STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(3)	S1	S10

STRUCTURAL GENERAL NOTES

1. General:

A. Workmanship and materials shall conform to the AASHTO LRFD Bridge Design Specification, 5th Edition, and the Hawaii Standard Specifications for Bridge and Road Construction (2005 Edition), and all applicable special provisions by the State of Hawaii Department of Transportation.

B. The Contractor shall compare the Civil and Structural drawings with each other and report in writing to the Contracting Officer, inconsistencies or omissions.

C. The Contractor shall take field measurements and verify field conditions and shall compare such field measurements and conditions with the drawings before commencing the work. Report in writing to the Contracting Officer all inconsistencies or omissions.

D. The Contractor shall be responsible for means and methods of construction, workmanship and job safety. The Contractor shall provide temporary shoring and bracing as required for stability of structural members and systems.

E. Details noted as typical on structural drawings shall apply in all conditions unless specifically shown or noted otherwise.

F. The Contractor shall be responsible for coordinating the work of all trades.

G. The Contractor shall be responsible for protection of the adjacent properties, structures, streets, and utilities during the construction period. Any damage or deteriorated property shall be restored to the condition prior to the beginning of work or better at no additional cost to the project.

H. Construction loading shall not exceed design live load unless special shoring is provided. Permitted construction loads shall be properly reduced in areas where the structure has not attained full design strength.

2. Design Criteria:

A. Dead Load
Weight of all components of the structures, appurtenances attached thereto, and earth covers.

B. Live Load
AASHTO HL-93 Loading

C. Seismic
Seismic design is in accordance with the AASHTO LRFD Bridge Design Specifications, 5th Edition.
0.2-second spectral response acceleration coefficient, Ss = 1.50
1.0-second spectral response acceleration coefficient, S_1 = 0.70
Horizontal peak ground acceleration coefficient, PGA = 0.67

D. Soil Properties
1. Static Lateral Earth Pressure:
a. At-Rest condition ——— = 54 pcf
2. Dynamic Lateral Earth Pressure: ——— = 120.0 H^2 plf
Where: H = Height of retained soil or backfill in feet
3. Bearing Pressure:
a. Extreme event limit state ——— = 7,500 psf
b. Strength limit state ——— = 5,000 psf
4. Coefficient of Friction:
a. Extreme event limit state ——— = 0.78
b. Strength limit state ——— = 0.62
5. Passive Earth Pressure:
a. Extreme event limit state ——— = 350 pcf
b. Strength limit state ——— = 175 pcf

3. Foundation:

A. Contractor shall provide for de-watering of excavation from either surface water, ground water or seepage. NPDES permit required for discharging into State waters.

B. Contractor shall provide for design and installation of all cofferdams, cribbing, sheeting, and shoring necessary for personnel safety and to preserve excavations and earth banks, and adjacent structures and property for damage.

C. Excavation boundaries and grade elevations for footing shall be approved by the Contracting Officer prior to placing the concrete and reinforcing.

D. Backfill behind the retaining wall structures shall be Type A structural backfill, conforming to Section 703.20 of the Hawaii Standard Specifications for Roads, Bridges and Public Works Construction, 2005.

4. Concrete:

A. Concrete shall be regular weight concrete and shall have a 4,000 psi minimum 28-day compressive strength. All concrete shall have maximum w/c ratio of 0.45.

B. All inserts, anchor bolts, plates, etc. embedded in concrete shall be hot-dip galvanized unless otherwise noted.

C. Conduits, pipes, and sleeves passing through a wall not conforming to typical details shall be located and submitted to the Contracting Officer for approval.

D. Construction joints may be relocated by the Contractor and submitted to the Engineer for approval. Construction joints shall be made and relocated as not to impair the strength of the structure and to minimize shrinkage stresses. All construction joints shall be cleaned, laitance removed and wetted. See typical structural details for specific requirements.

E. Non-shrink grouts shall be a premixed compound consisting of non-staining, non-metallic aggregate, cement, water reducing and plasticizing agents capable of developing minimum compressive strength of 4,000 psi in 3 days and 7,000 psi in 28 days.

F. Unless otherwise noted, chamfer all exposed concrete edges 3/4".

G. Concrete delivery tickets shall record all free water in the mix: at batching by plant, for consistency by driver, and any additional request by Contractor if permitted by the mix design.

H. Reinforcing bars, anchor bolts, inserts and other items to be cast in the concrete shall be secured in position prior to placement of concrete.

5. Reinforcing Steel:

A. Reinforcing steel shall be deformed bars conforming to ASTM A615, Grade 60, unless unless noted otherwise.

B. Clear concrete coverage for reinforcing bars shall be as follows, unless otherwise noted:
a. Footing, grade beams, etc. cast against earth ——— 3"
b. Footing, grade beams, etc. formed and exposed to earth ——— 2"
c. Wall faces, slabs, etc. exposed to earth or weather ——— 2"

C. Splices:
a. Reinforcing steel shall be spliced only where indicated on plans. Provide lap splice length per typical structural details and schedule sheet S2, unless otherwise noted.

D. Bar bends and hook shall be "standard hooks" in accordance with typical structural details on sheet S2.

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STRUCTURAL GENERAL NOTES

Scale: As Noted Date: August 21, 2015

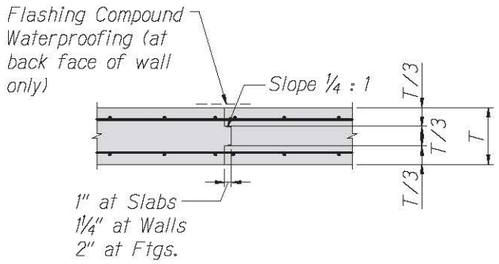
SHEET No. 1 OF 10

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(3)	S2	S10

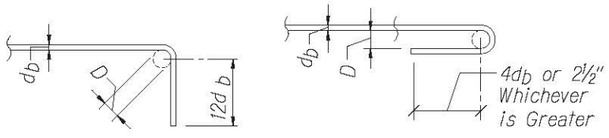
MINIMUM SPLICE & EMBEDMENT LENGTHS					
	CONCRETE STRENGTH = 4,000 PSI				
	LAP SPLICE		EMBEDMENT		
			STRAIGHT		
BAR SIZE	OTHER BARS	TOP BAR	OTHER BARS	TOP BAR	WITH STANDARD 90° HOOK
#3, #4	21"	29"	12"	17"	7"
#5	26"	36"	15"	21"	9"
#6	31"	43"	18"	26"	10"
#7	39"	54"	23"	32"	12"
#8	51"	71"	30"	42"	14"

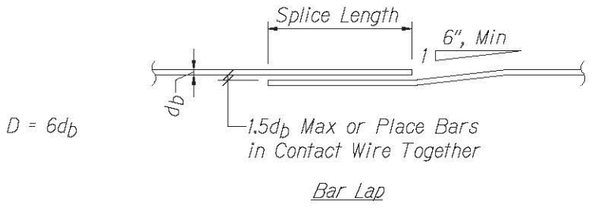
Notes:
1. "Top Bars" are horizontal bars with 12" or more of concrete cast below.
2. Splice lengths may be reduced by multiplying the tabulated values by 0.765 if the centerline of splice of adjacent bars are staggered 6'-0".
3. Embedment lengths for straight bars may be reduced by multiplying the tabulated values by 0.80 if the bars are spaced laterally not less than 6" center-to-center, with not less than 3" clear cover measured in the direction of the spacing.
4. Embedment lengths for bars with 90° hook are bars with side cover, normal to plane of hook, of not less than 2½" and cover on bar extension beyond hook not less than 2". Increase embedment length by 43% for bars not meeting these requirements.

TYPICAL REBAR SPLICE AND EMBEDMENT LENGTH SCHEDULE
Not to Scale — 1 | S2 | S2

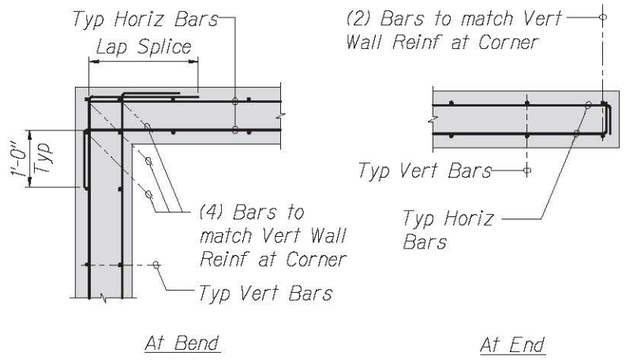


TYPICAL CONSTRUCTION JOINT DETAIL
Not to Scale — 3 | S2 | S2





STANDARD HOOKS AND SPLICE DETAIL
Not to Scale — 2 | S2 | S2



TYPICAL WALL HORIZONTAL REINFORCEMENT DETAILS
Not to Scale — 4 | S2 | S2

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TYPICAL STRUCTURAL DETAILS

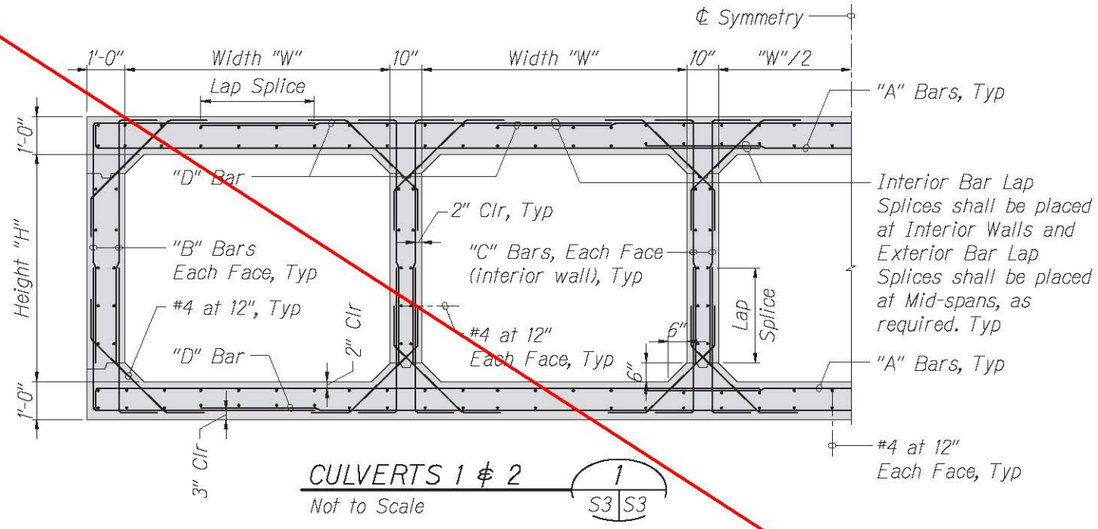
Scale: As Noted — Date: August 21, 2015

SHEET No. 2 OF 10

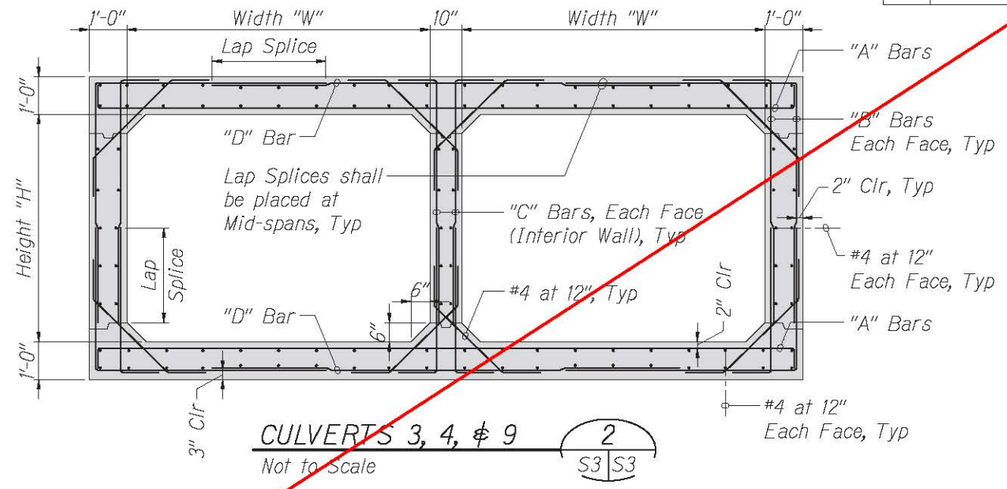
S2

Reinforced Concrete Box Culverts were precast. See project records for additional information.

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(3)	S3	S10



CULVERTS 1 & 2 — 1 (S3 | S3)
Not to Scale



CULVERTS 3, 4, & 9 — 2 (S3 | S3)
Not to Scale

CULVERT 5 — 3 (S3 | S3)
Not to Scale

CULVERT END DETAIL — 4 (S3 | S3)
Not to Scale

SECTION — 5 (S3 | S3)
Not to Scale

CONCRETE CULVERT SCHEDULE

Culvert No.	No. of Cells	Height "H"	Width "W"	"A" Bars	"B" Bars	"C" Bars	"D" Bars
1	5	5'-0"	7'-0"	#5 at 8"	#5 at 8"	#5 at 12"	#6 at 8"
2	5	6'-0"	7'-0"	#5 at 8"	#5 at 8"	#5 at 12"	#6 at 8"
3	2	4'-0"	6'-0"	#5 at 12"	#5 at 12"	#5 at 12"	#6 at 12"
4	2	4'-0"	6'-0"	#5 at 8"	#5 at 8"	#5 at 12"	#6 at 8"
5	1	7'-0"	8'-0"	#5 at 6"	#5 at 6"	-	-
9	2	6'-0"	8'-0"	#5 at 6"	#5 at 6"	#5 at 12"	#6 at 6"

Notes:
1. See Civil Dwgs for Foundation over-excavation and backfill requirements.
2. Only Construction Joints shall be allowed in the Apron Slab and Wing Walls, as required.

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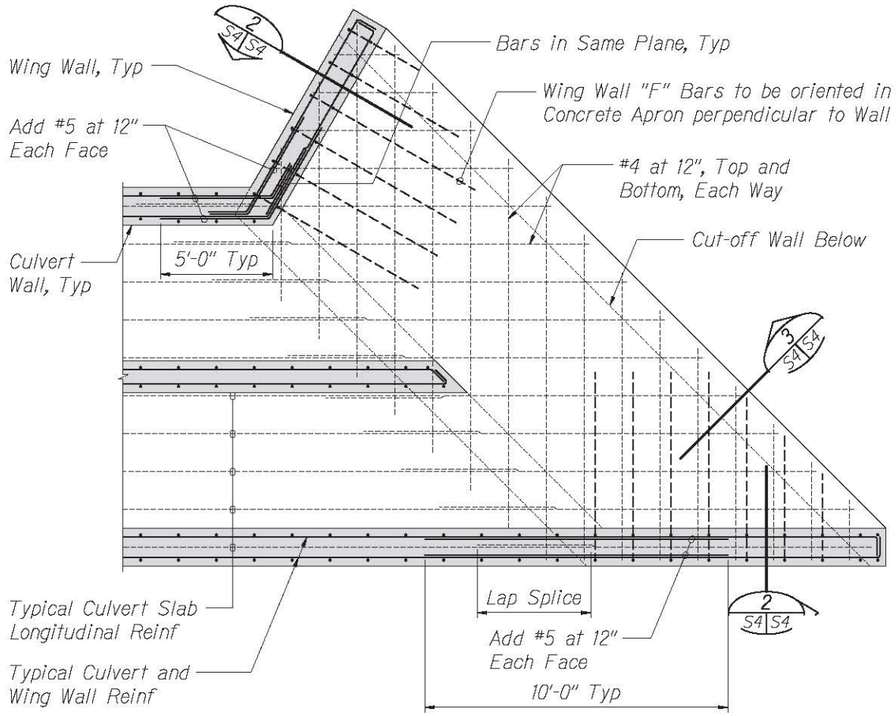
TYPICAL CONCRETE CULVERT SECTIONS AND DETAILS

Scale: As Noted Date: August 21, 2015

SHEET No. 3 OF 10

S3

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(3)	S4	S10

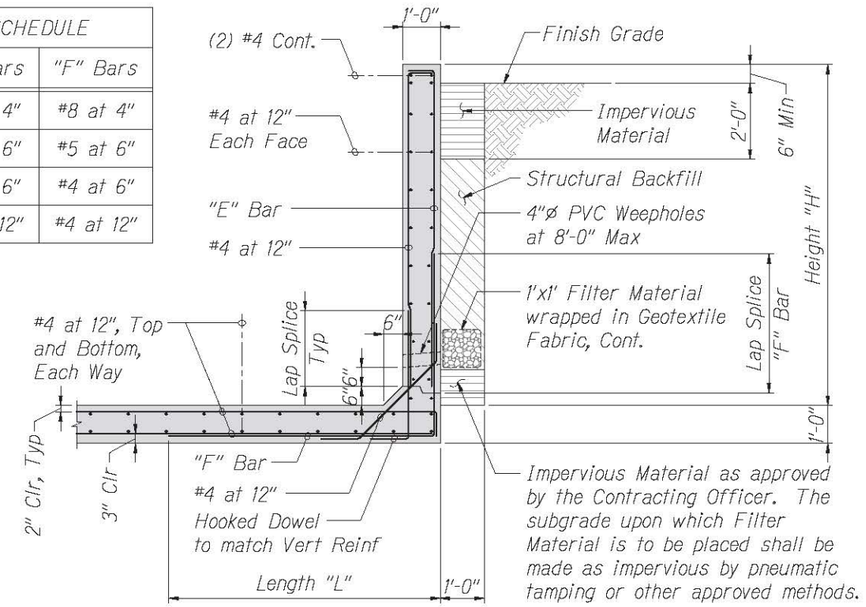


TYPICAL CONCRETE APRON DETAIL

Not to Scale

1 S4 | S4

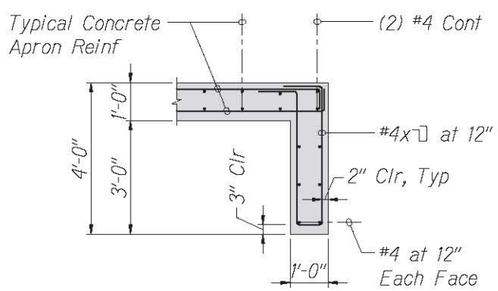
CONCRETE WING WALL SCHEDULE			
Height "H"	Length "L"	"E" Bars	"F" Bars
≤ 9'-0"	15'-0"	#6 at 4"	#8 at 4"
≤ 6'-0"	12'-0"	#5 at 6"	#5 at 6"
≤ 4'-0"	8'-0"	#4 at 6"	#4 at 6"
≤ 2'-0"	4'-0"	#4 at 12"	#4 at 12"



WING WALL DETAIL

Not to Scale

2 S4 | S4



CUT-OFF WALL DETAIL

Not to Scale

3 S4 | S4

Notes:

1. See Civil Dwgs for Foundation over-excavation and backfill requirements.
2. Only Construction Joints shall be allowed in the Apron Slab and Wing Walls, as required.

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TYPICAL CONCRETE APRON AND WING WALL STRUCTURAL DETAILS

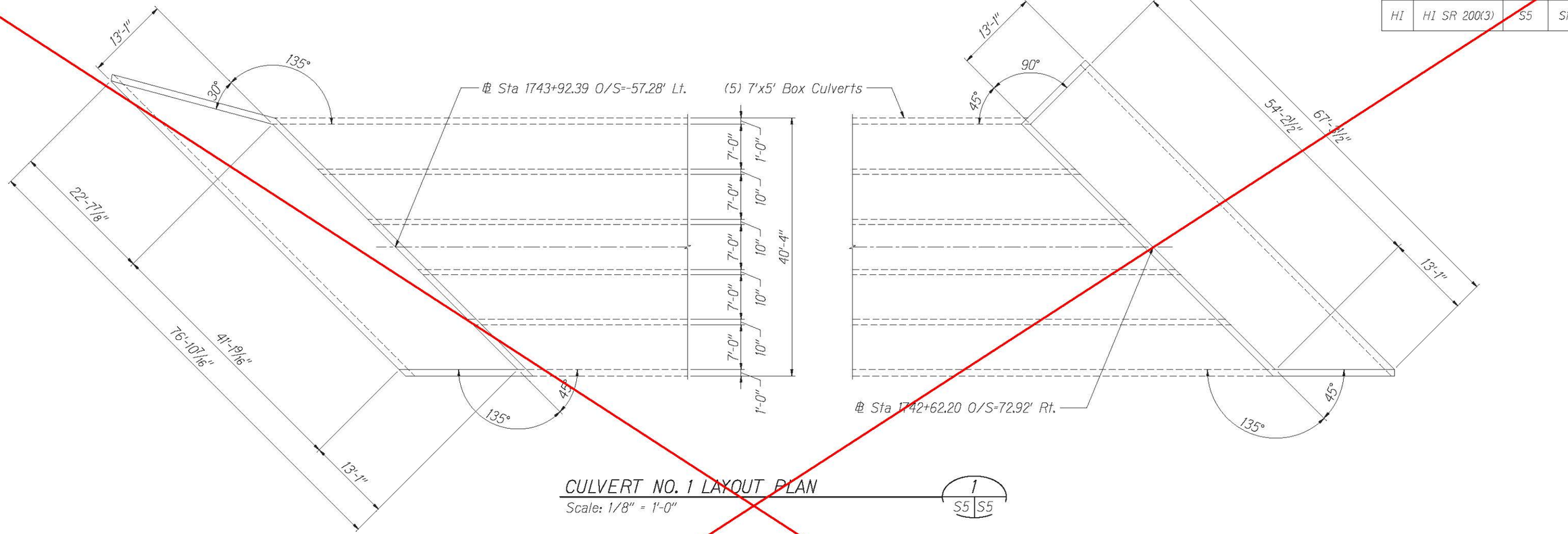
Scale: As Noted

Date: August 21, 2015

SHEET No. 4 OF 10

S4

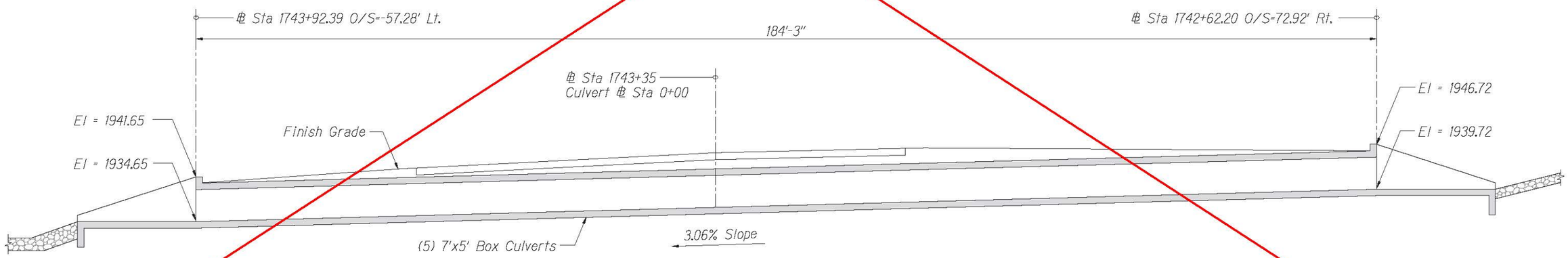
STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(3)	S5	S10



CULVERT NO. 1 LAYOUT PLAN

Scale: 1/8" = 1'-0"

1 | S5 | S5



CULVERT NO. 1 LONGITUDINAL SECTION

Scale: 1/8" = 1'-0"

2 | S5 | S5

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CULVERT NO. 1 - LAYOUT PLAN AND LONGITUDINAL SECTION

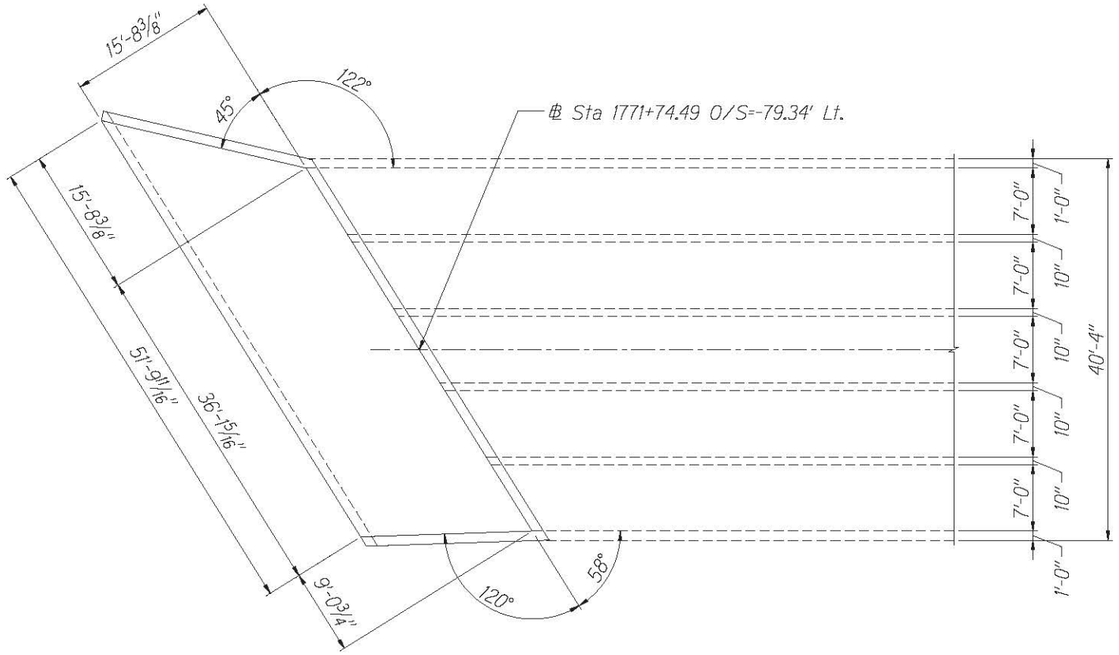
Scale: As Noted

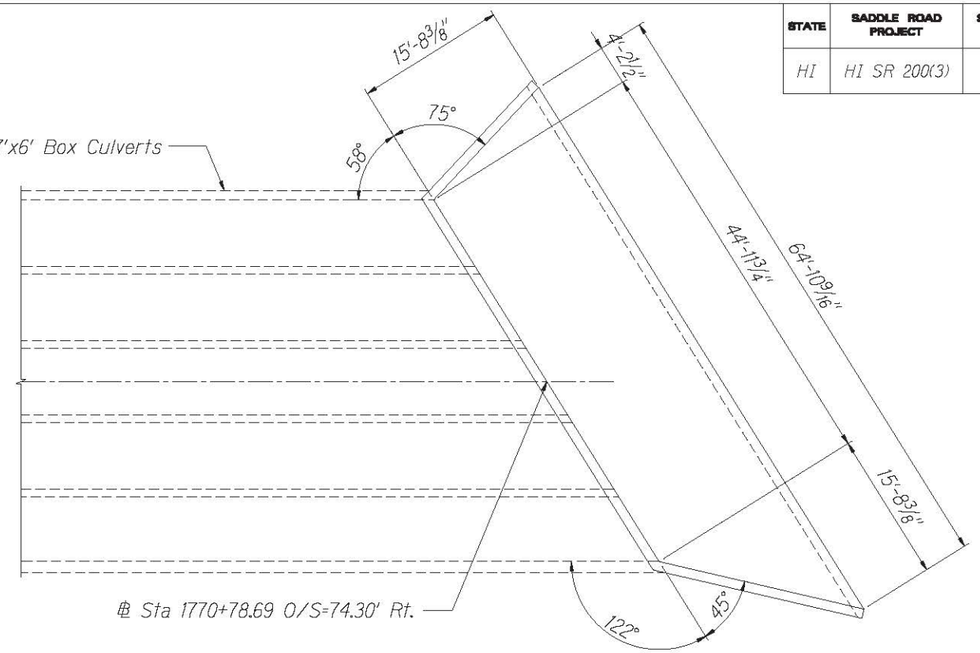
Date: August 21, 2015

SHEET No. 5 OF 10

S5

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(3)	S6	S10

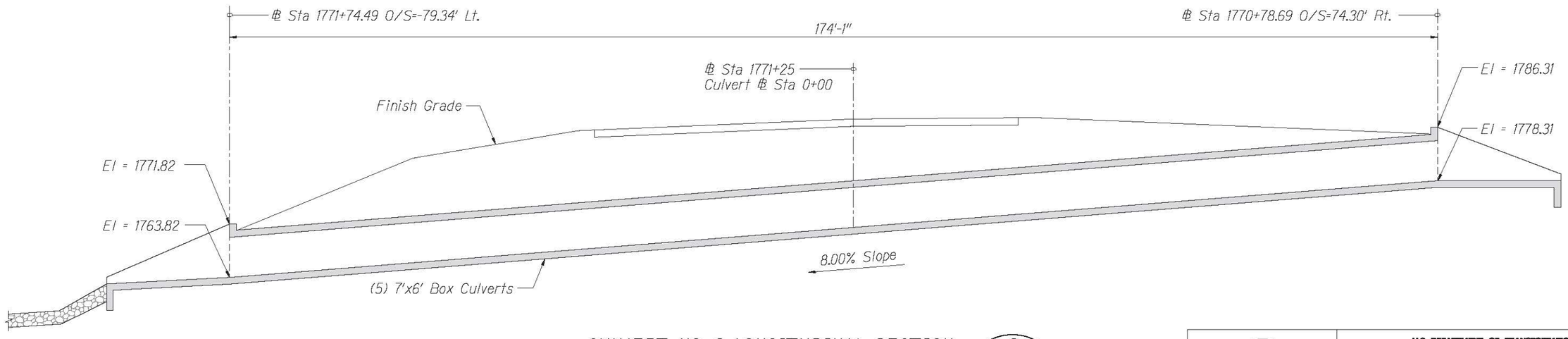




CULVERT NO. 2 LAYOUT PLAN

Scale: 1/8" = 1'-0"

1 / S6 | S6



CULVERT NO. 2 LONGITUDINAL SECTION

Scale: 1/8" = 1'-0"

2 / S6 | S6

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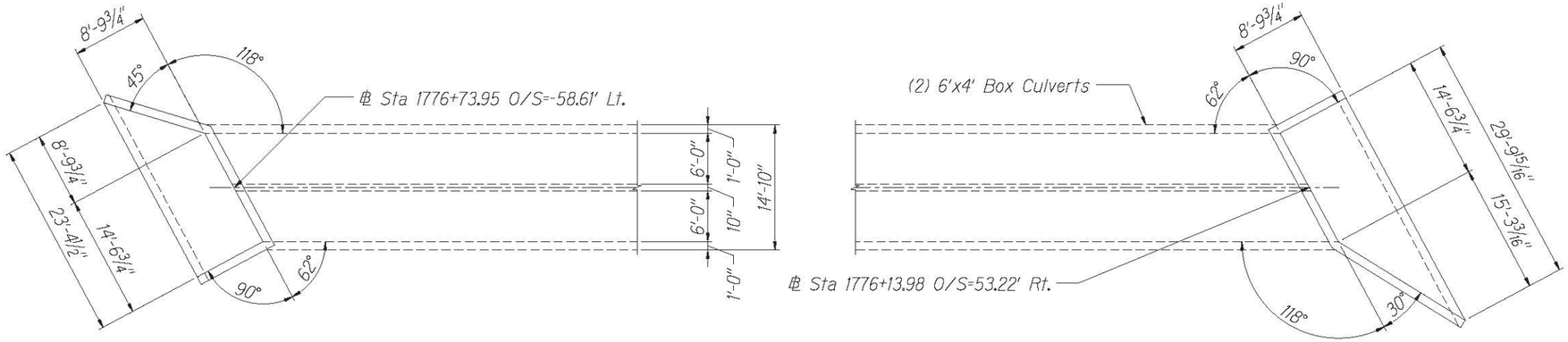
CULVERT NO. 2 - LAYOUT PLAN AND LONGITUDINAL SECTION

Scale: As Noted | Date: August 21, 2015

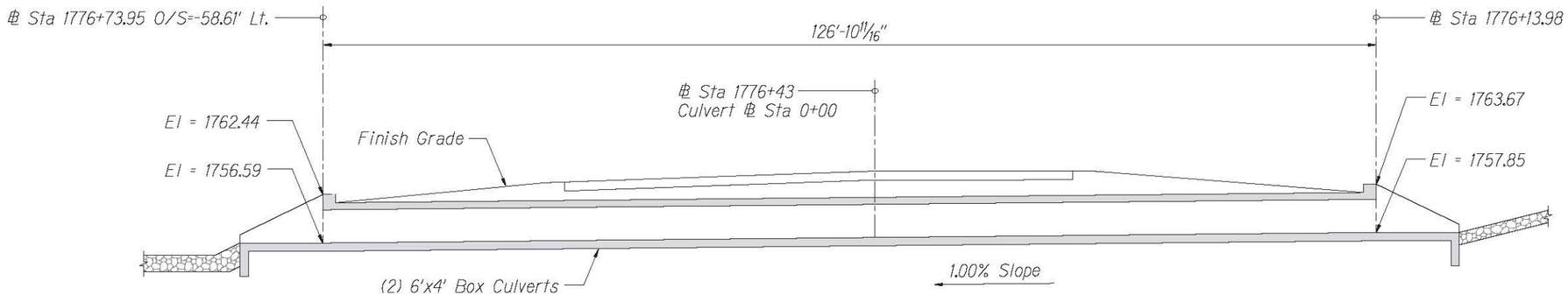
SHEET No. 6 OF 10

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(3)	S7	S10



CULVERT NO. 3 LAYOUT PLAN (1 / S7 | S7)

Scale: 1/8" = 1'-0"



CULVERT NO. 3 LONGITUDINAL SECTION (2 / S7 | S7)

Scale: 1/8" = 1'-0"

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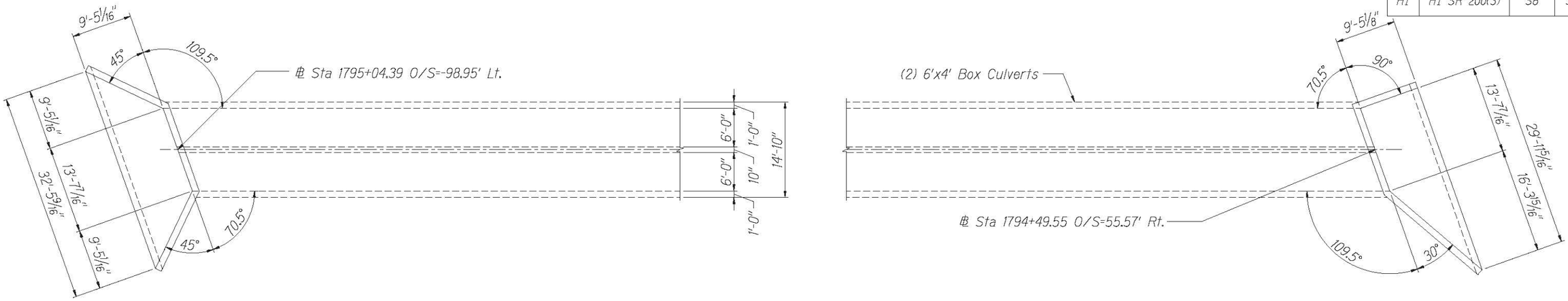
CULVERT NO. 3 - LAYOUT PLAN AND LONGITUDINAL SECTION

Scale: As Noted

Date: August 21, 2015

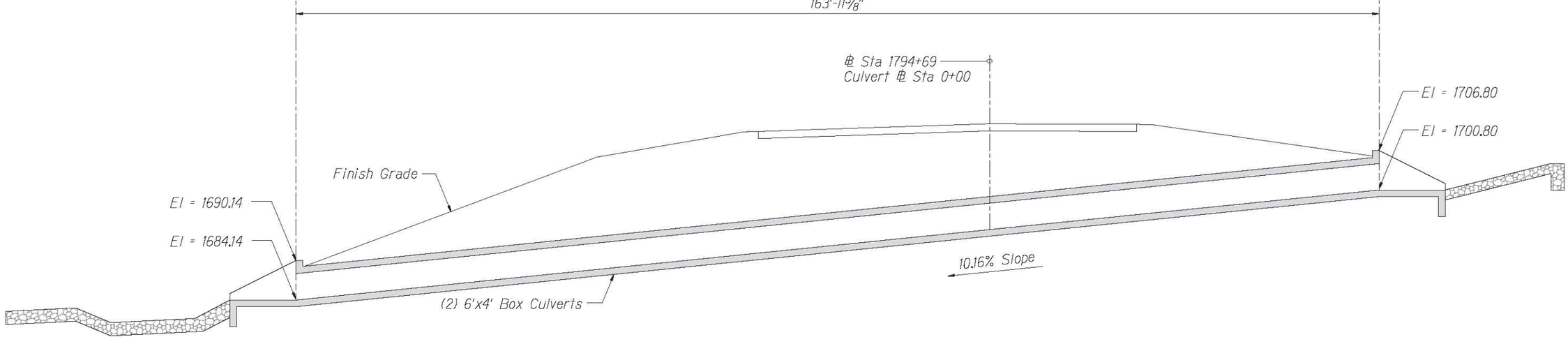
SHEET No. 7 OF 10

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(3)	S8	S10



CULVERT NO. 4 LAYOUT PLAN — 1 (S8 | S8)

Scale: 1/8" = 1'-0"



CULVERT NO. 4 LONGITUDINAL SECTION — 2 (S8 | S8)

Scale: 1/8" = 1'-0"

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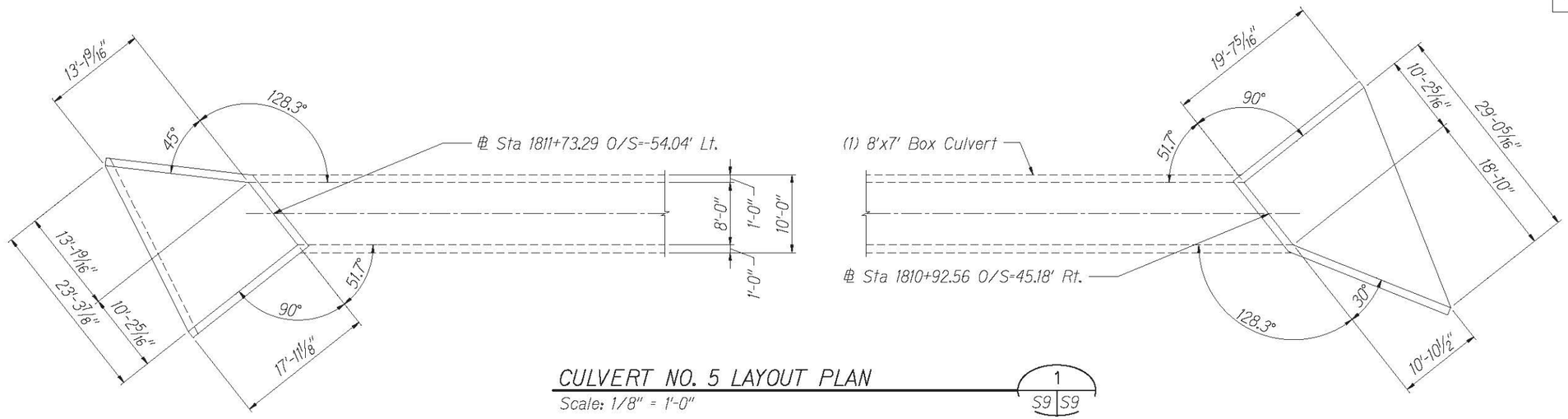
CULVERT NO. 4 - LAYOUT PLAN AND LONGITUDINAL SECTION

Scale: As Noted — Date: August 21, 2015

SHEET No. 8 OF 10

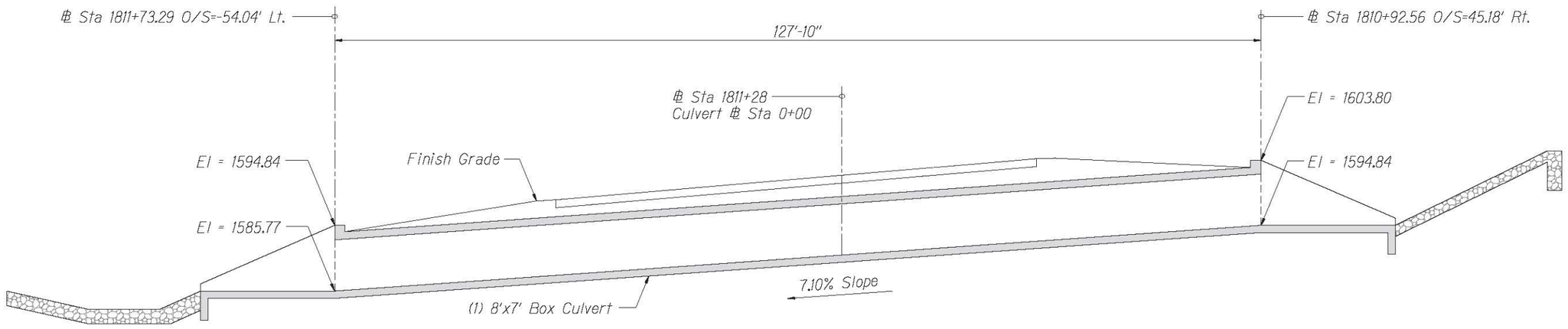
STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(3)	S9	S10



CULVERT NO. 5 LAYOUT PLAN

Scale: 1/8" = 1'-0"

1 | S9 | S9



CULVERT NO. 5 LONGITUDINAL SECTION

Scale: 1/8" = 1'-0"

2 | S9 | S9

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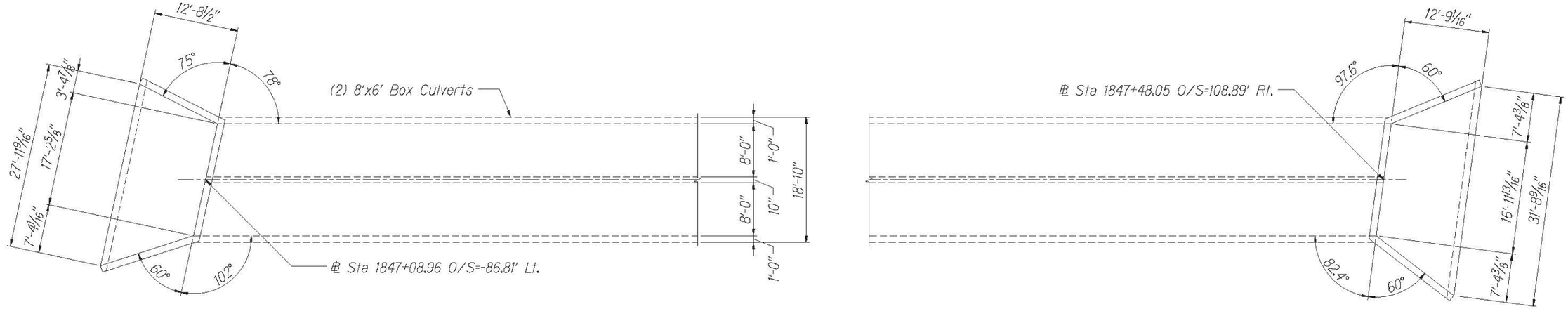
CULVERT NO. 5 - LAYOUT PLAN AND LONGITUDINAL SECTION

Scale: As Noted

Date: August 21, 2015

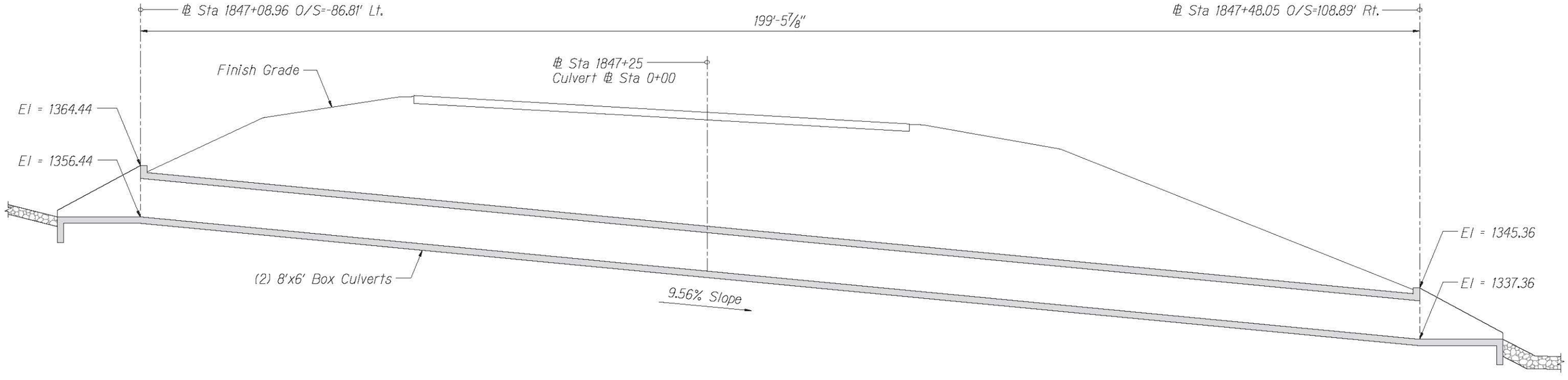
SHEET No. 9 OF 10

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(3)	S10	S10



CULVERT NO. 9 LAYOUT PLAN — 1 (S10 | S10)

Scale: 1/8" = 1'-0"



CULVERT NO. 9 LONGITUDINAL SECTION — 2 (S10 | S10)

Scale: 1/8" = 1'-0"

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CULVERT NO. 9 - LAYOUT PLAN AND LONGITUDINAL SECTION

Scale: As Noted — Date: August 21, 2015

SHEET No. 10 OF 10