

GENERAL NOTES

Except as shown in the plans, Structure Excavation and Backfill shall be in accordance with M-206-1 for Concrete Box Culvert and Wingwalls.

Expansion joint material shall meet AASHTO Specification M213.

All concrete shall be Class D (Box Culvert).

All concrete exposed to soil shall conform to cementitious materials requirements Class 2, corresponding to sulfate exposure Class 2. All structural concrete not exposed to soil shall conform to cementitious materials requirements Class 0, corresponding to sulfate exposure Class 0.

All construction joints not shown on the plans shall be approved by the Engineer.

All construction joints shall be thoroughly cleaned and roughened to 1/4" amplitude minimum before fresh concrete is placed.

All exposed concrete corners shall be chamfered 3/4", unless otherwise noted.

Grade 60 reinforcing steel is required.

All reinforcing steel shall be black (non-epoxy coated) reinforcing bars unless otherwise noted.

Ⓔ denotes epoxy coated reinforcing steel.

The following table gives the minimum lap splice length for epoxy coated reinforcing bars placed in accordance with subsection 602.06. These splice lengths shall be increased by 25% for bars spaced at less than 6" on center or less than 2" lateral cover.

Bar Size	#4	#5	#6	#7	#8	#9	#10	#11
Splice length for Class D concrete	1'-10"	2'-3"	3'-4"	3'-11"	4'-5"	5'-6"	6'-10"	8'-2"

When the Contractor elects to substitute epoxy coated reinforcement for black reinforcing bars, the minimum lap splice shall be as described above.

The following table gives the minimum lap splice length for black reinforcing bars placed in accordance with subsection 602.06. These splice lengths shall be increased by 25% for bars spaced at less than 6" on center or less than 2" lateral cover.

Bar Size	#4	#5	#6	#7	#8	#9	#10	#11
Splice length for Class D concrete	1'-6"	1'-11"	2'-3"	2'-7"	3'-0"	3'-8"	4'-7"	5'-5"

The Contractor shall be responsible for the stability of the structure during construction.

Backfill shall not begin until top slab has reached concrete strength, f'c.

Wingwall footings and the bottom slab of the cast-in-place box culvert shall be placed monolithically.

All dimensions are perpendicular to the centerline of the box.

All transverse reinforcing shall be normal to the centerline of the box.

For structure number installation, see Standard S-614-12.

Stations, elevations, and dimensions contained in these plans are calculated from a recent field survey and the "as constructed plans". The Contractor shall verify all dependent dimensions in the field before ordering or fabricating any material.

The information shown on these plans concerning the type and location of underground utilities is not guaranteed to be accurate or all inclusive. The Contractor is responsible for making his own determination as to the type and location of underground utilities as may be necessary to avoid damage thereto. The Contractor shall contact the Utility Notification Center of Colorado at 1-800-922-1987 at least 3 business days (not including the day of notification) prior to any excavation or other earthwork.

El. = Elevation Typ. = Typical SPA. = Spacing
 Cont. = Continuous HCL = Horizontal Control Line
 Constr. = Construction CBC = Concrete Box Culvert

DESIGN DATA

AASHTO LRFD Bridge Design Specifications, Seventh Edition with current interims.

Design Method: Load and Resistance Factor Design

Design Loading (Box Culvert):
 HL-93 (Design truck or tandem)
 Live Load Surcharge on exterior wall = 2 ft. of earth
 Unit Soil Weight = 130 pcf
 Maximum Design Fill Height: 16'-0" (9 ft. span); 8'-0" (15 ft. span)
 Active Lateral Earth Pressure: max = 60 pcf; min = 30 pcf

Design Loading (Wingwalls):
 Live Load Surcharge = 1 ft. of earth
 Allowable Bearing Capacity: 2,500 psf (H < 16 ft.); 3,000 psf (H > 16 ft.)
 Unit Soil Weight = 130 pcf
 Equivalent Fluid Pressure = 36 pcf
 Coefficient of Sliding Friction = 0.42

Reinforced Concrete:

Class D Concrete: f'c = 4,500 psi
 Reinforcing Steel: fy = 60,000 psi

INDEX OF DRAWINGS

- C1 GENERAL INFORMATION
- C2 GENERAL LAYOUT
- C3 ENGINEERING GEOLOGY
- C4 HYDRAULIC INFORMATION
- C5 TYPICAL SECTIONS
- C6 CULVERT EXTENSION DETAILS (1 OF 2)
- C7 CULVERT EXTENSION DETAILS (2 OF 2)
- C8 WINGWALL DETAILS

STRUCTURE DESCRIPTION

Existing double cell 9'-0" w x 10'-0" h x ± long cast-in-place box culvert with cast-in-place wingwalls under US 50 West (Eastbound & Westbound)

SCOPE OF WORK

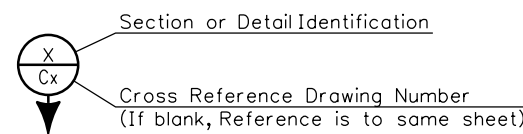
Remove existing Special Inlet and wingwalls on the north end. Extend culvert 134' north and replace Special Inlet and wingwalls.

SUMMARY OF QUANTITIES

STRUCTURE NO. K-18-CZ

ITEM NO.	DESCRIPTION	UNIT	CONCRETE BOX CULVERT	WINGWALLS	TOTAL
202-00495	REMOVAL OF PORTIONS OF PRESENT STRUCTURE	LS			1
① 203-00400	ROCK EXCAVATION	CY	654	94	748
① 206-00000	STRUCTURE EXCAVATION	CY	654	255	909
206-00100	STRUCTURE BACKFILL (CLASS 1)	CY	653	673	1,326
208-00400	WATER CONTROL	LS			0.5
211-03005	DEWATERING	LS			0.5
601-03030	CONCRETE CLASS D (BOX CULVERT)	CY	503	105	608
602-00000	REINFORCING STEEL	LB	81,610	13,735	95,345

① Excavation quantities include over excavation below CBC and wingwalls. Rock Excavation is assumed to be half of total excavation.



Know what's below. Call before you dig.

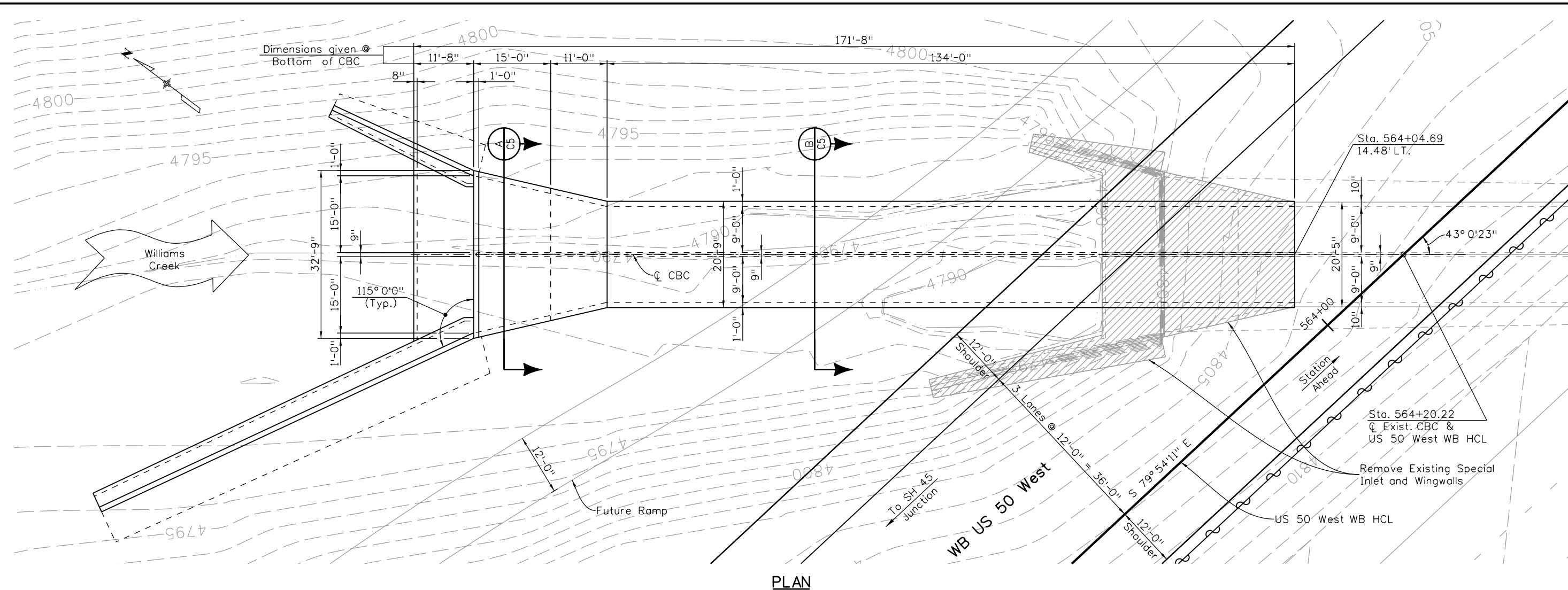
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DATE	INITIAL	DATE	INITIAL	DATE	INITIAL
06/16	KJS	06/16	KJS	07/16	KJS
07/16	SCR	07/16	SCR	08/16	SCR

Print Date: 1/19/2017			As Constructed No Revisions: Revised: Void:	US 50 WEST WESTBOUND WILLIAMS CREEK - CBC EXTENSION GENERAL INFORMATION		Project No./Code STA 0503-085 20344 Sheet Number 138	
File Name: 20344CULV_GenNotes.dgn							Designer: S. Redd Detailer: C. Miyamoto
Horiz. Scale: 1:1 Vert. Scale: As Noted Staff Bridge Branch - Unit 0226 Unit Leader: DDG							Structure Numbers: K-18-CZ Sheet Subset: Bridge Subset Sheets: C1 of 8
		902 Erie Avenue Pueblo, CO 81001 Phone: 719-562-5509 FAX: 719-546-5702	Region 2 DTD				

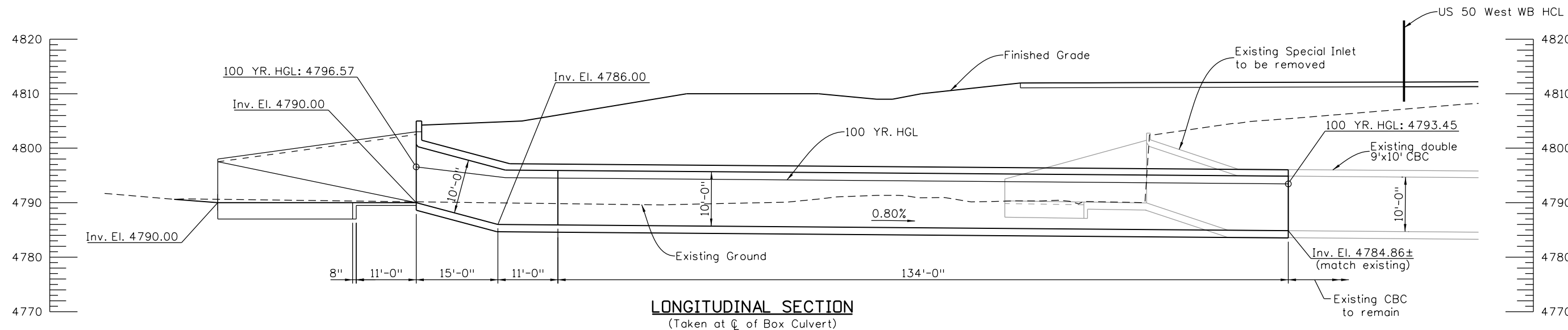
ken.soellner 11:09:12 AM J:\112407-01\00 - 20344 Bridge Drawings\Plot_Set\20344CULV_GenNotes.dgn

ken.soellner 11:09:14 AM J:\112407-01\00 - 20344\Bridges\Drawings\Plot_Set\20344CULV_GenLayout.dgn

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06/16	KJS	06/16	KJS	06/16	KJS
07/16	SCR	07/16	CAD	07/16	SCR
Checked By	Checked By	Checked By	Checked By	Checked By	Checked By



PLAN



LONGITUDINAL SECTION
(Taken at C of Box Culvert)

Print Date: 1/19/2017
File Name: 20344CULV_GenLayout.dgn
Horiz. Scale: 1:20 Vert. Scale: As Noted
Staff Bridge Branch - Unit 0226 Unit Leader: DDG
6300 South Syracuse Way Suite 600 Centennial, CO 80111 (303) 721-1440

Sheet Revisions		
Date:	Comments	Init.

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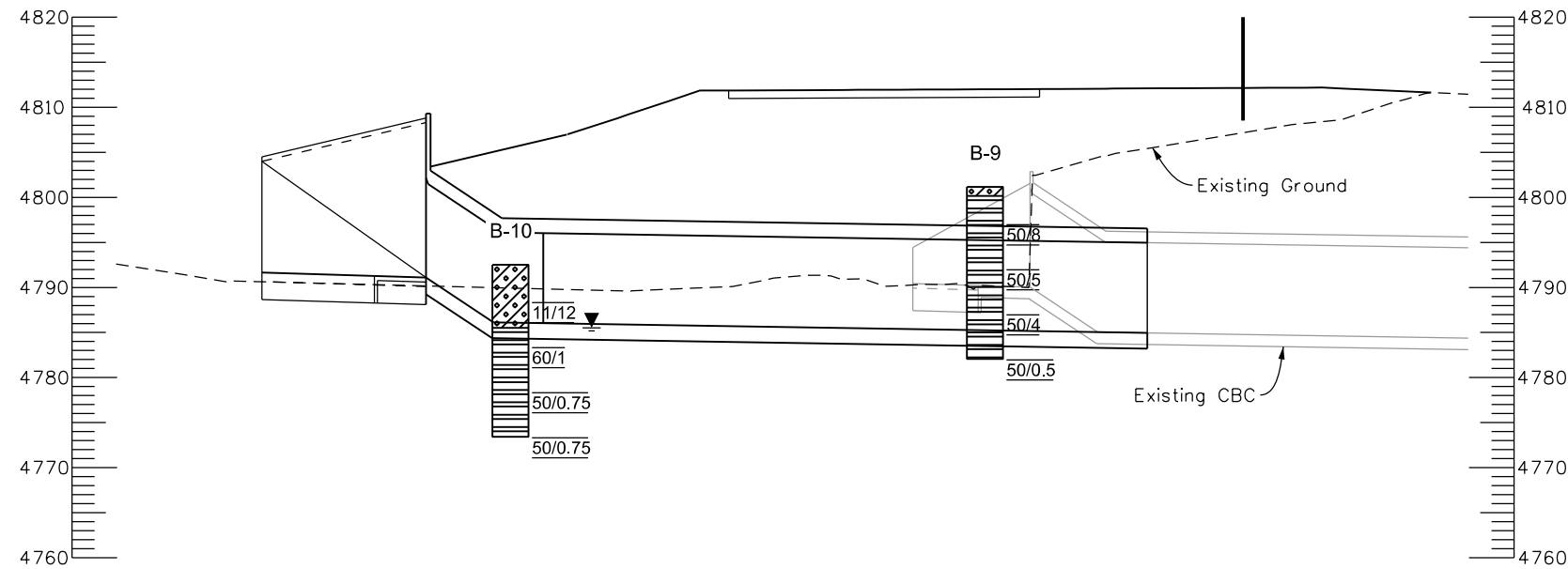
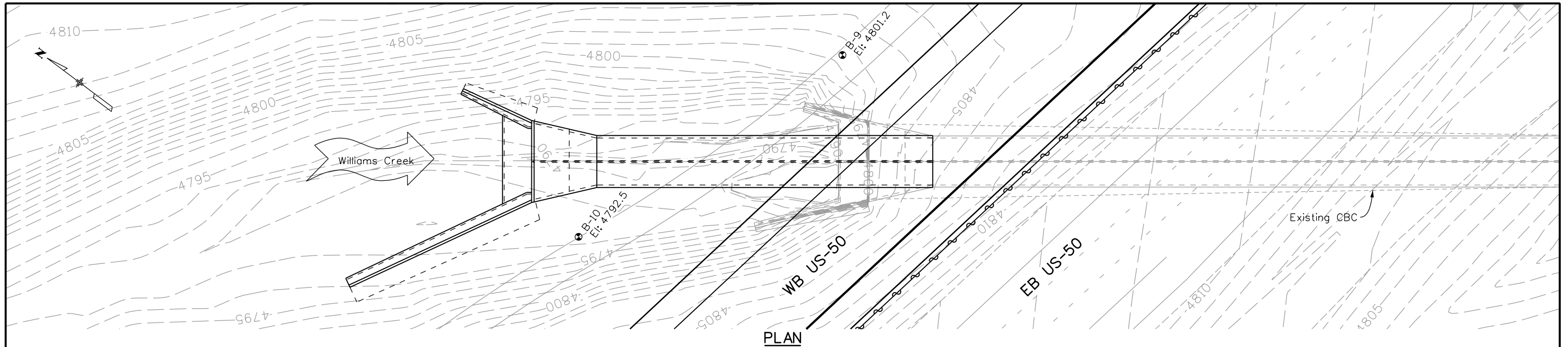
902 Erie Avenue
 Pueblo, CO 81001
 Phone: 719-562-5509 FAX: 719-546-5702

Region 2 DTD

As Constructed
No Revisions:
Revised:
Void:

US 50 WEST WESTBOUND WILLIAMS CREEK - CBC EXTENSION GENERAL LAYOUT			
Designer:	S. Redd	Structure Numbers	K-18-CZ
Detailer:	C. Miyamoto	Subset Sheets:	C2 of 8
Sheet Subset:	Bridge		

Project No./Code
STA 0503-085
20344
Sheet Number 139



ELEVATION

SUMMARY OF TEST RESULTS

Sample ID	Depth (ft)	Liquid Limit	Plasticity Index	% < #200 Sieve	Classification		Water Content (%)	Dry Density (%)	Sulfate (%)	Sample ID	Depth (ft)	Liquid Limit	Plasticity Index	% < #200 Sieve	Classification		Water Content (%)	Dry Density (%)	Sulfate (%)
					USCS	AASHTO									USCS	AASHTO			
B-9	4	25	9	37	SC	A-4 (0)	8.0		0.92										
B-9	9						8.3												
B-9	14						7.9												
B-9	19						4.3												
B-10	0-4	29	15	46	SC	A-6 (3)			0.40										
B-10	4	26	11	58	CL	A-6 (3)	20.3	113.3											

TYPE OF MATERIAL

	Asphalt Pavement		Fill - Aggregate Base Course
	Fill - CLAY		Fill - SAND
	Fill - SAND		Fill - CLAY
	TOPSOIL		Native - SAND, silty
	Native - SAND, gravelly		Native - SAND, clayey
	Native - CLAY		Native - CLAY, gravelly
	Native - GRAVEL, silty		Native - CLAY, sandy
	Bedrock - SANDSTONE		Bedrock - CLAYSTONE
	Bedrock - SHALE		

LEGEND

	B	Bridge Borehole
	▽	Ground Water Level At Time of Drilling
	9/12	9 Blows for 12 Inches
	50/3	50 Blows for 3 Inches
	88/7 SS	Split Spoon Sampler Required 8 Blows for 6 Inches Required 6 Blows for 6 Inches Required 7 Blows for 6 Inches

BORING ID NOTED AT THE TOP OF LOG
BLOW COUNTS OBTAINED WITH SPLIT SPOON SAMPLERS ARE NOTED WITH "SS". ALL OTHER BLOW COUNTS OBTAINED WITH A MODIFIED CALIFORNIA BARREL SAMPLER
SEE INDIVIDUAL LOG SHEETS FOR MORE DETAIL

Print Date: 1/19/2017	Sheet Revisions Date: Comments Init. 	Colorado Department of Transportation 902 Erie Avenue Pueblo, CO 81001 Phone: 719-562-5509 FAX: 719-546-5702 Region 2 DTD	As Constructed No Revisions: Revised: Void:	US 50 WEST WESTBOUND WILLIAMS CREEK CBC ENGINEERING GEOLOGY Designer: R. Lepro Detailer: D. Knight Subset:	Project No./Code STA 0503-088 20344 Sheet Number 140
File Name: 20344GED_EngGeo-WC CBC.dgn Horiz. Scale: 1:40 Vert. Scale: 1:20				Subset Sheets: C3 of 8	

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100-YEAR RECURRENCE INTERVAL

FLOW UPSTREAM OF CULVERT =2233 cfs
 DRAINAGE AREA = 37 SQ. MI.

CHANNEL DESCRIPTION

BOTTOM MATERIAL: COHESIVE NONCOHESIVE
 BOTTOM MAT. SIZE: CLAY SILT SAND GRAVEL COBBLES OTHERS _____
 STREAM FORM: STRAIGHT MEANDERING BRAIDED
 MANNING'S "n" FOR DESIGN: CHANNEL 0.079 OVERBANK 0.04
 DEBRIS: BRUSH TREES ICE OTHER _____

COMPARISON HYDRAULICS (100 YEAR EVENT)

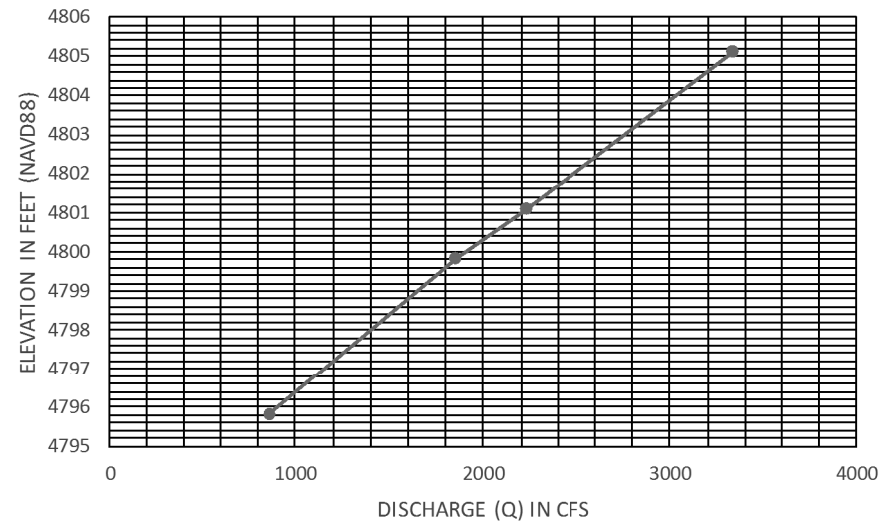
AT SECTION 1739.690 LOCATED 56 FT UPSTREAM OF PROPOSED WILLIAMS CREEK RCBC

	VELOCITY (fps)		WS EL. (ft.)	MAX BACKWATER (ft.)	FROUDE NO.
	AVERAGE	CHANNEL			
EXISTING CONDITIONS	3.72	3.72	4800.50		0.28
PROPOSED CONDITIONS	3.23	3.23	4801.12	0.62	0.23

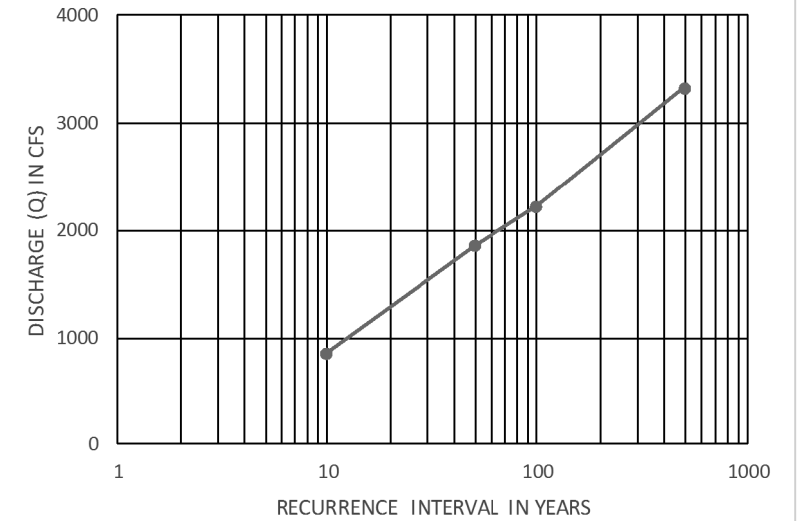
HYDRAULIC DATA

LOCATION	INVERT ELEVATION	SOFFIT ELEVATION OF BOX CULVERT	100-YEAR WATER SURFACE ELEVATION
WILLIAMS CREEK BOX CULVERT (UPSTREAM)	4790.29	4800.29	4796.57
WILLIAMS CREEK BOX CULVERT (DOWNSTREAM TIE-IN TO EXISTING BOX)	4784.13	4794.13	4793.45

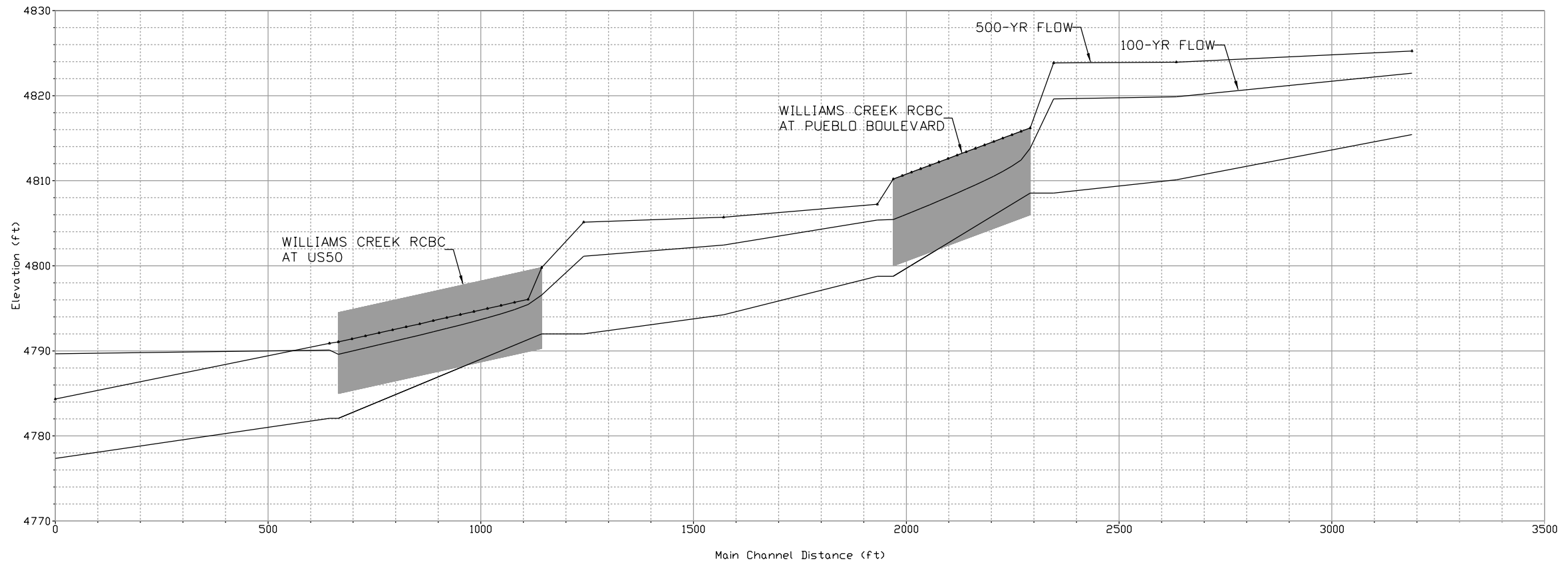
STAGE-DISCHARGE UPSTREAM OF WB US 50 AT WILLIAMS CREEK



DISCHARGE-FREQUENCY FOR WILLIAMS CREEK NEAR US 50



WILLIAMS CREEK MAIN CHANNEL PROFILE



Design: Initial: CAD, Date: 06/16, Checked By: SCR, Detailed By: CAD, Checked By: SCR, Quantities: Initial: KJS, Date: 07/16, Checked By: KJS, Quantities: Initial: KJS, Date: 08/16, Checked By: KJS
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Print Date: 1/19/2017
 File Name: 20344CULV_Hydraulics02.dgn
 Horiz. Scale: 1:300 Vert. Scale: As Noted
 Staff Bridge Branch - Unit 0226 Unit Leader: DDG

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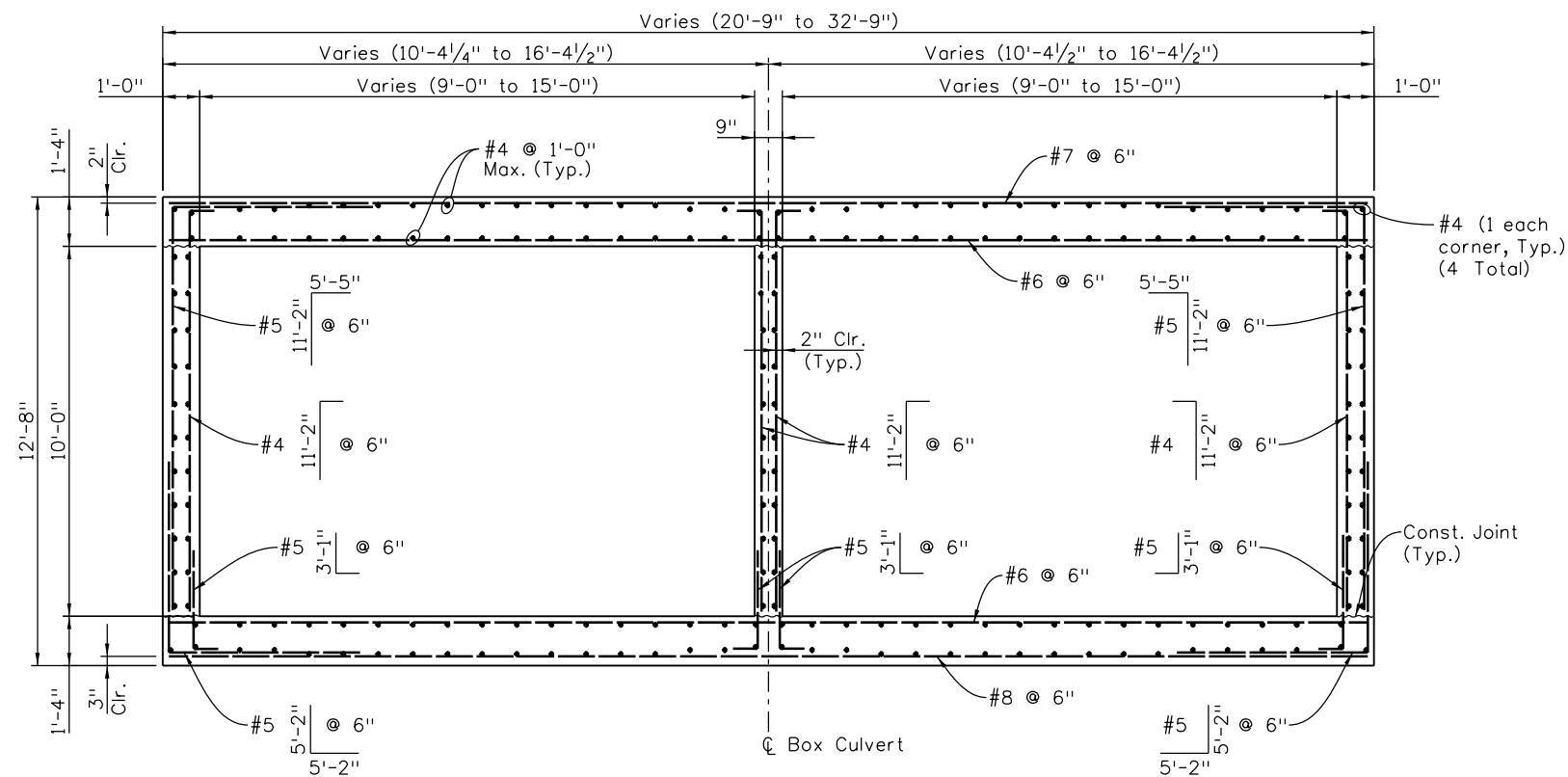
US 50 OVER WILLIAMS CREEK BOX CULVERT HYDRAULIC INFORMATION

Designer:	M. Love	Structure Numbers:	K-18-DA
Detailer:	C. Miyamoto	Sheet Subset:	Bridge
Sheet Subset: Bridge		Subset Sheets: C4 of 8	

Project No./Code
 STA 0503-085
 20344
 Sheet Number **141**

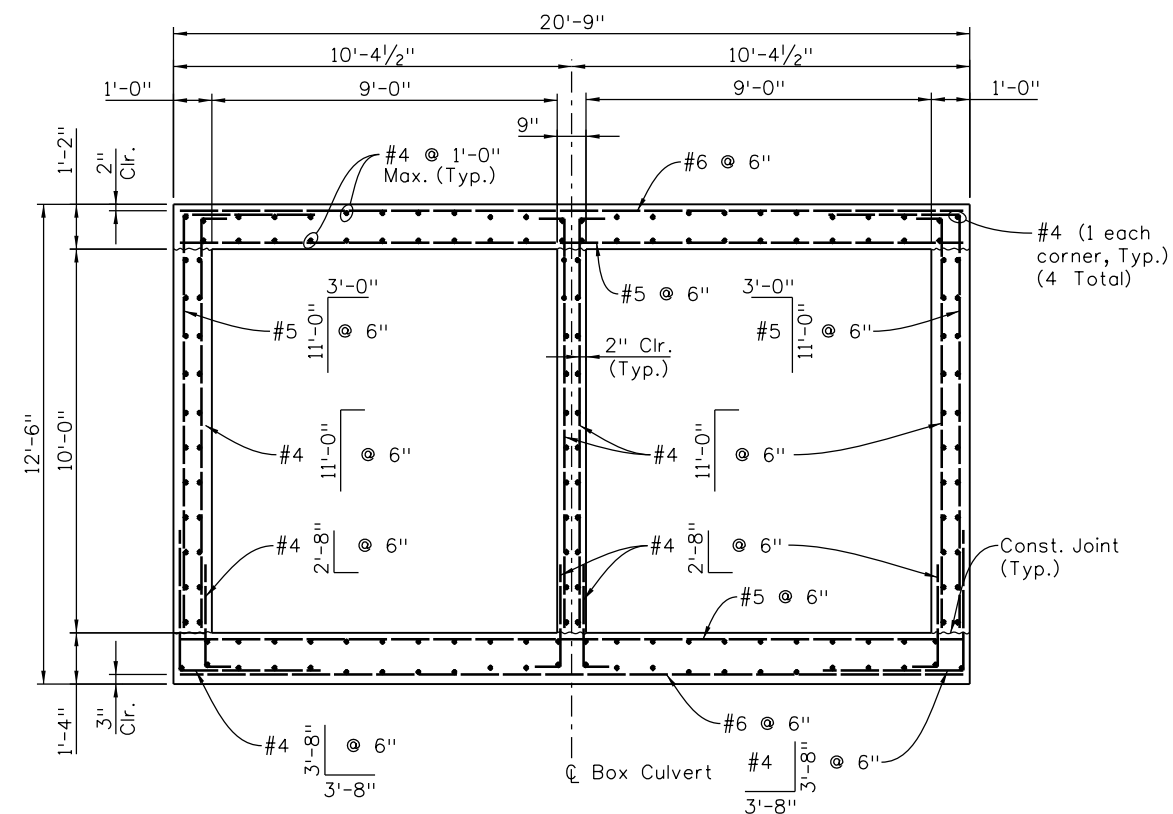
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07/16	SCR	07/16	SCR	08/16	SCR
Designed By	Checked By	Detailed By	Checked By	Quantities By	Checked By



BOX CULVERT AT WEST END (SPECIAL INLET)

SECTION A
C2



BOX CULVERT TYPICAL SECTION

SECTION B
C2

Print Date: 1/19/2017	0000
File Name: 20344CULV_ExtDetails03.dgn	
Horiz. Scale: 1:1 Vert. Scale: As Noted	
Staff Bridge Branch - Unit 0226 Unit Leader: DDG	
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Date:	Comments	Init.

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Region 2 DTD

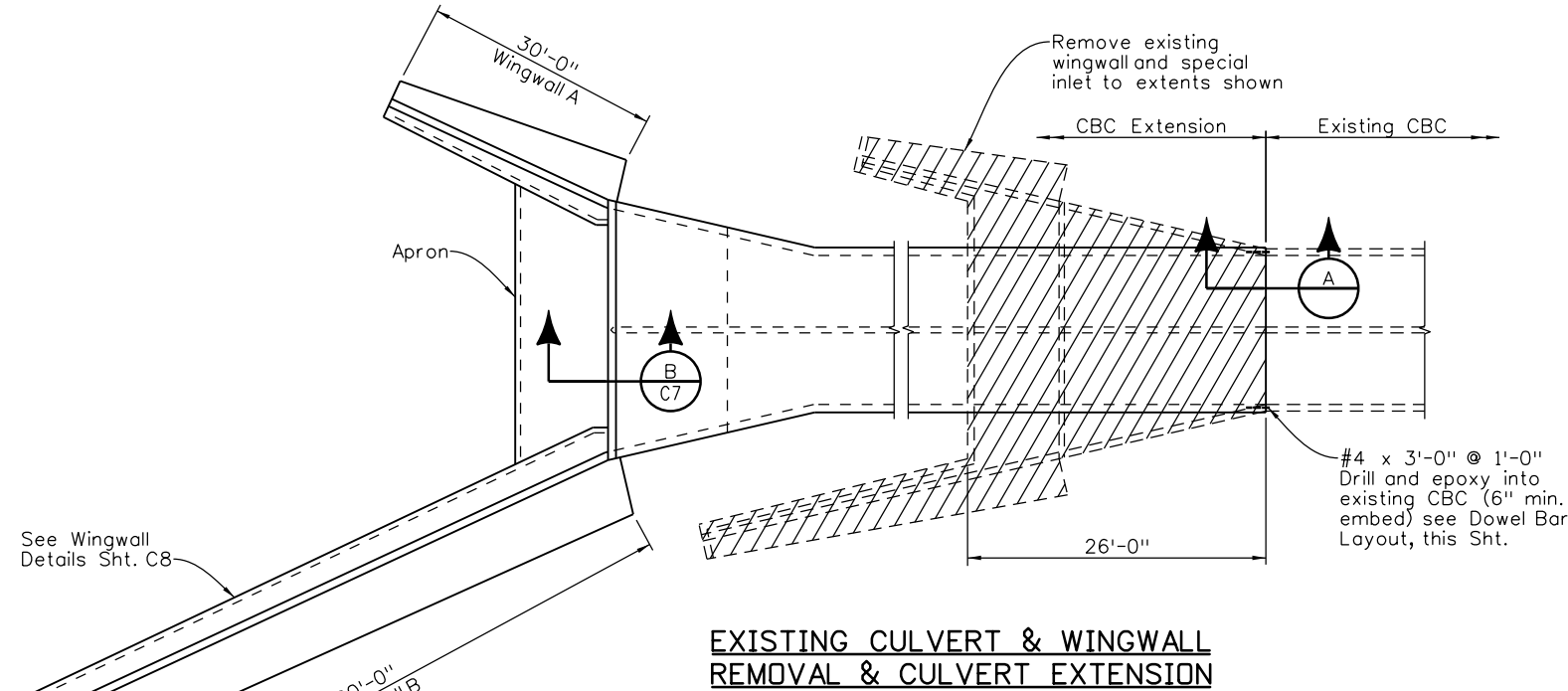
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No Revisions:
Revised:
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US 50 WEST WESTBOUND WILLIAMS CREEK - CBC EXTENSION TYPICAL SECTIONS			
Designer:	S. Redd	Structure Numbers	K-18-CZ
Detailer:	C. Miyamoto	Subset Sheets:	C5 of 8
Sheet Subset:	Bridge		

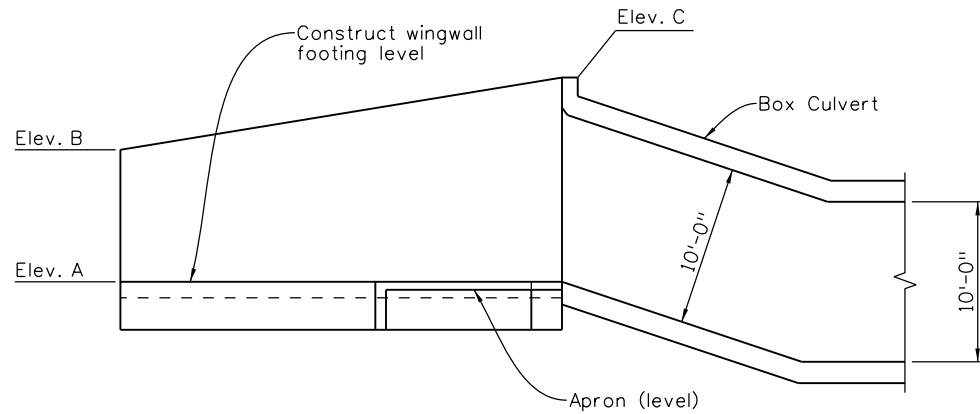
Project No./Code	STA 0503-085
	20344
Sheet Number	142

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Checked By	07/16	SCR	07/16	Checked By	SCR

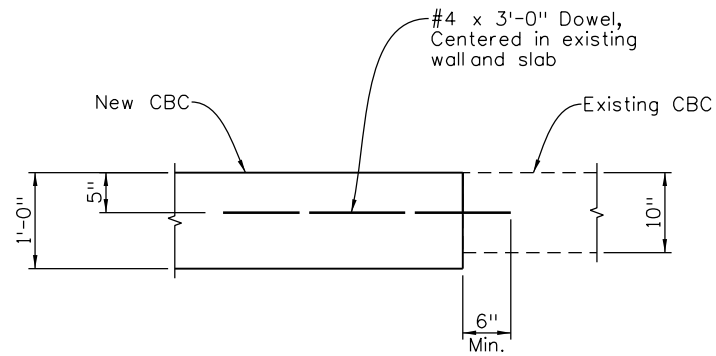


**EXISTING CULVERT & WINGWALL
REMOVAL & CULVERT EXTENSION**

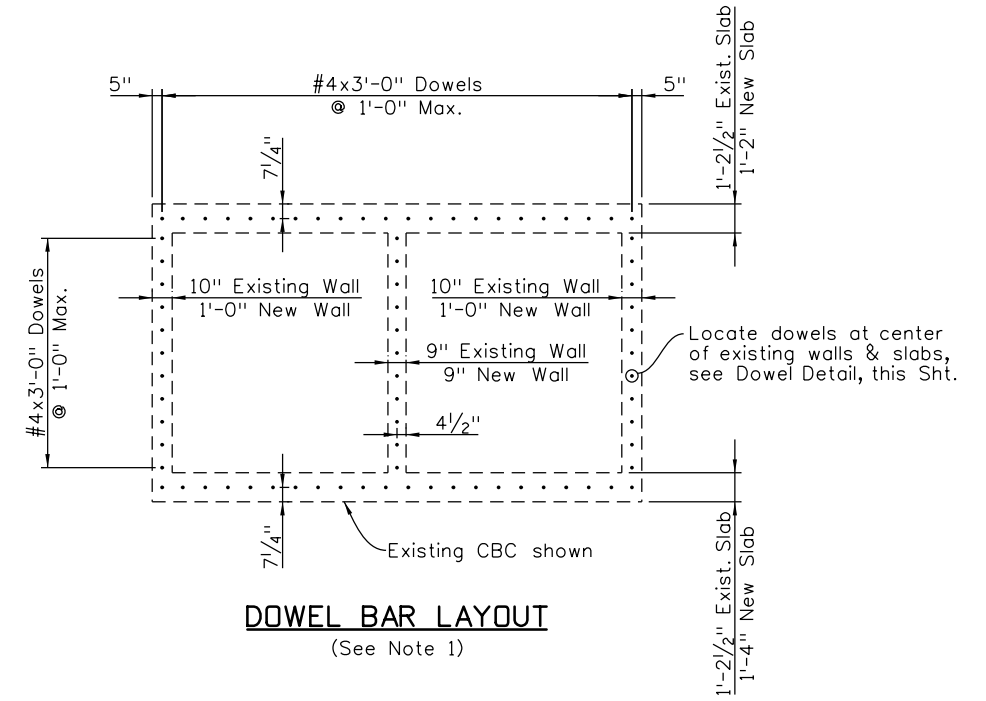


TYPICAL WINGWALL ELEVATION
(Looking North near Wingwall A)(Wingwall B similar)

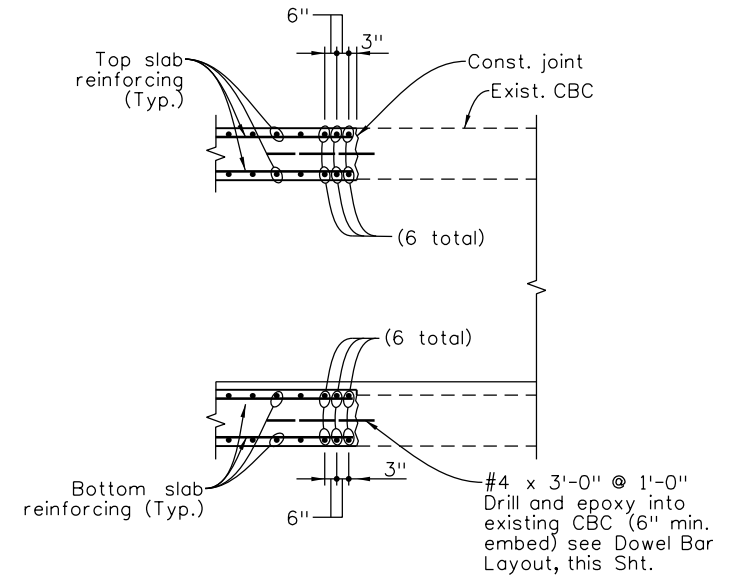
Wingwall	Elev. A	Elev. B	Elev. C
A	4790.0	4798.0	4803.0
B	4790.0	4803.5	4807.0



DOWEL DETAIL



DOWEL BAR LAYOUT
(See Note 1)



SECTION A

NOTES:

- Dowels shall be anchored using an approved epoxy adhesive. The cost of dowels, drilling and epoxy will not be paid for separately, but shall be included in the work.
- Existing wall and slab thicknesses to be field verified. Proposed dowel locations may be field adjusted to avoid existing reinforcement.

Print Date: 1/19/2017
 File Name: 20344CULV_ExtDetails01.dgn
 Horiz. Scale: 1:1 Vert. Scale: As Noted
 Staff Bridge Branch - Unit 0226 Unit Leader: DDG

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**US 50 WEST WESTBOUND
WILLIAMS CREEK - CBC EXTENSION
CULVERT EXTENSION DETAILS (1 OF 2)**

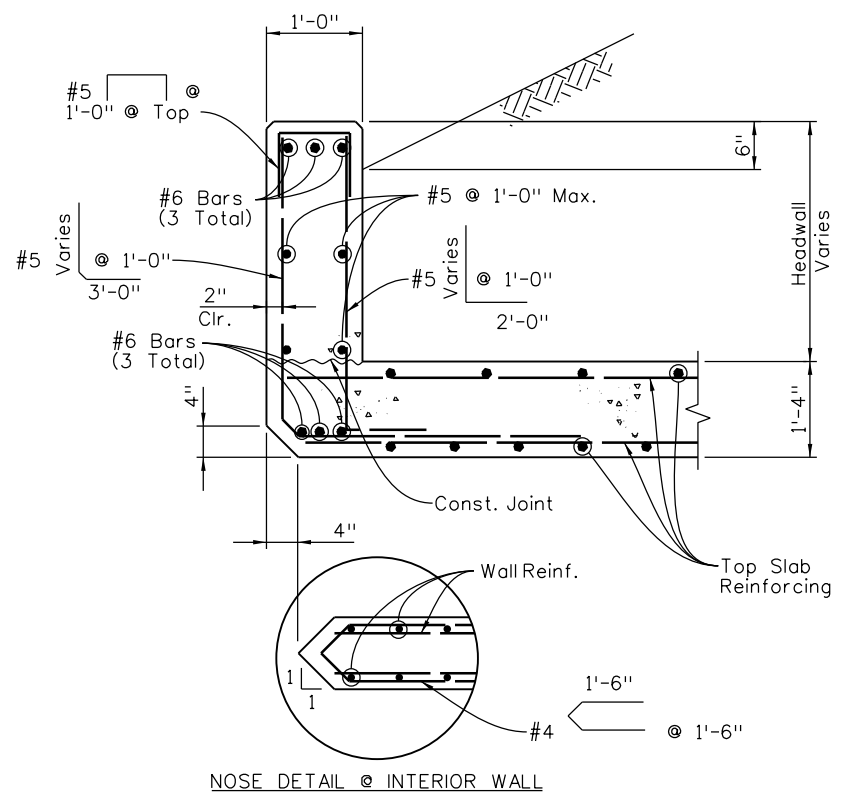
Designer: S. Redd Structure Numbers: K-18-CZ
 Detailer: C. Miyamoto
 Sheet Subset: Bridge Subset Sheets: C6 of 8

Project No./Code
 STA 0503-085
 20344
 Sheet Number **143**

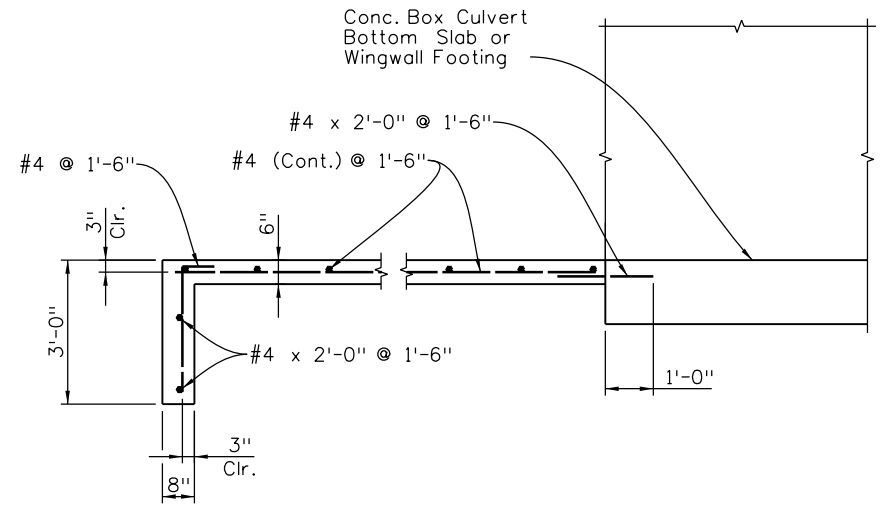


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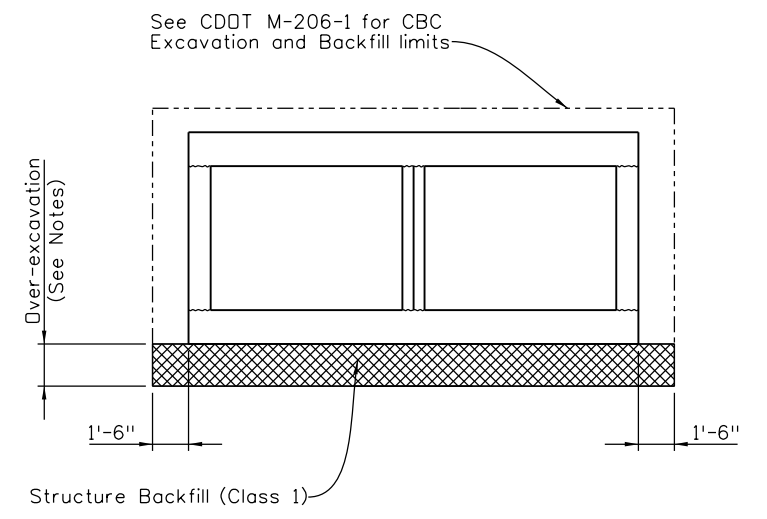
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07/16	SCR	07/16	SCR	07/16	SCR
Checked By	Checked By	Checked By	Checked By	Checked By	Checked By



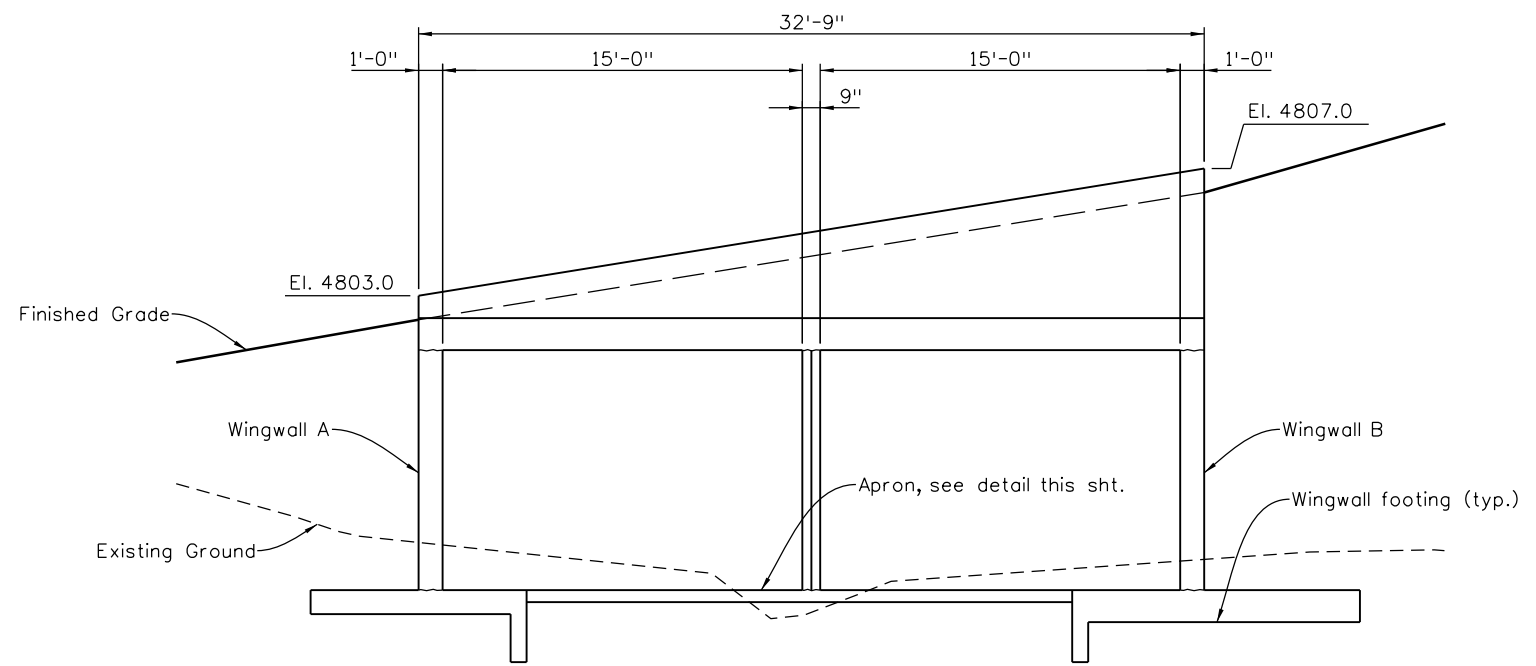
PARTIAL SECTION NEAR HEADWALL B
C6



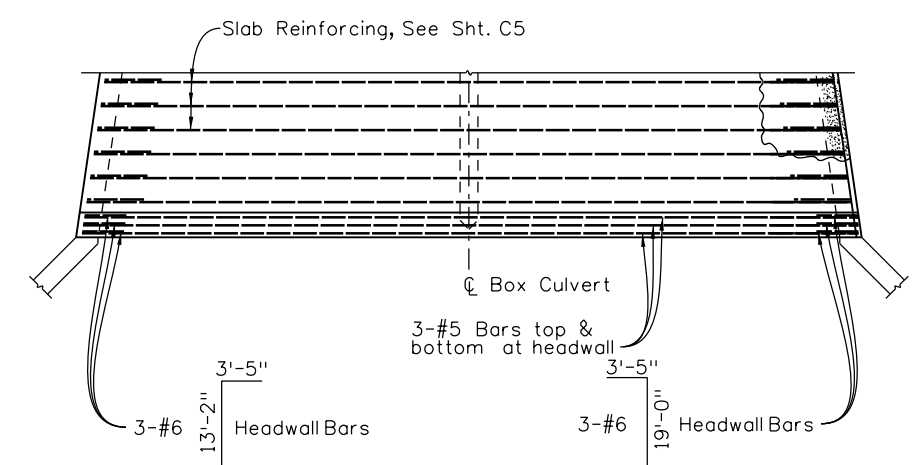
CONCRETE APRON DETAIL



OVER-EXCAVATION LIMITS
(See Sht. C8 for Over-excavation at Wingwalls)



ELEVATION AT WEST END

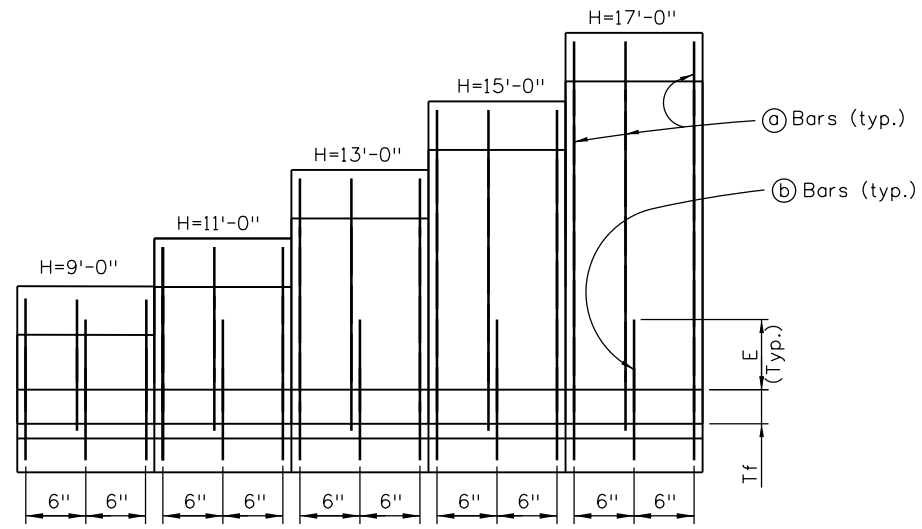


REINFORCING PLAN

NOTES:

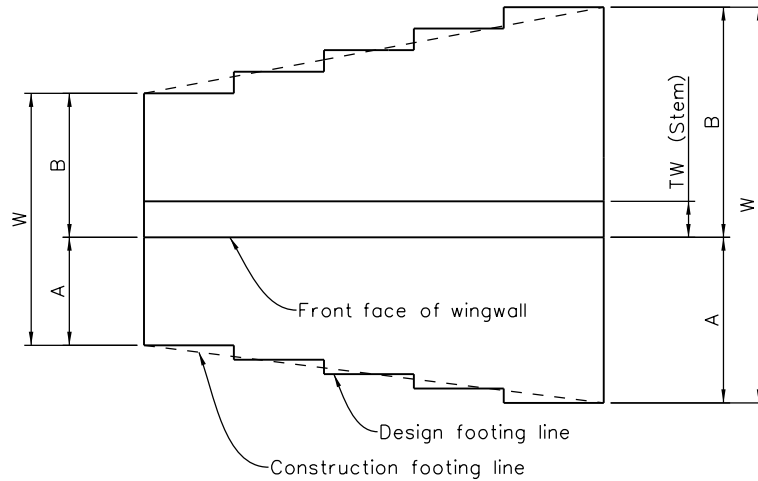
- Subgrade soils beneath structures shall be overexcavated a minimum of 2 feet below the bottom of the CBC or wingwall footing, or to competent bedrock, and replaced with Structure Backfill (Class 1) compacted in accordance with Section 206.
- Alternative subgrade preparation may include removal of existing soils to 1 foot below the bottom of the CBC, or to competent bedrock, installing a geotextile stabilization material and backfilling with Structure Backfill (Class 1). Geotextile material will be included in the cost of the backfill.
- Alternative methods of stabilization may be considered based on the conditions encountered. The Contractor shall submit alternative methods to CDOT for approval by the Geotechnical Engineer.

Print Date: 1/19/2017 File Name: 20344CULV_ExtDetails02.dgn Horiz. Scale: 1:1 Vert. Scale: As Noted Staff Bridge Branch - Unit 0226 Unit Leader: DDG	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3">Sheet Revisions</th> </tr> <tr> <th>Date:</th> <th>Comments</th> <th>Init.</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Sheet Revisions			Date:	Comments	Init.							<p>Colorado Department of Transportation 902 Erie Avenue Pueblo, CO 81001 Phone: 719-562-5509 FAX: 719-546-5702 Region 2 DTD</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">As Constructed</td> <td style="width: 50%;">No Revisions:</td> </tr> <tr> <td>Revised:</td> <td>Void:</td> </tr> </table>	As Constructed	No Revisions:	Revised:	Void:	US 50 WEST WESTBOUND WILLIAMS CREEK - CBC EXTENSION CULVERT EXTENSION DETAILS (2 OF 2)	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">Project No./Code</td> </tr> <tr> <td colspan="2" style="text-align: center;">STA 0503-085</td> </tr> <tr> <td style="width: 50%;">20344</td> <td style="width: 50%;">Sheet Number 144</td> </tr> </table>	Project No./Code		STA 0503-085		20344	Sheet Number 144
Sheet Revisions																											
Date:	Comments	Init.																									
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Project No./Code																											
STA 0503-085																											
20344	Sheet Number 144																										

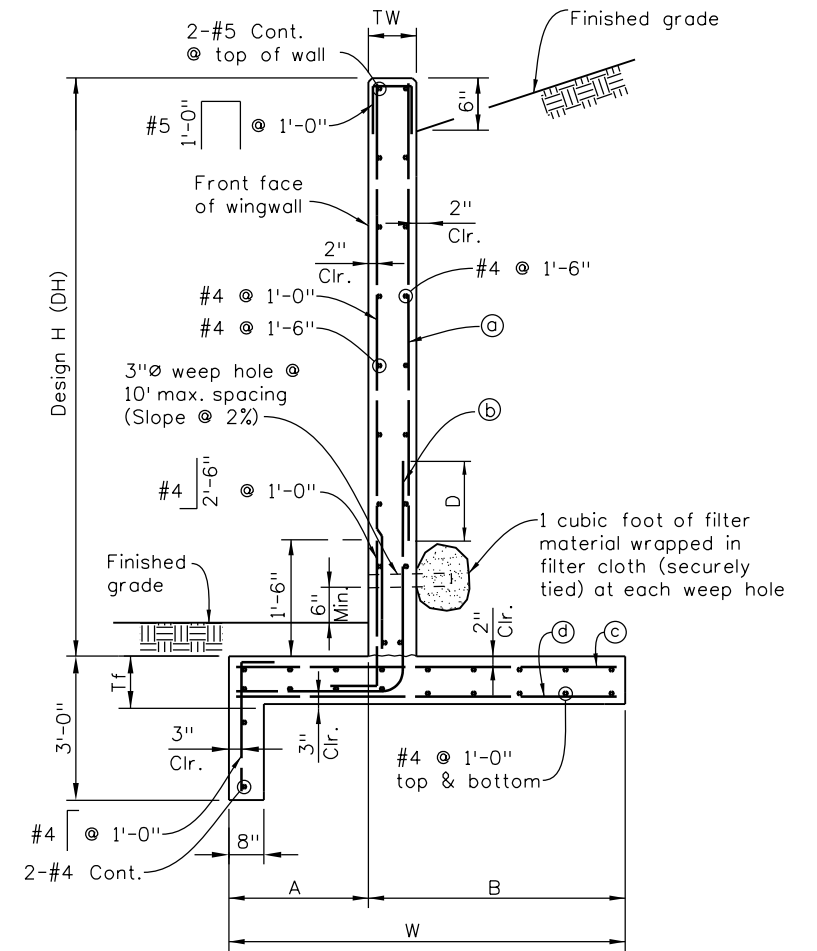


REINFORCING ELEVATION

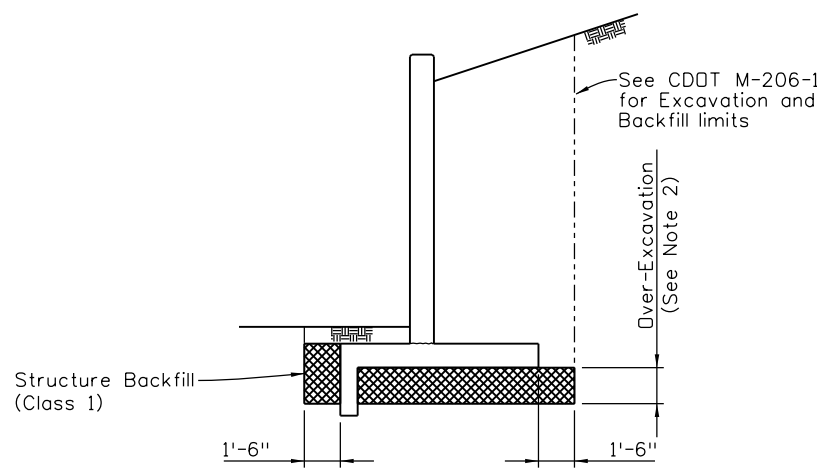
DESIGN DATA - REINFORCING STEEL & DIMENSIONS					
Design H (DH)	9'-0"	11'-0"	13'-0"	15'-0"	17'-0"
W (min.)	5'-0"	7'-0"	9'-0"	10'-6"	12'-0"
A (min.)	1'-6"	2'-0"	2'-6"	3'-0"	3'-6"
B (min.)	3'-6"	5'-0"	6'-6"	7'-6"	8'-6"
Tw	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
Tf	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
a bars	#4 @ 12"	#5 @ 12"	#5 @ 12"	#6 @ 12"	#8 @ 12"
b bars	#5 @ 12"	#5 @ 6"	#5 @ 6"	#6 @ 6"	#8 @ 6"
c bars	#5 @ 12"	#4 @ 6"	#5 @ 6"	#5 @ 6"	#6 @ 6"
d bars	#4 @ 12"	#4 @ 12"	#4 @ 12"	#4 @ 6"	#4 @ 6"
D	1'-6"	1'-11"	1'-11"	2'-3"	3'-0"
E	3'-0"	4'-0"	5'-0"	6'-0"	7'-0"
Conc. CY/LF	0.62	0.77	0.91	1.04	1.17
Reinf. Lb/LF	55.0	81.0	102.0	139.0	211.0



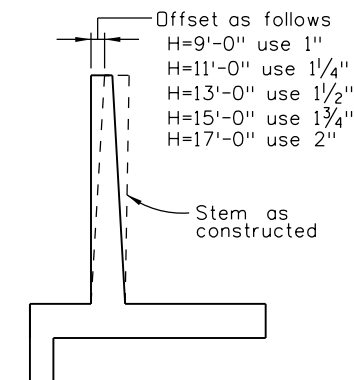
FOOTING PLAN DESIGN EXAMPLE



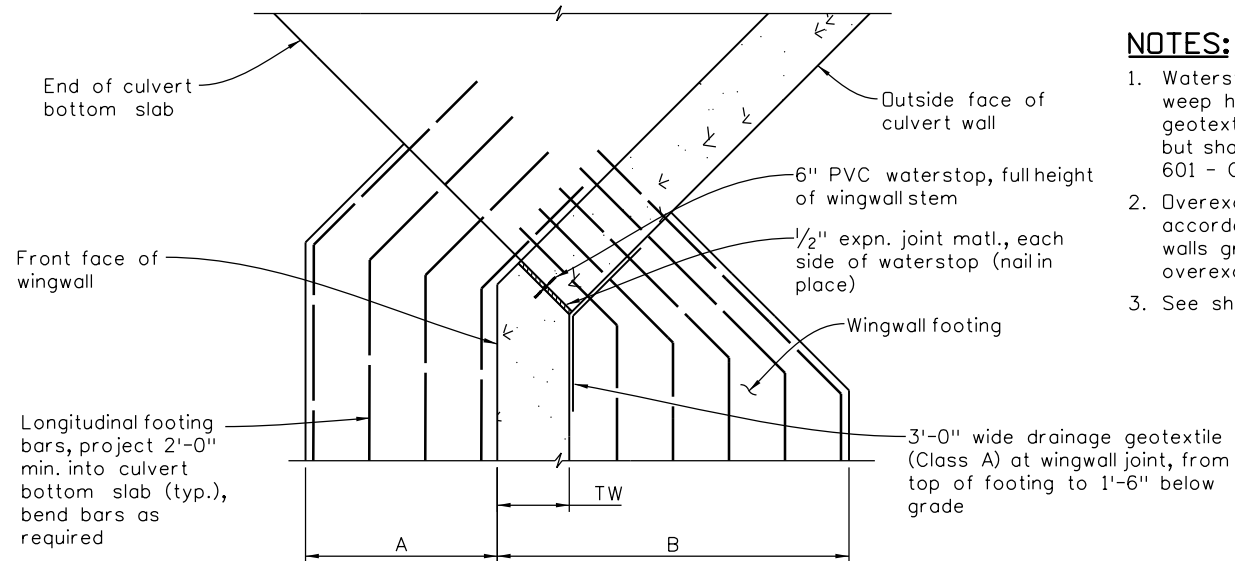
TYPICAL WINGWALL SECTION



OVER-EXCAVATION LIMITS



APPROXIMATE WALL OFFSETS



BOX CULVERT BOTTOM SLAB/WINGWALL INTERSECTION DETAIL

- NOTES:**
- Waterstop, 1/2" expansion joint material, weep hole drainage system & drainage geotextile will not be paid for separately, but shall be included in the cost of item 601 - Concrete Class D (Box Culvert).
 - Overexcavate soil below wingwall footing in accordance with notes on sheet C7. Except walls greater than DH = 15'-0" shall be overexcavated a minimum of 3 feet.
 - See sheet C7 for concrete apron detail.

Design		Detail		Quantities	
DATE	INITIAL	DATE	INITIAL	DATE	INITIAL
06/16	KJS	06/16	KJS	07/16	KJS
07/16	SCR	07/16	SCR	08/16	SCR
Designed By	Checked By	Detailed By	Checked By	Quantities By	Checked By
SCR	SCR	SCR	SCR	SCR	SCR

Print Date: 1/19/2017
 File Name: 20344CULV_Wingwalls.dgn
 Horiz. Scale: 1:1 Vert. Scale: As Noted
 Staff Bridge Branch - Unit 0226 Unit Leader: DDG

Sheet Revisions		
Date:	Comments	Init.

Colorado Department of Transportation

902 Erie Avenue
 Pueblo, CO 81001
 Phone: 719-562-5509 FAX: 719-546-5702

Region 2 DTD

As Constructed
No Revisions:
Revised:
Void:

US 50 WEST WESTBOUND
 WILLIAMS CREEK - CBC EXTENSION
 WINGWALL DETAILS

Designer: S. Redd Structure Numbers: K-18-CZ
 Detailer: C. Miyamoto

Sheet Subset: Bridge Subset Sheets: C8 of 8

Project No./Code
 STA 0503-085

20344

Sheet Number 145

FELSBURG
 HOLT &
 ULLEVIG

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ken.soellner 11:09:53 AM J:\112407-01\00 - 20344\Bridges\Drawings\Plot_Set\20344CULV_Wingwalls.dgn