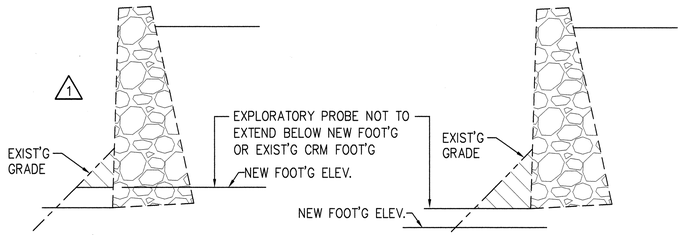
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	580A-01-02	2005	ADD.23	25

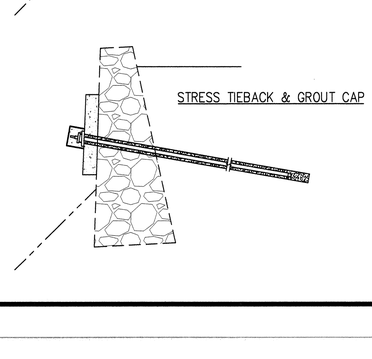
PHASE 1 – EXPLORATORY PROBING:

1. CONTRACTOR SHALL CONDUCT EXPLORATORY PROBING OF THE EXIST'G CRM WALL TO LOCATE THE BOTTOM ELEVATION OF THE CRM WALL.
2. PROBING SHALL CONSIST OF DIGGING A NARROW TRENCH, APPROXIMATELY 18" TO 24" IN WIDTH, PERPENDICULAR TO THE LENGTH OF THE CRM WALL.
3. LOCATIONS FOR THE CRM WALL PROBING ARE INDICATED ON SHEET S-3.
4. THE DEPTH OF THE EXPLORATORY TRENCH AT EACH LOCATION SHALL EXTEND TO THE BOTTOM ELEVATION OF THE EXISTING CRM WALL OR TO THE PLANNED BOTTOM ELEVATION OF THE NEW RETAINING WALL, WHICHEVER IS REACHED FIRST.
5. AT NO TIME SHALL THE TRENCHING EXTEND UNDER THE EXIST'G CRM WALL.
6. THE TRENCH SHALL BE BACKFILLED IMMEDIATELY AFTER MEETING THE REQUIRED DEPTH.
7. THE LOCATION AND SIZE OF WEEP HOLES ON THE EXIST'G CRM WALL SHALL BE RECORDED.
8. RESULTS OF THE PROBING AND WEEP HOLE INFORMATION SHALL BE SUBMITTED TO THE ENGINEER DAILY.
9. CONTRACTOR SHALL NOTIFY THE ENGINEER 7 DAYS PRIOR TO STARTING EXPLORATORY PROBING. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IF SOFT SOILS ARE ENCOUNTERED DURING THE EXPLORATORY PROBING.



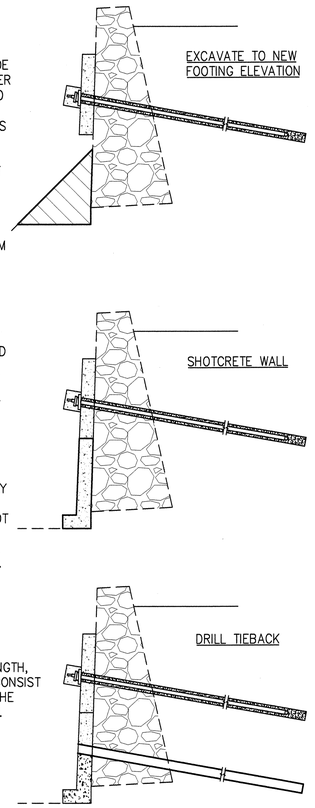
PHASE 2 – INSTALLATION OF TOP LAYER TIEBACKS:

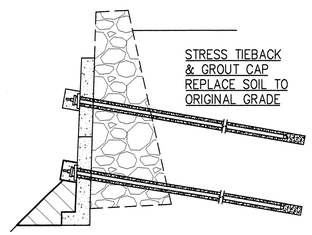
1. LAYOUT LOCATION OF TOP LAYER OF TIEBACK ANCHORS.
2. PLACE REQUIRED WELDED WIRE FABRIC AND BAR REINFORCEMENT. REINFORCEMENT SHALL ADEQUATELY EXTEND PAST CONSTRUCTION JOINT LOCATIONS FOR PROPER SPLICING.
3. SHOTCRETE OVER EXISTING CRM WALL. SHOTCRETE SHALL BE PLACED BETWEEN 1'-6½" BELOW TOP OF NEW WALL TO AN ELEVATION MIDPOINT BETWEEN THE TOP AND BOTTOM LAYERS OF TIEBACKS. CONTRACTOR HAS THE OPTION OF PLACING REINFORCING AND SHOTCRETING IN TWO LIFTS (HALF OF WALL THICKNESS AT A TIME) OR IN ONE LIFT HOWEVER; SHOTCRETE SHALL NOT SAG AND SHALL COMPLETELY ENCASE THE REINFORCEMENT SOLIDLY WITH NO HONEYCOMB OR VOIDS. IF SHOTCRETE IS PLACED IN TWO LIFTS, EACH LIFT SHALL BE THICK ENOUGH TO EMBED EACH LAYER OF REINFORCEMENT. CONTRACTOR HAS THE OPTION OF PREFORMING TIEBACK HOLES INSTEAD OF CORING THROUGH THE NEW WALL.
4. DRILL/CORE TIEBACK #1 IN THE TOP LAYER. TEMPORARY CASINGS SHALL BE INSTALLED IF THE HOLES TENDS TO COLLAPSE DURING DRILLING OR PLACEMENT OF TIEBACKS. THE TEMPORARY CASING SHALL BE WITHDRAWN AS THE GROUT IS PLACED. INSTALL AND GROUT THE TIEBACK WITHIN 8 HOURS OF DRILLING. SEE SPECIFICATIONS FOR OTHER DRILLING AND GROUTING REQUIREMENTS. DRILLING FLUIDS ARE NOT ALLOWED TO KEEP DRILLED HOLES OPEN.
5. AFTER THE GROUT HAS ACHIEVED THE REQUIRED STRENGTH, CONDUCT A PERFORMANCE/CREEP TEST BY SUBJECTING THE TIEBACK ANCHOR TO 150 PERCENT OF THE DESIGN LOAD AND HOLD IT FOR 8 HOURS. SEE SPECIFICATIONS FOR DETAILS. RESULTS OF THE CREEP TEST ARE TO BE SUBMITTED TO THE ENGINEER.
6. TIEBACK #1 IS A PRE-PRODUCTION TIEBACK. NO ORDERING OF MATERIAL IS PERMITTED UNTIL SUCCESSFUL PERFORMANCE OF THE PRE-PRODUCTION TIEBACK ANCHOR TESTING IS COMPLETED AND ACCEPTED BY THE ENGINEER. THE ENGINEER SHALL HAVE A MINIMUM 15 WORKING DAYS TO EVALUATE THE CONTRACTOR'S SUBMITTED TEST DATA AND DESIGN CALCULATIONS OF BONDED AND UNBONDED LENGTHS FOR THE PRODUCTION TIEBACK ANCHORS.
7. FOR THE NUMBERED TIEBACK LOCATIONS #2 IN THE TOP LAYER, DRILL/CORE HOLES THROUGH THE SHOTCRETE WALL, THE EXISTING CRM WALL AND INTO THE UNDERLYING SOIL TO THE REQUIRED DEPTH AND ANGLE. TEMPORARY CASINGS SHALL BE INSTALLED IF THE HOLES TENDS TO COLLAPSE DURING DRILLING OR PLACEMENT OF TIEBACKS. DRILLING FLUIDS ARE NOT ALLOWED TO KEEP DRILLED HOLES OPEN. THE TEMPORARY CASING SHALL BE WITHDRAWN AS THE GROUT IS IS PLACED. TEMPORARY CASINGS, IF USED, MAY BE LEFT IN PLACE BUT ONLY IN THE UNBONDED SECTION. THE ENGINEER WILL NOT PAY FOR ABANDONED CASINGS. INSTALL AND GROUT THE TIEBACK WITHIN 8 HOURS OF DRILLING. SEE SPECIFICATIONS FOR OTHER DRILLING AND GROUTING REQUIREMENTS.
8. AFTER THE GROUT HAS ACHIEVED THE REQUIRED STRENGTH, CONDUCT A PERFORMANCE/CREEP TEST BY SUBJECTING THE TIEBACK ANCHOR TO 150 PERCENT OF THE DESIGN LOAD AND HOLD IT FOR 8 HOURS. SEE SPECIFICATIONS FOR DETAILS. RESULTS OF THE CREEP TEST ARE TO BE SUBMITTED TO THE ENGINEER.
9. THE BALANCE OF THE PRODUCTION TIEBACKS SHALL CONTINUE UPON PERFORMANCE AND CREEP TEST ANCHORS PERFORMING SUCCESSFULLY AND APPROVAL FROM THE ENGINEER IS GIVEN. THE NUMBER OF PRODUCTION TIEBACK HOLES DRILLED SHALL BE LIMITED SUCH THAT TIEBACKS CAN BE INSTALLED AND GROUTED WITHIN 8-HOURS OF DRILLING. DRILLING SHALL FOLLOW THE SAME PROCEDURE AS DESCRIBED IN STEP 7 ABOVE.
10. AFTER THE GROUT HAS ACHIEVED REQUIRED STRENGTH, CONDUCT A PROOF TEST FOR ALL ANCHORS EXCEPT THOSE ALREADY PERFORMANCE/CREEP TESTED. SEE SPECIFICATIONS FOR DETAILS OF PROOF TESTING.
11. AFTER APPLYING THE LOCK-OFF LOAD TO EACH TIEBACK AND PRIOR TO REMOVING THE JACK, A LIFT-OFF LOAD READING SHALL BE MADE. SEE SPECIFICATIONS FOR DETAILS.
12. AFTER STRESSING THE TIEBACKS TO THE FINAL REQUIRED FORCE, PLACE END CAP FORMWORK AND GROUT SOLID REMAINDER OF DRILLED HOLE AND THE END CAP.
13. TIEBACKS WITH HIGHER CONSTRUCTION SEQUENCE NUMBERS SHALL NOT BE CONSTRUCTED UNTIL FINAL GROUTING UP TO THE ANCHOR PLATE FOR LOWER CONSTRUCTION SEQUENCE NUMBER HAS SET AND CURED 24 HOURS MINIMUM.



PHASE 3 – INSTALLATION OF BOTTOM LAYER TIEBACKS:

1. CONSTRUCTION OF TIEBACKS FOR THE BOTTOM LAYER SHALL NOT COMMENCE UNTIL THE TIEBACKS IN THE TOP LAYER HAS BEEN FULLY GROUTED AND STRESSED.
2. LAYOUT LOCATION OF BOTTOM LAYER OF TIEBACK ANCHORS.
3. REMOVE SOIL WHERE SHOTCRETE WILL BE PLACED FOR THE BOTTOM LAYER. IF THE BOTTOM OF THE NEW WALL IS BELOW THE BOTTOM OF THE EXISTING CRM WALL, THE EXCAVATION SHALL EXTEND FROM THE TOE OF THE EXISTING FOOTING. OVER EXCAVATION, PAST THE TOE AND UNDER THE EXISTING CRM WALL IS NOT PERMITTED. IF EXCAVATION IS REQUIRED BELOW THE EXISTING FOOTING ELEVATION, THE NEW WALL SHALL BE CONSTRUCTED WITHIN 24 HOURS AFTER EXCAVATING, PROVIDED THERE IS NO ADVERSE EFFECT ON THE STABILITY OF THE EXCAVATION FACE.
4. PLACE REQUIRED WELDED WIRE FABRIC AND BAR REINFORCEMENT. REINFORCEMENT SHALL ADEQUATELY EXTEND PAST CONSTRUCTION JOINT LOCATIONS FOR PROPER SPLICING. REINFORCING SHALL BE ADEQUATELY LAPPED TO THE REINFORCING EXTENDING FROM THE TOP LAYER SHOTCRETE WALL.
5. SHOTCRETE OVER EXISTING CRM WALL AND EXPOSED FACE OF EXCAVATION WHERE THE EXCAVATION EXTENDS BELOW THE EXISTING CRM WALL FOOTING. SHOTCRETE SHALL EXTEND FROM THE BOTTOM OF THE TOP LAYER SHOTCRETE WALL TO THE NEW FOOTING. CONTRACTOR HAS THE OPTION OF PLACING REINFORCING AND SHOTCRETING IN TWO LIFTS (HALF OF WALL THICKNESS AT A TIME) OR IN ONE LIFT HOWEVER; SHOTCRETE SHALL NOT SAG AND SHALL COMPLETELY ENCASE THE REINFORCEMENT SOLIDLY WITH NO HONEYCOMB OR VOIDS. IF SHOTCRETE IS PLACED IN TWO LIFTS, EACH LIFT SHALL BE THICK ENOUGH TO EMBED EACH LAYER OF REINFORCEMENT. CONTRACTOR HAS THE OPTION OF PREFORMING TIEBACK HOLES INSTEAD OF CORING THROUGH THE NEW WALL. FOOTING FOR THE NEW WALL CAN BE SHOTCRETE WITH THE WALL OR THE CONTRACTOR HAS THE OPTION OF CASTING IT AFTER COMPLETING THE BOTTOM LAYER SHOTCRETING BUT BEFORE STRESSING THE BOTTOM ROW OF TIEBACKS.
6. FOR ALL TIEBACK LOCATIONS IN THE BOTTOM LAYER, DRILL/CORE HOLES THROUGH THE SHOTCRETE WALL, EXISTING CRM WALL AND INTO THE UNDERLYING SOIL TO THE REQUIRED DEPTH AND ANGLE. TEMPORARY CASINGS SHALL BE INSTALLED IF THE HOLES TENDS TO COLLAPSE DURING DRILLING OR PLACEMENT OF TIEBACKS. DRILLING FLUIDS ARE NOT ALLOWED TO KEEP DRILLED HOLES OPEN. THE TEMPORARY CASING SHALL BE WITHDRAWN AS THE GROUT IS PLACED. TEMPORARY CASINGS, IF USED, MAY BE LEFT IN PLACE BUT ONLY IN THE UNBONDED SECTION. THE ENGINEER WILL NOT PAY FOR ABANDONED CASINGS. INSTALL AND GROUT THE TIEBACK WITHIN 8 HOURS OF DRILLING. SEE SPECIFICATIONS FOR OTHER DRILLING AND GROUTING REQUIREMENTS.
7. THE NUMBER OF HOLES DRILLED SHALL BE LIMITED SUCH THAT TIE-BACKS CAN BE INSTALLED AND GROUTED WITHIN 8-HOURS OF DRILLING.
8. AFTER THE SHOTCRETE AND GROUT HAS ACHIEVED THE REQUIRED STRENGTH, CONDUCT A PROOF TEST FOR ALL ANCHORS. THE PROOF TEST SHALL CONSIST OF SUBJECTING THE TIEBACK ANCHOR TO AT LEAST 150 PERCENT OF THE DESIGN LOAD AND THE LOAD SHALL BE HELD FOR 10 MINUTES MINIMUM. SEE SPECIFICATIONS FOR DETAILS.
9. AFTER APPLYING THE LOCK-OFF LOAD TO EACH TIEBACK AND PRIOR TO REMOVING THE JACK, A LIFT-OFF LOAD READING SHALL BE MADE. SEE SPECIFICATIONS FOR DETAILS.
10. AFTER STRESSING THE TIEBACKS TO THE FINAL REQUIRED FORCE, PLACE END CAP FORMWORK AND GROUT SOLID REMAINDER OF DRILLED HOLE AND THE END CAP.
11. TIEBACKS WITH HIGHER CONSTRUCTION SEQUENCE NUMBERS SHALL NOT BE CONSTRUCTED UNTIL FINAL GROUTING UP TO THE ANCHOR PLATE FOR LOWER CONSTRUCTION SEQUENCE NUMBER HAS SET AND CURED 24 HOURS MINIMUM.
12. REPLACE SOIL TO ORIGINAL GRADE.





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

EXPIRATION DATE OF THE LICENSE: APRIL 30, 2006

CRAIG H. SAKAMASHI LICENSED PROFESSIONAL ENGINEER No. 5509-S HAWAII U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

DATE		REVISION
2/02/06	1	CLARIFIED EXPLORATORY PROBING DEPTH

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONSTRUCTION SEQUENCE

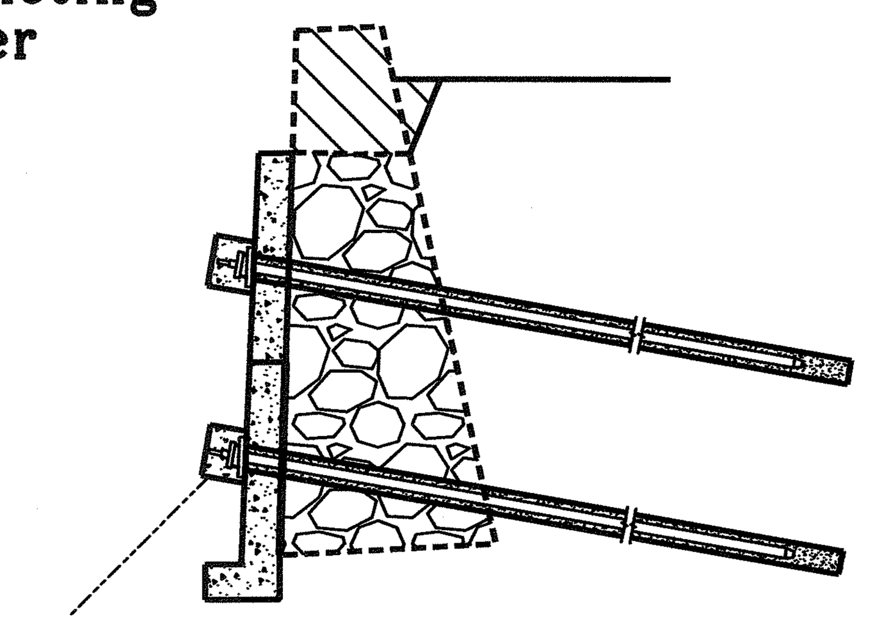
KUAMOO ROAD RETAINING WALL
IN THE VICINITY OF M.P. 1.1
PROJECT NO. 580A-01-02

SCALE: AS NOTED DATE: September 2005

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	580A-01-02	2005	24	25

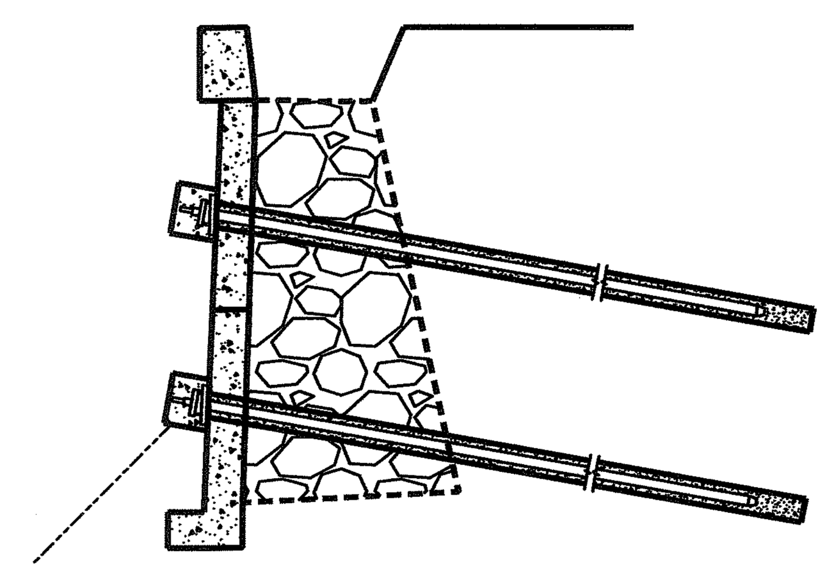
PHASE 4 - DEMOLITION: → **SEQUENCE CHANGE Work Done prior to Stressing of All Tiebacks and Completing Shotcrete of Bottom Layer (Phase 3)**

1. *Remove the top portion of the existing CRM wall. The existing wall is to be removed to approximately 18½" below the top of the New Concrete Wall. In no case shall portions of the existing CRM wall be removed closer than 24-inches from the top row of Tiebacks.*
2. *A portion of the shoulder may be removed, at the Contractor's option, to facilitate removal of the existing wall. If the Contractor pursues this option, excavation, backfill, material and redressing the shoulder shall be considered incidental to the various contract items.*
3. *Care shall be taken by the Contractor to avoid any damage to the top of the New Wall.*



PHASE 5 - CONSTRUCT WALL TOP BEAM: → **SEQUENCE CHANGE Work Done prior to Stressing of All Tiebacks (Phase 3)**

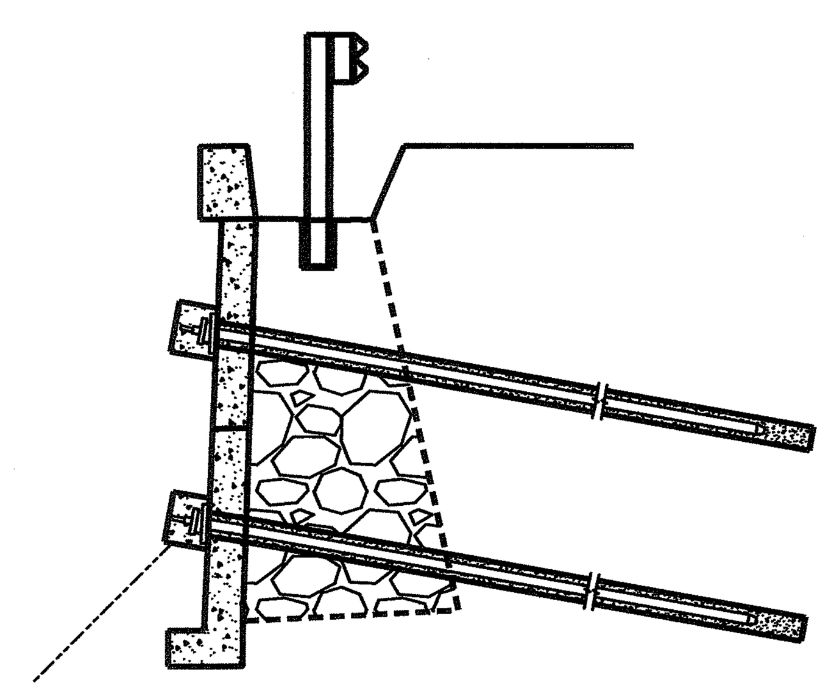
1. *Form 12" wide x 18½" deep Concrete Beam at top of Shotcrete Wall.*
2. *Place top of beam reinforcing.*
3. *Place concrete for beam.*

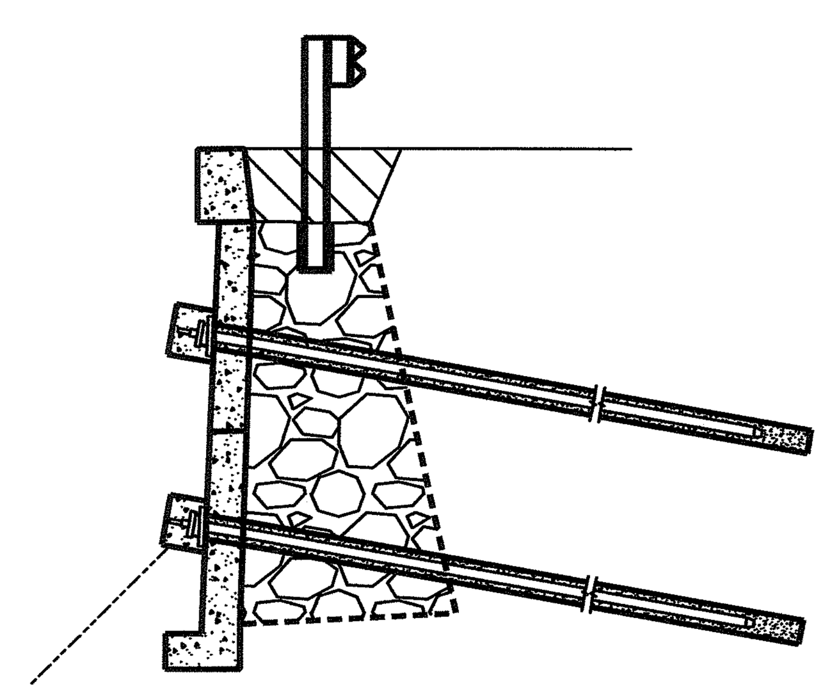


PHASE 6 - INSTALL GUARDRAIL POSTS → **SEQUENCE CHANGE Work Done prior to Stressing of All Tiebacks (Phase 3)**

1. **Excavate** ~~*Core*~~ *top of exposed CRM wall. Hole to be 8" in diameter and not less than 12" deep.*
2. *Install Guardrail Posts in hole. Posts shall be placed flush to the roadway side of the hole.*
3. *Fill 8" diameter hole with granular material conforming to ASTM C33, size no. 57.*
4. ~~*Coring and*~~ *placing Guardrail Posts may be ongoing with construction of the New Wall Top Beam.*

Phase 7 - Replace Soil to Original Grade.





ORIGINAL PLAN	SURVEY PLOTTED BY / DRAWN BY / TRACED BY / DESIGNED BY / QUANTITIES BY / CHECKED BY	DATE
NOTE BOOK No. 24dgn		

LEGEND FOR AS-BUILT POSTINGS

~~∿∿∿~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

EXPIRATION DATE OF THE LICENSE: APRIL 30, 2010

CRAIG H. SAKAMASHI, LICENSED PROFESSIONAL ENGINEER No. 5509-S, HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONSTRUCTION SEQUENCE

KUAMOO ROAD RETAINING WALL IN THE VICINITY OF M.P. 1J PROJECT NO. 580A-01-02

Scale: As Noted *Date: September 2005*

SHEET No. S-7 OF 8 SHEETS

"AS-BUILT"