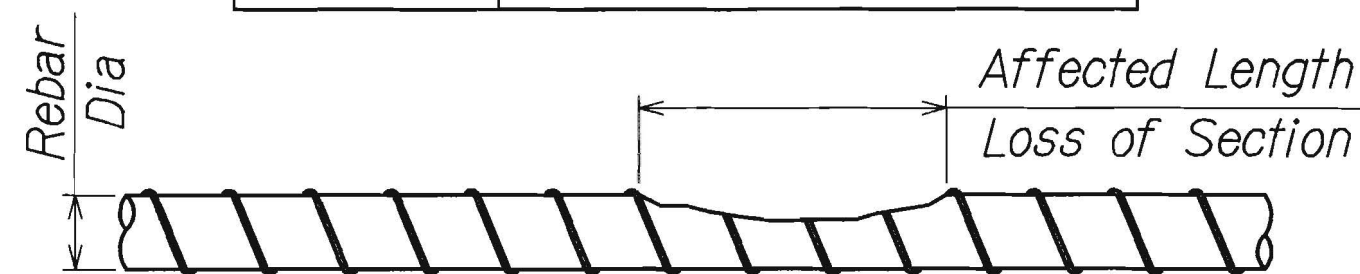


Table 1: Minimum Rebar Diameter at Section Loss

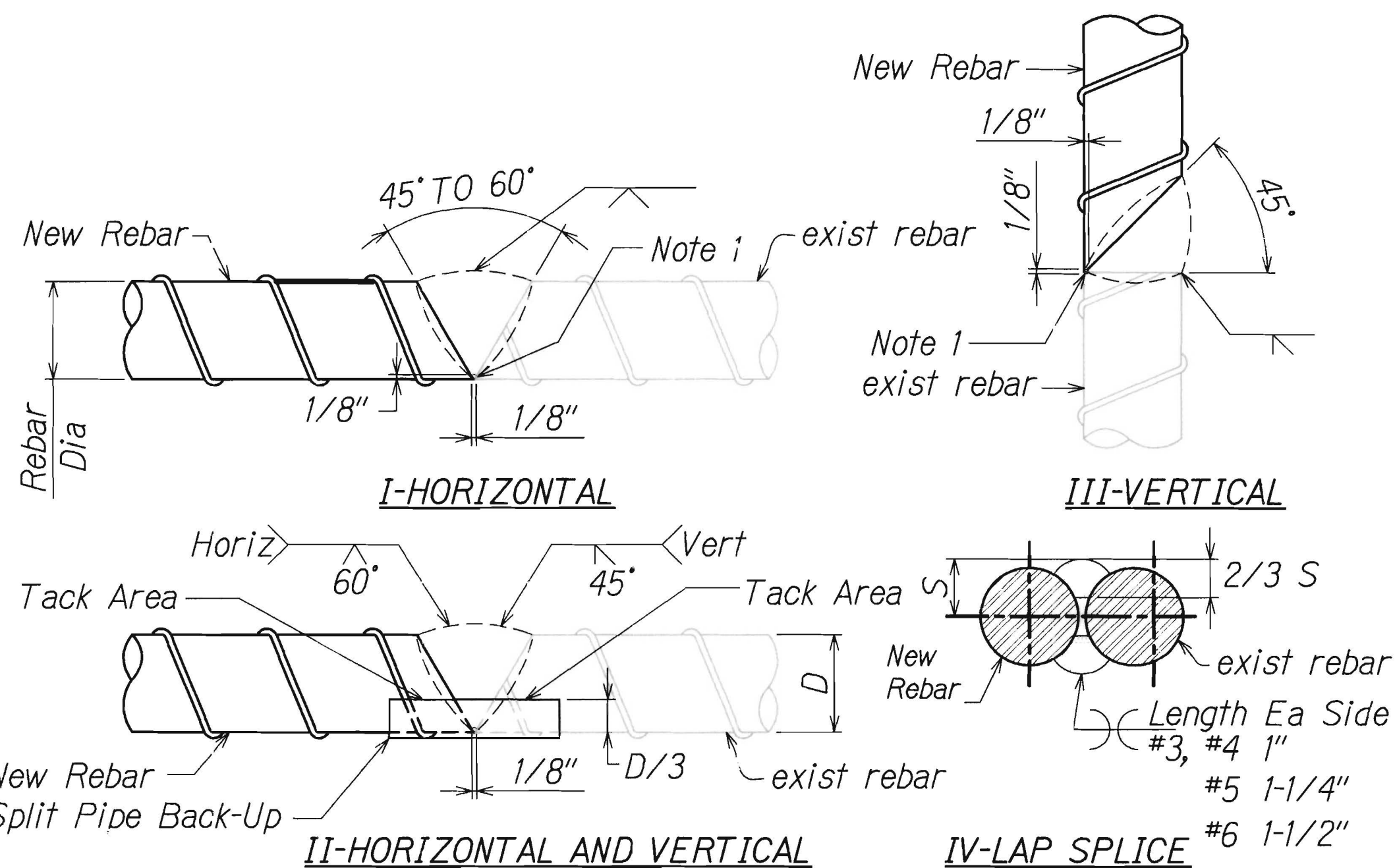
Rebar Size	Minimum Acceptable Diameter at Section Loss
#3	5/16"
#4	7/16"
#5	1/2"
#6	5/8"
#7	3/4"
#8	13/16"
#9	15/16"
#10	1-1/16"



Note:

1. Remove Heavy Corrosion and Scale from Rebars using Hand Tools (eg: wire brush) or other Approved methods.
2. If Rebar Diameter after Cleaning is less than that Shown in the Table I above, Repair Rebar per $\frac{2}{S-15 \ S-15}$.

1 REBAR CLEANING & LOSS OF SECTION
S-15 S-15 Not to Scale



Notes:

1. Chip, Grind or Gouge to Sound Metal before Welding other side.
2. Detail I and III for No. 9 and Larger. Detail II for No. 8 and smaller. Detail IV for No. 6 and smaller.
3. E70 Electrode for GR40, E90 Electrode for GR60.
4. See AWS D1.4 for Welding Process and other Details.

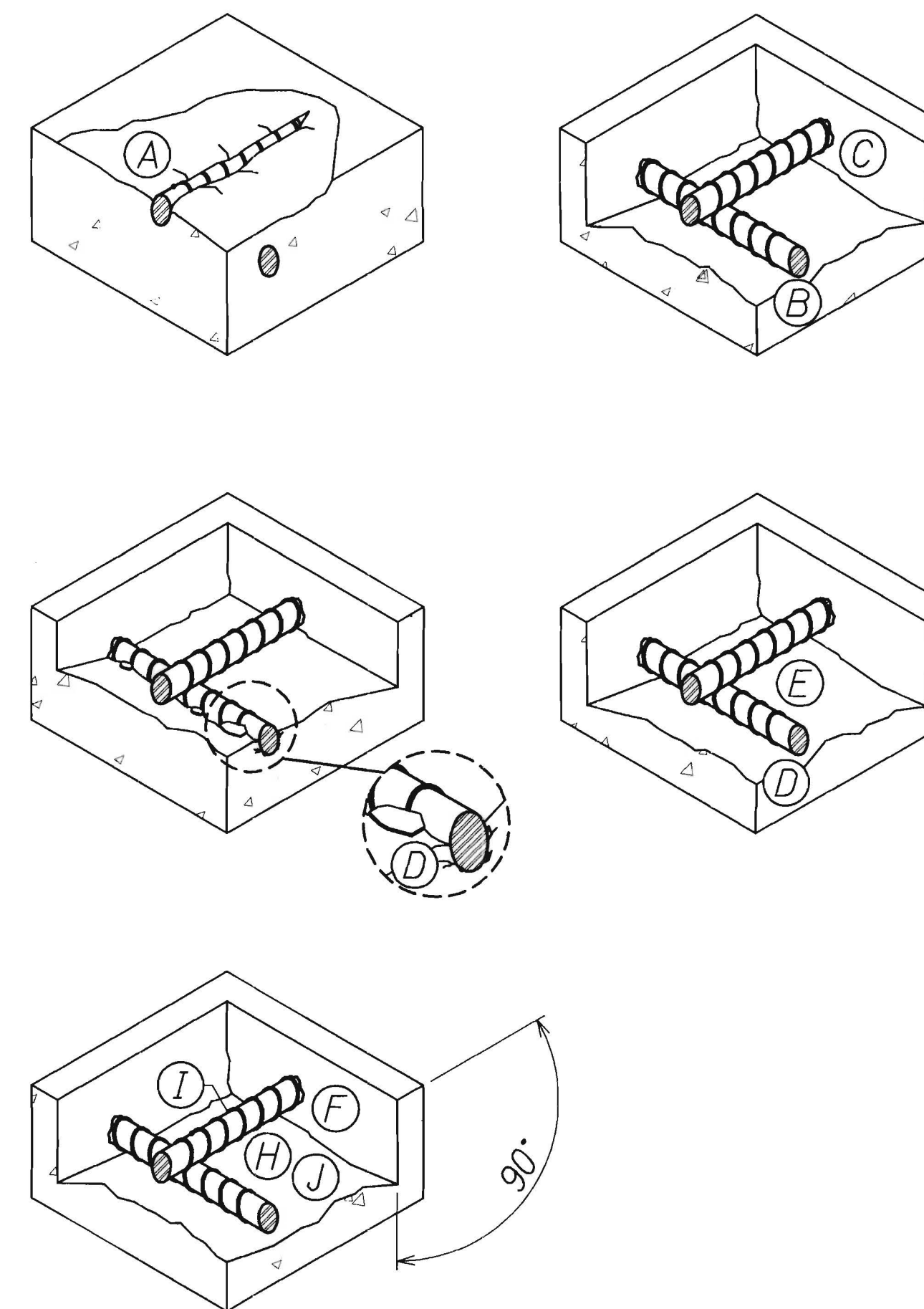
2 REBAR WELD SPLICE DETAIL
S-15 S-15 Not to Scale

CONCRETE REPAIR NOTES

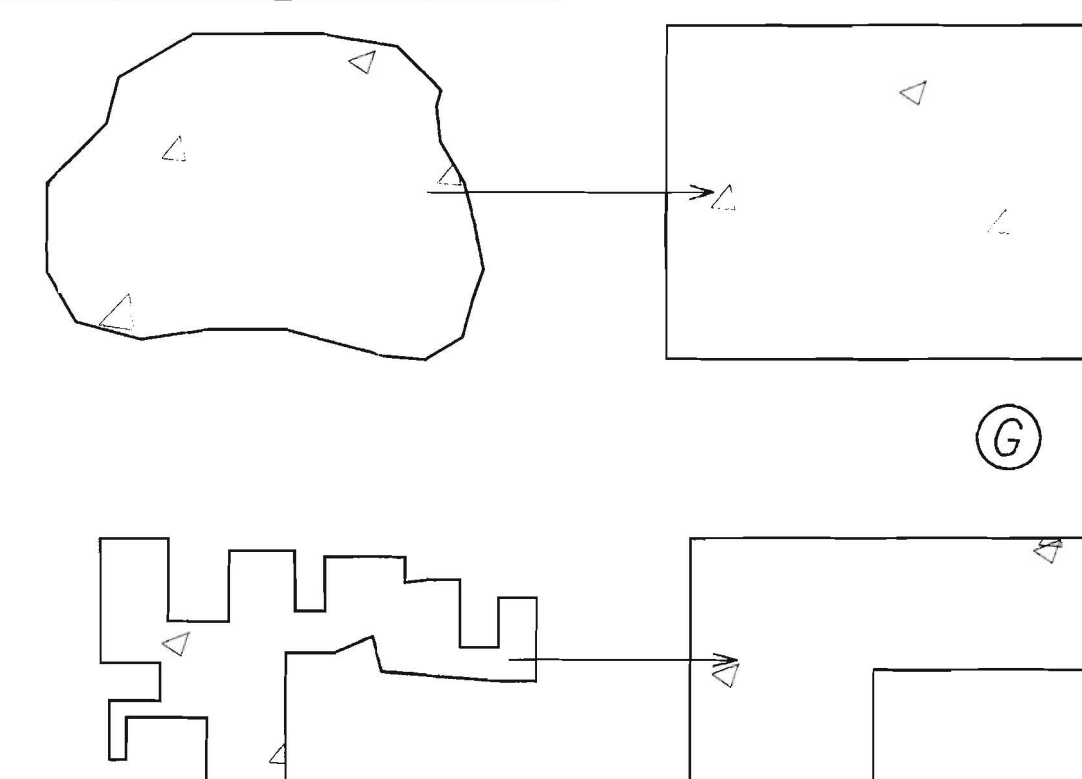
1. Spalls and Delaminations are indicated as "Spalls" since the repairs are the Same.
2. Concrete Repair shall be in conformance with the "Concrete Repair Manual", 2nd edition, International Concrete Repair Institute unless otherwise indicated.
3. Cleaning and Repair of Reinforcing Steel See $\frac{1}{S-15 \ S-15}$ and $\frac{2}{S-15 \ S-15}$.
4. Exposing and Under Cutting of Reinforcing Steel:
 - (A) Remove loose or delaminated concrete surrounding corroded reinforcing steel.
 - (B) Once initial removals are made, proceed with the undercutting of all exposed corroded bars. Undercutting shall provide clearance for under bar cleaning and full bar circumference bonding to surrounding concrete, and to secure the repair structurally. Provide minimum 3/4" clearance between exposed rebars and surrounding concrete or 1/4" larger than the largest aggregate in repair material, whichever is greater.
 - (C) Concrete removals shall extend along the bars to locations along the bar free of bond inhibiting corrosion, and where the bar is well bonded to surrounding concrete.
 - (D) If non-corroded reinforcing steel is exposed during the undercutting process, care shall be taken not to damage the bar's bond to surrounding concrete. If bond between bar and concrete is broken, undercutting of the bar shall be required.
 - (E) Any reinforcement which is loose shall be secured in place by tying to other secured bars or by other approved methods.
5. Edge and Surface Conditioning of Concrete:
 - (F) At edge locations, provide right angle cuts to the concrete surface with a sawcut 1/2" or less as required to avoid cutting reinforcing steel.
 - (G) Repair configurations should be kept as simple as possible, preferably with squared corners.
 - (H) After removals and edge conditioning are complete, remove bond inhibiting materials (dirt, concrete slurry, loosely bonded aggregates) using hand tools (eg: wire brush) or other contracting officer approved methods. Blasting using abrasive media or water is not allowed. Check the concrete surfaces after cleaning to insure that surface is free from additional loose aggregate, or that additional delamination are not present.
 - (I) Coat bars with epoxy and allow to harden.
 - (J) Apply slurry coat (or prime coat). See Special Provisions. Coat shall be thoroughly worked into concrete, corners and edges.
6. Repaired surfaces shall match existing conditions.
7. Apply migrating corrosion inhibitor to repaired concrete area and all concrete areas.

3 SURFACE PREPARATION OF SPALLED CONCRETE AND CORRODED BARS
S-15 S-15 Not to Scale

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	72B-01-13M	2013	18	34

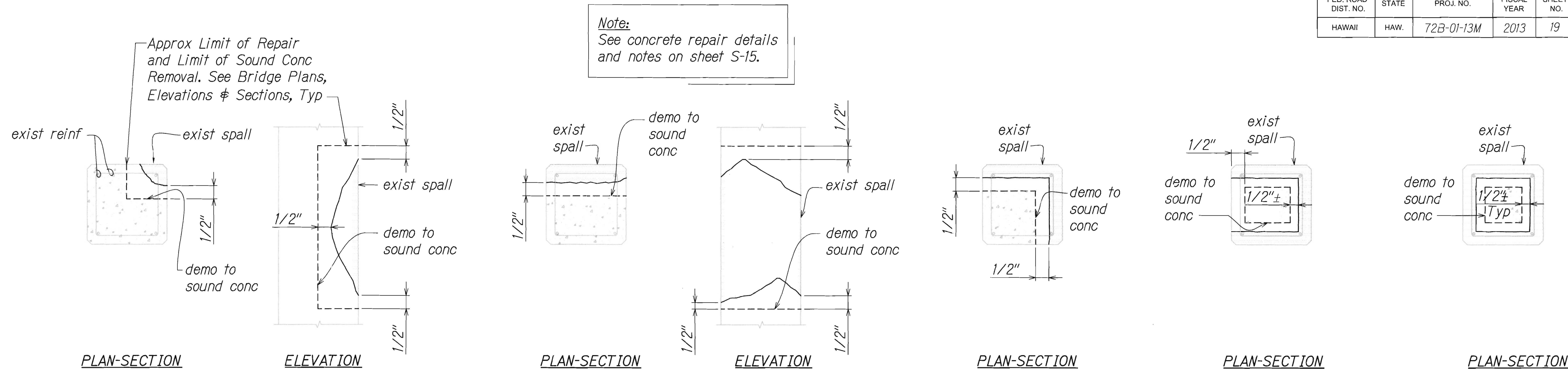


BOUNDARY OF SPALL OR DELAMINATED CONCRETE **RECOMMENDED LAYOUT**

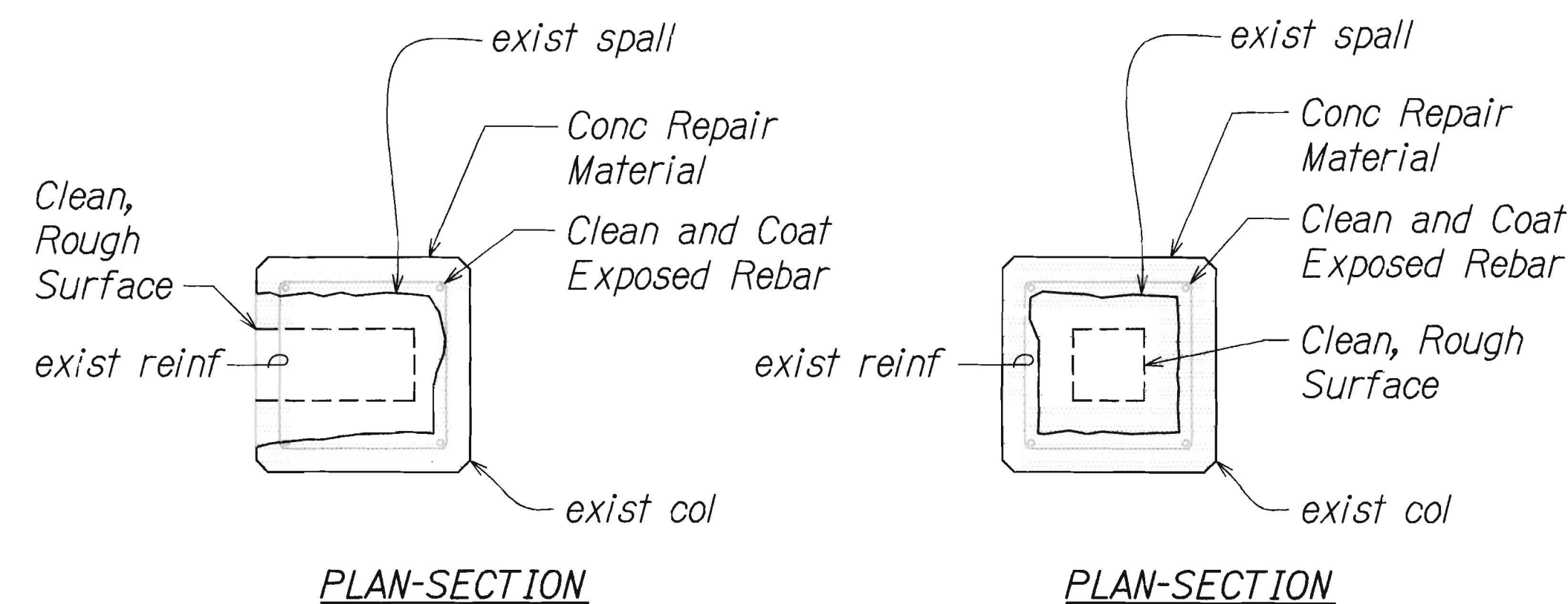
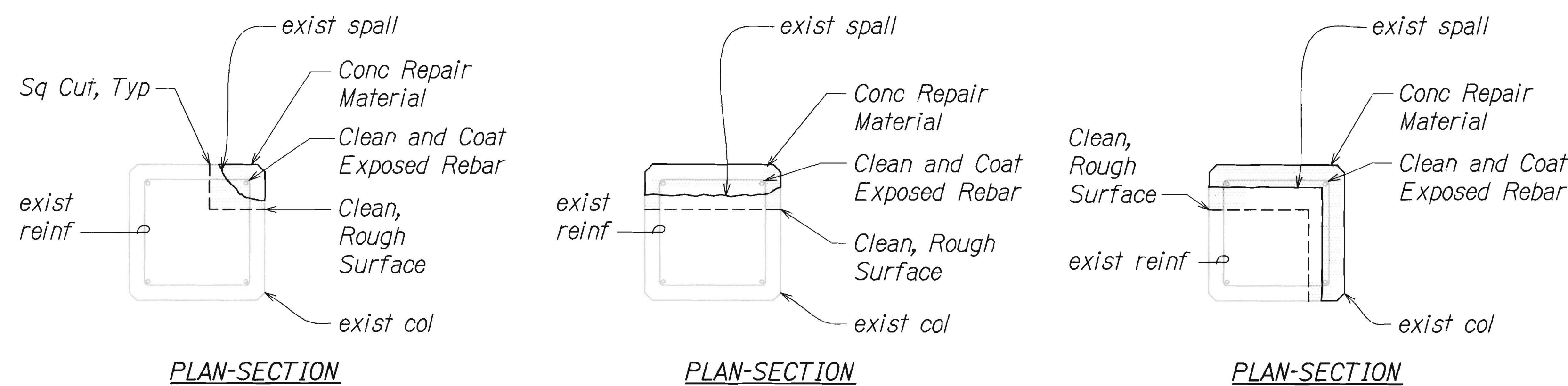


	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
	CONCRETE REPAIR DETAILS
	KALANIANA'OLE HIGHWAY Emergency Repairs of Ihiihilauakea Bridge Project No. 72B-01-13M
	Scale: As Shown Date: Jan. 16, 2013 SHEET No. S-15 OF 26 SHEETS

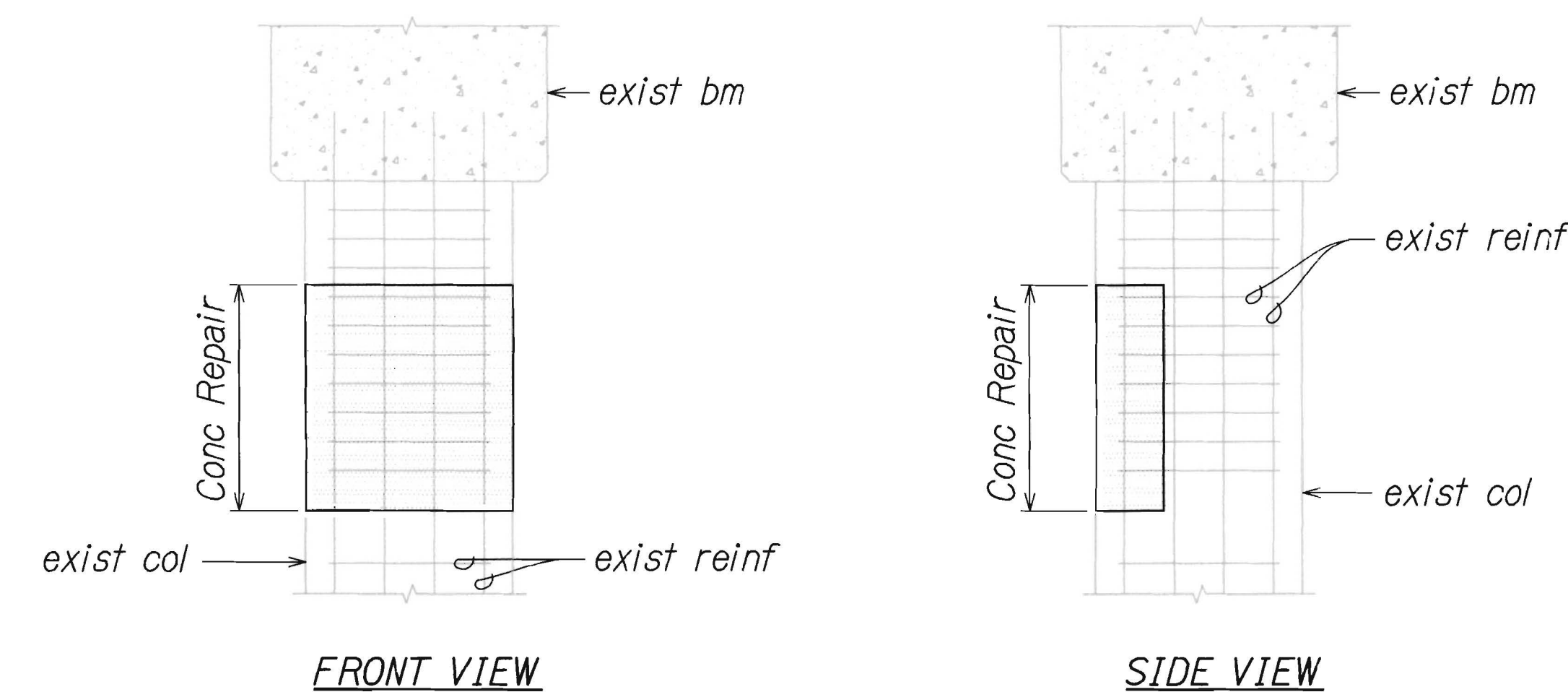
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	72B-01-13M	2013	19	34



1 TYPICAL COLUMN DETAIL - PREPARATION OF EXISTING CONDITIONS (SIMILAR FOR ARCH RIBS AND STRUTS)
S-16 S-16 Not to Scale



2 COLUMN SPALL REPAIR DETAIL (SIMILAR FOR ARCH RIBS AND STRUTS)
S-16 S-16 Not to Scale



3 ELEVATION - COLUMN REPAIR
S-16 S-16 Not to Scale

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

COLUMN REPAIR DETAILS

KALANIANA'OLE HIGHWAY
Emergency Repairs of Ihiihilauakea Bridge
Project No. 72B-01-13M

Norman K. Nagamine Scale: As Shown Date: Jan. 16, 2013

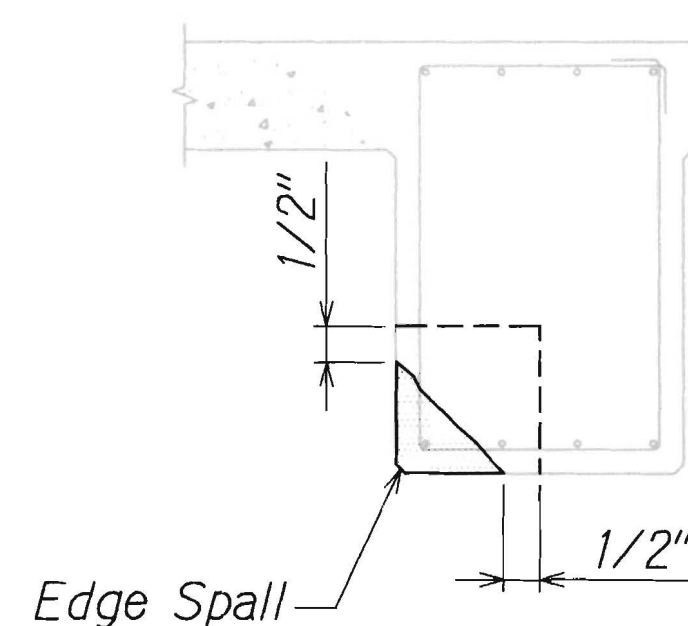
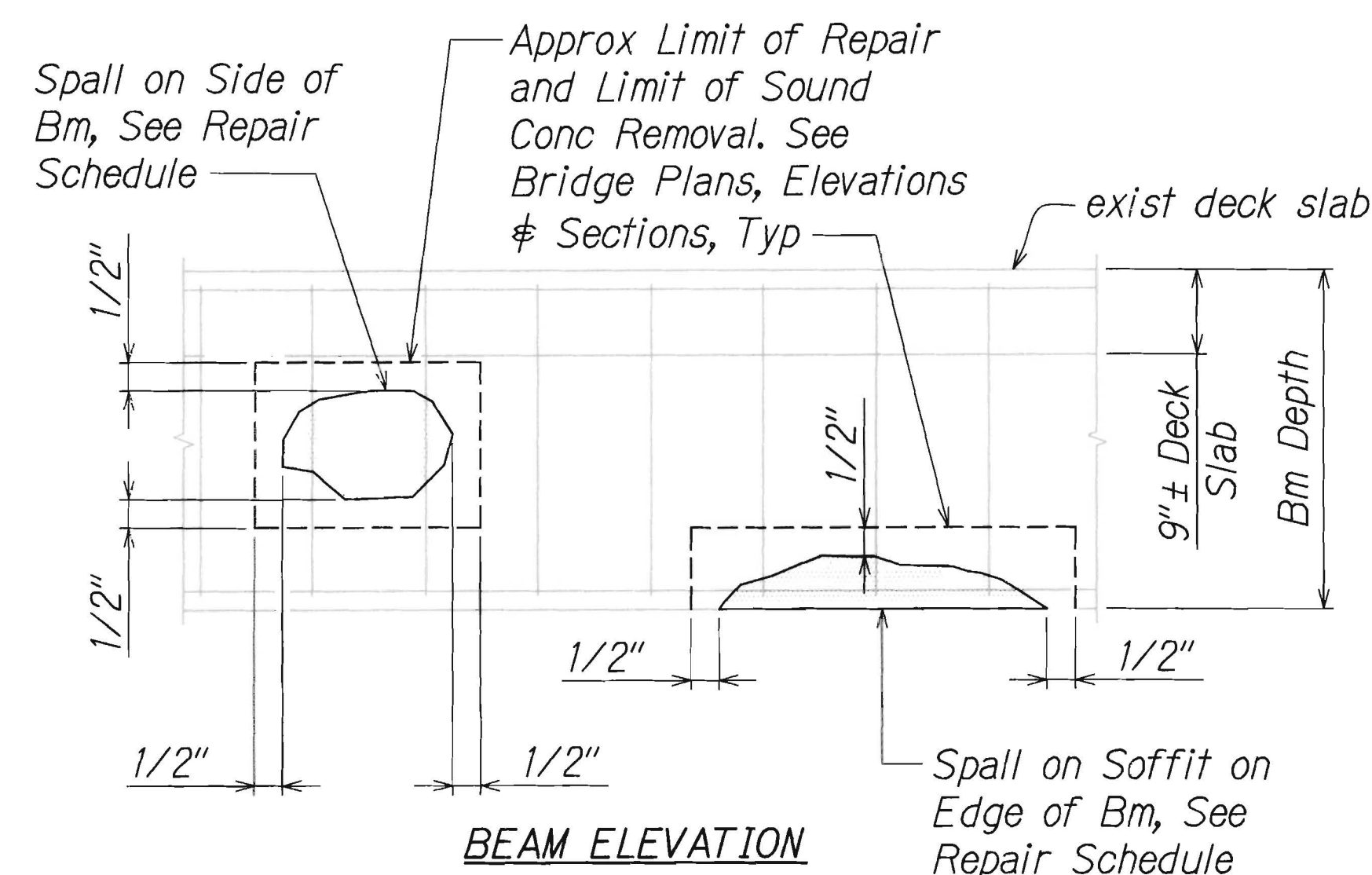
LICENSE EXPIRES: 4/30/14

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

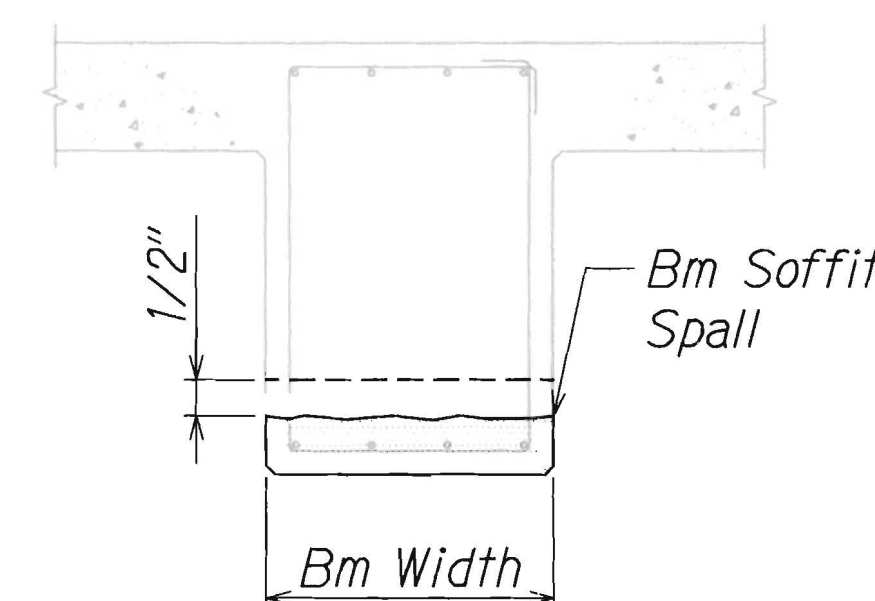
SHEET No. S-16 OF 26 SHEETS

SURVEY PLOTTED BY	DATE
DRAWN BY	
TRACED BY	
CHECKED BY	
QUANTITIES BY	
NOTED BY	
NO.	

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	72B-01-13M	2013	20	34

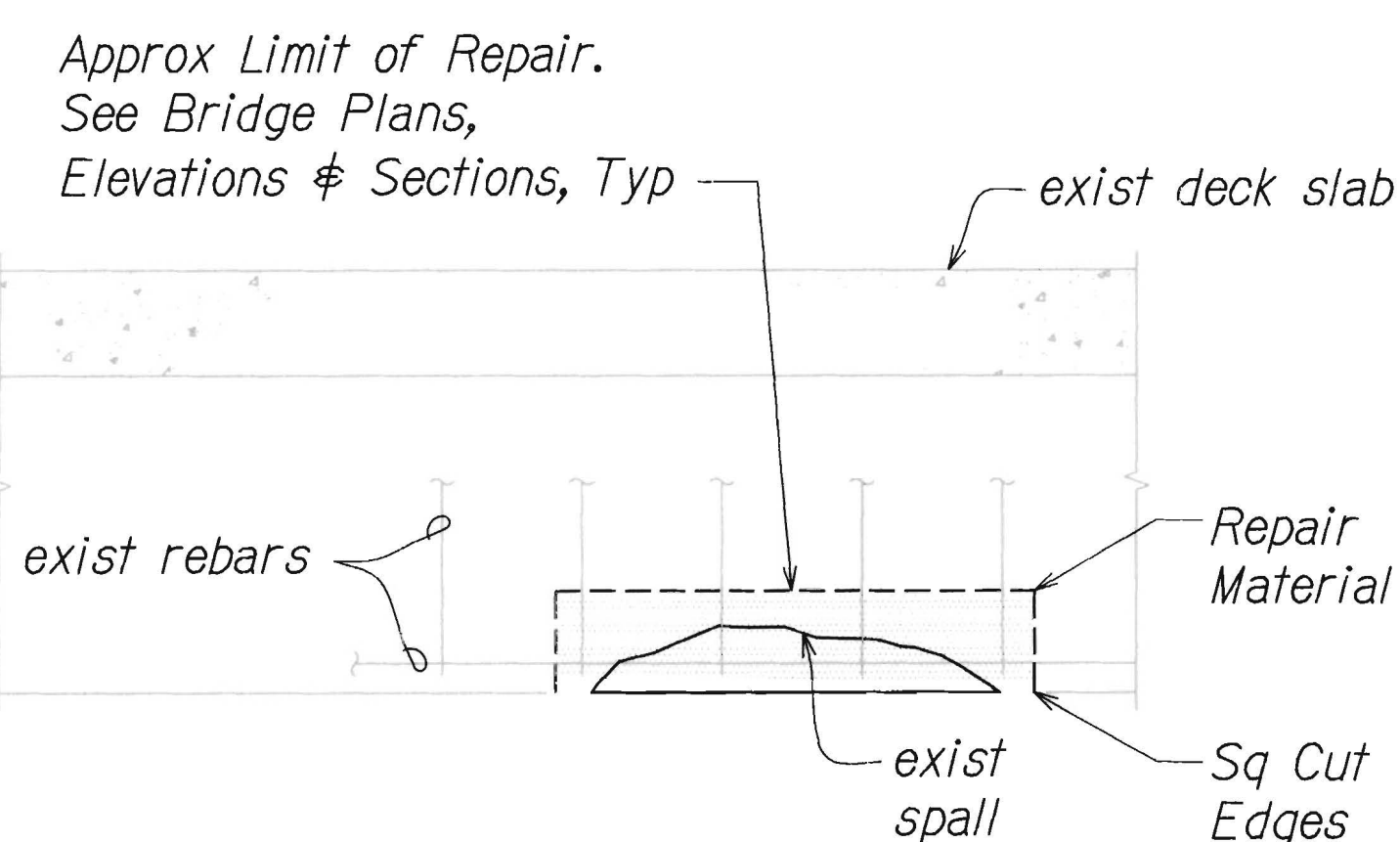


SECTION

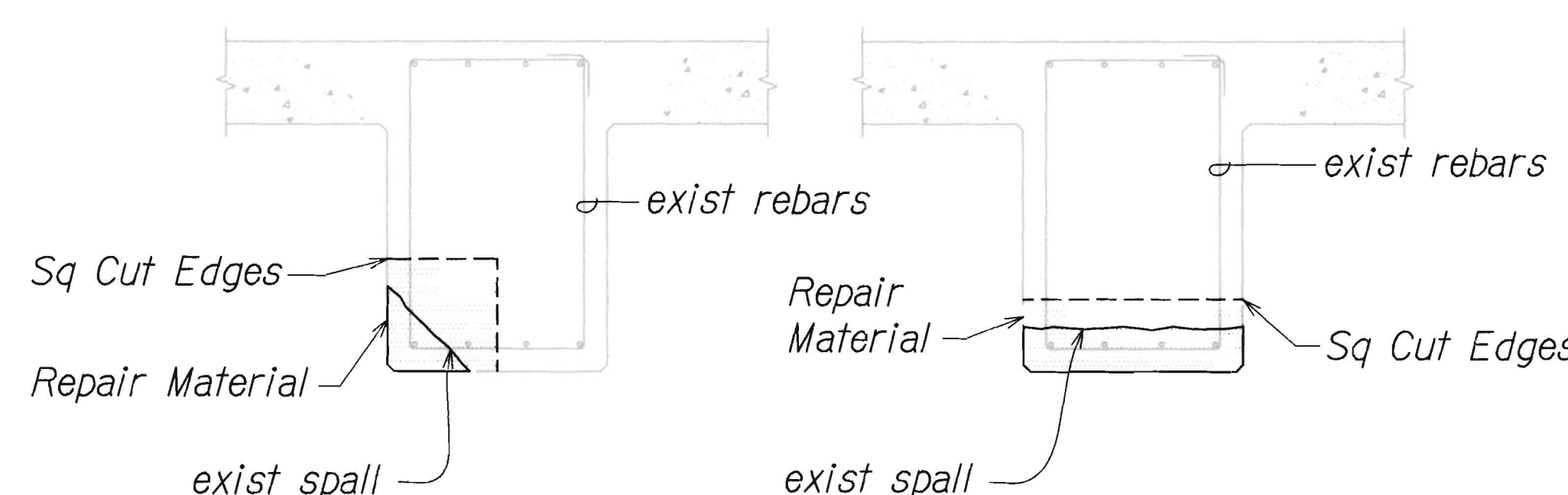


SECTION

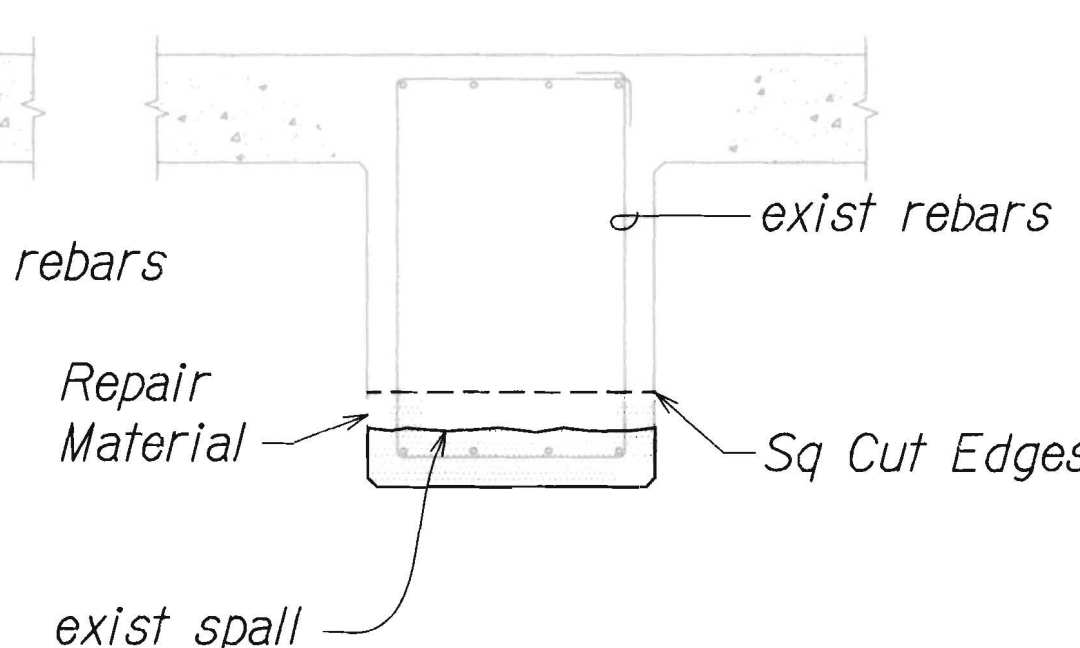
1 BEAM SPALLS - EXISTING CONDITIONS S-17 S-17 Not to Scale



BEAM ELEVATION

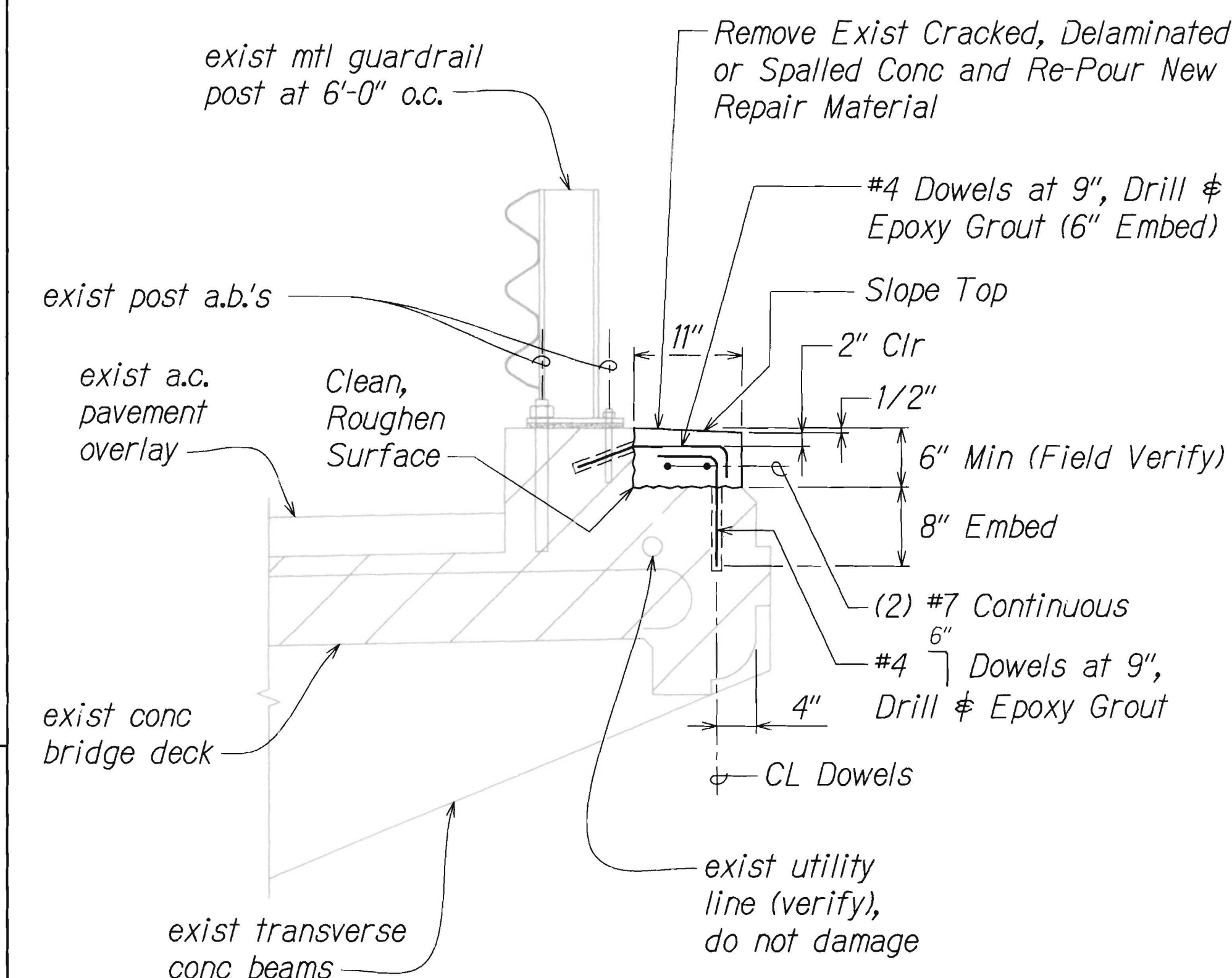


SECTION



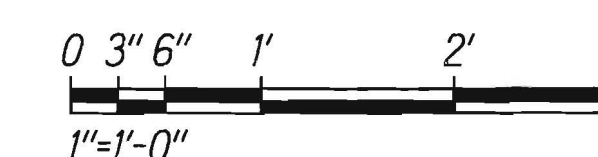
SECTION

2 BEAM SPALLS REPAIRS S-17 S-17 Not to Scale



3 SECTION - CONCRETE CURB REPAIR S-8, S-17 S-17 Scale: 1" = 1'-0"

GRAPHIC SCALE

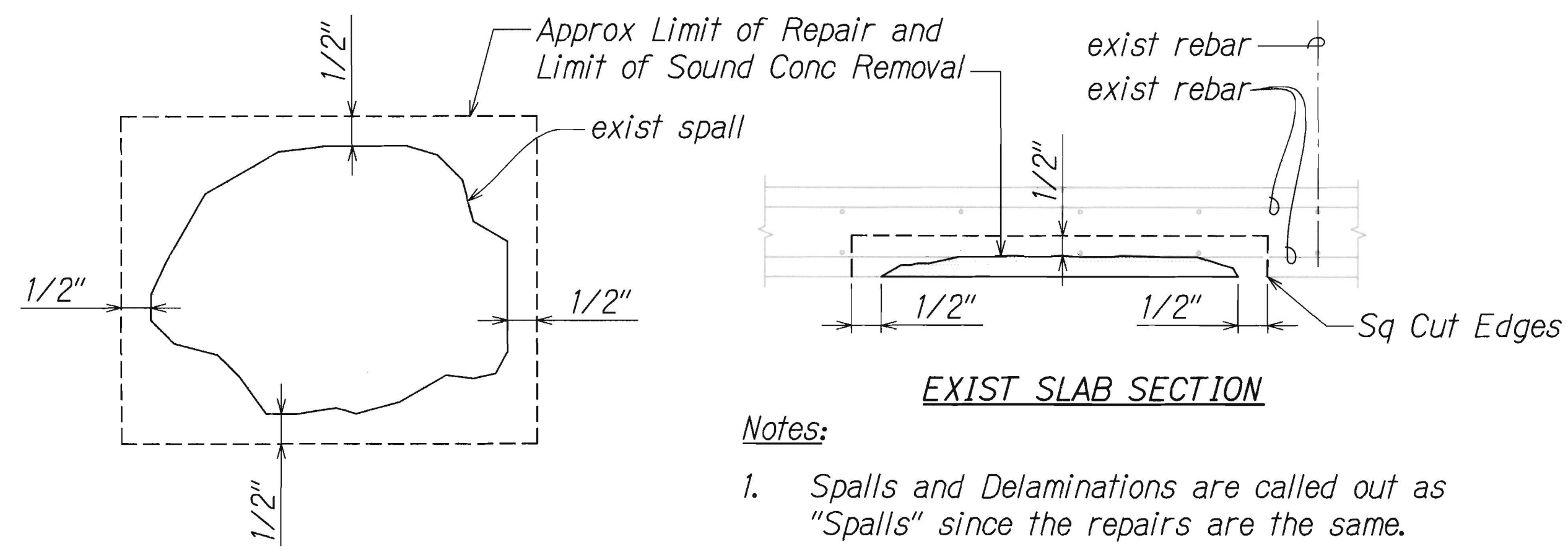


	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
	BEAM & CURB REPAIR DETAILS	
	KALANIANA'OLE HIGHWAY Emergency Repairs of Ihiihilauea Bridge Project No. 72B-01-13M	
	Norman K. Nagamine Scale: As Shown	Date: Jan. 16, 2013

SHEET No. S-17 OF 26 SHEETS

SURVEY PLOTTED BY	DATE
DRAWN BY	
CHECKED BY	
NOTED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NO.	

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	72B-01-13M	2013	21	34

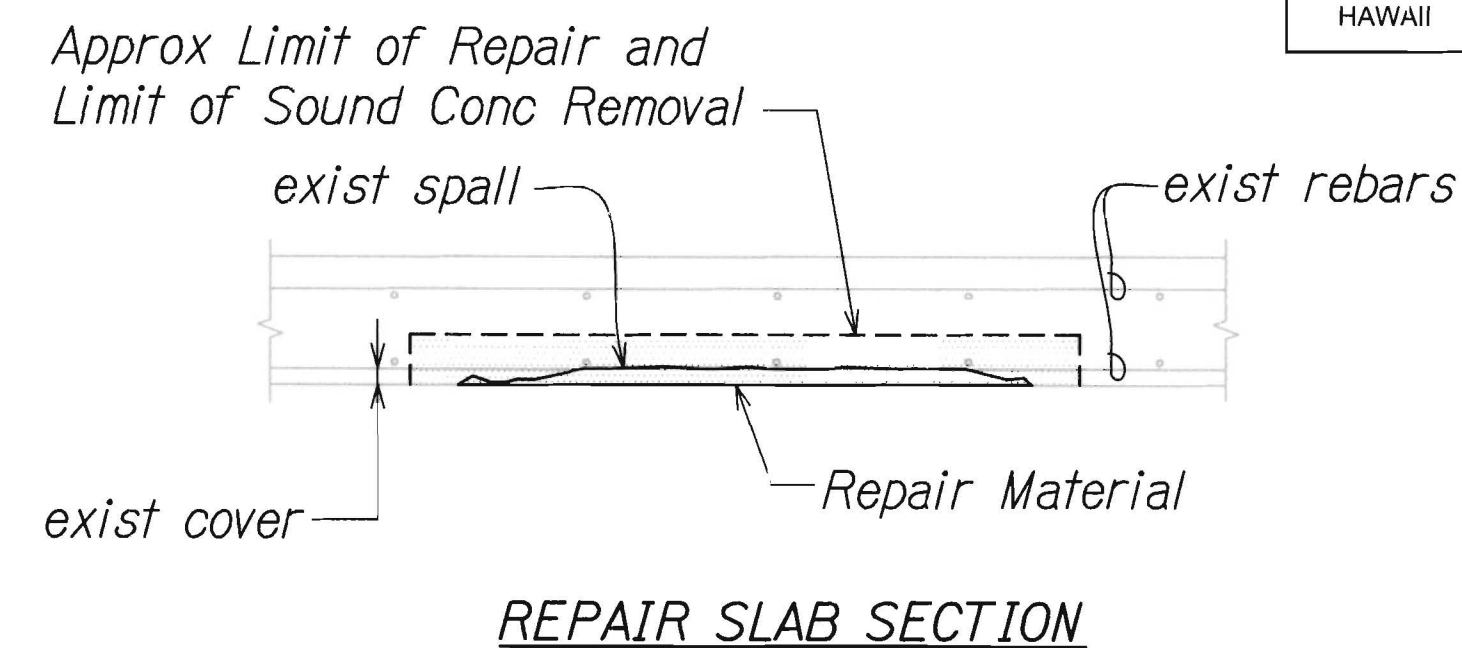


Notes:

1. Spalls and Delaminations are called out as "Spalls" since the repairs are the same.
2. See Concrete Repair Details on Sheet S-15.

REFLECTED PLAN VIEW

1 SLAB SOFFIT SPALL - EXISTING CONDITION
S-18 | S-18 Not to Scale

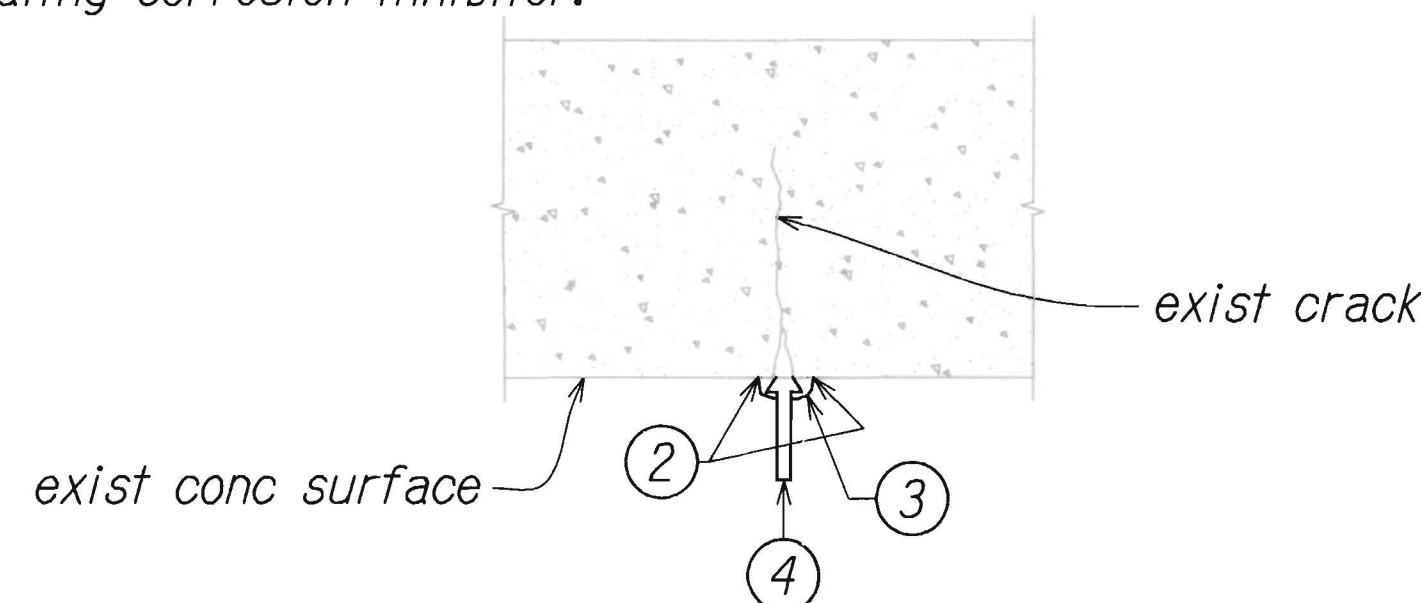


REPAIR SLAB SECTION

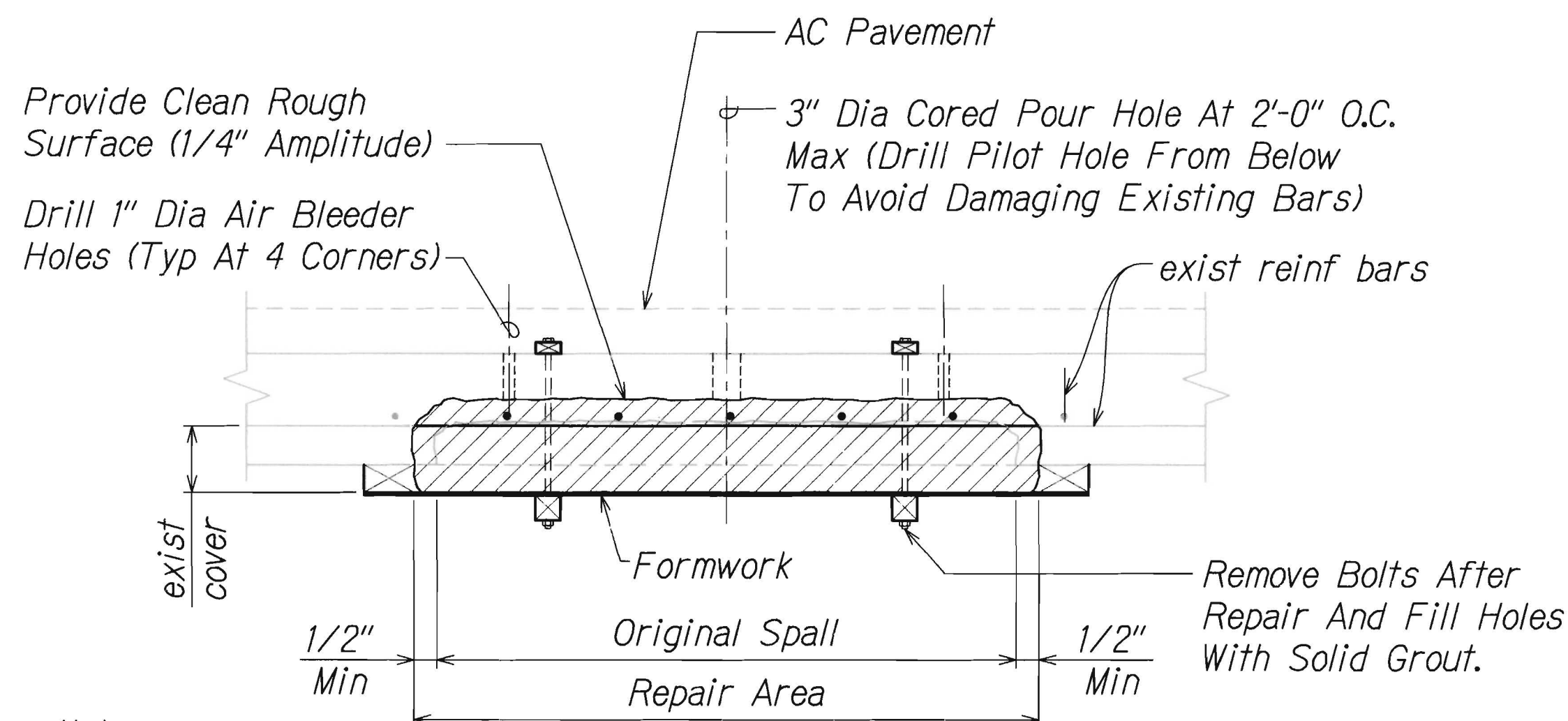
2 SLAB SOFFIT SPALL - REPAIR DETAIL
S-18 | S-18 Not to Scale

CONCRETE CRACK REPAIR NOTES:

1. Contractor shall field survey existing concrete surfaces. Cracks 0.040 inch and wider shall be repaired by epoxy injection. Cracks 0.010 inch to less than 0.040 inch shall be surface sealed. Crack repair allowance for pricing shall be 1,100 lineal feet total (See sheet S-14, Note 3).
2. Lightly tap the existing concrete adjacent to the crack. If the concrete sounds "hollow", chip off the surface and any delaminated concrete and repair as a spall; otherwise, proceed to step 3 below.
3. Clean the existing concrete surface along the crack of all loose, bond inhibiting and other deleterious materials, including any exst crack sealant by use of hand tools. Seal the crack with the surface cap sealant and install the pressure injection ports over the crack at a maximum interval of 12" on centers. Insure cap sealant completely bridges crack.
4. With steady pressure, pressure inject the epoxy beginning with the injection port at one end of the crack (bottom of the crack for vertical cracks). When epoxy emerges from the next adjacent port, move to the next adjacent port and continue with the epoxy injection.
5. After the epoxy has cured, remove the injection ports and cap sealant.
6. Finish concrete surface to match existing and apply concrete migrating corrosion inhibitor.



3 TYPICAL CONCRETE CRACK REPAIR DETAIL
S-14, S-18 | S-18 Not to Scale



Notes:

1. Fill with concrete repair material by pumping until concrete is flush with top of slab.
2. Remove formwork after concrete has cured.
3. Patch cored and drilled holes to match existing.
4. Patch and grind with repair mortar after form is removed to assure required reinforcement cover. Grind repair areas, as required, to remove concrete/mortar flashings and to provide a generally smooth surface repair.
5. Where the spall removal of deteriorated concrete exceeds half the thickness of the slab, the repair shall be a full depth repair when directed by the Engineer. Provide same size and spacing of reinforcing as existing.
6. Replace corroded rebars where required per Table 1 on Sht S-15.
7. Replace A.C., see Standard Specs.

4 SLAB SOFFIT SPALL - REPAIR AREA > 2 SQ FT (CONTRACTOR'S OPTION)
S-18 | S-18 Not to Scale

	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
	BEAM & CURB REPAIR DETAILS	
	KALANIANA'OLE HIGHWAY Emergency Repairs of Ihihilaauakea Bridge Project No. 72B-01-13M	
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