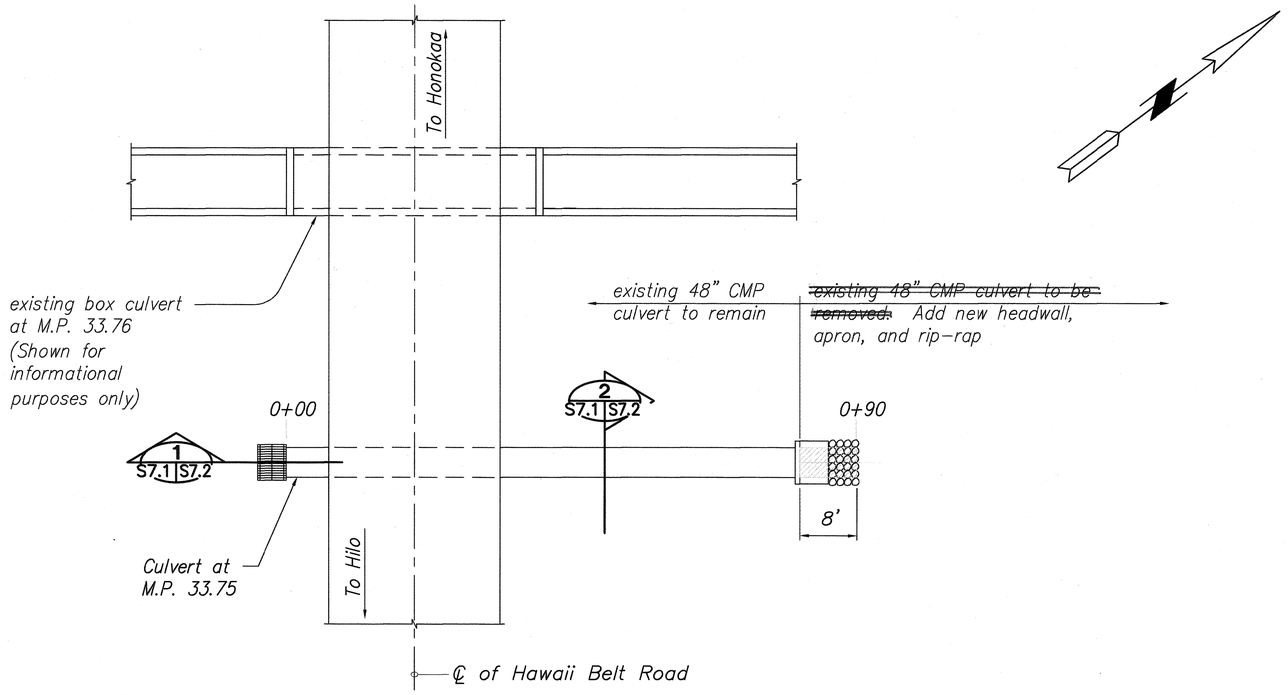
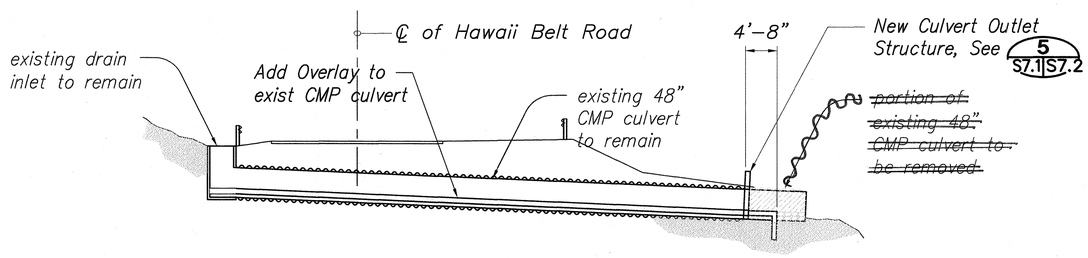
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19FGH-01-07M	2008	41	51



LAYOUT PLAN

Scale: 1" = 10'-0"



SECTION ALONG ℄ CULVERT

Scale: 1" = 10'-0"

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

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

M.P. 33.75 CULVERT PLAN AND PROFILE

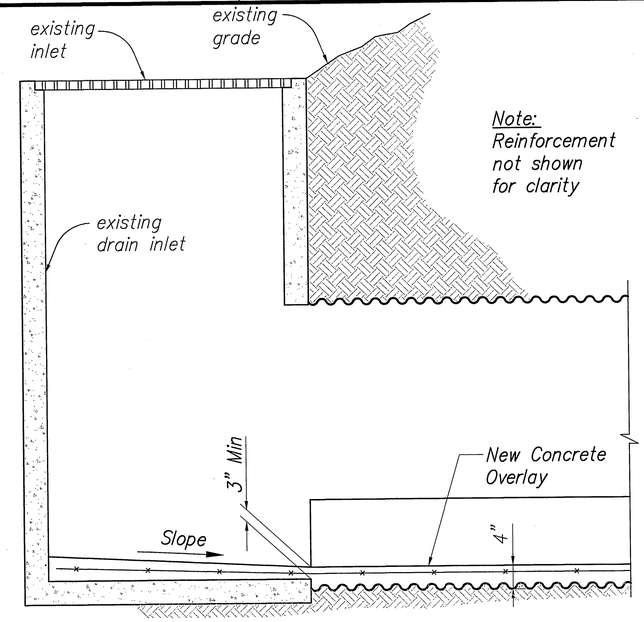
HAWAII BELT ROAD DRAINAGE IMPROVEMENTS
Project No. 19FGH-01-07M

Scale: AS NOTED Date: APRIL 2007

SHEET No. S7.1 OF 51 SHEETS

"AS-BUILT"

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19FGH-01-07M	2008	42	51

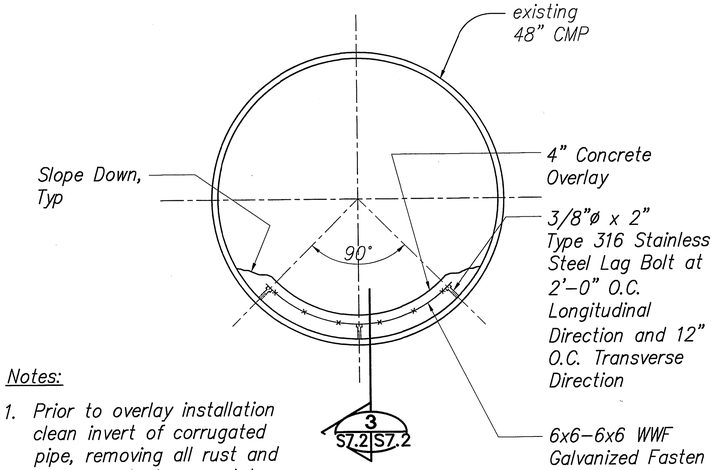


Notes:

1. Prepare concrete surface according to Sht. S1.2, Slab overlay notes.
2. Apply bonding agent prior to placing concrete.

SECTION (1 / S7.1 | S7.2)

Scale: 1" = 1'-0"

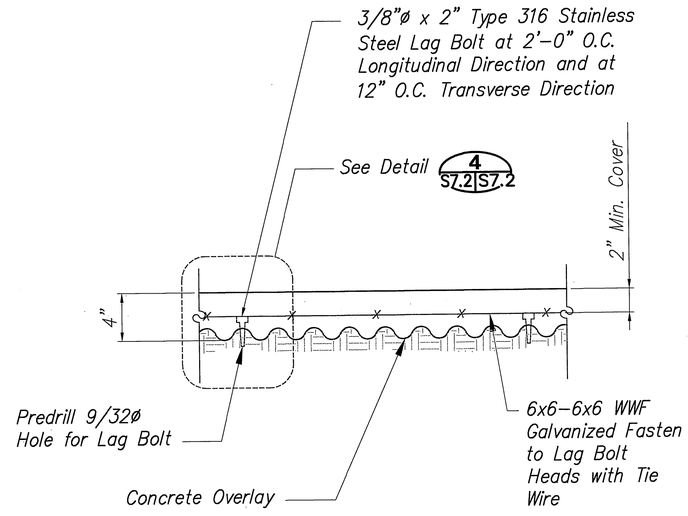


Notes:

1. Prior to overlay installation clean invert of corrugated pipe, removing all rust and dirt down to base metal. Cleaning shall be by blast cleaning or wire brush, or an approved equivalent method.
2. Apply epoxy bonding agent prior to placing concrete.

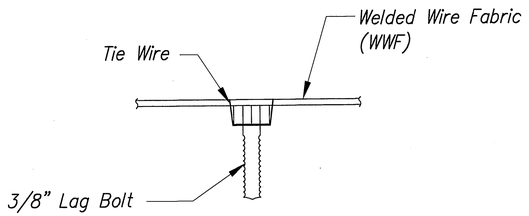
SECTION (2 / S7.1 | S7.2)

Scale: 1" = 1'-0"



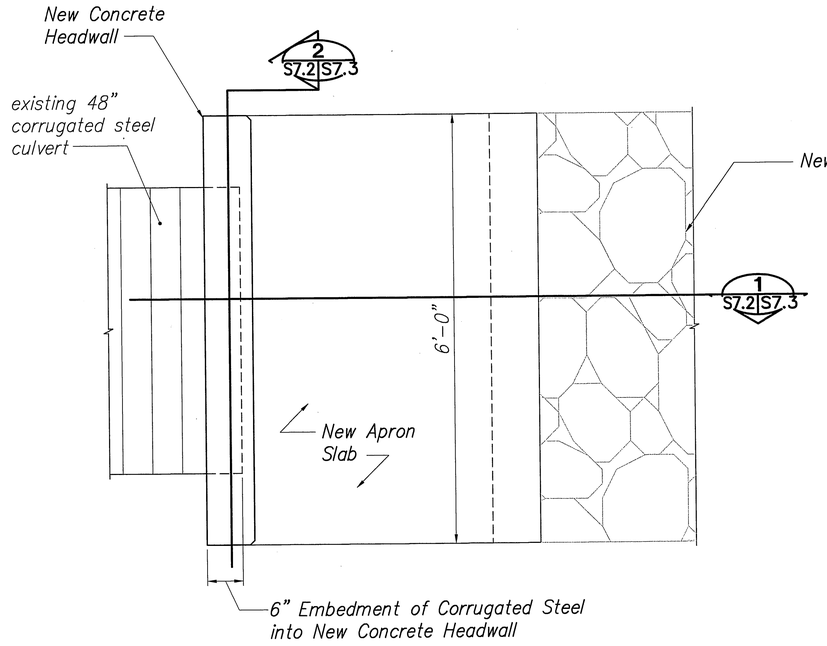
SECTION (3 / S7.2 | S7.2)

Scale: 3" = 1'-0"



WIRE TIE DETAIL (4 / S7.2 | S7.2)

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



CMP CULVERT OUTLET PLAN VIEW (5 / S7.1 | S7.2)

Scale: 1" = 1'-0"

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

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

REDUCED PLAN
(HALF SIZE)
0 1 2 3
3 INCHES ON ORIGINAL PLAN

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

M.P. 33.75 CULVERT SECTIONS AND DETAILS

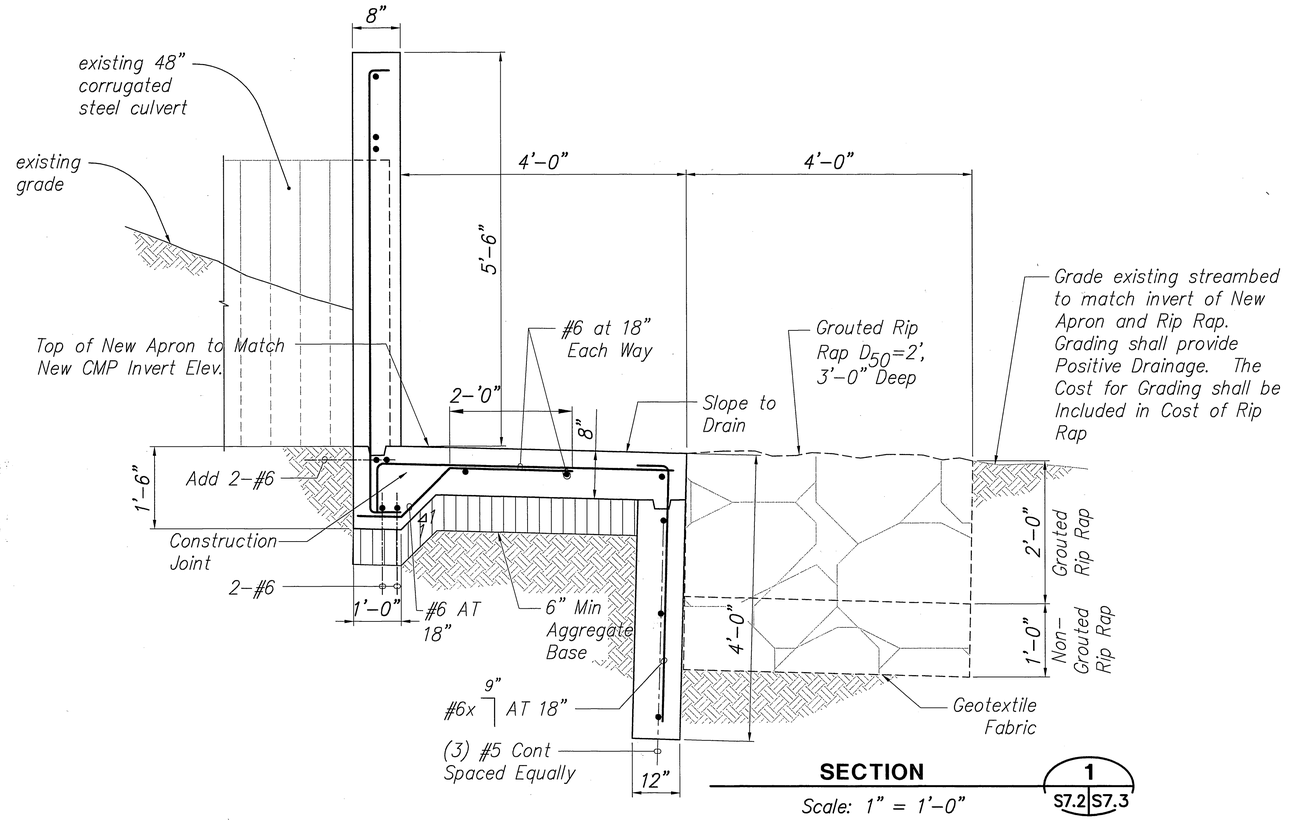
HAWAII BELT ROAD DRAINAGE IMPROVEMENTS
Project No. 19FGH-01-07M

Scale: AS NOTED Date: APRIL 2007

SHEET No. S7.2 OF 51 SHEETS

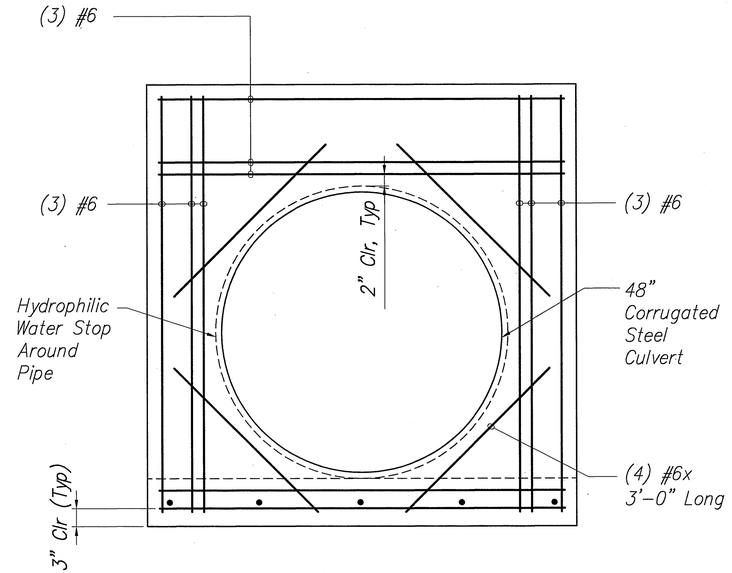
ORIGINAL PLAN	NOTE BOOK	No.	DATE
SURVEY PLOTTED BY			
DRAWN BY			
TRACED BY			
DESIGNED BY			
QUANTITIES BY			
CHECKED BY			

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19FGH-01-07M	2008	43	51



SECTION 1 (S7.2 | S7.3)

Scale: 1" = 1'-0"



SECTION 2 (S7.2 | S7.3)

Scale: 1" = 1'-0"

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

REDUCED PLAN (HALF SIZE)
0 1 2 3
3 INCHES ON ORIGINAL PLAN

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

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. 33.75 CULVERT SECTIONS AND DETAILS

HAWAII BELT ROAD DRAINAGE IMPROVEMENTS
Project No. 19FGH-01-07M

Scale: AS NOTED Date: APRIL 2007

SHEET No. S7.3 OF 51 SHEETS

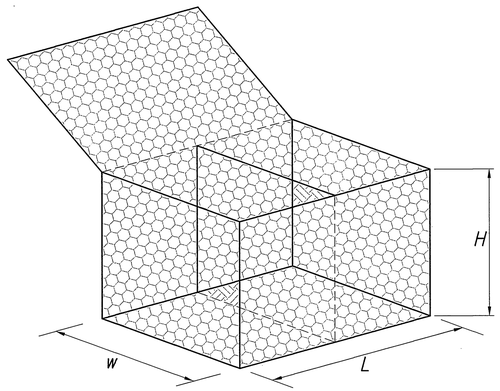
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19FGH-01-07M	2008	44	51

Notes :

1. Foundation :
   Gabion wall shall bear on 6" min. Class "D" concrete leveling pad. The leveling pad shall be poured directly on clean hard basalt rock. Any soft spots, cobbles, boulders and loose materials encountered in the foundation excavations shall be removed and cleaned down to hard basalt rock and the resulting depression backfilled with Class "D" concrete.

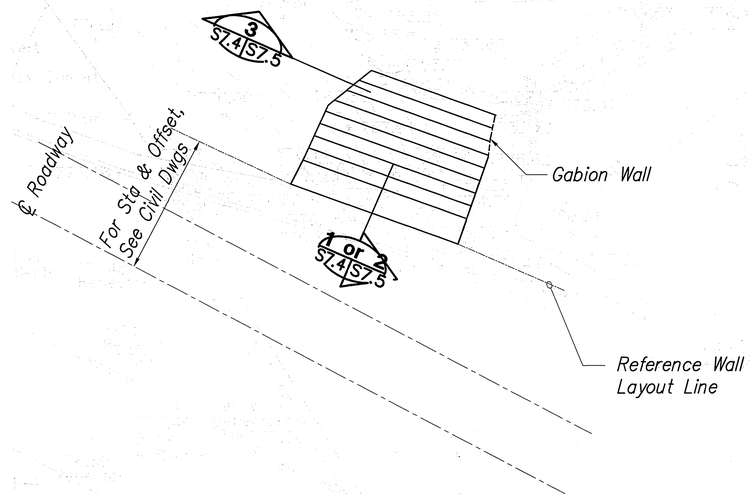
2. Gabions:
   A. PVC Coated Wire
      The technical characteristics and the resistance of the PVC to ageing shall meet the relevant standards. The main values for the pvc material shall be as follows: Specific gravity: 81–84 pcf (1.30–1.35 kg/dm 3,) in accordance with ASTM D792 Table 1:
      Hardness: between 50 and 60 Shore D, according to ASTM D 2240;
      Tensile strength: not less than 2,985 psi (20.6 MPa), according to ASTM D412–98;
      Modulus of elasticity: not less than 2,700 psi (18.6 MPa), in accordance with ASTM D412–92; Abrasion resistance: the percentage of the weight loss shall be less than 12%, according to ASTM D1242–95a. All tests on wire must be performed prior to manufacturing the mesh.
      1. Tensile Strength: the wire used for the manufacture of gabions shall have a tensile strength between 54,000–70,000 psi (372–470 MPa) according to ASTM A641–03.
         Wire tolerances (Table 3) shall be in accordance with ASTM A641–03.
      2. Elongation: elongation shall not be less than 12%, in accordance with ASTM A370–97a. Test must be carried out on a sample at least 12 in. (30 cm) long.
      3. The minimum quantities of zinc coating for the wire mesh shall meet or exceed the requirements of ASTM A641–03, Class III soft temper coating.
      4. Adhesion of zinc: the adhesion of the zinc coating to the wire shall be such that, when the wire is wrapped six turns around a mandrel having four times the diameter of the wire, it does not flake or crack when rubbing it with the bare fingers, in accordance with ASTM A641–97.
   B. Material Delivery
      Gabions shall be manufactured with all components mechanically connected at the production facility, as per ASTM A975–97. All gabions shall be supplied in the collapsed form, either folded and bundled or rolled. The bundles shall be compressed and strapped together at the factory for easy shipping and handling. Lacing wire shall be shipped in coils. Fasteners shall be shipped in boxes. Preformed stiffeners shall be shipped in bundles.
   C. Assembly
      Open and unfold each gabion on a flat, hard surface and remove any shipping fold. This can be done by placing the fold over a 2" x 4" board and walking along the sides. Lift up the sides, ends and diaphragms into a vertical position to form an open box shape. Connect the back and the front panels of the gabion to the end panels and center diaphragms. The top corner of the end panels and center diaphragms have an extended selvedge wire extending approximately 4" out from the corner edge. Raise the end panels and the diaphragms to a vertical position and wrap the selvedge wire around the edge wire of the top and back panels.
      Connect the edges of the gabion and diaphragms by using either lacing wire or ring fasteners. Ring fasteners shall not be spaced more than six (6) inches apart. The procedure for using lacing wire consists of cutting a sufficient length of wire, and first looping and/or twisting the lacing wire to the wire mesh. Proceed to lace with alternating double and single loops through every mesh opening approximately every 6 inches (150 mm) pulling each loop tight and finally securing the end of the lacing wire to the wire mesh by looping and/or twisting. The use of 6–inch to 8–inch pliers to aid assembly and wiring of the units using the binding wire supplied with the gabions is normally recommended.
      Place the diaphragms into the vertical position, and wire them to the side panels in the same manner.

3. Gabion Rocks :
   Rocks for gabions shall have a specific gravity of 2.64 and may be produced by any suitable quarrying method, and by the use of any device that yields the required sizes within the gradation limits chosen. Rocks shall be hard, angular to round, durable and of such quality that they shall not disintegrate on exposure to water or weathering during the life of the structure. Gabion rocks shall range between 4 inches and 8 inches (100–200 mm). The range in sizes may allow for a variation of 5% oversize and/or 5% undersize rock, provided it is not placed on the gabion exposed surface. In all cases, the oversize rock shall not be larger than 12 inches (300 mm), and the undersize rock shall not be smaller than 2 inches (50 mm).
4. Installation and Filling :
   After the foundation has been prepared, the pre–assembled gabions shall be placed in their proper location to form the structure. Gabions shall be connected together and aligned before filling the baskets with rock. All connections (panel–to–panel and basket–to–basket) shall be already carried out as described in the Assembly operations.
5. Wire Mesh Size:
   A. Galvanized and PVC coated wire mesh gabions (8 x 10 mesh type)
      PVC coating thickness: Nominal – 0.02 in., Minimum – 0.015 in
      Mesh Wire: Diameter – 0.106 in. internal, 0.146 in. external
      Selvedge Wire: Diameter – 0.134 in. internal, 0.174 in. external
      Mesh Opening: Nominal Dimension D = 3.25 in.
   B. Galvanized and PVC coated lacing wire and internal stiffeners:
      PVC coating thickness: Nominal – 0.02 in., Minimum – 0.015 in.
      Lacing wire: Diameter – 0.087 in. internal, 0.127 in. external
      Cross Tie/Stiffener wire: Diameter – 0.087 in. internal, 0.127 in. external
      Preformed Stiffener: Diameter – 0.134 in. internal, 0.174 in. external



Unit Sizes			
L (ft)	W (ft)	H (ft)	# of Cells
6	3	3	2
9	3	3	3
12	3	3	4

GABION UNIT SIZE
Not to Scale



GABION WALL PLAN
Scale: 1/8" = 1'-0"

REDUCED PLAN
(HALF SIZE)
0 1 2 3
3 INCHES ON ORIGINAL PLAN

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

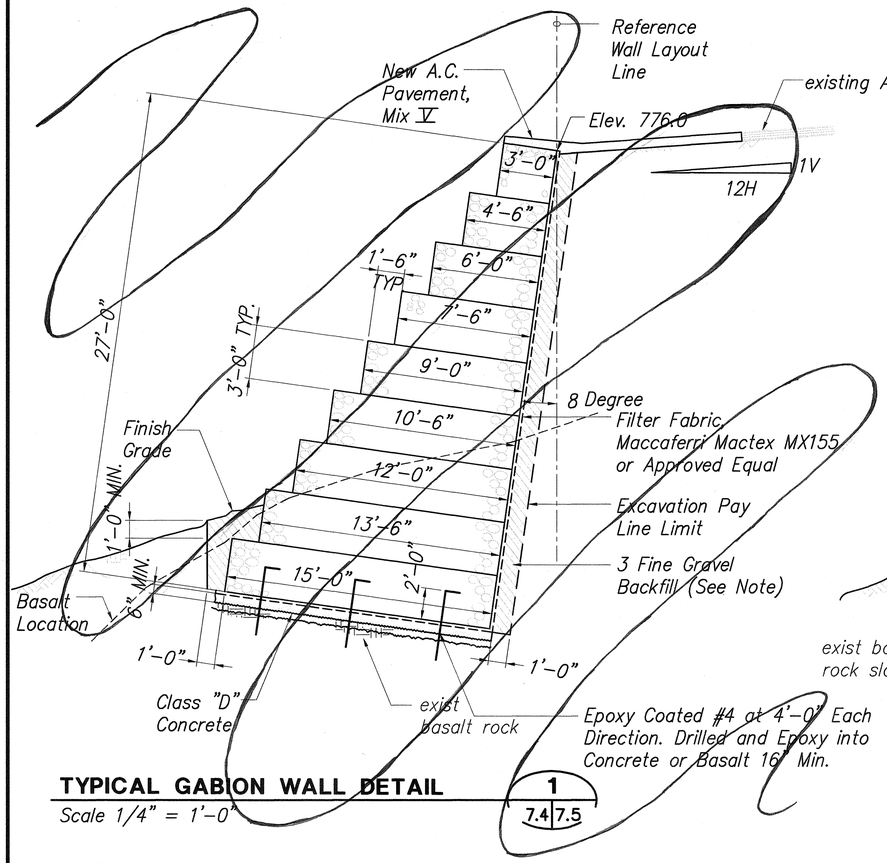
EXPIRATION DATE OF THE LICENSE 4/30/2008
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
M.P. 33.75
GABION WALL PLAN
HAWAII BELT ROAD DRAINAGE IMPROVEMENTS
Project No. 19FGH-01-07M
Scale: AS NOTED Date: APRIL 2007

SHEET No. S7.4 OF 51 SHEETS

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

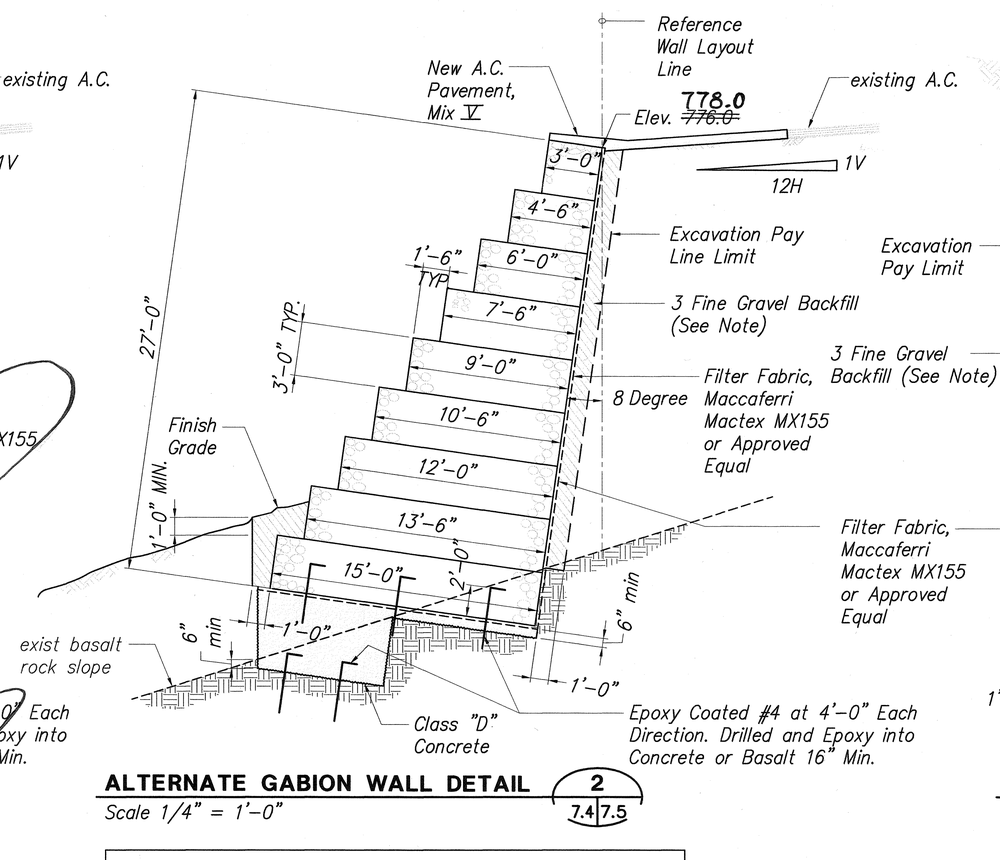
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19FGH-01-07M	2008	45	51



TYPICAL GABION WALL DETAIL (1) 7.4 | 7.5

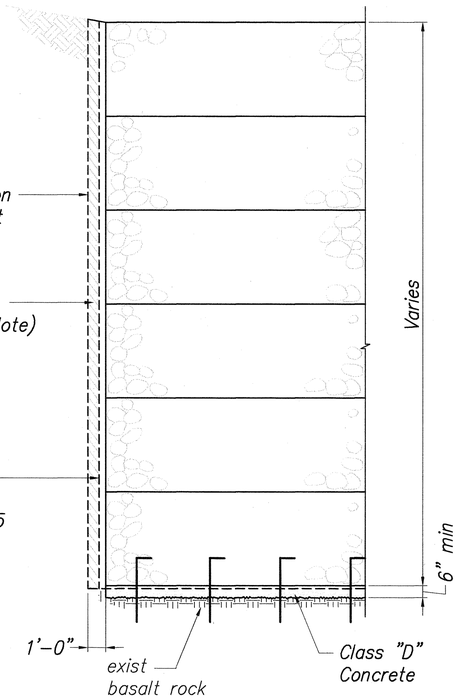
Scale 1/4" = 1'-0"

N.I.C.



ALTERNATE GABION WALL DETAIL (2) 7.4 | 7.5

Scale 1/4" = 1'-0"



SECTION (3) 7.4 | 7.5

Scale 1/4" = 1'-0"

Notes:

1. *The Alternate Gabion Wall detail shall be followed where the slope of the basalt rock lies below the proposed bottom surface of the gabion wall. The concrete pad shall be keyed into the basalt slope by 6", minimum. The excavation for the leveling pad shall be at the same slope as the bottom of gabion wall foundation. The basalt slope shall be over excavated to meet the requirements noted above. Payment for the additional work associated with the alternate design shall be paid for under the alternate gabion wall pay item. The engineer shall not measure the quantity for payment.*
2. *The Engineer shall evaluate the condition and adequacy of basalt layer under gabion wall before construction of wall.*
3. *3 B Fine shall be installed after installation of each layer of rock.*

ORIGINAL PLAN | NOTE BOOK No. | SURVEY PLOTTED BY DATE | DRAWN BY | TRACED BY | 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. 33.75

GABION WALL DETAILS

HAWAII BELT ROAD DRAINAGE IMPROVEMENTS
Project No. 19FGH-01-07M

Scale: AS NOTED Date: APRIL 2007

SHEET No. S7.5 OF 51 SHEETS

"AS-BUILT"