STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	18	39

Structural Notes:

1. General:

A. Workmanship and materials shall conform to the AASHTO LRFD Bridge Design Specification, 3rd Edition, and the Hawaii Standard Specifications for Bridge and Road Construction, as modified 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 Engineer, 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 Engineer all inconsistencies or omissions.

D. The Contractor shall be responsible for methods of construction, workmanship and job safety. The Contractor shall provide temporary shoring and bracing as required for stability of culvert walls, wingwalls, 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 same or better condition at no cost to the State.

H. The Contractor shall perform a visual, hands-on inspection of all culverts prior to the start of work, in order to verify the spall and crack quantities. The inspection shall include sounding all concrete surfaces with a hammer to detect hollow, soft or otherwise deteriorated concrete. Report in writing to the Engineer all findings that do not agree with quantities listed in contract proposal.

2. Foundation:

A. Foundation design is based upon geotechnical exploration report by Pacific Geotechnical Engineers, Inc., dated 3/29/04.

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

C. Footings shall bear on undisturbed in-situ firm soils or solid grout bags. The soil beneath the footings and bags shall be compacted to provide a relatively firm and smooth bearing surface prior to placement of reinforcing steel and concrete. If soft and/or loose materials are encountered at the bottom of footing excavation, they shall be over-excavated down to firm soil. The over-excavation shall be backfilled with select granular material up to the required bottom of footing elevation and compacted to to minimum of 95% relative compaction. The footing bottom may be extended down to the underlaying competent material at no extra cost to the State. Any change in design shall be stamped by a licensed structural engineer from the state of Hawaii.

D. Excavation boundaries and grade elevations for footing shall be approved by the Engineer prior to placing the concrete and reinforcing.

E. Structural fill and backfill shall consist of granular material conforming to Section 703.17 of the standard specifications with a CBR greater than 25.

F. Structural fill and backfill shall be placed in uniform lifts of no more than 8 inches in loose thickness, moisture-conditioned to within 2 percent of the optimum moisture content, and uniformly compacted to at least 95 percent relative compaction except for retaining walls and wing walls which shall be compacted to at least 90% relative compaction.

G. Relative compaction is defined as the dry density of the compacted material expressed as a percentage of the maximum dry density of the same material based on AASHTO T-180 test method.

3. Reinforcing Steel:

A. Reinforcing steel shall be deformed bars conforming to ASTM A615, Grade 60. Any reinforcing steel to be welded shall be ASTM A706.

B. Clear concrete coverage for reinforcing bars shall be as follows, unless otherwise noted:

a. Footing, ETC.
Cast against earth ——— 3"

b. Footing, Grade Beams, ETC.
Formed and exposed to earth ——— 2"

c. Wall faces exposed to earth
or weather ——— 2"

d. Slab overlay (top clearance) ——— 3"

e. New concrete apron slab ——— 3"

C. Splices:

a. Reinforcing steel shall be detailed in accordance with the latest edition of the A.C.I. Detailing Manual unless otherwise noted. Lap splices not shown in the plans shall not be located in areas of high stress.

b. Mechanical splice connectors shall develop in tension 90 percent of the specified ultimate tensile strength of reinforcing bars.

D. Bar bends and hook shall be "standard hooks" in accordance with LRFD Bridge Design Specifications, 3rd Edition.

4. Concrete:

A. All concrete shall have a minimum 28-day compressive strength as noted below:

a. Retaining Walls ——— 4000 PSI
b. Slab Overlay ——— 4000 PSI
c. Apron and Cut-off Wall ——— 4000 PSI
d. Box Culvert ——— 4000 PSI

All structures not listed shall have a concrete compressive strength of 4,000 PSI at 28 days.
Concrete compressive cylinders are to be tested in accordance with ASTM C39.

B. Spall repair concrete shall be in accordance with Sht. S1.2.

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

D. Construction joints may be located by the Contractor and submitted to the Engineer for approval. Construction joints shall be made and located as not to impair the strength of the structure and to minimize shrinkage stresses. All construction joints shall be cleaned, laitance removed and wetted prior to placing new concrete.

E. All expansion joints shall be located as shown in plans. Expansion joints for overlay slab shall coincide with joints in existing slab.

F. Non-shrink grouts shall be premixed compound consisting of non-metallic aggregate and non-standing types, 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.

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.

J. All drilled holes for dowels shall be brushed to remove loose material then cleaned with compressed air, prior to injecting the epoxy.

K. Epoxy shall conform to AASHTO M235, Type IV, Grade 3, Class C.

5. Structural steel:

A. Fabrication and erection of structural steel shall conform to the AASHTO LRFD Bridge Construction Specifications, 3rd Edition.

B. Structural steel shall conform to ASTM A36 unless otherwise noted.

C. Steel wide flange sections shall conform to ASTM A992 Grade 50.

D. Steel tubes shall conform to ASTM A500, Grade B

E. Bolts shall conform to ASTM A325, Type N. use load indicator washers.

F. Welds and welding procedures shall conform to the Structural Welding Code AWS D1.1 of the American Welding Society.

G. Welding shall be performed by welders prequalified for welding procedures to be used.

H. Welding electrodes shall be E70XX.

I. All Structural steel shall be hot-dip galvanized after fabrication according to ASTM A123.

J. All anchor bolts, plates, and other items to be cast in concrete shall be hot-dip galvanized according to ASTM A153 unless otherwise noted.

K. All damage to galvanized coating due to field drilling or shipping shall receive 2 coats of a cold applied galvanize metal coating.

6. Existing Concrete:

A. Verify location of existing reinforcement with an electromagnetic rebar locator before drilling holes into existing concrete. Holes may need to be adjusted to avoid existing reinforcement.

B. Contractor shall not damage, cut or drill through existing reinforcing. If reinforcing is damaged, the Contractor shall inform the Engineer immediately and shall be responsible for repairing the damage at Contractor's sole expense and to the satisfaction of the Engineer.

C. All holes which need to be abandoned due to the presence of reinforcing, shall be filled with non-shrink grout.

D. The Contractor will not be paid for the holes which need to be filled and abandoned.

E. Relocated holes shall be located according to the following criteria:

a. Alternate hole shall be within 3" of the original hole.

b. The hole shall not occur within 3" of all edges.

c. Alternate hole shall be at least 1/2" clear distance from existing rebar.

d. Holes shall not be located within an existing crack in base concrete.

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
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KEN KAZUO HAYASHIDA
LICENSED PROFESSIONAL ENGINEER
No. 6818-S
HAWAII, U.S.A.

EXPIRATION DATE OF THE LICENSE: 4/30/2006
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRUCTURAL NOTES

HAWAII BELT ROAD DRAINAGE IMPROVEMENTS

Project No. 19GHJ-01-05M

Scale: As Noted Date: April 14, 2006

SHEET No. S1.0 OF 39 SHEETS

STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	19	39

7. Demolition:

A. During the demolition of the existing aprons, wing walls and applicable sections of culvert, no concrete, reinforcing steel or any other debris shall be allowed to fall into the streambed. Any debris that does inadvertently fall into the streambed shall be removed by the Contractor, immediately, at his expense.

B. When structures are to be modified and only portions of the existing structure are to be removed, these portions shall be removed in such a manner as to leave the remaining structure undamaged and in proper condition for the intended use. Any spalls, cracks or any other damage to the portions remaining in service shall be repaired by the Contractor at his expense. All spall repairs shall be according to the plans.

C. Before beginning concrete removal operations involving the removal of a portion of a monolithic concrete element, a saw cut approximately one inch deep, without cutting existing rebars, shall be made to a true line along the limits of removal on all faces of the element which will be visible in the completed work. Old concrete shall be carefully removed to the lines designated by drilling, chipping or other methods approved by the Engineer. The surfaces presented as a result of this removal shall be reasonably true and even, with sharp, straight corners that will permit a neat and workmanlike joint with the new construction to be satisfactory for the purpose intended.

D. Where existing reinforcing bars are to extend from the existing structure into new construction, the concrete shall be removed so as to leave the projecting bars clean, free of all concrete and undamaged. Where projecting bars are not to extend into the new construction, they shall be cut off flush with the surface of the old concrete.

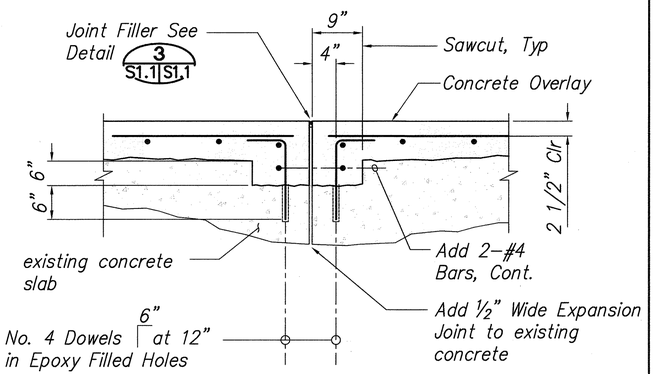
8. Water Diversion, Dewatering:

A. The contractor shall divert existing water flow through culverts to provide dry environment for concrete pour. All costs associated with diverting water flow shall be incidental to various contract items.

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

Notes:

1. Sawcut 1" minimum cont. along Both Sides of Joint.
2. Chip away existing or CLSM fill Down 6", Minimum.
3. Existing reinforcing steel to remain, Clean Rebar of all Rust and Bond-Inhibiting Material.
4. Remove Exposed Portion of existing joint filler.
5. Prepare Concrete Surface before adding Overlay in Accordance With Spall Repair Notes, Sheet S1.2.
6. Drill and Epoxy Dowels.
7. Add New Reinforcing Steel.
8. Pour Overlay, Allow to Cure For 14 Days, Minimum.
9. Add Joint Filler.



TYPICAL OVERLAY EXP. JOINT DETAIL (1) — S6.1, S3.3, S2.3, S1.1|S1.1

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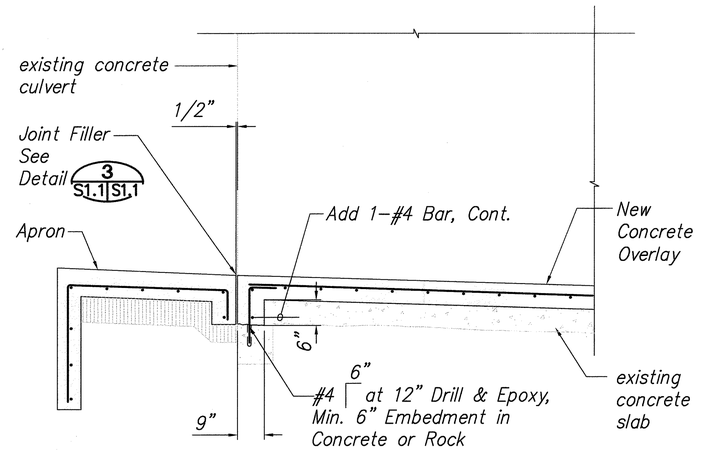

TYPICAL OVERLAY TERMINATION DETAIL (2) — S6.4, S3.3, S2.3, S1.1|S1.1

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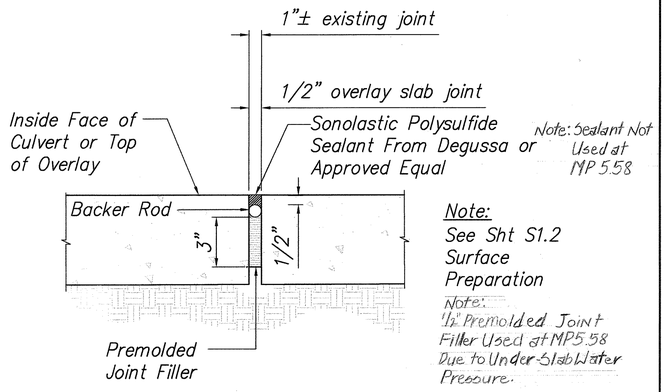

JOINT FILLER DETAIL (3) — S6.3, S4.4, S4.3, S1.1|S1.1

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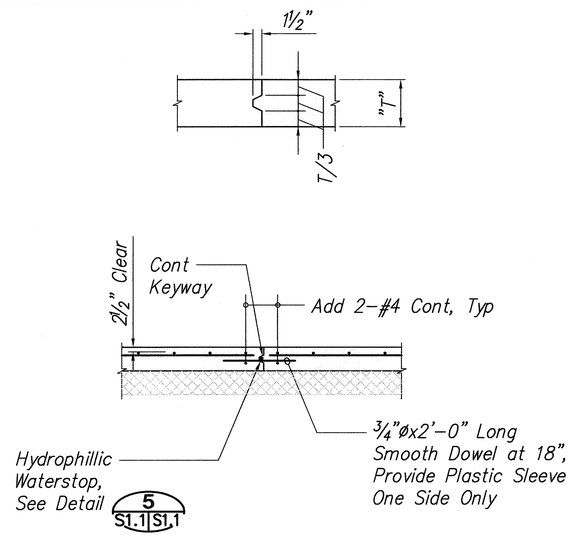
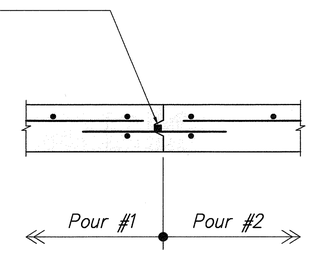


TYPICAL CONSTRUCTION JOINT DETAIL (4) — S1.1|S1.1

Not To Scale

The water swelling waterstop shall be gun grade material, supplied by Adeka Ultra Seal (P-201), or Deneef (swellseal), or approved equal. Only gun grade material is allowed. Minimum clear distance to edge of concrete is 2 1/2".



Note:
Add Waterstop after Pour #1 is cured.

HYDROPHILLIC WATERSTOP DETAIL (5) — S1.1|S1.1

Not To Scale

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KEN KAZUO HAYASHIDA LICENSED PROFESSIONAL ENGINEER No. 6818-S HAWAII, U.S.A.

EXPIRATION DATE OF THE LICENSE 4/30/2008
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRUCTURAL NOTES TYPICAL DETAILS

HAWAII BELT ROAD DRAINAGE IMPROVEMENTS

Project No. 19GHJ-01-05M

Scale: As Noted Date: April 14, 2006

SHEET No. S1.1 OF 39 SHEETS

"AS-BUILT"

STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	20	39

Surface Preparation Notes for Slab Overlay and Spall Repairs:

A. Deteriorated concrete shall be removed down to sound substrate, or to the specified depth as noted in the spall repair details. Sawcut all edges $\frac{1}{2}$" no feathering of patching material is allowed. Avoid cutting any reinforcing steel when sawcutting. The exposed concrete shall be roughened to a 1/8" amplitude and shall be cleaned and free of laitance, dust, and other bond inhibiting materials.

B. A means of collecting spoils from the chipping of concrete shall be instituted to avoid any debris or construction materials from falling into the stream. If the contractor elects to use hydro-scarification equipment, he/she shall be responsible for collecting and properly disposing of the runoff water generated. Runoff water will not be allowed to enter into the stream, or to constitute a hazard to adjacent drainage areas nor be allowed to erode existing slopes.

C. All reinforcing steel damaged due to the contractor's operations shall be repaired by the contractor at his/her expense.

D. Any exposed reinforcing steel, whether fully exposed or only partially exposed, shall be exposed all around, creating a minimum 3/4" annular space around rebar.

Bonding Agent :

A. After the concrete surfaces have been prepared and cleaned, and immediately before placing the concrete patching, a thin coat of Epoxy-modified bonding agent shall be applied. An appropriate percentage of the surface shall receive a thorough and even coating, and excess bonding agent shall not be permitted to collect in pockets. The progress in applying the bonding agent shall be limited so that it bonding agent does not become dry before it is covered with the concrete patching. During delays in the concrete patching operations, should the surface of the bonding agent become dry, the dried bonding agent shall be completely removed and fresh bonding agent applied. Removal shall be by sandblasting or by another procedure approved by the Engineer.

B. All spall repairs shall have a coating of epoxy-modified bonding agent applied to prepared surface prior to adding patching mortar. Bonding agent shall be an epoxy-modified, cementitious material that can provide corrosion protection to the reinforcing steel and act as a bonding agent for the fresh patching mortar. The reinforcing steel shall receive two coats at 20 mils each, total of 40 mils. The concrete surface shall receive one coat at 20 mils. Follow manufacturer's specifications for recommended time between application of bonding agent and patching mortar.
The minimum bond strength provided by the bonding agent shall be 2,400 PSI after 14 days (ASTM C-882).
Bonding agent not required for slab overlays, except at locations noted on plans.

Polymer Modified Patching Mortar:

A. Patching mortar shall be a polymer modified mortar, have high abrasion resistance and shall be suitable for horizontal and vertical surfaces. The minimum bond strength provided by the patching mortar shall be 2,200 PSI after 28 days (ASTM C-882). Refer to manufacturer's specifications for preparation and application guidance. Patching mortar and bonding agent/reinforcement protection shall be supplied by the same manufacturer and shall be fully compatible with each other.

B. Refer to specification Section 712.08 for additional requirements.

Elastomeric Concrete for Culvert Joints:

A. Refer to specification Section 656.

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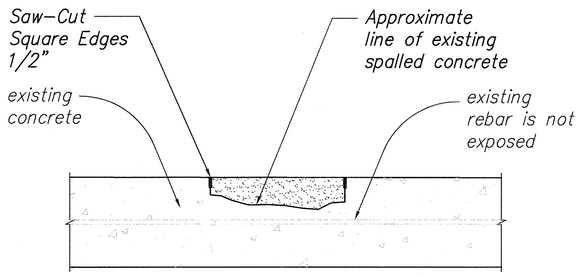

Type I Spall Repair Notes

1. Clean and prepare concrete according to the Surface Preparation Notes.
2. Substrate shall be saturated surface dry (SSD) with no standing water.
3. Apply corrosion inhibiting bonding agent to all surfaces to be patched.
4. Apply polymer modified patching mortar to repair areas to original finish lines, or until a minimum of $1\frac{1}{2}$" of cover over reinforcing steel is obtained.

SPALL DETAIL TYPE I

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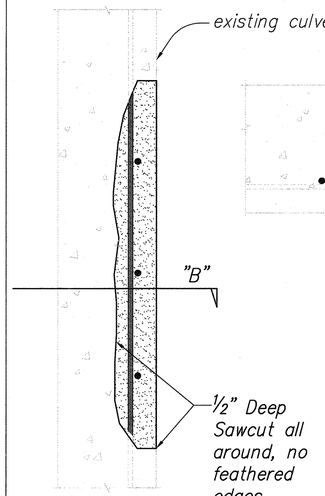
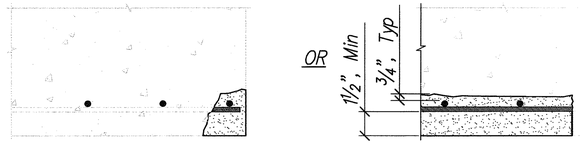


Note:
Horizontal Edge Spall Repair similar.

ELEVATION



PLAN SECTION B

Type II Spall Repair Notes:

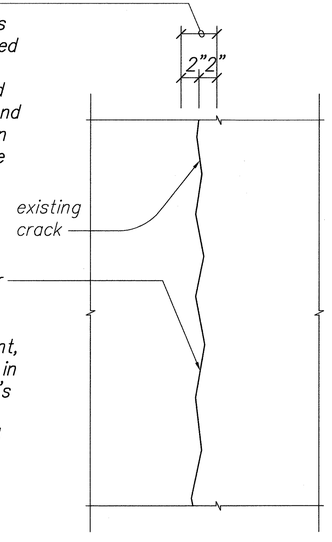
1. Clean and prepare concrete according to the Surface Preparation Notes.
2. Clean any exposed reinforcement by sand-blasting or with a wire brush, removing all corrosion, oil, dirt and all other bond-inhibiting agents.
3. Splice corroded rebars with more than 25% section loss according to rebar splice detail, Sht. S1.2.
4. Substrate shall be saturated surface dry (SSD) with no standing water.
5. Apply corrosion inhibiting bonding agent to all surfaces to be patched, including reinforcing steel.
6. Apply polymer modified patching mortar to repair areas to original finish lines, or until a minimum of $1\frac{1}{2}$" of cover over reinforcing steel is obtained.

SPALL DETAIL TYPE II

Not To Scale

Note:
The concrete along the cracks to be repaired shall be cleaned by sand blasting or water blasting down to clean, sound concrete. All dirt, algae, oil and any other material, other than firm, sound concrete, shall be removed. All concrete dust shall be removed prior to applying the sealer coat.

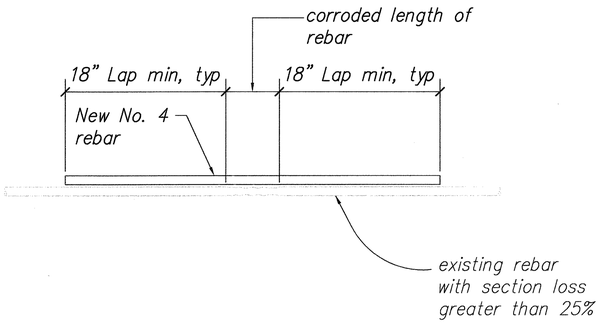
Apply seal coat of epoxy over crack. Install injects ports. Pressure inject crack with a low viscosity, moisture-tolerant, high strength epoxy adhesive in accordance with Manufacturer's Specifications. The adhesive shall conform to ASTM C-881 and AASHTO M-235 Specifications.



PLAN VIEW

CRACK REPAIR

Not To Scale



REBAR SPLICE DETAIL

Not To Scale

KEN KAZUO HAYASHIDA
LICENSED PROFESSIONAL ENGINEER
No. 6818-S
HAWAII, U.S.A.

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STATE OF HAWAII
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HIGHWAYS DIVISION

SPALL REPAIR NOTES AND DETAILS

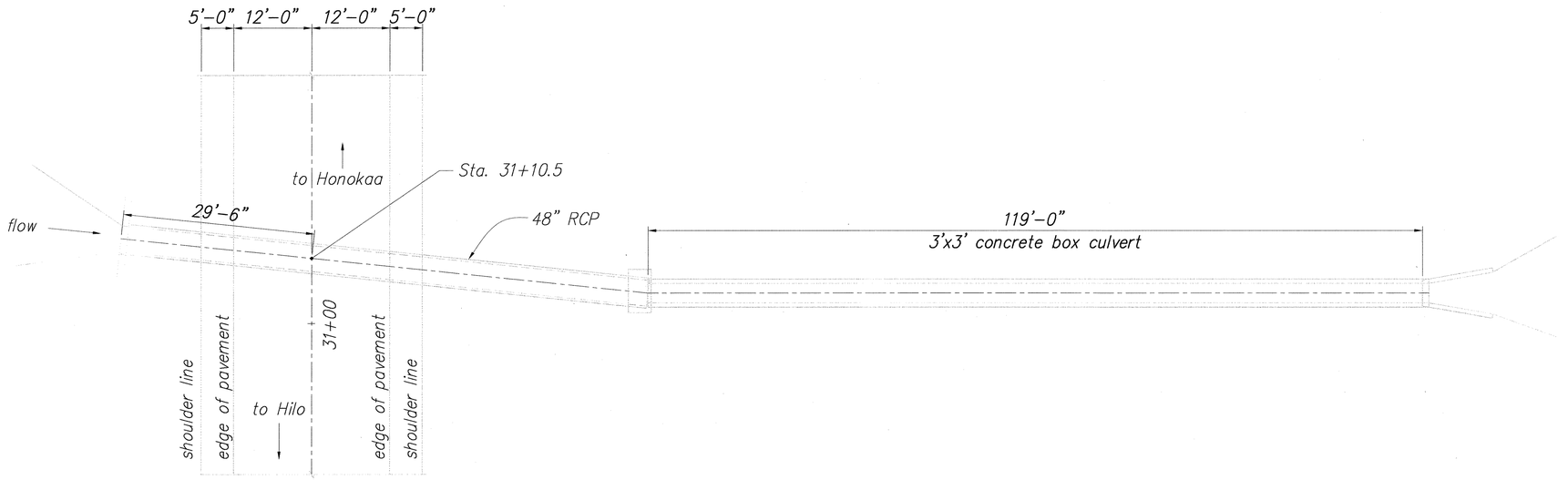
HAWAII BELT ROAD DRAINAGE IMPROVEMENTS

Project No. 19GHJ-01-05M

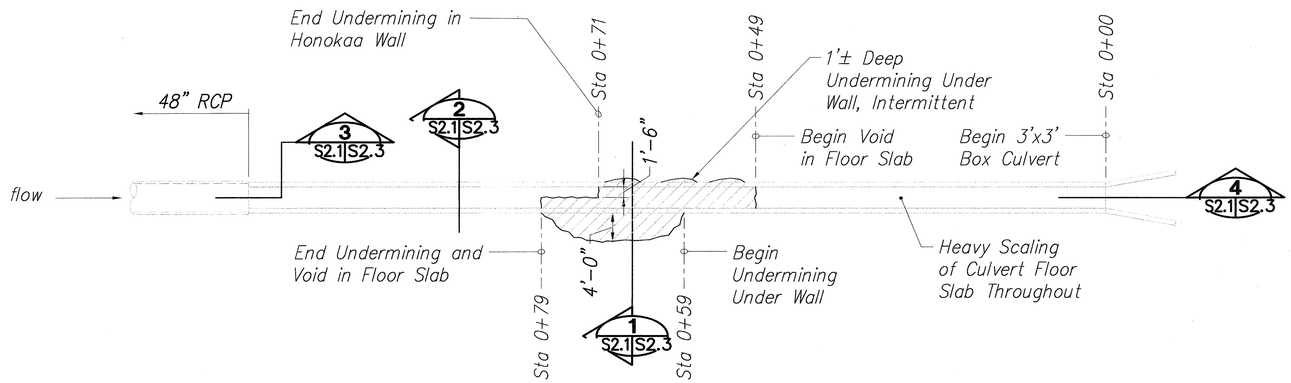
Scale: As Noted Date: April 14, 2006

SHEET No. S1.2 OF 39 SHEETS

STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	21	39



LAYOUT PLAN
Scale: 1" = 10'



CULVERT FLOOR PLAN
Scale: 1" = 10'

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KEN KAZUO HAYASHIDA
LICENSED PROFESSIONAL ENGINEER
No. 6818-S
HAWAII, U.S.A.

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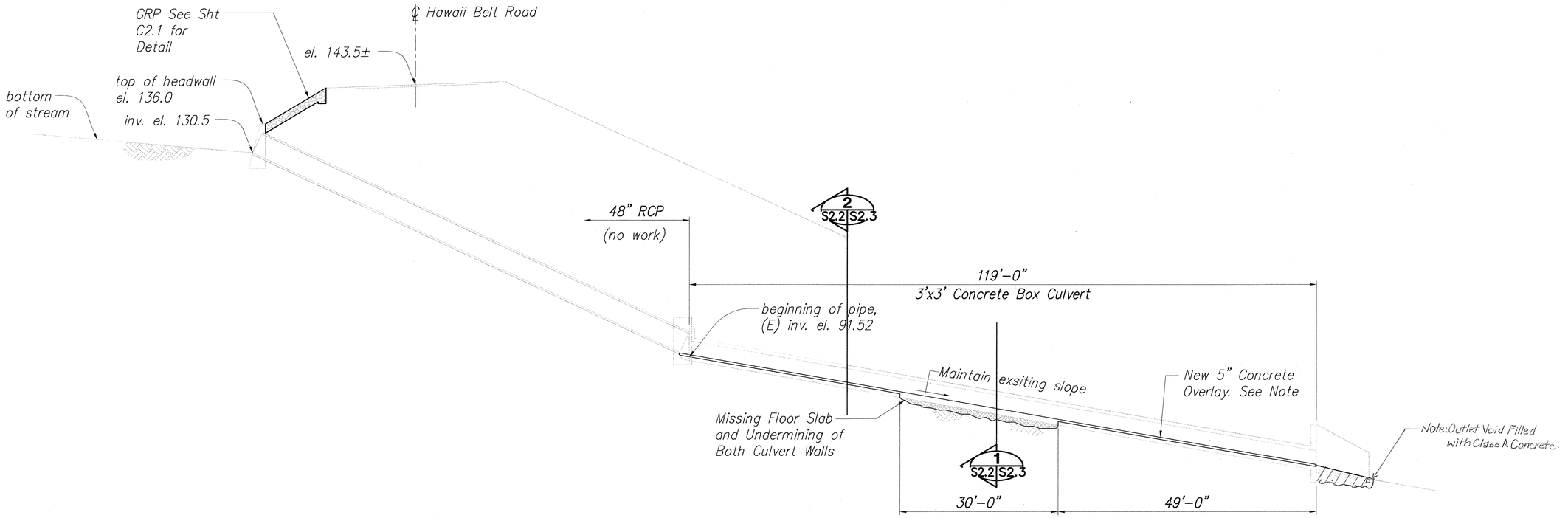
M.P. 5.45
PLANS
HAWAII BELT ROAD DRAINAGE IMPROVEMENTS
Project No. 19GHJ-01-05M

Scale: As Noted Date: April 14, 2006

SHEET No. S2.1 OF 39 SHEETS

STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	22	39



SECTION ALONG CENTERLINE OF CULVERT

Scale: 1" = 10'

Note:
The Thickness of New Concrete Overlay Shall be 5" and May Need to Be Increased to Maintain Positive Drainage Throughout the Length of the Culvert. Ponding on the Culvert Floor is not Allowed.

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KEN KAZUO HAYASHIDA
LICENSED PROFESSIONAL ENGINEER
No. 6818-S
HAWAII, U.S.A.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

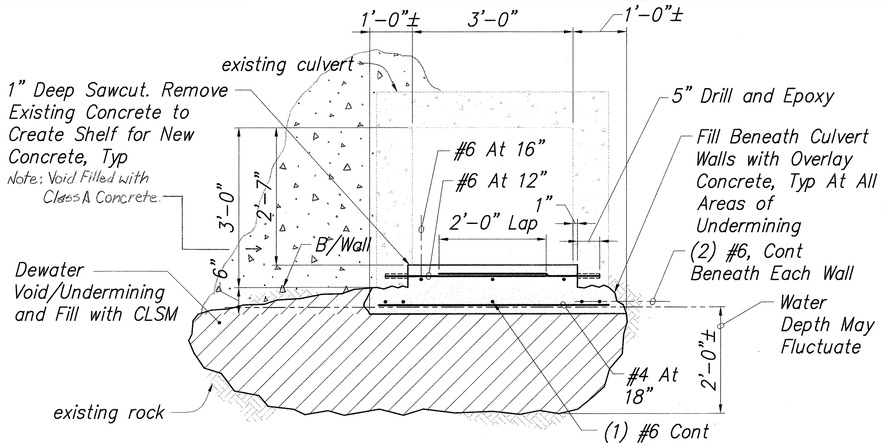
M.P. 5.45
SECTION
HAWAII BELT ROAD DRAINAGE IMPROVEMENTS
Project No. 19GHJ-01-05M

Scale: As Noted Date: April 14, 2006

SHEET No. S2.2 OF 39 SHEETS

"AS-BUILT"

STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	23	39

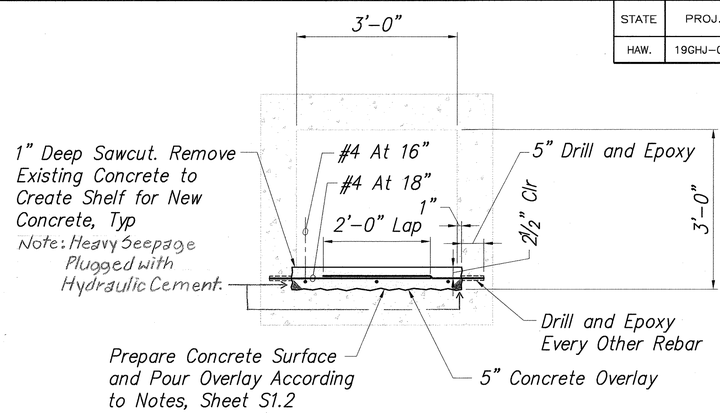


SECTION BETWEEN STA 0+49 AND 0+79 (1) S2.2, S2.1 S2.3

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

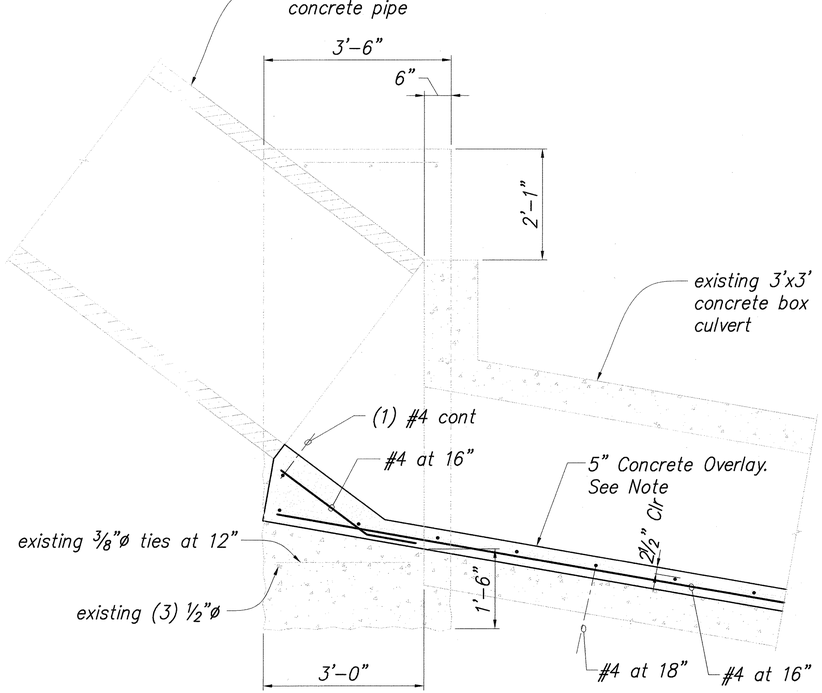
Notes:

1. Remove loose material from bottom of void prior to pouring CLSM. Paid from Item 206.4100.
2. Allow CLSM to cure for 3 days before pouring overlay.
3. Culvert to be dewatered prior to adding CLSM and again prior to adding overlay concrete.
4. Water shall not be allowed to flow over CLSM or concrete overlay until fully cured (14 days)
5. The same type of concrete as overlay concrete may be used for filling undermining at the option of the Contractor with no additional cost.



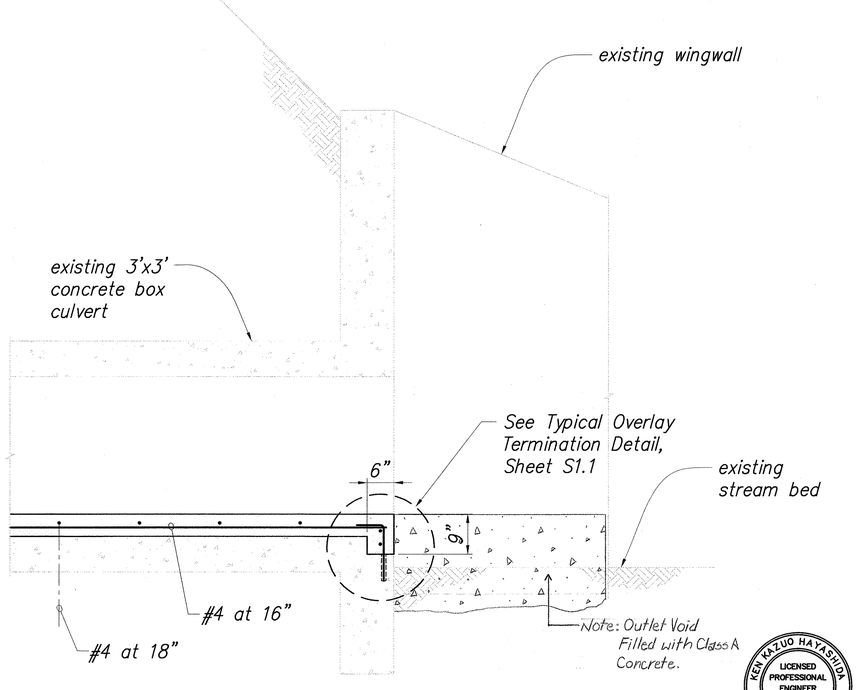
SECTION BETWEEN STA 0+00 TO 0+49 AND BETWEEN STA 0+70 TO 1+19 (2) S2.2, S2.1 S2.3

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



SECTION AT TRANSITION (3) S2.1 S2.3

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



SECTION AT OUTLET (4) S2.1 S2.3

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

Note:
The Thickness of New Concrete Overlay Shall be 5" and May Need to Be Increased to Maintain Positive Drainage Throughout the Length of the Culvert. Ponding on the Culvert Floor is not Allowed.

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	DESIGNED BY	
	QUANTITIES BY	
	CHECKED BY	

KEN KAZUO HAYASHIDA
LICENSED PROFESSIONAL ENGINEER
No. 6818-S
HAWAII, U.S.A.

EXPIRATION DATE OF THE LICENSE 4/30/2008
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

M.P. 5.45

SECTIONS

HAWAII BELT ROAD DRAINAGE IMPROVEMENTS

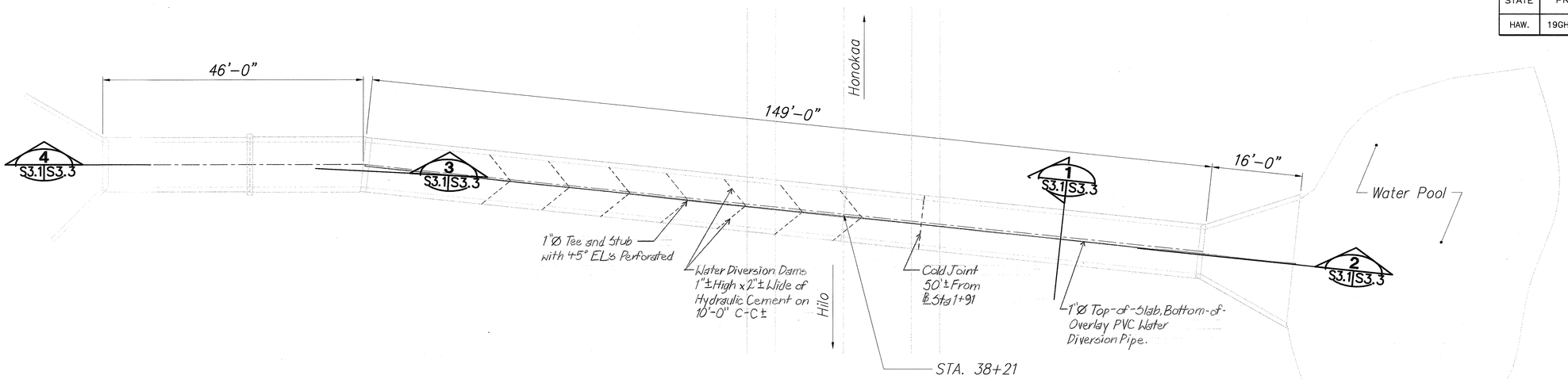
Project No. 19GHJ-01-05M

Scale: As Noted Date: April 14, 2006

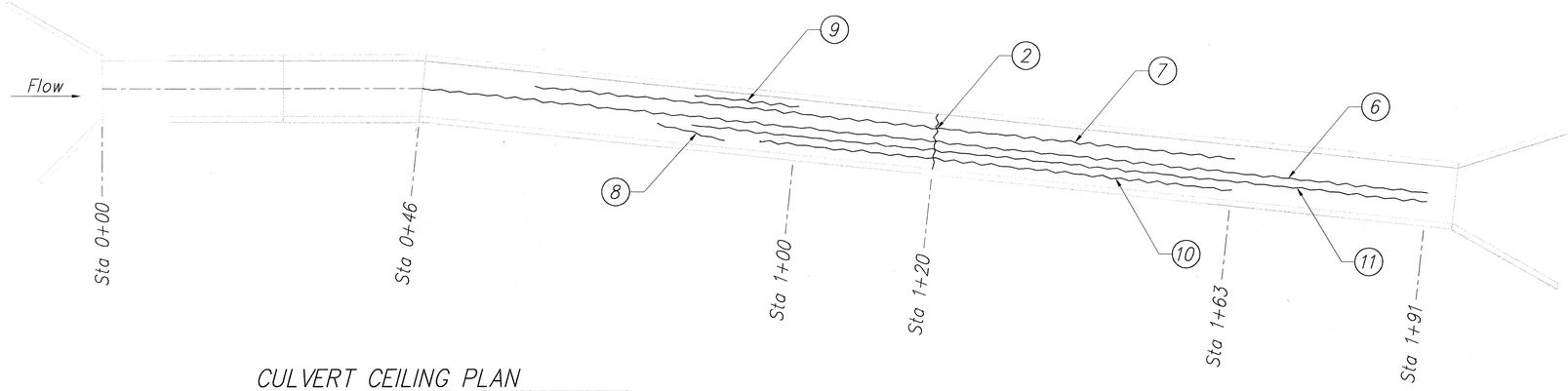
SHEET No. S2.3 OF 39 SHEETS

"AS-BUILT"

STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	24	39



LAYOUT PLAN
Scale: 1" = 10'



CULVERT CEILING PLAN
Scale: 1" = 10'

Legend:

(xx) Repair Items as Specified in Repair Schedule Shown in Sht S3.2.

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

KEN KAZUO HAYASHIDA
LICENSED PROFESSIONAL ENGINEER
No. 6818-S
HAWAII, U.S.A.

EXPIRATION DATE OF THE LICENSE 4/30/2008
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

M.P. 5.58
PLANS

HAWAII BELT ROAD DRAINAGE IMPROVEMENTS

Project No. 19GHJ-01-05M

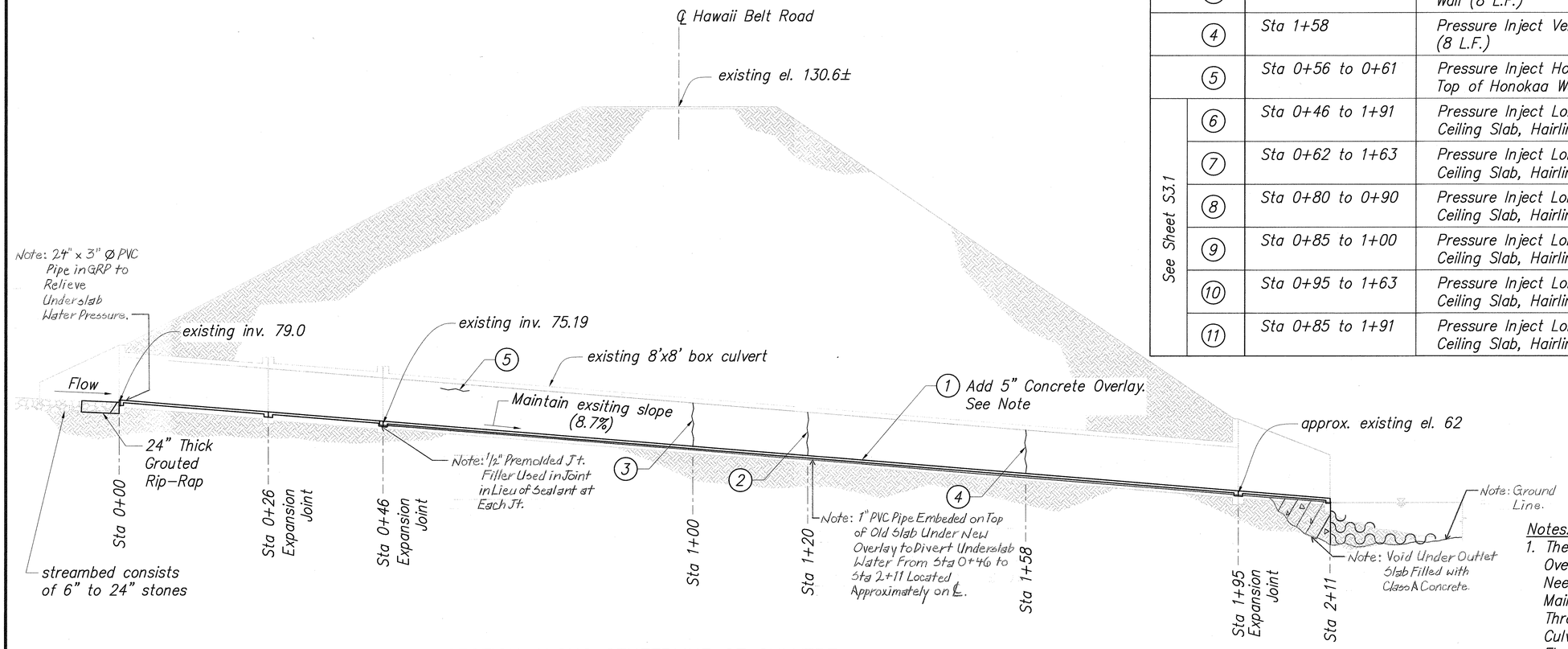
Scale: As Noted Date: April 14, 2006

SHEET No. S3.1 OF 39 SHEETS

"AS-BUILT"

STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	25	39

Item		Repair Schedule	
	(1)	Sta 0+00 to 2+11	5" Conc Overlay (1,688 S.F.)
	(2)	Sta 1+20	Pressure Inject Cracks in Ceiling and Both Walls (24 L.F.)
	(3)	Sta 1+00	Pressure Inject Vertical Crack in Honokaa Wall (8 L.F.)
	(4)	Sta 1+58	Pressure Inject Vertical Crack in Hilo Wall (8 L.F.)
	(5)	Sta 0+56 to 0+61	Pressure Inject Horizontal Crack Near Top of Honokaa Wall (5 L.F.).
See Sheet S3.1	(6)	Sta 0+46 to 1+91	Pressure Inject Longitudinal Crack in Ceiling Slab, Hairline to 0.05" Wide (145 L.F.)
	(7)	Sta 0+62 to 1+63	Pressure Inject Longitudinal Crack in Ceiling Slab, Hairline to 0.05" Wide (101 L.F.)
	(8)	Sta 0+80 to 0+90	Pressure Inject Longitudinal Crack in Ceiling Slab, Hairline to 0.05" Wide (10 L.F.)
	(9)	Sta 0+85 to 1+00	Pressure Inject Longitudinal Crack in Ceiling Slab, Hairline to 0.05" Wide (15 L.F.)
	(10)	Sta 0+95 to 1+63	Pressure Inject Longitudinal Crack in Ceiling Slab, Hairline to 0.05" Wide (68 L.F.)
	(11)	Sta 0+85 to 1+91	Pressure Inject Longitudinal Crack in Ceiling Slab, Hairline to 0.05" Wide (106 L.F.)



SECTION ALONG CENTERLINE OF CULVERT

Scale: 1" = 10'

Notes:

1. The Thickness of New Concrete Overlay Shall be 5" and May Need to Be Increased to Maintain Positive Drainage Throughout the Length of the Culvert. Ponding on the Culvert Floor is not Allowed.
2. The invert slopes are approximate and shall be verified by the Contractor.

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

KEN KAZUO HAYASHIDA
LICENSED PROFESSIONAL ENGINEER
No. 6818-S
HAWAII, U.S.A.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

M.P. 5.58

CULVERT PROFILE

HAWAII BELT ROAD DRAINAGE IMPROVEMENTS

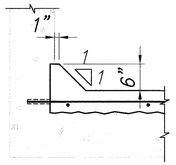
Project No. 19GHJ-01-05M

Scale: As Noted Date: April 14, 2006

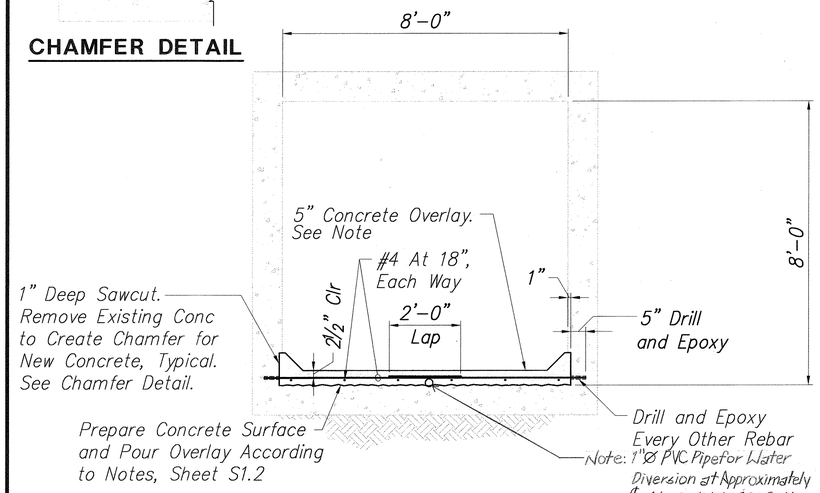
SHEET No. S3.2 OF 39 SHEETS

"AS-BUILT"

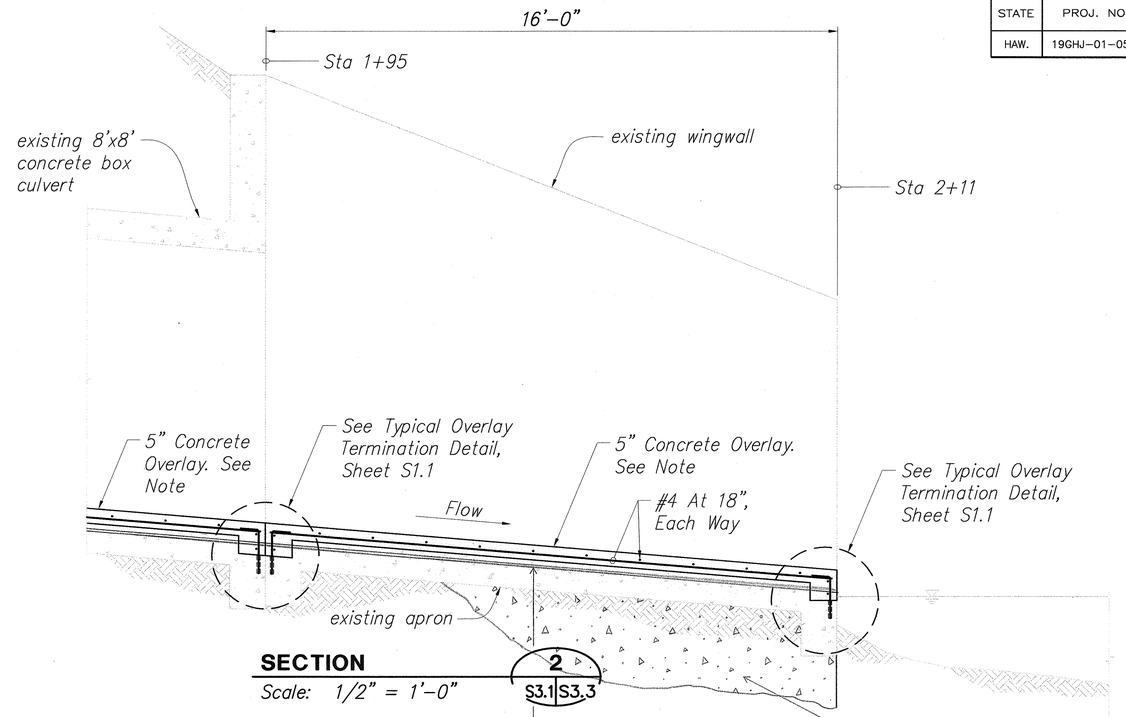
STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	26	39



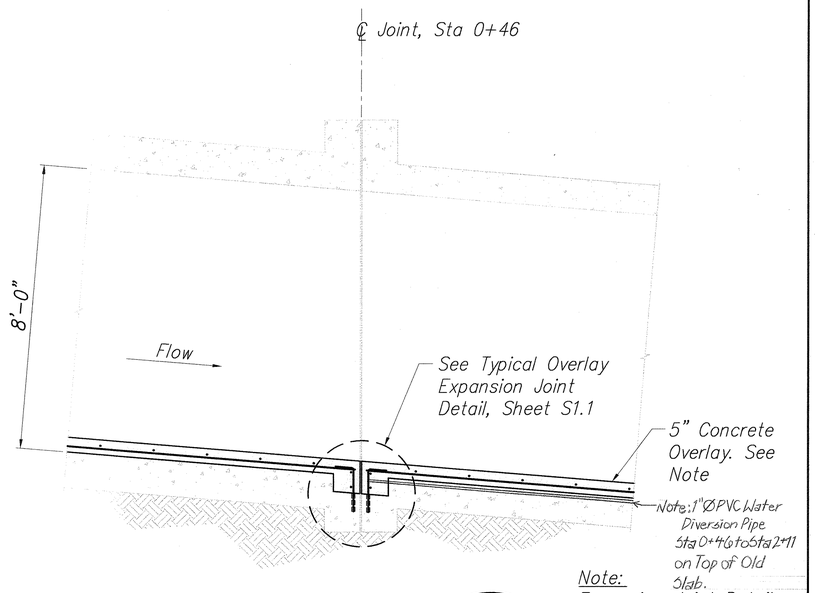
CHAMFER DETAIL



SECTION 1 (S3.1 | S3.3)
Scale: 1/2" = 1'-0"

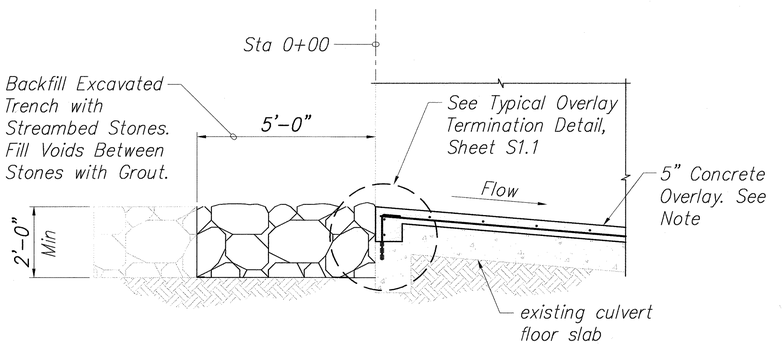


SECTION 2 (S3.1 | S3.3)
Scale: 1/2" = 1'-0"



Note:
Expansion Joint Detail at Sta 0+26 is Similar.

SECTION 3 (S3.1 | S3.3)
Scale: 1/2" = 1'-0"



SECTION 4 (S3.1 | S3.3)
Scale: 1/2" = 1'-0"

Note:
The Thickness of New Concrete Overlay Shall be 5" and May Need to Be Increased to Maintain Positive Drainage Throughout the Length of the Culvert. Ponding on the Culvert Floor is not Allowed.

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

KEN KAZUO HAYASHIDA
LICENSED PROFESSIONAL ENGINEER
No. 6818-S
HAWAII, U.S.A.

EXPIRATION DATE OF THE LICENSE 4/30/2008
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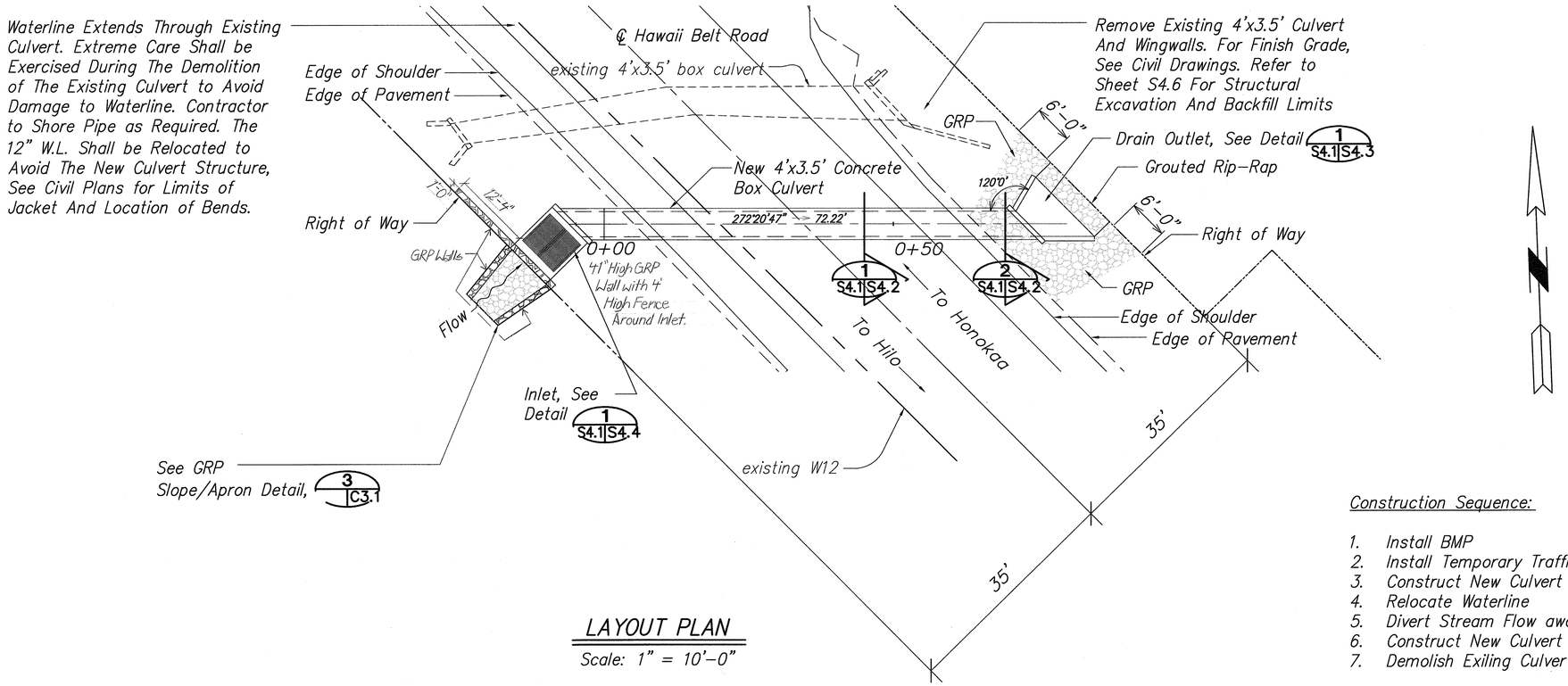
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
M.P. 5.58
SECTIONS
HAWAII BELT ROAD DRAINAGE IMPROVEMENTS
Project No. 19GHJ-01-05M
Scale: As Noted Date: April 14, 2006
SHEET No. S3.3 OF 39 SHEETS

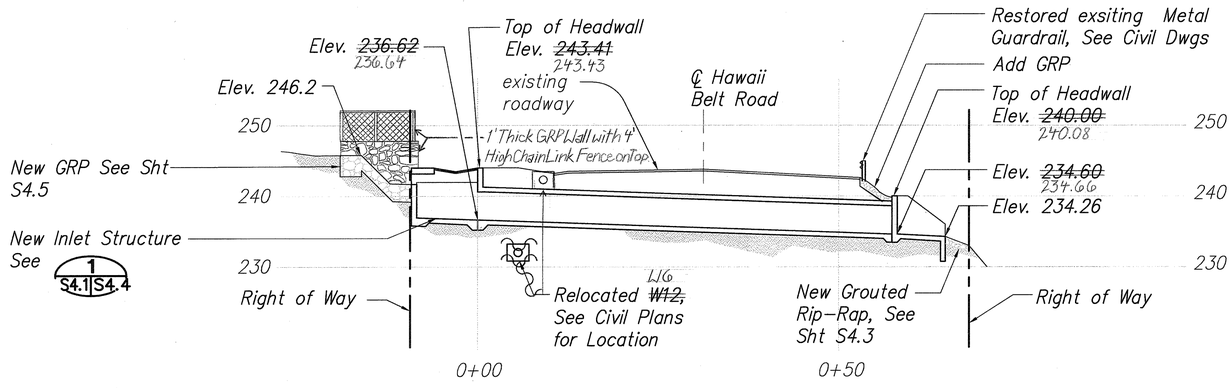
"AS-BUILT"

STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	27	39



LAYOUT PLAN

Scale: 1" = 10'-0"



SECTION ALONG ℄ CULVERT

Scale: 1" = 10'-0"

Construction Sequence:

1. Install BMP
2. Install Temporary Traffic Signal System
3. Construct New Culvert on Makai Side
4. Relocate Waterline
5. Divert Stream Flow away from New Inlet Structure
6. Construct New Culvert on Mauka Side
7. Demolish Exiling Culvert

Construction Sequence is Responsibility of the Contractor and Included Herein for Information Proposes.

Note:

1. The materials from on-site excavations are not suitable for use as structural fill or embankment fill.
2. For Elevation Bench Mark, See Civil Drawings.
3. The removal of existing culvert and installation of new culvert shall be scheduled to maintain at least one lane of traffic at all times. Refer to specifications for traffic control requirements.

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

KEN KAZUO HAYASHIDA
LICENSED PROFESSIONAL ENGINEER
No. 6818-S
HAWAII, U.S.A.

0' 10' 20' 30'
1" = 10'

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

M.P. 19.36

PLAN AND PROFILE

HAWAII BELT ROAD DRAINAGE IMPROVEMENTS

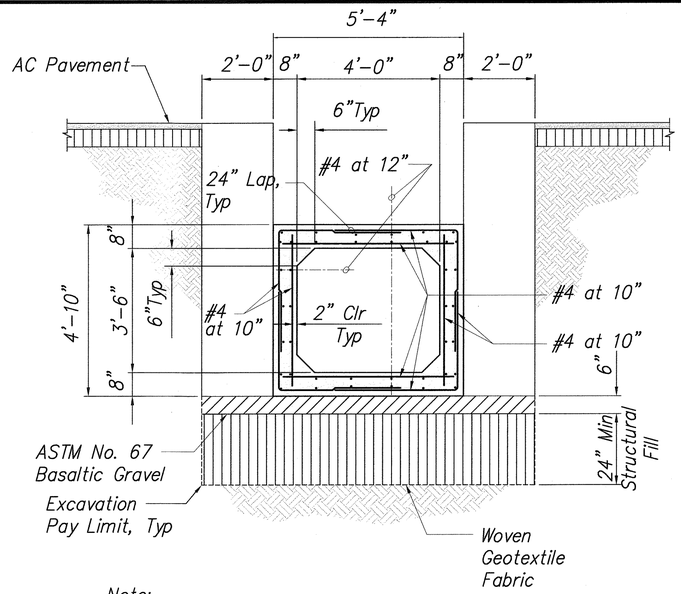
Project No. 19GHJ-01-05M

Scale: As Noted Date: April 14, 2006

SHEET No. S4.1 OF 39 SHEETS

"AS-BUILT"

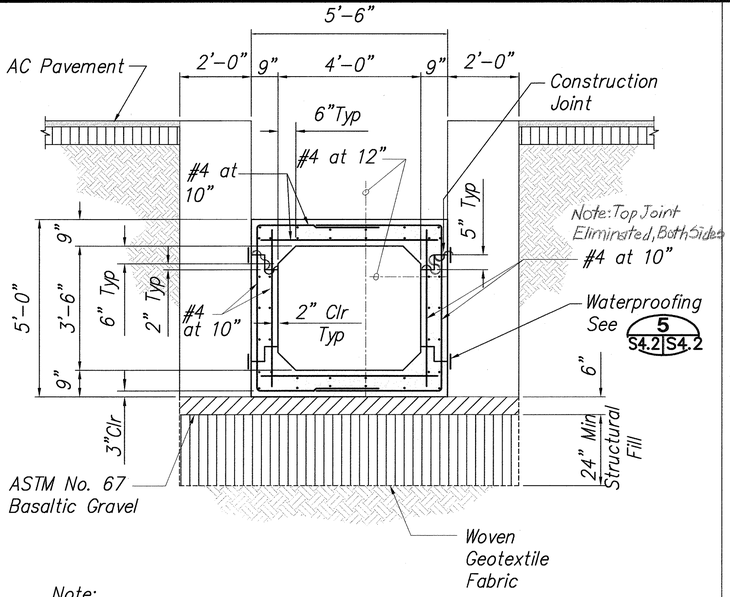
STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	28	39



Note:
Refer to Sheet S4.6 For Structure Excavation And Backfill Pay Limits

~~PRECAST CULVERT SECTION~~ 1 S4.1|S4.2

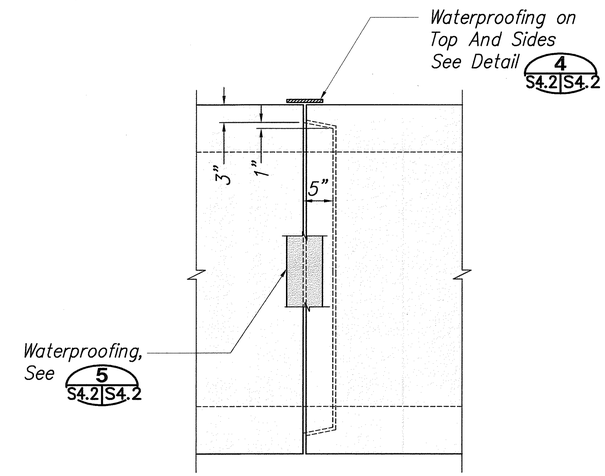
~~Scale: 1/2" = 1'-0"~~



Note:
Refer to Sheet S4.6 For Structure Excavation And Backfill Pay Limits

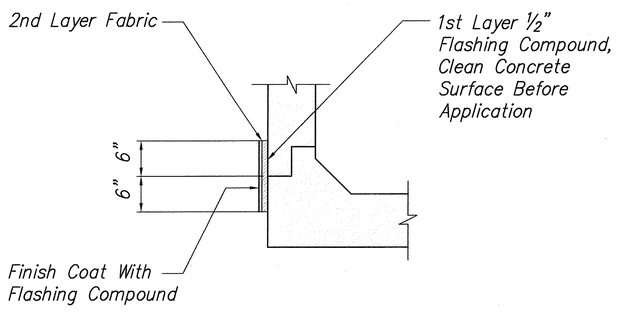
CAST-IN-PLACE CULVERT SECTION 2 S4.1|S4.2

Scale: 1/2" = 1'-0"

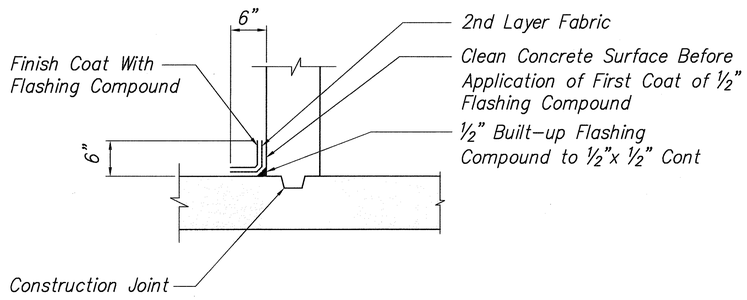


PRECAST CULVERT JOINT DETAIL 3 S4.2|S4.2

Scale: 1" = 1'-0"

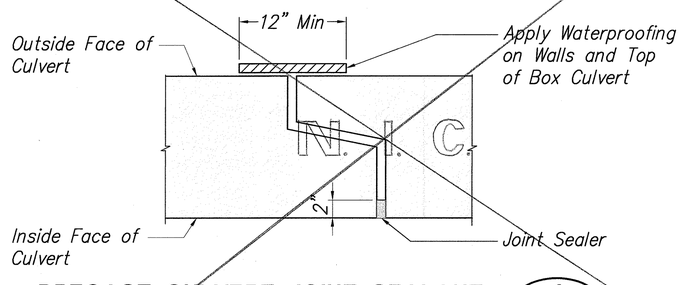


Construction Joint Detail



Corner Detail

Note:
1. Joint Sealer Shall be Butyl-Lok Sealant by A-Lock Products, Inc. or Ram-Neck Flexible Gasket by K.T. Snyder Co. Inc. Or Approved Equal.
2. Waterproofing Shall Conform to Detail 5 S4.2|S4.2



PRECAST CULVERT JOINT SEALANT 4 S4.2|S4.2

Scale: 3" = 1'-0"

WATERPROOFING DETAIL FOR CONSTRUCTION JOINTS OF CAST-IN-PLACE BOX CULVERT 5 S4.5, S4.3, S4.2|S4.2

Scale: 1" = 1'-0"

0' 6" 1' 2' 3'
1" = 1"-0"

0' 1' 2' 3' 4' 5' 6'
1/2" = 1'-0"

KEN KAZUO HAYASHIDA
LICENSED PROFESSIONAL ENGINEER
No. 6818-S
HAWAII, U.S.A.

EXPIRATION DATE OF THE LICENSE 4/30/2008
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

M.P. 19.36 CULVERT SECTION AND DETAILS

HAWAII BELT ROAD DRAINAGE IMPROVEMENTS

Project No. 19GHJ-01-05M

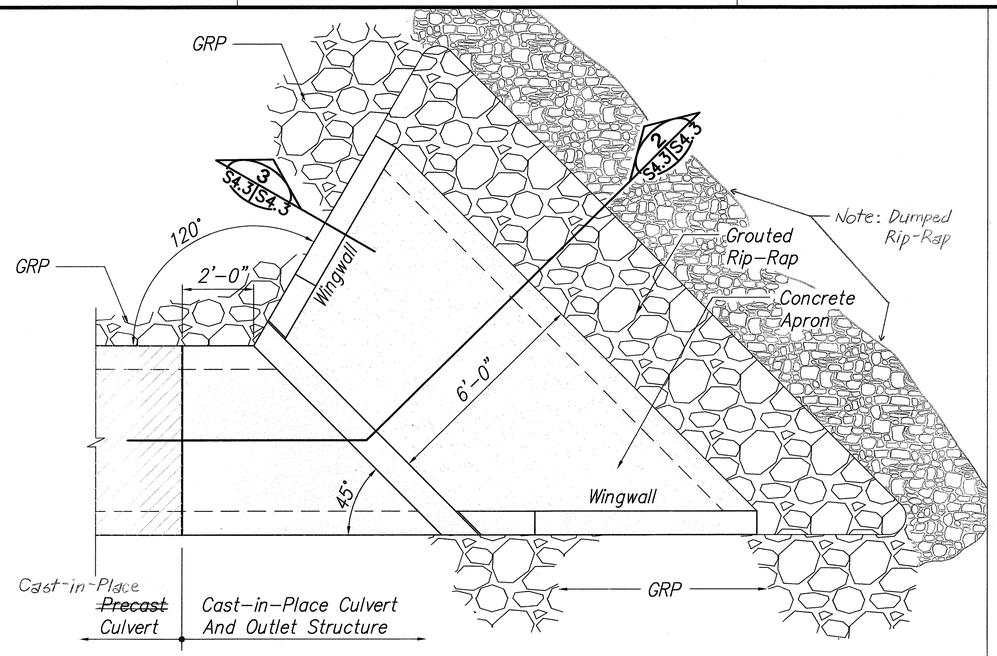
Scale: As Noted Date: April 14, 2006

SHEET No. S4.2 OF 39 SHEETS

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

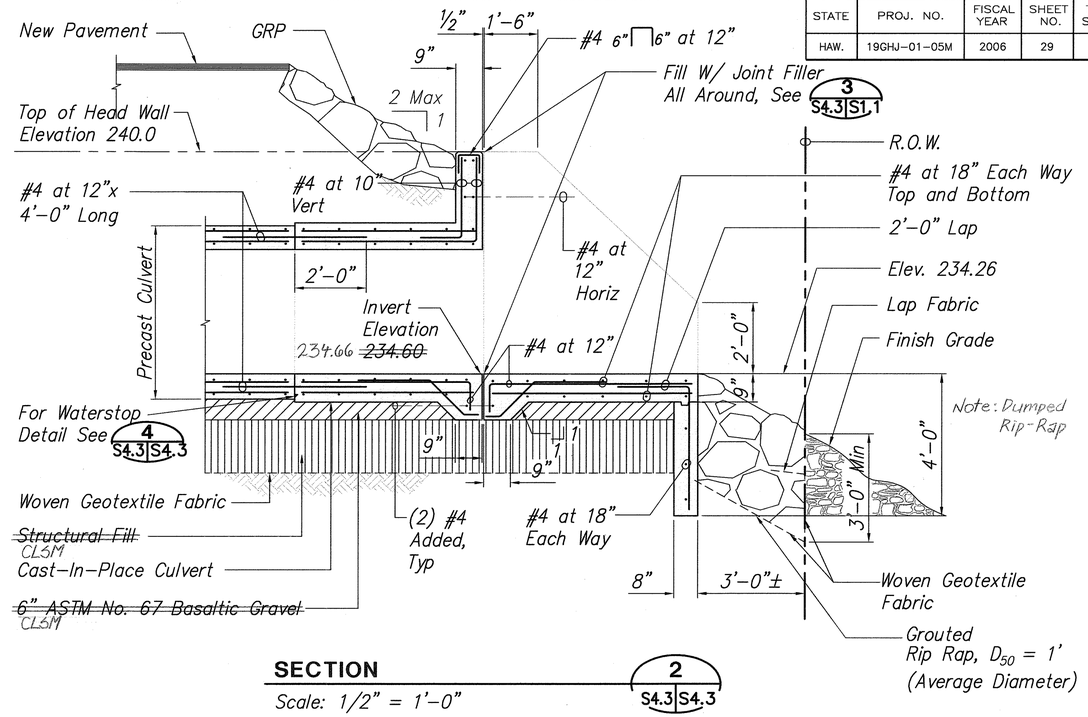
"AS-BUILT"

STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	29	39



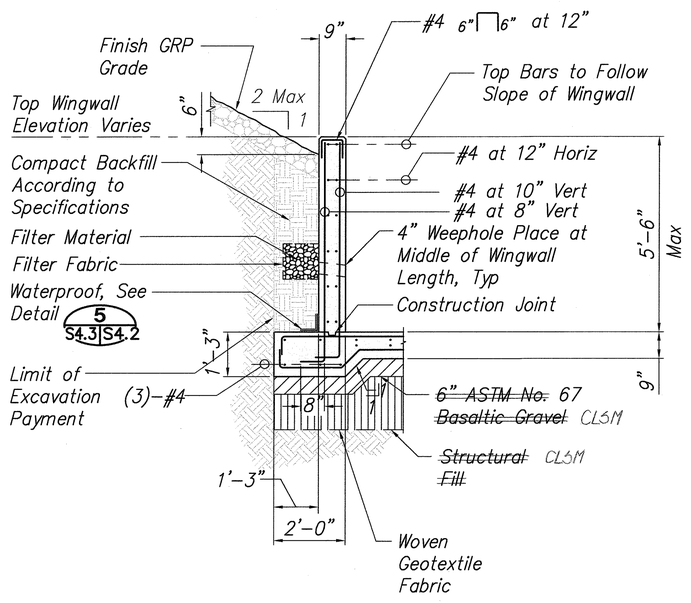
DRAIN OUTLET PLAN VIEW 1 S4.1|S4.3

Scale: 1/2" = 1'-0"



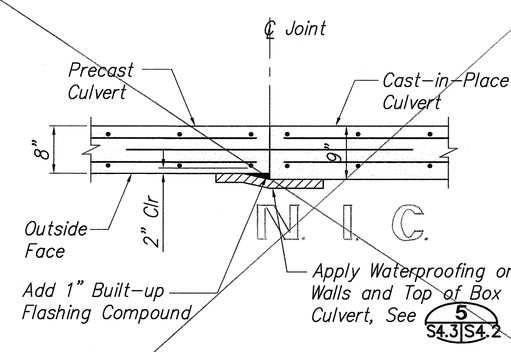
SECTION 2 S4.3|S4.3

Scale: 1/2" = 1'-0"

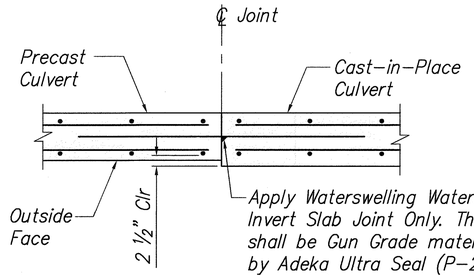


TYPICAL WINGWALL SECTION 3 S4.3|S4.3

Scale: 1/2" = 1'-0"



AT WALLS AND TOP SLAB



AT INVERT SLAB

WATERPROOFING DETAIL AT PRECAST AND CAST-IN-PLACE CULVERT JOINT 4 S4.3,S4.4|S4.3

Not to Scale

No Joint - All Cast-in-Place

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

0' 6" 1' 2' 3'
1" = 1"-0"

0' 1' 2' 3' 4' 5' 6'
1/2" = 1'-0"

KEN KAZUO HAYASHIDA LICENSED PROFESSIONAL ENGINEER No. 6818-S HAWAII, U.S.A.

EXPIRATION DATE OF THE LICENSE 4/30/2008
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

M.P. 19.36 CULVERT

OUTLET PLAN AND SECTIONS

HAWAII BELT ROAD DRAINAGE IMPROVEMENTS

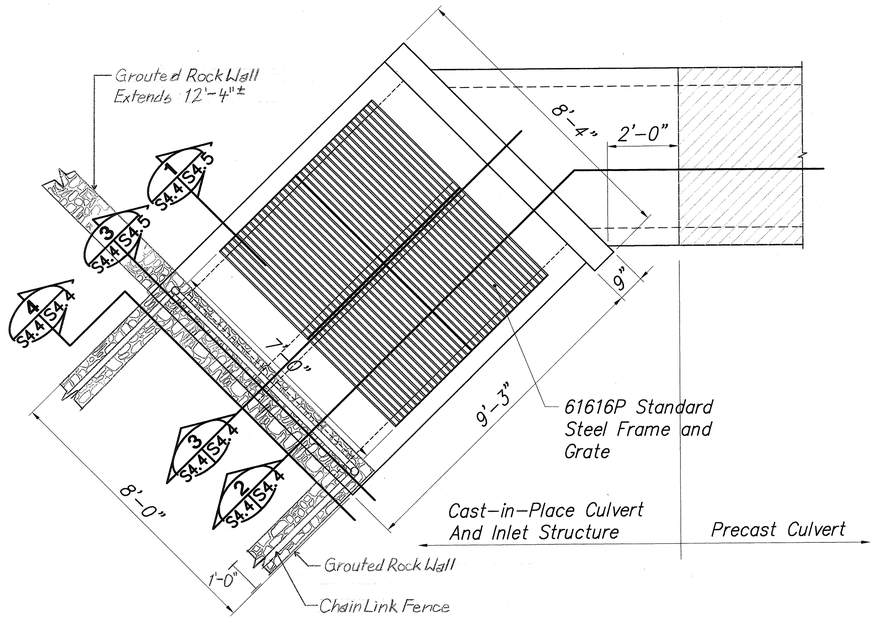
Project No. 19GHJ-01-05M

Scale: As Noted Date: April 14, 2006

SHEET No. S4.3 OF 39 SHEETS

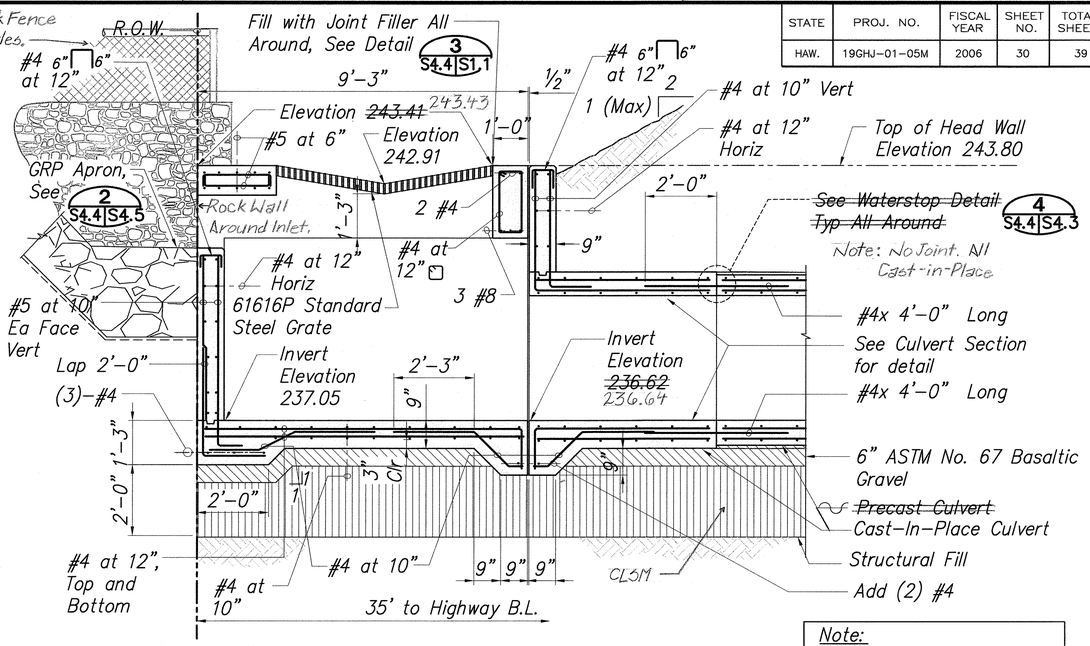
"AS-BUILT"

STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	30	39



DRAIN INLET PLAN VIEW — 1 / S4.1 | S4.4

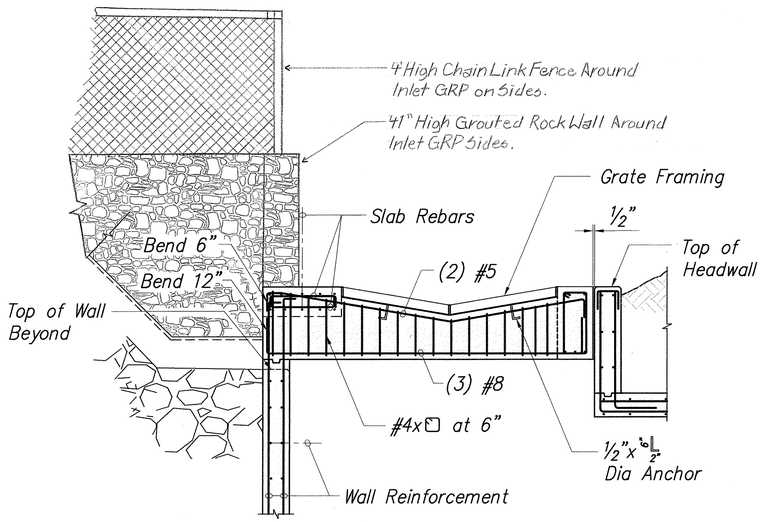
Scale: 1/2" = 1'-0"



SECTION — 2 / S4.4 | S4.4

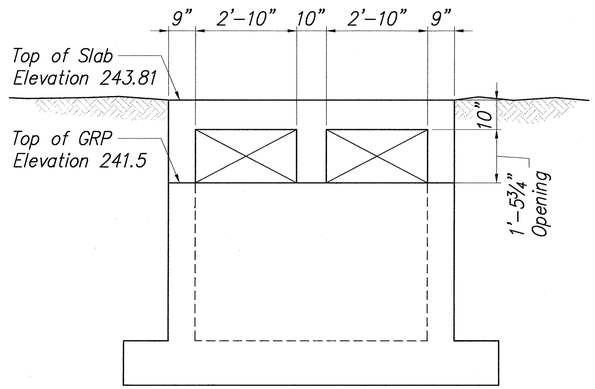
Scale: 1/2" = 1'-0"

Note:
Refer to Hawaii DOT Standard Plans for grating and frame details.



SECTION — 3 / S4.4 | S4.4

Scale: 1/2" = 1'-0"



INLET OPENING ELEVATION — 4 / S4.4 | S4.4

Scale: 1/2" = 1'-0"

0' 6" 1' 2' 3'
1" = 1"-0"

0' 1' 2' 3' 4' 5' 6'
1/2" = 1'-0"

KEN KAZUO HAYASHIDA
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No. 6818-S
HAWAII, U.S.A.

EXPIRATION DATE OF THE LICENSE 4/30/2008
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

M.P. 19.36 CULVERT INLET PLAN AND SECTIONS

HAWAII BELT ROAD DRAINAGE IMPROVEMENTS

Project No. 19GHJ-01-05M

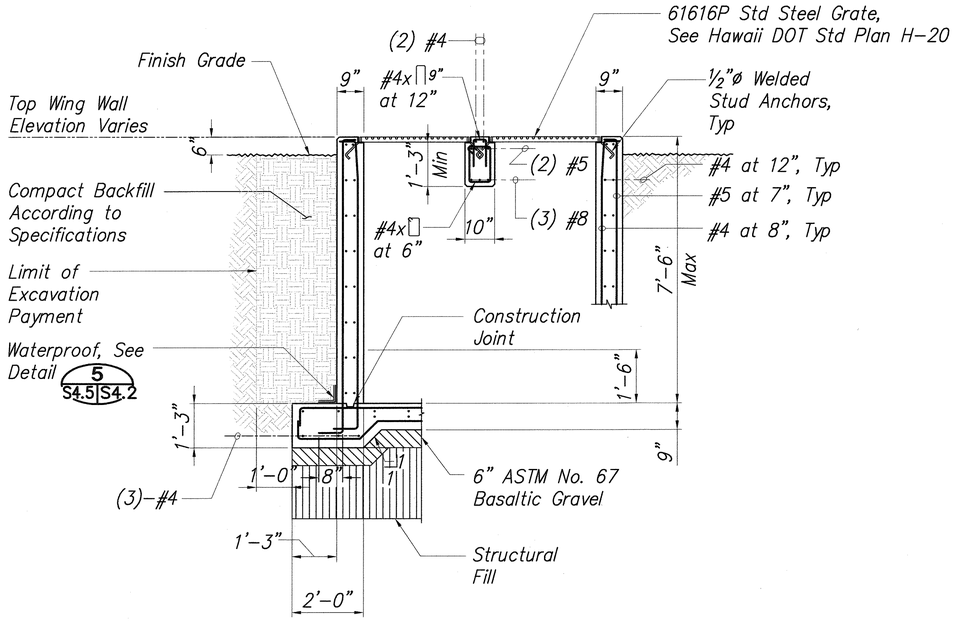
Scale: As Noted Date: April 14, 2006

SHEET No. S4.4 OF 39 SHEETS

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

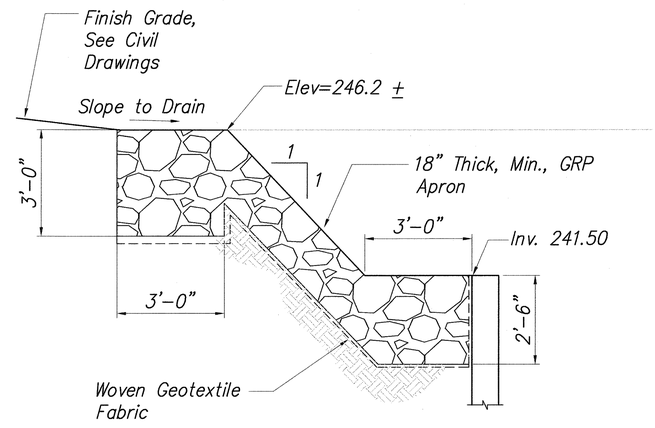
"AS-BUILT"

STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	31	39



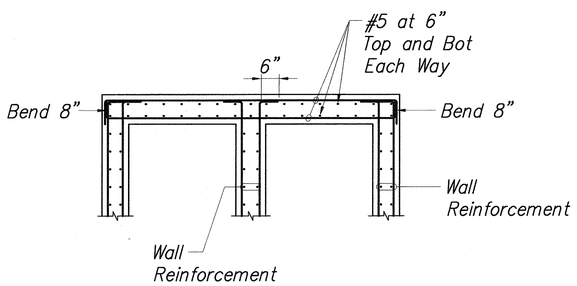
TYPICAL INLET WALL SECTION 1 S4.4|S4.5

Scale: 1/2" = 1'-0"



SECTION 2 S4.4|S4.5

Scale: 1/2" = 1'-0"



SECTION 3 S4.4|S4.5

Scale: 1/2" = 1'-0"

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

KEN KAZUO HAYASHIDA
LICENSED PROFESSIONAL ENGINEER
No. 6818-S
HAWAII, U.S.A.

0' 1' 2' 3' 4' 5' 6'
1/2" = 1'-0"

EXPIRATION DATE OF THE LICENSE-4/30/2008
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

M.P. 19.36

SECTIONS AND DETAILS

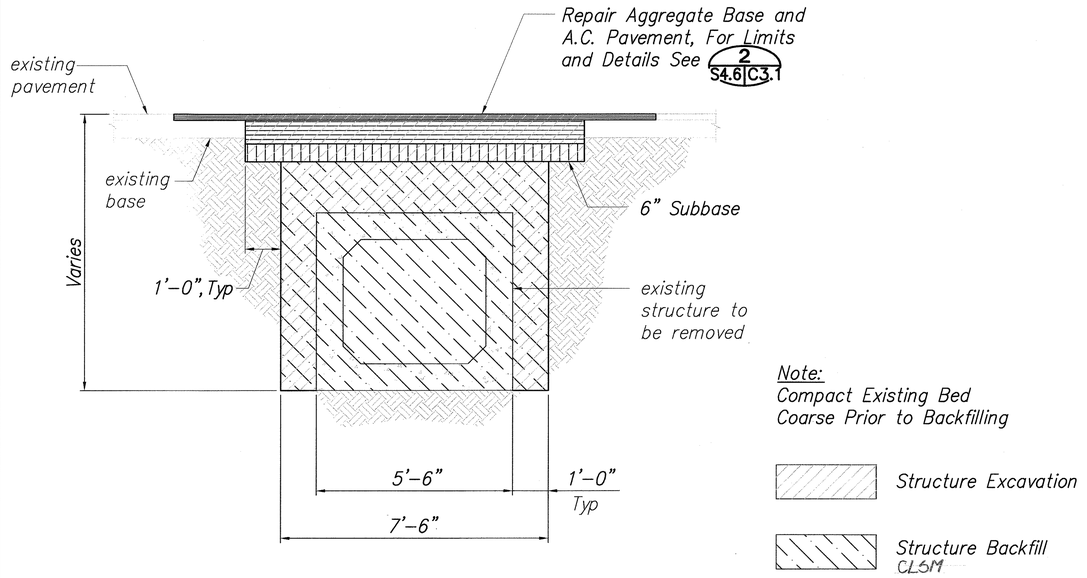
HAWAII BELT ROAD DRAINAGE IMPROVEMENTS

Project No. 19GHJ-01-05M

Scale: As Noted Date: April 14, 2006

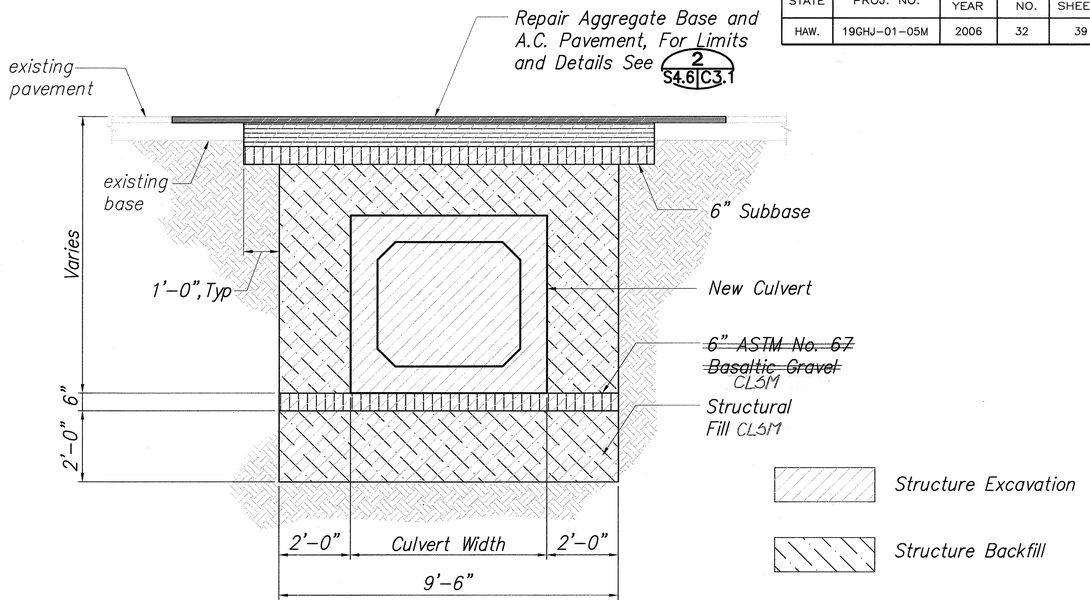
SHEET No. S4.5 OF 39 SHEETS

STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	32	39



STRUCTURE EXCAVATION AND BACKFILL (FOR EXISTING CULVERT) 1 S4.6 S4.6

Scale: 1/2" = 1'-0"



STRUCTURE EXCAVATION AND BACKFILL (FOR NEW CULVERT) 2 S4.6 S4.6

Scale: 1/2" = 1'-0"

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

KEN KAZUO HAYASHIDA
LICENSED PROFESSIONAL ENGINEER
No. 6818-S
HAWAII, U.S.A.

0' 1' 2' 3' 4' 5' 6'
1/2" = 1'-0"

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M.P. 19.36

EXCAVATION AND BACKFILL

HAWAII BELT ROAD DRAINAGE IMPROVEMENTS

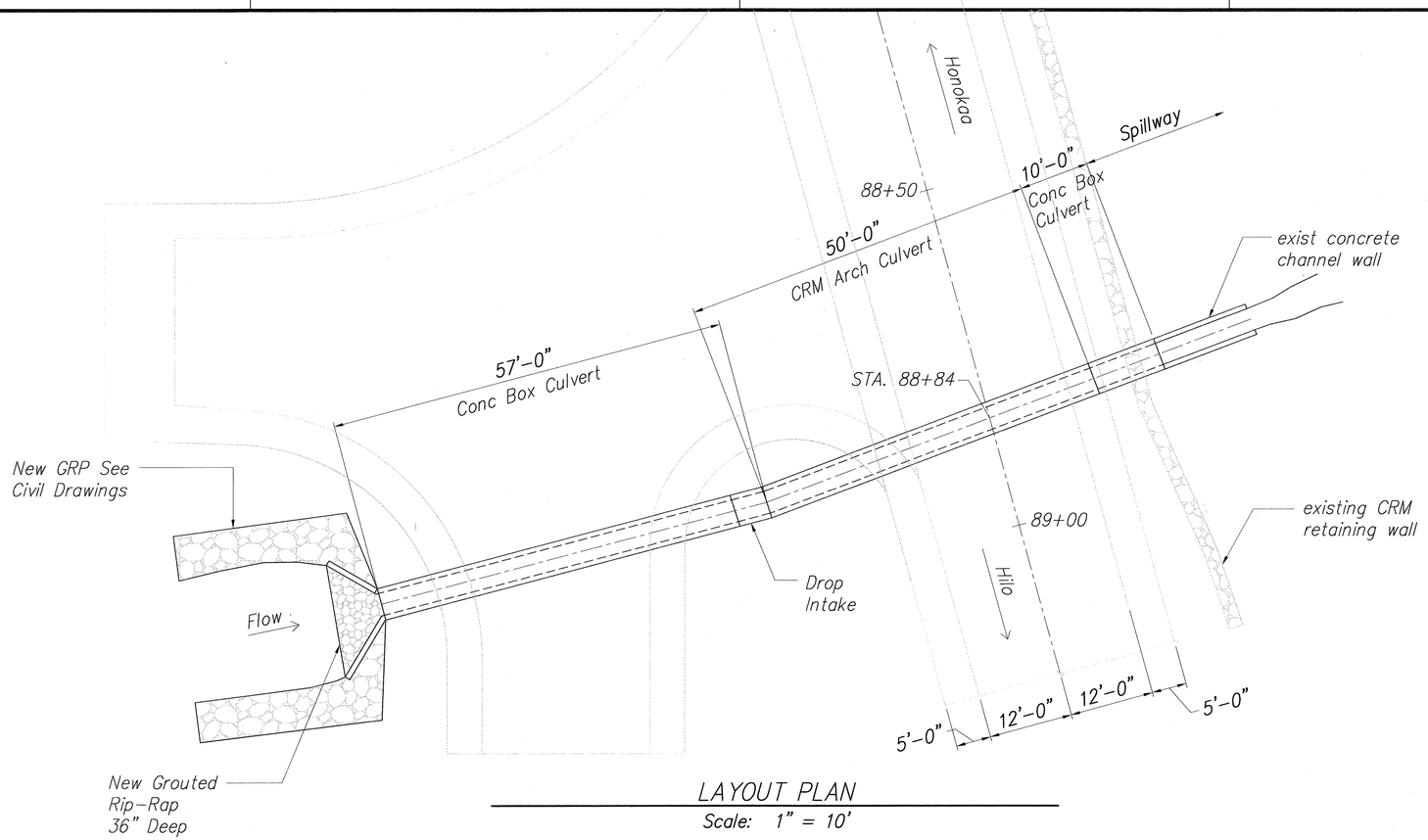
Project No. 19GHJ-01-05M

Scale: As Noted Date: April 14, 2006

SHEET No. S4.6 OF 39 SHEETS

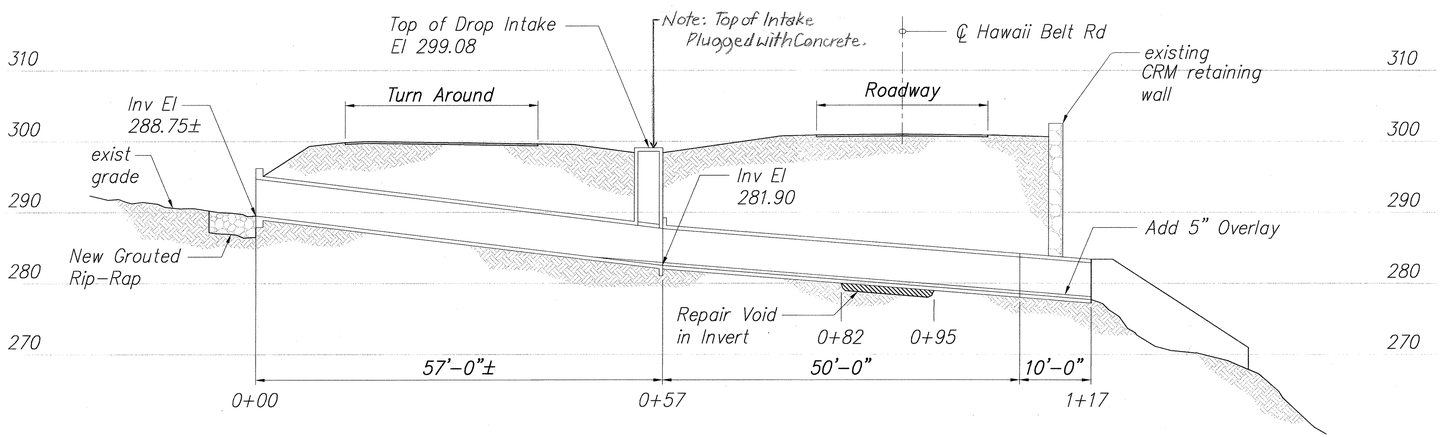
"AS-BUILT"

STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	33	39



LAYOUT PLAN

Scale: 1" = 10'



SECTION ALONG CENTERLINE OF CULVERT

Scale: 1" = 10'

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	
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	DESIGNED BY	
	QUANTITIES BY	
	CHECKED BY	

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LICENSED PROFESSIONAL ENGINEER
No. 6818-S
HAWAII, U.S.A.

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HIGHWAYS DIVISION

M.P. 21.19

PLAN AND SECTION

HAWAII BELT ROAD DRAINAGE IMPROVEMENTS

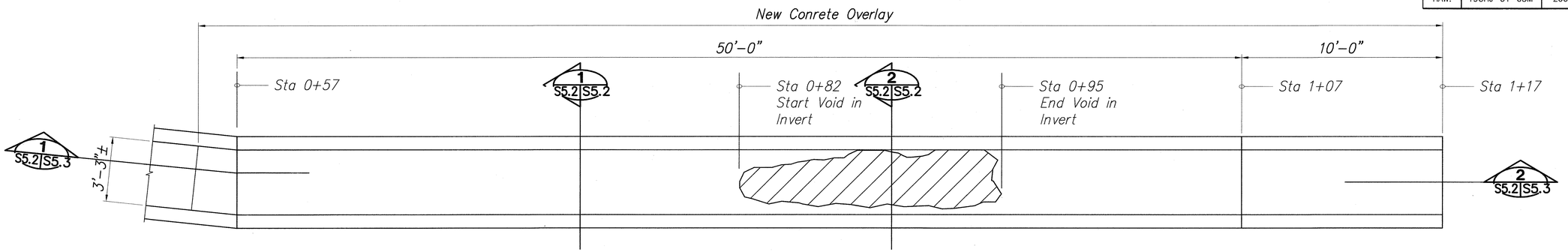
Project No. 19GHJ-01-05M

Scale: As Noted Date: April 14, 2006

SHEET No. S5.1 OF 39 SHEETS

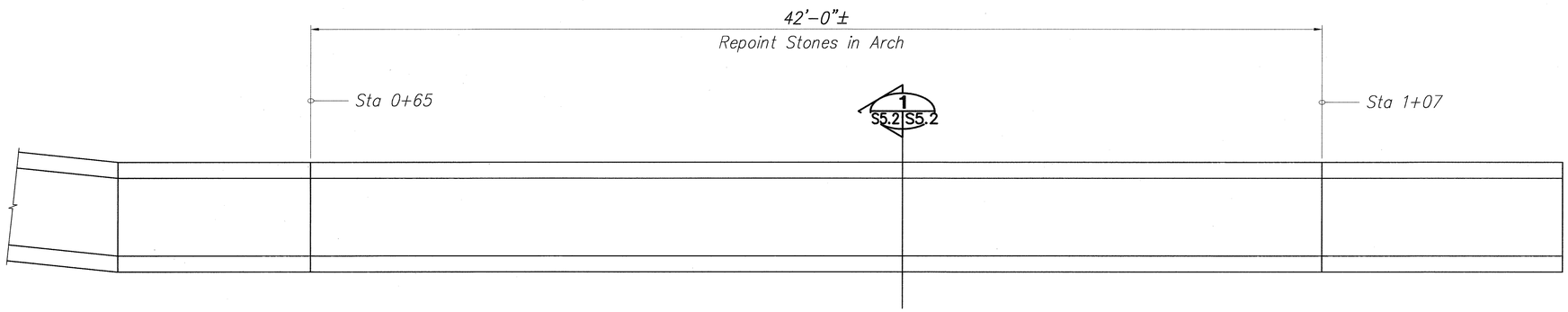
"AS-BUILT"

STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	34	39



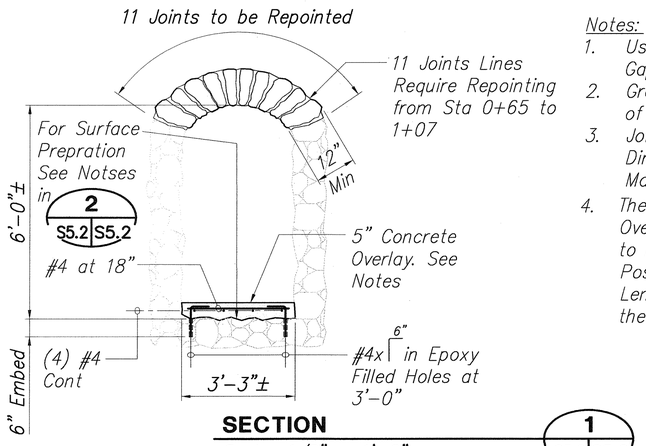
CULVERT FLOOR PLAN

Scale: 3/8" = 1'-0"



CULVERT CEILING PLAN

Scale: 3/8" = 1'-0"



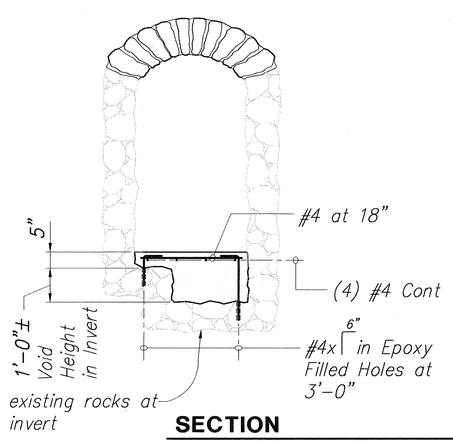
SECTION

Scale: 1/2" = 1'-0"

1 S5.2 S5.2

Notes:

1. Use Non-Shrink Grout to Fill Gaps Between Stones.
2. Grout Shall Extend a Minimum of 1' Into Joint.
3. Joints to be Cleaned of All Dirt and Other Bond Inhibiting Materials Before Pumping Grout.
4. The Thickness of New Concrete Overlay Shall be 5" and May Need to Be Increased to Maintain Positive Drainage Throughout the Length of the Culvert. Ponding on the Culvert Floor is not Allowed.



SECTION

Scale: 1/2" = 1'-0"

2 S5.2 S5.2

Notes:

1. Remove Loose Material from Bottom of Void Prior to Pouring Concrete.
2. Culvert to be Dewatered Prior to Pouring Concrete.
3. Water Shall Not be Allowed to Flow Over Concrete Overlay Until Fully Cured (14 Days).

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LICENSED PROFESSIONAL ENGINEER
No. 6818-S
HAWAII, U.S.A.

EXPIRATION DATE OF THE LICENSE: 4/30/2008

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MP 21.19

PLANS AND SECTIONS

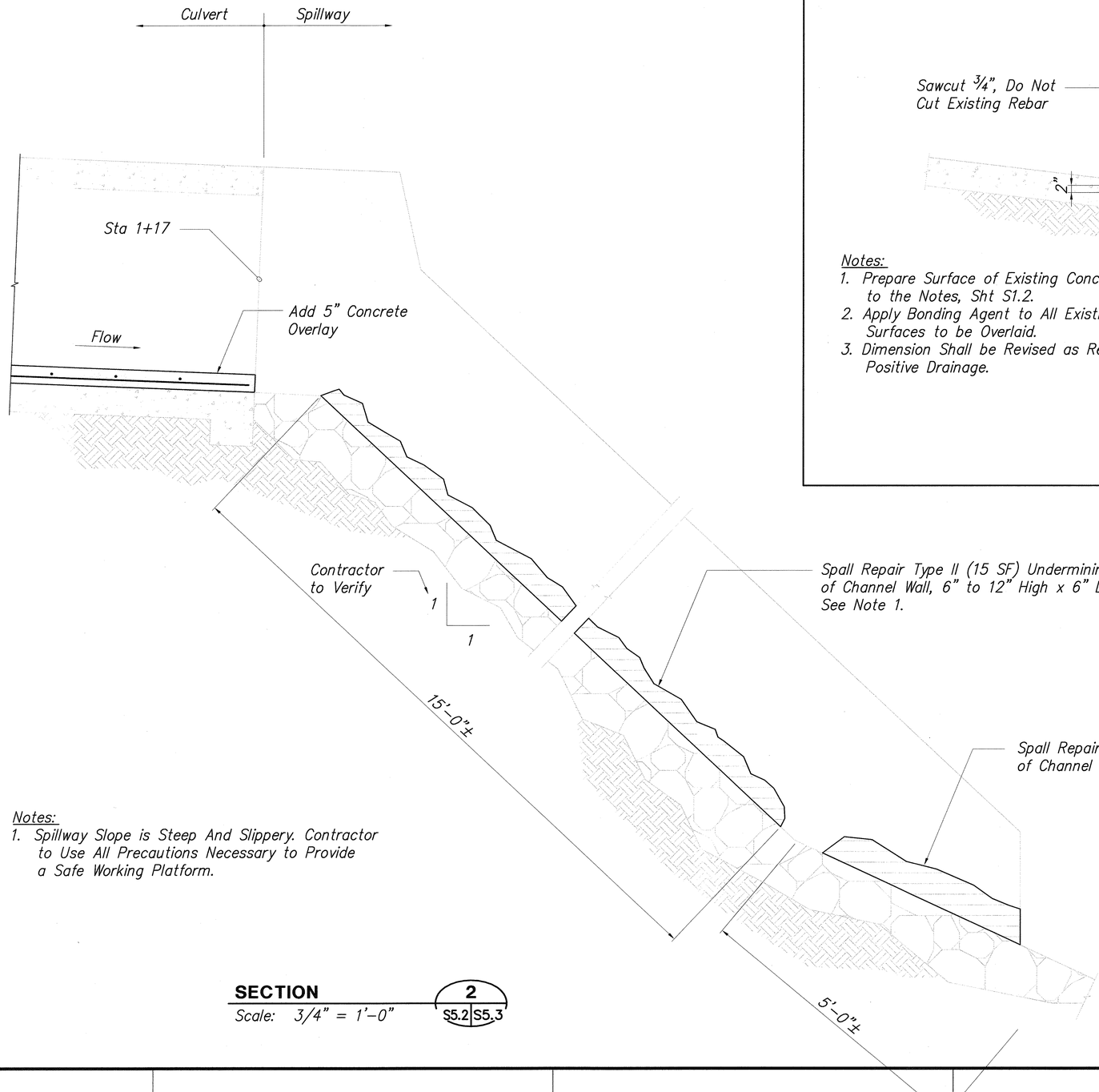
HAWAII BELT ROAD DRAINAGE IMPROVEMENTS

Project No. 19GHJ-01-05M

Scale: As Noted Date: April 14, 2006

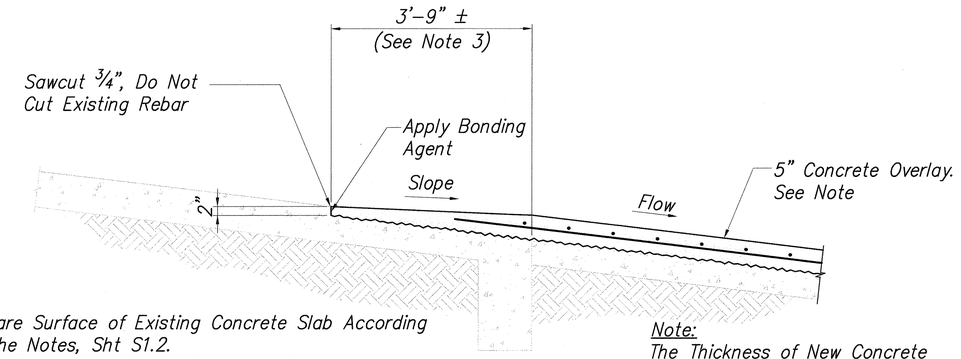
SHEET No. S5.2 OF 39 SHEETS

STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	35	39



Notes:
1. Spillway Slope is Steep And Slippery. Contractor to Use All Precautions Necessary to Provide a Safe Working Platform.

SECTION 2
Scale: 3/4" = 1'-0"
S5.2 | S5.3



Notes:
1. Prepare Surface of Existing Concrete Slab According to the Notes, Sht S1.2.
2. Apply Bonding Agent to All Existing Concrete Surfaces to be Overlaid.
3. Dimension Shall be Revised as Required to Maintain Positive Drainage.

Note:
The Thickness of New Concrete Overlay Shall be 5" and may Need to be Increased to Maintain Positive Drainage Throughout the Length of the Culvert. Ponding on the Culvert Floor is not Allowed.

SECTION 1
Scale: 3/4" = 1'-0"
S5.2 | S5.3

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

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LICENSED PROFESSIONAL ENGINEER
No. 6818-S
HAWAII, U.S.A.

EXPIRATION DATE OF THE LICENSE 4/30/2008
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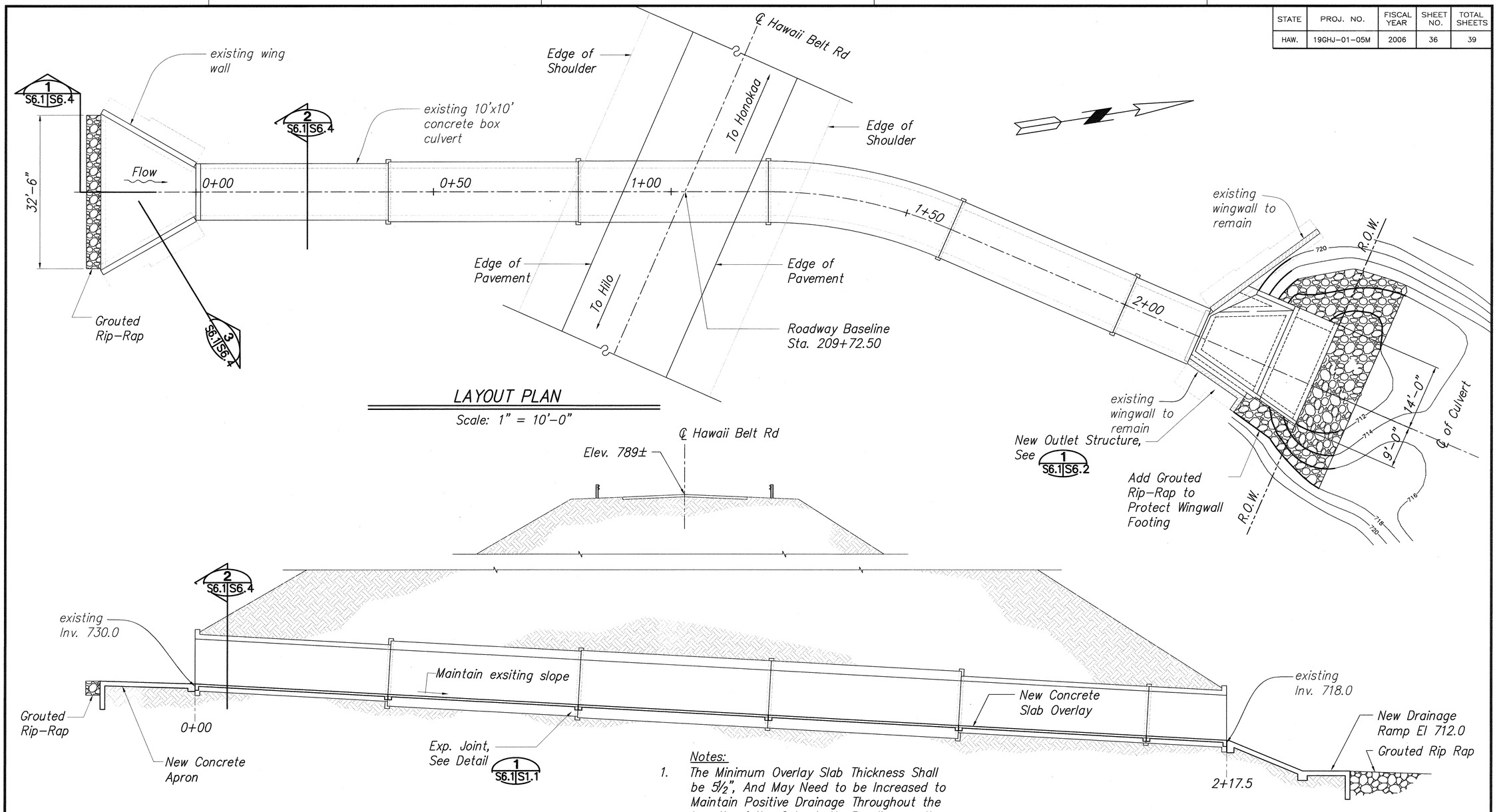
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

M.P. 21.19
SECTIONS
HAWAII BELT ROAD DRAINAGE IMPROVEMENTS
Project No. 19GHJ-01-05M

Scale: As Noted Date: April 14, 2006

SHEET No. S5.3 OF 39 SHEETS

STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	36	39



LAYOUT PLAN

Scale: 1" = 10'-0"

SECTION ALONG ℄ CULVERT

Scale: 1" = 10'-0"

Notes:

1. The Minimum Overlay Slab Thickness Shall be 5½", And May Need to be Increased to Maintain Positive Drainage Throughout the Length of the Culvert. No Ponding on the Culvert Floor is Allowed.
2. Elevations shown are taken from plans, Project No. DF-019-2(5), and are included for informational purposes only.

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

0' 10' 20' 30'
1" = 10'

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No. 6818-S
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STATE OF HAWAII
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M.P. 39.0

PLAN AND PROFILE

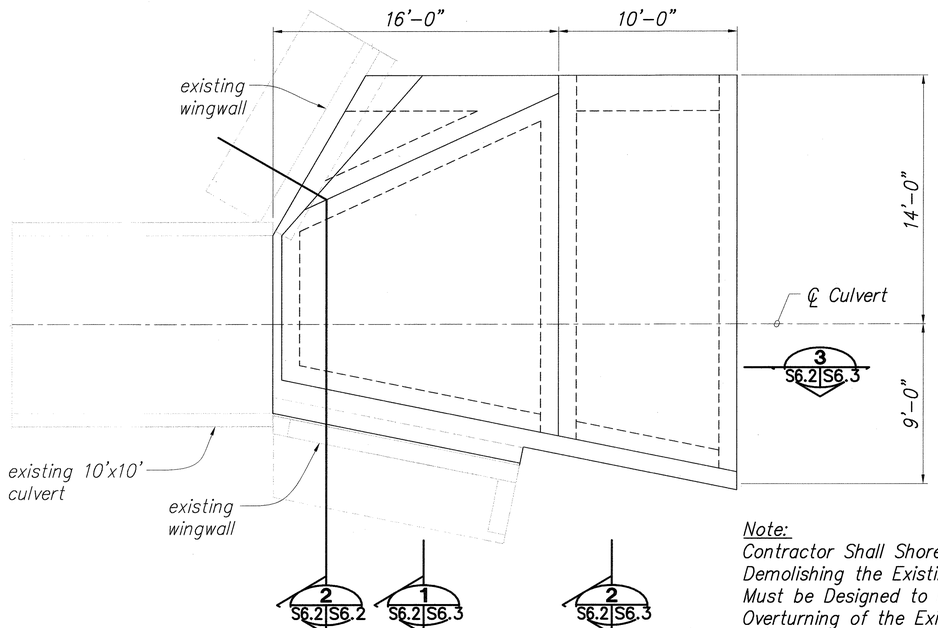
HAWAII BELT ROAD DRAINAGE IMPROVEMENTS

Project No. 19GHJ-01-05M

Scale: As Noted Date: April 14, 2006

SHEET No. S6.1 OF 39 SHEETS

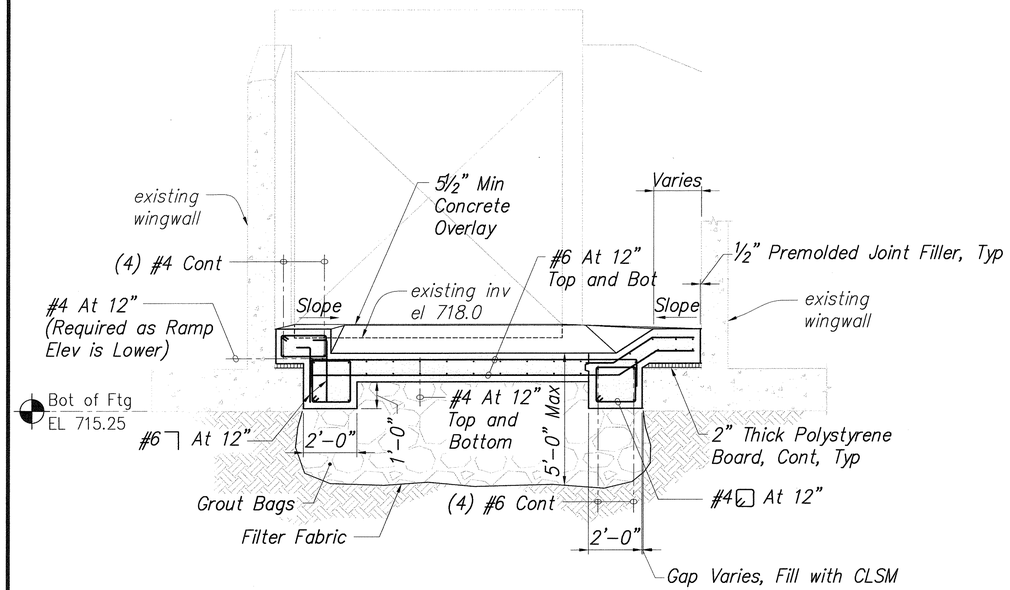
STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	37	39



OUTLET DETAIL (1 / S6.1|S6.2)

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

Note:
Contractor Shall Shore Both Existing Wingwalls Before Demolishing the Existing Apron Slab. The Shoring Must be Designed to Restrain all Possible Sliding and Overturning of the Existing Wingwall Footings During Excavation and Construction of New Drainage Ramp.



SECTION (2 / S6.2|S6.2)

Scale: 3/8" = 1'-0"

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

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LICENSED PROFESSIONAL ENGINEER
No. 6818-S
HAWAII, USA

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

M.P. 39.0

SECTIONS AND DETAILS

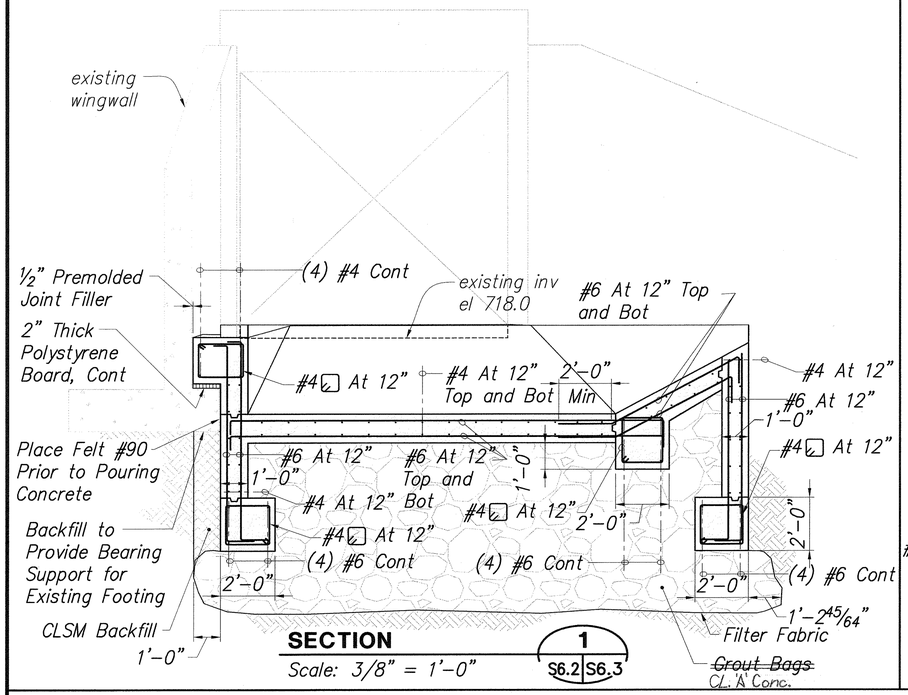
HAWAII BELT ROAD DRAINAGE IMPROVEMENTS

Project No. 19GHJ-01-05M

Scale: As Noted *Date: April 14, 2006*

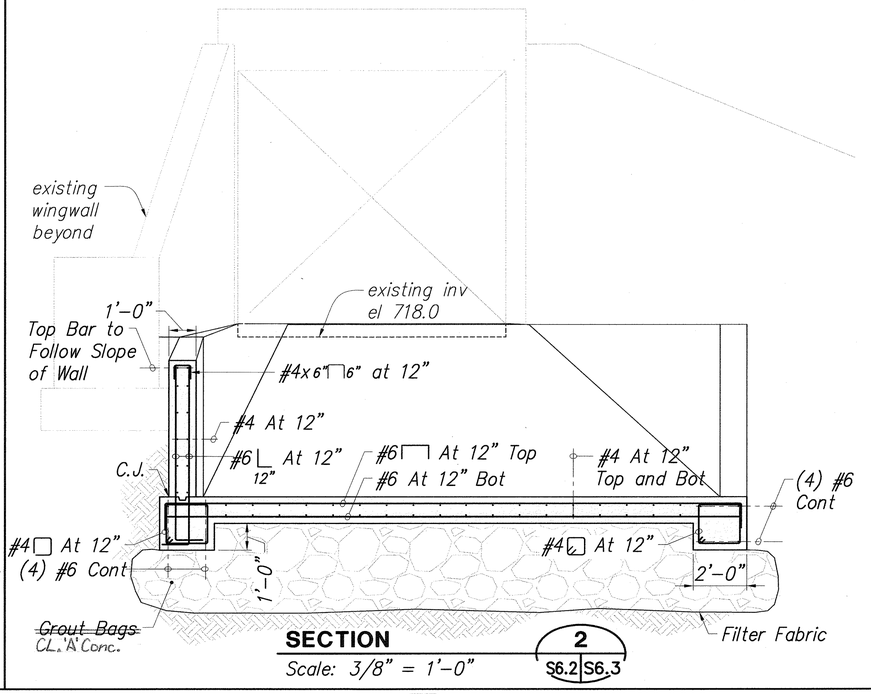
SHEET No. S6.2 OF 39 SHEETS

STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	38	39



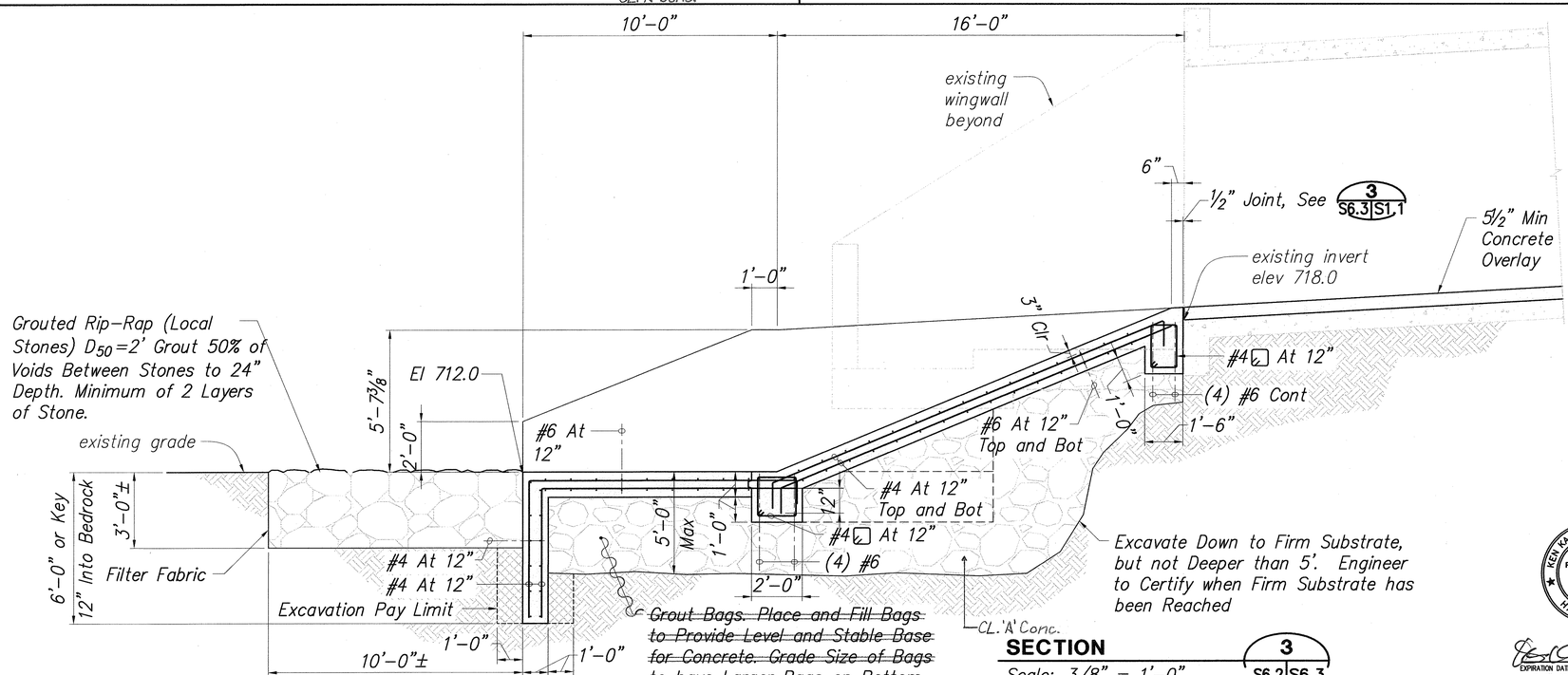
SECTION 1 (S6.2 | S6.3)

Scale: 3/8" = 1'-0"



SECTION 2 (S6.2 | S6.3)

Scale: 3/8" = 1'-0"



SECTION 3 (S6.2 | S6.3)

Scale: 3/8" = 1'-0"

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
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	CHECKED BY	

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"AS-BUILT"

STATE OF HAWAII
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M.P. 39.0

SECTIONS AND DETAILS

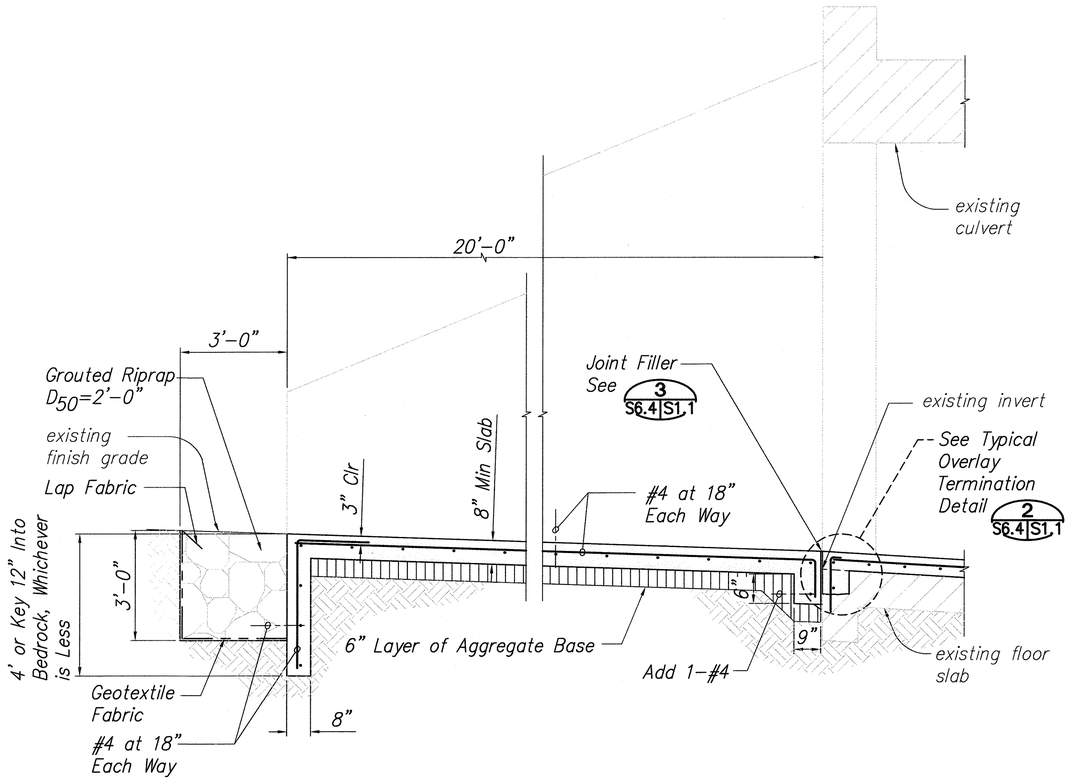
HAWAII BELT ROAD DRAINAGE IMPROVEMENTS

Project No. 19GHJ-01-05M

Scale: As Noted Date: April 14, 2006

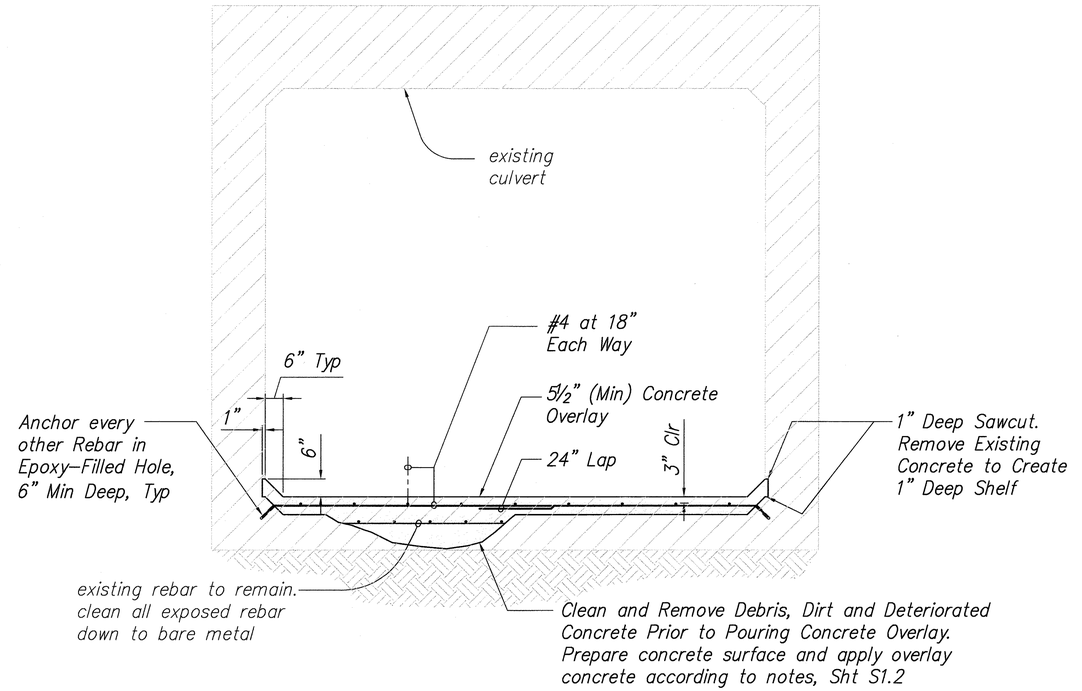
SHEET No. S6.3 OF 39 SHEETS

STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAW.	19GHJ-01-05M	2006	39	39



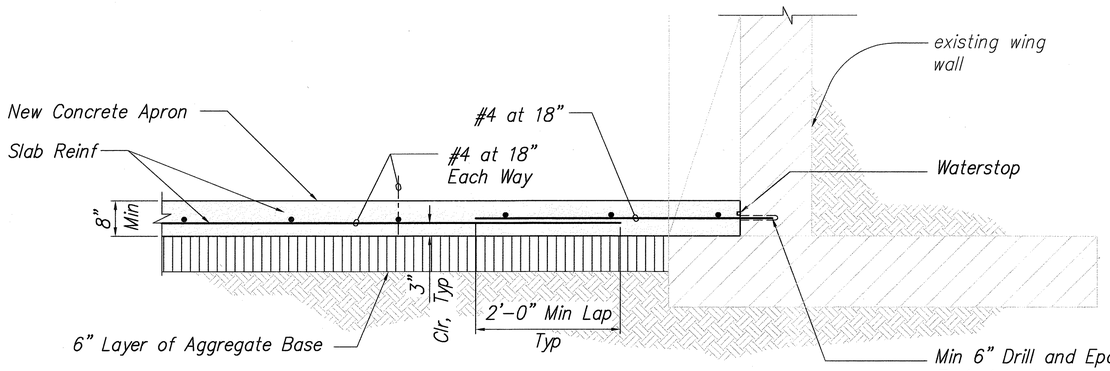
NEW INLET APRON SECTION 1 S6.1 | S6.4

Scale: 1/2" = 1'-0"



TYPICAL INVERT OVERLAY SECTION 2 S6.1 | S6.4

Scale: 1/2" = 1'-0"



NEW APRON DETAIL AT EXISTING WINGWALL 3 S6.1 | S6.4

Scale: 1" = 1'-0"

Note:
The water swelling waterstop shall be gun grade material, supplied by Adeka Ultra Seal (P-201), of Deneef (Swell Seal), or approved equal. Only gun grade material is allowed. Minimum clear distance to edge of concrete is 2½".

0' 6" 1' 2' 3'
1" = 1"-0"

0' 1' 2' 3' 4' 5' 6'
1/2" = 1'-0"

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HIGHWAYS DIVISION

M.P. 39.0 CULVERT SECTIONS AND DETAILS

HAWAII BELT ROAD DRAINAGE IMPROVEMENTS

Project No. 19GHJ-01-05M

Scale: As Noted Date: April 14, 2006

SHEET No. S6.4 OF 39 SHEETS

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