STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
HIGHWAY ROUTINE MAINTENANCE CONTRACT

TYPE OF WORK:

MISCELLANEOUS BRIDGE REPAIR

PROJECT NO. : BPM-638394001
HIGHWAY : SH 16
LIMITS OF WORK : VARIOUS LOCATIONS

GRAPHICS FILE	MAINTENANCE PROJECT NO.			SHEET NO.
	BPM-638394001			1
CHECKED	STATE	STATE DIST.	COUNTY	
	TEXAS	23	COMANCHE, ETC.	
CHECKED	CONT.	SECT.	JOB	HIGHWAY NO.
	6383	94	001	SH 16, ETC.

FINAL PLANS:

Contractor:
Letting date:
Date Contractor began work:
Date work was completed:
Date work was accepted:
Final CONTRACT COST:

CHANGE ORDER SUMMARY:

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	INDEX OF SHEETS

STATE OF TEXAS
ERIC L. LYKINS
86319
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Eric L Lykins, PE
9D2D0C440F014A4...
9/1/2021

SEE PAGES 3 THRU 7 FOR SITE MAP LOCATIONS

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD: ONE
NONE ELIMINATED

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIAL SPECIFICATION ITEMS INCLUDED IN THE CONTRACT SHALL GOVERN ON THIS PROJECT.

THE CONSTRUCTION WAS PERFORMED IN ACCORDANCE WITH THE PLANS & CONTRACT.

_____ , PE _____
DATE

TEXAS DEPARTMENT OF TRANSPORTATION

DocuSigned by:
Eric L Lykins, PE
9D2D0C440F014A4...
ING:
9/1/2021 20 __
DIRECTOR OF OPERATIONS

DocuSigned by:
Elias H. Ruelas
BB9FD402431A4A3...
ETTING:
9/1/2021 20 __
DISTRICT ENGINEER

INDEX OF SHEETS

STATE OF TEXAS
ERIC L. LYKINS
319
LICENSED
PROFESSIONAL ENGINEER

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9D2D0C440F014A4...
9/1/2021

THE STANDARD SHEETS LISTED ON THIS SHEET HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

SH 16, ETC.
PROJECT INDEX

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE, ETC.		2

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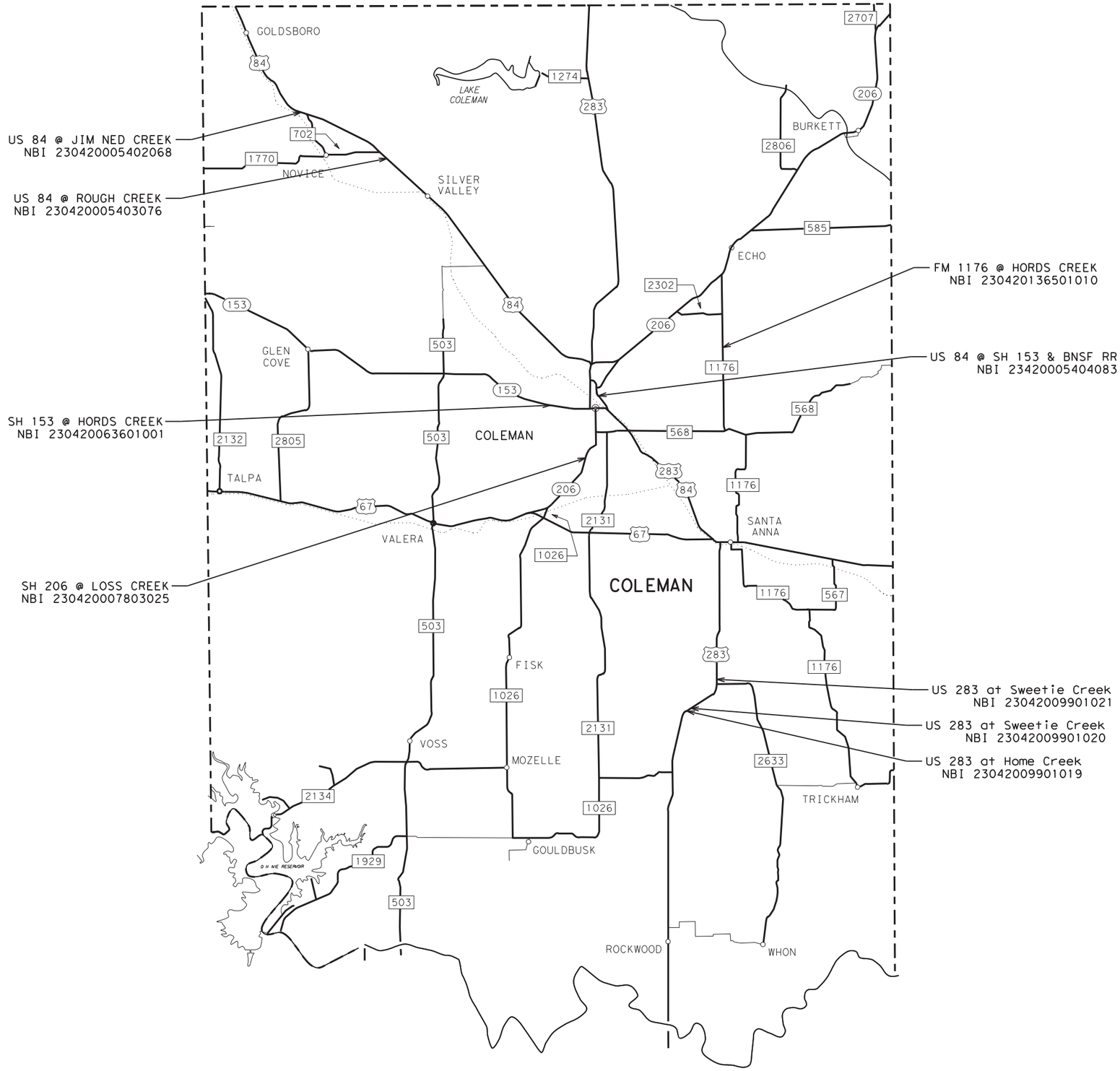

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COLEMAN COUNTY SITE MAP

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE, ETC.		3

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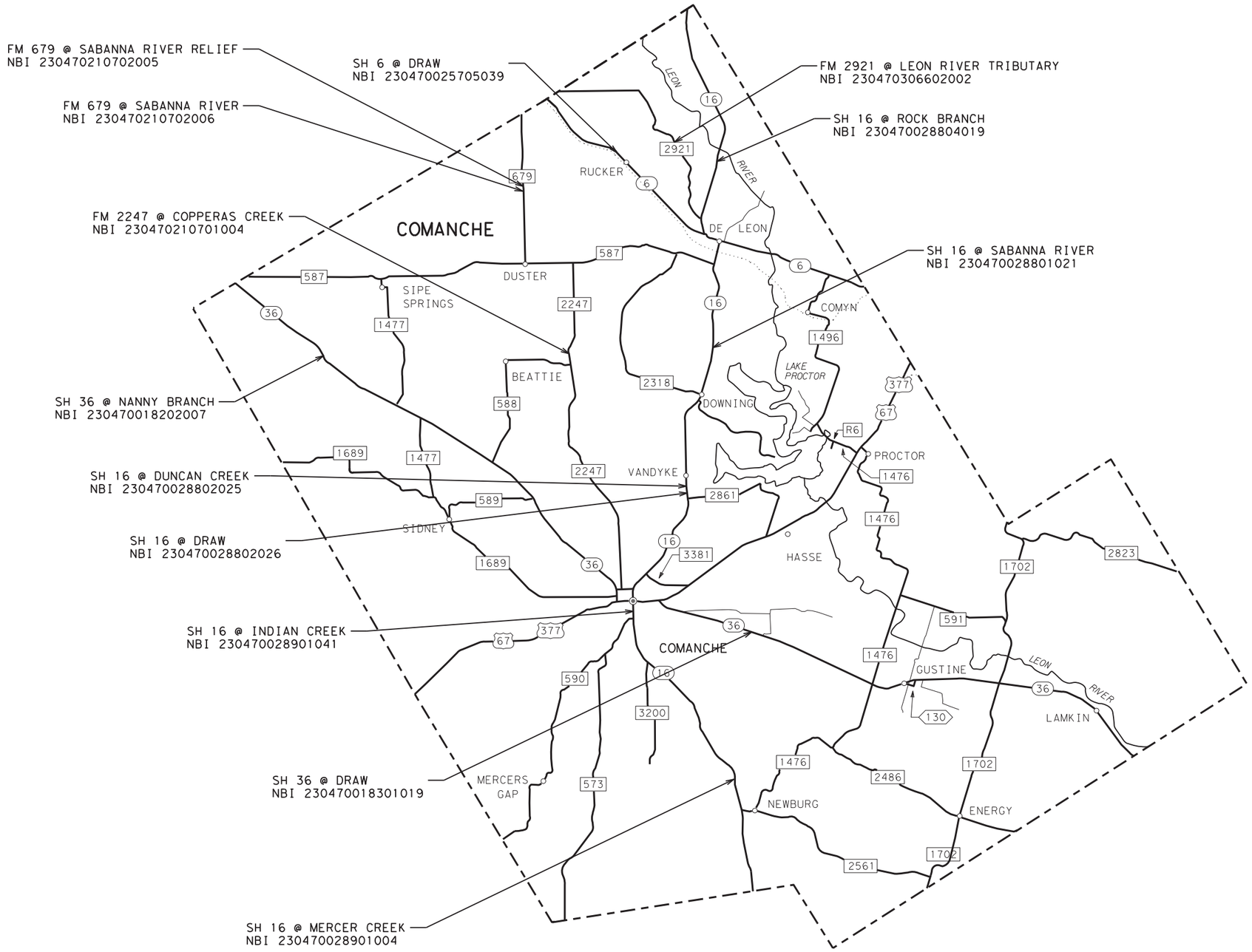

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86319
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

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Eric Lykins, PE
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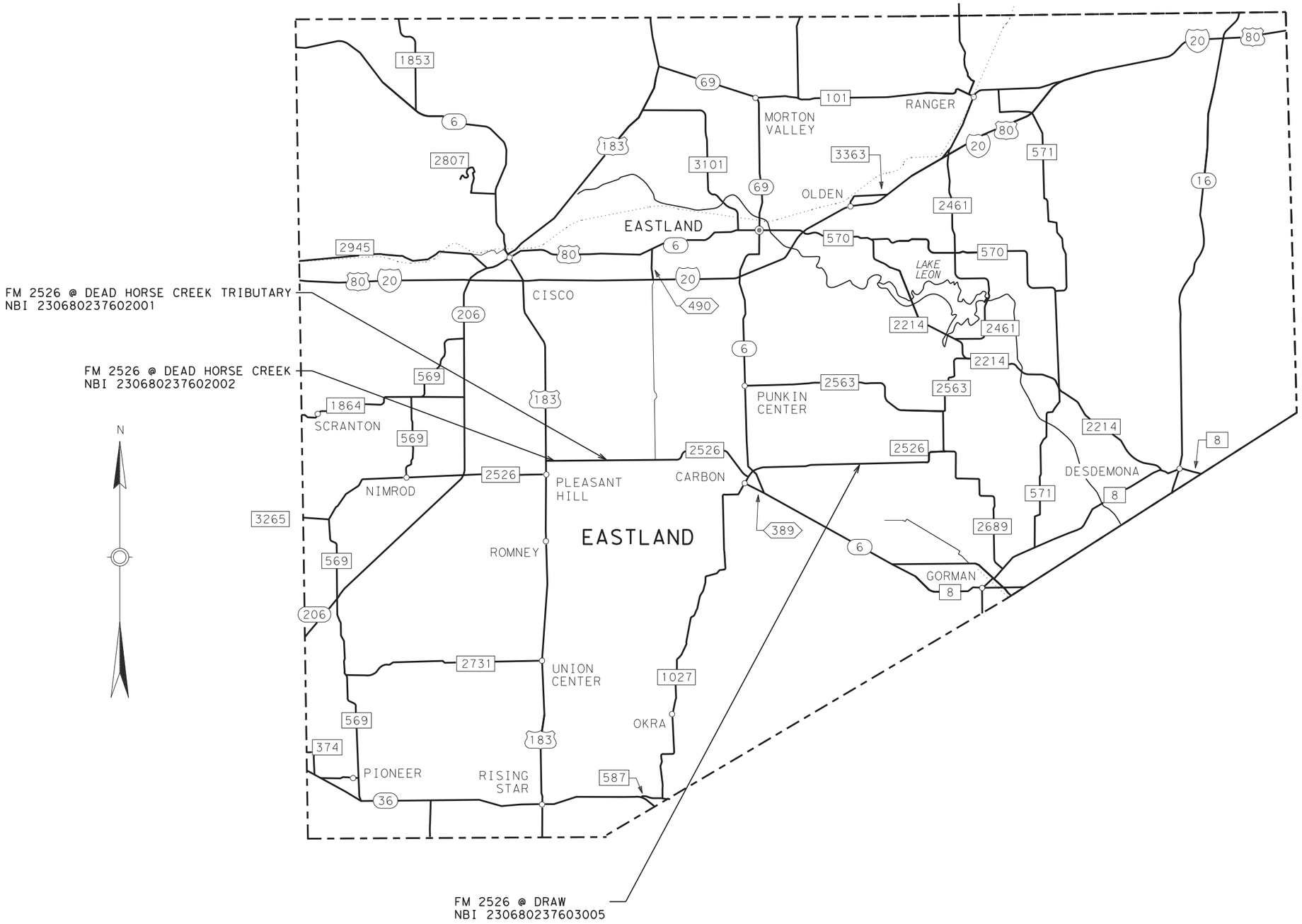
9/1/2021

COMANCHE COUNTY SITE MAP

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE, ETC.		4



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Eric L. Lykins, PE
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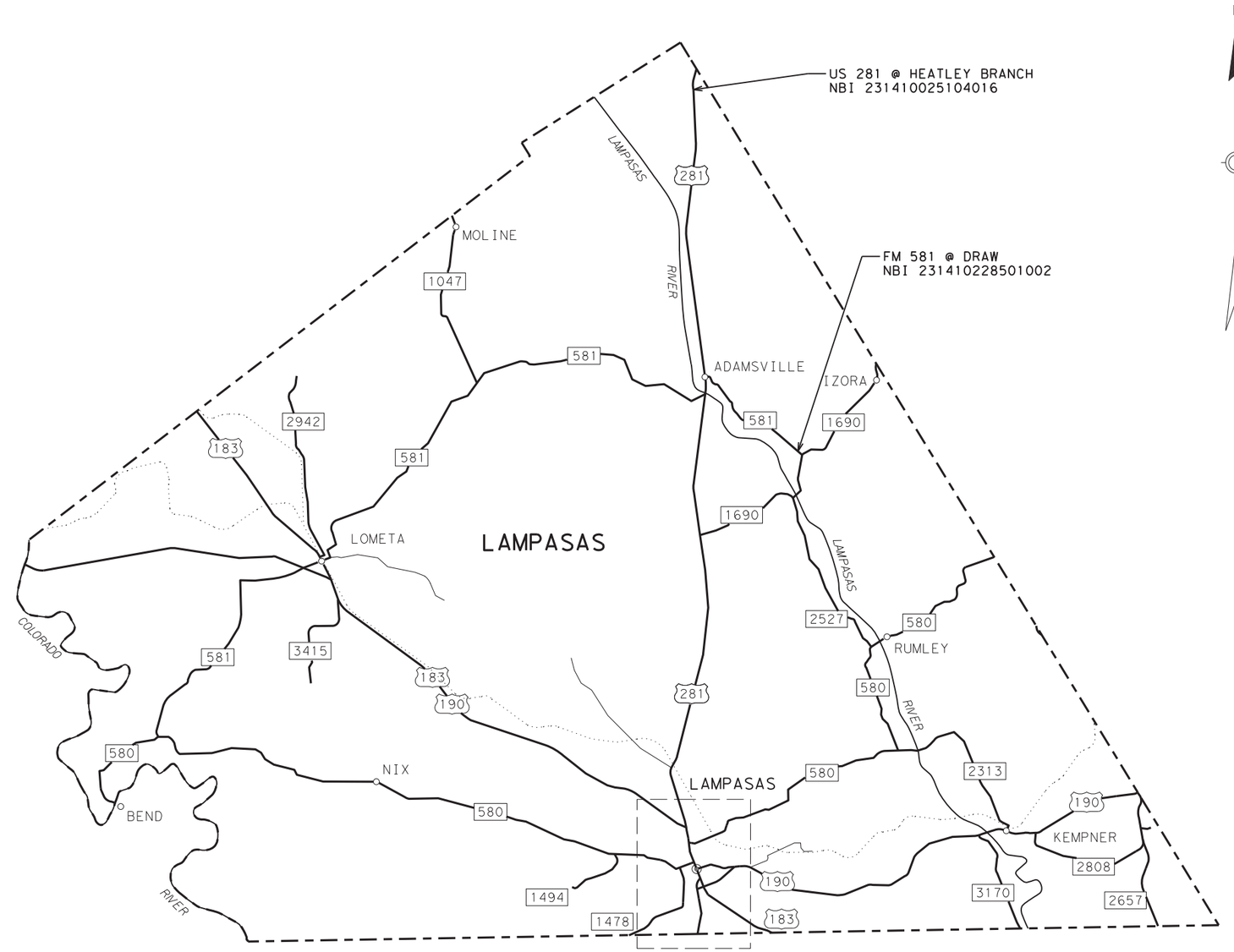
9/1/2021

STATE OF TEXAS
ERIC L. LYKINS
86319
LICENSED ENGINEER

EASTLAND COUNTY
SITE MAP

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE, ETC.		5



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STATE OF TEXAS
ERIC L. LYKINS
86319
LICENSED
PROFESSIONAL ENGINEER

LAMPASAS COUNTY SITE MAP

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE, ETC.		6

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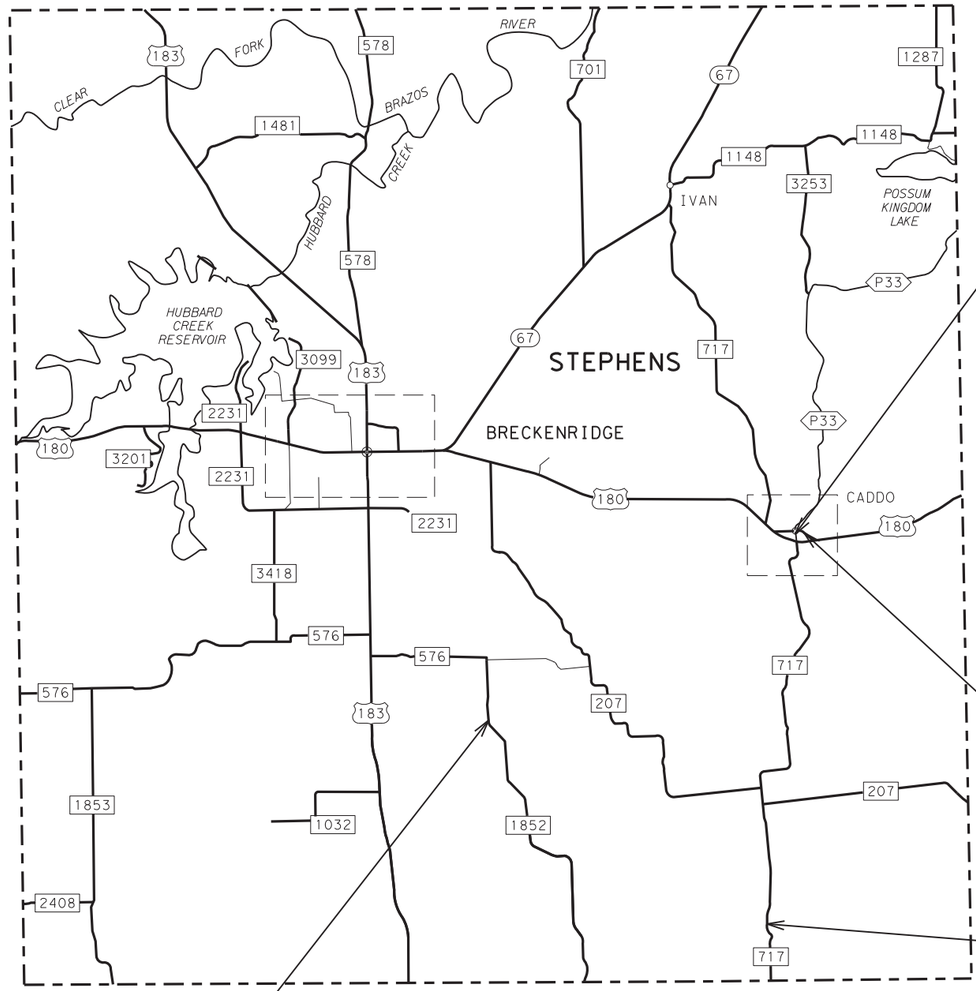

PR 33 @ DRAW
NBI 232150071402002

LOOP 252 @ CADDO CREEK
NBI 232150001112058

FM 717 @ COTTONWOOD CREEK
NBI 232150071403009

FM 1852 @ EAST FORK GONZALES CREEK
NBI 232150178101003

STATE OF TEXAS
ERIC L. LYKINS
86319
LICENSED ENGINEER

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9/1/2021

STEPHENS COUNTY
SITE MAP

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE, ETC.		7

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Project Number: BPM - 638394001

County: COMANCHE Control: 6383-94-001

Highway: SH0016

GENERAL NOTES

TEST TO BE IN ACCORDANCE WITH
TEXAS DEPARTMENT OF TRANSPORTATION
STANDARD TEST METHODS.

Counties included are: Coleman, Comanche, Eastland, Lampasas, and Stephens..

TEXAS ONE CALL

Fiber optic cable systems, gas lines, underground power lines, water lines, sewer lines, and other various utilities may be buried within the project limits. Protection of these utility systems is of extreme importance since any break could disrupt service to users resulting in business interruption and loss of revenue and profits. The Contractor shall telephone Texas One Call at 1-800-344-8377 (a 24-hour number), to determine if utilities are buried anywhere on the project in accordance with all UNDERGROUND FACILITY DAMAGE PREVENTION AND SAFETY laws. This action, however, will in no way be interpreted as relief of responsibilities under the terms of the Contract as set out in the plans and specifications. Coordinate the repair of all damages caused by daily operations and have facilities restored to service in a timely manner as directed at no additional cost to TxDOT.

No hazardous chemicals, petroleum products, or concrete washouts will be allowed to be stored in the Department's R.O.W.

The Contractor will not be allowed to store equipment, materials, incidentals, etc. in the Department's R.O.W. without written permission from the Engineer.

See the "Environmental" section of the plans for additional information.

GENERAL

Unless specifically noted as applying to only a certain project or projects, these general notes will apply to all projects associated to this contract.

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

Name	Email Address
Jordan Perry, P.E.	jordan.perry@txdot.gov
Eric Lykins, P.E.	eric.lykins@txdot.gov
Blake Stembridge, E.I.T.	blake.stembridge@txdot.gov

Project Number: BPM - 638394001

County: COMANCHE Control: 6383-94-001

Highway: SH0016

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

All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address:

https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting Responses/
All questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name.

The term "Article" or "Section" referred to hereon is defined in the forward of the *Standard Specifications for Construction and Maintenance of Highways, Streets, And Bridges* adopted by the Texas Department of Transportation November 2014.

Saw-Cutting with approved equipment as directed by the Engineer will be required at project limits to establish clean and straight joints. This work will not be paid for directly but will be considered subsidiary to various bids.

The total disturbed area is shown on the SW3P sheet(s).

The Contractor will establish drainage in ditches before seeding or as directed by the Engineer.

ITEM 5 CONTROL OF WORK

The responsibility for the construction surveying on this contract will be in accordance with Section 5.9.3. "Method C".

ITEM 7 LEGAL RELATIONS AND RESPONSIBILITIES

No significant traffic generator events identified.

ITEM 8 PROSECUTION AND PROGRESS

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

Work will not be performed without time being charged unless otherwise exempted by the Section as defined above.

Each Contract awarded by the Department stands on its own and as such, is separate from other Contracts. A Contractor awarded multiple Contracts must be capable and sufficiently staffed to concurrently process and/or execute all Contracts at the same time.

ITEM 164 SEEDING FOR EROSION CONTROL

The Contractor should anticipate multiple mobilizations for seeding at each project location.

ITEM 166 FERTILIZER

Fertilize all areas of project to be seeded.

Furnish and apply fertilizer with analysis of 20-10-10 at a rate of 300 bulk pounds per acre.

ITEM 401 FLOWABLE BACKFILL

All flowable backfill will be “Non-Excavatable” unless otherwise specified.

Adequate lead pressure shall be maintained with flowable fill in order to sufficiently fill voids under riprap. Access holes may be required down slope in order to verify suitable backfilling operations.

Use a minimum of four (4) sacks cement per cubic yard.

Type I Cement required if accelerator is used.

ITEM 421 HYDRAULIC CEMENT CONCRETE

Furnish dome lids with 4” x 8” cylinder test molds.

Strength testing equipment is not required for Contract controlling test.

ITEM 427 SURFACE FINISHES FOR CONCRETE

Surface Area II will receive a rub finish.

ITEM 429 CONCRETE STRUCTURE REPAIR

Submit repair materials to the Engineer. Materials must be capable of overhead repairs.

If required, drill and install anchor bars using TY III Class “C” epoxy adhesive meeting DMS-6100 “Epoxy Adhesives.”

ITEM 432 RIPRAP

Locations and quantities may be varied as directed by the Engineer to accommodate field conditions.

Use dry riprap for the stone protection item. Stones shall be graded so as not to obstruct full channel flow.

Project Number: BPM - 638394001

County: COMANCHE Control: 6383-94-001

Highway: SH0016

Filter fabric is required.

Limit excavation to within 1’ of riprap. If excavation exceeds these limits without the Engineer’s approval, riprap will be extended to the limits of the disturbance. No additional compensation will be allowed for this work.

ITEM 459 GABIONS AND GABION MATTRESSES

Due to field conditions changing during the removal of the existing bridge and the construction of the new structure, gabion installation will be verified by the Engineer before the Contractor installs the gabion(s) or gabion mattress(s).

Limit excavation to within 1’ of the gabion(s) or gabion mattress(s). If excavation exceeds these limits without the Engineer’s approval, the gabion(s) or gabion mattress(s) shall be extended to the limits of the disturbance. No compensation for the additional work will be allowed.

Type 2 filter fabric in accordance with DMS6200, “Filter Fabric” is required for this project.

The area adjoining and adjacent to the downstream Riprap and Gabion Mattresses for a distance of 1’-0” shall have a lean grout placed after the gabion mattresses are placed. The grout work will be subsidiary to this item.

ITEM 502 BARRICADES, SIGNS, AND TRAFFIC HANDLING

The Contractor will be required to keep all TCP devices clean. If notified by the Engineer to clean the TCP devices, the Contractor will have until the end of that daylight period to comply. Failure to comply will result in a suspension of all work until the TCP devices are clean. Time will not be suspended.

The Contractor Force Account “Safety Contingency” that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor’s Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

Excavations in Intersections adjacent to travel lanes will not be exposed or open overnight. Backfilling will take place the day excavations are made.

All equipment operated by the Contractor on or within thirty feet (30’) of the roadway will have a functioning flashing beacon mounted on it. Motor graders will have two standard orange warning flags mounted on them in addition to the flashing beacon.

Project Number: BPM - 638394001

County: COMANCHE

Control: 6383-94-001

Highway: SH0016

The Contractor will be responsible for maintaining the edge of the roadway throughout the project in a traversable condition and/or as directed by the Engineer. Salvaged milling may be used as directed by the Engineer. This work will not be paid for directly and will be considered subsidiary to Item 502 “Barricades, Signs, and Traffic Handling”.

All devices shown on the TCP Standards are required and considered subsidiary to Item 502 unless specifically outlined elsewhere in the plans.

All signs will be constructed in accordance with the details shown in the current Standard Highway Sign Designs for Texas manual.

ITEM 506 TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS

The Contractor should anticipate multiple mobilizations for the installation of BMP’s on this project. BMP’s will not be installed until authorized by the Engineer.

The Engineer will determine actual time and placement locations of BMP's and temporary measures once construction has begun.

Stockpile sites may be cleared of cover vegetation, but the vegetation root system will not be destroyed.

ITEM 6185 TRUCK MOUNTED ATTENUATOR (TMA) AND TRAILER ATTENUATOR (TA)

Provide the number of vehicles with truck mounted attenuators (TMA) listed in the table below. The Contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

TCP(1-1)	1	TCP(1-2)	1	TCP(1-3)	1	TCP(1-4)	1

Stationary shadow vehicle(s) with TMA’s are estimated at 30 days for this project.

Estimate Sheet

ESTIMATE SUMMARY

EST	FINAL	EST	FINAL	EST	FINAL	CONTROL 6383-94-001 SH0016 MISC BRIDGE REP EST	FINAL	ALT	ITEM CODE	DESC CODE	SP NO	DESCRIPTION	UNIT	TOTAL EST	FINAL
						20.000			104	6009		REMOVING CONC (RIPRAP)	SY	20.000	
						110.000			110	6002		EXCAVATION (CHANNEL)	CY	110.000	
						7500.000			164	6003		BROADCAST SEED (PERM) (RURAL) (CLAY)	SY	7500.000	
						3750.000			164	6009		BROADCAST SEED (TEMP) (WARM)	SY	3750.000	
						3750.000			164	6011		BROADCAST SEED (TEMP) (COOL)	SY	3750.000	
						80.000			401	6001		FLOWABLE BACKFILL	CY	80.000	
						233.000			429	6007		CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	233.000	
						5.300			429	6011		CONC STR REPR(REMOV AND REPL WINGWALL)	CY	5.300	
						4.000			432	6001		RIPRAP (CONC)(4 IN)	CY	4.000	
						44.000			432	6031		RIPRAP (STONE PROTECTION)(12 IN)	CY	44.000	
						41.000			432	6033		RIPRAP (STONE PROTECTION)(18 IN)	CY	41.000	
						277.000			432	6035		RIPRAP (STONE PROTECTION)(24 IN)	CY	277.000	
						415.000			432	6036		RIPRAP (STONE PROTECTION)(30 IN)	CY	415.000	
						197.000			432	6037		RIPRAP (STONE PROTECTION) (36 IN)	CY	197.000	
						1.000			446	6002	005	CLEAN & PAINT EXIST STR (SYSTEM II)	LS	1.000	
						9.000			459	6009		GABIONS (3' X 3')(GALV)	CY	9.000	
						1.000			499	6001		ADJUST STL SHOES	EA	1.000	
						1.000			500	6001		MOBILIZATION	LS	1.000	
						8.000			502	6001	008	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	8.000	
						2500.000			506	6038	002	TEMP SEDMT CONT FENCE (INSTALL)	LF	2500.000	
						2500.000			506	6039	002	TEMP SEDMT CONT FENCE (REMOVE)	LF	2500.000	
						34.000			780	6002		CNC CRACK REPAIR (DISCRETE)(INJECT)	LF	34.000	
						30.000			6185	6002	002	TMA (STATIONARY)	DAY	30.000	
						155.000			7000	6001		REML & DISPL DRIFTWOOD & DEBRIS	CY	155.000	

ESTIMATE & QUANTITY SHEET

DIST	COUNTY	CCSJ	SHEET
23	COMANCHE	6383-94-001	9

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

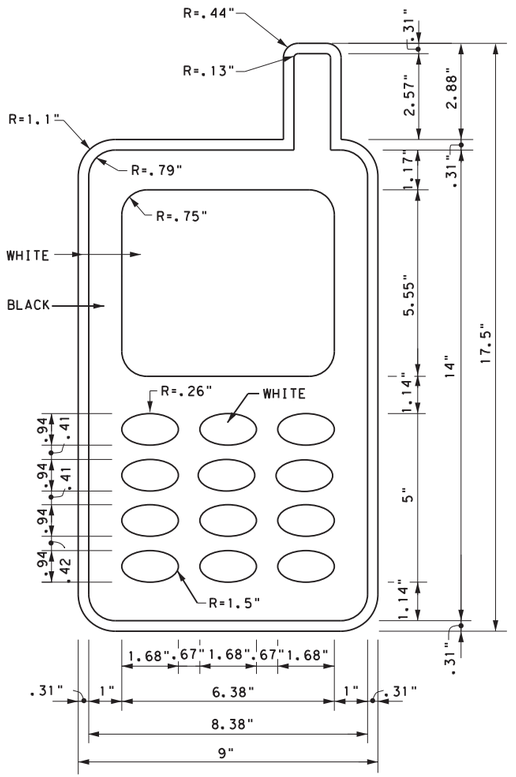
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

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

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

WORKER SAFETY APPAREL NOTES:

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



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

SIGN DETAIL (G20-10T)

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

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

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

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	6383	94	001	SH 16, ETC.
4-03 5-10 8-14	DIST	COUNTY		SHEET NO.
9-07 7-13	23	COMANCHE, ETC.		10

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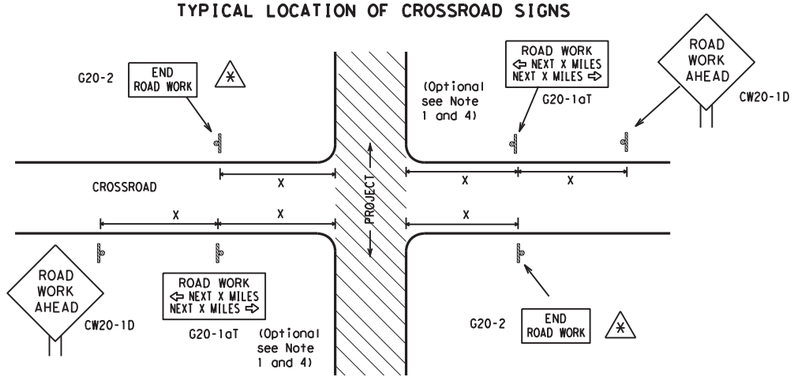
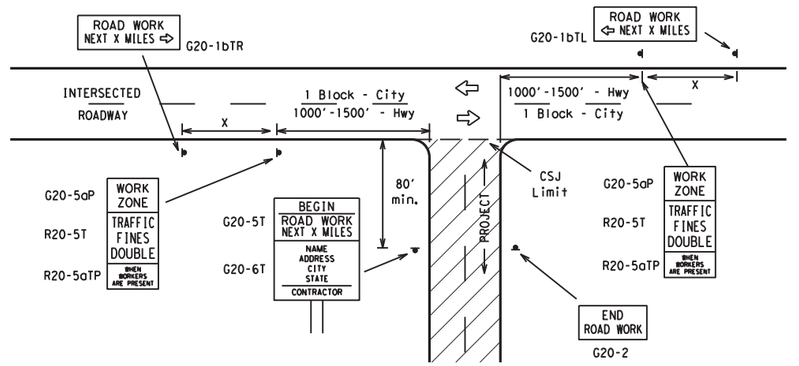
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

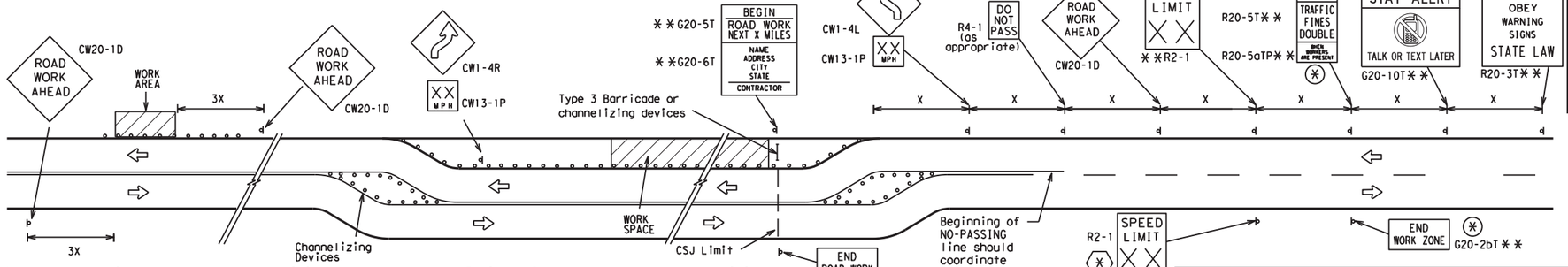
✱ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

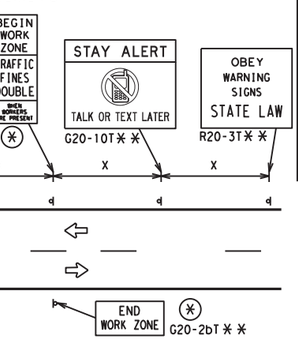
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

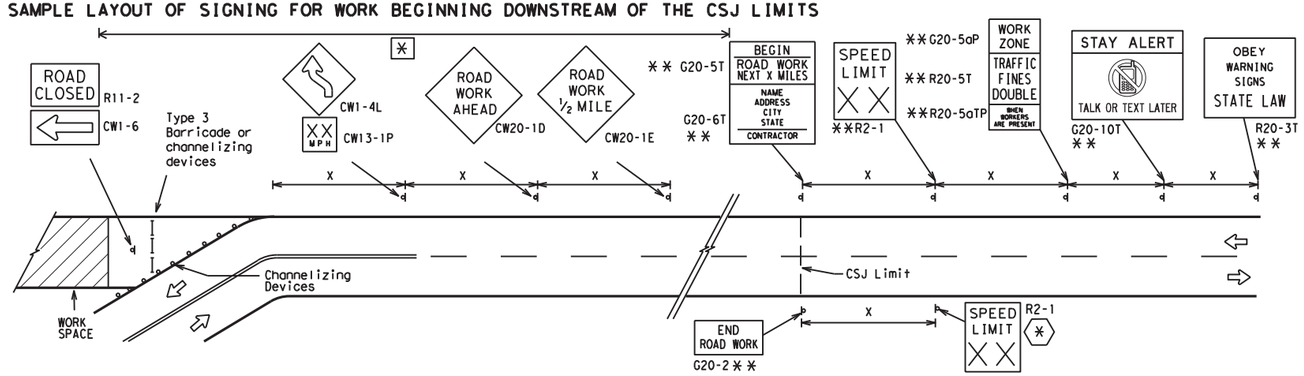


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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



NOTES

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

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

✱✱ 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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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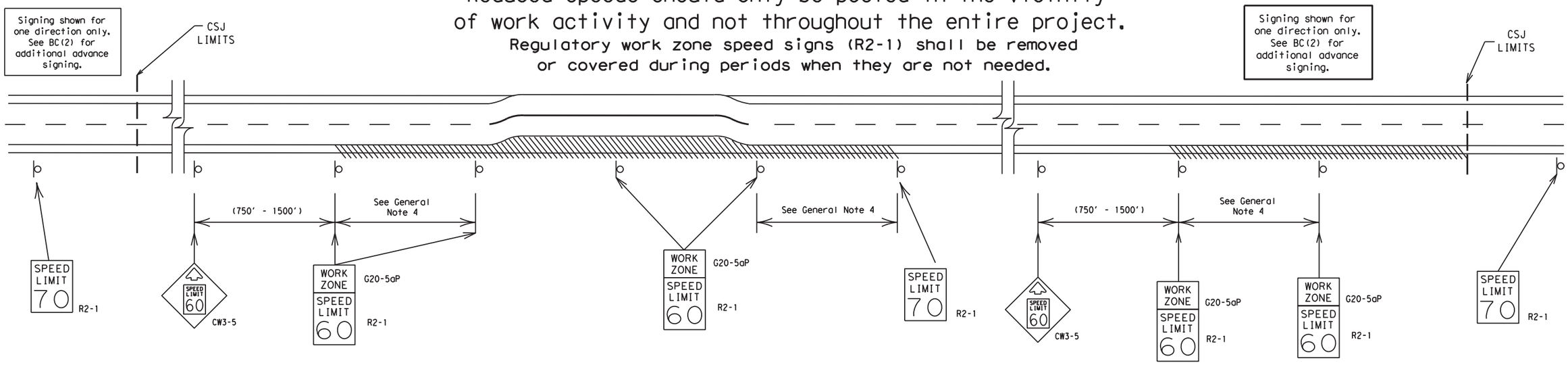
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

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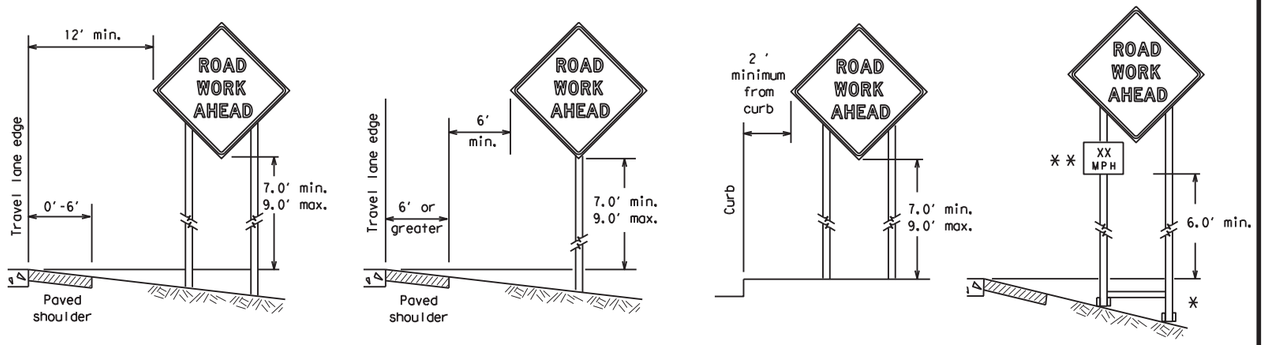
	DIST	COUNTY		SHEET NO.
	23	COMANCHE, ETC.		12

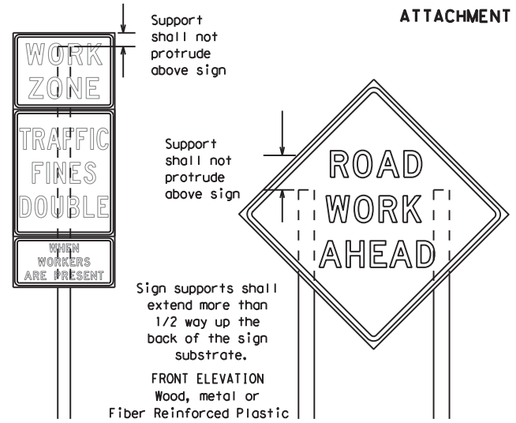
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



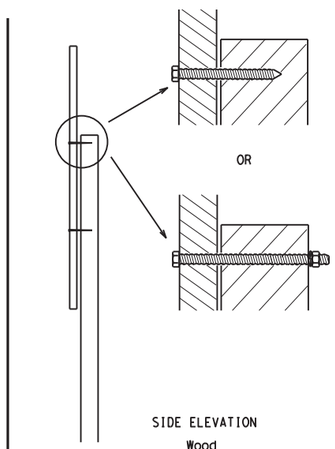
* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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



FRONT ELEVATION
Wood, metal or
Fiber Reinforced Plastic



SIDE ELEVATION
Wood

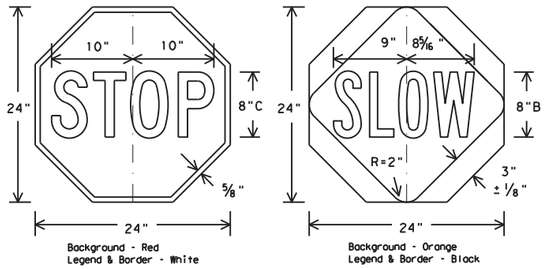
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

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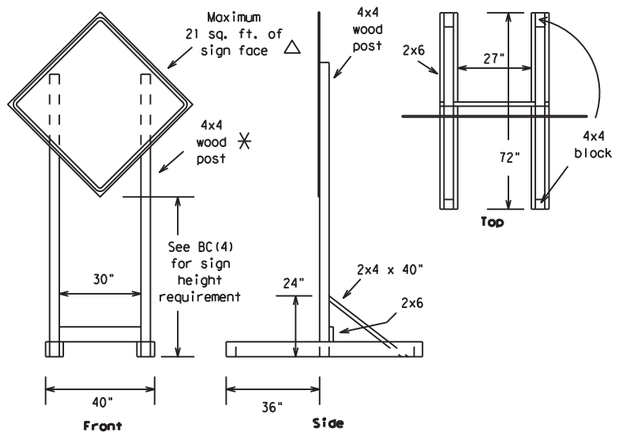
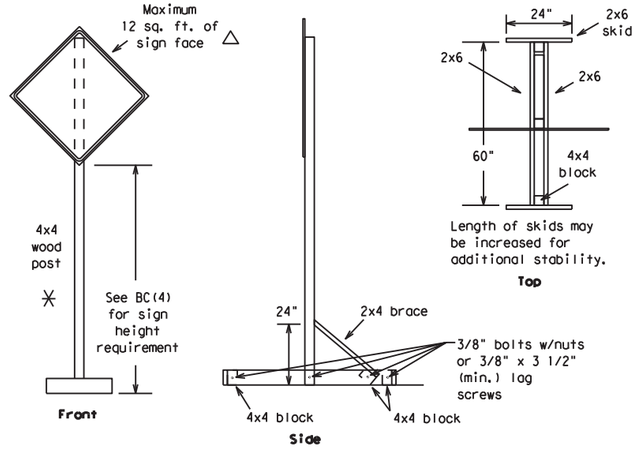
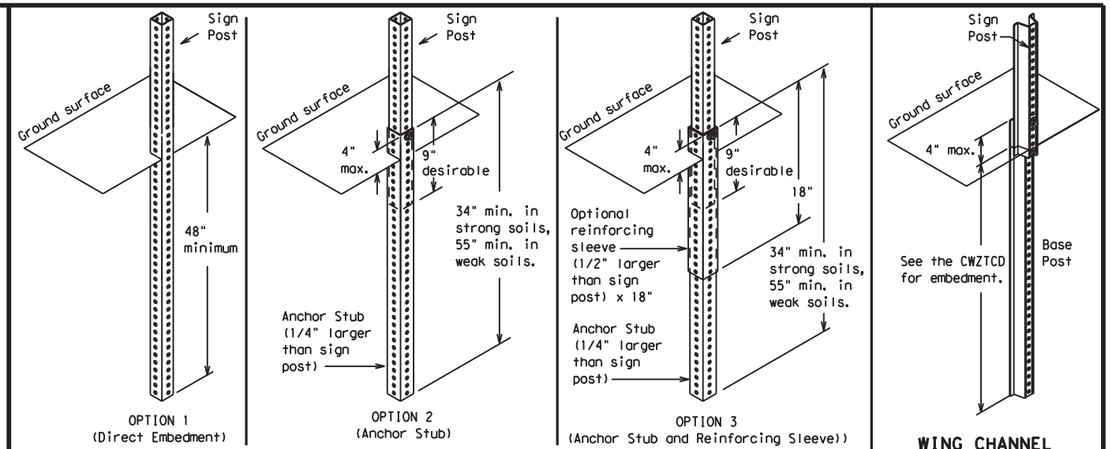




SKID MOUNTED WOOD SIGN SUPPORTS

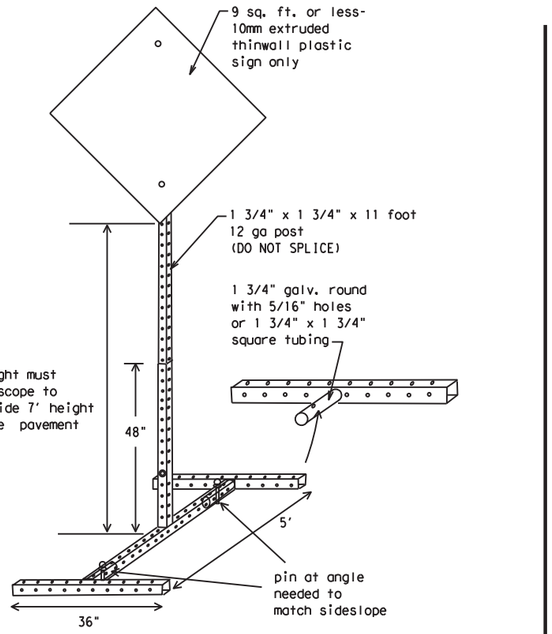
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □

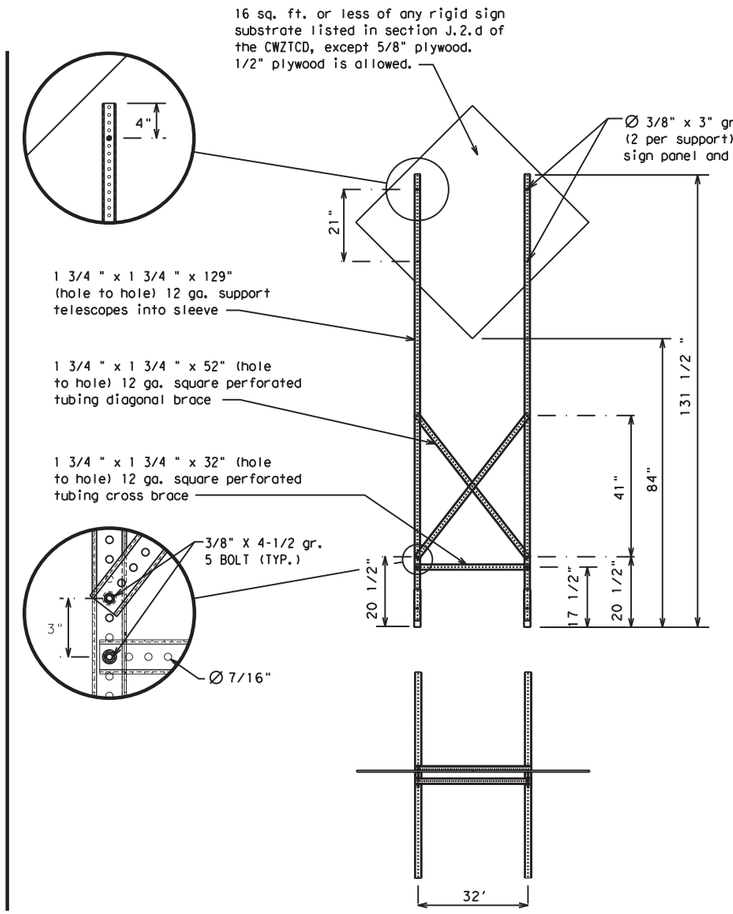


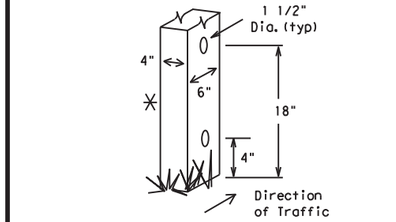
PERFORATED SQUARE METAL TUBING

GROUND MOUNTED SIGN SUPPORTS

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

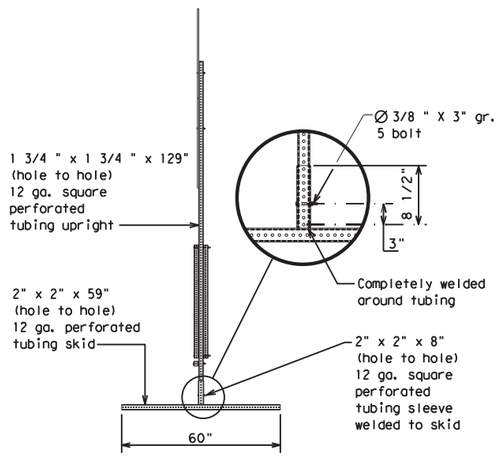






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS



WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

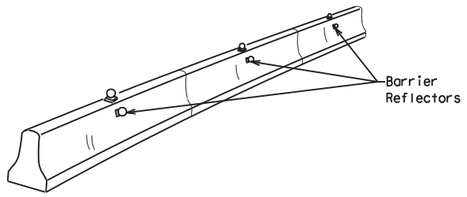
BC(6)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	6383	94	001	SH 16, ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	23	COMANCHE, ETC.		15

100

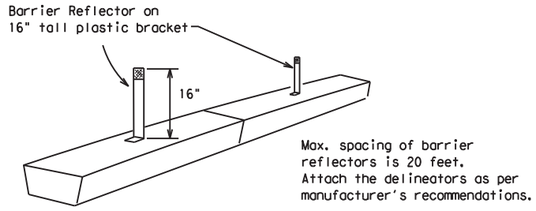
DATE: 5/18/2021 5:13:40 PM
FILE: C:\Engapps\2022 bpm\Standards\018 BC(6)-14.dgn

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

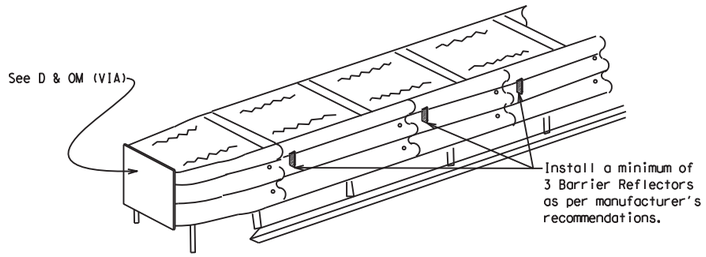


CONCRETE TRAFFIC BARRIER (CTB)

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



LOW PROFILE CONCRETE BARRIER (LPCB)

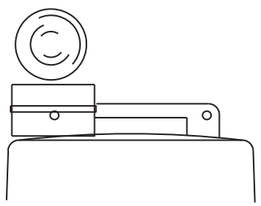


DELINEATION OF END TREATMENTS

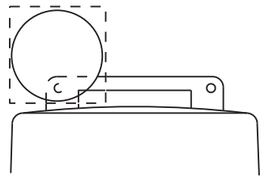
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

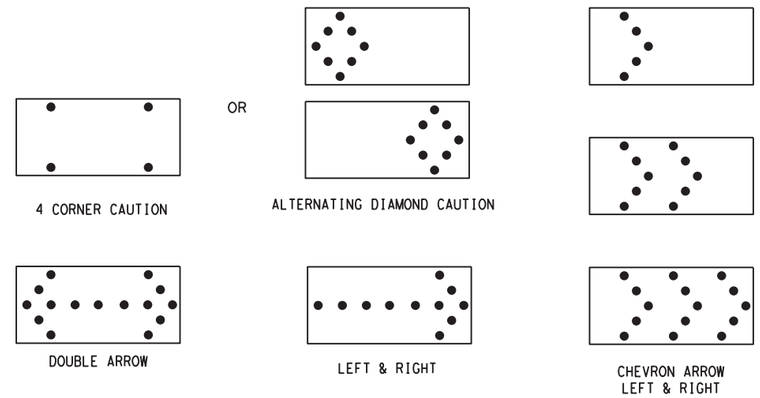
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Operations Division Standard

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	6383	94	001	SH 16, ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	23	COMANCHE, ETC.		16

101

GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

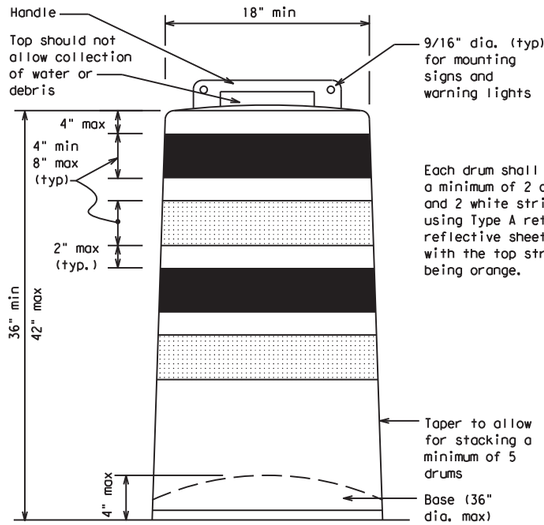
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

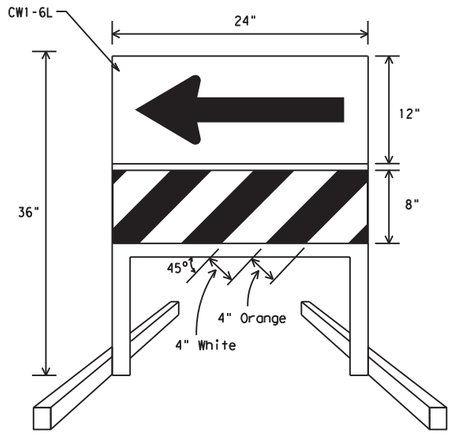
RETROREFLECTIVE SHEETING

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

BALLAST

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

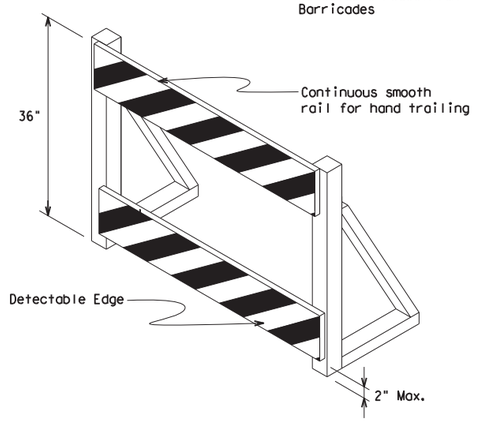




DIRECTION INDICATOR BARRICADE

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

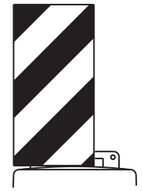
This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades



DETECTABLE PEDESTRIAN BARRICADES

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

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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

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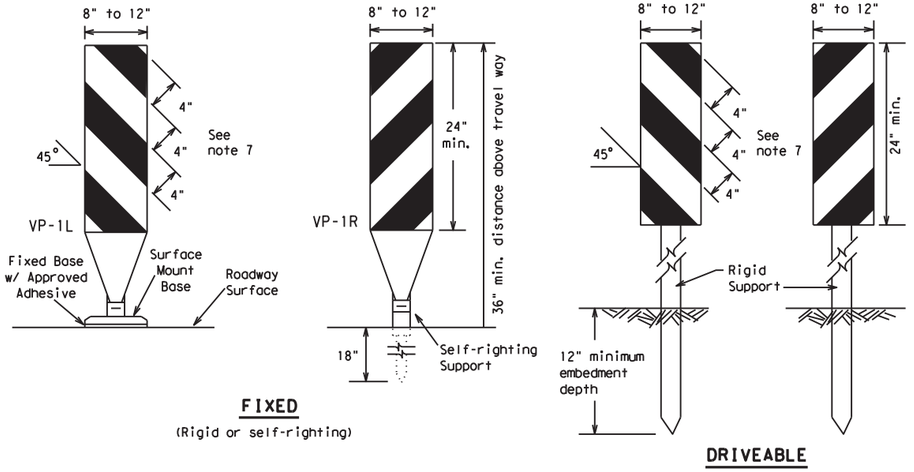
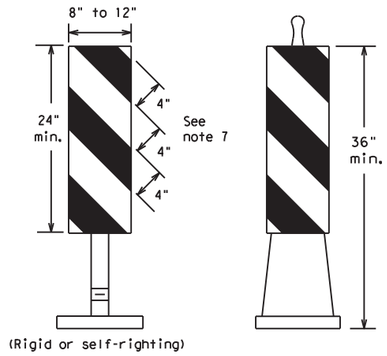


FIXED
(Rigid or self-righting)

DRIVEABLE

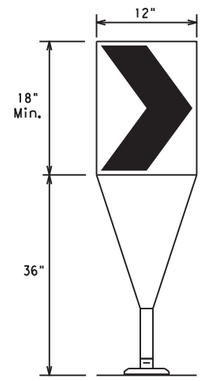


(Rigid or self-righting)

PORTABLE

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

VERTICAL PANELS (VPs)



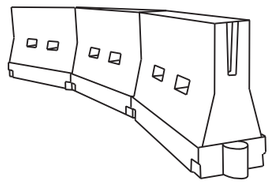
Fixed Base w/ Approved Adhesive
(Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

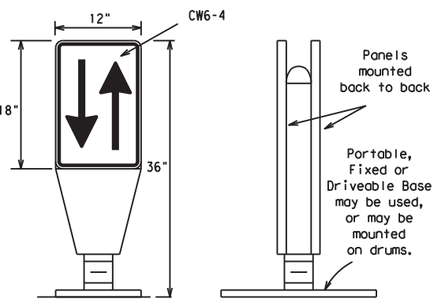
If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long canes and the top of the unit shall not be less than 32 inches in height.

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

SHEET 9 OF 12

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

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7-13	23	COMANCHE, ETC.		18

DATE: 5/18/2021 5:17:38 PM
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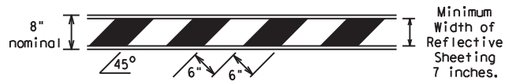
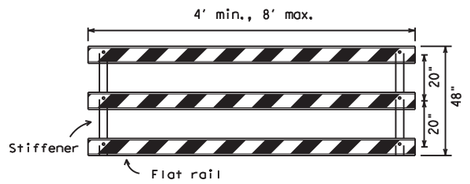
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



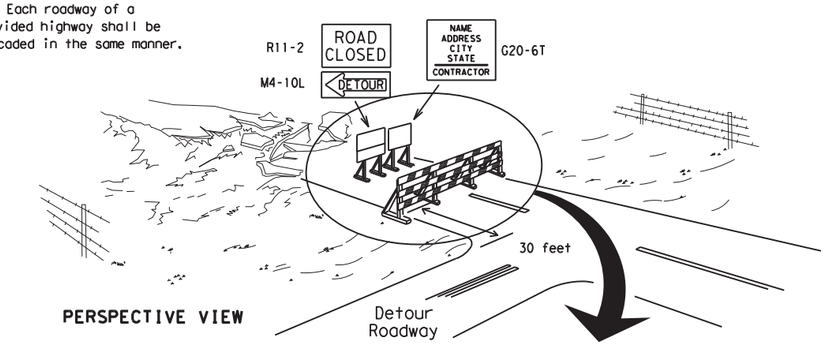
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

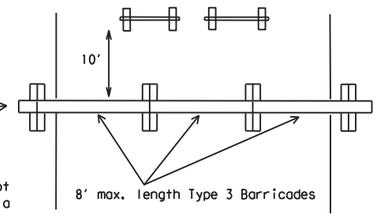
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

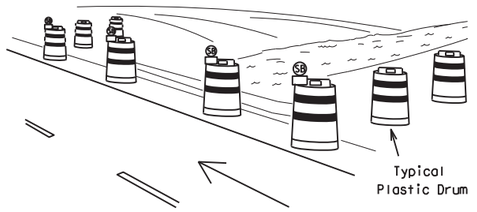
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

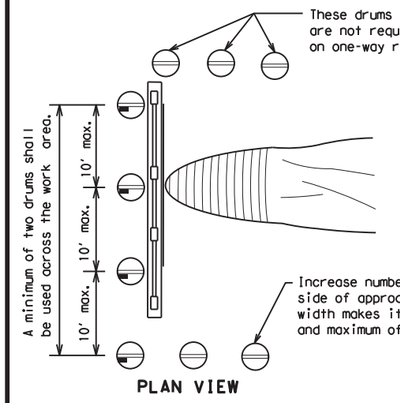
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

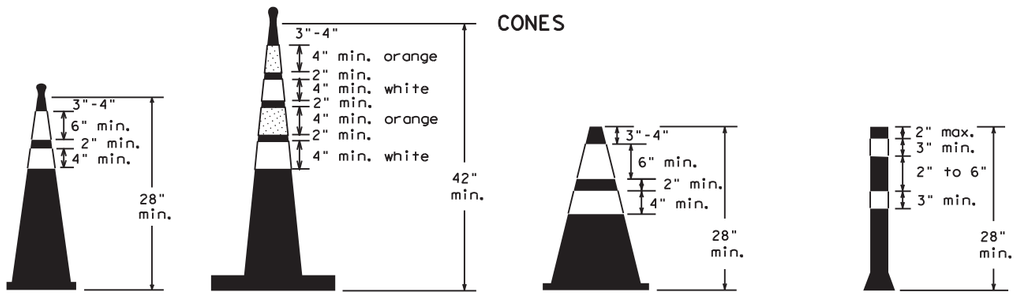
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

PLAN VIEW

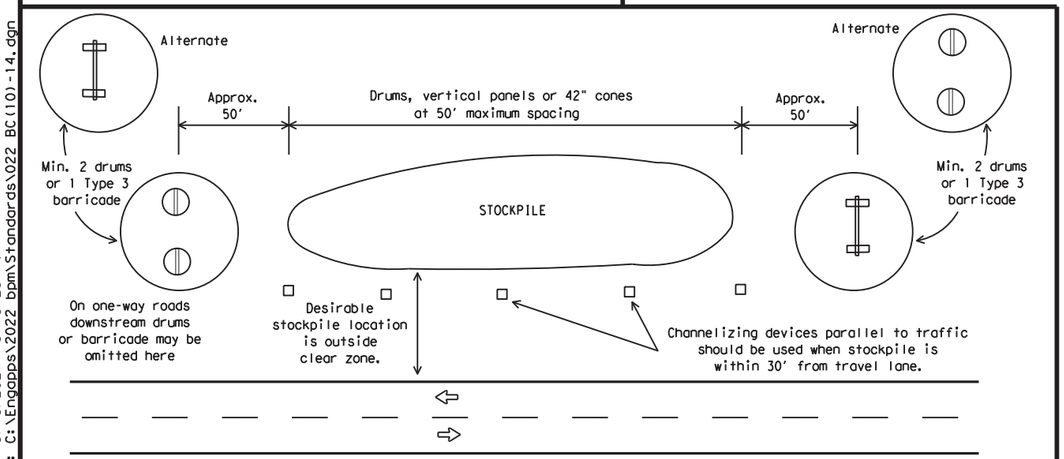
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

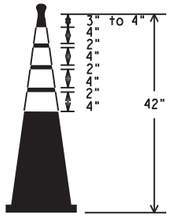
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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



EDGELINE CHANNELIZER

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

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DATE: 5/18/2021 5:18:23 PM
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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

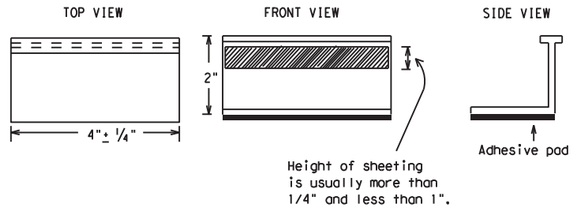
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

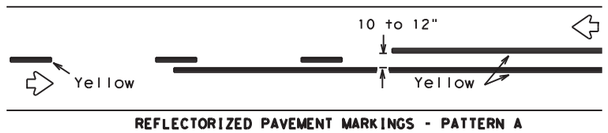
BC(11)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	6383	94	001	SH 16, ETC.
2-98 9-07	DIST	COUNTY		SHEET NO.
1-02 7-13	23	COMANCHE, ETC.		20
11-02 8-14				

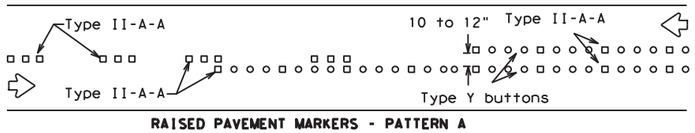
105

DATE: 5/18/2021 5:40:19 PM
FILE: C:\Engapps\2022 bpm\Standards\024 BC(12)-14.dgn

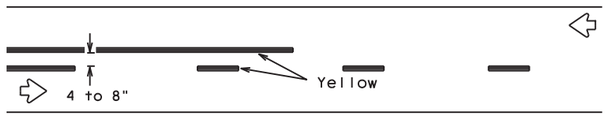
PAVEMENT MARKING PATTERNS



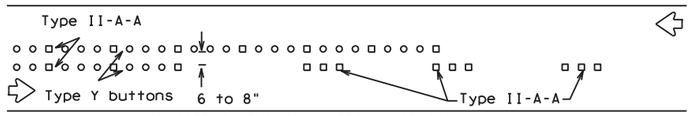
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



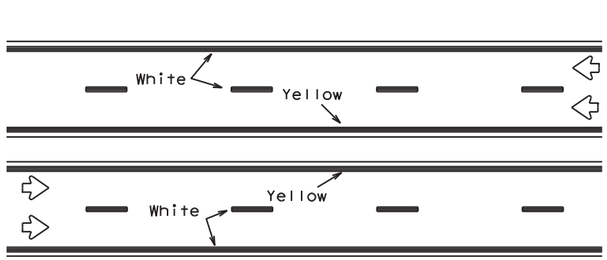
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



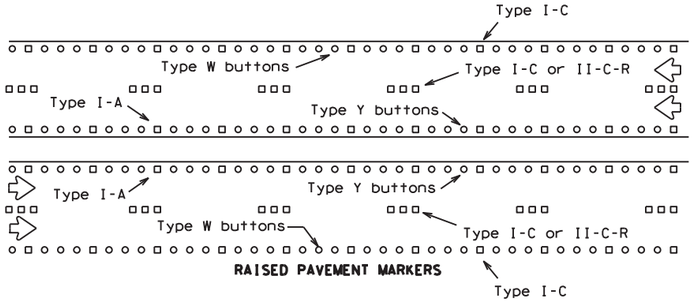
RAISED PAVEMENT MARKERS - PATTERN B

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

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



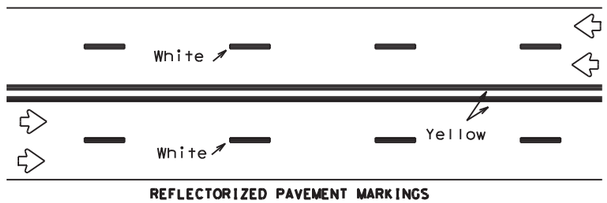
REFLECTORIZED PAVEMENT MARKINGS



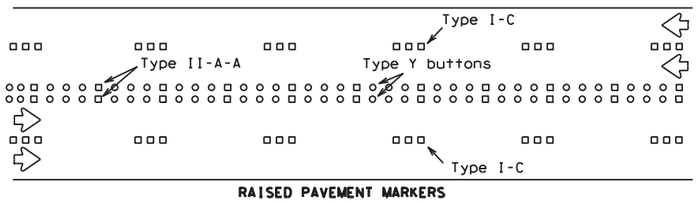
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



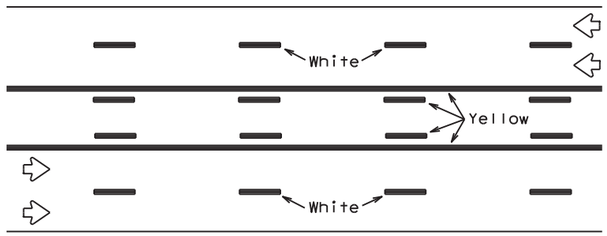
REFLECTORIZED PAVEMENT MARKINGS



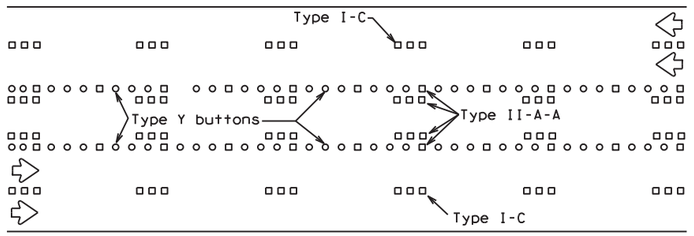
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

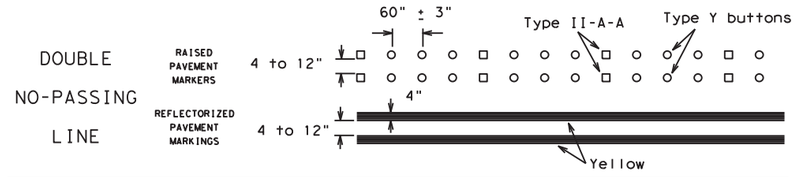
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

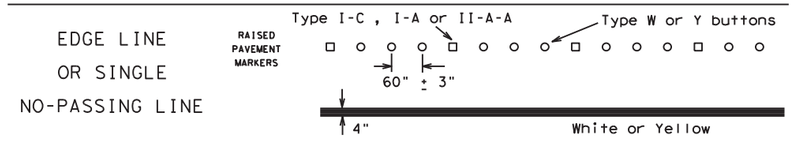
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

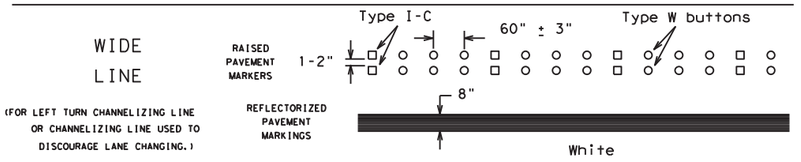


EDGE LINE OR SINGLE NO-PASSING LINE



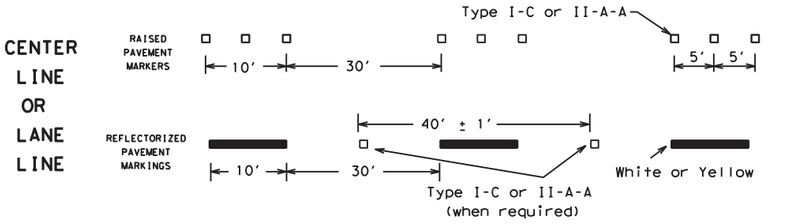
WIDE LINE

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

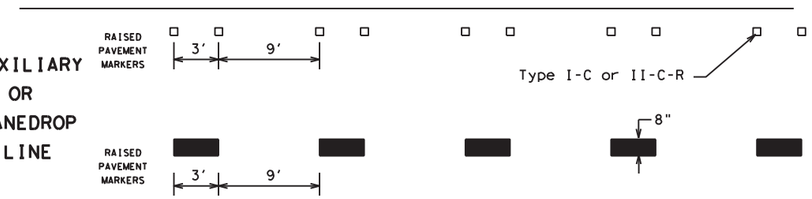


BROKEN LINES

CENTER LINE OR LANE LINE

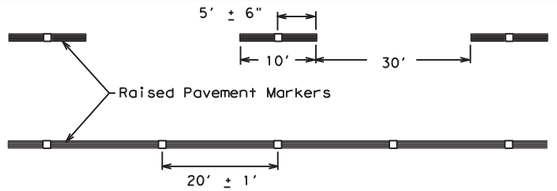


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

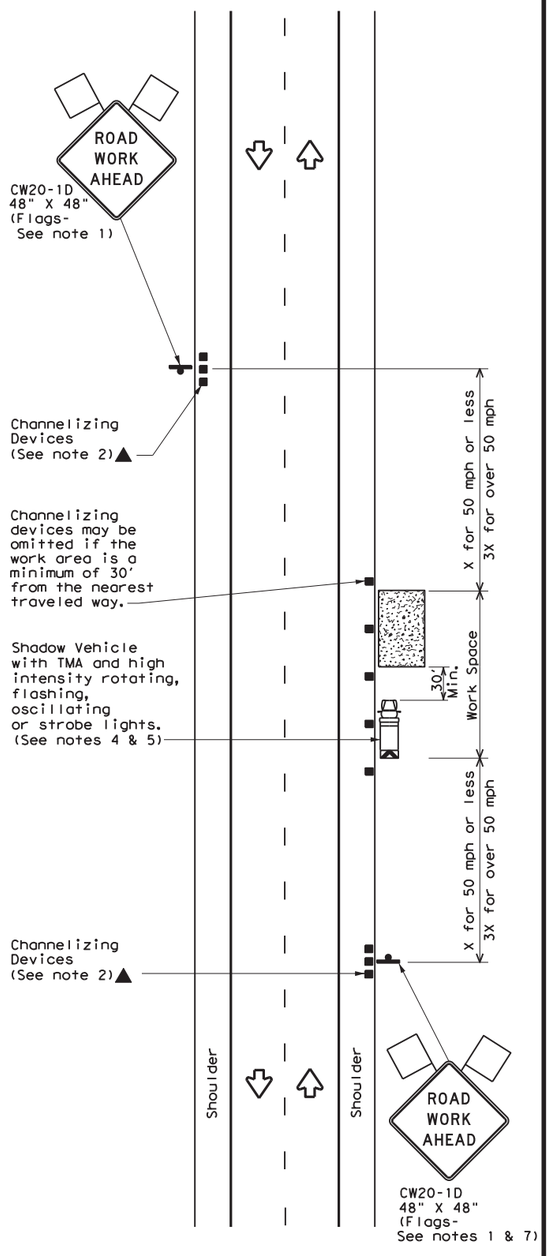
Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

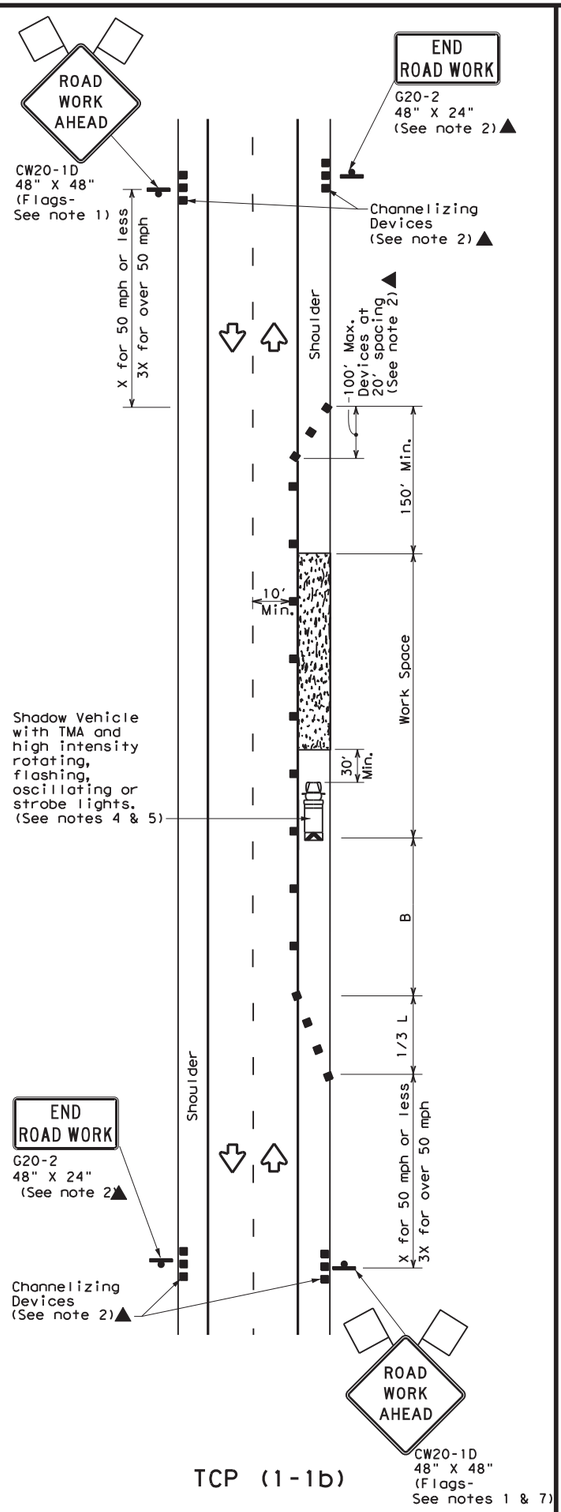
BC(12)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	6383	94	001	SH 16, ETC.
1-97 9-07	DIST	COUNTY		SHEET NO.
2-98 7-13	23	COMANCHE, ETC.		21
11-02 8-14				



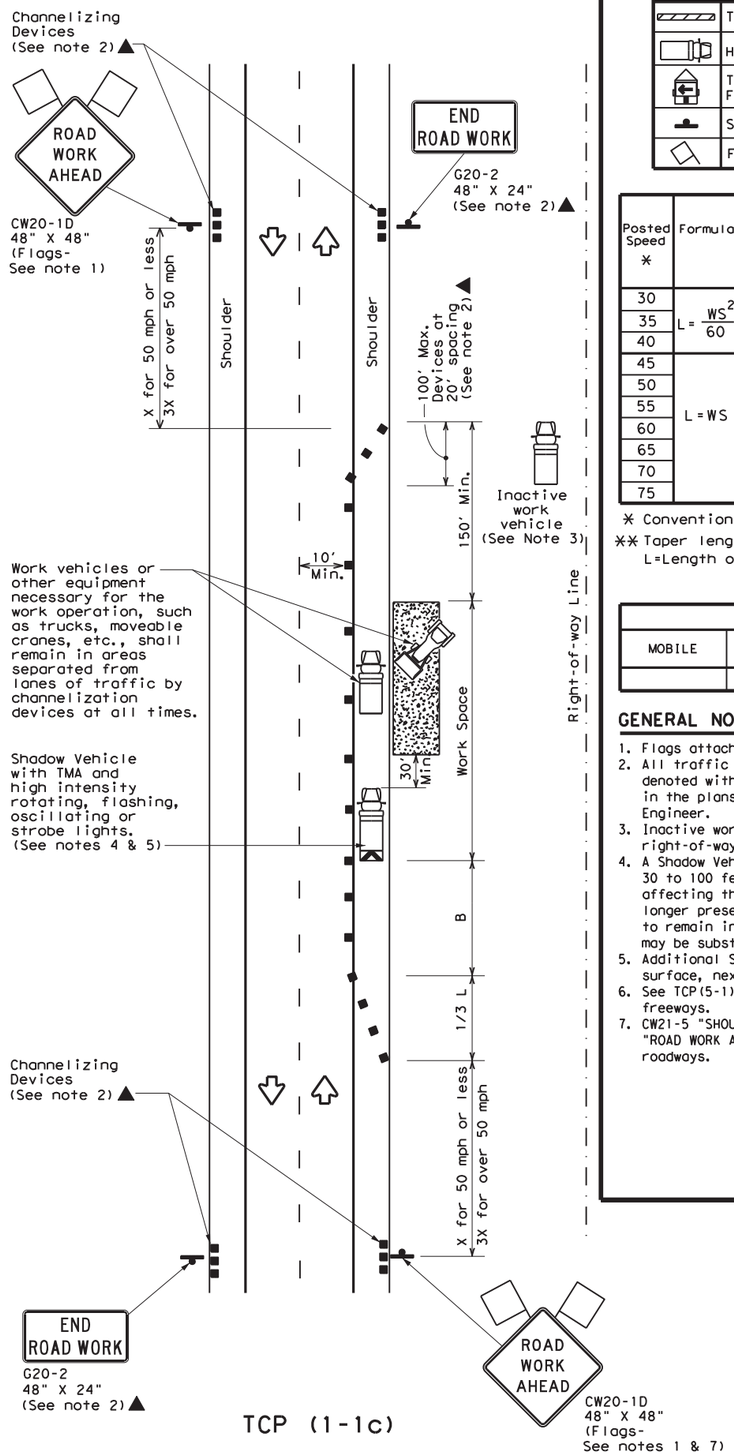
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98	6383	94	001	SH 16, ETC.
8-95 2-12	DIST	COUNTY		SHEET NO.
1-97 2-18	23	COMANCHE, ETC.		22

151

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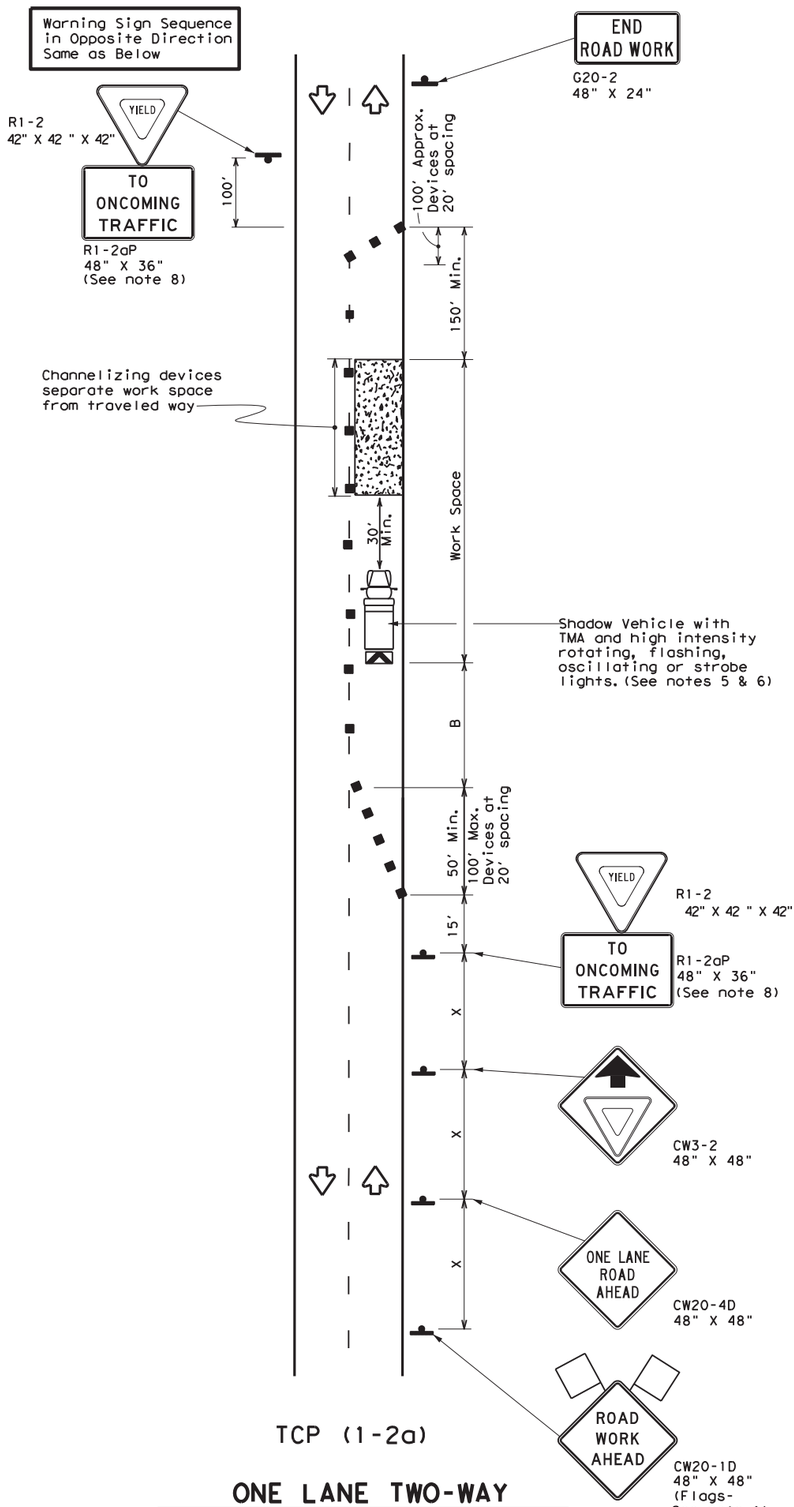
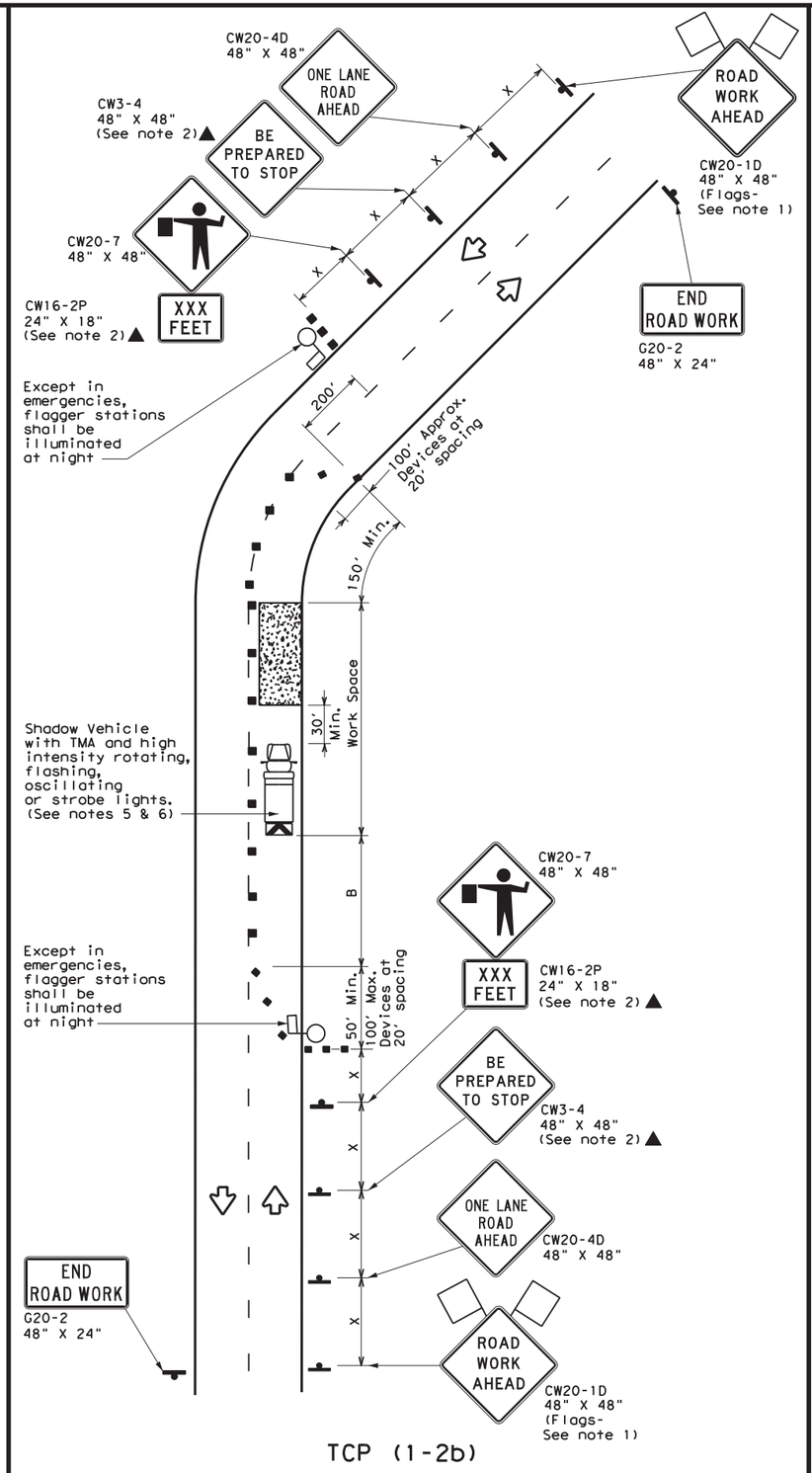


TCP (1-2a)

ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

LEGEND

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L = WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

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

TYPICAL USAGE

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

7. R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work spaces should be no longer than one half city block. In rural areas on roadways with less than 2000 ADT, work spaces should be no longer than 400 feet.
8. R1-2 "YIELD" sign with R1-2aP "TO ONCOMING TRAFFIC" plaque shall be placed on a support at a 7 foot minimum mounting height.

TCP (1-2b)

9. Flaggers should use two-way radios or other methods of communication to control traffic.
10. Length of work space should be based on the ability of flaggers to communicate.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
12. Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
13. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-18

FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	6383	94	001	SH 16, ETC.
4-90 4-98	DIST	COUNTY		SHEET NO.
2-94 2-12	23	COMANCHE, ETC.		23
1-97 2-18				

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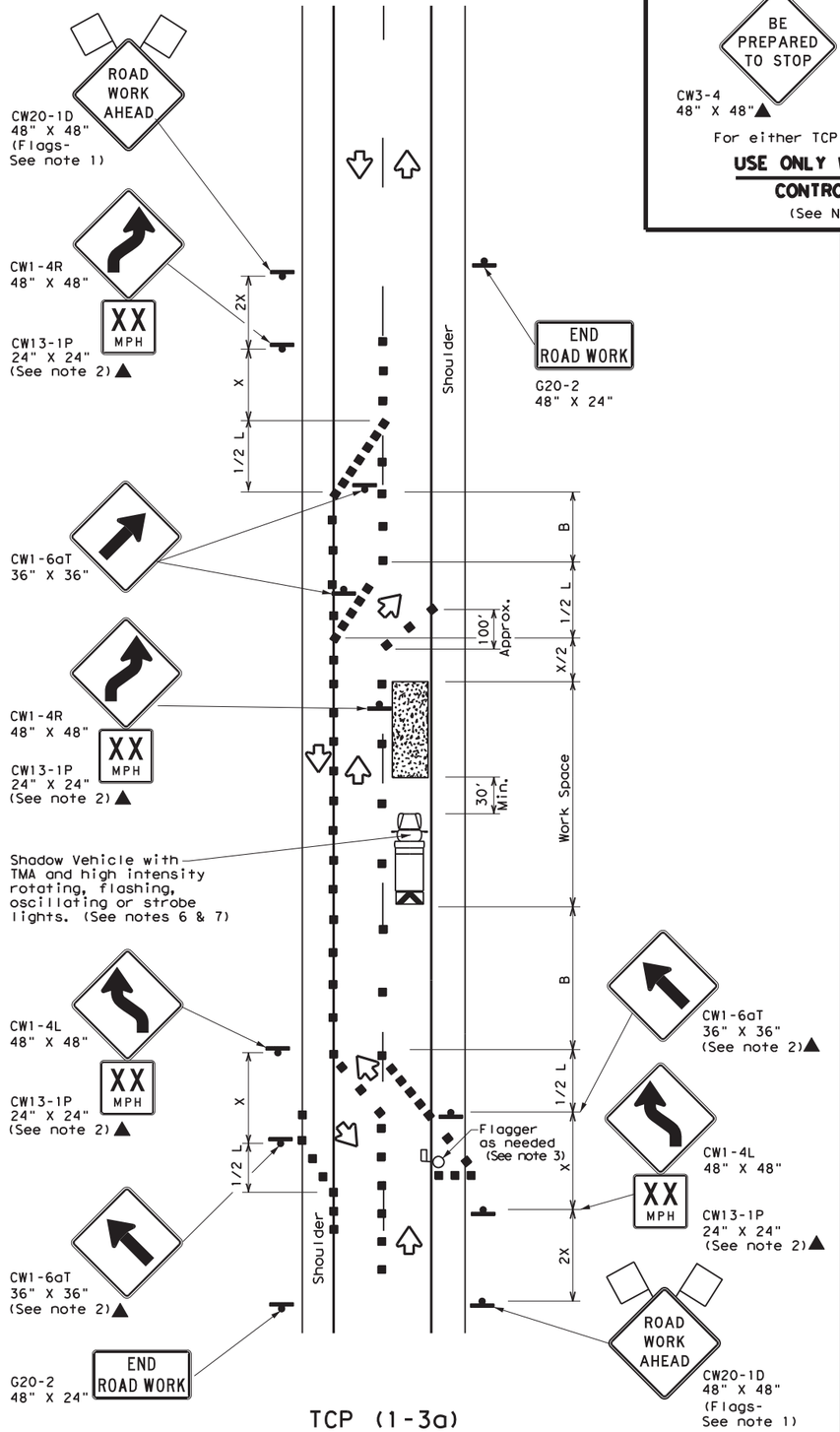
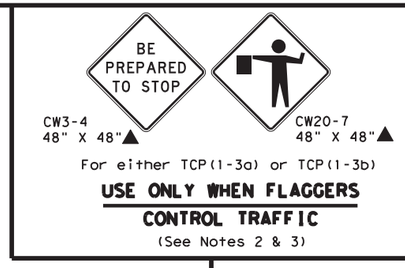


TCP (1-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

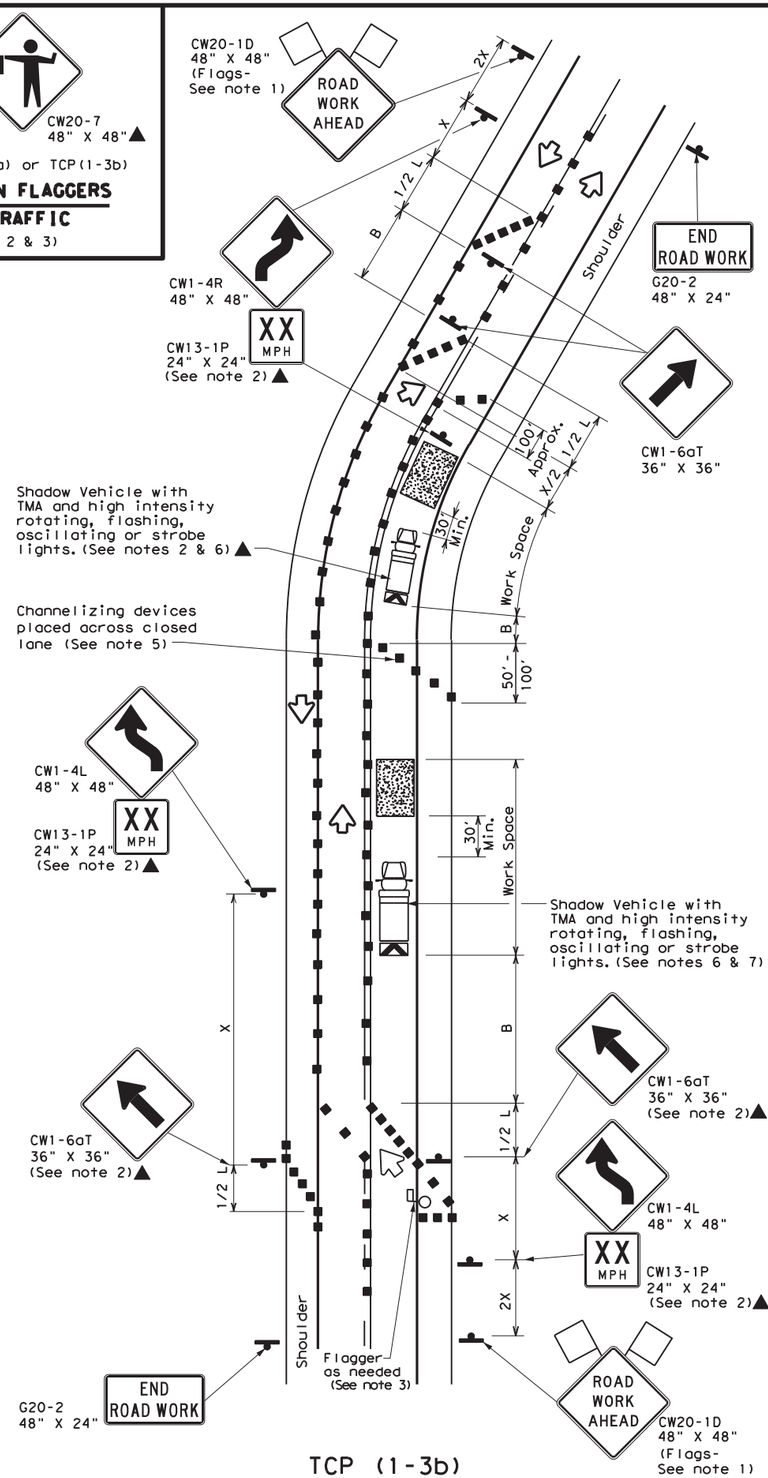
ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



For either TCP(1-3a) or TCP(1-3b)

USE ONLY WHEN FLAGGERS CONTROL TRAFFIC

(See Notes 2 & 3)



TCP (1-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Additional flaggers may be positioned in advance of traffic queues to alert traffic to reduce speed.
4. DO NOT PASS, PASS WITH CARE and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
5. When the work zone is made up of several work spaces, channelizing devices should be placed laterally across the closed lane to re-emphasize closure. Laterally placed channelizing devices should be repeated every 500 to 1000 feet in urban areas and every 1/4 to 1/2 mile in rural areas.
6. 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.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
8. 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 speed 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 area of conflicting markings not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
TRAFFIC SHIFTS ON TWO LANE ROADS
TCP(1-3)-18

FILE: tcp1-3-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	6383	94	001	SH 16, ETC.
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	23	COMANCHE, ETC.		24
1-97 2-18				

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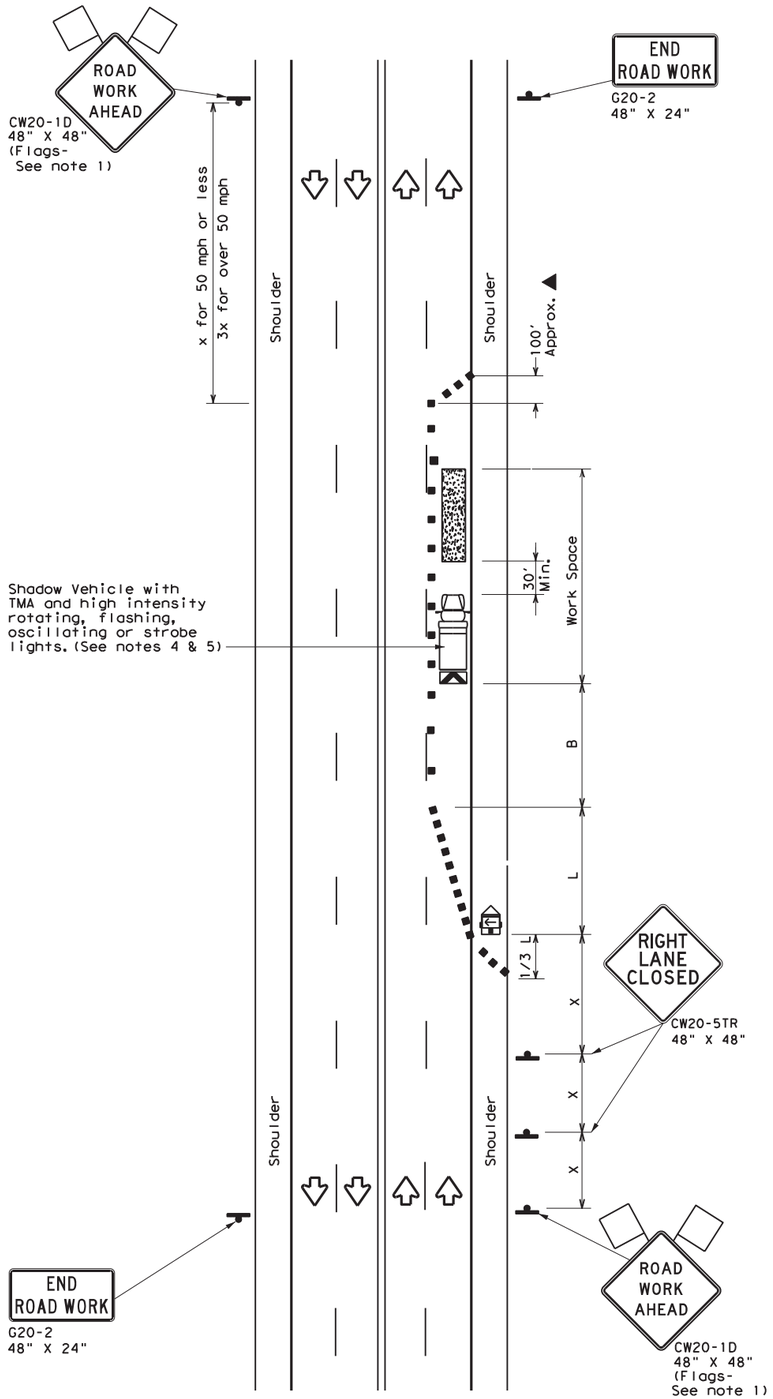
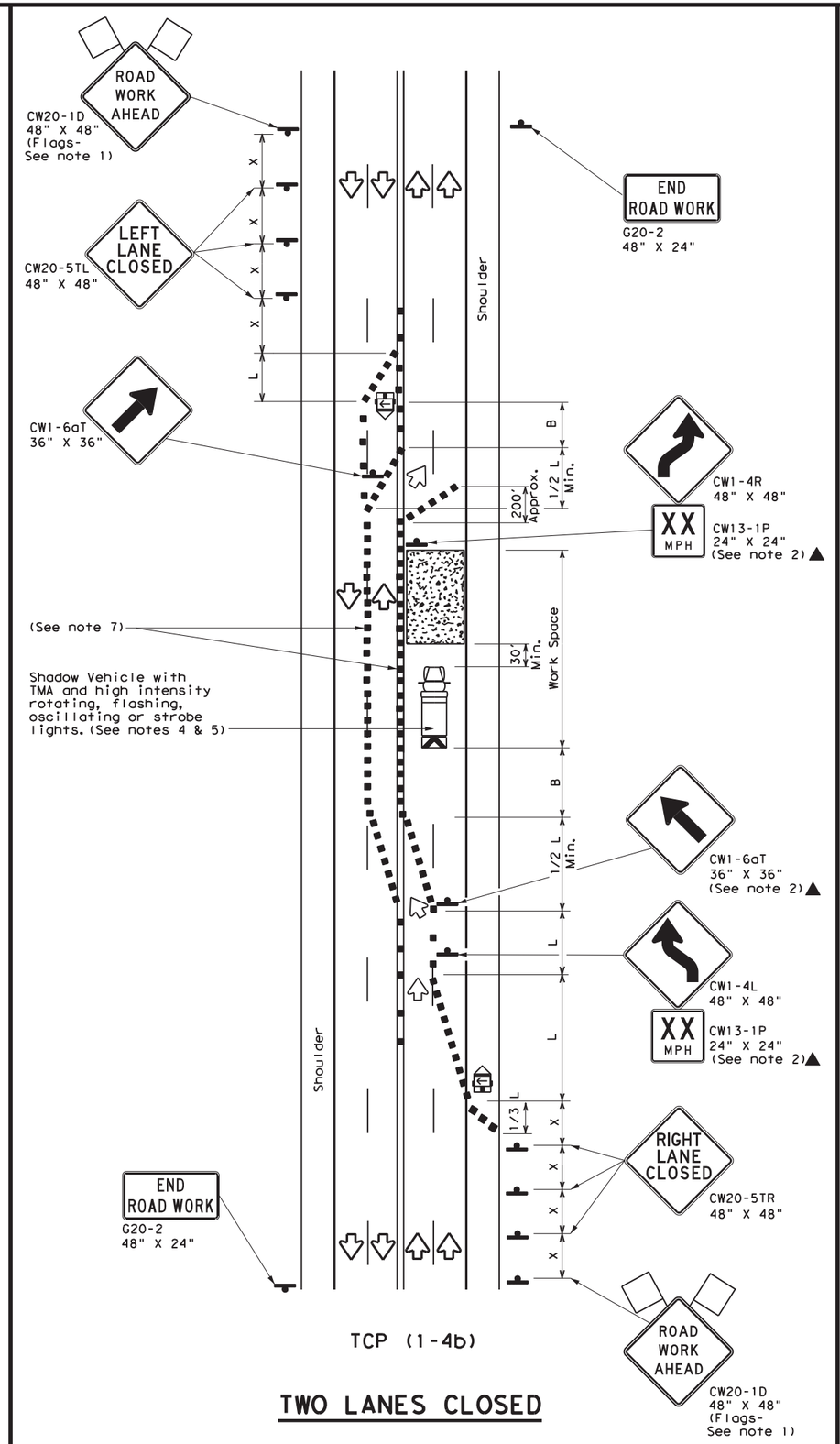


TCP (1-4a)

ONE LANE CLOSED



TCP (1-4b)

TWO LANES CLOSED

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

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

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

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

GENERAL NOTES

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

TCP (1-4a)

6. If this TCP is used for a left lane closure , CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline 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)

7. 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.

Texas Department of Transportation

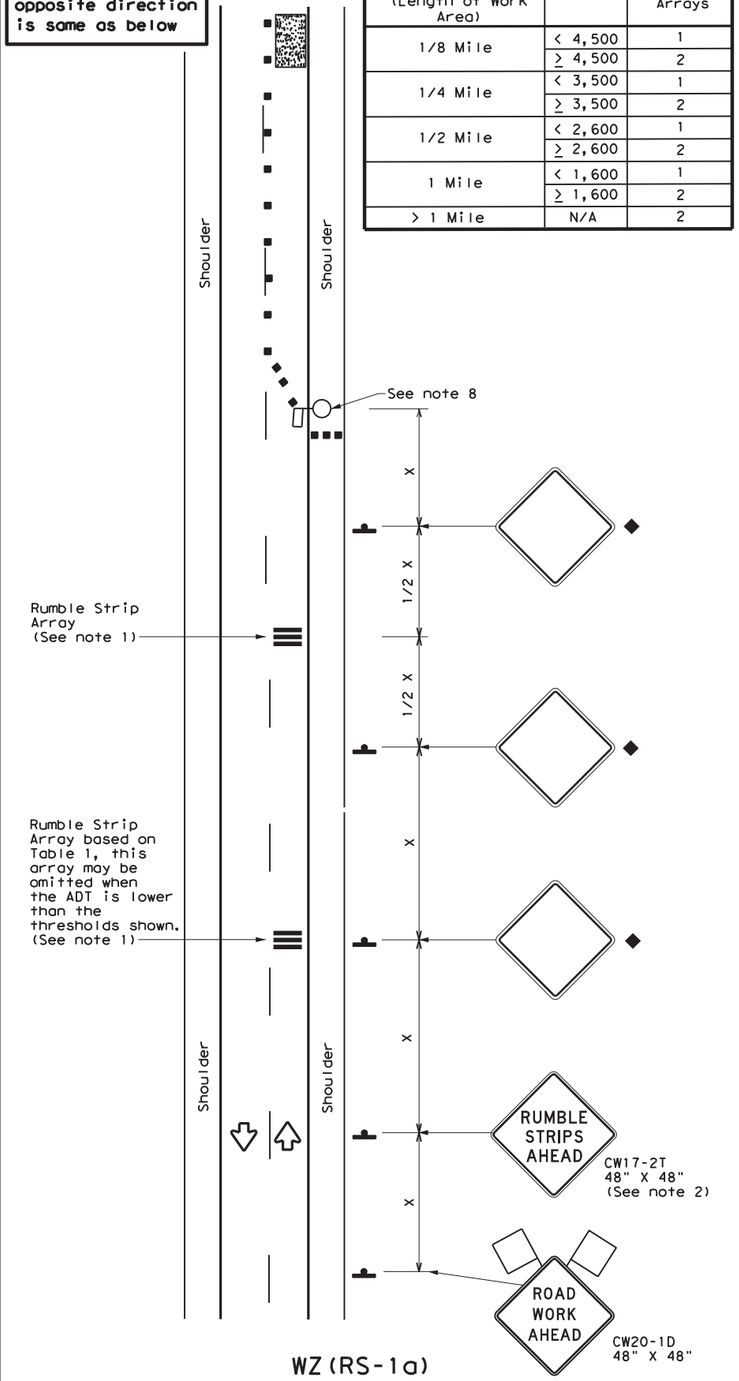
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(1-4)-18

FILE: tcp1-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	6383	94	001	SH 16, ETC.
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	23	COMANCHE, ETC.		25
1-97 2-18				

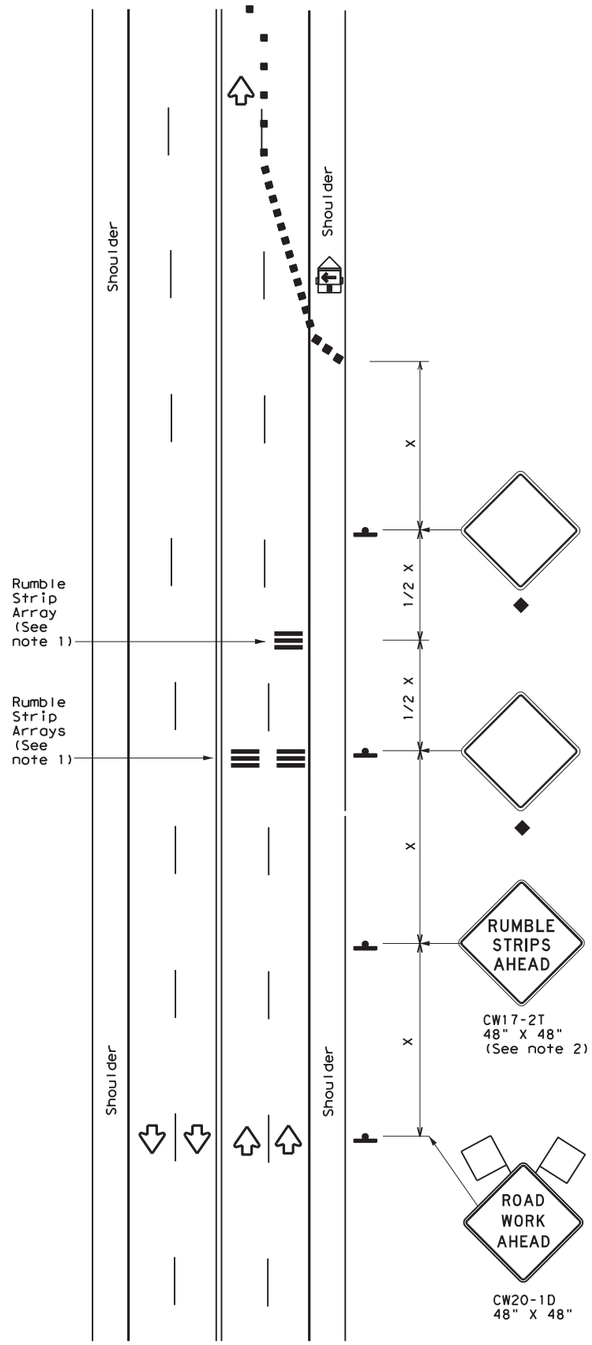
Warning sign and rumble strip sequence in opposite direction is same as below



WZ(RS-1a)
75 mph or Less

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION

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



WZ(RS-1b)
75 mph or Less

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-16

FILE: wzrs16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	6383	94	001	SH 16, ETC.
2-14	DIST	COUNTY		SHEET NO.
4-16	23	COMANCHE, ETC.		26

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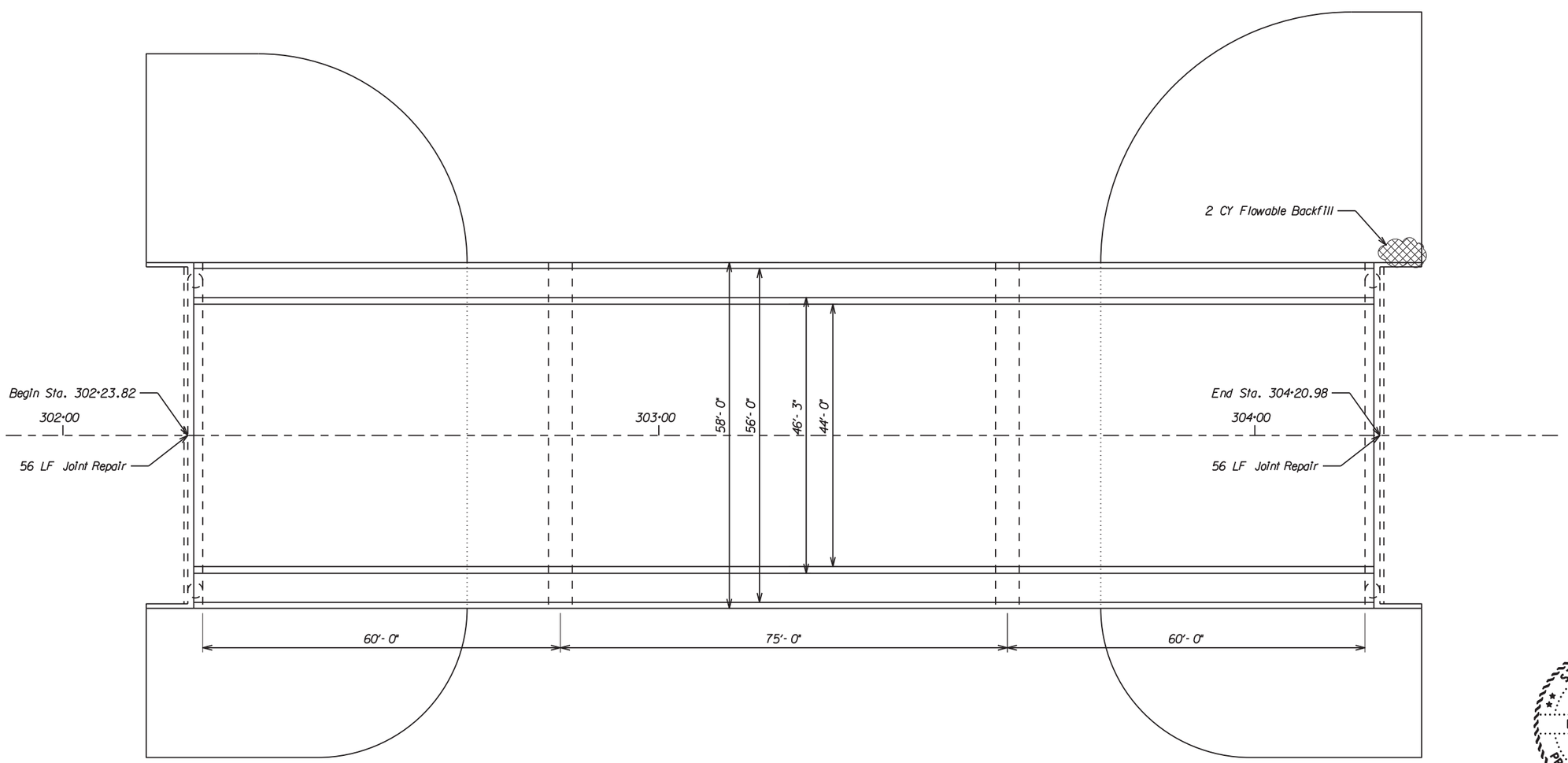

ITEM	CODE	DESCRIPTION	QUANT	UNIT
401	6001	FLOWABLE BACKFILL	2.0	CY

Sta. 302+23.82 - 304+20.98
3 Continuous Span Steel
I-Beam Bridge On Conctrete
Substructure Widened With
Prestressed Concrete I-Beams

STATE OF TEXAS
ERIC L. LYKINS
86319
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Eric L. Lykins, PE
9D2D0C440F014A4...
9/1/2021

US 84
JIM NED CREEK
230420005402068
COLEMAN CO.

Texas Department of Transportation®

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		27

DATE: 8/31/2021 5:42:46 PM
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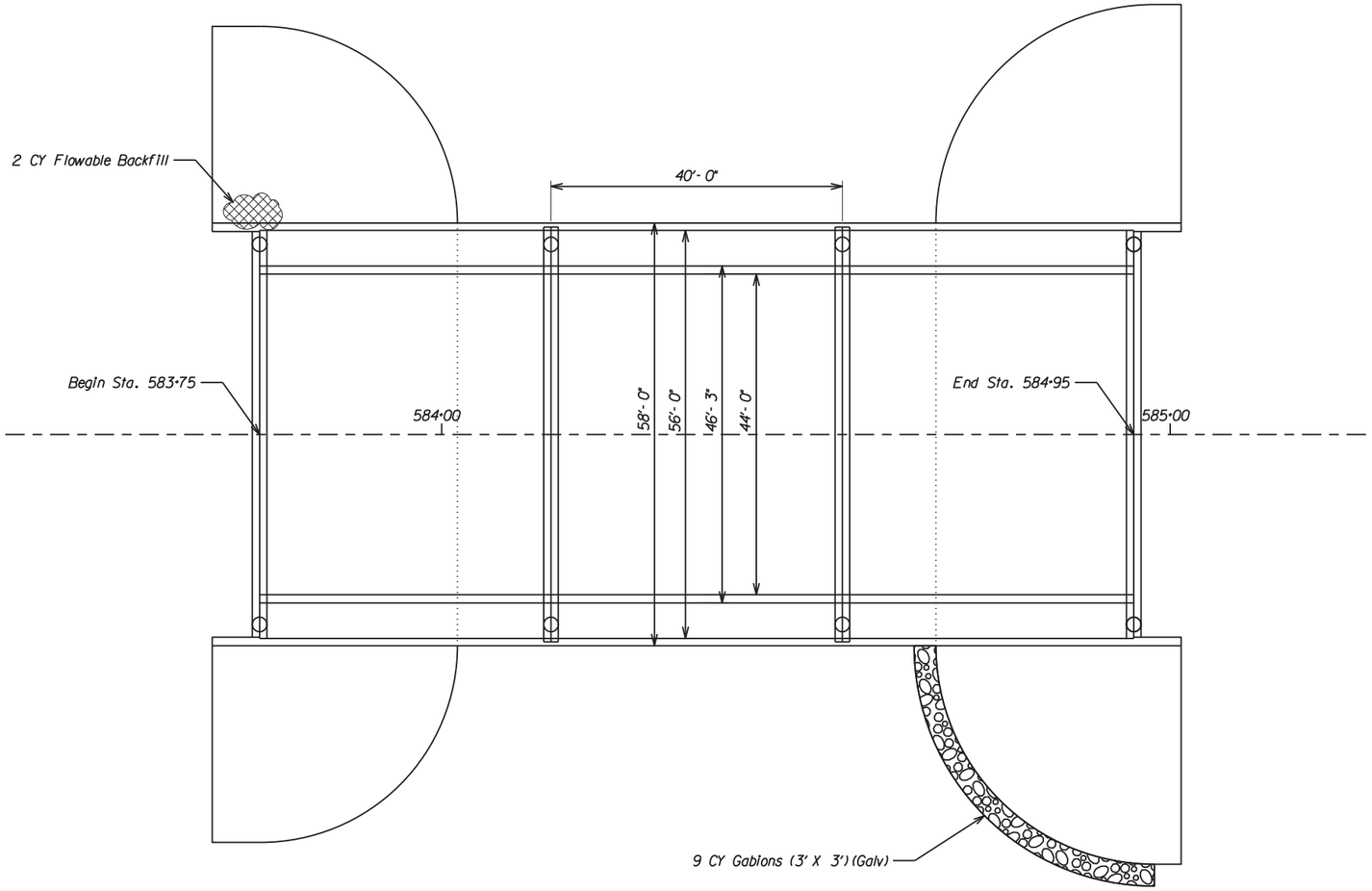

ITEM	CODE	DESCRIPTION	QUANT	UNIT
401	6001	FLOWABLE BACKFILL	2.0	CY
459	6009	GABIONS (3'X3') (GALV)	9.0	CY

Sta. 583+75 - 584+95
3 Simple Span Concrete
Pan Girder Bridge On
Concrete Substructure

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US 84
ROUGH CREEK
230420005403076
COLEMAN CO.

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CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		28

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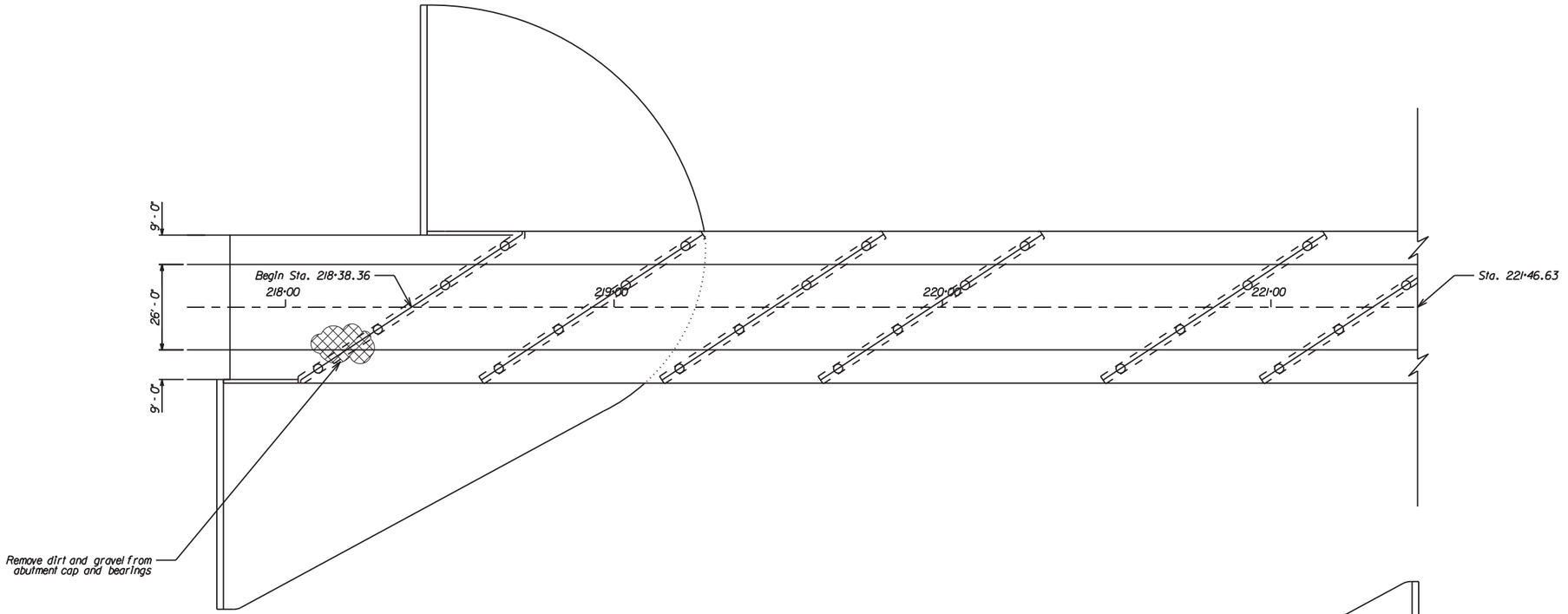

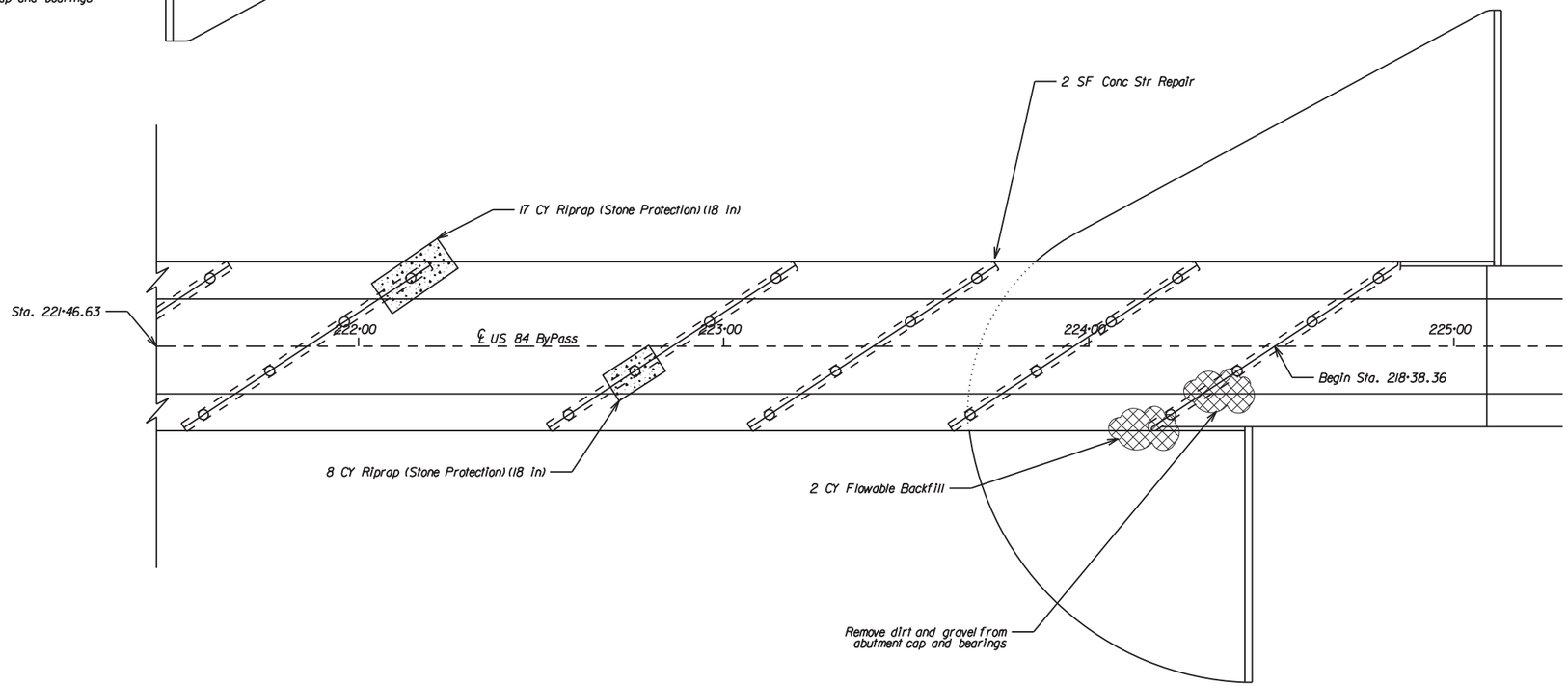

Sta. 218+38.36 - 218+38.36
10 Continuous Span Steel I-Beam

ITEM	CODE	DESCRIPTION	QUANT	UNIT
401	6001	FLOWABLE BACKFILL	2.0	CY
429	6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	2.0	SF
432	6033	RIPRAP (STONE PROTECTIONX18 IN)	25.0	CY

REMOVAL OF DIRT AND GRAVEL FROM ABUTMENT CAPS AND BEARINGS ARE SUBSIDIARY TO OTHER BID ITEMS.

STATE OF TEXAS
ERIC L. LYKINS
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9/1/2021

US 84 @
SH 153 &
BNSF RR
230420005404083
COLEMAN CO.

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		29

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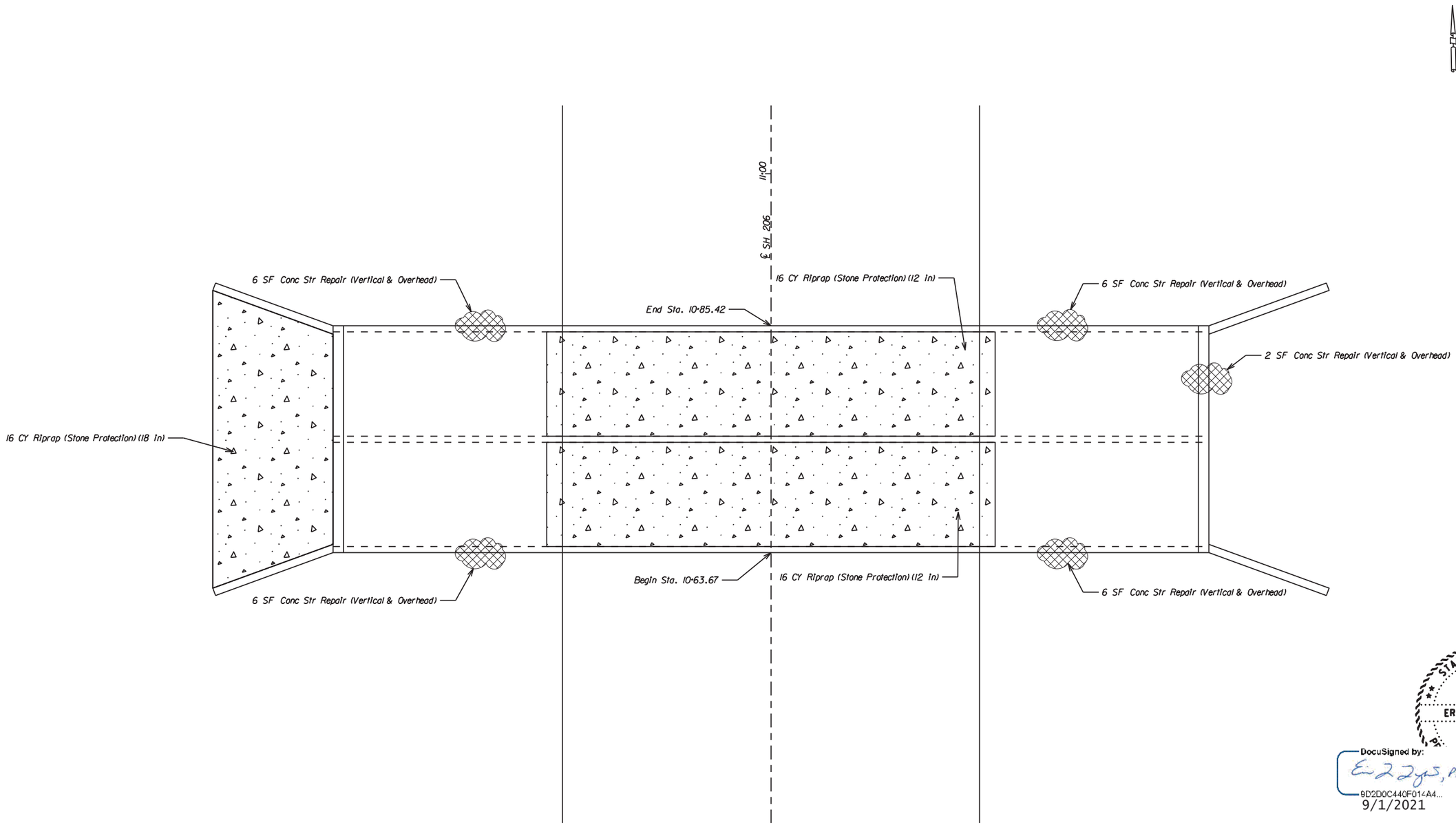

ITEM	CODE	DESCRIPTION	QUANT	UNIT
429	6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	26.0	SF
432	6031	RIPRAP (STONE PROTECTION)(12 IN)	32.0	CY
432	6033	RIPRAP (STONE PROTECTION)(18 IN)	16.0	CY

Sta. 10+63.67 - 10+85.42
2 - 10' x 5' Concrete Box Culvert

STATE OF TEXAS
ERIC L. LYKINS
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PROFESSIONAL ENGINEER

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9/1/2021

SH 206 @
LOSS CREEK
230420007803025
COLEMAN CO.

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		30

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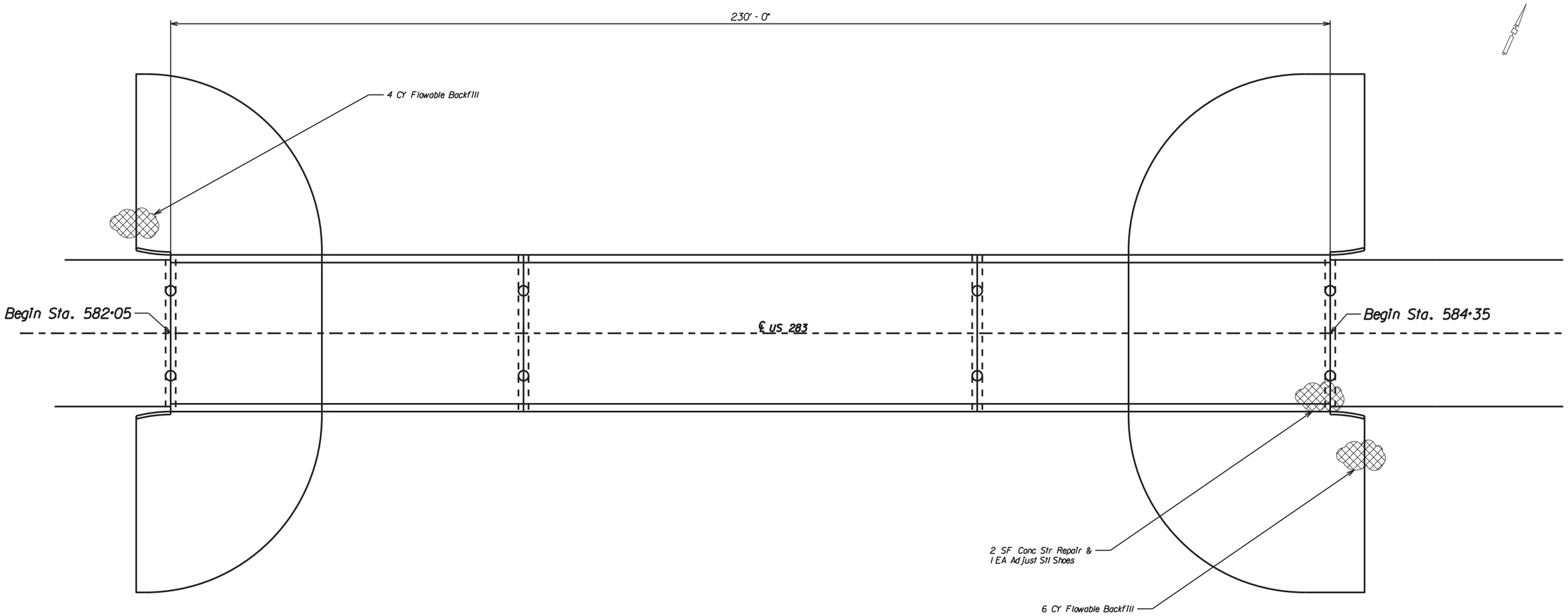

Sta. 588+60 - 590+20
3 Simiple Span Concrete Pan Girder
Bridge On Concrete Substructure

ITEM	CODE	DESCRIPTION	QUANT	UNIT
401	6001	FLOWABLE BACKFILL	10.0	CY
429	6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	2.0	SF
499	6001	ADJUST STL SHOES	1.0	EA

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US 283 @
HOME CREEK
23042009901019
COLEMAN CO.

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		31

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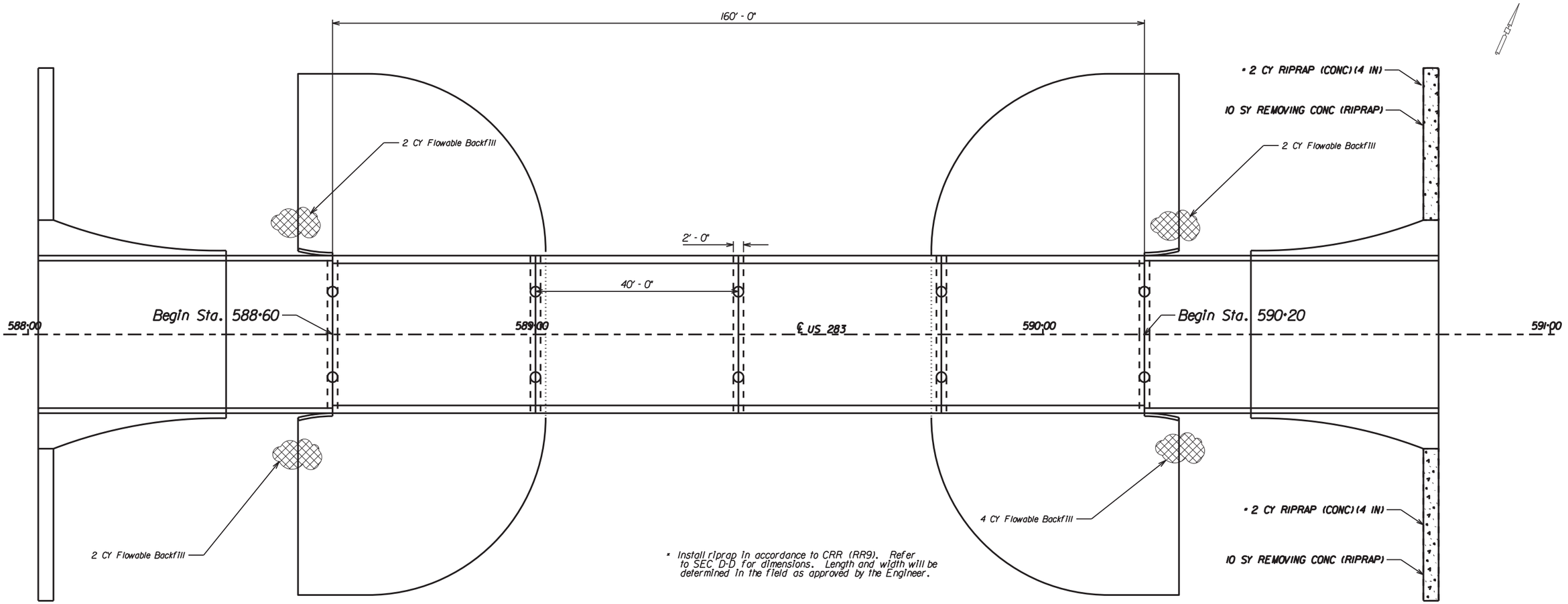

* Install riprap in accordance to CRR (RR9). Refer to SEC D-D for dimensions. Length and width will be determined in the field as approved by the Engineer.

ITEM	CODE	DESCRIPTION	QUANT	UNIT
104	6009	REMOVING CONC (RIPRAP)	20.0	SY
401	6001	FLOWABLE BACKFILL	10.0	CY
432	6001	RIPRAP (CONC)(4 IN)	4.0	CY

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Sta. 588+60 - 590+20
3 Simple Span Concrete Pan Girder
Bridge On Concrete Substructure

US 283 @ SWEETIE CREEK
23042009901020
COLEMAN CO.

Texas Department of Transportation®

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		32

DATE: 8/31/2021 5:51:41 PM
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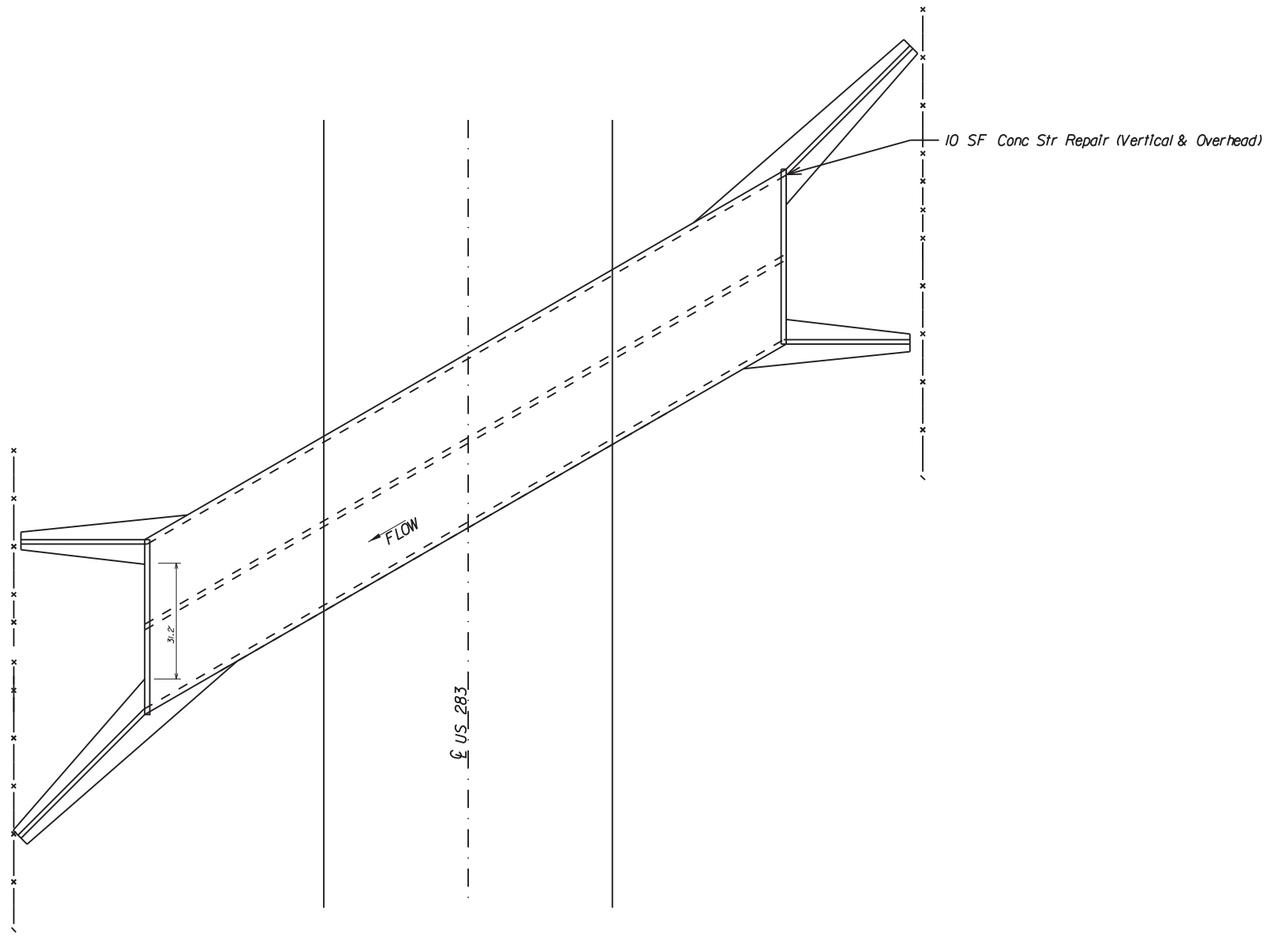

ITEM	CODE	DESCRIPTION	QUANT	UNIT
429	6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	10.0	SF

2 - 9' x 9' Concrete Box Culvert

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ERIC L. LYKINS
6319
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Eric Lykins, PE
9D2D0C440F014A4...
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US 283 @
SWEETIE CREEK
2304200990102I
COLEMAN COUNTY

Texas Department of Transportation®

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		33

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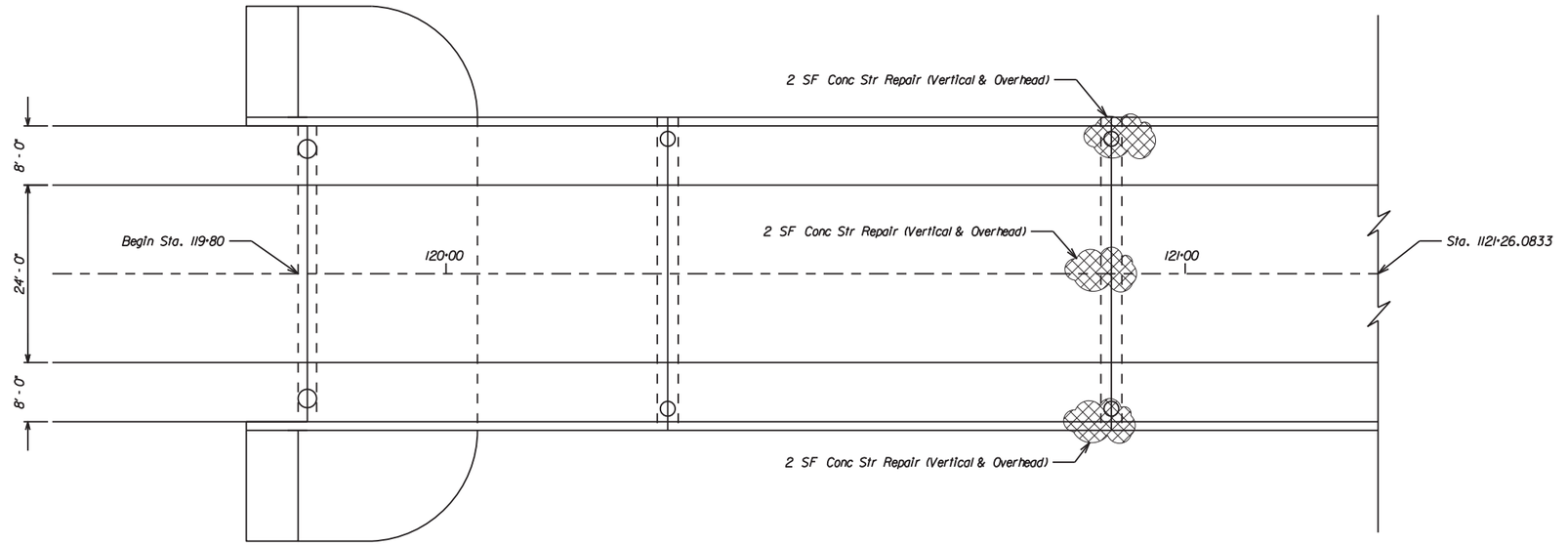

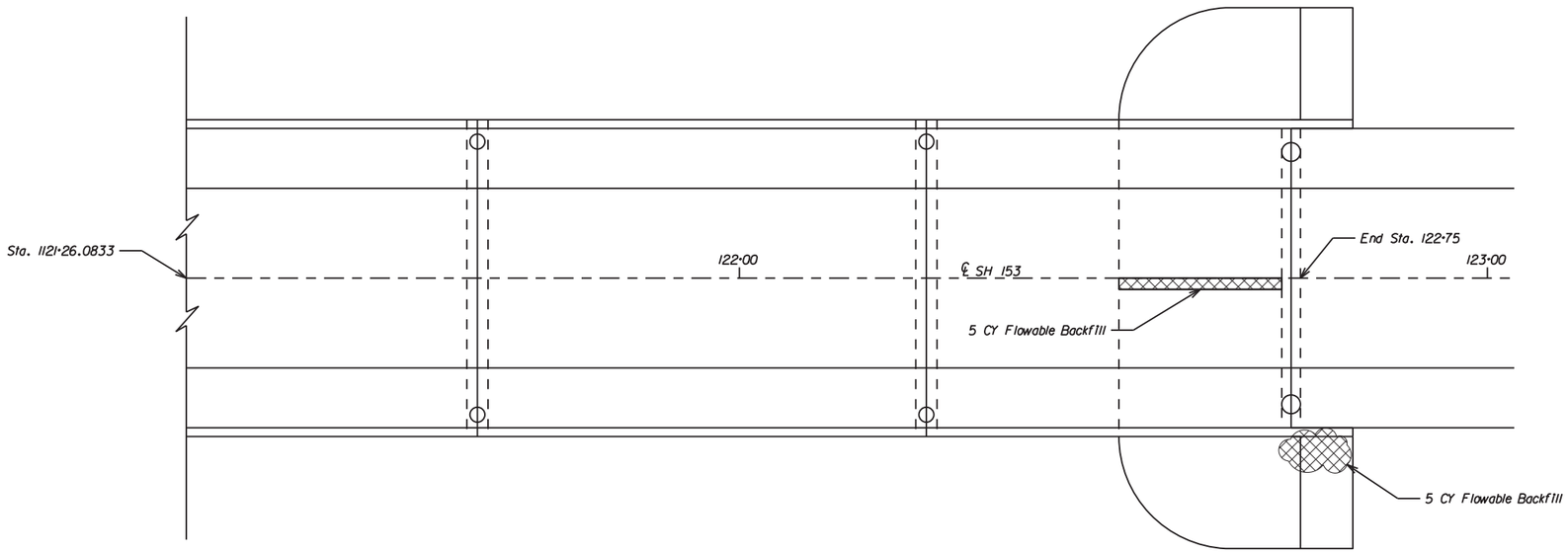

ITEM	CODE	DESCRIPTION	QUANT	UNIT
401	6001	FLOWABLE BACKFILL	10.0	CY
429	6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	6.0	CY

Sta. 119+80 - 122+75
5 Span Steel I-Beam On
Concrete Substructure Widened
With Prestressed Concrete I-Beams

STATE OF TEXAS
ERIC L. LYKINS
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LICENSED
PROFESSIONAL ENGINEER

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Eric Lykins, PE
9D8D0941...

9/1/2021

SH 153 @
HORDS CREEK
23042006360100I
COLEMAN CO.

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CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16. ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE.ETC.		34

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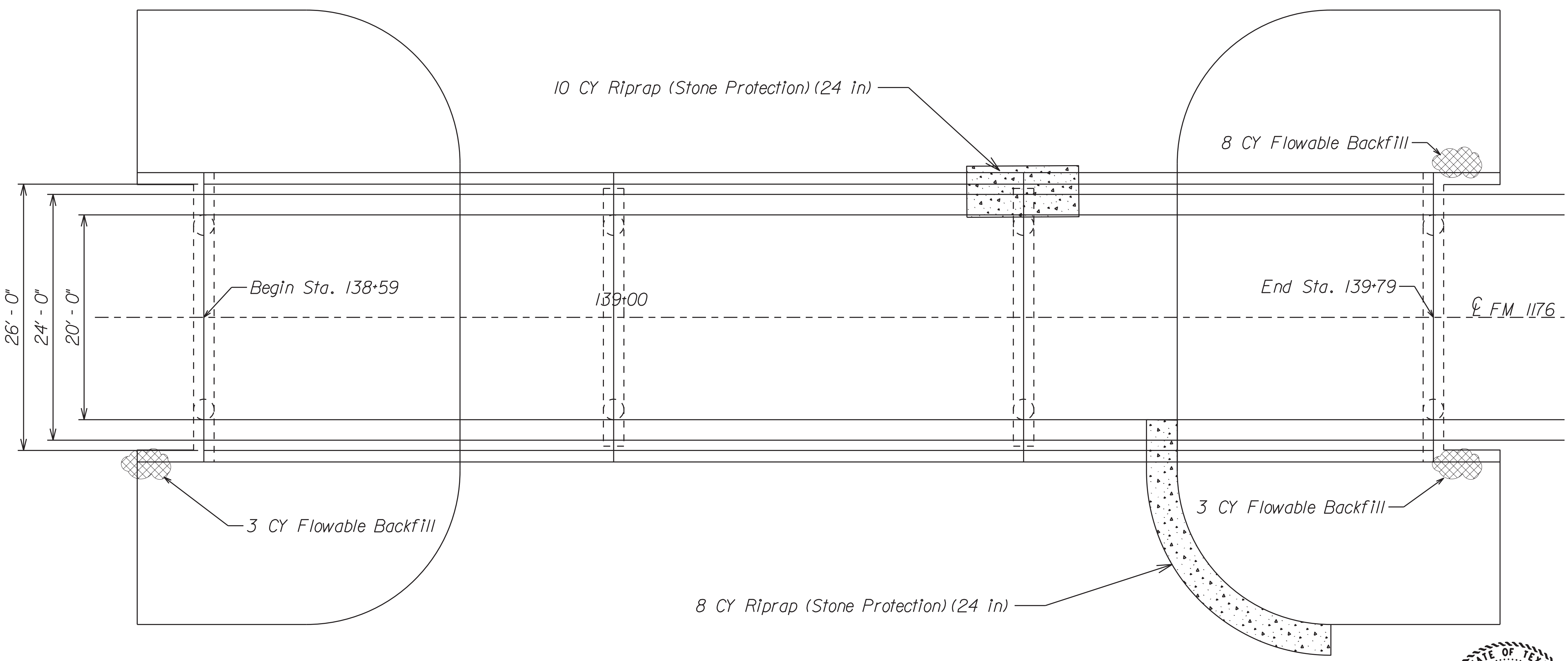

ITEM	CODE	DESCRIPTION	QUANT	UNIT
401	6001	FLOWABLE BACKFILL	14.0	CY
432	6035	RIPRAP (STONE PROTECTION)(24 IN)	18.0	CY

Sta. 138+59 - 139+79
3 Simple Span Concrete
Pan Girder Bridge On
Concrete Substructure

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ERIC L. LYKINS
86319
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9/1/2021

**FM 1176 @
HORDS CREEK
23042013650101O
COLEMAN CO.**

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST		COUNTY	SHEET NO.
23		COMANCHE,ETC.	35

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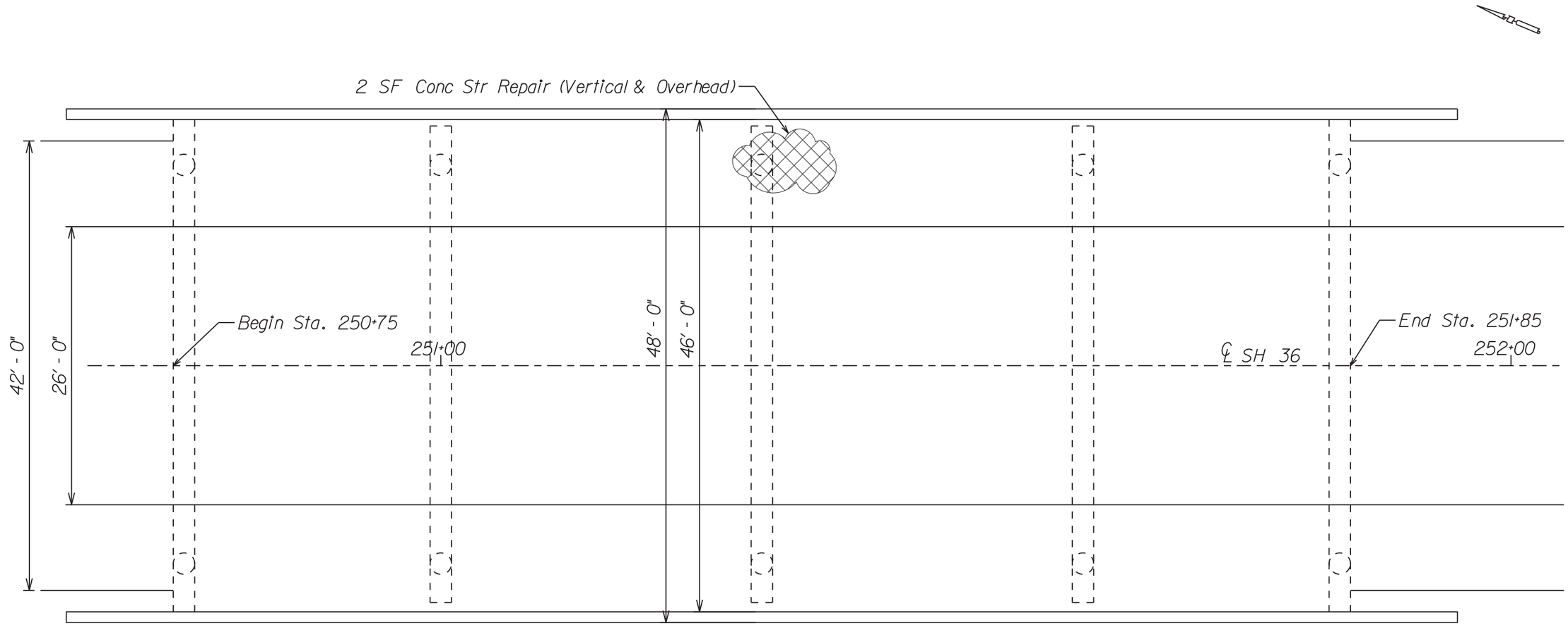

ITEM	CODE	DESCRIPTION	QUANT	UNIT
429	6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	2.0	SF

Sta. 250+75 - 251+85
4 Continuous Spans
Concrete Flat Slab Bridge on
Concrete Substructure

STATE OF TEXAS
ERIC L. LYKINS
86319
LICENSED ENGINEER

DocuSigned by:
Eric Lykins, PE
9D2D0C440F014A4...
9/1/2021

SH 36 @
NANNY BRANCH
230470018202007
COMANCHE CO.

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		36

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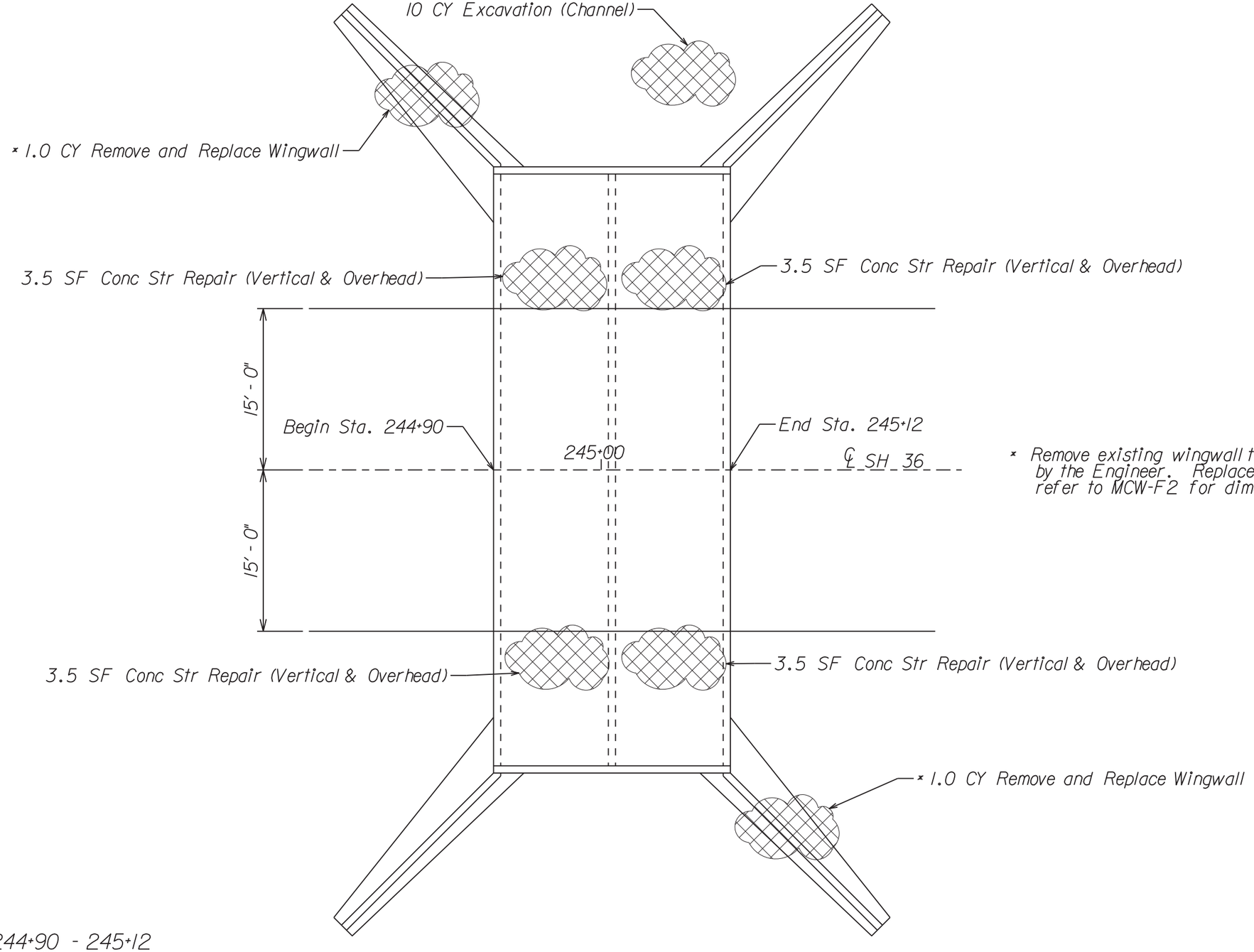

* Remove existing wingwall to dimensions as directed by the Engineer. Replace according to Item 429 and refer to MCW-F2 for dimensions.

Sta. 244+90 - 245+12
2 - 10' x 10'
Reinforced Concrete Box
Culvert With Cast In Place
Concrete Wingwalls

ITEM	CODE	DESCRIPTION	QUANT	UNIT
110	6002	EXCAVATION (CHANNEL)	10.0	CY
429	6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	14.0	SF
429	6011	CONC STR REPAIR (REMOV & REPL WINGWALL)	2.0	CY

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Eric Lykins, PE
9D2D0C440F014A4...
9/1/2021

SH 36 @
DRAW
23047001830101 9
COMANCHE CO.

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		37

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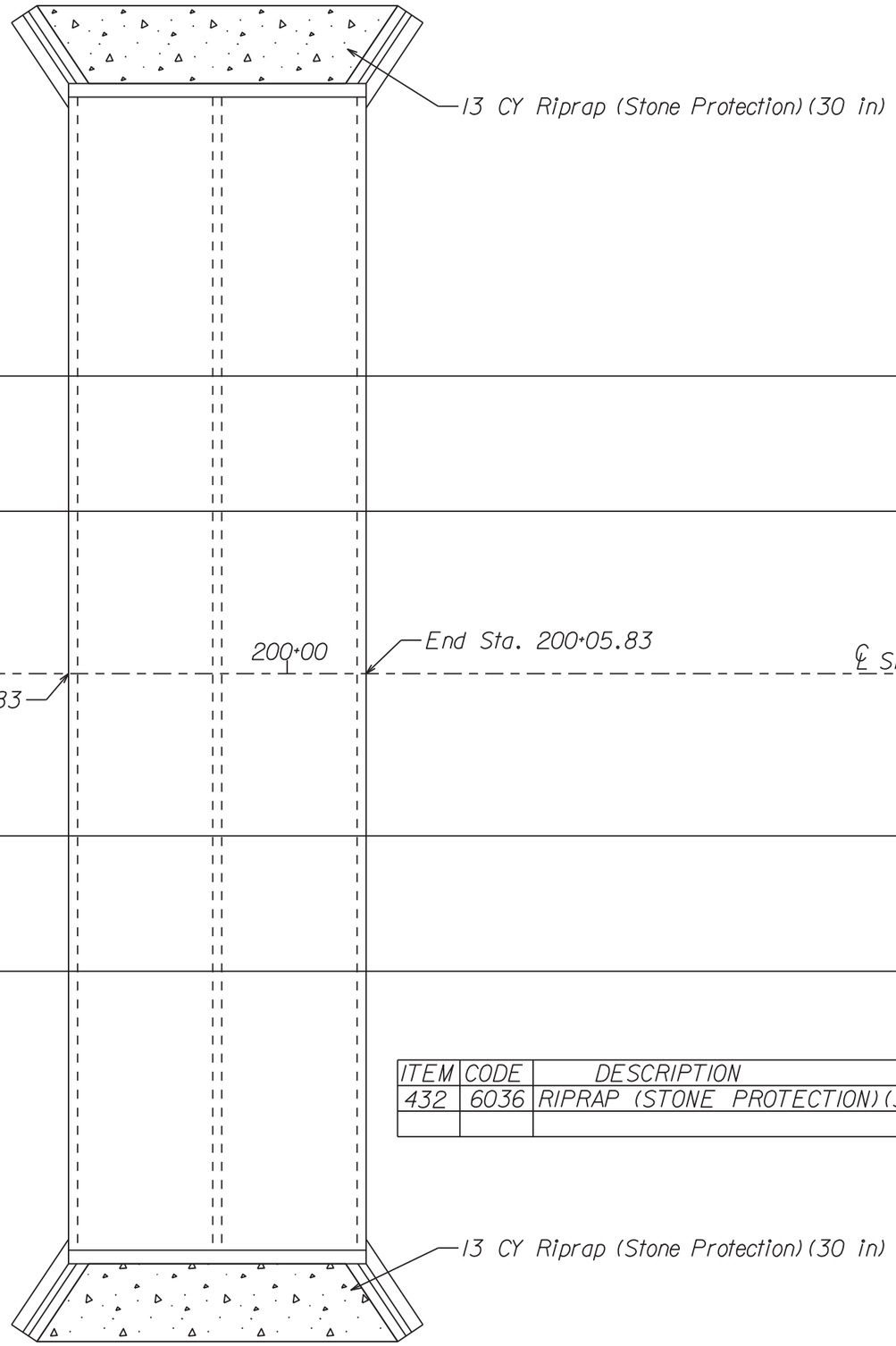

ITEM	CODE	DESCRIPTION	QUANT	UNIT
432	6036	RIPRAP (STONE PROTECTION)(30 IN)	26.0	CY

Sta. 217+46.75 - 223+88.25
13 Span Steel I-Beam Bridge
On Conc Substructure widened
with PS Conc I-Beams

DocuSigned by:
Eric L Lykins, PE
9D2D0C440F014A4...
9/1/2021

STATE OF TEXAS
ERIC L. LYKINS
86319
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SH 6 @
DRAW
230470025705039
COMANCHE CO.

Texas Department of Transportation®

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		38

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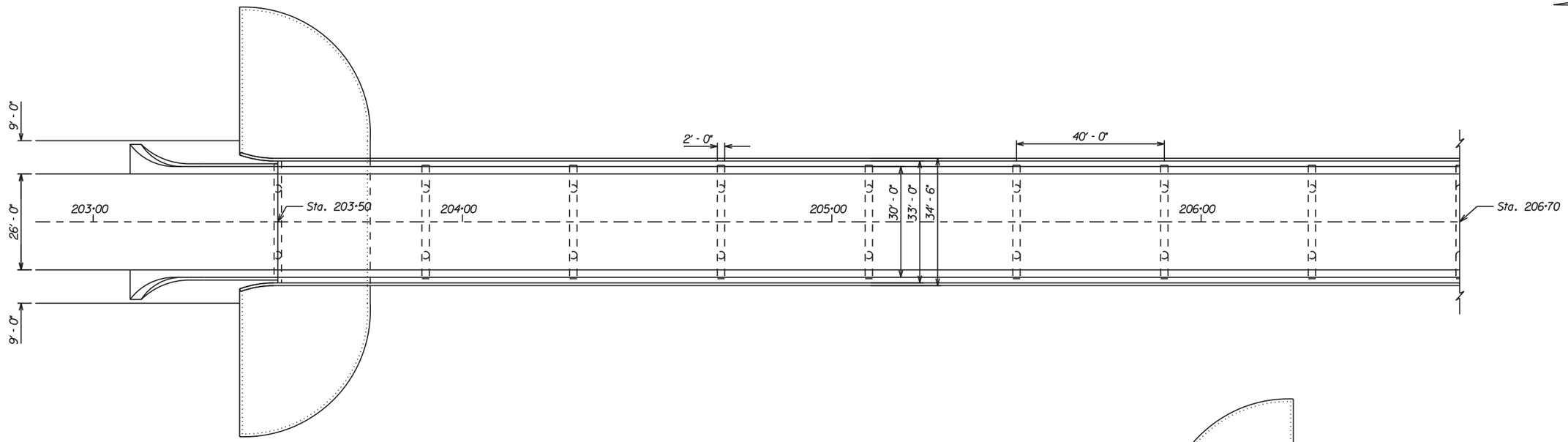

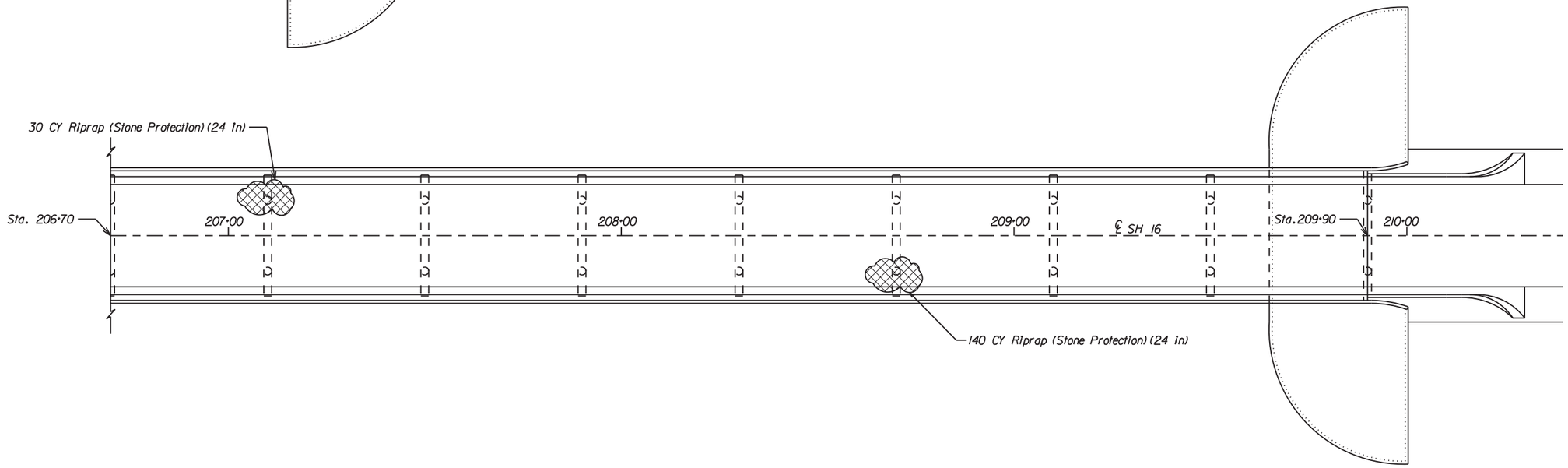

Sta. 203·50 - 209·90
16 Simple Span Concrete Pan Girder Bridge On Concrete Two Column Bents

ITEM	CODE	DESCRIPTION	QUANT	UNIT
432	6035	RIPRAP (STONE PROTECTION) (24 IN)	170.0	CY

DocuSigned by:
Eric Lykins, PE
9D2D0C440F014A4...
9/1/2021

STATE OF TEXAS
ERIC L. LYKINS
86319
LICENSED
PROFESSIONAL ENGINEER

SH 16 @ SABANNA RIVER
2304702880102I
COMANCHE CO.

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CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE, ETC.		39

DATE: 8/31/2021 6:11:46 PM
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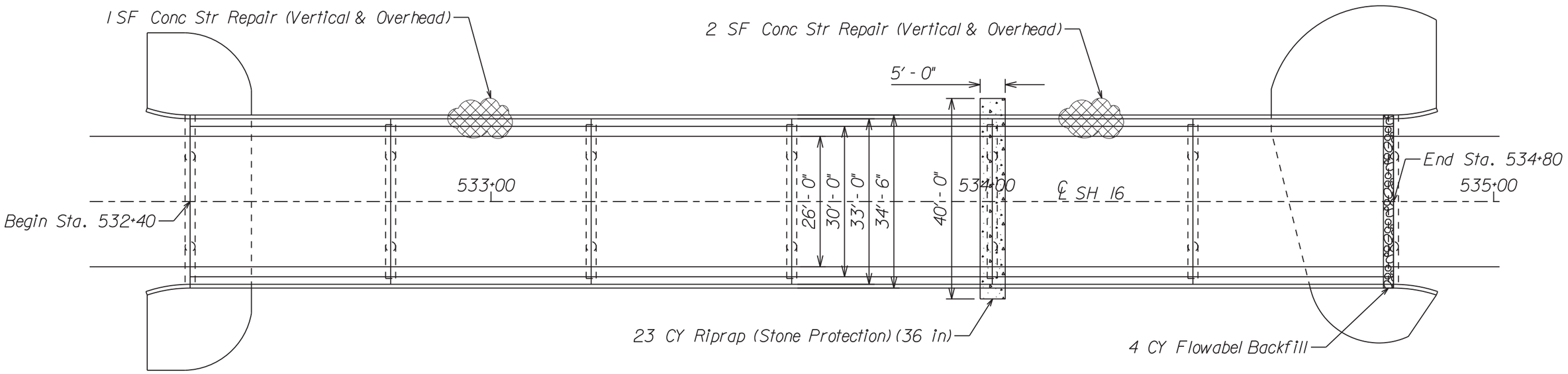

Sta. 532+40 - 534+80
6 Simple Span Concrete
Pan Girder Bridge on
Concrete Substructure

ITEM	CODE	DESCRIPTION	QUANT	UNIT
401	6001	FLOWABLE BACKFILL	4.0	CY
429	6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	3.0	SF
432	6037	RIPRAP (STONE PROTECTION) (36 IN)	23.0	CY

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6319
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9/1/2021

SH 16 @
DUNCAN CREEK
230470028802025
COMANCHE CO.

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE, ETC.		40

DATE: 8/31/2021 6:44:4 PM
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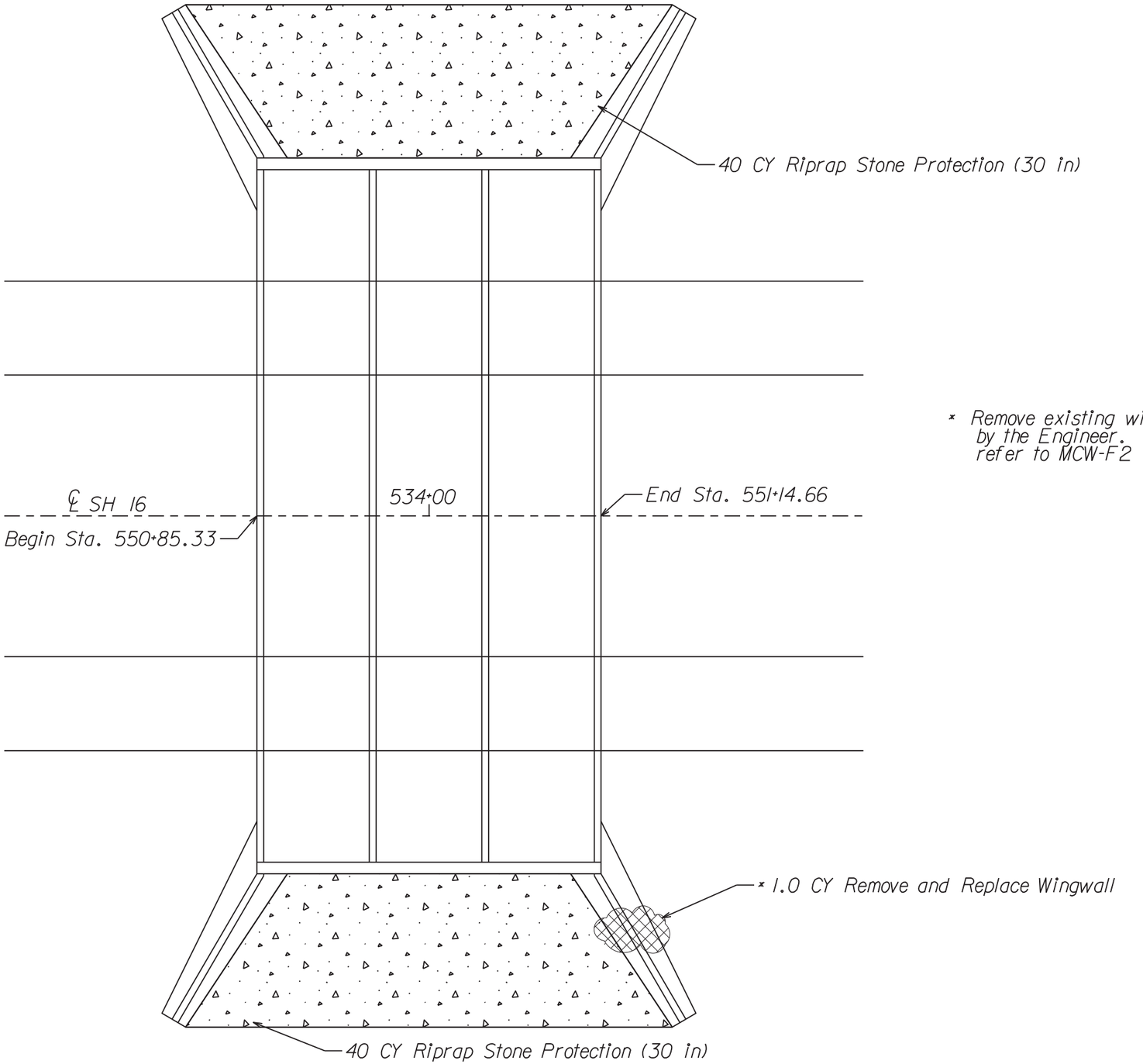

* Remove existing wingwall to dimensions as directed by the Engineer. Replace according to Item 429 and refer to MCW-F2 for dimensions.

Sta. 550+85.33 - 551+14.66
3 - 9' x 7' Concrete Box Culvert

ITEM	CODE	DESCRIPTION	QUANT	UNIT
429	6011	CONC STR REPAIR (REMOV & REPL WINGWALL)	1.0	CY
432	6036	RIPRAP (STONE PROTECTION)(30 IN)	80.0	CY

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86319
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SH 16 @
DRAW
230470028802026
COMANCHE CO.

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CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		41

DATE: 8/31/2021 6:15:24 PM
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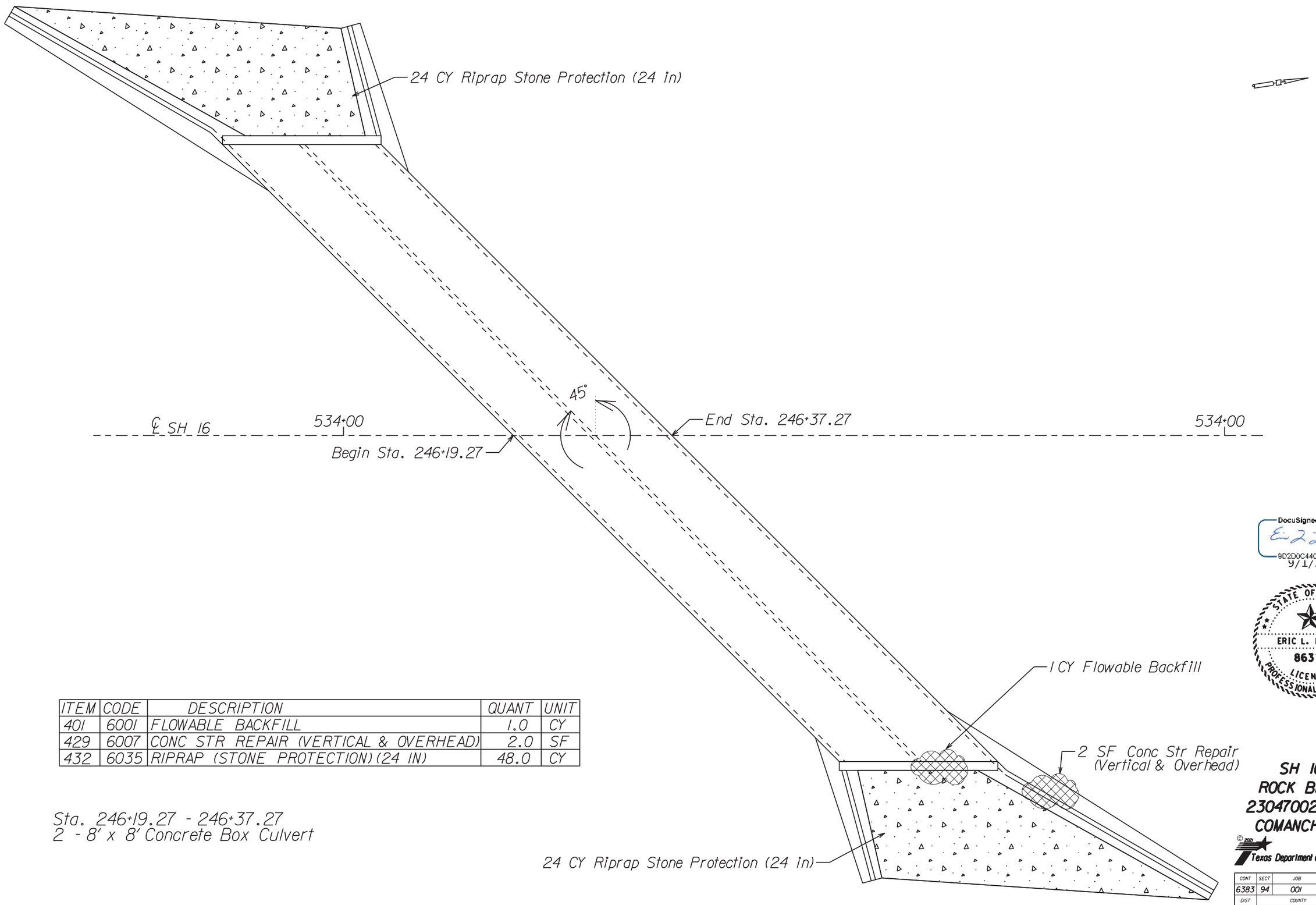

ITEM	CODE	DESCRIPTION	QUANT	UNIT
401	6001	FLOWABLE BACKFILL	1.0	CY
429	6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	2.0	SF
432	6035	RIPRAP (STONE PROTECTION)(24 IN)	48.0	CY

Sta. 246+19.27 - 246+37.27
2 - 8' x 8' Concrete Box Culvert

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Eric L Lykins, PE
9D2D0C440F014A4...
9/1/2021

STATE OF TEXAS
ERIC L. LYKINS
86319
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SH 16 @
ROCK BRANCH
230470028804019
COMANCHE CO.

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CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		42

DATE: 8/31/2021 6:47:58 PM
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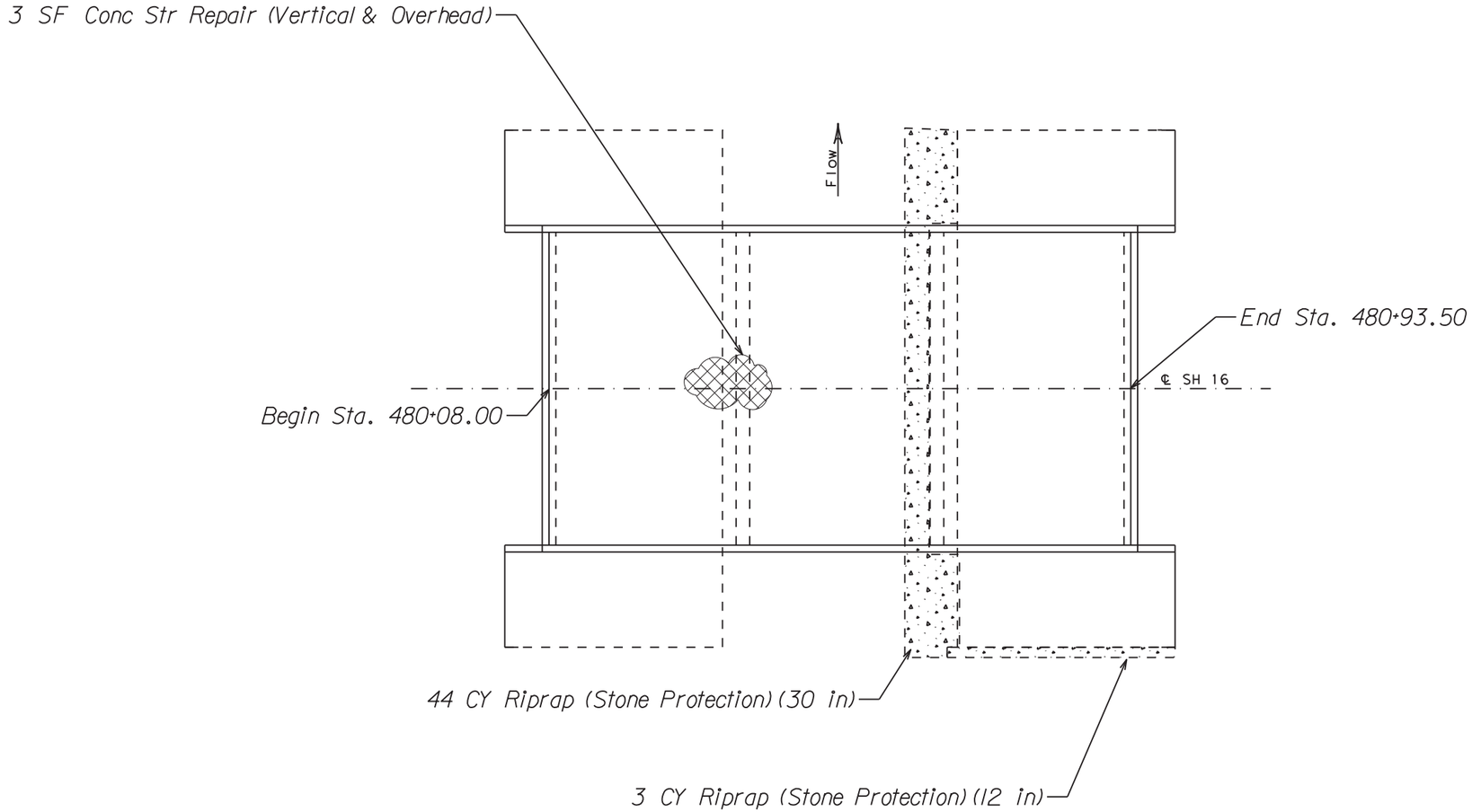

Sta. 480+08.00 - 480+93.50
Pan Girder Bridge/Prestressed I Girders
on Concrete Substructure

ITEM	CODE	DESCRIPTION	QUANT	UNIT
429	6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	3.0	SF
432	6031	RIPRAP (STONE PROTECTION) (12 IN)	3.0	CY
432	6036	RIPRAP (STONE PROTECTION) (30 IN)	44.0	CY

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Eric Lykins, PE
9D2D0C440F014A4...
9/1/2021

STATE OF TEXAS
ERIC L. LYKINS
86319
LICENSED
PROFESSIONAL ENGINEER

SH 16 @
MERCER CREEK
230470028901004
COMANCHE CO.

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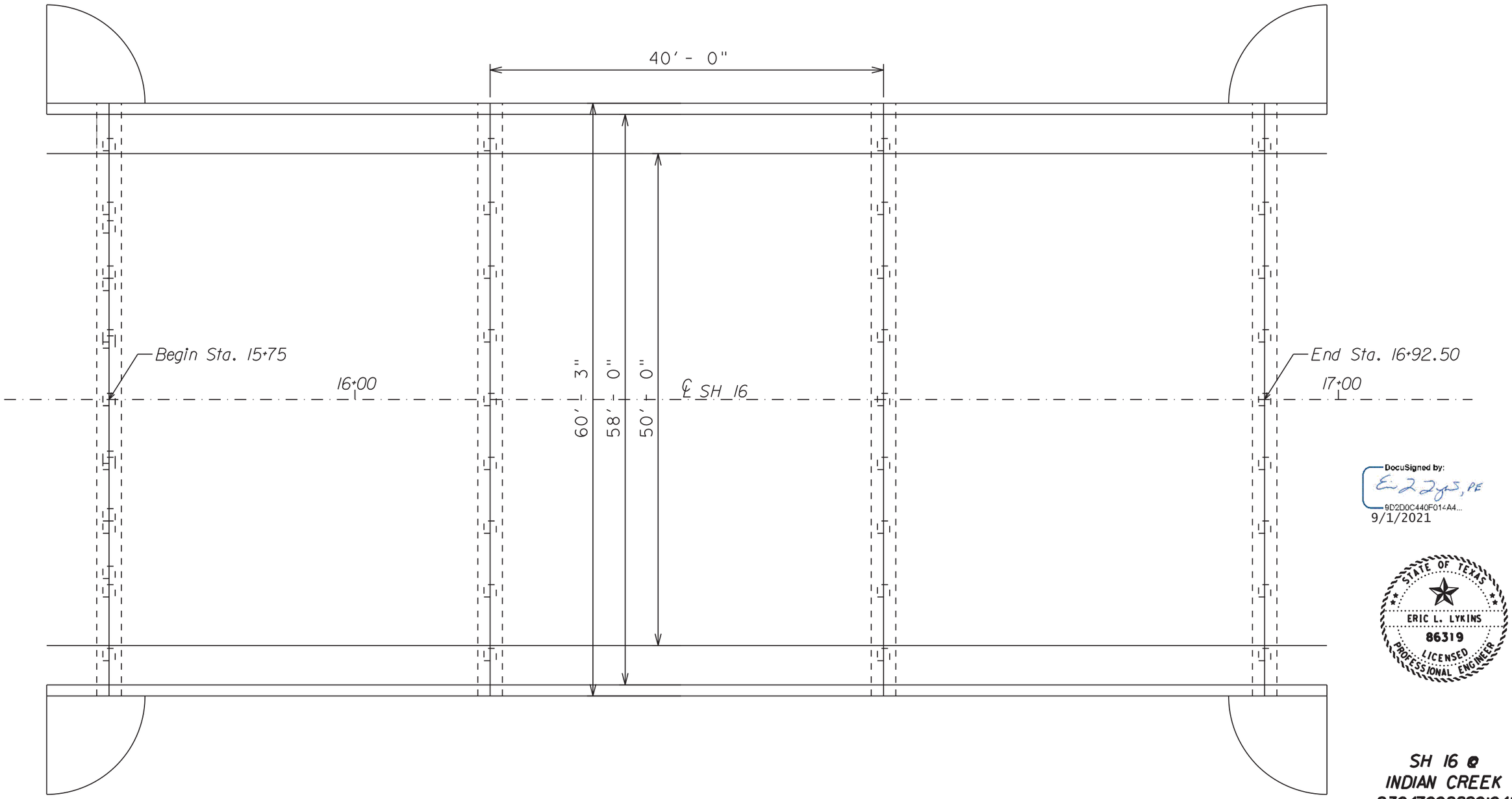
SHEET OF

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		43

DATE: 8/31/2021 6:33:31 PM
FILE: ...\SH 16 MERCER CREEK.dgn



Sta. 15+75 - 16+92.50
3 Simple Span Steel I-Beam
Bridge Widened With Prestressed
Concrete I-Beams

ITEM	CODE	DESCRIPTION	QUANT	UNIT
446	6002	CLEAN & PAINT EXIST STR (SYSTEM II)	1.0	LS

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SH 16 @
INDIAN CREEK
230470028901041
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CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		44

DATE: 8/31/2021 6:35:35 PM
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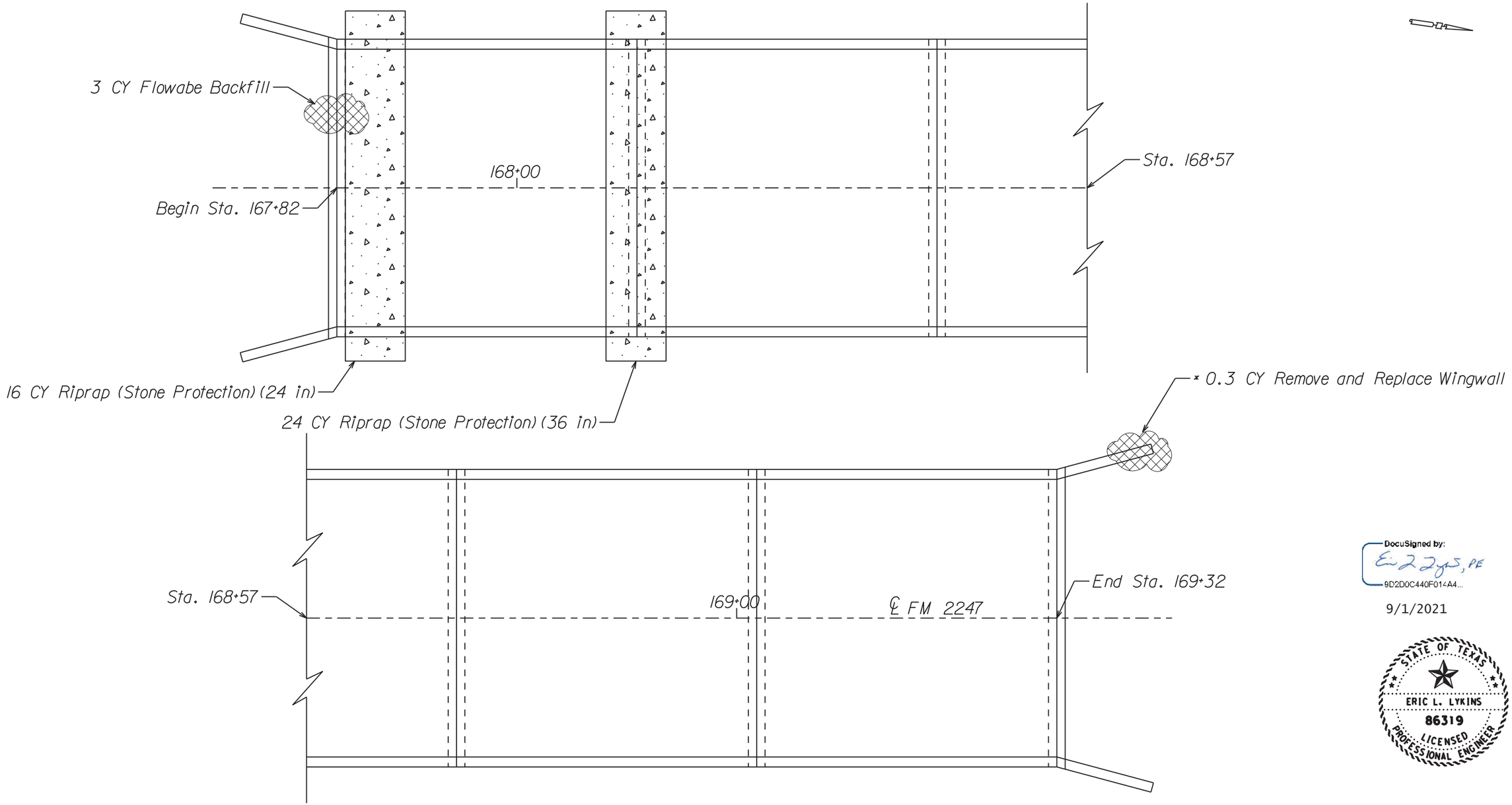

Sta. 167+82 - 169+32
5 Simple Span Concrete
Pan Girder Bridge On
Concrete Substructure

* Remove existing wingwall to dimensions as directed by the Engineer. Replace according to Item 429 and refer to BCG-24 for dimensions.

ITEM	CODE	DESCRIPTION	QUANT	UNIT
401	6001	FLOWABLE BACKFILL	3.0	CY
429	6011	CONC STR REPAIR (REMOV & REPL WINGWALL)	0.3	CY
432	6035	RIPRAP (STONE PROTECTION)(24 IN)	16.0	CY
432	6037	RIPRAP (STONE PROTECTION)(36 IN)	24.0	CY

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Eric L Lykins, PE
9D2D0C440F014A4...
9/1/2021

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FM 2247 @
COPPERAS CREEK
230470210701004
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CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		45

DATE: 8/31/2021 6:38:05 PM
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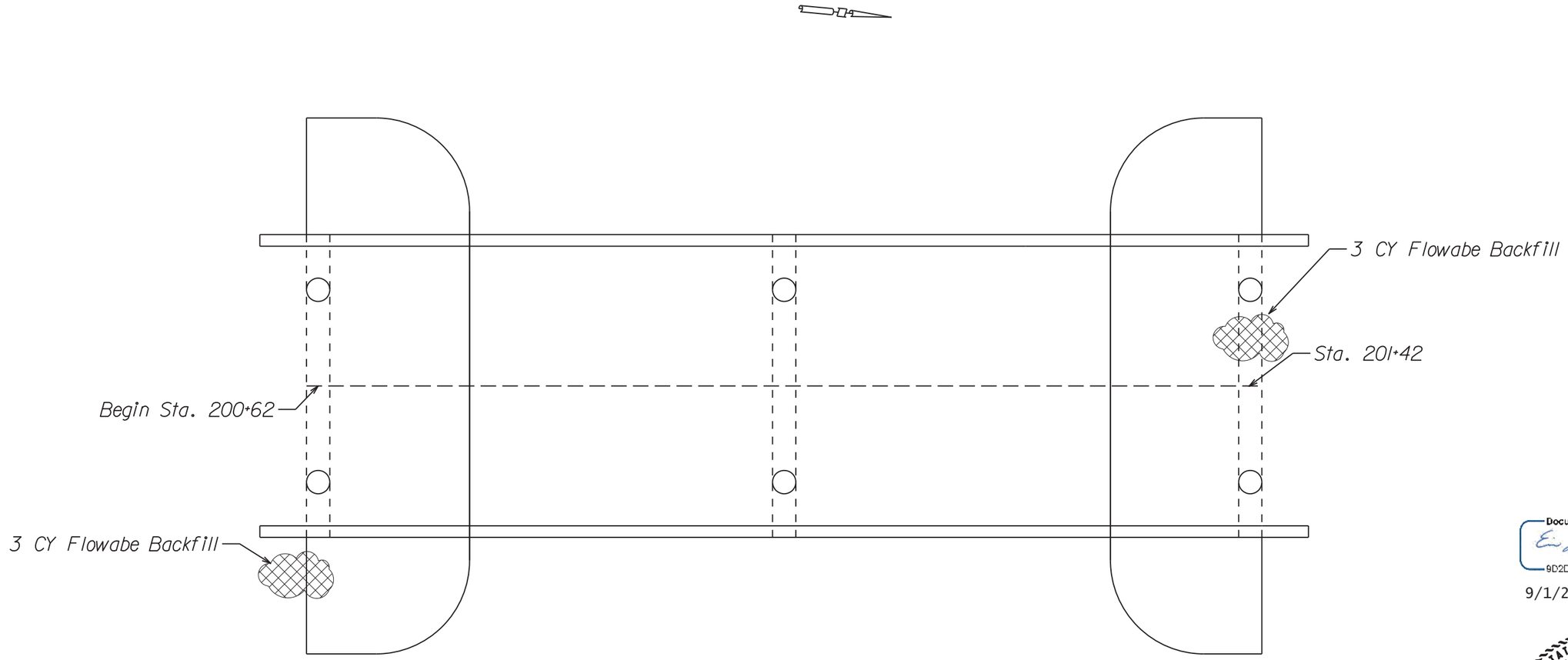

ITEM	CODE	DESCRIPTION	QUANT	UNIT
401	6001	FLOWABLE BACKFILL	6.0	CY

Sta. 200+62 - 201+42
2 Simple Span Concrete
Pan Girder Bridge On
Concrete Substructure

DATE: 8/31/2021 6:40:00 PM
FILE: ...\2022 bpm\FM 679 005.dgn

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E. Lykins, PE
9D2D0C440F014A4...
9/1/2021

STATE OF TEXAS
ERIC L. LYKINS
86319
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FM 679 @ SABANA RIVER RELIEF 230470210702005 COMANCHE CO.

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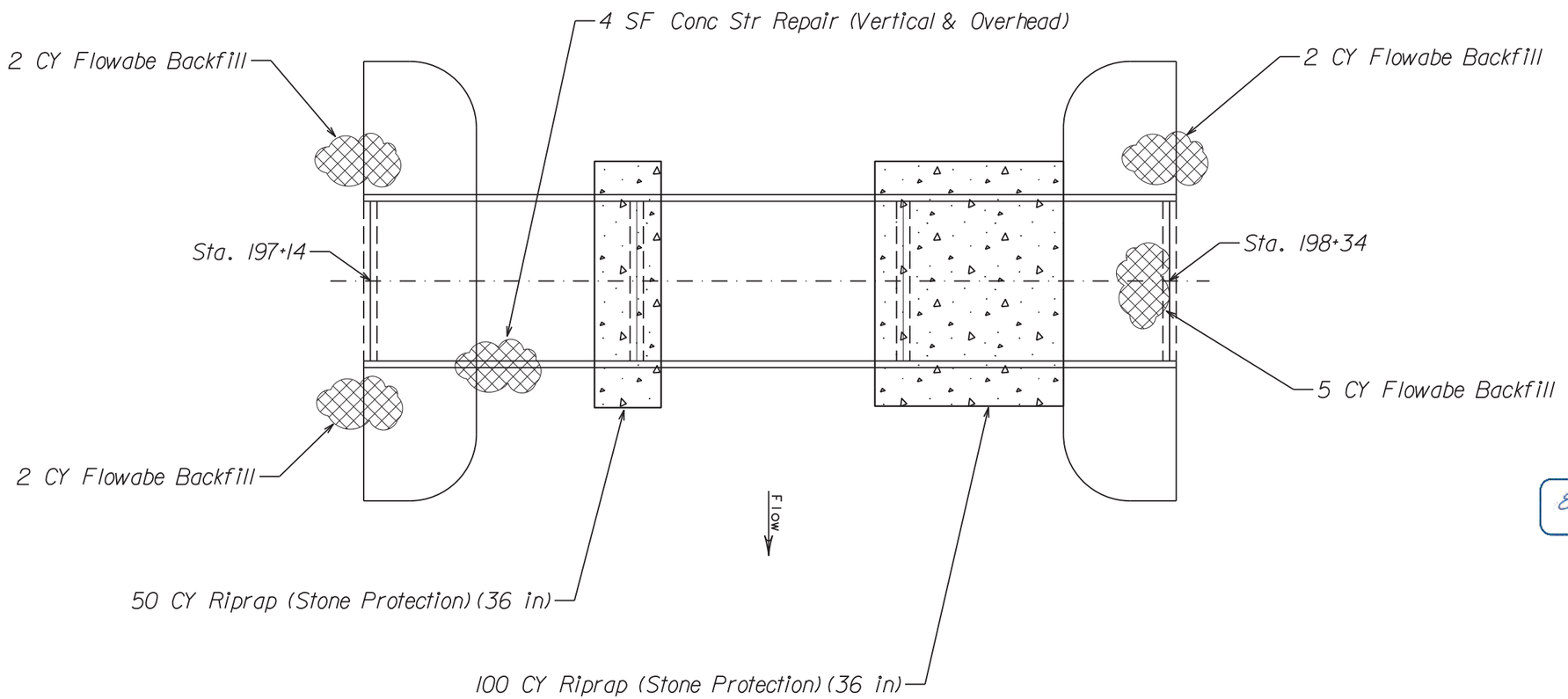
CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		46



ITEM	CODE	DESCRIPTION	QUANT	UNIT
401	6001	FLOWABLE BACKFILL	11.0	CY
429	6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	4.0	SF
432	6037	RIPRAP (STONE PROTECTION) (36 IN)	150.0	CY

Sta. 197+14 - 198+34
3 Simple Span Concrete
Pan Girder Bridge On
Concrete Substructure

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9/1/2021

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FM 679 @
SABANA RIVER
230470210702006
COMANCHE CO.

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CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE, ETC.		47

DATE: 8/31/2021 6:42:20 PM
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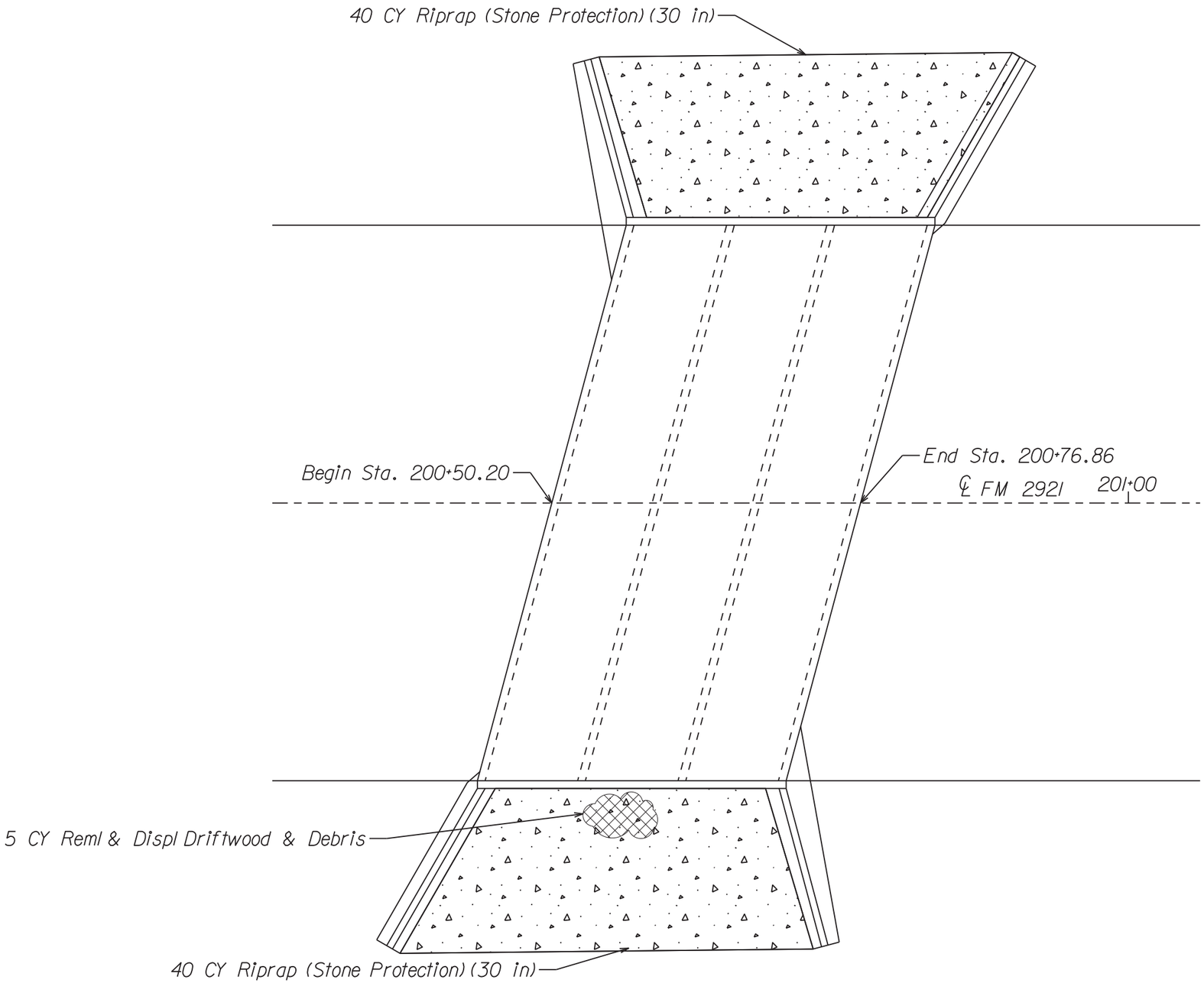

Sta. 200+50.20 - 200+76.86
3 - 8' x 8' x 48' Barrel
Concrete Box Culvert

ITEM	CODE	DESCRIPTION	QUANT	UNIT
432	6036	RIPRAP (STONE PROTECTION)(30 IN)	80.0	CY
7000	6001	REML & DISPL DRIFTWOOD & DEBRIS	5.0	CY

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Eric L Lykins, PE
9D2D0C440F014A4...
9/1/2021

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86319
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FM 2921 @ LEON RIVER TRIBUTARY
230470306602002
COMANCHE CO.

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CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		48

DATE: 8/31/2021 6:45:11 PM
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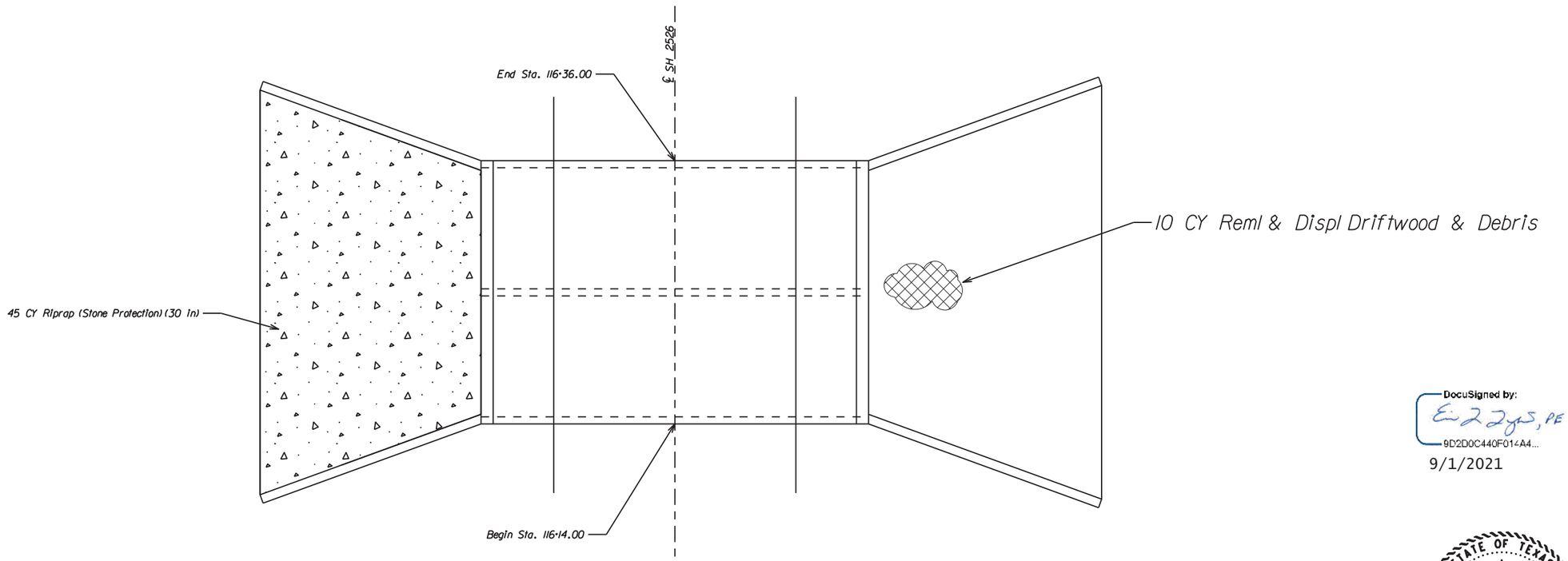

ITEM	CODE	DESCRIPTION	QUANT	UNIT
432	6036	RIPRAP (STONE PROTECTION) (30 IN)	45.0	CY
7000	6001	REML & DISPL DRIFTWOOD & DEBRIS	10.0	CY

Sta. 10+63.67 - 10+85.42
2 - 10' x 5' Concrete Box Culvert

DATE: 8/31/2021 6:47:10 PM
FILE: C:\Engapps\2022 bpm\FM 2526 Dead Horse Creek Tributary.dgn

DocuSigned by:
E. Lykins, PE
9D2D0C440F014A4...
9/1/2021

STATE OF TEXAS
ERIC L. LYKINS
86319
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FM 2526 @ DEAD HORSE CREEK TRIB
230680237602001
EASTLAND CO.

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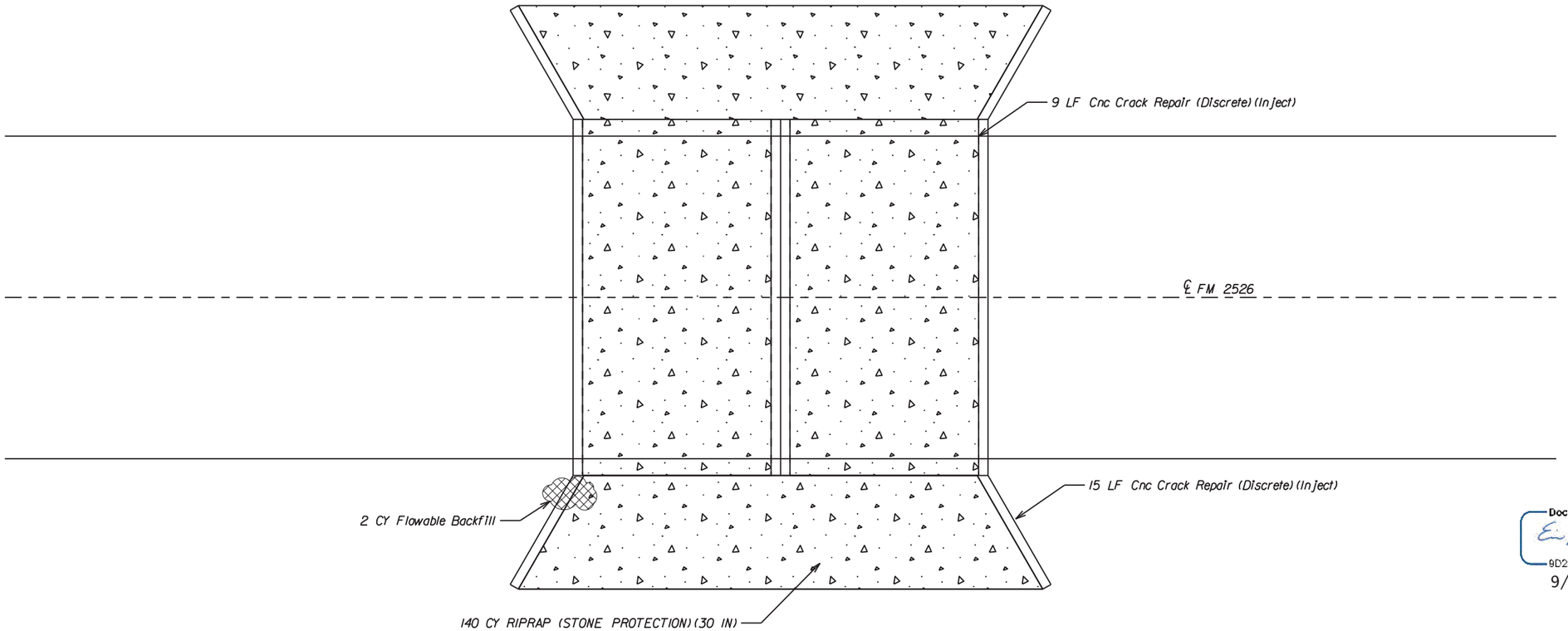
CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		49



DocuSigned by:
Eric Lykins, PE
9D2D0C440F014A4...
9/1/2021

STATE OF TEXAS
ERIC L. LYKINS
86319
LICENSED
PROFESSIONAL ENGINEER

2 Span Continuous Steel Stringer
Bridge On masonry Supports

ITEM	CODE	DESCRIPTION	QUANT	UNIT
401	6001	FLOWABLE BACKFILL	2.0	CY
432	6036	RIPRAP (STONE PROTECTION)(30 IN)	140.0	CY
780	6002	CNC CRACK REPAIR (DISCRETE)(INJECT)	24.0	LF

FM 2526 @
DEAD HORSE CREEK
230680237602002
EASTLAND CO.

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CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		50

DATE: 8/31/2021 6:48:16 PM
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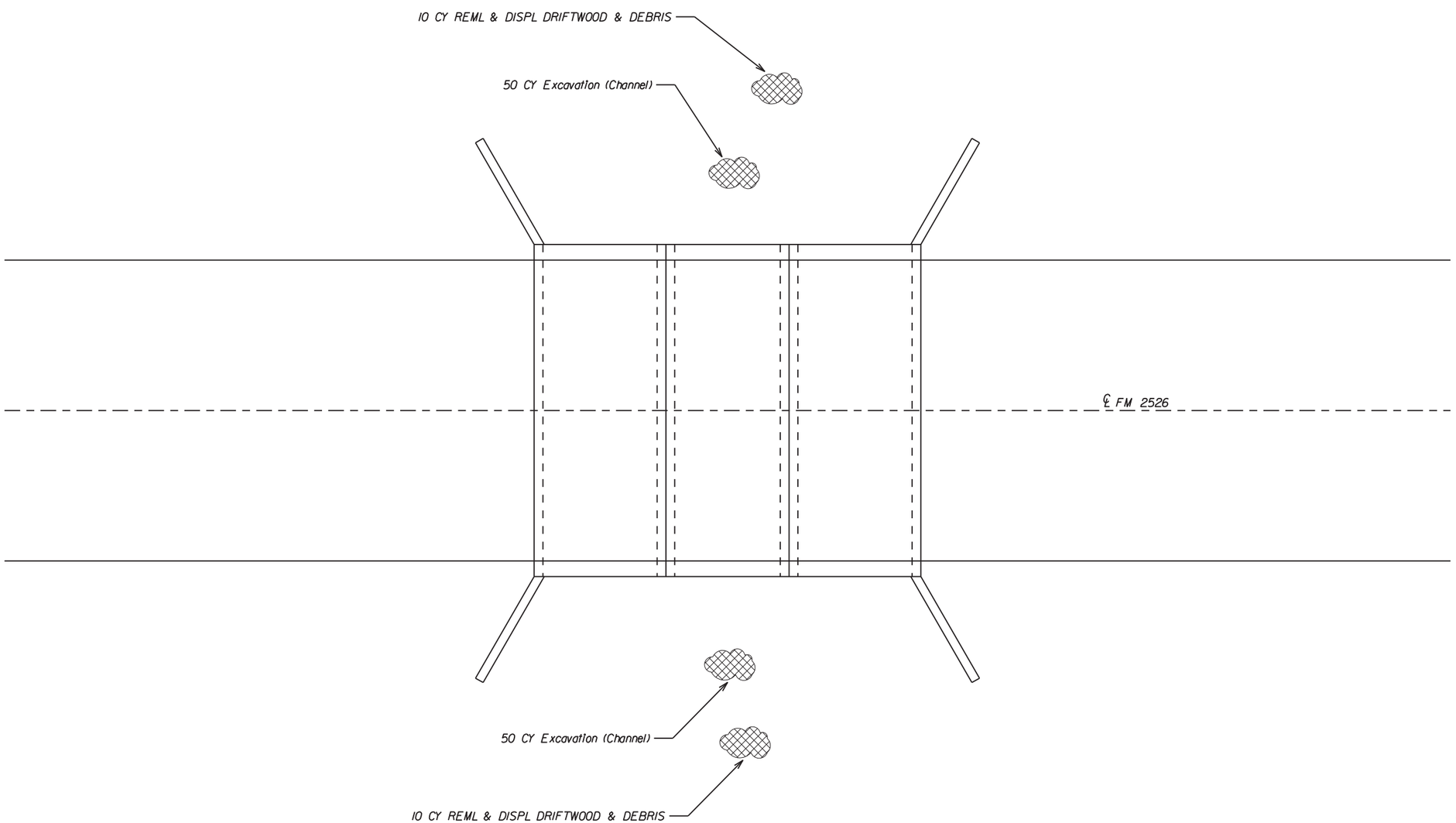

3 Span Continuous Steel Stringer
Bridge On masonry Supports

ITEM	CODE	DESCRIPTION	QUANT	UNIT
110	6002	EXCAVATION (CHANNEL)	100.0	CY
7000	6001	REML & DISPL DRIFTWOOD & DEBRIS	20.0	CY

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Eric Lykins, PE
9D2D0C440F014A4...
9/1/2021

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86319
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FM 2526 @
DRAW
230680237603005
EASTLAND CO.

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CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		51

DATE: 8/31/2021 7:46:19 PM
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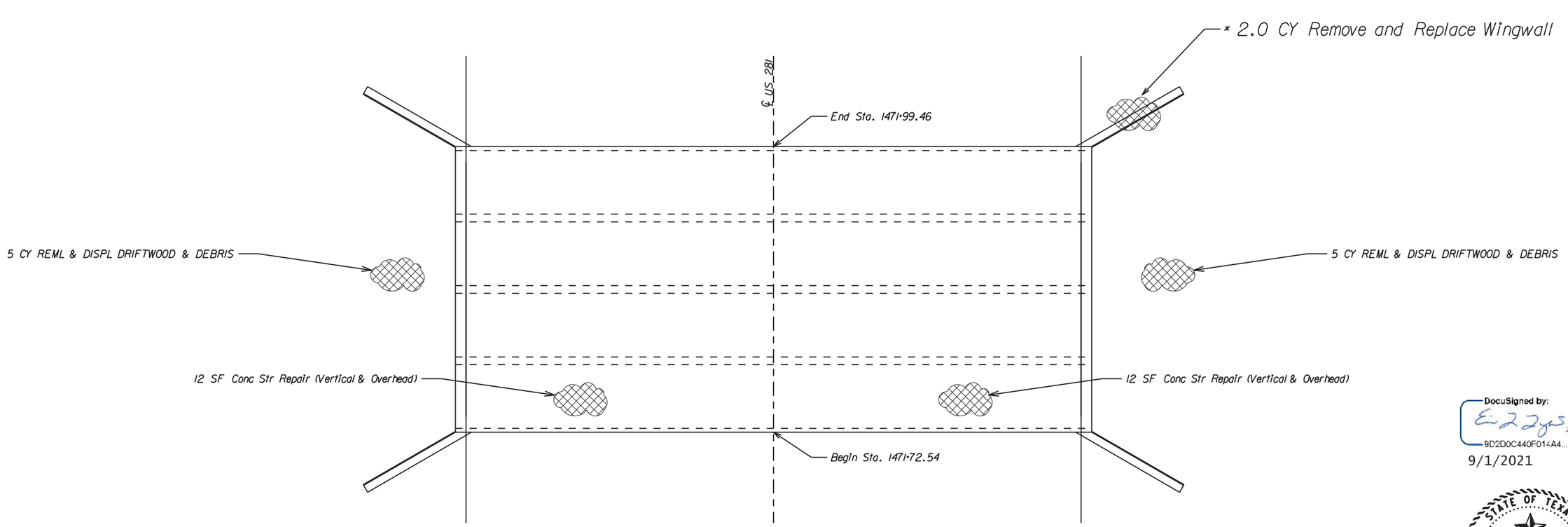
* Remove existing wingwall to dimensions as directed by the Engineer. Replace according to Item 429 and refer to MCW-F1 for dimensions.



Sta. 1471+72.54 - 1471+99.46
4 - 6' x 6' concrete box culvert

ITEM	CODE	DESCRIPTION	QUANT	UNIT
429	6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	24.0	SF
429	6011	CONC STR REPAIR (REMOV & REPL WINGWALL)	2.0	CY
7000	6001	REML & DISPL DRIFTWOOD & DEBRIS	10.0	CY

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9/1/2021

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ERIC L. LYKINS
86319
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US 281 @
HEATLEY BRANCH
23141002504016
LAMPASAS CO.

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CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		52

DATE: 8/31/2021 7:23:41 PM
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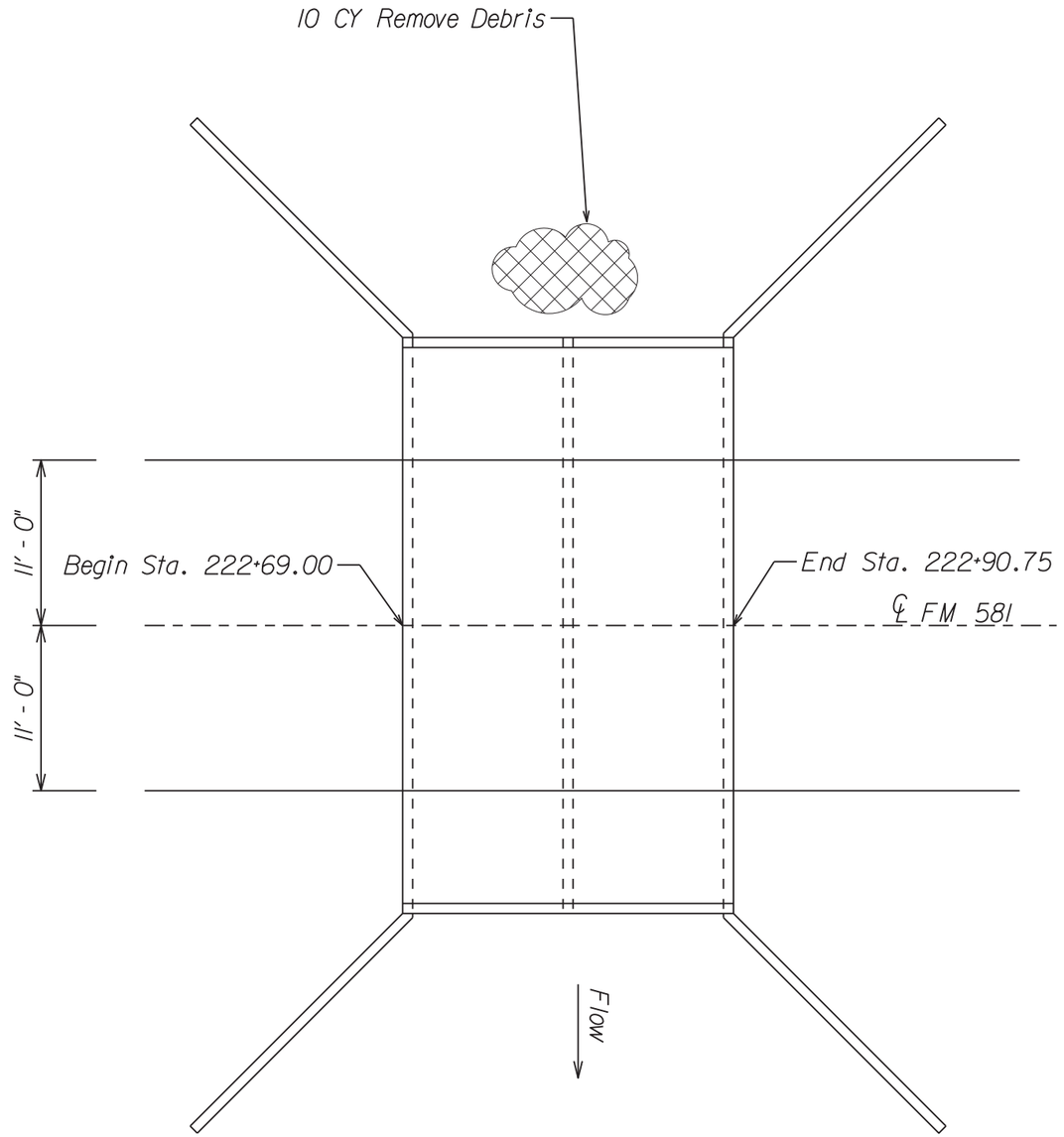

Sta. 222+69.00 - 222+90.75
2 - 10' x 6' MBC

ITEM	CODE	DESCRIPTION	QUANT	UNIT
7000	6001	REML & DISPL DRIFTWOOD & DEBRIS	10.0	CY

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Eric L. Lykins, PE
9D2D0C440F014A4...
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ERIC L. LYKINS
86319
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SH 581 ℄
DRAW
231410228501002
LAMPASAS CO.

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CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		53

DATE: 8/31/2021 7:25:00 PM
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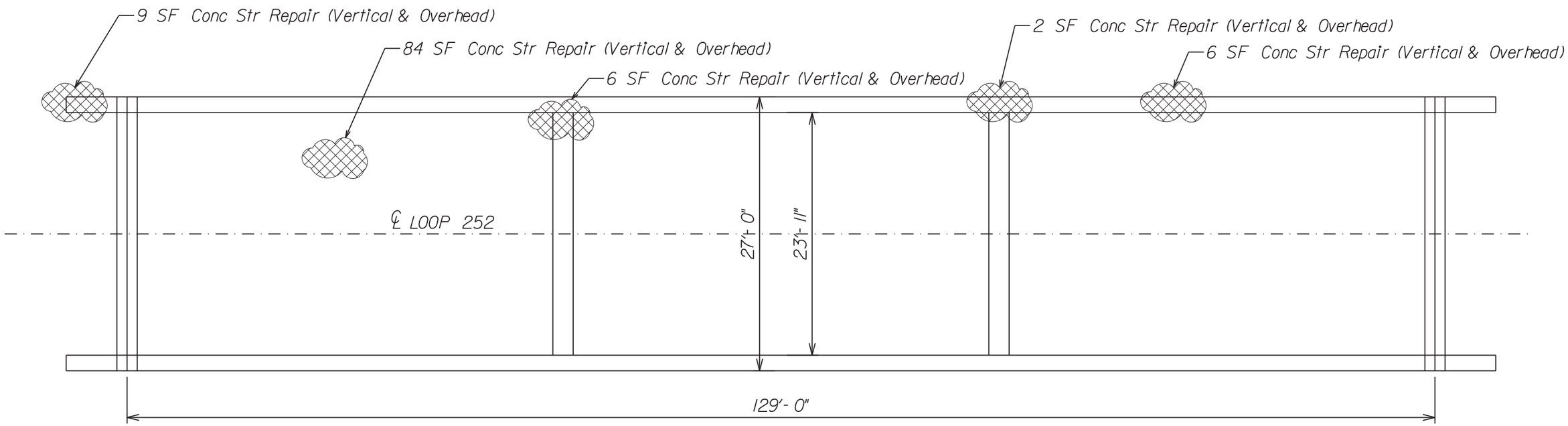

3 Simple Span Concrete
T-Beam Bridge On
Concrete Substructure

ITEM	CODE	DESCRIPTION	QUANT	UNIT
429	6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	107.0	SF

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ERIC L. LYKINS
6319
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Eric L. Lykins, PE
9D2D0C440F014A4...
9/1/2021

LOOP 252 @ CADDO CREEK
2321500III2058
STEPHENS CO.

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CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		54

DATE: 8/31/2021 7:26:17 PM
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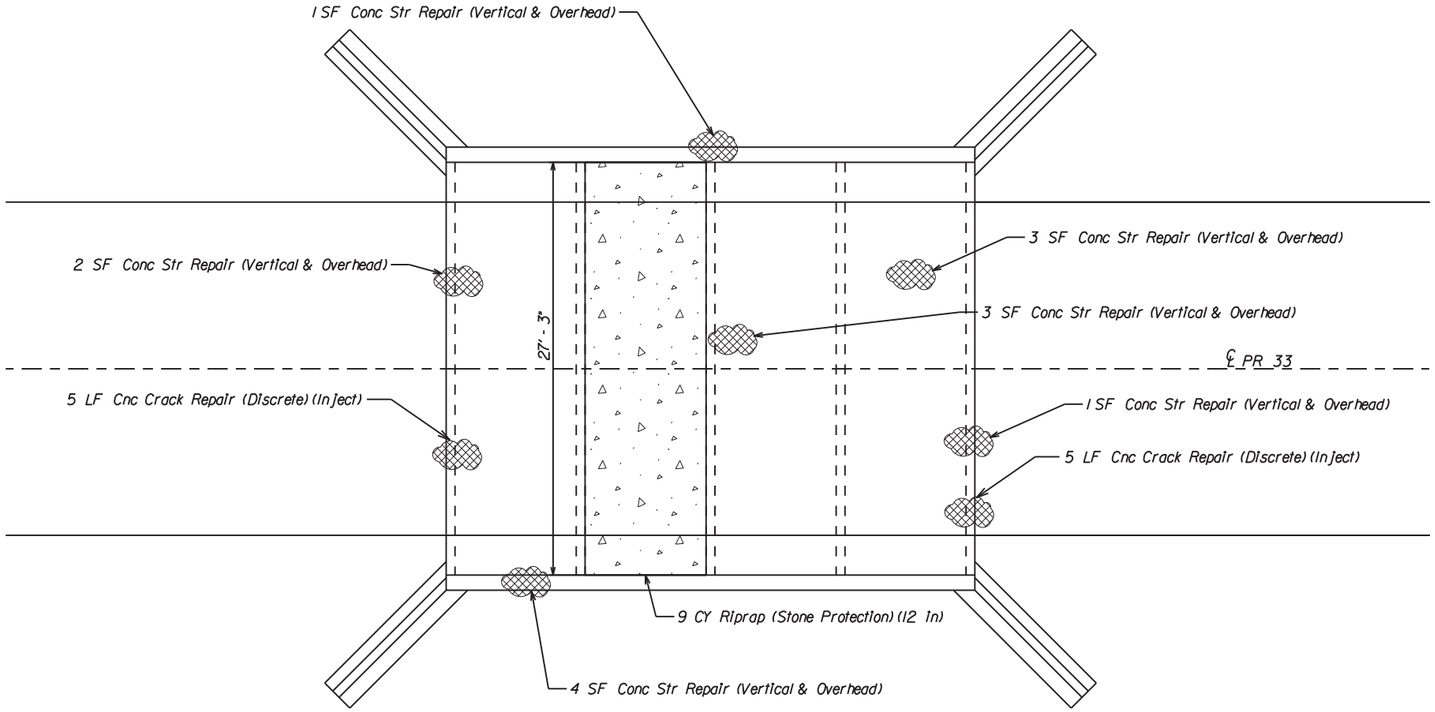

4 - 8' x 3' Concrete Box Culvert

ITEM	CODE	DESCRIPTION	QUANT	UNIT
429	6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	14.0	SF
432	6031	RIPRAP (STONE PROTECTION (12 IN)	9.0	CY
780	6002	CNC CRACK REPAIR (DISCRETE)(INJECT)	10.0	LF

STATE OF TEXAS
ERIC L. LYKINS
86319
REGISTERED ENGINEER

DocuSigned by:
Eric Lykins, PE
9D2D0C440F014A4...
9/1/2021

PR 33 @
DRAW
232150071402002
STEPHENS CO.

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CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		55

DATE: 8/31/2021 7:29:20 PM
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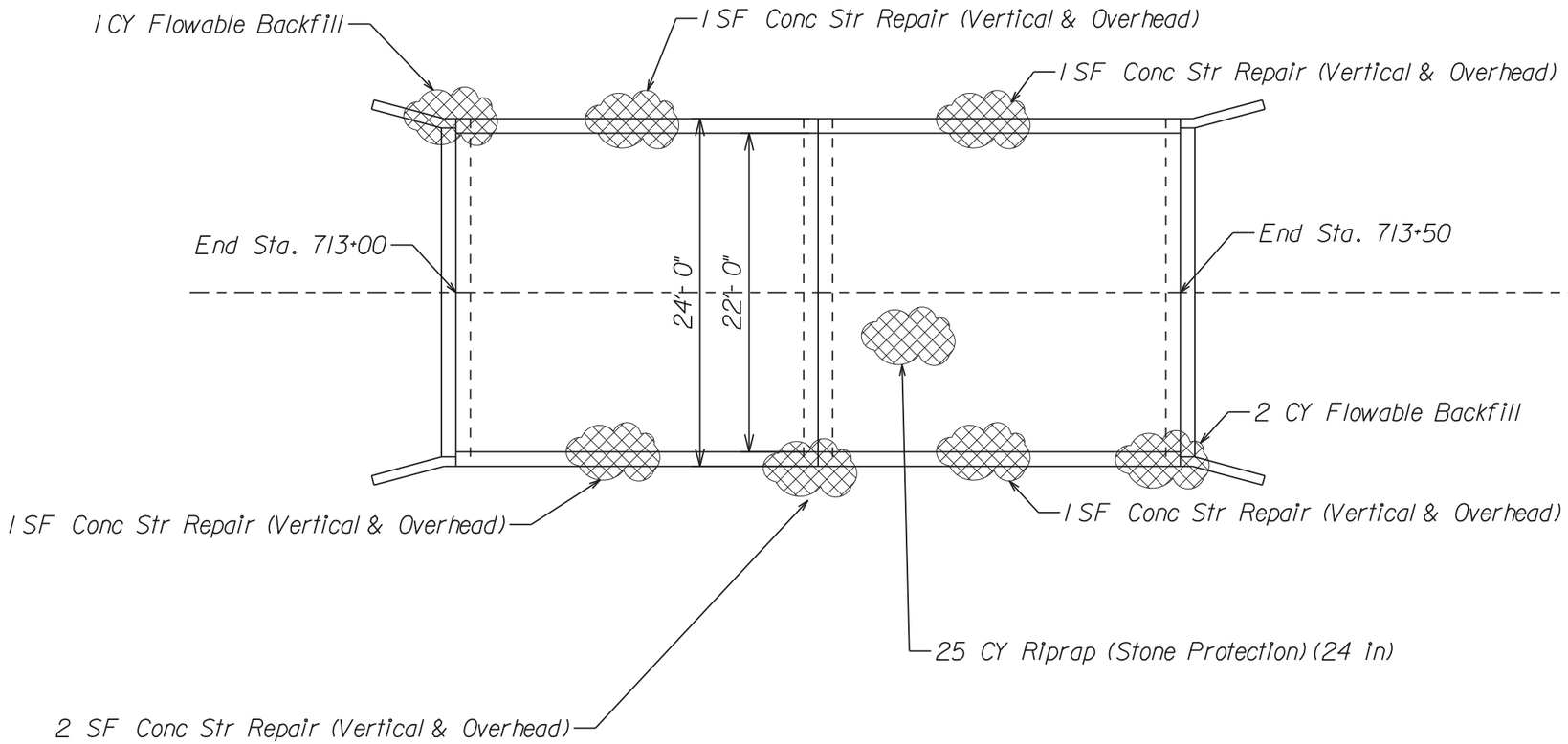

ITEM	CODE	DESCRIPTION	QUANT	UNIT
401	6001	FLOWABLE BACKFILL	3.0	CY
429	6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	6.0	SF
432	6035	RIPRAP (STONE PROTECTION (24 IN)	25.0	CY

Sta. 713+00 - 713+50
2 Simple Span
Concrete Flat Slab
Bridge on Concrete
Substructure

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ERIC L. LYKINS
86319
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DocuSigned by:
Eric L. Lykins, PE
9D2D0C440F014A4...
9/1/2021

FM 717 @
COTTONWOOD CREEK
232150071403009
STEPHENS CO.

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		56

DATE: 8/31/2021 7:30:34 PM
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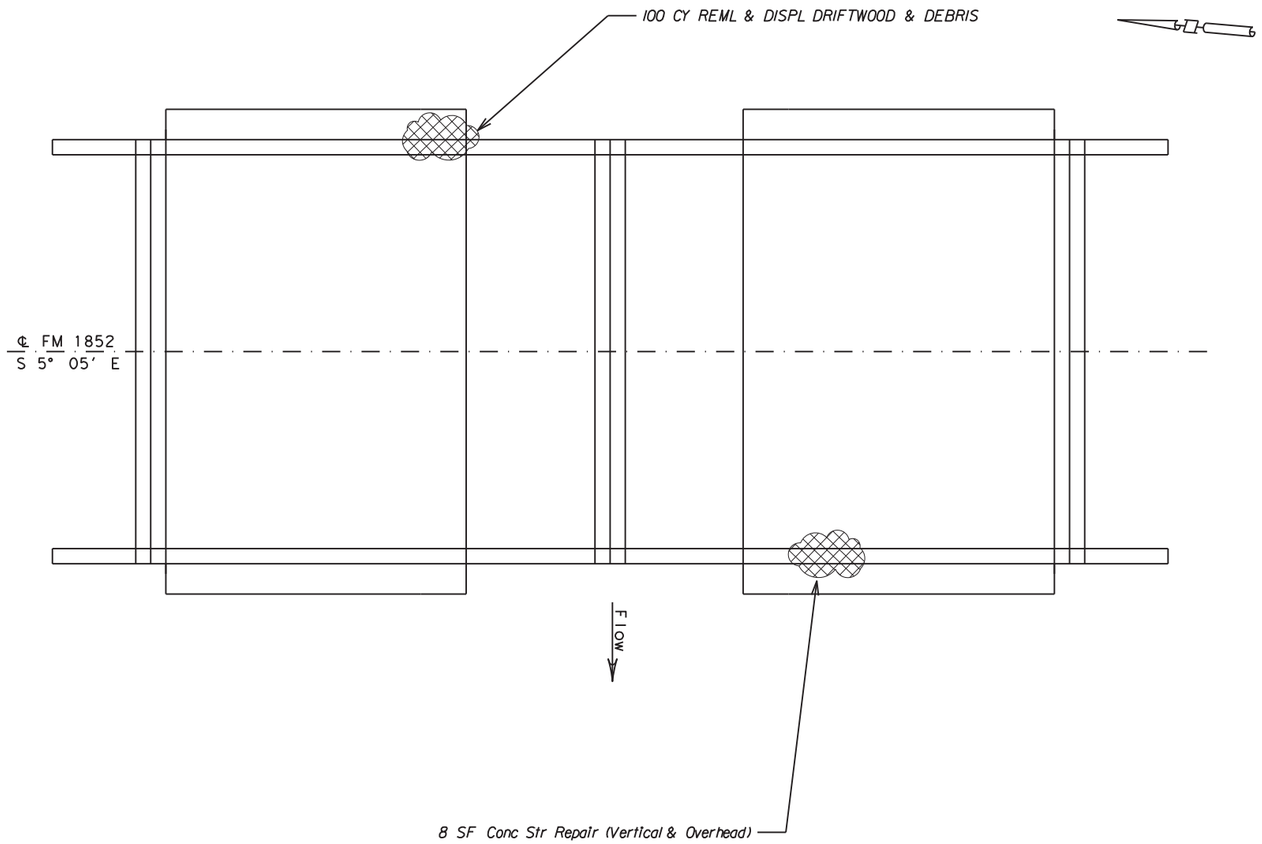

ITEM	CODE	DESCRIPTION	QUANT	UNIT
429	6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	8.0	CY
7000	6001	REML & DISPL DRIFTWOOD & DEBRIS	100.0	CY

STATE OF TEXAS
ERIC L. LYKINS
5319
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PROFESSIONAL ENGINEER

DocuSigned by:
Eric L Lykins, PE
9D2D0C440F01...

9/1/2021

FM 1852 @ E. FORK GONZALES CREEK
232150178101003
STEPHENS CO.

Texas Department of Transportation®

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE,ETC.		57

DATE: 8/31/2021 7:56:47 PM
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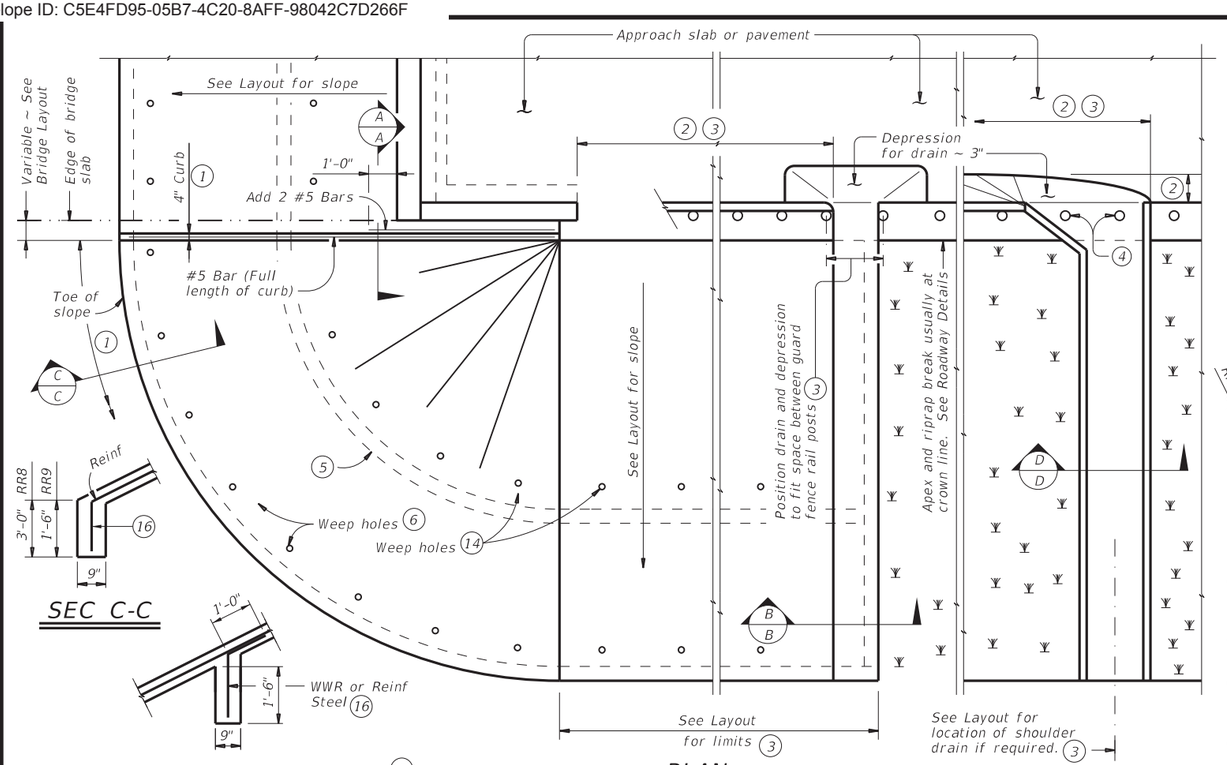
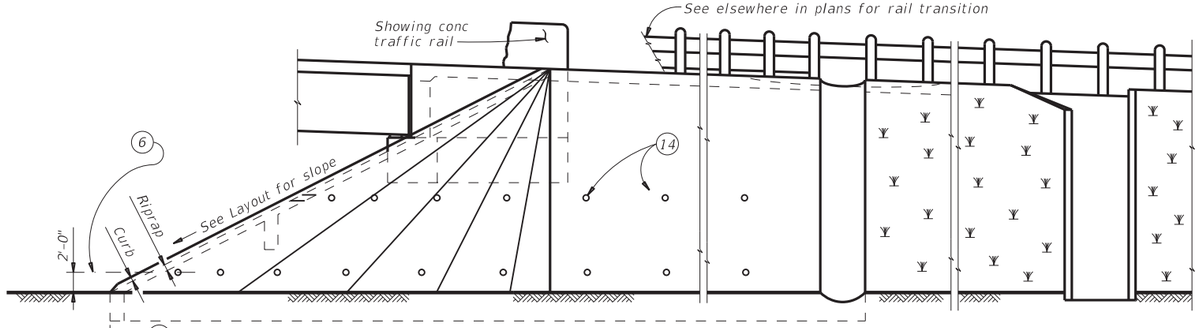


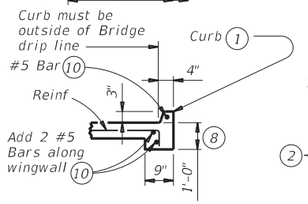
PLAN

SEC C-C

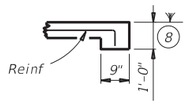
INTERMEDIATE TOEWALL



ELEVATION

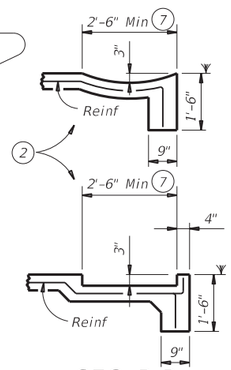


SEC A-A



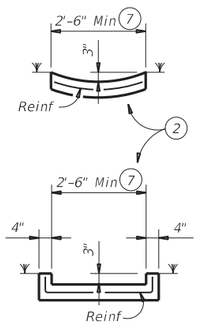
SEC B-B

(No drain)



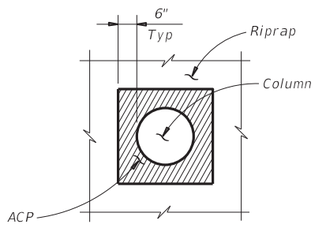
SEC B-B

(Shoulder drain integral with riprap)



SEC D-D

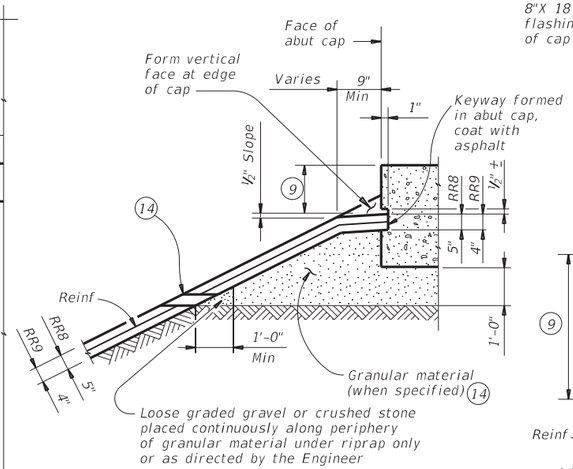
(Shoulder drain)



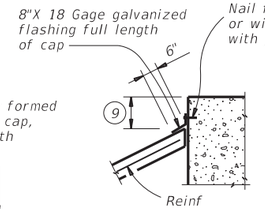
Riprap blockout to be filled with ACP. (Subsidiary to riprap)

RIPRAP DETAIL AT COLUMNS

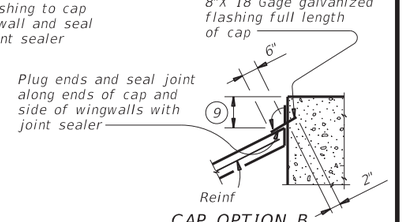
(As directed by the Engineer)



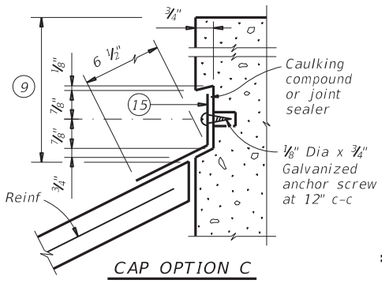
SHOWING KEYWAY OPTION



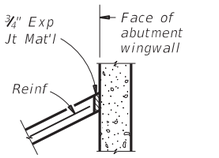
CAP OPTION A



CAP OPTION B

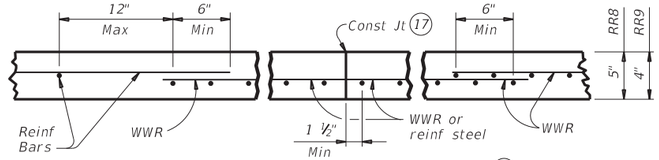


CAP OPTION C



SECT THRU RIPRAP AT WINGWALL (12)

SECTIONS THRU RIPRAP AT CAP (11)



REINFORCEMENT DETAILS (13)

See General Notes for optional synthetic fiber reinforcement.

1. When riprap is shown extended around header on layout, extend slab and toewall as shown and eliminate 4" curb.
2. Limits and configuration of drains and depressions are as shown elsewhere in plans or as directed by the Engineer.
3. Location of shoulder drain must consider limitations imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.
4. See details elsewhere in plans for installation of guard fence posts through concrete riprap.
5. Provide intermediate toewall only when designated elsewhere in the plans or included in the specifications.
6. Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 CF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.
7. Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer.
8. Wall extension may be reduced or modified if approved by the Engineer. Increase wall extension to 1'-6" whenever the optional intermediate toewall is called for in the plans.
9. Top of cap to top of riprap dimension varies as directed by the Engineer. Should be 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.
10. #5 bars shown are required even when synthetic fiber reinforcing option is selected.
11. Provide sealing option for joint between the face of cap and riprap as designated by the Engineer or as shown elsewhere on plans.
12. Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt Mat'l if shown on plans or directed by the Engineer.
13. Provide #3 reinforcing bars at 18" Spa c-c. Provide Welded Wire Reinforcement (WWR) as 6x6-D2.9xD2.9 or D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.
14. If granular material is specified, provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.
15. 8" x 18 Gage Galv Sheet Metal
16. Provide WWR or #3 bars, with 1'-0" extension into slope.
17. WWR or reinforcing steel is continuous through riprap construction joints. Provide WWR or reinforcing steel that extends 1'-1" minimum into adjacent riprap on each side of construction joint even if synthetic reinforcing fiber is utilized.

FOR CONTRACTOR'S INFORMATION ONLY:
5" of RR8 = 0.015 CY/SF
4" of RR9 = 0.012 CY/SF
#3 Reinf at 18" c-c = 0.501 Lbs/SF
6x6-D3xD3 = 0.408 Lbs/SF

GENERAL NOTES:

Provide Class "B" concrete (f'c = 2,000 psi) unless noted elsewhere in plans.

Provide Grade 60 reinforcing steel.

Provide deformed welded wire reinforcement (WWR) meeting ASTM A1064, unless otherwise shown.

Provide reinforcing bars, deformed WWR, or any suitable combination of both types for riprap reinforcing, unless specified elsewhere in the plans.

Optionally synthetic fibers may be used if approved by the Engineer. Provide synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) in lieu of steel reinforcing in riprap concrete.

Install construction joints or grooved joints extending the full slant slope height at intervals of approximately 20 feet unless otherwise directed by the Engineer.

Hardware cloth, loose grade stone behind weep holes, flashing, or other sealing material are subsidiary to the bid item "Riprap".

See Layout for limits of riprap.

RR8 is to be used on stream crossings.

RR9 is to be used on other embankments.

Texas Department of Transportation

Bridge Division Standard

CONCRETE RIPRAP AND SHOULDER DRAINS
EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)

CRR

FILE: crrstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	6383	94	001	SH 16, ETC.
	DIST	COUNTY		SHEET NO.
	23	COMANCHE, ETC.		58

DATE: 6/10/2021 1:43:02 PM
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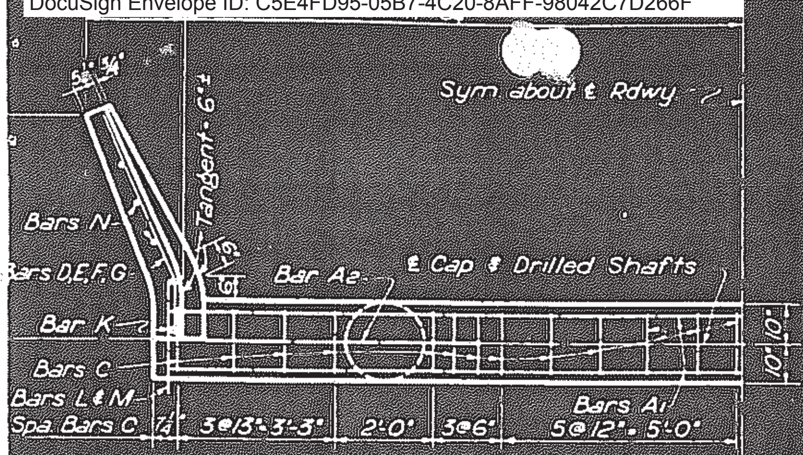
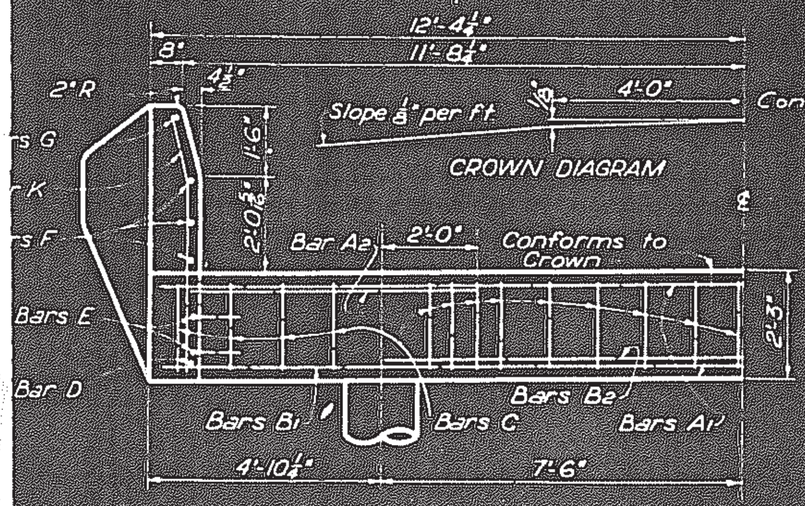
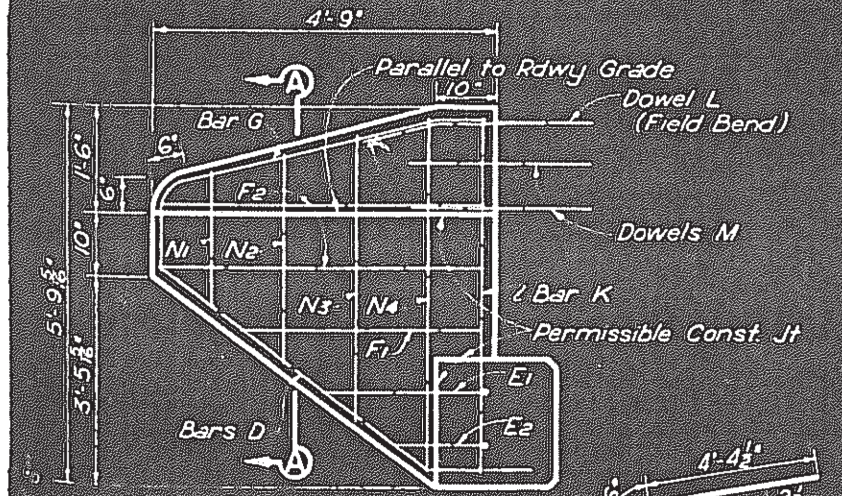


HALF PLAN

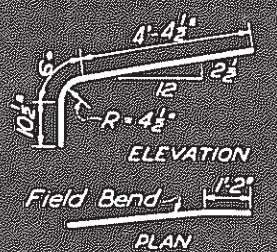


HALF ELEVATION

DETAIL OF ABUTMENT

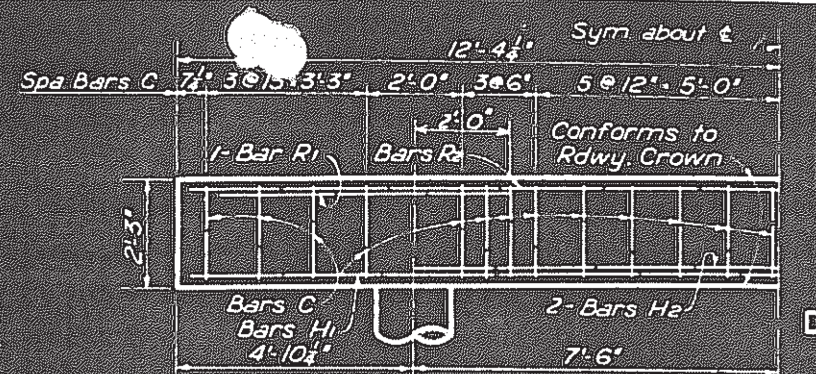


ELEVATION - WING

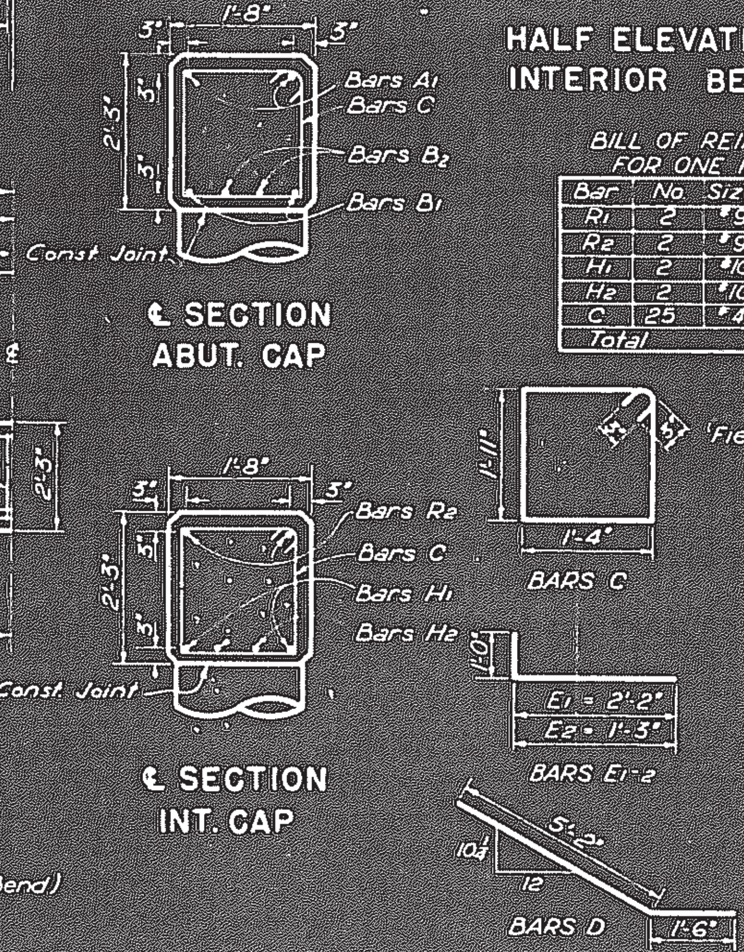


BARS G

SEC. A-A



HALF ELEVATION
INTERIOR BENT



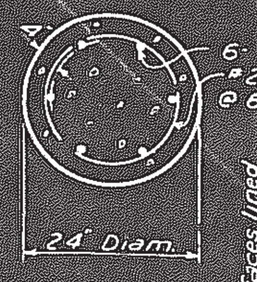
BILL OF REINFORCING STEEL
FOR ONE INTERIOR BENT

Bar	No.	Size	Spa.	Length	Weight
R1	2	#9	~	6'-0"	41
R2	2	#9	~	24'-4"	165
H1	2	#10	~	24'-4"	209
H2	2	#10	~	15'-0"	129
C	25	#4	Shown	7'-0"	117
Total				Lbs.	661

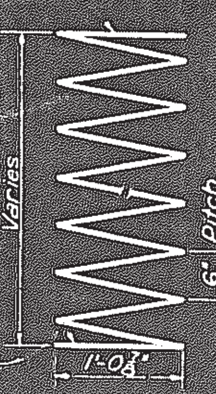
NOTE:
Portions of circular columns above ground shall be formed either with metal forms or with laminated fiber tubes with inside surfaces lined with plastic and coated with wax. These tubes to be Sonotubes as manufactured by Sonoco Products Company, or approved equal. (See layout for dimensions "X", "Y" & "H")

N1 = 1'-9"
N2 = 2'-9"
N3 = 3'-9"
N4 = 4'-9"

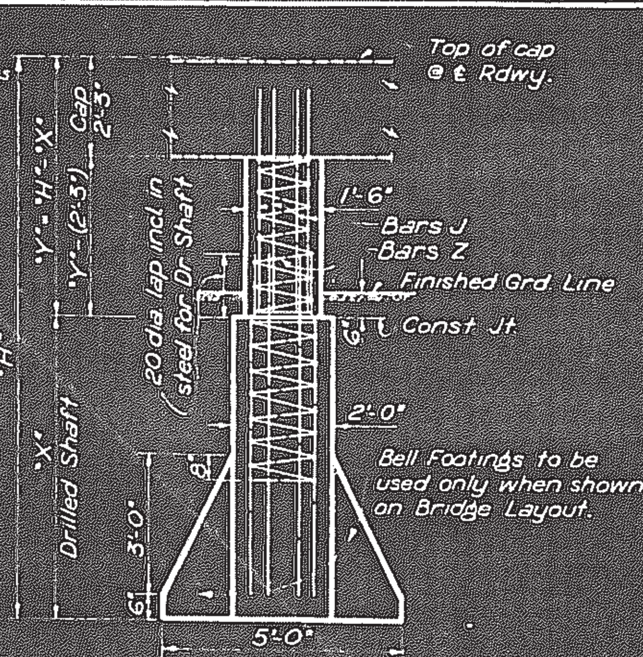
BARS N1-N4



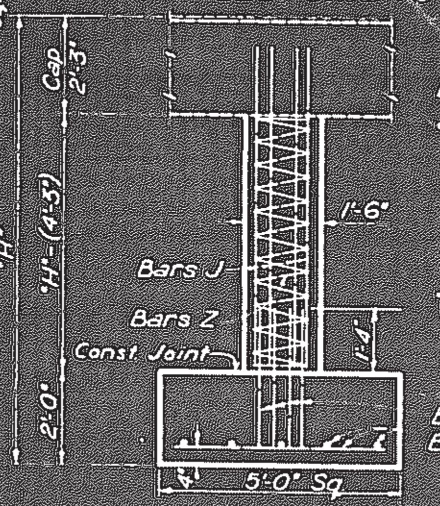
DRILLED SHAFT



BARS Z



DETAIL OF COLUMNS
DRILLED SHAFTS



DETAIL OF COLUMNS
SPREAD FOOTINGS

TYPICAL SEC.
18" COLUMN

REINF. STEEL ~ 2 SPREAD FOOTINGS

Bar	No.	Size	Spa.	Length	Weight
V	12	#6	~	3'-0"	54
W	20	#6	12"	4'-6"	135
Total					189

BILL OF REINFORCING STEEL
FOR ABUTMENT CAP & WINGS

Bar	No.	Size	Spac.	Length	Weight
A1	2	#8	~	24'-4"	130
A2	2	#8	~	6'-0"	32
B1	2	#9	~	24'-4"	165
B2	2	#9	~	15'-0"	102
C	25	#4	Shown	7'-0"	117
D	2	#4	~	6'-8"	9
E1-2	4	#4	8½"	Av 2'-8"	7
F1	2	#4	10½"	3'-6"	5
F2	4	#4	10½"	5'-0"	13
G	2	#4	~	5'-9"	8
K	2	#4	~	5'-6"	7
L	2	#5	~	3'-2"	7
M	4	#4	8"	2'-6"	7
N1-4	8	#4	12"	Av 3'-3"	17
Total					626

ABUTMENT
ESTIMATED QUANTITIES

Class A Concrete	C.Y.	4.4
Reinforcing Steel	Lb.	626
Conc. Bell Footings	C.Y.	2.2

ESTIMATED QUANTITIES ~ INTERIOR BENT

SPREAD FOOTING			DRILLED SHAFT			
"H"	Class A Conc. C.Y.	Reinf Steel Lb.	"Y"	Class A Conc. C.Y.	Reinf Steel Lb.	Conc Bell Ft'g. C.Y.
8'	7.7	930	5'	3.8	726	2.2
9'	7.8	944	6'	3.9	741	2.2
10'	7.9	960	7'	4.1	755	2.2
11'	8.0	974	8'	4.2	775	2.2
12'	8.1	989	9'	4.3	785	2.2
13'	8.3	1004	10'	4.4	800	2.2
14'	8.4	1019	11'	4.6	815	2.2
15	8.5	1033	12'	4.7	830	2.2
16'	8.7	1048	13'	4.8	844	2.2
17'	8.8	1063	14'	5.0	859	2.2
18'	8.9	1078	15'	5.1	874	2.2
19'	9.1	1093	16'	5.2	889	2.2
20'	9.2	1107	17'	5.4	904	2.2
			18'	5.5	918	2.2

REINFORCING STEEL - TWO COLUMNS
WITH DRILLED SHAFTS

"Y"	12-#5 Bars J		2-#2 Bars Z		Total
	Length	Weight	Length	Weight	Weight
5'	4'-6"	56	27'	9	65
6'	5'-6"	69	34'	11	80
7'	6'-6"	81	40'	13	94
8'	7'-6"	94	47'	16	110
9'	8'-6"	106	54'	18	124
10'	9'-6"	119	61'	20	139
11'	10'-6"	131	68'	23	154
12'	11'-6"	144	74'	25	169
13'	12'-6"	156	81'	27	183
14'	13'-6"	169	88'	29	198
15'	14'-6"	181	95'	32	213
16'	15'-6"	194	102'	34	228
17'	16'-6"	207	108'	36	243
18'	17'-6"	219	115'	38	257

REINFORCING STEEL - TWO COLUMNS
WITH SPREAD FOOTINGS

"H"	12-#5 Bars J		2-#2 Bars Z		Total
	Length	Weight	Length	Weight	Weight
8'	5'-6"	69	34'	11	80
9'	6'-6"	81	40'	13	94
10'	7'-6"	94	47'	16	110
11'	8'-6"	106	54'	18	124
12'	9'-6"	119	61'	20	139
13'	10'-6"	131	68'	23	154
14'	11'-6"	144	74'	25	169
15'	12'-6"	156	81'	27	183
16'	13'-6"	169	88'	29	198
17'	14'-6"	181	95'	32	213
18'	15'-6"	194	102'	34	228
19'	16'-6"	207	108'	36	243
20'	17'-6"	219	115'	38	257

GENERAL NOTES:

Designed for use with 30' Conc. Slab & Girder CGC-15, 23'-4½" Rdwy., 8" Curbs, H15-44 Loading in accordance with A.A.S.H.O. 1949 Standard Specifications as amended by T.H.D. Supplement #1.

All concrete shall be Class A. Chamfer exposed corners ¾".

Dimensions relating to reinforcing steel are to centers of bars.

Average calculated footing pressures:
Bell Footings 2.4 T/□'
Spread Footings 1.9 T/□'

TEXAS HIGHWAY DEPARTMENT

2-COLUMN BENTS
FOR USE WITH
CGC-15-23'-4½" RDWY.

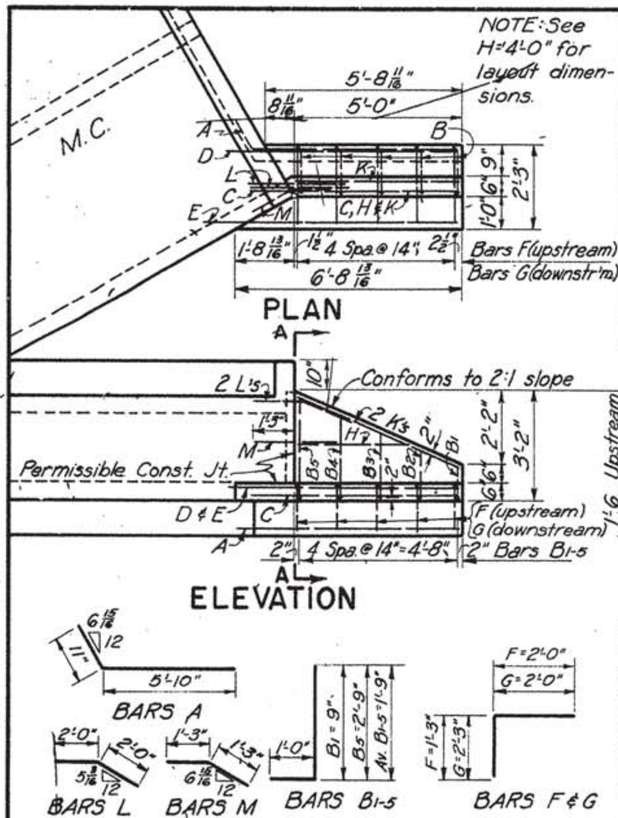
BGC-24

Dn. E.A.J.	Original	Aug. 1952	6	TEXAS
Ck. Dn. C.H.H.	Rev. 3-19-53 Slope of wings			
Dn. C.H.H.	Rev. 3-54 - Note on Col. forms			
Ck. Dn. H.K.R.				
Tr. R.N.S.				
Ck. Tr. C.H.H.				

45

PLAN — SURVEYED, NOTE BOOK, PLOTTED, ALIGNMENT CHECKED, No., RT. OF WAY CHECKED — BY — DATE

PROFILE — SURVEYED, NOTE BOOK, PLOTTED, GRADES CHECKED, No., W. NOTED, STRUCTURE NOTAT'NS CHEC'D — BY — DATE

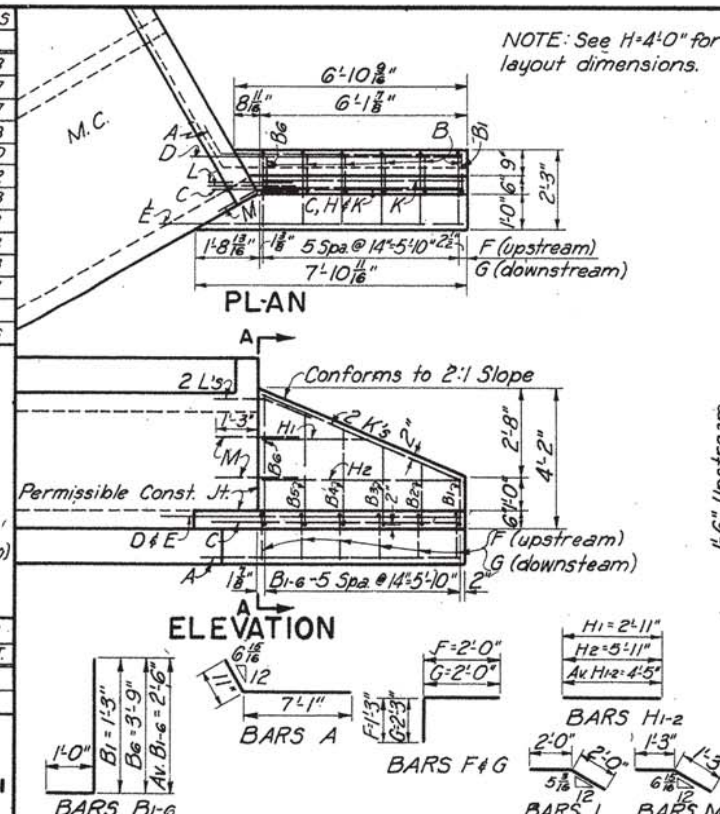


BILL OF REINF. STEEL - 4 WINGS					
BAR	NO.	SIZE	SPA	LGTH.	WT.
A	4	#4	-	6'-9"	18
B1-5	20	#4	14"	Av. 2'-9"	37
C	4	#4	-	6'-3"	17
D	4	#4	-	6'-9"	18
E	4	#4	-	7'-5"	20
F	10	#4	14"	3'-3"	22
G	10	#4	14"	4'-3"	28
H	4	#4	-	3'-1"	8
K	8	#4	-	5'-2"	28
L	8	#5	-	4'-0"	33
M	4	#4	-	2'-6"	7
TOTAL FOR 4 WINGS					236

SEC. A-A

ESTIMATED QUANT. - 4 WINGS		
ITEM	UNIT	QUANT.
CONCRETE	C.Y.	2.16
REINF. STEEL	LB.	236

WINGWALLS FOR M.C's. H = 2'-0"

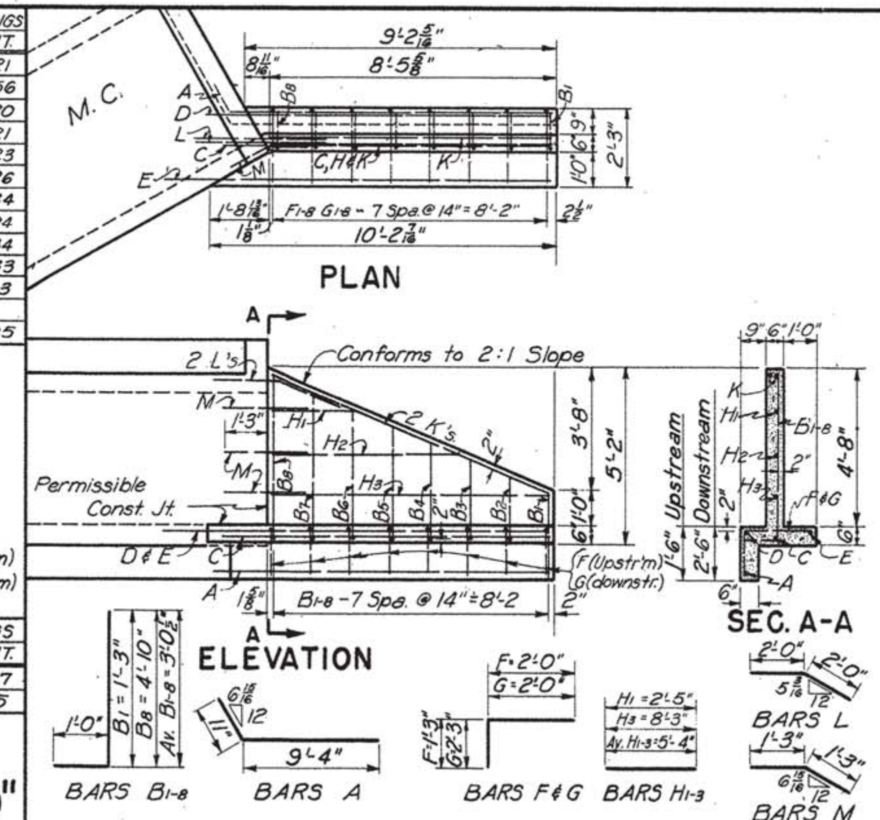


BILL OF REINF. STEEL - 4 WINGS					
BAR	NO.	SIZE	SPA	LGTH.	WT.
A	4	#4	-	8'-0"	21
B1-6	24	#4	14"	Av. 3'-6"	56
C	4	#4	-	7'-5"	20
D	4	#4	-	7'-11"	21
E	4	#4	-	8'-7"	23
F	12	#4	14"	3'-3"	26
G	12	#4	14"	4'-3"	34
H1-2	8	#4	15"	Av. 4'-5"	24
K	8	#4	-	6'-5"	34
L	8	#5	-	4'-0"	33
M	8	#4	15"	2'-6"	13
TOTAL FOR 4 WINGS					305

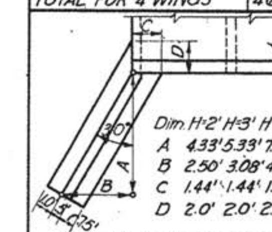
SEC. A-A

ESTIMATED QUANT. - 4 WINGS		
ITEM	UNIT	QUANT.
CONCRETE	C.Y.	2.97
REINF. STEEL	LB.	305

WINGWALLS FOR M.C's. H = 3'-0"



BILL OF REINF. STEEL - 4 WINGS					
BAR	NO.	SIZE	SPA	LGTH	WT.
A	4	#4	-	10'-3"	27
B1-8	32	#4	14"	Av. 4'-0"	86
C	4	#4	-	9'-8"	26
D	4	#4	-	10'-2"	27
E	4	#5	-	11'-5"	48
F	16	#4	14"	3'-3"	35
G	16	#4	14"	4'-3"	45
H1-3	12	#4	15"	Av. 5'-4"	43
K	8	#5	-	9'-0"	75
L	8	#5	-	4'-0"	33
M	12	#4	15"	2'-6"	20
TOTAL FOR 4 WINGS					465

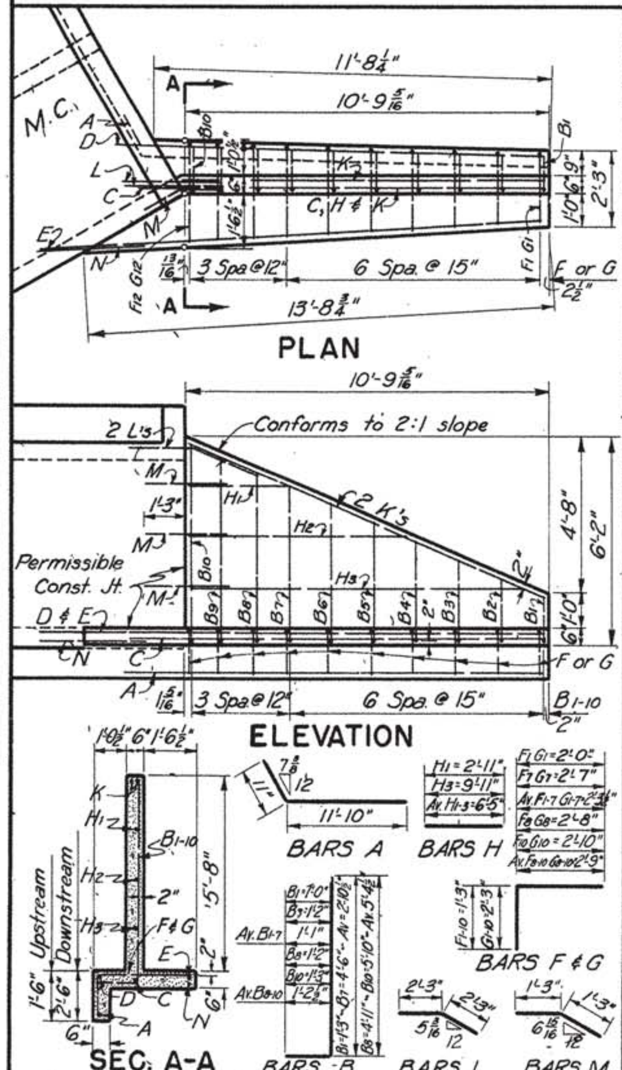


Dim.	H=2'	H=3'	H=4'
A	4.33'	5.33'	7.33'
B	2.50'	3.08'	4.23'
C	1.44'	1.44'	1.44'
D	2.0'	2.0'	2.0'

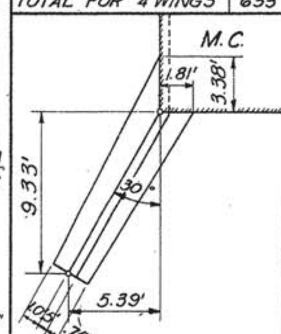
LAYOUT DIMENSIONS H=2'-0" TO H=4'-0" INCL.

ESTIMATED QUANT. - 4 WINGS		
ITEM	UNIT	QUANT.
CONCRETE	C.Y.	4.34
REINF. STEEL	LB.	465

WINGWALLS FOR M.C's. H = 4'-0"



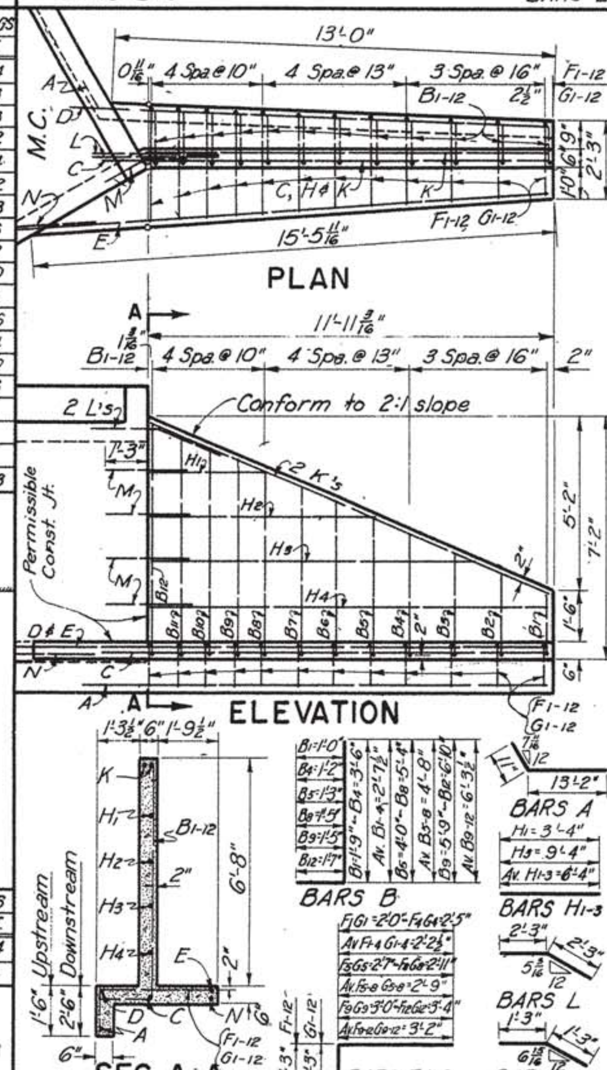
BILL OF REINF. STEEL - 4 WINGS					
BAR	No.	SIZE	SPA.	LGTH	WT.
A	4	#4	-	12'-9"	34
B1-7	28	#4	15"	Av. 3'-11"	73
B8-10	12	#4	12"	Av. 6'-7"	53
C	4	#4	-	12'-0"	32
D	4	#4	-	12'-8"	34
E	4	#5	-	14'-10"	62
F1-7	14	#4	15"	Av. 3'-6"	33
F8-10	6	#4	12"	Av. 4'-0"	16
G1-7	14	#4	15"	Av. 4'-6"	42
G8-10	6	#4	12"	Av. 5'-0"	20
H1-3	12	#4	18"	Av. 6'-5"	51
K	8	#5	-	11'-6"	96
L	8	#6	-	4'-6"	54
M	12	#4	18"	2'-6"	20
N	4	#5	-	3'-2"	13
TOTAL FOR 4 WINGS					633



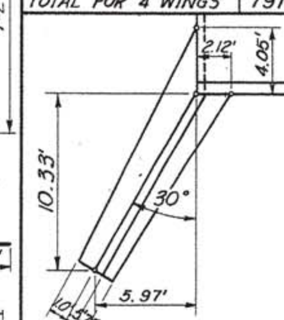
LAYOUT DIMENSIONS

ESTIMATED QUANT. - 4 WINGS		
ITEM	UNIT	QUANT.
CONCRETE	C.Y.	6.34
REINF. STEEL	LB.	633

WINGWALLS FOR M.C's H = 5'-0"



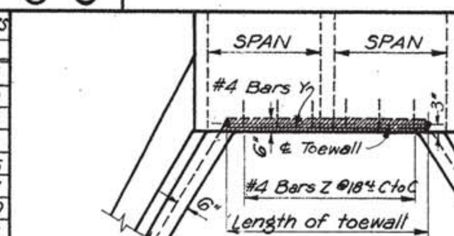
BILL OF REINF STEEL - 4 WINGS					
BAR	NO.	SIZE	SPA.	LGTH.	WT.
A	4	#4	-	14'-1"	38
B1-4	16	#4	16"	Av. 3'-8"	39
B5-8	16	#4	13"	Av. 6'-0"	64
B9-12	16	#4	10"	Av. 7'-9"	83
C	4	#4	-	13'-2"	35
D	4	#4	-	14'-0"	37
E	4	#5	-	16'-9"	70
F1-4	8	#4	16"	Av. 3'-5"	18
F5-8	8	#4	13"	Av. 4'-0"	21
F9-12	8	#4	10"	Av. 4'-5"	24
G1-4	8	#4	16"	Av. 4'-5"	24
G5-8	8	#4	13"	Av. 5'-0"	27
G9-12	8	#4	10"	Av. 5'-5"	29
H1-3	12	#4	16"	Av. 6'-4"	51
H4	4	#4	-	11'-8"	31
K	8	#5	-	12'-8"	106
L	8	#6	-	4'-6"	54
M	16	#4	16"	2'-6"	27
N	4	#5	-	3'-2"	13
TOTAL FOR 4 WINGS					791



LAYOUT DIMENSIONS

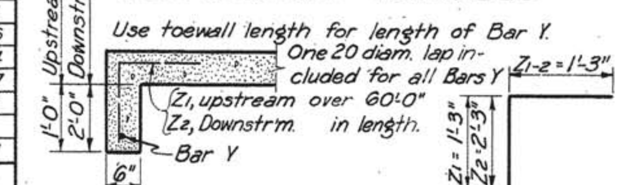
ESTIMATED QUANT. - 4 WINGS		
ITEM	UNIT	QUANT.
CONCRETE	C.Y.	7.95
REINF. STEEL	LB.	791

WINGWALLS FOR M.C's. H = 6'-0"



NOTE: Limits of culvert toewall shown by hatched area on above sketch. Length measured along ¢ of wall.

PLAN SHOWING TYPICAL REINFORCING FOR CULVERT TOEWALLS



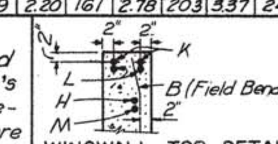
SEC. THRU TOEWALL BARS Z

TABLE OF TOEWALL LENGTHS FOR M.C.'s						
WING WALL	SPAN	LENGTH				
		2 SPANS	3 SPANS	4 SPANS	5 SPANS	6 SPANS
H=2'-0"	5'-0"	9'-5 3/4"	14'-11 3/4"	20'-5 3/4"	25'-11 3/4"	31'-5 3/4"
H=3'-0"	5'-0"	9'-5 3/4"	14'-11 3/4"	20'-5 3/4"	25-11 3/4"	31'-5 3/4"
	6'-0"	11'-5 3/4"	17'-11 3/4"	24'-5 3/4"	30'-11 3/4"	37'-5 3/4"
	7'-0"	13'-5 3/4"	20'-11 3/4"	28'-5 3/4"	35'-11 3/4"	43'-5 3/4"
H=4'-0"	5'-0"	9'-5 3/4"	14'-11 3/4"	20'-5 3/4"	25'-11 3/4"	31'-5 3/4"
	6'-0"	11'-5 3/4"	17'-11 3/4"	24'-5 3/4"	30'-11 3/4"	37'-5 3/4"
	7'-0"	13'-5 3/4"	20'-11 3/4"	28'-5 3/4"	35'-11 3/4"	43'-5 3/4"
	8'-0"	15'-5 3/4"	23'-11 3/4"	32'-5 3/4"	40'-11 3/4"	49'-5 3/4"
H=5'-0"	5'-0"	8'-11 7/8"	14'-6 13/16"	20'-1 13/16"	25'-8 3/4"	31'-3 3/4"
	6'-0"	10'-11 7/8"	17'-6 13/16"	24'-1 13/16"	30'-8 3/4"	37'-3 3/4"
	7'-0"	12'-11 7/8"	20'-6 13/16"	28'-1 13/16"	35'-8 3/4"	43'-3 3/4"
	8'-0"	14'-11 7/8"	23'-6 13/16"	32'-1 13/16"	40'-8 3/4"	49'-3 3/4"
	9'-0"	16'-11 7/8"	26'-6 13/16"	36'-1 13/16"	45'-8 3/4"	55'-3 3/4"
H=6'-0"	6'-0"	10'-4 7/16"	16'-11 3/8"	23'-6 3/8"	30'-1 5/16"	36'-8 1/4"
	7'-0"	12'-4 7/16"	19'-11 3/8"	27'-6 3/8"	35'-1 5/16"	42'-8 1/4"
	8'-0"	14'-4 7/16"	22'-11 3/8"	31'-6 3/8"	40'-1 5/16"	48'-8 1/4"
	9'-0"	16'-4 7/16"	25'-11 3/8"	35'-6 3/8"	45'-1 5/16"	54'-8 1/4"
	10'-0"	18'-4 7/16"	28'-11 3/8"	39'-6 3/8"	50'-1 5/16"	60'-8 1/4"

ESTIMATED QUANTITIES FOR TWO CULVERT TOEWALLS

WING WALL	SPAN LENGTH	2 SPANS CONC. C.Y.	2 SPANS REINF. LB.	3 SPANS CONC. C.Y.	3 SPANS REINF. LB.	4 SPANS CONC. C.Y.	4 SPANS REINF. LB.	5 SPANS CONC. C.Y.	5 SPANS REINF. LB.	6 SPANS CONC. C.Y.	6 SPANS REINF. LB.
H=2'-0" TO H=4'-0" INCL.	5'-0"	0.53	41	0.83	64	1.14	83	1.44	105	1.75	130
	6'-0"	0.64	51	1.00	76	1.36	101	1.72	129	2.08	154
	7'-0"	0.75	58	1.17	88	1.58	118	2.00	148	2.42	178
	8'-0"	0.86	65	1.33	100	1.80	135	2.28	166	2.75	202
H=5'-0"	5'-0"	0.50	40	0.81	63	1.12	83	1.43	106	1.74	130
	6'-0"	0.61	47	0.98	75	1.34	100	1.71	125	2.07	154
	7'-0"	0.72	57	1.14	88	1.56	118	1.99	148	2.41	178
	8'-0"	0.83	64	1.31	100	1.79	131	2.26	164	2.74	202
	9'-0"	0.94	71	1.48	112	2.01	148	2.54	185	3.07	226
H=6'-0"	6'-0"	0.58	46	0.94	71	1.31	99	1.67	124	2.04	149
	7'-0"	0.69	52	1.11	83	1.53	113	1.95	143	2.37	173
	8'-0"	0.80	63	1.28	95	1.75	130	2.23	163	2.71	197
	9'-0"	0.91	70	1.44	107	1.97	147	2.51	184	3.04	222
	10'-0"	1.02	76	1.61	119	2.20	161	2.78	203	3.37	248

GENERAL NOTES:-
DESIGN:- Wing Walls designed in accordance with Rankine's theory of retaining wall design. Elements of design are shown on sketch at right.



WINGWALL TOP DETAIL (TYPICAL)

Chamfer all exposed corners 3/4" unless specified otherwise.
All dimensions relating to reinforcing steel are to centers of bars.
Toe walls for culvert and wing walls shall be omitted when structure is founded on solid rock.

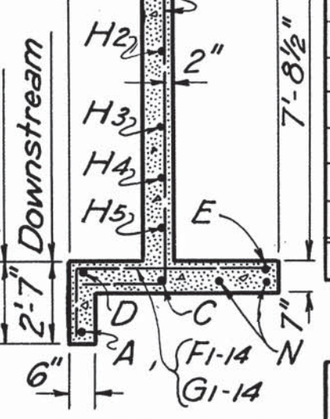
TEXAS HIGHWAY DEPARTMENT

FLARED WINGWALLS FOR MULTIPLE CULVERTS H = 2'-0" TO 6'-0" INCL.

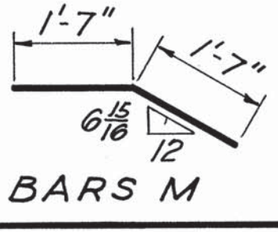
MCW-F1

DN.: A.B.L.	DRAWING	DATE	FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
CK.DN.: T.J.W.	Original	Aug. 1949	6	TEXAS				
DW.: A.B.L.			STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
CK.DW.: K.M.								
TR.: C.W.W.								
CK.TR.: M.D.A.	Rev. Nov. 1967							

BAR	NO.	SIZE	SPAC.	LGTH.	WT.
H-4	4	#4	12"	13'-8"	37
H-5	4	#4	12"	14'-1"	38
K	8	#5	~	15'-5"	129
L	8	#7	~	5'-0"	82
M	20	#5	12&18	3'-2"	66
N	8	#5	~	3'-2"	26
TOTAL FOR 4 WINGS					1,141



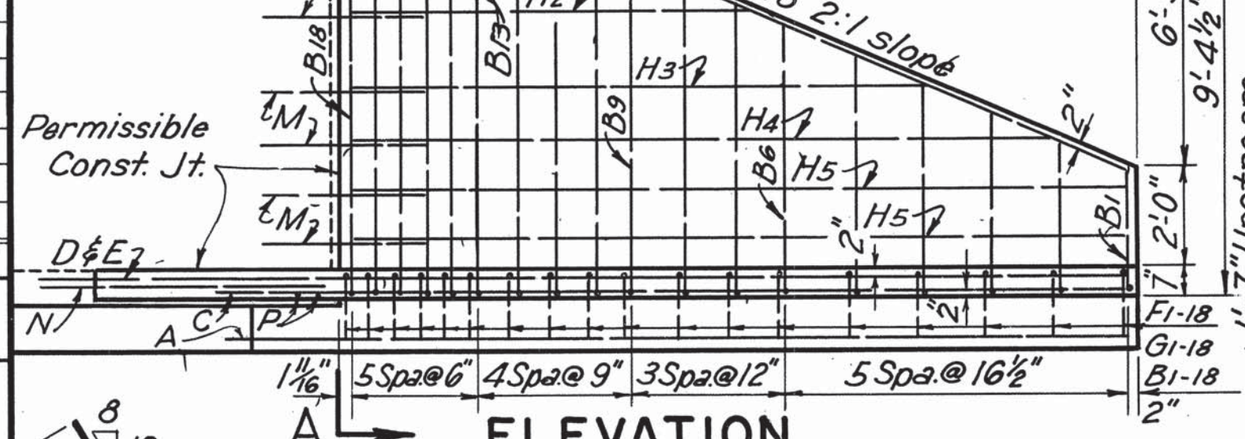
SEC. A-A



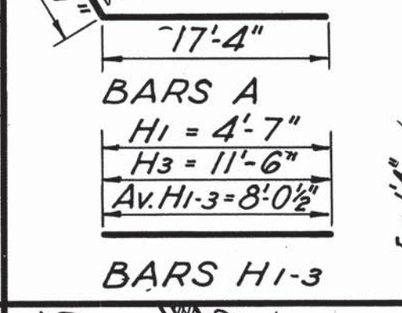
BARS M

ESTIMATED QUANTITIES FOR 4 WINGWALLS		
ITEM	UNIT	QUANT.
CONCRETE	C.Y.	12.05
REINF. STEEL	LB.	1,141

WINGWALLS FOR M.C's. H = 7'-0"



ELEVATION



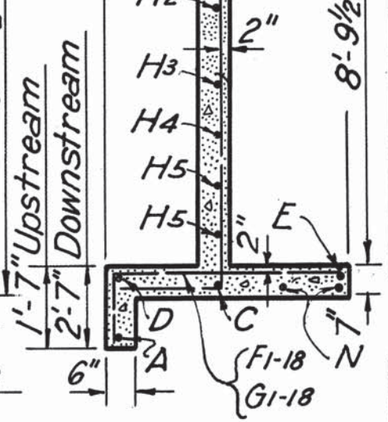
BARS A

H1 = 4'-7"
H3 = 11'-6"
Av. H1-3 = 8'-0½"

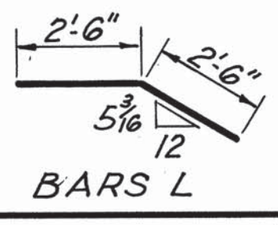
BARS H1-3

F1G1 = 2'-1" - F6G6 = 3'-2" Av. 2'-7½"
F7G7 = 3'-3" - F9G9 = 3'-7" Av. 3'-5"
F10G10 = 3'-9" - F13G13 = 4'-1" Av. 3'-11"
F14G14 = 4'-2" - F18G18 = 4'-6" Av. 4'-4"

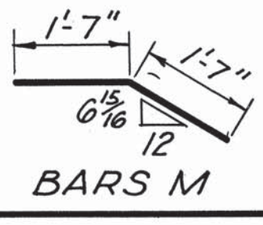
BARS F1-18 & G1-18



SEC. A-A

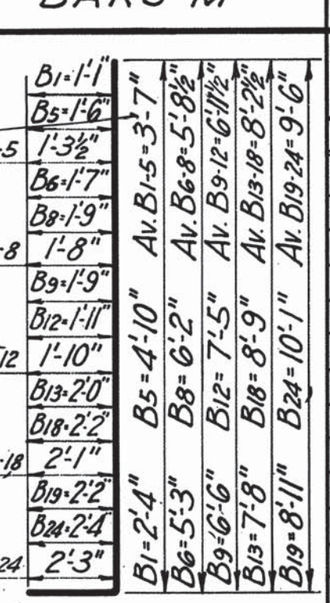


BARS L



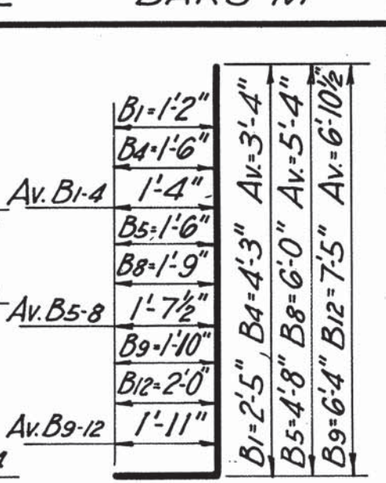
BARS M

BILL OF REINF. STEEL FOR 4 WINGWALLS					
BAR	NO.	SIZE	SPAC.	LGTH.	WT.
A	4	#4	~	20'-10"	56
B1-5	20	#4	17½"	Av. 4'-10"	65
B6-8	12	#4	12"	Av. 7'-4"	59
B9-12	16	#4	9"	Av. 8'-9"	94
B13-18	24	#4	6"	Av. 10'-3"	164
B19-24	24	#5	6"	Av. 11'-9"	294
C	4	#5	~	19'-9"	82
D	4	#5	~	21'-2"	88
E	4	#6	~	25'-0"	150
F1-5	10	#4	17½"	Av. 3'-10"	26
F6-8	6	#4	12"	Av. 4'-8"	19
F9-12	8	#4	9"	Av. 5'-1"	27
F13-18	12	#4	6"	Av. 5'-7"	45
F19-24	12	#5	6"	Av. 6'-1"	76
G1-5	10	#4	17½"	Av. 4'-10"	32
G6-8	6	#4	12"	Av. 5'-8"	23
G9-12	8	#4	9"	Av. 6'-1"	32
G13-18	12	#4	6"	Av. 6'-7"	53
G19-24	12	#5	6"	Av. 7'-1"	89
H1-4	16	#4	18"	Av. 8'-9"	94
H-5	4	#4	12"	16'-4"	44
H-6	8	#4	12"	17'-11"	96



BARS B1-24

PLAN



BARS B1-12

UPDATED 6/22/2017

During the planning phase of project development the following environmental permits, issues, and commitments have been developed during coordination with resource agencies, local governmental entities, and the general public. Any change orders and/or deviations from the final design must be reported to the Engineer prior to the commencement of construction activities, as additional environmental clearances may be required.

I. Clean Water Act, Sec. 402 Texas Pollutant Discharge Elimination System

(Addresses CGP and MS4 Storm Water requirements for the project.)

(In the event that the Contractor implements a PSL on or within one mile of the project, a SIte Notice and/or a NOI will apply.)

☐ No Action Required ☑ Required Action

Action No. 1

The project disturbs less than one acre of surface area. The contractor is responsible for the PSL as defined in the Standard Specifications for construction and Maintenance of Highways, Street, and Bridges (2014 Edition, Section 7.7.6, Page 42). The total disturbed acreage is the combined acreage to be disturbed on the project and the contractor's PSL.

The EPIC must be updated if the disturbed area increases to one or more acres during the course of construction (refer to following sections). It may become necessary to post a site notice and/or NOI for the project and/or PSL.

Commitment No. 1

Refer to the SW3P Plan Sheet, BMPs and Detail. It will address sweeping, chemical storage, sanitary waste, and all other management practices.

MS4 operators that receives discharge from the project: -N/A-

II. Clean Water Act, Section 401 and 404 Compliance

(Addresses Nationwide Permits, Individual Permits, and Wetlands.)

(Filling, dredging, or excavating in any water bodies, rivers, creeks, streams, wetlands, or wet area is prohibited unless specified in the USACE permit and approved by the Engineer.)

(When temporary fill is implemented, only stated TxDOT standards will be used unless written authorization for an alternative is obtained from the Engineer. No equipment is allowed in any stream channel below the Ordinary High Water Mark except on temporary stream crossings or drill pads.)

☐ No Action Required ☑ 404 Permit and 401 Certification Required

Permit	Required Action
NWP #14	Adher to permit and associated conditions
NWP #3	Adher to permit and associated conditions

Waters of the US	App. Plan Sheet(s)	Waters of the US	App. Plan Sheet(s)

Best Management Practices for applicable 401 General Conditions:

General Condition 12 - Categories I and II BMPs required

Category I (Erosion Control)

- ☑ Temporary Vegetation
- ☐ Mulch
- ☐ Interceptor Swale
- ☐ Erosion Control Compost
- ☐ Compost Filter Berms and Socks
- ☐ Blankets, Matting
- ☐ Sod
- ☐ Diversion Dike
- ☐ Mulch Filter Berms and Socks
- ☐ Compost Blankets

Category II (Sedimentation Control)

- ☐ Sand Bag Berm
- ☑ Silt Fence
- ☐ Triangular Filter Dike
- ☐ Stone Outlet Sediment Traps
- ☐ Erosion Control Compost
- ☐ Compost Filter Berms and Socks
- ☐ Rock Berm
- ☐ Hay Bale Dike
- ☐ Brush Berms
- ☐ Sediment Basins
- ☐ Mulch Filter Berms and Socks

General Condition 25 - Category III BMPs required

Category III (Post-Construction TSS Control)

- ☐ Retention/Irrigation
- ☐ Extended Detention Basin
- ☑ Vegetative Filter Strips
- ☐ Grassy Swales
- ☐ Erosion Control Compost
- ☐ Compost Filter Berms and Socks
- ☐ Constructed Wetlands
- ☐ Wet Basins
- ☐ Vegetation-Lined Ditches
- ☐ Sand Filter Systems
- ☐ Mulch filter Berms and Socks
- ☐ Sedimentation Chambers

III. Cultural Resources

(Addresses any special circumstances associated with cultural resources, such as archeological or historic sites.)

(Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.;cease work in the immediate area and contact the Engineer immediately.)

☑ No Action Required ☐ Required Action

Action No.	Station (Rt/Lt)	Commitment
1.	---	---

IV. Vegetation Resources

(Addresses any special circumstances associated with vegetation, such as large trees to be avoided, or mitigation that will occur as part of the project.)

☐ No Action Required ☑ Required Action

Action No.	Station (Rt/Lt)	Commitment
1.	All	Avoid non-mow locations for stockpiles and equipment parking/storage.
2.	Project Limits	Preserve native vegetation to the extent practical. Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

V. Federal Listed, Proposed, Threatened, Endangered Species, Critical Habitat, State Listed Species, Candidate Species, and Migratory Bird Treaty Act (MBTA)

(Addresses any special habitat that may need to be avoided, lists any threatened or endangered species where habitat was observed and might be impacted within the project area, and lists any precautions such as nesting seasons for migratory birds.)

☐ No Action Required ☑ Required Action

Species Potentially within Project Area & Description	Habitat Description
The Contractor is advised to avoid harm to species. When species enter the work area allow to leave work site. If bats are identified under bridges or culverts notify District Environmental Specialist and stop work if work will potentially harm bats.	

The Migratory Bird Treaty Act of 1918 states that it is unlawful to kill, capture, collect, possess, buy, sell, trade, or transport any migratory bird, nest, young, feather, or egg in part or in whole, without a federal permit issued in accordance within the Act's policies and regulations. Migration patterns would not be affected by the proposed project. The contractor will remove all old migratory bird nests from any structure where work would be done from September 1 through the end of February. In addition, the contractor will be prepared to prevent migratory birds from building nests between March 1 and August 31, per the Environmental Permits, Issues, and Commitments (EPIC) plans. In the event that migratory birds are encountered on-site during project construction, adverse impacts on protected birds, active nests, eggs, and/or young shall be avoided.

VI. Hazardous Material or Contamination Issues

(Addresses any previously identified high risk sites associated with hazardous materials that may be encountered during construction.)

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contractor will follow all applicable storage and management requirements for liquid oil products, liquid petroleum products, and other chemical liquids as per 40 CFR 112 (a.k.a. SPCC) and/or TCEQ Construction General Permit for storm water management.

Contact the Engineer if any of the following are detected:
- Dead or distressed vegetation (not identified as normal)
- Trash piles, drums, canisters, barrels, etc.
- Undesirable smells/odors
- Underground storage tanks
- Evidence of leaching or seepage of substances
- Any other evidence indicating possible hazardous materials or contamination discovered on-site

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Does the project involve any bridge class structure rehabilitation or replacements (bridge class structure not including box culverts)?

☐ Yes ☑ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing an asbestos assessment/inspection.
Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a Texas Department of State Health Services (DSHS) licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 10 working days prior to scheduled abatement and/or demolition.

If "No", then TxDOT is still required to notify DSHS 10 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Bridges on this project may contain Lead-Containing Paint (LCP) or other items that contain lead. The location of (LCP) is identified in the General Notes. Item 6.10.1.2 in the 2014 TxDOT Standard Specifications shall be utilized for this project.

VII. Other Environmental Issues

(Addresses any other environmental issues that may not have been covered in other sections.)

☑ No Action Required ☐ Required Action

Action No.	Station (Rt/Lt)	Commitment
1.	---	---

LIST OF ABBREVIATIONS

BMP: Best Management Practice
CGP: Construction General Permit
DSHS: Texas Department of State Health Services
FEMA: Federal Emergency Management Agency
FHWA: Federal Highway Administration
MOA: Memorandum of Agreement
MOU: Memorandum of Understanding
MS4: Municipal Separate Stormwater Sewer System
MBTA: Migratory Bird Treaty Act
NOI: Notice of Intent
NOT: Notice of Termination
NWP: Nationwide Permit
SPCC: Spill Prevention Control and Countermeasure
SW3P: Storm Water Pollution Prevention Plan
PCN: Pre-Construction Notification
PSL: Project Specific Location
TCEQ: Texas Commission on Environmental Quality
TPDES: Texas Pollutant Discharge Elimination System
TPWD: Texas Parks and Wildlife Department
TxDOT: Texas Department of Transportation
T&E: Threatened and Endangered Species
USACE: U.S. Army Corp of Engineers
USFWS: U.S. Fish and Wildlife Service

SH 16, ETC. ENVIRONMENTAL PERMITS, ISSUES, AND COMMITMENTS (EPIC)

Texas Department of Transportation
BROWNWOOD DISTRICT

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE, ETC.		62

Prepared by ********** ********** **********
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SITE DESCRIPTION

PROJECT LIMITS:

BPM-638394001
At various locations (see site maps)

Latitude = Various
Longitude = Various

LOCATION MAPS:

Refer to site maps for project locations.

PROJECT DESCRIPTION:

For miscellaneous bridge repair at various locations in Brown, Coleman, Comanche, Eastland, Lampasas, and Eastland Counties.

MAJOR SOIL DISTURBING ACTIVITIES:

No major soil distrubing activities.

TOTAL PROJECT AREA:	VARIOUS
TOTAL AREA TO BE DISTURBED:	VARIOUS

EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:

BPM-638394001
The existing soils vary. The prime use is maintained transportation crossing with various herbaceous and grass vegetation with 70% vegetative cover.

NAME OF RECEIVING WATERS:

BPM-638394001
Runoff from project flows into various stream Segments.

EROSION AND SEDIMENT CONTROLS

OTHER EROSION AND SEDIMENT CONTROLS:

MAINTENANCE:
All erosion controls will be maintained in good working order. If a repair is necessary, it will be made at the earliest possible date, but no later than seven (7) calendar days after the ground has dried sufficiently to prevent further damage from equipment. The areas around creeks and drainage ways shall have priority over other areas on the project site.

INSPECTION:
An inspection will be performed by a TxDOT inspector at least once every seven (7) calendar days. An inspection and maintenance report will be made per each inspection. Stormwater controls will be modified as directed by the Engineer based on these reports.

WASTE MATERIALS:
Any waste materials generated during construction will be disposed of in accordance with existing federal, state, and local laws.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING):
At a minimum, any products in the following categories are considered to be hazardous: Fuels, Lubricating products, Asphalt products, or Concrete curing compounds and any additives. In the event of a spill which may be hazardous, clean-up will be done in accordance with federal, state, and local regulations.

SANITARY WASTE:
Sanitary waste from portable units will be collected by a licensed sanitary waste management contractor.

OFF SITE VEHICLE TRACKING AND DUST CONTROL:

- [X] DUST CONTROL (OFF SITE) AS NEEDED- PER ENGINEER
- [ ] HAUL ROADS DAMPENED FOR DUST CONTROL
- [ ] LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
- [ ] EXCESS DIRT ON ROAD REMOVED DAILY
- [ ] STABILIZED CONSTRUCTION ENTRANCE

REMARKS:
Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, water body or stream bed. Construction staging area and vehicle maintenance area shall be constructed by the contractor in a manner to minimize the runoff pollutants. All waterways shall be cleared as soon as practicable of temporary embankment, temporary bridges, matting, false work, piling, debris or other obstructions placed during construction operations that are not a part of the finished work.

For off R.O.W. facilities the contractor shall comply with TCEQ requirements.

The contractor is responsible for ensuring that all subcontractors are aware of and comply with all components of the SW3P per Item 506.

Sedimentation Basins - Since the area disturbed is less than 10 acres per drainage area; a sedimentation basin is not required.

Best Management Practices:

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

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

The order of activities will be as follows:

1. Preserve existing vegetative cover as much as possible.
2. Install temporary sediment control fencing and other items as shown on plans prior to any soil disturbing activities.
3. Perform structure work and perform any necessary excavation, embankment and grading, and temporary seeding.
4. Place permanent seeding as shown in the plans and as directed by the Engineer.

STORM WATER MANAGEMENT:

Storm water will be carried to cross drainage structures by side road ditches and culverts which will empty into the various natural runoff channels.

STATE OF TEXAS
ERIC L. LYKINS
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LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Eric Lykins, PE
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9/1/2021

**SH 16, ETC.
BROWNWOOD DIST.
STORM WATER
POLLUTION
PREVENTION PLAN**

Texas Department of Transportation
Brownwood District Office
2495 Highway 183 North
Brownwood Texas, 76802

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE, ETC.		63

CK:
DW:
CK:
DN:

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EXACT LOCATION & QUANTITIES OF SW3P ITEMS TO BE DETERMINED IN THE FIELD

164-6003	164-6009	164-6011	506-6038	506-6039
BROADCAST SEED (PERM) (RURALXCLAY) SY	BROADCAST SEED (TEMP) (WARM) SY	BROADCAST SEED (TEMP) (COOL) SY	TEMP SEDIMENT CONT FENCE INSTLL LF	TEMP SEDIMENT CONT FENCE REMOVE LF
7500	3750	3750	2500	2500

NOTES: APPROXIMATELY 100 LF OF SEDIMENT CONTROL FENCE SHALL BE PLACED AT 25 LOCATIONS.

APPROXIMATELY 300 SY OF SEEDING SHALL BE PLACED AT 25 LOCATIONS.

BMP PLACEMENT

CONT	SECT	JOB	HIGHWAY
6383	94	001	SH 16, ETC.
DIST	COUNTY		SHEET NO.
23	COMANCHE, ETC.		64

DATE: 6/10/2021 4:30:18 PM
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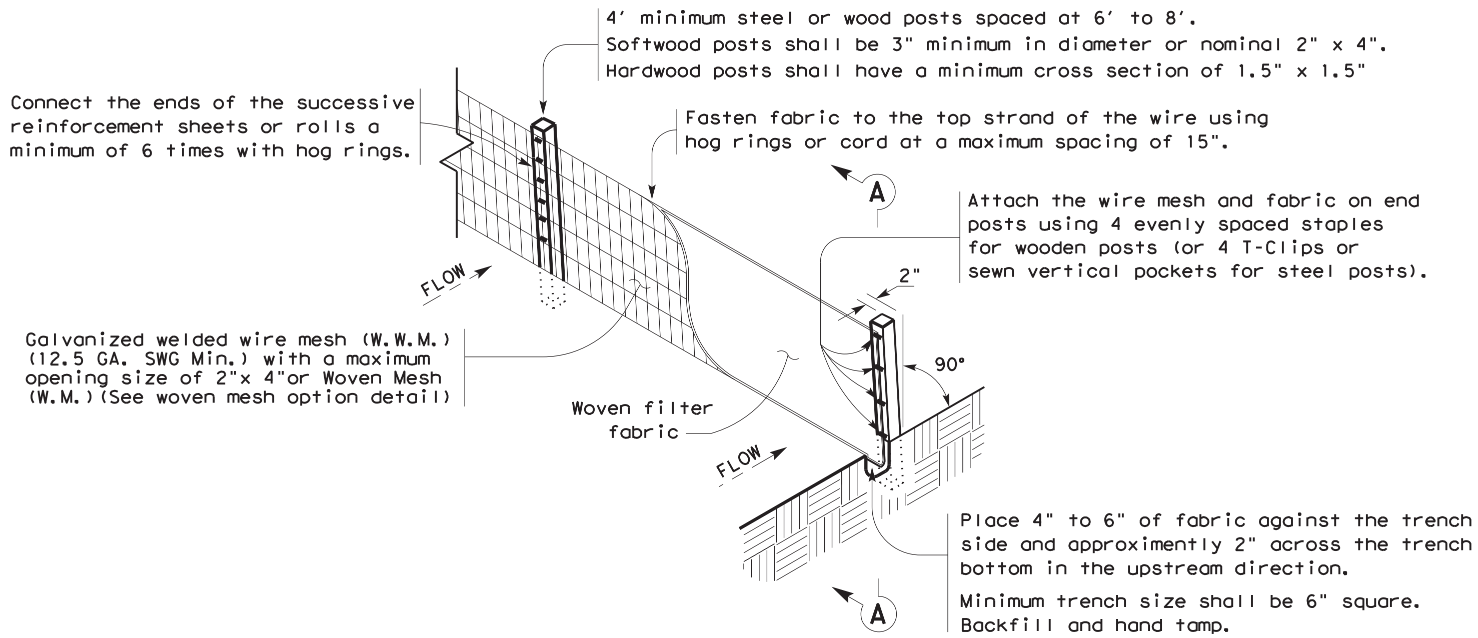
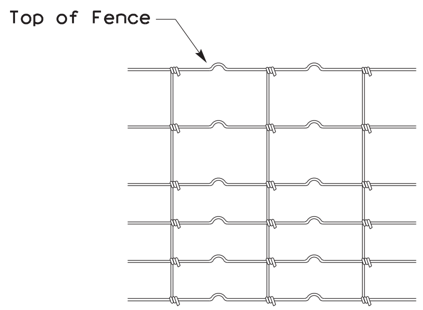


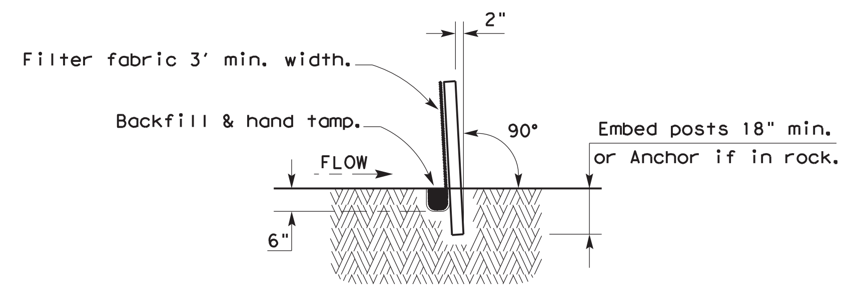
TEMPORARY SEDIMENT CONTROL FENCE

SCF



HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.



SECTION A-A

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

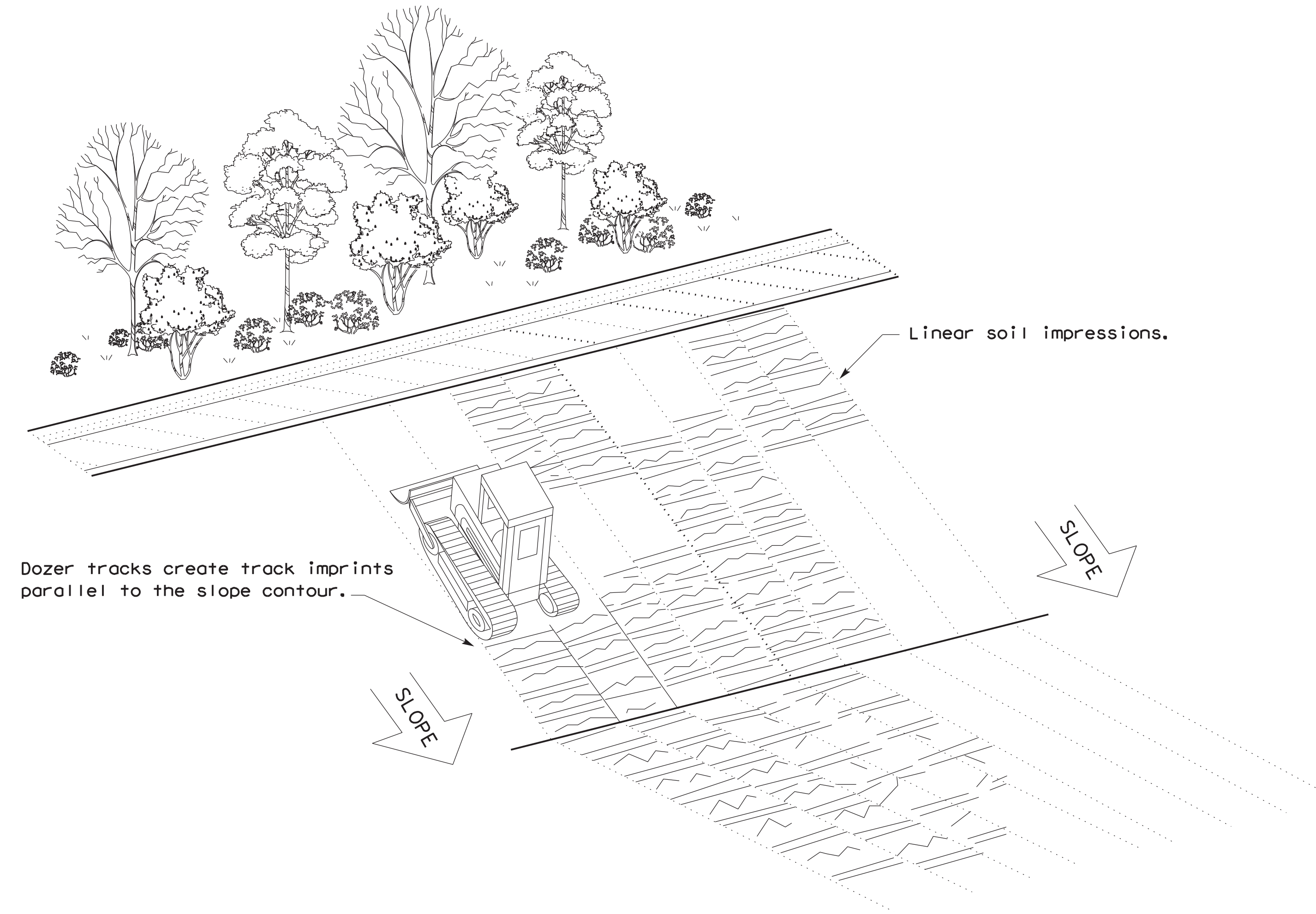
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation | Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	6383	94	001	SH 16, ETC.	
	DIST		COUNTY		SHEET NO.
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