

GENERAL STRUCTURE NOTES:

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-019-1(20)	2005	226	315

GENERAL SPECIFICATIONS:

State of Hawaii, Department of Transportation Standard Specifications for Road and Bridge Construction, 1994 (Standard Specifications), and Special Provisions prepared for this project.

DESIGN SPECIFICATIONS:

AASHTO LRFD Bridge Design Specifications, 3rd Edition, 2004 with Subsequent Interims.

DESIGN LOADS:

1. Live Load: HL-93
2. Seismic Acceleration Coefficient: 0.7

DESIGN LOADS FOR RETAINING WALLS:

1. Bearing Capacities on Compacted Fill and/or Basalt Rock
 - a. Strength Limit State: 24,000 psf
 - b. Extreme Event Limit State: 40,000 psf
2. Coefficients of Friction
 - a. Strength Limit State: 0.6
 - b. Extreme Event Limit State: 0.75
3. Passive Pressures
 - a. Strength Limit State: 225 pcf
 - b. Extreme Event Limit State: 450 pcf
4. Lateral Earth Pressures:
 - a. Level Backfill, Active
32 pcf Horizontal
 - b. Level Backfill, At Rest
52 pcf Horizontal
 - c. Level Backfill, Dynamic
19H psf Rectangular Distribution
 - d. Maximum 3H:1V Sloping Backfill, Active
34 pcf Horizontal
11 pcf Vertical
 - e. Maximum 3H:1V Sloping Backfill, At Rest
54 pcf Horizontal
18 pcf Vertical
 - f. Maximum 3H:1V Sloping Backfill, Dynamic
34H psf Rectangular Distribution

DESIGN LOADS FOR BOX CULVERTS:

1. Bearing Capacities on Cushion Fill on Medium Hard Basalt Rock
 - a. Service Limit State: 6,000 psf
 - b. Strength Limit State: 12,000 psf
 - c. Extreme Event Limit State: 20,000 psf
2. Coefficients of Friction
 - a. Strength Limit State: 0.54
 - b. Extreme Event Limit State: 0.67
3. Passive Pressures
 - a. Strength Limit State: 250 pcf
 - b. Extreme Event Limit State: 500 pcf
4. Lateral Earth Pressure, At Rest
52 pcf Horizontal

GENERAL:

1. Refer to State of Hawaii, D.O.T. Standard Plans for additional details and notes not covered by the drawings. Standard Plans Drawing sheet numbers B-01 and B-03 inclusive refer to structures in general except for modifications as may be required by special conditions.
2. Refer to Hawaii Standard Specifications for Road, Bridge and Public Works Construction, 1994 Edition and Special Provisions.
3. All items noted incidental will not be paid for separately.
4. All vertical dimensions are measured plumb, and horizontal dimensions are measured flat unless otherwise noted.
5. Construction loading shall not exceed design loads unless special shoring is provided. Allowable loads shall be reduced in areas where the structure has not attained full design strength.

FOUNDATION NOTES:

1. Excavation for all footings and stems shall be accomplished by maintaining as near a vertical cut as possible and it shall be the Contractor's responsibility to maintain the stability of the existing roadway prism throughout the course of work.
2. Footings shall be excavated and poured to neat lines as called for on the plans.
3. Footings shall bear on compacted fills and/or basalt rock formations.
4. The subgrade below all structures shall be proof-rolled with a minimum 20-Ton vibratory drum roller for a minimum of 8 passes. Where cavities and/or voids are discovered, over-excavate and backfill with structural fill.

CONCRETE:

1. Structural concrete shall have a 28-day compressive strength (f'_c) of 4000 psi and a maximum water/cement ratio of 0.49.
2. The minimum cover measured from the surface of the concrete to the face of any reinforcing bar shall be as follows, unless noted otherwise:
 - a. Concrete cast against forms and later exposed to earth/weather _____ 2"
 - b. Concrete cast against and permanently exposed to earth _____ 3"
3. Unless noted otherwise, chamfer all exposed concrete edges $\frac{3}{4}$ inch.
4. Contractor shall locate construction joints so as not to impair the strength of the structure and to minimize shrinkage stresses. Submit location of construction joints to the Engineer for approval, unless otherwise noted.
5. For concrete finishes, see Standard Specifications.

REINFORCING STEEL:

1. All reinforcing steel shall conform to the requirements of ASTM A615.
2. All reinforcing steel, anchor bolts, dowels and other embedded items shall be securely tied in place prior to pouring of concrete.
3. All dimensions relating to reinforcing bars are to centers of bars unless noted otherwise.
4. Reinforcing bars shall be detailed, supported, and placed in accordance with the latest edition of the ACI Detailing Manual and CRSI Placing Reinforcing Bars and Manual of Standard Practice, unless noted otherwise.
5. Stagger all splices where possible.

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DRAWN BY	
TRACED BY	
DESIGNED BY	
QUANTITIES BY	
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Wesley R. Segawa
WESLEY R. SEGAWA & ASSOCIATES, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRUCTURAL NOTES

QUEEN KAAHUMANU HIGHWAY WIDENING
HENRY ST. to KEALAKEHE PKWY - PHASE I

Federal Aid Project No. NH-019-1(20)

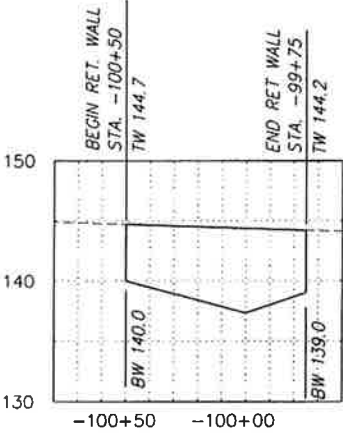
Date: November 2009

SHEET No. S-1 OF 9 SHEETS

AS-BUILT

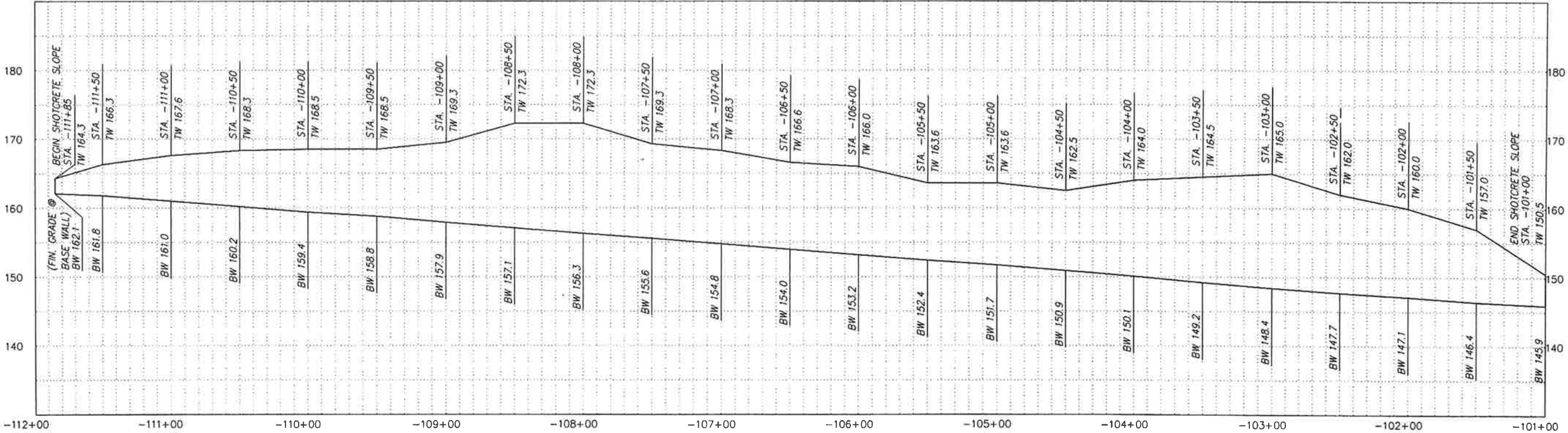
226

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-019-1(20)	2005	227	315



CONC. RETAINING WALL 3

SCALE: HORIZ. 1"=40'
VERT. 1"=8'



SHOTCRETE SLOPE

SCALE: HORIZ. 1"=40'
VERT. 1"=8'



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WALL ELEVATIONS

QUEEN KAAHUMANU HIGHWAY WIDENING
HENRY ST. to KEALAKEHE PKWY - PHASE I

Federal Aid Project No. NH-019-1(20)

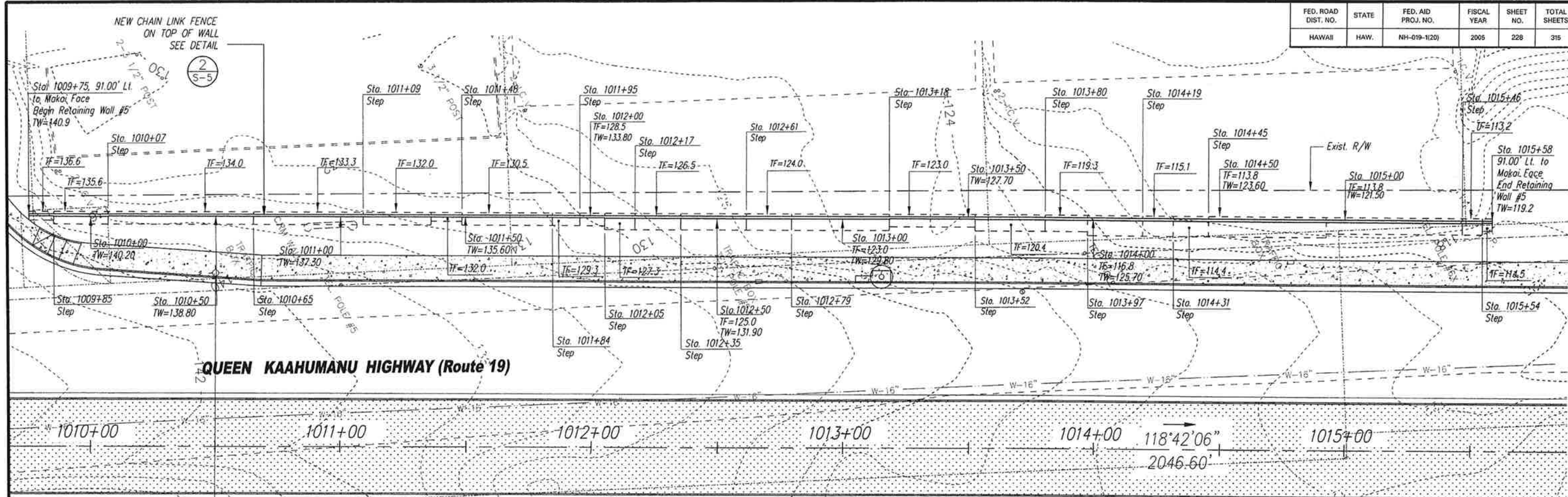
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Date: November 2009

SHEET No. S-2 OF 9 SHEETS

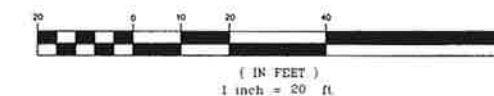
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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-019-1(20)	2005	228	315



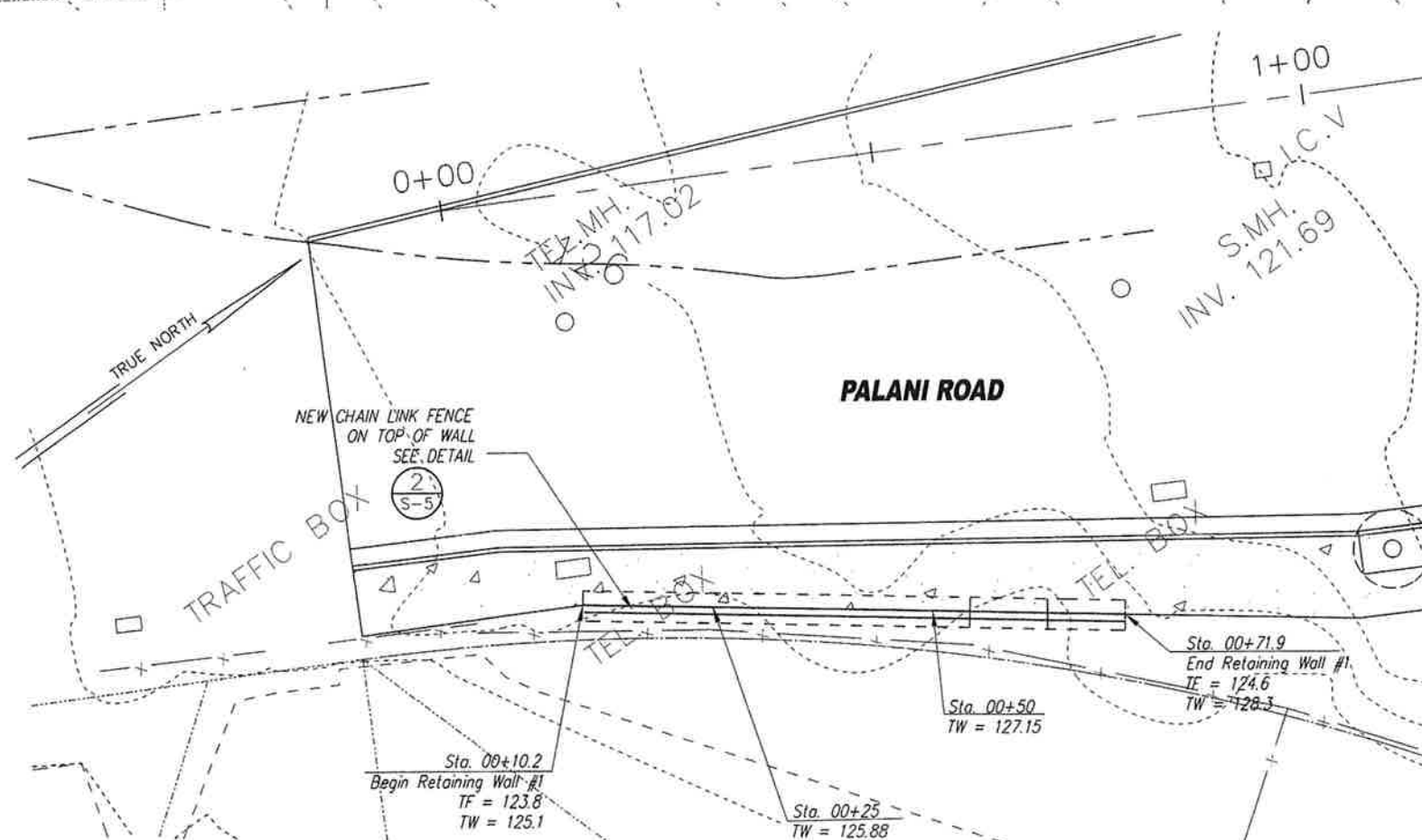
PLAN - RETAINING WALL #5

SCALE: 1" = 20'



TRUE NORTH

DATE	_____
SURVEY PLANNED BY	_____
DRAWN BY	_____
DESIGNED BY	_____
NOTED BY	_____
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PLAN - RETAINING WALL #1

SCALE: 1" = 10'



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RETAINING WALL PLAN
WALL #5 AND WALL #1

QUEEN KAAHUMANU HIGHWAY WIDENING
HENRY ST. to KEALAKEHE PKWY - PHASE I
Federal Aid Project No. NH-019-1(20)

Scale: As Noted Date: November 2009

SHEET No. S-3 OF 9 SHEETS

AS-BUILT

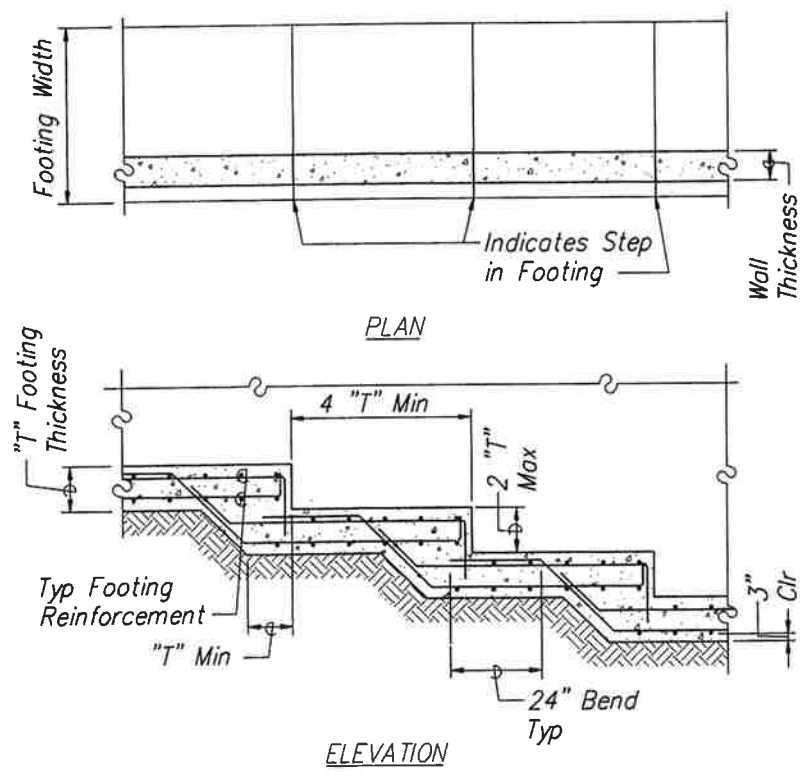
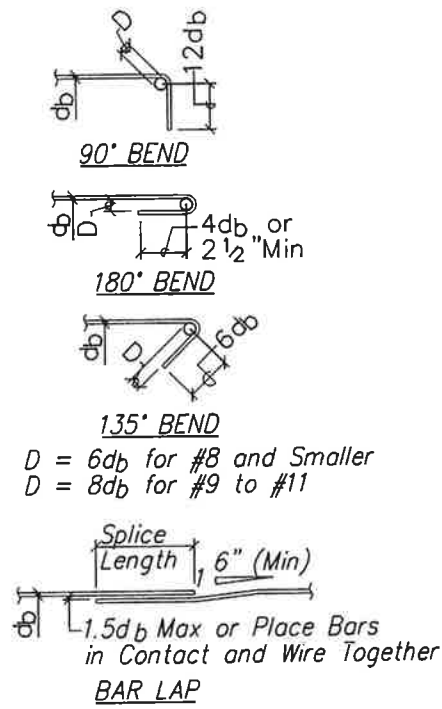
228

TABLE OF MINIMUM SPLICE AND EMBEDMENT LENGTHS					
Concrete Strength = 4,000 psi					
Bar Size	Lap Splice		Embedment		
	Bot Bar or Wall Bar	Top Bar	Straight		With Standard Hook
			Bot Bar or Wall Bar	Top Bar	
#3, #4	16"	20"	12"	16"	9"
#5	18"	24"	14"	18"	12"
#6	22"	29"	17"	22"	14"
#7	32"	42"	25"	32"	17"
#8	37"	48"	28"	37"	19"
#9	42"	54"	32"	42"	21"
#10	47"	61"	36"	47"	24"
#11	52"	68"	40"	52"	27"

TABLE NOTE:

- Lengths are for concrete with rebar spaced 6 bar diameters minimum o.c. Increase bar lengths 25% for bars spaced less than 6 bar diameters o.c.
- "Top Bar" are horizontal bars with 12" or more concrete below the bars.

TYPICAL SPLICE AND EMBEDMENT LENGTHS
No Scale



STEP FOOTING DETAIL
Scale: 3/4" = 1'-0"

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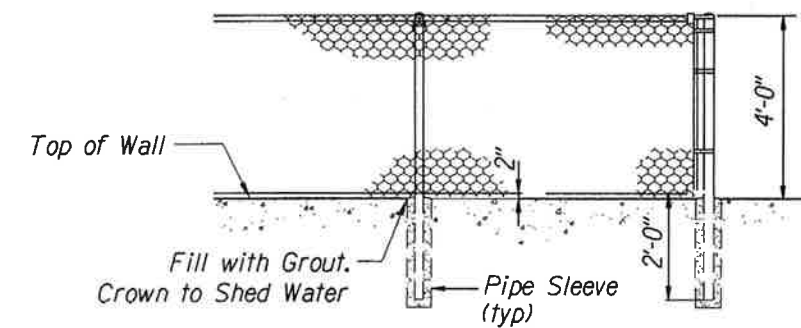
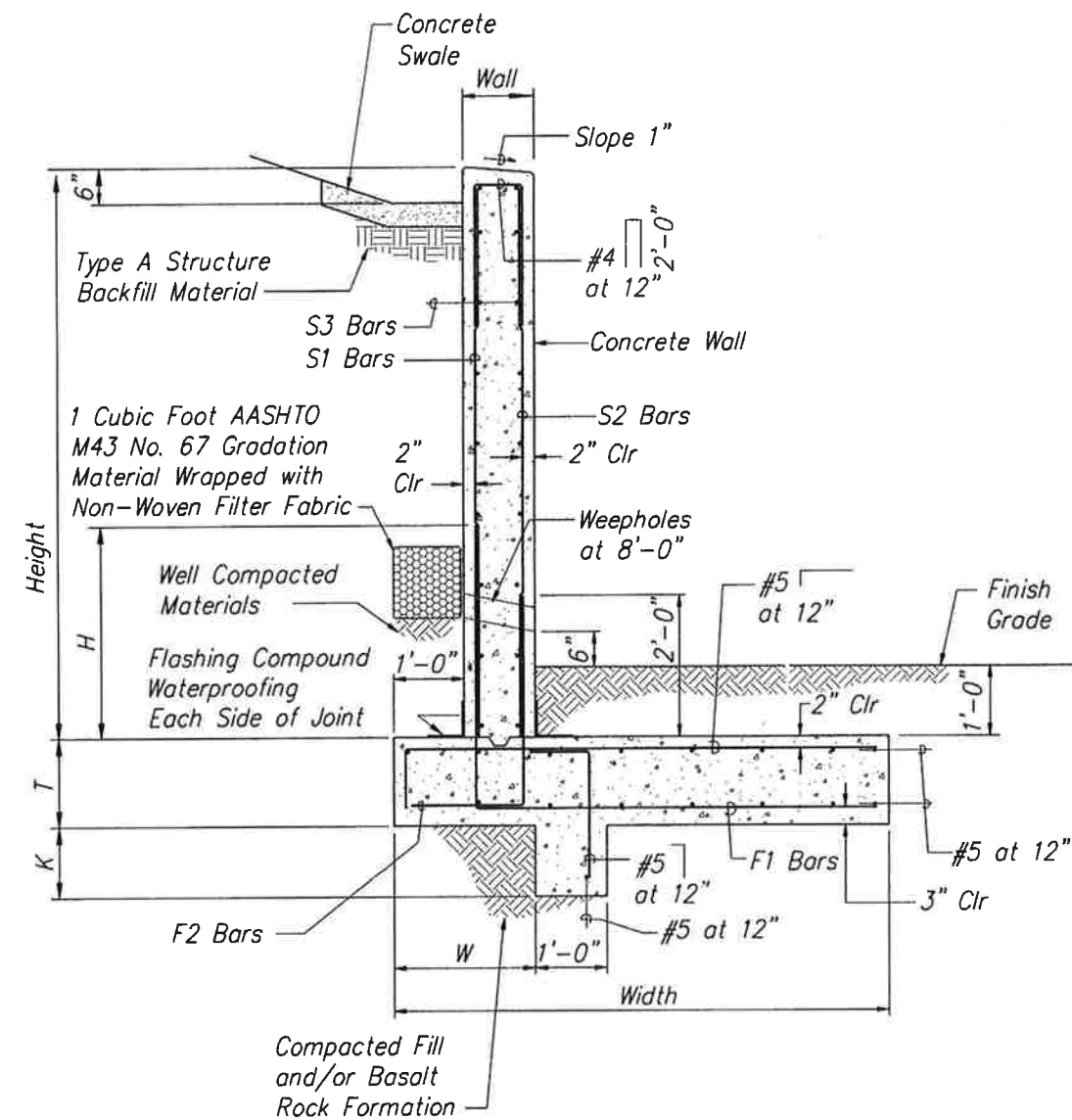
STATE OF HAWAII
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TYPICAL DETAILS

QUEEN KAAHUMANU HIGHWAY WIDENING
HENRY ST. to KEALAKEHE PKWY - PHASE I
Federal Aid Project No. NH-019-1(20)

Scale: As Noted Date: November 2009

SHEET No. S-4 OF 10 SHEETS



2 FENCE POST EMBEDMENT DETAIL
S-5 SCALE: NTS

Cut Retaining Wall Schedule

Height	Wall	Width	T	K	W	H	F1 Bars	F2 Bars	S1 Bars	S2 Bars	S3 Bars
10'-0"	1'-0"	9'-0"	1'-3"	1'-6"	2'-0"	3'-6"	#6 at 6"	#4 at 12"	#6 at 12"	#4 at 12"	#4 at 12"
8'-0"	1'-0"	7'-0"	1'-3"	1'-0"	2'-0"	3'-6"	#6 at 12"	#4 at 12"	#5 at 12"	#4 at 12"	#4 at 12"
6'-0"	10"	5'-6"	1'-0"	-	-	2'-6"	#5 at 12"	#4 at 18"	#5 at 12"	#4 at 18"	#4 at 18"
4'-0"	10"	3'-6"	1'-0"	-	-	2'-6"	#5 at 12"	#4 at 18"	#5 at 12"	#4 at 18"	#4 at 18"

CUT RETAINING WALL SECTION
Scale: 3/4" = 1'-0"

1
S5 S5

DATE: _____
SURVEY NOTED BY: _____
DESIGNED BY: _____
CHECKED BY: _____
ORIGINAL PLAN: _____
NOTE BOOK: _____
QUANTITIES BY: _____



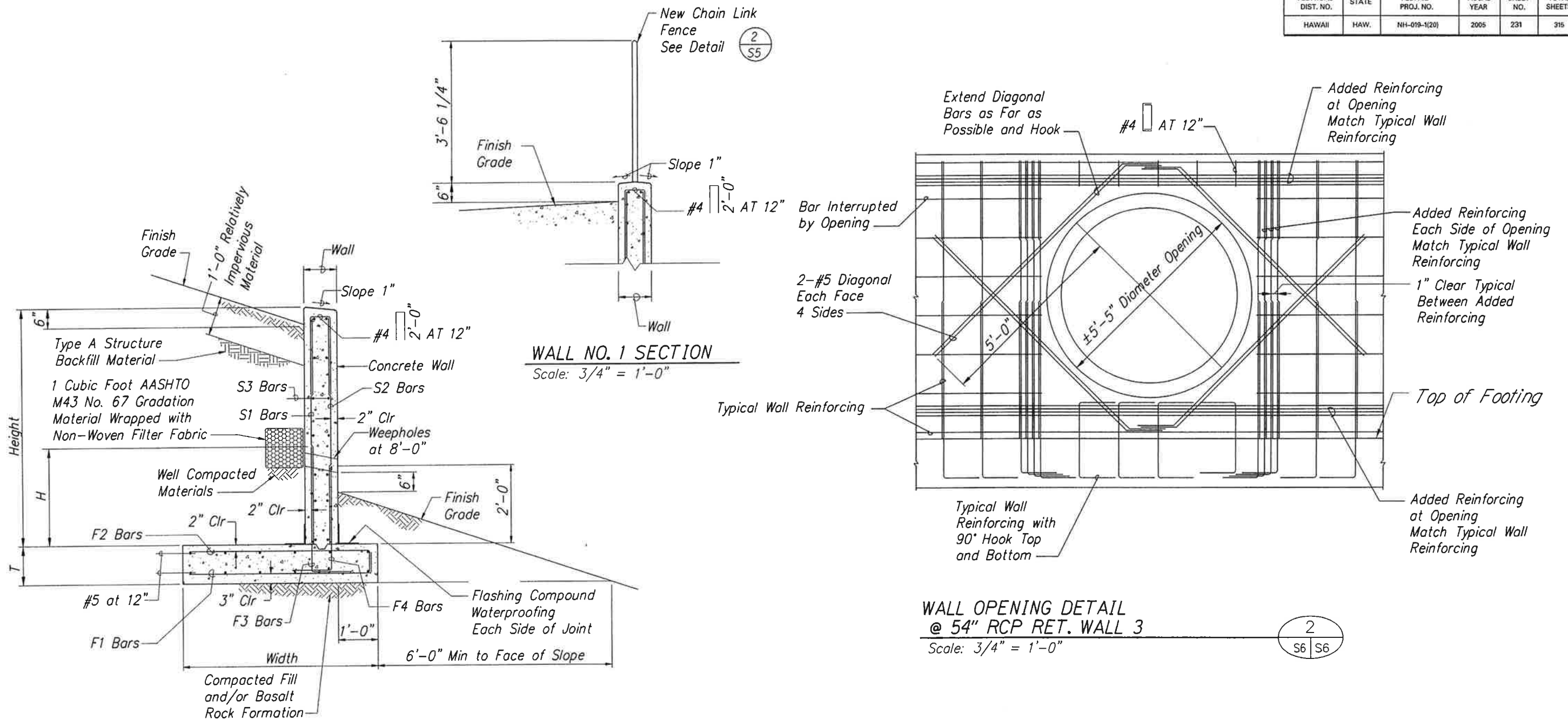
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**WALL SECTION
AND DETAIL**

QUEEN KAAHUMANU HIGHWAY WIDENING
HENRY ST. to KEALAKEHE PKWY - PHASE I
Federal Aid Project No. NH-019-1(20)
Scale: As Noted Date: November 2009

SHEET No. S-5 OF 9 SHEETS



Height	Wall	Width	T	H	F1 Bars	F2 Bars	F3 Bars	F4 Bars	S1 Bars	S2 Bars	S3 Bars
12'-0"	1'-3"	10'-0"	1'-6"	4'-0"	#7 at 6"	#7 at 6"	#7 at 6"	#4 at 12"	#6 at 12"	#4 at 12"	#4 at 12"
10'-0"	1'-0"	8'-0"	1'-3"	3'-6"	#6 at 6"	#6 at 6"	#6 at 6"	#4 at 12"	#6 at 12"	#4 at 12"	#4 at 12"
8'-0"	1'-0"	6'-6"	1'-3"	3'-6"	#6 at 12"	#6 at 12"	#6 at 12"	#4 at 12"	#5 at 12"	#4 at 12"	#4 at 12"
6'-0"	10"	5'-0"	1'-0"	2'-6"	#5 at 12"	#5 at 12"	#5 at 12"	#4 at 18"	#5 at 12"	#4 at 18"	#4 at 18"
4'-0"	10"	3'-6"	1'-0"	2'-6"	#5 at 12"	#5 at 12"	#5 at 12"	#4 at 18"	#5 at 12"	#4 at 18"	#4 at 18"

FILL RETAINING WALL SECTION
Scale: 3/4" = 1'-0"

1
S6 S6

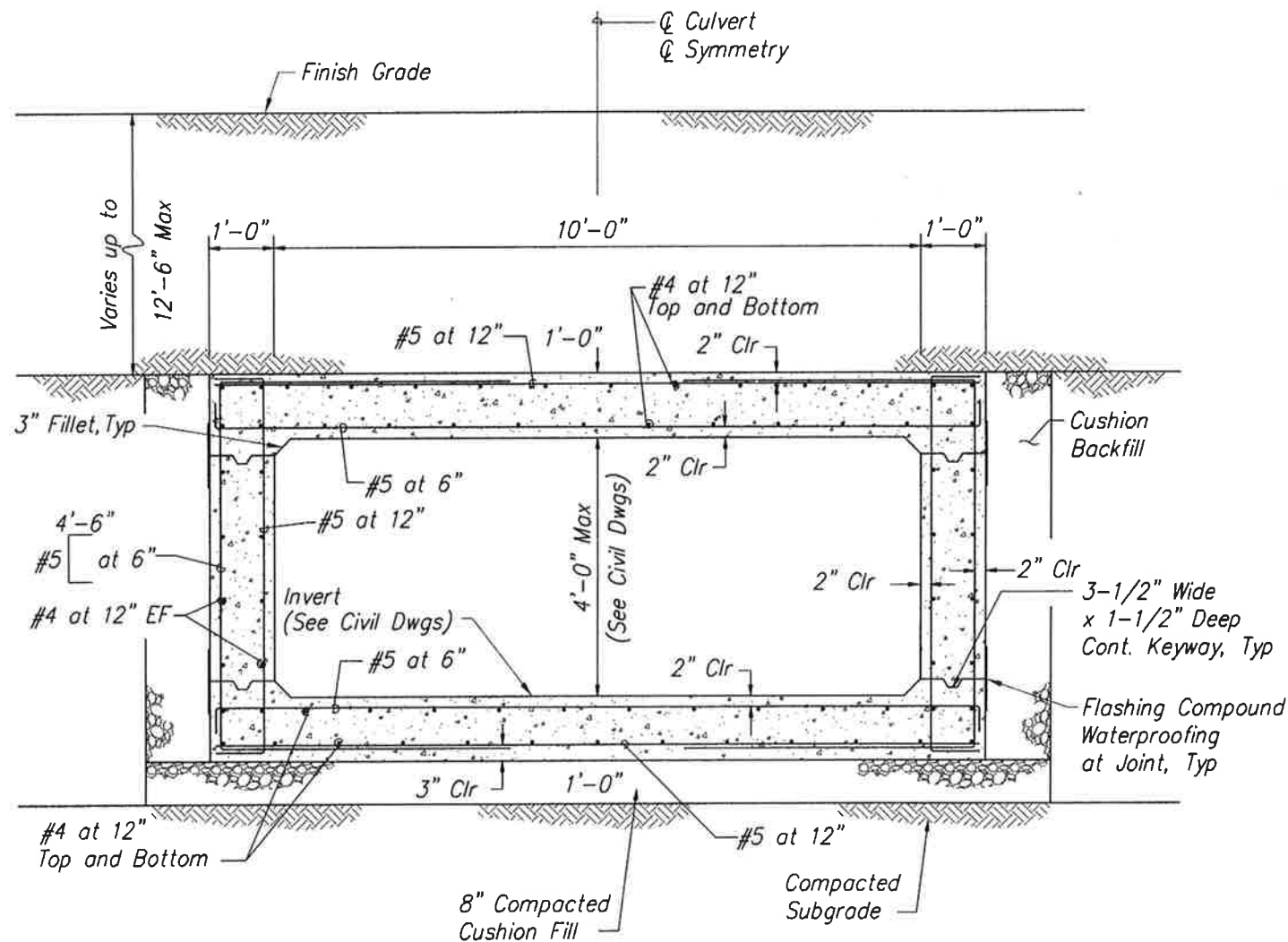


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STATE OF HAWAII
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HIGHWAYS DIVISION
WALL SECTION AND DETAIL
WALLS 1+3+5
QUEEN KAAHUMANU HIGHWAY WIDENING
HENRY ST. to KEALAKEHE PKWY - PHASE I
Federal Aid Project No. NH-019-1(20)
Scale: As Noted Date: November 2009
SHEET No. S-6 OF 9 SHEETS

AS-BUILT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-019-1(20)	2005	232	315

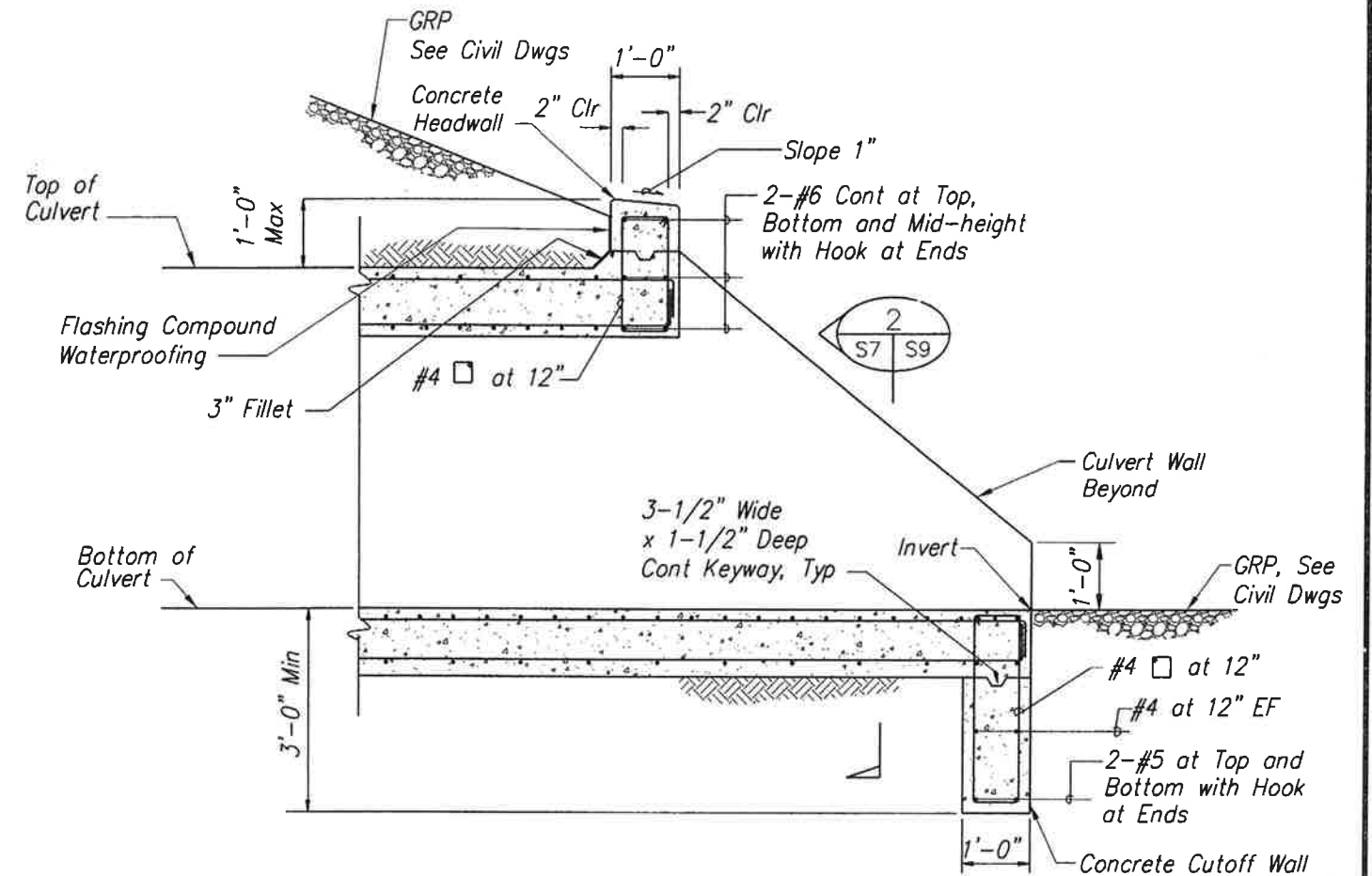
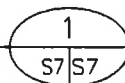


NOTES:

- Contractor shall backfill on each side of the Culvert simultaneously. Backfill elevation on one side shall not be more than 1'-0" than the opposite side at any time.
- During compaction of backfill, Contractor shall take every precaution to prevent Culvert from moving.
- Heavy Construction Equipment greater than HL-93 load shall not be allowed to crossover top of Culvert.
- For detail of opening in top of Culvert, see sheet S-9.

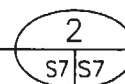
BOX CULVERT 2 SECTION

Scale: 3/4" = 1'-0"



HEADWALL AND CUTOFF WALL SECTION

Scale: 3/4" = 1'-0"



DESIGNED BY	DATE
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IN CHARGE	



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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BOX CULVERT 2

QUEEN KAAHUMANU HIGHWAY WIDENING
HENRY ST. to KEALAKEHE PKWY - PHASE I

Federal Aid Project No. NH-019-1(20)

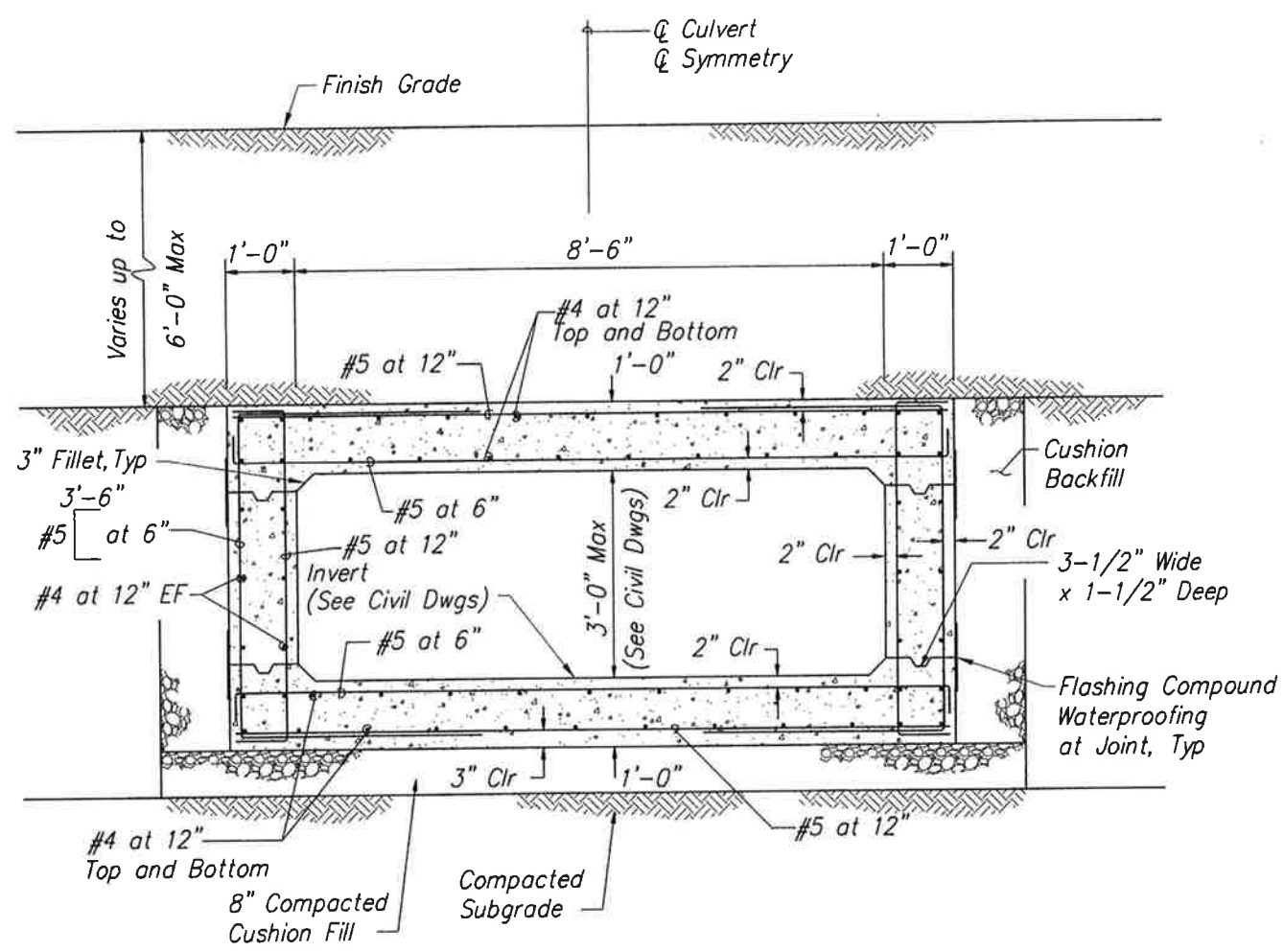
Scale: 3/4" = 1'

Date: November 2009

SHEET No. S-7 OF 9 SHEETS

AS-BUILT

232

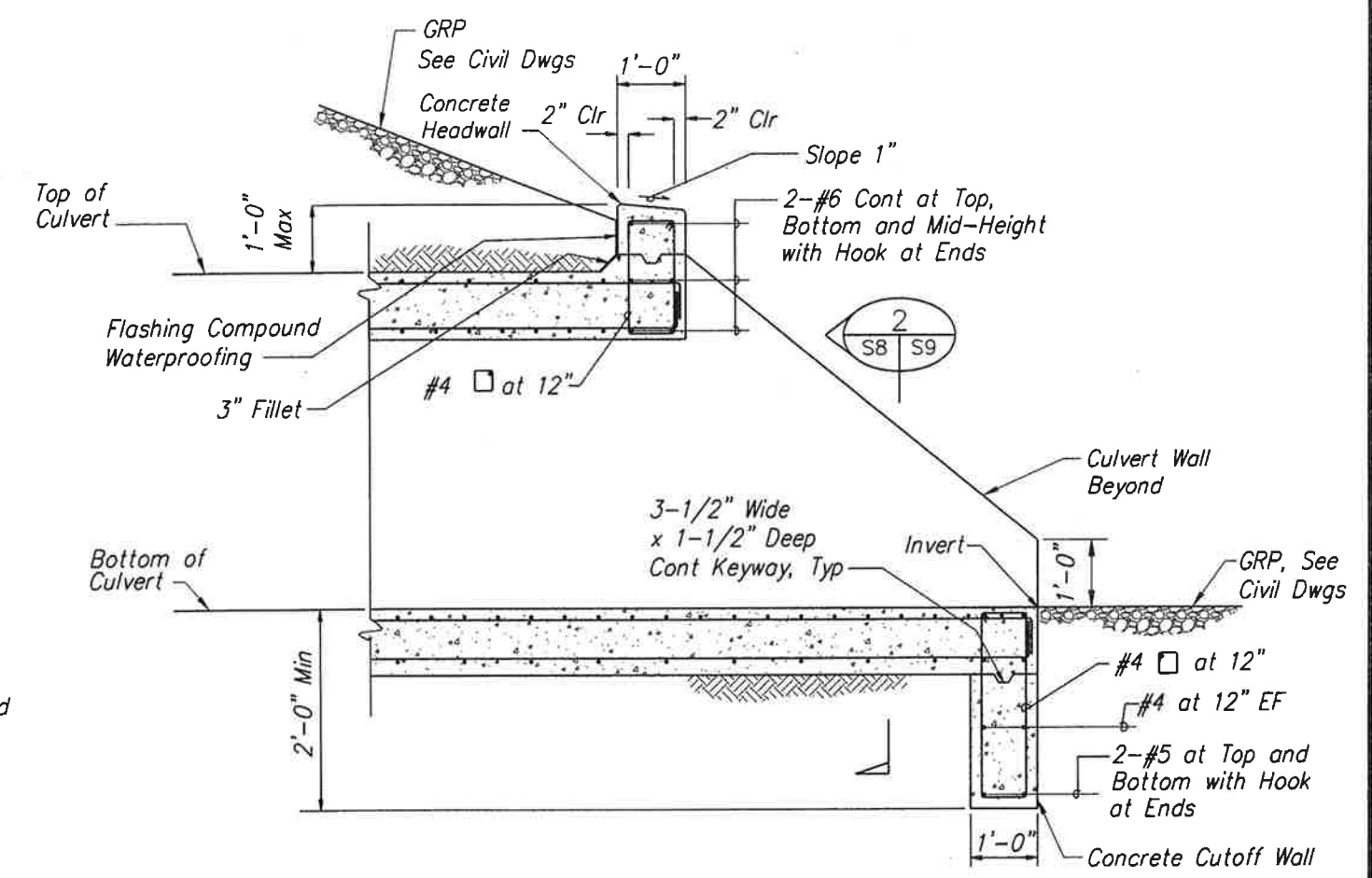


NOTES:

1. Contractor shall backfill on each side of the Culvert simultaneously. Backfill elevation on one side shall not be more than 1'-0" than the opposite side at any time.
2. During compaction of backfill, Contractor shall take every precaution to prevent Culvert from moving.
3. Heavy Construction Equipment greater than HL-93 load shall not be allowed to crossover top of Culvert.

BOX CULVERT 3 SECTION
Scale: 3/4" = 1'-0"

1
S8 S8



HEADWALL AND CUTOFF WALL SECTION
Scale: 3/4" = 1'-0"

2
S8 S8

SURVEY PLOTTED BY	DATE
DESIGNED BY	
REVISIONS BY	
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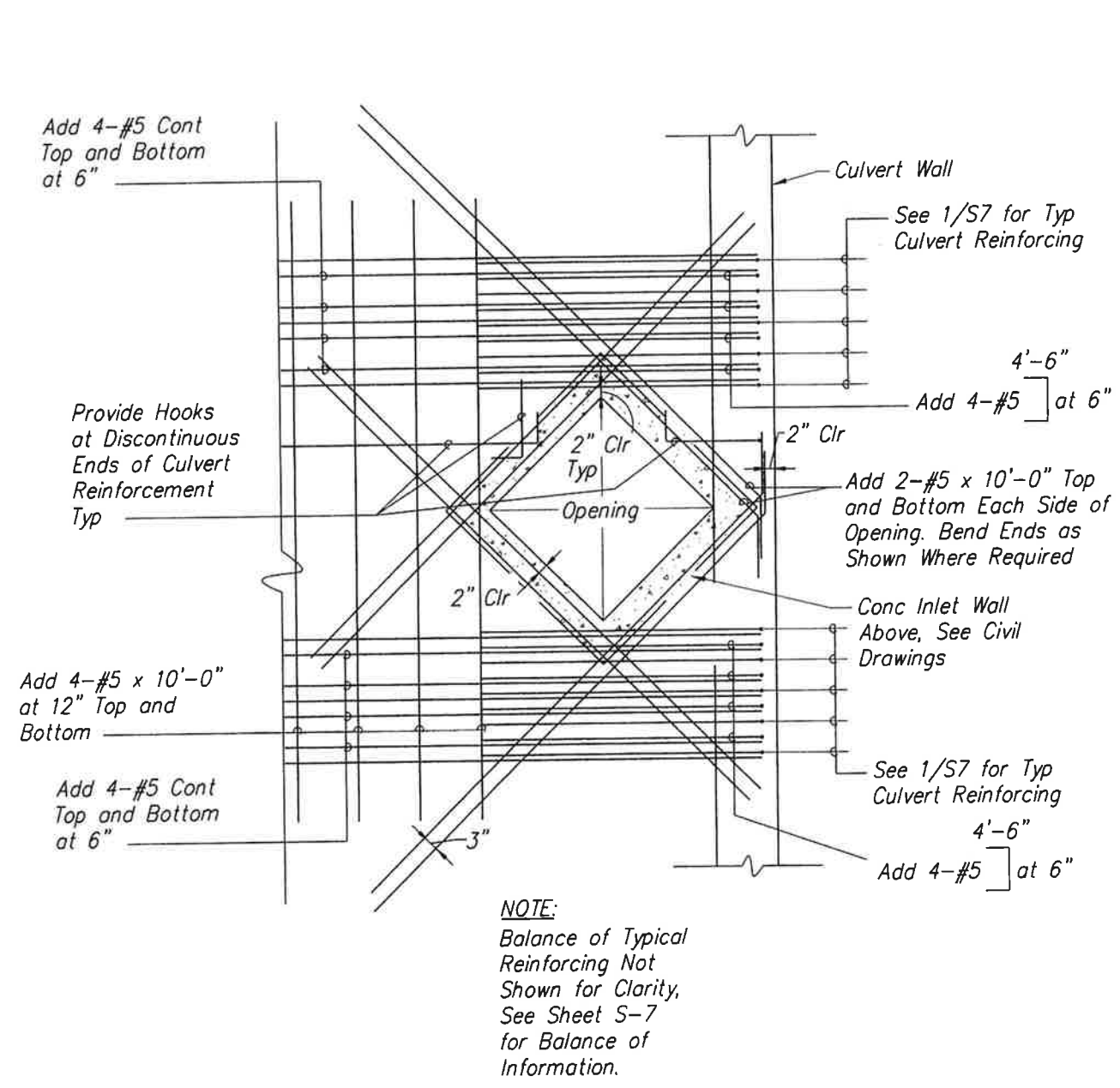
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BOX CULVERT 3

QUEEN KAAHUMANU HIGHWAY WIDENING
HENRY ST. to KEALAKEHE PKWY - PHASE I
Federal Aid Project No. NH-019-1(20)
Scale: 3/4" = 1'
Date: November 2009

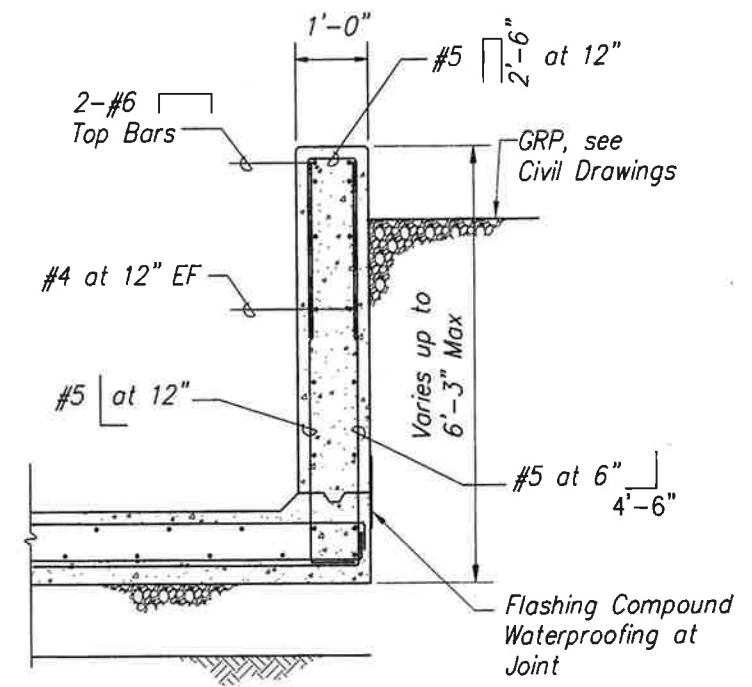
SHEET No. S-8 OF 9 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-019-1(20)	2005	234	315



OPENING IN CULVERT DETAIL
 Scale: 3/4" = 1'-0"

1
 S7 S9

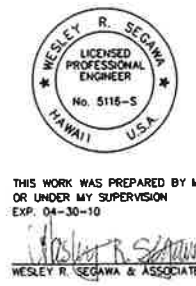


NOTE:
 See 1/S-7 and 1/S-8 for Balance of Information.

CULVERT END WALL SECTION
 Scale: 3/4" = 1'-0"

2
 S7 S8 S9

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DRAWN BY	
DESIGNED BY	
NOTED BY	
CHECKED BY	
APPROVED BY	
DATE	



STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION
**MISCELLANEOUS
 CULVERT DETAILS**
 QUEEN KAAHUMANU HIGHWAY WIDENING
 HENRY ST. to KEALAKEHE PKWY - PHASE I
 Federal Aid Project No. NH-019-1(20)
 Scale: 3/4" = 1' Date: November 2009
 SHEET No. S-9 OF 9 SHEETS