

STRUCTURAL GENERAL NOTES:

1. General:

- A. Workmanship and materials shall conform to the AASHTO LRFD Bridge Design Specification, 7th 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 embankments, 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. Foundation:

- A. Retaining system design values are based on Geotechnical Reconnaissance and Evaluation Report by Yogi Kwong Engineers, LLC, dated December, 2015.
- 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. Excavation boundaries and grade elevations for wall shall be approved by the Engineer prior to placing the concrete and reinforcing.

3. Reinforcing Steel:

- A. Reinforcing steel shall be deformed bars conforming to ASTM A615, Grade 60.
- B. Clear concrete coverage for reinforcing bars shall be as follows, unless otherwise noted:
- a. Footing, Wall, etc. cast against earth: ----- 3"
- b. Footing, Wall, etc. formed and exposed to earth: --- 2"
- c. Wall faces exposed to each or weather: ----- 2"
- C. Reinforcing steel shall be spliced only where indicated on plans. Provide lap splice length per typical details and schedule, unless otherwise noted.
- D. Bar bends and hook shall be "standard hooks" in accordance with AASHTO 5.11.2. or as shown in Detail 1/S-1, whichever is greater.

4. Shotcrete:

- A. Shotcrete shall be regular weight hard rock concrete and shall have a minimum 28-day compressive strength of 4000 psi.
- B. All inserts, anchor bolts, plates, etc. embedded in shotcrete shall be hot-dip galvanized unless otherwise noted.
- C. Conduits, pipes, and sleeves passing through a wall 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. See typical details for specific requirements.
- E. Non-shrink grout shall be a premixed compound consisting of non-staining, non-metallic aggregate, 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.
- F. Unless otherwise noted, chamfer all shotcrete edges 3/4".
- 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 shotcrete shall be secured in position prior to placement of shotcrete.

5. Geocomposite Drain:

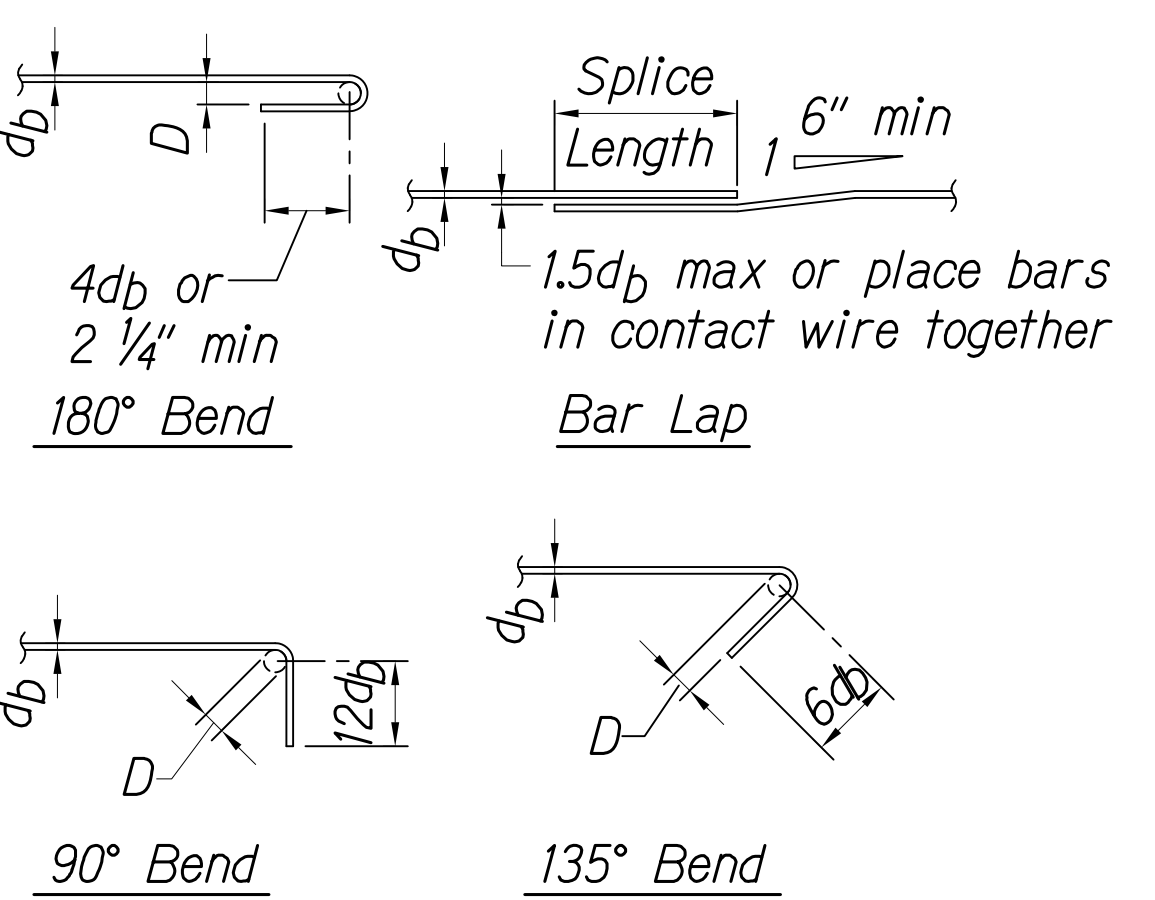
- A. Submit manufacturer's literature and product data for geocomposite drain for Engineer's approval prior to placing the order.
- B. Submit manufacturer's installation instruction for geocomposite drain for Engineer's review and approval.
- C. Geocomposite drains shall be installed to ensure that the drains are hydraulically connected from the top to bottom of the shotcrete wall.
- D. Geocomposite drains shall be attached to excavation surface by placing geotextile fabric directly against cut surface.
- E. Geocomposite drains shall be placed in strips and connected in accordance with manufacturer's instructions to maintain continuity of flow channel through the drain.
- F. Geocomposite drain strips shall be 2 feet wide and placed at 5 foot spacings.
- G. Geocomposite drain shall be suitably wrapped and protected from exposure to direct sunlight.
- H. If the geotextile cover fabric becomes damaged during installation by tearing or puncturing, the damaged section shall be completely cut out and replaced. If, in the judgment of the Engineer, the damage is not serious enough to warrant removal, the damaged area shall be repaired by overlaying with a piece of fabric, large enough to cover the damaged area and provide a 4 inch overlap on all sides, and taping it in place with 3 inch wide strips of waterproof, plastic tape.
- I. Geocomposite drains shall be protected from damage and deleterious contamination where drains must remain exposed until they are covered with embankment or backfill material.
- J. The cost for all components shall be considered incidental to various structural items. This includes, but not limited to, geocomposite drain strip, filter materials, geotextile fabric, weep holes, and drain grates.

| Minimum Splice and Development Lengths |            |            |             |            |                    |
|--|------------|------------|-------------|------------|--------------------|
| Bar Size                               | Lap Splice |            | Development |            |                    |
|  | Top Bars   | Other Bars | Straight    |            | with Standard Hook |
|  |            |            | Top Bars    | Other Bars |                    |
| #3                                     | 26"        | 20"        | 20"         | 16"        | 8"                 |
| #4                                     | 34"        | 26"        | 26"         | 20"        | 10"                |
| #5                                     | 42"        | 32"        | 32"         | 24"        | 12"                |
| #6                                     | 50"        | 38"        | 38"         | 30"        | 16"                |
| #7                                     | 72"        | 54"        | 54"         | 42"        | 18"                |
| #8                                     | 82"        | 62"        | 62"         | 48"        | 20"                |

Notes:

1. Lengths are for concrete with rebar space 6 bar diameters minimum. Increase 25% for bars spaced less than 6 bar diameters.
2. "Top Bars" are horizontal bars with 12" or more of concrete cast below.
3.  $D = 6d_b$

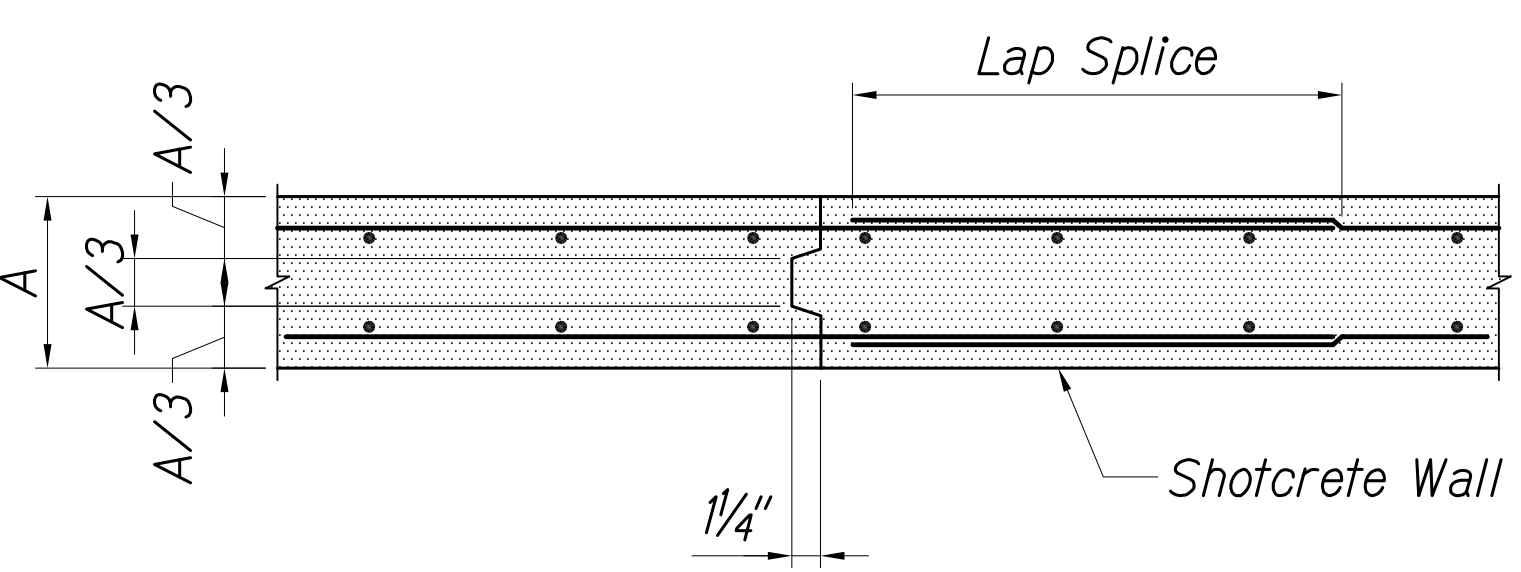
| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | 36C-01-10          | 2020        | 30        | 35           |



TYPICAL REBAR SPLICE AND EMBEDMENT LENGTH SCHEDULE

Not to Scale

1  
S-1 | S-1



Note:

Construction joints shall not be located within 2'-0" from any soil nail or rock dowel.

TYPICAL WALL CONSTRUCTION JOINT DETAIL

Not to Scale

2  
S-1 | S-1

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

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. OBSERVATION OF CONSTRUCTION IS DEFINED IN CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

SIGNATURE: *[Signature]* LIC. EXPIRATION: 4/2022  
R. M. TOWILL CORPORATION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**STRUCTURAL GENERAL NOTES  
AND TYPICAL DETAILS**

HANA HIGHWAY ROCKFALL  
MITIGATION MP12  
PROJECT NO. 36C-01-10

Scale: MARCH 2020