

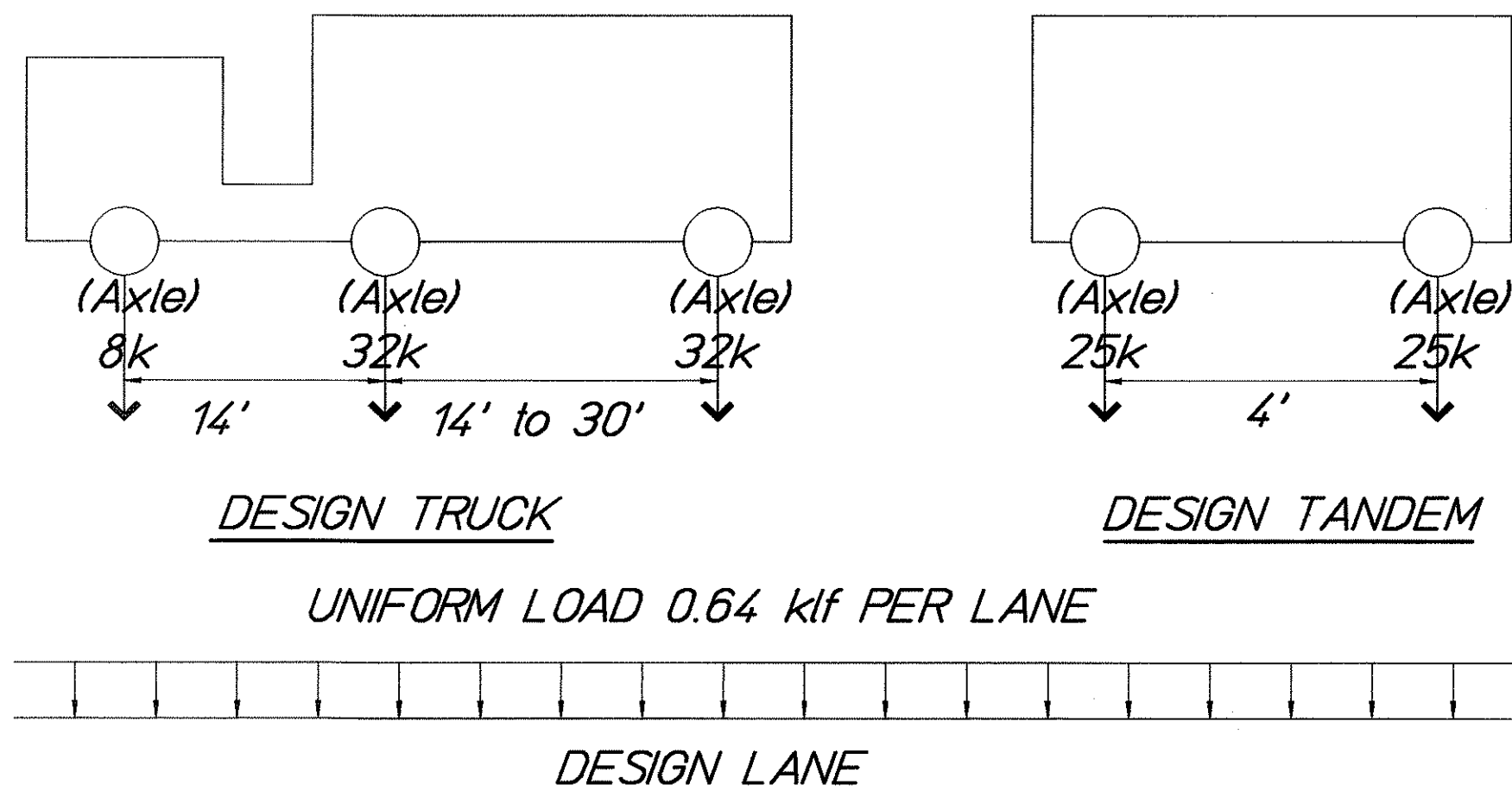
FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH - A311 (7)	2004	99	138

GENERAL NOTES

DESIGN CRITERIA

- 1- DESIGN SPECIFICATIONS ARE:
A- AASHTO 'LRFD Bridge Design Specifications', Second Edition (1998) Including The 1999, 2000 and 2001 Interim Revisions.
- 2- GEOTECHNICAL REPORT:
*Soils Investigation Report for Puunene Avenue/ Mokulele Highway Widening Project, Puunene, Maui, Hawaii, by Ernest K. Hirata & Associates, Inc., W.O. 99-3144, dated October 1, 1999
- 3- DESIGN LOADS ARE:
A- DEAD LOADS: Reinforced And Prestressed Concrete - 0.16 kcf
Future Asphalt - 0.025 ksf
Soil - 0.12 kcf

B- LIVE LOADS HL-93 (Combined as Per Design Specifications)



- C- DESIGN SPEED : 55 MPH
- D- WIND LOADS: 100 mph Design Wind Speed At 30 ft Above The Ground For Wind Load On Structures.
- E- SEISMIC LOADS:
Acceleration Coefficient - 0.25 G
Seismic Zone - '3'
Importance Category - 'Essential'
Soil Type - '1'
- F- TRAFFIC RAILING LOADS: In Accordance With Railing Performance Level TL-4.
- G- EARTH LATERAL PRESSURES
ACTIVE PRESSURE:
Free Standing Condition = 40 pcf
Restrained Condition = 60 pcf
PASSIVE PRESSURE: = 300 PCF
- 4- MATERIALS ARE:
A- CONCRETE:
Box Culverts - $f'c$ = 4 ksi
Barriers - 4 ksi
Retaining Walls & Footings - 4 ksi

These Are 28 Days Strengths.

B- REINFORCING STEEL:
Per ASTM A615 Grade 60 (Unless Noted Otherwise).

C- MISCELLANEOUS STEELS:
Per ASTM A36, Hot Dipped Galvanized Per ASTM A123, Unless Noted Otherwise.

- 5- SOIL BEARING CAPACITY:
Foundations Shall Be Designed For The Following Maximum Bearing Values:
Service Limit State = 2500 psf
Strength Limit State = 4500 psf
Extreme Event Limit State = 7500 psf

6- DESIGN METHODS AND ALLOWABLE STRESSES ARE:

A- REINFORCED CONCRETE: Strength & Service Limit State.

B- SEISMIC DESIGN: Extreme Event Limit State.

REINFORCING NOTES

- 1- ACI STANDARD RADII SHALL BE USED TO BEND ALL REINFORCEMENT UNLESS NOTED OTHERWISE. ALL BEND DIMENSIONS GIVEN ARE OUT TO OUT OF BARS.
- 2- BAR SPACINGS ARE GIVEN IN INCHES UNLESS NOTED OTHERWISE.
- 3- EXCEPT AS NOTED ON THE PLANS, CONCRETE COVER TO REINFORCEMENT (MAIN BARS UNLESS NOTED OTHERWISE) SHALL BE:

Headwalls, Retaining Walls, Frontface	- 2 in
Headwalls, Retaining Walls, Backface (Formed)	- 2 in
Footings, Top	- 2 in
Footings, Bottom	- 3 in
Footings, Sides	- 3 in
Culvert Top Slab, Top & Bottom	- 2 in
Culvert Bottomslab, Bottom	- 3 in
Convert Bottomslab, Top	- 2 in
Culvert Walls, Exterior	- 2 in
Culvert Walls, Interior	- 2 in

CONSTRUCTION NOTES:

- 1- CONSTRUCTION SPECIFICATIONS ARE THE 'HAWAII STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND PUBLIC WORKS CONSTRUCTION' 1994, AND THE AASHTO LRFD BRIDGE CONSTRUCTION SPECIFICATIONS, 1998, AND SPECIAL PROVISIONS THERETO.
- 2- ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 3/4 in x 3/4 in UNLESS NOTED OTHERWISE.
- 3- CONSTRUCTION JOINTS SHALL BE LOCATED ONLY AT THOSE LOCATIONS SHOWN ON THE PLANS, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
- 4- THE CONTRACTOR SHALL VERIFY ALL SITE CONDITIONS AND NOT RELY UPON THESE PLANS FOR ACCESS ROAD OR STREAM LOCATION, ETC.
- 5- THE CONTRACTOR SHALL DETERMINE THE LOCATION OF ALL UTILITIES AND AVOID DAMAGE THERETO.

OTHER NOTES

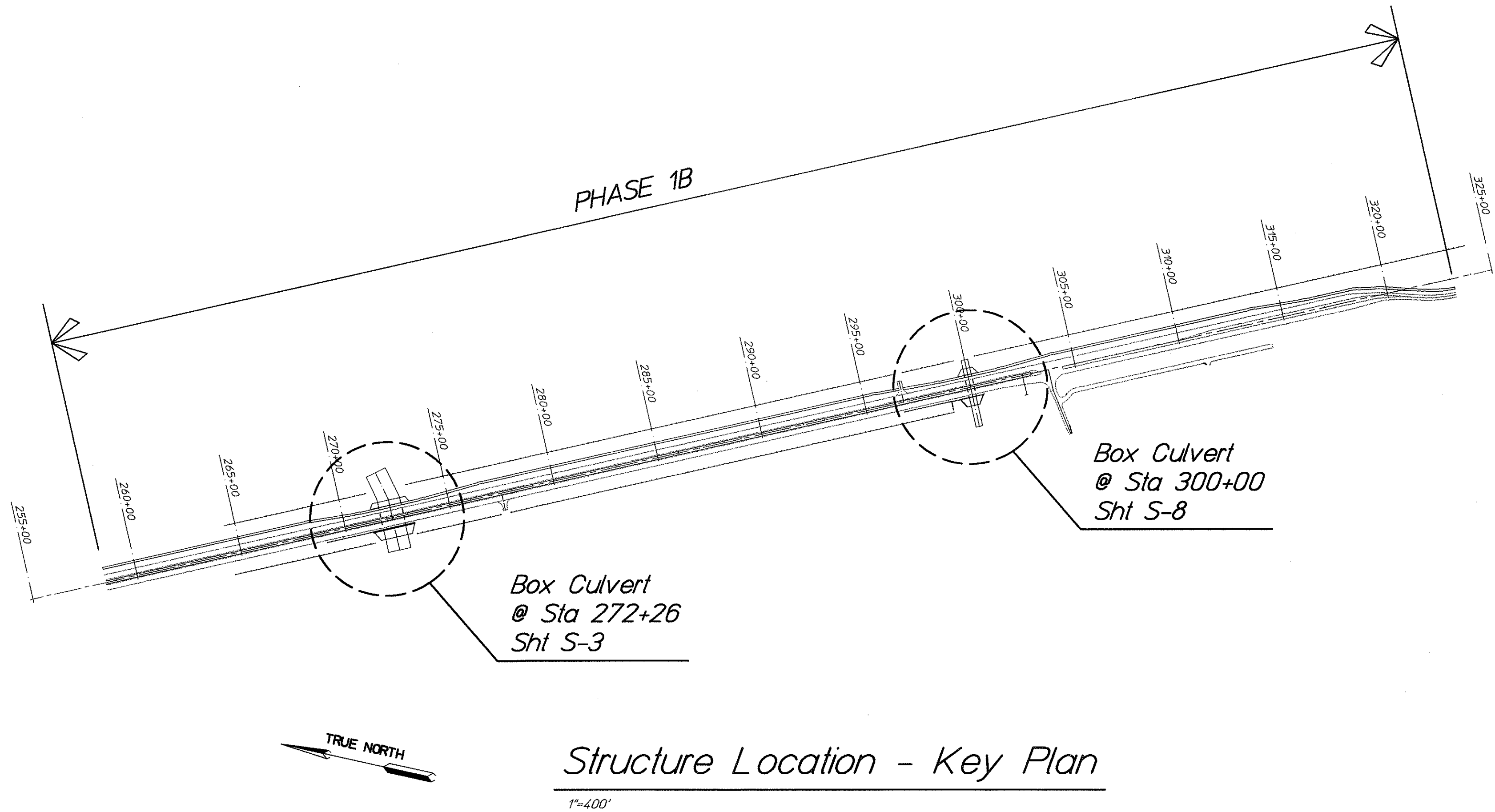
- 1- ALL STATIONS AND LONGITUDINAL DIMENSIONS ARE MEASURED ALONG THE BASELINES.
- 2- ALL DIMENSIONS ARE HORIZONTAL OR VERTICAL UNLESS NOTED OTHERWISE. ALL SECTIONS ARE CUT HORIZONTALLY OR VERTICALLY UNLESS NOTED OTHERWISE.
- 3- ALL VIEWS ARE LOOKING UPSTATION UNLESS NOTED OTHERWISE.
- 4- ALL ELEVATIONS ARE REFERED TO MEAN SEA LEVEL.

ORIGINAL PLAN	DATE
SURVEY PLOTTED BY	
DRAWN BY	
DESIGNED BY	
CHECKED BY	
NOTED BY	
QUANTITIES BY	
NO.	

	STATE OF HAWAII	
	DEPARTMENT OF TRANSPORTATION	
	HIGHWAYS DIVISION	
	BOX CULVERTS	
	MOKULELE HIGHWAY WIDENING Vicinity of Kalaloo Bridge to Vicinity of Kealia Pond Driveway Federal - Aid Project No. NH - A311 (7)	
Scale: as Shown Date: August 2003		SHEET No. S-1 OF 21 SHEETS

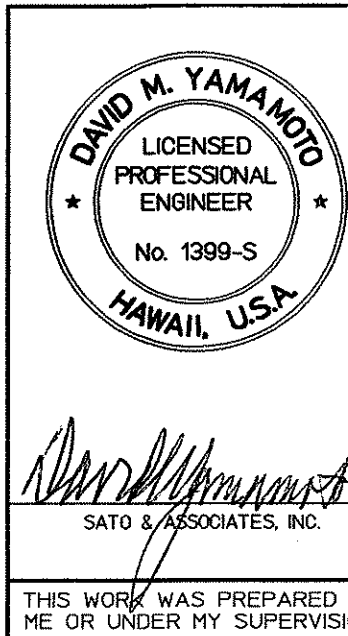
Plot date 7-Aug-03

FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH - A311 (7)	2004	100	138



Estimated Quantities

Item No.	Item	Estimated Quantity
206.4000	Structure Excavation for Box Culverts.....	14,300 CY
206.5000	Structure Excavation for Wingwalls & Retaining Walls	1,850 CY
206.7250	Structure Backfill for Wingwalls & Retaining Walls	1,600 CY
503.1030	Concrete for C.I.P. Box Culverts (Incl Cut-Off Walls, Headwalls, Wingwalls & Retaining Walls)	900 CY
507.1000	Metal Pedestrian Railing (1-Rail on Concrete Traffic Railing).....	300 LF
507.1500	Metal Bicycle Railing (2-Rail on Culvert Headwall and Wingwall).....	290 LF
507.7000	Concrete (Traffic) Railing.....	360 LF
509.1000	Precast Concrete Box Culvert (10'x6').....	220 LF
509.1100	Precast Concrete Box Culvert (12'x8') Sta 272+26	650 LF
602.0030	Reinforcing Steel in C.I.P. Concrete Portion of Box Culverts (Incl Cut-Off Walls, Headwalls, Wingwalls & Retaining Walls) ...	110,000 LB
611.0100	Hand Laid Riprap	510 CY
612.0100	Grouted Rubble Paving	950 CY



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
BOX CULVERTS

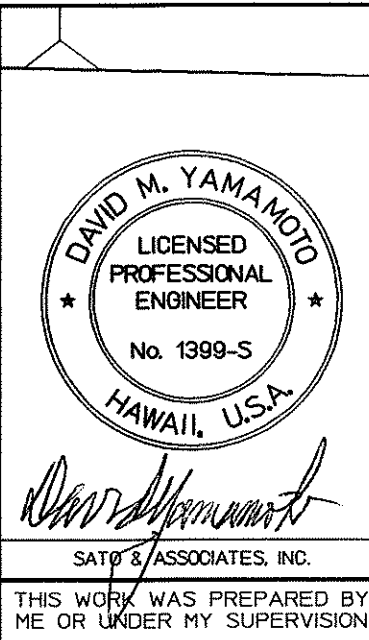
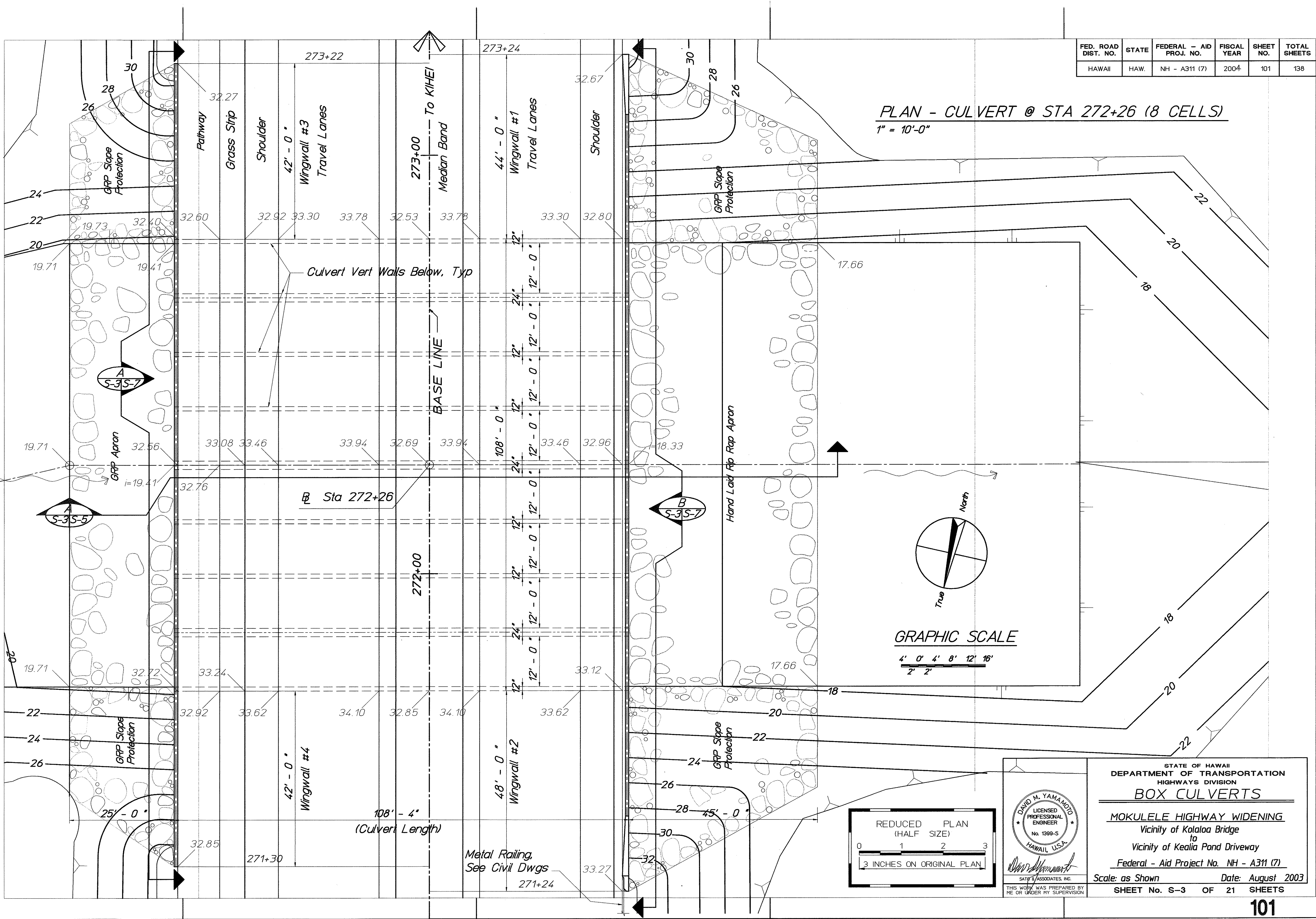
MOKULELE HIGHWAY WIDENING
Vicinity of Kalaloo Bridge
to
Vicinity of Kealia Pond Driveway
Federal - Aid Project No. NH - A311 (7)

Scale: as Shown Date: August 2003
SHEET No. S-2 OF 21 SHEETS

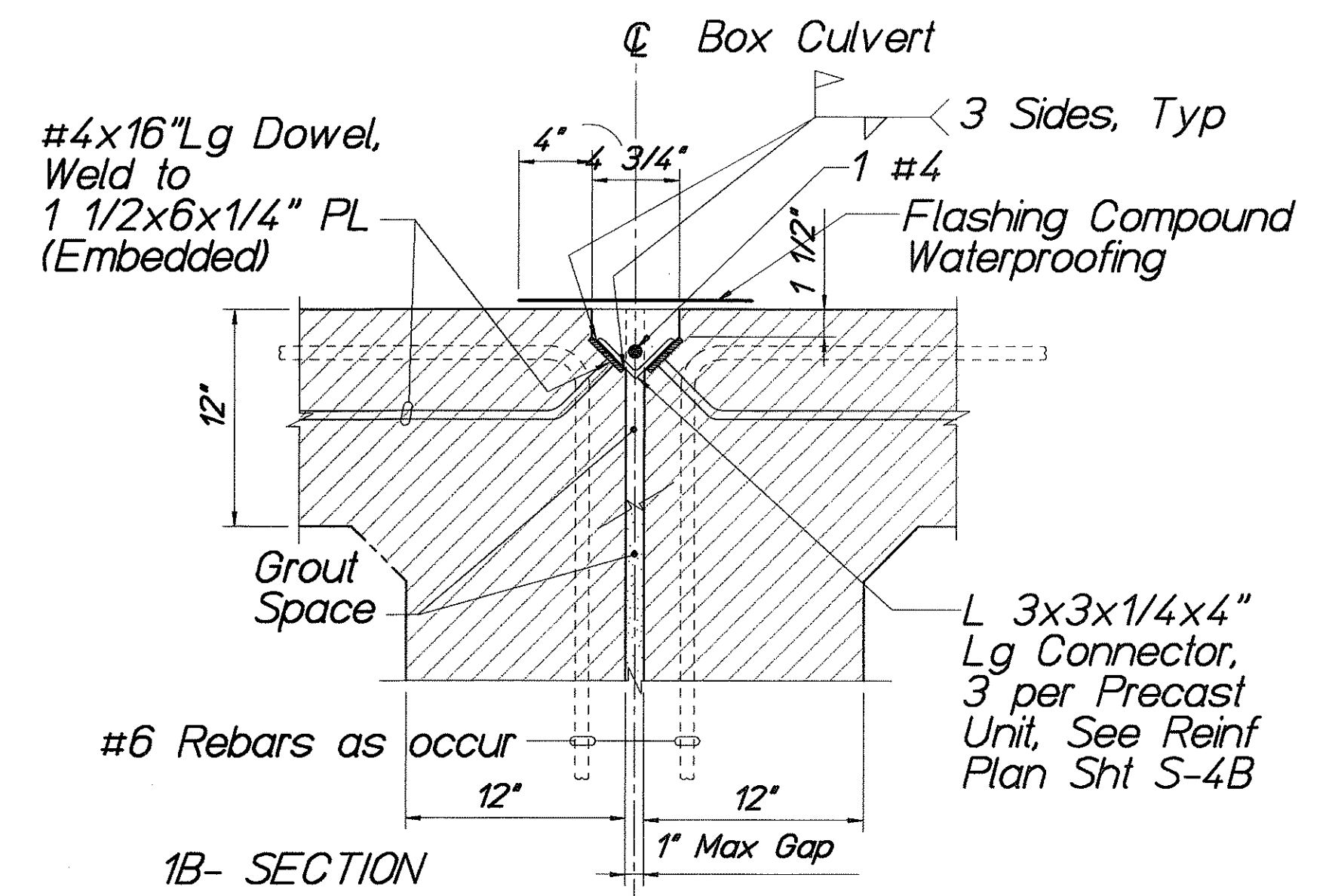
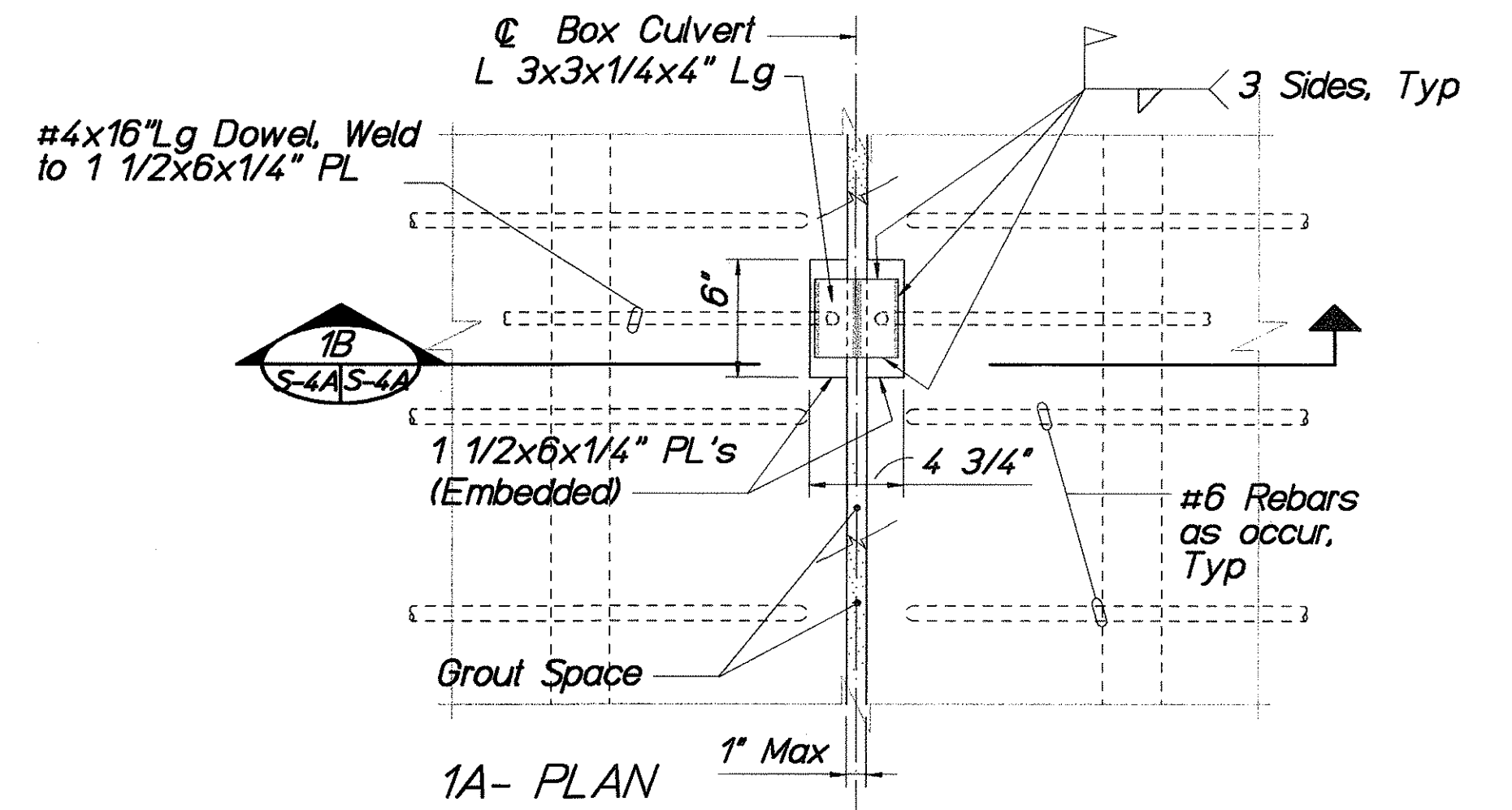
FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH - A311 (7)	2004	101	138

PLAN - CULVERT @ STA 272+26 (8 CELLS)
1" = 10'-0"

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DESIGNED BY	
	TRACED BY	
	NOTE BOOK	
No.	QUANTITIES BY	
	CHECKED BY	



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
BOX CULVERTS
MOKULELE HIGHWAY WIDENING
Vicinity of Kalalao Bridge
to
Vicinity of Kealia Pond Driveway
Federal - Aid Project No. NH - A311 (7)
Scale: as Shown Date: August 2003
SHEET No. S-3 OF 21 SHEETS

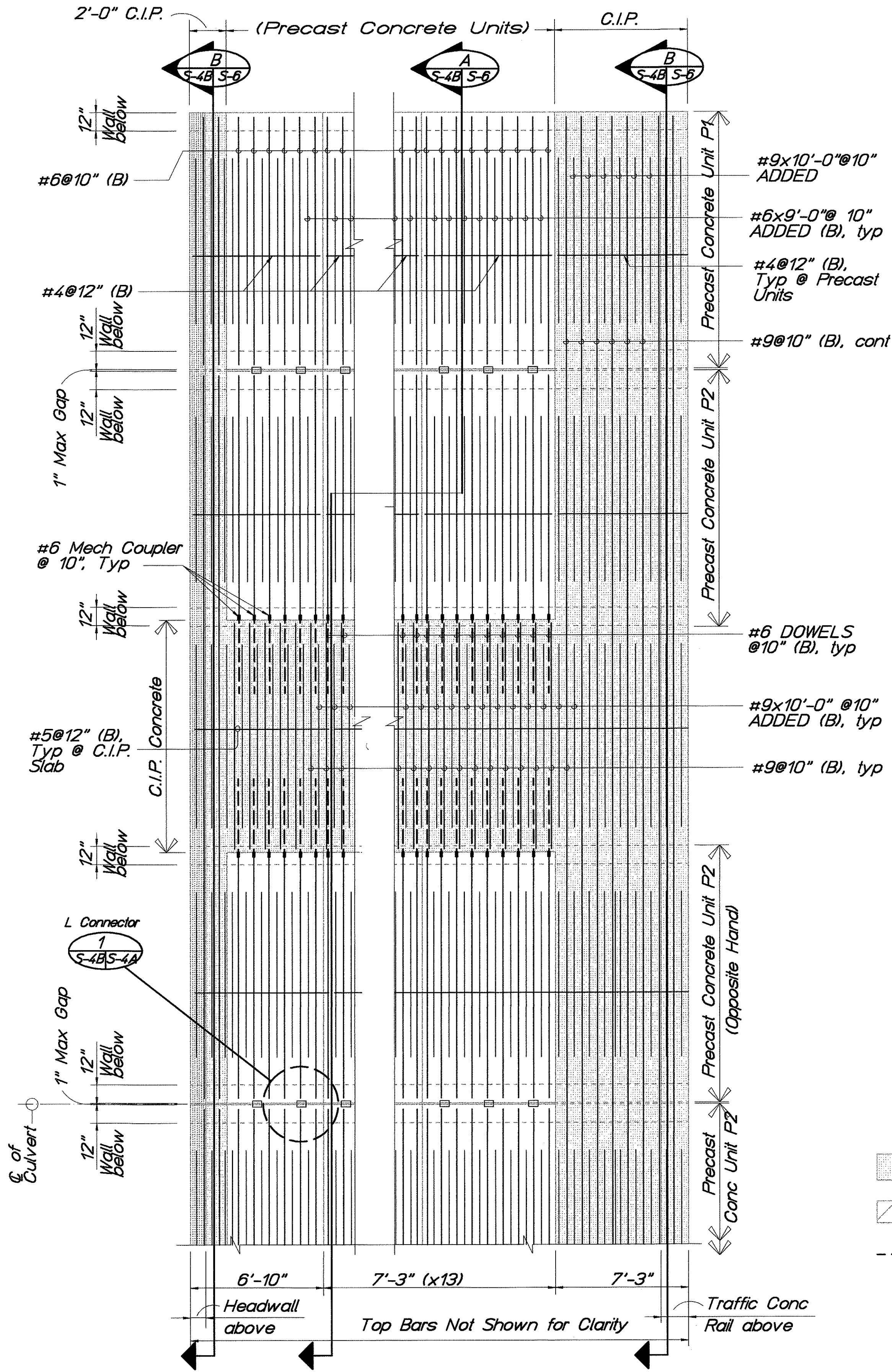


S-4B, S-6

A graphic scale bar with alternating black and white segments. Above the bar, the following units are marked from left to right: 0, 6", 0, 6", 1', 2'.

SHEET No. S-4A OF 21 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH - A311 (7)	2004	103	138



CONCRETE TOP SLAB REINFORCEMENT DETAIL

1/4" = 1'-0"

(Note: For Top Bars & Rebar Extensions from Walls, See Sections on Sht S-6)

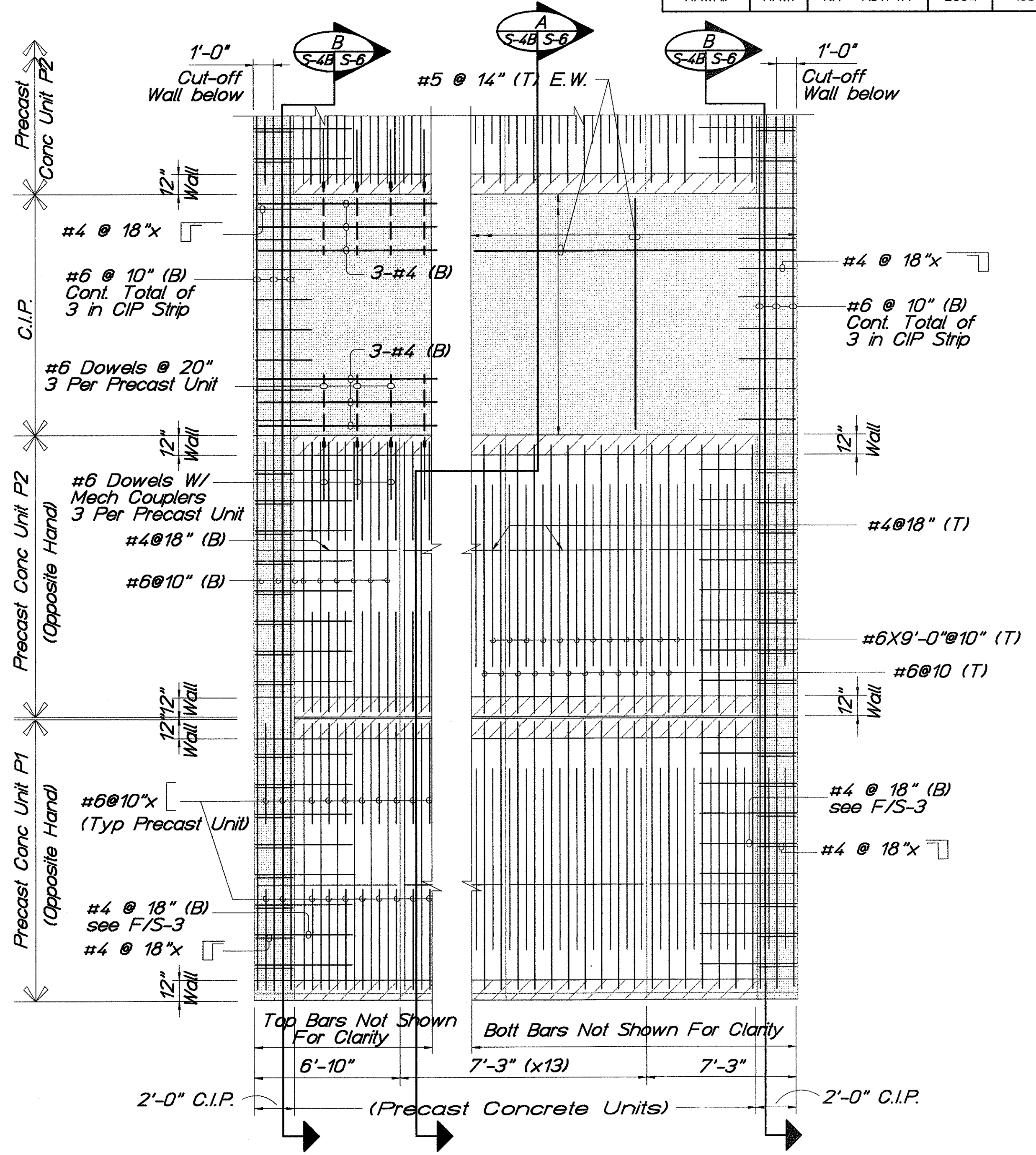
A
S-4AS-4B

LEGEND :

- C.I.P. Concrete
- Precast Concrete
- Insert Bars

GRAPHIC SCALE

1/4" = 1'-0" 1' 0' 2' 4' 6' 8' 10'



CONCRETE BOTTOM SLAB REINFORCEMENT DETAIL

1/4" = 1'-0"

B
S-4AS-4B



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BOX CULVERTS

MOKULELE HIGHWAY WIDENING
Vicinity of Kaloa Bridge
to
Vicinity of Kealia Pond Driveway
Federal - Aid Project No. NH - A311 (7)

Scale: as Shown Date: August 2003

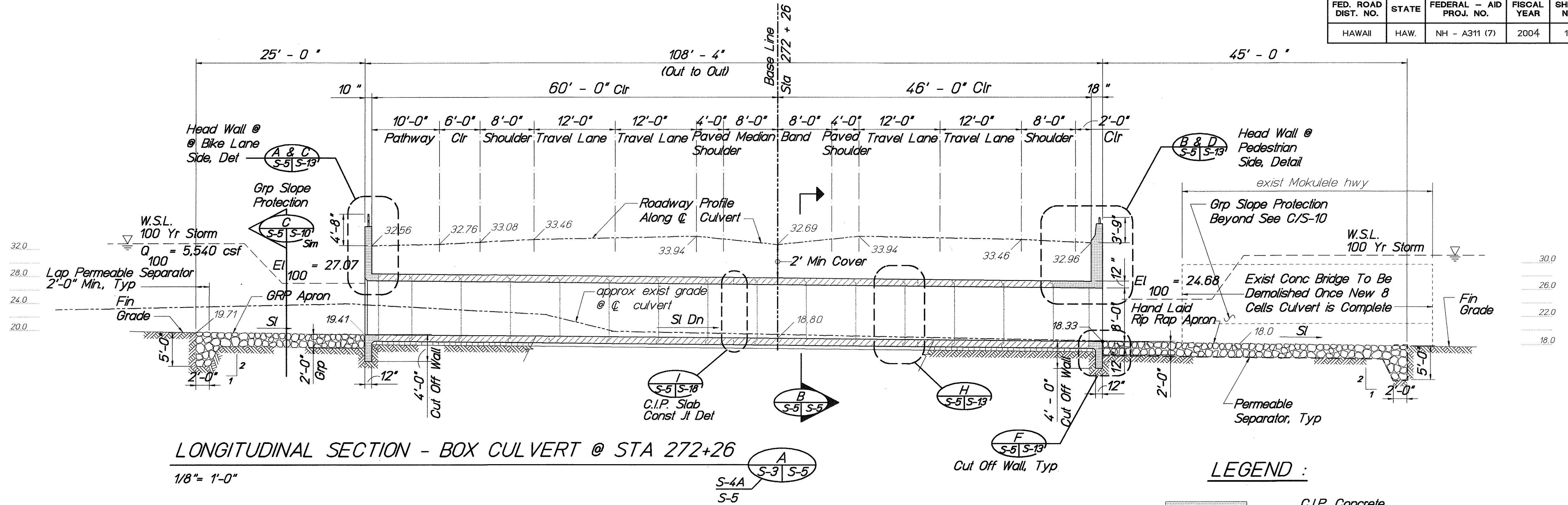
SHEET No. S-4B OF 21 SHEETS

DAVID M. YAMAMOTO
LICENSED PROFESSIONAL ENGINEER
No. 1399-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

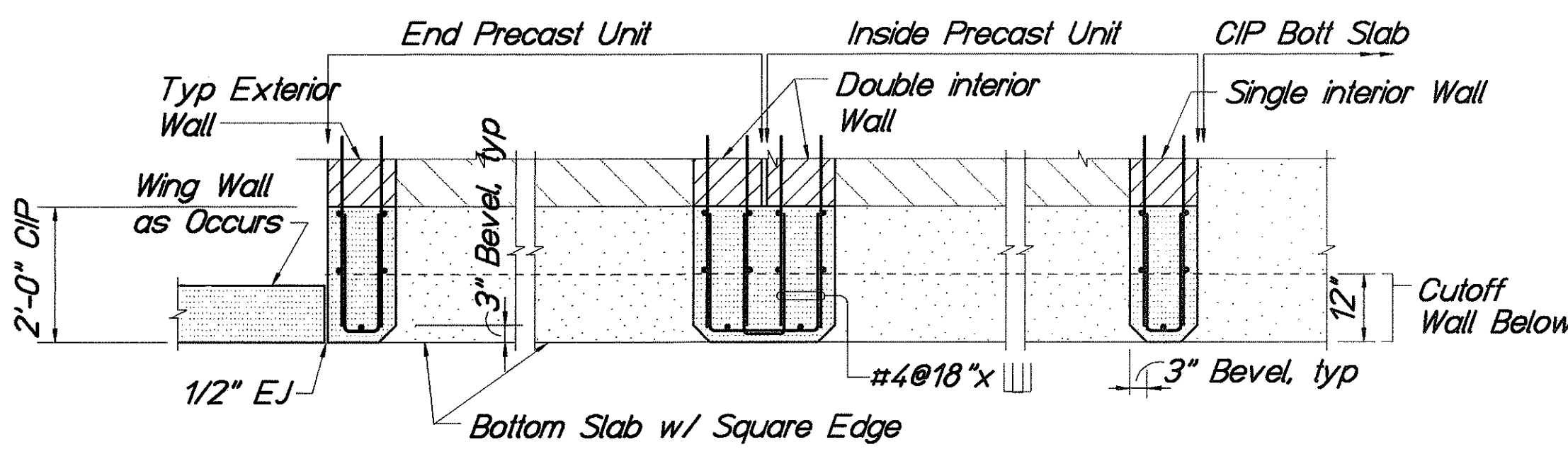
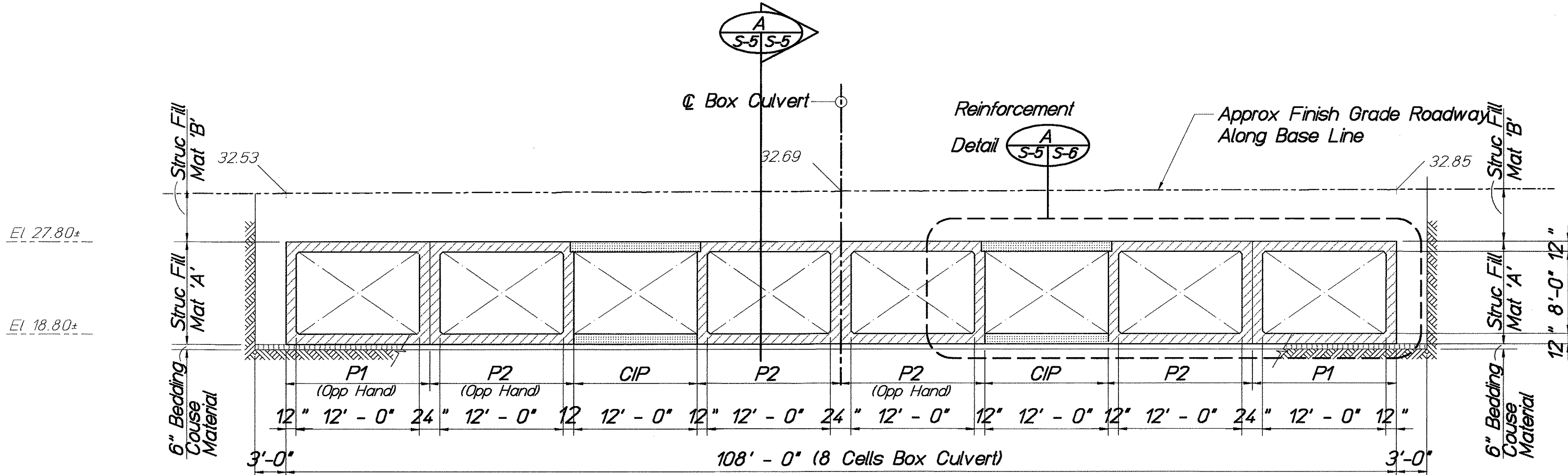
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DESIGNED BY	
TRACED BY	
NOTE BOOK	
QUANTITIES BY	
CHECKED BY	
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FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH - A311 (7)	2004	104	138

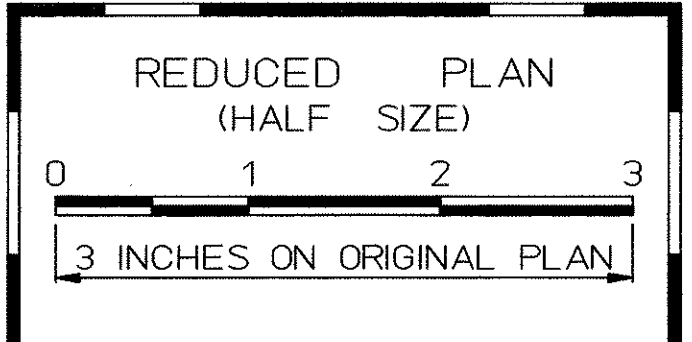
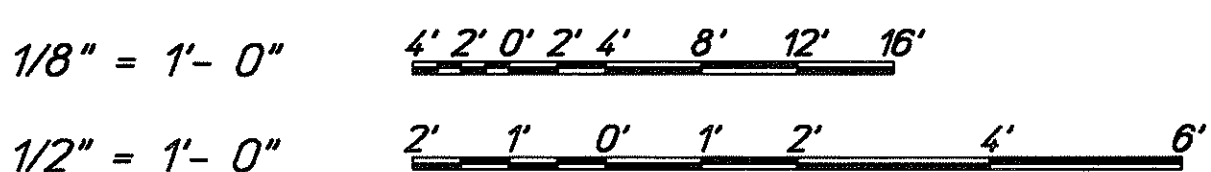


LEGEND :

- C.I.P. Concrete
- Precast Concrete



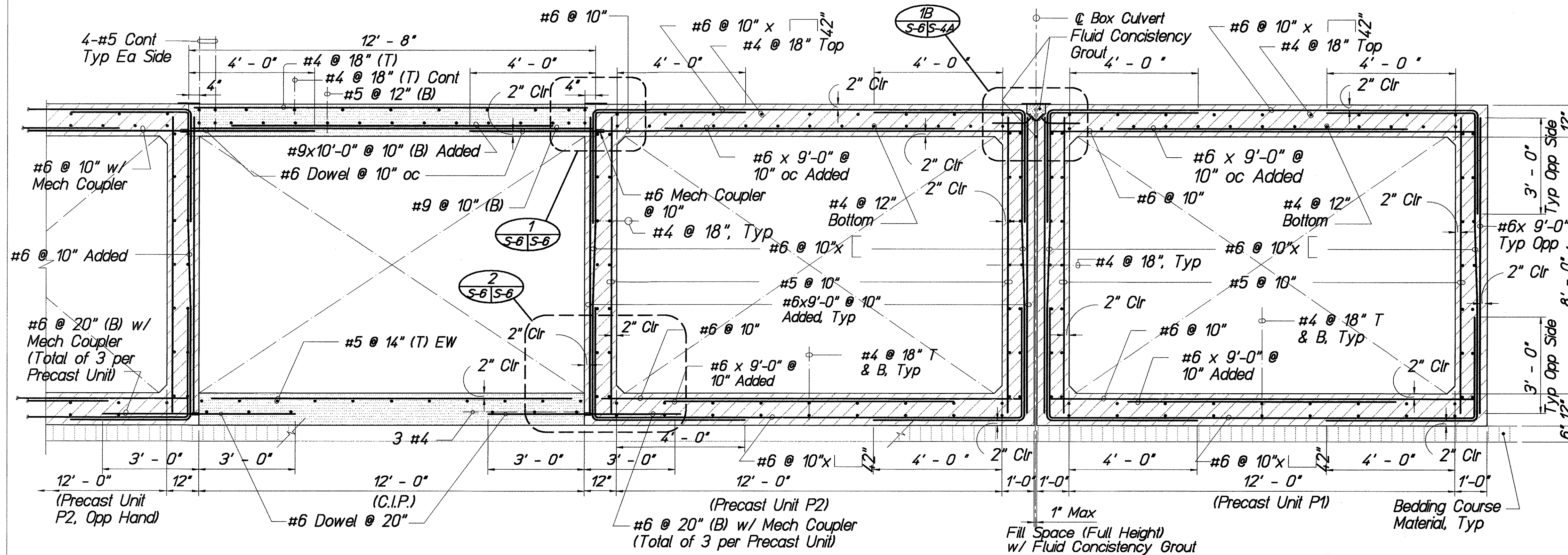
GRAPHIC SCALES



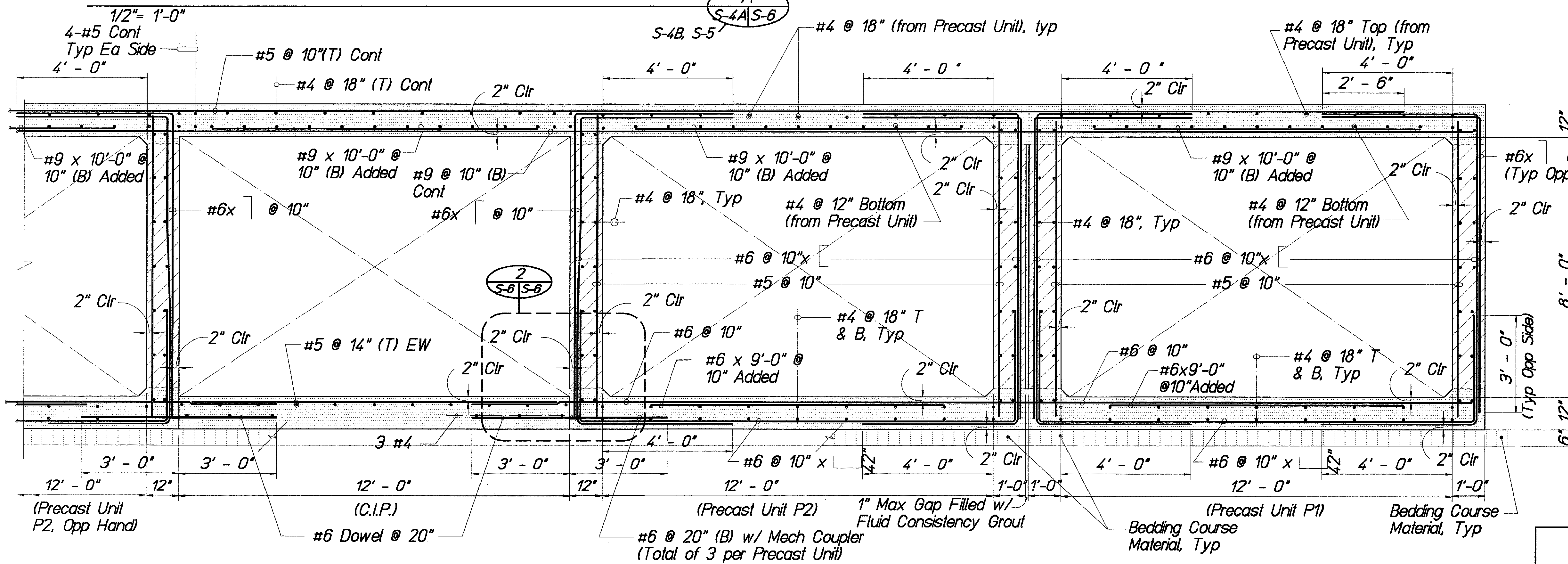
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QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
NO.	

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
BOX CULVERTS
MOKULELE HIGHWAY WIDENING
Vicinity of Kotaloa Bridge
to
Vicinity of Kealia Pond Driveway
Federal - Aid Project No. NH - A311 (7)
Scale: as Shown Date: August 2003
SHEET No. S-5 OF 21 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH - A311 (7)	2004	105	138



CROSS SECTION - BOX CULVERT @ STA 272+26

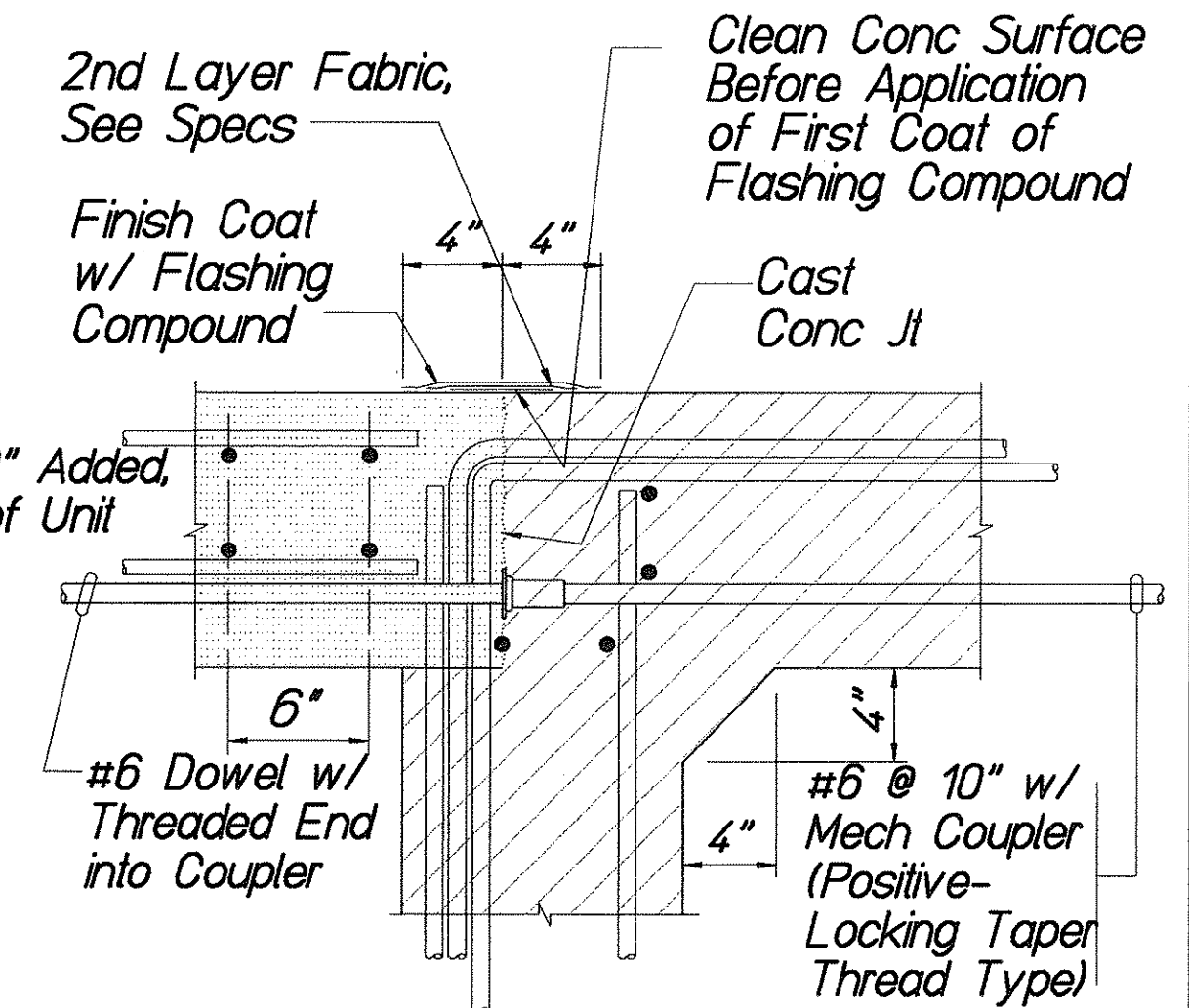
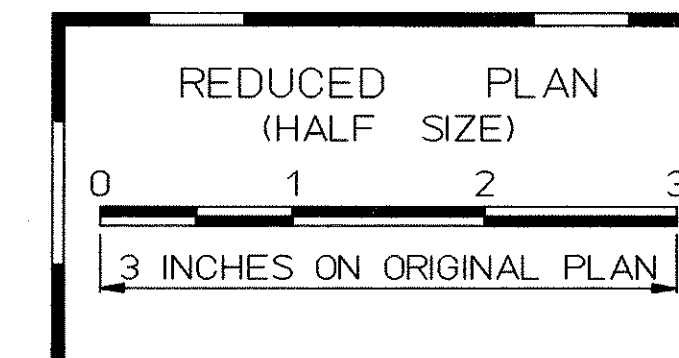
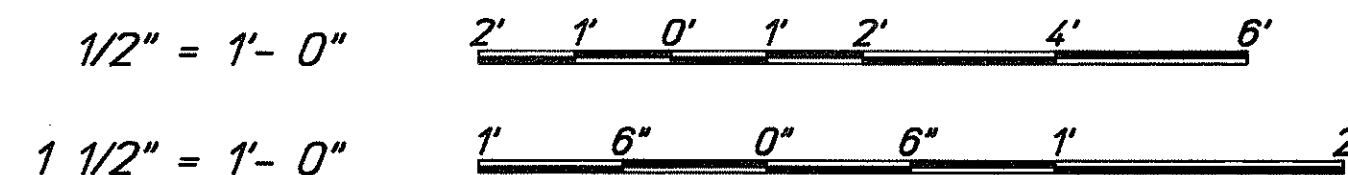


CROSS SECTION - BOX CULVERT NEAR HEADWALL

LEGEND:

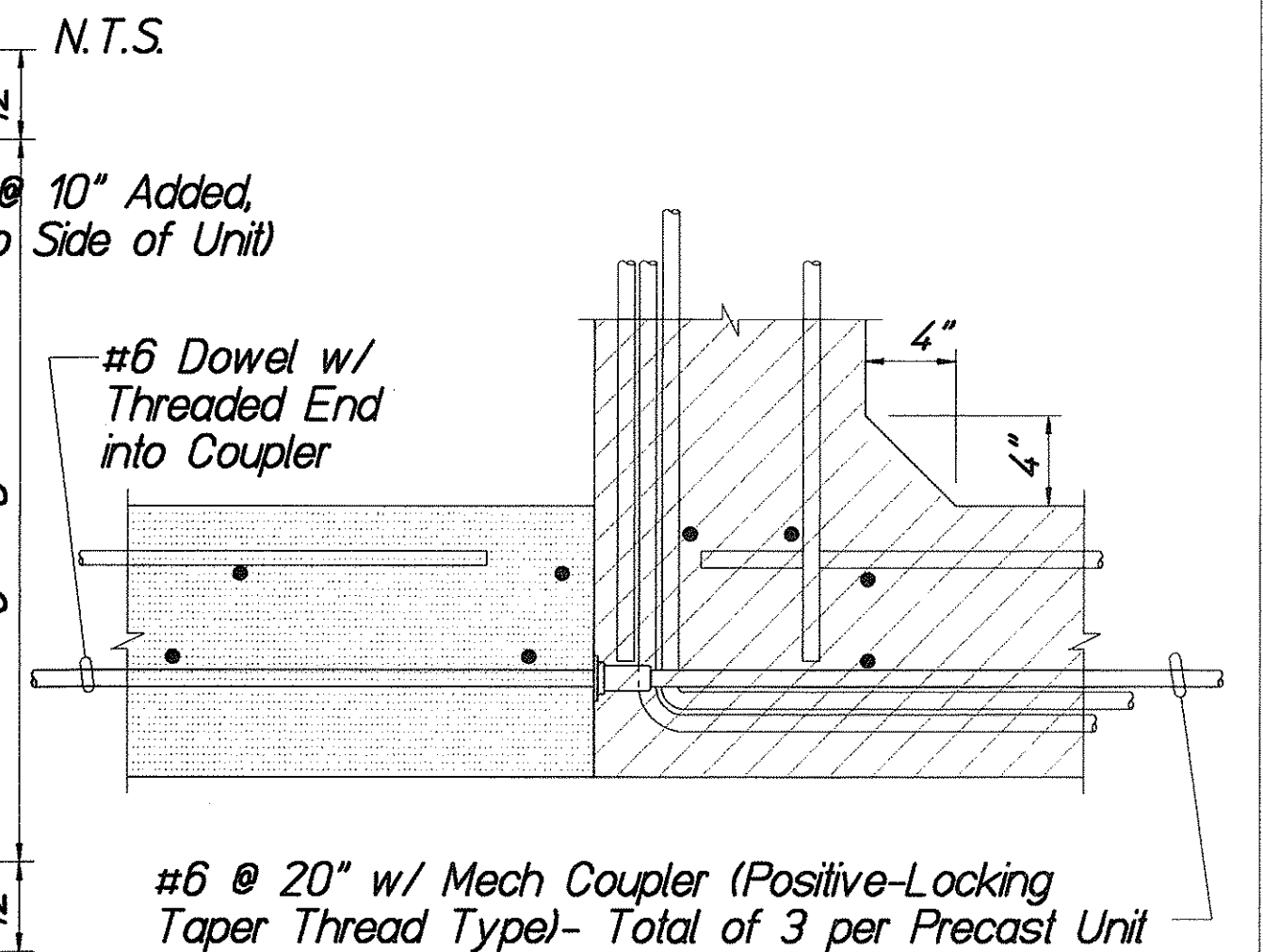
- Precast Concrete
- Cast in Place Concrete (C.I.P.)
- Insert Bars

GRAPHIC SCALES



NOTE:
Flashing Compound For Construction Joint Waterproofing Shall Conform to The Requirement of ASTM Specifications D4586 As a Plying Cement In The Construction of Membrane Waterproofing Systems With Fabrics Conforming to ASTM Specification D1668 (Asphalt Types). The Product Shall Adhere to Damp Concrete And Masonry Surfaces.

TYP FLASHING COMPOUND WATERPROOFING DETAIL



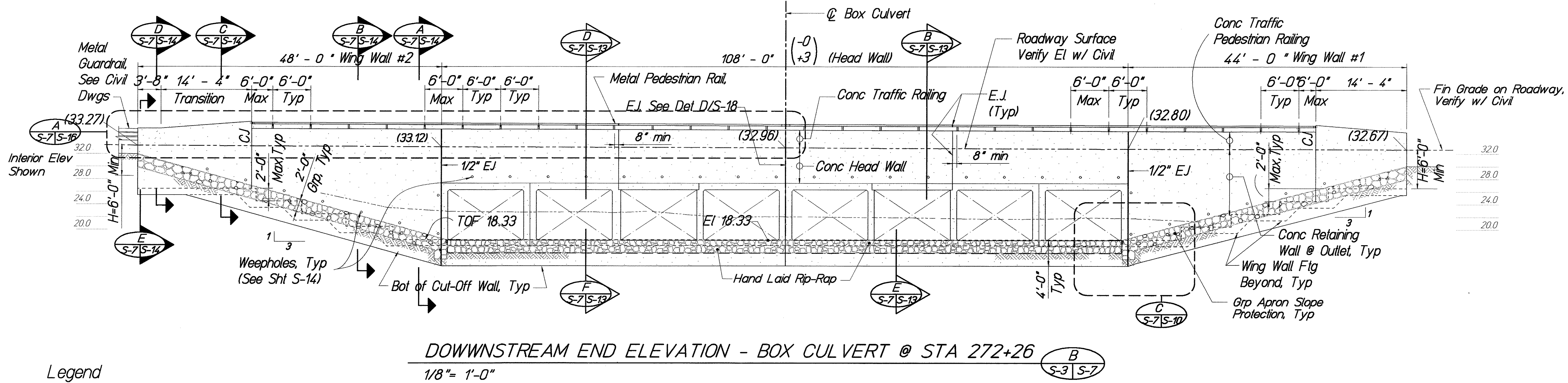
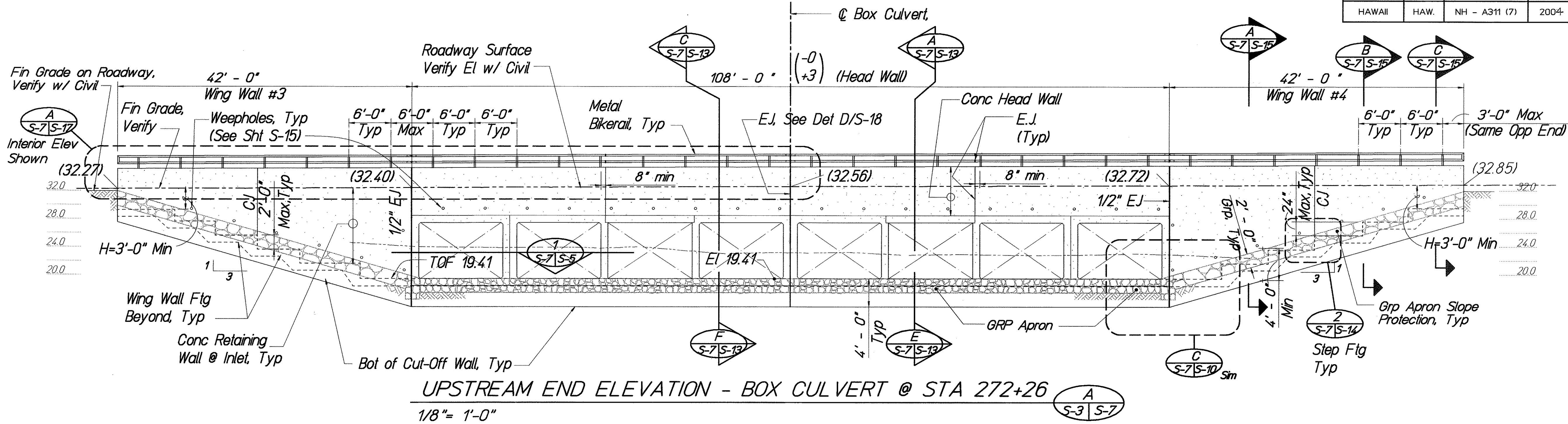
DETAIL 1

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
BOX CULVERTS
MOKULELE HIGHWAY WIDENING
Vicinity of Kalahele Bridge
Vicinity of Kealia Pond Driveway
Federal - Aid Project No. NH - A311 (7)
Scale: as Shown Date: August 2003
SHEET No. S-6 OF 21 SHEETS

105

FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH - A311 (7)	2004	106	138

Plot date: 7-Aug-03



Legend

- EJ Expansion Joint. See Sht S-18 For Details.
- CJ Construction Joint. See Sht S-18 For Details.
- (32.40) Approx Fin Grade Spot Elevation @ Headwall.
- TOF 19.41 Top of Wingwall Footing Elevation

GRAPHIC SCALE

1/8" = 1'- 0" 4' 2' 0' 2' 4' 8' 12' 16'



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No. 1399-S
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BOX CULVERTS

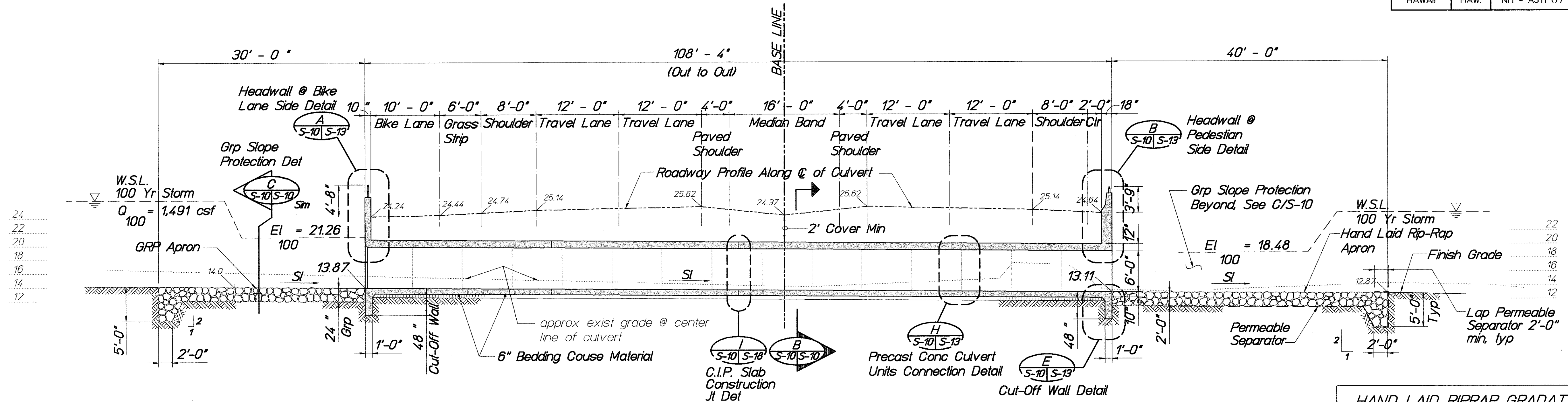
MOKULELE HIGHWAY WIDENING
Vicinity of Kalaloa Bridge
to
Vicinity of Kealia Pond Driveway
Federal - Aid Project No. NH - A311 (7)

Scale: as Shown Date: August 2003

SHEET No. S-7 OF 21 SHEETS

DATE	_____
SURVEY PLOTTED BY	_____
DESIGNED BY	_____
NOTED BY	_____
CHECKED BY	_____
ORIGINAL PLAN	_____
NOTE BOOK	_____
No.	_____

FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH - A311 (7)	2004	109	138



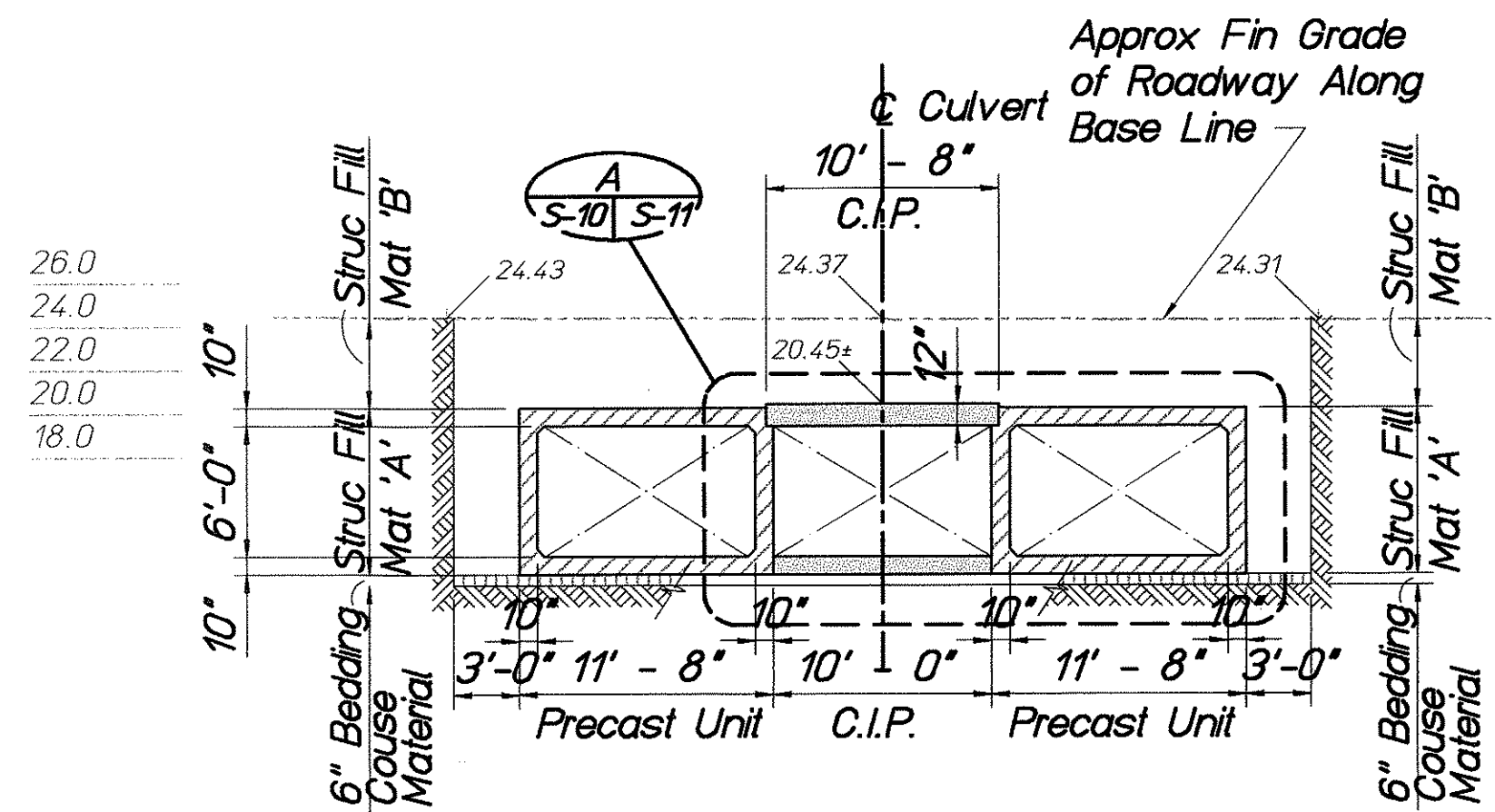
LONGITUDINAL SECTION - BOX CULVERT @ STA 300+00

1/8" = 1'-0"

A
S-8 S-10

HAND LAID RIPRAP GRADATION	
STONE SIZE (LBS)	PERCENT OF STONE SMALLER THAN
200	100
75	50
5	10

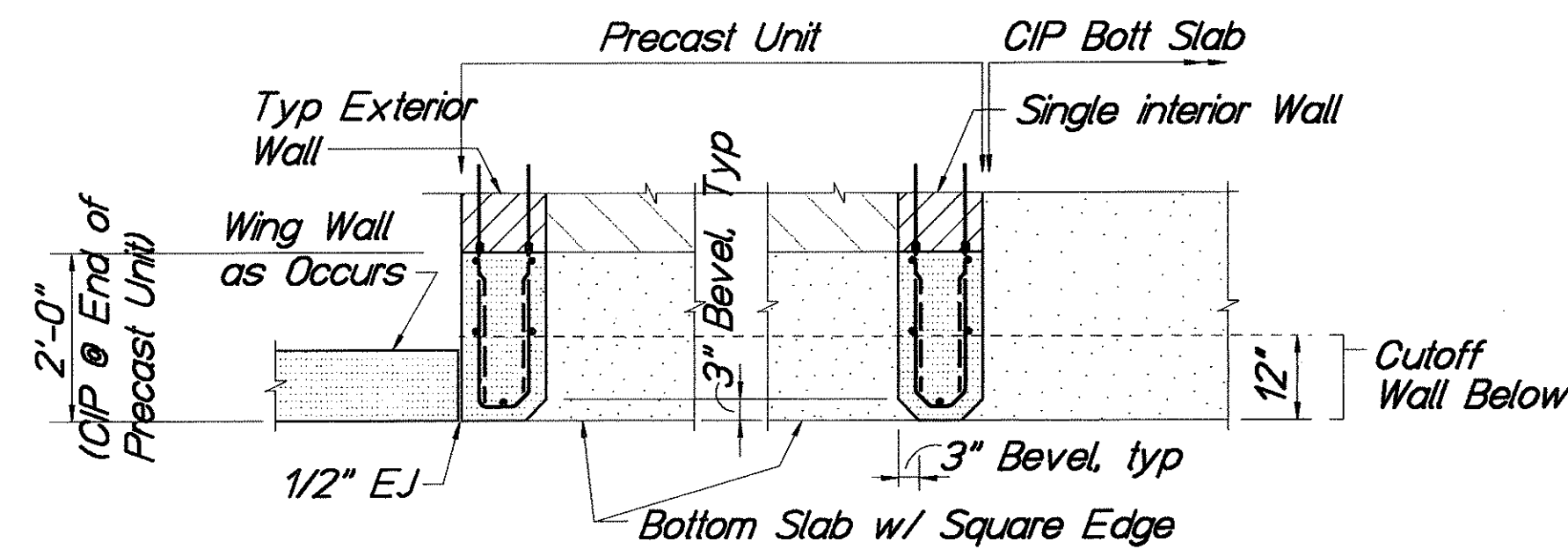
NOTE:
Neither Width Nor Thickness of a Single Stone Shall be Less Than one-Third its Length.



CROSS SECTION ALONG BASE LINE - BOX CULVERT @ STA 300+00 (3 CELLS)

1/8" = 1'-0"

B
S-10 S-10
S-9



PLAN - CULVERT WALL END DETAIL (AT INLET)

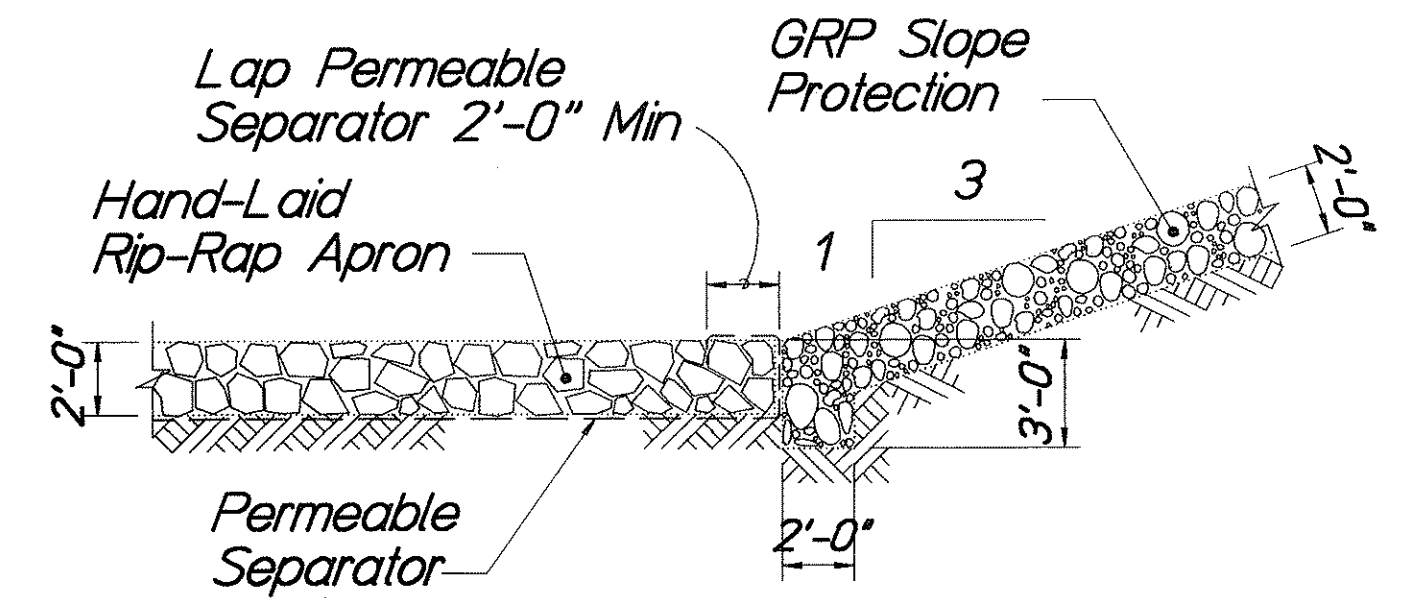
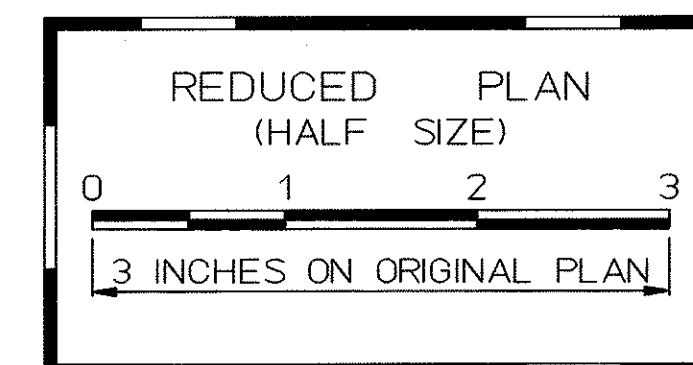
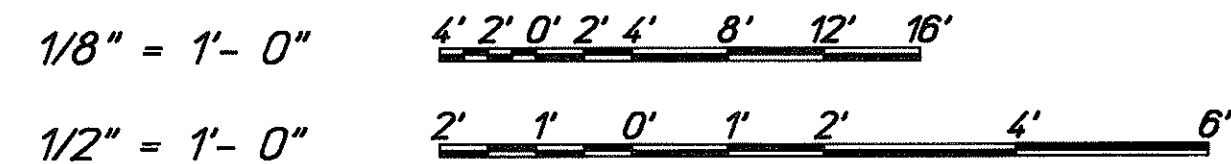
1/2" = 1'-0"

1
S-12 S-10

LEGEND :

- C.I.P. Concrete
- Precast Concrete

GRAPHIC SCALES



SECTION

1/2" = 1'-0"

C
S-7, S-10, S-12
S-5 S-10

SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
No.	

DAVID M. YAMAMOTO
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No. 1399-S
HAWAII, U.S.A.

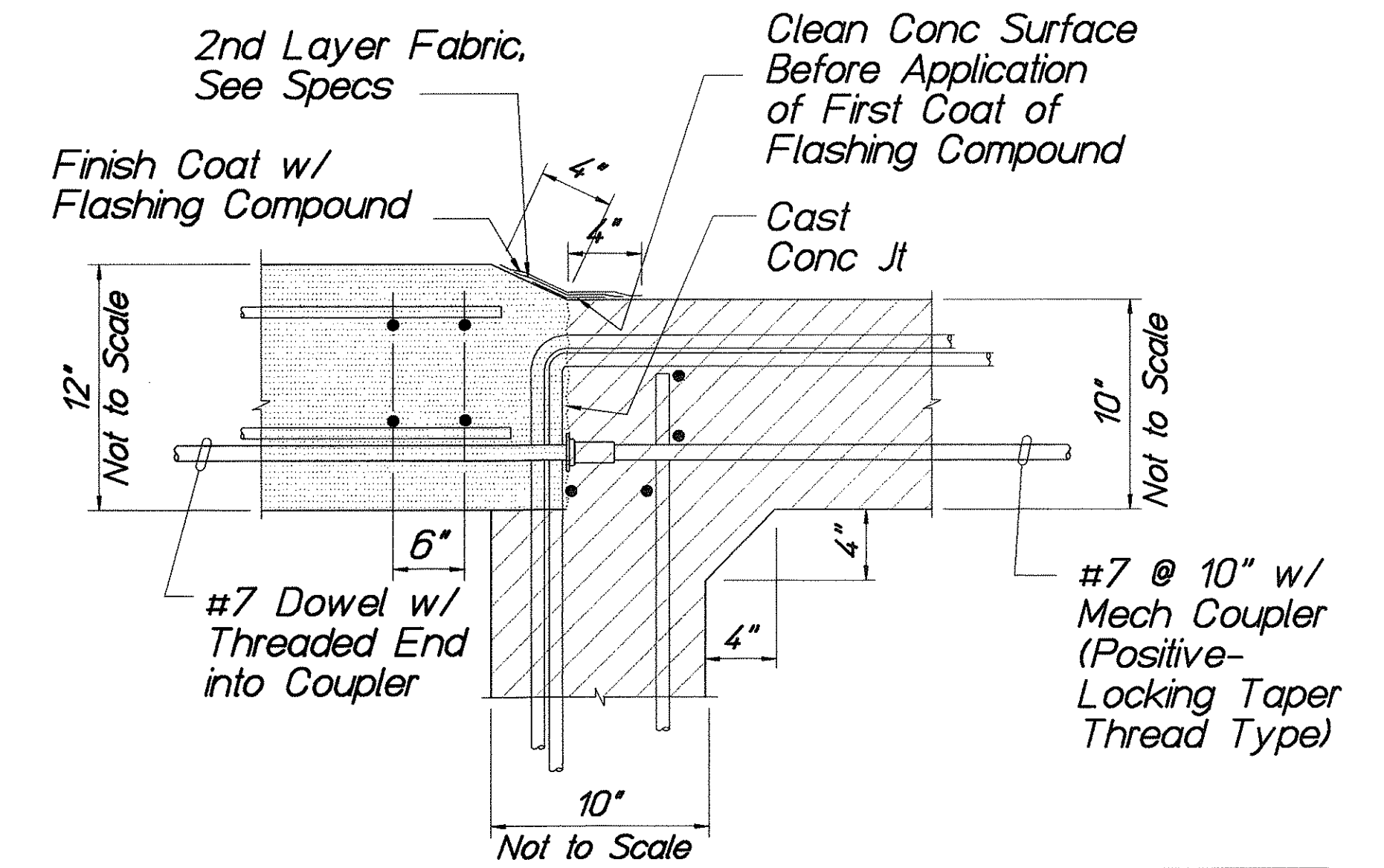
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BOX CULVERTS

MOKULELE HIGHWAY WIDENING
Vicinity of Kalalaa Bridge
to
Vicinity of Kealia Pond Driveway
Federal - Aid Project No. NH - A311 (7)

Scale: as Shown Date: August 2003

SHEET No. S-10 OF 21 SHEETS

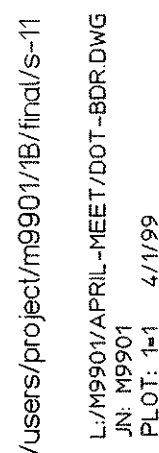
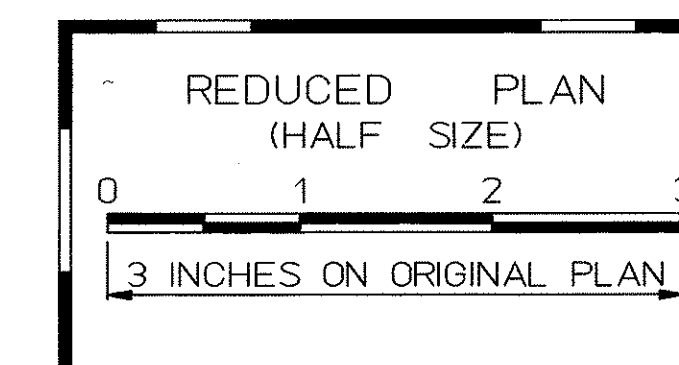
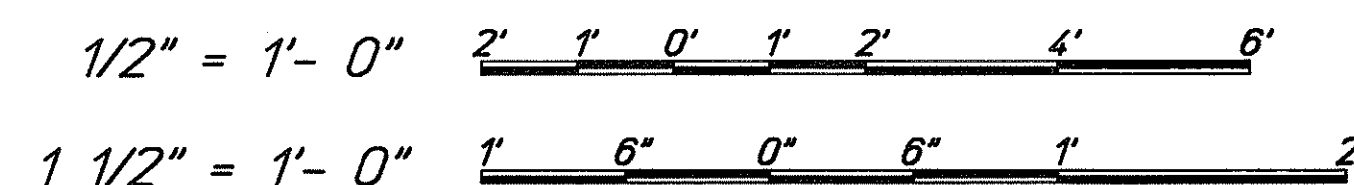
Plot date: 7-Aug-03

Flashing Compound For Construction Joint Waterproofing Shall Conform To The Requirement of ASTM Specifications D4586 As a Plying Cement In The Construction of Membrane Waterproofing Systems With Fabrics Conforming to ASTM Specification D1668 (Asphalt Types). The Product Shall Adhere to Damp Concrete And Masonry Surfaces.

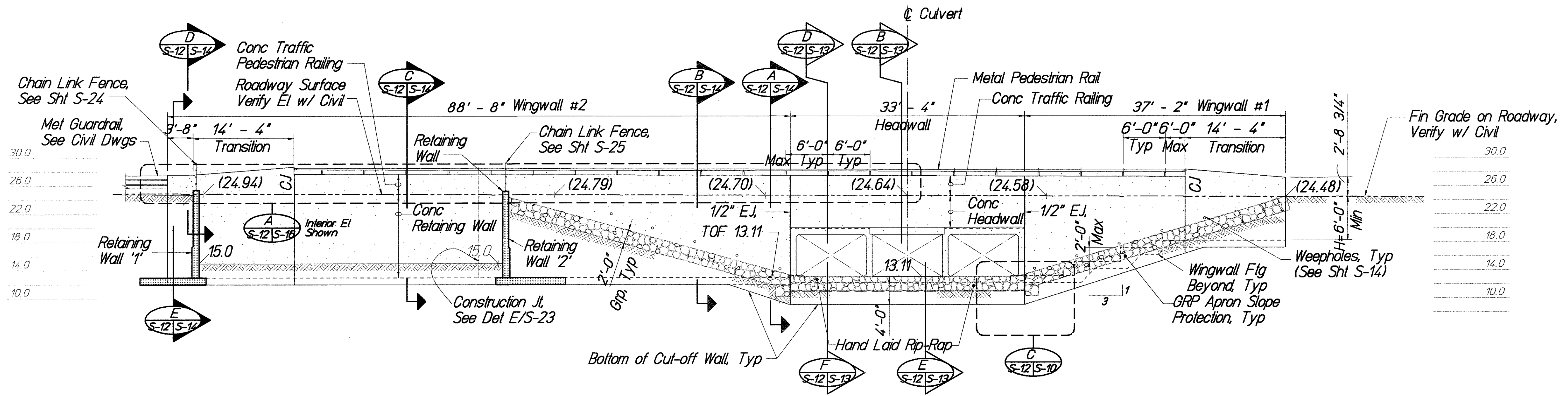
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Precast Concrete
 Cast in Place Concrete (C.I.P.)
 Insert Bars

GRAPHIC SCALES

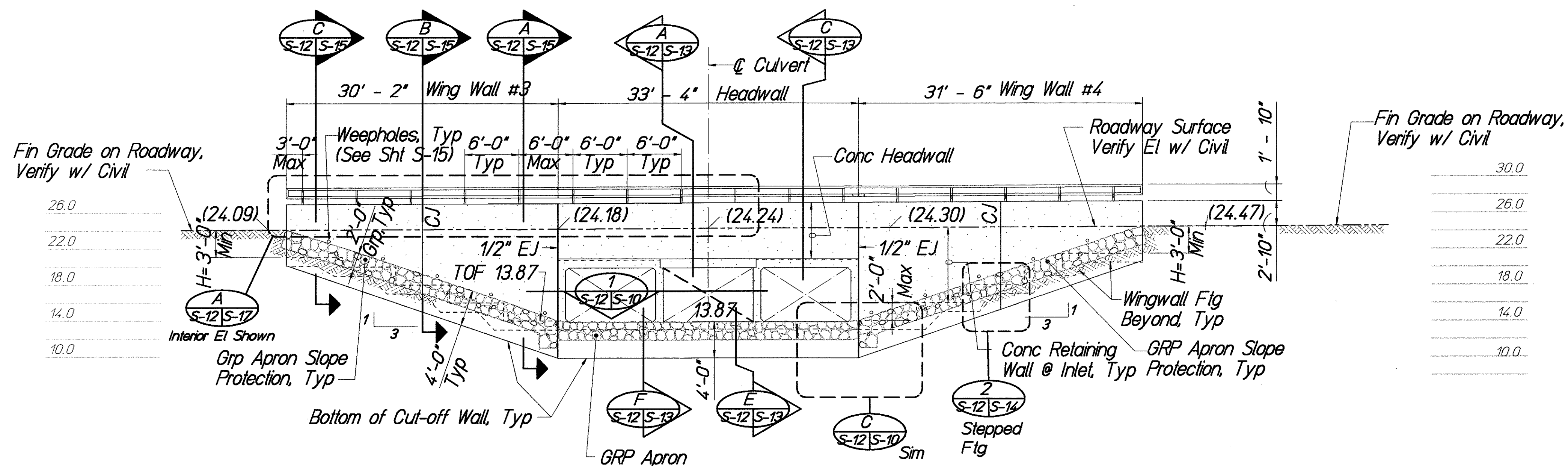


FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH - A311 (7)	2004	111	138



DOWNSTREAM END ELEVATION - BOX CULVERT @ STA 300+00
1/8" = 1'-0"

B
S-8 S-12



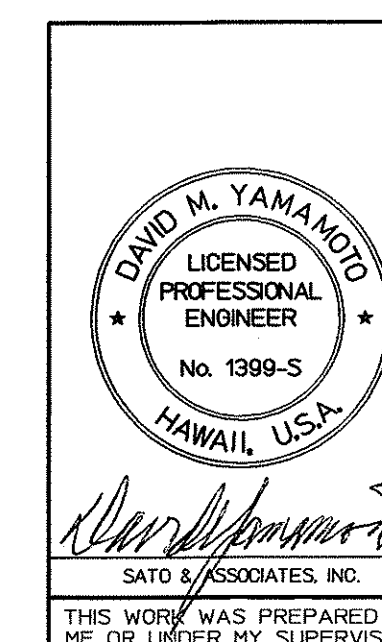
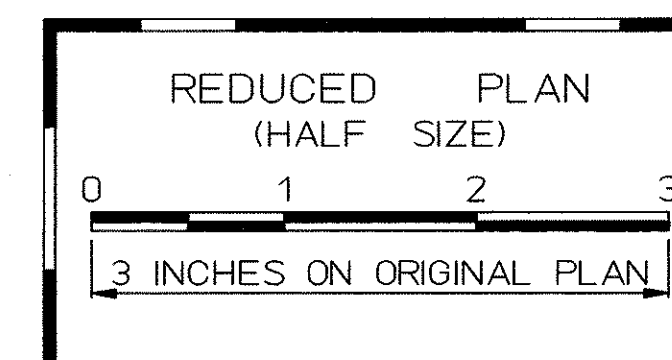
UPSTREAM END ELEVATION - BOX CULVERT @ STA 300+00
1/8" = 1'-0"

A
S-8 S-12

Legend

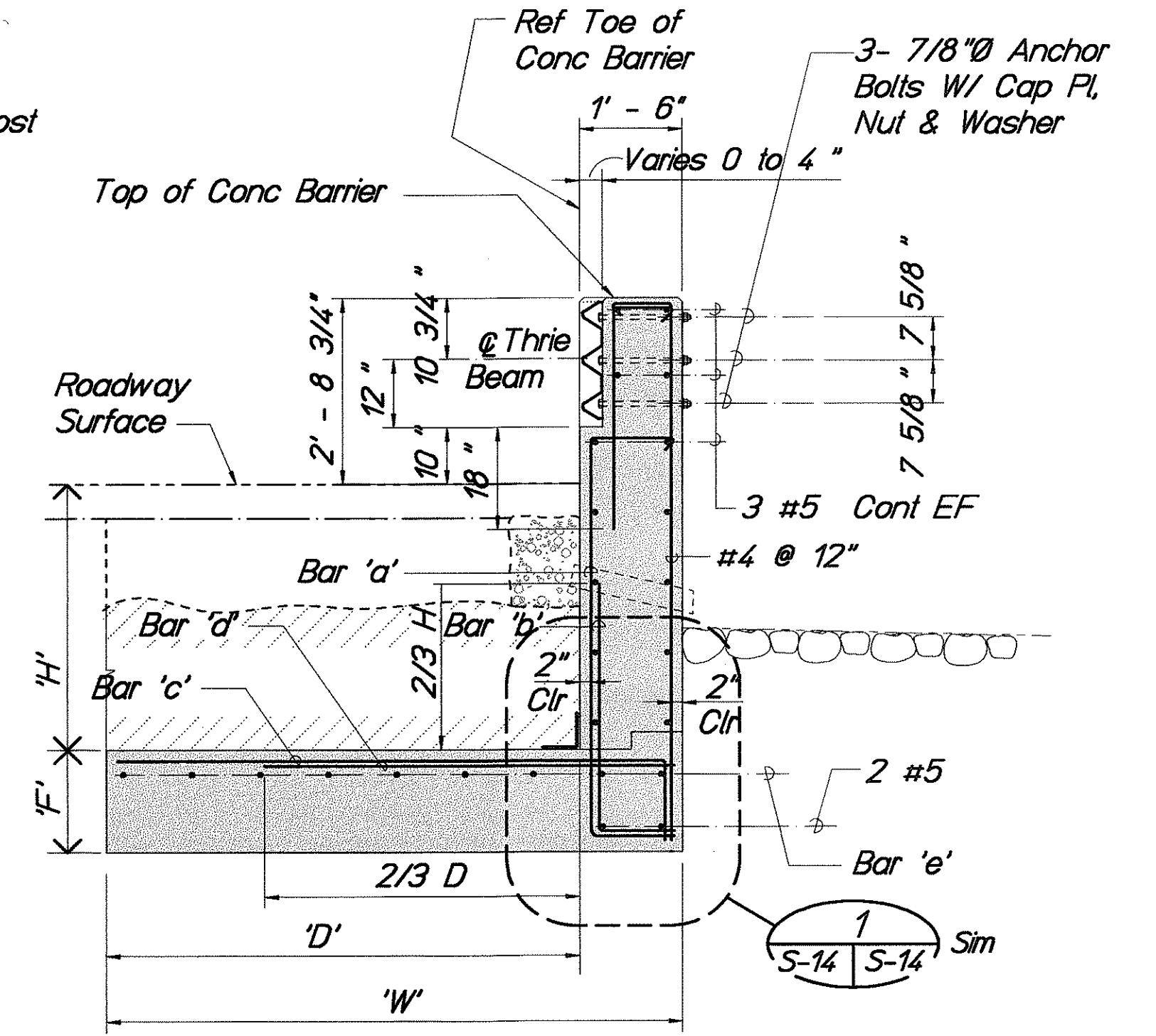
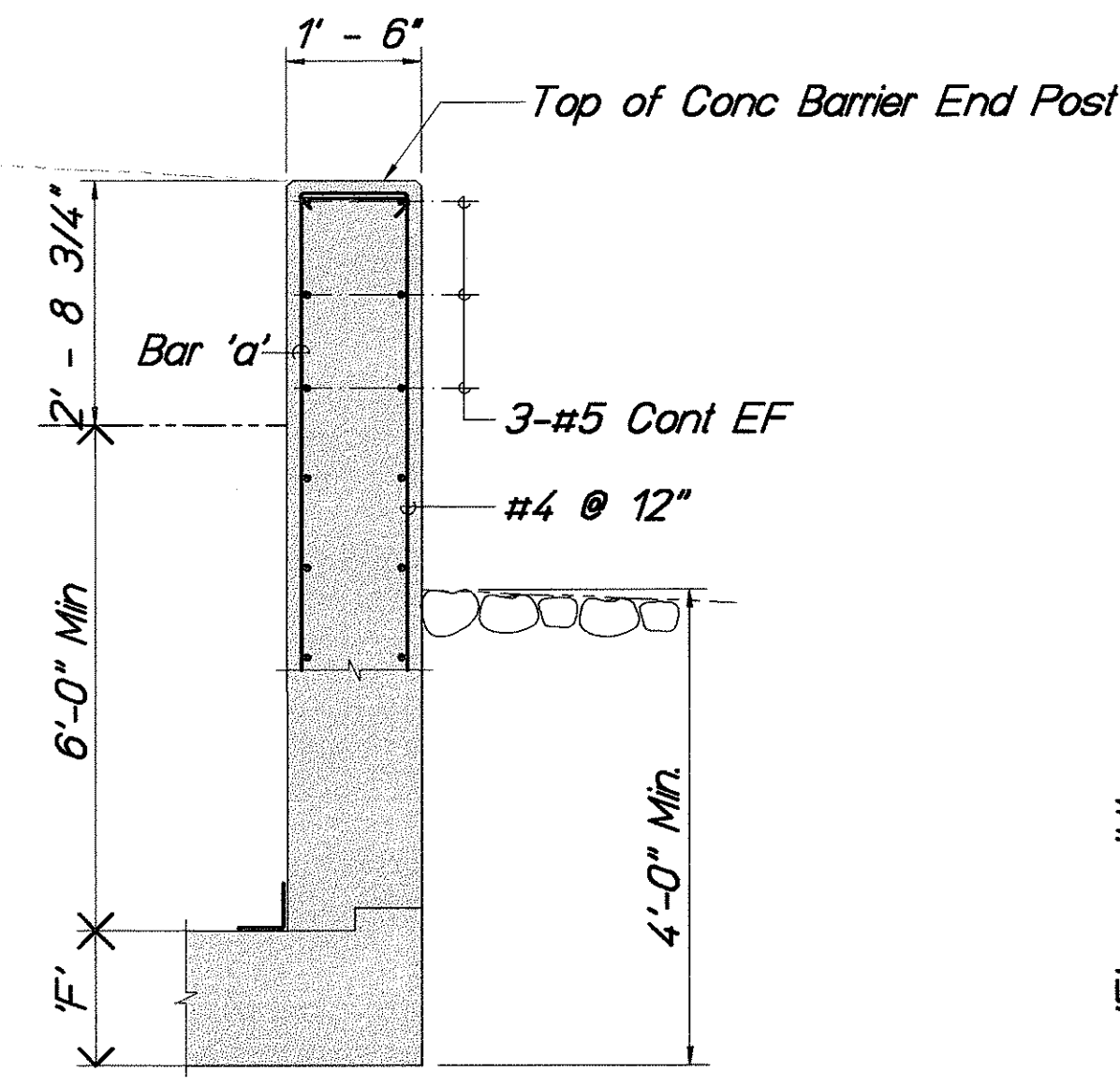
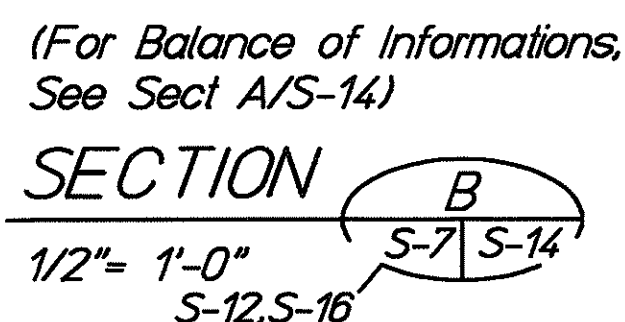
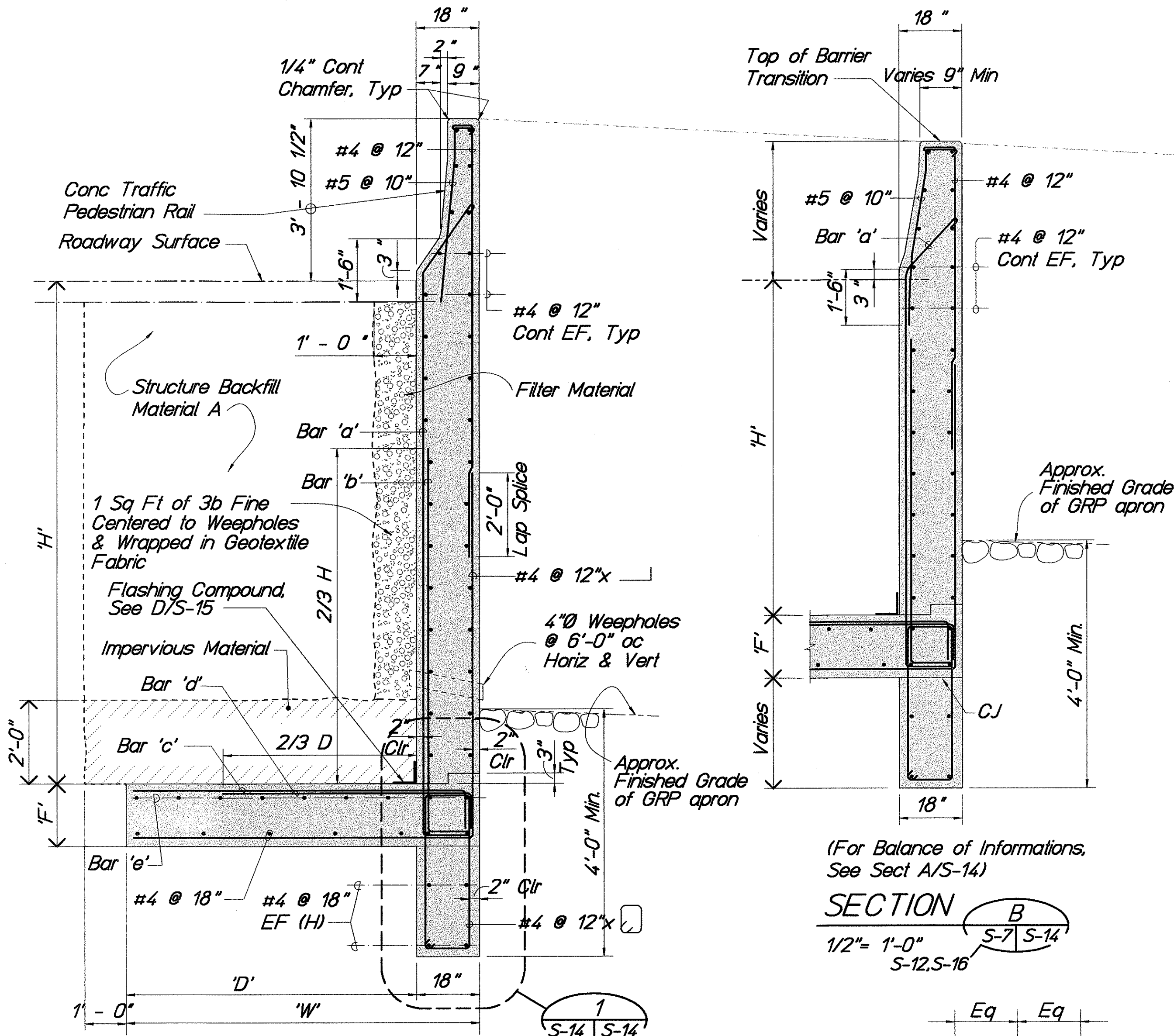
- EJ Expansion Joint. See Sht S-18 For Details.
- CJ Construction Joint. See Sht S-18 For Details.
- (32.40) Approx Fin Grade Spot Elevation @ Headwall
- TOF 19.41 Top of Wingwall Footing Elevation

DATE	
SURVEY PLOTTED BY	
DRAWN BY	
DESIGNED BY	
NOTED BY	
CHECKED BY	
NO.	



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
BOX CULVERTS
MOKULELE HIGHWAY WIDENING
Vicinity of Kalalao Bridge
to
Vicinity of Kealia Pond Driveway
Federal - Aid Project No. NH - A311 (7)
Scale: as Shown Date: August 2003
SHEET No. S-12 OF 21 SHEETS

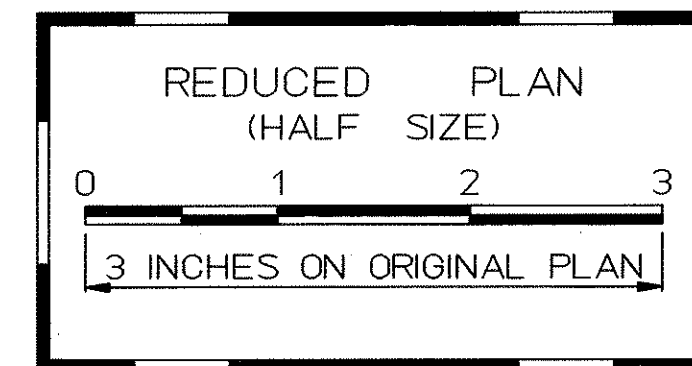
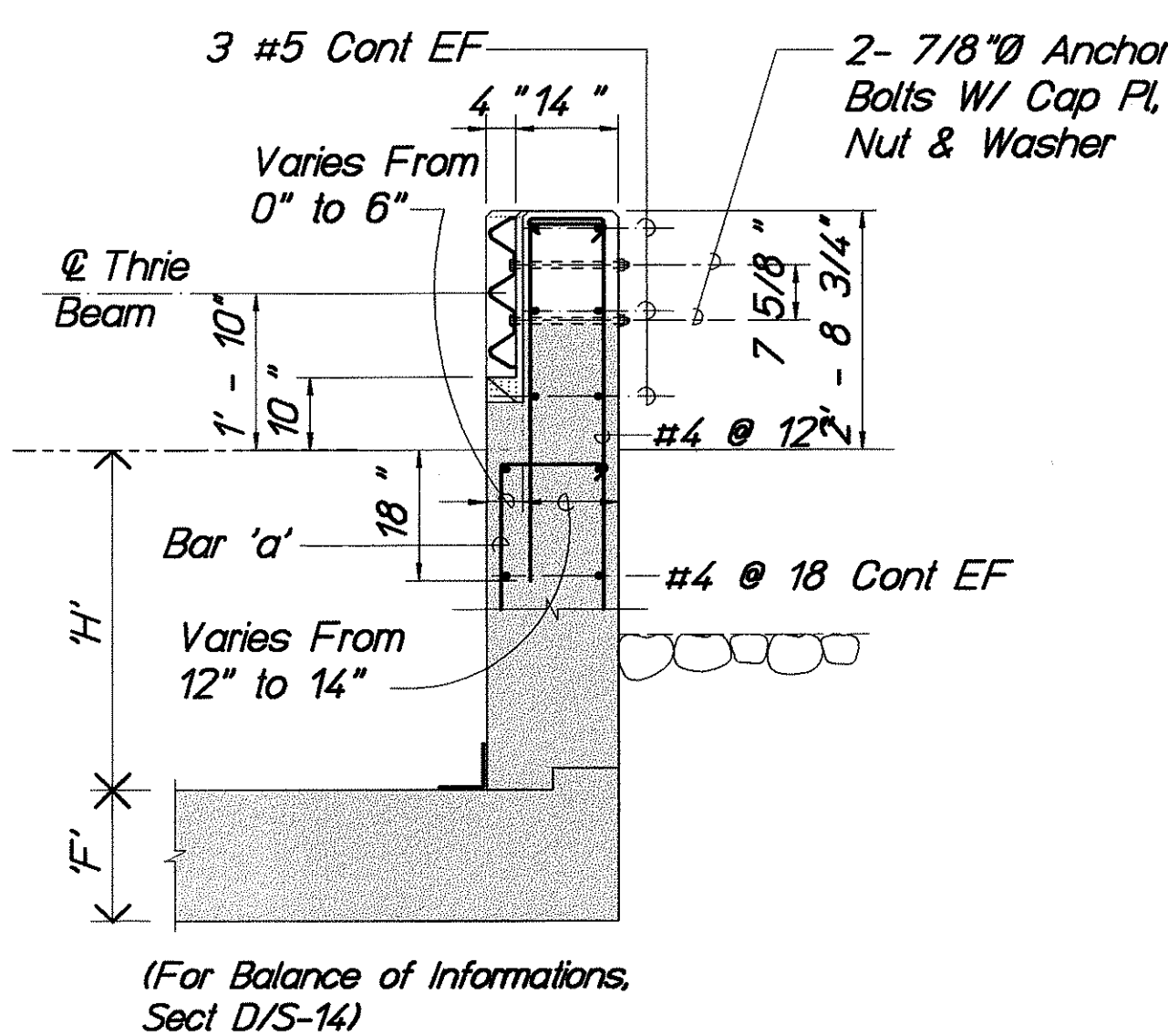
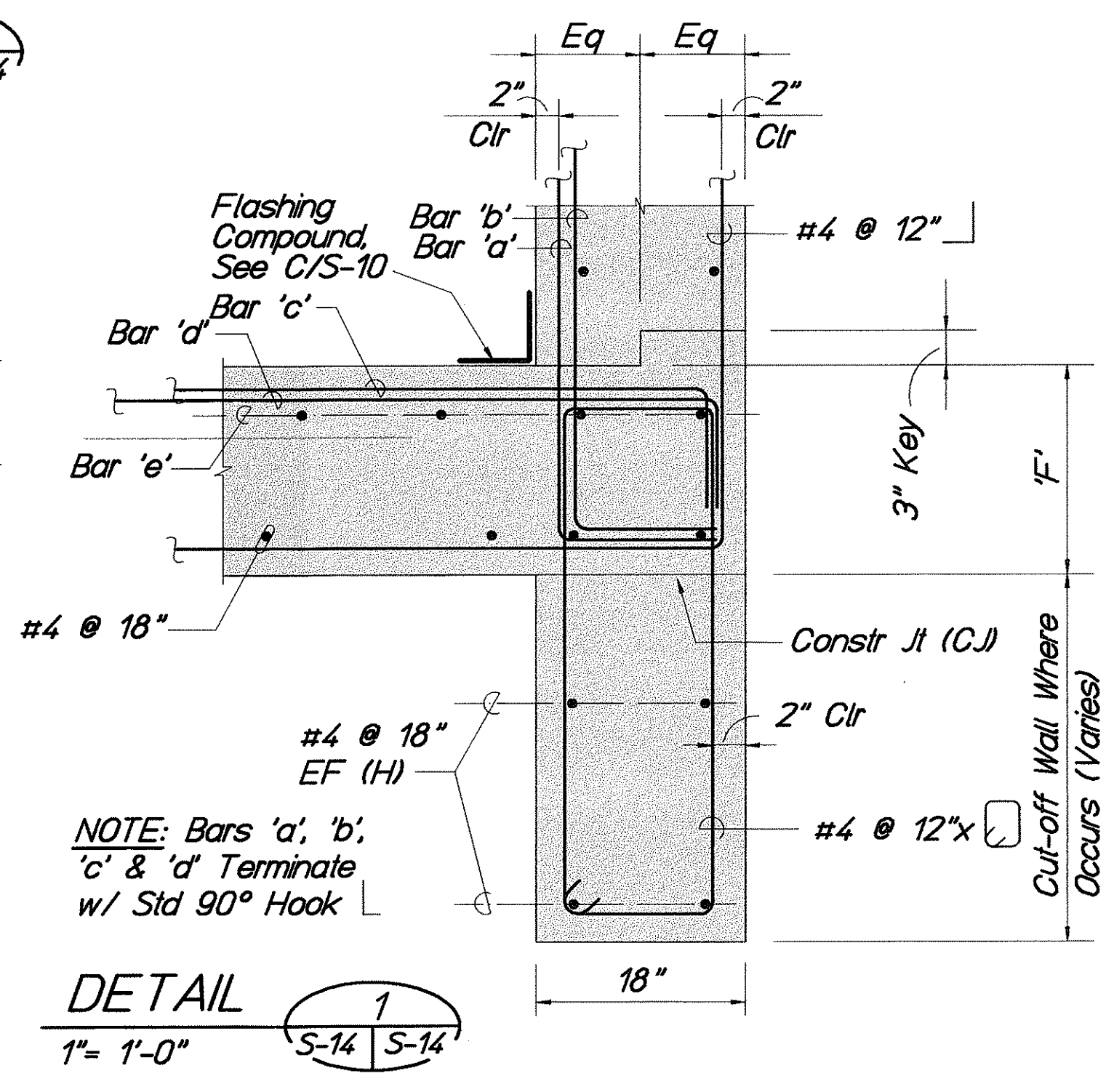
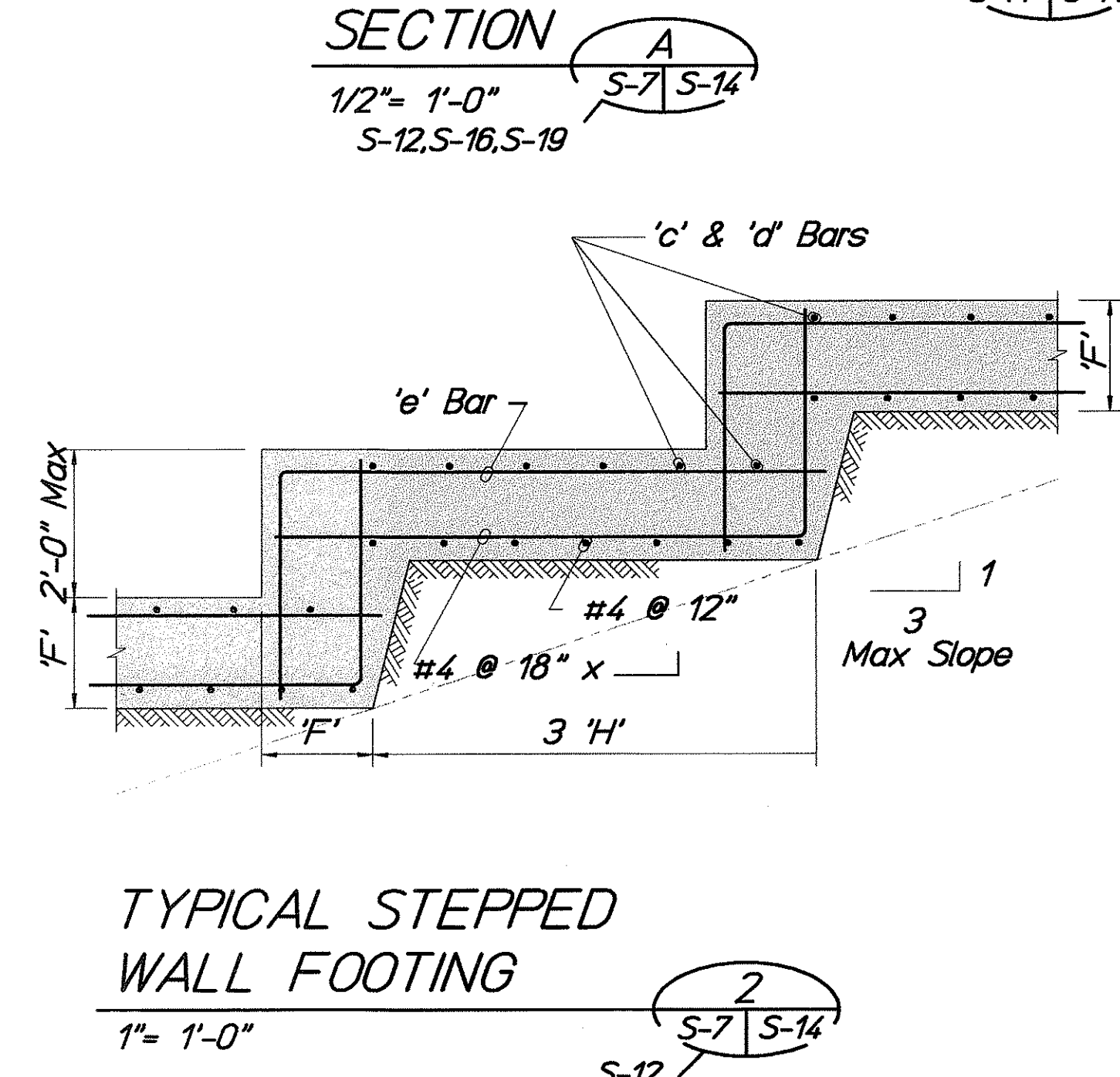
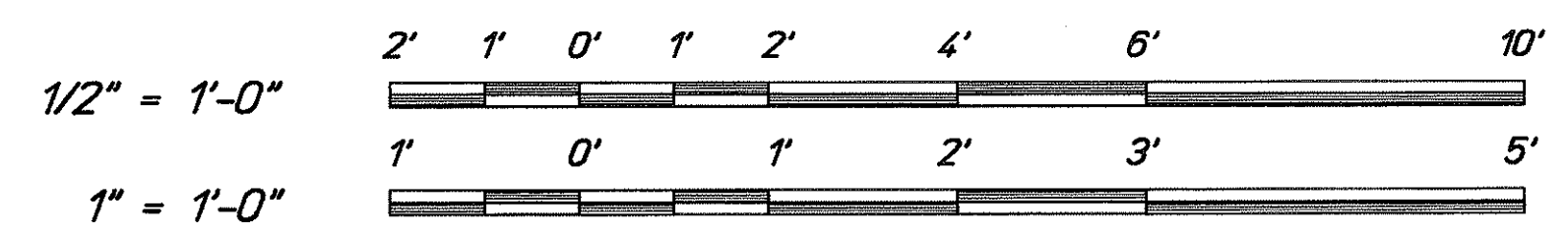
FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH - A311 (7)	2004	113	138



WING WALLS #1 & #2 SCHEDULE

Design 'H'	6'	8'	10'	12'	14'	16'
'F'	1'- 2"	1'- 2"	1'- 4"	1'- 4"	1'- 6"	1'- 10"
'W'	12'- 6"	12'- 6"	12'- 6"	14'- 0"	15'- 6"	19'- 0"
'a' Bars	#5 @ 10	#5 @ 10	#5 @ 10	#6 @ 10	#6 @ 10	#6 @ 10
'b' Bars	#5 @ 20	#6 @ 20	#6 @ 10	#6 @ 10	#7 @ 10	#8 @ 10
'c' Bars	#6 @ 10	#7 @ 10	#7 @ 10	#8 @ 10	#8 @ 10	#9 @ 10
'd' Bars	#6 @ 10	#7 @ 10	#7 @ 10	#8 @ 10	#8 @ 10	#9 @ 10
'e' Bars	12 #5	12 #5	14 #5	14 #5	16 #5	20 #5

GRAPHIC SCALES



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BOX CULVERTS

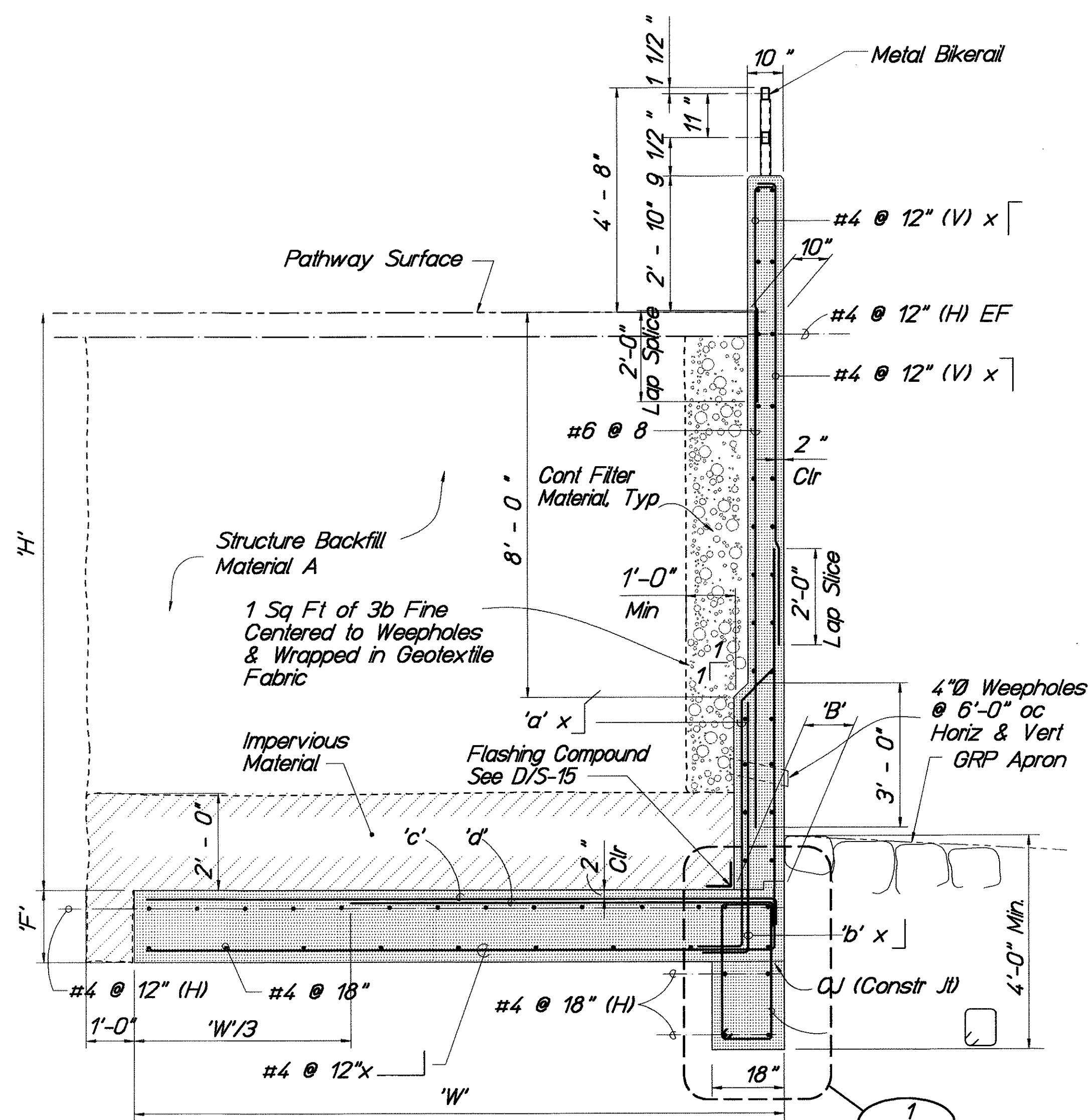
MOKULELE HIGHWAY WIDENING
Vicinity of Kalaloe Bridge
to
Vicinity of Kealia Pond Driveway
Federal - Aid Project No. NH - A311 (7)

Scale: as Shown Date: August 2003
SHEET No. S-14 OF 21 SHEETS

DAVID M. YAMAMOTO
LICENSED PROFESSIONAL ENGINEER
No. 1399-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

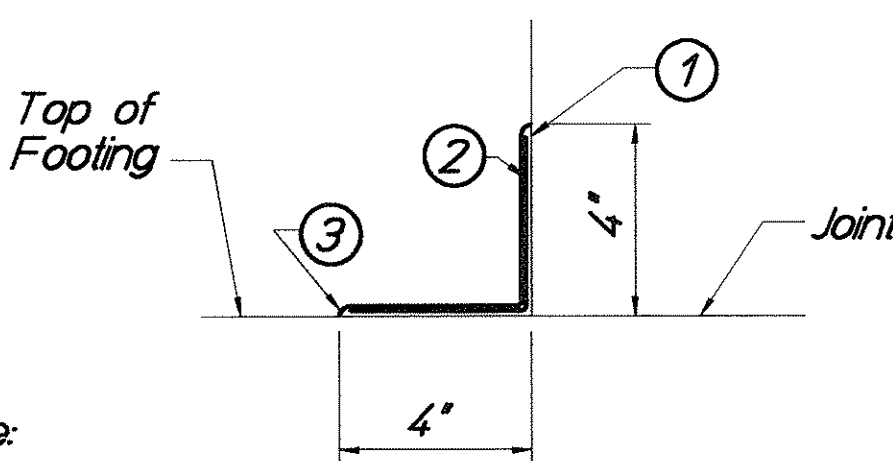
FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH - A311 (7)	2004	114	138



Condition @ Cut Off Wall 'H' > 8'

SECTION
1/2" = 1'-0"
S-12, S-17

WING WALLS #3 & #4 SCHEDULE							
Design 'H'	3'	4'	6'	8'	10'	12'	14'
'F'	1'- 0"	1'- 0"	1'- 0"	1'- 2"	1'- 2"	1'- 4"	1'- 6"
'W'	7'- 6"	7'- 6"	8'- 0"	9'- 0"	9'- 9"	12'- 0"	13'- 6"
'B'	10"	10"	10"	10"	12"	14"	16"
'a' Bars	#4 @ 12	#4 @ 12	#5 @ 12	#6 @ 8	#6 @ 8	#6 @ 10	#6 @ 10
'b' Bars					#6 @ 24	#7 @ 10	#7 @ 10
'c' Bars	#7 @ 12	#7 @ 12	#6 @ 12	#7 @ 12	#8 @ 12	#8 @ 10	#8 @ 10
'd' Bars			#6 @ 12	#7 @ 12	#8 @ 12	#8 @ 10	#8 @ 10

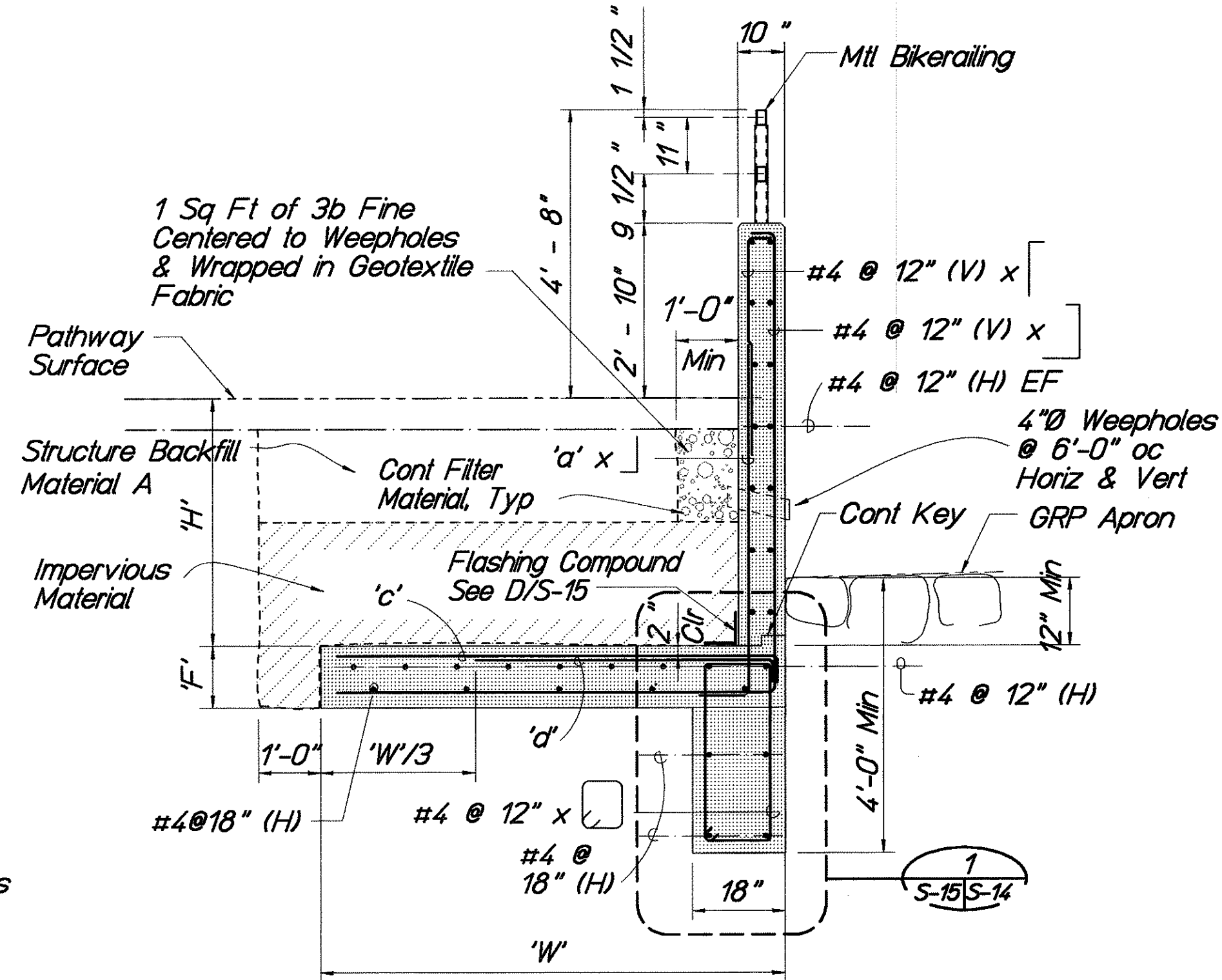


Note:

Flashing Compound for Construction Joint Waterproofing Shall Conform to Requirements of ASTM Specifications D4586 as a Flying Cement in the Construction of Membrane Waterproofing systems With Fabrics Conforming to ASTM Specification D1668 (Asphalt Types). The Product Shall Adhere to Damp Concrete and Masonry Surfaces.

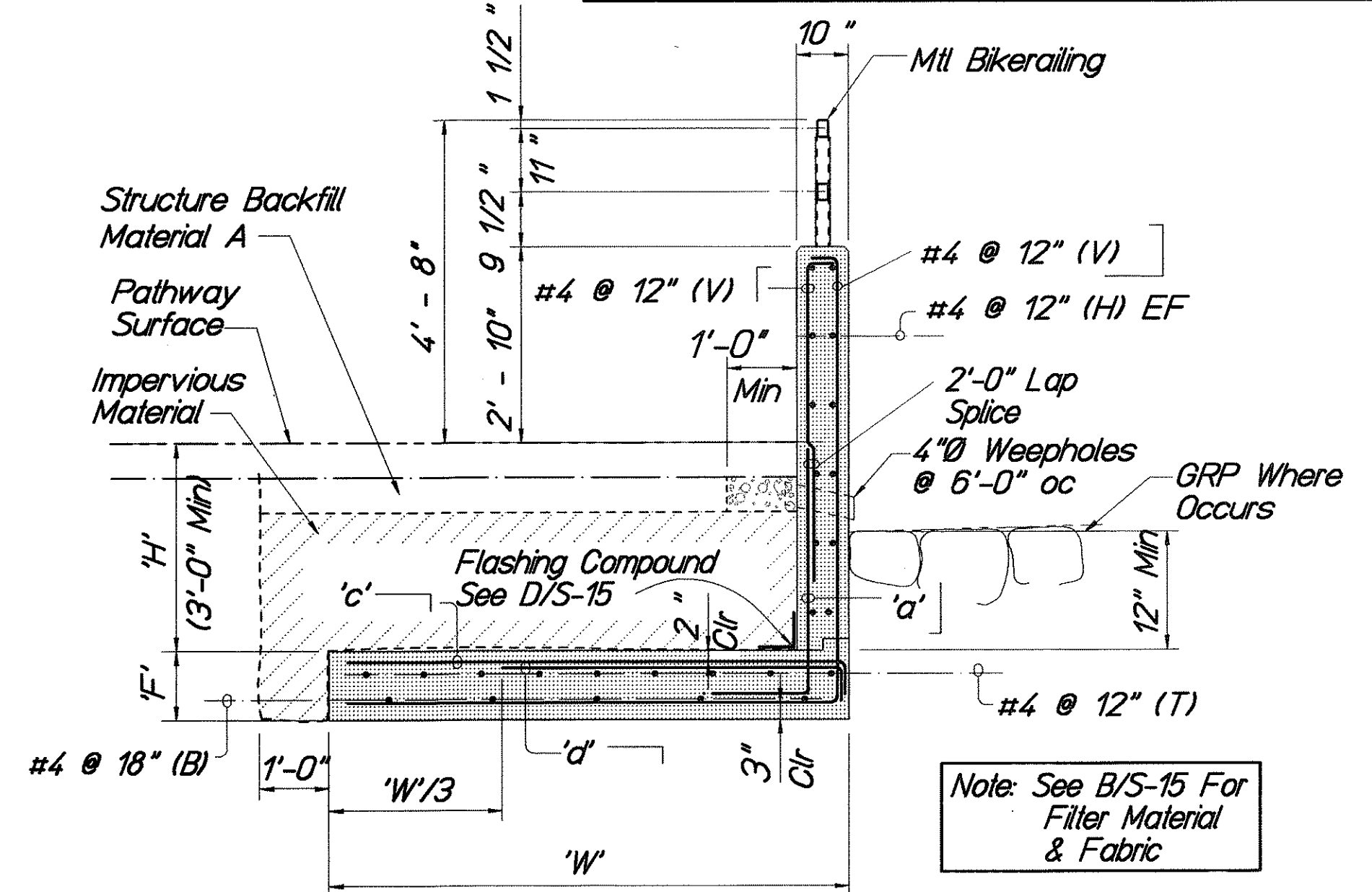
FLASHING COMPOUND
WATERPROOFING DETAIL
NO SCALE

S-14, S-15, S-19, S-20



Condition @ Cut Off Wall 'H' < 8'

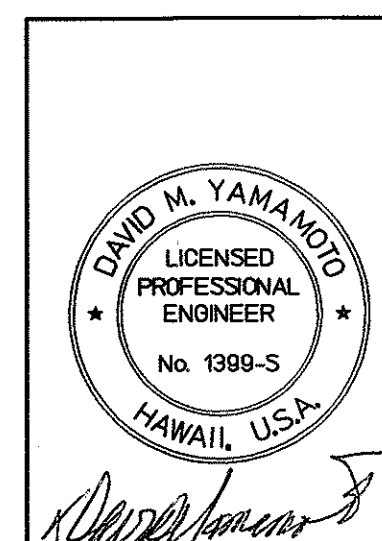
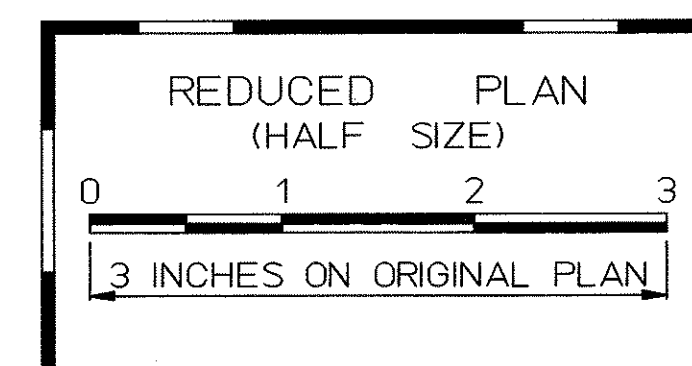
SECTION
1/2" = 1'-0"
S-12, S-17



Condition @ End
CONDITION @ END
1/2" = 1'-0"
S-12, S-17

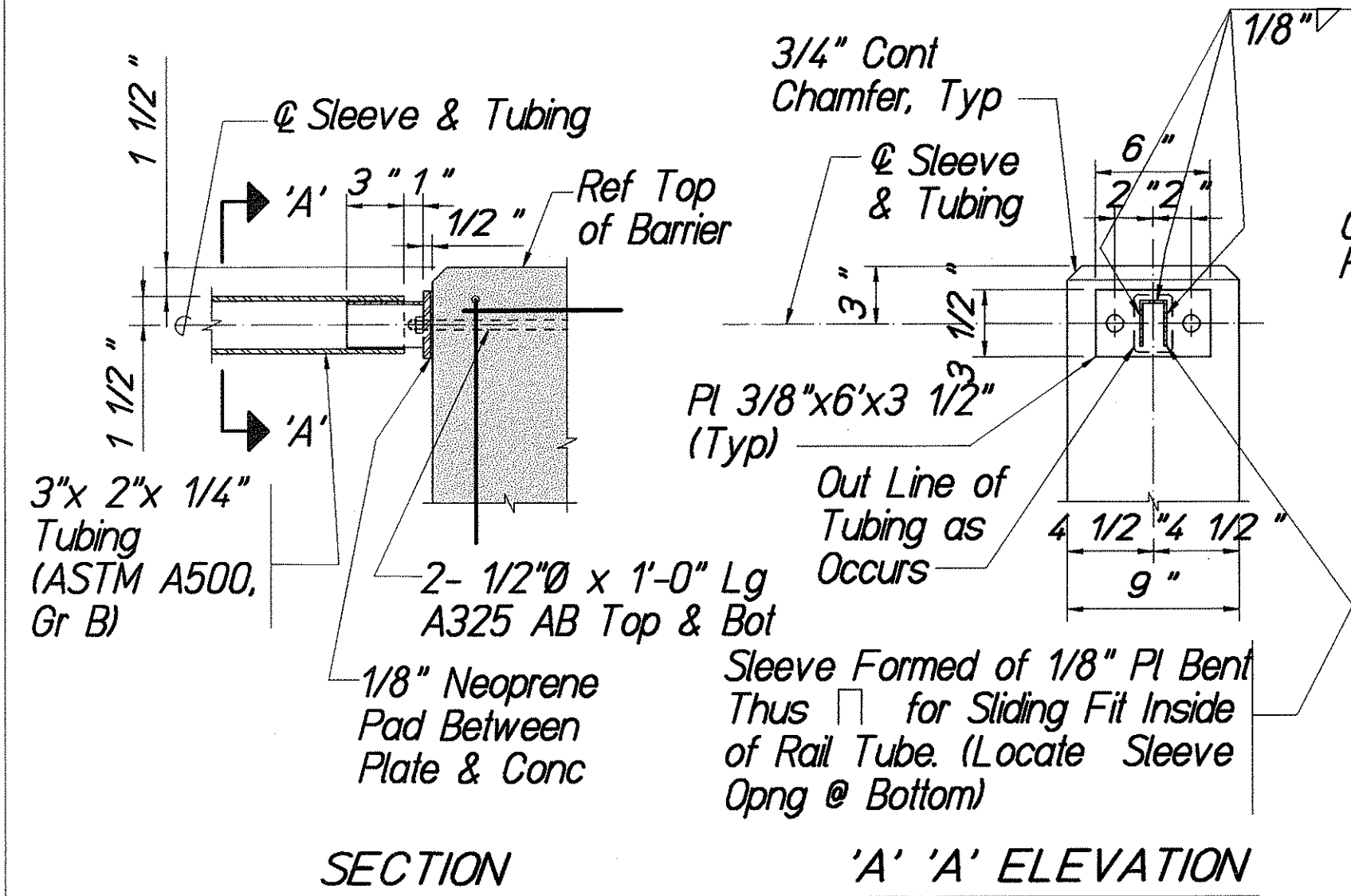
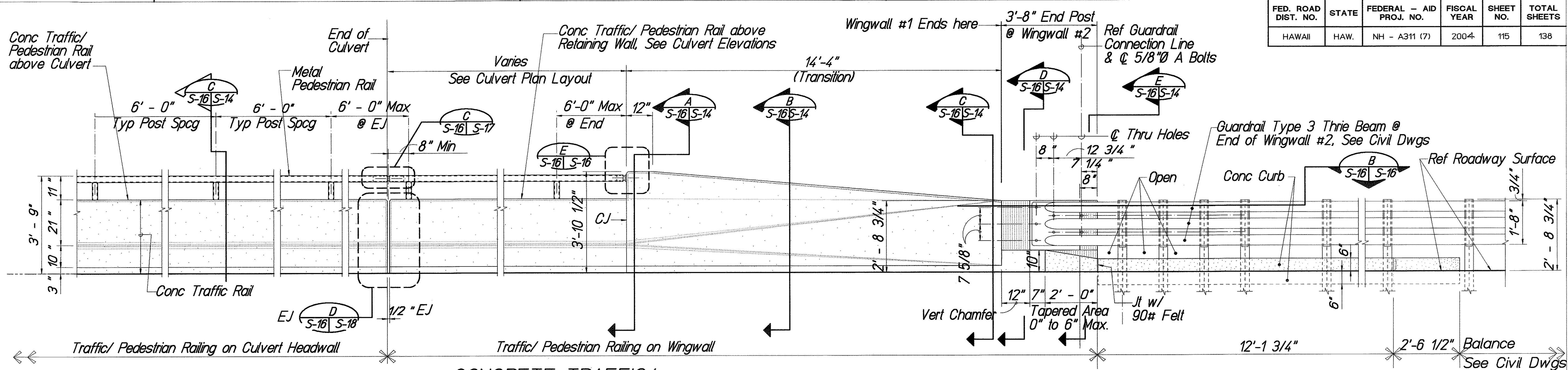
GRAPHIC SCALE

1/2" = 1'-0"



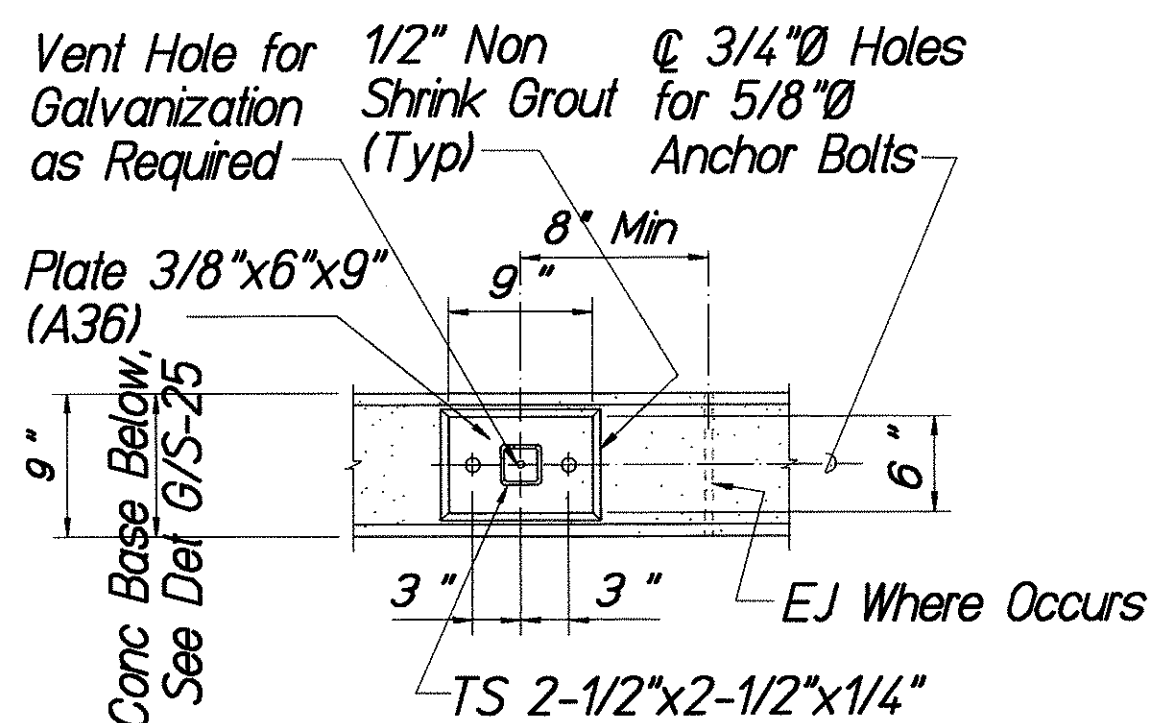
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
BOX CULVERTS
MOKULELE HIGHWAY WIDENING
Vicinity of Kataloa Bridge
to
Vicinity of Kealia Pond Driveway
Federal - Aid Project No. NH - A311 (7)
Scale: as Shown Date: August 2003
SHEET No. S-15 OF 21 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH - A311 (7)	2004	115	138



TYPICAL RAIL SLEEVE ANCHOR AT CONCRETE WING WALL CONNECTION DETAILS

1 1/2" = 1'-0"



ANCHOR PLATE FOR PEDESTRIAN RAIL

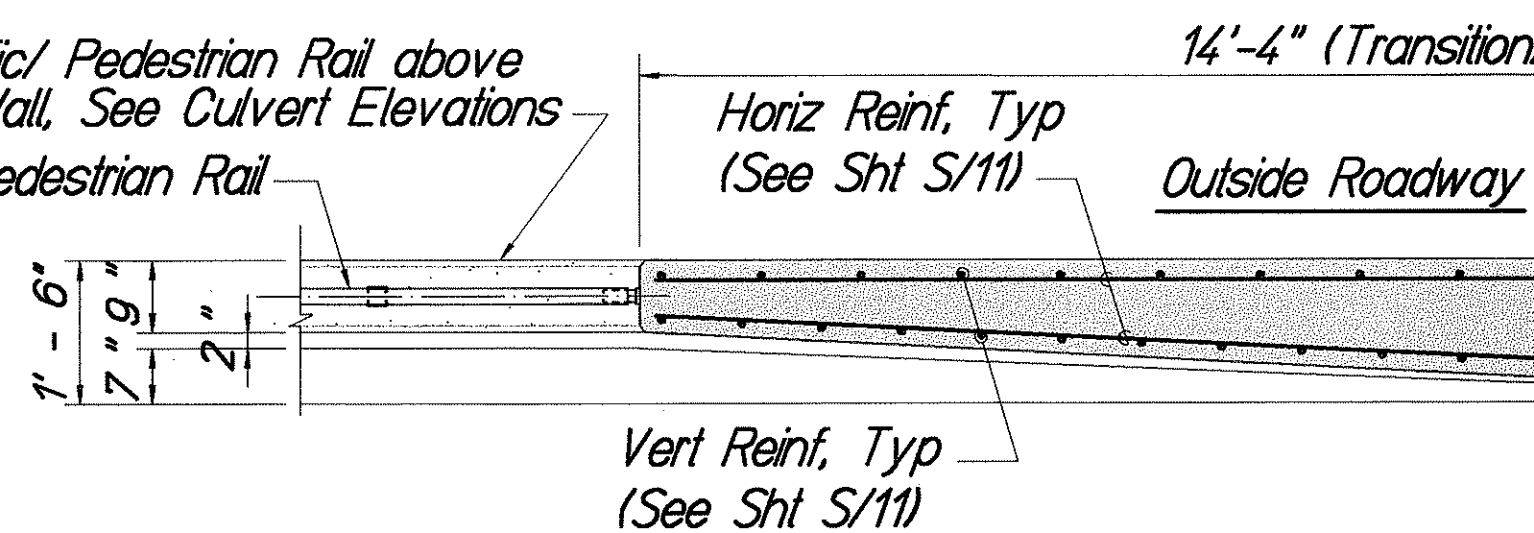
1" = 1'-0"

CONCRETE TRAFFIC/ PEDESTRIAN RAIL-ELEVATION

1/2" = 1'-0"

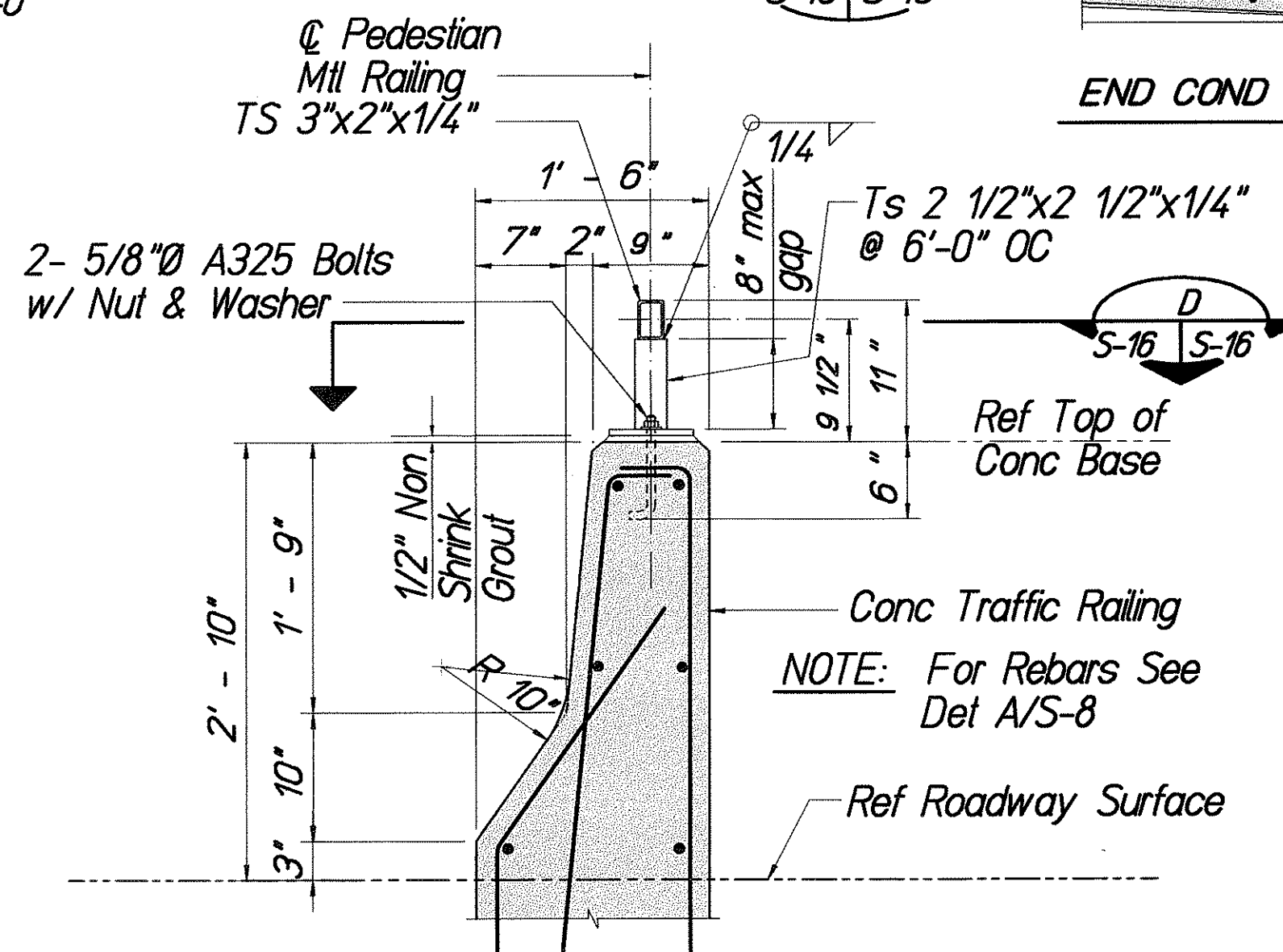
Conc Traffic/ Pedestrian Rail above Retaining Wall, See Culvert Elevations

Metal Pedestrian Rail



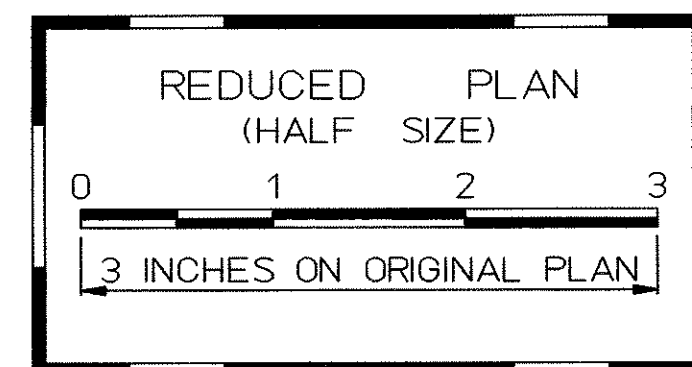
CONCRETE TRAFFIC/ PEDESTRIAN RAIL-TOP VIEWS

1/2" = 1'-0"



PEDESTRIAN RAILING DETAIL

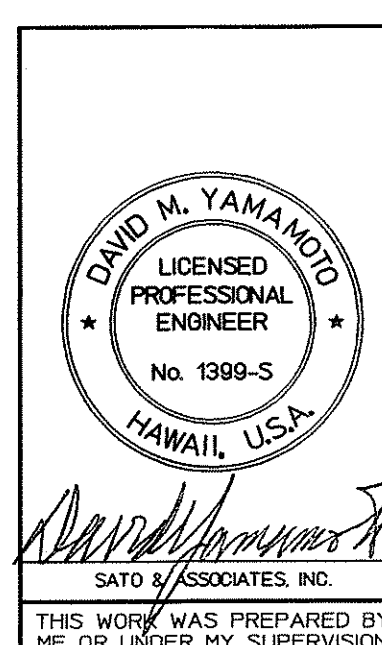
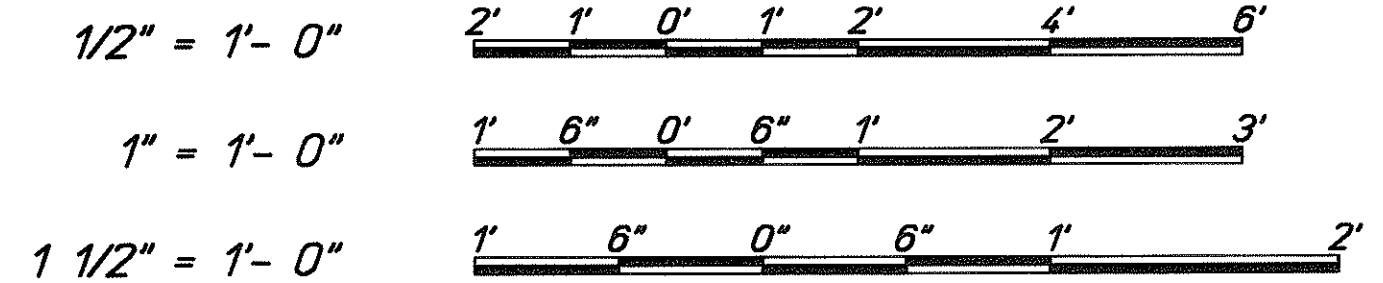
1" = 1'-0"



NOTE:

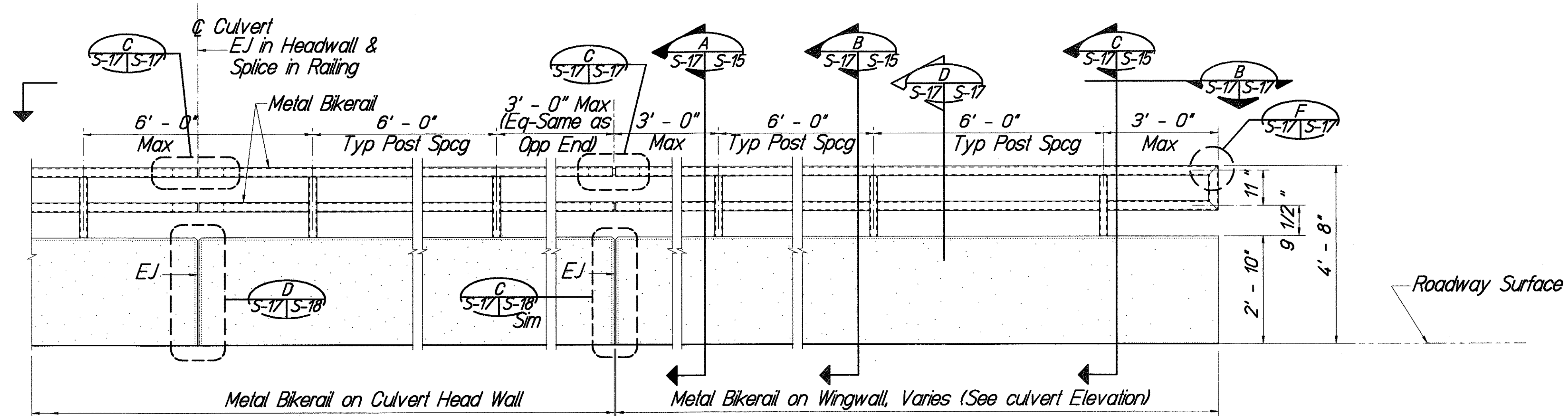
1. Curb to be in Line w/ Front Face of Metal Guardrail & Match Front Face of End Post at Tapered End.
2. Curb Transition Section shall be Cast Monolithically with the Endpost.

GRAPHIC SCALES



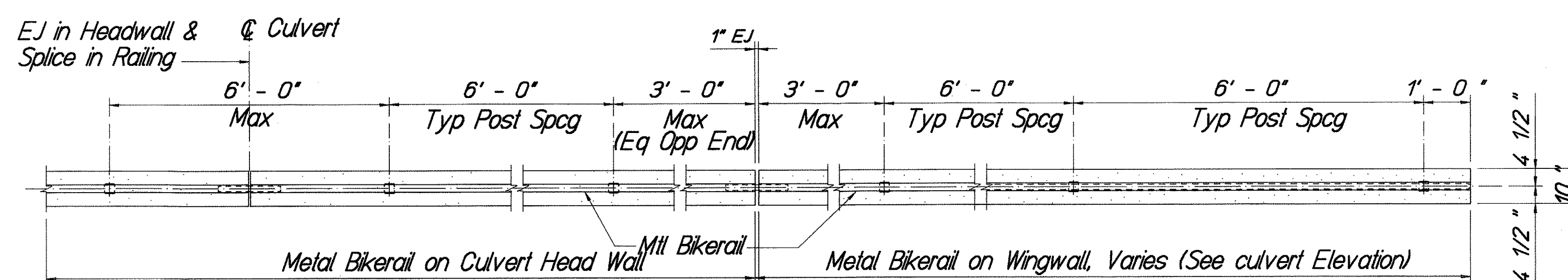
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
BOX CULVERTS
MOKULELE HIGHWAY WIDENING
Vicinity of Kotalaa Bridge
to
Vicinity of Kealia Pond Driveway
Federal - Aid Project No. NH - A311 (7)
Scale: as Shown Date: August 2003
SHEET No. S-16 OF 21 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH - A311 (7)	2004	116	138

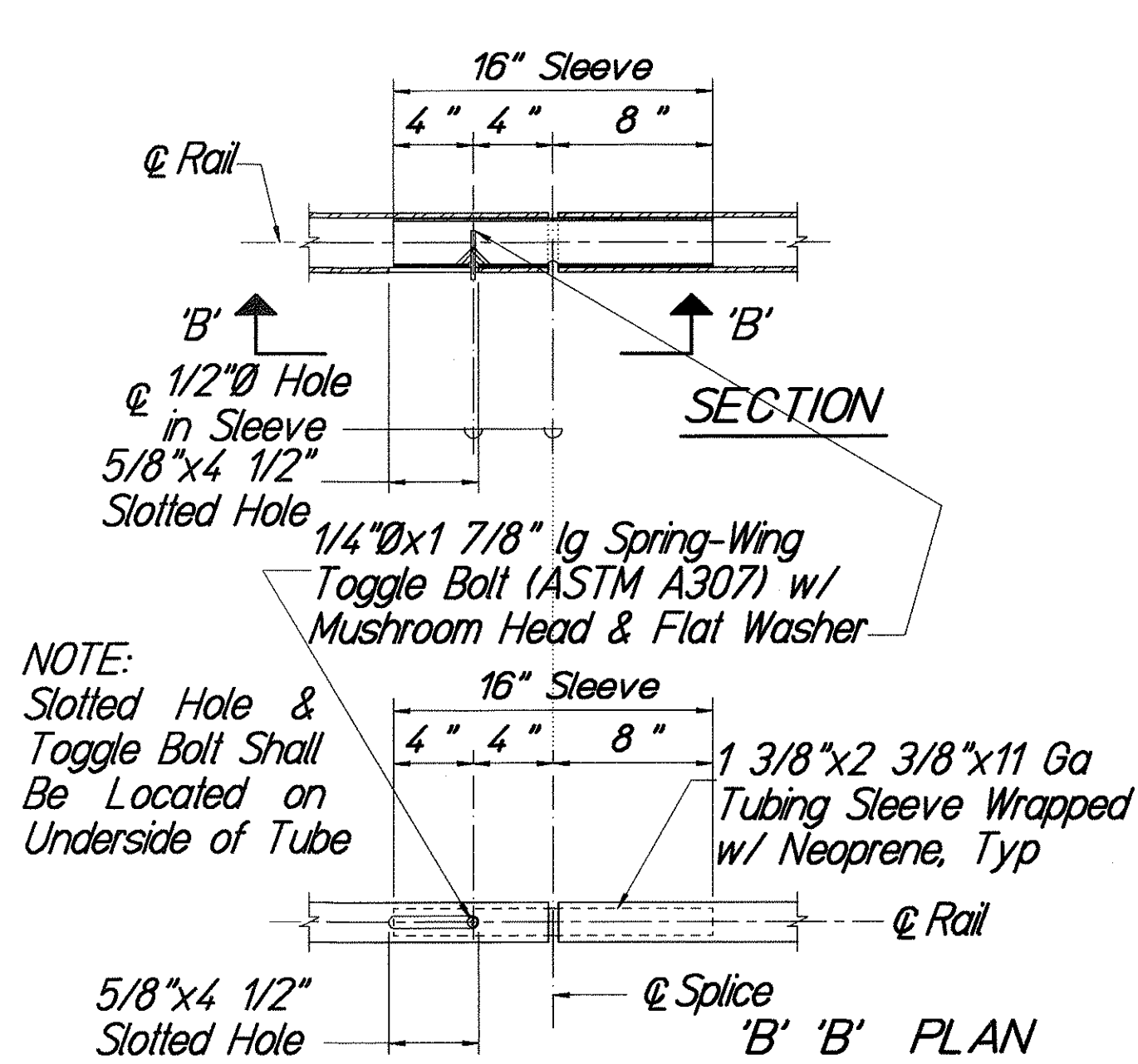


BIKERAIL - ELEVATION

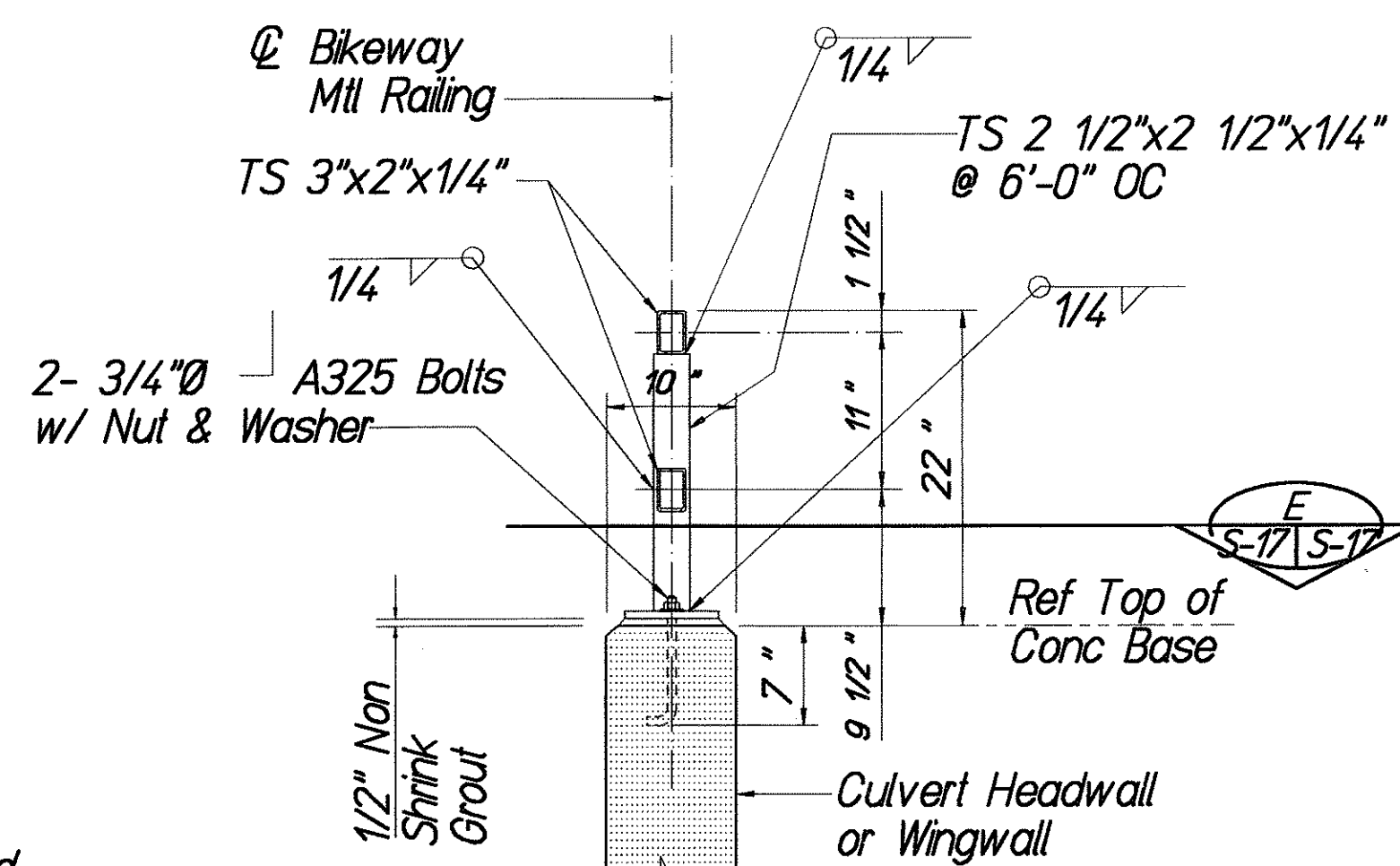
1/2"= 1'-0" (Wingwall #3 Shown, Wingwall #4 Opp Hand)



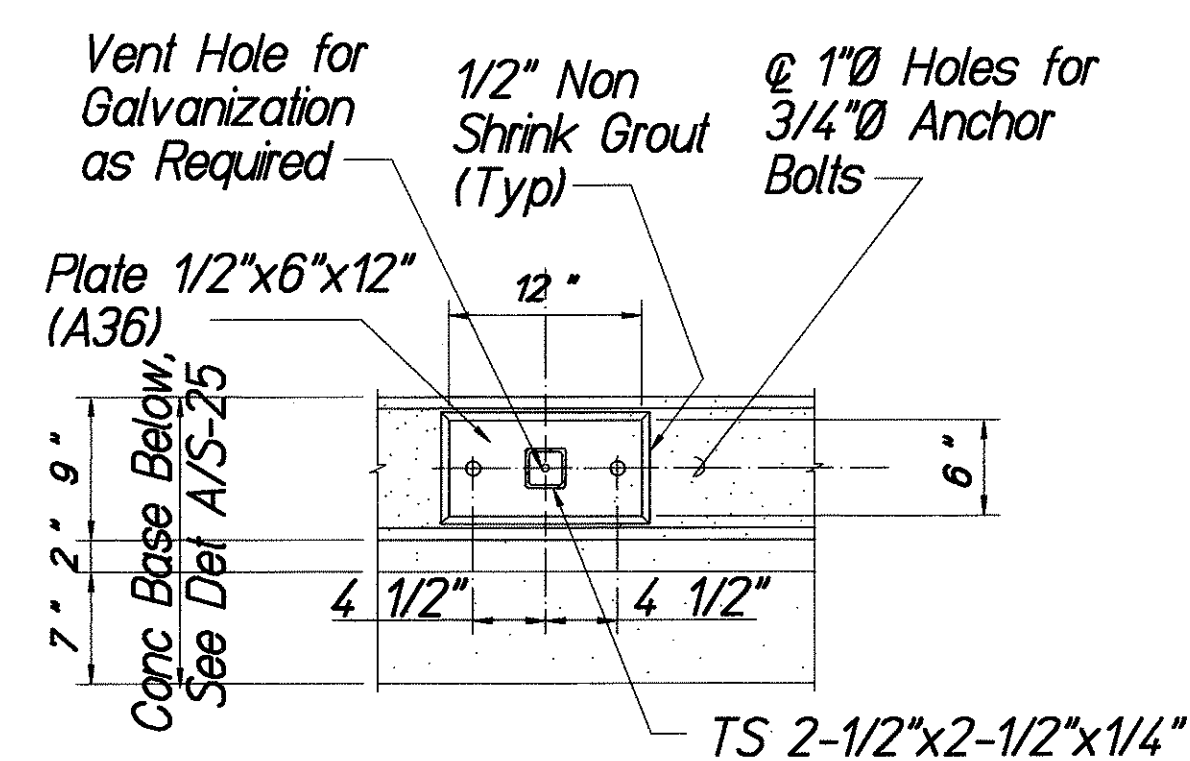
BIKERAIL - TOP VIEW

$$1/2'' = 1'-0''$$


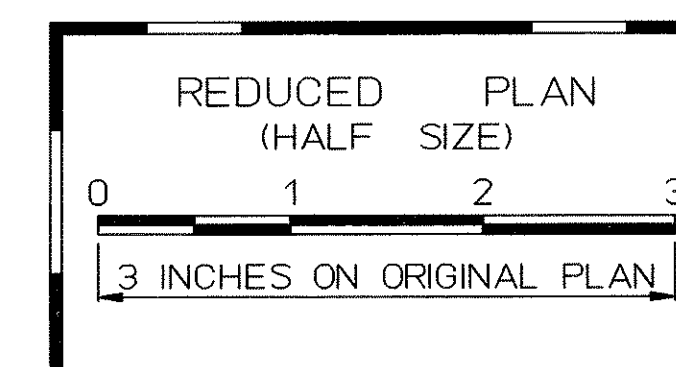
TYPICAL TUBE SPlice DETAILS

$$1\frac{1}{2}'' = 1'-0''$$


BIKEWAY RAILING DETAIL

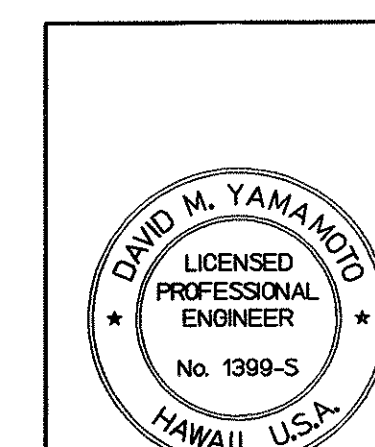
$$1'' = 1' - 0''$$


ANCHOR PLATE
FOR BIKERAIL

$$1'' = 1' - 0''$$


GRAPHIC SCALES

$1/2" = 1' - 0"$ $2' \quad 1' \quad 0' \quad 1' \quad 2' \quad 4' \quad 6'$
 $1" = 1' - 0"$ $1' \quad 6" \quad 0' \quad 6" \quad 1' \quad 2' \quad 3'$
 $1 \ 1/2" = 1' - 0"$ $1' \quad 6" \quad 0" \quad 6" \quad 1' \quad 2'$



David J. Sato
SATO & ASSOCIATES, INC.
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BOX CULVERTS

MOKULELE HIGHWAY WIDENING

Vicinity of Kolaloa Bridge

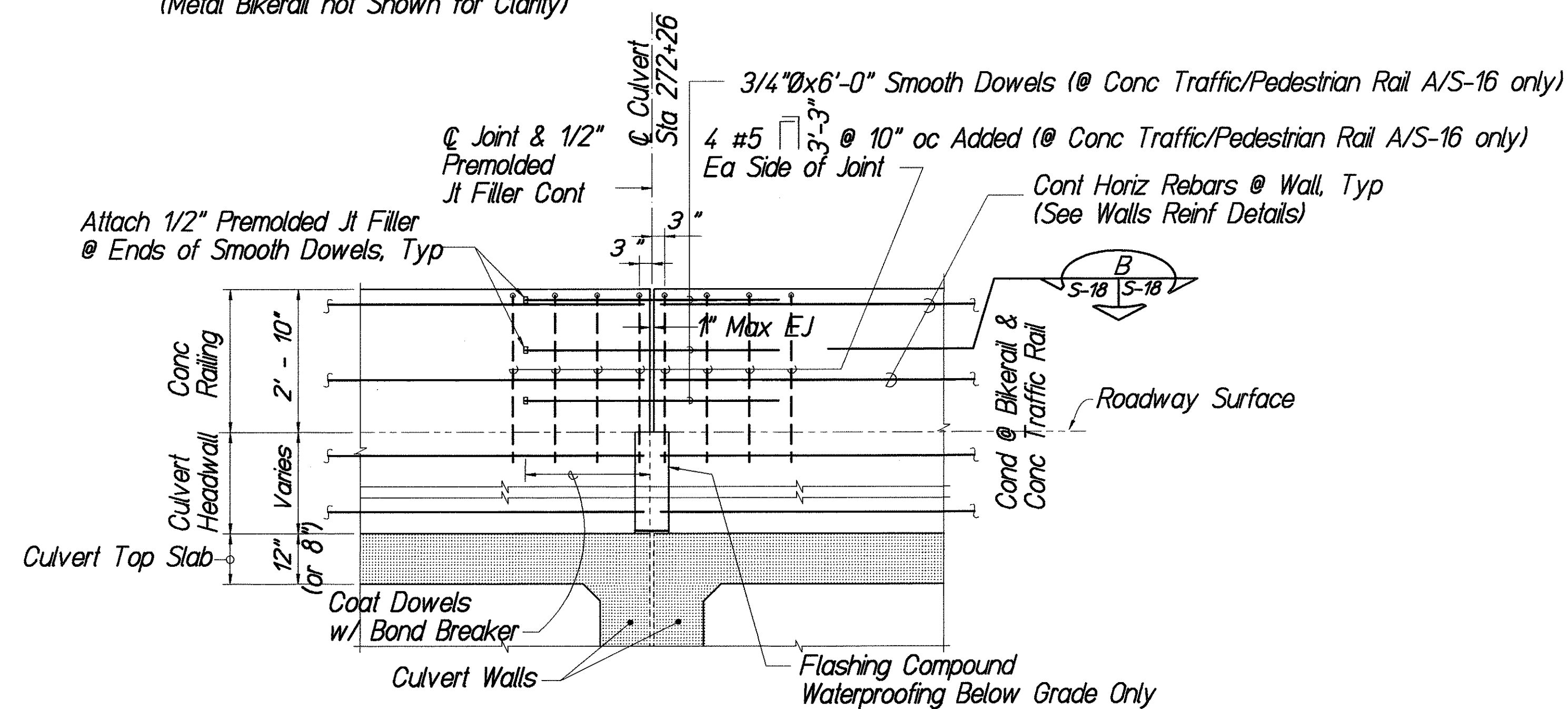
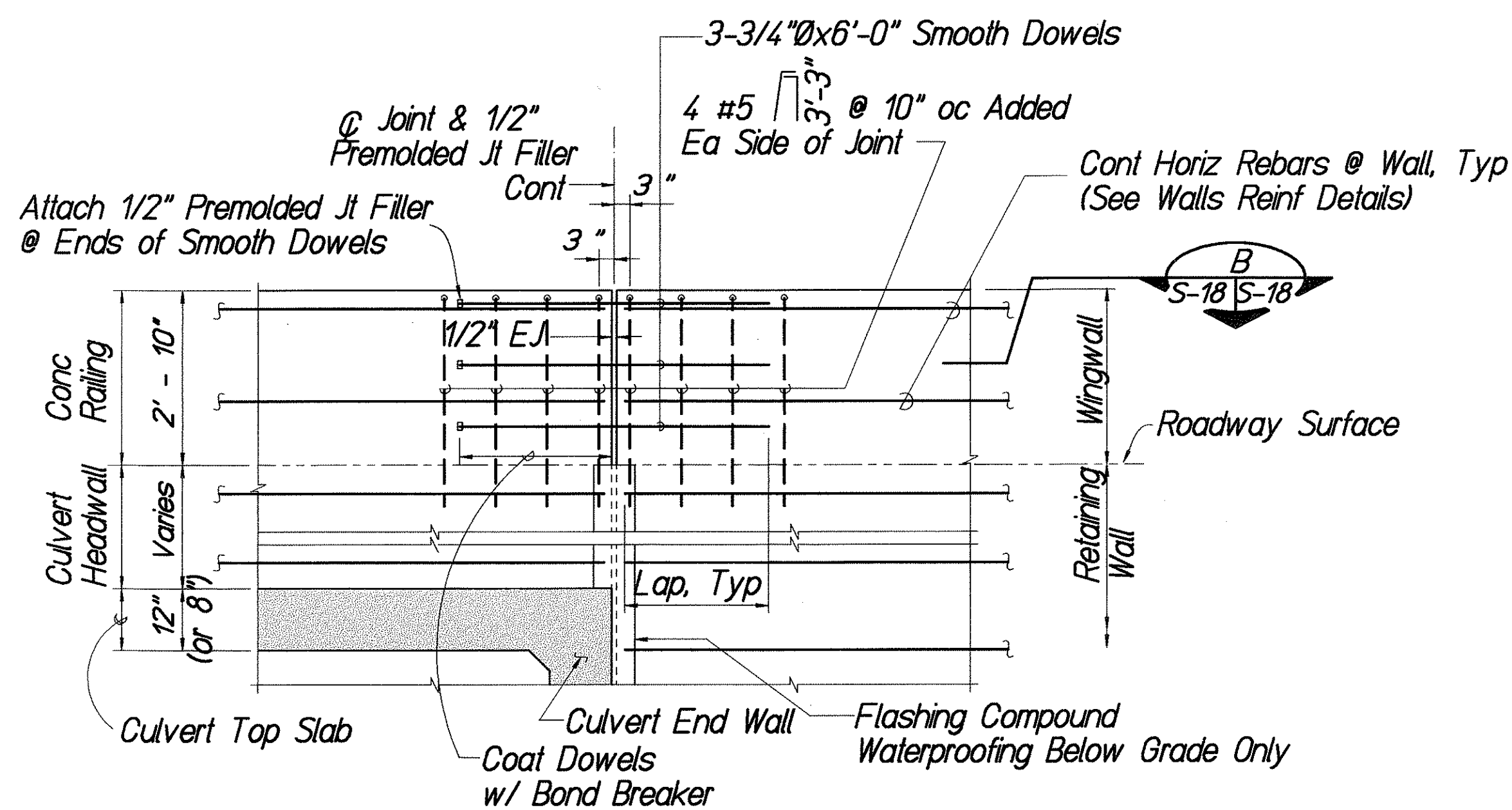
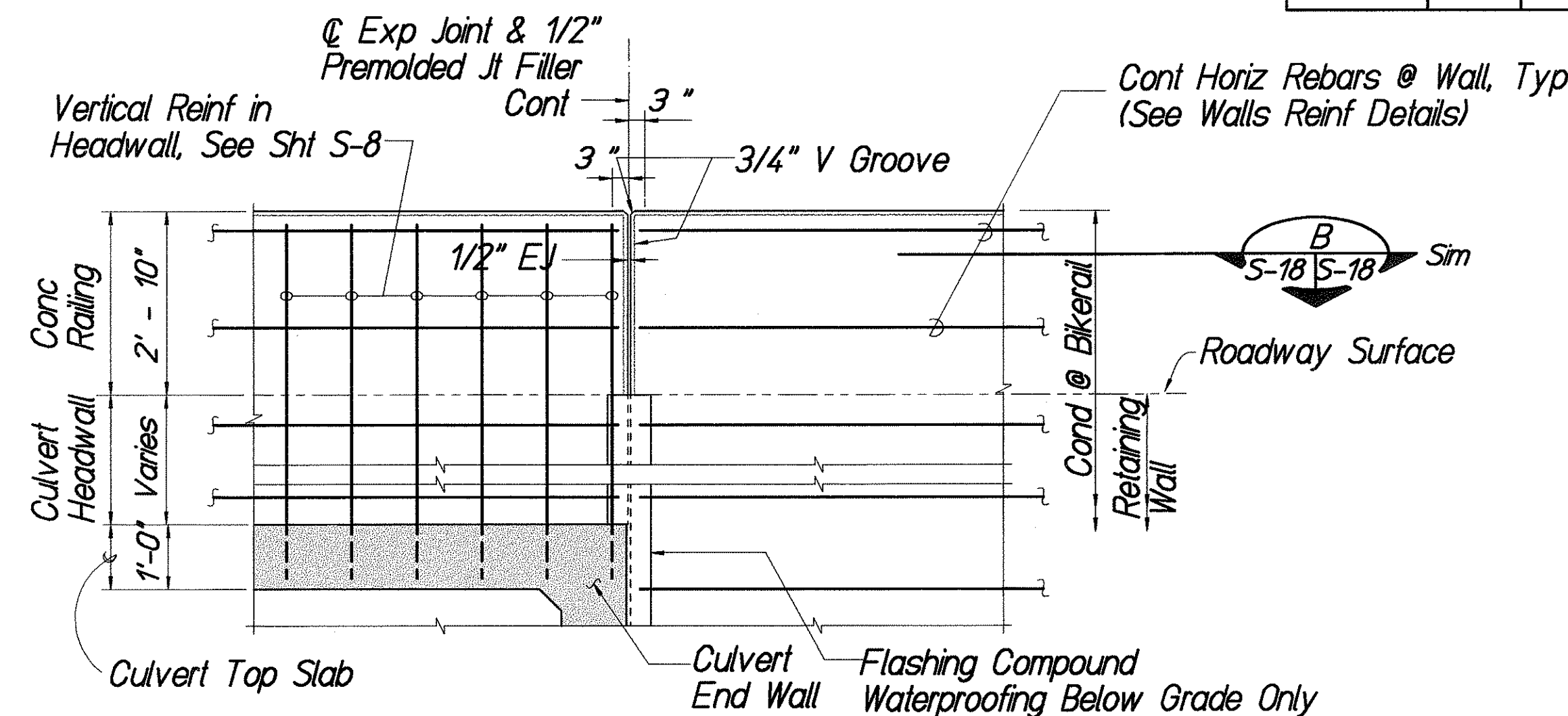
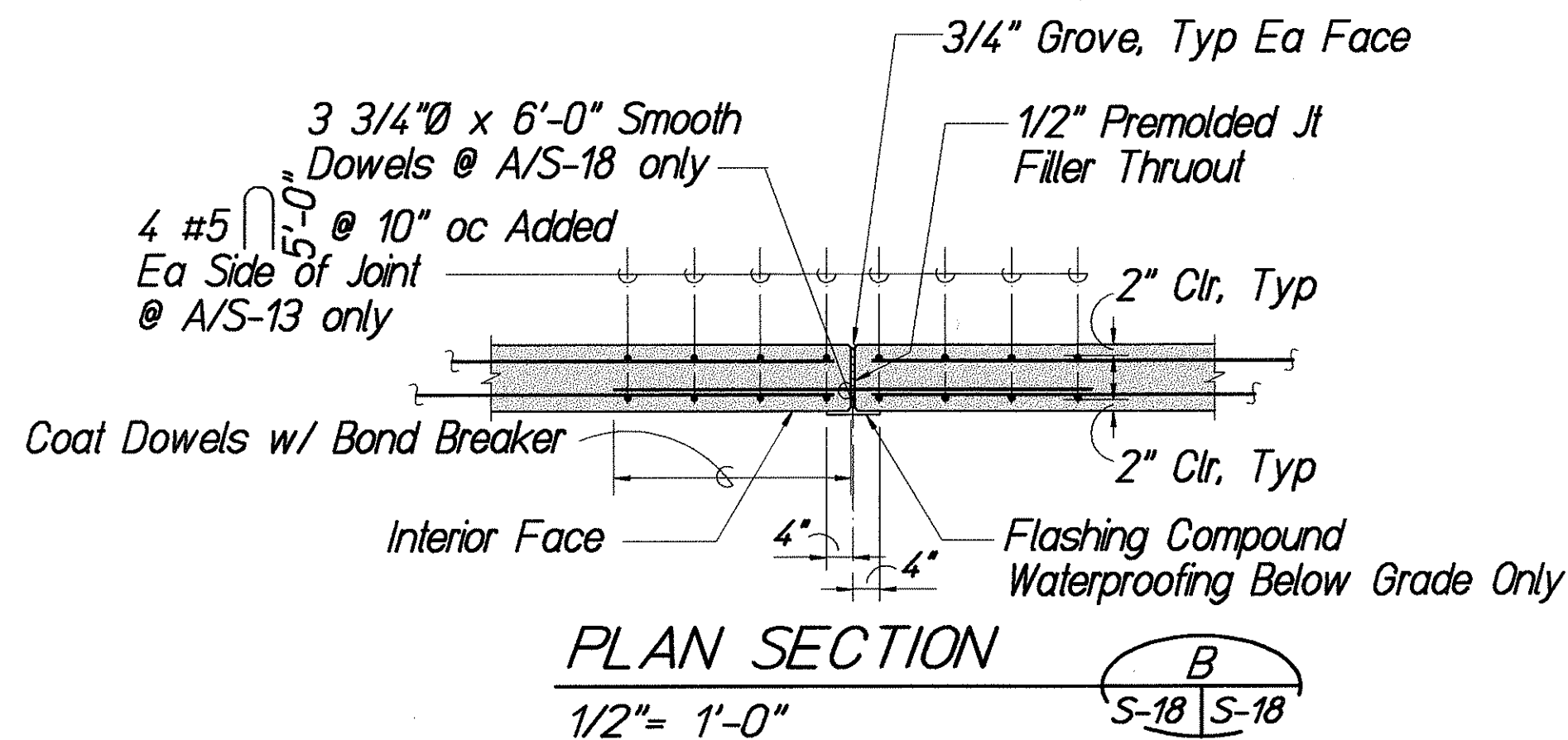
to
Vicinity of Kealia Pond Driveway

Federal - Aid Project No. NH - A311 (7)

Scale: as Shown Date: August 2003

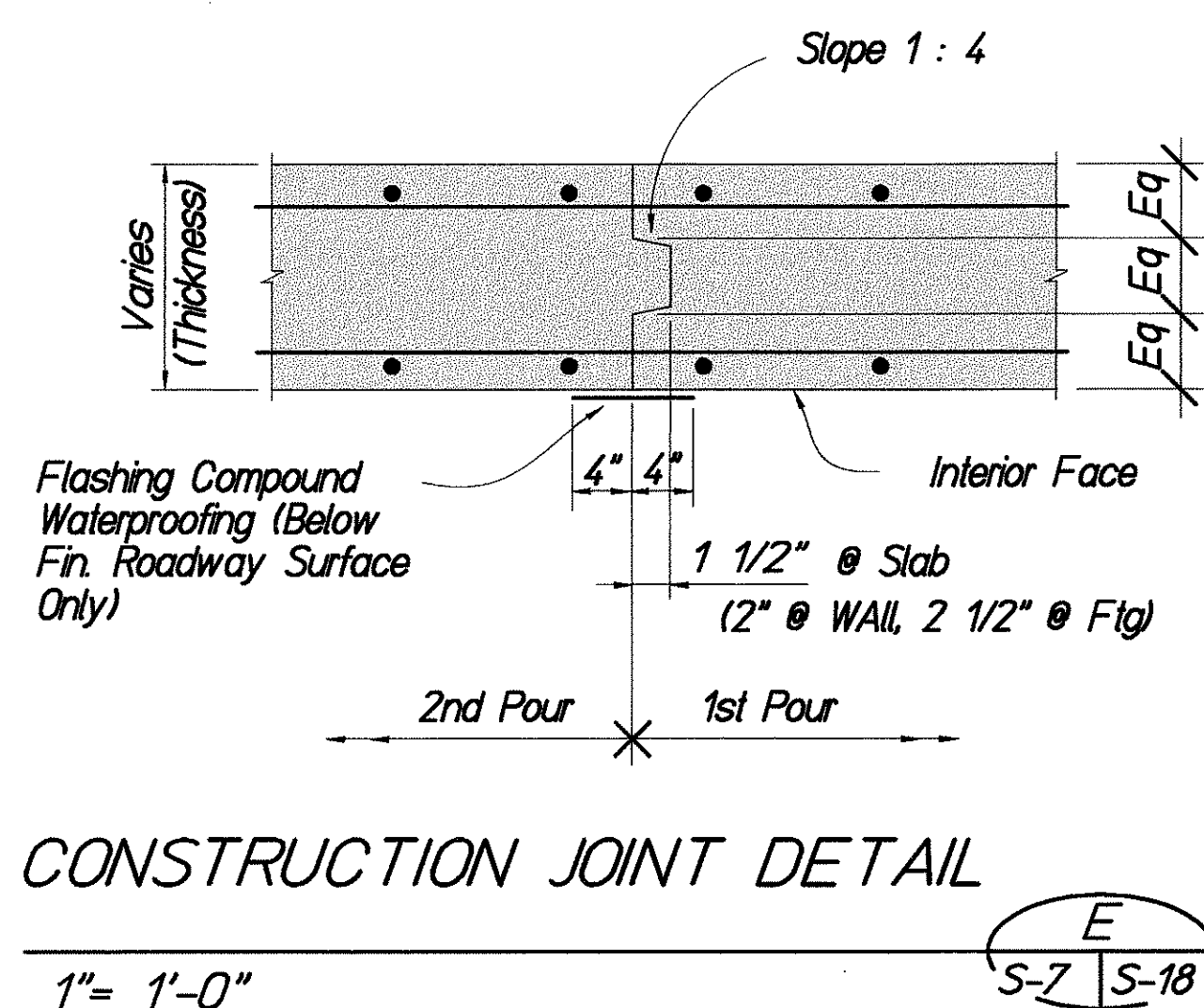
SHEET No. S-17 OF 21 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH - A311 (7)	2004	117	138

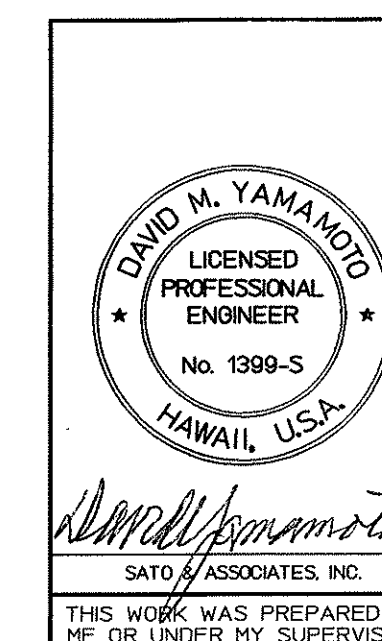
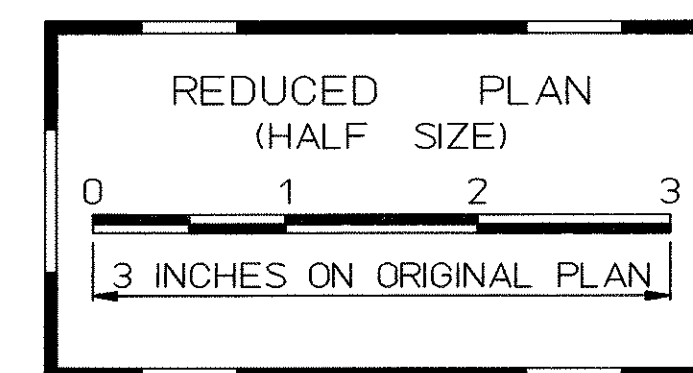
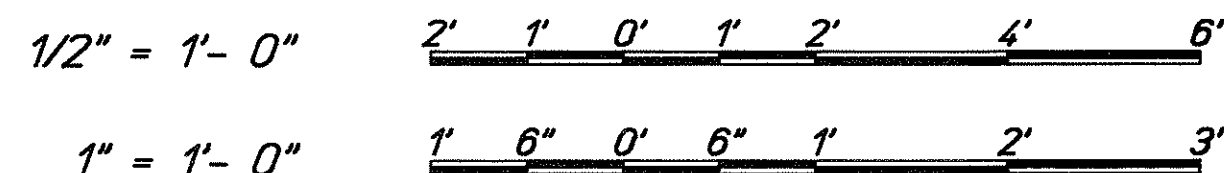


EXPANSION JOINT DETAIL
(CONDITION @ TRAFFIC RAILING SIDE)
1/2" = 1'-0"
(Metal Pedestrian not Shown for Clarity)

EXPANSION JOINT DETAIL
(CONDITION @ CENTER OF 8 CELLS CULVERT)
1/2" = 1'-0"



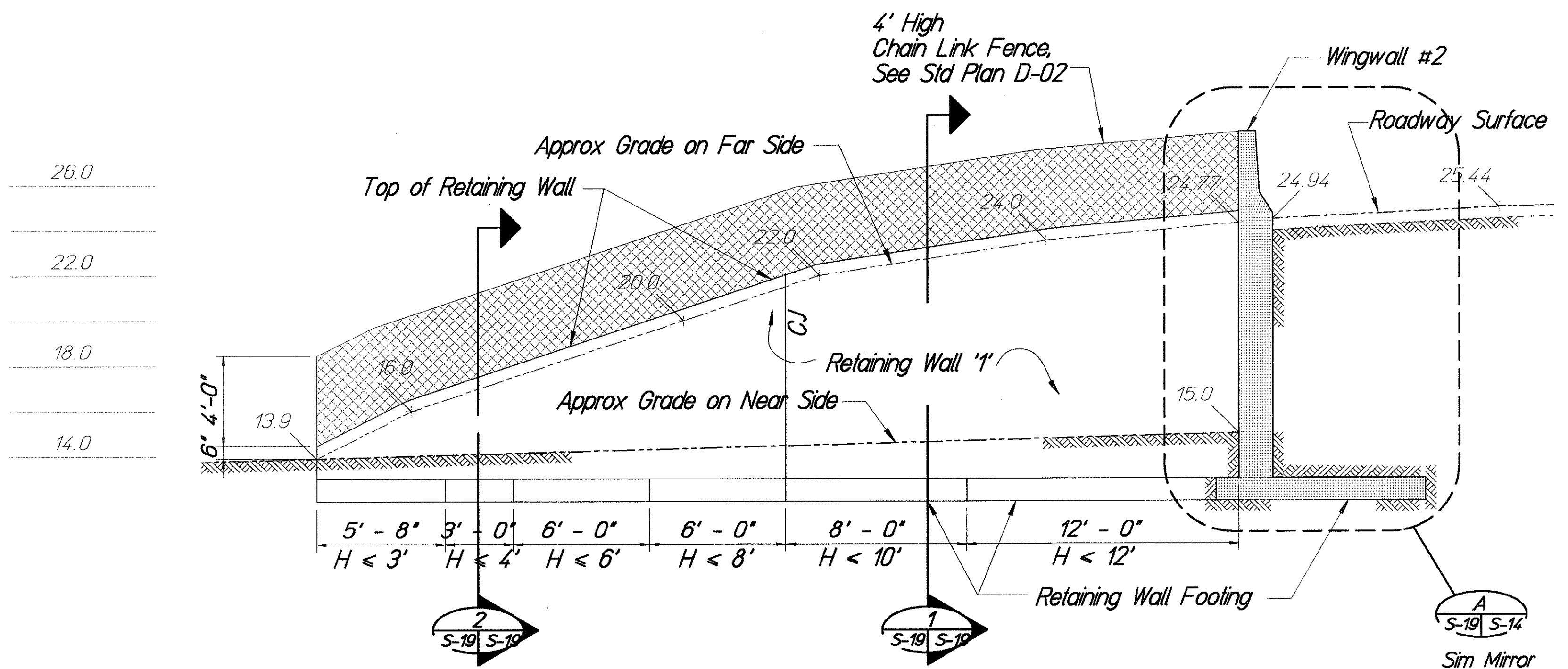
GRAPHIC SCALES



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
BOX CULVERTS
MOKULELE HIGHWAY WIDENING
Vicinity of Kalahele Bridge
to
Vicinity of Kealia Pond Driveway
Federal - Aid Project No. NH - A311 (7)
Scale: as Shown Date: August 2003
SHEET No. S-18 OF 21 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH - A311 (7)	2004	118	138

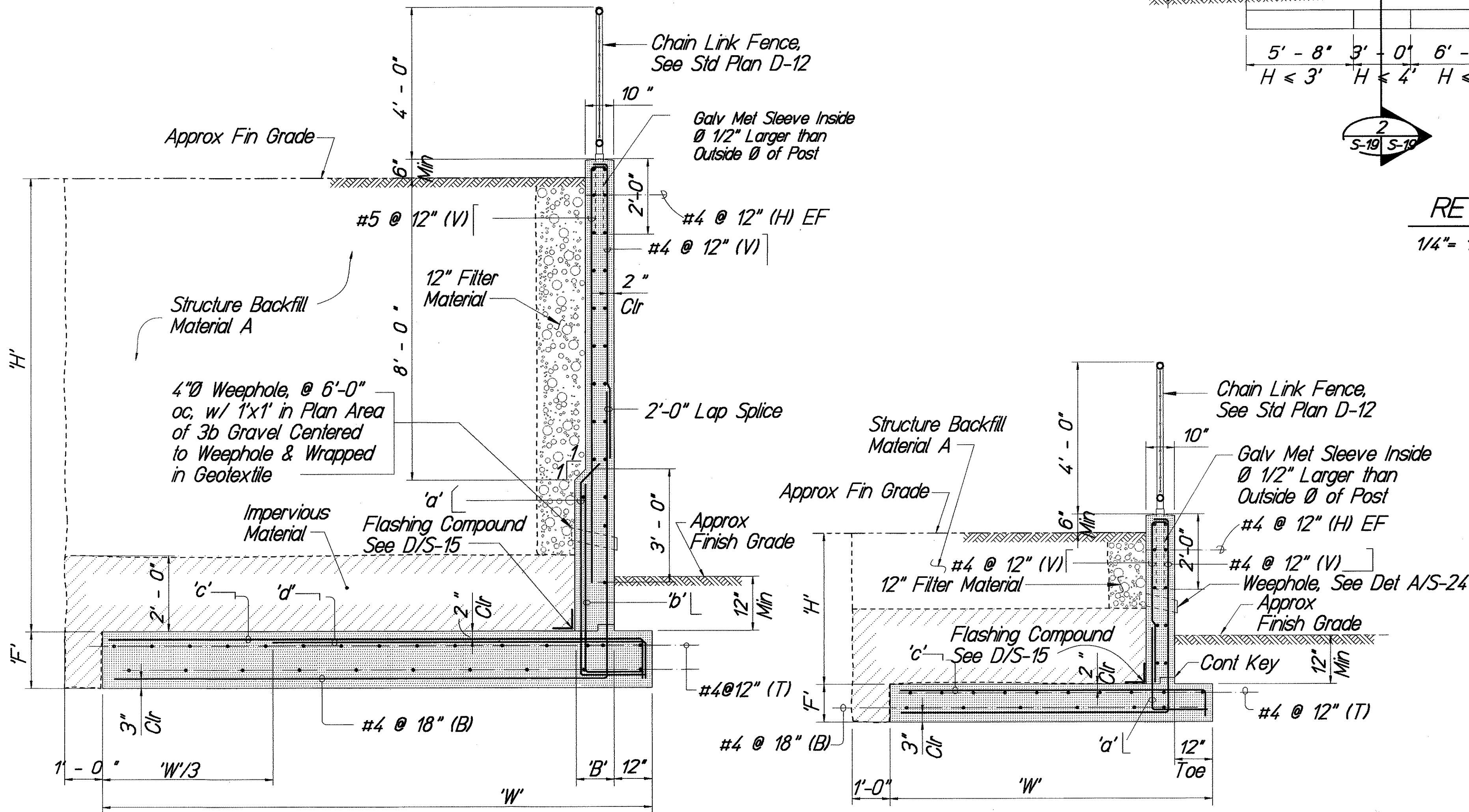
RETAINING WALL SCHEDULE						
Design 'H'	3'	4'	6'	8'	10'	12'
'F'	1'- 0"	1'- 0"	1'- 0"	1'- 0"	1'- 0"	1'- 0"
'W'	3'- 0"	4'- 0"	5'- 0"	7'- 0"	8'- 0"	9'- 6"
'B'	10"	10"	10"	10"	12"	12"
'a' Bars	#4 @ 12	#4 @ 12	#4 @ 12	#5 @ 12	#5 @ 12	#6 @ 12
'b' Bars					#5 @ 12	#6 @ 12
'c' Bars	#4 @ 12	#4 @ 12	#4 @ 12	#5 @ 12	#5 @ 12	#5 @ 12
'd' Bars					#4 @ 12	#6 @ 12
Toe	1'- 0"	1'- 0"	1'- 0"	1'- 0"	1'- 0"	1'- 0"



RETAINING WALL '1' ELEVATION

1/4" = 1'-0"

A
S-8 S-19



Condition w/ 'H' > 8'

SECTION

1/2" = 1'-0"

1
S-19 S-19

Condition w/ 'H' < 8'

SECTION

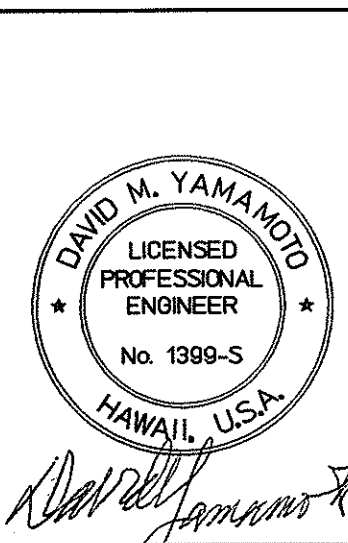
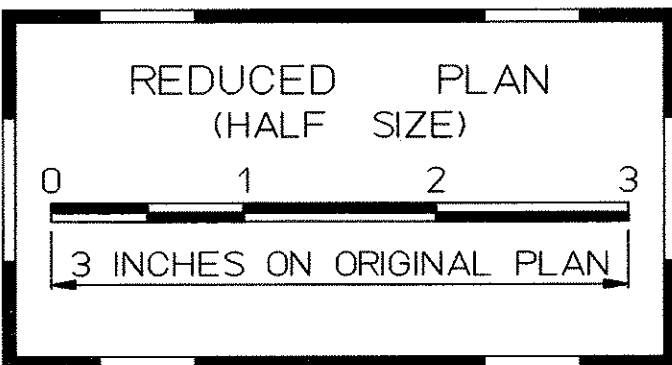
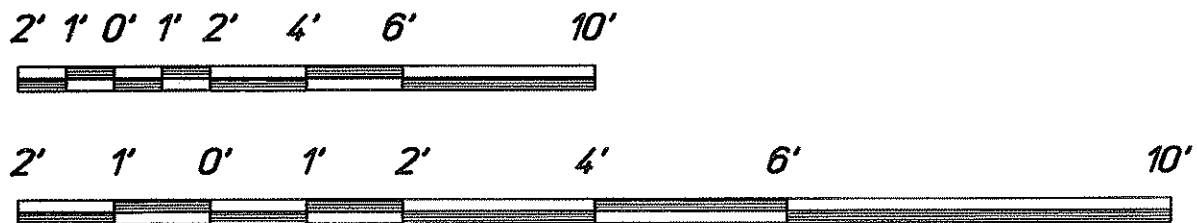
1/2" = 1'-0"

2
S-19 S-19

GRAPHIC SCALES

1/4" = 1'-0"

1/2" = 1'-0"

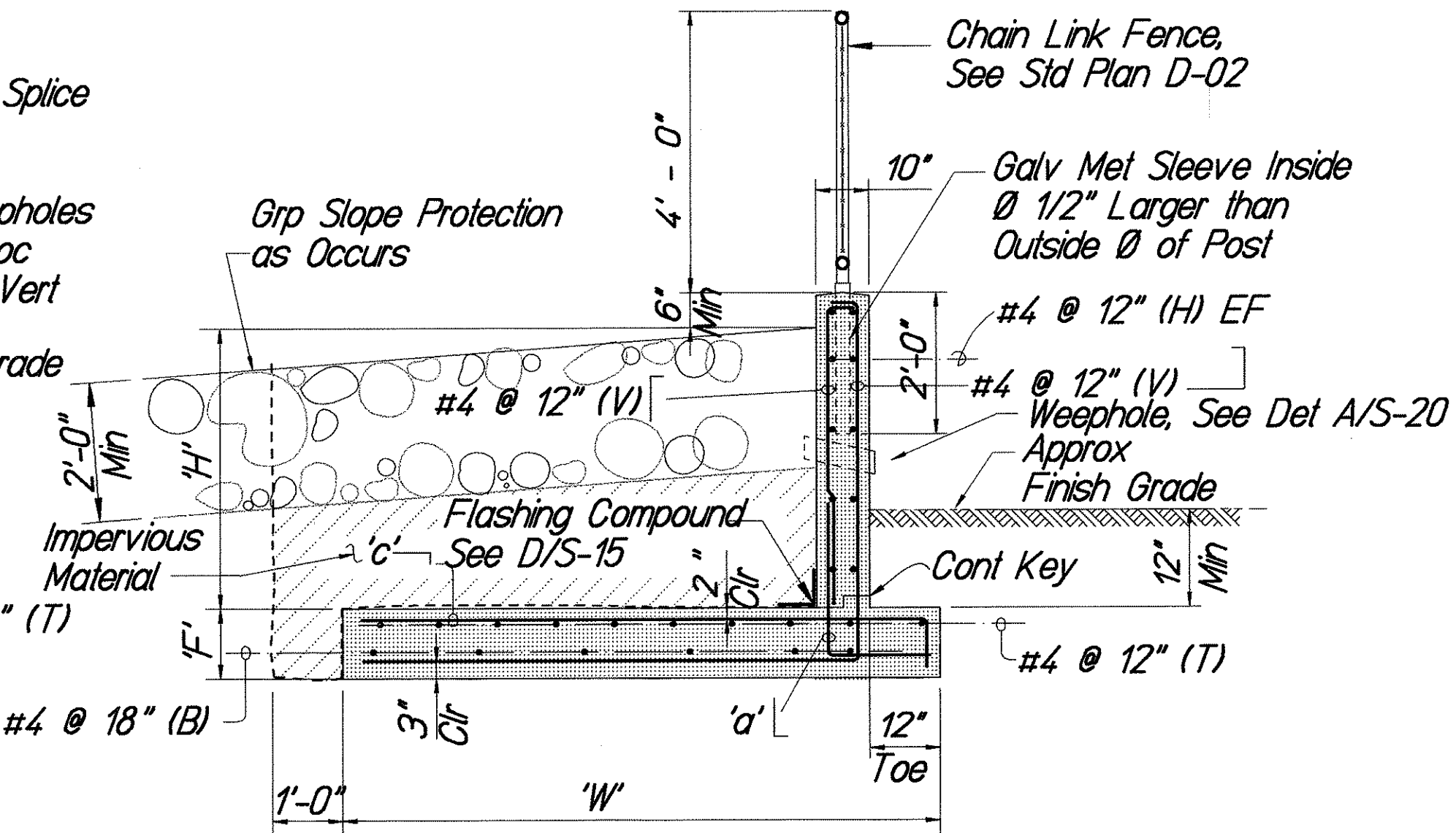
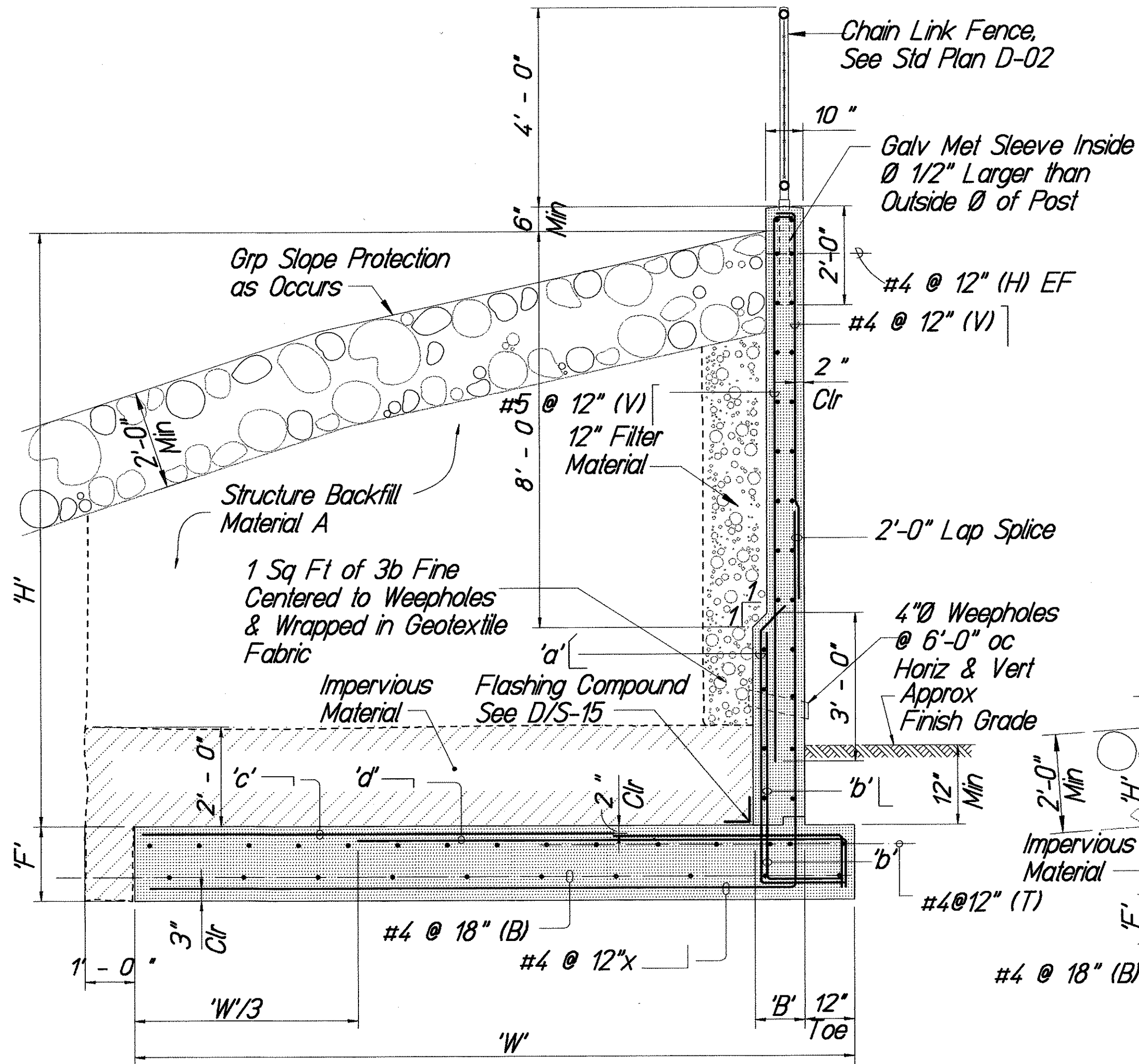
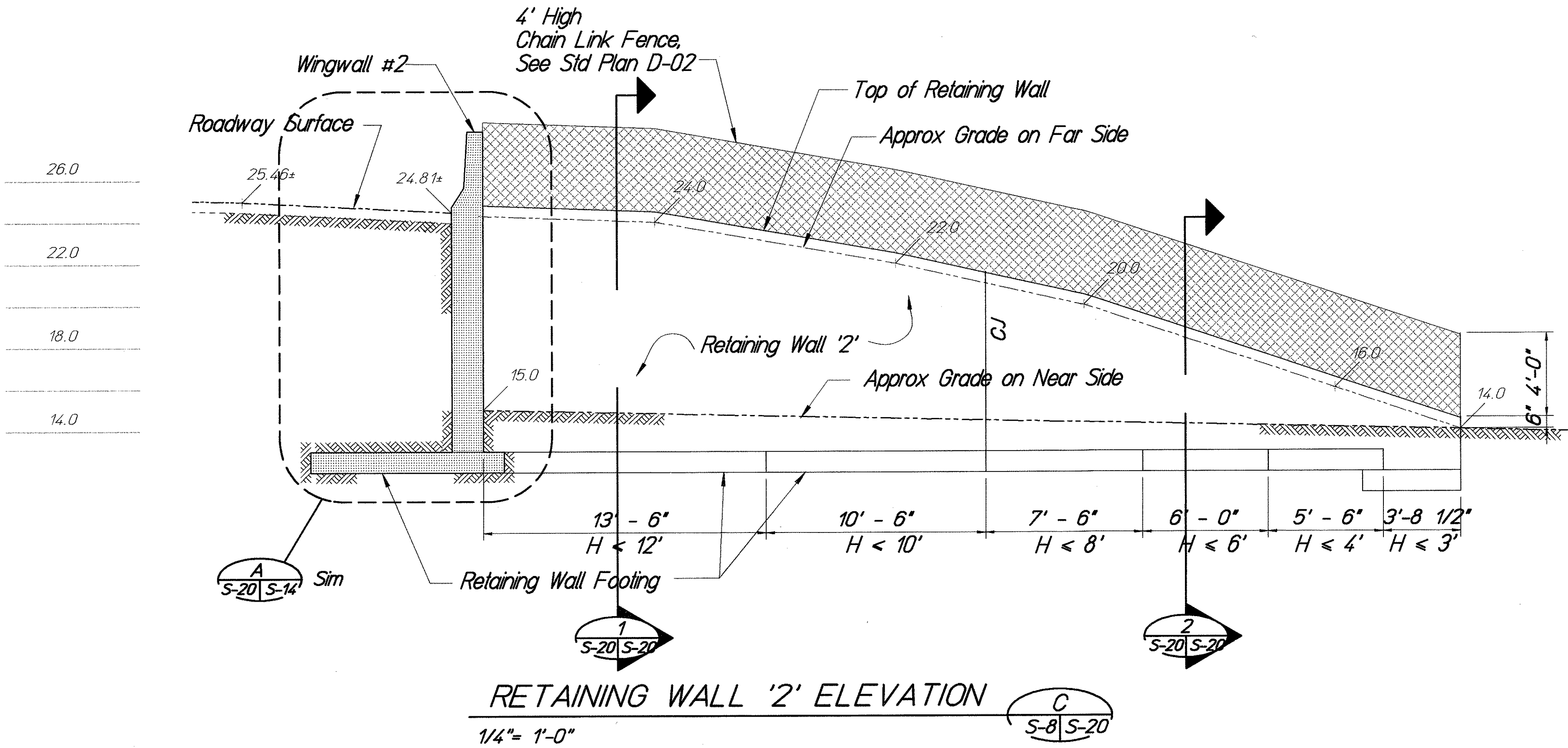


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
BOX CULVERTS
MOKULELE HIGHWAY WIDENING
Vicinity of Kalalao Bridge
to
Vicinity of Kealia Pond Driveway
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Scale: as Shown Date: August 2003
SHEET No. S-19 OF 21 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH - A311 (7)	2004	119	138

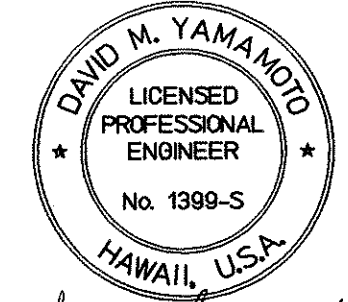
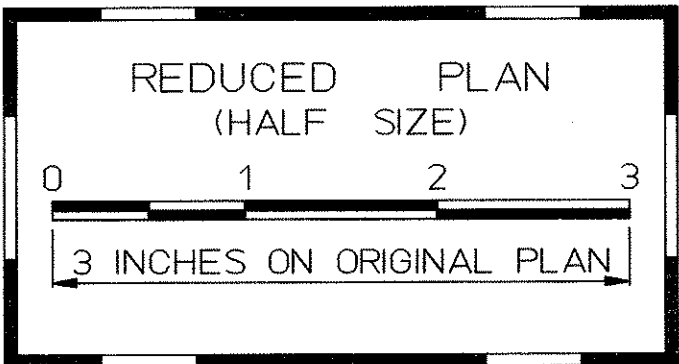
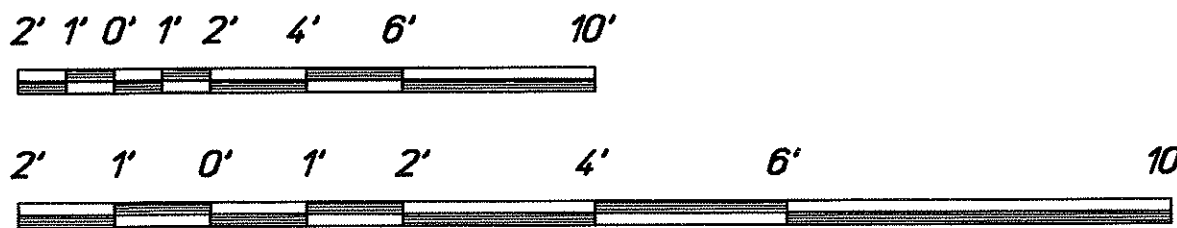
RETAINING WALL SCHEDULE						
Design 'H'	3'	4'	6'	8'	10'	12'
'F'	1'- 0"	1'- 0"	1'- 0"	1'- 0"	1'- 0"	1'- 0"
'W'	3'- 0"	4'- 0"	5'- 0"	7'- 0"	8'- 0"	9'- 6"
'B'	10"	10"	10"	10"	12"	12"
'a' Bars	#4 @ 12	#4 @ 12	#4 @ 12	#5 @ 12	#5 @ 12	#6 @ 12
'b' Bars					#5 @ 12	#6 @ 12
'c' Bars	#4 @ 12	#4 @ 12	#4 @ 12	#5 @ 12	#5 @ 12	#5 @ 12
'd' Bars					#4 @ 12	#6 @ 12
Toe	1'- 0"	1'- 0"	1'- 0"	1'- 0"	1'- 0"	1'- 0"



GRAPHIC SCALES

1/4" = 1'-0"

1/2" = 1'-0"



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
BOX CULVERTS
MOKULELE HIGHWAY WIDENING
Vicinity of Kalalaa Bridge
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Federal - Aid Project No. NH - A311 (7)
Scale: as Shown Date: August 2003
SHEET No. S-20 OF 21 SHEETS