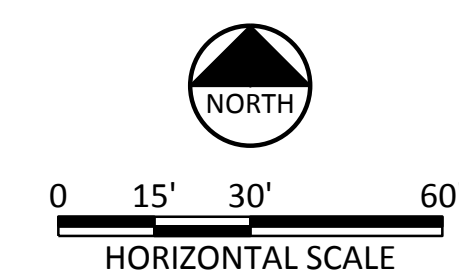
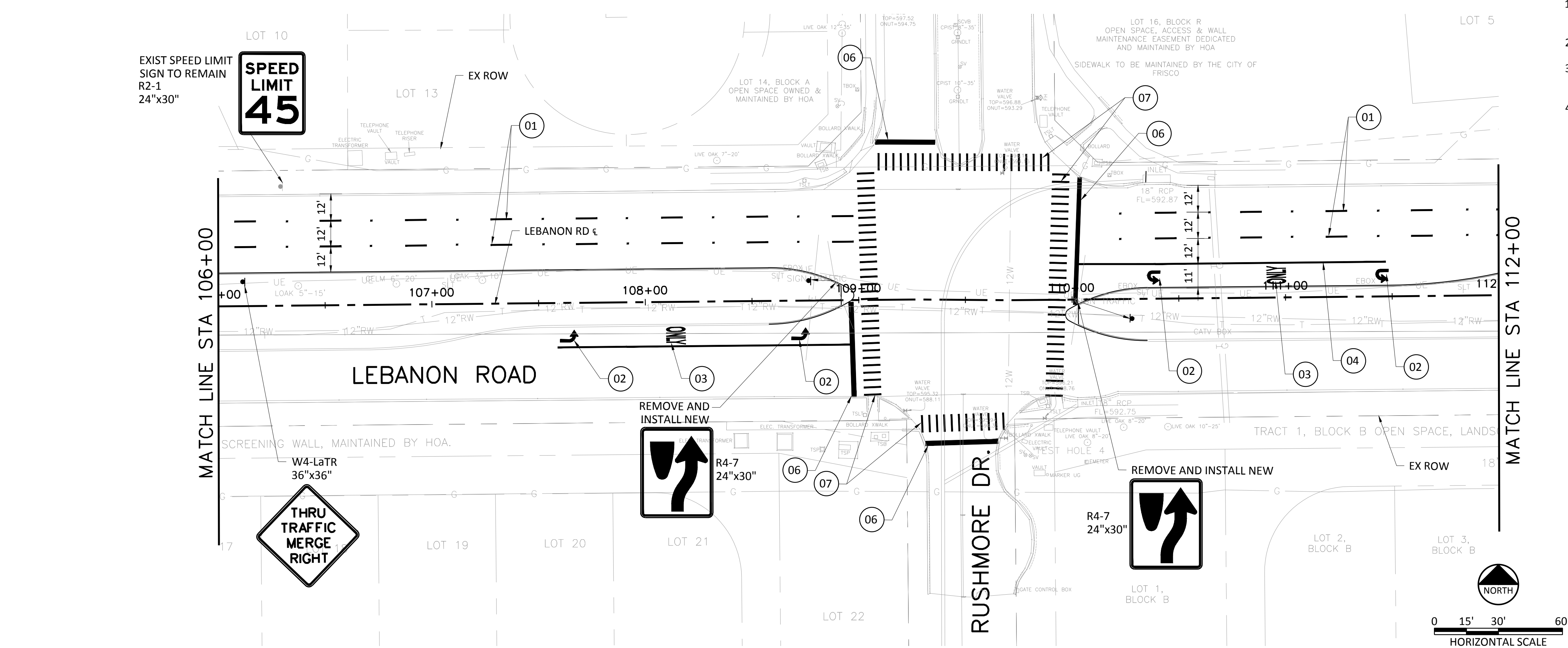


LEGEND	
1	INSTALL BROKEN 4" WHITE LANE LINE
2	INSTALL ARROW (W) TYP.
3	INSTALL WORD (W) TYP.
4	INSTALL 8" WHITE TURN BAY LINE
5	INSTALL WHITE NUTRAL AREA CHANNELIZATION
6	INSTALL 24" STOP BAR
7	INSTALL 24"x6' WHITE LINE WITH 4' SPACE (CROSSWALK)



- NOTES:**
- REFER TO PAVEMENT MARKING DETAIL SHEET FOR PAVEMENT MARKING INFORMATION INCLUDING REFLECTORS REQUIRED.
 - ALL SIGNS REMOVED TO BE RETURNED TO THE CITY OF FRISCO. CONTACT SALVADOR MARQUEZ AT 972-292-5831.
 - ALL EXISTING PAVEMENT MARKINGS IN CONFLICT WITH PROPOSED PAVEMENT MARKINGS SHALL BE REMOVED (NO SEPARATE PAY).
 - CONTRACTOR SHALL FIELD VERIFY SIGN LOCATIONS WITH CITY TRAFFIC ENGINEER PRIOR TO INSTALLATION.

ACAD Ref: 20.06 (LMS Tech)
 Filename: N:\Drawings\cv-trt-pl-pm\k01.dwg
 Last Saved: 4/25/2017 11:25 AM Saved By: sli

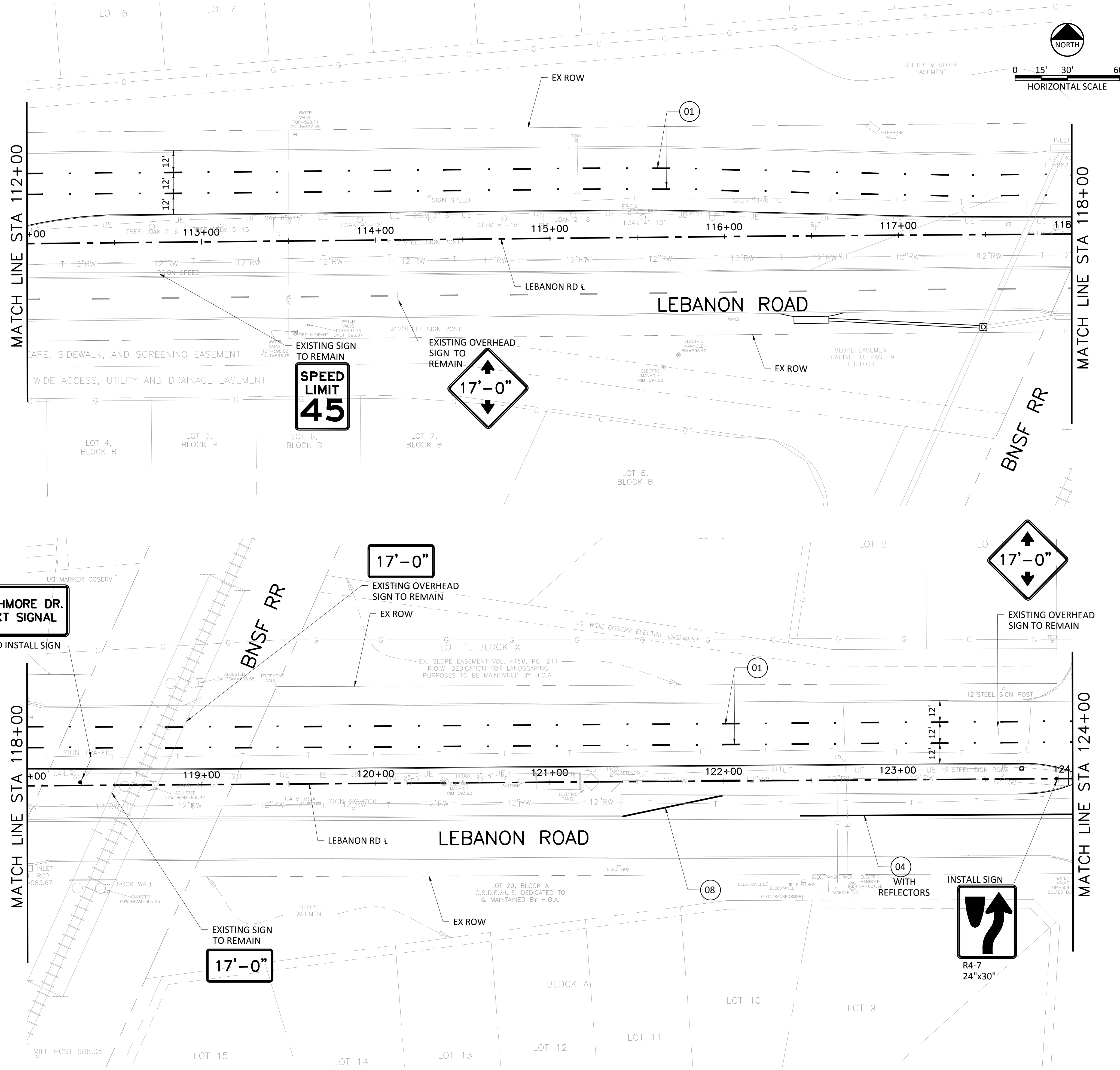


FREES & NICHOLS
 6136 Frisco Square Blvd, Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freese.com

CITY OF FRISCO, TEXAS
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
 CIVIL
LEBANON ROAD PAVEMENT MARKING & SIGNAGE
 BEGIN TO STA 112+00

NO.	ISSUE	BY	DATE	FRJ JOB NO.	FRCL5624
				DATE	4/2017
				DESIGNED	AU
				DRAWN	SI
				REVISED	
				CHECKED	
				FILE NAME	cv-trt-pl-pm\k01
0	VERIFY SCALE				
1	Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.				

ACAD Ref: 20.0x (LMS Tech)
 Filename: N:\F\Drawings\cv-trt-pl-pvmrk02.dwg
 Last Saved: 2/28/2017 5:36 PM. Saved By: sli



LEGEND	
1	INSTALL BROKEN 4" WHITE LANE LINE
2	INSTALL ARROW (W) TYP.
3	INSTALL WORD (W) TYP.
4	INSTALL 8" WHITE TURN BAY LINE
5	INSTALL WHITE NUTRAL AREA CHANNELIZATION
6	INSTALL 24" STOP BAR
7	INSTALL 24"x6' WHITE LINE WITH 4' SPACE (CROSSWALK)
8	INSTALL 4" YELLOW LANE LINE

- NOTES:**
- REFER TO PAVEMENT MARKING DETAIL SHEET FOR PAVEMENT MARKING INFORMATION INCLUDING REFLECTORS REQUIRED.
 - ALL SIGNS REMOVED TO BE RETURNED TO THE CITY OF FRISCO. CONTACT SALVADOR MARQUEZ AT 972-292-5831.
 - ALL EXISTING PAVEMENT MARKINGS IN CONFLICT WITH PROPOSED PAVEMENT MARKINGS SHALL BE REMOVED (NO SEPARATE PAY).
 - CONTRACTOR SHALL FIELD VERIFY SIGN LOCATIONS WITH CITY TRAFFIC ENGINEER PRIOR TO INSTALLATION.
 - CITY WILL PROVIDE NEW SIGN PANEL.

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

05-01-2017

FREES & NICHOLS
 6136 Frisco Square Blvd, Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freese.com

CITY OF FRISCO, TEXAS

LEBANON ROAD IMPROVEMENTS AND FORCE MAIN

CIVIL

LEBANON ROAD PAVEMENT MARKING & SIGNAGE
 STA 112+00 TO STA 124+00

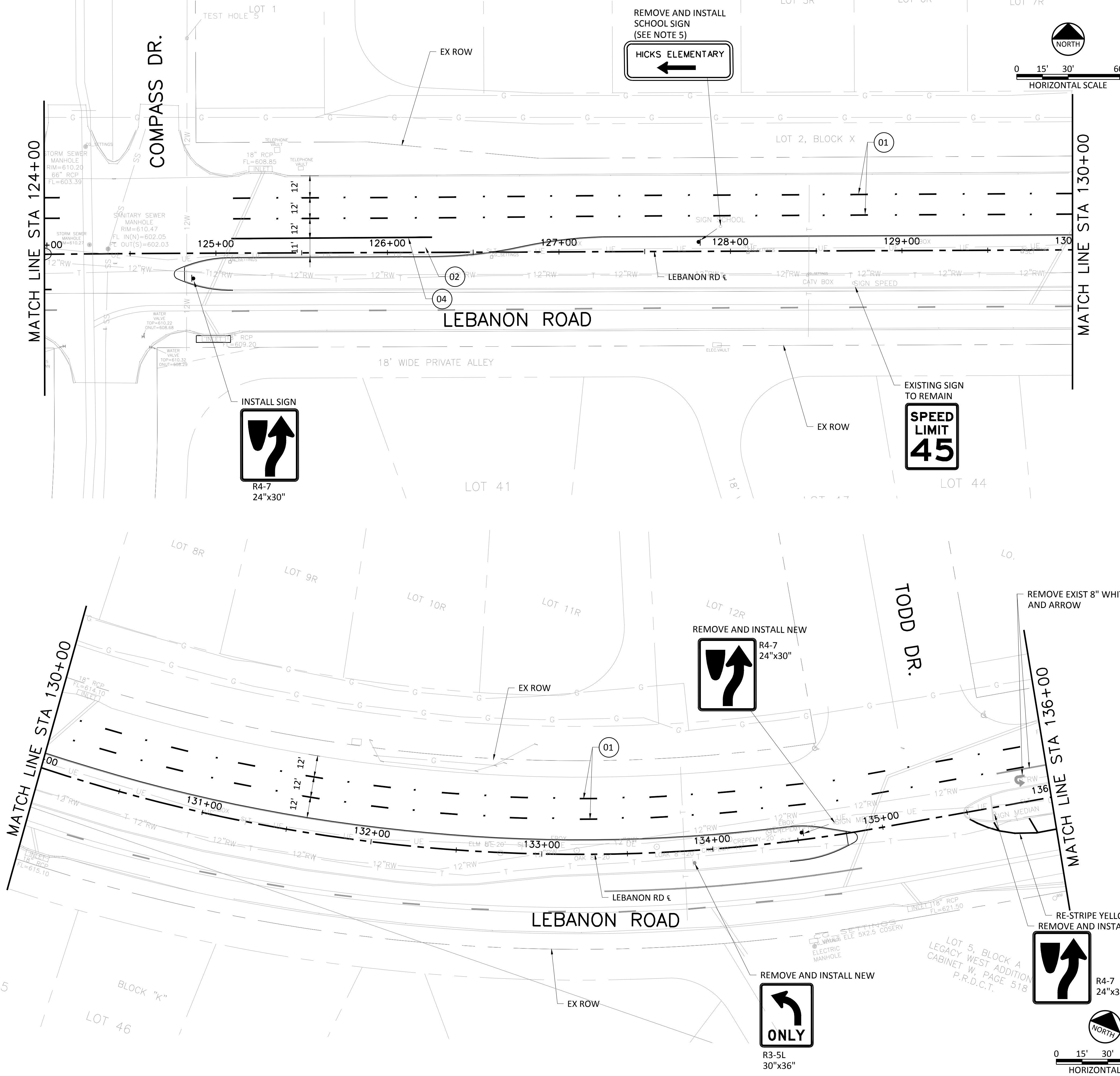
NO.	ISSUE	DATE	BY	FR/JOB NO.	DATE	DESIGNED	DRAWN	REVISION	CHECKED	FILE NAME
0	VERIFY SCALE			FRCL15624	4/2017	AU	SI			cv-trt-pl-pvmrk02
1										

Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.

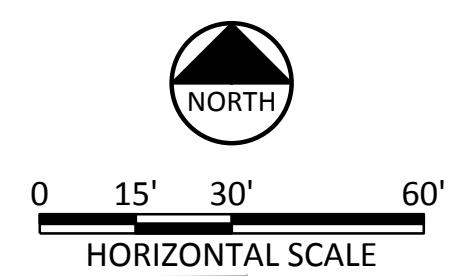
SHEET **PM-02**

SEQ. **70**

ACAD Ref: 20.0% (LMS Tech)
 Filename: N:\Drawings\cv-trt-pl-pvmrk03.dwg
 Last Saved: 3/1/2017 12:17 PM. Saved By: sli



REMOVE AND INSTALL SCHOOL SIGN (SEE NOTE 5)
HICKS ELEMENTARY



LEGEND	
1	INSTALL BROKEN 4" WHITE LANE LINE
2	INSTALL ARROW (W) TYP.
3	INSTALL WORD (W) TYP.
4	INSTALL 8" WHITE TURN BAY LINE
5	INSTALL WHITE NUTRAL AREA CHANNELIZATION
6	INSTALL 24" STOP BAR
7	INSTALL 24"x6' WHITE LINE WITH 4' SPACE (CROSSWALK)

- NOTES:**
- REFER TO PAVEMENT MARKING DETAIL SHEET FOR PAVEMENT MARKING INFORMATION INCLUDING REFLECTORS REQUIRED.
 - ALL SIGNS REMOVED TO BE RETURNED TO THE CITY OF FRISCO. CONTACT SALVADOR MARQUEZ AT 972-292-5831.
 - ALL EXISTING PAVEMENT MARKINGS IN CONFLICT WITH PROPOSED PAVEMENT MARKINGS SHALL BE REMOVED (NO SEPARATE PAY).
 - CONTRACTOR SHALL FIELD VERIFY SIGN LOCATIONS WITH CITY TRAFFIC ENGINEER PRIOR TO INSTALLATION.
 - CITY WILL PROVIDE NEW SIGN PANEL.

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

05-01-2017

FREES & NICHOLS
 6136 Frisco Square Blvd, Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freese.com

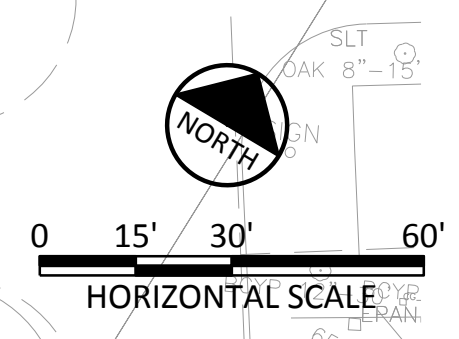
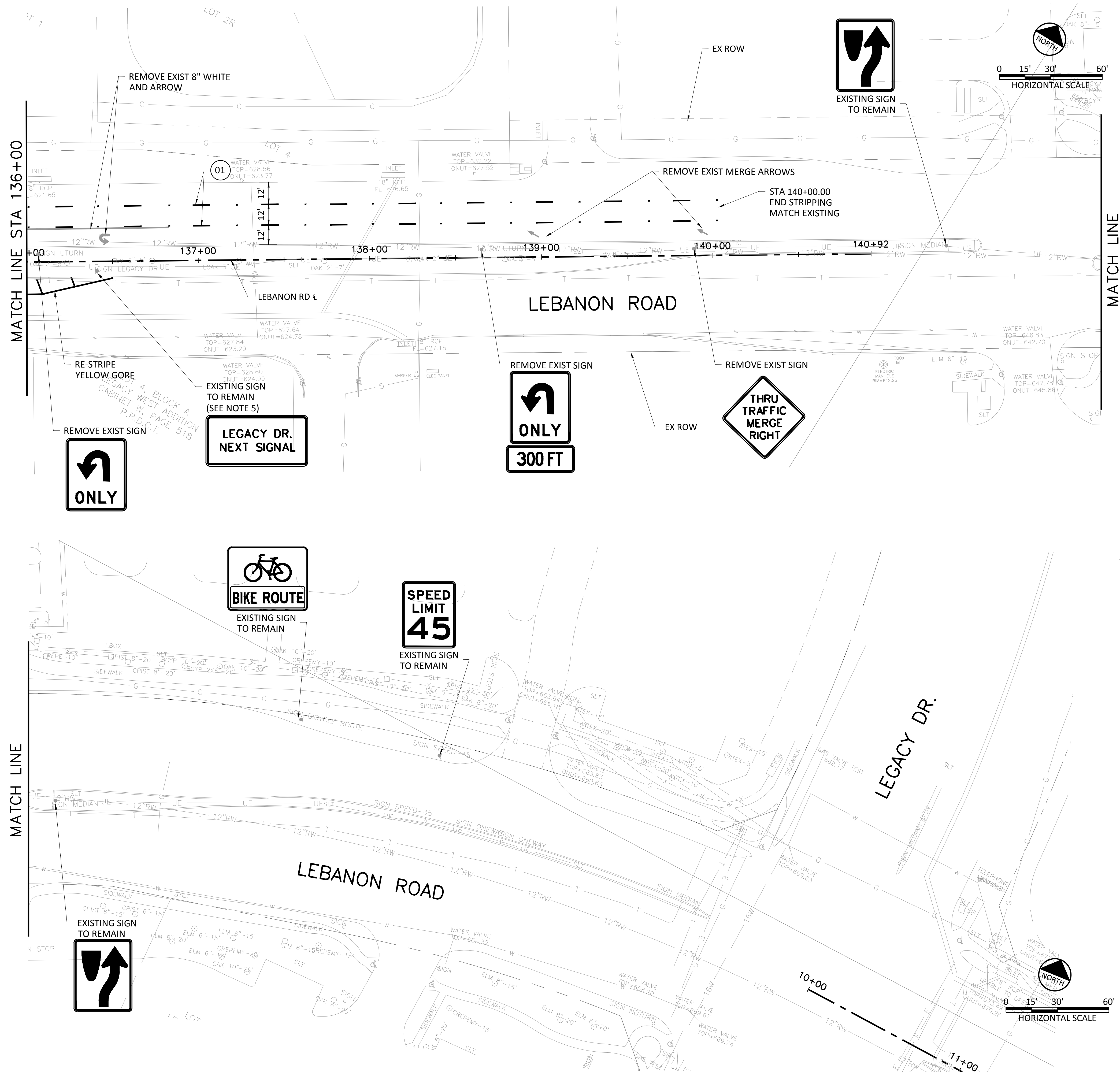
CITY OF FRISCO, TEXAS

LEBANON ROAD IMPROVEMENTS AND FORCE MAIN

CIVIL

LEBANON ROAD PAVEMENT MARKING & SIGNAGE
 STA 124+00 TO STA 136+00

NO.	ISSUE	BY	DATE	FRJ JOB NO.	FRCL5624
0	VERIFY SCALE			DATE	4/2017
1	Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.			DESIGNED	AU
				DRAWN	SI
				REVISION	
				CHECKED	
				FILE NAME	cv-trt-pl-pvmrk03
SHEET	PM-03				
SEQ.	71				



LEGEND	
1	INSTALL BROKEN 4" WHITE LANE LINE
2	INSTALL ARROW (W) TYP.
3	INSTALL WORD (W) TYP.
4	INSTALL 8" WHITE TURN BAY LINE
5	INSTALL WHITE NUTRAL AREA CHANNELIZATION
6	INSTALL 24" STOP BAR
7	INSTALL 24"x6" WHITE LINE WITH 4' SPACE (CROSSWALK)

- NOTES:**
- REFER TO PAVEMENT MARKING DETAIL SHEET FOR PAVEMENT MARKING INFORMATION INCLUDING REFLECTORS REQUIRED.
 - ALL SIGNS REMOVED TO BE RETURNED TO THE CITY OF FRISCO. CONTACT SALVADOR MARQUEZ AT 972-292-5831.
 - ALL EXISTING PAVEMENT MARKINGS IN CONFLICT WITH PROPOSED PAVEMENT MARKINGS SHALL BE REMOVED (NO SEPARATE PAY).
 - CONTRACTOR SHALL FIELD VERIFY SIGN LOCATIONS WITH CITY TRAFFIC ENGINEER PRIOR TO INSTALLATION.
 - CITY WILL PROVIDE NEW SIGN PANEL.

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

Salvador Marquez
 05-01-2017

FREES NICHOLS

6136 Frisco Square Blvd, Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freese.com

CITY OF FRISCO, TEXAS

LEBANON ROAD IMPROVEMENTS AND FORCE MAIN

CIVIL

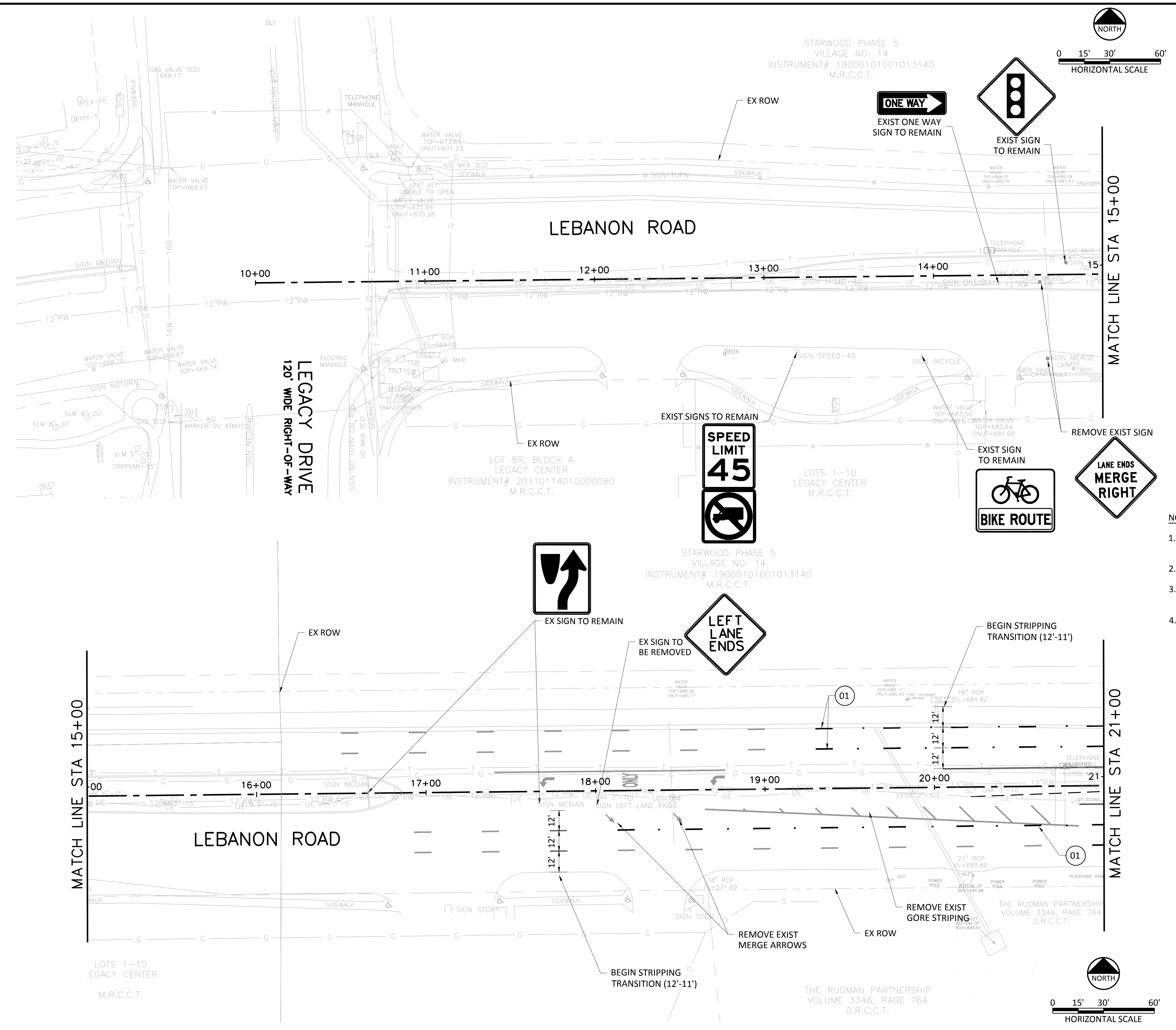
LEBANON ROAD PAVEMENT MARKING & SIGNAGE
 STA 136+00 TO 140+92

NO.	ISSUE	BY	DATE	FRJ JOB NO.	DATE	DESIGNED	AU	SI	FILE NAME
0	VERIFY SCALE			FRCL15624	4/2017				cv-trt-pl-pvmrk04
1	Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.								

SHEET **PM-04**

SEQ. **72**

ACAD Ref: 20.06 (LMS Tech)
 Filename: N:\F\Drawings\cv-trt-pl-pvmrk05.dwg
 Last Saved: 3/1/2017 10:39 AM. Saved By: sli



LEGEND	
1	INSTALL BROKEN 4" WHITE LANE LINE
2	INSTALL ARROW (W) TYP.
3	INSTALL WORD (W) TYP.
4	INSTALL 8" WHITE TURN BAY LINE
5	INSTALL WHITE NUTRAL AREA CHANNELIZATION
6	INSTALL 24" STOP BAR
7	INSTALL 24"x6" WHITE LINE WITH 4' SPACE (CROSSWALK)

- NOTES:
- REFER TO PAVEMENT MARKING DETAIL SHEET FOR PAVEMENT MARKING INFORMATION INCLUDING REFLECTORS REQUIRED.
 - ALL SIGNS REMOVED TO BE RETURNED TO THE CITY OF FRISCO. CONTACT SALVADOR MARQUEZ AT 972-292-5831.
 - ALL EXISTING PAVEMENT MARKINGS IN CONFLICT WITH PROPOSED PAVEMENT MARKINGS SHALL BE REMOVED (NO SEPARATE PAY).
 - CONTRACTOR SHALL FIELD VERIFY SIGN LOCATIONS WITH CITY TRAFFIC ENGINEER PRIOR TO INSTALLATION.

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

05-01-2017

FREES & NICHOLS
 6136 Frisco Square Blvd, Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freese.com

CITY OF FRISCO, TEXAS

LEBANON ROAD IMPROVEMENTS AND FORCE MAIN

CIVIL

LEBANON ROAD PAVEMENT MARKING & SIGNAGE
 BEGIN TO STA 21+00

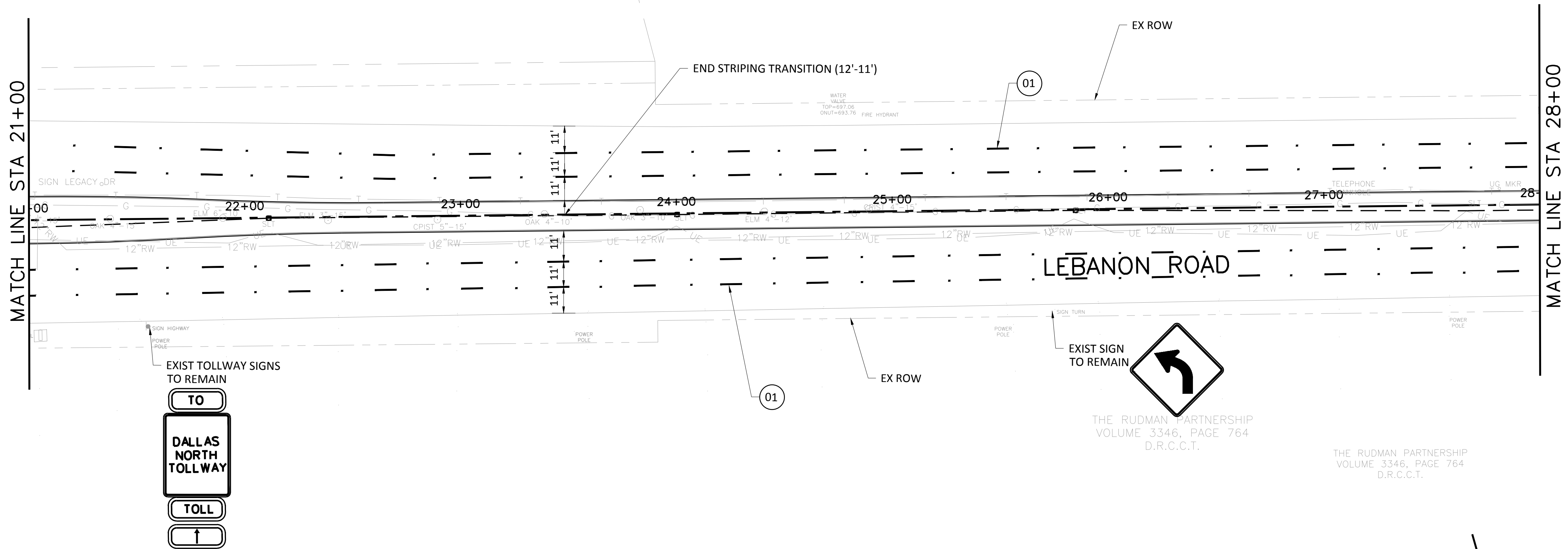
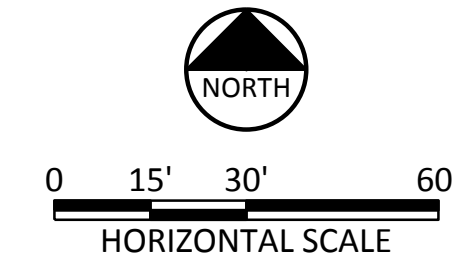
NO.	ISSUE	BY	DATE	FR&N JOB NO.	DATE	DESIGNED	DRAWN	REUSED	CHECKED	FILE NAME
0				FRCL15624	4/2017	AU	SI			CV-TRT-PL-PVMRK05

VERIFY SCALE: 1" = 100'

Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.

STARWOOD PHASE 5
VILLAGE NO. 14
INSTRUMENT# 19000101001013140
M.R.C.C.T.

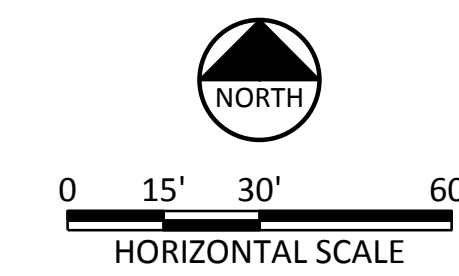
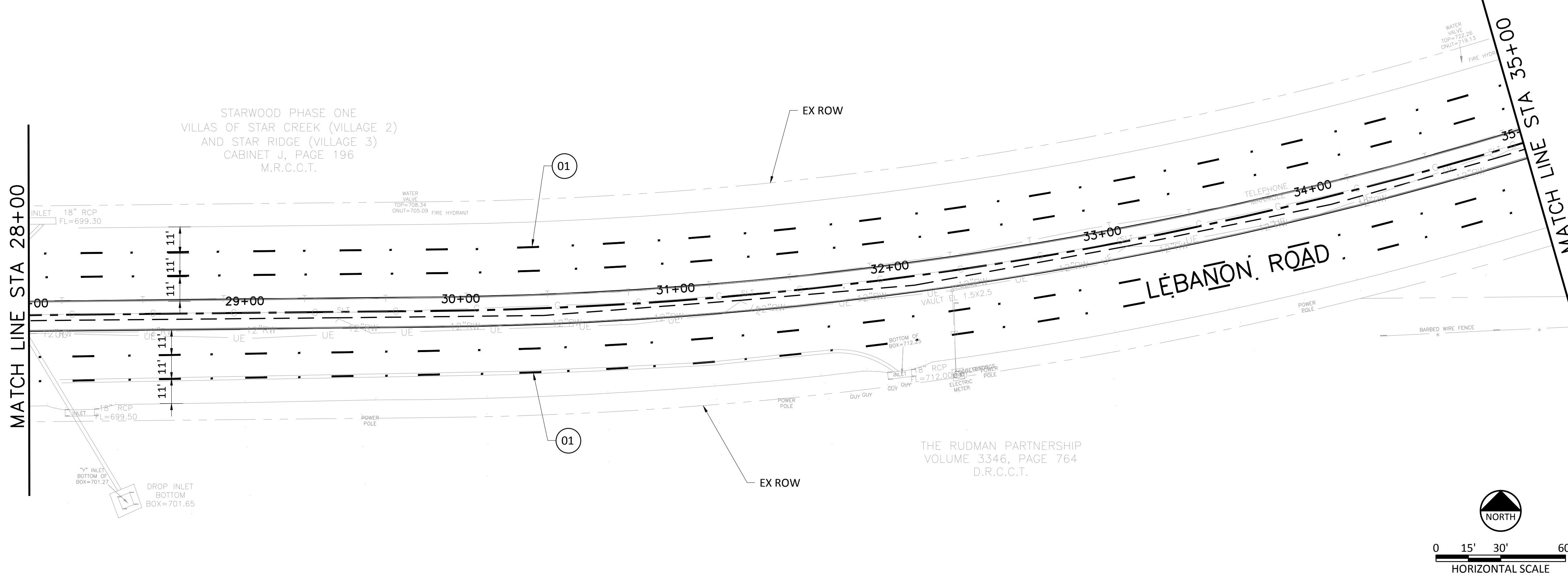
STARWOOD PHASE ONE
VILLAS OF STAR CREEK (VILLAGE 2)
AND STAR RIDGE (VILLAGE 3)
CABINET J, PAGE 196
M.R.C.C.T.



LEGEND	
1	INSTALL BROKEN 4" WHITE LANE LINE
2	INSTALL ARROW (W) TYP.
3	INSTALL WORD (W) TYP.
4	INSTALL 8" WHITE TURN BAY LINE
5	INSTALL WHITE NUTRAL AREA CHANNELIZATION
6	INSTALL 24" STOP BAR
7	INSTALL 24"x6' WHITE LINE WITH 4' SPACE (CROSSWALK)

NOTES:

- REFER TO PAVEMENT MARKING DETAIL SHEET FOR PAVEMENT MARKING INFORMATION INCLUDING REFLECTORS REQUIRED.
- ALL SIGNS REMOVED TO BE RETURNED TO THE CITY OF FRISCO. CONTACT SALVADOR MARQUEZ AT 972-292-5831.
- ALL EXISTING PAVEMENT MARKINGS IN CONFLICT WITH PROPOSED PAVEMENT MARKINGS SHALL BE REMOVED (NO SEPARATE PAY).
- CONTRACTOR SHALL FIELD VERIFY SIGN LOCATIONS WITH CITY TRAFFIC ENGINEER PRIOR TO INSTALLATION.



FREES & NICHOLS
6136 Frisco Square Blvd, Suite 200
Frisco, Texas 75034
Phone - (972) 624-9201
Fax - (972) 624-9202
Web - www.freese.com

CITY OF FRISCO, TEXAS
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
CIVIL
LEBANON ROAD PAVEMENT MARKING & SIGNAGE
STA 21+00 TO STA 35+00

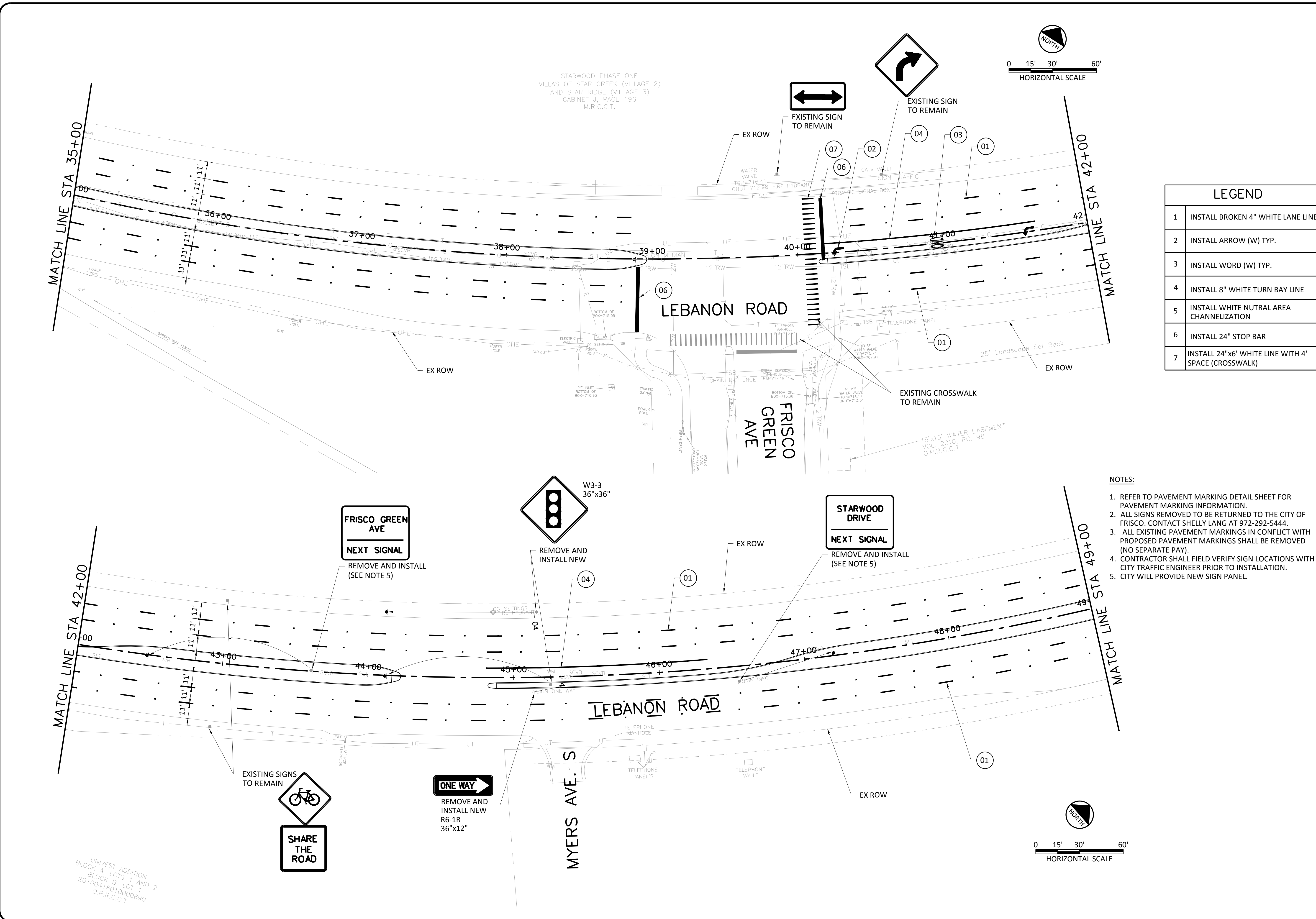
NO.	ISSUE	BY	DATE	FR/JOB NO.	FRCL15624
			4/2017	DATE	
				DESIGNED	AU
				DRAWN	SI
				REVISED	
				CHECKED	
				FILE NAME	cv-fft-pl-pvmrk06

SHEET **PM-06**
SEQ. **74**

ACAD Ref: 20.06 (IMS Tech)
Filename: N:\F\Drawings\cv-fft-pl-pvmrk06.dwg
Last Saved: 4/25/2017 1:52 PM. Saved By: sli

ACAD Ref: 20.06 (LMS Tech)
 Filename: N:\F\Drawings\cv-trt-pl-pvmrk07.dwg
 Last Saved: 3/1/2017 11:49 AM. Saved By: sli

UNIVEST ADDITION
 BLOCK A, LOTS 1 AND 2
 BLOCK B, LOT 1
 20100416010000690
 O.P.R.C.C.T



LEGEND	
1	INSTALL BROKEN 4" WHITE LANE LINE
2	INSTALL ARROW (W) TYP.
3	INSTALL WORD (W) TYP.
4	INSTALL 8" WHITE TURN BAY LINE
5	INSTALL WHITE NUTRAL AREA CHANNELIZATION
6	INSTALL 24" STOP BAR
7	INSTALL 24"x6' WHITE LINE WITH 4' SPACE (CROSSWALK)

- NOTES:**
1. REFER TO PAVEMENT MARKING DETAIL SHEET FOR PAVEMENT MARKING INFORMATION.
 2. ALL SIGNS REMOVED TO BE RETURNED TO THE CITY OF FRISCO. CONTACT SHELLY LANG AT 972-292-5444.
 3. ALL EXISTING PAVEMENT MARKINGS IN CONFLICT WITH PROPOSED PAVEMENT MARKINGS SHALL BE REMOVED (NO SEPARATE PAY).
 4. CONTRACTOR SHALL FIELD VERIFY SIGN LOCATIONS WITH CITY TRAFFIC ENGINEER PRIOR TO INSTALLATION.
 5. CITY WILL PROVIDE NEW SIGN PANEL.

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

05-01-2017

FREES & NICHOLS
 6136 Frisco Square Blvd, Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freese.com

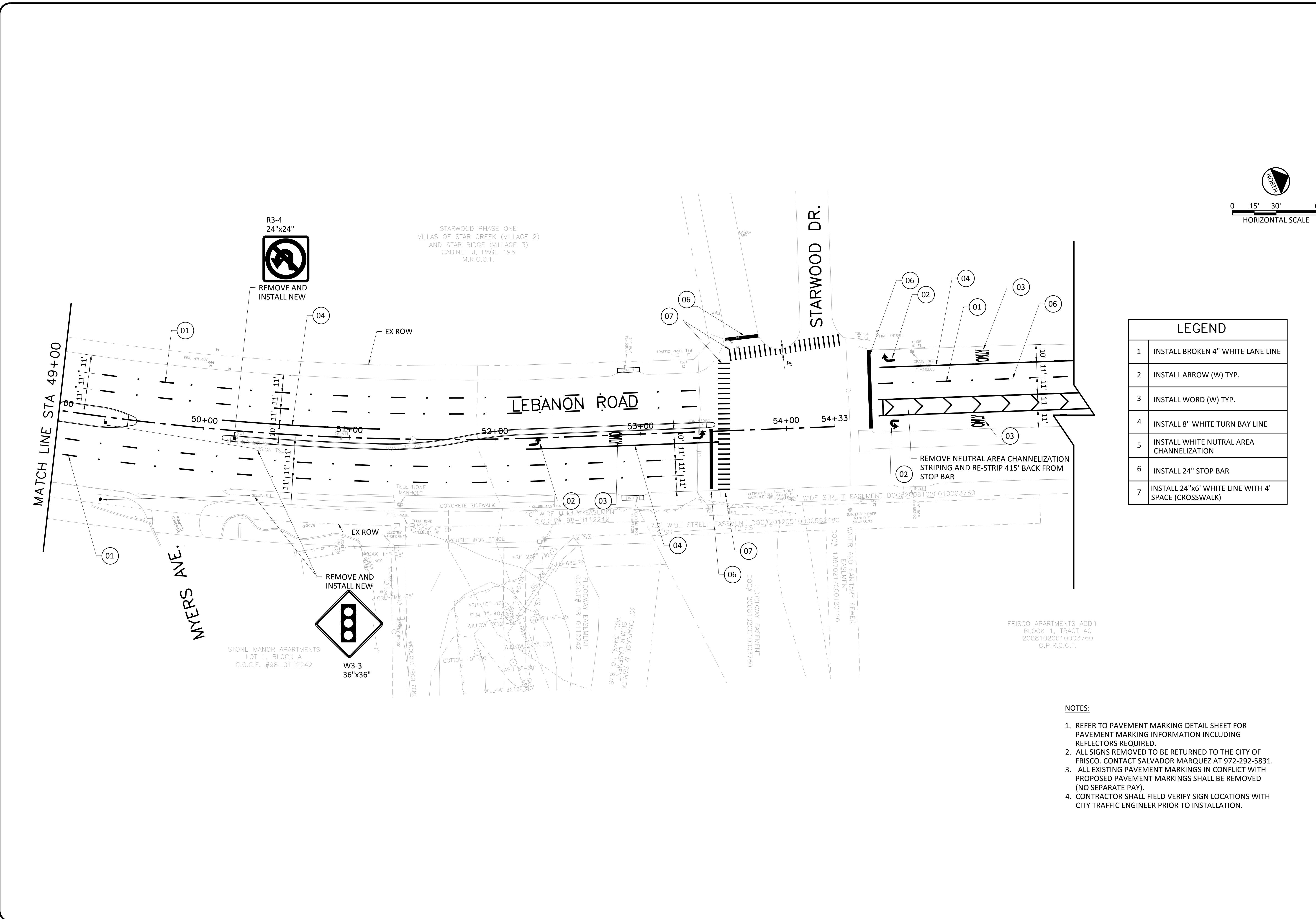
CITY OF FRISCO, TEXAS

LEBANON ROAD IMPROVEMENTS AND FORCE MAIN

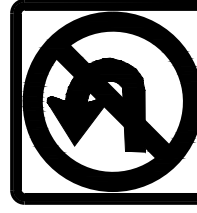
CIVIL

LEBANON ROAD PAVEMENT MARKING & SIGNAGE
 STA 35+00 TO STA 49+00

NO.	ISSUE	BY	DATE	FRJ JOB NO.	FRCL1624
0	VERIFY SCALE			DATE	4/2017
1	Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.			DESIGNED	AU
				DRAWN	SI
				REVISION	
				CHECKED	
				FILE NAME	cv-trt-pl-pvmrk07
SHEET	PM-07				
SEQ.	75				

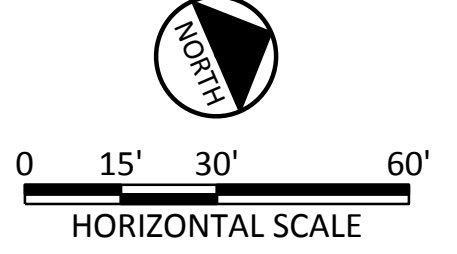


R3-4
24"x24"

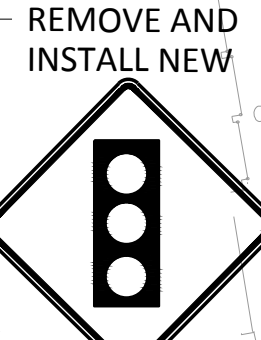


REMOVE AND
INSTALL NEW

STARWOOD PHASE ONE
 VILLAS OF STAR CREEK (VILLAGE 2)
 AND STAR RIDGE (VILLAGE 3)
 CABINET J, PAGE 196
 M.R.C.C.T.



LEGEND	
1	INSTALL BROKEN 4" WHITE LANE LINE
2	INSTALL ARROW (W) TYP.
3	INSTALL WORD (W) TYP.
4	INSTALL 8" WHITE TURN BAY LINE
5	INSTALL WHITE NUTRAL AREA CHANNELIZATION
6	INSTALL 24" STOP BAR
7	INSTALL 24"x6' WHITE LINE WITH 4' SPACE (CROSSWALK)



W3-3
36"x36"

STONE MANOR APARTMENTS
 LOT 1, BLOCK A
 C.C.C.F. #98-0112242

NOTES:

1. REFER TO PAVEMENT MARKING DETAIL SHEET FOR PAVEMENT MARKING INFORMATION INCLUDING REFLECTORS REQUIRED.
2. ALL SIGNS REMOVED TO BE RETURNED TO THE CITY OF FRISCO. CONTACT SALVADOR MARQUEZ AT 972-292-5831.
3. ALL EXISTING PAVEMENT MARKINGS IN CONFLICT WITH PROPOSED PAVEMENT MARKINGS SHALL BE REMOVED (NO SEPARATE PAY).
4. CONTRACTOR SHALL FIELD VERIFY SIGN LOCATIONS WITH CITY TRAFFIC ENGINEER PRIOR TO INSTALLATION.

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

05-01-2017

FREESE NICHOLS
 6136 Frisco Square Blvd, Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freese.com

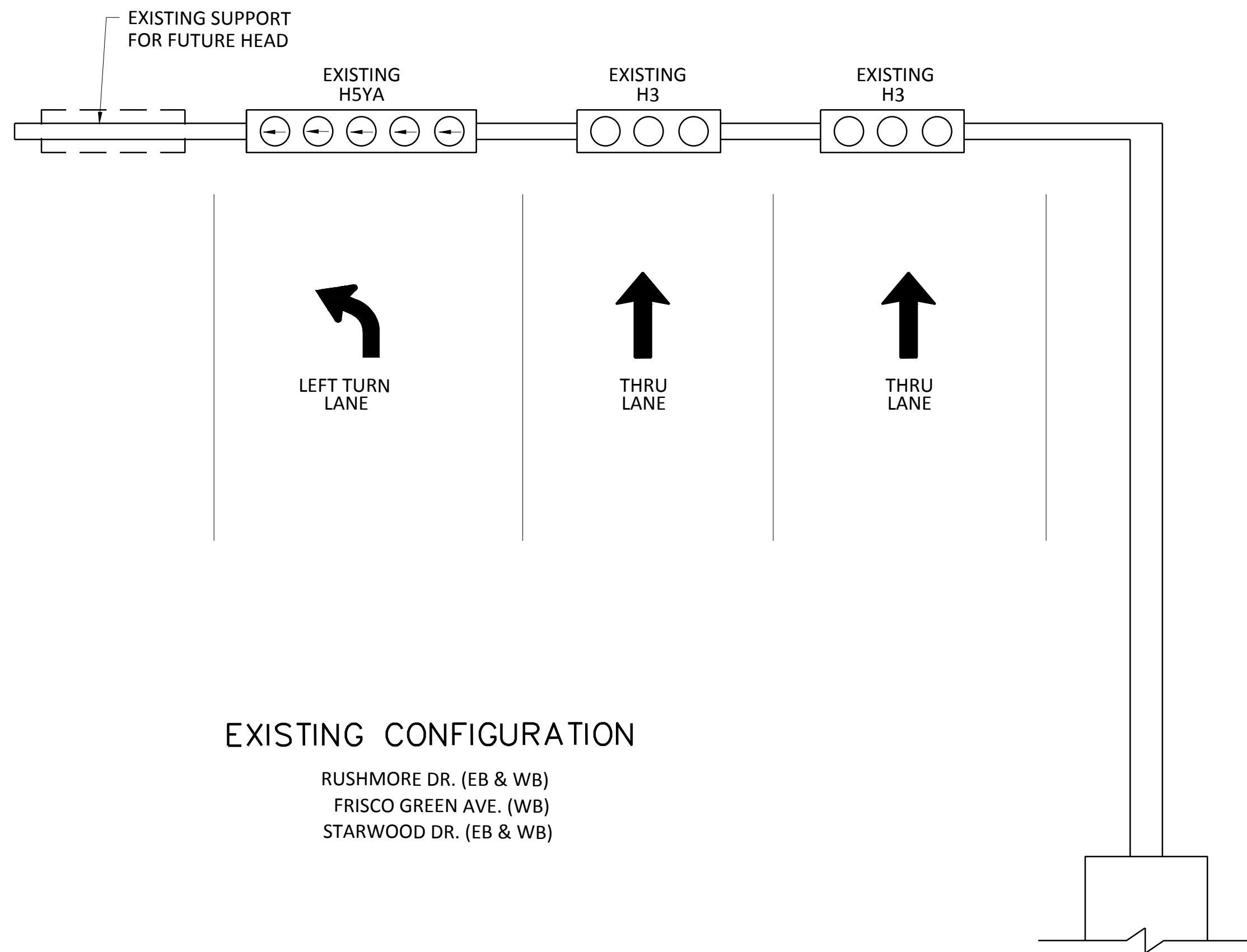
CITY OF FRISCO, TEXAS

LEBANON ROAD IMPROVEMENTS AND FORCE MAIN

CIVIL

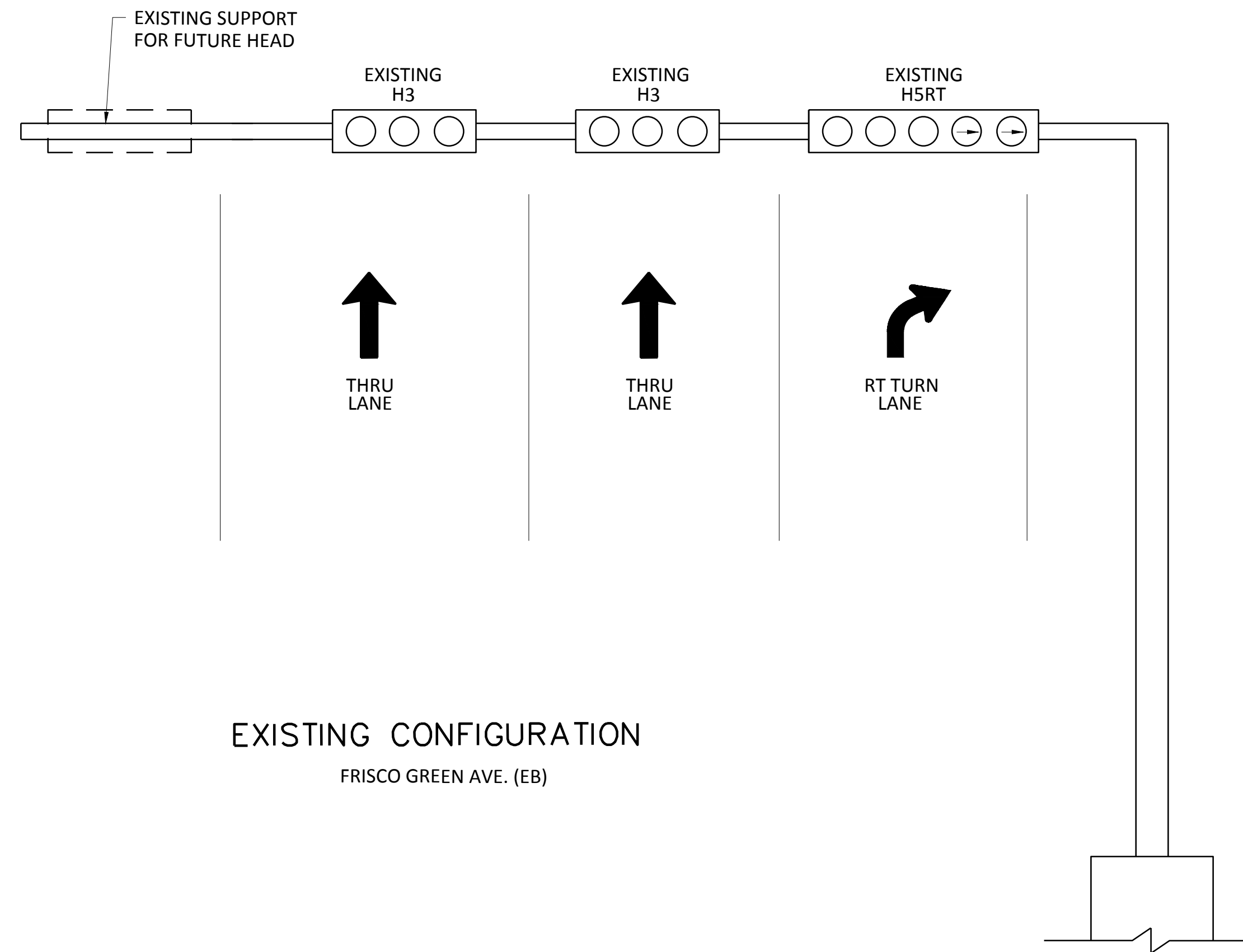
LEBANON ROAD PAVEMENT MARKING & SIGNAGE
 STA 49+00 TO END

NO.	ISSUE	BY	DATE	F&N JOB NO.	FRCL15624
				DATE	4/2017
				DESIGNED	AU
				DRAWN	SI
				REVISED	
				CHECKED	
				FILE NAME	cv-trt-pl-pvmrk08
VERIFY SCALE		Bar: is one inch on original drawing. If not one inch on this sheet, adjust scale.		1	
SHEET		PM-08			
SEQ.		76			



EXISTING CONFIGURATION

RUSHMORE DR. (EB & WB)
FRISCO GREEN AVE. (WB)
STARWOOD DR. (EB & WB)

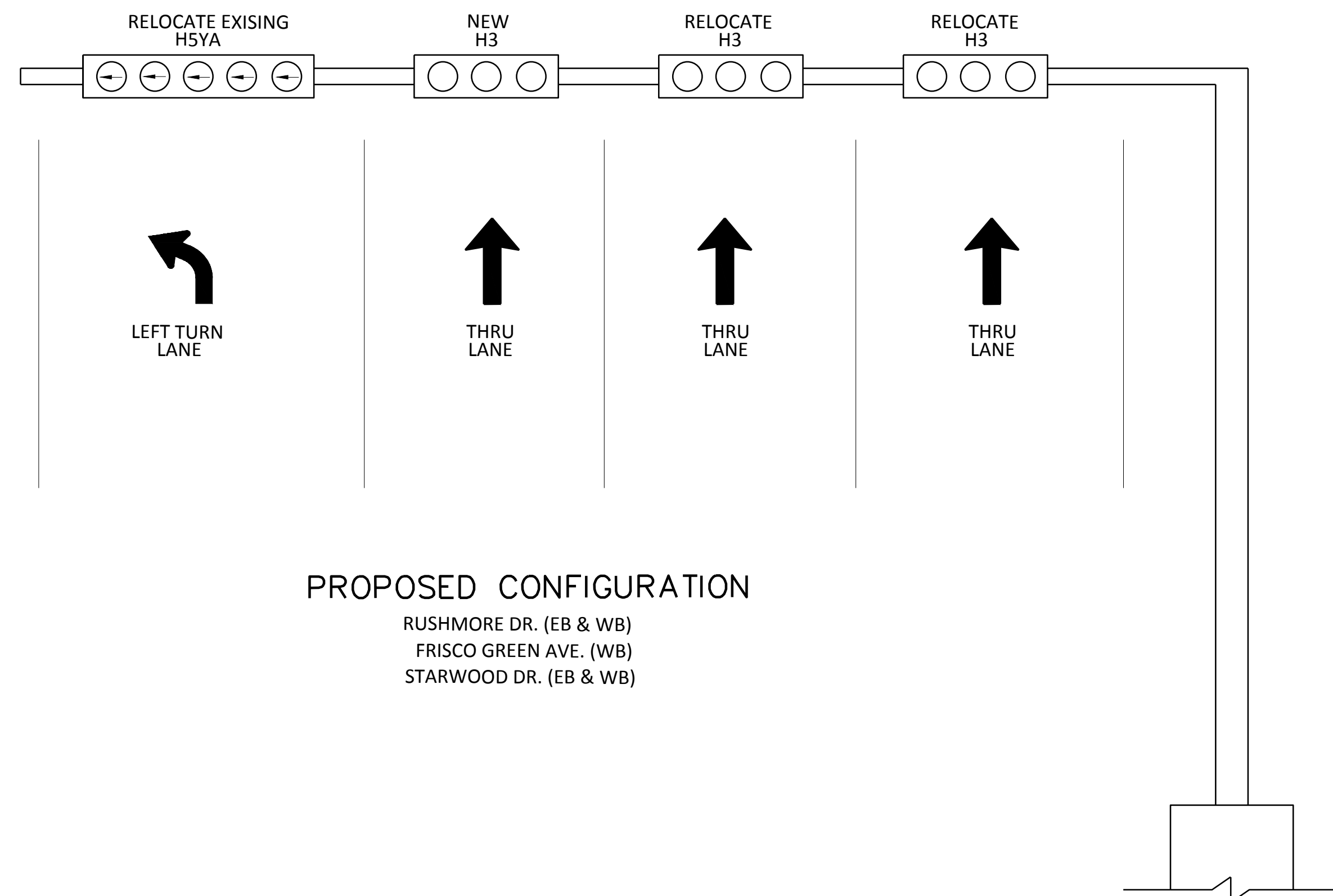


EXISTING CONFIGURATION

FRISCO GREEN AVE. (EB)

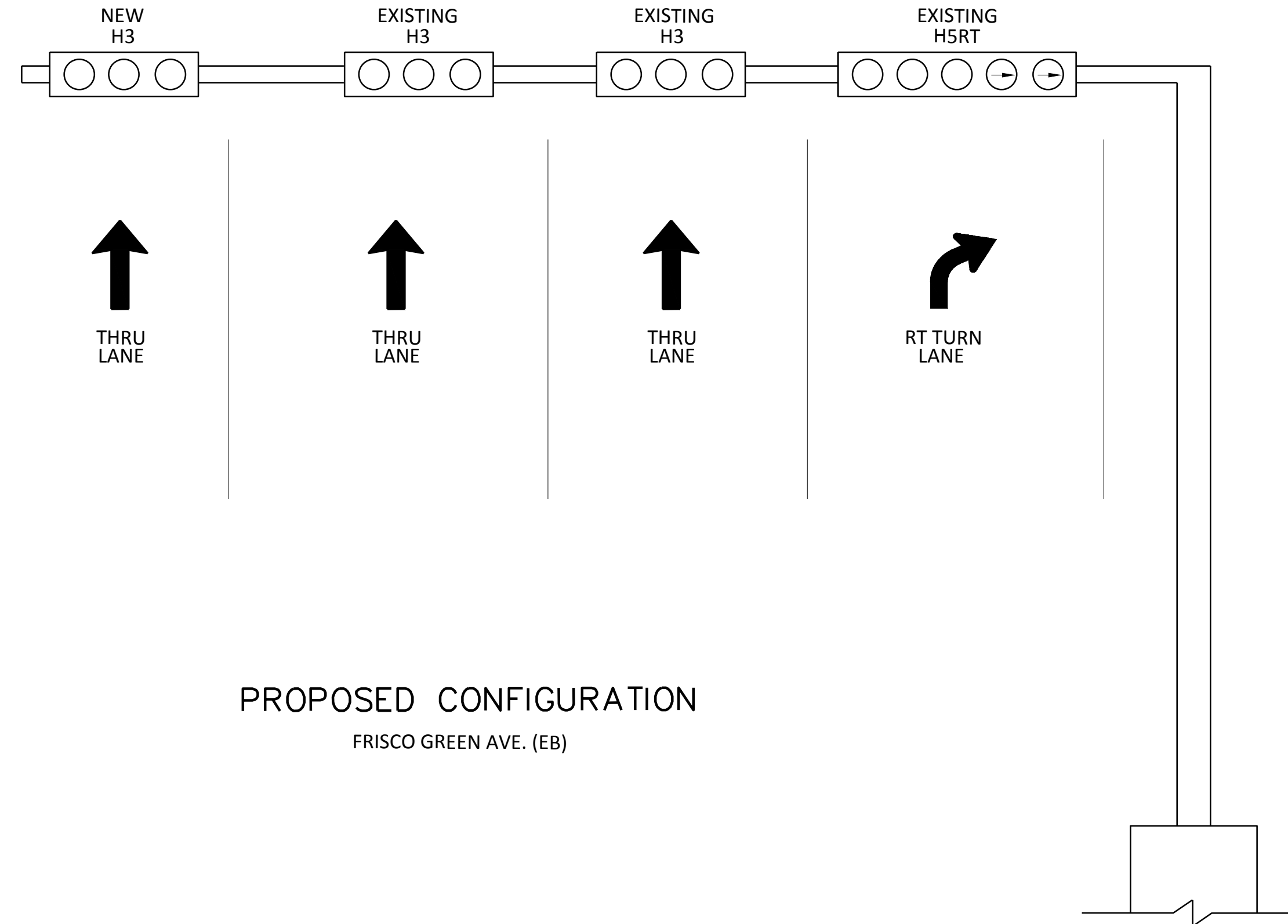
NOTES:

1. CONTRACTOR TO RELOCATE VIDEO DETECTION CAMERAS AS NEEDED WHEN LEFT TURN LANE IS MOVED TO SOUTH OR NORTH AT EACH SIGNALIZED INTERSECTION.
2. NEW 7 CONDUCTOR CABLE NEEDS TO BE PULLED FROM BOTTOM OF SIGNAL POLE TO NEW 5-SECTION SIGNAL HEAD AT RUSHMORE, FRISCO GREEN, AND STARWOOD.
3. RELOCATE 5-SECTION SIGNAL HEADS AND INSTALL NEW 3-SECTION SIGNAL HEAD. CITY TO PROVIDE SIGNAL HEADS AND LED'S. CONTRACTOR TO PROVIDE AND INSTALL SIGNAL HEAD MOUNTING HARDWARE.



PROPOSED CONFIGURATION

RUSHMORE DR. (EB & WB)
FRISCO GREEN AVE. (WB)
STARWOOD DR. (EB & WB)



PROPOSED CONFIGURATION

FRISCO GREEN AVE. (EB)

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



FREES & NICHOLS
6136 Frisco Square Blvd, Suite 200
Frisco, Texas 75034
Phone - (972) 624-9201
Fax - (972) 624-9202
Web - www.freese.com

CITY OF FRISCO, TEXAS
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN

CIVIL
**LEBANON ROAD
SIGNALIZATION DETAIL**

NO.	ISSUE	BY	DATE	FR&N JOB NO.	FRCL15624
0	VERIFY SCALE			DATE	4/2017
				DESIGNED	AU
				DRAWN	SI
				REVISION	
				CHECKED	
				FILE NAME	CV-FR-dt-SIGLOT-1

SHEET **PM-09**
SEQ. **77**

ACAD Ref: 2017 (LMS Tech)
Filename: N:\F\Drawings\cv-trt-dt-SIGLOT-1.dwg
Last Saved: 3/1/2017 11:27 AM. Saved By: sli

Version 1912

DOUBLE YELLOW LINE (PAVEMENT MARKINGS)

* RE: TxDOT PM(2)-10 DETAIL "B"

DOUBLE YELLOW LINE (BUTTONS, RAISED PAVEMENT MARKERS)

BROKEN WHITE LANE LINE

WHITE OR YELLOW EDGE LINE

LEFT TURN "PUPPY TRACKS"

LEFT TURN BAY LINE

* RE: TxDOT PM(4)-03 DETAIL "C"

RIGHT TURN BAY LINE

* RE: TxDOT PM(4)-03 DETAIL "C"

NOTES:

1. ALL STRIPING, ARROWS AND WORDS ON PAVEMENT SHALL BE THERMOPLASTIC UNLESS OTHERWISE NOTED IN PLANS.
2. REFER TO TECHNICAL SPECIFICATION 321723.

STANDARD CONSTRUCTION DETAIL
PAVEMENT MARKINGS AND MARKERS
SHEET 1 OF 2

SCALE: 1"=20'
 REVISED: MAR 2012
 T01

Version 1912

OPPOSING TRAFFIC GORE DETAIL

NEUTRAL AREA CHANNELIZATION

LANE DROP

NOTES:

1. REFER TO TxDOT PM(4)-03 DETAIL "A" FOR DIMENSION BETWEEN PAVEMENT MARKINGS AND MARKERS.
2. REFER TO TECHNICAL SPECIFICATION 321723.

STANDARD CONSTRUCTION DETAIL
PAVEMENT MARKINGS AND MARKERS
SHEET 2 OF 2

SCALE: 1"=20'
 REVISED: MAR 2012
 T02

Version 1912

NOTES:

1. ALL SIGNAGE SHALL BE IN ACCORDANCE WITH THE LATEST REVISIONS OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND THE STANDARD HIGHWAY SIGN DESIGN FOR TEXAS (SHSD).
2. LOCATIONS SHOWN FOR SIGNAGE ARE APPROXIMATE; FINAL LOCATIONS MAY CHANGE DUE TO POST CONSTRUCTION CONDITIONS AND PRESENCE OF OTHER PHYSICAL FEATURES. FINAL LOCATION OF ALL SIGNAGE SHALL BE FIELD VERIFIED WITH CITY PRIOR TO INSTALLATION.
3. ALL SIGNS SHALL BE DIAMOND GRADE INTENSITY AND THE SIZES SHALL BE STANDARD UNLESS OTHERWISE NOTED.
4. ALL TRAFFIC SIGNS, POSTS, AND MATERIALS SHALL BE INSTALLED PER DETAIL THIS SHEET.
5. FOR STOP SIGNS THAT WILL ACCEPT FUTURE STREET SIGNS, EXTEND POST ABOVE STOP SIGN SO THAT 2 HOLES ARE AVAILABLE FOR MOUNTING. FOR ALL OTHERS, POST SHALL NOT EXTEND ABOVE SIGN.
6. REFER TO TECHNICAL SPECIFICATION 344150 SMALL ROADSIDE SIGN SUPPORTS AND ASSEMBLIES.

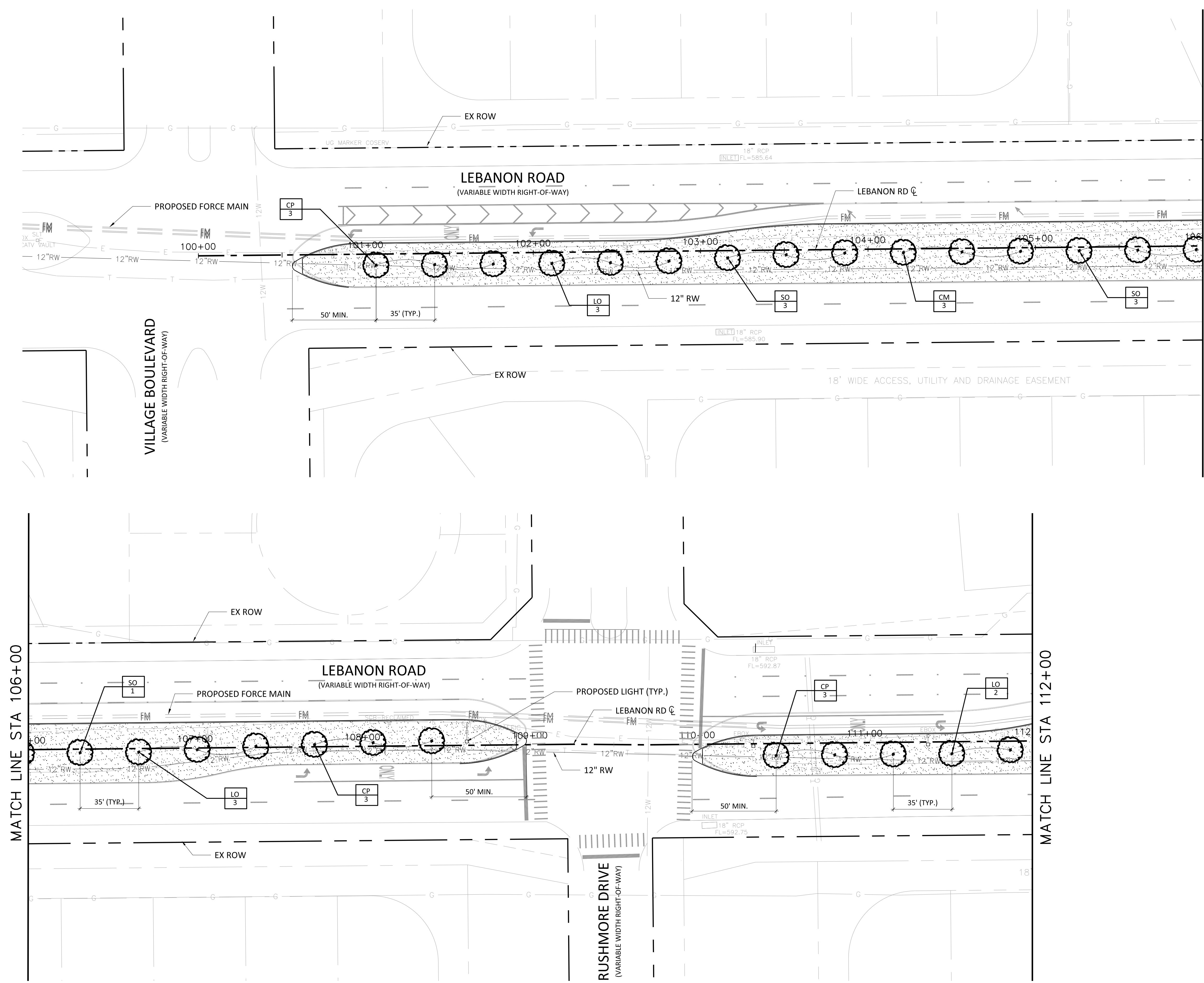
SIGN POST

STANDARD CONSTRUCTION DETAIL
SIGN POST

SCALE: 1"=1'
 REVISED: MAR 2012
 T04

NO.	ISSUE	DATE	BY	F&N JOB NO.	FRCL15624	DATE	4/2017	DESIGNED	AU	DRAWN	SI	REVISED	CHECKED	FILE NAME	CV-FT-DT-PM01
<p>Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.</p> <p>VERIFY SCALE 1</p>															
SHEET PM01-01															
SEQ. 78															

ACAD Ref: 20.0s (LMS Tech)
 Filename: N:\LA\Drawings\L-RD-PL-Plant1.dwg
 Last Saved: 5/1/2017 2:10 PM Saved By: 02589



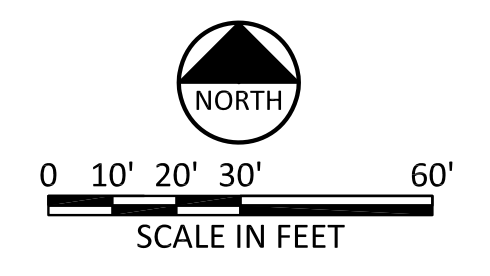
MATCH LINE STA 106+00

MATCH LINE STA 106+00

MATCH LINE STA 112+00

- NOTES:**
- REFER TO SHEET LA-09 FOR PLANTING DETAILS, AND SHEET LA-10 FOR DESCRIPTIONS AND SPECIES INFORMATION.
 - ALL TREES TO BE CENTERED IN MEDIAN.
 - NOTIFY LANDSCAPE ARCHITECT OF ANY DISCREPANCIES BETWEEN FIELD CONDITIONS AND DIMENSIONS SHOWN.
 - WRITTEN DIMENSIONS SHALL GOVERN OVER SCALED DRAWINGS.

- LEGEND**
- SOLID TURF GRASS
 - STREET / ORNAMENTAL TREES
 - TREE SPECIES ABBREVIATION (SEE PLANT LIST SHEET LA-10 FOR PLANT DESCRIPTIONS)
 - QUANTITY



Freese and Nichols, Inc.
 Texas Registered Engineering Firm F-2444

MATTHEW L. NICHOLS
 05/01/2017

FREES NICHOLS

6136 Frisco Square Blvd, Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freese.com

CITY OF FRISCO, TEXAS

LANDSCAPE ARCHITECTURE

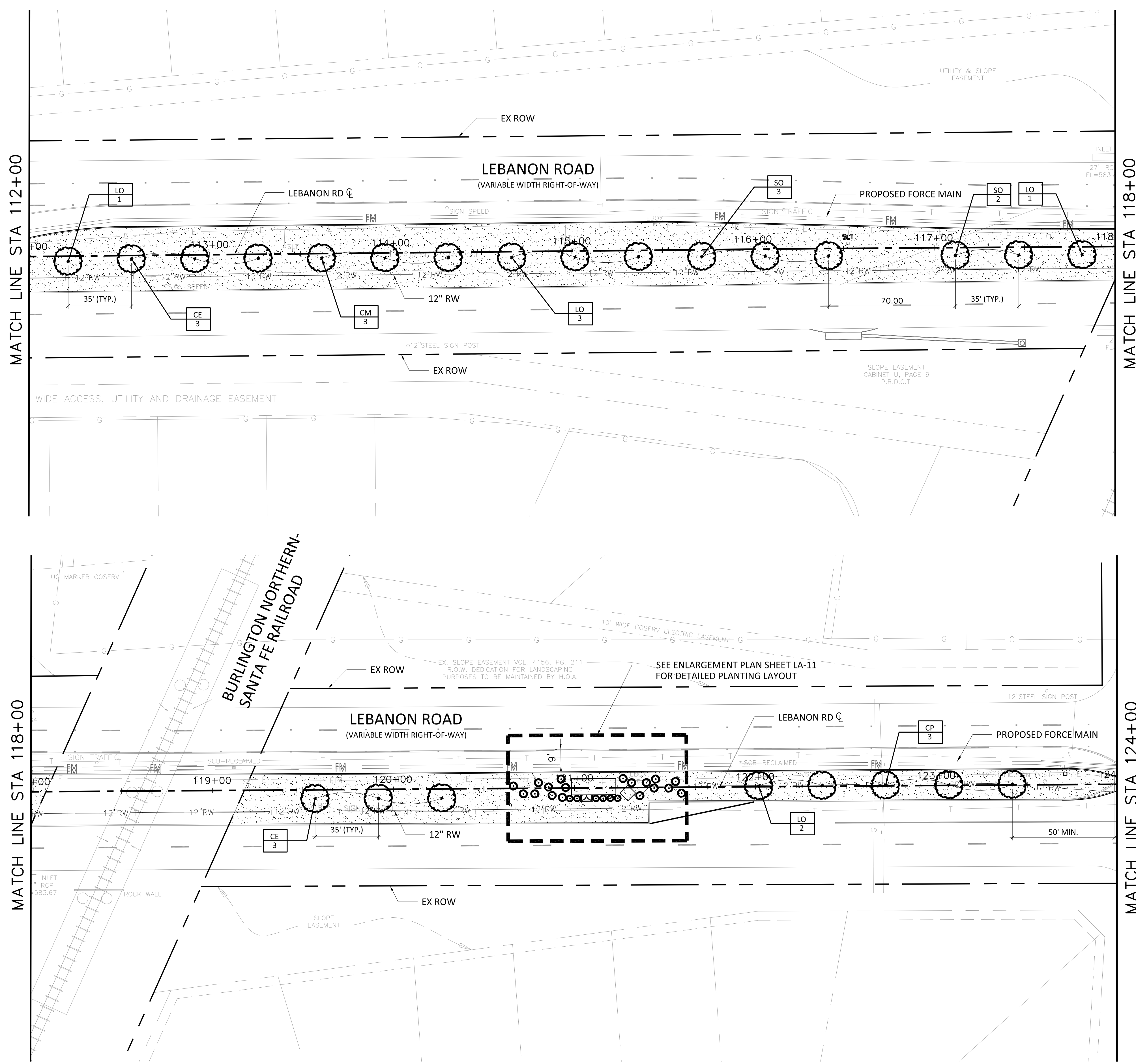
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN

LEBANON ROAD PLANTING PLAN

BEGIN TO STA 112+00

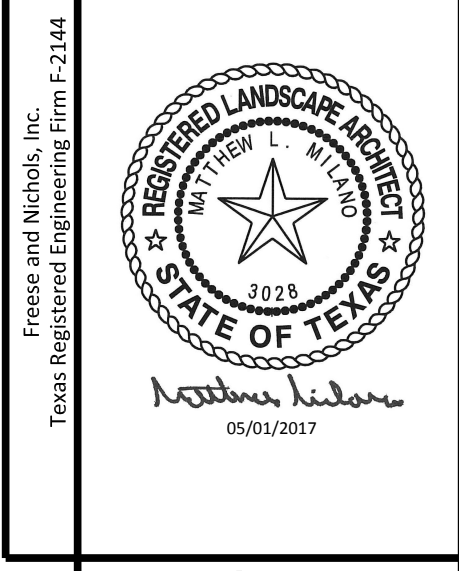
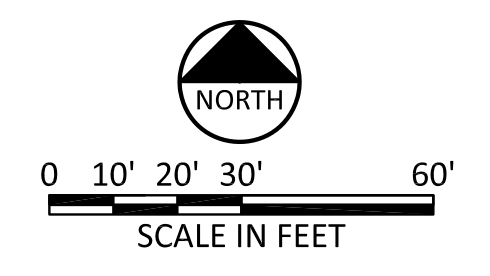
NO.	ISSUE	BY	DATE	FRAN JOB NO.	DATE	DESIGNED	DRAWN	REVISION	CHECKED	FILE NAME
				FRCL15624	4/2017	M/LM	YC		HH	L-RD-PL-Plant1
VERIFY SCALE: Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.										
SCALE IN FEET: 0 10' 20' 30' 60'										
										SHEET
										LA-01
										SEQ.
										79

ACAD Ref: 20.0s (LMS Tech)
 Filename: N:\LA\Drawings\L-RD-PL-Plant2.dwg
 Last Saved: 5/1/2017 2:10 PM Saved By: 02589



- NOTES:
- REFER TO SHEET LA-09 FOR PLANTING DETAILS, AND SHEET LA-10 FOR DESCRIPTIONS AND SPECIES INFORMATION.
 - ALL TREES TO BE CENTERED IN MEDIAN.
 - NOTIFY LANDSCAPE ARCHITECT OF ANY DISCREPANCIES BETWEEN FIELD CONDITIONS AND DIMENSIONS SHOWN.
 - WRITTEN DIMENSIONS SHALL GOVERN OVER SCALED DRAWINGS.

- LEGEND
- SOLID TURF GRASS
 - STREET / ORNAMENTAL TREES
 - TREE SPECIES ABBREVIATION (SEE PLANT LIST SHEET LA-10 FOR PLANT DESCRIPTIONS)
 - QUANTITY



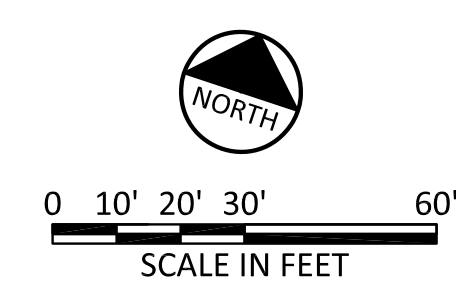
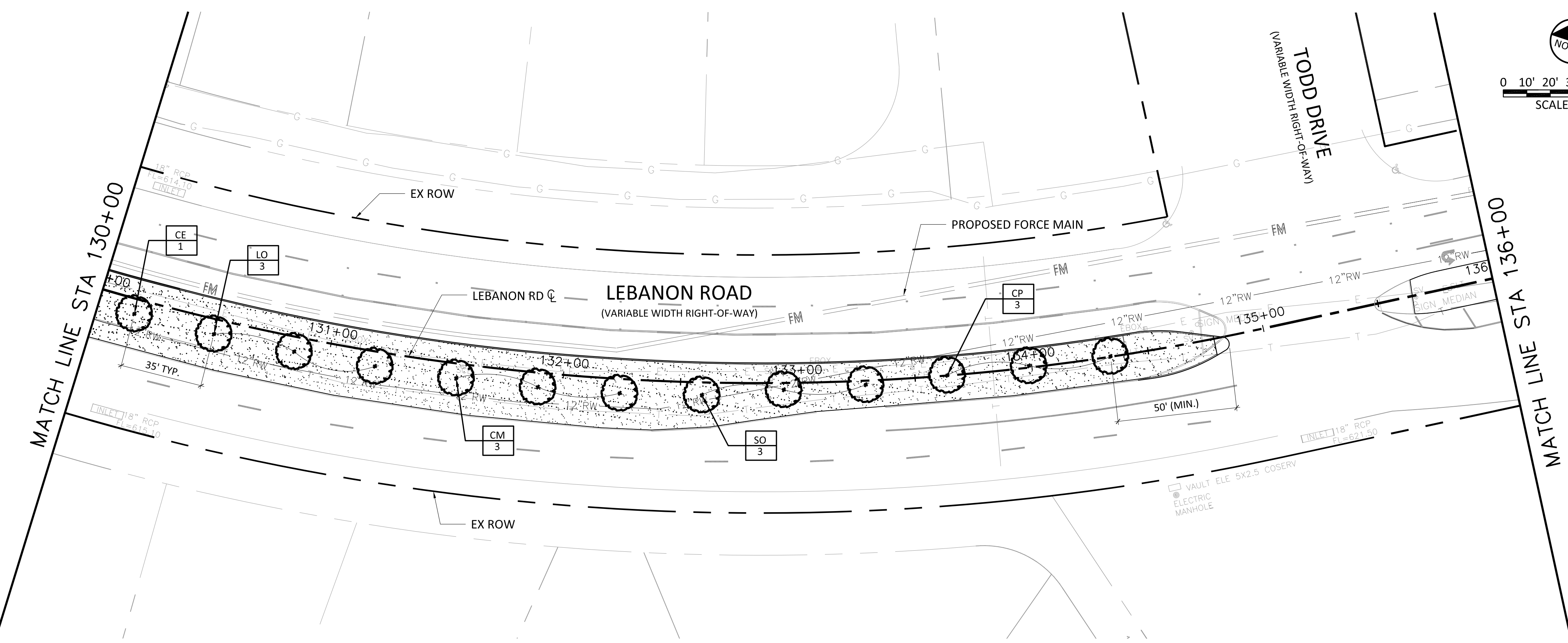
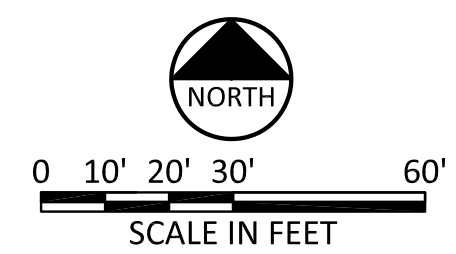
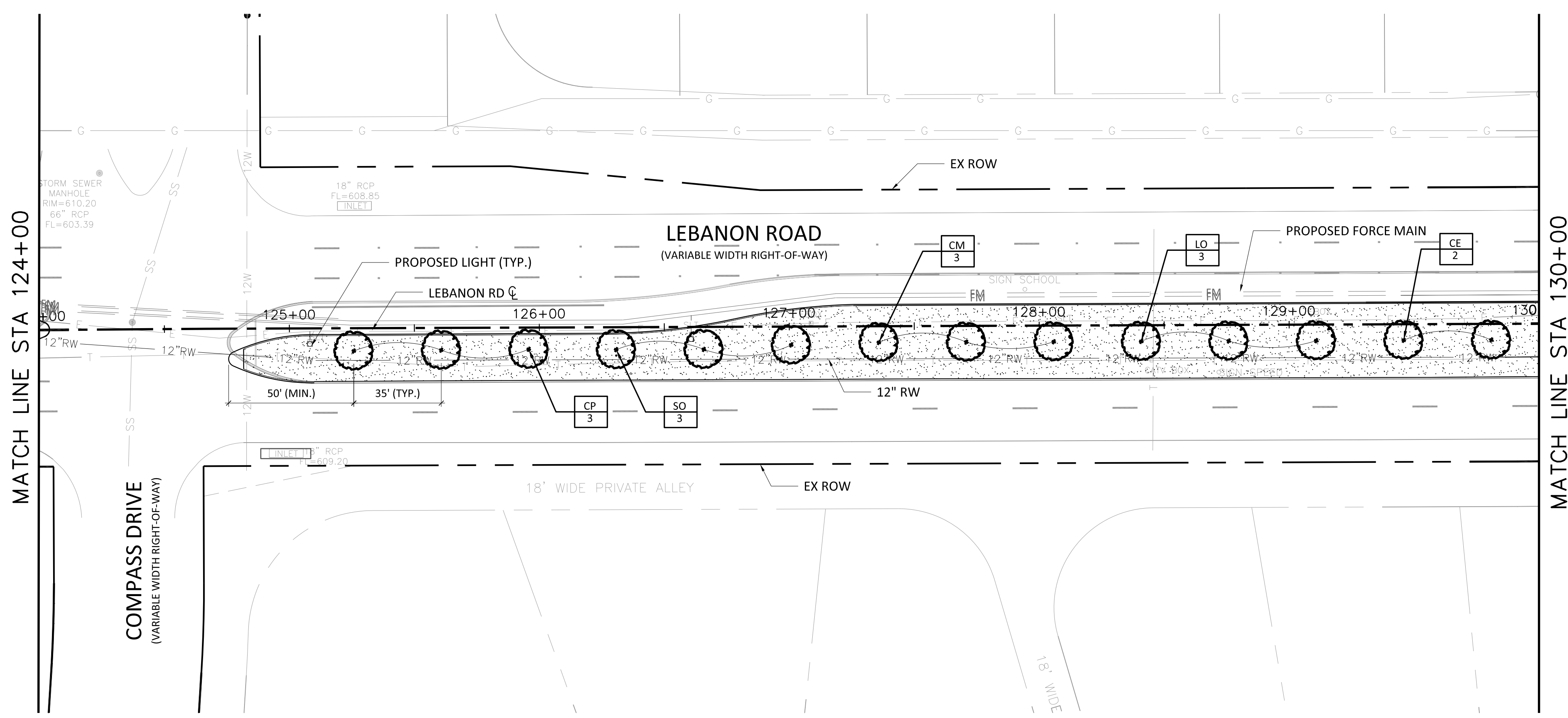
FREESSE NICHOLS
 6136 Frisco Square Blvd., Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freesse.com

CITY OF FRISCO, TEXAS
 LANDSCAPE ARCHITECTURE
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
LEBANON ROAD PLANTING PLAN
STA 112+00 TO STA 124+00

NO.	ISSUE	BY	DATE	F&N JOB NO.	FRCL15624
				DATE	4/2017
				DESIGNED	MLM
				DRAWN	YC
				REVISED	
				CHECKED	HH
				FILE NAME	L-RD-PL-Plant2
VERIFY SCALE	0				
Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.					
SHEET	LA-02				
SEQ.	80				

ACAD Ref: 20.0s (LMS Tech)
 Filename: N:\LA\Drawings\L-RD-PL-Plant3.dwg
 Last Saved: 5/1/2017 2:24 PM Saved By: 02589

Plot Date: 5/1/2017 2:24 PM Plot By: 02589 Filename: N:\LA\Drawings\L-RD-PL-Plant3.dwg

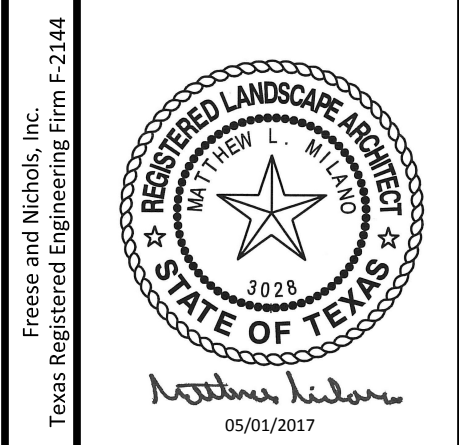


NOTES:

1. REFER TO SHEET LA-09 FOR PLANTING DETAILS, AND SHEET LA-10 FOR DESCRIPTIONS AND SPECIES INFORMATION.
2. ALL TREES TO BE CENTERED IN MEDIAN.
3. NOTIFY LANDSCAPE ARCHITECT OF ANY DISCREPANCIES BETWEEN FIELD CONDITIONS AND DIMENSIONS SHOWN.
4. WRITTEN DIMENSIONS SHALL GOVERN OVER SCALED DRAWINGS.

LEGEND

- SOLID TURF GRASS
- STREET / ORNAMENTAL TREES
- TREE SPECIES ABBREVIATION (SEE PLANT LIST SHEET LA-10 FOR PLANT DESCRIPTIONS)
- QUANTITY



FREESSE NICHOLS
 LANDSCAPE ARCHITECTURE
 6136 Frisco Square Blvd., Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freesc.com

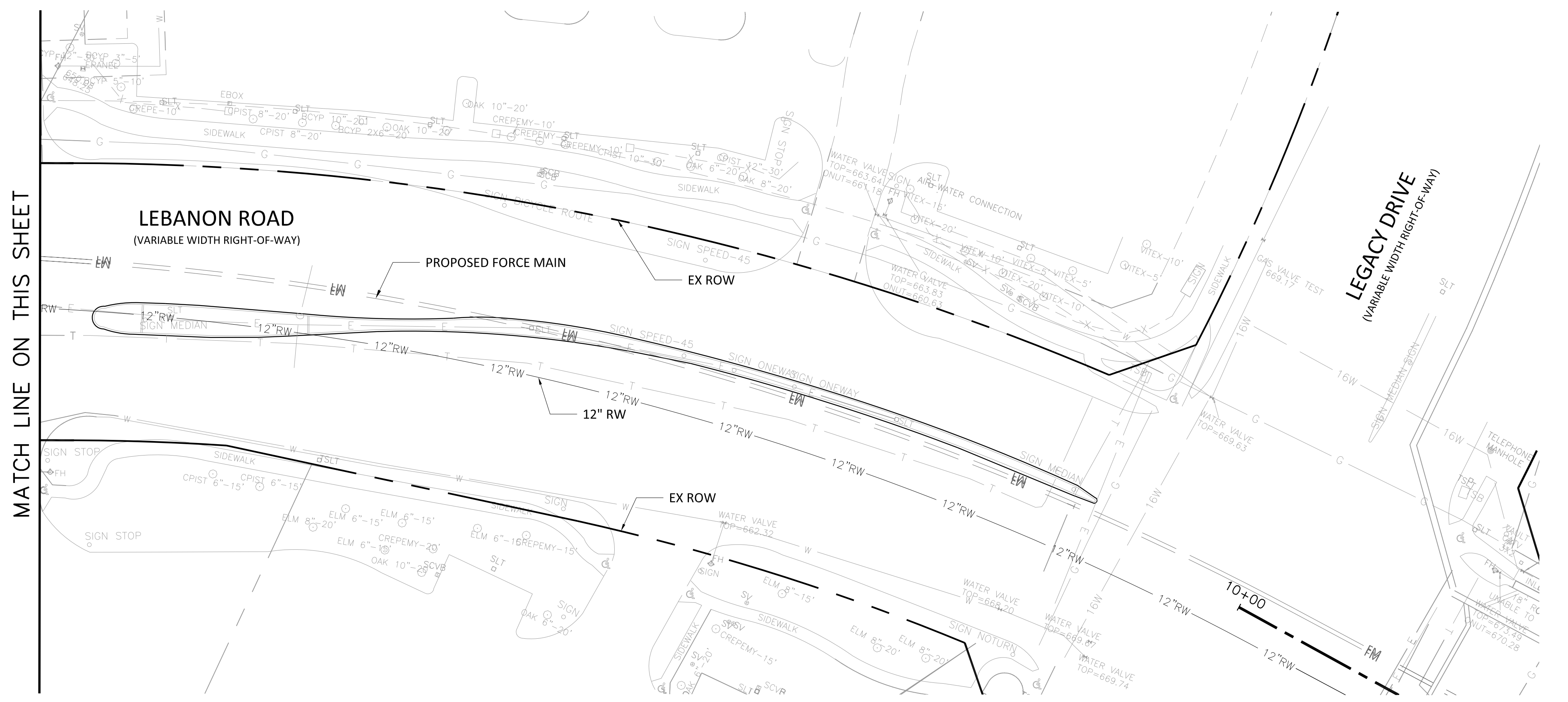
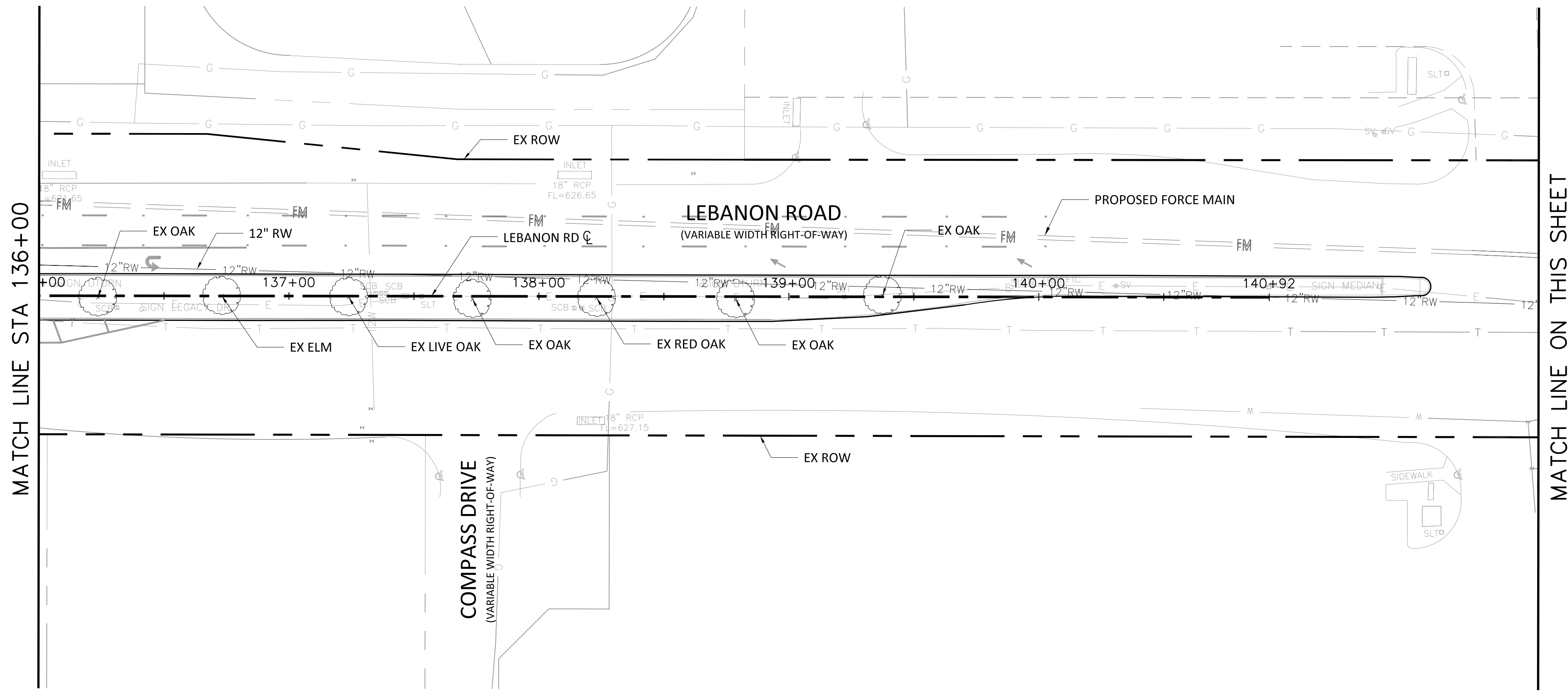
CITY OF FRISCO, TEXAS
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
 LANDSCAPE ARCHITECTURE
LEBANON ROAD PLANTING PLAN
 STA 124+00 TO STA 136+00

NO.	ISSUE	DATE	BY	FRN JOB NO.	DATE	DESIGNED	DRAWN	REVISION	CHECKED	FILE NAME
				FRCL15624	4/2017	M/LM	YC		HH	L-RD-PL-Plant3

SHEET **LA-03**
 SEQ. **81**

ACAD Ref: 20.0s (LMS Tech)
 Filename: N:\LA\Drawings\L-RD-PL-Plant4.dwg
 Last Saved: 5/1/2017 2:12 PM Saved By: 02589

Plot Date: 5/1/2017 2:12 PM Plot By: 02589 Filename: N:\LA\Drawings\L-RD-PL-Plant4.dwg





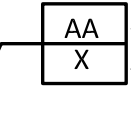

MATCH LINE ON THIS SHEET

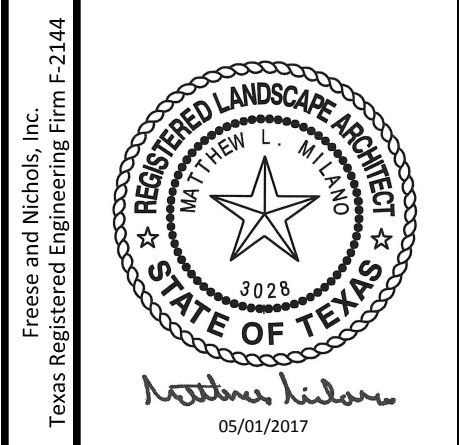
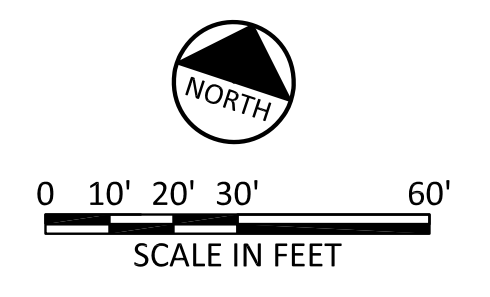
MATCH LINE ON THIS SHEET

NOTES:

1. REFER TO SHEET LA-09 FOR PLANTING DETAILS, AND SHEET LA-10 FOR DESCRIPTIONS AND SPECIES INFORMATION.
2. ALL TREES TO BE CENTERED IN MEDIAN.
3. NOTIFY LANDSCAPE ARCHITECT OF ANY DISCREPANCIES BETWEEN FIELD CONDITIONS AND DIMENSIONS SHOWN.
4. WRITTEN DIMENSIONS SHALL GOVERN OVER SCALED DRAWINGS.

LEGEND

-  SOLID TURF GRASS
-  STREET / ORNAMENTAL TREES
-  TREE SPECIES ABBREVIATION (SEE PLANT LIST SHEET LA-10 FOR PLANT DESCRIPTIONS)
-  QUANTITY



FREESSE NICHOLS
 6136 Frisco Square Blvd, Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freesse.com

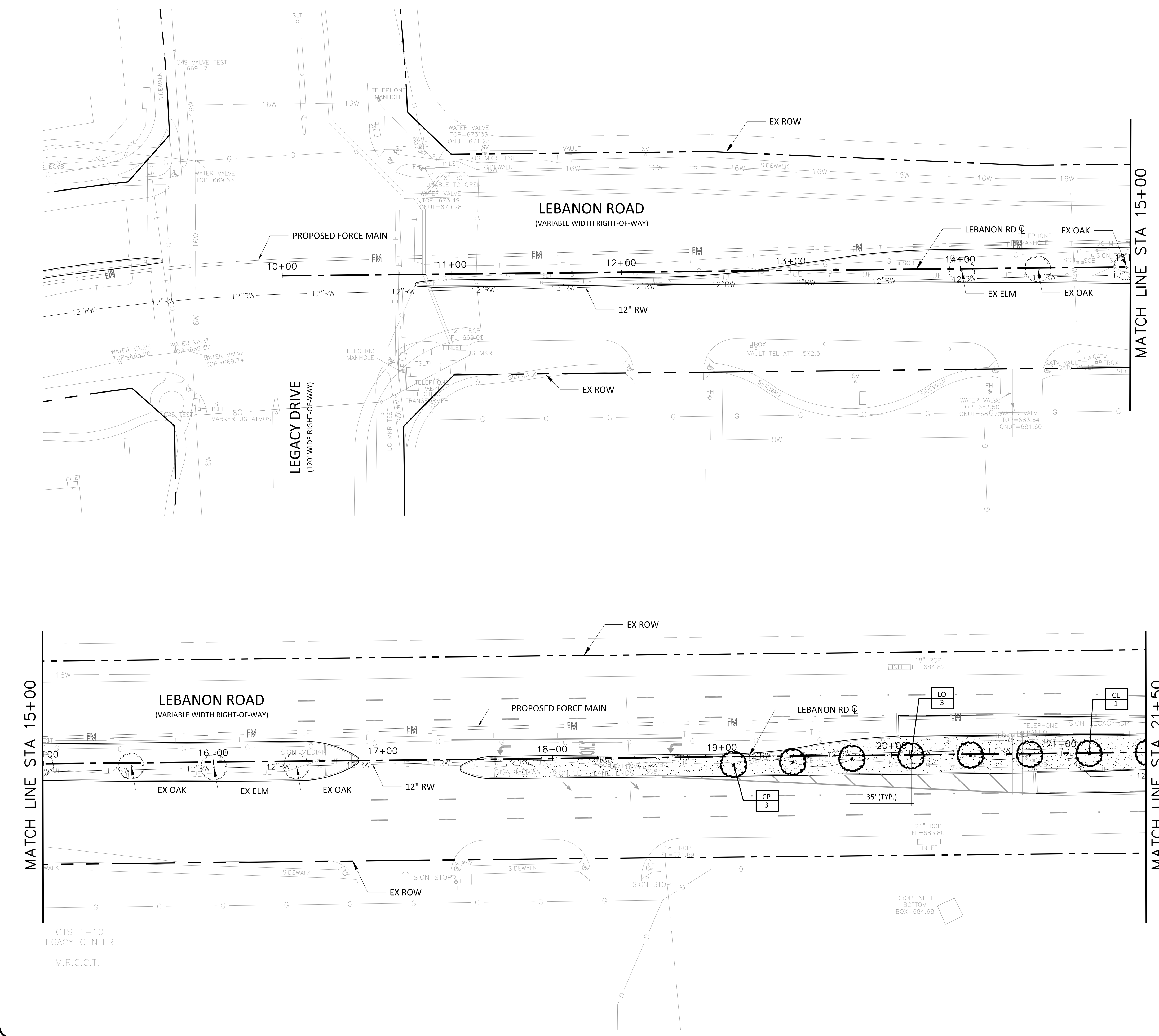
CITY OF FRISCO, TEXAS
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
 LANDSCAPE ARCHITECTURE
LEBANON ROAD PLANTING PLAN
STA 1136+00 TO PHASE 1 BEGIN

NO.	ISSUE	BY	DATE	FRAN JOB NO.	DATE	DESIGNED	DRAWN	REVISION	CHECKED	FILE NAME
				FRCL15624	4/2017	MLM	YC		HH	L-RD-PL-Plant4

VERIFY SCALE: 1" = 10' (Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.)

SHEET **LA-04**
SEQ. **82**

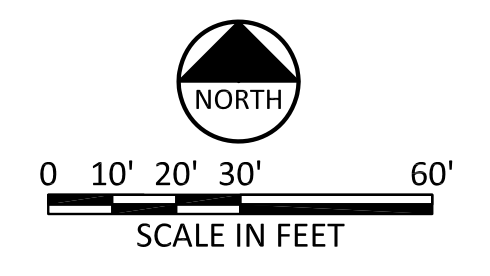
ACAD Ref: 20.0s (LMS Tech)
 Filename: N:\LA\Drawings\L-RD-PL-Plant5.dwg
 Last Saved: 5/1/2017 2:13 PM Saved By: 02589



- NOTES:
- REFER TO SHEET LA-09 FOR PLANTING DETAILS, AND SHEET LA-10 FOR DESCRIPTIONS AND SPECIES INFORMATION.
 - ALL TREES TO BE CENTERED IN MEDIAN.
 - NOTIFY LANDSCAPE ARCHITECT OF ANY DISCREPANCIES BETWEEN FIELD CONDITIONS AND DIMENSIONS SHOWN.
 - WRITTEN DIMENSIONS SHALL GOVERN OVER SCALED DRAWINGS.

LEGEND

- SOLID TURF GRASS
- STREET / ORNAMENTAL TREES
- TREE SPECIES ABBREVIATION (SEE PLANT LIST SHEET LA-10 FOR PLANT DESCRIPTIONS)
- QUANTITY



Freese and Nichols, Inc.
 Texas Registered Engineering Firm F-2444

FREES NICHOLS

6136 Frisco Square Blvd., Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freese.com

CITY OF FRISCO, TEXAS

LANDSCAPE ARCHITECTURE

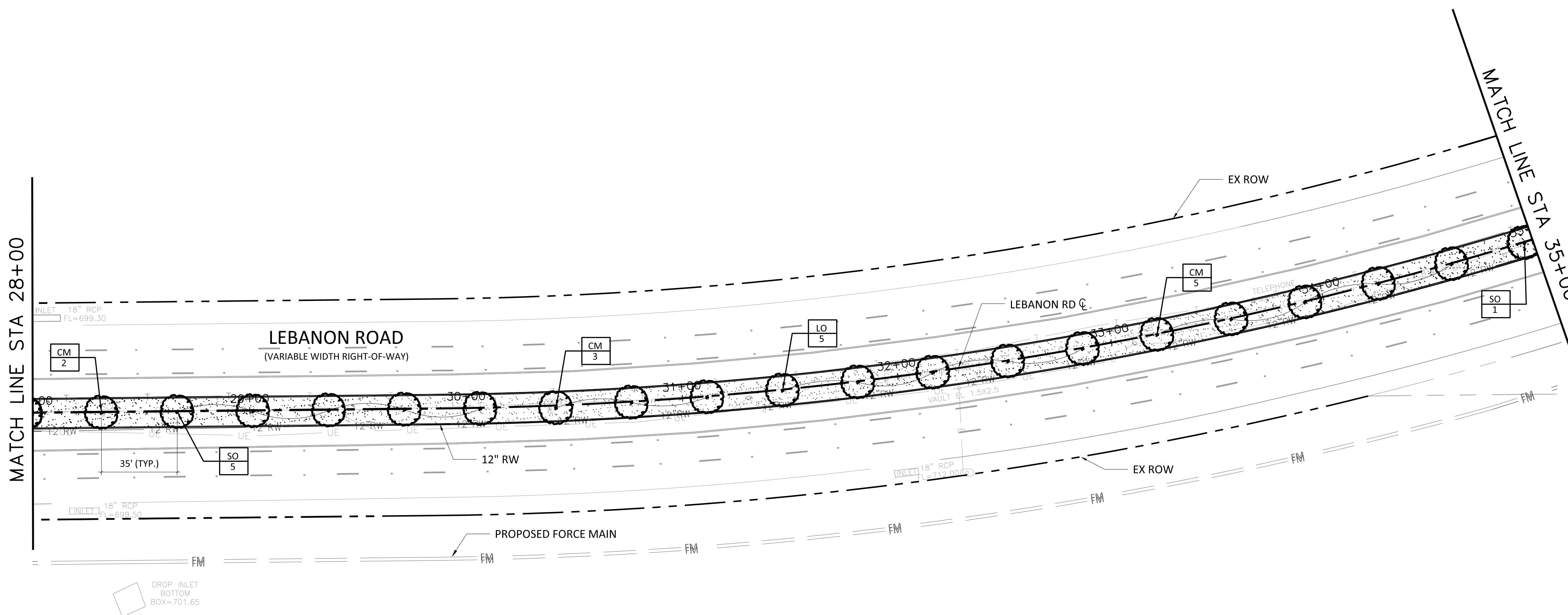
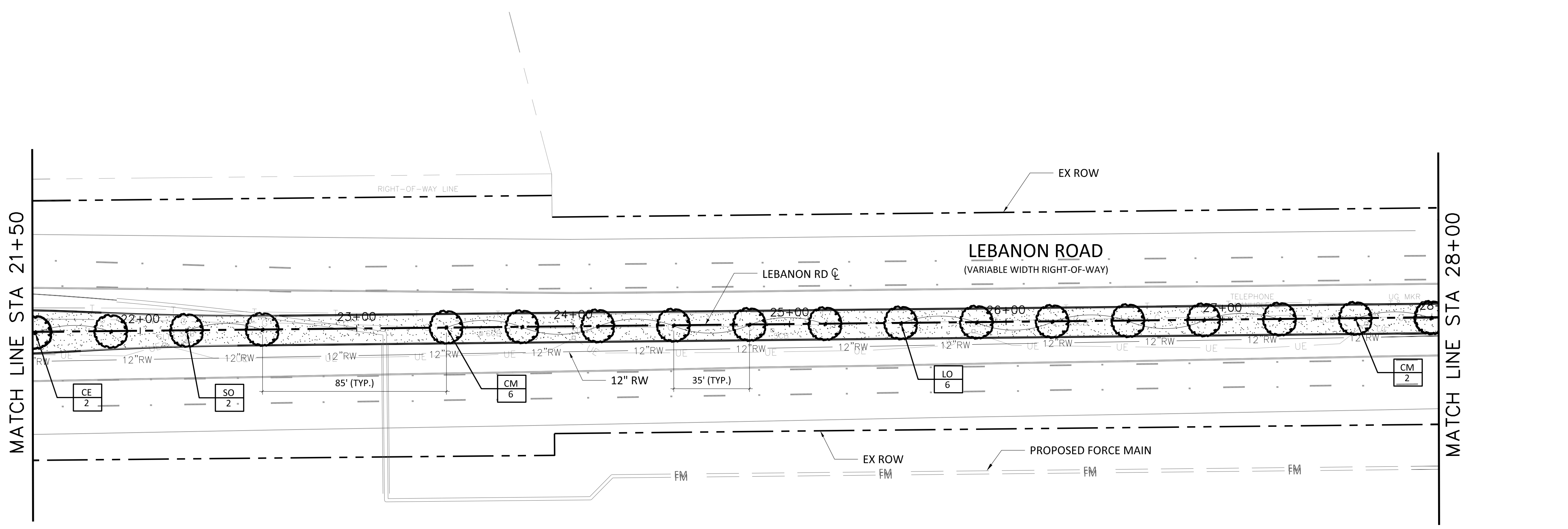
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN

LEBANON ROAD PLANTING PLAN

PHASE 1 BEGIN TO STA 21+50

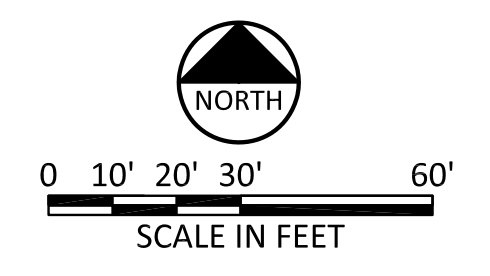
NO.	ISSUE	BY	DATE	FRN JOB NO.	DATE	DESIGNED	DRAWN	REVISION	CHECKED	FILE NAME
				FRCL15624	4/2017	M/LM	Y/C		HH	L-RD-PL-Plant5
VERIFY SCALE: 1" = 10' (original drawing, if not one inch on this sheet, adjust scale.)										
SHEET										LA-05
SEQ.										83

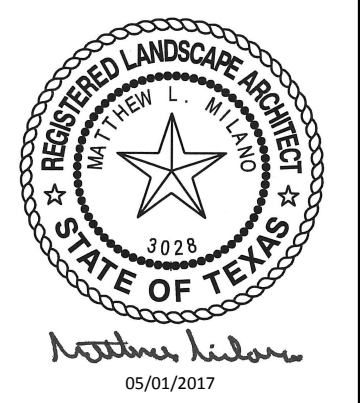
NO.	ISSUE	BY	DATE	FRAN JOB NO.	FRCL15624
			4/2017	DESIGNED	MLM
				DRAWN	YC
				REVISED	HH
				CHECKED	HH
				FILE NAME	L-RD-PL-Plant6
VERIFY SCALE				Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.	
SCALE				1	
SHEET				LA-06	
SEQ.				84	



- NOTES:
- REFER TO SHEET LA-09 FOR PLANTING DETAILS, AND SHEET LA-10 FOR DESCRIPTIONS AND SPECIES INFORMATION.
 - ALL TREES TO BE CENTERED IN MEDIAN.
 - NOTIFY LANDSCAPE ARCHITECT OF ANY DISCREPANCIES BETWEEN FIELD CONDITIONS AND DIMENSIONS SHOWN.
 - WRITTEN DIMENSIONS SHALL GOVERN OVER SCALED DRAWINGS.

- LEGEND
- SOLID TURF GRASS
 - STREET / ORNAMENTAL TREES
 - TREE SPECIES ABBREVIATION (SEE PLANT LIST SHEET LA-10 FOR PLANT DESCRIPTIONS)
 - QUANTITY



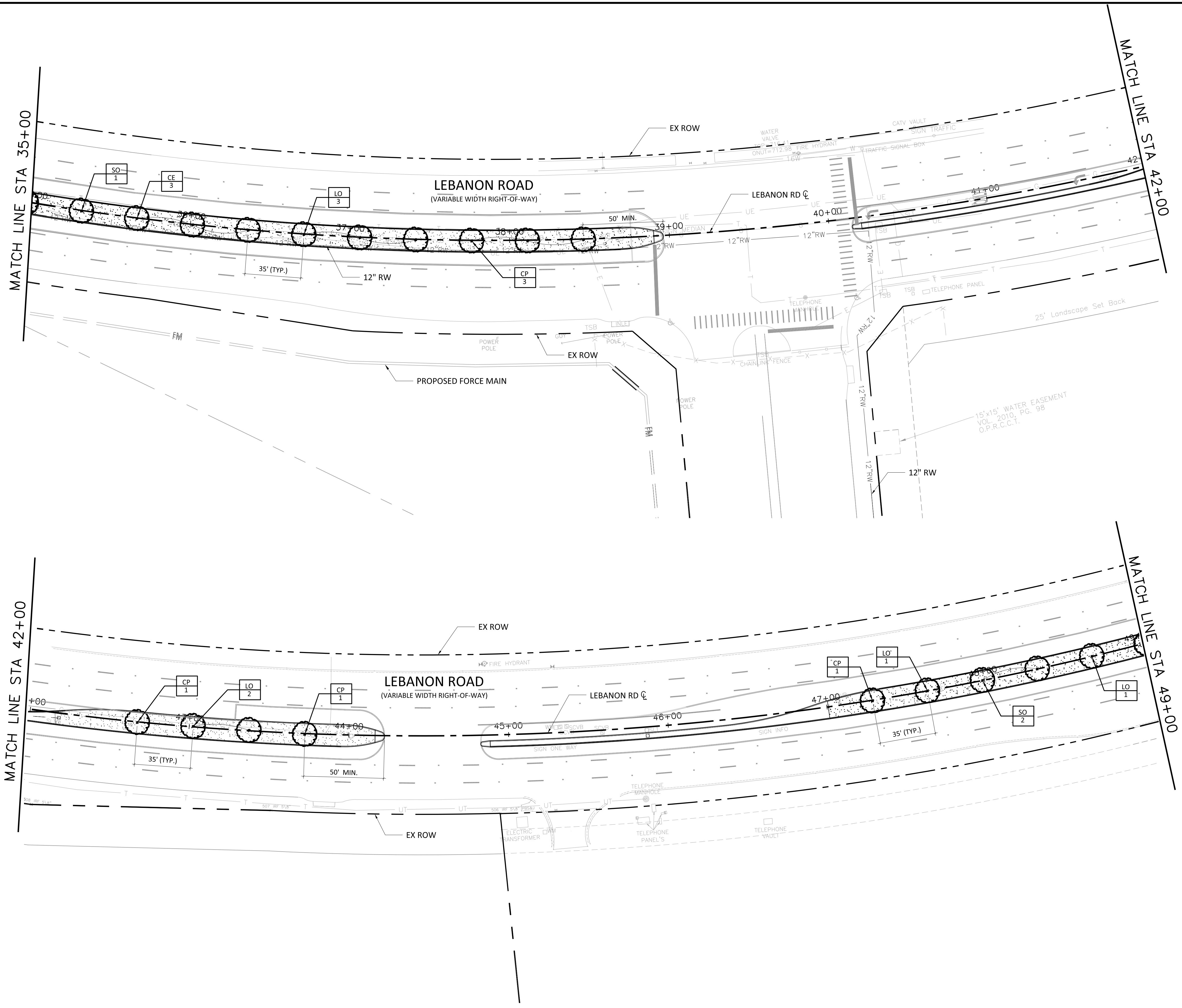


NO.	ISSUE	BY	DATE	FRJ JOB NO.	FRCL5624
0	VERIFY SCALE			DATE	4/2017
1	Bar is one inch on original drawing, if not one inch on this sheet, adjust scale.			DESIGNED	MLM
				DRAWN	EAF
				REVISION	
				CHECKED	HH
				FILE NAME	L-RD-PL-Plant7
SHEET	LA-07				
SEQ.	85				

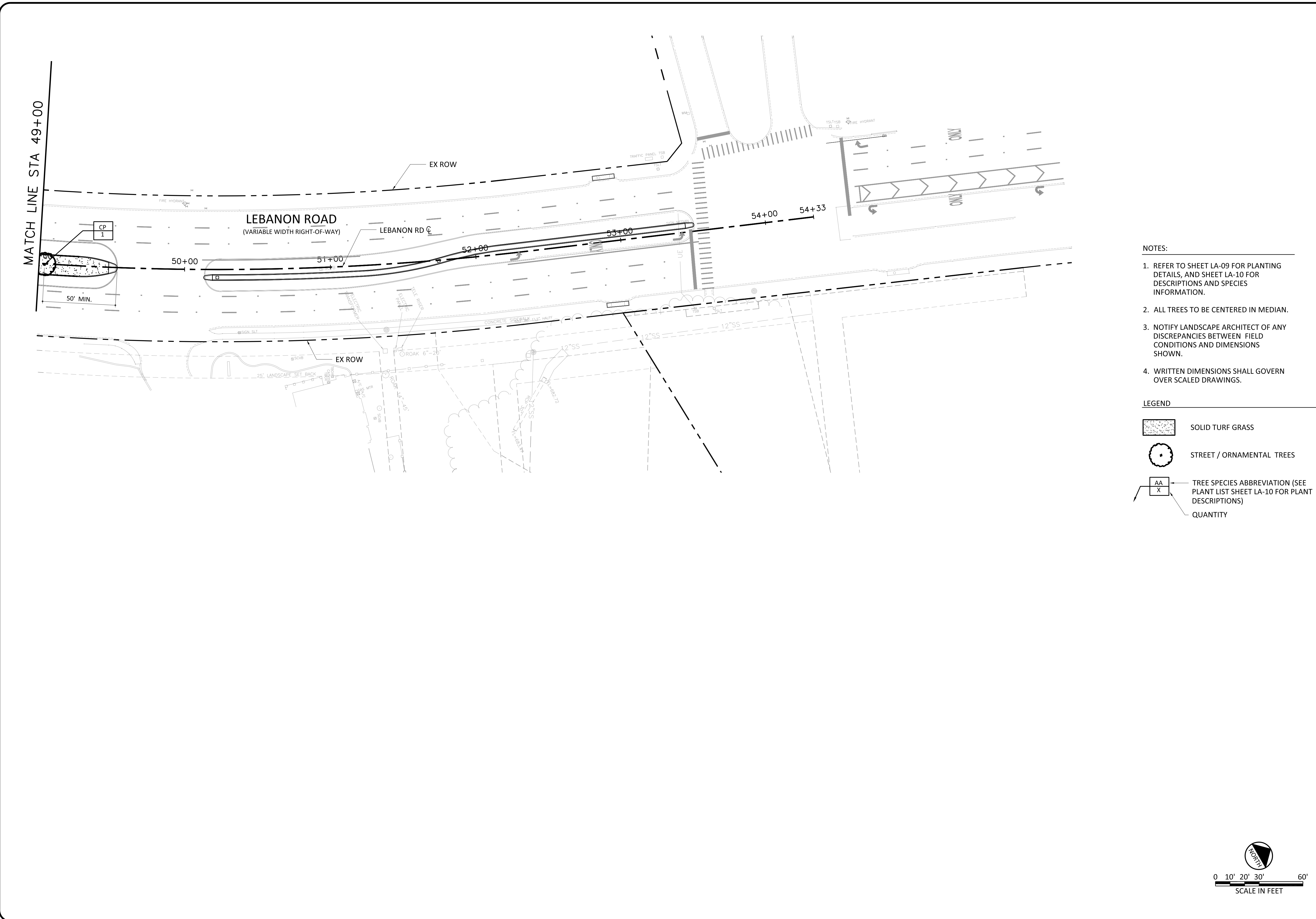
- NOTES:
- REFER TO SHEET LA-09 FOR PLANTING DETAILS, AND SHEET LA-10 FOR DESCRIPTIONS AND SPECIES INFORMATION.
 - ALL TREES TO BE CENTERED IN MEDIAN.
 - NOTIFY LANDSCAPE ARCHITECT OF ANY DISCREPANCIES BETWEEN FIELD CONDITIONS AND DIMENSIONS SHOWN.
 - WRITTEN DIMENSIONS SHALL GOVERN OVER SCALED DRAWINGS.

LEGEND

- SOLID TURF GRASS
- STREET / ORNAMENTAL TREES
- TREE SPECIES ABBREVIATION (SEE PLANT LIST SHEET LA-10 FOR PLANT DESCRIPTIONS)
- QUANTITY

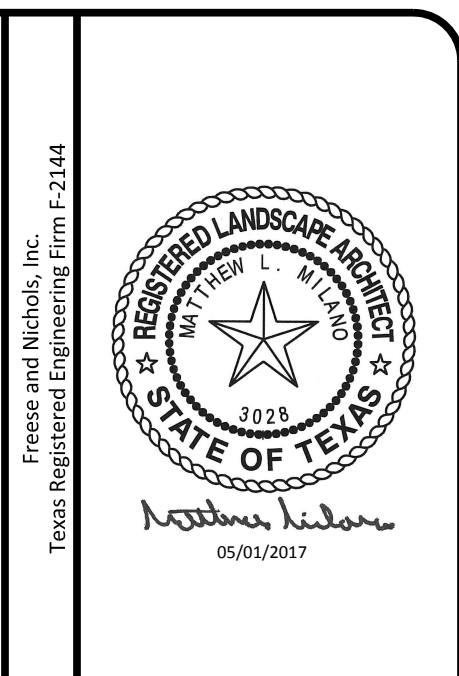
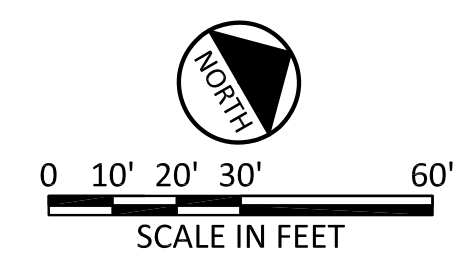


ACAD Ref: 20.0s (LMS Tech)
 Filename: N:\LA\Drawings\L-RD-PL-Plant8.dwg
 Last Saved: 5/1/2017 2:21 PM Saved By: 02589



- NOTES:
1. REFER TO SHEET LA-09 FOR PLANTING DETAILS, AND SHEET LA-10 FOR DESCRIPTIONS AND SPECIES INFORMATION.
 2. ALL TREES TO BE CENTERED IN MEDIAN.
 3. NOTIFY LANDSCAPE ARCHITECT OF ANY DISCREPANCIES BETWEEN FIELD CONDITIONS AND DIMENSIONS SHOWN.
 4. WRITTEN DIMENSIONS SHALL GOVERN OVER SCALED DRAWINGS.

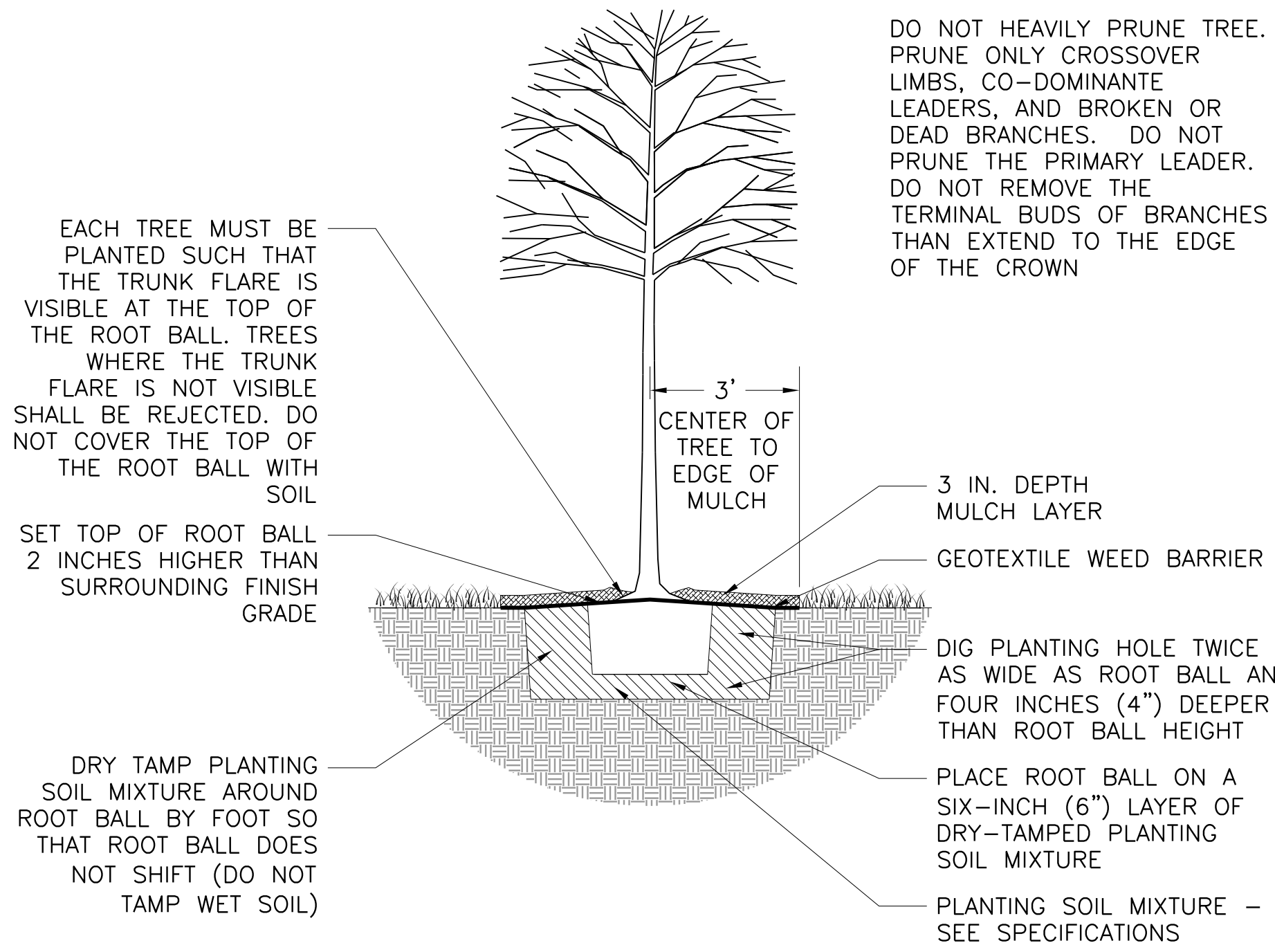
- LEGEND
- SOLID TURF GRASS
 - STREET / ORNAMENTAL TREES
 - TREE SPECIES ABBREVIATION (SEE PLANT LIST SHEET LA-10 FOR PLANT DESCRIPTIONS)
 QUANTITY



FREESSE NICHOLS
 6136 Frisco Square Blvd, Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freesse.com

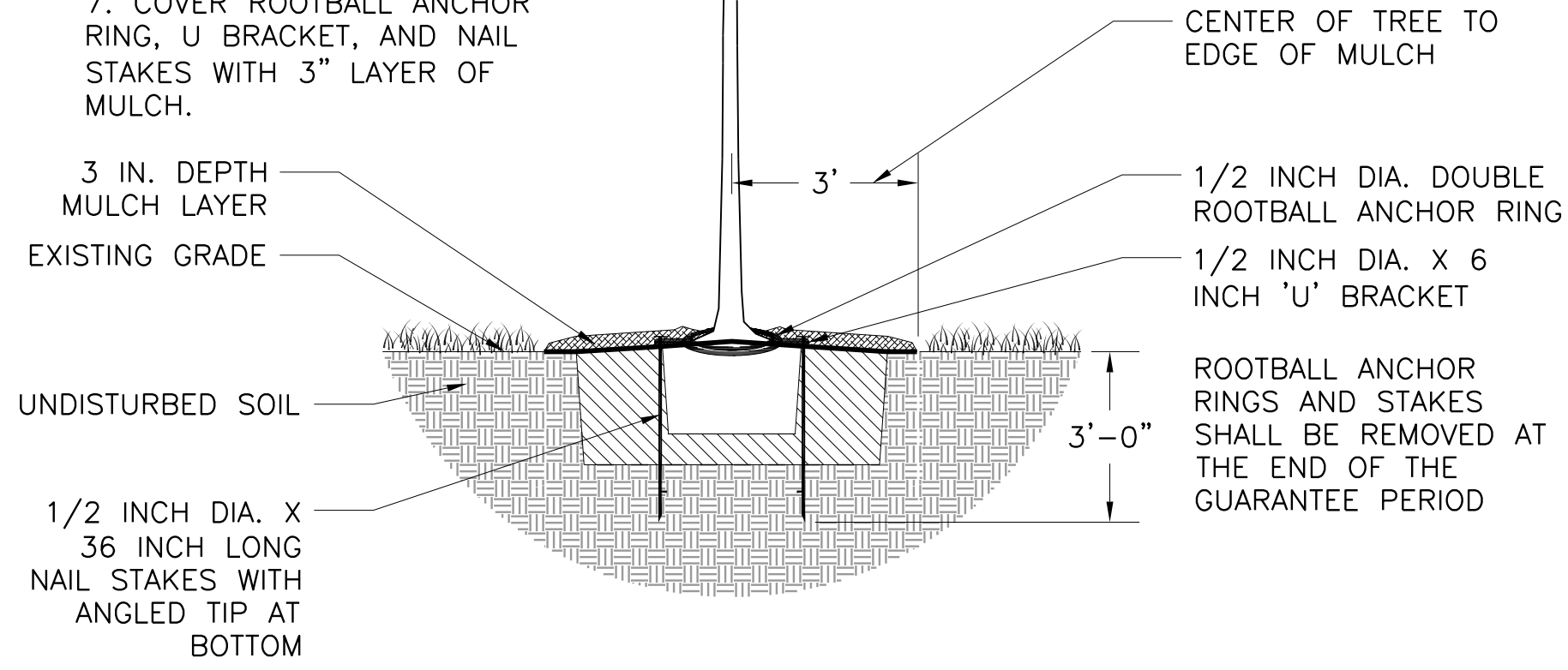
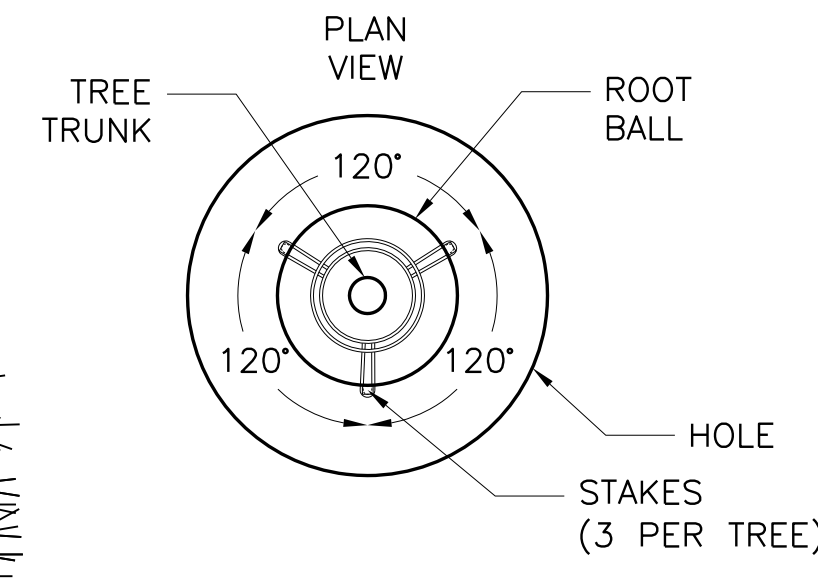
CITY OF FRISCO, TEXAS
 LANDSCAPE ARCHITECTURE
**LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
 LEBANON ROAD PLANTING PLAN
 PHASE 1 STA 49+00 TO END**

NO.	ISSUE	BY	DATE	FRAN JOB NO.	FRCL15624
				DATE	4/2017
				DESIGNED	MLM
				DRAWN	EAF
				REVISED	
				CHECKED	HH
				FILE NAME	L-RD-PL-Plant8
VERIFY SCALE				Bar is one inch on original drawing, if not one inch on this sheet, adjust scale.	
SCALE				1	
SHEET	LA-08				
SEQ.	86				



DO NOT HEAVILY PRUNE TREE. PRUNE ONLY CROSSOVER LIMBS, CO-DOMINANTE LEADERS, AND BROKEN OR DEAD BRANCHES. DO NOT PRUNE THE PRIMARY LEADER. DO NOT REMOVE THE TERMINAL BUDS OF BRANCHES THAN EXTEND TO THE EDGE OF THE CROWN

- TREE STAKING NOTES:
1. TREE STAKE TO BE TREE STAKE SOLUTIONS ROOT ANCHOR TREE SUPPORT PRODUCT.
 2. PLACE ROOTBALL ANCHOR RING ON BASE OF ROOTBALL.
 3. TRUNK SHOULD BE IN THE CENTER OF THE RING.
 4. INSTALL NAIL STAKE WITH HAMMER OR Mallet FIRMLY INTO UNDISTURBED SOIL.
 5. DRIVE NAIL STAKES FLUSH WITH 'U' BRACKET ADJACENT TO ROOTBALL (DO NOT DISTURB ROOTBALL)
 6. BACKFILL HOLE WITH PLANTING SOIL MIXTURE.
 7. COVER ROOTBALL ANCHOR RING, U BRACKET, AND NAIL STAKES WITH 3" LAYER OF MULCH.

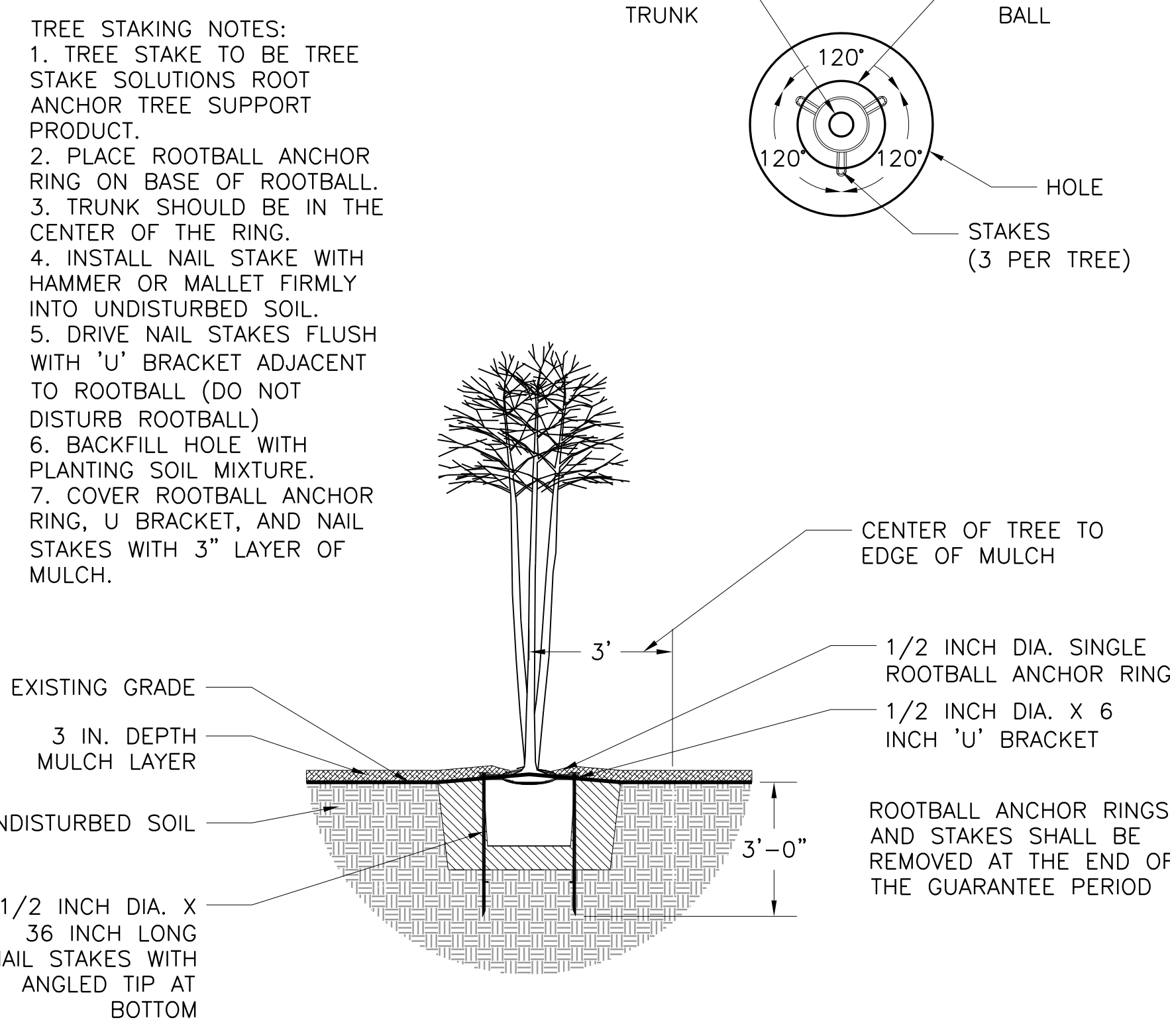


DO NOT HEAVILY PRUNE TREE. PRUNE ONLY CROSSOVER LIMBS, CO-DOMINANTE LEADERS, AND BROKEN OR DEAD BRANCHES. DO NOT PRUNE THE PRIMARY LEADER. DO NOT REMOVE THE TERMINAL BUDS OF BRANCHES THAN EXTEND TO THE EDGE OF THE CROWN

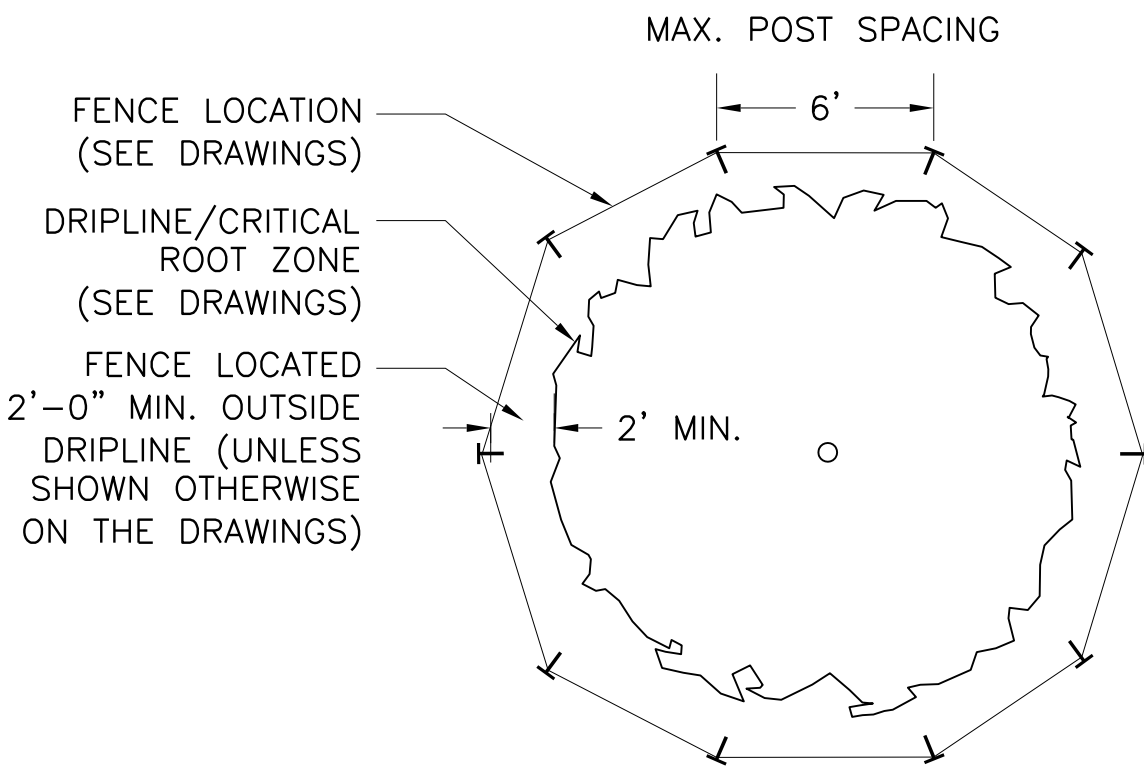
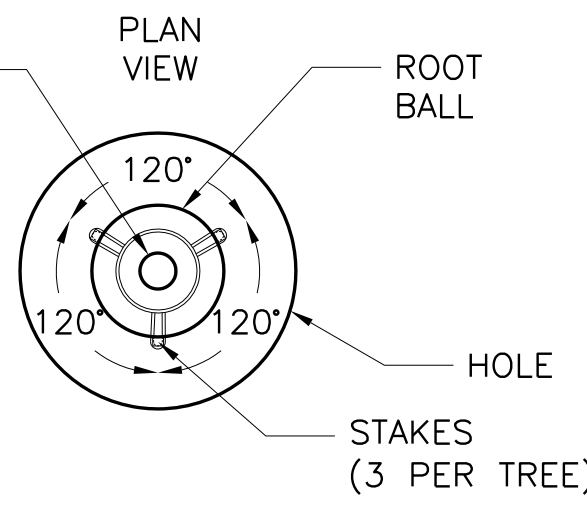
1 LA-09 SHADE TREE IN TURF PLANTING DETAIL NOT TO SCALE

2 LA-09 SHADE TREE STAKING DETAIL NOT TO SCALE

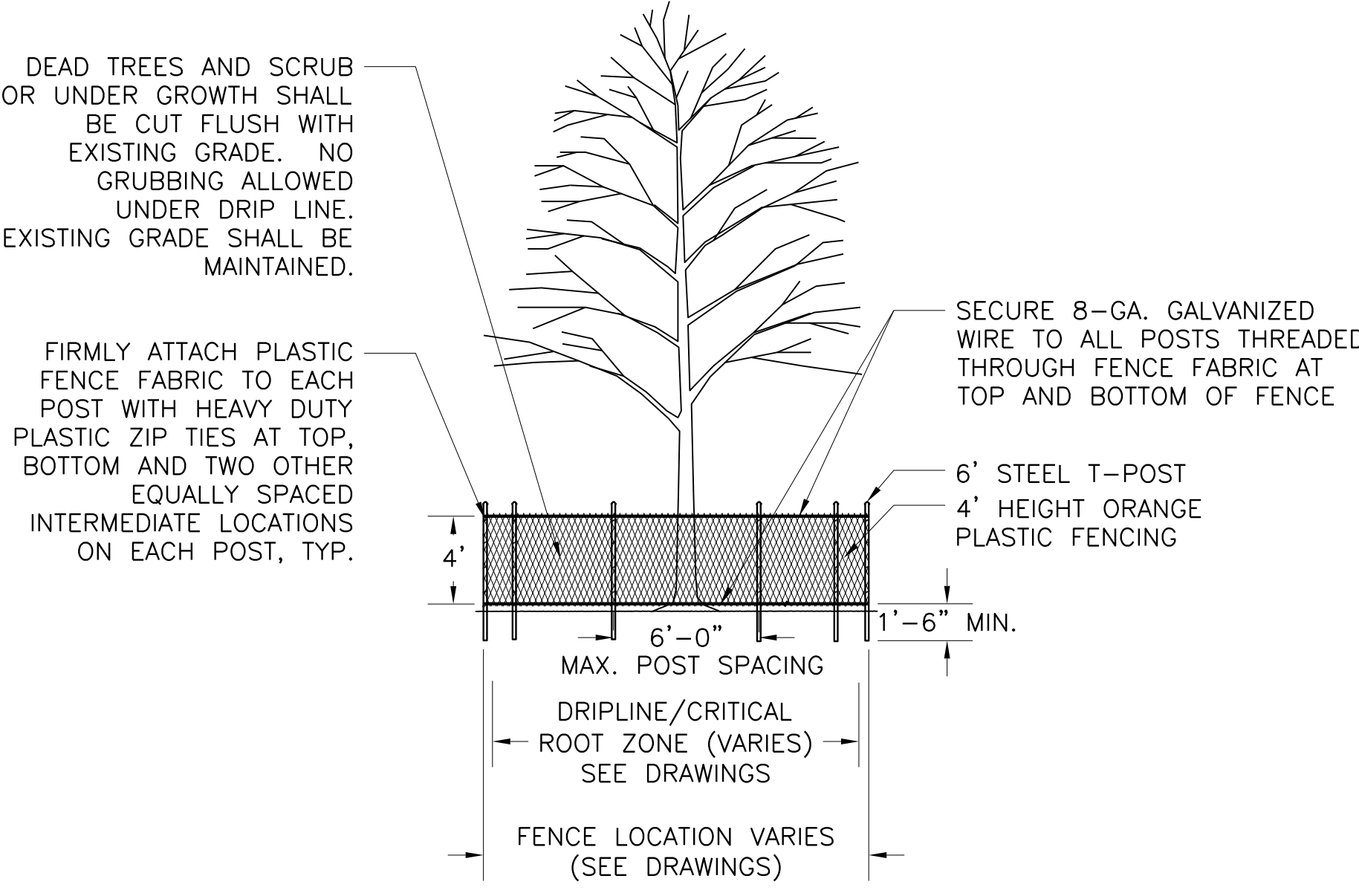
3 LA-09 ORNAMENTAL TREE IN TURF PLANTING DETAIL NOT TO SCALE



- TREE STAKING NOTES:
1. TREE STAKE TO BE TREE STAKE SOLUTIONS ROOT ANCHOR TREE SUPPORT PRODUCT.
 2. PLACE ROOTBALL ANCHOR RING ON BASE OF ROOTBALL.
 3. TRUNK SHOULD BE IN THE CENTER OF THE RING.
 4. INSTALL NAIL STAKE WITH HAMMER OR Mallet FIRMLY INTO UNDISTURBED SOIL.
 5. DRIVE NAIL STAKES FLUSH WITH 'U' BRACKET ADJACENT TO ROOTBALL (DO NOT DISTURB ROOTBALL)
 6. BACKFILL HOLE WITH PLANTING SOIL MIXTURE.
 7. COVER ROOTBALL ANCHOR RING, U BRACKET, AND NAIL STAKES WITH 3" LAYER OF MULCH.



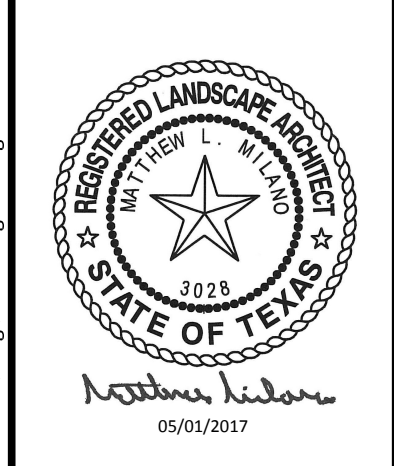
- NOTES:
1. TREE PROTECTION FENCE SHALL BE ERRECTED AROUND EACH PROTECTED TREE OR GROUP OF PROTECTED TREES AT LEAST TWO FEET BEYOND THE DRIP-LINE, UNLESS SHOWN OTHERWISE ON THE DRAWINGS.
 2. DURING CONSTRUCTION, NO ACCESS IS PERMITTED WITHIN THE PROTECTIVE FENCE FOR ANY PURPOSE, EXCEPT TRASH REMOVAL AND LANDSCAPE MAINTENANCE.
 3. DURING CONSTRUCTION, AREA WITHIN THE TREE PROTECTION FENCE SHALL BE WATERED AT A RATE WHICH PROVIDES ONE INCH OF WATER PER WEEK, INCLUSIVE OF RAINFALL.
 4. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AND AVOIDING UNDERGROUND UTILITIES OR OTHER IMPROVEMENTS PRIOR TO PLACEMENT OF TREE PROTECTION FENCING.



5 LA-09 TREE PROTECTION FENCE DETAIL - PLAN VIEW NOT TO SCALE

6 LA-09 TREE PROTECTION FENCE DETAIL - ELEVATION VIEW NOT TO SCALE

4 LA-09 ORNAMENTAL TREE STAKING DETAIL NOT TO SCALE



FREESSE AND NICHOLS
 6136 Frisco Square Blvd., Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freese.com

CITY OF FRISCO, TEXAS
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
 LANDSCAPE ARCHITECTURE
LANDSCAPE DETAILS

PROJ. NO.	FRCL15624	DATE	4/2017	DESIGNED	MLM	DRAWN	EF	CHECKED	HH
ISSUE		BY		REVISION		REVISION		FILE NAME	L-RD-PL-Plant9
NO.		DATE		DESIGNED		DRAWN		CHECKED	
1									

ACAD Ref: 20.0s (LMS Tech)
 Filename: N:\LA\Drawings\L-RD-PL-Plant9.dwg
 Last Saved: 4/27/2017 12:08 PM. Saved By: 02589

PLANT LIST						
PLANT ABBREVIATION	QUANTITY	SIZE	COMMON NAME	BOTANICAL NAME	CONDITION	COMMENTS
LARGE SHADE TREES						
CE	15	3" CALIPER 10'-12' HEIGHT 5'-6' SPREAD	CEDAR ELM	ULMUS CRASSIFOLIA	CONTAINER	FULL DENSE CANOPY; MATCH SELECTIONS FOR UNIFORM HEIGHT AND SPREAD
CP	28	4" CALIPER 10' HEIGHT 6' SPREAD	CHINESE PISTACHIO	PISTACIA CHINENSIS	CONTAINER	FULL DENSE CANOPY; MATCH SELECTIONS FOR UNIFORM HEIGHT AND SPREAD
LO	42	3" CALIPER 10'-12' HEIGHT 6' SPREAD	LIVE OAK	QUERCUS VIRGINIANA	CONTAINER	FULL DENSE CANOPY; MATCH SELECTIONS FOR UNIFORM HEIGHT AND SPREAD
SO	29	3" CALIPER 12' HEIGHT 6' SPREAD	SHUMARD OAK	QUERCUS SHUMARDII	CONTAINER	FULL DENSE CANOPY; MATCH SELECTIONS FOR UNIFORM HEIGHT AND SPREAD
ORNAMENTAL TREES						
CM	29	2" CALIPER 7' HEIGHT 4' SPREAD	NATCHEZ CRAPE MYRTLE	LAGERSTROEMIA X FAUREI 'NATCHEZ'	CONTAINER	FOUR TO FIVE TRUNKS; FULL DENSE CANOPY; MATCH SELECTIONS FOR UNIFORM HEIGHT AND SPREAD
VT	6	2" CALIPER 7' HEIGHT 4' SPREAD	VITEX SHOAL CREEK	VITEX AGNUS-CASTUS 'SHOAL CREEK'	CONTAINER	FULL DENSE CANOPY; MATCH SELECTIONS FOR UNIFORM HEIGHT AND SPREAD
EVERGREEN TREE						
NP	6	10 GALLON 5' HEIGHT 3' SPREAD	NEEDLEPOINT HOLLY	ILEX CORNUTA 'NEEDLEPOINT'	CONTAINER	FULL DENSE CANOPY; MATCH SELECTIONS FOR UNIFORM HEIGHT AND SPREAD
NR	12	2" CALIPER 7' HEIGHT 4' SPREAD	NELLIE R. STEVENS HOLLY	ILEX X 'NELLIE R. STEVENS'	CONTAINER	FULL DENSE CANOPY; MATCH SELECTIONS FOR UNIFORM HEIGHT AND SPREAD
TURF						
SOD	119,415	SQ. FT.	TIF 419 BERMUDA	CYNODON DACTYLON 'TIF 419'	-	SOLID SOD (SEE SPECIFICATIONS)

NOTES:
ALL SIZES SHOWN FOR ALL PLANTS (SUCH AS CALIPER, CONTAINER SIZE, SPREAD, HEIGHT, BRANCHING HEIGHT, ETC.) ARE MINIMUM CRITERIA REQUIRED. A CONTAINER SIZE LARGER THAN THE MINIMUM SIZE CONTAINER INDICATED IN THE PLANT LIST MAY BE NECESSARY TO PROVIDE THE OTHER MINIMUM CRITERIA INDICATED.

CITY OF FRISCO – LANDSCAPE AND TREE PROTECTION NOTES:

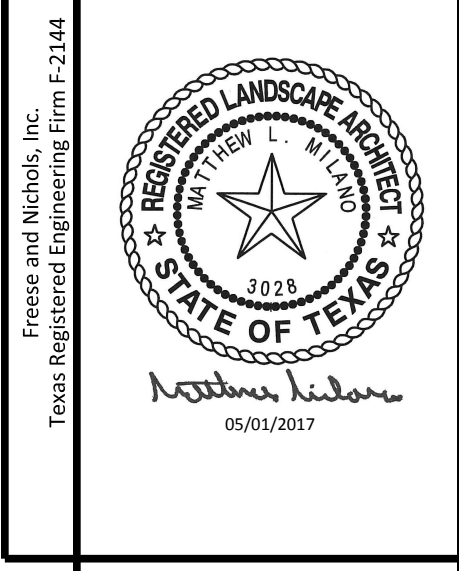
- INSPECTIONS:**
- NO EXCAVATION SHALL OCCUR IN CITY R.O.W. WITHOUT A R.O.W. PERMIT--CONTACT PUBLIC WORKS DEPARTMENT.
 - THE CONTRACTOR SHALL MARK ALL WATER LINES, SEWER LINES, AND TREE LOCATIONS PRIOR TO CALLING FOR ROW PERMIT.
 - THE LANDSCAPE INSTALLATION SHALL COMPLY WITH APPROVED LANDSCAPE DRAWINGS PRIOR TO FINAL ACCEPTANCE BY THE CITY AND ISSUANCE OF A CERTIFICATE OF OCCUPANCY. CONTACT DEVELOPMENT SERVICES LANDSCAPE ARCHITECT FOR A LANDSCAPE INSPECTION.
 - WATER METERS, CLEANOUTS AND OTHER APPURTENANCES, SHALL BE ACCESSIBLE, ADJUSTED TO GRADE, CLEARLY MARKED WITH FLAGGING, AND COMPLIANT WITH PUBLIC WORKS DEPARTMENT STANDARDS PRIOR TO CALLING FOR LANDSCAPE AND FINAL R.O.W. INSPECTIONS.

- LANDSCAPE STANDARDS:**
- PLANTINGS AND LANDSCAPE ELEMENTS SHALL COMPLY WITH ENGINEERING STANDARDS, PUBLIC R.O.W. VISIBILITY REQUIREMENTS.
 - UNLESS OTHERWISE SPECIFIED, TREES SHALL BE PLANTED NO LESS THAN 6' FROM CURBS, AND 4' FROM SIDEWALKS, UTILITY LINES, AND SCREENING WALLS. THE CITY HAS FINAL APPROVAL FOR ALL TREE PLACEMENTS.
 - A THREE FOOT RADIUS AROUND A FIRE HYDRANT SHALL REMAIN CLEAR OF PLANT MATERIALS PURSUANT TO THE FIRE CODE.
 - STREET TREES, WHERE REQUIRED, SHALL BE (10') MINIMUM FROM THE EDGE OF A STORM SEWER CURB INLET BOX AND THE EDGE OF THE ROOT BALL SHALL BE (4') MINIMUM FROM THE WATER METER.
 - ALL PLANTS SHALL BE GROWN AND HARVESTED IN ACCORDANCE WITH THE AMERICAN STANDARD FOR NURSERY STOCK (ANSI Z60.1-2004)
 - TREE PLANTING SHALL COMPLY WITH DETAILS HEREIN AND THE INTERNATIONAL SOCIETY OF ARBORICULTURE (ISA) STANDARDS.
 - TREE PITS SHALL BE TESTED FOR WATER PERCOLATION. IF WATER DOES NOT DRAIN OUT OF TREE PIT WITHIN 24-HOURS, THE TREE SHALL BE MOVED OR DRAINAGE SHALL BE PROVIDED.
 - NATIVE SITE TOPSOIL IS TO BE PROTECTED FROM EROSION OR STOCKPILED.
 - NATIVE SITE TOPSOIL SHALL BE LABORATORY TESTED BY AN ACCREDITED LABORATORY AND AMENDED PER SAID LABORATORY'S RECOMMENDATIONS.

- IRRIGATION STANDARDS:**
- ANY CHANGES TO THESE APPROVED IRRIGATION DRAWINGS SHALL BE AUTHORIZED BY THE DEVELOPMENT SERVICES LANDSCAPE ARCHITECT.
 - CONTACT DEVELOPMENT SERVICES FOR IRRIGATION PERMIT PRIOR TO INSTALLING THE IRRIGATION SYSTEM.
 - IRRIGATION OVERSPRAY ON STREETS AND WALKS IS PROHIBITED.
 - MAINLINES, VALVES, OR CONTROL WIRES SHALL NOT BE LOCATED IN THE R.O.W.
 - ET IRRIGATION CONTROLLERS SHALL BE PROGRAMMED AND ADJUSTED TO NOT EXCEED THE LANDSCAPE WATER ALLOWANCE (LWA) PRIOR TO APPROVAL OF LANDSCAPE INSTALLATION.
 - VALVES SHALL BE LOCATED A MINIMUM OF (3') AWAY FROM STORM SEWERS AND SANITARY SEWER LINES AND 5 FEET FROM CITY FIRE HYDRANTS AND WATER VALVES.
 - THE BORE DEPTH UNDER STREETS, DRIVE AISLES, AND FIRE LANES SHALL PROVIDE (2') OF CLEARANCE (MINIMUM).
 - IRRIGATION HEADS THAT RUN PARALLEL AND NEAR PUBLIC WATER AND SANITARY SEWER LINES; SHALL BE FED FROM STUBBED LATERALS OR BULL-BEADS. A MINIMUM 5-FOOT SEPARATION IS REQUIRED BETWEEN IRRIGATION MAIN LINES AND LATERALS THAT RUN PARALLEL TO PUBLIC WATER AND SANITARY SEWER LINES.
 - NO VALVES, BACKFLOW PREVENTION ASSEMBLIES, QUICK COUPLERS ETC. SHALL BE LOCATED CLOSER THAN 10' FROM THE CURB AT STREET OR DRIVEWAY INTERSECTIONS.

- MAINTENANCE STANDARDS:**
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ESTABLISHMENT, MAINTENANCE, AND VIGOR OF PLANT MATERIAL IN ACCORDANCE WITH THE DESIGN INTENT AND AS APPROPRIATE FOR THE SEASON OF THE YEAR.
 - LANDSCAPE AND OPEN AREAS SHALL BE FREE OF TRASH, LITTER AND WEEDS.
 - ALL TREES AND SHRUBS SHALL BE MAINTAINED IN ACCORDANCE WITH THE ENGINEERING DESIGN STANDARDS - PUBLIC R.O.W. VISIBILITY REQUIREMENTS.
 - TREE MAINTENANCE SHALL BE IN ACCORDANCE WITH THE AMERICAN NATIONAL STANDARDS FOR TREE CARE OPERATIONS, ANSI A300 AND THE STANDARDS OF THE INTERNATIONAL SOCIETY OF ARBORICULTURE (ISA).
 - TREE STAKING MATERIALS, IF USED, SHALL BE REMOVED AFTER (1) GROWING SEASON AND NOT MORE THAN (1) YEAR AFTER INSTALLATION AS APPROVED BY THE OWNER. STEEL TREE STAKES, WIRES, AND HOSES ARE PROHIBITED.

- TREE PROTECTION NOTES**
- CONTACT DEVELOPMENT SERVICES FOR A TREE REMOVAL PERMIT AT 972-292-5300 PRIOR TO REMOVAL OR TRANSPLANTING OF ANY TREES.
 - ALL TREES WHICH ARE TO REMAIN ON SITE SHALL BE PROTECTED WITH A (4') TALL BRIGHTLY COLORED PLASTIC FENCE, OR SILT FENCE, PLACED AT THE DRIP LINE OF THE TREES.
 - PRIOR TO THE PRE-CONSTRUCTION MEETING OR OBTAINING A GRADING PERMIT, ALL TREE MARKINGS AND PROTECTIVE FENCING SHALL BE INSTALLED BY THE CONTRACTOR AND SHALL BE INSPECTED BY THE DEVELOPMENT SERVICES LANDSCAPE ARCHITECT.
 - NO EQUIPMENT SHALL BE CLEANED, OR HARMFUL LIQUIDS DEPOSITED WITHIN THE LIMITS OF THE ROOT ZONE OF TREES WHICH REMAIN ON SITE.
 - NO SIGNS, WIRES, OR OTHER ATTACHMENTS SHALL BE ATTACHED TO ANY TREE TO REMAIN ON SITE.
 - VEHICULAR AND CONSTRUCTION EQUIPMENT SHALL NOT PARK OR DRIVE WITHIN THE LIMITS OF THE DRIP LINE.
 - GRADE CHANGES IN EXCESS OF 3 INCHES (CUT OR FILL) SHALL NOT BE ALLOWED WITHIN A ROOT ZONE, UNLESS ADEQUATE TREE PRESERVATION METHODS ARE APPROVED BY THE CITY.
 - NO TRENCHING SHALL BE ALLOWED WITHIN THE DRIP-LINE OF A TREE, UNLESS APPROVED BY THE CITY.
 - ALL REMOVED TREES SHALL BE CHIPPED AND USED FOR MULCH ON SITE OR HAULED OFF-SITE.
 - ALL TREE MAINTENANCE TECHNIQUES SHALL BE IN CONFORMANCE WITH AMERICAN NATIONAL STANDARDS FOR TREE CARE OPERATIONS, ANSI A300 INDUSTRY IDENTIFIED STANDARDS. IMPROPER OR MALICIOUS PRUNING TECHNIQUES ARE STRICTLY PROHIBITED.

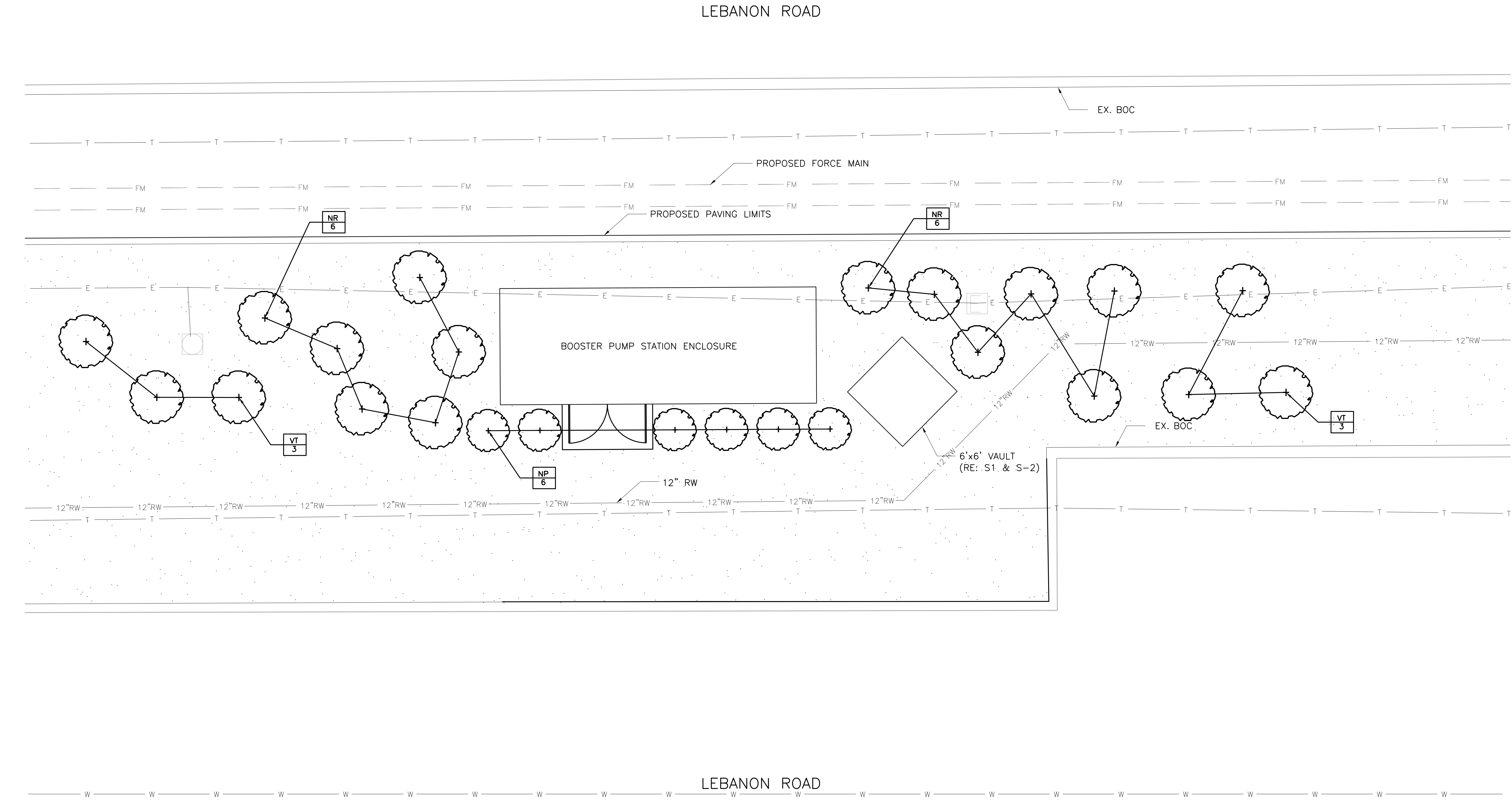


FREESSE AND NICHOLS
 6136 Frisco Square Blvd., Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freese.com

CITY OF FRISCO, TEXAS
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
 LANDSCAPE ARCHITECTURE
PLANT LIST AND LANDSCAPE NOTES

NO.	ISSUE	DATE	BY	FRAN JOB NO.	FRCL15624
0	VERIFY SCALE	4/2017		DATE	4/2017
				DESIGNED	MLM
				DRAWN	EF
				REVISED	
				CHECKED	HH
				FILE NAME	L-RD-PL-Plant10
Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.					
SHEET					
LA-10					
SEQ. 88					

ACAD Rel: 20.0s (LMS Tech)
 Filename: N:\LA\Drawings\CV-ALL-SITE-BPS.dwg
 Last Saved: 5/1/2017 2:22 PM. Saved By: 02589



LEBANON ROAD

LEBANON ROAD

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



FREES & NICHOLS
 6136 Frisco Square Blvd., Suite 200
 Frisco, Texas 75034-9201
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freese.com

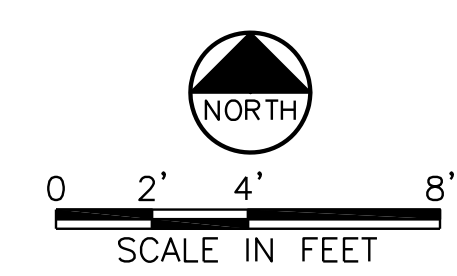
CITY OF FRISCO, TEXAS
 LEBANON ROAD IMPROVEMENTS AND FORCE MAIN

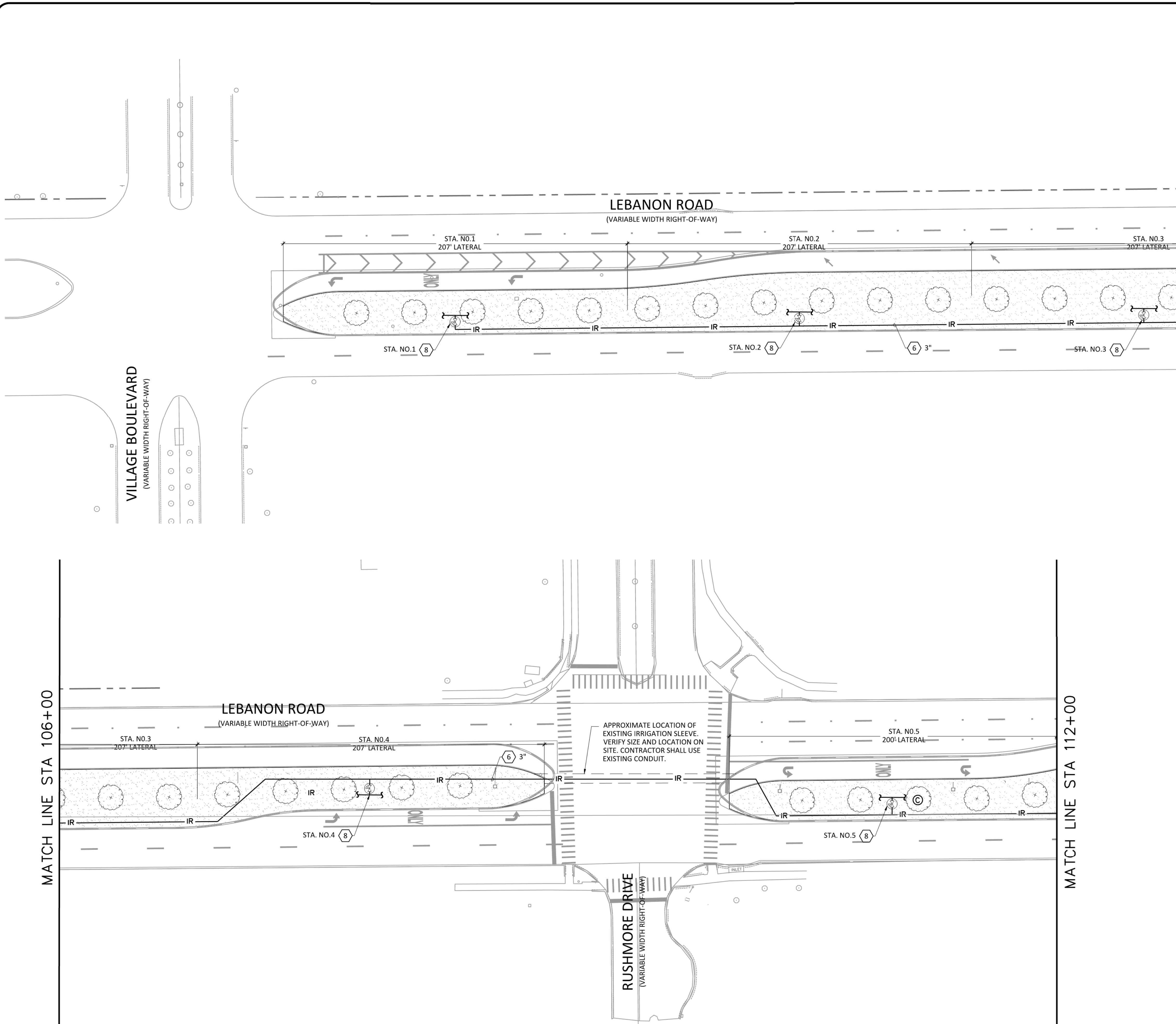
LANDSCAPE ARCHITECTURE
 BOOSTER PUMP STATION
 LANDSCAPE SITE PLAN

NO.	ISSUE	BY	DATE	F&N JOB NO.	FRC15624
				DATE	4/2017
				DESIGNED	RE
				DRAWN	MB
				REVISED	
				CHECKED	CB
				FILE NAME	CV-ALL-SITE-BPS

Bar is one inch on original
 drawing. If printed on
 this sheet, adjust scales.

SHEET
 LA-11
 SEQ.
 89

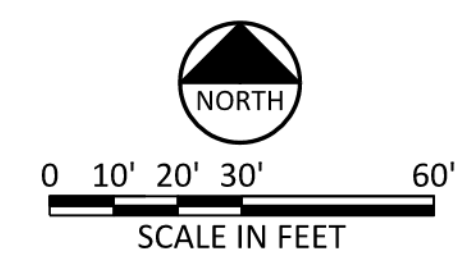




- NOTES BY SYMBOL "⬡"**
- 3" IRRIGATION SYSTEM RAW WATER SUPPLY TAP INTO CITY MAIN BY THE CITY, PER TCEQ, AHJ AND CITY OF FRISCO STANDARDS. VERIFY EXACT LOCATION PRIOR TO BEGINNING CONSTRUCTION.
 - 3" WATER METER AND METER VAULT PROVIDED BY THE CITY.
 - 3" BACKFLOW PREVENTER IN ACCORDANCE WITH AHJ IN ABOVE GROUND ENCLOSURE. RE: DETAIL 4/IR-11.
 - 3" ISOLATION VALVE (¼ TURN FULL-PORT, BALL VALVE) IN 9" DIAMETER VALVE BOX.
 - AMBIENT LIGHT POWERED IRRIGATION CONTROLLER. DIG LEIT-2ET. PROVIDE QUANTITIES REQUIRED BY THE NUMBER OF STATIONS NECESSARY. PROVIDE WEATHER STATIONS IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN STANDARDS. PROVIDE A 12 INCH WIDE SQUARE X 8" THICK REINFORCED CONCRETE (4000 PSI) STABILIZING PAD BENEATH POLE, LEVEL WITH SURROUNDING FINISHED GRADE. PROVIDE WEATHER STATIONS MOUNTED A MINIMUM OF 51" ABOVE FINISHED GRADE ON A 1-1/2" INCH DIA. GALVANIZED STEEL PIPE WITH THREADED TOP CAP. DRILL INTO PIPE FOR CONDUCTORS AND REAM THE HOLE SMOOTH AND SEAL WITH 25 YEAR CLEAR FLEXIBLE CAULK. MOUNT THE POLE IN AN 18 INCH X 18 INCH X 12 INCH THICK REINFORCED CONCRETE STABILIZING PAD SET FLUSH WITH FINAL GRADE.
 - IRRIGATION SYSTEM WATER SUPPLY MAIN. SLEEVE PIPE WITH RIGID PVC BENEATH WALKS, DRIVES AND ROADWAYS.
 - DRIP LINE IRRIGATION SYSTEM ZONE FOR TURF AREAS AND TREE RINGS. PROVIDE RAINBIRD DRIP LINE, DRIP SYSTEM FOR TURF AND TREE RINGS IN THIS AREA. SLEEVE RIGID PVC BENEATH WALKS, DRIVES AND ROADWAYS. RE: DETAIL ON SHEET XX
 - STATION CONTROL VALVE WITH PRESSURE REGULATOR IN VALVE BOX. PROVIDE WIRING AS REQUIRED BACK TO CONTROLLER. ADJUST NUMBER OF CONTROL VALVES TO SUIT DESIGN REQUIREMENTS OF THE SYSTEM IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. LOCATE CONTROL VALVES NO FURTHER THAN PERMITTED BY THE MANUFACTURER OF THE CONTROLLER.

- GENERAL NOTES:**
- PROVIDE COMPLETE LANDSCAPE IRRIGATION SYSTEM IN ACCORDANCE WITH THE SPECIFICATIONS AND DRAWINGS. DRAWINGS ARE GENERALLY SCHEMATIC AND PERFORMANCE BASED. PROVIDE DETAILED DRAWINGS AS REQUIRED BY THE SPECIFICATIONS.
 - LOCATE AND UTILIZE EXISTING PVC SLEEVES BETWEEN ISLANDS FOR PIPING AND LOW VOLTAGE CONDUCTORS.
 - LAYOUT AND DETAILS OF DRIP IRRIGATION SYSTEMS SHALL COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS AND THE DETAILS INCLUDED IN THIS SET OF DRAWINGS.

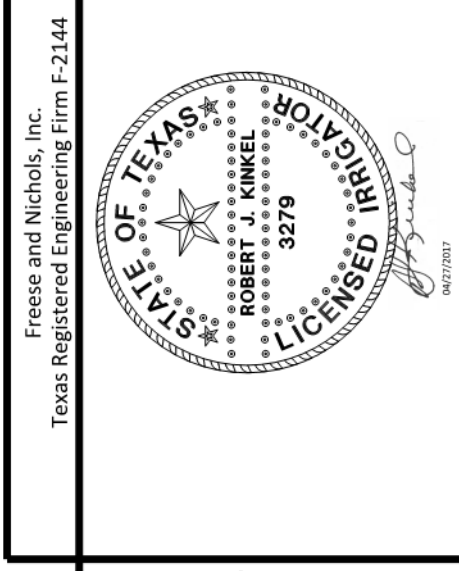
- LEGEND**
- WATER METER IN METER VAULT
 - BACKFLOW PREVENTER IN ACCORDANCE WITH AHJ IN ABOVE GROUND ENCLOSURE
 - ISOLATION VALVE IN VALVE BOX
 - CONTROL VALVE IN VALVE BOX
 - IRRIGATION SUPPLY MAIN
 - IRRIGATION SYSTEM CONTROLLER
 - TURF GRASS AREA
 - SIDEWALK



MATCH LINE STA 106+00

MATCH LINE STA 106+00

MATCH LINE STA 112+00



FREESSE & NICHOLS
 6136 Frisco Square Blvd., Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freesse.com

CITY OF FRISCO, TEXAS

LANDSCAPE ARCHITECTURE

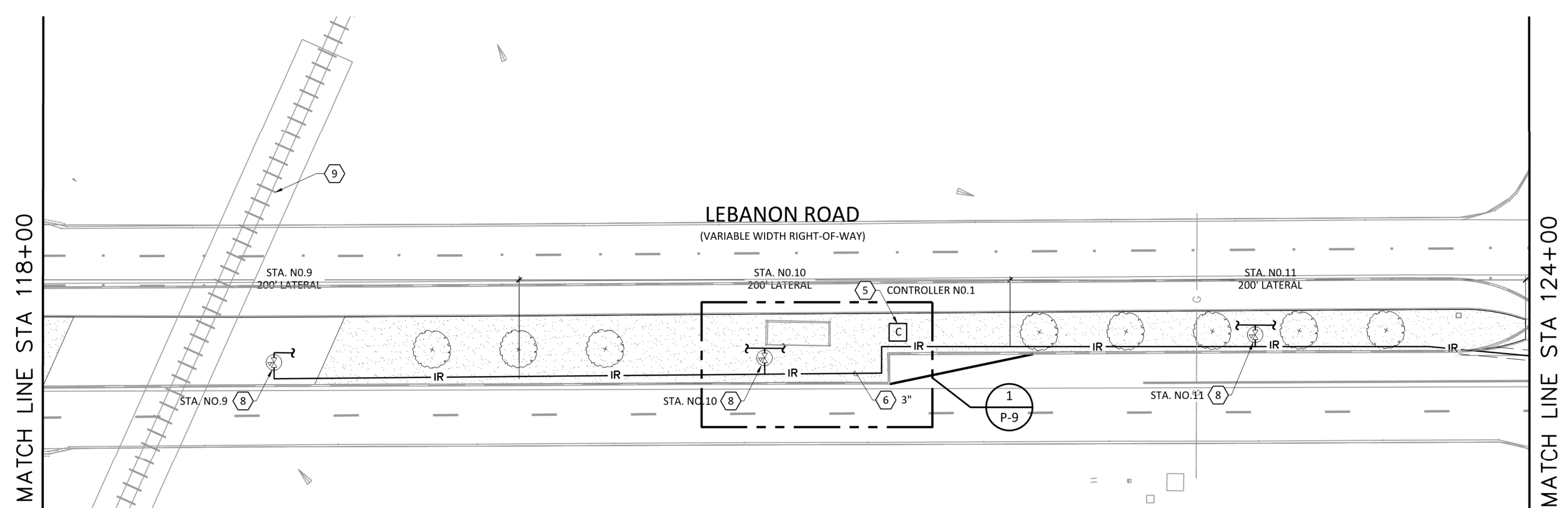
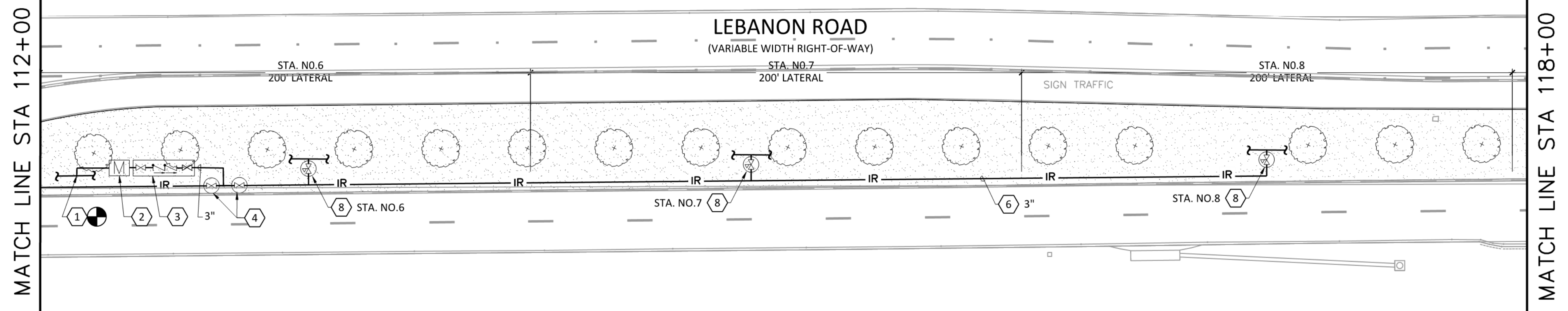
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN

LEBANON ROAD IRRIGATION PLAN

BEGIN TO STA 112+00

NO.	ISSUE	BY	DATE	FRN JOB NO.	FRCL15624
			4/2017	DATE	
				DESIGNED	MRB
				DRAWN	MRB
				REVISED	
				CHECKED	RIK
				FILE NAME	IR-RD-PL-Plant1
VERIFY SCALE	0				
	Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.				
SHEET	IR-1				
SEQ.	90				

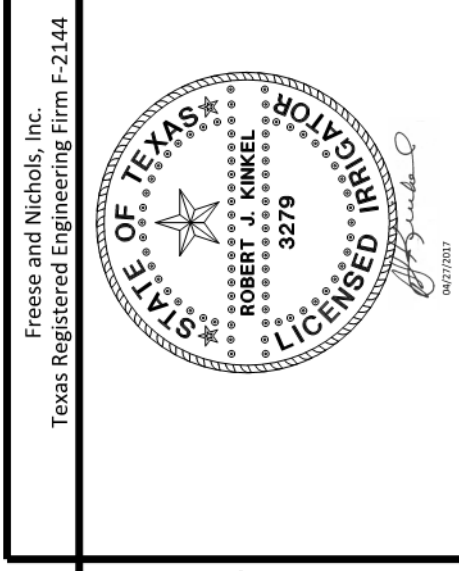
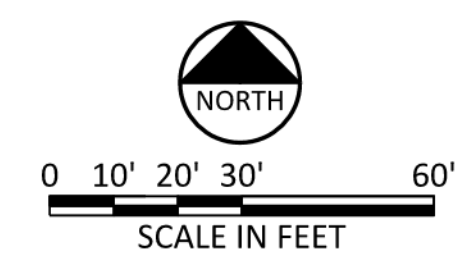
ACAD Ref: 21.0s (LMS Tech)
 Filename: N:\PLBG\IR-RD-PL-Plant2.dwg
 Last Saved: 4/27/2017 12:30 PM Saved By: 02387



- NOTES BY SYMBOL "1"**
- 3" IRRIGATION SYSTEM RAW WATER SUPPLY TAP INTO CITY MAIN BY THE CITY, PER TCEQ, AHJ AND CITY OF FRISCO STANDARDS. VERIFY EXACT LOCATION PRIOR TO BEGINNING CONSTRUCTION.
 - 3" WATER METER AND METER VAULT PROVIDED BY THE CITY.
 - 3" BACKFLOW PREVENTER IN ACCORDANCE WITH AHJ IN ABOVE GROUND ENCLOSURE. RE: DETAIL 4/IR-11.
 - 3" ISOLATION VALVE (¼ TURN FULL-PORT, BALL VALVE) IN 9" DIAMETER VALVE BOX.
 - AMBIENT LIGHT POWERED IRRIGATION CONTROLLER. DIG LEIT-2ET. PROVIDE QUANTITIES REQUIRED BY THE NUMBER OF STATIONS NECESSARY. PROVIDE WEATHER STATIONS IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN STANDARDS. PROVIDE A 12 INCH WIDE SQUARE X 8" THICK REINFORCED CONCRETE (4000 PSI) STABILIZING PAD BENEATH POLE, LEVEL WITH SURROUNDING FINISHED GRADE. PROVIDE WEATHER STATIONS MOUNTED A MINIMUM OF 5'1" ABOVE FINISHED GRADE ON A 1-1/2" INCH DIA. GALVANIZED STEEL PIPE WITH THREADED TOP CAP. DRILL INTO PIPE FOR CONDUCTORS AND REAM THE HOLE SMOOTH AND SEAL WITH 25 YEAR CLEAR FLEXIBLE CAULK. MOUNT THE POLE IN AN 18 INCH X 18 INCH X 12 INCH THICK REINFORCED CONCRETE STABILIZING PAD SET FLUSH WITH FINAL GRADE.
 - IRRIGATION SYSTEM WATER SUPPLY MAIN. SLEEVE PIPE WITH RIGID PVC BENEATH WALKS, DRIVES AND ROADWAYS.
 - DRIP LINE IRRIGATION SYSTEM ZONE FOR TURF AREAS AND TREE RINGS. PROVIDE RAINBIRD DRIP LINE, DRIP SYSTEM FOR TURF AND TREE RINGS IN THIS AREA. SLEEVE RIGID PVC BENEATH WALKS, DRIVES AND ROADWAYS. RE: DETAIL ON SHEET XX
 - STATION CONTROL VALVE WITH PRESSURE REGULATOR IN VALVE BOX. PROVIDE WIRING AS REQUIRED BACK TO CONTROLLER. ADJUST NUMBER OF CONTROL VALVES TO SUIT DESIGN REQUIREMENTS OF THE SYSTEM IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. LOCATE CONTROL VALVES NO FURTHER THAN PERMITTED BY THE MANUFACTURER OF THE CONTROLLER.
 - VERIFY EXISTING RAILROAD ROW AND DO NOT PROVIDE PIPING WITHIN THAT AREA.

- GENERAL NOTES:**
- PROVIDE COMPLETE LANDSCAPE IRRIGATION SYSTEM IN ACCORDANCE WITH THE SPECIFICATIONS AND DRAWINGS. DRAWINGS ARE GENERALLY SCHEMATIC AND PERFORMANCE BASED. PROVIDE DETAILED DRAWINGS AS REQUIRED BY THE SPECIFICATIONS.
 - LOCATE AND UTILIZE EXISTING PVC SLEEVES BETWEEN ISLANDS FOR PIPING AND LOW VOLTAGE CONDUCTORS.
 - LAYOUT AND DETAILS OF DRIP IRRIGATION SYSTEMS SHALL COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS AND THE DETAILS INCLUDED IN THIS SET OF DRAWINGS.

- LEGEND**
- WATER METER IN METER VAULT
 - BACKFLOW PREVENTER IN ACCORDANCE WITH AHJ IN ABOVE GROUND ENCLOSURE
 - ISOLATION VALVE IN VALVE BOX
 - CONTROL VALVE IN VALVE BOX
 - IRRIGATION SUPPLY MAIN
 - IRRIGATION SYSTEM CONTROLLER
 - TURF GRASS AREA
 - SIDEWALK

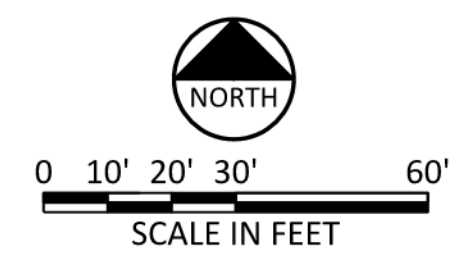
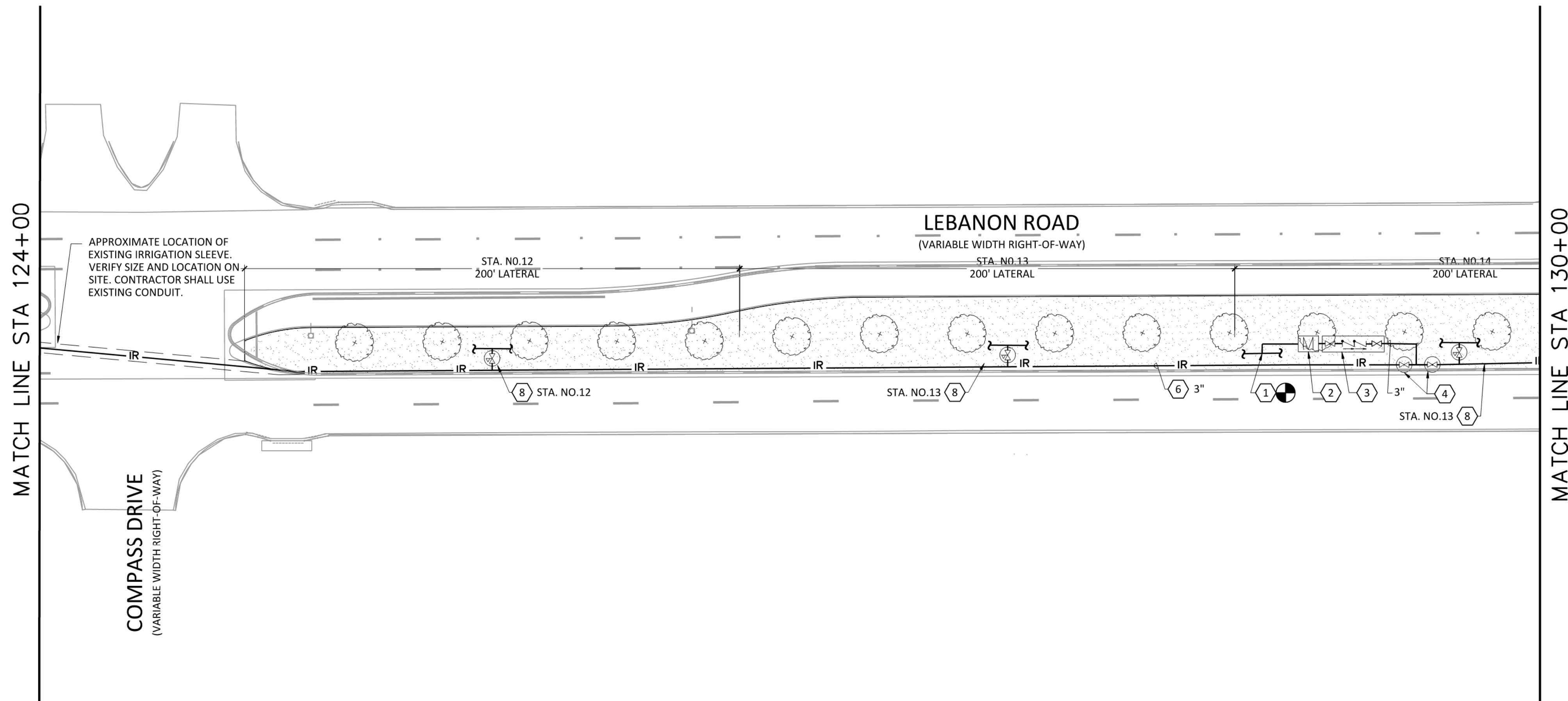


FREESSE & NICHOLS
 6136 Frisco Square Blvd., Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freesse.com

CITY OF FRISCO, TEXAS
 LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
 LANDSCAPE IRRIGATION
 LEBANON ROAD IRRIGATION PLAN
 STA 112+00 TO STA 124+00

NO.	ISSUE	DATE	BY	FILE NAME
0	VERIFY SCALE			IR-RD-PL-Plant2
Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.				
SHEET IR-2				
SEQ. 91				

ACAD Ref: 21.0s (LMS Tech)
 Filename: N:\PLBG\IR-RD-PL-Plant3.dwg
 Last Saved: 4/27/2017 12:44 PM Saved By: 02387

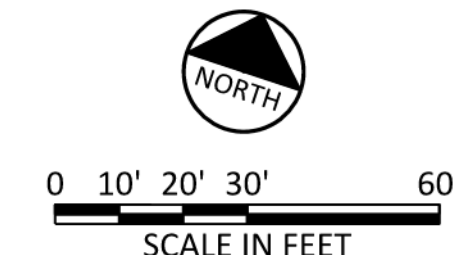
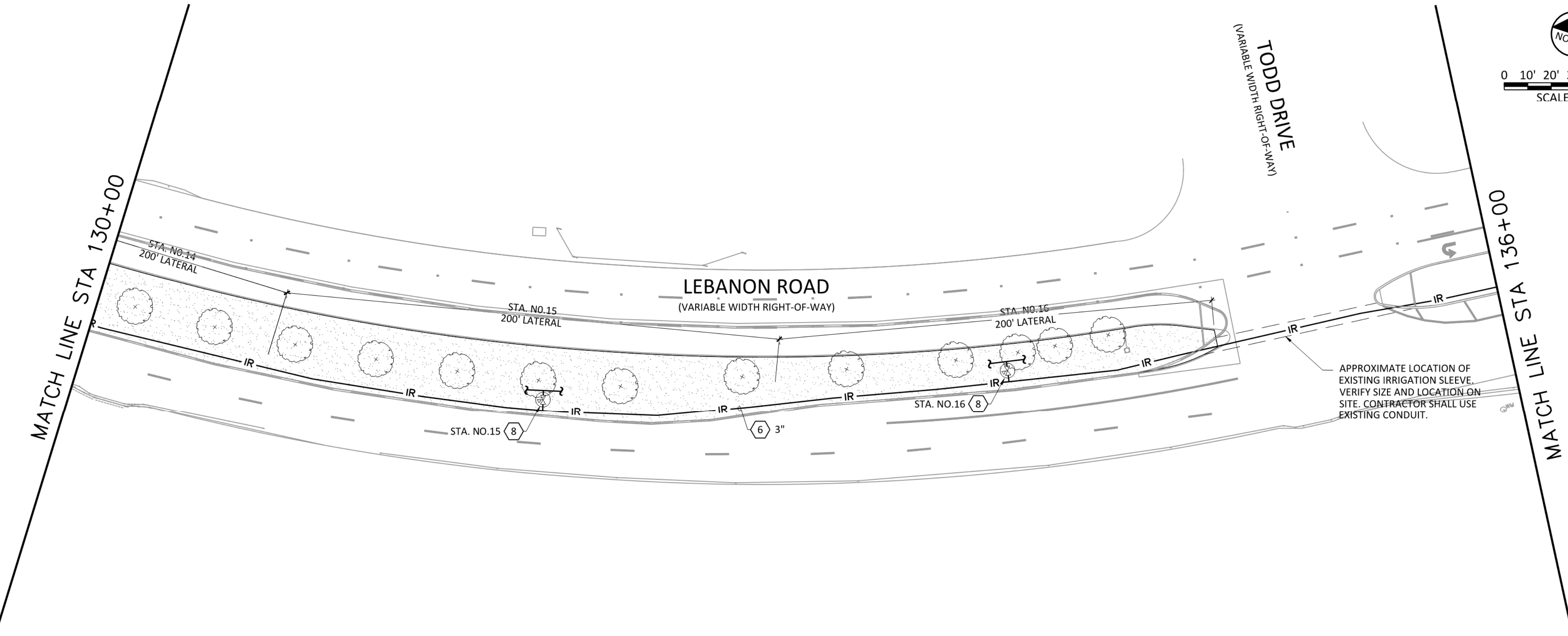


NOTES BY SYMBOL "1"

- 3" IRRIGATION SYSTEM RAW WATER SUPPLY TAP INTO CITY MAIN BY THE CITY, PER TCEQ, AHJ AND CITY OF FRISCO STANDARDS. VERIFY EXACT LOCATION PRIOR TO BEGINNING CONSTRUCTION.
- 3" WATER METER AND METER VAULT PROVIDED BY THE CITY.
- 3" BACKFLOW PREVENTER IN ACCORDANCE WITH AHJ IN ABOVE GROUND ENCLOSURE. RE: DETAIL 4/IR-11.
- 3" ISOLATION VALVE (1/4 TURN FULL-PORT, BALL VALVE) IN 9" DIAMETER VALVE BOX.
- AMBIENT LIGHT POWERED IRRIGATION CONTROLLER. DIG LEIT-2ET. PROVIDE QUANTITIES REQUIRED BY THE NUMBER OF STATIONS NECESSARY. PROVIDE WEATHER STATIONS IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN STANDARDS. PROVIDE A 12 INCH WIDE SQUARE X 8" THICK REINFORCED CONCRETE (4000 PSI) STABILIZING PAD BENEATH POLE, LEVEL WITH SURROUNDING FINISHED GRADE. PROVIDE WEATHER STATIONS MOUNTED A MINIMUM OF 5'1" ABOVE FINISHED GRADE ON A 1-1/2" INCH DIA. GALVANIZED STEEL PIPE WITH THREADED TOP CAP. DRILL INTO PIPE FOR CONDUCTORS AND REAM THE HOLE SMOOTH AND SEAL WITH 25 YEAR CLEAR FLEXIBLE CAULK. MOUNT THE POLE IN AN 18 INCH X 18 INCH X 12 INCH THICK REINFORCED CONCRETE STABILIZING PAD SET FLUSH WITH FINAL GRADE.
- IRRIGATION SYSTEM WATER SUPPLY MAIN. SLEEVE PIPE WITH RIGID PVC BENEATH WALKS, DRIVES AND ROADWAYS.
- DRIP LINE IRRIGATION SYSTEM ZONE FOR TURF AREAS AND TREE RINGS. PROVIDE RAINBIRD DRIP LINE, DRIP SYSTEM FOR TURF AND TREE RINGS IN THIS AREA. SLEEVE RIGID PVC BENEATH WALKS, DRIVES AND ROADWAYS. RE: DETAIL ON SHEET XX
- STATION CONTROL VALVE WITH PRESSURE REGULATOR IN VALVE BOX. PROVIDE WIRING AS REQUIRED BACK TO CONTROLLER. ADJUST NUMBER OF CONTROL VALVES TO SUIT DESIGN REQUIREMENTS OF THE SYSTEM IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. LOCATE CONTROL VALVES NO FURTHER THAN PERMITTED BY THE MANUFACTURER OF THE CONTROLLER.

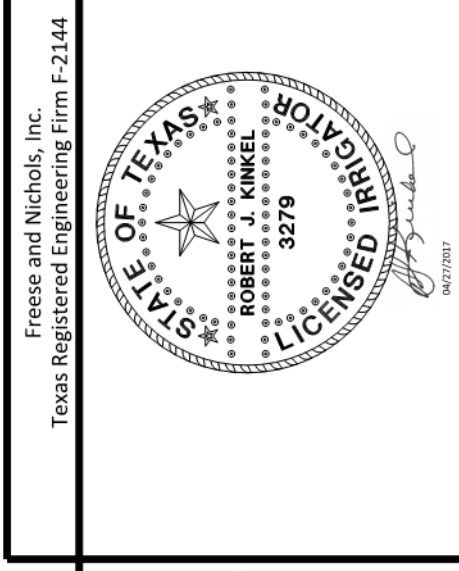
GENERAL NOTES:

- PROVIDE COMPLETE LANDSCAPE IRRIGATION SYSTEM IN ACCORDANCE WITH THE SPECIFICATIONS AND DRAWINGS. DRAWINGS ARE GENERALLY SCHEMATIC AND PERFORMANCE BASED. PROVIDE DETAILED DRAWINGS AS REQUIRED BY THE SPECIFICATIONS.
- LOCATE AND UTILIZE EXISTING PVC SLEEVES BETWEEN ISLANDS FOR PIPING AND LOW VOLTAGE CONDUCTORS.
- LAYOUT AND DETAILS OF DRIP IRRIGATION SYSTEMS SHALL COMPLY WITH MANUFACTURERS WRITTEN INSTRUCTIONS AND THE DETAILS INCLUDED IN THIS SET OF DRAWINGS.



LEGEND

- WATER METER IN METER VAULT
- BACKFLOW PREVENTER IN ACCORDANCE WITH AHJ IN ABOVE GROUND ENCLOSURE
- ISOLATION VALVE IN VALVE BOX
- CONTROL VALVE IN VALVE BOX
- IRRIGATION SUPPLY MAIN
- IRRIGATION SYSTEM CONTROLLER
- TURF GRASS AREA
- SIDEWALK



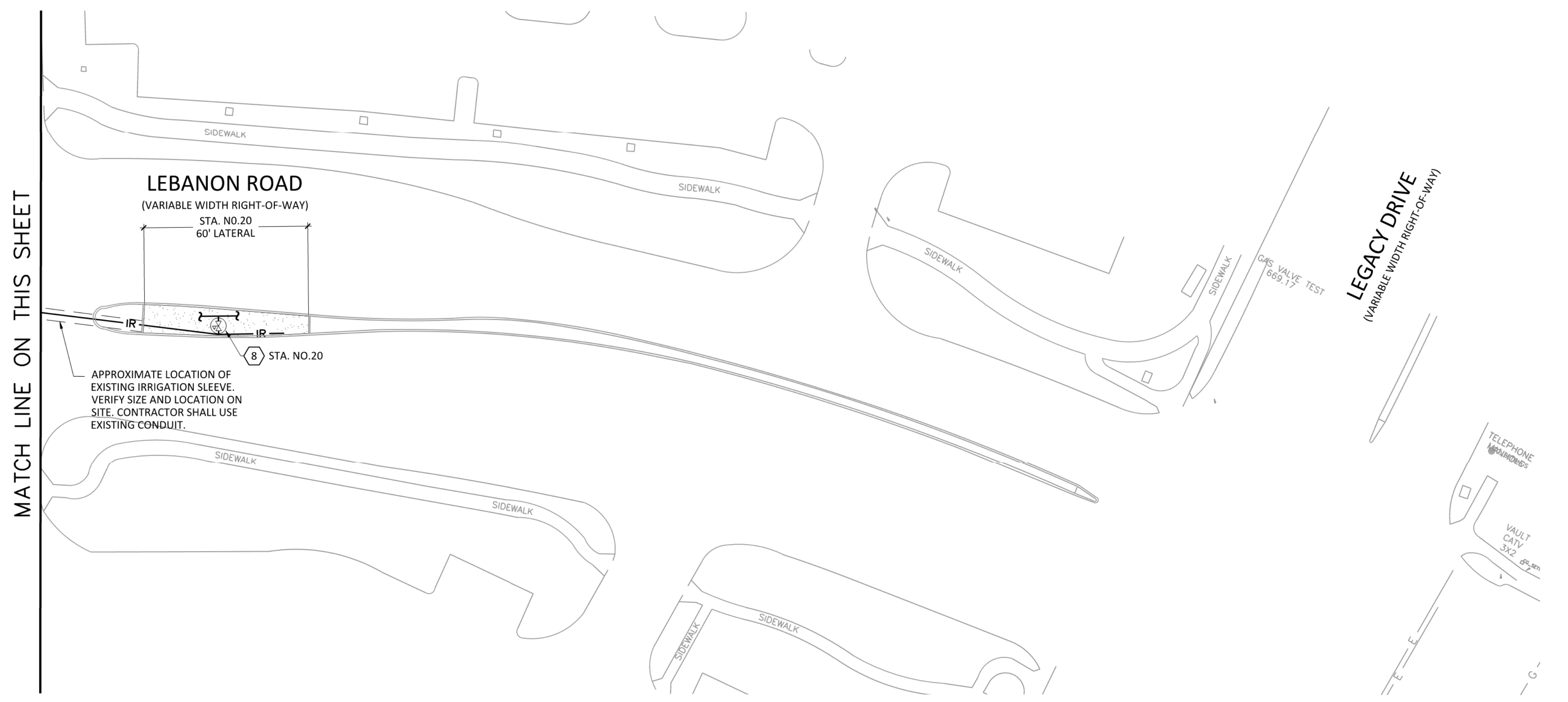
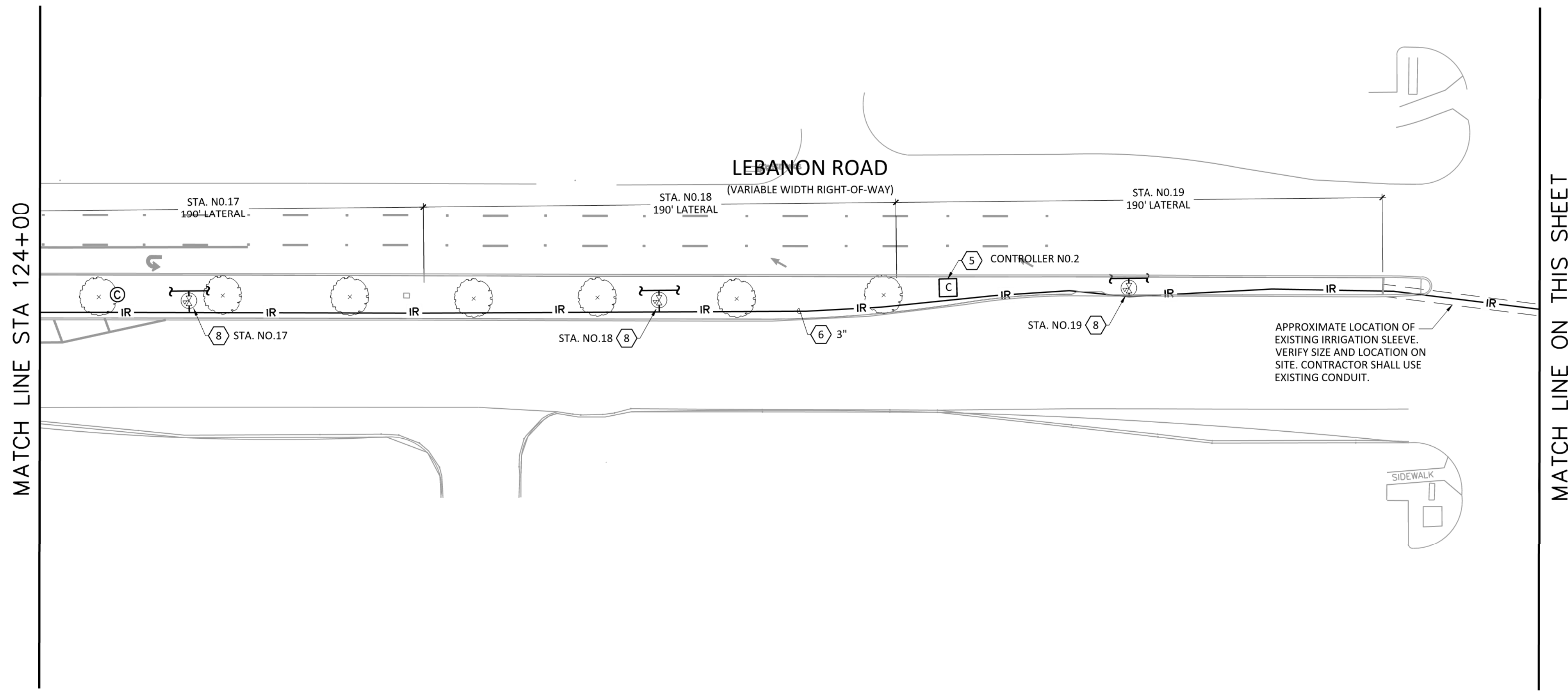
FREESSE & NICHOLS
 6136 Frisco Square Blvd., Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freesse.com

CITY OF FRISCO, TEXAS
 LANDSCAPE ARCHITECTURE
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
LEBANON ROAD IRRIGATION PLAN
STA 124+00 TO STA 136+00

NO.	ISSUE	BY	DATE	FRN JOB NO.	FRCL15624
				DATE	4/2017
				DESIGNED	MRB
				DRAWN	MRB
				REVISED	
				CHECKED	RIK
				FILE NAME	IR-RD-PL-Plant3
VERIFY SCALE 0 1 Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.				SHEET IR-3	
SEQ.				92	

ACAD Ref: 21.0s (LMS Tech)
 Filename: N:\PLBG\IR-RD-PL-Plant4.dwg
 Last Saved: 4/27/2017 12:44 PM Saved By: 02387

Plot Date: 4/27/2017 1:13 PM Plot By: 02387 Filename: N:\PLBG\IR-RD-PL-Plant4.dwg



NOTES BY SYMBOL

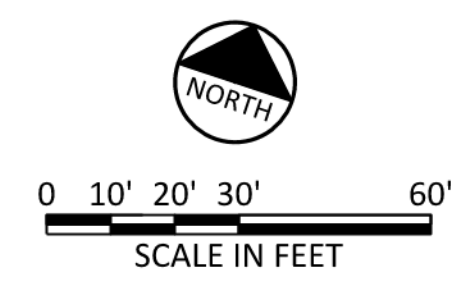
- 3" IRRIGATION SYSTEM RAW WATER SUPPLY TAP INTO CITY MAIN BY THE CITY, PER TCEQ, AHJ AND CITY OF FRISCO STANDARDS. VERIFY EXACT LOCATION PRIOR TO BEGINNING CONSTRUCTION.
- 3" WATER METER AND METER VAULT PROVIDED BY THE CITY.
- 3" BACKFLOW PREVENTER IN ACCORDANCE WITH AHJ IN ABOVE GROUND ENCLOSURE. RE: DETAIL 4/IR-11.
- 3" ISOLATION VALVE (¼ TURN FULL-PORT, BALL VALVE) IN 9" DIAMETER VALVE BOX.
- AMBIENT LIGHT POWERED IRRIGATION CONTROLLER. DIG LEIT-2ET. PROVIDE QUANTITIES REQUIRED BY THE NUMBER OF STATIONS NECESSARY. PROVIDE WEATHER STATIONS IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN STANDARDS. PROVIDE A 12 INCH WIDE SQUARE X 8" THICK REINFORCED CONCRETE (4000 PSI) STABILIZING PAD BENEATH POLE, LEVEL WITH SURROUNDING FINISHED GRADE. PROVIDE WEATHER STATIONS MOUNTED A MINIMUM OF 5'1" ABOVE FINISHED GRADE ON A 1-1/2" INCH DIA. GALVANIZED STEEL PIPE WITH THREADED TOP CAP. DRILL INTO PIPE FOR CONDUCTORS AND REAM THE HOLE SMOOTH AND SEAL WITH 25 YEAR CLEAR FLEXIBLE CAULK. MOUNT THE POLE IN AN 18 INCH X 18 INCH X 12 INCH THICK REINFORCED CONCRETE STABILIZING PAD SET FLUSH WITH FINAL GRADE.
- IRRIGATION SYSTEM WATER SUPPLY MAIN. SLEEVE PIPE WITH RIGID PVC BENEATH WALKS, DRIVES AND ROADWAYS.
- DRIP LINE IRRIGATION SYSTEM ZONE FOR TURF AREAS AND TREE RINGS. PROVIDE RAINBIRD DRIP LINE, DRIP SYSTEM FOR TURF AND TREE RINGS IN THIS AREA. SLEEVE RIGID PVC BENEATH WALKS, DRIVES AND ROADWAYS. RE: DETAIL ON SHEET XX
- STATION CONTROL VALVE WITH PRESSURE REGULATOR IN VALVE BOX. PROVIDE WIRING AS REQUIRED BACK TO CONTROLLER. ADJUST NUMBER OF CONTROL VALVES TO SUIT DESIGN REQUIREMENTS OF THE SYSTEM IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. LOCATE CONTROL VALVES NO FURTHER THAN PERMITTED BY THE MANUFACTURER OF THE CONTROLLER.

GENERAL NOTES:

- PROVIDE COMPLETE LANDSCAPE IRRIGATION SYSTEM IN ACCORDANCE WITH THE SPECIFICATIONS AND DRAWINGS. DRAWINGS ARE GENERALLY SCHEMATIC AND PERFORMANCE BASED. PROVIDE DETAILED DRAWINGS AS REQUIRED BY THE SPECIFICATIONS.
- LOCATE AND UTILIZE EXISTING PVC SLEEVES BETWEEN ISLANDS FOR PIPING AND LOW VOLTAGE CONDUCTORS.
- LAYOUT AND DETAILS OF DRIP IRRIGATION SYSTEMS SHALL COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS AND THE DETAILS INCLUDED IN THIS SET OF DRAWINGS.

LEGEND

- WATER METER IN METER VAULT
- BACKFLOW PREVENTER IN ACCORDANCE WITH AHJ IN ABOVE GROUND ENCLOSURE
- ISOLATION VALVE IN VALVE BOX
- CONTROL VALVE IN VALVE BOX
- IRRIGATION SUPPLY MAIN
- IRRIGATION SYSTEM CONTROLLER
- TURF GRASS AREA
- SIDEWALK



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

FREES & NICHOLS

6136 Frisco Square Blvd., Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freese.com

CITY OF FRISCO, TEXAS

LEBANON ROAD IMPROVEMENTS AND FORCE MAIN

LANDSCAPE IRRIGATION

LEBANON ROAD IRRIGATION PLAN
 STA 136+00 TO PHASE 1 BEGIN

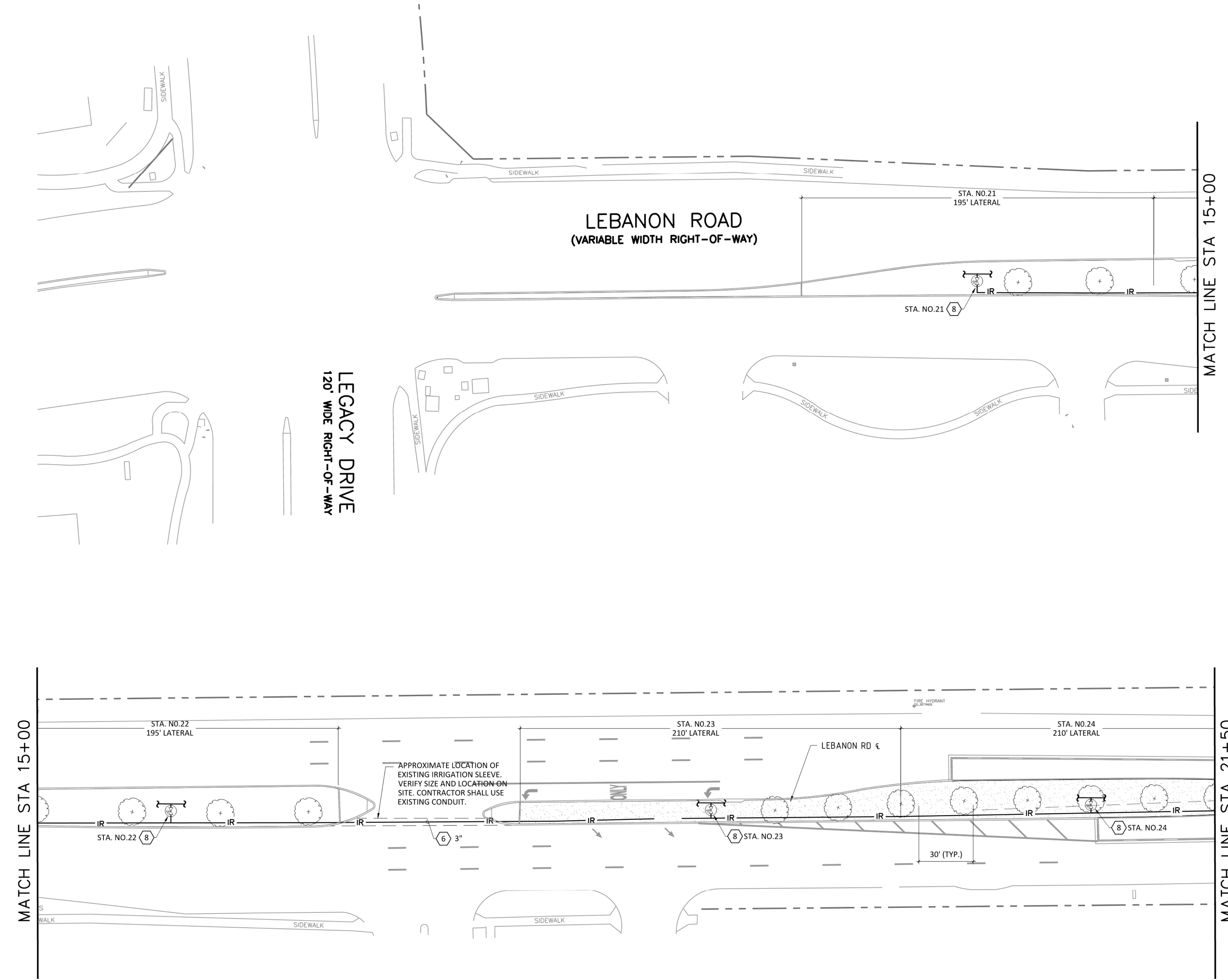
NO.	ISSUE	DATE	BY	DATE	FRN/JOB NO.	FILE NAME
		4/2017			FRCL15624	IR-RD-PL-Plant4
					DESIGNED	
					DRAWN	
					REVISED	
					CHECKED	
					RIK	

VERIFIED SCALE 1
 Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.

SHEET IR-4

SEQ. 93

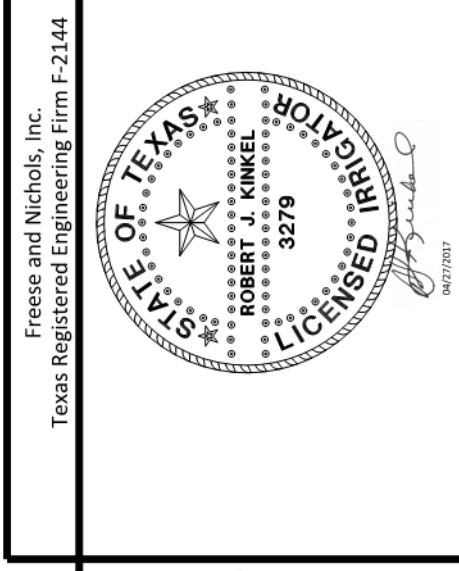
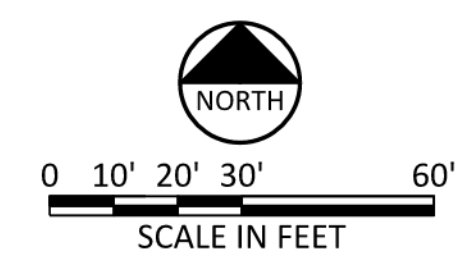
ACAD Ref: 21.0s (LMS Tech)
 Filename: N:\PLBG\IR-RD-PL-Plant5.dwg
 Last Saved: 4/26/2017 1:15 PM Saved By: 02387



- ### NOTES BY SYMBOL "1"
- 3" IRRIGATION SYSTEM RAW WATER SUPPLY TAP INTO CITY MAIN BY THE CITY, PER TCEQ, AHJ AND CITY OF FRISCO STANDARDS. VERIFY EXACT LOCATION PRIOR TO BEGINNING CONSTRUCTION.
 - 3" WATER METER AND METER VAULT PROVIDED BY THE CITY.
 - 3" BACKFLOW PREVENTER IN ACCORDANCE WITH AHJ IN ABOVE GROUND ENCLOSURE. RE: DETAIL 4/IR-11.
 - 3" ISOLATION VALVE (¼ TURN FULL-PORT, BALL VALVE) IN 9" DIAMETER VALVE BOX.
 - AMBIENT LIGHT POWERED IRRIGATION CONTROLLER. DIG LEIT-2ET. PROVIDE QUANTITIES REQUIRED BY THE NUMBER OF STATIONS NECESSARY. PROVIDE WEATHER STATIONS IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN STANDARDS. PROVIDE A 12 INCH WIDE SQUARE X 8" THICK REINFORCED CONCRETE (4000 PSI) STABILIZING PAD BENEATH POLE, LEVEL WITH SURROUNDING FINISHED GRADE. PROVIDE WEATHER STATIONS MOUNTED A MINIMUM OF 5'1" ABOVE FINISHED GRADE ON A 1-1/2" INCH DIA. GALVANIZED STEEL PIPE WITH THREADED TOP CAP. DRILL INTO PIPE FOR CONDUCTORS AND REAM THE HOLE SMOOTH AND SEAL WITH 25 YEAR CLEAR FLEXIBLE CAULK. MOUNT THE POLE IN AN 18 INCH X 18 INCH X 12 INCH THICK REINFORCED CONCRETE STABILIZING PAD SET FLUSH WITH FINAL GRADE.
 - IRRIGATION SYSTEM WATER SUPPLY MAIN. SLEEVE PIPE WITH RIGID PVC BENEATH WALKS, DRIVES AND ROADWAYS.
 - DRIP LINE IRRIGATION SYSTEM ZONE FOR TURF AREAS AND TREE RINGS. PROVIDE RAINBIRD DRIP LINE, DRIP SYSTEM FOR TURF AND TREE RINGS IN THIS AREA. SLEEVE RIGID PVC BENEATH WALKS, DRIVES AND ROADWAYS. RE: DETAIL ON SHEET XX
 - STATION CONTROL VALVE WITH PRESSURE REGULATOR IN VALVE BOX. PROVIDE WIRING AS REQUIRED BACK TO CONTROLLER. ADJUST NUMBER OF CONTROL VALVES TO SUIT DESIGN REQUIREMENTS OF THE SYSTEM IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. LOCATE CONTROL VALVES NO FURTHER THAN PERMITTED BY THE MANUFACTURER OF THE CONTROLLER.

- ### GENERAL NOTES:
- PROVIDE COMPLETE LANDSCAPE IRRIGATION SYSTEM IN ACCORDANCE WITH THE SPECIFICATIONS AND DRAWINGS. DRAWINGS ARE GENERALLY SCHEMATIC AND PERFORMANCE BASED. PROVIDE DETAILED DRAWINGS AS REQUIRED BY THE SPECIFICATIONS.
 - LOCATE AND UTILIZE EXISTING PVC SLEEVES BETWEEN ISLANDS FOR PIPING AND LOW VOLTAGE CONDUCTORS.
 - LAYOUT AND DETAILS OF DRIP IRRIGATION SYSTEMS SHALL COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS AND THE DETAILS INCLUDED IN THIS SET OF DRAWINGS.

- ### LEGEND
- Water Meter in Meter Vault
 - Backflow Preventer in Accordance with AHJ in Above Ground Enclosure
 - Isolation Valve in Valve Box
 - Control Valve in Valve Box
 - Irrigation Supply Main
 - Irrigation System Controller
 - Turf Grass Area
 - Sidewalk

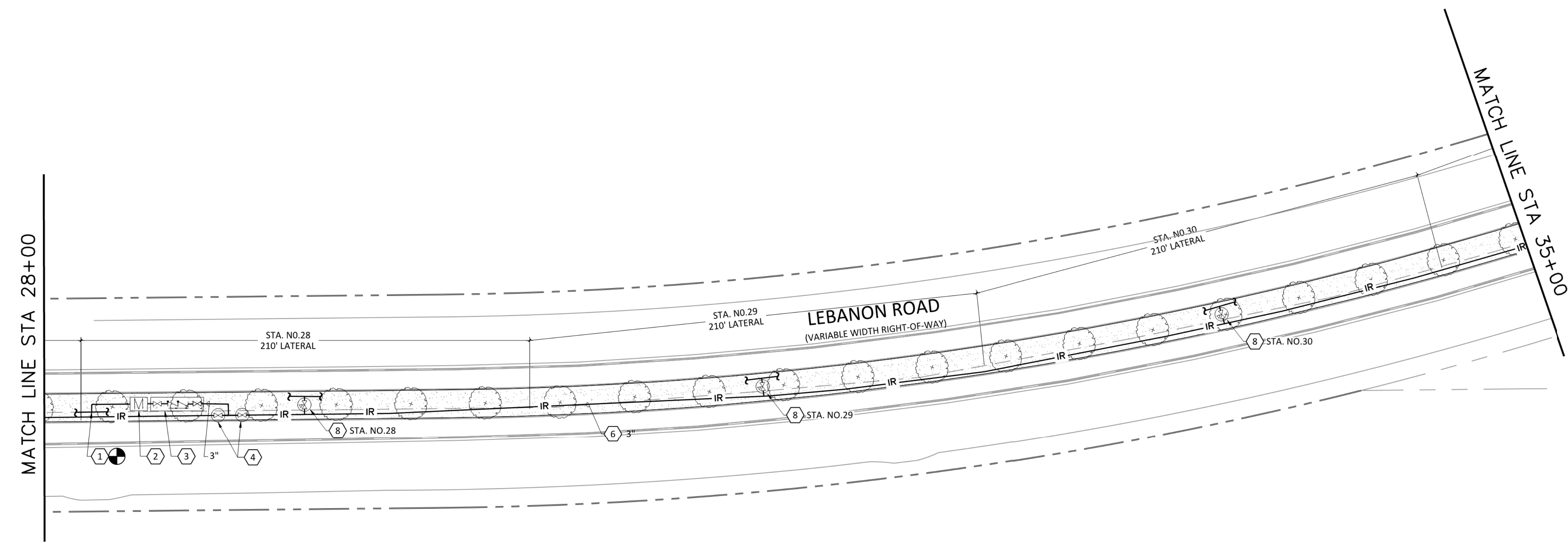
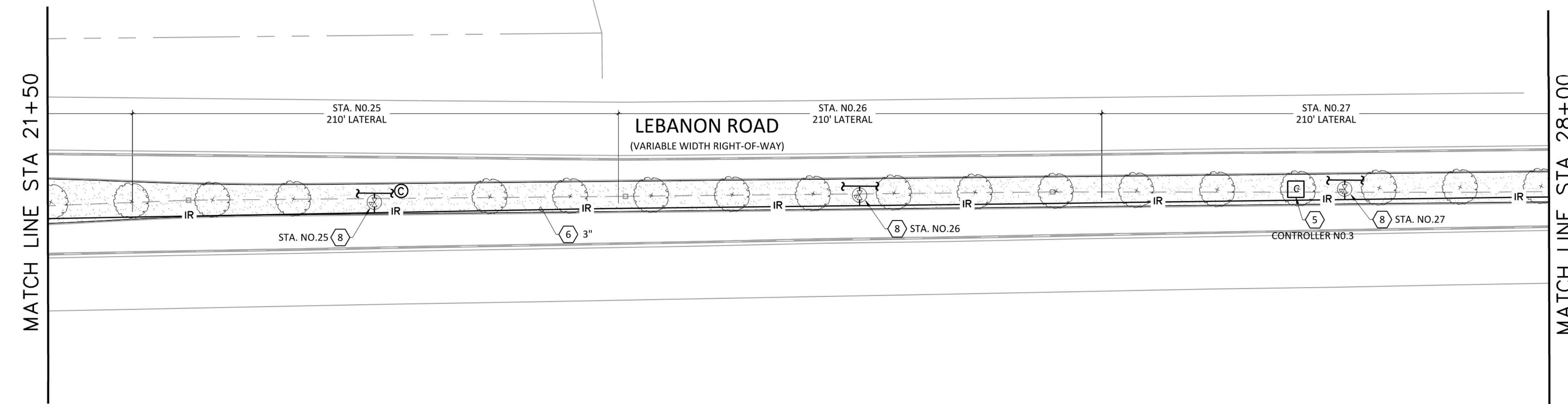


FREESSE & NICHOLS
 6136 Frisco Square Blvd., Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freesse.com

CITY OF FRISCO, TEXAS
 LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
 LANDSCAPE IRRIGATION
 LEBANON ROAD IRRIGATION PLAN
 PHASE 1 BEGIN TO STA 21+50

NO.	ISSUE	BY	DATE	FRN JOB NO.	FRCL15624
			4/2017	DATE	
			DESIGNED	MLM	
			DRAWN	EMF	
			REVISED		
			CHECKED	HH	
			FILE NAME	IR-RD-PL-Plant5	
VERIFY SCALE	1				
Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.					
SHEET	IR-5				
SEQ.	94				

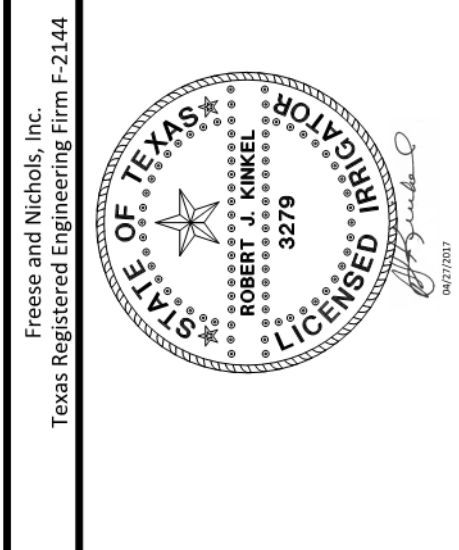
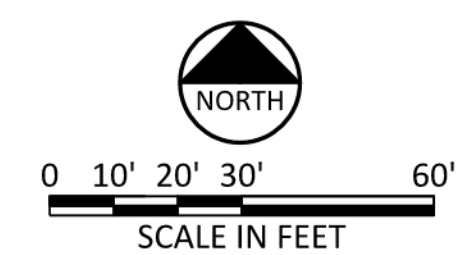
ACAD Ref: 21.0s (LMS Tech)
 Filename: N:\PLBG\IR-RD-PL-Plant6.dwg
 Last Saved: 4/27/2017 1:04 PM Saved By: 02387



- NOTES BY SYMBOL "⬡"**
- 3" IRRIGATION SYSTEM RAW WATER SUPPLY TAP INTO CITY MAIN BY THE CITY, PER TCEQ, AHJ AND CITY OF FRISCO STANDARDS. VERIFY EXACT LOCATION PRIOR TO BEGINNING CONSTRUCTION.
 - 3" WATER METER AND METER VAULT PROVIDED BY THE CITY.
 - 3" BACKFLOW PREVENTER IN ACCORDANCE WITH AHJ IN ABOVE GROUND ENCLOSURE. RE: DETAIL 4/IR-11
 - 3" ISOLATION VALVE (¼ TURN FULL-PORT, BALL VALVE) IN 9" DIAMETER VALVE BOX.
 - AMBIENT LIGHT POWERED IRRIGATION CONTROLLER. DIG LEIT-2ET. PROVIDE QUANTITIES REQUIRED BY THE NUMBER OF STATIONS NECESSARY. PROVIDE WEATHER STATIONS IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN STANDARDS. PROVIDE A 12 INCH WIDE SQUARE X 8" THICK REINFORCED CONCRETE (4000 PSI) STABILIZING PAD BENEATH POLE, LEVEL WITH SURROUNDING FINISHED GRADE. PROVIDE WEATHER STATIONS MOUNTED A MINIMUM OF 3" ABOVE FINISHED GRADE ON A 1-1/2" INCH DIA. GALVANIZED STEEL PIPE WITH THREADED TOP CAP. DRILL INTO PIPE FOR CONDUCTORS AND REAM THE HOLE SMOOTH AND SEAL WITH 25 YEAR CLEAR FLEXIBLE CAULK. MOUNT THE POLE IN AN 18 INCH X 18 INCH X 12 INCH THICK REINFORCED CONCRETE STABILIZING PAD SET FLUSH WITH FINAL GRADE.
 - IRRIGATION SYSTEM WATER SUPPLY MAIN. SLEEVE PIPE WITH RIGID PVC BENEATH WALKS, DRIVES AND ROADWAYS.
 - DRIP LINE IRRIGATION SYSTEM ZONE FOR TURF AREAS AND TREE RINGS. PROVIDE RAINBIRD DRIP LINE, DRIP SYSTEM FOR TURF AND TREE RINGS IN THIS AREA. SLEEVE RIGID PVC BENEATH WALKS, DRIVES AND ROADWAYS. RE: DETAIL ON SHEET XX
 - STATION CONTROL VALVE WITH PRESSURE REGULATOR IN VALVE BOX. PROVIDE WIRING AS REQUIRED BACK TO CONTROLLER. ADJUST NUMBER OF CONTROL VALVES TO SUIT DESIGN REQUIREMENTS OF THE SYSTEM IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. LOCATE CONTROL VALVES NO FURTHER THAN PERMITTED BY THE MANUFACTURER OF THE CONTROLLER.

- GENERAL NOTES:**
- PROVIDE COMPLETE LANDSCAPE IRRIGATION SYSTEM IN ACCORDANCE WITH THE SPECIFICATIONS AND DRAWINGS. DRAWINGS ARE GENERALLY SCHEMATIC AND PERFORMANCE BASED. PROVIDE DETAILED DRAWINGS AS REQUIRED BY THE SPECIFICATIONS.
 - LOCATE AND UTILIZE EXISTING PVC SLEEVES BETWEEN ISLANDS FOR PIPING AND LOW VOLTAGE CONDUCTORS.
 - LAYOUT AND DETAILS OF DRIP IRRIGATION SYSTEMS SHALL COMPLY WITH MANUFACTURERS WRITTEN INSTRUCTIONS AND THE DETAILS INCLUDED IN THIS SET OF DRAWINGS.

- LEGEND**
- WATER METER IN METER VAULT
 - BACKFLOW PREVENTER IN ACCORDANCE WITH AHJ IN ABOVE GROUND ENCLOSURE
 - ISOLATION VALVE IN VALVE BOX
 - CONTROL VALVE IN VALVE BOX
 - IRRIGATION SUPPLY MAIN
 - IRRIGATION SYSTEM CONTROLLER
 - TURF GRASS AREA
 - SIDEWALK

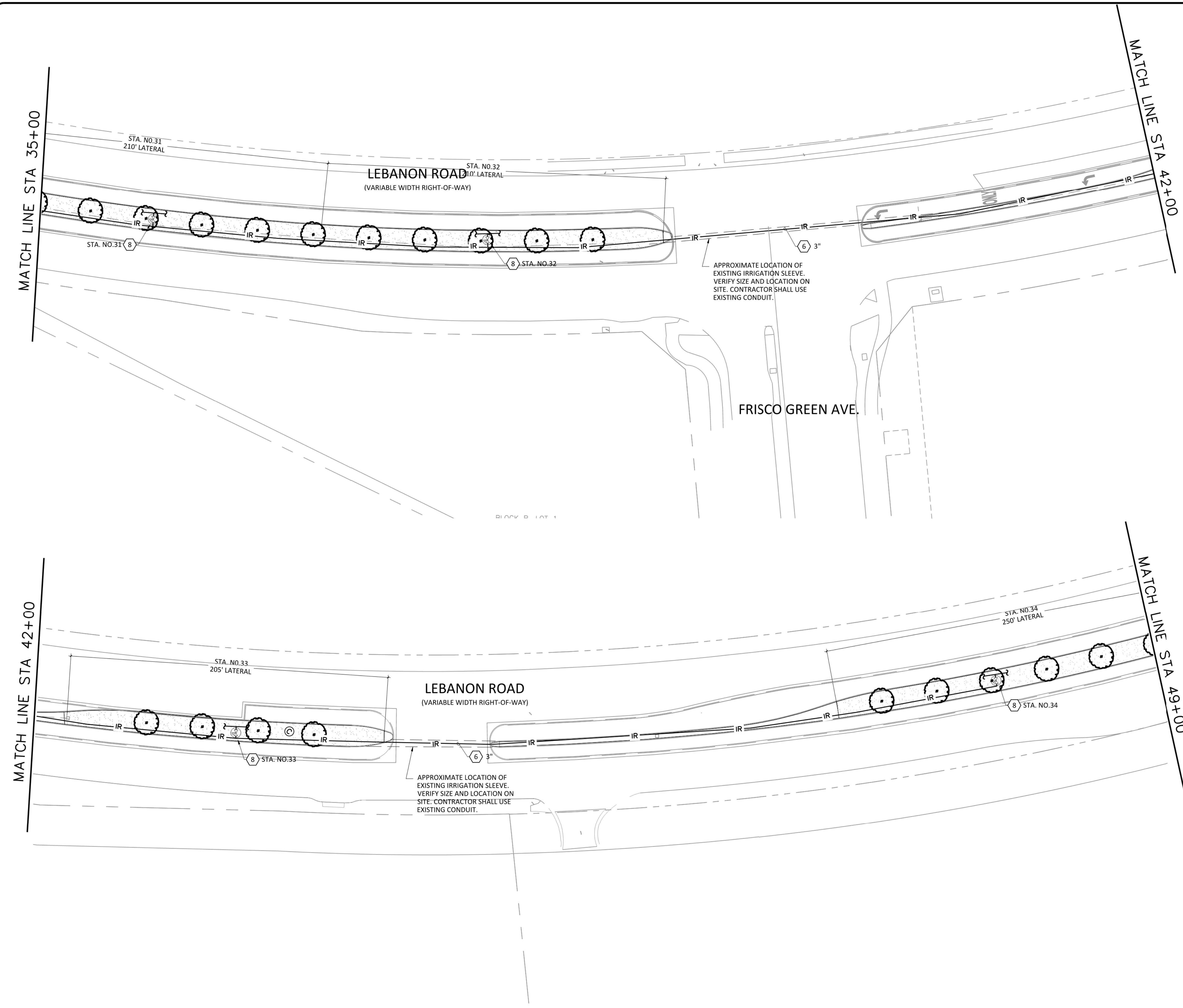


FREESSE & NICHOLS
 6136 Frisco Square Blvd., Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freesse.com

CITY OF FRISCO, TEXAS
 LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
 LANDSCAPE IRRIGATION
 LEBANON ROAD IRRIGATION PLAN
 PHASE 1 STA 21+50 TO STA 35+00

NO.	ISSUE	DATE	BY	FRAN JOB NO.	FRCL15624
		4/2017		DATE	
				DESIGNED	MLM
				DRAWN	EMF
				REVISED	
				CHECKED	HH
				FILE NAME	IR-RD-PL-Plant6
VERIFY SCALE		Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.			
1					
SHEET	IR-6				
SEQ.	95				

ACAD Ref: 21.0s (LMS Tech)
 Filename: N:\PLBG\IR-RD-PL-Plant7.dwg
 Last Saved: 4/27/2017 1:06 PM Saved By: 02387

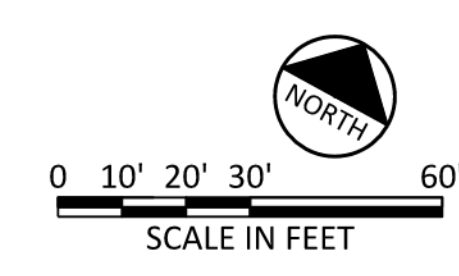


- NOTES BY SYMBOL**
- 3" IRRIGATION SYSTEM RAW WATER SUPPLY TAP INTO CITY MAIN BY THE CITY, PER TCEQ, AHJ AND CITY OF FRISCO STANDARDS. VERIFY EXACT LOCATION PRIOR TO BEGINNING CONSTRUCTION.
 - 3" WATER METER AND METER VAULT PROVIDED BY THE CITY.
 - 3" BACKFLOW PREVENTER IN ACCORDANCE WITH AHJ IN ABOVE GROUND ENCLOSURE. RE: DETAIL 4/IR-11.
 - 3" ISOLATION VALVE (¼ TURN FULL-PORT, BALL VALVE) IN 9" DIAMETER VALVE BOX.
 - AMBIENT LIGHT POWERED IRRIGATION CONTROLLER. DIG LEIT-ZET. PROVIDE QUANTITIES REQUIRED BY THE NUMBER OF STATIONS NECESSARY. PROVIDE WEATHER STATIONS IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN STANDARDS. PROVIDE A 12 INCH WIDE SQUARE X 8" THICK REINFORCED CONCRETE (4000 PSI) STABILIZING PAD BENEATH POLE, LEVEL WITH SURROUNDING FINISHED GRADE. PROVIDE WEATHER STATIONS MOUNTED A MINIMUM OF 51" ABOVE FINISHED GRADE ON A 1-1/2" INCH DIA. GALVANIZED STEEL PIPE WITH THREADED TOP CAP. DRILL INTO PIPE FOR CONDUCTORS AND REAM THE HOLE SMOOTH AND SEAL WITH 25 YEAR CLEAR FLEXIBLE CAULK. MOUNT THE POLE IN AN 18 INCH X 18 INCH X 12 INCH THICK REINFORCED CONCRETE STABILIZING PAD SET FLUSH WITH FINAL GRADE.
 - IRRIGATION SYSTEM WATER SUPPLY MAIN. SLEEVE PIPE WITH RIGID PVC BENEATH WALKS, DRIVES AND ROADWAYS.
 - DRIP LINE IRRIGATION SYSTEM ZONE FOR TURF AREAS AND TREE RINGS. PROVIDE RAINBIRD DRIP LINE, DRIP SYSTEM FOR TURF AND TREE RINGS IN THIS AREA. SLEEVE RIGID PVC BENEATH WALKS, DRIVES AND ROADWAYS. RE: DETAIL ON SHEET XX
 - STATION CONTROL VALVE WITH PRESSURE REGULATOR IN VALVE BOX. PROVIDE WIRING AS REQUIRED BACK TO CONTROLLER. ADJUST NUMBER OF CONTROL VALVES TO SUIT DESIGN REQUIREMENTS OF THE SYSTEM IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. LOCATE CONTROL VALVES NO FURTHER THAN PERMITTED BY THE MANUFACTURER OF THE CONTROLLER.

- GENERAL NOTES:**
- PROVIDE COMPLETE LANDSCAPE IRRIGATION SYSTEM IN ACCORDANCE WITH THE SPECIFICATIONS AND DRAWINGS. DRAWINGS ARE GENERALLY SCHEMATIC AND PERFORMANCE BASED. PROVIDE DETAILED DRAWINGS AS REQUIRED BY THE SPECIFICATIONS.
 - LOCATE AND UTILIZE EXISTING PVC SLEEVES BETWEEN ISLANDS FOR PIPING AND LOW VOLTAGE CONDUCTORS.
 - LAYOUT AND DETAILS OF DRIP IRRIGATION SYSTEMS SHALL COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS AND THE DETAILS INCLUDED IN THIS SET OF DRAWINGS.

LEGEND

- WATER METER IN METER VAULT
- BACKFLOW PREVENTER IN ACCORDANCE WITH AHJ IN ABOVE GROUND ENCLOSURE
- ISOLATION VALVE IN VALVE BOX
- CONTROL VALVE IN VALVE BOX
- IRRIGATION SUPPLY MAIN
- IRRIGATION SYSTEM CONTROLLER
- TURF GRASS AREA
- SIDEWALK

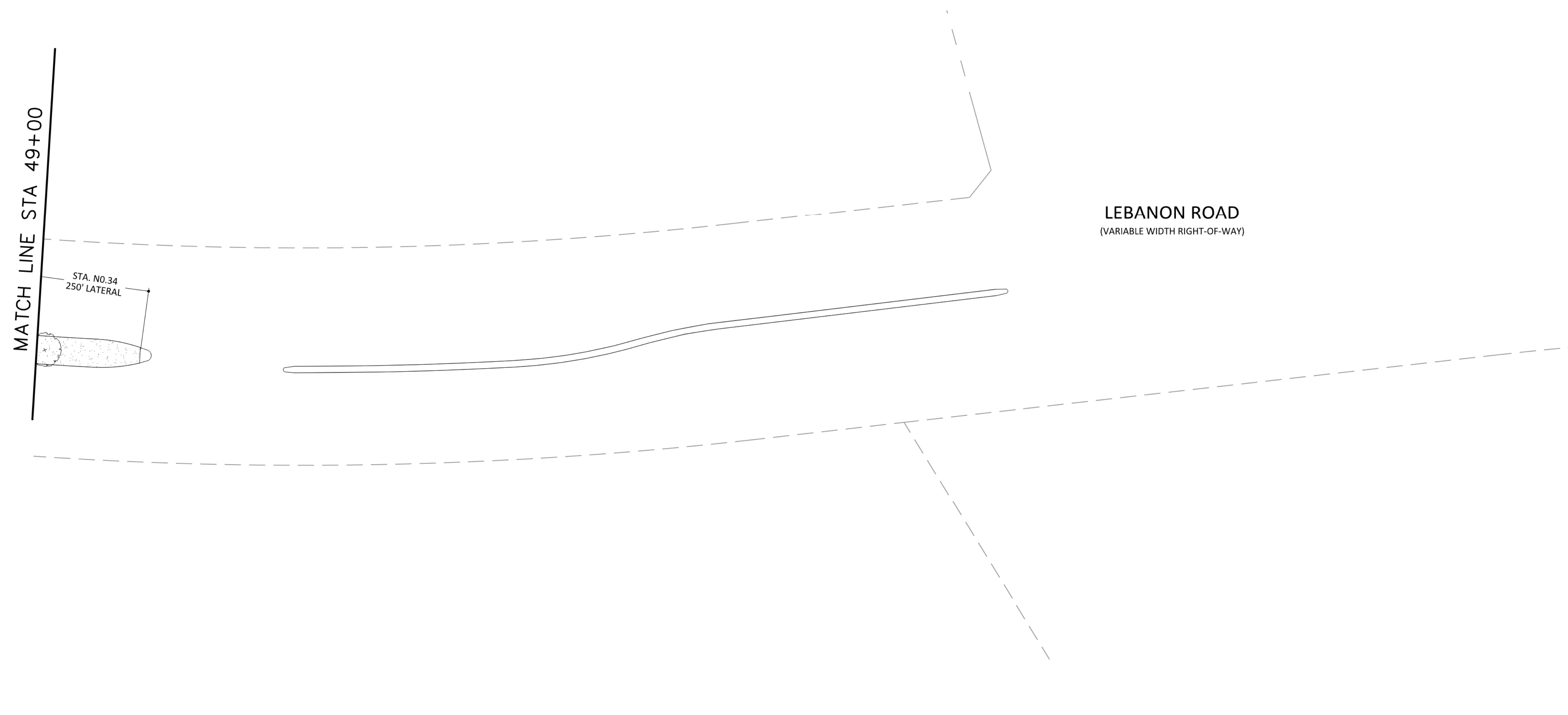


Freese and Nichols, Inc.
 Texas Registered Engineering Firm F-2144

FREES & NICHOLS
 6136 Frisco Square Blvd., Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freese.com

CITY OF FRISCO, TEXAS
 LANDSCAPE IRRIGATION
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
LEBANON ROAD IRRIGATION PLAN
PHASE 1 STA 35+00 TO 49+00

FRN JOB NO.	FRCL15624
DATE	4/2017
DESIGNED	MRB
DRAWN	MRB
REVISID	
CHECKED	RIK
FILE NAME	IR-RD-PL-Plant7
NO. ISSUE	
BY	
DATE	
VERIFY SCALE	1
Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.	
SHEET	IR-7
SEQ.	96



LEBANON ROAD
 (VARIABLE WIDTH RIGHT-OF-WAY)

NOTES BY SYMBOL "⬠"

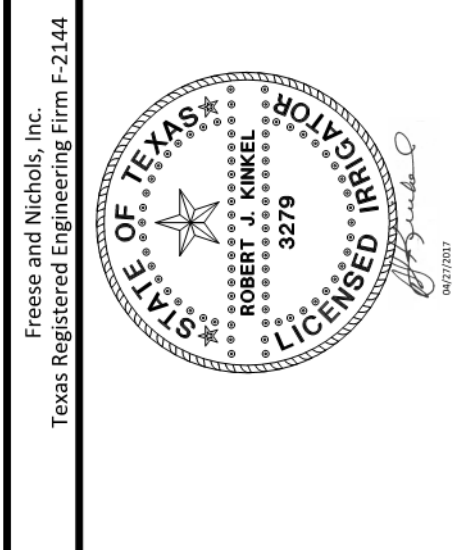
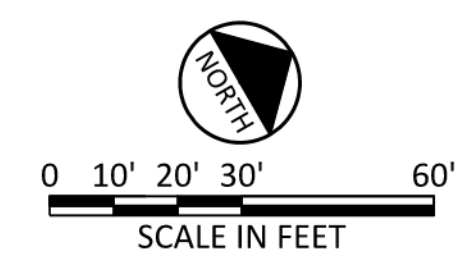
- 3" IRRIGATION SYSTEM RAW WATER SUPPLY TAP INTO CITY MAIN BY THE CITY, PER TCEQ, AHJ AND CITY OF FRISCO STANDARDS. VERIFY EXACT LOCATION PRIOR TO BEGINNING CONSTRUCTION.
- 3" WATER METER AND METER VAULT PROVIDED BY THE CITY.
- 3" BACKFLOW PREVENTER IN ACCORDANCE WITH AHJ IN ABOVE GROUND ENCLOSURE. . RE: DETAIL 4/IR-11.
- 3" ISOLATION VALVE (¼ TURN FULL-PORT, BALL VALVE) IN 9" DIAMETER VALVE BOX.
- AMBIENT LIGHT POWERED IRRIGATION CONTROLLER. DIG LEIT-2ET. PROVIDE QUANTITIES REQUIRED BY THE NUMBER OF STATIONS NECESSARY. PROVIDE WEATHER STATIONS IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN STANDARDS. PROVIDE A 12 INCH WIDE SQUARE X 8" THICK REINFORCED CONCRETE (4000 PSI) STABILIZING PAD BENEATH POLE, LEVEL WITH SURROUNDING FINISHED GRADE. PROVIDE WEATHER STATIONS MOUNTED A MINIMUM OF 51" ABOVE FINISHED GRADE ON A 1-1/2" INCH DIA. GALVANIZED STEEL PIPE WITH THREADED TOP CAP. DRILL INTO PIPE FOR CONDUCTORS AND REAM THE HOLE SMOOTH AND SEAL WITH 25 YEAR CLEAR FLEXIBLE CAULK. MOUNT THE POLE IN AN 18 INCH X 18 INCH X 12 INCH THICK REINFORCED CONCRETE STABILIZING PAD SET FLUSH WITH FINAL GRADE.
- IRRIGATION SYSTEM WATER SUPPLY MAIN. SLEEVE PIPE WITH RIGID PVC BENEATH WALKS, DRIVES AND ROADWAYS.
- DRIP LINE IRRIGATION SYSTEM ZONE FOR TURF AREAS AND TREE RINGS. PROVIDE RAINBIRD DRIP LINE, DRIP SYSTEM FOR TURF AND TREE RINGS IN THIS AREA. SLEEVE RIGID PVC BENEATH WALKS, DRIVES AND ROADWAYS. RE: DETAIL ON SHEET XX
- STATION CONTROL VALVE WITH PRESSURE REGULATOR IN VALVE BOX. PROVIDE WIRING AS REQUIRED BACK TO CONTROLLER. ADJUST NUMBER OF CONTROL VALVES TO SUIT DESIGN REQUIREMENTS OF THE SYSTEM IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. LOCATE CONTROL VALVES NO FURTHER THAN PERMITTED BY THE MANUFACTURER OF THE CONTROLLER.

GENERAL NOTES:

- PROVIDE COMPLETE LANDSCAPE IRRIGATION SYSTEM IN ACCORDANCE WITH THE SPECIFICATIONS AND DRAWINGS. DRAWINGS ARE GENERALLY SCHEMATIC AND PERFORMANCE BASED. PROVIDE DETAILED DRAWINGS AS REQUIRED BY THE SPECIFICATIONS.
- LOCATE AND UTILIZE EXISTING PVC SLEEVES BETWEEN ISLANDS FOR PIPING AND LOW VOLTAGE CONDUCTORS.
- LAYOUT AND DETAILS OF DRIP IRRIGATION SYSTEMS SHALL COMPLY WITH MANUFACTURERS WRITTEN INSTRUCTIONS AND THE DETAILS INCLUDED IN THIS SET OF DRAWINGS.

LEGEND

- WATER METER IN METER VAULT
- BACKFLOW PREVENTER IN ACCORDANCE WITH AHJ IN ABOVE GROUND ENCLOSURE
- ISOLATION VALVE IN VALVE BOX
- CONTROL VALVE IN VALVE BOX
- IRRIGATION SUPPLY MAIN
- IRRIGATION SYSTEM CONTROLLER
- TURF GRASS AREA
- SIDEWALK



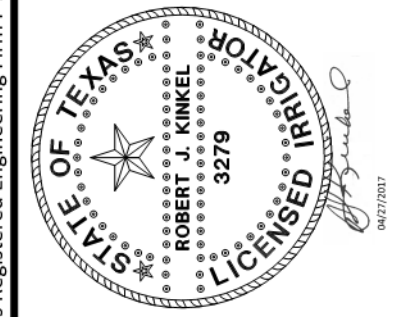
FREESSE & NICHOLS
 6136 Frisco Square Blvd., Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freesse.com

CITY OF FRISCO, TEXAS
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN

LANDSCAPE IRRIGATION
LEBANON ROAD IRRIGATION PLAN
PHASE 1 STA 49+00 TO END

NO.	ISSUE	BY	DATE	FRN JOB NO.	FR15624
			4/2017	DATE	4/2017
				DESIGNED	MRB
				DRAWN	MRB
				REVISED	MRB
				CHECKED	RIK
				FILE NAME	IR-RD-PL-Plant8
VERIFY SCALE: 1 Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.					
SHEET		IR-8			
SEQ.		97			

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



FREEZE & NICHOLS
6136 Frisco Square Blvd., Suite 200
Frisco, Texas 75034
Phone - (972) 624-9201
Fax - (972) 624-9202
Web - www.freeze.com

CITY OF FRISCO, TEXAS
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN

LANDSCAPE IRRIGATION
**LEBANON ROAD IRRIGATION PLAN
ENARGED PLAN**

NO.	ISSUE	DATE	BY	FILE NAME
				IR-RD-PL-Plant10
FRAN JOB NO.	FRCL15624	DATE	4/2017	
DESIGNED	MRB	DRAWN	MRB	
REVISED	MRB	CHECKED	RIK	
VERIFY SCALE	1			

NOTES BY SYMBOL "C"

- 3" IRRIGATION SYSTEM RAW WATER SUPPLY TAP INTO CITY MAIN BY THE CITY, PER TCEQ, AHJ AND CITY OF FRISCO STANDARDS. VERIFY EXACT LOCATION PRIOR TO BEGINNING CONSTRUCTION.
- 3" WATER METER AND METER VAULT PROVIDED BY THE CITY.
- 3" BACKFLOW PREVENTER IN ACCORDANCE WITH AHJ IN ABOVE GROUND ENCLOSURE. RE: DETAIL 4/IR-11.
- 3" ISOLATION VALVE (¼ TURN FULL-PORT, BALL VALVE) IN 9" DIAMETER VALVE BOX.
- AMBIENT LIGHT POWERED IRRIGATION CONTROLLER. DIG LEIT-2ET. PROVIDE QUANTITIES REQUIRED BY THE NUMBER OF STATIONS NECESSARY. PROVIDE WEATHER STATIONS IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN STANDARDS. PROVIDE A 12 INCH WIDE SQUARE X 8" THICK REINFORCED CONCRETE (4000 PSI) STABILIZING PAD BENEATH POLE, LEVEL WITH SURROUNDING FINISHED GRADE. PROVIDE WEATHER STATIONS MOUNTED A MINIMUM OF 5'1" ABOVE FINISHED GRADE ON A 1-1/2" INCH DIA. GALVANIZED STEEL PIPE WITH THREADED TOP CAP. DRILL INTO PIPE FOR CONDUCTORS AND REAM THE HOLE SMOOTH AND SEAL WITH 25 YEAR CLEAR FLEXIBLE CAULK. MOUNT THE POLE IN AN 18 INCH X 18 INCH X 12 INCH THICK REINFORCED CONCRETE STABILIZING PAD SET FLUSH WITH FINAL GRADE.
- IRRIGATION SYSTEM WATER SUPPLY MAIN. SLEEVE PIPE WITH RIGID PVC BENEATH WALKS, DRIVES AND ROADWAYS.
- DRIP LINE IRRIGATION SYSTEM ZONE FOR TURF AREAS AND TREE RINGS. PROVIDE RAINBIRD DRIP LINE, DRIP SYSTEM FOR TURF AND TREE RINGS IN THIS AREA. SLEEVE RIGID PVC BENEATH WALKS, DRIVES AND ROADWAYS. RE: DETAIL ON SHEET XX
- STATION CONTROL VALVE WITH PRESSURE REGULATOR IN VALVE BOX. PROVIDE WIRING AS REQUIRED BACK TO CONTROLLER. ADJUST NUMBER OF CONTROL VALVES TO SUIT DESIGN REQUIREMENTS OF THE SYSTEM IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. LOCATE CONTROL VALVES NO FURTHER THAN PERMITTED BY THE MANUFACTURER OF THE CONTROLLER.

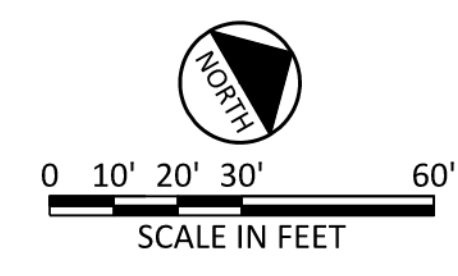
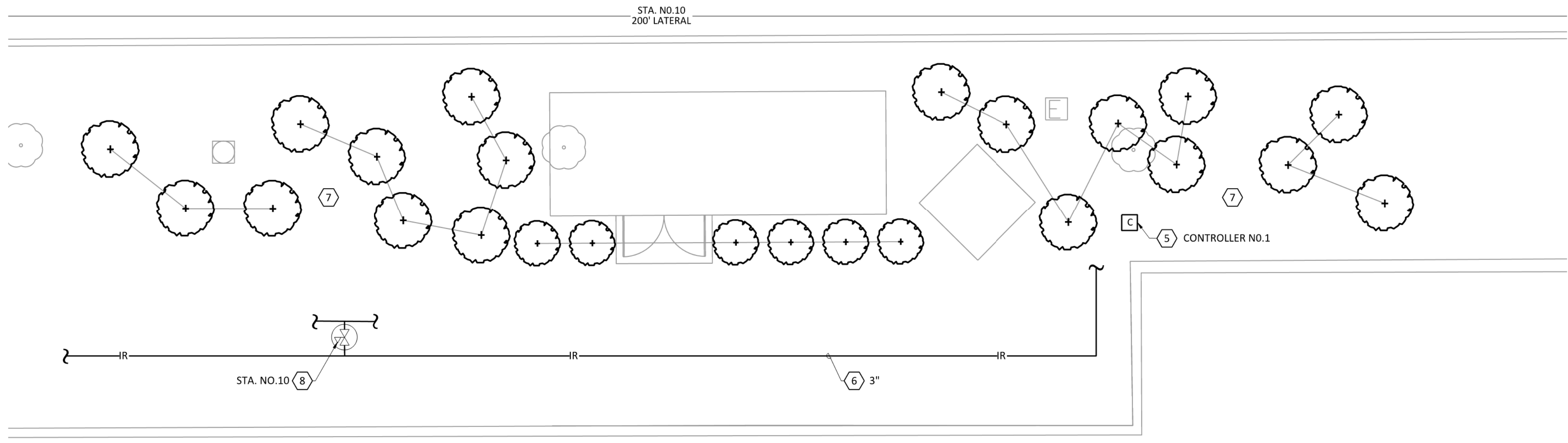
GENERAL NOTES:

- PROVIDE COMPLETE LANDSCAPE IRRIGATION SYSTEM IN ACCORDANCE WITH THE SPECIFICATIONS AND DRAWINGS. DRAWINGS ARE GENERALLY SCHEMATIC AND PERFORMANCE BASED. PROVIDE DETAILED DRAWINGS AS REQUIRED BY THE SPECIFICATIONS.
- LOCATE AND UTILIZE EXISTING PVC SLEEVES BETWEEN ISLANDS FOR PIPING AND LOW VOLTAGE CONDUCTORS.
- LAYOUT AND DETAILS OF DRIP IRRIGATION SYSTEMS SHALL COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS AND THE DETAILS INCLUDED IN THIS SET OF DRAWINGS.

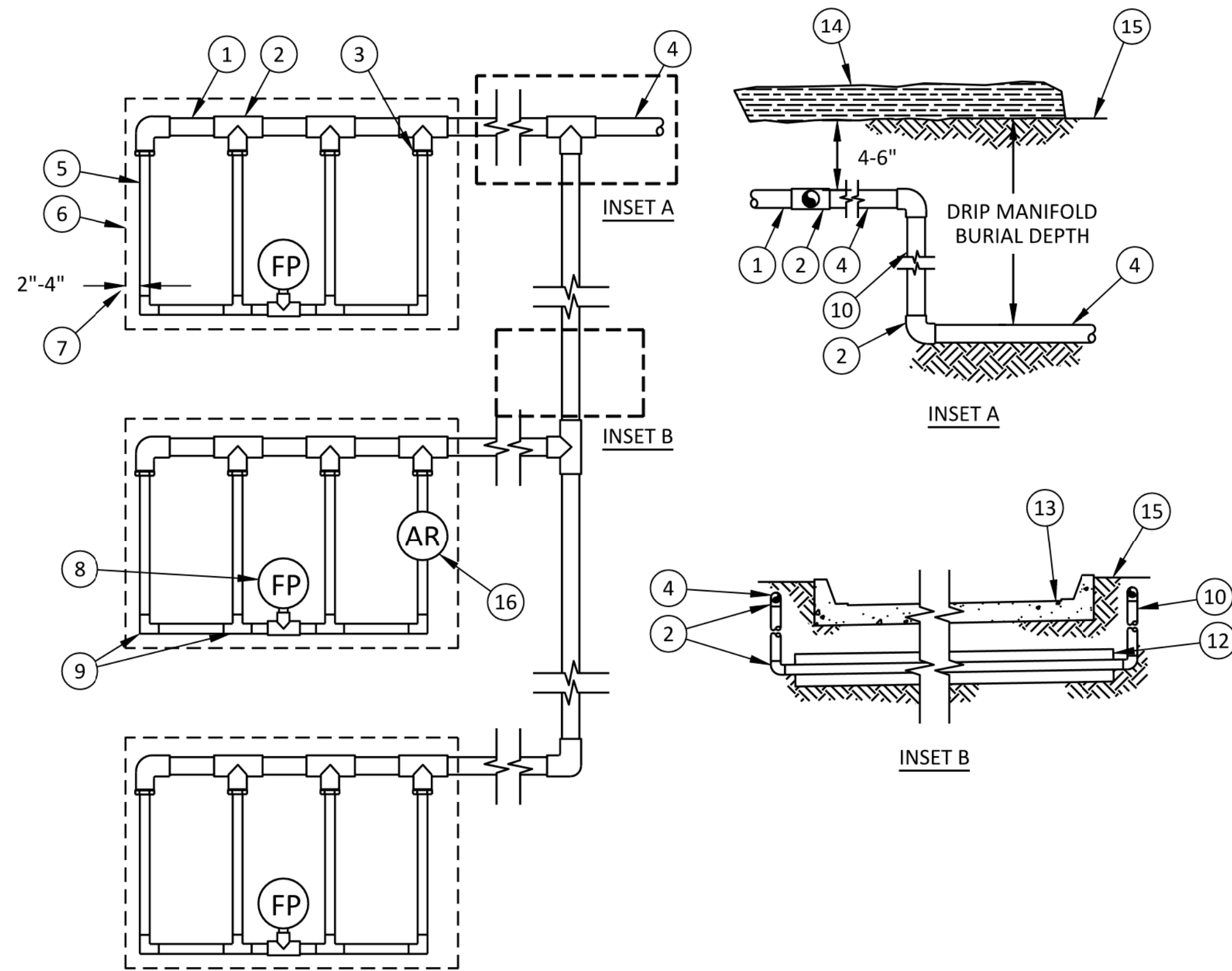
LEGEND

- WATER METER IN METER VAULT
- BACKFLOW PREVENTER IN ACCORDANCE WITH AHJ IN ABOVE GROUND ENCLOSURE
- ISOLATION VALVE IN VALVE BOX
- CONTROL VALVE IN VALVE BOX
- IRRIGATION SUPPLY MAIN
- IRRIGATION SYSTEM CONTROLLER
- TURF GRASS AREA
- SIDEWALK

LEBANON ROAD



ACAD Ref: 21.0s (LMS Tech)
Filename: N:\PLBG\IR-RD-PL-Plant10.dwg
Last Saved: 4/26/2017 1:16 PM. Saved By: 02387



- ① PVC SUPPLY HEADER
- ② PVC SCH 40 TEE OR EL (TYPICAL)
- ③ BARB X MALE FITTING:
RAIN BIRD XFF-MA FITTING (TYPICAL)
- ④ PVC DRIP MANIFOLD FROM RAIN BIRD CONTROL ZONE VALVE KIT (SIZED TO MEET LATERAL FLOW DEMAND)
- ⑤ SUB-SURFACE DRIPLINE:
RAIN BIRD XF SERIES DRIPLINE (TYPICAL)
POTABLE: XFS DRIPLINE
NON-POTABLE: XFSP DRIPLINE
- ⑥ PERIMETER OF AREA
- ⑦ PERIMETER DRIPLINE PIPE TO BE INSTALLED 2"-4" FROM PERIMETER OF AREA
- ⑧ FLUSH POINT (TYPICAL) - SEE RAIN BIRD XFS DETAILS FOR FLUSH POINT INSTALLATION
- ⑨ BARB X BARB INSERT TEE OR EL:
RAIN BIRD XFF-TEE OR
RAIN BIRD XFF-ELBOW (TYPICAL)
- ⑩ PVC RISER PIPE
- ⑪ PVC SUPPLY MANIFOLD
- ⑫ PVC SCH 40 SLEEVE PIPE SIZED TWICE THE SIZE OF MANIFOLD PIPE SIZE
- ⑬ PAVEMENT AND CURB
- ⑭ TURF OR MULCH
- ⑮ FINISH GRADE
- ⑯ 1/2" AIR RELIEF VALVE: RAIN BIRD MODEL: ARV050 SEE RAIN BIRD XFS DETAILS FOR AIR RELIEF INSTALLATION

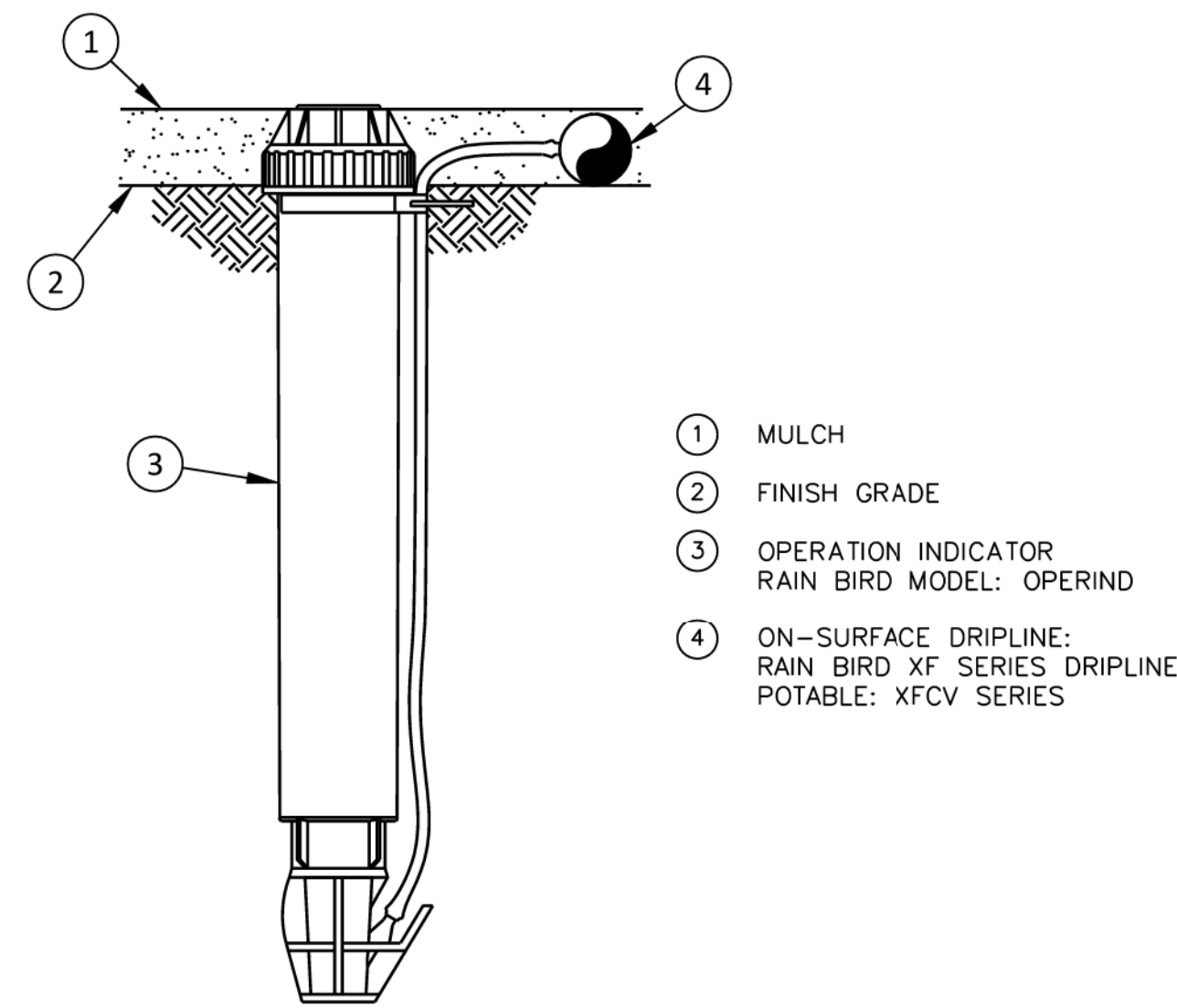
- NOTES:
1. DISTANCE BETWEEN LATERAL ROWS AND EMITTER SPACING TO BE BASED ON SOIL TYPE, PLANT MATERIALS AND CHANGES IN ELEVATION. SEE INSTALLATION SPECIFICATIONS ON RAIN BIRD WEB SITE (WWW.RAINBIRD.COM) FOR SUGGESTED SPACING.
 2. LENGTH OF LONGEST DRIPLINE LATERAL SHOULD NOT EXCEED THE MAXIMUM SPACING SHOWN IN THE ACCOMPANYING TABLE.
 3. INSTALL AIR RELIEF VALVE AT HIGH POINTS IN DRIP LATERAL.
 4. WHEN USING 17MM INSERT FITTINGS WITH DESIGN PRESSURE OVER 50PSI, IT IS RECOMMENDED THAT STAINLESS STEEL CLAMPS BE INSTALLED ON EACH FITTING.

① XFCV SUB-SURFACE DRIPLINE
 N.T.S. TYPICAL ISLAND LAYOUT

XFS Dripline Maximum Lateral Lengths (Feet)						
Inlet Pressure psi	12" Spacing		18" Spacing		24" Spacing	
	Nominal Flow (gph)		Nominal Flow (gph)		Nominal Flow (gph)	
	0.6	0.9	0.6	0.9	0.6	0.9
15	273	155	314	250	424	322
20	318	169	353	294	508	368
30	360	230	413	350	586	414
40	395	255	465	402	652	474
50	417	285	528	420	720	488
60	460	290	596	455	780	514

CITY OF FRISCO, TEXAS
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
 LANDSCAPE IRRIGATION
LEBANON ROAD IRRIGATION PLAN
IRRIGATION DETAILS I

NO.	ISSUE	DATE	BY	FRN JOB NO.	FRCL15624
		4/20/17		DATE	4/20/17
				DESIGNED	MRB
				DRAWN	MRB
				REVISED	
				CHECKED	RIK
				FILE NAME	IR-RD-PL-DETIAL03
VERIFY SCALE: 1" = 10' (Bar is one inch on original drawing, if not one inch on this sheet, adjust scale.)					
SHEET IR-10					
SEQ. 99					



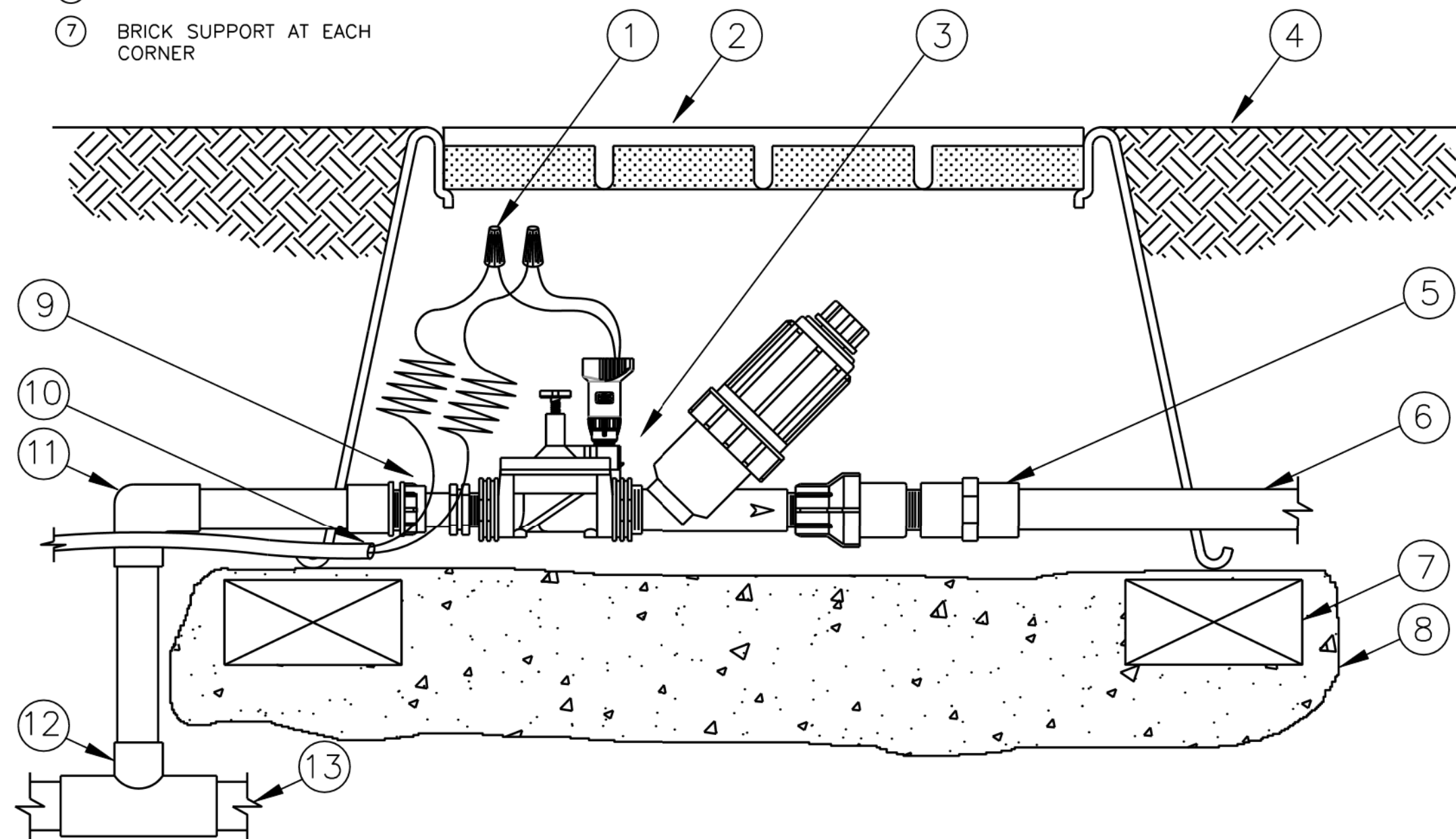
- ① MULCH
- ② FINISH GRADE
- ③ OPERATION INDICATOR
RAIN BIRD MODEL: OPERIND
- ④ ON-SURFACE DRIPLINE:
RAIN BIRD XF SERIES DRIPLINE
POTABLE: XFCV SERIES

NOTE:

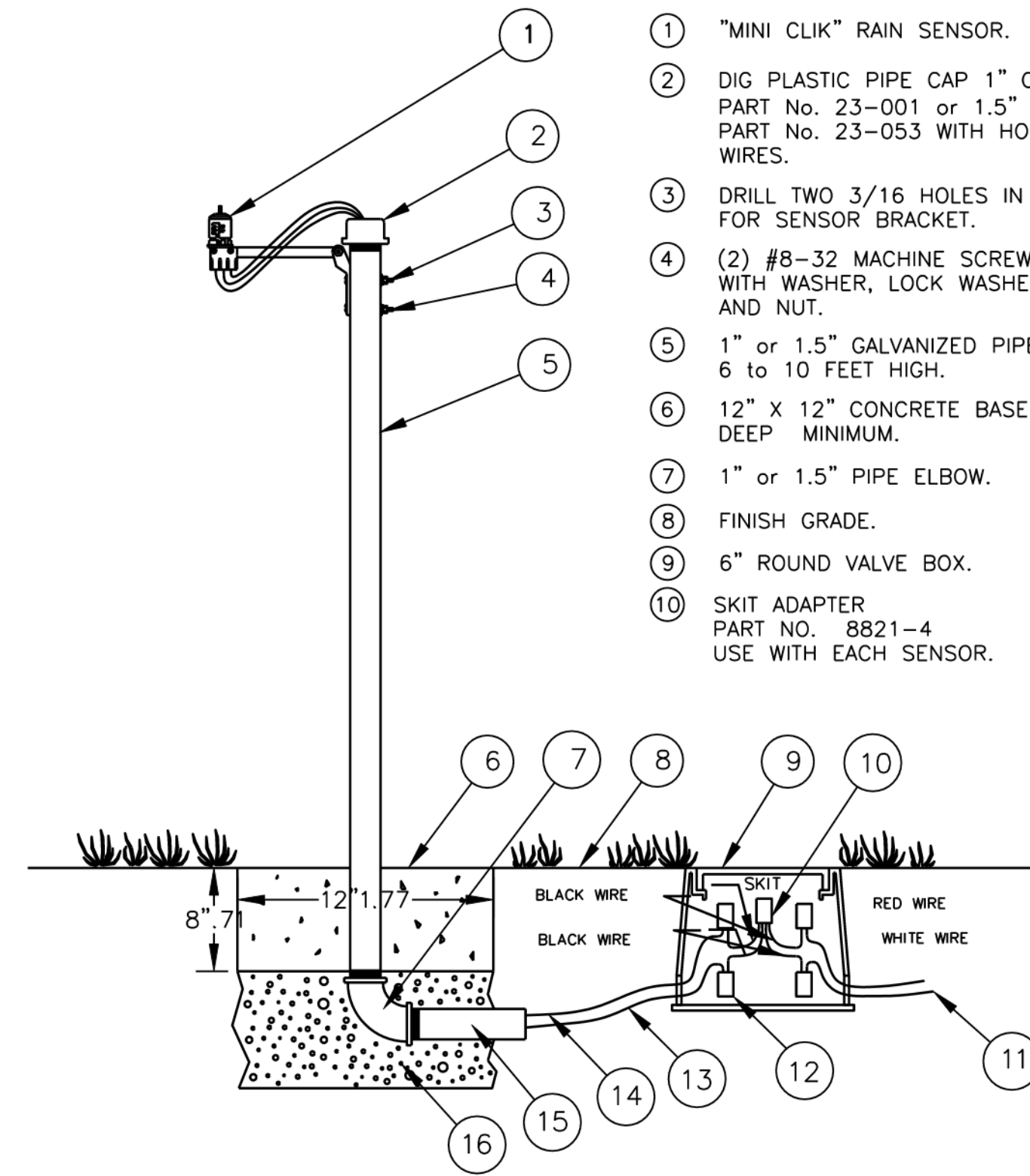
1. USE XERIMAN TOOL XM-TOOL TO INSERT BARB TRANSFER FITTING DIRECTLY INTO DRIPLINE TUBING.
2. VAN NOZZLE MAY BE SET TO CLOSED, OR IF IT IS DESIRED TO SEE SPRAY FROM THE NOZZLE, SET THE ARC TO ¼ PATTERN. THE FLOW FROM THE NOZZLE, 0.3 GPM, SHOULD BE ACCOUNTED FOR IN THE SYSTEM DESIGN.

① DRIP OPERATION INDICATOR
N.T.S.

- ① WIRE CONNECTORS
- ② VALVE BOX WITH COVER
12" SIZE
- ③ DIG LEIT ¼" REMOTE
CONTROL VALVE
ASSEMBLY MODEL
P52-075 (30 PSI)
- ④ FINISH GRADE TOP
- ⑤ ¾" FEMALE NPT
COUPLING X SLIP
- ⑥ PVC LATERAL LINE
- ⑦ BRICK SUPPORT AT EACH
CORNER
- ⑧ PEA GRAVEL SUMP
MINIMUM 3"
- ⑨ SWIVEL FITTING DIG
MODEL 23-004 1" F X
¾" M
- ⑩ CONTROL WIRE TO
OTHER VALVE
- ⑪ PVC SCH 40 90 DEGREE
- ⑫ SCH 40 TEE
- ⑬ MAIN SUPPLY LINE

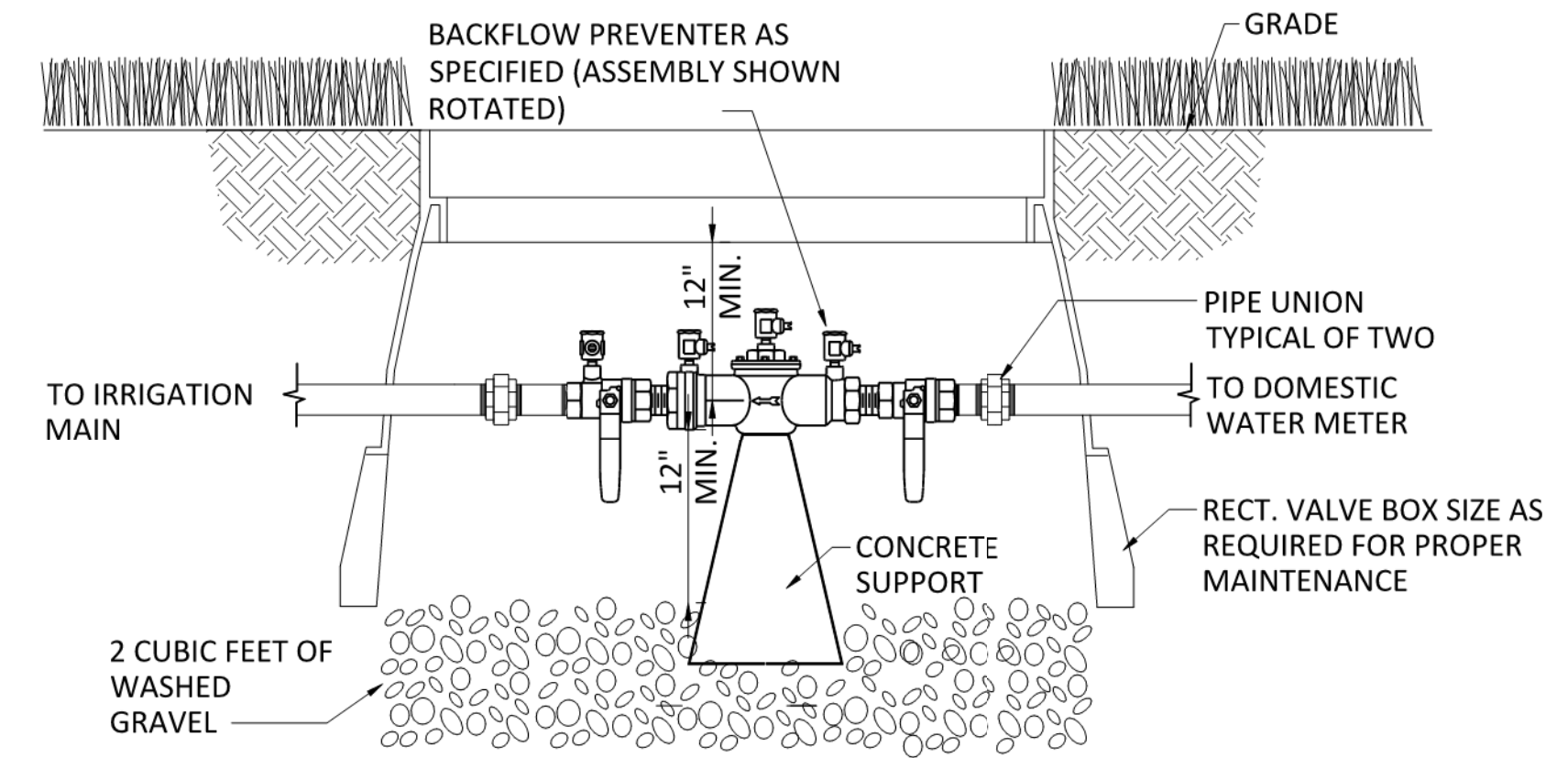


③ DRIP STATION ASSEMBLY FOR LEIT SYSTEM
N.T.S.



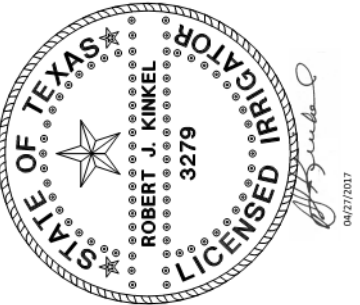
- ① "MINI CLIK" RAIN SENSOR.
- ② DIG PLASTIC PIPE CAP 1" CAP
PART No. 23-001 or 1.5" CAP
PART No. 23-053 WITH HOLE FOR
WIRES.
- ③ DRILL TWO 3/16 HOLES IN PIPE
FOR SENSOR BRACKET.
- ④ (2) #8-32 MACHINE SCREWS
WITH WASHER, LOCK WASHER
AND NUT.
- ⑤ 1" or 1.5" GALVANIZED PIPE
6 TO 10 FEET HIGH.
- ⑥ 12" X 12" CONCRETE BASE 8"
DEEP MINIMUM.
- ⑦ 1" or 1.5" PIPE ELBOW.
- ⑧ FINISH GRADE.
- ⑨ 6" ROUND VALVE BOX.
- ⑩ SKIT ADAPTER
PART NO. 8821-4
USE WITH EACH SENSOR.
- ⑪ TO CONTROLLER OR VALVE.
- ⑫ (4) DRY SPLICE CONNECTORS.
- ⑬ NORMALLY CLOSED WIRE FROM SENSOR.
- ⑭ COMMON WIRE FROM SENSOR.
- ⑮ 1" or 1.5" NIPPLE.
- ⑯ GRAVEL.

② WEATHER STATION ASSEMBLY (COLUMN MOUNTED)
N.T.S.



④ UNDERGROUND BACKFLOW PREVENTER DETAIL
N.T.S.

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



FREES & NICHOLS
6136 Frisco Square Blvd., Suite 200
Frisco, Texas 75034
Phone - (972) 624-9201
Fax - (972) 624-9202
Web - www.freese.com

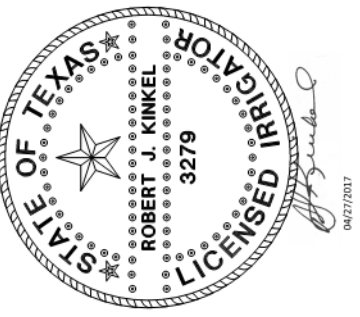
CITY OF FRISCO, TEXAS
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN

LANDSCAPE IRRIGATION
LEBANON ROAD PLANTING PLAN
IRRIGATION DETAILS II

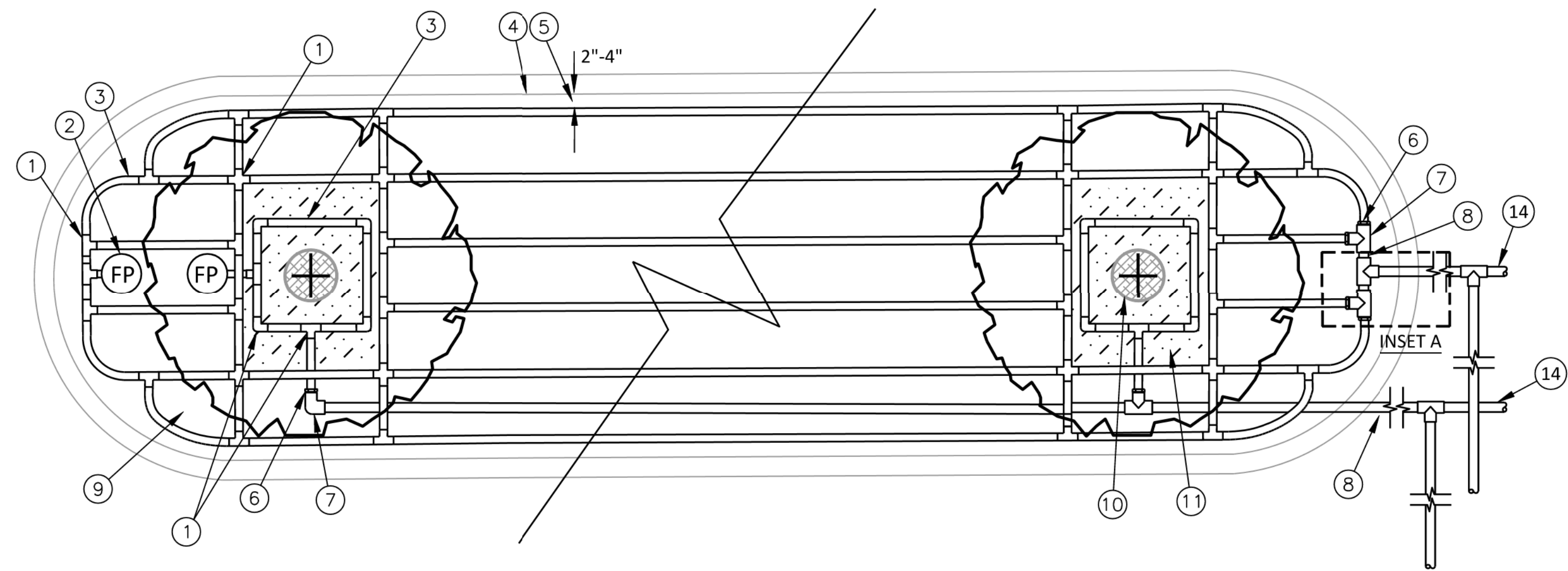
FRN JOB NO.	FR15624
DATE	4/2017
DESIGNED	MRB
DRAWN	MRB
REVISED	
CHECKED	RIK
FILE NAME	IR-RD-PL-DETIAL02

SHEET IR-11
SEQ. 100

ACAD Ref: 21.0s (LMS Tech)
Filename: N:\PLBG\IR-RD-PL-DETIAL02.dwg
Last Saved: 4/26/2017 11:01 AM Saved By: 02387



NO.	ISSUE	DATE	BY	FILE NAME
0	VERIFY SCALE			IR-RD-PL-DETAIL01
1	Bar is one inch on original drawing, if not one inch on this sheet, adjust scale.			

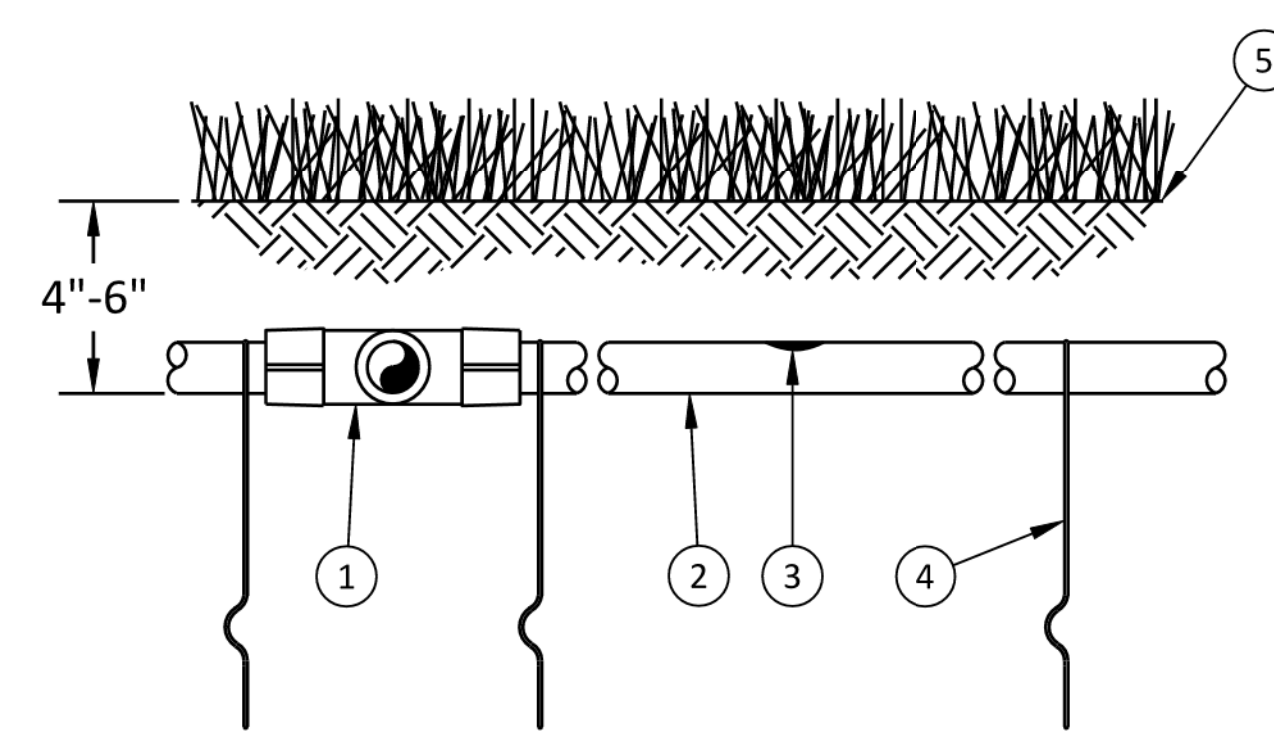


NOTES:

- DISTANCE BETWEEN LATERAL ROWS AND EMITTER SPACING TO BE BASED ON SOIL TYPE, PLANT MATERIALS AND CHANGES IN ELEVATION. SEE INSTALLATION SPECIFICATIONS ON RAIN BIRD WEB SITE (WWW.RAINBIRD.COM) FOR SUGGESTED SPACING.
- LENGTH OF LONGEST DRIPLINE LATERAL SHOULD NOT EXCEED THE MAXIMUM SPACING SHOWN IN THE ACCOMPANYING TABLE.
- PLACE TIE DOWN STAKES EVERY THREE FEET IN SAND, FOUR FEET IN LOAM, AND FIVE FEET IN CLAY.
- AT FITTINGS WHERE THERE IS A CHANGE OF DIRECTION SUCH AS TEES OR ELBOWS, USE TIE-DOWN STAKES ON EACH LEG OF THE CHANGE OF DIRECTION.
- WHEN USING 17MM INSERT FITTINGS WITH DESIGN PRESSURE OVER 50PSI, IT IS RECOMMENDED THAT STAINLESS STEEL CLAMPS BE INSTALLED ON EACH FITTING.

1 ON-SURFACE DRIPLINE PARKING ISLAND WITH TREES
N.T.S.

- BARB X BARB INSERT EL, TEE OR CROSS:
RAIN BIRD XFF-ELBOW (TYPICAL)
RAIN BIRD XFF-TEE (TYPICAL)
RAIN BIRD XFD-CROSS (TYPICAL)
- FLUSH POINT (TYPICAL)
SEE RAIN BIRD DETAIL "XFD FLUSH POINT"
- ON-SURFACE DRIPLINE PIPE:
RAIN BIRD XF SERIES DRIPLINE
POTABLE: XFD DRIPLINE
- PARKING ISLAND CURB
- PERIMETER DRIPLINE PIPE TO BE INSTALLED 2"-4" FROM PARKING ISLAND CURB
- BARB X MALE FITTING:
RAIN BIRD XFD-MA FITTING (TYPICAL)
- PVC SCH 40 TEE OR EL (TYPICAL)
- PVC SUPPLY MANIFOLD
- SHRUB OR GROUND COVER BED
- TREE (TYPICAL)
- MULCH BED FOR TREE
- 2-3 INCHES DEPTH OF MULCH
- FINISH GRADE
- PVC DRIP MANIFOLD FROM RAIN BIRD CONTROL ZONE VALVE KIT (SIZED TO MEET LATERAL FLOW DEMAND)
- PVC RISER PIPE

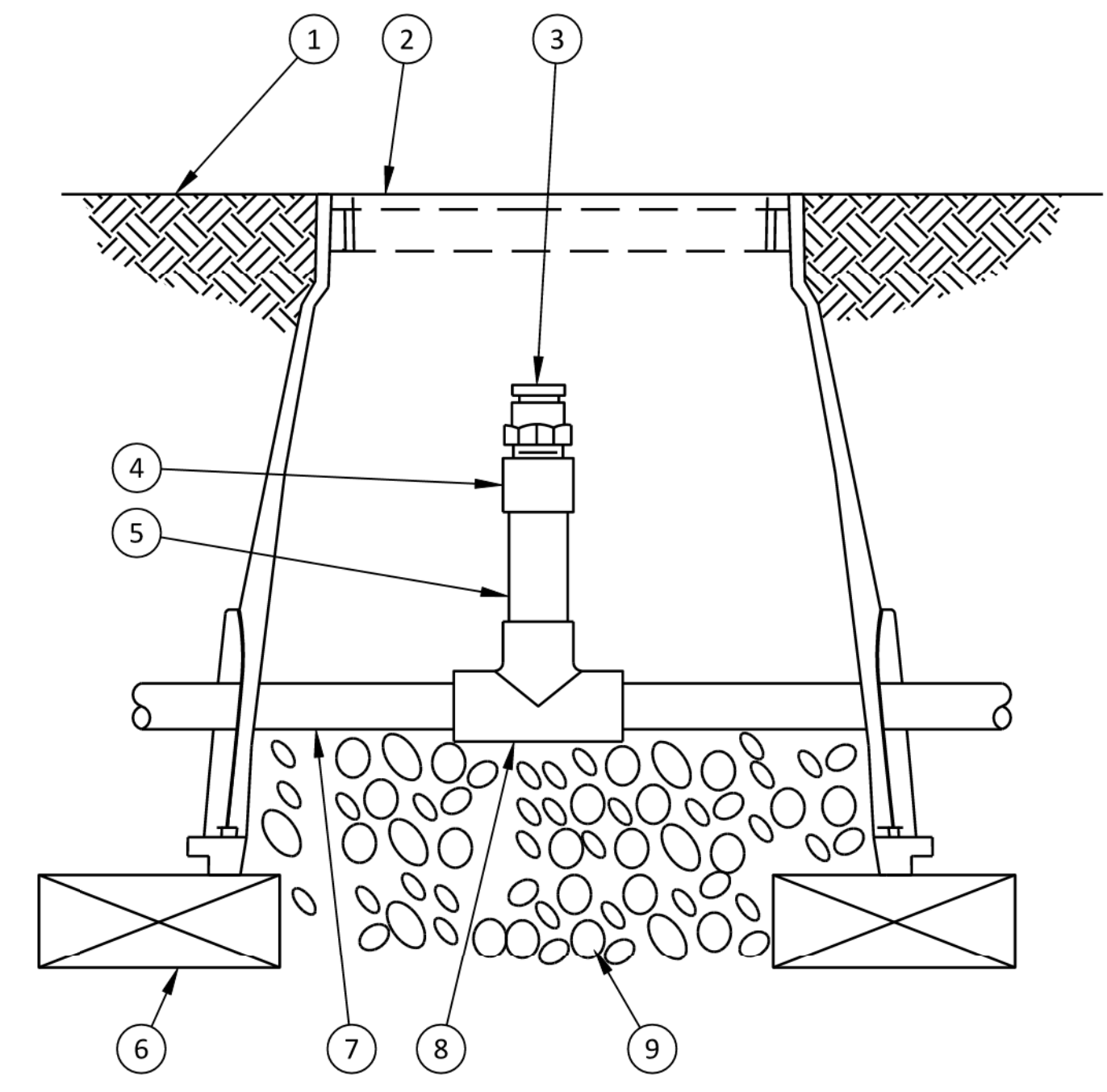


- EASY FIT COMPRESSION TEE:
RAIN BIRD MDCFTEE
- SUB-SURFACE DRIPLINE:
RAIN BIRD XF SERIES DRIPLINE
POTABLE: XFS DRIPLINE
NON-POTABLE: XFSP DRIPLINE
- INLINE DRIP EMITTER
- TIE DOWN STAKE: RAIN BIRD TDS-050 WITH BEND (TYPICAL)
- TURF/FINISH GRADE OR SHRUB BED WITH MULCH

NOTES:

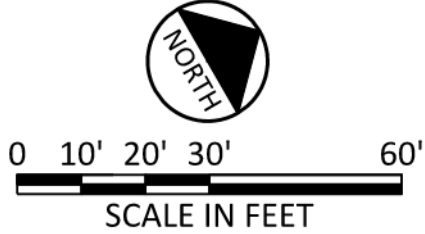
- PLACE TIE DOWN STAKES EVERY THREE FEET IN SAND, FOUR FEET IN LOAM, AND FIVE FEET IN CLAY.
- AT FITTINGS WHERE THERE IS A CHANGE OF DIRECTION SUCH AS TEES OR ELBOWS, USE TIE-DOWN STAKES ON EACH LEG OF THE CHANGE OF DIRECTION.
- INSERTION PLOW AND TRENCHED INSTALLATIONS DO NOT REQUIRE TIE DOWN STAKES.

2 SUB-SURFACE DRIPLINE BURIAL
N.T.S.



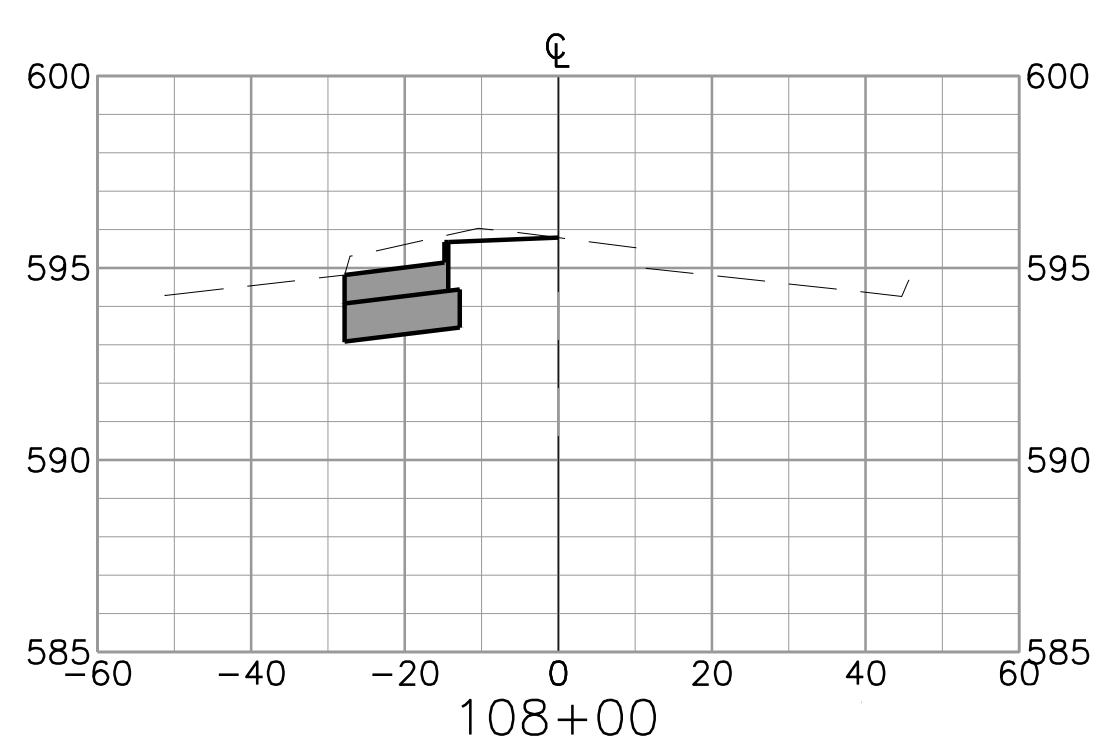
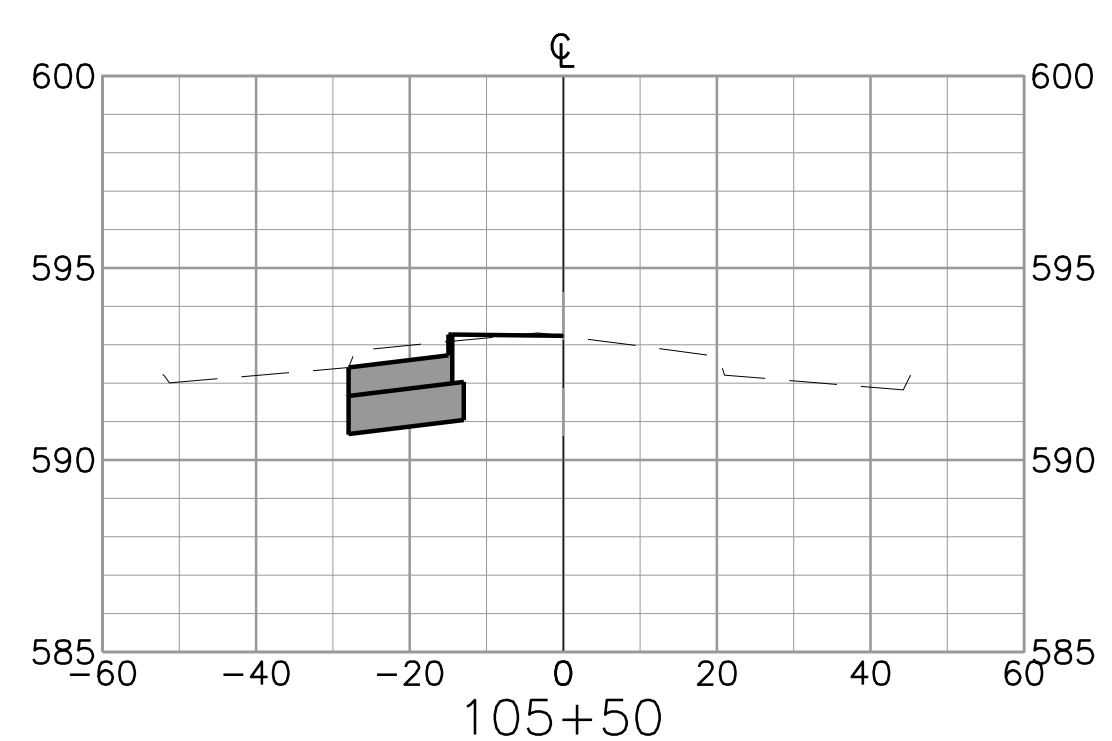
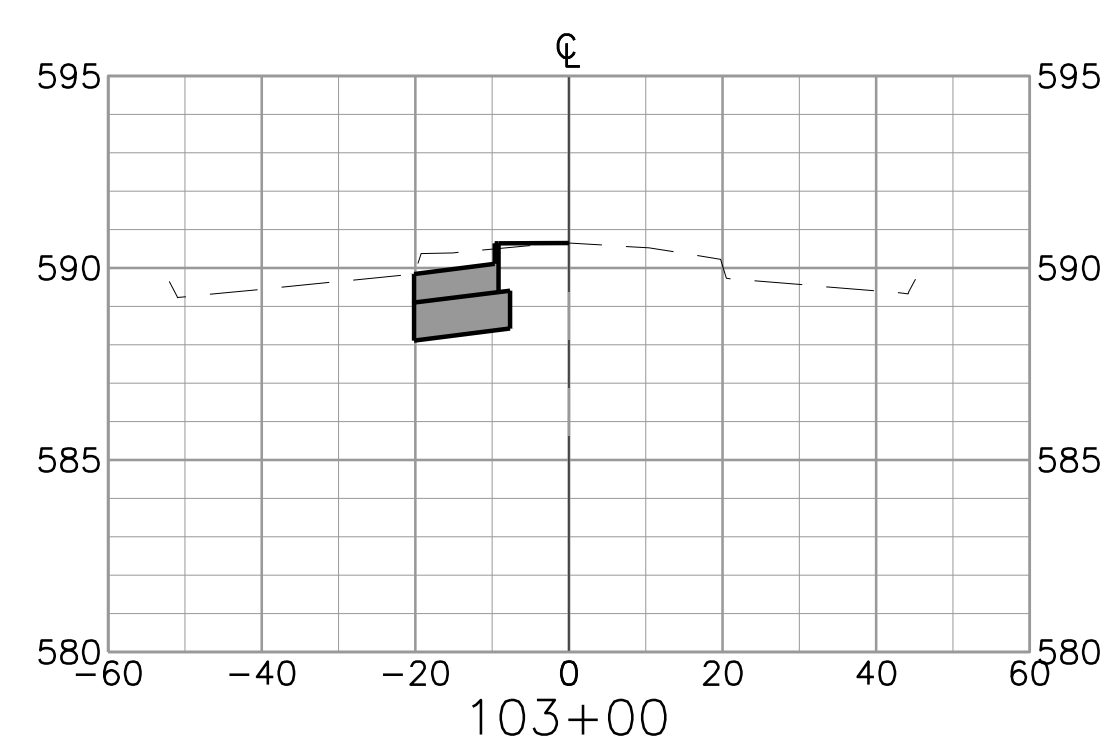
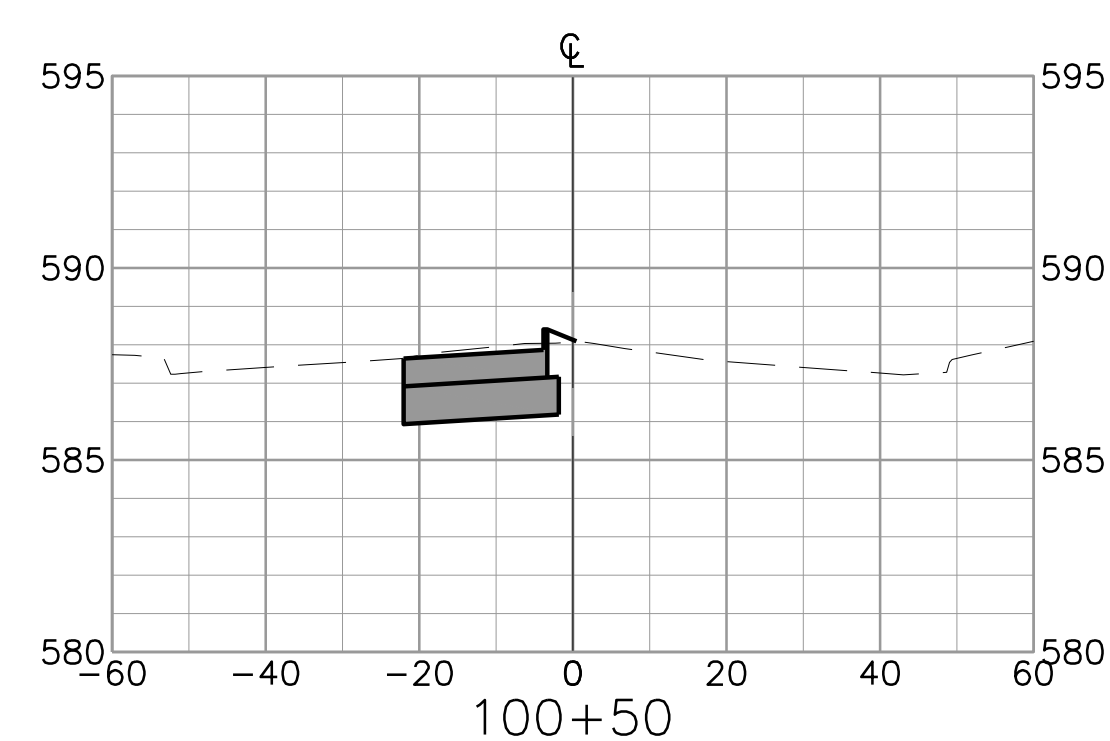
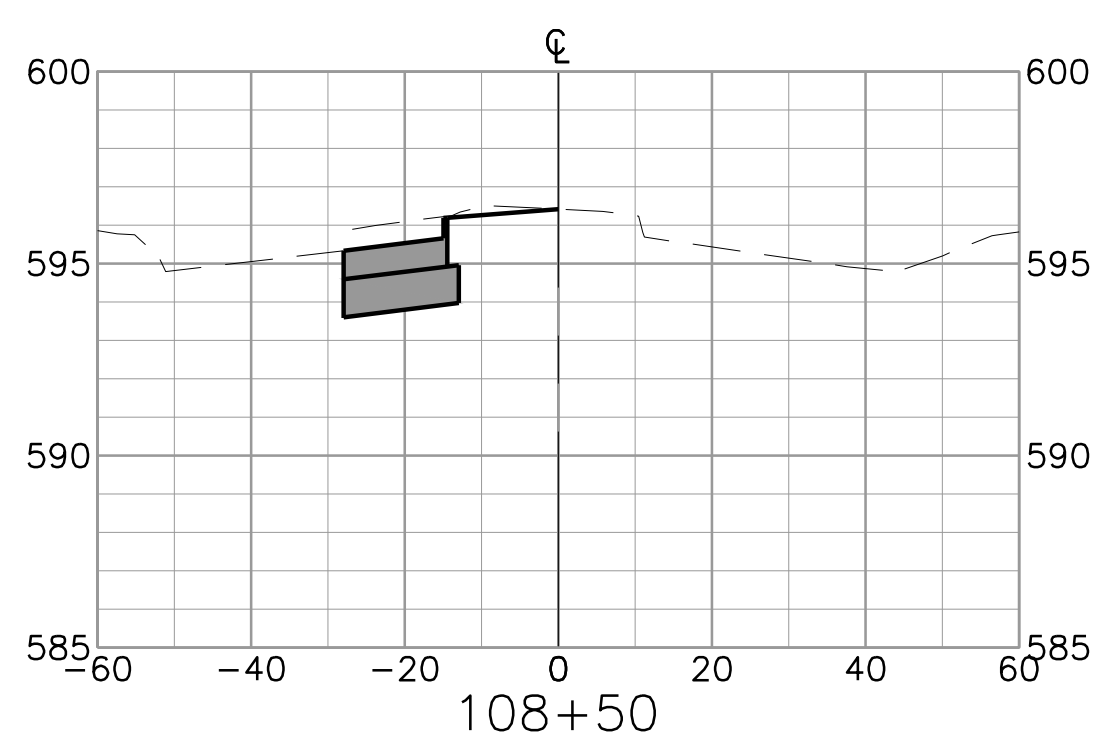
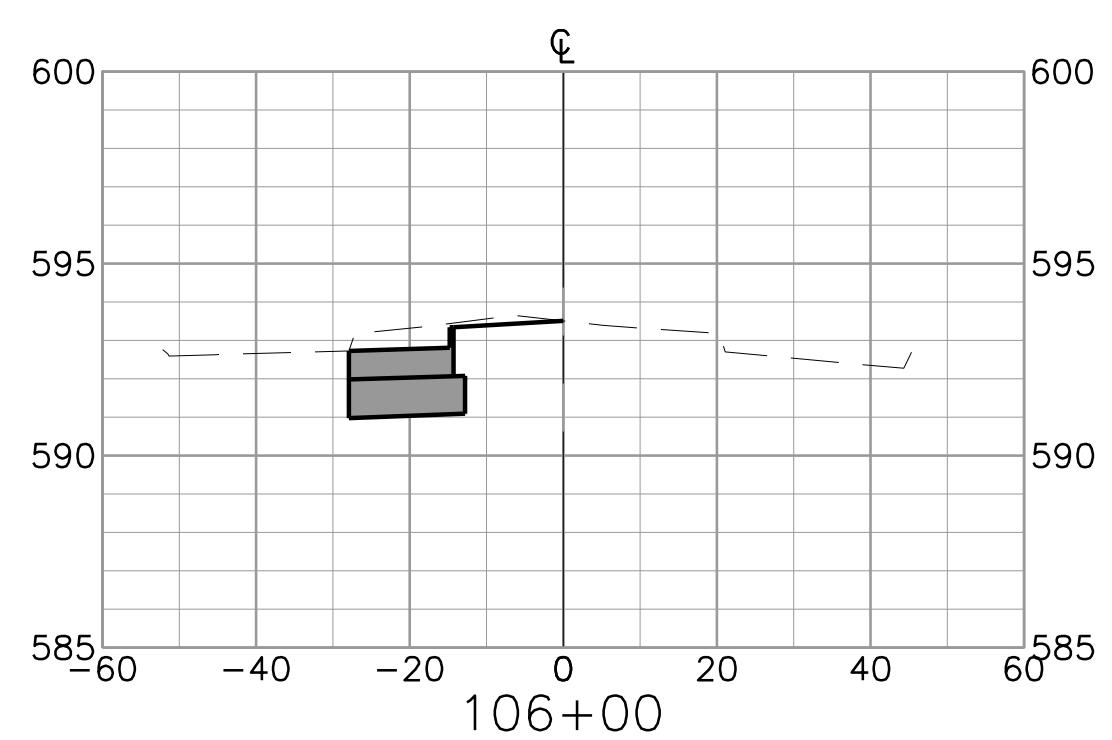
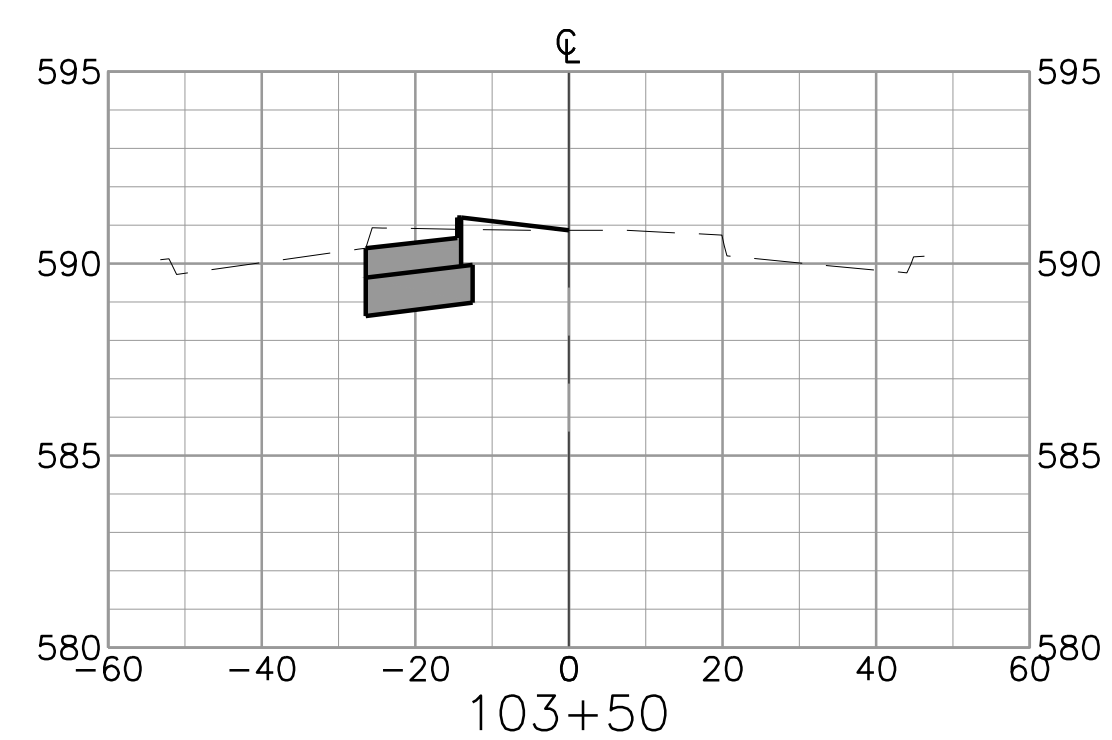
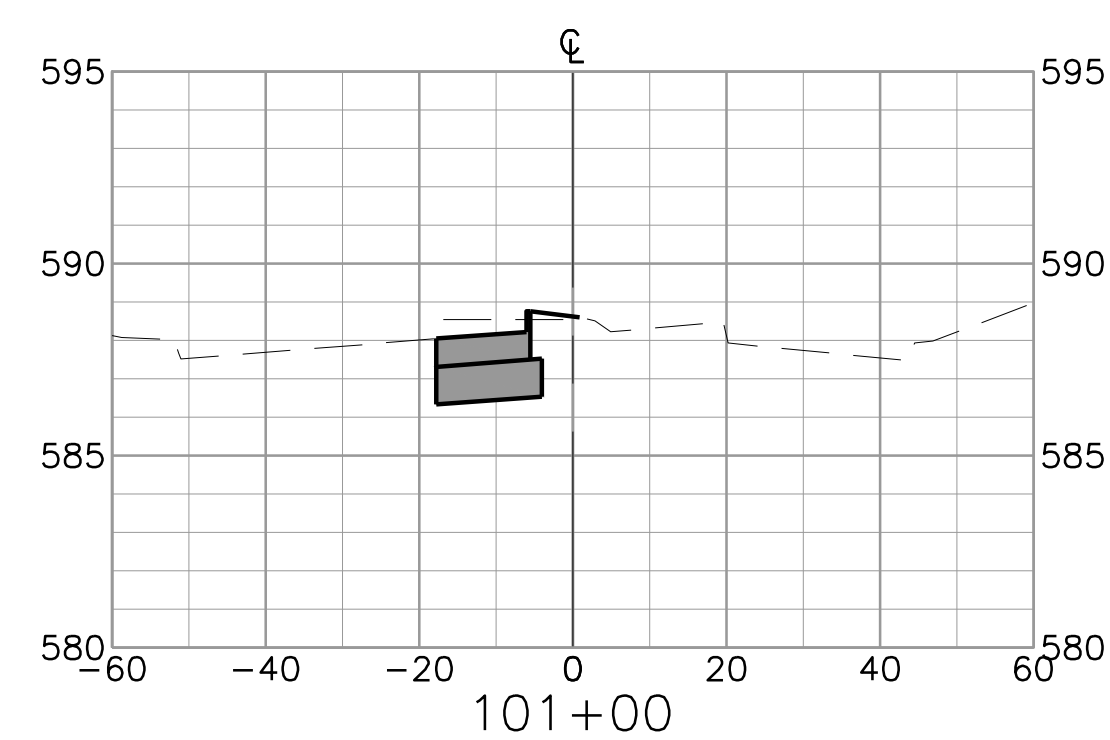
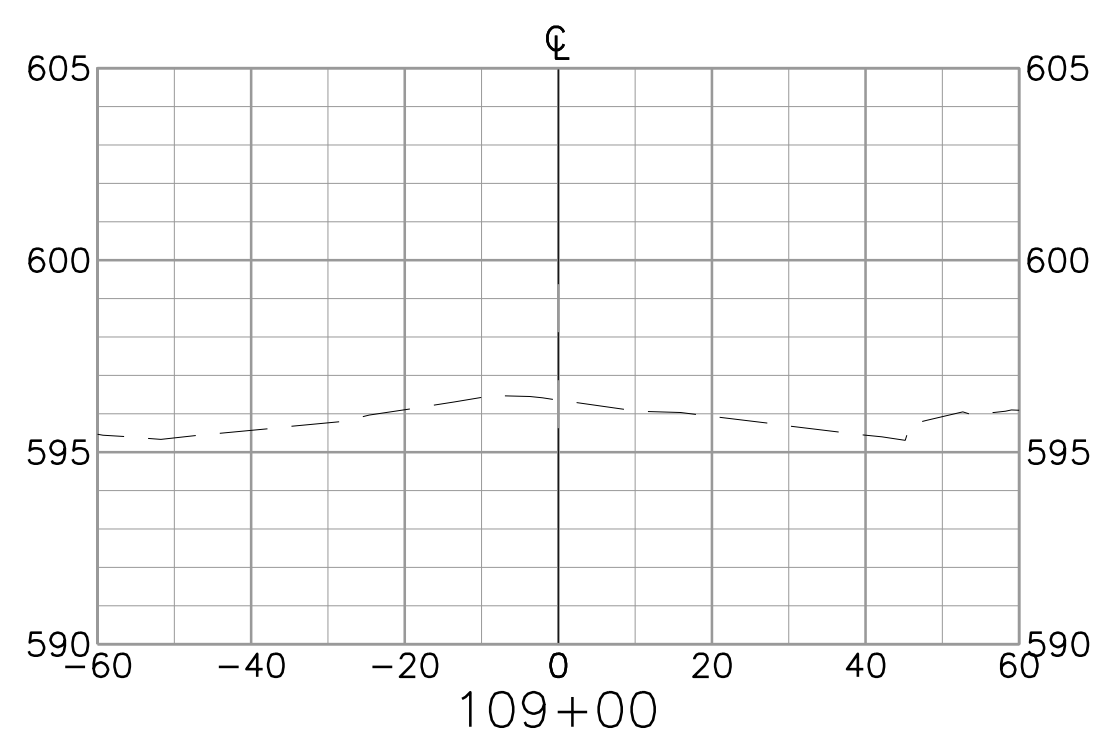
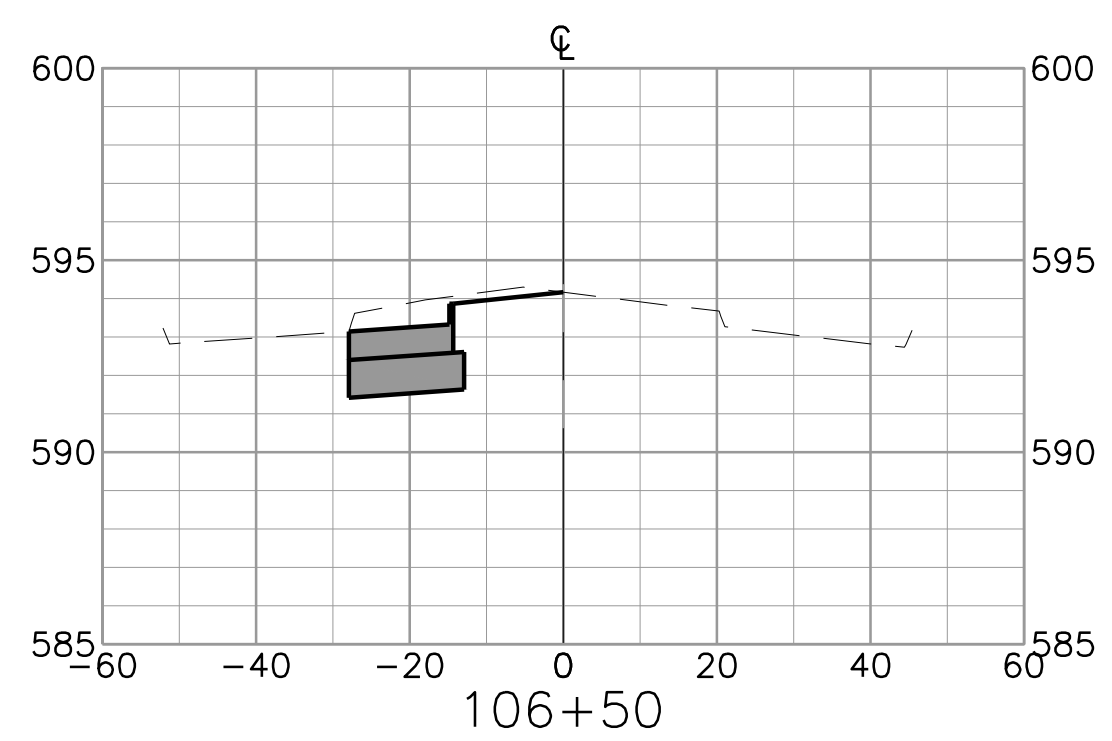
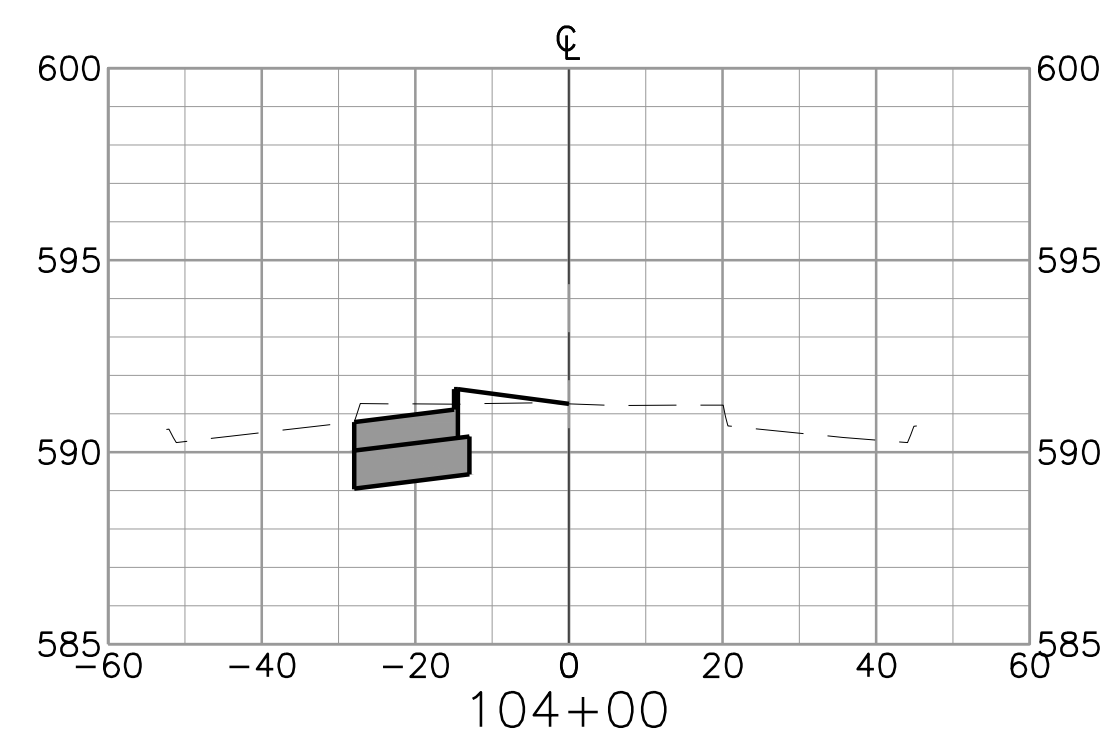
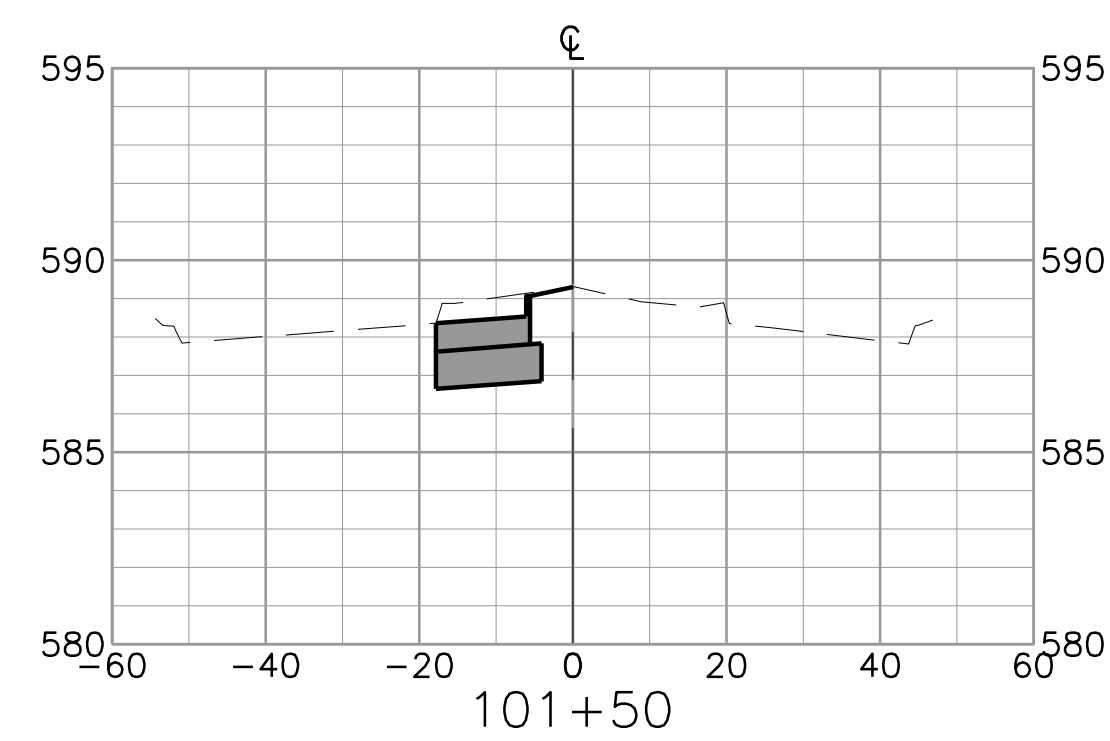
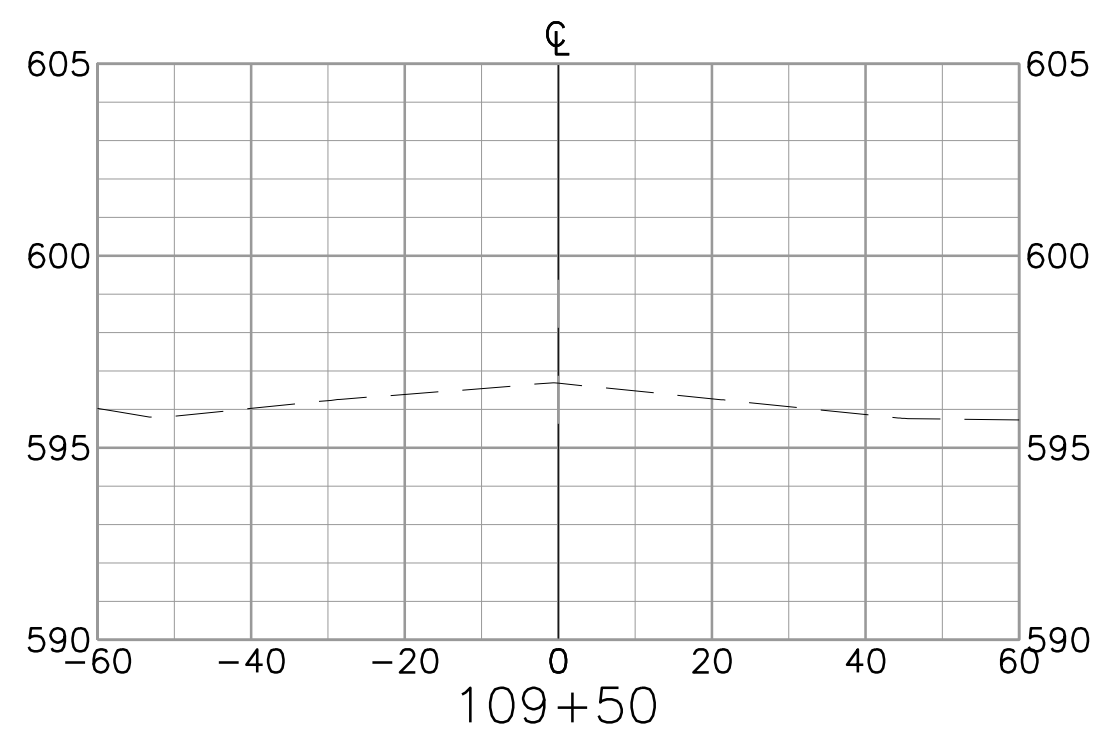
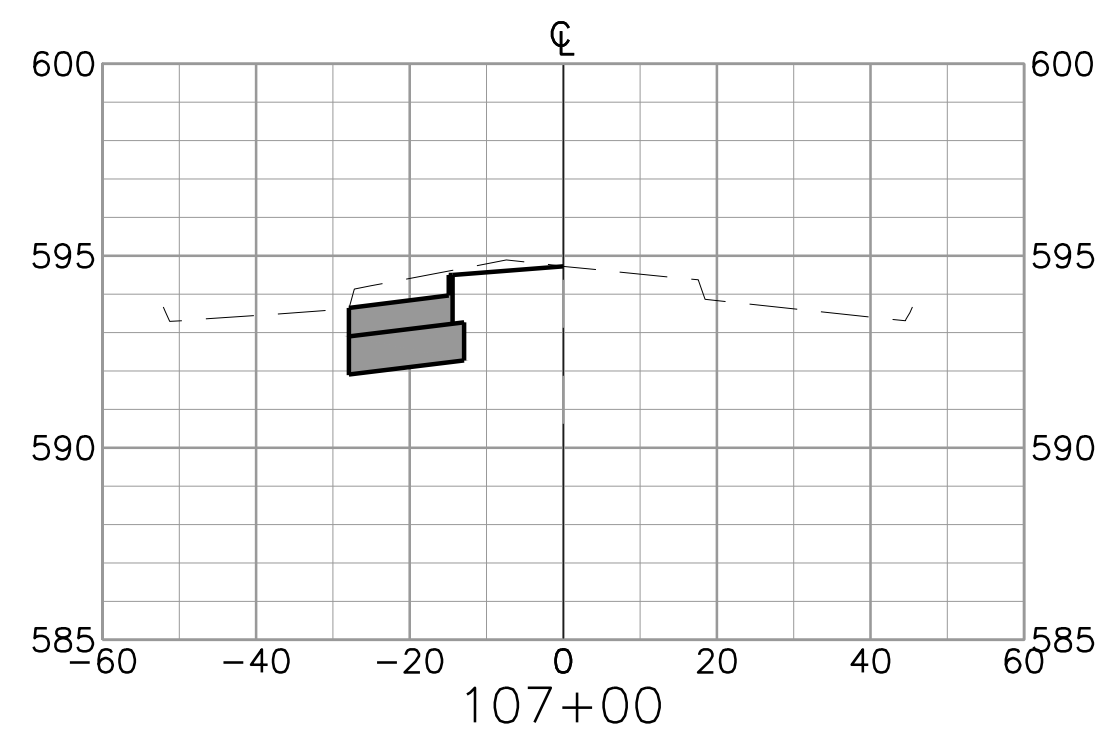
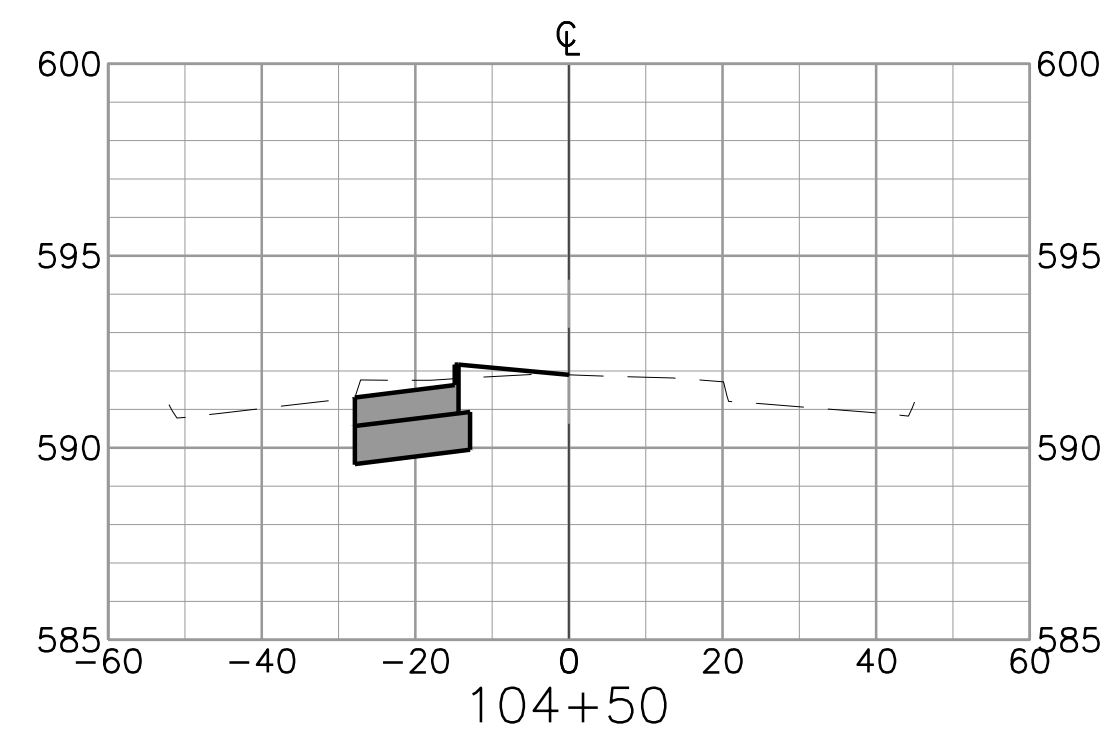
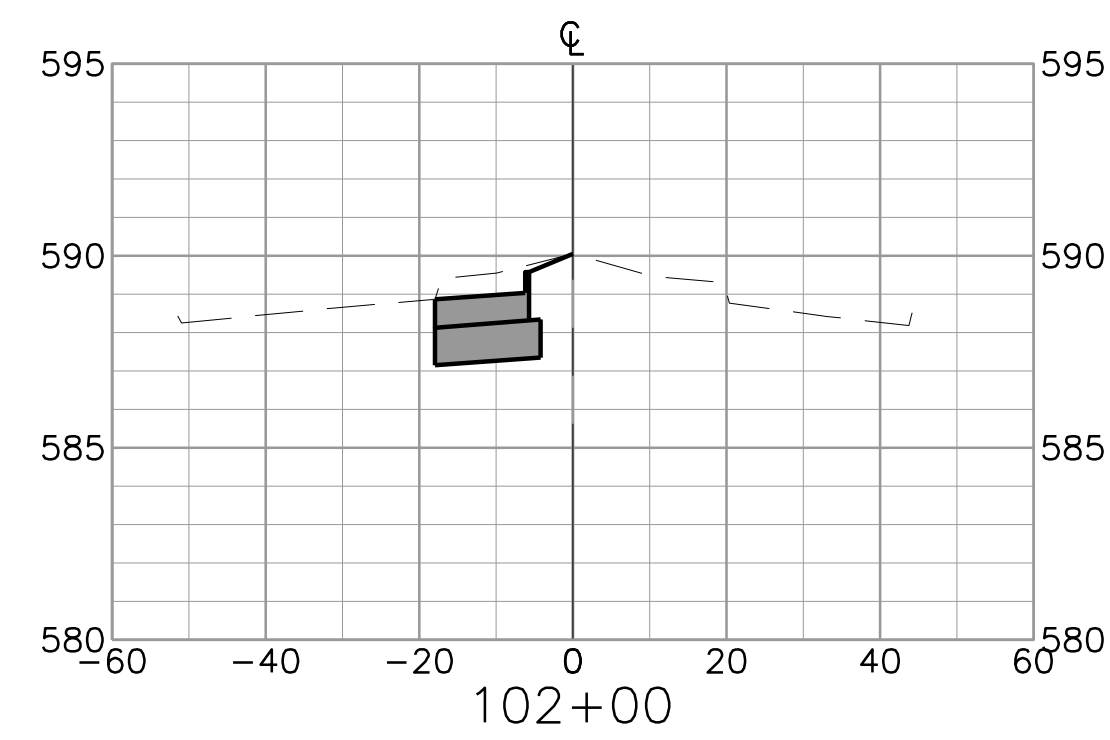
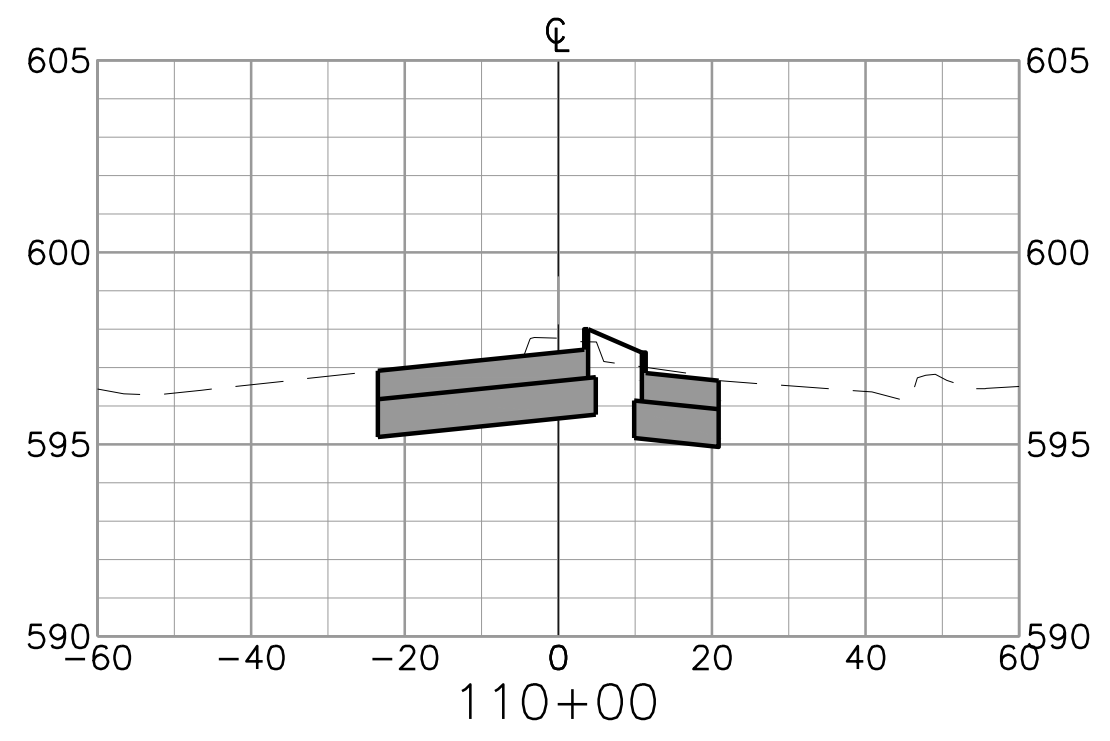
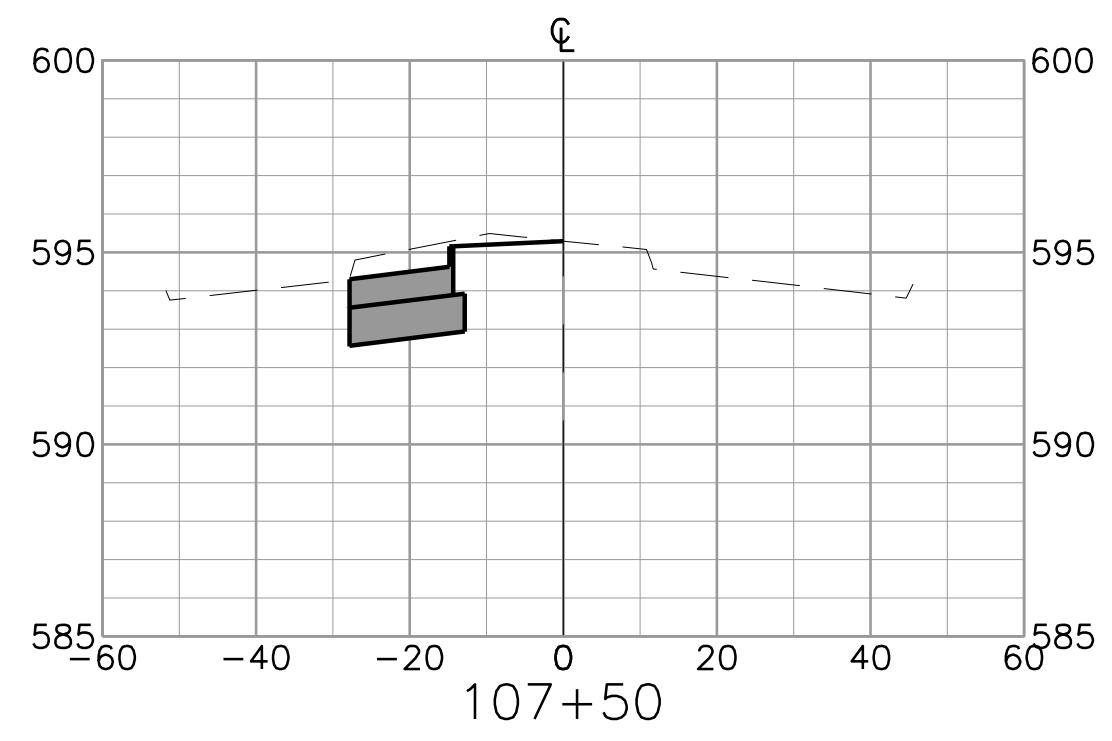
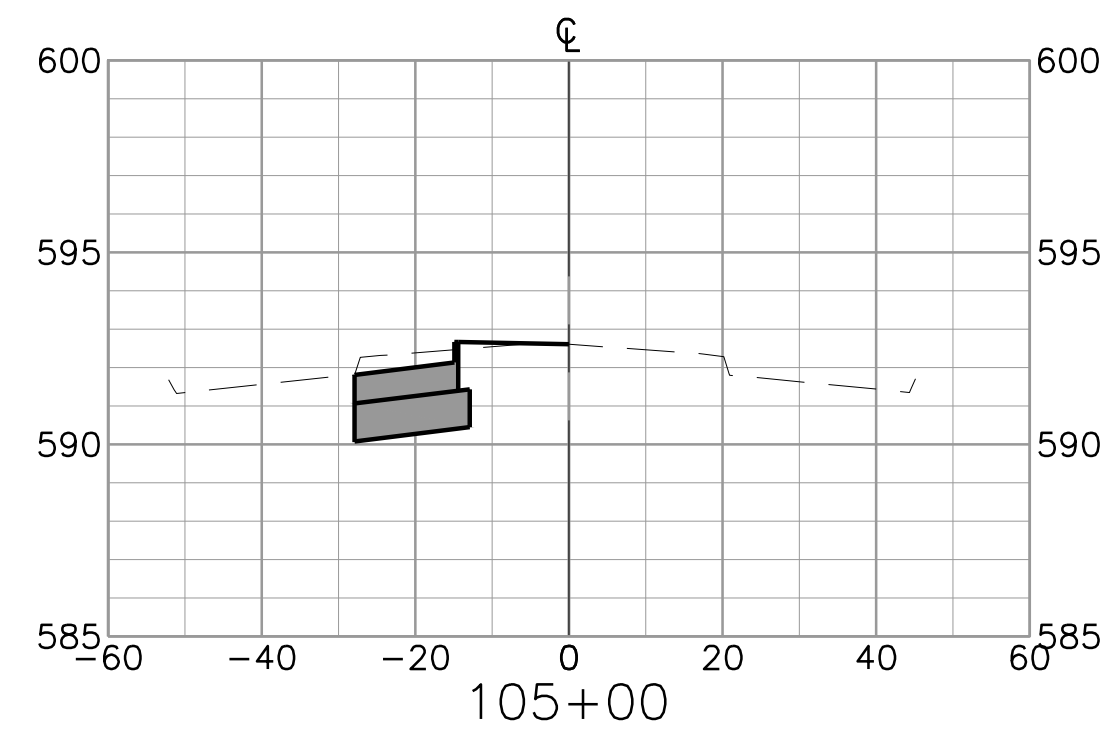
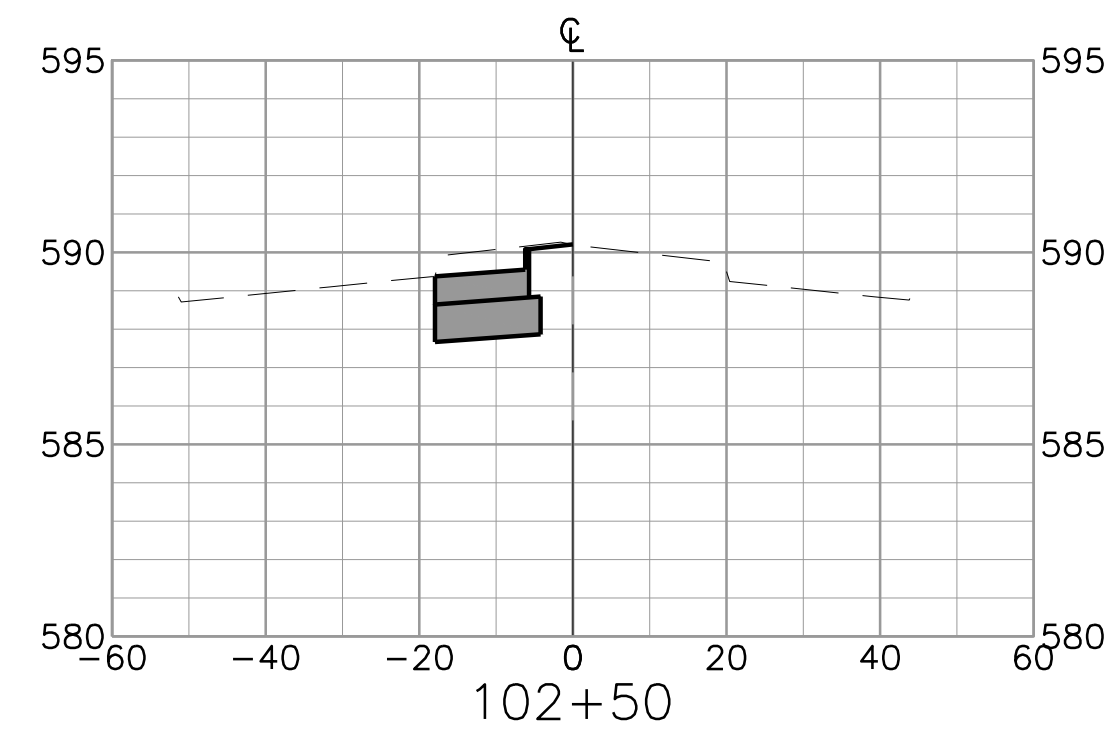
- FINISH GRADE
- SUBTERRANEAN EMITTER BOX:
RAIN BIRD SEB 7XB
- 1/2" AIR RELIEF VALVE:
RAIN BIRD ARV050
TO BE INSTALLED AT HIGH POINTS IN DRIP ZONE
- PVC SCH 40 FEMALE ADAPTER
- PVC SCH 80 RISER
- BRICK (1 OF 2)
- PVC HEADER PIPE
- PVC SCH 40 TEE
- 3" MINIMUM DEPTH OF 3/4" WASHED GRAVEL

3 SUB-SURFACE DRIPLINE 1/2" AIR RELIEF VALVE IN PVC HEADER
N.T.S.



ACAD Ref: 20.06 (LMS Tech)
 Filename: N:\F\Drawings\cv-trt-pr-XS01.dwg
 Last Saved: 3/5/2017 10:10 AM. Saved By: sli

Plot Date: 3/9/2017 9:28 AM Plot By: sli Filename: N:\F\Drawings\cv-trt-pr-XS01.dwg



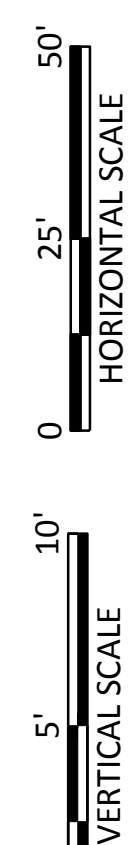
FRESE & NICHOLS
 6136 Frisco Square Blvd., Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freac.com

CITY OF FRISCO, TEXAS
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
 CIVIL
LEBANON ROAD CROSS SECTIONS
BEGIN TO STA 110+00

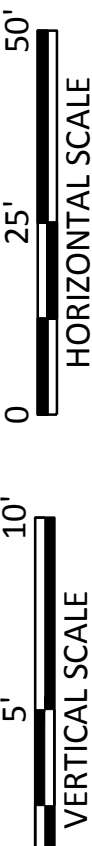
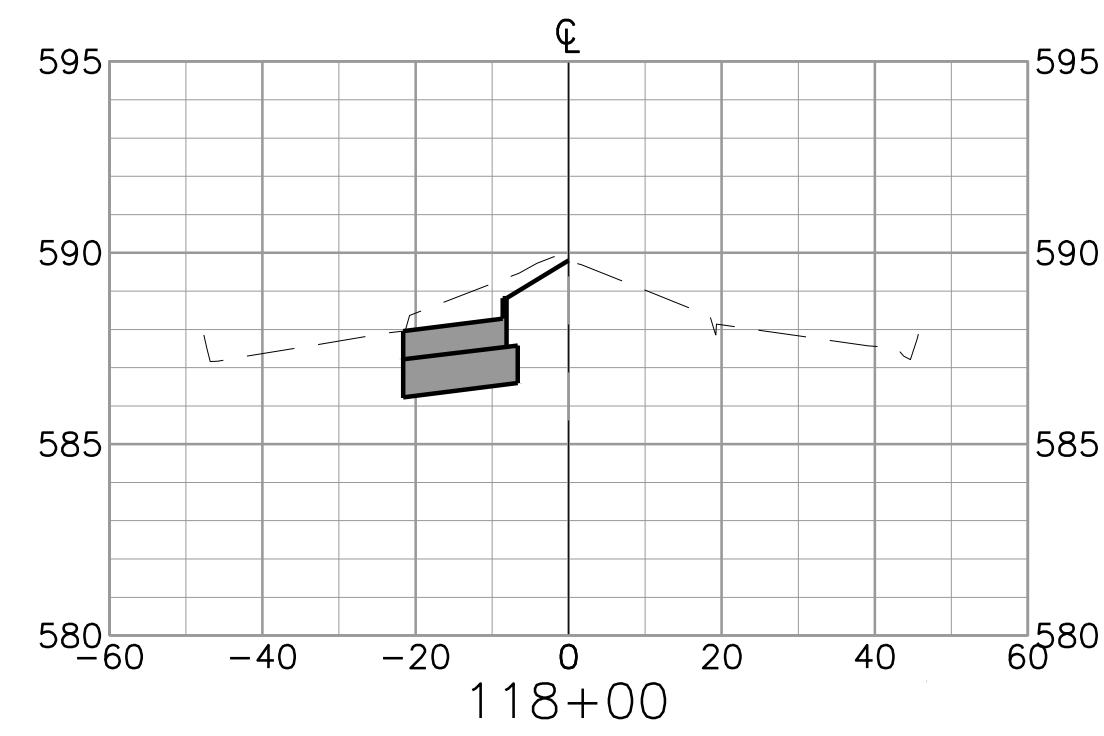
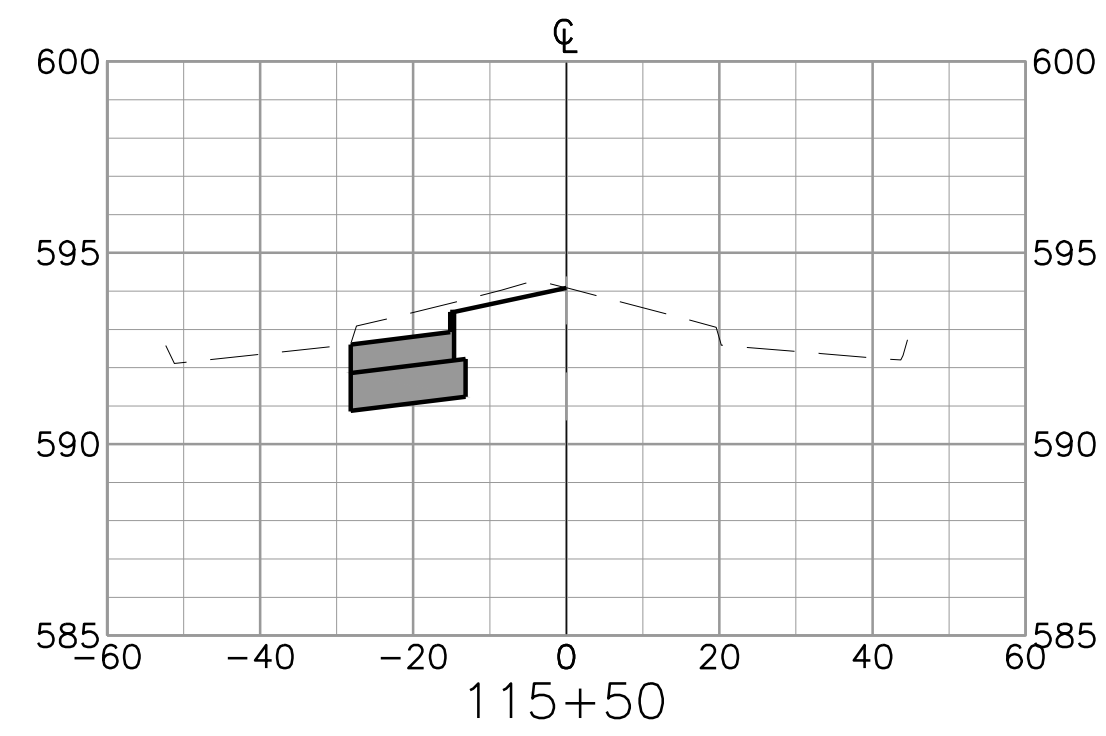
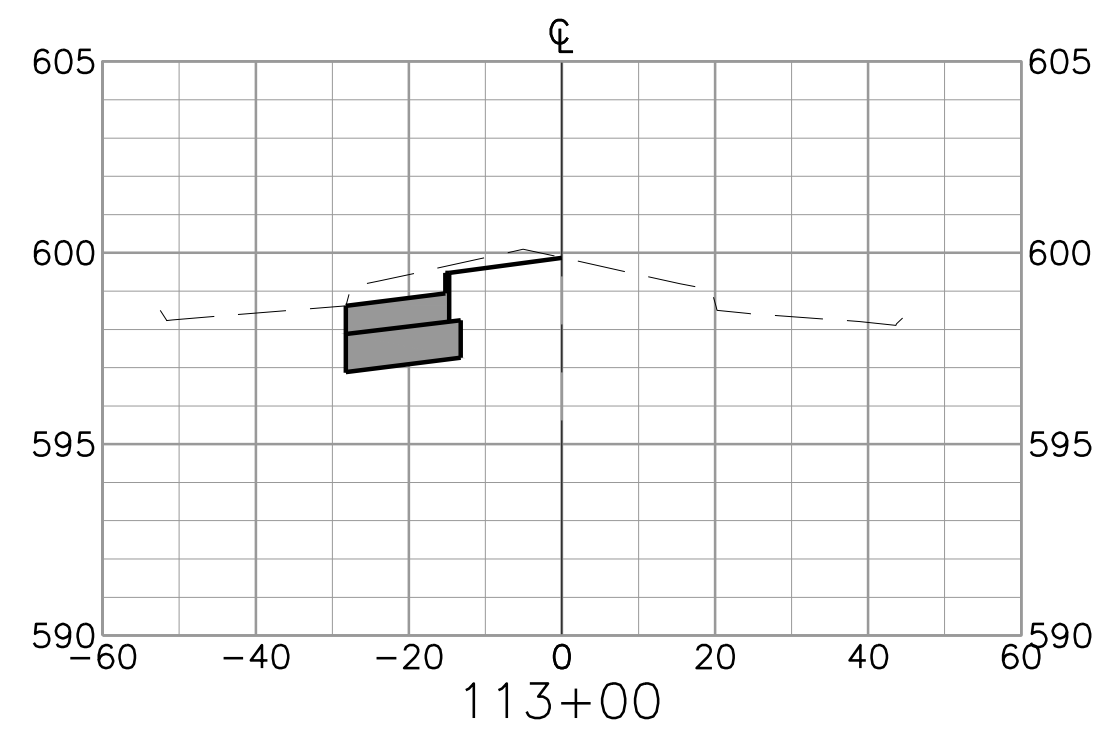
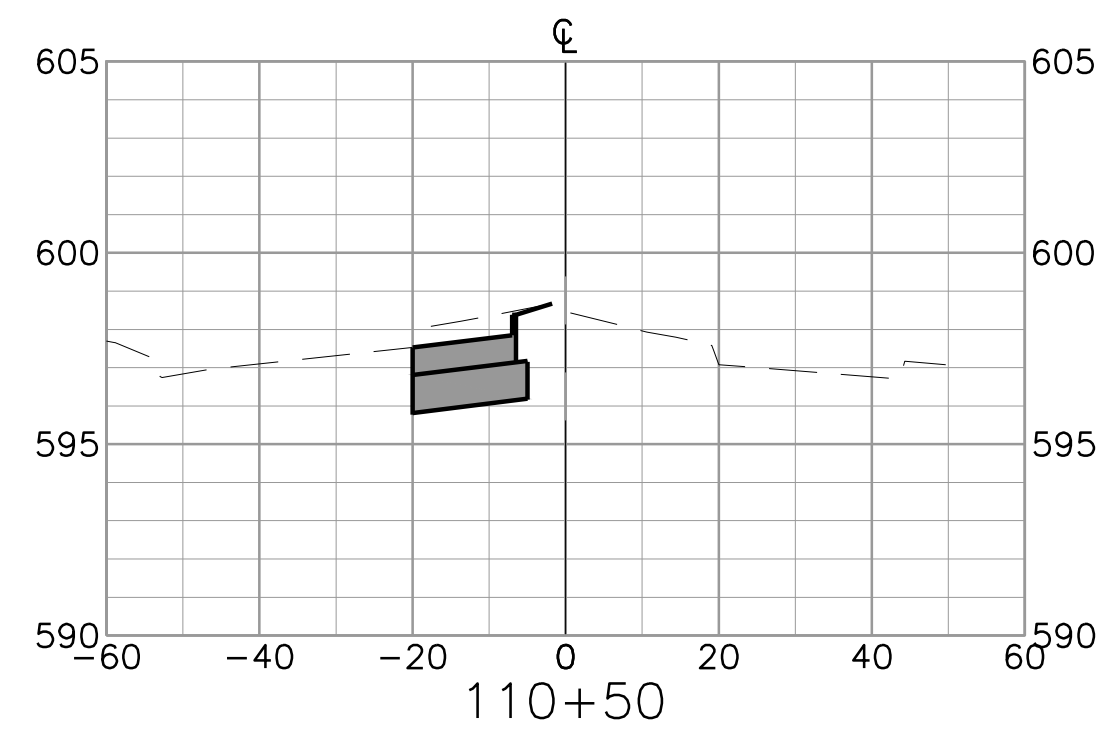
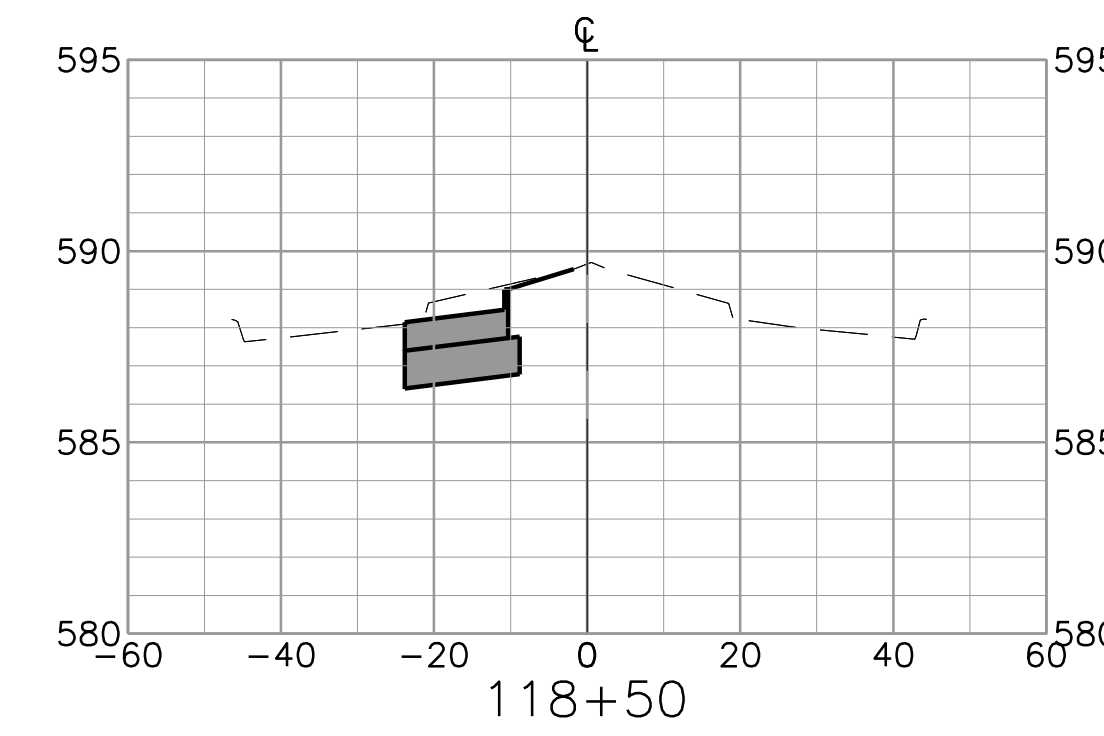
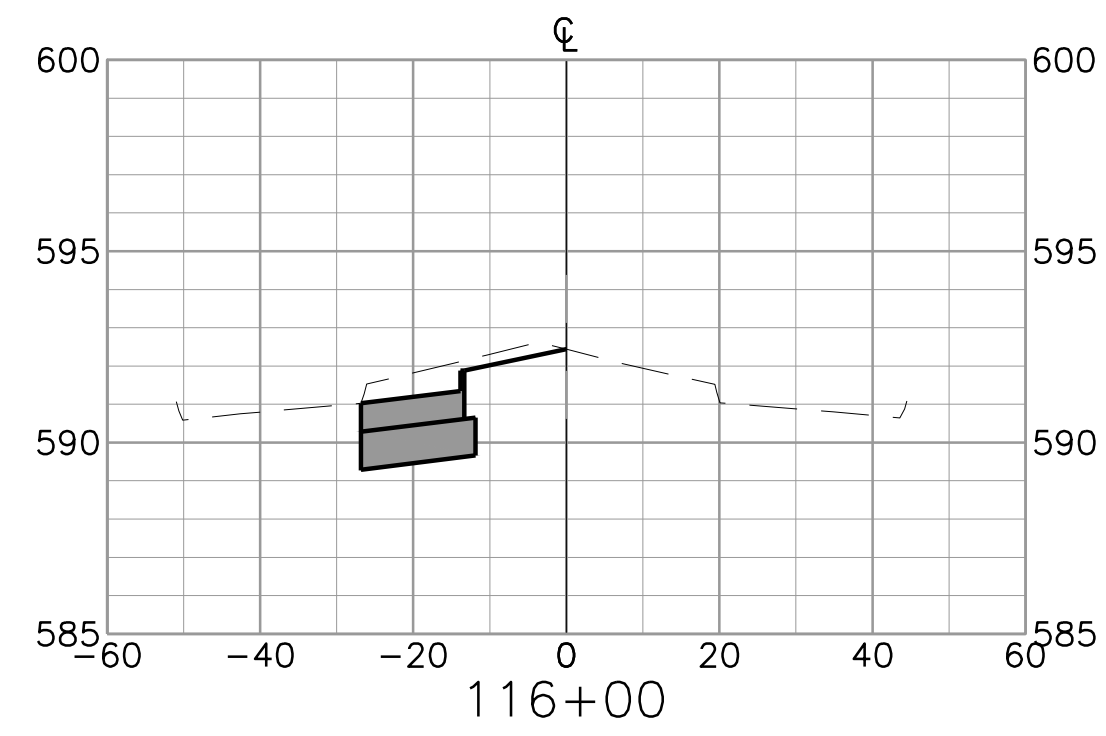
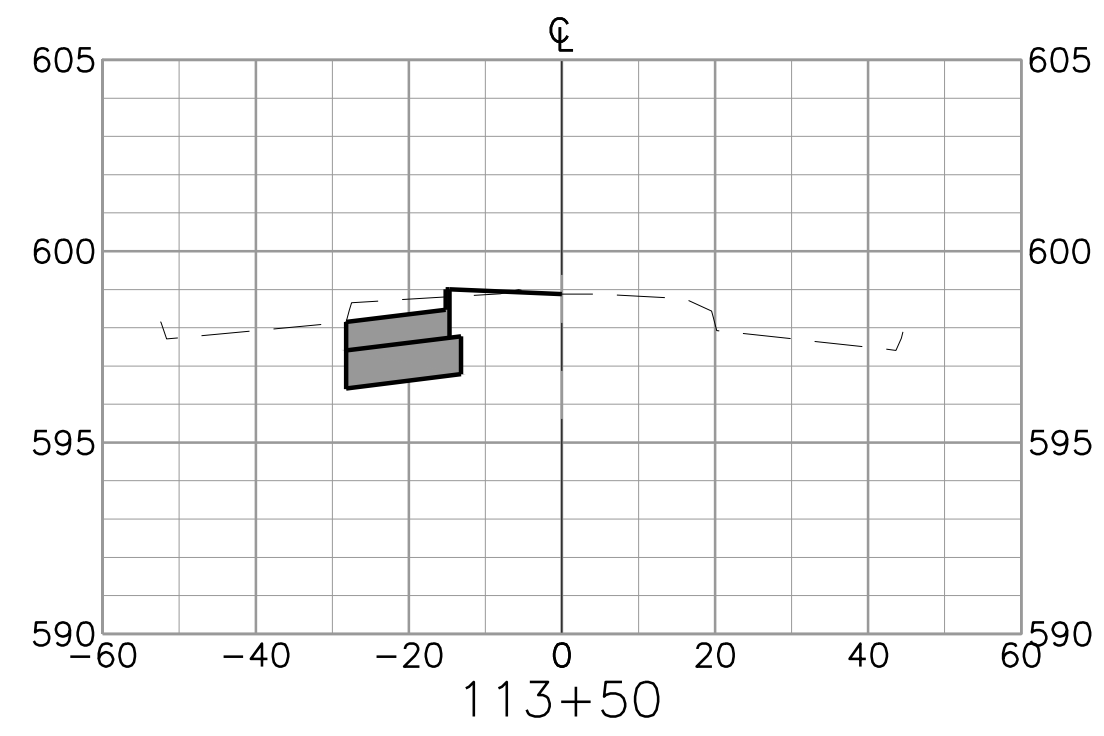
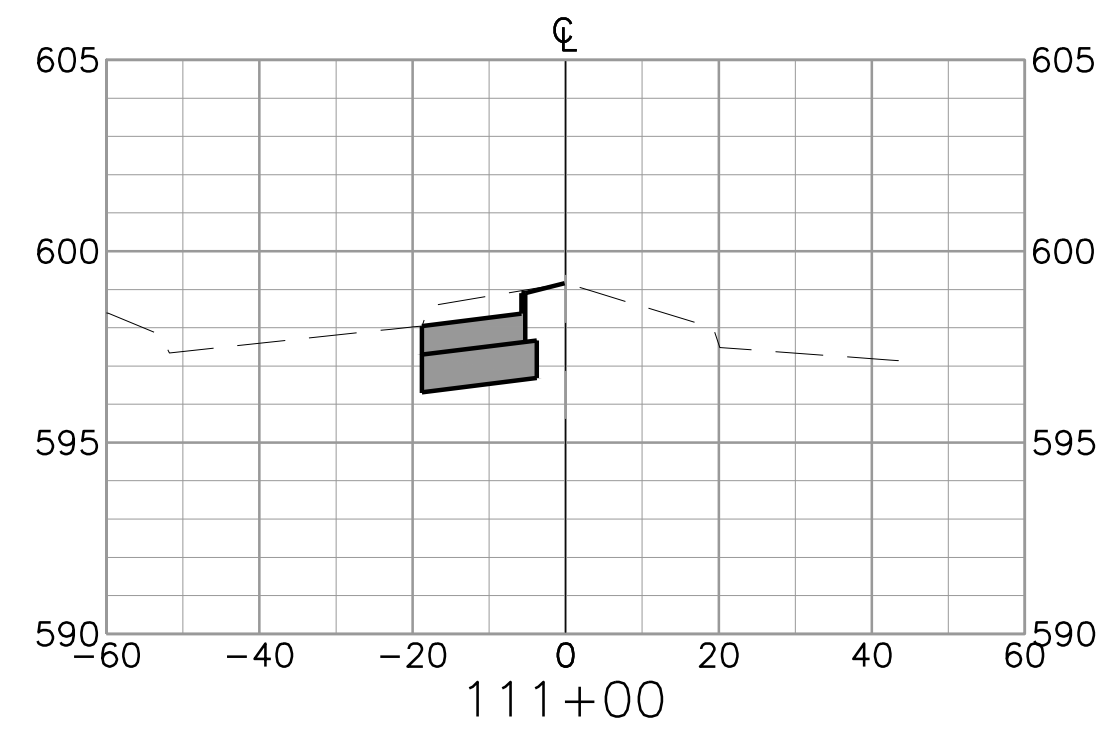
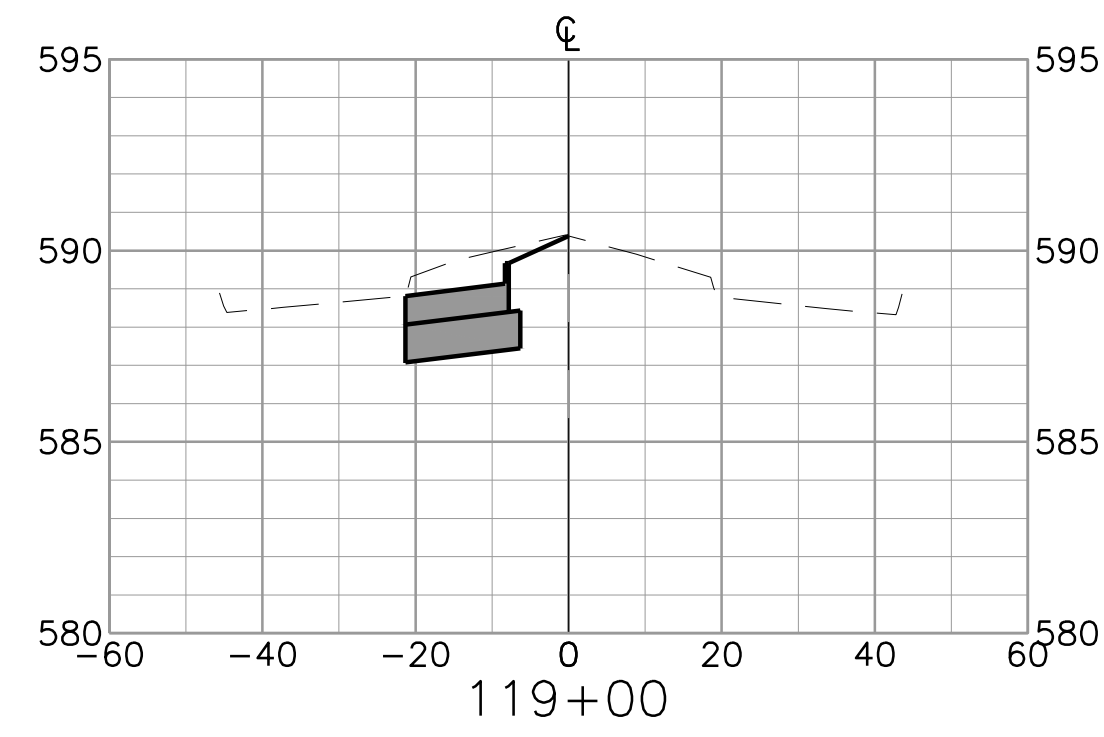
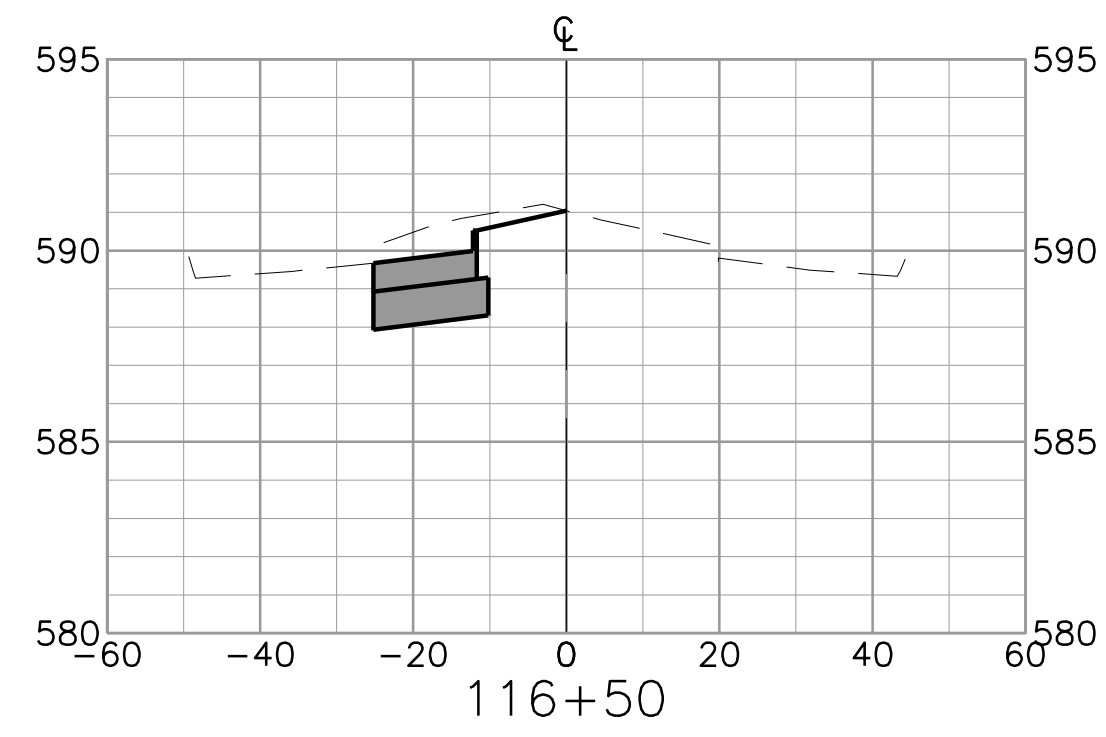
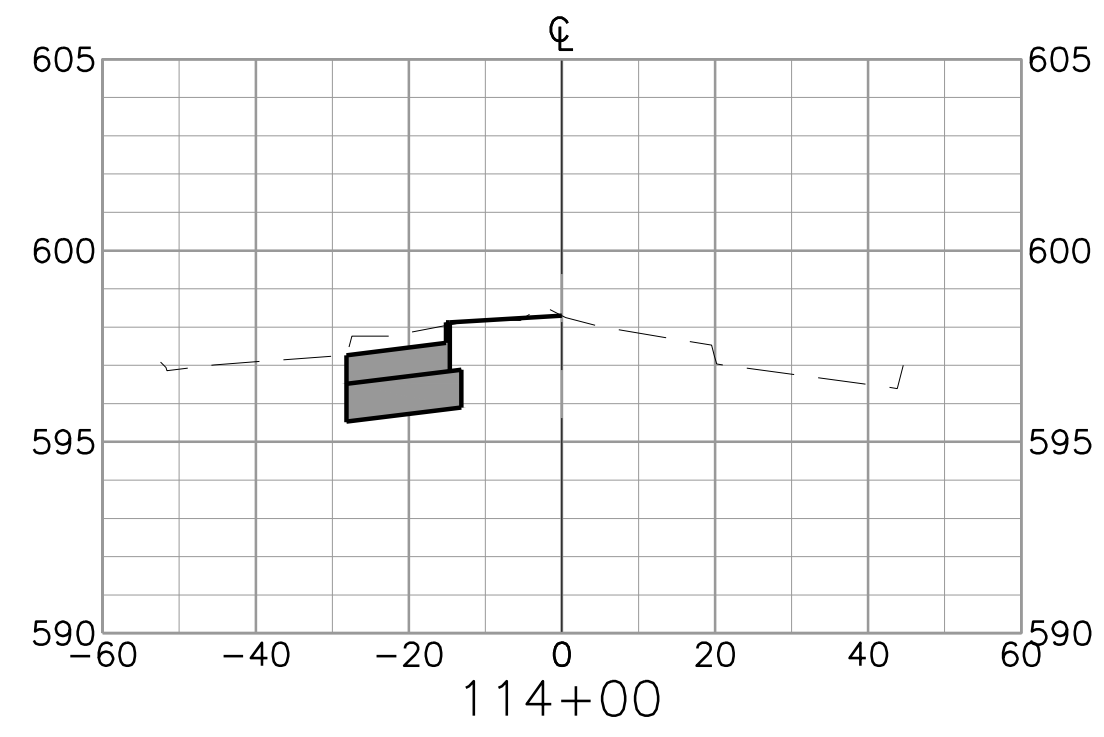
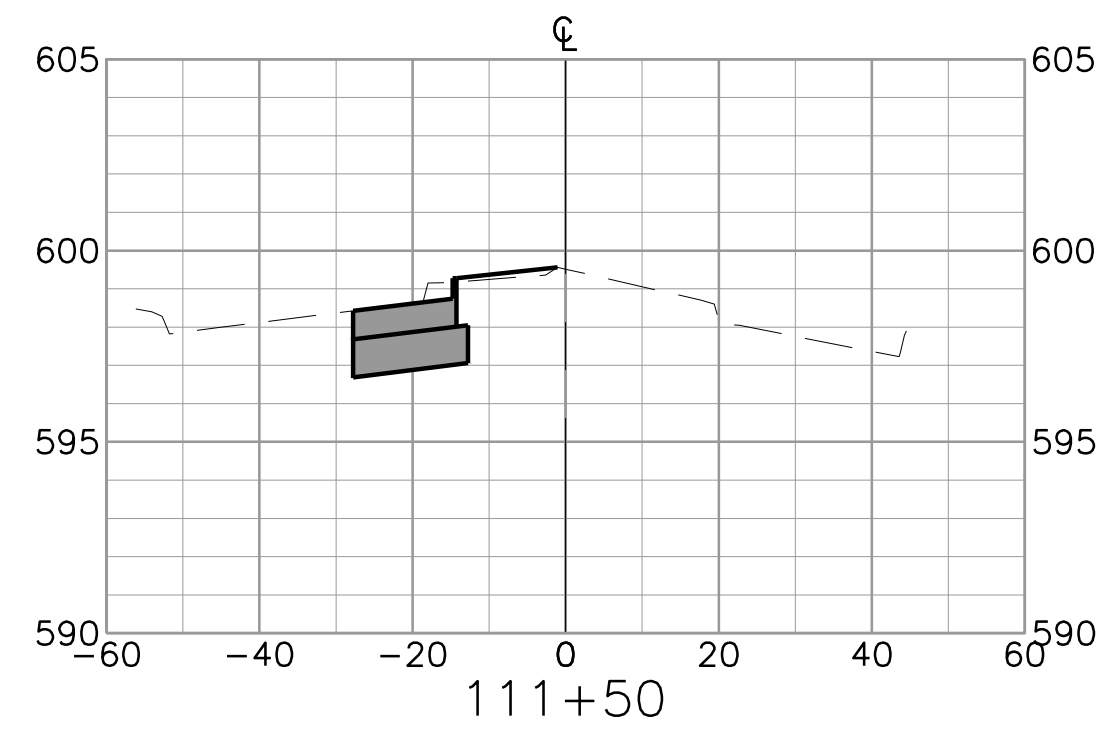
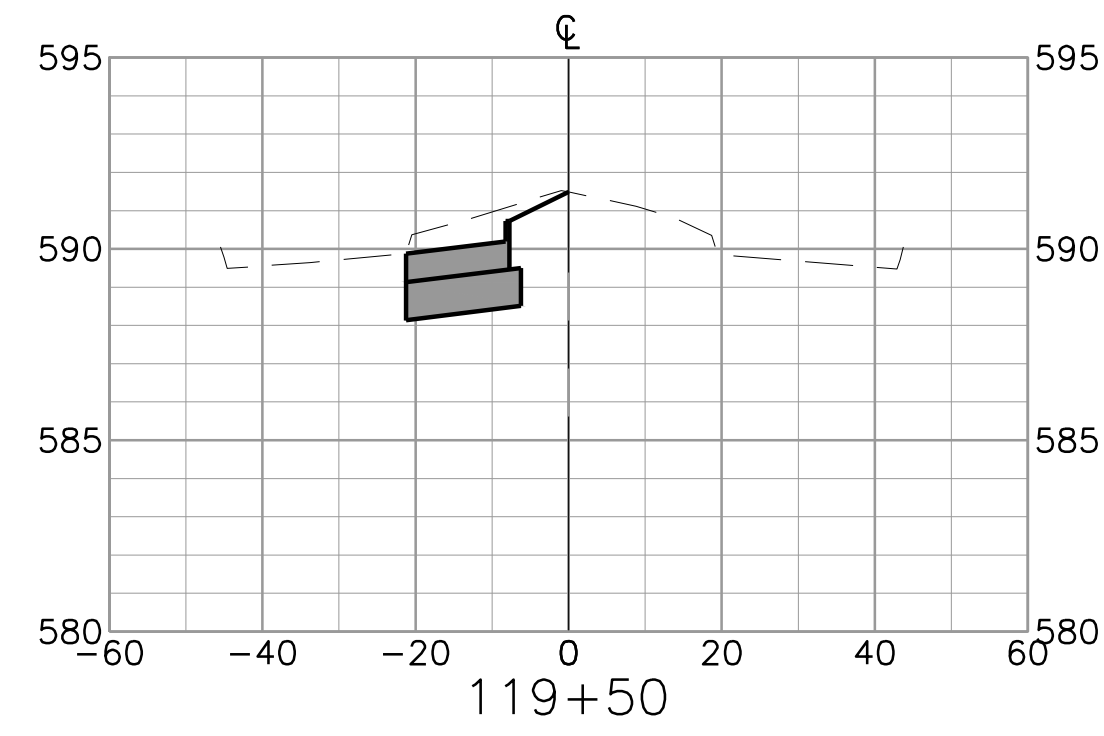
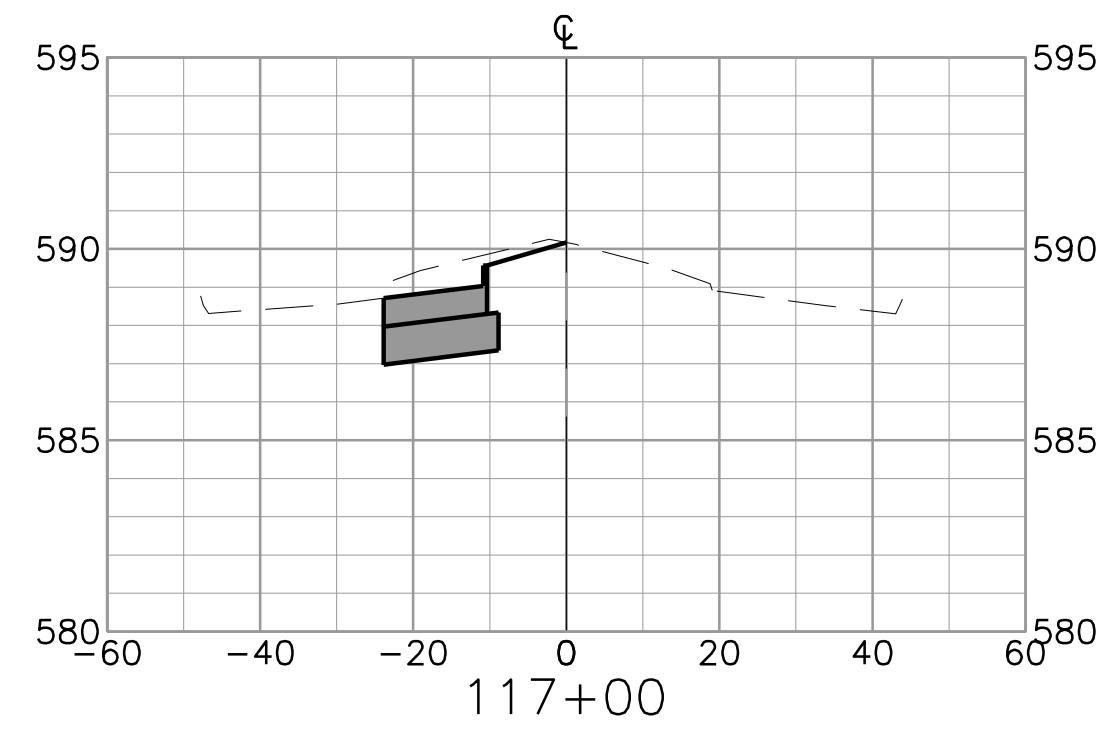
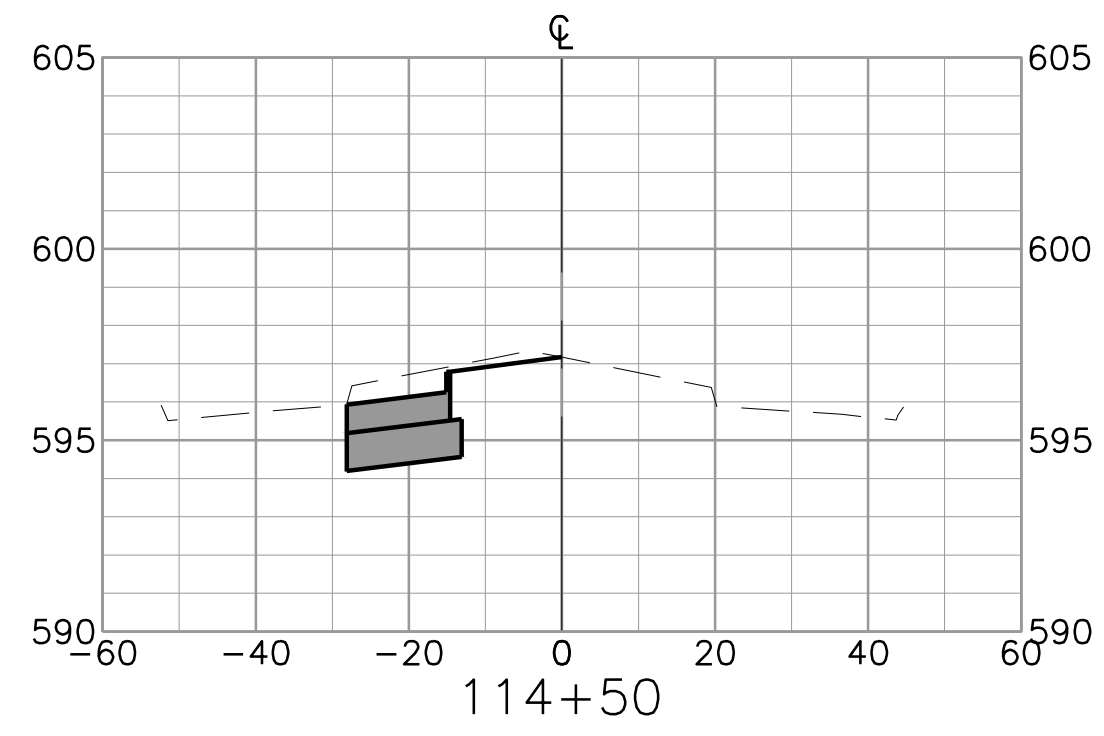
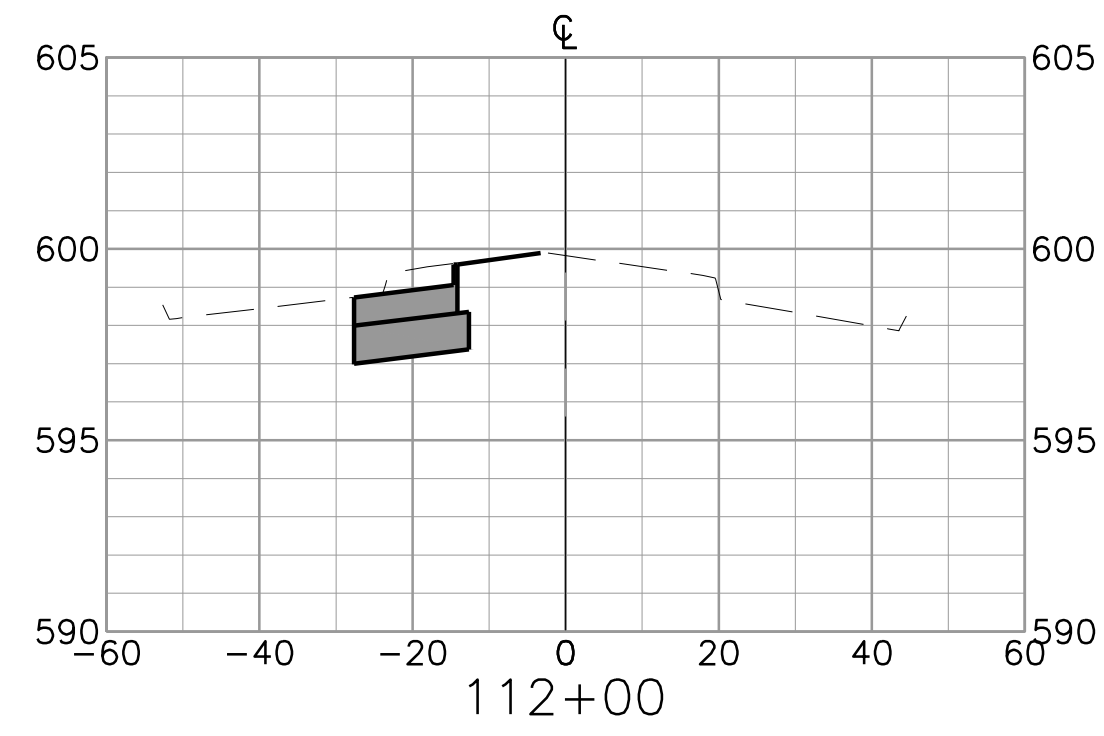
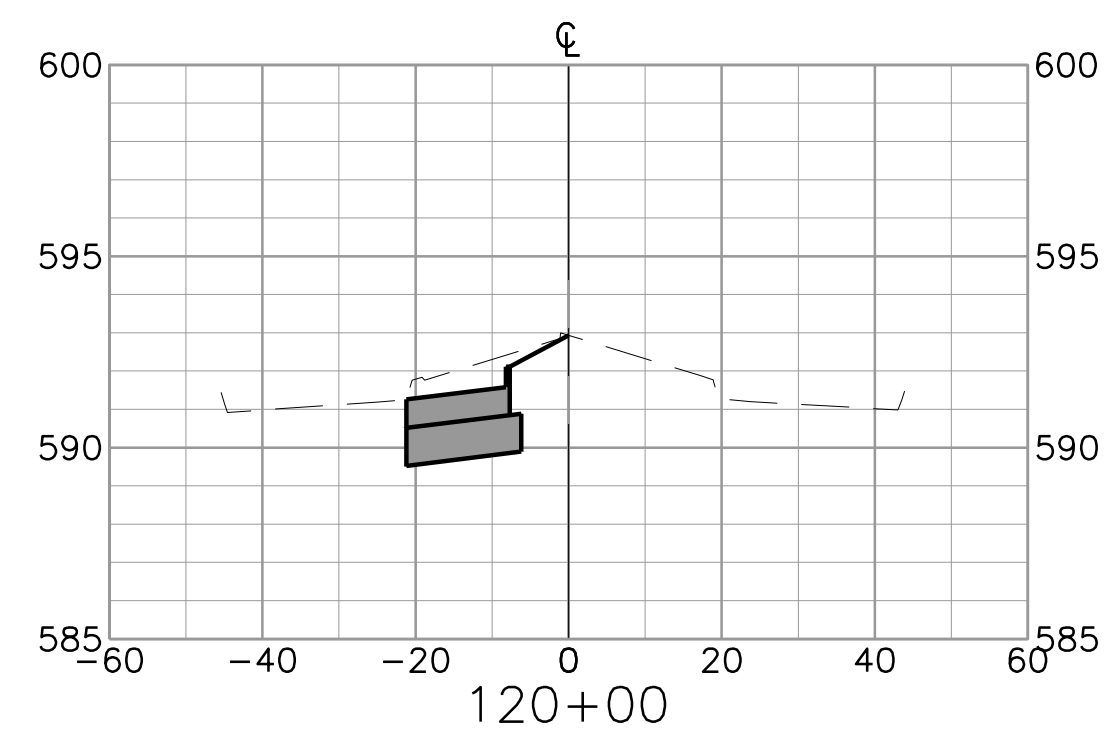
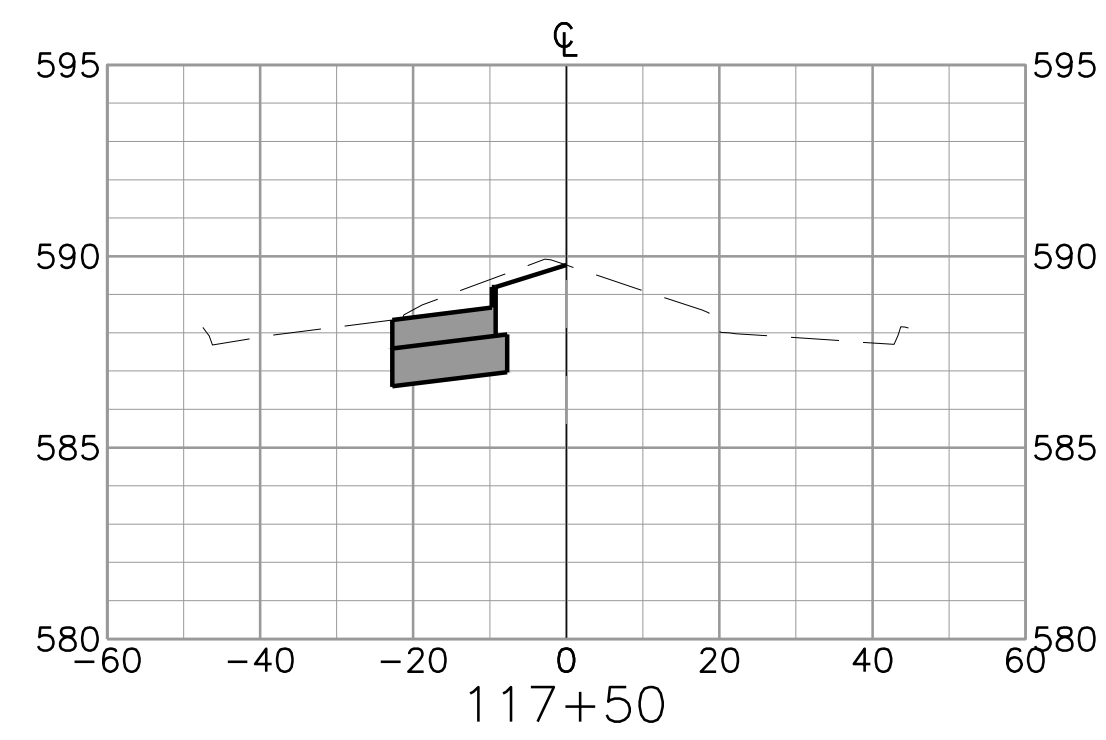
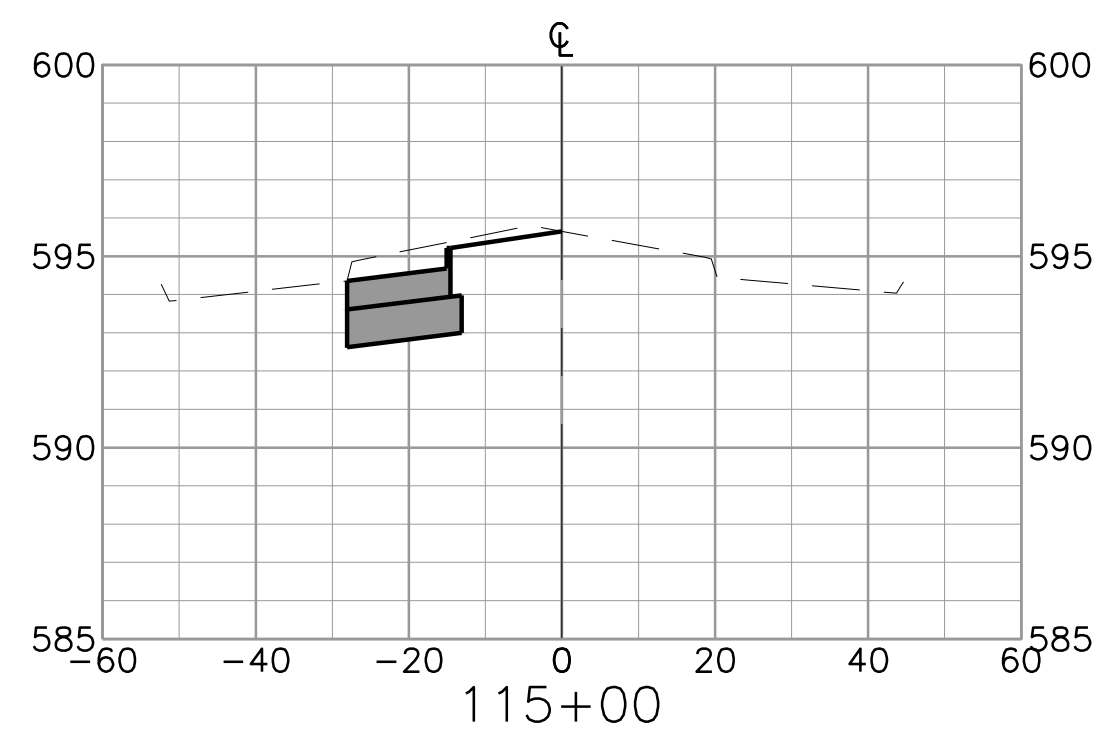
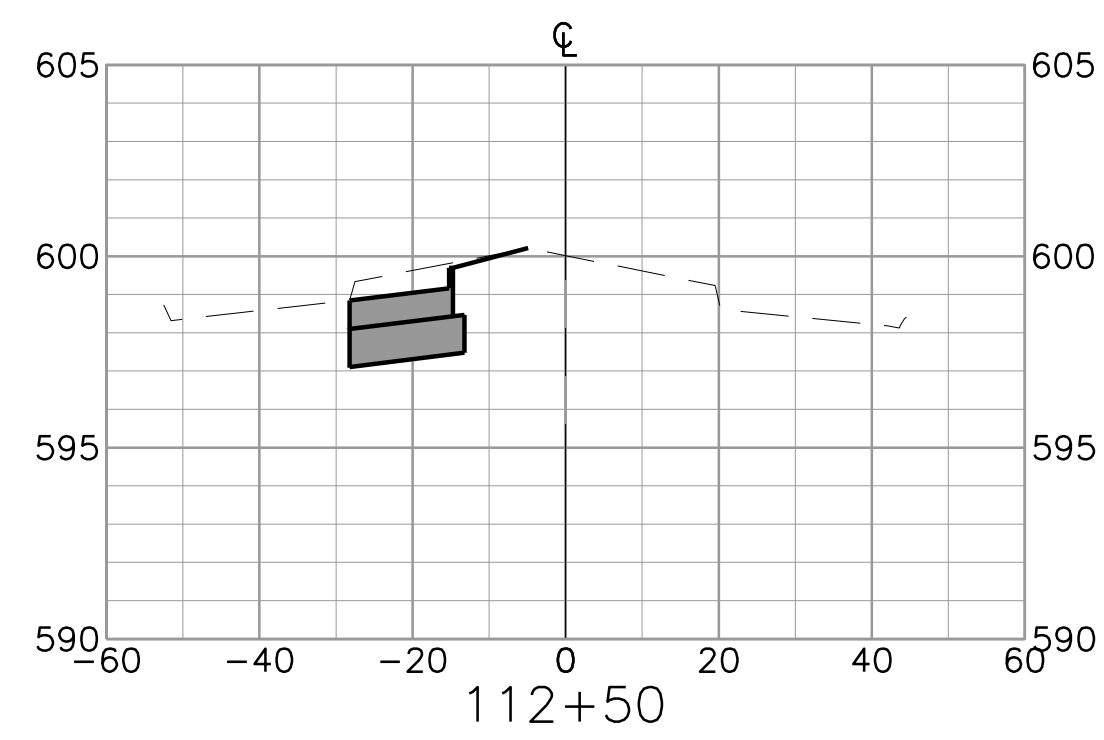
NO.	ISSUE	DATE	BY	FILE NAME
0	VERIFY SCALE			cv-trt-pr-XS01
1	Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.			

FR15624
 DATE 4/2017
 DESIGNED AU
 DRAWN SI
 REVISED
 CHECKED

SHEET XS-01
 SEQ. 102



ACAD Ref: 2017 (LMS Tech)
 Filename: N:\Drawings\cv-trt-pr-XS02.dwg
 Last Saved: 3/9/2017 9:29 AM Saved By: sli



NO.	ISSUE	DATE	BY	FILE NAME
0	VERIFY SCALE			cv-trt-pr-XS02
1	Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.			

SHEET XS-02
 SEQ. 103

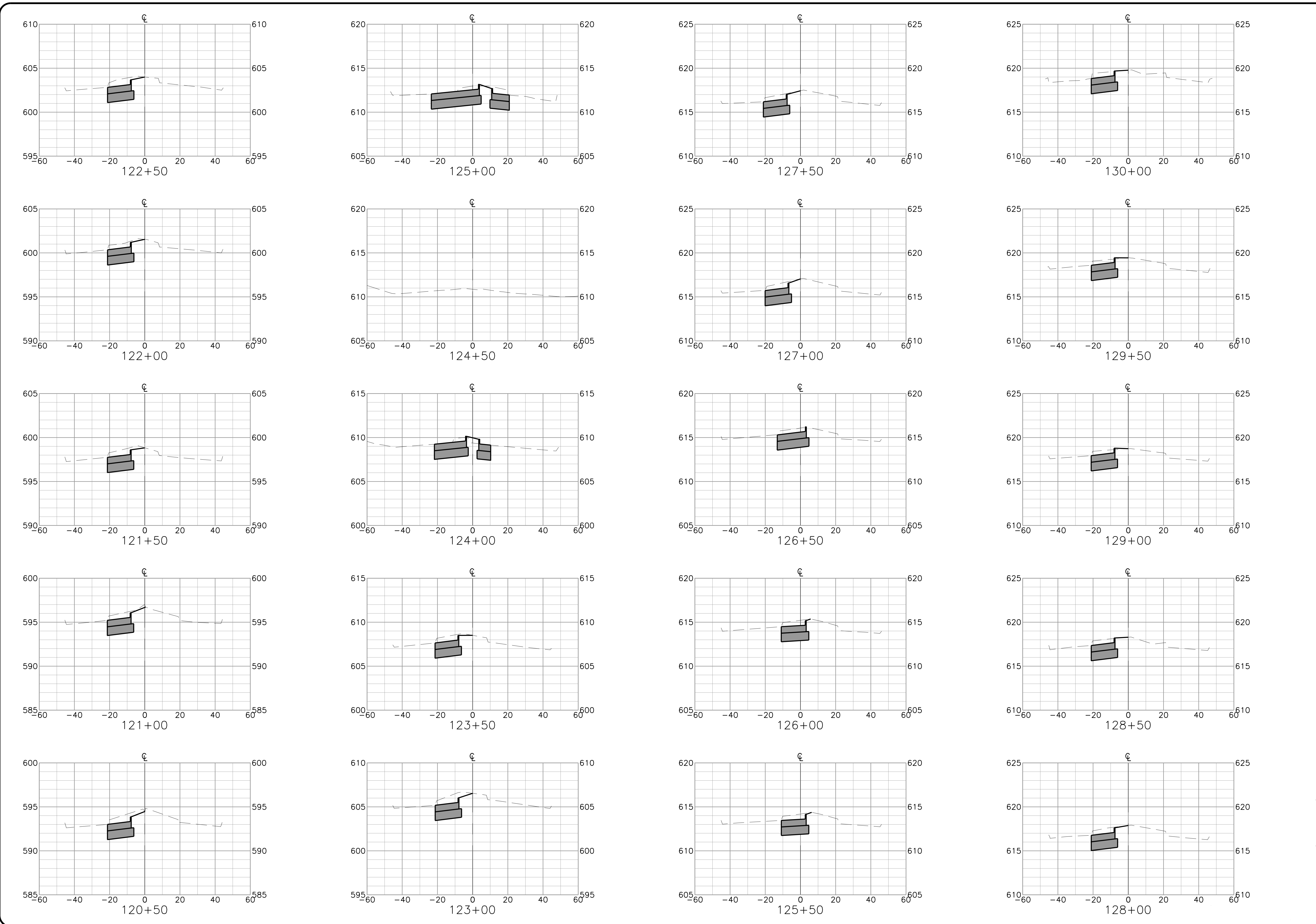
CITY OF FRISCO, TEXAS
 CIVIL

LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
 LEBANON ROAD CROSS SECTIONS
 STA 110+50 TO STA 120+00



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





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

Wayne P. Hart
 118231
 05-01-2017

FREES & NICHOLS
 6136 Frisco Square Blvd, Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freese.com

CITY OF FRISCO, TEXAS
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
 CIVIL
LEBANON ROAD CROSS SECTIONS
STA 120+50 TO STA 130+00

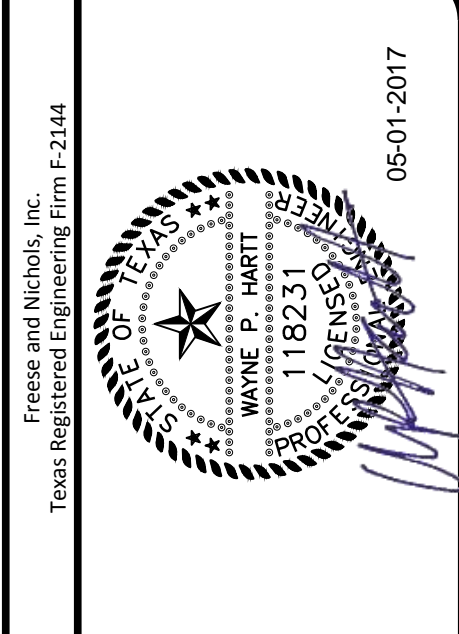
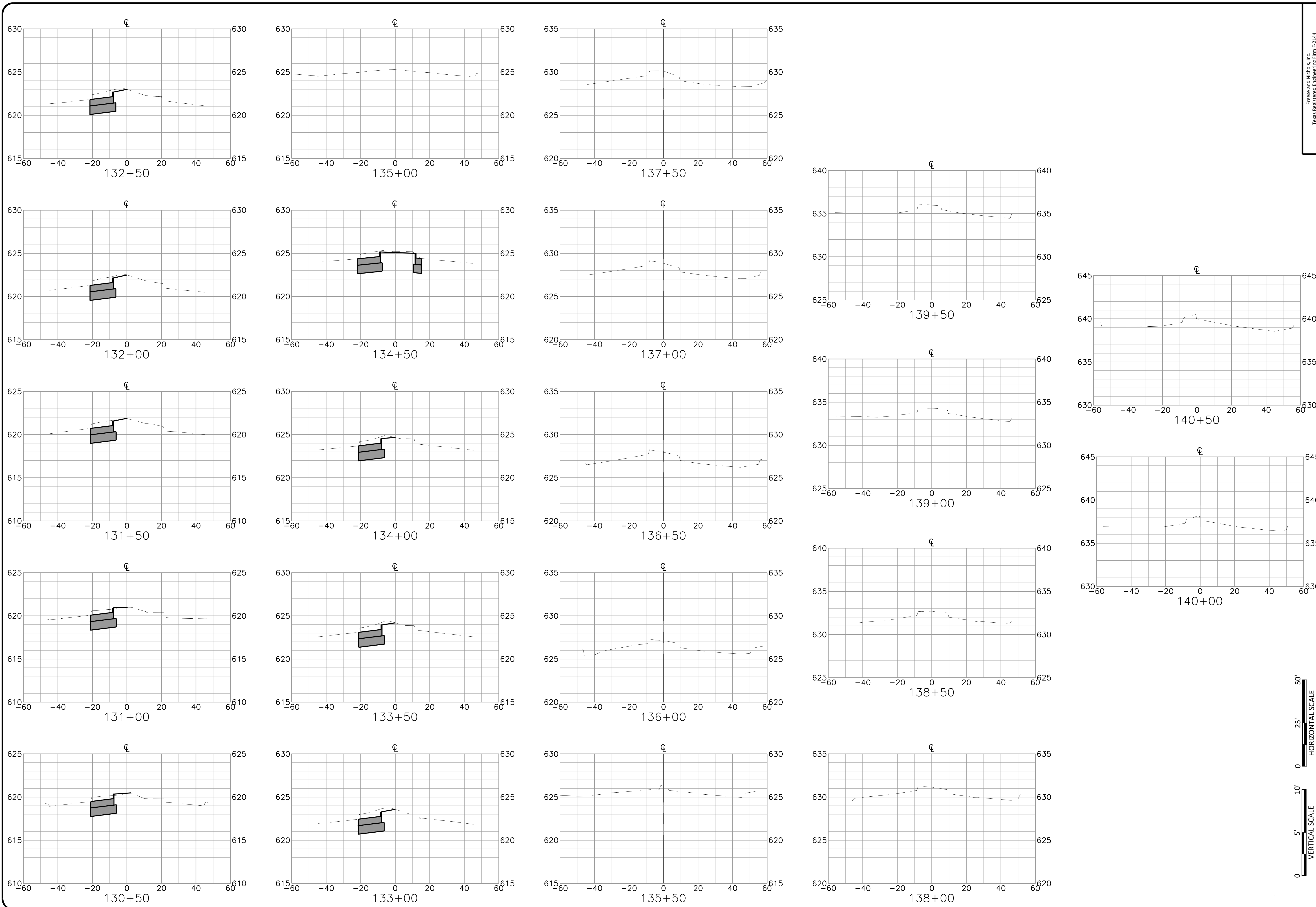
NO.	ISSUE	DATE	BY	FILE NAME
0	VERIFY SCALE			cv-trt-pr-XS03
1	Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.			

FR&N JOB NO. FRCL5624
 DATE 4/2017
 DESIGNED AU
 DRAWN SI
 REVISED
 CHECKED

VERTICAL SCALE: 1" = 5'
 HORIZONTAL SCALE: 1" = 50'

SHEET XS-03
 SEQ. 104

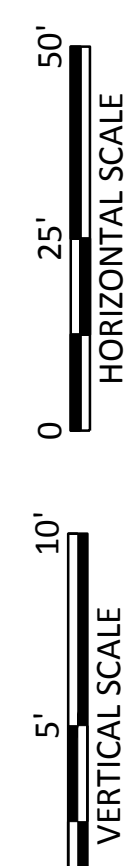
ACAD Ref: 2016 (LMS Tech)
 Filename: N:\F\Drawings\cv-trt-pr-XS04.dwg
 Last Saved: 3/5/2017 10:10 AM. Saved By: sli



FRESE NICHOLS
 6136 Frisco Square Blvd, Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.frees.com

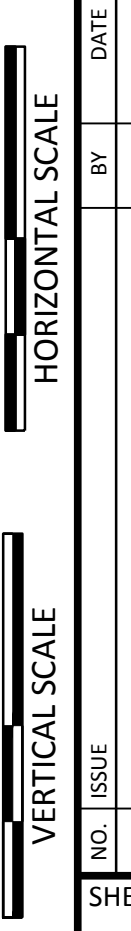
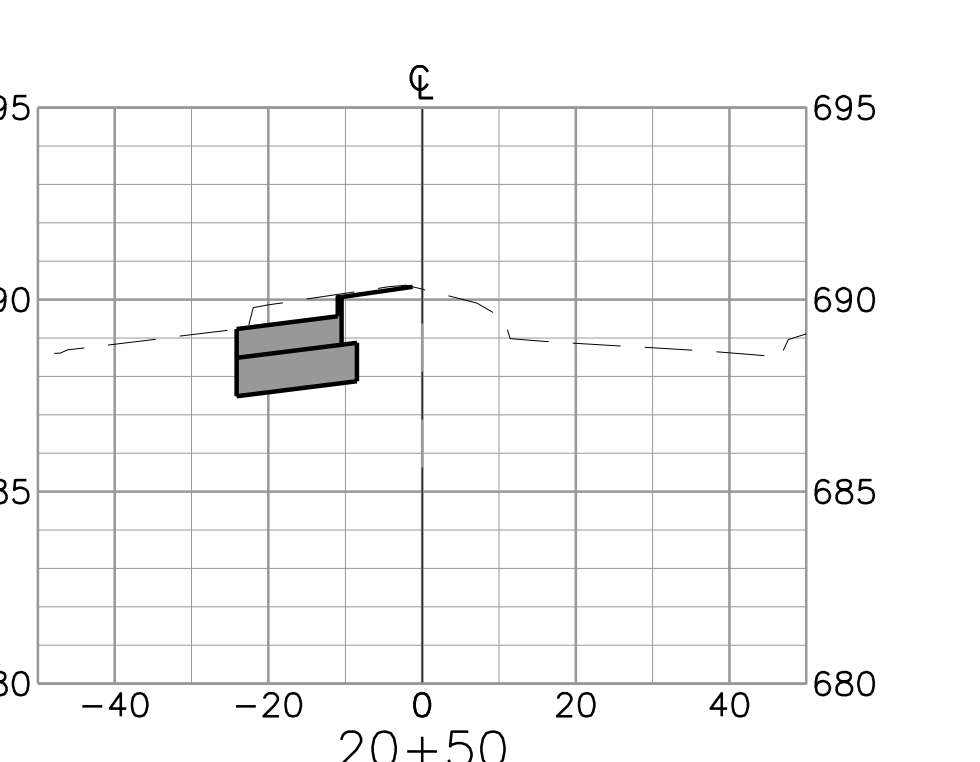
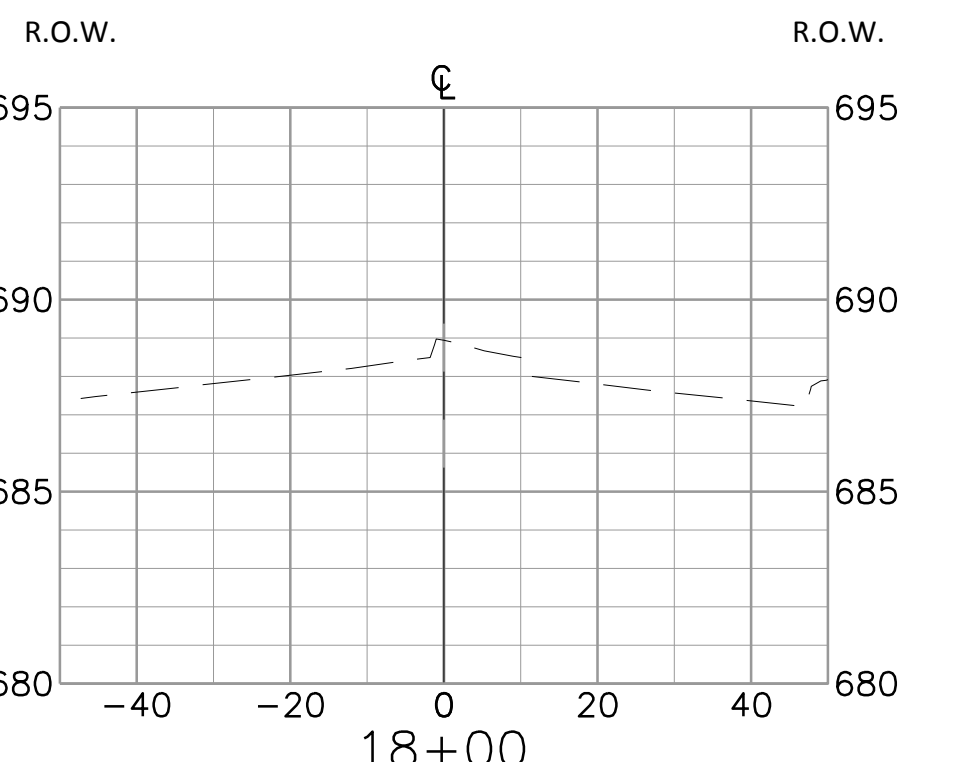
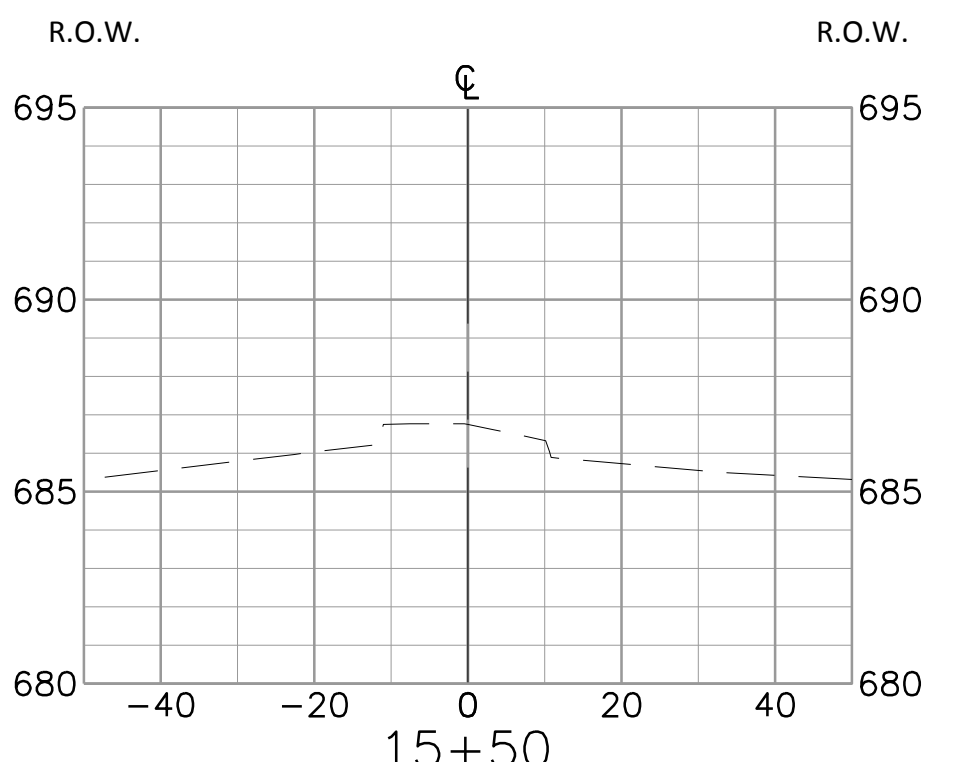
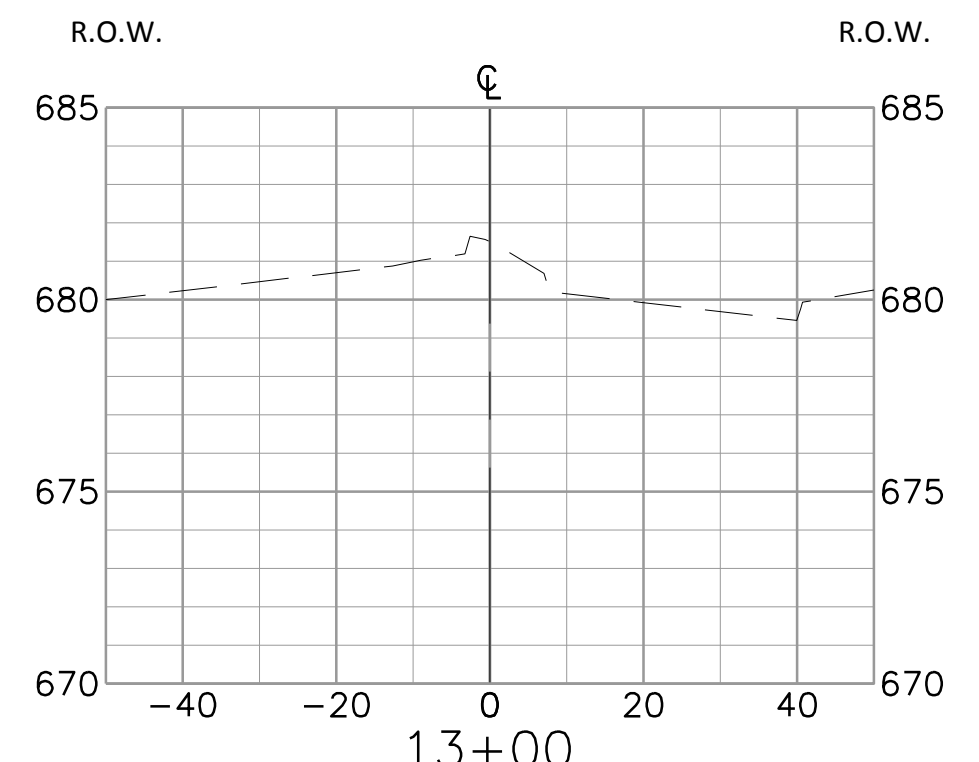
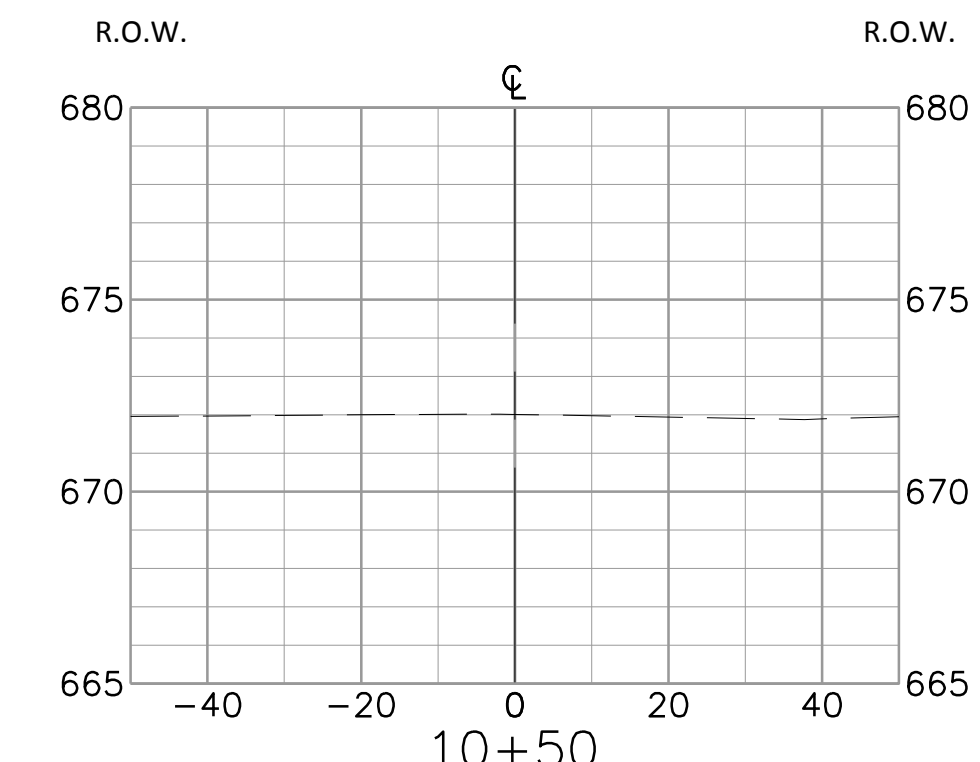
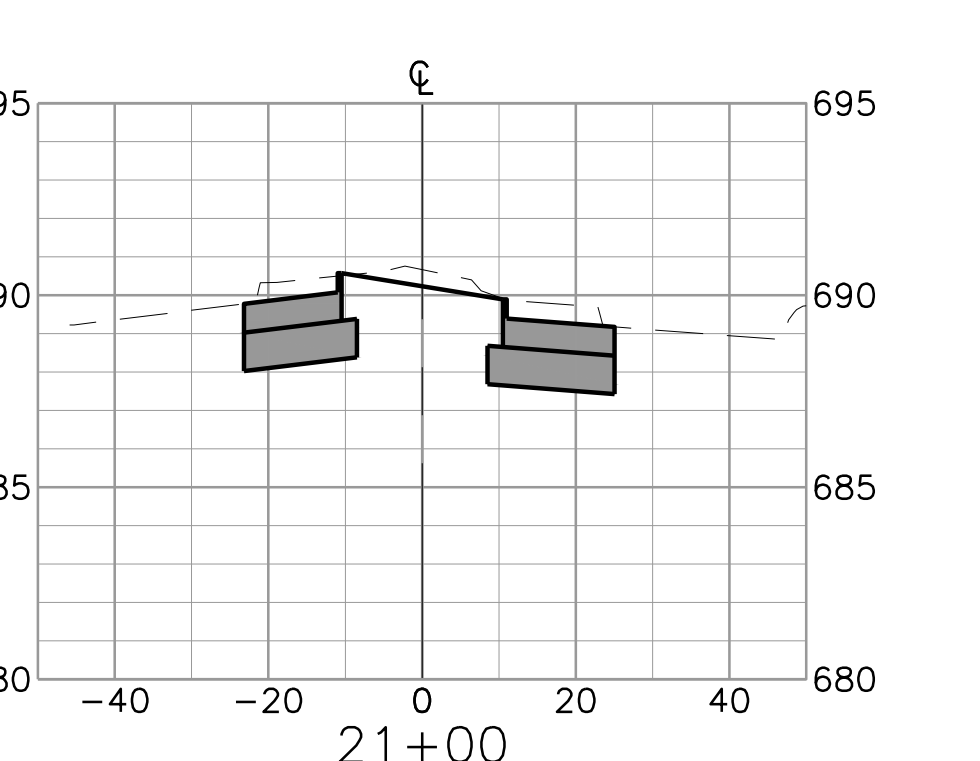
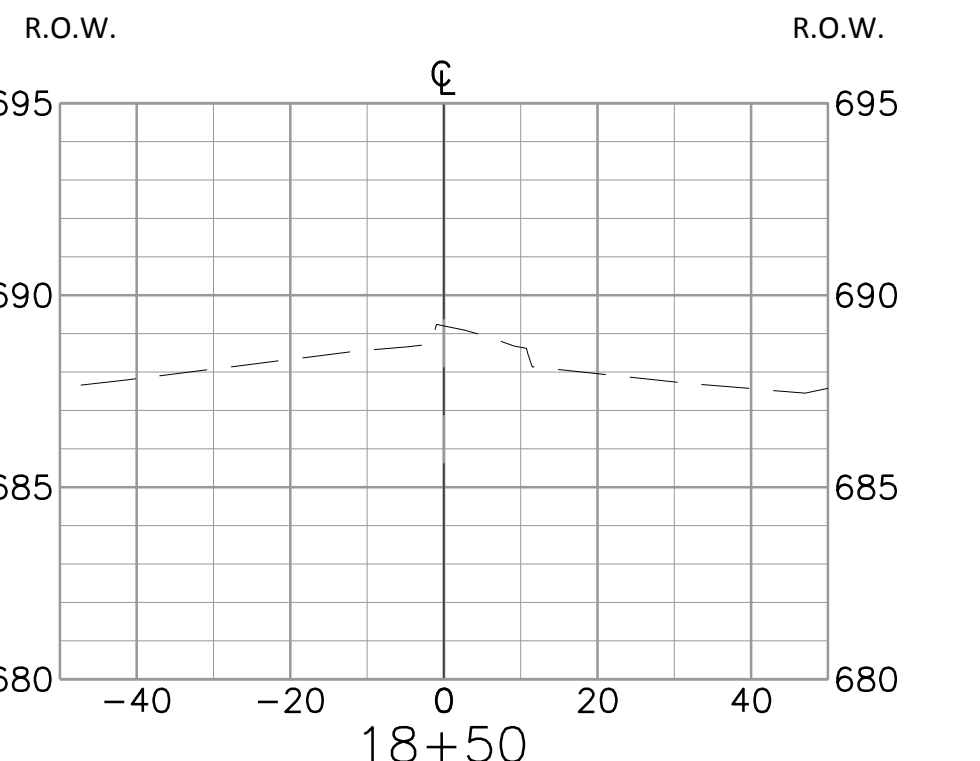
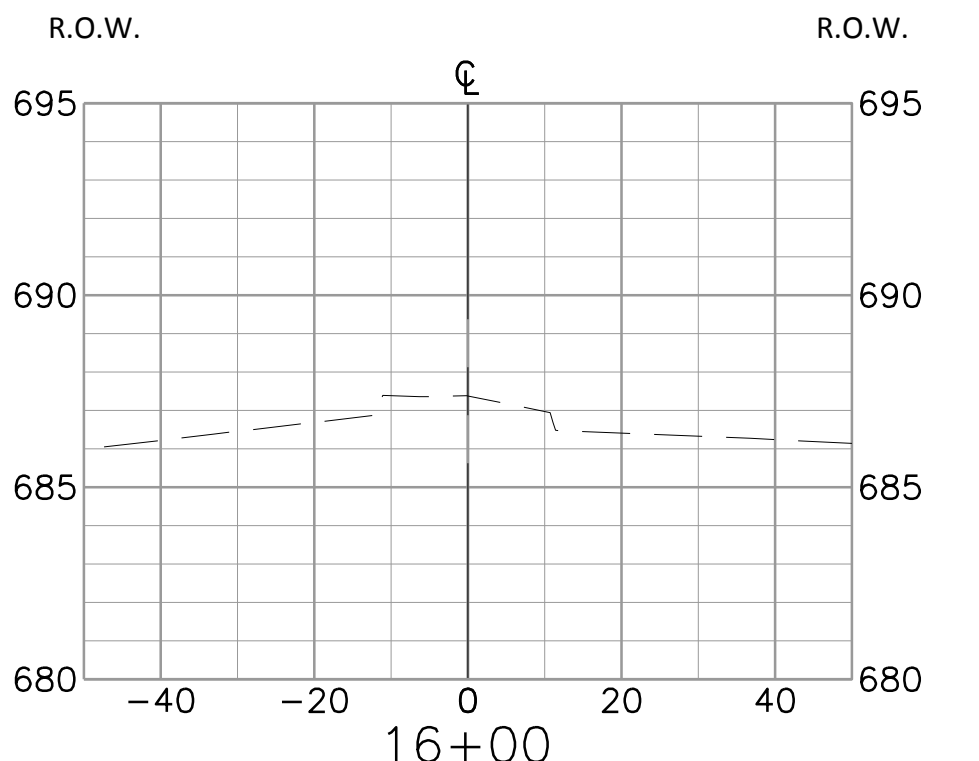
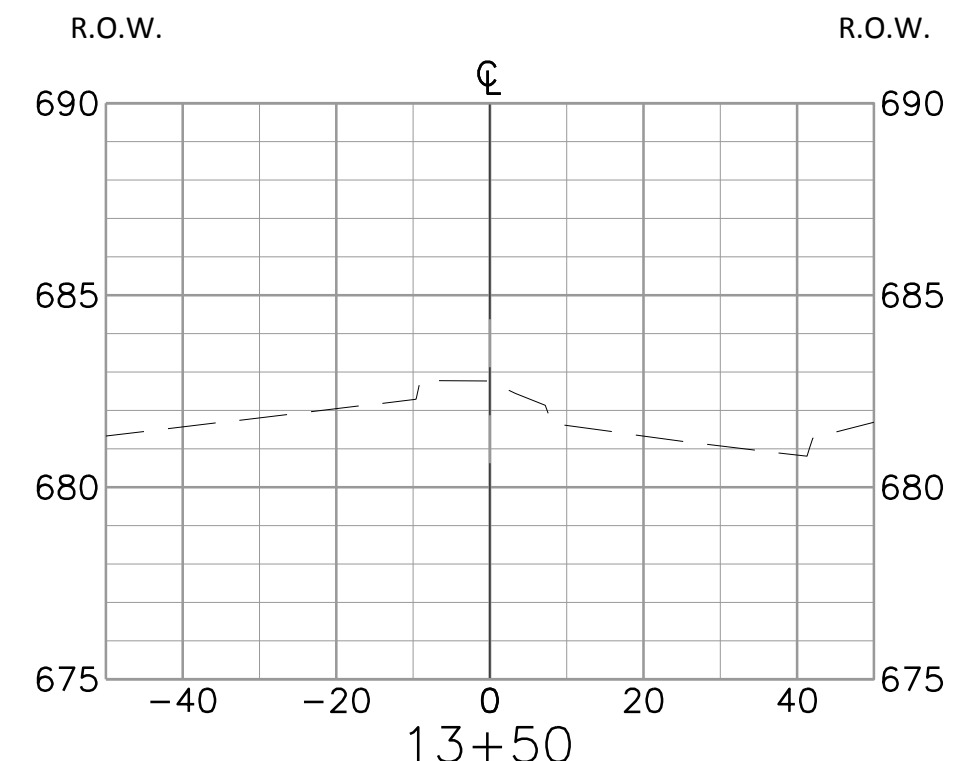
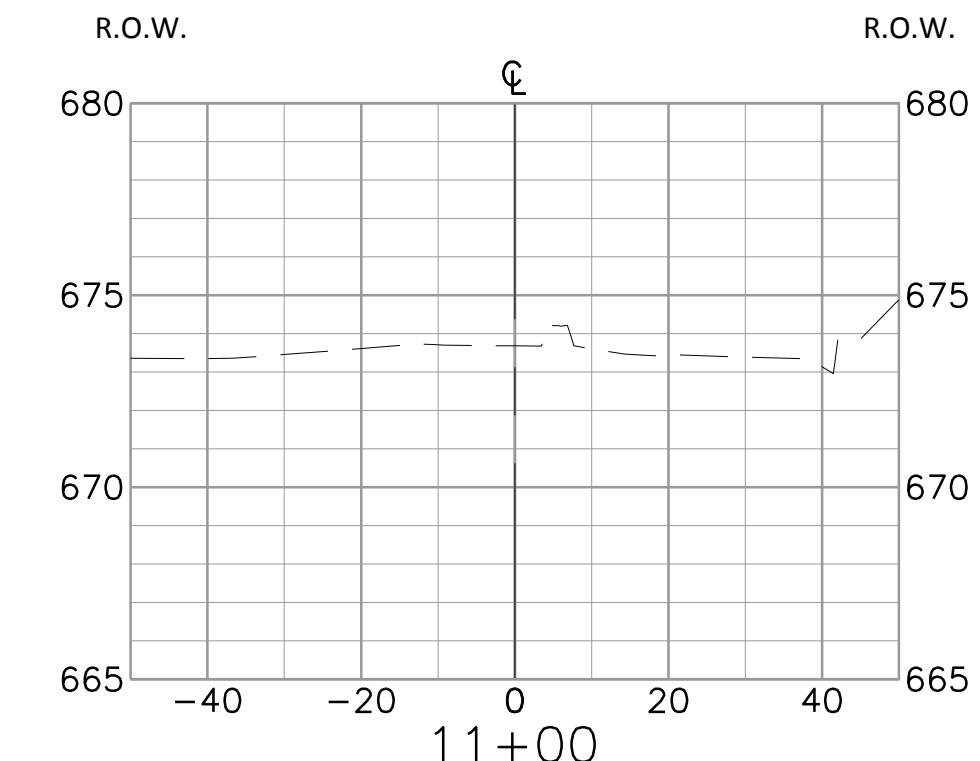
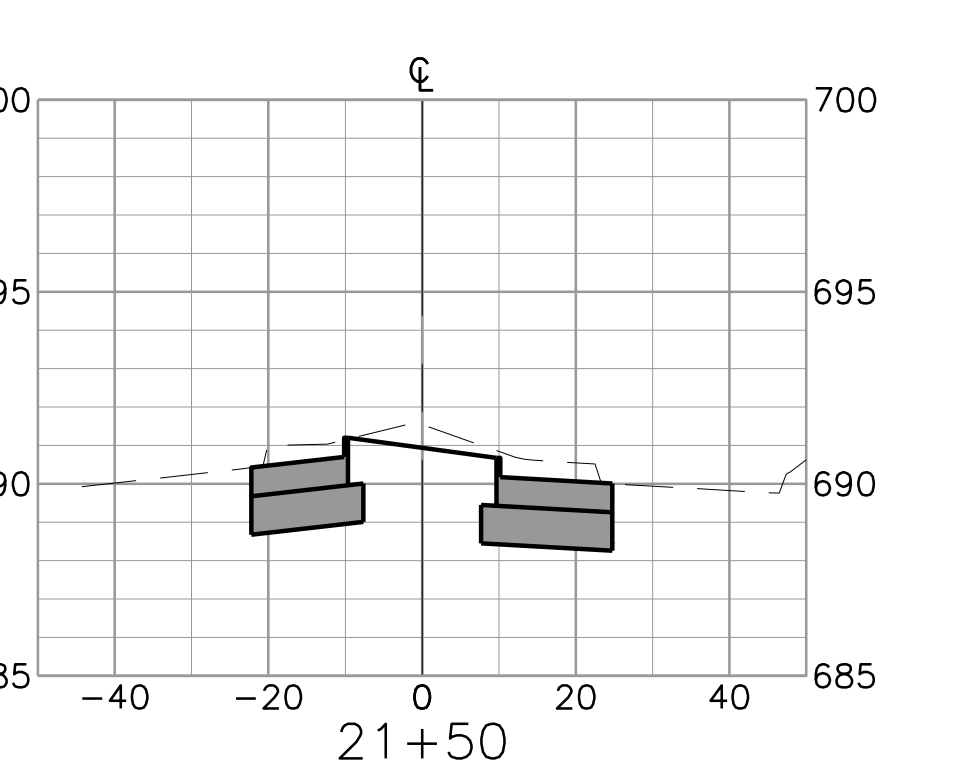
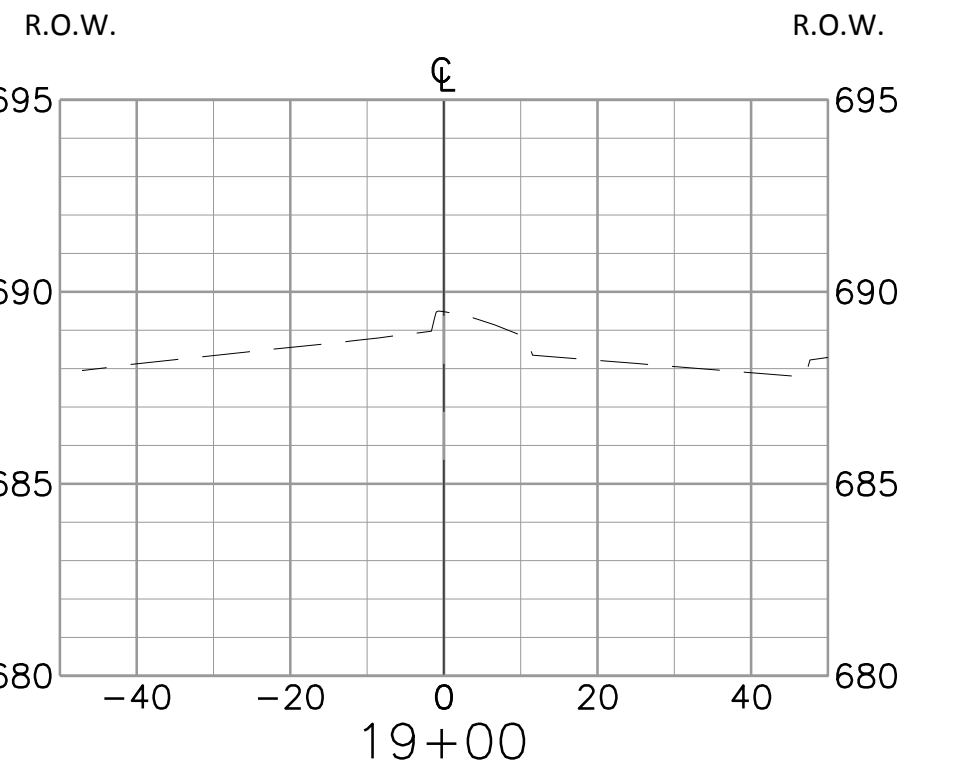
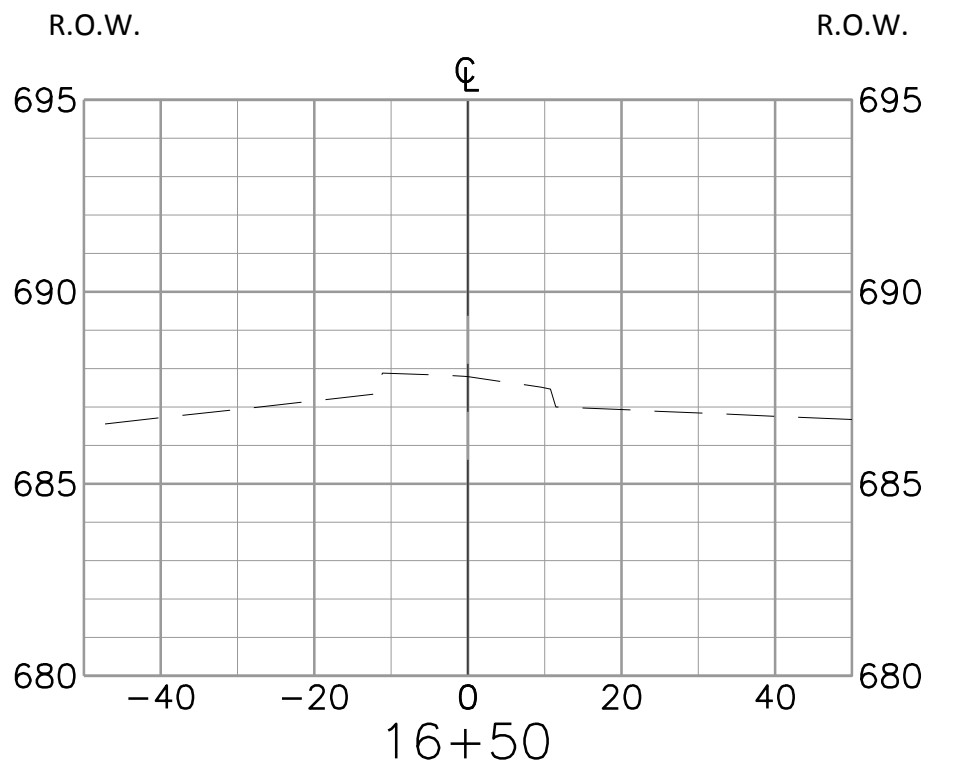
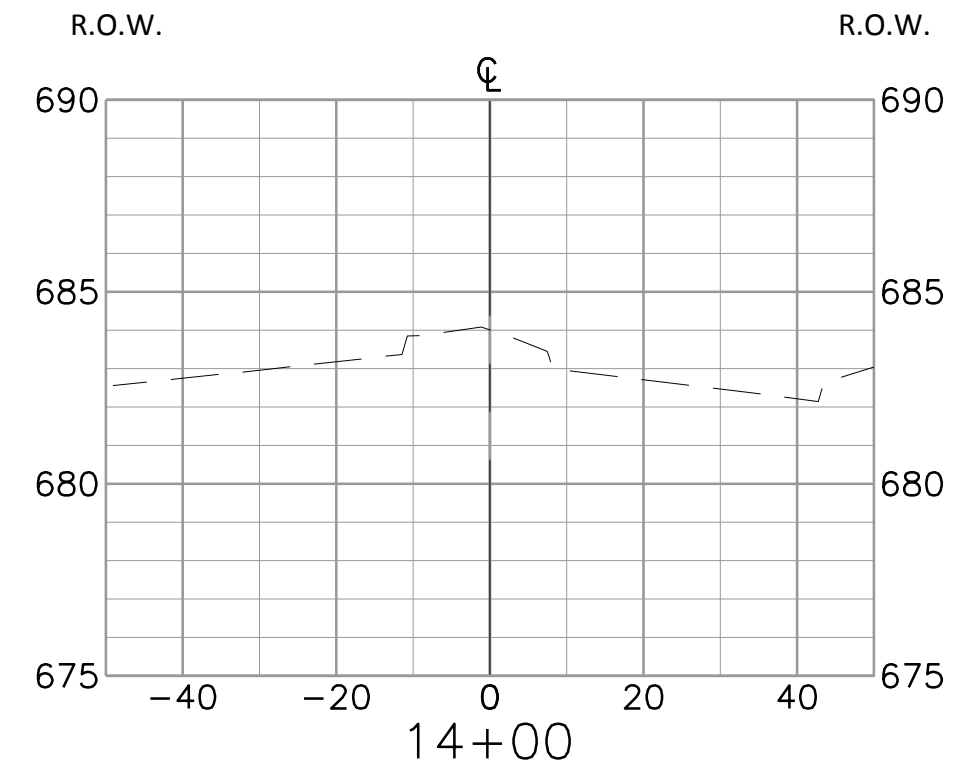
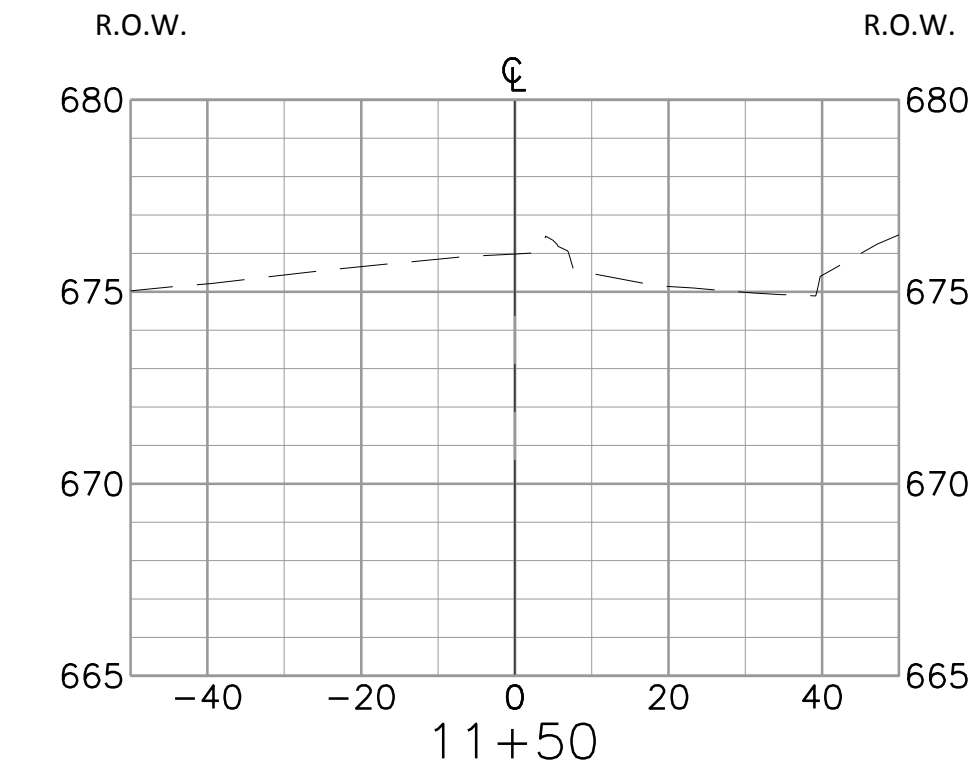
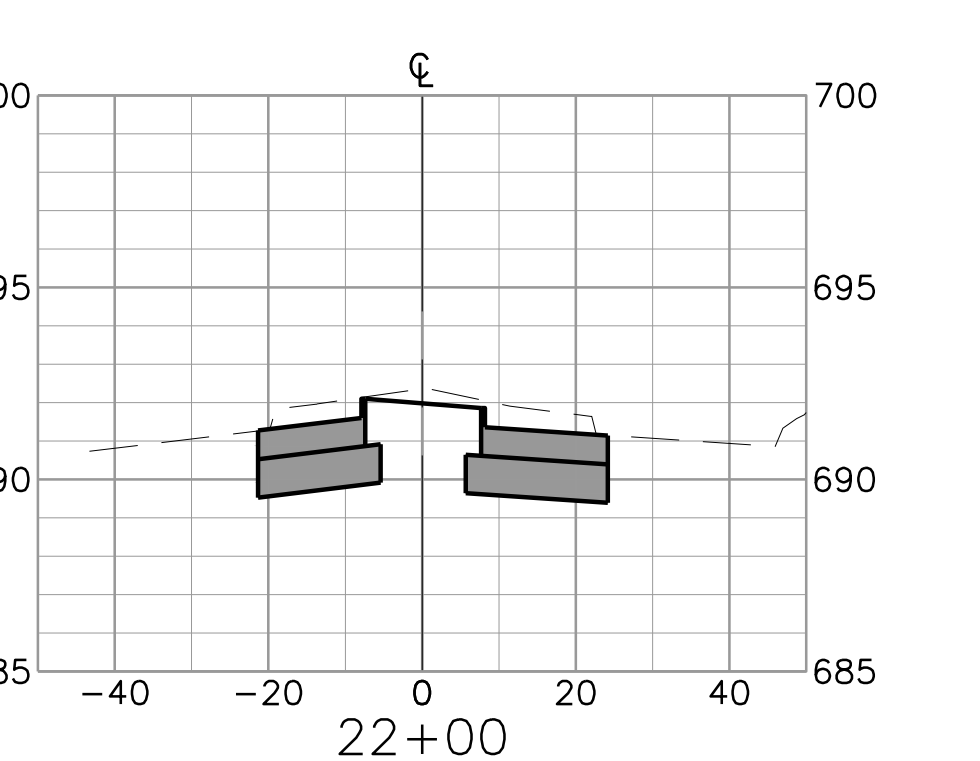
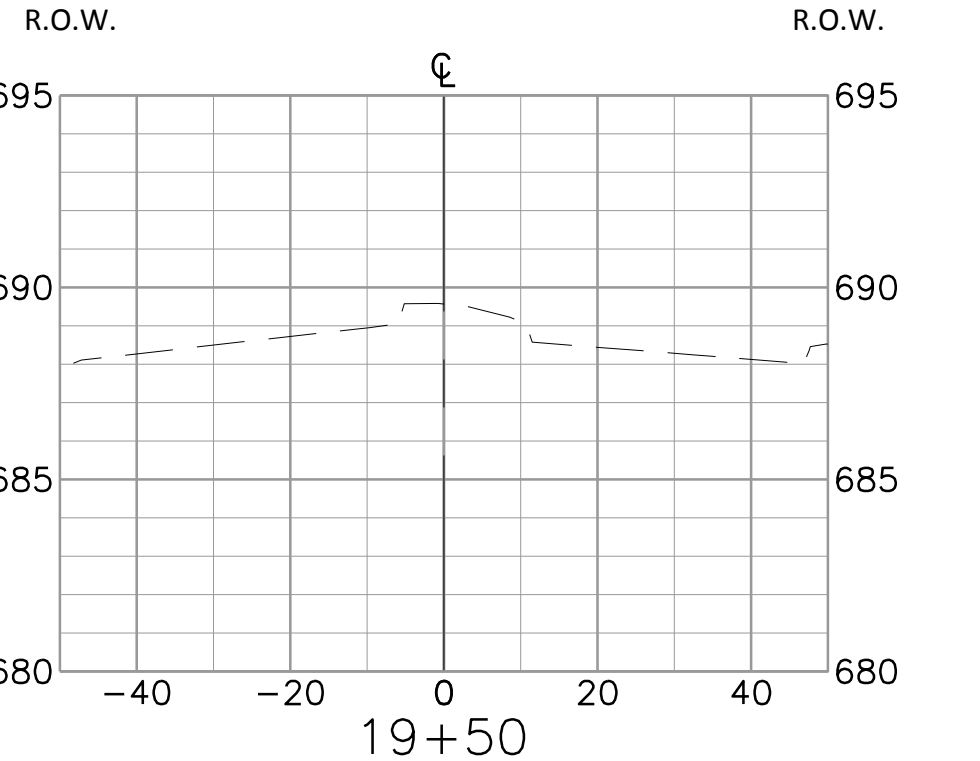
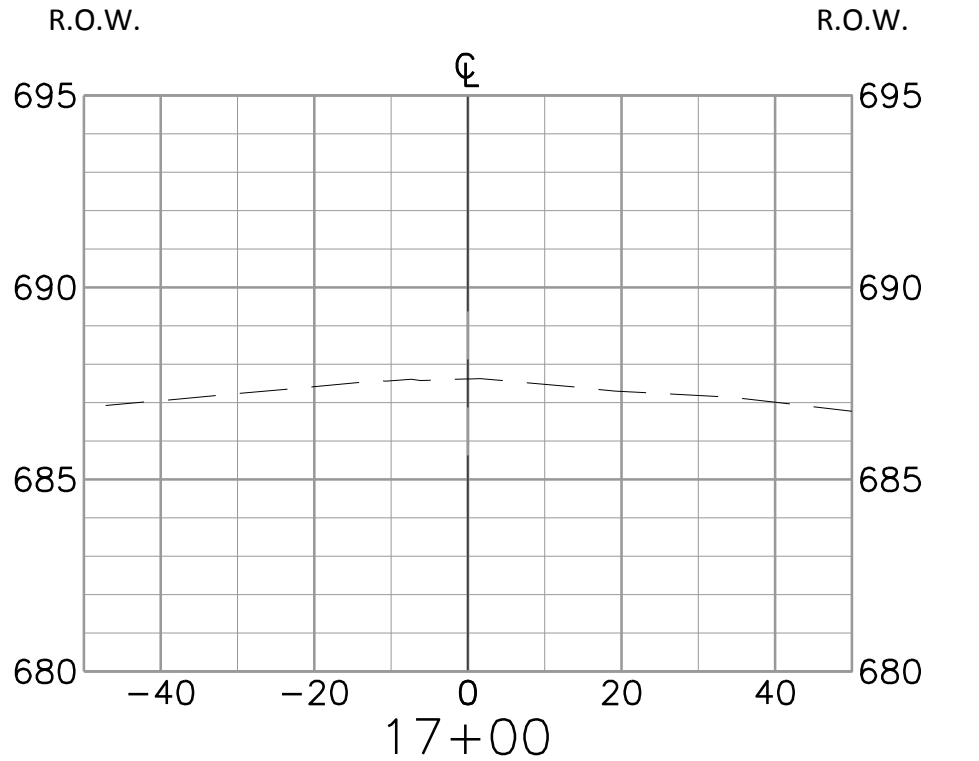
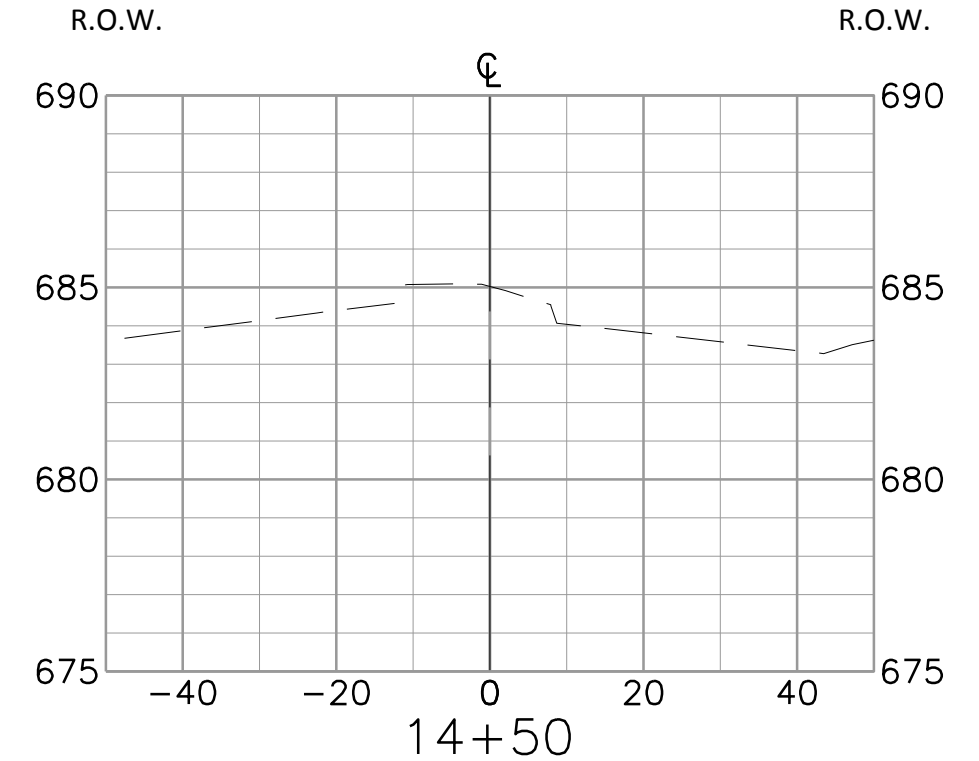
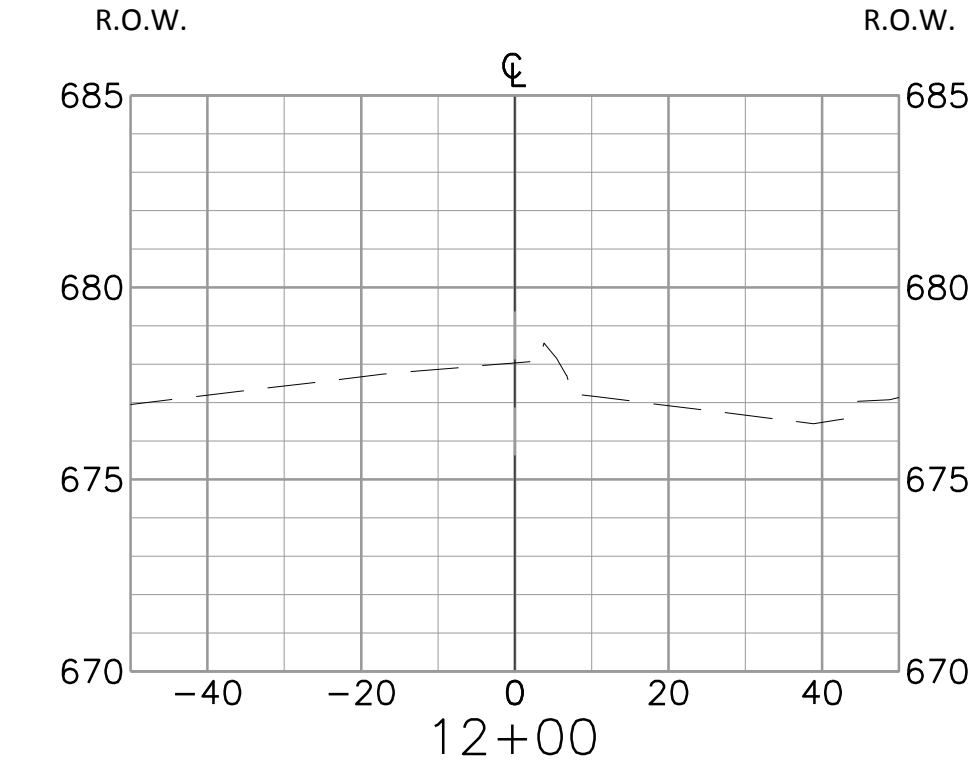
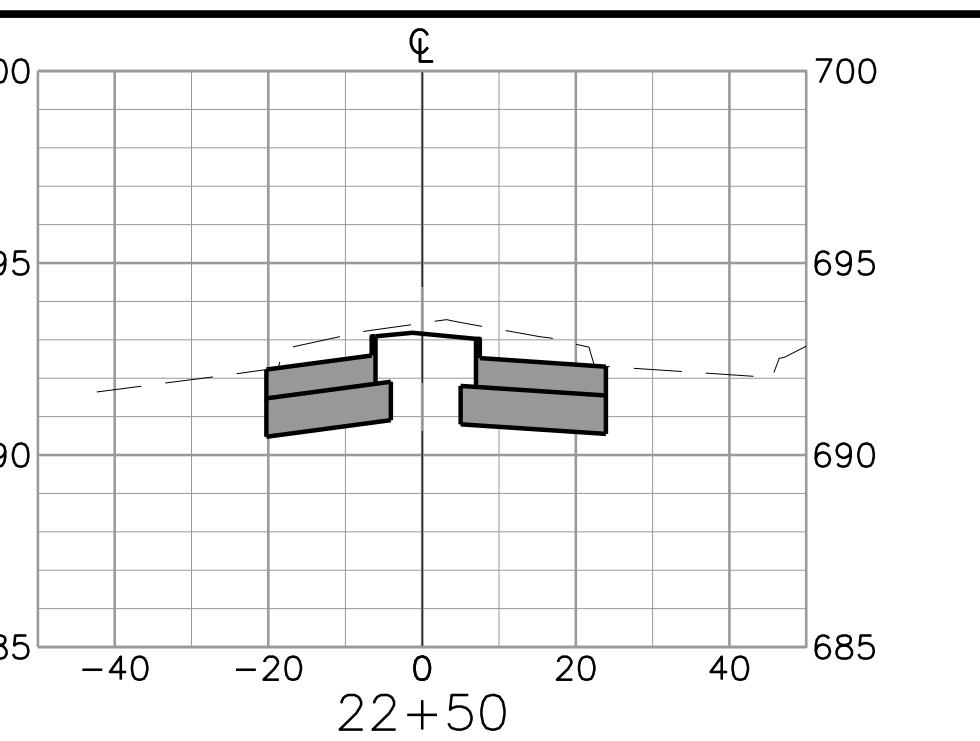
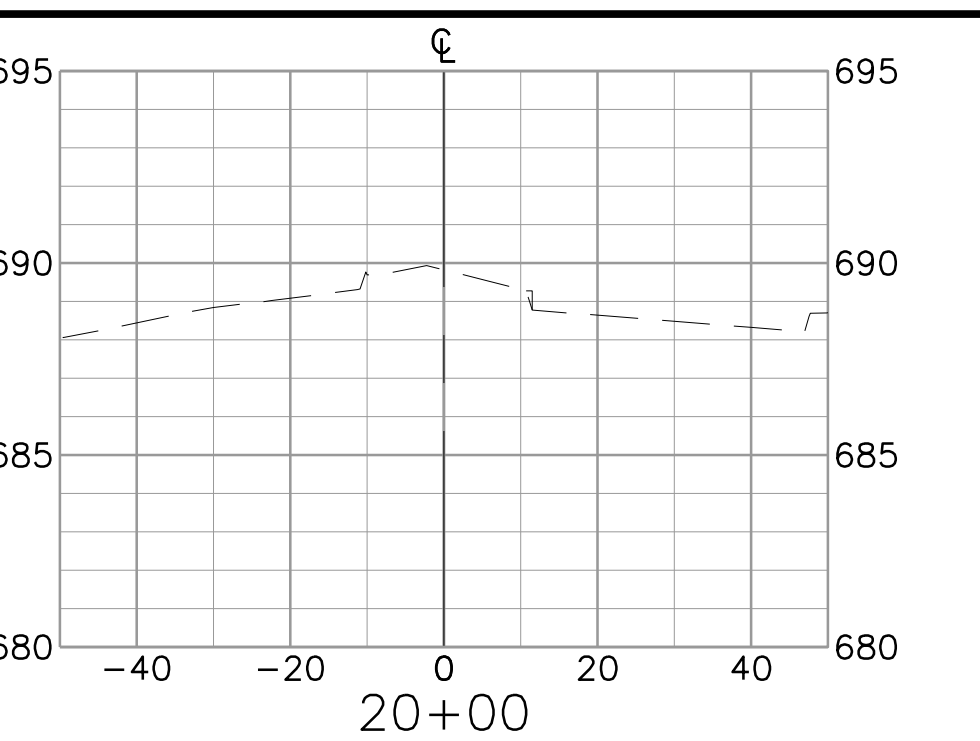
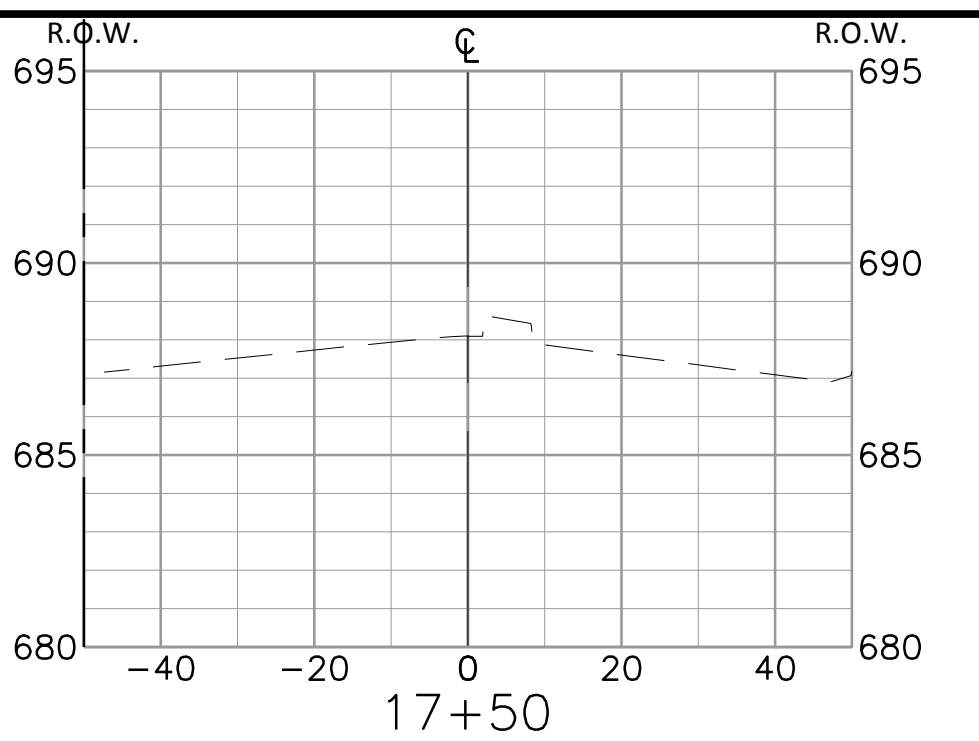
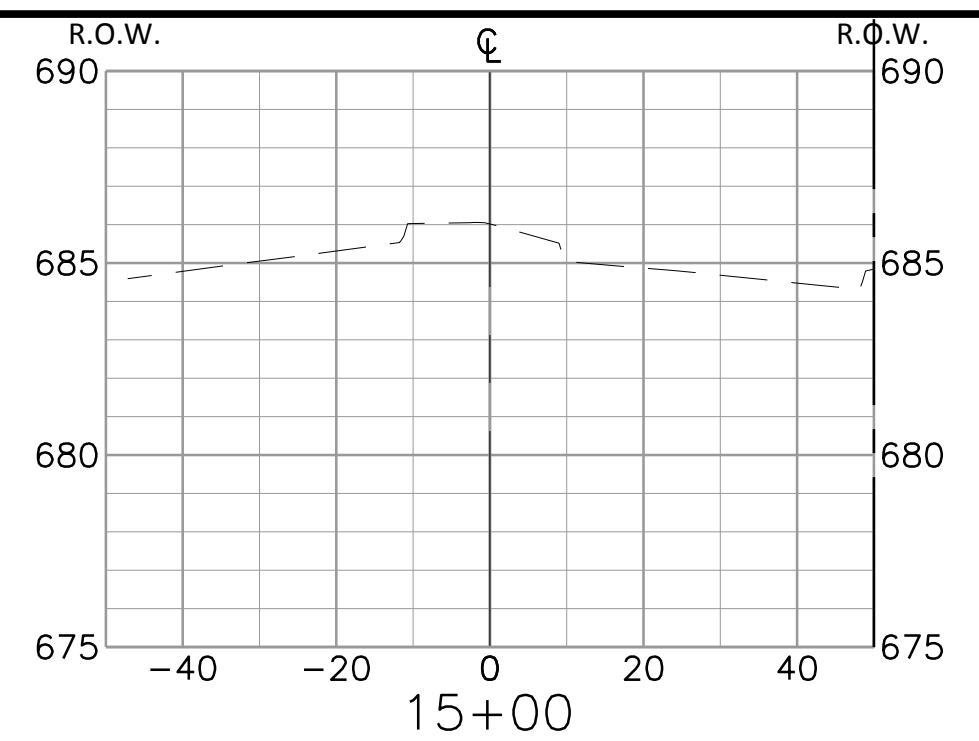
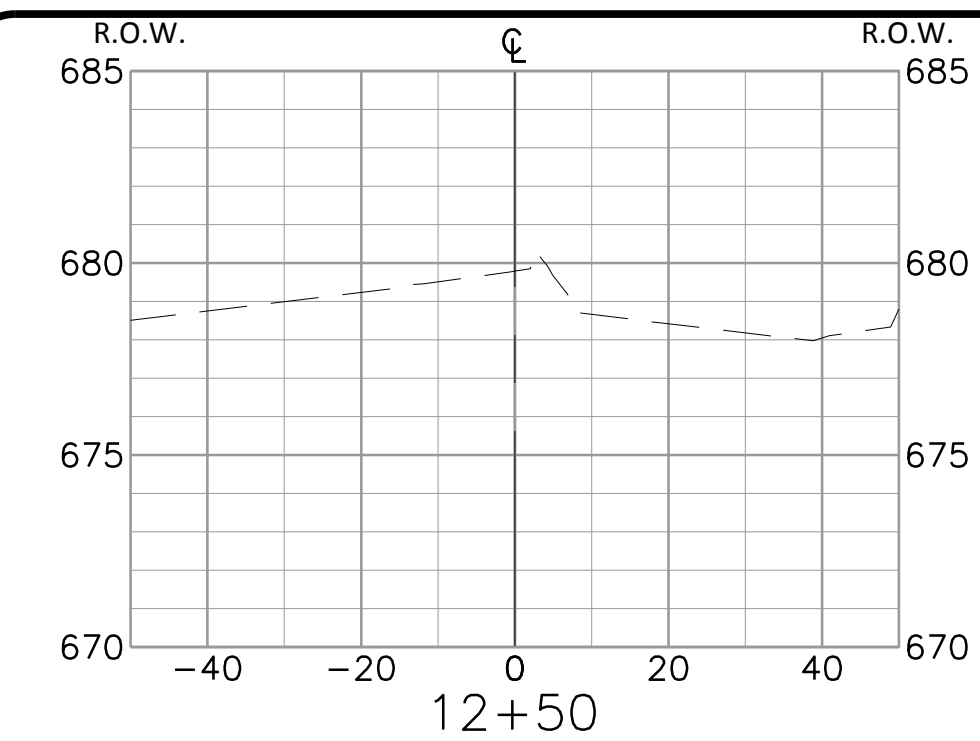
CITY OF FRISCO, TEXAS

LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
 CIVIL
LEBANON ROAD CROSS SECTIONS
STA 130+50 TO 140+50



NO.	ISSUE	DATE	BY	FILE NAME
0	VERIFY SCALE			cv-ftt-pr-XS04
1	Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.			

ACAD Ref: 20.06 (LMS Tech)
 Filename: N:\Drawings\cv-trt-pr-XS05.dwg
 Last Saved: 3/9/2017 8:51 AM Saved By: sli



NO.	ISSUE	DATE	BY	FILE NAME
0	VERIFY SCALE			cv-trt-pr-XS05
1	Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.			

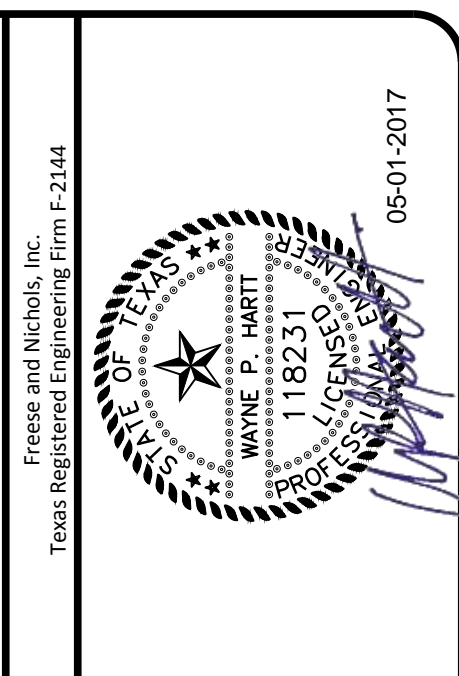
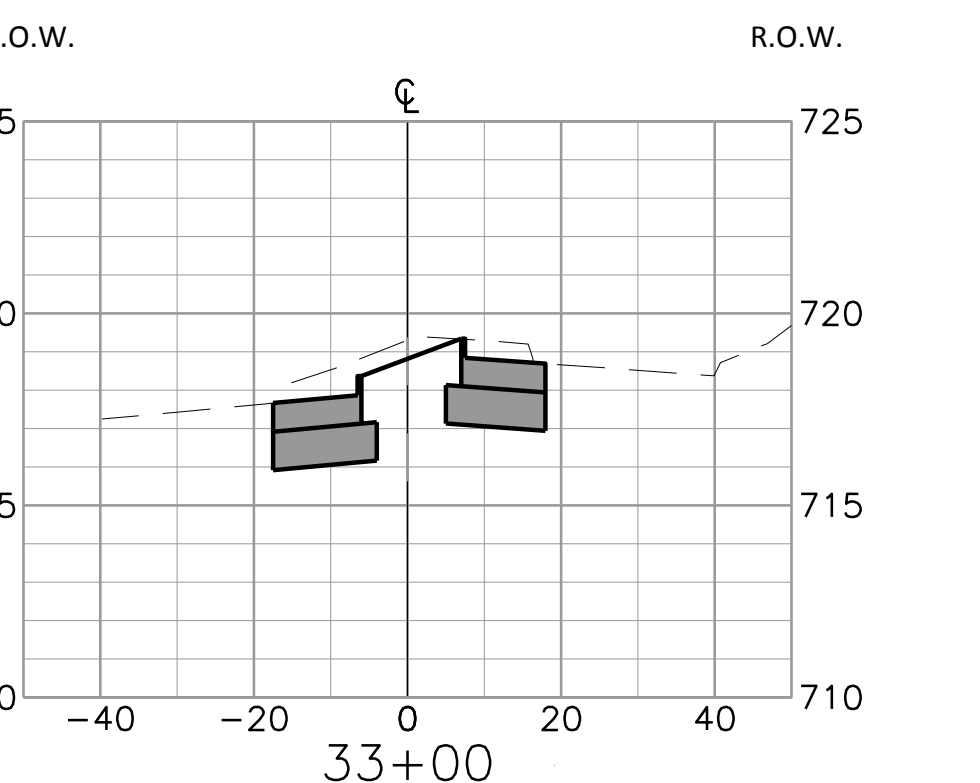
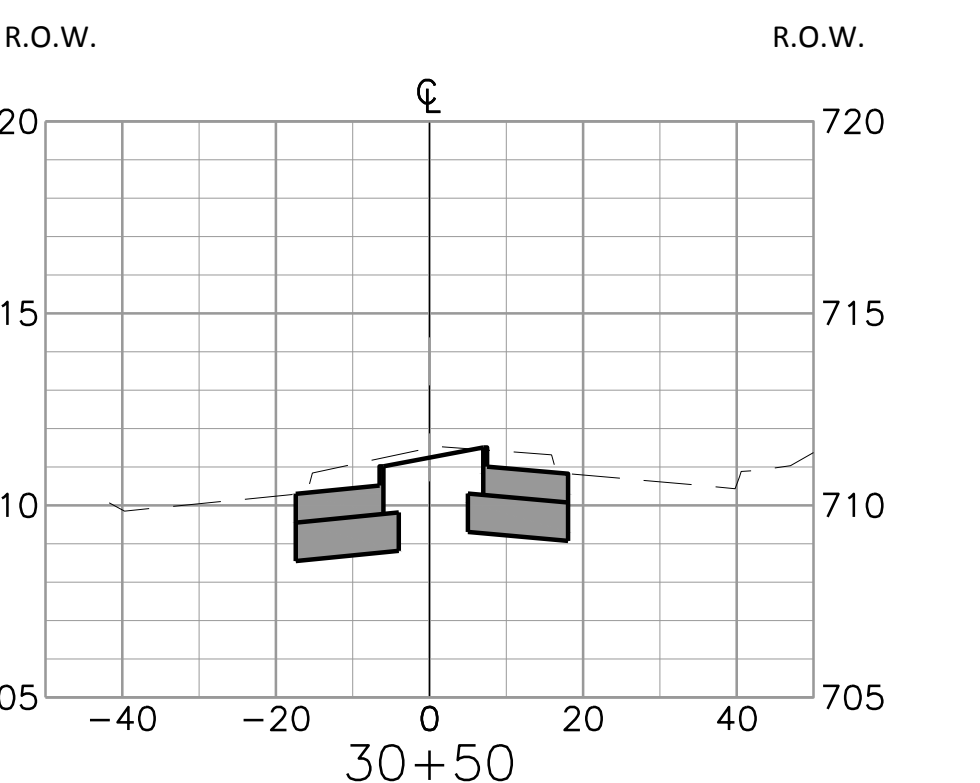
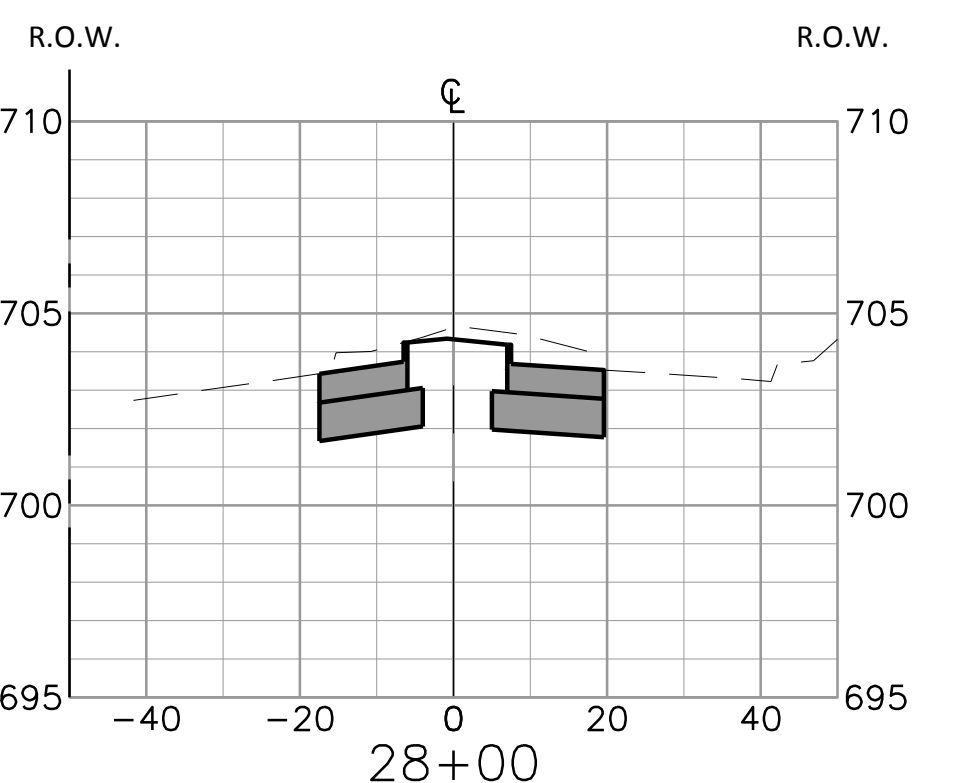
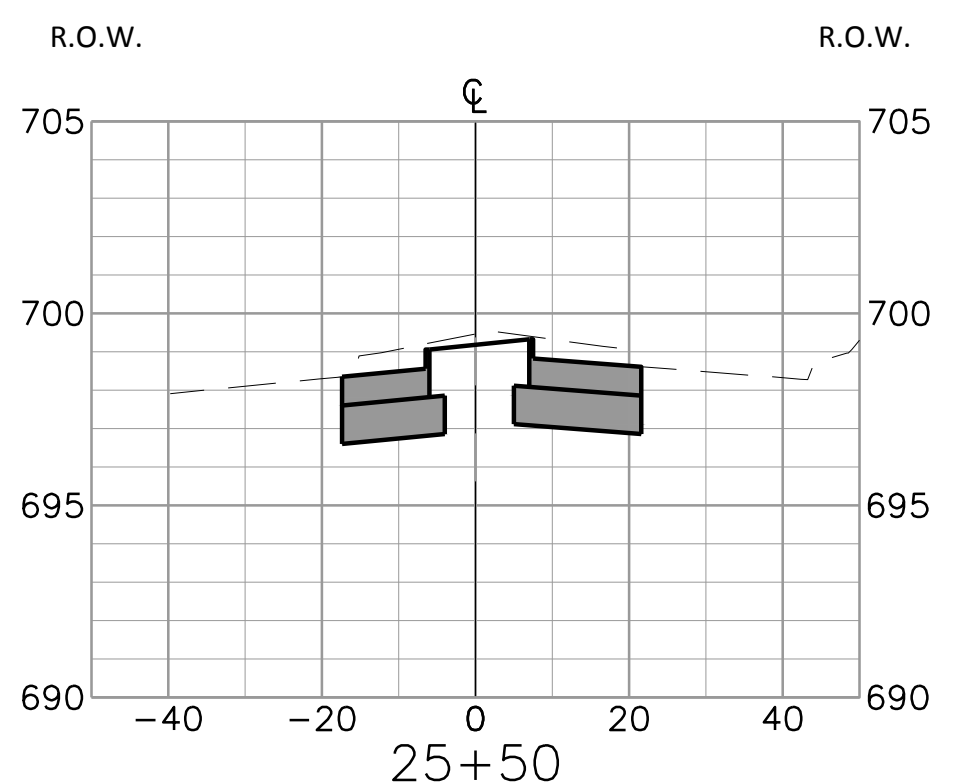
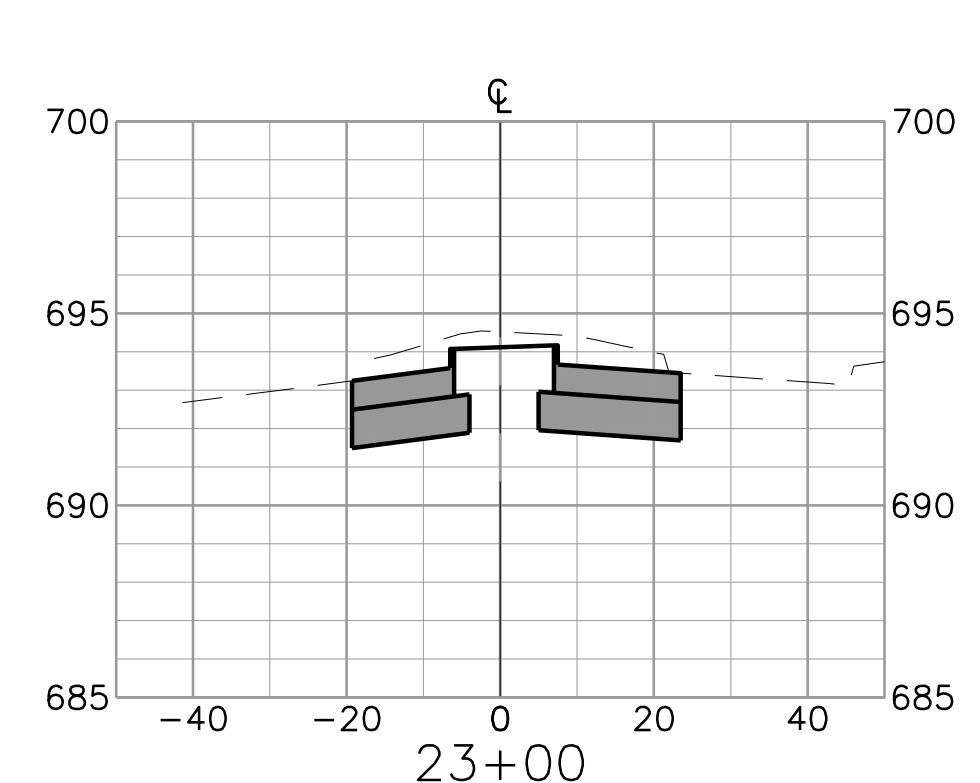
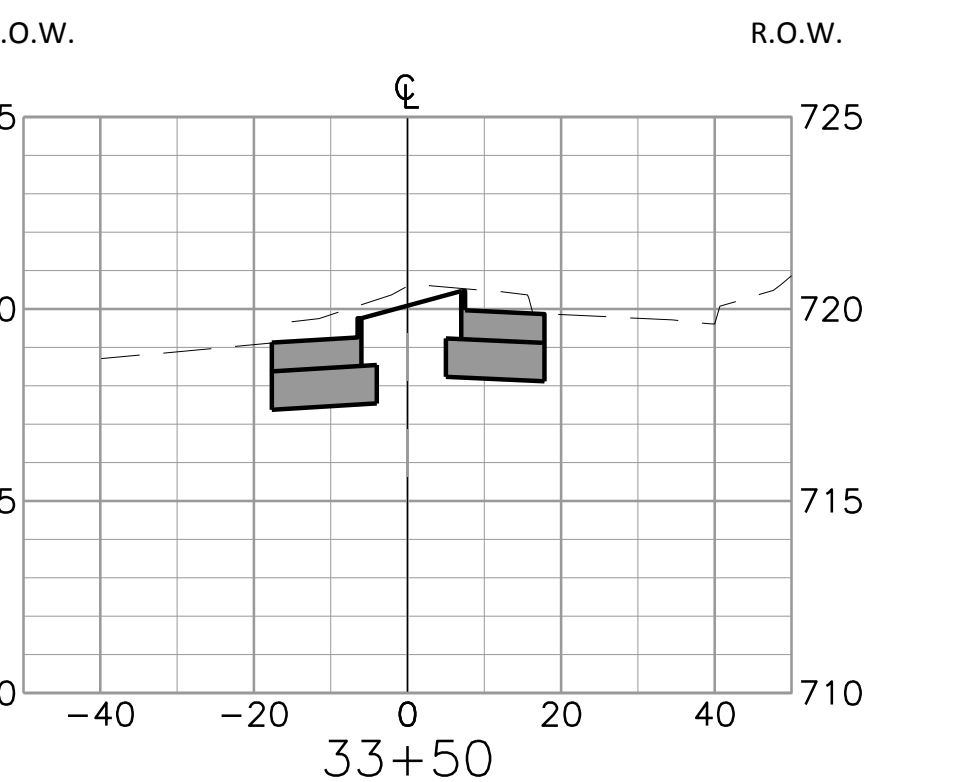
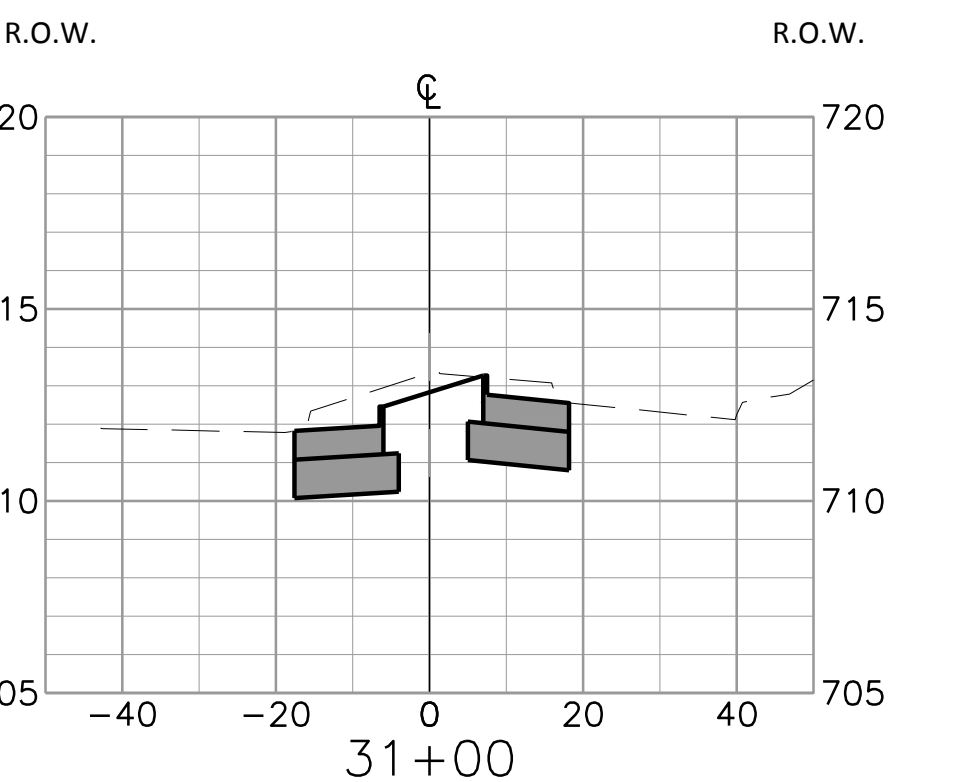
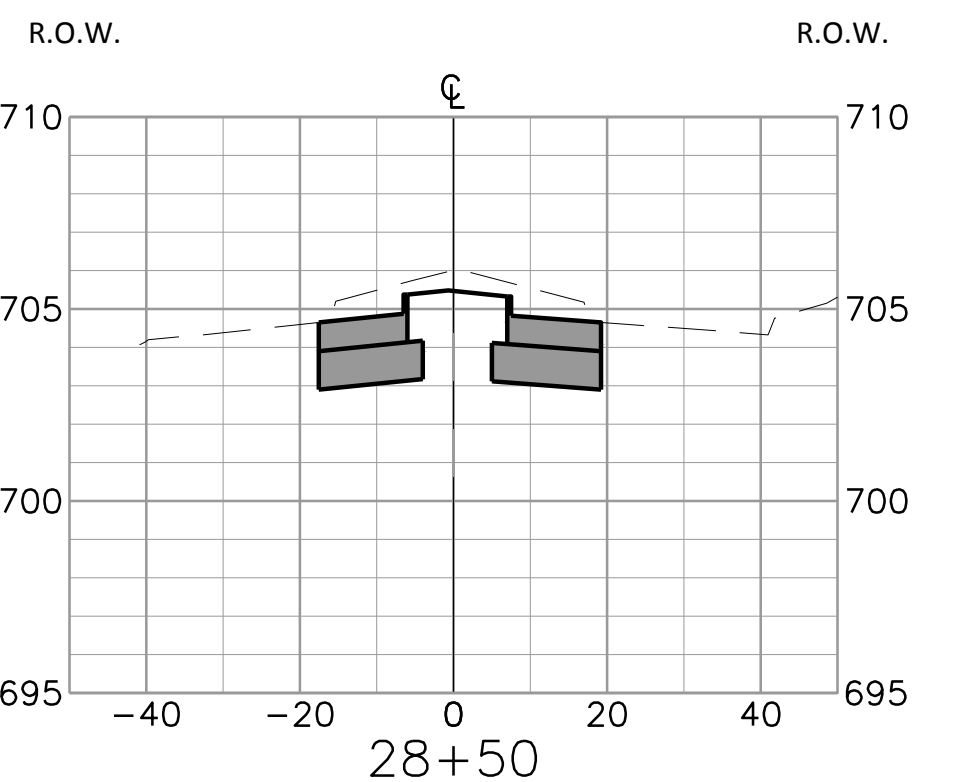
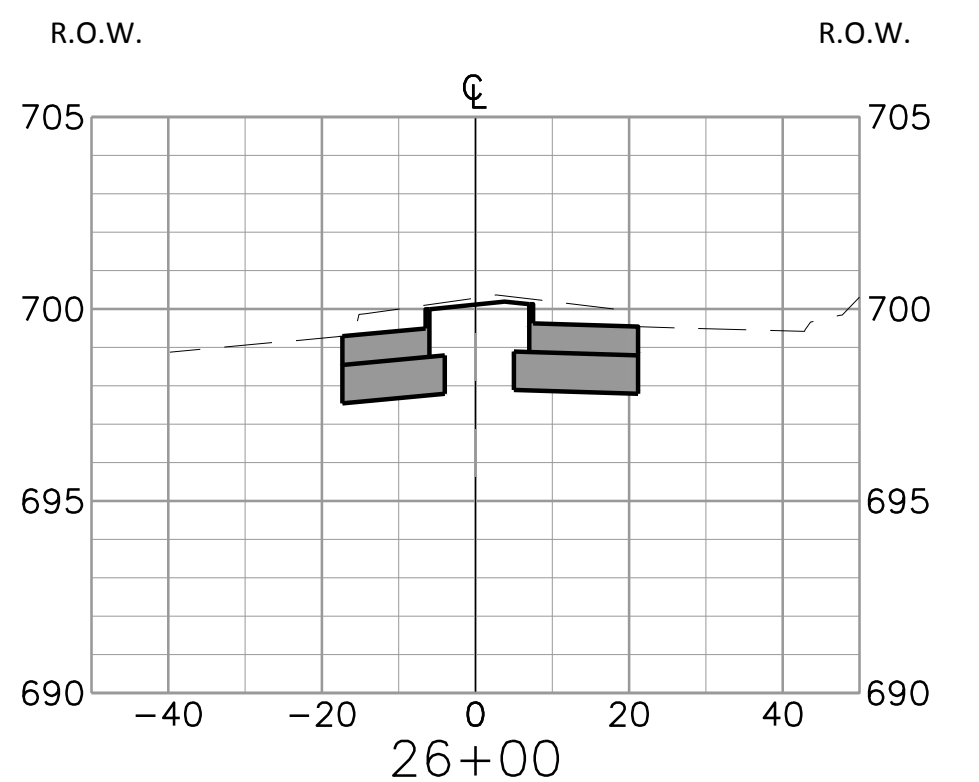
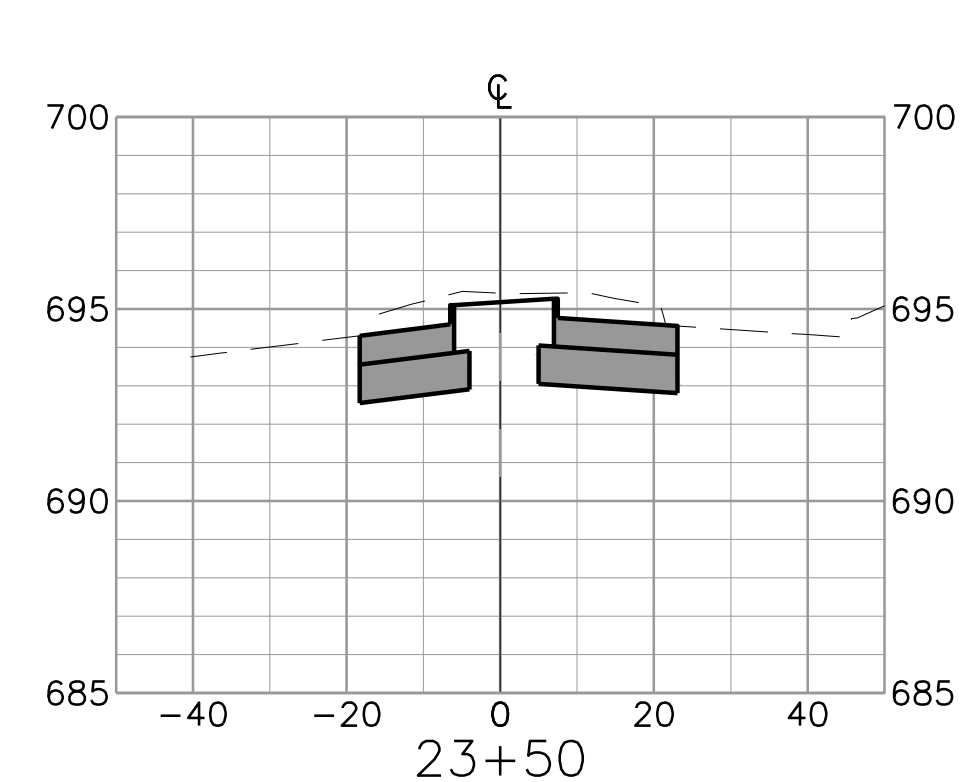
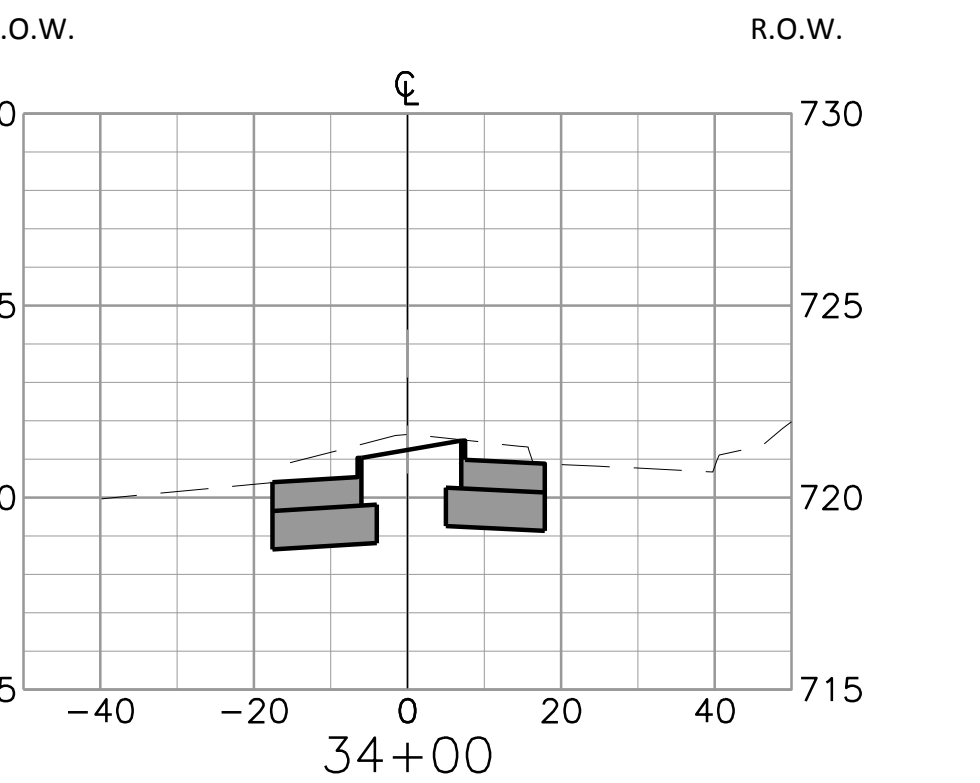
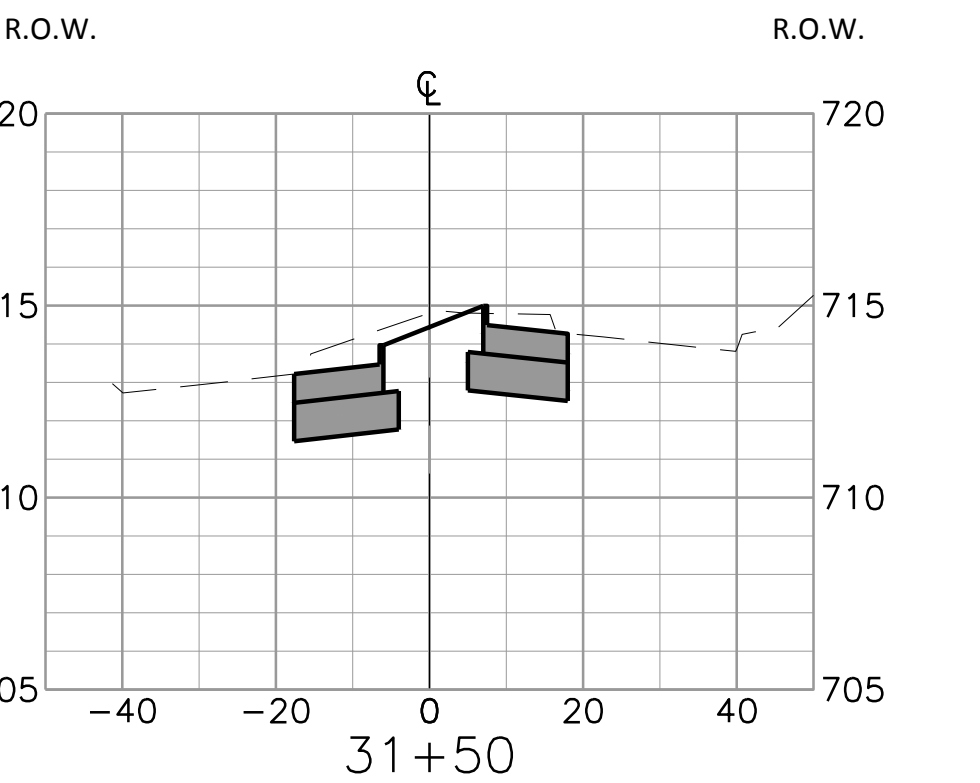
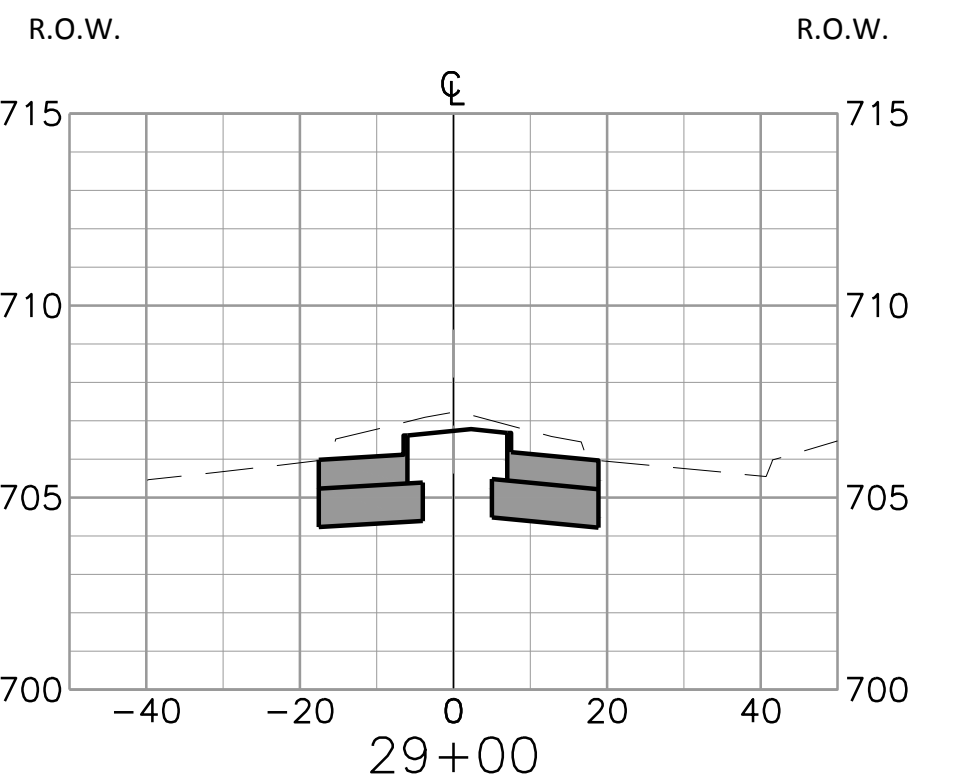
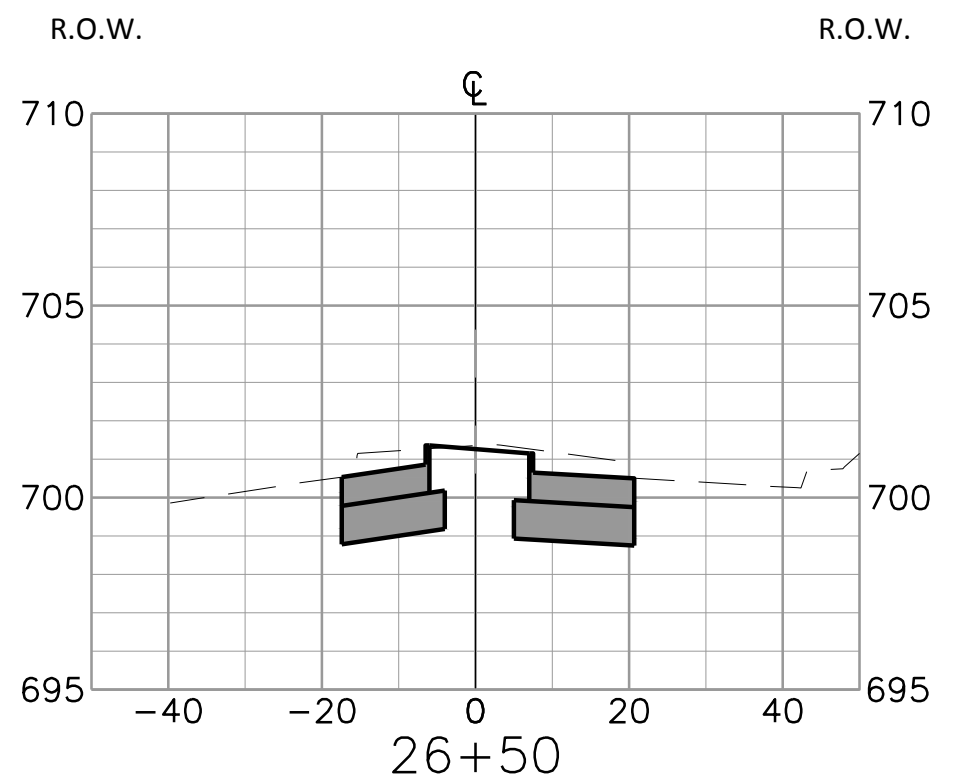
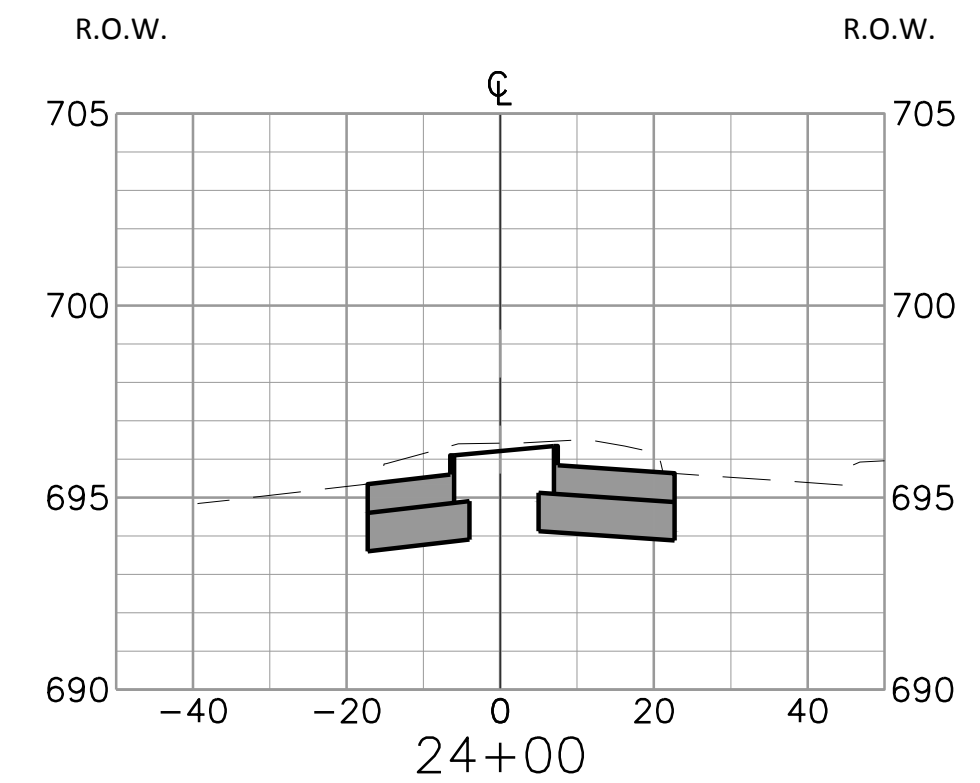
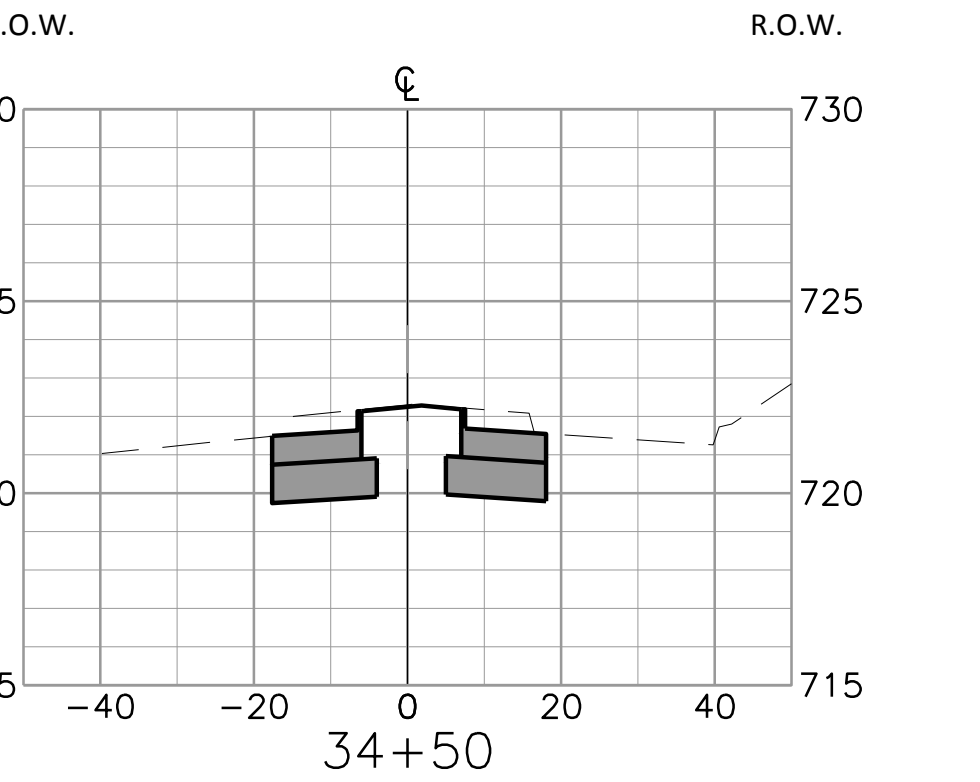
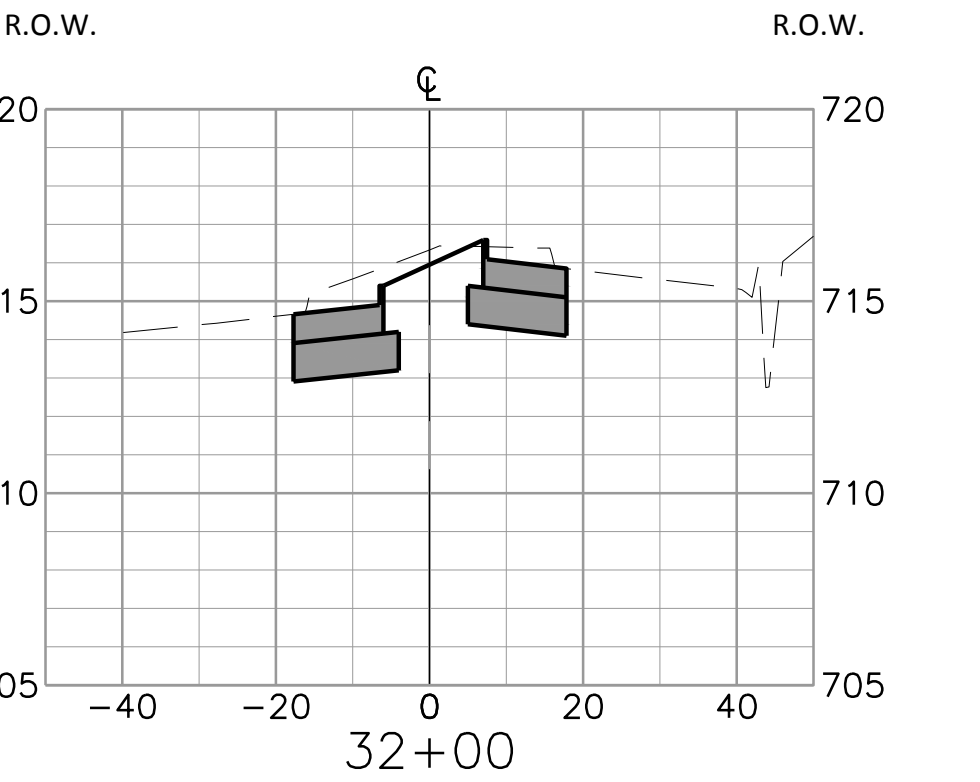
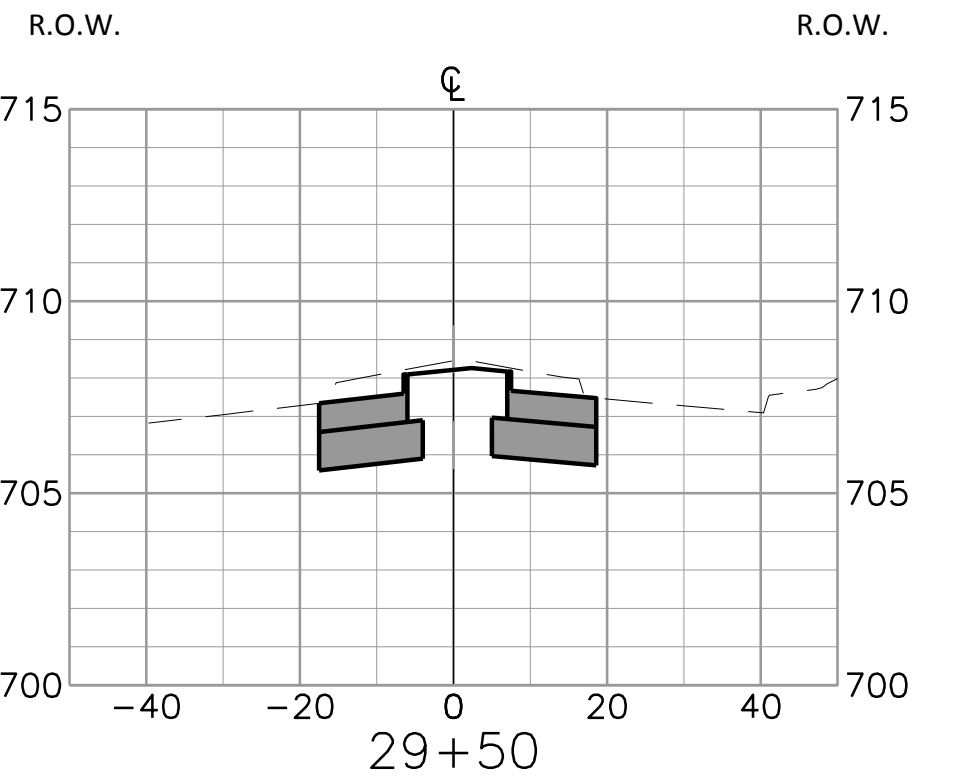
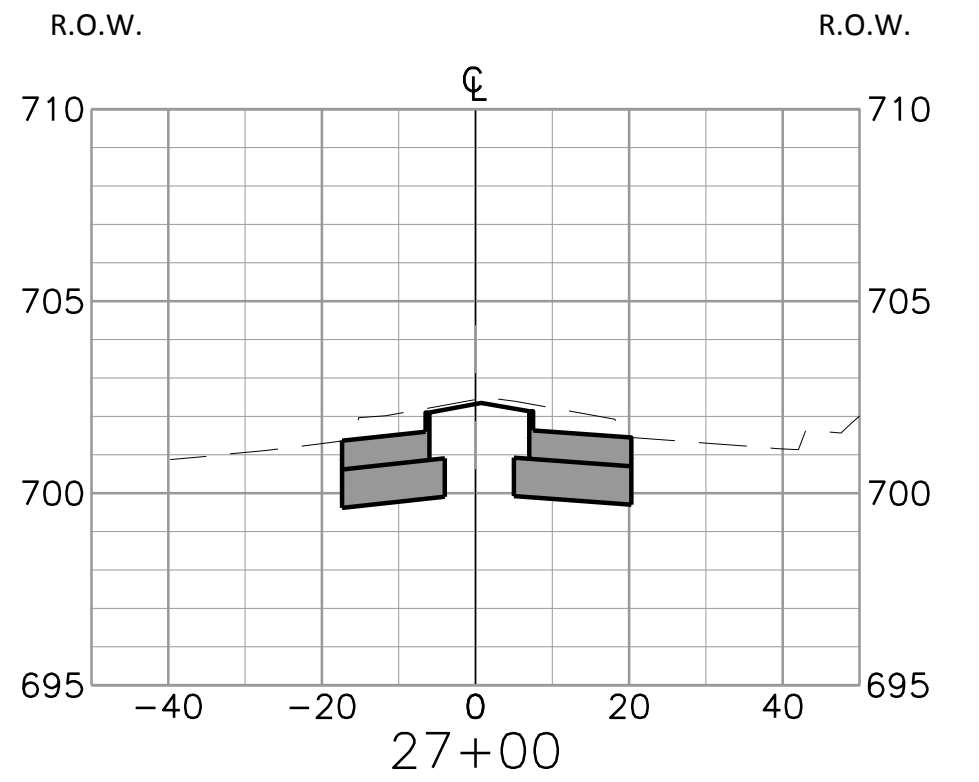
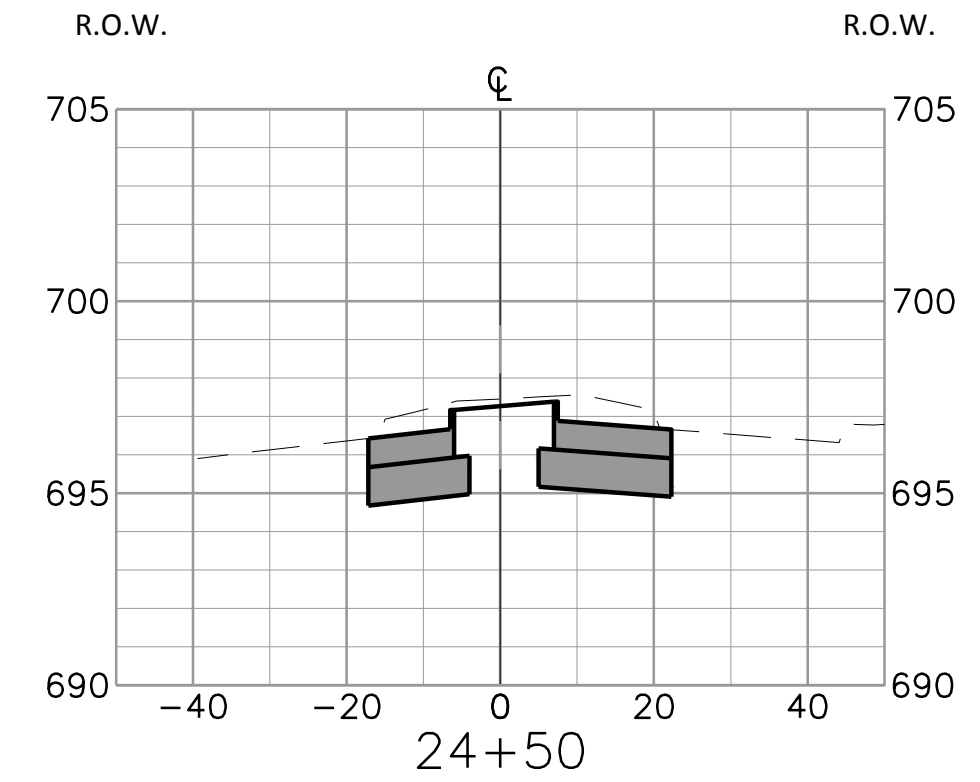
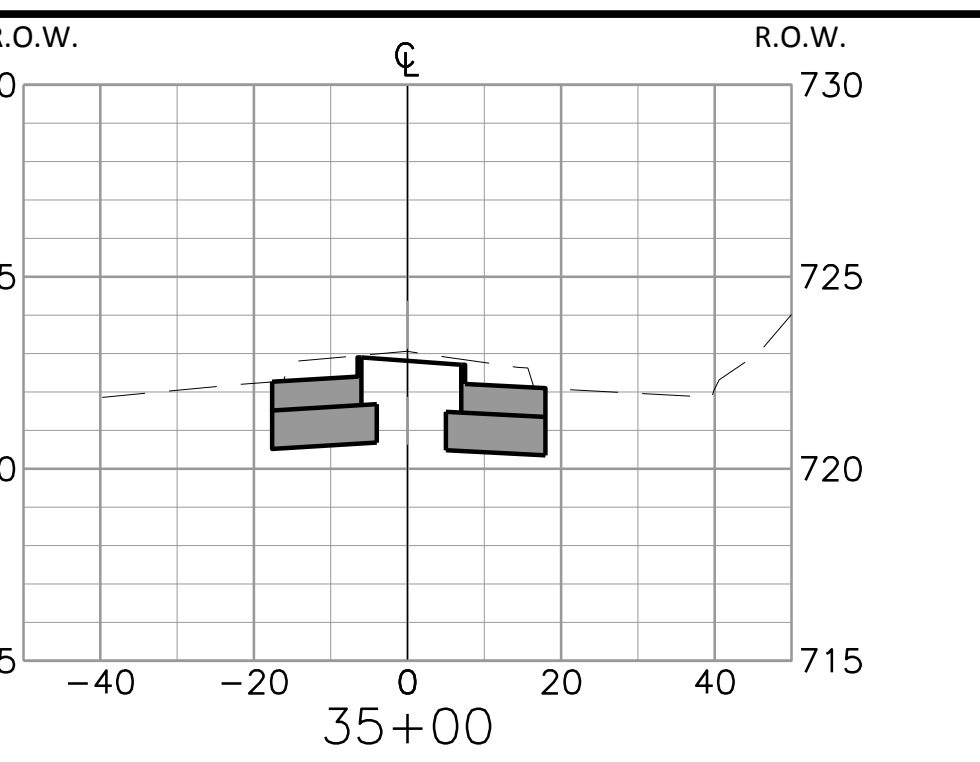
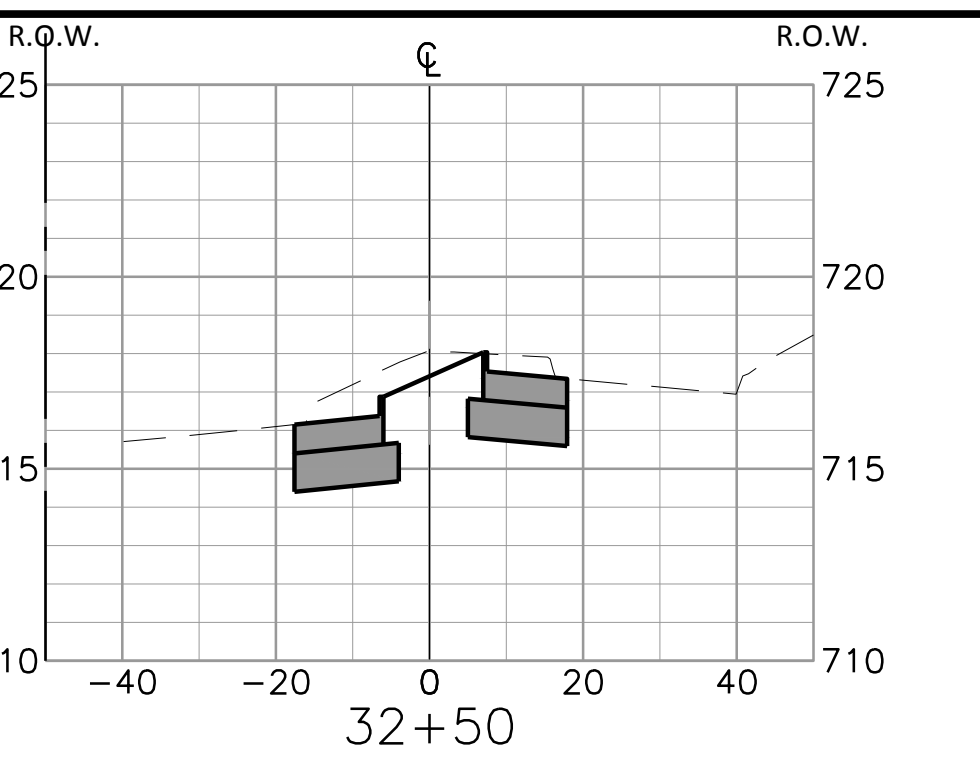
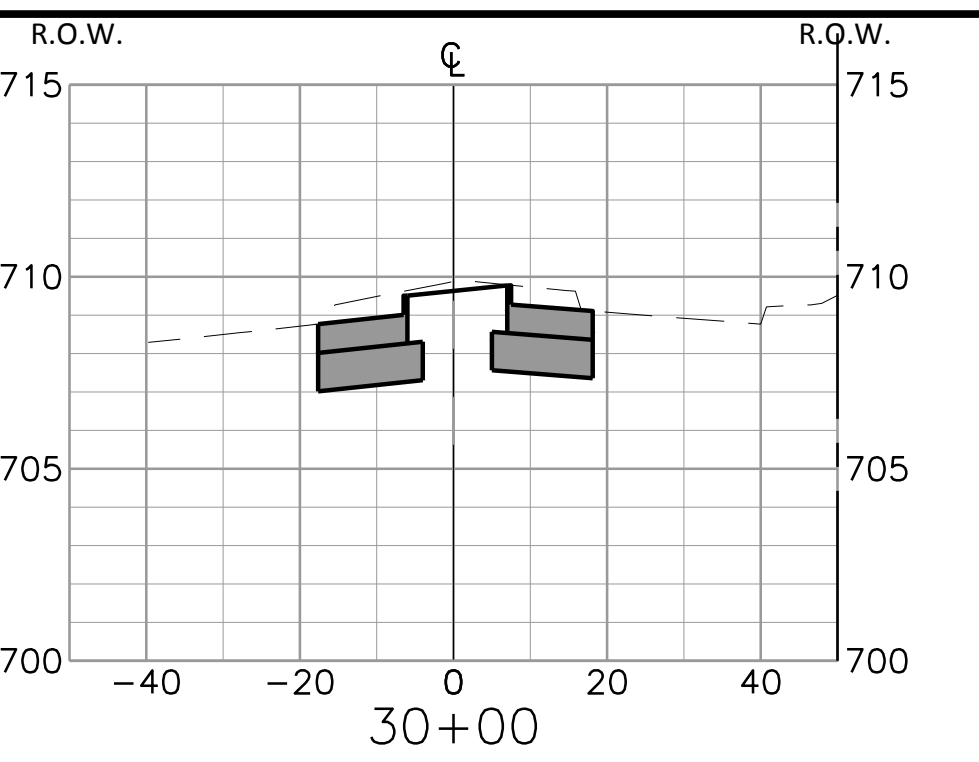
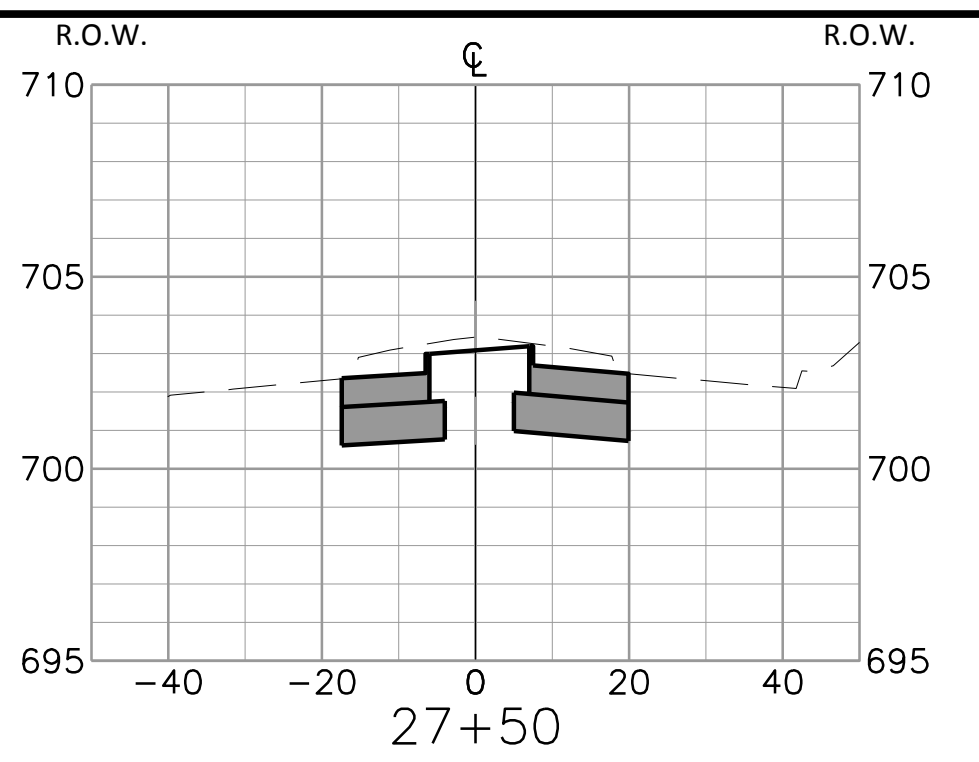
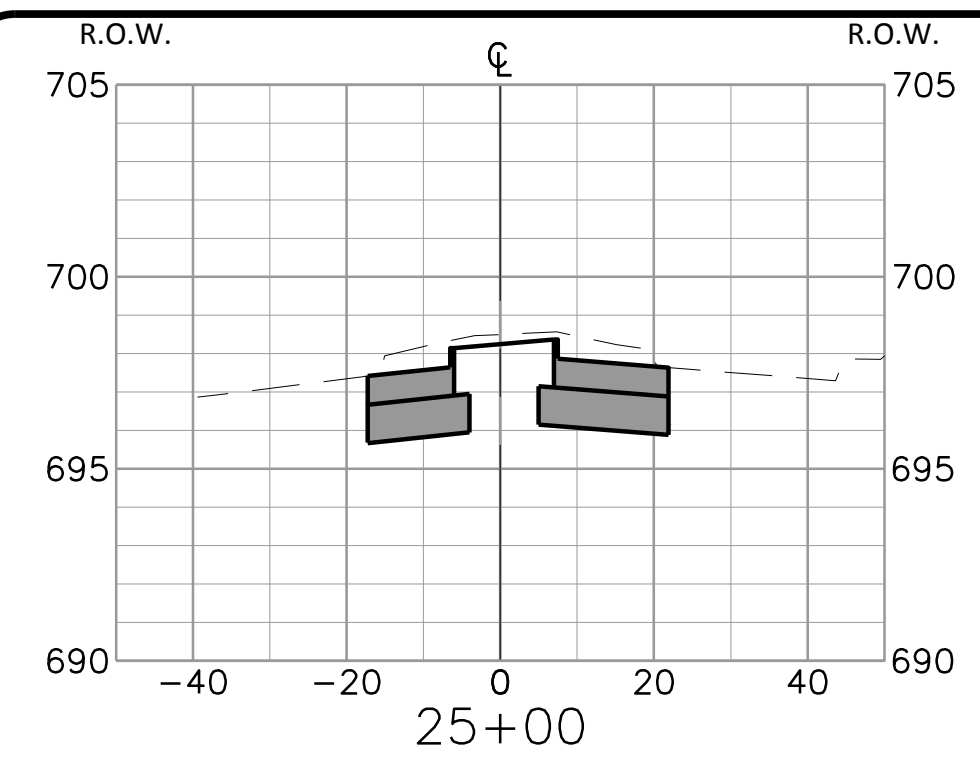
FR&N JOB NO.	FRCL15624
DATE	4/2017
DESIGNED	AU
DRAWN	SI
REVISED	
CHECKED	

CITY OF FRISCO, TEXAS
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
 CIVIL
LEBANON ROAD CROSS SECTIONS BEGIN TO STA 22+50

FRESE NICHOLS
 6136 Frisco Square Blvd, Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freese.com



ACAD Ref: 2016 (LMS Tech)
 Filename: N:\F\Drawings\cv-trt-pr-XS06.dwg
 Last Saved: 3/5/2017 8:53 AM Saved By: sli



FRESE AND NICHOLS
 6136 Frisco Square Blvd, Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.fresenichols.com

CITY OF FRISCO, TEXAS
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
 CIVIL
LEBANON ROAD CROSS SECTIONS
STA 23+00 TO STA 35+00

NO.	ISSUE	DATE	BY	FILE NAME
0	VERIFY SCALE			cv-fft-pr-XS06
1				

Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.

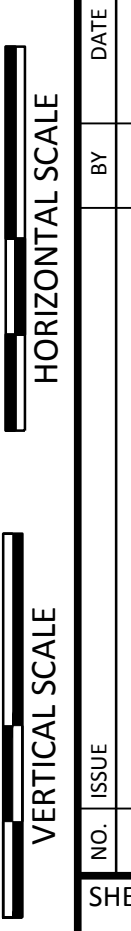
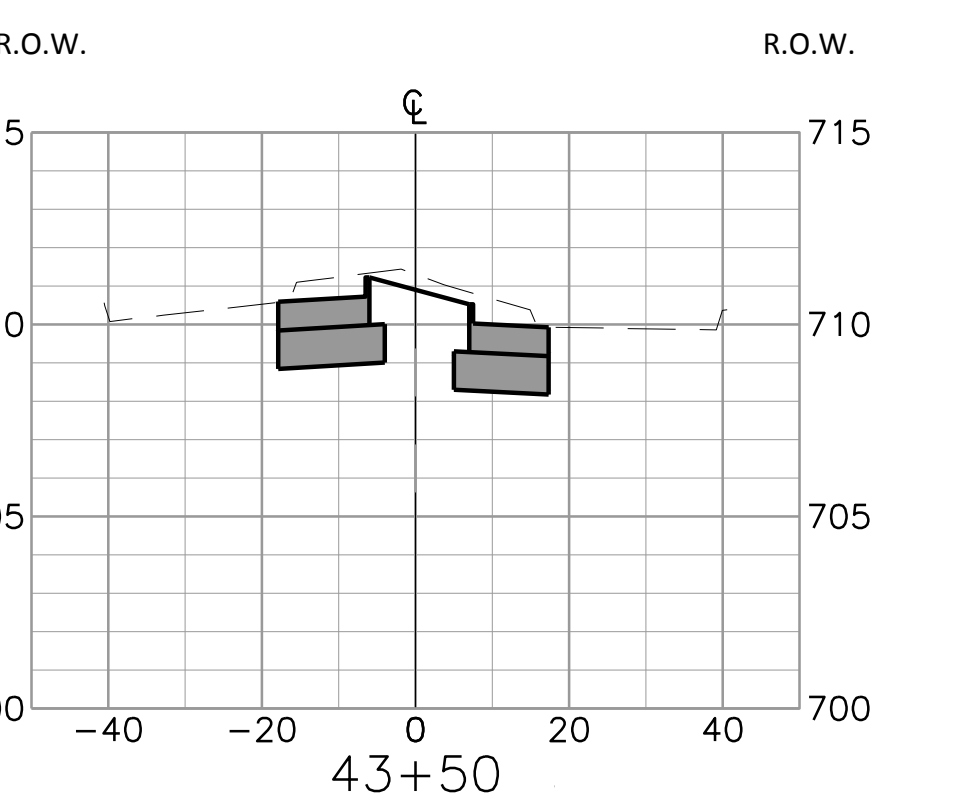
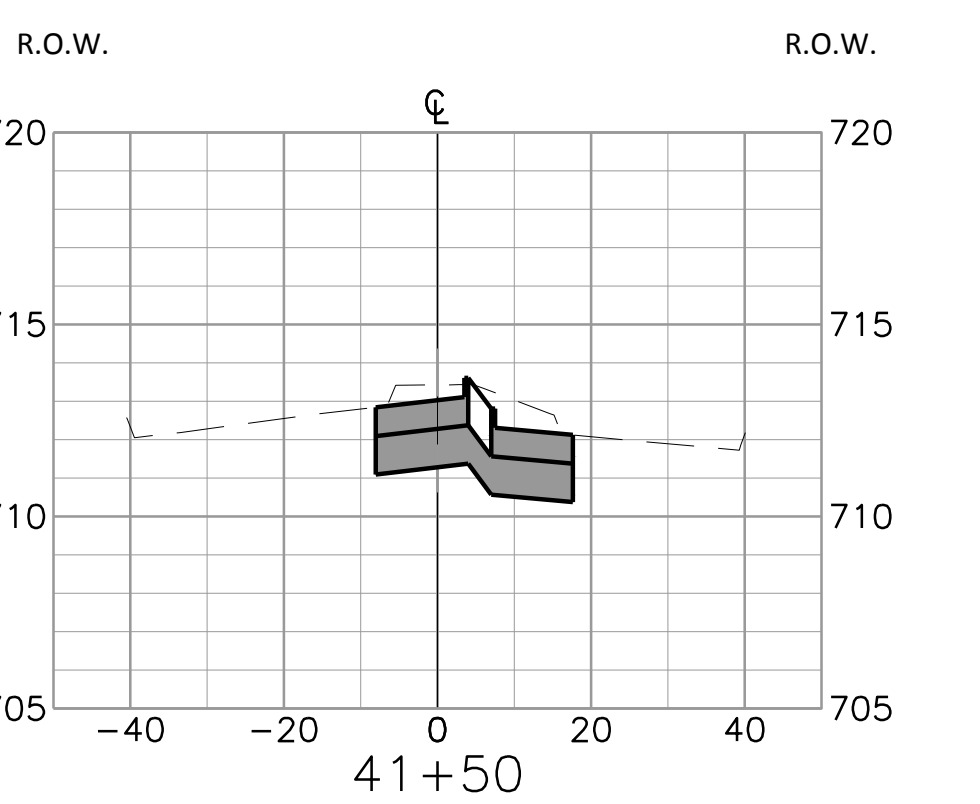
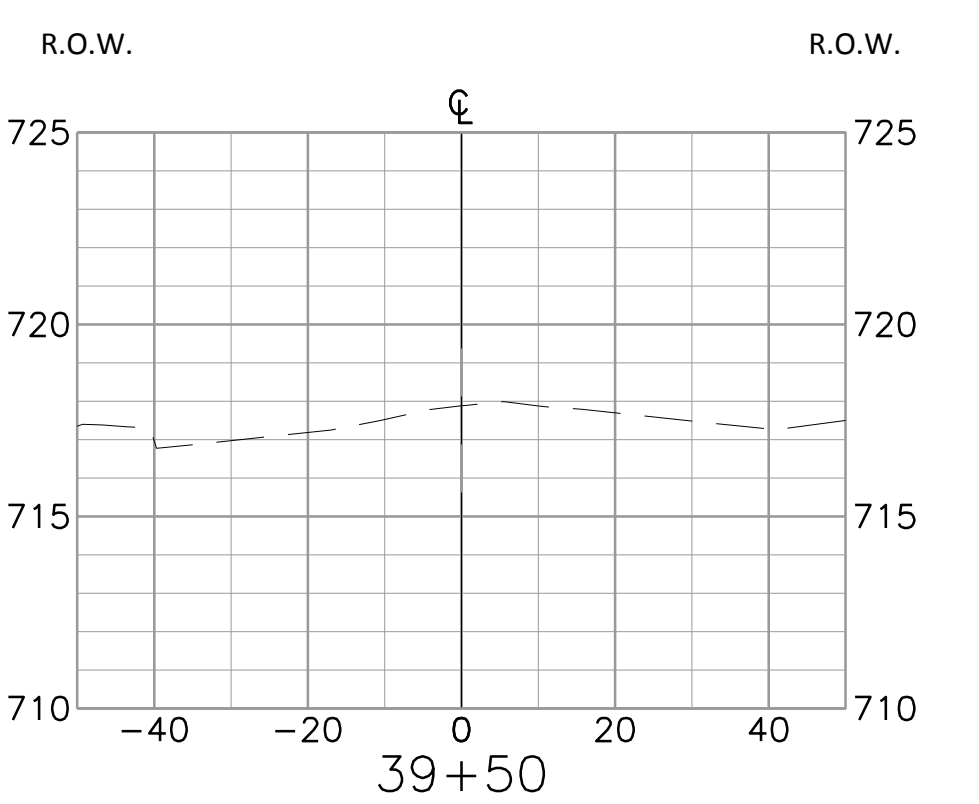
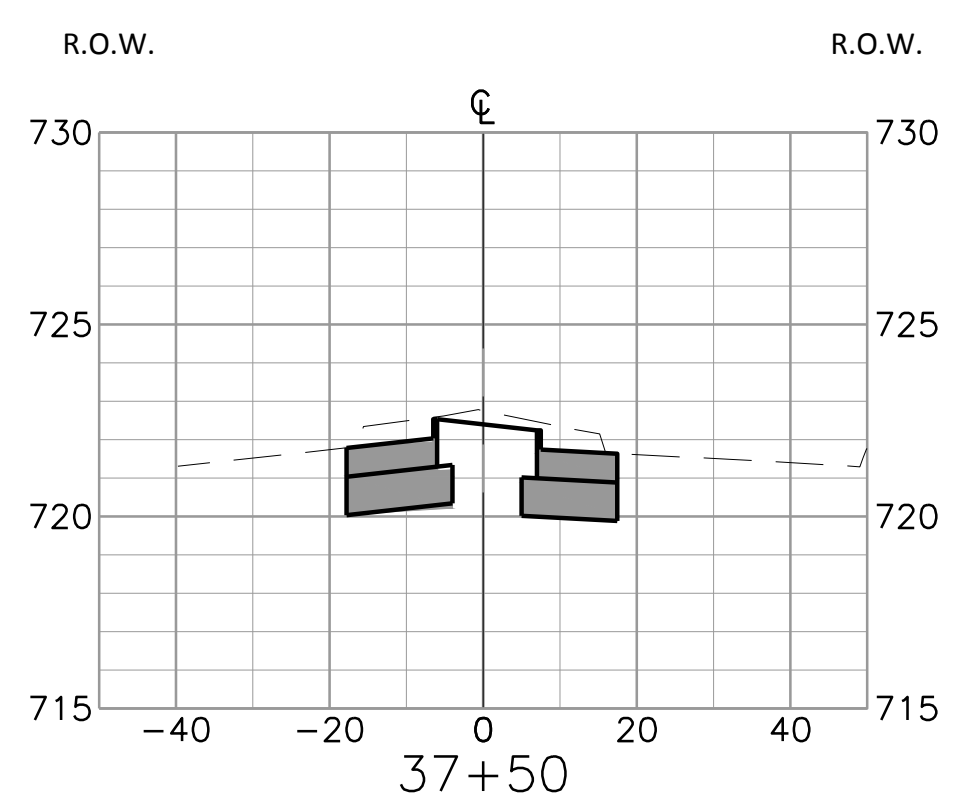
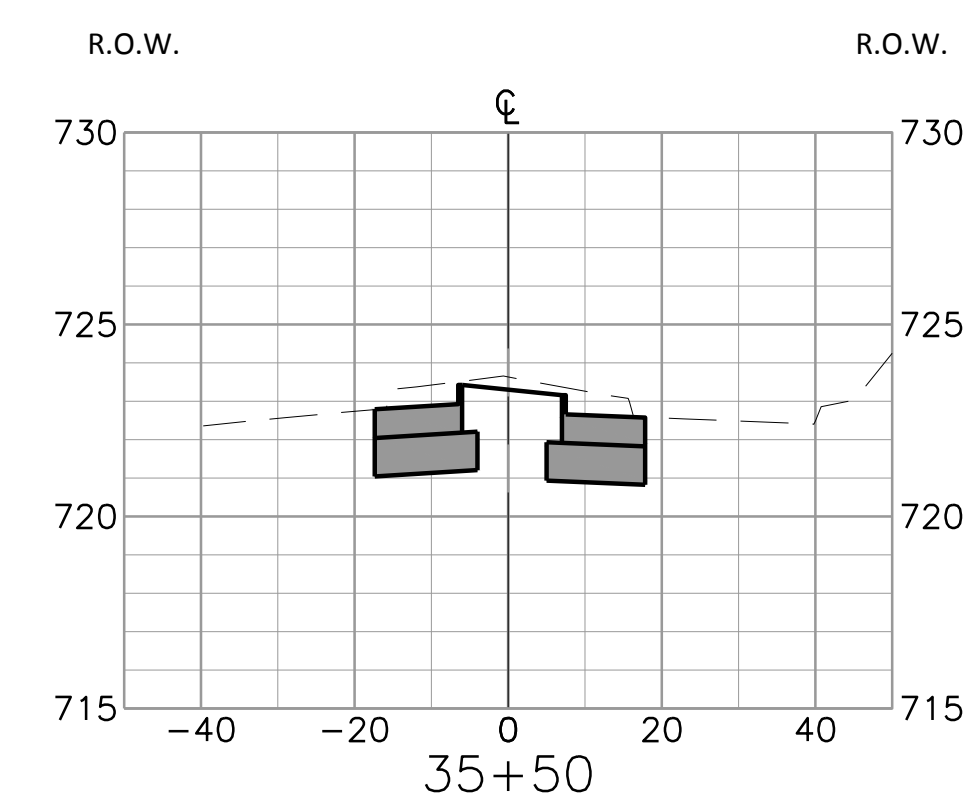
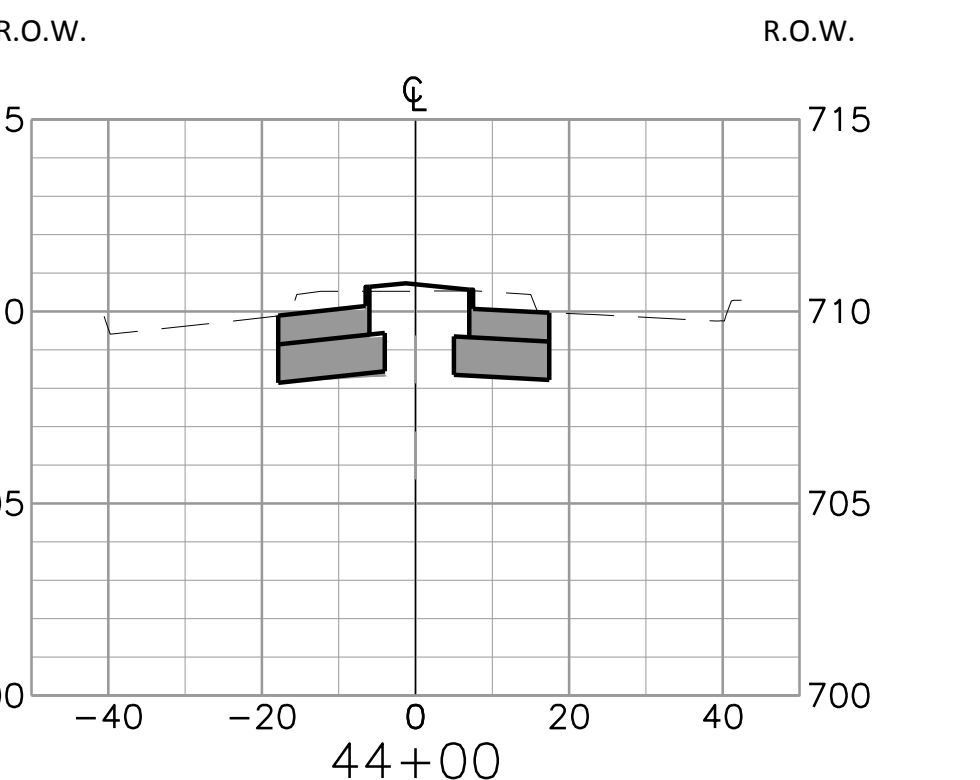
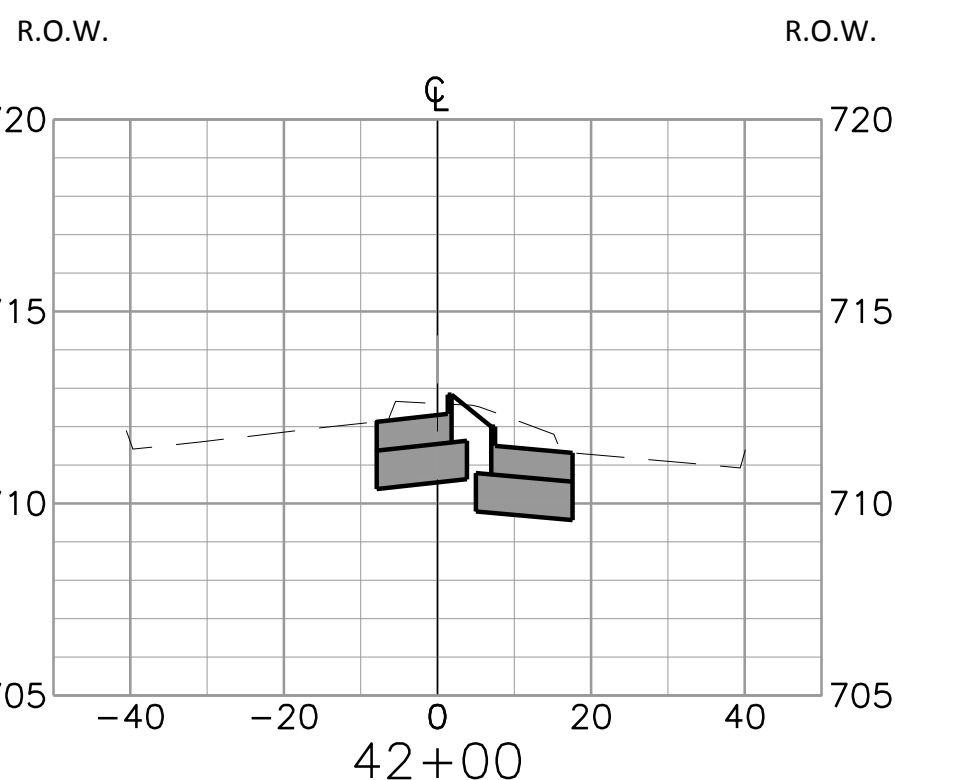
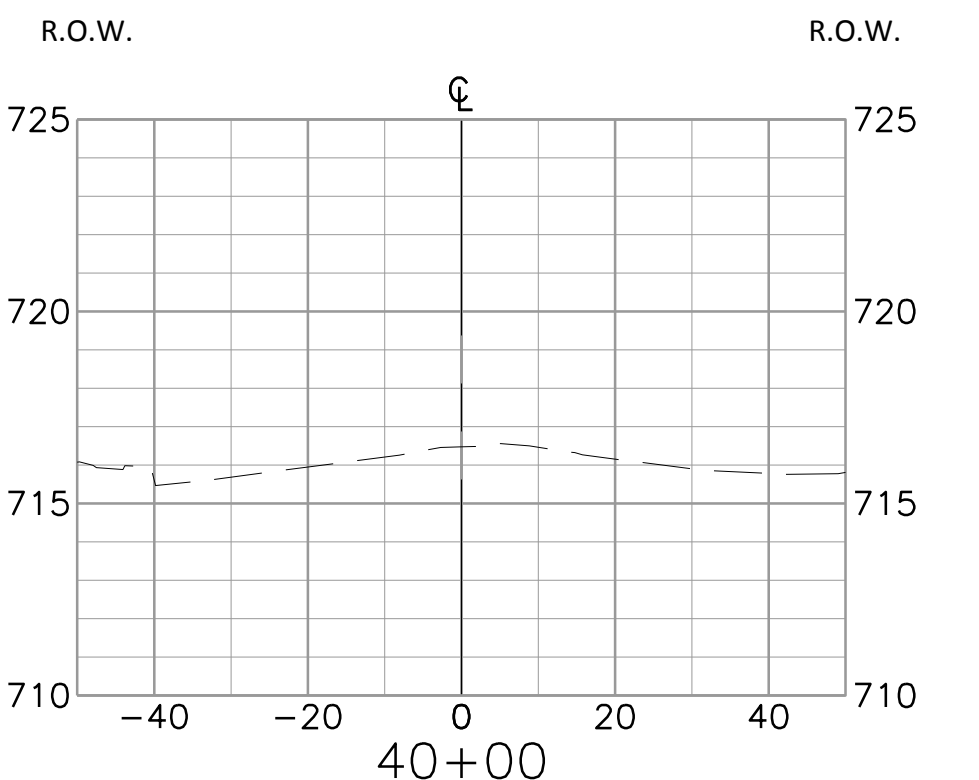
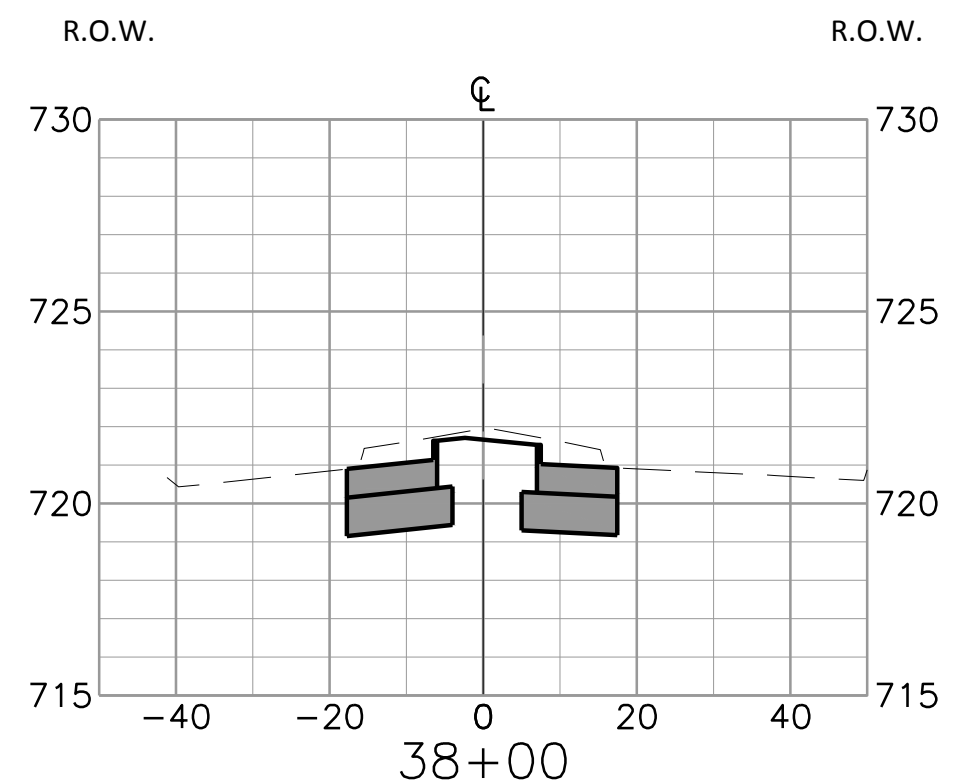
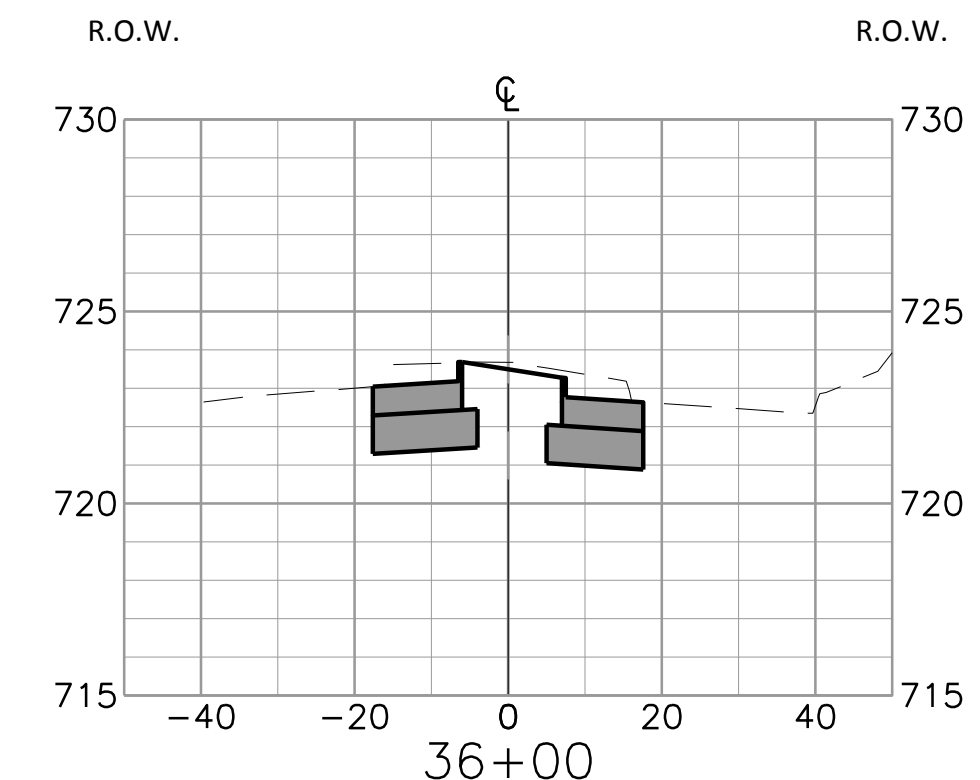
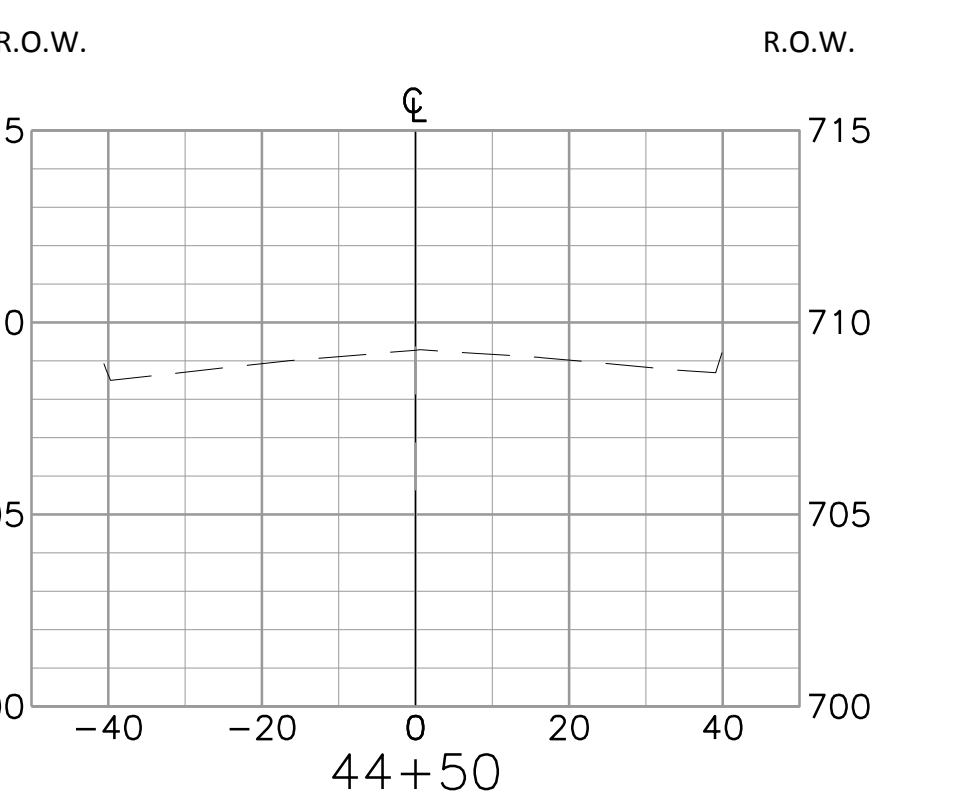
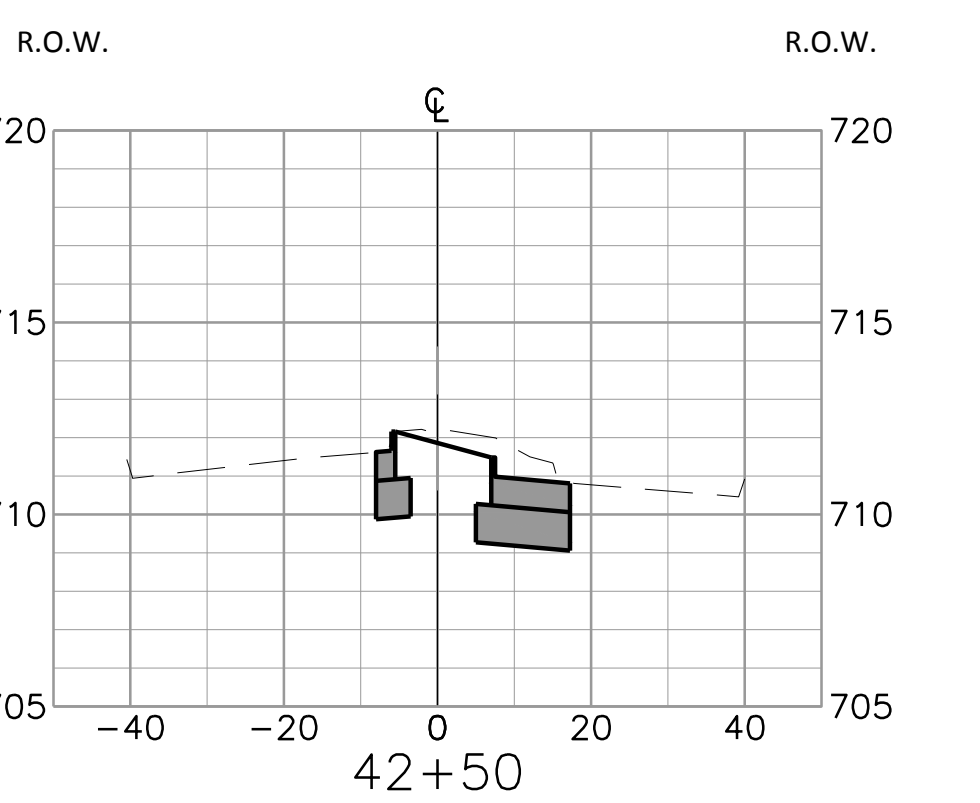
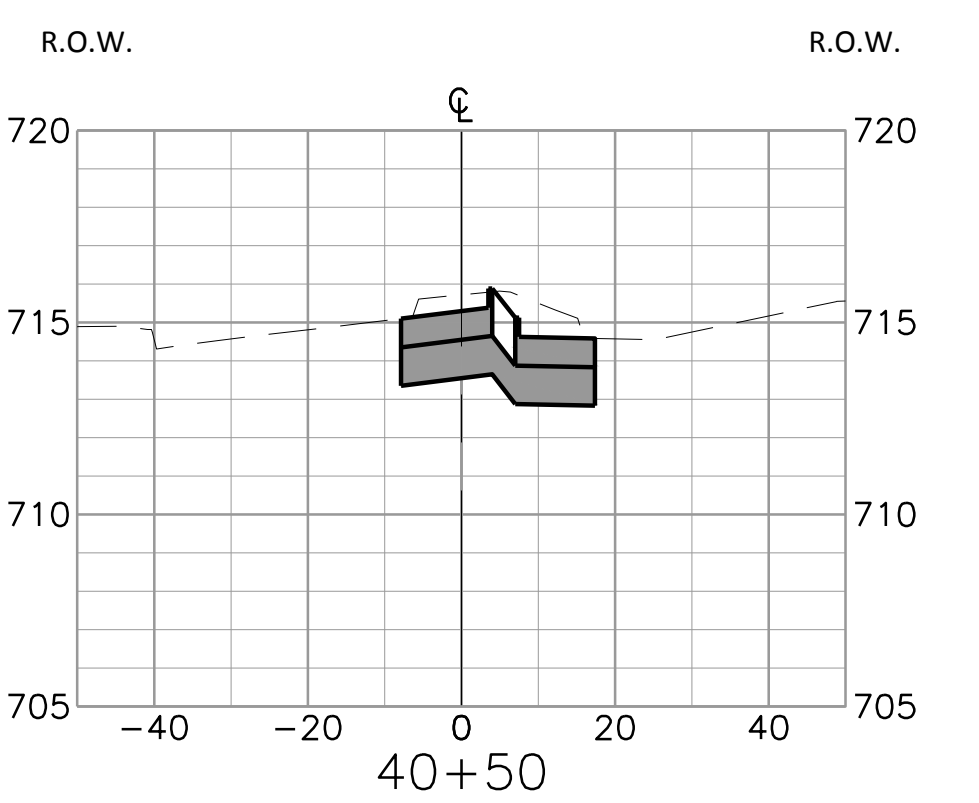
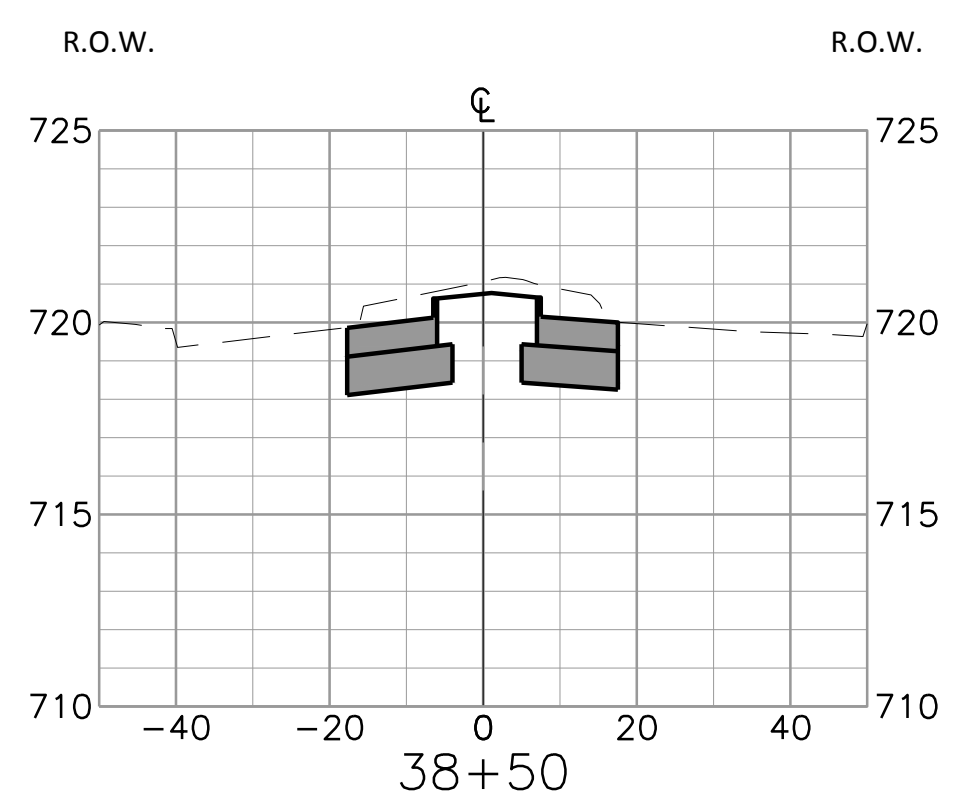
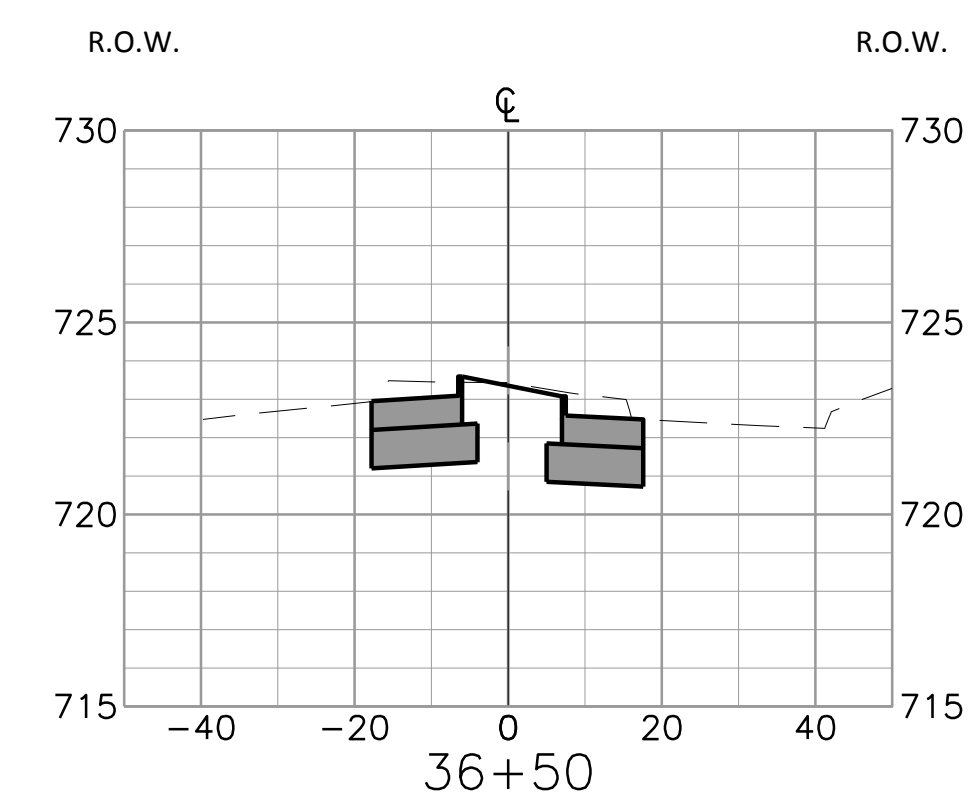
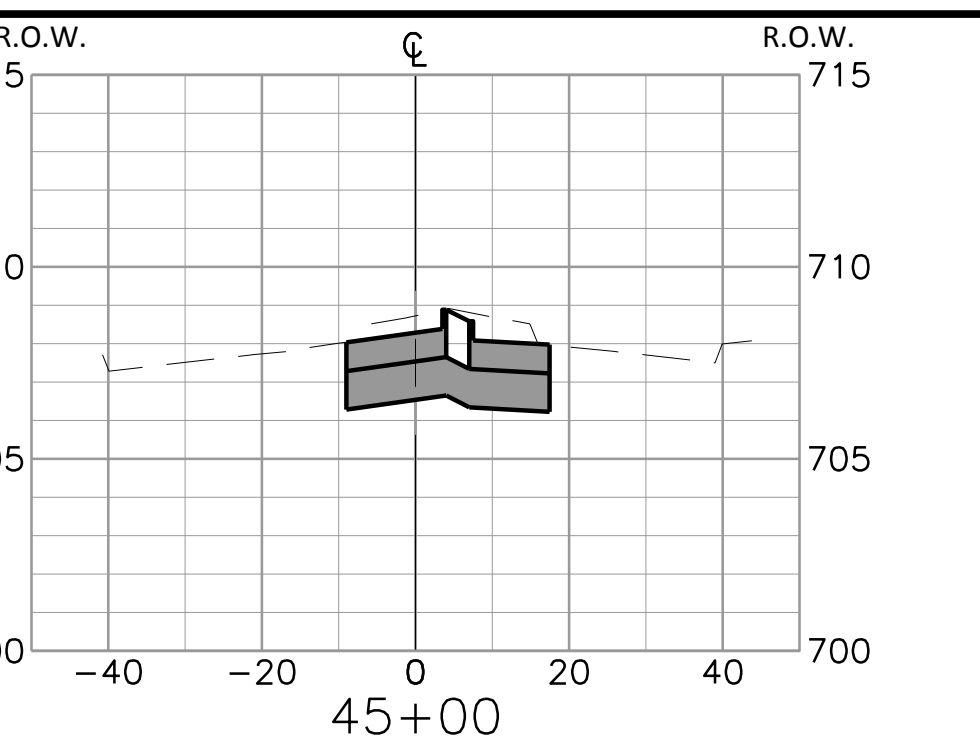
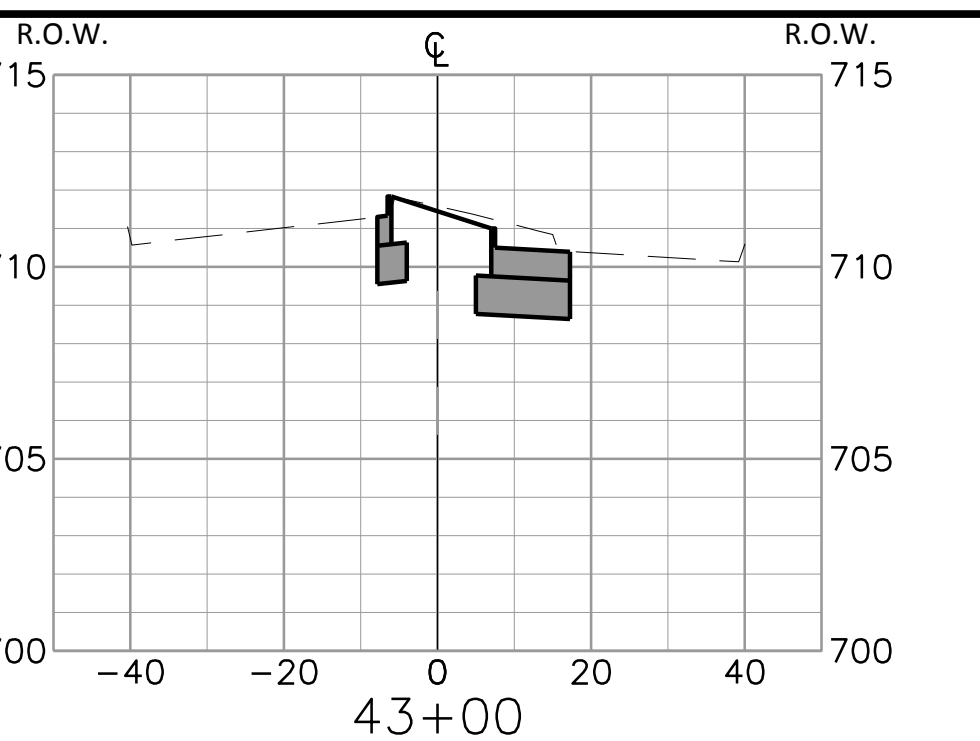
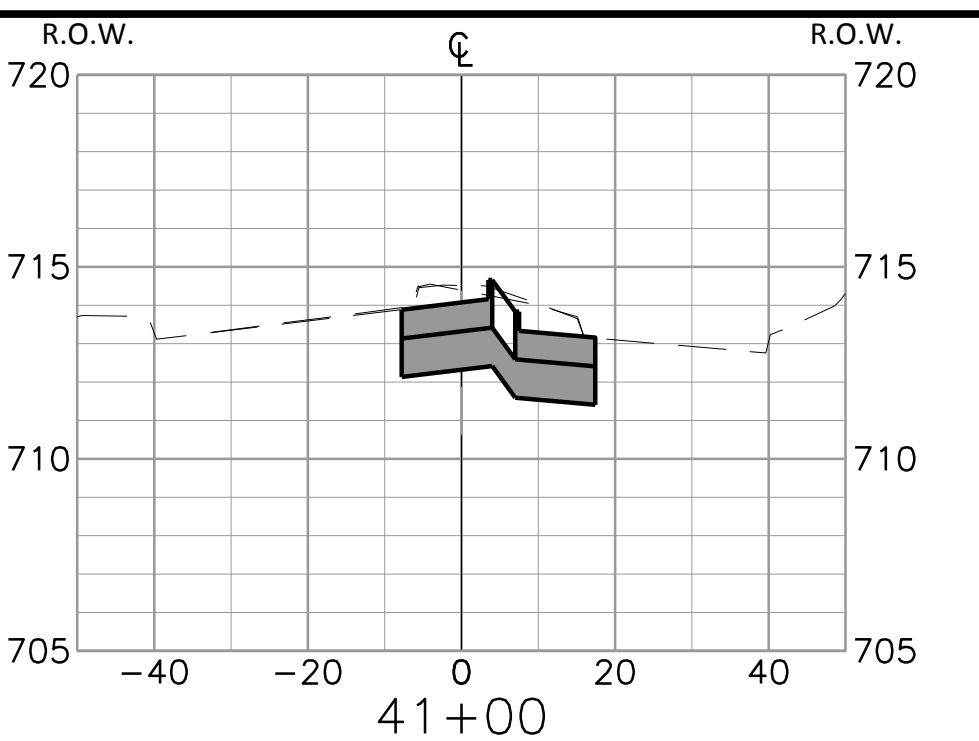
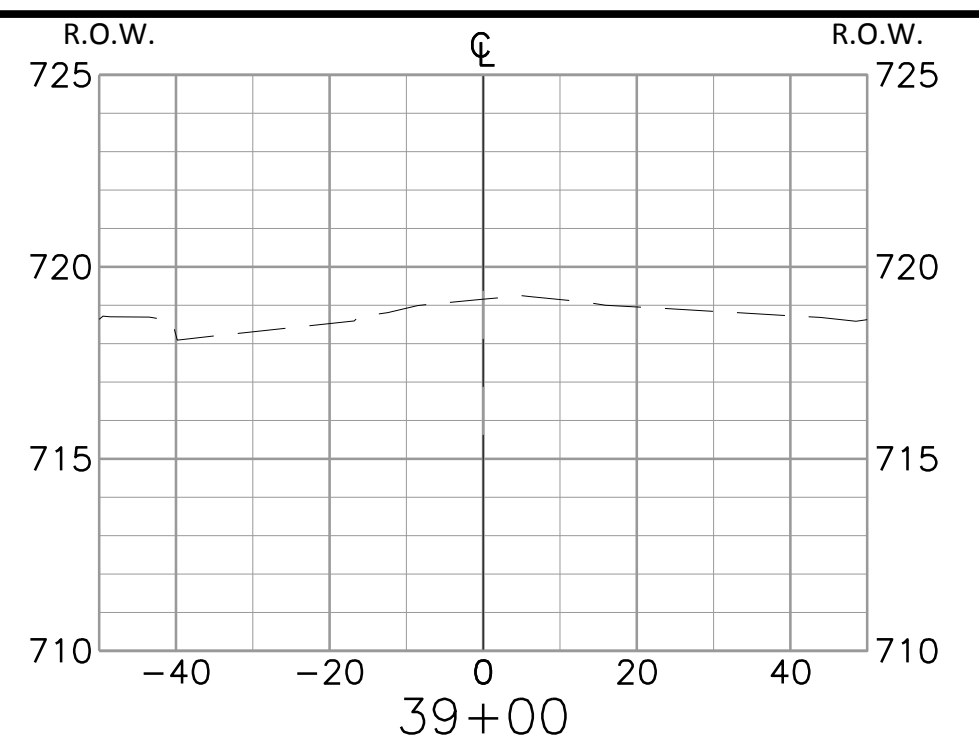
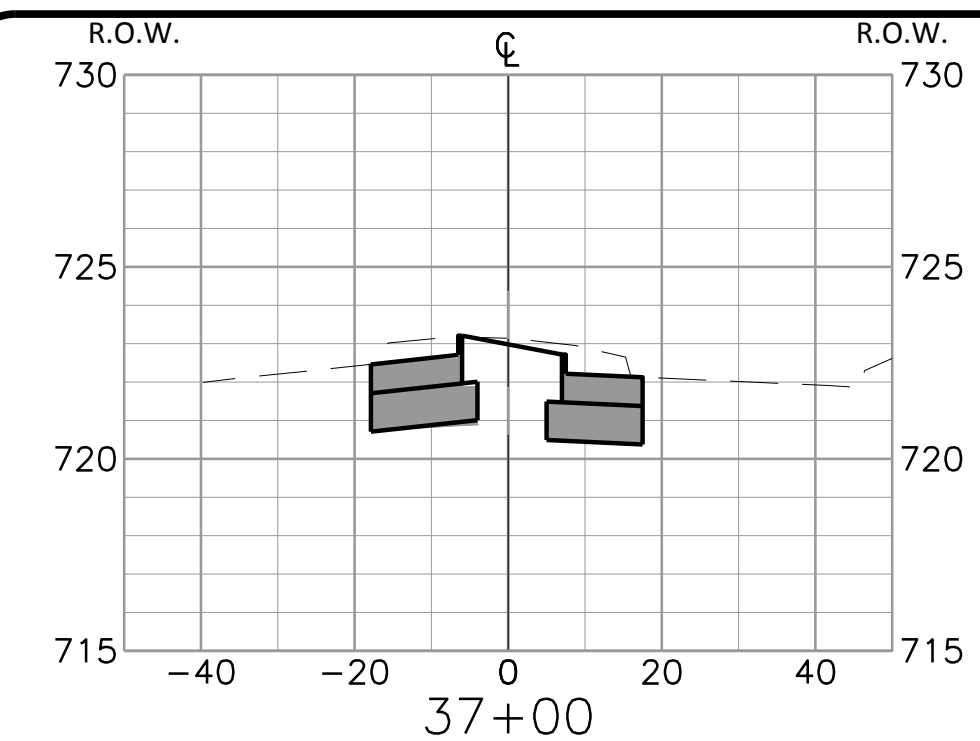
VERIFIED SCALE: 1" = 10'

HORIZONTAL SCALE: 1" = 50'

VERTICAL SCALE: 1" = 5'

SHEET: XS-06
 SEQ: 107

ACAD Ref: 2017 (LMS Tech)
 Filename: N:\Drawings\cv-trt-pr-XS07.dwg
 Last Saved: 3/9/2017 10:11 AM. Saved By: sli



NO.	ISSUE	BY	DATE	F&N JOB NO.	DATE	DESIGNED	DRAWN	REVISED	CHECKED	FILE NAME
0	VERIFY SCALE			FRCL15624	4/2017	AU	SI			cv-trt-pr-XS07

Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.

1

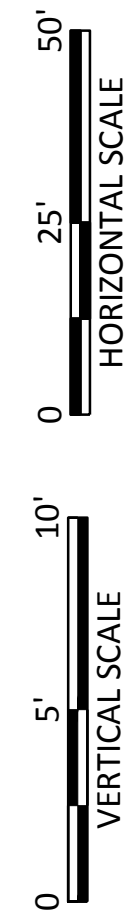
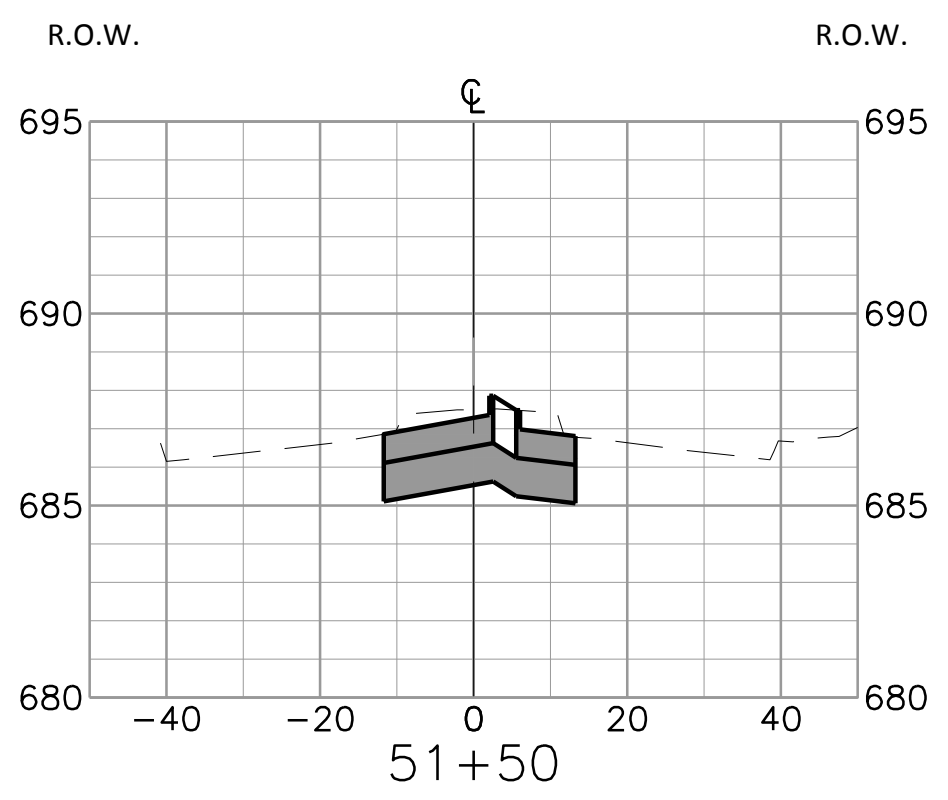
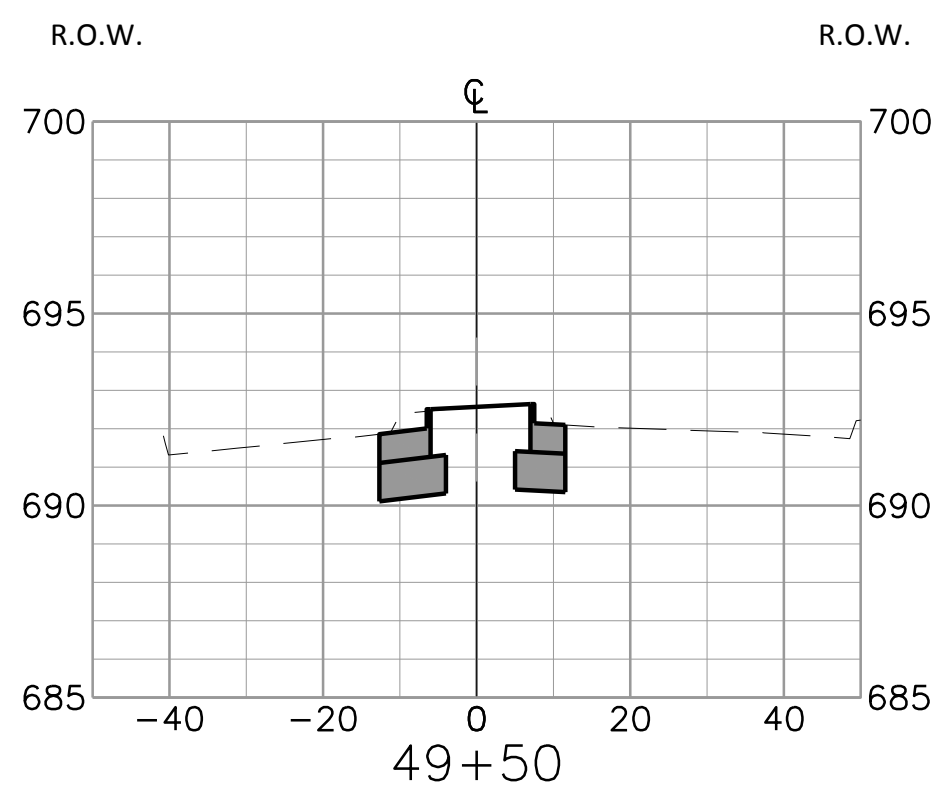
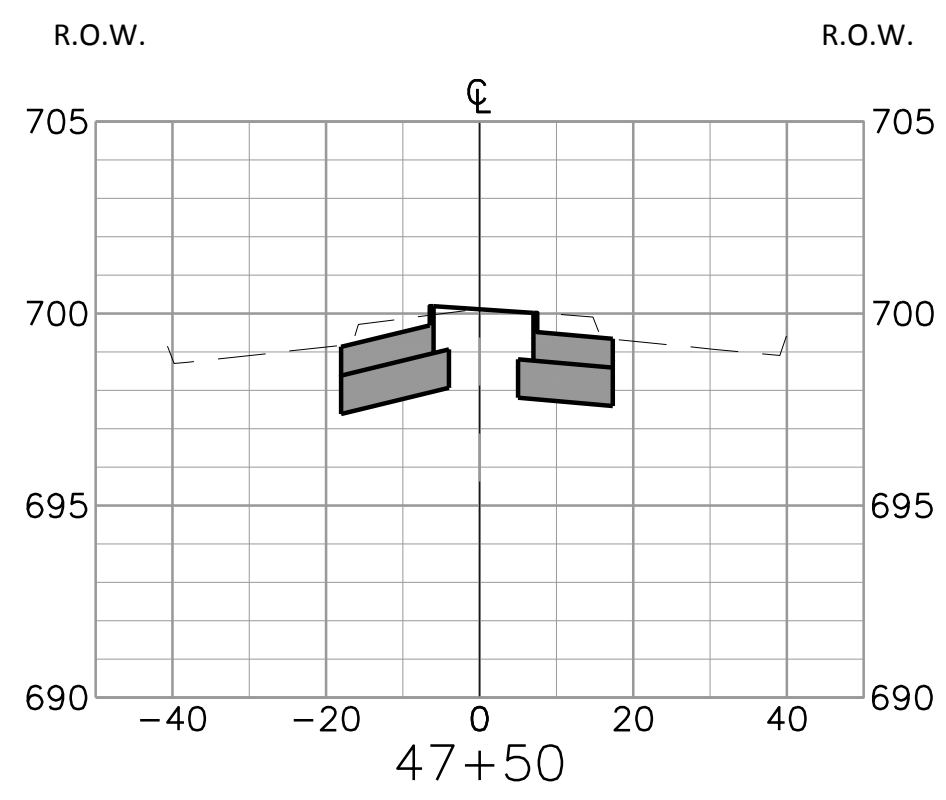
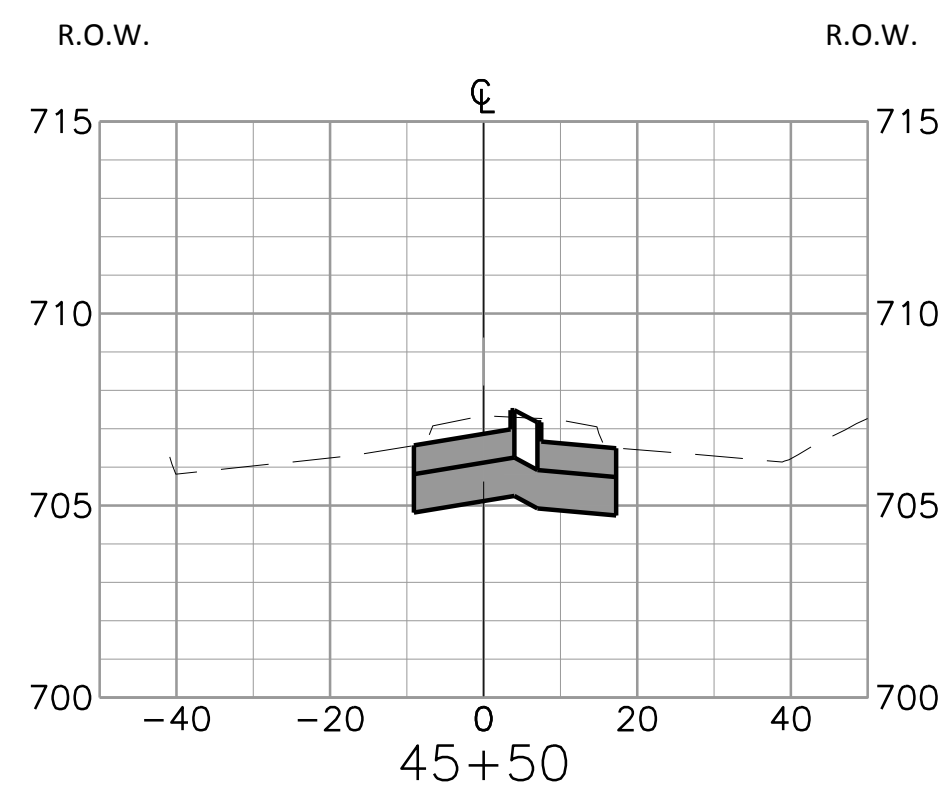
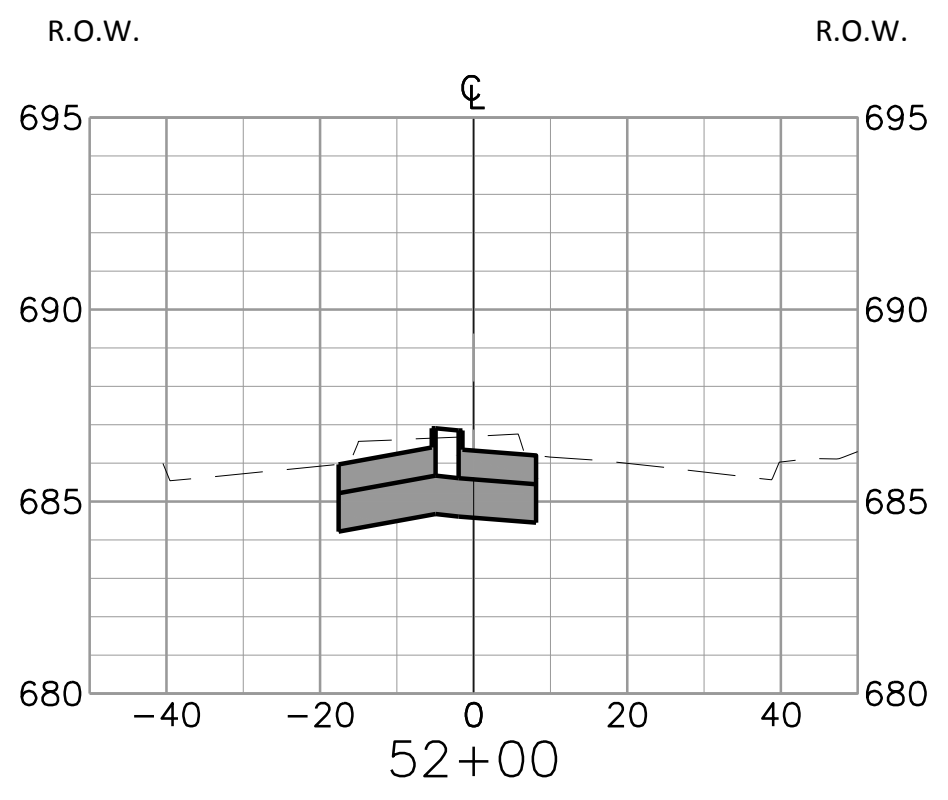
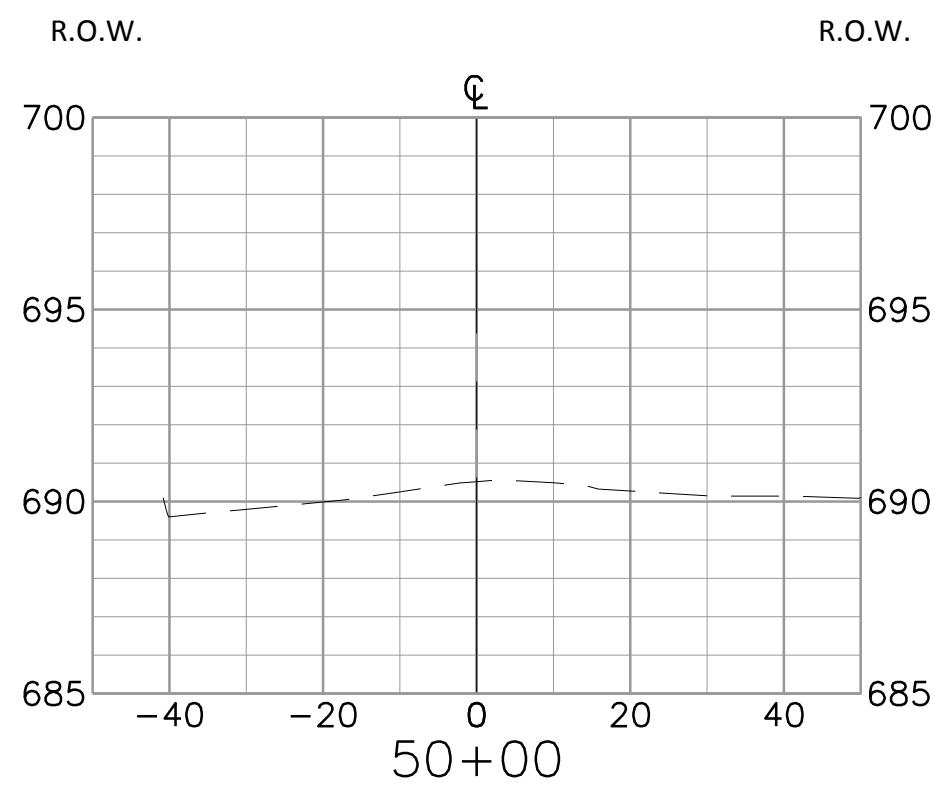
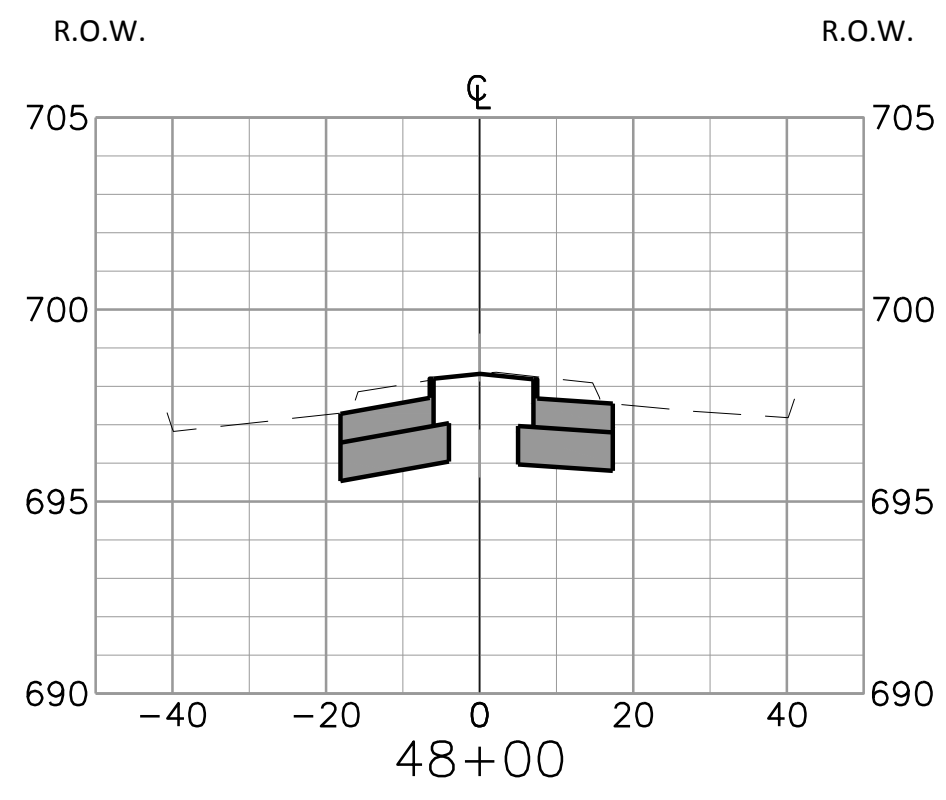
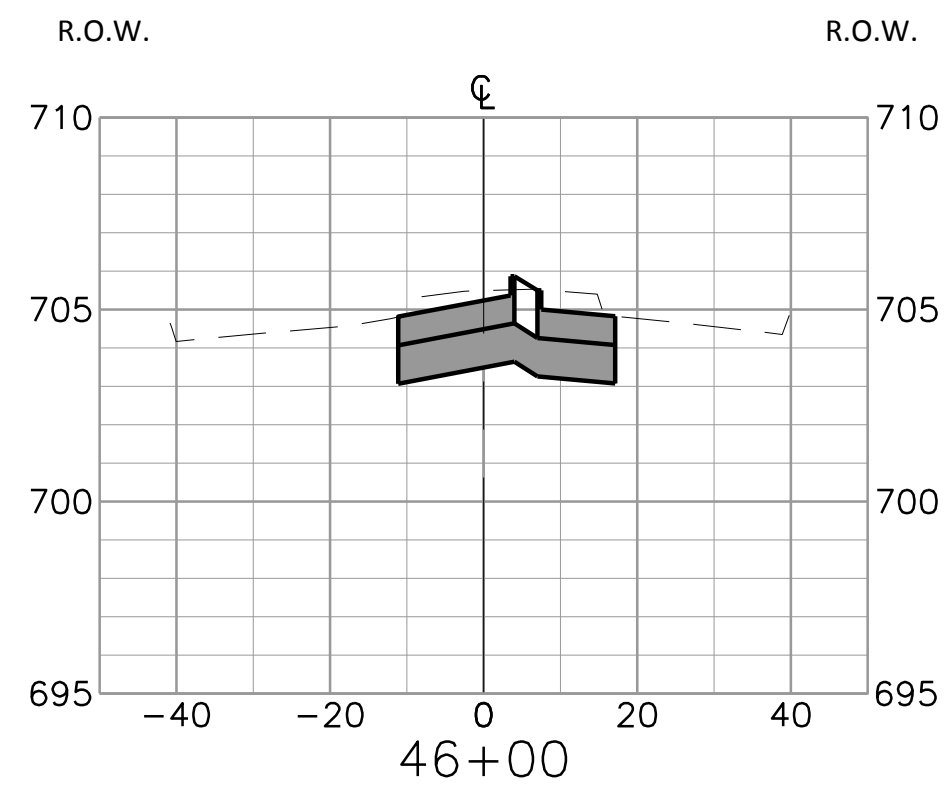
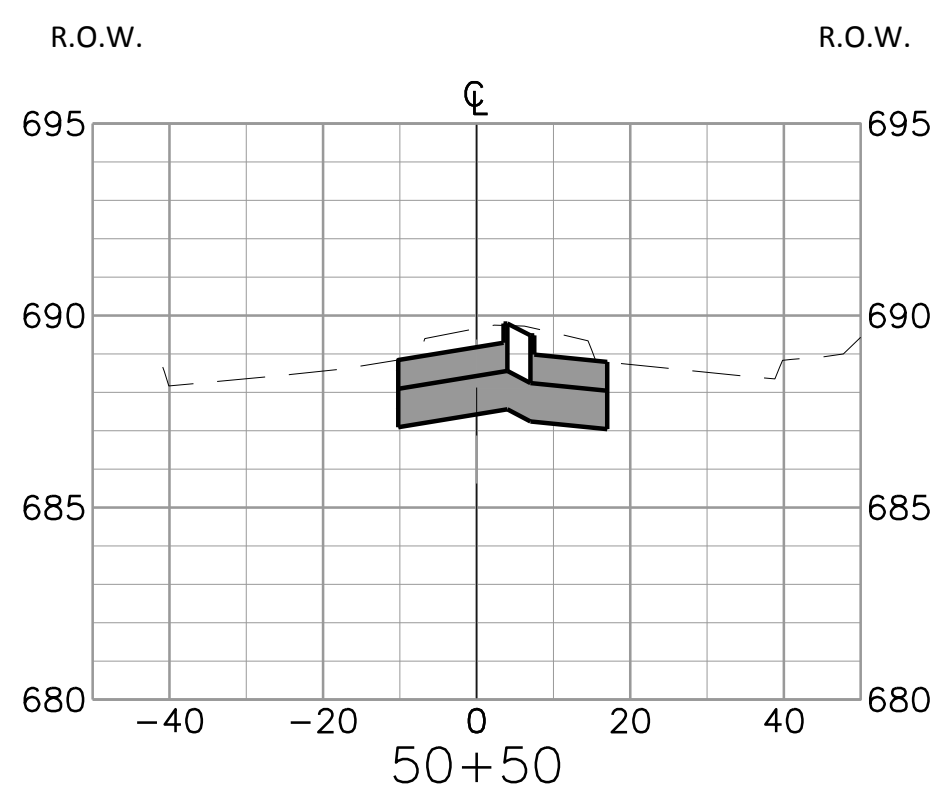
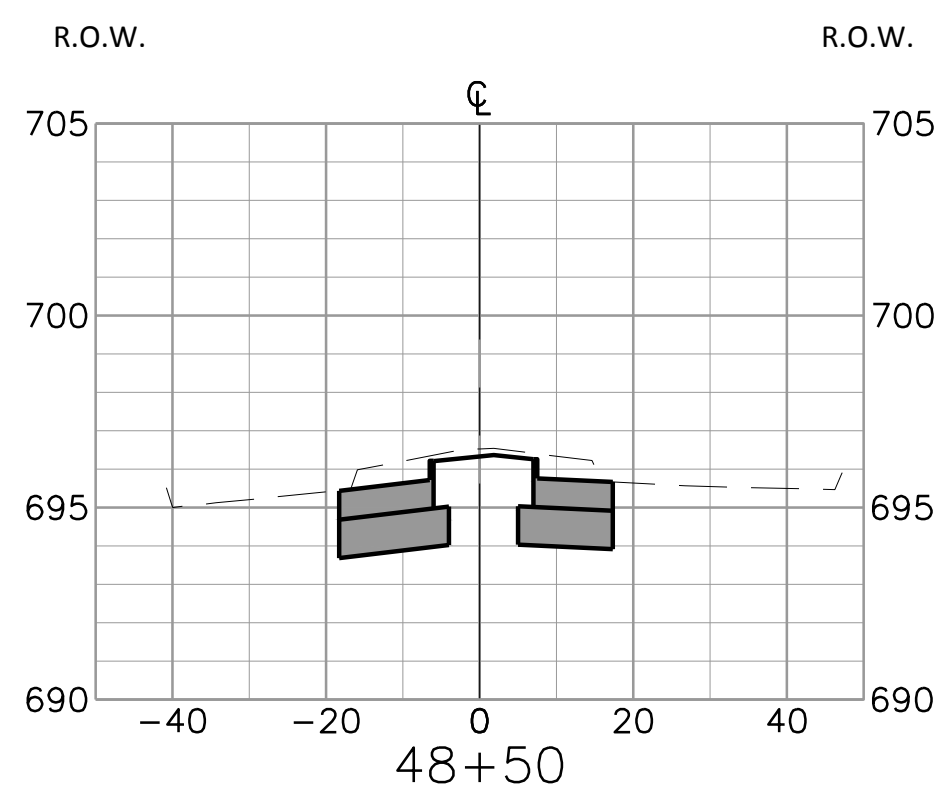
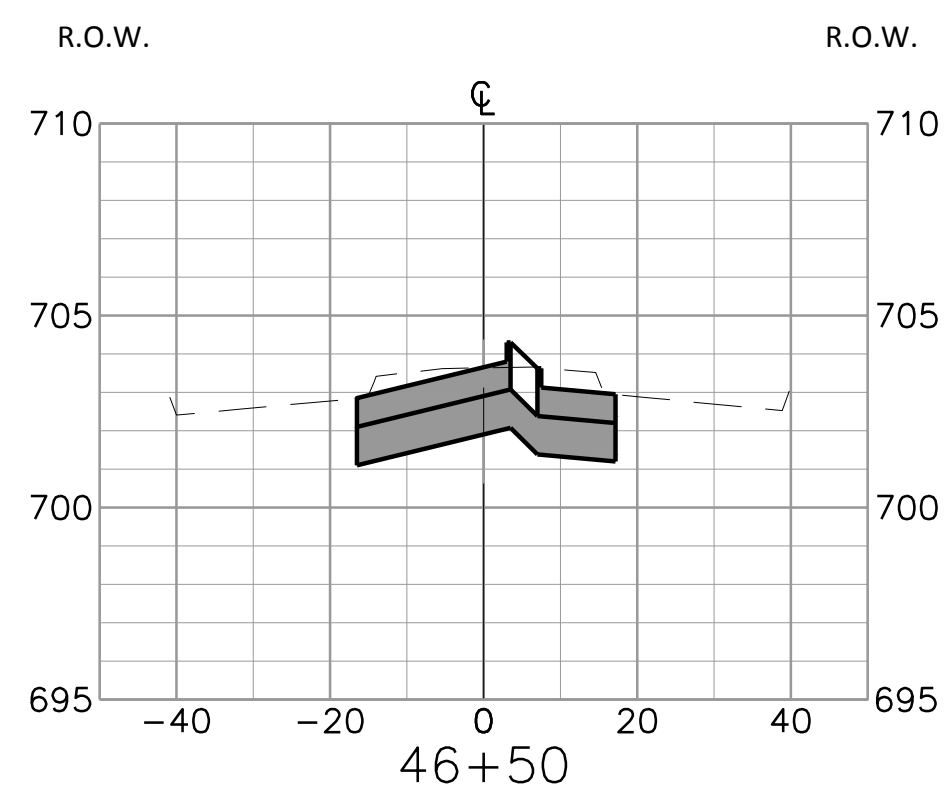
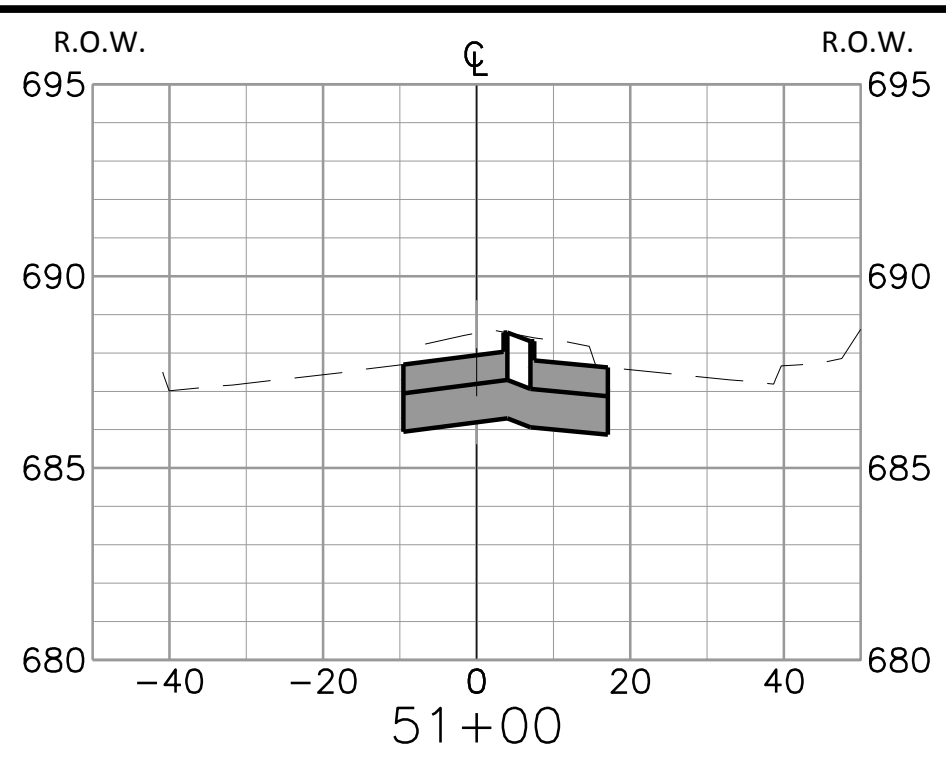
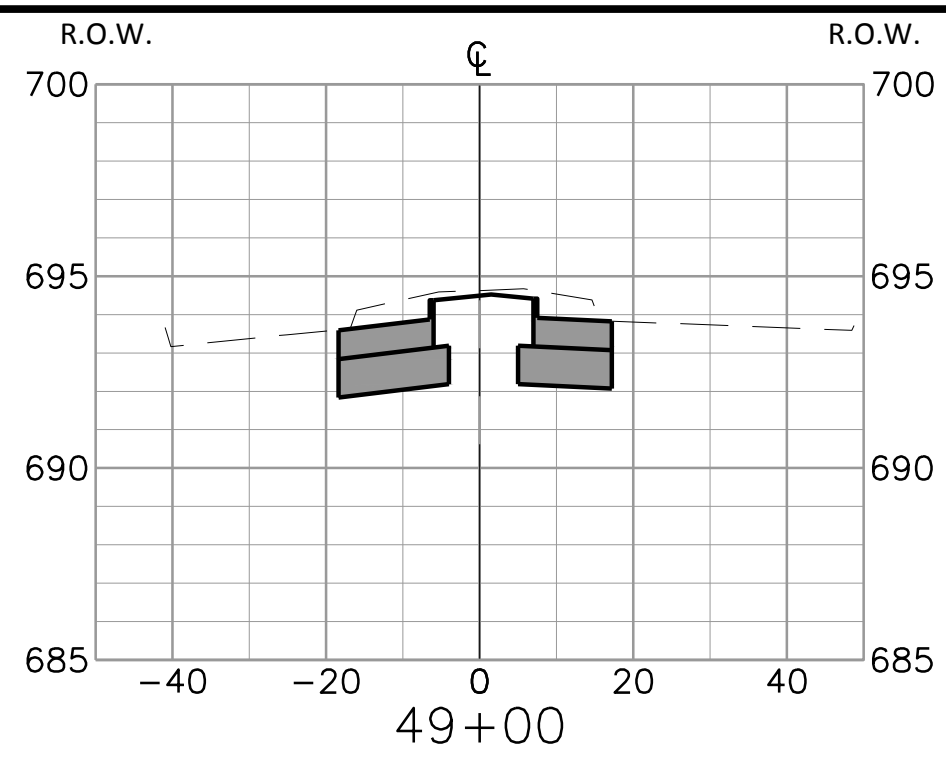
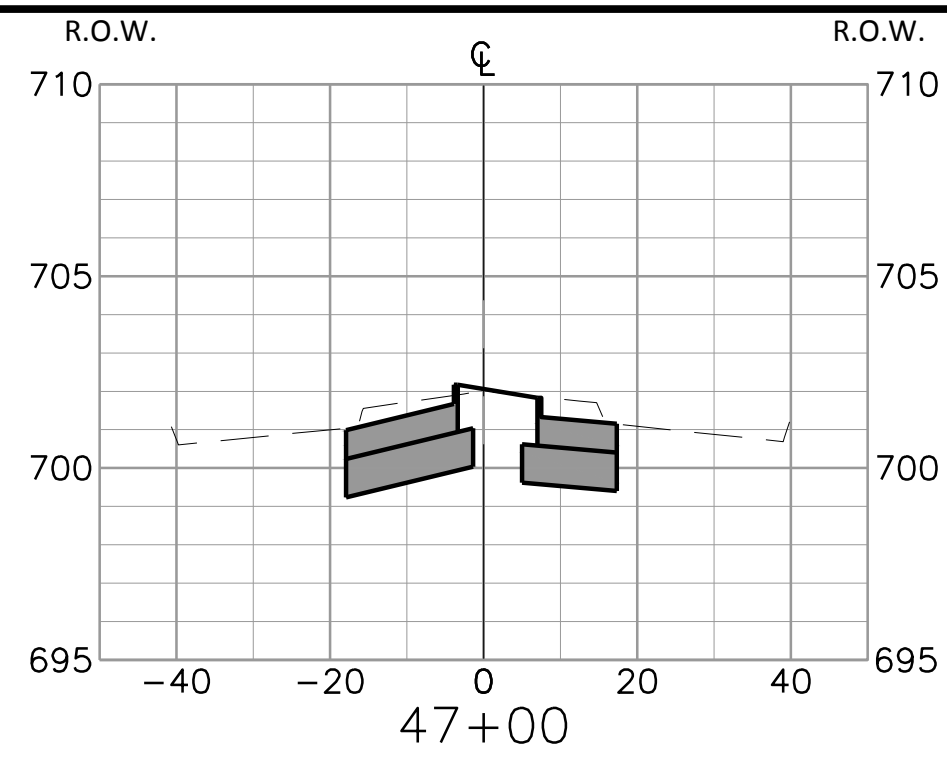
SHEET XS-07
 SEQ. 108

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

FREES & NICHOLS
 6136 Frisco Square Blvd., Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freese.com

CITY OF FRISCO, TEXAS
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
 CIVIL
LEBANON ROAD CROSS SECTIONS
STA 35+50 TO STA 45+00

ACAD Ref: 20.06 (LMS Tech)
 Filename: N:\F\Drawings\cv-trt-pr-XS08.dwg
 Last Saved: 3/5/2017 9:08 AM Saved By: sli



NO.	ISSUE	BY	DATE	F&N JOB NO.	FRCL15624
			4/2017	DATE	4/2017
			AU	DESIGNED	AU
			SI	DRAWN	SI
				REVISED	
				CHECKED	
				FILE NAME	CV-TRT-PR-XS08
VERIFY SCALE				Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.	
SHEET				XS-08	
SEQ.				109	

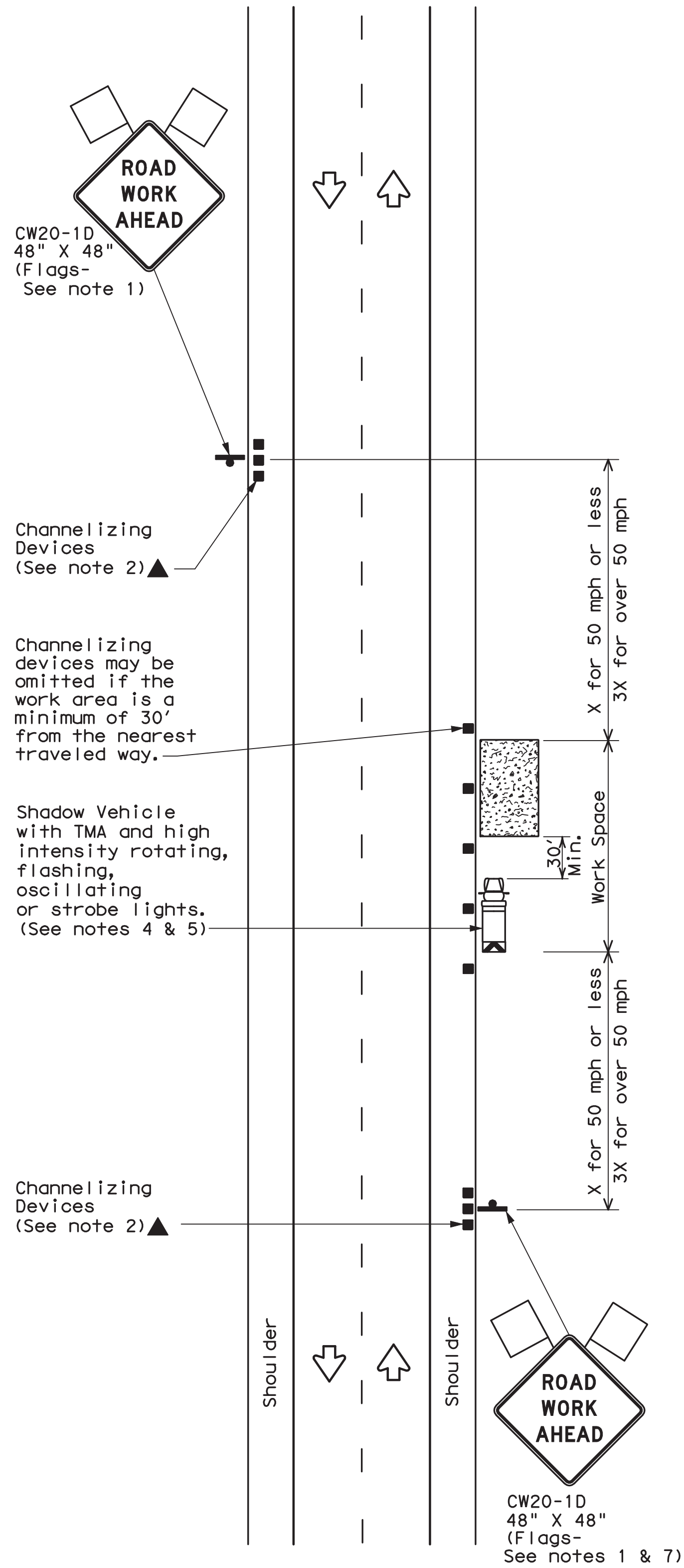
CITY OF FRISCO, TEXAS
LEBANON ROAD IMPROVEMENTS AND FORCE MAIN
 CIVIL
LEBANON ROAD CROSS SECTIONS
STA 45+50 TO END

FRESE & NICHOLS
 6136 Frisco Square Blvd., Suite 200
 Frisco, Texas 75034
 Phone - (972) 624-9201
 Fax - (972) 624-9202
 Web - www.freese.com

Freese and Nichols, Inc.
 Texas Registered Engineering Firm F-2144
 05-01-2017

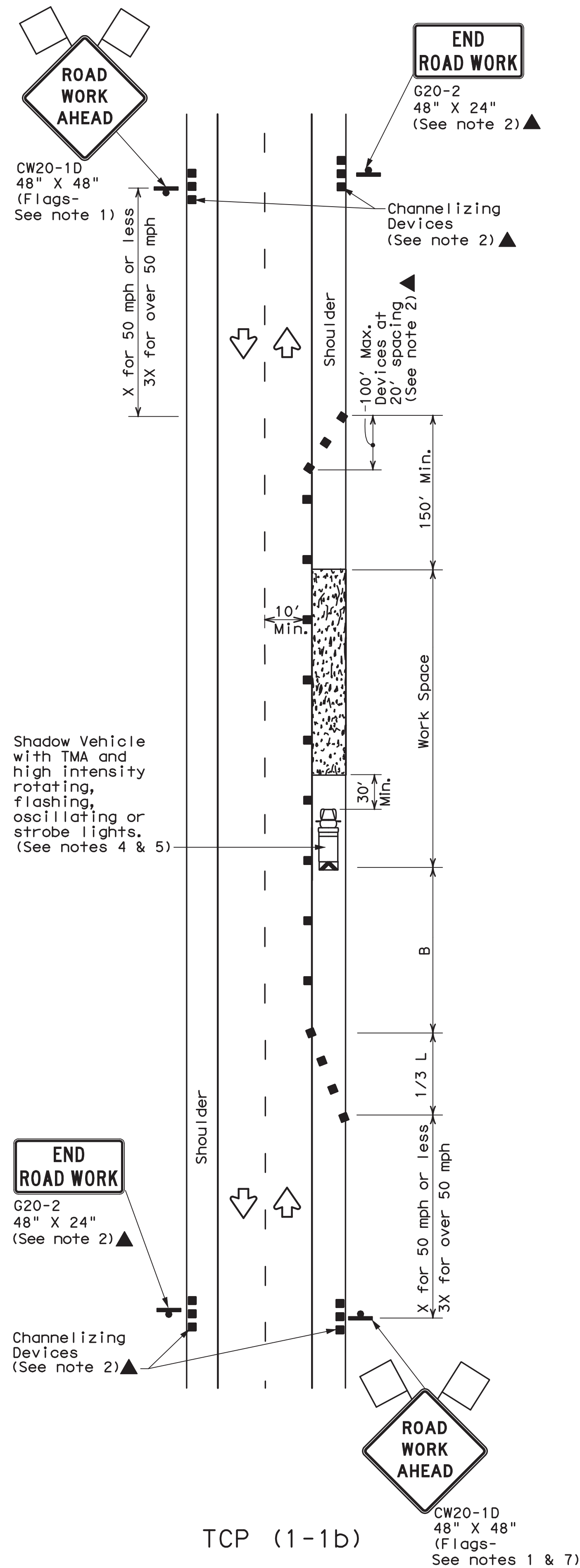
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:



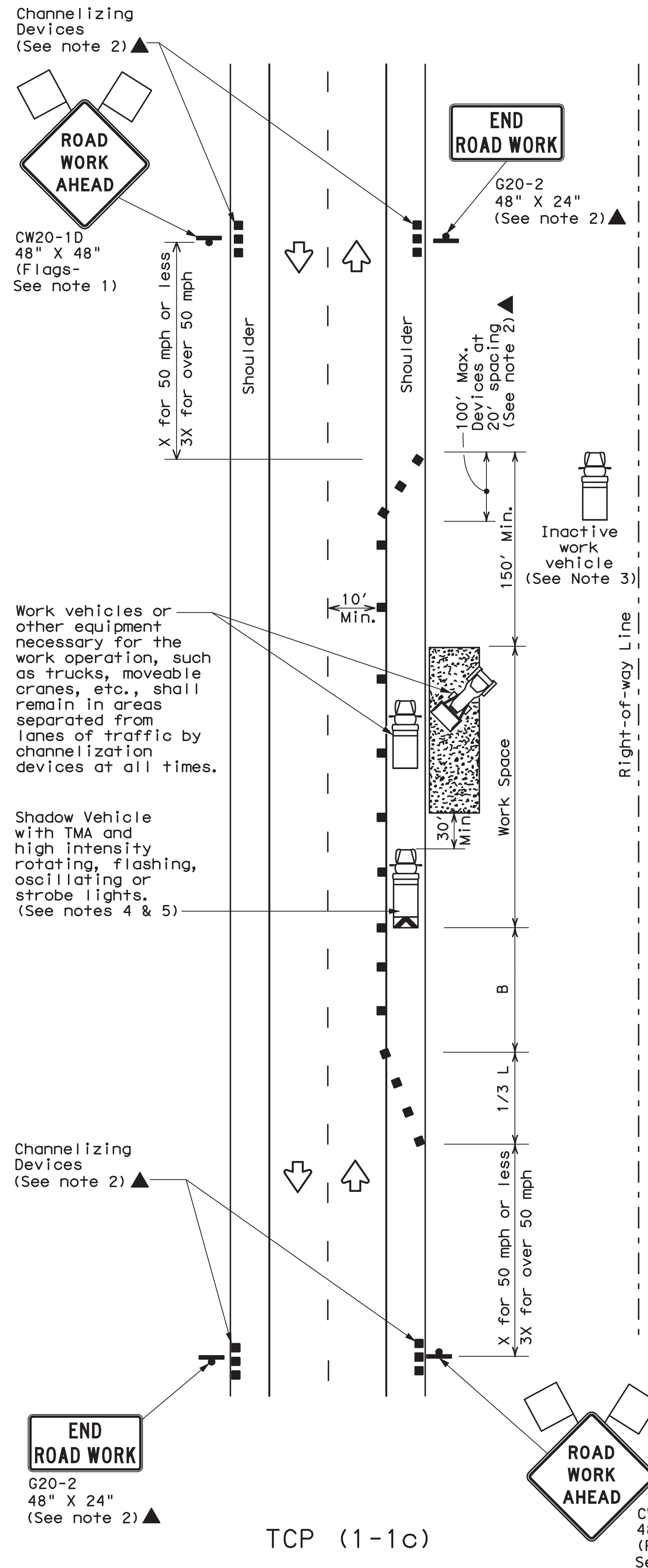
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

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

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

GENERAL NOTES

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

For construction or maintenance contract work, specific project requirements for shadow vehicles can be found in the project GENERAL NOTES for Item 502, Barricades, Signs and Traffic Handling.

Texas Department of Transportation
Traffic Operations Division

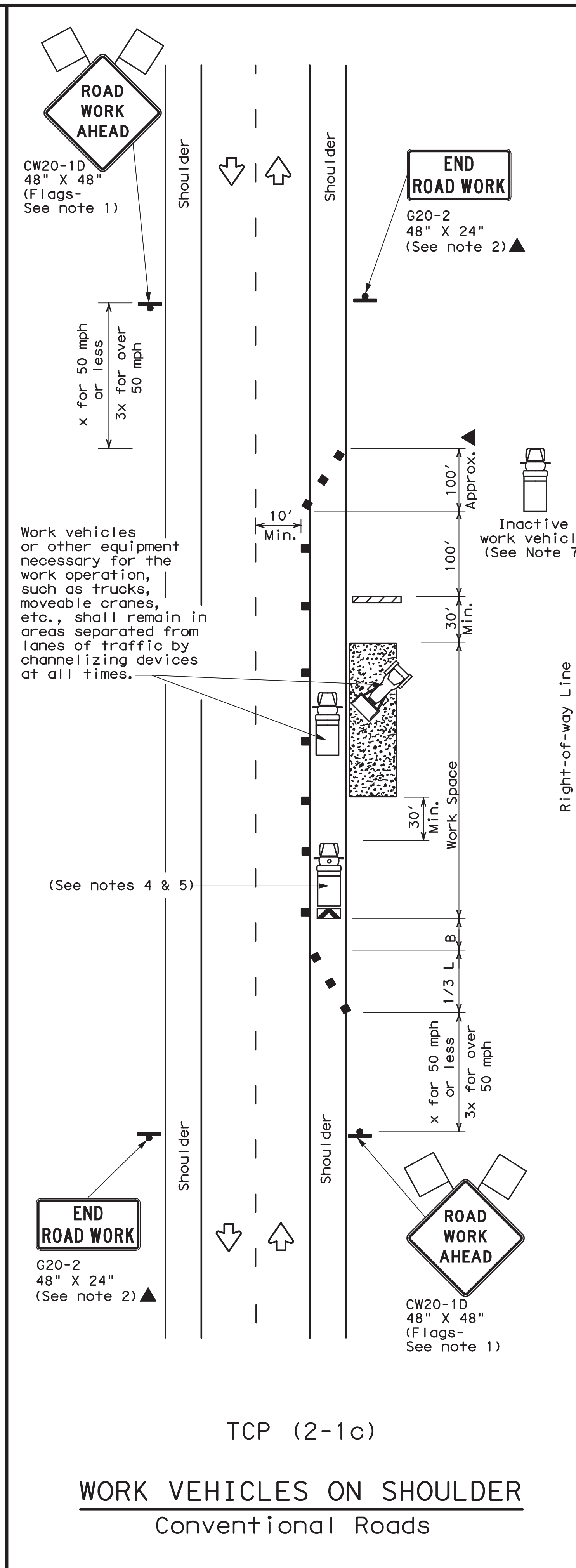
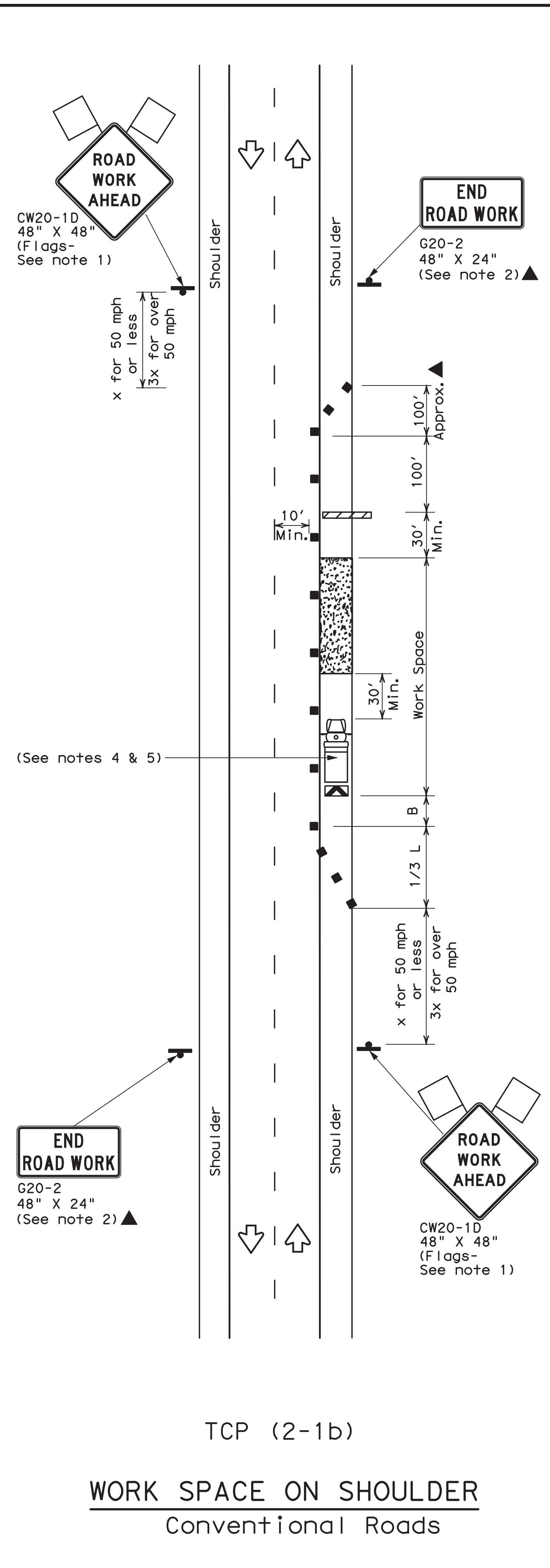
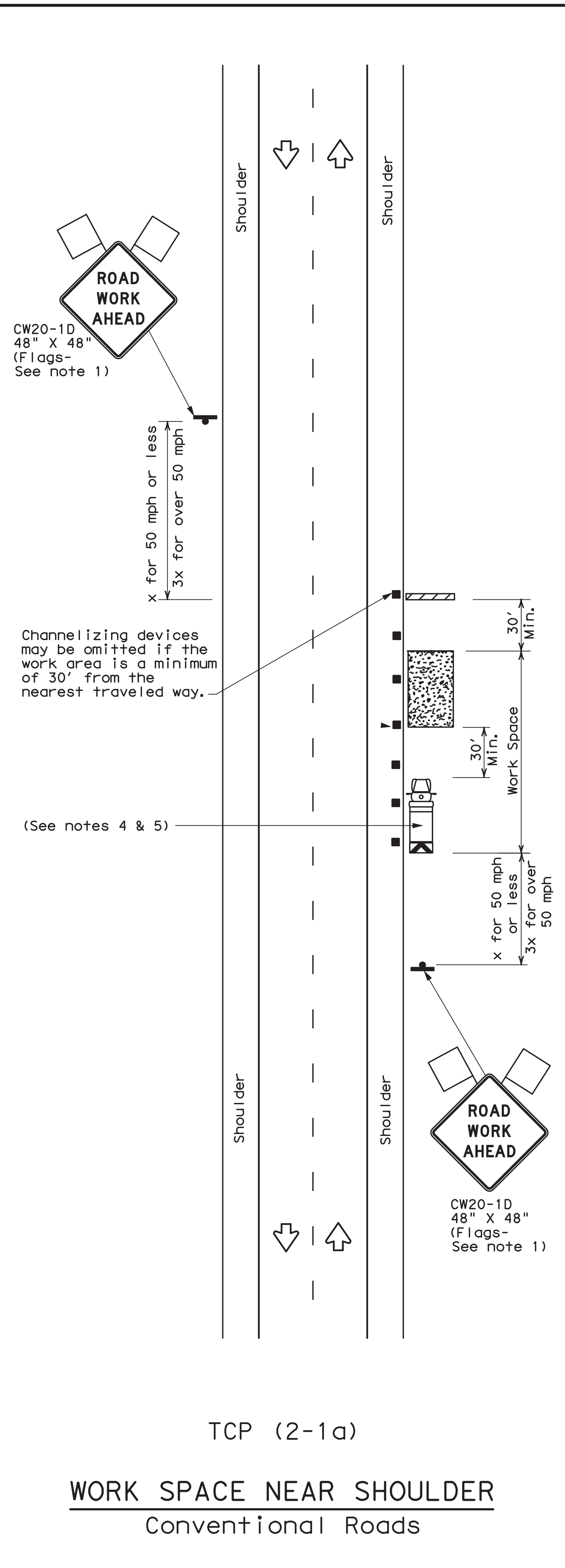
TRAFFIC CONTROL PLAN
CONVENTIONAL ROAD
SHOULDER WORK

TCP(1-1)-12

© TxDOT December 1985		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
REVISIONS		CONT	SECT	JOB	HIGHWAY
2-94	2-12				
8-95					
1-97		DIST	COUNTY		SHEET NO.
4-98					110

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

DATE:
FILE:



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

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

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

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

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

For construction or maintenance contract work, specific project requirements for shadow vehicles can be found in the project GENERAL NOTES for Item 502, Barricades, Signs and Traffic Handling.



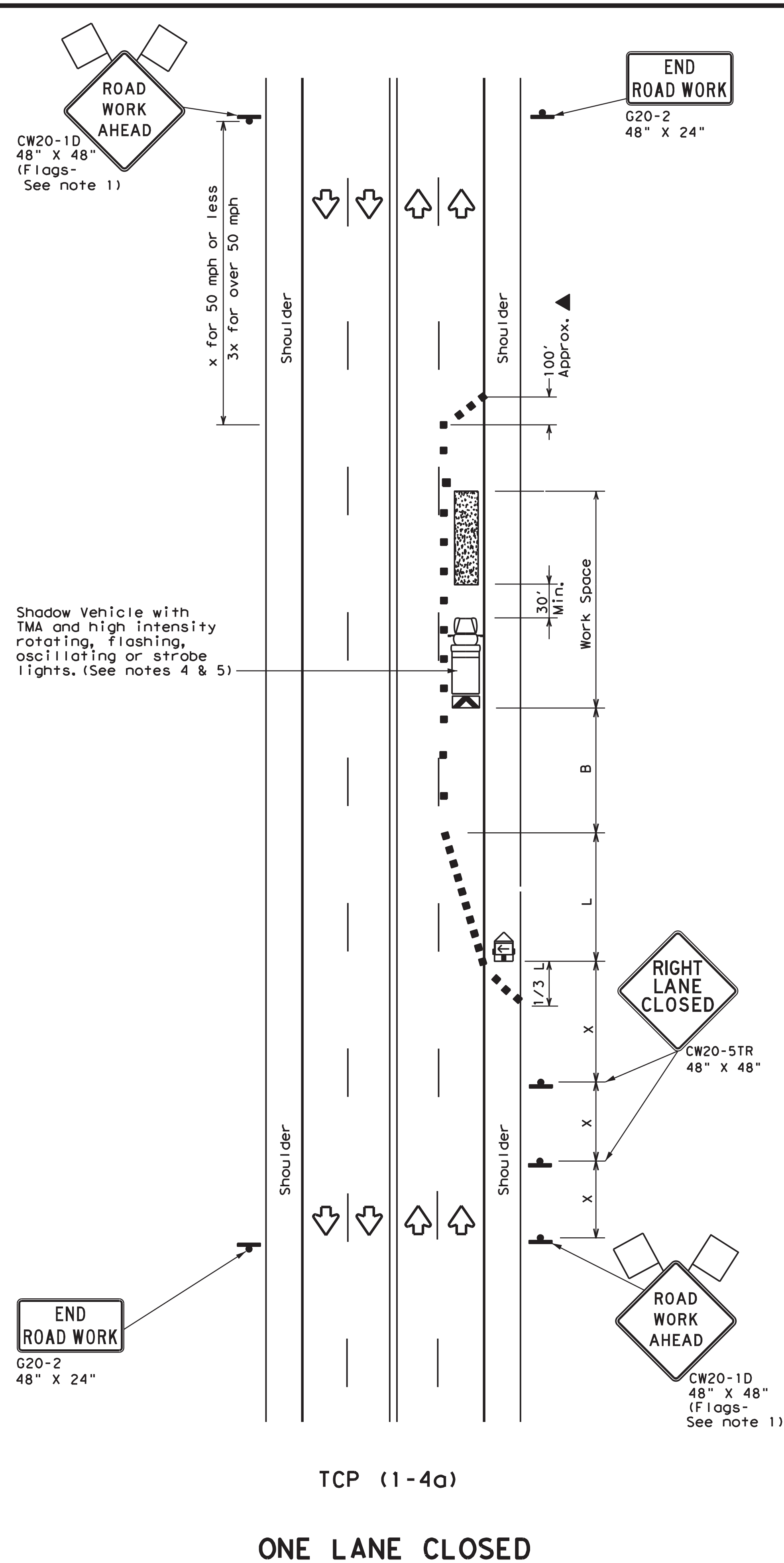
TRAFFIC CONTROL PLAN
 CONVENTIONAL ROAD
 SHOULDER WORK

TCP (2-1) - 12

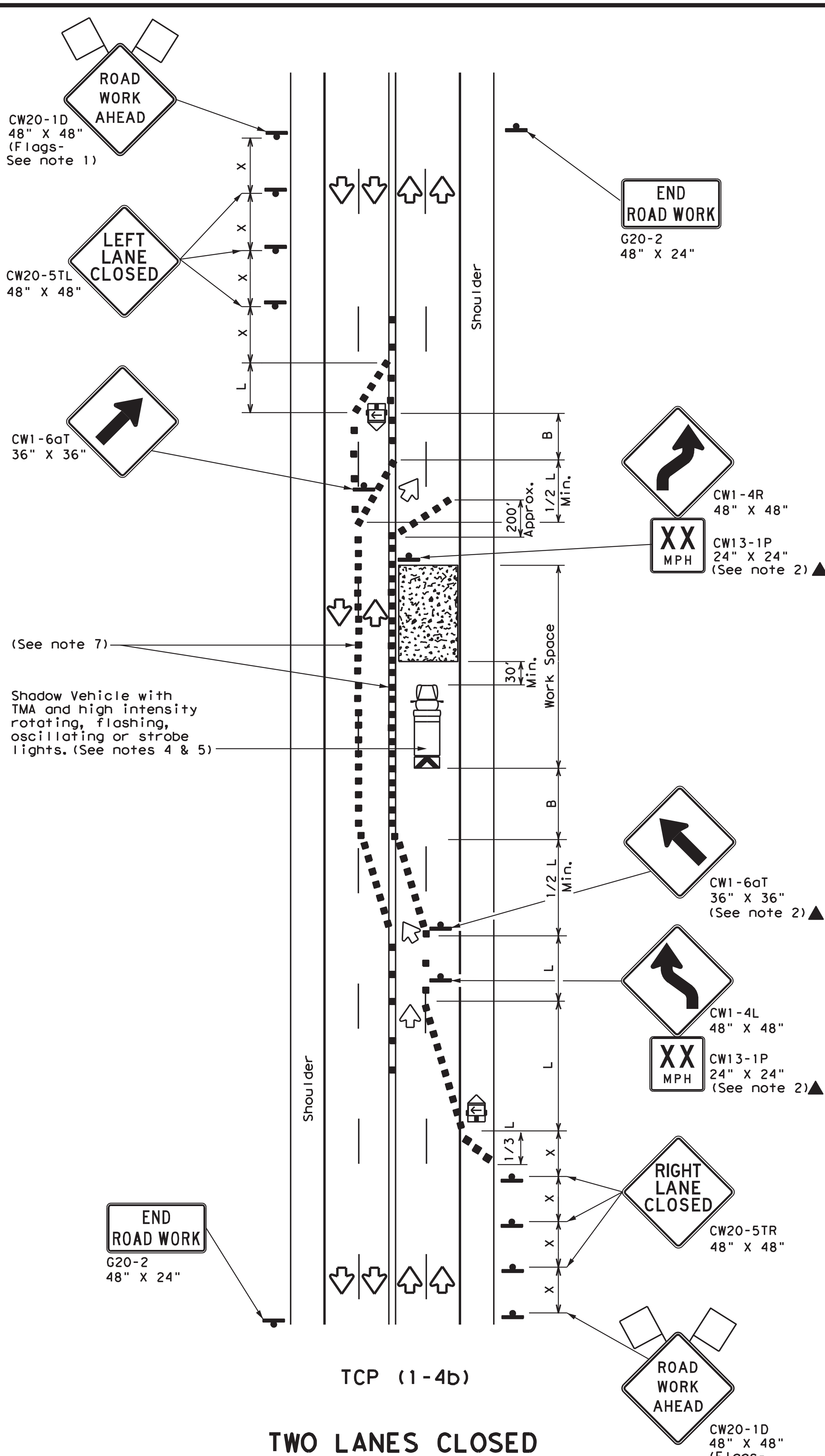
© TxDOT December 1985		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
REVISIONS		CONT	SECT	JOB	HIGHWAY
2-94	2-12				
8-95					
1-97					
4-98					
		DIST	COUNTY	SHEET NO.	
				111	

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

DATE:
FILE:



ONE LANE CLOSED



TWO LANES CLOSED

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

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

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

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

- GENERAL NOTES**
- Flags attached to signs where shown are REQUIRED.
 - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
 - The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
 - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
 - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-4a)

- 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 where needed to protect the work space from opposing traffic with the arrow panel placed in the closed lane near the end of the merging taper.

TCP (1-4b)

- 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 1/2S where S is the speed in mph. This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

For construction or maintenance contract work, specific project requirements for shadow vehicles can be found in the project GENERAL NOTES for Item 502, Barricades, Signs and Traffic Handling.

Texas Department of Transportation
 Traffic Operations Division

TRAFFIC CONTROL PLAN
LANE CLOSURES ON MULTILANE
CONVENTIONAL ROADS

TCP (1-4) -12

© TxDOT December 1985

DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
CONTRACT	SECTION	JOB	HIGHWAY
DISTRICT	COUNTY	SHEET NO.	

154

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.

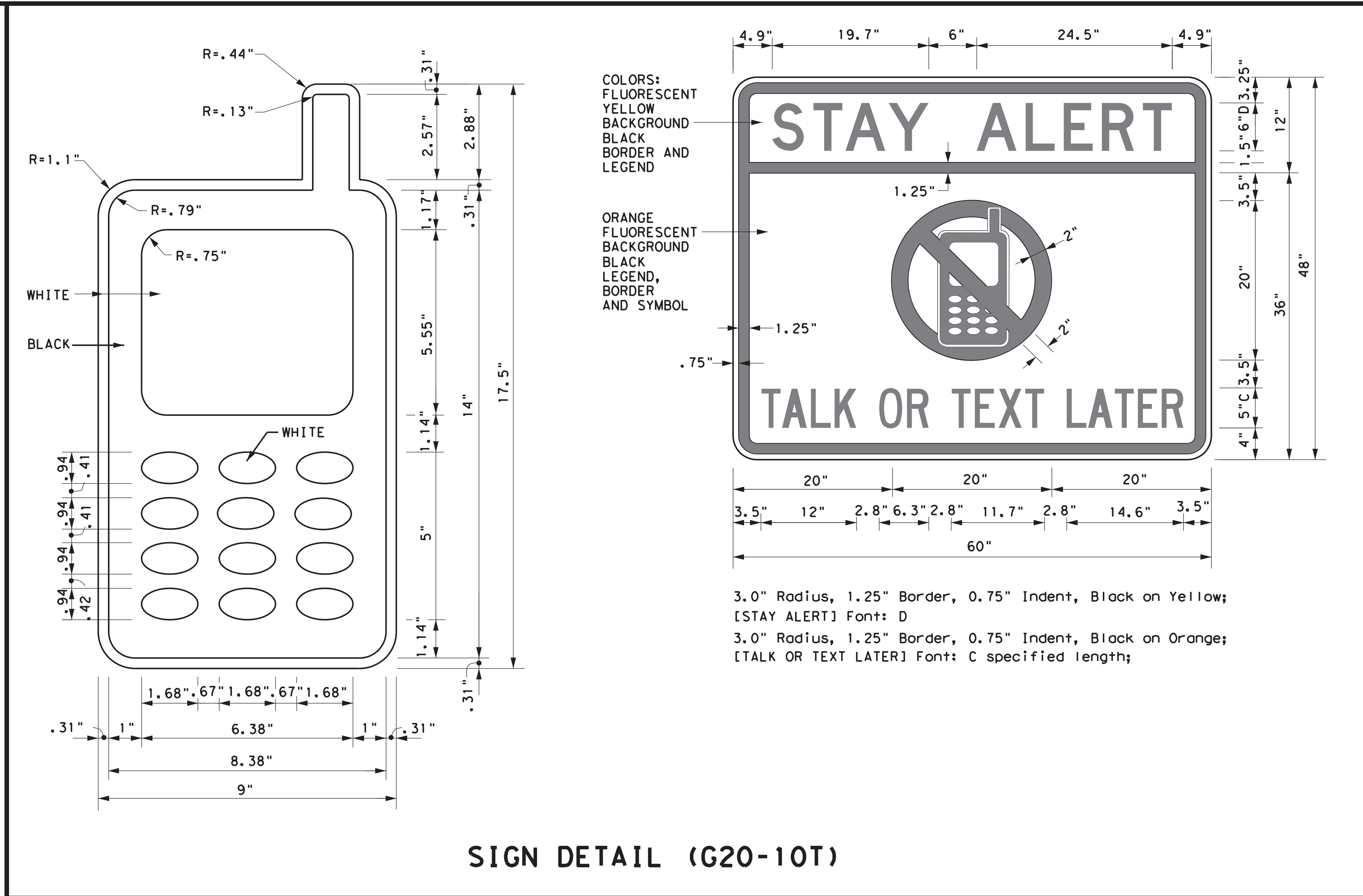
BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

- 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).
- The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.
- Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.
- The Engineer has the final decision on the location of all traffic control devices.
- Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY APPAREL NOTES:

- 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.

DATE:
 FILE:



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

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

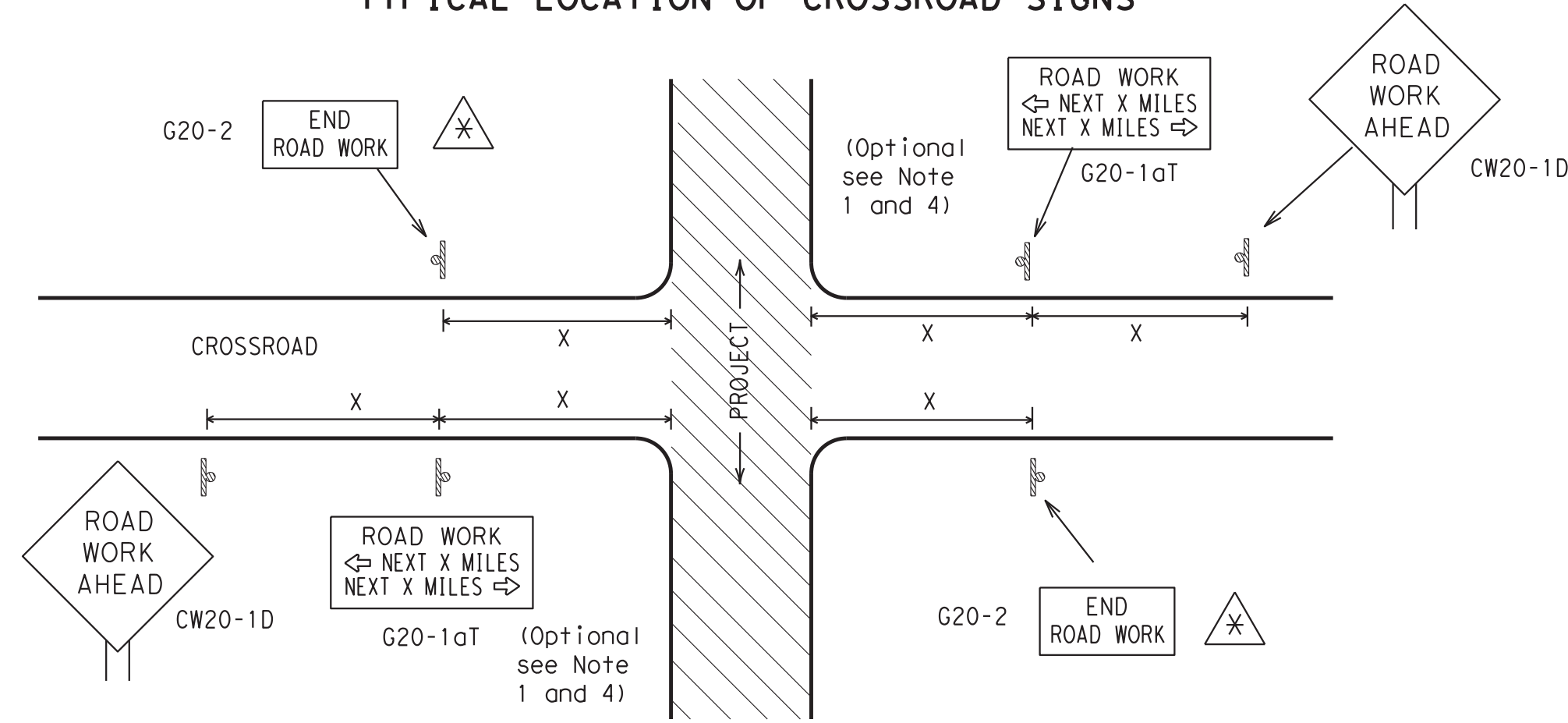
THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS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

SHEET 1 OF 12

		<i>Traffic Operations Division Standard</i>
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS		
BC (1) - 14		
FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT
REVISIONS	JOB	
4-03 5-10 8-14	HIGHWAY	
9-07 7-13	DIST	COUNTY
		SHEET NO.
		113

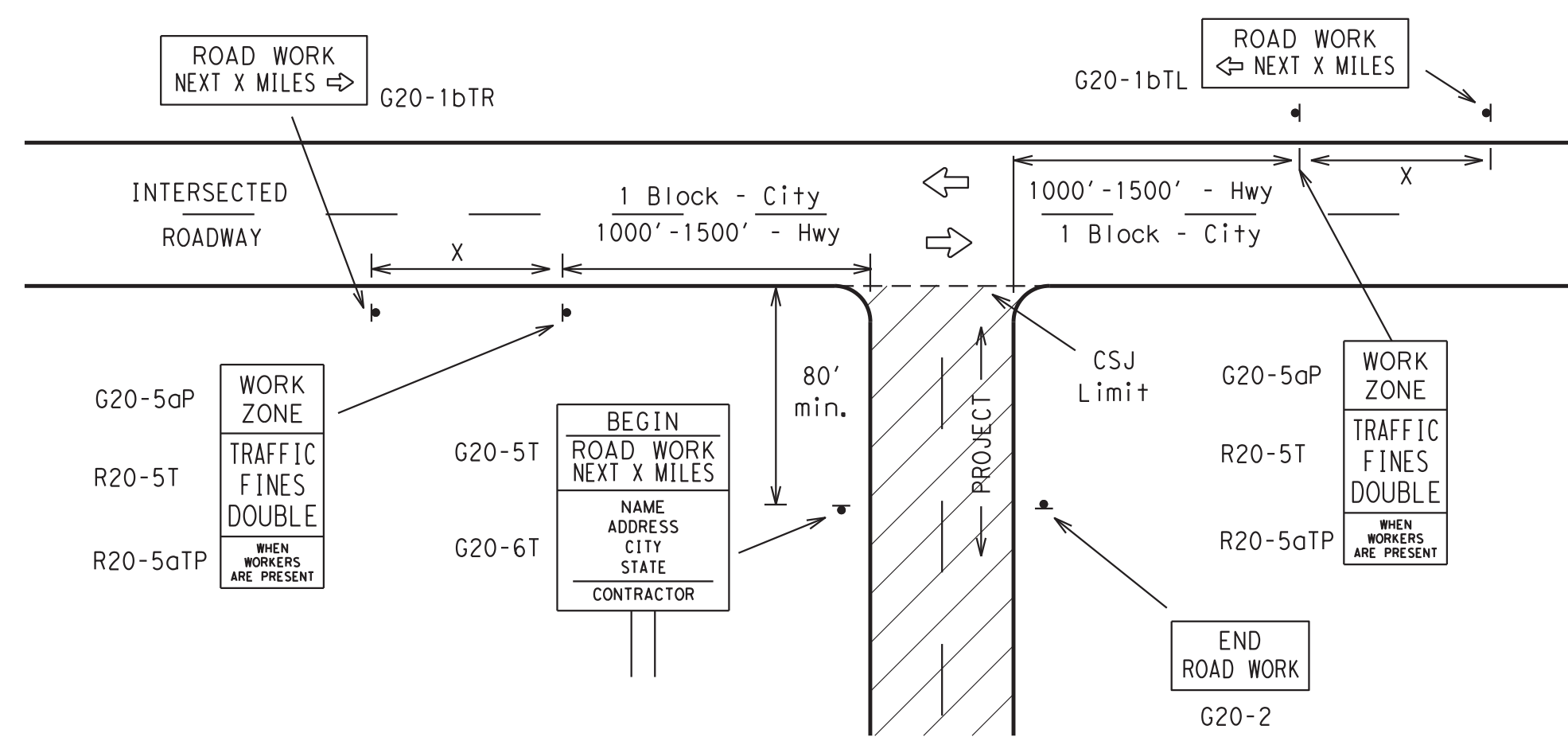
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

TYPICAL LOCATION OF CROSSROAD SIGNS



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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

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

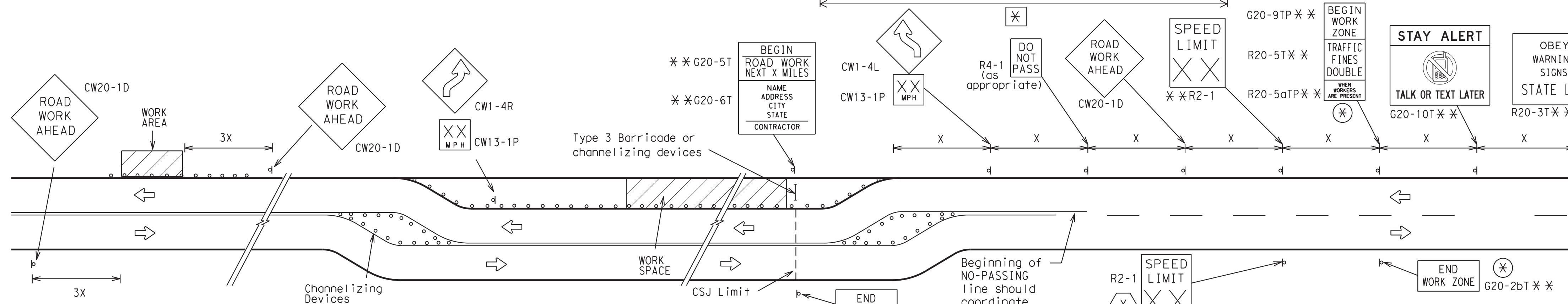
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

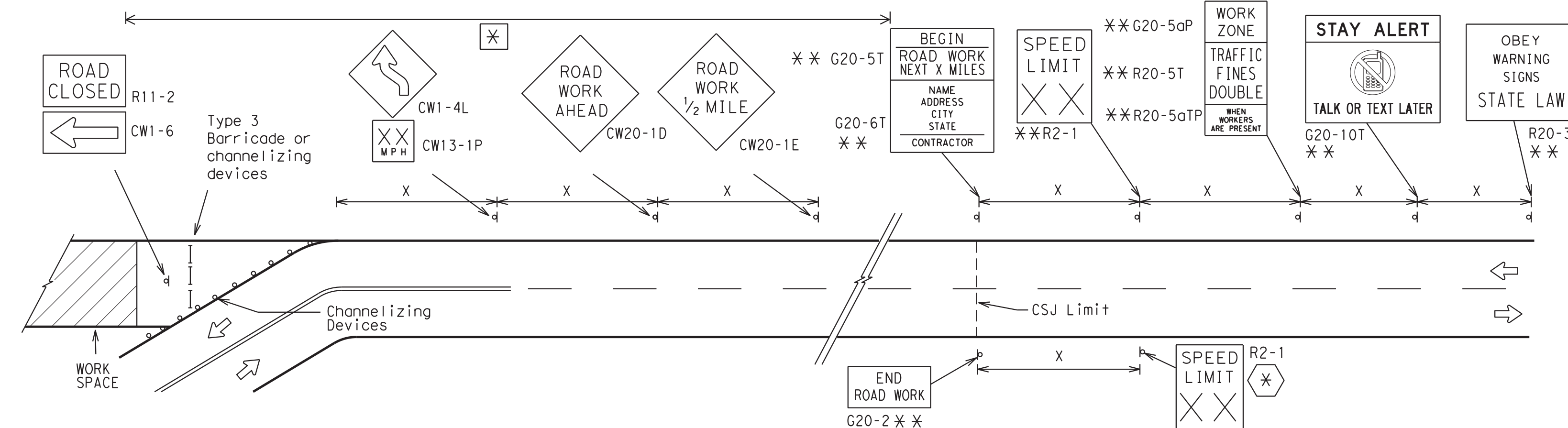
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

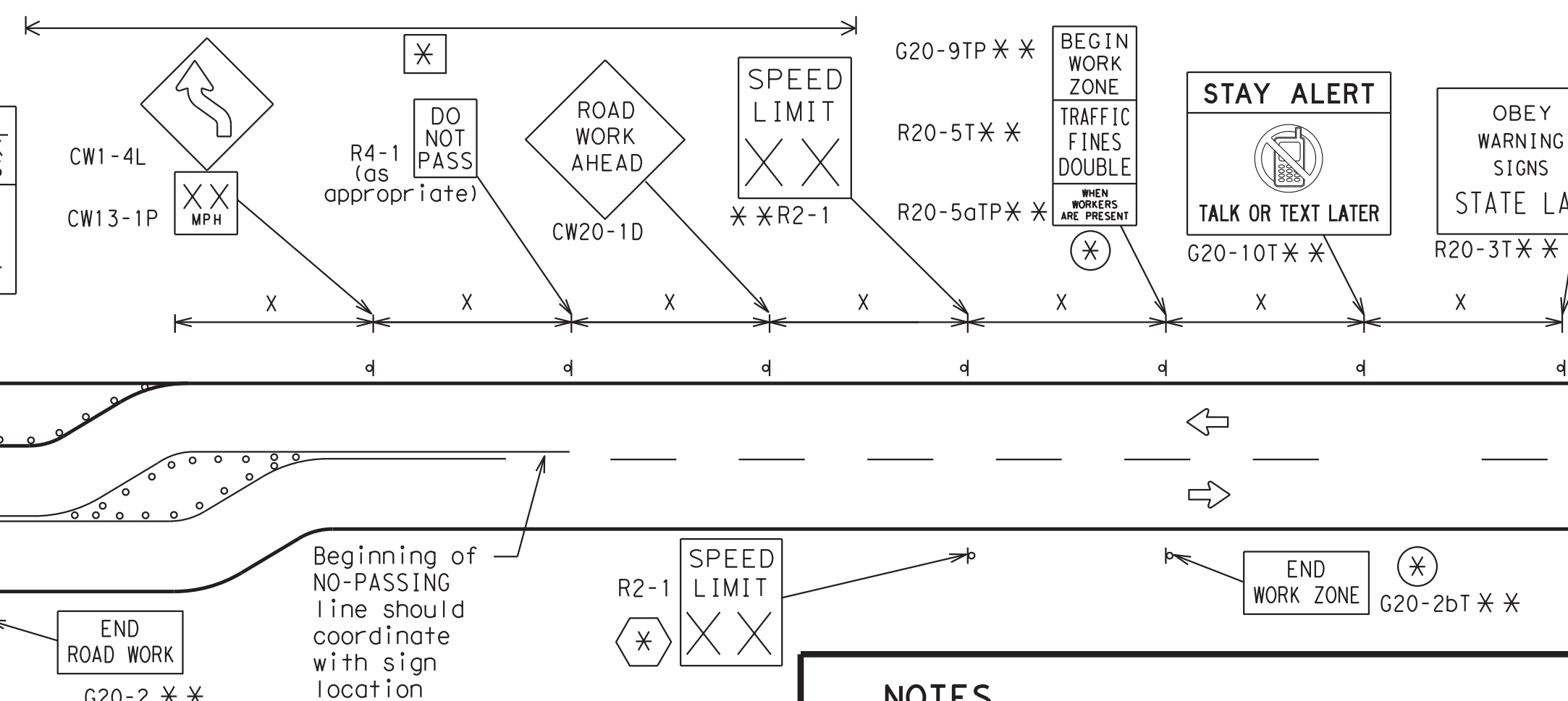


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



NOTES

- The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.
- ⊗ The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
- ** Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.
- ⊗ Area for placement of "ROAD WORK AHEAD" (CW20-1D) sign and other signs or devices as called for on the Traffic Control Plan.
- ⊗ Contractor will install a regulatory speed limit sign at the end of the work zone.

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

SHEET 2 OF 12



BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

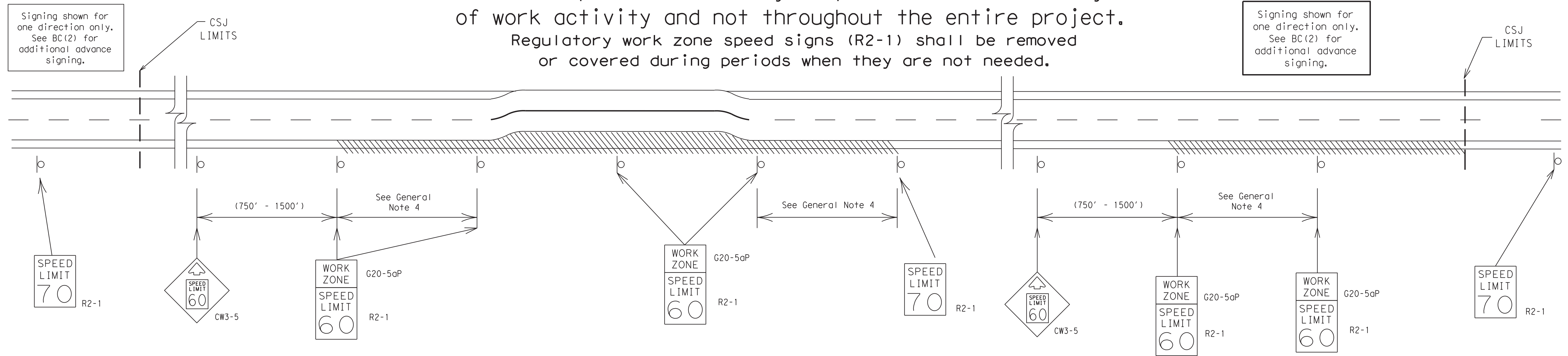
FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				
9-07 8-14				
7-13				
	DIST	COUNTY		SHEET NO.
				114

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:

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

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

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

DATE:
FILE:

SHEET 3 OF 12

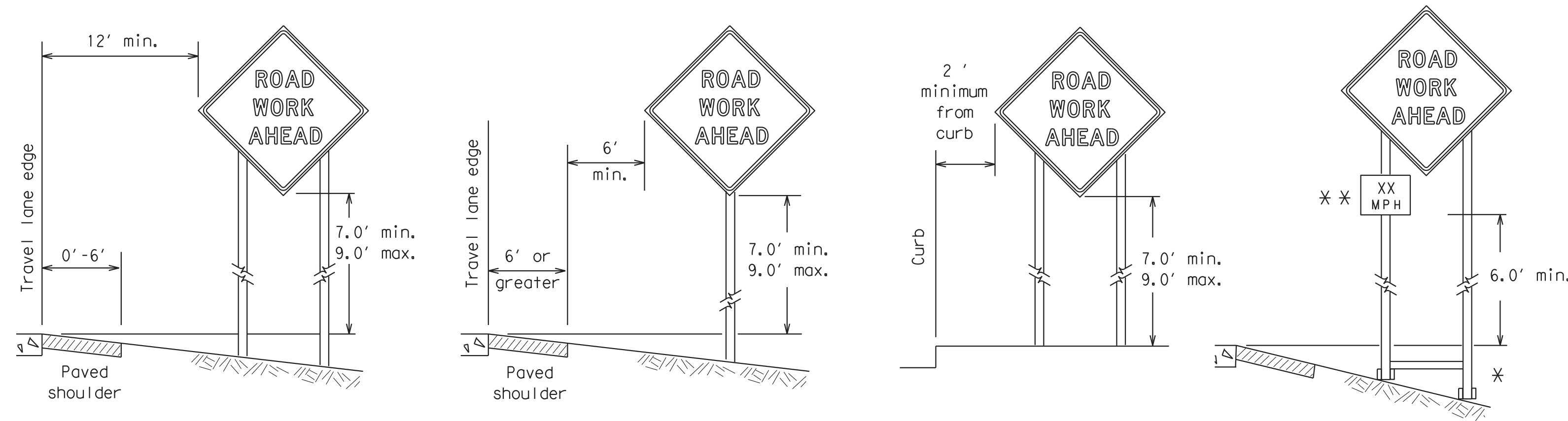


BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC (3) - 14

FILE:	bc-14.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS									
9-07	8-14								
7-13									SHEET NO.
								115	

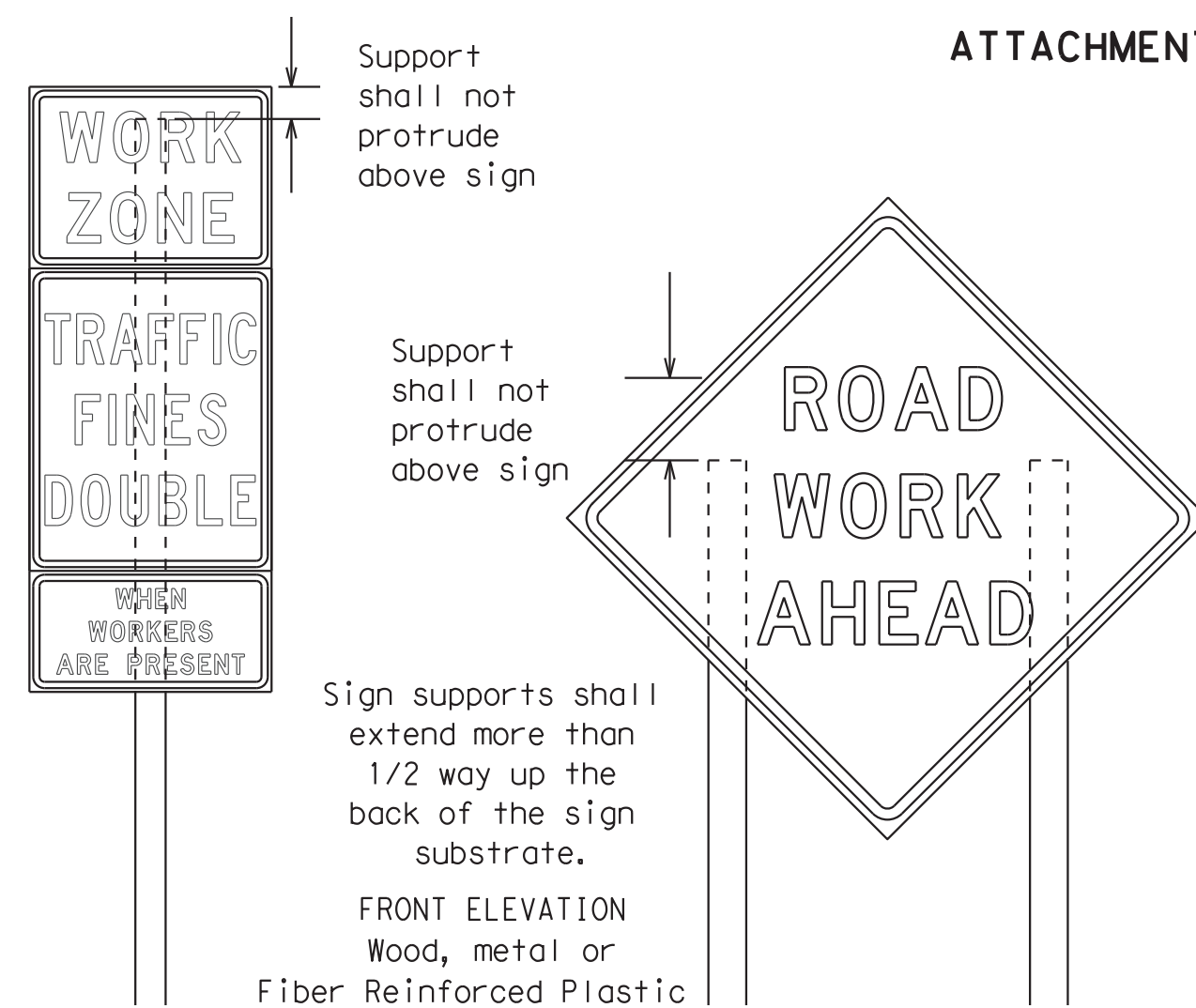
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



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

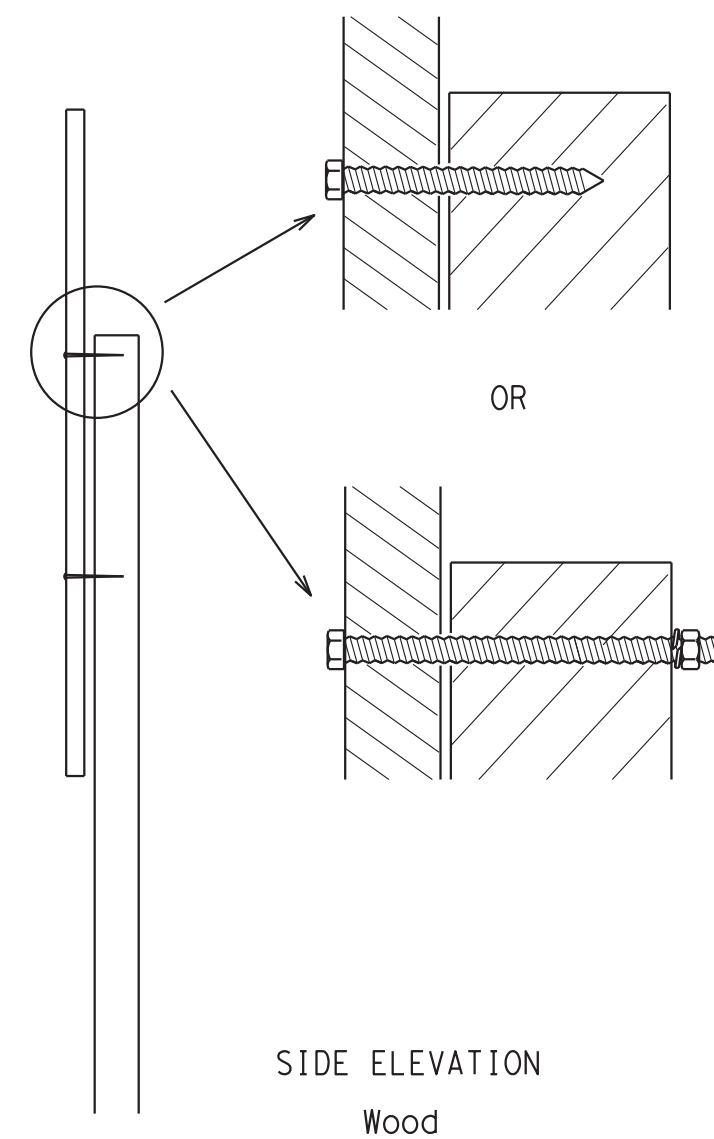
** When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

ATTACHMENT FOR SIGN SUPPORTS



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

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.

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

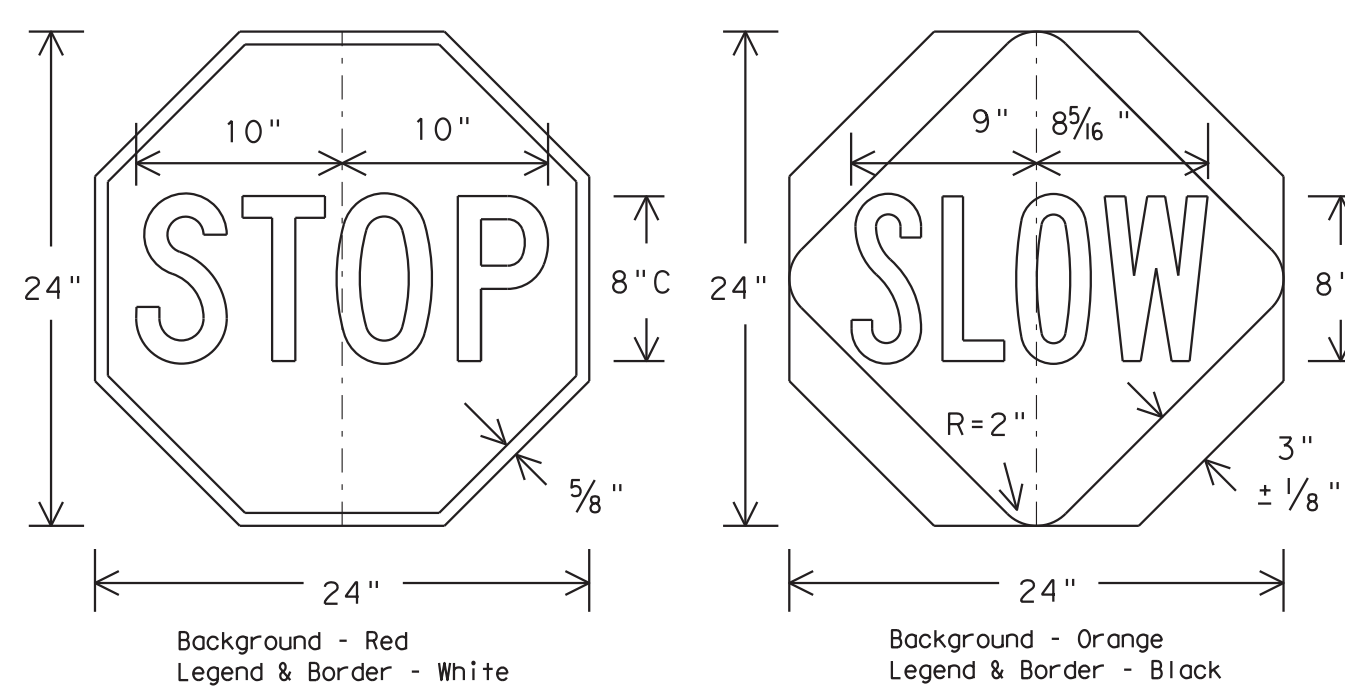
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not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

FLAGS ON SIGNS

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

STOP/SLOW PADDLES

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



CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

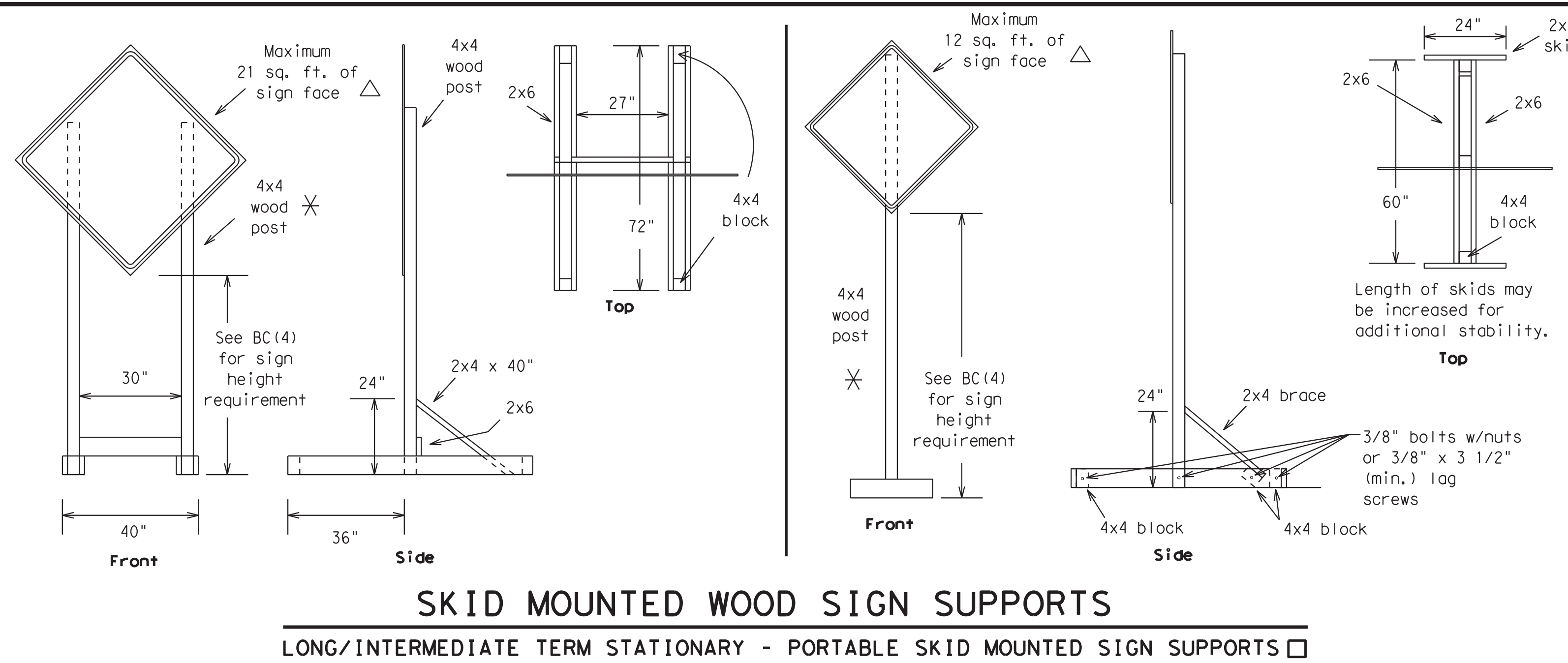
BC (4) - 14

FILE:	bc-14.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS									
9-07	8-14	DIST		COUNTY	SHEET NO.				
7-13					116				

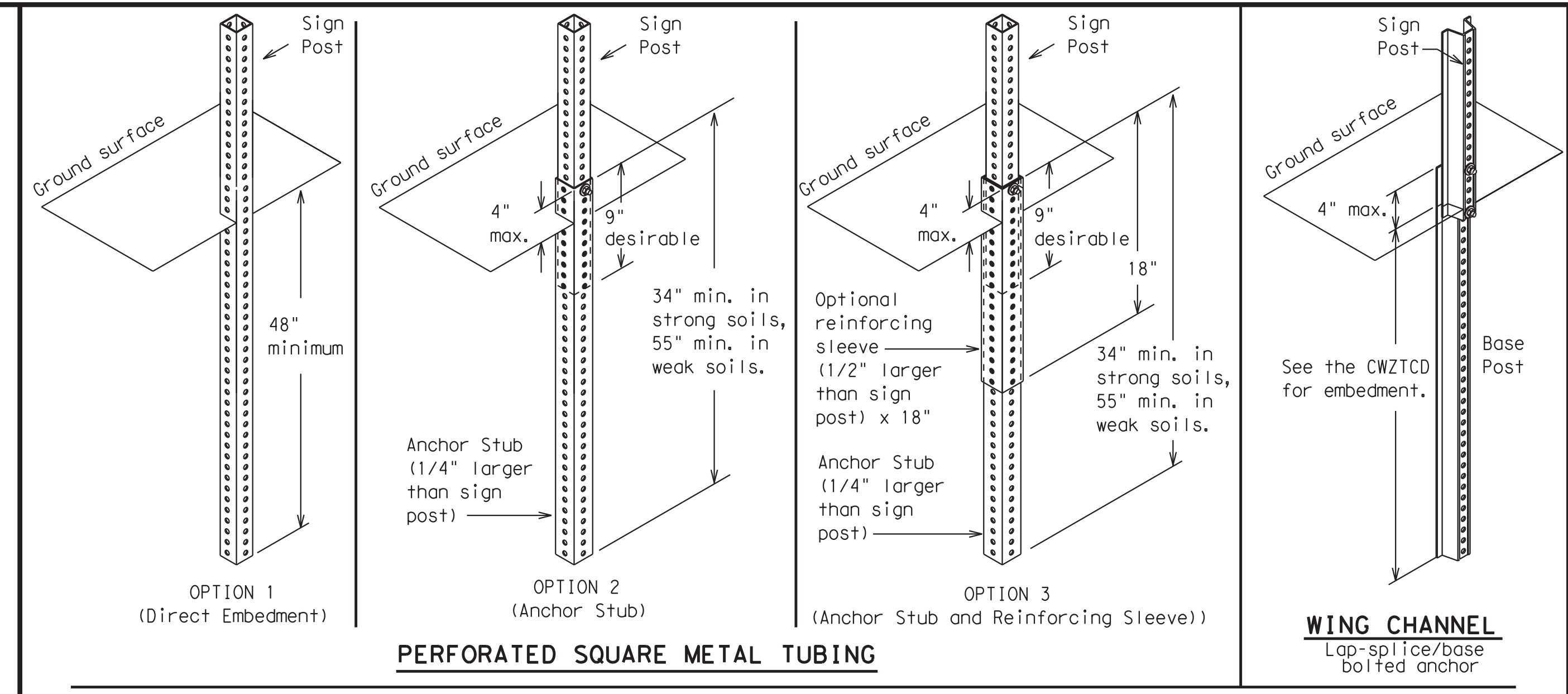
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

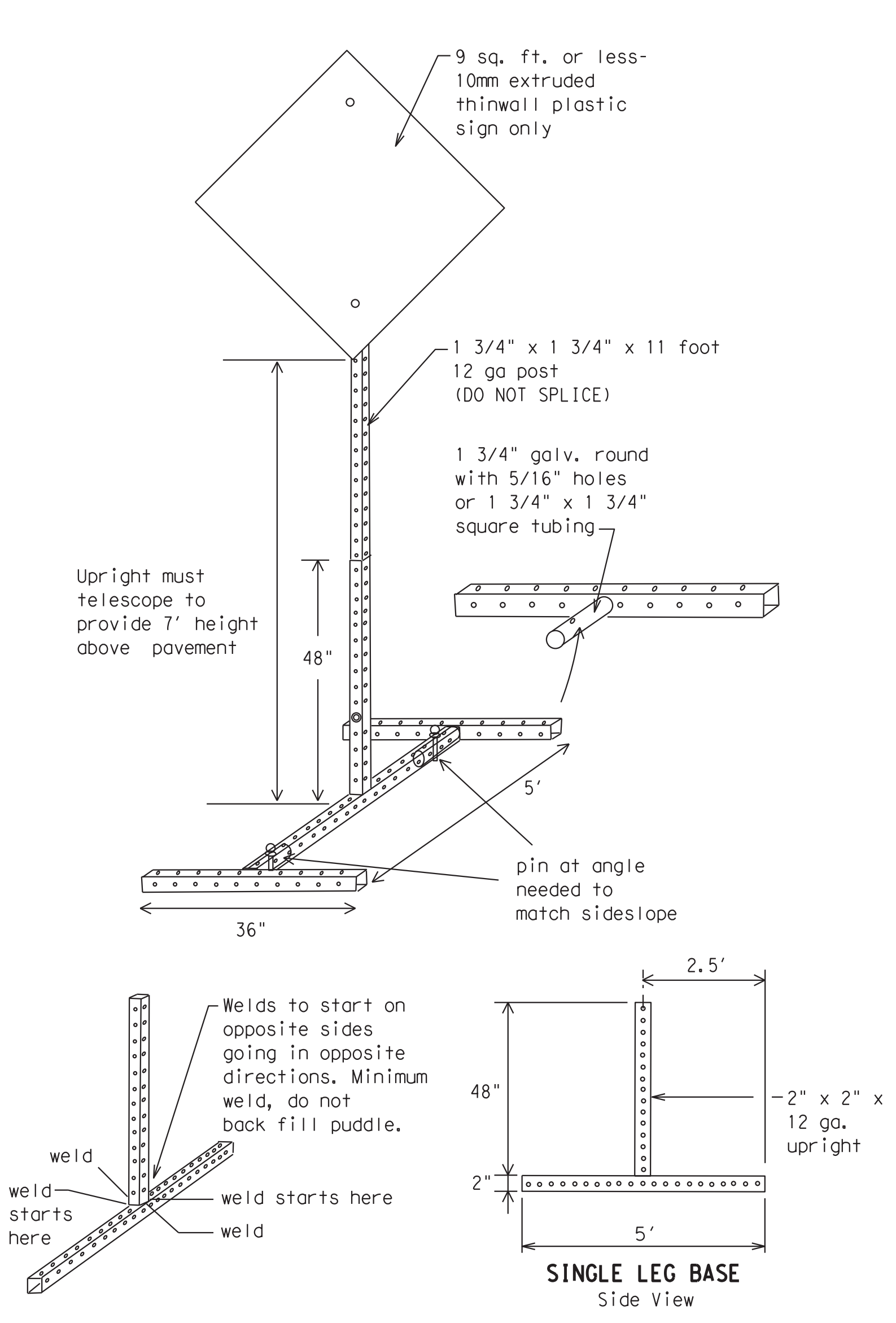
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



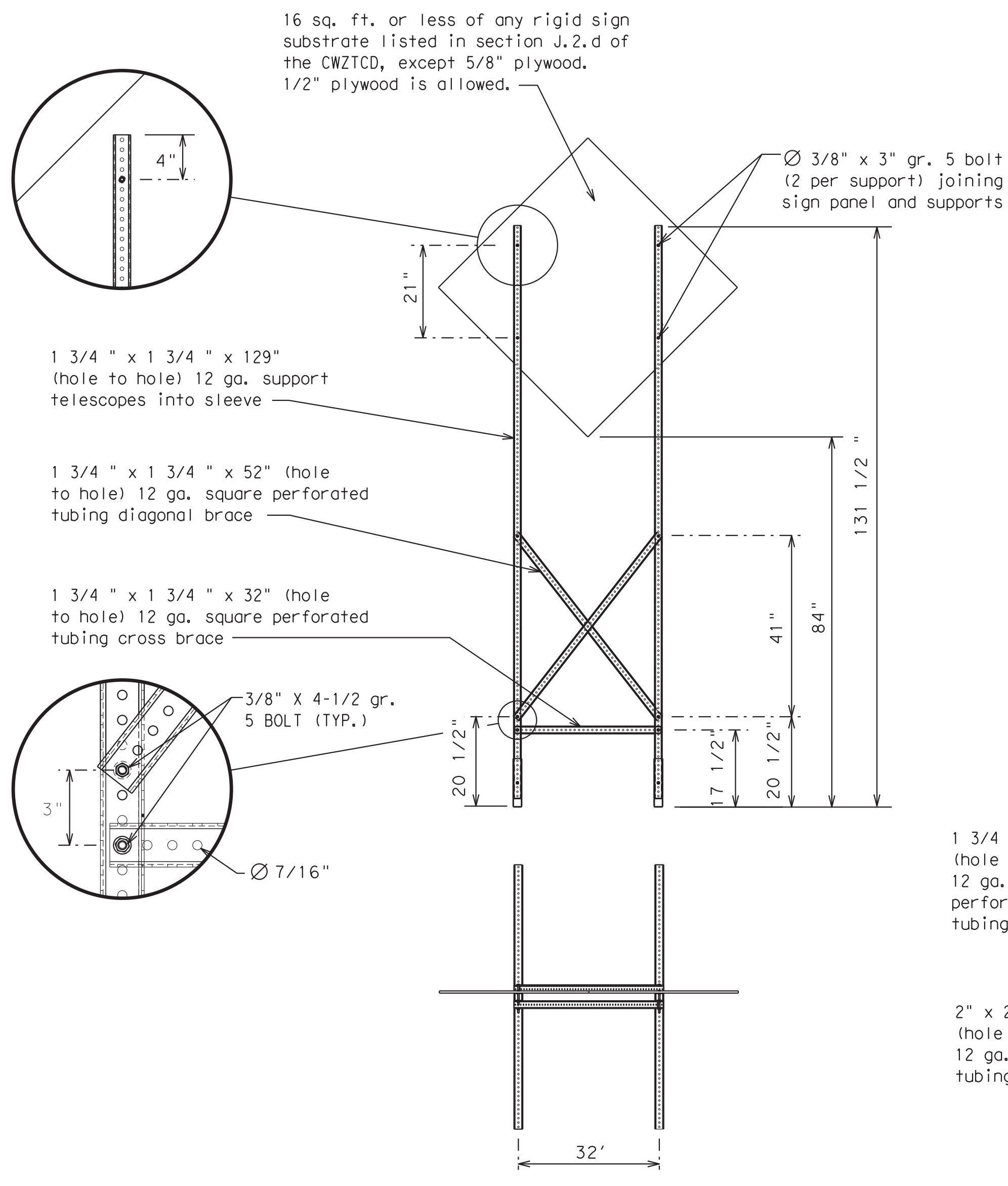
SKID MOUNTED WOOD SIGN SUPPORTS
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □



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

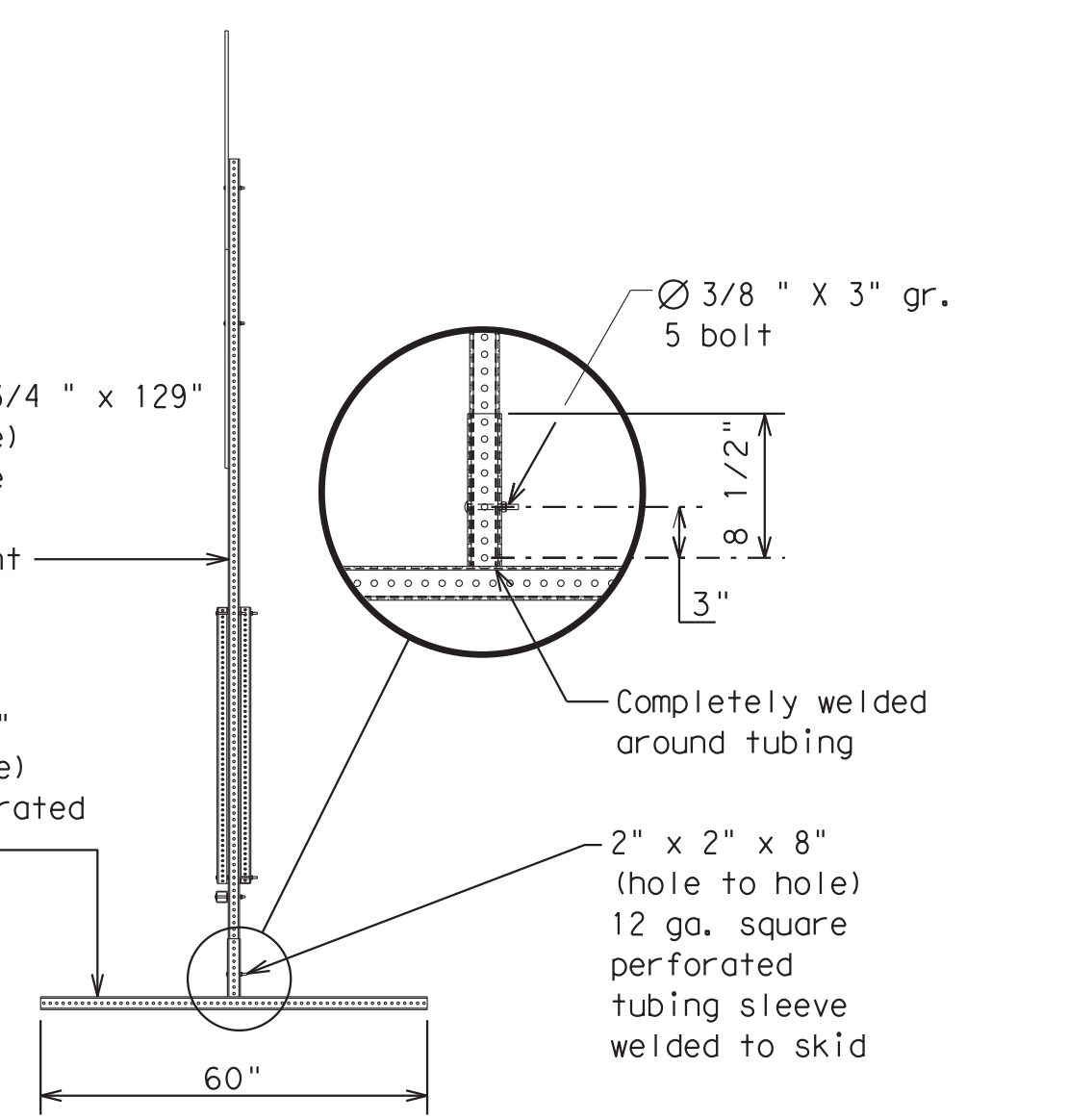


SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS



WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS

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



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

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

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

- See BC(4) for definition of "Work Duration."
- ✕ Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.
- △ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5) - 14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				
9-07	8-14			
7-13				
	DIST	COUNTY		SHEET NO.
				117

DATE: FILE:

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

FRONTAGE ROAD CLOSED
SHOULDER CLOSED XXX FT
RIGHT LN CLOSED XXX FT
RIGHT X LANES OPEN
DAYTIME LANE CLOSURES
I-XX SOUTH EXIT CLOSED
EXIT XXX CLOSED X MILE
RIGHT LN TO BE CLOSED
X LANES CLOSED TUE - FRI

ROADWORK XXX FT
FLAGGER XXXX FT
RIGHT LN NARROWS XXXX FT
MERGING TRAFFIC XXXX FT
LOOSE GRAVEL XXXX FT
DETOUR X MILE
ROADWORK PAST SH XXXX
BUMP XXXX FT
TRAFFIC SIGNAL XXXX FT

ROAD REPAIRS XXXX FT
LANE NARROWS XXXX FT
TWO-WAY TRAFFIC XX MILE
CONST TRAFFIC XXX FT
UNEVEN LANES XXXX FT
ROUGH ROAD XXXX FT
ROADWORK NEXT FRI-SUN
US XXX EXIT X MILES
LANES SHIFT *

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

MERGE RIGHT
DETOUR NEXT X EXITS
USE EXIT XXX
STAY ON US XXX SOUTH
TRUCKS USE US XXX N
WATCH FOR TRUCKS
EXPECT DELAYS
REDUCE SPEED XXX FT
USE OTHER ROUTES
STAY IN LANE *

FORM X LINES RIGHT
USE XXXXX RD EXIT
USE EXIT I-XX NORTH
USE I-XX E TO I-XX N
WATCH FOR TRUCKS
EXPECT DELAYS
PREPARE TO STOP
END SHOULDER USE
WATCH FOR WORKERS

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

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.

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

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

APPLICATION GUIDELINES

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

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

FULL MATRIX PCMS SIGNS

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

WORDING ALTERNATIVES

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

SHEET 6 OF 12



BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

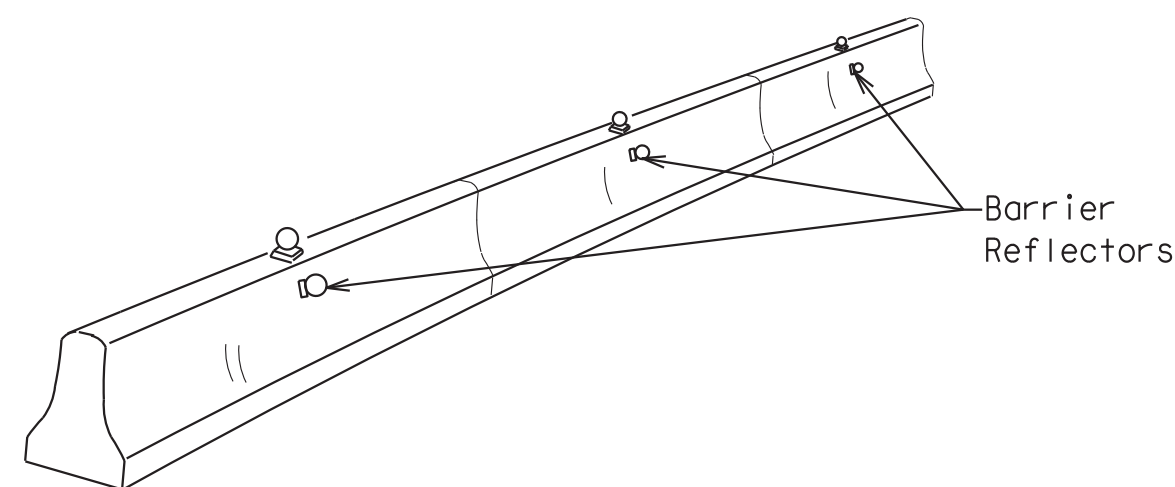
BC (6) - 14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13				118

DATE: FILE:

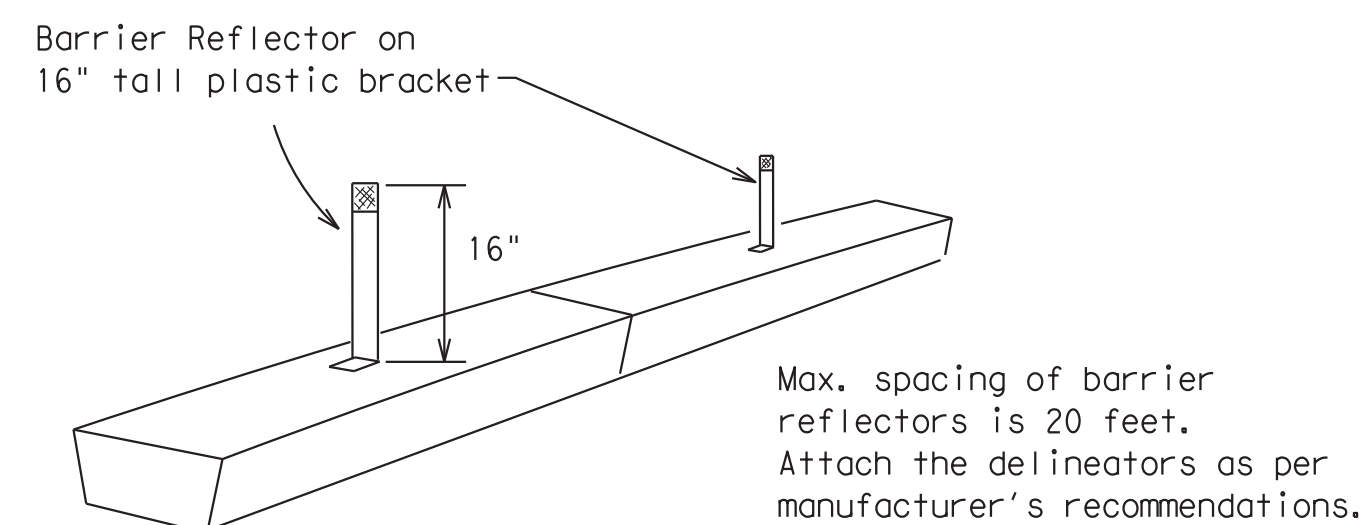
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

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

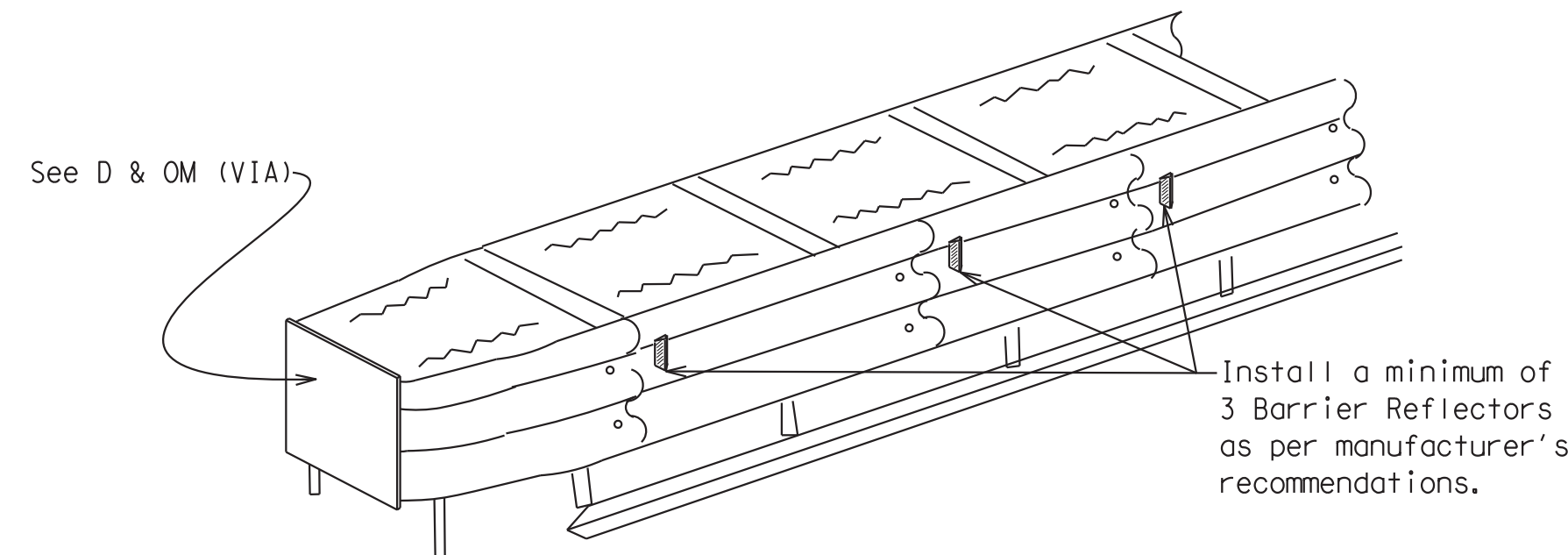


CONCRETE TRAFFIC BARRIER (CTB)

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



LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS

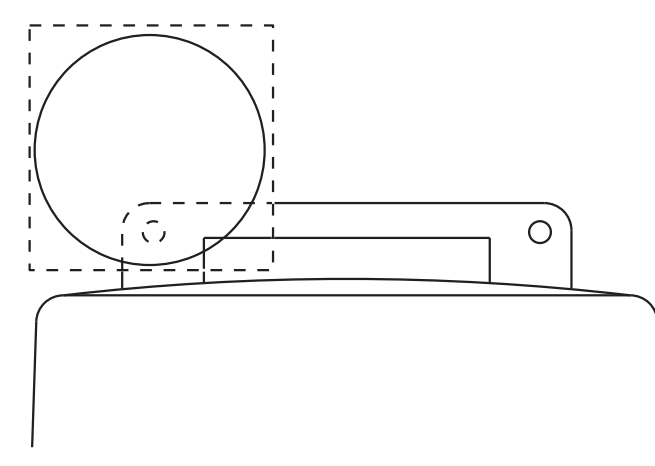
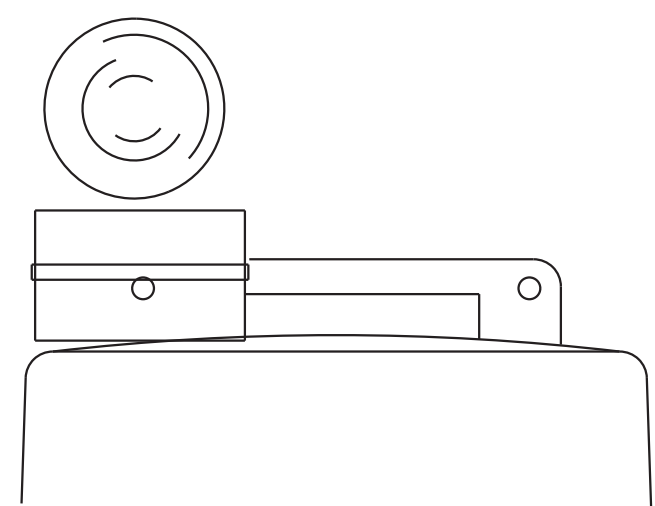
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

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

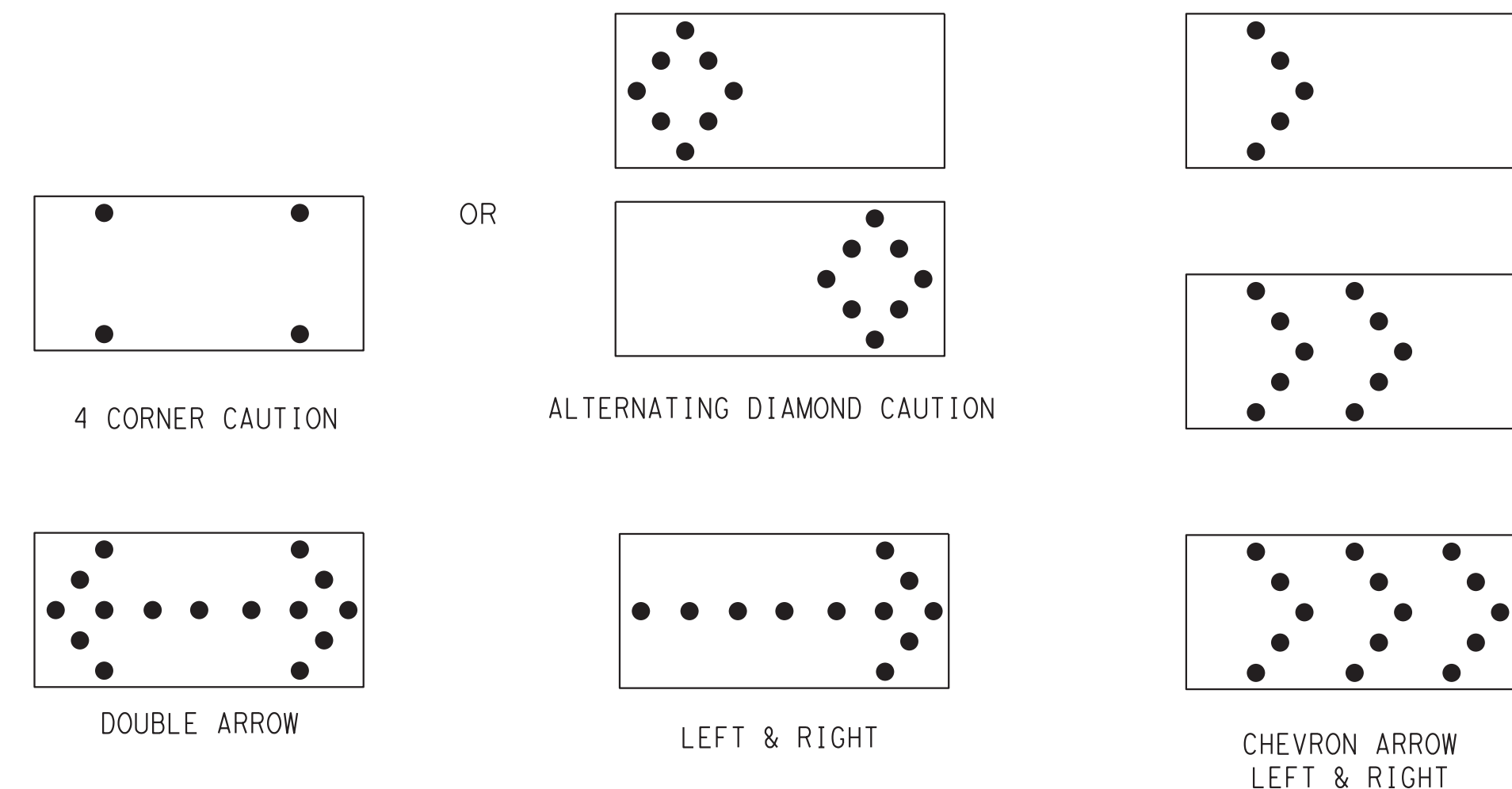
WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C (STEADY BURN) WARNING LIGHTS

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



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

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



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

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

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

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

FLASHING ARROW BOARDS

SHEET 7 OF 12

TRUCK-MOUNTED ATTENUATORS

- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or the Manual for Assessing Safety Hardware (MASH).
- Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- Refer to the CWZTCD for a list of approved TMAs.
- TMAs are required on freeways unless otherwise noted in the plans.
- A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
- The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.



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

BC (7) - 14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				
9-07	8-14			
7-13				
	DIST	COUNTY		SHEET NO.
				119

DATE:
FILE:

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

GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

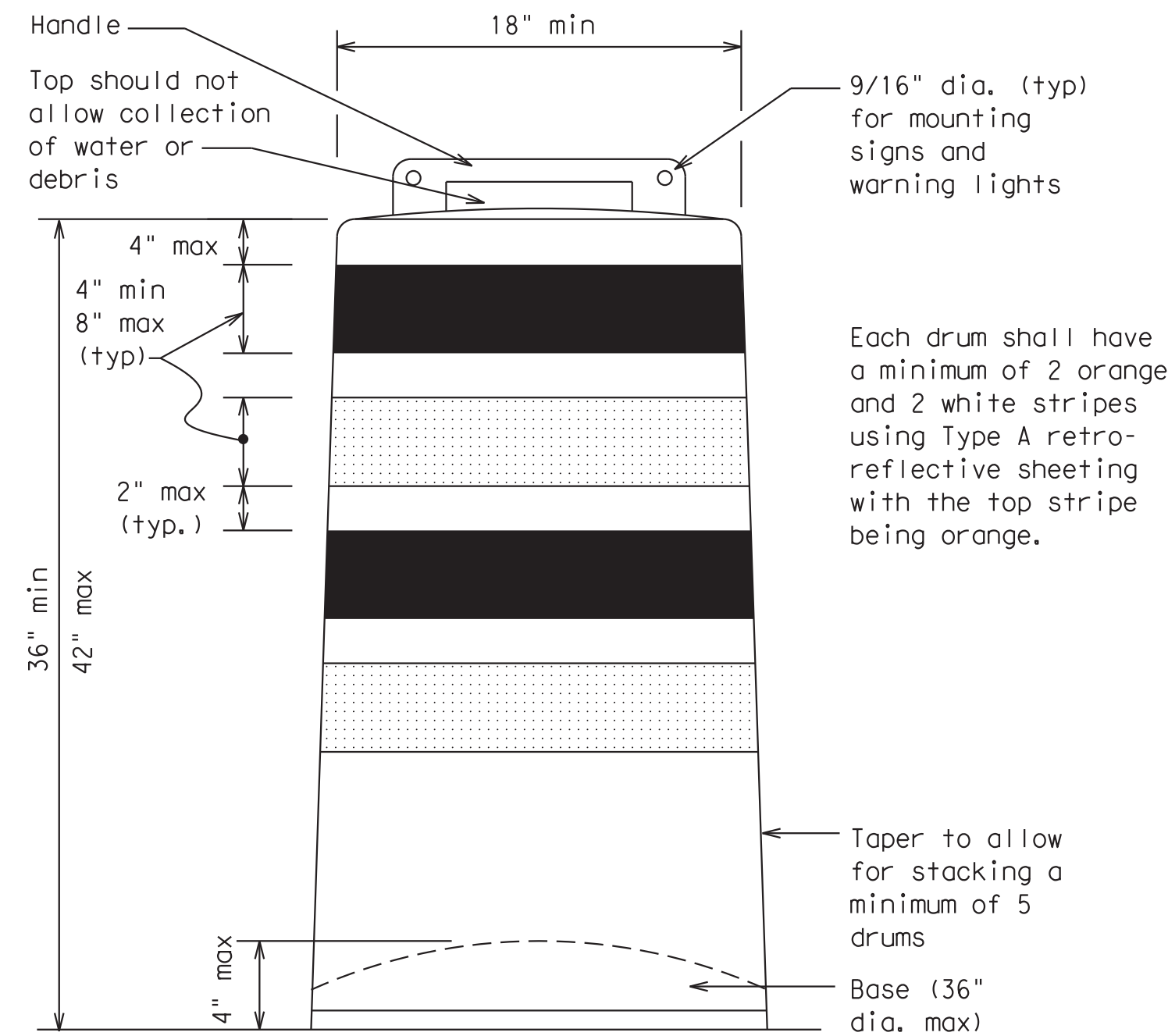
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

RETROREFLECTIVE SHEETING

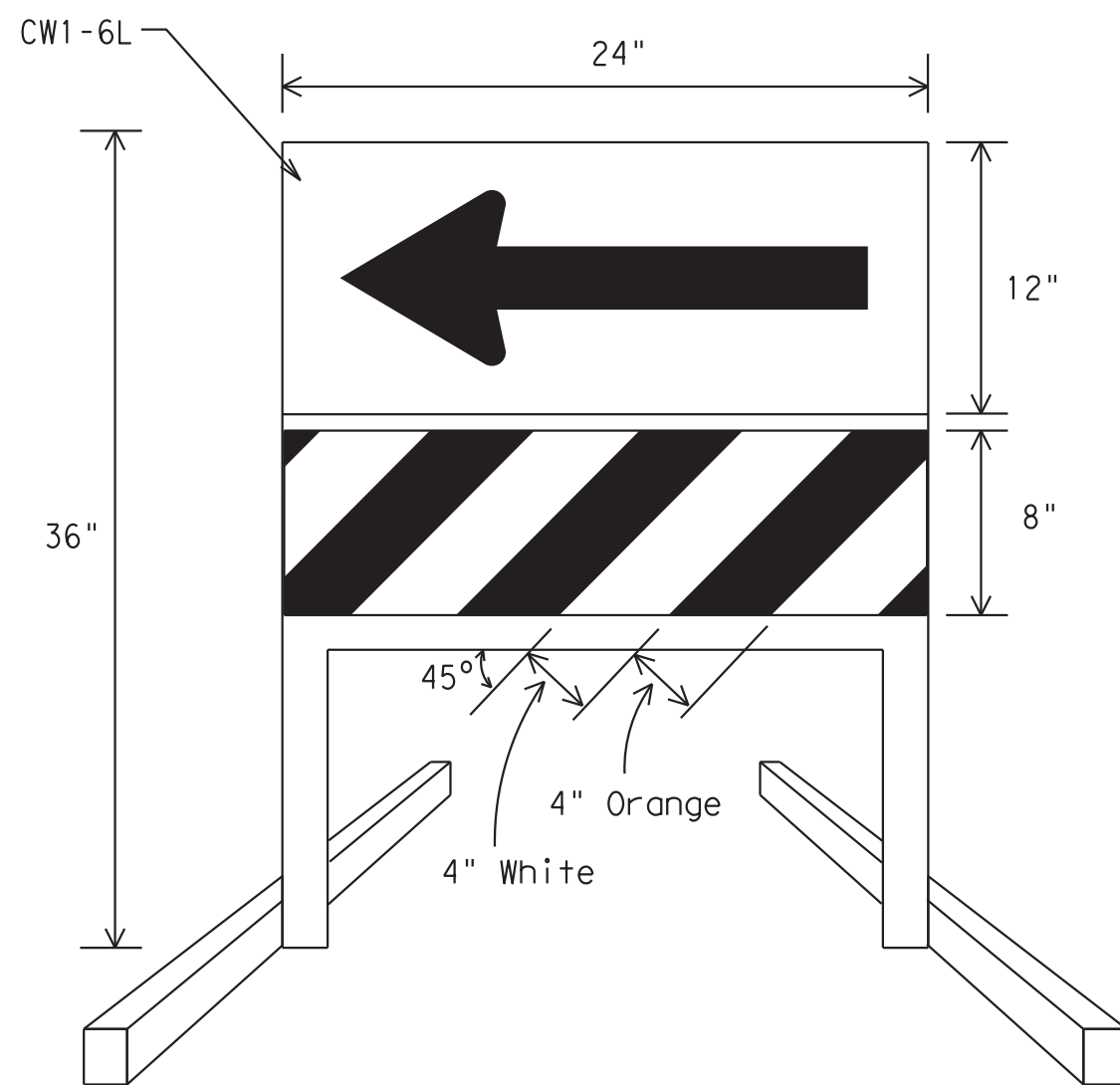
- The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A reflective sheeting shall be supplied unless otherwise specified in the plans.
- The sheeting shall be suitable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

BALLAST

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



Each drum shall have a minimum of 2 orange and 2 white stripes using Type A retro-reflective sheeting with the top stripe being orange.



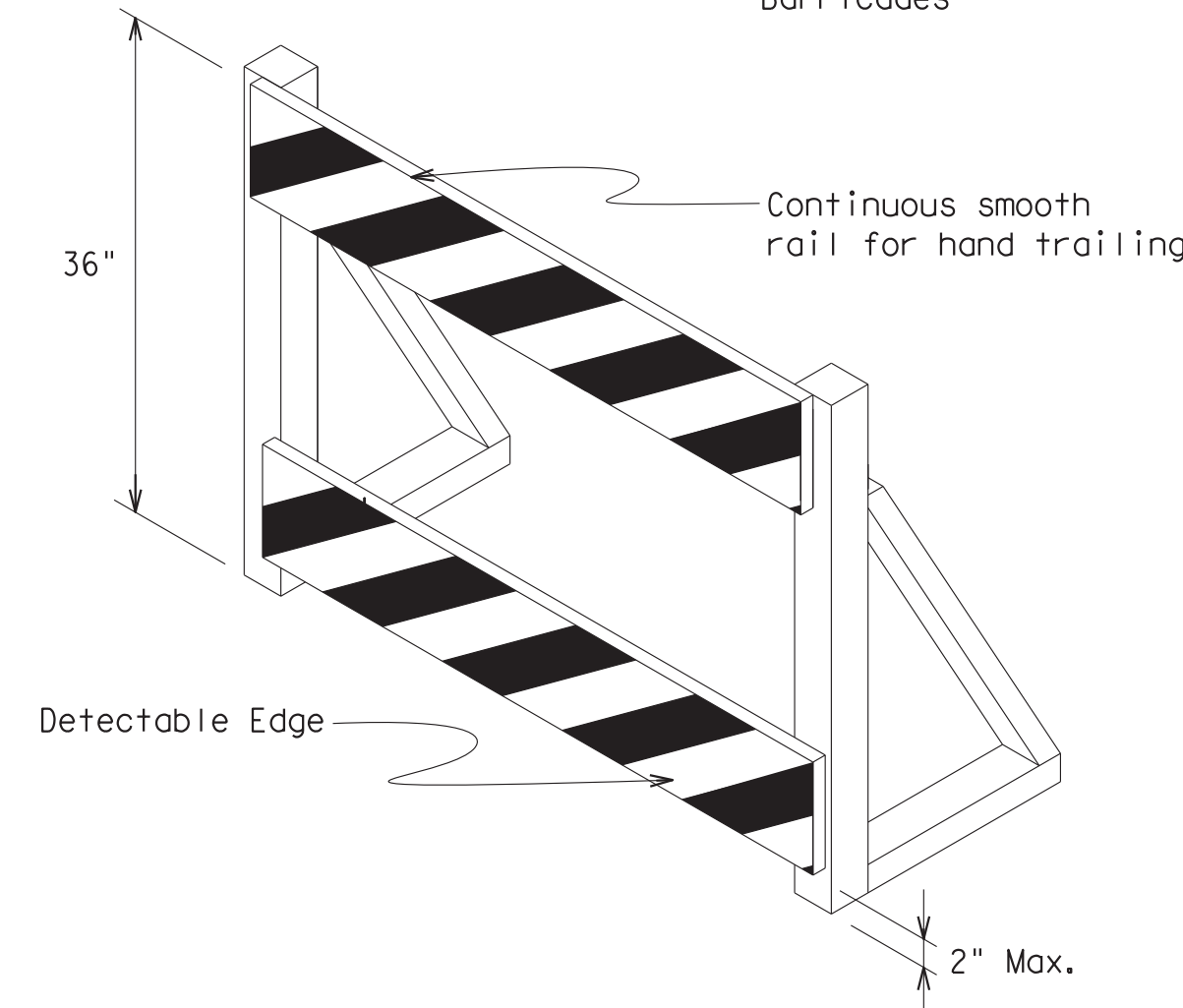
DIRECTION INDICATOR BARRICADE

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

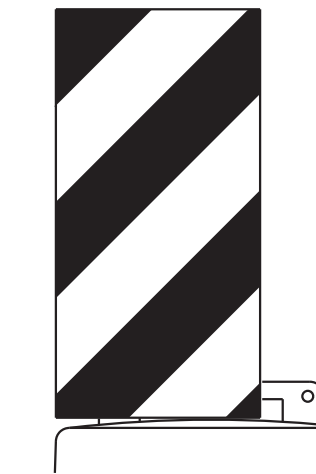
DETECTABLE PEDESTRIAN BARRICADES

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

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

SHEET 8 OF 12



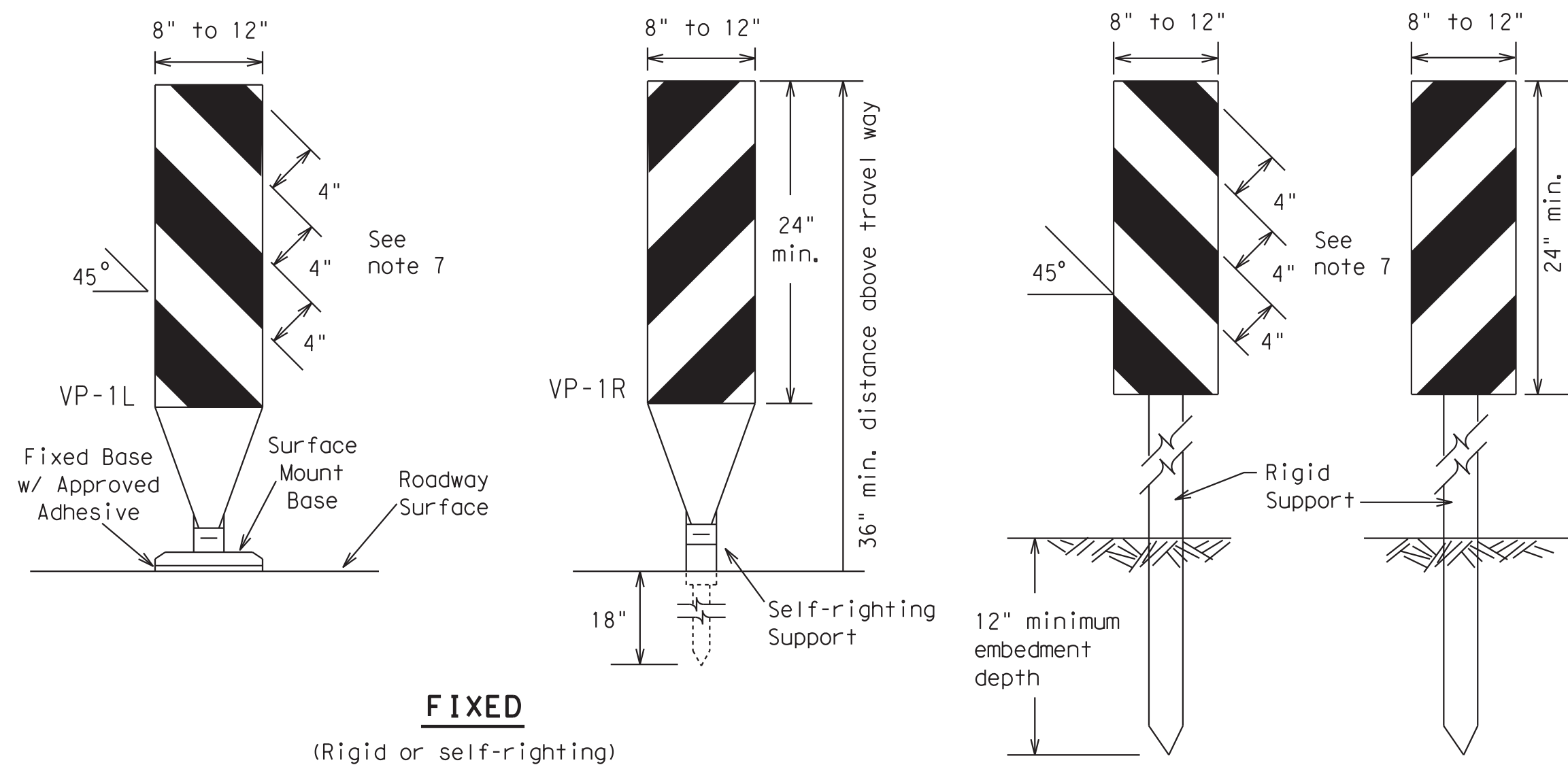
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (8) - 14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				
4-03 7-13	DIST	COUNTY	SHEET NO.	
9-07 8-14			120	

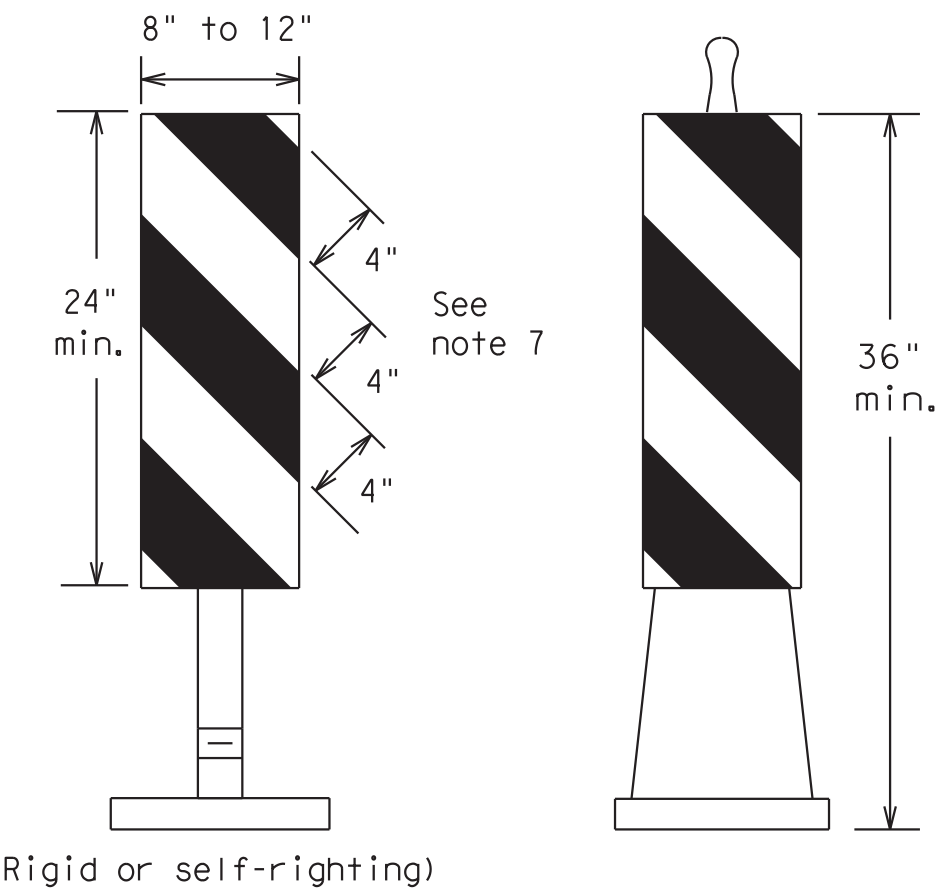
DATE:
FILE:

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



FIXED
(Rigid or self-righting)

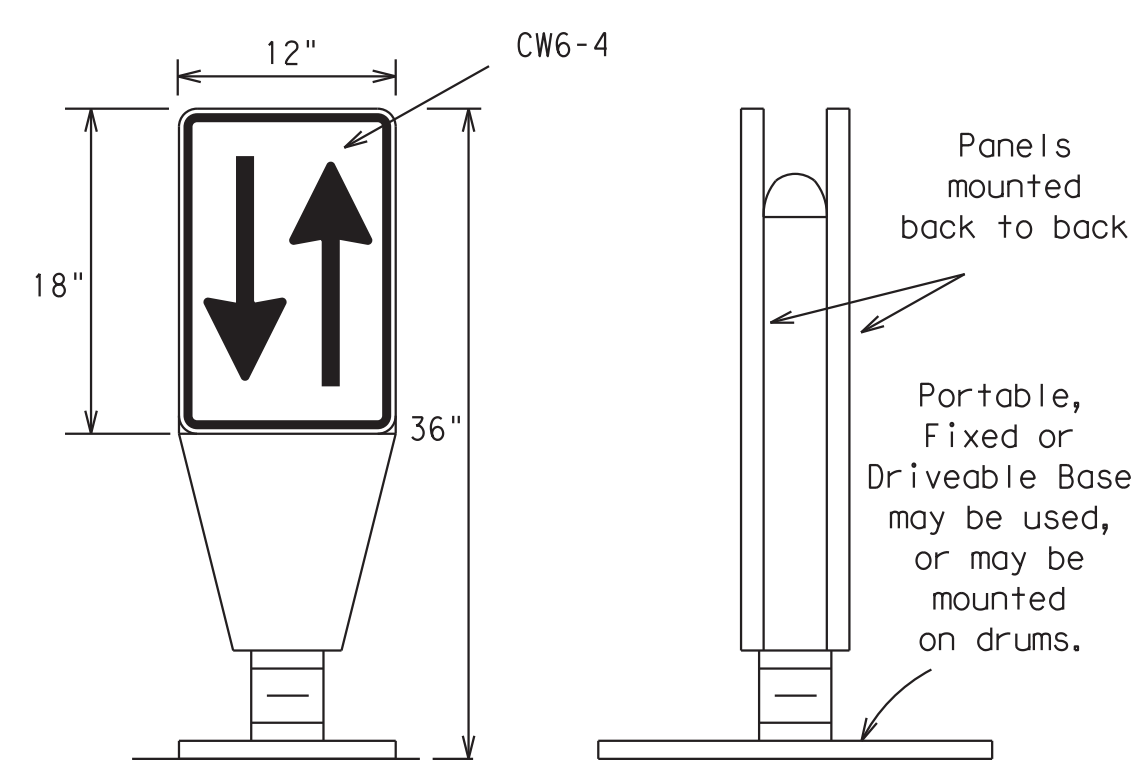
DRIVEABLE



PORTABLE

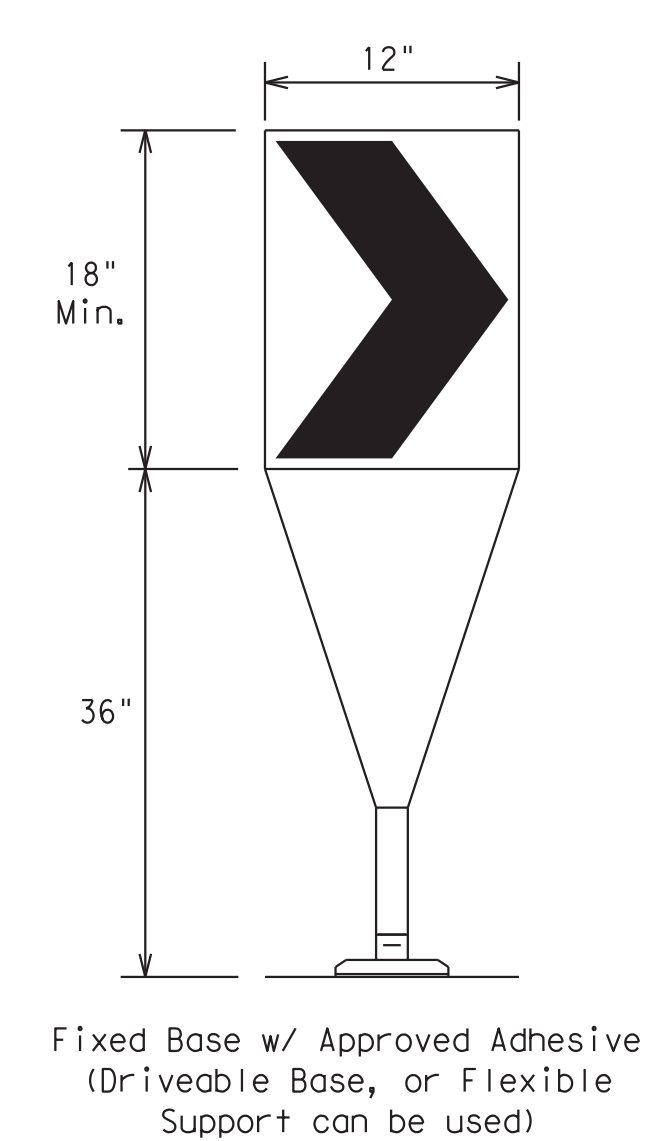
VERTICAL PANELS (VPs)

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



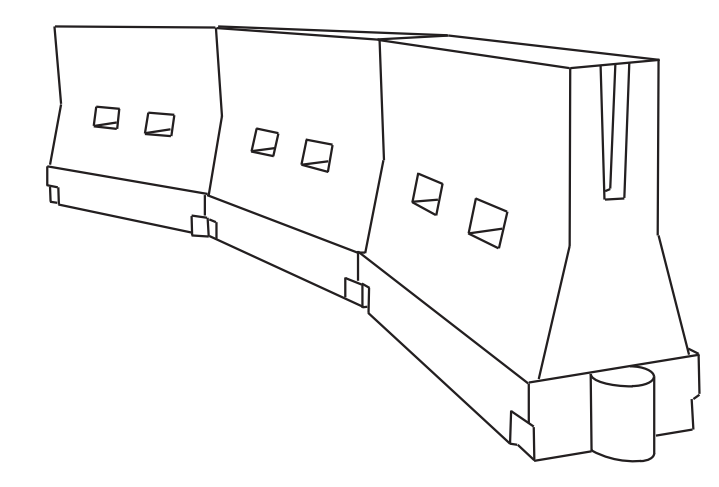
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

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



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

CHEVRONS



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

1. Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

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

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

GENERAL NOTES

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

Posted Speed X	Formula	Minimum Desirable Taper Lengths X X			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'	

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (9) - 14

FILE:	bc-14.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS									
9-07	8-14	DIST	COUNTY		SHEET NO.				
7-13					121				

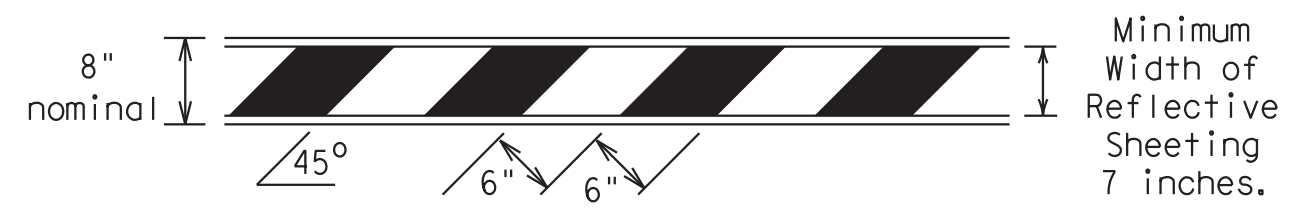
DATE:
FILE:

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

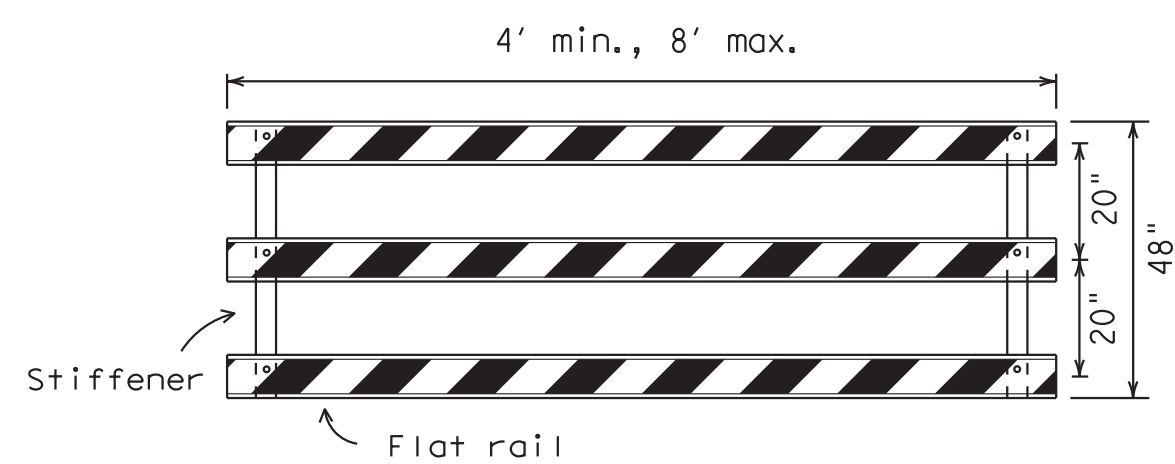
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.

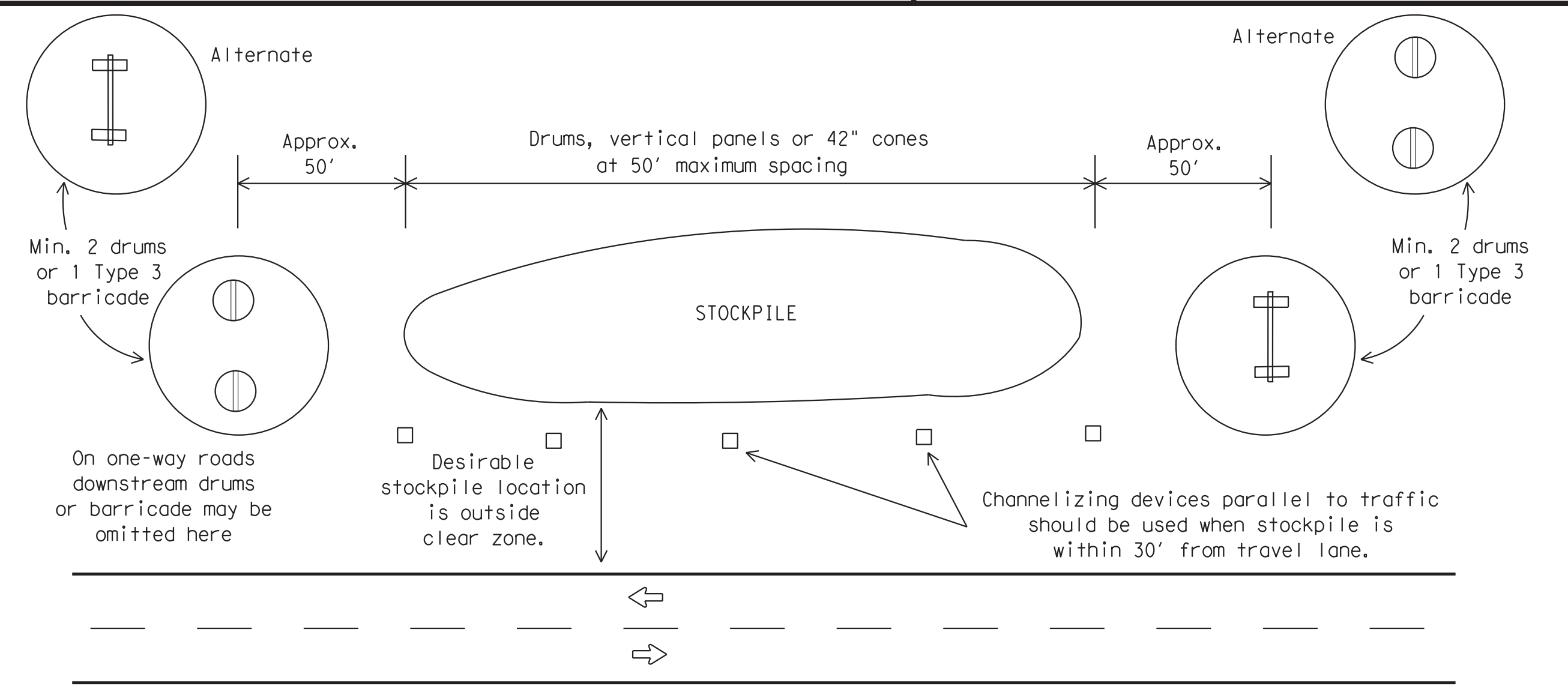


TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



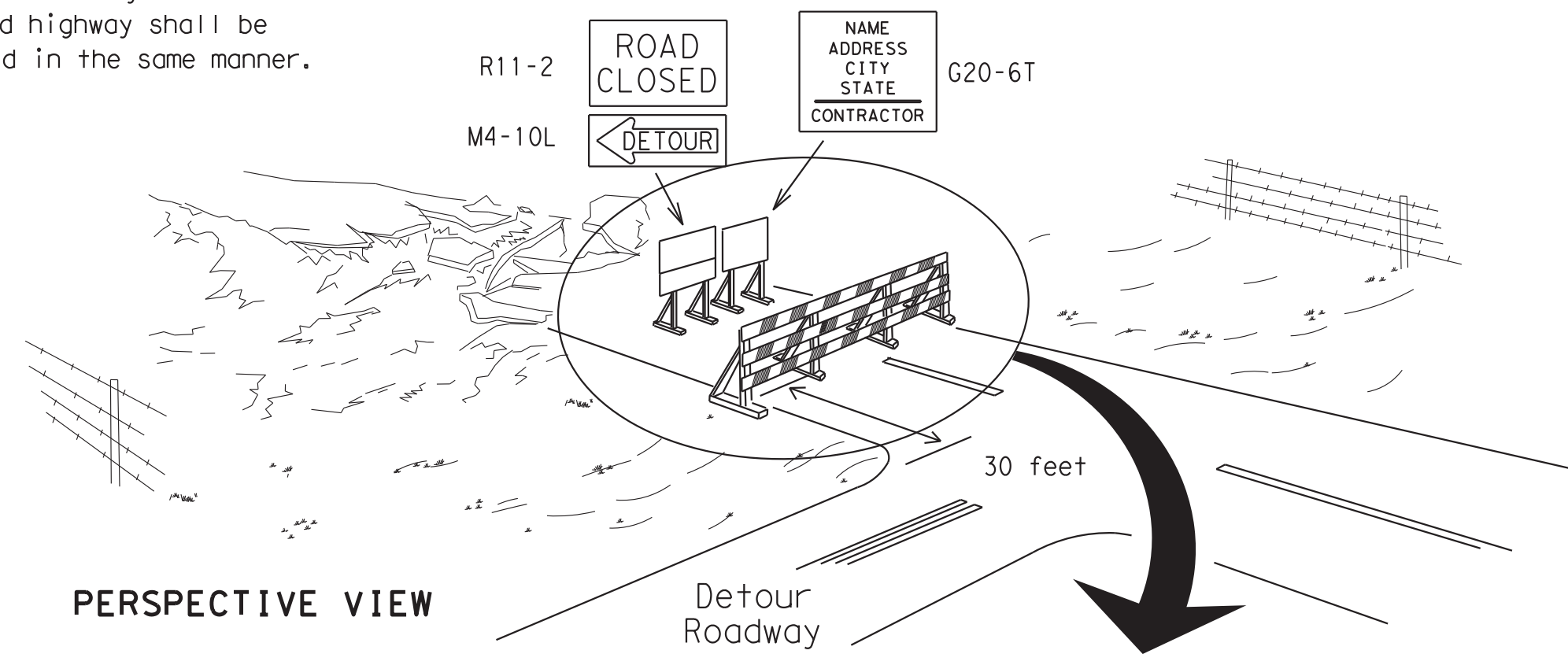
Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES



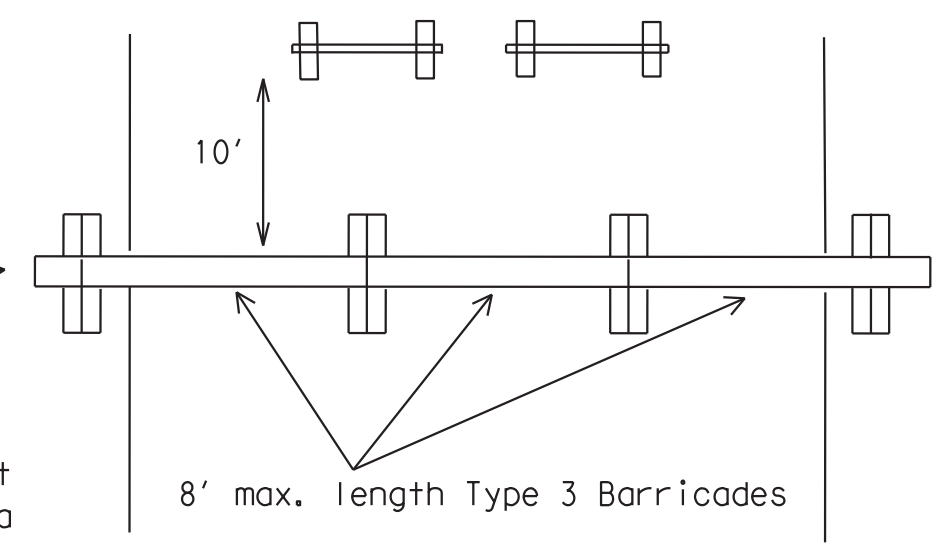
TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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



PERSPECTIVE VIEW

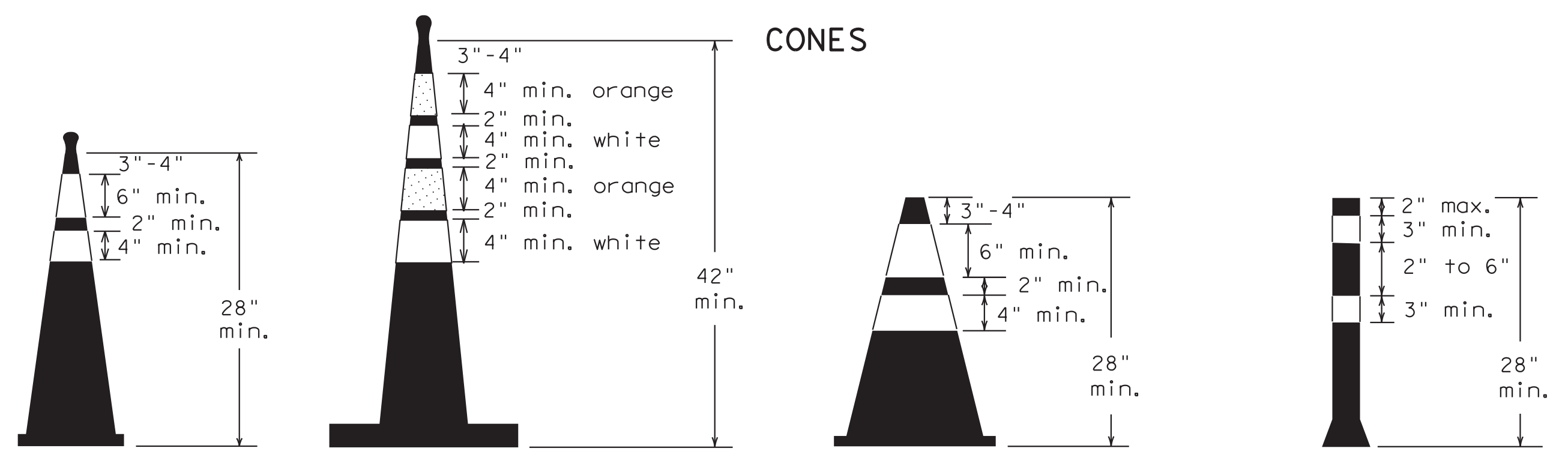
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



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



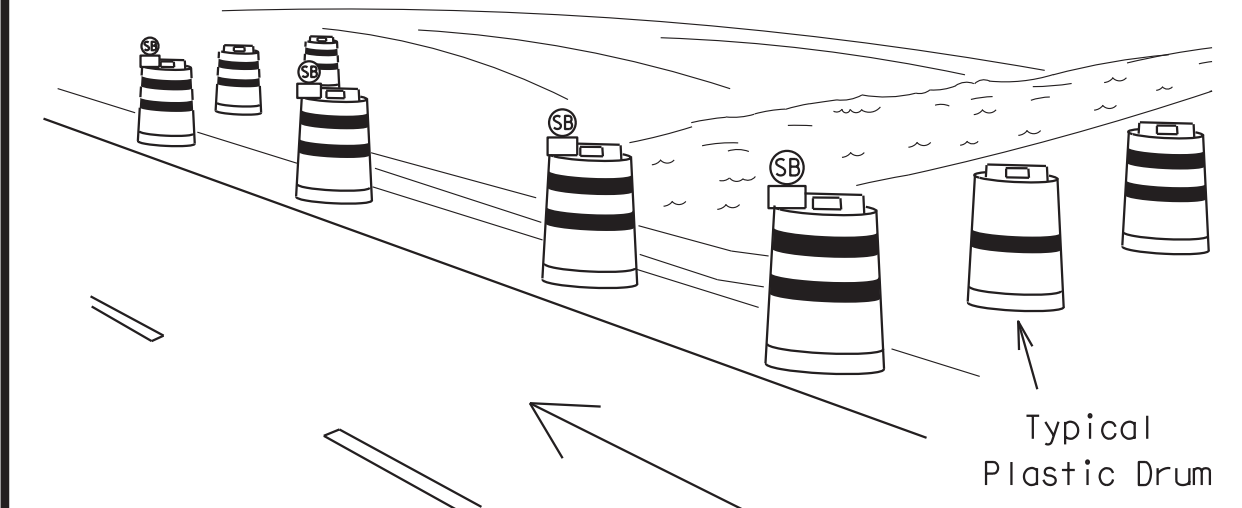
Two-Piece cones

One-Piece cones

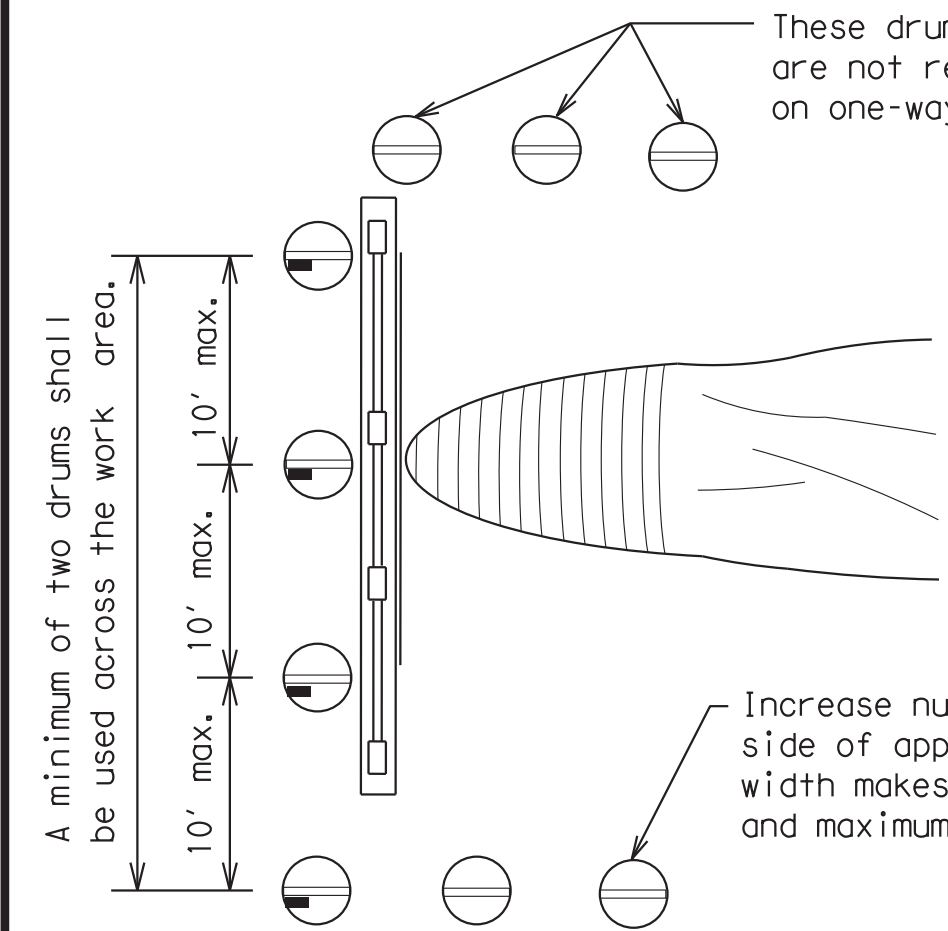
Tubular Marker

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

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



PERSPECTIVE VIEW



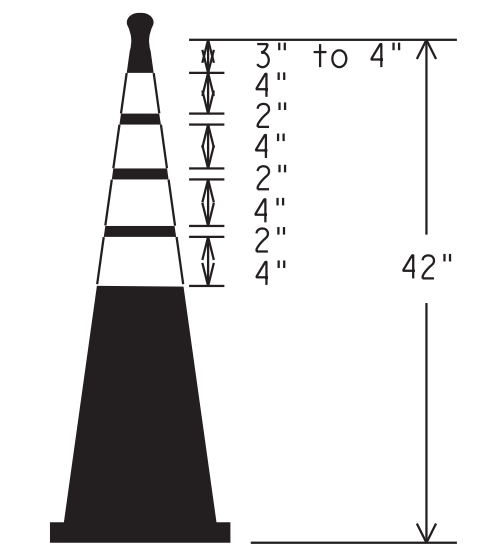
PLAN VIEW

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

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

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

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



EDGE LINE CHANNELIZER

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

SHEET 10 OF 12



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (10) - 14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				
9-07	8-14			
7-13				
DIST			COUNTY	SHEET NO.
				122

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

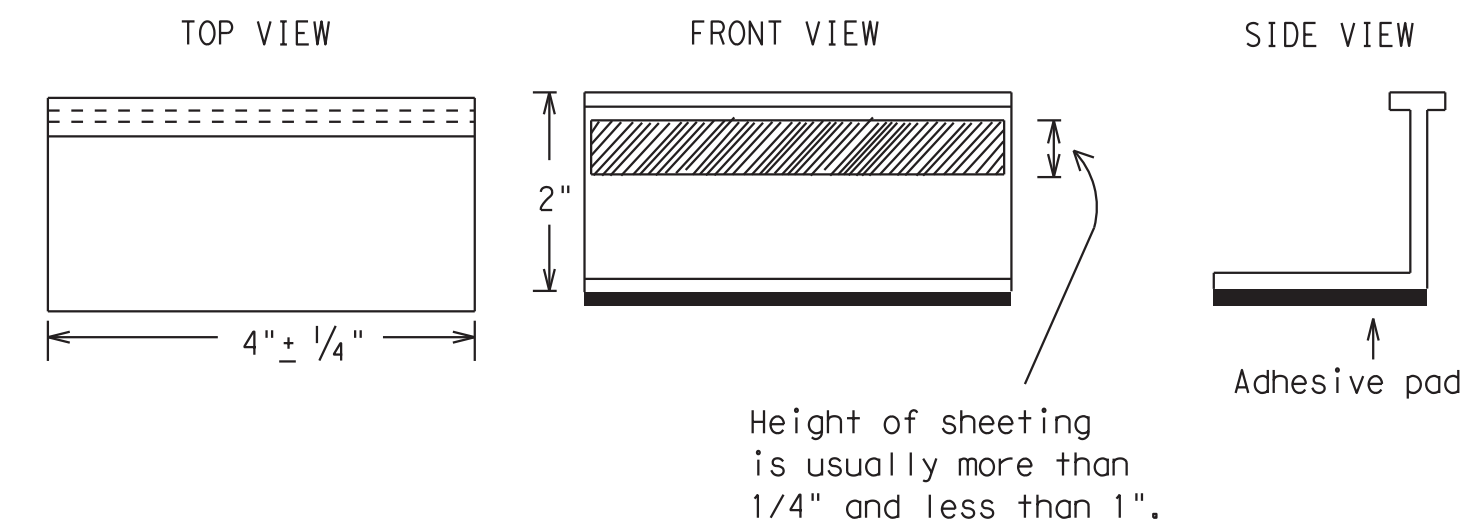
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

SHEET 11 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

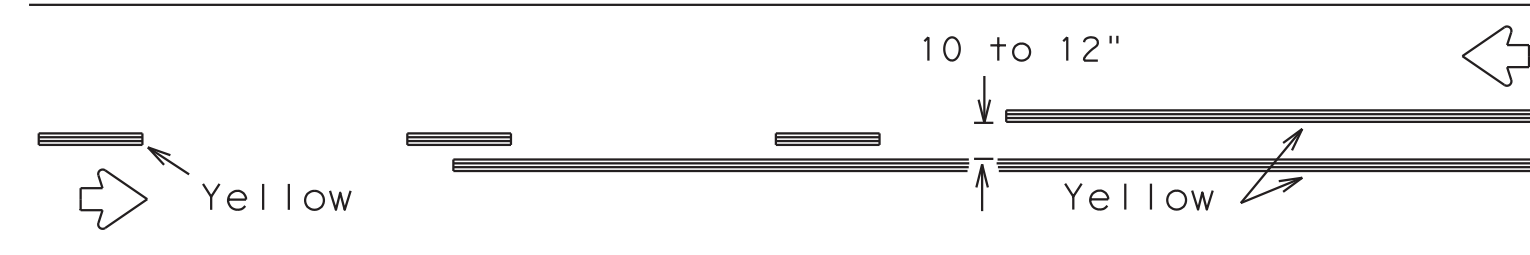
BC(11) - 14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS				
2-98 9-07				
1-02 7-13				
11-02 8-14				
	DIST	COUNTY	SHEET NO.	
			123	

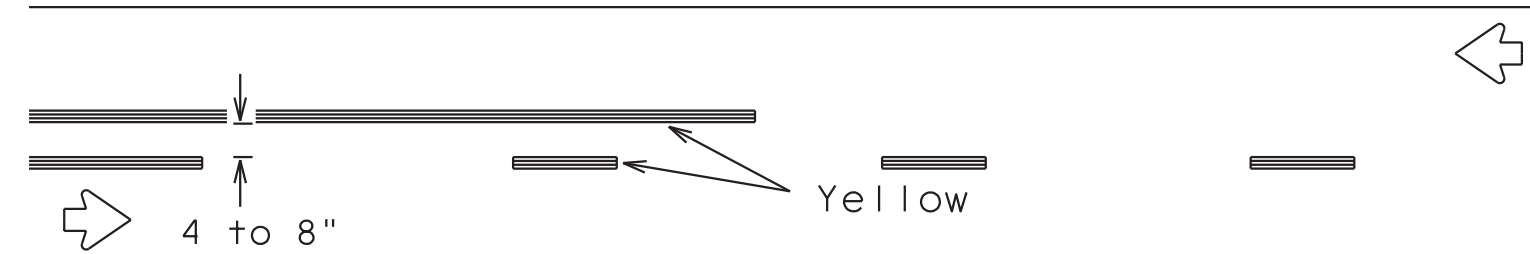
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act." No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

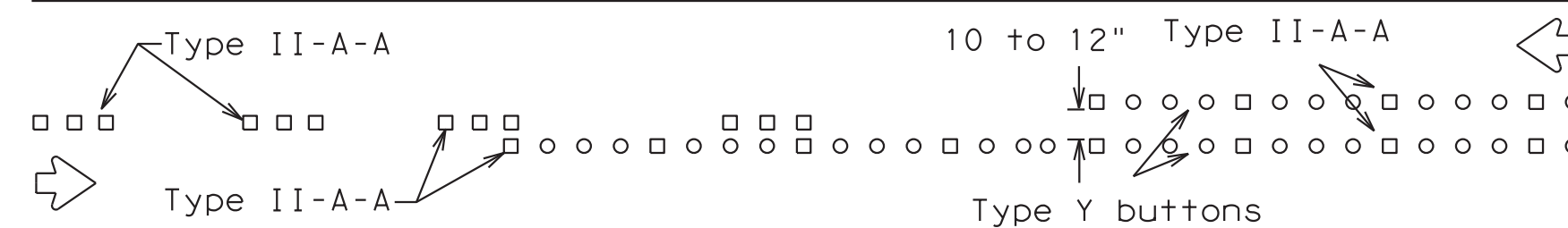
PAVEMENT MARKING PATTERNS



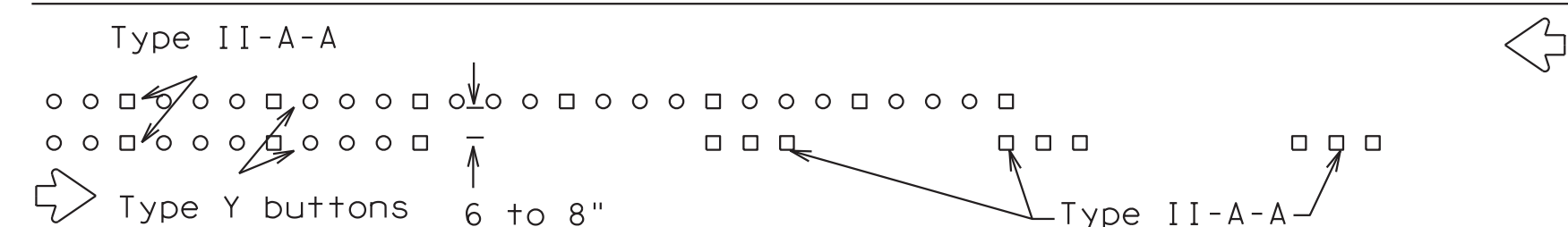
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



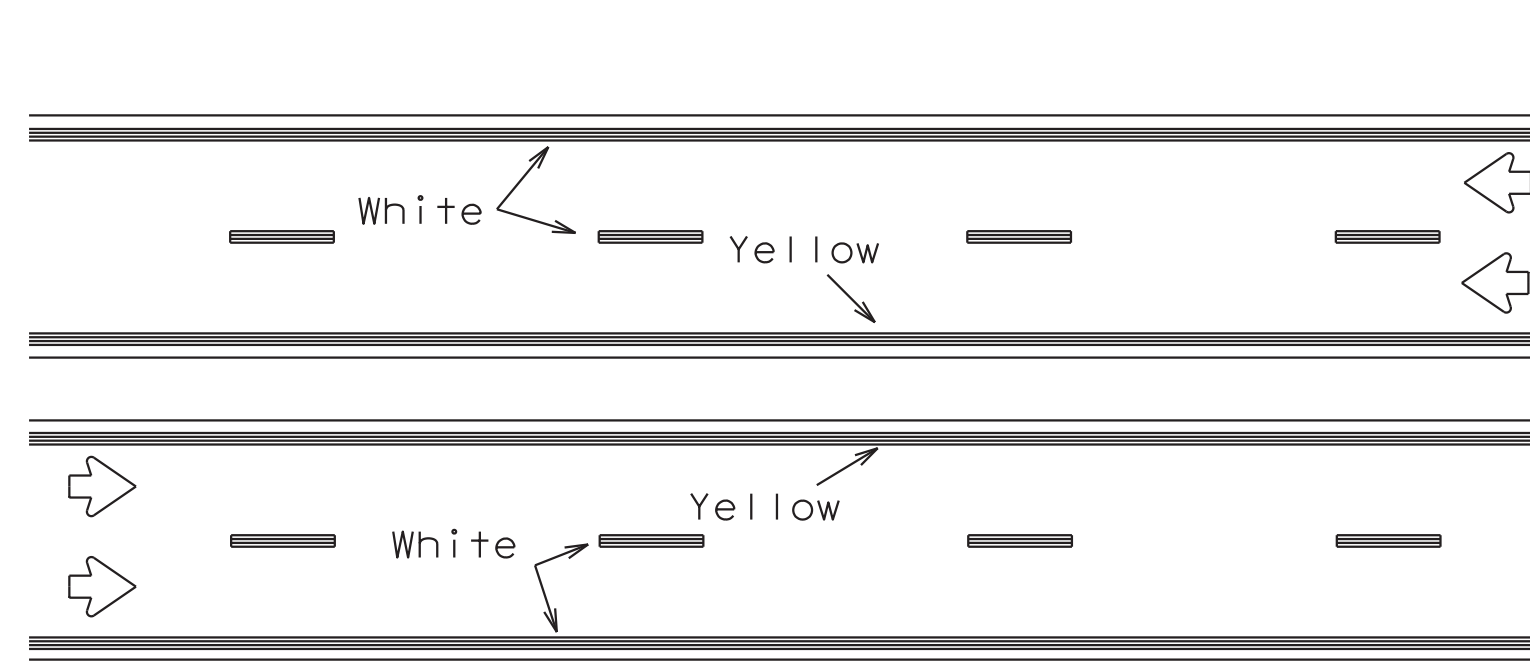
RAISED PAVEMENT MARKERS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN B

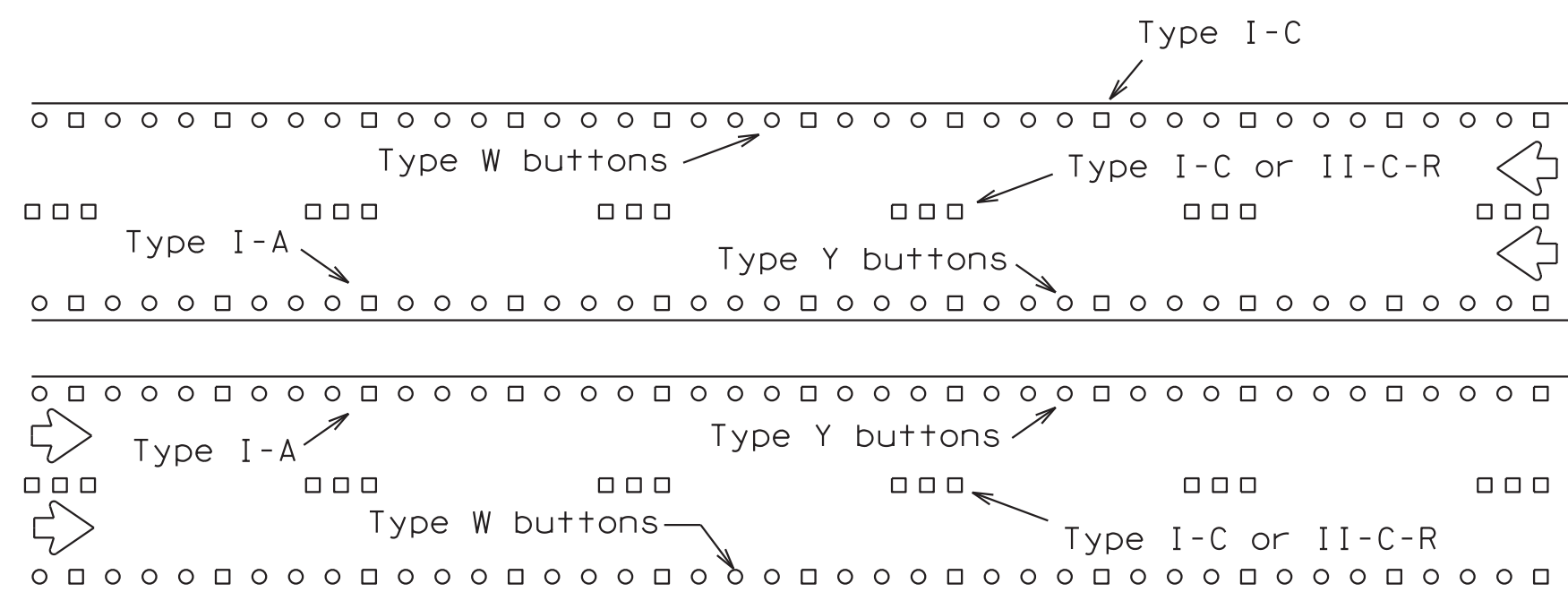
Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer. Prefabricated markings may be substituted for reflectORIZED pavement markings.

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



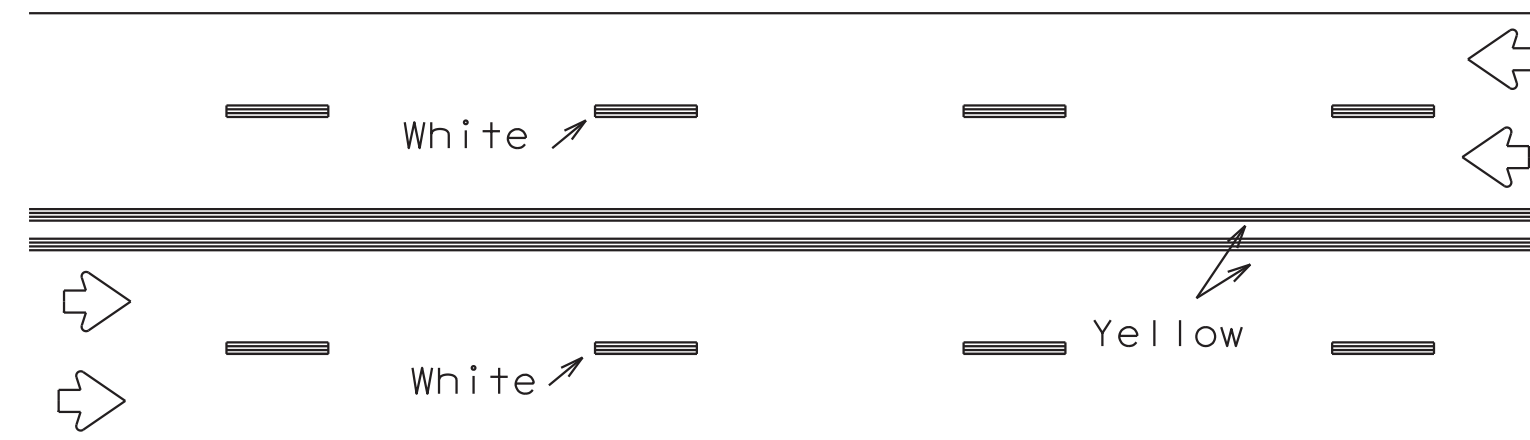
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



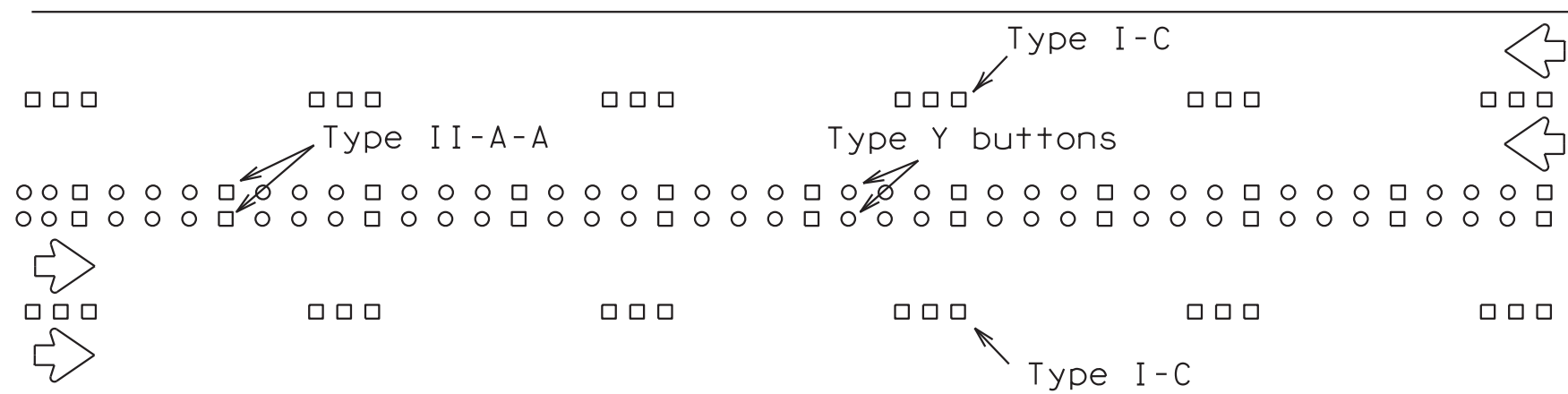
RAISED PAVEMENT MARKERS

EDGE & LANE LINES FOR DIVIDED HIGHWAY



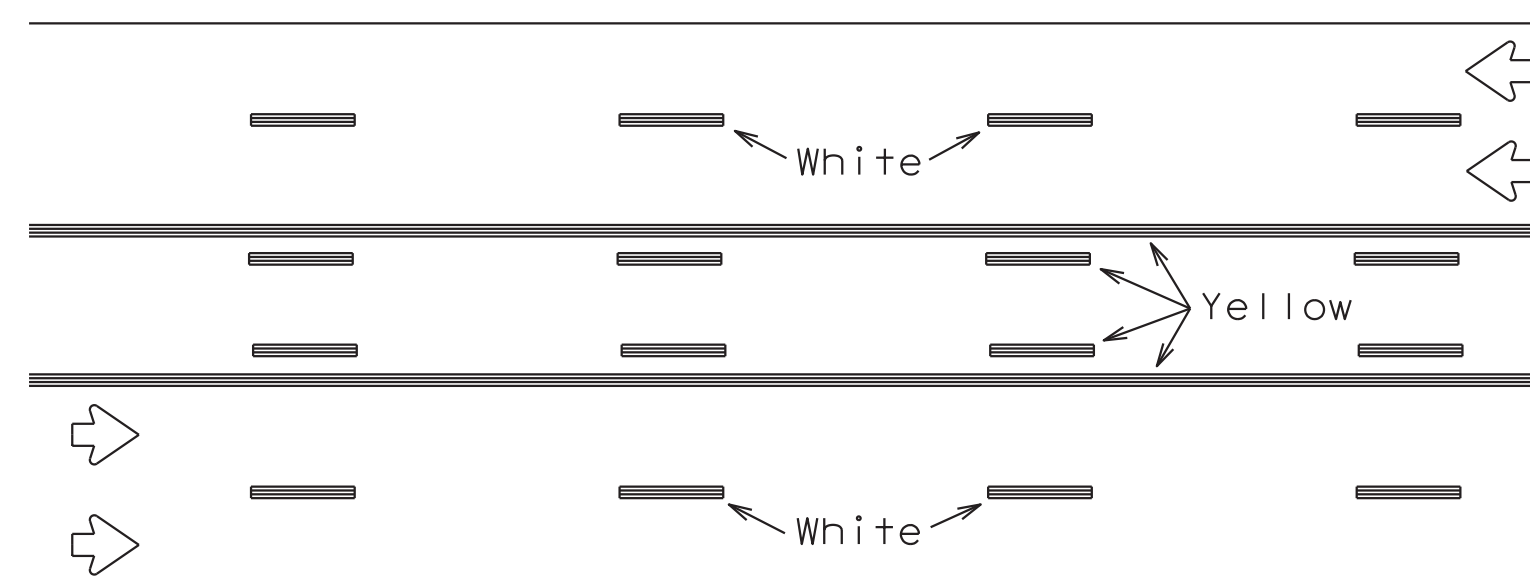
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



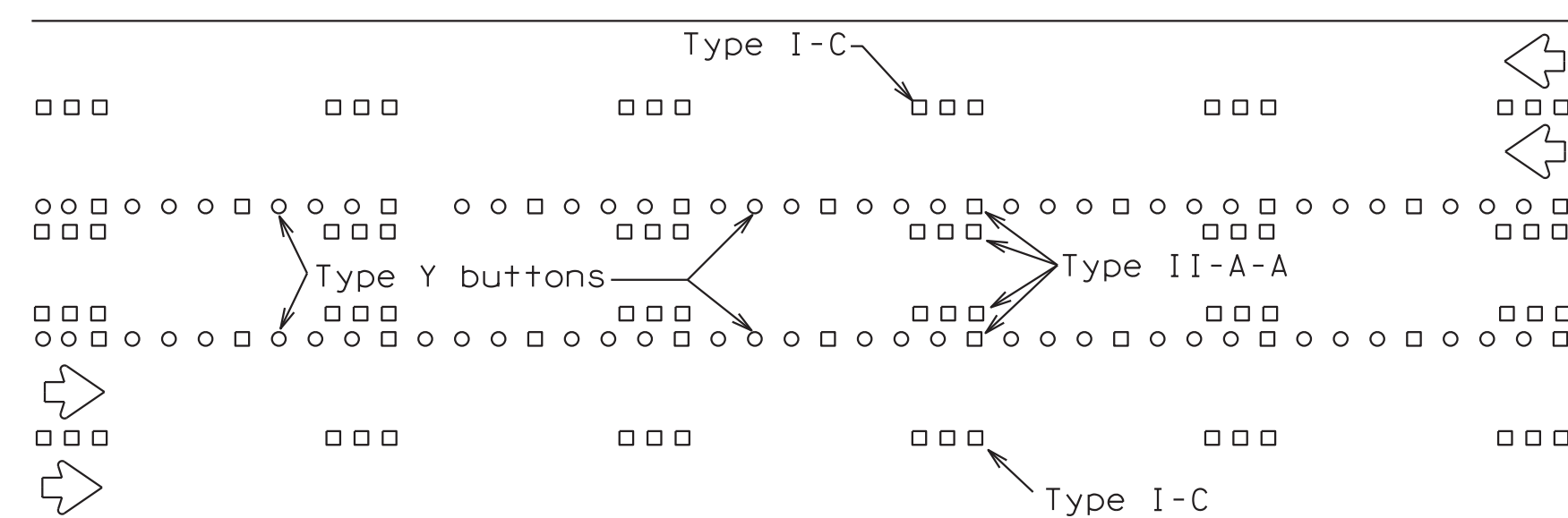
RAISED PAVEMENT MARKERS

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

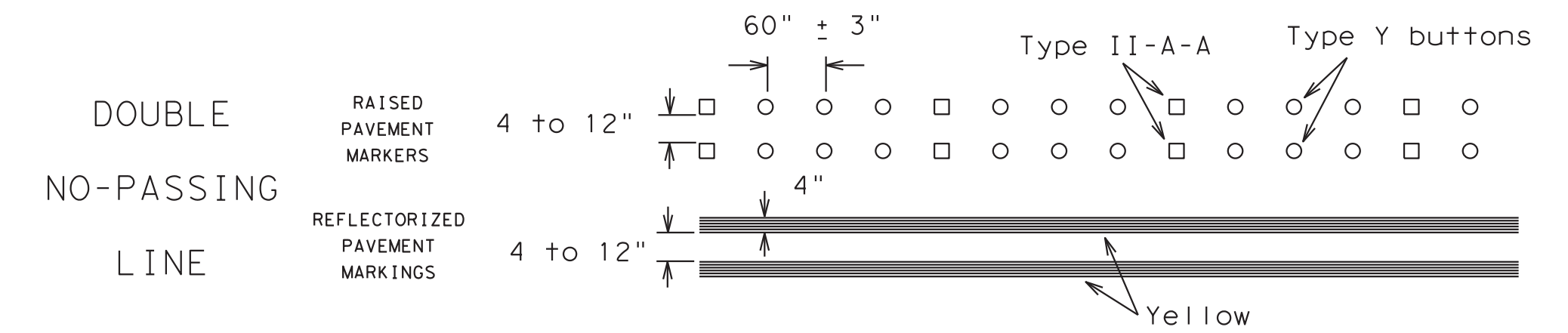
Prefabricated markings may be substituted for reflectORIZED pavement markings.



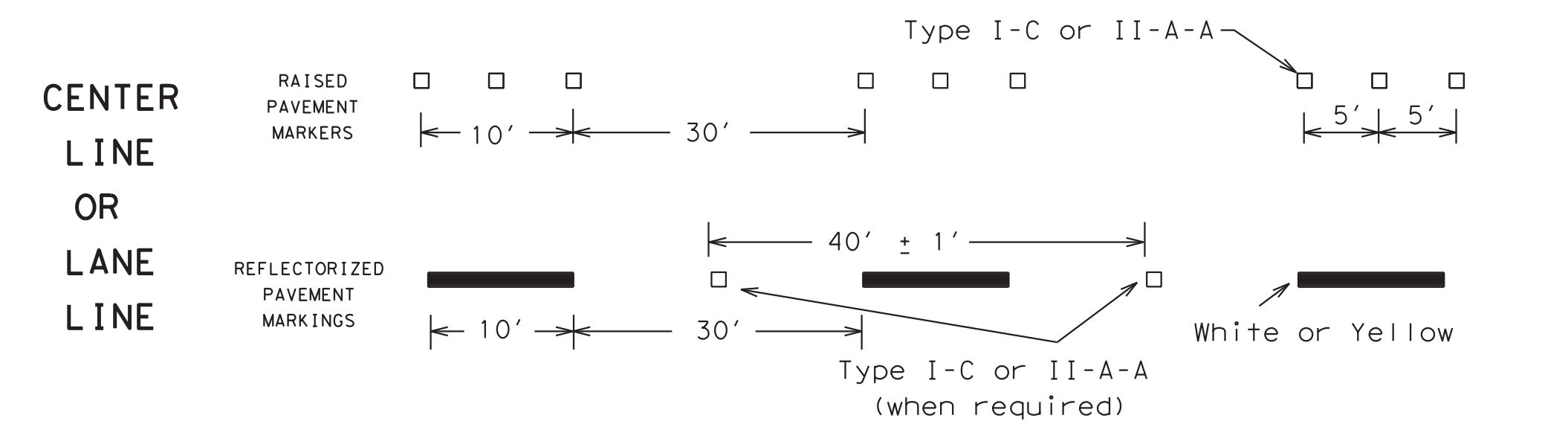
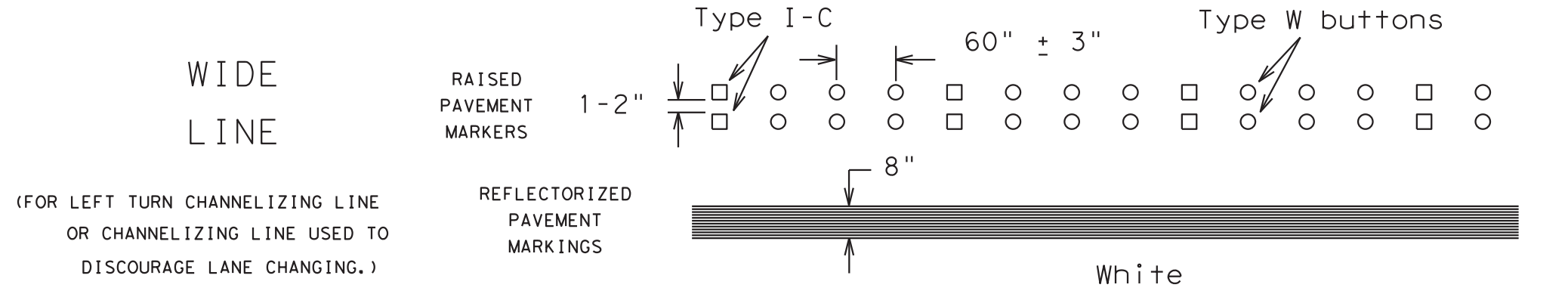
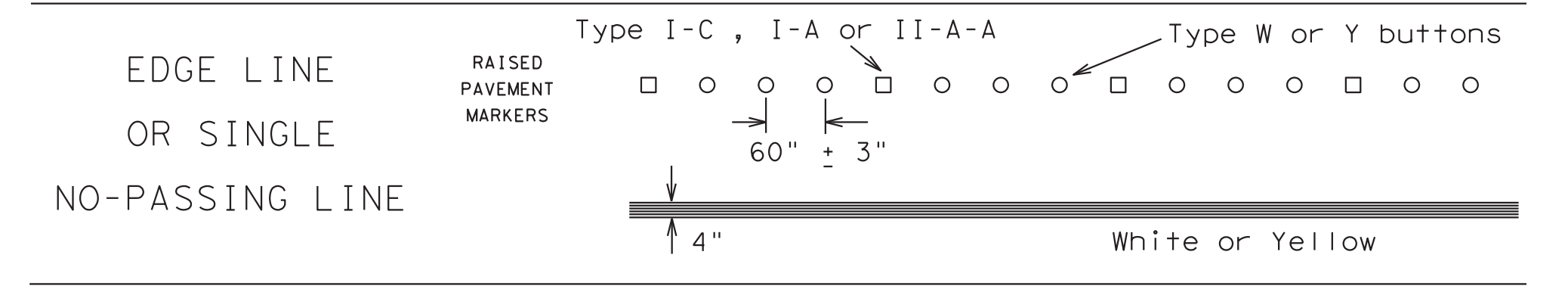
RAISED PAVEMENT MARKERS

TWO-WAY LEFT TURN LANE

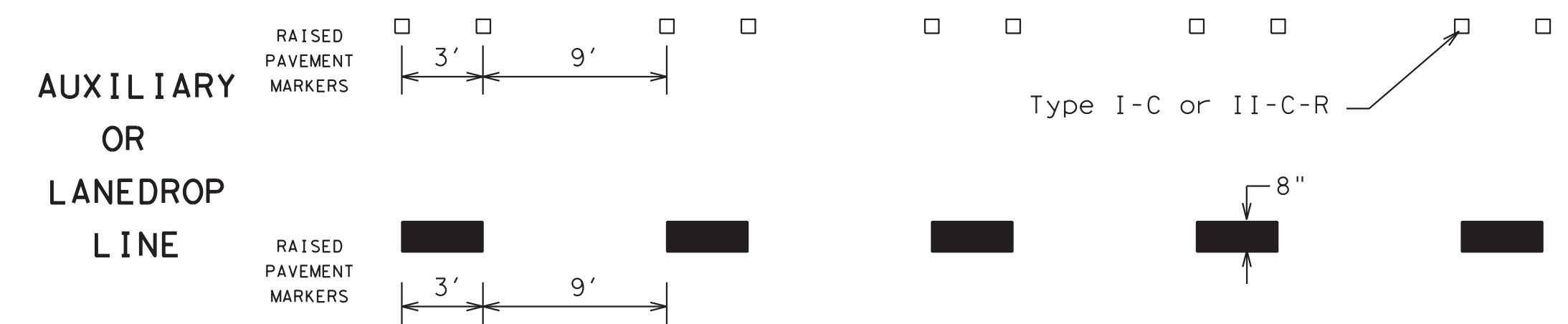
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



SOLID LINES

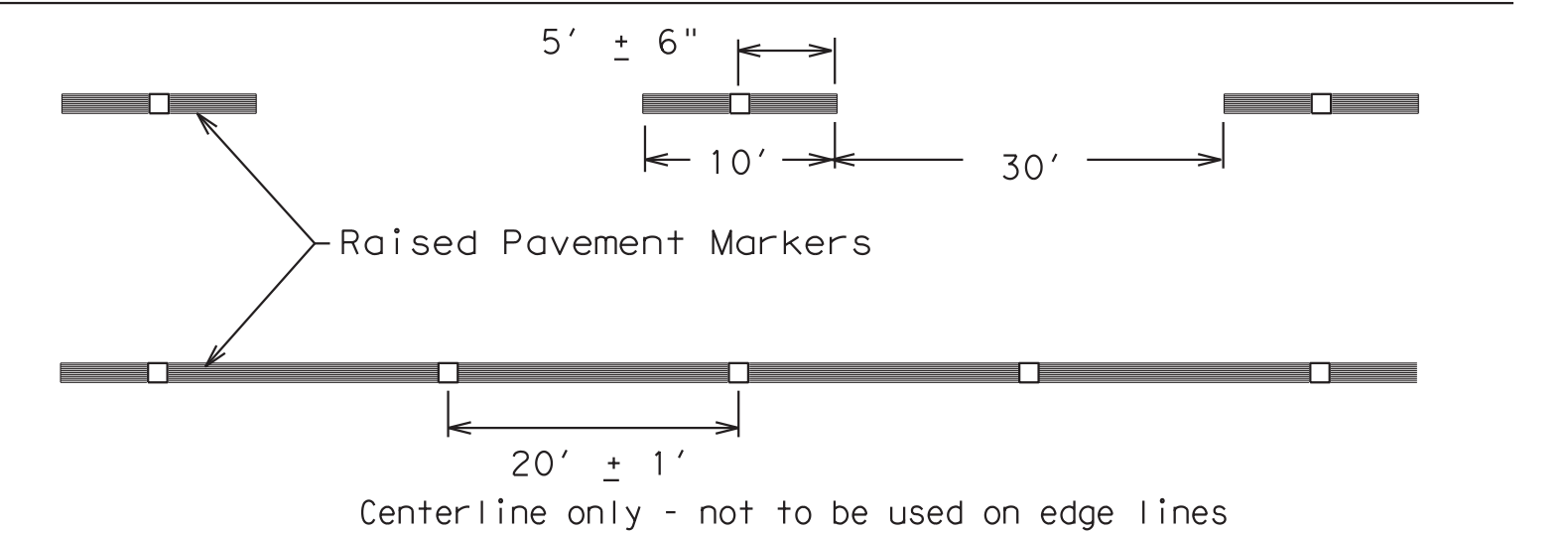


BROKEN LINES



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.



SHEET 12 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC (12) - 14

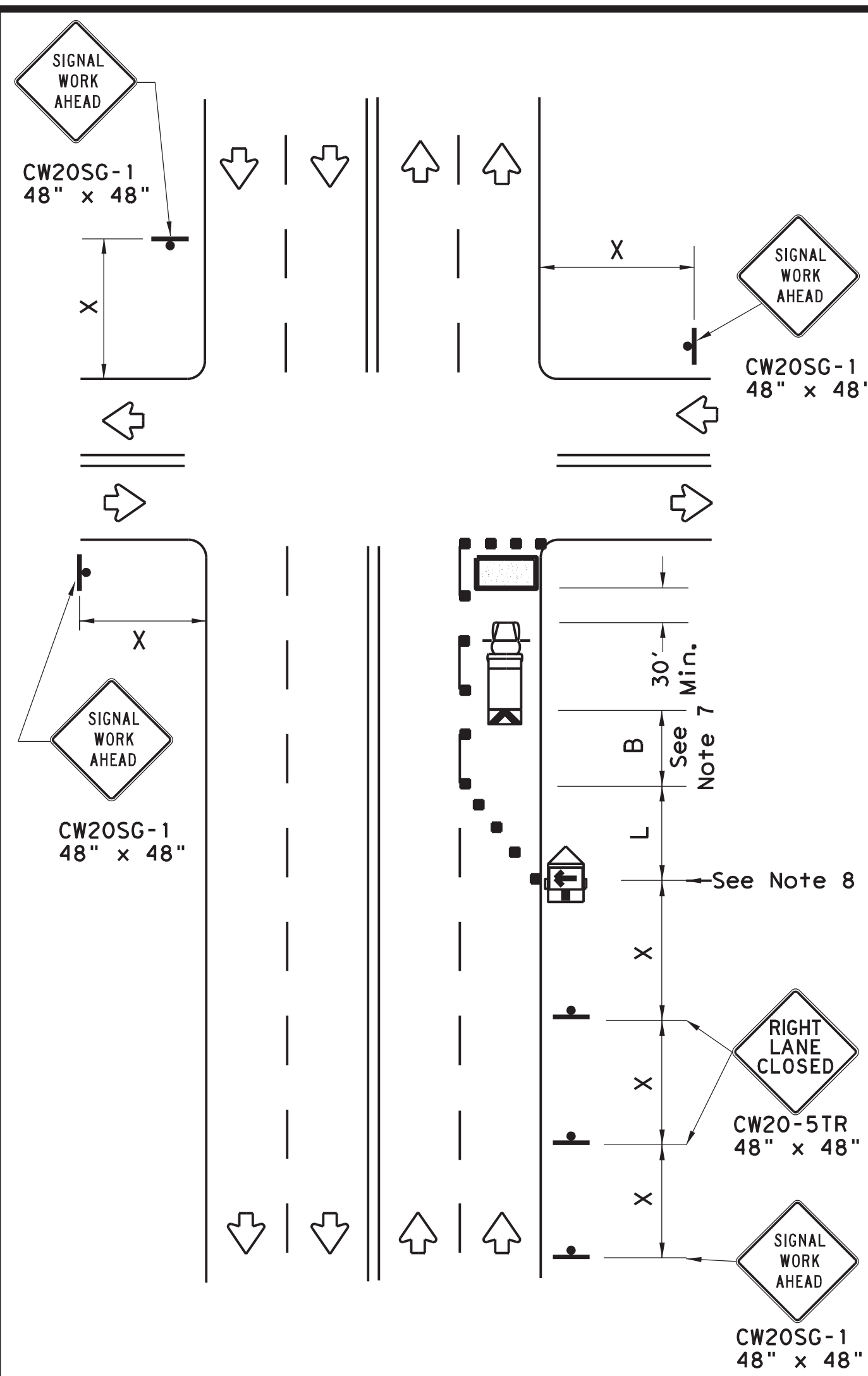
FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS				
1-97 9-07				
2-98 7-13				
11-02 8-14				
DIST	COUNTY	SHEET NO.		124

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

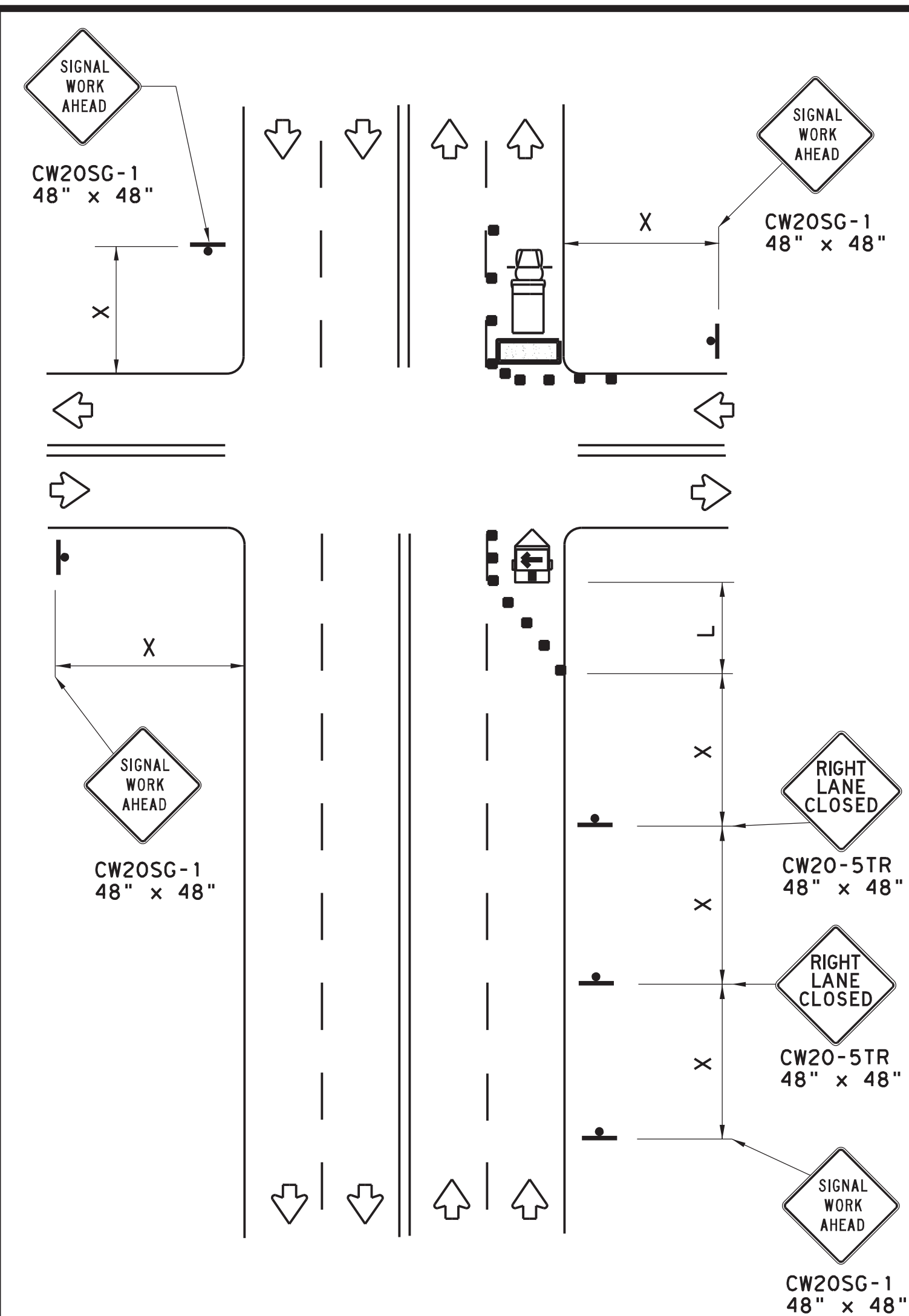
DATE: FILE:

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

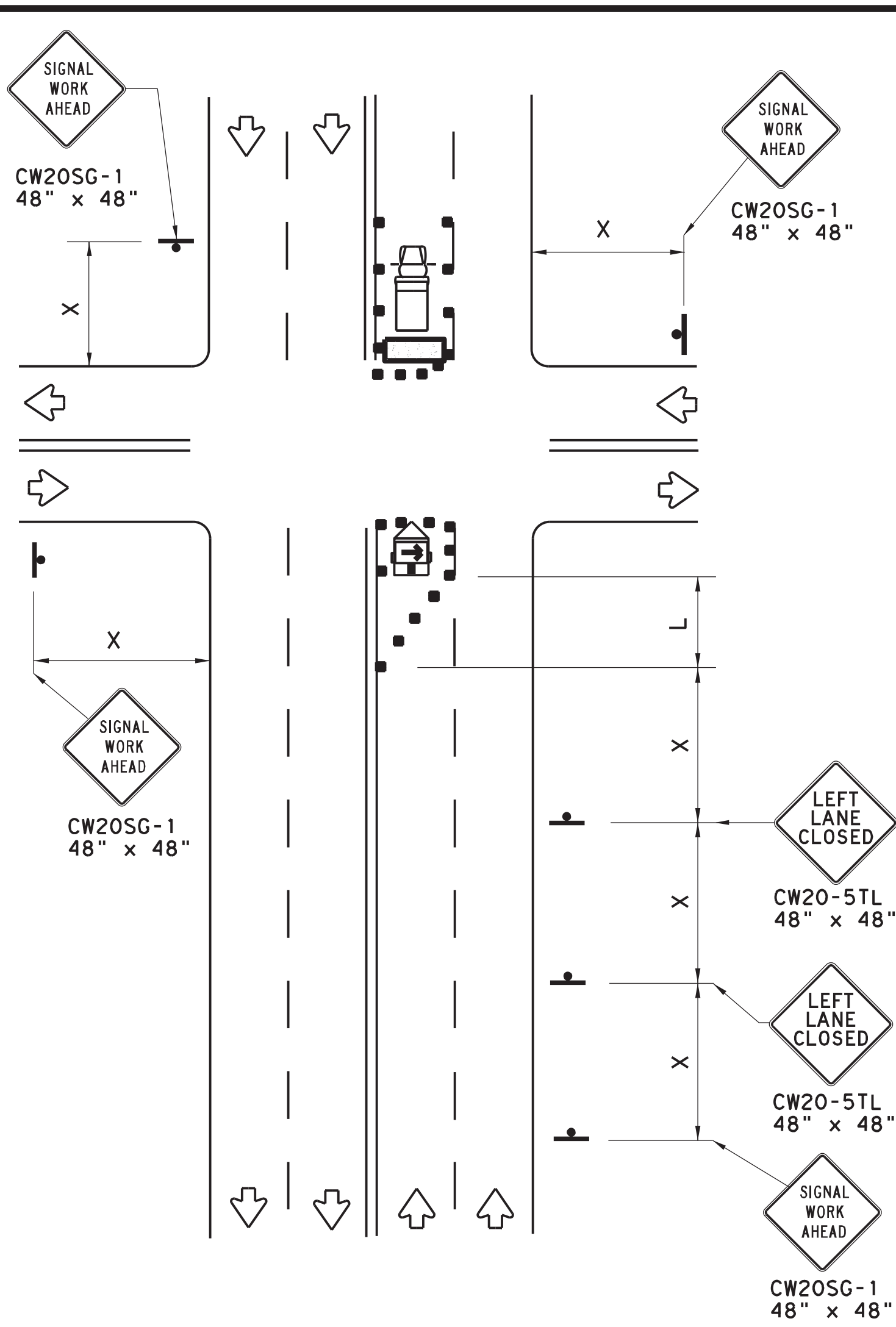
DATE: FILE:



NEAR SIDE LANE CLOSURE
SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE RIGHT LANE CLOSURE
SHORT DURATION OR SHORT TERM STATIONARY



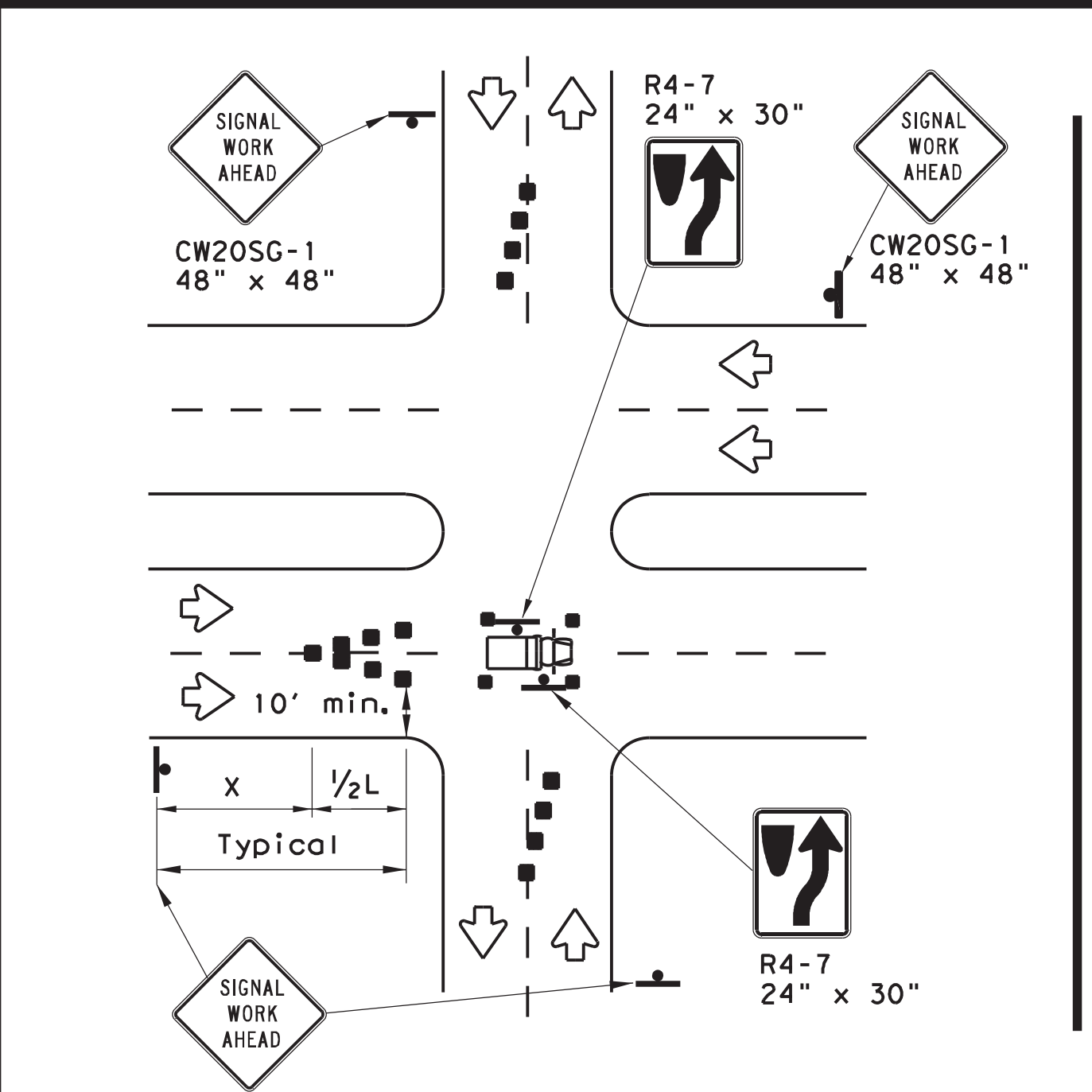
FAR SIDE LEFT LANE CLOSURE
SHORT DURATION OR SHORT TERM STATIONARY

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

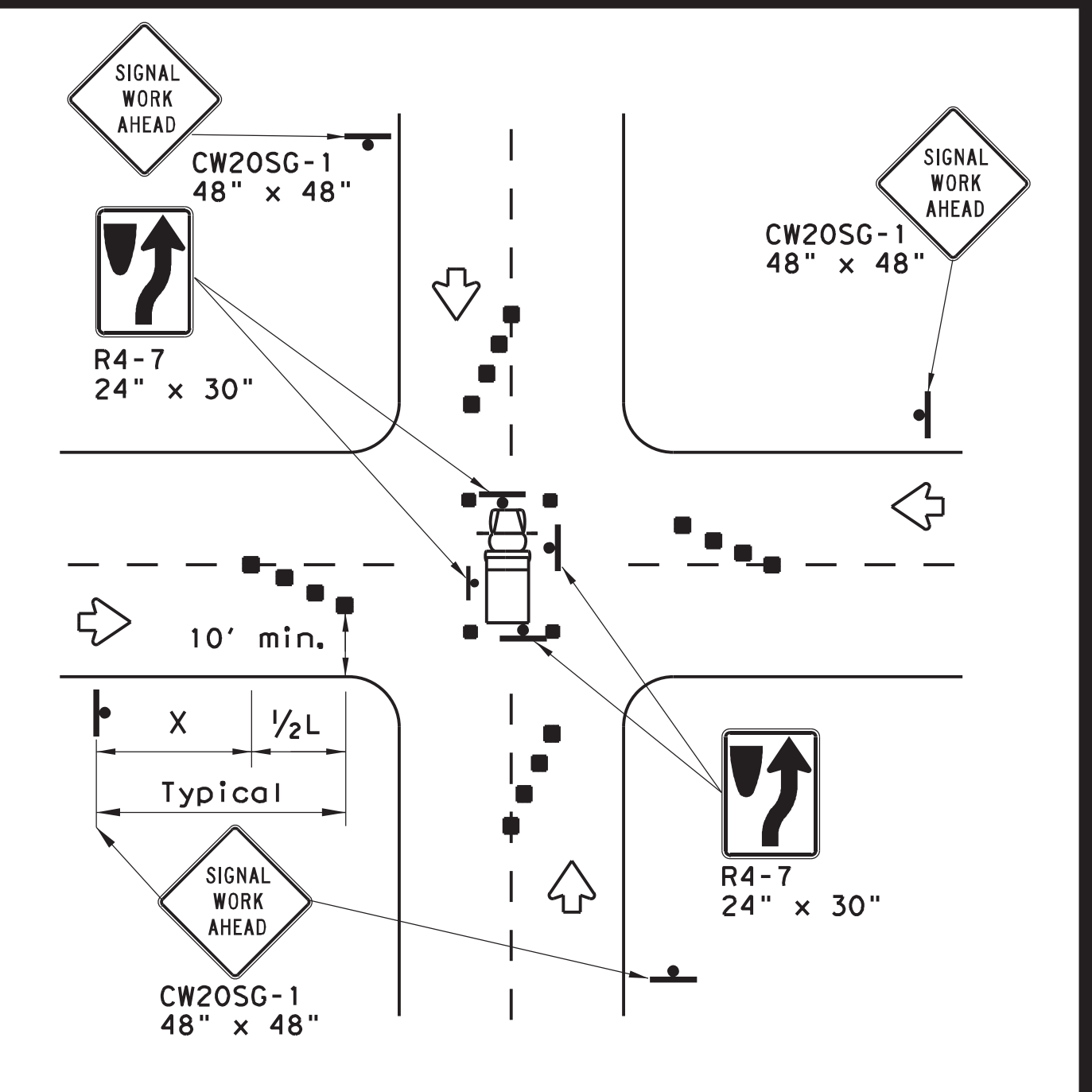
Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'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

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

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



OPERATIONS IN THE INTERSECTION
SHORT DURATION



GENERAL NOTES

- 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.
- Obstructions or hazards at the work area shall be clearly marked and delineated at all times.
- Flaggers and Flagger Symbol (CW20-7) signs may be required according to field conditions.
- Vehicles parked in roadway shall be equipped with at least two high intensity rotating, flashing, oscillating or strobe type lights.
- High level warning devices (flag trees) may be used at corners of the vehicle.
- 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.
- 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.
- 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.
- 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.



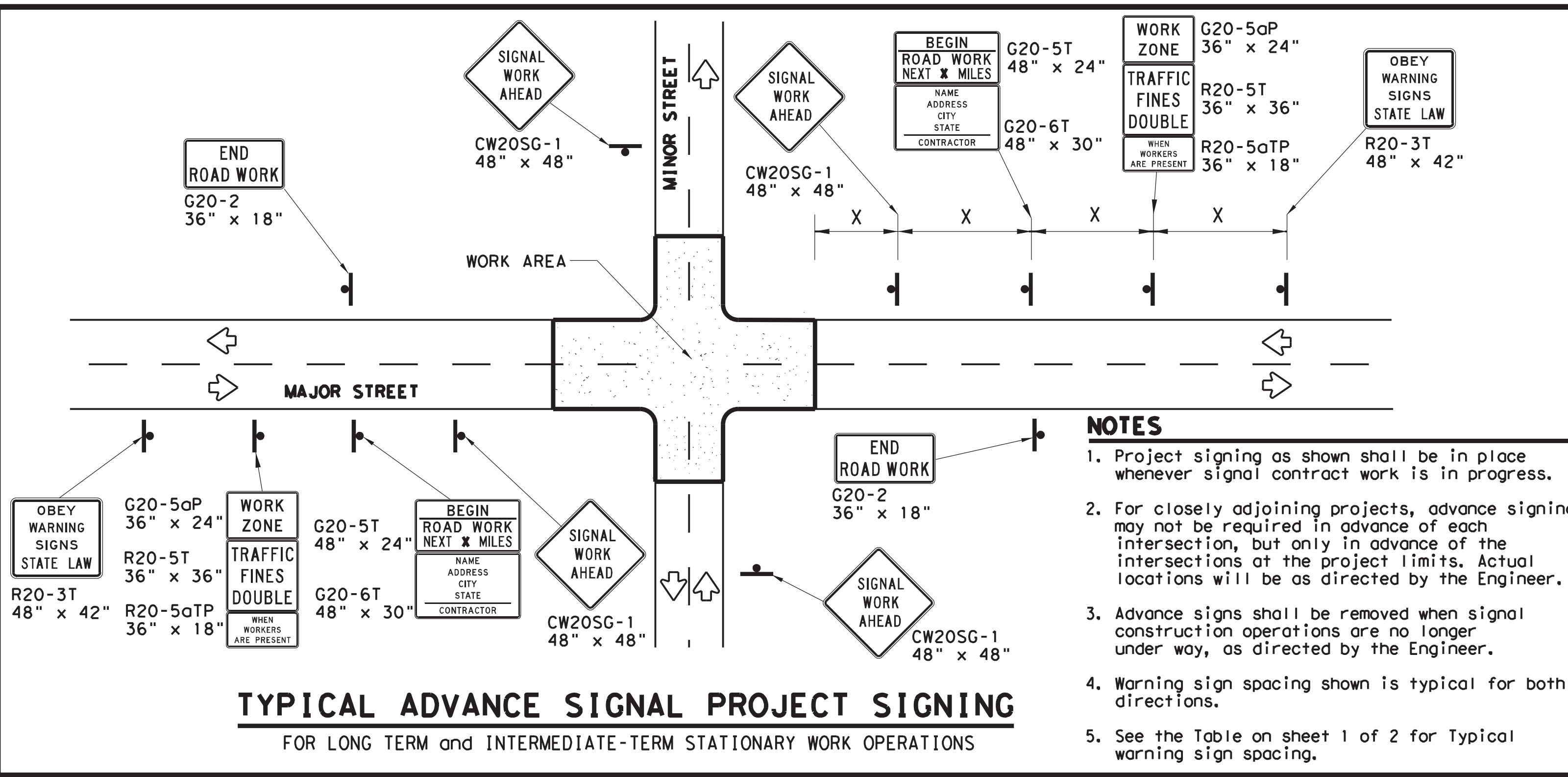
TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ (BTS-1) - 13

FILE: wzbts-13.dgn	DN: TxDOT	CR: TxDOT	OW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS				
2-98 10-99 7-13	DIST	COUNTY	SHEET NO.	
4-98 3-03			125	

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

DATE: FILE:



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 66.02 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

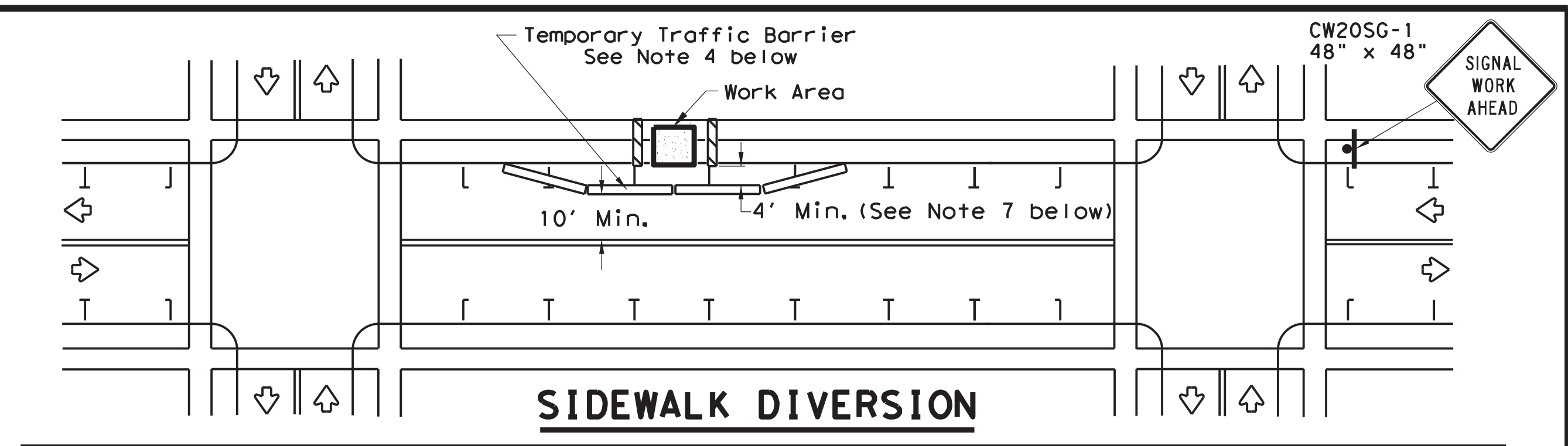
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support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

LEGEND	
	Sign
	Channelizing Devices
	Type 3 Barricade

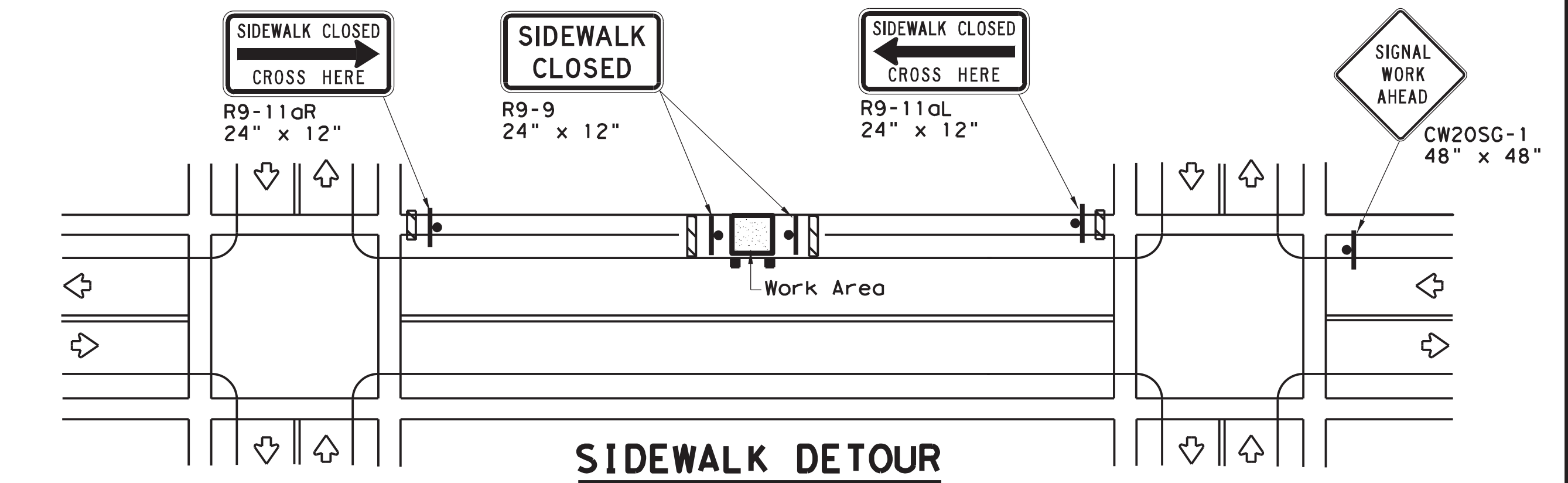
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

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

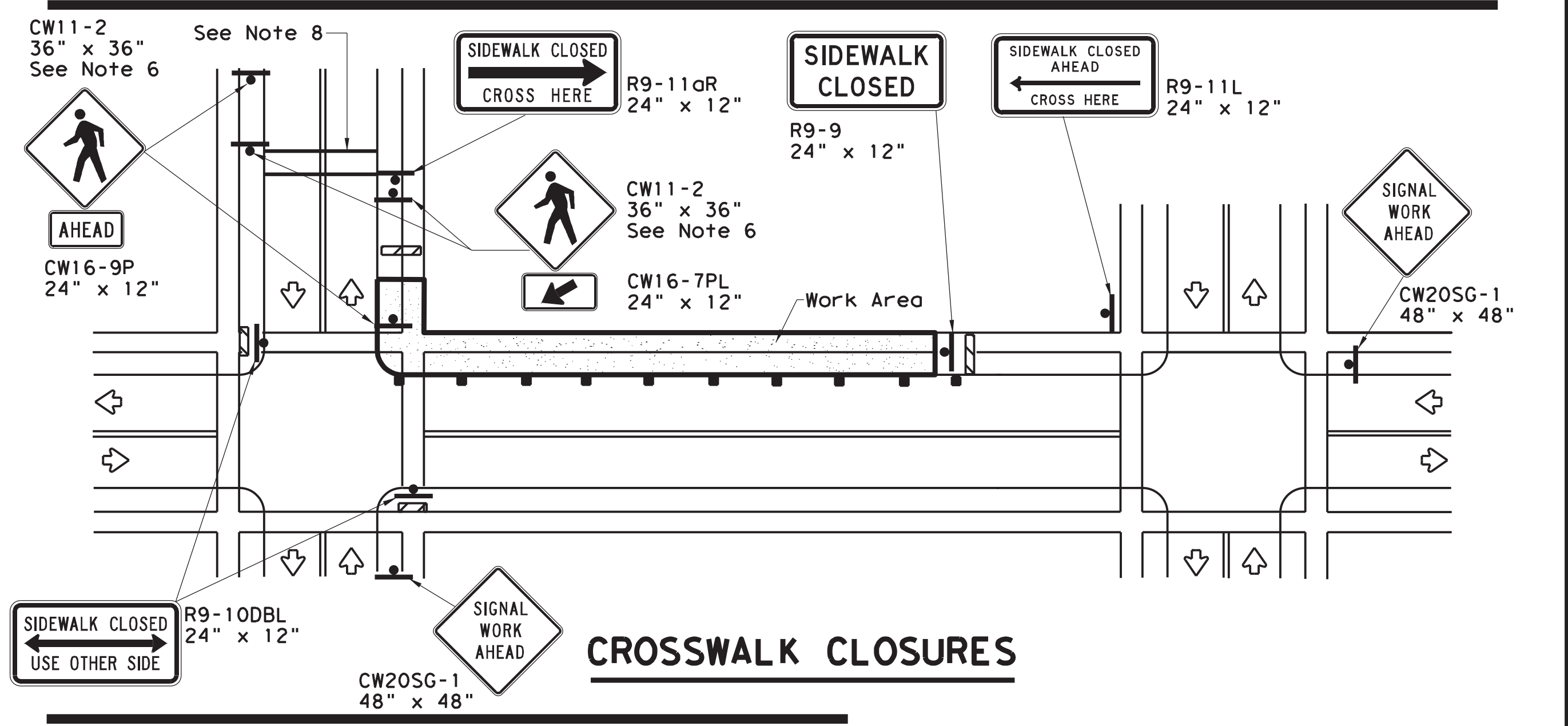
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



SIDEWALK DIVERSION



SIDEWALK DETOUR



CROSSWALK CLOSURES

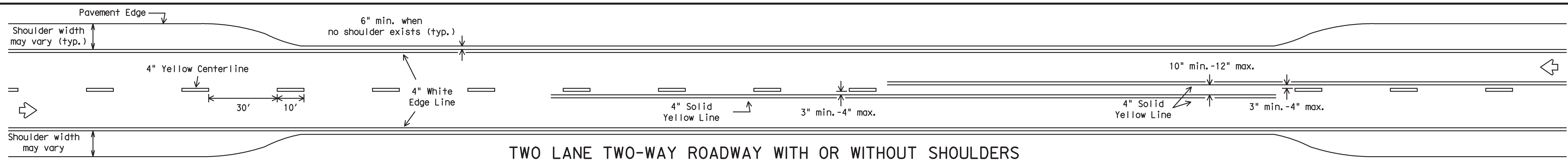
PEDESTRIAN CONTROL

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.

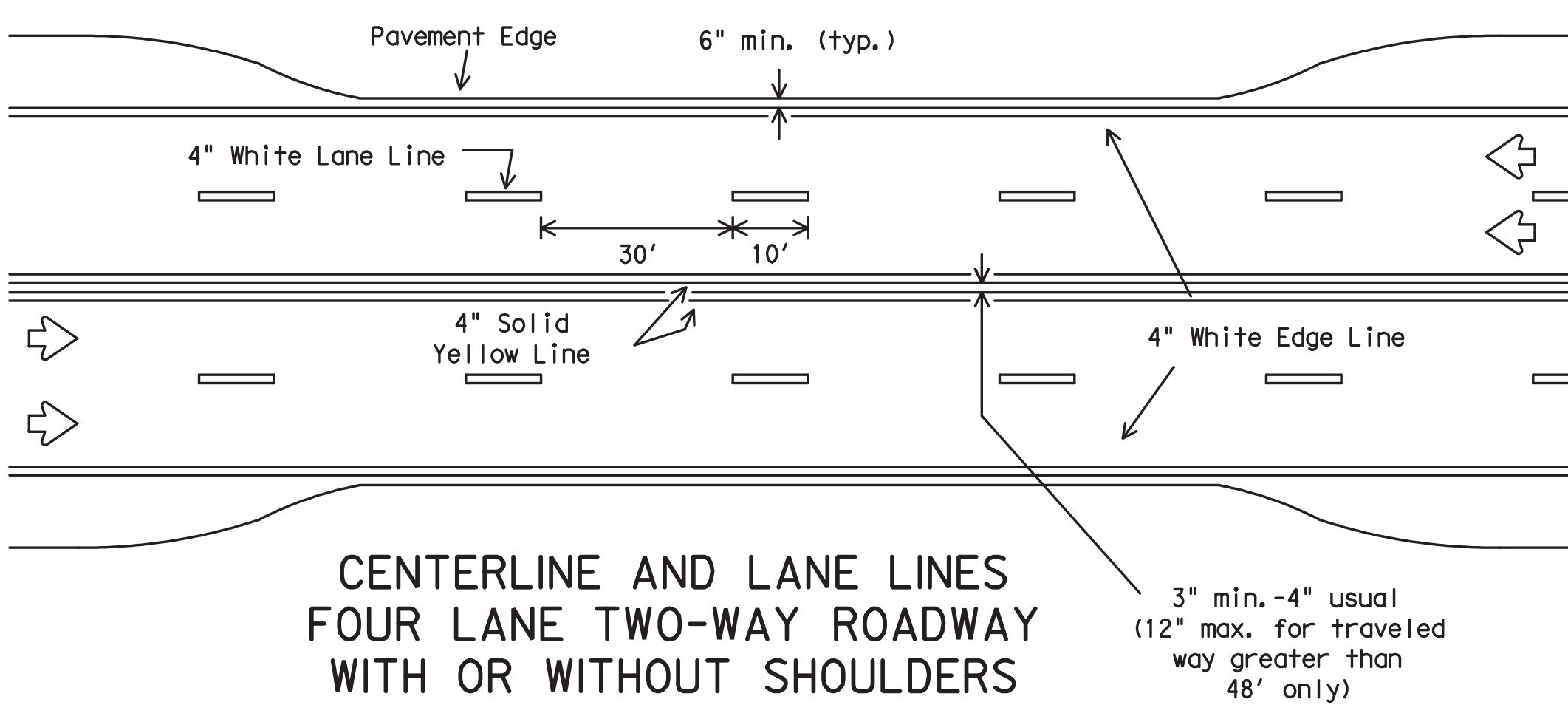
SHEET 2 OF 2

		Traffic Operations Division Standard
<h2>TRAFFIC SIGNAL WORK BARRICADES AND SIGNS</h2>		
<h3>WZ (BTS-2) - 13</h3>		
FILE: wzbtts-13.dgn © TxDOT April 1992 REVISIONS 2-98 10-99 7-13 4-98 3-03	DWS: TxDOT CONT: TxDOT DIST: COUNTY	CK: TxDOT DW: TxDOT JOB: HIGHWAY SHEET NO.: 126

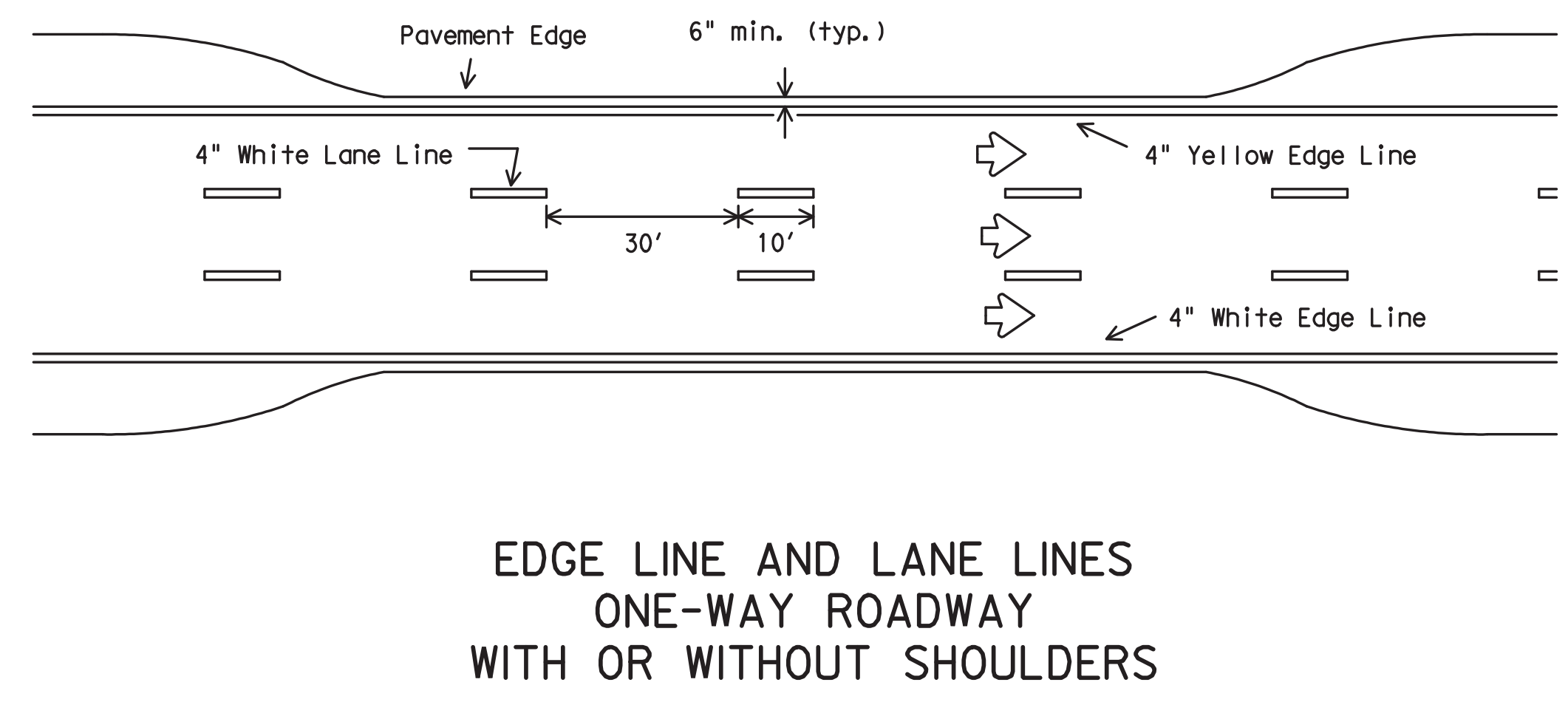
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



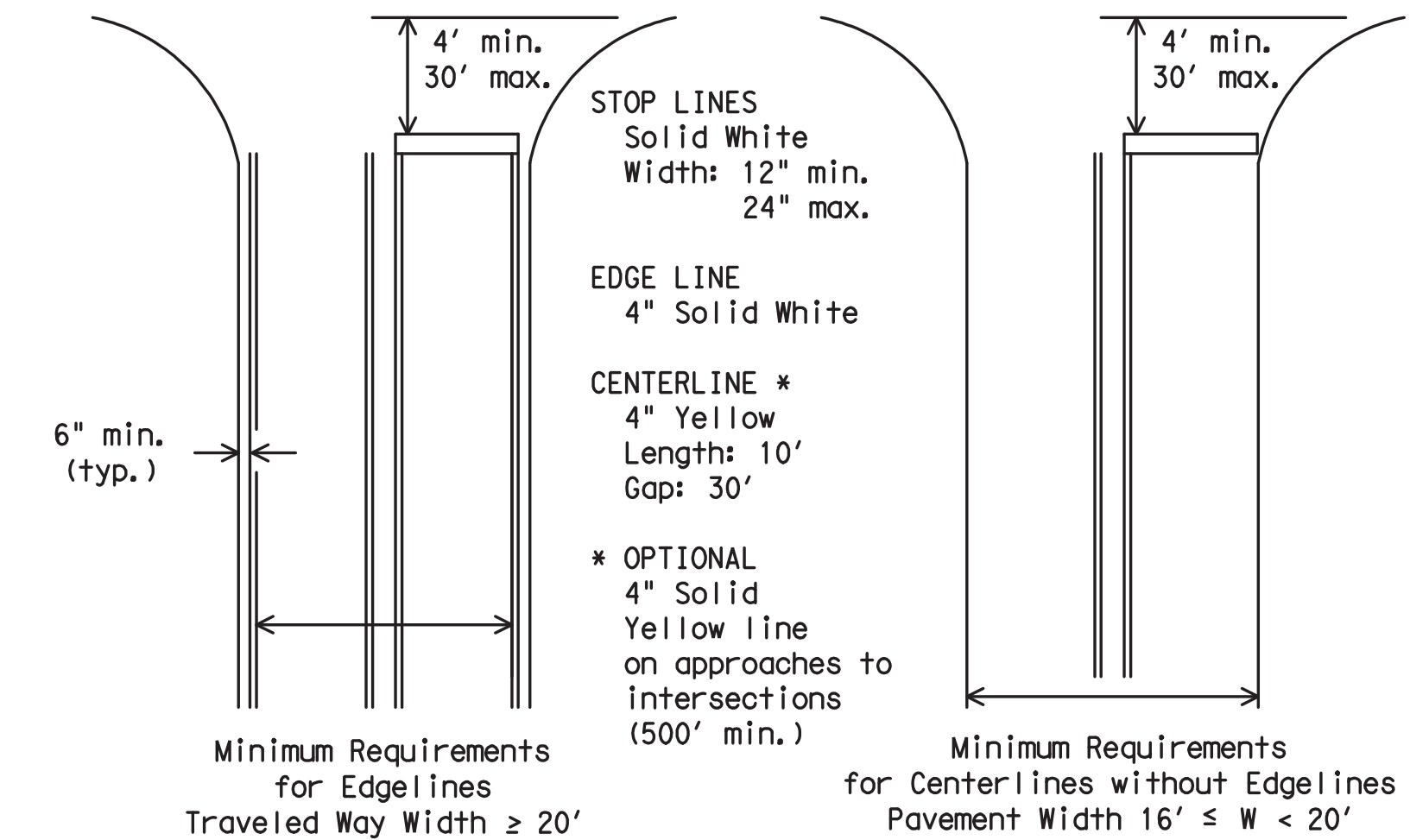
TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



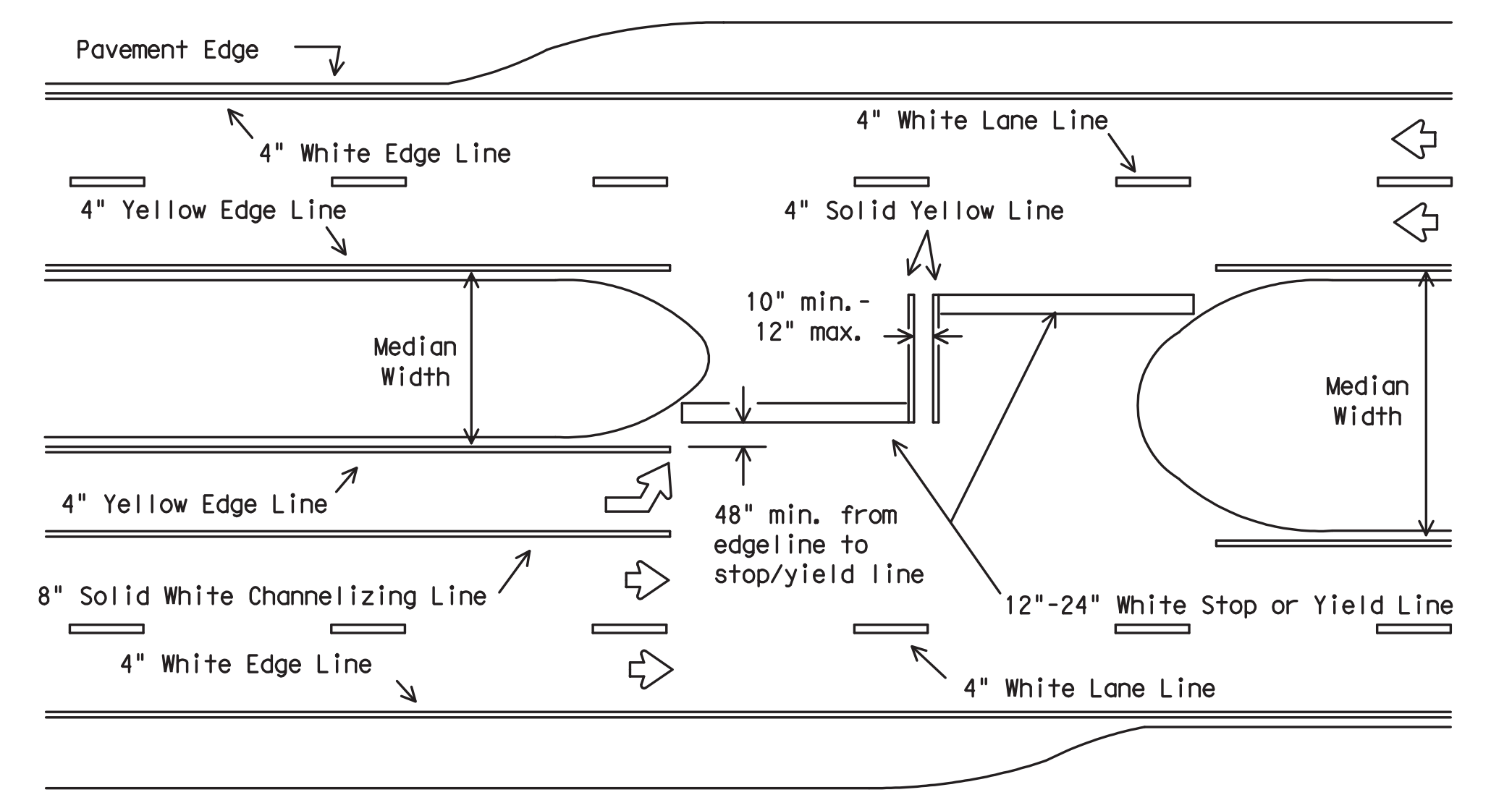
**CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS**



**EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS**

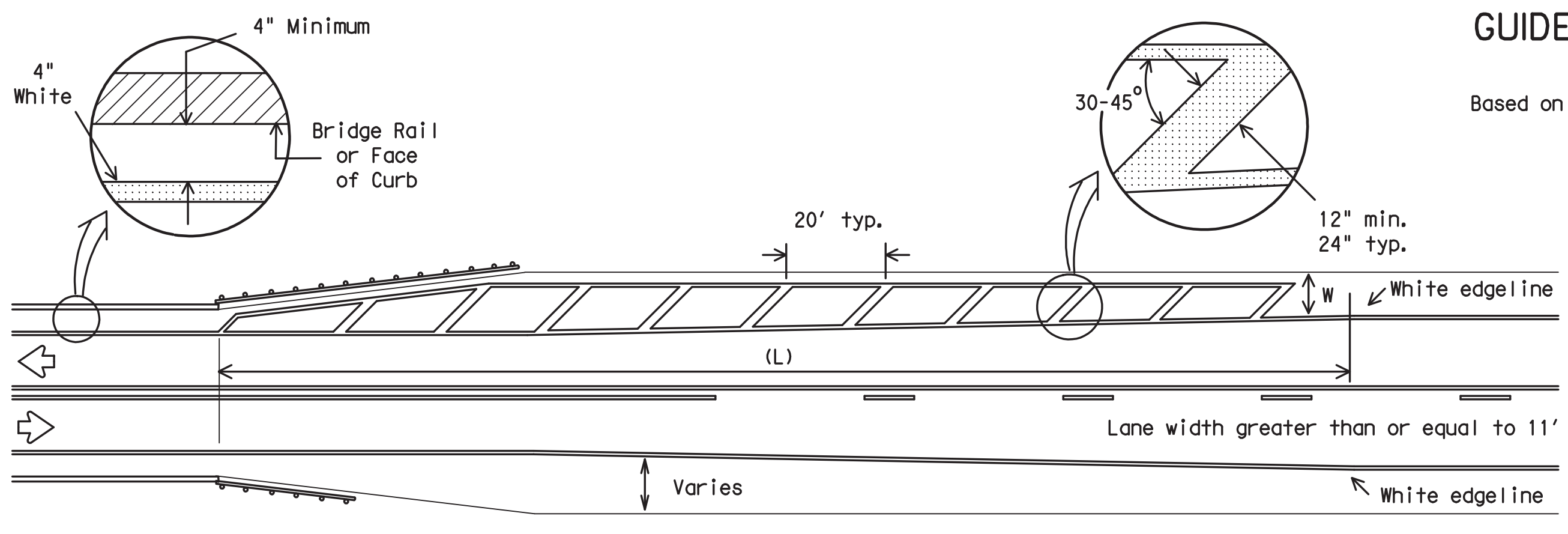


**GUIDE FOR PLACEMENT OF STOP LINES,
EDGE LINE & CENTERLINE**
Based on Traveled Way and Pavement Widths for Undivided Highways



All medians shall be field measured to determine the location of necessary striping. Stop/Yield bars and centerlines shall be placed when the median width is greater than 30 ft. The median width is defined as the area between two roadways of a divided highway measured from edge of traveled way to edge of traveled way. The median excludes turn lanes. The median width might be different between intersections, interchanges and of opposite approaches of the same intersection. The narrow median width will be the controlling width to determine if markings are required.

FOUR LANE DIVIDED ROADWAY INTERSECTIONS



- NOTES:
- No-passing zone on bridge approach is optional but if used, it shall be a minimum 500 feet long.
 - For crosshatching length (L) see Table 1.
 - The width of the offset (W) and the required crosshatching width is the full shoulder width in advance of the bridge.
 - The crosshatching is not required if delineators or barrier reflectors are used along the structure.
 - For guard fence details, refer elsewhere in the plans.

**ROADWAYS WITH REDUCED SHOULDER
WIDTHS ACROSS BRIDGE OR CULVERT**

TABLE 1 - TYPICAL LENGTH (L)

Posted Speed *	Formula
≤ 40	$L = \frac{WS^2}{60}$
≥ 45	$L = WS$

* 85th Percentile Speed may be used on roads where traffic speeds normally exceed the posted speed limit. Crosshatching length should be rounded up to nearest 5 foot increment.
L=Length of Crosshatching (FT.) W=Width of Offset (FT.) S=Posted Speed (MPH)

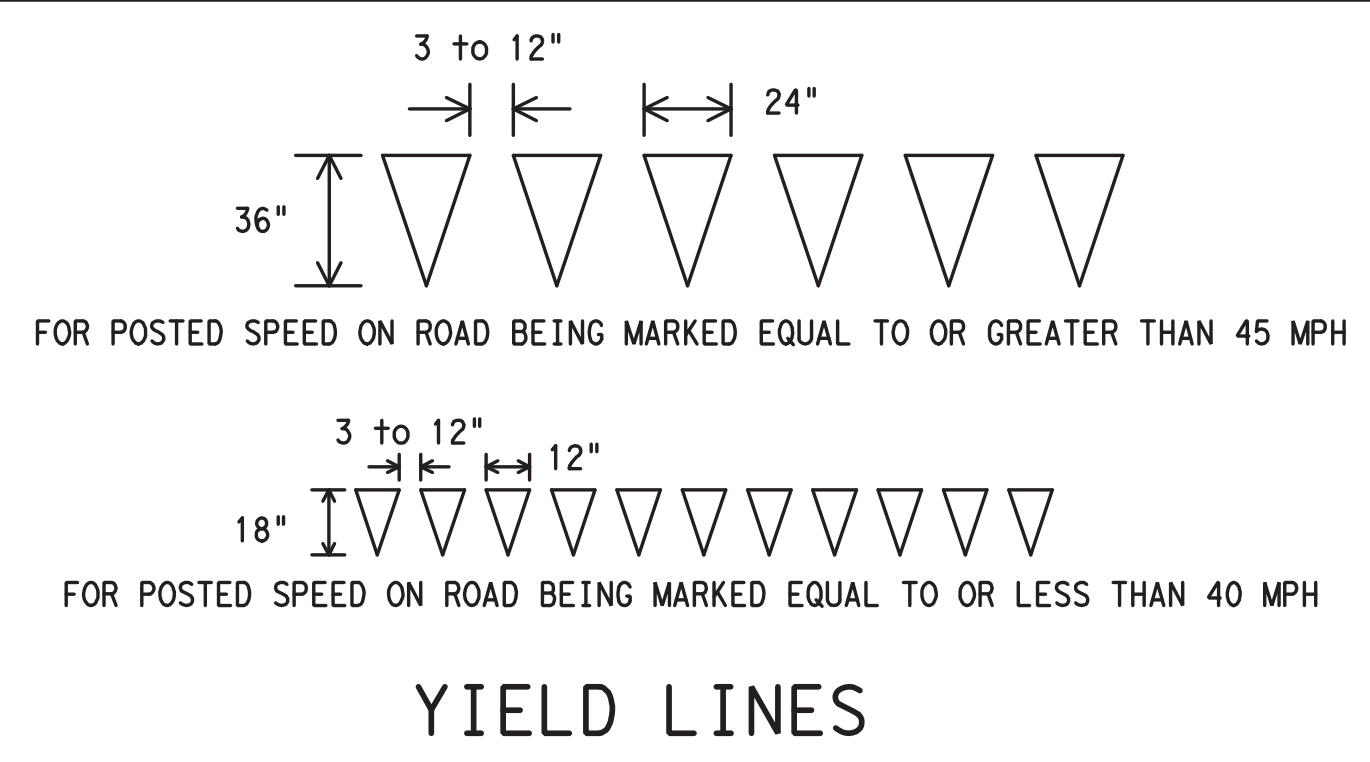
EXAMPLES:
An 8 foot shoulder in advance of a bridge reduces to 4 feet on a 70 MPH roadway. The length of the crosshatching should be:
 $L = 8 \times 70 = 560$ ft.
A 4 foot shoulder in advance of a bridge reduces to 2 feet on a 40 MPH roadway. The length of the crosshatching should be:
 $L = 4(40)^2 / 60 = 106.67$ ft. rounded to 110 ft.

GENERAL NOTES

- Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should typically be placed a minimum of 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.
- The traveled way includes only that portion of the roadway used for vehicular travel and not the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to 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.



YIELD LINES

**TYPICAL STANDARD
PAVEMENT MARKINGS**

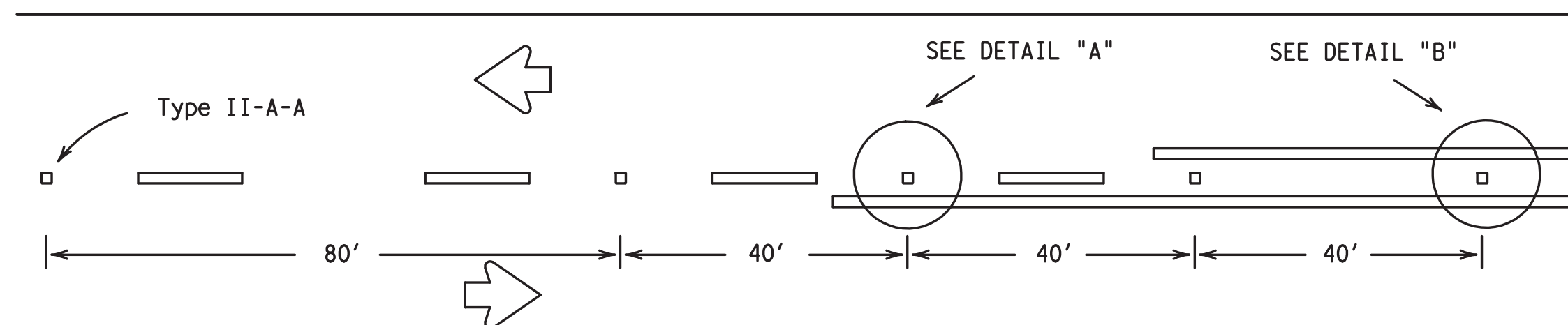
PM(1)-12

© TxDOT November 1978	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
8-95 2-12				
5-00				
8-00				
3-03	DIST	COUNTY		SHEET NO.
				127
22A				

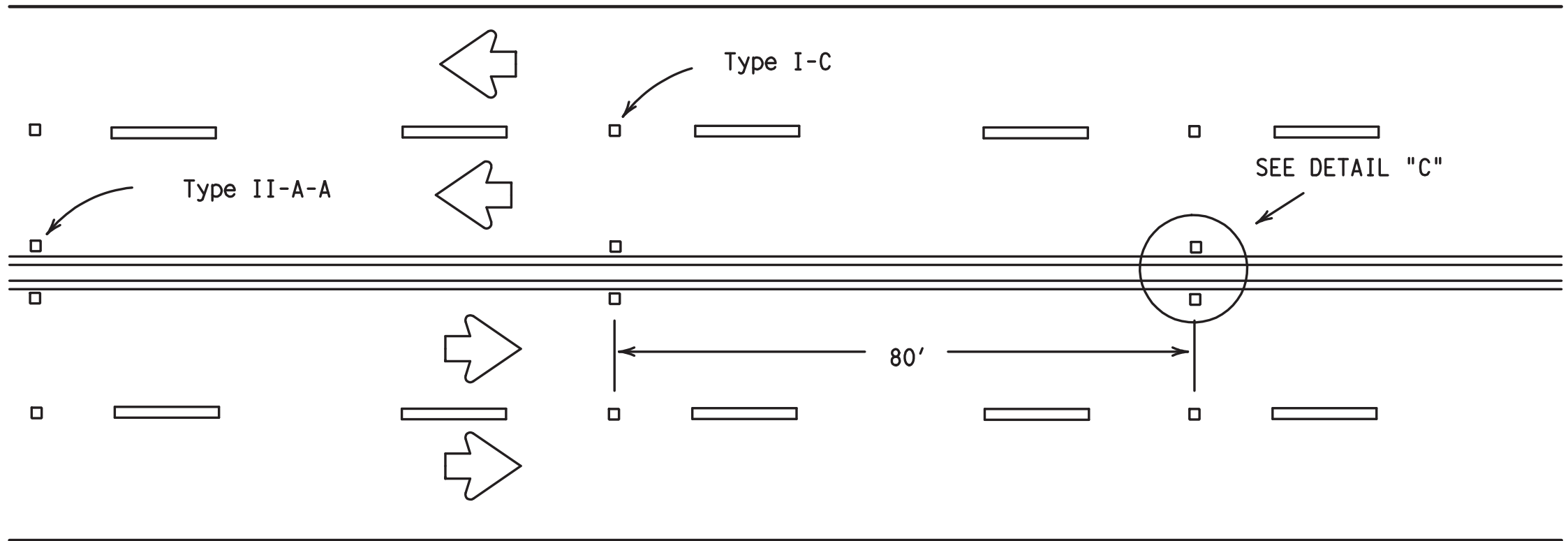
DATE:
FILE:

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

REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

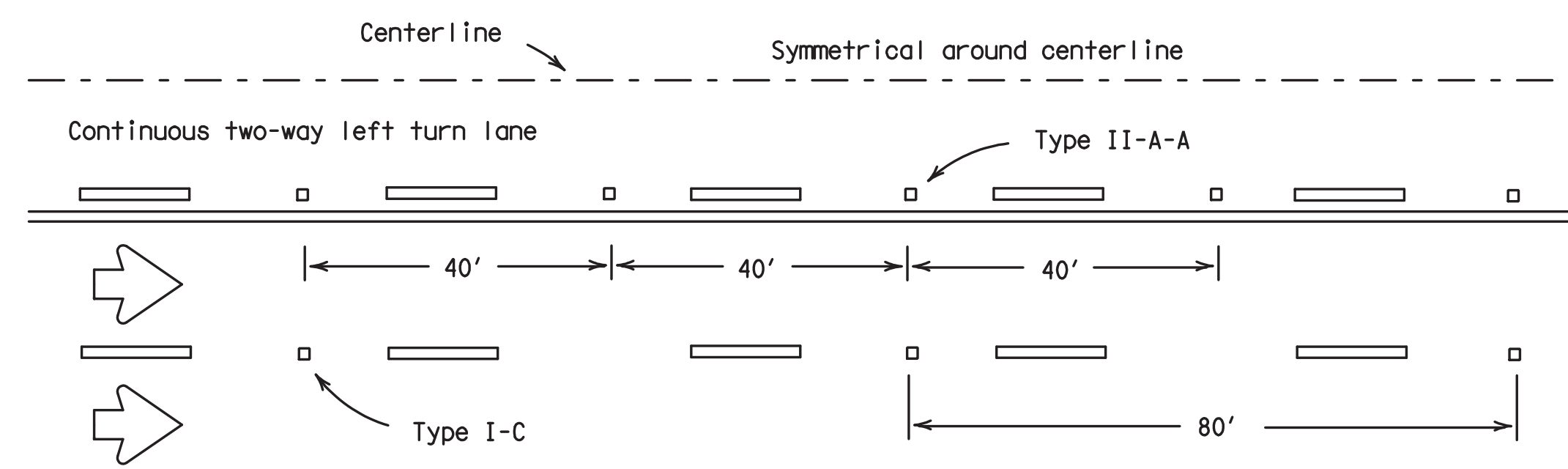


CENTERLINE FOR ALL TWO LANE ROADWAYS

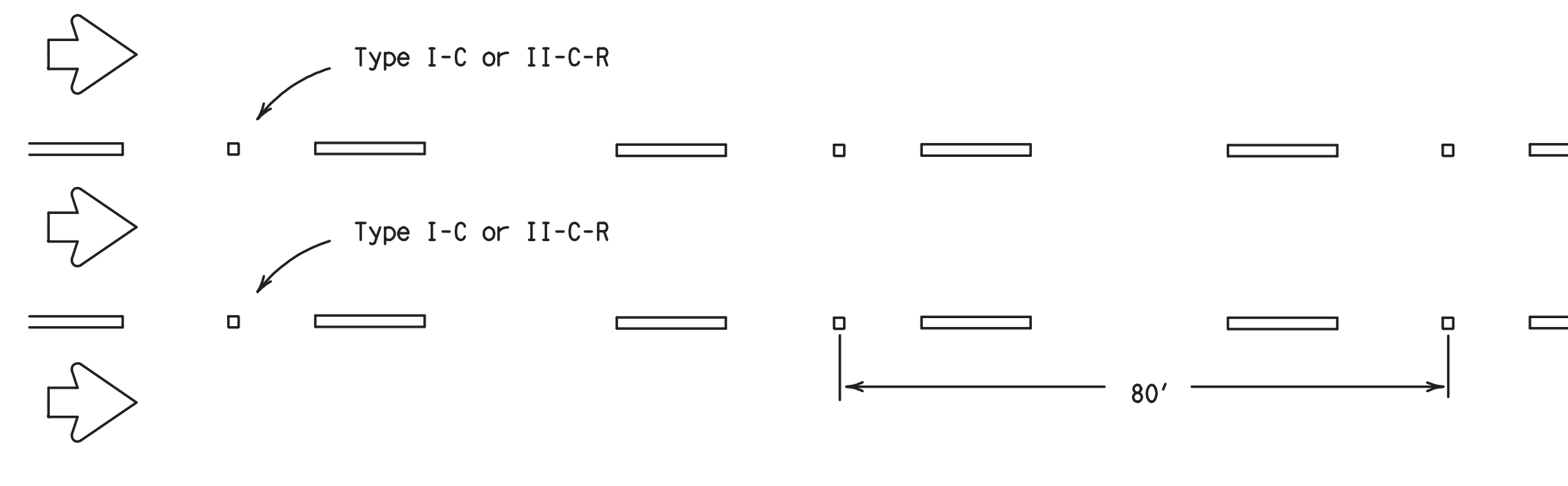


CENTERLINE & LANE LINES
FOR FOUR LANE TWO-WAY HIGHWAYS

Raised pavement marker Type I-C, clear face toward normal traffic, shall be placed on 80-foot centers.

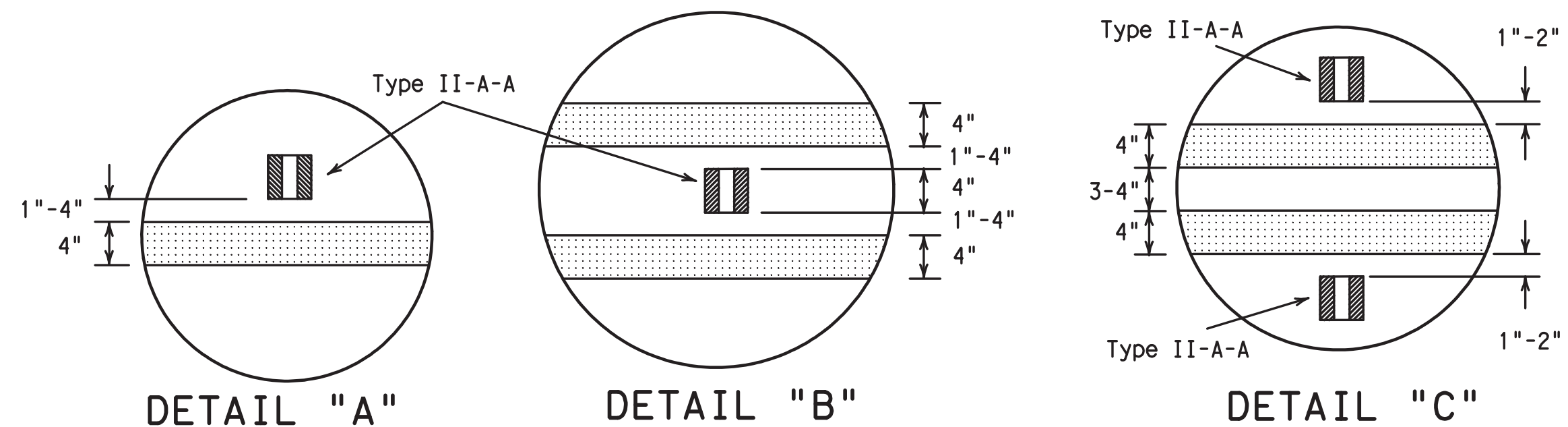


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

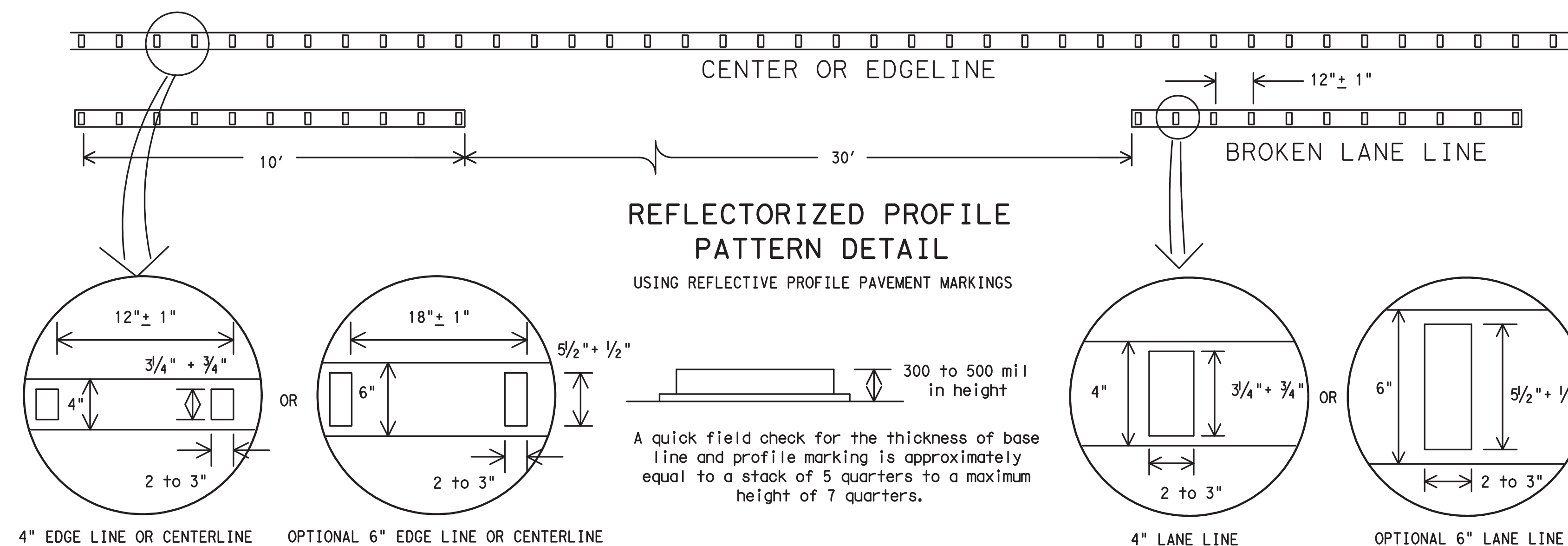
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.



DETAIL "A"

DETAIL "B"

DETAIL "C"



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:

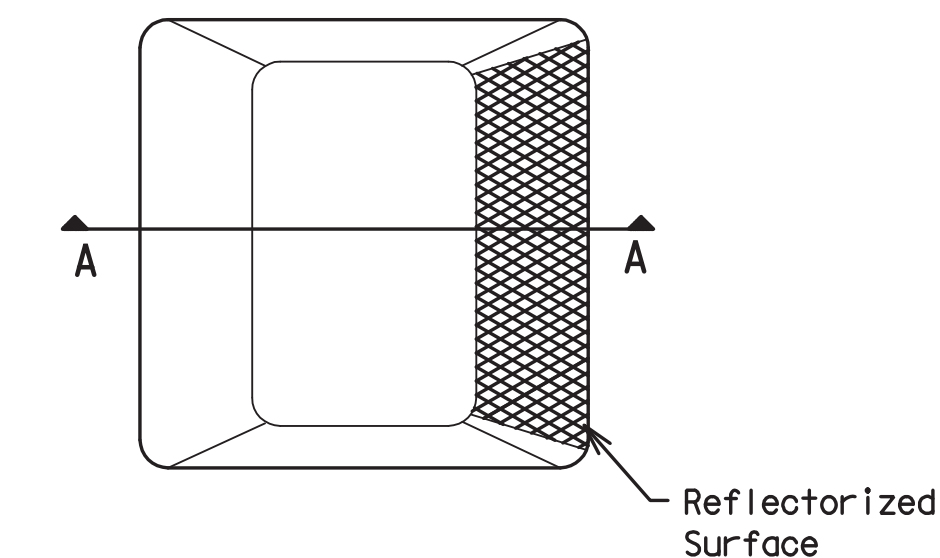
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

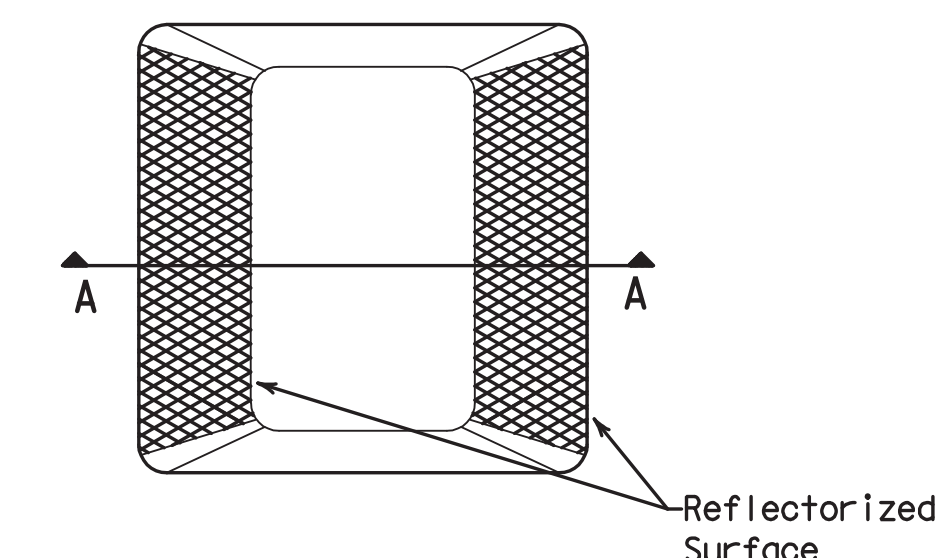
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

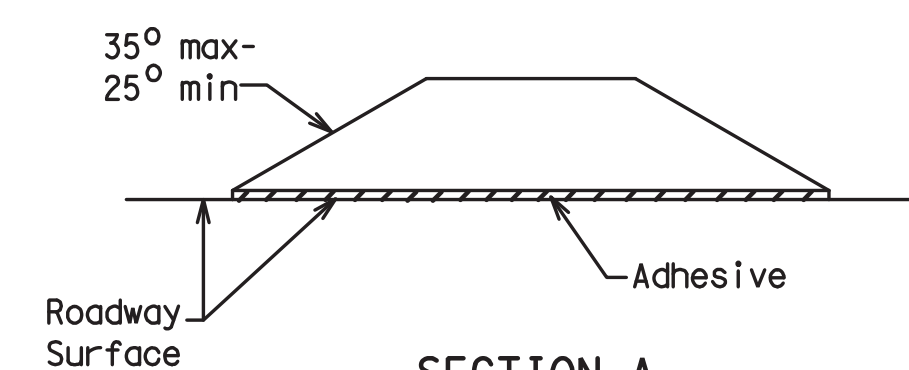
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



POSITION GUIDANCE USING RAISED MARKERS REFLECTORIZED PROFILE MARKINGS

PM(2) - 12

© TxDOT April 1977		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
REVISONS		CONT	SECT	JOB	HIGHWAY
4-92	2-10				
5-00	2-12				
8-00					
2-08		DIST	COUNTY		SHEET NO.
					128

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

DATE: FILE:

GENERAL NOTES FOR ALL ELECTRICAL WORK

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

CONDUIT

A. MATERIALS

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


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

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

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

B. CONSTRUCTION METHODS

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

 Texas Department of Transportation		Traffic Operations Division Standard	
<h1>ELECTRICAL DETAILS CONDUITS & NOTES</h1>			
<h2>ED(1) - 14</h2>			
FILE:	ed1-14.dgn	DW:	CK:
© TxDOT	October 2014	CONT	SECT
REVISIONS		JOB	
		HIGHWAY	
		COUNTY	
		SHEET NO.	
		129	

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.

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.

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.

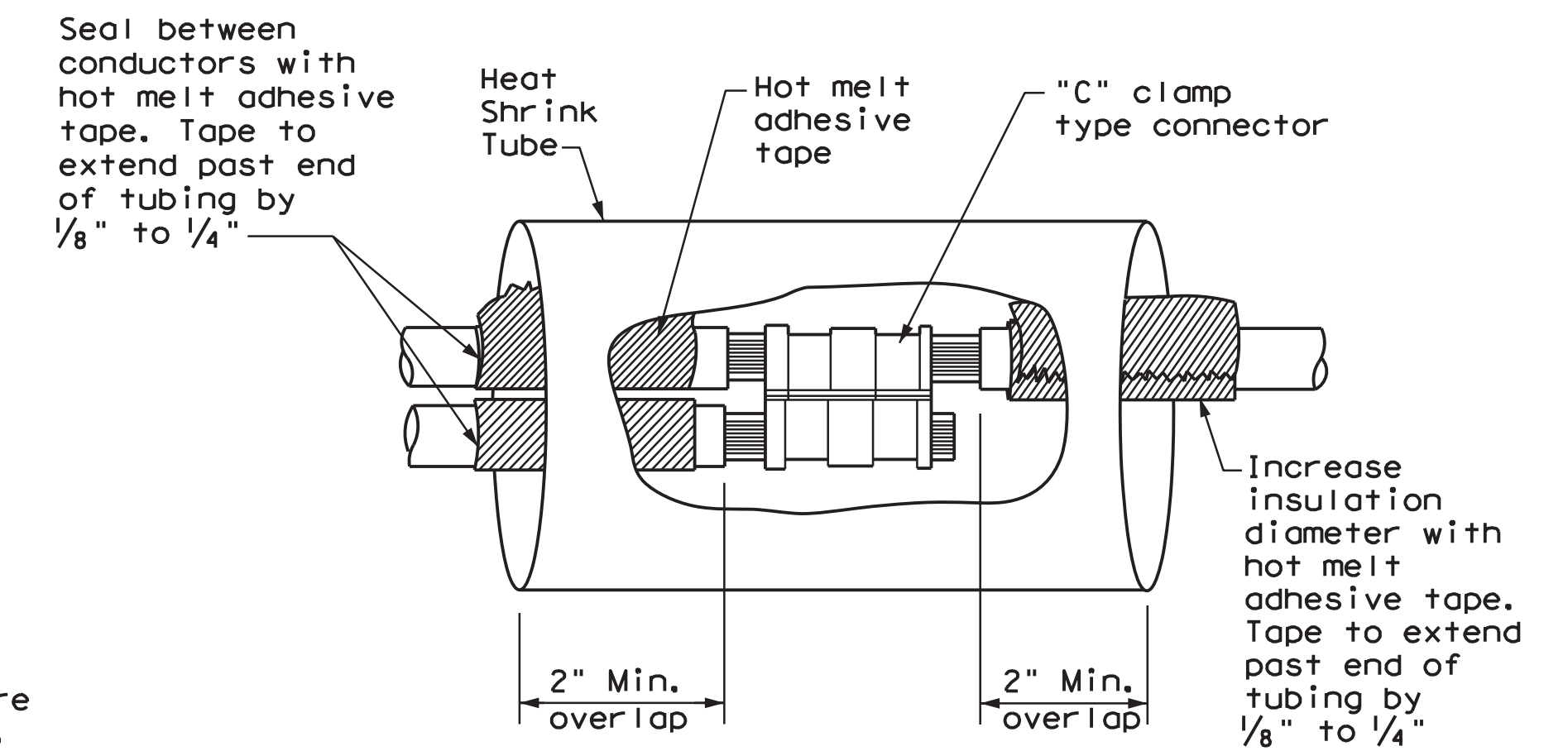
GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

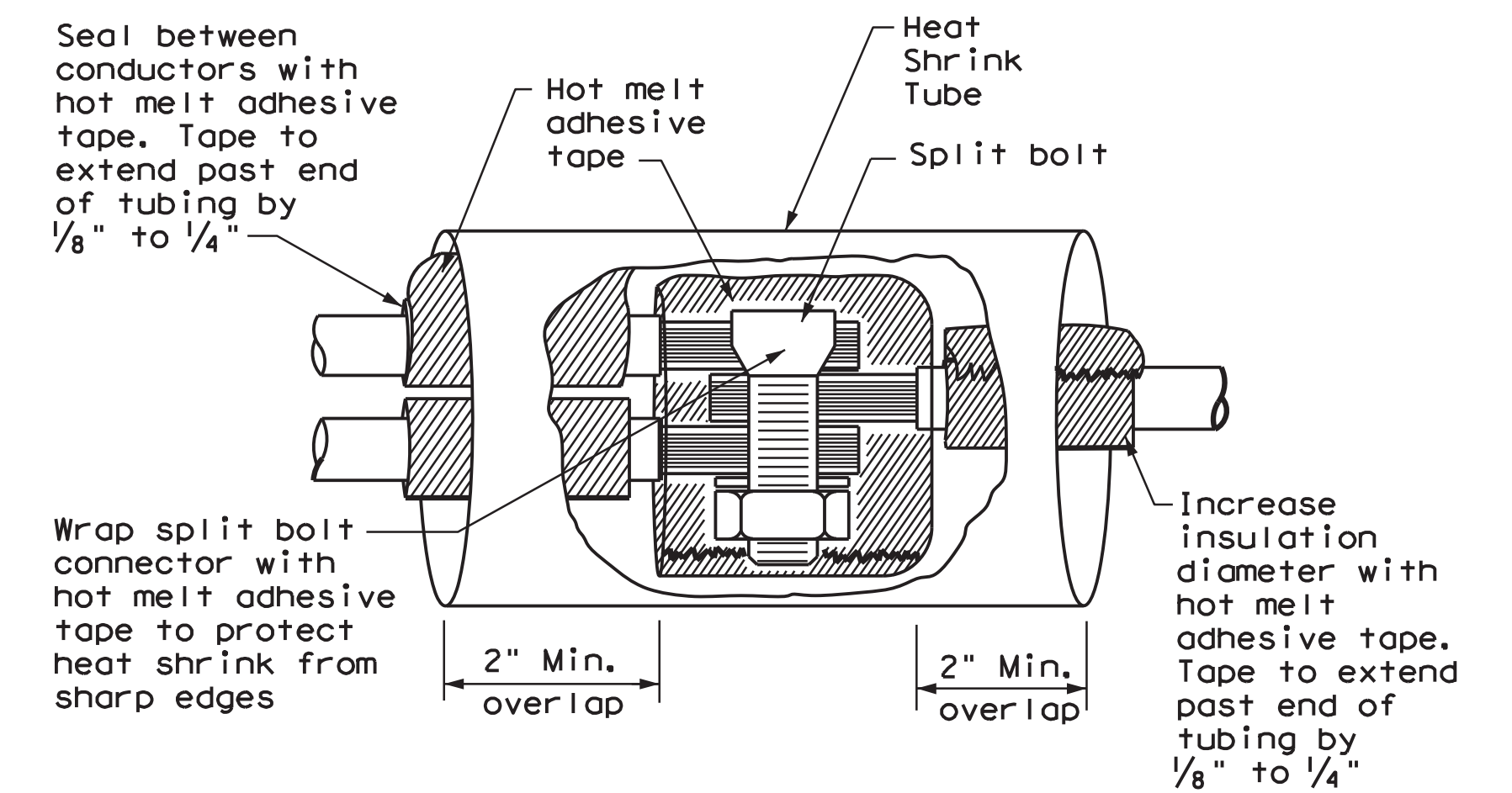
1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in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

B. CONSTRUCTION METHODS

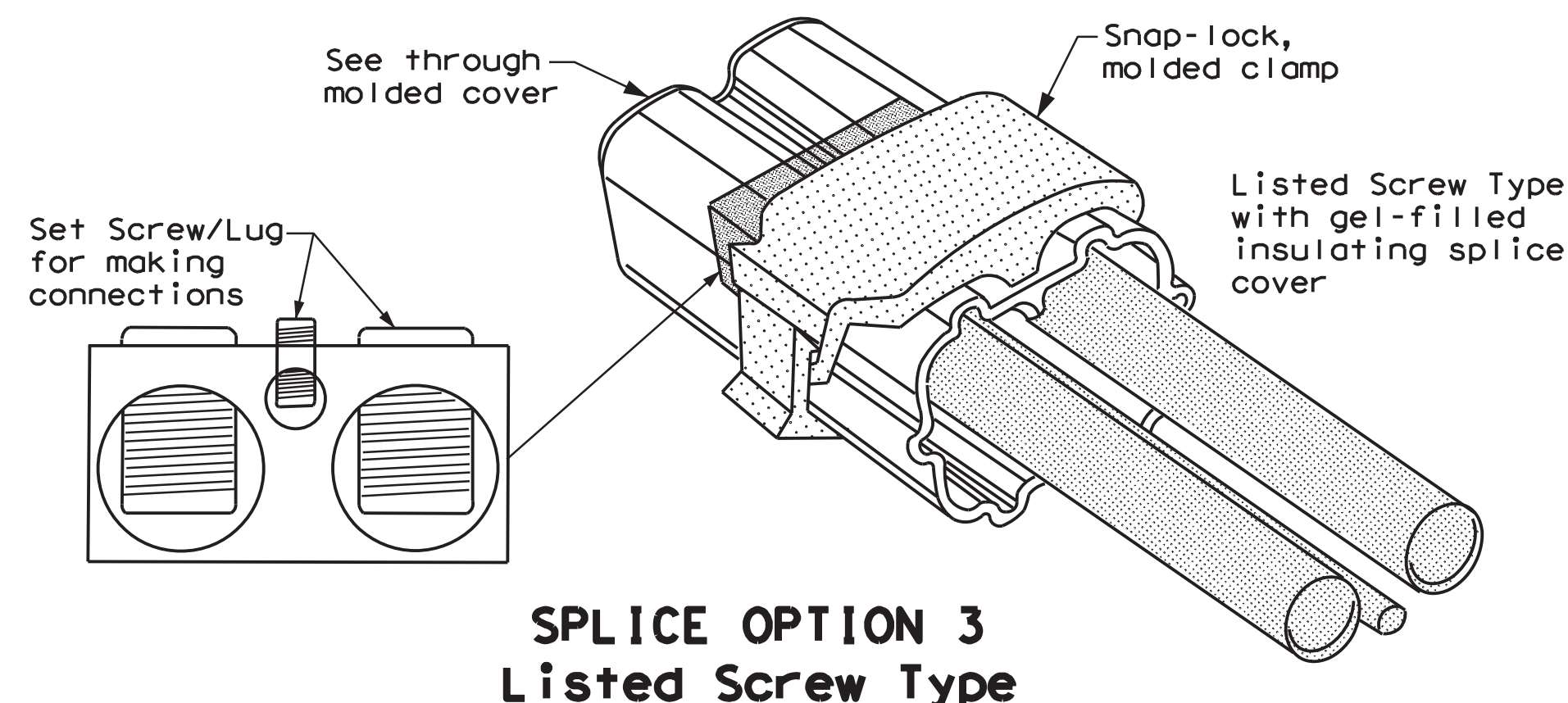
1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, 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**

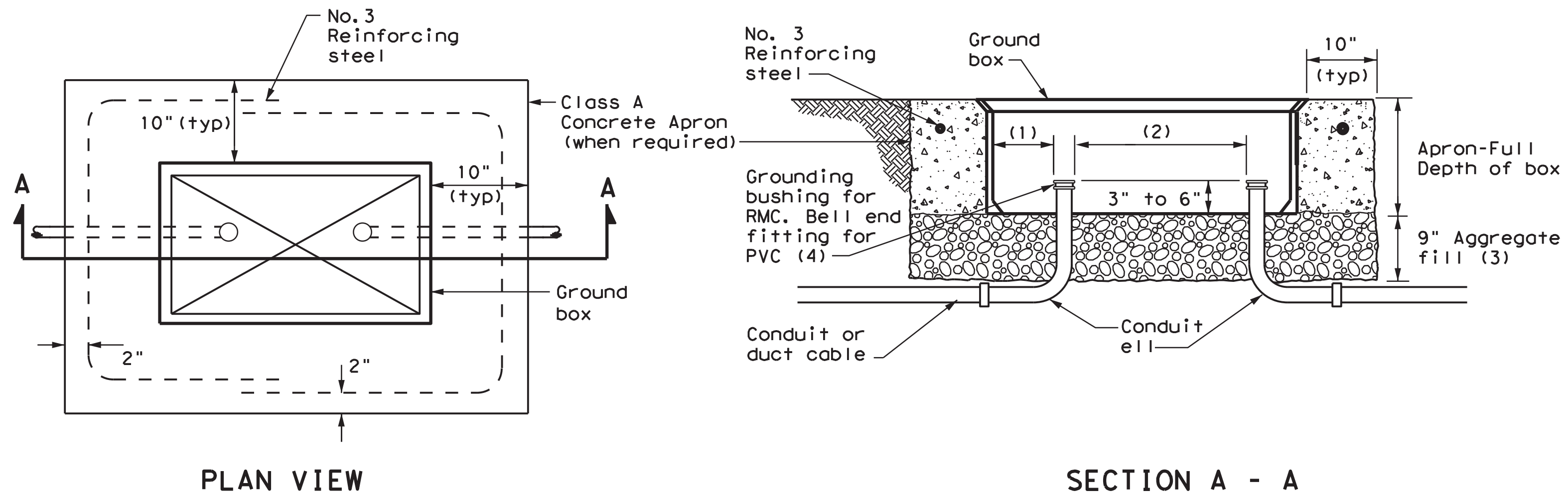


**SPLICE OPTION 3
Listed Screw Type**

		Traffic Operations Division Standard	
<h2>ELECTRICAL DETAILS CONDUCTORS</h2>			
<h3>ED(3) - 14</h3>			
FILE: ed3-14.dgn	DW: TxDOT	CK: TxDOT	CR: TxDOT
© TxDOT October 2014	CONT	SECT	JOB
REVISIONS		HIGHWAY	
DIST	COUNTY	SHEET NO.	
		130	

DATE: FILE:

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



APRON FOR GROUND BOX

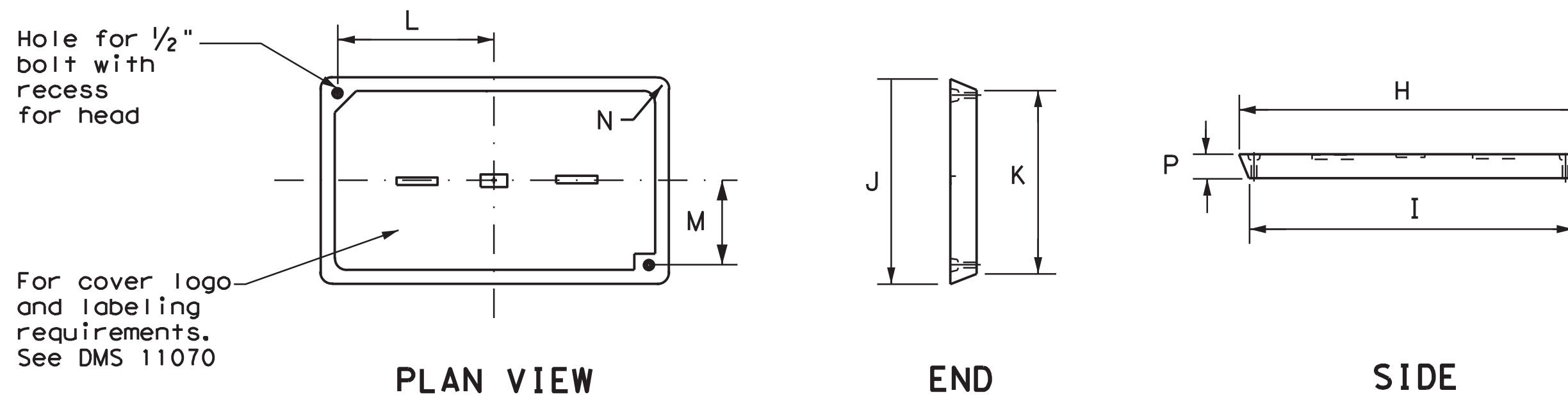
- (1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.
- (2) Maintain sufficient space between conduits to allow for proper installation of bushing.
- (3) Place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

GROUND BOX DIMENSIONS

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

GROUND BOX COVER DIMENSIONS

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



GROUND BOX COVER

GROUND BOXES

A. MATERIALS

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

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

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

B. CONSTRUCTION METHODS

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

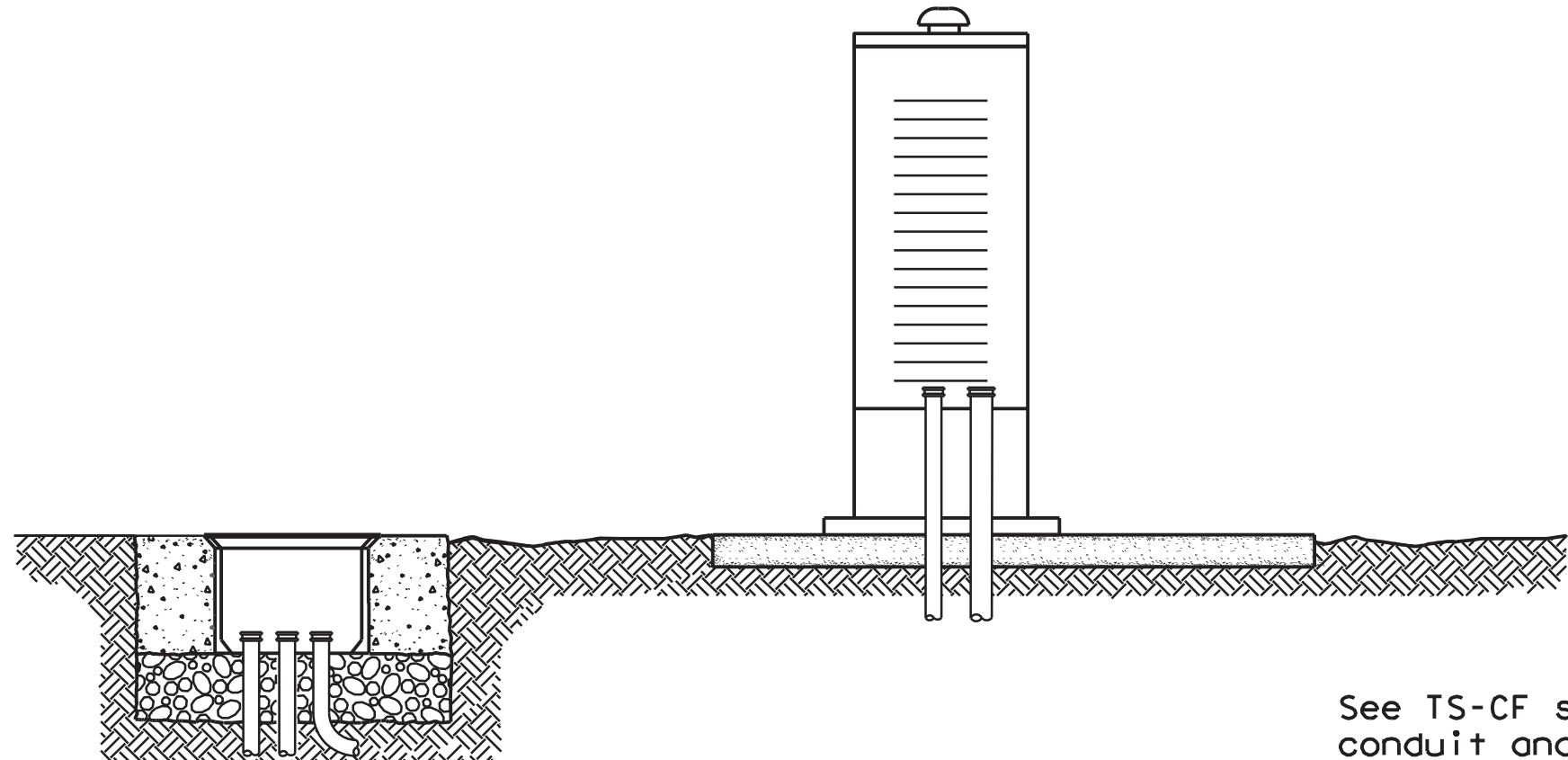
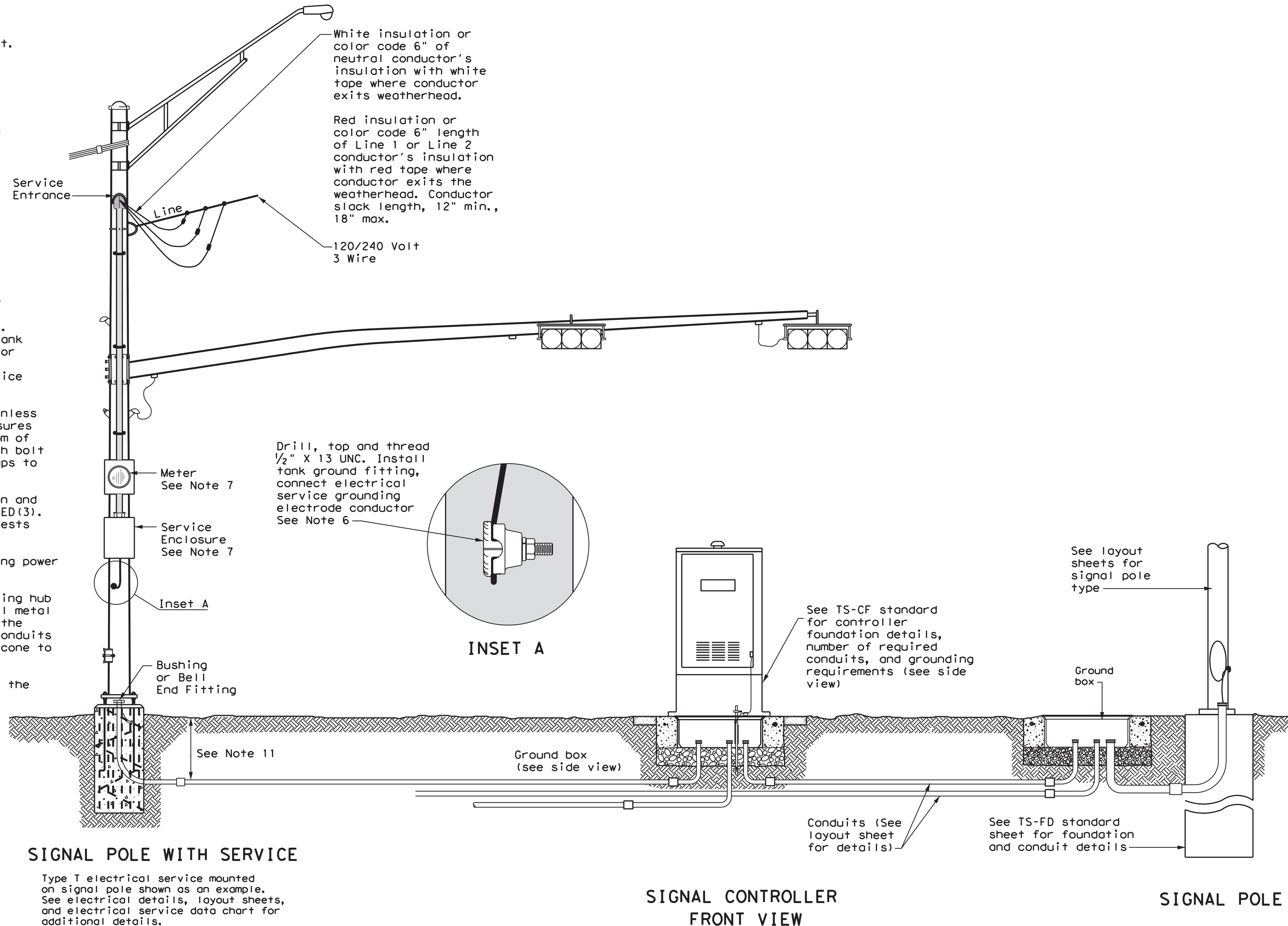
Texas Department of Transportation				Traffic Operations Division Standard	
<h2 style="margin: 0;">ELECTRICAL DETAILS</h2> <h3 style="margin: 0;">GROUND BOXES</h3> <h4 style="margin: 0;">ED(4) - 14</h4>					
FILE:	ed4-14.dgn	DN:	TxDOT	CK:	TxDOT
© TxDOT	October 2014	CONT:	SECT:	JOB:	HIGHWAY:
REVISIONS		DIST:	COUNTY:		SHEET NO.
					131

DATE: FILE:

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

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 1/2 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 3/4 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 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 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.

SIGNAL CONTROLLER FRONT VIEW

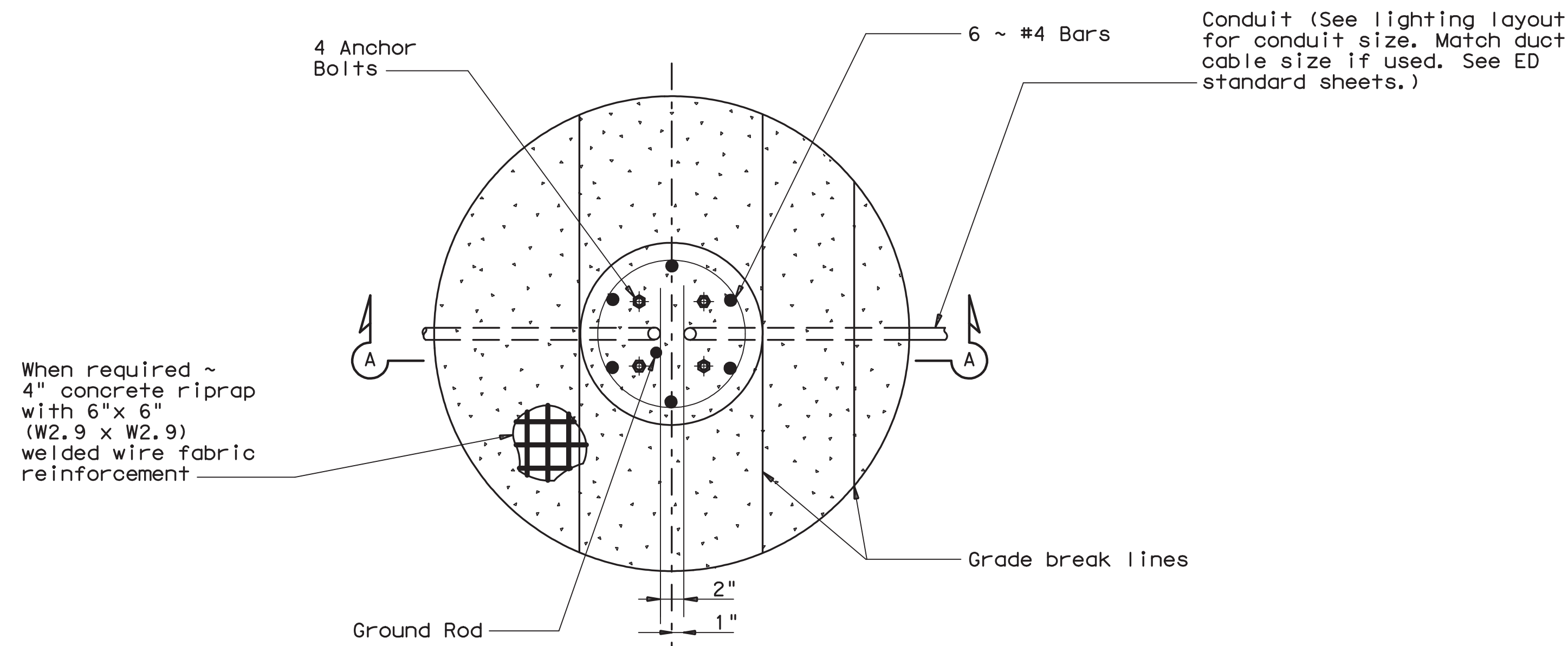
SIGNAL POLE

**ELECTRICAL DETAILS
TYPICAL TRAFFIC SIGNAL
SYSTEM DETAILS
ED(8) - 14**

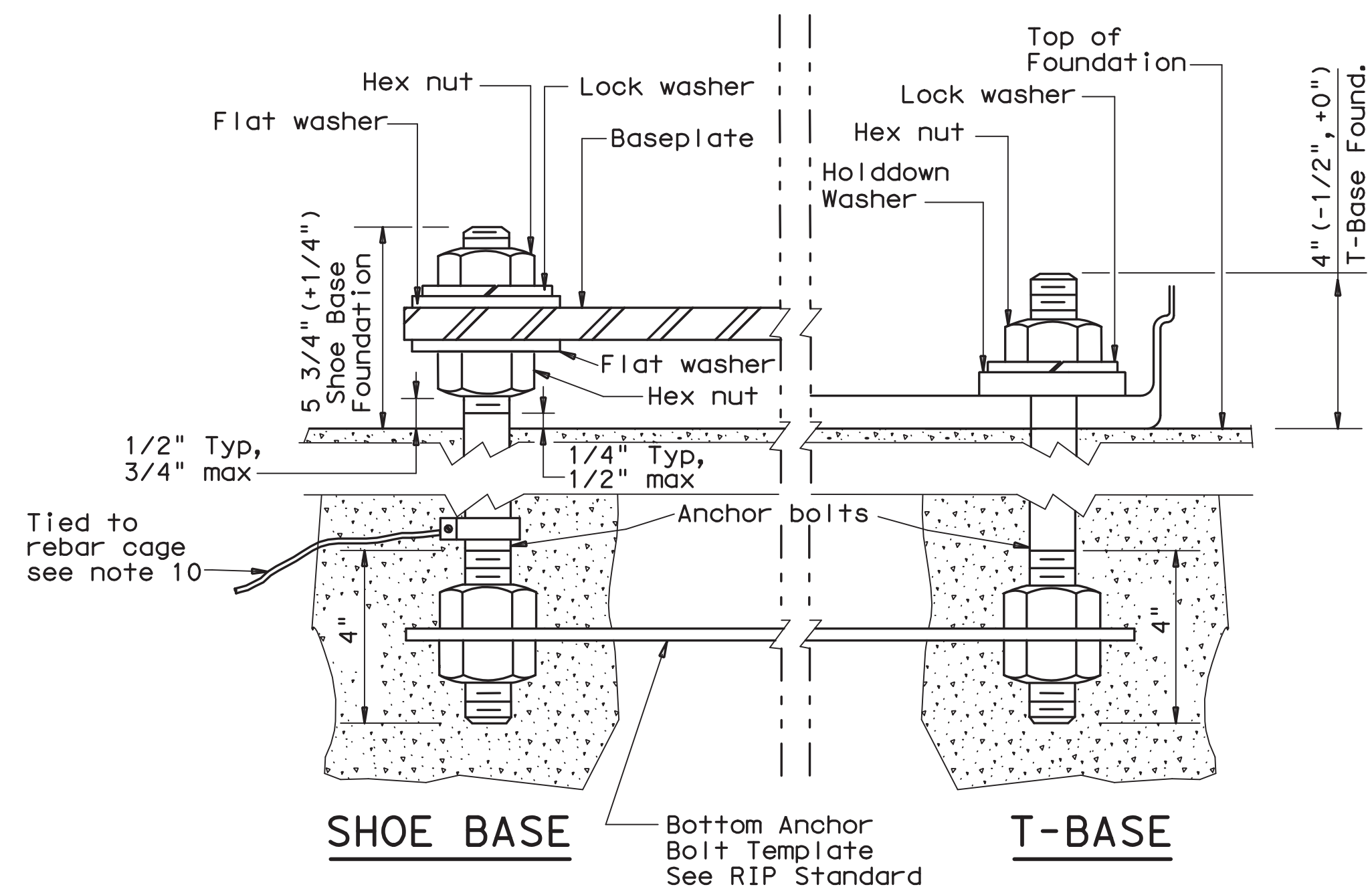
FILE: ed8-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY	SHEET NO.	
			132	

DATE:
FILE:

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

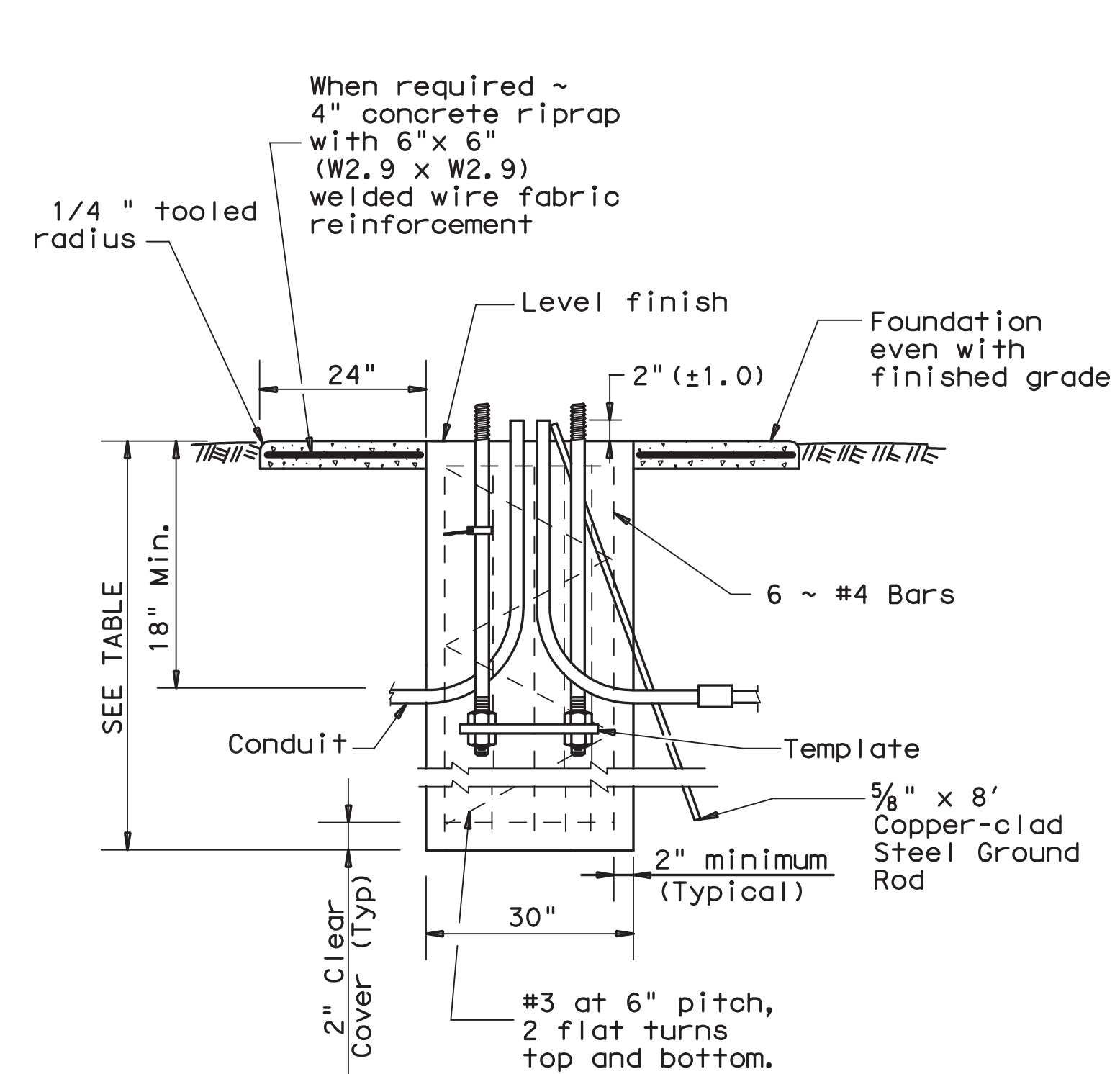


FOUNDATION DETAIL



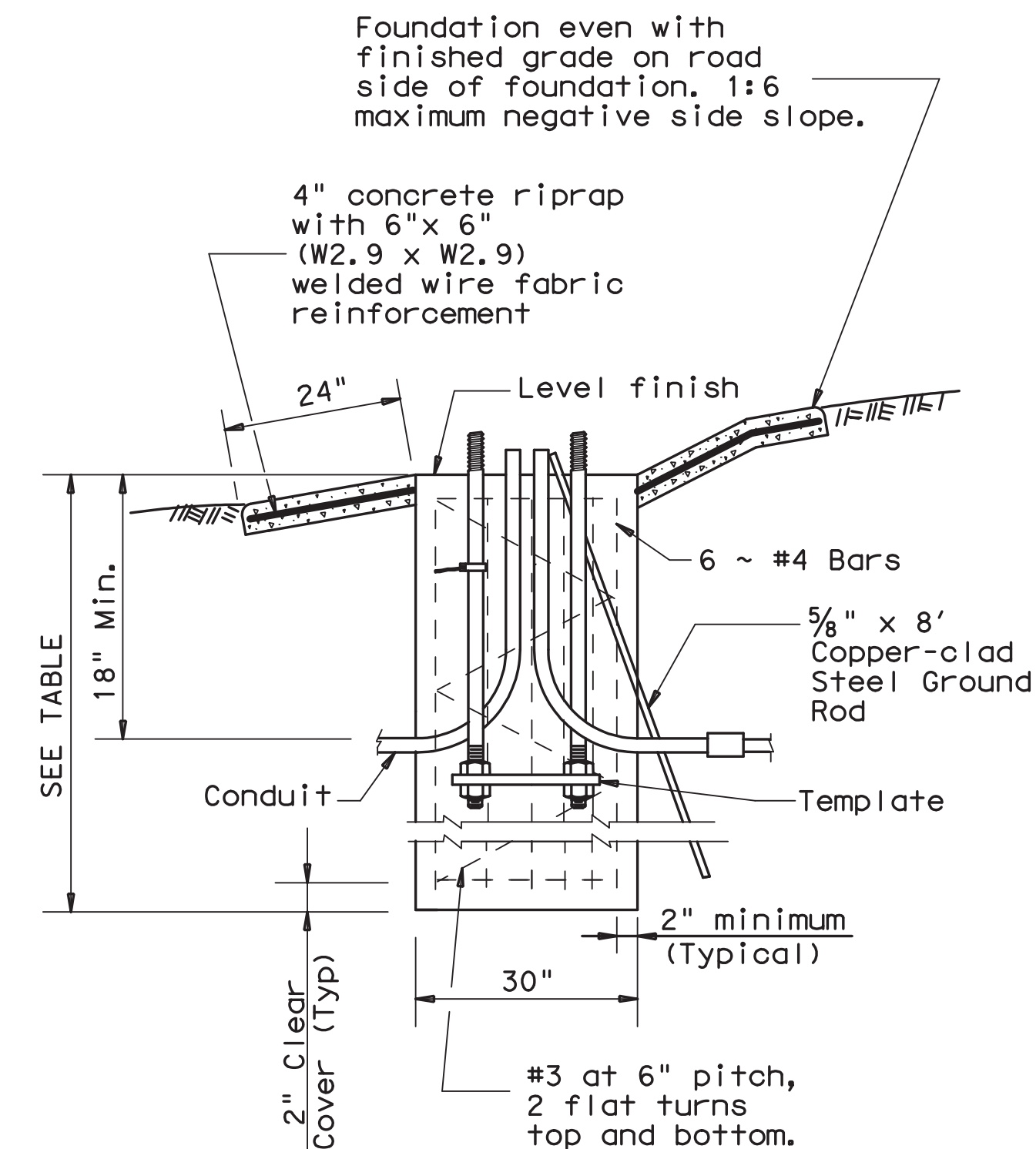
ANCHOR BOLT DETAIL

- "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.
- 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.
- 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.
- Use appropriate class of concrete as specified in Items 416 and 432.
- Place riprap around the foundation when called for elsewhere in the plans. Riprap will be paid for under Item 432.
- 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 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 design guidelines for further information.
- Use 8 hold down washers on transformer base poles as recommended by the manufacturer and supplied with base.
- 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.
- Conduit location in foundations is critical for breakaway devices. Place conduits 2 in. apart on centerline as shown.
- Bond anchor bolt to rebar cage with #6 bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete.
- Use rip rap on T-base foundations that are located on a sloped grades.



SECTION A-A

SHOWING CONSTANT GRADE



SECTION A-A

SHOWING SLOPED GRADE

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

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'

ANCHOR BOLTS

POLE MOUNTING HEIGHT	BOLT CIRCLE		ANCHOR BOLT SIZE
	Shoe Base	T-Base	
<40 ft.	13 in.	14 in.	1 in. x 30 in.
40-50 ft.	15 in.	17 1/4 in.	1 1/4 in. x 30 in.

BREAKAWAY POLE PLACEMENT (See note 6)

Roadway Functional Classification	** Pole offset (distance to transformer base, tolerance + 6 in. -0 in.)
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.

Texas Department of Transportation
 Traffic Operations Division

ROADWAY ILLUMINATION DETAILS

(RDWY ILLUM FOUNDATIONS)

RID (FND) - 11

© TxDOT January 2007	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
1-11	CONT	SECT	JOB	HIGHWAY
	DIST	COUNTY		SHEET NO.
				133