FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(51)	2007	27	106

GENERAL NOTES

1. General Specifications: Hawaii Department of Transportation, Standard Specifications for Road, Bridge and Public Works Construction, 1994, together with Special Provisions prepared for this contract.

2. Design Specifications:
   - (A) AASHTO LRFD Bridge Design Specifications (Third Edition, 2004) and modifications by the HDOT Highways Division.
   - (B) HDOT Memorandum HWY-DB 2.6843 dated February 14, 2005 with subject title "Design Criteria for Bridges and Structures".
   - (C) Post-Tensioning Institute "Recommendations for Prestressed Rock and Soil Anchors".

3. Loads:
   - (A) Live Load: AASHTO HL-93 Truck Loading
   - (B) Seismic Loads: Acceleration coefficient – 0.18
   - (C) Railing (Barriers) Test Level: TL-2

4. Materials:
   - (A) All concrete strengths shall be as noted below:

Item No.	Structural Parts	Classes of Concrete	Compressive Strength f'c (28 Days)	Maximum W/C Ratio
(1)	Stressing Block	–	6000 PSI	0.40
(2)	Concrete Wall	–	6000 PSI	0.40
(3)	CRM/Conrete barrier Wall Closure	–	6000 PSI	0.40
(4)	Except as noted otherwise, all others	A	3000 PSI	0.55

   - (B) For Ground Anchors, refer to Section 681 of the Special Provisions.
   - (C) A shrinkage reducing admixture (SRA) shall be added to all concrete mixes. The required dosage shall be 128 ounces per cubic yard of concrete and follow all manufacturer's recommendations.
   - (D) A migrating corrosion inhibitor amine carboxylate water-based admixture shall be added to the concrete mix for all concrete mixes. The minimum dosage shall be 1.5 pints per cubic yard of concrete. The admixture shall not affect the set time of the concrete.
   - (E) The use of any calcium chloride in any concrete is prohibited.
   - (F) All reinforcing steel shall be ASTM A 615, Grade 60 unless otherwise noted. Epoxy coated reinforcing steel shall be ASTM A775 Grade 60.
   - (G) All anchor bolts, washers and nuts shall be ASTM A 193 (UNS S31600) stainless steel unless otherwise specified.
   - (H) All structural steel shapes and plates shall be ASTM A36 hot dip galvanized after fabrication, unless otherwise noted.
   - (J) Steel tubes shall conform to ASTM A500, Grade B.
   - (K) All dowels with non-shrink grout into existing wall shall be ASTM A 955 UNS S31603 Grade 60 deformed stainless steel reinforcement.
   - (L) A black or brown stain shall be applied on exposed concrete surfaces per Specification Section 503.02 (A).
   - (M) Hydrophilic rubber waterstop shall have a minimum dimensions of 20 mm x 10 mm. It shall be composed of non-vulcanized rubber and urethane polymer hydrophilic agent. It shall have a stainless steel wire mesh embedded in the product to direct expansion in the thickness direction and to restrict expansion in the longitudinal direction. It shall develop no less than 400 psi expansion pressure and withstand a minimum 150 foot hydrostatic head.

5. Reinforcement:
   - (A) The covering measured from the surface of the concrete to the face of any reinforcing bar shall be three inches, unless otherwise noted.
   - (B) Reinforcing bars shall be detailed in accordance with the latest edition of the A.C.I. Detailing Manual unless otherwise noted.

5. Reinforcement:
   - (C) Minimum clear spacing between parallel bars shall be 1 1/2 times the diameter of bars (for non-bundled bars). In no case shall the clear distance between the bars be less than 1 1/2 times the maximum size of the coarse aggregate or 1 1/2".
   - (D) All dimensions relating to reinforcing bars are to centers of bars unless otherwise noted.
   - (E) Reinforcing bars shall be securely tied at all intersections and lap splices except where the spacing of intersections is less than one foot in each direction, in which case alternate intersections shall be tied.

6. Glass Fiber Reinforced Polymer Bar
   - (A) Glass Fiber Reinforced Polymer (GFRP) rebar shall have a minimum tensile strength of 110 ksi for #4 bar and smaller. All others shall have a minimum tensile strength of 95 ksi. The allowable stress is equal to 1/4 of the tensile strength.
   - (B) The modulus of elasticity of the GFRP bar shall be a minimum of 5,900,000 psi.
   - (C) Minimum concrete cover for the GFRP bars shall be 3/4" unless otherwise noted.
   - (D) Minimum lap splice lengths for the GFRP bars shall be 42 bar diameters unless otherwise noted.
   - (E) All GFRP bars shall be securely tied in place.
   - (F) The GFRP bars may be cut in the field with a masonry or diamond blade.
   - (G) All work including materials and bends shall follow manufacturer's recommendations.

7. Retaining Wall Notes:
   - (A) All work related to the retaining walls required for this project shall be performed in accordance with Specification Section 503 entitled Concrete Structures. Precast walls will not be permitted.
   - (B) Materials
     - (1) All reinforcing for ground anchors shall consist of seven wire low relaxation strands conforming to ASTM 416 Grade 270 and shall be fully encapsulated, as shown on the plans.
     - (2) Encapsulation of the reinforcing for ground anchors shall consist of minimum 0.1– inch thick corrugated HDPE (AASHTO M252) or corrugated PVC (ASTM D1784). Encapsulation shall provide at least 0.25–inches of grout cover over the reinforcing. Encapsulation shall be resistant to ultra violet light degradation, normal handling stresses, and grouting pressures. The encapsulation shall be fabricated in the factory with a proper end cap on one side.
     - (3) Ground anchor grout shall develop a minimum compressive strength of 3000 psi at the time of stressing. See Specification Section 681 for further requirements.
   - (C) The Contractor shall provide and maintain a stable slope above and below the retaining walls. See Specification Section 206 B for further requirements.
   - (D) The Contractor shall anticipate the presence of soft, collapsible materials and also hard materials in the form of cobbles, boulders and hard rock during drilling for the ground anchors. Voids in the existing ground may also be encountered during the construction work.
   - (E) The Contractor has the option to make adjustments in the size of the drilled hole of the ground anchor (shown on plans as 6–inches) provided that the ground anchor is capable of sustaining a minimum load of 6.3 kips per lineal foot of ground anchor length based on the acceptance criteria stated in the Specifications. However, the drilled hole for the ground anchor shall not be less than 6–inches in diameter.

8. Construction Notes:
   - (A) The Contractor shall verify all dimensions and site conditions and shall report any discrepancies in writing to the Engineer before commencing work or ordering materials.
   - (B) The Contractor shall verify all site conditions and not rely upon these plans for existing elevations and azimuths, roads, roadway gutters, curbs and sidewalks, etc. Conditions may differ from those shown.
   - (C) The Contractor shall be solely responsible for the protection of adjacent properties, utilities and existing and new structures from damage due to construction. Repairing any damage shall be at the Contractor's own expense, to the satisfaction of the Engineer.
   - (D) The Contractor shall verify the location of all utility lines and notify the respective owners before commencing with excavation, and any temporary piling or sheeting.
   - (E) Except as otherwise noted, all vertical dimensions are measured plumb.
   - (F) For concrete finish see Standard Specifications and Special Provisions.
   - (G) Control joints may be a construction joints providing the details are same as for control joints.
   - (H) Unless otherwise noted, all exposed concrete edges shall be chamfered 3/4" x 3/4".
   - (J) Concrete surfaces which new concrete is poured against shall be cleaned and roughened to 1/4–inch amplitude.
   - (K) All construction dust, debris or other material not incorporated in the permanent work shall not be allowed to contaminate the project site and shall be removed from the project site at the Contractor's expense.
   - (L) Drilled holes in existing wall for reinforcing steel dowels shall be grouted within 8 hours after holes are drilled.
   - (M) Submit shop drawings for locations and details of dowels, construction joints and ground anchors. Shop drawings shall also show excavation and ground anchor installation sequence.
   - (N) See Special Provisions Section 681.05(C)(1) for coring rather than drilling holes for ground anchors in the existing CRM walls.

9. Foundation:
   - (A) For boring logs and other geotechnical information, see foundation report by Geolabs, Inc.

ORIGINAL PLAN
NOTE BOOK ____ No. ____

SURVEY PLOTTED BY ____ DATE ____
DRAWN BY ____
TRACED BY ____
DESIGNED BY ____
QUANTITIES BY ____
CHECKED BY ____

DAVID K. FUJIWARA
LICENSED PROFESSIONAL ENGINEER
NO. 8104–S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

David K. Fujiwara 4-30-08
SIGNATURE EXPIRATION DATE OF THE LICENSE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
GENERAL NOTES

Kalanianaole Highway Improvements
Retaining Wall at Makapuu, Oahu
Federal–Aid Project No. NH–072–1(51)

Scale: None Date: April 2007

SHEET No. S-1 OF 15 SHEETS