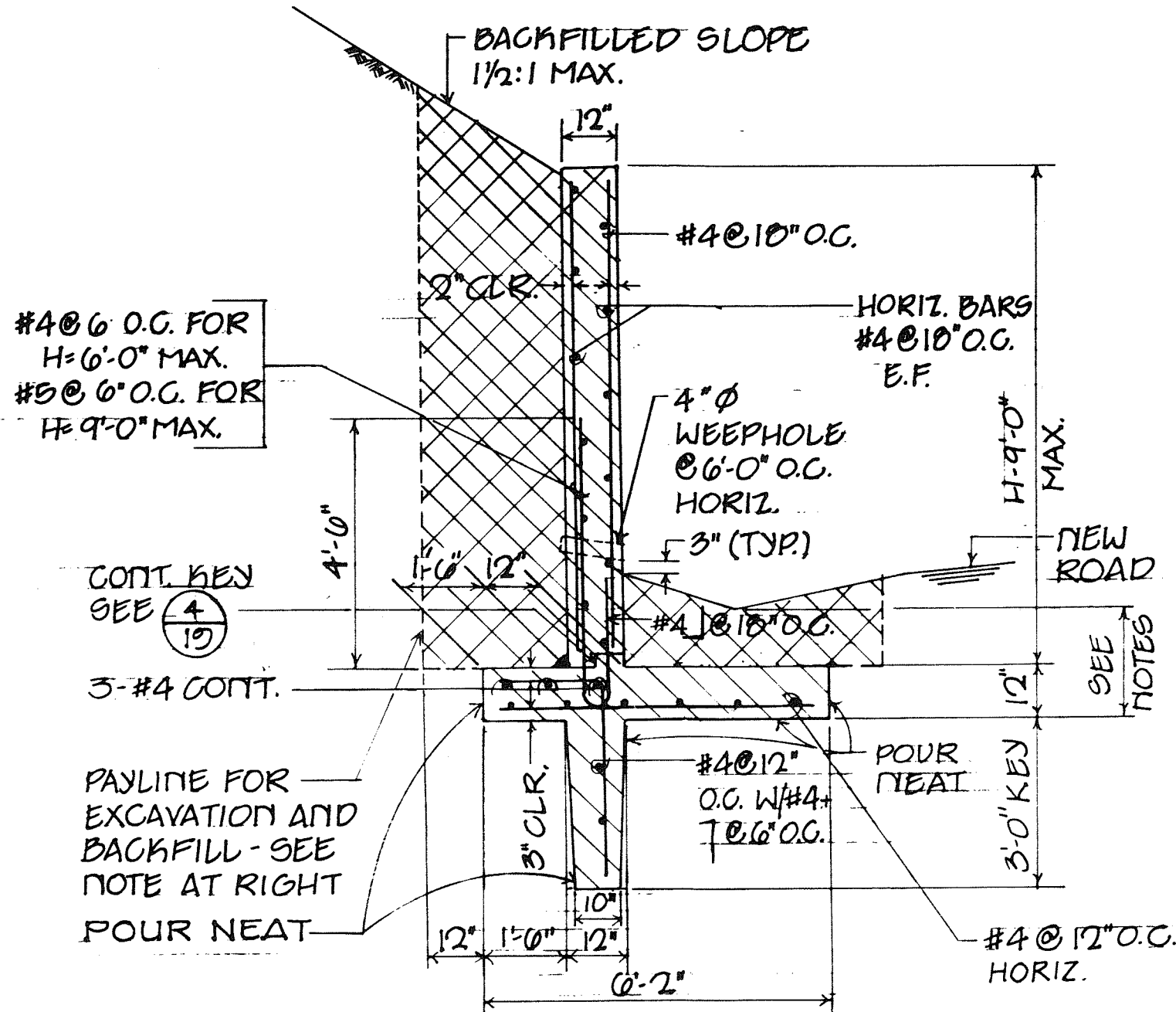
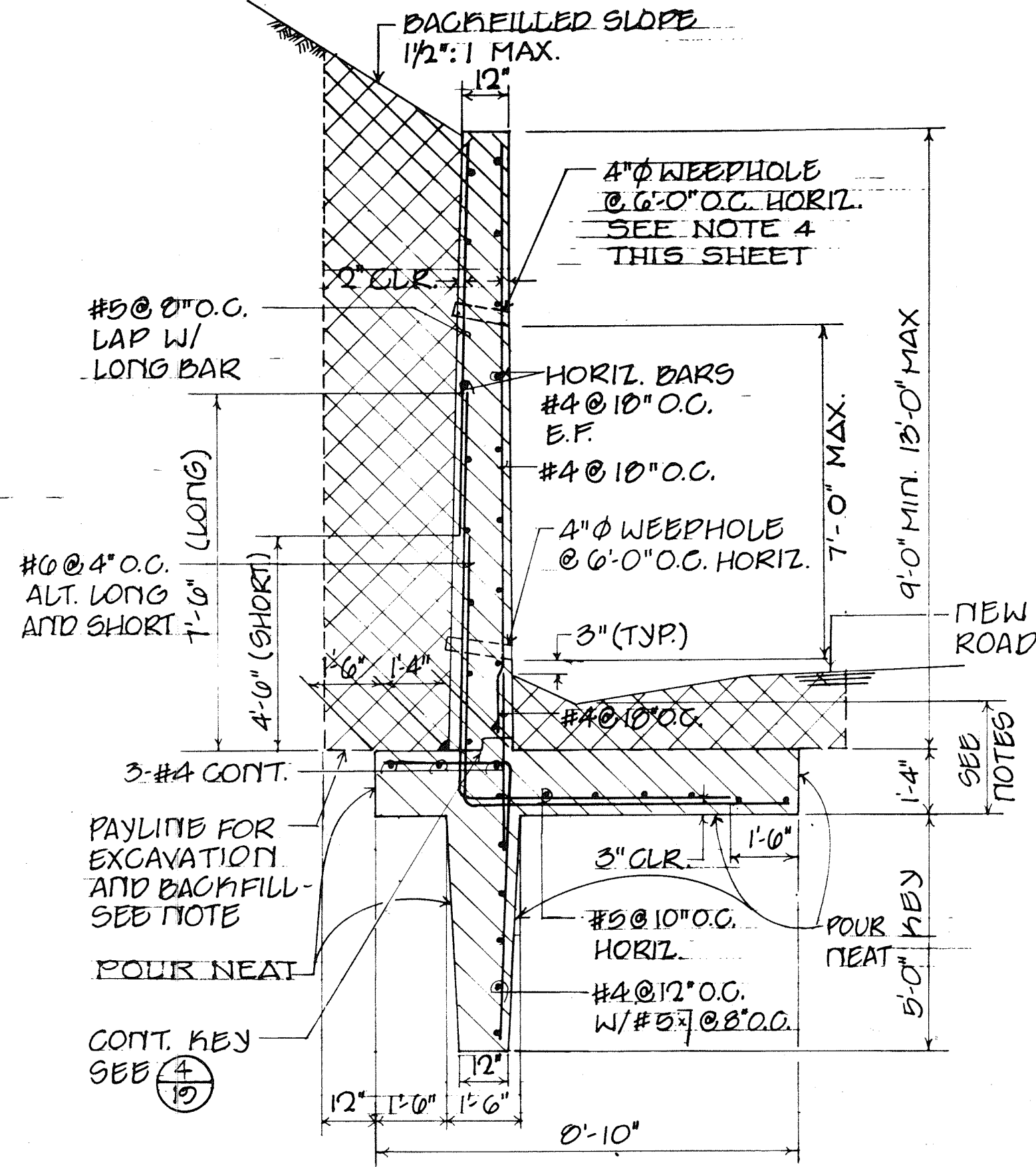


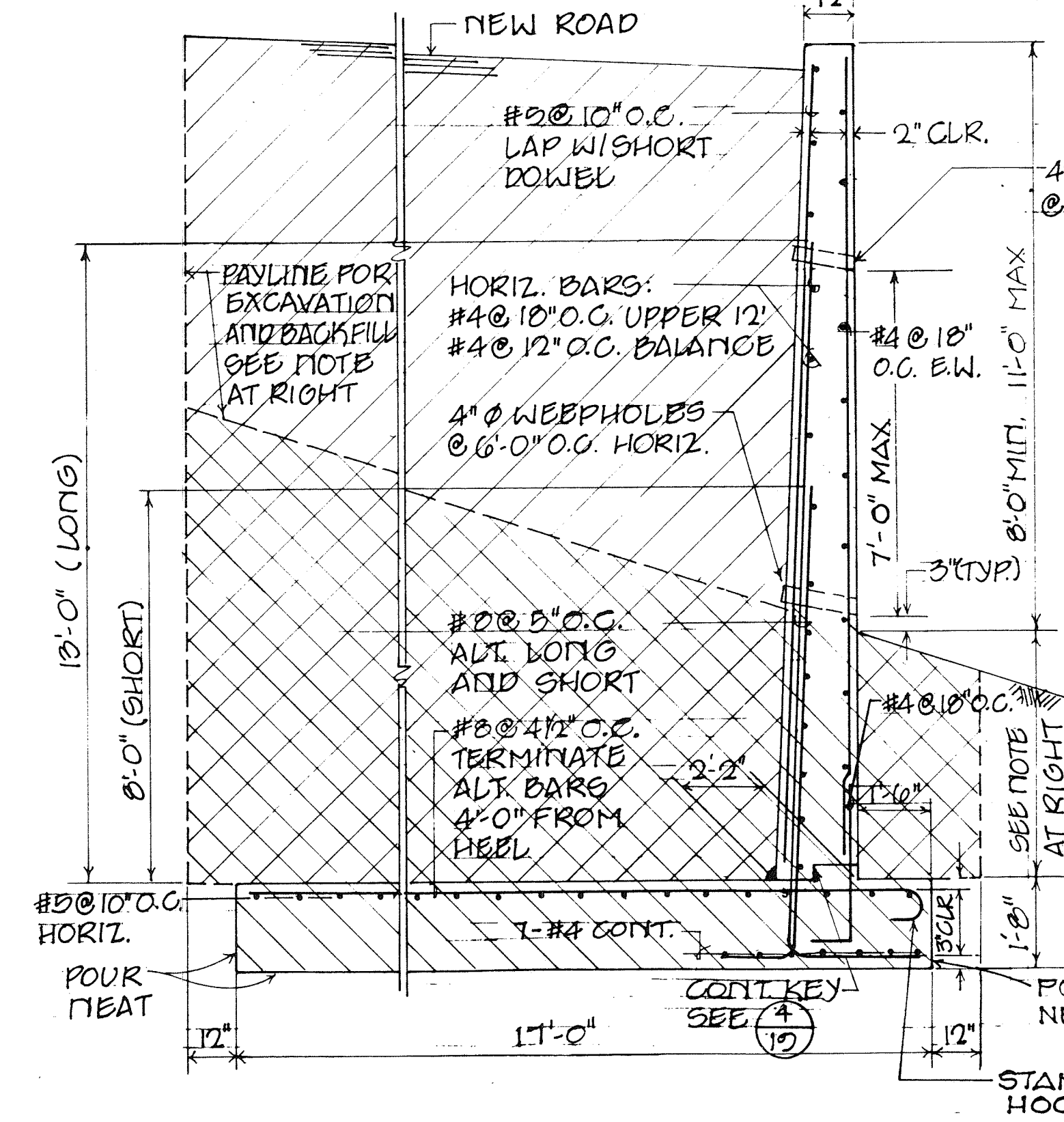
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.			21	53



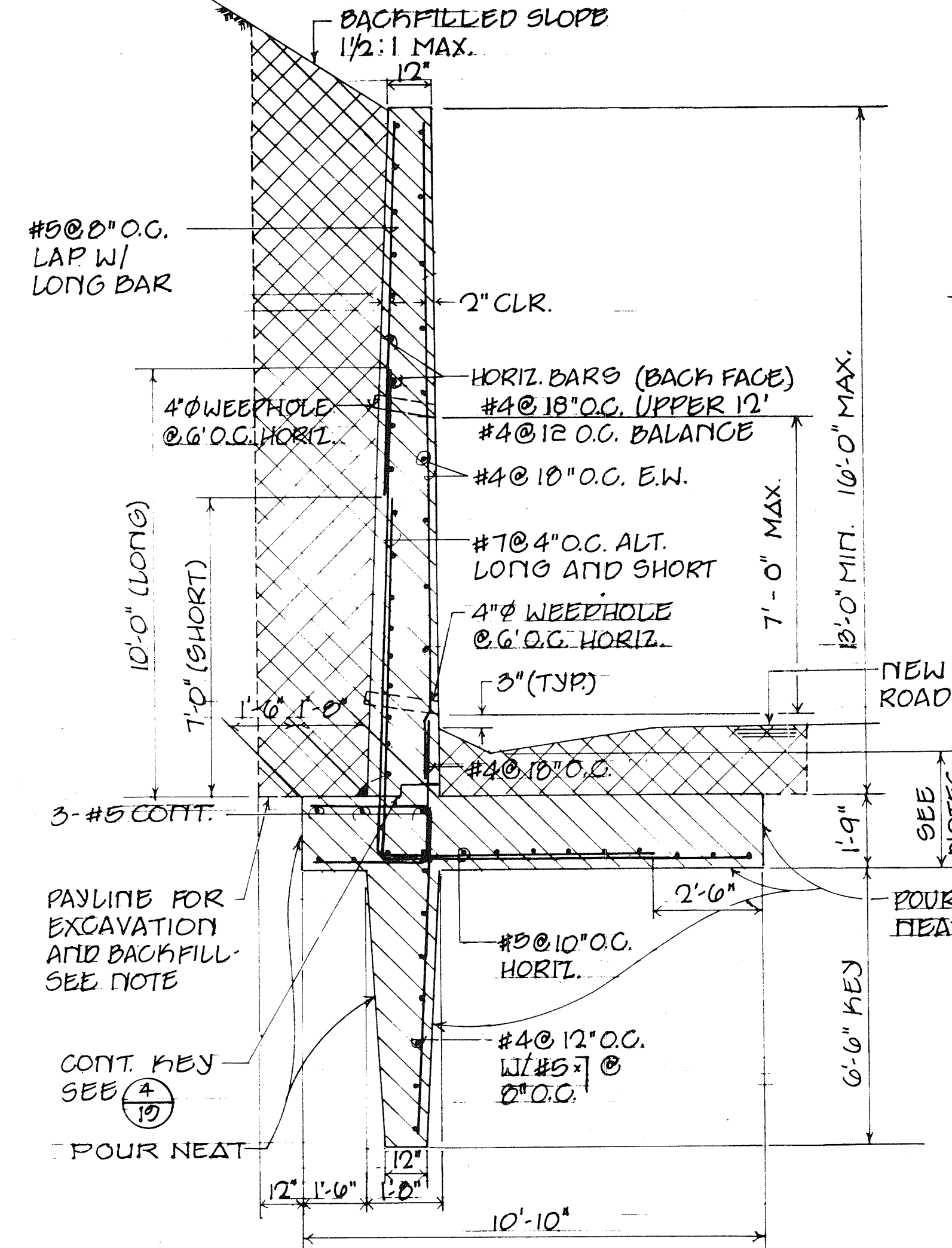
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21 **0-9' REINFORCED CONCRETE RETAINING WALL - UPSLOPE**
SCALE: 3/8" = 1'-0"



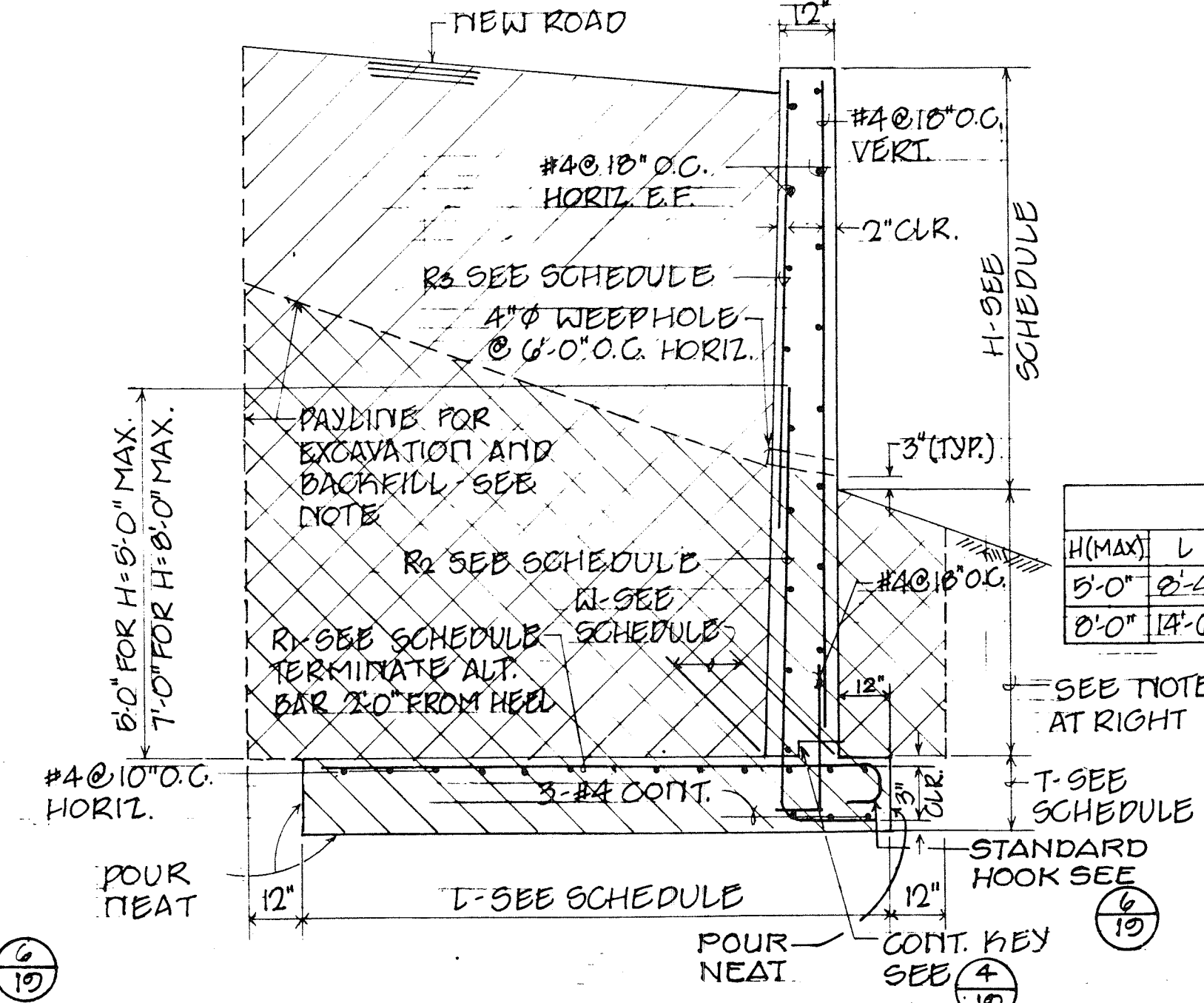
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21 **9-13' REINFORCED CONCRETE RETAINING WALL - UPSLOPE**
SCALE: 3/8" = 1'-0"



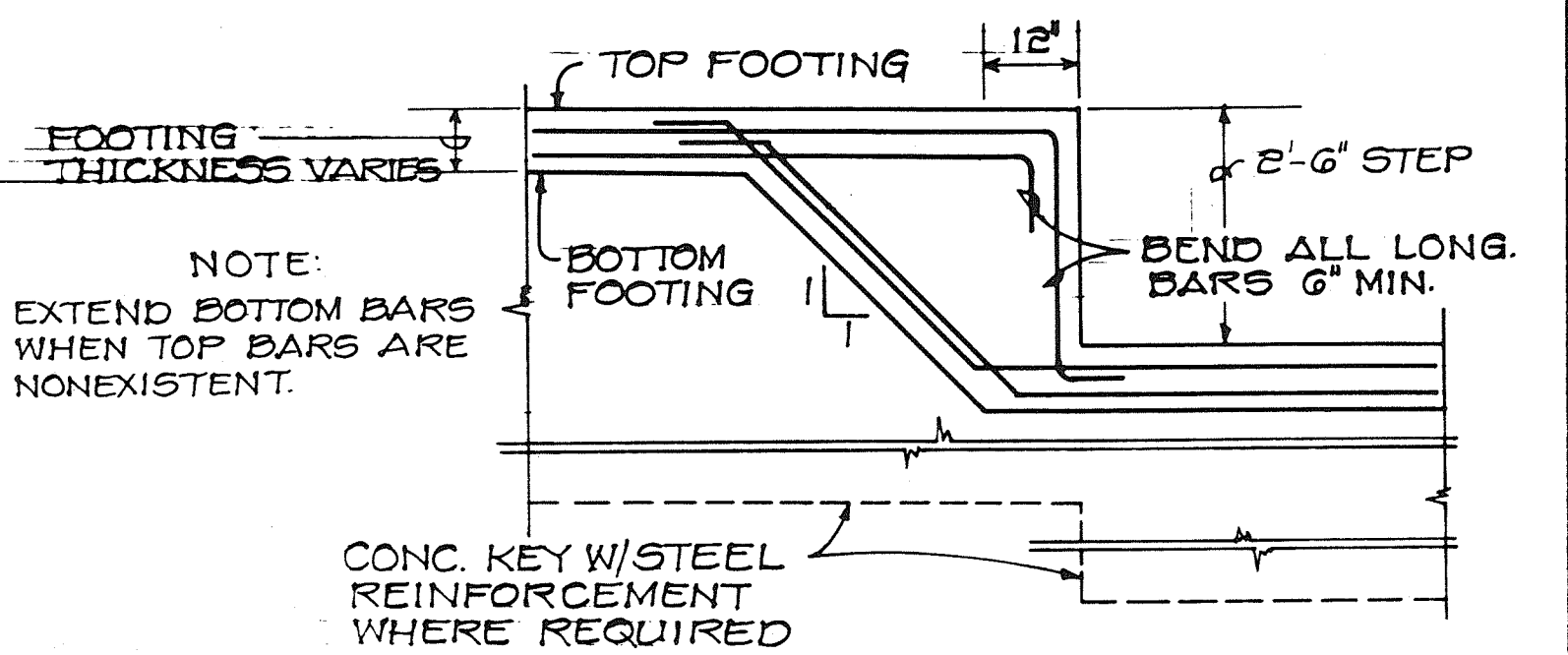
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21 **8'-11' REINFORCED CONCRETE RETAINING WALL - DOWNSLOPE**
SCALE: 3/8" = 1'-0"



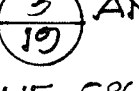
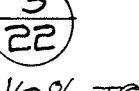
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21 **13-16' REINFORCED CONCRETE RETAINING WALL - UPSLOPE**
SCALE: 3/8" = 1'-0"



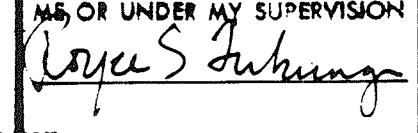
5
21 **0'-8' REINFORCED CONCRETE RETAINING WALL - DOWNSLOPE**
SCALE: 3/8" = 1'-0"



6
21 **STEP FOOTING DETAIL**
SCALE: 1/2" = 1'-0"

- NOTES:**
- THE CONTRACTOR MAY, AT HIS OPTION, CONSTRUCT REINFORCED CONC. RETAINING WALLS USING PRECAST SECTIONS. SEE SHEETS 22-23 FOR ADDITIONAL DETAILS FOR PRECAST WALL CONSTRUCTION.
 - TOP FOOTING ELEVATIONS FOR REINFORCED CONCRETE WALL ARE SHOWN ON PLAN, PROFILE AND GRADING SHEETS (SHEET NOS. 9-17)
 - HATCH AREA SHOWN  DENOTES LIMITS OF STRUCTURE EXCAVATION. HATCH AREA SHOWN  DENOTES LIMITS OF STRUCTURE BACKFILL.
 - ALL WALLS SHALL HAVE IMPERVIOUS MATERIAL AND FILTER MATERIAL IN BACKFILL BEHIND WALL. SEE  **5**
 - WEEPHOLES SHALL BE MADE FLUSH WITH EXPOSED FACE OF WALLS.
 - REBARS SHALL BE GRADE 40. FOR TYPICAL REBAR BENDING DETAIL, SEE  **6**
 - JOINTS FOR REINFORCED CONCRETE WALL AND FOOTINGS SHALL BE REQUIRED AS FOLLOWS:
CONTRACTION JOINTS @ 30'-0" O.C. MAX;
EXPANSION JOINTS @ 90'-0" O.C. MAX;
CONSTRUCTION JOINTS AS REQUIRED.
FOR JOINT DETAILS, SEE  **3** AND  **22**
 - ALL CONCRETE SHALL RECEIVE 6% (+1/2% TOLERANCE) AIR ENTRAINMENT PER ASTM C260 STANDARD. SEE SPECS. FOR ADMIXTURES.

SCHEDULE						
H (MAX)	L	T	W	R ₁	R ₂	R ₃
5'-0"	2'-4"	1'-2"	12"	#4 @ 10' O.C.	#4 @ 12' O.C.	#4 @ 14' O.C.
8'-0"	14'-6"	1'-2"	12"	#4 @ 10' O.C.	#4 @ 12' O.C.	#4 @ 14' O.C.

THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**REINFORCED CONCRETE WALL
TYPICAL SECTIONS**

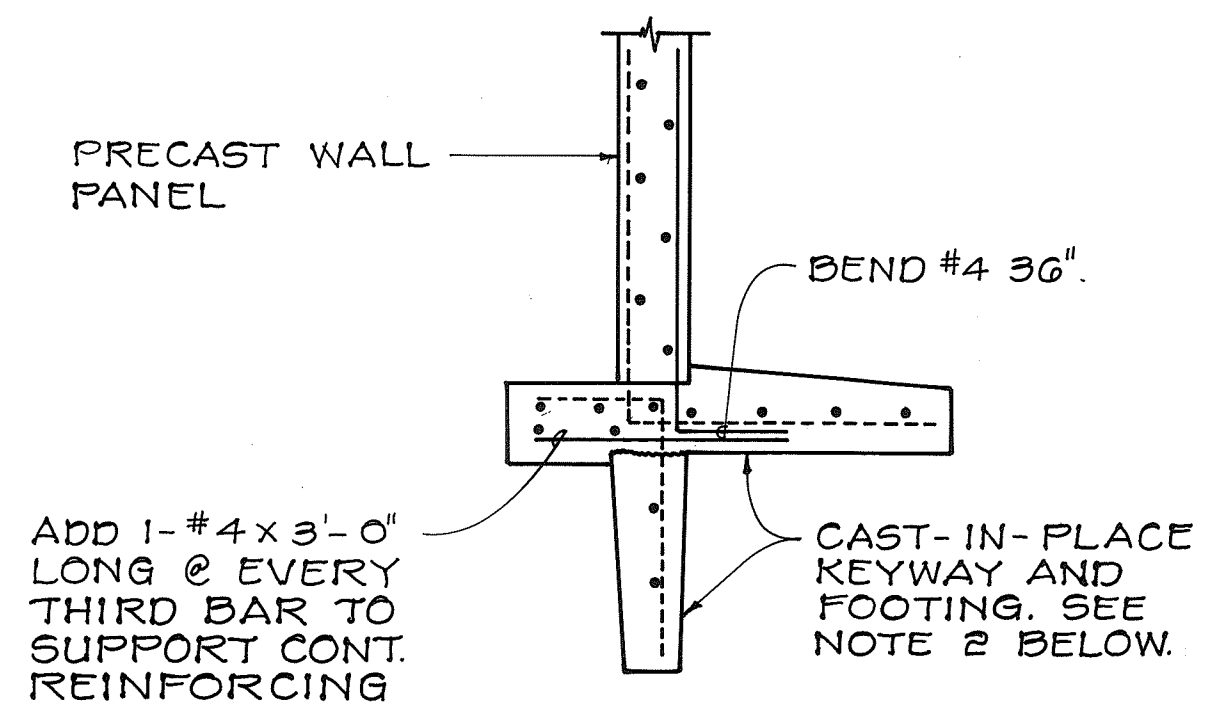
MAUNA KEA OBSERVATORY ACCESS ROAD
PHASE III - B

PROJECT NO.

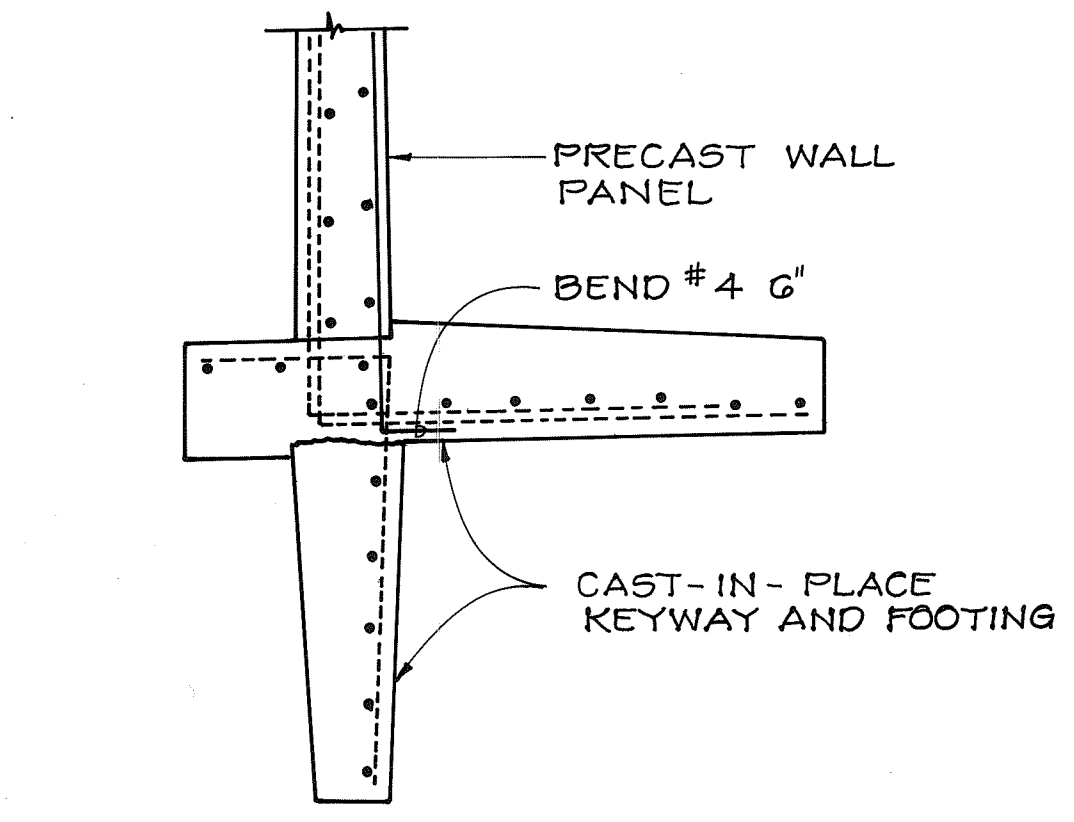
SCALE: AS SHOWN

SURVEY PLOTTED BY	DATE
DRAWN BY	
CHECKED BY	
NOTE BOOK	
QUANTITIES BY	
CHECKED BY	

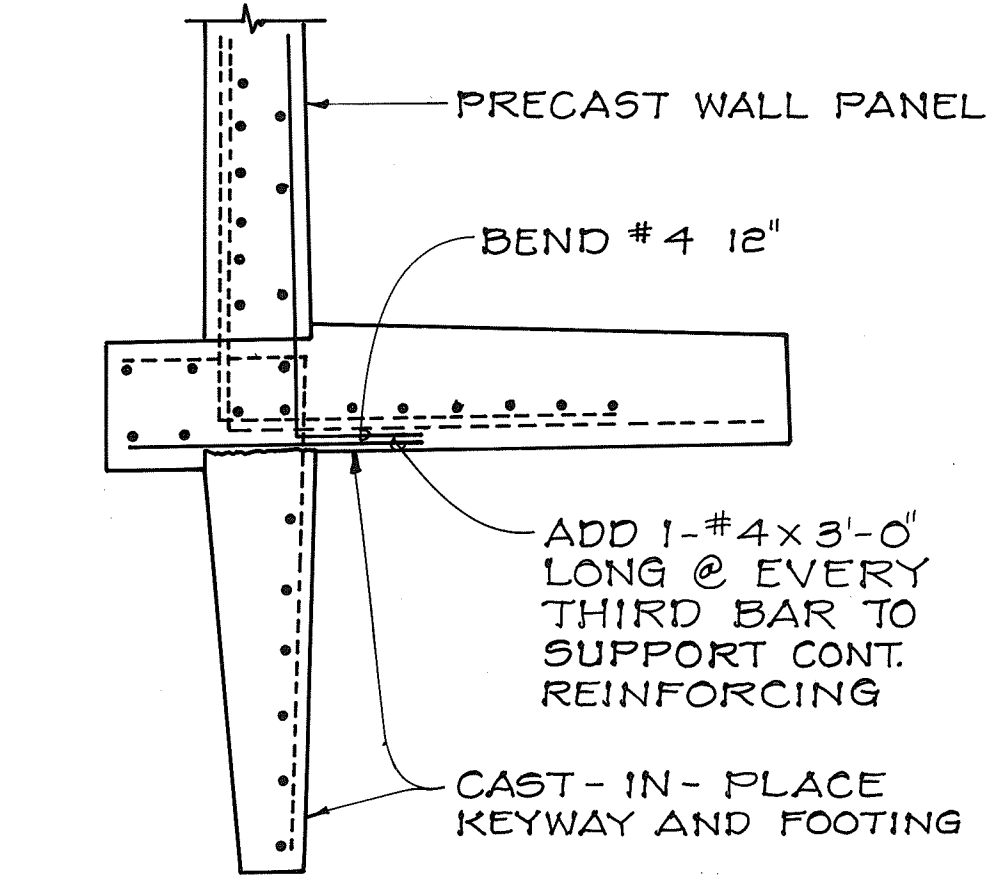
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.			22	53



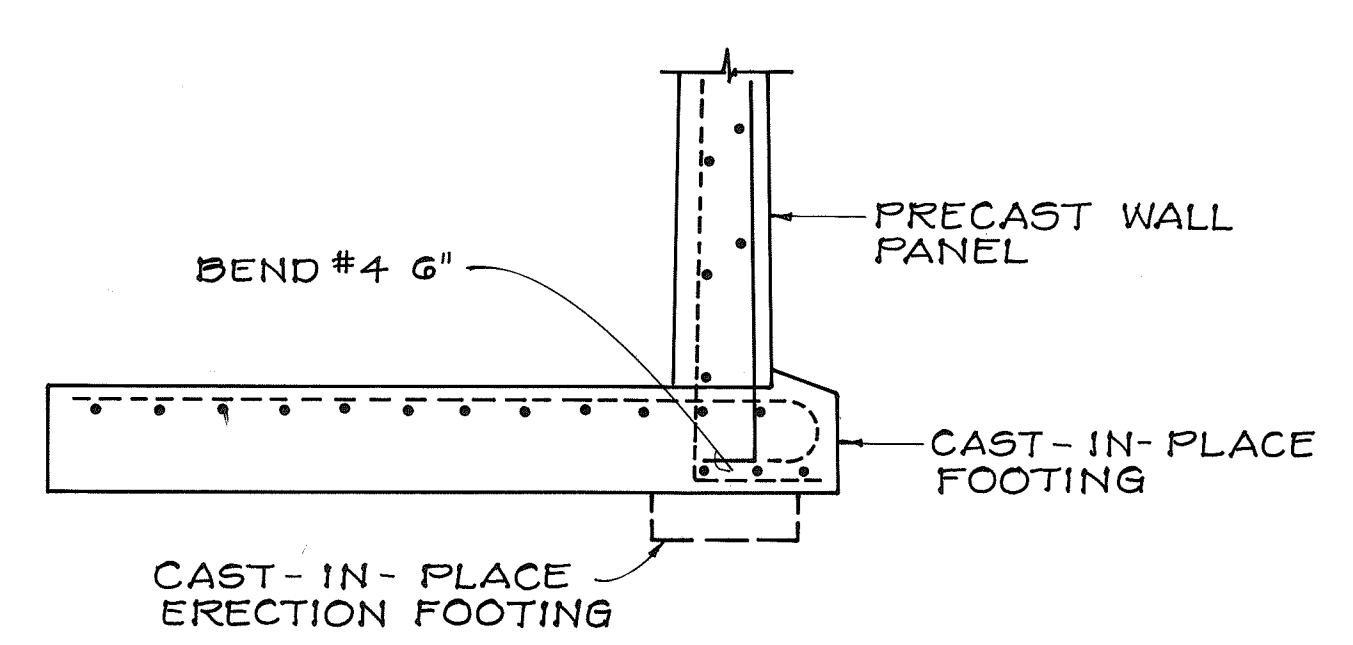
0' - 9' UPSLOPE WALL



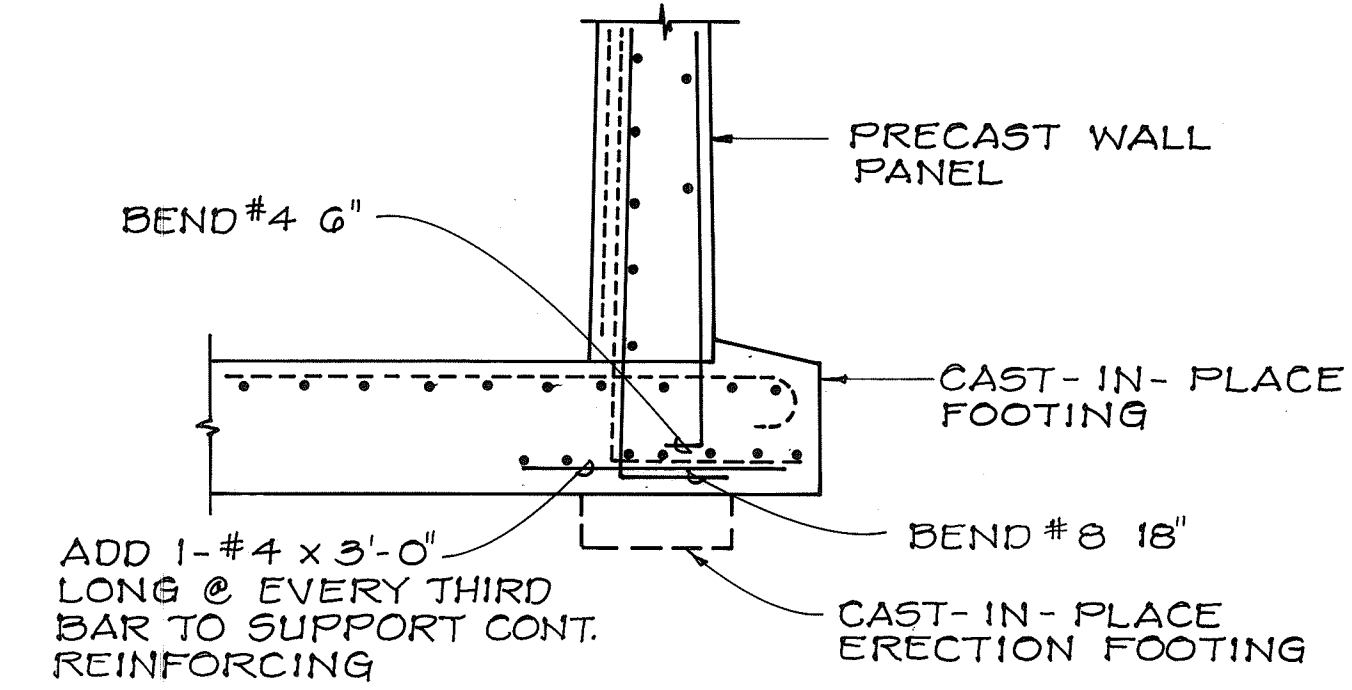
9' - 13' UPSLOPE WALL



13' - 16' UPSLOPE WALL



0' - 8' DOWNSLOPE WALL

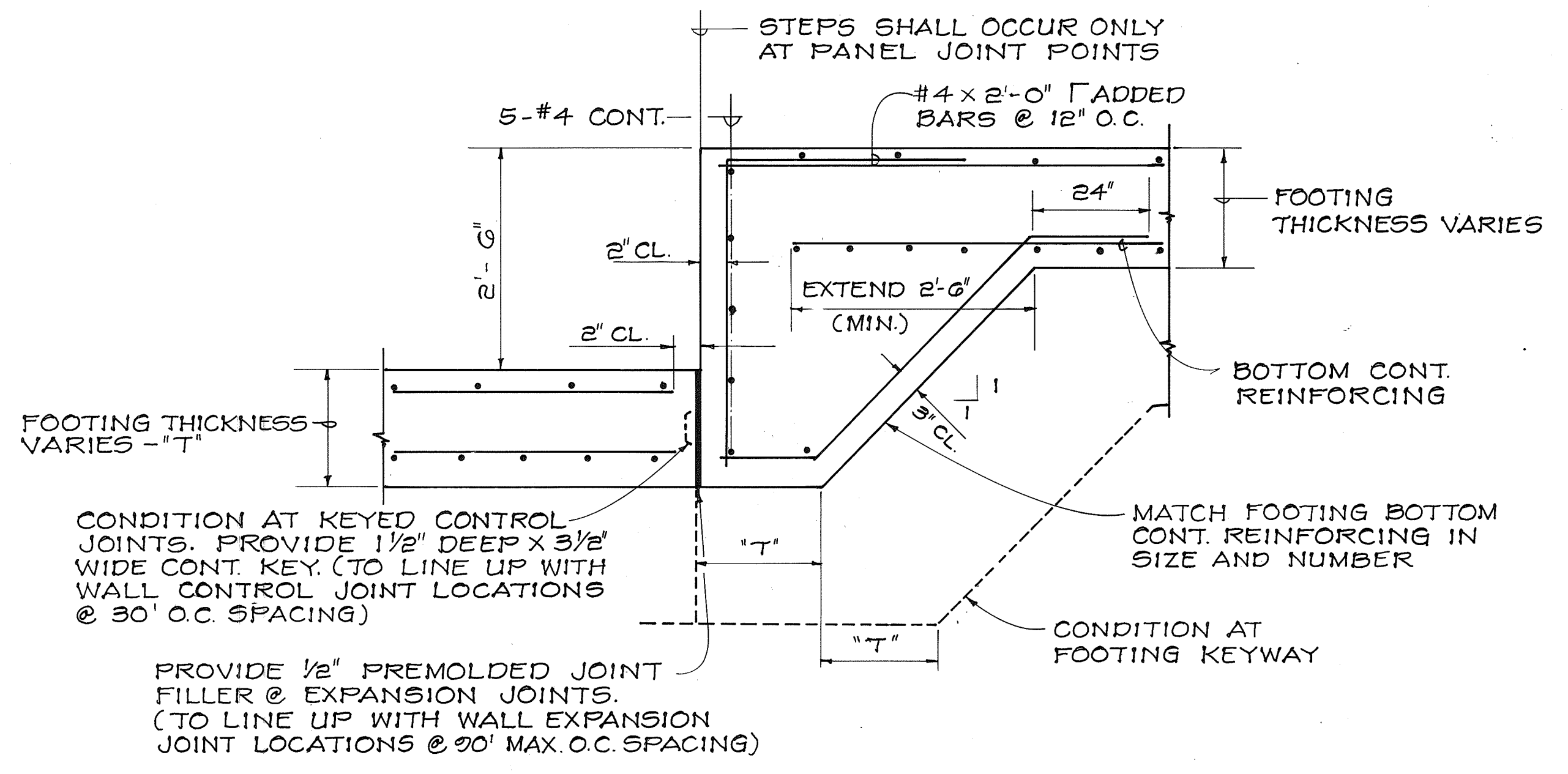


8' - 11' DOWNSLOPE WALL

NOTES:

- THIS DETAIL INDICATES REQUIRED MODIFICATIONS TO THE REINFORCING SHOWN ON DETAILS (1) THRU (5) INCLUSIVE, IF THE PRECAST CONCRETE WALL ALTERNATIVE IS IMPLEMENTED. MODIFIED REBARS AND/OR ADDITIONAL REBARS ARE SHOWN AS SOLID LINES AND ARE LABELED. REBARS NOT REQUIRING MODIFICATION ARE SHOWN AS DASHED LINES AND ARE NOT LABELED, AND SHALL BE SIZED AND PLACED IN ACCORDANCE WITH THE AFOREMENTIONED DETAILS ON SHEET 21 FOR THE RESPECTIVE WALL HEIGHTS.
- CAST-IN-PLACE KEYWAYS AND FOOTINGS SHALL BE POURED IN MAXIMUM 30' LENGTHS. PROVIDE EXPANSION JOINTS @ 90' MAXIMUM SPACING (SEE (2)). PROVIDE CONTRACTION JOINTS @ 30' MAXIMUM SPACING (SEE (4)).
- PROVIDE SUFFICIENT LAP LENGTH WHEN SPLICING TRANSVERSE BAR. SEE STANDARD SPECIFICATIONS.

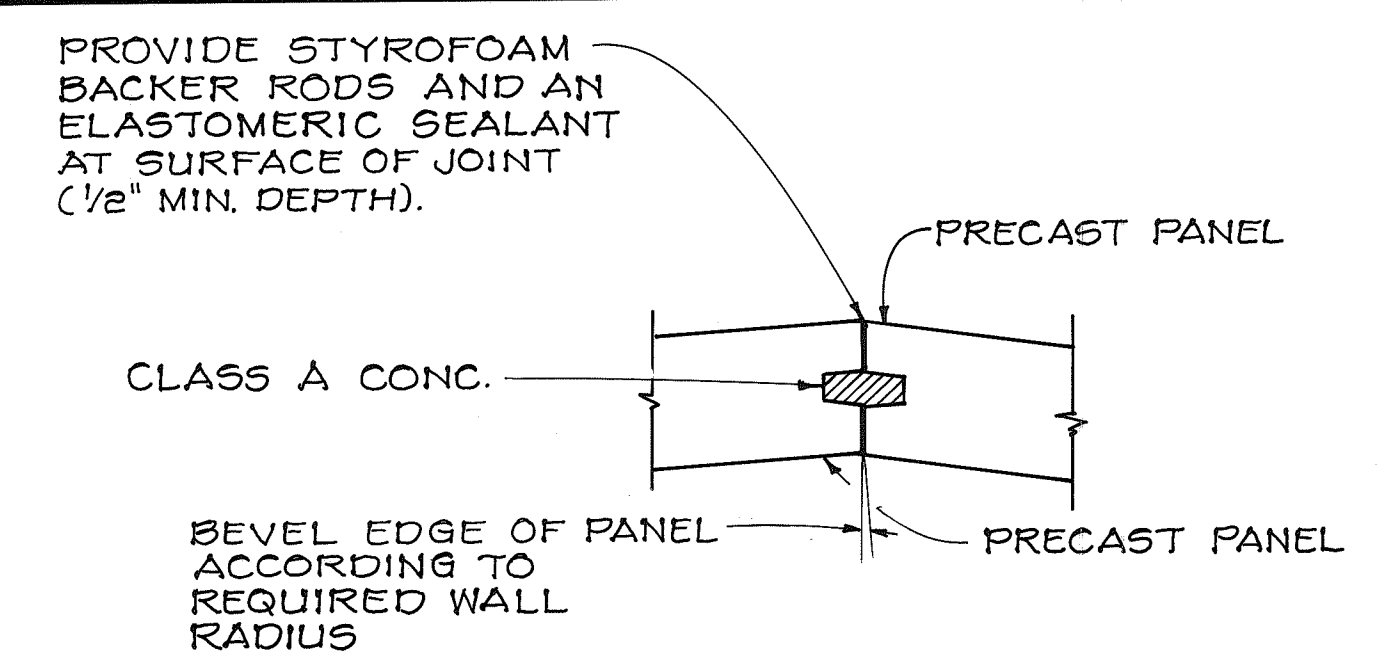
(1) DETAIL - MODIFICATION OF REINFORCING FOR PRECAST CONCRETE WALL ALTERNATIVE



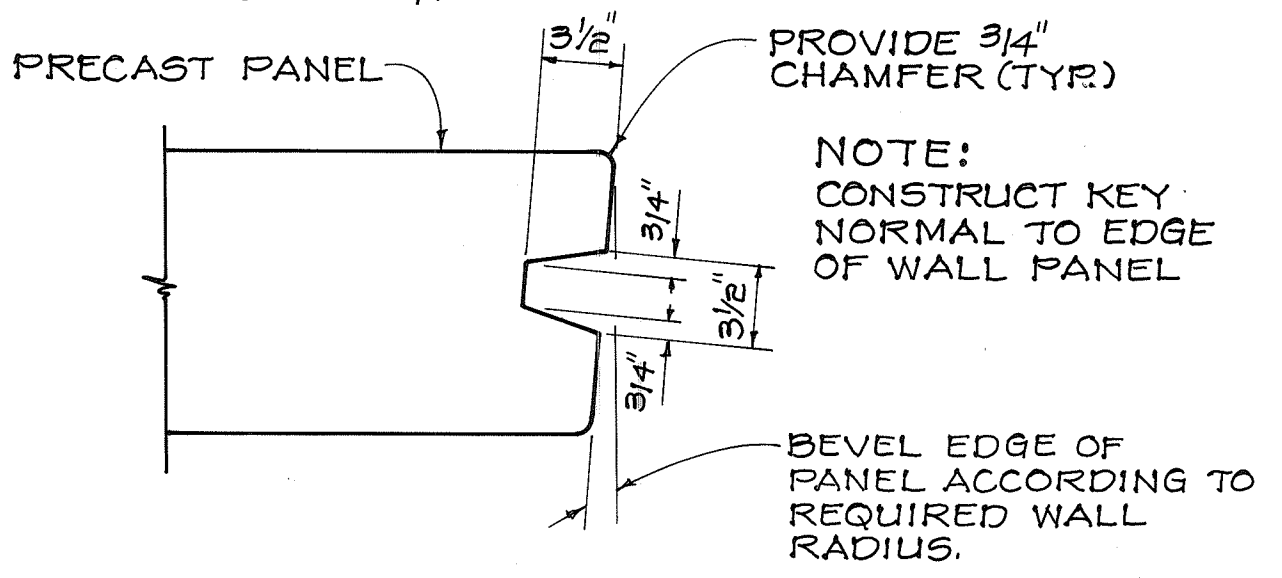
(2) STEPPED FOOTING DETAIL FOR PRECAST WALL ALTERNATIVE
NOT TO SCALE

NOTES FOR PRECAST WALL ALTERNATIVE

- THE CONTRACTOR IS ALLOWED THE OPTION OF PRECASTING THE STEM PORTION OF THE RETAINING WALL STRUCTURES.
- ALL CONCRETE, INCLUDING PRECAST ELEMENTS, SHALL BE AIR ENTRAINED CONCRETE PER ASTM C 260 STANDARD SPECIFICATIONS. THE AMOUNT OF AIR ENTRAINMENT SHALL BE 6% ($\pm 1\frac{1}{2}\%$ TOLERANCE).
- SEE SHEET 23 FOR ADDITIONAL REQUIREMENTS NECESSARY TO IMPLEMENT THE PRECAST WALL ALTERNATIVE.
- THE CONTRACTOR SHALL SUBMIT TO THE STATE FOR REVIEW AND APPROVAL SHOP DRAWINGS FOR THE PRECAST WALL PANEL.

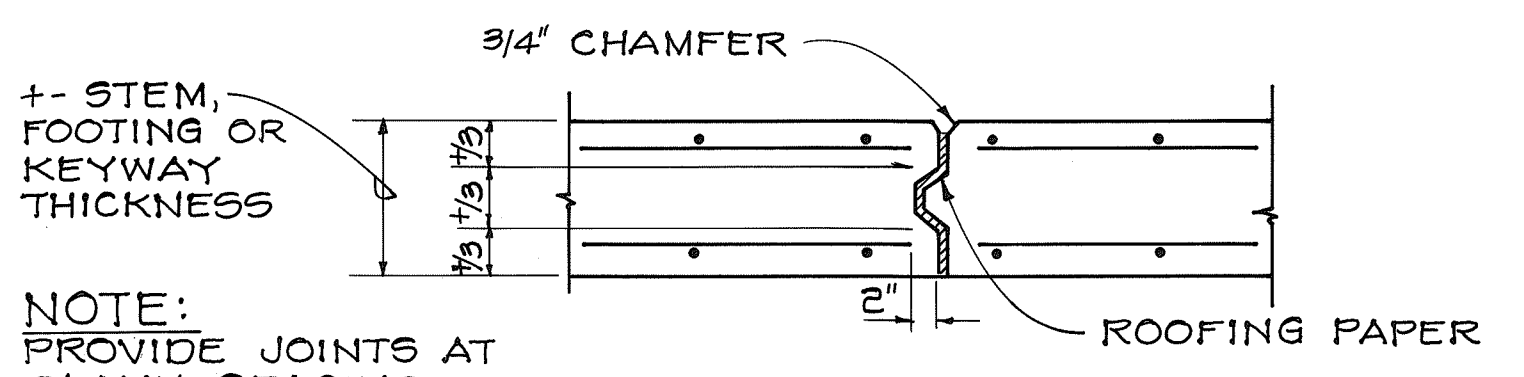


PLAN
SCALE: 3/4" = 1'-0"

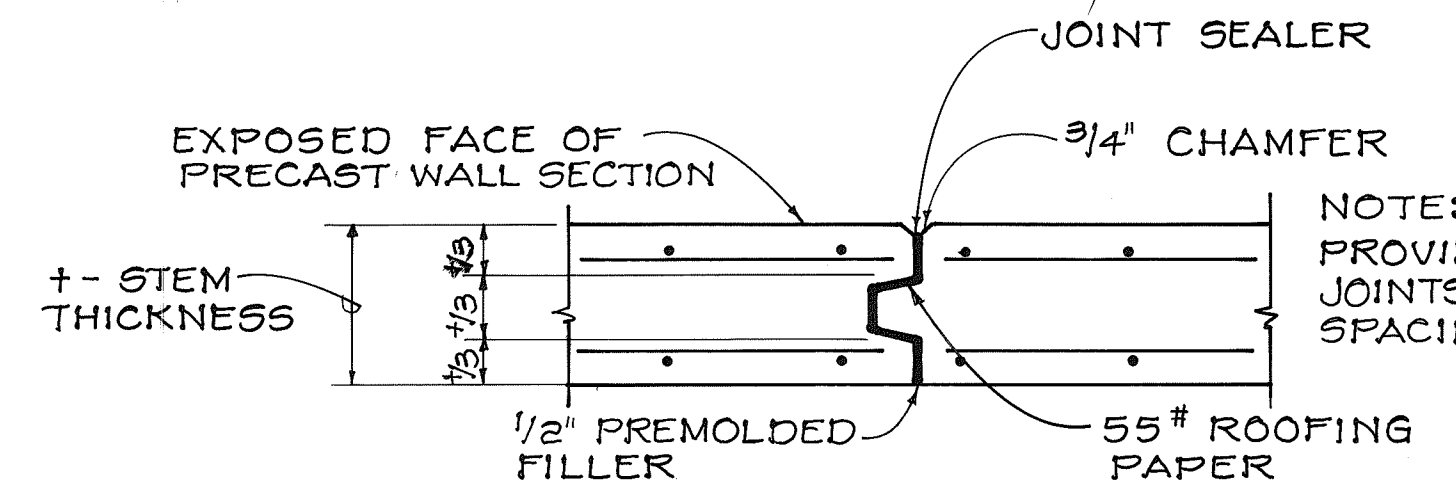


JOINT DETAIL
SCALE: 1/2" = 1'-0"

(6) CURVED WALL SECTION
SCALE: AS NOTED



(4) CONTRACTION JOINT



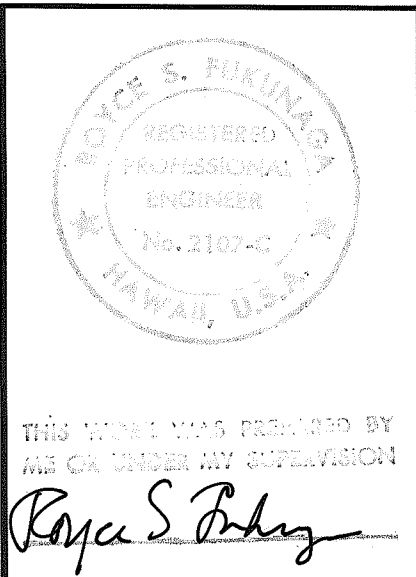
(5) EXPANSION JOINT

STRAIGHT WALL SECTION

(3) JOINT DETAILS FOR PRECAST WALL PANELS
NOT TO SCALE

NOTE: SEE (3) FOR EXPANSION JOINT DETAIL @ CAST-IN-PLACE KEYWAYS AND FOOTINGS.

SURVEY PLOTTED BY	DATE
DESIGNED BY	
TRACED BY	
NOTE BOOK	
QUANTITIES BY	
CHECKED BY	

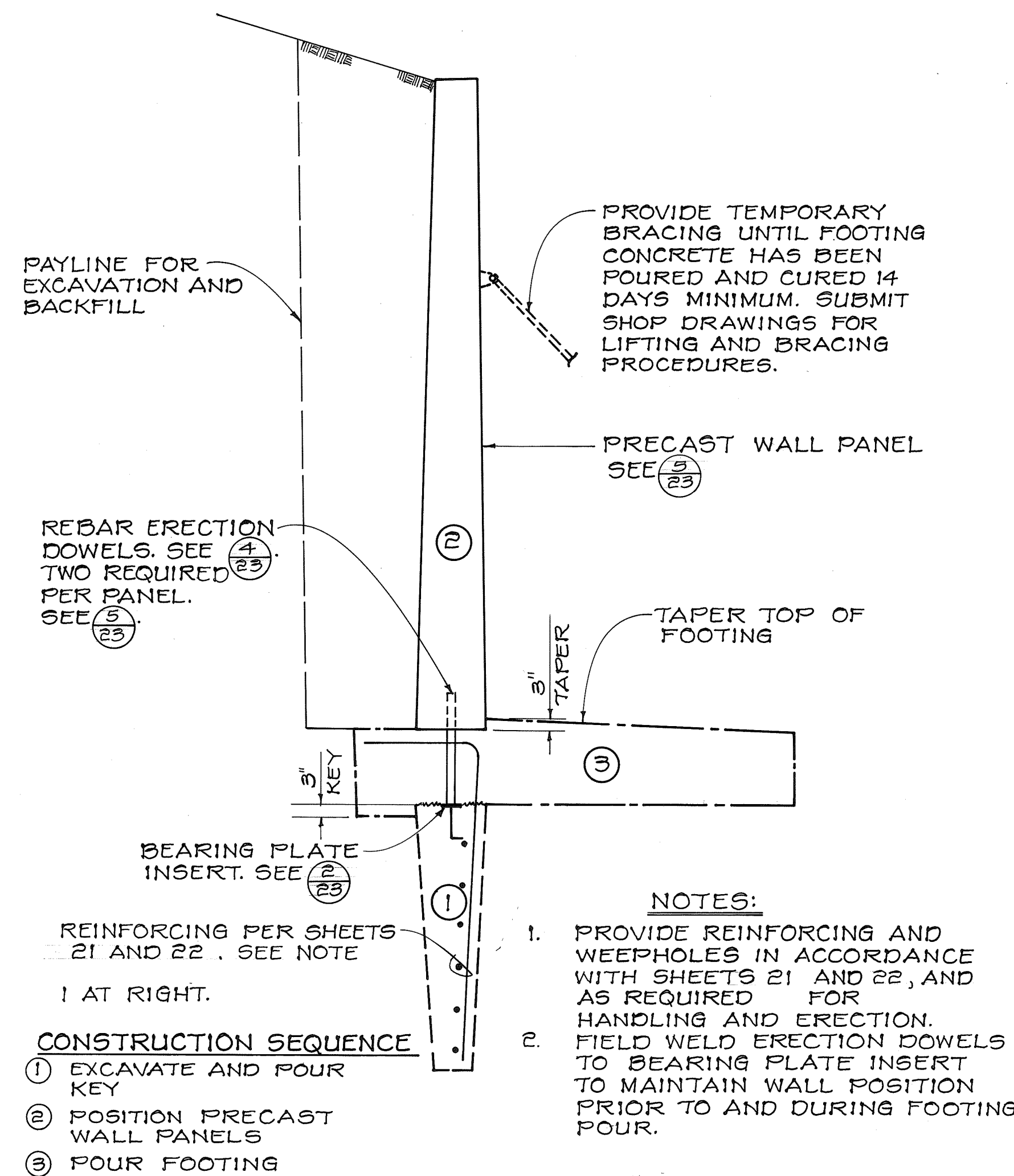


STATE OF HAWAII
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HIGHWAYS DIVISION

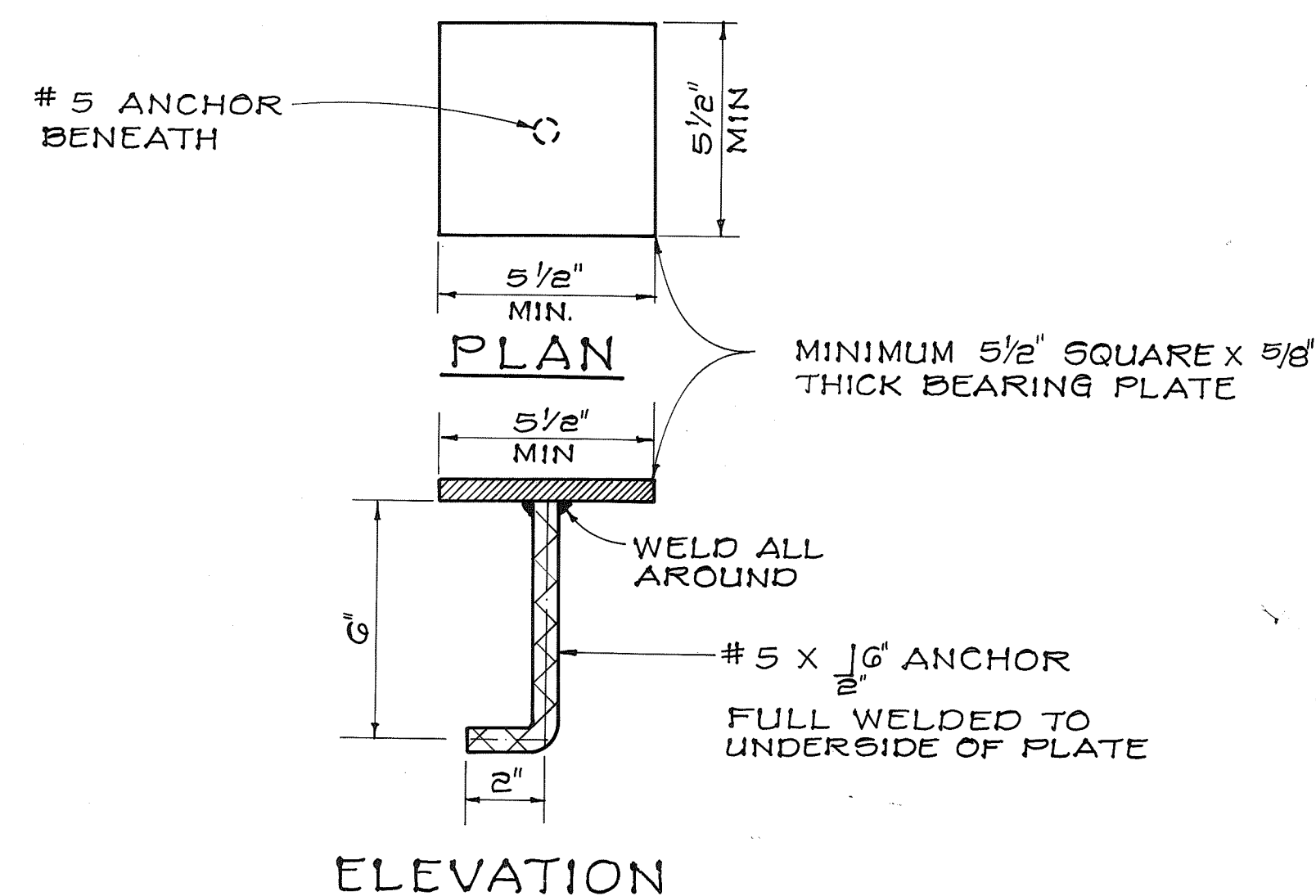
**PRECAST CONCRETE WALL
CONSTRUCTION DETAILS**

MAUNA KEA OBSERVATORY ACCESS ROAD
PHASE III - B
PROJECT NO.
SCALE: AS SHOWN

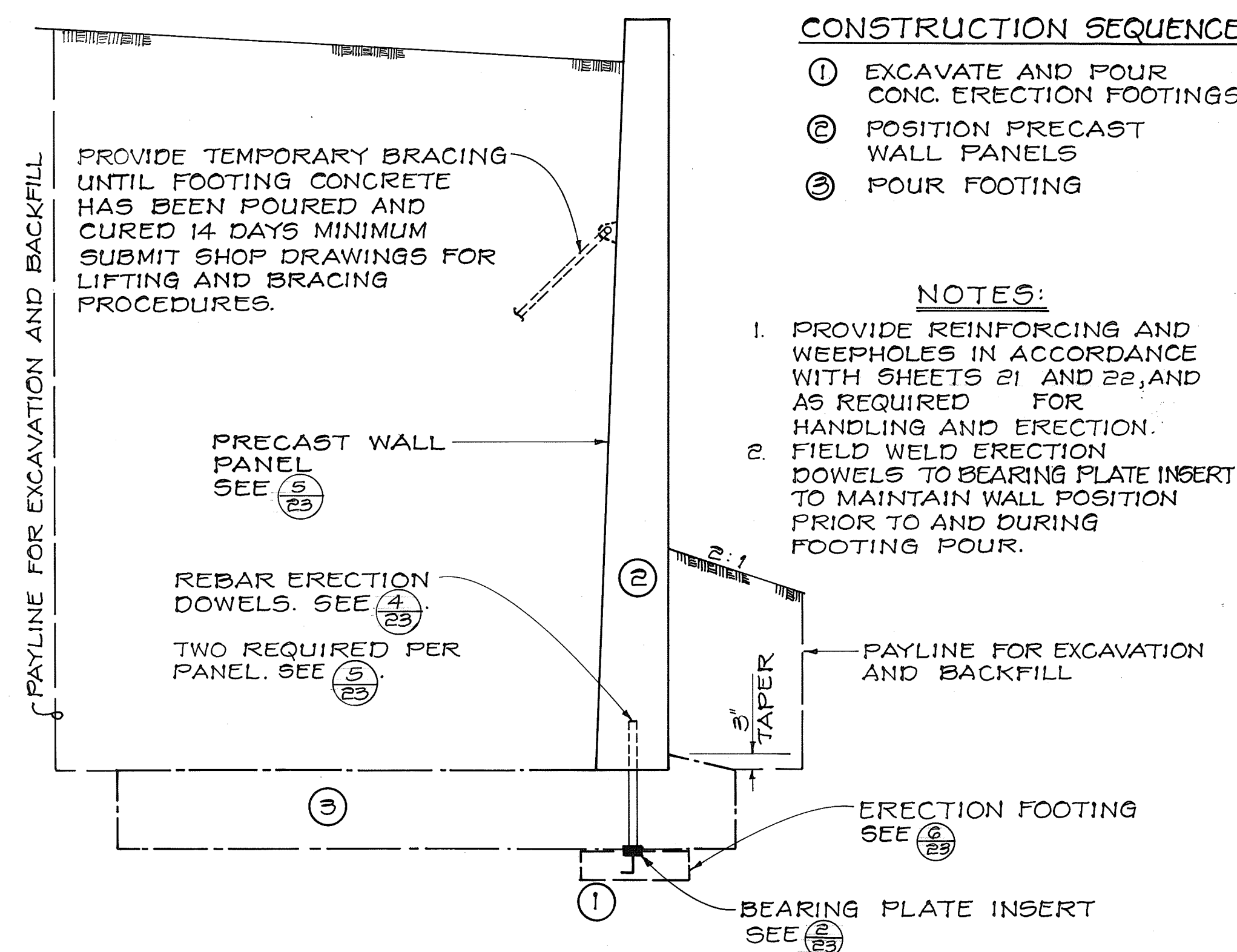
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HAWAII	HAW.			23	53



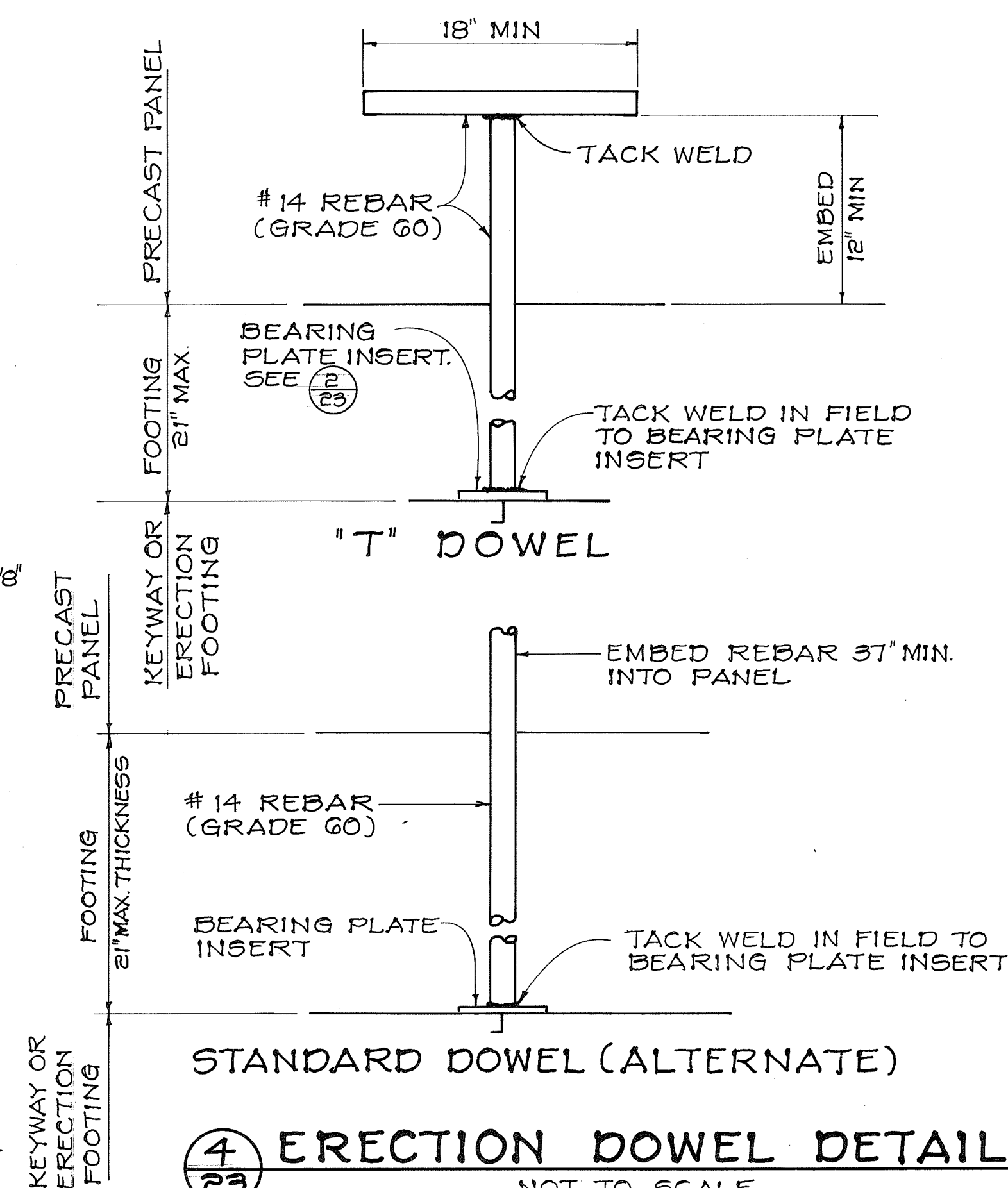
1 CONSTRUCTION SEQUENCE FOR UPSLOPE RETAINING WALL
NOT TO SCALE



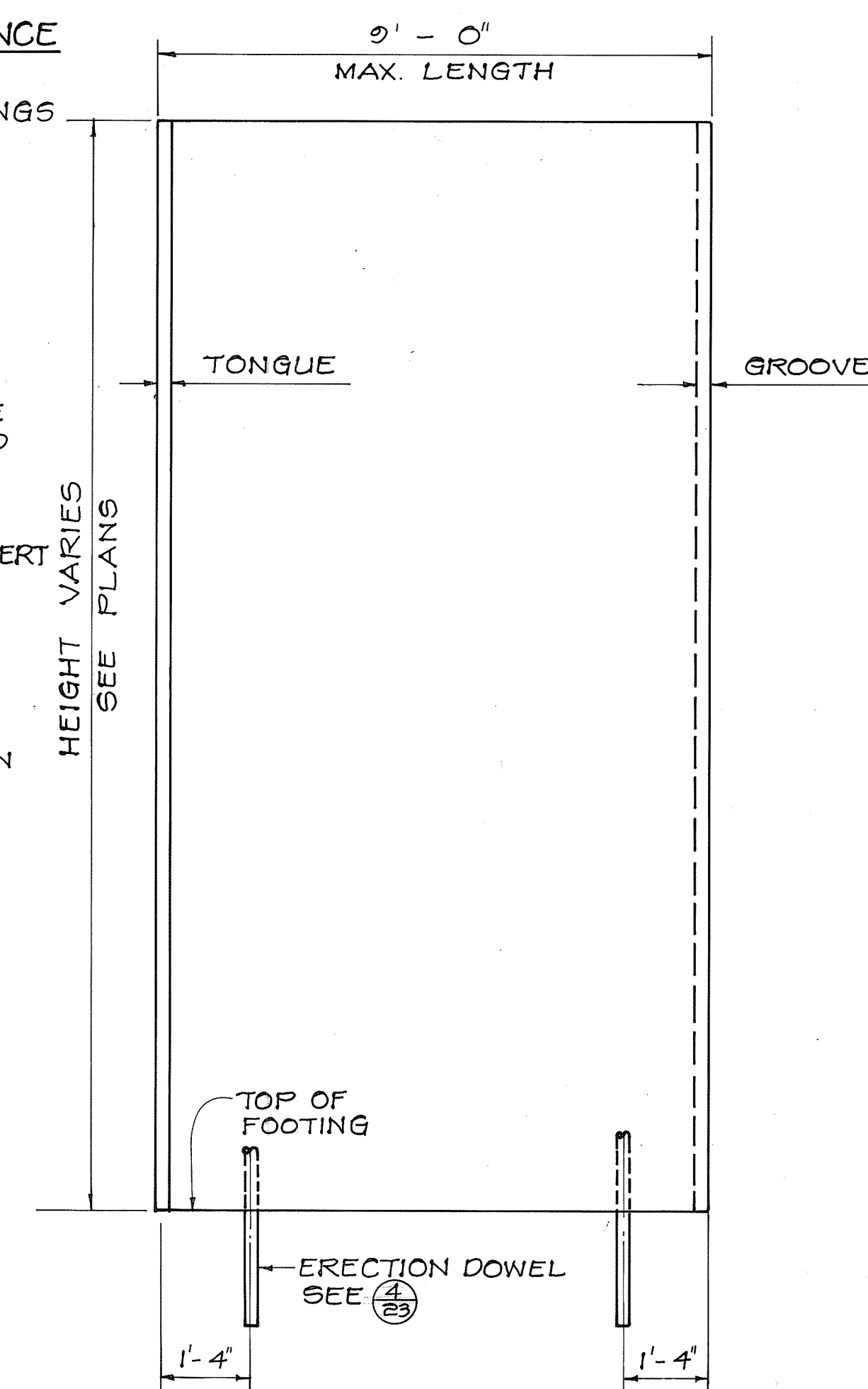
2 BEARING PLATE INSERT DETAIL
NOT TO SCALE



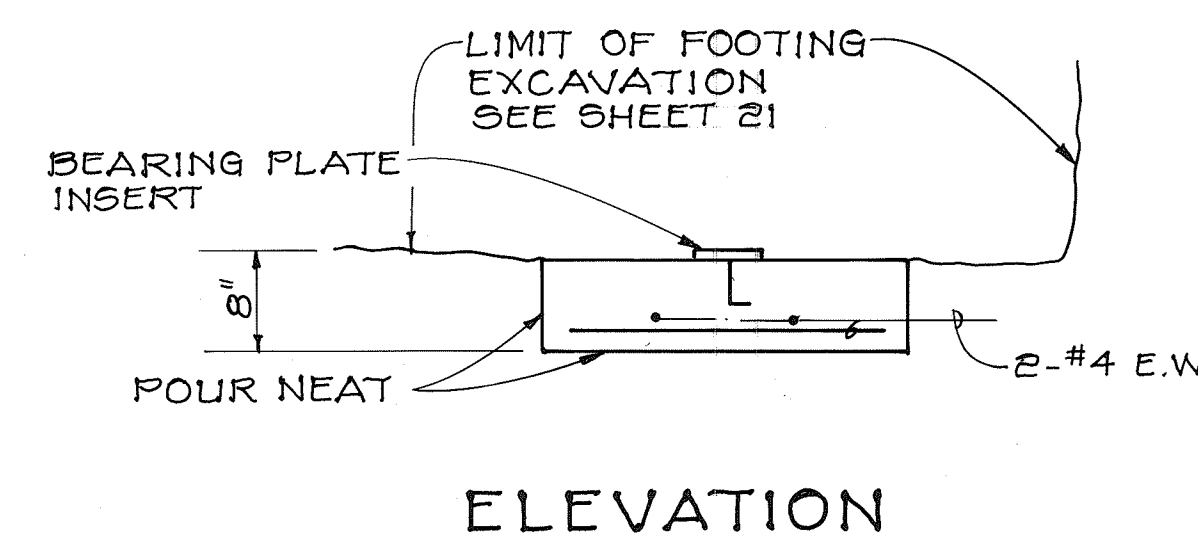
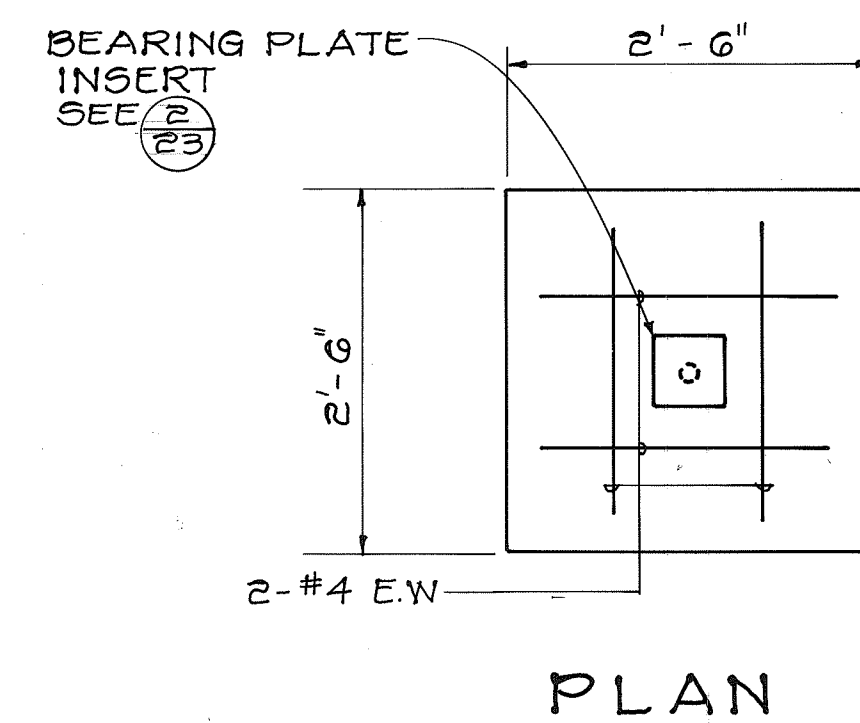
3 CONSTRUCTION SEQUENCE FOR DOWNSLOPE RETAINING WALL
NOT TO SCALE



4 ERECTION DOWEL DETAIL
NOT TO SCALE

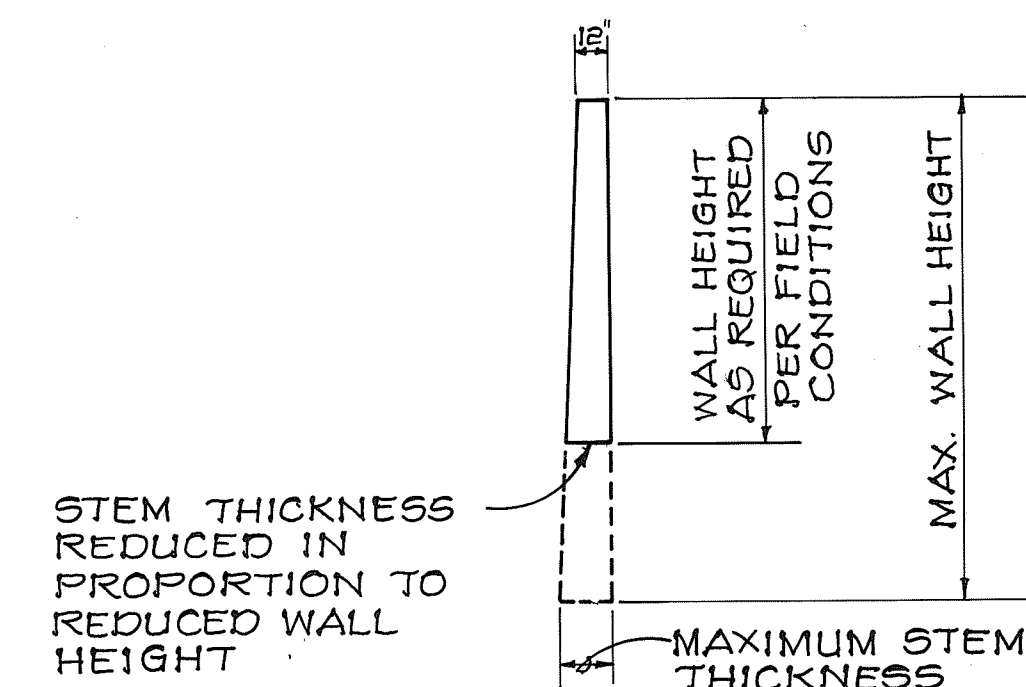


5 PRECAST PANEL ELEVATION
NOT TO SCALE



6 DOWNSLOPE RETAINING WALL ERECTION FOOTING DETAIL
NOT TO SCALE

- NOTES:**
- TAPERED FACE OF WALLS ARE FACING BACKFILL.
 - SEE SHEET 21 FOR REQUIRED WALL STEM THICKNESS AND REINFORCING. BOTTOM OF STEM THICKNESS SHOWN ON SHEET 21 APPLIES TO THE MAXIMUM WALL HEIGHTS FOR THE RESPECTIVE HEIGHT RANGES. WALLS WITH HEIGHTS LESS THAN THE MAXIMUM HEIGHT SHALL HAVE A BOTTOM OF STEM THICKNESS REDUCED IN PROPORTION TO THE REDUCED WALL HEIGHT. SEE FIGURE BELOW:
 - SEE SHEET 22 FOR JOINT DETAILS.
 - LIFTING AND BRACING PROCEDURES, INCLUDING ANY REQUIRED INSERTS, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL.



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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**PRECAST CONCRETE WALL
CONSTRUCTION DETAILS**

MAUNA KEA OBSERVATORY ACCESS ROAD
PHASE III - B

PROJECT NO. _____

SCALE: AS SHOWN

SHEET No. 3 OF 3 SHEETS