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| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
| HAWAII | HAW. | NH-HI-1 (260) | 2014 | 175 | 194 |

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Codes

Building Code: All Materials, Workmanship, Design, and Construction shall Conform to the Drawings, State of Hawaii DOT (HDOT) 2005 Standard Specifications, AASHTO LRFD Bridge Design Specifications, 2014.

Loads

In Addition to Its Self Weight, the Structure is Designed for an AASHTO HL-93 Load Scenario.

Micropile Factored Design Load (FDL): 60 kips

Criteria

Micropile Design and Construction FHWA-NHI-05-039, December 2005.

Geotechnical

Micropile Foundation Type B shall be in Accordance with the Geotechnical Memorandum and Inspected by the Geotechnical Engineer.

Geotechnical Memo Reference: Geolabs, Inc.
Memo # 6400-00
Dated: April 24, 2015

Submittals

Contractor shall Submit to the Engineer the Following:

- Micropile Monitoring Plan.
- Shop Drawings and Product Data for the Preferred Micropile System, Which Includes but not Limited to the Following; Corrosion Protection System, all Threaded Bar, Bearing Plate, Spherical Nut, Centralizers, Spacers, Couplers, Etc.
- A Description of Test Setup and Jack, Pressure Gauge and Load Cell Calibration Curves Prior to Testing.
- Grout and Concrete Design Mix.
- Post Installed Adhesive Anchor Product Data.
- CIP Concrete Shop Drawings.
- Existing Drainage Structure Steel Angle Frame Shop Drawings.

Existing Conditions

Contractor shall Verify All Existing Dimensions, Member Sizes, and Structural Conditions Prior to Commencing Any Work. All Dimensions of Existing Construction Shown on the Drawings are Intended as Guidelines Only and Must be Verified. Existing Conditions Shown on Drawings are Based Either on Site Observations, Original Drawings, or were Assumed Based on Expected Conditions. If Existing Conditions do not Closely Match Conditions Shown on Drawings, or if Existing Materials are Damaged, Questionable or Substandard Quality, Notify Engineer Prior to Commencing Work.

Existing Utilities

All Existing Utilities Must be Located and Existing Drainage Structures and Pipe shall be Assessed for any Existing Damage/Deterioration by the Contractor Prior to Pile Installation. Utilities Must be Protected Prior to Beginning Construction, and Must be Monitored During the Pile Installation.

Micropile Fabrication

Micropile System shall be Contractor Manufacture Designed and Sized for the Maximum Proof Test Load (PTL) Indicated in these Notes. Micropile shall be Type B in Accordance

with FHWA-NHI-05-039.

All Threaded Deformed Bars shall be ASTM A615 Grade 75, Bearing Plate shall be ASTM A36 and shall be Hot-Dipped Galvanized in Accordance with ASTM A153.

All Threaded Deformed Bars for Production Piles Used as Proof Test Piles shall be ASTM A722 Grade 150 or ASTM A615 Grade 75. See Note 3 of Test Pile Acceptance Criteria on Sheet S-02 for Upsizing Requirements.

All Fastener Hardware shall be Galvanized. No Dissimilar Metals shall be in Direct Contact.

Steel Pipe Pile Encasement shall be ASTM A252, Grade 2, Structural Steel Pipe ASTM A53 Grade B, Fy=35 ksi or Approved Substitution.

Grout Strength shall be a Minimum of 4,000 psi at 28 Days with Water-Cement Ratio of 0.50 or Less.

Micropile Outside Drill Diameter shall be 6 Inch Min to 11 Inch Max.

Storage and Handling

Micropile System Components shall be Handled and Stored in such a Manner as to Avoid Damage or Corrosion. Damage to the Components as Result of Abrasions, Cut, Nicks, Welds and Weld Splatter will be Cause for Rejection by the Engineer. The Components shall be Protected from Dirt, Rust, and Deleterious Substances. If Heavy Corrosion or Pitting is Noted, the Engineer will Reject the Affected Items.

The Contractor shall Use Care in Handling and Storing the Items at the Site. Prior to Inserting the Threaded Bar in the Drill Hole, the Contractor will Examine the Bar and its Corrosion System for Damage. Contractor shall Repair Observed Damaged Areas.

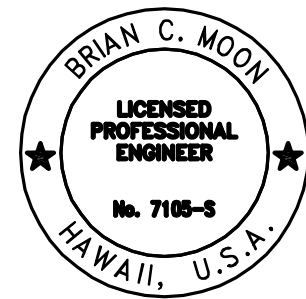
Micropile Installation

The Contractor shall Select the Drilling Method, the Grouting Procedure, and the Grouting Pressure Used for the Installation of the Piles.

When Caving Conditions are Encountered, no Further Drilling will be Allowed Until the Contractor Selects a Method to Prevent Ground Movement. The Contractor's Method to Prevent Ground Movement shall be Approved by the Geotechnical Engineer. The Drill Hole shall be Located so the Longitudinal Axis of the Drill Hole and the Longitudinal Axis of the Threaded Bar are Parallel. The Micropile shall not be Drilled in a Location that Requires the Threaded Bar to be Bent in Order to Enable the Bearing Plate to be Connected to the Structure. At the Point of Entry the Micropile shall be Installed Within the Construction Tolerances Indicated in these Notes.

The Threaded Bar/Rod shall be Inserted into the Drill Hole to the Minimum Depth. When the Bar cannot be Completely Inserted without Difficulty, the Contractor shall Remove the Bar from the Drill Hole and Clean or Redrill the Hole to Permit Insertion. Partially Inserted Bar shall not be Driven or Forced into the Hole.

The Grout Equipment shall Produce a Grout Free of Lumps and Undispersed Cement. A Positive Displacement Grout Pump shall be Used. The Pump shall be Equipped with a Pressure Gauge Near the Discharge End to Monitor Grout Pressures. The Pressure Gauge shall be Capable of Measuring Pressures of at Least 150 psi or Twice the Actual Grout Pressures Used by the Contractor, whichever is Greater. The Grouting Equipment shall be Sized to Enable the Grout to be Pumped in one Continuous Operation. The Mixer shall be Capable of Continuously Agitating the Grout.



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REID MIDDLETON INCORPORATED APRIL 30, 2020 LIC. EXP. DATE

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| STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION |
| GENERAL NOTES |
| INTERSTATE ROUTE H-1 PM CONTRAFLOW LANE FEDERAL AID PROJECT NO. NH-HI-1 (260) |
| Scale: Not to Scale Date: December, 2014 |
| SHEET No. S-01 OF 6 SHEETS |

"AS-BUILT"



175

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| ORIGINAL PLAN | DATE |
| SURVEY PLOTTED BY | |
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The Grout shall be Injected from the Lowest Point of the Drill Hole. The Grout may be Pumped Through Grout Tubes, Casing, or Hollow Core Rods. The Grout can be Placed Before, During, or After Insertion of the Threaded Bar. The Quantity of the Grout and the Grout Pressures shall be Recorded. The Grout Pressures and Grout Takes shall be Controlled to Prevent Excessive Heave in Soils or Fracturing of Rock Formations.

After Grouting, the Micropile shall not be Loaded for a Minimum of 3 Days or Until Design Strength is Met, Whichever is Greater.

Micropile Monitoring Plan

The Geotechnical Engineer and Contractor shall Develop a Pile Monitoring Program Prior to the Beginning of Construction. The Project Surveyor and Contractor shall Meet Onsite with the Geotechnical Engineer Prior to Beginning Pile Installation.

Survey Points shall be Installed Along the Top of the Micropile and Existing Drainage Structures. Survey Points shall also be Established on Any Other Adjacent Structures That may be Sensitive to Ground Movements. For Planning Purposes, Monitoring Points shall be Installed at Each Micropile and at Four Corners of the Existing Drainage Structures at All Four Locations. Baseline Readings shall be Acquired for All Survey Points Prior to Pile Installation. Monitoring of the Survey Points shall Occur Right After Each Set of Four Micropiles are Installed at Each Existing Structure. Another Set of Readings Must be Performed Prior to Casting the Concrete Slab.

Following Pile Installation, Decreased Survey Frequency can be Considered if Data Indicate Little or no Movement.

Immediately and Directly Notify the Geotechnical and Structural Engineers, if 0.5 Inches of Movement Occurs Between Two Consecutive Readings or When Total Movements Reach 0.5 Inch. At the Amount of Movement, the Engineers and Designers shall Determine the Cause of the Displacement and Develop Remedial Measures Sufficient to Limit Total Movements to 1 Inch. All Earthwork and Construction Activities Must be Directed Towards Immediate Implementation of Remedial Measures Necessary to Limit Total Movements to What has been Defined as Acceptable.

Survey Monitoring Data shall be Given to the Geotechnical Engineer Within 24 Hours of Acquiring the Readings. Monitoring Data shall be Summarized and Submitted to the Engineer Within 2 Days After Each Set of Readings are Taken. The Engineer shall be Immediately Contacted if Related Movements are Detected.

Micropile Testing

Testing shall be Conducted no Earlier Than 7 Days After Completion of the Micropile Installation and After Grout has Attained a Minimum Unconfined Compressive Strength of 4,000 psi, Whichever is Later.

Tests shall be Made by Incrementally Loading the Micropile in Accordance with the Following Schedules, Consistent with the Load Resistance Factor Design (LRFD) Design Method.

Pile Proof Pull Testing

A Minimum of Two (2) Proof Test Piles shall be Installed and Tested. Test Pile Lengths shall Correspond to Lengths on Drawings. Test shall be Incrementally Loaded to a Maximum Proof Test Load (PTL) of 109 kips. The Pile Movements shall be Recorded at Each Load Increment, and the Load shall be Raised from One Increment to Another Immediately After the Reading. Additional Proof Tests shall be Conducted if Different Drill or Installation Equipment or Techniques are Used to Install the Piles.

Proof Test Piles shall be Similar to the Micropile Detail on Sheet S-04, Except for All Threaded Bar or Rod.

Proof Loading Schedule:

| Load | Hold Time | Load | Hold Time |
|-------------------|-----------|--------------------------------|--------------------|
| al (.05 fdl max.) | 1 minute | 0.96 fdl | 5 minutes |
| 0.12 fdl | 5 minutes | 1.08 fdl | 5 minutes |
| 0.24 fdl | 5 minutes | 1.20 fdl | 5 minutes |
| 0.36 fdl | 5 minutes | 1.32 fdl | 5 minutes |
| 0.48 fdl | 5 minutes | 1.44 fdl | 5 minutes |
| 0.60 fdl | 5 minutes | 1.56 fdl | 5 minutes |
| 0.72 fdl | 5 minutes | 1.68 fdl | 5 minutes |
| 0.84 fdl | 5 minutes | 1.82 fdl (max. test load, PTL) | 10 minutes Minimum |

The Alignment Load (AL) should be the Minimum Load Required to Align the Testing Apparatus and should not Exceed 5 Percent of the FDL.

All Load Increments shall be Maintained Within 5 Percent of the Intended Load. The Load-Hold Period shall Start as soon as the Maximum Test Load is Applied and the Pile Movement, with Respect to a Fixed Reference, shall be Measured and Recorded at 1, 2, 3, 4, 5, 6, and 10 Minutes. If the Pile Movement Between 1 and 10 Minutes Exceeds 0.04 Inches, the Maximum Test Load shall be Held of an Additional 50 Minutes. If the Load-Hold is Extended, the Pile Movement shall be Recorded at 20, 30, 40, 50, and 60 Minutes. If a Pile Fails in Creep, Retesting will not be Allowed.

Test Pile Acceptance Criteria

- Pile Carries the Maximum Test Load with Less Than 0.04 Inches of Movement Between 1 and 10 Minutes; and
- Pile Carries the Maximum Test Load with a Creep Rate at the End of the 1.32 fdl Increment does not Exceed 0.08 in./log Cycle of Time and is a Linear or Decreasing Creep Rate.
- Total Movement at the Maximum Test Load Does not Exceed 80 Percent of the Theoretical Elastic Elongation of the Bar Unbonded Length Total (0.37 Inches for 1.25" Diameter All Threaded Rod Grade 150 ASTM A722 and 0.2 Inches for #14 All Threaded Bar Grade 75 ASTM A615).

Test Rejection

Proof Tests Failing to Meet the Acceptance Criteria or Otherwise Determined Unsatisfactory by the Engineer shall be Replaced and Retested. Contractor shall Modify the Micropile Design, Pile Installation Procedures or Both.

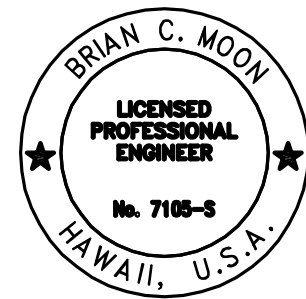
Micropile Tolerance

Micropile shall be Within 6 Inches of the Horizontal Locations Indicated on the Drawings. Piles shall be Installed such that the Axial Alignment of the Top 10 Feet of the Pile is Within 4 Percent (\pm 4.8 Inches) of Plumb. If Steel Encasement so Happens to be Misaligned, it shall not be Pulled Laterally. The Bearing Plate shall be Placed so it is Perpendicular to the Axis of the Micropile Threaded Bar and the Drill Hole.

Slab Materials

Concrete for Slab shall be Very Early Strength Latex Modified Concrete (VESLMC), Where 4,000 psi Strength can be Achieved in 3 Hours.

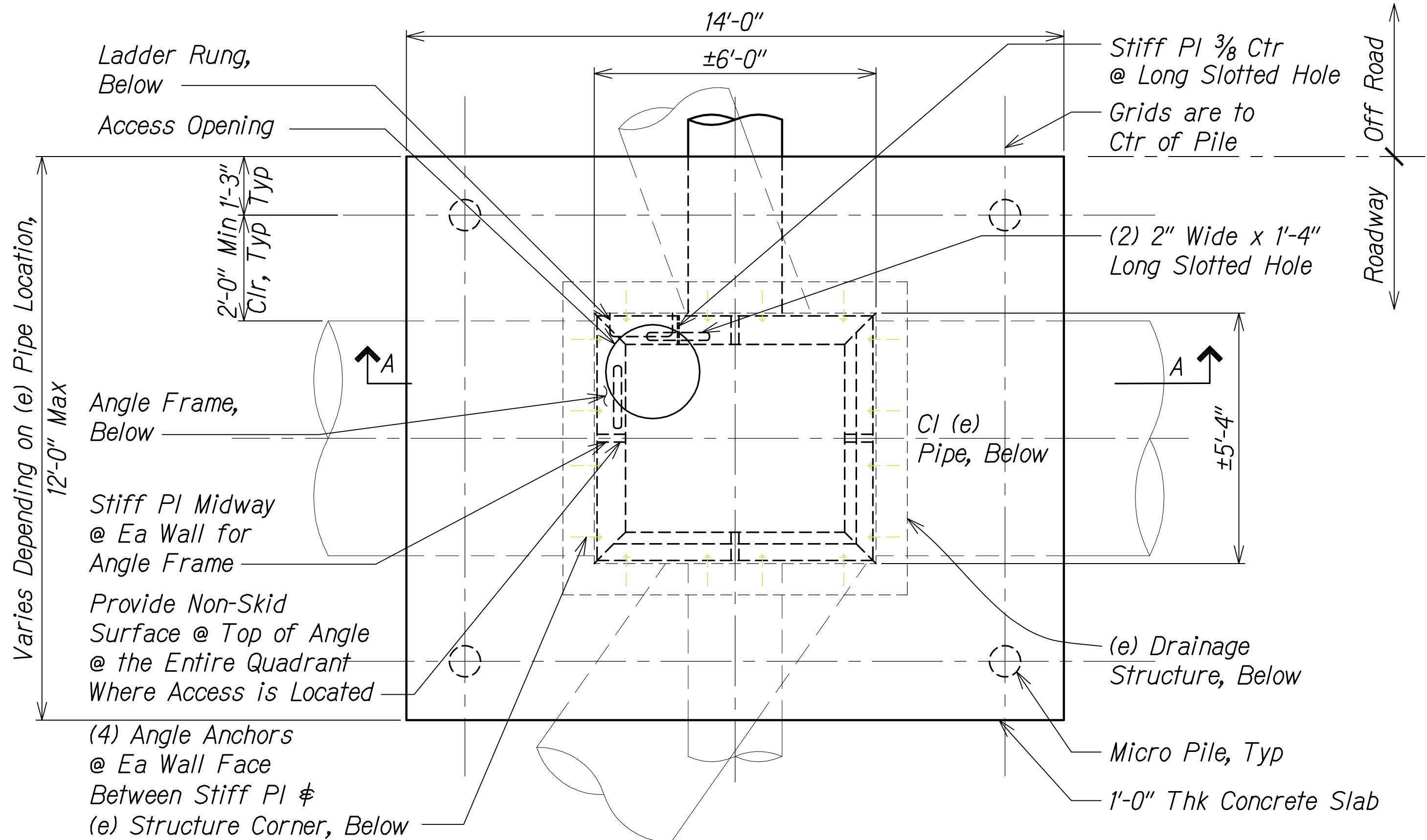
Reinforcing shall be Deformed Bars in Accordance with ASTM A615 Grade 60 Except as Noted for Micropile.



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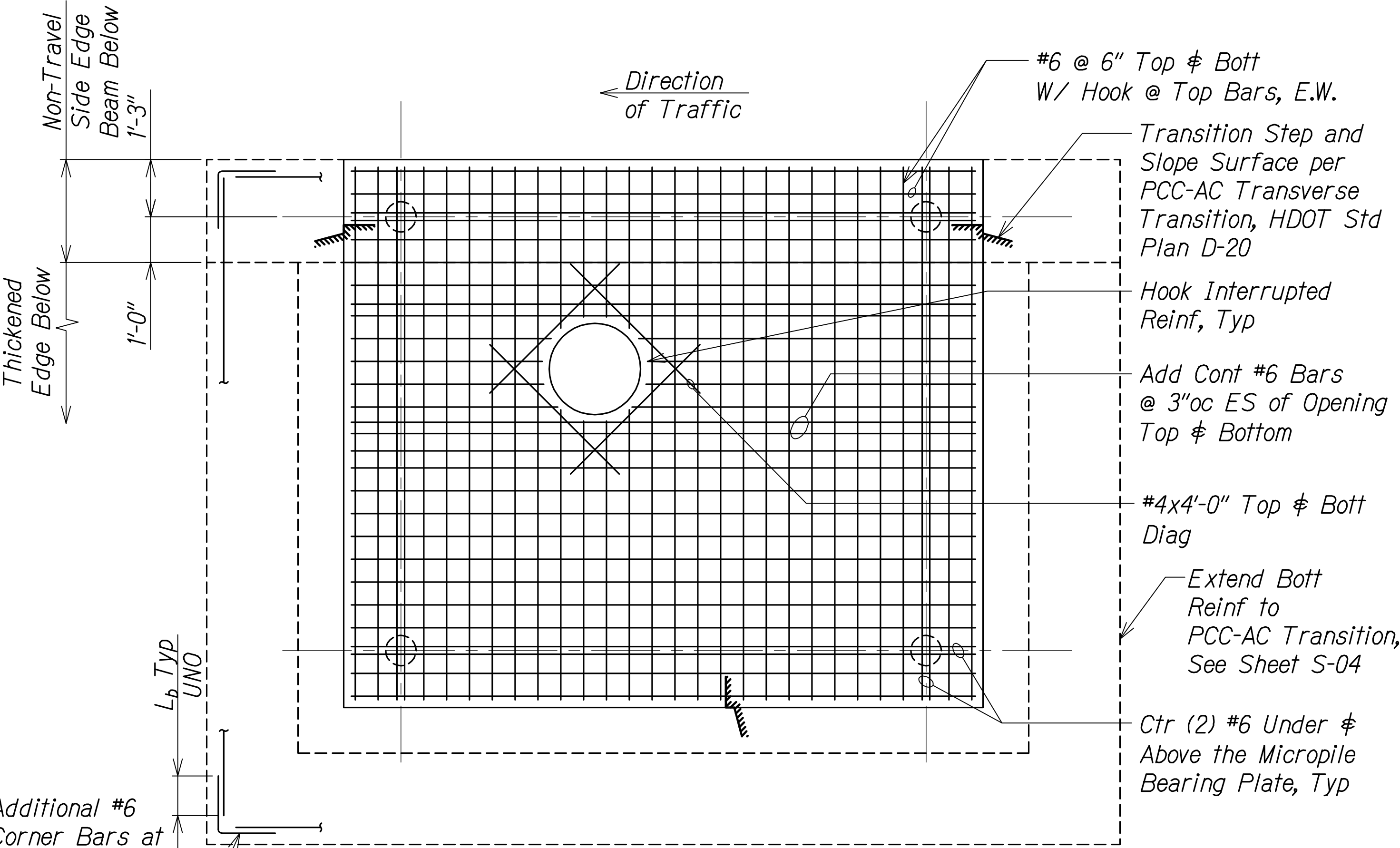
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| STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION | |
| GENERAL NOTES | |
| INTERSTATE ROUTE H-1 PM CONTRAFLOW LANE FEDERAL AID PROJECT NO. NH-HI-1 (260) | |
| Scale: Not to Scale | Date: December, 2014 |
| SHEET No. S-02 OF 6 SHEETS | |

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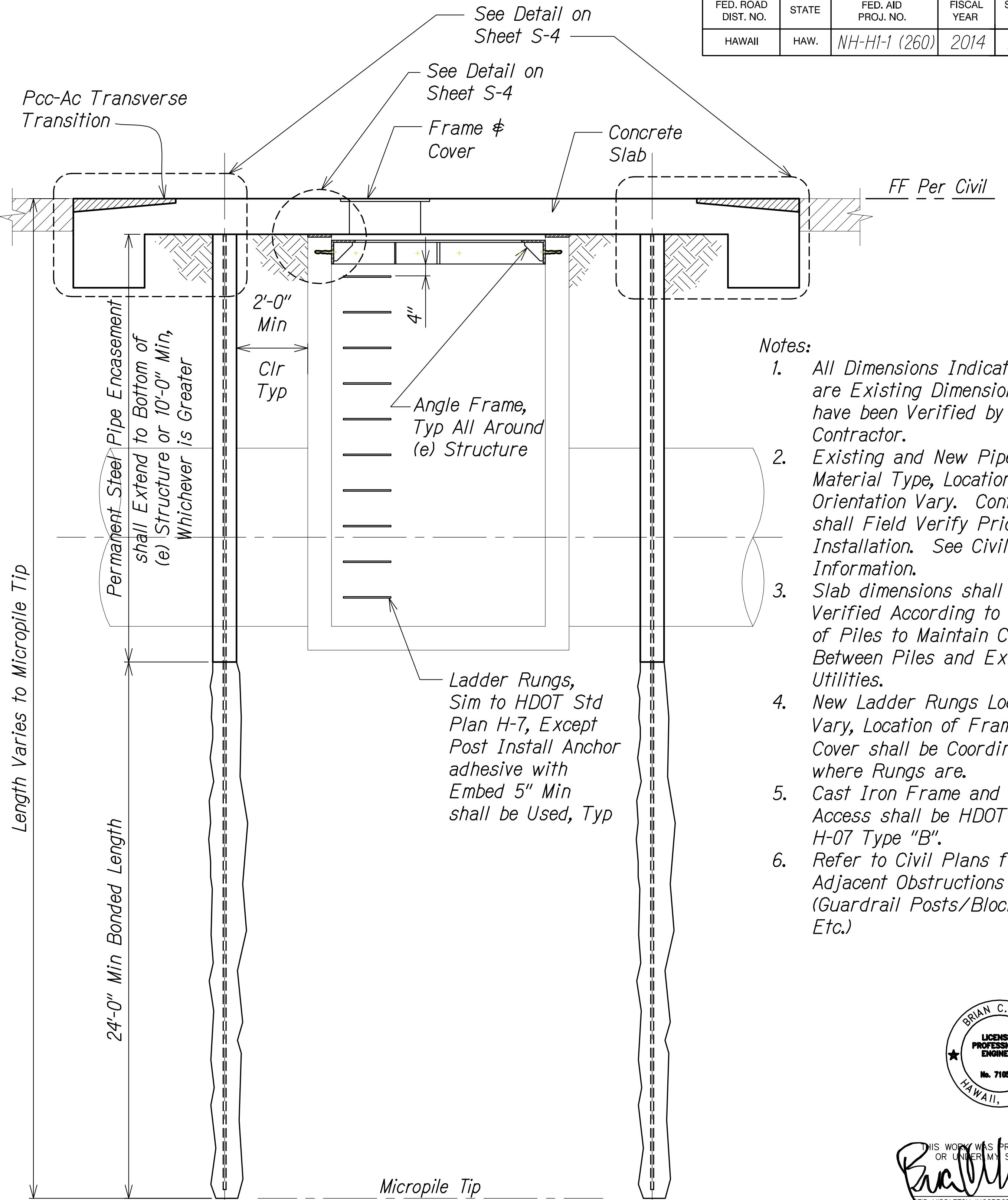
PLAN VIEW

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



CONCRETE SLAB-PLAN VIEW

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



SECTION A-A

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

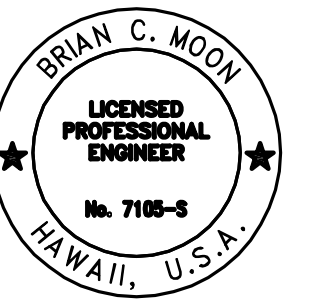
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- Notes:
- All Dimensions Indicated with ± are Existing Dimensions that have been Verified by the Contractor.
  - Existing and New Pipe Size, Material Type, Location and Orientation Vary. Contractor shall Field Verify Prior to Pile Installation. See Civil for more Information.
  - Slab dimensions shall be Field Verified According to Location of Piles to Maintain Clearances Between Piles and Existing Utilities.
  - New Ladder Rungs Location Vary, Location of Frame & Cover shall be Coordinated where Rungs are.
  - Cast Iron Frame and Cover for Access shall be HDOT Std Plan H-07 Type "B".
  - Refer to Civil Plans for Adjacent Obstructions (Guardrail Posts/Blockouts, Etc.)



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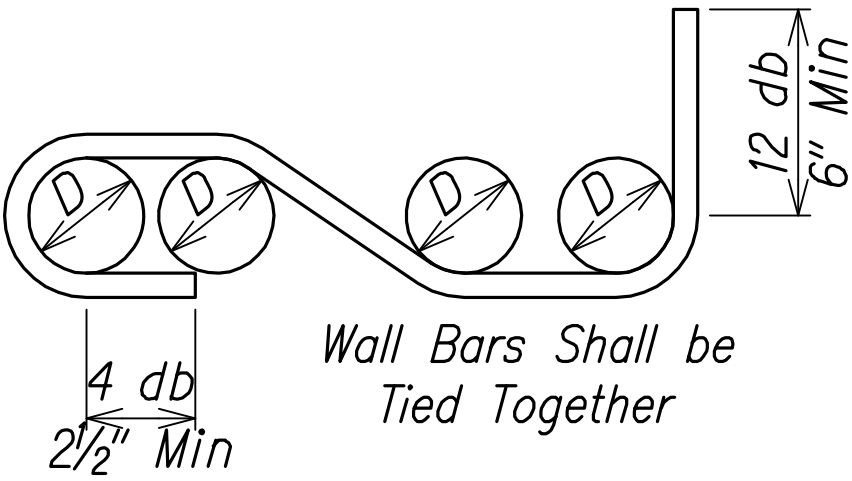
STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION  
**EXISTING DRAINAGE STRUCTURE PILE SUPPORT SLAB DETAILS**  
 INTERSTATE ROUTE H-1  
 PM CONTRAFLOW LANE  
 FEDERAL AID PROJECT NO. NH-HI-1 (260)  
 Scale: Not to Scale Date: December, 2014

SHEET No. S-03 OF 6 SHEETS



db= Bar Dia  
D= Finished Inside Bend Dia  
D= 6 db for #3 Thru #8  
D= 8 db for #9, #10 & #11  
D= 10 db for #14 & #18

BEND DIAMETER SCHEDULE



HOOKS AND BENDS



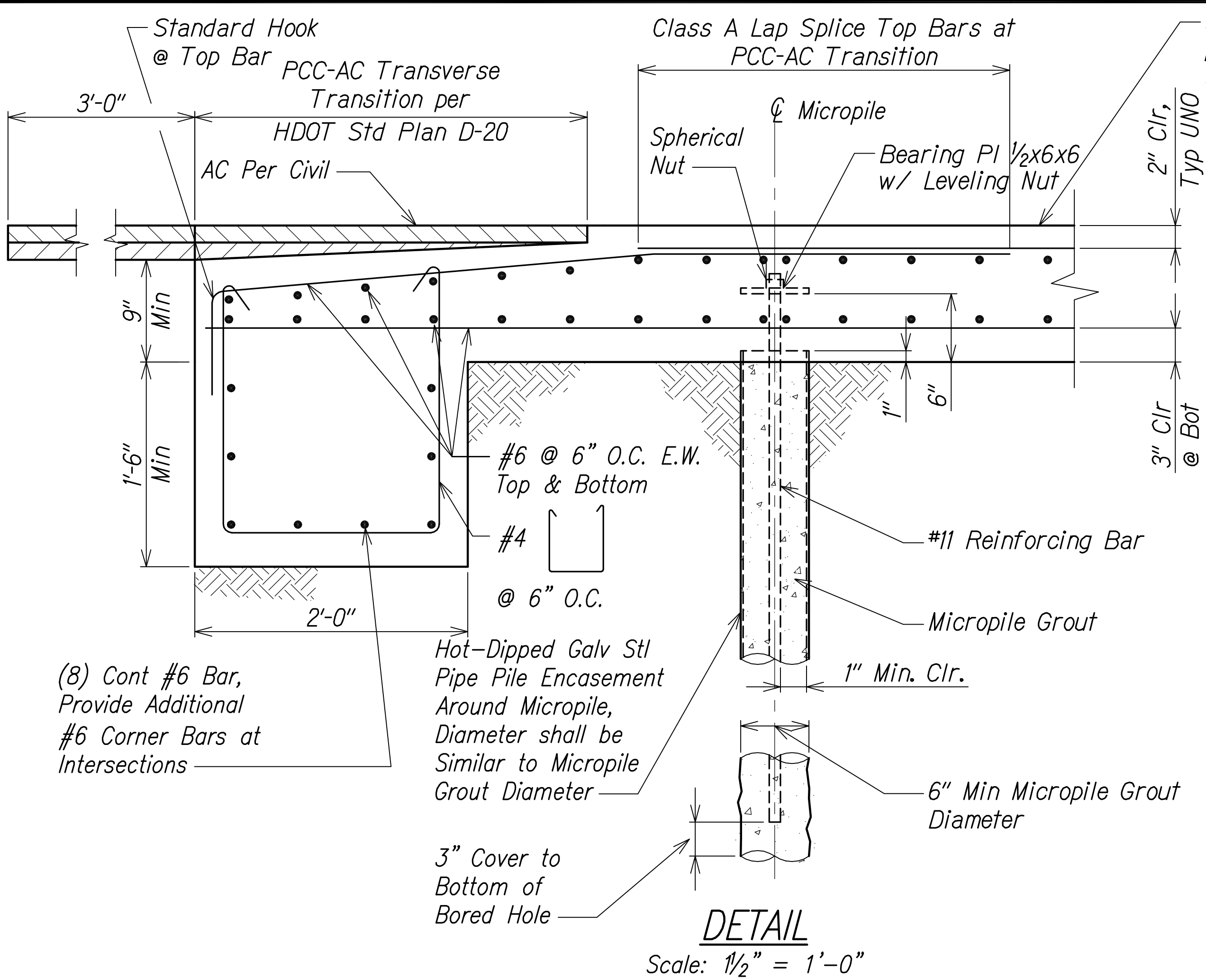
Bars Larger Than #11 Shall be Welded or Mechanical Spliced

SPLICE

TYPICAL REINFORCING BAR BEND

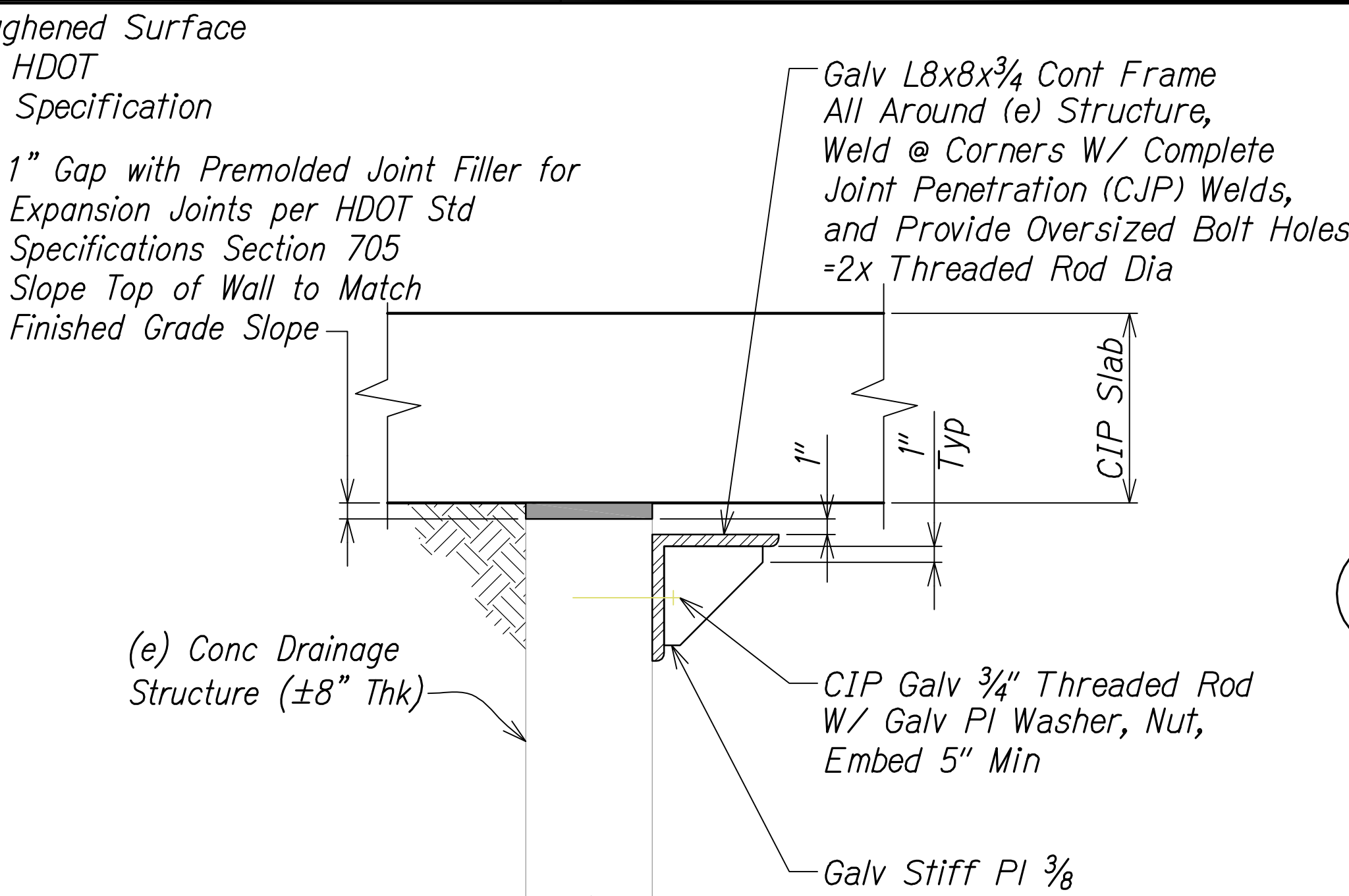
AND LAP DETAILS

Not to Scale



DETAIL

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



NOTES:

1. A 1" Separation Between the Top of the Existing Structure and New Concrete Slab shall be Provided.
2. Locate Threaded Rods and Stiff Plates per Plan.
3. Galvanized Steel Plate Washer shall Cover Entire Oversized Hole.

DETAIL

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

Notes:

1. Use the Lengths in the Below Table, Unless Noted Otherwise.
2. For Bars with Low Cover or Spacing, Increase Length by 50%. If Bars are Enclosed in Stirrups or Ties, Increase Applies when Bar Cover or Clear Bar Spacing is less than db. If Bars are not Enclosed in Stirrups or Ties, Increase Applies when Bar Cover is less than db or Clear Bar Spacing is less than 2db.
3. For Top Bars Increase Length by 30%. A Top Bar is a Horizontal Bar with more than 12 Inches of Fresh Concrete Cast Below it.

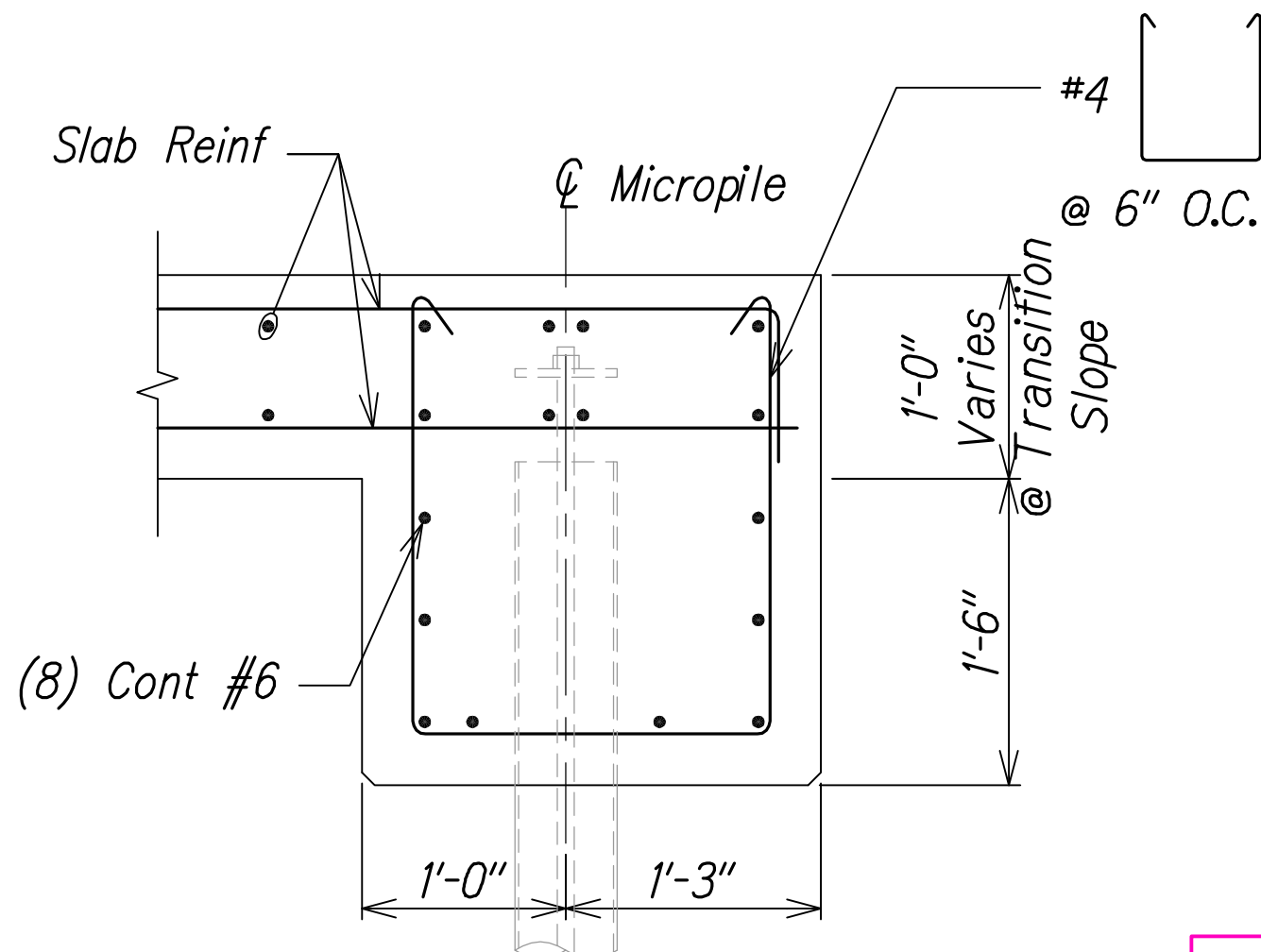
| F'c = 4,000 p.s.i |               |               |          |
|-------------------|---------------|---------------|----------|
| Size              | $L_s^{(2,3)}$ | $L_d^{(2,3)}$ | $L_{dh}$ |
| 3                 | 15            | 19            | 8        |
| 4                 | 19            | 25            | 10       |
| 5                 | 24            | 31            | 12       |
| 6                 | 29            | 37            | 15       |
| 7                 | 42            | 54            | 17       |
| 8                 | 48            | 62            | 19       |
| 9                 | 54            | 70            | 22       |
| 10                | 61            | 79            | 25       |
| 11                | 67            | 87            | 27       |

Abbreviations:

- db Bar Diameter  
 $L_s$  Tension Development Length  
 $L_{st}$  Tension Development Length For a Top Bar (See Note 3)  
 $L_a$  Class A Lap Splice Length  
 $L_{at}$  Class A Lap Splice Length For a Top Bar (See Note 3)  
 $L_b$  Class B Lap Splice Length  
 $L_{bt}$  Class B Lap Splice Length For a Top Bar (See Note 3)  
 $L_{dh}$  Tension Development Length For a Standard Hook

REINFORCING BAR DEVELOPMENT TABLE

Not to Scale



TYPICAL NON-TRAVEL SIDE EDGE BEAM

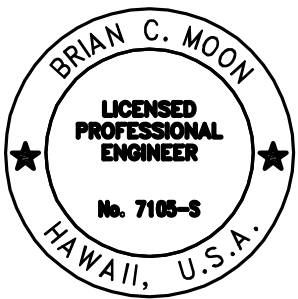
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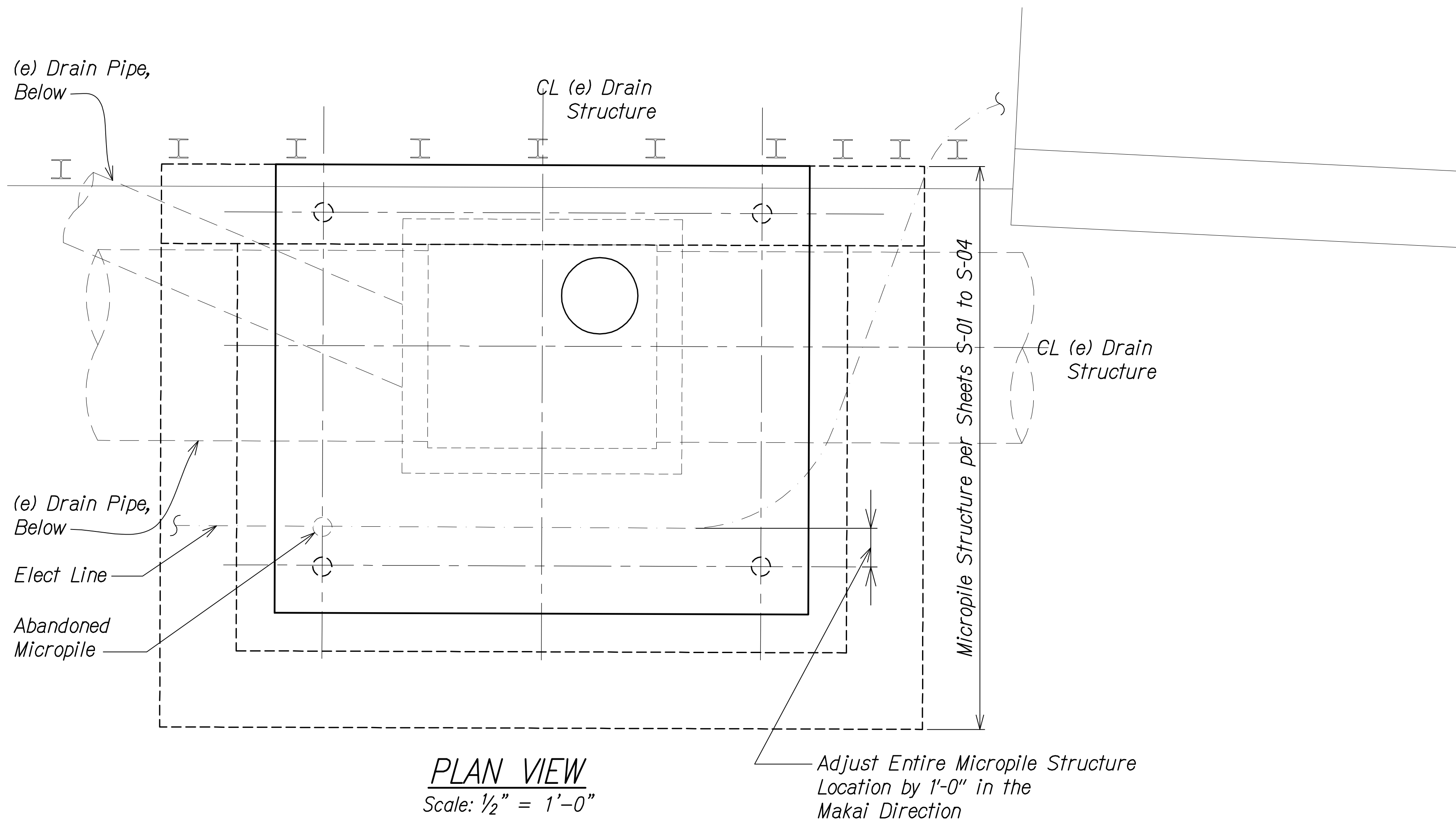
STATE OF HAWAII
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DETAILS

INTERSTATE ROUTE H-1
PM CONTRAFLOW LANE
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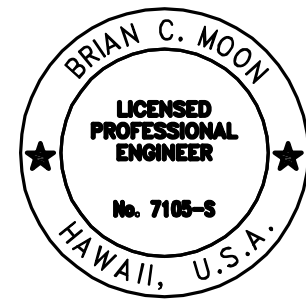
SHEET No. S-04 OF 6 SHEETS

| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

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PLAN AND SECTIONS**

INTERSTATE ROUTE H-1
PM CONTRAFLOW LANE
FEDERAL AID PROJECT NO. NH-HI-1 (260)
Scale: Not to Scale Date: December, 2014

SHEET No. S-06 OF 6 SHEETS