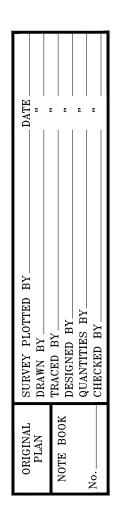
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## Foundation:

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- A. Foundation design is based upon the Technical Memorandum, Highway Lighting Improvements, Moanalua Freeway Halawa Heights Off-Ramp to Middle Street Overpass F.A.P. No. NH-H201(005) Geotechnical Recommendations by Geolabs, Inc., dated July 21, 2017.
- A. Deformed and Plain Carbon Steel Bars for Concrete Reinforcement shall meet B. Contractor shall provide for de-watering of excavation from either surface water, the requirements of AASHTO M31M/M31-19, Grade 60 (ASTM A615/ A615M-16, ground water or seepage. NPDES permit required for discharging into State waters. Grade 60).
- C. Contractor shall provide for design and installation of all cribbing, sheeting, and B. Deformed and Plain Carbon Steel Bars for Concrete Reinforcement to be shoring necessary for personnel safety and to preserve excavations and earth banks, spliced by welding or otherwise welded, such as welded hoops, or for seismic and adjacent structures and property for damage. reinforcing shall meet the requirements of AASHTO M31M/M31-19, Grade 60 (ASTM A615/ A615M-16, Grade 60) and meet the requirements of ASTM A706/A706M-16. Geotechnical Engineer prior to placing the concrete and reinforcing.
- D. Excavation boundaries and grade elevations for footing shall be approved by the
- C. The welding of reinforcing steel shall be in accordance with the Structural E. Backfill behind the retaining structures (above the groundwater level) may consist of the on-site suitable soils or select granular fills (Type A Structure Backfill). Welding Code-Reinforcing Steel AWS D1.4. Backfill shall be placed in uniform lifts of no more than 8 inches in loose thickness D. Zinc (Hot-Dip Galvanizing) Coatings for deformed bars shall conform to ASTM A767 unless otherwise noted. and uniformly compacted to at least 95 percent relative compaction.

## Concrete

A. Concrete shall be regular weight hard rock concrete and shall have the following minimum 28-day compressive strengths and water to cement ratios: Marminm

	MINI	mum Compressive	Maxmiun
	<u>Structural Item</u> <u>Stre</u>	ength f'c (28 days)	<u>(W/C)</u>
0	Drilled Shafts	4,500 psi	0.40
2	Traffic Railing/Barrier	4,000 psi	0.40
3.	Glare Screens	4,000 psi	0.40
1.	All other concrete	4,000 psi	0.45
			L. •

- G. The use of any calcium chloride in any concrete is prohibited.
- H. Concrete delivery tickets shall record all free water in the mix at batching plant, added for consistency by driver, and any additional request by contractor up to the maximum amount allowed by the mix design.
- I. Conduits, pipes, and sleeves passing through a wall not conforming to typical details shall be located and submitted to the structural engineer for approval.
- J. Construction joints may be relocated by the contractor and submitted to the structural engineer for approval. Construction joints shall be made and relocated 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.
- K. Unless otherwise noted, chamfer all exposed concrete edges 3/4".
- L. Reinforcing bars, anchor bolts, inserts and other items to be cast in the concrete shall be secured in position prior to placement of concrete.
- M. All inserts, anchor bolts, plates, and other structural items to be cast in the minimum yield strength of reinforcing bars. R. Stagger all splices where possible. concrete shall be hot-dip galvanized according to ASTM A153 unless S. Bar bends and hook shall be "standard hooks" in accordance with typical details. otherwise noted.
- N. Non-shrink Grout shall conform to Section 712.04 of the Standard Specification.
- O. A shrinkage reducing admixture (SRA), Tetraguard AS20 by BASF, Eclipse by W.R. Grace \$\U00e7 Co, or an approved equal shall be added to the concrete. The minimum dosage requirement shall be 128 oz per cubic yard of concrete. The concrete shall have a maximum shrinkage strain of 0.00006 at 28 days and 0.000145 at 56 days according to ASTM C512.
- P. A corrosion inhibiting admixture shall be included in the concrete mix for all concrete. The corrosion inhibiting admixture shall contain a minimum of 30% calcium nitrate by mass and shall be added at a dosage rate of 4.0 gallons per cubic yard of concrete or as recommended by the manufacturer. The admixture shall be Masterline CI 30 Calcium Nitrate-Based corrosion inhibitor, DCI S corrosion inhibitor or an approved equal. Addition of corrosion inhibiting admixture shall be as recommended by the manufacturer.
- Q. Epoxy-bonding compound shall be two part epoxy resin adhesive conforming to AASHTO M235, Type V, Class C.
- R. Stay-in-Place forms shall not be allowed.

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Reinforcing Steel:

- E. Epoxy-coated dowels and deformed bars shall conform to ASTM A775, Grade 60 unless otherwise noted.
- F. The contractor shall not damage the epoxy coating on the dowels and deformed bars in any way during shipment, handling, or placement. Damaged epoxy coated dowels and deformed bars shall be replaced at no cost to the State. Repair of epoxy coating as approved by the Engineer shall meet ASTM A775.
- G. Clear concrete cover for reinforcing bars shall be as follows, unless otherwise noted:

1. Footing, walls, etc, cast against earth ------ 3" 2. Exterior concrete in coastal region ------ 3" 3. Exterior concrete other than above ------ 2" Measured to the closest part of the bars.

- M. At the time concrete is placed, reinforcing shall be free from mud, oil, laitance or other coatings which may adversely affect bond strength.
- N. Minimum clear spacing between parallel bars shall be one and one-half  $(1^{1}/_{2}^{\prime\prime})$ times the diameter of the larger bar (for non-bundled bars), but in no case shall the clear distance between the bars be less than one and one-half  $(1^{1}/_{2}^{\prime\prime})$ times the maximum coarse aggregate size.
- O. All dimensions relating to reinforcing bars (e.g. spacing of bars etc.) are to centers of bars unless noted otherwise.
- P. Reinforcing steel shall be spliced only where indicated on plans. Provide lap splice length per typical details and schedule, unless otherwise noted.
- Q. Mechanical splice connectors shall develop, in tension, 125 percent of the specified
- T. Minimum reinforcement bend diameters shall comply with AASHTO 5.10.2.3.

LICENSED PROFESSIONAL ENGINEER No. 6818-S	STATE OF HAWAI'I DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION <u>STRUCTURAL</u> <u>GENERAL NOTES</u> <u>MOANALUA FREEWAY, HIGHWAY LIGHTING IMPROVEMENTS</u> Halawa Heights Off-ramp to Middle St. Overpass		
EXPIRATION DATE OF THE LICENSE 4/30/2022 THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION	<u>FAP NO. NH-H201(005</u> Scale: As Shown	<u>) PHASE 2</u> Date: July 2020	
	SHEET No. SO.1 OF	25 SHEETS	
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