

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.

2. Design Criteria:

- a. Lateral Earth Pressure
At Active _____ 50 pcf
- b. Passive Earth Pressure _____ 300 pcf
- c. Strength Limit Bearing Pressure _____ 5000 psf

3. Foundation:

- A. 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.
- B. Footings shall bear on compacted 3 B Fine. The 3 B fine beneath the the footings 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 below the proposed 3 B Fine layer they shall be over-excavated down to firm soil. The over-excavation shall be backfilled with 3 B Fine up to the required bottom of footing elevation and compacted with at least 8 passes of compactor. Any change in design shall be stamped by a licensed structural engineer from the state of Hawaii.
- C. Excavation boundaries and grade elevations for footing shall be approved by the Engineer prior to placing the concrete and reinforcing.

4. 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
Formed and exposed to earth _____ 2"
- c. Wall faces exposed to earth
or weather _____ 2"
- C. Splices:
- a. Reinforcing steel shall be detailed in accordance with the 3rd Edition of the LRFD Bridge Design specifications. 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.

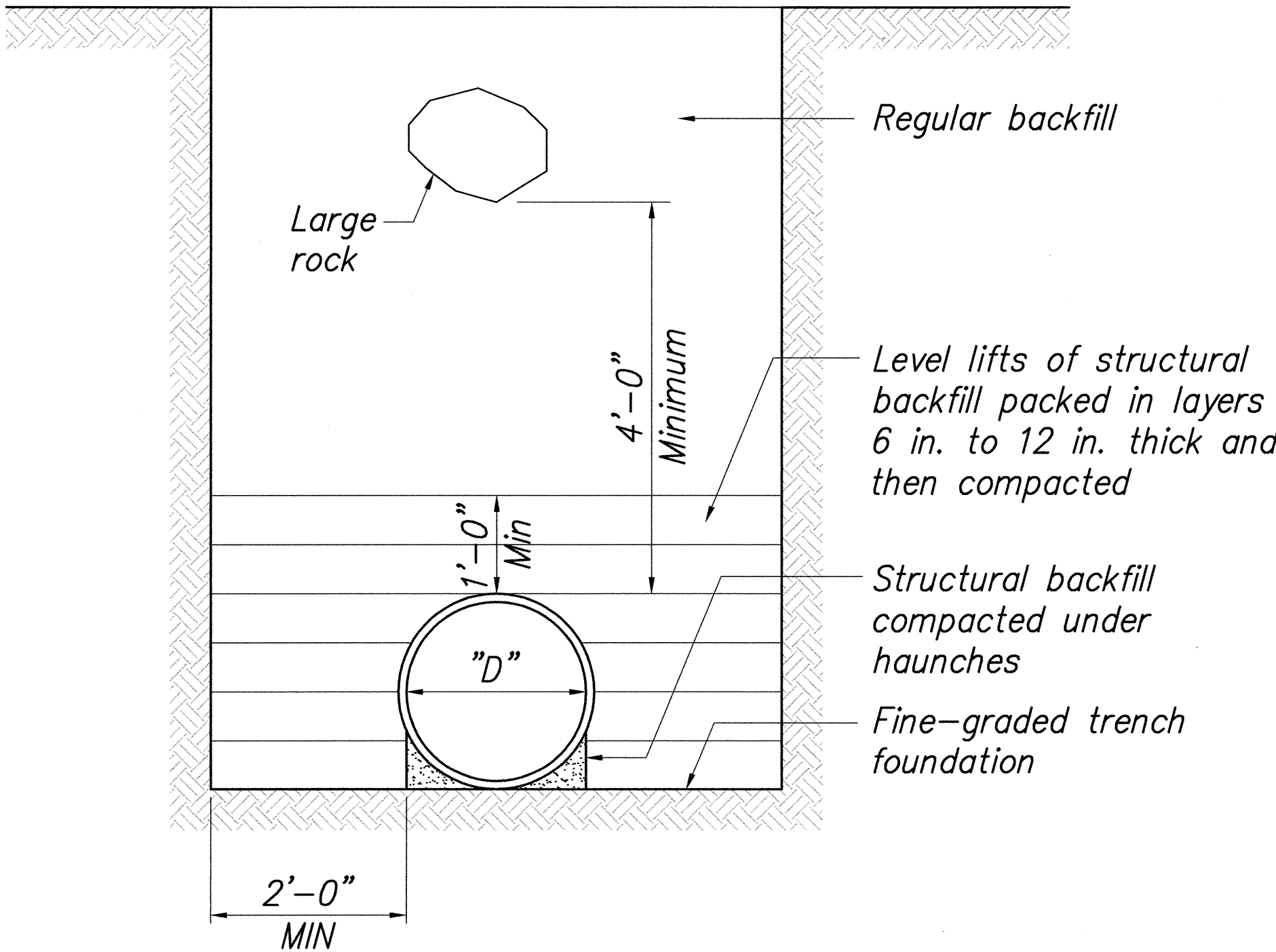
5. Concrete:

- A. All concrete shall have a minimum 28-day compressive strength as noted below:
- a. Retaining Walls _____ 4000 PSI
- b. Apron and Cut-off Wall _____ 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. Conduits, pipes, and sleeves passing through a culvert not conforming to typical details shall be located and submitted to the Engineer for approval.
- C. 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.
- D. Non-shrink grout shall be a 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.
- E. 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.
- F. Reinforcing bars, anchor bolts, inserts and other items to be cast in the concrete shall be secured in position prior to placement of concrete.

6. Culvert Backfill Notes:

- A. Soil used as structural backfill must not contain rock retained on a 3 in. diameter ring, frozen lumps, highly plastic clays, organic matter, corrosive material, or other deleterious foreign matter. Backfill material shall be ASTM No. 57 Gradition or ASTM No. 67 Gradition crush rock.

- B. Structural backfill should be placed by moving equipment longitudinally, parallel to the structure centerline, rather than at right angles to the structure. Material must not be dumped directly on or against the structure. In embankment installations, heavy compaction equipment should stay at least 4 ft away from the structure.
- C. Heavy construction equipment must not be operated over the structure without adequate protective cover.
- D. The difference in the depth of structural backfill on opposite sides of the structure should not be greater than 2 ft. The compacted structural backfill should usually be placed to 0.75 the height of structure before covering the crown.
- E. Special attention must be given to materials used and compaction obtained around the corners of pipe-arches.
- F. Large boulders must not be permitted in regular backfill in trenches that are under surface loads and never within 4 ft of the structure.
- G. The backfill material should be well graded granular materials that meets the requirements of AASHTO M 145 for soft classifications A-1, A-2, or A-3.
- H. A layer of structural backfill, 2 ft deep, should be placed over the crown before introduction of regular backfill.



4/26/06	Revised Notes
Date	Revision
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
STRUCTURAL NOTES	
Kuhio Highway Emergency Repairs Vicinity of MP 21.7 (Wailapa Stream) FEDERAL AID PROJECT NO. ER-14(1)	
Scale: As shown	Date: April 2006
SHEET No. 51.0 OF 34 SHEETS	