

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	83G-01-17M	2017	26	48

GENERAL NOTES

- A. Workmanship and materials shall conform to the Hawaii Standard Specifications For Road & Bridge Construction (2005 Edition) & Special Provisions. However, where reference is made to performance conforming to other standards the more stringent shall apply.
- B. The Contractor shall compare all the contract documents with each other and report in writing to the Engineer all inconsistencies and 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 work. Report in writing to the Engineer all inconsistencies and 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 structural members and systems.
- E. Construction loading shall not exceed design live load unless special shoring is provided. Allowable loads shall be reduced in areas where the structure has not attained full design strength.
- F. The Contractor shall be responsible for protection of the adjacent properties, structures, streets and utilities during the construction period.
- G. Details noted as typical on the structural drawings shall apply in all conditions unless specifically shown or noted.
- H. The General Contractor and his Subcontractors must submit in writing any requests for modifications to the plans and specifications.

FOUNDATION

- A. Foundation design is based on a geotechnical investigation by Hirata & Associates, Inc. and report dated October 4, 2016.
- B. Contractor shall provide for de-watering of excavation from surface water, ground water or seepage.
- C. Contractor shall provide for design and installation of all cribbing, sheeting, and shoring necessary to preserve excavations and earth banks.
- D. Footings shall bear on undisturbed in-situ firm soils or properly compacted fill material. If soft and/or loose materials are encountered at the bottom of footing excavations, they shall be over-excavated to expose the underlying firm materials. The over-excavation shall be backfilled with fill material and compacted as indicated below.

FOUNDATION (CONT'D):

- E. Site Preparation: The project site shall be cleared of all vegetation, tree roots, and other deleterious material. In areas requiring fill placement, the exposed subgrade should be scarified to a minimum depth of 6 inches, moisture conditioned, and compacted to a minimum 90 percent compaction as determined by ASTM D 1557. Soft or loose soils, indicated by pumping conditions, should be removed and replaced with imported granular structural fill.
- F. Onsite Fill Material: The onsite clayey silt and completely weathered rock will be acceptable for reuse in compacted fills and backfills. All rock fragments larger than 3 inches in maximum dimension shall be removed from the onsite soils prior to reuse.
- G. Imported Fill Material: Imported structural fill shall be well-graded, non-expansive granular material. Specifications for imported granular structural fill shall indicate a maximum particle size of 3 inches, and state that between 8 and 20 percent of soil by weight shall pass the #200 sieve. In addition, the plasticity index (P.I.) of that portion of the soil passing the #40 sieve shall not be greater than 10. Imported structural fill shall have a CBR expansion value no greater than 1.0 percent and a minimum CBR value of 15 percent, when tested in accordance with ASTM D 1883.
- H. Compaction: The onsite clayey silt and completely weathered rock shall be placed in horizontal lifts restricted to eight inches in loose thickness and compacted to a minimum 90 percent compaction as determined by ASTM D1557. Imported structural fill shall be placed in horizontal lifts restricted to eight inches in loose thickness and compacted to a minimum 95 percent compaction as determined BY ASTM D 1557.
- I. Fill placed in areas which slope steeper than 5H:1V shall be continually benched as the fill is brought up in lifts.
- J. Contractor shall brace or protect all walls below grade from lateral loads until attaching structural members are in place and have attained their full design strength.
- K. The Geotechnical Engineer shall be retained during construction and paid by the Contractor to (1) observe footing excavations prior to placement of reinforcing steel and concrete, (2) review and/or perform laboratory testing on import borrow to determine its acceptability for use in compacted fills, (3) observe structural fill placement and perform compaction testing, and (4) provide geotechnical consultation as required.

CONCRETE

- A. Concrete construction shall be in accordance with Hawaii Standard Specifications for Road and Bridge Constructions & Special Provisions.
- B. Concrete shall be regular weight hard rock concrete and shall have the following minimum 28 day compressive strengths:
  - a. Footings ————— 3,000 PSI
  - b. Slabs on grade ————— 3,000 PSI
  - c. Walls ————— 3,000 PSI
  - d. All other concrete ————— 3,000 PSI

CONCRETE (CONT'D):

- C. 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.
- D. Reinforcing bars and other items to be cast in the concrete shall be secured in position prior to placement of concrete.
- E. The Contractor shall locate construction joints so as not to impair the strength of the structure and to minimize shrinkage stresses. Submit location of construction joints to the Engineer for approval, unless otherwise noted.
- F. Non-shrink grout shall be a premixed non-metallic formula, capable of developing a minimum compressive strength of 3,000 PSI in 1 day and 5,000 PSI in 28 days.
- G. The Engineer shall be notified at least 3 working days prior to any concrete pour. No concrete shall be poured prior to observation by the Engineer or his representative.

WATERSTOPS:

- A. Waterstops for new fluid containing cast in place concrete structures shall be polyvinyl chloride (pvc) waterstops made of extruded polyvinylchloride (pvc) manufactured from virgin materials conforming to coe crd-c-572.
- B. Waterstops for new fluid containing cast in place concrete structures attached to existing concrete structures shall be self-expanding strip waterstops manufactured rectangular or trapezoidal strip sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4" x 1".
- C. Waterstop type for construction joints shall be serrated (ribbed) flat and shall be vinylex r6-38, greenstreak style 679 by vinylex corporation, greenstreak plastic products company, or approved equal.

ORIGINAL PLAN	DATE
NOTED BY	DATE
DESIGNED BY	DATE
CHECKED BY	DATE

KAWA WATERSHED STORM WATER  
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RON E. IWAMOTO

LICENSED PROFESSIONAL ENGINEER

No. 6871-S

HAWAII, U.S.A.

4/30/18

EXP. DATE

*R. E. Iwamoto*

This work was prepared by me or under my supervision.

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

STRUCTURAL NOTES

KAWA WATERSHED STORM WATER

BEST MANAGEMENT PRACTICES ON OAHU, PHASE 1

Project No. 83G-01-17M

Scale: AS SHOWN

Date: April 2017

SHEET No. EC-15 OF 20 SHEETS



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WATERSTOPS (CONT'D):

- D. Waterstop type for joints between existing concrete and new concrete shall be greenstreak swellstop, or approved equal.
- E. Splices shall be factory made at all corners, tees and cross intersections and shall have a tensile strength conforming to code CRD-C-572.
- F. Provide hog rings and tie wire to rigidly locate waterstops in forms.

CONCRETE JOINTS:

- A. Coordinate joint types, description, and location with drawings.
- B. Space typical slab joints not exceeding 20 feet in the direction of transverse or secondary reinforcing, typically the smaller reinforcing nearer to the center of the slab thickness.
- C. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- D. Provide all joints in walls and slabs, retaining liquids or earth, with 6-inch waterstops as indicated on the drawings. continue all reinforcing through the joint unless otherwise noted.
- E. Before depositing new concrete on or against concrete that has hardened, clean and roughen the entire surface of the joint exposing clean course aggregate solidly embedded in mortar matrix. provide typically 1/4 inch roughness or amplitude of the concrete surface measured from the top of the exposed aggregate to the bottom of pockets between stones.
- F. Drench the prepared joint with clean water and remove prior to the concrete pour.
- G. Cover horizontal wall joints and wall to slab joints with a minimum thickness of 2 inches and a maximum of 6 inches of the modified concrete mix, consisting of the designated concrete mix with one half of the course aggregate removed.
- H. Use special care in vibrating adjacent to construction joints to ensure thorough consolidation of the concrete around waterstops and against the hardened portion of the joint. additional hand tamping may be required.
- I. Waterstop:
  - 1. Restrict field splices to butt joints in straight runs. for pvc type, make by heat welding, using a splicing iron.
  - 2. Positively locate and support in the forms so that concrete may be placed, consolidated, and vibrated on both sides of the embedded portion without displacement of the waterstop and without causing voids in the concrete. protect the outstanding portion from damage during the first concrete pour and clean and positively support prior to the second pour. place, consolidate and vibrate the second pour without displacement of the waterstop and without causing voids in the concrete.

REINFORCING STEEL

- A. Reinforcing steel shall be deformed bars conforming to AASHTO M31, Grade 60.
- B. Welded wire fabric shall conform to AASHTO M55, galvanized.
- C. Clear concrete cover for reinforcing bars shall be as follows, unless otherwise noted:
  - a. cast against & permanently exposed to earth——3"
  - b. exterior (exposed to earth or weather)——2"
- D. Reinforcing steel shall be spliced where indicated on plans. Provide lap splice length per typical details and schedule, unless otherwise noted.
- E. Bar laps shall be made away from points of maximum stress. Unless noted otherwise, splices, laps, dowel extensions and embedments shall be 48 bar diameters, but not less than 24 inches. Splices shall be staggered where possible.
- F. Unless otherwise noted, all horizontal reinforcing steel at wall and wall footing corners and intersections shall extend to the far face of the corner and hooked a length of 48 bar diameters, but not less than 24 inches, around the corner.
- G. Welded wire fabric shall be lapped 8 inches or one full mesh plus 2 inches, whichever is greater.
- H. Bar bends and hooks shall be "standard hooks" in accordance with AASHTO LRFD Bridge Design Specifications 7th Edition 2014.

EPOXIED ANCHOR REQUIREMENTS

- A. Epoxy used for anchoring threaded rods and reinforcing steel into existing concrete shall be Hilti HIT-HY 200 system, Simpson SET-XP system, Powers P1000+ system, or approved equal, and shall be installed per manufacturer's recommendations.
- B. Anchors shall be installed with the minimum embedment requirements as indicated on the drawings.

STRUCTURAL STEEL

- A. Fabrication and erection of structural steel shall conform to the Hawaii Standard Specifications For Road & Bridge Construction (2005 Edition) & Special Provisions.
- B. Structural steel shall conform to ASTM A36 unless otherwise noted.
- C. Threaded rods shall conform to ASTM F1554 Grade 36 unless otherwise noted.
- D. Welds and welding procedures shall conform to the Structural Welding Code AWS D1.1 of the American Welding Society.
- E. Welding shall be performed by welders prequalified for welding procedures to be used.
- F. Welding electrodes shall be E70XX.
- G. All steel shall be hot-dipped galvanized after fabrication, unless otherwise noted.
- H. All field welding of galvanized metal shall be repaired per Hawaii Standard Specifications Section 501.03 (G) (2).

INSPECTION OF WORK AND MATERIALS

- A. Contractor shall be responsible for ensuring that inspection of portions of the work, as required by the Hawaii Standard Specifications for Road & Bridge Construction & Special Provisions, is made at the appropriate time. The Contractor shall give timely notice of when and where inspections are to be made and provide access for the Inspector. The Contractor shall correct defective work at no additional cost to the State and pay for re-inspection.
- B. The following structural work and materials requires inspection:
  - a. Concrete
  - b. Drilled and epoxied threaded rods & reinforcing steel in concrete.
  - c. Reinforcing steel
  - d. Structural welding

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STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

STRUCTURAL NOTES

KAWA WATERSHED STORM WATER  
BEST MANAGEMENT PRACTICES ON OAHU, PHASE 1  
Project No. 83G-01-17M  
Scale: AS SHOWN  
Date: April 2017

4/30/18  
EXP. DATE  
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STATE OF HAWAII  
LICENSED PROFESSIONAL ENGINEER  
No. 6871-S  
HAWAII, U.S.A.

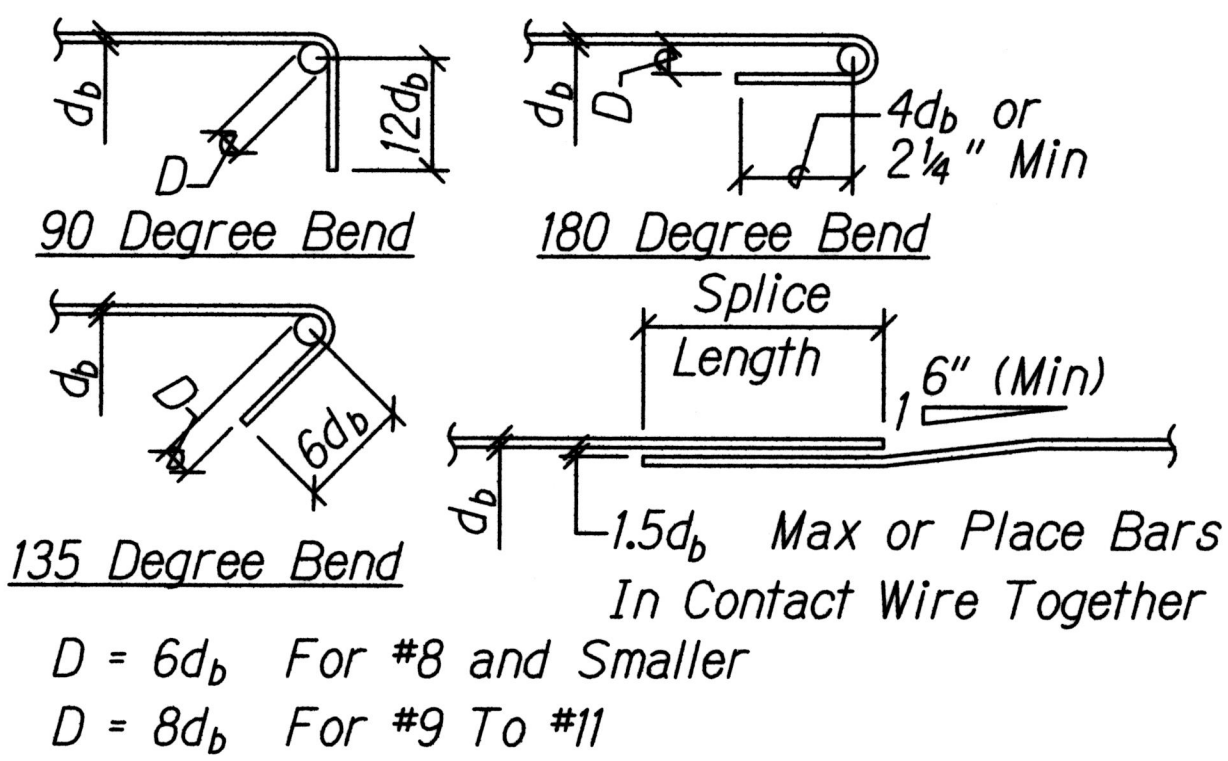
SHEET No. EC-16 OF 20 SHEETS

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Minimum Splice & Embedment Lengths For Concrete					
Bar Size	Lap Splice		Embedment		
	Bot Bar Or Wall Bar	Top Bar	Straight Bot Bar Or Wall Bar	Top Bar	w/ Std Hook
#3, #4	29"	38"	22"	29"	11"
#5	36"	47"	28"	36"	14"
#6	43"	56"	33"	43"	17"
#7	63"	82"	48"	63"	20"

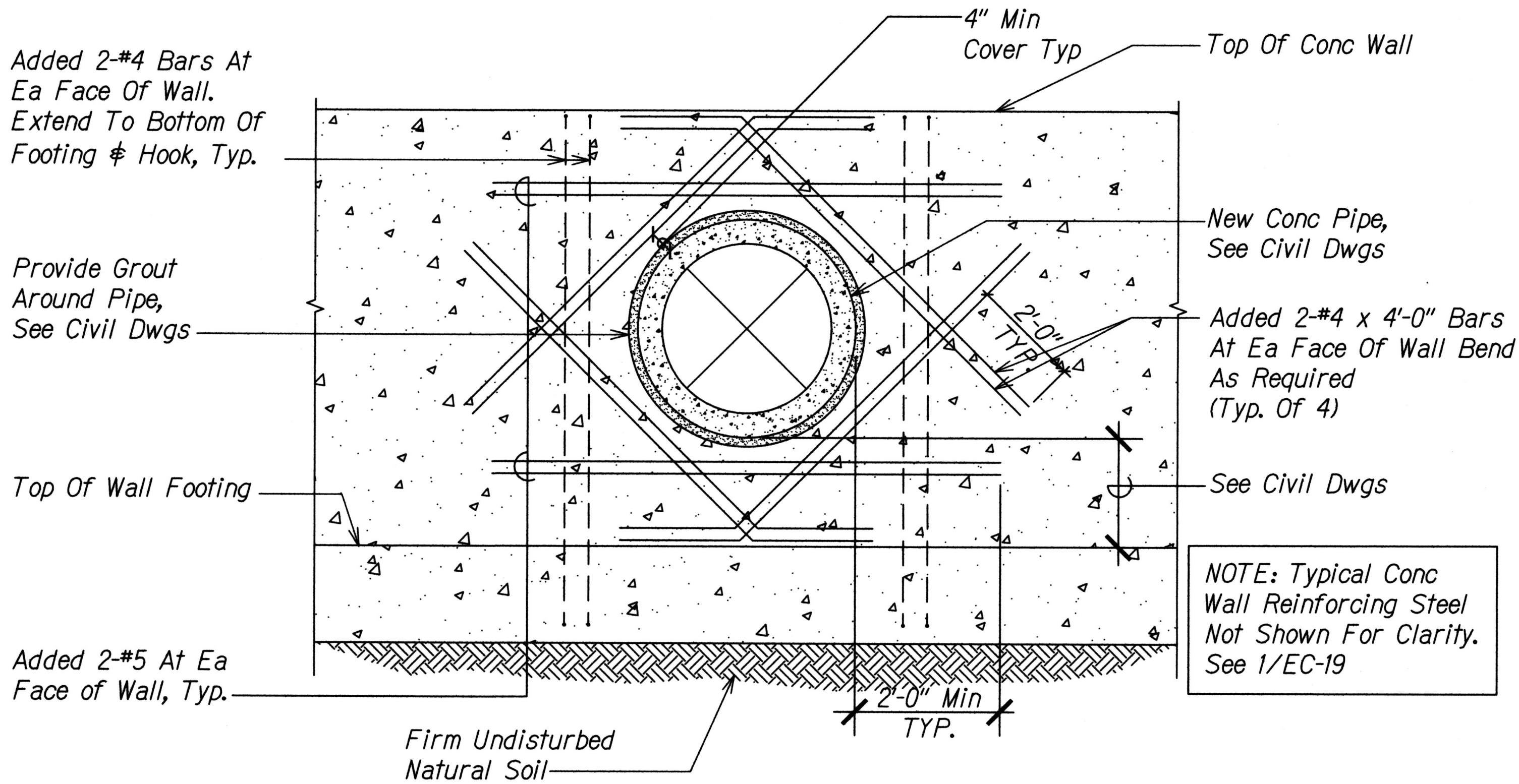


1. Lengths Are For Concrete Walls with Rebars Spaced 2 Bar Diameters Min O.C. Increase Bar Length 50% For Bars Spaced Closer Than Minimums Specified.
2. "Top Bars" Are Horizontal Bars With 12" Or More Of Concrete Cast Below.

TYPICAL REBAR SPLICE & EMBEDMENT LENGTH SCHEDULE

Scale: Not to Scale

EC-17



TYPICAL PIPE PENETRATION THRU WALL DETAIL

Scale: Not to Scale

EC-19

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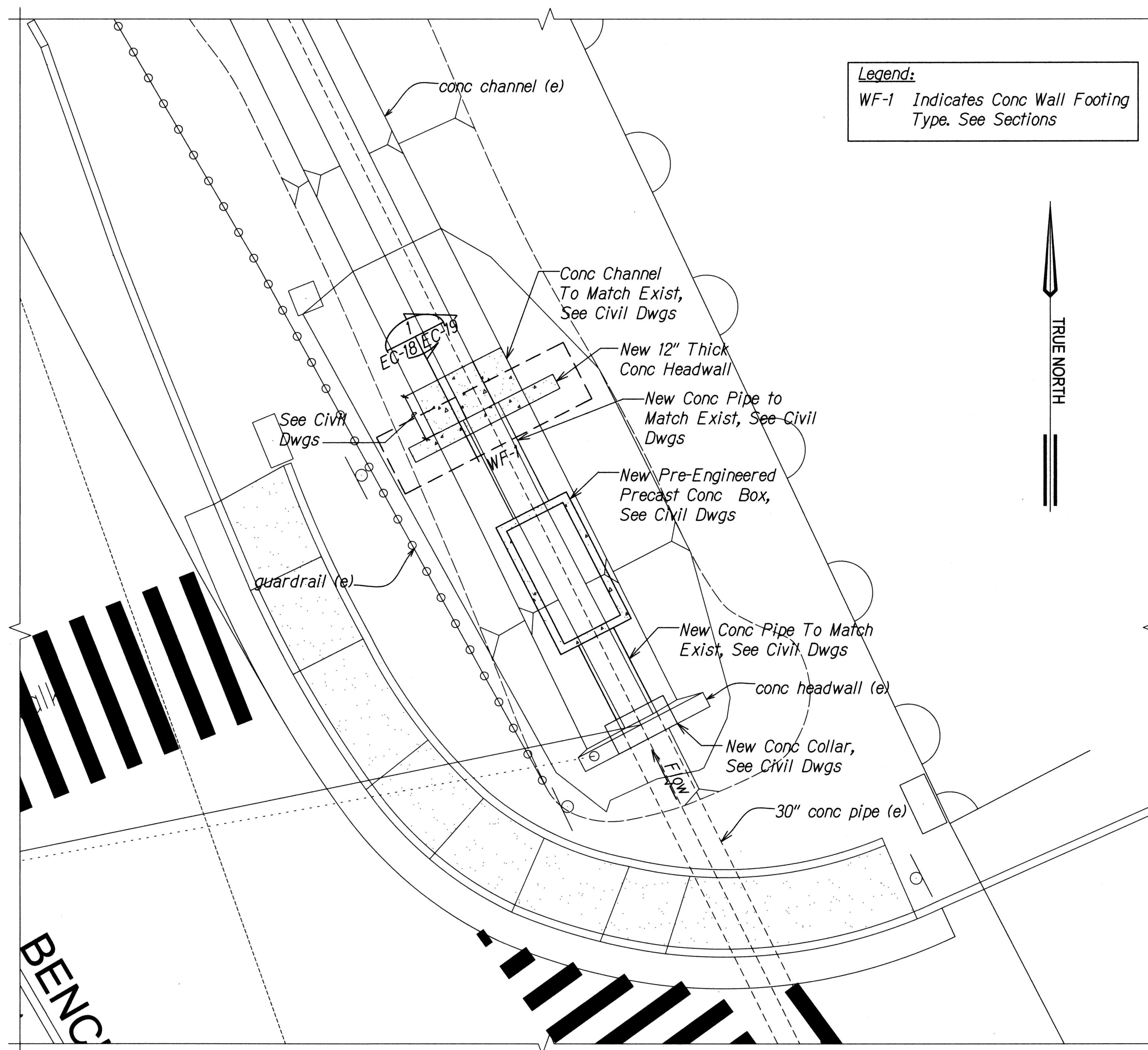
**TYPICAL DETAILS**

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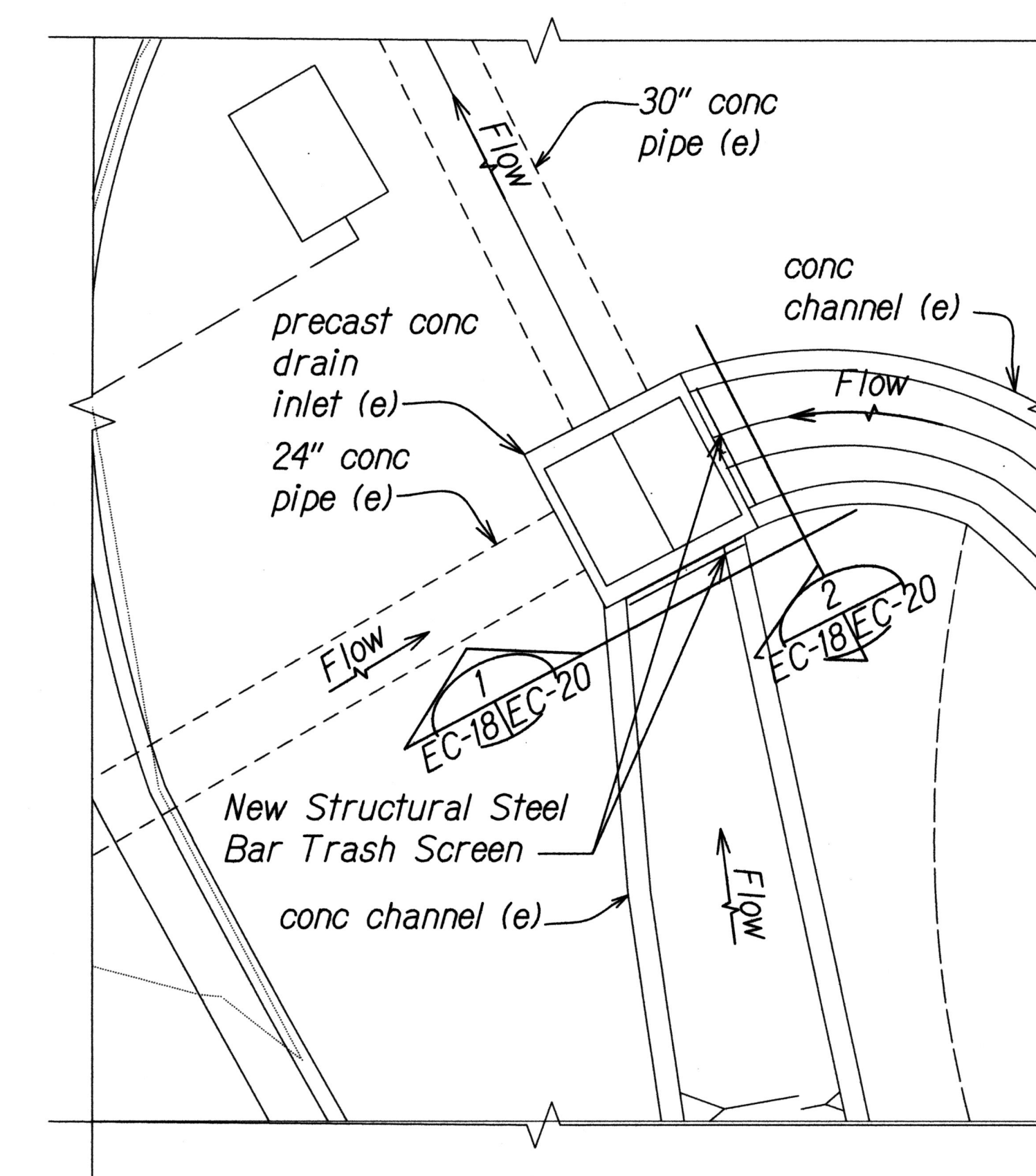


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**PARTIAL SITE FOUNDATION PLAN "A"**  
Scale: 1/4" = 1'-0"

**Legend:**  
WF-1 Indicates Conc Wall Footing Type. See Sections



**PARTIAL SITE FOUNDATION PLAN "B"**  
Scale: 1/4" = 1'-0"

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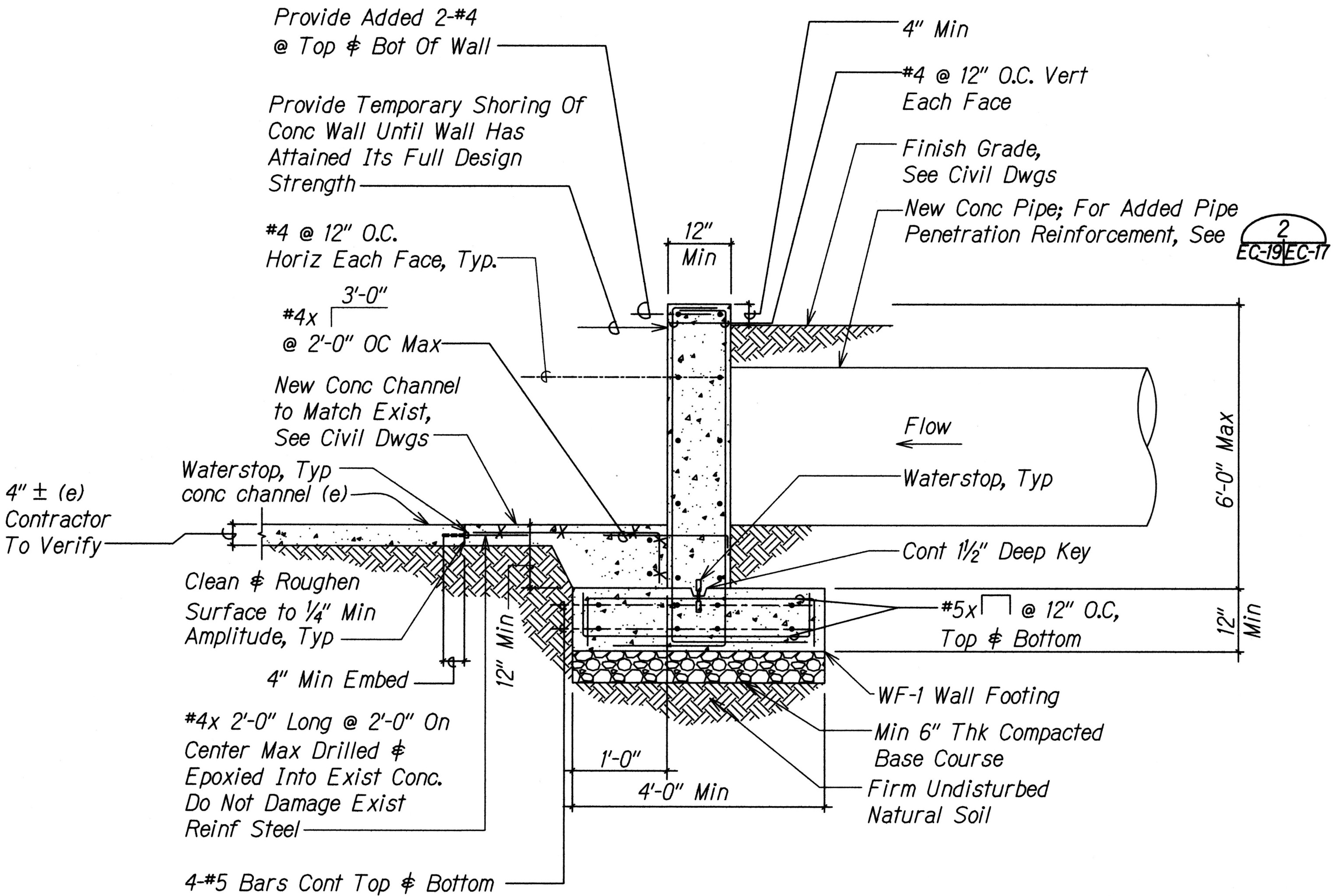
**PARTIAL SITE  
FOUNDATION PLAN "A" & "B"**

KAWA WATERSHED STORM WATER  
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SECTION  
Scale: 3/4" = 1'-0"

EC-18/EC-19

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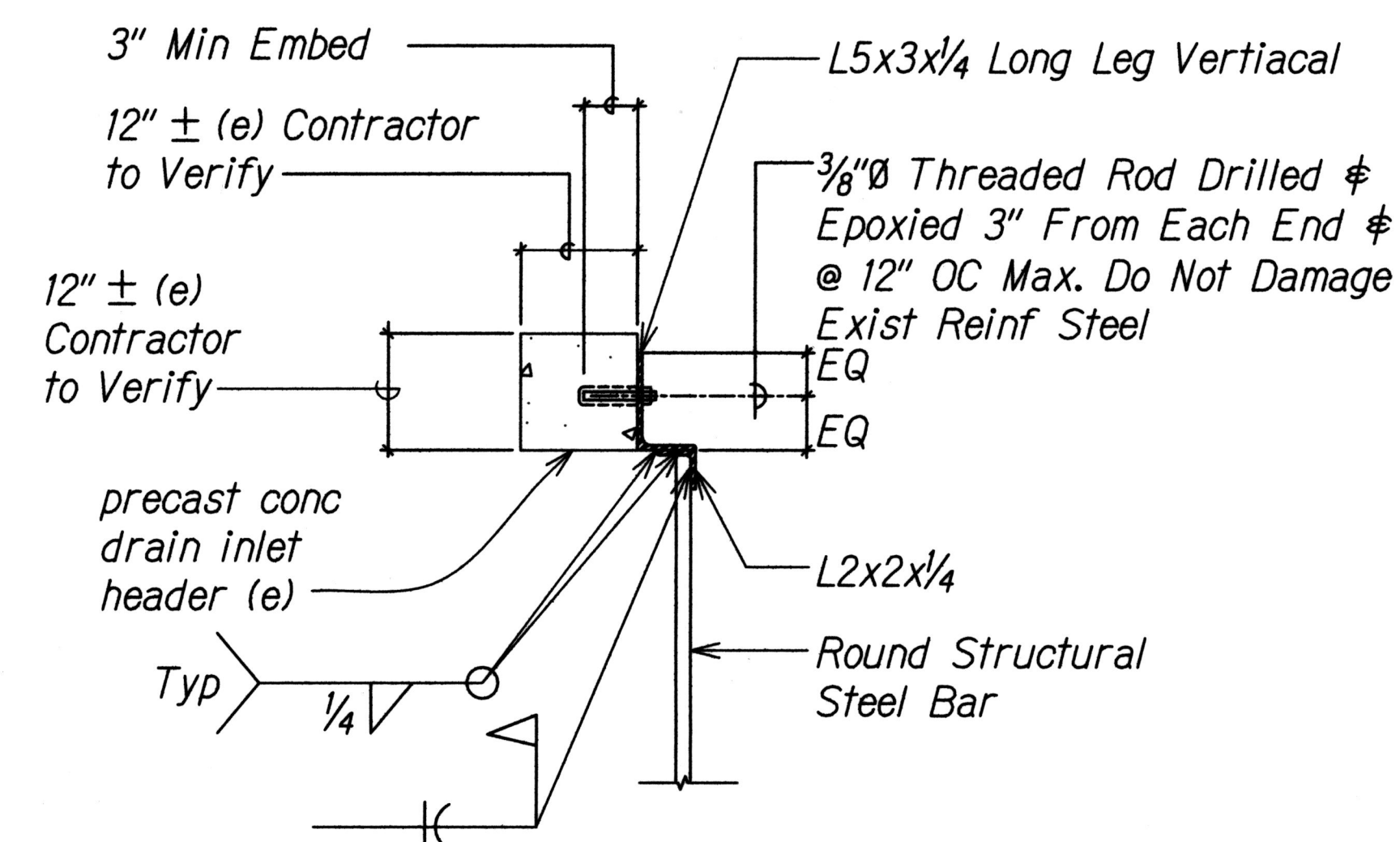
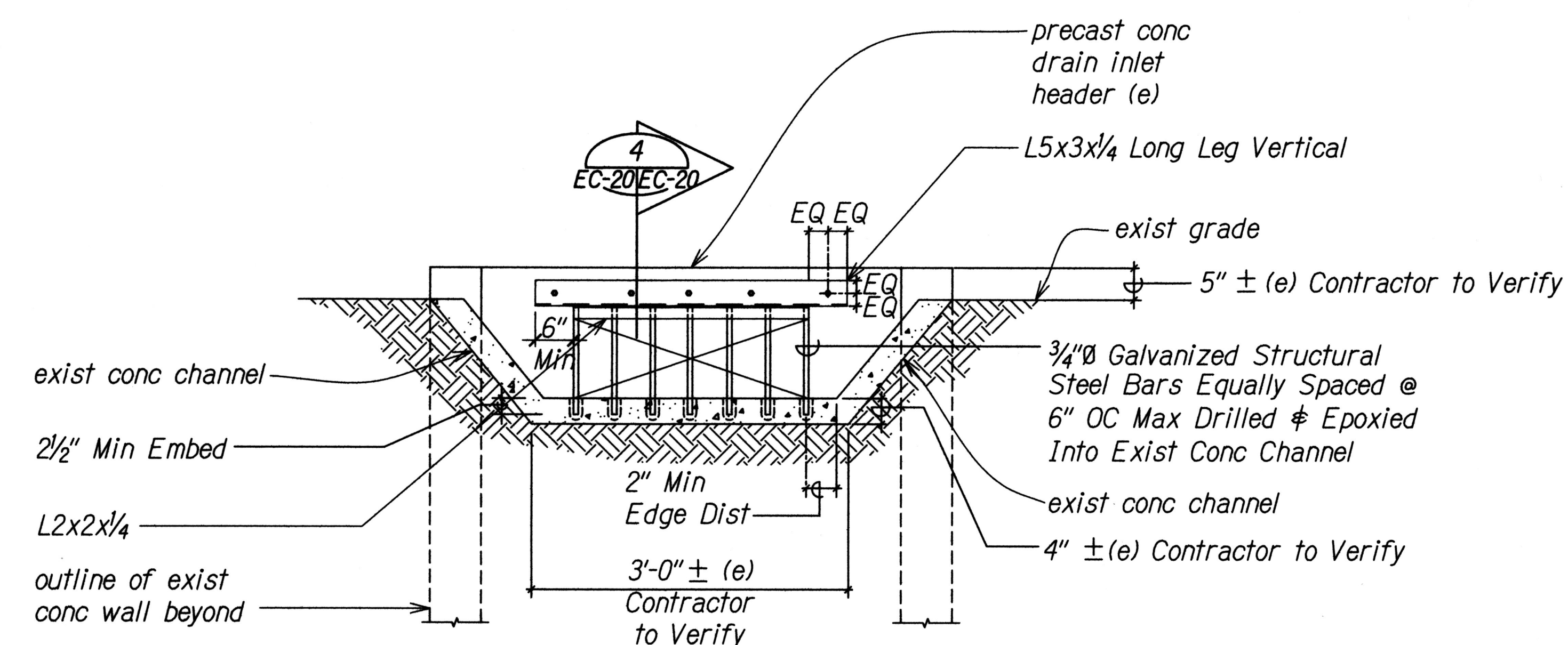
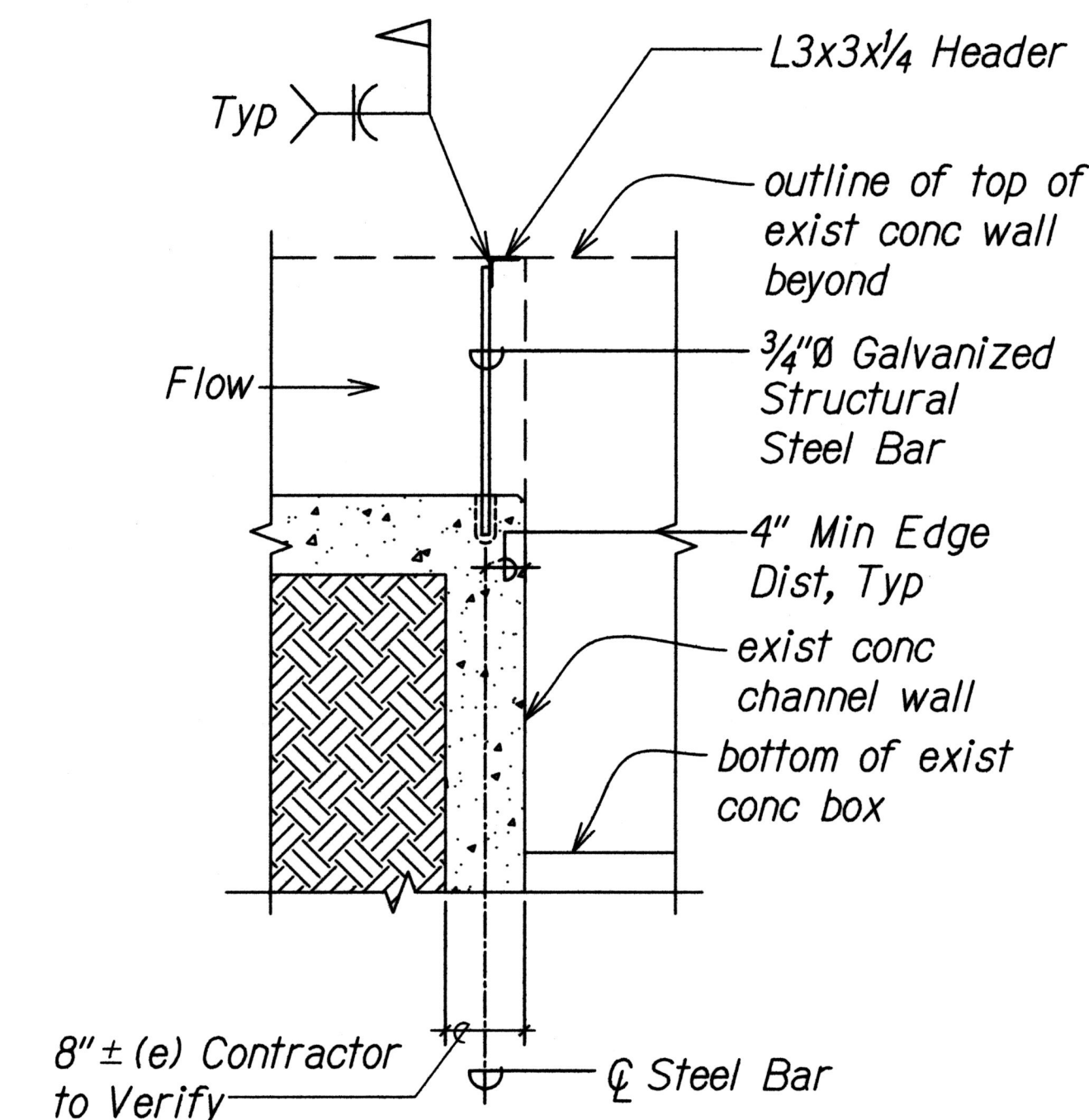
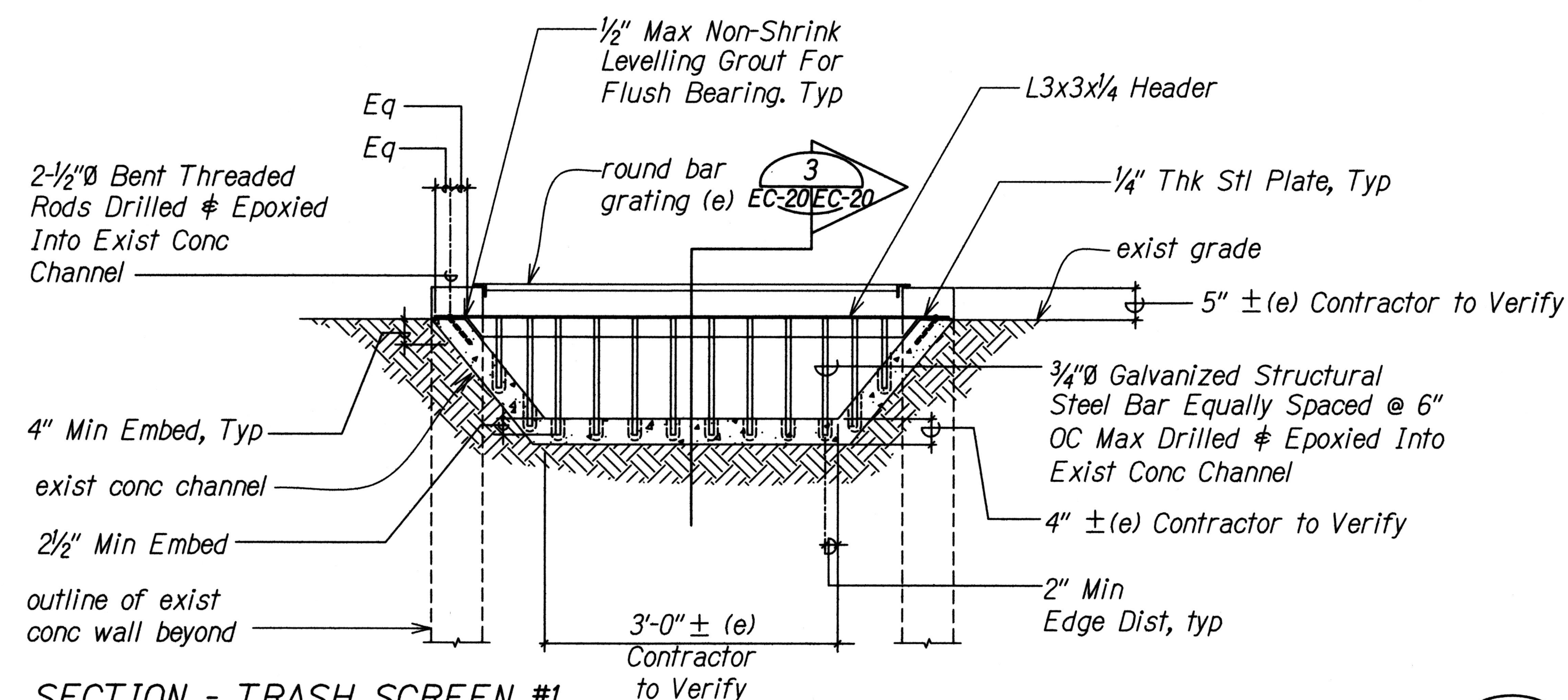
**SECTIONS & DETAILS**

KAWA WATERSHED STORM WATER  
BEST MANAGEMENT PRACTICES ON OAHU, PHASE 1  
Project No. 83G-01-17M  
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**SECTIONS**

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