CITY OF LUBBOCK
DANIEL M. POPE, MAYOR

TEXAS DEPARTMENT OF TRANSPORTATION
LUBBOCK DISTRICT

STEVEN P. WARREN, P.E., DISTRICT ENGINEER

FEDERAL AID PROJECT NO.			
STP 2021 (423) MM			
CONT	SECT	JOB	HIGHWAY
0905	06	118	CS
DIST	COUNTY		SHEET NO.
LBB	LUBBOCK		1

FEDERAL PROJECT NUMBER: STP 2021 (423) MM

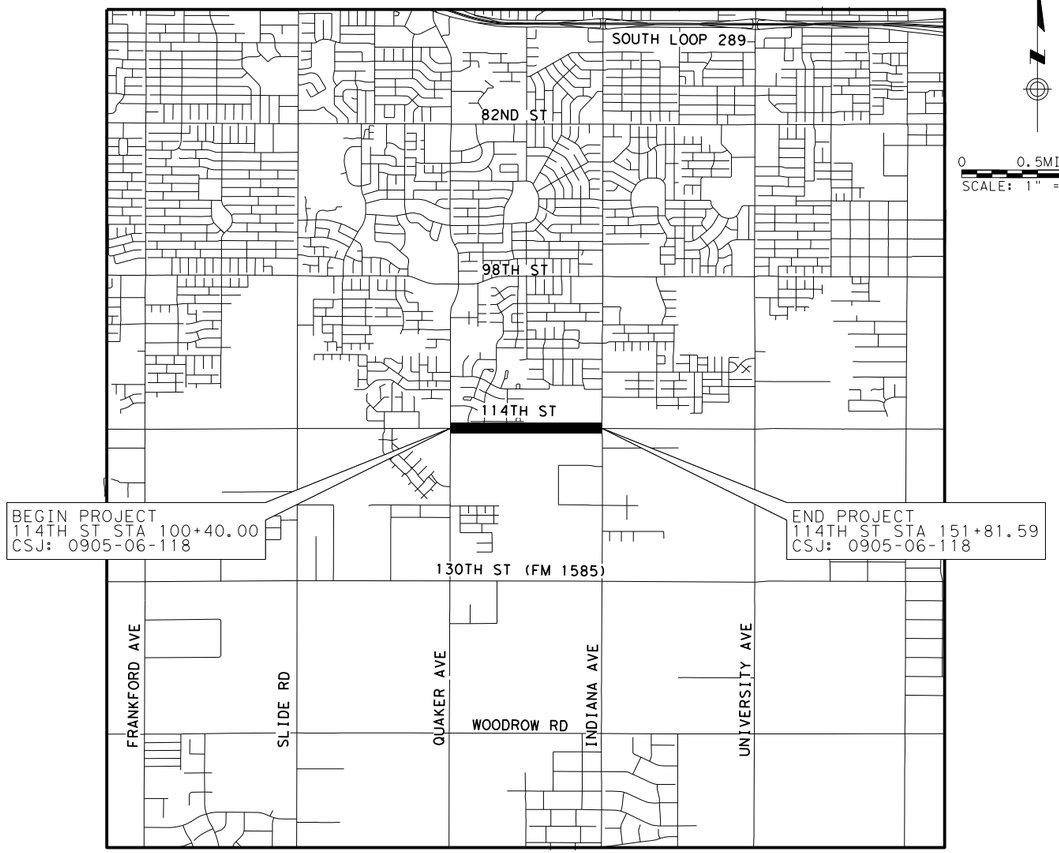
CSJ: 0905-06-118

114TH STREET
LUBBOCK COUNTY

LIMITS: FROM QUAKER AVENUE TO INDIANA AVENUE
TOTAL LENGTH OF PROJECT= 5141.59 FT.= 0.974 MI.

TYPE OF WORK: WIDEN NON-FREEWAY TWO LANES TO FIVE LANES
CONSISTING OF: GRADING, STRUCTURES, REINFORCED CONCRETE PAVEMENT, PAVEMENT MARKINGS, AND SIGNS.

114TH ST
DESIGN SPEED = 45 MPH
CURRENT A.D.T. (2020)= 13,995
PROJECTED A.D.T. (2042)= 19,250
FUNCTIONAL CLASS: MINOR ARTERIAL



LOCATION MAP

N

0 0.5MI 1.0MI
SCALE: 1" = 1.0MI

NO EQUATIONS
NO EXCEPTIONS
NO RAILROAD CROSSINGS

STATE OF TEXAS
CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER

3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

Texas Department of Transportation

REGISTERED ACCESSIBILITY SPECIALIST (RAS) INSPECTION REQUIRED
TDLR NO. TABS2022017740

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)

SUBMITTED FOR LETTING: 4/29/2022
DocuSigned by: Chris Bosco 135DEFFAC81C470...
CONSULTANT ENGINEER

RECOMMENDED FOR LETTING: 4/29/2022
DocuSigned by: Shelley C. Harris P.E. F9984108931347C...
DESIGN ENGINEER

RECOMMENDED FOR LETTING: 4/29/2022
DocuSigned by: Michael Wittie, P.E. 62A1809BE662415...
AREA ENGINEER

CONCURRENCE: 4/29/2022
DocuSigned by: Michael A. Leamon, P.E. 19E4B6A8BD7E43F...
CITY ENGINEER, CITY OF LUBBOCK

APPROVED FOR LETTING: 4/29/2022
DocuSigned by: Steve P. Warren P.E. 642C665E4DDD46A...
DISTRICT ENGINEER

DATE: Apr. 28, 2022 - 12:11:07 PM
FILE: N:\Plan Set\1. General\cv-trf-gn-cover01.dgn

GENERAL

1	TITLE SHEET
2	INDEX SHEET
3	PROJECT LAYOUT
4-6	TYPICAL SECTIONS
7, 7A-7L	GENERAL NOTES
8, 8A-8B	ESTIMATE AND QUANTITY SUMMARY

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14-15	TRAFFIC CONTROL PLAN PHASE ONE STEP 2
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24	DETOUR LAYOUT PHASE THREE
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39	%TCP (2-5)-18
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STATE OF TEXAS
CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER

CHRIS B. BOSCO, P.E. — DATE 3/9/2022

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

STATE OF TEXAS
WILLIAM CUMMINGS
131022
LICENSED
PROFESSIONAL ENGINEER

WILLIAM CUMMINGS, P.E. — DATE 4/25/2022

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A "+" HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

STATE OF TEXAS
KEVIN MORRIS
105091
LICENSED
PROFESSIONAL ENGINEER

KEVIN M. MORRIS, P.E. — DATE 3-10-2022

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A "%" HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

STATE OF TEXAS
WADE J. BARNES
120012
LICENSED
PROFESSIONAL ENGINEER

WADE J. BARNES, P.E. — DATE 03/03/2022

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A "#" HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

STATE OF TEXAS
DANIEL W. KOSS
110037
LICENSED
PROFESSIONAL ENGINEER

DANIEL W. KOSS, P.E. — DATE 04/22/2022

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A "@" HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

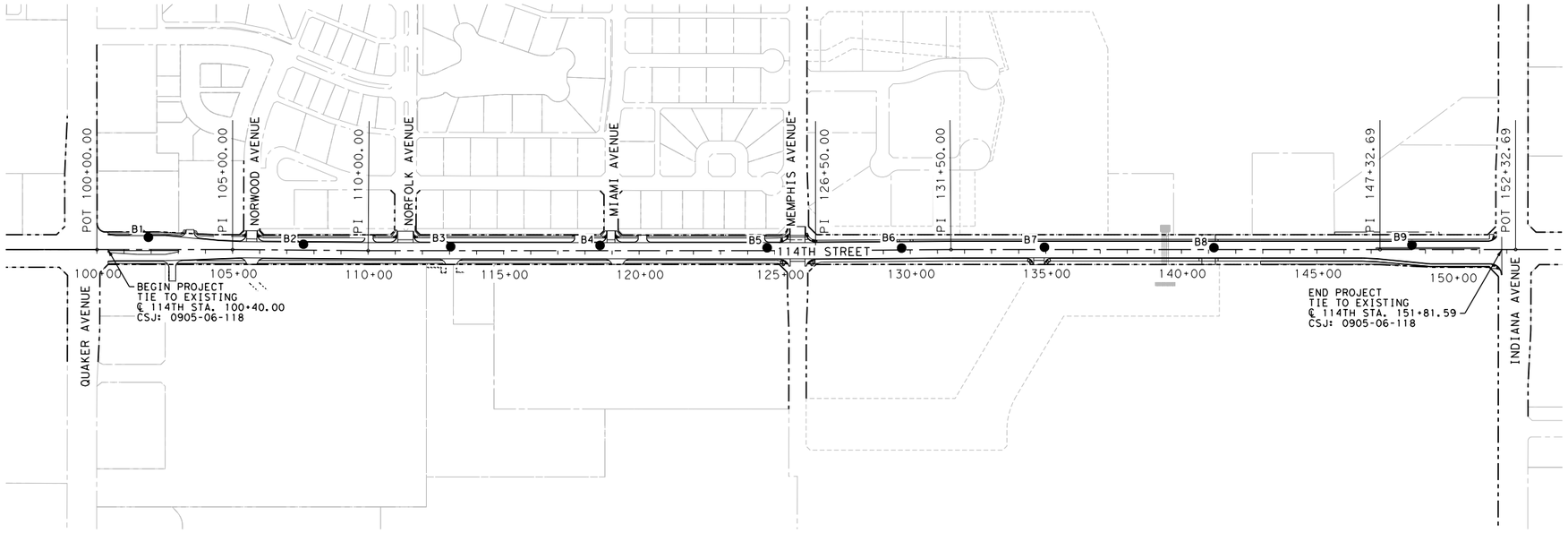
FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
INDEX

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	2
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

$USER$
500.0000 ft / in.



GEOTECHNICAL BORING HOLE INFORMATION				
BORING NUMBER	LAT	LONG	APPROX STA	APPROX OFF
B1	33°29′27.07"N	101°54′14.93"W	101+90.00	45.00′ LT
B2	33°29′26.85"N	101°54′8.15"W	107+60.00	20.00′ LT
B3	33°29′26.82"N	101°54′1.81"W	113+00.00	15.00′ LT
B4	33°29′26.38"N	101°53′55.30"W	118+50.00	19.00′ LT
B5	33°29′26.66"N	101°53′47.93"W	124+70.00	11.00′ LT
B6	33°29′26.64"N	101°53′42.07"W	129+70.00	7.00′ LT
B7	33°29′26.66"N	101°53′36.26"W	135+00.00	9.00′ LT
B8	33°29′26.65"N	101°53′28.37"W	141+20.00	7.00′ LT
B9	33°29′26.80"N	101°53′20.00"W	148+50.00	17.00′ LT

STATE OF TEXAS
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3/9/2022

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Texas Department of Transportation

114TH STREET
QUAKER AVE. TO INDIANA AVE.
PROJECT LAYOUT

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	3
	0905	06	118	

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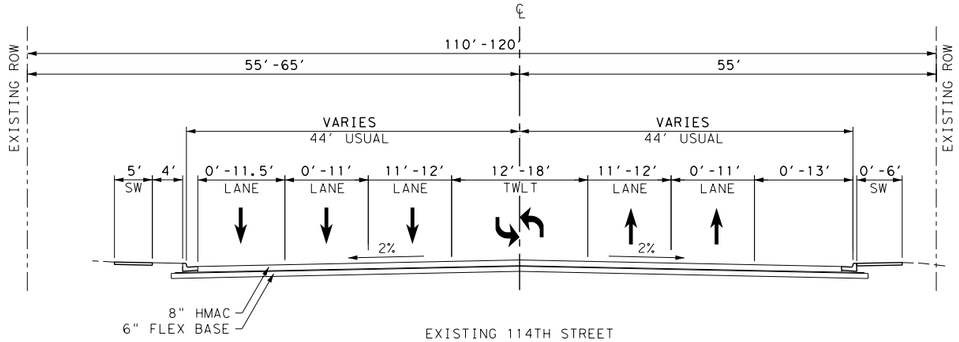
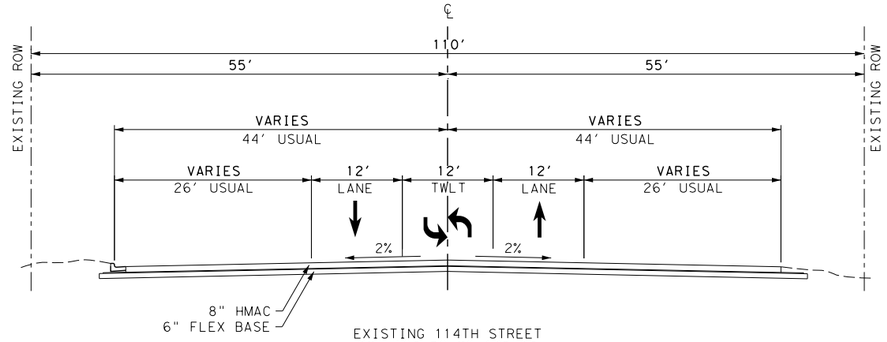


EXISTING 114TH STREET
BEGIN TO STA 105+70
NOT TO SCALE



EXISTING 114TH STREET
STA 105+70 TO 123+85
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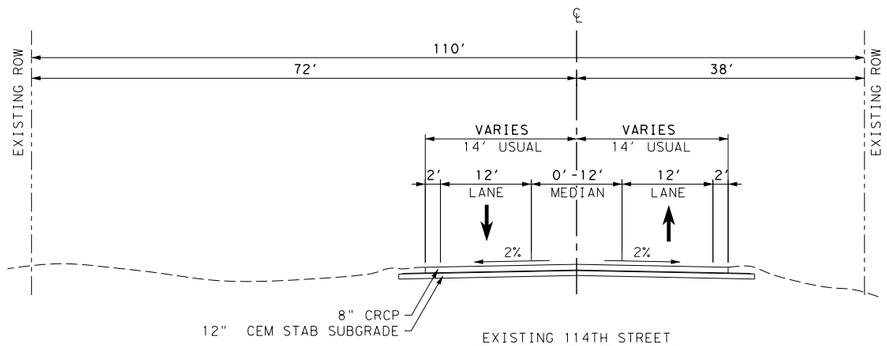

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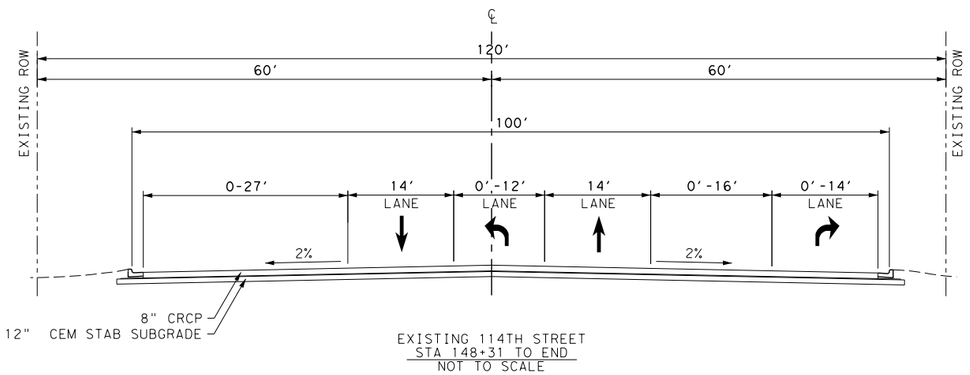
STA 123+85 TO STA 148+31
NOT TO SCALE



EXISTING 114TH STREET
STA 148+31 TO END
NOT TO SCALE

CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

3/9/2022

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Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

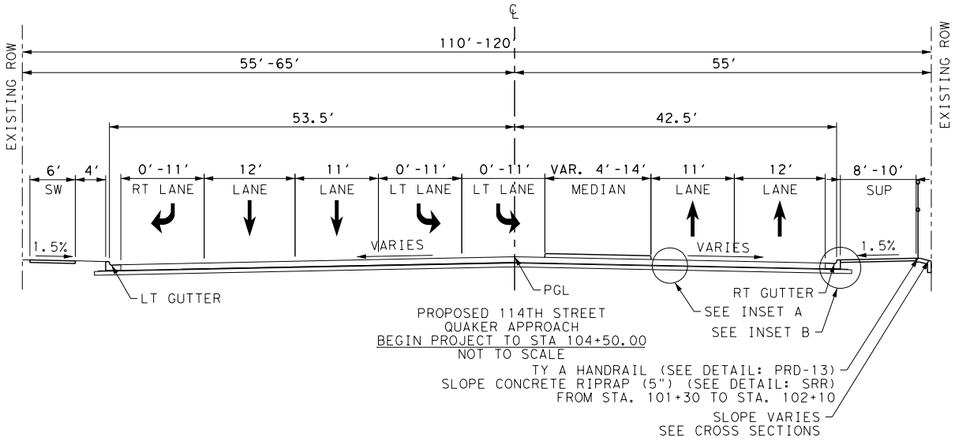
FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

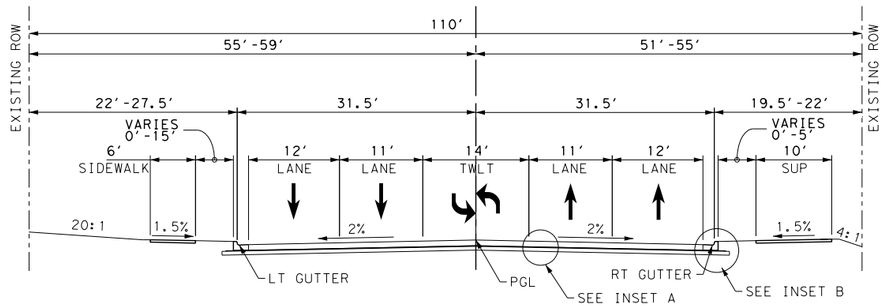
Texas Department of Transportation

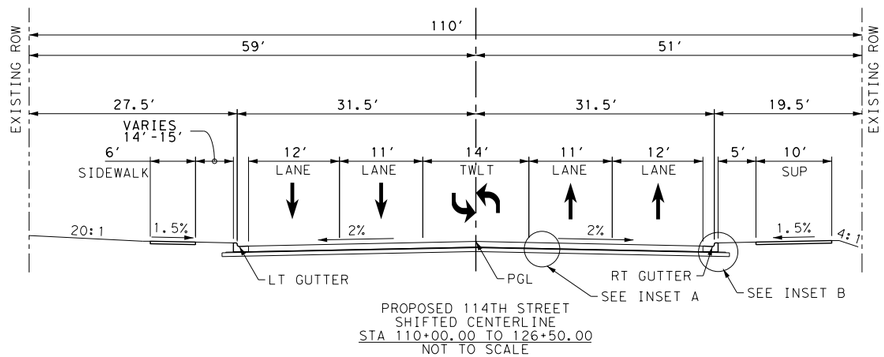
114TH STREET
QUAKER AVE. TO INDIANA AVE.
TYPICAL SECTIONS

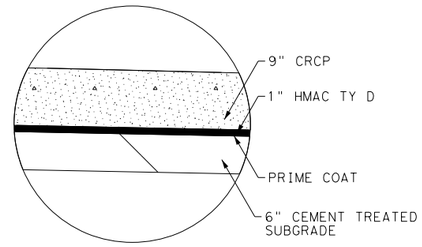
SHEET 1 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	4
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

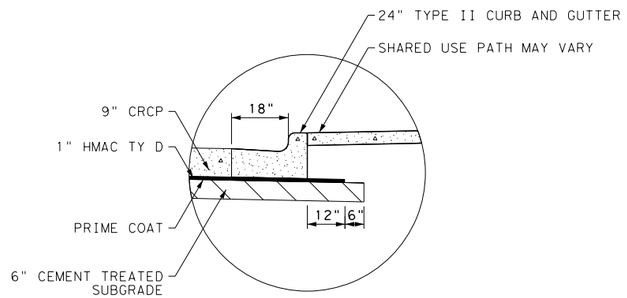








INSET A



INSET B

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

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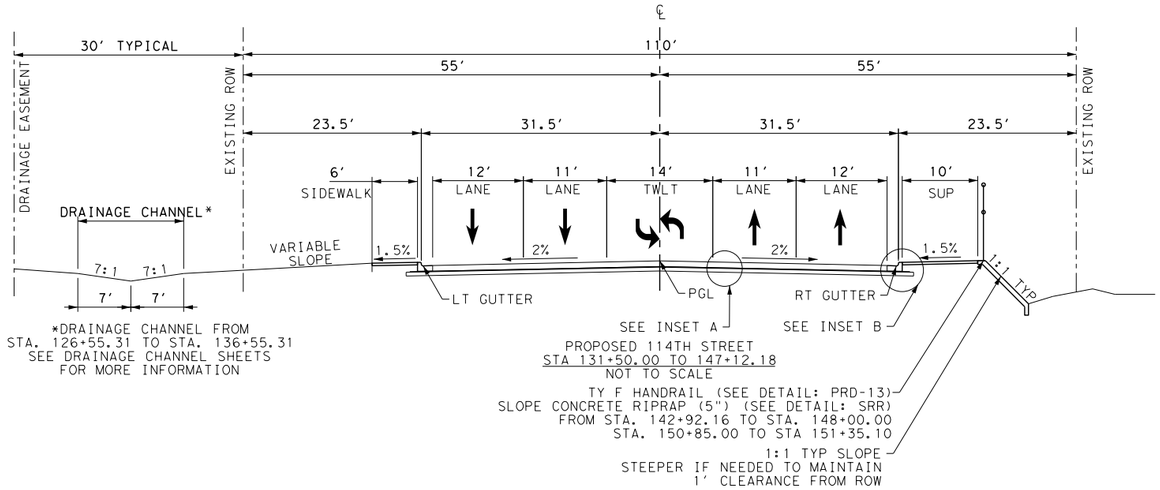
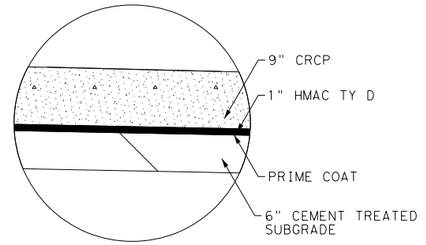
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
TYPICAL SECTIONS

SHEET 2 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	5
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	





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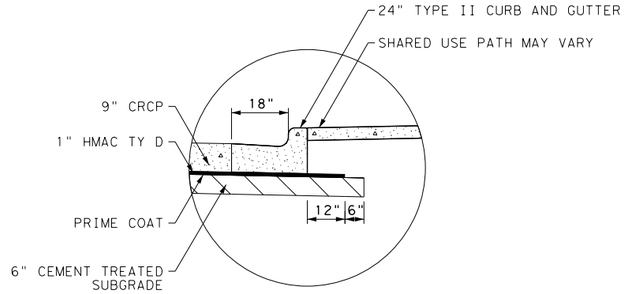

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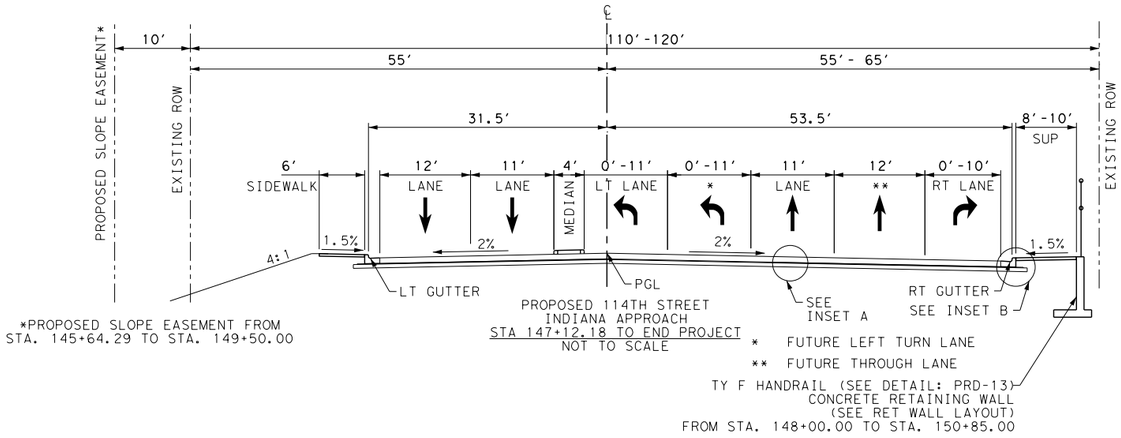

STATE OF TEXAS
CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER
3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

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114TH STREET
QUAKER AVE. TO INDIANA AVE.
TYPICAL SECTIONS

SHEET 3 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	6
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

GENERAL NOTES:

APPLICATION RATES

ITEM	DESCRIPTION	*RATE (approx.)	AREA
275	CEMENT	17 LBS/SY	40,079 SY
310	PRIME COAT (MC-30)	0.2 GAL/SY	39,190 SY
3076	1 IN, D-GR HMA TY-D SAC-A PG70-22	115 LBS/SY	39,190 SY
3076	TACK COAT	0.14 GAL/SY	921 SY

*Actual rates will be determined by Engineer in Field

W.W.A.R.P

Provide coarse aggregate for Type D hotmix meeting a minimum class of **A** as published in the *AGGREGATE QUALITY MONITORING PROGRAM RATED SOURCE QUALITY CATALOGUE.*

Provide coarse aggregate for Type B meeting a minimum class of **B** as published in the *AGGREGATE QUALITY MONITORING PROGRAM RATED SOURCE QUALITY CATALOGUE.*

General Requirements and Covenants - Items 1 thru 9

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

Michael Wittie, P.E. – Michael.wittie@txdot.gov (806) 748-4424
Ross McMillan, P.E. – Ross.mcmillan@txdot.gov (806) 748-4496

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

All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address:
https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/

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. Check the FTP site regularly for any updates.

Special Provision 000-025 Americans with Disabilities Act Curb Ramp Workshop:

Before starting work, schedule and attend a mandatory preconstruction Americans with Disabilities Act curb ramp workshop. The workshop will be administered by the Department, will be four hours or less, and will be held during normal working hours at an approved location in proximity to the project.

County: Lubbock **Control:** 0905-06-118

Highway: CS **Sheet:** 7

Supervisory personnel responsible for control of the work must attend the workshop.

The Department will provide workshop facilitators and facilities. No direct compensation will be made for fulfilling these requirements, as this workshop is considered subsidiary to the items of the contract.

Contract Prosecution – Each contract awarded by the Department stands on its own and as such, is separate from other contracts. A contractor awarded multiple contracts, must be capable and sufficiently staffed to concurrently process any and all contracts at the same time.

Item 2 – Instructions to Bidders

The following standard(s) have been modified:

- CCCG-21(MOD)
- EC(9)-16(MOD)

The construction time determination schedule will be posted on the Contractor Q&A FTP site.

Earthwork files and cross-sections will be posted on the Contractor Q&A FTP site.

View the plans on-line or download from the web at:
http://www.dot.state.tx.us/business/plansonline/agreement.htm
Choose "I Agree" then, "Click here", then "State-Let-Construction", pick the letting month, then "Plans" and then choose the plans set.

Order plans from any of the plan reproduction companies shown on the web at:
http://www.dot.state.tx.us/business/contractors_consultants/repro_companies.htm

By signing this proposal, a bidder acknowledges that he/she has a copy of the "Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges", adopted by the Texas Department of Transportation, November 1, 2014. This specification book may be purchased from the Department or downloaded at:
http://www.txdot.gov/business/resources/txdot-specifications.html

Utilities

Overhead and underground utility installations exist within the project limits.

Call One Call to mark the locations of all utilities. Call the City and TxDOT separately to have their respective utilities marked.

West Texas Gas gas line was relocated underneath proposed culvert crossing in August 2021.

Atmos gas line was relocated underneath proposed culvert crossing in April 2022.

Item 5 – Control of the Work

Perform construction surveying in accordance with Article 5.9.3, "Method C."

When deviation from the plans is requested by the Contractor, but not required for installation, the Contractor will bear any additional costs associated with the deviation.

Alter the location of all ground boxes, foundations and structures shown on the plans only as approved by the Engineer in writing. Contact the Engineer prior to installing ground boxes, foundations and structures in order that the Inspector may verify and approve the location.

The construction, operation, and maintenance of the proposed project will be consistent with the state implementation plan as prepared by the Texas Commission on Environmental Quality. At the end of each day remove from the ROW, inside or outside the project limits, any excess material and debris resulting from construction.

Correct any deficiencies identified during the final inspection including required paperwork.

Submit all required paperwork within 60 days of project acceptance.

When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Item 6 – Control of Materials

Use materials from pre-qualified producers. A list of material producers pre-qualified by the Construction Division (CST) of the Texas Department of Transportation (TxDOT) can be found at the following website:
http://www.txdot.gov/business/resources/producer-list.html

In addition to the requirements of the plans and specifications, make all material and equipment furnished, installed, modified, tested, or otherwise used on this contract, and becoming the property of TxDOT, fully functional within the manufacturer normal specifications, warranties, and guarantees. Make any additional functions of the material and equipment normally supplied by the manufacturer, but not specified by TxDOT, completely functional.

Article 6.6

Receive and unload all materials with Contractor's personnel.

County: Lubbock **Control:** 0905-06-118

Highway: CS **Sheet:** 7A

Store material off TxDOT property or Right of Way unless approved by the project supervisor.

Article 6.11

Repair damage to the Right of Way to the satisfaction of the project supervisor.

Item 7 – Legal Relations and Responsibilities

Coordinate street closures with the local fire, police, and other emergency personnel.

Maintain access to adjacent property at all times.

Notify, in writing, each residence and business 10 days prior to beginning construction of the phase/phases that are expected to affect their ingress and egress. This notice may be hand delivered or mailed.

When applicable, comply with all requirements of the Environmental Permits Issues and Commitments (EPIC) sheets.

Provide a lidded dumpster to be used by Contractor's personnel on the job site. This shall be considered subsidiary to the various bid items.

Dispose of all waste materials in compliance with local, state, and federal regulations. Submit a list of all approved waste sites to the Engineer for review.

Provide uniformed, licensed peace officers for traffic control during construction operations at and/or near the high volume intersections, and during critical changes in traffic control, as approved by the Engineer. This will be paid by a force account.

All vehicles in the work zone shall use flashing amber strobe lights visible 360 degrees.

No significant traffic generator events identified.

Item 8 - Prosecution and Progress

This project is to be complete in 256 working days and 16 months of barricades in accordance with the contract documents.

Work must begin by November 1, 2022.

Liquidated damages are as defined in SP 000-658 ($1,125) will be increased by the calculated road user cost of $4,078, for a total of $5,203.

Milestone

The time charges for the Milestone will begin when 114th Street is closed from Memphis to Indiana, and they will cease when substantial completion for 114th Street from Memphis to Indiana is reached.

Substantially complete the Milestone in 92 working days. The road-user liquidated damages for the Milestone is $5,203 per day. If it takes longer than 92 working days, then this amount will be assessed each day as liquidated damages until substantial completion is met. Substantial completion for the Milestone is defined as 114th Street from Memphis to Indiana being open to full traffic in its final configuration.

Monthly schedule updates are a very important aspect of managing the progress of this project. The Engineer may withhold the monthly estimate if the schedule update has not been received.

A bar chart will be required on this project.

Do not begin work before sunrise or end work after sunset unless authorized by the Engineer, and remove all equipment from the roadway before sundown.

Perform any erosion control measures such as seeding or sodding before beginning the next phase, or land, unless otherwise authorized by the Engineer.

Working days will be computed and charged in accordance with Article 8.3.1.4 Standard Workweek.

Shut down operations the working day before the following major traffic generating holidays: January 1st (New Year's); Last Monday in May (Memorial Day); July 4th (Independence Day); First Monday in September (Labor Day); Fourth Thursday in November (Thanksgiving); and December 24th (Christmas Eve).

Payment for final 3% mobilization will be made according to Article 500.3. Timeliness for submittal of required paperwork and correction of deficiencies is a consideration in developing the final contractor evaluation score.

Item 9 - Measurement and Payment

Submit material-on-hand payment requests by the monthly estimate cutoff date.

Item 100 - Preparing Right Of Way

Sprinkler systems shall be cut at the right-of-way line and restored to operating conditions using a licensed irrigator. Payment for this work shall be considered subsidiary.

Item to be used for the preparation of areas to receive embankment, small tree removal less than 6" diameter, and any other removals not itemized.

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Item 103 - Disposal of Wells

Provide a copy of the State of Texas Plugging Report to the Engineer within 30 days from the date the well is plugged.

Employ a licensed water well driller for plugging water wells, to oversee the work and prepare and file required documents with applicable agencies.

Item 105 – Removing Stabilized Treated and Untreated Base and Asphalt Pavement

Store salvaged asphalt material in stockpiles located at 8425 North Avenue P, Lubbock TX.

Items 110 And 132 - Excavation and Embankment

Provide Type C Embankment conforming to the following material specifications:

Liquid Limit (maximum)	45
Plasticity Index (maximum)	25
Bar Linear Shrinkage (minimum)	2

Consider all embankment to be Earth Embankment in accordance with Article 132.3.1.

Proof roll, as directed by the Engineer.

An estimated 16,000 CY of excavated material shall be disposed of by the contractor.

Earthwork volumes as shown in the plans represent the total cumulative cubic yardage as measured between the proposed subgrade and the existing finished grade.

Item 160 - Topsoil

Salvage and stockpile topsoil from areas designated for topsoil placement. Maximum salvage depth is 6-in.

Place a 4-in. layer of Topsoil to designated areas.

Item 162 - Sodding for Erosion Control

Furnish and place sod, between the edge of the roadway and the edge of the ROW, of the same variety as existing in the adjacent property. No additional compensation will be given for different varieties.

Item 164 - Seeding For Erosion Control

Notify the Engineer of scheduled seeding operations 24 hours prior to seeding applications. Do not begin seeding operations until the Engineer has approved seedbed preparations. Locate and

flag all irrigation heads, valve covers, utility facility covers, etc. prior to commencing seed application operations.

Leave the seeded area lightly tracked in order to establish a better environment for seed germination.

Furnish seed tags from the seed supplier to the Engineer for verification of quantity and type.

Place cellulose fiber mulch (hydromulch) on all seeded areas.

Apply hydromulch from two opposite (180 degrees) directions to prevent “shadowing” and to provide an even coverage. Add tackifier to the slurry at a minimum of 3 percent of total volume as specified by the manufacturer, or as directed by the Engineer.

Submit an available substitution to the Engineer, for approval, if a grass variety is not available.

Do not disturb or drive on newly seeded areas. Repair any damage to the seeded areas to the satisfaction of the Engineer.

A Cultipak planter may be used in lieu of drill seeding.

Item 168 - Vegetative Watering

Water landscape plant material at least twice a week during the 90 day establishment period.

Water newly seeded or sodded grass areas with a minimum of two-tenths (2/10) of an inch per day for 30 consecutive days and as directed

Water from a tanked, spray-equipped vehicle capable of spraying water to all such areas without driving or trailering the vehicle on said areas.

Furnish and apply water containing less than 10,000 parts per million solids (as determined by evaporation).

Items 162, 164, 166, And 168

Furnish and place hay mulch or cellulose fiber mulch, seed, fertilizer, and vegetative watering on all cut and fill slopes as soon as each construction sequence will allow, but within 14 days of the end of the construction phase and prior to beginning a new construction phase. Leave the seeded area lightly tracked in order to provide the seed a better environment for germination.

Items 192 & 193 - Landscape Planting and Establishment

Use shredded cypress bark mulch material for surface application.

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Prior to planting any material, install the irrigation system and ensure it is operational up to the locations of each plant. Immediately after placement of plant, finish the portion of the irrigation system that supplies that plant.

Monitor the irrigation system throughout installation of plant material and the establishment period to ensure the plant material is properly watered. Check the soil a minimum of every two weeks with a moisture meter capable of measuring soil moisture levels at a dept of 24 inches. Make adjustments to the irrigation system water schedule as required to ensure the desired moisture level is maintained.

Failure to replace plant material that is dying or does not meet specifications during the specified time period will be considered non-performance of the guarantee and maintenance requirements included in this contract and the Engineer may withhold payment until the plant material is replaced.

Provide a written list of all nursery locations, names, phone numbers (including area code), and mailing addresses where plant material will be procured. Indicate which materials and quantities will be used from each nursery.

Item 216 – Proof Rolling

Provide a 25 ton roller, or other equipment approved by the Engineer for proof rolling.

Proof roll as directed.

Item 275 – Cement Treatment (Road-Mixed)

Use the target rate of three percent by weight, based on an estimated unit weight of 125 pounds per cubic foot, unless otherwise directed by the Engineer. The actual rate to be used will be based on laboratory tests that yield a strength of 200 psi at unconfined lateral pressure unless otherwise directed by the Engineer.

Use a vane feeder system to distribute cement.

Cure treated base courses for a minimum of 72 hours before priming unless otherwise directed by the Engineer.

Asphalt material will not be permitted for curing.

Remove and replace areas that lose required moisture, stability or finish. Continue work until specification requirements are met and perform work at no additional expense to the Department.

Microcrack the treated base. This work is considered subsidiary.

Proof roll as directed by the Engineer. A BOMAG or milling machine will not be allowed for initial scarifying of existing material. Use other means to scarify.

Allow 30 days for testing of material.

Item 310 - Prime Coat

Apply a prime coat to all finished treated base, new flexible and salvage base due to receive asphaltic concrete pavement or surface treatments. Remove all loose and scabbed material from the surface prior to prime coat application.

Allow the prime coat to penetrate and dry for a minimum of 72 hours before placing any asphaltic material on the primed surface, unless otherwise authorized by the Engineer.

Item 320 – Equipment for Asphalt Concrete Pavement

Provide waterproof tarpaulins on all hauling equipment.

Item 351 – Flexible Pavement Structure Repair

Saw cut at least two inches deep around the edges of concrete or asphaltic pavement to be removed, unless otherwise directed by the Engineer.

The type and grade of tack coat shall be AC or PG.

The type and grade of prime shall be MC-30.

A motor grader will be allowed only as directed by the Engineer.

Use a roadway structure of 6” HMAC TY B, prime coat, and compacted subgrade for repairs.

The minimum repair area shall be 10’ wide by 20’ long.

Item 360 - Concrete Pavement

Multiple piece tie bars will be required.

Saw cut the perimeter of the concrete paving and seal with a class 5 or class 8 joint-sealant materials and fillers conforming to Item 438, “Cleaning and Sealing Joints.”

Use Method B, as shown on JS-14, to seal joints.

CRCP will be designed using the Optimized Aggregate Gradation (OAG) procedure, in accordance with Tex-470-A.

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Design the CRCP with a minimum of 10% - 35% fly ash.

A pre-paving meeting will be required.

Submit a paving plan detailing the location of joints and the sequence of paving to the Engineer a minimum of seven days before paving begins.

Use number 6 reinforcing bars.

The Engineer reserves the right to require fibrillated fibers in the mixture to mitigate dry shrinkage cracking. Dosage rate will be 5 lbs/CY. Payment will be subsidiary.

Concrete paving adjacent to existing Concrete Paving will require a neat saw cut edge and dowelling as per Item 361. This work will be considered subsidiary to Item 360.

The pay limits for concrete paving will not include curb and gutter sections, even when the curb and gutter is placed monolithically with the concrete paving. For measurement and payment purposes, curb and gutter sections are considered 24 inches wide.
Cold weather protection requirements within 72 hours of a concrete paving pour as per the following table:

PROJECTED LOW TEMP	PROTECTION REQUIRED
< 20 degrees	DO NOT POUR
20-27 degrees	cover with plastic, then a insulating blanket, and plastic on top
28-35 degrees	cover with plastic, then a insulating blanket
> 35 degrees	no protection required

All projected temperatures will be based on the NOAA website. None of the above actions releases the Contractor from the responsibility for freeze damaged concrete for whatever reason.

Stockpiling of earthen or rock materials on concrete paving will not be permitted.

Unless otherwise directed, use coarse aggregate to produce concrete, with a coefficient of thermal expansion (COTE) less than or equal to 5.5 microstrain/degree F when tested in accordance with Tex-428-A. Provide samples or test specimens as directed and allow 30 days for testing. TxDOT will perform the testing and test results are final. Testing is required for naturally occurring aggregates.

Place the evaporation retarder right after the finish float and before the curing compound.

Schedule the placement width in a manner such that all joints will coincide with proposed lane lines (+/- 6 inches).

Concrete test specimens will be cured under the same conditions as the pavement. Make 3 sets of cylinders. Cylinders will not be moved for 3 days and will not be stripped out of their molds until testing.

The Engineer will perform all concrete job control testing.

Saw the contraction joints within 12 hours of concrete placement.

Provide good consolidation at the construction joints.

Item 400 - Excavation and Backfill for Structures

Furnish crushed caliche or sand and gravel as aggregate for cement stabilized backfill.

Deliver the cement stabilized backfill in a mixer truck in a flowable state and capable of filling all the voids.

Construct fill over structures to plan grade before hauling with heavy equipment over structures.

Compact backfill used for structures, other than flowable backfill, to a minimum density of 95 percent.

Use a template in order to secure reasonably accurate Class C shaping of the foundation material outside of cement stabilized areas.

Contact the utility company and properly secure the utility poles prior to excavating next to the utility poles. The work and material used to secure the utility poles are subsidiary to the pertinent items.

Item 402 - Trench Excavation Protection

Maintain trench protection to protect State inspectors and Contractors during testing operations.

Item 403 – Temporary Special Shoring

The intent of this item is to provide a coffer dam for structures in playa lakes so the water may be pumped out and work resumed after a rain event.

Item 416 – Drilled Shaft Foundations

For large diameter drilled shafts, when water is encountered during drilling and slurry is not used, the shaft needs to be re-worked the next day to achieve proper skin friction capacity.

Item 420 - Concrete Substructures

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Furnish and place preformed fiber material, a minimum one-half (1/2)-inch thick, as shown on the plans or directed by the Engineer.

Furnish a temperature recorder with the minimum capabilities of a 7-day recording time, 2 degree F division, and 120 VAC with 9-volt backup, for each curing tank used on the project. Supply all charts, recording pins, and other equipment necessary for complete operation of the temperature recorder during the project. The temperature recorder and all associated equipment will not be paid directly, but will be subsidiary to the various bid items

Use Grade 3 or Grade 4 coarse aggregate in all concrete structures.

The same cold weather protection requirements as specified in Item 360 shall apply to all concrete flatwork.

PROJECTED LOW TEMP	PROTECTION REQUIRED
< 20 degrees	DO NOT POUR
20-27 degrees	cover with plastic, then a insulating blanket, and plastic on top
28-35 degrees	cover with plastic, then a insulating blanket
> 35 degrees	no protection required

All projected temperatures will be based on the NOAA website. None of the above actions releases the Contractor from the responsibility for freeze damaged concrete for whatever reason.

Coring of structural classes of concrete will not be allowed. All coring of miscellaneous concrete shall be at the Contractor's expense including all prep work. Coring must be completed within 3 days of notice of failing 28-day samples; otherwise pay deductions apply using 28-day compressive strength.

Provide TY II curing compound for all curb and gutter, sidewalks, driveways, curb ramps, riprap, and cast-in-place SET's.

When doweling into concrete, clean out the hole, fill completely with epoxy, then place the dowel. Do not dip the dowel into epoxy first and shove it into the hole.

Do not place concrete when the wind gusts get to over 25 miles per hour.

Paint the NBI number on the bridge class culvert as directed.

Place the evaporation retarder right after the finish float and before the curing compound.

Vibrate all concrete.

Item 421 - Hydraulic Cement Concrete

All Class C concrete will be designed using Option 3.

If fly ash is used, a maximum of 35% will be allowed.

Provide air entrainment in all concrete except for concrete used in drilled shafts and precast concrete members. Target an entrained air content of 4.0% +/- 1% for concrete pavement and 5.5% +/- 1% for all other concrete requiring air entrainment. Ensure the minimum entrained air content is at least 3.0% for all classes of concrete.

The Engineer will perform all concrete job control testing.

Use 4-inch by 8-inch cylinder molds for concrete with Grade 3 or smaller coarse aggregate. Supply new cylinder molds and lids subsidiary to the various bid items.

Provide sulphate resistant concrete for drilled shafts and bridge structure components in contact with the soil.

Concrete plant must be capable of providing automated moisture content control for both coarse and fine aggregate.

Item 423 - Retaining Walls

Drain water away from the levelling pads or have a pump on-hand for dewatering during rainfall events. This is considered subsidiary.

Additional materials, labor, and incidentals required for the installation of an illumination foundation monolithically with the retaining wall will be considered subsidiary to the retaining walls item.

Item 427 - Surface Finishes For Concrete

Provide surface area I concrete surfaces with a rub finish as soon as forms are removed.

Item 432 - Riprap

Provide 5-inch thick concrete riprap, unless otherwise indicated in the plans.

Reinforce with steel rebar reinforcing.

In large areas of riprap, provide one-half (1/2)-inch thick expansion joint material at approximately 15-foot intervals, or as determined by the Engineer.

Place asphalt expansion joint material between proposed riprap and utility poles, guy wires, vent pipes, stand pipes and as directed.

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Place felt or filter fabric at open joints as required by the Engineer. This will be considered subsidiary.

Follow cold weather protection requirements listed under Item 420.

Item 467 - Safety End Treatment

Install reinforced concrete aprons on all Type I SET, using reinforcing composed of #4 bars at 12-inch spacings, center-to-center, or as shown on the detail sheet.

Item 496 - Removing Structures

Contractor to dispose of removed structures.

Structures may be set in cementitious material; removal of associated cementitious material is subsidiary to the structure removal. Contractor shall provide heavy equipment if needed for removal.

Item 502 - Barricades, Signs And Traffic Handling

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

Additional signs and barricades as directed by the Engineer shall be considered subsidiary to Item 502.

Provide flashing portable arrow panels for all lane closures.

Wash the channelizing devices and barricades following each rainfall or snowfall event and at times deemed necessary by the Engineer.

To ensure the safety and convenience of traffic, flaggers may be required when construction machinery is being operated along, across, or adjacent to lanes carrying traffic. If considered necessary by the Engineer, supplemental signs and barricades may be required.

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

Barricades, Signs and Traffic Handling is a plan quantity item. If time is suspended, no additional compensation will be made.

Traffic switches will not be permitted on Fridays or any working day preceding a holiday unless authorized by the Engineer.

Cones or chevrons may be used in lieu of vertical panels at the discretion of the Engineer. Cones cannot be used to separate opposing traffic.

Construct temporary ramps to maintain access to driveways and city streets as directed by the Engineer. Temporary ramp construction is subsidiary to Item 502.

The Contractor shall bid the traffic control plan shown in the plans. Any proposed alterations to the TCP (combining work areas / phasing / etc.) shall be submitted to the Engineer at least 10 days prior to anticipated changes.

Even when not explicitly shown in the project TCP, vertical panels shall be used with an opposing lane divider every 5th panel in accordance with BC(9) for all opposing traffic conditions without a positive barrier.

Square tubing sign supports may be used for temporary construction signs. Aluminum and wood signs may be mounted if the vertical supports are embedded into the ground. Square tubing supports on skids which are typically held in place with sand bags can only support signs made of light weight flutted plastic.

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.

Correct all noted deficiencies within 7 calendar days, otherwise, cease all operations until the noted deficiencies are corrected.

Stockpiles that meet the barricade requirements as shown on the BC(10) Standard are required to be erected at the time of material delivery in the Right-of-Way and maintained as long as the stockpile exists. Payment for Material-on-Hand will be withheld from the estimate for inadequate barricades or the failure to maintain barricades on a per stockpile basis as determined by the Engineer.

Like new traffic control devices will be required at the initial setup for all projects or as approved by the Engineer.

Provide flags and a CW8-15P "MOTORCYCLE WARNING" plaque on all CW20-1D "ROAD WORK AHEAD" signs except on side roads.

Use only the work zone speed limit and TCP signs that are relevant to the active work area and as directed. Reset signs for subsequent work phases as work progresses and approved by the Engineer. Reset normal speed limit signs at the ends of work zones.

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All bid items and work requiring traffic control is the responsibility of the contractor, even when not explicitly detailed in the plans. Consider this work subsidiary to Item 502.

TMAs and Portable Changeable Message Boards will not be used as Arrow Boards.

Item 504 - Facilities for Field Office and Laboratory

Furnish one Type D structure and one Type B structure. Field offices and laboratory shall be located adjacent to the project site.

The Contractor will furnish a concrete cylinder breaker and cylinder bath, subsidiary to the furnished field laboratory. Provide calibration documentation for all supplied equipment.

Partition the floor of the Type D structure into a minimum of three interconnected rooms. Furnish each room with a door. Type D structure must have at least two windows and two exterior doors.

Block and tie down portable structures.

Equip the Type D field lab with an eyewash facility capable of flushing the eyes for at least 15 minutes, connected to the main water supply or an approved stand-alone water supply.

Encompass the field office only with a fence enclosure providing a minimum 6.5-foot clearance around the perimeter of the field office.

Provide internet connectivity, a printer/fax/scanner/copier, and telephone service to field offices, including installation, monthly charges and the phones.

Equip all field offices and field labs with a surge protector at the circuit breaker panel.

Item 506 - Temporary Erosion, Sedimentation, and Environmental Controls

Place a weatherproof bulletin board containing the TCEQ required information on the project at a site directed by the Engineer. Post the following documents: (1) "TCEQ TPDES Storm Water Program" Construction Site Notice and (2) TCEQ "TPDES Permit." Place rain gauge(s) at locations designated by the Engineer. At the completion of the contract, the bulletin board will become the property of the State and will remain in place until 70 percent vegetation coverage has been obtained.

Provide long-term, Type 1 construction exits, located at the Contractor's equipment storage area.

Silt fence, sandbags and other BMPs will be placed and relocated as directed by the Engineer in order to comply fully with the SW3P requirements.

The soil area disturbed by this project, including all disturbed areas within the limits of this project as described in the Contract and at Contractor project specific locations (PSLs) within one mile of

the project limits, contributes to the establishment of the Texas Commission on Environmental Quality (TCEQ) Construction General Permit (CGP) requirements for storm water discharges. The Department will obtain an authorization from the TCEQ to discharge storm water for construction activities shown on the plans. The Contractor shall obtain the required authorization from the TCEQ for Contractor project specific locations (PSLs) for construction support activities off the right-of-way. As directed by the Engineer, the Contractor shall obtain any required authorization from the TCEQ for on-site PSLs. When the total area disturbed within the project limits and at PSLs within one mile of the project limits exceeds five acres, the Contractor shall provide a copy of the Contractor's Notice of Intent (NOI) submission and Construction General Permit for PSLs on the right-of-way to the Engineer (and submit a copy of NOIs to appropriate MS4 operators).

Water pumped off the project must have sediment and any other solids in suspension removed before discharging.

Sediments removed from BMPs shall be paid for by force account. The Contractor shall submit an invoice for the work.

Correct all noted deficiencies within 7 calendar days, otherwise, cease all operations until the noted deficiencies are corrected.

Maintain 100 feet of silt fence, 100 feet of erosion control logs, and 50 sandbags on site at all times for repairs/replacement as needed.

Item 508 - Constructing Detours

Provide detour sections consisting of six inches of Type B hot mix on prime coat on prepared subgrade to lines and grades directed by the Engineer.

Item 529 - Concrete Curb, Gutter and Combined Curb and Gutter

Place one-half (1/2)-inch pre-molded expansion joint material at 40-foot intervals and at the beginning and end of all radii. Place 3/25-inch grooved or sawed construction joints, as directed by the Engineer, spaced equally, with the spacing not to exceed ten feet between joints.

Curb and gutter may be placed monolithically with concrete paving in areas where they are adjacent to each other. In the event of monolithic placement, concrete for curb and gutter will meet the requirements of concrete pavement as specified in Item 360, and the reinforcing steel will be extended to the back of the curb. Measurement and payment for curb and gutter placed monolithically with the concrete paving will be by the foot as specified in Item 529, "Concrete Curb, Gutter and Combined Curb and Gutter."

All concrete curb and gutter shall be reinforced with four #4 bars.

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The lip of gutter and back of curb shall be formed. The existing pavement edge shall not be used as the form.

Mortar will not be used to finish curb and gutter.

Item 530 – Intersections, Driveways, and Turnouts

Use Class A Concrete for all concrete driveways.

Reinforce concrete driveways with # 4 bars on 12"x12" grid spacing centered in the slab depth.

Item 531 - Sidewalks

Construct concrete sidewalks at least four inches thick, reinforced with # 3 bars on 18"x18" grid spacing centered in the slab depth. The locations and details shown on the plans may be field modified by the Engineer.

Construct curb ramps in conformance with details shown on the plans. The accessibility of the curb ramps shall be according to the "Americans with Disabilities Act (ADA)."

When lack of right of way width or obstructions creates insufficient space, the ramp may be relocated within the right of way when authorized by the Engineer. All deficient ramps will be removed and replaced at the Contractor's expense.

Form tooled joints on each side of the four-foot wide ramp section, and at each break in ramp slope or geometry, and at four-foot intervals as if it were sidewalk. Place asphalt expansion joint material between proposed ramps and existing concrete.

Form tooled joints in sidewalk at 6' intervals or as directed.

Place asphalt expansion joint material between proposed sidewalk and utility poles, guide wires, vent pipes, stand pipes and as directed.

All curbs on curb ramps will not be paid for directly but are considered subsidiary to the various bid items.

Schedule work such that two-way traffic is provided through all intersections and intersecting streets at all times, unless otherwise authorized by the Engineer.

Chicago-brick-red truncated dome brick pavers or an approved equivalent are required for all curb ramps.

Removal and disposal of existing asphaltic concrete is considered subsidiary to this item.

Follow cold weather protection requirements listed under Item 420.

Item 585 - Ride Quality for Pavement Surfaces

Use Surface Test Type B.

"Pay Adjustment Schedule" number 2 will be used on this project.

Corrective action, when required, shall be diamond grinding, as approved and directed by the Engineer. Seal all concrete surfaces after grinding with linseed oil or as directed. This work is considered subsidiary.

Item 610 – Roadway Illumination Assemblies

For project specific shop drawings, furnish seven sets of drawings of the complete assembly in accordance with Item 441, "Steel Structures". Deliver shop drawings to the Engineer at the project address.

Provide a schedule and notify the District Traffic Office a minimum of 3 days prior to any illumination installation. Contact via email at LBB-TRFOPS@TxDOT.GOV.

Item 618 - Conduit

The location of conduit is diagrammatic and may be varied to meet local conditions upon approval of the Engineer. Ensure all couplings and connectors are made wrench tight. Trenching depths shall provide a minimum of 2.5 feet (30 inches) of cover unless otherwise approved by the Engineer. The Contractor must ensure that conduit is not damaged during trench or bore pit backfilling operations. No conductors shall be pulled through conduit until all backfilling for the conduit run is complete and the template, having a diameter of not less than 75 percent of the inside diameter of the conduit, has been drawn through the conduit. Open ends of all conduit shall be fitted with temporary caps or plugs to prevent entry of dirt or debris during construction operations. A non-metallic pull rope shall be used to pull electrical conductors and traffic signal cables through non-metallic conduit. A flat, high tensile strength polyester fiber pull rope shall be pulled through each conduit run and shall remain in the conduit for future use. A minimum of three feet of pull rope shall be neatly left coiled in the ground boxes at each end of the conduit run. The pull rope will not be paid for directly but shall be considered subsidiary to Item 618, "Conduit." After the work is completed, the Contractor shall restore any curbs, walks, driveways or raised concrete medians which have been damaged or disturbed to an equivalent original condition and to the satisfaction of the Engineer. This work shall not be paid for directly but shall be considered subsidiary to Item 618, "Conduit."

Conduit for this project is capable of being installed by trenching. Contractor may elect to bore conduit for the contractor's benefit, but this will be at no added cost.

Use Schedule 80 PVC conduit for all traffic and illumination portion of this project. Bored conduit runs placed under driveways and streets or highway approaches shall maintain a minimum of 30

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inches below the proposed natural ground elevation or 36 inches below the existing driveway or proposed top of pavement backfill and compact trenches the same day or erect plastic fencing to discourage entry into the trenched area by pedestrians or vehicles.

Item 620 – Electrical Conductors

Grounding conductors that share the same conduit, junction box, ground box or structure shall be bonded together at every accessible point in accordance with the electrical detail sheets (ED), and the latest edition of the National Electrical Code.

Use certified persons to perform electrical work. See Item 7 Section 18.1.3 "Electrical Requirements" for additional details.

Item 628 - Electrical Services

Secure a permit for electrical service from Lubbock Power and Light (LP&L) and South Plains Electric Coop (SPEC). Coordinate with LP&L and SPEC during the first three weeks of the project lead-time period allowing adequate time for any necessary utility adjustments, transformer installation, etc. All necessary expense for power service connection shall be considered subsidiary to Item 628 "Electrical Services".

Provide circuit breaker and install when additional circuit from existing electrical service is called for in the plans.

Concrete for service pole foundations, when required, will be Class C and will be in accordance with Item 421: Hydraulic Cement Concrete, except that concrete will not be paid for directly but is to be considered subsidiary to Item 628: Electrical Services. Reinforcing steel for service pole foundations, when required, will be in accordance with Item 440: Reinforcing Steel, except that reinforcing steel will not paid for directly but is to be considered subsidiary to Item 628: Electrical Services.

Item 644 - Small Roadside Sign Assemblies

All signs on this project, new or relocated, will require a retroreflective wrap on the sign support. This wrap shall be 12 inches in height, visible in all directions and shall be placed 3 ft. below the bottom of the sign. The color for YIELD, STOP, WRONG WAY, and DO NOT ENTER signs shall be red. The color for all other signs shall be yellow. This retroreflective wrap will not be paid for directly but considered subsidiary to Item 644.

Stake all sign locations, and receive approval from the Engineer, prior to sign placement.

The triangular slip bases will be the two bolt clamp type (Southern Plains Fabrication or equivalent). For more information refer to the approved materials producers list: http://www.txdot.gov/business/resources/producer-list.html

Coordinate with the City of Lubbock Traffic Operations department for all Street Name Signs and mounting brackets.

Item 656 - Foundations for Traffic Control Devices

Do not extend traffic signal pole foundations more than two inches above natural ground, medians or other surfaces surrounding the drilled shaft unless approval is obtained from the Engineer.

Use Class “C” concrete for traffic signal pole foundations.

Locate the bases for signal poles a minimum of 4 feet from the face of vertical curbs.

Item 658 - Delineator and Object Marker Assemblies

Delineator and object marker assembly posts shall be driveable and composed of post-consumer recycled materials. Embedded stub shall be perforated square tubing.

Driveable posts shall be the three-piece Flexible Delineator Post System, utilizing a 2-3/8” round post with a square to round flexible joint. The Embedded Anchor shall be 2" x 12 gauge x 24" long steel perforated square tubing. The Posts shall be permanently sealed at the top and have a 3-1/2” wide x 13" flattened surface to accommodate up to a 3" x 12" reflective sheet on both sides.

Item 662 - Work Zone Pavement Markings

Use short-term removable striping as directed by the Engineer.

Water base paint may be used for all non-removable striping if authorized by the Engineer. Water based paint will be allowed on asphalt surfaces in lieu of removable pavement markings as directed by the Engineer. If water based paint is used, there will be no payment for striping refresh.

The deviation rate in alignment shall not exceed one inch per 200 feet of roadway. The maximum deviation shall not exceed 2 inches nor shall any deviation be abrupt. Striping not in conformance shall be removed and replaced at the Contractor's expense.

All removable work zone pavement markings placed on CRCP shall consist of ceramic buttons and RPMs as shown on standard sheet BC(11). These shall be applied with a thermoplastic adhesive, unless otherwise directed by the Engineer.

No guide markers will be placed on a finished surface unless they fall on a proposed lane line. Stick-down markings will be removed by the Contractor prior to final marking.

Do not place guide markers on a finished surface unless they fall on a proposed lane line. Remove Stick-down markings prior to final marking. Remove tabs at the same time as the RPM placement.

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Type I markings must be at least one twenty-fifth (1/25) of an inch thick.

Remove ceramic buttons, RPMs, and Adhesives as directed by the Engineer. Payment for this work is subsidiary to Item 662.

Use thermoplastic adhesive to glue down work zone buttons and RPMs. Bituminous adhesive will not be allowed.

Temporary striping must be placed within 14 days of placing tabs.

Item 666 - Reflectorized Pavement Markings

Mark the location of standard pavement markings, including barrier lines, no passing zones, gores, and transitions adjusting to meet latest standards or as directed by the Engineer.

After completion of all work and removal of the barricades, time charges will be suspended. The performance period for the project will not begin until all the striping has been completed. Final acceptance will not be granted until the performance period for pavement markings is complete. If replacement markings are needed, traffic control for moving operations will be required. No payment will be made for traffic control during replacement striping work. All traffic control work shall be considered subsidiary to the project’s replacement striping work.

The yellow or white long-line striping for re-striping operations will not lag one another by more than four (4) working days. The performance period for a roadway will not begin for a section of roadway or a project until all required striping for that section or project has been completed.

Provide a schedule and notify the District Traffic Office a minimum of 3 days prior to any striping operation. Contact via email at LBB-TRFOPS@TxDOT.GOV. If not notified, the time frame for testing and meeting the Retroreflectivity requirements in article 4.4 will start the day the department is made aware of that the markings have been applied.

Item 668 - Prefabricated Pavement Markings

Reference the “Standard Highway Sign Designs for Texas” manual for dimensions to words and symbols.

Manufacturer’s sealer is subsidiary to this item. Surface preparation is paid for separately under Item 678.

Item 677 - Eliminating Existing Pavement Markings and Markers

Eliminate existing pavement markings on concrete surfaces by the Water Blasting Method.

Item 678 - Pavement Surface Preparation for Markings

Use water blasting for concrete surfaces.

Item 680 - Highway Traffic Signals

The city shall furnish all necessary controller cabinets, controllers, conflict monitors, and loop detector amplifiers. The city shall establish signal timing and phasing. This will be paid for using the City of Lubbock force account.

A representative of the City Traffic Engineer from the City of Lubbock shall be present when the signals are to be placed in operation. The Contractor shall notify the City a minimum of one week in advance to coordinate this work.

The signal installation will consist of the following principal items:

1) Installing signal poles, signal heads, optical detectors, multi-conductor signal cable, pull boxes, conduit, loop detectors, and signal controller.
2) Furnishing and placing all concrete for the signal pole foundations, pull boxes, and controller pad.
3) Furnishing and installing miscellaneous items essential for complete signal installation.

The City of Lubbock shall furnish and wire the controllers and establish signal timing and phasing.

The City of Lubbock shall furnish all street name signs.

Turn all non-operational signal heads down facing the roadway surface, or completely cover the lenses with an opaque material. The location of signal poles, conduit, ground boxes and controllers may be adjusted to accommodate existing utilities or local conditions with prior approval of the Engineer. Verify the location of all existing utilities in the field prior to construction. Provide a technician on call in the city at all times during the required 30-day test period.

Item 682 - Vehicle and Pedestrian Signal Heads

Provide pedestrian signal indications using symbol type and astro bracket mounted with CGB or galvanized pipe nipple.

Provide aluminum vehicle and pedestrian signal heads for this project. Furnish ABS formed black plastic back-plates with the vehicle signal heads. Attach back-plates to the vehicle signal heads and with a minimum of ½ inch of material from the edge of mounting holes to the near edge of the back plate. Furnish aluminum visors for vehicle signal heads.

Mount the signal head for horizontally mounted vehicle signal heads, at least 18 feet but no more than 20 feet, above the pavement grade measured from the center of the roadway to the bottom of the signal head.

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Item 686 - Traffic Signal Pole Assemblies (Steel)

Use bracket assembly Option C of the SMA-100 and DMA-100 Standard Sheets for signal head mounting for both horizontal and vertical mount signal heads. Check foundation elevations to assure compliance with mounting height requirements.

Attach dampening devices to mast arms 36 feet in length and longer. Dampening will not be paid for directly, but will be considered subsidiary to Item 686 – "Traffic Signal Pole Assemblies".

Internally wire signal cable for the vehicular signal heads without drip loops. Thread the hole in the mast arm shaft leading into the astro-bracket mount for a CGB connector or a galvanized pipe nipple. Furnish and install CGB connectors or galvanized pipe nipples. The materials and work necessary will not be paid for separately but will be considered subsidiary to Item 686 – "Traffic Signal Pole Assemblies".

Item 688 – Pedestrian Detectors and Vehicle Loop Detectors

Provide push buttons for pedestrian actuation meeting current ADA requirements.

Item 730 - Roadside Mowing

Mow full-width from pavement edge to Right-of-Way line 2 times. The Engineer shall dictate the times to mow and the areas in the project to mow.

Each mowing cycle is for the entire project. Mowing area is approximately 4 acres.
Notify the Engineer by 9:00 am each day for work completed the previous day, including hand trimming and cleanup. The Engineer will then inspect the section(s) of roadway for acceptance, not more than two (2) working days after notification.

Truck mounted attenuators shall be used while mowing.

Item 734 – Litter Removal

Perform litter removal prior to mowing and as directed by the Engineer.

Item 1005 – Loose Aggregate for Groundcover

Type I aggregate is 3" River Rock. All fines shall be screened from the aggregate within 1/4" tolerance. River rock shall be composed of earth-toned smooth rounded rocks. This material shall be free of organic and inorganic debris and trash

Type II aggregate is Pea Gravel. All fines shall be screened from the aggregate within 1/8" tolerance. Pea Gravel material shall be free of organic and inorganic debris and trash.

Item 3076 – Dense-Graded Hot-Mix Asphalt

PG 70-22 asphalt is required for this project.

Provide a summary spreadsheet for each lot in accordance with Article 520.2 of the Standard Specifications.

Design the mixture with a Superpave Gyratory Compactor (SGC).

Aggregate will be subjected to five cycles of the magnesium sulfate soundness test in accordance with Test Method TEX-411-A. The loss shall not be greater than **20** percent.

The mix will be evaluated for stripping through the boil and hamburg wheel tests. If it is determined to be stripping then 1% lime, liquid anti-strip or a warm mix additive proven to prevent stripping will be required.

Schedule the placement width for the final hotmix surface in such a manner that all joints will coincide with proposed lane lines (+/- 6 inches).

Provide emulsified trackless asphalt for tack coat at a rate of 0.10-0.14 gal/sy.

The Contractor will be required to tack 100% of the surfaces prior to the subsequent lift including all vertical joints.

Use a self-propelled, wheel-mounted material transfer vehicle (MTV) capable of receiving hot mix from the haul trucks separate from the paver on this project or provide the PaveIR. Minimum requirements for the MTV are a storage capacity of approximately 25 tons, a pivoting discharge conveyor, a means of completely remixing the ACP prior to placement, and a paver hopper equipped with a separate surge storage insert with a minimum capacity of approximately 20 tons.

Provide straight edges including the outside edge. Any edges not conforming to the typical sections will be cut and removed at the Contractor's expense.

There are paving widths less than 10 ft wide on this project.

Do not pave when temperatures get below 32 degrees F in a 12 hour period.

No substitute PG grade binders will be allowed.

Asphalt stabilized base will not be allowed as RAP.

Fractionate the RAP if used in the mixture design.

Post-consumer RAS will not be allowed.

No exempt production on driving lanes and shoulder.

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Highway: CS **Sheet:** 7L

Item 6001 - Portable Changeable Message Sign

Provide messages as directed by the Engineer.

Provide 2 solar powered changeable message signs for the duration of this project.

Inform the public 2 weeks before construction begins.

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

Provide 2 TMAs for stationary use for the duration of the project. Stationary TMAs will be used during the various phases of work required for this project. Payment will be made by the day for each TMA used in stationary operations.

Provide 3 TMA for mobile use. Mobile TMAs will be used for moving operations such as striping and RPM placement. Payment will be made by the day for each TMA used in mobile operations.

Item 6307 – Temporary Speed Monitoring System

Provide 1 speed monitoring trailers for this project.

Utilize the speed monitoring trailer on the project for the duration of this project as directed for the protection of the workers.

Change locations of speed monitoring trailer on a regular basis to improve driver attention.

PROJECT: STP 2021 (423)		PROJECT: STP 2021 (423)		ALT.	ITEM-CODE			DESCRIPTION	UNIT	TOTAL	
CONTROL: 0905-06-118		CONTROL: 0905-06-118									
114TH ST ROAD BID ITEMS		114TH ST BRIDGE BID ITEMS									
EST.	FINAL	EST.	FINAL		ITEM NO	DESC CODE	SP NO.			EST.	FINAL
51.00					100	6002		PREPARING ROW	STA	51.00	
11.00					100	6003		PREPARING ROW(TREE)(5" TO 12" DIA)	EA	11.00	
3.00					100	6004		PREPARING ROW(TREE)(12" TO 24" DIA)	EA	3.00	
2.00					103	6001		DISPOSAL OF WATER WELLS	EA	2.00	
12525.00					104	6001		REMOVING CONC (PAV)	SY	12525.00	
818.00					104	6017		REMOVING CONC (DRIVEWAYS)	SY	818.00	
3025.00					104	6022		REMOVING CONC (CURB AND GUTTER)	LF	3025.00	
3349.00					104	6036		REMOVING CONC (SIDEWALK OR RAMP)	SY	3349.00	
20284.00					105	6033		REMOVING STB BASE AND ASPH PAV(10-14")	SY	20284.00	
9589.00					110	6001		EXCAVATION (ROADWAY)	CY	9589.00	
16400.00					110	6002		EXCAVATION (CHANNEL)	CY	16400.00	
10750.00					132	6006		EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY	10750.00	
14669.00					160	6003		FURNISHING AND PLACING TOPSOIL (4")	SY	14669.00	
933.00					162	6002		BLOCK SODDING	SY	933.00	
13736.00					164	6025		CELL FBR MLCH SEED(PERM)(URBAN)(SANDY)	SY	13736.00	
17140.00					164	6051		DRILL SEED (TEMP)(WARM OR COOL)	SY	17140.00	
20.00					164	6052		BROADCAST SEED (PERM)(SPECIAL MIX)	SY	20.00	
493.00					168	6001		VEGETATIVE WATERING	MG	493.00	
133.00					192	6002		PLANT MATERIAL (1-GAL)	EA	133.00	
43.00					192	6004		PLANT MATERIAL (5-GAL)	EA	43.00	
40.00					216	6001		PROOF ROLLING	HR	40.00	
342.00					275	6001		CEMENT	TON	342.00	
40079.00					275	6019		CEMENT TREAT (SUBGRADE)(6")	SY	40079.00	
7838.00					310	6009		PRIME COAT (MC-30)	GAL	7838.00	
1015.00					351	6002		FLEXIBLE PAVEMENT STRUCTURE REPAIR(6")	SY	1015.00	
36064.00					360	6003		CONC PVMT (CONT REINF - CRCP) (9")	SY	36064.00	
		40.00			400	6005		CEM STABIL BKFL	CY	40.00	
		107.00			402	6001		TRENCH EXCAVATION PROTECTION	LF	107.00	
		1168.00			403	6006		TEMPORARY SPL SHORING (COFFERDAM)	SF	1168.00	
24.00					416	6002		DRILL SHAFT (24 IN)	LF	24.00	
48.00					416	6004		DRILL SHAFT (36 IN)	LF	48.00	
21.00					416	6006		DRILL SHAFT (48 IN)	LF	21.00	
408.00					416	6029		DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	408.00	
20.00					420	6074		CL C CONC (MISC)	CY	20.00	
880.00					423	6004		RETAINING WALL (CONC BLOCK)	SF	880.00	
1608.00					423	6008		RETAINING WALL (CAST - IN - PLACE)	SF	1608.00	
119.00		10.50			432	6002		RIPRAP (CONC)(5 IN)	CY	129.50	
56.00					432	6031		RIPRAP (STONE PROTECTION)(12 IN)	CY	56.00	
211.00					432	6031		RIPRAP (STONE PROTECTION)(12 IN)	CY	211.00	
924.00					450	6052		RAIL (HANDRAIL)(TY F)	LF	924.00	
		360.00			462	6010		CONC BOX CULV (6 FT X 3 FT)	LF	360.00	
		6.00			467	6212		SET (TY I)(S= 6 FT)(HW= 4 FT)(4:1) (C)	EA	6.00	
5.00					479	6001		ADJUSTING MANHOLES	EA	5.00	
4.00					496	6016		REMOV STR (PIPE)	EA	4.00	
1.00					500	6001		MOBILIZATION	LS	1.00	
18.00					502	6001		BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	16.00	
275.00					506	6004		ROCK FILTER DAMS (INSTALL) (TY 4)	LF	275.00	
275.00					506	6011		ROCK FILTER DAMS (REMOVE)	LF	275.00	
264.00					506	6020		CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	264.00	
264.00					506	6024		CONSTRUCTION EXITS (REMOVE)	SY	264.00	
321.00					506	6037		SANDBAGS FOR EROSION CONTROL (12")	LF	321.00	
5235.00					506	6042		BIODEG EROSN CONT LOGS (INSTL) (18")	LF	5235.00	
5235.00					506	6043		BIODEG EROSN CONT LOGS (REMOVE)	LF	2618.00	
552.00					508	6001		CONSTRUCTING DETOURS	SY	552.00	

ESTIMATE AND QUANTITY

DESIGN KMM	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS DAP	6			CS
CHECK CBB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK SRJ	TEXAS	LBB	LUBBOCK	8
	CONTROL	SECTION	JOB	
	0905	06	118	

PROJECT: STP 2021 (423)		PROJECT: STP 2021 (423)		ALT.	ITEM-CODE			DESCRIPTION	UNIT	TOTAL	
CONTROL: 0905-06-118		CONTROL: 0905-06-118									
114TH ST ROAD BID ITEMS		114TH ST BRIDGE BID ITEMS			ITEM NO	DESC CODE	SP NO.				
EST.	FINAL	EST.	FINAL							EST.	FINAL
144.00					529	6012		CONC CURB (SLOTTED)	LF	144.00	
9239.00					529	6037		CONC CURB & GUTTER TY II (MOD)	LF	9239.00	
1311.00					530	6001		INTERSECTIONS (CONC)	SY	1311.00	
1571.00					530	6004		DRIVEWAYS (CONC)	SY	1571.00	
8694.00					531	6002		CONC SIDEWALKS (5")	SY	8694.00	
130.00					531	6018		CURB RAMPS (TY 1)	SY	130.00	
93.00					531	6019		CURB RAMPS (TY 2)	SY	93.00	
35.00					531	6027		CURB RAMPS (TY 10)	SY	35.00	
504.00					536	6002		CONC MEDIAN	SY	504.00	
795.00					556	6008		PIPE UNDERDRAINS (TY 8) (6")	LF	795.00	
29.00					610	6130		IN RD IL (TY SA) 20T-8 (250W EQ) LED	EA	29.00	
22.00					610	6162		IN RD IL (TY SA) 30T-8 (250W EQ) LED	EA	22.00	
32.00					618	6046		CONDT (PVC) (SCH 80) (2")	LF	32.00	
10565.00					618	6046		CONDT (PVC) (SCH 80) (2")	LF	10565.00	
1088.00					618	6058		CONDT (PVC) (SCH 80) (4")	LF	1088.00	
430.00					620	6008		ELEC CONDR (NO.8) INSULATED	LF	430.00	
10565.00					620	6008		ELEC CONDR (NO.8) INSULATED	LF	10565.00	
75.00					620	6009		ELEC CONDR (NO.6) BARE	LF	75.00	
21130.00					620	6009		ELEC CONDR (NO.6) BARE	LF	21130.00	
2.00					624	6002		GROUND BOX TY A (122311)W/APRON	EA	2.00	
9.00					624	6008		GROUND BOX TY C (162911)W/APRON	EA	9.00	
1.00					628	6043		ELC SRV TY A 240/480 060(NS)SS(E)OT(O)	EA	1.00	
1.00					628	6044		ELC SRV TY A 240/480 060(NS)SS(E)PS(U)	EA	1.00	
1.00					628	6303		ELC SRV TY T 120/240 000(NS)GS(N)EX(O)	EA	1.00	
68.00					636	6001		ALUMINUM SIGNS (TY A)	SF	68.00	
10.00					644	6001		IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	10.00	
3.00					644	6004		IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	3.00	
5.00					644	6009		IN SM RD SN SUP&AM TY10BWG(1)SB(P)	EA	5.00	
8.00					644	6076		REMOVE SM RD SN SUP&AM	EA	8.00	
3.00					658	6047		INSTL OM ASSM (OM-2Y)(WC)GND	EA	3.00	
3424.00					662	6048		WK ZN PAV MRK REMOV (REFL) TY I-C	EA	3424.00	
3786.00					662	6050		WK ZN PAV MRK REMOV (REFL) TY II-A-A	EA	3786.00	
9056.00					662	6056		WK ZN PAV MRK REMOV (TRAF BTN) TY W	EA	9056.00	
8546.00					662	6058		WK ZN PAV MRK REMOV (TRAF BTN) TY Y	EA	8546.00	
1350.00					662	6075		WK ZN PAV MRK REMOV (W)24"(SLD)	LF	1350.00	
1980.00					666	6030		REFL PAV MRK TY I (W)8"(DOT)(100MIL)	LF	1980.00	
3220.00					666	6036		REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	3220.00	
225.00					666	6141		REFL PAV MRK TY I (Y)12"(SLD)(100MIL)	LF	225.00	
4.00					666	6156		REFL PAV MRK TY I(Y)(MED NOSE)(100MIL)	EA	4.00	
19842.00					666	6224		PAVEMENT SEALER 4"	LF	19842.00	
5200.00					666	6226		PAVEMENT SEALER 8"	LF	5200.00	
1223.00					666	6230		PAVEMENT SEALER 24"	LF	1223.00	
22.00					666	6231		PAVEMENT SEALER (ARROW)	EA	22.00	
11.00					666	6232		PAVEMENT SEALER (WORD)	EA	11.00	
4.00					666	6233		PAVEMENT SEALER (MED NOSE)	EA	4.00	
9510.00					666	6300		RE PM W/RET REQ TY I (W)4"(BRK)(100MIL)	LF	9510.00	
2300.00					666	6312		RE PM W/RET REQ TY I (Y)4"(BRK)(100MIL)	LF	2300.00	
8032.00					666	6315		RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	8032.00	

ESTIMATE AND QUANTITY

DESIGN KMM	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS DAP	6			CS
CHECK CBB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK SRJ	TEXAS	LBB	LUBBOCK	8A
	CONTROL	SECTION	JOB	
	0905	06	118	

PROJECT: STP 2021 (423)		PROJECT: STP 2021 (423)		ALT.	ITEM-CODE			DESCRIPTION	UNIT	TOTAL	
CONTROL: 0905-06-118		CONTROL: 0905-06-118									
114TH ST ROAD BID ITEMS		114TH ST BRIDGE BID ITEMS									
EST.	FINAL	EST.	FINAL		ITEM NO	DESC CODE	SP NO.			EST.	FINAL
1223.00					668	6018		PREFAB PAV MRK TY B (W)(24")(SLD)	LF	1223.00	
22.00					668	6019		PREFAB PAV MRK TY B (W)(ARROW)	EA	22.00	
11.00					668	6027		PREFAB PAV MRK TY B (W)(WORD)	EA	11.00	
256.00					672	6007		REFL PAV MRKR TY I-C	EA	256.00	
237.00					672	6009		REFL PAV MRKR TY II-A-A	EA	237.00	
1420.00					677	6001		ELIM EXT PAV MRK & MRKS (4")	LF	1420.00	
755.00					677	6003		ELIM EXT PAV MRK & MRKS (8")	LF	755.00	
2.00					677	6008		ELIM EXT PAV MRK & MRKS (ARROW)	EA	2.00	
19842.00					678	6001		PAV SURF PREP FOR MRK (4")	LF	19842.00	
5200.00					678	6004		PAV SURF PREP FOR MRK (8")	LF	5200.00	
225.00					678	6006		PAV SURF PREP FOR MRK (12")	LF	225.00	
1223.00					678	6008		PAV SURF PREP FOR MRK (24")	LF	1223.00	
22.00					678	6009		PAV SURF PREP FOR MRK (ARROW)	EA	22.00	
11.00					678	6016		PAV SURF PREP FOR MRK (WORD)	EA	11.00	
4.00					678	6024		PAV SURF PREP FOR MRK (MED NOSE)	EA	4.00	
1.00					680	6002		INSTALL HWY TRF SIG (ISOLATED)	EA	1.00	
10.00					682	6001		VEH SIG SEC (12")LED(GRN)	EA	10.00	
4.00					682	6002		VEH SIG SEC (12")LED(GRN ARW)	EA	4.00	
10.00					682	6003		VEH SIG SEC (12")LED(YEL)	EA	10.00	
8.00					682	6004		VEH SIG SEC (12")LED(YEL ARW)	EA	8.00	
10.00					682	6005		VEH SIG SEC (12")LED(RED)	EA	10.00	
4.00					682	6006		VEH SIG SEC (12")LED(RED ARW)	EA	4.00	
9.00					682	6018		PED SIG SEC (LED)(COUNTDOWN)	EA	9.00	
10.00					682	6054		BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10.00	
4.00					682	6055		BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	4.00	
131.00					684	6031		TRF SIG CBL (TY A)(14 AWG)(5 CONDR)	LF	131.00	
645.00					684	6033		TRF SIG CBL (TY A)(14 AWG)(7 CONDR)	LF	645.00	
451.00					684	6046		TRF SIG CBL (TY A)(14 AWG)(20 CONDR)	LF	451.00	
962.00					684	6080		TRF SIG CBL (TY C)(14 AWG)(2 CONDR)	LF	962.00	
2.00					686	6041		INS TRF SIG PL AM(S)1 ARM(40')	EA	2.00	
1.00					686	6045		INS TRF SIG PL AM(S)1 ARM(44')	EA	1.00	
1.00					686	6053		INS TRF SIG PL AM(S)1 ARM(50')	EA	1.00	
4.00					687	6001		PED POLE ASSEMBLY	EA	4.00	
353.00					1005	6001		LOOSE AGGR FOR GROUNDCOVER (TYPE I)	CY	353.00	
25.00					1005	6002		LOOSE AGGR FOR GROUNDCOVER (TYPE II)	CY	25.00	
2760.00					2005	6001		FILTER FABRIC (TY 2)	SY	2760.00	
2254.00					3076	6041		D-GR HMA TY-D SAC-A PG70-22	TON	2254.00	
129.00					3076	6066		TACK COAT	GAL	129.00	
1.00					4171	6001		INSTALL BRIDGE IDENTIFICATION NUMBERS	EA	1.00	
340.00					6001	6001		PORTABLE CHANGEABLE MESSAGE SIGN	DAY	960.00	
680.00					6185	6002		TMA (STATIONARY)	DAY	512.00	
24.00					6185	6005		TMA (MOBILE OPERATION)	DAY	24.00	
1.00					6307	6003		TEMP SPEED MONITOR SYS	EA	1.00	
1.00					7286	6001		16" WATER LINE RELOCATION	LS	1.00	
1.00					7286	6002		REMOVE AND RELOCATE FIRE HYDRANT	EA	1.00	
13.00					7286	6003		ADJUSTING VALVE COVERS	EA	13.00	
1.00					7286	6004		ADJUST CATHODIC PROTECTION STATION	LS	1.00	
2.00					7287	6001		INST. 16" LINE STOP	EA	2.00	
								FEDERAL NON-PARTICIPATING ITEMS			
		1.00			480	6001		CLEAN EXIST CULVERTS	EA	1.00	
2.00					730	6107		FULL - WIDTH MOWING	CYC	2.00	
2.00					734	6002		LITTER REMOVAL	CYC	2.00	
1.00								14 - PUBLIC UTILITY FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.00	
1.00								18 - SAFETY CONTINGENCY FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.00	
1.00								18 - EROSION CONTROL MAINTENANCE FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.00	
1.00								18 - LAW ENFORCEMENT FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.00	
1.00								39 - CITY FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.00	

ESTIMATE AND QUANTITY

DESIGN KMM	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS DAP	6			CS
CHECK CBB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK SRJ	TEXAS	LBB	LUBBOCK	8B
	CONTROL	SECTION	JOB	
	0905	06	118	

TRAFFIC CONTROL PLAN NARRATIVE

THE FOLLOWING IS THE RECOMMENDED SEQUENCE OF CONSTRUCTION AND MAINTENANCE OF TRAFFIC FOR COMPLETION OF THE WORK DEPICTED IN THE TRAFFIC CONTROL PLAN FOR THE 114TH STREET PROJECT.

EACH PHASE AND STEP OF TEMPORARY TRAFFIC CONTROL SHALL BEGIN WITH THESE TWO PROCESSES.

1. PLACE ADVANCED WARNING SIGNS FOR THE PROJECT LIMITS. SIGNS SHALL BE PLACED IN GENERAL ACCORDANCE WITH TXDOT STANDARD BC (1-12)-21.

2. INSTALL TEMPORARY EROSION CONTROL DEVICES PRIOR TO BEGINNING ANYSOIL DISTURBING ACTIVITIES.

ADDITIONALLY, FOR EACH PHASE AND STEP THE CONTRACTOR SHALL COMPLETE THESE TWO PROCESSES AS APPROPRIATE.

1. CONSTRUCT THE CONCRETE PAVEMENT WITH AT LEAST TWO STEPS IN A MANNER TO MAINTAIN ACCESS TO ADJACENT ROADWAYS AND DRIVEWAYS.

2. STABILIZE EXPOSED EARTHEN SLOPES AND IMPLEMENT APPLICABLE PERMANENT EROSION CONTROL MEASURES NECESSARY TO COMPLY WITH THE SW3P.

PHASE 1

PHASE 1 STEP 1

THE INTENT OF PHASE 1 STEP 1 IS TO PERFORM CONSTRUCTION OPERATIONS RELATED TO THE RECONSTRUCTION AND WIDENING OF THE NORTH HALF OF 114TH ROADWAY FROM QUAKER AVENUE TO STATION 114+37.

PROCEDURE:

1. PLACE WORK ZONE WARNING SIGNS AND CHANNELIZING DEVICES ON EB 114TH ST WEST OF QUAKER AVE IN ACCORDANCE WITH TXDOT STANDARD TCP (2-5B) FOR A LANE CLOSURE OF THE NORTHERNMOST THROUGH LANE.

2. PLACE WORK ZONE WARNING SIGNS AND CHANNELIZING DEVICES ON WB 114TH ST EAST OF MIAMI AVENUE ACCORDING TO THE DRAWINGS TO SHIFT THE EXISTING THREE-LANE SECTION TO THE SOUTHERNMOST PAVING THROUGH THE CONSTRUCTION ZONE.

3. WHEN SITES ARE ADEQUATELY BARRICADED, REMOVE AND HAUL AWAY EXISTING PAVEMENT AND SUBGRADE AS NEEDED TO PREPARE SURFACE, TREAT SUBGRADE, AND CONSTRUCT CONTINUOUSLY REINFORCED CONCRETE PAVEMENT.

PHASE 1 STEP 2

THE INTENT OF PHASE 1 STEP 2 IS TO PERFORM CONSTRUCTION OPERATIONS RELATED TO THE RECONSTRUCTION OF THE SOUTH HALF OF 114TH ROADWAY FROM QUAKER AVENUE TO STATION 114+37.

PROCEDURE

1. PLACE WORK ZONE WARNING SIGNS AND CHANNELIZING DEVICES ON EB 114TH ST WEST OF QUAKER AVE IN ACCORDANCE WITH TXDOT STANDARD TCP (2-5B) FOR A LANE CLOSURE OF THE SOUTHERNMOST THROUGH LANE. PLACE ADDITIONAL CHANNELIZING DEVICES TO BEGIN SHIFTING THE THROUGH LANE PRIOR TO THE INTERSECTION AS INDICATED IN THE PLANS.

2. PLACE WORK ZONE WARNING SIGNS AND CHANNELIZING DEVICES ON WB 114TH ST EAST OF MIAMI AVENUE ACCORDING TO THE DRAWINGS TO SHIFT THE EXISTING THREE-LANE SECTION TO THE NORTHERNMOST PAVING THROUGH THE CONSTRUCTION ZONE.

3. WHEN SITES ARE ADEQUATELY BARRICADED, REMOVE AND HAUL AWAY EXISTING PAVEMENT AND SUBGRADE AS NEEDED TO PREPARE SURFACE, TREAT SUBGRADE, AND CONSTRUCT CONTINUOUSLY REINFORCED CONCRETE PAVEMENT.

PHASE 1 STEP 3

THE INTENT OF PHASE 1 STEP 3 IS TO PERFORM CONSTRUCTION OPERATIONS RELATED TO THE RECONSTRUCTION OF THE CENTER LANES AND MEDIAN AT QUAKER AVENUE AND TO INSTALL TEMPORARY PAVEMENT REQUIRED TO FACILITATE THE PLANNED CONSTRUCTION PHASING.

PROCEDURE

1. PLACE WORK ZONE WARNING SIGNS AND CHANNELIZING DEVICES ON EB 114TH ST WEST OF QUAKER AVE IN ACCORDANCE WITH TXDOT STANDARD TCP (2-5B) FOR A LANE CLOSURE OF THE NORTHERNMOST THROUGH LANE.

2. PLACE WORK ZONE WARNING SIGNS AND CHANNELIZING DEVICES ON WB 114TH ST EAST OF MIAMI AVENUE ACCORDING TO THE DRAWINGS TO MAINTAIN THE EXISTING THREE-LANE SECTION IN THE CENTER OF THE ROAD, AND NOT INTRODUCE NEW LANES.

3. WHEN SITES ARE ADEQUATELY BARRICADED, REMOVE AND HAUL AWAY EXISTING PAVEMENT AND SUBGRADE AS NEEDED TO PREPARE SURFACE, TREAT SUBGRADE, AND CONSTRUCT CONTINUOUSLY REINFORCED CONCRETE PAVEMENT, MEDIAN AND TEMPORARY PAVEMENT.

PHASE 2

PHASE 2 STEP 1

THE INTENT OF PHASE 2 STEP 1 IS TO PERFORM CONSTRUCTION OPERATIONS RELATED TO THE RECONSTRUCTION AND WIDENING OF THE NORTH HALF OF 114TH ROADWAY FROM STATION 114+37 TO MEMPHIS AVENUE.

PROCEDURE:

1. PLACE WORK ZONE WARNING SIGNS AND CHANNELIZING DEVICES ON EB 114TH ST EAST OF QUAKER AVE IN ACCORDANCE WITH TXDOT STANDARD TCP (2-5B) FOR A LANE CLOSURE OF THE NORTHERNMOST THROUGH LANE.

2. PLACE WORK ZONE STRIPING ON WB 114TH ST EAST OF MEMPHIS AVENUE ACCORDING TO THE DRAWINGS TO SHIFT THE EXISTING LANE SOUTH IN ORDER TO LINE UP THE LANES ON THE WEST SIDE OF THE INTERSECTION.

3. WHEN SITES ARE ADEQUATELY BARRICADED, REMOVE AND HAUL AWAY EXISTING PAVEMENT AND SUBGRADE AS NEEDED TO PREPARE SURFACE, TREAT SUBGRADE, AND CONSTRUCT CONTINUOUSLY REINFORCED CONCRETE PAVEMENT.

PHASE 3 STEP 1

THE INTENT OF PHASE 3 STEP 1 IS TO PERFORM CONSTRUCTION OPERATIONS RELATED TO THE RECONSTRUCTION AND WIDENING OF THE SOUTH HALF OF 114TH ROADWAY FROM STATION 114+37 TO MEMPHIS AVENUE AND BEGIN NON-PAVEMENT CONSTRUCTION (CULVERTS, EMBANKMENT, WATER LINE LOWERING, ETC).

PROCEDURE:

1. PLACE WORK ZONE WARNING SIGNS AND CHANNELIZING DEVICES ON EB 114TH ST EAST OF QUAKER AVE IN ACCORDANCE WITH TXDOT STANDARD TCP (2-5B) FOR A LANE CLOSURE OF THE SOUTHERNMOST THROUGH LANE.

2. PLACE WORK ZONE WARNING SIGNS AND CHANNELIZING DEVICES ON EB 114TH ST WEST OF MEMPHIS AVENUE AND WB 114TH ST EAST OF INDIANA AVENUE IN ACCORDANCE WITH TXDOT STANDARD WZ (TCD)-13 FOR A ROAD CLOSURE FROM MEMPHIS AVENUE TO INDIANA AVE.

3. PLACE WORK ZONE WARNING SIGNS AND CHANNELIZING DEVICES ON SB INDIANA AVE NORTH OF 114TH ST IN ACCORDANCE WITH TXDOT STANDARD TCP (2-5B) FOR A LANE CLOSURE OF THE SB RT TURN LANE AND OUTSIDE SB THROUGH LANE.

4. PLACE WORK ZONE WARNING SIGNS AND CHANNELIZING DEVICES ON NB INDIANA AVE SOUTH OF 114TH ST IN ACCORDANCE WITH TXDOT STANDARD TCP (2-5B) FOR A LANE CLOSURE OF THE NB L T TURN LANE.

5. WHEN SITES ARE ADEQUATELY BARRICADED, REMOVE AND HAUL AWAY EXISTING PAVEMENT AND SUBGRADE AS NEEDED TO PREPARE SURFACE, TREAT SUBGRADE, AND CONSTRUCT CONTINUOUSLY REINFORCED CONCRETE PAVEMENT.

PHASE 3 STEP 2

THE INTENT OF PHASE 3 STEP 2 IS TO PERFORM CONSTRUCTION OPERATIONS RELATED TO THE RECONSTRUCTION AND WIDENING OF 114TH ROADWAY FROM MEMPHIS AVENUE TO INDIANA AVENUE INCLUDING THE COMPLETION OF NON-PAVEMENT CONSTRUCTION INITIATED IN PHASE 3 STEP 1.

PROCEDURE:

1. WORK ZONE WARNING SIGNS AND CHANNELIZING DEVICES PLACED IN PHASE 3 STEP 1 TO CLOSE 114TH ST FROM MEMPHIS AVENUE TO INDIANA AVENUE TO REMAIN.

2. WHEN SITES ARE ADEQUATELY BARRICADED, REMOVE AND HAUL AWAY EXISTING PAVEMENT AND SUBGRADE AS NEEDED TO PREPARE SURFACE, TREAT SUBGRADE, AND CONSTRUCT CONTINUOUSLY REINFORCED CONCRETE PAVEMENT.

PHASE 4

THE INTENT OF PHASE 4 IS TO PREPARE THE PROJECT AREA TO BE OPENED FOR THE FULL PROJECT LIMITS.

PROCEDURE:

1. UPON COMPLETION OF CONSTRUCTION ACTIVITIES, REMOVE ALL REMAINING TEMPORARY EROSION CONTROL MEASURES.

2. REMOVE ALL CONSTRUCTION TRAFFIC SIGNS AND BARRICADES, INCLUDING ADVANCED WARNING SIGNS BEYOND THE LIMITS OF THE PROJECT.

3. OPEN TO TRAFFIC

TRAFFIC CONTROL PLAN NOTES

1. CONTRACTOR SHALL MAINTAIN ACCESS TO ALL ADJACENT PROPERTIES AT ALL TIMES UNLESS EXPLICIT PERMISSION IS RECEIVED FROM THE ADJACENT PROPERTY OWNER.

2. ACCESS ACROSS THE WORK ZONE MAY REQUIRE FILL, MILLINGS, OR OTHER TEMPORARY SURFACES AND OPENING THE CHANNELIZING DEVICES WHERE APPROPRIATE WITH SIGNAGE INDICATING AN OPEN DRIVEWAY.

3. THERE ARE MULTIPLE PROPERTIES, ALLEYS, AND STREETS THAT CAN ALLOW FOR CLOSURES, PROVIDED THERE IS AN ALTERNATE ACCESS POINT. CONTRACTOR SHALL PROVIDE IN WRITING THEIR PROPOSED WORK PLAN AND CLOSURES OF SUCH PAIRED ACCESS POINTS TO OPTIMIZE THEIR CONSTRUCTION PLAN.

4. CONTRACTOR SHALL COORDINATE WITH CITY OF LUBBOCK AND THE CONTRACTOR FOR THE ADJACENT SEGMENT OF 114TH ST FROM SLIDE RD TO QUAKER AVE.

5. CONTRACTOR SHALL IDENTIFY ANY CONFLICTS BETWEEN TRAFFIC CONTROL PLAN PROPOSED FOR THIS PROJECT, AND IMPACTS OF ACTIVE TRAFFIC CONTROL FOR ADJACENT PROJECT AND COMMUNICATE TO ENGINEER AND CITY FOR RESOLUTION.

STATE OF TEXAS
KEVIN MORRIS
105091
LICENSED
PROFESSIONAL ENGINEER

Kevin Morris 3-10-2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
TRAFFIC CONTROL NARRATIVE

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	9
	0905	06	118	

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS									
LOCATION	502 6001	508 6001	662 6048	662 6050	662 6056	662 6058	662 6075	677 6001	677 6003
	BARRICADES, SIGNS AND TRAFFIC HANDLING	CONSTRUCTING DETOURS	WK ZN PAV MRK REMOV (REFL) TY I-C	WK ZN PAV MRK REMOV (REFL) TY II-A-A	WK ZN PAV MRK REMOV (TRAF BTN) TY W	WK ZN PAV MRK REMOV (TRAF BTN) TY Y	WK ZN PAV MRK REMOV (W)24"(SLD)	ELIM EXT PAV MRK & MRKS (4")	ELIM EXT PAV MRK & MRKS (8")
	MO	SY	EA	EA	EA	EA	LF	LF	LF
Overall									
PHASE 1									
STEP 1	2								
SHEET 1 - STA. 89+00 TO STA. 99+00			100		236			720	220
SHEET 2 - STA. 100+40 TO STA. 120+00			136	413	407	748	72		
STEP 2	2								
SHEET 1 - STA. 89+00 TO STA. 99+00			247		739			700	535
SHEET 2 - STA. 100+40 TO STA. 120+00			139	227	415	679	108		
STEP 3	3								
SHEET 1 - STA. 89+00 TO STA. 99+00			100		236				
SHEET 2 - STA. 100+40 TO STA. 120+00		405	202	386	605	698	75		
SHEET 3 - STA. 120+00 TO STA. 131+50		147	12	58	35	92			
PHASE 2									
STEP 1	1								
SHEET 1 - STA. 100+40 TO STA. 120+00			261	305	520	709	174		
SHEET 2 - STA. 120+00 TO STA. 131+50			69	72	206	215	36		
PHASE 3									
STEP 1	4		420	379	1051	973	174		
SHEET 1 - STA. 100+40 TO STA. 120+00			26	53	78	159	36		
SHEET 2 - STA. 120+00 TO STA. 156+00									
STEP 2	4								
SHEET 1 - STA. 120+00 TO STA. 156+00									
REPLACEMENT			1712	1893	4528	4273	675		
PROJECT TOTALS	16	552	3424	3786	9056	8546	1350	1420	755

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS						
LOCATION	677 6008	6001 6001	6185 6002	6185 6005	6307 6003	
	ELIM EXT PAV MRK & MRKS (ARROW)	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)	TEMP SPEED MONITOR SYS	WATER FILLED BARRIER*
	EA	DAY	DAY	DAY	EA	
Overall		960	512	30	1	
PHASE 1						
STEP 1						
SHEET 1 - STA. 89+00 TO STA. 99+00						
SHEET 2 - STA. 100+40 TO STA. 120+00						1430
STEP 2						
SHEET 1 - STA. 89+00 TO STA. 99+00	2					
SHEET 2 - STA. 100+40 TO STA. 120+00						1430
STEP 3						
SHEET 1 - STA. 89+00 TO STA. 99+00						
SHEET 2 - STA. 100+40 TO STA. 120+00						1006
SHEET 3 - STA. 120+00 TO STA. 131+50						258
PHASE 2						
STEP 1						
SHEET 1 - STA. 100+40 TO STA. 120+00						593
SHEET 2 - STA. 120+00 TO STA. 131+50						683
PHASE 3						
STEP 1						593
SHEET 1 - STA. 100+40 TO STA. 120+00						683
SHEET 2 - STA. 120+00 TO STA. 156+00						
STEP 2						
SHEET 1 - STA. 120+00 TO STA. 156+00						
REPLACEMENT						
PROJECT TOTALS	2	960	512	30	1	6676

* QUANTITY IS SUBSIDIARY TO ITEM 502.

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

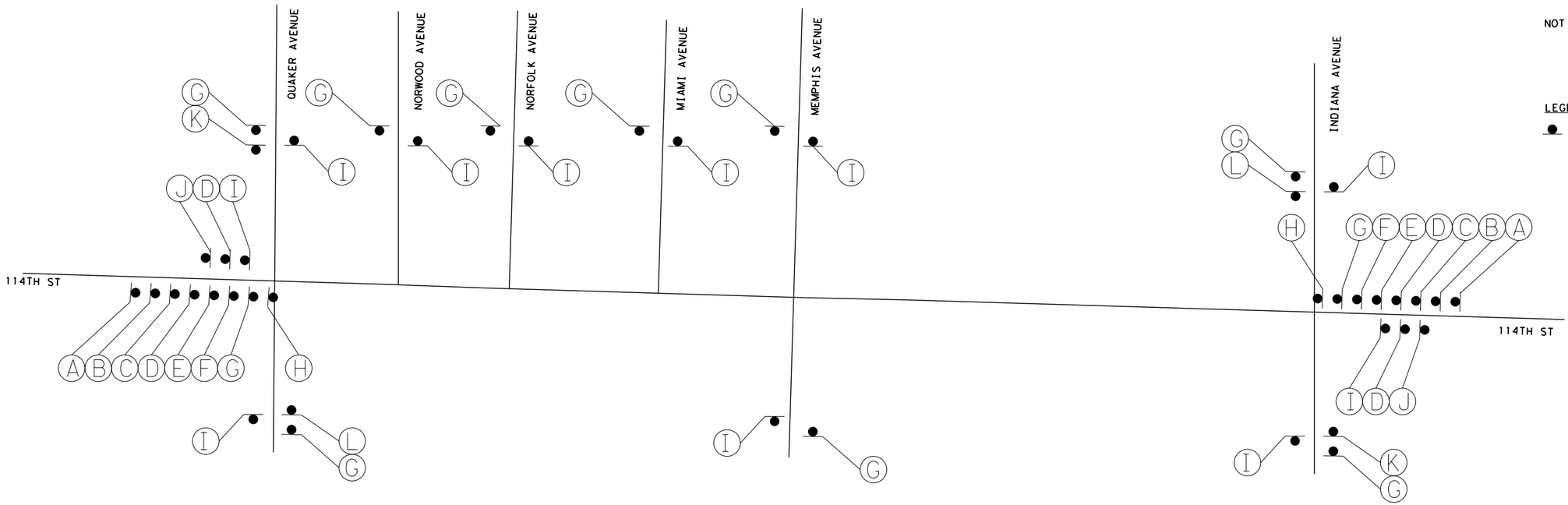
NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
TRAFFIC CONTROL PLAN SUMMARY

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	10
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	



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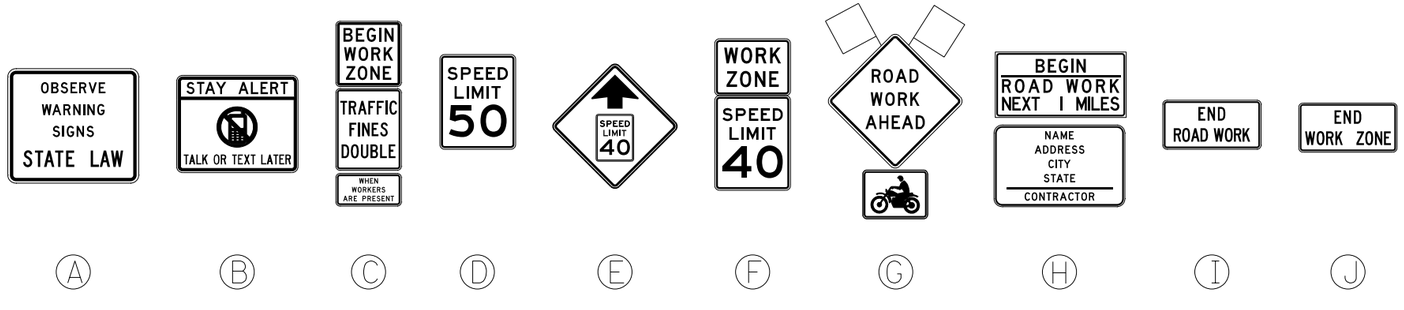
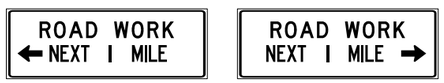
NOT TO SCALE

LEGEND

● SIGN





NOTE:
1. USE TYPICAL LOCATION OF ALL CROSS ROAD SIGNS SEE BC(2)-21.

2. SEE STANDARD DETAIL BC(2)-21 AND BC (3)-21 FOR SIGN LOCATION AND SPACING.

3-10-2022

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Texas Registered Engineering Firm F-2144

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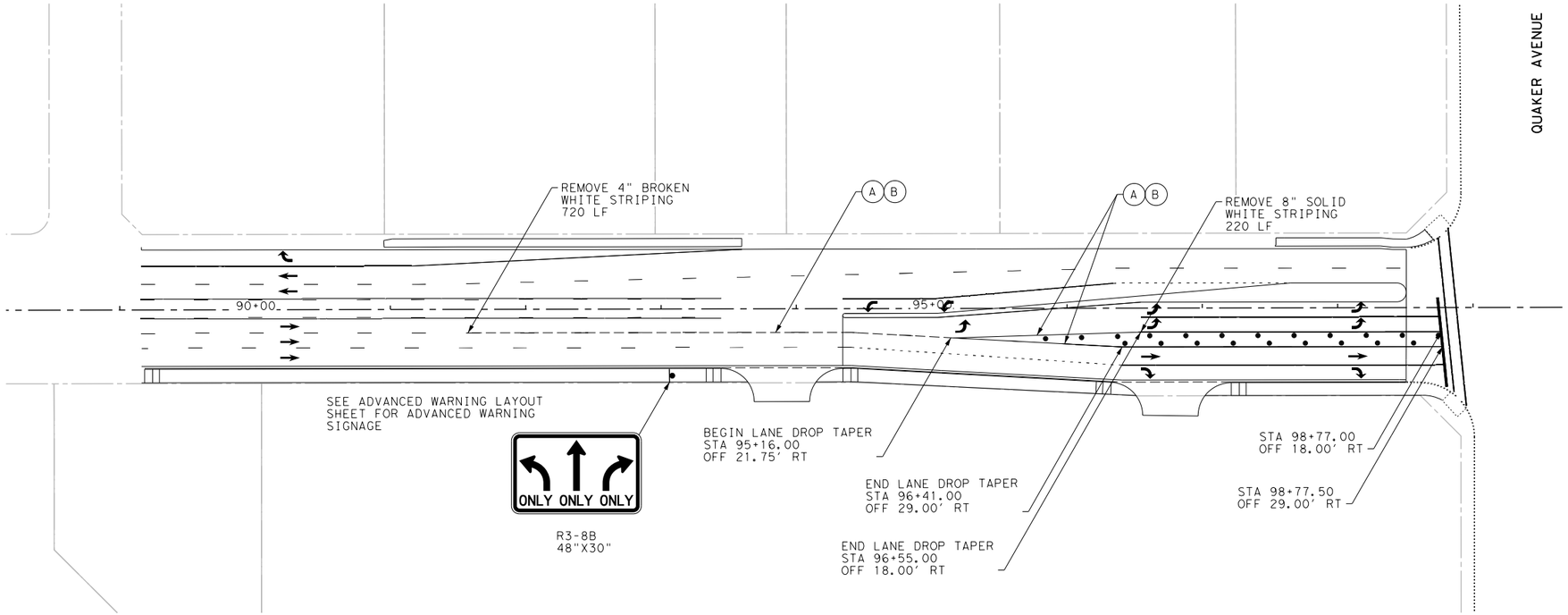
114TH STREET
QUAKER AVE. TO INDIANA AVE.
ADVANCE WARNING LAYOUT

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	11
	0905	06	118	



N

0 50' 100'
SCALE IN FEET

LEGEND

	TEMPORARY PAVEMENT
	CONSTRUCTED THIS PHASE
	PREVIOUSLY CONSTRUCTED
	WATER-FILLED BARRIER
	CHANNELIZING DEVICE
	WATER-FILLED BARRIER
	TYPE III BARRICADE
	WORK ZONE SIGN
	TRAFFIC DIRECTION
(A)	WK ZN PAV MRK REMOV (REFL) TY I-C
(B)	WK ZN PAV MRK REMOV (TRAF BTN) TY W
(C)	WK ZN PAV MRK REMOV (REFL) TY II-A-A
(D)	WK ZN PAV MRK REMOV (TRAF BTN) TY Y
(E)	WK ZN PAV MRK REMOV (Y) (24") (SLD)
A-X	ONE OF TWO DRIVEWAYS TO REMAIN OPEN
B-X	BUILD IN HALF-WIDTH

NOTE:
CONTRACTOR SHALL COORDINATE WITH CITY OF LUBBOCK FOR SPECIAL ADJUSTMENTS TO TRAFFIC SIGNAL FOR EACH PHASE OF TRAFFIC CONTROL 7 DAYS PRIOR TO TRAFFIC SHIFT.

STATE OF TEXAS
KEVIN MORRIS
105091
LICENSED
PROFESSIONAL ENGINEER

Kevin Morris 3-10-2022

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Texas Registered Engineering Firm F-2144

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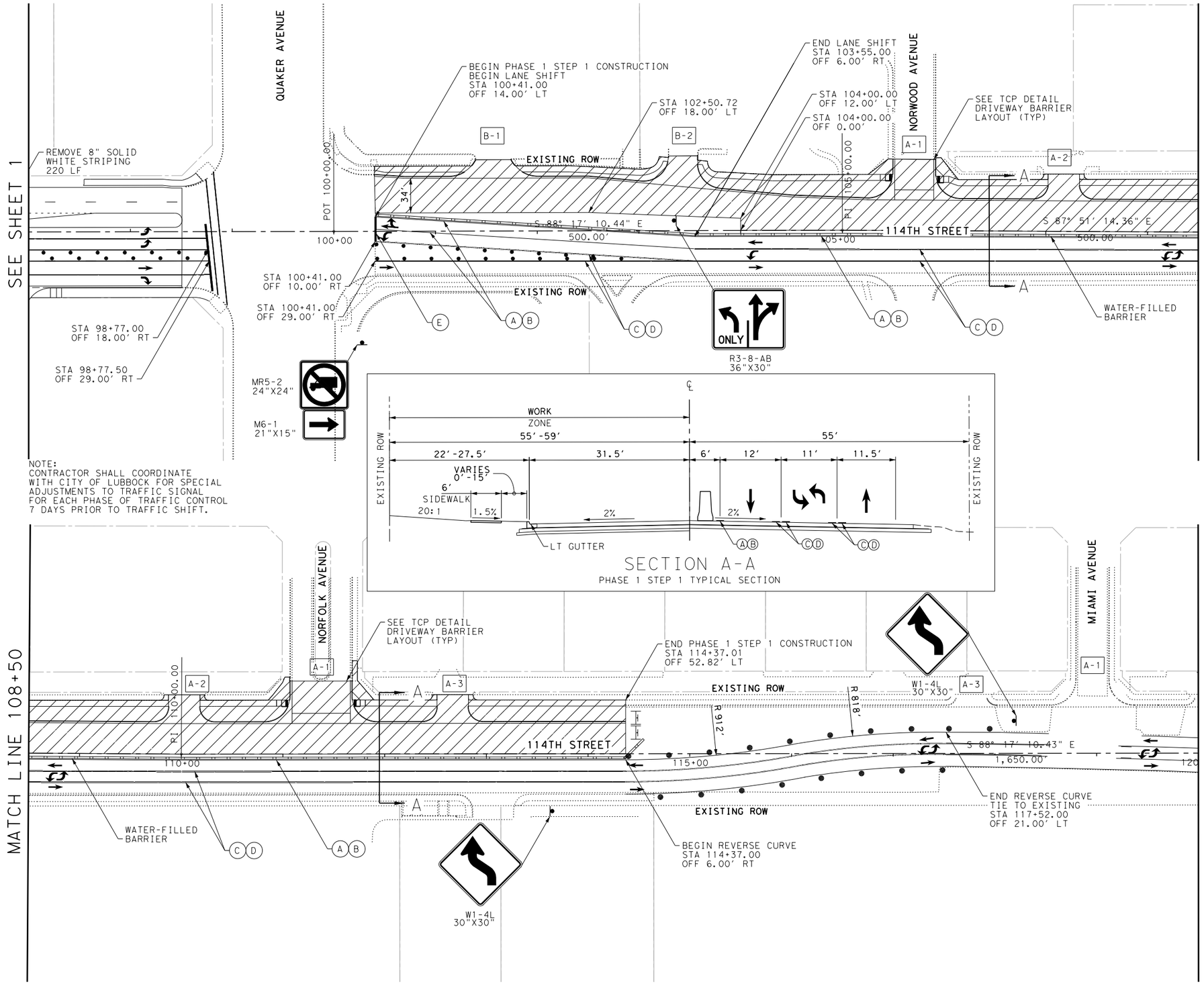
114TH STREET
QUAKER AVE. TO INDIANA AVE.
TRAFFIC CONTROL PLAN
PHASE ONE
STEP 1
SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	12
	0905	06	118	

$USER$
100.0000 ft / in.



N

0 50' 100'
SCALE IN FEET

LEGEND

	TEMPORARY PAVEMENT
	CONSTRUCTED THIS PHASE
	PREVIOUSLY CONSTRUCTED
	WATER-FILLED BARRIER
• • • •	CHANNELIZING DEVICE
	WATER-FILLED BARRIER
	TYPE III BARRICADE
	WORK ZONE SIGN
	TRAFFIC DIRECTION
(A)	WK ZN PAV MRK REMOV (REFL) TY I-C
(B)	WK ZN PAV MRK REMOV (TRAF BTN) TY W
(C)	WK ZN PAV MRK REMOV (REFL) TY II-A-A
(D)	WK ZN PAV MRK REMOV (TRAF BTN) TY Y
(E)	WK ZN PAV MRK REMOV (Y) (24") (SLD)
A-X	ONE OF TWO DRIVEWAYS TO REMAIN OPEN
B-X	BUILD IN HALF-WIDTH

STATE OF TEXAS
KEVIN MORRIS
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Texas Department of Transportation
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114TH STREET
QUAKER AVE. TO INDIANA AVE.
TRAFFIC CONTROL PLAN
PHASE ONE
STEP 1
SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	13
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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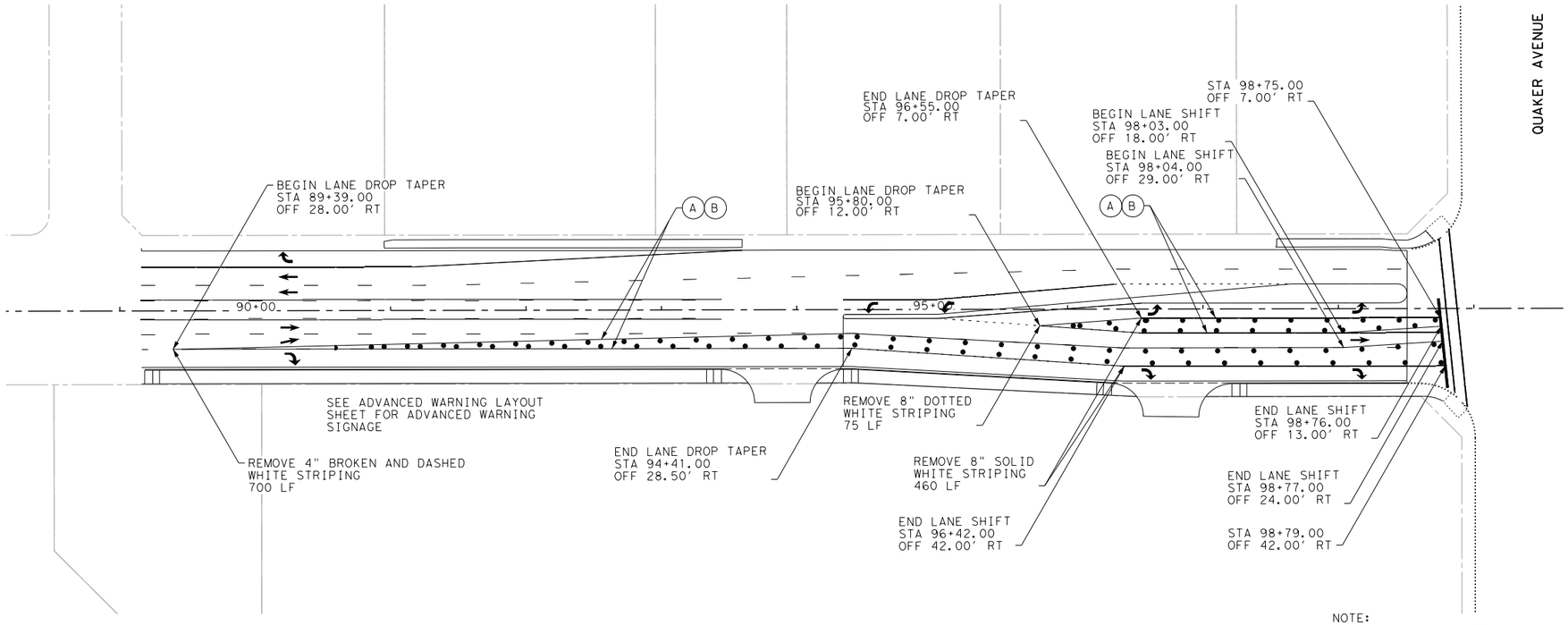

NOTE:
CONTRACTOR SHALL COORDINATE WITH CITY OF LUBBOCK FOR SPECIAL ADJUSTMENTS TO TRAFFIC SIGNAL FOR EACH PHASE OF TRAFFIC CONTROL 7 DAYS PRIOR TO TRAFFIC SHIFT.

N

0 50' 100'
SCALE IN FEET

LEGEND

	TEMPORARY PAVEMENT
	CONSTRUCTED THIS PHASE
	PREVIOUSLY CONSTRUCTED
	WATER-FILLED BARRIER
	CHANNELIZING DEVICE
	WATER-FILLED BARRIER
	TYPE III BARRICADE
	WORK ZONE SIGN
	TRAFFIC DIRECTION
(A)	WK ZN PAV MRK REMOV (REFL) TY I-C
(B)	WK ZN PAV MRK REMOV (TRAF BTN) TY W
(C)	WK ZN PAV MRK REMOV (REFL) TY II-A-A
(D)	WK ZN PAV MRK REMOV (TRAF BTN) TY Y
(E)	WK ZN PAV MRK REMOV (Y) (24") (SLD)
A-X	ONE OF TWO DRIVEWAYS TO REMAIN OPEN
B-X	BUILD IN HALF-WIDTH

STATE OF TEXAS
KEVIN MORRIS
105091
LICENSED
PROFESSIONAL ENGINEER

Kevin Morris 3-10-2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

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Lubbock, TX 79401
Phone - (806) 686-2700
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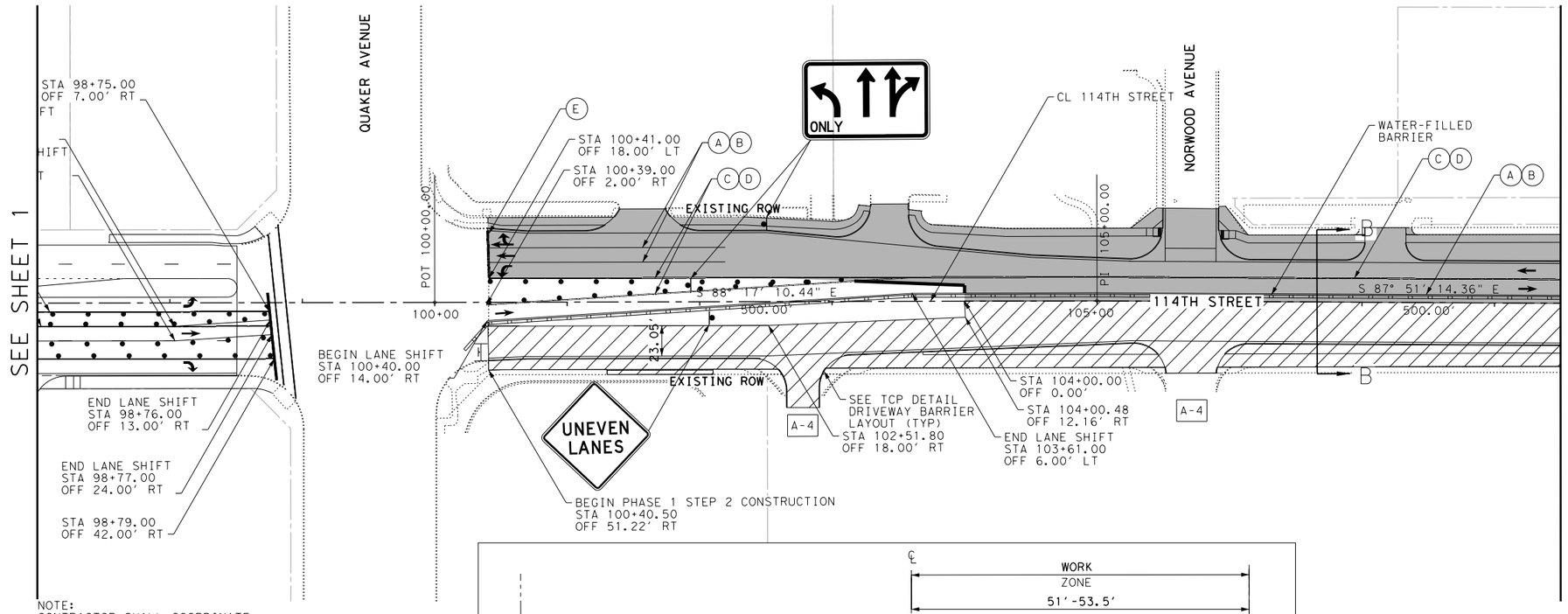
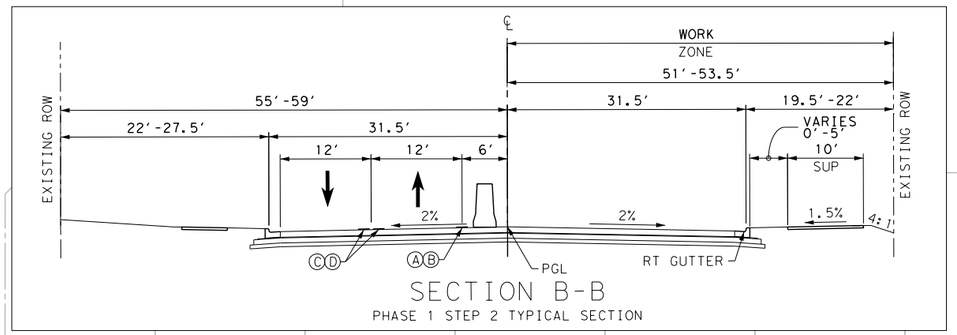
114TH STREET
QUAKER AVE. TO INDIANA AVE.
TRAFFIC CONTROL PLAN
PHASE ONE
STEP 2
SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	14
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

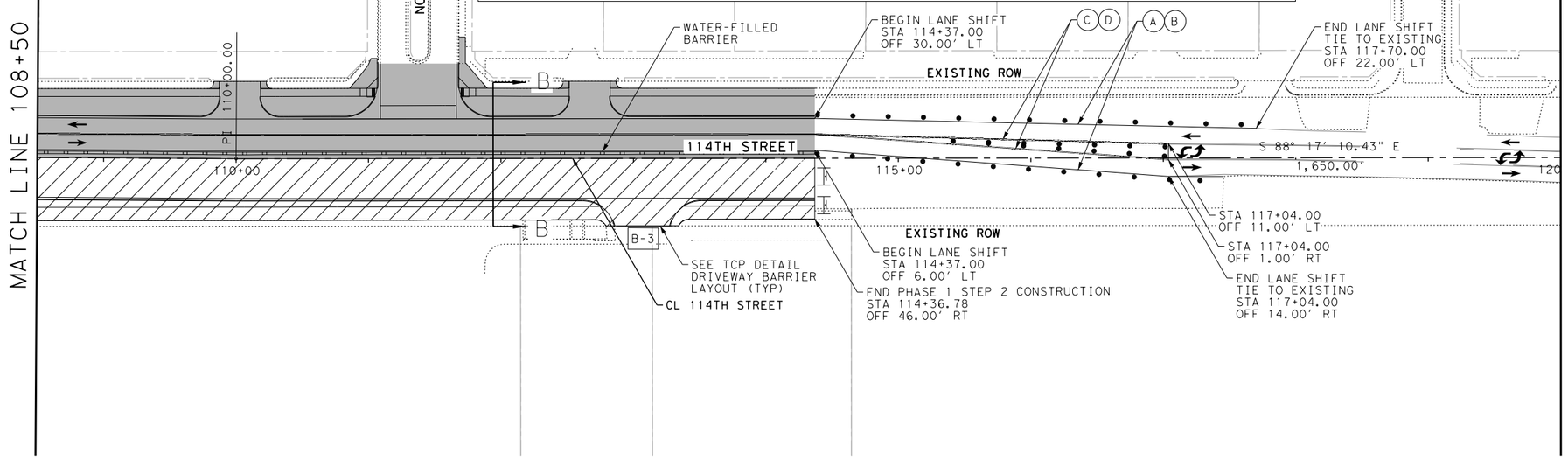
$USER$
100.0000 ft / in.

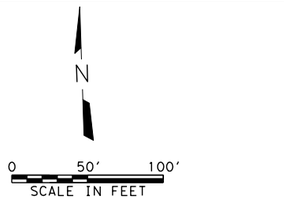


NOTE:
CONTRACTOR SHALL COORDINATE WITH CITY OF LUBBOCK FOR SPECIAL ADJUSTMENTS TO TRAFFIC SIGNAL FOR EACH PHASE OF TRAFFIC CONTROL 7 DAYS PRIOR TO TRAFFIC SHIFT.



SECTION B-B
PHASE 1 STEP 2 TYPICAL SECTION





LEGEND

- TEMPORARY PAVEMENT
- CONSTRUCTED THIS PHASE
- PREVIOUSLY CONSTRUCTED
- WATER-FILLED BARRIER
- CHANNELIZING DEVICE
- WATER-FILLED BARRIER
- TYPE III BARRICADE
- WORK ZONE SIGN
- TRAFFIC DIRECTION
- (A) WK ZN PAV MRK REMOV (REFL) TY I-C
- (B) WK ZN PAV MRK REMOV (TRAF BTN) TY W
- (C) WK ZN PAV MRK REMOV (REFL) TY II-A-A
- (D) WK ZN PAV MRK REMOV (TRAF BTN) TY Y
- (E) WK ZN PAV MRK REMOV (Y) (24") (SLD)
- A-X ONE OF TWO DRIVEWAYS TO REMAIN OPEN
- B-X BUILD IN HALF-WIDTH

STATE OF TEXAS
KEVIN MORRIS
105091
LICENSED
PROFESSIONAL ENGINEER

Kevin Morris 3-10-2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

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114TH STREET
QUAKER AVE. TO INDIANA AVE.
TRAFFIC CONTROL PLAN
PHASE ONE
STEP 2
SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	15
	0905	06	118	

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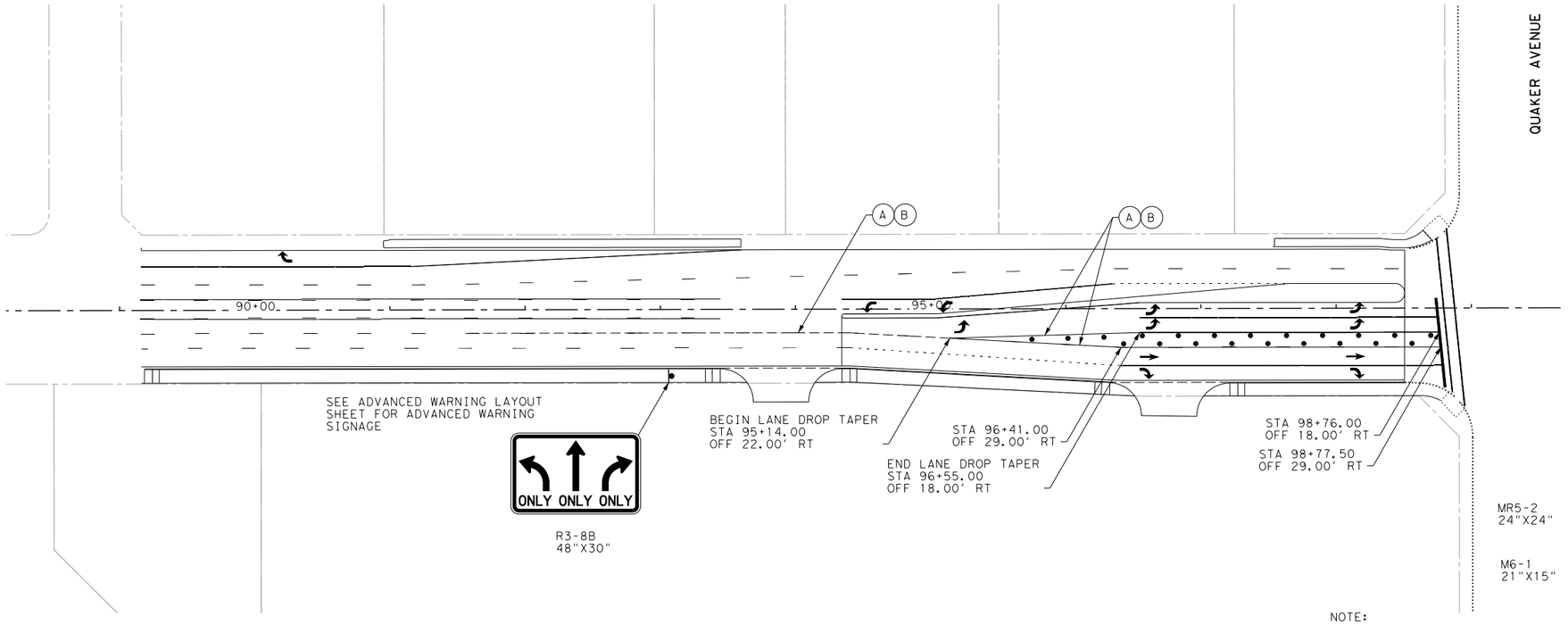

NOTE:
CONTRACTOR SHALL COORDINATE WITH CITY OF LUBBOCK FOR SPECIAL ADJUSTMENTS TO TRAFFIC SIGNAL FOR EACH PHASE OF TRAFFIC CONTROL 7 DAYS PRIOR TO TRAFFIC SHIFT.

LEGEND

	TEMPORARY PAVEMENT
	CONSTRUCTED THIS PHASE
	PREVIOUSLY CONSTRUCTED
	WATER-FILLED BARRIER
	CHANNELIZING DEVICE
	WATER-FILLED BARRIER
	TYPE III BARRICADE
	WORK ZONE SIGN
	TRAFFIC DIRECTION
(A)	WK ZN PAV MRK REMOV (REFL) TY I-C
(B)	WK ZN PAV MRK REMOV (TRAF BTN) TY W
(C)	WK ZN PAV MRK REMOV (REFL) TY II-A-A
(D)	WK ZN PAV MRK REMOV (TRAF BTN) TY Y
(E)	WK ZN PAV MRK REMOV (Y) (24") (SLD)
A-X	ONE OF TWO DRIVEWAYS TO REMAIN OPEN
B-X	BUILD IN HALF-WIDTH

Kevin Morris 3-10-2022

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Texas Registered Engineering Firm F-2144

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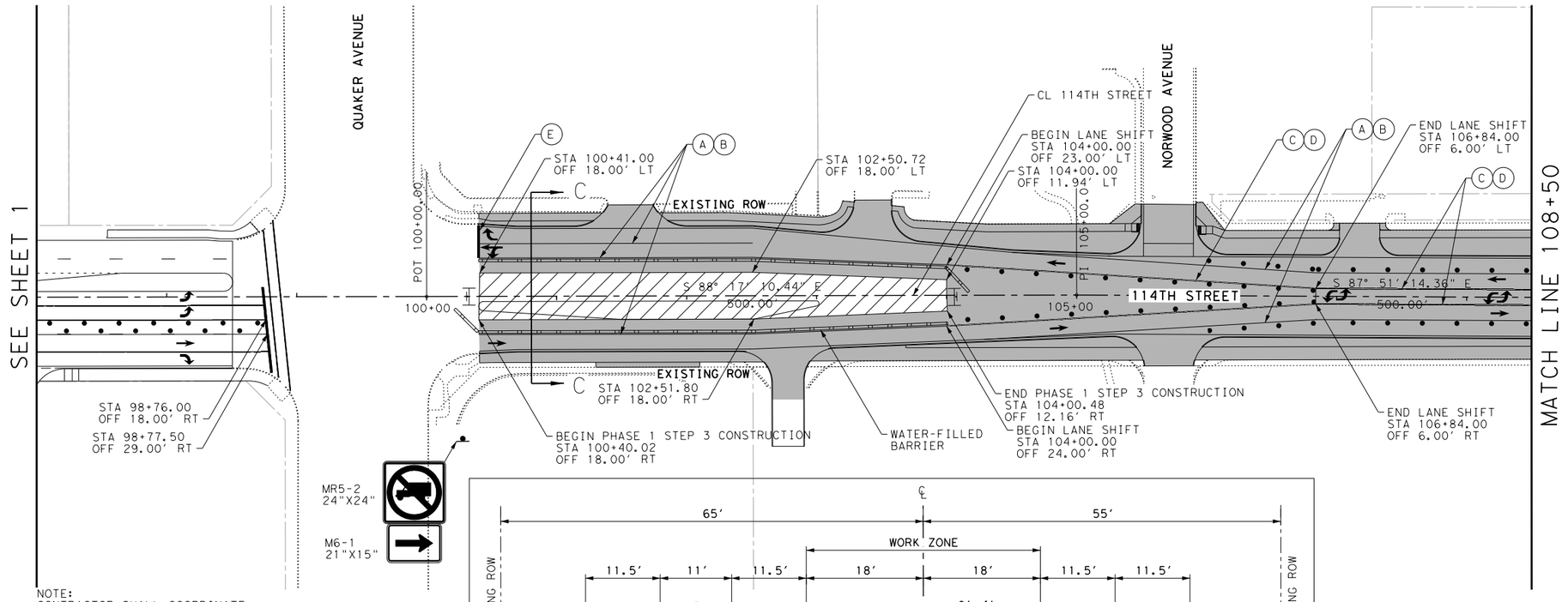
114TH STREET
QUAKER AVE. TO INDIANA AVE.
TRAFFIC CONTROL PLAN
PHASE ONE
STEP 3

SHEET 1 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	16
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	



NOTE:
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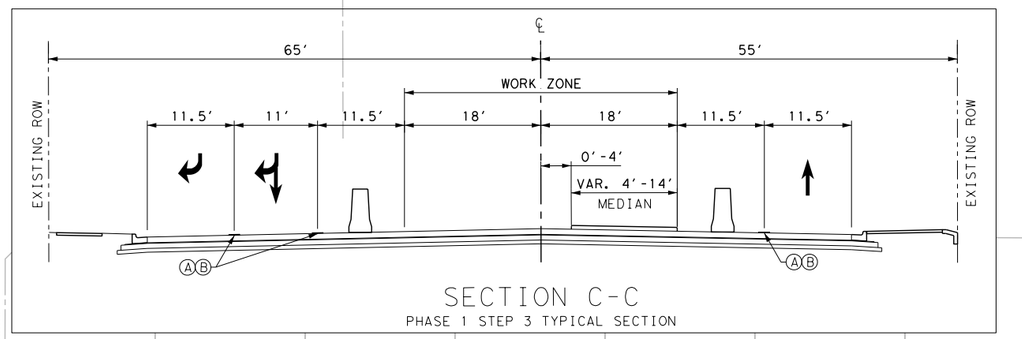
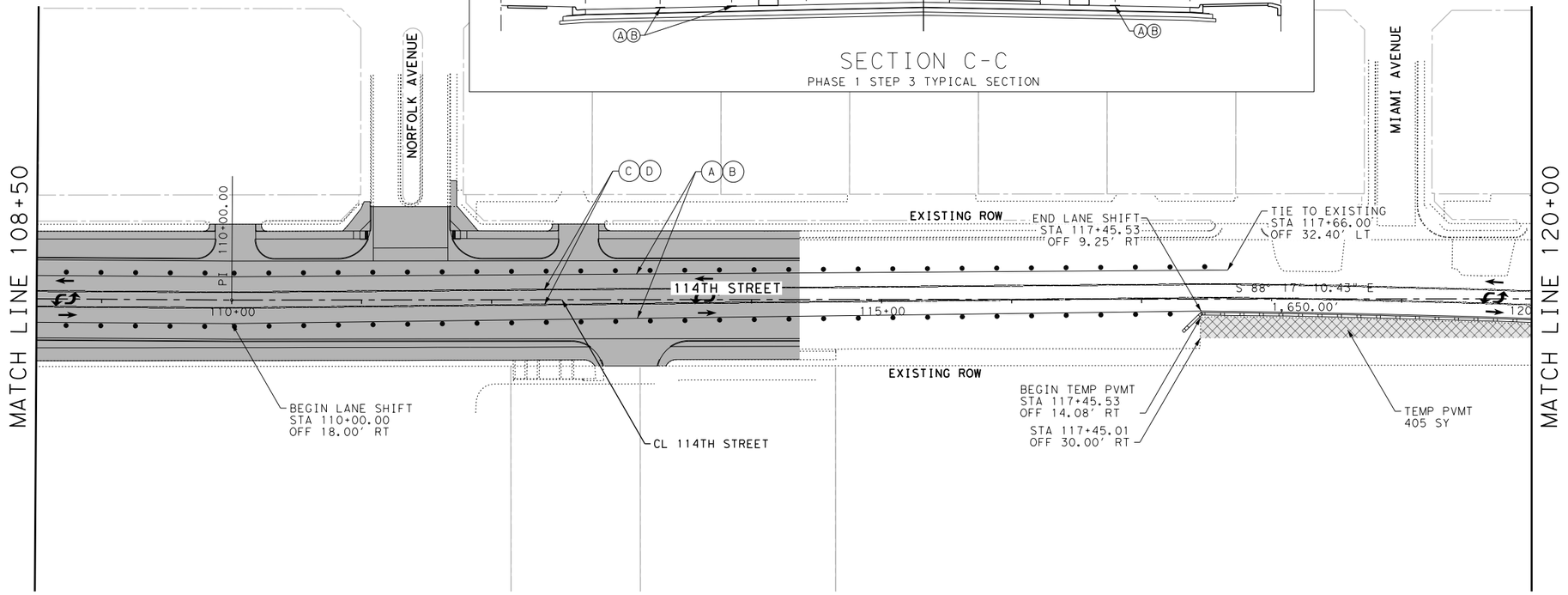
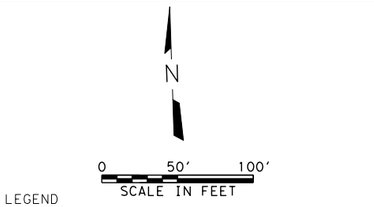


SECTION C-C
PHASE 1 STEP 3 TYPICAL SECTION





LEGEND

	TEMPORARY PAVEMENT
	CONSTRUCTED THIS PHASE
	PREVIOUSLY CONSTRUCTED
	WATER-FILLED BARRIER
• • • •	CHANNELIZING DEVICE
	WATER-FILLED BARRIER
	TYPE III BARRICADE
	WORK ZONE SIGN
	TRAFFIC DIRECTION
A	WK ZN PAV MRK REMOV (REFL) TY I-C
B	WK ZN PAV MRK REMOV (TRAF BTN) TY W
C	WK ZN PAV MRK REMOV (REFL) TY II-A-A
D	WK ZN PAV MRK REMOV (TRAF BTN) TY Y
E	WK ZN PAV MRK REMOV (Y) (24") (SLD)
A-X	ONE OF TWO DRIVEWAYS TO REMAIN OPEN
B-X	BUILD IN HALF-WIDTH

Kevin Morris 3-10-2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

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114TH STREET
QUAKER AVE. TO INDIANA AVE.
TRAFFIC CONTROL PLAN
PHASE ONE
STEP 3

SHEET 2 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	17
	0905	06	118	

MATCH LINE 120+00

MEMPHIS AVENUE

TIE TO EXISTING
STA 122+30.00
OFF 4.25' RT

D

D

114TH STREET

+00

125+00

PI 126+50.00

EXISTING ROW

S 88° 43' 29.51" E

500.00'

130+00

PI 131+50.00

MATCH LINE 131+50

EXISTING ROW

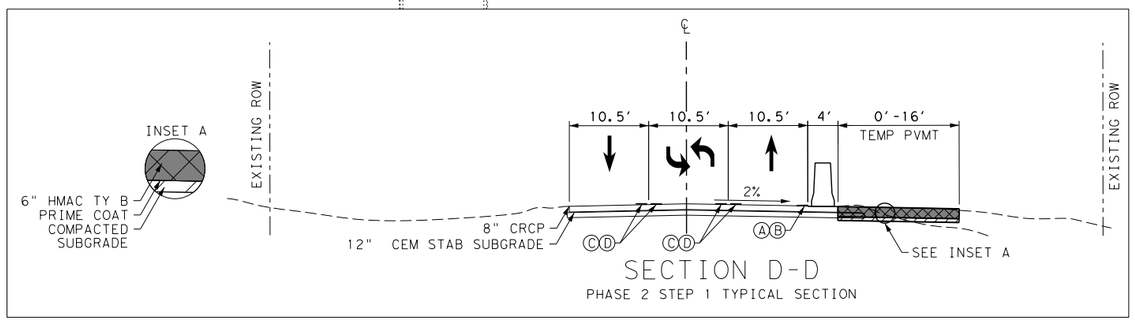
TEMP PVMT
147 SY

END TEMP PVMT
STA 122+27.90
OFF 31.00'RT

CL 114TH STREET

TIE TO EXISTING
STA 123+46.00
OFF 29.60' RT

NOTE:
CONTRACTOR SHALL COORDINATE
WITH CITY OF LUBBOCK FOR SPECIAL
ADJUSTMENTS TO TRAFFIC SIGNAL
FOR EACH PHASE OF TRAFFIC CONTROL
7 DAYS PRIOR TO TRAFFIC SHIFT.



SECTION D-D
PHASE 2 STEP 1 TYPICAL SECTION

N

0 50' 100'
SCALE IN FEET

LEGEND

	TEMPORARY PAVEMENT
	CONSTRUCTED THIS PHASE
	PREVIOUSLY CONSTRUCTED
	WATER-FILLED BARRIER
	CHANNELIZING DEVICE
	WATER-FILLED BARRIER
	TYPE III BARRICADE
	WORK ZONE SIGN
	TRAFFIC DIRECTION
Ⓐ	WK ZN PAV MRK REMOV (REFL) TY I-C
Ⓑ	WK ZN PAV MRK REMOV (TRAF BTN) TY W
Ⓒ	WK ZN PAV MRK REMOV (REFL) TY II-A-A
Ⓓ	WK ZN PAV MRK REMOV (TRAF BTN) TY Y
Ⓔ	WK ZN PAV MRK REMOV (Y) (24") (SLD)
A-X	ONE OF TWO DRIVEWAYS TO REMAIN OPEN
B-X	BUILD IN HALF-WIDTH

STATE OF TEXAS
KEVIN MORRIS
105091
LICENSED
PROFESSIONAL ENGINEER

Kevin Morris 3-10-2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

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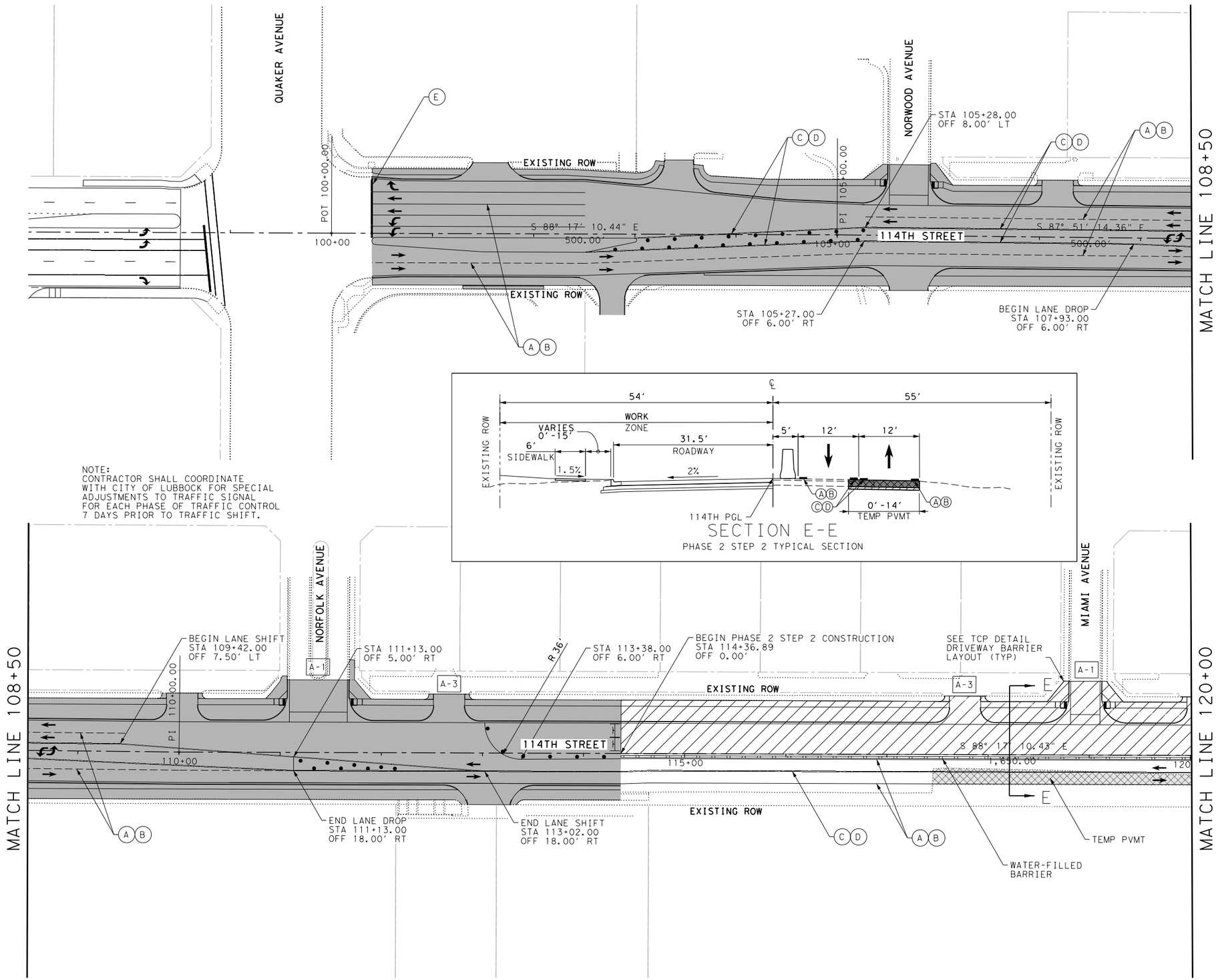
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
TRAFFIC CONTROL PLAN
PHASE ONE
STEP 3

SHEET 3 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	18
	0905	06	118	

$USER$
100.0000 ft / in.



SECTION E-E
PHASE 2 STEP 2 TYPICAL SECTION

NOTE:
CONTRACTOR SHALL COORDINATE WITH CITY OF LUBBOCK FOR SPECIAL ADJUSTMENTS TO TRAFFIC SIGNAL FOR EACH PHASE OF TRAFFIC CONTROL 7 DAYS PRIOR TO TRAFFIC SHIFT.

N

0 50' 100'
SCALE IN FEET

LEGEND

	TEMPORARY PAVEMENT
	CONSTRUCTED THIS PHASE
	PREVIOUSLY CONSTRUCTED
	WATER-FILLED BARRIER
	CHANNELIZING DEVICE
	WATER-FILLED BARRIER
	TYPE III BARRICADE
	WORK ZONE SIGN
	TRAFFIC DIRECTION
A	WK ZN PAV MRK REMOV (REFL) TY I-C
B	WK ZN PAV MRK REMOV (TRAF BTN) TY W
C	WK ZN PAV MRK REMOV (REFL) TY II-A-A
D	WK ZN PAV MRK REMOV (TRAF BTN) TY Y
E	WK ZN PAV MRK REMOV (Y) (24") (SLD)
A-X	ONE OF TWO DRIVEWAYS TO REMAIN OPEN
B-X	BUILD IN HALF-WIDTH

STATE OF TEXAS
KEVIN MORRIS
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114TH STREET
QUAKER AVE. TO INDIANA AVE.
TRAFFIC CONTROL PLAN
PHASE TWO
STEP 1
SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	19
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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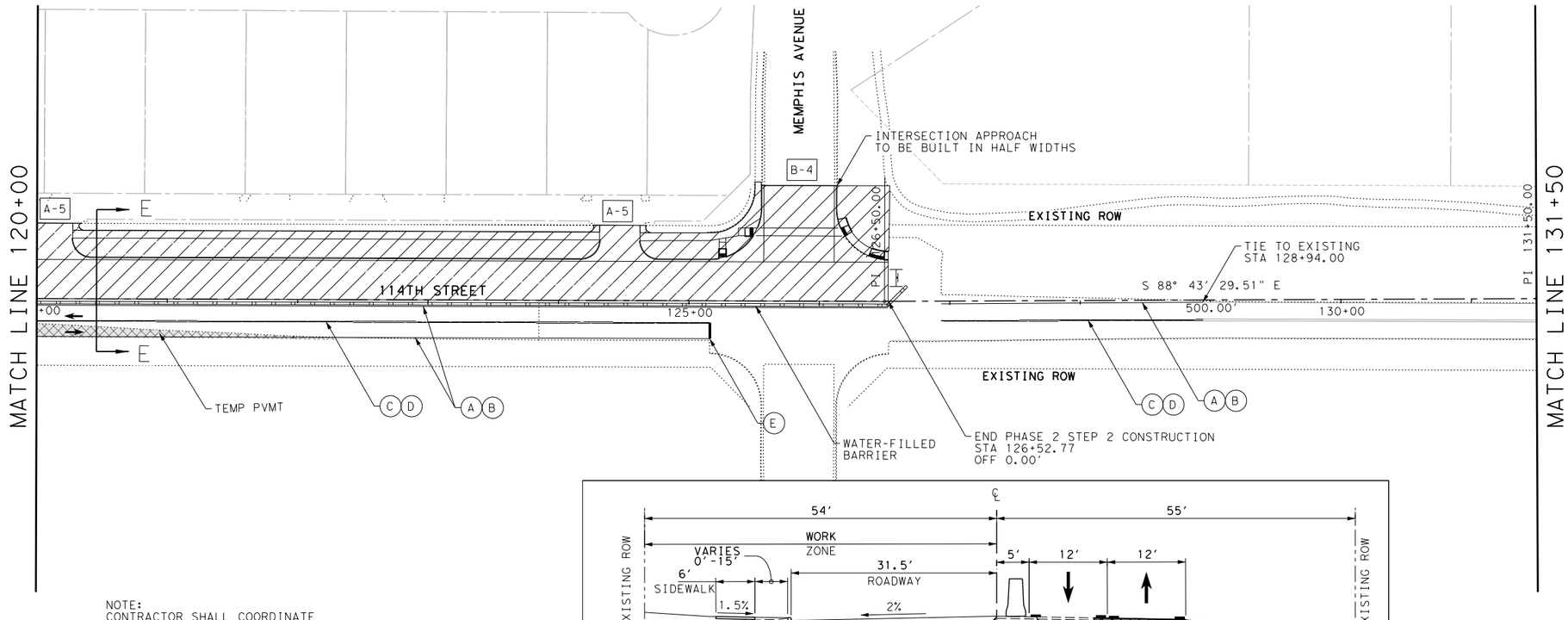
MATCH LINE 120+00

MATCH LINE 131+50



NOTE:
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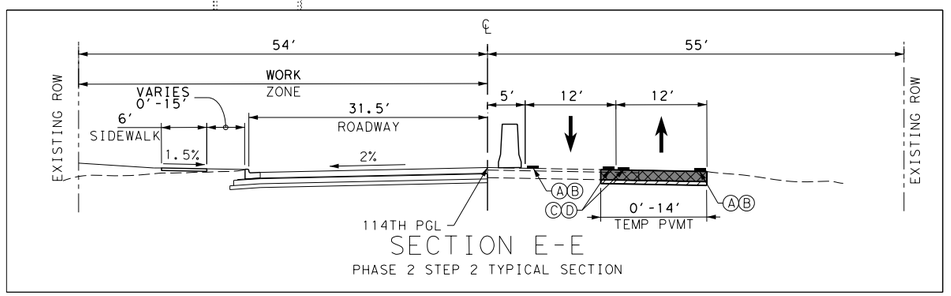

SECTION E-E
PHASE 2 STEP 2 TYPICAL SECTION

N

0 50' 100'
SCALE IN FEET

LEGEND

	TEMPORARY PAVEMENT
	CONSTRUCTED THIS PHASE
	PREVIOUSLY CONSTRUCTED
	WATER-FILLED BARRIER
	CHANNELIZING DEVICE
	WATER-FILLED BARRIER
	TYPE III BARRICADE
	WORK ZONE SIGN
	TRAFFIC DIRECTION
A	WK ZN PAV MRK REMOV (REFL) TY I-C
B	WK ZN PAV MRK REMOV (TRAF BTN) TY W
C	WK ZN PAV MRK REMOV (REFL) TY II-A-A
D	WK ZN PAV MRK REMOV (TRAF BTN) TY Y
E	WK ZN PAV MRK REMOV (Y) (24") (SLD)
A-X	ONE OF TWO DRIVEWAYS TO REMAIN OPEN
B-X	BUILD IN HALF-WIDTH

STATE OF TEXAS
KEVIN MORRIS
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PROFESSIONAL ENGINEER

Kevin Morris 3-10-2022

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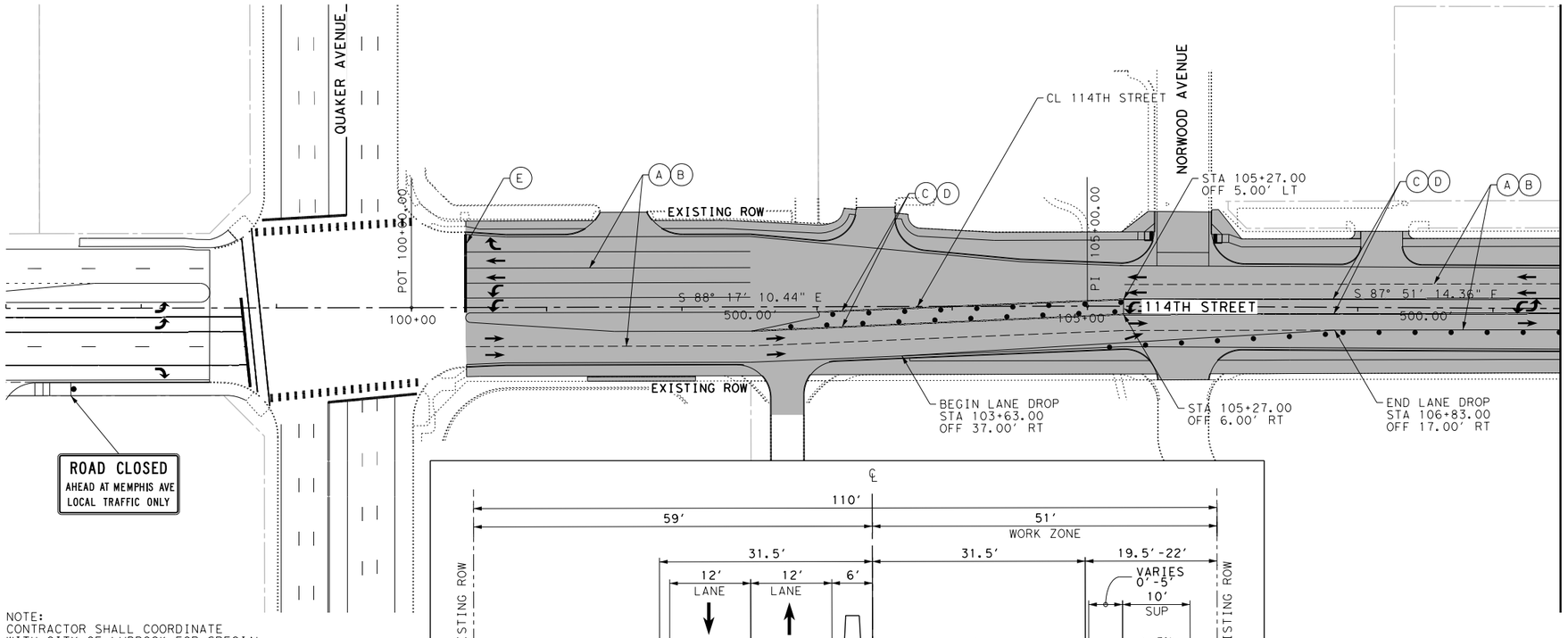
Texas Department of Transportation

114TH STREET
QUAKER AVE. TO INDIANA AVE.
TRAFFIC CONTROL PLAN
PHASE TWO
STEP 1

SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	20
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

$USER$
100.0000 ft / in.



NOTE:
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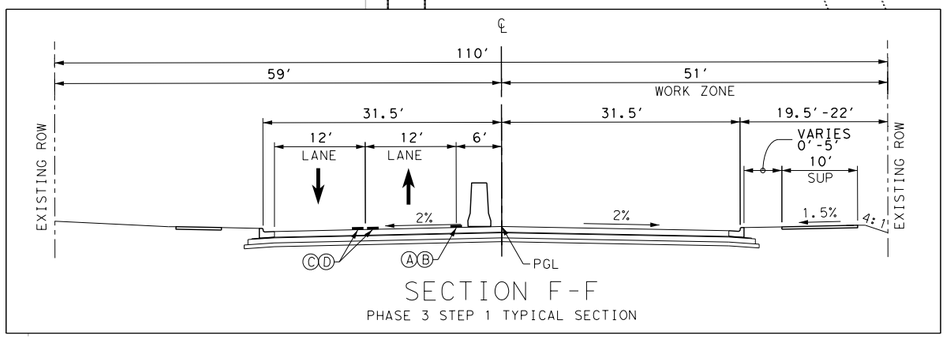
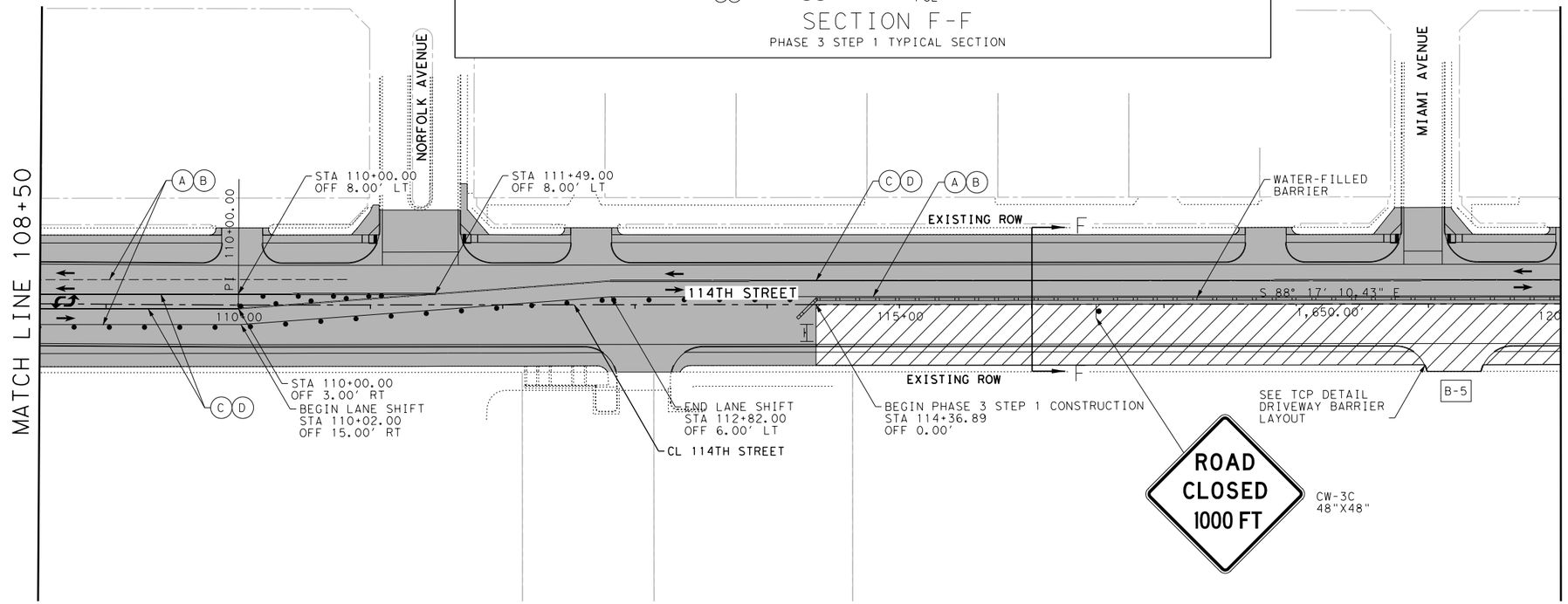
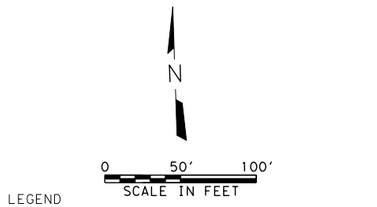


SECTION F-F
PHASE 3 STEP 1 TYPICAL SECTION





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114TH STREET
QUAKER AVE. TO INDIANA AVE.
TRAFFIC CONTROL PLAN
PHASE THREE
STEP 1
SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	21
	0905	06	118	

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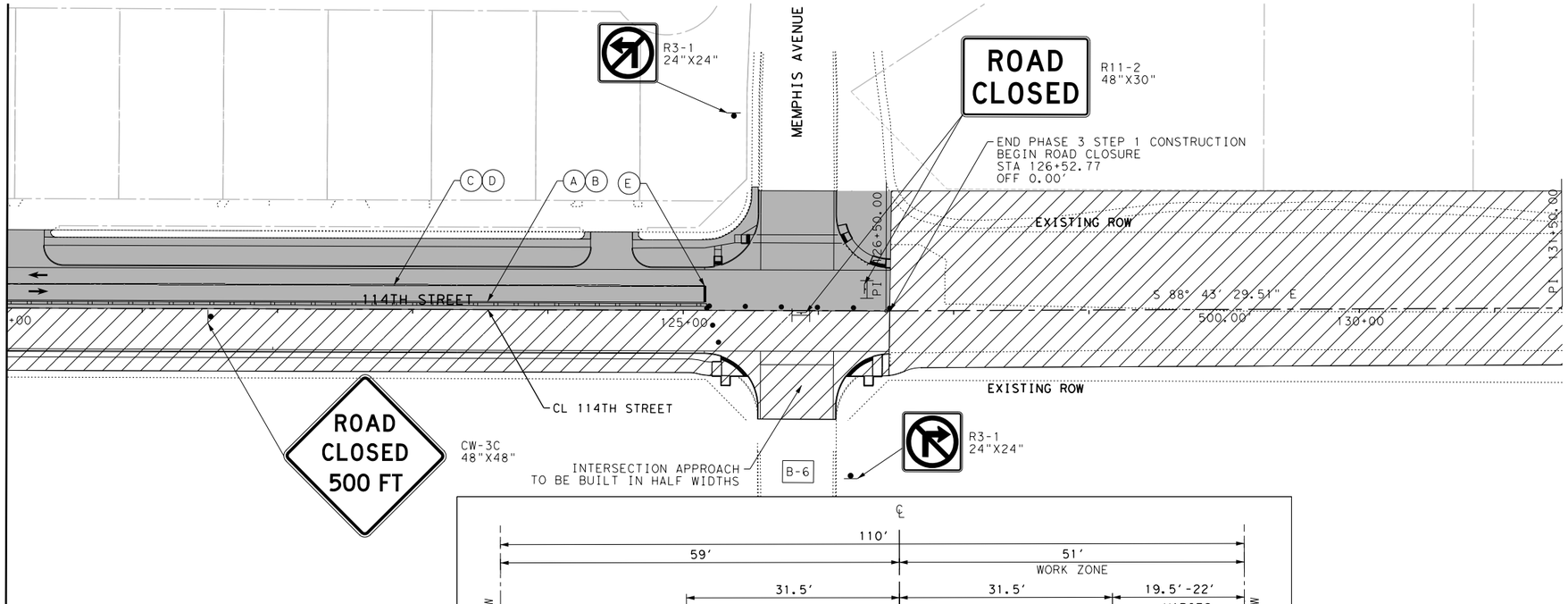

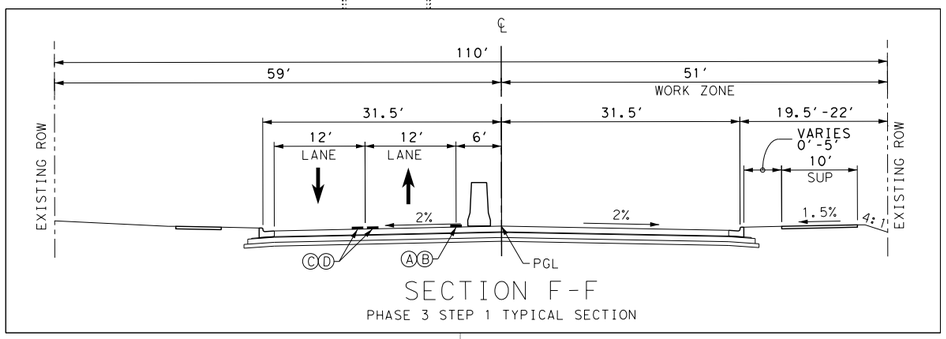

SECTION F-F
PHASE 3 STEP 1 TYPICAL SECTION

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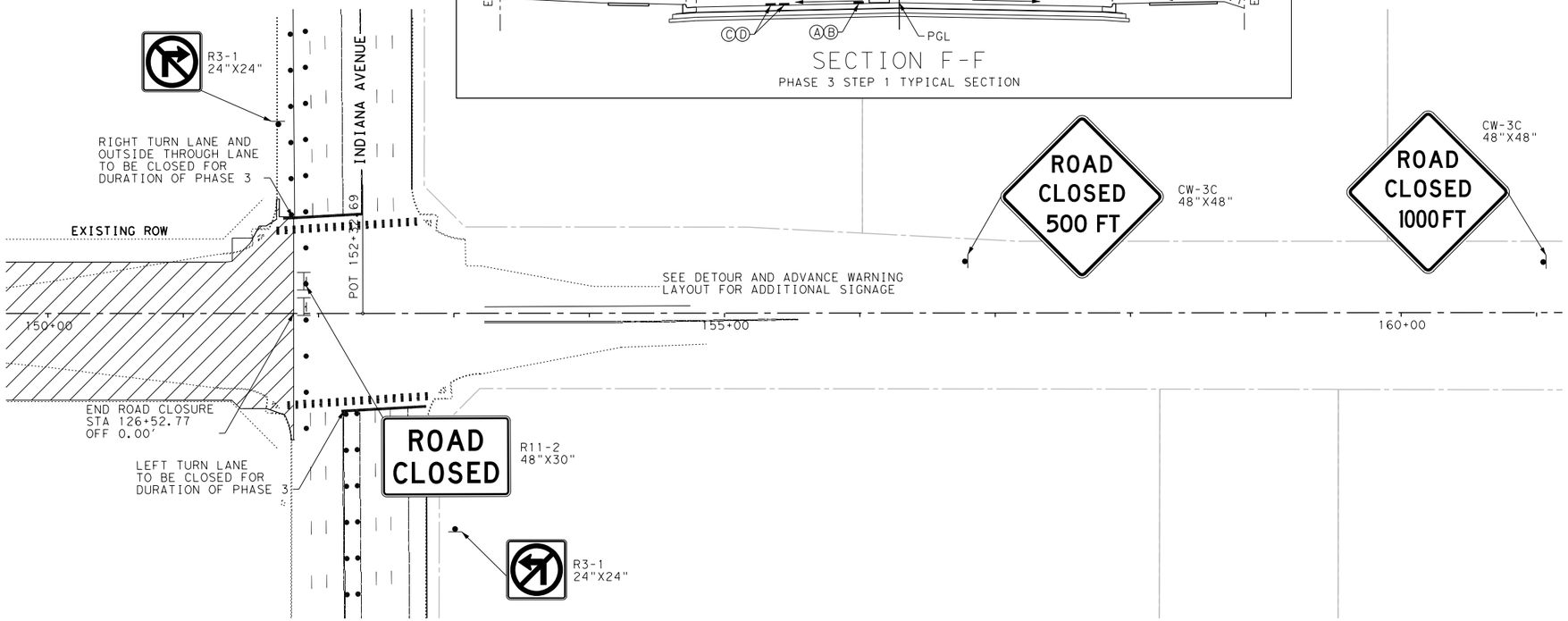

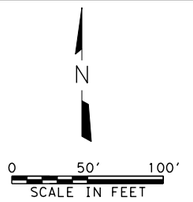

LEGEND

- TEMPORARY PAVEMENT
- CONSTRUCTED THIS PHASE
- PREVIOUSLY CONSTRUCTED
- WATER-FILLED BARRIER
- CHANNELIZING DEVICE
- WATER-FILLED BARRIER
- TYPE III BARRICADE
- WORK ZONE SIGN
- TRAFFIC DIRECTION
- (A) WK ZN PAV MRK REMOV (REFL) TY I-C
- (B) WK ZN PAV MRK REMOV (TRAF BTN) TY W
- (C) WK ZN PAV MRK REMOV (REFL) TY II-A-A
- (D) WK ZN PAV MRK REMOV (TRAF BTN) TY Y
- (E) WK ZN PAV MRK REMOV (Y) (24") (SLD)
- [A-X] ONE OF TWO DRIVEWAYS TO REMAIN OPEN
- [B-X] BUILD IN HALF-WIDTH

Kevin Morris 3-10-2022

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Texas Registered Engineering Firm F-2144

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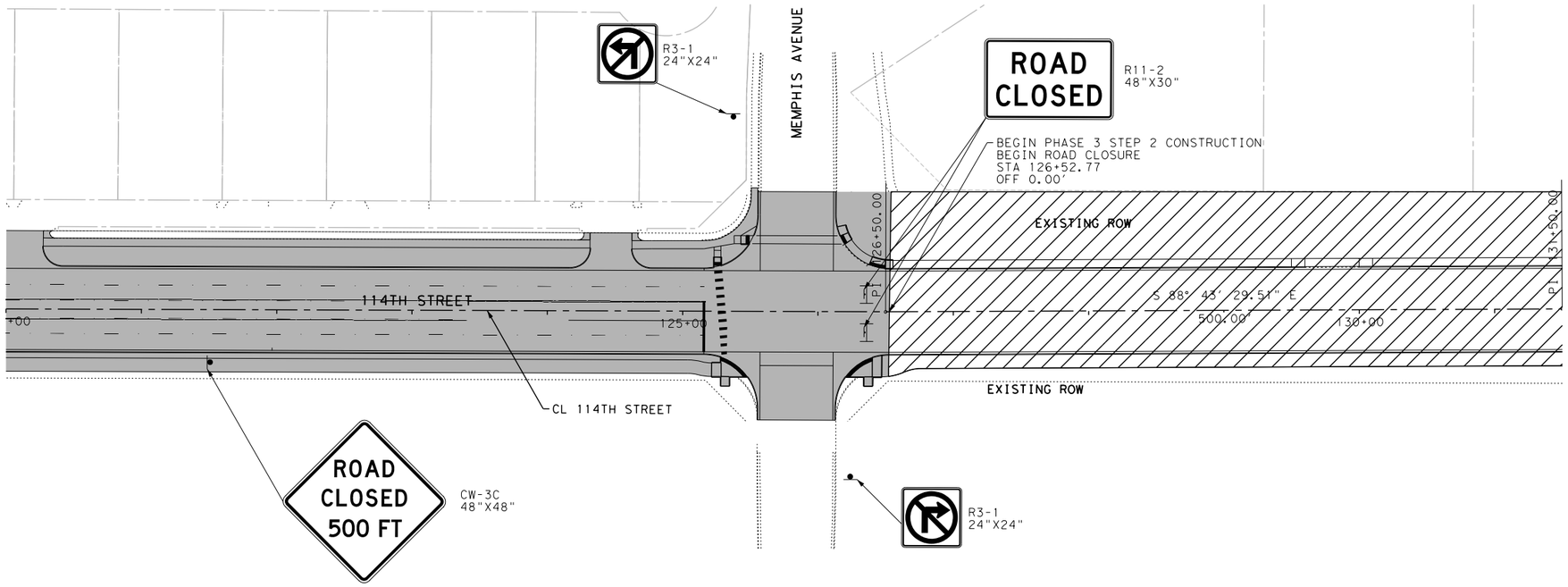
114TH STREET
QUAKER AVE. TO INDIANA AVE.
TRAFFIC CONTROL PLAN
PHASE THREE
STEP 1

SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	22
	0905	06	118	



NOTE:
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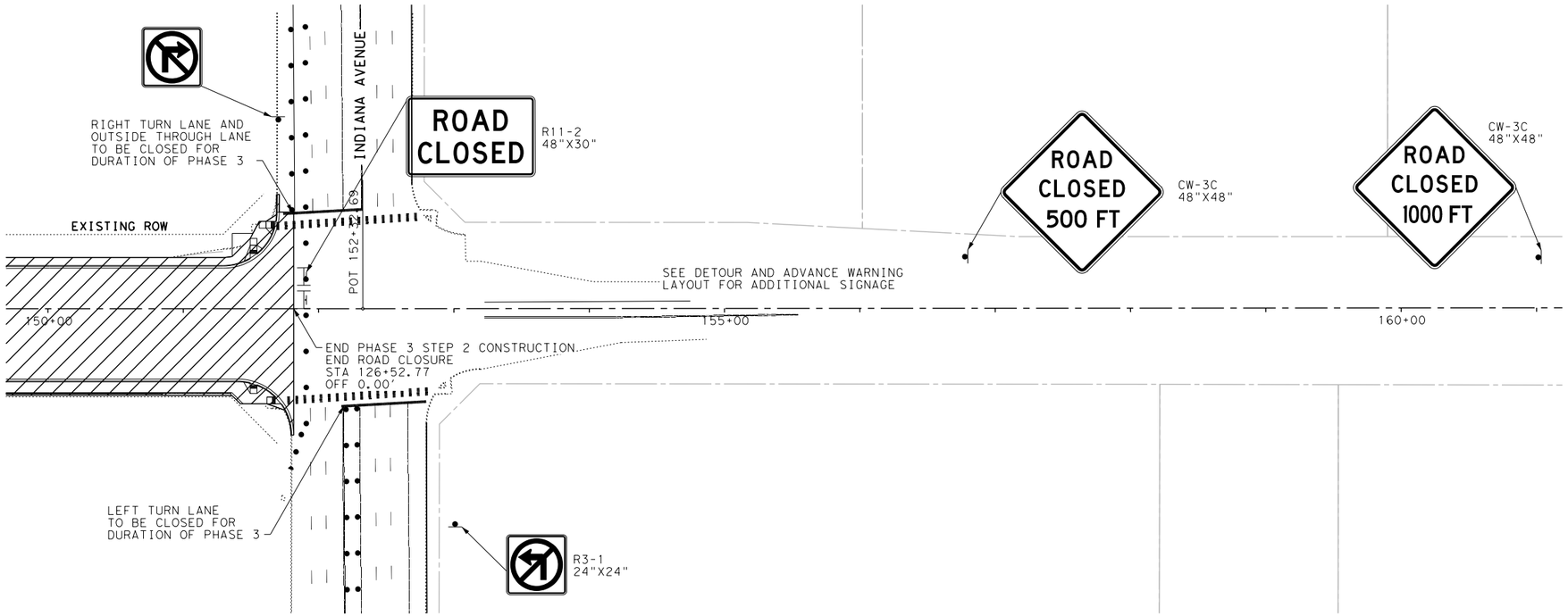
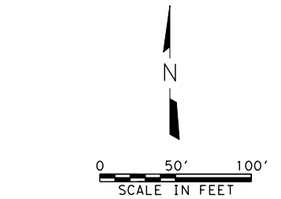
ADJUSTMENTS TO TRAFFIC SIGNAL
FOR EACH PHASE OF TRAFFIC CONTROL
7 DAYS PRIOR TO TRAFFIC SHIFT.





LEGEND

	TEMPORARY PAVEMENT
	CONSTRUCTED THIS PHASE
	PREVIOUSLY CONSTRUCTED
	WATER-FILLED BARRIER
	CHANNELIZING DEVICE
	WATER-FILLED BARRIER
	TYPE III BARRICADE
	WORK ZONE SIGN
	TRAFFIC DIRECTION
Ⓐ	WK ZN PAV MRK REMOV (REFL) TY I-C
Ⓑ	WK ZN PAV MRK REMOV (TRAF BTN) TY W
Ⓒ	WK ZN PAV MRK REMOV (REFL) TY II-A-A
Ⓓ	WK ZN PAV MRK REMOV (TRAF BTN) TY Y
Ⓔ	WK ZN PAV MRK REMOV (Y) (24") (SLD)
A-X	ONE OF TWO DRIVEWAYS TO REMAIN OPEN
B-X	BUILD IN HALF-WIDTH

STATE OF TEXAS
KEVIN MORRIS
105091
LICENSED
PROFESSIONAL ENGINEER

Kevin Morris 3-10-2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

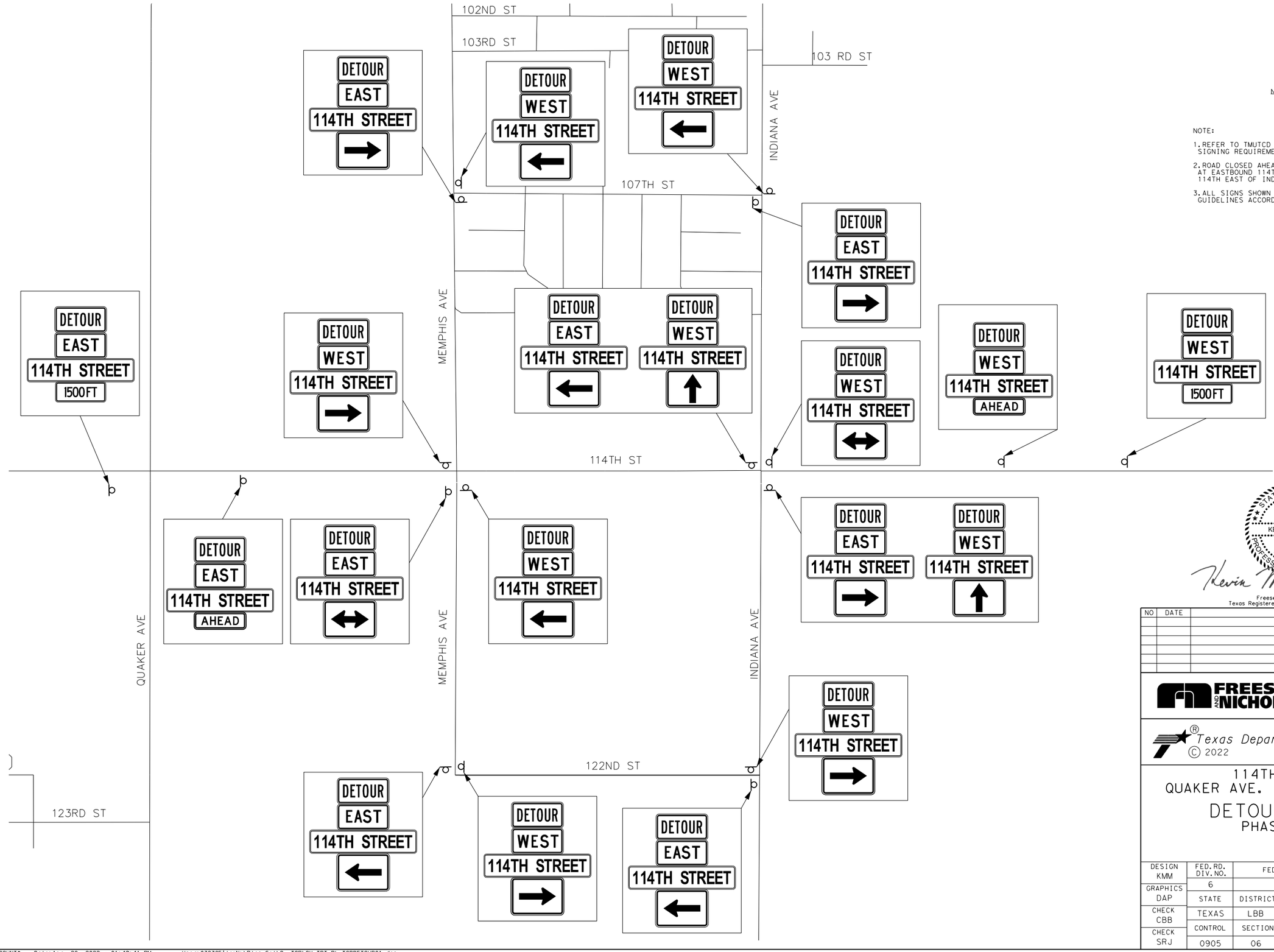
FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

Texas Department of Transportation

114TH STREET
QUAKER AVE. TO INDIANA AVE.
TRAFFIC CONTROL PLAN
PHASE THREE
STEP 2

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	23
	0905	06	118	



N

NOT TO SCALE

NOTE:

1. REFER TO TMUTCD FOR ADDITIONAL DETOUR SIGNING REQUIREMENTS.
2. ROAD CLOSED AHEAD AND DETOUR AHEAD SIGNAGE AT EASTBOUND 114TH WEST OF QUAKER AND WESTBOUND 114TH EAST OF INDIANA ACCORDING TO WZ(RCD)-13.
3. ALL SIGNS SHOWN ARE SIZED FOR CONVENTIONAL ROAD GUIDELINES ACCORDING TO TMUTCD.

STATE OF TEXAS
KEVIN MORRIS
105091
LICENSED PROFESSIONAL ENGINEER

Kevin Morris 4-28-2022

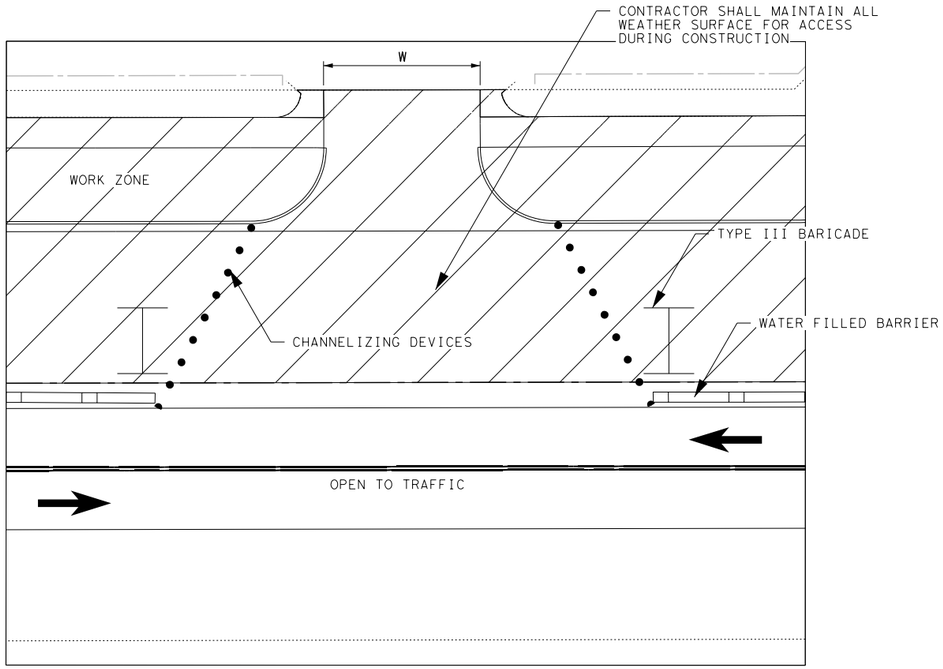
Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

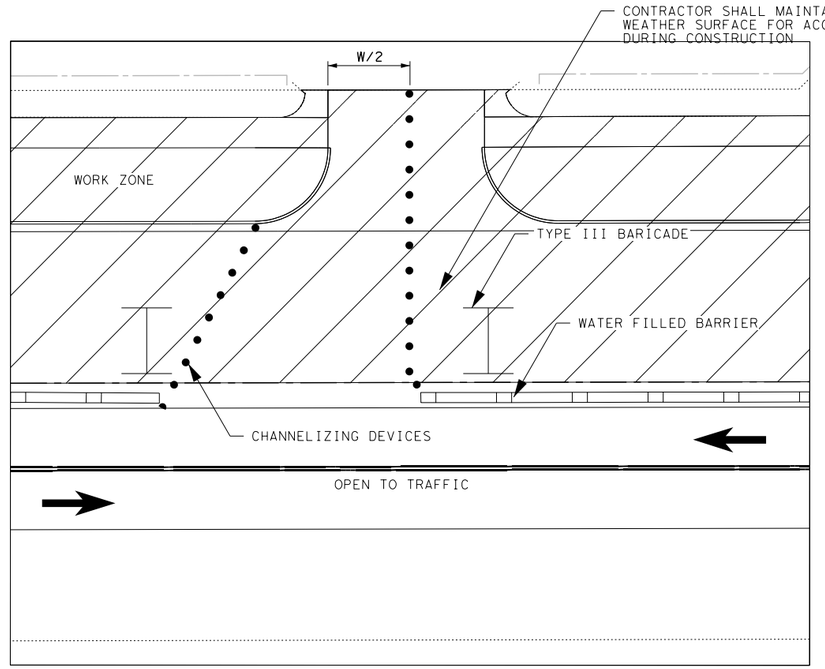
FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
DETOUR LAYOUT
PHASE THREE

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	24
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	



FULL ACCESS



HALF-ACCESS FOR BLOCK OUTS

TYPICAL BARRIER LAYOUTS AT DRIVEWAYS AND SIDE STREETS

STATE OF TEXAS
KEVIN MORRIS
105091
LICENSED
PROFESSIONAL ENGINEER

Kevin Morris 3-10-2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.

TCP DETAIL
DRIVEWAY BARRIER LAYOUT

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	25
	0905	06	118	

DATE:
FILE:

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

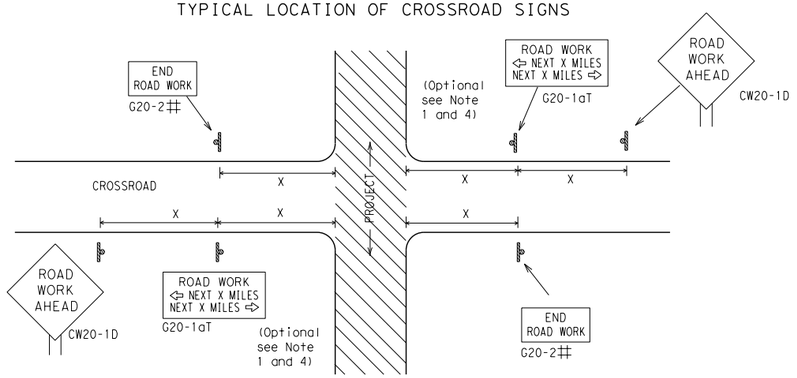
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	LBB	LUBBOCK		26
5-10 5-21				

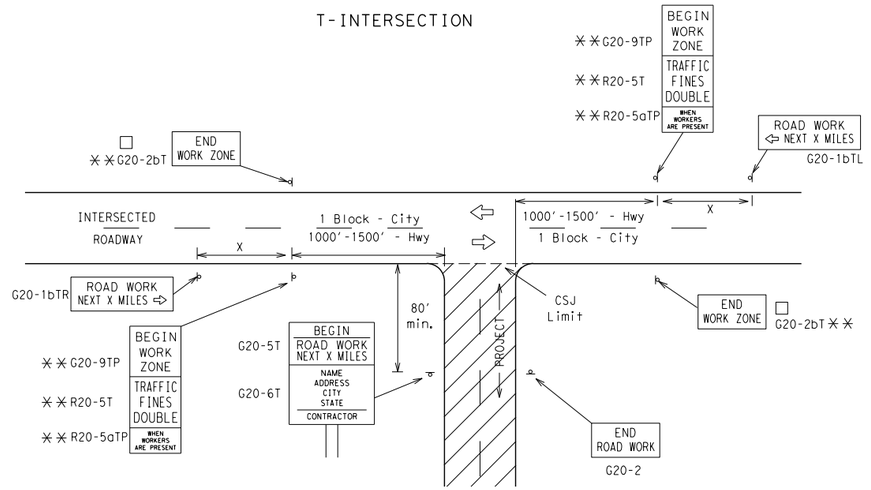
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

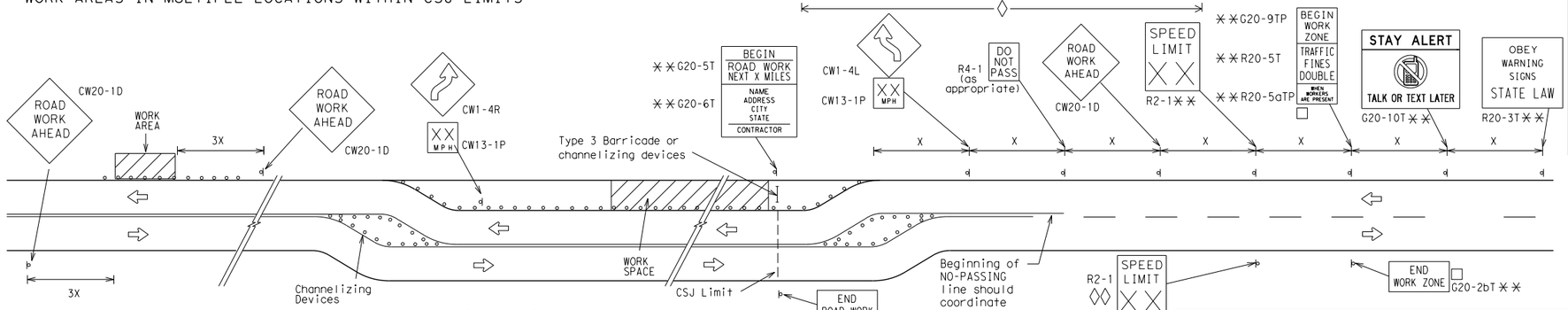
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

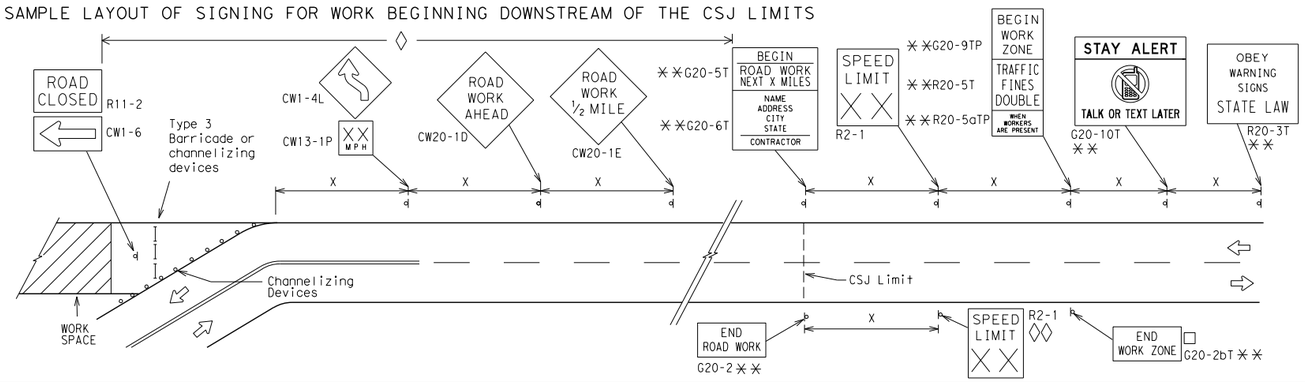
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	LUBBOCK		27

DATE:
FILE:

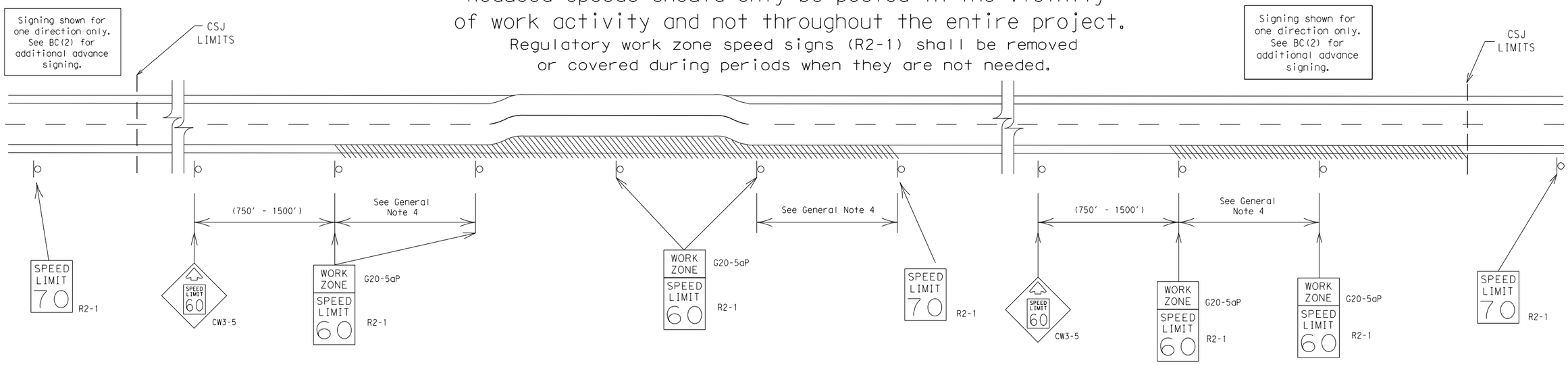
DATE:
FILE:

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

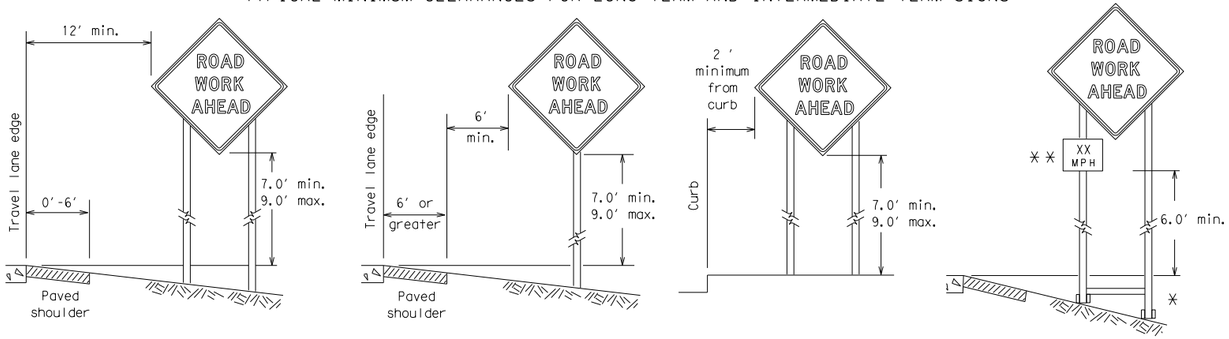
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	LUBBOCK		28

97

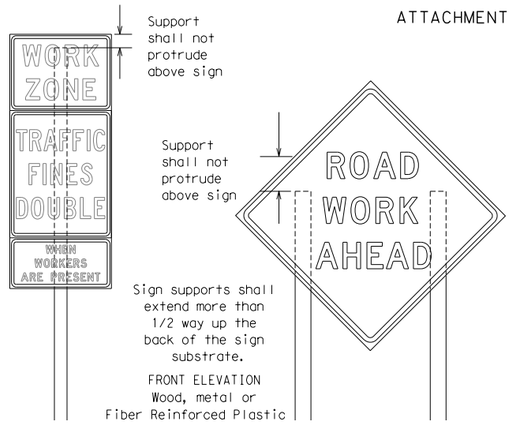
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

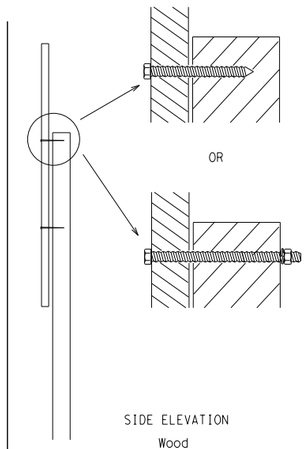


⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





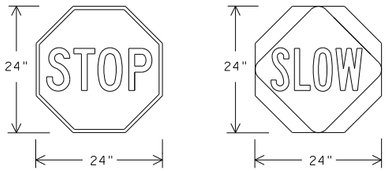
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

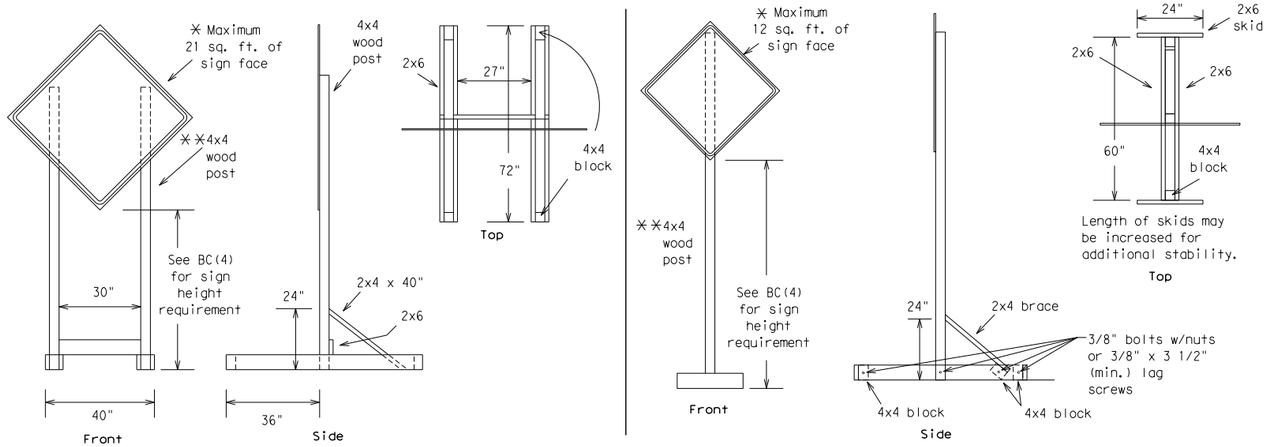
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

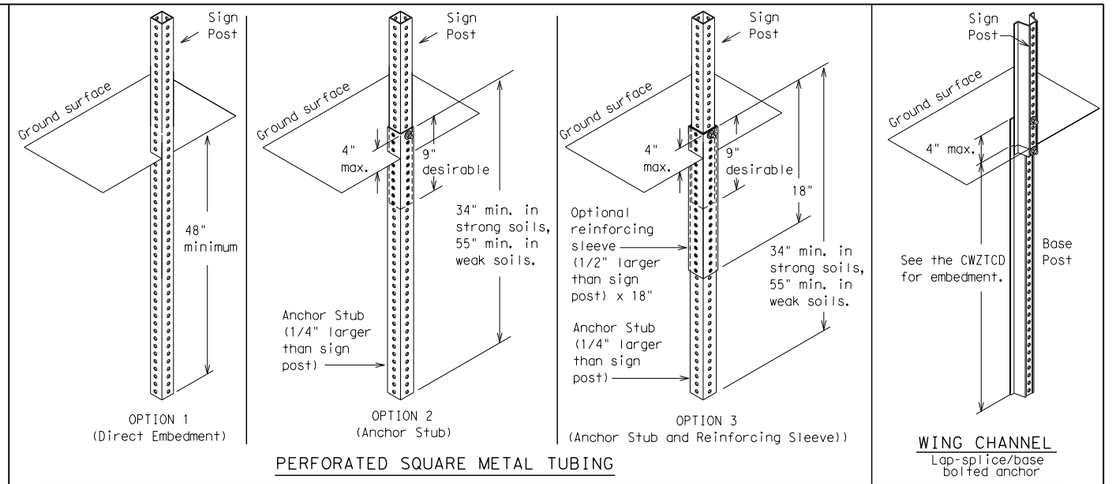
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	LUBBOCK		29

DATE:
FILE:



SKID MOUNTED WOOD SIGN SUPPORTS

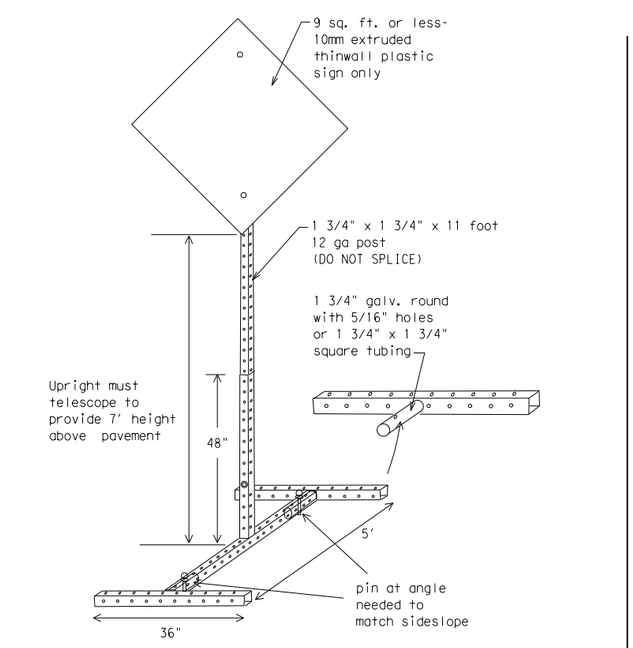
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

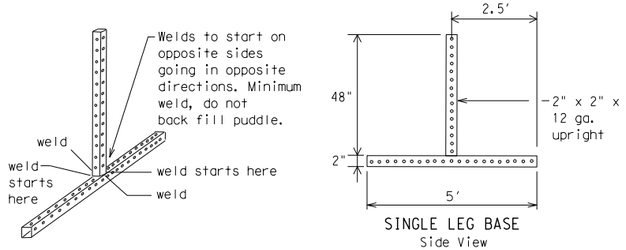


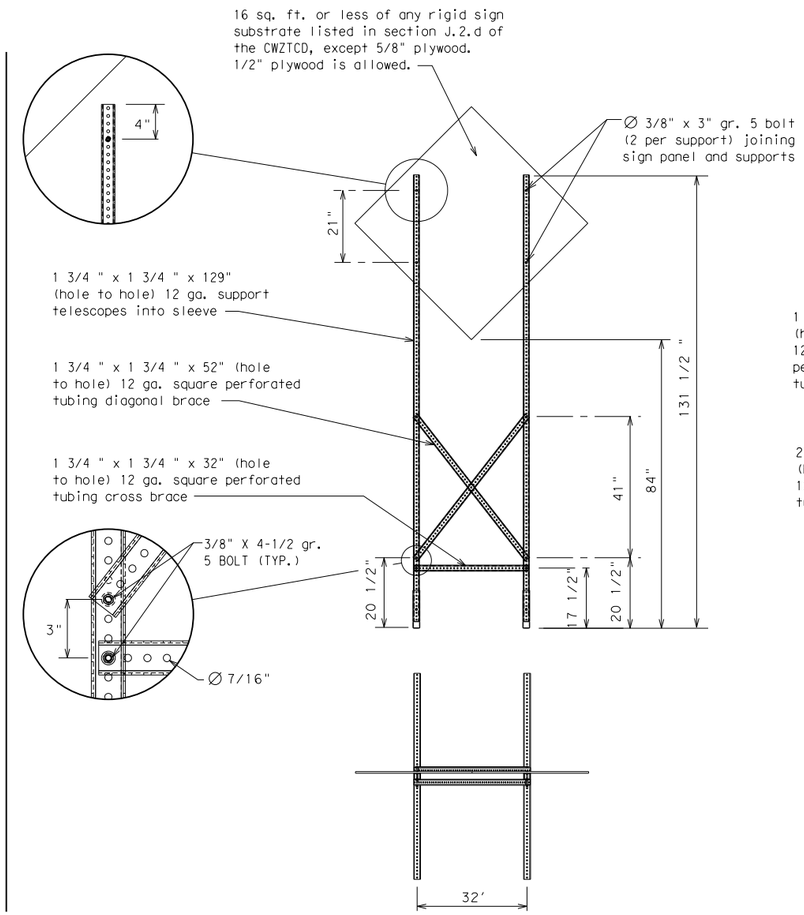
PERFORATED SQUARE METAL TUBING

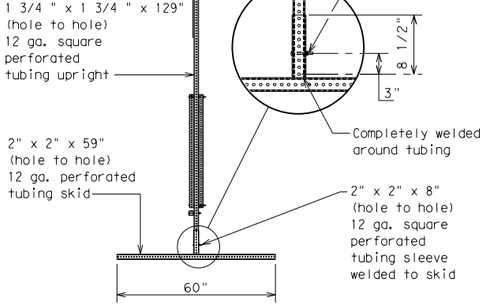
GROUND MOUNTED SIGN SUPPORTS

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









SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
9-07 8-14	DIST	COUNTY		SHEET NO.
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DATE:
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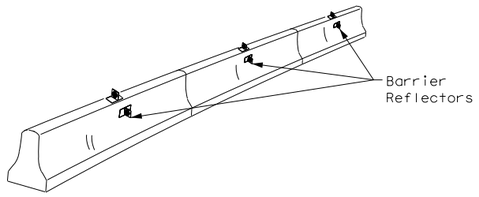
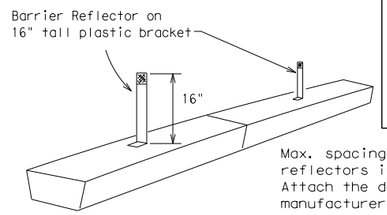
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



CONCRETE TRAFFIC BARRIER (CTB)

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

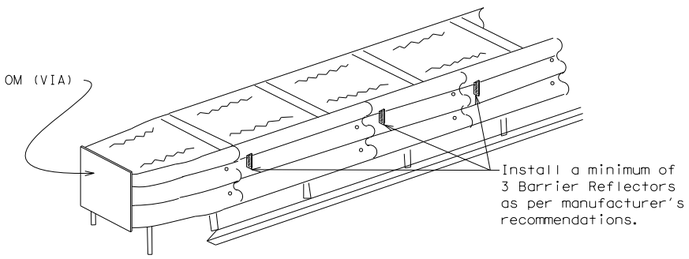


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

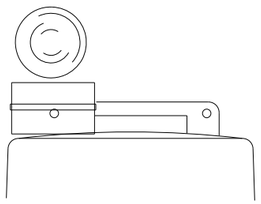


DELINEATION OF END TREATMENTS

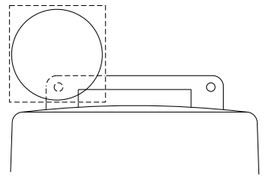
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

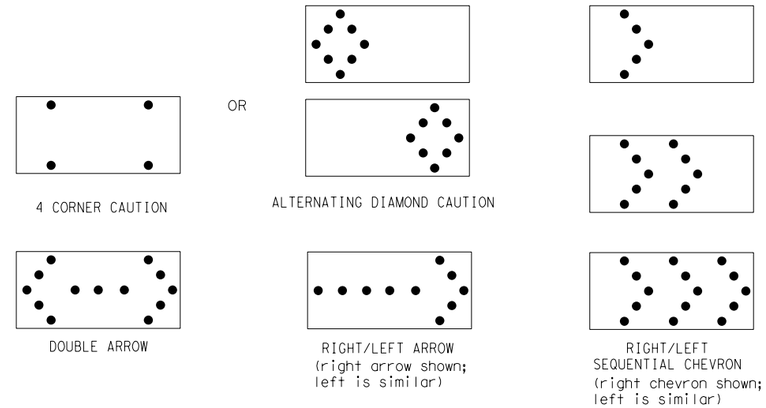
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



4 CORNER CAUTION

ALTERNATING DIAMOND CAUTION

DOUBLE ARROW

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

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

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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	LUBBOCK		32

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DATE:
FILE:

GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

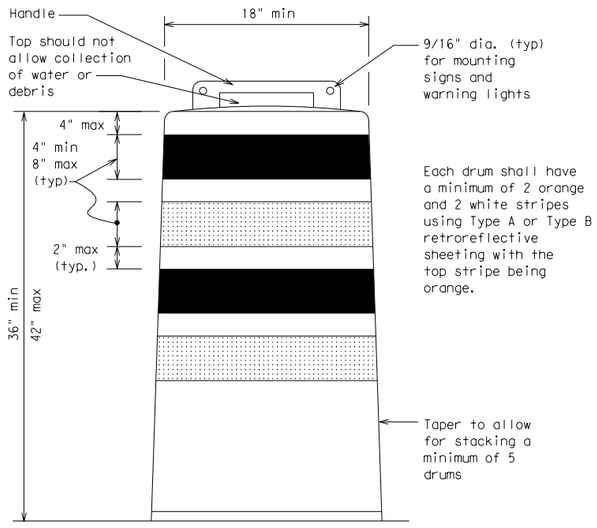
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

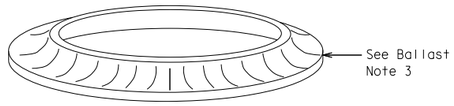
RETROREFLECTIVE SHEETING

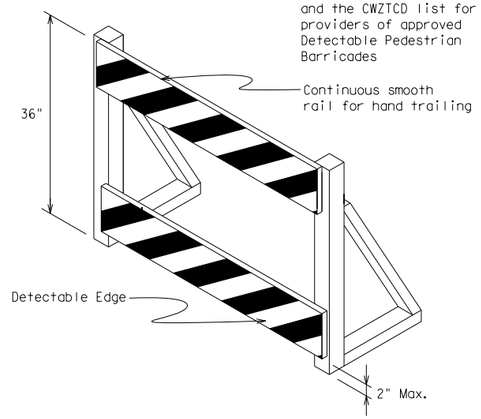
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

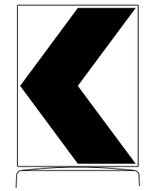




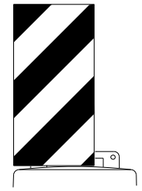


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	LBB	LUBBOCK		33
7-13				

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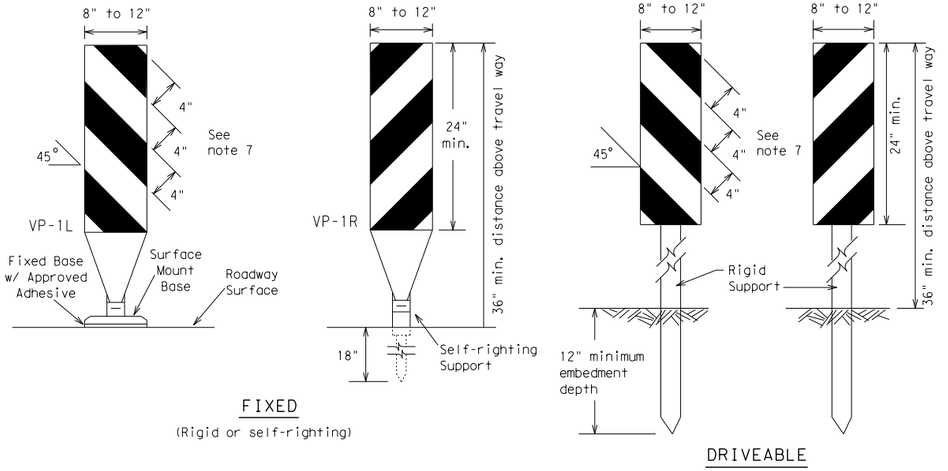
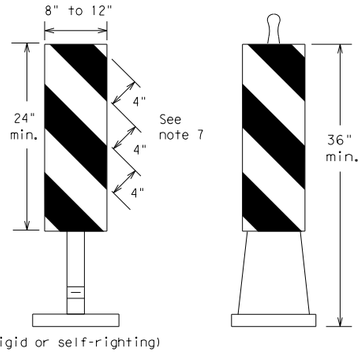


FIXED

(Rigid or self-righting)

DRIVEABLE

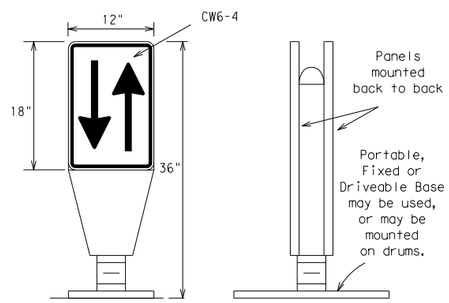


(Rigid or self-righting)

PORTABLE

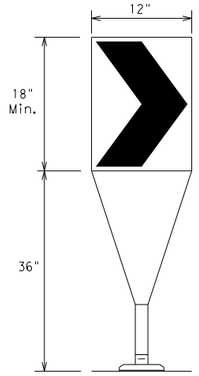
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



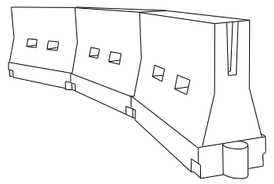
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

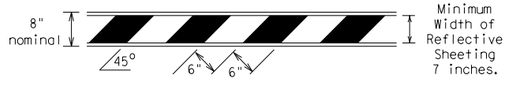
BC(9)-21

FILE:	bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS		0905	06	118	CS
9-07 8-14		DIST	COUNTY		SHEET NO.
7-13 5-21		LBB	LUBBOCK		34

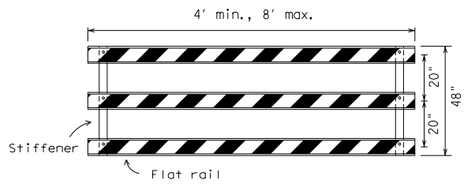
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



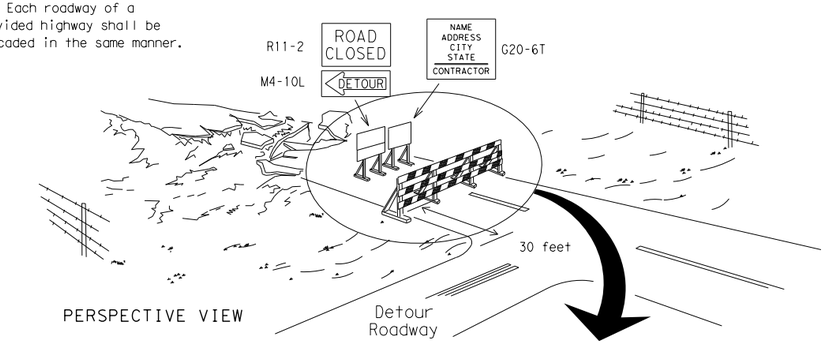
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES

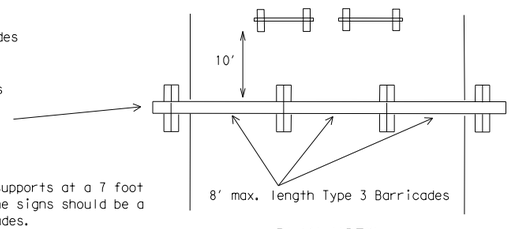
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

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

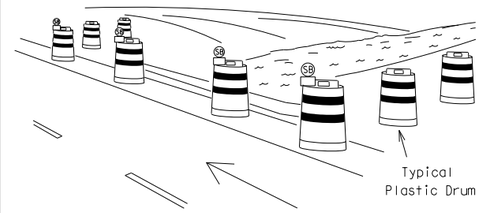
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

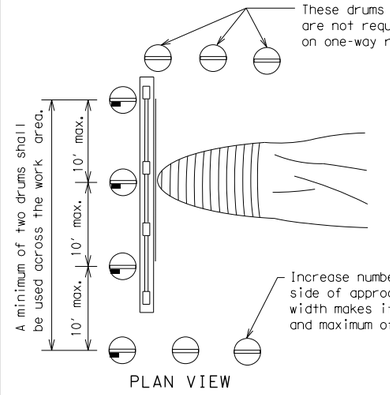
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

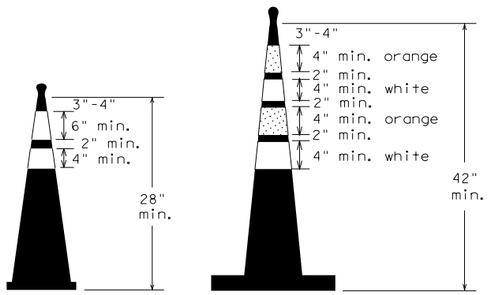
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



PLAN VIEW

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

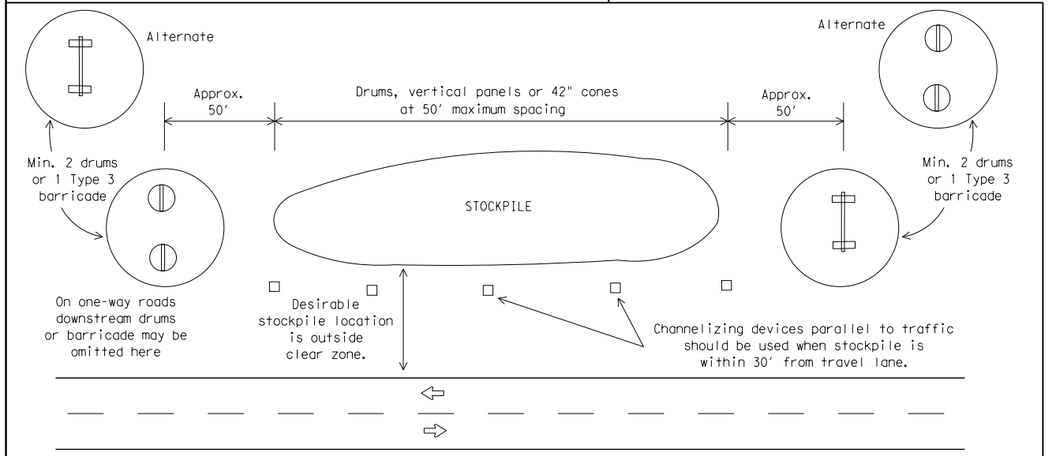
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

DATE:
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Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	LUBBOCK		35

DATE:
FILE:

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

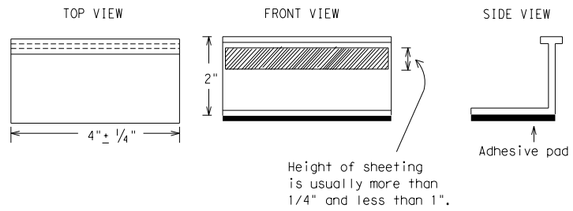
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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1-02 7-13	DIST	COUNTY		SHEET NO.
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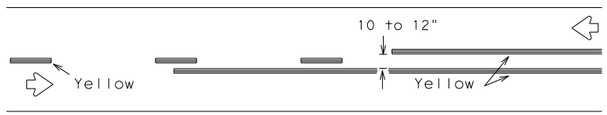
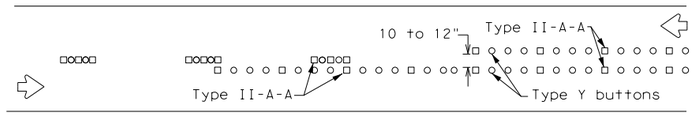
105

DATE:
FILE:

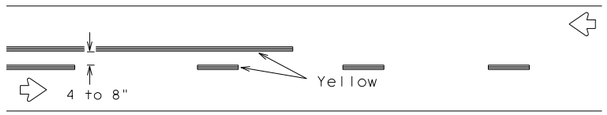
PAVEMENT MARKING PATTERNS



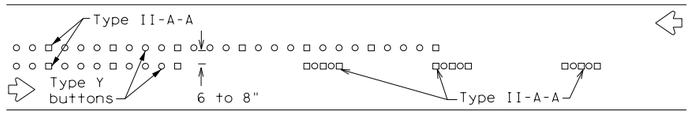
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



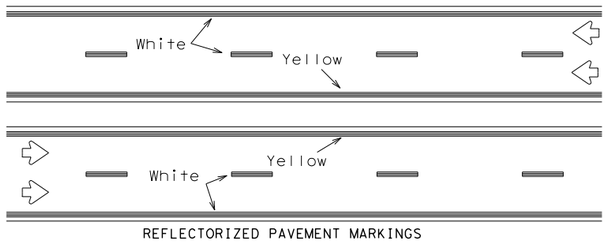
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



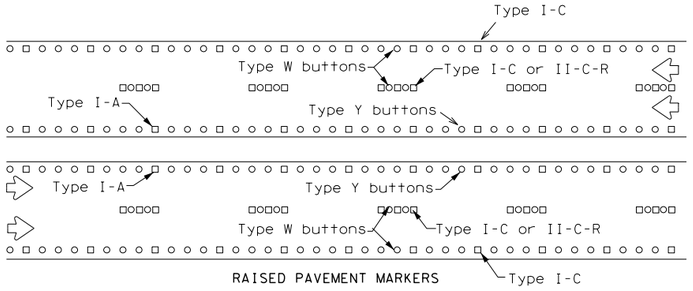
RAISED PAVEMENT MARKERS - PATTERN B

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

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



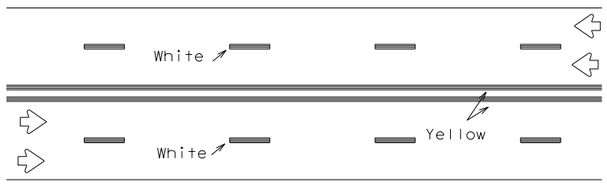
REFLECTORIZED PAVEMENT MARKINGS



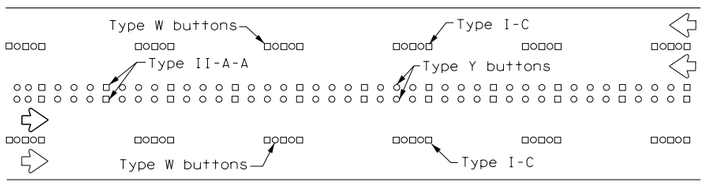
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



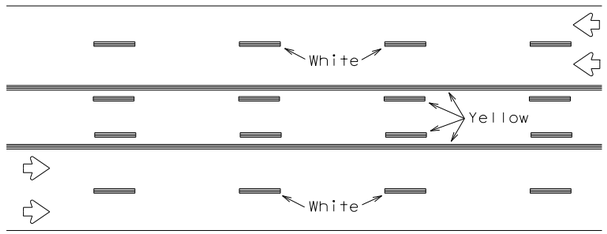
REFLECTORIZED PAVEMENT MARKINGS



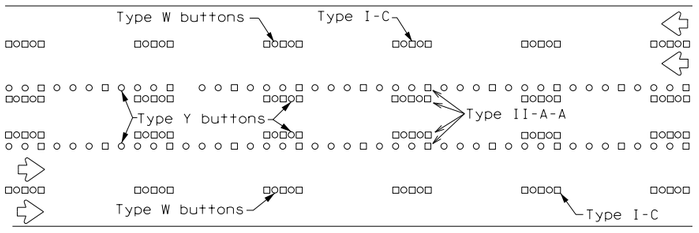
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

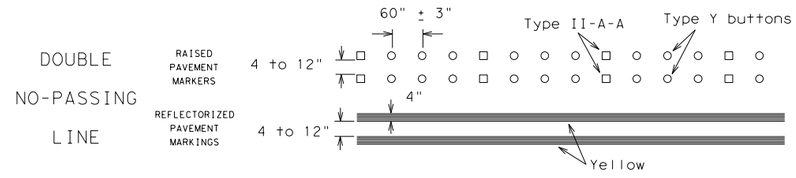
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

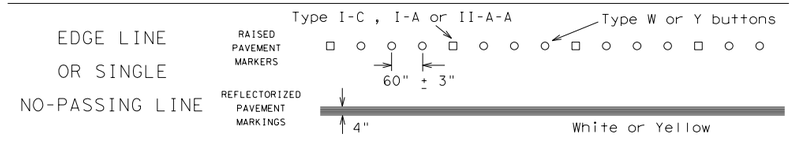
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

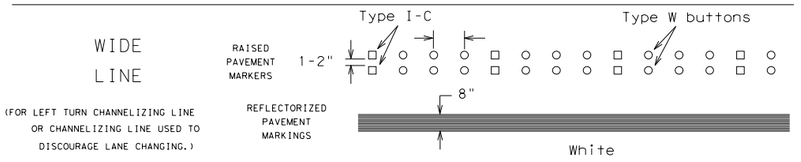


EDGE LINE OR SINGLE NO-PASSING LINE



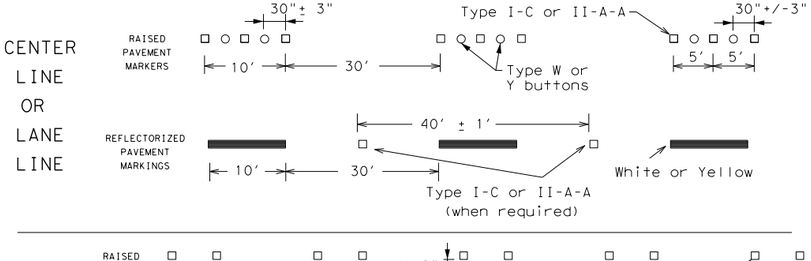
WIDE LINE

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

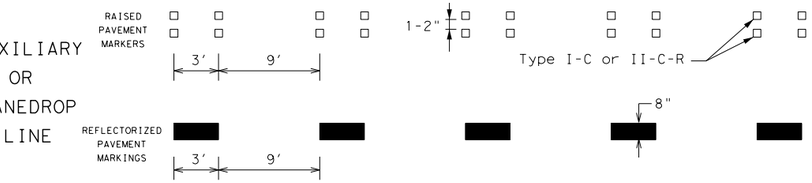


BROKEN LINES

CENTER LINE OR LANE LINE

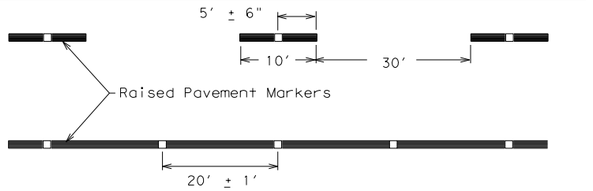


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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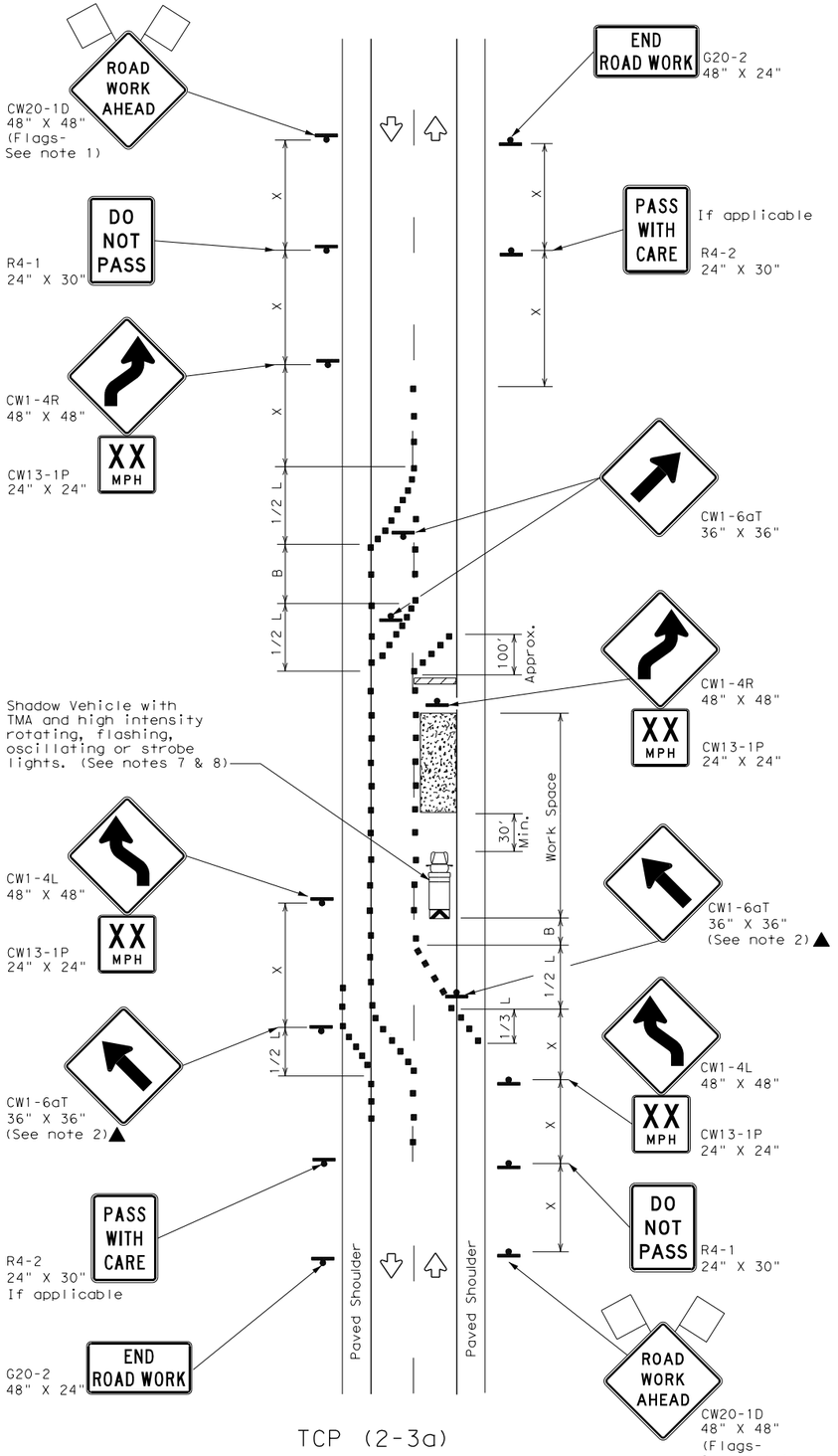
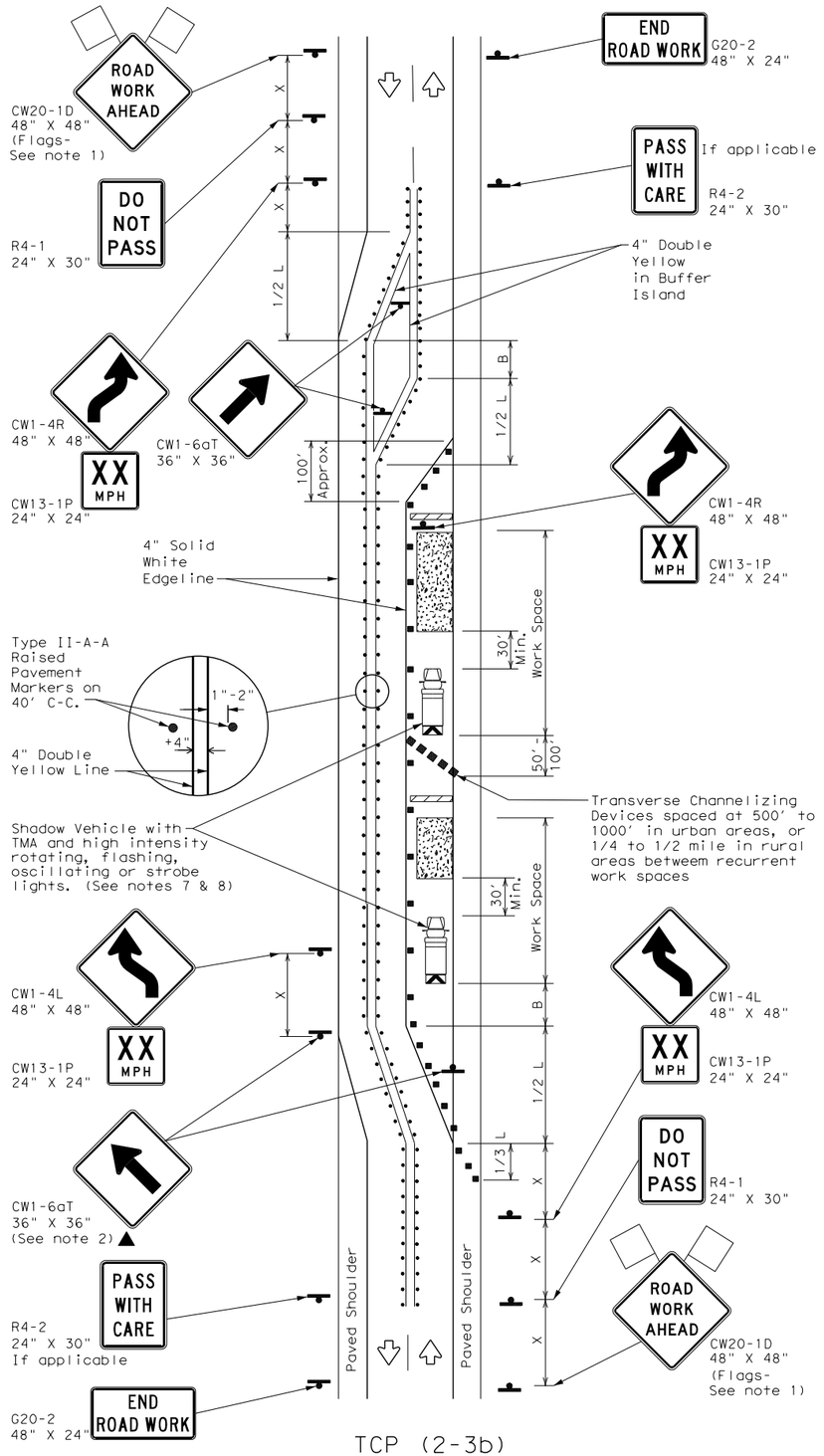


TCP (2-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



TCP (2-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Raised Pavement Markers Ty II-AA
	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
				TCP(2-3b)ONLY
			✓	✓

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. When work space will be in place less than three days existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.
4. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue.
5. The R4-1 "DO NOT PASS," R4-2 " PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained.
6. Conflicting pavement marking shall be removed for long term projects.
7. 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.
8. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-3a)

9. Conflicting pavement markings shall be removed for long-term projects. 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 device spacing is intended for the area of the conflicting markings, not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

TCP(2-3)-18

FILE: tcp(2-3)-18.dgn	DN:	CK:	DW:	CK:
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4-98 2-18				

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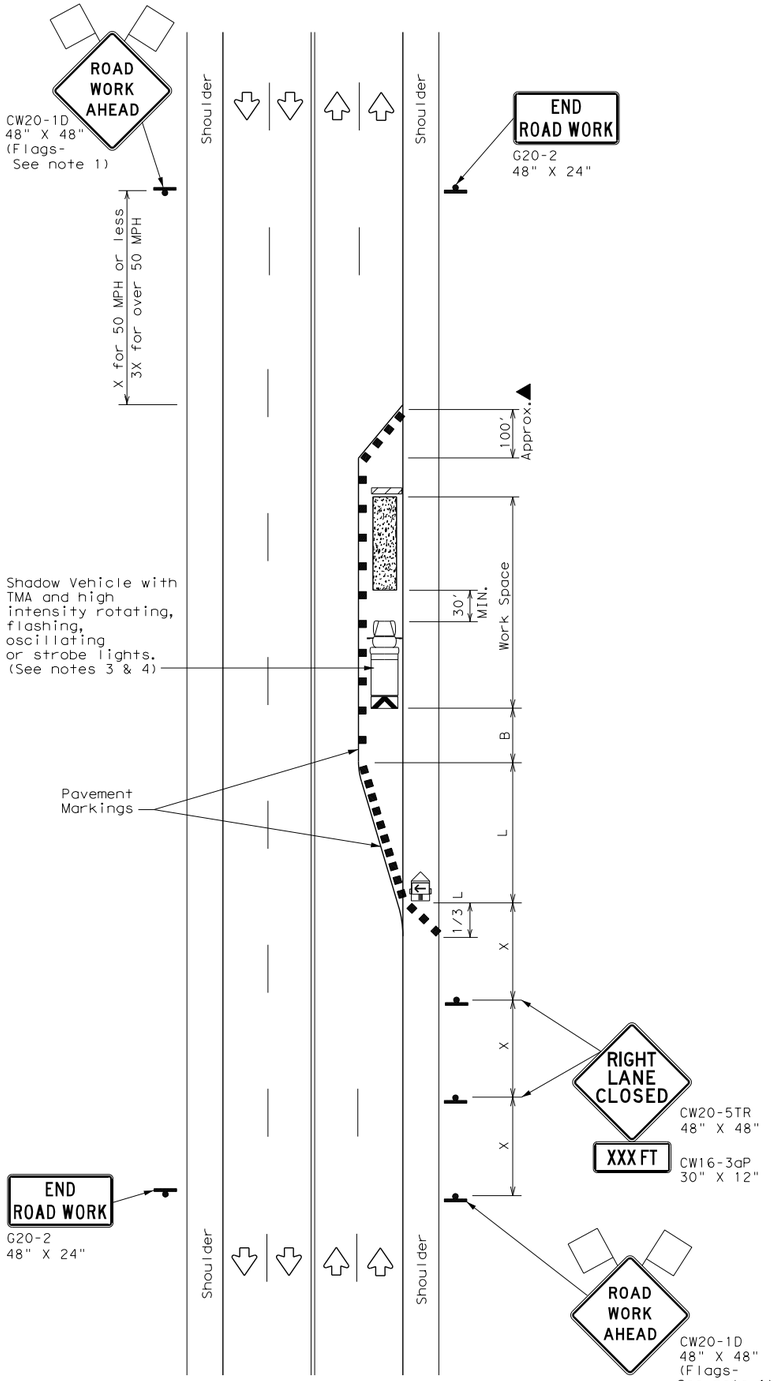
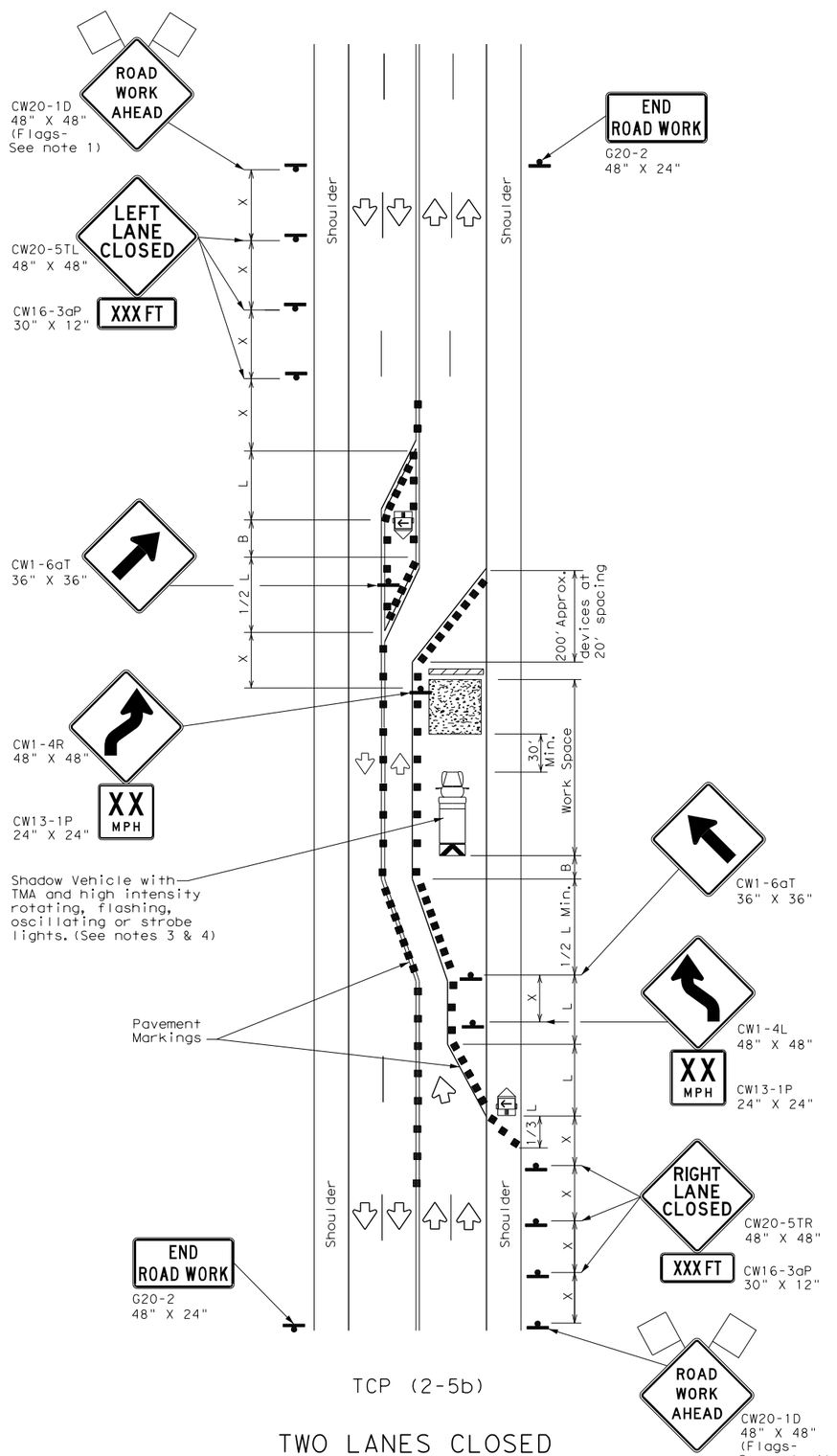


TCP (2-5a)

ONE LANE CLOSED



TCP (2-5b)

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. 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 eposure 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 substitutued for the Shadow Vehicle and TMA.
4. 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.
5. The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.

TCP (2-5a)

6. 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 (2-5b)

7. Conflicting pavement markings shall be removed for long-term projects.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
LONG TERM LANE CLOSURES
MULTILANE CONVENTIONAL RDS.

TCP(2-5)-18

FILE: tcp2-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 2-12	0905	06	118	CS
1-97 3-03	DIST	COUNTY		SHEET NO.
4-98 2-18	LBB	LUBBOCK		39

DATE:
FILE:

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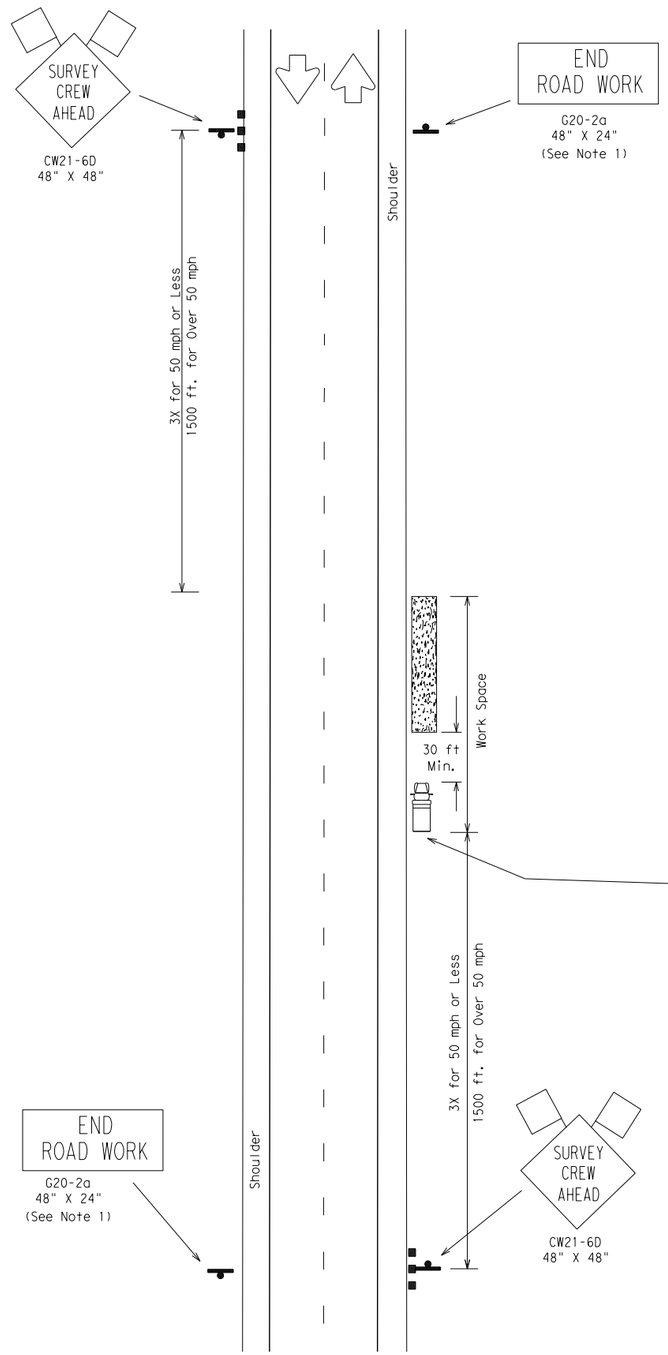
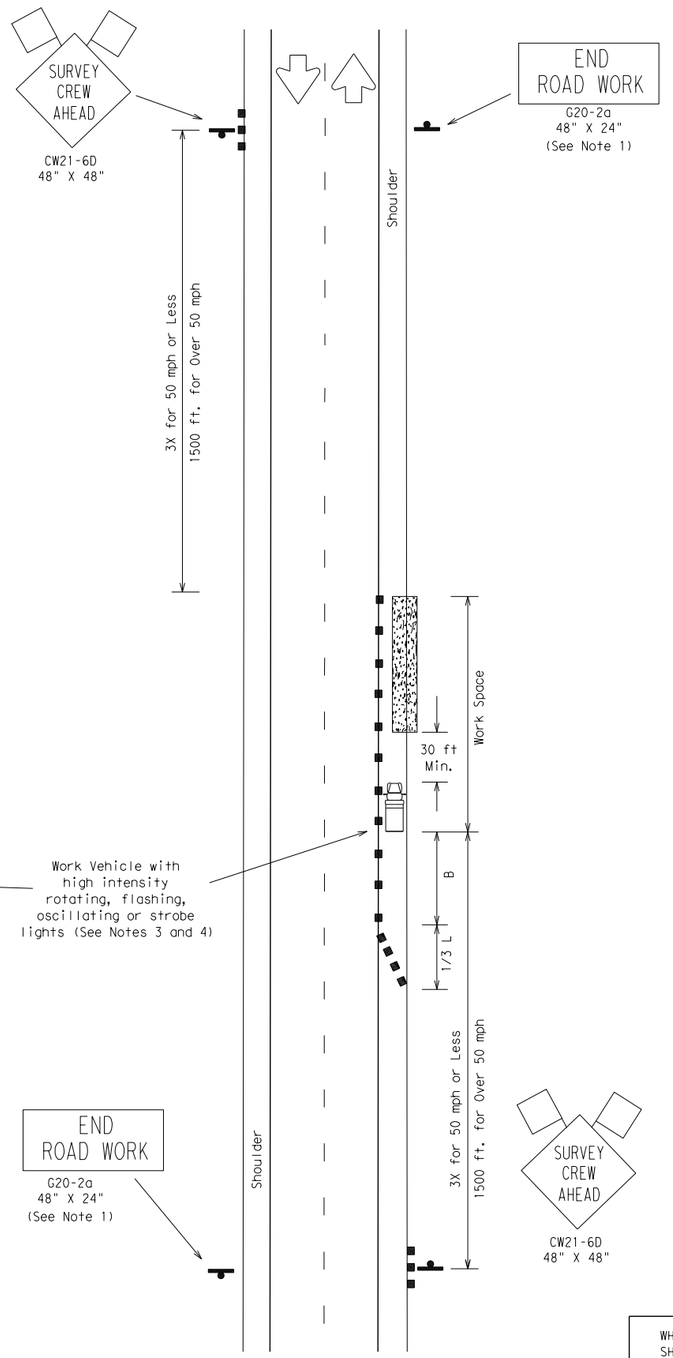


TCP (S-1a)
WORK OFF SHOULDER OR PAVED SURFACE



TCP (S-1b)
WORK ON SHOULDER

LEGEND

Type III Barricade | Channelizing Devices | Flag
Heavy Work Vehicle | Truck Mounted Attenuator (TMA)
Trailer Mounted Flashing Arrow Panel | Portable Changeable Message Sign (PCMS)
Flagger | Sign Post

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 10′ Offset	11′ Offset	12′ Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150′	165′	180′	30′	60′-75′	120′	90′
35		205′	225′	245′	35′	70′-90′	160′	120′
40		265′	295′	320′	40′	80′-100′	240′	155′
45	L=WS	450′	495′	540′	45′	90′-110′	320′	195′
50		500′	550′	600′	50′	100′-125′	400′	240′
55		550′	605′	660′	55′	110′-140′	500′	295′
60		600′	660′	720′	60′	120′-150′	600′	350′
65		650′	715′	780′	65′	130′-165′	700′	410′
70		700′	770′	840′	70′	140′-175′	800′	475′
75		750′	825′	900′	75′	150′-185′	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
	✓	✓		

DEFINITIONS:
SHORT DURATION - work that occupies a location up to 1 hour.
SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

GENERAL NOTES:

1. The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
2. Channelizing devices on the shoulder taper and tangent section may be omitted for short duration (less than 1 hour) work.
3. If line-of-sight requirements for surveying operations will preclude the placement of the Work Vehicle to protect workers, the channelizing devices mentioned in Note 2 are required.
1. 4. A Shadow Vehicle with a Truck Mounted Attenuator and flashing warning lights/arrow panel in caution mode may be used in lieu of the Work Vehicle to protect the work space.
5. The CW20-1D "ROAD WORK AHEAD" sign may be substituted for the CW21-6D "SURVEY CREW AHEAD" sign.
6. This plan may also be used for shoulder work or off shoulder work for multilane undivided roadways.
7. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.

TCP(S-1a)

8. Cones may be placed at edge of pavement adjacent to the work space to enhance safety.

WHENEVER POSSIBLE, SURVEY PARTIES SHOULD AVOID, BY THE USE OF OFFSET LINES, ANY UNNECCESSARY PERIODS OF TIME ON THE ROAD SURFACE.

8-18-08 Revision
1 Corrected misspelling.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-1)-08A

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

REVISIONS
8-08

CONT	SECT	JOB	HIGHWAY
0905	06	118	CS
DIST	COUNTY		SHEET NO.
LBB	LUBBOCK		40

DATE:
FILE:

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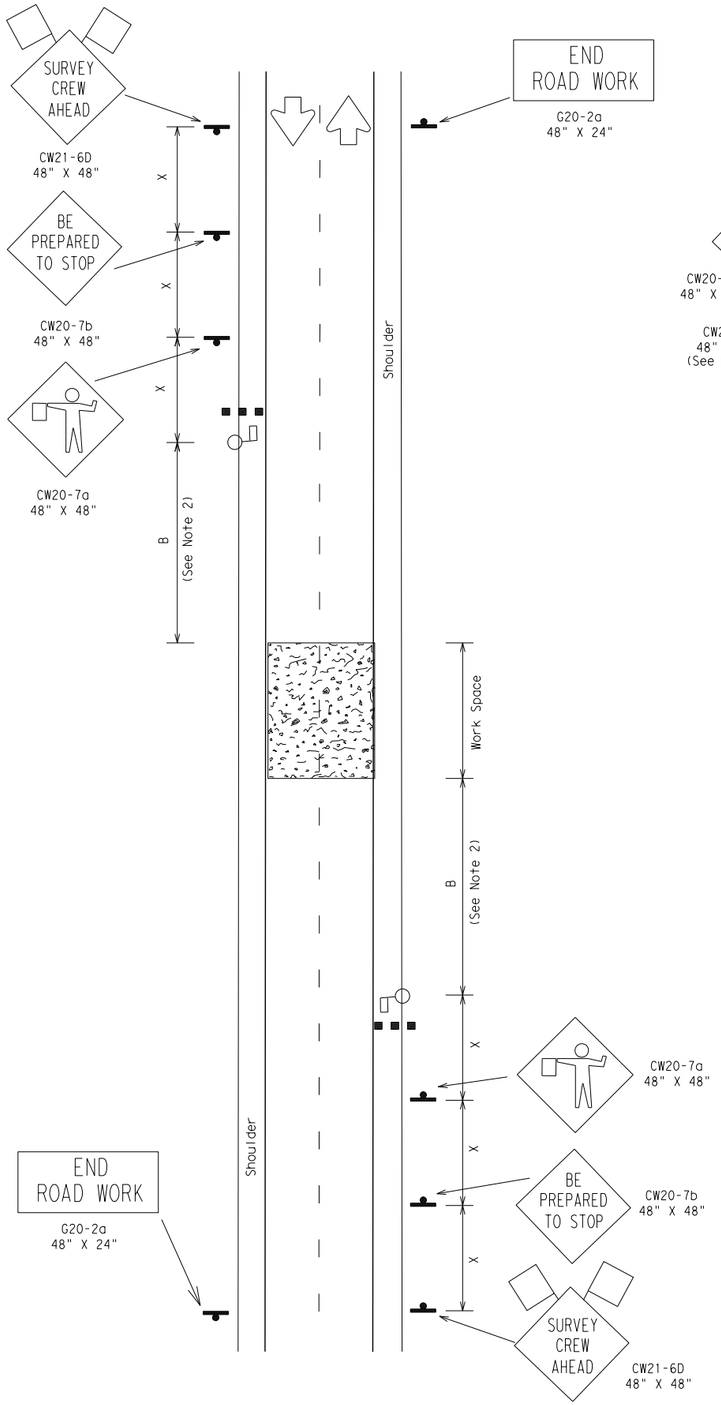
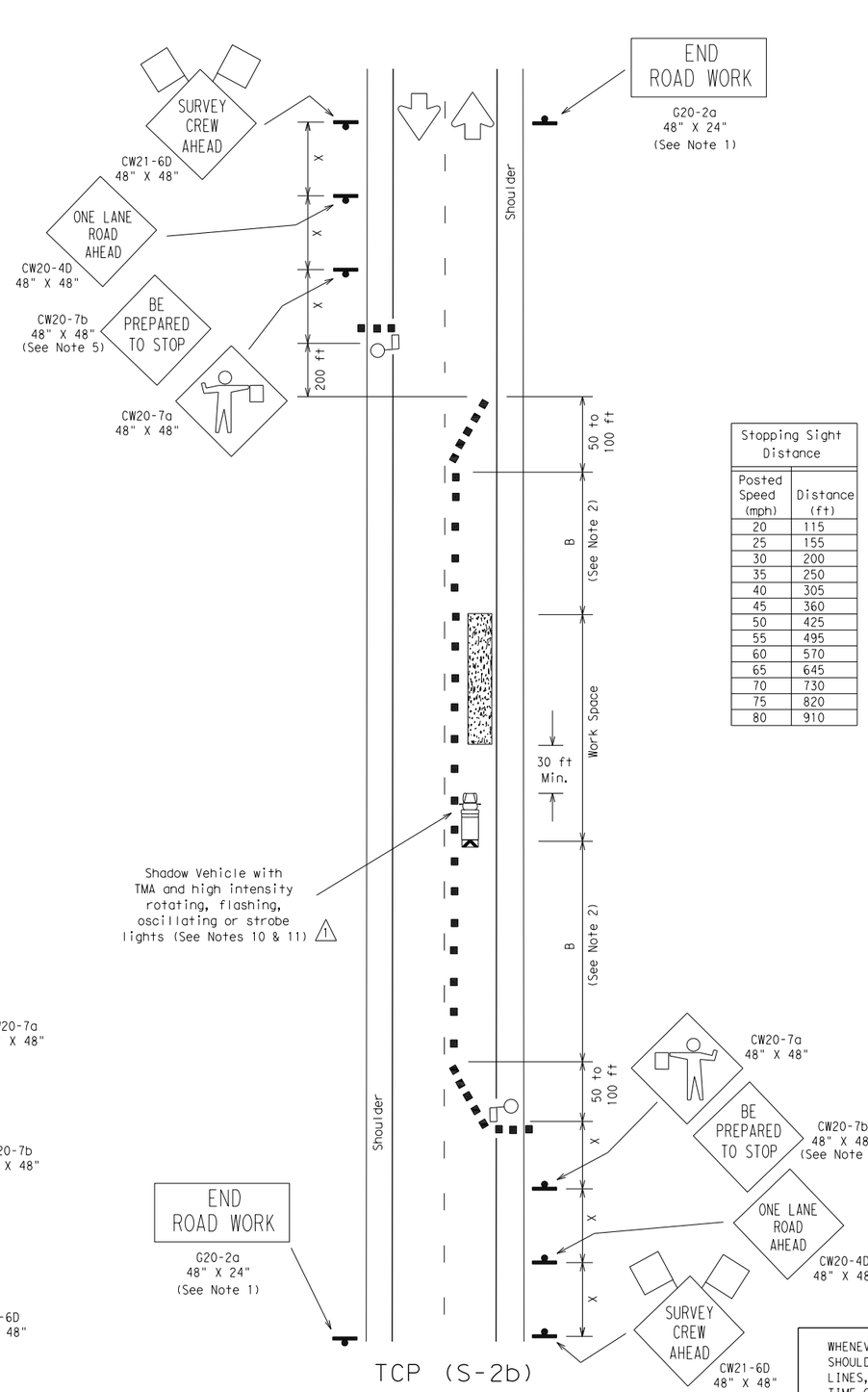


TCP (S-2a)
ROAD CLOSED FOR LESS THAN 20 MINUTES -
OFF PEAK TRAFFIC HOURS
WITH OR WITHOUT SHOULDERS



TCP (S-2b)
WORK IN ROADWAY
OFF PEAK TRAFFIC HOURS
WITH OR WITHOUT SHOULDERS

Stopping Sight Distance	
Posted Speed (mph)	Distance (ft)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820
80	910

LEGEND

Type III Barricade ■ ■ Channelizing Devices Flag
Heavy Work Vehicle Truck Mounted Attenuator (TMA)
Trailer Mounted Flashing Arrow Panel Portable Changeable Message Sign (PCMS)
Flagger Sign Post

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'	90'
35		205'	225'	245'	35'	70'-90'	160'	120'
40		265'	295'	320'	40'	80'-100'	240'	155'
45	L=WS	450'	495'	540'	45'	90'-110'	320'	195'
50		500'	550'	600'	50'	100'-125'	400'	240'
55		550'	605'	660'	55'	110'-140'	500'	295'
60		600'	660'	720'	60'	120'-150'	600'	350'
65		650'	715'	780'	65'	130'-165'	700'	410'
70		700'	770'	840'	70'	140'-175'	800'	475'
75		750'	825'	900'	75'	150'-185'	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
	✓	✓		

DEFINITIONS:
SHORT DURATION - work that occupies a location up to 1 hour.
SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

GENERAL NOTES:
1. The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
2. Adequate Stopping Sight Distance (see Stopping Sight Distance table) should be maintained from approaching traffic to the flagger or a queue of stopped vehicles. The Buffer Space "B" should be extended around curves or other obstacles, when necessary, to have adequate Stopping Sight Distance to the flagger station.
3. Flaggers should use two-way radios or other means of communication while flagging.
4. The length of the work space should be based on the ability of the flaggers to communicate.
5. CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" signs.
6. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.

TCP(S-2a)

7. Road closures shall be less than 20 minutes. Closures less than 5 minutes are desirable.
8. Sign spacing should be increased if traffic repeatedly queues past the CW20-7b "BE PREPARED TO STOP" sign.
9. The surveying instrument should not be located on the paved surface.

TCP (S-2B)

10. For short duration work the Shadow Vehicle with a TMA may be replaced by another Work Vehicle with high intensity rotating, flashing or strobe lights.
11. Shadow Vehicles with a TMA are desirable when workers or equipment are in the work space. When approved by the engineer, Type III barricades or other channelizing devices may be substituted for the Shadow Vehicle.
12. The CW20-7b "BE PREPARED TO STOP" sign is optional. When used, it should be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign.

WHENEVER POSSIBLE, SURVEY PARTIES SHOULD AVOID, BY THE USE OF OFFSET LINES, ANY UNNECCESSARY PERIODS OF TIME ON THE ROAD SURFACE.

8-18-08 Revision
1 Corrected referrence to notes.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

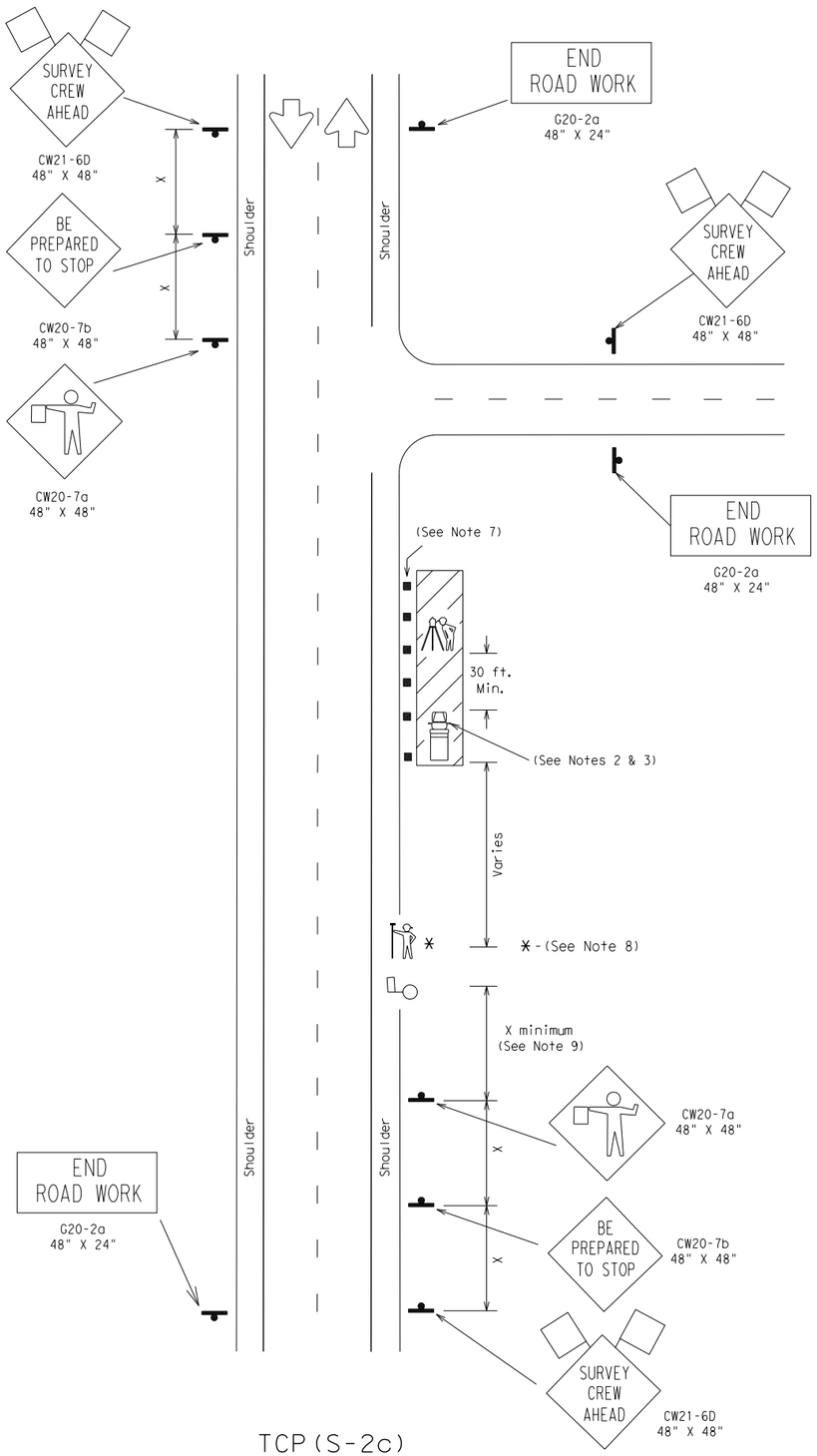
TCP(S-2)-08A

REVISIONS
8-08

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

CONT	SECT	JOB	HIGHWAY
0905	06	118	CS
DIST	COUNTY		SHEET NO.
LBB	LUBBOCK		41

DATE:
FILE:



TCP(S-2c)

Stopping Sight Distance	
Posted Speed (mph)	Distance (ft)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820
80	910

LEGEND

Type III Barricade | Channelizing Devices | Flag

Work Vehicle | Truck Mounted Attenuator (TMA)

Flagger | Sign Post | Survey Rodman | Instrument Person

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'	90'
35		205'	225'	245'	35'	70'-90'	160'	120'
40		265'	295'	320'	40'	80'-100'	240'	155'
45	L=WS	450'	495'	540'	45'	90'-110'	320'	195'
50		500'	550'	600'	50'	100'-125'	400'	240'
55		550'	605'	660'	55'	110'-140'	500'	295'
60		600'	660'	720'	60'	120'-150'	600'	350'
65		650'	715'	780'	65'	130'-165'	700'	410'
70		700'	770'	840'	70'	140'-175'	800'	475'
75		750'	825'	900'	75'	150'-185'	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
	✓	✓		

DEFINITIONS:

MOBILE - work that moves continously or intermittently (stopping up to approximately 15 minutes).

SHORT DURATION - work that occupies a location up to 1 hour.

SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

GENERAL NOTES:

1. The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
2. Work Vehicle with high intensity rotating, flashing, oscillating or strobe lights should be used to protect work space.
3. When approved by the engineer, Type III barricades or other channelizing devices may be substituted for the Heavy Work Vehicle.
4. CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" SIGNS.
5. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads may be omitted when approved by the Engineer.
6. The Surveying Instrument shall not be located on the paved surface.
7. Cones at edge of pavement adjacent to instrument person may be omitted when approved by the Engineer.
8. Rodman may only enter roadway when accompanied by flagger and as traffic allows.
9. The distance between the advance warning signs and the work should not exceed a two mile maximum.
10. Flaggers and Survey Crew should use two-way radios or other means of communication.
11. Survey Crew and Flaggers shall wear high-visibility apparel meeting the ANSI 107-2007 standard performance for Class 2 or Class 3 risk exposure.
12. Additional traffic control devices may be required to address local site conditions.
13. Stopping Sight Distance shall be maintained from approaching traffic to the flagger. See "Stopping Sight Distance" table.

SURVEY PARTIES SHOULD AVOID ANY UNNECCESSARY PERIODS OF TIME ON THE ROAD SURFACE.

This TCP is to cover two lane rural type roadways as determined by the Engineer. All other type roadways will be covered by other established Survey TCP'S.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-2c)-10

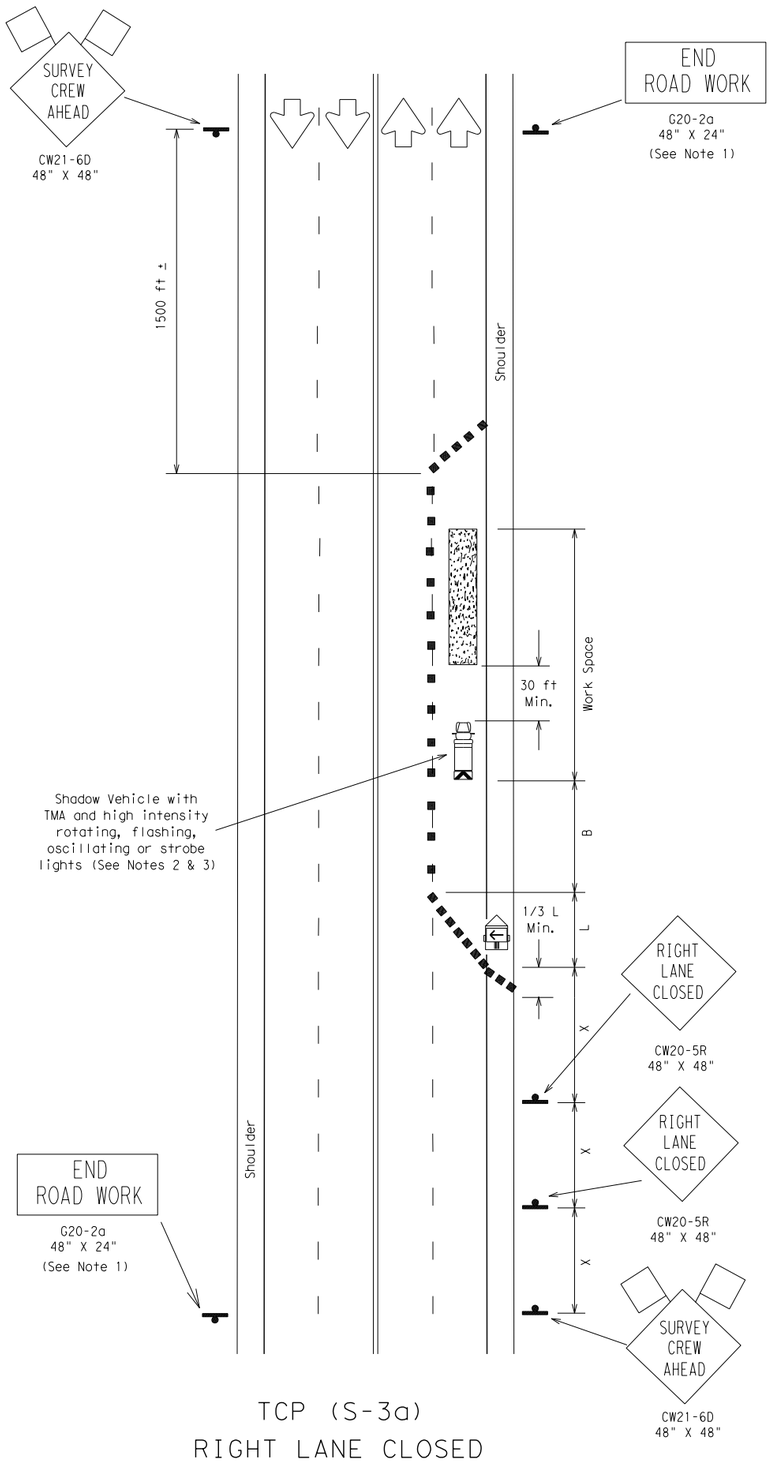
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS

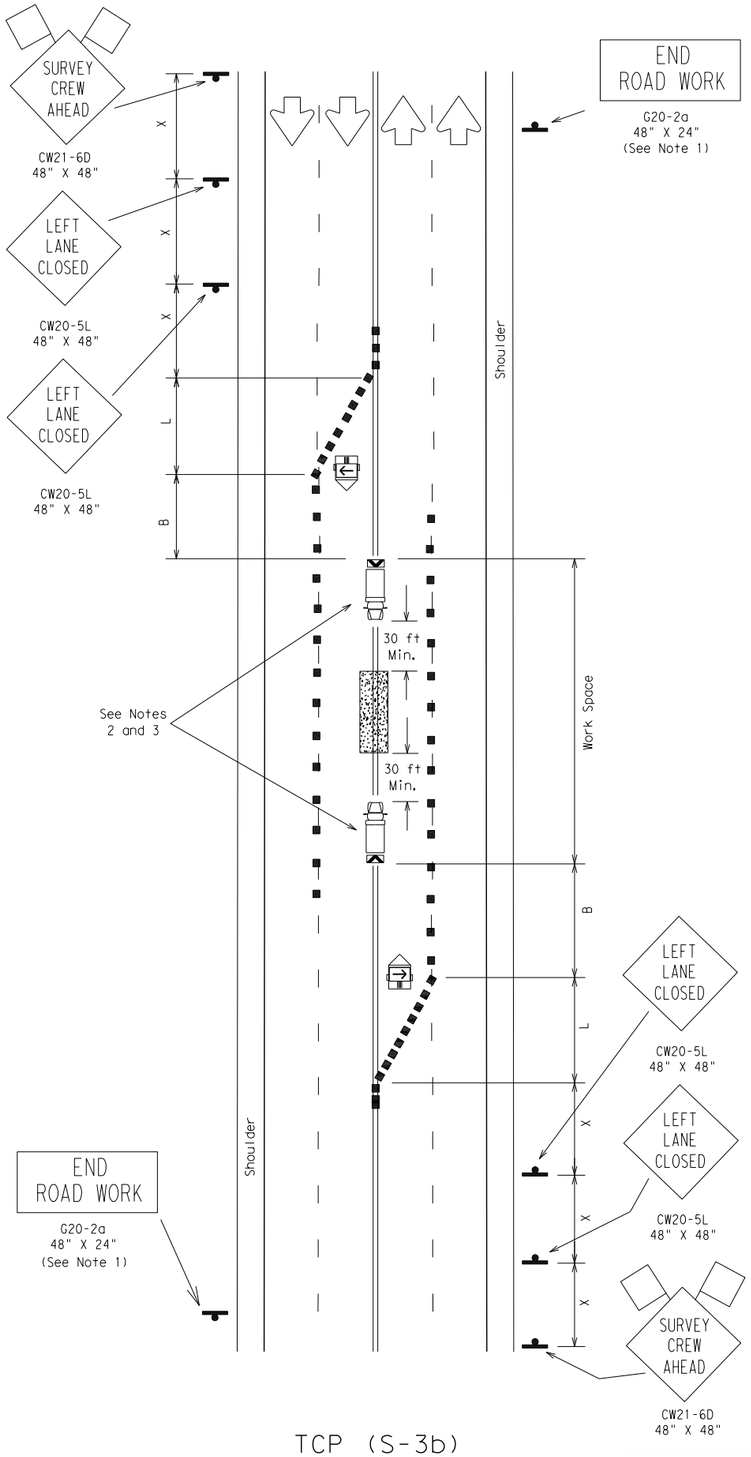
CONT	SECT	JOB	HIGHWAY
0905	06	118	CS
DIST	COUNTY		SHEET NO.
LBB	LUBBOCK		42

212A

DATE:
FILE:



TCP (S-3a)
RIGHT LANE CLOSED
WITH OR WITHOUT SHOULDERS



TCP (S-3b)
WORK ON CENTERLINE

WHENEVER POSSIBLE, SURVEY PARTIES SHOULD AVOID, BY THE USE OF OFFSET LINES, ANY UNNECCESSARY PERIODS OF TIME ON THE ROAD SURFACE.

LEGEND

Type III Barricade ■ ■ Channelizing Devices Flag
Heavy Work Vehicle Truck Mounted Attenuator (TMA)
Trailer Mounted Flashing Arrow Panel (M) Portable Changeable Message Sign (PCMS)
Flagger Sign Post

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 10′ Offset	11′ Offset	12′ Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	150′	165′	180′	30′	60′-75′	120′	90′
35		205′	225′	245′	35′	70′-90′	160′	120′
40		265′	295′	320′	40′	80′-100′	240′	155′
45	L=WS	450′	495′	540′	45′	90′-110′	320′	195′
50		500′	550′	600′	50′	100′-125′	400′	240′
55		550′	605′	660′	55′	110′-140′	500′	295′
60		600′	660′	720′	60′	120′-150′	600′	350′
65		650′	715′	780′	65′	130′-165′	700′	410′
70		700′	770′	840′	70′	140′-175′	800′	475′
75		750′	825′	900′	75′	150′-185′	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
	✓	✓		

DEFINITIONS:
SHORT DURATION - work that occupies a location up to 1 hour.
SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

GENERAL NOTES:
1. The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
2. For short duration work the Shadow Vehicle with TMA may be replaced by another Work Vehicle with high intensity rotating, flashing or strobe lights.
3. Shadow Vehicles with a TMA are desirable when workers or equipment are in the work space. When approved by the engineer, Type III barricades or other channelizing devices may be substituted for the Shadow Vehicle.
4. CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" signs.
5. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.

TCP(S-3a)
6. If shoulders are not present, the 1/3L shoulder taper is to be omitted and four channelizing devices shall be placed in front of the arrow panel, perpendicular to traffic.

TCP(S-3b)
7. One CW20-5L "LEFT LANE CLOSED" sign in each direction may be omitted when the posted speed is less than 45mph and volume is less then 2000 ADT.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-3)-08

REVISIONS

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

CONT	SECT	JOB	HIGHWAY
0905	06	118	CS
DIST	COUNTY		SHEET NO.
LBB	LUBBOCK		43

DATE:
FILE:

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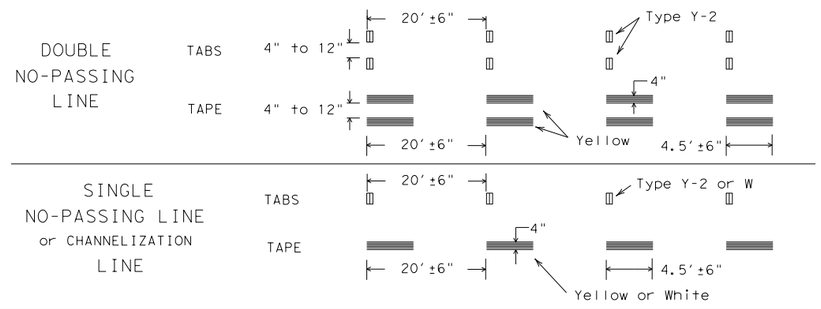
DATE:
FILE:

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



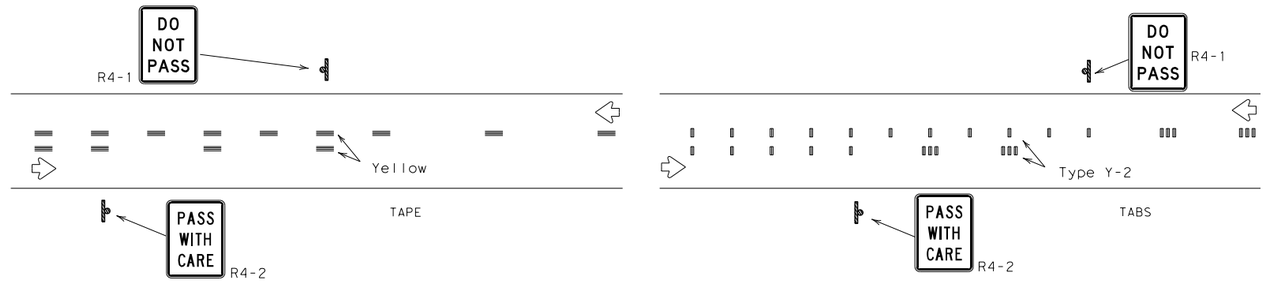
NOTES:

1. Short term pavement markings may be prefabricated markings (stick down tape) or temporary flexible-reflective roadway marker tabs unless otherwise specified elsewhere in plans.
2. Short term pavement markings shall NOT be used to simulate edge lines.
3. Dimensions indicated on this sheet are typical and approximate. Variations in size and height may occur between markers or devices made by manufacturers, by as much as 1/4 inch, unless otherwise noted.
4. Temporary flexible-reflective roadway marker tabs will require normal maintenance replacement when used on roadways with an ADT per lane of up to 7500 vehicles with no more than 10% truck mix. When roadways exceed these values, additional maintenance replacement of devices should be planned.
5. No segment of roadway open to traffic shall remain without permanent pavement markings for a period greater than 14 calendar days. The Contractor will be responsible for maintaining short term pavement markings until permanent pavement markings are in place. When the Contractor is responsible for placement of permanent pavement markings, no segment of roadway shall remain without permanent pavement markings for a period greater than 14 calendar days unless weather conditions prohibit placement. Permanent pavement markings shall be placed as soon as weather permits.
6. For two lane, two-way roadways, DO NOT PASS signs shall be erected to mark the beginning of sections where passing is prohibited and PASS WITH CARE signs shall be erected to mark the beginning of sections where passing is permitted. Signs shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and may be used to indicate the limits of no-passing zones for up to 14 calendar days. Permanent pavement markings should then be placed.
7. For low volume two lane, two-way roadways of 4000 ADT or less, no-passing lines may be omitted when approved by the Engineer. DO NOT PASS and PASS WITH CARE signs shall be erected (see note 6).
8. For exit gores where a lane is being dropped place wide gore markings or retroreflective channelizing devices to guide motorist through the exit. If channelizing devices are to be used it should be noted elsewhere in the plans. One piece cones are not allowed for this purpose.

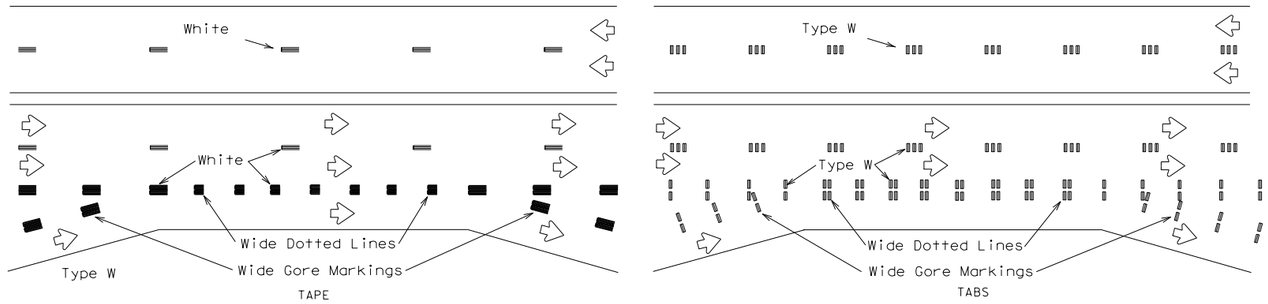
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

1. Temporary flexible-reflective roadway marker tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one white or silver reflective surface with white body). Additional details may be found on BC(11).
2. Tabs shall meet requirements of Departmental Material Specification DMS-8242.
3. When dry, tabs shall be visible for a minimum distance of 200 feet during normal daylight hours and when illuminated by automobile low-beam head light at night, unless sight distance is restricted by roadway geometrics.
4. No two consecutive tabs nor four tabs per 1000 feet of line shall be missing or fail to meet the visual performance requirements of Note 3.

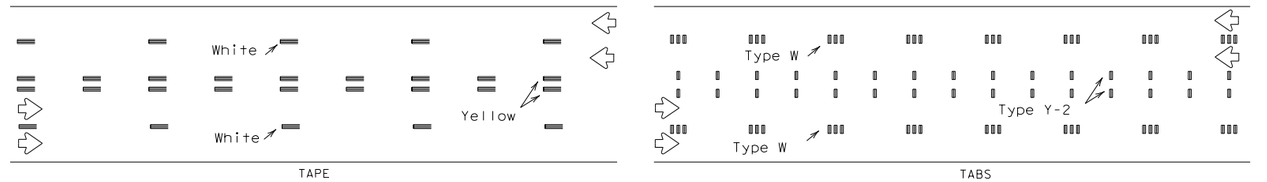
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



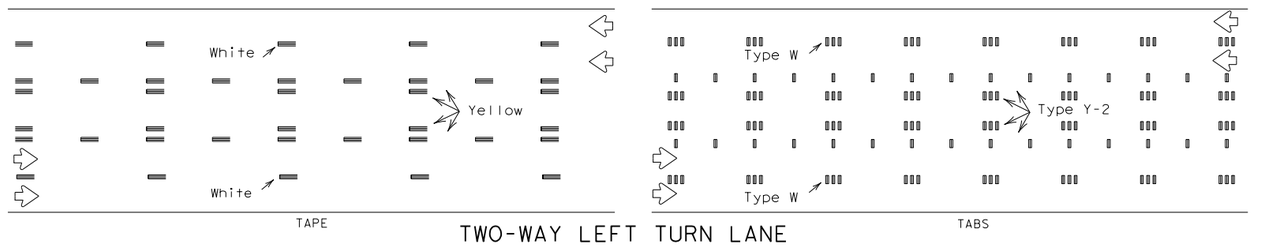
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



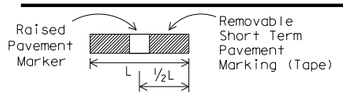
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



If raised pavement markers are used to supplement REMOVABLE short term markings, the markers shall be applied to the top of the tape at the approximate mid length of the tape. This allows an easier removal of raised markers and tape.

PREFABRICATED PAVEMENT MARKINGS

1. Temporary Removable Prefabricated Pavement Markings shall meet the requirements of DMS-8241.
2. Non-removable Prefabricated Pavement Markings shall meet the requirements of either DMS-8240 "Permanent Prefabricated Pavement Markings" or DMS-8243 "Temporary Costruction-Grade Prefabricated Pavement Markings."

RAISED PAVEMENT MARKERS

1. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and DMS-4200.

DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS) & MATERIAL PRODUCER LISTS (MPL)

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:
   http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

FILE:	wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS		0905	06	118	CS
1-97		DIST	COUNTY		SHEET NO.
3-03		LBB	LUBBOCK		44
7-13					

111

DATE:
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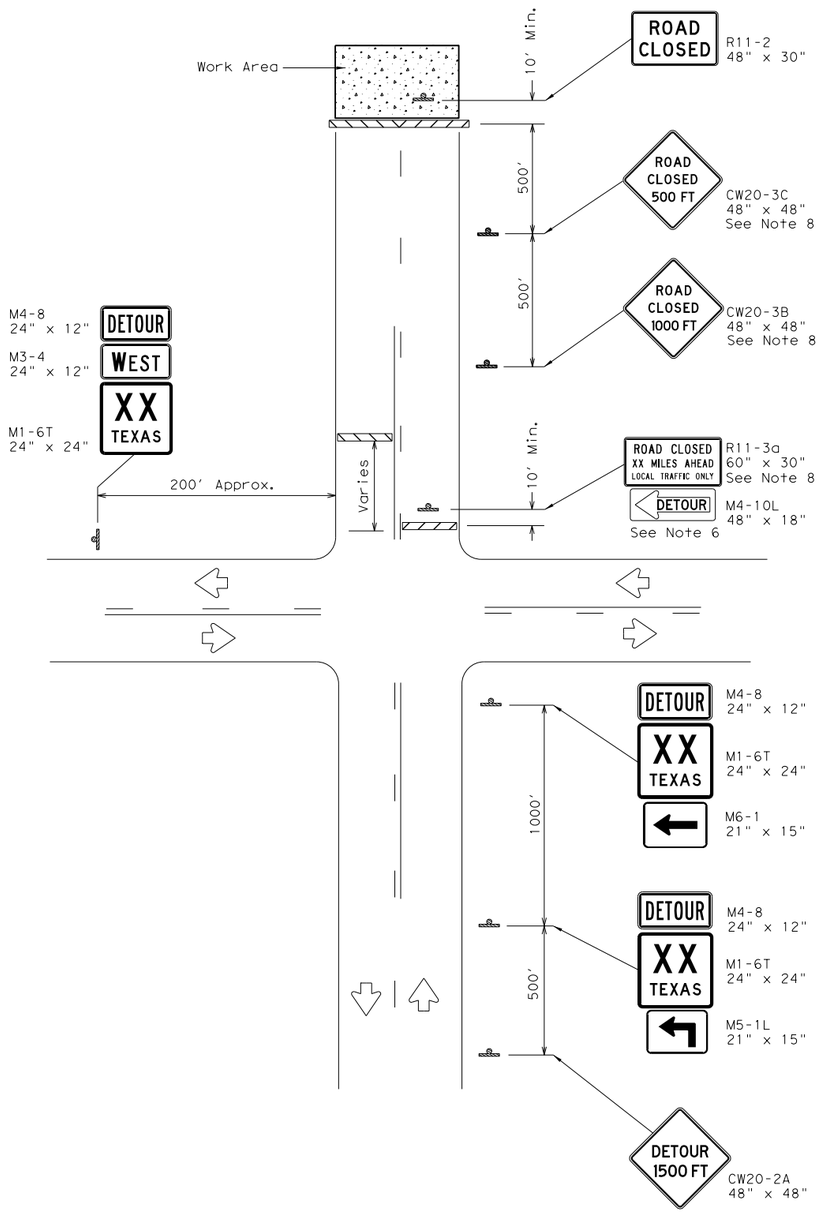
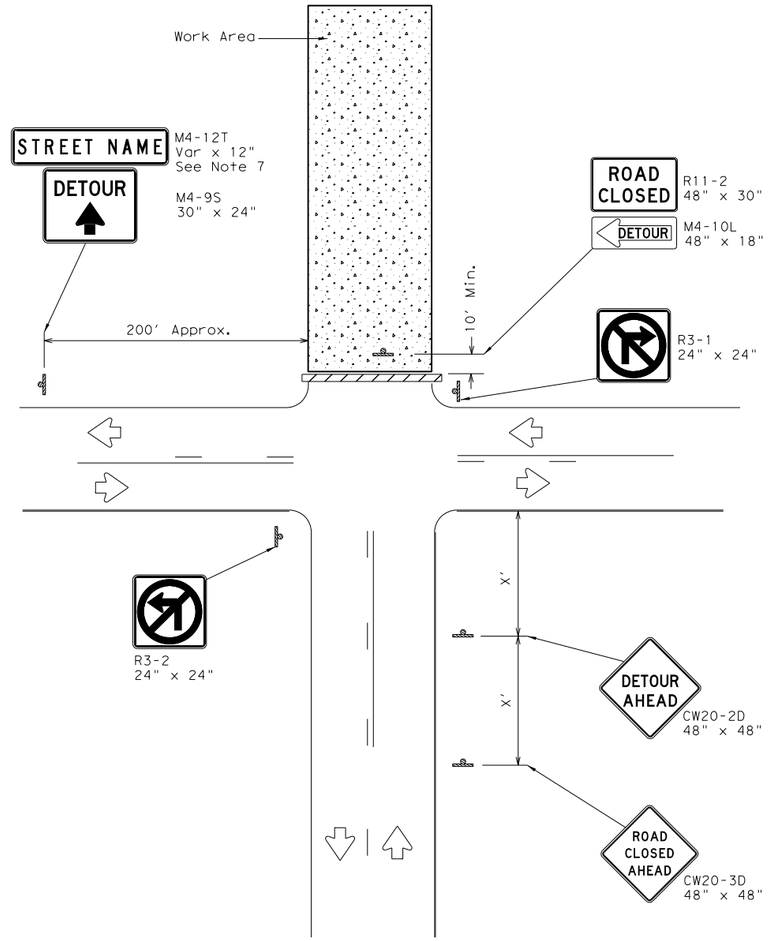


ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

Signing for an Un-numbered Route with an Off-Site Detour

LEGEND	
	Type 3 Barricade
	Sign

Posted Speed *	Minimum Sign Spacing "X" Distance
30	120'
35	160'
40	240'
45	320'
50	400'
55	500'
60	600'
65	700'
70	800'
75	900'

* Conventional Roads Only

GENERAL NOTES

1. This sheet is intended to provide details for temporary work zone road closures. For permanent road closure details see the D&OM standards.
2. Barricades used shall meet the requirements shown on Barricade and Construction Standard BC(10) and listed on the Compliant Work Zone Traffic Control Devices list (CWZTCD).
3. Stockpiled materials shall not be placed on the traffic side of barricades.
4. Barricades at the road closure should extend from pavement edge to pavement edge.
5. Detour signing shown is intended to illustrate the type of signing that is appropriate for numbered routes or un-numbered routes as labeled. It does not indicate the full extent of detour signing required. Detour routes should be signed as shown elsewhere in the plans.
6. If the road is open for a significant distance beyond the intersection or there are significant origin/destination points beyond the intersection, the signs and barricades at this location should be located at the edge of the traveled way.
7. The Street Name (M4-12T) sign is to be placed above the DETOUR (M4-9S) sign.
8. For urban areas where there is a shorter distance between the intersection and the actual closure location, the ROAD CLOSED XX MILES AHEAD (R11-3a) sign may be replaced with a ROAD CLOSED TO THRU TRAFFIC (R11-4) sign. If adequate space does not exist between the intersection and the closure a single ROAD CLOSED AHEAD (CW20-3D) sign spaced as per the table above may replace the ROAD CLOSED 1000 FT (CW20-3B) and ROAD CLOSED 500 FT (CW20-3C) signs.
9. Signs and barricades shown shall be subsidiary to Item 502. Locations where these details will be required shall be as shown elsewhere in the plans.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
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2-98 3-03	LBB	LUBBOCK		45

113

DATE:
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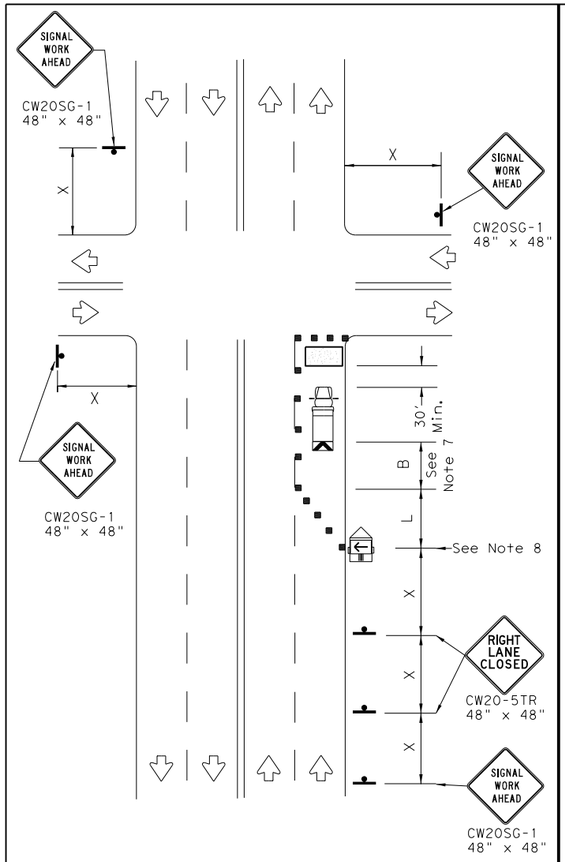
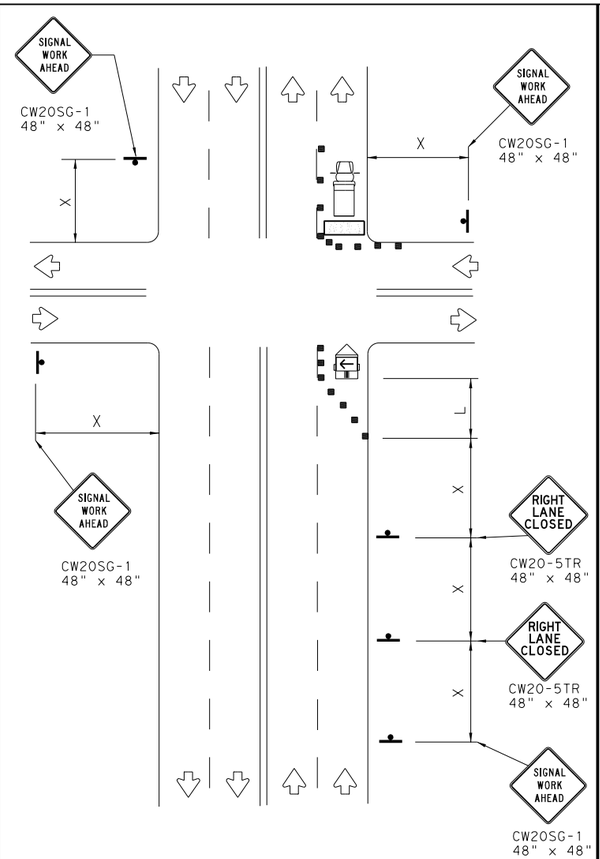


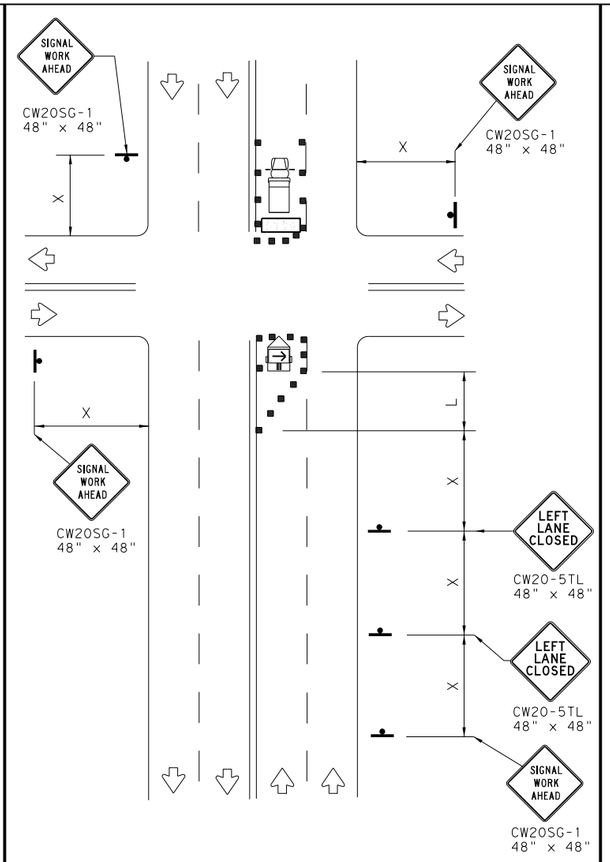
NEAR SIDE LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



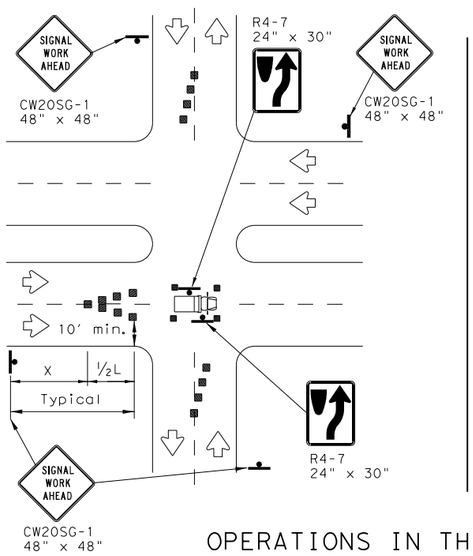
FAR SIDE RIGHT LANE CLOSURE

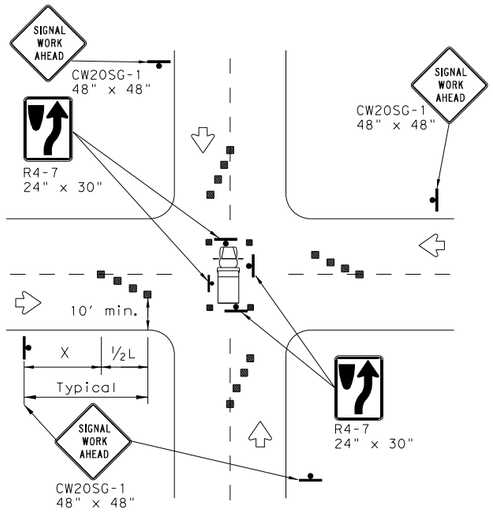
SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY





OPERATIONS IN THE INTERSECTION

SHORT DURATION

GENERAL NOTES

1. The minimum size channelizing device is the 28" cone. 42" Two-piece cones, drums, vertical panels or barricades will be required when the device must be left unattended at night.
2. Obstructions or hazards at the work area shall be clearly marked and delineated at all times.
3. Flaggers and Flagger Symbol (CW20-7) signs may be required according to field conditions.
4. Vehicles parked in roadway shall be equipped with at least two high intensity rotating, flashing, oscillating or strobe type lights.
5. High level warning devices (flag trees) may be used at corners of the vehicle.
6. When work operations are performed on existing signals, the signals may be placed in flashing red mode when approved by the engineer. If existing signals do not have power, All-Way Stop (R1-1 and R1-3P) signs may be implemented when approved by the engineer.
7. For Short-Term Stationary work the buffer space "B" from the above table should be used if field conditions permit. For Short Duration (less than 1 hour) any buffer space provided will enhance the safety of the setup.
8. The arrow board at this location may be omitted for Short Duration work if the work vehicle has an arrow board in operation. As an option, the arrow board may be placed at the end of the taper in the closed lane if space is not available at the beginning of the taper.
9. Signs and devices for the NEAR SIDE LANE CLOSURE may be altered for a left lane closure by using a LEFT LANE CLOSED (CW20-5TL) and adding channelizing devices on the centerline to protect the work space from opposing traffic.

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

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

* Conventional Roads Only

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

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

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	LBB	LUBBOCK		46

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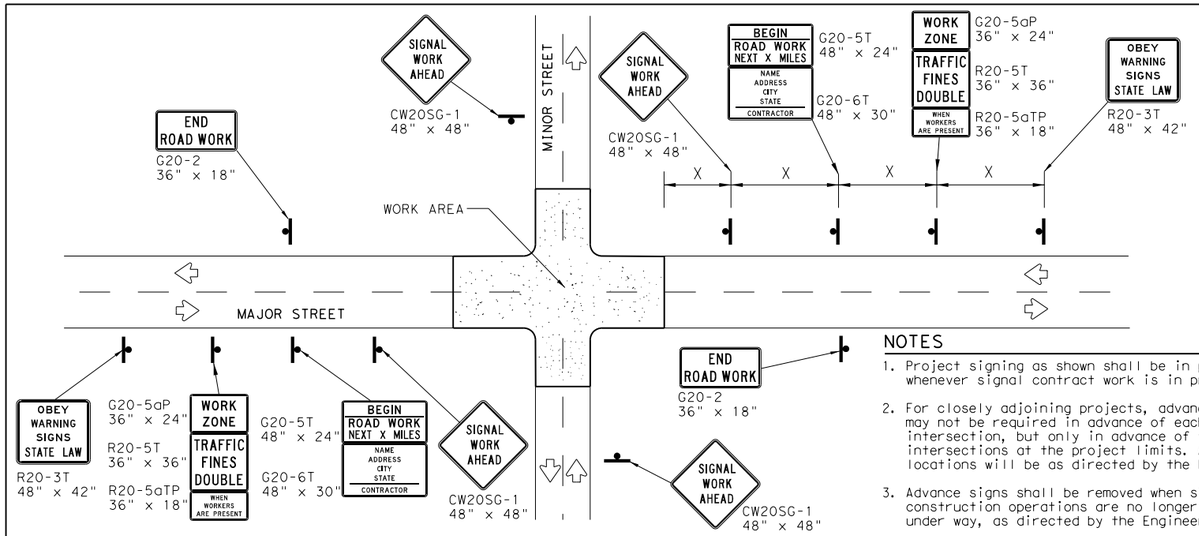


TYPICAL ADVANCE SIGNAL PROJECT SIGNING

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

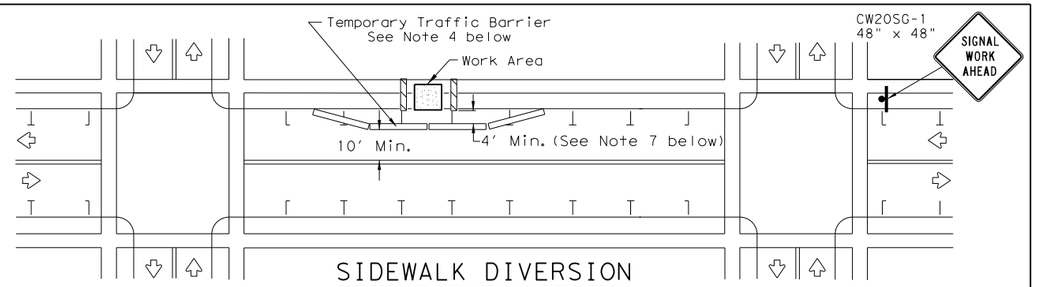
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support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

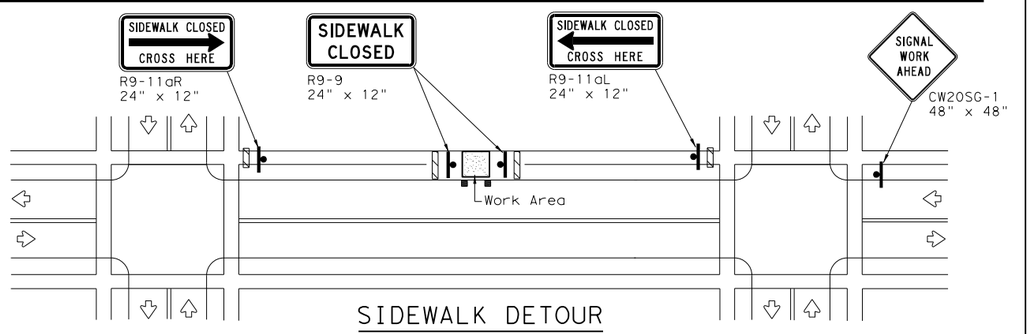
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

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

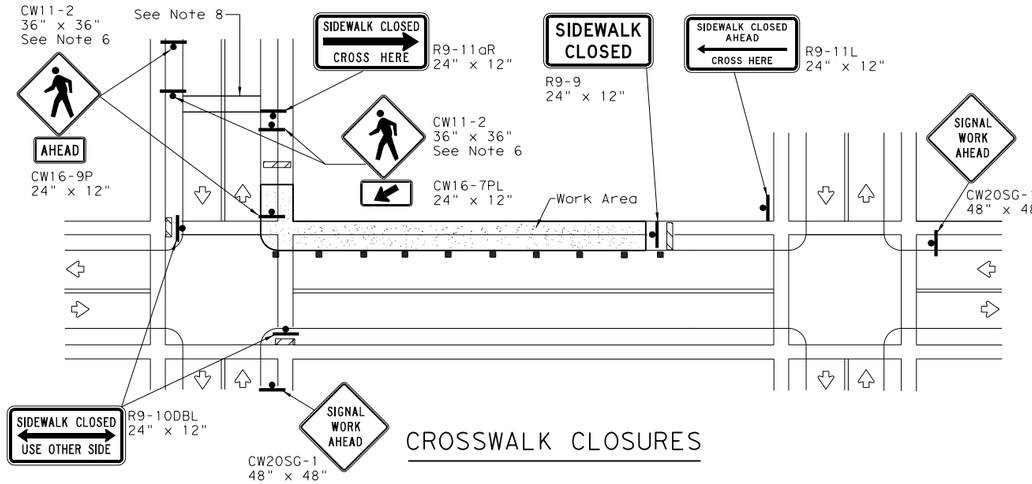
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



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
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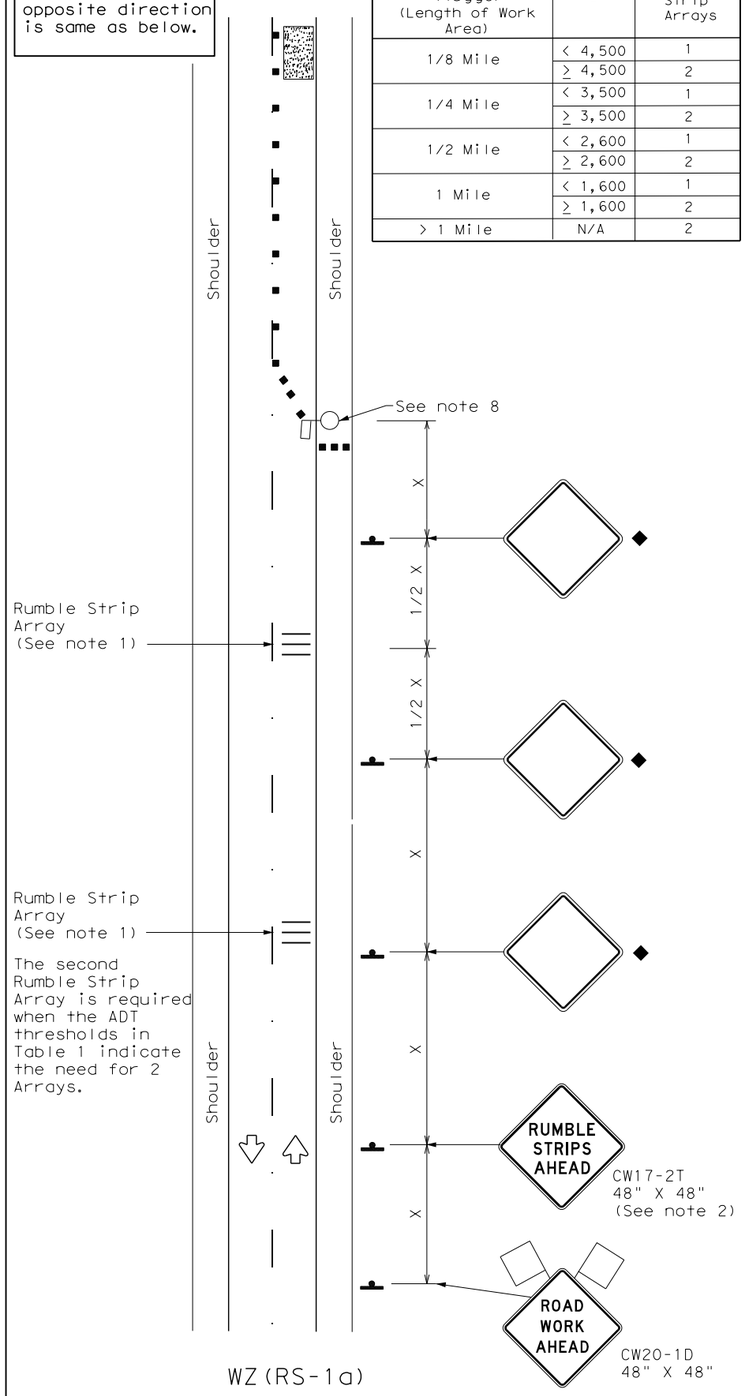
2-98 10-99 7-13		DIST	COUNTY		SHEET NO.
4-98 3-03		LBB	LUBBOCK		47

DATE:
FILE:

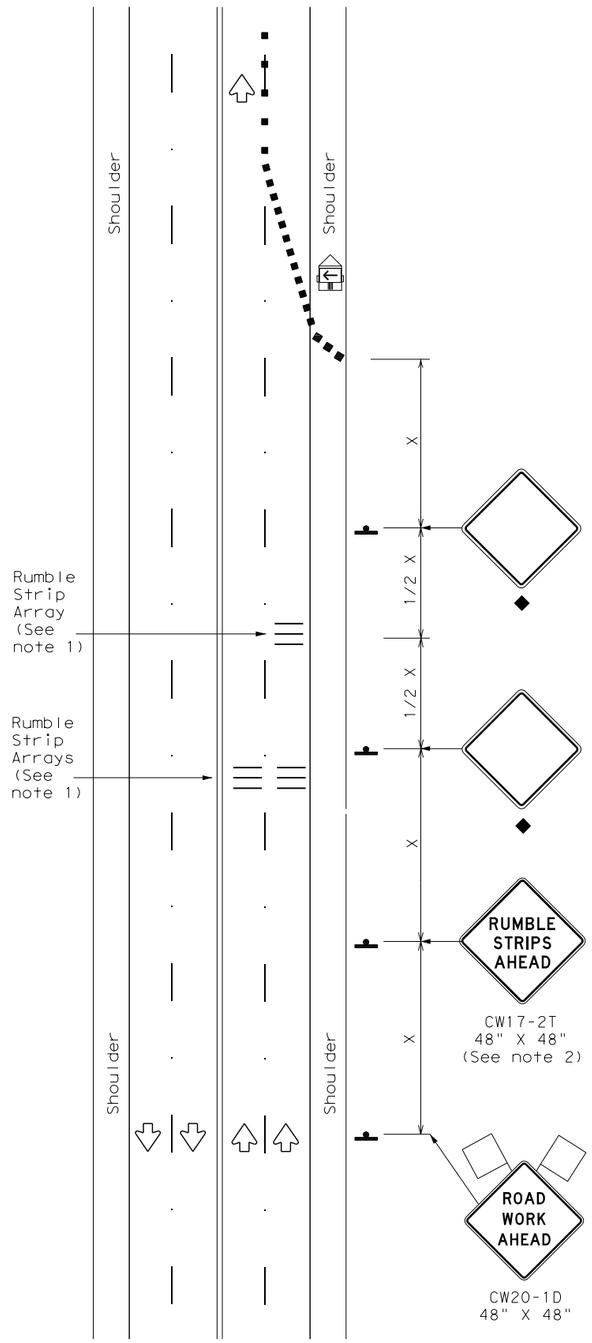
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0905	06	118	CS
2-14 1-22	DIST	COUNTY		SHEET NO.
4-16	LBB	LUBBOCK		48

117

DATE:
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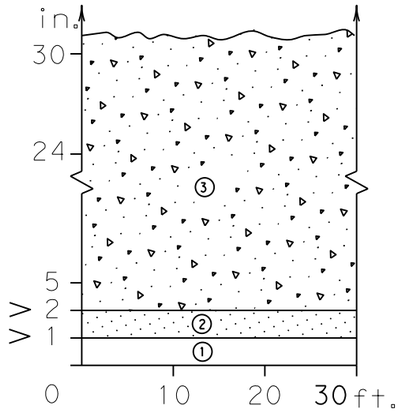
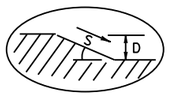
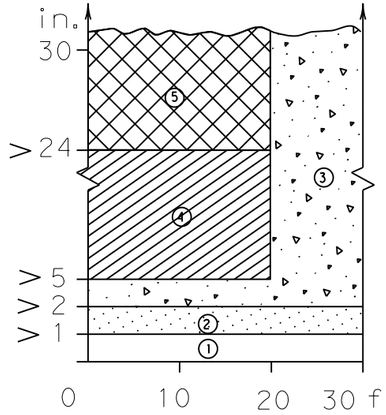
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

Edge Height (D) in Inches versus Lateral Clearance (Y) in Feet

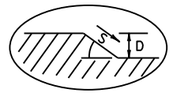


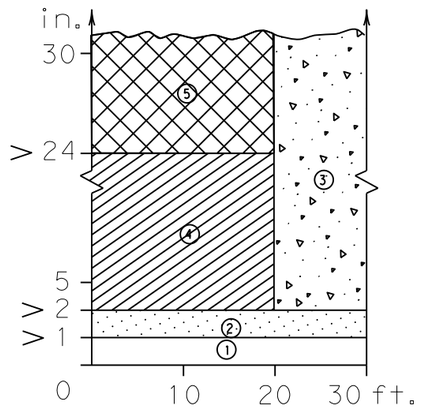
Edge Condition I
S = (3:1) (or flatter)



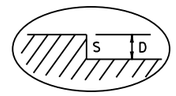


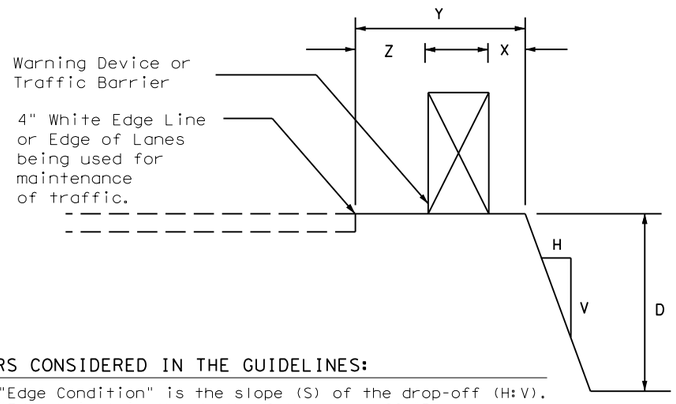
Edge Condition II
S = ((2.99):1) to (1:1)





Edge Condition III
S is steeper than (1:1)





FACTORS CONSIDERED IN THE GUIDELINES:

1. The "Edge Condition" is the slope (S) of the drop-off (H:V). The "Edge Height is the depth of the drop-off "D".

2. Distance "X" is to be the maximum practical under job conditions. Two feet minimum for high speed conditions. Distance "Y" is the lateral clearance from edge of travel lane to edge of dropoff. Distance "Z" does not have a minimum.

3. In addition to the factors considered in the guidelines, each construction zone drop-off situation should be analyzed individually, taking into account other variables, such as: traffic mix, posted speed in the construction zone, horizontal curvature, and the practicality of the treatment options.

4. The conditions for indicating the use of positive or protective barriers are given by Zone-5 and Figure-1. Traffic barriers are primarily applicable for high speed conditions. Urban areas with speeds of 30 mph or less may have a lesser need for signing, delineation, and barriers. Right-angled edges, however, with "D" greater than 2 inches and located within a lateral offset of 6 feet, may indicate a higher level of treatment.

5. If the distance "Y" must be less than 3 feet, the use of a positive barrier may not be feasible. In such a case, consider either: 1) narrowing the lanes to a desired 11 to 12 feet or 10 foot minimum (see CW20-8 sign), or 2) provide an edge slope such as Edge Condition I.

Zone	Treatment Types Guidelines:
①	No treatment
②	CW 8-11 "Uneven Lanes" signs.
③	CW 8-9a Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
④	CW8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge slope to that of the profered Edge Condition I.
⑤	Check indications (Figure-1) for possitive barrier. Where positive barrier is not indicated, the treatment shown above for Zone-4 may be used after consideration of other applicable factors.

Edge Condition Notes:

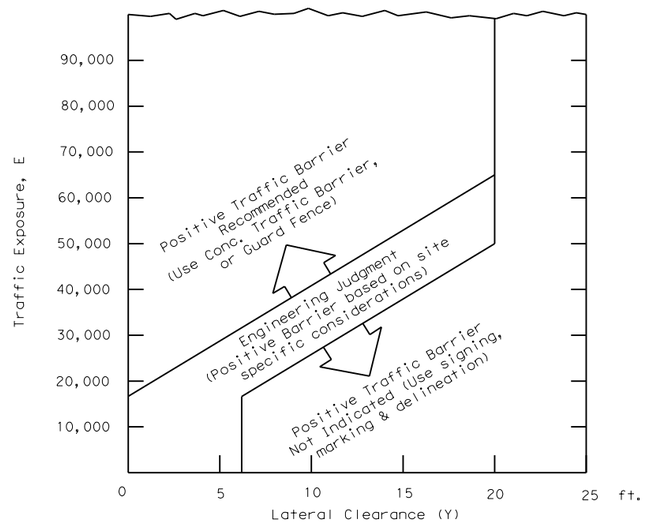
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

2. Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1 to 1) so long as "D" does not exceed 5 inches. Under-carriage drag on most automobiles will occur when "D" exceeds 6 inches. As "D" exeeds 24 inches, the possibility for rollover is greater in most vehicles.

3. Edge Condition III: When slopes are greater than (1 to 1) and where "D" is greater than 2 inches, a more difficult control factor may exist for some vehicles, if not properly treated. For example, where "D" is greater than 2 inches and up to 24 inches different types of vehicles may experience different steering control at different edge heights. Automobiles might experience more steering control differential when "D" is greater than 2 inches and up to 5 inches. Trucks, particularly those with high loads, have more steering control differential when "D" is greater than 5 inches and up to 24 inches. When "D" exceeds 24 inches, the possibility of rollover is greater for most vehicles.

4. Milling or overlay operations that result in Edge Condition III should not be in place without appropriate warning treatments, and these conditions should not be left in place for extended periods of time.

FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 (▨)



1. E = ADT x T
Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.

2. Figure-1 provides a practical approach to the use of positive barriers for the protection of vehicles from pavement drop-offs. Other factors, such as the presence of heavy machinery, construction workers, or the mix and volume of traffic may make the use of positive barriers appropriate, even when the edge condition alone may not justify the use of a barrier.

3. An approved end treatment should be provided for any positive barrier end located within the clear zone.

These guidelines apply to temporary traffic control areas or work zones where continuous pavement edges or drop-offs exists parallel and adjacent to a lane used by traffic. The edge conditions may be present between shoulders and travel lanes, between adjacent or opposing travel lanes, or at intermediate points across the width of the paved surface. Due to the variability in construction operations, tolerances in the variables may be allowed by the engineer. These guidelines do not apply to short term operations. These guidelines do not constitute a rigid standard or policy; rather, they are guidance to be used in conjunction with engineering judgement. These guidelines may be updated on the Design Division's on-line manuals.

Engineer's Seal

STATE OF TEXAS
KEVIN MORRIS
105091
LICENSED
PROFESSIONAL ENGINEER

Kevin Morris

Date 3-10-2022

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
©TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
03-01 08-01 9-21	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		49

SUMMARY OF REMOVAL ITEMS

LOCATION	100 6002	100 6003	100 6004	103 6001	104 6001	104 6017	104 6022	104 6036	105 6033	496 6016	644 6076
	PREPARING ROW	PREPARING ROW(TREE) (5" TO 12" DIA)	PREPARING ROW(TREE) (12" TO 24" DIA)	DISPOSAL OF WATER WELLS	REMOVING CONC (PAV)	REMOVING CONC (DRIVEWAYS)	REMOVING CONC (CURB AND GUTTER)	REMOVING CONC (SIDEWALK OR RAMP)	REMOVING STB BASE AND ASPH PAV(10-14")	REMOV STR (PIPE)	REMOVE SM RD SN SUP&AM
	STA	EA	EA	EA	SY	SY	LF	SY	SY	EA	EA
REMOVAL PLAN - BEGIN PROJECT TO STA 120+00					296	725	2478	1859	18209		4
REMOVAL PLAN - STA 120+00 TO STA 143+00		11	3		7845	93	429	1471	2075	2	3
REMOVAL PLAN - STA 143+00 TO END				2	4384		118	19		2	1
OVERALL	51										
PROJECT TOTALS	51	11	3	2	12525	818	3025	3349	20284	4	8

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
REMOVAL SUMMARY

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	50
	0905	06	118	

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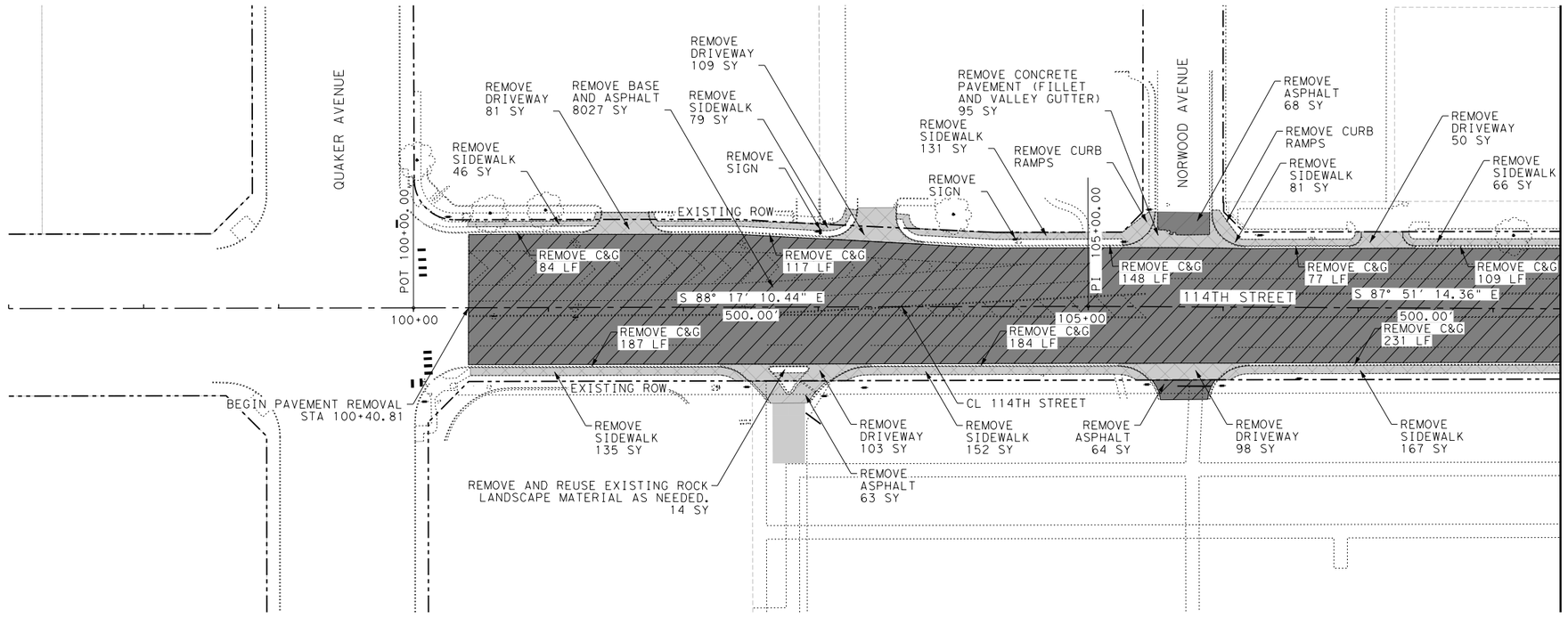
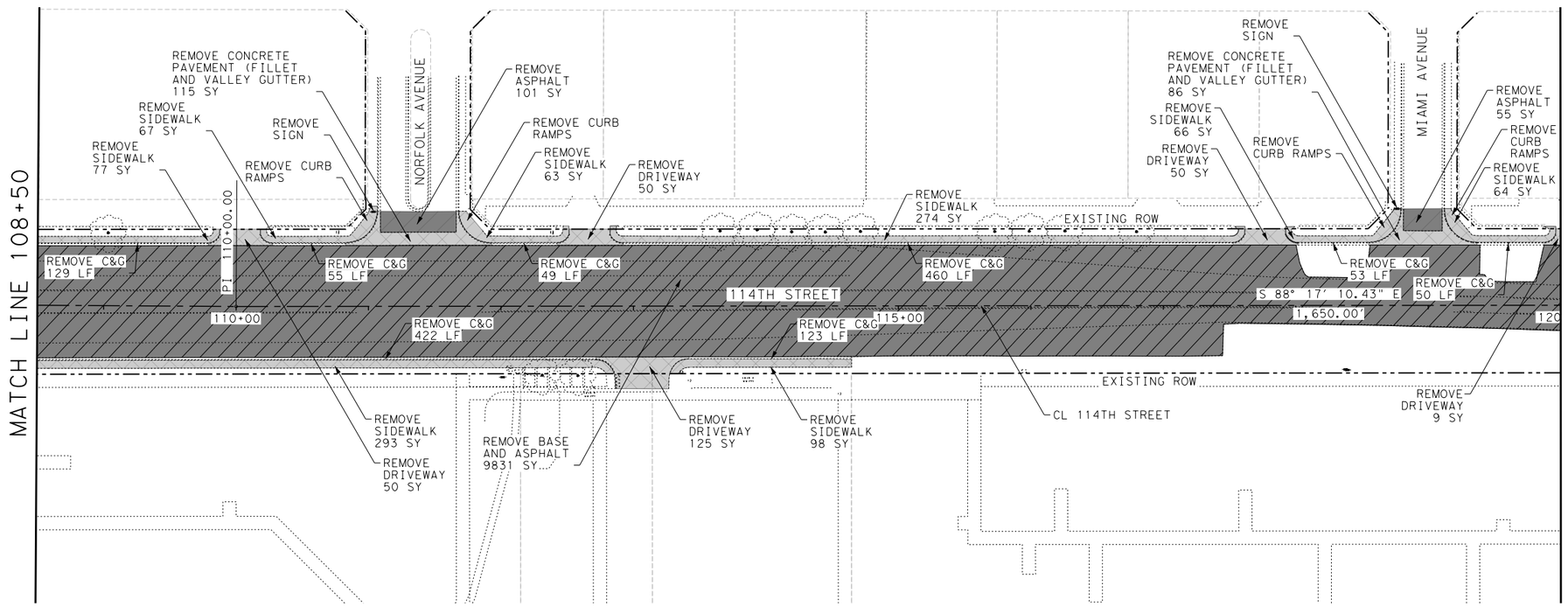
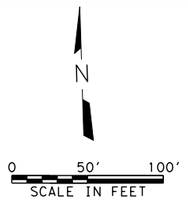
100.0000 ft / in.







LEGEND

- ASPHALT REMOVAL
- CONCRETE REMOVAL

NOTES:

1. CONTRACTOR TO CONTACT DIG-TESS 48 HOURS PRIOR TO REMOVAL AT 1-800-344-8377. CONTRACTOR SHALL PROTECT AND AVOID ALL KNOWN UTILITIES, ESPECIALLY CRITICAL CITY OF LUBBOCK WATERLINE UNDER EXISTING PAVEMENT.
2. CONTRACTOR SHALL TAKE CARE TO PROTECT EXISTING CURB, GUTTER, FENCE, AND SIDEWALK DESIGNATED TO REMAIN. ANY DAMAGE CAUSED BY CONTRACTOR OR CONTRACTOR'S EQUIPMENT WILL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
3. ONLY THE TREES MARKED FOR REMOVAL SHALL BE CONSIDERED FOR REMOVAL. EVERY EFFORT SHALL BE MADE BY THE CONTRACTOR TO PRESERVE AS MANY TREES AS POSSIBLE. ENGINEER SHALL BE NOTIFIED PRIOR TO REMOVAL OF TREES MARKED BY THE CONTRACTOR FOR VERIFICATION.
4. SIGNS IDENTIFIED FOR REMOVAL TO BE TURNED OVER TO THE CITY OF LUBBOCK TRAFFIC DEPARTMENT. CITY WILL PICK UP. CONTACT THE CITY OF LUBBOCK TRAFFIC DEPARTMENT AT 806-775-2131 TO COORDINATE PICK UP.
5. REMOVAL OF CULVERTS SHALL INCLUDE ALL CORRESPONDING MATERIALS. REMOVE SET IS SUBSIDIARY TO REMOVE PIPE PAY ITEM.

3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

Texas Department of Transportation

114TH STREET
QUAKER AVE. TO INDIANA AVE.
REMOVAL PLAN

BEGIN PROJECT TO STA 120+00

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	51
	0905	06	118	

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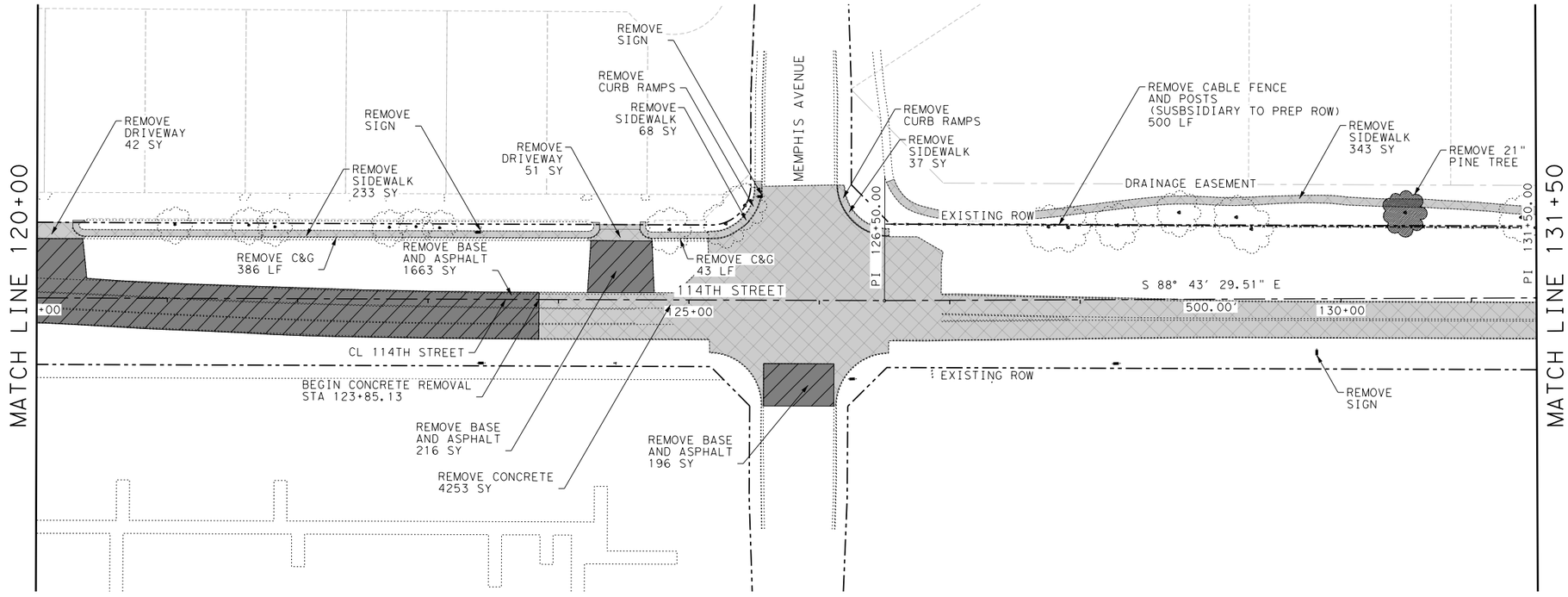

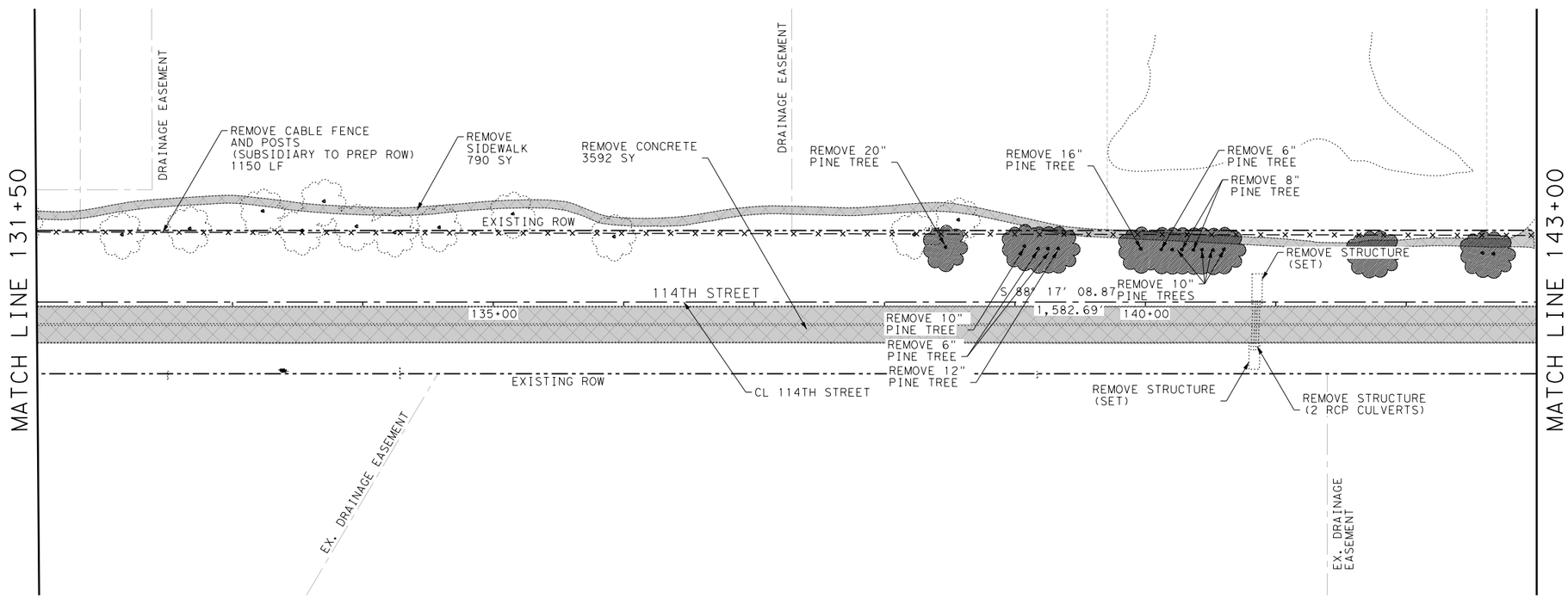

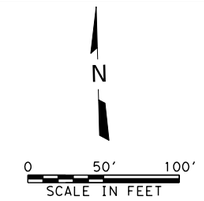

LEGEND

- ASPHALT REMOVAL
- CONCRETE REMOVAL

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3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

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1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

Texas Department of Transportation

114TH STREET
QUAKER AVE. TO INDIANA AVE.
REMOVAL PLAN

STA 120+00 TO STA 143+00

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	52
	0905	06	118	

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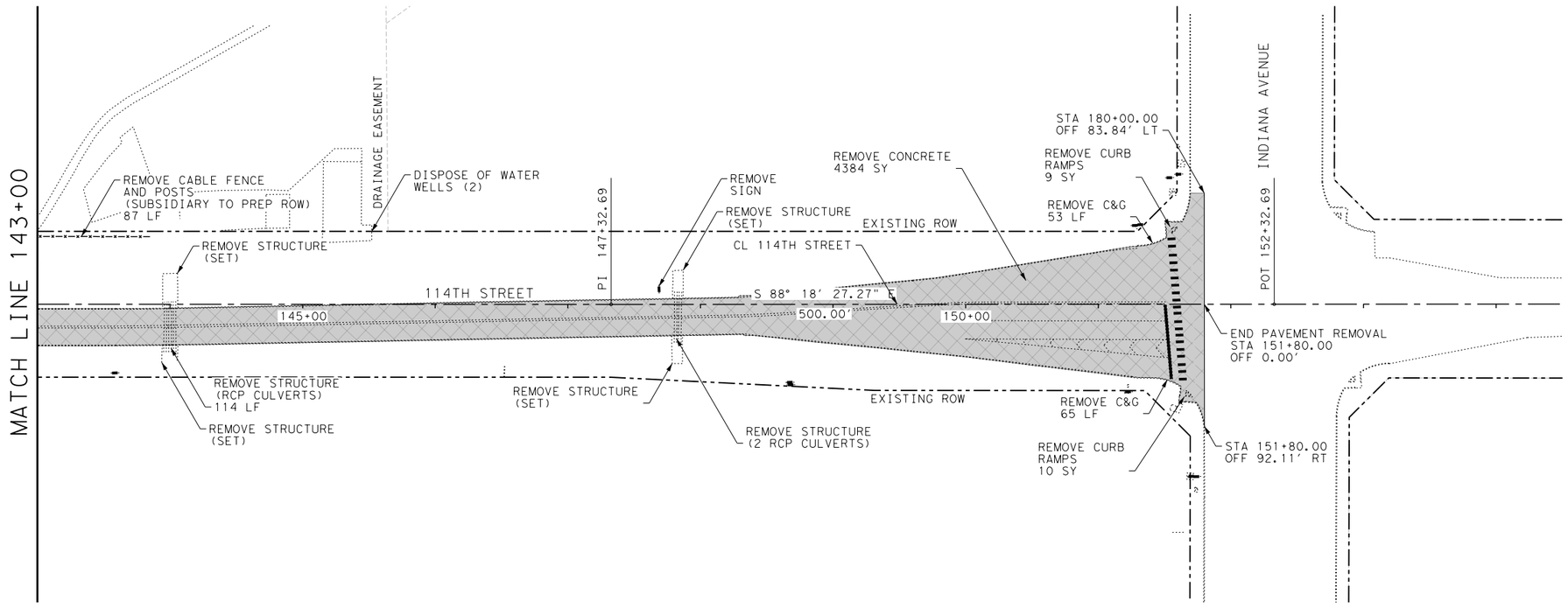

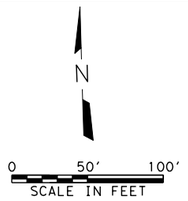

LEGEND

- ASPHALT REMOVAL
- CONCRETE REMOVAL

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Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

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1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
REMOVAL PLAN

STA 143+00 TO END

(SHEET 3 OF 3)

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
	CONTROL	SECTION	JOB	53
CHECK SRJ	0905	06	118	

$USER$
1.0000 ft / in.

Beginning chain CL_114TH description

Point 20	N	7,243,668.31	E 929,379.42	Sta 85+00.00
Course from 20 to 21 S 88° 15′ 47.93" E Dist 1,500.00				
Point 21	N	7,243,622.85	E 930,878.73	Sta 100+00.00
Course from 21 to 22 S 88° 17′ 10.44" E Dist 500.00				
Point 22	N	7,243,607.90	E 931,378.51	Sta 105+00.00
Course from 22 to 23 S 87° 51′ 14.36" E Dist 500.00				
Point 23	N	7,243,589.17	E 931,878.16	Sta 110+00.00
Course from 23 to 24 S 88° 17′ 10.43" E Dist 1,650.00				
Point 24	N	7,243,539.83	E 933,527.42	Sta 126+50.00
Course from 24 to 25 S 88° 43′ 29.51" E Dist 500.00				
Point 25	N	7,243,528.70	E 934,027.30	Sta 131+50.00
Course from 25 to 26 S 88° 17′ 08.87" E Dist 1,582.69				
Point 26	N	7,243,481.36	E 935,609.27	Sta 147+32.69
Course from 26 to 27 S 88° 18′ 27.27" E Dist 500.00				
Point 27	N	7,243,466.59	E 936,109.05	Sta 152+32.69
Course from 27 to 28 S 88° 19′ 49.78" E Dist 1,767.31				
Point 28	N	7,243,415.10	E 937,875.61	Sta 170+00.00

Ending chain CL_114TH description

Beginning chain CULV01 description
Feature: Geom_Centerline

Point CULV0100	N 7,243,686.7262	E 934,885.0971	Sta 0+00.00	
Course from CULV0100 to CULV0101 S 1° 46′ 09.86" W Dist 377.1919				
Point CULV0101	N 7,243,309.7141	E 934,873.4505	Sta 3+77.19	

Ending chain CULV01 description

STATE OF TEXAS
CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER

3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
HORIZONTAL ALIGNMENT DATA

(SHEET 1 OF 2)

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	54
	0905	06	118	

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1.0000 ft / in.

Beginning chain CHNL01 description
Feature: Geom_Centerline

Point CHNL011 N 7,243,588.86 E 933,508.74 Sta 10+00.00

Course from CHNL011 to PC CHNL01_3 N 66° 05′ 38.85" E Dist 6.71

Curve Data

Curve CHNL01_3			
P.I. Station	10+49.60	N 7,243,608.53	E 933,554.28
Delta =	16° 16′ 15.25" (RT)		
Degree =	19° 05′ 45.38"		
Tangent =	42.89		
Length =	85.21		
Radius =	300.04		
External =	3.05		
Long Chord =	84.92		
Mid. Ord. =	3.02		
P.C. Station	10+06.71	N 7,243,591.58	E 933,514.87
P.T. Station	10+91.92	N 7,243,613.75	E 933,596.85
C.C.		N 7,243,315.94	E 933,633.38
Back = N	66° 44′ 06.52" E		
Ahead = N	83° 00′ 21.77" E		
Chord Bear = N	74° 52′ 14.14" E		

Curve Data

Curve CHNL01_4			
P.I. Station	11+17.68	N 7,243,616.56	E 933,622.46
Delta =	9° 12′ 07.14" (RT)		
Degree =	17° 53′ 48.84"		
Tangent =	25.76		
Length =	51.42		
Radius =	320.14		
External =	1.04		
Long Chord =	51.36		
Mid. Ord. =	1.03		
P.C. Station	10+91.92	N 7,243,613.75	E 933,596.85
P.T. Station	11+43.33	N 7,243,615.24	E 933,648.19
C.C.		N 7,243,295.52	E 933,631.78
Back = N	83° 44′ 12.93" E		
Ahead = S	87° 03′ 39.93" E		
Chord Bear = N	88° 20′ 16.50" E		

Curve Data

Curve CHNL01_5			
P.I. Station	11+78.01	N 7,243,613.46	E 933,682.82
Delta =	12° 32′ 52.47" (RT)		
Degree =	18° 09′ 52.26"		
Tangent =	34.68		
Length =	69.08		
Radius =	315.43		
External =	1.90		
Long Chord =	68.94		
Mid. Ord. =	1.89		
P.C. Station	11+43.33	N 7,243,615.24	E 933,648.19
P.T. Station	12+12.41	N 7,243,604.20	E 933,716.24
C.C.		N 7,243,300.23	E 933,632.02
Back = S	87° 03′ 39.93" E		
Ahead = S	74° 30′ 47.46" E		
Chord Bear = S	80° 47′ 13.69" E		

Curve Data

Curve CHNL01_6			
P.I. Station	12+40.48	N 7,243,596.56	E 933,743.25
Delta =	30° 39′ 51.86" (LT)		
Degree =	55° 58′ 29.30"		
Tangent =	28.06		
Length =	54.78		
Radius =	102.36		
External =	3.78		
Long Chord =	54.13		
Mid. Ord. =	3.64		
P.C. Station	12+12.41	N 7,243,604.20	E 933,716.24
P.T. Station	12+67.20	N 7,243,603.76	E 933,770.37
C.C.		N 7,243,702.69	E 933,744.11
Back = S	74° 12′ 08.81" E		
Ahead = N	75° 07′ 59.33" E		
Chord Bear = S	89° 32′ 04.74" E		

Curve Data

Curve CHNL01_7			
P.I. Station	12+95.48	N 7,243,611.68	E 933,797.53
Delta =	27° 38′ 24.46" (RT)		
Degree =	49° 49′ 49.94"		
Tangent =	28.28		
Length =	55.47		
Radius =	114.98		
External =	3.43		
Long Chord =	54.93		
Mid. Ord. =	3.33		
P.C. Station	12+67.20	N 7,243,603.76	E 933,770.37
P.T. Station	13+22.66	N 7,243,606.10	E 933,825.25
C.C.		N 7,243,493.38	E 933,802.56
Back = N	73° 44′ 30.30" E		
Ahead = S	78° 37′ 05.24" E		
Chord Bear = N	87° 33′ 42.53" E		

Curve Data

Curve CHNL01_8			
P.I. Station	13+49.61	N 7,243,601.89	E 933,851.87
Delta =	9° 24′ 45.55" (LT)		
Degree =	17° 30′ 11.22"		
Tangent =	26.95		
Length =	53.78		
Radius =	327.35		
External =	1.11		
Long Chord =	53.72		
Mid. Ord. =	1.10		
P.C. Station	13+22.66	N 7,243,606.10	E 933,825.25
P.T. Station	13+76.44	N 7,243,602.09	E 933,878.82
C.C.		N 7,243,929.43	E 933,876.37
Back = S	81° 01′ 01.55" E		
Ahead = N	89° 34′ 12.90" E		
Chord Bear = S	85° 43′ 24.33" E		

Chain CHNL01 (continued)
Feature: Geom_Centerline

Curve Data

Curve CHNL01_9			
P.I. Station	13+91.92	N 7,243,601.95	E 933,894.30
Delta =	3° 50′ 54.98" (LT)		
Degree =	12° 26′ 01.89"		
Tangent =	15.48		
Length =	30.95		
Radius =	460.80		
External =	0.26		
Long Chord =	30.95		
Mid. Ord. =	0.26		
P.C. Station	13+76.44	N 7,243,602.09	E 933,878.82
P.T. Station	14+07.39	N 7,243,602.85	E 933,909.76
C.C.		N 7,244,062.88	E 933,883.04
Back = S	89° 28′ 32.33" E		
Ahead = N	86° 40′ 32.69" E		
Chord Bear = N	88° 36′ 00.18" E		

Curve Data

Curve CHNL01_10			
P.I. Station	14+59.21	N 7,243,606.08	E 933,961.47
Delta =	13° 32′ 17.26" (RT)		
Degree =	13° 07′ 31.84"		
Tangent =	51.81		
Length =	103.14		
Radius =	436.52		
External =	3.06		
Long Chord =	102.90		
Mid. Ord. =	3.04		
P.C. Station	14+07.39	N 7,243,602.85	E 933,909.76
P.T. Station	15+10.54	N 7,243,597.12	E 934,012.50
C.C.		N 7,243,167.18	E 933,937.01
Back = N	86° 25′ 14.57" E		
Ahead = S	80° 02′ 28.17" E		
Chord Bear = S	86° 48′ 36.80" E		

Curve Data

Curve CHNL01_11			
P.I. Station	15+47.04	N 7,243,591.27	E 934,048.54
Delta =	4° 33′ 33.18" (LT)		
Degree =	6° 14′ 53.02"		
Tangent =	36.50		
Length =	72.97		
Radius =	917.02		
External =	0.73		
Long Chord =	72.95		
Mid. Ord. =	0.73		
P.C. Station	15+10.54	N 7,243,597.12	E 934,012.50
P.T. Station	15+83.51	N 7,243,588.31	E 934,084.92
C.C.		N 7,244,502.29	E 934,159.43
Back = S	80° 46′ 48.31" E		
Ahead = S	85° 20′ 21.48" E		
Chord Bear = S	83° 03′ 34.89" E		

Curve Data

Curve CHNL01_12			
P.I. Station	16+28.01	N 7,243,584.38	E 934,129.25
Delta =	3° 12′ 11.12" (LT)		
Degree =	3° 35′ 58.08"		
Tangent =	44.51		
Length =	88.99		
Radius =	1,591.79		
External =	0.62		
Long Chord =	88.98		
Mid. Ord. =	0.62		
P.C. Station	15+83.51	N 7,243,588.31	E 934,084.92
P.T. Station	16+72.50	N 7,243,582.94	E 934,173.73
C.C.		N 7,245,173.88	E 934,225.39
Back = S	84° 56′ 13.91" E		
Ahead = S	88° 08′ 25.04" E		
Chord Bear = S	86° 32′ 19.47" E		

Curve Data

Curve CHNL01_13			
P.I. Station	16+86.90	N 7,243,582.47	E 934,188.13
Delta =	0° 02′ 17.02" (RT)		
Degree =	0° 07′ 55.57"		
Tangent =	14.41		
Length =	28.81		
Radius =	43,371.91		
External =	0.00		
Long Chord =	28.81		
Mid. Ord. =	0.00		
P.C. Station	16+72.50	N 7,243,582.94	E 934,173.73
P.T. Station	17+01.31	N 7,243,581.99	E 934,202.53
C.C.		N 7,200,233.87	E 932,766.21
Back = S	88° 08′ 25.04" E		
Ahead = S	88° 06′ 08.02" E		
Chord Bear = S	88° 07′ 16.53" E		

Course from PT CHNL01_13 to CHNL0116 S 88° 48′ 35.71" E Dist 181.14

Point CHNL0116 N 7,243,578.23 E 934,383.63 Sta 18+82.44

Course from CHNL0116 to CHNL0118 S 88° 39′ 08.95" E Dist 68.56

Point CHNL0118 N 7,243,576.62 E 934,452.17 Sta 19+51.01

Course from CHNL0118 to CHNL0119 S 88° 39′ 08.95" E Dist 155.68

Point CHNL0119 N 7,243,572.96 E 934,607.81 Sta 21+06.68

Ending chain CHNL01 description

STATE OF TEXAS
CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER

3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

Texas Department of Transportation
© 2022

114TH STREET
QUAKER AVE. TO INDIANA AVE.
HORIZONTAL ALIGNMENT DATA

(SHEET 2 OF 2)

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	55
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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VERTICAL ALIGNMENT CHECK											
114TH ST - LUBBOCK											
PI STATION	ELEVATION	LENGTH	G1	G2	E	K-VALUE CALCULATED	K-VALUE MINIMUM	CREST OR SAG?	MEETS MIN. K?	UNDER MAX. GRADE?	OVER MIN. GRADE?
	(FT)	(FT)	(%)	(%)	(FT)			(C/S)	(Y/N)	(Y/N)	(Y/N)
0905-06-118											
100+40.00	3244.43	-		0.8841	NO VERTICAL CURVE					Y	Y
102+40.00	3246.20	-	0.8841	1.0100	NO VERTICAL CURVE					Y	Y
105+40.00	3249.23	240	1.0100	-1.5761	-0.78	93	61	C	Y	Y	Y
107+40.00	3246.08	-	-1.5761	-1.5772	NO VERTICAL CURVE					Y	Y
109+25.00	3243.16	-	-1.5772	-1.3375	NO VERTICAL CURVE					Y	Y
112+45.00	3238.88	-	-1.3375	-1.0119	NO VERTICAL CURVE					Y	Y
113+70.00	3237.62	-	-1.0119	-0.9873	NO VERTICAL CURVE					Y	Y
124+20.00	3227.25	-	-0.9873	-0.8473	NO VERTICAL CURVE					Y	Y
129+60.00	3222.67	150	-0.8473	-0.2043	0.12	233	79	S	Y	Y	N
141+00.00	3220.34	50	-0.2043	0.3000	0.03	99	79	S	Y	Y	N
149+25.00	3222.82	150	0.3000	-0.6123	-0.17	165	61	C	Y	Y	N
	3221.25	-	-0.6123		NO VERTICAL CURVE					Y	Y

DESIGN EXCEPTION APPROVED
FOR GRADES LOWER THAN
MINIMUM GRADE OF 0.35%

ROADWAY DESIGN MANUAL
CHECKS BASED ON 45 MPH DESIGN SPEED

THIS PROJECT MEETS THE BASIC SAFETY REQUIREMENTS OF THE 4R DESIGN CRITERIA.

STATE OF TEXAS
CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER

3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

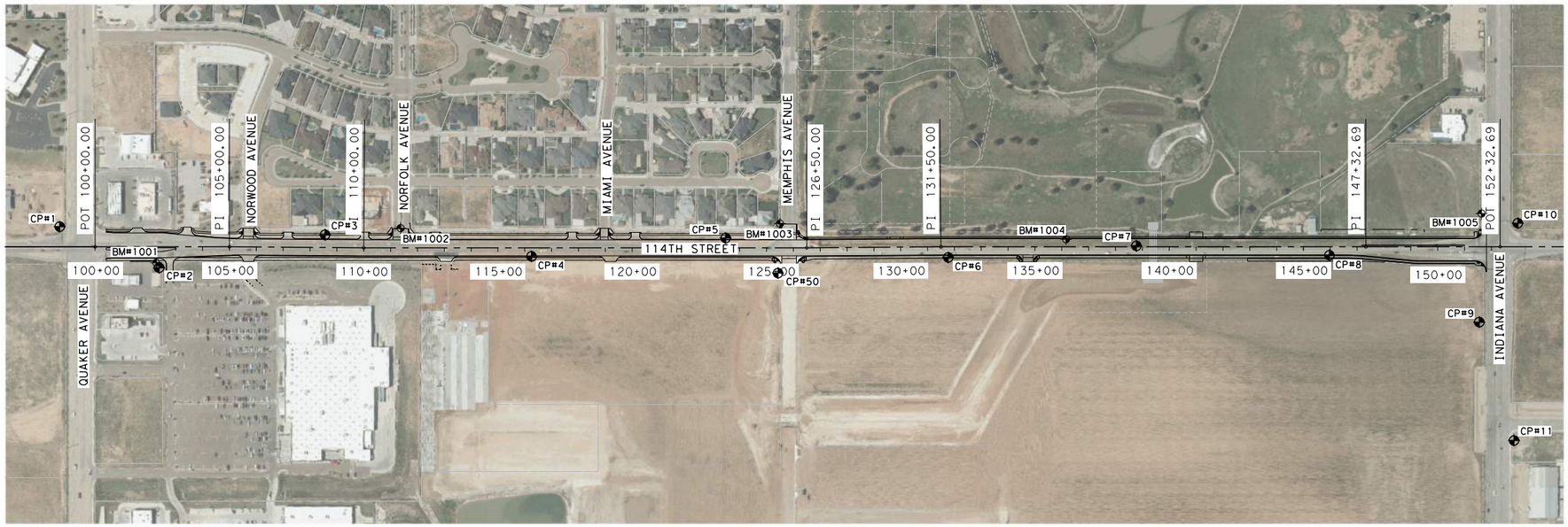
NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
ALIGNMENT CHECK

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	56
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

$USER$
500.0000 ft / in.



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0 250' 500'
SCALE IN FEET

POINT #	NORTHING (Y)	EASTING (X)	ELEV (Z)	MONUMENT DESCRIPTION
1	7,243,701.83	930,748.78	3,245.11	1/2"CIRS "1519 CONTROL"
2	7,243,537.62	931,114.27	3,244.44	1/2"CIRS "1519 CONTROL"
3	7,243,641.97	931,735.91	3,244.31	"X" CUT IN CONCRETE
4	7,243,538.59	932,501.98	3,234.88	MAG NAIL W/ WASHER
5	7,243,585.35	933,226.78	3,226.97	1/2"CIRS "1519 CONTROL"
6	7,243,488.30	934,053.04	3,220.36	1/2"CIRS "1519 CONTROL"
7	7,243,510.36	934,754.86	3,218.60	1/2"CIRS "1519 CONTROL"
8	7,243,453.76	935,472.54	3,218.70	1/2"CIRS "1519 CONTROL"
9	7,243,188.04	936,022.82	3,219.06	1/2"CIRS "1519 CONTROL"
10	7,243,552.42	936,177.44	3,222.21	1/2"CIRS "1519 CONTROL"
11	7,242,743.45	936,138.93	3,218.69	1/2"CIRS "1519 CONTROL"
50	7,243,449.04	933,417.58	3,226.92	1/2"CIRS "1519 CONTROL"
1001	7,243,556.75	931,104.27	3,247.28	#1 RR SPIKE IN PP
1002	7,243,658.22	932,017.70	3,241.62	#2 SQUARE CUT W/ "X" CUT
1003	7,243,632.68	933,430.36	3,227.00	#3 SQUARE CUT W/ "X" CUT
1004	7,243,542.91	934,493.66	3,221.64	#4 RR SPIKE IN PP
1005	7,243,592.31	936,043.35	3,222.79	#5 RR SPIKE IN PP

NOTES:
1. COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM OF 1983 (NAD83) (NA2011) EPOCH 2010.00, NORTH CENTRAL ZONE (4202), AND SCALED TO SURFACE BY USING THE GRID TO SURFACE FACTOR FOR LUBBOCK COUNTY (1.00021) WITH A BASE POINT OF 0,0.
2. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), USING GEOID 12B.
3. SURVEY DATA CONTAINED HEREIN MAY OR MAY NOT SHOW ALL CURRENTLY EXISTING IMPROVEMENTS AND UTILITIES, ABOVE OR BELOW GROUND. ALL VEGETATION IS NOT SHOWN HEREIN AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR VISITING THE ENTIRE PROJECT PRIOR TO SUBMITTING A BID.
4. CONTRACTOR SHALL VERIFY PROJECT CONTROL AS SOON AS PRACTICAL, PRIOR TO COMMENCING WITH ANY CONSTRUCTION ACTIVITY. CONTRACTOR SHALL IMMEDIATELY NOTIFY ENGINEER IF THERE ARE ANY DISCREPANCIES.

STATE OF TEXAS
REGISTERED
SHAUN MARVIN PIEPKORN
6432
PROFESSIONAL
LAND SURVEYOR

Shaun Marvin Piepkorn
Registered Professional Land Surveyor
Texas No. 6432
Date of Survey: July 12, 2021
Bowman Consulting Group, Ltd.
1200 West Magnolia Avenue, Suite 300
Fort Worth, Texas 76104
214-484-8586
Texas Firm No. 10120600

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
SURVEY CONTROL

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	57
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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End Area Volume Report

Report Created: 2/23/2022
Time: 3:24pm

Cross Section Set Name: CL_114TH_MPR_22_2
Alignment Name: CL_114TH
Input Grid Factor: 1.000000 **Note:** All units in this report are in feet, square feet and cubic yards unless specified otherwise.

Baseline Station	Station Quantities: Cut Factor	Cut Area	Cut Volume	Cut Adjusted	Station Quantities: Fill Factor	Fill Area	Fill Volume	Fill Adjusted	Added Quantities: Cut Factor	Cut Volume	Cut Adjusted	Added Quantities: Fill Factor	Fill Volume	Fill Adjusted	Mass Ordinate
100+00.00 R1															0
100+50.00 R1	1.000	90.2644	84	84	1.000	0.9920	1	1							83
101+00.00 R1	1.000	94.4822	171	171	1.000	0.8114	2	2							252
101+50.00 R1	1.000	89.7909	171	171	1.000	1.4491	2	2							421
102+00.00 R1	1.000	91.6728	168	168	1.000	0.6800	2	2							587
102+50.00 R1	1.000	94.9277	173	173	1.000	0.2021	1	1							759
103+00.00 R1	1.000	89.3436	171	171	1.000	0.0000	0	0							929
103+50.00 R1	1.000	82.0095	159	159	1.000	0.4085	0	0							1087
104+00.00 R1	1.000	83.7414	153	153	1.000	3.0190	3	3							1238
104+50.00 R1	1.000	78.9811	151	151	1.000	4.5552	7	7							1381
105+00.00 R1	1.000	104.2613	170	170	1.000	0.7424	5	5							1546
105+50.00 R1	1.000	115.0733	203	203	1.000	0.0000	1	1							1748
106+00.00 R1	1.000	82.3159	183	183	1.000	0.6090	1	1							1931
106+50.00 R1	1.000	70.3224	141	141	1.000	10.2411	10	10							2062
107+00.00 R1	1.000	65.4743	126	126	1.000	9.3897	18	18							2169
107+50.00 R1	1.000	72.3855	128	128	1.000	13.1939	21	21							2276
108+00.00 R1	1.000	86.9351	148	148	1.000	7.9383	20	20							2404
108+50.00 R1	1.000	93.5168	167	167	1.000	5.4825	12	12							2559
109+00.00 R1	1.000	105.8849	185	185	1.000	3.4105	8	8							2735
109+50.00 R1	1.000	107.7888	198	198	1.000	3.2614	6	6							2927
110+00.00 R1	1.000	96.3262	189	189	1.000	2.1382	5	5							3111
110+50.00 R1	1.000	100.2587	182	182	1.000	3.2400	5	5							3288
111+00.00 R1	1.000	98.1517	184	184	1.000	3.1992	6	6							3466
111+50.00 R1	1.000	93.6414	178	178	1.000	3.3035	6	6							3637
112+00.00 R1	1.000	98.5384	178	178	1.000	3.5924	6	6							3809
112+50.00 R1	1.000	103.6701	187	187	1.000	0.9920	4	4							3992
113+00.00 R1	1.000	93.3107	182	182	1.000	3.4157	4	4							4170
113+50.00 R1	1.000	84.1673	164	164	1.000	4.5802	7	7							4327
114+00.00 R1	1.000	94.2554	165	165	1.000	6.1375	10	10							4482
114+50.00 R1	1.000	88.0324	169	169	1.000	5.6342	11	11							4640
115+00.00 R1	1.000	96.1938	171	171	1.000	5.6192	10	10							4800
115+50.00 R1	1.000	98.3732	180	180	1.000	7.0641	12	12							4969
116+00.00 R1	1.000	97.4880	181	181	1.000	6.9603	13	13							5137
116+50.00 R1	1.000	99.8061	183	183	1.000	6.3872	12	12							5307
117+00.00 R1	1.000	101.8344	187	187	1.000	6.6752	12	12							5482
117+50.00 R1	1.000	92.4583	180	180	1.000	2.3792	8	8							5654
118+00.00 R1	1.000	75.7429	156	156	1.000	2.0931	4	4							5805
118+50.00 R1	1.000	81.3831	145	145	1.000	12.1884	13	13							5937
119+00.00 R1	1.000	86.5860	156	156	1.000	13.8079	24	24							6069
119+50.00 R1	1.000	84.7717	159	159	1.000	9.2475	21	21							6206
120+00.00 R1	1.000	87.6229	160	160	1.000	2.5909	11	11							6355
120+50.00 R1	1.000	77.9761	153	153	1.000	10.8733	12	12							6496
121+00.00 R1	1.000	73.5543	140	140	1.000	17.0227	26	26							6610
121+50.00 R1	1.000	77.5937	140	140	1.000	13.6670	28	28							6722
122+00.00 R1	1.000	74.7561	141	141	1.000	12.1458	24	24							6839
122+50.00 R1	1.000	76.8667	140	140	1.000	9.7816	20	20							6959
123+00.00 R1	1.000	79.1592	144	144	1.000	9.7558	18	18							7085
123+50.00 R1	1.000	83.9379	151	151	1.000	11.6095	20	20							7217
124+00.00 R1	1.000	93.6910	164	164	1.000	8.9178	19	19							7362
124+50.00 R1	1.000	87.9875	168	168	1.000	0.0017	8	8							7522
125+00.00 R1	1.000	85.7644	161	161	1.000	6.4955	6	6							7677

Baseline Station	Station Quantities: Cut Factor	Cut Area	Cut Volume	Cut Adjusted	Station Quantities: Fill Factor	Fill Area	Fill Volume	Fill Adjusted	Added Quantities: Cut Factor	Cut Volume	Cut Adjusted	Added Quantities: Fill Factor	Fill Volume	Fill Adjusted	Mass Ordinate
125+50.00 R1	1.000	77.5577	151	151	1.000	0.1517	6	6							7822
126+00.00 R1	1.000	67.0192	134	134	1.000	0.5918	1	1							7955
126+50.00 R1	1.000	63.2196	121	121	1.000	0.2690	1	1							8075
127+00.00 R1	1.000	59.4352	114	114	1.000	0.4409	1	1							8188
127+50.00 R1	1.000	45.1300	97	97	1.000	12.6510	12	12							8273
128+00.00 R1	1.000	38.6272	78	78	1.000	19.8854	30	30							8320
128+50.00 R1	1.000	35.7454	69	69	1.000	22.6495	39	39							8349
129+00.00 R1	1.000	36.6638	67	67	1.000	22.7565	42	42							8374
129+50.00 R1	1.000	31.8109	63	63	1.000	26.1032	45	45							8393
130+00.00 R1	1.000	27.0887	55	55	1.000	26.0280	48	48							8399
130+50.00 R1	1.000	18.9261	43	43	1.000	34.7869	56	56							8385
131+00.00 R1	1.000	11.5533	28	28	1.000	45.3842	74	74							8339
131+50.00 R1	1.000	7.1058	17	17	1.000	49.6027	88	88							8269
132+00.00 R1	1.000	4.4693	11	11	1.000	52.4834	95	95							8185
132+50.00 R1	1.000	2.6818	7	7	1.000	55.8506	100	100							8091
133+00.00 R1	1.000	3.3100	6	6	1.000	63.5105	111	111							7986
133+50.00 R1	1.000	6.2443	9	9	1.000	61.5440	116	116							7879
134+00.00 R1	1.000	6.9069	12	12	1.000	65.3080	117	117							7774
134+50.00 R1	1.000	5.8933	12	12	1.000	62.6984	119	119							7667
135+00.00 R1	1.000	5.8740	11	11	1.000	63.9656	117	117							7561
135+50.00 R1	1.000	4.6162	10	10	1.000	62.5334	117	117							7453
136+00.00 R1	1.000	2.3168	6	6	1.000	71.6694	124	124							7336
136+50.00 R1	1.000	0.5088	3	3	1.000	80.1203	141	141							7198
137+00.00 R1	1.000	0.0620	1	1	1.000	89.0672	157	157							7041
137+50.00 R1	1.000	1.4844	1	1	1.000	79.4913	156	156							6887
138+00.00 R1	1.000	3.9743	5	5	1.000	63.7873	133	133							6759
138+50.00 R1	1.000	3.0388	6	6	1.000	92.1034	144	144							6621
139+00.00 R1	1.000	9.7684	12	12	1.000	62.6672	143	143							6490
139+50.00 R1	1.000	13.9190	22	22	1.000	62.2773	116	116							6396
140+00.00 R1	1.000	18.8569	30	30	1.000	69.4676	122	122							6305
140+50.00 R1	1.000	27.2023	43	43	1.000	63.2510	123	123							6224
141+00.00 R1	1.000	32.0406	55	55	1.000	60.7383	115	115							6164
141+50.00 R1	1.000	21.0603	49	49	1.000	72.0741	123	123							6091
142+00.00 R1	1.000	12.8497	31	31	1.000	71.4169	133	133							5989
142+50.00 R1	1.000	3.8585	15	15	1.000	96.8296	156	156							5849
143+00.00 R1	1.000	0.0000	4	4	1.000	145.1096	224	224							5628
143+50.00 R1	1.000	0.0000	0	0	1.000	152.7018	276	276							5353
144+00.00 R1	1.000	0.4038	0	0	1.000	133.6096	265	265							5088
144+50.00 R1	1.000	0.0000	0	0	1.000	184.9553	295	295							4793
145+00.00 R1	1.000	0.0000	0	0	1.000	214.9196	370	370							4423
145+50.00 R1	1.000	0.0000	0	0	1.000	255.0889	435	435							3988
146+00.00 R1	1.000	0.0000	0	0	1.000	278.3660	494	494							3494
146+50.00 R1	1.000	0.0000	0	0	1.000	320.2558	554	554							2940
147+00.00 R1	1.000	0.0000	0	0	1.000	326.6310	599	599							2341
147+50.00 R1	1.000	0.0000	0	0	1.000	322.2939	601	601							1740
148+00.00 R1	1.000	0.0000	0	0	1.000	281.9366	559	559							1180
148+50.00 R1	1.000	0.0000	0	0	1.000	316.3135	554	554							626
149+00.00 R1	1.000	0.0000	0	0	1.000	292.8905	564	564							62
149+06.30 R1															0
149+50.00 R1	1.000	0.0000	0	0	1.000	240.7217	494	494							-432
150+00.00 R1	1.000	0.0000	0	0	1.000	162.4064	373	373							-805
150+50.00 R1	1.000	0.0000	0	0	1.000	94.2513	238	238							-1043
151+00.00 R1	1.000	3.7730	3	3	1.000	20.3149	106	106							-1145
151+50.00 R1	1.000	0.0000	3	3	1.000	0.0000	19	19							-1161
Grand Total:			9589	9589			10750	10750							

CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS
3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
EARTHWORK CALCULATIONS

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	58
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

02861
1.0000 ft / in.

SUMMARY OF ROADWAY ITEMS

LOCATION	110 6001	132 6006	216 6001	275 6001	275 6019	310 6009	351 6002	360 6003	432 6002	432 6031	450 6052	529 6012
	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT)(TY C)	PROOF ROLLING	CEMENT	CEMENT TREAT (SUBGRADE)(6")	PRIME COAT (MC-30)	FLEXIBLE PAVEMENT STRUCTURE REPAIR(6")	CONC PVMT (CONT REINF - CRCP) (9")	RIPRAP (CONC)(5 IN)	RIPRAP (STONE PROTECTION)(12 IN)	RAIL (HANDRAIL)(TY F)	CONC CURB (SLOTTED)
	CY	CY	HR	TON	SY	GAL	SY	SY	CY	CY	LF	LF
OVERALL	9589	10750					1015					
PAVING PLAN AND PROFILE - BEGIN TO STA. 108+50			8	59	6935	1369		6305	7		80	
PAVING PLAN AND PROFILE - STA. 108+50 TO STA. 120+00			8	73	8562	1623		7667				
PAVING PLAN AND PROFILE - STA. 120+00 TO STA. 131+50			8	73	8562	1687		7667				44
PAVING PLAN AND PROFILE - STA. 131+50 TO STA. 143+00			8	73	8562	1687		7667	4	56	8	100
PAVING PLAN AND PROFILE - STA. 143+00 TO END			8	64	7458	1472		6758	108		836	
PROJECT TOTALS	9589	10750	40	342	40079	7838	1015	36064	119	56	924	144

SUMMARY OF ROADWAY ITEMS

LOCATION	529 6037	530 6001	530 6004	531 6002	531 6018	531 6019	531 6027	536 6002	730 6107	734 6002	3076 6041	3076 6066
	CONC CURB & GUTTER TY II (MOD)	INTERSECTIONS (CONC)	DRIVEWAYS (CONC)	CONC SIDEWALKS (5")	CURB RAMPS (TY 1)	CURB RAMPS (TY 2)	CURB RAMPS (TY 10)	CONC MEDIAN	FULL - WIDTH MOWING	LITTER REMOVAL	D-GR HMA TY-D SAC-A PG70-22	TACK COAT
	LF	SY	SY	SY	SY	SY	SY	SY	CYC	CYC	TON	GAL
OVERALL									2	2		
PAVING PLAN AND PROFILE - BEGIN TO STA. 108+50	1335	171	740	1251	23			334			394	19
PAVING PLAN AND PROFILE - STA. 108+50 TO STA. 120+00	1927	404	626	1955	50						467	27
PAVING PLAN AND PROFILE - STA. 120+00 TO STA. 131+50	2083	652	205	1951	21	37	35				485	29
PAVING PLAN AND PROFILE - STA. 131+50 TO STA. 143+00	2108	84		2000		56					485	29
PAVING PLAN AND PROFILE - STA. 143+00 TO END	1786			1537	36			170			423	25
PROJECT TOTALS	9239	1311	1571	8694	130	93	35	504	2	2	2254	129

SUMMARY OF RETAINING WALL ITEMS

LOCATION	423 6008
	RETAINING WALL (CAST - IN - PLACE)
	SF
RETAINING WALL LAYOUT	1608
PROJECT TOTALS	1608

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Phone - (806) 686-2700
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114TH STREET
QUAKER AVE. TO INDIANA AVE.
ROADWAY SUMMARY

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	59
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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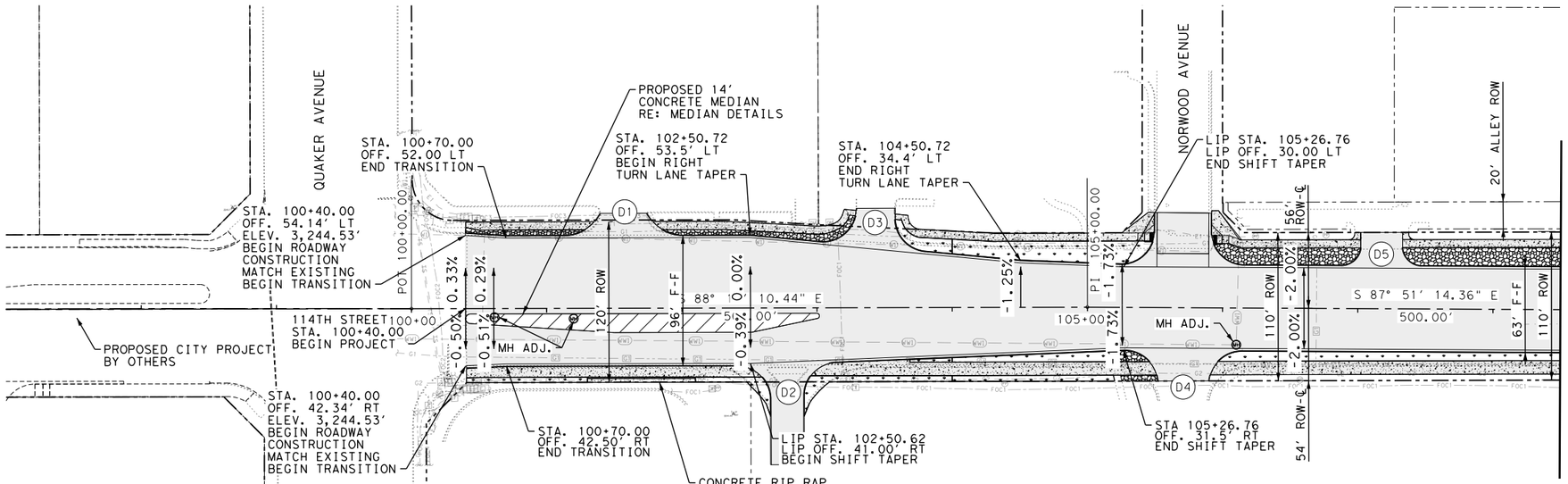
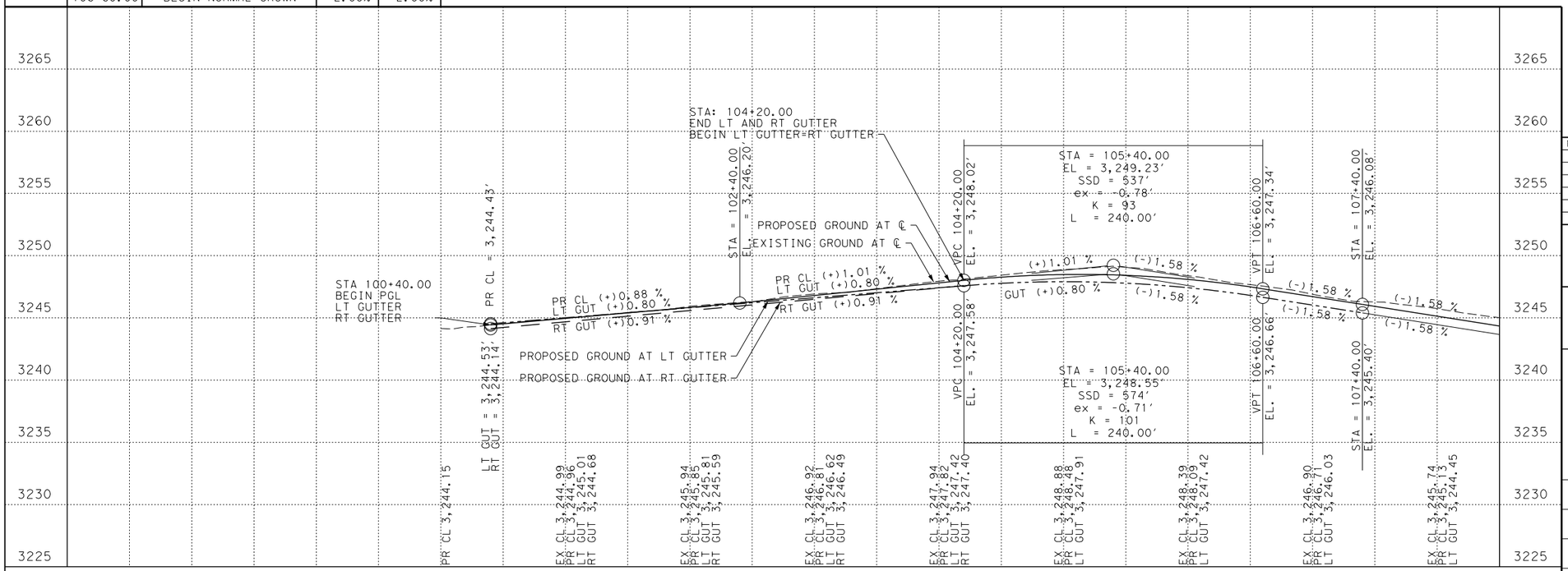


SUPERELEVATION TABLE			
STATION	DESCRIPTION	LT SIDE	RT SIDE
100+40.00	SUPER	0.33%	-0.50%
100+70.00	SUPER	0.29%	-0.51%
102+50.68	SUPER	-	-0.39%
102+50.72	SUPER	0.00%	-
104+50.72	SUPER	-1.25%	-
105+26.76	SUPER	-1.73%	-1.73%
106+60.00	BEGIN NORMAL CROWN	-2.00%	-2.00%



LEGEND

- PROPOSED ROADWAY
- PROPOSED MEDIAN
- PROPOSED SHARED USE PATH/SIDEWALK
- PROPOSED CONCRETE RIPRAP
- PROPOSED LOOSE AGGREGATE LIMITS
- PROPOSED ROCK RIPRAP
- PROPOSED SOD SEED LIMITS
- MH MANHOLE ADJUSTMENT
- WV VALVE ADJUSTMENT

HORIZONTAL SCALE 0 50' 100'
VERTICAL SCALE 0 5' 10'

NOTES:

1. ALL DIMENSIONS ARE TO FACE OF CURB, UNLESS OTHERWISE NOTED.
2. ALL EXISTING UTILITIES SHALL BE FIELD VERIFIED BY CONTRACTOR.
3. CONTRACTOR SHALL PROTECT ALL EXISTING TREES, FENCES, RETAINING WALLS, AND STRUCTURES, UNLESS OTHERWISE NOTED.
4. REFER TO DRIVEWAY AND LANDSCAPE SHEETS FOR MORE INFORMATION FOR CONSTRUCTION BEYOND THE CURB.

STATE OF TEXAS
CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER
3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

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114TH STREET
QUAKER AVE. TO INDIANA AVE.
PLAN AND PROFILE

BEGIN TO STA. 108+50
SHEET 1 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	60
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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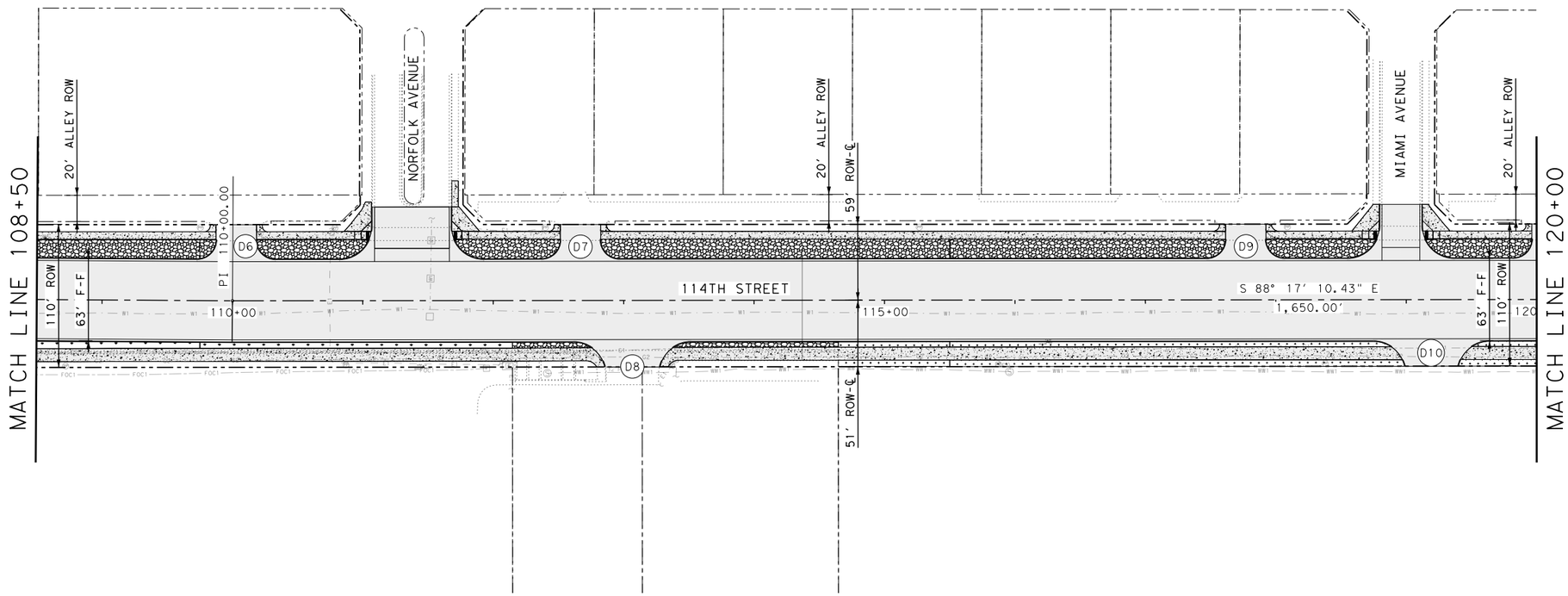

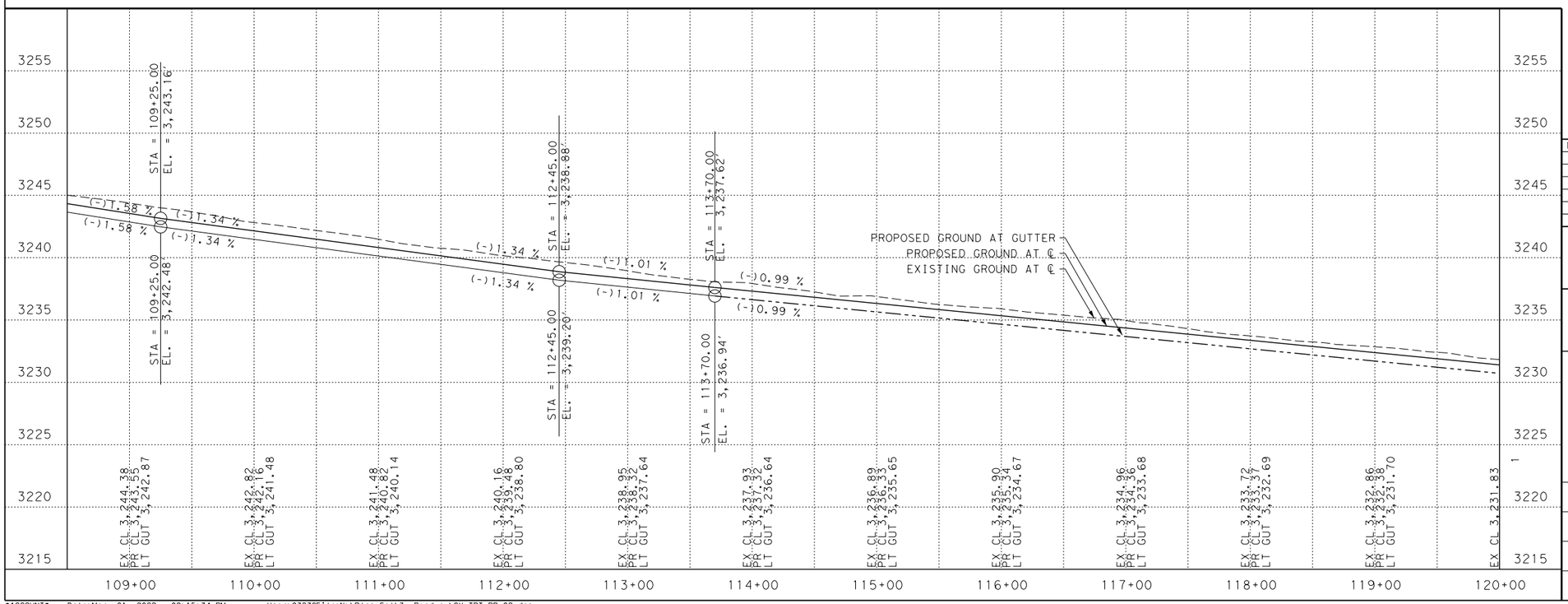

N

0 50' 100'
HORIZONTAL SCALE
0 5' 10'
VERTICAL SCALE

LEGEND

- PROPOSED ROADWAY
- PROPOSED MEDIAN
- PROPOSED SHARED USE PATH/SIDEWALK
- PROPOSED CONCRETE RIPRAP
- PROPOSED LOOSE AGGREGATE LIMITS
- PROPOSED ROCK RIPRAP
- PROPOSED SOD SEED LIMITS
- MH MANHOLE ADJUSTMENT
- WV VALVE ADJUSTMENT

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STATE OF TEXAS
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93679
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3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

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FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
PLAN AND PROFILE

STA 108+50 TO STA 120+00
SHEET 2 OF 5

DESIGN	FED.RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	61
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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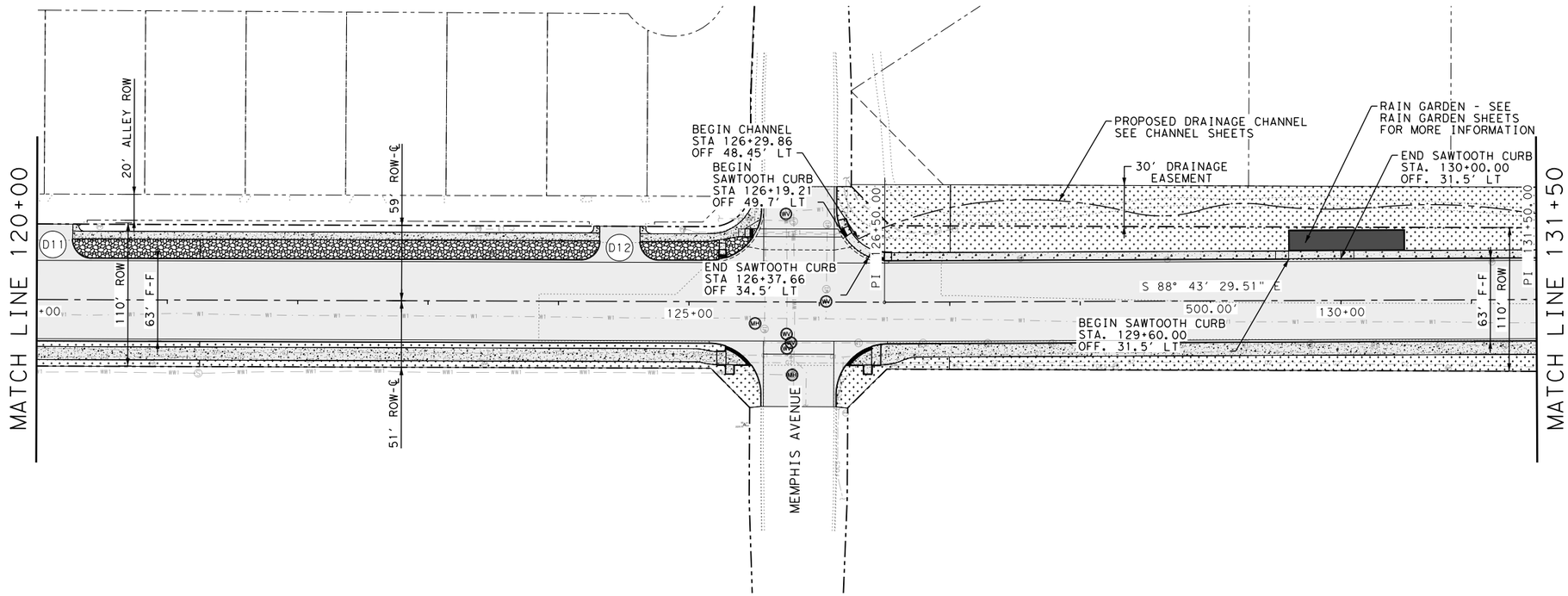

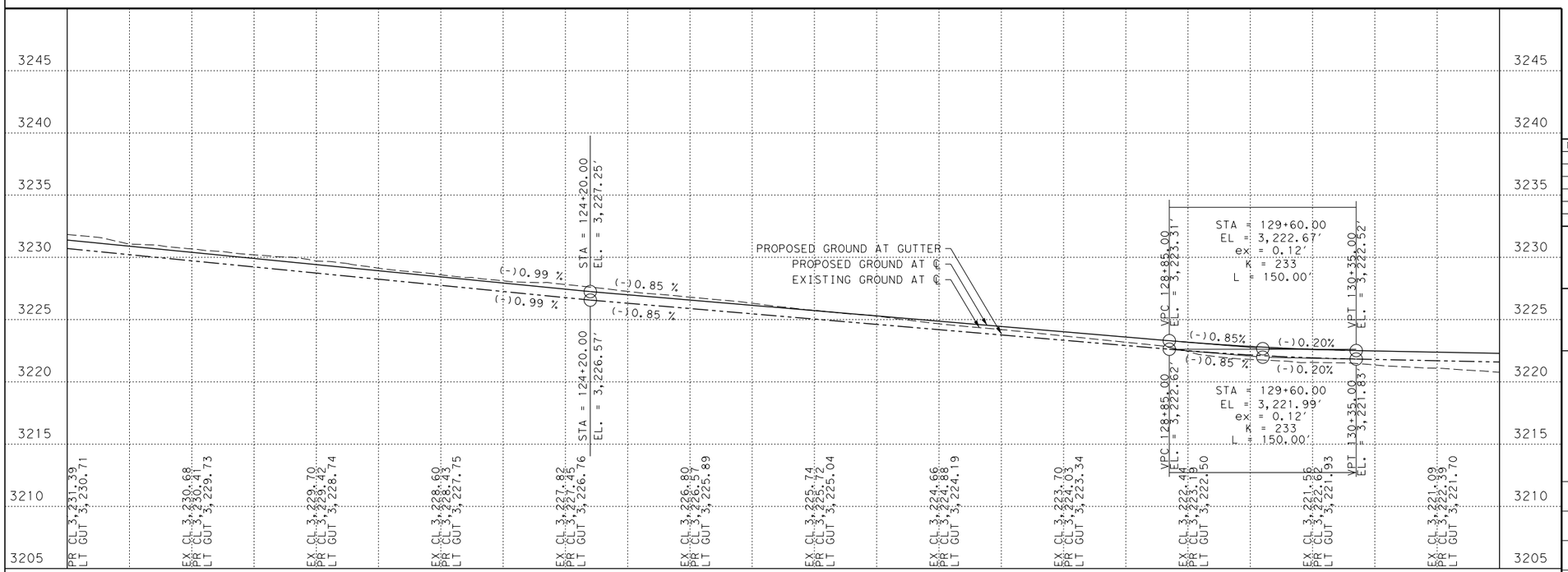

N

0 50' 100'
HORIZONTAL SCALE

0 5' 10'
VERTICAL SCALE

LEGEND

- PROPOSED ROADWAY
- PROPOSED MEDIAN
- PROPOSED SHARED USE PATH/SIDEWALK
- PROPOSED CONCRETE RIPRAP
- PROPOSED LOOSE AGGREGATE LIMITS
- PROPOSED ROCK RIPRAP
- PROPOSED SOD SEED LIMITS
- MH MANHOLE ADJUSTMENT
- WV VALVE ADJUSTMENT

NOTES:

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STATE OF TEXAS
CHRIS B. BOSCO
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3/9/2022

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FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
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Texas Department of Transportation

114TH STREET
QUAKER AVE. TO INDIANA AVE.
PLAN AND PROFILE

STA 120+00 TO STA 131+50
SHEET 3 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	62
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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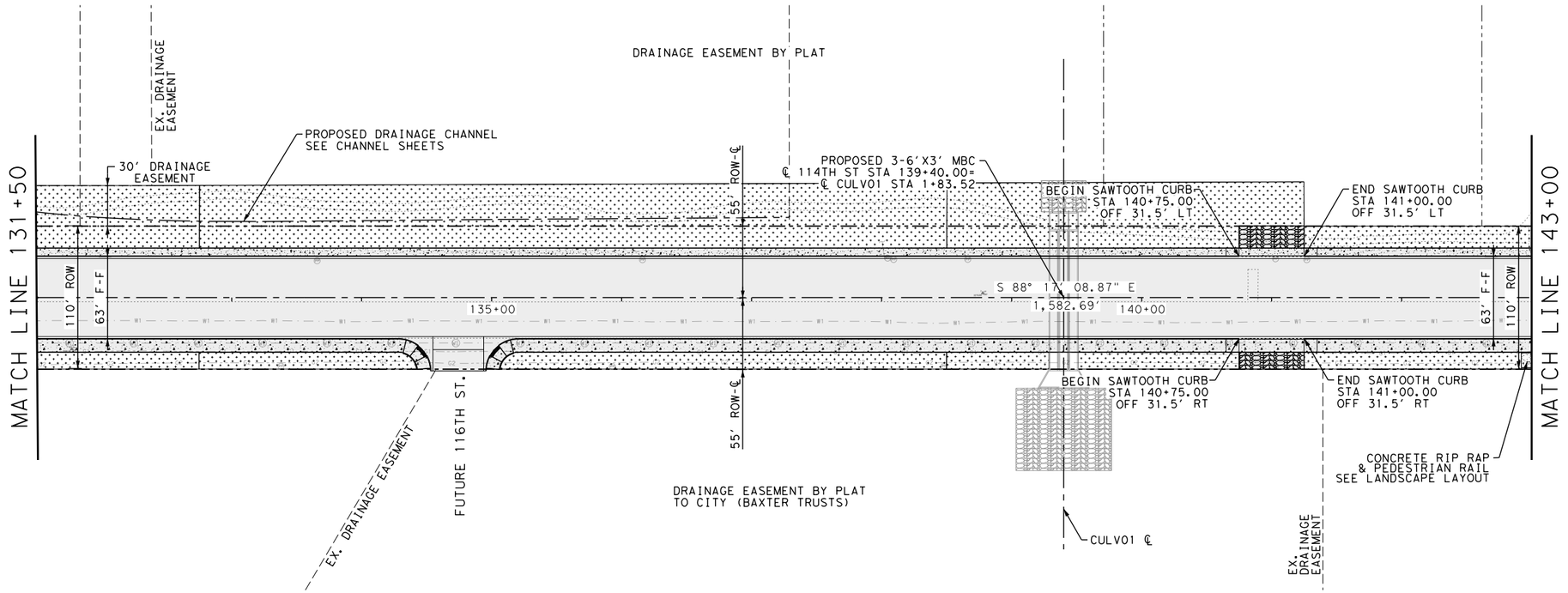

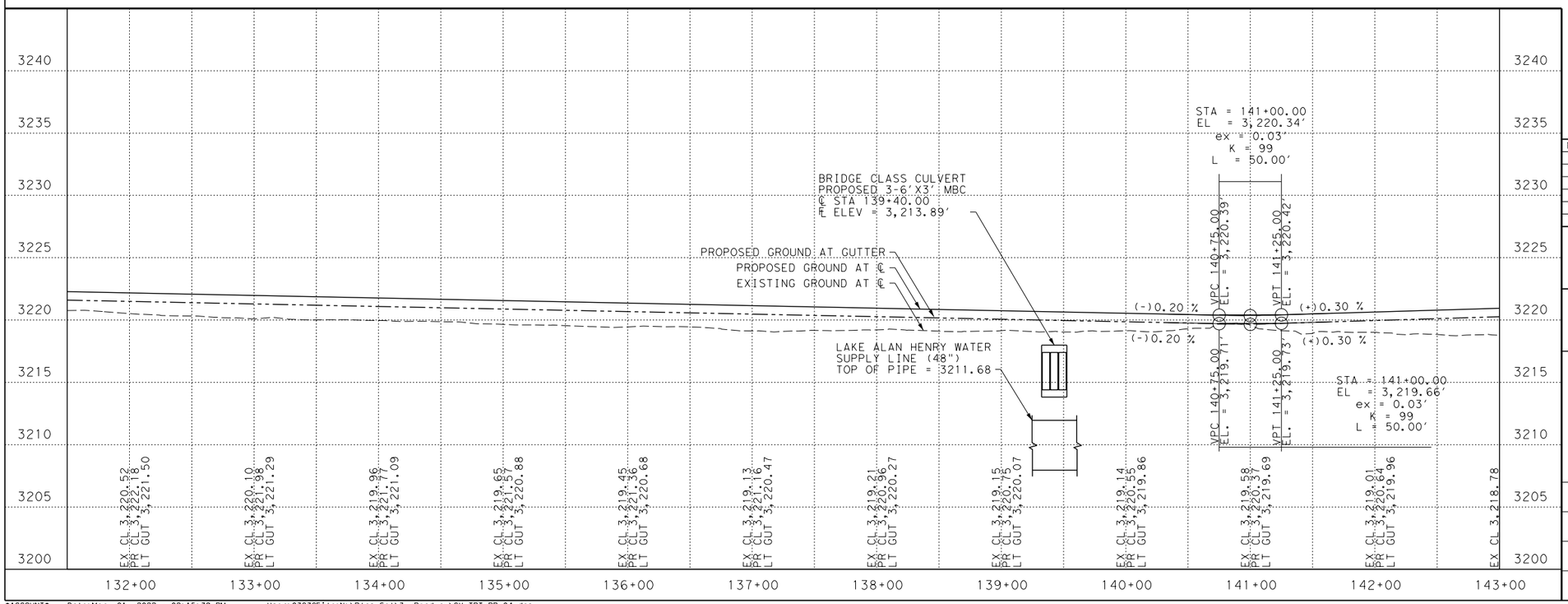

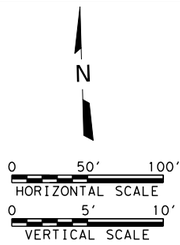

LEGEND

- PROPOSED ROADWAY
- PROPOSED MEDIAN
- PROPOSED SHARED USE PATH/SIDEWALK
- PROPOSED CONCRETE RIPRAP
- PROPOSED LOOSE AGGREGATE LIMITS
- PROPOSED ROCK RIPRAP
- PROPOSED SOD SEED LIMITS
- (MH) MANHOLE ADJUSTMENT
- (WV) VALVE ADJUSTMENT

NOTES:

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Freese and Nichols, Inc.
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FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
PLAN AND PROFILE

STA 131+50 TO STA 143+00
SHEET 4 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	63
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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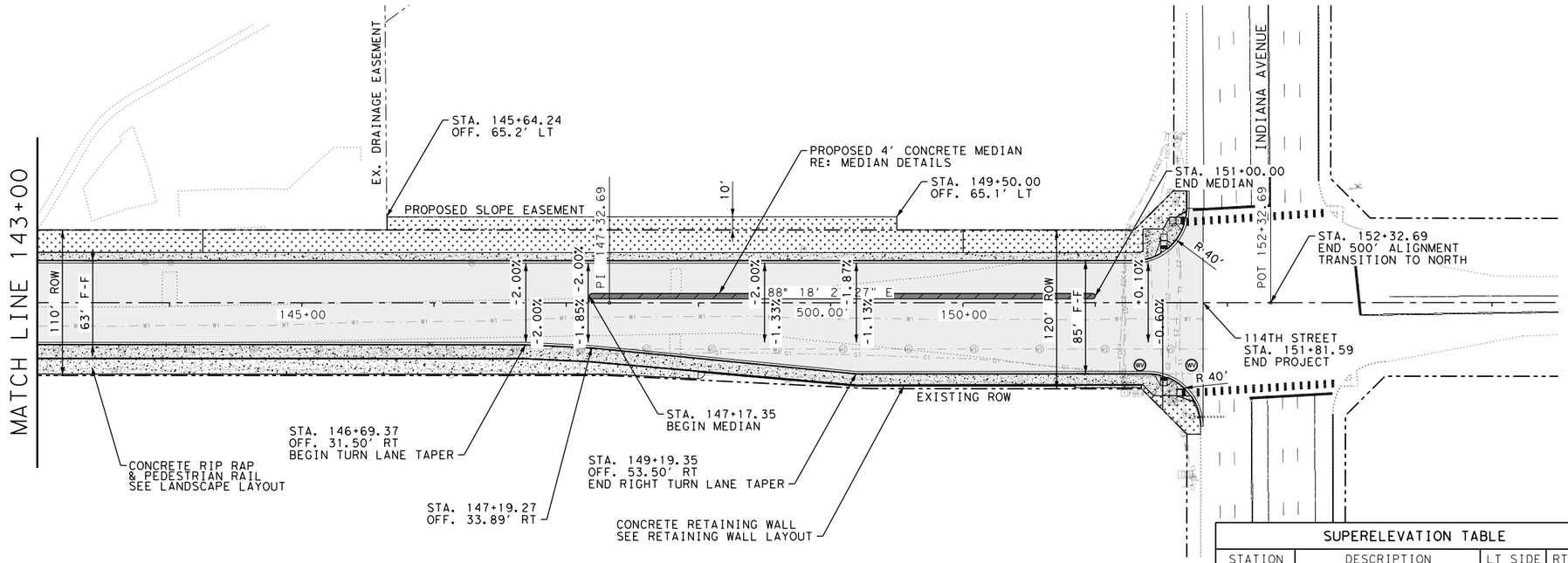
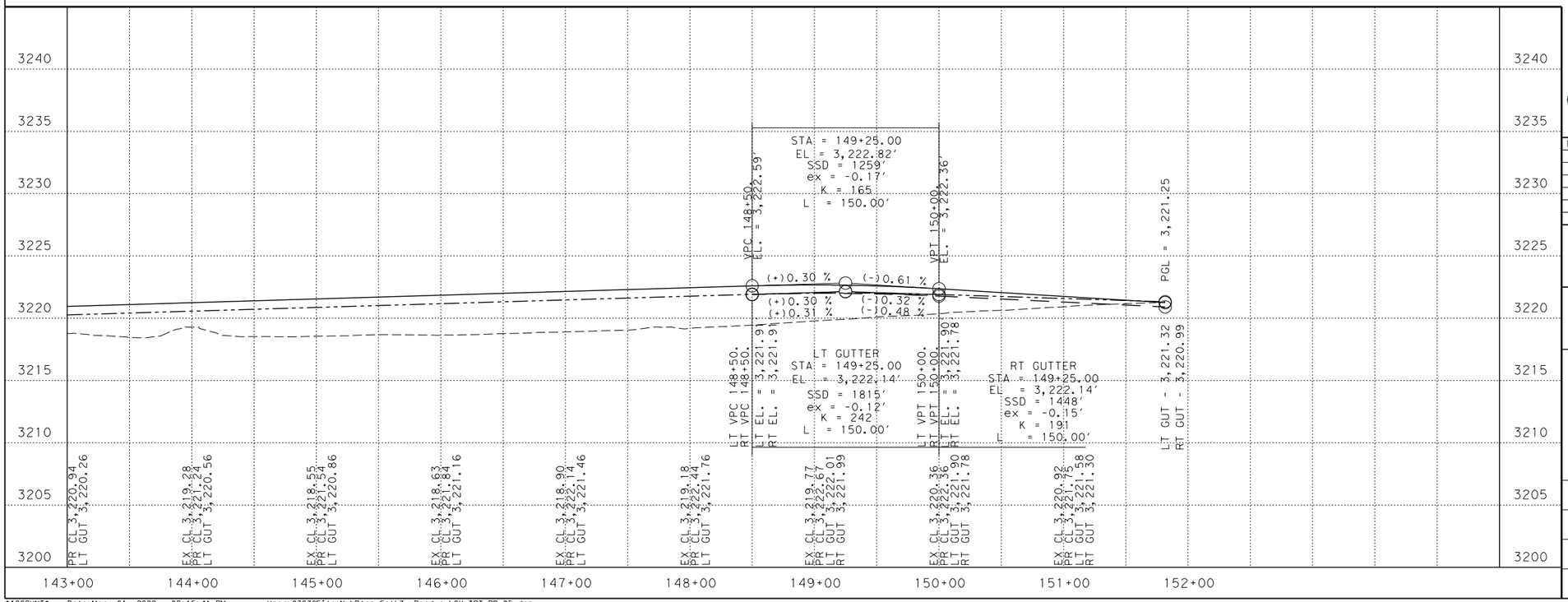


SUPERELEVATION TABLE			
STATION	DESCRIPTION	LT SIDE	RT SIDE
146+69.37	END NORMAL CROWN	-2.00%	-2.00%
147+19.27	SUPER	-2.00%	-1.85%
148+50.00	SUPER	-2.00%	-1.33%
149+19.35	SUPER	-1.87%	-1.13%
151+40.09	SUPER	+0.10%	-0.60%



LEGEND

- PROPOSED ROADWAY
- PROPOSED MEDIAN
- PROPOSED SHARED USE PATH/SIDEWALK
- PROPOSED CONCRETE RIPRAP
- PROPOSED LOOSE AGGREGATE LIMITS
- PROPOSED ROCK RIPRAP
- PROPOSED SOD SEED LIMITS
- MH MANHOLE ADJUSTMENT
- WV VALVE ADJUSTMENT

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Freese and Nichols, Inc.
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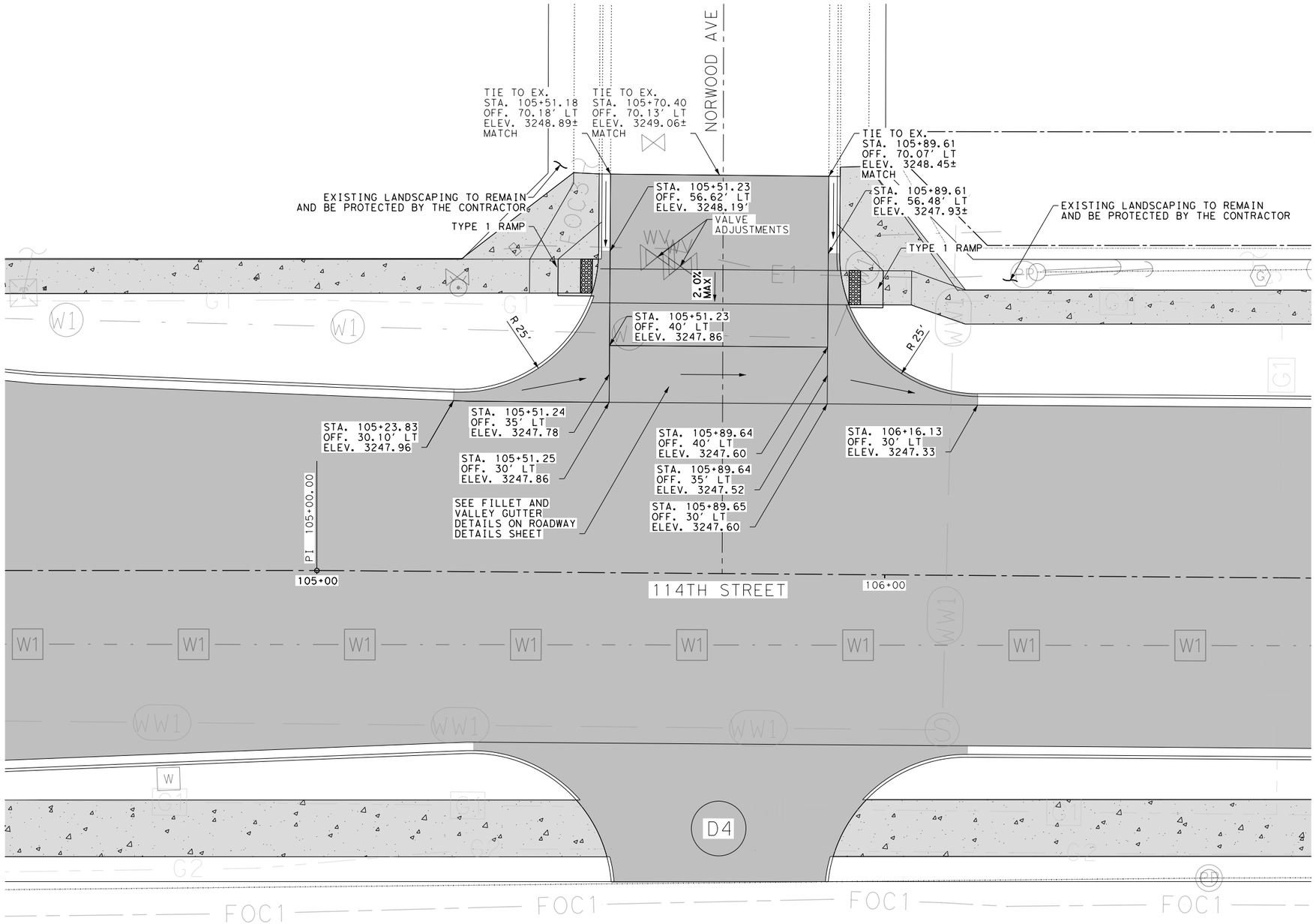
114TH STREET
QUAKER AVE. TO INDIANA AVE.
PLAN AND PROFILE

STA 143+00 TO END

SHEET 5 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	64
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	



N

0 10' 20'
SCALE IN FEET

LEGEND

- PROPOSED ROADWAY
- PROPOSED SHARED USE PATH/SIDEWALK

NOTES:

1. PEDESTRIAN RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE WITH TXDOT STANDARDS AND ADA REQUIREMENTS.
2. CONTRACTOR SHALL ENSURE THAT THE PEDESTRIAN CONNECTION ACROSS THE INTERSECTION PAVEMENT HAS A 2% MAXIMUM CROSS SLOPE.
3. REFER TO ROADWAY DETAILS FOR CLARIFICATION IN PAY ITEM BREAKDOWNS AT INTERSECTIONS.
4. REFER TO DRIVEWAY AND LANDSCAPE SHEETS FOR MORE INFORMATION FOR CONSTRUCTION BEYOND THE CURB.

STATE OF TEXAS
CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER

3/9/2022

Freese and Nichols, Inc.
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Lubbock, TX 79401
Phone - (806) 686-2700
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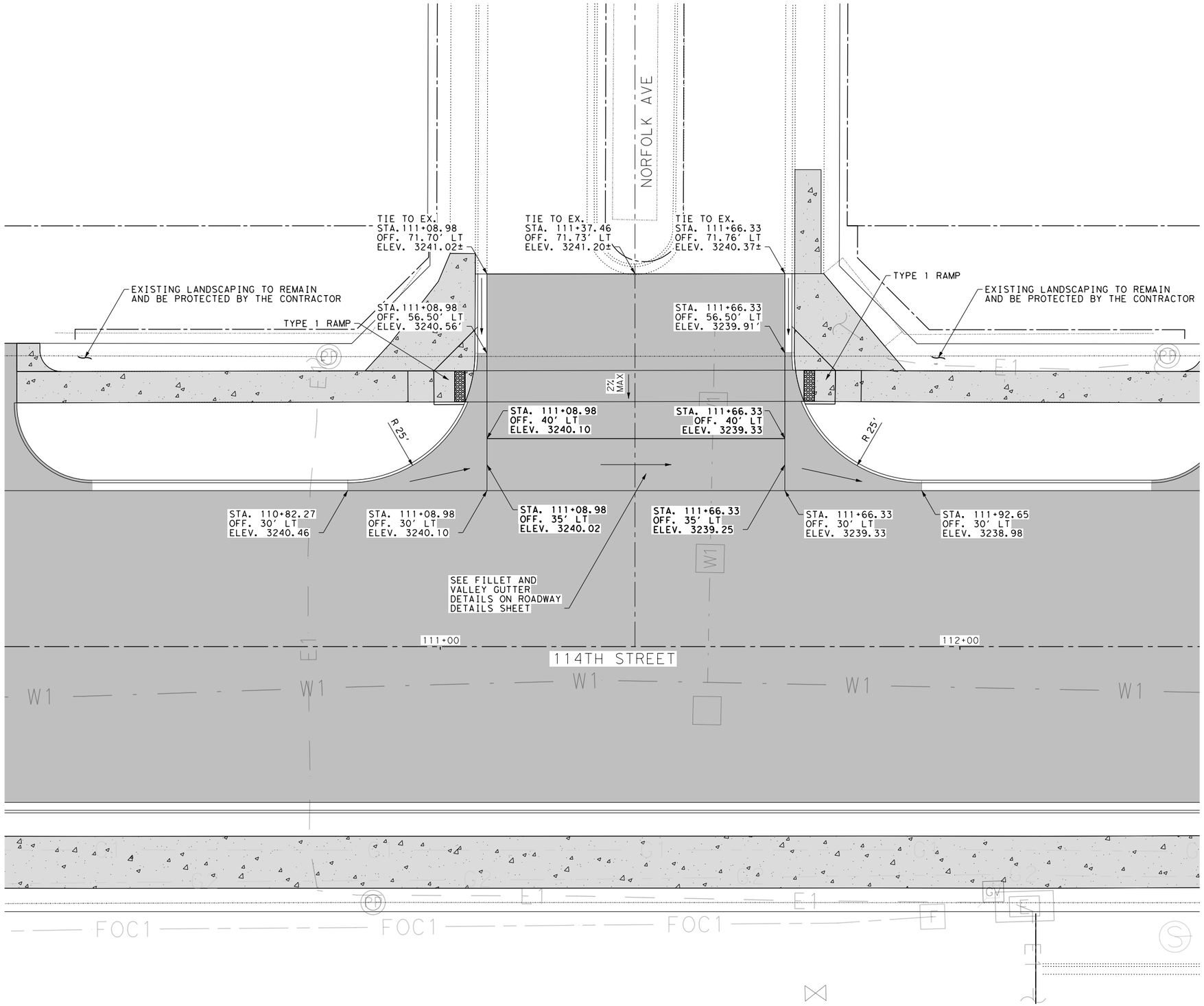
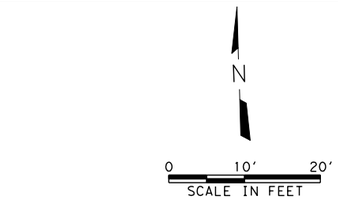
114TH STREET
QUAKER AVE. TO INDIANA AVE.

INTERSECTION LAYOUT
114TH STREET AND NORWOOD AVENUE

SHEET 1 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	65
	0905	06	118	





LEGEND

- PROPOSED ROADWAY
- PROPOSED SHARED USE PATH/SIDEWALK

NOTES:

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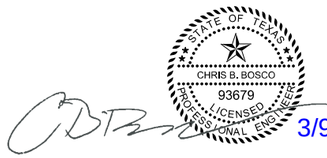

3/9/2022

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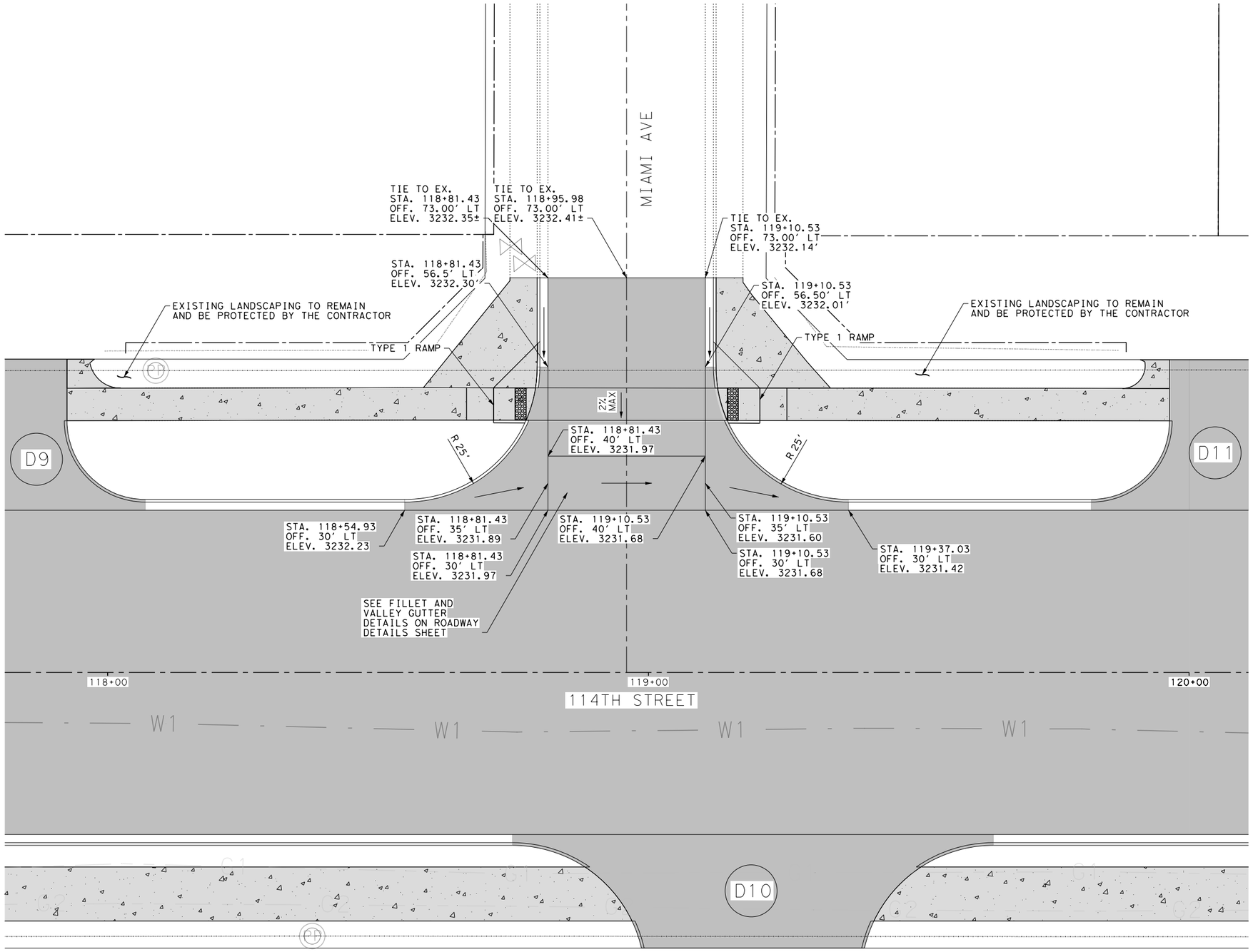
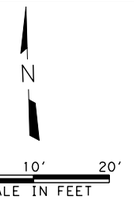
114TH STREET
QUAKER AVE. TO INDIANA AVE.

INTERSECTION LAYOUT
114TH STREET AND NORFOLK AVENUE

SHEET 2 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	66
	0905	06	118	



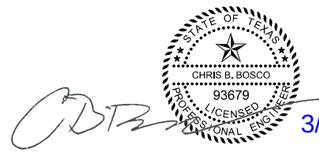


LEGEND

- PROPOSED ROADWAY
- PROPOSED SHARED USE PATH/SIDEWALK

NOTES:

1. PEDESTRIAN RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE WITH TXDOT STANDARDS AND ADA REQUIREMENTS.
2. CONTRACTOR SHALL ENSURE THAT THE PEDESTRIAN CONNECTION ACROSS THE INTERSECTION PAVEMENT HAS A 2% MAXIMUM CROSS SLOPE.
3. REFER TO ROADWAY DETAILS FOR CLARIFICATION IN PAY ITEM BREAKDOWNS AT INTERSECTIONS.
4. REFER TO DRIVEWAY AND LANDSCAPE SHEETS FOR MORE INFORMATION FOR CONSTRUCTION BEYOND THE CURB.



Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

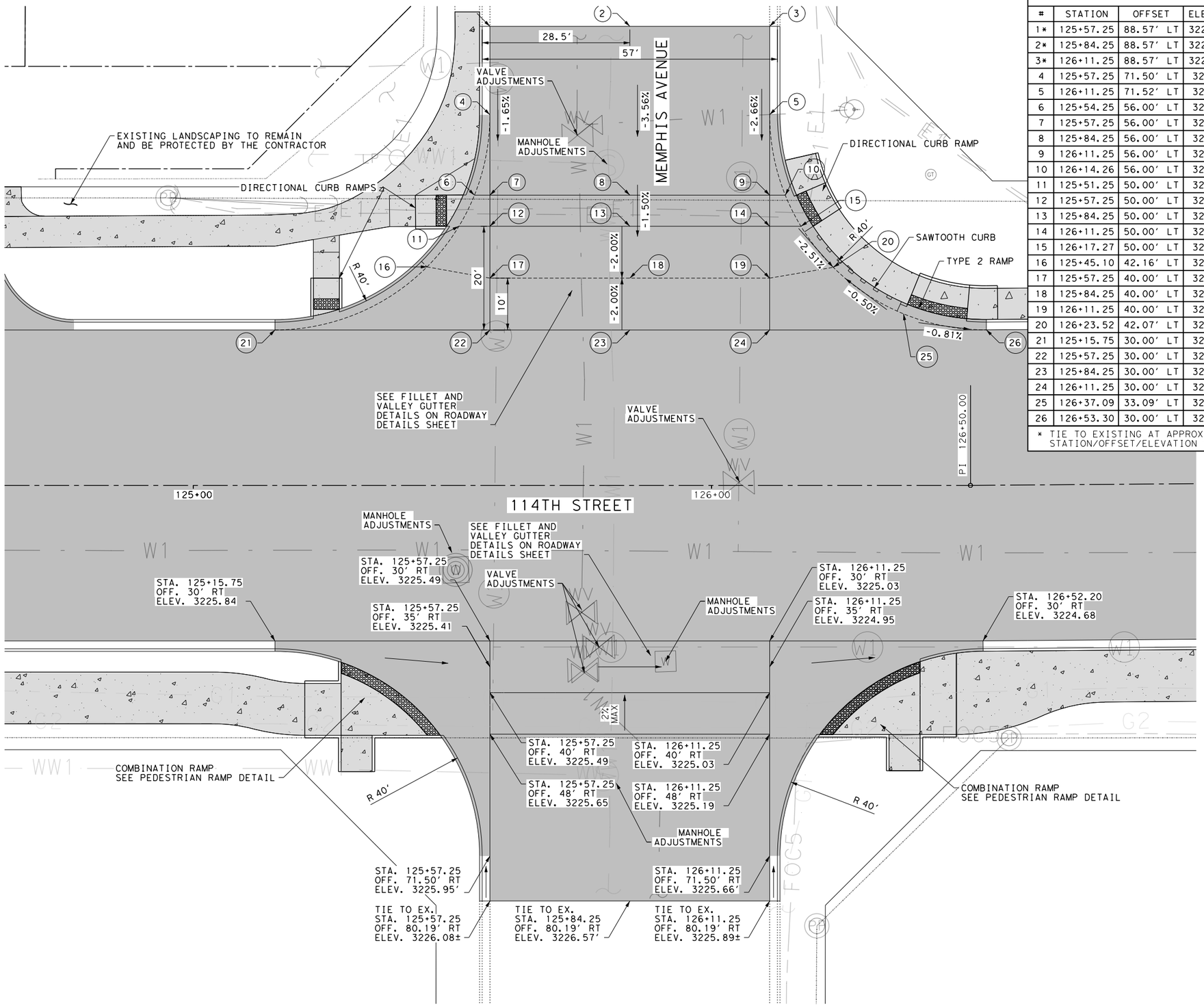
FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.

INTERSECTION LAYOUT
114TH STREET AND MIAMI AVENUE

SHEET 3 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	67
	0905	06	118	



POINT INFORMATION

#	STATION	OFFSET	ELEVATION
1*	125+57.25	88.57' LT	3226.11'±
2*	125+84.25	88.57' LT	3226.51'±
3*	126+11.25	88.57' LT	3225.99'±
4	125+57.25	71.50' LT	3225.83'
5	126+11.25	71.52' LT	3225.53'
6	125+54.25	56.00' LT	3225.60'
7	125+57.25	56.00' LT	3225.58'
8	125+84.25	56.00' LT	3225.35'
9	126+11.25	56.00' LT	3225.12'
10	126+14.26	56.00' LT	3225.09'
11	125+51.25	50.00' LT	3225.54'
12	125+57.25	50.00' LT	3225.49'
13	125+84.25	50.00' LT	3225.26'
14	126+11.25	50.00' LT	3225.03'
15	126+17.27	50.00' LT	3224.98'
16	125+45.10	42.16' LT	3225.39'
17	125+57.25	40.00' LT	3225.29'
18	125+84.25	40.00' LT	3225.06'
19	126+11.25	40.00' LT	3224.83'
20	126+23.52	42.07' LT	3224.72'
21	125+15.75	30.00' LT	3225.84'
22	125+57.25	30.00' LT	3225.49'
23	125+84.25	30.00' LT	3225.26'
24	126+11.25	30.00' LT	3225.03'
25	126+37.09	33.09' LT	3224.80'
26	126+53.30	30.00' LT	3224.67'

* TIE TO EXISTING AT APPROXIMATE STATION/OFFSET/ELEVATION SHOWN

N

0 10' 20'
SCALE IN FEET

LEGEND

- PROPOSED ROADWAY
- PROPOSED SHARED USE PATH/SIDEWALK

NOTES:

1. PEDESTRIAN RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE WITH TXDOT STANDARDS AND ADA REQUIREMENTS.
2. CONTRACTOR SHALL ENSURE THAT THE PEDESTRIAN CONNECTION ACROSS THE INTERSECTION PAVEMENT HAS A 2% MAXIMUM CROSS SLOPE.
3. REFER TO ROADWAY DETAILS FOR CLARIFICATION IN PAY ITEM BREAKDOWNS AT INTERSECTIONS.
4. REFER TO DRIVEWAY AND LANDSCAPE SHEETS FOR MORE INFORMATION FOR CONSTRUCTION BEYOND THE CURB.

STATE OF TEXAS
CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER

3/9/2022

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Texas Registered Engineering Firm F-2144

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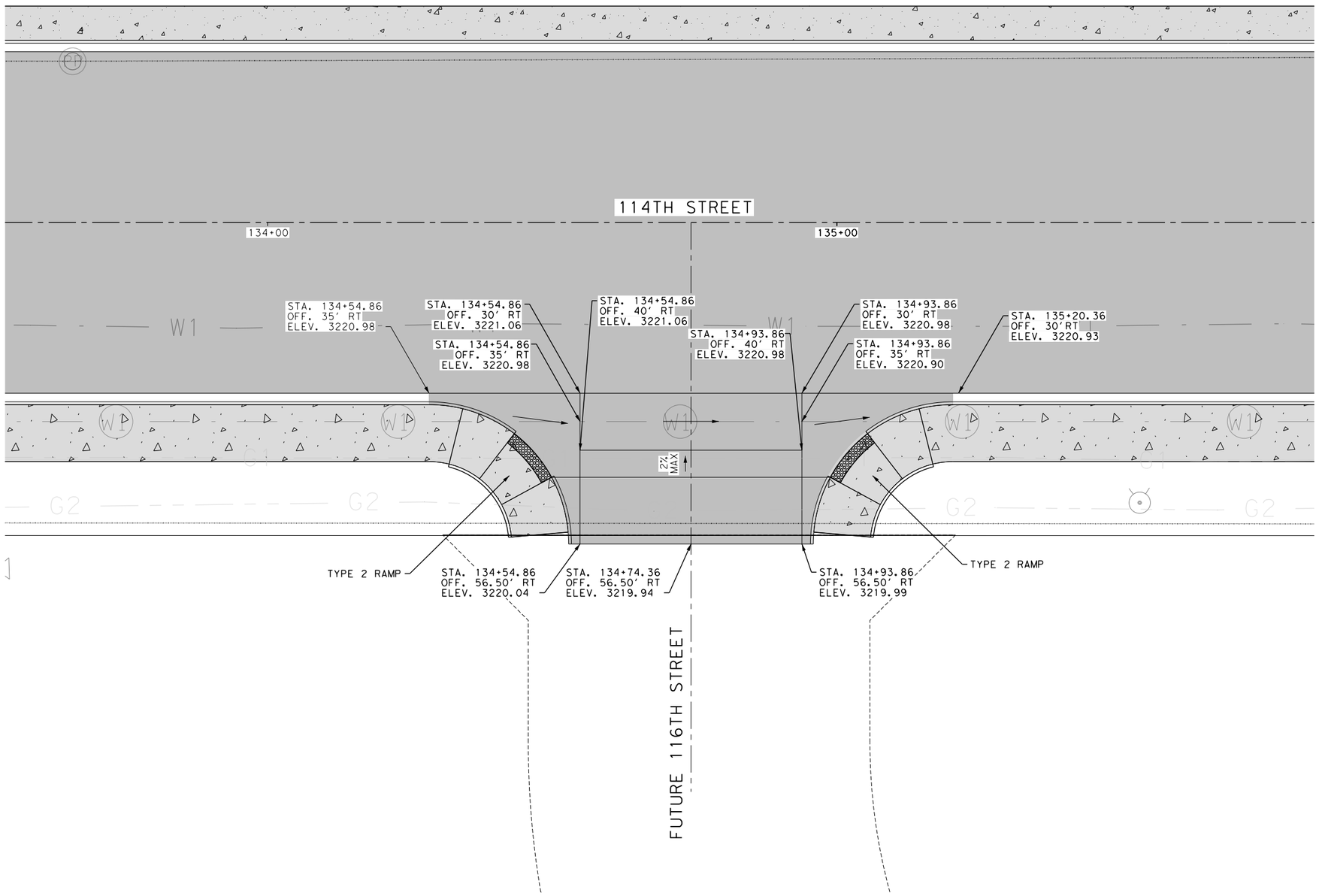
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
INTERSECTION LAYOUT
114TH STREET AND MEMPHIS AVENUE

SHEET 4 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	68
	0905	06	118	



N

0 10' 20'
SCALE IN FEET

LEGEND

- PROPOSED ROADWAY
- PROPOSED SHARED USE PATH/SIDEWALK

NOTES:

1. PEDESTRIAN RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE WITH TXDOT STANDARDS AND ADA REQUIREMENTS.
2. CONTRACTOR SHALL ENSURE THAT THE PEDESTRIAN CONNECTION ACROSS THE INTERSECTION PAVEMENT HAS A 2% MAXIMUM CROSS SLOPE.
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STATE OF TEXAS
CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER

3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

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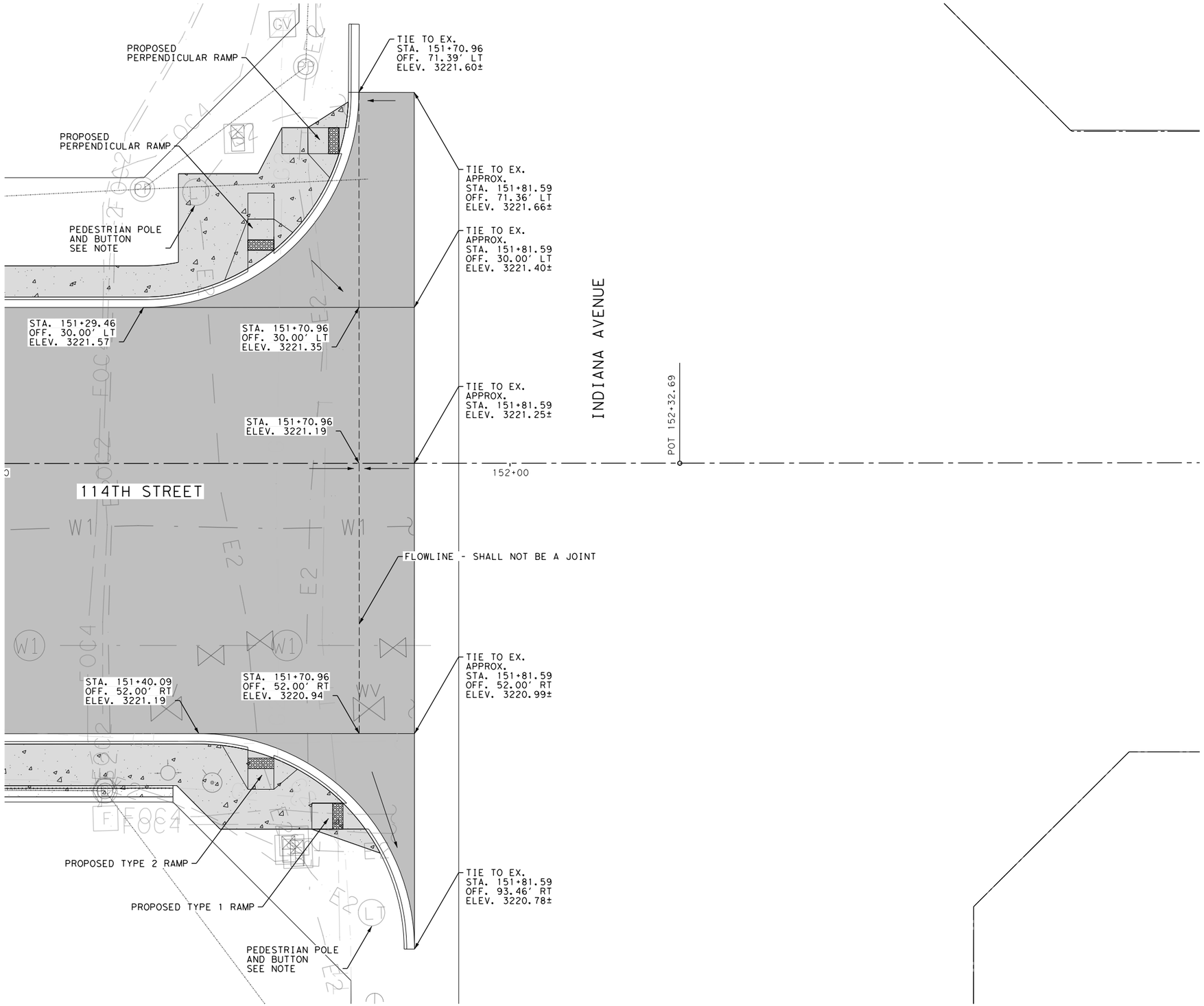
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
INTERSECTION LAYOUT
114TH STREET AND 116TH STREET

SHEET 5 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	69
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	



NOTE:
CONTRACTOR SHALL PROVIDE ADVANCED NOTICE TO THE CITY OF LUBBOCK TRAFFIC MANAGEMENT DEPARTMENT (806) 775-2132 BEFORE INSTALLING ANY FLATWORK AT INDIANA AVENUE SO ADDITIONAL PEDESTRIAN POLES AND BUTTONS MAY BE INSTALLED BY THE CITY OF LUBBOCK.

STATE OF TEXAS
CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER

3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

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1500 Broadway Street, Suite 1150
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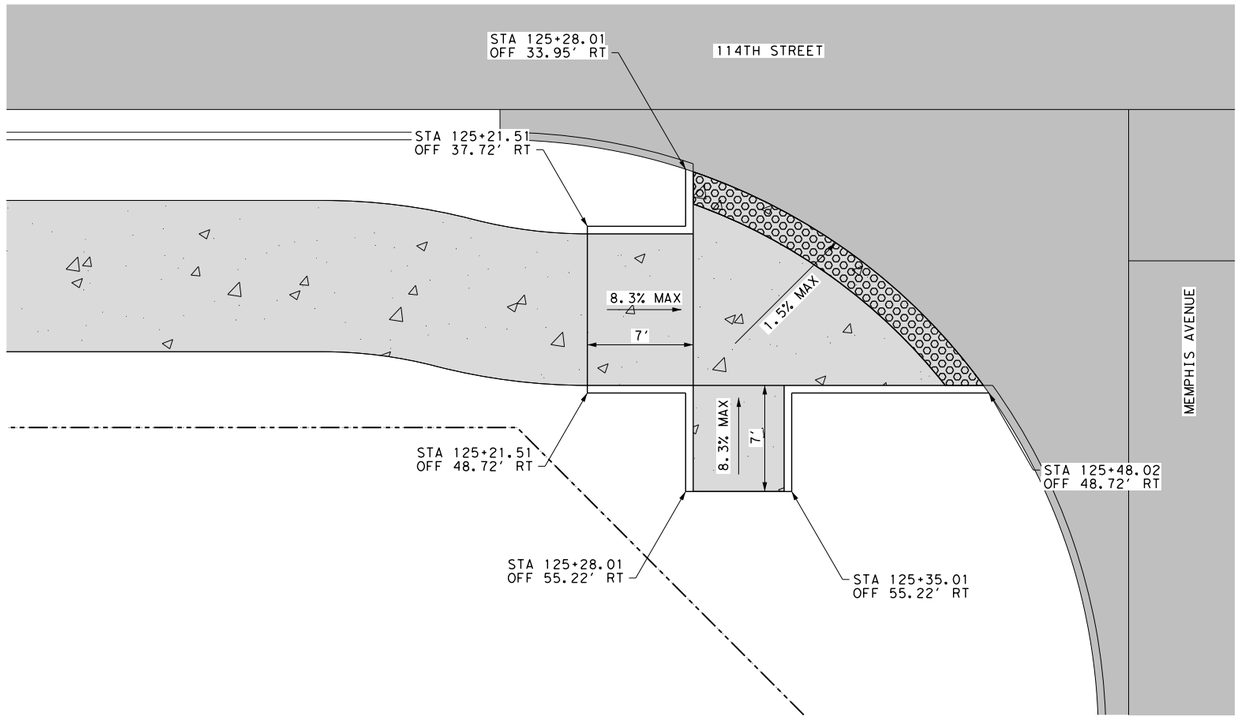
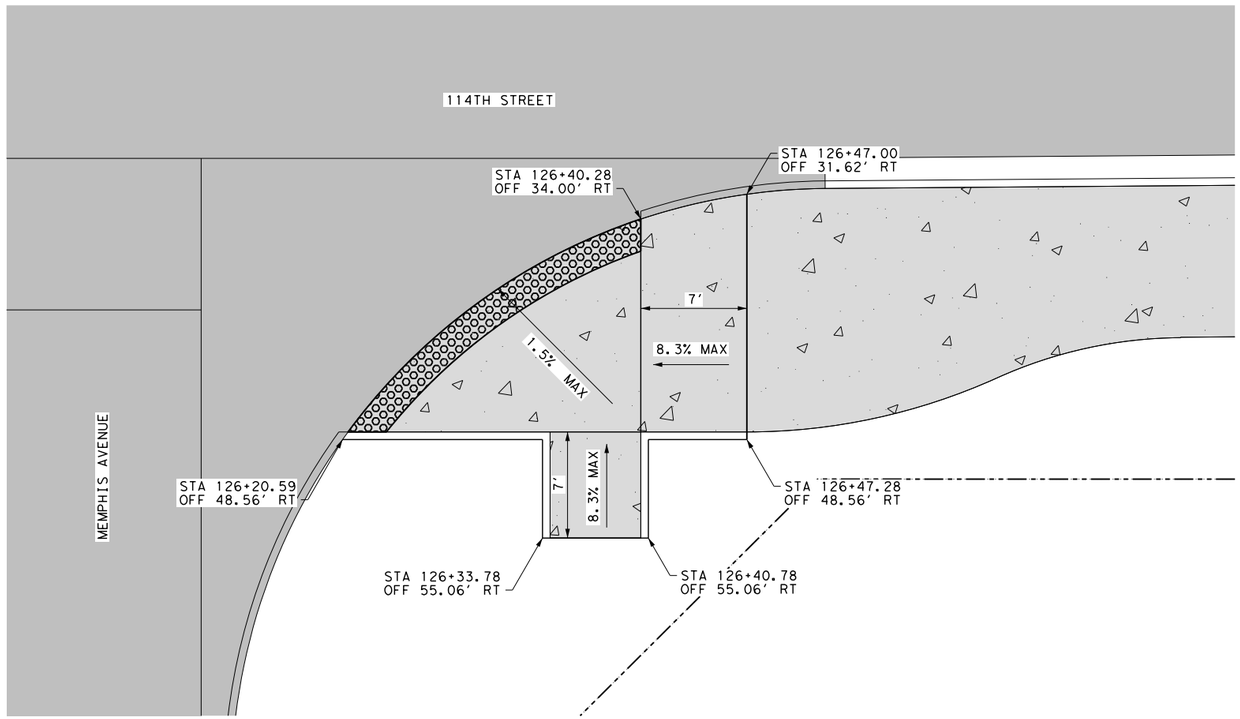
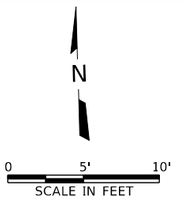
114TH STREET
QUAKER AVE. TO INDIANA AVE.
INTERSECTION LAYOUT
114TH STREET AND INDIANA AVENUE
SHEET 6 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	70
	0905	06	118	







LEGEND

- PROPOSED ROADWAY
- PROPOSED SHARED USE PATH/SIDEWALK
- DETECTABLE WARNING SURFACE

3/9/2022

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Texas Registered Engineering Firm F-2144

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Lubbock, TX 79401
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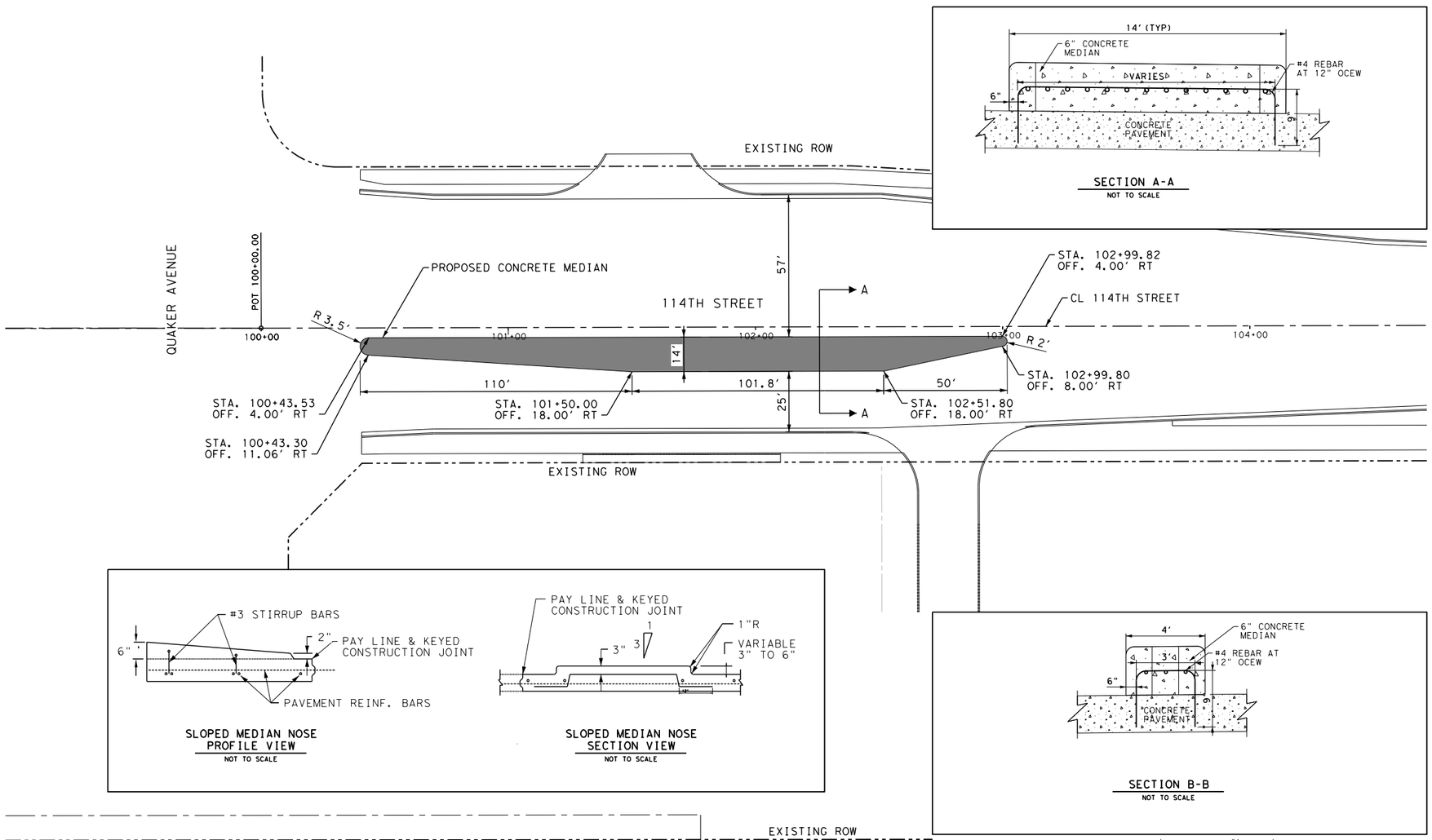
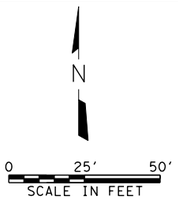
114TH STREET
QUAKER AVE. TO INDIANA AVE.
PEDESTRIAN RAMP DETAIL
114TH STREET AND MEMPHIS AVENUE

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	71
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

$USER$
50.0000 ft / in.



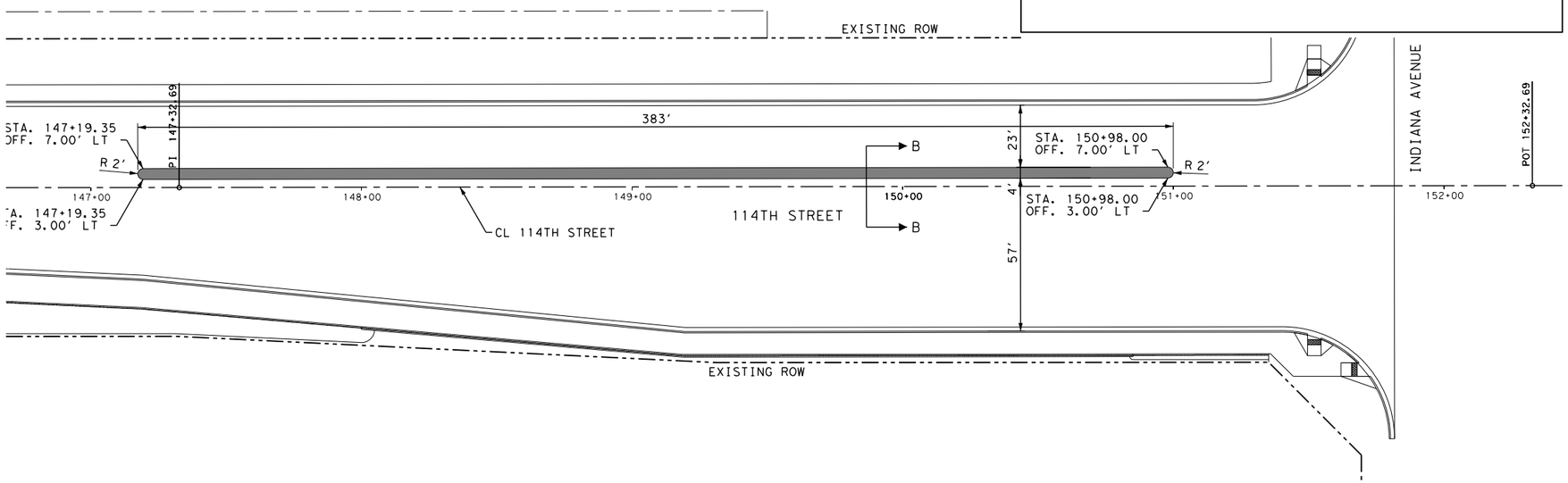
SECTION A-A
NOT TO SCALE



SLOPED MEDIAN NOSE PROFILE VIEW
NOT TO SCALE

SLOPED MEDIAN NOSE SECTION VIEW
NOT TO SCALE

SECTION B-B
NOT TO SCALE



CHRIS B. BOSCO
93679
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

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Texas Department of Transportation
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114TH STREET
QUAKER AVE. TO INDIANA AVE.
MEDIAN DETAILS

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	72
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

Mar. 01, 2022 - 02:15:58 PM
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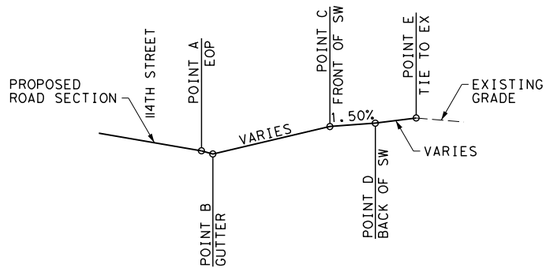
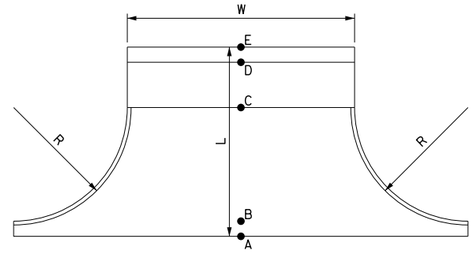


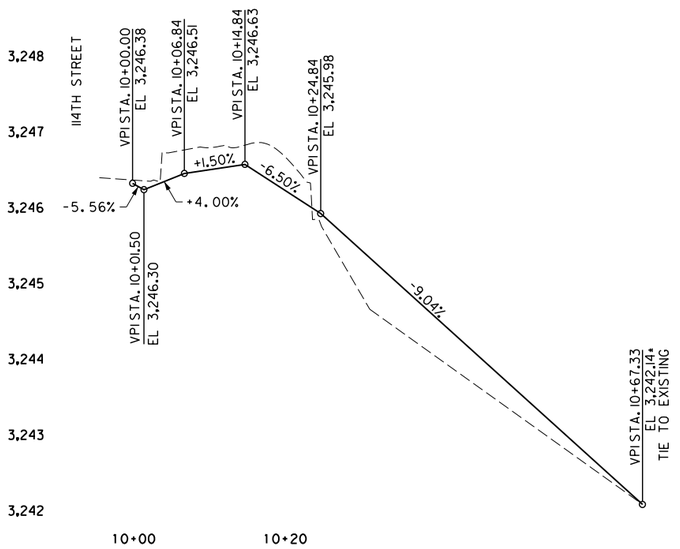
1 TYPICAL DRIVEWAY SECTION
NOT TO SCALE



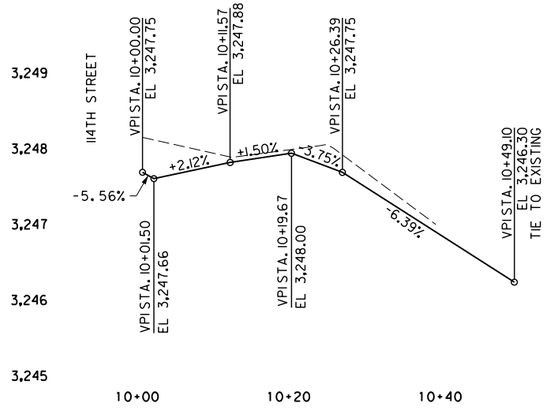
2 TYPICAL DRIVEWAY PLAN
NOT TO SCALE

DRIVEWAY LOCATION			DRIVEWAY GEOMETRY				POINT A		POINT B		POINT C		POINT D		POINT E	
DRIVEWAY NUMBER	ROADWAY STATION AT DRIVEWAY CL	RT/LT	RADIUS "R" (FT)	LENGTH "L" (FT)	WIDTH "W" (FT)	AREA (SY)	PVI STA	PVI ELEV	PVI STA	PVI ELEV	PVI STA	PVI ELEV	PVI STA	PVI ELEV	PVI STA	PVI ELEV
D1	101+56.90	LT	30	18.1	35.2	110	10+00.00	3245.62	10+01.50	3245.54	10+09.72	3246.16	10+15.72	3246.25	10+18.15	3246.33
D2	102+77.88	RT	25	40.1	25	246	FOR PVI STATION AND ELEVATION INFORMATION, SEE DETAIL THIS SHEET									
D3	103+43.53	LT	25	30.3	29	138	10+00.00	3247.25	10+01.50	3247.16	10+16.19	3247.66	10+24.35	3247.90	10+30.35	3247.99
D4	105+71.32	RT	25	38.8	38	140	FOR PVI STATION AND ELEVATION INFORMATION, SEE DETAIL THIS SHEET									
D5	107+17.48	LT	15	23	31	108	10+00.00	3245.87	10+01.50	3245.79	10+15.07	3246.49	10+21.07	3246.58	10+23.00	3246.66
D6	110+03.00	LT	15	25	31	115	10+00.00	3241.52	10+01.50	3241.44	10+16.95	3242.21	10+22.95	3242.30	10+28.35	3242.60
D7	112+66.89	LT	15	25	31	114	10+00.00	3238.06	10+01.50	3237.98	10+16.96	3238.83	10+22.96	3238.92	10+28.22	3239.22
D8	113+06.58	RT	25	33	41	133	10+00.00	3237.66	10+01.50	3237.58	10+06.50	3237.93	10+16.50	3238.08	10+21.00	3238.40
D9	117+76.98	LT	15	25	31	113	10+00.00	3233.00	10+01.50	3232.92	10+16.95	3233.38	10+22.95	3233.47	10+28.35	3233.61
D10	119+19.34	RT	25	25	41.3	133	10+00.00	3231.59	10+01.50	3231.51	10+08.00	3232.03	10+16.00	3232.15	10+21.00	3232.43
D11	120+11.88	LT	15	25	31	113	10+00.00	3230.68	10+01.50	3230.59	10+16.54	3231.31	10+22.54	3231.40	10+25.00	3231.42
D12	124+46.90	LT	15	24	31	112	10+00.00	3226.42	10+01.50	3226.34	10+16.16	3227.05	10+22.16	3227.14	10+27.63	3227.03

* 8' SUP USED IN DRIVEWAY LAYOUT



DRIVEWAY D2
114TH STA 102+77.88
3 NOT TO SCALE



DRIVEWAY D4
114TH STA 105+71.32
4 NOT TO SCALE

CHRIS B. BOSCO
93679
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
4/28/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
DRIVEWAY DETAILS

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	73
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

SUMMARY OF LANDSCAPE ITEMS						
LOCATION	162 6002	164 6025	168 6001	1005 6001	2005 6001	160 6003
	BLOCK SODDING	CELL FBR MLCH SEED(PERM)(URBAN)(SANDY)	VEGETATIVE WATERING	LOOSE AGGR FOR GROUNDCOVER (TYPE I)	FILTER FABRIC (TY 2)	FURNISHING AND PLACING TOPSOIL (4")
	SY	SY	MG	CY	SY	SY
OVERALL						
LANDSCAPE LAYOUT - BEGIN TO STA 109+75	813		27	72	648	813
LANDSCAPE LAYOUT - STA 109+75 TO STA 121+25	120	604	24	168	1512	724
LANDSCAPE LAYOUT - STA 121+25 TO STA 132+75		4806	162	67	600	4806
LANDSCAPE LAYOUT - STA 132+75 TO STA 144+25		6420	216			6420
LANDSCAPE LAYOUT - STA 144+25 TO END		1906	64			1906
PROJECT TOTALS	933	13736	493	307	2760	14669

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Texas Registered Engineering Firm F-2144

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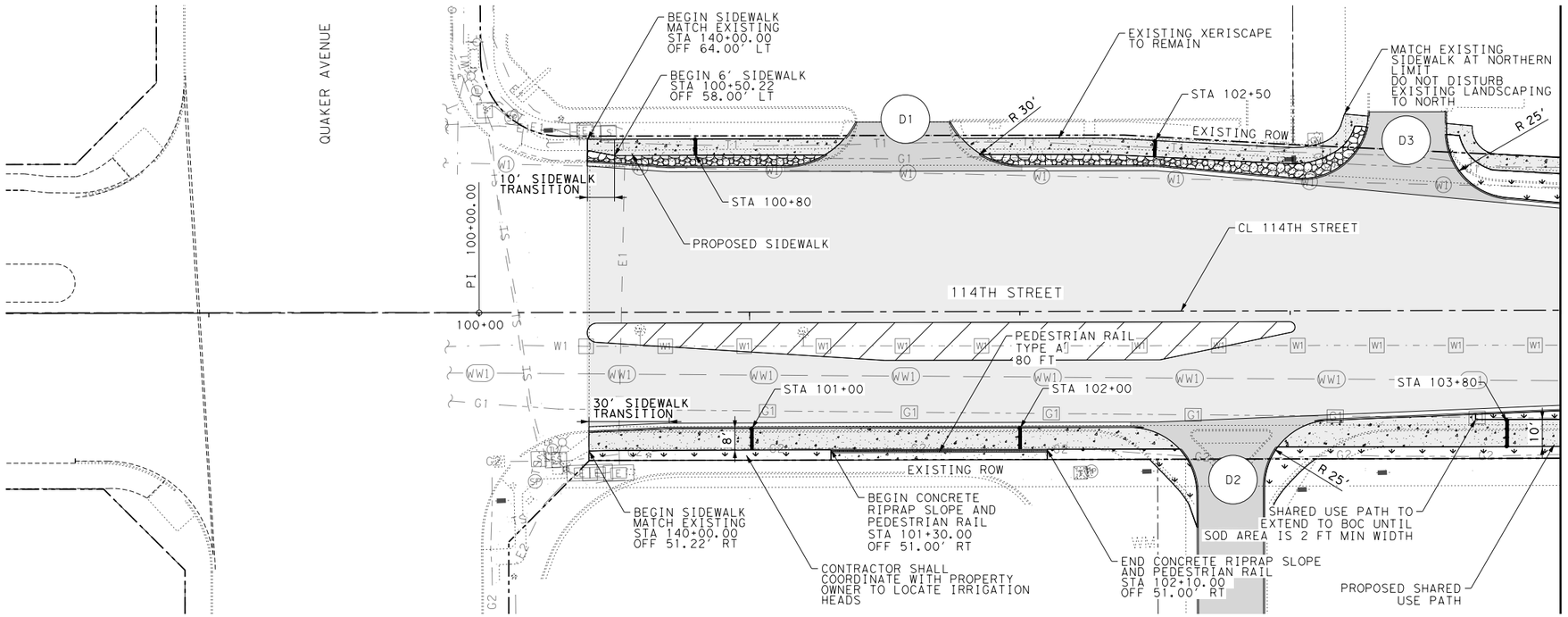
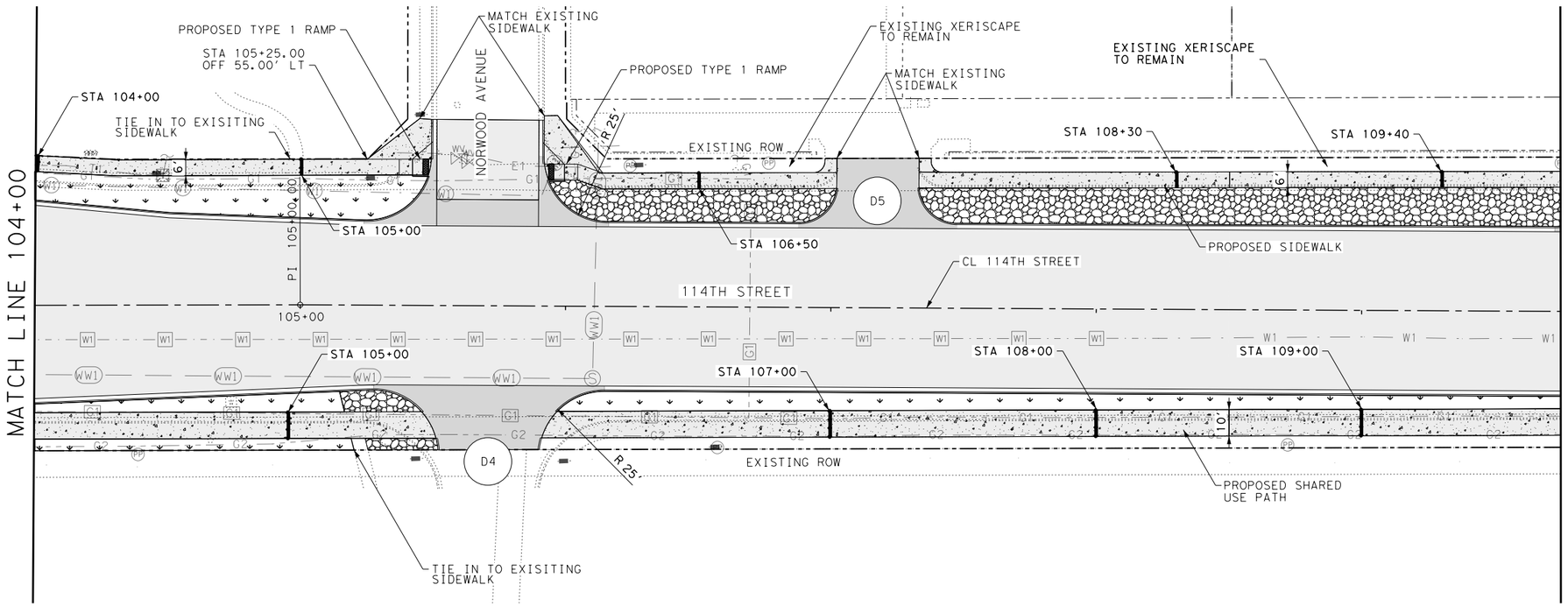
114TH STREET
QUAKER AVE. TO INDIANA AVE.
LANDSCAPE SUMMARY

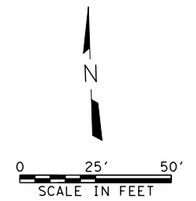
SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	74
	0905	06	118	

$USER$
50.0000 ft / in.







LEGEND

- PROPOSED SHARED USE PATH/SIDEWALK
- PROPOSED LOOSE AGGREGATE WITH FILTER FABRIC LIMITS
- PROPOSED CONCRETE RIPRAP
- PROPOSED SEEDING LIMITS
- PROPOSED SODDING LIMITS
- 3" PVC IRRIGATION SLEEVE

NOTE:
SEE ROADWAY DETAILS FOR MORE INFORMATION ON IRRIGATION SLEEVES AND LOOSE AGGREGATE LANDSCAPING

STATE OF TEXAS
CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER

3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

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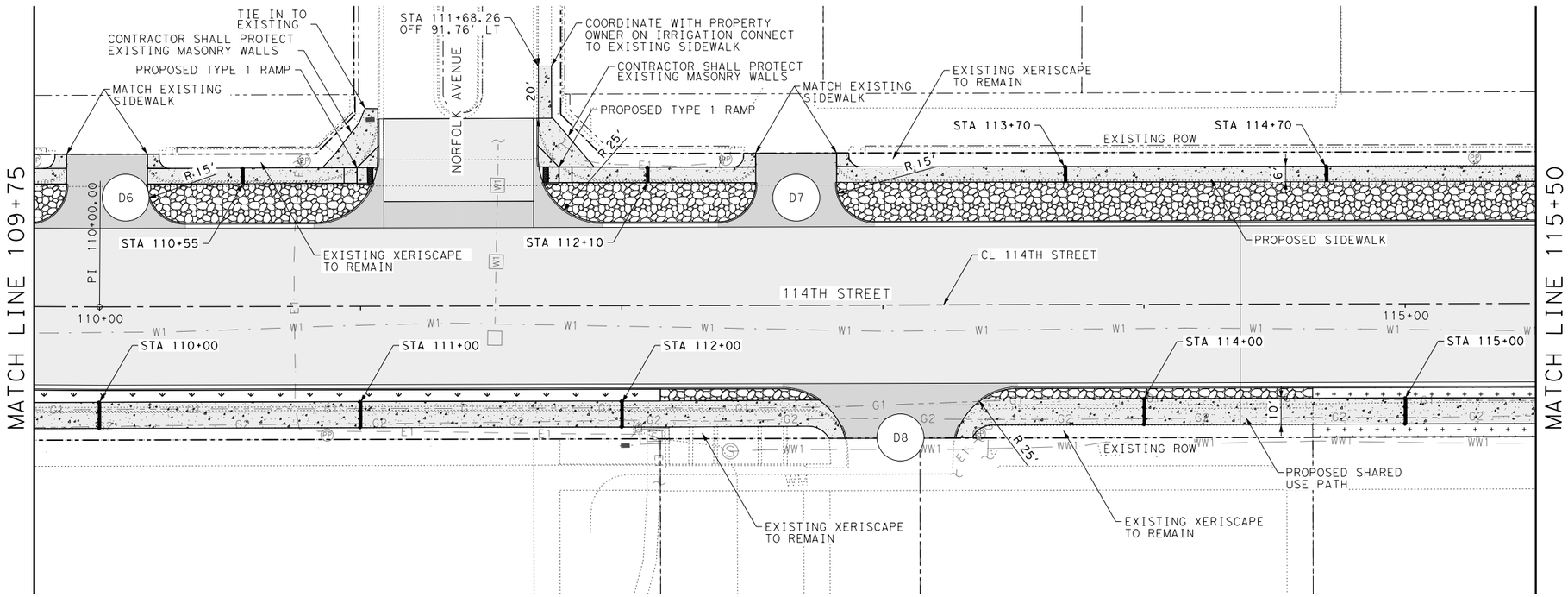
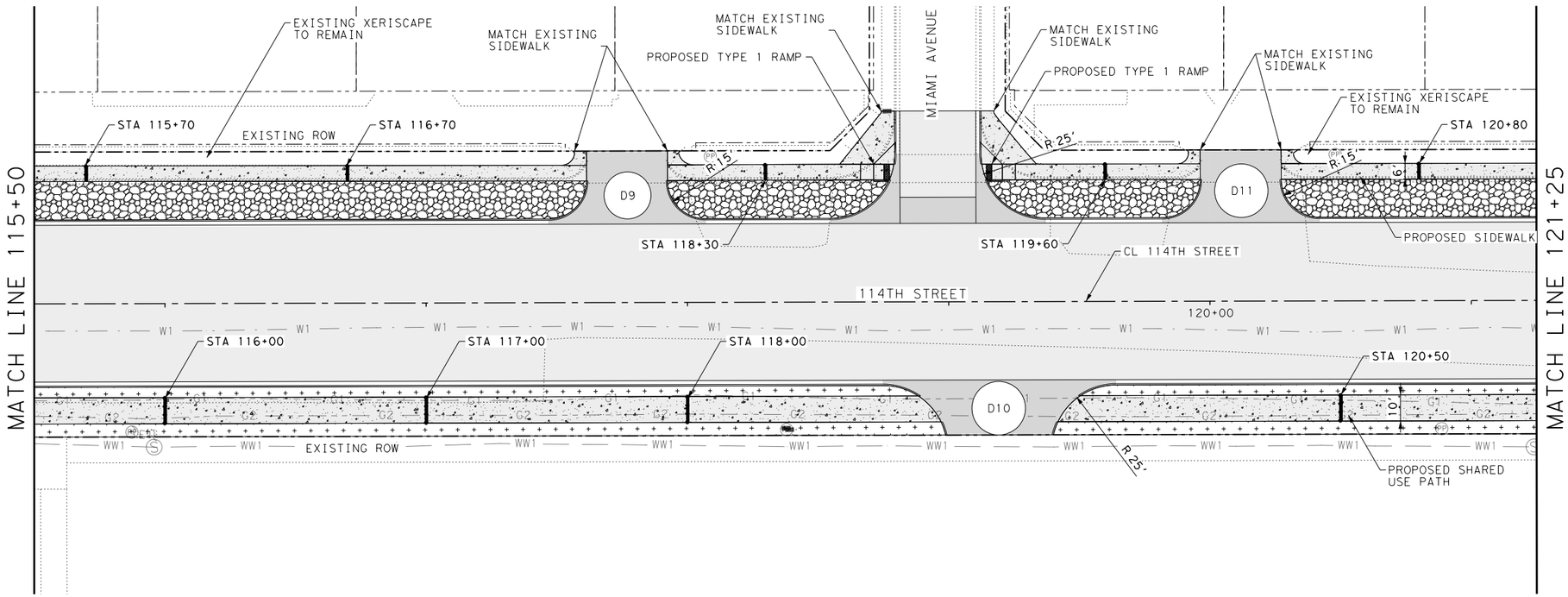
114TH STREET
QUAKER AVE. TO INDIANA AVE.
LANDSCAPE LAYOUT

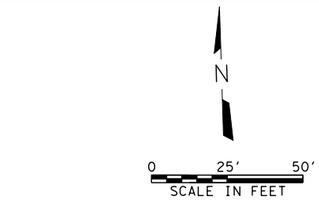
BEGIN PROJECT TO STA 109+75

SHEET 1 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	75
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	







LEGEND

- PROPOSED SHARED USE PATH/SIDEWALK
- PROPOSED LOOSE AGGREGATE WITH FILTER FABRIC LIMITS
- PROPOSED CONCRETE RIPRAP
- PROPOSED SEEDING LIMITS
- PROPOSED SODDING LIMITS
- 3" PVC IRRIGATION SLEEVE

NOTE:
SEE ROADWAY DETAILS FOR MORE INFORMATION ON IRRIGATION SLEEVES AND LOOSE AGGREGATE LANDSCAPING

STATE OF TEXAS
CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER

3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

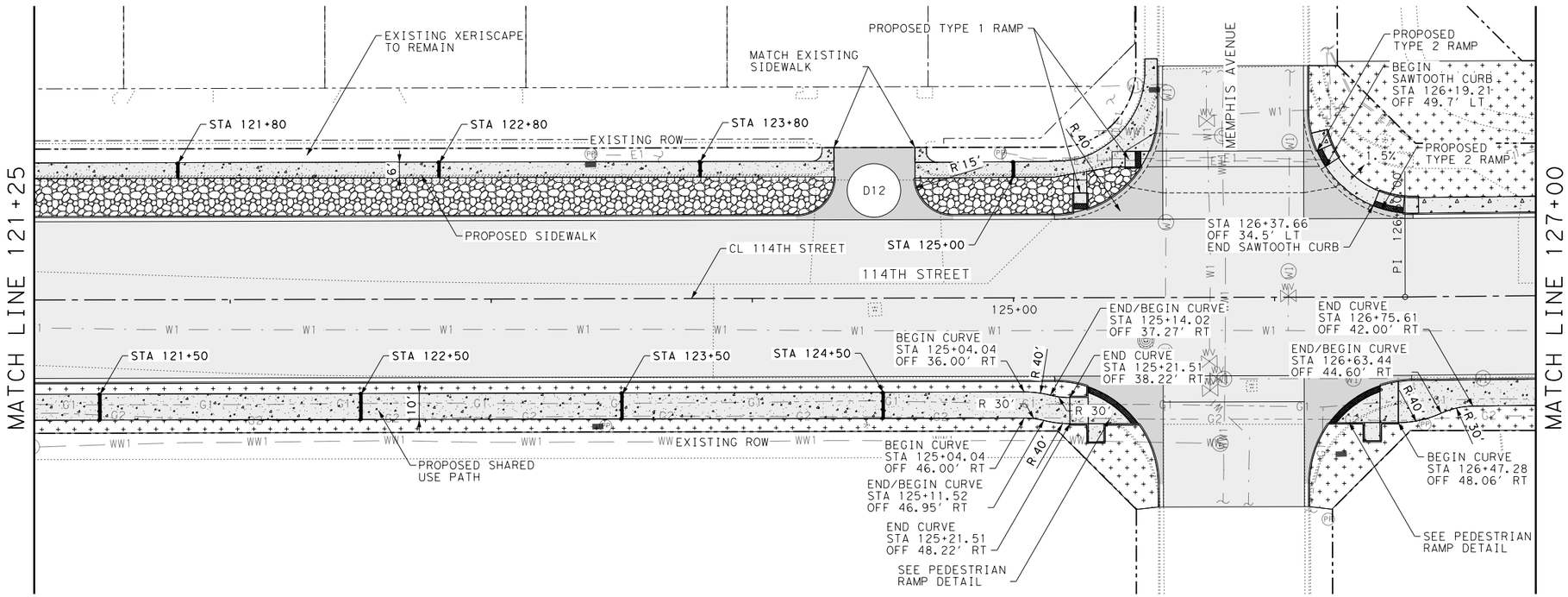
FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

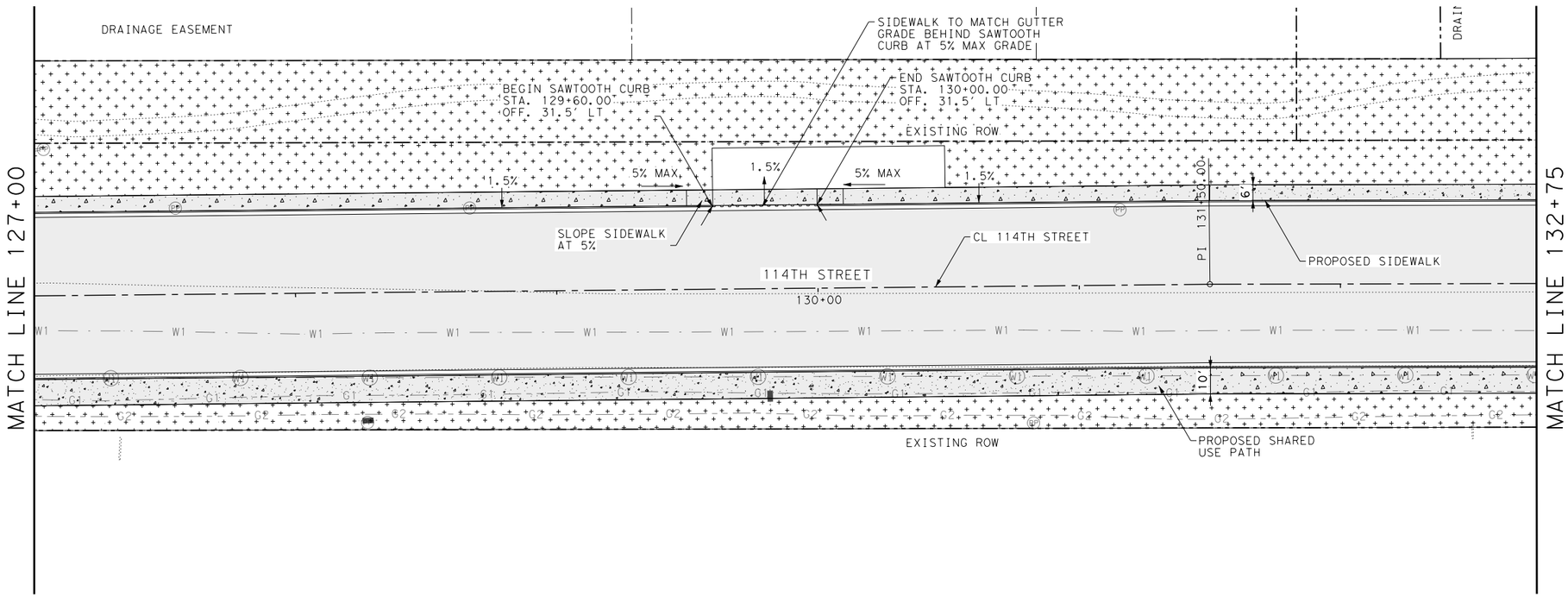
114TH STREET
QUAKER AVE. TO INDIANA AVE.
LANDSCAPE LAYOUT

STA 109+75 TO STA 121+25

SHEET 2 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	76
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	





N

0 25' 50'
SCALE IN FEET

LEGEND

- PROPOSED SHARED USE PATH/SIDEWALK
- PROPOSED LOOSE AGGREGATE WITH FILTER FABRIC LIMITS
- PROPOSED CONCRETE RIPRAP
- PROPOSED SEEDING LIMITS
- PROPOSED SODDING LIMITS
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STATE OF TEXAS
CHRIS B. BOSCO
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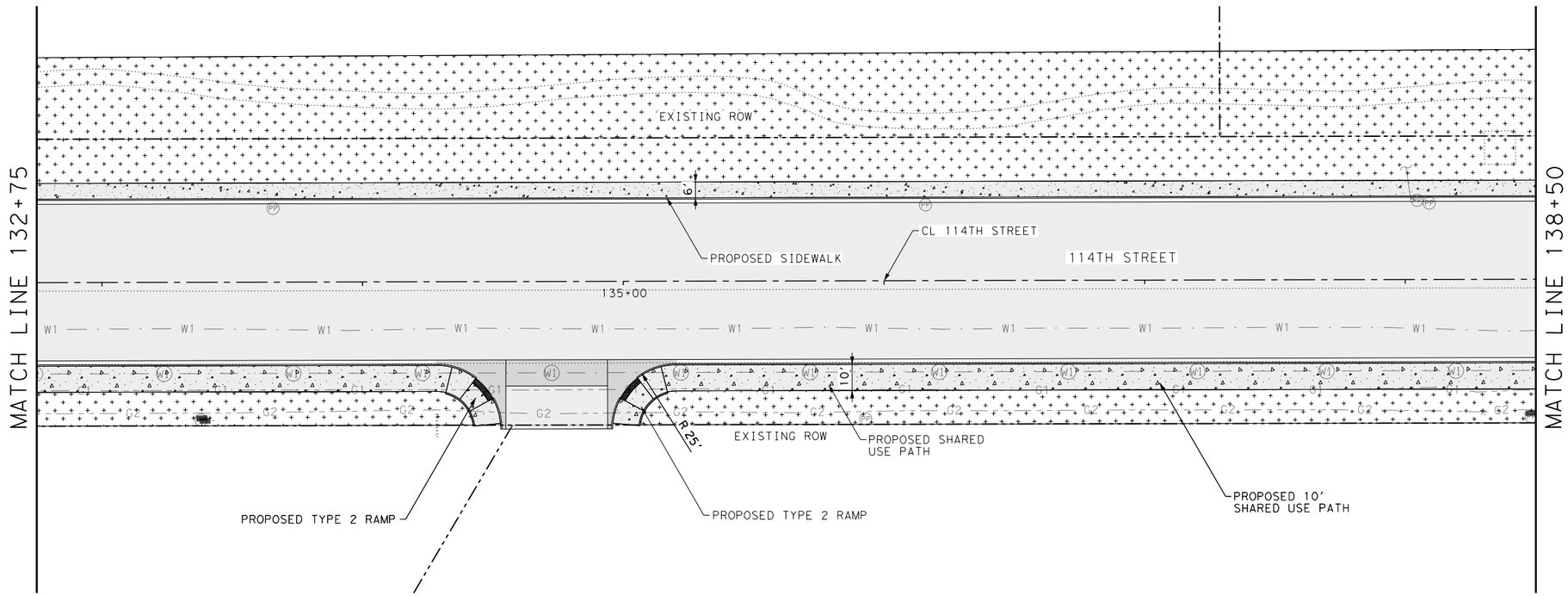
114TH STREET
QUAKER AVE. TO INDIANA AVE.
LANDSCAPE LAYOUT

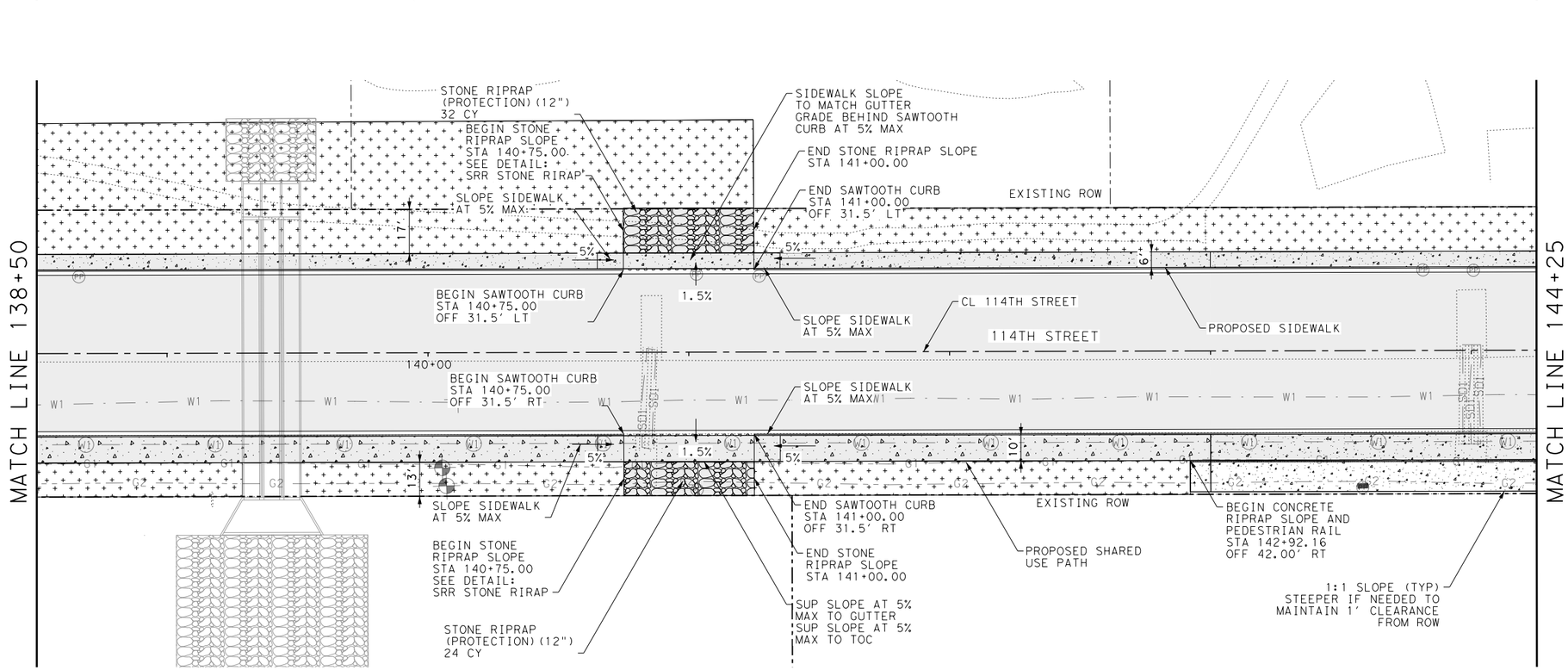
STA 121+25 TO STA 132+75

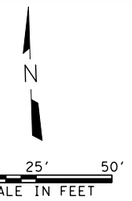
SHEET 3 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	77
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

$USER$
50.0000 ft / in.







LEGEND

- PROPOSED SHARED USE PATH/SIDEWALK
- PROPOSED LOOSE AGGREGATE WITH FILTER FABRIC LIMITS
- PROPOSED CONCRETE RIPRAP
- PROPOSED SEEDING LIMITS
- PROPOSED SODDING LIMITS
- 3" PVC IRRIGATION SLEEVE

NOTE:
SEE ROADWAY DETAILS FOR MORE INFORMATION ON IRRIGATION SLEEVES AND LOOSE AGGREGATE LANDSCAPING

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

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Lubbock, TX 79401
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114TH STREET
QUAKER AVE. TO INDIANA AVE.
LANDSCAPE LAYOUT

STA 132+75 TO STA 144+25

SHEET 4 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
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CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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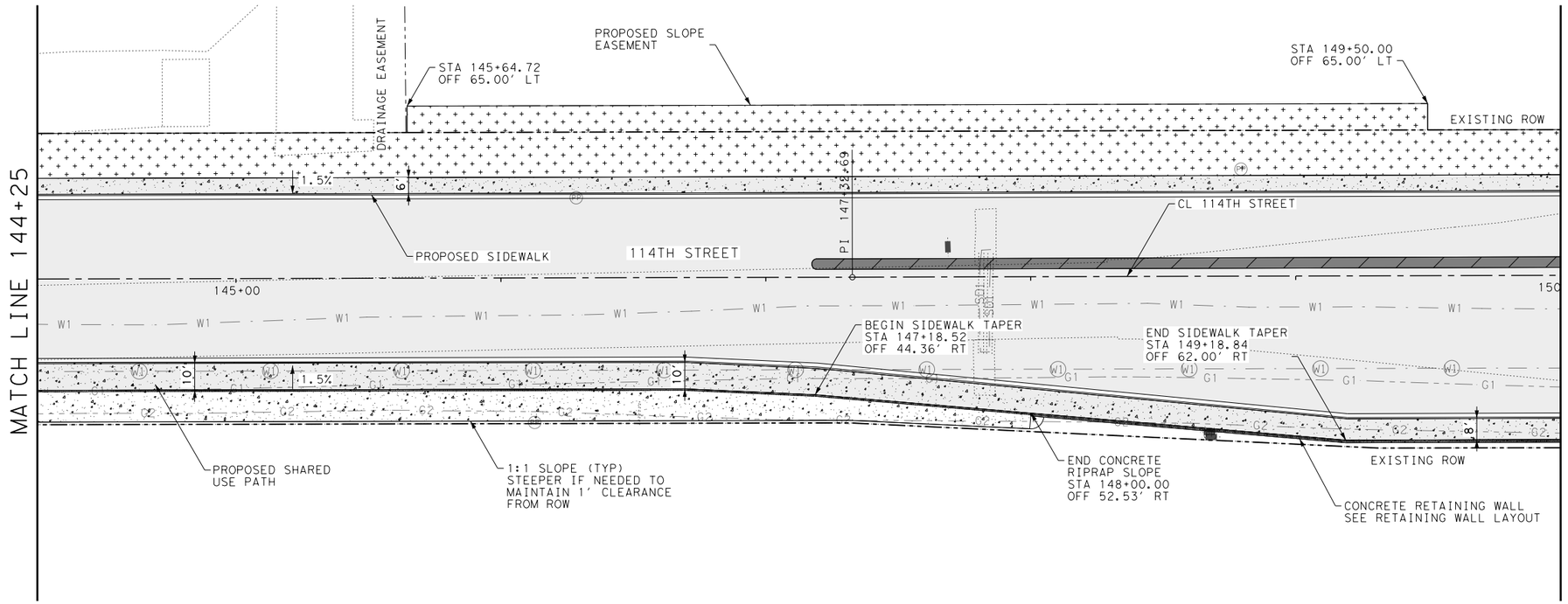
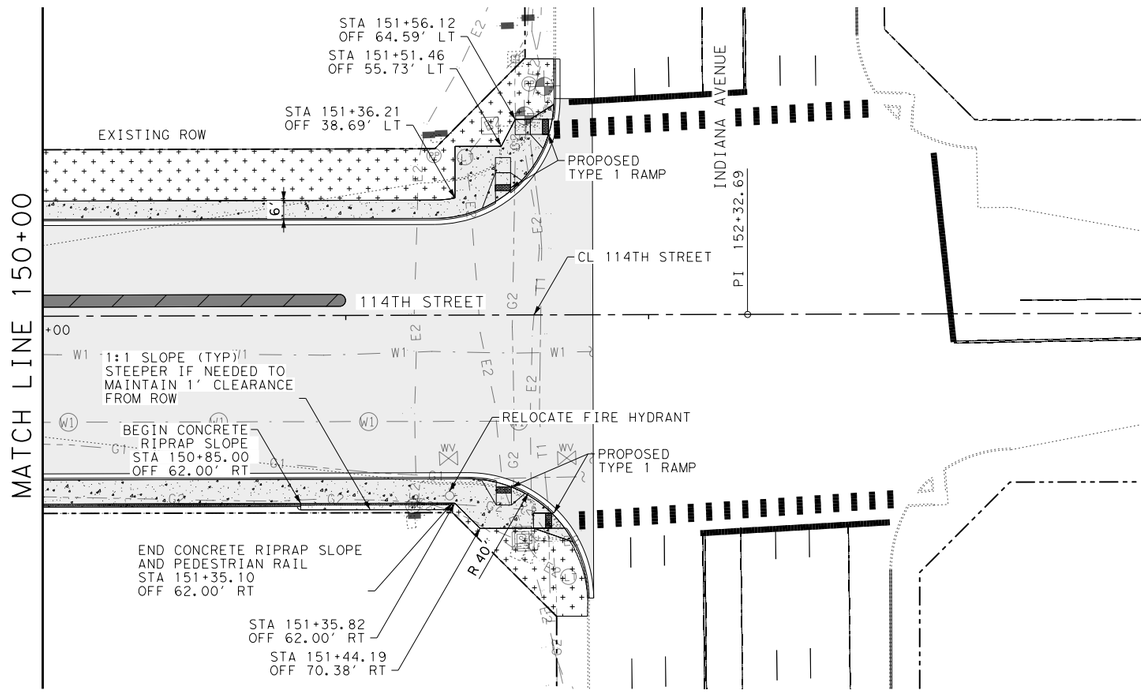
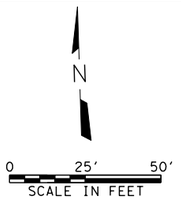
50.0000 ft / in.







LEGEND

- PROPOSED SHARED USE PATH/SIDEWALK
- PROPOSED LOOSE AGGREGATE WITH FILTER FABRIC LIMITS
- PROPOSED CONCRETE RIPRAP
- PROPOSED SEEDING LIMITS
- PROPOSED SODDING LIMITS
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NOTE:
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114TH STREET
QUAKER AVE. TO INDIANA AVE.
LANDSCAPE LAYOUT

STA 144+25 TO END

SHEET 5 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	79
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

Mar. 01, 2022 - 02:16:12 PM
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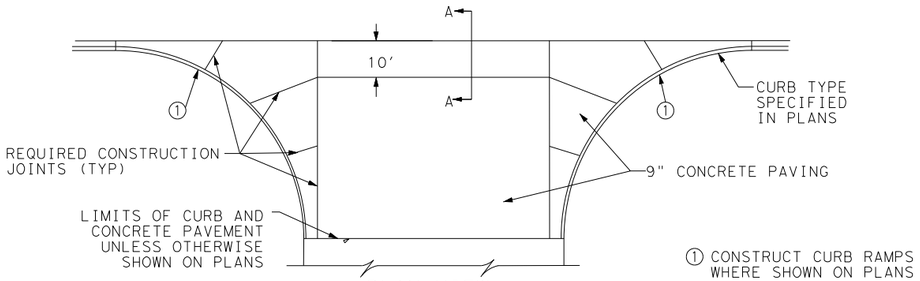
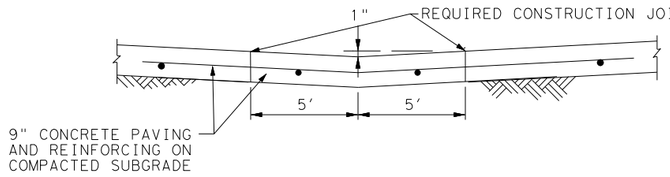


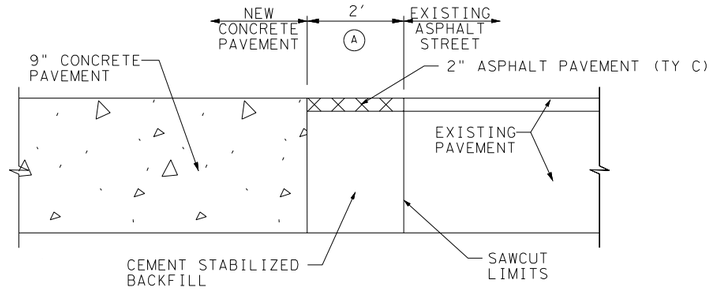
1 CONSTRUCT CURB RAMPS WHERE SHOWN ON PLANS

PLAN VIEW

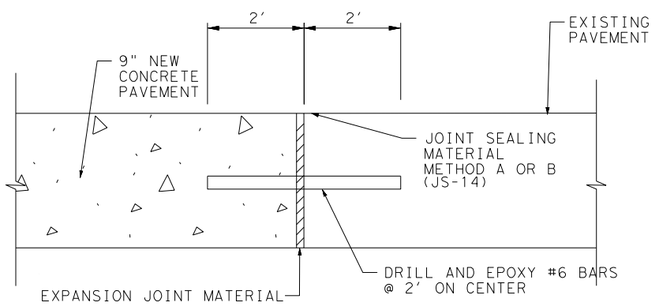


SECTION "A-A"
FILLET AND VALLEY GUTTER DETAIL
NTS

Ⓐ PAYMENT FOR CSB AND ASPHALT PAVEMENT WILL NOT BE MADE DIRECTLY, BUT IS CONSIDERED SUBSIDIARY TO CONCRETE PAVEMENT AND/OR INTERSECTIONS.



TYPICAL SECTION
NEW CONCRETE TIE TO EXIST ASPHALT
NTS



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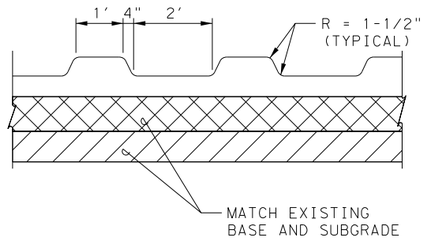
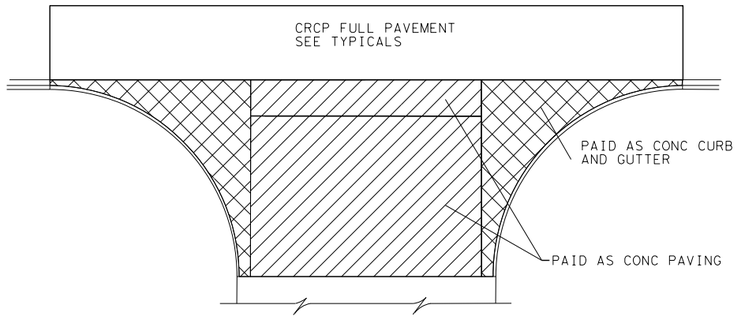
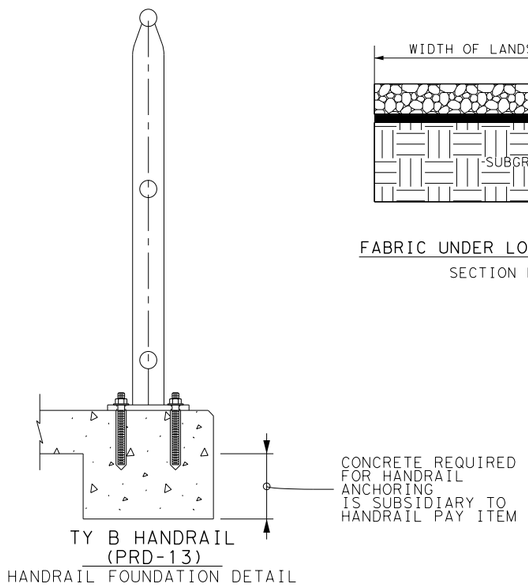
NEW CONCRETE TIE TO EXIST CONCRETE
NTS



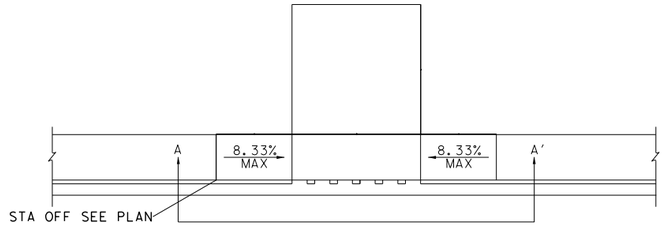
SAWTOOTH CURB AND GUTTER PROFILE



PAYMENT OF FILLETS AND VALLEY GUTTERS

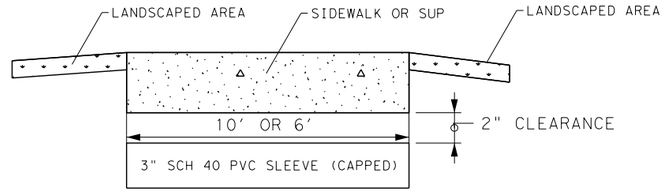


TY B HANDRAIL
(PRD-13)
HANDRAIL FOUNDATION DETAIL

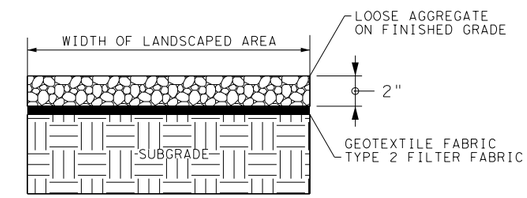


SIDEWALK DETAIL AT SAWTOOTH
NTS

SECTION A-A'
NTS



IRRIGATION SLEEVE
BENEATH SIDEWALK DETAIL



FABRIC UNDER LOOSE AGGREGATE
SECTION DETAIL

3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

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1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
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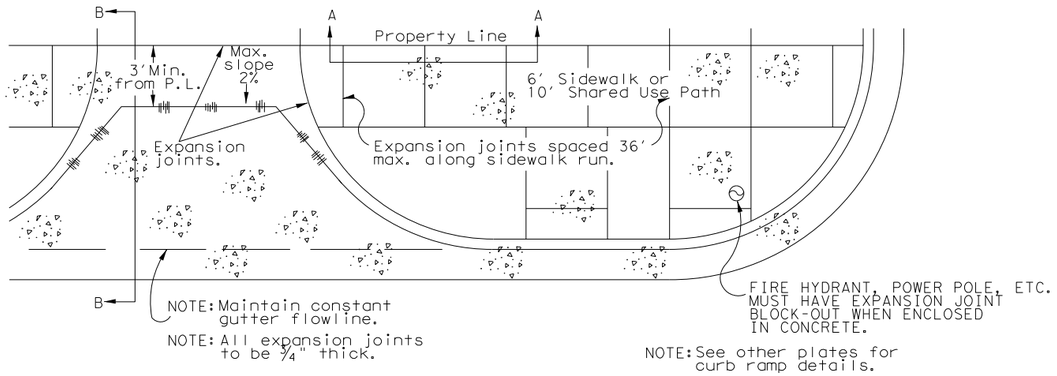
Texas Department of Transportation

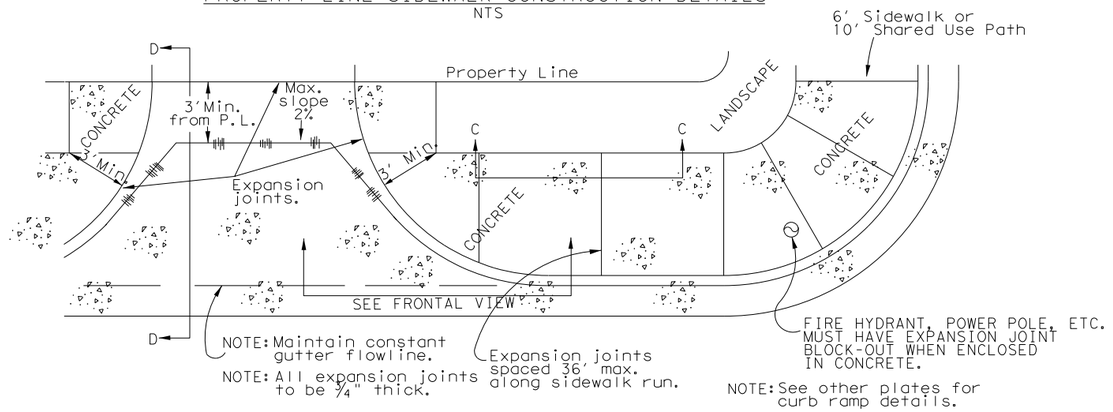
114TH STREET
QUAKER AVE. TO INDIANA AVE.
ROADWAY DETAILS

SHEET 1 OF 2

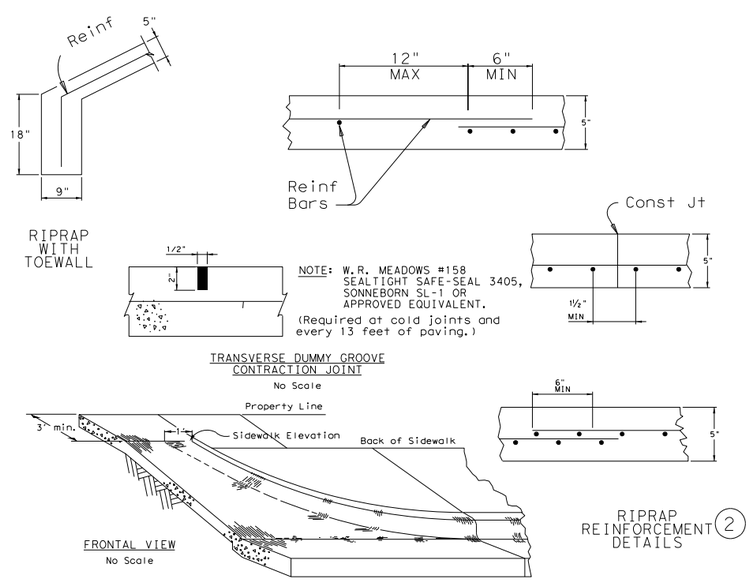
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	80
	0905	06	118	

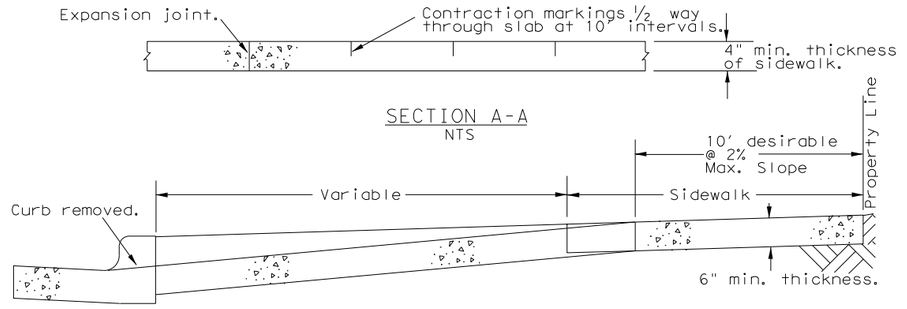


PROPERTY LINE SIDEWALK CONSTRUCTION DETAILS
NTS

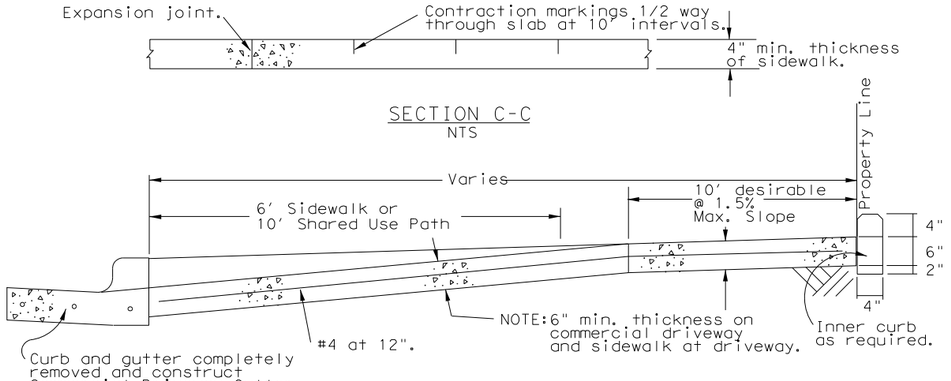


CURB BACK SIDEWALK CONSTRUCTION DETAILS
NTS





SECTION B-B
NTS



SECTION D-D
NTS

GENERAL NOTES:
All reinforcing steel shall be Grade 60.
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.
Construction joints or grooved joints extending the full slant slope height shall be at intervals of approximately 20 feet unless otherwise directed by the Engineer.
Hardware cloth, loose graded stone behind weep holes, flashing, or other sealing material shall not be paid for directly but shall be subsidiary to the bid item "Riprap".

(1) #5 bars shown are required even when synthetic fiber reinforcing option is selected.

(2) Reinforcing bars shall be #3 at 12" Spa c-c.

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

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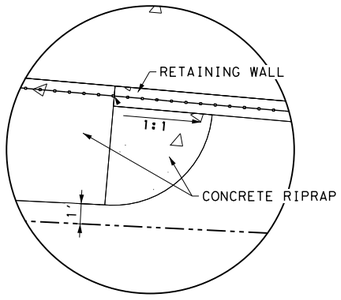
Web www.freese.com

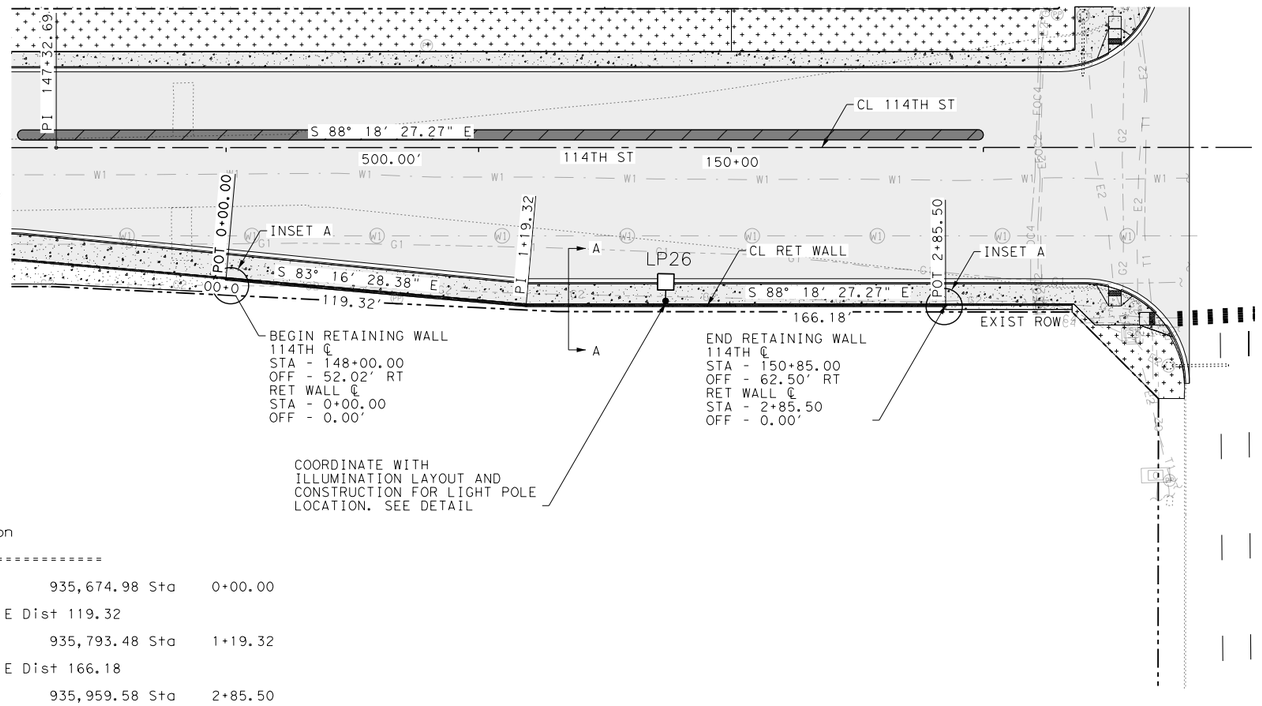
114TH STREET
QUAKER AVE. TO INDIANA AVE.
ROADWAY DETAILS

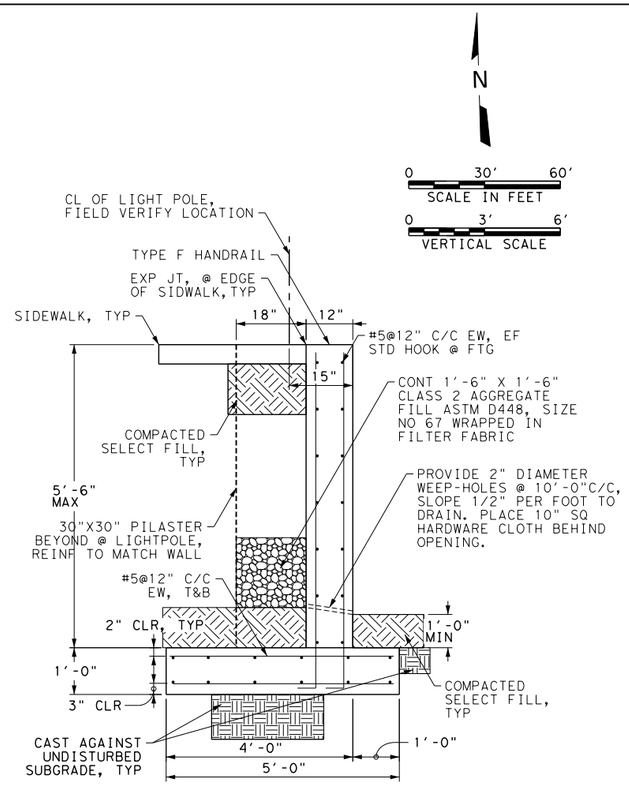
SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	81
	0905	06	118	



INSET A



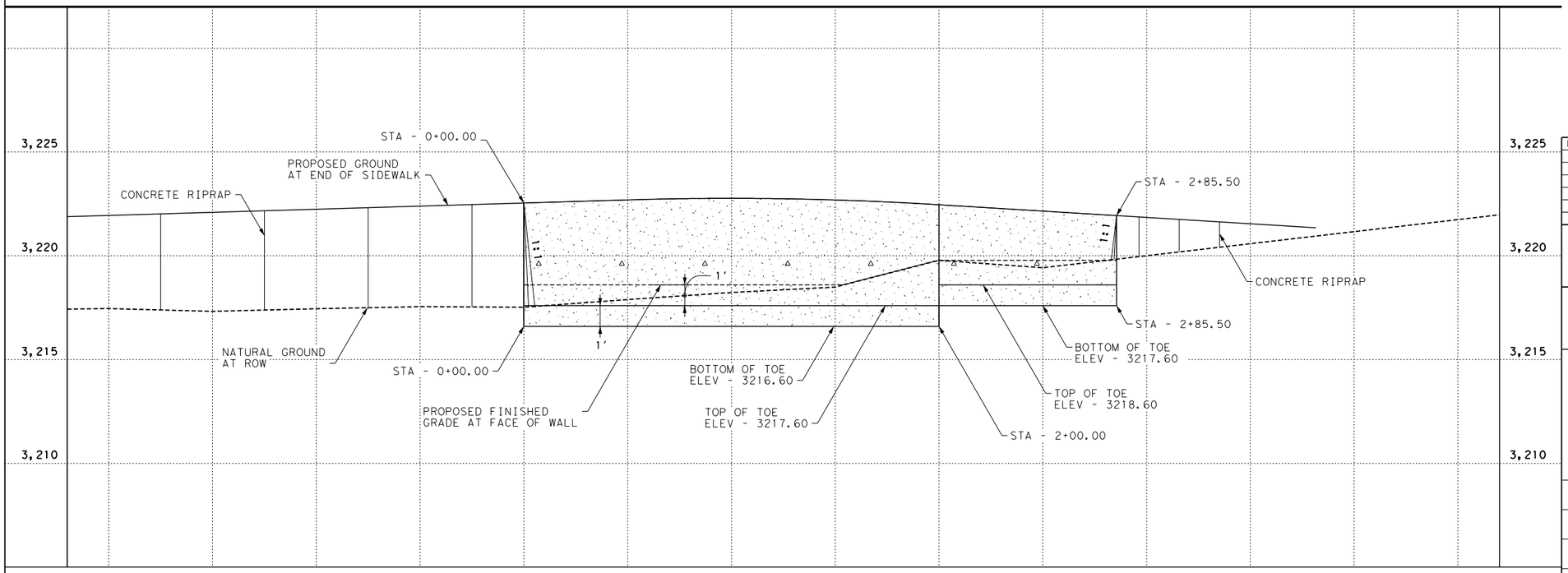


SECTION A-A

Beginning chain RETWALL_CL2 description
Feature: Geom_Centerline

Point 32	N	7,243,427.36 E	935,674.98 Sta	0+00.00
Course from 32 to 33 S 83° 16' 28.38" E Dist 119.32				
Point 33	N	7,243,413.39 E	935,793.48 Sta	1+19.32
Course from 33 to 34 S 88° 18' 27.27" E Dist 166.18				
Point 34	N	7,243,408.48 E	935,959.58 Sta	2+85.50

Ending chain RETWALL_CL2 description



STATE OF TEXAS
KEVIN MORRIS
105091
LICENSED
PROFESSIONAL ENGINEER

Kevin Morris 3-10-2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

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Lubbock, TX 79401
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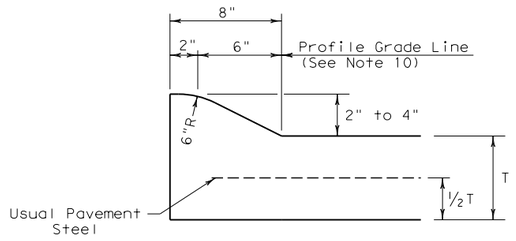
114TH STREET
QUAKER AVE. TO INDIANA AVE.

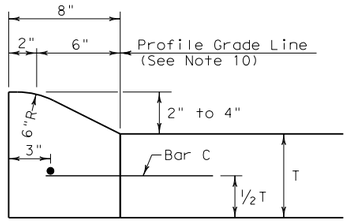
RETAINING WALL LAYOUT

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	82
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

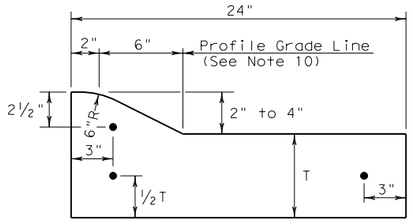
DATE:
FILE:



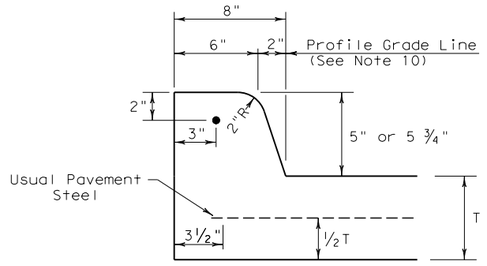
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



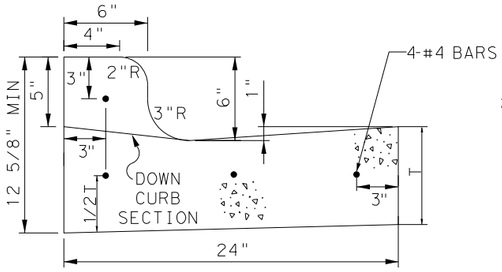
TYPE I CURB
2" - 4" HEIGHT



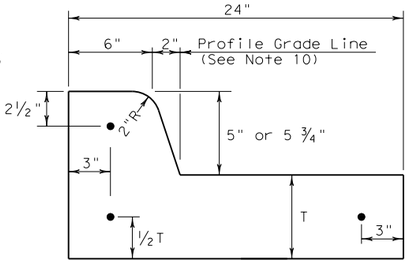
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT

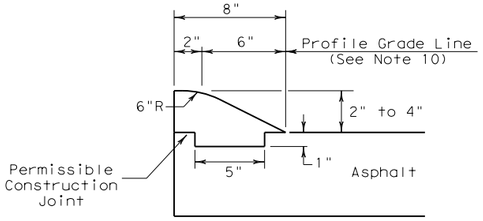


MODIFIED TY II CURB AND GUTTER
NTS

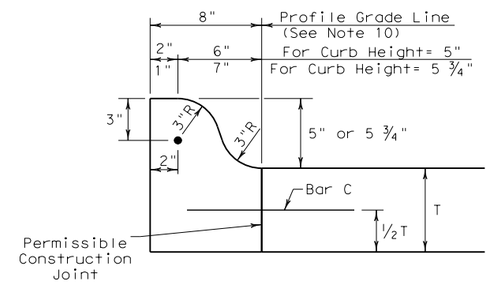


TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT

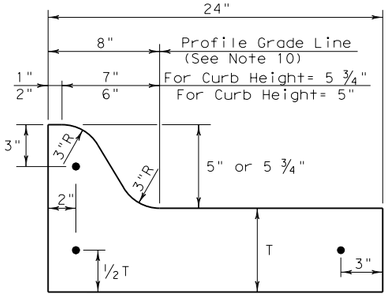
NOTE: CURB CANNOT BE POURED MONOLITHICALLY WITH PAVEMENT



TYPE III CURB (KEYED)
2" - 4" HEIGHT



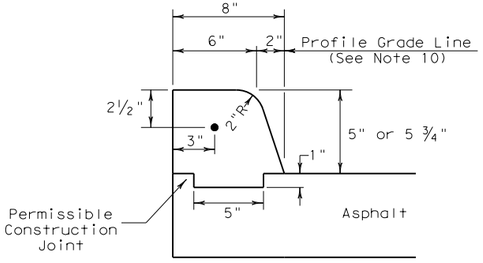
TYPE IIa CURB
5" - 5 ¾" HEIGHT



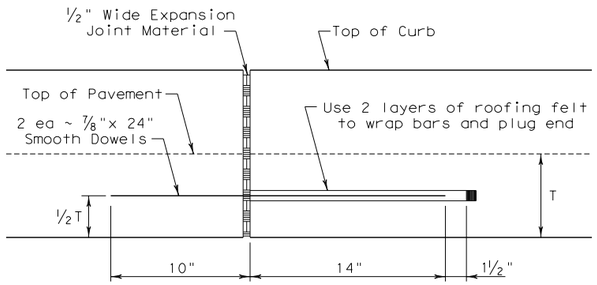
TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT

BAR B

BAR C

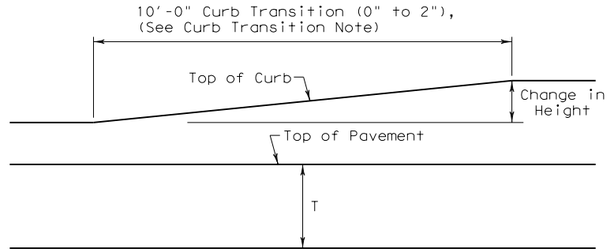


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

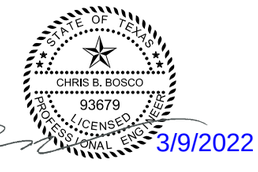
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

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



3/9/2022

Texas Department of Transportation

Design Division Standard

CONCRETE CURB AND CURB AND GUTTER (MOD)

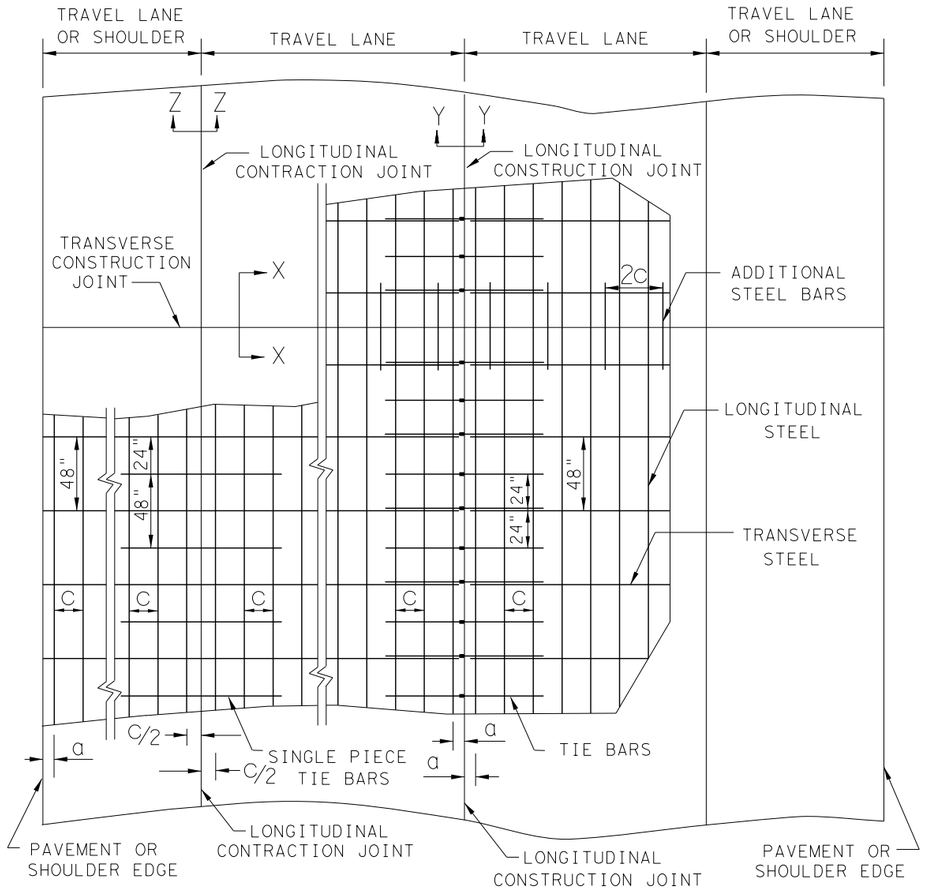
CCCG-21 (MOD)

FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: SS	CK: KM
© TxDOT: FEBRUARY 2021 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0905	06	118	CS
	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		83

DATE:
FILE:

TABLE NO.1 LONGITUDINAL STEEL					
SLAB THICKNESS AND BAR SIZE		REGULAR STEEL BARS	FIRST SPACING AT EDGE OR JOINT	ADDITIONAL STEEL BARS AT TRANSVERSE CONSTRUCTION JOINT (SECTION X-X)	
T (IN.)	BAR SIZE	SPACING C (IN.)	SPACING a (IN.)	SPACING 2 X C (IN.)	LENGTH L (IN.)
7.0	#5	6.5	3 TO 4	13	50
7.5	#5	6.0	3 TO 4	12	50
8.0	#6	9.0	3 TO 4	18	50
8.5	#6	8.5	3 TO 4	17	50
9.0	#6	8.0	3 TO 4	16	50
9.5	#6	7.5	3 TO 4	15	50
10.0	#6	7.0	3 TO 4	14	50
10.5	#6	6.75	3 TO 4	13.5	50
11.0	#6	6.5	3 TO 4	13	50
11.5	#6	6.25	3 TO 4	12.5	50
12.0	#6	6.0	3 TO 4	12	50
12.5	#6	5.75	3 TO 4	11.5	50
13.0	#6	5.5	3 TO 4	11	50

TABLE NO.2 TRANSVERSE STEEL AND TIE BARS						
SLAB THICKNESS (IN.)	TRANSVERSE STEEL		TIE BARS AT LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z)		TIE BARS AT LONGITUDINAL CONSTRUCTION JOINT (SECTION Y-Y)	
	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
7.0 - 7.5	#5	48	#5	48	#5	24
8.0 - 13.0	#5	48	#6	48	#6	24

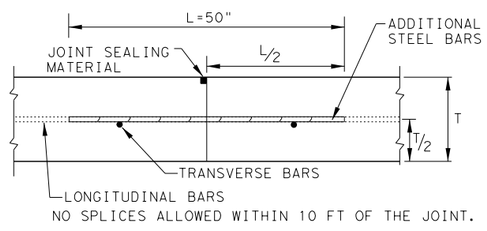


TYPICAL PAVEMENT LAYOUT

PLAN VIEW (NOT TO SCALE)

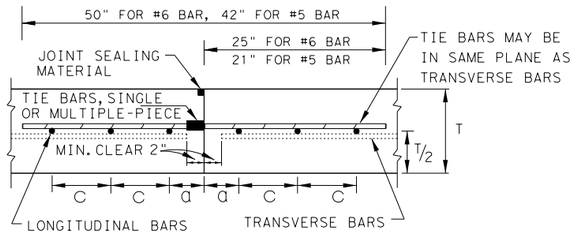
GENERAL NOTES

1. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT ARE NOT COVERED BY THIS STANDARD.
2. USE COARSE AGGREGATES WITH A RATED COEFFICIENT OF THERMAL EXPANSION (CoTE) OF NOT MORE THAN 5.5 X 10^{-6} IN/IN/ °F AS LISTED IN THE CONCRETE RATED SOURCE QUALITY CATALOG (CRSQC).
3. ALL THE REINFORCING STEEL AND TIE BARS SHALL BE DEFORMED STEEL BARS CONFORMING TO ASTM A 615 (GRADE 60) OR ASTM A 996 (GRADE 60) OR ABOVE. STEEL BAR SIZES AND SPACINGS SHALL CONFORM TO TABLE NO.1 AND TABLE NO.2.
4. STEEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1 IN. HORIZONTALLY AND +/- 0.5 IN. VERTICALLY. CALCULATED AVERAGE BAR SPACING (CONCRETE PLACEMENT WIDTH / NUMBER OF LONGITUDINAL BARS) SHALL CONFORM TO TABLE NO.1
5. PAVEMENT WIDTHS OF MORE THAN 15 FT. SHALL HAVE A LONGITUDINAL JOINT (SECTION Z-Z OR SECTION Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6 IN. OF THE LANE LINE UNLESS THE JOINT LOCATION IS SHOWN ELSEWHERE ON THE PLANS.
6. THE SAW CUT DEPTH FOR THE LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z) SHALL BE ONE THIRD OF THE SLAB THICKNESS (T/3).
7. WHEN TYING CONCRETE GUTTER AT A LONGITUDINAL JOINT, THE TIE BAR LENGTH OR POSITION MAY BE ADJUSTED. PROVIDE 3 IN. OF CONCRETE COVER FROM THE BACK OF GUTTER TO THE END OF TIE BAR.
8. REPLACE MISSING OR DAMAGED TIE BARS WITHOUT ADDITIONAL COMPENSATION BY DRILLING MIN.10 IN. DEEP AND GROUTING TIE BARS WITH TYPE III, CLASS C EPOXY. MEET THE PULL-OUT TEST REQUIREMENTS IN ITEM 361.
9. OMIT TIE BARS LOCATED WITHIN 18-IN. OF THE TRANSVERSE CONSTRUCTION JOINTS (SECTION X-X). USE HAND-OPERATED IMMERSION VIBRATORS TO CONSOLIDATE THE CONCRETE ADJACENT TO ALL FORMED JOINTS.
10. LONGITUDINAL REINFORCING STEEL SPLICES SHALL BE A MINIMUM OF 25 IN. STAGGER THE LAP LOCATIONS SO THAT NO MORE THAN 1/3 OF THE LONGITUDINAL STEEL IS SPLICED IN ANY GIVEN 12-FT. WIDTH AND 2-FT. LENGTH OF THE PAVEMENT.
11. THE DETAIL FOR THE JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



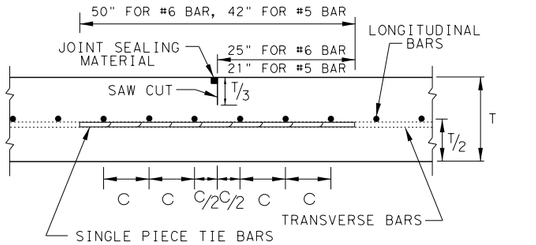
TRANSVERSE CONSTRUCTION JOINT

SECTION X - X



LONGITUDINAL CONSTRUCTION JOINT

SECTION Y - Y



LONGITUDINAL CONTRACTION JOINT

SECTION Z - Z

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

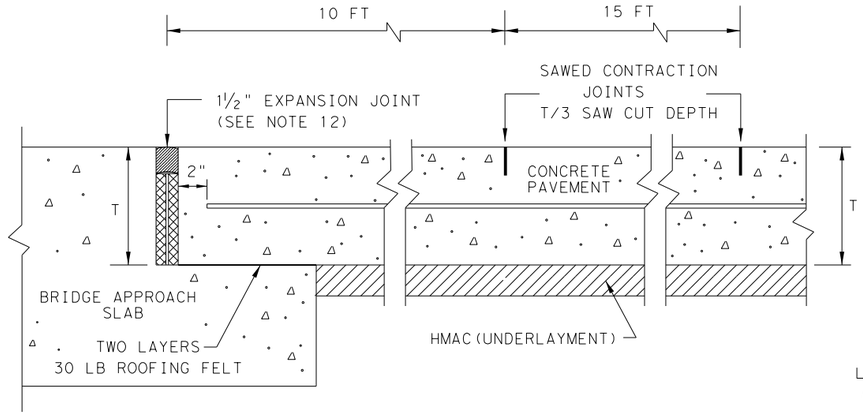
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

ONE LAYER STEEL BAR PLACEMENT T - 7 to 13 INCHES

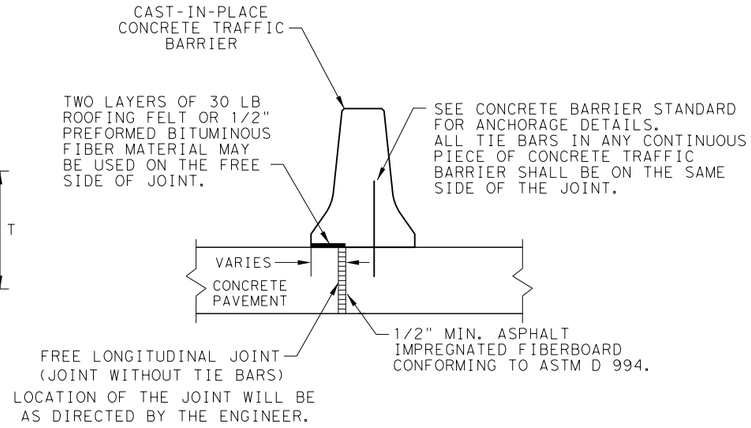
CRCP(1)-20

FILE: crcp120.dgn	DN: TxDOT	CK:KM	DW: AN	CK:VP
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 10/10/2011 ADD GN #12 04/09/2013 REMOVE 6" AND 6.5" ADD CTE REQUIREMENTS 05/05/2017 CoTE AS RATED 4.3	0905	06	118	CS
	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		84

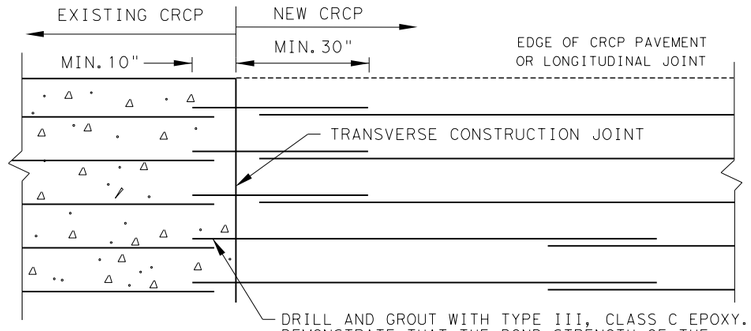
DATE:
FILE:



TRANSVERSE EXPANSION JOINT DETAIL
AT BRIDGE APPROACH



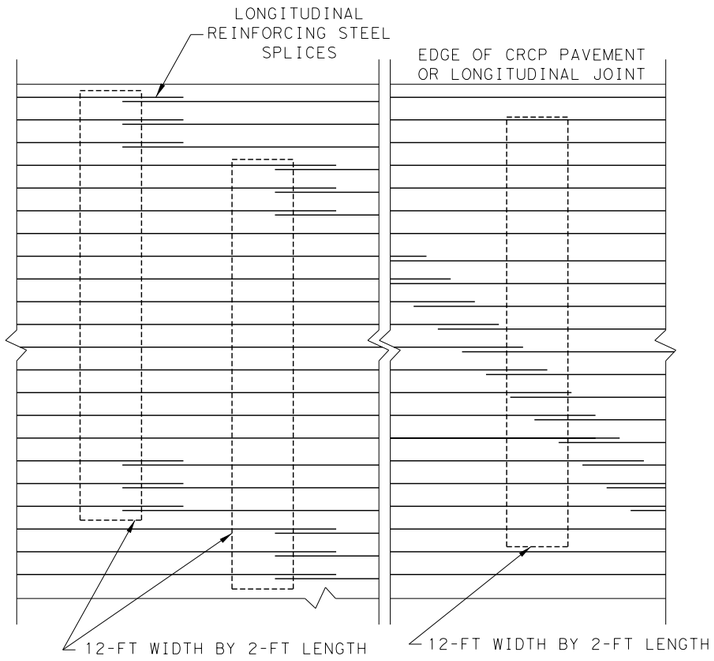
FREE LONGITUDINAL JOINT DETAIL



OPTION A: DRILL AND EPOXY
PLAN VIEW (NOT TO SCALE)

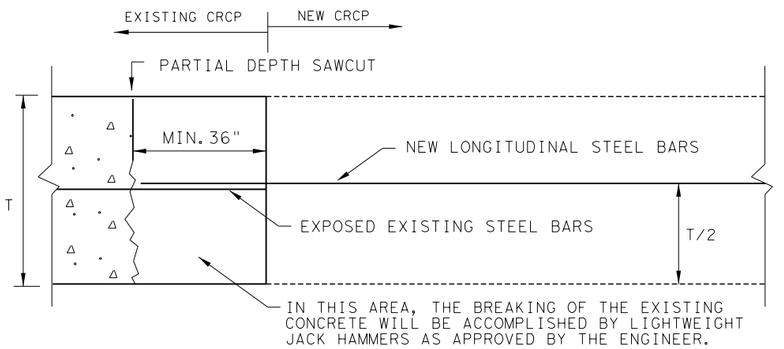
1. BEFORE WIDENING WORK, DEMONSTRATE THAT THE BOND STRENGTH OF THE EPOXY-GROUTED TIE BARS MEETS THE REQURIMENTS OF PULL-OUT TEST SPECIFIED IN ITEM 361.
2. SPACE TIE BARS AT 24" SPACING. USE #6 TIE BARS FOR 8" AND THICKER SLABS, USE #5 TIE BARS FOR LESS THAN 8" THICK SLABS.

LONGITUDINAL WIDENING JOINT DETAIL



STAGGER THE LAP LOCATIONS SO THAT NO MORE THAN 1/3 OF THE LONGITUDINAL STEEL IS SPLICED IN ANY GIVEN 12-FT. WIDTH AND 2-FT. LENGTH OF THE PAVEMENT. ANY OTHER LAP CONFIGURATION MEETING THIS REQUIREMENT WILL BE ALLOWED.

EXAMPLES OF LAP CONFIGURATION
PLAN VIEW (NOT TO SCALE)



OPTION B: BREAKBACK AND LAP

TRANSVERSE TIE JOINT DETAIL
EXISTING CRCP TO NEW CRCP

Texas Department of Transportation

Design Division Standard

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

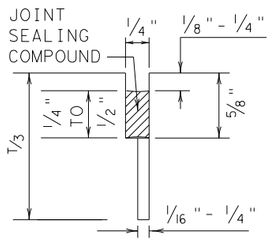
ONE LAYER STEEL BAR PLACEMENT
T - 7 to 13 INCHES

CRCP(1)-20

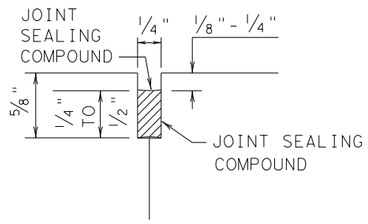
FILE: crcp120.dgn	DN: TxDOT	CK: KM	DW: AN	CK: VP
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 03/16/2020 REMOVED TABLE 1A	0905	06	118	CS
	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		85

DATE:
FILE:

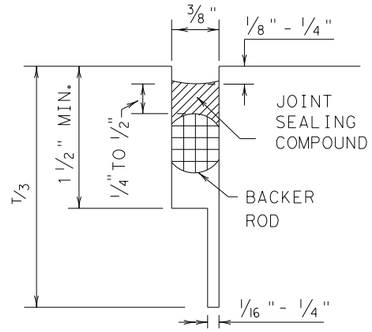
METHOD B: JOINT SEALING COMPOUND



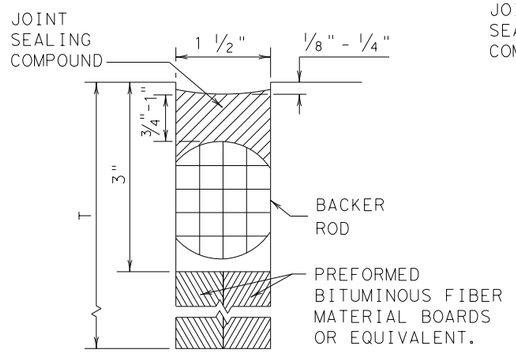
LONGITUDINAL SAWED CONTRACTION JOINT



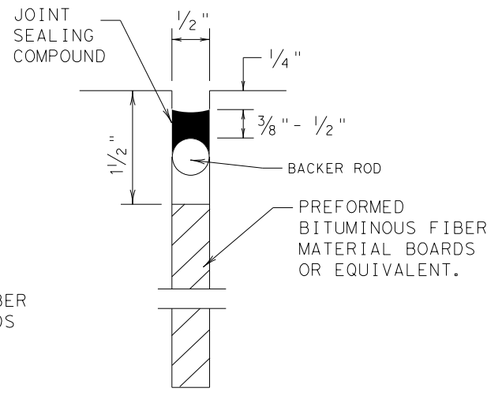
LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT

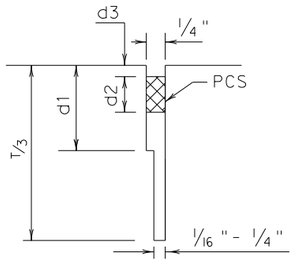


TRANSVERSE FORMED EXPANSION JOINT

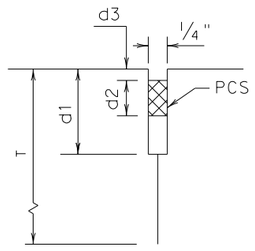


FORMED ISOLATION JOINT

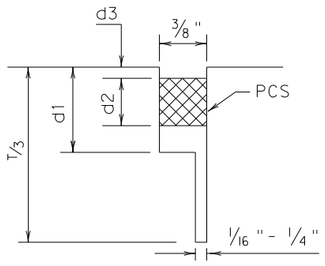
METHOD A: PREFORMED COMPRESSION SEALS (PCS)(DMS-6310 CLASS 6)



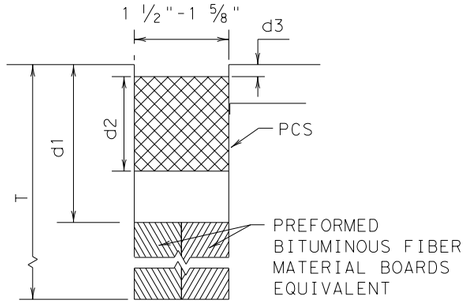
LONGITUDINAL SAWED CONTRACTION JOINT



LONGITUDINAL CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT



TRANSVERSE FORMED EXPANSION JOINT

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, EITHER METHOD "A" OR METHOD "B" MAY BE USED.
2. THE LOCATION OF JOINTS SHALL BE AS SHOWN ELSEWHERE IN THE PLANS.
3. THE JOINT RESERVOIR FOR SEALANT OR PCS SHALL BE SAWED UNLESS OTHERWISE SHOWN ON THE PLANS FOR THE LONGITUDINAL AND TRANSVERSE CONSTRUCTION JOINTS AND THE SAWED JOINTS.
4. DIMENSIONS d1, d2, AND d3 SHOWN IN METHOD A SHALL BE IN ACCORDANCE WITH THE PREFORMED COMPRESSION SEAL MANUFACTURER'S RECOMMENDATION.
5. REFER TO DMS-6310 "JOINT SEALANTS AND FILLERS" FOR THE CLASSIFICATIONS.
6. FOR SAWED LONGITUDINAL JOINT, LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT, USE JOINT SEALANT CLASS 5 OR 8 UNLESS OTHERWISE SHOWN ON THE PLAN OR APPROVED.
7. FOR TRANSVERSE SAWED CONTRACTION, TRANSVERSE FORMED EXPANSION JOINT, AND ISOLATION JOINT USE JOINT SEALANT CLASS 5 OR 8 AT NEW JOINTS. USE JOINT SEALANT CLASS 4,5,7,OR 8 FOR MAINTAINING EXISTING JOINTS.
8. THE JOINTS SHALL BE CLEANED IN ACCORDANCE WITH THE ITEM 438 "CLEANING AND SEALING JOINTS" OR ITEM 713 "CLEANING AND SEALING JOINTS AND CRACKS (CONCRETE PAVEMENT)".
9. ISOLATION JOINTS ACCOMMODATE HORIZONTAL AND VERTICAL MOVEMENTS THAT OCCUR BETWEEN A PAVEMENT AND A STRUCTURE. ISOLATION JOINTS MAY BE USED FOR BRIDGE ABUTMENTS, INTERSECTIONS, CURB AND GUTTER, OLD AND NEW PAVEMENTS, OR AROUND DRAINAGE INLETS, MANHOLES, FOOTINGS AND LIGHTING STRUCTURES.

Texas Department of Transportation

Design Division Standard

CONCRETE PAVING DETAILS

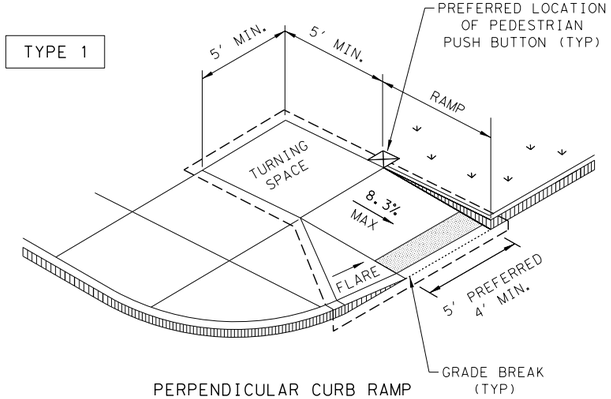
JOINT SEALS

JS-14

FILE: js14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
©TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		86

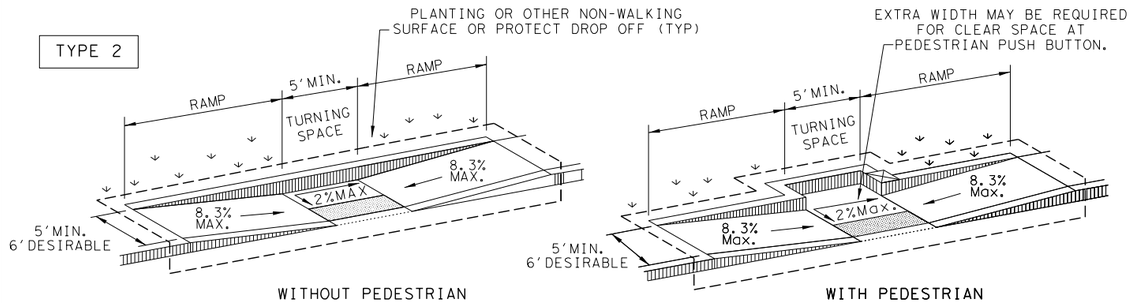
DATE:
FILE:

TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

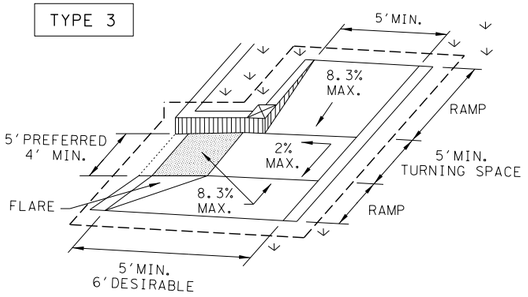


WITHOUT PEDESTRIAN PUSH BUTTON

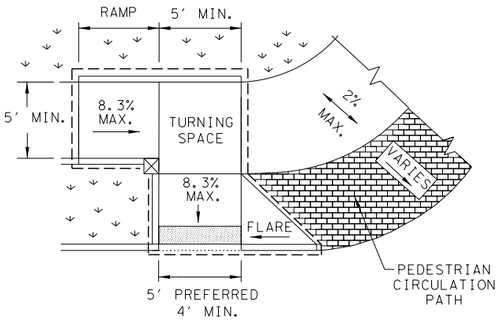
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3

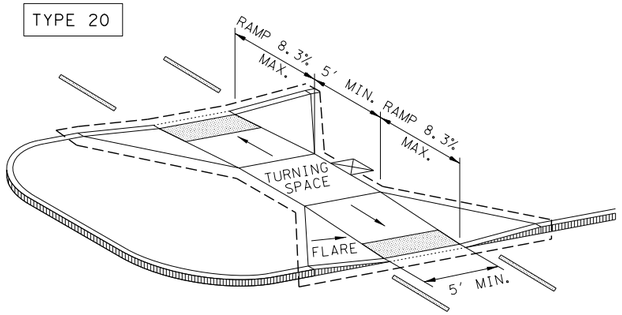


TYPE 6



COMBINATION CURB RAMPS

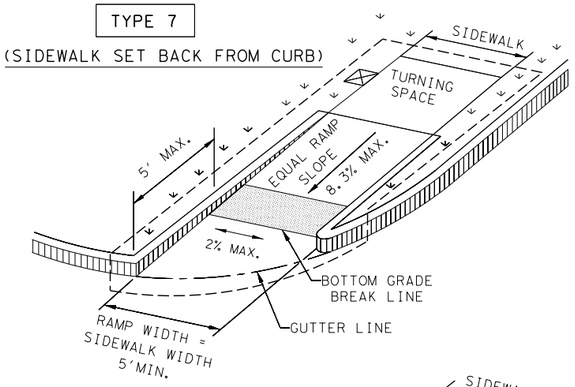
TYPE 20



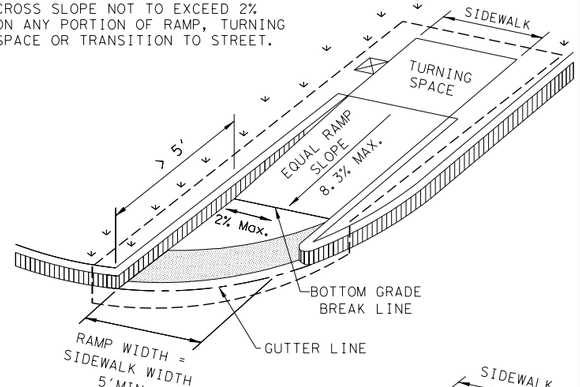
CURB RAMPS AT MEDIAN ISLANDS

TYPE 7

(SIDEWALK SET BACK FROM CURB)

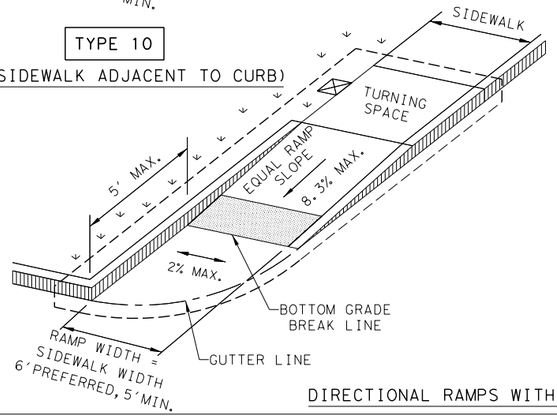


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.

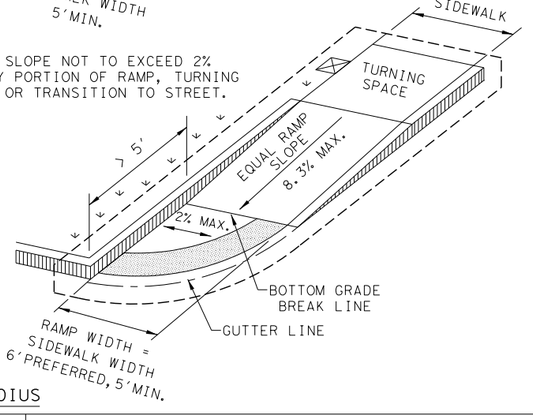


TYPE 10

(SIDEWALK ADJACENT TO CURB)

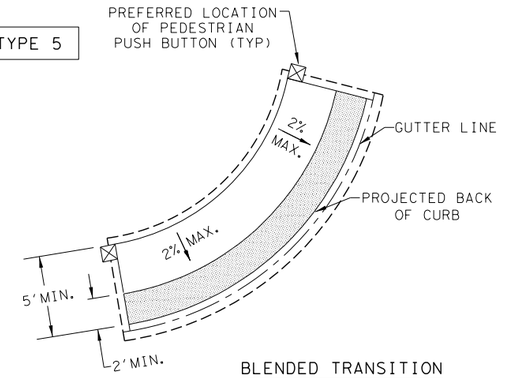


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



DIRECTIONAL RAMPS WITHIN RADIUS

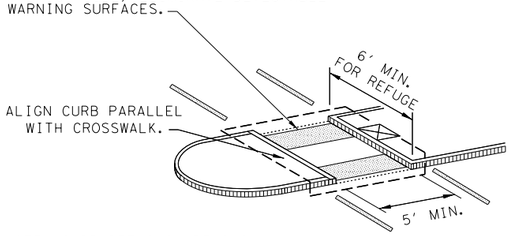
TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

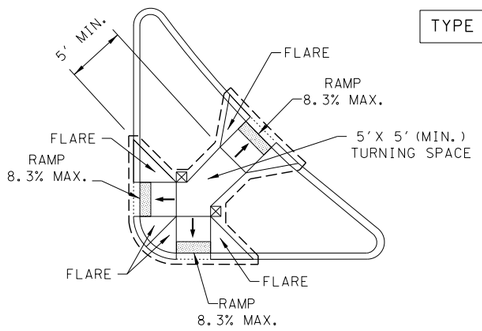
INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.

TYPE 21

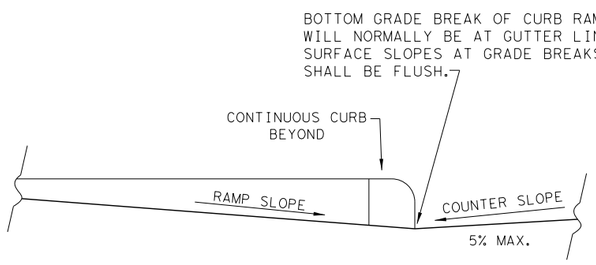


NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22



COMBINATION ISLAND RAMPS



TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

NOTES / LEGEND:

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

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

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE

GRADE BREAK

RAMP LIMITS OF PAYMENT

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		87

DATE:
FILE:

GENERAL NOTES

CURB RAMPS

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

DETECTABLE WARNING MATERIAL

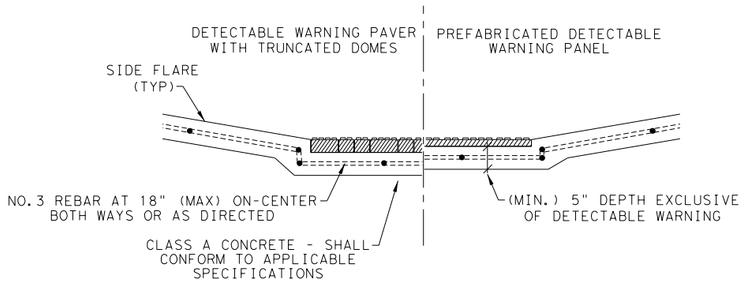
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material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

DETECTABLE WARNING PAVERS (IF USED)

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

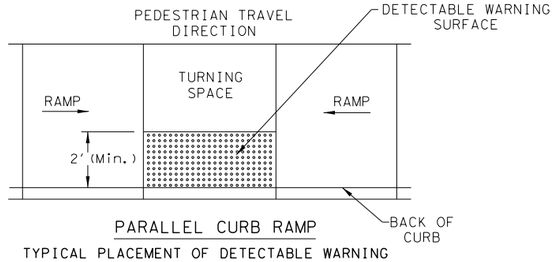
SIDEWALKS

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



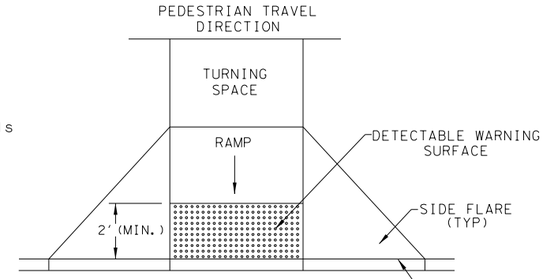
SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

DETECTABLE WARNING SURFACE DETAILS



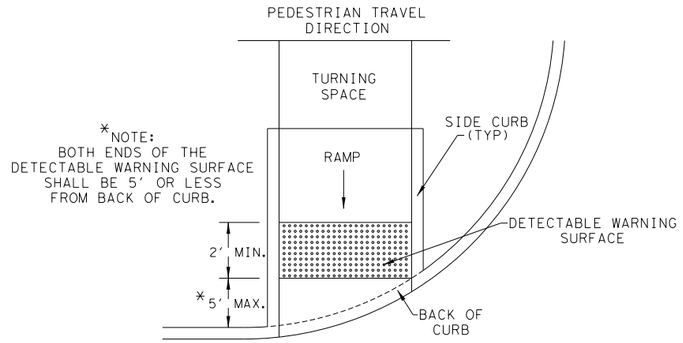
PARALLEL CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.



PERPENDICULAR CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.



DIRECTIONAL CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.

Texas Department of Transportation

Design Division Standard

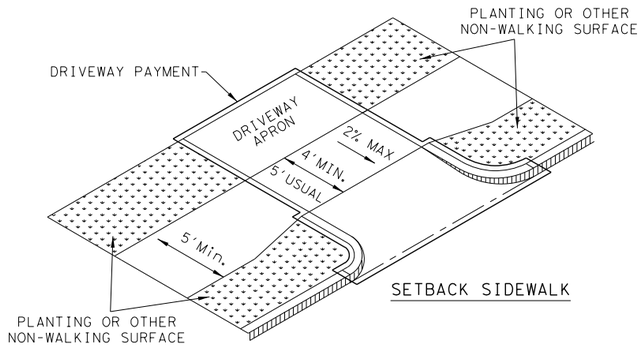
PEDESTRIAN FACILITIES
CURB RAMPS

PED-18

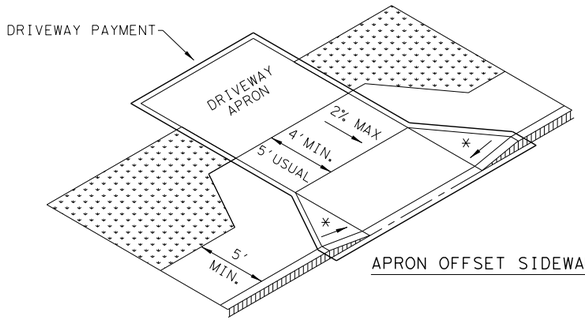
FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0905	06	118		CS
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY			SHEET NO.
	LBB	LUBBOCK			88

DATE:
FILE:

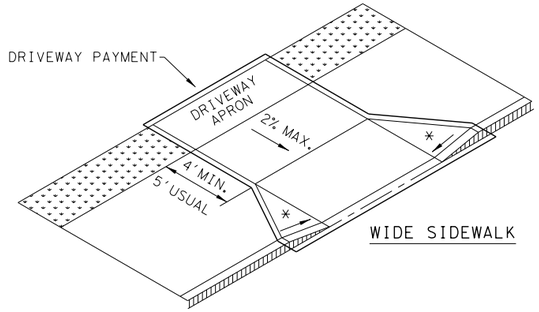
SIDEWALK TREATMENT AT DRIVEWAYS



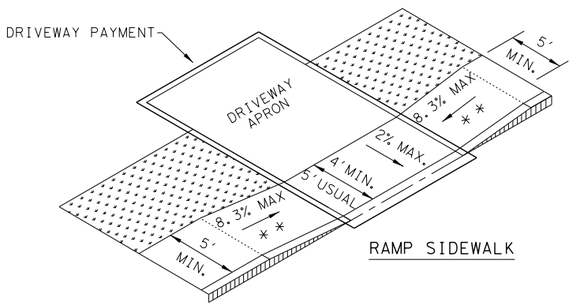
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

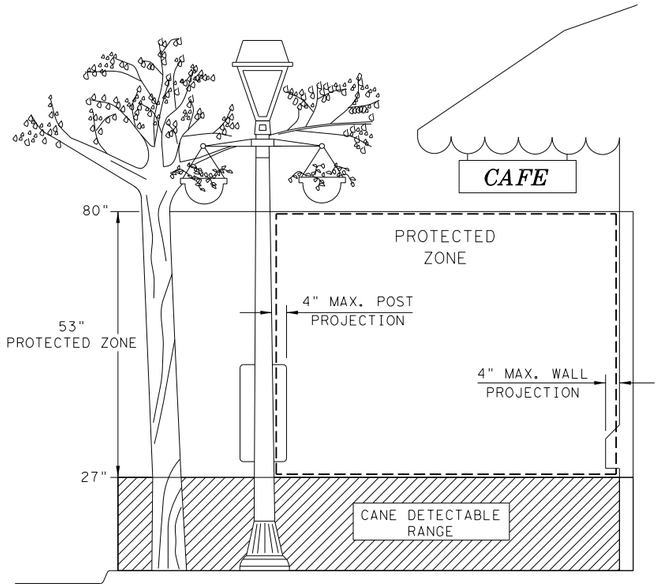


RAMP SIDEWALK

NOTES:

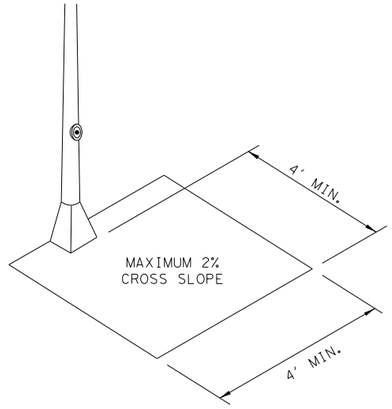
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

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

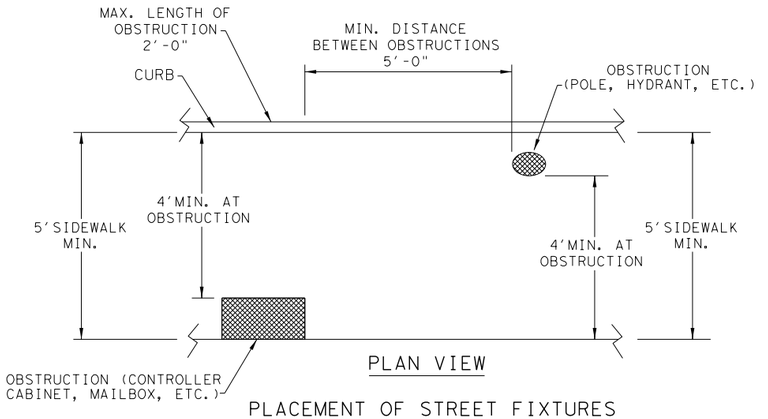


PROTECTED ZONE

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



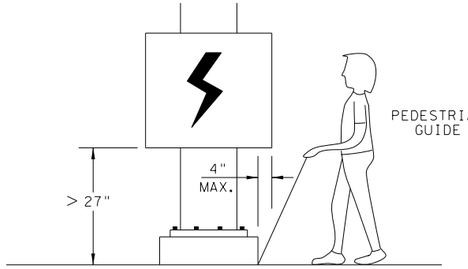
CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



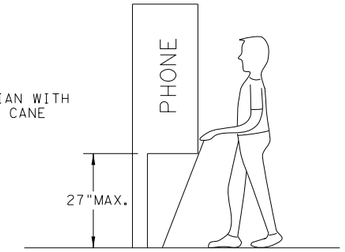
PLAN VIEW

PLACEMENT OF STREET FIXTURES

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



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



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

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

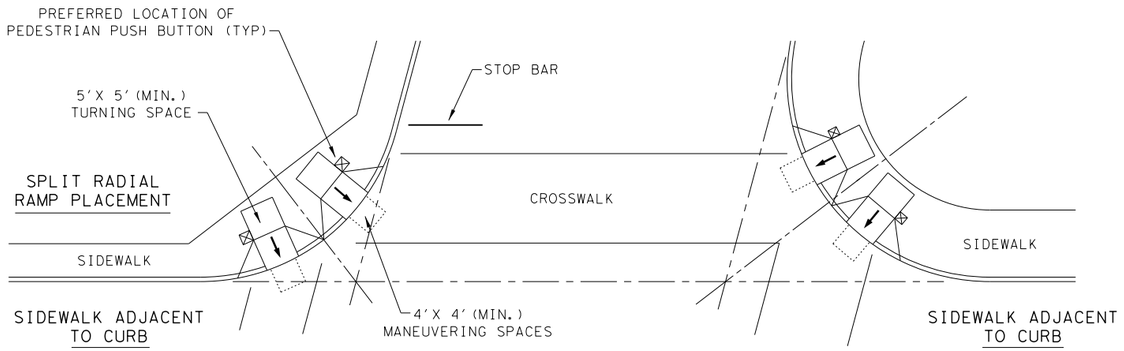
PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		89

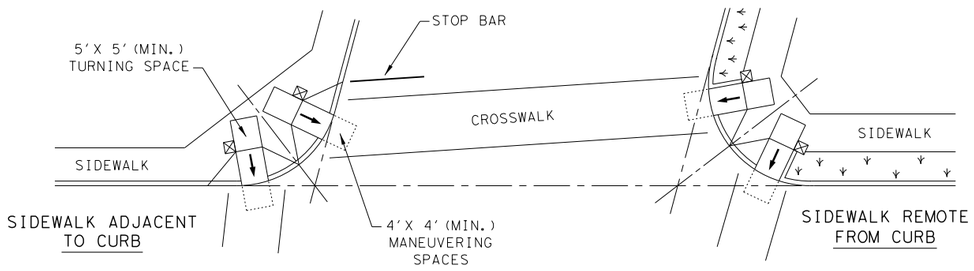
DATE:
FILE:

TYPICAL CROSSING LAYOUTS

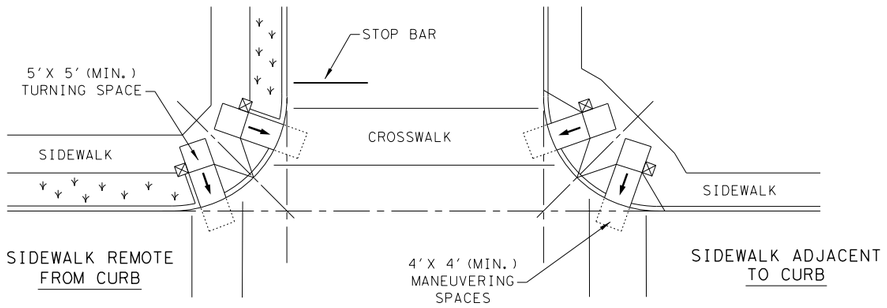
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



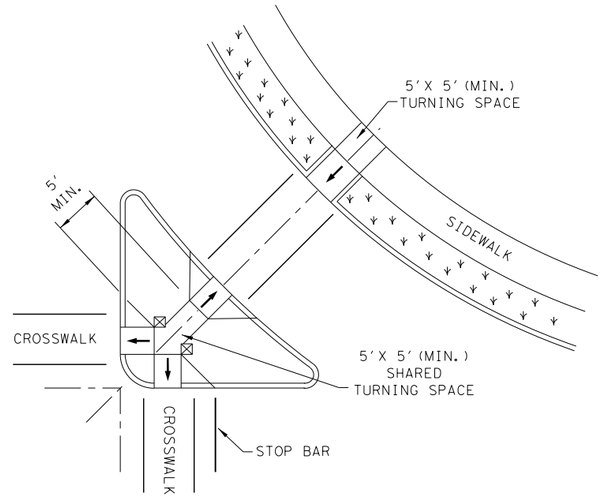
SKEWED INTERSECTION WITH "LARGE" RADIUS



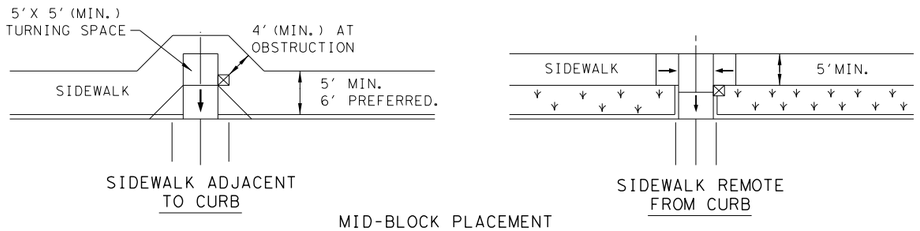
SKEWED INTERSECTION WITH "SMALL" RADIUS



NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND



MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

LEGEND:

SHOWS DOWNWARD SLOPE. →

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

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

SHEET 4 OF 4

Texas Department of Transportation

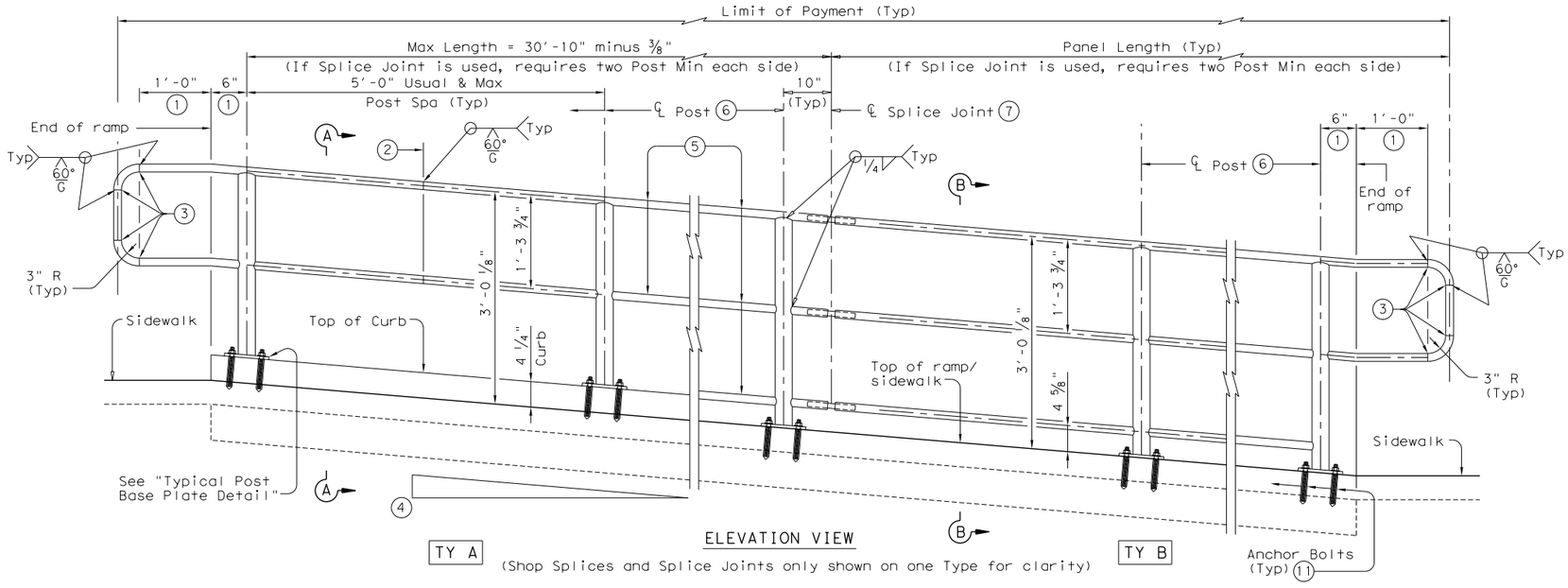
Design Division Standard

PEDESTRIAN FACILITIES
CURB RAMPS

PED-18

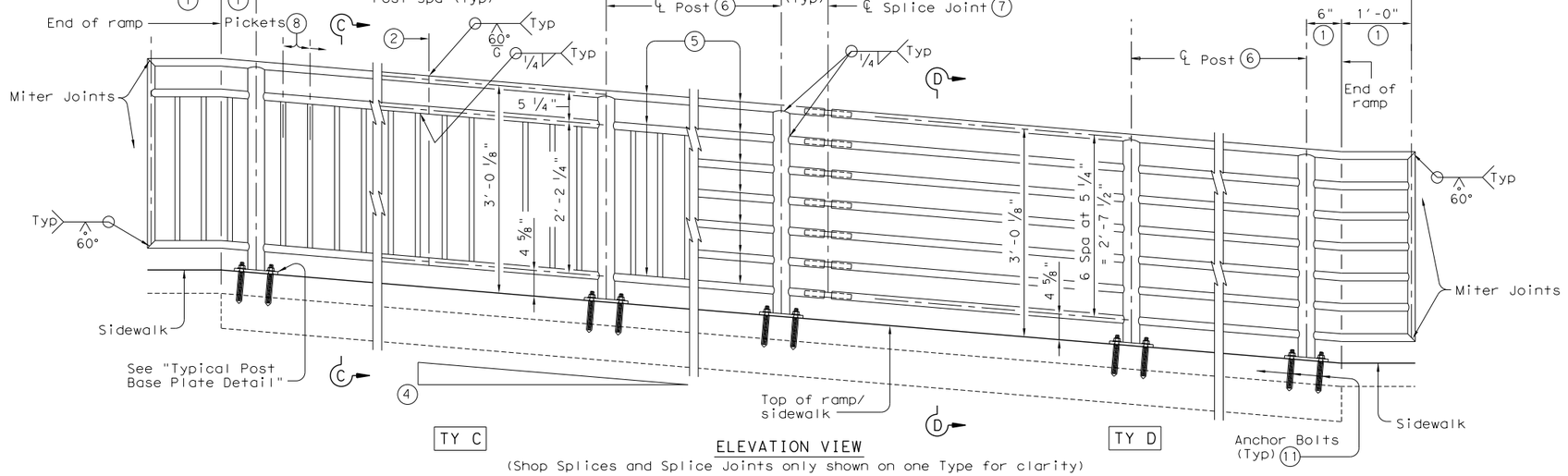
FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0905	06	118		CS
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY			SHEET NO.
	LBB	LUBBOCK			90

DATE:
FILE:



ELEVATION VIEW

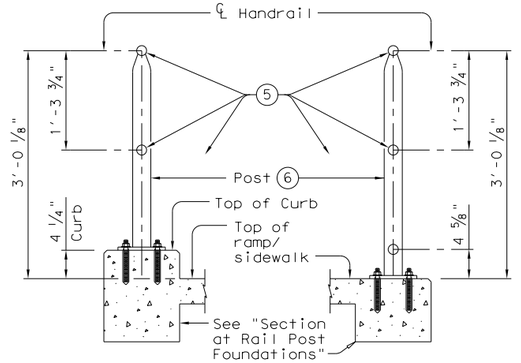
(Shop Splices and Splice Joints only shown on one Type for clarity)



ELEVATION VIEW

(Shop Splices and Splice Joints only shown on one Type for clarity)

RECOMMENDED USAGE (9) (10)	
Dropoff Height/ Condition	Recommended Rail Options
< 30" dropoff	TY A, TY B, TY C, or TY D
≥ 30" dropoff, or along Bike Path	TY E or TY F

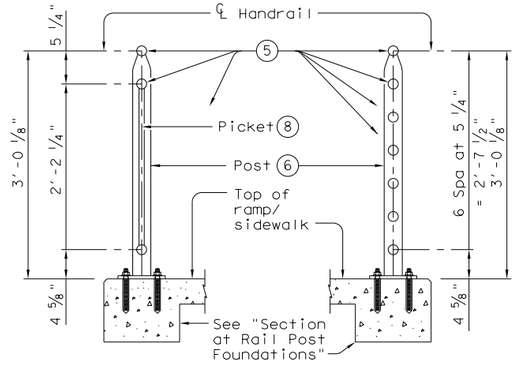


SECTION A-A

(Showing Handrail TY A)

SECTION B-B

(Showing Handrail TY B)



SECTION C-C

(Showing Handrail TY C)

SECTION D-D

(Showing Handrail TY D)

(1) Parallel to ground.

(2) One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.

(3) Shop splice is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.

(4) See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30" rise if grade exceeds 5 percent.

(5) 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.

(6) 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). See "Post Mount Detail" for crimping and trimming post to fit Dia. of top rail. Provide holes as needed in post for galvanizing drainage and venting. Plumb all posts.

(7) See "Handrail Fabrication Details" for Splice Joints.

(8) ℄ ⅝" Dia. Round Bar equal spacing at 4 ½" Max. Plumb all pickets.

(9) When needed for accessibility (grade > 5 percent) or as needed for pedestrian safety.

(10) Not to be used on bridges.

(11) See "General Notes" for anchor bolt information.

SHEET 1 OF 3

Texas Department of Transportation

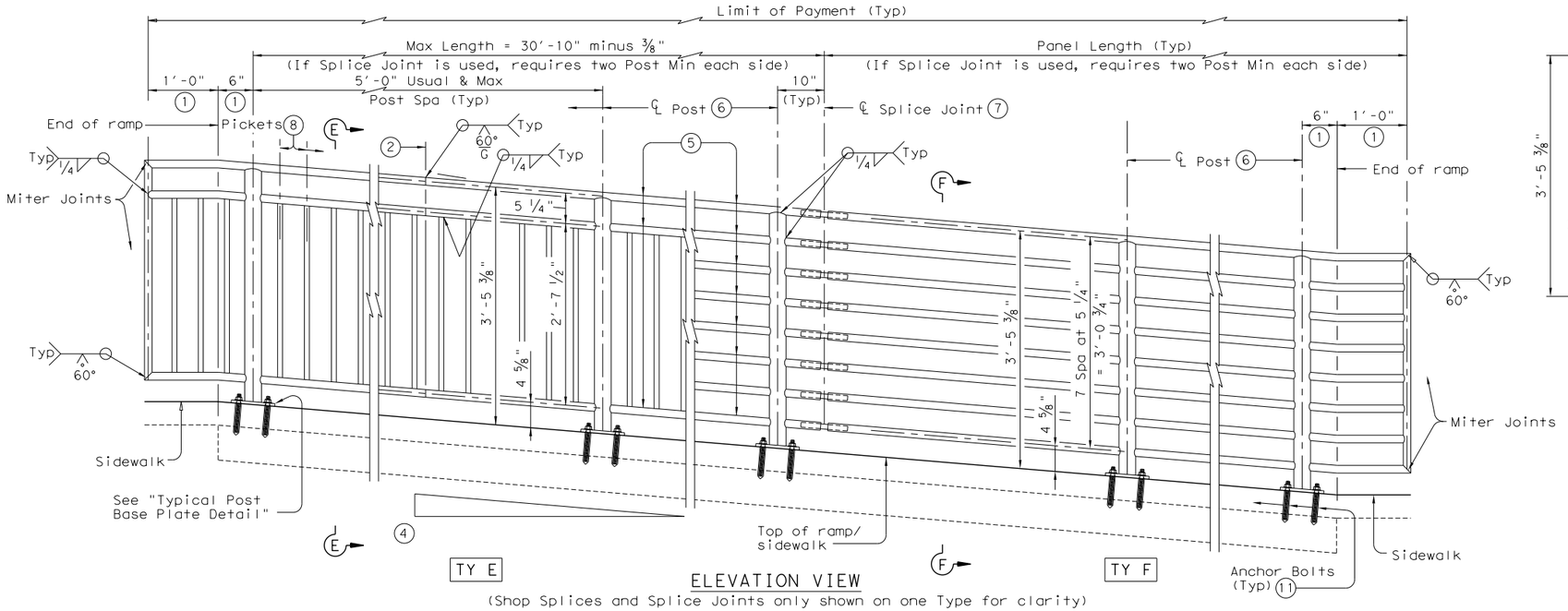
Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

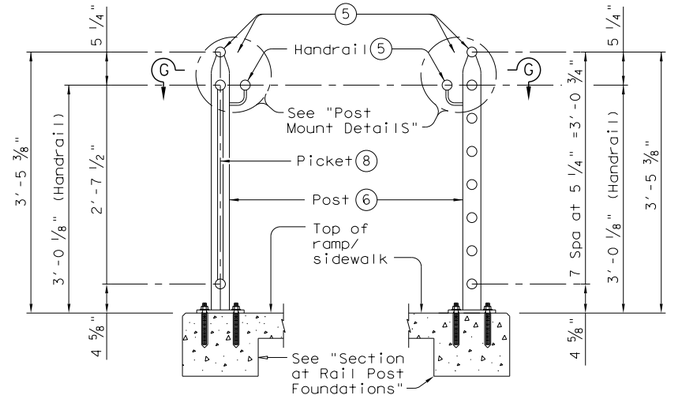
FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT Decmeber 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED MAY, 2013 (VP)	0905	06	118	CS
	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		91

DATE:
FILE:



ELEVATION VIEW

(Shop Splices and Splice Joints only shown on one Type for clarity)

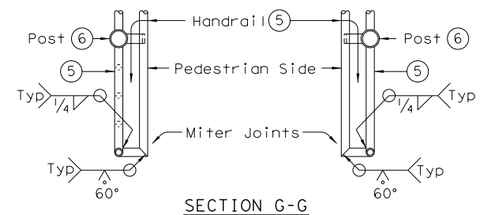


SECTION E-E

(Showing Handrail TY E)

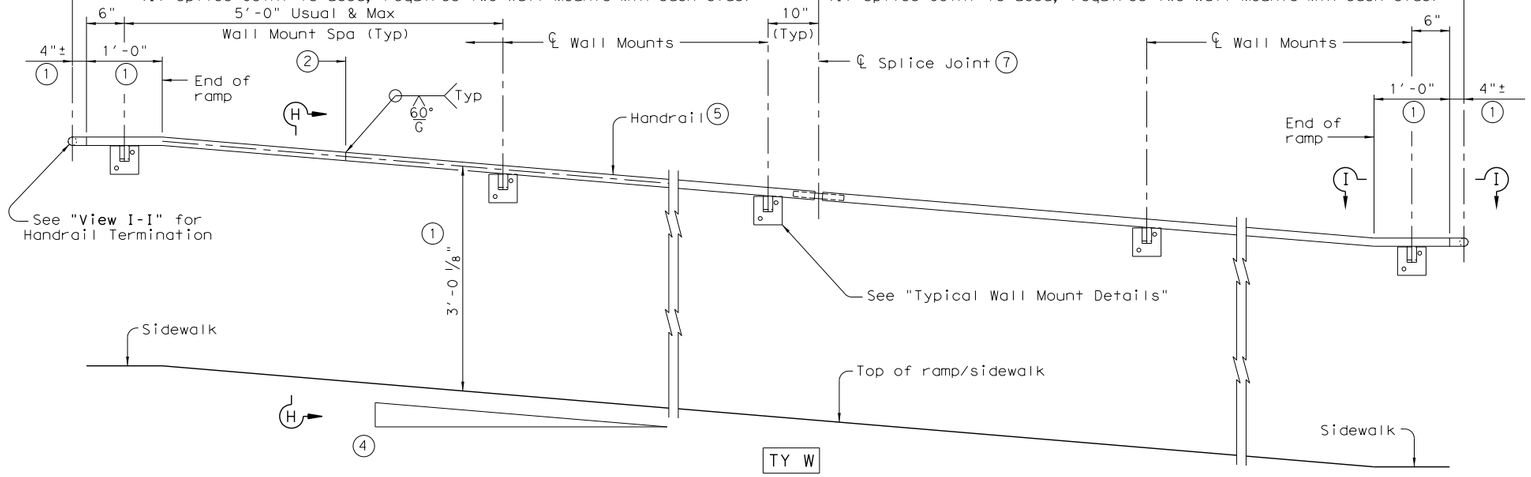
SECTION F-F

(Showing Handrail TY F)

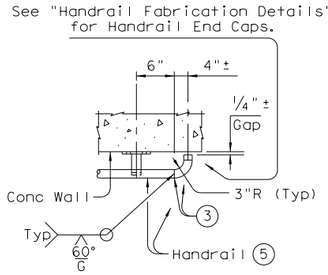


SECTION G-G

(Showing Handrail Termination)

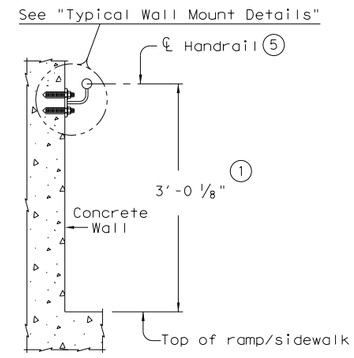


ELEVATION VIEW



VIEW I-I

(Showing Handrail Termination)



SECTION H-H

(Showing Handrail TY W)

1. Parallel to ground.
2. One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
3. Shop splice is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
4. See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30" rise if grade exceeds 5 percent.
5. 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.
6. 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). See "Post Mount Detail" for crimping and trimming post to fit Dia. of top rail. Provide holes as needed in post for galvanizing drainage and venting. Plumb all posts.
7. See "Handrail Fabrication Details" for Splice Joints.
8. ℄ ⅝" Dia. Round Bar equal spacing at 4 ½" Max. Plumb all pickets.
11. See "General Notes" for anchor bolt information.

Texas Department of Transportation

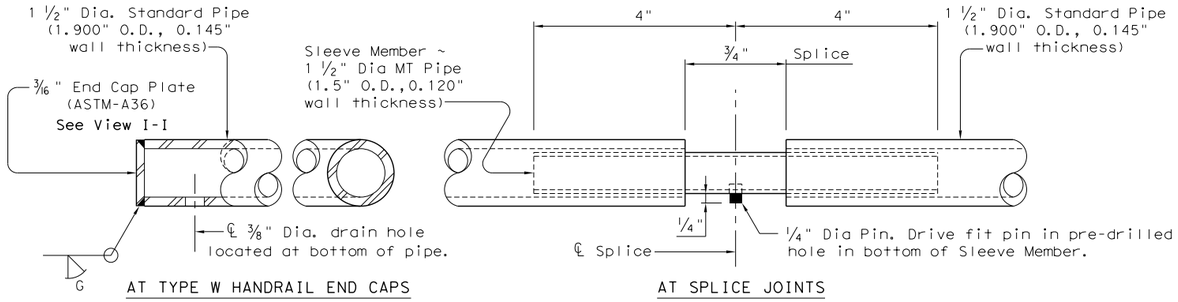
Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

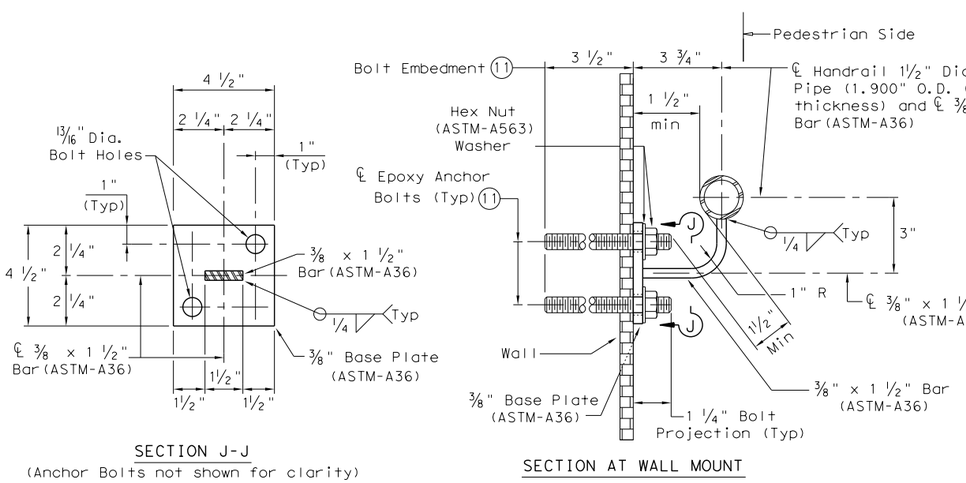
PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED MAY, 2013 (VP)	0905	06	118	CS
	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		92

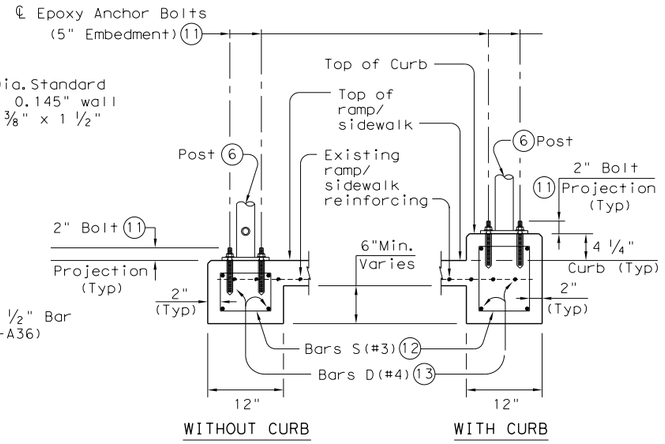
DATE:
FILE:

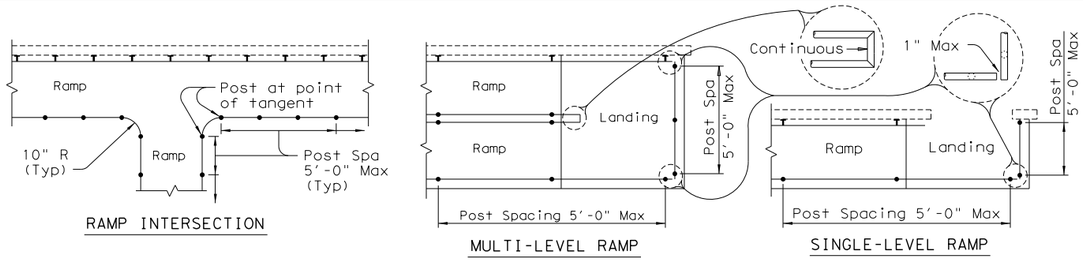


HANDRAIL FABRICATION DETAILS



TYPICAL WALL MOUNT DETAILS





PLAN SHOWING RAIL AT RAMP CONDITIONS

GENERAL NOTES

Designed according to ADAAG, Texas Accessibility Standards, Uniform Building Code, and AASHTO LRFD Specifications.

Handrail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Pipe will conform to ASTM-A53 Grade B or A500 Grade B. Steel plates and steel bars will conform to ASTM-A36. Mechanical tubing (MT) will conform to ASTM A513 Grade 1015 or higher. Galvanize all steel components except reinforcing steel unless noted otherwise.

Concrete for foundations will be in accordance with Item 531 "Sidewalks". All reinforcing steel must be Grade 60. Bar laps, where required, will be as follows: Uncoated ~ #4 = 1'-5" Epoxy coated ~ #4 = 2'-1"

When the plans require painted steel, follow the requirements for painting galvanized steel in Item 446, "Cleaning and Painting Steel". Sleeve Members will receive galvanization and only get field painted after installation unless directed otherwise by Engineer.

Epoxy Anchor bolts for wall mount and post base plate will be ⅝" Dia. ASTM A36 threaded rods with one hex nut and one hardened steel washer at each bolt. ⅝" Dia. threaded rod embedment depth for wall mounts is 3 ½" and embedment depth for post base plate is 5".

Embed threaded rods into concrete with a Type III (Class C) epoxy meeting the requirements of DMS-6100, "Epoxies and Adhesives". Mix and dispense adhesive with the manufacturer's static mixing nozzle/dual cartridge system. Core drill holes (percussion drilling not permitted).

At the contractor's option the post base plate anchor bolts may be cast with the Ramp/Sidewalk (See Cast-in-Place Anchor Bolt Options).

Optional cast-in-place anchor bolts will be ⅝" Dia ASTM A307 Grade A bolts (or A36 threaded rods with one tack welded hex nut each) with one hex nut and one hardened steel washer at each bolt. Embedment depth of cast-in-place bolt will be 8" for post base plate.

Handrails and any wall or other surface adjacent to them will be free of any sharp or abrasive elements.

Submit shop drawings to the Engineer unless otherwise noted. For curved handrail applications, fabricate the handrail to the curve if radius is less than 600 ft. Shop drawings are required when rail is fabricated to the curve.

For all handrails, erection drawings will be submitted to the Engineer for approval to ensure proper installation.

Drawings will show handrail mount locations with bolts setting, spacing, ramp slope, and/or splice joint locations, and handrail lengths with identification showing where each handrail goes on the layout.

Payment for concrete sidewalks or curb ramps will be paid for in accordance with Item 531 "Sidewalks".

Payment for all items shown is to be included in unit price bid in accordance with Item 450 "Railing" of the type specified.

All exposed edges will be rounded or chamfered to approximately ⅛" by grinding.

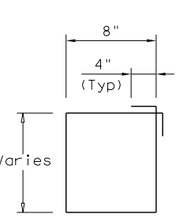
(5) 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp/sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.

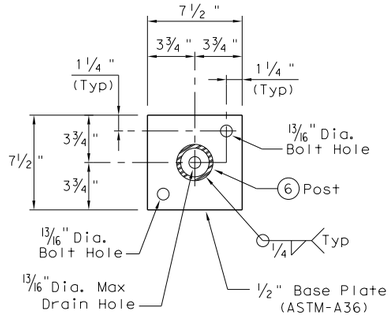
(6) 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). Plumb all posts. See "Post Mount Detail" for crimping and trimming post to fit the diamenter of top rail. Provide holes as needed in post for galvanizing drainage and venting.

(11) See "General Notes" for anchor bolt information.

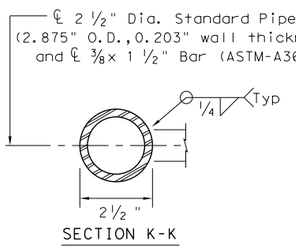
(12) Bars S(#3) spaced at 12" Max (Spaced 3" from outside edge of overall length of Ramp/Sidewalk).

(13) Provide 1 ½" end cover to Bars D(#4) from outside edge of overall length of Ramp/Sidewalk.

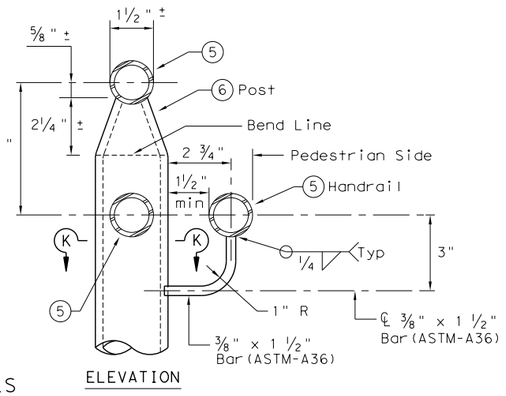




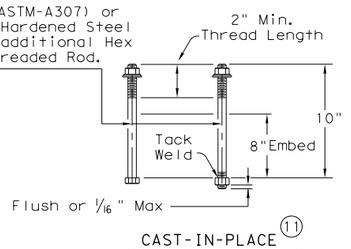
TYPICAL POST BASE PLATE DETAIL



POST MOUNT DETAILS



ELEVATION



Texas Department of Transportation

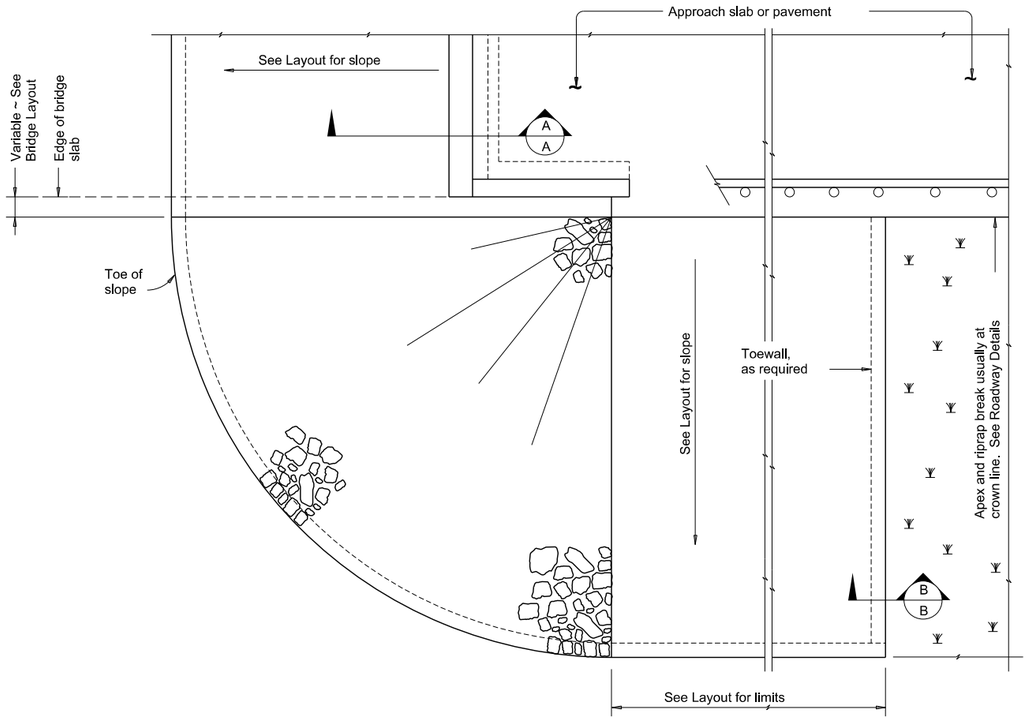
Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

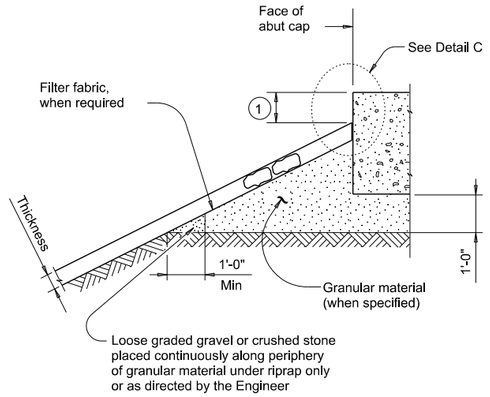
PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
REVISED MAY, 2013 (VP)	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		93

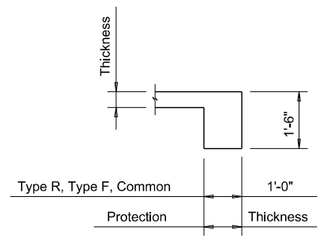
DATE:
FILE:



PLAN

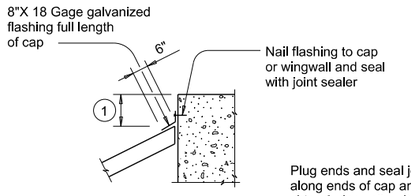


SECTION A-A AT CAP

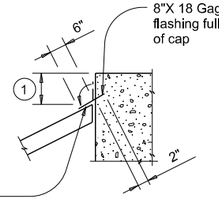


SECTION B-B

Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".

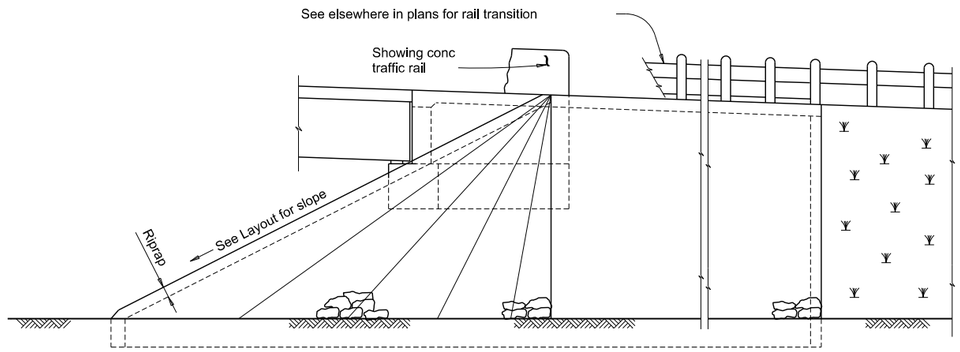


CAP OPTION A



CAP OPTION B

DETAIL C



ELEVATION

(1) Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

GENERAL NOTES:
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.
See elsewhere in plans for locations and details of shoulder drains.

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES		CK: JGD	DW: BWH		CK: AES	
©TxDOT April 2019	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0905	06	118		CS		
	DIST	COUNTY				SHEET NO.	
	LBB	LUBBOCK				94	

DATE:
FILE:

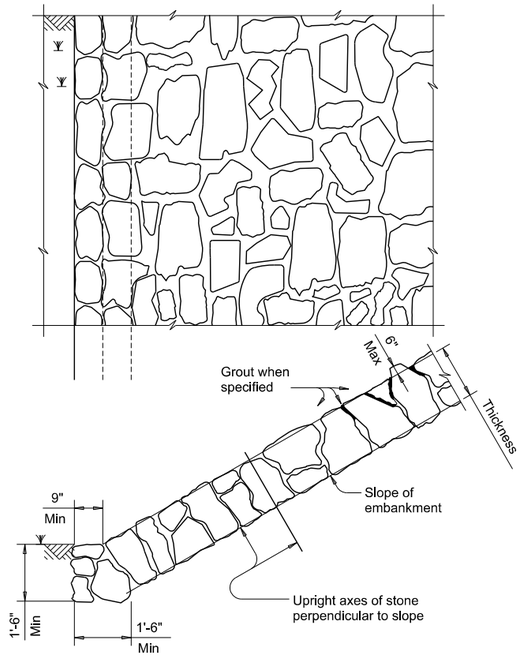


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

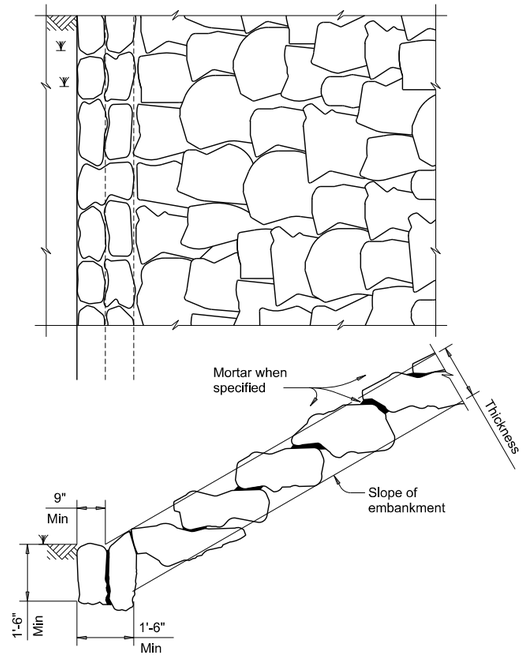


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

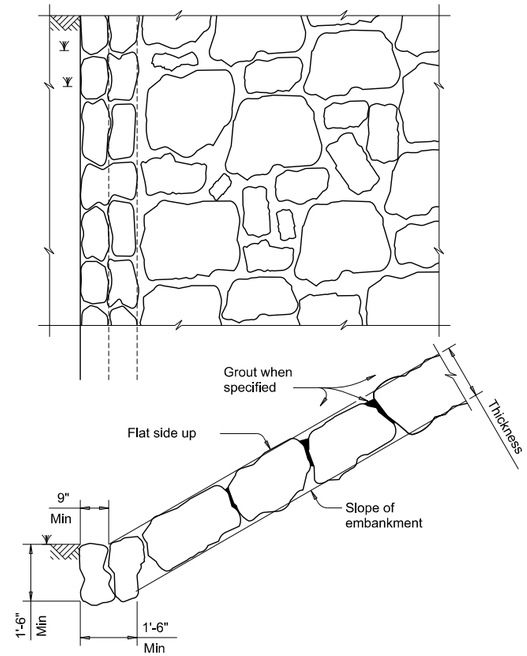


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted

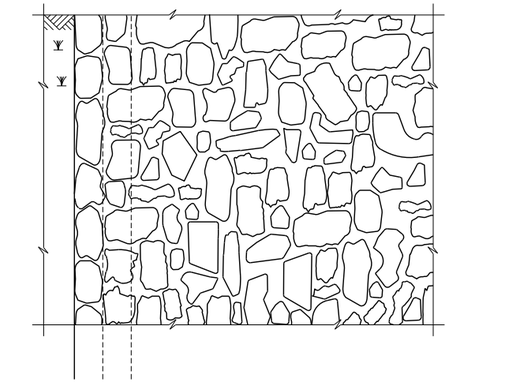


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

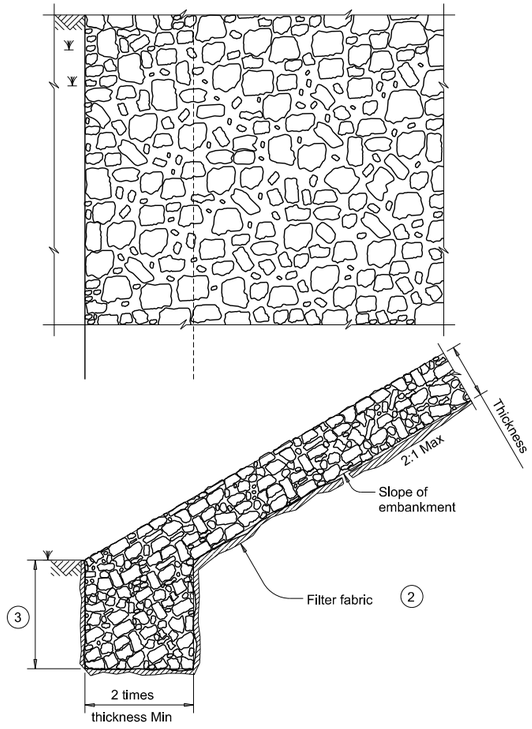


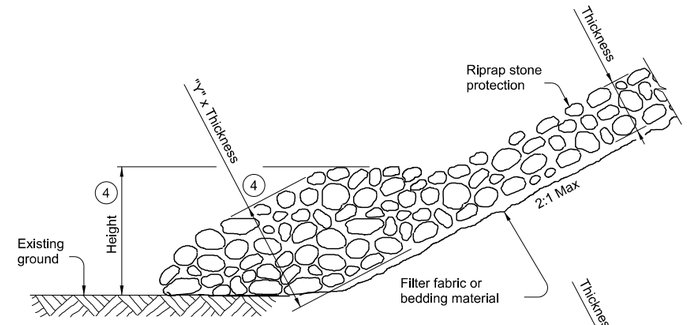
FIGURE 5 ~ PROTECTION STONE RIPRAP 5

2 Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

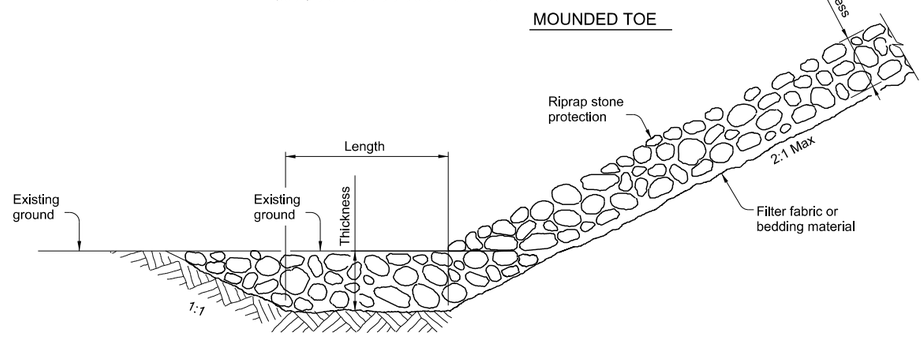
3 Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

4 "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.

5 List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS 5

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905		118	CS
	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		95

02861
1.0000 ft / in.

SUMMARY OF DRAINAGE ITEMS										
LOCATION	110 6002	164 6052	192 6002	192 6004	420 6074	423 6004	432 6031	556 6008	1005 6001	1005 6002
	EXCAVATION (CHANNEL)	BROADCAST SEED (PERM)(SPECIAL MIX)	PLANT MATERIAL (1-GAL)	PLANT MATERIAL (5-GAL)	CL C CONC (MISC)	RETAINING WALL (CONC BLOCK)	RIPRAP (STONE PROTECTION)(12 IN)	PIPE UNDERDRAINS (TY 8) (6")	LOOSE AGGR FOR GROUNDCOVER (TYPE I)	LOOSE AGGR FOR GROUNDCOVER (TYPE II)
	CY	SY	EA	EA	CY	SF	CY	LF	CY	CY
OVERALL	16400	20	133	43	20	880	211	795	46	25
PROJECT TOTALS	16400	20	133	43	20	880	211	795	46	25

SUMMARY OF BRIDGE ITEMS	NBI: 05-152-0-B001-14-001						
LOCATION	400 6005	402 6001	403 6006	432 6002	462 6010	467 6212	480 6001
	CEM STABIL BKFL	TRENCH EXCAVATION PROTECTION	TEMPORARY SPL SHORING (COFFERDAM)	RIPRAP (CONC)(5 IN)	CONC BOX CULV (6 FT X 3 FT)	SET (TY I)(S= 6 FT)(HW= 4 FT)(4:1)(C)	CLEAN EXIST CULVERTS
	CY	LF	SF	CY	LF	EA	EA
OVERALL	40	107	1168	10.5	360	6	1
PROJECT TOTALS	40	107	1168	10.5	360	6	1

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
DRAINAGE SUMMARY

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
DAP	TEXAS	LBB	LUBBOCK	
CHECK	CONTROL	SECTION	JOB	96
CBB	0905	06	118	
CHECK				
SRJ				

Apr. 28, 2022 - 04:29:45 PM
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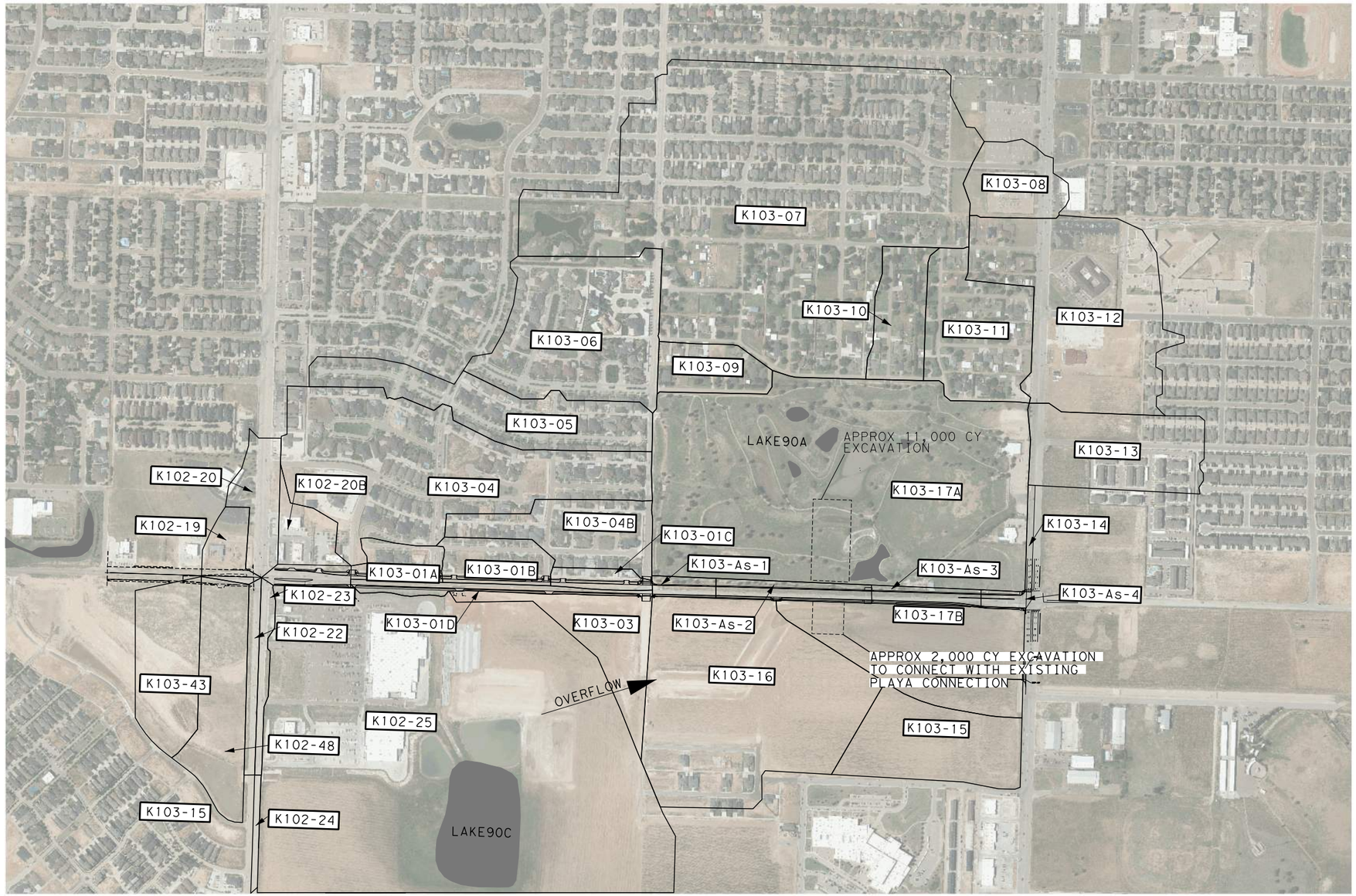
$USER$
800.0000 ft / in.



0 400′ 800′
SCALE IN FEET

N

LEGEND

K103-08	SYSTEM K SUB BASIN ID
LAKE90A	PLAYA LAKE NUMBER
———	114TH STREET SUB-BASIN LIMITS

STATE OF TEXAS
WADE J. BARNES
120012
LICENSED PROFESSIONAL ENGINEER

03/03/2022
Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.

DRAINAGE AREA MAP
OVERALL

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	97
	0905	06	118	

Mar. 01, 2022 - 02:16:55 PM
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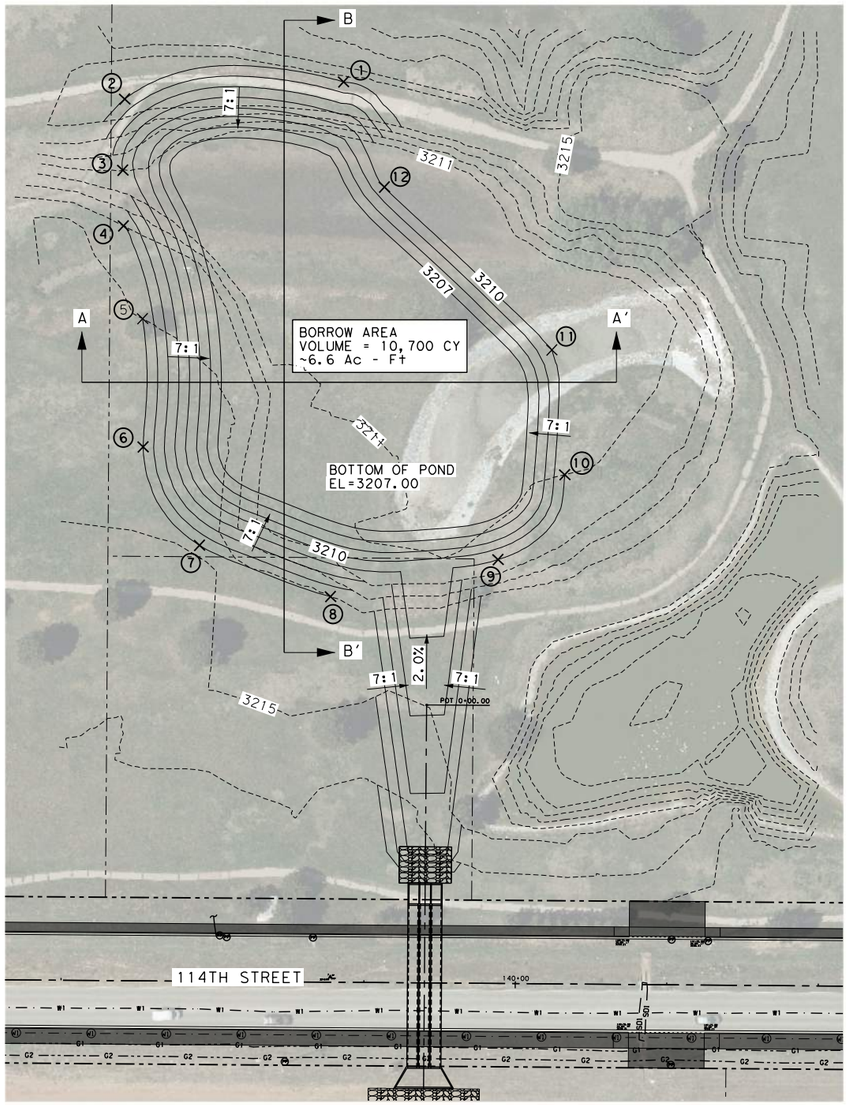
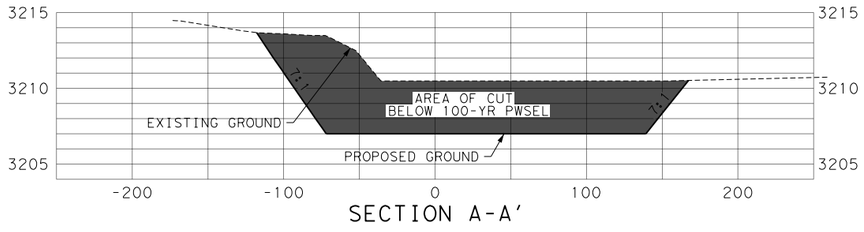
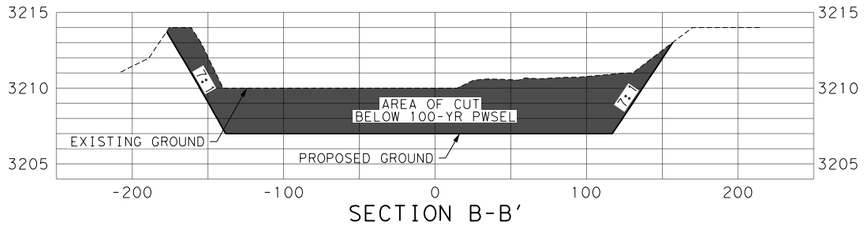




SECTION A-A'



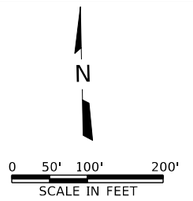
SECTION B-B'

GRADING TABLE				
POINT NO.	NORTHING	EASTING	ELEVATION	POINT DESCRIPTION
1	7244100.98	934776.76	3214.00	TOP OF SLOPE
2	7244092.81	934632.05	3214.00	TOP OF SLOPE
3	7244045.92	934629.79	3211.00	TOP OF SLOPE
4	7244009.18	934629.41	3213.00	TOP OF SLOPE
5	7243947.61	934640.69	3214.00	TOP OF SLOPE
6	7243862.99	934639.14	3214.00	TOP OF SLOPE
7	7243797.22	934674.90	3215.00	TOP OF SLOPE
8	7243761.45	934760.64	3214.00	TOP OF SLOPE
9	7243783.41	934871.73	3211.00	TOP OF SLOPE
10	7243838.44	934917.06	3211.00	TOP OF SLOPE
11	7243920.98	934910.34	3210.00	TOP OF SLOPE
12	7244030.98	934802.18	3210.00	TOP OF SLOPE

FILL MATERIAL DENSITY REQUIREMENTS:

ALL FILL SHALL BE IN ACCORDANCE WITH THE CITY OF LUBBOCK CODE OF ORDINANCES, SECTION 38.07.002, REQUIREMENTS AND VERIFICATION.

1. TESTING SHALL BE PERFORMED BY A COMMERCIAL TESTING LABORATORY IN ACCORDANCE WITH AMERICAN SOCIETY FOR TESTING MATERIALS (ASTM) STANDARDS.
2. ALL FILL MATERIALS SHALL BE COMPACTED TO NINETY-FIVE (95) PERCENT STANDARD PROCTOR DENSITY IN ACCORDANCE WITH ASTM D-698.
3. FIELD DENSITIES SHALL BE DETERMINED IN ACCORDANCE WITH ASTM D-2167 (RUBBER BALLOON DENSITY METHOD), ASTM D-1556 (SAND CONE DENSITY METHOD) OR ASTM D-2922 (NUCLEAR DENSITY METHOD).
4. FOUR (4) FIELD DENSITIES SHALL BE TAKEN PER ACRE OF FILL MATERIAL, AND DENSITIES SHALL BE TAKEN FOR EACH SIX-INCH COMPACTED DEPTH, OR PORTION THEREOF, OF SUCCEEDING DEPTHS OF FILL MATERIAL. EACH AREA OF FILL MATERIAL LESS THAN ONE-HALF ACRE SHALL HAVE A MINIMUM OF TWO (2) FIELD DENSITIES FOR EACH SIX-INCHDEPTH, AND AREAS OF FILL MATERIAL BETWEEN ONE-HALF ACRE AND ONE (1) ACRE SHALL HAVE A MINIMUM OF THREE (3) FIELD DENSITIES FOR EACH SIX-INCH DEPTH.
5. EACH LIFT SHALL HAVE A MAXIMUM COMPACTED DEPTH OF SIX (6) INCHES.
6. THE FIELD DENSITIES SHALL BE TAKEN IN SUCH A MANNER AS TO BE A REPRESENTATIVE SAMPLING OF THE SIX-INCH DEPTHS. THE LOCATION OF THE TESTS SHALL BE PROPORTIONATELY SPACED TO REPRESENT APPROXIMATE EQUAL AREAS OF EACH ACRE BEING TESTED. TESTING SHALL NOT OCCUR AT THE SAME LOCATION IN SUCCEEDING DEPTHS, SO A REPRESENTATIVE SAMPLING OF THE TOTAL FILL MAY BE OBTAINED.
7. THE LOCATION OF THE FIELD DENSITY TESTS SHALL BE INDICATED UPON A MAP TO BECOME A PART OF THE CERTIFIED AS-BUILT CUT AND FILL PLAN.
8. COPIES OF ALL TEST RESULTS WITH LOCATION MAPS SHALL BE FURNISHED TO THE CITY ENGINEER WITH THE CERTIFIED AS-BUILT CUT AND FILL PLAN.
9. FILL MATERIAL WITH A PLASTICITY INDEX (PI) OF GREATER THAN TWENTY (20) WILL NOT BEALLOWED IN ANY PUBLIC RIGHT-OF-WAY. THE SUBSTANDARD MATERIAL SHALL BE DISCARDED AT A LOCATION ABOVE THE PREDICTED PEAK WATER ELEVATION OF THE PLAYA LAKE, AND SELECT FILL MATERIAL SHALL BE IMPORTED TO THE SITE FOR PLACEMENT WITHIN THE PUBLIC RIGHT-OF-WAY.



LEGEND

- DRAINAGE EASEMENT
- PROPERTY LINE
- 3274 EXISTING CONTOURS
- 3274 PROPOSED CONTOURS
- PROPOSED LIMITS OF EXCAVATION

GENERAL NOTES:

1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE MOST CURRENT VERSION OF THE CITY OF LUBBOCK MINIMUM DESIGN STANDARDS AND SPECIFICATIONS AND DRAINAGE CRITERIA.
2. CONTRACTOR SHALL COORDINATE UTILITY WORK WITH PROPER UTILITY OWNER PRIOR TO RELOCATION.

03/03/2022
Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
PLAYA LAKE
CUT AND FILL PLAN

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	98
	0905	06	118	

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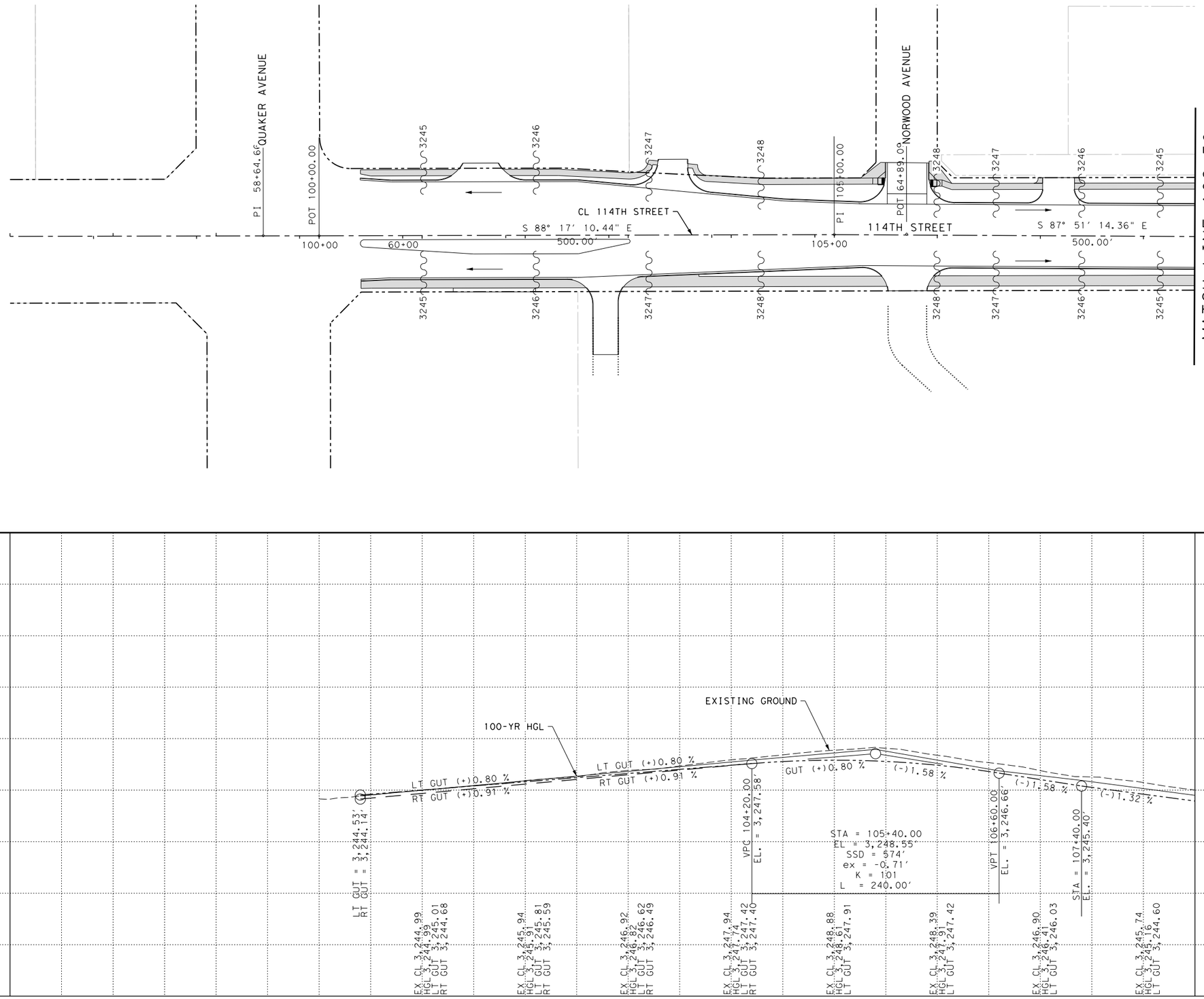

N

0 50' 100'
HORIZONTAL SCALE

0 5' 10'
HORIZONTAL SCALE

LEGEND

100 YR PSWEL

FLOW DIRECTION

STATE OF TEXAS
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114TH STREET
QUAKER AVE. TO INDIANA AVE.
STORM WATER ROUTING MAP
PLAN AND PROFILE
BEGIN TO STA 108+50

SHEET 1 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	99
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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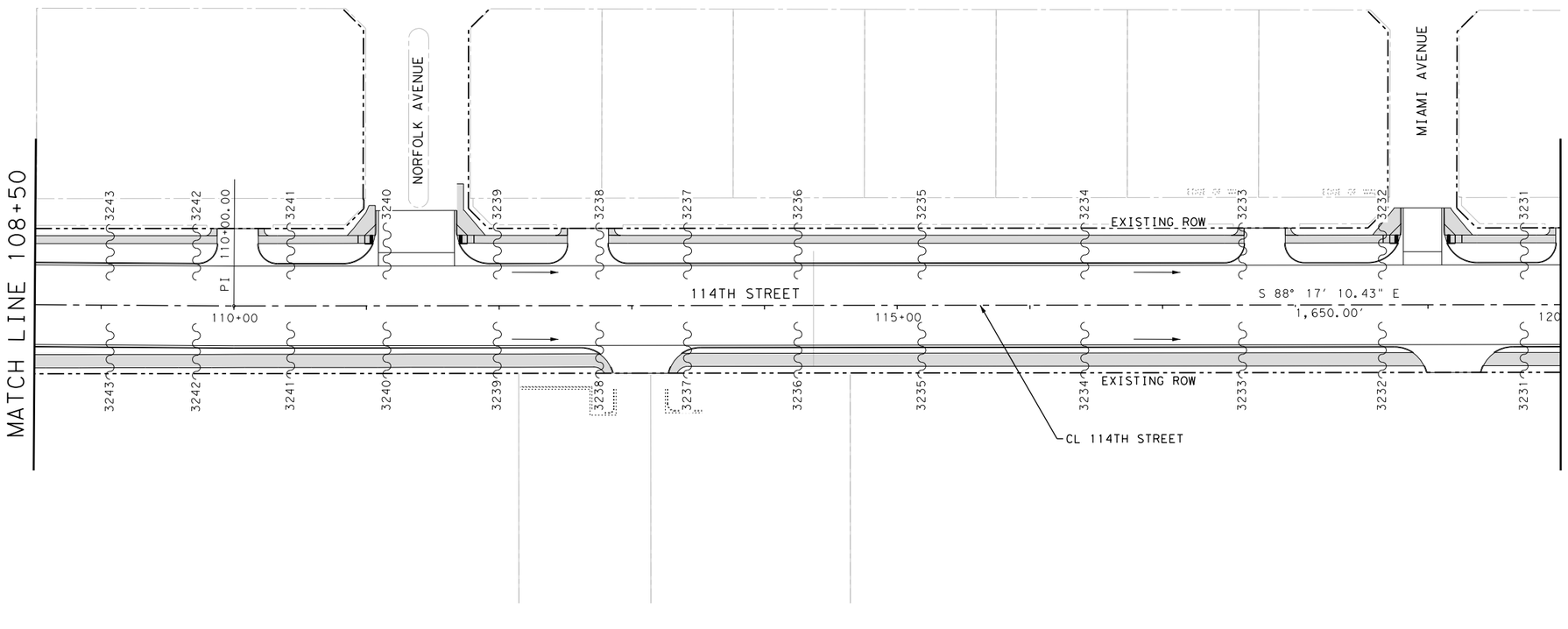

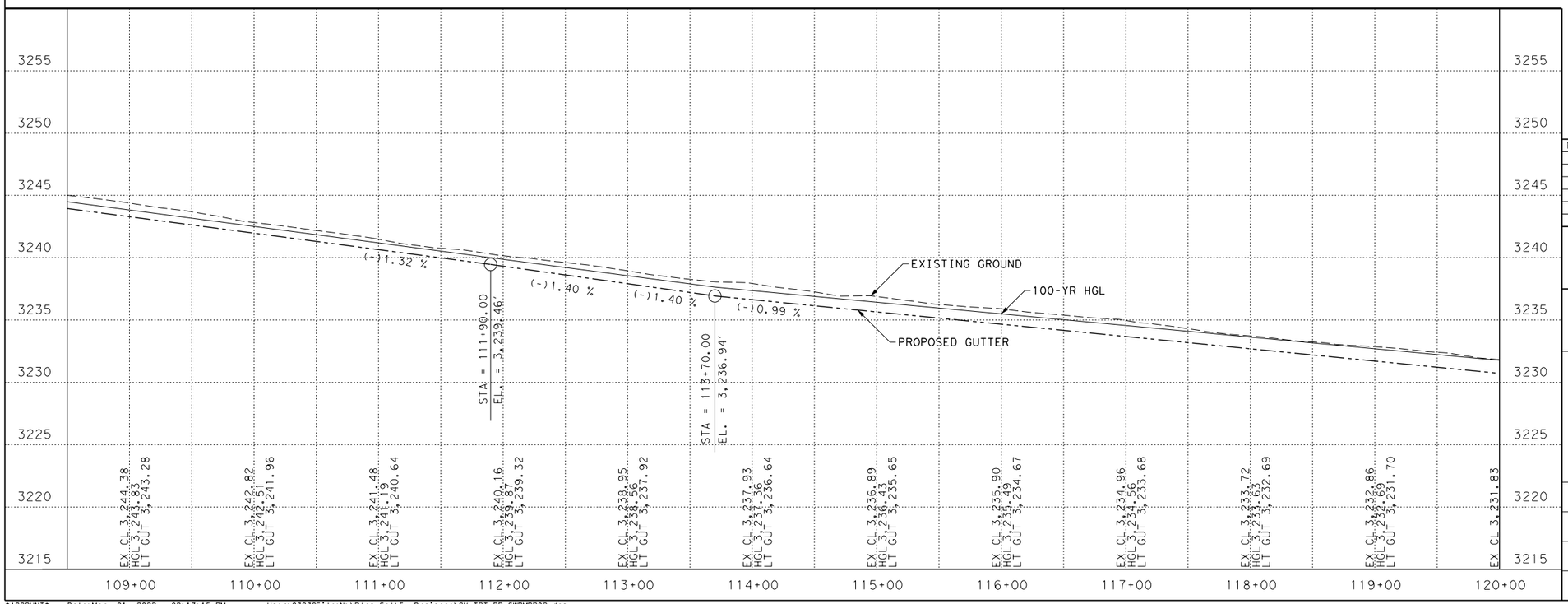

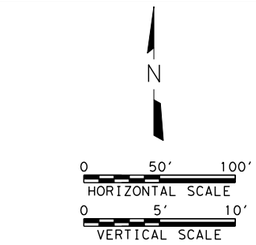

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114TH STREET
QUAKER AVE. TO INDIANA AVE.
STORM WATER ROUTING MAP
PLAN AND PROFILE
STA 108+50 TO STA 120+00

SHEET 2 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	100
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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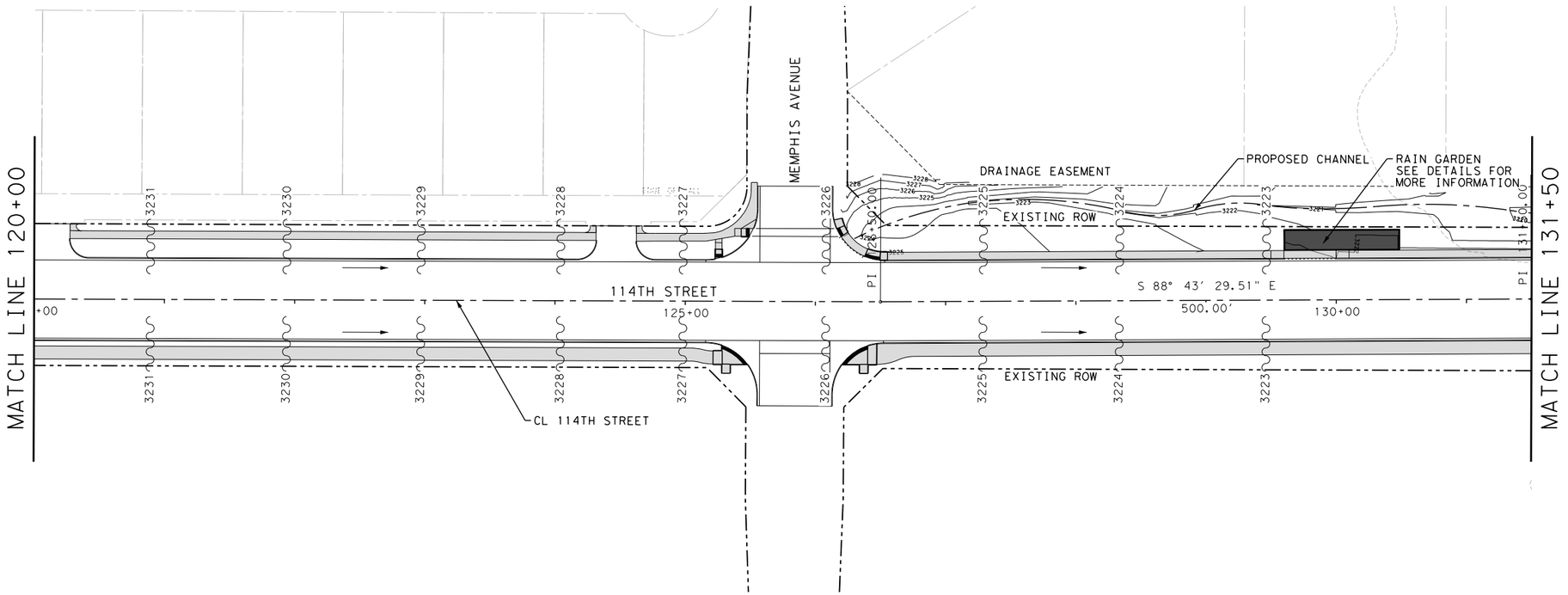

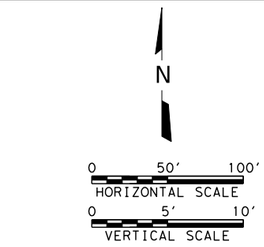

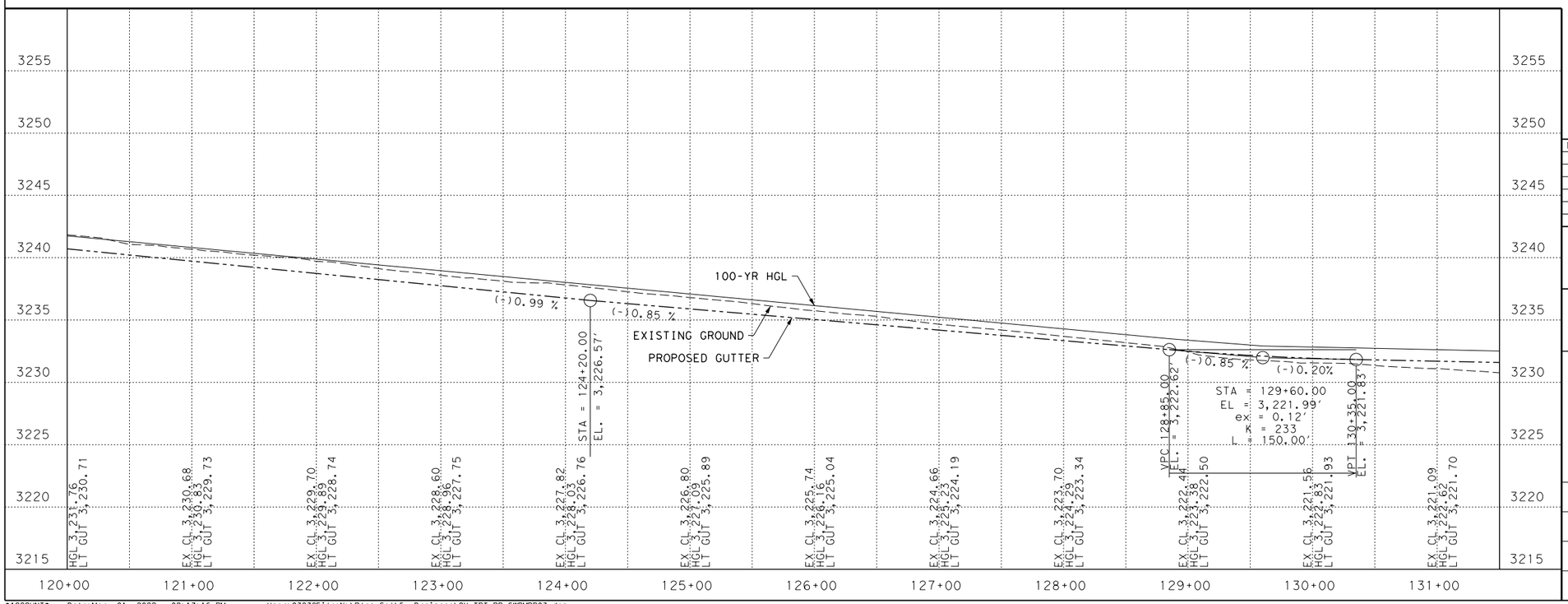

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114TH STREET
QUAKER AVE. TO INDIANA AVE.
STORM WATER ROUTING MAP
PLAN AND PROFILE
STA 120+00 TO STA 131+50

SHEET 3 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	101
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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CV-TRT-PP-SWRMPP03.dgn

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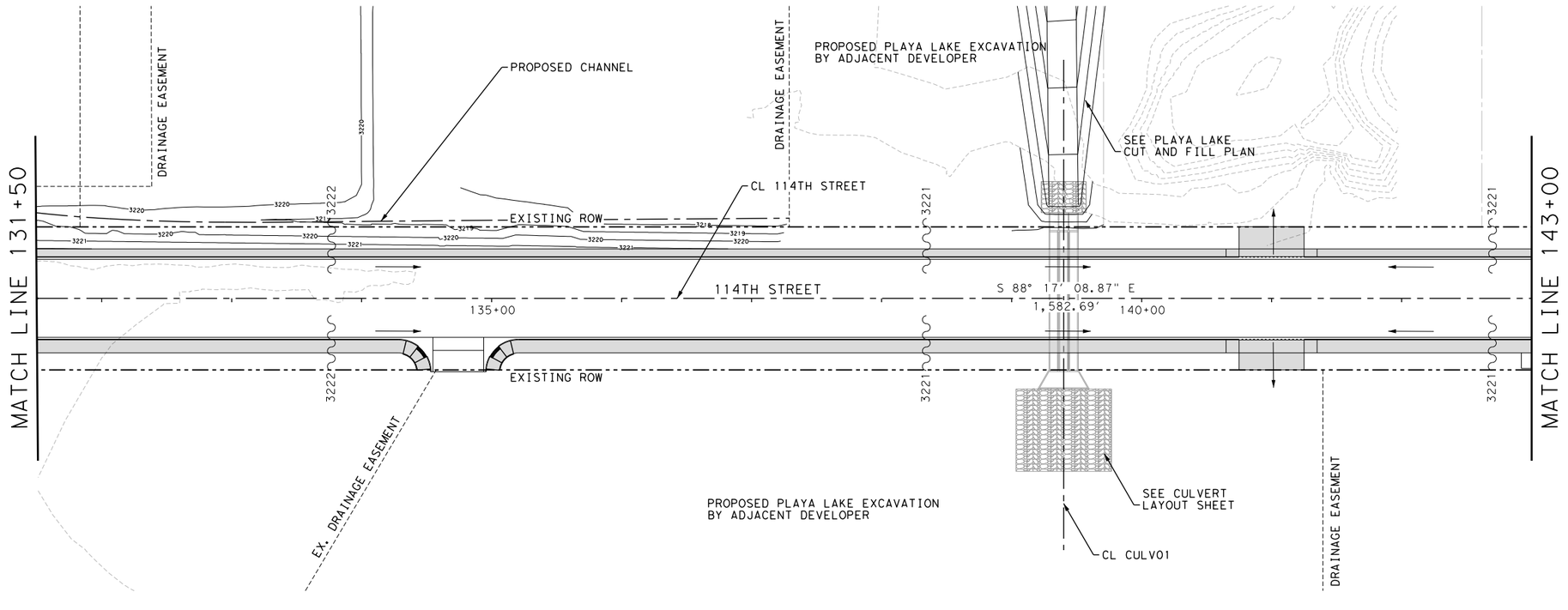


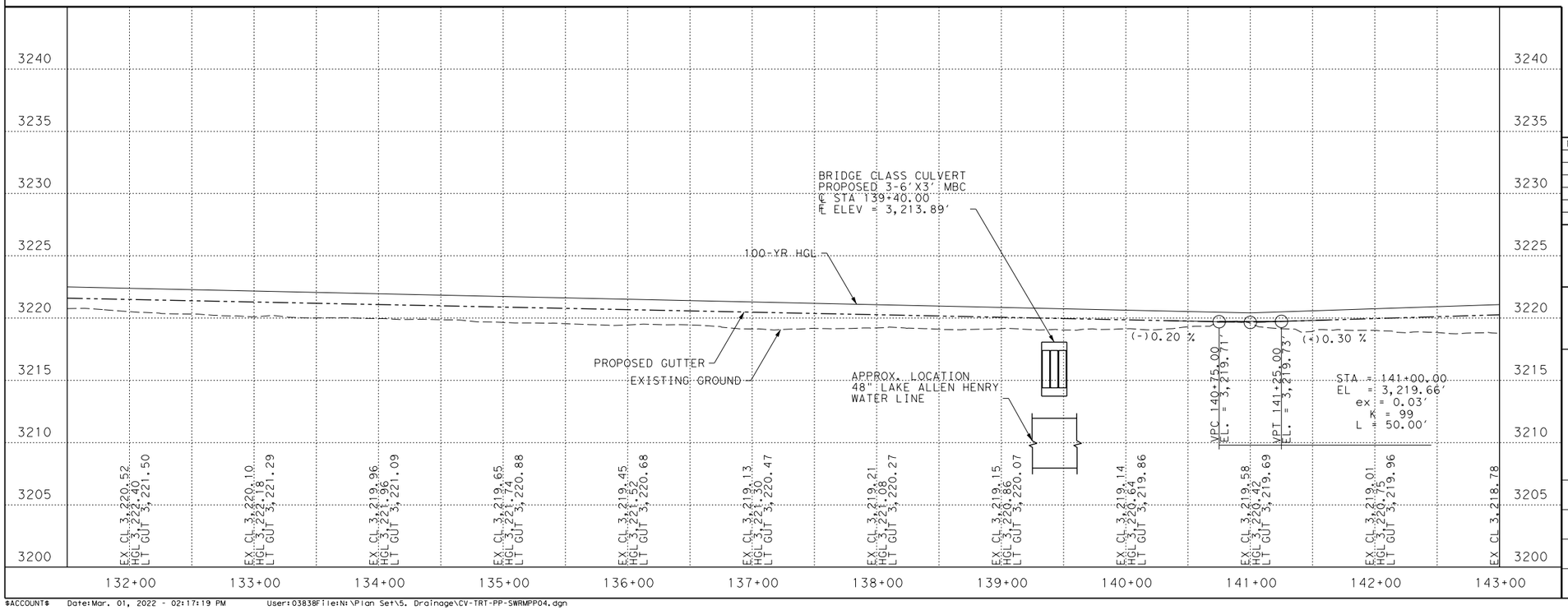
N

0 50' 100'
HORIZONTAL SCALE
0 5' 10'
VERTICAL SCALE

LEGEND

100 YR PSWEL

FLOW DIRECTION



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Texas Department of Transportation

114TH STREET
QUAKER AVE. TO INDIANA AVE.
STORM WATER ROUTING MAP
PLAN AND PROFILE
STA 131+50 TO STA 143+00

SHEET 4 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	102
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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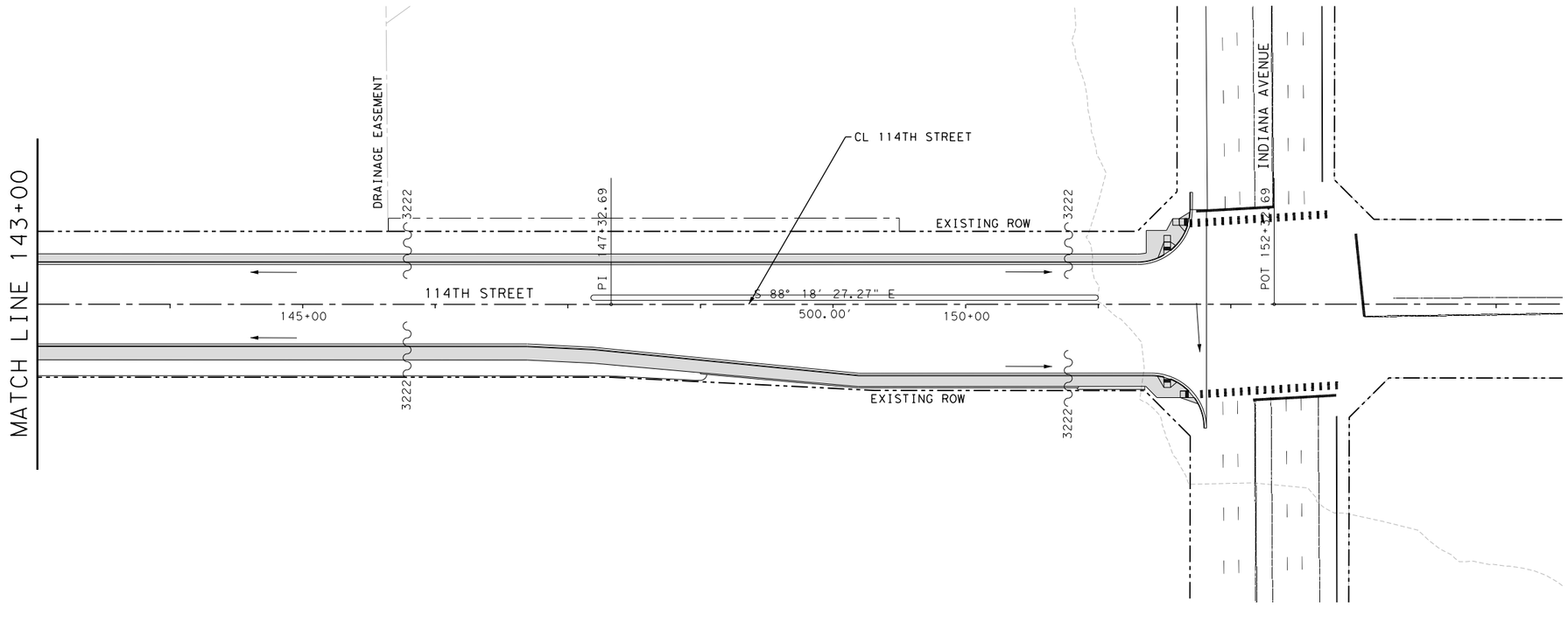
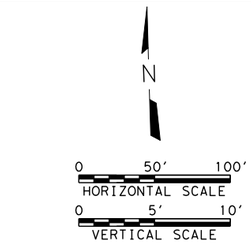
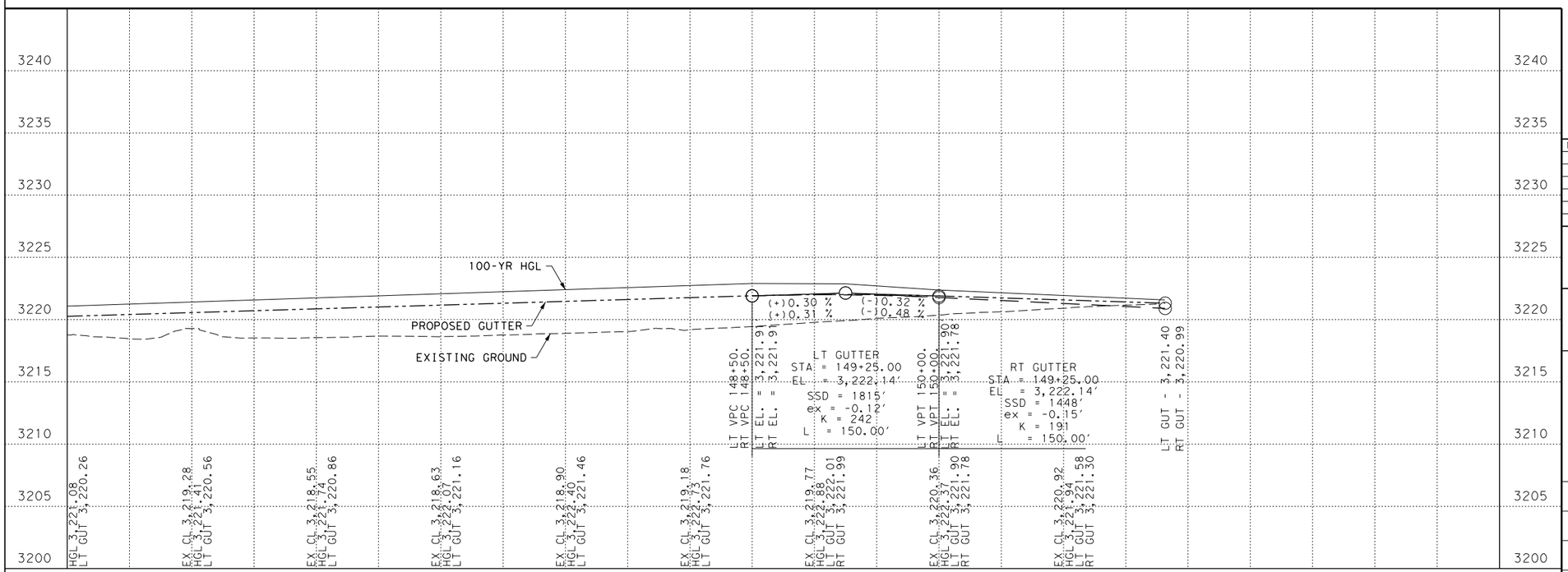




LEGEND

100 YR PSWEL

FLOW DIRECTION



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Wade J. Barnes

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Texas Department of Transportation

114TH STREET
QUAKER AVE. TO INDIANA AVE.
STORM WATER ROUTING MAP
PLAN AND PROFILE
STA 143+00 TO END

SHEET 5 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	103
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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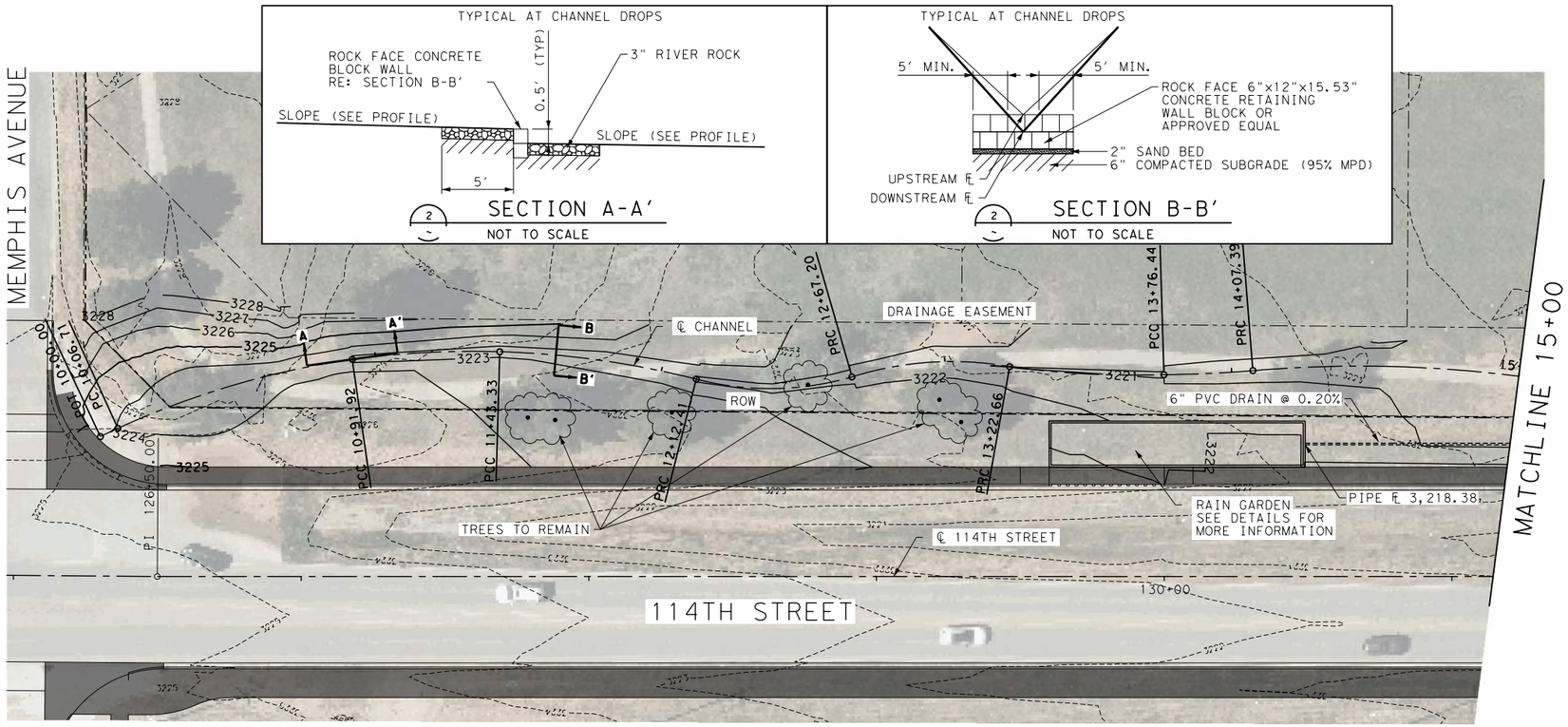

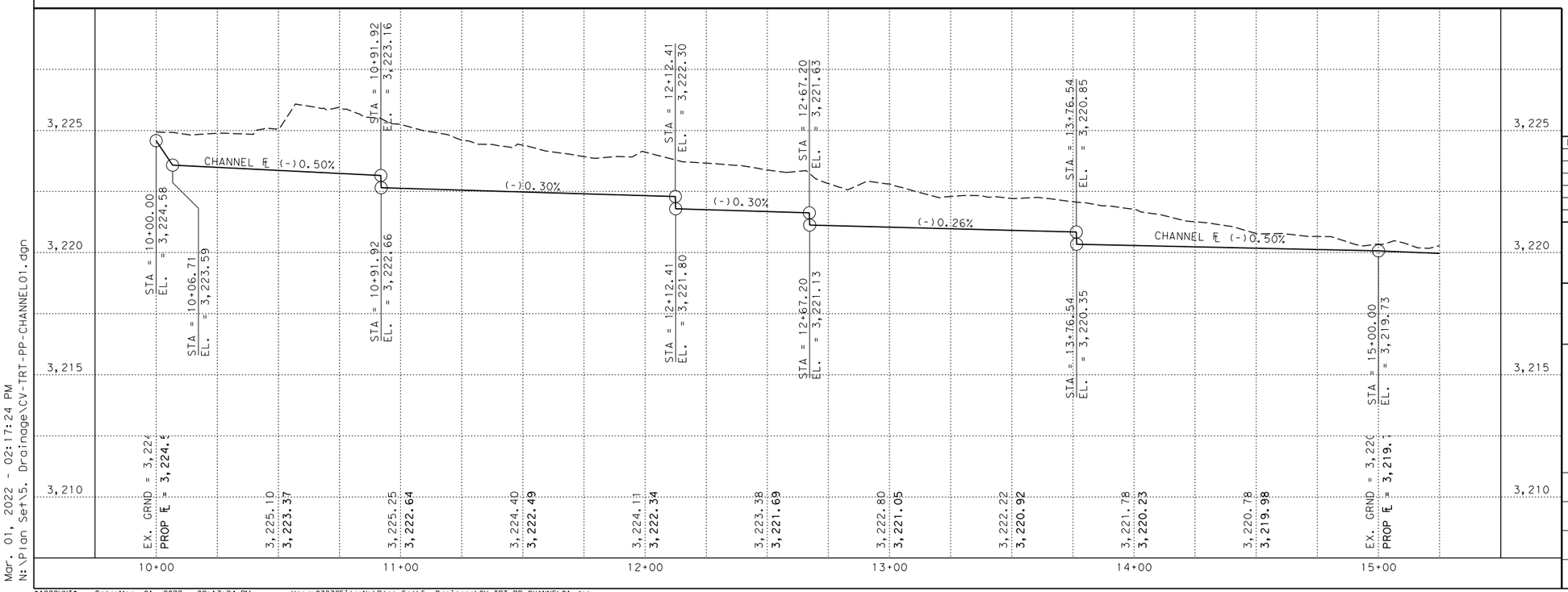

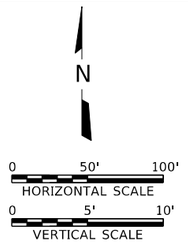

NOTES:

1. PLACE CONSTRUCTION FENCING AROUND TREES TO REMAIN.
2. USE SMALL EQUIPMENT ONLY TO CONSTRUCT CHANNEL.

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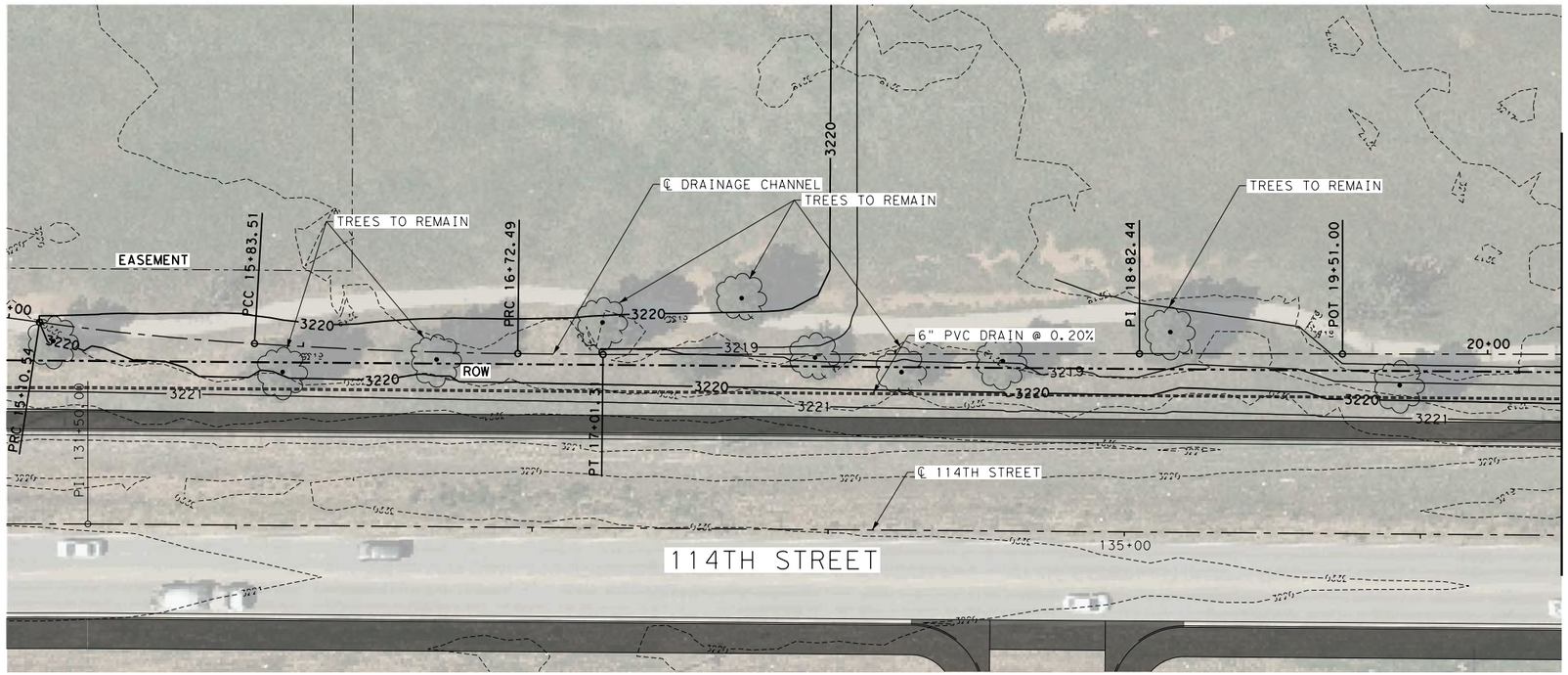
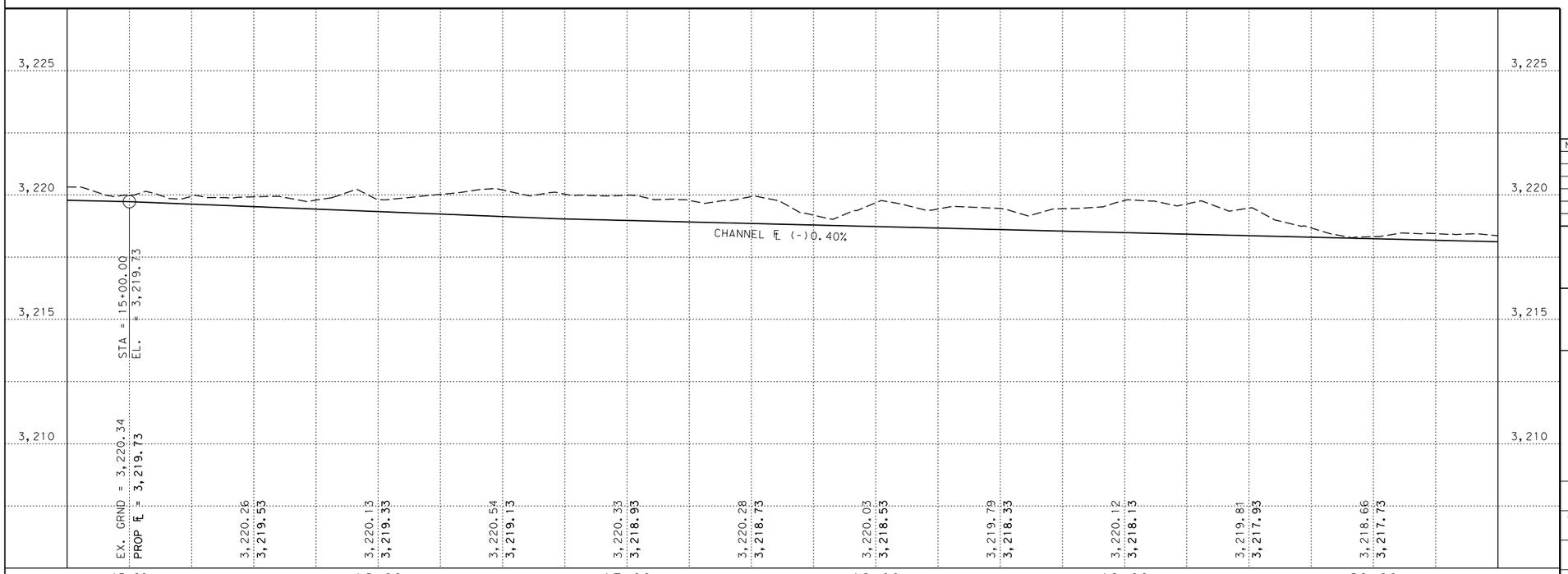
114TH STREET
QUAKER AVE. TO INDIANA AVE.
DRAINAGE CHANNEL PLAN AND PROFILE

SHEET 1 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	104
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	



MATCHLINE 20+25



N

0 50' 100'
HORIZONTAL SCALE

0 5' 10'
VERTICAL SCALE

NOTES:

1. PLACE CONSTRUCTION FENCING AROUND TREES TO REMAIN.
2. ONLY USE SMALL EQUIPMENT TO CONSTRUCT CHANNEL.

STATE OF TEXAS
WADE J. BARNES
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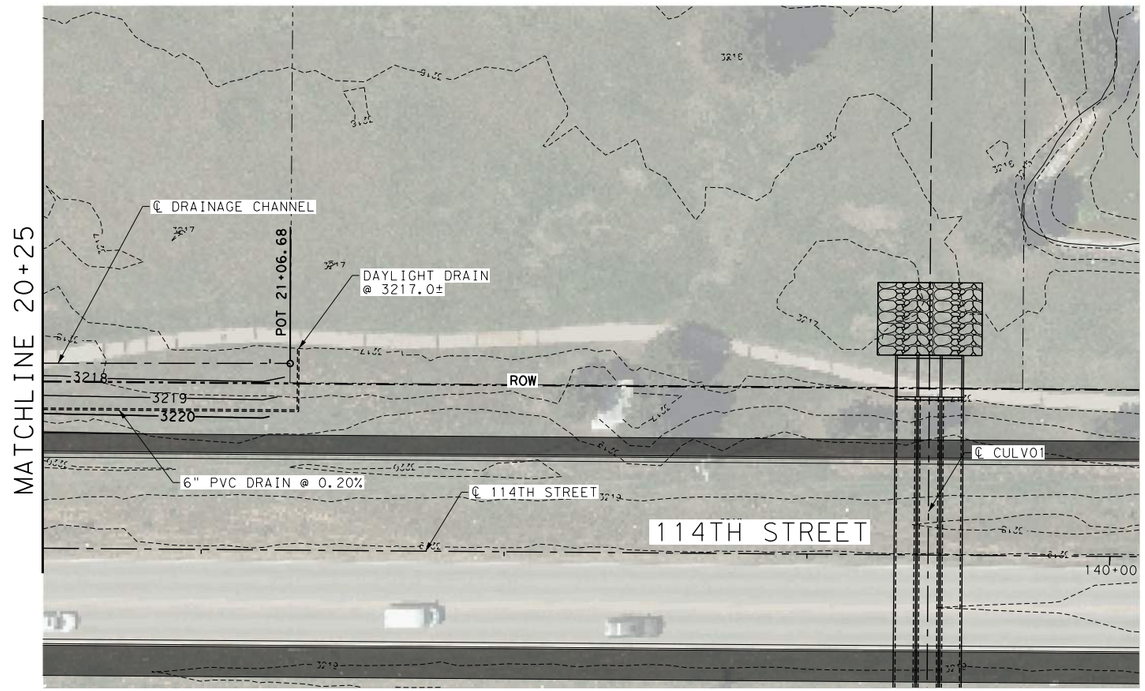
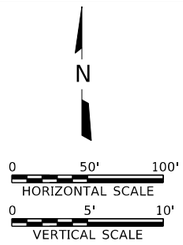
114TH STREET
QUAKER AVE. TO INDIANA AVE.
DRAINAGE CHANNEL PLAN AND PROFILE

SHEET 2 OF 3

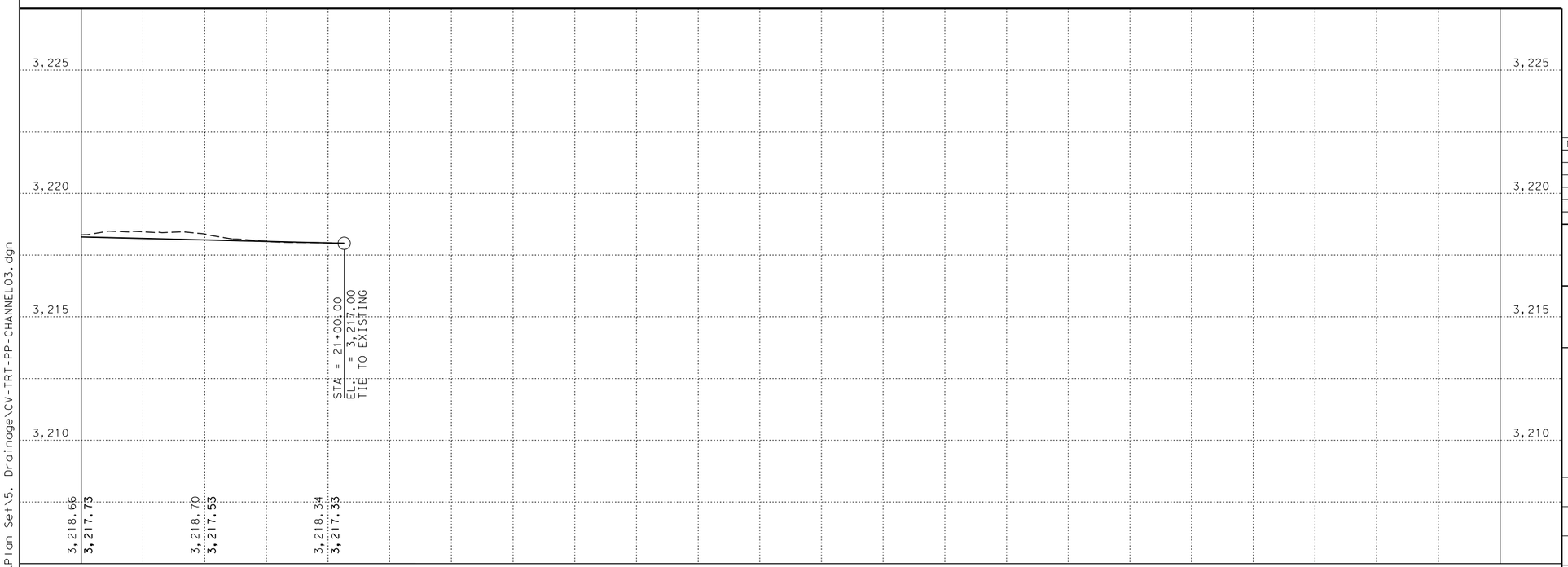
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	105
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	





NOTES:

1. PLACE CONSTRUCTION FENCING AROUND TREES TO REMAIN.
2. ONLY USE SMALL EQUIPMENT TO CONSTRUCT CHANNEL.



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114TH STREET
QUAKER AVE. TO INDIANA AVE.
DRAINAGE CHANNEL PLAN AND PROFILE

SHEET 3 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	106
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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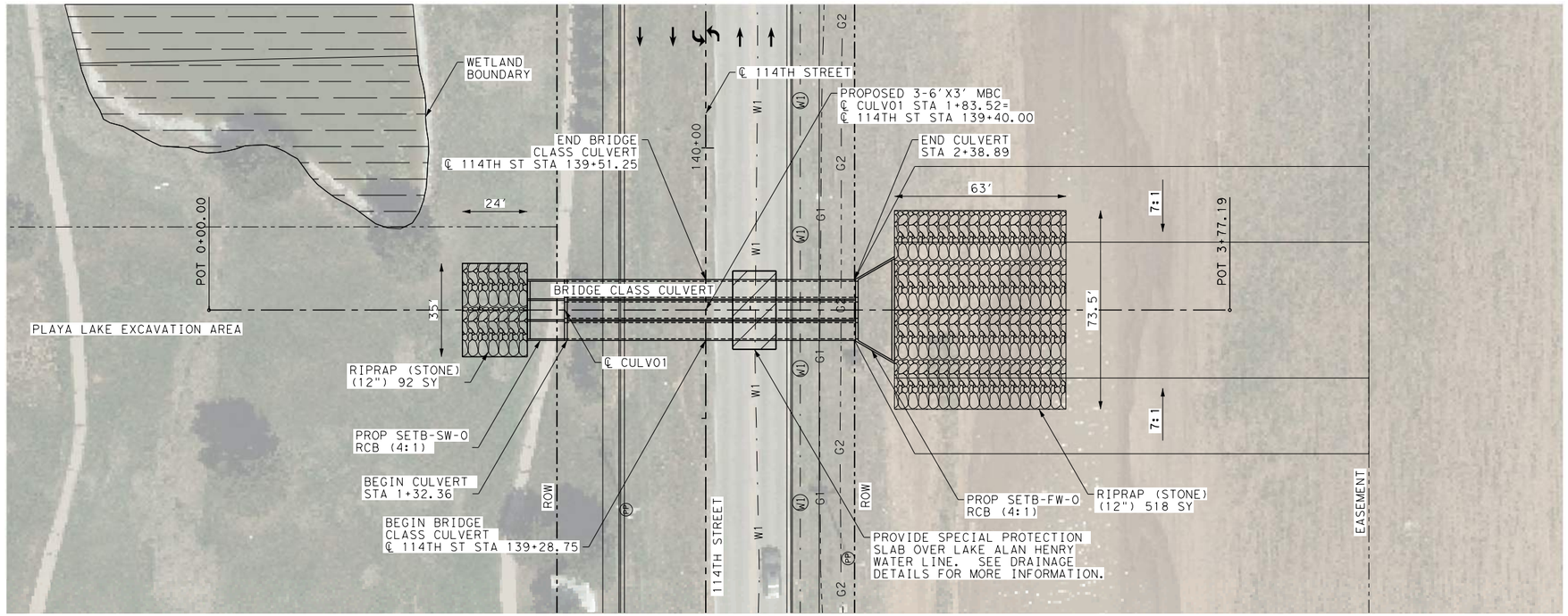


N

0 25' 50'
HORIZONTAL SCALE
0 5' 10'
VERTICAL SCALE

Chain CULV01 contains:
CULV011 CULV012

Beginning chain CULV01 description

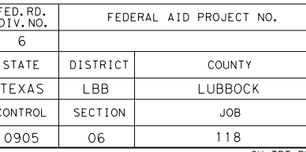
Point CULV011
N 7,243,688.51 E 934,822.43 Sta 0+00.00

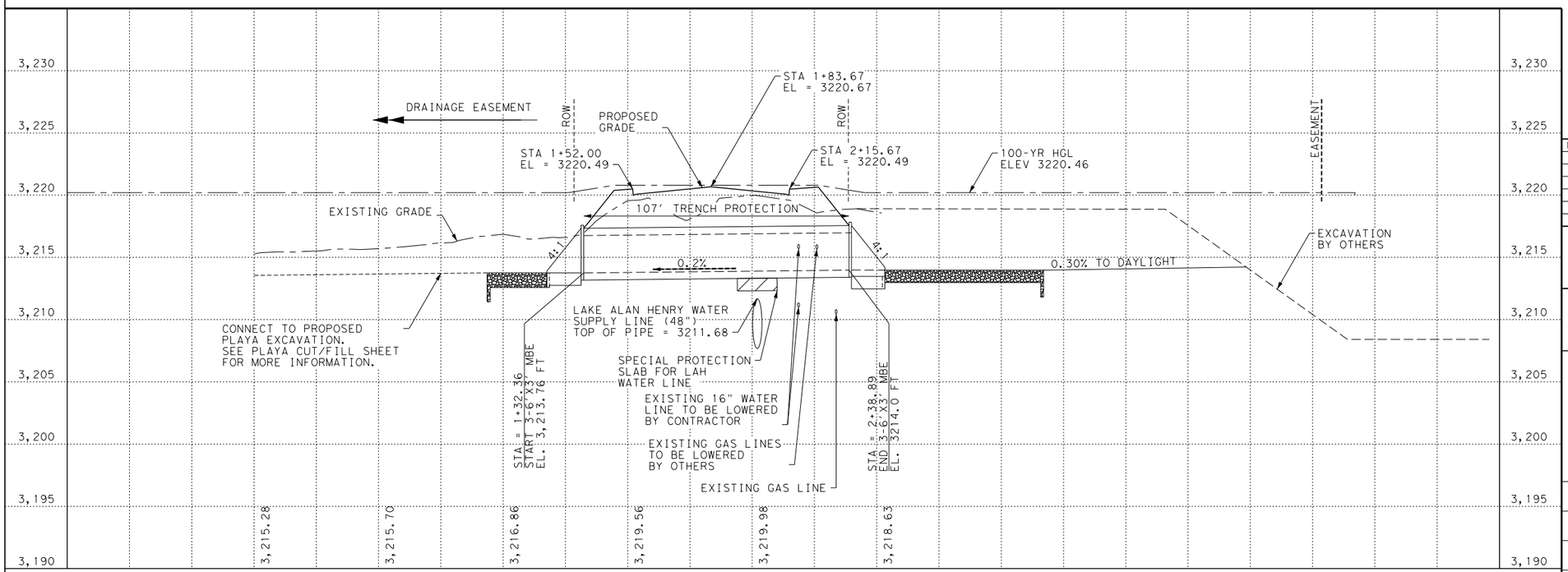
Course from CULV011 to CULV012
S 1° 42' 51.13" W Dist 377.19

Point CULV012
N 7,243,311.48 E 934,811.15 Sta 3+77.19

Ending chain CULV01 description

INTENDED PAYMENT LIMITS FOR TEMP SPCL SHORING. TEMP SPCL SHORING NEEDS TO BE PROPOSED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER.





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Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
BRIDGE CLASS CULVERT PLAN AND PROFILE

NBI: 05-152-0-B001-14-001

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
DAP	TEXAS	LBB	LUBBOCK	107
CHECK	CONTROL	SECTION	JOB	
CBB	0905	06	118	
CHECK				
SRJ				

Mar. 01, 2022 - 02:17:34 PM
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Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw Height of Wingwall (1) (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
CULV01 (L+)	3 ~ 6' X 3	2.4'	SCP-6	SW-0	0	4:1	7"	7"	0.250	3.583	N/A	N/A	13.000	N/A	N/A	4.4	0.2	3.7	51
CULV01 (R+)	3 ~ 6' X 3	2.4'	SCP-6	FW-0	0	4:1	7"	7"	0.250	3.583	13.000	7.506	15.011	N/A	N/A	6.1	0.2	4.3	59

DATE:
FILE:

NOTES:
Skew = 0° on SW-0, FW-0, SETB-CD, SETB-SW-0, and SETB-FW-0 standard sheets;
30° maximum for safety end treatment

SL:1 = Horizontal : 1 Vertical
· Side slope at culvert for flared or straight wingwalls.
· Channel slope for parallel wingwalls.
· Slope must be 3:1 or flatter for safety end treatments.

T = Box culvert top slab thickness. Dimension can be found on the applicable box culvert standard sheet.

U = Box culvert wall thickness. Dimension can be found on the applicable box culvert standard sheet.

C = Curb height

See applicable wing or end treatment standard sheets for calculations of Hw, A, B, Lw, Ltw, Atw, and Total Wingwall Area.

Hw = Height of wingwall

A = Distance from face of curb to end of wingwall (not applicable to parallel or straight wingwalls)

B = Offset of end of wingwall (not applicable to parallel or straight wingwalls)

Lw = Length of longest wingwall.

Ltw = Length of culvert toewall (not applicable when using riprap apron)

Atw = Length of anchor toewall (applicable to safety end treatment only)
Total Wingwall Area = Wingwall area in sq. ft. for two wingwalls (one structure end) if Lt or Rt.
Area for four wingwalls (two structure ends) if Both.

(1) Round the wall heights shown to the nearest foot for bidding purposes.

(2) Concrete volume shown is for box culvert curb only. For curbs using the Box Culvert Rail Mounting Details (RAC) standard sheet quantities shown must be increased by a factor of 2.25. If Class S concrete is required for the top slab of the culvert, also provide Class S concrete for the curb. Curb concrete is considered part of the Box Culvert for payment.

(3) Concrete volume shown is total of wings, footings, culvert toewall (if any), anchor toewalls (if any) and wingwall toewalls. Riprap aprons, culverts, and curb quantities are not included.

(4) Regardless of the type of culvert shown on this sheet, the Contractor has the option of furnishing cast-in-place or precast culverts unless otherwise shown elsewhere on the plans. If the Contractor elects to provide culverts of a different type than those shown on this sheet, it is the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

SPECIAL NOTE:

This sheet is a supplement to the box culvert standards. It is to be filled out by the culvert specifier and provides dimensions for the construction of the box culvert wingwalls and safety end treatments.

An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

03/03/2022

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE:	bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		0905	06	118	CS
		DIST	COUNTY		SHEET NO.
		LBB	LUBBOCK		108

CHANNEL HYDRAULICS

CHANNEL HYDRAULICS AND GEOMETRIC DATA										25-YEAR EVENT							100-YEAR EVENT						
ROADWAY STATION	LENGTH	SHAPE	MAX DEPTH	BOTTOM WIDTH	SIDE SLOPE	CHANNEL SLOPE	Q CAPACITY	UPSTREAM INVERT ELEVATION	DOWNSTREAM INVERT ELEVATION	Q REQ'D	UPSTREAM			DOWNSTREAM			Q REQ'D	UPSTREAM			DOWNSTREAM		
											DESIGN VELOCITY	DESIGN STAGE	DEPTH	DESIGN VELOCITY	DESIGN STAGE	DEPTH		DESIGN VELOCITY	DESIGN STAGE	DEPTH	DESIGN VELOCITY	DESIGN STAGE	DEPTH
#	(ft)		(ft)	(ft)		(%)	(cfs)	(ft)	(ft)	(cfs)	(fps)	(ft)	(ft)	(fps)	(ft)	(ft)	(cfs)	(fps)	(ft)	(ft)	(fps)	(ft)	(ft)
126+00	400	IRREGULAR	2.00	N/A	VARIE	0.5%	145.00	3223.59	3220.35	40.00	1.42	3225.44	1.85	2.30	3221.69	1.34	60.00	1.49	3225.57	1.98	2.31	3221.79	1.44
130+00	800	IRREGULAR	2.00	N/A	VARIE	0.3%	1372.00	3220.35	3217.00	40.00	4.15	3221.69	1.34	4.26	3220.01*	3.01	60.00	4.31	3221.79	1.44	4.44	3220.31*	3.31

CULVERT HYDRAULICS

CULVERT HYDRAULICS - 25 YEAR													
CULVERT ID	CULVERT WIDTH	CULVERT HEIGHT	# OF BARREL	LENGTH	INVERT ELEVATION (US)	INVERT ELEVATION (DS)	SLOPE	MAX FLOW	MAX VELOCITY	MAX STAGE	ROAD CROWN	HGL US	HGL DS
#	(ft)	(ft)	#	(ft)	(ft)	(ft)	%	(cfs)	(fps)	(ft)	(ft)	(ft)	(ft)
1	6	3	3	130	3214	3213.75	0.2%	473.99	9.03	3220.27	3220.67	3220.21	3219.65

CULVERT HYDRAULICS - 100 YEAR													
CULVERT ID	CULVERT WIDTH	CULVERT HEIGHT	# OF BARREL	LENGTH	INVERT LEVATION (US)	INVERT ELEVATION (DS)	SLOPE	MAX FLOW	MAX VELOCITY	MAX STAGE	ROAD CROWN	HGL US	HGL DS
#	(ft)	(ft)	#	(ft)	(ft)	(ft)	%	(cfs)	(fps)	(ft)	(ft)	(ft)	(ft)
1	6	3	3	130	3214	3213.75	0.2%	485.63	9.25	3220.81	3220.67	3220.81	3220.02

HYDROLOGIC DATA SUMMARY TABLE

SUB BASIN ID	DRAINAGE AREA (AC)	NRCS URBANIZED FULLY	TIME OF CONCENTRATION (MIN)	100-YR PEAK FLOW (CFS)
K103-01A	3.4	80.3	10.0	21.0
K103-01B	5.1	80.0	13.5	29.4
K103-01C	2.1	79.7	16.0	10.9
K103-01D	2.9	97.1	16.0	19.1
K103-03	9.6	92.7	15.0	60.6
K103-04	38.1	84.1	45.0	120.4
K103-04B	10.8	79.4	15.0	58.3
K103-05	15.8	79.9	32.0	59.0
K103-06	24.6	79.9	30.0	95.7
K103-07	100.0	80.1	37.0	341.3
K103-08	7.1	82.7	12.0	41.7
K103-09	5.5	79.2	17.0	28.0
K103-10	7.3	79.7	24.0	32.2
K103-11	14.4	79.8	21.0	67.9
K103-12	31.0	90.3	28.0	143.0
K103-13	14.4	92.0	23.0	76.5
K103-14	0.8	98.0	12.0	5.7
K103-15	13.9	90.3	22.0	75.3
K103-16	40.4	84.2	32.0	154.5
K103-17	78.0	71.6	10.0	363.0
K103-17B	20.4	87.4	15.0	119.1

NOTES:

1. INTERCONNECTED POND ROUTING (ICPR) VERSION 4 SOFTWARE USED FOR ALL HYDROLOGIC AND HYDRAULIC SIMULATIONS.

2. ALL STORM EVENTS ARE 24-HOUR DURATION.

3. FUTURE FULLY DEVELOPED HYDROLOGIC CONDITIONS WERE USED FOR DESIGN

REFERENCES:

1. CITY OF LUBBOCK MASTER DRAINAGE PLAN UPDATE 2018.

2. CITY OF LUBBOCK DRAINAGE CRITERIA MANUAL.

3. CITY OF LUBBOCK 2016 LIDAR DATA.

NRCS TYPE II DESIGN STORM RAINFALL TOTALS (24-HOUR EVENT)

RETURN PERI	COL DCM PRECIPITATION DEPTH (INCHES)
2	2.72
5	3.54
10	4.25
25	5.27
50	6.08
100	6.94
500	8.38

PLAYA LAKE SUMMARY

PLAYA LAKE NUMBER	DESIGN INITIAL W/S ELEVATIONS	ESTIMATED OVERFLOW ELEVATIONS	PEAK WATER SURFACE ELEVATION (NAVD)					
	(NAVD)	(NAVD)	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
L090A-N	3213	3220.34	3215.96	3218.24	3219.68	3220.02	3220.15	3220.32
L090A-S	3213	3219.61	3215.98	3218.26	3219.7	3220.01	3220.14	3220.46

STATE OF TEXAS
WADE J. BARNES
120012
LICENSED
PROFESSIONAL ENGINEER

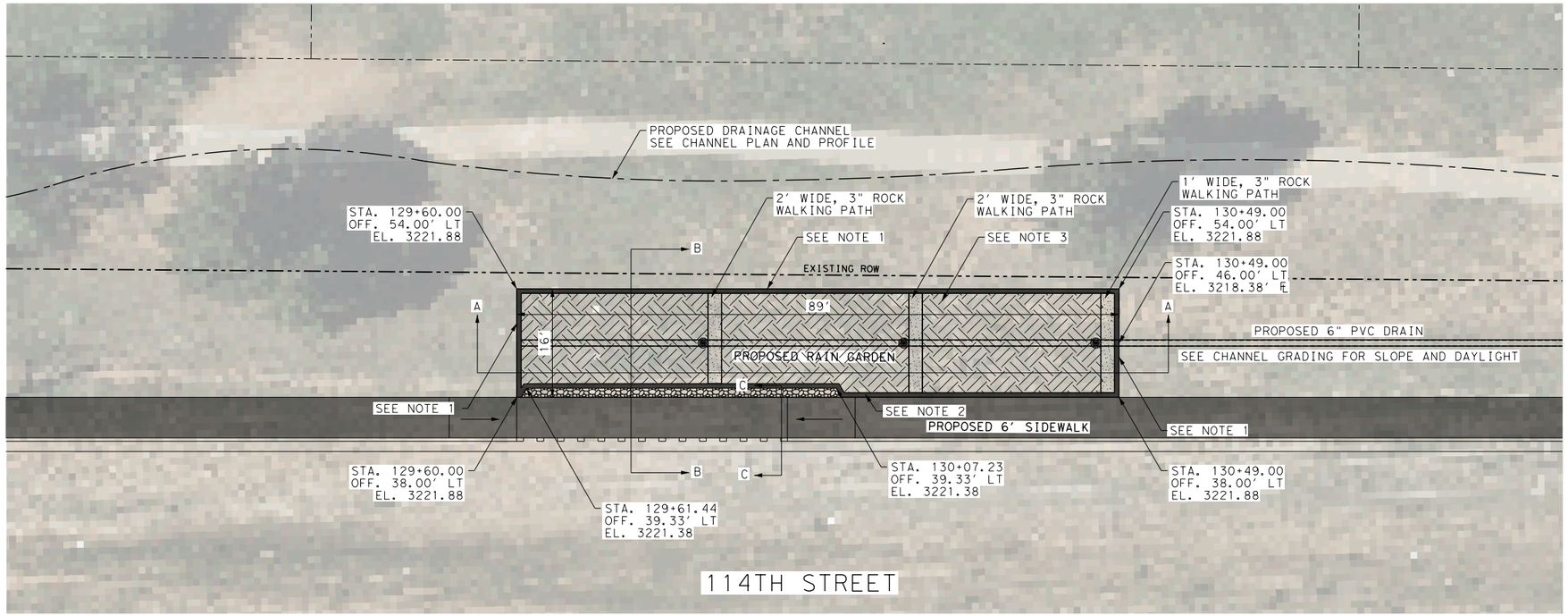
03/03/2022
Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

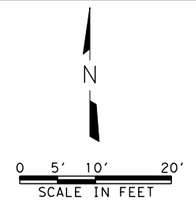
NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
HYDRAULIC AND HYDROLOGIC DATA SUMMARY

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	109
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	





NOTES:

1. RAIN GARDEN NORTH, EAST, AND WEST WALLS CONSIST OF PLAIN CMU BLOCK AND ROCK FACE CMU BLOCKS. PLAIN CMU BLOCK SHALL BE CONSTRUCTED FROM THE FOOTING BASE FOR A 2 FT HEIGHT. ROCK FACE CMU SHALL BE CONSTRUCTED ON TOP OF THE PLAIN CMU BLOCK FOR AN ADDITIONAL 2 FT IN HEIGHT. TOTAL WALL HEIGHT EQUALS 4 FT. REGAL STONE PRO ROCK FACE WITH ADOBE BLEND CONCRETE RETAINING WALL BLOCK OR AN APPROVED EQUAL.
2. RAIN GARDEN SOUTH WALL IS CONSTRUCTED OF PLAIN CMU BLOCK FOR 4 FT IN HEIGHT.
3. PLANTING SCHEDULE IN RAIN GARDEN, SEE LANDSCAPE DETAIL.

03/03/2022
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Texas Registered Engineering Firm F-2144

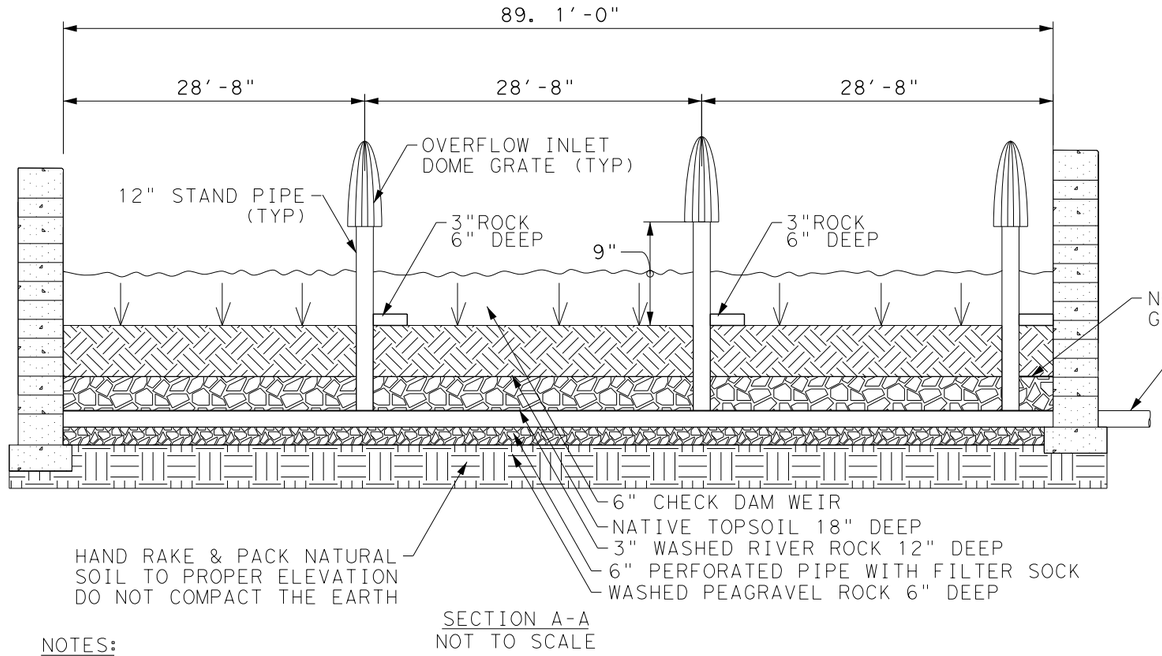
NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

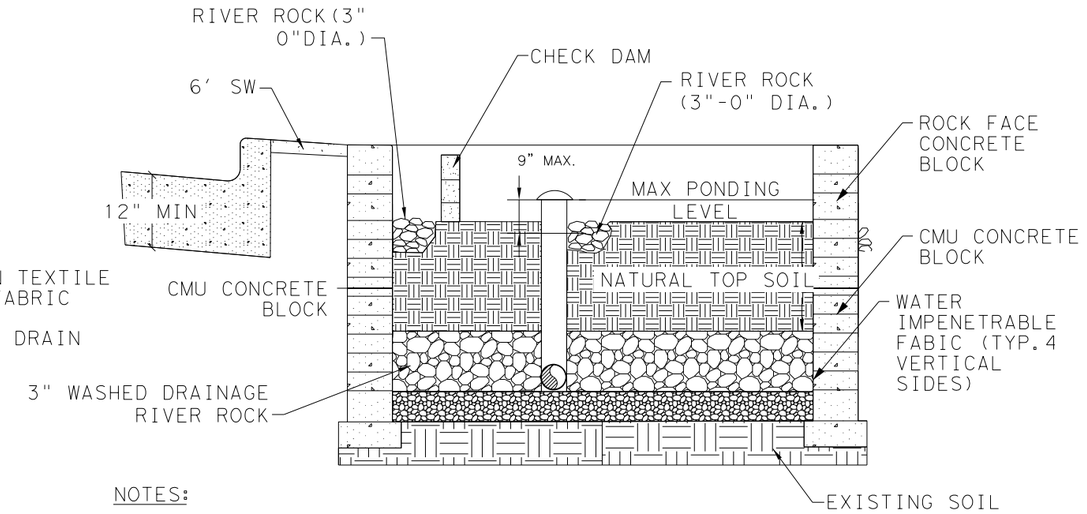
114TH STREET
QUAKER AVE. TO INDIANA AVE.
RAIN GARDEN DETAILS

SHEET 1 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	110
	0905	06	118	



SECTION A-A
NOT TO SCALE



SECTION B-B
NOT TO SCALE

NOTES:

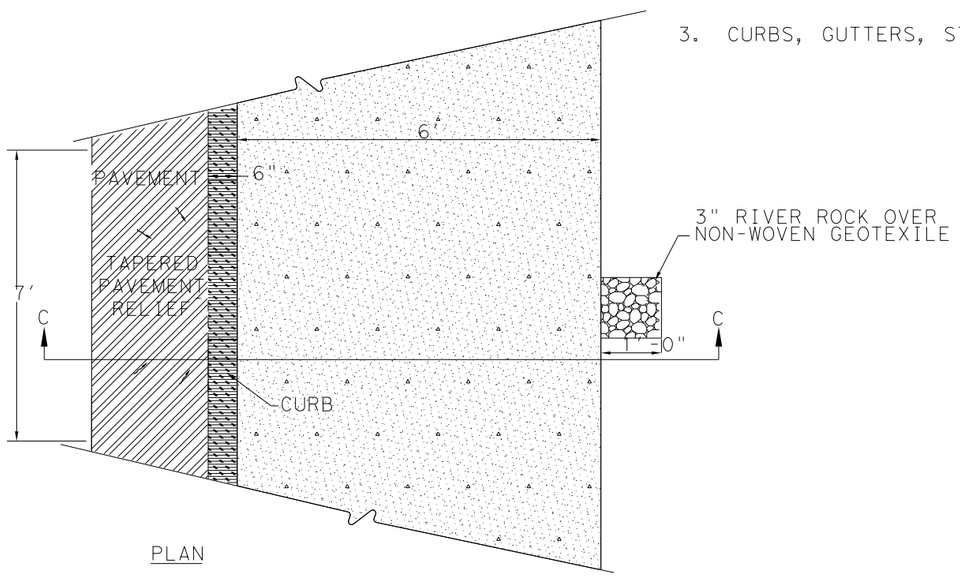
1. PLANTER WALL SHALL BE 4' MAXIMUM HEIGHT FOR PLANTERS.
2. SPECIAL DESIGN CONSIDERATIONS OR STRUCTURAL REVIEW MAY BE REQUIRED FOR LONGER PLANTER WALL SPANS. STEEL REINFORCEMENT OR ADDITIONAL CONCRETE CHECK DAMS MAY BE NEEDED FOR STABILITY.

NOTES:

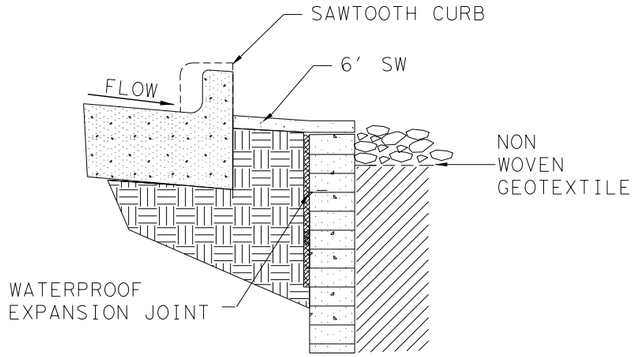
1. IF SLOPES OF STREET AND SIDEWALK ALLOW, PLANTERS SHALL BE BUILT WITH LEVEL PLANTING AREAS.
2. SPECIAL DESIGN CONSIDERATIONS OR STRUCTURAL REVIEW MAY BE REQUIRED FOR LONGER PLANTER WALL SPANS. STEEL REINFORCEMENT OR ADDITIONAL CONCRETE CHECK DAMS MAY BE NEEDED FOR STABILITY.

NOTES FOR STORMWATER PLANTERS:

1. LONGITUDINAL SLOPES OF CURBS SURROUNDING PLANTER SHALL MATCH ROADWAY. TOP SURFACE OF PLANTERS SHALL BE A MAXIMUM DEPTH OF 12" BELOW A CONSTANT ELEVATION OF 3221.88' AS SHOWN ON SHEET 1 OF THE RAIN GARDEN DETAILS.
2. CROSS SLOPES SHOULD ALWAYS BE AS CLOSE TO LEVEL (0% SLOPE) AS POSSIBLE.
3. CURBS, GUTTERS, STREETS, AND SIDEWALKS SHALL CONFORM TO CITY OF LUBBOCK STANDARDS.



PLAN



SECTION C-C

STATE OF TEXAS
WADE J. BARNES
120012
LICENSED
PROFESSIONAL ENGINEER
Wade J. Barnes
03/03/2022
Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

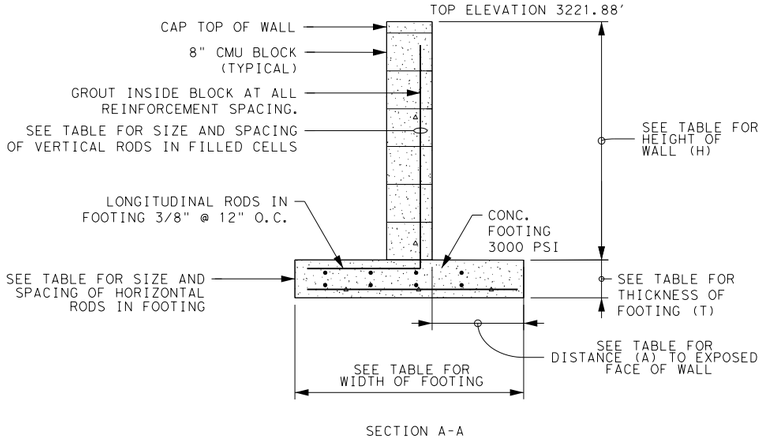
NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

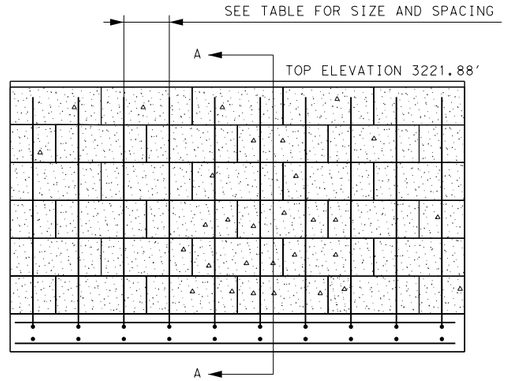
114TH STREET
QUAKER AVE. TO INDIANA AVE.
RAIN GARDEN
DETAILS

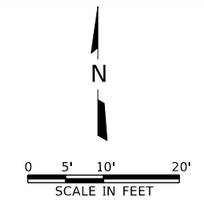
SHEET 2 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	111
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

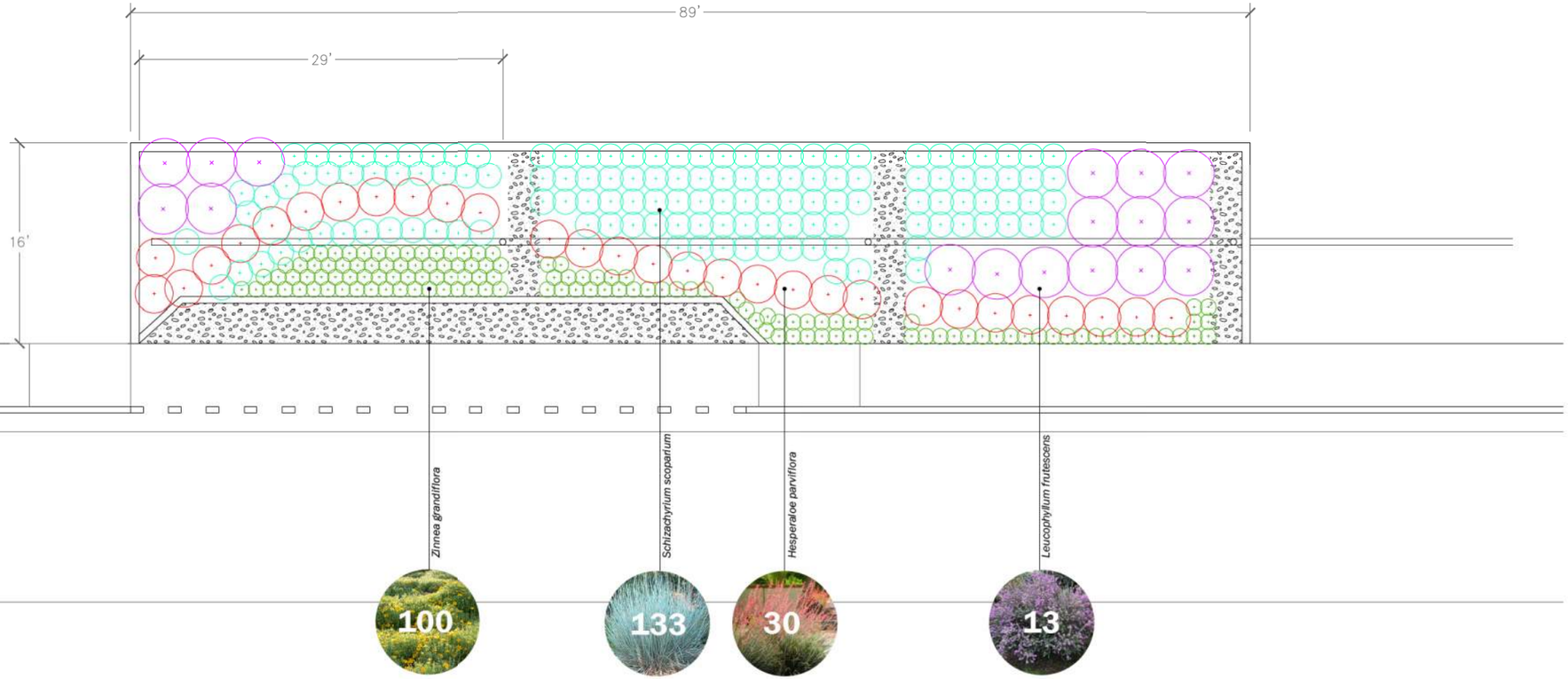


SECTION A-A





REINFORCED CONCRETE MASONRY RETAINING WALL					
HEIGHT OF WALL "H"	WIDTH OF FOOTING	THICKNESS OF FOOTING "T"	DISTANCE "A" TO FACE OF WALL	SIZE & SPACING OF VERTICAL RODS IN WALL	SIZE & SPACING OF HORIZONTAL RODS IN FOOTING
3'-4"	2'-4"	9"	8"	#3 @ 32"	#3 @ 27"
4'-0"	2'-9"	9"	10"	#4 @ 32"	#3 @ 27"
4'-8"	3'-3"	10"	12"	#5 @ 32"	#3 @ 27"
5'-4"	3'-8"	10"	14"	#4 @ 16"	#4 @ 30"
6'-0"	4'-2"	12"	15"	#6 @ 24"	#4 @ 25"



Use	Type	Plant Name (Latin)	Common Name	Mature Height	Spread (est.)	Size upon planting	Bloom Color	Bloom time	Water tolerance	Notes	# specified in current design
Groundcover	Ornamental grass	Schizachyrium scoparium	Little Bluestem	3'	2'	1 Gallon	White	Fall	Low Water	hanges color from blue-green (summer) to rust (winte	133
Groundcover	Wildflower	Zinnea grandiflora	Plains Zinnia	4"	15"	Broadcast Seeding or 2.5" start	Yellow	Late summer to fall	Low Water	Pollinator friendly	100
Focal	Perrennial (evergreen) Shrub	Leucophyllum frutescens	Cenizo, Texas Sage	5'	4'	5 gal	Purple/Pink	Varies	Low Water	, Blooms with the rain! Has a tap root and prefers well	13
Focal	Perrennial succulent	Hesperaloe parviflora	Red Yucca	5'	3'	5 gal	Pink/Plum	March-July	Low Water	ly, flower stalk rises to 5 feet with showy coral-colored	30

INSTALL PLANTS IN APPROXIMATE LOCATION. PER SPREAD DIMENSIONS

RAIN GARDEN PLANTING PLAN

03/03/2022
Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
RAIN GARDEN DETAILS

SHEET 3 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	112
	0905	06	118	

DISCLAIMER:
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DATE:
FILE:

TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for One Structure End)

Maximum Wingwall Height Hw (9)	W	X	Y	Z	Variable Reinforcing Bars J1 Size	Bars J1 Spa	Bars J2 Size	Bars J2 Spa	Estimated Quantities (3) per ft of wing length (Two~Wings) Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'- 8"	1'- 9"	1'- 3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'- 2"	2'- 0"	1'- 6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'- 8"	2'- 3"	1'- 9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'- 2"	2'- 6"	2'- 0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'- 8"	2'- 9"	2'- 3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'- 2"	3'- 0"	2'- 6"	9"	#7	6"	#5	6"	162.29	0.721

TABLE OF WING WALL REINFORCING
(Two~Wings)

Bar	Size	No.	Spa
D	#5 ~	1'-0"	
E	#4 ~	1'-0"	
F	#4 ~	1'-0"	
G	#6 4 ~		
M	#4 4 ~		
P	#4 ~	1'-0"	
R	#5 6 ~		
V	#4 ~	1'-0"	

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

Bar	Size	No.	Spa
L	#4 ~	1'-6"	
Q	#4 1 ~		
Reinf (Lb/Ft)			2.45
Conc (CY/Ft)			0.037

TABLE OF ESTIMATED ANCHOR TOEWALL QUANTITIES

Bar	Size	No.	Spa
K	#4 ~	1'-0"	
N	#5 6 ~		
OL	#4 6 ~		
Reinf (Lb/Ft)			9.82
Conc (CY/Ft)			0.074

(1) Extend Bars P 3'-0" Min into bottom slab of box culvert.

(2) Adjust to fit as necessary to maintain 1 1#2" clear cover and 4" Min between bars.

(3) Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings multiply the tabulated values by Lw.

(4) Recommended values of slope are: 3:1, 4:1, and 6:1. Provide 3:1 or flatter slope.

(5) When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, extend construction joints or grooved joints, oriented in the direction of flow, across the full distance of the riprap, at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B is not required.

(6) At Contractor's option, end the culvert toewall flush with wingwall toewall. Adjust reinforcing as needed.

(7) 3" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to the Extend Curb Details (ECD) standard sheet.

(8) For vehicle safety, reduce curb heights, if necessary, to provide a maximum 3" projection above finished grade. No changes will be made in quantities and no additional compensation will be allowed for this work.

(9) See Table of Maximum Wing Heights for various slopes. Height is limited based on a 33'-6" maximum safety pipe runner length.

TABLE OF MAXIMUM WING HEIGHTS (9)

Side Slope	Hw Max
3:1	11'- 5"
4:1	8'-10"
6:1	6'- 1"

WING DIMENSION CALCULATIONS:

Hw = H + T + C - 0.250' (9)
A = (Hw - 0.333') (SL)
B = (A) (tan (30°))
Lw = (A) ÷ cos (30°))

For cast-in-place culverts:
Ltw = (N) (S) + (N + 1) (U)
For precast culverts:
Ltw = (N) (2U + S) + (N - 1) (0.500')

Lc = (Ltw) - (2U)
Atw = (Lc) + (2B)
Total Wingwall Area (two wings ~ SF)
= (Hw + 0.333') (Lw)

Hw = Height of wingwall (feet)
Atw = Anchor toewall length (feet)
Lw = Length of wingwall (feet)
N = Number of culvert barrels
SL:1 = Side slope ratio (horizontal : 1 vertical)
Ltw = Culvert toewall length (feet)
Lc = Culvert curb between wings (feet)

See applicable box culvert standard for H, S, T, and U values.
See Table of Maximum Wall Heights for limits on Hw.

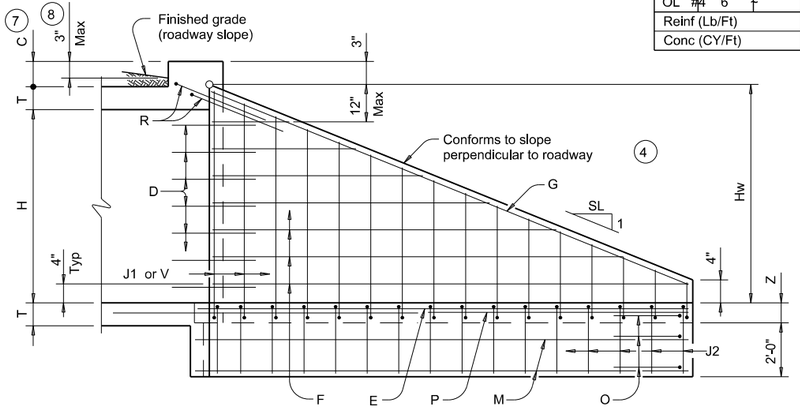
MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.
Provide Class "C" concrete (f'c = 3,600 psi).
Adjust reinforcing as necessary to provide a minimum clear cover of 1½".
Provide pipe runners and anchor pipes meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.
Provide ASTM A307 bolts and nuts.
Provide ASTM A36 steel plates.
Galvanize all steel components, except reinforcing unless required elsewhere in the plans, after fabrication.
Repair galvanizing damaged during transport or construction in accordance with the Item 445, "Galvanizing".
For optional adhesive anchors, install adhesive anchorages in accordance with the manufacturer's instructions including hole size, drilling equipment and method, hole cleaning equipment and method, mixing and dispensing adhesive, and anchor insertion. Do not alter the manufacturer's mixing nozzle or dispenser. Provide anchorage rods that are clean and free of grease, oil, or any other foreign material. Demonstrate hole cleaning method to the Engineer for approval and continue the approved process for all anchorage locations. Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

GENERAL NOTES:

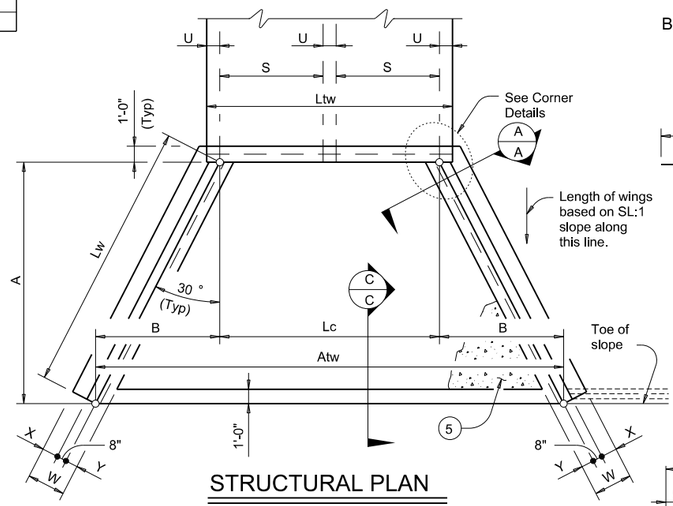
Designed according to AASHTO LRFD Bridge Design Specifications.
The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.
Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
All bolts, nuts, washers, brackets, angles, and pipe runners are considered parts of the safety end treatment for payment.
The quantities for pipe runners, reinforcing steel, and concrete, resulting from the formulas given herein are for Contractor's information only.
See the Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing dimensions are out-to-out of bars.



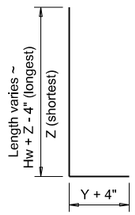
INSIDE ELEVATION OF WINGWALL

(Showing reinforcing. Culvert and culvert toewall reinforcing not shown for clarity.)

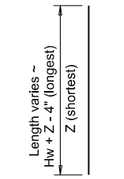


STRUCTURAL PLAN

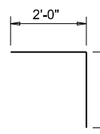
(Showing dimensions.)



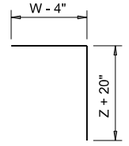
BARS J1



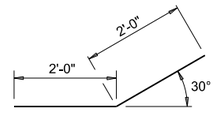
BARS V



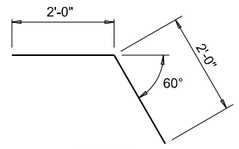
BARS L



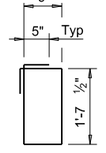
BARS J2



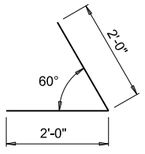
BARS D



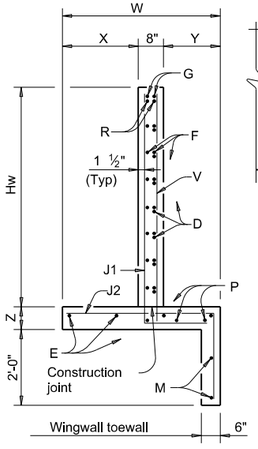
BARS R



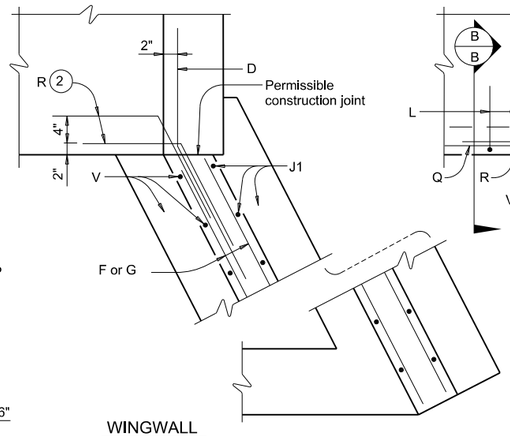
BARS K
(Length = 5'-5")



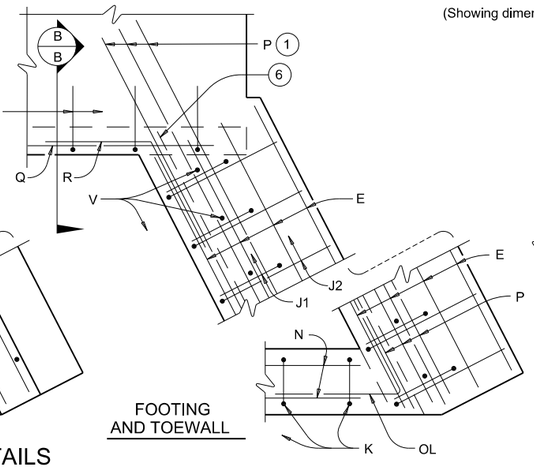
BARS OL



SECTION A-A



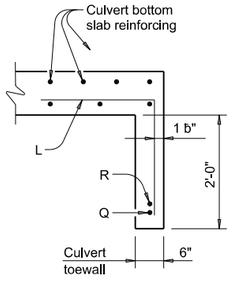
WINGWALL



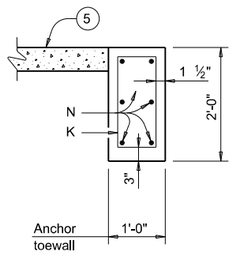
FOOTING AND TOEWALL

CORNER DETAILS

(Culvert and culvert toewall reinforcing not shown for clarity.)



SECTION B-B (5)



SECTION C-C

SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

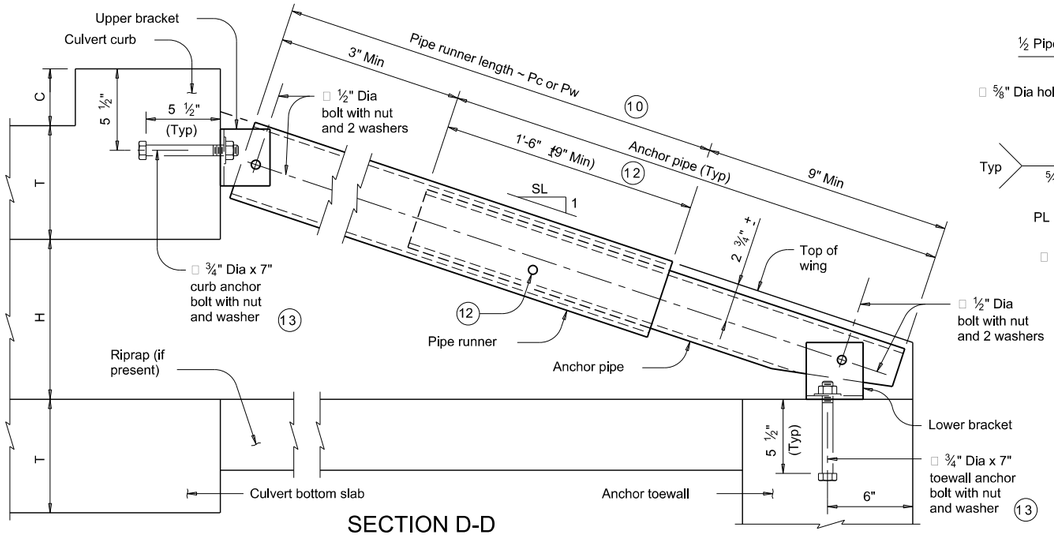
SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

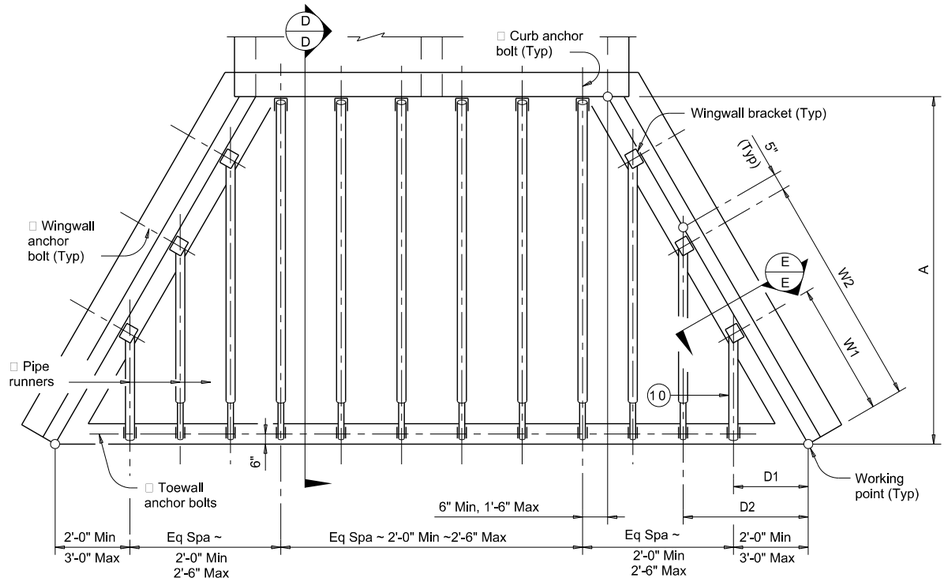
FILE:	setbf0se-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		0905	06	118	CS
		DIST	COUNTY		SHEET NO.
		LBB	LUBBOCK		113

DATE:
FILE:

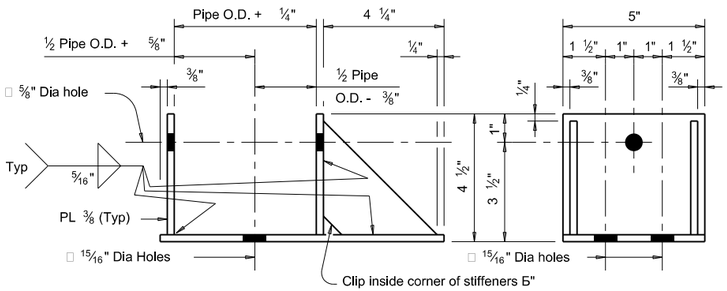


SECTION D-D

(Showing curb pipe runner. Except for upper bracket, wingwall pipe runners are similar.)

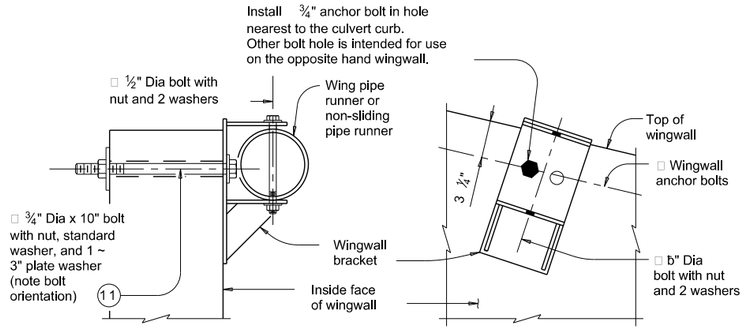


PIPE RUNNER PLAN



ELEVATION

SIDE VIEW

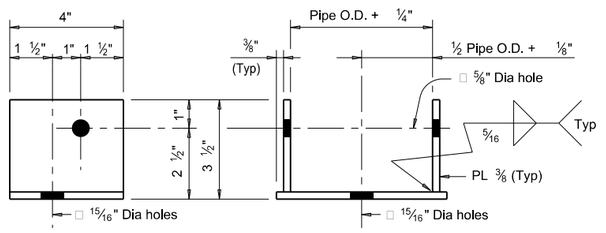


SECTION E-E
(Showing installed bracket.)

ELEVATION
(Showing installed bracket normal to wall. Pipe not shown for clarity.)

Note: Match wingwall bracket to the upper curb bracket size.

WINGWALL BRACKET DETAILS

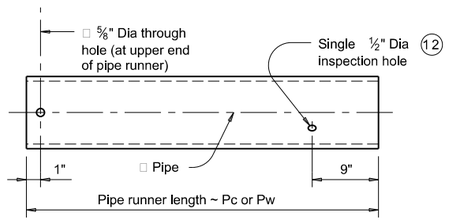


SIDE VIEW

ELEVATION

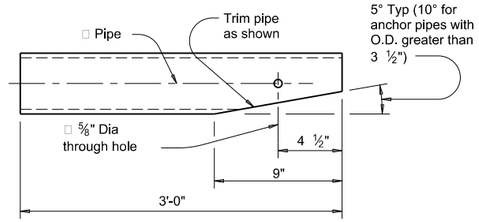
Note: Match upper and lower brackets, except for the brackets used with non-sliding pipe runners, to the required pipe diameters as shown in the table.

UPPER AND LOWER BRACKET DETAILS

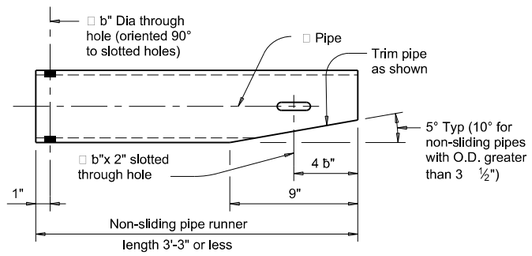


Note: Pipe diameter required for curb pipe runner is also used for wingwall pipe runner.

PIPE RUNNER DETAILS



ANCHOR PIPE DETAILS



Note: Pipe size is the same as required for curb pipe runner. Adjust the corresponding lower bracket accordingly.

NON-SLIDING PIPE RUNNER DETAILS

MAXIMUM PIPE RUNNER LENGTHS AND REQUIRED PIPE RUNNER SIZES

Maximum Pipe Runner Length (Pc or Pw)	Required Pipe Runner Size			Required Anchor Pipe Size		
	Pipe Size	Pipe O.D.	Pipe I.D.	Pipe Size	Pipe O.D.	Pipe I.D.
9'-4"	3" STD	3.500"	3.068"	2" STD	2.375"	2.067"
19'-0"	4" STD	4.500"	4.026"	3" STD	3.500"	3.068"
33'-6"	5" STD	5.563"	5.047"	4" STD	4.500"	4.026"

(10) If pipe runner length (Pw) is 1'-9" or less replace the normal pipe runner and anchor pipe with a single non-sliding pipe runner. See Non-Sliding Pipe Runner Details for additional information.

(11) At Contractor's option, ⅞" diameter hole may be formed or cored drilled. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes.

(12) After installation of pipe runner, use the b" inspection hole to ensure that the lap of the anchor pipe with the pipe runner is adequate.

(13) At Contractor's option, an adhesive anchor may be used. Provide ¾" Dia adhesive anchors that meet the requirements of ASTM A307 Gr A fully threaded rods. Embed threaded rods into curb, wingwalls, and toewall using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 5 b". Provide anchor adhesive able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use.

PIPE RUNNER DIMENSION CALCULATIONS:

Wn = (2.000) (Dn) - (0.416')
Pwn = (Dn) (K2) - (2.063')
Pw1 Non-Sliding Pipe Runner (If required)
= (D1) (K2) - (0.563')
Pc = (A) (K1) - (1.688')

Wn = Distance from working point to centerline anchor bolt measured along bottom inside face of wing (feet)
Dn = Distance from working point to centerline pipe runner measured along outside face of anchor toewall (feet)
Pw = Wingwall pipe runner length (feet)
Pc = Curb pipe runner length (feet)
K = Constant values for use in formulas

Slope SL:	K1	K2
3:1	~ 1.054	~ 1.826
4:1	~ 1.031	~ 1.785
6:1	~ 1.014	~ 1.756

n = Wing pipe runner number

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

FILE: setbf0se-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
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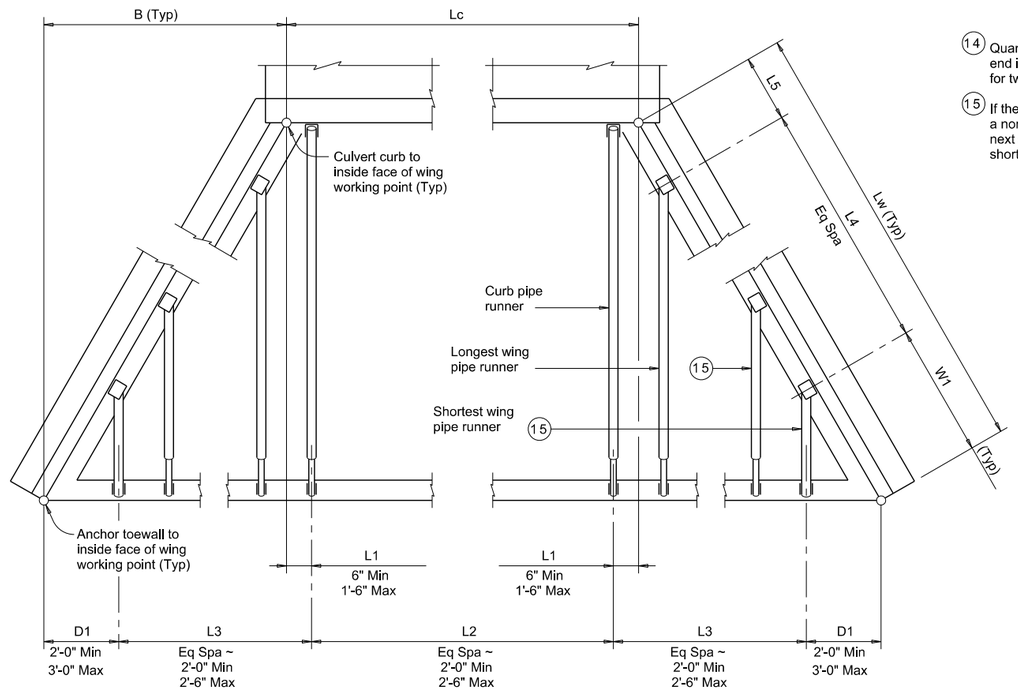
REVISIONS	0905		118	CS
	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		114

Culvert Station and/or Creek name followed by applicable end (Lt, Rt or Both) (14)	Lc	L1	L2			D1	L3			W1	L4			L5	Curb Pipe Runner (Pc)		Longest Wing Pipe Runner (Pw)	Shortest Wing Pipe Runner (Pw)	Non-Sliding Wing Pipe Runner (if applicable)	Curb, Wing, and/or Non-Sliding Pipe Runners		3'-0" Anchor Pipe	
			No. Spa	Spa at	Overall Length		No. Spa	Spa at	Overall Length		No. Spa	Spa at	Overall Length		No.	Length				Size (3",4" or 5")	Total Length (14)	Size (2",3" or 4")	Total Length (14)
	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)	(Ft)				
CULV01 (RT)	22.5	1	9	2.167	20.5	2.75	3	2.167	6.5	5.5	3	2.89	8.66	1.33	10	21.5	11.5	3.75					



PIPE RUNNER LAYOUT

(14) Quantities shown are for one structure end if Lt or Rt. Quantities shown are for two structure ends if Both.

(15) If the outermost wing pipe runner is a non-sliding pipe runner, consider the next outermost wing pipe runner as the shortest.

SPECIAL NOTE:

This tabular sheet is to be filled out by the culvert specifier and provides information for the construction details and quantities of pipe runners.

An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

Note that the tabular quantities are given for estimating purposes only. It is likely that these quantities will change due to field conditions. Therefore, all dimensions must be verified by the Contractor in the field prior to fabrication of the safety end treatment components.

DATE:
FILE:

STATE OF TEXAS
WADE J. BARNES
120012
LICENSED
PROFESSIONAL ENGINEER

03/03/2022

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

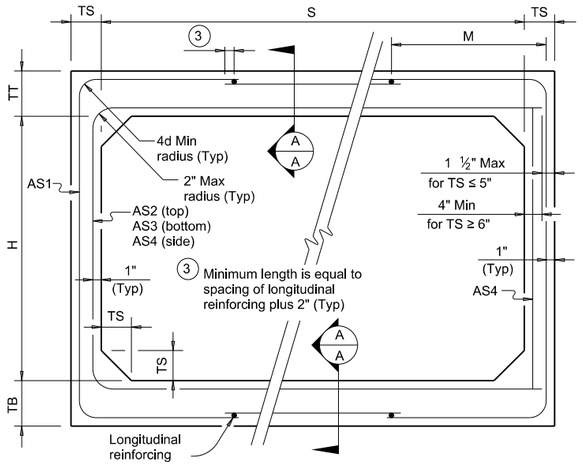
FILE:	setbf0se-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		0905		118	CS
		DIST	COUNTY		SHEET NO.
		LBB	LUBBOCK		115

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
6	2	8	7	7	< 2	-	0.23	0.27	0.19	0.17	0.19	0.19	0.17	7.2
6	2	7	7	7	2 < 3	43	0.25	0.21	0.17	0.17	-	-	-	6.8
6	2	7	7	7	3 - 5	43	0.20	0.17	0.17	0.17	-	-	-	6.8
6	2	7	7	7	10	39	0.20	0.17	0.17	0.17	-	-	-	6.8
6	2	7	7	7	15	39	0.26	0.20	0.20	0.17	-	-	-	6.8
6	2	7	7	7	20	39	0.34	0.26	0.26	0.17	-	-	-	6.8
6	2	7	7	7	25	39	0.43	0.32	0.32	0.17	-	-	-	6.8
6	2	7	7	7	30	39	0.52	0.38	0.39	0.17	-	-	-	6.8
6	3	8	7	7	< 2	-	0.20	0.31	0.22	0.17	0.19	0.19	0.17	7.9
6	3	7	7	7	2 < 3	43	0.21	0.24	0.19	0.17	-	-	-	7.5
6	3	7	7	7	3 - 5	39	0.17	0.18	0.17	0.17	-	-	-	7.5
6	3	7	7	7	10	39	0.17	0.18	0.19	0.17	-	-	-	7.5
6	3	7	7	7	15	38	0.22	0.24	0.24	0.17	-	-	-	7.5
6	3	7	7	7	20	38	0.28	0.31	0.31	0.17	-	-	-	7.5
6	3	7	7	7	25	38	0.35	0.38	0.39	0.17	-	-	-	7.5
6	3	7	7	7	30	38	0.42	0.46	0.46	0.17	-	-	-	7.5
6	4	8	7	7	< 2	-	0.19	0.34	0.25	0.17	0.19	0.19	0.17	8.6
6	4	7	7	7	2 < 3	43	0.19	0.27	0.21	0.17	-	-	-	8.2
6	4	7	7	7	3 - 5	39	0.17	0.21	0.19	0.17	-	-	-	8.2
6	4	7	7	7	10	39	0.17	0.20	0.21	0.17	-	-	-	8.2
6	4	7	7	7	15	38	0.18	0.27	0.27	0.17	-	-	-	8.2
6	4	7	7	7	20	38	0.24	0.34	0.35	0.17	-	-	-	8.2
6	4	7	7	7	25	38	0.29	0.43	0.42	0.17	-	-	-	8.2
6	4	7	7	7	30	38	0.35	0.51	0.52	0.17	-	-	-	8.2
6	5	8	7	7	< 2	-	0.19	0.37	0.28	0.17	0.19	0.19	0.17	9.3
6	5	7	7	7	2 < 3	43	0.17	0.30	0.24	0.17	-	-	-	8.9
6	5	7	7	7	3 - 5	43	0.17	0.23	0.21	0.17	-	-	-	8.9
6	5	7	7	7	10	39	0.17	0.22	0.23	0.17	-	-	-	8.9
6	5	7	7	7	15	38	0.17	0.28	0.29	0.17	-	-	-	8.9
6	5	7	7	7	20	38	0.20	0.37	0.38	0.17	-	-	-	8.9
6	5	7	7	7	25	38	0.25	0.45	0.46	0.17	-	-	-	8.9
6	5	7	7	7	30	38	0.30	0.54	0.55	0.17	-	-	-	8.9
6	6	8	7	7	< 2	-	0.19	0.38	0.30	0.17	0.19	0.19	0.17	10
6	6	7	7	7	2 < 3	52	0.17	0.32	0.26	0.17	-	-	-	9.6
6	6	7	7	7	3 - 5	52	0.17	0.24	0.22	0.17	-	-	-	9.6
6	6	7	7	7	10	43	0.17	0.23	0.24	0.17	-	-	-	9.6
6	6	7	7	7	15	39	0.17	0.29	0.31	0.17	-	-	-	9.6
6	6	7	7	7	20	39	0.18	0.38	0.39	0.17	-	-	-	9.6
6	6	7	7	7	25	38	0.23	0.46	0.48	0.17	-	-	-	9.6
6	6	7	7	7	30	38	0.27	0.55	0.57	0.17	-	-	-	9.6

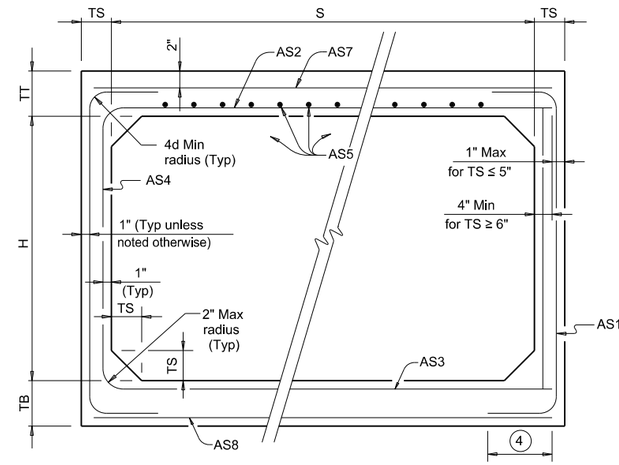
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

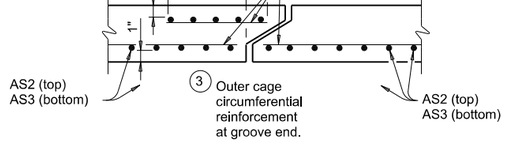
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f'c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

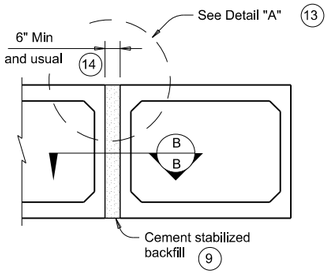
SINGLE BOX CULVERTS PRECAST

6'-0" SPAN

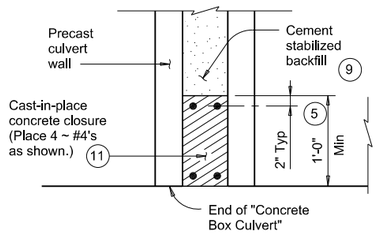
SCP-6

FILE: scp06sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		116

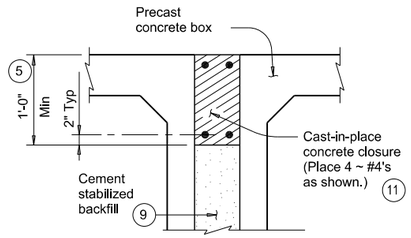
DATE:
FILE:



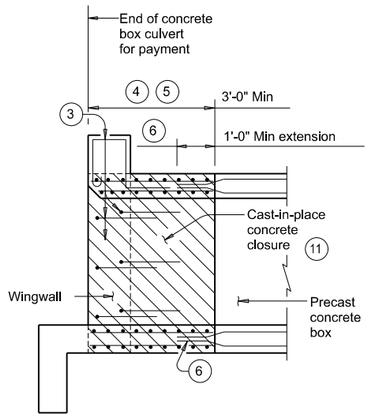
MULTIPLE UNIT PLACEMENT



SECTION B-B

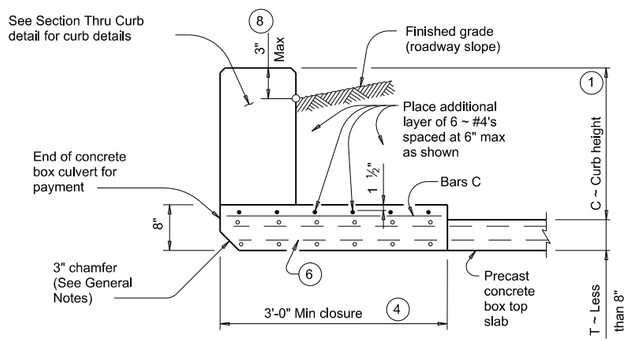


DETAIL "A" (13)

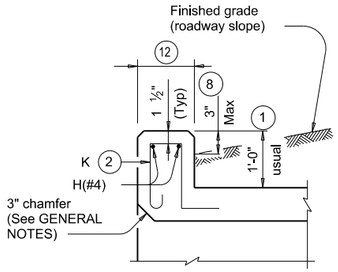


WINGWALL CONNECTION

(Also applies to safety end treatment.)

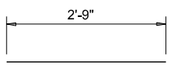


SECTION THRU TOP SLABS LESS THAN 8"

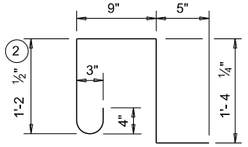


SECTION THRU CURB

QUANTITIES PER FOOT OF CURB (10)	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY



BARS C (#4)
(Spa = 1'-0" Max)



BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")

1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail, or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
2. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
3. Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not fit into closure area.
4. Provide a 3'-0" Min cast-in-place concrete closure. Break back boxes in the field or cast boxes short. Provide bands of reinforcing in the closure that are the same size and spacing as in the precast box section. Provide #4 longitudinal reinforcement spaced at 12 inches Max within the closure. Except where shown otherwise, construct the cast-in-place closure flush with the inside and outside faces of the precast box section.
5. For multiple unit placements, adjust the length of the closure for the interior walls as necessary. Provide a 3'-0" Min cast-in-place closure in the top slab, bottom slab, and exterior wall. See Section B-B detail when interior walls are cast full length.
6. Extend precast box reinforcing a minimum of 1'-0" into concrete closure (Typ).
7. Place bands of reinforcing matching the inside and outside face reinforcing in the gaps of the top and bottom slabs. Place a band matching the outside face reinforcing of the wall in the gaps of the walls (placed in the outside face only). Tack weld the bands to the exposed reinforcing at each point of contact.
8. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
9. Cement stabilized backfill between boxes is considered part of the box culvert for payment.
10. All curb concrete and reinforcing is considered part of the box culvert for payment.
11. Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.
12. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.
13. For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in Detail "A".
14. This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box". No payment will be made for any additional material in the gap between adjacent boxes.

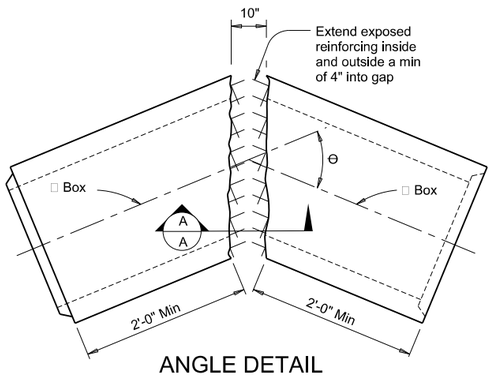
MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide ASTM A1064 welded wire reinforcement.
Provide Class C concrete (f'c = 3,600 psi) for the closures.
Provide cement stabilized backfill meeting the requirements of Item 400, "Excavation and Backfill for Structures."
Any additional concrete required for the closures will be considered subsidiary to the box culvert.

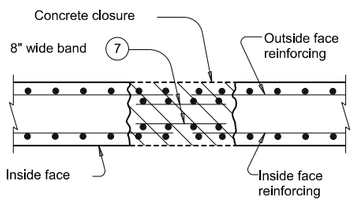
GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to the Single Box Culverts Precast (SCP) standard sheets for details and notes not shown.
Chamfer the bottom edge of the top slab closure 3 inches at culvert closure ends.

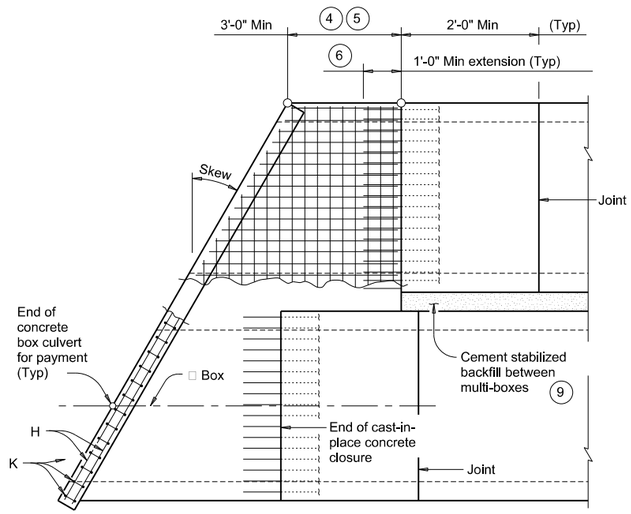
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bars dimensions are out-to-out of bars.



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi-box placement.)

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS

SCP-MD

FILE: scpmdsts-20.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		117

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TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for One Structure End)

Maximum Wingwall Height Hw (9)	W	X	Y	Z	Variable Reinforcing Bars J1 Size	Bars J1 Spa	Bars J2 Size	Bars J2 Spa	Estimated Quantities per ft of wing length (Two~Wings) (3) Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'- 8"	1'- 9"	1'- 3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'- 2"	2'- 0"	1'- 6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'- 8"	2'- 3"	1'- 9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'- 2"	2'- 6"	2'- 0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'- 8"	2'- 9"	2'- 3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'- 2"	3'- 0"	2'- 6"	9"	#7	6"	#5	6"	162.29	0.721

TABLE OF WINGWALL REINFORCING (Two~Wings)

Bar	Size	No.		Spa
D	#5	~	1'-0"	
E	#4	~	1'-0"	
F	#4	~	1'-0"	
G	#6	4	~	
M	#4	4	~	
P	#4	~	1'-0"	
R	#5	6	~	
V	#4	~	1'-0"	

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

Bar	Size	No.		Spa
L	#4	~	1'-6"	
Q	#4	1	~	
Reinf (Lb/Ft)				2.45
Conc (CY/Ft)				0.037

TABLE OF ESTIMATED ANCHOR TOEWALL QUANTITIES

Bar	Size	No.		Spa
K	#4	~	1'-0"	
N	#5	6	~	
OL	#4	6	~	
Reinf (Lb/Ft)				9.82
Conc (CY/Ft)				0.074

1. Extend Bars P 3'-0" Min into bottom slab of box culvert.
2. Adjust to fit as necessary to maintain 1 1#2" clear cover and 4" Min between bars.
3. Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings multiply the tabulated values by Lw.
4. Recommended values of slope are: 3:1, 4:1, and 6:1. Provide 3:1 or flatter slope.
5. When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, extend construction joints or grooved joints, oriented in the direction of flow, across the full distance of the riprap, at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B is not required.
6. At Contractor's option, end the culvert toewall flush with wingwall toewall. Adjust reinforcing as needed.
7. 3" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to Extended Curb Details (ECD) standard sheet.
8. For vehicle safety, reduce curbs height, if necessary, to provide a maximum 3" projection above finished grade. No changes will be made in quantities and no additional compensation will be allowed for this work.
9. See Table of Maximum Wing Heights for various slopes. Height is limited based on a 33'-6" maximum safety pipe runner length.

TABLE OF MAXIMUM WING HEIGHTS (9)

Side Slope	Hw Max
3:1	11'- 5"
4:1	8'-10"
6:1	6'- 1"

WING DIMENSION CALCULATIONS:

Hw = H + T + C - 0.250' (9)
Lw = (Hw - 0.333') (SL)

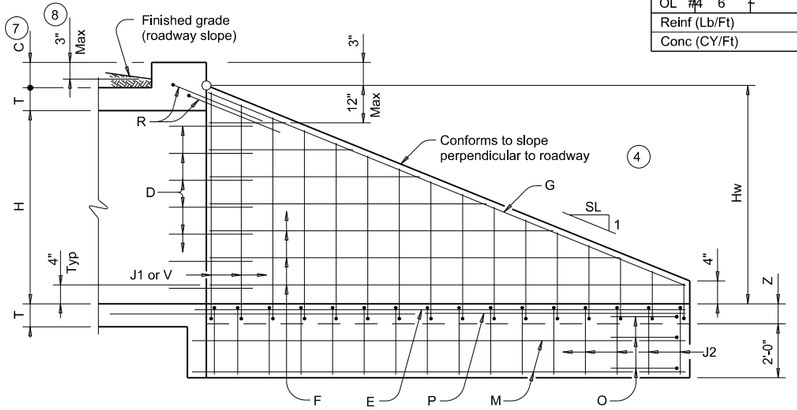
For cast-in-place culverts:
Ltw = (N) (S) + (N + 1) (U)

For precast culverts:
Ltw = (N) (2U + S) + (N - 1) (0.500')

Lc = (Ltw) - (2U)
Atw = Lc
Total Wingwall Area (two wings ~ SF)
= (Hw + 0.333') (Lw)

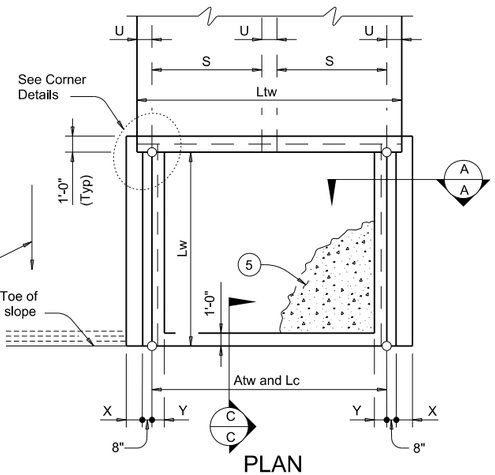
Hw = Height of wingwall (feet)
SL:1 = Side slope ratio (horizontal : 1 vertical)
Lw = Length of wingwall (feet)
Ltw = Culvert toewall length (feet)
Lc = Culvert curb between wings (feet)
Atw = Anchor toewall length (feet)
N = Number of culvert spans

See applicable box culvert standard for H, S, T, and U values. See Table of Maximum Wall Heights for limits on Hw.



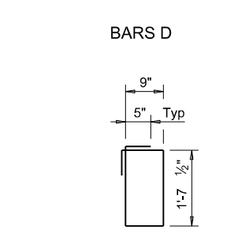
INSIDE ELEVATION OF WINGWALL

(Showing reinforcing. Culvert and culvert toewall reinforcing not shown for clarity.)

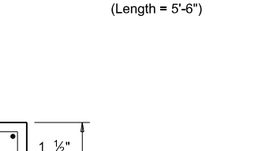


PLAN

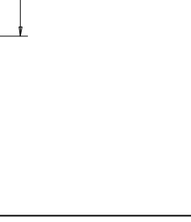
(Showing dimensions.)



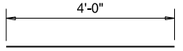
BARS J1 BARS V



BARS L and OL BARS J2



BARS R



BARS D

BARS K
(Length = 5'-6")

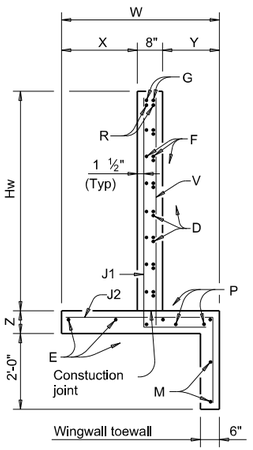
MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.
Provide Class "C" concrete (f'c = 3,600 psi).
Adjust reinforcing as necessary to provide a minimum clear cover of 1 ½".
Provide pipe runners and anchor pipes meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.
Provide ASTM A307 bolts and nuts.
Provide ASTM A36 steel plates.
Galvanize all steel components, except reinforcing unless required elsewhere in the plans, after fabrication.
Repair galvanizing damaged during transport or construction in accordance with the Item 445, "Galvanizing".
For optional adhesive anchors, install epoxy adhesive anchorages in accordance with the manufacturer's instructions including hole size, drilling equipment and method, hole cleaning equipment and method, mixing and dispensing adhesive, and anchor insertion. Do not alter the manufacturer's mixing nozzle or dispenser. Provide anchorage rods that are clean and free of grease, oil, or any other foreign material. Demonstrate hole cleaning method to the Engineer for approval and continue the approved process for all anchorage locations. Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

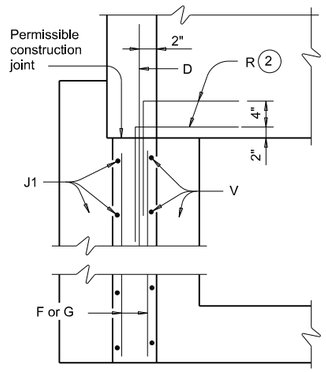
GENERAL NOTES:

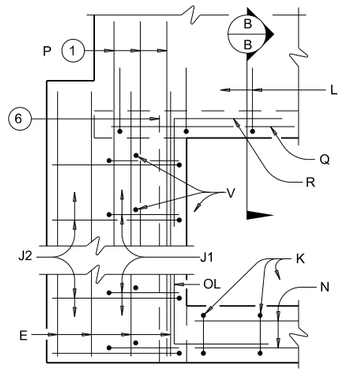
Designed according to AASHTO LRFD Bridge Design Specifications.
The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.
Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
All bolts, nuts, washers, brackets, angles, and pipe runners are considered parts of the safety end treatment for payment.
The quantities for pipe runners, reinforcing steel, and concrete, resulting from the formulas given herein are for Contractor's information only.
See Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing dimensions are out-to-out of bars.



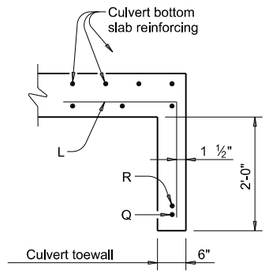
SECTION A-A



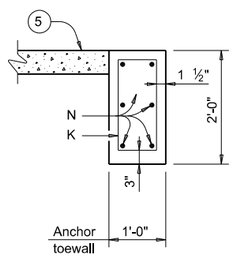


CORNER DETAILS

(Culvert and culvert toewall reinforcing not shown for clarity.)



SECTION B-B (5)



SECTION C-C

SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

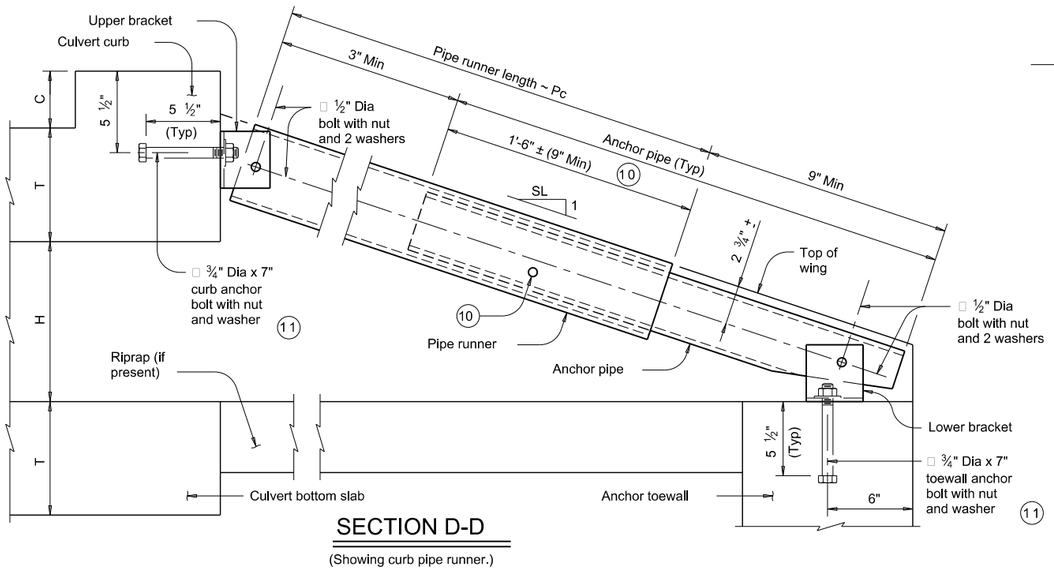
SAFETY END TREATMENT WITH STRAIGHT WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-SW-O

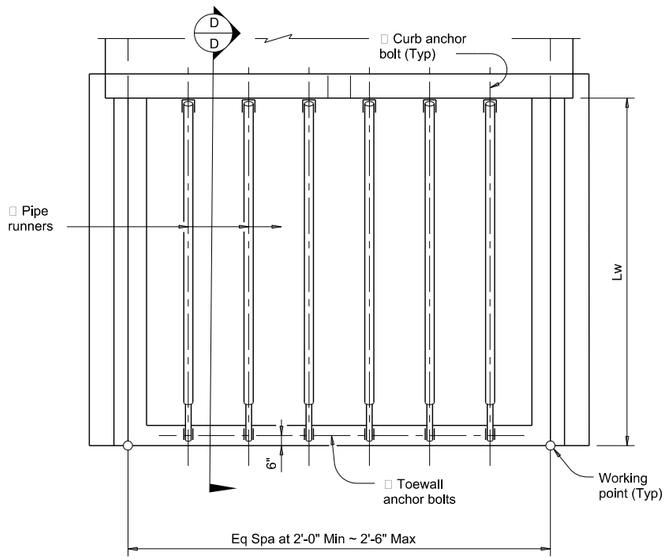
FILE:	setbs0se-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		0905	06	118	CS
		DIST	COUNTY		SHEET NO.
		LBB	LUBBOCK		118

DATE:
FILE:

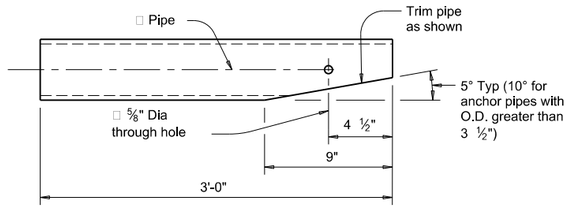


SECTION D-D

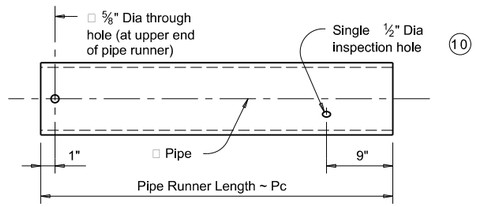
(Showing curb pipe runner.)



PIPE RUNNER PLAN



ANCHOR PIPE DETAILS



PIPE RUNNER DETAILS

MAXIMUM PIPE RUNNER LENGTHS AND REQUIRED PIPE RUNNER AND ANCHOR PIPE SIZES						
Maximum Pipe Runner Length (Pc)	Required Pipe Runner Size			Required Anchor Pipe Size		
	Pipe Size	Pipe O.D.	Pipe I.D.	Pipe Size	Pipe O.D.	Pipe I.D.
9'-4"	3" STD	3.500"	3.068"	2" STD	2.375"	2.067"
19'-0"	4" STD	4.500"	4.026"	3" STD	3.500"	3.068"
33'-6"	5" STD	5.563"	5.047"	4" STD	4.500"	4.026"

(10) After installation of pipe runner, use the ½" inspection hole to ensure that the lap of the anchor pipe with the pipe runner is adequate.

(11) At Contractor's option, an adhesive anchor may be used. Provide ¾" Dia adhesive anchors that meet the requirements of ASTM A307. Gr A fully threaded rods. Embed threaded rods into curb, wingwalls, and toewall using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 5 ½". Provide anchor adhesive able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use.

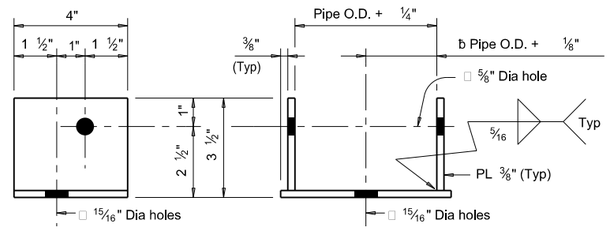
PIPE RUNNER DIMENSION CALCULATIONS:

Pc = (Lw) (K) - (1.688)

Pc = Pipe runner length (feet)

K = Constant values for use in formulas

Slope SL:1	K
3:1	~ 1.054
4:1	~ 1.031
6:1	~ 1.014



SIDE VIEW ELEVATION

Note: Upper and lower brackets match the required pipe diameters as shown in the table.

UPPER AND LOWER BRACKET DETAILS

SHEET 2 OF 3

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT WITH STRAIGHT WINGS

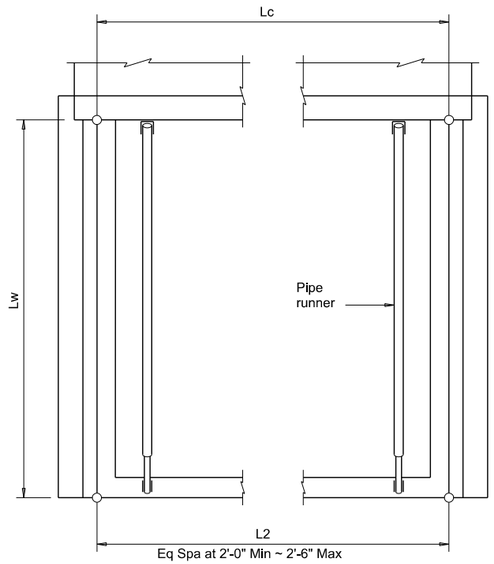
FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-SW-O

FILE: setbs0se-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		119

Culvert Station and/or Creek name followed by applicable end (Lt, Rt or Both) (12)	Lc	L2			Pipe Runner (Pc)				3'-0" Anchor Pipe	
	(Ft)	No. Spa	Spa at (Ft)	Overall Length (Ft)	No.	Length (Ft)	Size (3",4" or 5")	Total Length (Ft) (12)	Size (2",3" or 4")	Total Length (Ft) (12)
CULV 01 (LT)	21.33	9	2.33	21.33	9	13	3"	117		

(12) Quantities shown are for one structure end if Lt or Rt. Quantities shown are for two structure ends if Both.



PIPE RUNNER LAYOUT

SPECIAL NOTE:

This tabular sheet is to be filled out by the culvert specifier and provides information for the construction details and quantities of pipe runners.

An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

Note that the tabular quantities are given for estimating purposes only. It is likely that these quantities will change due to field conditions. Therefore, all dimensions must be verified by the Contractor in the field prior to fabrication of the safety end treatment components.

STATE OF TEXAS
WADE J. BARNES
93679
LICENSED
PROFESSIONAL ENGINEER

03/03/2022

DATE:
FILE:

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT WITH STRAIGHT WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-SW-O

FILE: setbs0se-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		120

SUMMARY OF TRAFFIC SIGNAL ITEMS

LOCATION	416 6002	416 6004	416 6006	618 6046	618 6058	620 6008	620 6009	624 6008	628 6303	636 6001	682 6001	682 6002	682 6003	682 6004	682 6005	682 6006	682 6018
	DRILL SHAFT (24 IN)	DRILL SHAFT (36 IN)	DRILL SHAFT (48 IN)	CONDT (PVC) (SCH 80) (2")	CONDT (PVC) (SCH 80) (4")	ELEC CONDR (NO. 8) INSULATED	ELEC CONDR (NO. 6) BARE	GROUND BOX TY C (162911) W/APRON	ELC SRV TY T 120/240 000(NS)G S(N)EX(O)	ALUMINUM SIGNS (TY A)	VEH SIG SEC (12")LED (GRN)	VEH SIG SEC (12")LED (GRN ARW)	VEH SIG SEC (12")LED (YEL)	VEH SIG SEC (12")LED (YEL ARW)	VEH SIG SEC (12")LED (RED)	VEH SIG SEC (12")LED (RED ARW)	PED SIG SEC (LED)(COUNTDOWN)
	LF	LF	LF	LF	LF	LF	LF	EA	EA	SF	EA	EA	EA	EA	EA	EA	EA
OVERALL	24	48	21	32	1088	430	75	9	1	68	10	4	10	8	10	4	9
PROJECT TOTALS	24	48	21	32	1088	430	75	9	1	68	10	4	10	8	10	4	9

SUMMARY OF TRAFFIC SIGNAL ITEMS

LOCATION	682 6054	682 6055	684 6031	684 6033	684 6046	684 6080	686 6041	686 6045	686 6053	687 6001	680 6002
	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	TRF SIG CBL (TY A)(14 AWG)(5 CONDR)	TRF SIG CBL (TY A)(14 AWG)(7 CONDR)	TRF SIG CBL (TY A)(14 AWG)(20 CONDR)	TRF SIG CBL (TY C)(14 AWG)(2 CONDR)	INS TRF SIG PL AM(S)1 ARM(40')	INS TRF SIG PL AM(S)1 ARM(44')	INS TRF SIG PL AM(S)1 ARM(50')	PED POLE ASSEMBLY	INSTALL HWY TRF SIG (ISOLATED)
	EA	EA	LF	LF	LF	LF	EA	EA	EA	EA	EA
OVERALL	10	4	131	645	451	962	2	1	1	4	1
PROJECT TOTALS	10	4	131	645	451	962	2	1	1	4	1

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
TRAFFIC SIGNAL SUMMARY

SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	121
	0905	06	118	

03838
1.0000 ft / in.

CONDUIT AND CABLE CHART

RUN NO	RUN LEN	ITEM 618 CONDUIT				ITEM 620 ELECTRICAL CONDUCTORS				ITEM 684 TRAFFIC SIGNAL CABLES								INSTALLATION ONLY (PROVIDED BY CITY OF LUBBOCK)			
		2" PVC		4" PVC		XHHW, 8 GA		XHHW, 6 GA		TY C, 2 CONDR, 14 GA		TY A, 5 CONDR, 14 GA		TY A, 7 CONDR, 14 GA		TY A, 20 CONDR, 14 GA		VIVDS CAMERA CABLE		OPTICOM RECEIVER CABLE	
		QTY	LEN	QTY	LEN	QTY	LEN	QTY	LEN	QTY	LEN	QTY	LEN	QTY	LEN	QTY	LEN	QTY	LEN	QTY	LEN
1	20			1	20			3	60												
2	5			1	5	1	5	3	15							4	20				
3	5			1	5					8	40							4	20	2	10
4	6			1	6	1	6									1	6				
5	6			1	6					1	6							1	6	1	6
6	16	1	16			1	16			1	16										
7	96			1	96					4	384							2	192		
8	96			1	96	1	96									2	192				
9	19			1	19					1	19										
10	19			1	19	1	19					1	19								
11	17			1	17					1	17							1	17		
12	17			1	17	1	17					1	17			1	17				
13	102			1	102					2	204					1	102	1	102		
14	102			1	102	1	102														
15	15			1	15					1	15										
16	15			1	15	1	15					1	15								
17	8			1	8					1	8							1	8		
18	8			1	8	1	8					1	8			1	8				
19	99			1	99					2	198							1	99	1	99
20	99			1	99	1	99									1	99				
21	7			1	7					1	7							1	7	1	7
22	7			1	7	1	7									1	7				
23	16	1	16			1	16			1	16										
P1	VAR					1	4			1	4	1	9	3	144						
P2	VAR					1	2			1	4	1	9								
P3	VAR					1	2			1	4										
P4	VAR					1	4			1	4	2	18	4	187					1	70
P5	VAR					1	4			1	4	2	18	3	155					1	64
P6	VAR					1	2			1	4										
P7	VAR					1	4			1	4	1	9	4	159						
P8	VAR					1	2			1	4	1	9								
TOTAL			32		768		430		75		962		131		645		451		451		256

ITEM 636 SIGNS

SIGN NO	SIGN	DESCRIPTION	STATUS	DIMENSION
S1	D3-1G	OVERHEAD STREET NAME	I	VAR X 18
S2	R10-3eL	PEDESTRIAN SIGN	F/I	9 X 15
S3	R10-3eL	PEDESTRIAN SIGN	F/I	9 X 15
S4	D3-1G	OVERHEAD STREET NAME	I	VAR X 18
S5	R10-3eL	PEDESTRIAN SIGN	F/I	9 X 15
S6	R10-3eL	PEDESTRIAN SIGN	F/I	9 X 15
S7	D3-1G	OVERHEAD STREET NAME	I	VAR X 18
S8	R10-3eL	PEDESTRIAN SIGN	F/I	9 X 15
S9	R10-3eL	PEDESTRIAN SIGN	F/I	9 X 15
S10	D3-1G	OVERHEAD STREET NAME	I	VAR X 18
S11	R10-3eL	PEDESTRIAN SIGN	F/I	9 X 15
S12	R10-3eL	PEDESTRIAN SIGN	F/I	9 X 15
F = FURNISH, I = INSTALL				

ITEM 682 VEHICLE AND PEDESTRIAN SIGNAL HEADS

HEAD NO	VENTED BACKPLATE W/RETROREFLECTIVE BORDER		12" LED TRAFFIC SIGNAL LAMP UNIT						PEDESTRIAN LED SIGNAL
	3-SEC	4-SEC	R CIR	Y CIR	G CIR	R ARW	Y ARW	G ARW	COUNTDOWN MODULE
1		1				1	2	1	
2	1		1	1	1				
3	1		1	1	1				
4									1
5									1
6		1				1	2	1	
7	1		1	1	1				
8	1		1	1	1				
9									1
10	1		1	1	1				
11									1
12		1				1	2	1	1
13	1		1	1	1				
14	1		1	1	1				
15									1
16									1
17		1				1	2	1	
18	1		1	1	1				
19	1		1	1	1				
20									1
21	1		1	1	1				
22									1
TOTAL	10	4	10	10	10	4	8	4	9

SIGNAL POLES

POLE NO	ITEM 686 TRAFFIC SIGNAL POLE ASSEMBLIES (STEEL)	ITEM 416 DRILLED SHAFT FOUNDATIONS		
		FND TY	DIA	LEN
P1	SMA100-40	36-B	36"	15.2
P2	PED POLE	24-A	24"	5.7'
P3	PED POLE	24-A	24"	5.7'
P4	LMA-50	48-A	48"	21'
P5	SMA100-44	36-B	36"	15.2
P6	PED POLE	24-A	24"	5.7'
P7	SMA100-40	36-B	36"	15.2
P8	PED POLE	24-A	24"	5.7'

ITEM 624 GROUND BOXES

ITEM	QTY
TY C W/APRON	9

ITEM 628 ELECTRICAL SERVICES

DESCRIPTION	QTY
TY T 120/240 070 (NS) GS (N) EX (O)	1

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
TRAFFIC SIGNAL SUMMARY

SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	121A
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

$USER$
20.0000 ft / in.

PROPOSED SIGNS

D3-1G VARx18
Memphis Ave 11300
S10

D3-1G VARx18
114th St 3700
S1

D3-1G VARx18
Memphis Ave 11400
S4

D3-1G VARx18
114th St 3800
S7

R10-3eL 9x15
S2, S5, S8, S11

R10-3eR 9x15
S3, S6, S9, S12

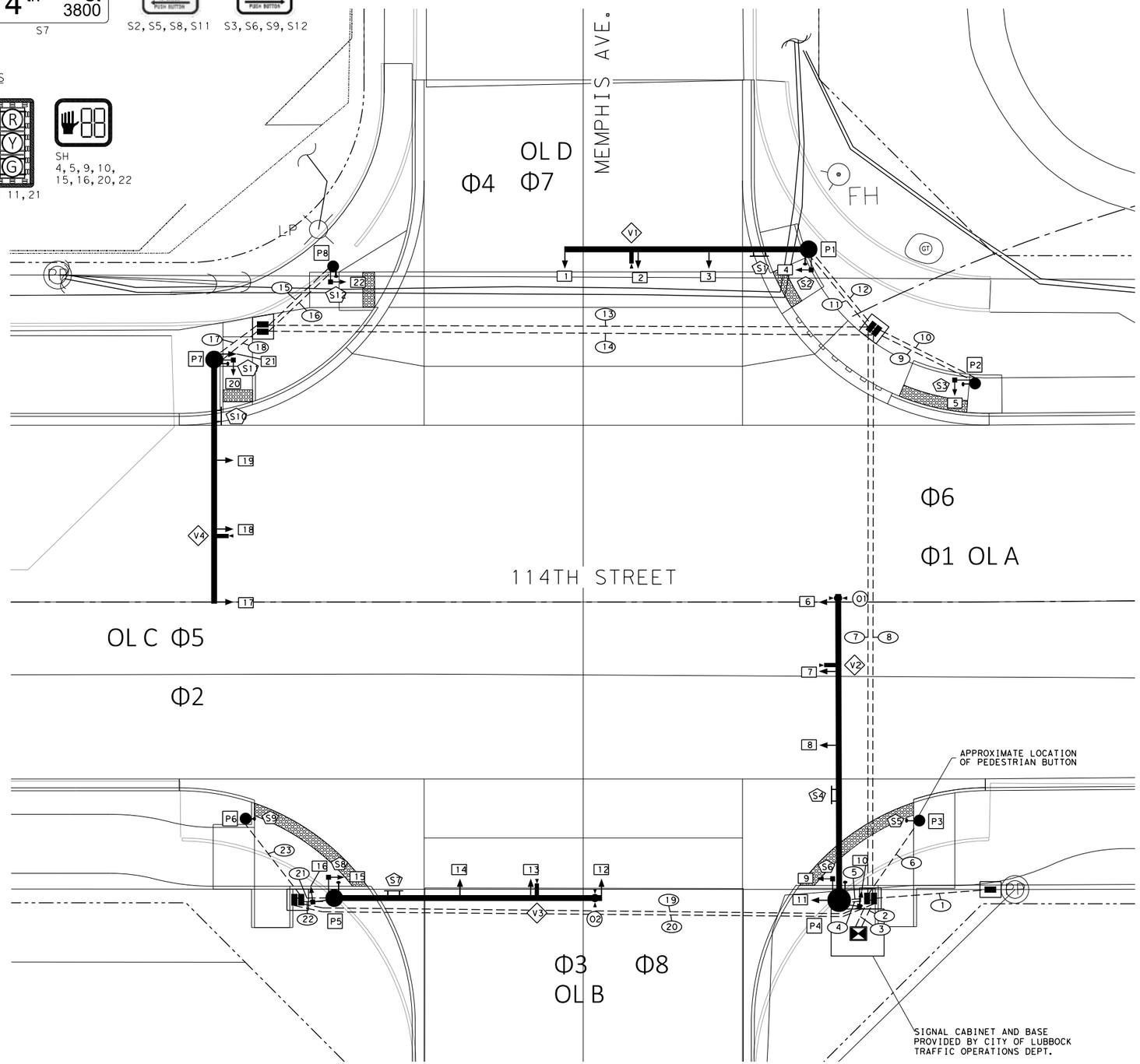
PROPOSED SIGNALS

SH 1, 6, 12, 17

SH 2, 3, 7, 8, 13, 14, 18, 19

SH 11, 21

SH 4, 5, 9, 10, 15, 16, 20, 22



N

0 5' 10' 20'
SCALE IN FEET

LEGEND
- SIGNAL POLE
- CONDUIT RUN
- SIGNAL HEAD
- VIVDS CAMERA
- OPTICOM RECEIVER
- APS STATION
- SIGN

STATE OF TEXAS
WILLIAM CUMMINGS
131022
LICENSED PROFESSIONAL ENGINEER

William Cummings, P.E. 4/25/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

Texas Department of Transportation

114TH STREET
QUAKER AVE. TO INDIANA AVE.
TRAFFIC SIGNAL LAYOUT

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	122
	0905	06	118	

Apr. 26, 2022 - 07:40:26 AM
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SUMMARY OF ILLUMINATION ITEMS									
LOCATION	416	610	610	618	620	620	624	628	628
	6029	6130	6162	6046	6008	6009	6002	6043	6044
	DRILL SHAFT (RDWY ILL POLE) (30 IN)	IN RD IL (TY SA) 20T-8 (250W EQ) LED	IN RD IL (TY SA) 30T-8 (250W EQ) LED	CONDT (PVC) (SCH 80) (2")	ELEC CONDR (NO. 8) INSULATED	ELEC CONDR (NO. 6) BARE	GROUND BOX TY A (122311) W/APRON	ELC SRV TY A 240/480 060(NS) SS(E)OT(O)	ELC SRV TY A 240/480 060(NS) SS(E)PS(U)
	LF	EA	EA	LF	LF	LF	EA	EA	EA
BEGIN TO STA 120+00 (SHEET 1 OF 3)	128	2	14	3895	3895	7790			
STA 120+00 TO STA 143+00 (SHEET 2 OF	200	17	8	4980	4980	9960	2	1	1
STA 143+00 TO END STA (SHEET 3 OF 3)	80	10	0	1690	1690	3380			
PROJECT TOTALS	408	29	22	10565	10565	21130	2	1	1

T-Base				
Designation				Quantity
Pole	A1	A2	Luminaire	
(Type SA 20 T - 8)			(250W EQ) LED	29
(Type SA 30 T - 8)			(250W EQ) LED	22

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

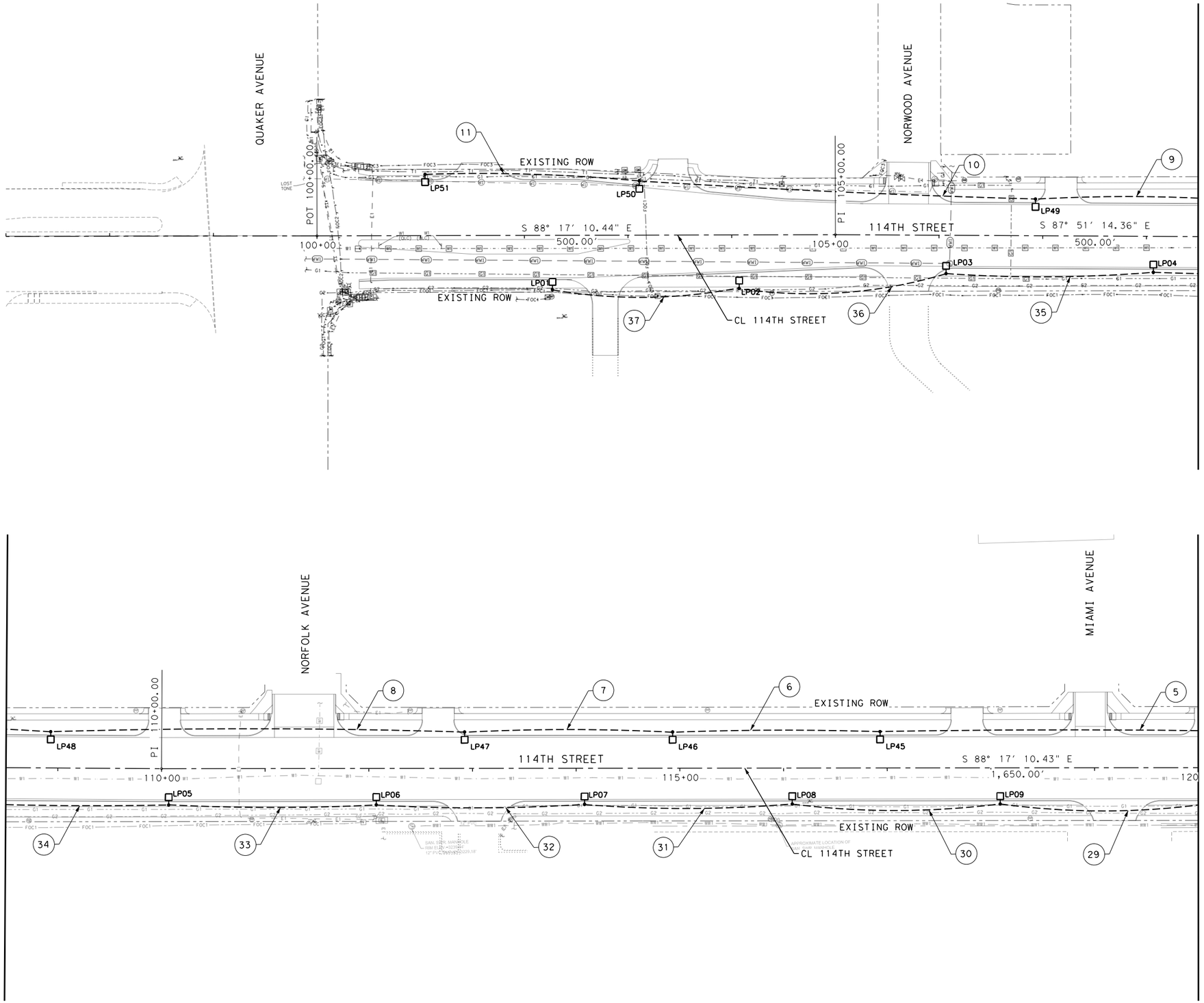
114TH STREET
QUAKER AVE. TO INDIANA AVE.

ILLUMINATION SUMMARY

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
FM	6			CS
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
FAA	TEXAS	LBB	LUBBOCK	
CHECK	CONTROL	SECTION	JOB	123
DKK	0905	06	118	
CHECK				
DWK				

$USER$
100.0000 ft / in.



N

0 50′ 100′
HORIZONTAL SCALE

LEGEND

	PROPOSED LIGHT POLE
	PROPOSED ELECTRICAL SERVICE
PB	PROPOSED PULL BOX
	ILLUMINATION CONDUIT (TRENCHED)
	EXISTING RESIDENTIAL LIGHT POLE TO REMAIN

GENERAL NOTES:

A. ALL LIGHT POLE FOUNDATIONS SHALL BE A MINIMUM OF 18" FROM BACK OF CURB TO FACE OF FOUNDATION.

B. LIGHTING CONDUIT SHOWN IS DIAGRAMMATIC ONLY. THE BEST FINAL CONDUIT ROUTING SHALL BE DETERMINED BY THE CONTRACTOR AT THE TIME OF CONSTRUCTION.

C. THE INFORMATION SHOWN ON THESE PLANS REGARDING THE TYPE AND LOCATION OF UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. CONTRACTOR SHALL DETERMINE THE FINAL LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

D. CONTRACTOR SHALL EXERCISE EXTREME CAUTION WITH EXISTING OVERHEAD POWER LINES AND COMMUNICATION LINES IN THE AREA AND MAINTAIN ADEQUATE CLEARANCES (10′ MIN DESIRABLE).

04/22/2022

STATE OF TEXAS
DANIEL W. KOSS
110037
LICENSED
PROFESSIONAL ENGINEER

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
ILLUMINATION PLAN

BEGIN TO STA 120+00
SHEET 1 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
FM	6			CS
GRAPHICS FAA	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DKK	TEXAS	LBB	LUBBOCK	
CHECK DWK	CONTROL	SECTION	JOB	124
	0905	06	118	

Mar. 01, 2022 - 02:18:12 PM
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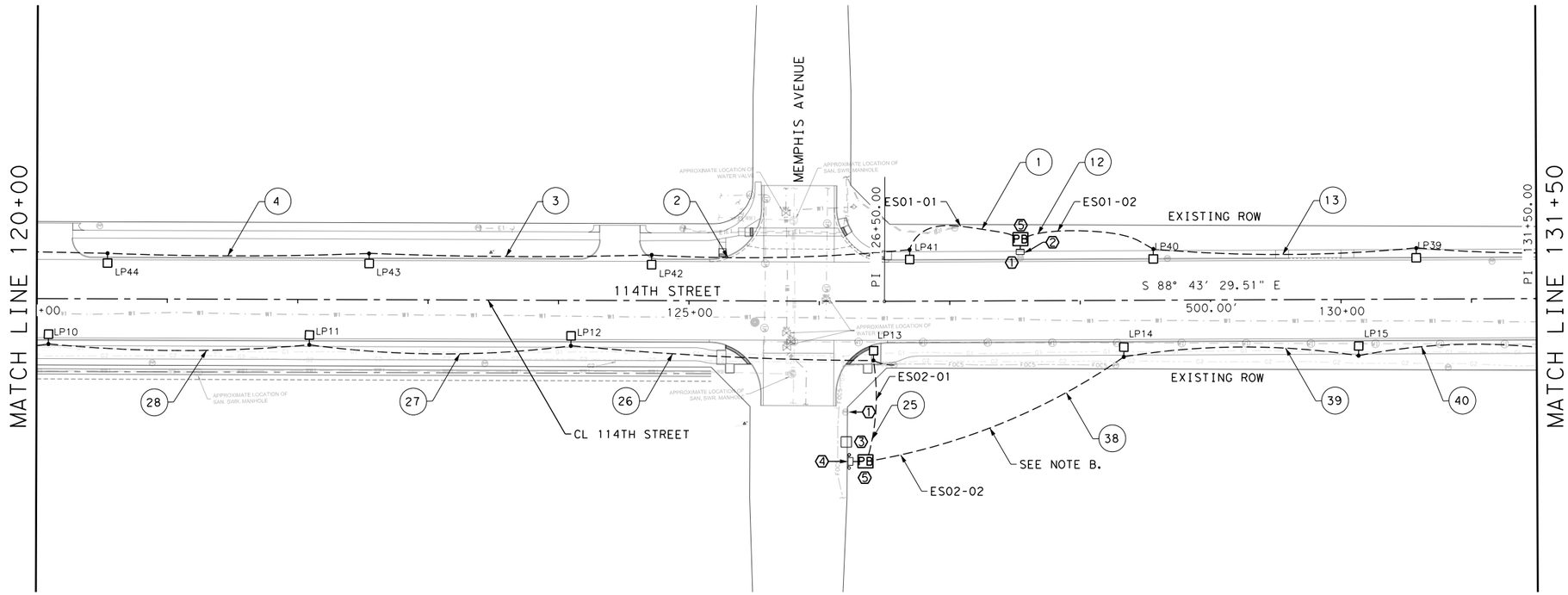
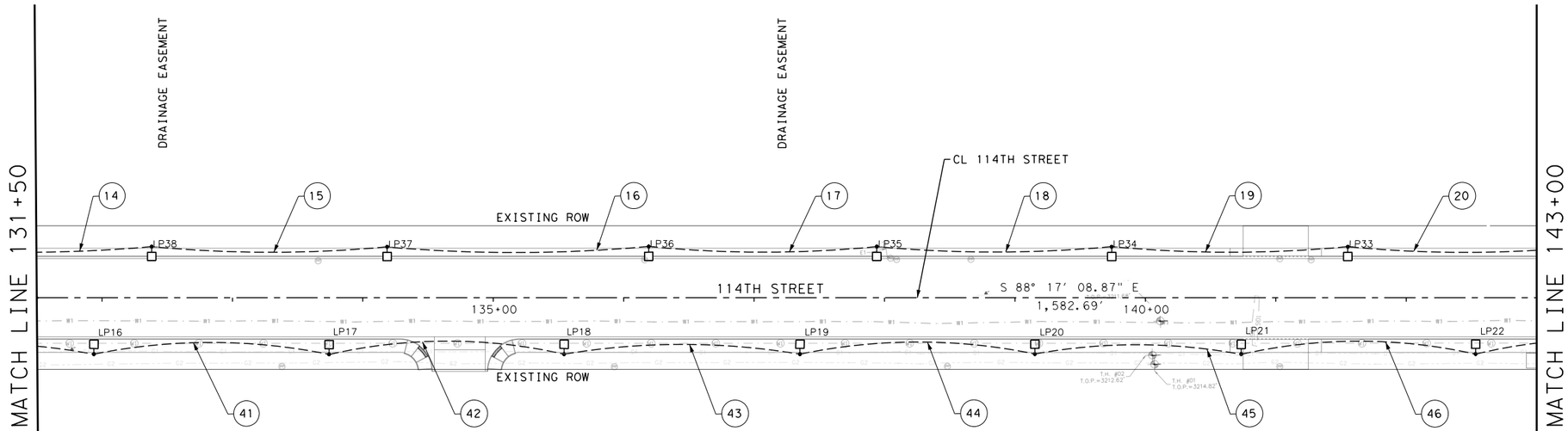
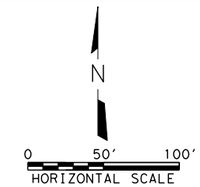






LEGEND

	PROPOSED LIGHT POLE
	PROPOSED ELECTRICAL SERVICE
PB	PROPOSED PULL BOX
-----	ILLUMINATION CONDUIT (TRENCHED)
	EXISTING RESIDENTIAL LIGHT POLE TO REMAIN

GENERAL NOTES:

A. ALL LIGHT POLE FOUNDATIONS SHALL BE A MINIMUM OF 18" FROM BACK OF CURB TO FACE OF FOUNDATION.

B. LIGHTING CONDUIT SHOWN IS DIAGRAMMATIC ONLY. THE BEST FINAL CONDUIT ROUTING SHALL BE DETERMINED BY THE CONTRACTOR AT THE TIME OF CONSTRUCTION.

C. THE INFORMATION SHOWN ON THESE PLANS REGARDING THE TYPE AND LOCATION OF UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. CONTRACTOR SHALL DETERMINE THE FINAL LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

D. CONTRACTOR SHALL EXERCISE EXTREME CAUTION WITH EXISTING OVERHEAD POWER LINES AND COMMUNICATION LINES IN THE AREA AND MAINTAIN ADEQUATE CLEARANCES (10' MIN DESIRABLE).

NOTES BY SYMBOL "⬡"

1. EXISTING UTILITY POWER POLE.
2. PROVIDE NEW 480V SERVICE ENCLOSURE CONTROL BOX MOUNTED ON POWER POLE. REFER TO SHEET 7 CONTROL BOX DETAIL.
3. NEW POWER PEDESTAL BY UTILITY.
4. PROVIDE RACK MOUNT 480V SERVICE ENCLOSURE CONTROL BOX. PROVIDE STEEL CHANNEL RACK FOR MOUNTING OF CONTROL BOX REFER TO SHEET 7 FOR CONTROL BOX DETAIL.
5. NEW UNDERGROUND PULL BOX FOR ROADWAY LIGHTING CIRCUITS. GROUND BOX TO BE TYPE A. REFER TO TXDOT DETIAL SHEET ED(4)-14 FOR ADDITIONAL INFORMATION.

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

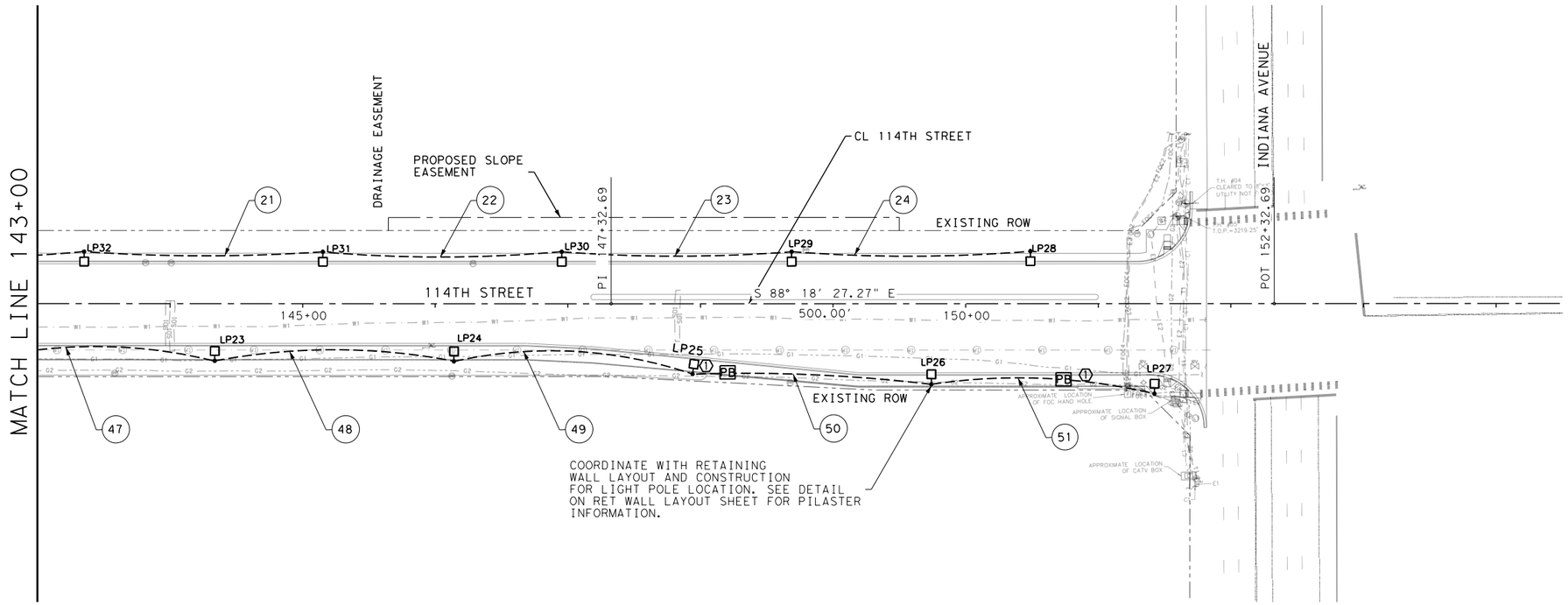
NO	DATE	REVISION	APPROVED

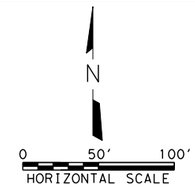
FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
ILLUMINATION PLAN

STA 120+00 TO STA 143+00
SHEET 2 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
FM	6			CS
GRAPHICS FAA	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DKK	TEXAS	LBB	LUBBOCK	125
CHECK DWK	CONTROL	SECTION	JOB	
	0905	06	118	





LEGEND

	PROPOSED LIGHT POLE
	PROPOSED ELECTRICAL SERVICE
PB	PROPOSED PULL BOX
- - - - -	ILLUMINATION CONDUIT (TRENCHED)
	EXISTING RESIDENTIAL LIGHT POLE TO REMAIN

GENERAL NOTES:

A. ALL LIGHT POLE FOUNDATIONS SHALL BE A MINIMUM OF 18" FROM BACK OF CURB TO FACE OF FOUNDATION.

B. LIGHTING CONDUIT SHOWN IS DIAGRAMMATIC ONLY. THE BEST FINAL CONDUIT ROUTING SHALL BE DETERMINED BY THE CONTRACTOR AT THE TIME OF CONSTRUCTION.

C. THE INFORMATION SHOWN ON THESE PLANS REGARDING THE TYPE AND LOCATION OF UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. CONTRACTOR SHALL DETERMINE THE FINAL LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

D. CONTRACTOR SHALL EXERCISE EXTREME CAUTION WITH EXISTING OVERHEAD POWER LINES AND COMMUNICATION LINES IN THE AREA AND MAINTAIN ADEQUATE CLEARANCES (10' MIN DESIRABLE).

NOTES BY SYMBOL "⬡"

1. NEW UNDERGROUND PULL BOX FOR ROADWAY LIGHTING CIRCUITS. GROUND BOX TO BE TYPE A. REFER TO TXDOT DETIAL SHEET ED(4)-14 FOR ADDITIONAL INFORMATION.

04/22/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
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Texas Department of Transportation

114TH STREET
QUAKER AVE. TO INDIANA AVE.
ILLUMINATION PLAN

STA 143+00 TO END
SHEET 3 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
FM	6			CS
GRAPHICS FAA	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DKK	TEXAS	LBB	LUBBOCK	126
CHECK DWK	CONTROL	SECTION	JOB	
	0905	06	118	

$USER$
1.0000 ft / in.

ELECTRICAL SERVICE DATA												
ELEC. SERVICE NO.	SHEET NO.	ELECTRICAL SERVICE DESCRIPTION (SEE ED (5) - 14)	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO. / SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMP.	TWO-POLE CONTACTOR AMPS	PANELBOARD/ LOADCENTER AMP RATING	CIRCUIT NO.	BRANCH CKT. BKR. POLE/AMP	BRANCH CIRCUIT	KVA LOAD
ES01	2 OF 3	ELEC SERV TY A 240/480V 030 (SS) SS (E) OT (O)	2"	(3) #4 AWG	60	2P/60	60	N/A	ES01-01	2P/20	3.5	1680
									ES01-02	2P/20	3.25	1560
ES02	2 OF 3	ELEC SERV TY A 240/480V 030 (SS) SS (E) PS (O)	2"	(3) #4 AWG	60	2P/60	60	N/A	ES02-01	2P/20	3.5	1680
									ES02-02	2P/20	3.5	1680

SUMMARY OF LIGHT POLE DETAILS						
SHEET NO.	LIGHT POLE LABEL	ILLUMINATION ASSEMBLY DESCRIPTION	CHAIN	STN	OFFSET (FEET)	SIDE
1 OF 3	LP01	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114TH STREET	102+27	53	SOUTH
1 OF 3	LP02	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	104+07	52	SOUTH
1 OF 3	LP03	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	106+07	37	SOUTH
1 OF 3	LP04	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	108+07	35	SOUTH
1 OF 3	LP05	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	110+07	35	SOUTH
1 OF 3	LP06	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	112+07	35	SOUTH
1 OF 3	LP07	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	114+08	35	SOUTH
1 OF 3	LP08	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	116+08	35	SOUTH
1 OF 3	LP09	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	118+09	35	SOUTH
2 OF 3	LP10	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	120+09	35	SOUTH
2 OF 3	LP11	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	122+09	35	SOUTH
2 OF 3	LP12	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	124+09	35	SOUTH
2 OF 3	LP13	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	126+42	45	SOUTH
2 OF 3	LP14	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	128+34	43	SOUTH
2 OF 3	LP15	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	130+13	43	SOUTH
2 OF 3	LP16	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	131+94	43	SOUTH
2 OF 3	LP17	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	133+74	44	SOUTH
2 OF 3	LP18	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	135+54	43	SOUTH
2 OF 3	LP19	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	137+35	43	SOUTH
2 OF 3	LP20	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	139+15	43	SOUTH
2 OF 3	LP21	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	140+74	43	SOUTH
2 OF 3	LP22	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	142+53	43	SOUTH
3 OF 3	LP23	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	144+34	43	SOUTH
3 OF 3	LP24	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	146+14	44	SOUTH
3 OF 3	LP25	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	147+94	54	SOUTH
3 OF 3	LP26	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	149+74	57	NORTH
3 OF 3	LP27	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	151+39	57	NORTH
3 OF 3	LP28	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	150+49	40	NORTH
3 OF 3	LP29	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	148+69	39	NORTH
3 OF 3	LP30	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	146+95	39	NORTH
3 OF 3	LP31	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	145+15	39	NORTH
3 OF 3	LP32	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	143+35	39	NORTH
2 OF 3	LP33	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	141+55	39	NORTH
2 OF 3	LP34	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	139+74	39	NORTH
2 OF 3	LP35	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	137+94	39	NORTH
2 OF 3	LP36	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	136+19	39	NORTH
2 OF 3	LP37	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	134+19	39	NORTH
2 OF 3	LP38	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	132+38	39	NORTH
2 OF 3	LP39	IN RD IL (TY SA 20 T-8) (250W EQ) LED	114th STREET	130+58	39	NORTH
2 OF 3	LP40	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	128+56	39	NORTH
2 OF 3	LP41	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	126+69	40	NORTH
2 OF 3	LP42	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	124+71	35	NORTH
2 OF 3	LP43	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	122+55	35	NORTH
2 OF 3	LP44	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	120+54	35	NORTH
1 OF 3	LP45	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	116+93	35	NORTH
1 OF 3	LP46	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	114+93	35	NORTH
1 OF 3	LP47	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	112+92	35	NORTH
1 OF 3	LP48	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	108+93	35	NORTH
1 OF 3	LP49	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	106+93	35	NORTH
1 OF 3	LP50	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	103+11	52	NORTH
1 OF 3	LP51	IN RD IL (TY SA 30 T-8) (250W EQ) LED	114th STREET	101+04	59	NORTH

*LUMINAIRE LAYOUT BASED ON 480V FIXTURES TO MINIMIZE VOLTAGE DROP.

04/22/2022

STATE OF TEXAS
DANIEL W. KOSS
110037
LICENSED
PROFESSIONAL ENGINEER

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
ELECTRICAL SERVICE & LIGHT POLE SUMMARY

SHEET 1 OF 2

DESIGN FM	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS FAA	6			CS
CHECK DKK	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DWK	TEXAS	LBB	LUBBOCK	127
	CONTROL	SECTION	JOB	
	0905	06	118	

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$USER$
1.0000 ft / in.

ES01 - SUMMARY OF CONDUIT AND CONDUCTORS									
SHEET NO.	RUN NO.	RUN LENGTH	CIRCUIT	CONDUIT TYPE	CONDUIT				
					2 IN. PVC SCH 80	ELEC CONDR (NO. 8) BARE		ELEC CONDR (NO. 8) INSULATED	
						QA	LENGTH	QA	LENGTH
2 OF 3	1	100	1	T	100	1	100	2	200
2 OF 3	2	210	1	T	210	1	210	2	420
2 OF 3	3	230	1	T	230	1	230	2	460
2 OF 3	4	210	1	T	210	1	210	2	420
1 OF 3	5	340	1	T	340	1	340	2	680
1 OF 3	6	210	1	T	210	1	210	2	420
1 OF 3	7	210	1	T	210	1	210	2	420
1 OF 3	8	425	1	T	425	1	425	2	850
1 OF 3	9	220	1	T	220	1	220	2	440
1 OF 3	10	400	1	T	400	1	400	2	800
1 OF 3	11	220	1	T	220	1	220	2	440
2 OF 3	12	115	2	T	115	1	115	2	230
2 OF 3	13	210	2	T	210	1	210	2	420
2 OF 3	14	220	2	T	220	1	220	2	440
2 OF 3	15	190	2	T	190	1	190	2	380
2 OF 3	16	210	2	T	210	1	210	2	420
2 OF 3	17	185	2	T	185	1	185	2	370
2 OF 3	18	190	2	T	190	1	190	2	380
2 OF 3	19	190	2	T	190	1	190	2	380
2 OF 3	20	190	2	T	190	1	190	2	380
3 OF 3	21	190	2	T	190	1	190	2	380
3 OF 3	22	190	2	T	190	1	190	2	380
3 OF 3	23	185	2	T	185	1	185	2	370
3 OF 3	24	190	2	T	190	1	190	2	380
				TOTALS	5230		5230		10460

ES02 - SUMMARY OF CONDUIT AND CONDUCTORS									
SHEET NO.	RUN NO.	RUN LENGTH	CIRCUIT	CONDUIT TYPE	CONDUIT				
					2 IN. PVC SCH 80	ELEC CONDR (NO. 8) BARE		ELEC CONDR (NO. 8) INSULATED	
						QA	LENGTH	QA	LENGTH
2 OF 3	25	90	1	T	90	1	90	2	180
2 OF 3	26	240	1	T	240	1	240	2	480
2 OF 3	27	210	1	T	210	1	210	2	420
2 OF 3	28	210	1	T	210	1	210	2	420
1 OF 3	29	210	1	T	210	1	210	2	420
1 OF 3	30	210	1	T	210	1	210	2	420
1 OF 3	31	210	1	T	210	1	210	2	420
1 OF 3	32	210	1	T	210	1	210	2	420
1 OF 3	33	210	1	T	210	1	210	2	420
1 OF 3	34	210	1	T	210	1	210	2	420
1 OF 3	35	210	1	T	210	1	210	2	420
1 OF 3	36	210	1	T	210	1	210	2	420
1 OF 3	37	190	1	T	190	1	190	2	380
2 OF 3	38	280	2	T	280	1	280	2	560
2 OF 3	39	190	2	T	190	1	190	2	380
2 OF 3	40	190	2	T	190	1	190	2	380
2 OF 3	41	190	2	T	190	1	190	2	380
2 OF 3	42	190	2	T	190	1	190	2	380
2 OF 3	43	190	2	T	190	1	190	2	380
2 OF 3	44	190	2	T	190	1	190	2	380
2 OF 3	45	170	2	T	170	1	170	2	340
2 OF 3	46	190	2	T	190	1	190	2	380
3 OF 3	47	190	2	T	190	1	190	2	380
3 OF 3	48	190	2	T	190	1	190	2	380
3 OF 3	49	190	2	T	190	1	190	2	380
3 OF 3	50	190	2	T	190	1	190	2	380
3 OF 3	51	175	2	T	175	1	175	2	350
				TOTALS	5335		5335		10670

04/22/2022

STATE OF TEXAS
DANIEL W. KOSS
110037
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PROFESSIONAL ENGINEER

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Texas Registered Engineering Firm F-2144

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FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

Texas Department of Transportation

114TH STREET
QUAKER AVE. TO INDIANA AVE.
ELECTRICAL SERVICE & LIGHT POLE SUMMARY

SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
FM	6			CS
GRAPHICS FAA	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DKK	TEXAS	LBB	LUBBOCK	
CHECK DWK	CONTROL	SECTION	JOB	128
	0905	06	118	

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NOTES:

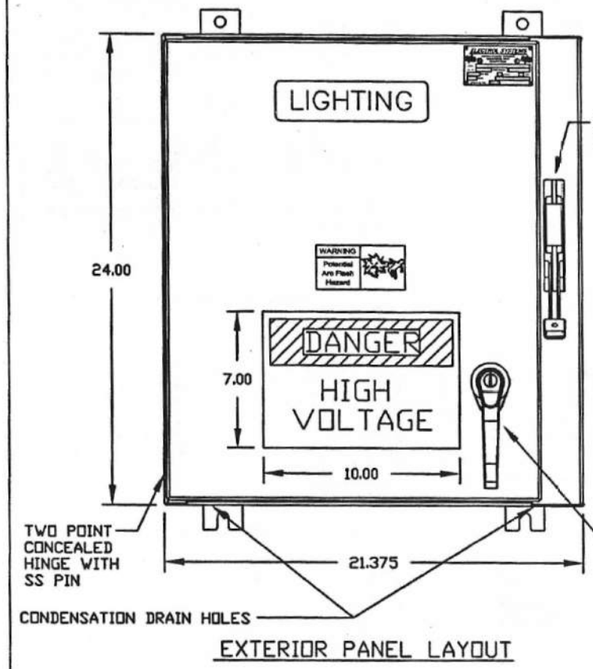
1. ALL DIMENSIONS ARE IN INCHES.
2. ENCLOSURE: TYPE 3R (FLANGE MOUNTED), 24" X 21.38" X 8".
3. INNER DOOR LABELS:
   LISTED - ENCLOSED INDUSTRIAL CONTROL PANEL
   LISTED - RECORD JOB NUMBER TO NUMBER OF UL LABELS USED.
   LISTED - INDUSTRIAL CONTROL PANEL ENCLOSURE
   LISTED - SUITABLE ONLY FOR USE AS SERVICE EQUIPMENT
   MFG. - QA/TEST LABEL.
   MFG. - FOR CONTRACTOR/JOB NUMBER.
4. OUTER DOOR LABELS: SEE LAYOUT.
5. LABEL ALL COMPONENTS IN ENCLOSURE.
6. LABEL TORQUE COMPONENTS TO SPECS.

INDUSTRIAL CONTROL PANEL- SUBJECT 508A

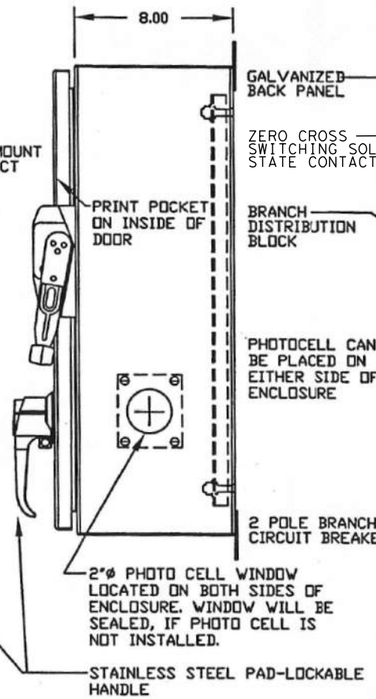
UL UNDERWRITERS LABORATORIES, INC.

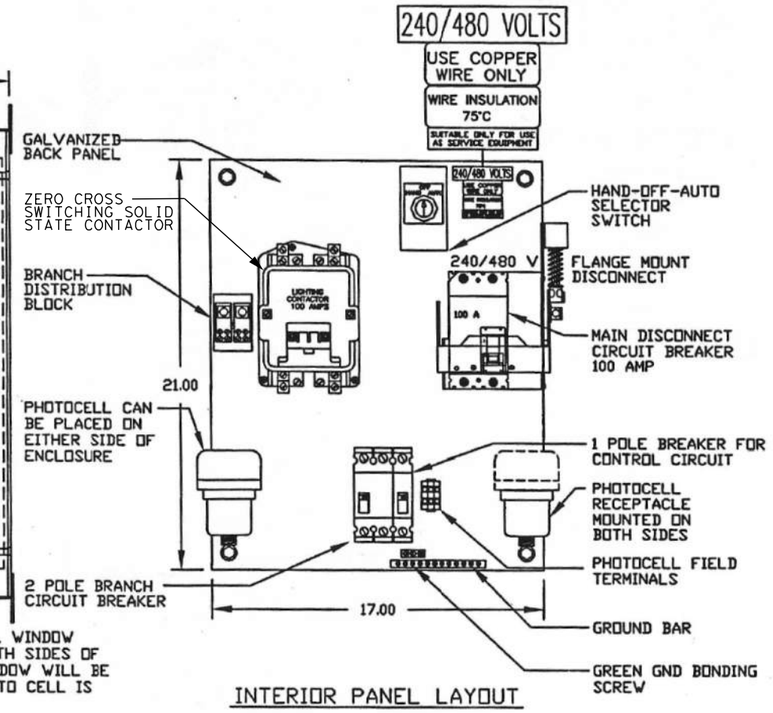
ELECTROL SYSTEMS, INC. FILE NO. E166806

DWG CK: | DWG CK: | DWG CK:



EXTERIOR PANEL LAYOUT





INTERIOR PANEL LAYOUT

TYPICAL 4 ELECTRICAL SERVICE

POWDER COATED ALUMINUM ENCLOSURE TX DOT STANDARD 2014

*DETAIL PROVIDED BY LP&L AS STANDARD FOR USE ON THIS PROJECT

CONTRACTOR: TECHLINE, INC./LUBBOCK POWER		FILE: 1620311	REVISION: NO REVISION	REVISION DATE:
DATE: 7/28/16 DRAWN BY: LZ SCALE: NTS	UL ELECTROL SYSTEMS, INC. 433 RECOLETA SAN ANTONIO, TX 78216 [210] 599-6485	PROJECT: TxDOT TYPE A TYA(240/480)100(NS)AL(E)GC(U)	TITLE: ELECTRICAL SERVICE PANEL LAYOUT EXTERIOR / INTERIOR	REFERENCE # ESI-16-203-11

04/22/2022

STATE OF TEXAS
DANIEL W. KOSS
110037
LICENSED
PROFESSIONAL ENGINEER

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

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FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
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Texas Department of Transportation

114TH STREET
QUAKER AVE. TO INDIANA AVE.

ELECTRICAL SERVICE PANEL LAYOUT

DESIGN FM	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
	6			CS
GRAPHICS FAA	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DKK	TEXAS	LBB	LUBBOCK	
CHECK DWK	CONTROL	SECTION	JOB	129
	0905	06	118	

SUMMARY OF PAVEMENT MARKING AND SIGNING ITEMS

LOCATION	644 6001	644 6004	644 6009	658 6047	666 6030	666 6036	666 6141	666 6156	666 6224	666 6226	666 6228	666 6231	666 6232
	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	IN SM RD SN SUP&AM TY10BWG(1)SB(P)	INSTL OM ASSM (OM-2Y)(WC)GND	REFL PAV MRK TY I (W)8"(DOT)(100MIL)	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	REFL PAV MRK TY I (Y)12"(SLD)(100MIL)	REFL PAV MRK TY I(Y)(MED NOSE)(100MIL)	PAVEMENT SEALER 4"	PAVEMENT SEALER 8"	PAVEMENT SEALER 12"	PAVEMENT SEALER (ARROW)	PAVEMENT SEALER (WORD)
	EA	EA	EA	EA	LF	LF	LF	EA	LF	LF	LF	EA	EA
OVERALL													
PAVEMENT MARKING AND SIGNING PLAN - WEST OF QUAKER AVE					780	680			720	1460		2	
PAVEMENT MARKING AND SIGNING PLAN - BEGIN TO STA 120+00	3		5		230	660	225	2	8036	890	225	7	6
PAVEMENT MARKING AND SIGNING PLAN - STA 120+00 TO STA 143+00	4	2		3	350	620			8293	970		9	1
PAVEMENT MARKING AND SIGNING PLAN - STA 143+00 TO END	3	1			620	1260		2	2793	1880		4	4
PROJECT TOTALS	10	3	5	3	1980	3220	225	4	19842	5200	225	22	11

SUMMARY OF PAVEMENT MARKING AND SIGNING ITEMS

LOCATION	666 6233	666 6300	666 6312	666 6315	668 6018	668 6019	668 6027	672 6007	672 6009	678 6001	678 6004	678 6006	678 6008
	PAVEMENT SEALER (MED NOSE)	RE PM W/RET REQ TY I (W)4"(BRK)(100MIL)	RE PM W/RET REQ TY I (Y)4"(BRK)(100MIL)	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	PREFAB PAV MRK TY B (W)(24")(SLD)	PREFAB PAV MRK TY B (W)(ARROW)	PREFAB PAV MRK TY B (W)(WORD)	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A	PAV SURF PREP FOR MRK (4")	PAV SURF PREP FOR MRK (8")	PAV SURF PREP FOR MRK (12")	PAV SURF PREP FOR MRK (24")
	EA	LF	LF	LF	LF	EA	EA	EA	EA	LF	LF	LF	LF
OVERALL													
PAVEMENT MARKING AND SIGNING PLAN - WEST OF QUAKER AVE		720				2				720	1460		
PAVEMENT MARKING AND SIGNING PLAN - BEGIN TO STA 120+00	2	3950	597	3489	223	7	6	126	96	8036	890	225	223
PAVEMENT MARKING AND SIGNING PLAN - STA 120+00 TO STA 143+00		3980	863	3450	472	9	1	108	58	8293	970		472
PAVEMENT MARKING AND SIGNING PLAN - STA 143+00 TO END	2	860	840	1093	528	4	4	22	83	2793	1880		528
PROJECT TOTALS	4	9510	2300	8032	1223	22	11	256	237	19842	5200	225	1223

SUMMARY OF PAVEMENT MARKING AND SIGNING ITEMS

LOCATION	678 6009	678 6016	678 6024	4171 6001
	PAV SURF PREP FOR MRK (ARROW)	PAV SURF PREP FOR MRK (WORD)	PAV SURF PREP FOR MRK (MED NOSE)	INSTALL BRIDGE IDENTIFICATION NUMBERS
	EA	EA	EA	EA
OVERALL				
PAVEMENT MARKING AND SIGNING PLAN - WEST OF QUAKER AVE	2			
PAVEMENT MARKING AND SIGNING PLAN - BEGIN TO STA 120+00	7	6	2	
PAVEMENT MARKING AND SIGNING PLAN - STA 120+00 TO STA 143+00	9	1		1
PAVEMENT MARKING AND SIGNING PLAN - STA 143+00 TO END	4	4	2	
PROJECT TOTALS	22	11	4	1

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

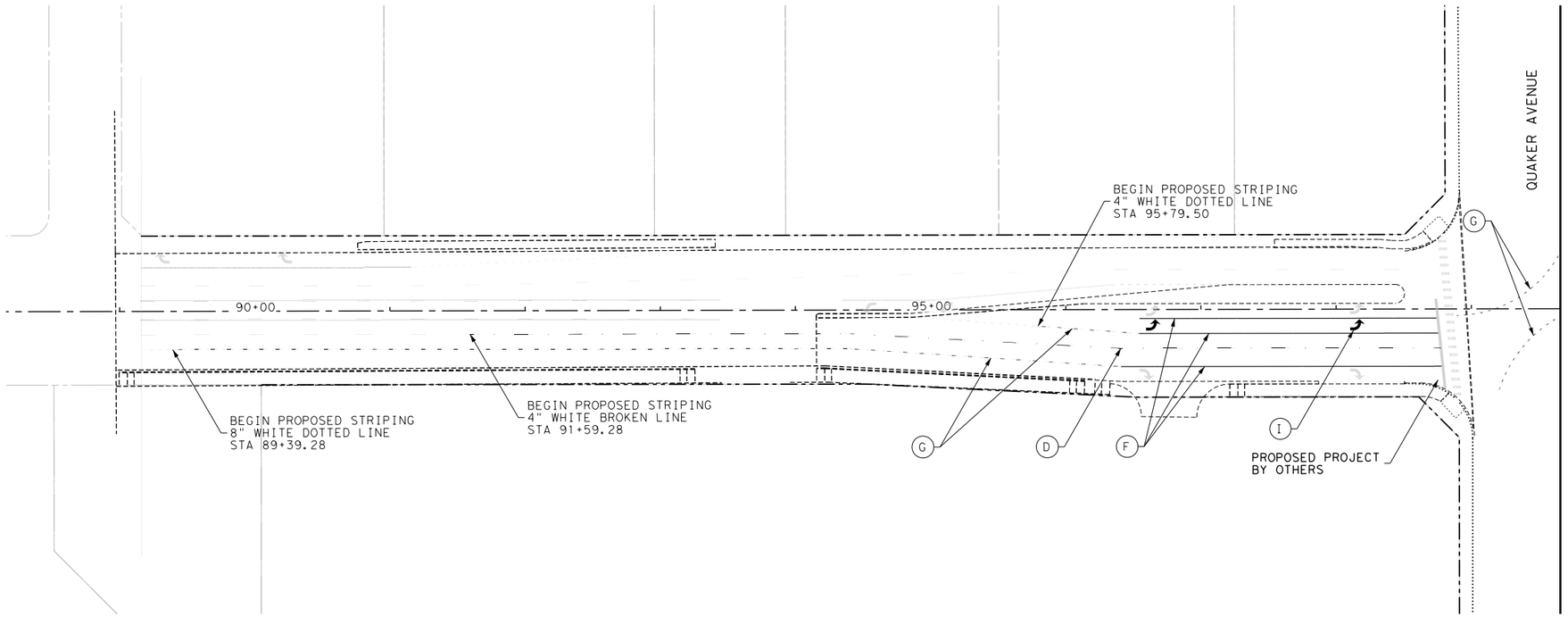
NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.

PAVEMENT MARKING AND SIGNING SUMMARY

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	130
	0905	06	118	



SEE SHEET BEGIN TO STA 120+00

N

0 50′ 100′
SCALE IN FEET

LEGEND

(A)	4" YELLOW SOLID	(H)	24" WHITE SOLID
(B)	4" YELLOW BROKEN	(I)	ARROW WHITE TY B
(C)	24" YELLOW SOLID	(J)	WORD WHITE TY I
(D)	4" WHITE BROKEN	(K)	RPM TY I-C
(E)	4" WHITE SOLID	(L)	RPM TY II A-A
(F)	8" WHITE SOLID		SIGNAGE
(G)	8" WHITE DOTTED (3′/9′)	(#)	SIGN NUMBER RE: SOSS

NOTES:

1. CITY OF LUBBOCK WILL PROVIDE ALL OVERHEAD STREET NAME MARKERS. CONTRACTOR TO COORDINATE WITH CITY OF LUBBOCK SIGN SHOP.
2. ALL MEDIAN NOSES SHALL BE PAINTED YELLOW.
3. INSTALL OBJECT MARKERS ACCORDING TO TMUTCD.

STATE OF TEXAS
CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER

3/9/2022

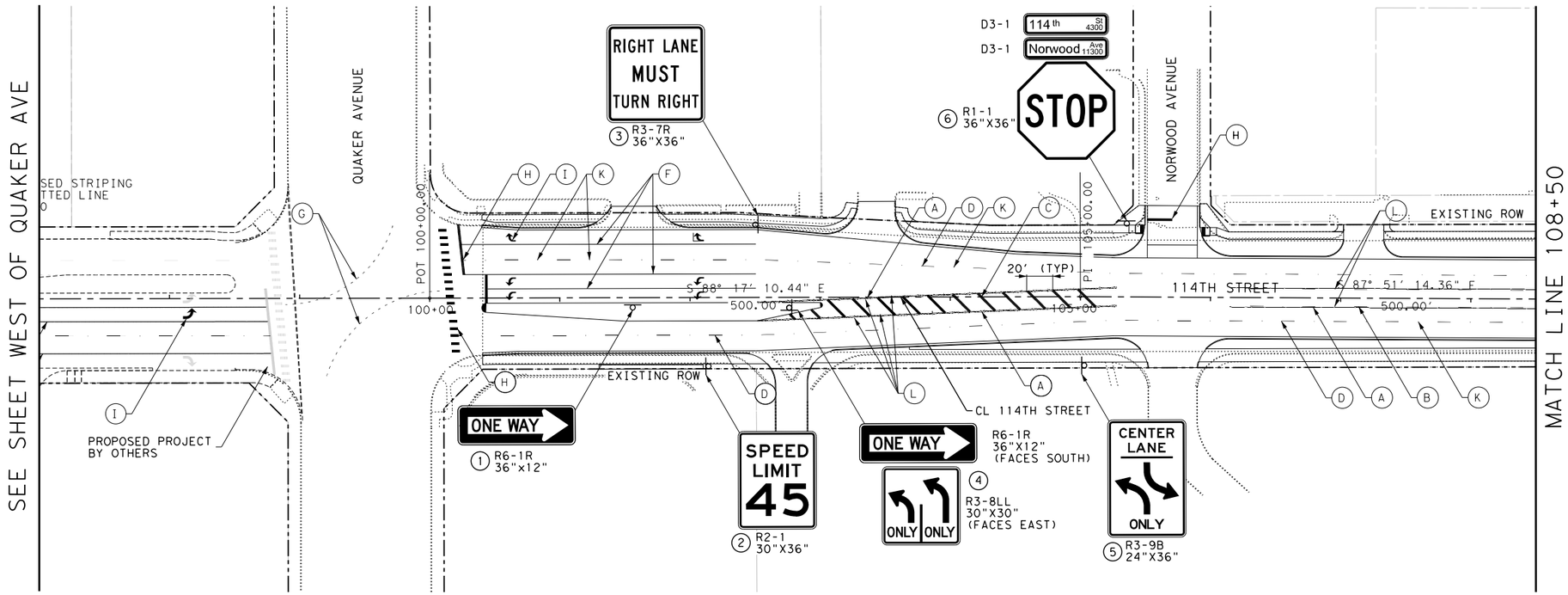
Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

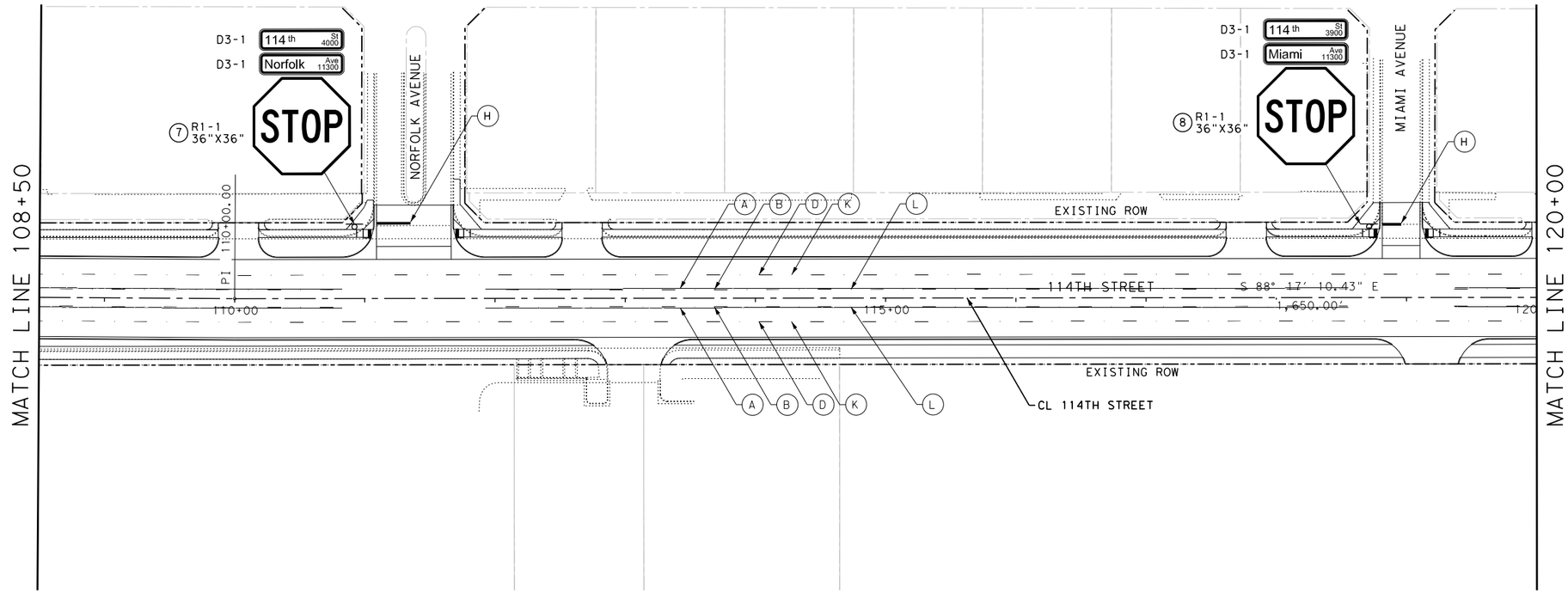
NO	DATE	REVISION	APPROVED

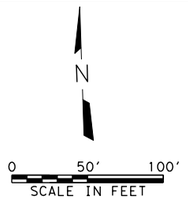
FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
PAVEMENT MARKING AND SIGNING PLAN
WEST OF QUAKER AVE

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	131
	0905	06	118	







LEGEND

A	4" YELLOW SOLID	H	24" WHITE SOLID
B	4" YELLOW BROKEN	I	ARROW WHITE TY B
C	24" YELLOW SOLID	J	WORD WHITE TY I
D	4" WHITE BROKEN	K	RPM TY I-C
E	4" WHITE SOLID	L	RPM TY II A-A
F	8" WHITE SOLID		SIGNAGE
G	8" WHITE DOTTED (3'/9')	#	SIGN NUMBER RE: SOSS

NOTES:

1. CITY OF LUBBOCK WILL PROVIDE ALL OVERHEAD STREET NAME MARKERS. CONTRACTOR TO COORDINATE WITH CITY OF LUBBOCK SIGN SHOP.
2. ALL MEDIAN NOSES SHALL BE PAINTED YELLOW.
3. INSTALL OBJECT MARKERS ACCORDING TO TMUTCD.

3/9/2022

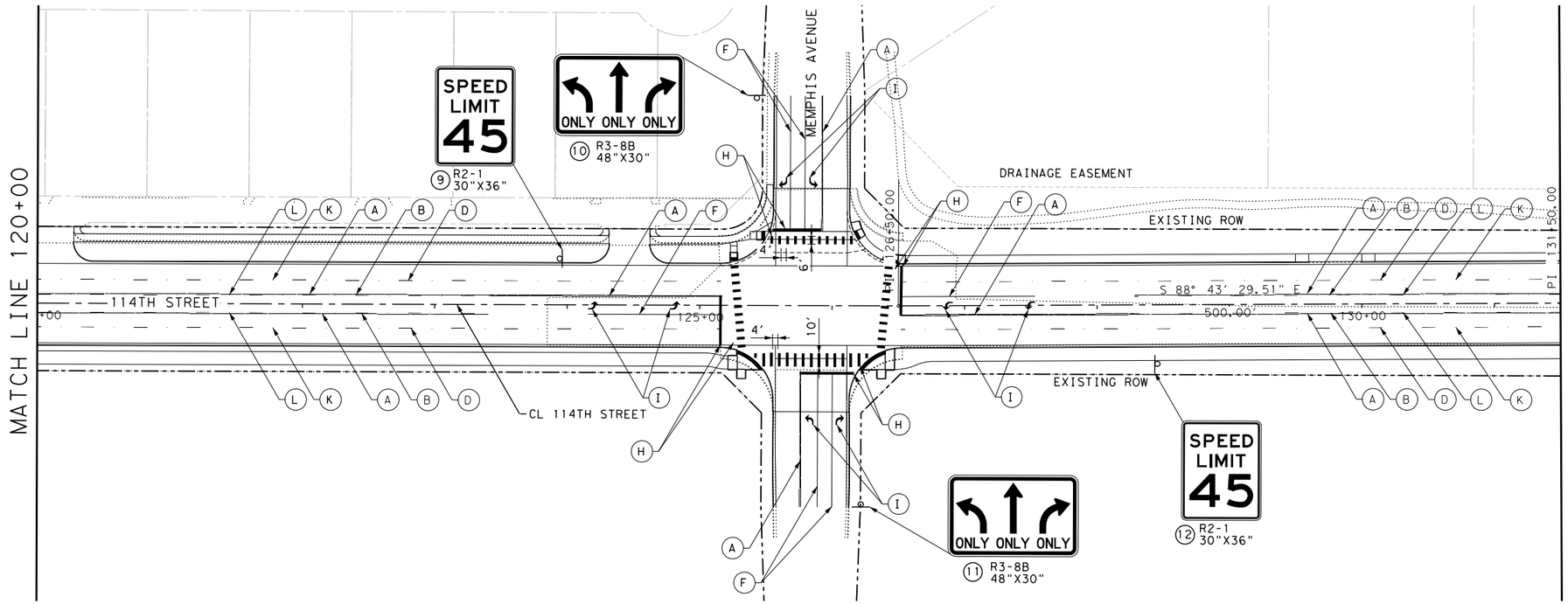
Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

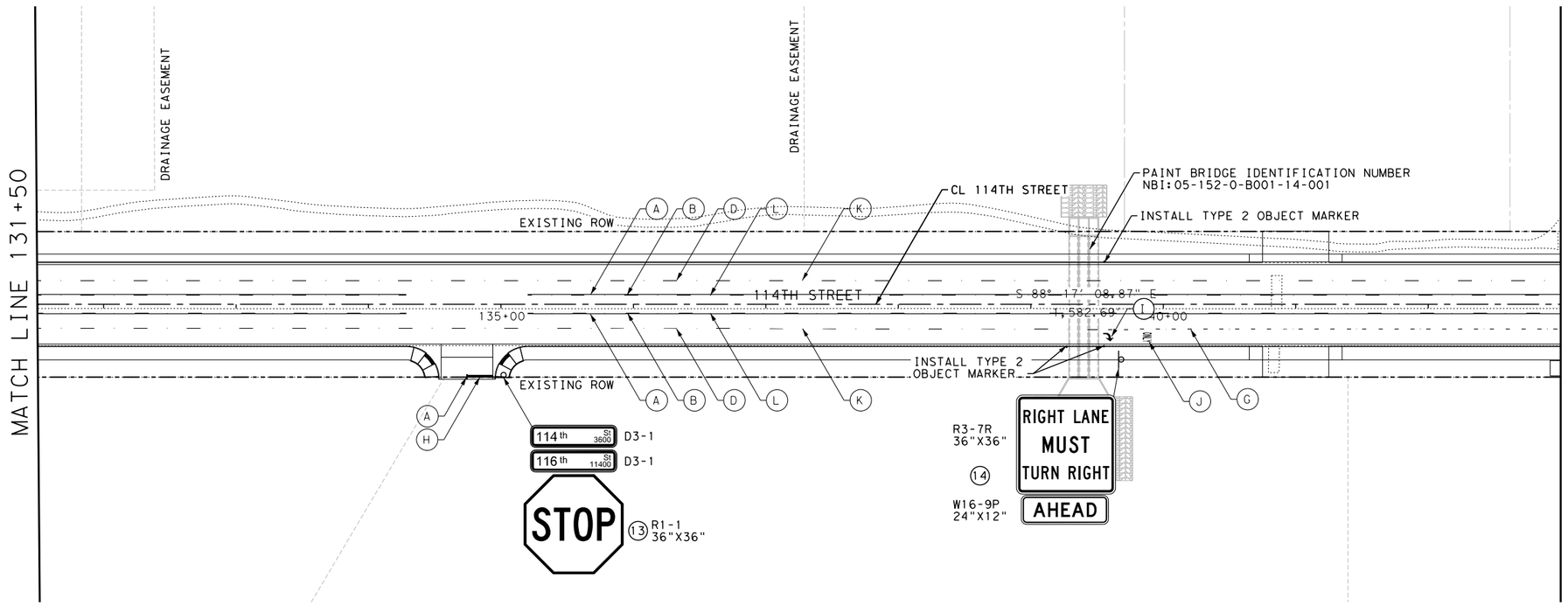
NO	DATE	REVISION	APPROVED

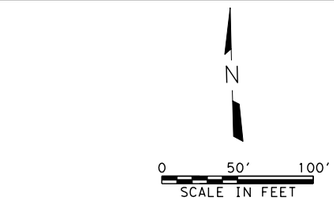
FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
PAVEMENT MARKING AND SIGNING PLAN
BEGIN TO STA 120+00

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	132
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	







LEGEND

A	4" YELLOW SOLID	H	24" WHITE SOLID
B	4" YELLOW BROKEN	I	ARROW WHITE TY B
C	24" YELLOW SOLID	J	WORD WHITE TY I
D	4" WHITE BROKEN	K	RPM TY I-C
E	4" WHITE SOLID	L	RPM TY II A-A
F	8" WHITE SOLID		SIGNAGE
G	8" WHITE DOTTED (3'/9')	#	SIGN NUMBER RE: SOSS

NOTES:

1. CITY OF LUBBOCK WILL PROVIDE ALL OVERHEAD STREET NAME MARKERS. CONTRACTOR TO COORDINATE WITH CITY OF LUBBOCK SIGN SHOP.
2. ALL MEDIAN NOSES SHALL BE PAINTED YELLOW.
3. INSTALL OBJECT MARKERS ACCORDING TO TMUTCD.

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

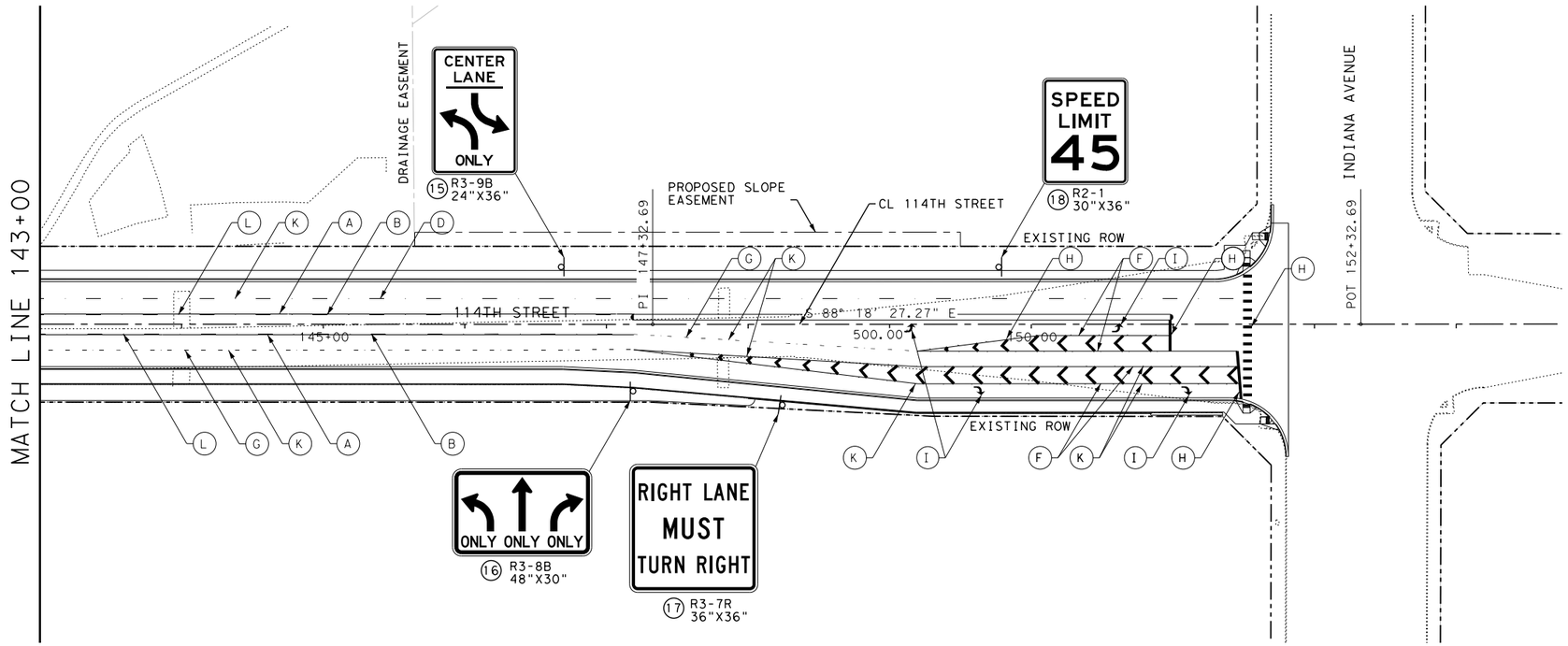
NO	DATE	REVISION	APPROVED

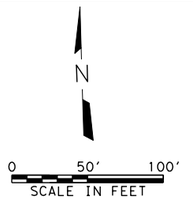
FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
PAVEMENT MARKING AND SIGNING PLAN
STA 120+00 TO STA 143+00

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	133
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

$USER$
100.0000 ft / in.





LEGEND

(A)	4" YELLOW SOLID	(H)	24" WHITE SOLID
(B)	4" YELLOW BROKEN	(I)	ARROW WHITE TY B
(C)	24" YELLOW SOLID	(J)	WORD WHITE TY I
(D)	4" WHITE BROKEN	(K)	RPM TY I-C
(E)	4" WHITE SOLID	(L)	RPM TY II A-A
(F)	8" WHITE SOLID		SIGNAGE
(G)	8" WHITE DOTTED (3'/9')	(#)	SIGN NUMBER RE: SOSS

NOTES:

1. CITY OF LUBBOCK WILL PROVIDE ALL OVERHEAD STREET NAME MARKERS. CONTRACTOR TO COORDINATE WITH CITY OF LUBBOCK SIGN SHOP.
2. ALL MEDIAN NOSES SHALL BE PAINTED YELLOW.
3. INSTALL OBJECT MARKERS ACCORDING TO TMUTCD.

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

Texas Department of Transportation

114TH STREET
QUAKER AVE. TO INDIANA AVE.
PAVEMENT MARKING AND SIGNING PLAN
STA 143+00 TO END

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	134
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
2 OF 4	1	R6-1R	ONE WAY	36"X12"	X		10BWG	1	SB	P		
	2	R2-1	SPEED LIMIT (45 MPH)	30"X36"	X		10BWG	1	SA	P		
	3	R3-7R	RIGHT LANE MUST TURN RIGHT	36"X36"	X		10BWG	1	SA	P		
	4	R6-1R, R3-8LL	ONE WAY, INTERSECTION LANE CONTROL (2 LANE, LEFT)	36"X12", 30"X30"	X		10BWG	1	SB	P		
	5	R3-9B	CENTER LANE TWO WAY LEFT TURN ONLY	24"X36"	X		10BWG	1	SA	P		
	6	R1-1, 2x D3-1	STOP, 114TH ST, NORWOOD AVE *	36"X36"	X		10BWG	1	SB	P		
	7	R1-1, 2x D3-1	STOP, 114TH ST, NORFOLK AVE *	36"X36"	X		10BWG	1	SB	P		
	8	R1-1, 2x D3-1	STOP, 114TH ST, MIAMI AVE *	36"X36"	X		10BWG	1	SB	P		
3 OF 4	9	R2-1	SPEED LIMIT (45 MPH)	30"X36"	X		10BWG	1	SA	P		
	10	R3-8B	INTERSECTION LANE CONTROL (3 LANE, LEFT/STRAIGHT/RIGHT)	48"X30"	X		10BWG	1	SA	T		
	11	R3-8B	INTERSECTION LANE CONTROL (3 LANE, LEFT/STRAIGHT/RIGHT)	48"X30"	X		10BWG	1	SA	T		
	12	R2-1	SPEED LIMIT (45 MPH)	30"X36"	X		10BWG	1	SA	P		
	13	R1-1, 2x D3-1	STOP, 114TH ST, 116TH ST *	36"X36"	X		10BWG	1	SA	P		
	14	R3-7R, W16-9P	RIGHT LANE MUST TURN RIGHT, AHEAD	36"X36", 24"X12"	X		10BWG	1	SA	P		
4 OF 4	15	R3-9B	CENTER LANE TWO WAY LEFT TURN ONLY	24"X36"	X		10BWG	1	SA	P		
	16	R3-8B	INTERSECTION LANE CONTROL (3 LANE, LEFT/STRAIGHT/RIGHT)	48"X30"	X		10BWG	1	SA	T		
	17	R3-7R	RIGHT LANE MUST TURN RIGHT	36"X36"	X		10BWG	1	SA	P		
	18	R2-1	SPEED LIMIT (45 MPH)	30"X36"	X		10BWG	1	SA	P		

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS) Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

* CITY STREET NAME SIGNS AND MOUNTING BRACKETS WILL BE PROVIDED TO THE CONTRACTOR BY THE CITY OF LUBBOCK. CONTRACTOR IS RESPONSIBLE FOR COORDINATING INSTALLATION. THIS IS SUBSIDIARY TO OTHER SIGN ITEMS.

Texas Department of Transportation — Traffic Operations Division Standard

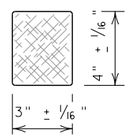
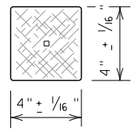
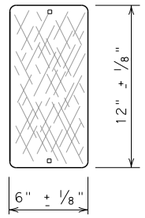
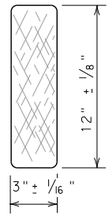
SUMMARY OF SMALL SIGNS

SOSS

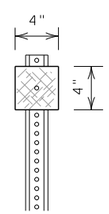
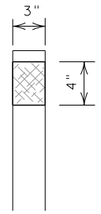
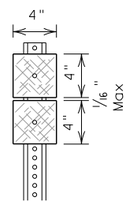
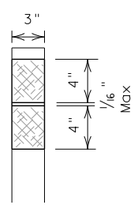
FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-16 8-16	0905	06	118	CS
	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		135

DATE: FILE: ...Design Files\Details\sums16.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
- S = Single
- D = Double

COLOR OF REFLECTORS
- W = White
- Y = Yellow
- R = Red

REFLECTOR UNIT SIZE
- 1 or 2

TYPE OF POST OR DELINEATOR
- WC = Wing Channel Post
- YFLX = Yellow Flexible Post
- WFLX = White Flexible Post
- BRF = Barrier Reflector

TYPE OF MOUNT
- GND = Embedded (drivable or set in concrete)
- CTB = Concrete Barrier Mount
- GF1 or GF2 = Guard Fence Attachment
- SRF = Surface Mount

DIRECTION
- If Required
- BI = Bi-Directional
- BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
- 1, 2, 3, or 4

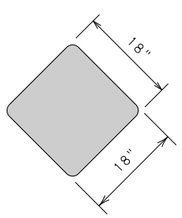
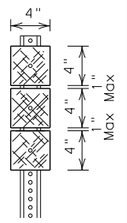
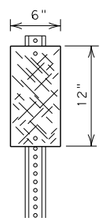
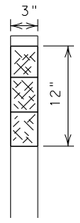
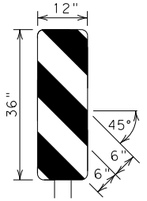
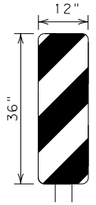
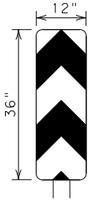
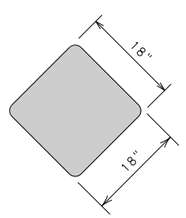
NUMBER OF REFLECTORS OR DIRECTION
- X = 3-Size 2 reflector units (Type 2 only)
- Y = 1-Size 3 reflector unit (Type 2 only)
- Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
- L = Left Side (Type 3 Object Marker only)
- R = Right Side (Type 3 Object Marker only)
- C = Center (Type 3 Object Marker only)

TYPE OF POST
- WC = Wing Channel Post
- WFLX = White Flexible Post
- TWT = Thin Walled Tubing

TYPE OF MOUNT
- GND = Embedded (drivable)
- SRF = Surface Mount
- WAS = Wedge Anchor Steel
- WAP = Wedge Anchor Plastic

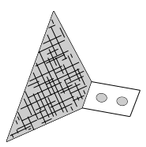
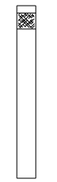
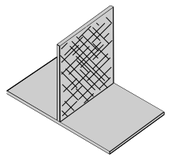
DIRECTION
- If Required
- BI = Bi-Directional

OBJECT MARKERS

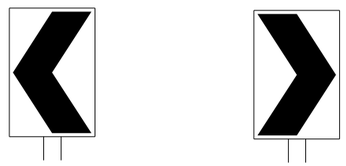
	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

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

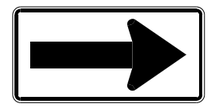
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	
NOTE	1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).			

ONE DIRECTION LARGE ARROW

DEVICE	 W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

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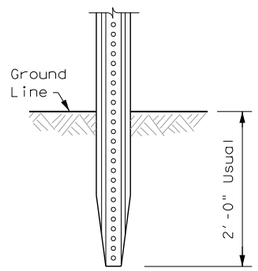
POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

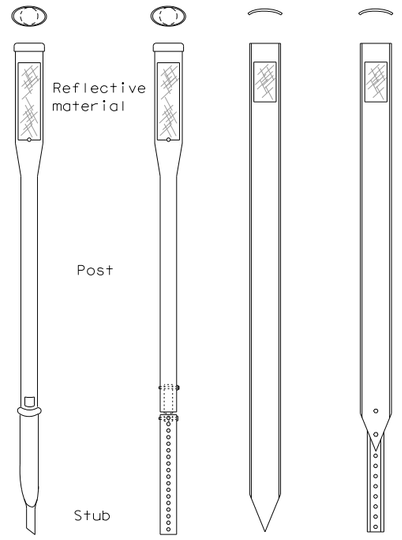


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

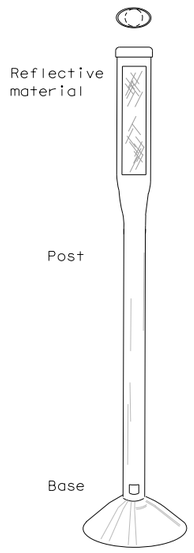
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



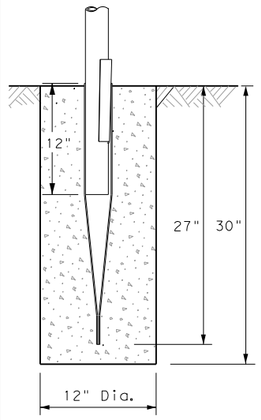
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

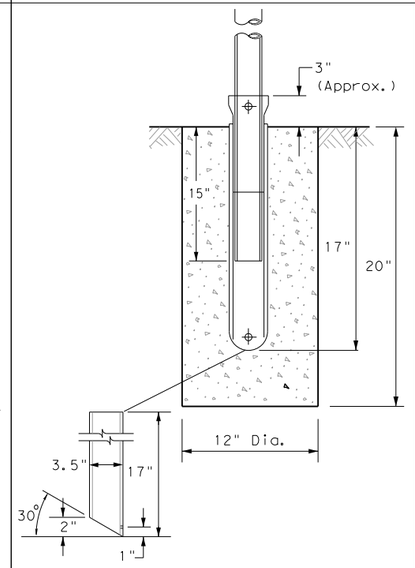
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

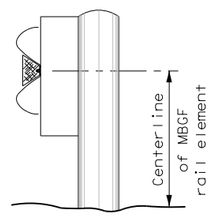
NOTE

1. Install per manufacturer's recommendations.

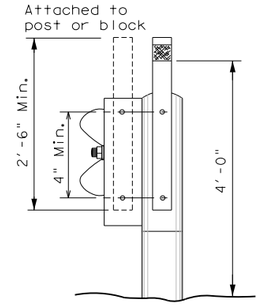
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

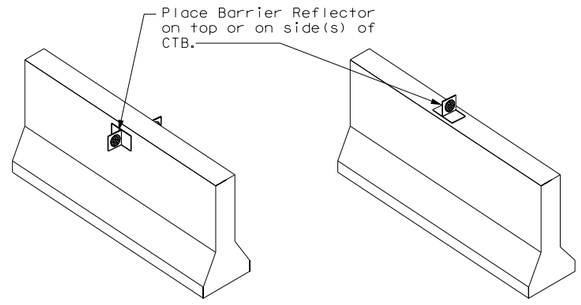
GF1



GF2



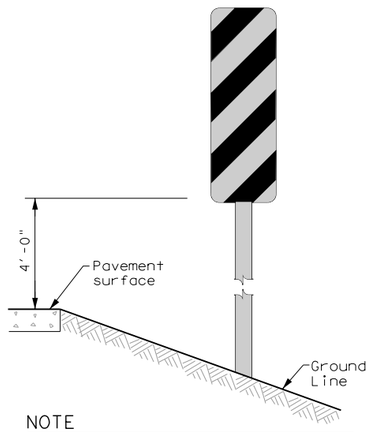
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

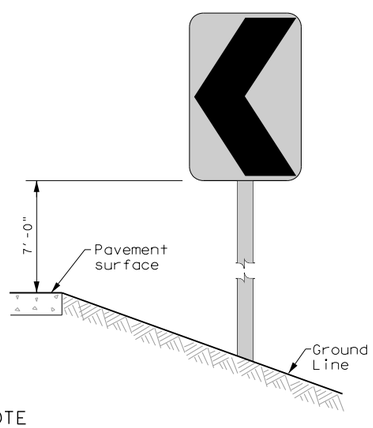
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

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

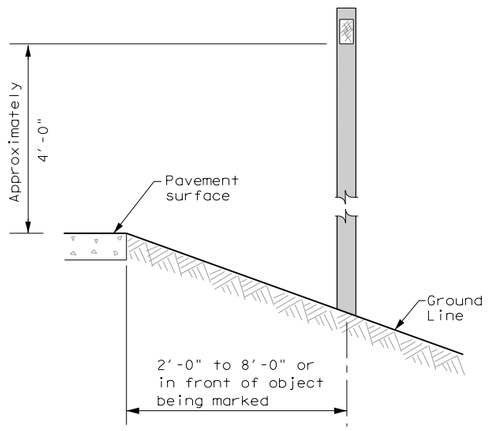
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

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

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

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DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

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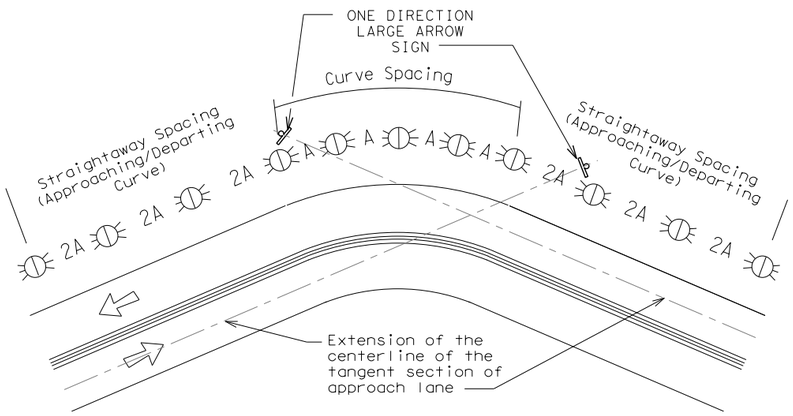
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

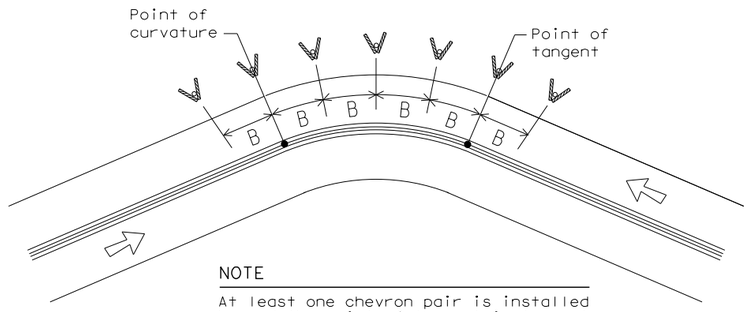
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

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

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

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

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

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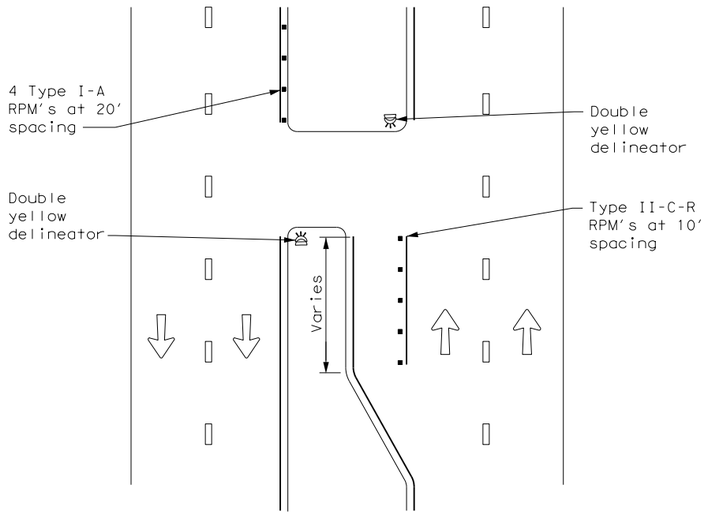
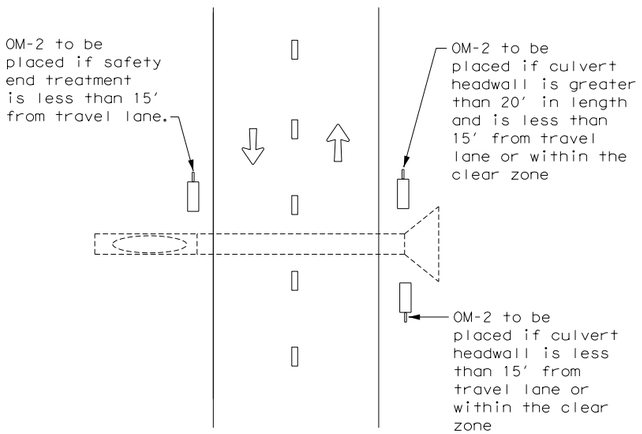
CROSSOVERS



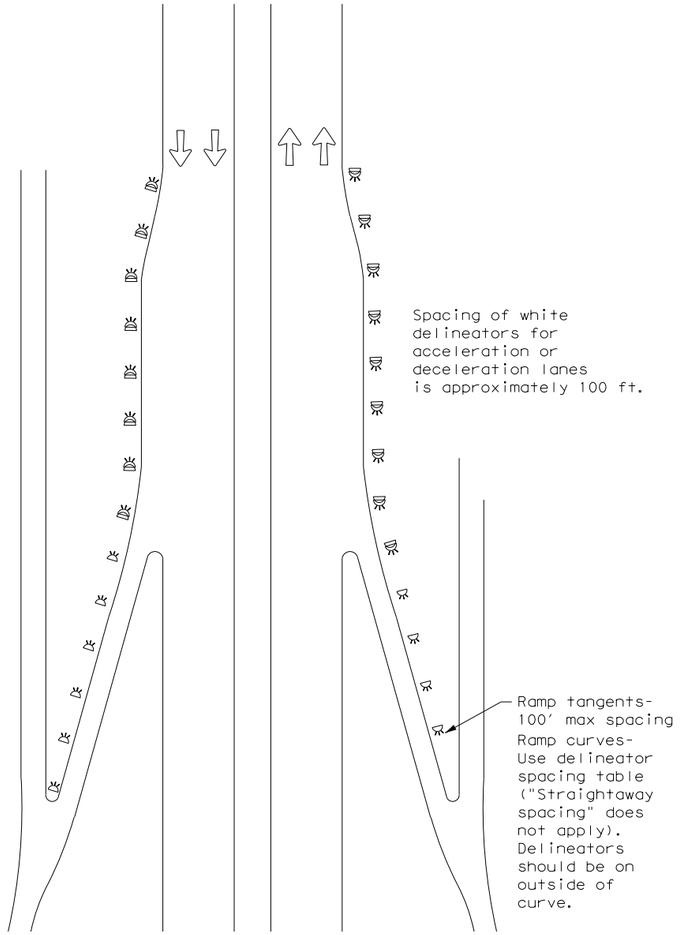
DETAIL 1

FOR CULVERTS WITHOUT MBGF



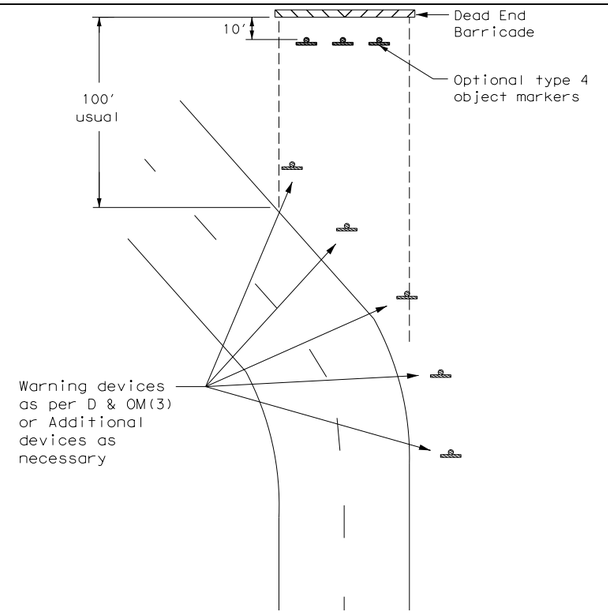
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



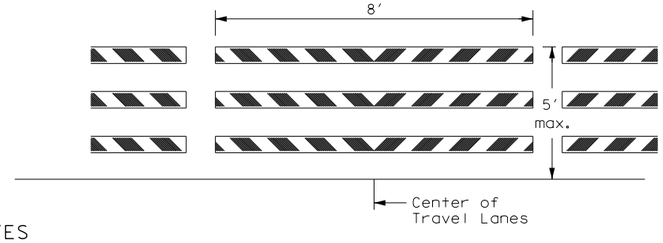
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

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DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

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GENERAL NOTES FOR ALL ELECTRICAL WORK

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

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

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

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

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

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

CONDUIT

A. MATERIALS

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

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

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

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

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

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

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

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

FILE:	ed1-14.dgn	DN:		CK: DKK	DW:	CK: DWK
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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.

2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.

3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.

4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.

2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.

3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.

4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.

5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.

6. Support conductors in illumination poles with a J-hook at the top of the pole.

7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.

8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.

9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.

10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.

11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.

2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.

3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.

4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.

5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

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

B. CONSTRUCTION METHODS

1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.

2. Do not place ground rods in the same drilled hole as a timber pole.

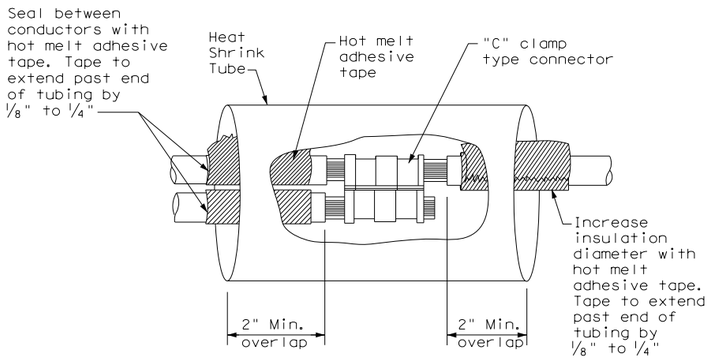
3. Install ground rods so the imprinted part number is at the upper end of the rod.

4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.

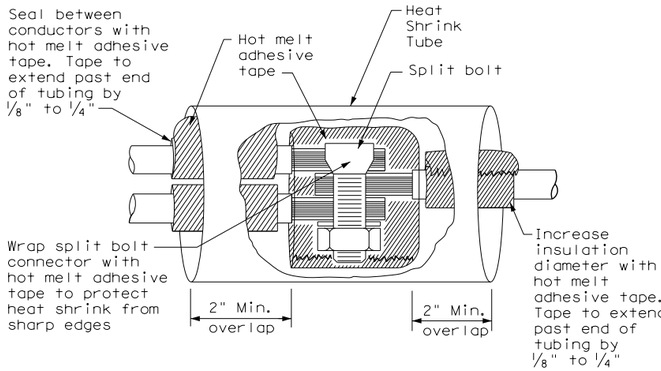
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

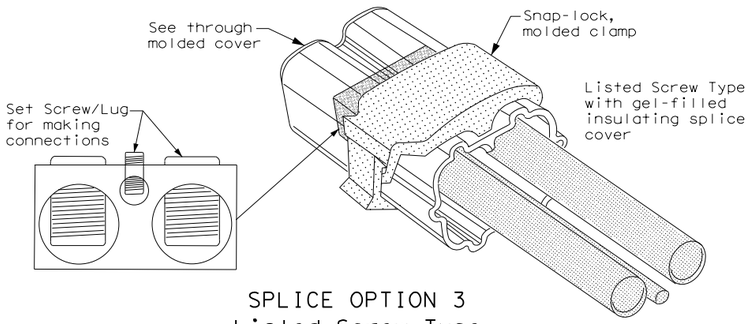
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

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Traffic Operations Division Standard

ELECTRICAL DETAILS
CONDUCTORS

ED(3)-14

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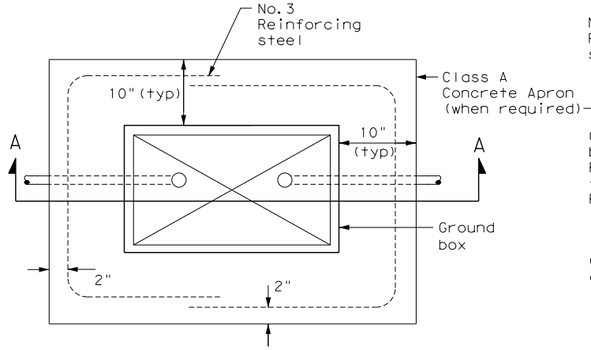
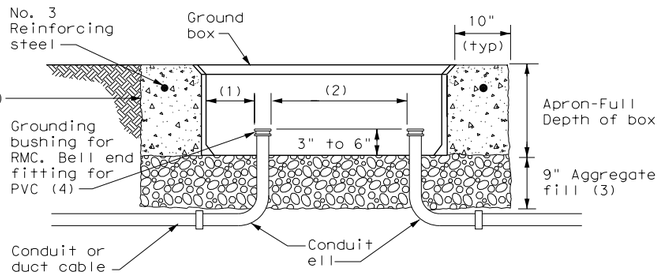


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

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

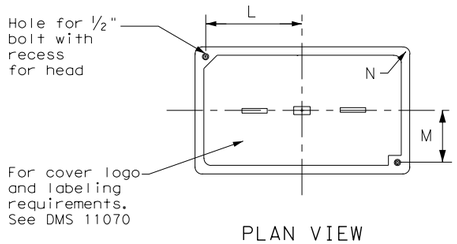
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

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

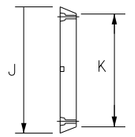
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

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

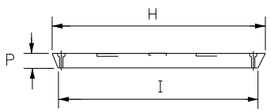
GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW



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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ELECTRICAL SERVICES NOTES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SERVICE ASSEMBLY ENCLOSURE

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

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

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

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

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

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

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

PHOTOELECTRIC CONTROL

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

* ELECTRICAL SERVICE DATA

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

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

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

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

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

Schematic Type

Service Voltage V / V

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

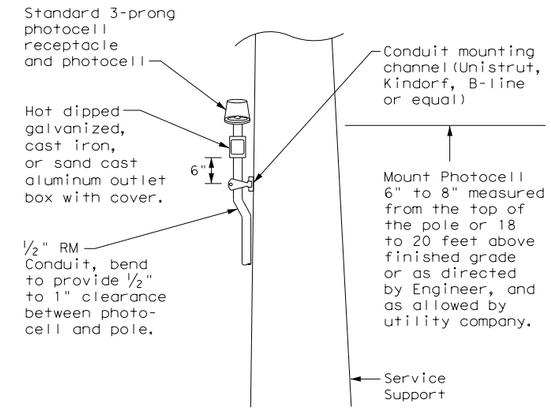
(SS)= Safety Switch Ahead of Meter-Check with Utility
(NS)= No safety Switch Ahead of Meter-Check with Utility

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

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

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

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



TOP MOUNTED PHOTOCELL

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

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Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

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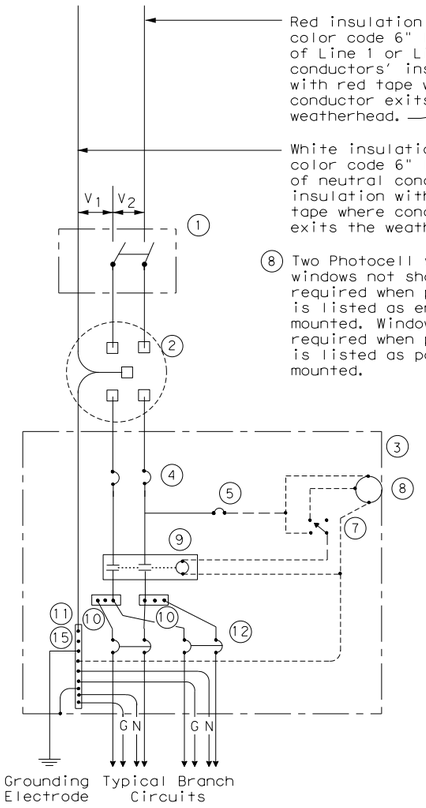
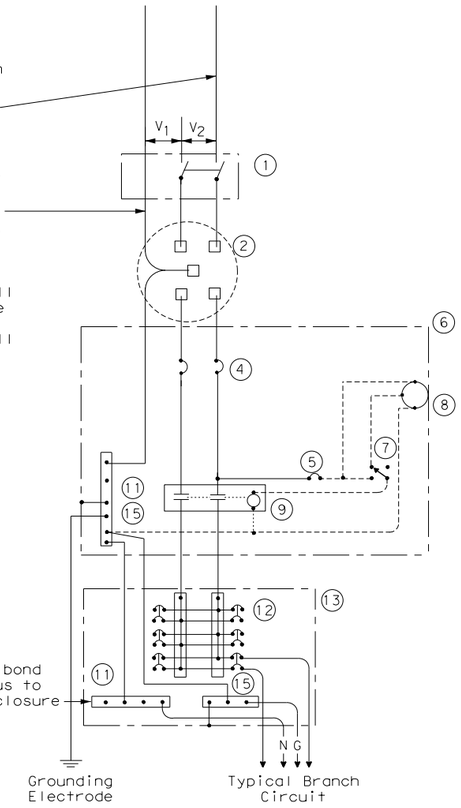
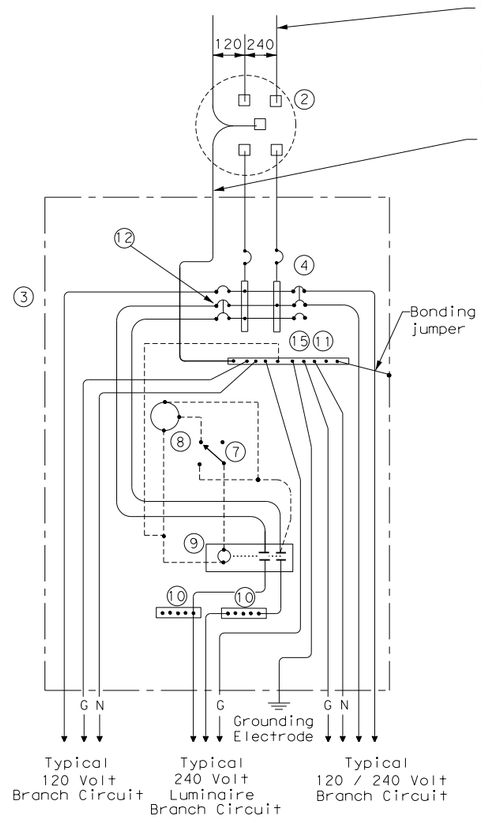


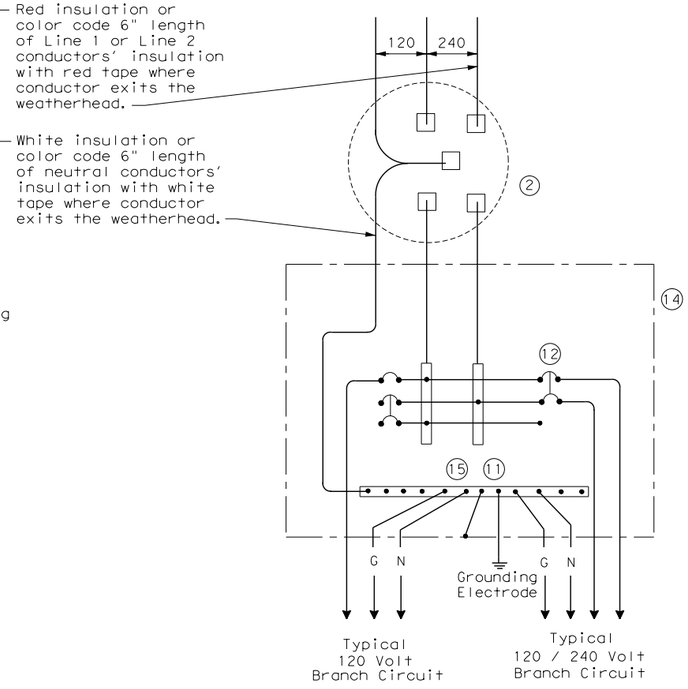
SCHEMATIC TYPE A
THREE WIRE



SCHEMATIC TYPE C
THREE WIRE



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



SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

ED(6)-14

FILE: ed6-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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SUPPORT TYPE STEEL POLE (SP) AND STEEL FRAME (SF)

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

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

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

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

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

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

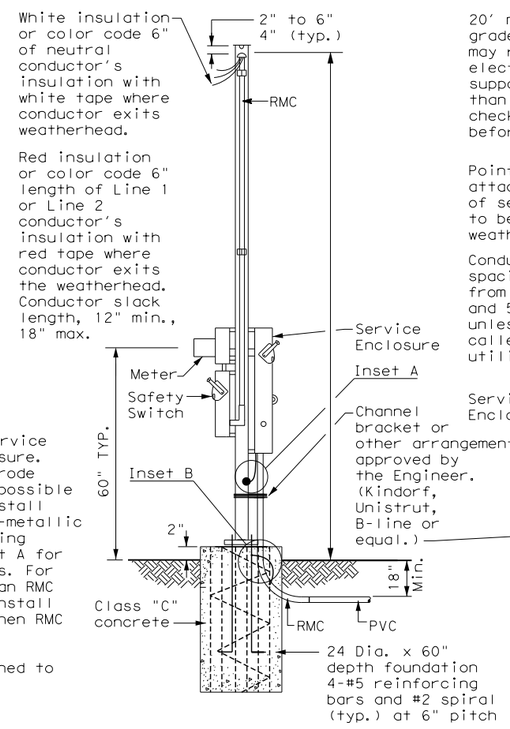
7. Drill and tap steel poles and frames for ½ in. X 13 UNC tank ground fitting. For steel pole service supports, provide and install tank ground fitting 4 in. to 6 in. below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode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

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

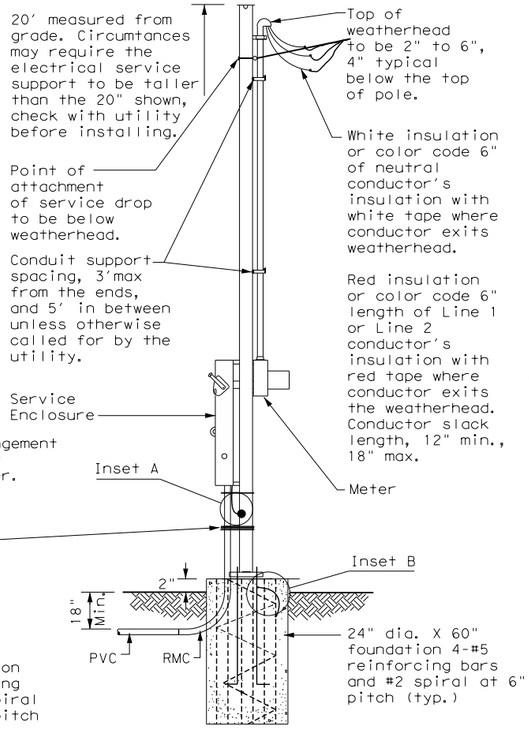
9. Provide ¼" - 20 machine screws for bonding. Do not use sheet metal screws. Remove all non-conductive material at contact points. Terminate bonding jumpers with listed devices. Install minimum size 6 AWG stranded copper bonding jumpers. Make up all threaded bonding connections wrench tight.

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

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

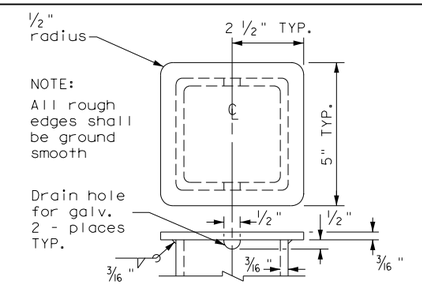


WITH SAFETY SWITCH

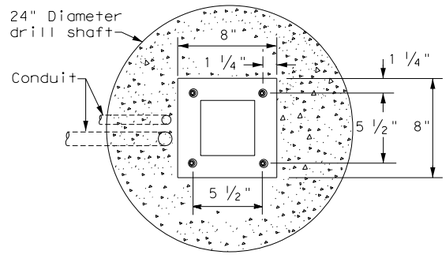


WITHOUT SAFETY SWITCH

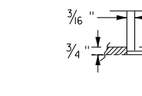
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE



POLE TOP PLATE

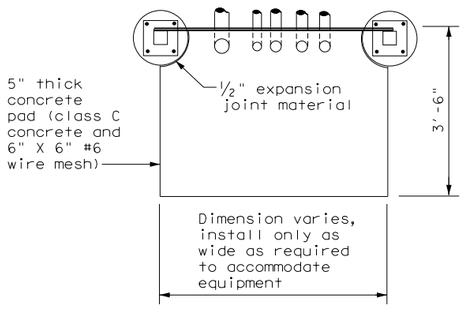


BASE PLATE DETAIL



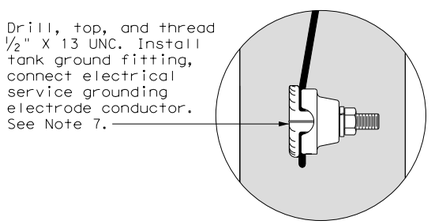
BOTTOM OF POLE

SERVICE SUPPORT TYPE SF & SP



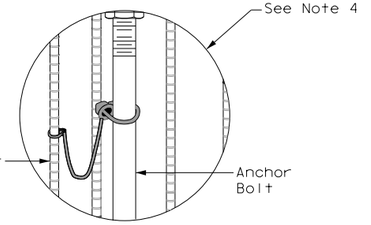
TOP VIEW

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

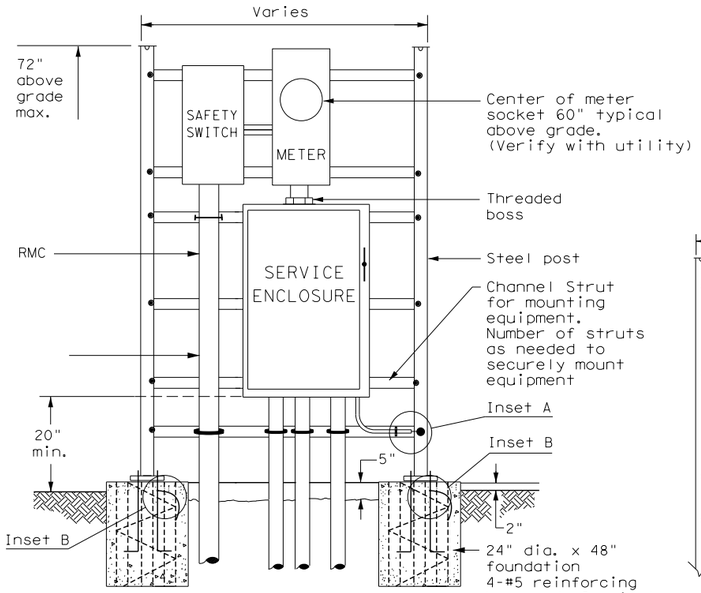


FRONT VIEW

INSET A

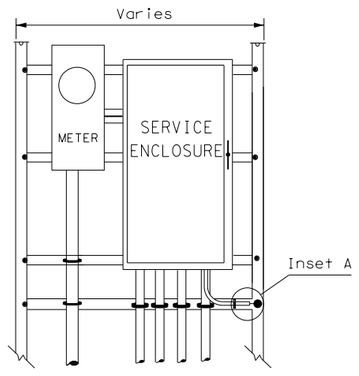


INSET B

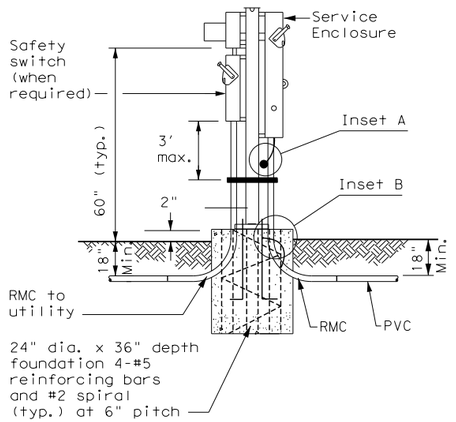


WITH SAFETY SWITCH

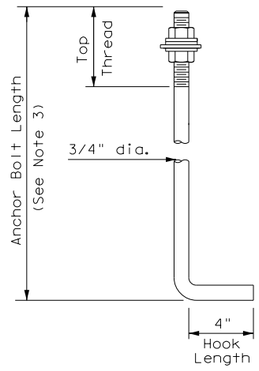
FRONT VIEW



WITHOUT SAFETY SWITCH



WITH SAFETY SWITCH



HOOKED ANCHOR DETAIL

SERVICE SUPPORT TYPE SF(U) - UNDERGROUND SERVICE

SERVICE SUPPORT TYPE SP(U) - UNDERGROUND SERVICE

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP

ED(7)-14

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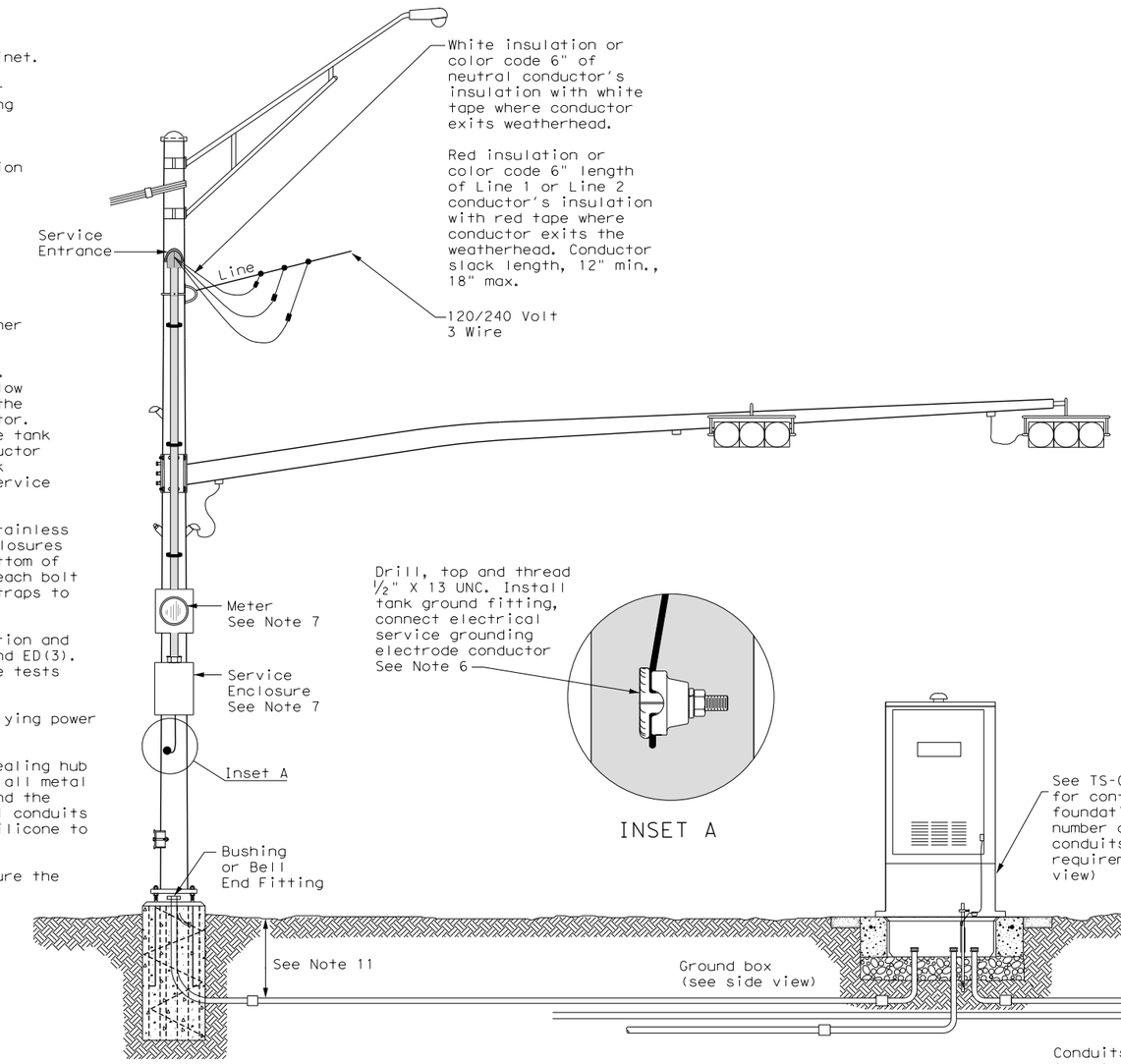
TRAFFIC SIGNAL NOTES

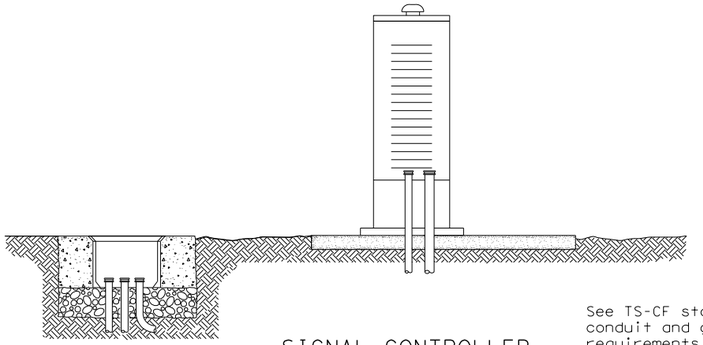
1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material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



SIGNAL POLE WITH SERVICE

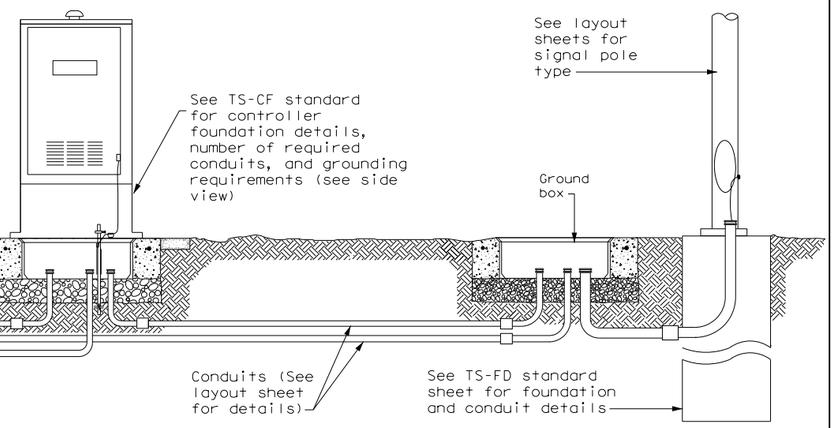
Type T electrical service mounted on signal pole shown as an example. See electrical details, layout sheets, and electrical service data chart for additional details.

INSET A



SIGNAL CONTROLLER SIDE VIEW

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



SIGNAL CONTROLLER FRONT VIEW

SIGNAL POLE

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS
ED(8)-14

FILE: ed8-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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PEDESTAL SERVICE NOTES

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

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

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

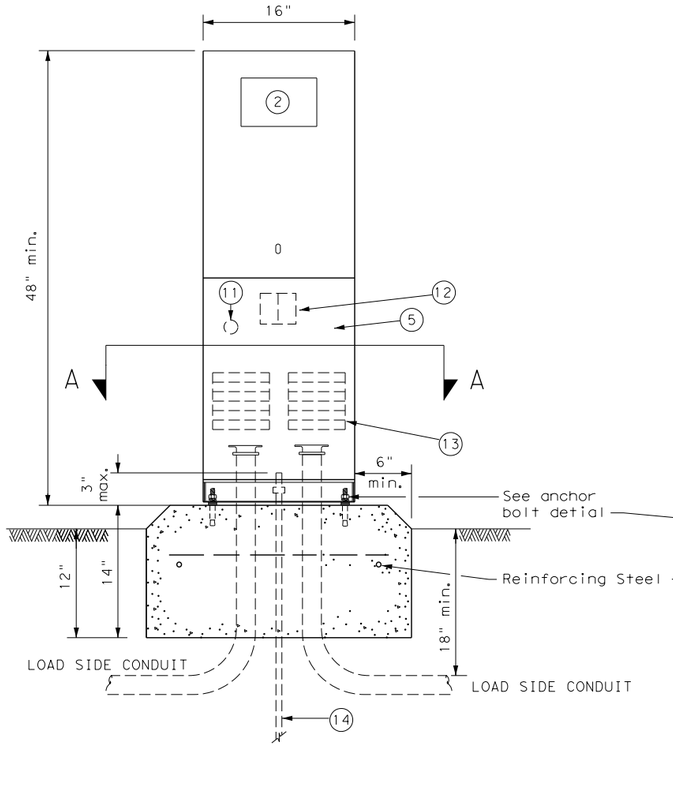
4. Provide #4 reinforcing steel for foundations in accordance with Item 440, "Reinforcement for Concrete."

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

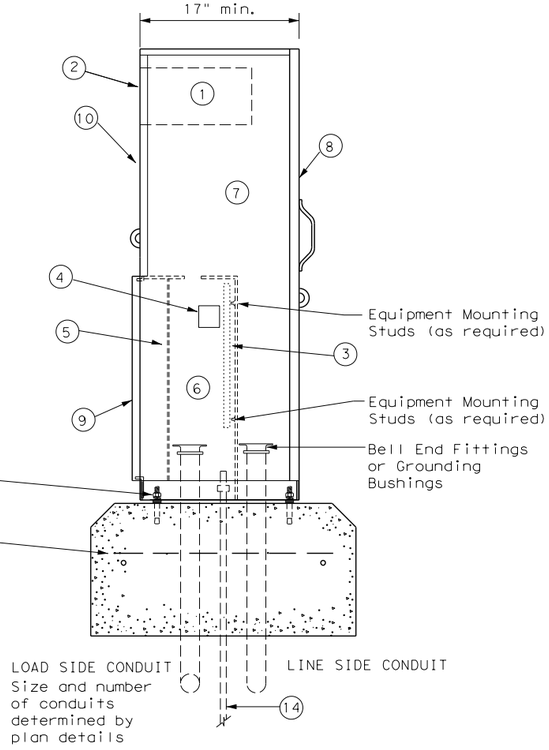
6. Finish top of concrete foundation in a neat and workmanlike manner. If leveling washers are used, ensure no more than ⅛ in. gap at any corner. Do not exceed a maximum dip or rise in the foundation of ⅛ in. per foot. When properly installed, ensure the top of the service enclosure is level front to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

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

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

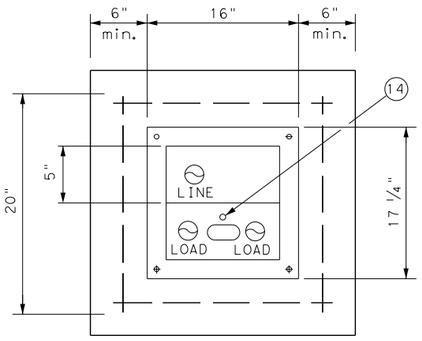


FRONT VIEW

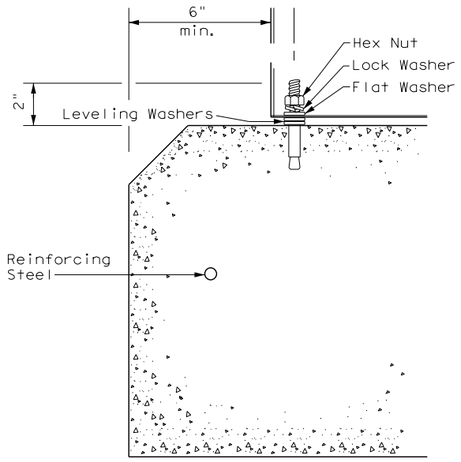


SIDE VIEW

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



SECTION A-A



ANCHOR BOLT DETAIL

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

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
ELECTRICAL SERVICE SUPPORT
PEDESTAL SERVICE TYPE PS

ED(9)-14

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TIMBER POLE(TP)SERVICE SUPPORT NOTES

1. Ensure electrical service support is a class 5 treated timber pole as per Item 627 "Treated Timber Poles." Embed timber pole to depth required in Item 627.

2. Conduit and electrical conductors attached to the electrical service pole and underground within 12 in. of service pole are not paid for directly but are subsidiary to the electrial service.

3. Install pole-top mounted photocell (T) on north side of pole, or in service enclosure (E) as required. See Electrical Service Data chart in plan set.

4. Gain pole as required to provide flat surface for each channel. Gain timber pole to 5/8 in. max. depth and 1 7/8 in. max. height. Gain pole in a neat and workmanlike manner.

5. Mount meter and service equipment on stainless steel or galvanized channel (Unistrut, Kindorf, or equal). Provide channel sized 1 in. to 3 3/4 in. maximum depth, and 1½ in. to 1⅝ in. maximum width. File smooth the cut ends of galvanized channel and paint with zinc rich paint before installing on pole. Secure each channel section to timber pole with two galvanized or SS lag bolts, ¼ in. minimum diameter by 1½ in. minimum length. Use a galvanized or SS flat washer on each lag bolt. Do not stack channel.

6. When excess length must be trimmed from poles, trim from the top end only.

(1) Class 5 pole, height as required

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

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

(4) Safety switch (when required)

(5) Meter (when required)

(6) Service enclosure

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

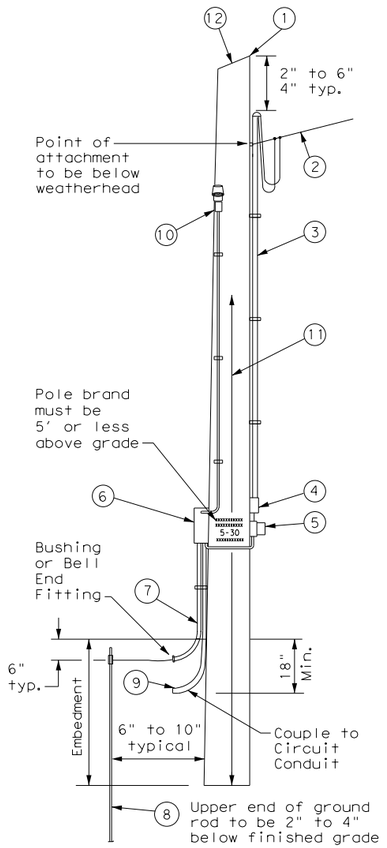
(8) 5/8 in. x 8 ft. Copper clad ground rod - drive ground rod to a depth of 2 in. to 4 in. below grade.

(9) RMC same size as branch circuit conduit.

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

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

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



SERVICE SUPPORT TYPE TP (O)

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES GC, OC, & TP

ED(10)-14

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BATTERY BOX GROUND BOXES NOTES

A. MATERIALS

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

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

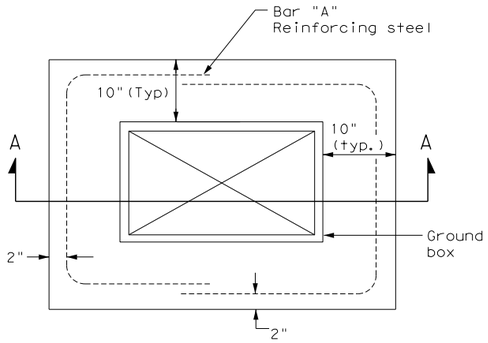
B. CONSTRUCTION METHODS

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

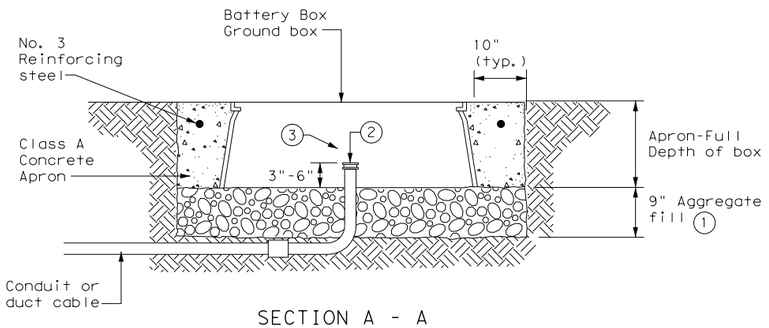
2. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting battery box ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure the aggregate bed is in place and is a minimum of 9 in. deep prior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

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

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



PLAN VIEW



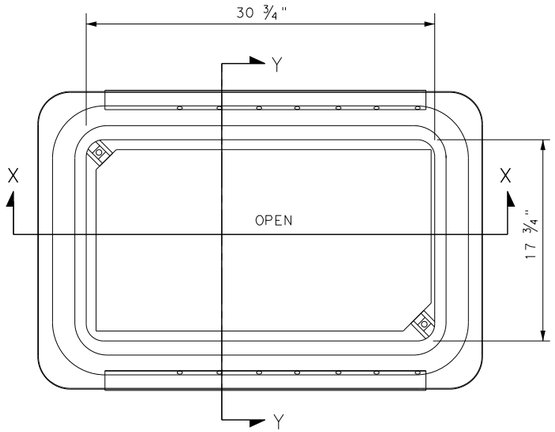
SECTION A - A

APRON FOR BATTERY BOX GROUND BOXES

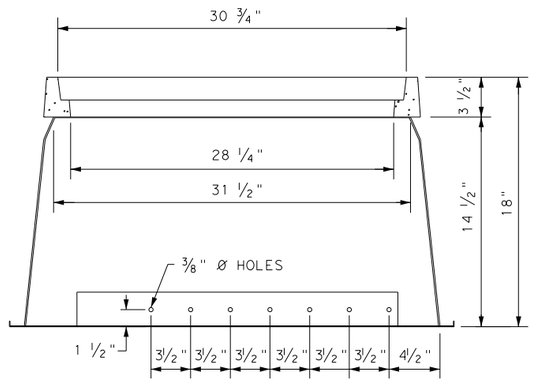
(1) Place aggregate under the box and not in the box. Aggregate should not encroach on the interior volume of the box.

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

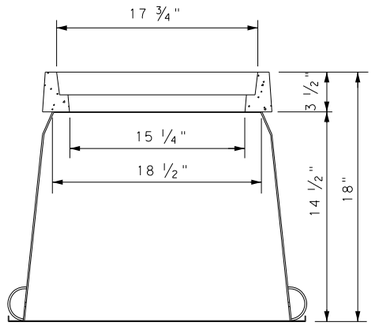
(3) Install all conduits in a neat and workmanlike manner.



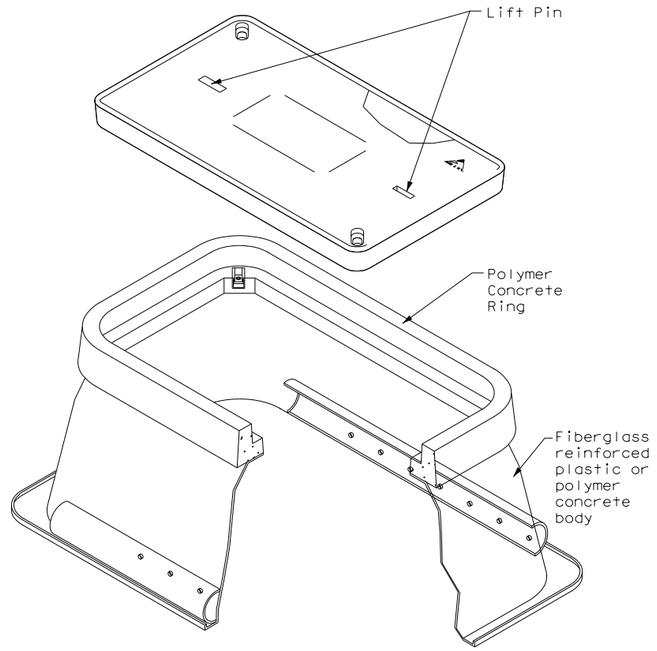
BATTERY BOX TOP VIEW



SECTION X-X



SECTION Y-Y



Texas Department of Transportation

Traffic Operations Division Standard

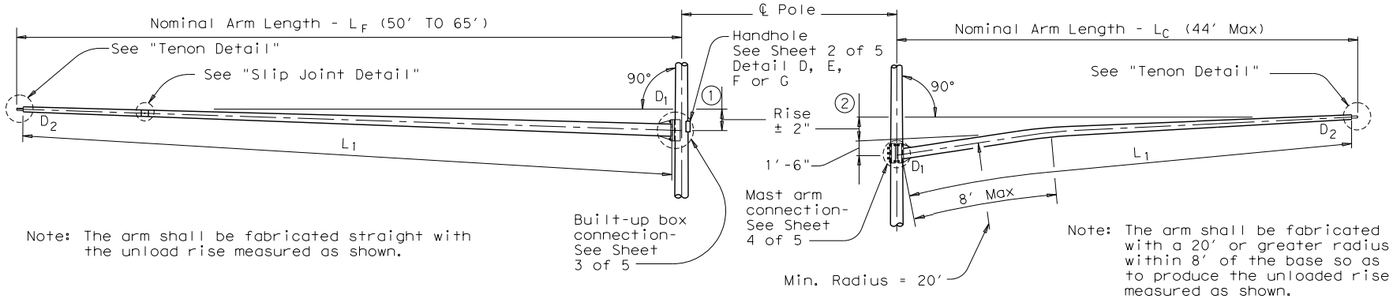
ELECTRICAL DETAILS
BATTERY BOX
GROUND BOXES

ED(12)-14

FILE: ed12-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		149

71M

DATE:
FILE:



Note: The arm shall be fabricated straight with the unload rise measured as shown.

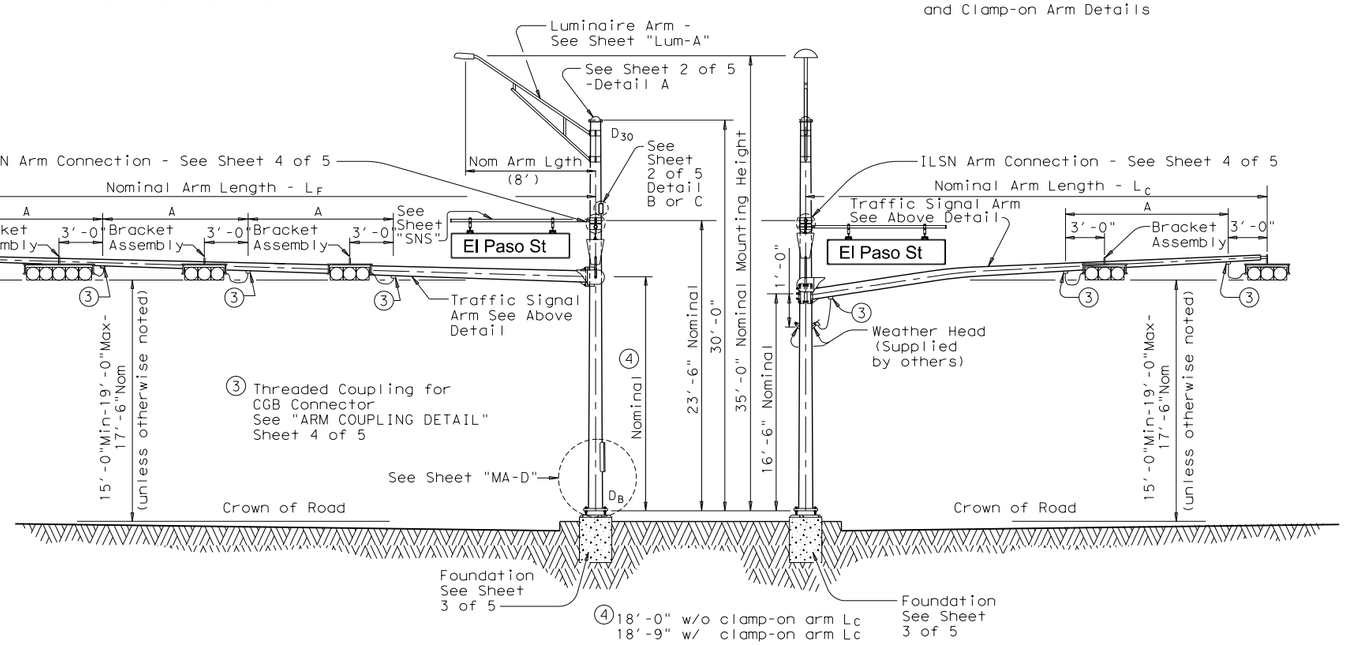
Note: The arm shall be fabricated with a 20' or greater radius within 8' of the base so as to produce the unloaded rise measured as shown.

FIXED MOUNT TRAFFIC SIGNAL ARM

① See Sheet 3 of 5 for Arm Rise

CLAMP-ON TRAFFIC SIGNAL ARM (IF REQUIRED)

② See Sheet 4 of 5 for Arm Rise and Clamp-on Arm Details

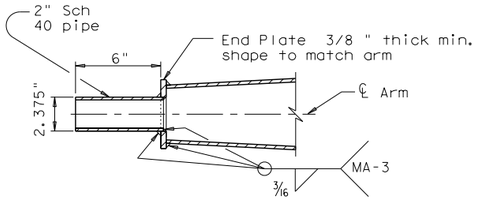


ELEVATION
(Showing fixed mount arm)

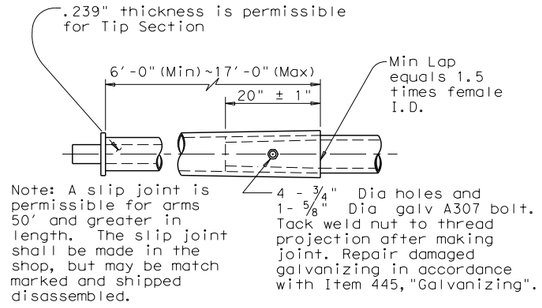
STRUCTURE ASSEMBLY

ELEVATION
(Showing clamp-on arm)

TABLE OF DIMENSIONS "A"										
Arm Length	24'	28'	32'	36'	40'	44'	50'	55'	60'	65'
Arm Type II	10'	11'	12'	13'						
Arm Type III			10'	11'	12'	12'				
Arm Type IV							12'	12'	12'	12'



TENON DETAIL



Note: A slip joint is permissible for arms 50' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

SLIP JOINT DETAIL (FIXED MOUNT ARM)

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed can be either 100 mph or 80 mph plus a 1.3 gust factor. If clamp-on traffic signal is required, designs are based on an arm included angle of 90 degrees or more. Angles of less than approximately 75 degrees will require a special design.

Poles are designed to support one 8'-0" luminaire arm, two 9'-0" internally lighted street name (ILSN) signs and two traffic signal arms with limited length combinations.

Each arm with its related attachment is shown below

Arm	Equivalent DL ⑤	WL EPA ⑤⑥
8' Luminaire Arm	Luminaire 60 lbs	1.6 sq ft
9' ILSN Arm	Sign 85 lbs	11.5 sq ft
50' to 65' Fixed Mount Arm	Signal Loads 310 lbs	52 sq ft
Up to 44' Clamp-on Arm	Signal Loads 180 lbs	32.4 sq ft

⑤ Equivalent dead load plus horizontal wind load applied at the end of arm except ILSN arm, which applied 4.5' from the centerline of the pole.

⑥ Effective projected area (actual area times drag coefficient) for the application of horizontal wind load.

Except as noted in Sheet 1 thru 5 of 5, other details not covered shall refer to Standard Sheet "MA-D" for pole details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Material, fabrication tolerances, and shipping practices shall also meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing" after fabrication.

Deviations from the details and dimensions shown herein require submission of shop drawings in accordance with the Item 441, "Steel Structures". Alternate designs are not acceptable.

Installation of damping plate for the long mast arm is not recommended.

Provision of the bracket assembly used to support the traffic signal heads shall be under the direction of the Engineer for approval.

Design also conforms to NCHRP Report 412 for fatigue resistance except that there are no stiffeners at the base plate. TxDOT is conducting tests to determine if stiffeners at the base plate will or will not result in optimal performance; depending upon the results of the tests, poles may need a retrofit to ensure optimal fatigue performance.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)
LMA(1)-12

Sheet 1 of 5

DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT

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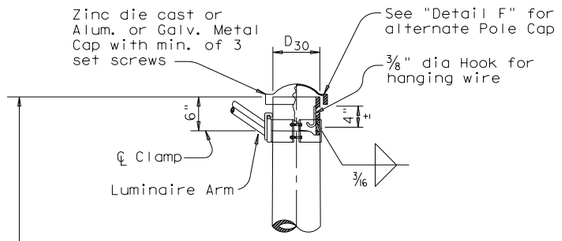
CONT	SECT	JOB	HIGHWAY
0905	06	118	CS

DIST	COUNTY	SHEET NO.
LBB	LUBBOCK	150

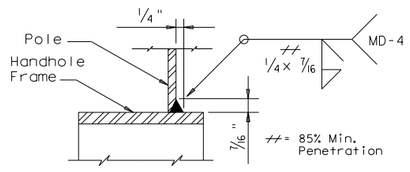
131A

DATE:
FILE:

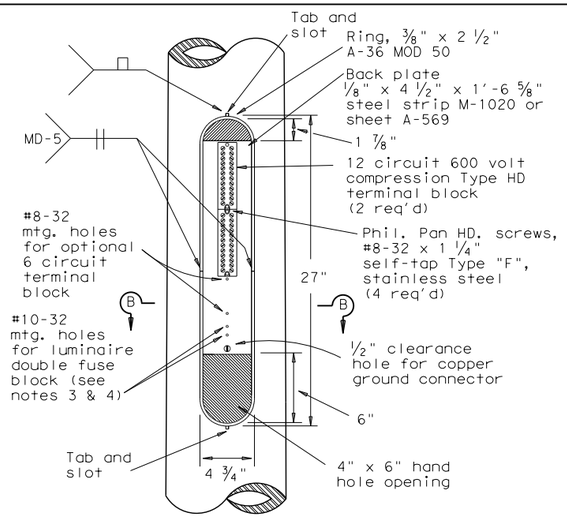


DETAIL A

(for pole with luminaire)



DETAIL H

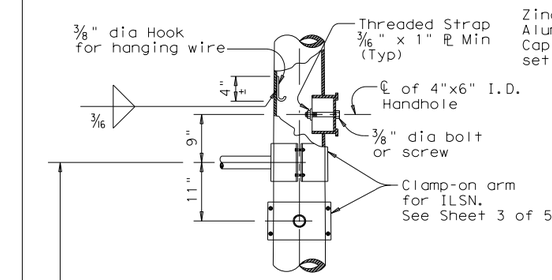


ACCESS COMPARTMENT

MATERIALS	
Round Shafts or Polygonal Shafts (7)	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 (8)
Plates (7)	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325, or A449 except where noted
Pin Bolts	ASTM A325
Pipe (7)	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

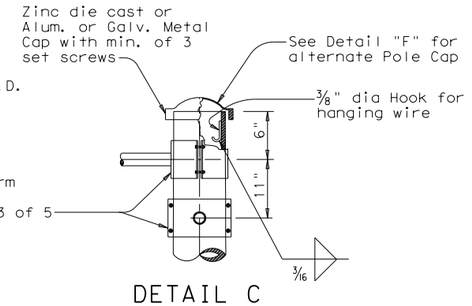
(7) ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F, or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

(8) ASTM A1011 SS Gr.50 shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

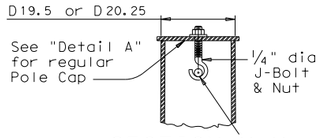


DETAIL B

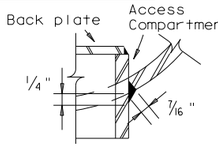
(If ILSN applied)



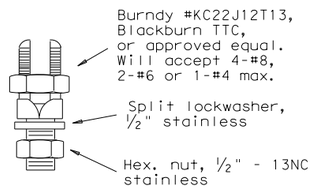
DETAIL C



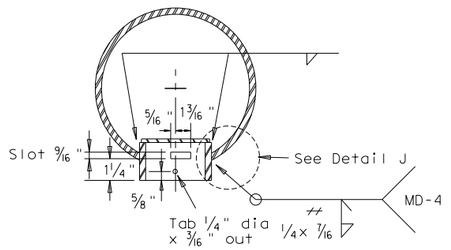
SECTION Y-Y



DETAIL J



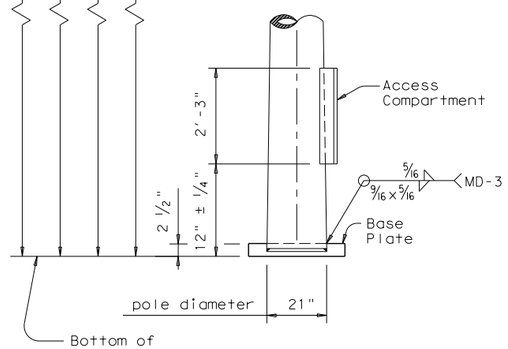
COPPER GROUND CONNECTOR



SECTION B-B

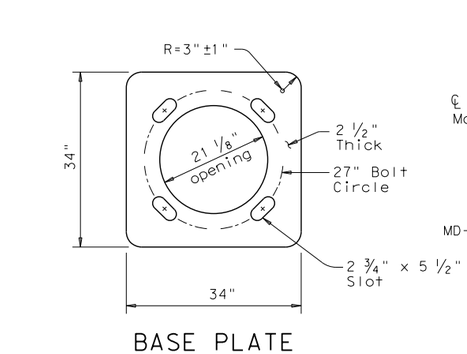
// = 85% Min. Penetration

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.



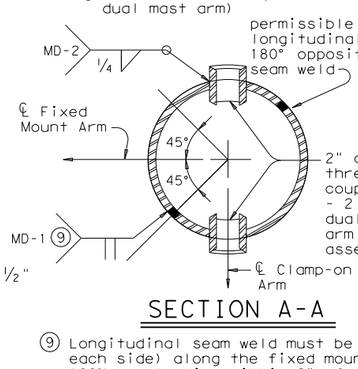
DETAIL D

(for 30' pole with luminaire and ILSN sign)



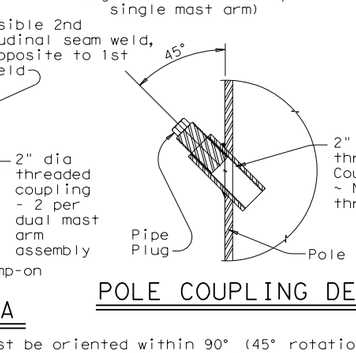
DETAIL E

(for 24' pole with ILSN sign and no luminaire, single or dual mast arm)



DETAIL F

(for 20.25' pole with no ILSN sign and no luminaire, dual mast arm)



DETAIL G

(for 19.5' pole with no ILSN sign and no luminaire, single mast arm)

ACCESS COMPARTMENT NOTES:

1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

POLE ELEVATION

BASE PLATE

SECTION A-A

POLE COUPLING DETAIL

(9) Longitudinal seam weld must be oriented within 90° (45° rotation each side) along the fixed mount arm. 60% min penetration required, 100% penetration within 6" of circumferential base weld.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 2 of 5

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DN: JSY	CK: ARC	DW: TGG	CK: JSY

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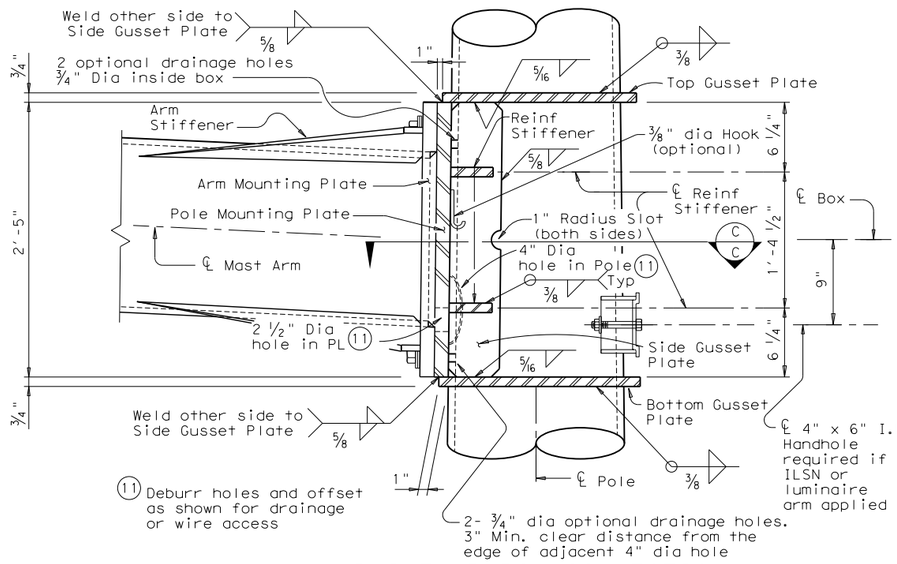
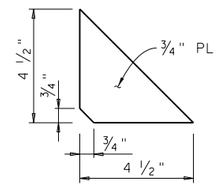
CONT	SECT	JOB	HIGHWAY
0905	06	118	CS
DIST	COUNTY		SHEET NO.
LBB	LUBBOCK		151

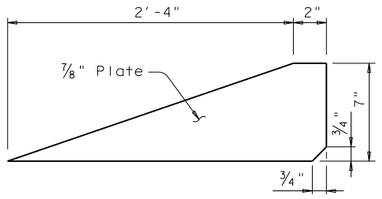
131B



BUILT-UP BOX CONNECTION

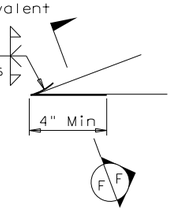


REINFORCING STIFFENER



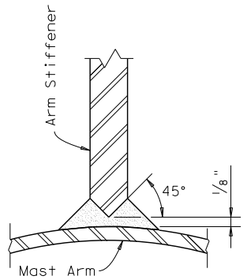
ARM STIFFENER
(Cut to match arm inclination and taper)

Provide Detail shown in SECTION F-F or equivalent 100% complete joint penetration weld from both sides.



Only 4" length at tip of Arm Stiffener requires a complete joint penetration weld. Smooth weld radius to connect Stiffener. Only a fillet weld is required for the remaining weld length.

DETAIL "K"



SECTION F-F

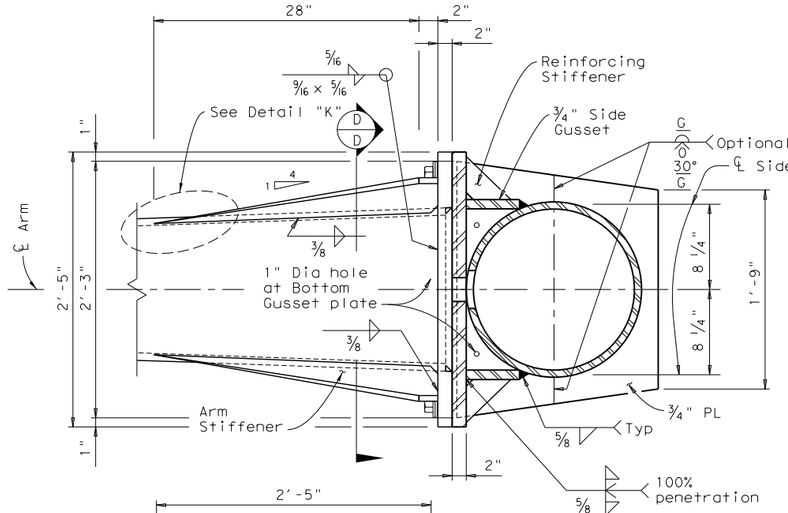
Fixed Mount Arm L_F	ROUND POLES (13)					Foundation Type
	D_B	$D_{19.5}$ or $D_{20.25}$	D_{24}	D_{30}	(12) thk	
ft.	in.	in.	in.	in.	in.	
50', 55' 60', 65'	21.0	18.2	17.6	16.8	.3125	48-A

Fixed Mount Arm L_F	ROUND ARMS (13)				
	L_1	D_1	D_2	(12) thk	Rise
ft.	ft.	in.	in.	in.	
50	49	18.5	11.7	.3125	3'- 3"
55	54	18.5	11.0	.3125	3'- 7"
60	59	18.5	10.3	.3125	3'-11"
65	64	18.5	9.6	.3125	4'- 4"

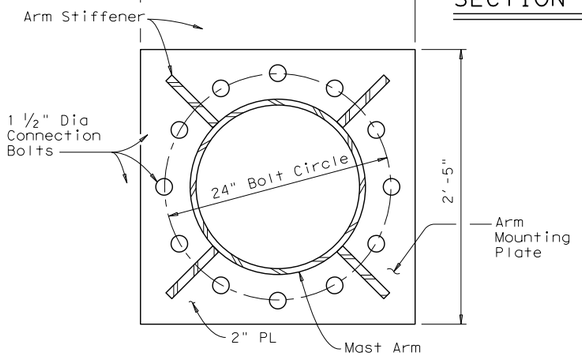
D_B = Pole Base O.D.
$D_{19.5}$ = Pole Top O.D. with no Luminaire and no ILSN (single mast arm)
$D_{20.25}$ = Pole Top O.D. with no Luminaire and no ILSN (dual mast arm)
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L_F = Fixed Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

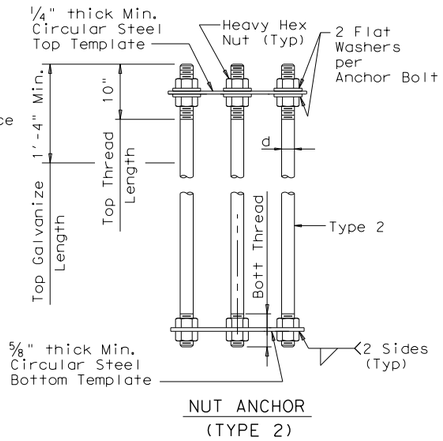
(13) Shaft profile 16-sided or 18-sided is considered to be equivalent to round section.



SECTION C-C

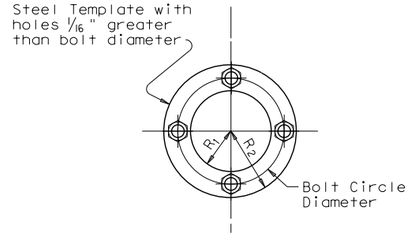


SECTION D-D



NUT ANCHOR
(TYPE 2)

ANCHOR BOLT ASSEMBLY



TEMPLATE DETAIL

ANCHOR BOLT & TEMPLATE SIZE						
Bolt Dia in.	Length ‡	Top Thread	Bottom Thread	Bolt Circle	R_2	R_1
2 1/2"	5'-2"	10"	6 1/2"	27"	16"	11"

‡ Min dimension given, longer bolts are acceptable.

FOUNDATION DESIGN TABLE													
FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		DRILLED SHAFT LENGTH-ft (16), (17), (18)			ANCHOR BOLT DESIGN (14)				FOUNDATION DESIGN LOAD (15)		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
				10	15	40							
48-A	48"	20 #9	#4 at 6"	21.9	19.5	14.7	2 1/2"	55	27"	2	490	10	50' to 65' Mast arm assembly.

SEE SHEET "TS-FD" FOR ADDITIONAL DETAILS.

(14) Anchor bolt design develops the foundation capacity given under Foundation Design Laods.

(15) Foundation Design Loads are the allowable moments and shears at the base of the structure.

(16) Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

(17) If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

(18) Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

GENERAL NOTES:

Built-up Box Connection: For the welded arm-to-pole connection as a build-up box configuration illustrated here is an example only, fabricators are required to submit a shop drawing of box connection for approval. The drawing shall specify the details of each box element, welds of arm-to-pole connection, arm-to-plate socket connection, and arm rise creation. Specify the proper location of drain holes along the pole. 2 1/2" dia hole in the pole mounting plate and 4" dia hole in the pole need to be aligned for wiring access or drainage. Arm stiffeners cut to match arm inclination and taper shall also be included.

The deviation from flat for either arm or pole mounting plate shall not exceed 1/32 in., which is measured along the center of mounting plate to a radial distance of 13.5 in. The deformed-from-flat connection between arm and pole mounting plates shall not be allowed if the center of both mounting plates cannot contact directly.

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

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TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT)
(80 AND 100 MPH WIND ZONE)

Sheet 3 of 5 LMA(3)-12

DN: JSY	CK: ARC	DW: TGG	CK: JSY

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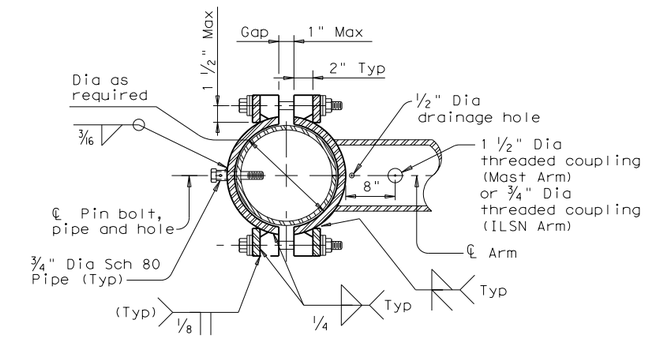
CONT	SECT	JOB	HIGHWAY
0905	06	118	CS
DIST	COUNTY		SHEET NO.
LBB	LUBBOCK		152

131C

DATE:
FILE:



CLAMP-ON CONNECTION

80 MPH WIND

Clamp-on Arm Lc	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	thk (12)	Rise	L_1	D_1	D_2	thk (12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	6.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	3.5	.179	1'-10"
32	31.0	9.0	4.7	.179	2'-1"	31.0	9.0	3.5	.179	2'-0"
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	3.5	.179	2'-1"
40	39.0	9.5	4.1	.239	2'-8"	39.0	9.5	3.5	.239	2'-3"
44	43.0	10.0	4.1	.239	2'-11"	43.0	10.0	3.5	.239	2'-6"

100 MPH WIND

Clamp-on Arm Lc	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	thk (12)	Rise	L_1	D_1	D_2	thk (12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	8.0	5.3	.179	1'-8"	19.1	8.0	3.5	.179	1'-7"
24	23.1	9.0	5.8	.179	1'-9"	23.1	9.0	3.5	.179	1'-8"
28	27.1	9.5	5.7	.179	1'-10"	27.1	10.0	3.5	.179	1'-9"
32	31.0	9.5	5.2	.239	1'-11"	31.0	9.5	3.5	.239	1'-10"
36	35.0	10.0	5.1	.239	2'-0"	35.0	10.0	3.5	.239	1'-11"
40	39.0	10.5	5.1	.239	2'-3"	39.0	11.0	3.5	.239	2'-1"
44	43.0	11.0	5.1	.239	2'-8"	43.0	11.5	4.0	.239	2'-3"

D1 = Arm Base O.D.
D2 = Arm End O.D.
L1 = Shaft Length
Lc = Clamp-on Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

CLAMP-ON ARM CONNECTION

ILSN Arm Size		A	F	4 Conn. Bolts	⅝" Dia. Pin Bolts
Sch 40 pipe Dia	Thick			Dia	No.
in.	in.	in.	in.	in.	ea
3	.216	10	4	¾	2

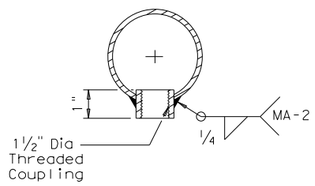
Mast Arm Size		A	F	4 Conn. Bolts	⅝" Dia. Pin Bolts
Base Dia	Thick			Dia	No.
in.	in.	in.	in.	in.	ea
6.5	.179	12	6	1	2
7.5	.179	14	8	1	2
8.0	.179	14	8	1	2
9.0	.179	16	10	1	2
9.5	.179	18	12	1 ¼	3
9.5	.239	18	12	1 ¼	3
10.0	.239	18	12	1 ¼	3
10.5	.239	18	12	1 ¼	3
11.0	.239	18	12	1 ¼	3
11.5	.239	18	12	1 ¼	3

GENERAL NOTES:

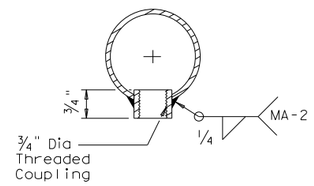
Clamp-on details are used for the second arm on dual mast arm assemblies or ILSN arm support. For a clamp-on mast arm, a maximum 1 ½" wide vertical slotted hole may be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1". For an ILSN arm, a 1 ½" diameter hole shall be cut in the front clamp plate for wire access. A matched hole shall be field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.

Where duplicate parts occur on a detail, welds shown for part shall apply to all similar parts on the detail.

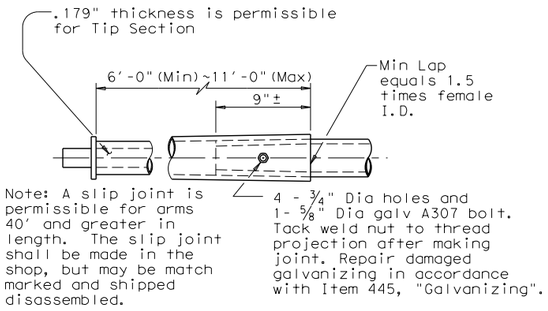
Pin bolts are required to prevent rotation of clamp-on arms under design wind forces. Pin bolts shall be ASTM A325 with threads excluded from the shear plane. Pin bolt and ¾" diameter pipe shall have 3⁄16" diameter holes for a ⅛" diameter galvanized cotter pin. Back clamp plate shall be furnished with a ¾" diameter hole for each pin bolt. An 11⁄16" diameter hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.



ARM COUPLING DETAIL



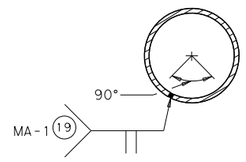
ILSN ARM COUPLING DETAIL



SLIP JOINT DETAIL (CLAMP-ON ARM)

Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

(19) Longitudinal Seam Weld must be oriented within the lower 90° of the signal arm.
60% Min penetration
100% penetration within 6" of circumferential base welds.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 4 of 5 LMA(4)-12

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	LBB	LUBBOCK		153

131D

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Shipping Parts List

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed arm connection bolts and washers, and any additional hardware listed in the table.

Nominal Arm Length	30' Poles with Luminaire: See note above plus: one (or two if ILSN attached) small hand hole, clamp-on simplex		24' Poles with ILSN: See note above plus one small hand hole		19.50' (Single Mast Arm) 20.25' (Dual Mast Arm) Poles with no Luminaire and no ILSN: See note above	
Single Mast Arm						
Lf ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
50	50L		50S		50	1
55	55L		55S		55	
60	60L		60S		60	
65	65L		65S		65	
Dual Mast Arm						
Lf ft. / Lc ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
50 / 20	5020L		5020S		5020	
50 / 24	5024L		5024S		5024	
50 / 28	5028L		5028S		5028	
50 / 32	5032L		5032S		5032	
50 / 36	5036L		5036S		5036	
50 / 40	5040L		5040S		5040	
50 / 44	5044L		5044S		5044	
55 / 20	5520L		5520S		5520	
55 / 24	5524L		5524S		5524	
55 / 28	5528L		5528S		5528	
55 / 32	5532L		5532S		5532	
55 / 36	5536L		5536S		5536	
55 / 40	5540L		5540S		5540	
55 / 44	5544L		5544S		5544	
60 / 20	6020L		6020S		6020	
60 / 24	6024L		6024S		6024	
60 / 28	6028L		6028S		6028	
60 / 32	6032L		6032S		6032	
60 / 36	6036L		6036S		6036	
60 / 40	6040L		6040S		6040	
60 / 44	6044L		6044S		6044	
65 / 20	6520L		6520S		6520	
65 / 24	6524L		6524S		6524	
65 / 28	6528L		6528S		6528	
65 / 32	6532L		6532S		6532	
65 / 36	6536L		6536S		6536	
65 / 40	6540L		6540S		6540	
65 / 44	6544L		6544S		6544	

Foundation Summary Table **

Location Ident.	Avg. N Blow/ft.	No. Each	Drill Shaft *** Length (feet) 48-A
1114TH/MEMPHIS	10	1	22
Total Drill Shaft Length			

Notes

** Foundations may be listed separately and type. Quantities are for the Contractor's information only.

*** Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

Shipping Parts List

Traffic Signal Arms (Fixed Mount) (1 per pole)
Ship each arm with listed equipment attached

Nominal Arm Length	Type IV Arm (4 Signals) 3 Bracket Assembly and 4 CGB Connectors	
ft.	Designation	Quantity
50	50IV	1
55	55IV	
60	60IV	
65	65IV	

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Traffic Signal Arms (80 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers		Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp w/bolts and washers		Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp w/bolts and washers	
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80					
24	24I-80		24II-80			
28	28I-80		28II-80			
32			32II-80		32III-80	
36			36II-80		36III-80	
40					40III-80	
44					44III-80	

Traffic Signal Arms (100 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

Nominal Arm	Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers		Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp		Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp	
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-100					
24	24I-100		24II-100			
28	28I-100		28II-100			
32			32II-100		32III-100	
36			36II-100		36III-100	
40					40III-100	
44					44III-100	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
2 1/2 "	5' - 3"	1

Each anchor bolt assembly consists of the following: Top and bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers and 4 nut anchor devices (type 2) per Standard Drawing "TS-FD". Templates may be removed for shipment.

Abbreviations
Lf= Fixed Arm Length
Lc= Clamp-on Arm Length (44' Max.)

Texas Department of Transportation
Traffic Operations Division

LONG MAST ARM ASSEMBLY PARTS LIST

LMA(5)-12

Sheet 5 of 5

DN: JK	CK: GRB	DW: FDN	CK: CAL

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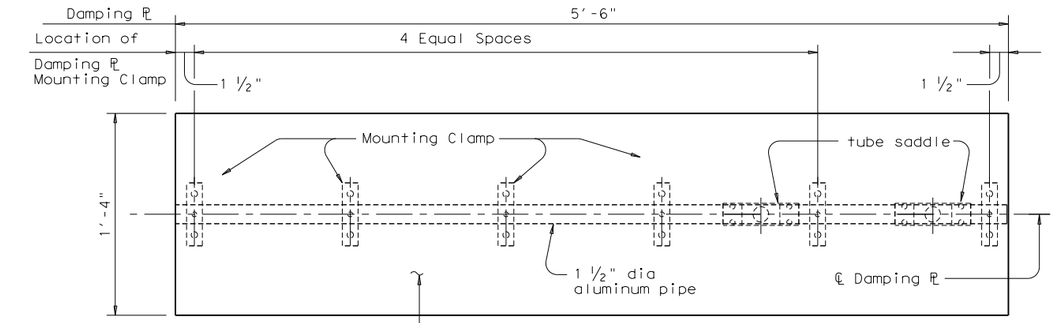

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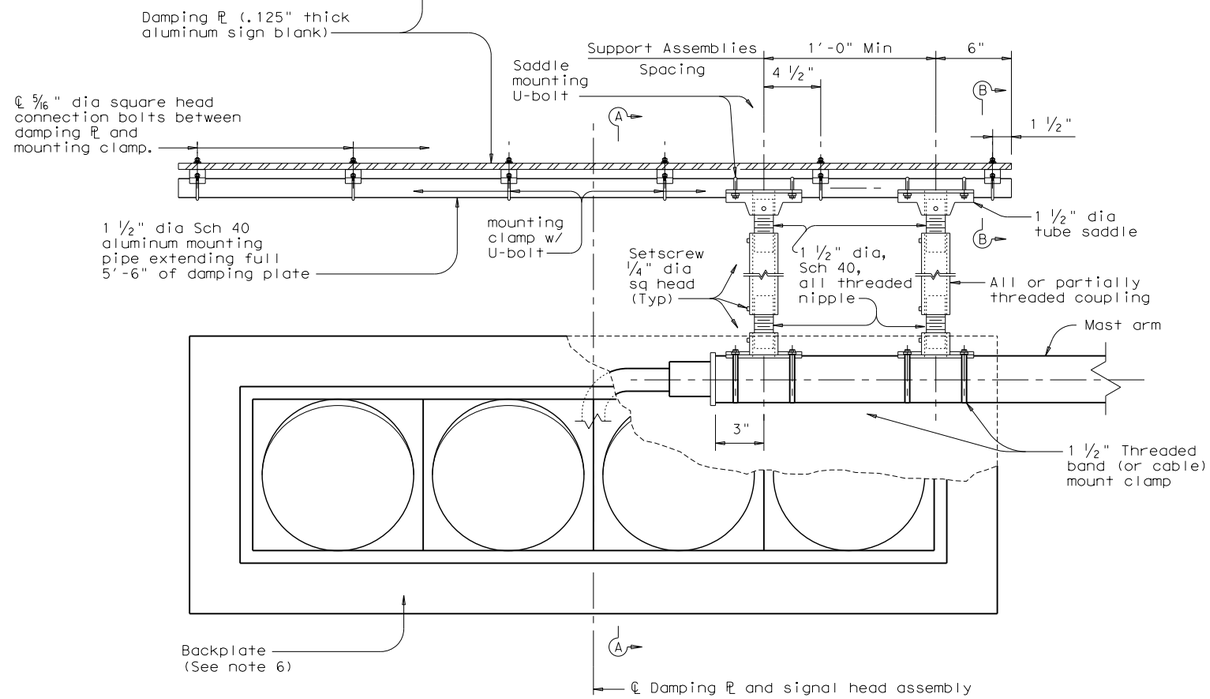
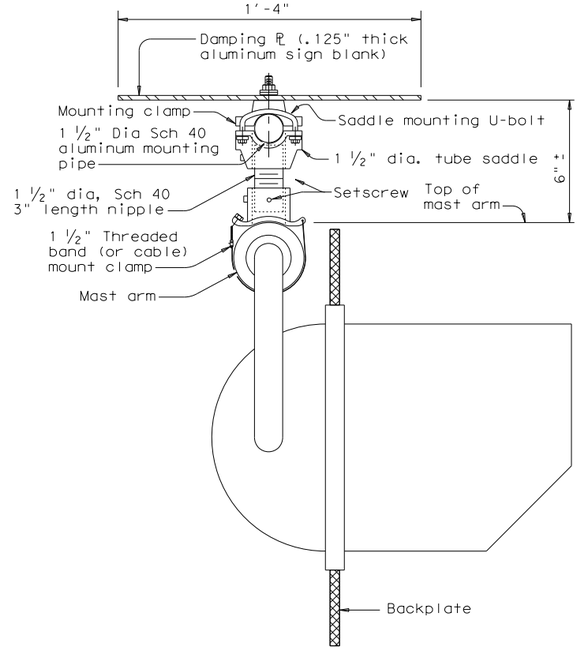


ELEVATION

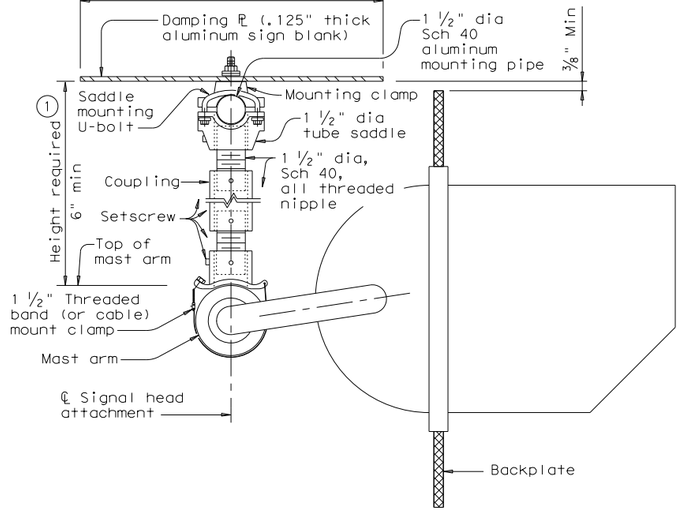
DAMPING PLATE MOUNTING DETAILS

(Showing alternate placement of signal head)



SECTION A-A

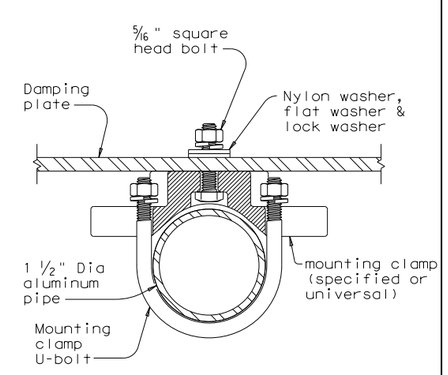
(Showing standard placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)



SECTION A-A

(Showing alternate placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)

① Recommended supporting assemblies to achieve required height for horizontal section heads			
Height required	One nipple each length	Two nipples each length plus	One coupling each length
6"-6 ¾"	3"	-	-
7"-8 ½"	4"	-	-
9"-10 ½"	6"	-	-
11"-15 ½"	-	4"	5"
16"-24"	-	6"	10"



SECTION B-B

(Showing damping plate attachment)

GENERAL NOTES:

1. In accordance with the findings of TxDOT sponsored research, the installation of a damping plate in accordance with the details shown here at the end of signal mast arms of SMA and DMA standard structures reduces excessive harmonic vertical vibration, and thus fatigue damage. Any deviation from these details may reduce the effectiveness of this damping device.

2. Aluminum sign blank for damping plate will conform to Departmental Material Specifications DMS-7110. Materials for mast arm mounting clamp and tube saddle will be aluminum castings or aluminum alloys as in accordance with manufacturers' stipulations. Mounting pipe, pipe nipple and coupling will be aluminum alloy 6061-T6 or 6063-T6. Damping plate mounting clamp and u-bolt assemblies will conform to Standard sheet SMD(GEN). U-bolts for saddle mounting will have a minimum yield strength of 36 ksi.

3. Damping plate will be mounted horizontally. Position centerline of damping plate to align with centerline of mast arm or horizontal signal head assembly. Vertical clearance between signal head (with or without backing plate) and bottom of damping plate will be maintained as shown. The attachments shown here are examples only, other supporting details which meet both alignment and vertical clearance requirements are also acceptable.

4. Unless stipulated by the manufacturers, all steel parts will be galvanized finish in accordance with Standard Specification Item 445, "Galvanizing".

5. Contractor will verify applicable field dimensions before the installation.

6. Backplates are optional for traffic signals. When backplates are used, Backplates will have a 2-inch fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 "Sign Face Materials." See Sheet TS-BP-20 for backplate details.

Texas Department of Transportation

Traffic Safety Division Standard

MAST ARM DAMPING PLATE DETAILS

MA-DPD-20

FILE: ma-dpd-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS 6-20	0905	06	118	CS
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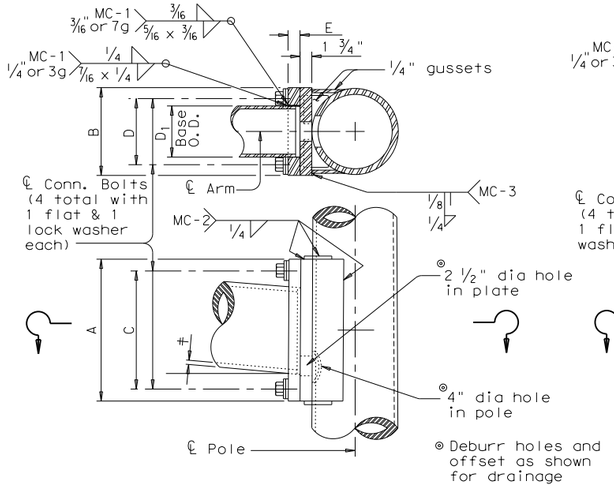
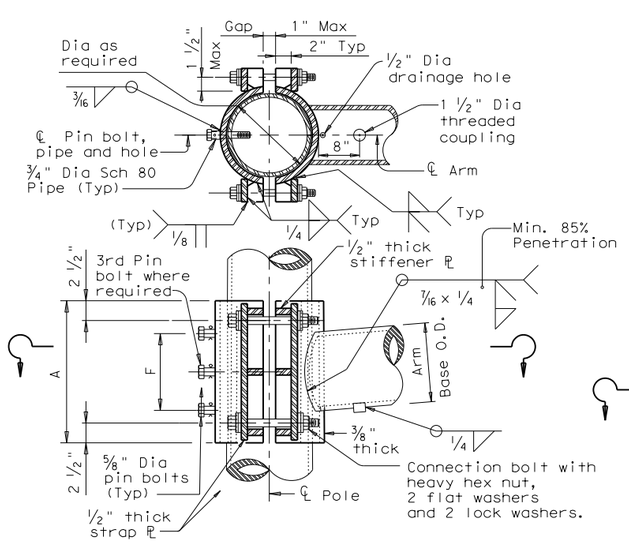
ARM SIZE D_1 in.	ARM SIZE ǂ in.	A in.	B in.	C in.	D in.	E in.	CONN BOLT DIA in.
6.5	.179	12	9	9	6	1 ¾	1
7.5	.179	13	9	10	6	1 ¾	1
8.0	.179	14	10	11	7	2	1 ¼
9.0	.179	16	11	13	8	2	1 ¼
9.5	.179	17	12	14	9	2	1 ¼
9.5	.239	18	12	15	9	2	1 ¼
10.0	.239	18	12	15	9	2	1 ¼
10.5	.239	18	13	15	10	3	1 ½
11.0	.239	18	13	15	10	3	1 ½



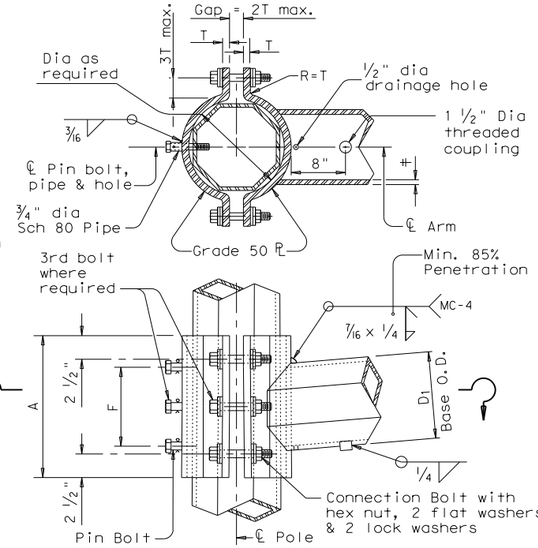
FIXED MOUNT DETAIL 1

ARM SIZE D_1 in.	ARM SIZE ǂ in.	A in.	F in.	CONN. BOLTS No. ea.	CONN. BOLTS Dia in.	PIN BOLTS No. ea.	PIN BOLTS Dia in.
6.5	.179	12	6	4	1	2	⅝
7.5	.179	14	8	4	1	2	⅝
8.0	.179	14	8	4	1	2	⅝
9.0	.179	16	10	4	1	2	⅝
9.5	.179	18	12	4	1 ¼	3	⅝
9.5	.239	18	12	4	1 ¼	3	⅝
10.0	.239	18	12	4	1 ¼	3	⅝



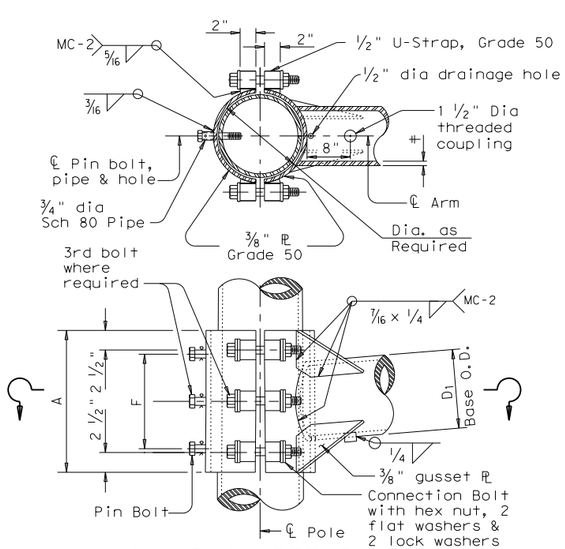
CLAMP-ON DETAIL 1

ARM SIZE D_1 in.	ARM SIZE ǂ in.	A in.	F in.	T in.	CONN. BOLTS No. ea.	CONN. BOLTS Dia in.	PIN BOLTS No. ea.	PIN BOLTS Dia in.
7.0	.179	12	6	¾	4	¾	2	⅝
7.5	.179	14	8	¾	4	¾	2	⅝
8.0	.179	14	8	¾	4	¾	2	⅝
9.0	.179	16	10	⅞	4	1	2	⅝
10.0	.179	18	10	⅞	4	1	2	⅝
9.5	.239	18	10	1	6	1	3	⅝
10.0	.239	18	10	1	6	1	3	⅝

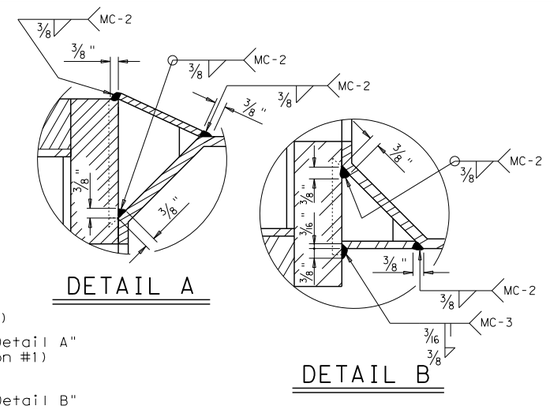


CLAMP-ON DETAIL 2

ARM SIZE D_1 in.	ARM SIZE ǂ in.	A in.	F in.	CONN. BOLTS No. ea.	CONN. BOLTS Dia in.	PIN BOLTS No. ea.	PIN BOLTS Dia in.
6.5	.179	12	6	4	1	2	⅝
7.5	.179	14	8	4	1	2	⅝
8.0	.179	14	8	4	1	2	⅝
9.0	.179	16	10	4	1	2	⅝
9.5	.179	18	12	6	1	3	⅝
9.5	.239	18	12	6	1	3	⅝
10.0	.239	18	12	6	1	3	⅝

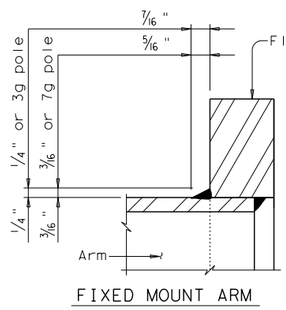


CLAMP-ON DETAIL 3

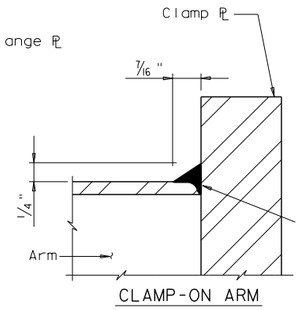


DETAIL A

DETAIL B



FIXED MOUNT ARM



CLAMP-ON ARM

ARM BASE WELD DETAILS

MATERIALS	
Round Shafts or Polygonal Shafts ①	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 ②
Plates ①	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325 or A449, except where noted
Pin Bolts	ASTM A325
Pipe ①	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

① ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

② ASTM A1011 SS Gr.50 material shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1 ½" wide vertical slotted hole shall be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and ¾" dia pipe shall have 5/16" dia holes for a 1/8" dia galvanized cotter pin. Back clamp plate shall be furnished with a ¾" dia hole for each pin bolt. An 11/16" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

MAST ARM CONNECTIONS

MA-C-12

DN: MS	CK: JSY	DW: MMF	CK: JSY

REVISIONS
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5-09
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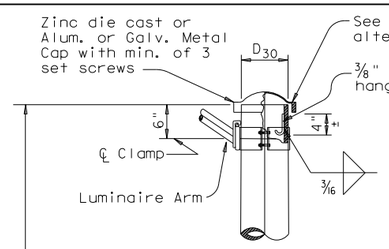
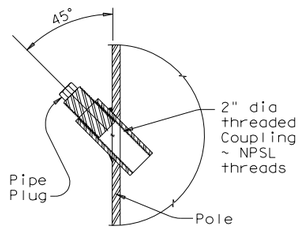
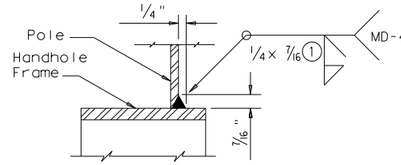


DETAIL A

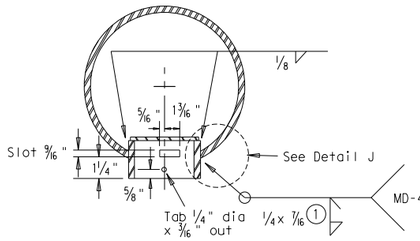
(for pole with luminaire)



POLE COUPLING DETAIL



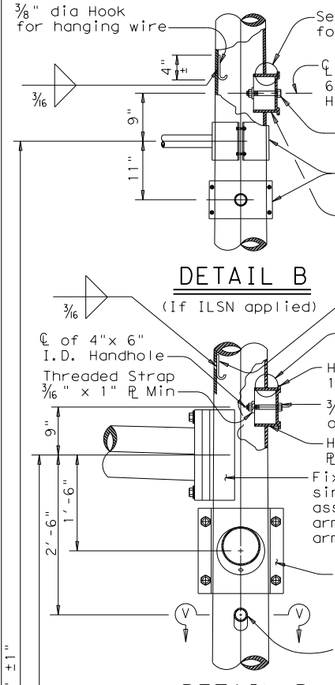
DETAIL G



SECTION X-X

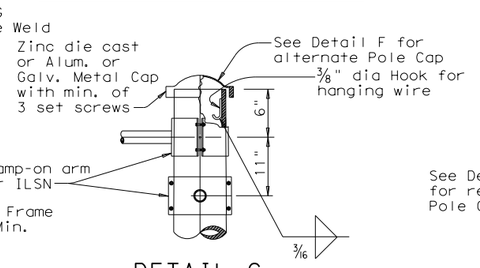
Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.

DETAIL J

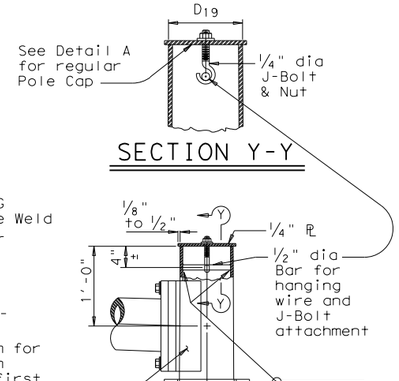


DETAIL B

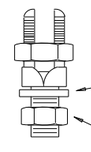
(If ILSN applied)



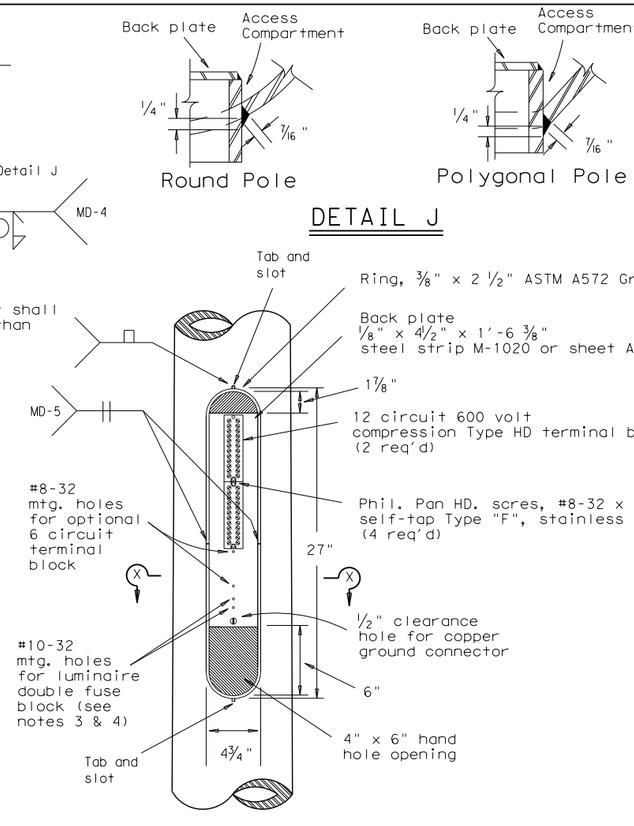
DETAIL C



SECTION Y-Y



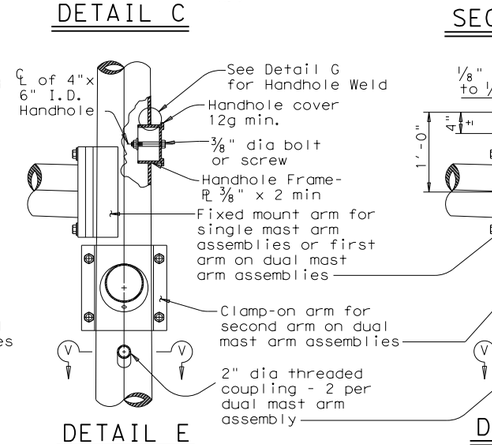
COPPER GROUND CONNECTOR



ACCESS COMPARTMENT

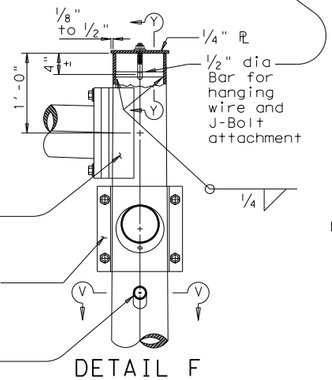
DETAIL D

(for 30' pole with luminaire and ILSN sign)



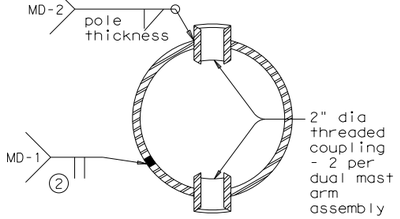
DETAIL E

(for 24' pole with ILSN sign and no luminaire)

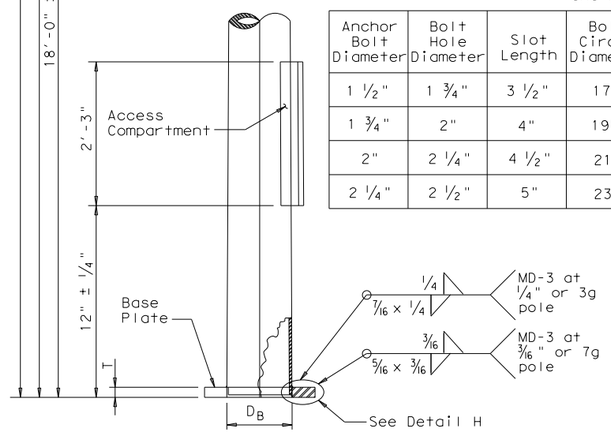


DETAIL F

(for 19' pole with no ILSN sign and no luminaire)

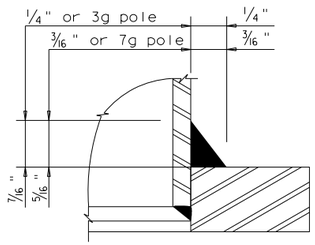


SECTION V-V

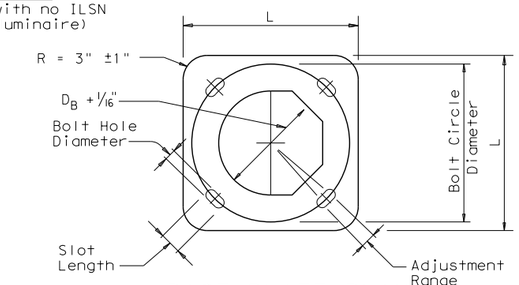


POLE ELEVATION

Anchor Bolt Diameter	Bolt Hole Diameter	Slot Length	Bolt Circle Diameter	Base ℞ Dim. L x T	Adjust. Range
1 1/2"	1 3/4"	3 1/2"	17"	18" x 1 1/2"	13.4°
1 3/4"	2"	4"	19"	20" x 1 3/4"	13.5°
2"	2 1/4"	4 1/2"	21"	22" x 2"	13.6°
2 1/4"	2 1/2"	5"	23"	24" x 2 1/4"	13.7°



DETAIL H



BASE PLATE PLAN

(1) 85% Min. penetration

(2) 60% Min. penetration 100% pemetration within 6" of circumferential base welds.

NOTES:

1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS

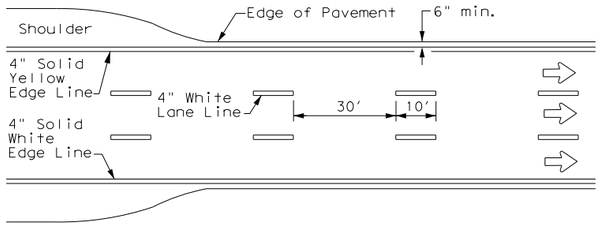
MA-D-12

DN: MS	CK: JSY	DW: FDN	CK: CAL

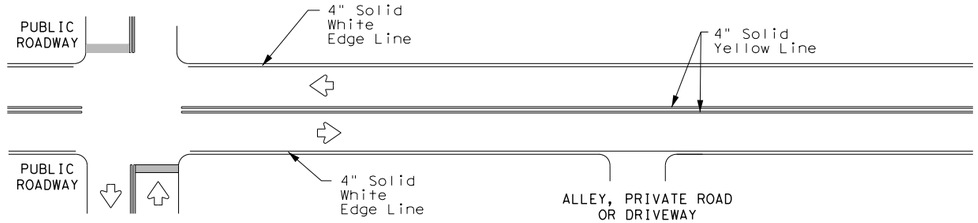
REVISIONS
8-99
1-12

CONT	SECT	JOB	HIGHWAY
0905	06	118	CS

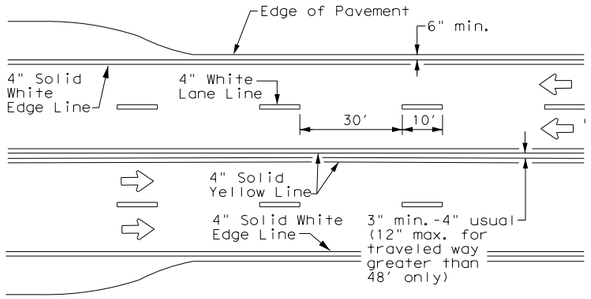
DIST	COUNTY	SHEET NO.
LBB	LUBBOCK	157



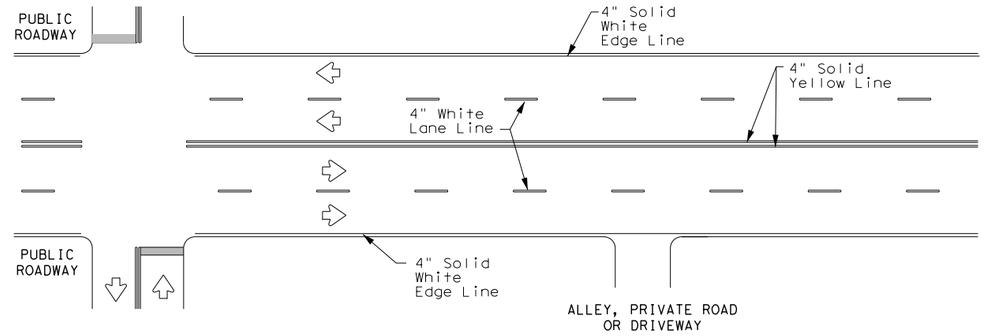
EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



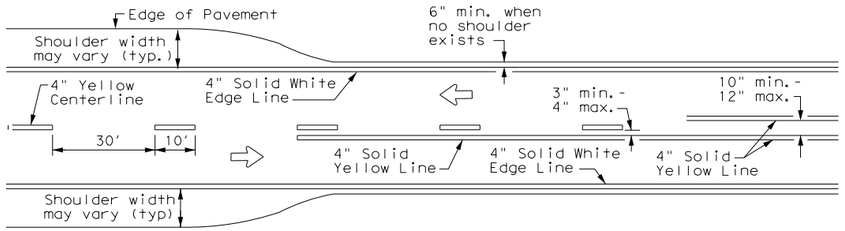
TYPICAL TWO-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS



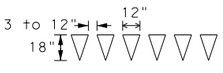
CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



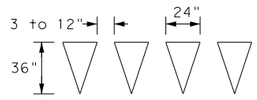
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS

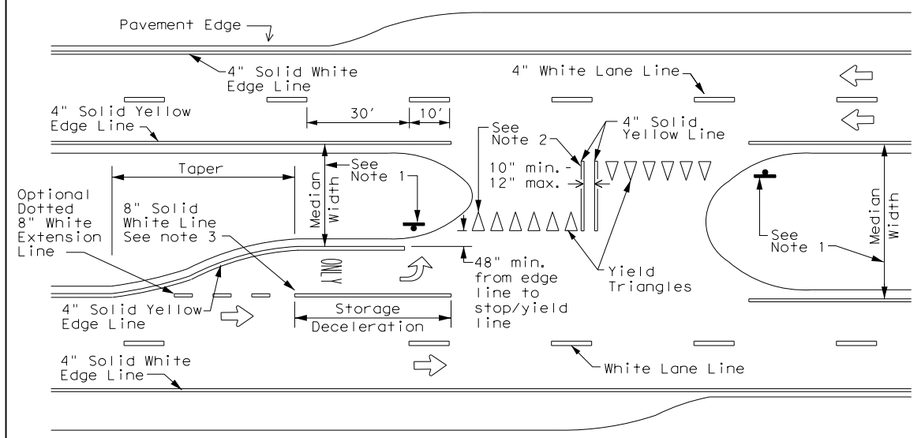


For posted speed on road being marked equal to or less than 40 MPH.



For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

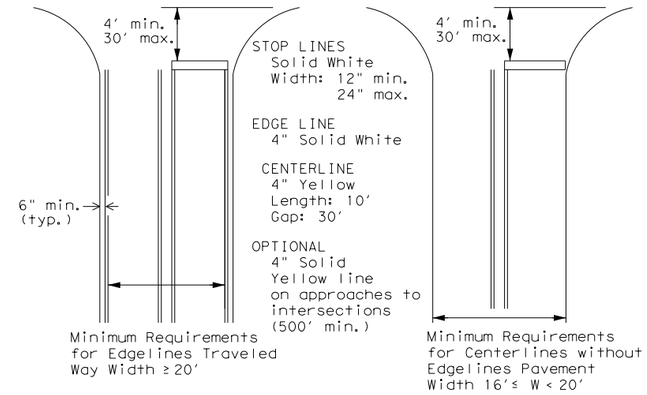
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



GUIDE FOR PLACEMENT OF STOP LINES,
EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths
for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

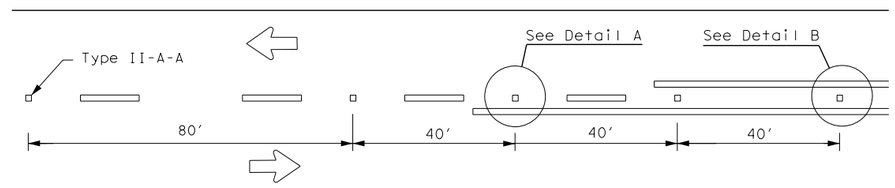
PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0905	06	118	CS
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	LBB	LUBBOCK		158

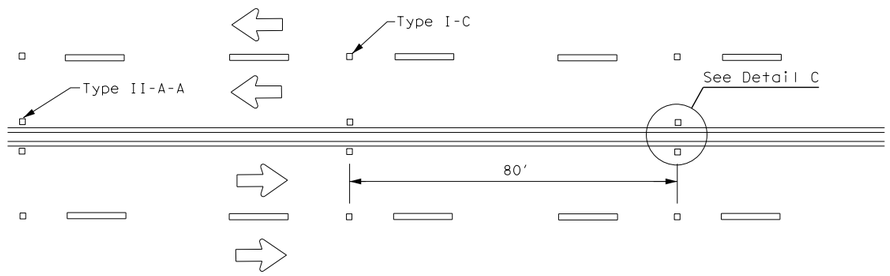
22A

DATE:
FILE:

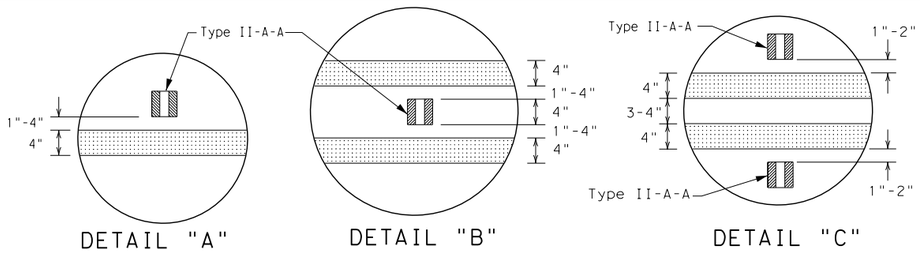
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



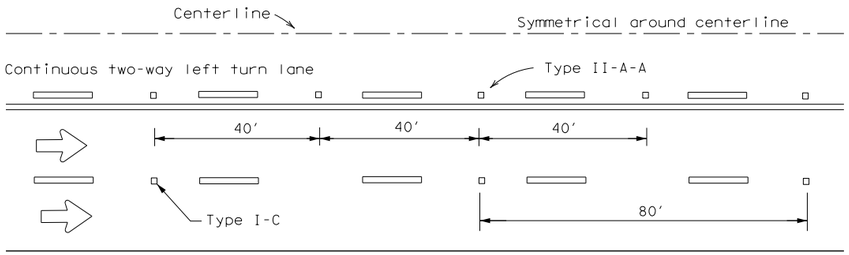
CENTERLINE FOR ALL TWO LANE ROADWAYS



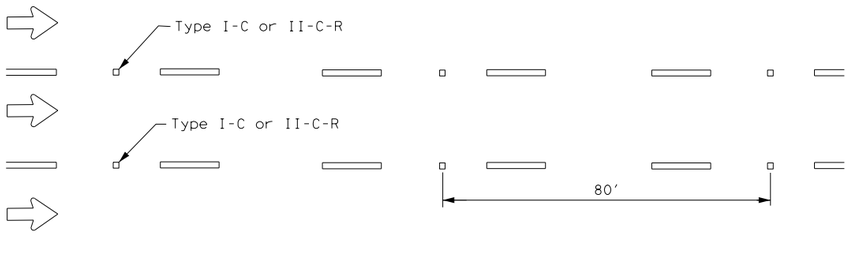
CENTERLINE & LANE LINES
FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" DETAIL "B" DETAIL "C"

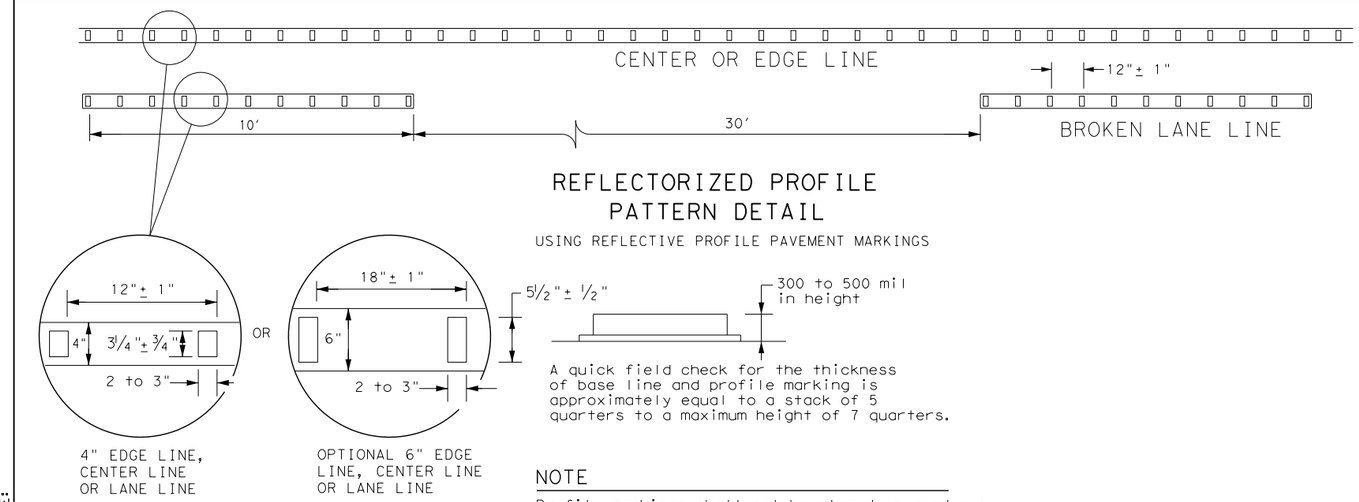


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.



4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTE

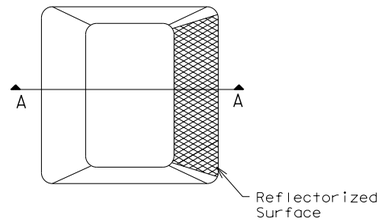
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

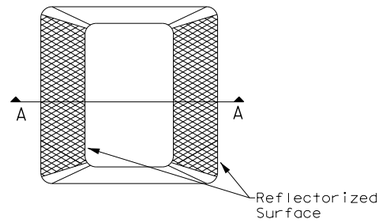
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

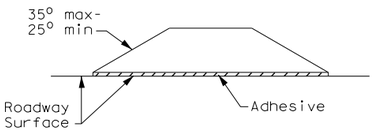
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10	0905	06	118	CS
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	LBB	LUBBOCK		159

22B

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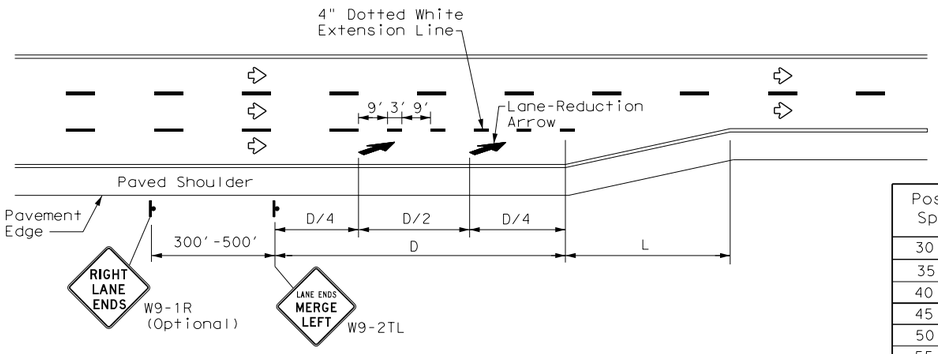
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

DATE:
FILE:

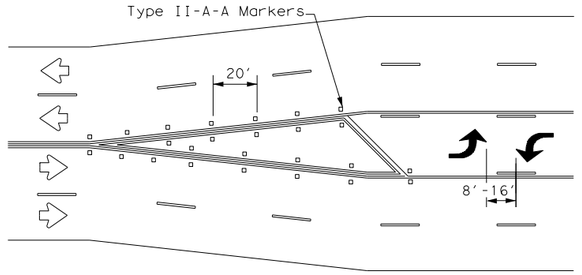


LANE REDUCTION

Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional W9-1R "RIGHT LANE ENDS" sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.



A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

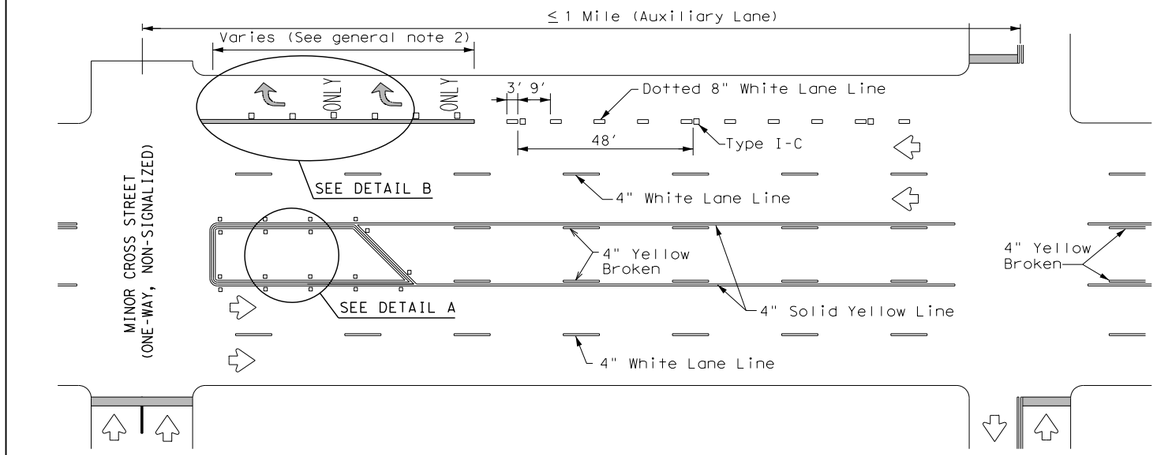
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

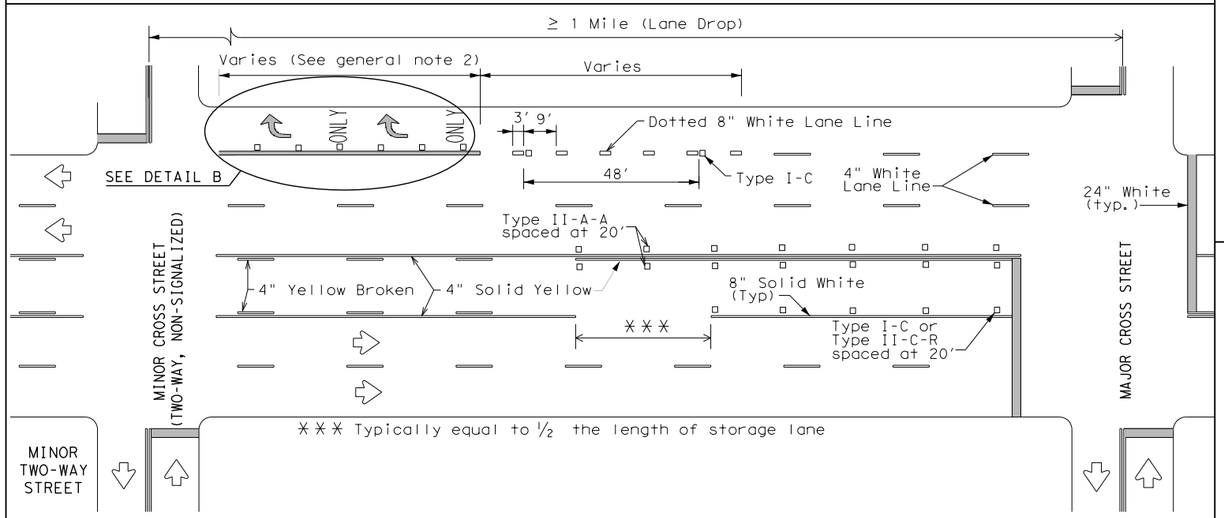
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

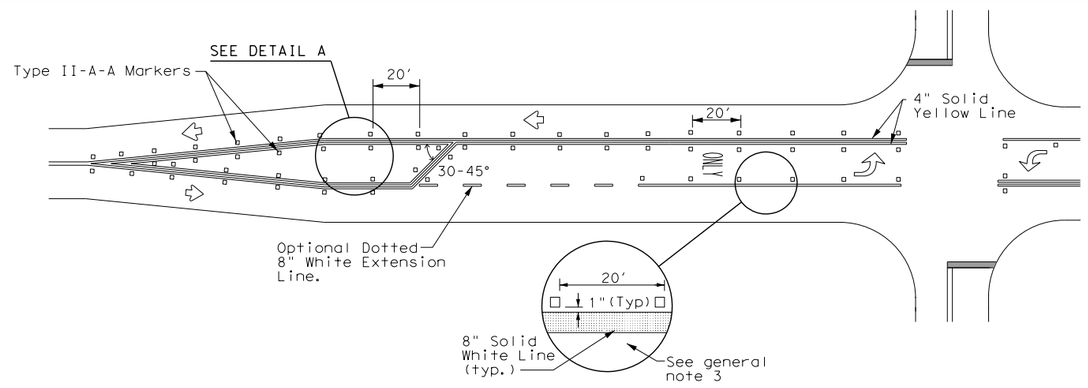
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



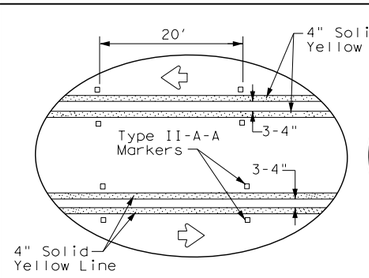
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



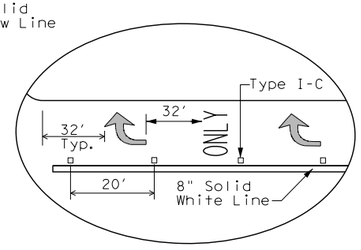
TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



DETAIL A



DETAIL B

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Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-20

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REVISIONS	0905	06	118	CS
5-00 2-10	DIST	COUNTY		SHEET NO.
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3-03 6-20				

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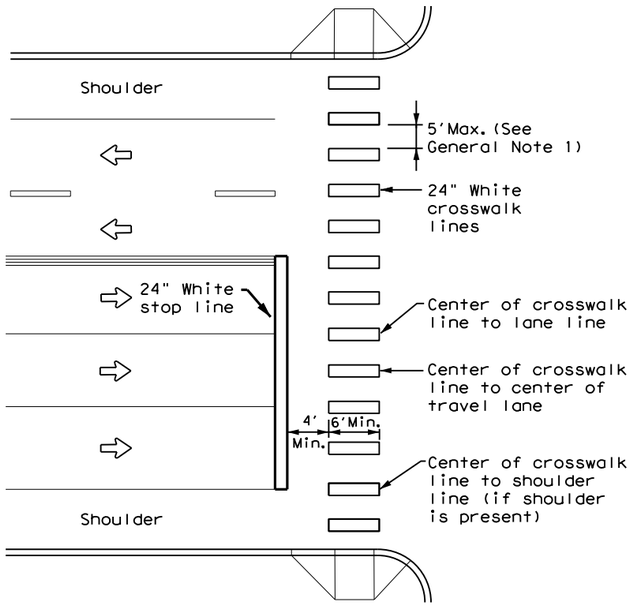


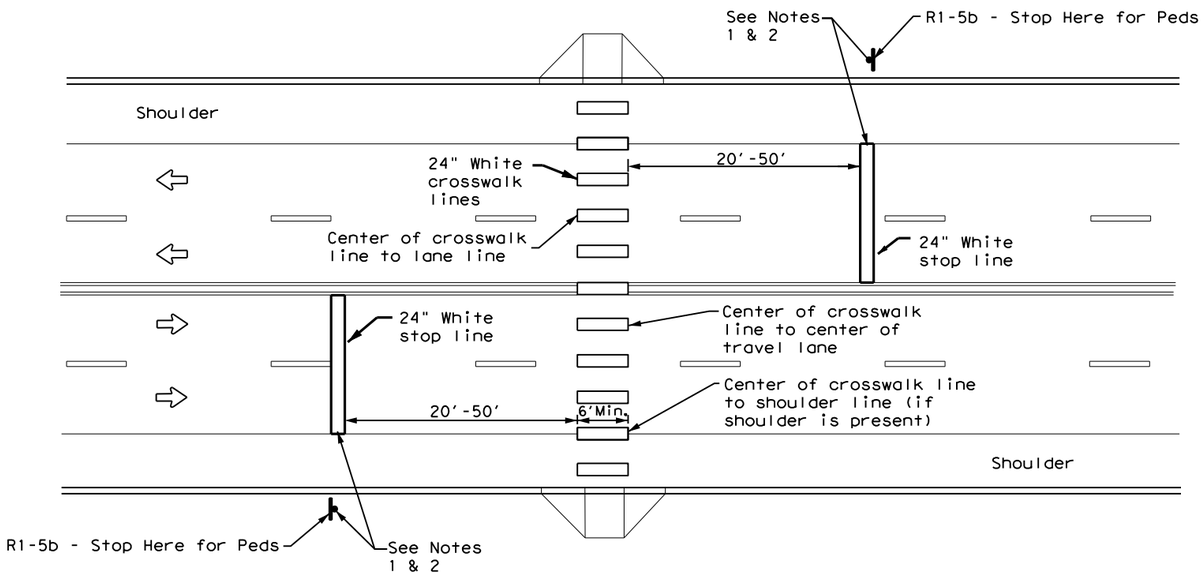
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6' wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



UNSIGNALIZED MID BLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

NOTES:

1. Use stop bars with "Stop Here for Pedestrians" signs at unsignalized mid block cross walks.
2. Use stop bars with "Stop Here on Red" signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

Texas Department of Transportation

Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

PM(4)-22

FILE: pm4-22.dgn	DN:	CK:	DW:	CK:
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REVISIONS	0905	06	118	CS
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	LBB	LUBBOCK		161

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ROADWAY ILLUMINATION ASSEMBLY NOTES

1. Details apply to roadway lighting installations bid or referenced under Item 610, "Roadway Illumination Assemblies." Provide, furnish, and install all other materials not shown on the plans which may be necessary for complete and proper construction. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the State such warranties or guarantees.

2. The locations of poles and fixtures may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC),TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA),and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association, Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection.

4. Provide Roadway Illumination Light Fixtures as per TxDOT Departmental Material Specification (DMS) 11010, Item 610, and as shown on the Material Producers List (MPL) for Roadway Illumination and Electrical Supplies.

5. Fabricate steel roadway illumination poles in accordance with Roadway Illumination Poles (RIP) standards and Item 610. Poles fabricated according to RIP standards do not require shop drawing submittals.

   a. Alternate designs to RIP standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" on the TxDOT web site.

   b. Limitations on use of the RIP standard: The RIP standard details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than (i.e. not more than) 25′ above the elevation of the surrounding terrain, in accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 6th Edition (2013) of the AASHTO Design Specifications. For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25′ above the surrounding terrain, provide poles meeting the following requirements:

      i. Submittals. Following the electronic shop drawing submittal process (see Guide to Electronic Shop Drawing Submittal on the TxDOT web site), submit to the Engineer for approval fabrication drawings and calculations for the poles, sealed by a Texas licensed professional engineer (P.E.).

      ii. Luminaire Structural Support Requirements. Provide light poles, arms, and anchor bolt assemblies with a 25 year design life to safely resist dead loads, ice loads and the required basic wind speeds at the location of installation in accordance with the 6th edition (2013) of the AASHTO Design Specifications. For transformer base poles, include transformer base and connecting hardware in calculations and shop drawing submittals. Structurally test all transformer bases to resist the theoretical plastic moment capacity of the pole. Submit certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished with the shop drawings. Show breakaway base model number, manufacturer's name, and logo on shop drawings. Include on manufacturer's shop drawings the ASTM designations for all materials to be used.

6. For both transformer and shoe-base type illumination poles, provide and install double-pole breakaway fuse holders as specified by DMS-11040. Breakaway fuse holders are listed on the MPL for Roadway Illumination and Electrical Supplies under Items 610 & 620. Provide 10 amp time delay fuses for breakaway connectors in light poles, or inside the light fixture for underpass luminaires. In each pole, connect luminaires to the breakaway connector with continuous stranded 12 AWG copper conductors as listed on the MPL. Bond all equipment grounding conductors together and to the ground lug in the transformer base or hand hole.

7. Tighten anchor bolts for shoe base, concrete traffic barrier base, and bridge mount roadway illumination poles, in accordance with Item 449.

8. Install T-Base with following procedure:

   a. Anchor Bolt Tightening.

      i. Coat the threads of the anchor bolts with electrically conductive lubricant.

      ii. Place the T-base over the anchor bolts. Foundation must be level and flat. The maximum permissible gap under any one corner of the t-base is 1/8" before nuts are tightened.

      iii. Coat the bearing surfaces of the nuts and washers with electrically conductive lubricant. Install (1) 1/2" hold down washer, (1) lock washer, and (1) nut on each anchor bolt. Turn the nuts onto the bolts so that each is hand-tight against the washer.

      iv. Using a torque wrench, tighten each nut to 150 ft-lb. Uniform contact is required between the foundation and the T-base in the corner regions of the T-base, and all corner gaps must be closed after applying torque. If a gap still exists after torquing to 150 ft-lbs, continue torquing each bolt incrementally until gap is closed or maximum allowable torque of 250 ft. pound is reached, whichever comes first. If 250 ft-lbs is not enough to close the gap the foundation must be leveled. Gaps along the straight sides of the T-bases and the foundation are permissible. Ensure that no high point of contact occurs between the straight sides of the T-base and the foundation.

      v. Check top of T-base for level. If not level then foundation must be leveled.

   b. Top Bolt Procedure

      i. Erect pole over T-base with crane. Coat bolts, nuts, washers, and lock washers with electrically conductive lubricant.

      ii. Install bolts and 1/2" connecting washers from the inside of the T-base, thread up through the pole base. Install flat washers, lock washers and nuts snug tight according to Item 447, "Structural Bolting."

      iii. Tighten each nut to 150 ft-lb. using a torque wrench.

   c. Level and Plumb

      i. Ensure pole is plumb and mast arm is perpendicular to the roadway according to plans to within 5 degrees.

9. Construct luminaire pole foundations in accordance with Item 416, "Drilled Shaft Foundations," and TxDOT standard sheet RID(2).

10. Provide and install underpass luminaires in accordance with Item 610, DMS-11010, and TxDOT standard sheet RID(3). Typical luminaire size for underpass luminaires is 150W HPS or 150W EQ LED.

11. Mount luminaires on arms level as shown by the luminaire level indicator.

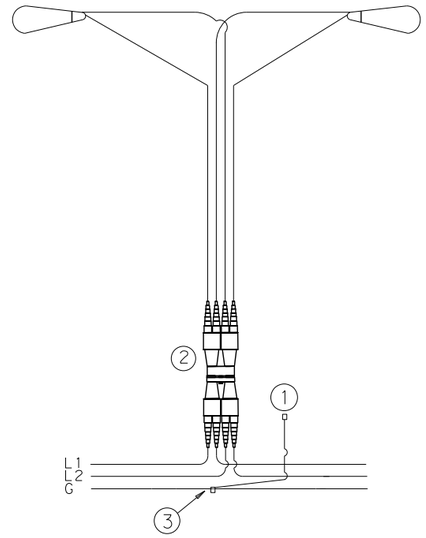
12. Orient luminaires perpendicular to the roadway intended to be lit unless otherwise shown on the plans.

Wiring Diagram Notes:

(1) Use 1/2 in.-13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors, bonded to T-base, or use ground lug in handhole as available.

(2) Use pre-qualified two-pole breakaway connectors for all luminaire pole installations. For luminaires fed by a circuit with a neutral conductor, use double pole breakaway connectors with the neutral side unfused and marked white.

(3) Split Bolt or other connector.



L1,L2 = Hot Conductors
G = Grounding Conductor

TYPICAL WIRING DIAGRAM

LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.

Decorative LED Lighting Notes:

1. LED Drivers in Remote Outdoor enclosures (for drivers that do not include an enclosure as part of a factory assembly):

   a. Provide NEMA 3R outdoor enclosure or as approved.

   b. Install enclosure at least 12" above ground or other horizontal surface. Mount vertically or on ceiling, and avoid direct sun where possible.

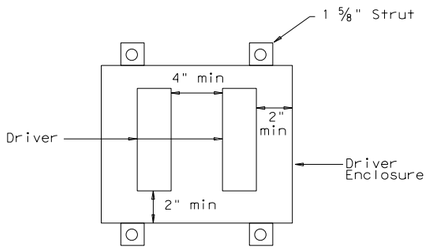
   c. Install drivers with at least 2 inches of space from enclosure walls.

   d. For multiple drivers in an enclosure, provide at least 4 inches side to side and 1 inch end to end from other drivers or electronic equipment

   e. For drivers mounted on back wall of enclosure, mount enclosure on 1 5/8" strut or other standoff to dissipate heat, or mount driver to side of the enclosure or to the metal cover.

   f. Provide remote drivers with a maximum of 100 watts

   g. Provide drivers with documentation of 100,000 hr lifetime at Tcase of 65C or higher.



Driver Spacing In Remote Enclosure

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION DETAILS

RID(1)-20

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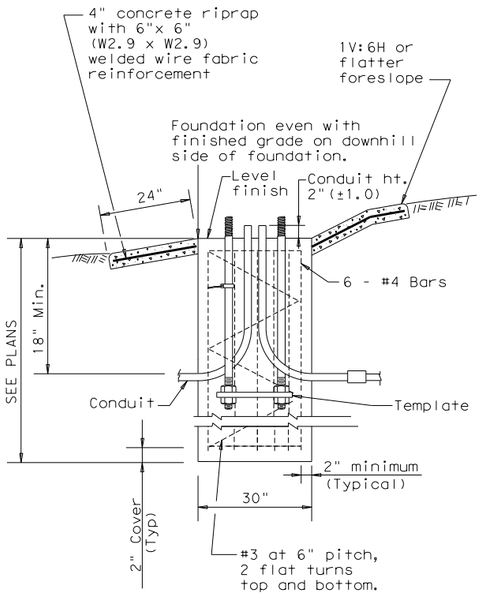
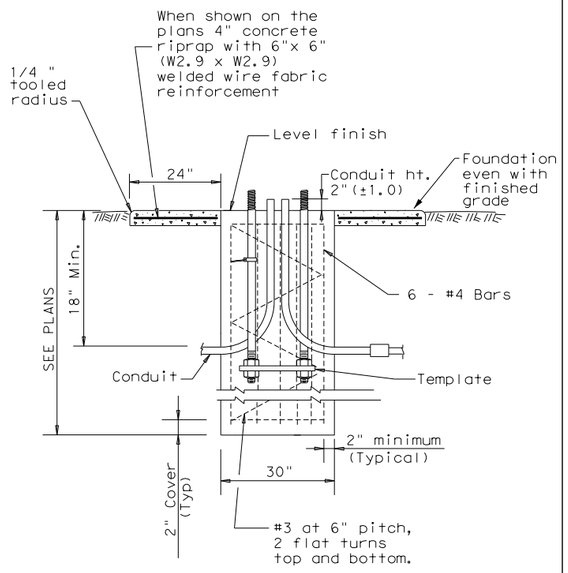


SECTION A-A
SHOWING SLOPED GRADE



SECTION A-A
SHOWING CONSTANT GRADE

TABLE 1

ANCHOR BOLTS

POLE MOUNTING HEIGHT	BOLT CIRCLE		ANCHOR BOLT SIZE
	Shoe Base	T-Base	
<40 ft.	13 in.	14 in.	1in. x 30in.
40-50 ft.	15 in.	17 ¼in.	1 ¼in. x 30in.

TABLE 2

RECOMMENDED FOUNDATION LENGTHS (See note 1)

MOUNTING HEIGHT	TEXAS CONE PENETROMETER N Blows/ft		
	10	15	40
≤20 ft.	6′	6′	6′
>20 ft. to 30 ft.	8′	6′	6′
>30 ft. to 40 ft.	8′	8′	6′
>40 ft. to 50 ft.	10′	8′	6′

TABLE 3

PAY QUANTITY OF RIPRAP PER FOUNDATION (Install only when shown on the plans)

Foundation Diameter	RIPRAP DIAMETER	RIPRAP (CONC) (CL B)
30 in.	78 in.	0.35 CY

GENERAL NOTES:

1. "Recommended Foundation Lengths" table is for information purposes only. Foundation lengths shall be as shown on the plans, or as directed by the Engineer. Foundations will be paid for under Item 416, "Drilled Shaft Foundations," unless otherwise shown on the plans.
2. Erect roadway illumination assembly poles plumb and true. Form and level the top 6" of the foundation so the pole will be plumb. Use leveling nuts to plumb shoe base poles. Do not use shims or leveling nuts under transformer bases. Do not grout between baseplate and the foundation.
3. Ensure Class 2A and 2B fit for anchor bolts and nuts. Tap and chase nuts after galvanizing. Anchor bolt body with rolled threads need not be full size.
4. Use appropriate class of concrete as specified in Items 416 and 432. Concrete for riprap may be upgraded to Class C at no extra cost to the Department.
5. Place riprap around the foundation when called for elsewhere in the plans. Riprap will be paid for under Item 432.
6. Locate breakaway roadway illumination assemblies as shown in the placement table, unless otherwise dimensioned on the plans. Protect non-breakaway illumination assemblies from vehicular impact (i.e. 2.5 ft. behind guard rail or mounted on traffic barrier), or located outside the clear zone, except that 2.5 ft. from curb face is minimum desired for light poles on city streets, 45 mph or less. See Roadway Design Manual for further information.
7. Use 4 hold down and 4 connecting washers on transformer base poles as recommended by the manufacturer and supplied with base.
8. Install a minimum of 2 conduits in each foundation. See lighting layout sheets for locations of foundations with more than 2 conduits. Cap unused conduits in foundations on both ends.
9. Conduit location in foundations is critical for breakaway devices. Place conduits 2 in. apart on centerline as shown.
10. Bond anchor bolt to rebar cage with #6 bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. The bonded steel in the foundation creates a concrete encased grounding electrode which replaces the ground rod.
11. Grade earthwork around T-base foundations even with the finished grade as shown in Section A-A to ensure proper function of the breakaway device. Use riprap on T-base foundations that are located on sloped grades, and as shown on the plans for level grades.

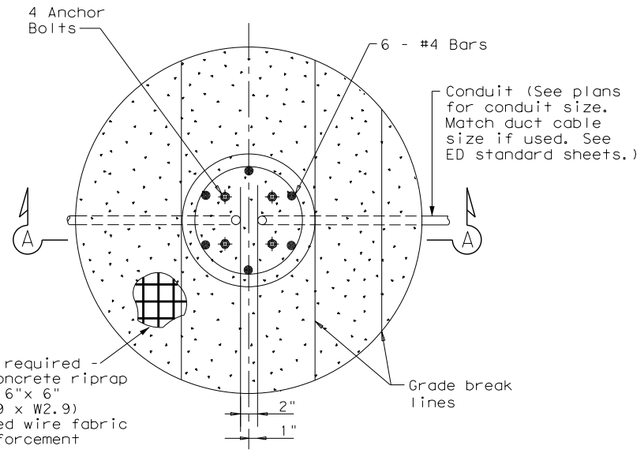
TABLE 4

BREAKAWAY POLE PLACEMENT (See note 6)

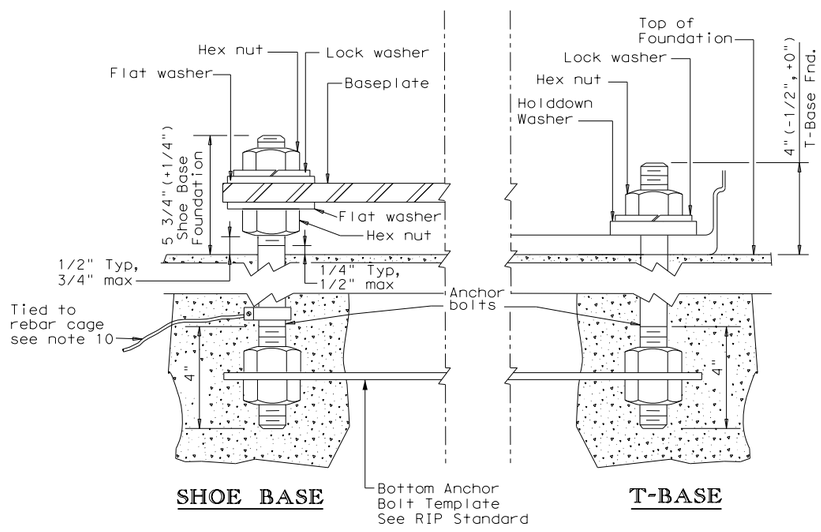
ROADWAY FUNCTIONAL CLASSIFICATION	** POLE OFFSET (DISTANCE TO FACE OF TRANSFORMER BASE)
Freeway Mainlanes (roadway with full control of access)	15 ft. (minimum and typical) from lane edge
All curbed, 45 mph or less design speed	2.5 ft. minimum (15 ft. desirable) from curb face
All others	10 ft. minimum*(15 ft. desirable) from lane edge

* or as close to ROW line as is practical

** provide 2/5 of the luminaire mounting height behind the pole for "falling area" to prevent encroachment on the other travel lanes. See design guidelines.



FOUNDATION DETAIL



SHOE BASE T-BASE

ANCHOR BOLT DETAIL

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION DETAILS
(RDWY ILLUM FOUNDATIONS)

RID(2)-20

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SHIPPING PARTS LIST - POLES AND LUMINAIRE ARMS

Nominal Mounting Ht. (ft)	Shoe Base Designation				Quantity	T-Base Designation				Quantity	CSB/SSCB Mounted Designation				Quantity
	Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire	

OTHER Designation				Quantity
Pole	A1	A2	Luminaire	

GENERAL NOTES:

1. All work, materials and services not shown on the plans which may be necessary for complete and proper construction shall be performed, furnished and installed by the Contractor. Faulty fabrication or poor workmanship in any material, equipment or installation will be considered justification for rejection. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the Department such warranties or guarantees.

2. The location of poles and fixtures are diagrammatic only and may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Standard Steel Pole Designs. Steel poles fabricated in accordance with the details and dimensions shown herein, shall be considered standard designs. Submission of shop drawings and design calculations for standard designs is not required.

4. Optional Steel Pole Designs. Multi-sided steel poles may be allowed as optional designs, if steel poles are permitted or required, pending approval by the Department as outlined below.

   a. Shop Drawings. Optional designs require submission of shop drawings and design calculations bearing the seal of an engineer licensed in the State of Texas, in accordance with Item 441, "Steel Structures." The Department may elect to pre-approve some shop drawings for optionally designed poles. Submission of shop drawings and design calculations is not required for structures fabricated in accordance with the details of shop drawings on the pre-approved list maintained by the TxDOT Traffic Operations Division. Any deviation from the pre-approved shop drawings will require submission of shop drawings of the complete assembly and design calculations as described above.
   b. Structural Support Design for Luminaires. Lighting support structures shall be designed for a 25 year design life in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto. All poles shall be designed for 110 mph 3-second gust wind speeds. The Gust Factor, G, and Wind Importance Factor, Ir, shall be applied as per the AASHTO Specifications assuming a 25-year design life. The design wind pressure for hurricane wind velocities greater than 100 mph shall not be less than the design wind pressure using 100 mph with the non-hurricane Wind Importance Factor, Ir, value. For transformer base poles, fabricator shall include transformer base and connecting hardware in design calculations and shop drawing submittals. All transformer bases shall have been structurally tested to resist the theoretical plastic moment capacity of the pole. Certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished shall be submitted with the shop drawings. Shop drawings shall show breakaway base model number, and manufacturer's name and logo. Manufacturer's shop drawings shall include the ASTM designations for all materials to be used.
   c. Mast Arm Attachments. All poles and attachments shall be structurally designed to support two 12-foot mast arms and luminaires. Poles shall be supplied with mast arm combinations as shown in the plans. All mast arms shall be designed for a 60-pound luminaire having an effective projected area of 1.6 square feet.
   d. Anchor Bolt Assembly. Anchor bolt assemblies for optionally designed poles shall be the same as those shown herein.

5. Aluminum Pole Designs. Aluminum pole designs may be allowed, if aluminum poles are permitted or required, pending approval by the Department as outlined below.

   a. Meet all of the requirements stated above for optional steel pole designs and the following:
      1. Aluminum poles shall be fabricated in accordance with "Structural Welding Code-Aluminum" AWS D1.2.
      2. Aluminum pole designs shall use the same anchor bolt assembly and be subject to the same geometric restraints and other requirements for steel poles specified herein.
      3. Aluminum poles shall be equipped with vibration mitigation devices, as approved by the engineer.
      4. Pole components shall be constructed using the following material:
         Shaft: ASTM B221 or B241 Alloy 6063-T6, ASTM B209 Alloy 5086-H34, ASTM B221 Alloy 6005-T5.
         Base Flange: ASTM B26 Alloy 356.0-T6 or ASTM B108 Alloy 356.0-T6 (Yield strength test required).
         Mast Arm Fitting: ASTM B209 Alloy 6061-T6 or ASTM B221 Alloy 6005-T5.
         Mast Arms: ASTM B241 Alloy 6061-T6 or Alloy 6063-T6.
         Pole Cap: ASTM B209 Alloy 5086-H32 or ASTM B108 or B26 Alloy 356.0-T6.
         Bolts: Stainless Steel AISI 300 series. Bolts threading into aluminum threads shall be treated with anti-seize compound, Never-Seez Compound, Permatex 133K or equal.

6. Special Designs. Poles with architectural treatments shall meet the requirements shown elsewhere in the plans.

7. Luminaire Mounting Height. Actual luminaire mounting height shall be the nominal mounting height given on RIP(2) for all pole-arm combinations except for poles with 4 ft. luminaire arms, which shall be 3'-0" lower than the nominal height, unless otherwise shown or directed.

EXPLANATION OF ROADWAY ILLUMINATION ASSEMBLY DESIGNATIONS

(TYPE SA 50 T - X - X) (400W EQ) LED

SA: Pole and mast arm may be steel or aluminum.
ST: Pole and mast arm must be steel.
AL: Pole and mast arm must be aluminum.
SP: Special (ovalized) steel or aluminum pole for installing on CSB or SSCB. See standard sheet CSB (4), or SSCB (4).

Two numerical digits denote nominal mounting height in feet.

Next letter denotes type of base, (S-Shoe Base, T-Transformer Base, or B-Bridge/Ret.Wall Mount)

First number denotes length of mast arm in feet.

Use of second mast arm is indicated by second dashed number which denotes length in feet.

Luminaire rating in watts (i.e. 400W). Equivalent wattage LED fixtures will include EQ (i.e. 400W EQ)

Last letters indicate light source (S - High Pressure Sodium; LED - LED luminaire)

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Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(1)-19

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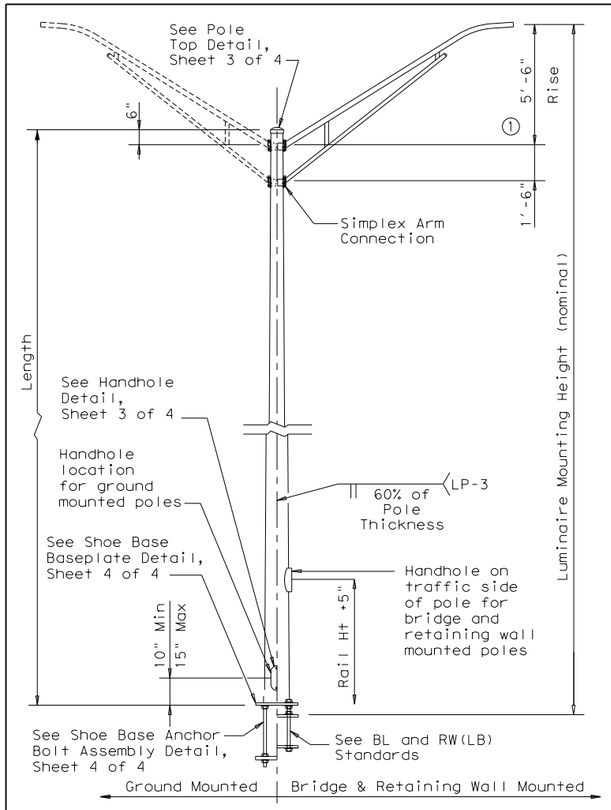
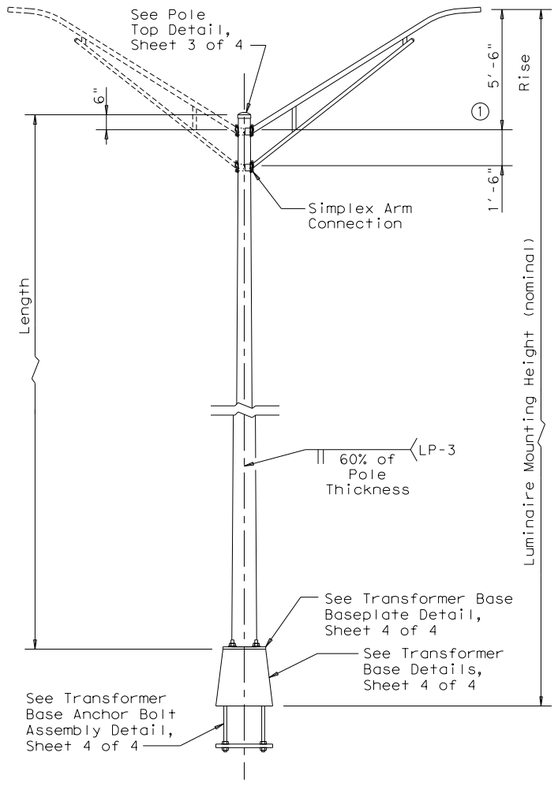


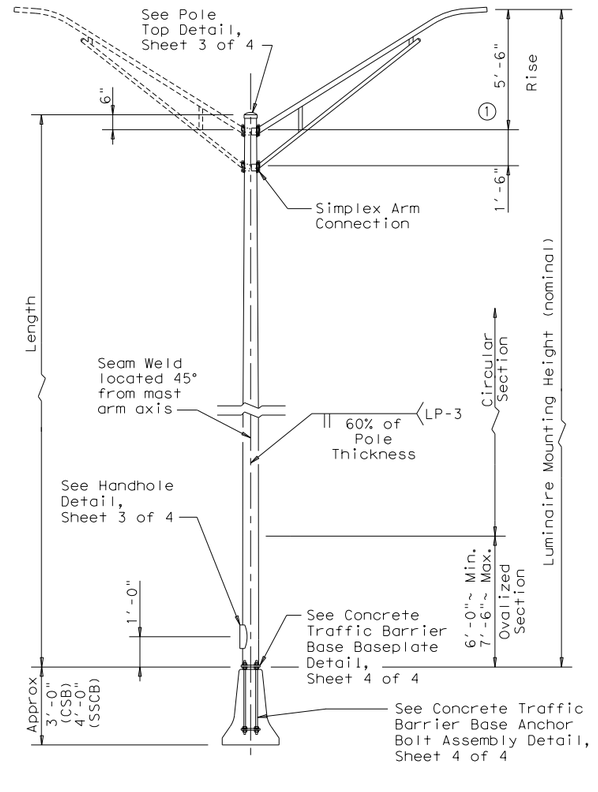
SHOE BASE POLE

SHOE BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	4.90	15.00	0.1196	7.1
30.00	7.50	4.00	25.00	0.1196	13.2
31.00-39.00	8.00	4.36-3.24	26.00-34.00	0.1196	20.7
40.00	8.50	3.60	35.00	0.1196	20.7
50.00	10.50	4.20	45.00	0.1196	30.3



TRANSFORMER BASE POLE

TRANSFORMER BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	5.11	13.50	0.1196	7.1
30.00	7.50	4.21	23.50	0.1196	13.2
31.00-39.00	8.00	4.57-3.45	24.50-32.50	0.1196	20.7
40.00	8.50	3.81	33.50	0.1196	20.7
50.00	10.00	3.91	43.50	0.1196	30.3



CONCRETE TRAFFIC BARRIER BASE POLE

CONCRETE TRAFFIC BARRIER BASE POLE (CSB/SSCB)						
Luminaire Mounting Height (Nominal) (ft)	Base ② Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)	
					About ℄ of Rail	Perp. to Rail
28.00	9.00	5.78	23.00	0.1196	10.3	13.2
38.00	9.00	4.38	33.00	0.1196	16.6	20.8
48.00	10.50	4.48	43.00	0.1345	25.1	30.5

MATERIAL DATA		
COMPONENT	ASTM DESIGNATION	MIN. YIELD (ksi)
Pole Shaft (0.14"/ft. Taper)	A572 Gr 50, A595 Gr A, A1011 HSLAS Gr 50 Cl 2 ③, or A1008 HSLAS Gr 50 Cl 2	50
Base Plate and Handhole Frame	A572 Gr.50, or A36	36
T-Base Connecting Bolts	F3125 Gr A325	92
Anchor Bolts	F1554 Gr 55, A193-B7 or A321	55 105
Anchor Bolt Templates	A36	36
Heavy Hex (H.H.) Nuts	A194 Gr 2H, or A563 Gr DH	
Flat Washers	F436	

NOTES:

① 2'-6" rise for 4 ft. luminaire arms.

② Before ovalized as shown on Concrete Traffic Barrier Base Baseplate details, Sheet 4 of 4.

③ A1011 SS Gr 50 may be used instead of HSLAS, provided the material meets the elongation requirements for HSLAS.

POLE ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Shaft length	+1"
I.D. of outside piece of slip fitting pieces	+1/8", -1/16"
O.D. of inside piece of slip fitting pieces	+1/32", -1/8"
Shaft diameter: other	+3/16"
Out of "round"	1/4"
Straightness of shaft	±1/4" in 10 ft
Twist in multi-sided shaft	4° in 50 ft
Perpendicular to baseplate	1/8" in 24"
Pole centered on baseplate	±1/4"
Location of Attachments	±1/4"
Bolt hole spacing	±1/16"

GENERAL NOTES:

1. Designs conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals , 6th Edition (2013) and Interim Revisions thereto. Design 3-Second Gust Wind Speed equals 110 mph with a 1.14 gust factor. A wind importance factor of 0.80 is applied to adjust the wind speed to a 25 year recurrence interval. Design moments listed in tables assume base of pole is 25' above natural ground level.
2. Structures are designed to support two 12' luminaire mast arms and luminaires. Mast arms are designed to support a 60-pound luminaire having an effective projected area of 1.6 square feet.
3. Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown herein. Do not submit shop drawings for roadway illumination pole assemblies fabricated in accordance with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of these sheets and the Specifications. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
4. For mounting heights between values shown in the tables, use base diameter and thickness values for the larger height.
5. Unless otherwise noted, all steel parts shall be galvanized in accordance with Item 445, "Galvanizing."
6. Steel poles shall be fabricated in accordance with Item 441, "Steel Structures." Longitudinal seam welds for pole sections shall have 60% minimum penetration. All welding shall be in accordance with AWS D1.1, Structural Welding Code-Steel.
7. Two-section poles joined by circumferential welds will not be permitted, unless otherwise shown on the plans. Poles may be fabricated in two sections and field-assembled by the lap-joint method. The two sections shall telescope together with a lap length of not less than 1-1/2 times the shaft diameter at the lap joint.
8. Alternate material equal to or better than material specified may be substituted with the approval of the Engineer.
9. Lubricate and tighten anchor bolts, when erecting shoe base poles and concrete traffic barrier base poles, in accordance with Item 449, "Anchor Bolts."
10. All poles, except Transformer Base Poles, shall have hand holes with reinforcing frames and covers. For ground mounted shoe base poles, hand holes shall be placed 90 degrees to mast arm unless otherwise noted on the plans. For poles mounted on a concrete traffic barrier with one luminaire arm, hand holes shall be located 180 degrees from luminaire arm. For poles mounted on a concrete traffic barrier with two luminaire arms, all hand holes shall be on the same side of the barrier. For poles mounted on a bridge lighting bracket or a retaining wall lighting bracket, hand hole shall be on traffic side of the pole, at a height that will clear the barrier.
11. The finished pole shall have a smooth, uniform finish free of pits, blisters, or other defects. Scratched, chipped, and other damaged galvanized areas on poles and mast arms shall be repaired in accordance with Item 445, "Galvanizing."
12. Pole length is based on a 5'-6" luminaire arm rise. 4 ft. luminaire arms have a 2'-6" rise. A pole with 4 ft. luminaire arms will have an actual mounting height 3'-0" less than the nominal mounting height. Increasing the pole length to meet the nominal mounting height is allowed, but unnecessary unless otherwise directed by the engineer.
13. Erect transformer base poles in accordance with sheet RID(1).

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(2)-19

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REVISIONS	0905	06	118	CS
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12-19	LBB	LUBBOCK		165

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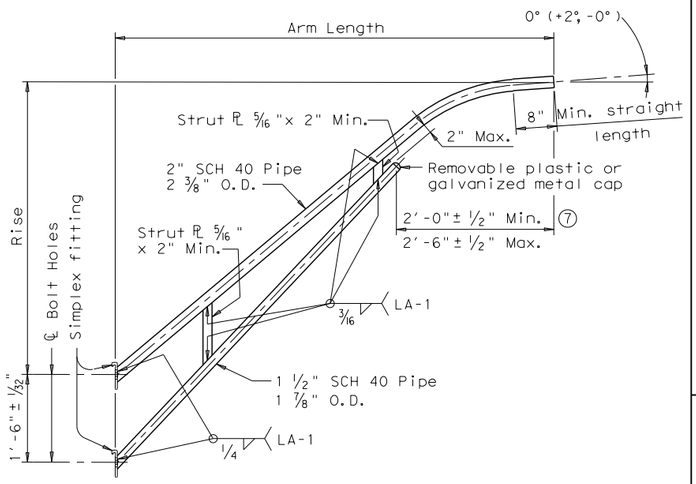
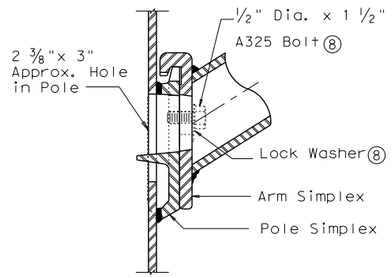


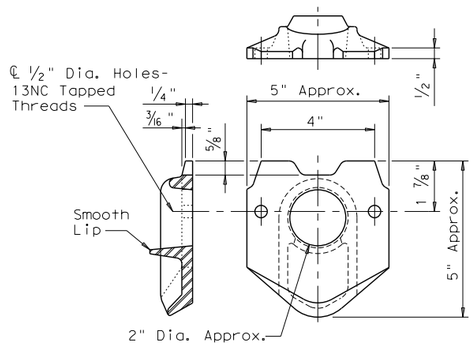
LUMINAIRE ARM

LUMINAIRE ARM DIMENSIONS		
Nominal Arm Length	Arm Length	Rise
4'-0"	3'-6"	2'-6"
6'-0"	5'-6"	5'-6"
8'-0"	7'-6"	5'-6"
10'-0"	9'-6"	5'-6"
12'-0"	11'-6"	5'-6"

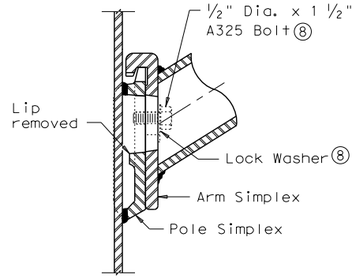
ARM ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Arm Length	±1"
Arm Rise	±1"
Deviation from flat	1/8" in 12"
Spacing between holes	±1/32"



UPPER SIMPLEX FITTING
(Gusset not shown for clarity)

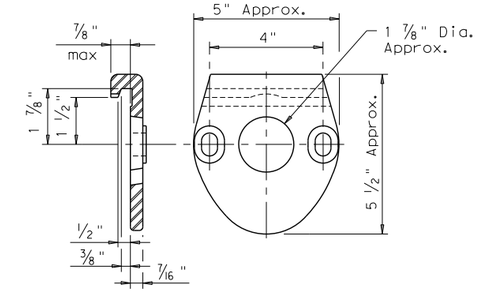


POLE SIMPLEX DETAIL ⑨



LOWER SIMPLEX FITTING
(Gusset not shown for clarity)

SECTION B-B



ARM SIMPLEX DETAIL ⑨

NOTES:

④ Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

⑤ A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.

⑥ A572, A1008 HSLAS-F, and A1011 HSLAS-F materials may have higher yield strengths but shall not have less elongation than the grade indicated.

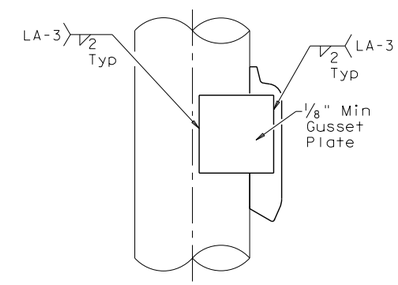
⑦ Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

⑧ Each pole simplex fitting shall be supplied with 2 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans.

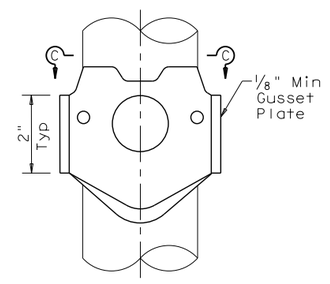
⑨ Proposed deviations in arm simplex dimensions or materials must be submitted to the Department for approval.

⑩ A welded handhole frame is permissible. Maximum of two (2) CJP weld splices is allowed.

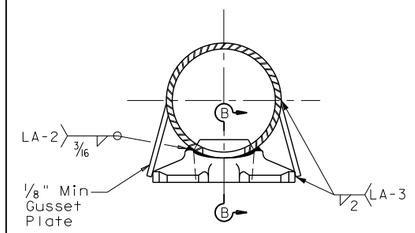
MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr 65-35 or Gr 70-36, A148 Gr 80-50, A576 Gr 1021 ⑤, or A36 (Arm only)
Arm Pipes	ASTM A53 Gr A or B, A500 Gr B, A501, A 1008 HSLAS-F Gr 50 ⑥, or A1011 HSLAS-F Gr 50 ⑥
Arm Struts and Gusset Plates ④	ASTM A36, A572 Gr 50 ⑥, or A588
Misc.	ASTM designations as noted



SIDE

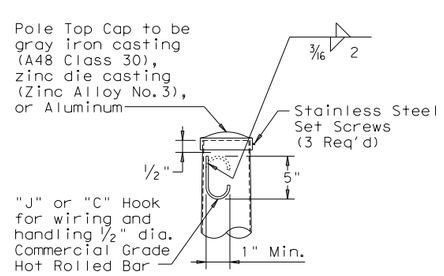


ELEVATION

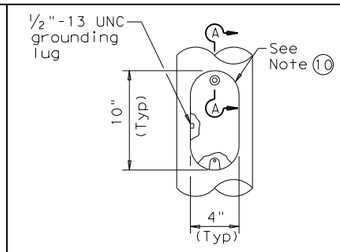


SECTION C-C

SIMPLEX ATTACHMENT DETAIL



POLE TOP



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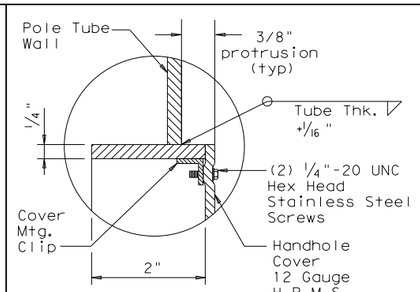

SECTION A-A

HANDHOLE

SHEET 3 OF 4

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(3)-19

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12-19	LBB	LUBBOCK		166

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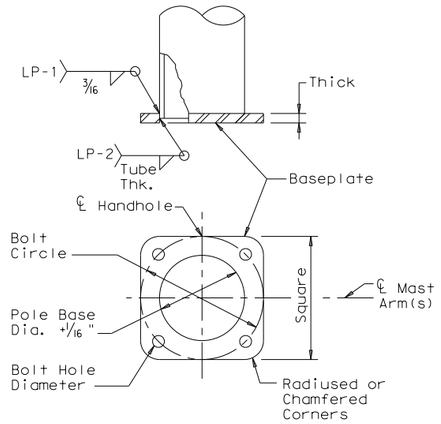
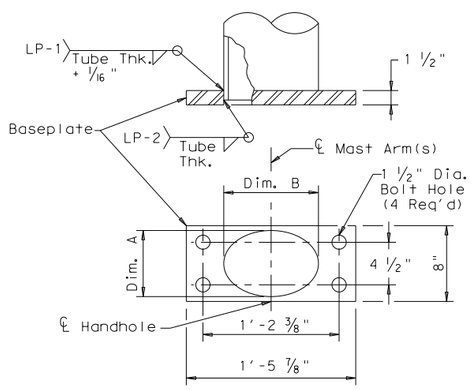


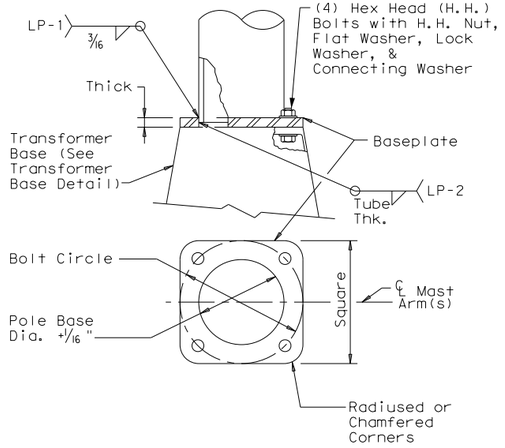
SHOE BASE BASEPLATE

SHOE BASE BASEPLATE TABLE				
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	BOLT HOLE DIAMETER
20′ - 39′	13"	13"	1 1/4"	1 1/4"
40′	15"	15"	1 1/4"	1 1/2"
50′	15"	15"	1 1/2"	1 1/2"



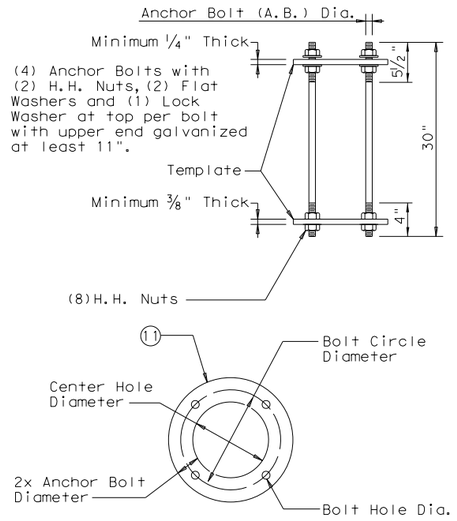
CONCRETE TRAFFIC BARRIER BASE BASEPLATE

CONCRETE TRAFFIC BARRIER BASE BASEPLATE TABLE			
MOUNTING HEIGHTS (nominal)	POLE DIA.(12)	DIM. A	DIM. B
28′ - 38′	9"	7" ± 1/4"	10" ± 1/4"
48′	10 1/2"	7" ± 1/4"	13" ± 1/4"



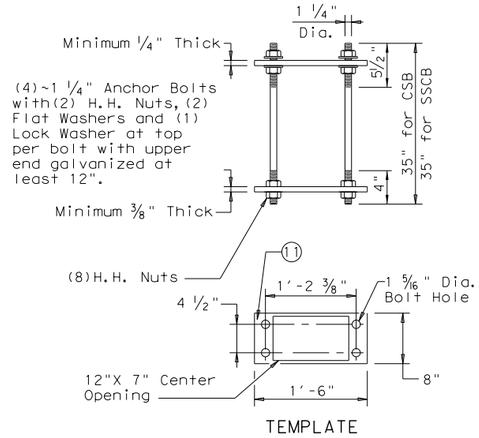
TRANSFORMER BASE BASEPLATE

TRANSFORMER BASE BASEPLATE TABLE						
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	CONNECTING BOLT DIA.	BOLT HOLE DIAMETER	TRANSFOMER BASE TYPE
20′ - 39′	13"	13"	1 1/4"	1"	1 1/4"	A
40′	15"	15"	1 1/4"	1 1/4"	1 1/2"	B
50′	15"	15"	1 1/2"	1 1/4"	1 1/2"	B



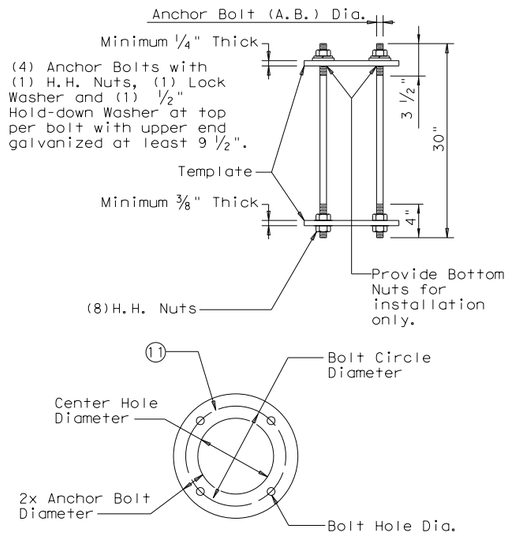
SHOE BASE ANCHOR BOLT ASSEMBLY

SHOE BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20′-39′	1"	13"	11"	1 1/16"
40′-50′	1 1/4"	15"	12 1/2"	1 5/16"



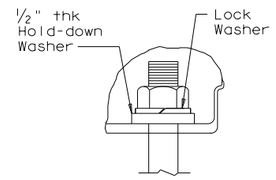
CONCRETE TRAFFIC BARRIER BASE ANCHOR BOLT ASSEMBLY

TRANSFORMER BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20′- 39′	1"	14"	12"	1 1/16"
40′- 50′	1 1/4"	17 1/4"	14 3/4"	1 5/16"

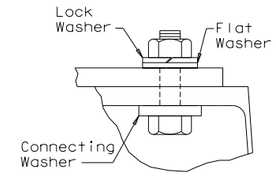


TRANSFORMER BASE ANCHOR BOLT ASSEMBLY

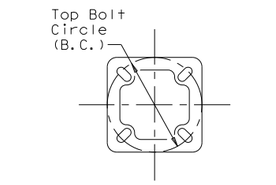
TRANSFORMER BASE TABLE		
TYPE	TOP B.C.	BTM. B.C.
A	13"	14"
B	15"	17 1/4"



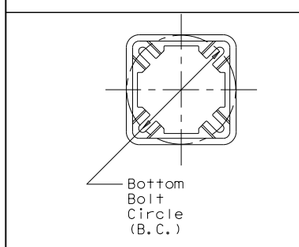
DETAIL A



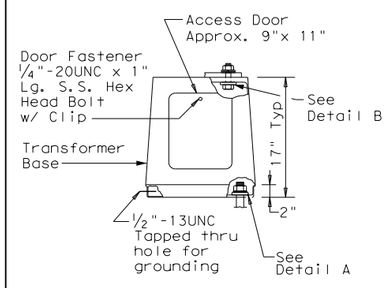
DETAIL B



TOP PLAN



BOTTOM PLAN



ELEVATION

TRANSFORMER BASE DETAILS

GENERAL NOTES:

1. For mounting heights between those shown in the table, use the values in the table for the larger mounting height.
2. All breakaway bases shall meet the breakaway requirements of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto, and shall have been tested by FHWA-approved methods. All bases shall have been structurally tested to resist 150% of the design moment.
3. Transformer bases shall be cast from aluminum, ASTM B108 or B26 Alloy 356.0-T6, or other material approved by the Engineer. Four Hex Head (H.H.) bolts with four H.H. nuts, four lock washers, four flat washers, and connecting and hold-down washers as recommended by the manufacturer, galvanized to ASTM A153 Class C or D, or B695 Class 50, shall be provided with each transformer base for connecting the pole. Bolts shall be ASTM A325 or approved equal. Nuts shall be ASTM A563 grade DH galvanized.
4. Bases shall be stamped, incised or by other approved permanent means, marked to show fabricator's name or logo, and model number. Such information shall be placed in a readily seen location, inside or outside the base, but shall not be placed on the door.
5. Doors for transformer bases shall be made of plastic, fiberglass or other non-metallic material approved by the Engineer and shall be attached with stainless steel screws or bolts. Transformer bases shall be cleaned by grit blast cleaning after heat treatment. Certification by the manufacturer of heat treatment shall be furnished with transformer bases. The certification shall show the metal alloy and temper and that the base meets those requirements, chemical and physical. The certification shall also show the material ASTM specification. Transformer bases shall be cast with a removable tab bar for material testing. Some bars may have been removed by the manufacturer for testing.

NOTES:

(11) Anchor Bolt Templates do not need to be galvanized.

(12) Pole diameter before ovalized.

ANCHOR BOLT FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Length	± 1/2"
Threaded length	± 1/2"
Galvanized length (if required)	- 1/4"

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Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(4)-19

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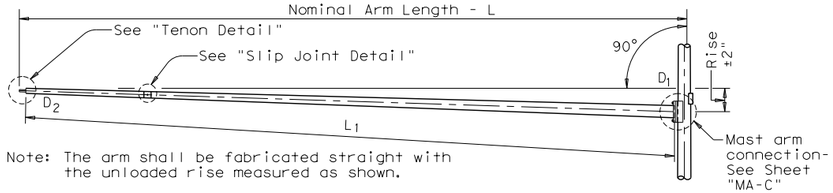
Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D_B	D_{19}	D_{24}	D_{30}	① thk	D_B	D_{19}	D_{24}	D_{30}	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	12.0	9.3	8.6	7.8	.239	12.5	9.5	8.7	7.8	.239	36-A
24	12.0	9.3	8.6	7.8	.239	13.0	10.0	9.2	8.3	.239	36-A
28	12.0	9.3	8.6	7.8	.239	13.5	10.5	9.7	8.8	.239	36-A
32	13.0	10.3	9.6	8.8	.239	14.0	11.0	10.2	9.3	.239	36-A
36	13.5	10.8	10.1	9.3	.239	15.0	12.0	11.2	10.3	.239	36-A
40	14.0	11.3	10.6	9.8	.239	16.0	13.0	12.2	11.3	.239	36-B
44	14.5	11.8	11.1	10.3	.239	16.5	13.5	12.7	11.8	.239	36-B

Arm Length	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	① thk	Rise	L_1	D_1	② D_2	① thk	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	8.0	5.3	.179	1'-8"	19.1	8.0	3.5	.179	1'-7"
24	23.1	9.0	5.8	.179	1'-9"	23.1	9.0	3.5	.179	1'-8"
28	27.1	9.5	5.7	.179	1'-10"	27.1	10.0	3.5	.179	1'-9"
32	31.0	9.5	5.2	.239	1'-11"	31.0	9.5	3.5	.239	1'-10"
36	35.0	10.0	5.1	.239	2'-0"	35.0	10.0	3.5	.239	1'-11"
40	39.0	10.5	5.1	.239	2'-3"	39.0	11.0	3.5	.239	2'-1"
44	43.0	11.0	5.1	.239	2'-8"	43.0	11.5	4.0	.239	2'-3"

D_B = Pole Base O.D.
D_{19} = Pole Top O.D. with no Luminaire and no ILSN
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L = Nominal Arm Length

① Thickness shown are minimums, thicker materials may be used.

② D_2 may be increased by up to 1" for polygonal arms.



Note: The arm shall be fabricated straight with the unloaded rise measured as shown.

TRAFFIC SIGNAL ARM

(Fixed Mount)

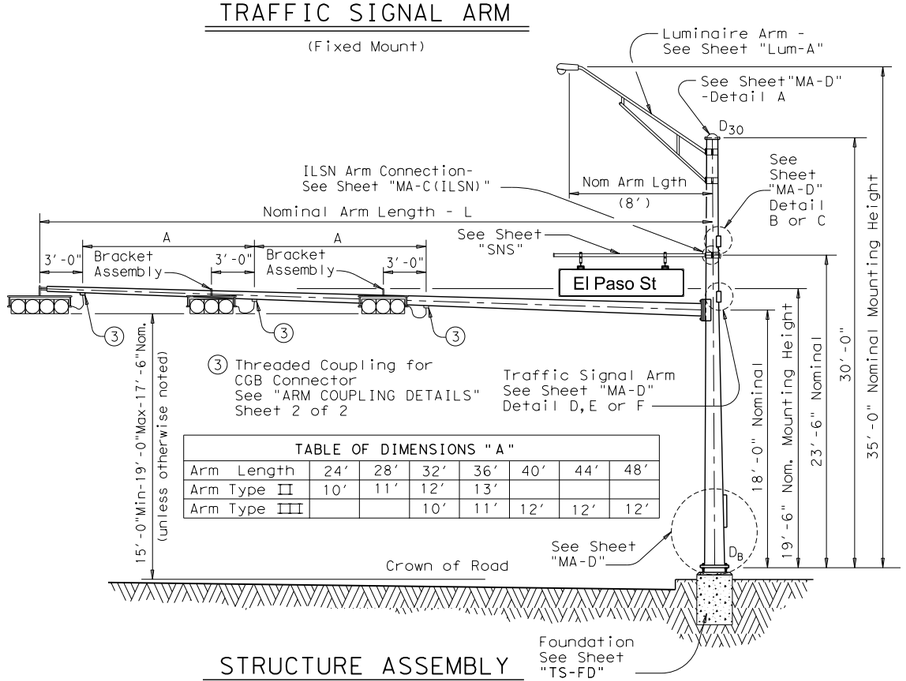


TABLE OF DIMENSIONS "A"							
Arm Length	24'	28'	32'	36'	40'	44'	48'
Arm Type II	10'	11'	12'	13'			
Arm Type III			10'	11'	12'	12'	12'

STRUCTURE ASSEMBLY

SHIPPING PARTS LIST

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed-arm connection bolts and washers and any additional hardware listed in the table.

Nominal Arm Length	30' Poles With Luminaire		24' Poles With ILSN		19' Poles With No Luminaire and No ILSN	
	Above hardware plus: One (or two if ILSN attached) small hand hole, clamp-on simplex		Above hardware plus one small hand hole		See note above	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20L-100		20S-100		20-100	
24	24L-100		24S-100		24-100	
28	28L-100		28S-100		28-100	
32	32L-100		32S-100		32-100	
36	36L-100		36S-100		36-100	
40	40L-100		40S-100		40-100	2
44	44L-100		44S-100		44-100	1

Traffic Signal Arms (1 per pole) Ship each arm with the listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal)		Type II Arm (2 Signals)		Type III Arm (3 Signals)	
	1 CGB connector		1 Bracket Assembly and 2 CGB Connectors		2 Bracket Assemblies and 3 CGB Connectors	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-100					
24	24I-100		24II-100			
28	28I-100		28II-100			
32			32II-100		32III-100	
36			36II-100		36III-100	
40					40III-100	2
44					44III-100	1

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
1 ½"	3'-4"	
1 ¾"	3'-10"	
2"	4'-3"	3

Each anchor bolt assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD".

Templates may be removed for shipment.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(100 MPH WIND ZONE)

SMA-100(1)-12

DN: MS	CK: JSY	DW: MWF	CK: JSY

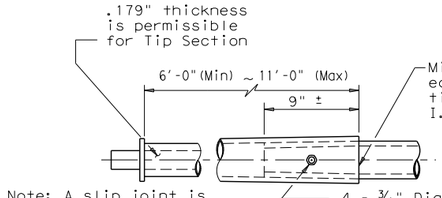
REVISIONS
5-96
11-99
1-12

CONT	SECT	JOB	HIGHWAY
0905	06	118	CS
DIST	COUNTY		SHEET NO.
LBB	LUBBOCK		168

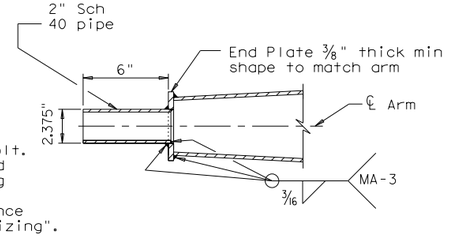
123A

DATE:
FILE:

DATE:
FILE:

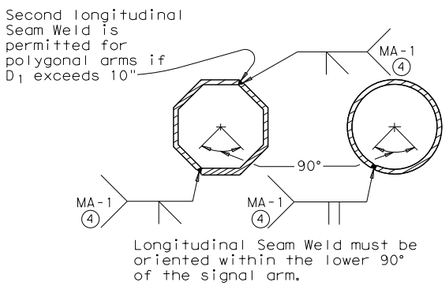


SLIP JOINT DETAIL



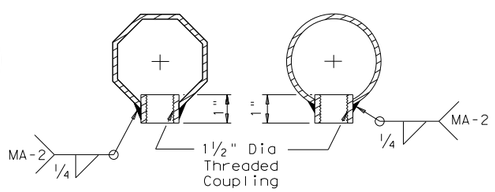
TENON DETAIL

BRACKET ASSEMBLY



ARM WELD DETAIL

(4) 60% Min. penetration
100% pemetration within 6" of circumferential base welds.



ARM COUPLING DETAILS

VIBRATION WARNING

Mast Arms of SMA and DMA structures and clamp-on Arms of LMA structures of approximately 40 ft or longer are subject to harmonic vertical vibrations in light wind conditions due to the aeroelastic characteristics of a few of the myriads of possible combinations of the following: signal numbers, weights and positions; existence/solidity of backplates; presence of additional attachments to the arm, such as signs and cameras; arm-wind orientation; and arm-pole stiffness.

Such vibrations may cause fatigue damage to the structure and may lead to galloping in moderate wind conditions which may further damage the structure and alarm the public. Tests have indicated that when wind is blowing toward the back side of signal heads having un-vented backplates attached the probability of unacceptable harmonic vibration and/or galloping is rather high.

If backplates are not required for improved visibility they should not be applied to the signal heads or, if they must be applied, they should be vented as a first and inexpensive measure to mitigate vibrations.

The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signal heads and any attachments, including any required backpates. If vertical movements with a total excursion (maximum upward excursion to maximum downward excursion) of more than approximately 8" are observed at the arm tip, a damping plate shall be fitted to the arm. See "Damping Plate Mounting Details" on standard sheet, MA-DPD-10.

This visual inspection shall be repeated after each modification of the structure that could affect its aeroelastic response. Excessive vibrations shall not be allowed to continue for more than two days.

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 100 mph plus a 1.3 gust factor.

Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing", after fabrication.

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(100 MPH WIND ZONE)

SMA-100(2)-12

DN: MS	CK: JSY	DW: MMF	CK: JSY

REVISIONS
5-96
1-12

CONT	SECT	JOB	HIGHWAY
0905	06	118	CS
DIST	COUNTY		SHEET NO.
LBB	LUBBOCK		169

123B

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

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

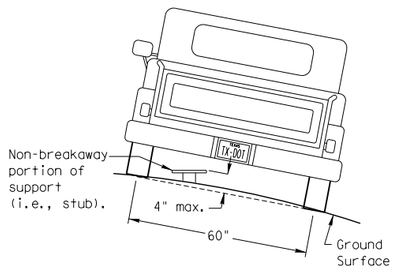
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

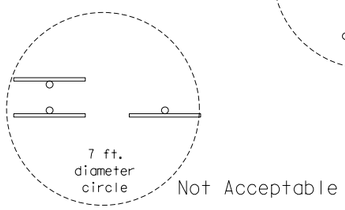
P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

No more than 2 sign posts should be located within a 7 ft. circle.



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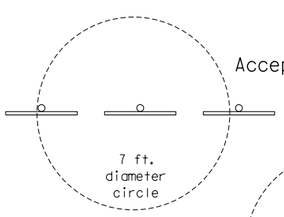
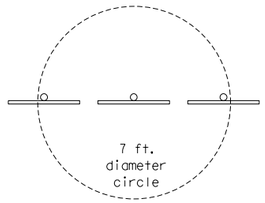


Acceptable



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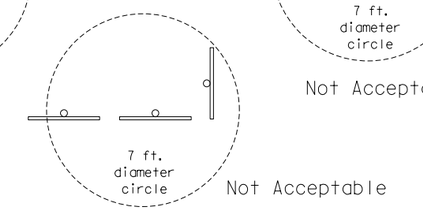
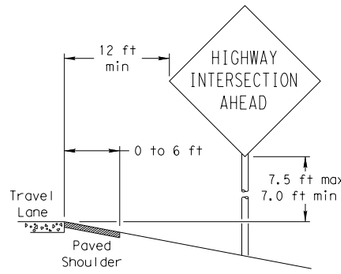


Not Acceptable

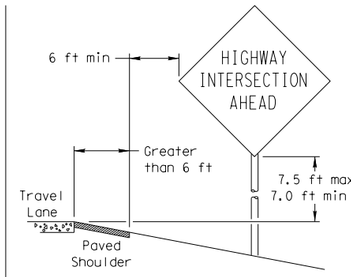
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

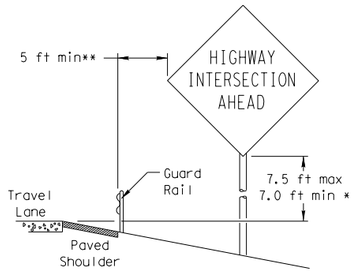
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



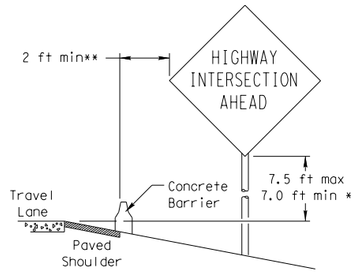
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

BEHIND BARRIER



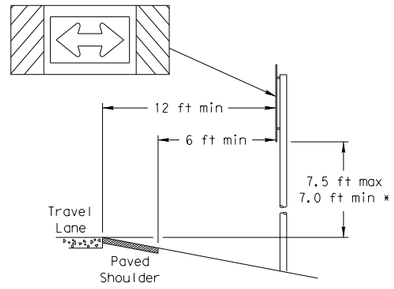
BEHIND GUARDRAIL



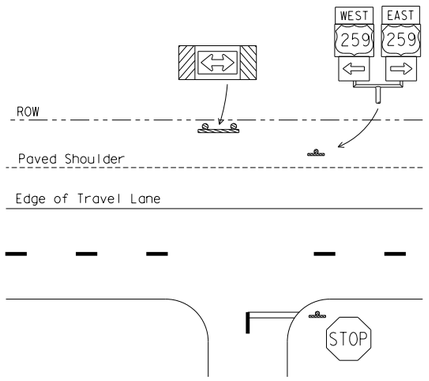
BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

T-INTERSECTION



When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

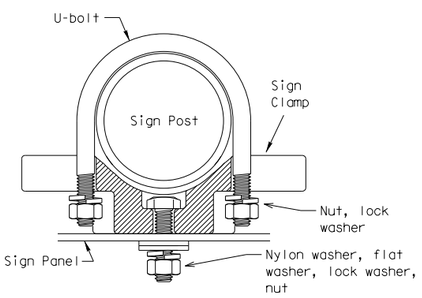
The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

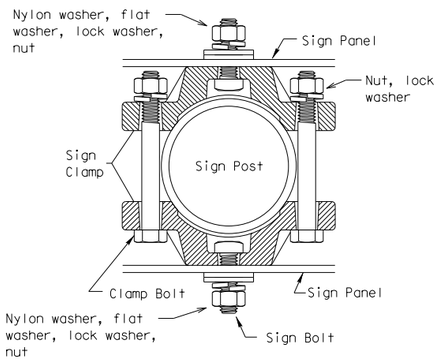
The website address is:
http://www.txdot.gov/publications/traffic.htm

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



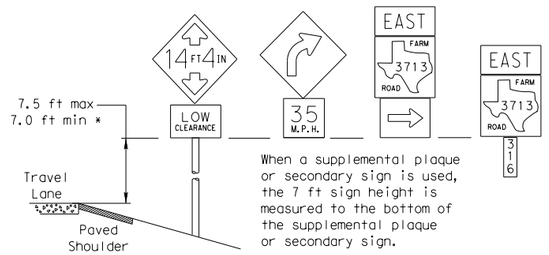
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

Sign clamps may be either the specific size clamp or the universal clamp.

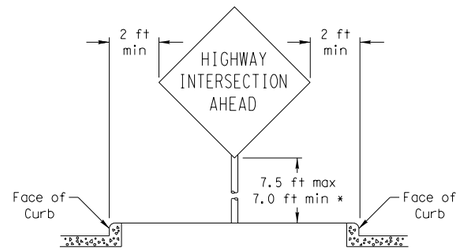
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



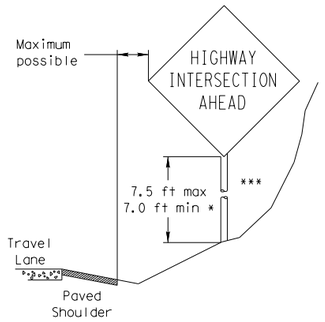
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

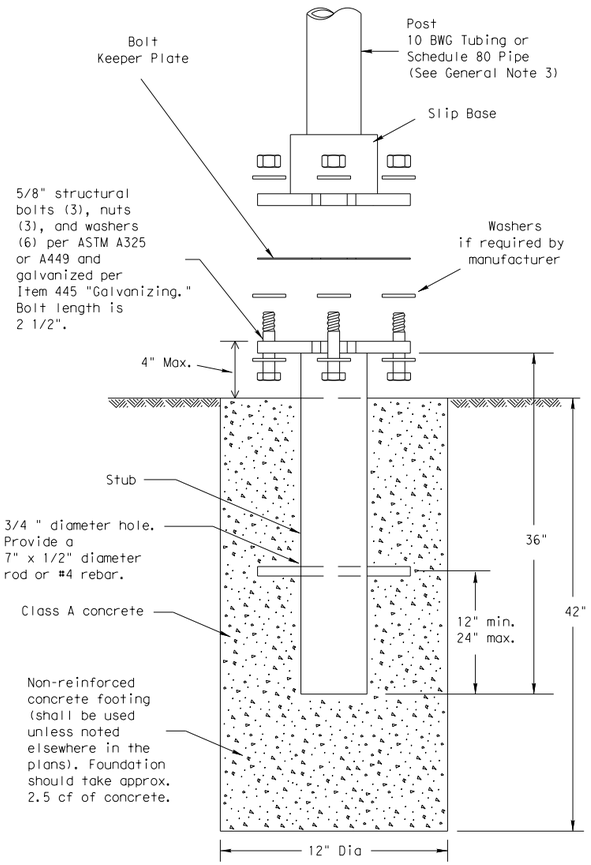
REVISIONS
9-08

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

CONT	SECT	JOB	HIGHWAY
0905	06	118	CS
DIST	COUNTY		SHEET NO.
LBB	LUBBOCK		170

DATE:
FILE:

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

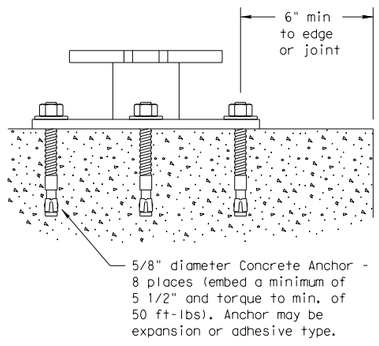
1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   0.134" nominal wall thickness
   Seamless or electric-resistance welded steel tubing or pipe
   Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   Other steels may be used if they meet the following:
   55,000 PSI minimum yield strength
   70,000 PSI minimum tensile strength
   20% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
   Schedule 80 Pipe (2.875" outside diameter)
   0.276" nominal wall thickness
   Steel tubing per ASTM A500 Gr C
   Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
   46,000 PSI minimum yield strength
   62,000 PSI minimum tensile strength
   21% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



SM RD SGN ASSM TY XXXXX(X)SB(X-XXXX)

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

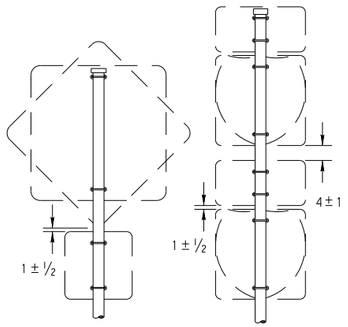
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
9-08

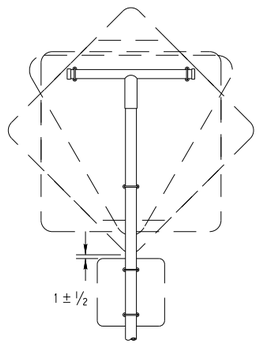
CONT	SECT	JOB	HIGHWAY
0905	06	118	CS

DIST	COUNTY	SHEET NO.
LBB	LUBBOCK	171

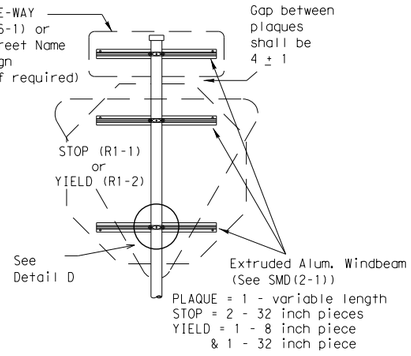
DATE:
FILE:



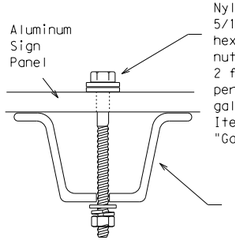
SM RD SGN ASSM TY XXXXX(1)XX(P)



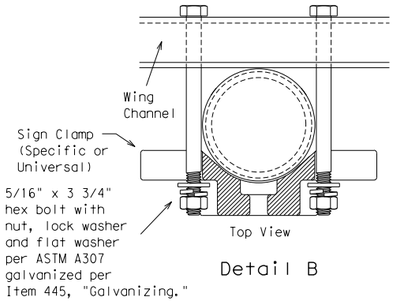
SM RD SGN ASSM TY XXXXX(1)XX(T)



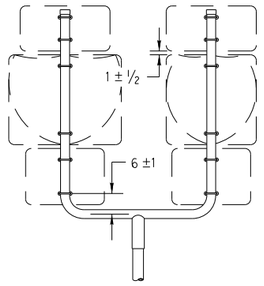
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



Detail A



Detail B



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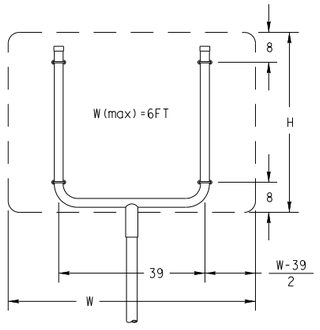

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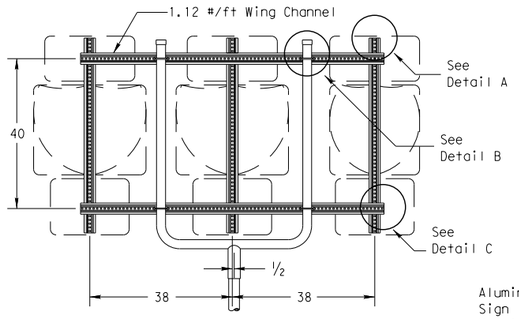
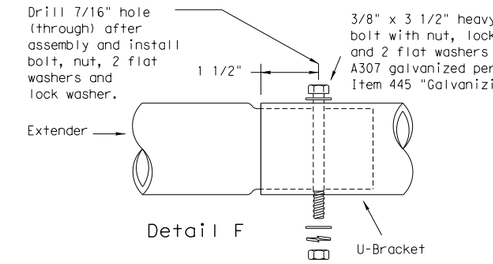
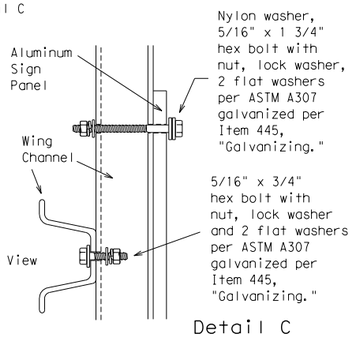


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

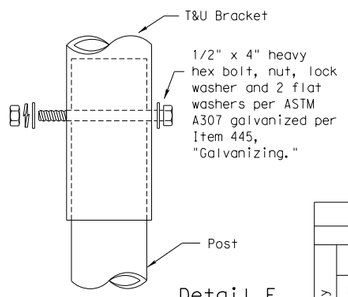


Detail F

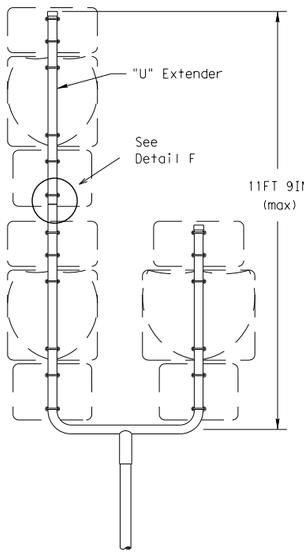
Splices shall only be allowed behind the sign substrate.



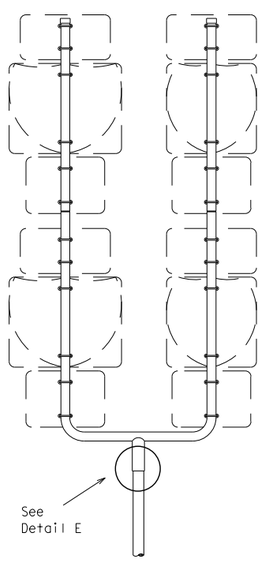
Detail C



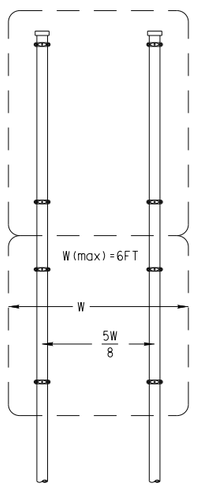
Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

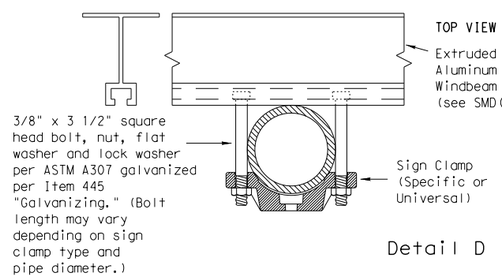


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

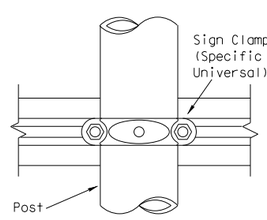


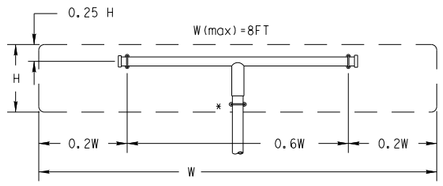
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

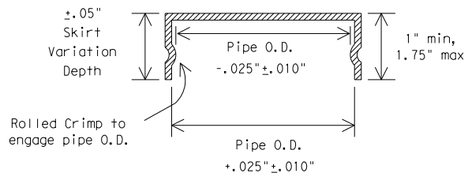




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

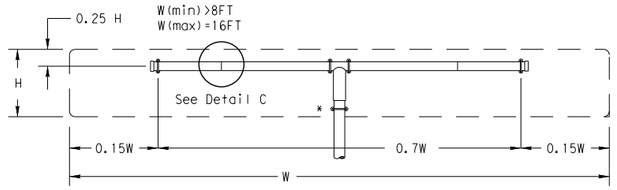
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0905	06	118	CS
	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		172

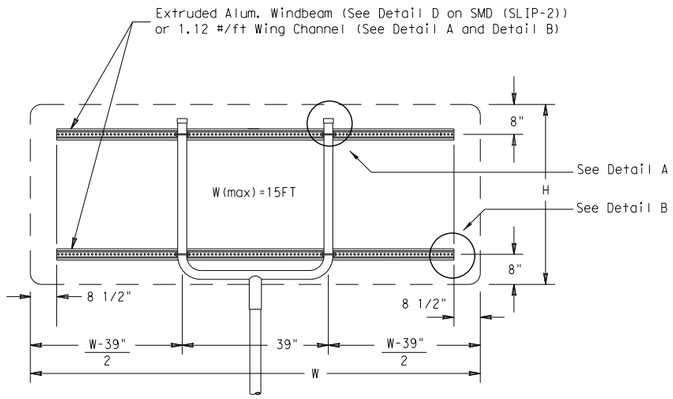
26C

DATE:
FILE:

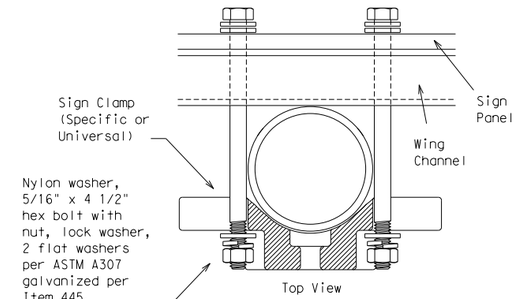
DATE:
FILE:



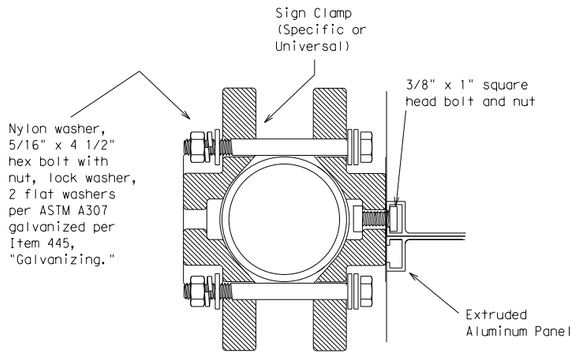
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



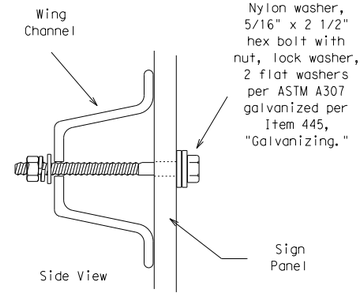
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



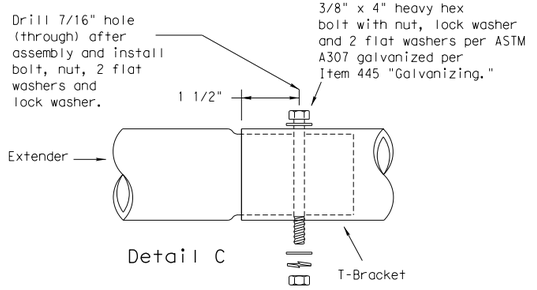
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

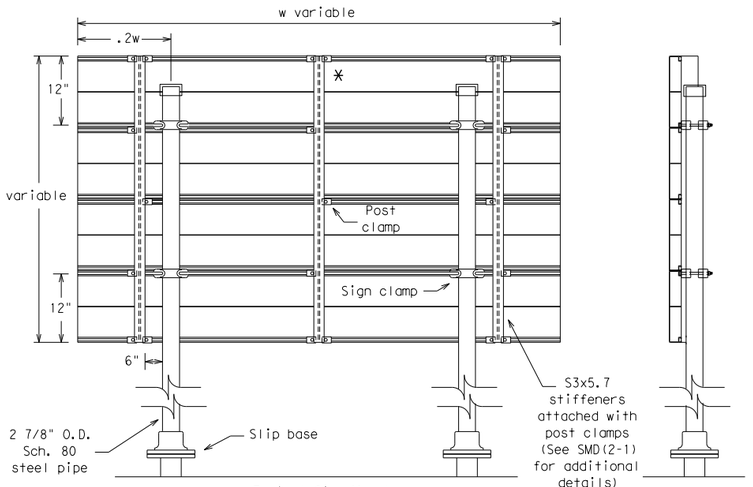


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

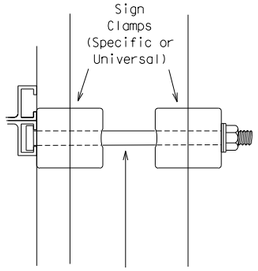


Typical Sign Mount

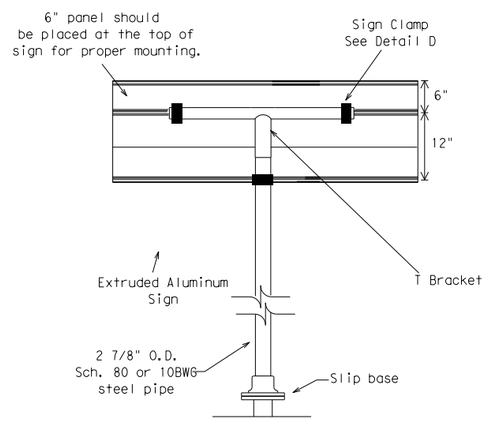
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

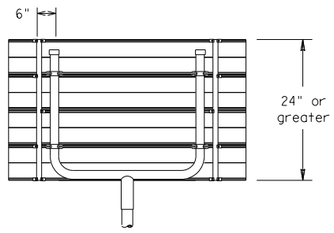
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1.
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
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6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

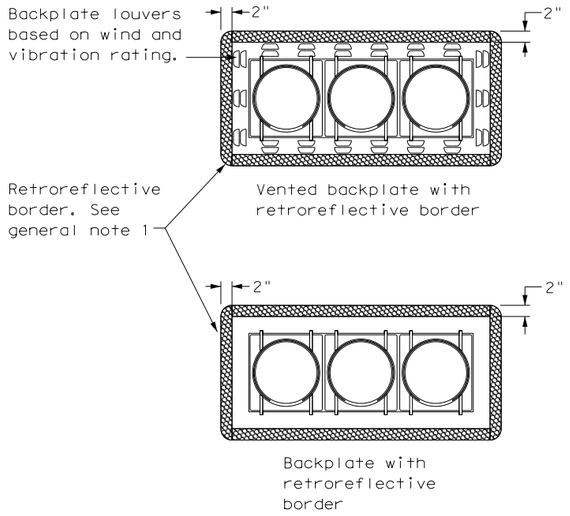
SMD(SLIP-3)-08

REVISIONS
9-08

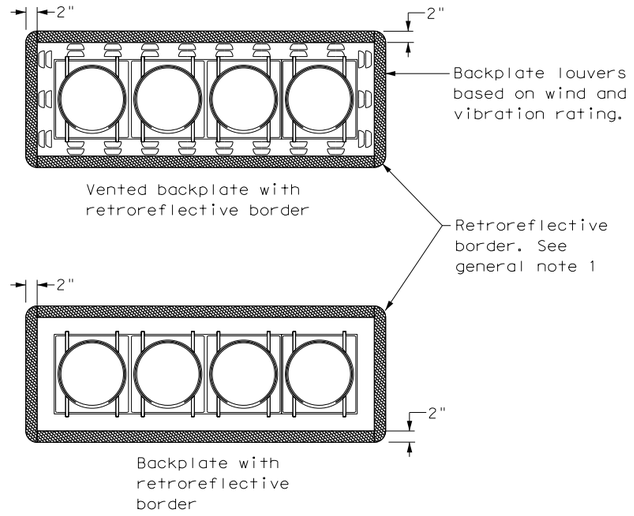
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
0905	06	118	CS
DIST	COUNTY		SHEET NO.
LBB	LUBBOCK		173

26D

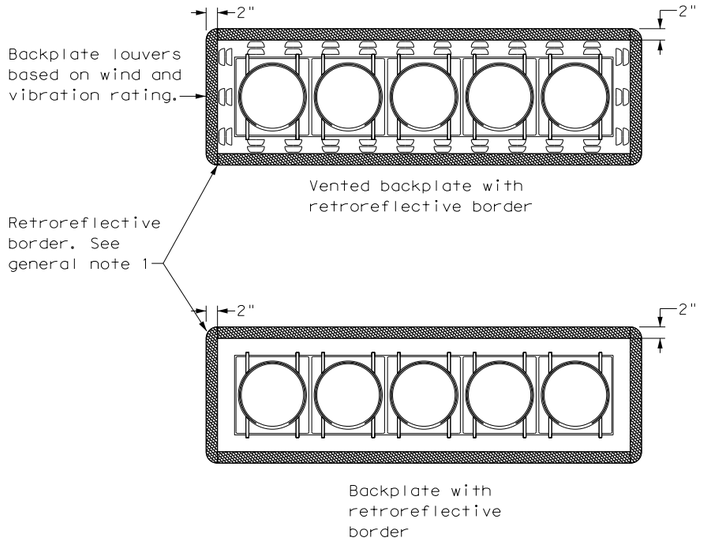
DATE:
FILE:



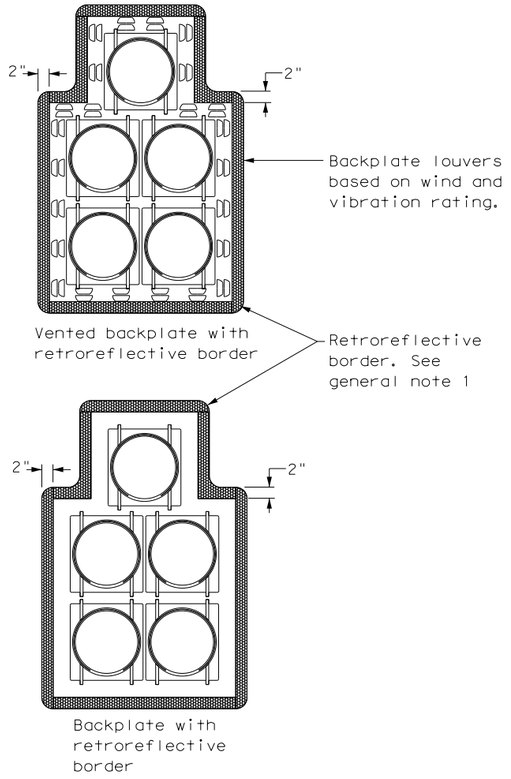
THREE-SECTION HEAD
HORIZONTAL OR VERTICAL



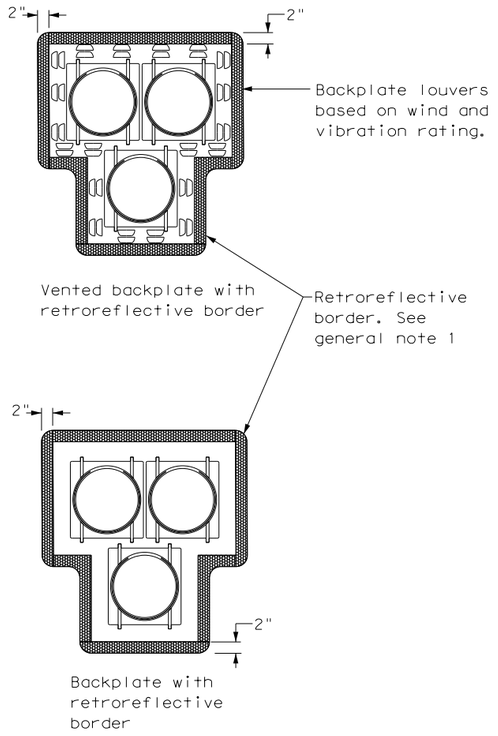
FOUR-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
CLUSTER



PEDESTRIAN HYBRID
BEACON

GENERAL NOTES:

1. Backplates are optional for traffic signals and pedestrian hybrid beacons. When backplates are used, a 2-inch wide fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 is required. Place on all approaches when used.
2. Signal head and backplate compatability must be verified by the contractor prior to installation.
3. When using backplates on signal heads, venting is preferred to reduce cyclic vibration stress.
4. When a vented backplate is used, the retroreflective border must not be placed over the louvers.
5. This standard sheet applies to all signal heads with backplates, including but not limited to:
   - Pole mounted
   - Overhead mounted
   - Span wire mounted
   - Mast arm mounted
   - Vertical signal heads
   - Horizontal signal heads
   - Clustered signal heads
   - Pedestrian hybrid beacons

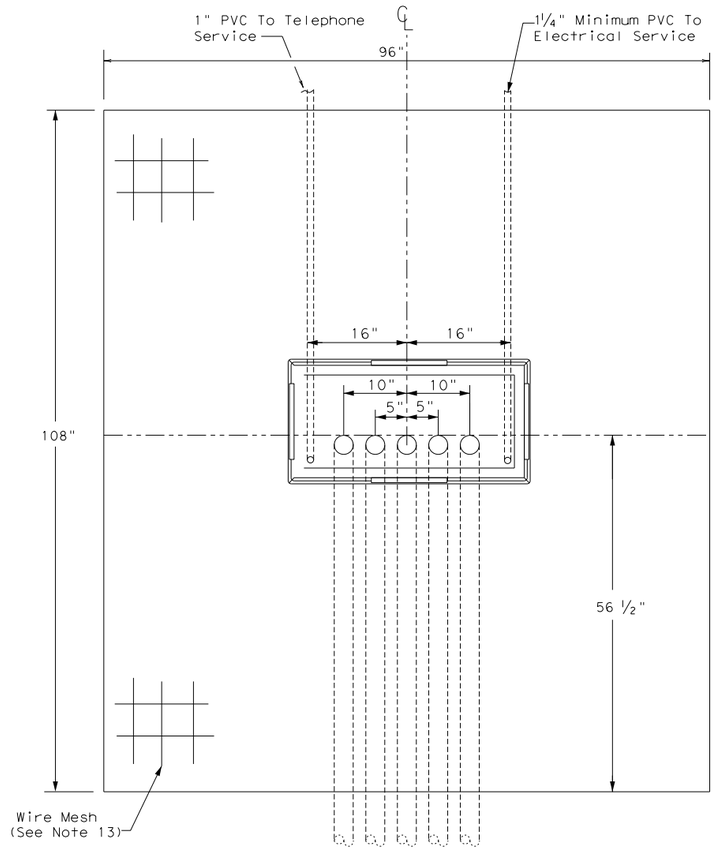
Texas Department of Transportation

Traffic Safety Division Standard

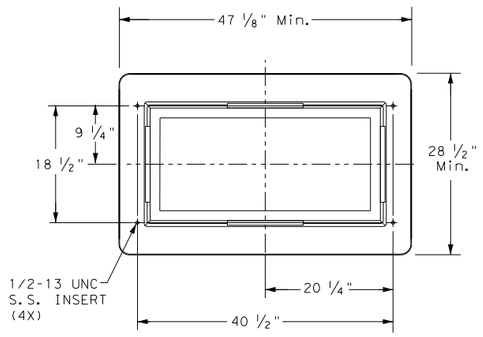
TRAFFIC SIGNAL HEAD WITH BACKPLATE

TS-BP-20

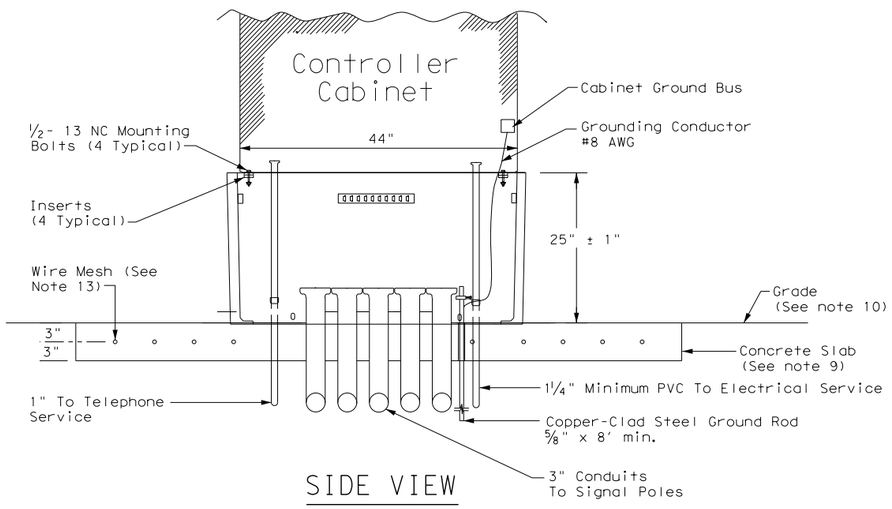
FILE: ts-bp-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT June 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		174



TOP VIEW



CABINET BASE



SIDE VIEW

TRAFFIC SIGNAL CONTROLLER BASE:

1. Provide a traffic signal controller base (cabinet base) manufactured of polymer concrete material consisting of calcareous and siliceous stone; glass fibers and thermoset polyester resin. The polymer concrete cabinet base must be reinforced on the inside of the cabinet base with fiberglass matting. Provide one of the following bases: Armorcast Part # A6001848X24, Quazite Model # PG3048Z709, or other as approved by TxDOT Traffic Safety Division.
2. The polymer concrete material must have a minimum compressive strength of 10,300 pounds per square inch (psi), minimum flexural strength of 3600 psi, and minimum shear strength of 3600 psi.
3. The polymer concrete cabinet base must conform to the dimensions shown and must accommodate a standard TxDOT basemount cabinet.
4. Supply the cabinet base with four 1#2"-13 UNC stainless steel inserts for attachment of the cabinet to the base. Inserts must withstand a minimum torque of 50 ft-lb and a minimum straight pull out strength of 750 lbs.
5. Provide the cabinet base with 4 cable racks mounted one on each side of the base 2" to 7 " from the top edge of the base. Unless approved otherwise, cable racks must be 1-1/2 x 9#16x 3#16inch steel channel with eight T-slots spaced at 1-1/2 inches. The cable racks must easily accommodate the insertion of tie wraps to attach field wiring to the racks to serve as strain relief. Secure cable racks to the base using 1#2"-13 UNC stainless steel screws and inserts.
6. The cabinet base, when secured to the concrete slab with controller cabinet attached, must withstand a minimum wind load of 125 mph or a 850 lb force applied at 49" above the bottom of the base without causing the base or cabinet to come out of their anchored position or cause any permanent deformation. The manufacturer must supply certification by an independent testing laboratory or sealed by a Texas Licensed Professional Engineer. Provide the cabinet base with hardware for attachment to a concrete slab.
7. The traffic signal base must be permanently marked either by impress or by permanent ink with the manufacturer's model number and name or logo.
8. Seal the base to the concrete with a silicone caulk bead and fastened to the slab per manufacturer's instructions.

CONCRETE SLAB:

9. Traffic signal controller pad must be a portland cement concrete slab poured in place, must conform to the dimensions shown, and must be level.
10. Grade earthwork such that it is flush with the concrete pad on all four sides, unless otherwise shown on the plans. Subsidiary to ITEM 680, four inch rip rap may be used in lieu of earthwork. Slopes shall gradually contour to match plans.
11. Bond a #8 AWG copper ground wire and an 8 ft ground rod bonded to the reinforcing mesh by a suitable UL Listed clamp and terminated to the cabinet grounding bus for the purpose of providing a local ground for the electrical grounding conductor. The electrical grounding conductor specified in Item 680-3.A.4 is required and must be terminated to the cabinet ground bus.
12. Install a PVC sleeve to prevent the ground rod from direct embedment in the slab.
13. Provide welded wire mesh 6X6-W2.9 X W2.9 for reinforcement. Provide joints and splices in the mesh with a minimum 6-inch overlap. Center the mesh between top and bottom and provide a minimum 3 inch cover on the edges.
14. Provide Class B concrete minimum for the slab in accordance with Item 421. Construct the slab in accordance with Item 531.

CONDUITS:

15. Stub up and run 3-inch conduits through the slab to the various traffic signal poles and ground boxes as shown on the layouts. Install the number of conduits as shown on layouts plus two additional 3 inch conduits for future use. Terminate the conduits with a bushing between 2 and 4-inches above the slab.
16. Extend conduits for future use at least 18-inches from the edge of the slab, terminate underground with a coupling, and cap and seal so that the seal can be removed without damaging the coupling. This must also apply to unused telephone conduit.
17. Stub up two separate conduits through the slab from the electrical and telephone services. Run the conduit for the electrical feed directly to the electrical service enclosure. Run the conduit for the telephone line directly to the telephone service, usually located on the same pole as the electrical service. Telephone must not under any circumstance share a conduit with any other function.
18. Terminate electric and telephone conduits above the slab with a coupling. After the base is installed, extend the conduits above the top of the base and secure to the base using a steel one-hole strap or similar suitable substitute.

CONTROLLER CABINET:

19. Anchor the controller cabinet to the base using four stainless steel 1/2-13 NC bolts.
20. The silicone caulk bead specified in Item 680.3.B must be RTV 133.

PAYMENT:

21. Bid TS-CF as subsidiary to Item 680.

Texas Department of Transportation

Traffic Safety Division Standard

TRAFFIC SIGNAL CONTROLLER CABINET BASE AND PAD

TS-CF-21

FILE: ts-cf-21.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
12-04	DIST	COUNTY		SHEET NO.
2-21	LBB	LUBBOCK		175

132

DATE:
FILE:

DATE: Mar. 01, 2021 TIME: 2:19:39 PM
FILE: N:\Master Design Files\Details\TRAFFIC\ts-fd.dgn

FOUNDATION DESIGN TABLE

FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		EMBEDDED DRILLED SHAFT LENGTH-ft (4), (5), (6)			ANCHOR BOLT DESIGN (1)				FOUNDATION DESIGN LOAD (2)		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
				10	15	40							
24-A	24"	4- #5	#2 at 12"	5.7	5.3	4.5	¾"	36	12 ¾"	1	10	1	Pedestal pole, pedestal mounted controller.
30-A	30"	8- #9	#3 at 6"	11.3	10.3	8.0	1 ½"	55	17"	2	87	3	Mast arm assembly. (see Selection Table)
36-A	36"	10- #9	#3 at 6"	13.2	12.0	9.4	1 ¾"	55	19"	2	131	5	Mast arm assembly. (see Selection Table) 30' strain pole with or without luminaire.
36-B	36"	12- #9	#3 at 6"	15.2	13.6	10.4	2"	55	21"	2	190	7	Mast arm assembly. (see Selection Table) Strain pole taller than 30' & strain pole with mast arm
42-A	42"	14- #9	#3 at 6"	17.4	15.6	11.9	2 ¼"	55	23"	2	271	9	Mast arm assembly. (see Selection Table)

NOTES:

(1) Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

(2) Foundation Design Loads are the allowable moments and shears at the base of the structure.

(3) Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.

(4) Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

(5) If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

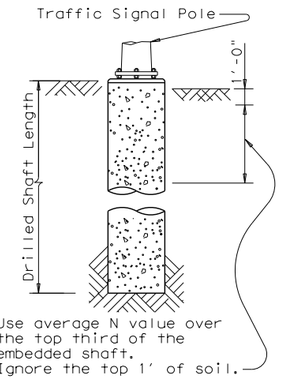
(6) Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

FOUNDATION SUMMARY TABLE (3)

LOCATION IDENTIFICATION	AVG. N BLOW /ft.	FDN TYPE	NO. EA	DRILLED SHAFT LENGTH (6) (FEET)				
				24-A	30-A	36-A	36-B	42-A
114TH & MEMPHIS	10	24-A	4	24				
114TH & MEMPHIS	10	36-B	3				48	
TOTAL DRILLED SHAFT LENGTHS								

FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)

		FDN 30-A	FDN 36-A	FDN 36-B	FDN 42-A
80 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH	32'	48'		
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	24' X 24'			
		28' X 28'			
		32' X 28'	32' X 32'		
			36' X 36'		
			40' X 36'		
			44' X 28'	44' X 36'	
100 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH		36'	44'	
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS		24' X 24'		
			28' X 28'		
			32' X 24'	32' X 32'	
				36' X 36'	
				40' x24'	40' X 36'
					44' x 36'



ANCHOR BOLT & TEMPLATE SIZES

BOLT DIA IN.	(7) BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
¾"	1'-6"	3"	—	12 ¾"	7 ⅛"	5 ⅝"
1 ½"	3'-4"	6"	4"	17"	10"	7"
1 ¾"	3'-10"	7"	4 ½"	19"	11 ¼"	7 ¾"
2"	4'-3"	8"	5"	21"	12 ½"	8 ½"
2 ¼"	4'-9"	9"	5 ½"	23"	13 ¾"	9 ¼"

(7) Min dimensions given, longer bolts are acceptable.

GENERAL NOTES:

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

Reinforcing steel shall conform to Item 440, "Reinforcing Steel".

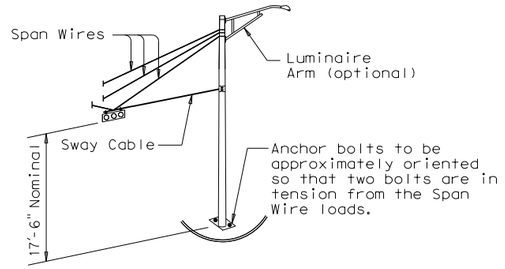
Concrete shall be Class "C".

Threads for anchor bolts and nuts shall be rolled or cut threads of 8UN series up to 2" in diameter or UNC series for all sizes. Bolts and nuts shall have Class 2A and 2B fit tolerances. Galvanized nuts shall be tapped after galvanizing.

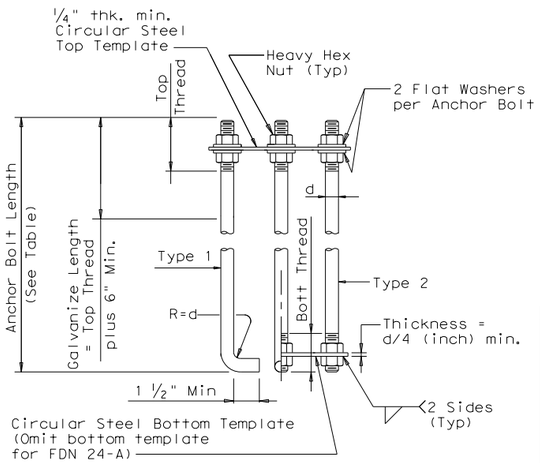
Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top end thread length plus 6" for all anchor bolts unless otherwise noted. Exposed washers and exposed nuts shall be galvanized. All galvanizing shall be in accordance with Item 445, "Galvanizing".

Templates and embedded nuts need not be galvanized. Lubricate and tighten anchor bolts when erecting the structure in accordance with Item 449, "Anchor Bolts".

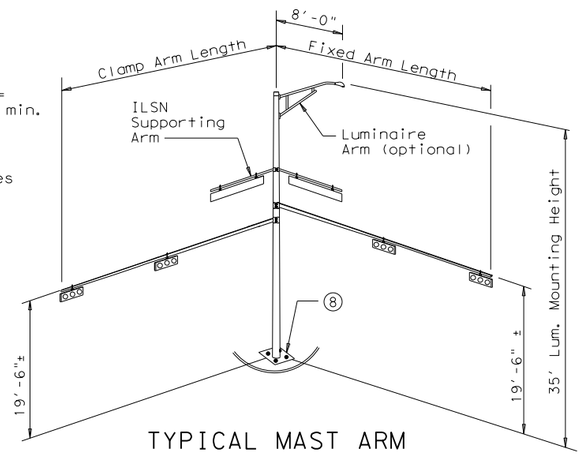
EXAMPLE:
1. For 80mph design wind speed, foundation 30-A can support up to a 32' arm with another arm up to 28'
2. For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.



TYPICAL STRAIN POLE ASSEMBLY



ANCHOR BOLT ASSEMBLY



TYPICAL MAST ARM ASSEMBLY

⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.

FOUNDATION DETAILS

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL POLE FOUNDATION

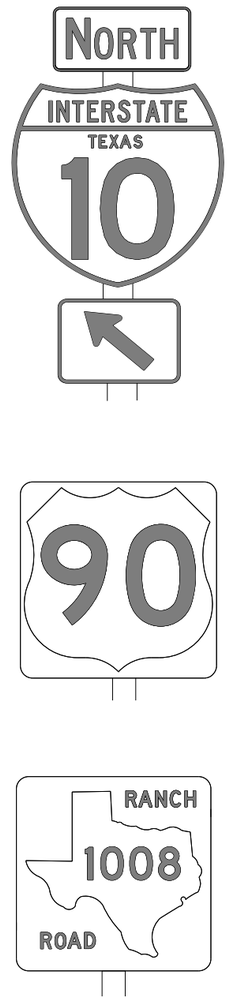
TS-FD-12

©TxDOT August 1995	DN: MS		CK: JSY		DW: MAO/MMF	CK: JSY/TEB
REVISIONS	CONT	SECT	JOB		HIGHWAY	
5-96 11-99 1-12	0905	06	118		CS	
	DIST		COUNTY			SHEET NO.
	LBB		LUBBOCK			176

DATE:
FILE:

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING

TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	LBB	LUBBOCK		177

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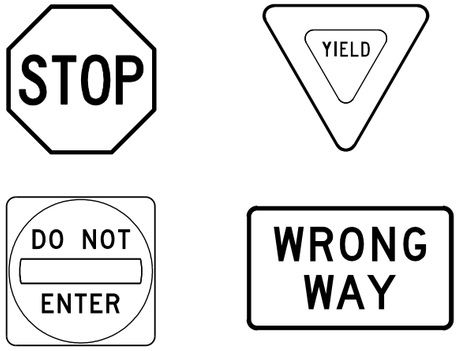
DATE:
FILE:

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

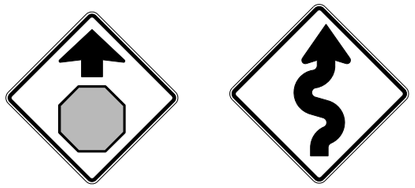
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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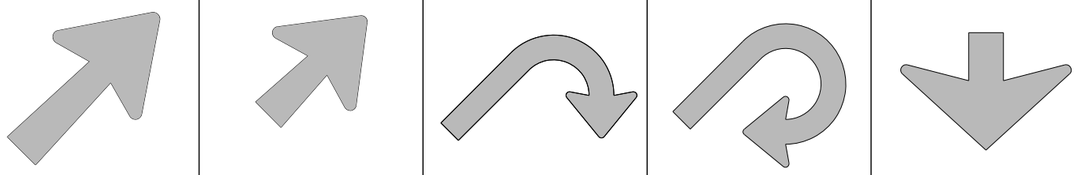
REVISIONS	0905	06	118	CS
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	LBB	LUBBOCK		178

4

DATE:
FILE:

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

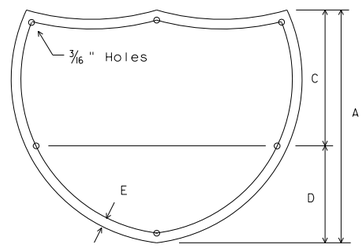
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

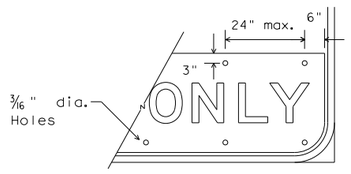
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

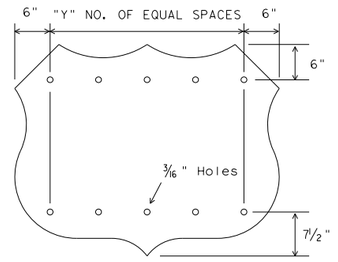


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

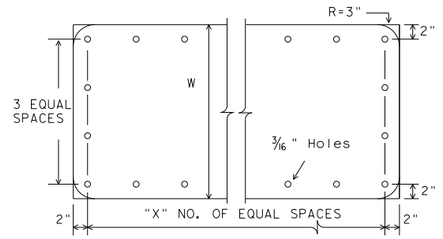


EXIT ONLY PANEL



U.S. ROUTE MARKERS

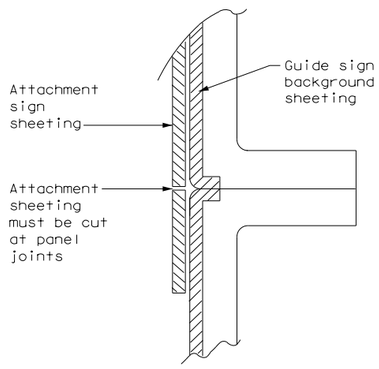
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



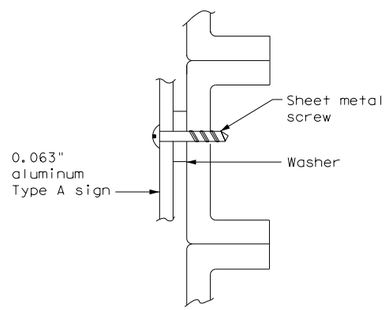
STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

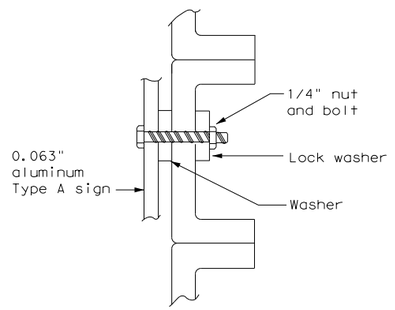
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



SCREW ATTACHMENT



NUT/BOLT ATTACHMENT

NOTE:

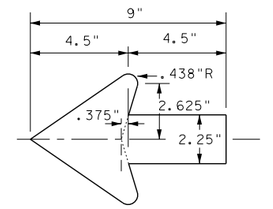
1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

NOTE:

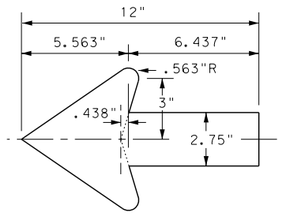
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0905	06	118	CS
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	LBB	LUBBOCK		179

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SUMMARY OF UTILITY WATER ITEMS						
LOCATION	479 6001	7286 6001	7286 6002	7286 6003	7286 6004	7287 6001
	ADJUSTING MANHOLES	16" WATER LINE RELOCATION	REMOVE AND RELOCATE FIRE HYDRANT	ADJUSTING VALVE COVERS	CATHODIC PROTECTION MH ADJ	INST TEMP 16" LINE STOP
	EA	LS	EA	EA	LS	EA
OVERALL	5	1	1	13	1	2
PROJECT TOTALS	5	1	1	13	1	2

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
UTILITY SUMMARY

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	180
	0905	06	118	

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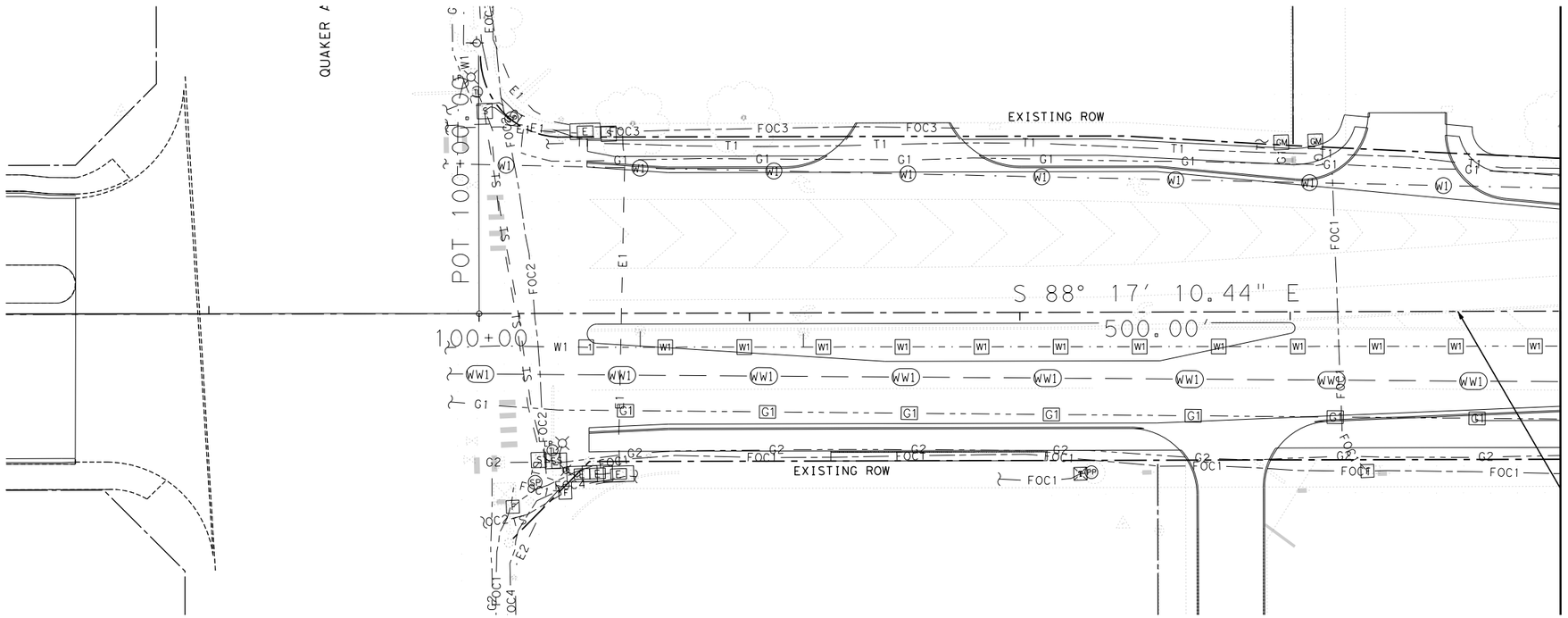
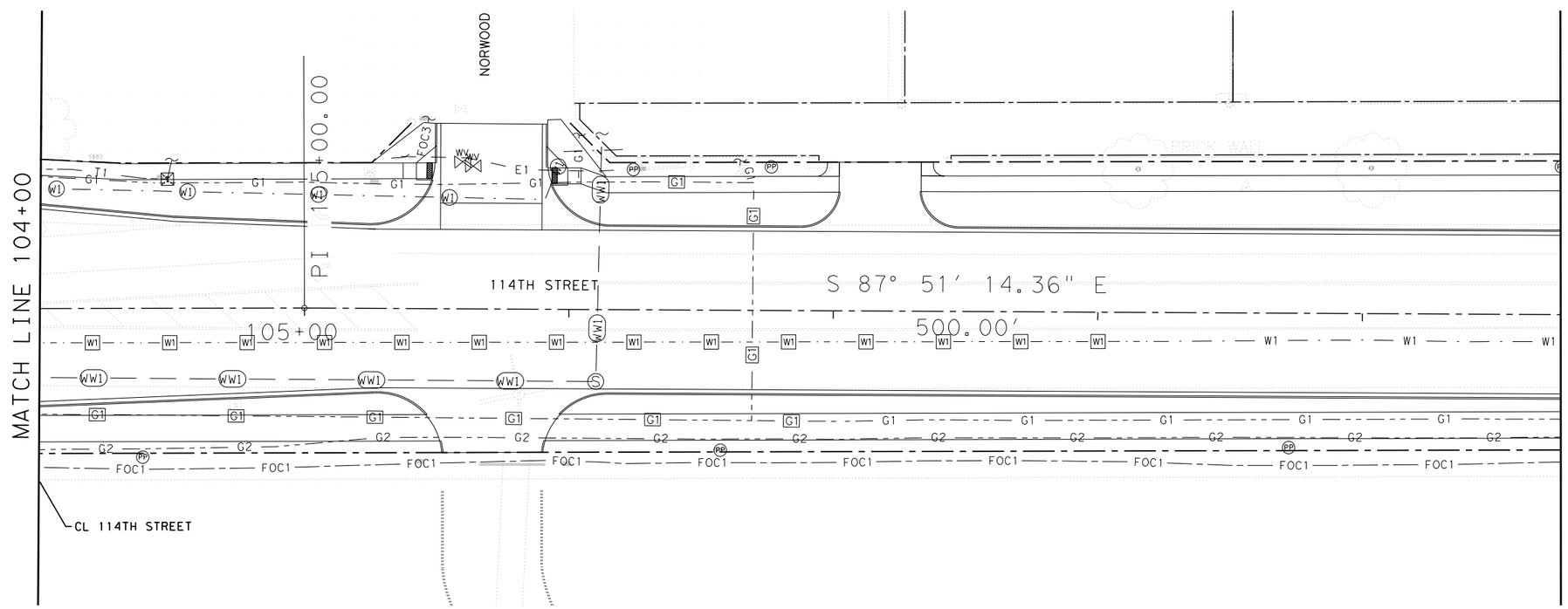
50.0000 ft / in.





CAUTION!!!
EXISTING OVERHEAD AND UNDERGROUND ELECTRIC LINES

N

0 25' 50'
SCALE IN FEET

LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
AT&T		T1
COX		C1
AT&T		FOC1
COX		FOC2
CITY OF LUBBOCK		FOC3
NTS		FOC4
SUDDENLINK		FOC5
XXXXXXXXXXXXXXXX	QL "C/D"	(T1)
GAS	QL "B"	
ATMOS		G1
WEST TEXAS GAS		G2
XXXXXXXXXXXXXXXX		G3
	QL "C"	
ATMOS		G3
SEWERS/DRAINS	QL "B"	
CITY OF LUBBOCK		WW1
XXXXXXXXXXXXXXXX		WW2
CITY OF LUBBOCK		SD1
XXXXXXXXXXXXXXXX		SD2
	QL "D"	
CITY OF LUBBOCK		(WW1)
XXXXXXXXXXXXXXXX		(SD1)
WATER	QL "B"	
CITY OF LUBBOCK		W1
XXXXXXX		W2
	QL "C"	
CITY OF LUBBOCK		(W)
	QL "D"	
CITY OF LUBBOCK		(W1)
ELECTRIC/POWER	QL "B"	
LP&L		E1
CITY OF LUBBOCK		E2
COX		E3
CITY OF LUBBOCK		TS
	QL "C"	
XXXXXXXXXXXXXXXX		E3

NOTE:

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STATE OF TEXAS
CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER

3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
EXISTING UTILITY LAYOUT

BEGIN PROJECT TO STA 109+75

SHEET 1 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	181
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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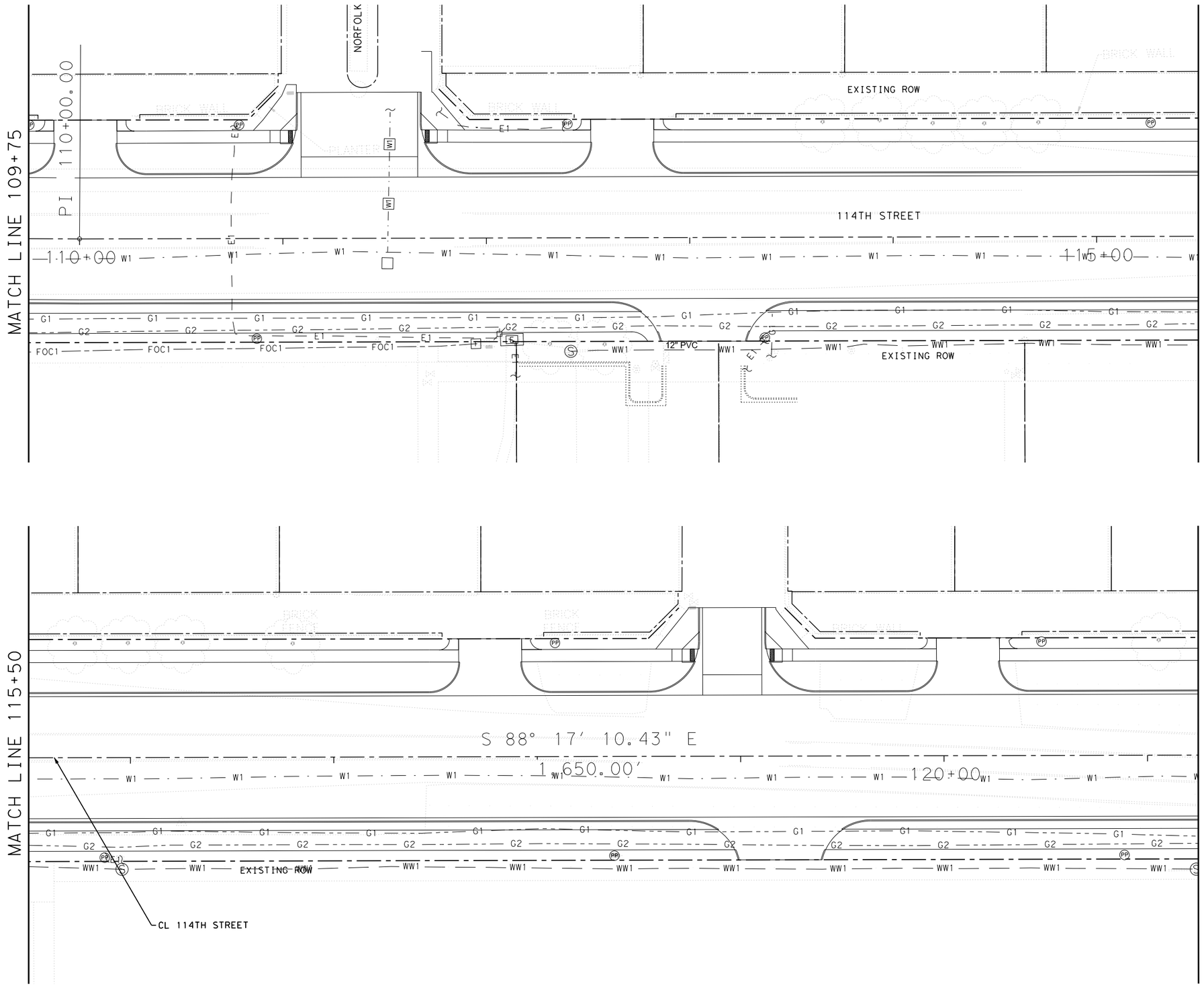

CAUTION!!!
EXISTING OVERHEAD AND UNDERGROUND ELECTRIC LINES

N

0 25' 50'
SCALE IN FEET

LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
AT&T		T1
COX		C1
AT&T		FOC1
COX		FOC2
CITY OF LUBBOCK		FOC3
NTS		FOC4
SUDDENLINK		FOC5
	QL "C/D"	
XXXXXXXXXXXXXXXX		T1
GAS	QL "B"	
ATMOS		G1
WEST TEXAS GAS		G2
XXXXXXXXXXXXXXXX		G3
	QL "C"	
ATMOS		G1
SEWERS/DRAINS	QL "B"	
CITY OF LUBBOCK		WW1
XXXXXXXXXXXXXXXX		WW2
CITY OF LUBBOCK		SD1
XXXXXXXXXXXXXXXX		SD2
	QL "D"	
CITY OF LUBBOCK		WW1
XXXXXXXXXXXXXXXX		SD1
WATER	QL "B"	
CITY OF LUBBOCK		W1
XXXXXXX		W2
	QL "C"	
CITY OF LUBBOCK		W1
	QL "D"	
CITY OF LUBBOCK		W1
ELECTRIC/POWER	QL "B"	
LP&L		E1
CITY OF LUBBOCK		E2
COX		E3
CITY OF LUBBOCK		TS
	QL "C"	
XXXXXXXXXXXXXXXX		E3

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STATE OF TEXAS
CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER

3/9/2022

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Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
EXISTING UTILITY LAYOUT

STA 109+75 TO STA 121+25

SHEET 2 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	182
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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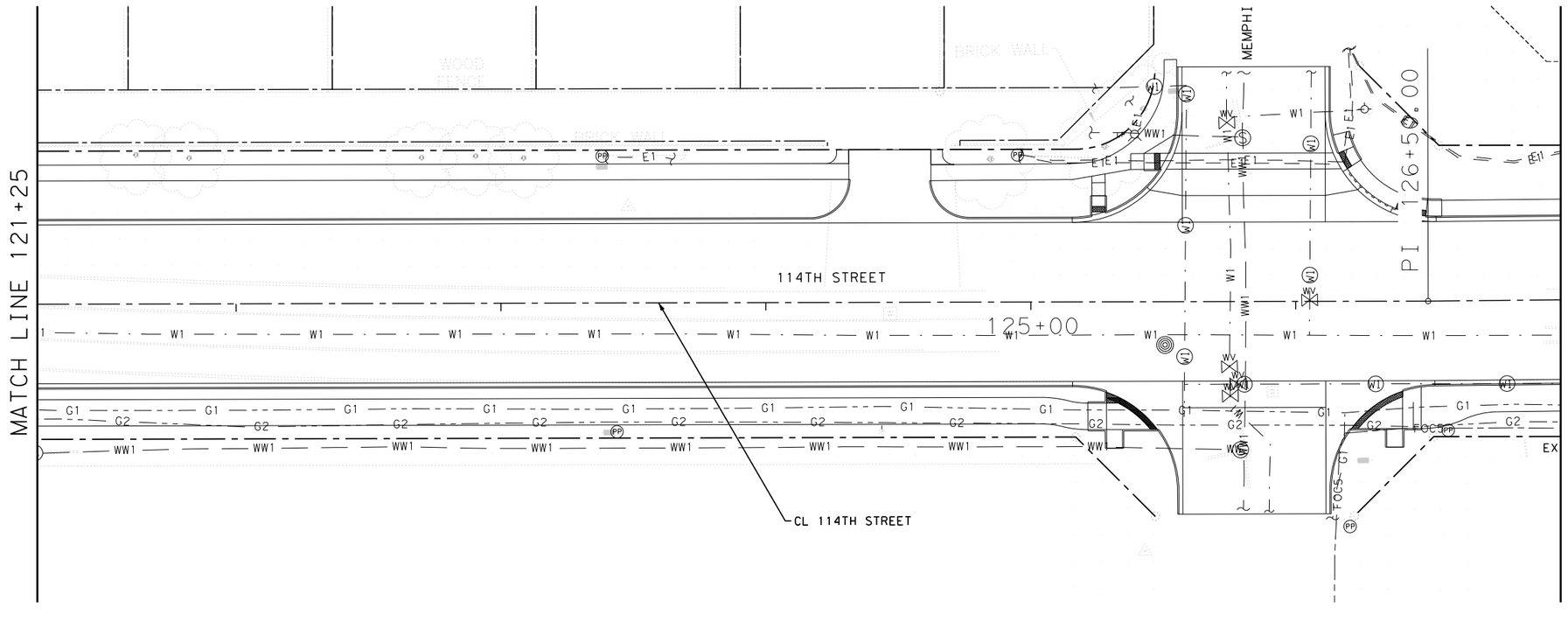
50.0000 ft / in.



CAUTION!!!
EXISTING OVERHEAD AND UNDERGROUND ELECTRIC LINES

N

0 25' 50'
SCALE IN FEET

LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
AT&T		T1
COX		C1
AT&T		FOC1
COX		FOC2
CITY OF LUBBOCK		FOC3
NTS		FOC4
SUDDENLINK		FOC5
	QL "C/D"	
XXXXXXXXXXXXXXXX		T1
GAS	QL "B"	
ATMOS		G1
WEST TEXAS GAS		G2
XXXXXXXXXXXXXXXX		G3
	QL "C"	
ATMOS		G1
SEWERS/DRAINS	QL "B"	
CITY OF LUBBOCK		WW1
XXXXXXXXXXXXXXXX		WW2
CITY OF LUBBOCK		SD1
XXXXXXXXXXXXXXXX		SD2
	QL "D"	
CITY OF LUBBOCK		WW1
XXXXXXXXXXXXXXXX		SD1
WATER	QL "B"	
CITY OF LUBBOCK		W1
XXXXXXX		W2
	QL "C"	
CITY OF LUBBOCK		W1
	QL "D"	
CITY OF LUBBOCK		W1
ELECTRIC/POWER	QL "B"	
LP&L		E1
CITY OF LUBBOCK		E2
COX		E3
CITY OF LUBBOCK		TS
	QL "C"	
XXXXXXXXXXXXXXXX		E3

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STATE OF TEXAS
CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER
3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

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1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
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114TH STREET
QUAKER AVE. TO INDIANA AVE.
EXISTING UTILITY LAYOUT

STA 121+25 TO STA 132+75

SHEET 3 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	183
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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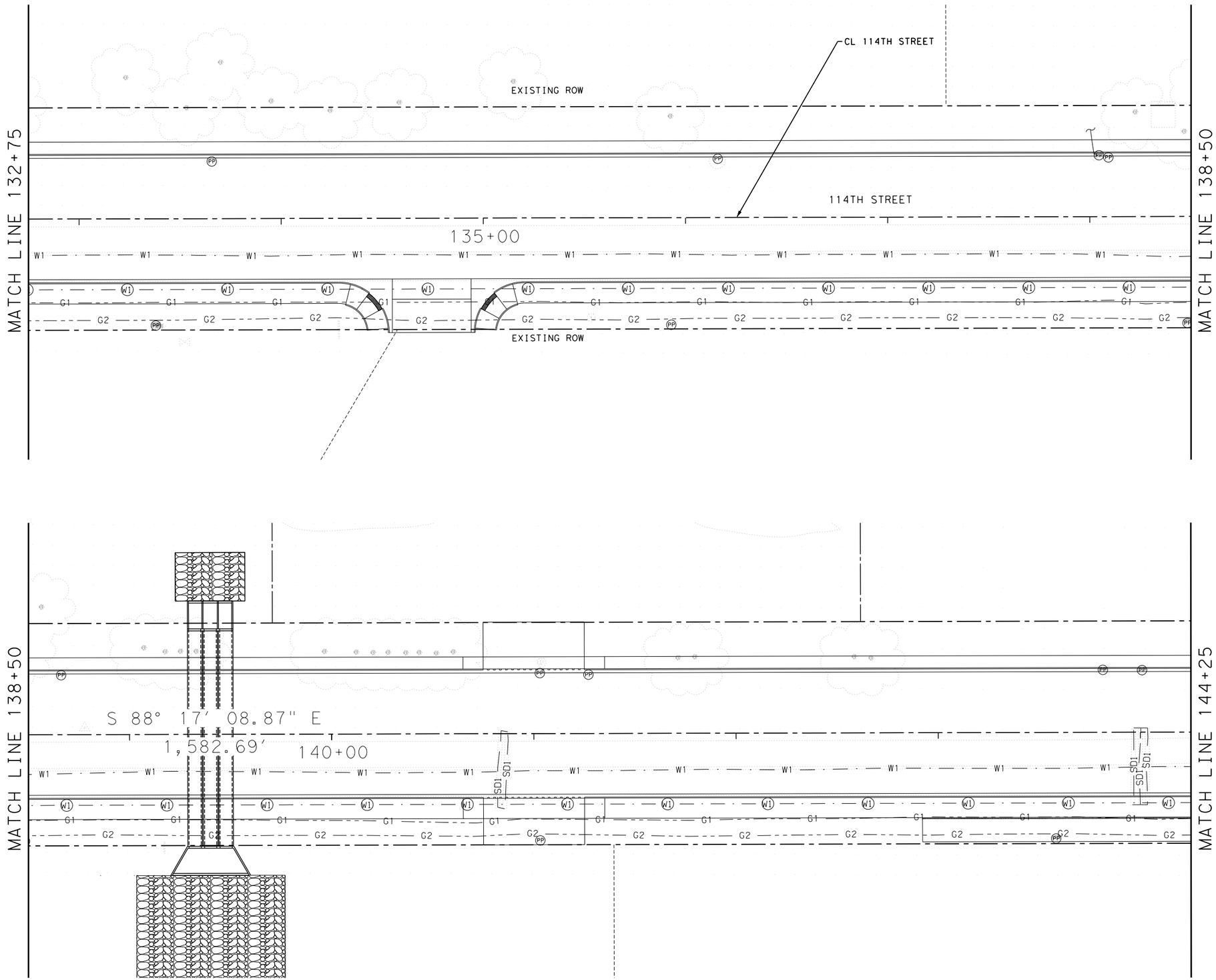

CAUTION!!!
EXISTING OVERHEAD AND UNDERGROUND ELECTRIC LINES

N

0 25' 50'
SCALE IN FEET

LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
AT&T		T1
COX		C1
AT&T		FOC1
COX		FOC2
CITY OF LUBBOCK		FOC3
NTS		FOC4
SUDDENLINK		FOC5
	QL "C/D"	
XXXXXXXXXXXXXXXX		T1
GAS	QL "B"	
ATMOS		G1
WEST TEXAS GAS		G2
XXXXXXXXXXXXXXXX		G3
	QL "C"	
ATMOS		G3
SEWERS/DRAINS	QL "B"	
CITY OF LUBBOCK		WW1
XXXXXXXXXXXXXXXX		WW2
CITY OF LUBBOCK		SD1
XXXXXXXXXXXXXXXX		SD2
	QL "D"	
CITY OF LUBBOCK		XW1
XXXXXXXXXXXXXXXX		SD1
WATER	QL "B"	
CITY OF LUBBOCK		W1
XXXXXXX		W2
	QL "C"	
CITY OF LUBBOCK		W1
	QL "D"	
CITY OF LUBBOCK		W1
ELECTRIC/POWER	QL "B"	
LP&L		E1
CITY OF LUBBOCK		E2
COX		E3
CITY OF LUBBOCK		TS
	QL "C"	
XXXXXXXXXXXXXXXX		E3

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STATE OF TEXAS
CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER

3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

Texas Department of Transportation

114TH STREET
QUAKER AVE. TO INDIANA AVE.
EXISTING UTILITY LAYOUT

STA 132+75 TO STA 144+25

SHEET 4 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	184
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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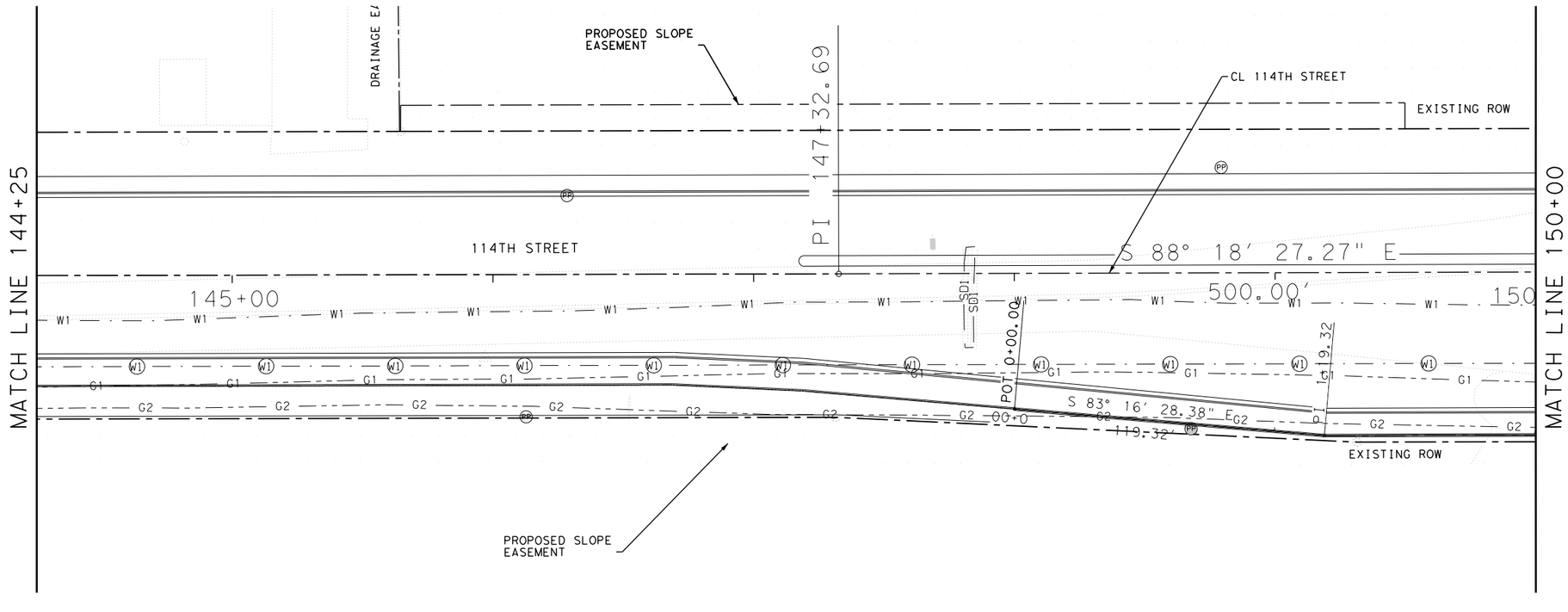

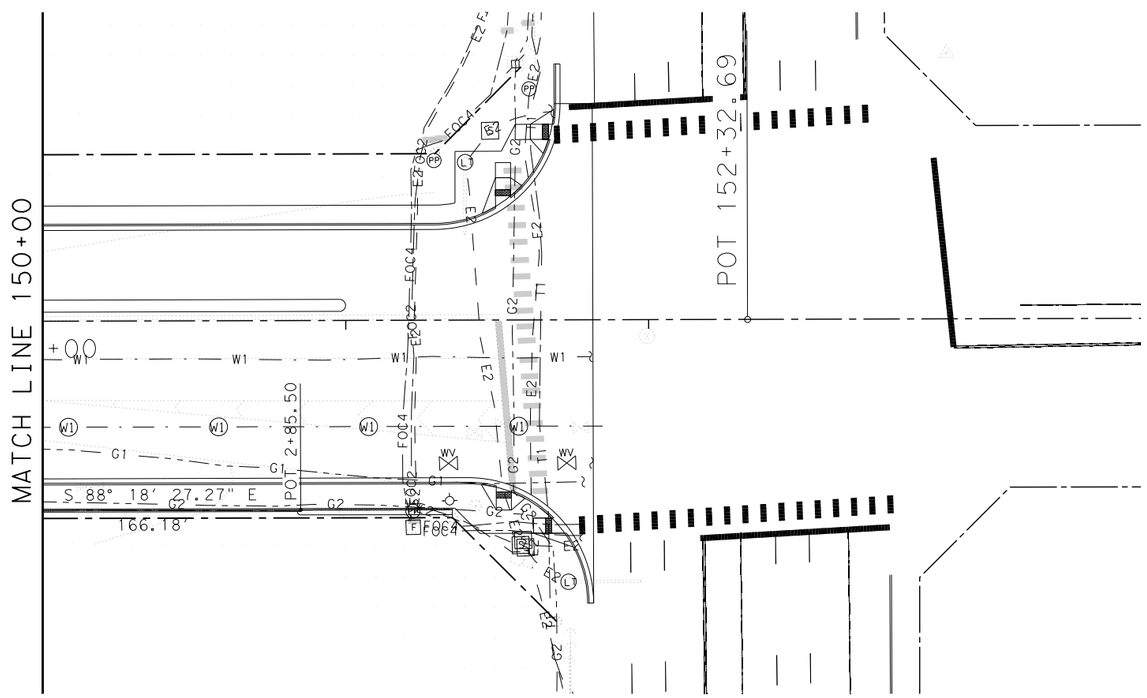

CAUTION!!!
EXISTING OVERHEAD AND UNDERGROUND ELECTRIC LINES

N

0 25' 50'
SCALE IN FEET

LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
AT&T		T1
COX		C1
AT&T		FOC1
COX		FOC2
CITY OF LUBBOCK		FOC3
NTS		FOC4
SUDDENLINK		FOC5
	QL "C/D"	
XXXXXXXXXXXXXXXX		T1
GAS	QL "B"	
ATMOS		G1
WEST TEXAS GAS		G2
XXXXXXXXXXXXXXXX		G3
	QL "C"	
ATMOS		G3
SEWERS/DRAINS	QL "B"	
CITY OF LUBBOCK		WW1
XXXXXXXXXXXXXXXX		WW2
CITY OF LUBBOCK		SD1
XXXXXXXXXXXXXXXX		SD2
	QL "D"	
CITY OF LUBBOCK		WW1
XXXXXXXXXXXXXXXX		SD1
WATER	QL "B"	
CITY OF LUBBOCK		W1
XXXXXXX		W2
	QL "C"	
CITY OF LUBBOCK		W1
	QL "D"	
CITY OF LUBBOCK		W1
ELECTRIC/POWER	QL "B"	
LP&L		E1
CITY OF LUBBOCK		E2
COX		E3
CITY OF LUBBOCK		TS
	QL "C"	
XXXXXXXXXXXXXXXX		E3

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STATE OF TEXAS
CHRIS B. BOSCO
93679
LICENSED
PROFESSIONAL ENGINEER

3/9/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
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114TH STREET
QUAKER AVE. TO INDIANA AVE.
EXISTING UTILITY LAYOUT

STA 144+25 TO END

SHEET 5 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	185
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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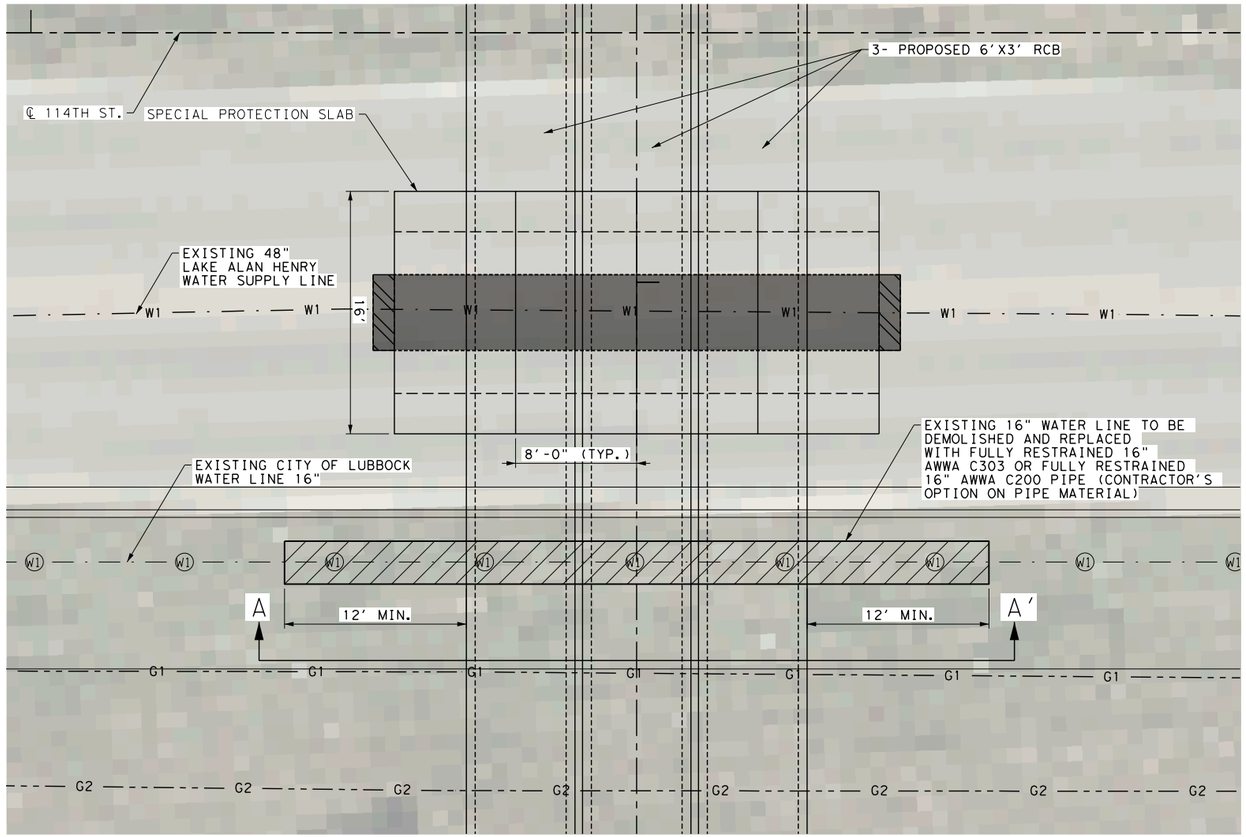


114TH STREET AND PROPOSED 6'X3' RCB CROSSING PLAN VIEW

EXISTING CATHODIC PROTECTION STATION AT NECORNER OF 114TH ST & MEMPHIS AVE LOOKING SE

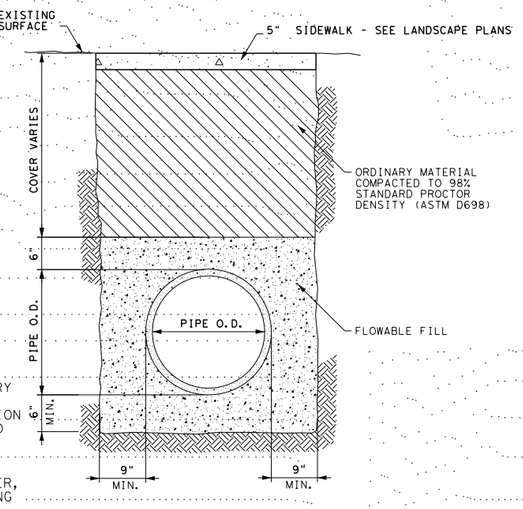
EXISTING CATHODIC PROTECTION TEST BOX MODIFICATION

LEGEND

GAS		
ATMOS	QL "B"	G1
WEST TEXAS GAS		G2
ATMOS	QL "C"	G1
SEWERS/DRAINS		
CITY OF LUBBOCK	QL "B"	WW1
CITY OF LUBBOCK		SD1
CITY OF LUBBOCK	QL "D"	WW1
WATER		
CITY OF LUBBOCK	QL "B"	W1
XXXXXXX		W2
CITY OF LUBBOCK	QL "C"	W1
CITY OF LUBBOCK	QL "D"	W1

N

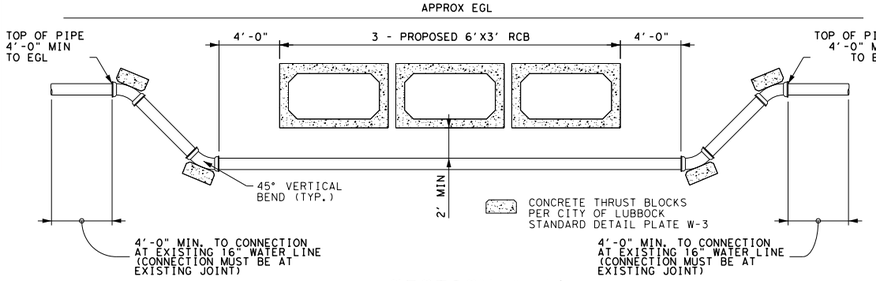
0 5' 10'
SCALE IN FEET



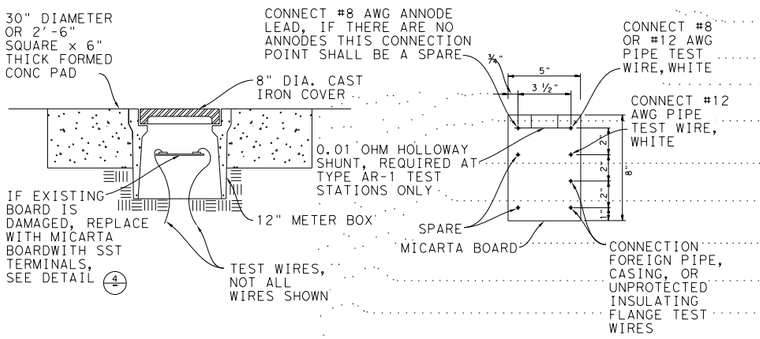
1 FLOWABLE FILL
NOT TO SCALE

NOTES:

1. MUNICIPAL WATER LINE LOWERING WORK SHALL INCLUDE ALL NECESSARY TRENCH SAFETY, EXCAVATION, BACKFILL, FLOWABLE FILL, PIPE, FITTINGS, ADAPTERS, APPURTENANCES, THRUST RESTRAINT, CONNECTION TO EXISTING WATER LINE, TESTING AND DISINFECTION NECESSARY TO BRING THE EXISTING LINE BACK INTO SERVICE AND MEET CITY OF LUBBOCK MOST CURRENT DESIGN STANDARDS FOR WATER DISTRIBUTION.
2. CONTRACTOR SHALL VERIFY ELEVATION, INSIDE AND OUTSIDE DIAMETER, COATING AND LINING, JOINT LOCATION, AND JOINT TYPE OF EXISTING 16-INCH WATER LINE PRIOR TO CONSTRUCTION.
3. CONTRACTOR SHALL COORDINATE SHUTDOWN OF EXISTING 16-INCH WATER LINE WITH THE CITY OF LUBBOCK. CONTRACTOR MUST GIVE THE CITY OF LUBBOCK 7 DAYS NOTICE PRIOR TO REMOVAL OF EXISTING PIPE.
4. EXISTING PIPE TO BE DEMOLISHED SHALL NOT BE RE-USED AS PART OF THIS PROJECT.
5. CONTRACTOR SHALL PROVIDE APPROPRIATE SIGNAGE, BARRICADES, FLAGMEN, ETC. REQUIRED TO MAINTAIN SAFETY ADJACENT TO THE WORK AREA. ALL TRAFFIC CONTROL MEASURES SHALL BE IN ACCORDANCE WITH TXDOT'S MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.
6. EXISTING 16-INCH WATERLINE IS APPROXIMATELY 4'-0" TOP OF PIPE TO EXISTING GRADE LINE (CONTRACTOR TO VERIFY PRIOR TO CONSTRUCTION).



2 SECTION A-A'
NOT TO SCALE



NOTES:

1. MAINTAIN SLACK IN WIRES, 18 INCHES MINIMUM

FLUSH STYLE TEST BOX 3/— NTS

NOTES:

1. TERMINALS SHALL BE 1/4" STAINLESS STEEL WITH LOCKING WASHER, TWO FLAT WASHERS, AND DOUBLE NUTS.
2. ALL WIRE CONNECTIONS TO BE WITH RING TONGUE COMPRESSION TERMINALS.

FLUSH STYLE TERMINAL BOARD 4/— NTS

STATE OF TEXAS
MICHAEL A. MCBEE
130463
LICENSED
PROFESSIONAL ENGINEER

03/01/2022
Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
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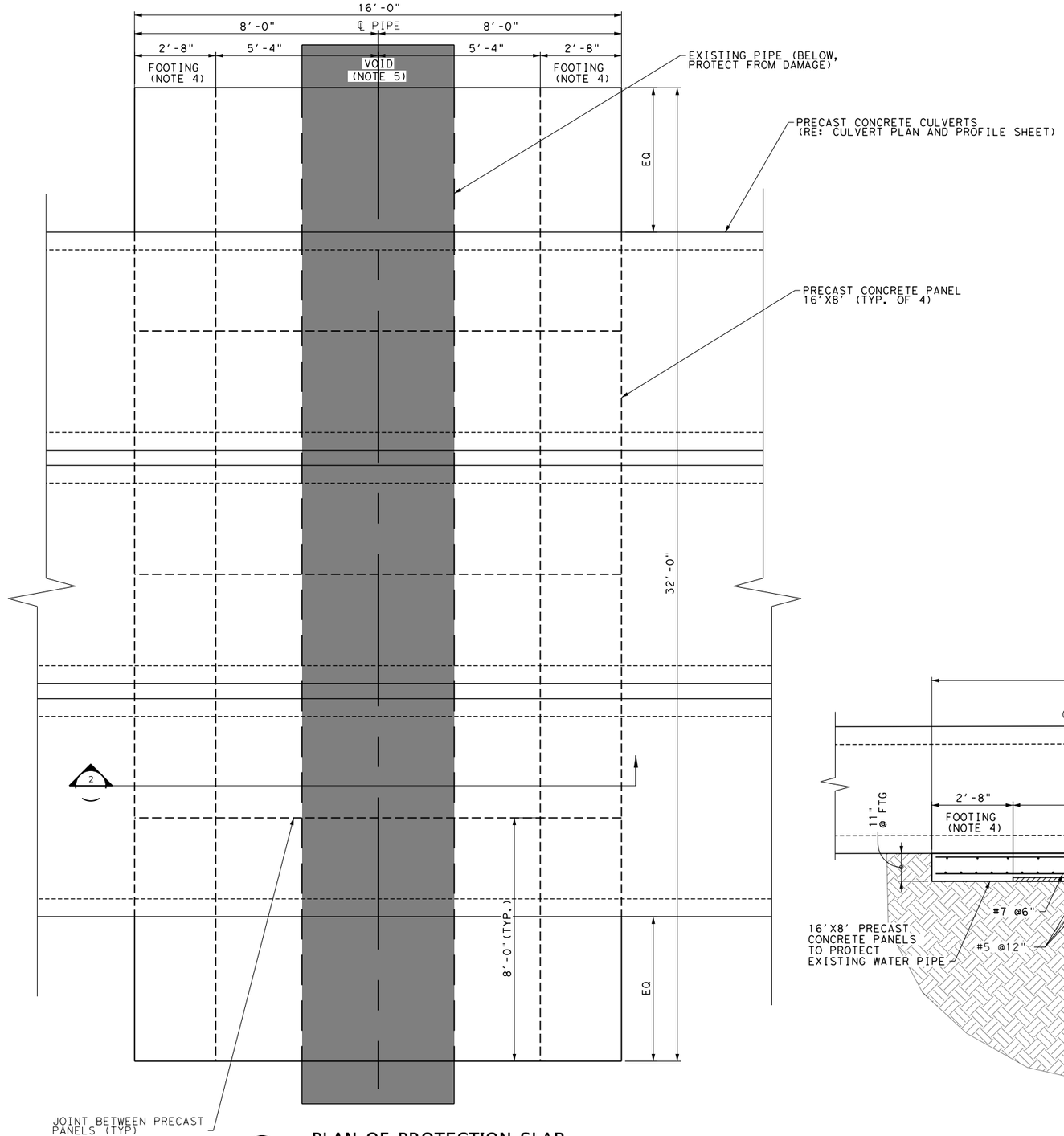
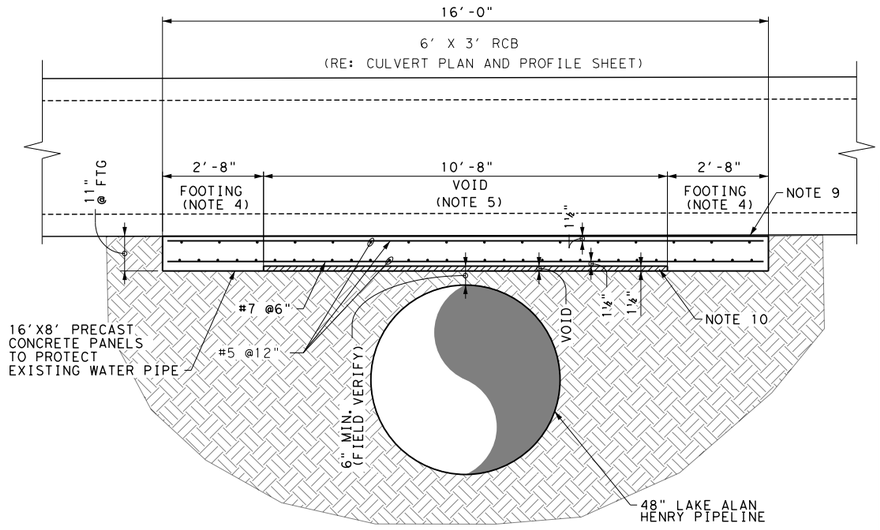
114TH STREET
QUAKER AVE. TO INDIANA AVE.
MUNICIPAL WATER LINE LOWERING DETAIL & CP MODIFICATION

DESIGN KMM	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS DAP	6			CS
CHECK CBB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK SRJ	TEXAS	LBB	LUBBOCK	186
	CONTROL	SECTION	JOB	
	0905	06	118	

$USER$
4.000 ' / in.



1 **PLAN OF PROTECTION SLAB**
1/4" = 1'-0"



2 **SECTION**
1/4" = 1'-0"

2' 0 2' 4'
SCALE: ¼"=1'-0"

GENERAL NOTE:

1. PRECAST PANEL HAS BEEN DESIGNED FOR HS-20 LOADING ON THE ROAD WAY. MINIMIZE CONSTRUCTION LOADS IN THE EXCAVATED VICINITY ABOVE THE PIPE.
2. ALL CONCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI, AND SHALL BE IN ACCORDANCE WITH AI 301.
3. ALL REINFORCING STEEL SHALL BE IN ACCORDANCE WITH ATM A 615, GRADE 60, AND FABRICATED IN ACCORDANCE WITH AI 315.
4. FOOTING SHALL BE EXCAVATED SO THAT BOTTOM IS DRY, FLAT, LEVEL, CLEAR OF LOOSE DEBRIS. PROVIDE "JUMPING- JACK" TYPE TAMPER AND TAMP ENTIRE EXPOSED SURFACE OF EACH FOOTING TO VERIFY THAT NO SOFT OR PUMPING SOILS EXIST. REMOVE SOFT SOIL AND RE COMPACT. PLACE CONCRETE PANELS IN FOOTING EXCAVATION WITHIN 24 HOURS OF FINAL EXCAVATION.
5. EXCAVATE TO FOOTING BEARING DEPTH TO CREATE A VOID BELOW PRECAST PROTECTION SLAB. DO NOT FILL OR COMPACT IN THIS AREA.
6. PROVIDE A CONTINUOUS NON WOVEN FILTER FABRIC, MEDIUM WEIGHT, NUMBER 70 (AOS), ACROSS TOP OF ALL PRECAST PANELS.
7. FIELD LOCATE EXISTING PIPE LONGITUDINAL AXIS USING HAND EXCAVATION. DO NOT DAMAGE PIPE. PLACE PRECAST PANEL SPAN ORTHOGONAL TO PIPE AXIS.
8. PROVIDE 4 LIFTING POINTS FOR EACH PRECAST PANEL AND ADDITIONAL REINFORCEMENT AROUND THEM IF REQUIRED.
9. THERE SHOULD BE 1" TO 2" OF GAP BETWEEN THE PANELS AND THE BOXES. THIS GAP SHOULD BE FILLED BY SHIMS AND CEMENTITIOUS GROUT TO ALLOW FOR PLACEMENT TOLERANCES.
10. 1 1/2" VOID SPACE BETWEEN FOOTINGS. FIELD VERIFY PIPE CENTERLINE AND CLEARANCE BELOW VOID BY HAND EXCAVATION. DO NOT DAMAGE PIPE.

STATE OF TEXAS
BRAD B. WATSON
80318
REGISTERED
PROFESSIONAL ENGINEER
03/02/2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

114TH STREET
QUAKER AVE. TO INDIANA AVE.
WATER LINE PROTECTION SLAB DETAIL

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	187
	0905	06	118	

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SUMMARY OF EROSION CONTROL ITEMS								
LOCATION	164 6051	506 6004	506 6011	506 6020	506 6024	506 6037	506 6042	506 6043
	DRILL SEED (TEMP)(WARM OR COOL)	ROCK FILTER DAMS (INSTALL) (TY 4)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	SANDBAGS FOR EROSION CONTROL (12")	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	SY	LF	LF	SY	SY	LF	LF	LF
OVERALL	17140			240	240			
EROSION CONTROL PLAN - BEGIN TO STA 120+00						167	264	132
EROSION CONTROL PLAN - STA 120+00 TO 143+00		250	250			125	2810	1405
EROSION CONTROL PLAN - STA 143+00 TO END							1685	843
REPLACEMENT		25	25	24	24	29	476	238
PROJECT TOTALS	17140	275	275	264	264	321	5235	2618

NOTE:
SEDIMENT BASINS ARE NOT FEASIBLE ON THE PROJECT BECAUSE RIGHT-OF-WAY IS LIMITED AND THE CONSTRUCTION OF A SEDIMENTATION BASIN WOULD BE WITHIN THE BOUNDARIES OF THE ROADWAY'S CLEAR ZONE AND FOR THE SAFTEY OF MOTORISTS, SEDIMENTATION BASINS CANNOT BE CONSTRUCTED WITHIN THE CLEAR ZONE. SINCE SEDIMENT BASINS ARE NOT FEASIBLE DUE TO THE LACK OF RIGHT-OF-WAY, MATHEMATICAL CALCULATIONS HAVE NOT BEEN DEVELOPED.

CONSTRUCTION EXITS WERE ESTIMATED TO HAVE TWO AT 20'X50' FOR ESTIMATING PURPOSES.

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114TH STREET
QUAKER AVE. TO INDIANA AVE.
EROSION CONTROL SUMMARY

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	
CHECK SRJ	CONTROL	SECTION	JOB	188
	0905	06	118	

STORM WATER POLLUTION PREVENTION PLAN (SW3P):

This SW3P has been developed in accordance with TPDES General Permit TXR150000. The operator, the Texas Department of Transportation, provides project specifications for the development of adequate BMPs. The contractor shares responsibility for implementing the BMPs described herein. The contactor shall implement changes approved by the Project Engineer to the SW3P within the time specified in the SW3P or in the TPDES Construction General Permit. See EPIC sheet for a list of the MS4 Operators.

1. SITE OR PROJECT DESCRIPTION:

a. NATURE OF THE CONSTRUCTION ACTIVITY:
TxDOT (Lubbock District) Roadway Reconstruction of 114th Street from Quaker Avenue to Indiana Avenue in the City of Lubbock, Lubbock County.

b. POTENTIAL POLLUTANTS AND SOURCES:

Sediment laden storm water	Storm water conveyance over disturbed areas
Fuels, oils, and lubricants	Construction vehicles and storage areas
Construction debris and waste	Various construction activities
Sanitary waste	Restroom facilities
Trash	Construction site and receptacles
Concrete Washout Water	Concrete Trucks, Concrete Pump Trucks, Paving Equipment

Potential pollutants will primarily be from sediments leaving the right-of-way and petroleum products. Principle sources of pollutants will be: disturbed soil from grading, excavation, embankment, and other roadway construction activities; litter and debris from construction activities; gasoline, oil, and grease from asphalt distributor vehicles, scrappers, trucks, rollers, compactors, and fuel trucks during daily, routine operations.

c. SEQUENCE OF ACTIVITIES THAT WILL DISTURB SOILS:
1. Roadway demolition, excavation, clearing of ROW and Easements, subgrade treatment, embankment, and playa excavation.

d. AREAS:
TOTAL AREA OF PROJECT: 26.65 ACRES
TOTAL AREA OF SOIL DISTURBANCE: 14.67 ACRES
TOTAL AREA OF OFF-SITE PSL: To be determined when construction begins.

e. DATA DESCRIBING THE SOIL:
The western three-quarters of the project are comprised of Posey and Amarillo fine sandy loam. The easter quarter of the project in the low-lying area is Lofton and Estacado clay loam. Pre-construction soils are over 50% developed and covered with roadway, sidealk, and driveway improvements, the remaining undeveloped land is is covered with various grass and weeds or is seasonally cultivated. The soils are friable and in dry weather conditions may be picked up by regional winds. The local climate is semi-arid (19" average annual rain).

WATER QUALITY ASSESSMENT: A site (visual & odor) assessment of water quality will be performed once construction begins.

f. GENERAL LOCATION MAP: SEE TITLE SHEET TO PROJECT PLANS.

g. DETAILED SITE MAP: SEE SW3P PLAN SHEET AND/OR TYPICAL SECTIONS, PLAN SHEETS, AND DRAINAGE AREA MAP

h. THE LOCATION AND DESCRIPTIONS OF SUPPORT ACTIVITIES AUTHORIZED UNDER THE PERMITEE'S NOI: There are no asphalt or concrete batch plants providing support to the project authorized under the Lubbock District's (TxDOT) NOI.

i. NAME OF RECEIVING WATERS: Playa Lake 90A, potentially overflowing to Playa Lake 90B.

j. A COPY OF TPDES CGP TXR150000 IS INCLUDED IN THE SW3P FILE.

k. A COPY OF THE NOI, ACKNOWLEDGEMENT CERTIFICATE AND/OR CONSTRUCTION SITE NOTICE IS IN THE PROJECT SW3P FILE

2. DESCRIPTION OF BMPs USED TO MINIMIZE POLLUTION IN RUNOFF:

EROSION AND SEDIMENT CONTROLS: If it is necessary to pump water, BMP's shall be used to reduce the off-site transport of sediment. BMP's shall be installed per the manufacturer specifications or as directed by the Engineer.

GENERAL SCHEDULE FOR IMPLEMENTATION OF SW3P CONTROLS

CONTROL	IMPLEMENTATION SCHEDULE AND DESCRIPTION	REMOVAL SCHEDULE
general, various controls	control measures are to be provided at a time and in a manner that will minimize impacts to receiving waters	at final stabilization; at the resumption of construction (temporary measures); at the direction of the SW3P plan; at the direction of the project manager
rock filter dams	to be installed prior to soil disturbing activities in the surrounding areas	at final stabilization or as directed by the project engineer
sandbag berms	to be installed prior to the start of construction; sandbag berms are to serve as water velocity dissipaters, as ditch blocks, as sedimentation basins, in support of other control devices, and as a final multiple control for water leaving the construction zone	at final stabilization or as directed by the project engineer
silt fence	silt fence will be installed prior to the start of construction along right-of-way lines silt fence will be installed as quickly as feasible (where it is reasonable to do so) at the toe of header bank and other slopes silt fence may be installed at the start of construction, during construction as appropriate, and during construction to support other controls as needed	at final stabilization or as directed by the project engineer at final stabilization or as directed by the project engineer at the removal of the construction exit, at final stabilization, or as directed by the project engineer
tackifiers	soil tackifiers may be used to control dust	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
water	to be used to suppress dust and compact dirt on an as needed schedule	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
seed, temporary	to be installed, when apprppriate, in disturbed areas where construction has temporarily ceased for 21 days	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
seed, permanent	to be installed as a final stabilization measure where construction is complete or as directed by the Engineer	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
construction exits	to be installed at all construction vehicle exit points to publicly traveled ways prior to the use of these exits by construction vehicles	as directed by construction conditions or by the Engineer
erosion control logs	to be installed prior to the start of construction; erosion control logs are to serve as water velocity dissipaters, as ditchblocks, as sedimentation basins, and in support of other control devices.	as directed by construction conditions or by the Engineer
soil retention blankets	to be installed as a final stabilization measure where construction is complete or as directed by the Engineer	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
inlet protectors	to be installed to cover curb inlets with support from sandbags or as directed by the Engineer	as directed by construction conditions or by the Engineer
compost socks	to be installed as channel blocks, inlet protectors, and to support sandbag berms, silt fences or as directed by the Engineer	as directed by construction conditions or by the Engineer

Note: this is a general schedule for the installation of and removal of SW3P best management practice controls, the final determination of the implementation and removal of controls is at the discretion of the project engineer.

Note: control measures must be properly selected, installed, and maintained according to the manufacturer's or designer's specifications. If periodic inspections or other information indicates control has been used incorrectly, or that the control is performing inadequately, the operator must replace or modify the control as soon as practicable after the discovery that the control has been used incorrectly, is performing inadequately, or is damaged.

Note: sediment must be removed from traps and sedimentation ponds no later than the time that design capacity has been reduced by 50 percent.

Note: If sediment escapes the site, accumulations must be removed at a frequency to minimize further negative effects, and whenever feasible, prior to the next rain event.

Note: controls must be developed to limit, to the extent practicable, the off-site transport of litter, construction debris, and construction materials.

Note: erosion and sediment controls must be designed to retain sediment on-site to the extent practicable with consideration for local topography, soil type, and rainfall. Controls must also be designed and utilized to reduce the off-site transport of suspended sediments and other pollutants if it is necessary to pump or channel standing water.

STABILIZATION PRACTICES: The SW3P must include a description of interim and permanent stabilization practices, including a schedule describing when these practices will be implemented.
1. Water: water will be used to temporarily suppress dust and compact dirt.
2. Tackifiers: tackifiers such as asphalt emulsion, guar, (and other natural tackifiers), and synthetic tackifiers will be used to control air (dust) & water erosion.
3. Existing Vegetation & Vegetative Buffers: to the extent practicable, existing vegetation will not be disturbed by construction activities; where feasible (especially at storm water discharge sites) existing vegetation will remain undisturbed to form a vegetative buffer between construction areas and areas undisturbed by construction.
4. Riprap: concrete riprap can be installed as a permanent stabilization measure at locations where construction is complete and permanent stabilization is required.

Site Manager and CPM Sheet Incorporation into the SW3P

The Lubbock District of the Texas Department of Transportation uses Site Manager, a computer based construction record-keeping system. Documentation describing major grading activities, temporary or permanent cessation of construction, and temporary and permanent stabilization measures is a part of this system and is incorporated by reference into this SW3P.

Storm Water Pollution Plans (SW3P) are a part of a highway project's construction plans, and construction plans contain information that supplement a project's SW3P. Project plans provide information on changes in elevations, on the locations where dirt has been removed and the locations where dirt has been added; on construction sequencing and scheduling and other data that might be important to a full understanding of TCEQ storm water pollution prevention requirements and a project's SW3P.

Contactor's Critical Path Model (CPM) schedule is incorporated into the project's SW3P by reference.

Erosion control and stabilization measures must be initiated immediately in portions of the site where construcion activities have ceased and will not resume for a period exceeding 14 calendar days. Stabilization measures that provide a protective cover must be initiated immediately in portions of the site where construction activities have permanently ceased (CGP Part III Sect. F2(b)iii page 33)

SEDIMENT CONTROL PRACTICES:
1. Sandbags: the purpose of a sandbag is to intercept sediment laden storm water from disturbed areas, create a detention pond, detain sediment and release water in a sheet flow. Sandbag berms are a general purpose sediment control device and will be used throughout the project to detain sediment on site. Sandbags will be placed in ditches and channels to form sedimentation basins. Sandbags will also be used where runoff exits the construction site to enter receiving waters and to support other storm water controls.
2. Silt fence: silt fence is to be installed with construction near the perimeter of a disturbed area to intercept sediment while allowing water to percolate through. This is a general use control that will be used to create detention basins that retain sediment on-site; they will also be used in support of other controls such as construction exits and rock filter dams.
Silt fence will be used along playa lakes to reduce the loss of sediment from roadway front slopes; it may be used in ditches, channels, discharge points to support sandbag berms; may be used to support stabilized construction exits.
3. Rock Filter Dams: the purpose of a rock filter dam is to intercept and slow sediment laden water runoff from disturbed areas, retain the sediment and release the water in sheet flow. Rock filter dams will generally be used in high water velocity flow channels.
4. Stabilized Construction Exit: the purpose of the stabilized exit is to reduce the tracking of sediment and dirt onto public roadways beyond the construction zone. Stabilized Construction Exits are to be in-place at exit points to streets and thoroughfares in urban areas and are to be used by all construction vehicles regardless of size. They are to be supported where appropriate with silt fence and mechanized brooms.

Sediment basins are required where feasible for common drainage locations that serve an area with 10 or more acres disturbed at one time. Temporary or permanent sediment basins that provide water storage capacity are located on the project; the following controls provide, where feasible, structural controls / sediment basins:
1. Sandbag Berm as a Sediment Basin: a temporary basin designed to intercept sediment-laden storm water runoff and to trap sediment on-site.
2. Vegetative Buffer Strip: vegetative buffer strips reduce water velocity which reduces the potential of water erosion and allows sediments to fall out of the storm water.
3. Silt Fence will be used to reduce the loss of sediment from roadway front slopes adjacent to playa lakes by filtering out silt laden storm water from construction area.

STATE OF TEXAS
KEVIN MORRIS
105091
LICENSED
PROFESSIONAL ENGINEER

Kevin Morris 4-29-2022

SW3P

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			189
STATE	STATE DIST.NO.	COUNTY	
TEXAS	LBB	LUBBOCK	
CONT.	SECT.	JOB	HIGHWAY NO.
0905	06	118	CS
FILENAME	SW3Pnarrative.dgn		

3. DESCRIPTION OF PERMANENT STORM WATER CONTROLS

PERMANENT STORM WATER CONTROLS: A description of controls that will stay in-place after construction is completed must be included in the SW3P.

1. Riprap: concrete riprap can be installed as a permanent stabilization measure at locations where construction is completed must be included in SW3P.
2. Existing Vegetation & Vegetative Buffers: to the extent practicable, existing vegetation will not be disturbed by construction activities; and, where feasible (especially at storm water discharge sites), existing vegetation will remain undisturbed to form a vegetative buffer between construction areas and areas undisturbed by construction.
3. Permanent Sodding/Seeding & Plantings: this is the establishment of permanent perennial vegetation. Permanent vegetation stabilizes soil by holding soil particles in-place. Vegetation filters sediments, helps soil absorb water, improves wildlife habitat, and enhances aesthetics of the site. Permanent vegetation will remain in vegetated channels.

4. OTHER REQUIRED CONTROLS AND BMPs

(a) Tracking and Dust: Off-site tracking and generation of dust must be minimized.
1. Stabilized Construction Exit: a stabilized pad of stone, timber, or other stabilized surface located at points where construction traffic will leave the construction zone to enter a public roadway. The purpose of the stabilized exit is to reduce the tracking of sediment and dirt onto public roadways beyond the construction zone. Stabilized Construction Exits will be placed as needed.
2. Water: water will be used to temporarily suppress dust and compact dirt.
3. Tackifiers: tackifiers such as asphalt emulsion, guar, (and other natural tackifiers), and synthetic tackifiers will be used to control air (dust) & water erosion.
4. Existing Vegetation & Vegetative Buffers: to the extent practicable, existing vegetation will not be disturbed by construction activities; where feasible (especially at storm water discharge sites), existing vegetation will remain undisturbed to form a vegetative buffer between construction areas and areas undisturbed by construction.
5. Cleaning and Sweeping: clean and sweep curb and gutter sections twice a month to reduce dirt and trash or as directed.

(b) On-Site Storage of Construction and Waste Materials:
Storage of construction and waste materials on-site shall be temporary; the contractor shall maintain a clean and orderly construction site; and construction waste such as trash, rubble, litter, scrap, and vegetation shall be stored / disposed of in lidded dumpsters or in a manner approved by the project engineer. Disposal methods must meet federal, state, and local waste management requirements. No construction waste shall be buried or burned on-site. Spoils of disposal, material storage, and waste materials from the demolition of existing roads and structures shall be stored in areas designated by the project engineer, and prevented from becoming a pollutant source with appropriate BMPs. Construction and waste materials that might be temporarily stored on-site include concrete and steel pipe; steel reinforcing bar, forms and frames; sand and gravel; wire, concrete and steel beams; wood and steel building units; and controls, construction signs and barricades. A list of construction and waste materials stored on site and controls will be presented to the Project Engineer.

Contractor shall design and utilize appropriate controls to minimize the offsite transport of suspended sediments and other pollutants, if it is necessary to pump or channel standing water from the site.

Litter, construction debris, and construction material exposed to stormwater shall be managed in a manner that prevents this material from becoming a pollutant. A regular sweep of the project shall be made to pick up litter. No construction material of any kind (including dirt) shall be discharged to a water of the United States (ephemeral streams and playa lakes) without a permit from the Corps of Engineers.

Oil, gasoline, grease, solvents, and other petroleum products are not to be stored on-site. Major vehicle maintenance shall occur on-site only under emergency conditions, and when this maintenance type is necessary, a plastic cover shall be used (and properly disposed of) to prevent petroleum products from contaminating the surrounding soil.

(c) Potential Pollutant Sources from Areas Other than Construction:

oil, grease, and other petroleum fluids construction traffic at concrete plant and field office
sediment laden stormwater disturbed soil from concrete batch plant and field office
litter, motorists driving through the project

All best management practices available to this construction project are available to control non-construction generated pollutants including sand bag berms, silt fence, stabilized construction exits, sedimentation basins, and litter management programs among other controls listed in this document.

Storage tanks that are above ground, regardless of whether they are used to store petroleum products, hazardous waste, or other hazardous material must follow the Summary of Federal Requirements.
Aboveground storage tanks (ASTs) used for the storage of petroleum products is regulated primarily under 40 CFR 112. These containers are used for purposes including, but not limited to, the storage of oil prior to use, while being used, or prior to further distribution in commerce.
A bulk storage container is 55 gal. or greater and may be aboveground, partially buried, bunkered, or completely buried. AST's include mobile storage containers such as trailers and tanked vehicles. Oil-filled electrical, operating, or manufacturing equipment is not a bulk storage container.

All bulk storage container installations must be constructed so a secondary means of containment is provided for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. Diked areas must be sufficiently impervious to contain discharged oil.

Mobile/Portable AST:

Mobile or portable oil bulk storage containers must be positioned or located to prevent a discharge and furnished with a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation.

5. DOCUMENTATION OF COMPLIANCE WITH APPROVED STATE AND LOCAL PLANS:

SW3P must comply with Part III.F.5 of Construction General Permit.

6. MAINTENANCE REQUIREMENTS

Control measures shall be properly installed and maintained according to the manufacturer's specifications. Sediment must be removed from BMP's as directed by the SW3P plan requirements, and as directed by the manufacturer's recommendations, but no later than the time at which the capacity of the BMP has been reduced by 50 percent. If sediment or other pollutants escape the site, accumulations will be removed to reduce further negative effects. If inspections or other information indicates a control has been installed, used, or is performing inadequately, the contractor must modify or replace the control as soon as practicable after the problem is discovered. Controls shall be maintained in effective operating condition.
If inspections determine that BMPs are not operating effectively, maintenance shall be performed as necessary to continue the effectiveness of the controls. Controls that have been intentionally disabled, run over, removed, or otherwise made ineffective, must be corrected or replaced at discovery.

7. INSPECTION OF CONTROLS

Lubbock District: an informal inspection of controls shall occur every work day; a formal inspection of controls accompanied by an inspection report using Form 2118 shall occur every seven calendar days.

Inspectors must inspect disturbed areas that have not been finally stabilized, areas that are used for storage of materials and that are exposed to rain, discharge locations and structural controls for evidence of, or the potential for, pollutants entering the drainage system.

The SW3P must be modified based on the results of inspections to better control pollutants in runoff. Revisions to the SW3P must be completed within seven calendar days following inspection. If existing BMPs are modified or if additional BMPs are necessary, an implementation schedule must be described in the SW3P and wherever possible those changes implemented before the next storm event.

Determination of Reportable Quantities

A list of each substance designated as hazardous in 40 CFR Part 116 is found in the project's SW3P folder. The 40 CFR 116 registration applies to quantities, when discharged into or upon the Waters of the United States, adjoining shorelines, into or upon the contiguous zone, or beyond the contiguous zone as provided in the Act.

Litter and Construction Debris

The project contractor shall establish a schedule for the regular removal of litter and construction debris; this schedule shall be approved by the project engineer; and, once approved, implemented by the contractor. As needed, the project engineer shall direct the contractor to establish good housekeeping measures consistent with the TCEQ's Construction General Permit.

Concrete Truck Wash-Outs

Concrete truck wash-out is allowed provided:
(a) wash-out of concrete trucks to surface waters in the state, including storm sewer drains and inlets, is prohibited;
(b) wash-out shall be to a structural control;
(c) the direct discharge of wash-out water is prohibited at all times;
(d) the discharge shall not contribute to groundwater contamination;
(e) wash-out areas must be shown on the site map.
(f) wash-out pits shall be bermed and lined with plastic.

404 PERMIT REQUIRED: ___YES _X_NO
401 WATER QUALITY CERTIFICATION AND BMPs REQUIRED: ___YES _X_NO
401 (401) BMPs - INTERIM (ITM) BMPs - PERMANENT (PER) BMPs

EROSION CONTROLS	401	ITM	PER	SEDIMENT CONTROLS	401	ITM	PER
* temporary vegetation	____	_X_	_X_	* sandbag berm	____	_X_	____
* blankets / matting	____	____	____	* silt fence	____	____	____
* mulch	____	____	____	* triangular filter dikes	____	____	____
* sod	____	_X_	_X_	* rock berms	____	_X_	____
* interceptor swales	____	____	____	* hay bale dikes	____	____	____
* diversion dikes	____	____	____	* brush berms	____	____	____
* erosion control compost	____	____	____	* stone outlet sediment trap	____	____	_X_
* mulch filter berms & socks	____	____	____	* sediment basins	____	____	____
* compost filter berms & socks	____	____	____	* erosion control compost	____	____	____
* 401 BMP not required	_X_	____	____	* mulch filter berms & socks	____	____	____
				* compost filter berms & socks	____	____	____
				* 401 BMP not required	_X_	____	____

POST - CONTSTRUCTION TOTAL SUSPENDED SOLIDS (TSS)

	401	ITM	PER		401	ITM	PER
* retention / irrigation	____	____	____	* detention basin	____	____	____
* vegetation filter strips	____	____	____	* constructed wetland	____	____	____
* wet basin	____	____	____	* vegetation lined drainage ditch	____	____	____
* grassy swale	____	____	____	* sand filter system	____	____	____
* extended detention basin	____	____	____	* mulch filter berms & socks	____	____	____
* erosion control compost	____	____	____	* compost filter berms & socks	____	____	____
* 401 BMP not required	_X_	_X_	_X_				

Note: The best management practices listed in the SW3P may or may not be incorporated into the project design depending on the demands placed by weather and project construction. Should any best management practice not currently listed above be incorporated into the project SW3P design, a description of that best best management practice will be added to the Project SW3P File.

STATE OF TEXAS
KEVIN MORRIS
105091
LICENSED
PROFESSIONAL ENGINEER

Kevin Morris 4-29-2022

SW3P

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			190
STATE	STATE DIST.NO.	COUNTY	
TEXAS	LBB	LUBBOCK	
CONT.	SECT.	JOB	HIGHWAY NO.
0905	06	118	CS
FILENAME	SW3Pnarrative.dgn		

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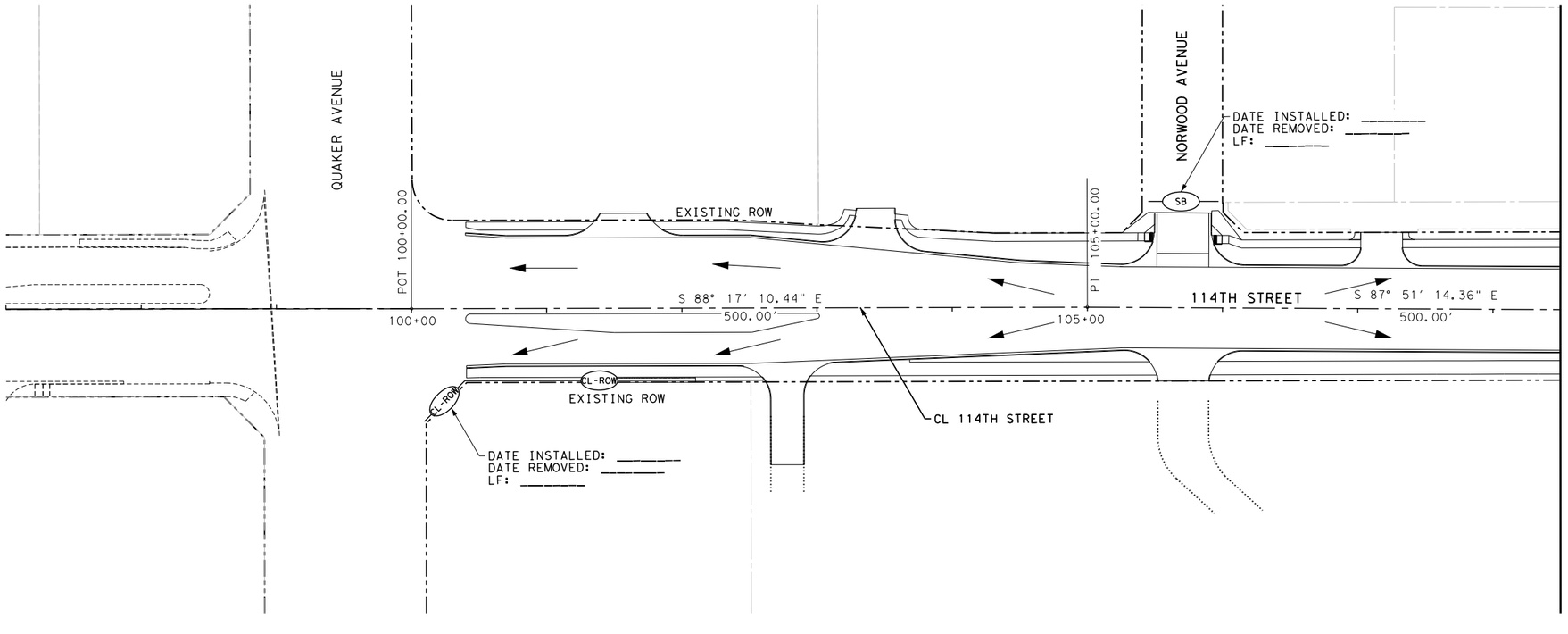
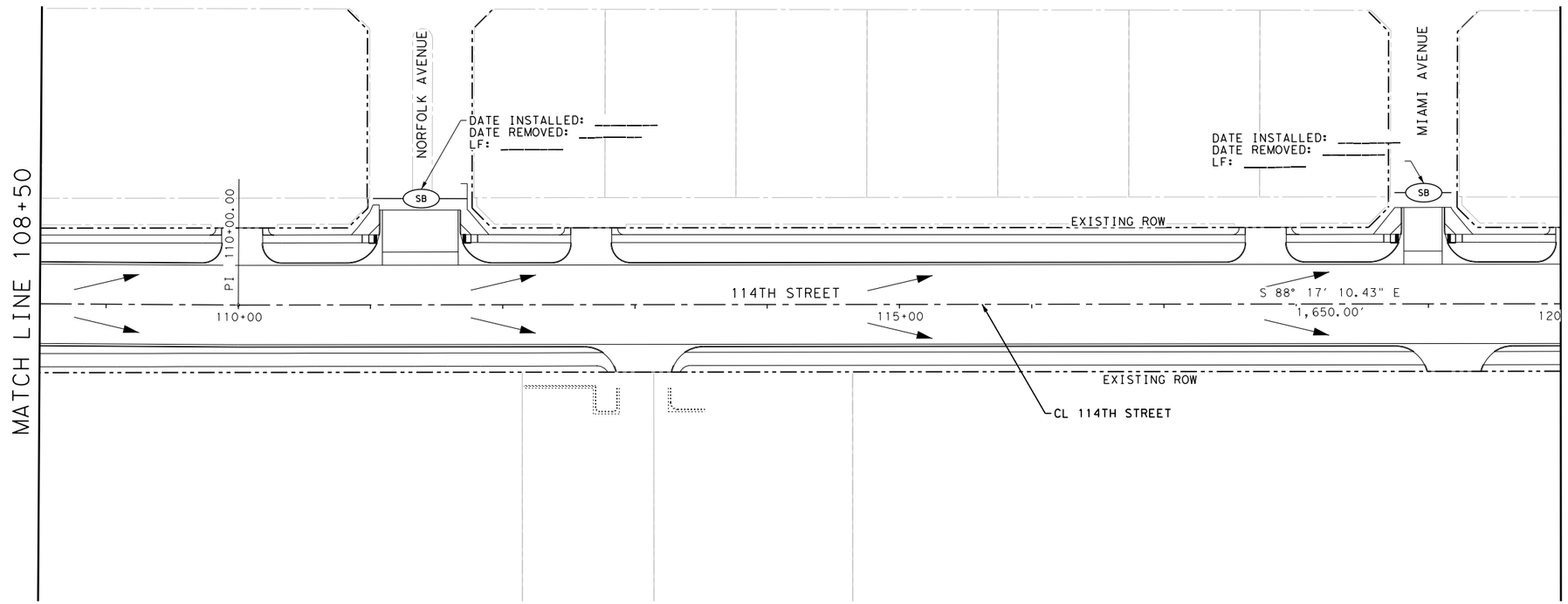
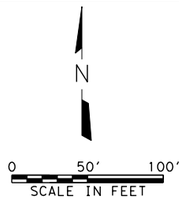
100.0000 ft / in.







LEGEND

←	FLOW ARROWS
CL-ROW	EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
CL-CI	EROSION CONTROL LOG AT CURB INLET
RFD4	ROCK FILTER DAM TY 4
SB	SANDBAGS

NOTE:
EROSION CONTROL DEVICES ARE MEANT TO BE COORDINATED WITH TCP PHASING, SPECIFICALLY SANDBAGS RELATED TO GUTTER ONLY OR FULL WIDTH INSTALLATIONS.

Kevin Morris 3-10-2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

Texas Department of Transportation

114TH STREET
QUAKER AVE. TO INDIANA AVE.
EROSION CONTROL PLAN
BEGIN TO STA 120+00

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	191
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

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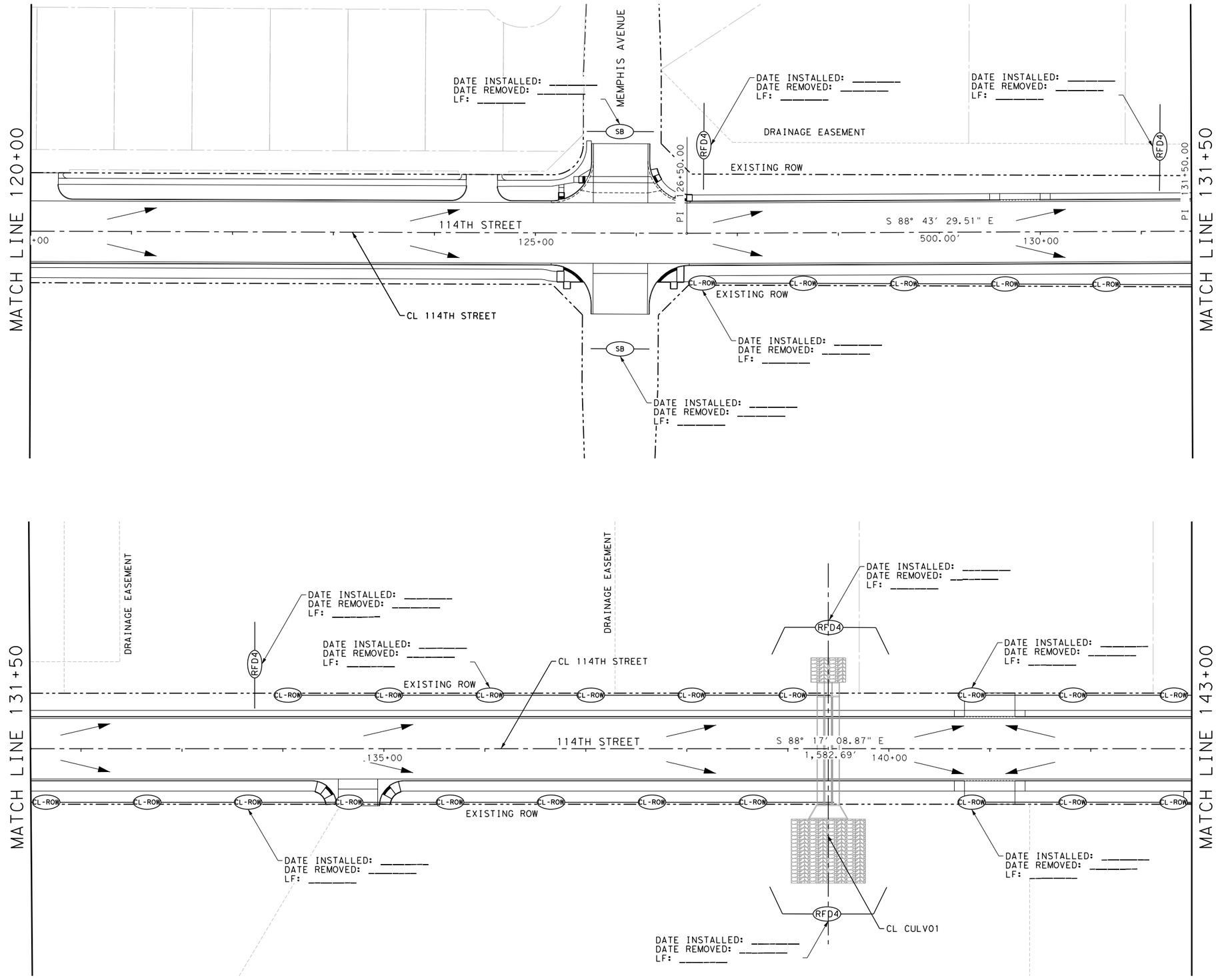
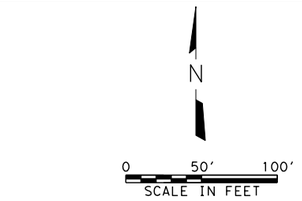
100.0000 ft / in.





LEGEND

←	FLOW ARROWS
CL-ROW	EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
CL-CI	EROSION CONTROL LOG AT CURB INLET
RFD4	ROCK FILTER DAM TY 4
SB	SANDBAGS

NOTE:
EROSION CONTROL DEVICES ARE MEANT TO BE COORDINATED WITH TCP PHASING, SPECIFICALLY SANDBAGS RELATED TO GUTTER ONLY OR FULL WIDTH INSTALLATIONS.

Kevin Morris 3-10-2022

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

NO	DATE	REVISION	APPROVED

FREESE AND NICHOLS
1500 Broadway Street, Suite 1150
Lubbock, TX 79401
Phone - (806) 686-2700
Web www.freese.com

Texas Department of Transportation
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114TH STREET
QUAKER AVE. TO INDIANA AVE.
EROSION CONTROL PLAN
STA 120+00 TO STA 143+00

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	192
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

Apr. 28, 2022 - 10:28:48 AM
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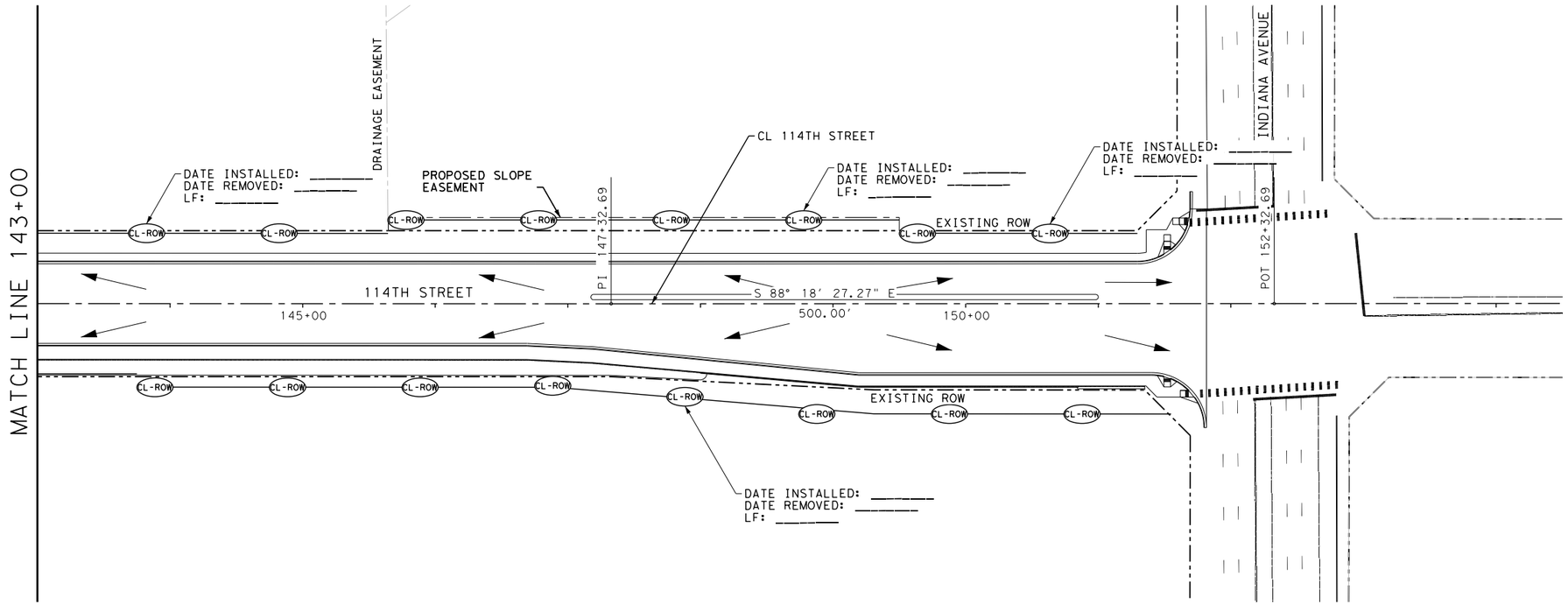

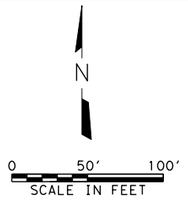

LEGEND

←	FLOW ARROWS
CL-ROW	EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
CL-CI	EROSION CONTROL LOG AT CURB INLET
RFD4	ROCK FILTER DAM TY 4
SB	SANDBAGS

NOTE:
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Lubbock, TX 79401
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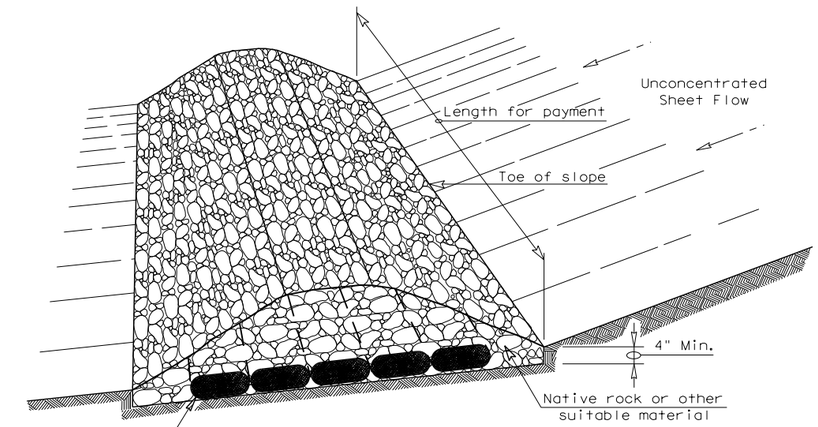
114TH STREET
QUAKER AVE. TO INDIANA AVE.
EROSION CONTROL PLAN

STA 143+00 TO END

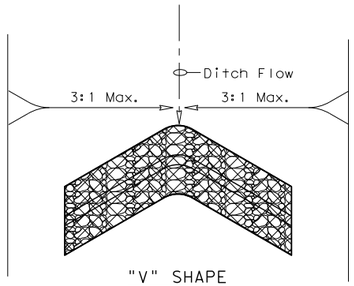
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
KMM	6			CS
GRAPHICS DAP	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CBB	TEXAS	LBB	LUBBOCK	193
CHECK SRJ	CONTROL	SECTION	JOB	
	0905	06	118	

DATE:
FILE:

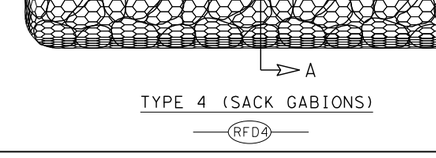


FILTER DAM AT TOE OF SLOPE

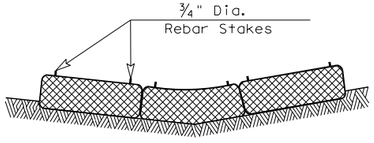
RFD1



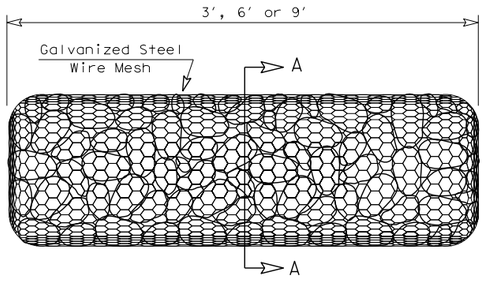
"V" SHAPE
PLAN VIEW



PLAN VIEW

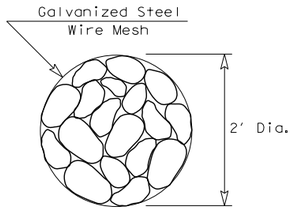


SECTION B-B

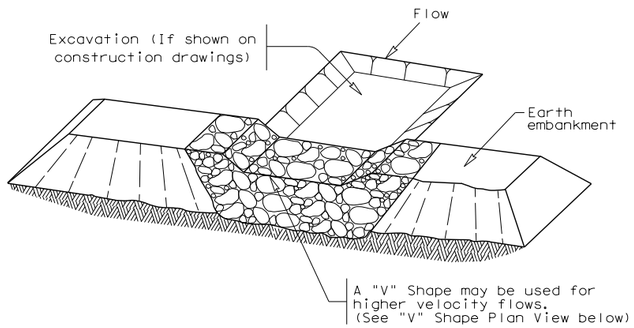


TYPE 4 (SACK GABIONS)

RFD4

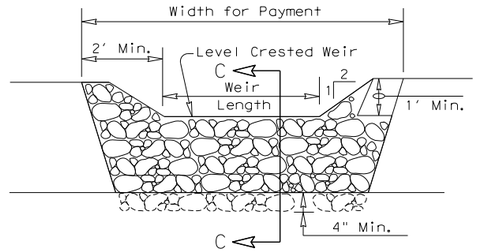


SECTION A-A

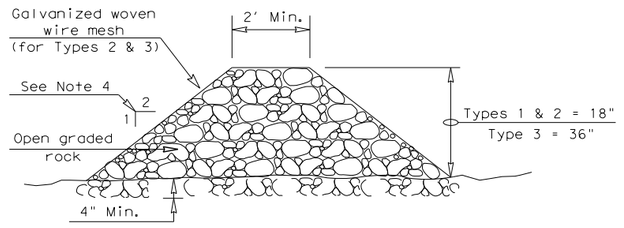


FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

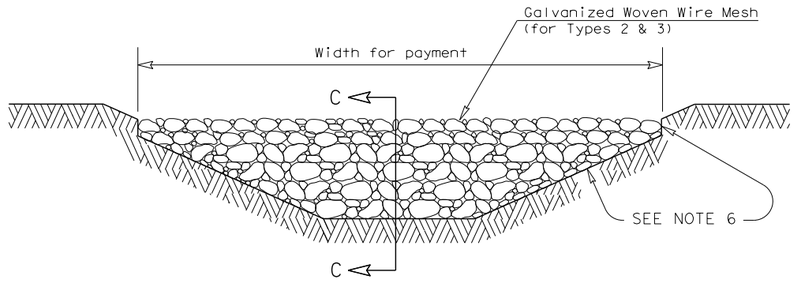
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation

Design Division Standard

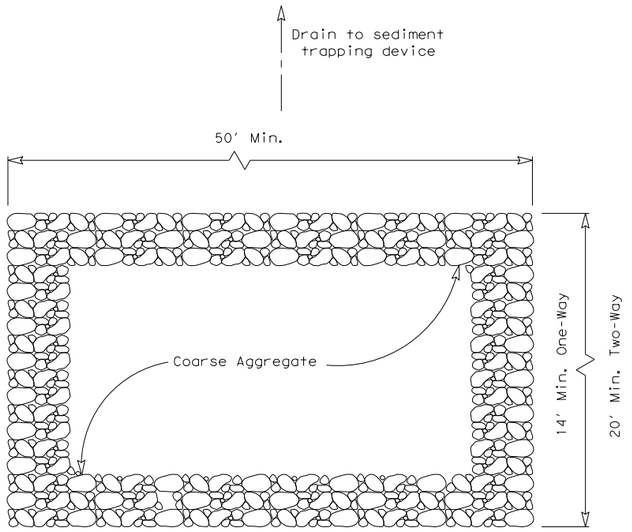
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

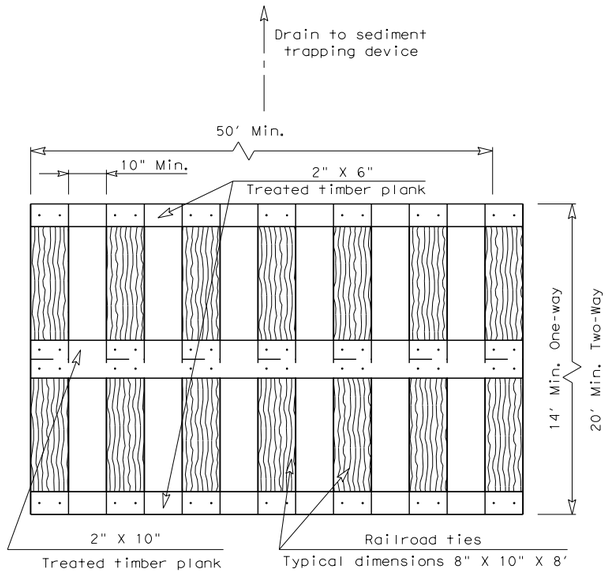
EC(2)-16

FILE: ec216	DN: TxDOT		CK: KM	DW: VP		DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0905	06	118		CS	
	DIST	COUNTY			SHEET NO.	
	LBB	LUBBOCK			194	

DATE:
FILE:



PLAN VIEW



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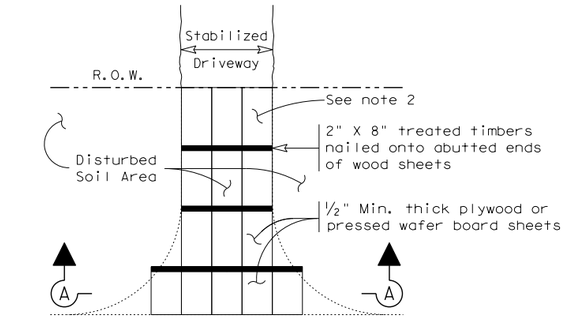
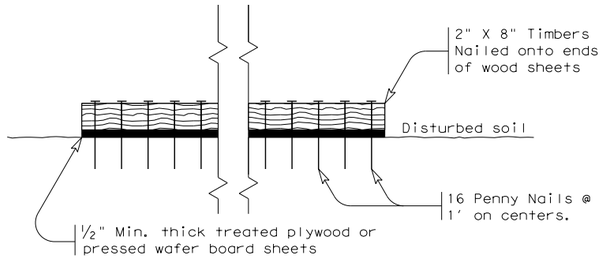


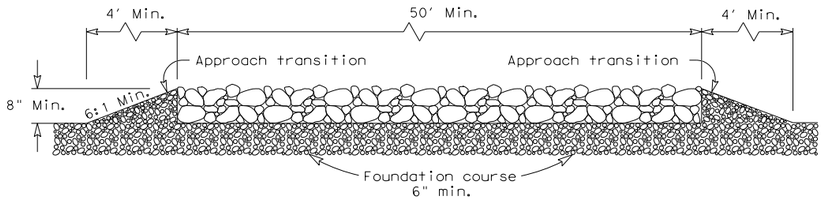
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

SHORT TERM



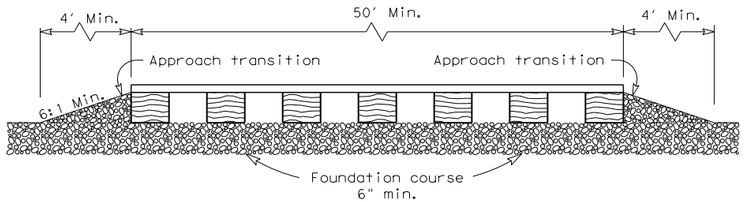
ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50′.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50′.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

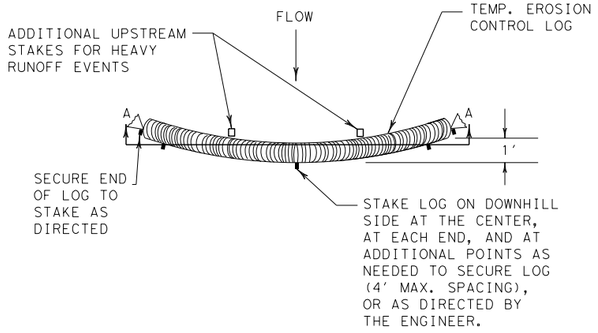
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

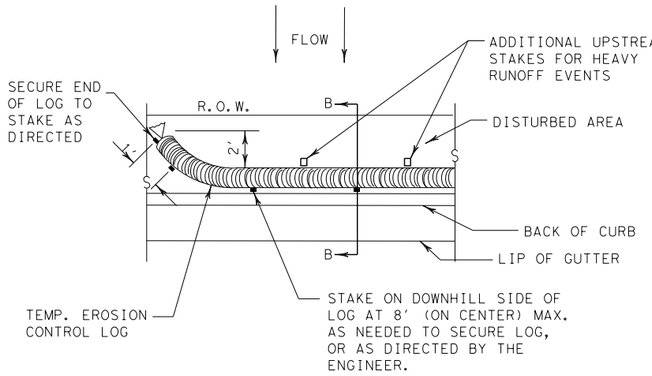
EC(3)-16

FILE: ec316	DN: TxDOT		CK: KM		DW: VP	DN/CK: LS
	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0905	06	118		CS	
	DIST	COUNTY				SHEET NO.
	LBB	LUBBOCK				195

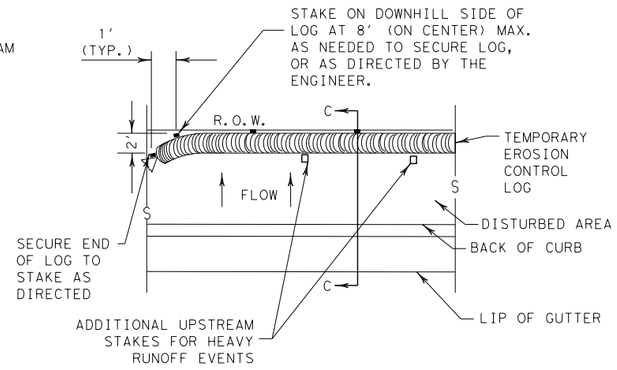
DATE:
FILE:



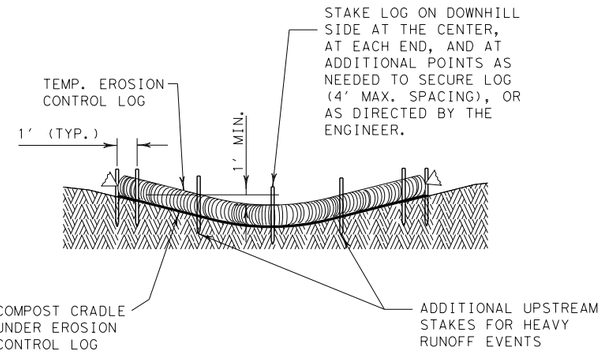
PLAN VIEW



PLAN VIEW



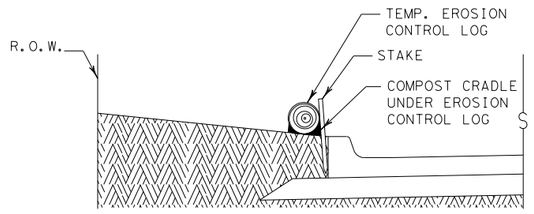
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

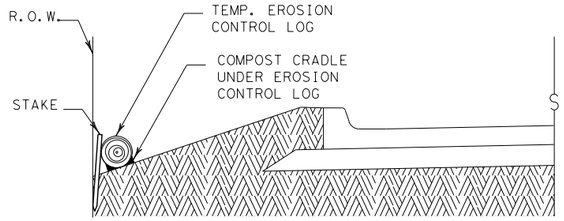
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW

GENERAL NOTES:

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

LEGEND

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

SEDIMENT BASIN & TRAP USAGE GUIDELINES

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

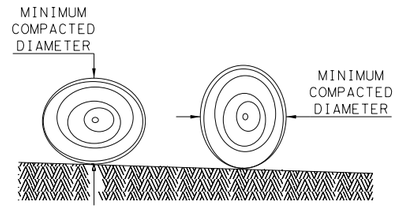
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

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

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

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



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

3-10-2022

MODIFICATION:
REMOVED REBAR OPTION FOR CONTROL LOG STAKES.
ONLY WOOD STAKES ARE TO BE USED.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16 (MOD)

FILE: ec916		DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0905	06	118		CS		
	DIST	COUNTY				SHEET NO.	
	LBB	LUBBOCK				196	

DATE:
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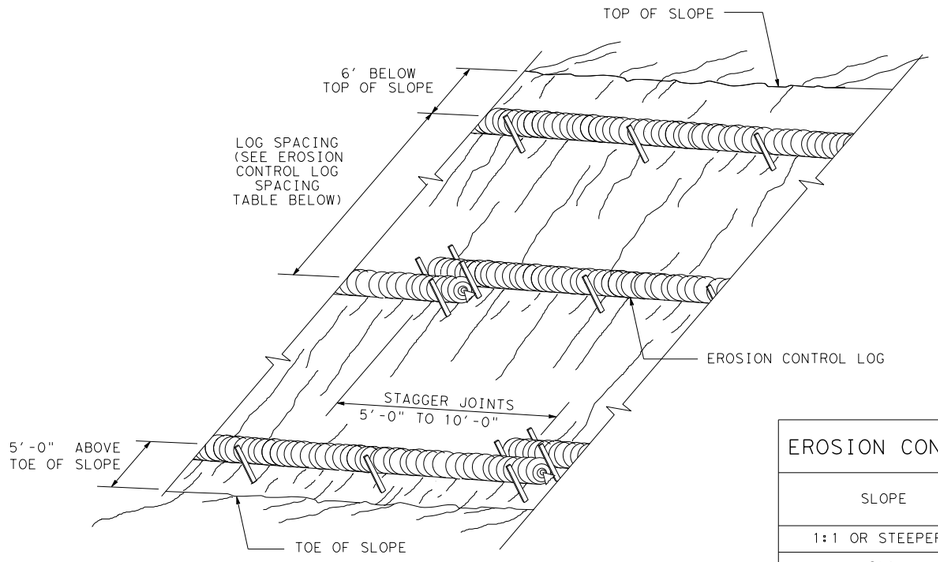
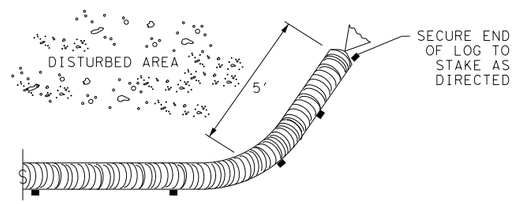


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

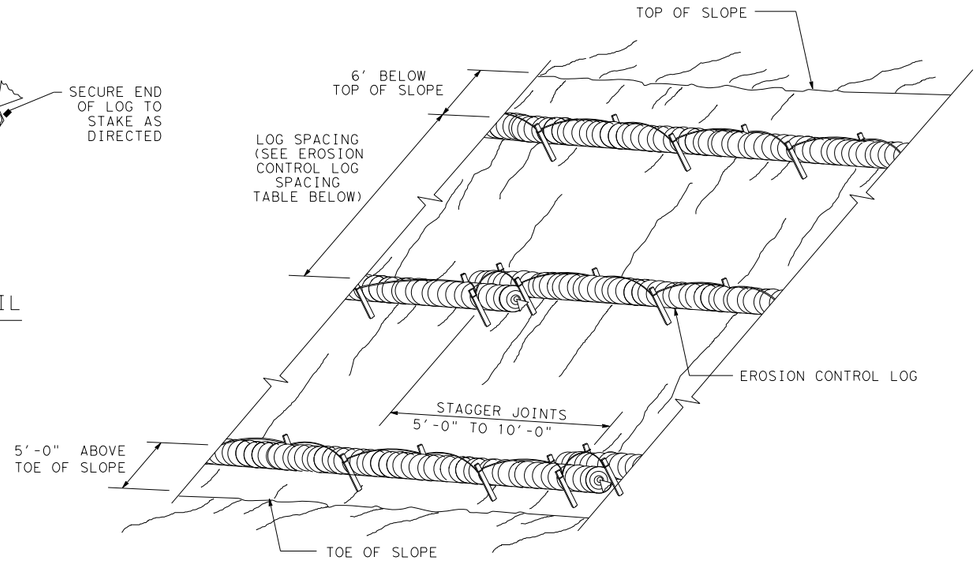
CL-SST



END SECTION RAP DETAIL

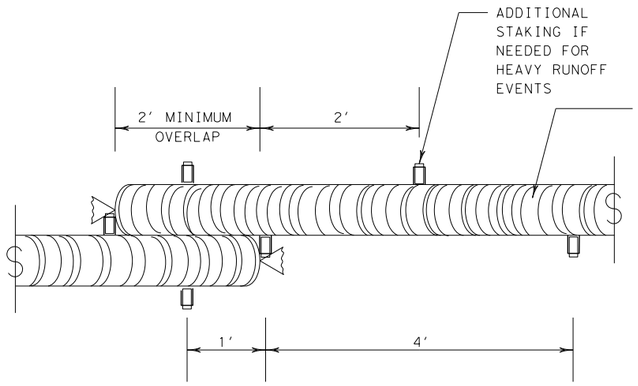
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

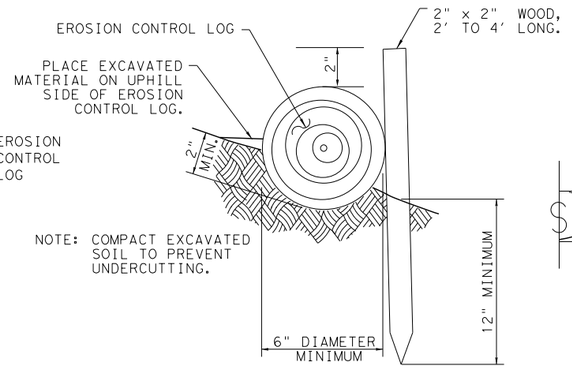
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

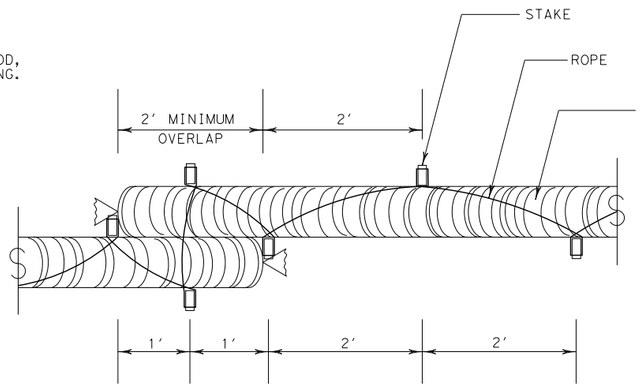


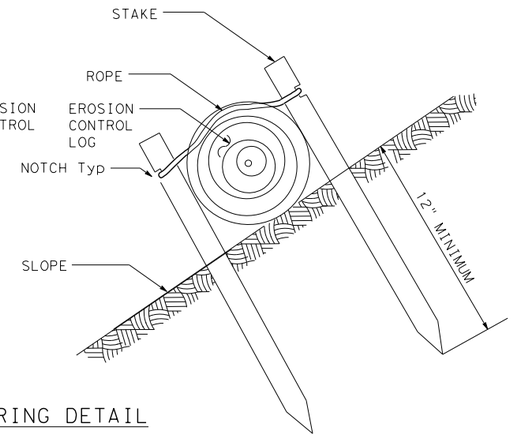


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

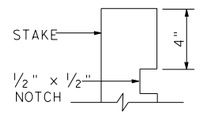
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

MODIFICATION:
REMOVED REBAR OPTION FOR CONTROL LOG STAKES.
ONLY WOOD STAKES ARE TO BE USED.

Texas Department of Transportation

Design Division Standard

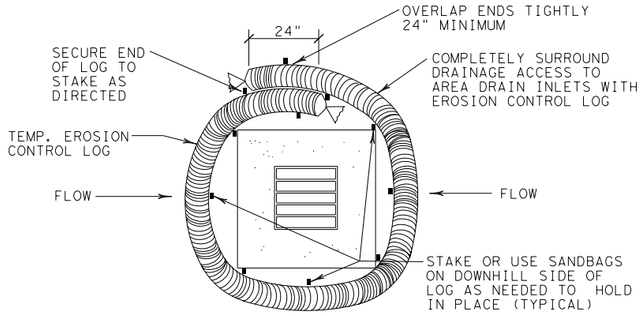
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16 (MOD)

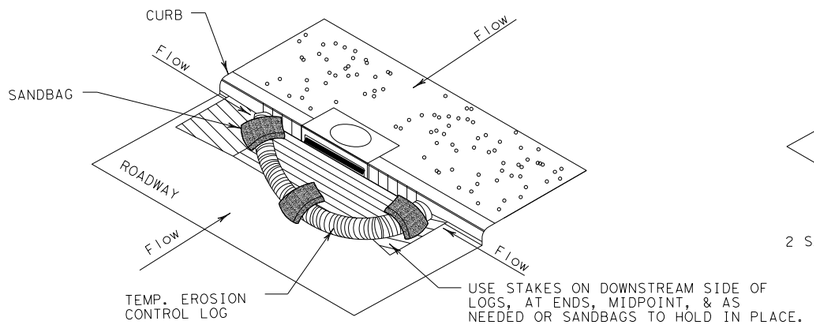
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	06	118	CS
	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		197

DATE:
FILE:



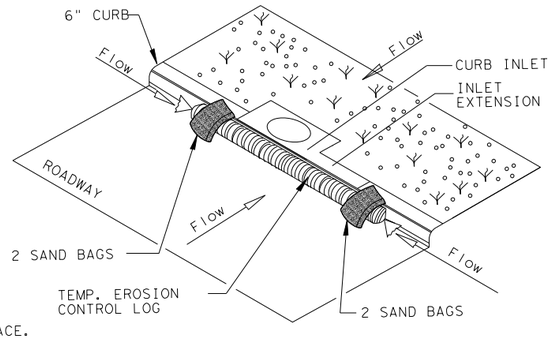
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

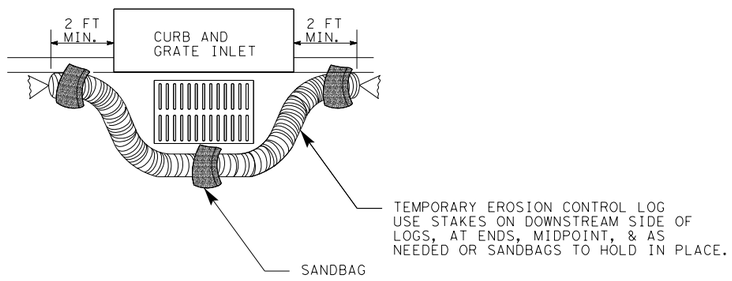
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

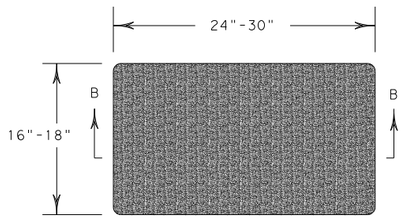
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS		
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0905	06	118	CS		
	DIST	COUNTY		SHEET NO.		
	LBB	LUBBOCK		198		

DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

City of Lubbock

2.

☐ No Action Required ☒ Required Action

Action No.

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

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

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

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

☒ No Permit Required
☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
☐ Individual 404 Permit Required
☐ Other Nationwide Permit Required: NWP# _____

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

1.

2.

3.

4.

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

Best Management Practices:

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

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

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. Comply with Executive Order 13112 on Invasive Plant Species.
2. Comply with TxDOT Executive Memorandum on beneficial landscaping.
3. Comply with temporary and permanent vegetation stabilization protocols of the SW3P.

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. Do not handle or harm Texas horned lizards, prairie dogs, barn swallows or burrowing owls.
2. No prairie dog towns can be damaged or crossed with equipment without approval of the Engineer.
3. No nests of burrowing owls (in prairie dog holes) can be disturbed or damaged (See General Notes).
4. No nests of barn swallows (likely on structures such as bridges) can be disturbed or damaged (See General Notes).

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.

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.

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):

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

VII. OTHER ENVIRONMENTAL ISSUES

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

☐ No Action Required ☒ Required Action

Action No.

1. Maintain equipment muffler systems and work hour restrictions to reduce traffic noise.
2. No PSL's may be located in the prairie dog towns, playa lakes (wet or dry) or stream beds (wet or dry).
3. No dumping of construction material in playa lakes or stream beds regardless of property owner requests.
4. Contractor must obtain historical and archaeological clearances for off-site PSL's.
5. Contractor is responsible for air quality permits for concrete and asphalt batch and similar plants.
6. Contractor is responsible for water appropriation or impoundment TCEQ permits.
7. Contractor will protect environmentally sensitive areas with fencing, work sequencing or scheduling as directed.
8. PSL's beyond the project right-of-way have "individual operator" status under the TPDES Construction General Permit and the Contractor is responsible for the SW3P and any TCEQ permits.
9. No waste material of any type may be placed at any location where it could be washed into a water of the U.S. or a surface water of Texas.
10. Flood elevations will not be increased to a level that would violate flood plain regulations or ordinances.

Texas Department of Transportation

Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0905	06	118	CS
	DIST	COUNTY		SHEET NO.
	LBB	LUBBOCK		199