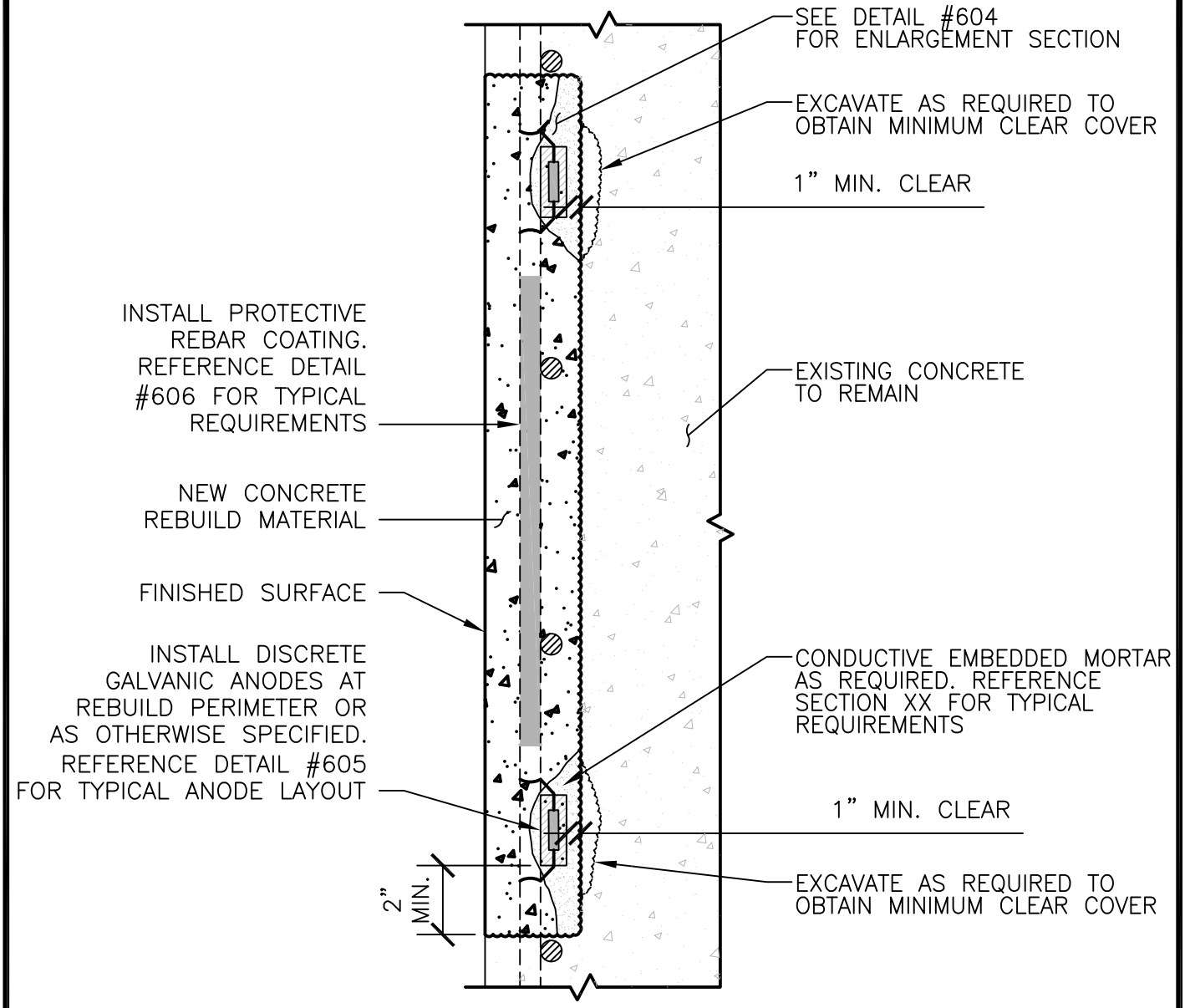
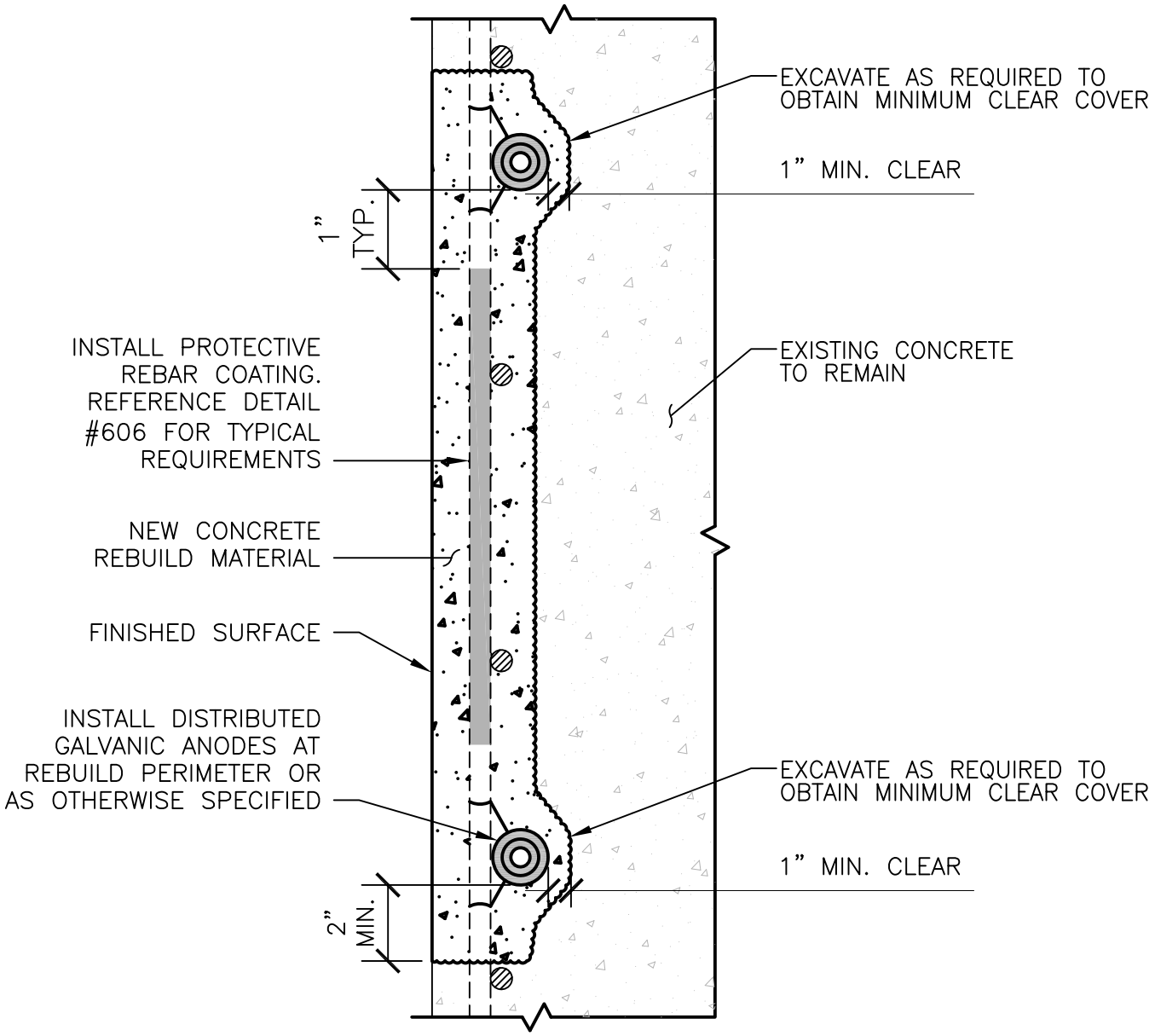


NOTES:

1. REFERENCE SPECIFICATION 03700 FOR CONCRETE REBUILD INFORMATION NOT OTHERWISE SHOWN.
2. GALVANIC ANODE SIZES AND SHAPES MAY VARY.

NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 600
		SHEET 1 OF 1
	INSTALLATION OF DISCRETE GALVANIC ANODES	DATE 1/2021

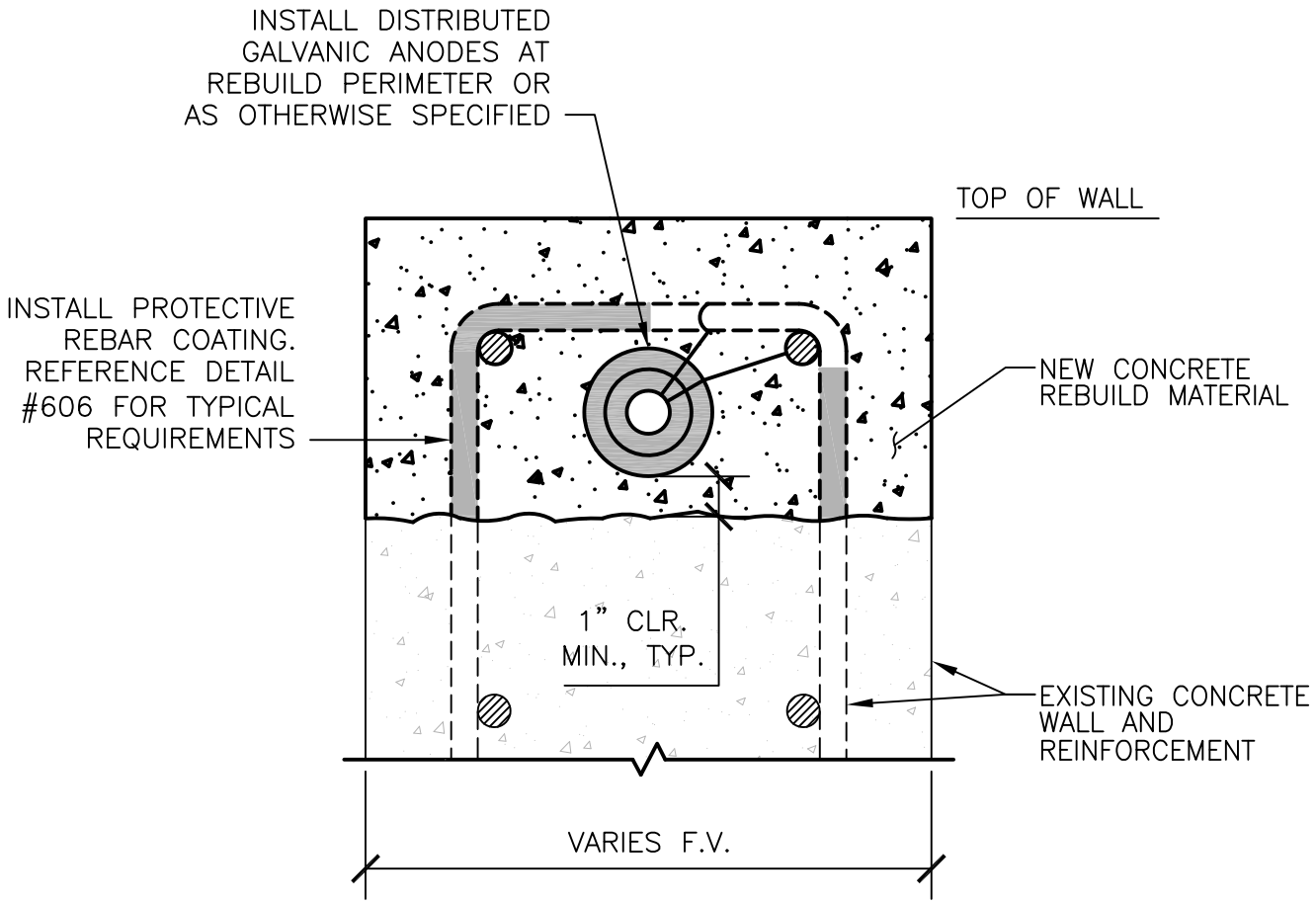


NOTES:

1. REFERENCE SPECIFICATION 03700 FOR CONCRETE REBUILD INFORMATION NOT OTHERWISE SHOWN.
2. CONDUCTIVE MORTAR NOT SHOWN. ENCAPSULATE ANODES IN CONDUCTIVE MORTAR AS REQUIRED BY MANUFACTURER.
3. GALVANIC ANODE SIZES AND SHAPES MAY VARY.

NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 601
		SHEET 1 OF 1
	INSTALLATION OF DISTRIBUTED GALVANIC ANODES	DATE 1/2021

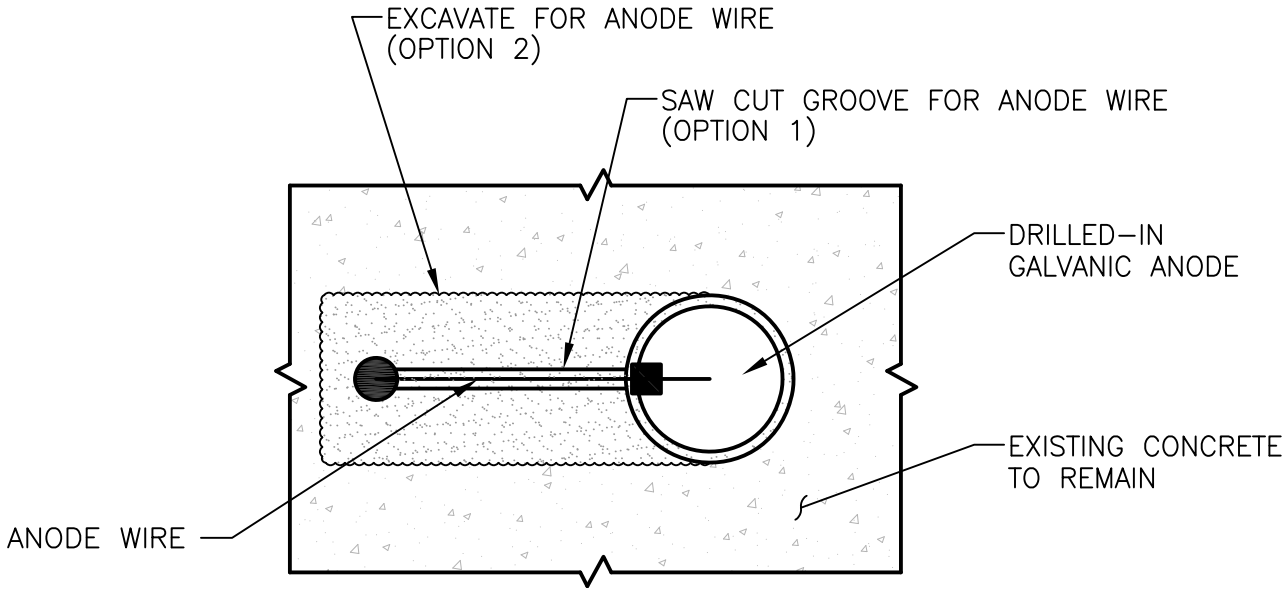


NOTES:

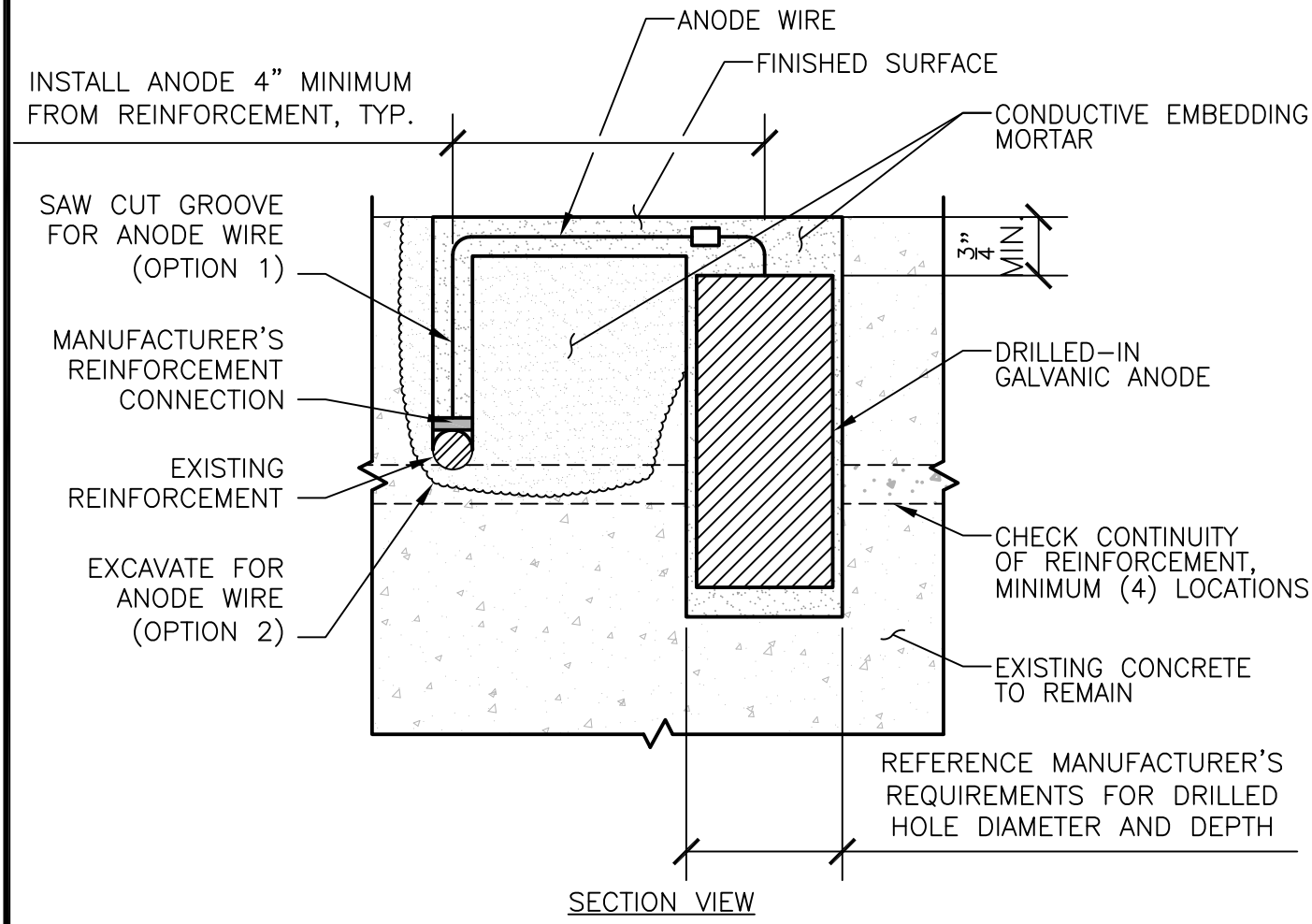
1. REFERENCE SPECIFICATION 03700 FOR CONCRETE REBUILD INFORMATION NOT OTHERWISE SHOWN.
2. CONDUCTIVE MORTAR NOT SHOWN. ENCAPSULATE ANODES IN CONDUCTIVE MORTAR AS REQUIRED BY MANUFACTURER.
3. GALVANIC ANODE SIZES AND SHAPES MAY VARY.

NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 602
		SHEET 1 OF 1
	DISTRIBUTED GALVANIC ANODES AT TOP OF WALL	DATE 1/2021



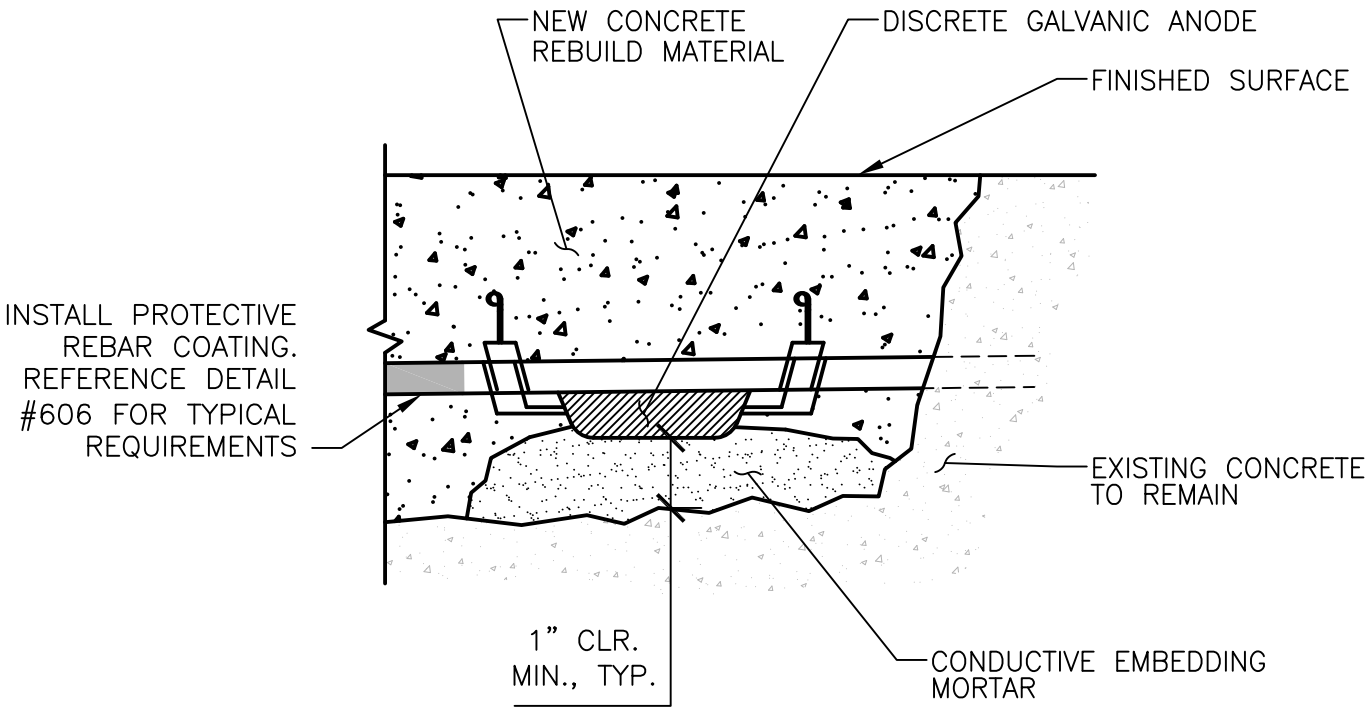
PLAN VIEW



SECTION VIEW

NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 603
		SHEET 1 OF 1
	INSTALLATION OF DRILLED–IN GALVANIC ANODES	DATE 1/2021

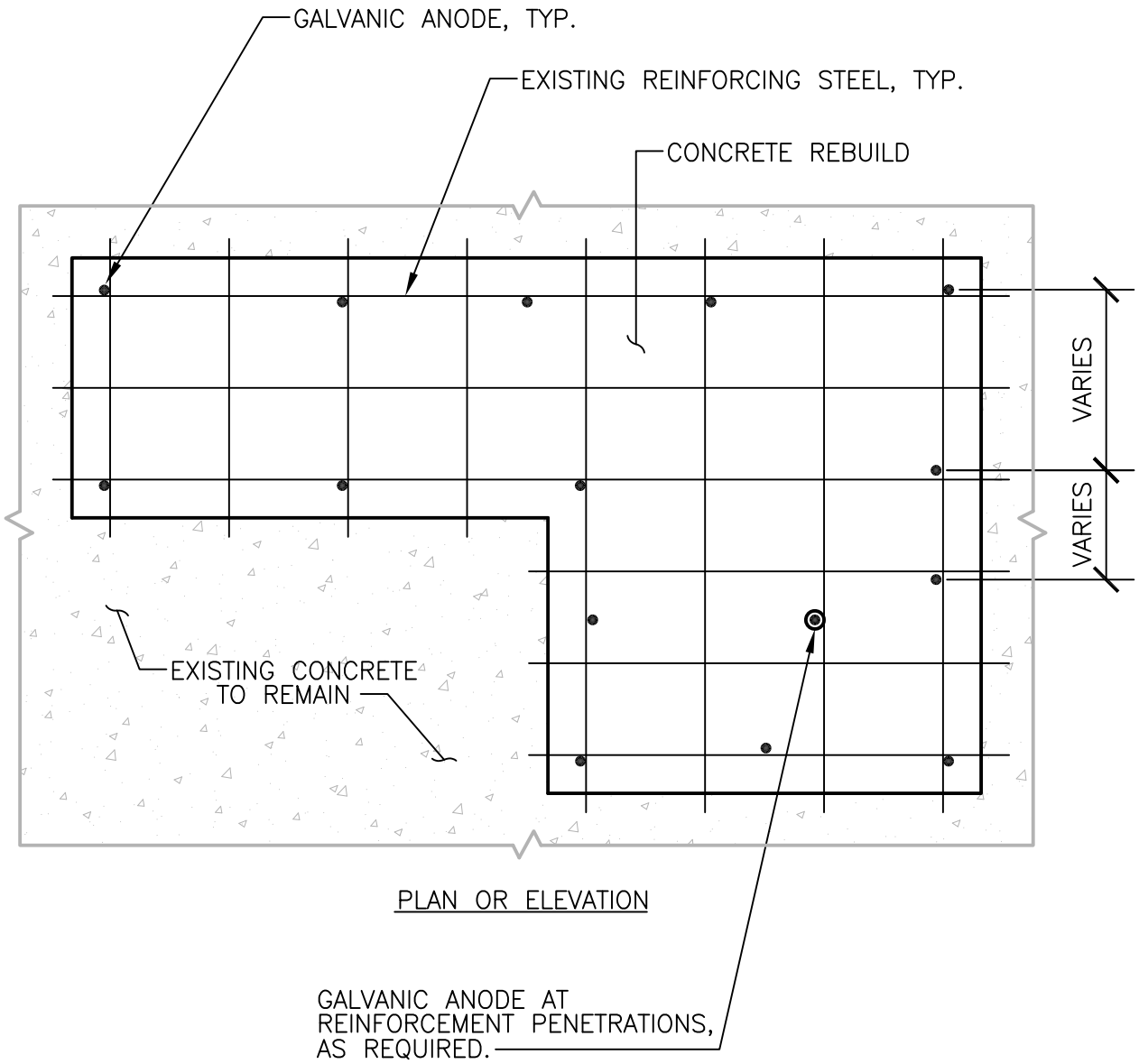


NOTES:

1. CONDUCTIVE BEDDED MORTAR SHALL BE INSTALLED FOR ANODES WHEN NEW CONCRETE REBUILD MATERIAL ELECTRICAL RESISTIVITY IS GREATER THAN 15,000 OHM-CM.
2. GALVANIC ANODE SIZES AND SHAPES MAY VARY.

NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 604
	CONDUCTIVE MORTAR BRIDGE FOR USE WITH HIGH RESISTIVITY REPAIR MORTARS	SHEET 1 OF 1
		DATE 1/2021

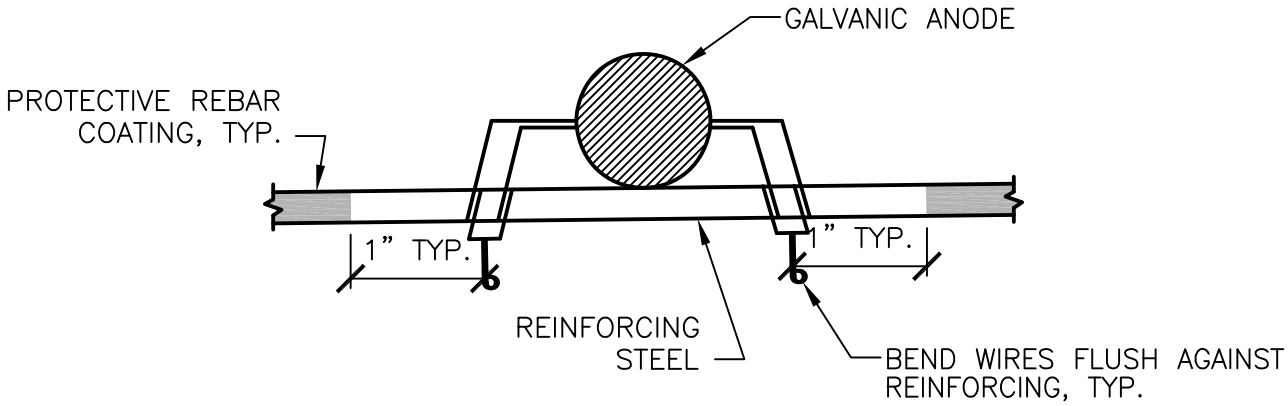


NOTES:

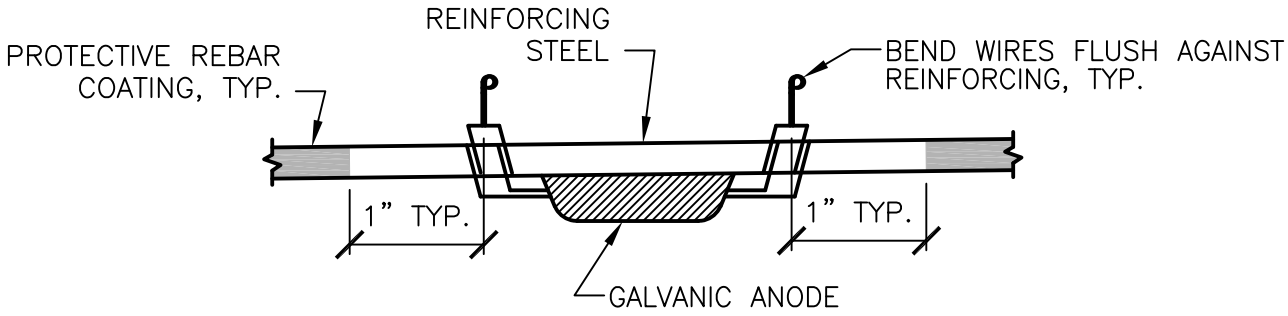
1. REFERENCE SPECIFICATION 03700 FOR CONCRETE REBUILD INFORMATION NOT OTHERWISE SHOWN.
2. GALVANIC ANODE SPACING SHALL BE IN ACCORDANCE WITH SPECIFICATION REQUIREMENTS.
3. SEE DETAIL #606 FOR TYPICAL ANODE CONNECTION DETAILS.

NOT TO SCALE

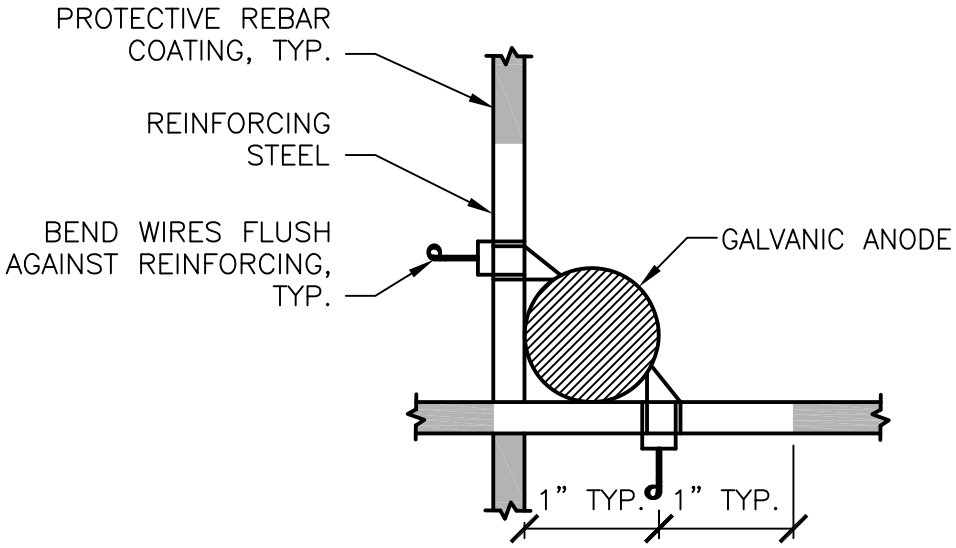
HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 605
		SHEET 1 OF 1
	TYPICAL GALVANIC ANODE LAYOUT	DATE 1/2021



TYPICAL INSTALLATION TO SIDE REBAR



TYPICAL INSTALLATION ABOVE/BELOW REBAR



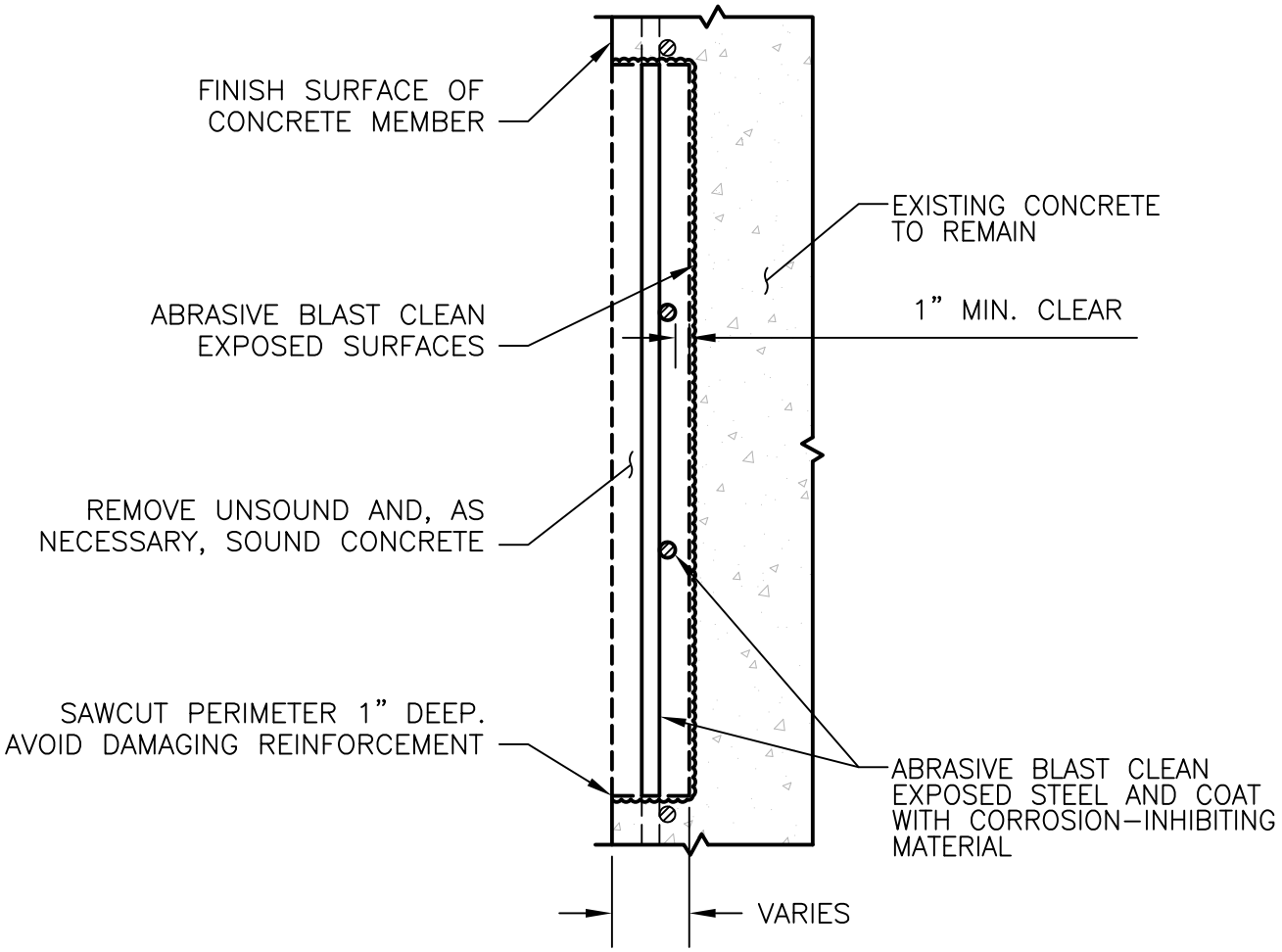
TYPICAL INSTALLATION AT REBAR INTERSECTION

NOTES:

1. GALVANIC ANODE SIZES AND SHAPES MAY VARY.

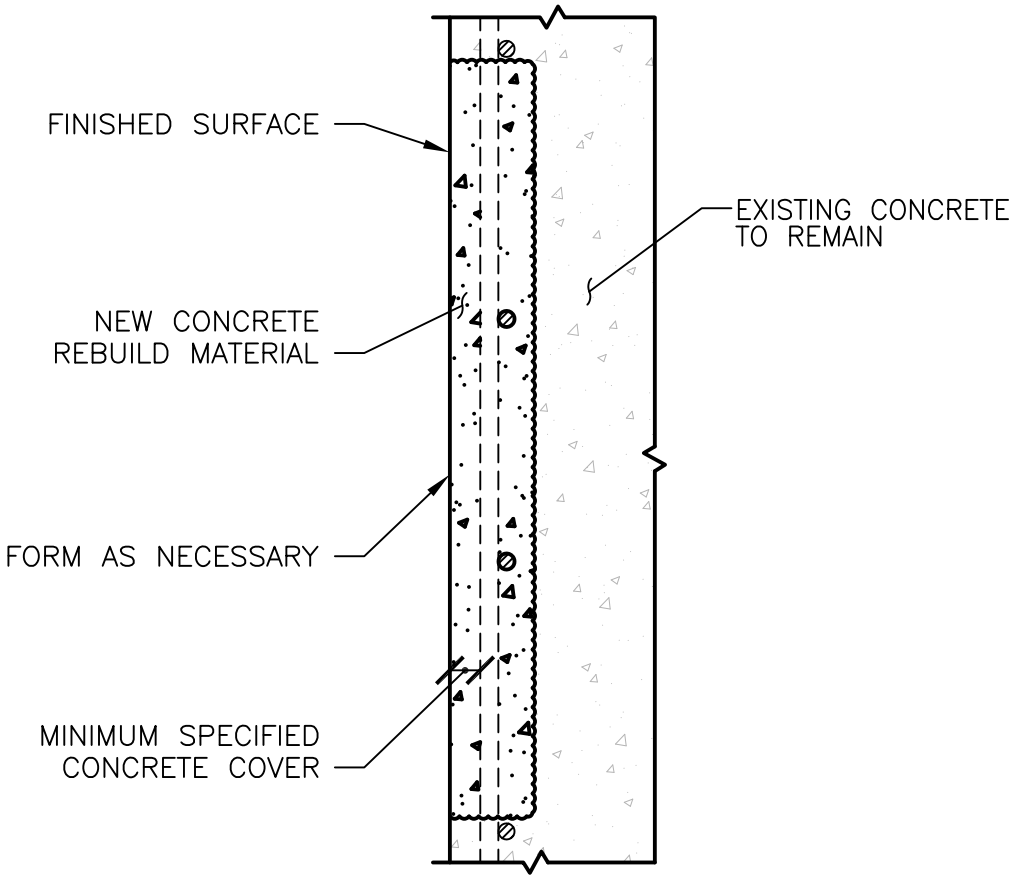
NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 606
		SHEET 1 OF 1
	TYPICAL GALVANIC ANODE CONNECTIONS	DATE 1/2021



NOT TO SCALE

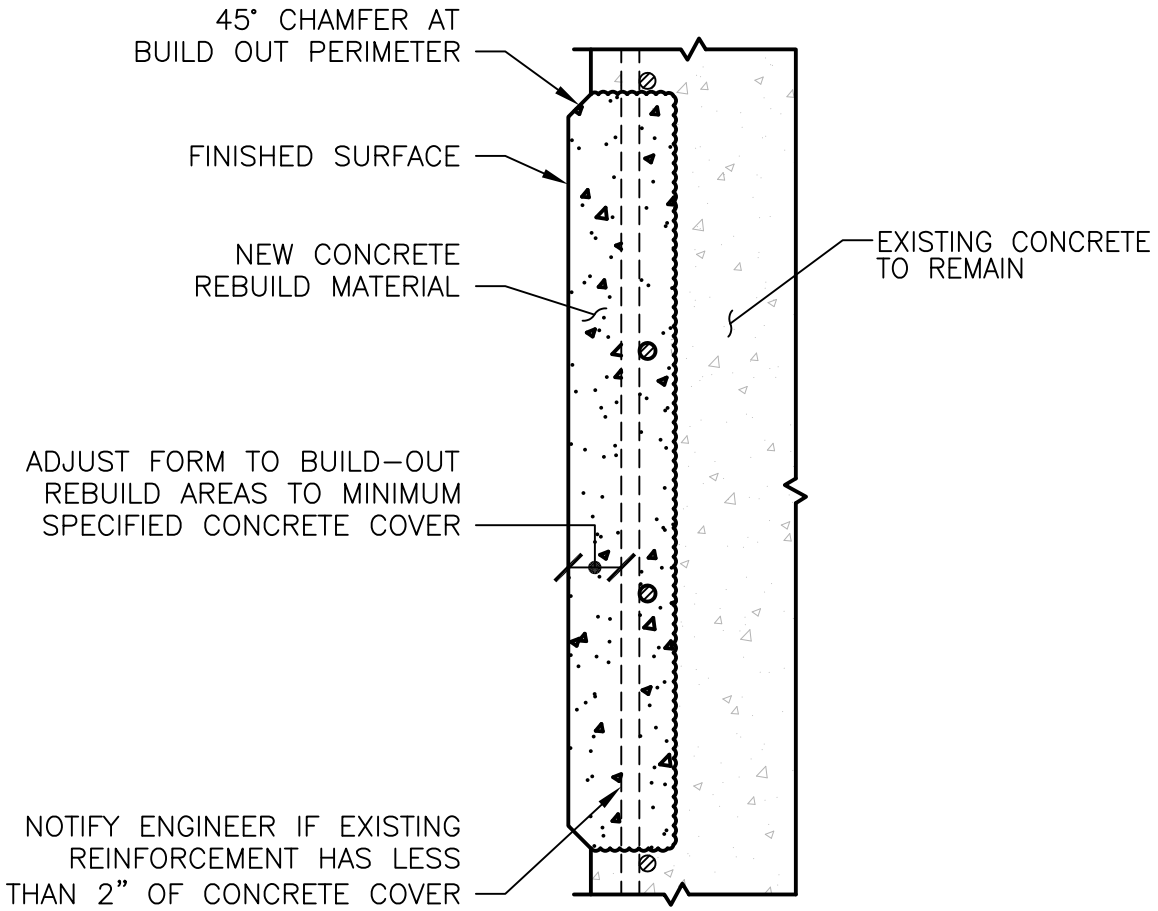
HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 626
	REMOVAL OF UNSOUND CONCRETE TYPICAL SECTION	SHEET 1 OF 1
		DATE 1/2021



NOTES:
1. GALVANIC ANODES NOT SHOWN FOR CLARITY. REFER TO SPECIFICATION 03800 FOR REQUIREMENTS.

NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 627
		SHEET 1 OF 1
	CONCRETE REBUILD TYPICAL SECTION	DATE 1/2021

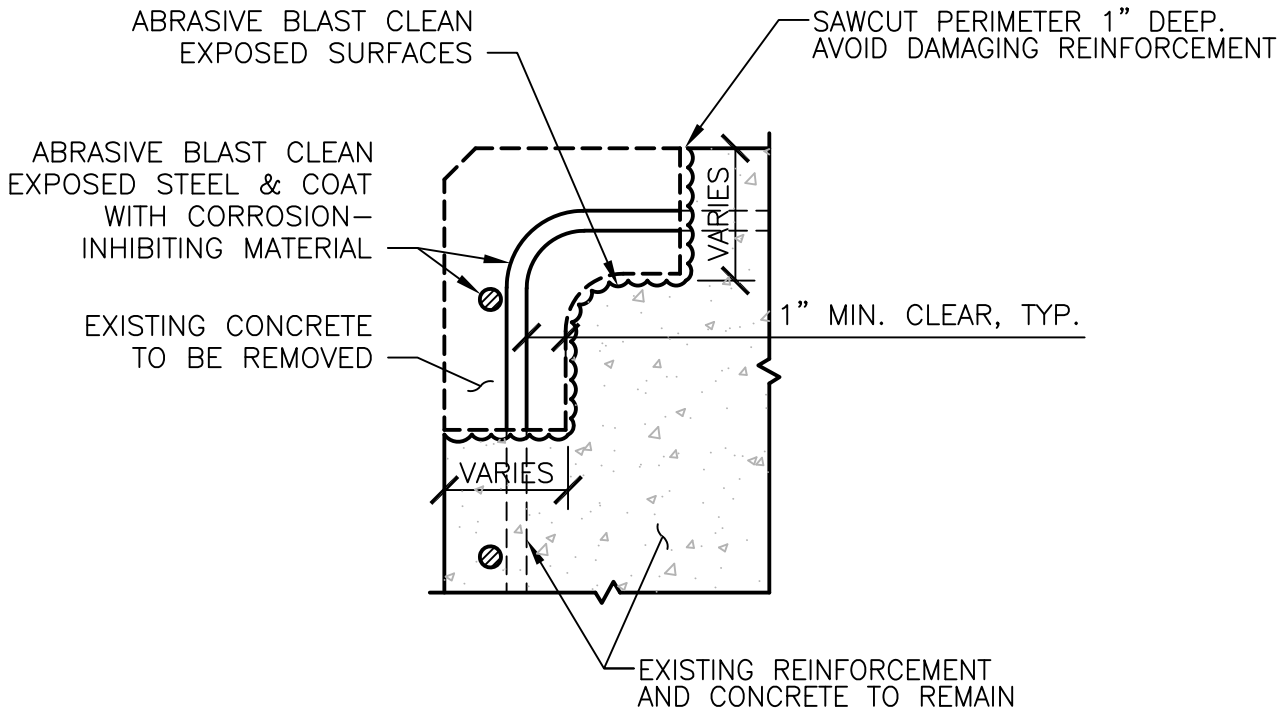


NOTES:

1. GALVANIC ANODES NOT SHOWN FOR CLARITY. REFER TO SPECIFICATION 03800 FOR REQUIREMENTS.

NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 628
	CONCRETE REBUILD TO PROVIDE MINIMUM COVER TYPICAL SECTION	SHEET 1 OF 1
		DATE 1/2021

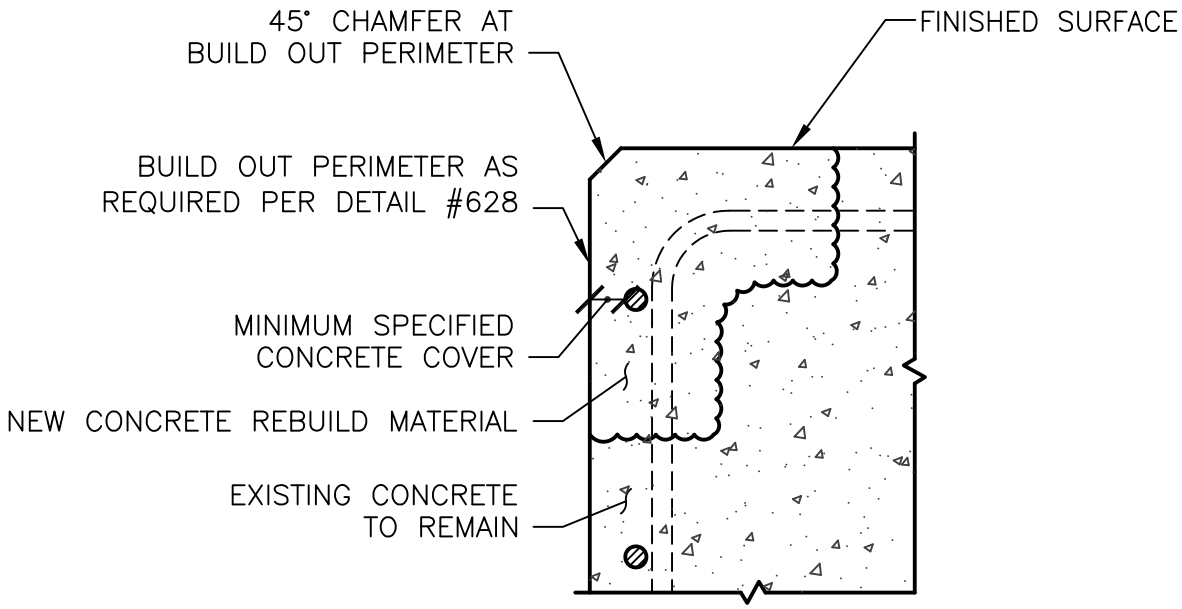


NOTES:

1. GALVANIC ANODES NOT SHOWN FOR CLARITY. REFER TO SPECIFICATION 03800 FOR REQUIREMENTS.

NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 629
		SHEET 1 OF 1
	REMOVAL OF UNSOUND CONCRETE TYPICAL CORNER SECTION	DATE 1/2021



NOTES:

1. GALVANIC ANODES NOT SHOWN FOR CLARITY. REFER TO SPECIFICATION 03800 FOR REQUIREMENTS.

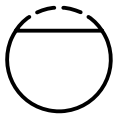
NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 630
		SHEET 1 OF 1
	CONCRETE REBUILD TYPICAL CORNER SECTION	DATE 1/2021

10% SECTION LOSS

BAR NO.	DIAMETER IN.	AREA IN.^{2}	BAR DIAMETER WITH 10% SECTION LOSS (IN.)	
			CIRCUMFERENTIAL LOSS	ONE – SIDED LOSS
3	0.375	0.110	0.356	0.315
4	0.500	0.196	0.474	0.420
5	0.625	0.307	0.593	0.525
6	0.750	0.442	0.712	0.625
7	0.875	0.601	0.830	0.735
8	1.000	0.785	0.949	0.835
9	1.128	0.999	1.070	0.945
10	1.270	1.267	1.205	1.060
11	1.410	1.561	1.338	1.180

CIRCUMFERENTIAL LOSS



ONE – SIDED LOSS

HRSD

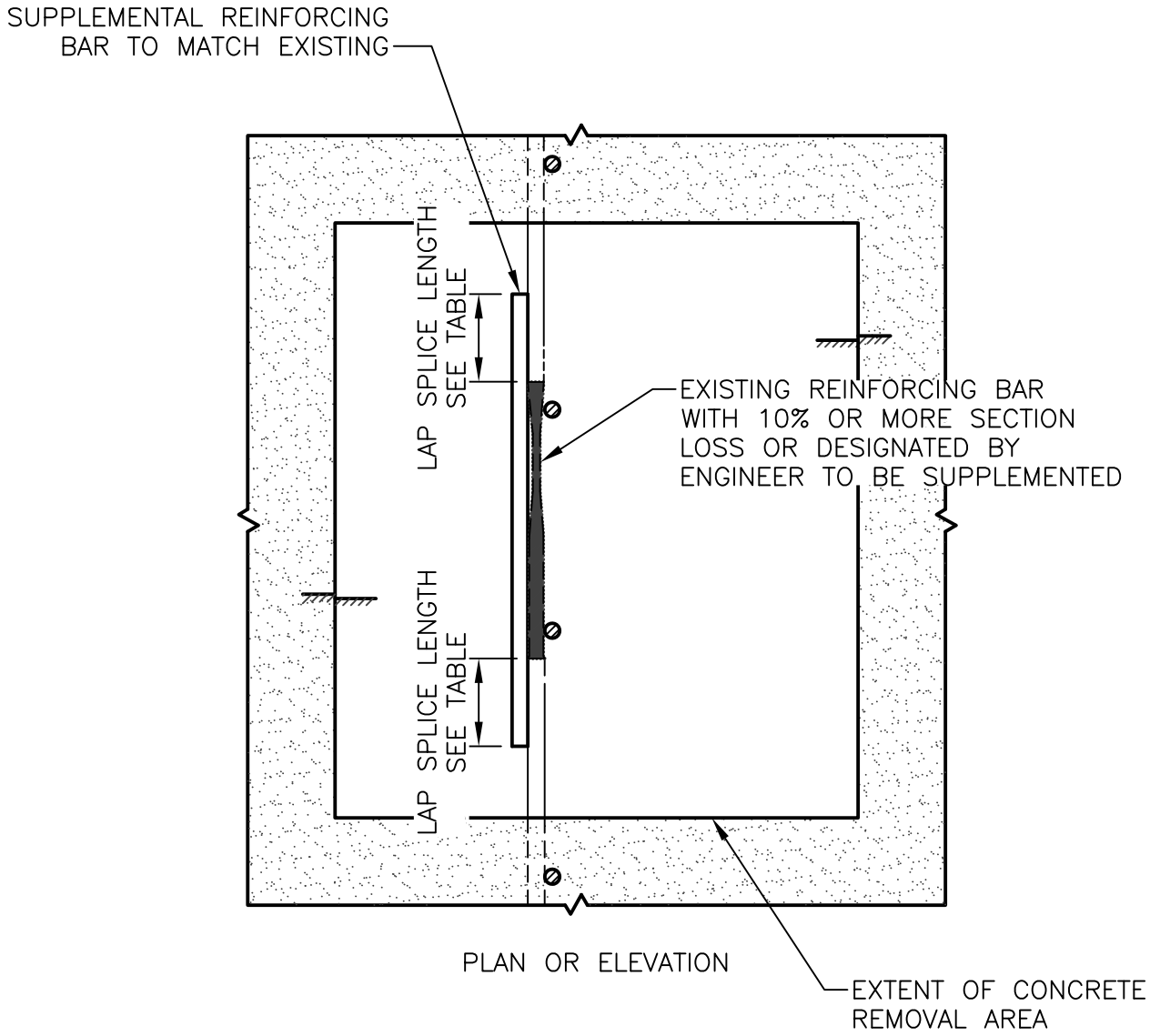
STANDARD DESIGN DETAIL

REINFORCING SECTION LOSS TABLE

DRAWING NO. 631

SHEET 1 OF 1

DATE 1/2021



NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 632
		SHEET 1 OF 1
	LAP SPLICE – OPTION 1	DATE 1/2021

TENSION LAP LENGTH – CLASS B SPLICE – TOP & BOTTOM BARS
(GRADE 60 UNCOATED BARS & NORMAL WEIGHT CONCRETE)

BAR NO.	fc=4,000PSI		fc=5,000PSI	
	TOP	BOT	TOP	BOT
3	15"	12"	13"	12"
4	20"	15"	18"	14"
5	24"	19"	22"	17"
6	29"	22"	26"	20"
7	42"	33"	38"	29"
8	48"	37"	43"	33"
9	60"	46"	54"	41"
10	74"	57"	66"	51"
11	89"	68"	79"	61"

NOTES:

1. THIS TABLE IS BASED ON ACI 318–11, EQUATION 12–1 WITH A MINIMUM CLEAR COVER OF 2 INCHES AND MINIMUM CENTER–TO–CENTER BAR SPACING OF 5 INCHES.
2. "TOP" BARS ARE HORIZONTAL REINFORCING BARS WITH MORE THAN 12 INCHES OF FRESH CONCRETE CAST BELOW THE BARS AT THE DEVELOPMENT LENGTH. ALL OTHER BARS ARE CONSIDERED "BOT" BARS.
3. FOR EPOXY COATED OR ZINC AND EPOXY DUAL COATED BARS, MULTIPLY THE TABLE VALUES BY 1.5 FOR BOTTOM BARS, OR 1.3 FOR TOP BARS. IF THE CONCRETE COVER IS AT LEAST 3X THE BAR DIAMETER AND CLEAR SPACING AT LEAST 6X THE BAR DIAMETER, MULTIPLY VALUES BY 1.2.
4. FOR CLASS A SPLICE, DIVIDE VALUES BY 1.3.
5. FOR LIGHTWEIGHT CONCRETE, MULTIPLY VALUES BY 1.33.

HRSD

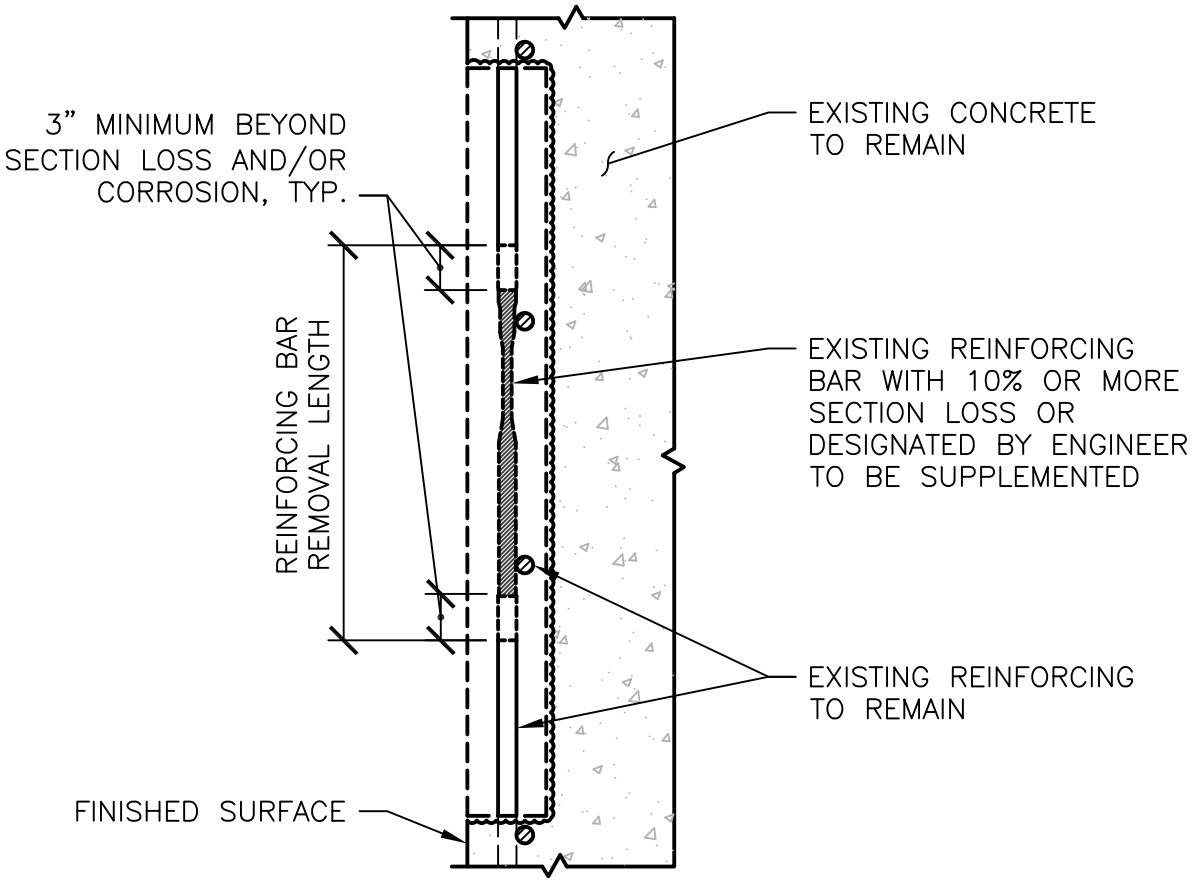
STANDARD DESIGN DETAIL

LAP SPLICE LENGTHS – OPTION 1

DRAWING NO. 633

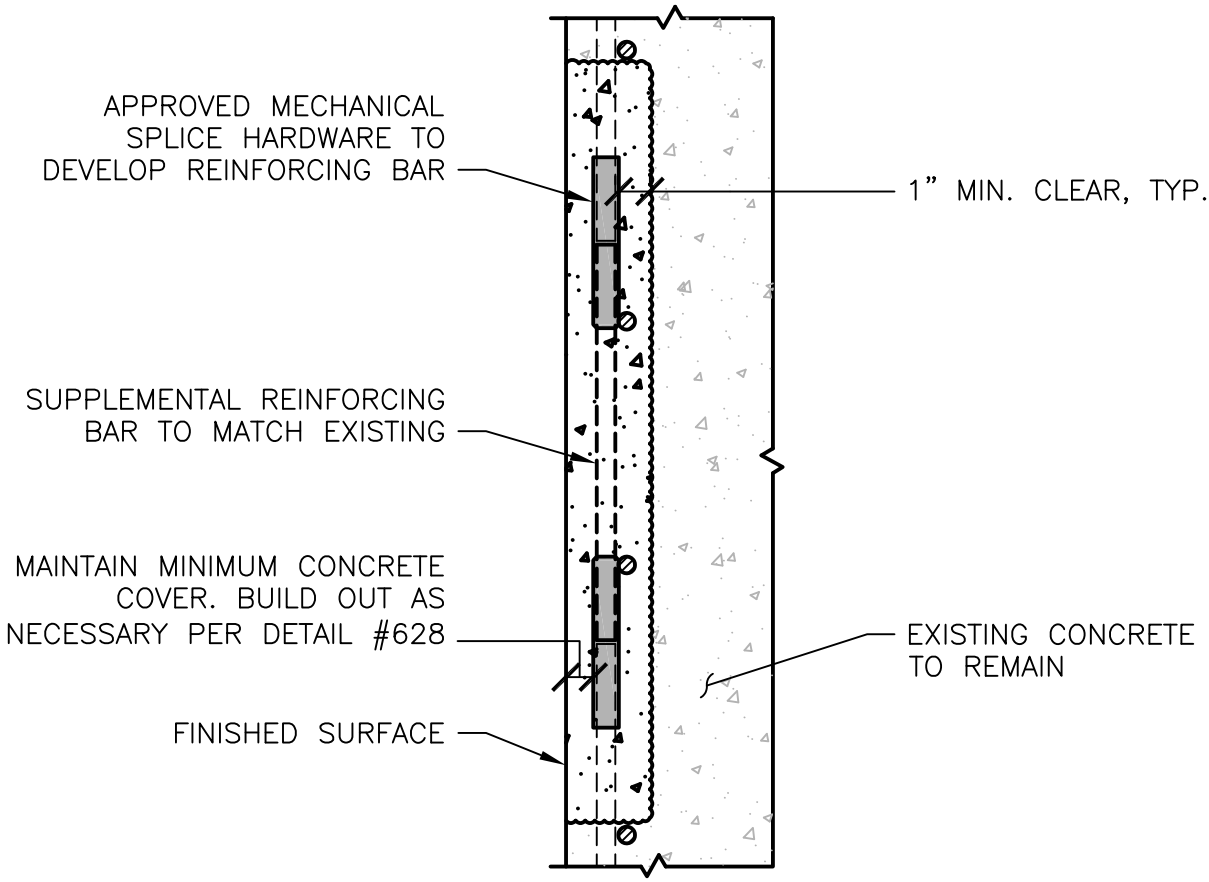
SHEET 1 OF 1

DATE 1/2021



NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 634
	MECHANICAL SPLICE – OPTION 2 TYPICAL REMOVAL SECTION	SHEET 1 OF 1
		DATE 1/2021

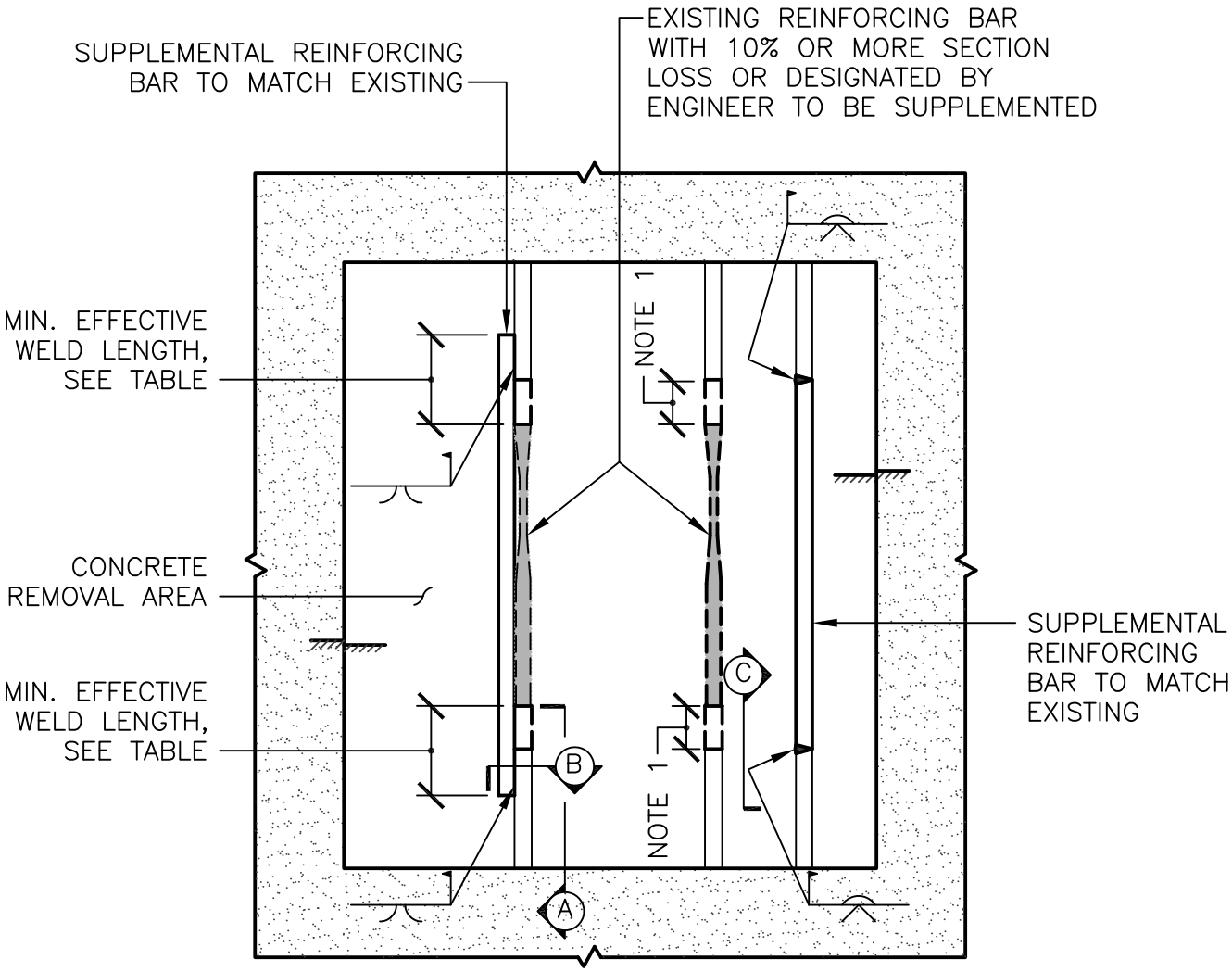


NOTES:

1. GALVANIC ANODES NOT SHOWN FOR CLARITY. REFER TO SPECIFICATION 03800 FOR REQUIREMENTS.

NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 635
	MECHANICAL SPLICE – OPTION 2 TYPICAL REBUILD SECTION	SHEET 1 OF 1
		DATE 1/2021



PLAN OR ELEVATION

NOTE 1: CUT BAR 3 INCHES MINIMUM BEYOND SECTION LOSS AND/OR CORROSION AND REMOVE

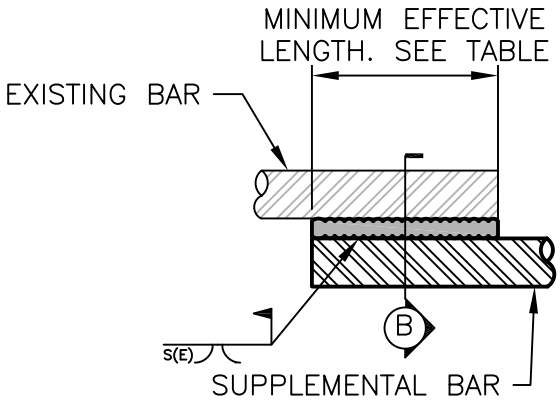
NOTE 2: SEE DETAILS 637 & 638 FOR SECTIONS

NOTE 3: GALVANIC ANODES NOT SHOWN FOR CLARITY. REFER TO SPECIFICATION 03800 FOR REQUIREMENTS.

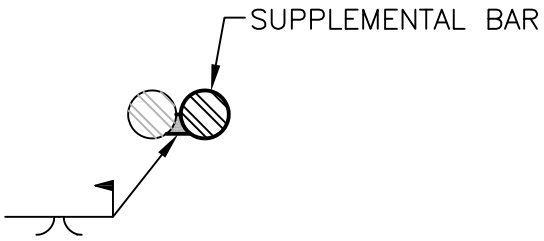
NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 636
		SHEET 1 OF 1
	WELD SPLICE – OPTION 3	DATE 1/2021

GRIND ALL EDGES SMOOTH AFTER WELDING, TYP



SECTION A – FLARE V – GROOVE WELD SPLICE



SECTION B

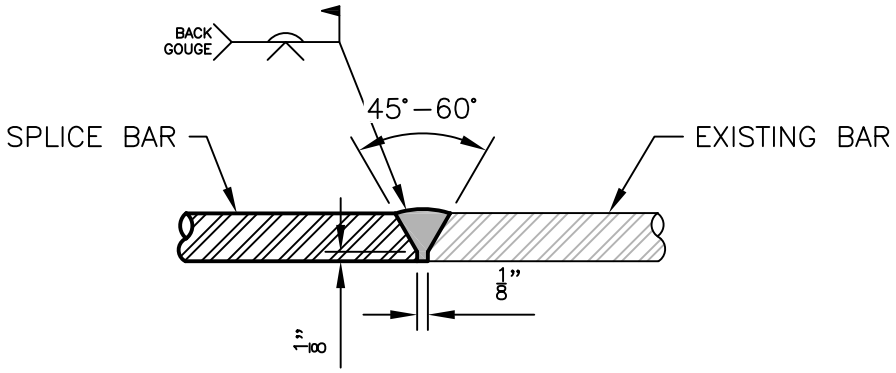
WELD SPLICE LENGTHS

BAR NO.	MINIMUM EFFECTIVE WELD LENGTH, in.	BAR RADIUS, S, in.
3	3.5	0.188
4	4.5	0.250
5	5.5	0.313
6	7.0	0.375
7	8.0	0.438
8	9.0	0.500
9	10.0	0.563
10	11.5	0.625
11	12.5	0.688

E–EFFECTIVE THROAT, 0.65
BASED ON E70XX ELECTRODES

NOT TO SCALE

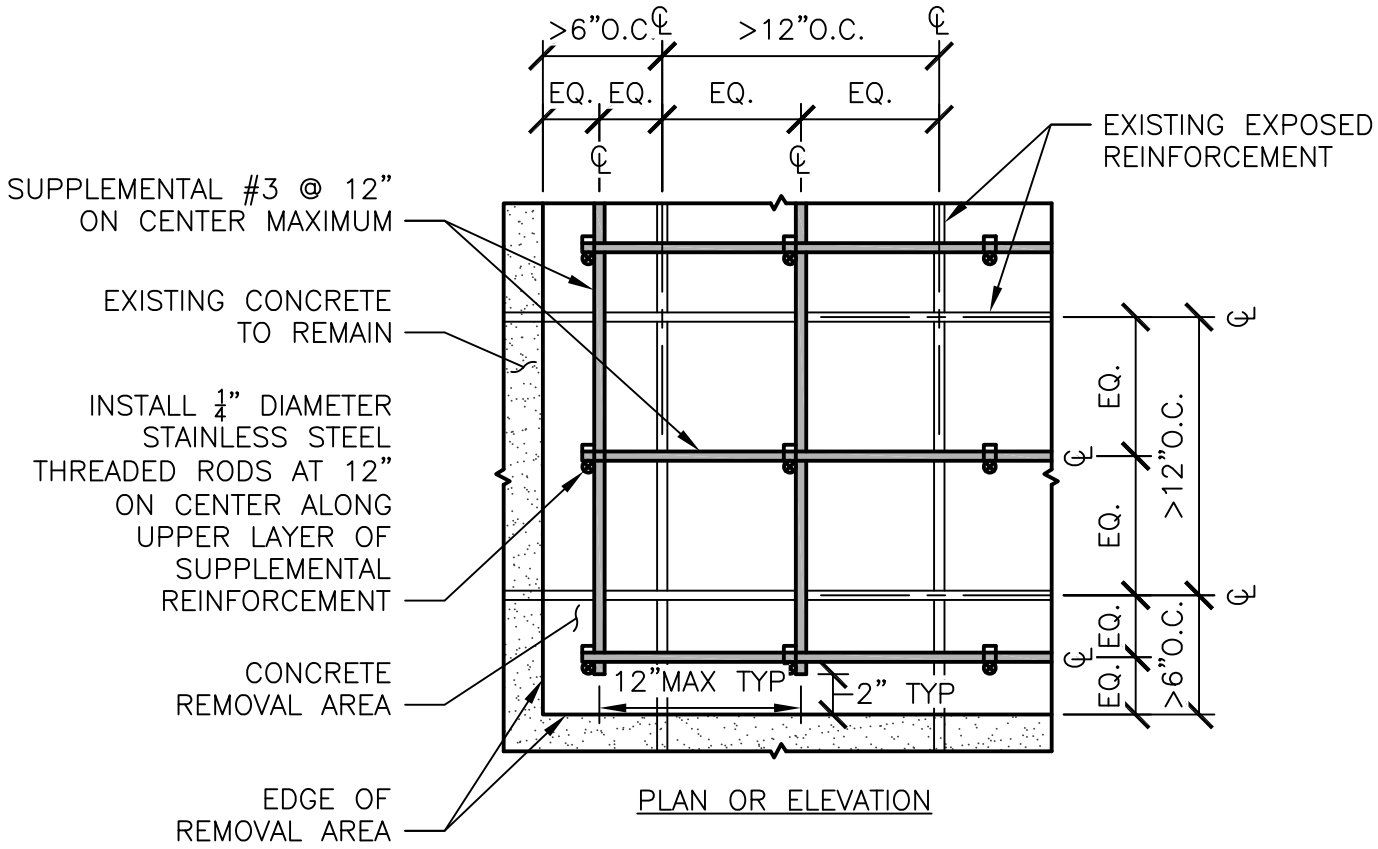
HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 637
		SHEET 1 OF 1
	WELD SPLICE DETAILS – OPTION 3	DATE 1/2021



SECTION C – SINGLE V – GROOVE WELD SPLICE

NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 638
		SHEET 1 OF 1
	WELD SPLICE DETAILS – OPTION 3	DATE 1/2021



NOTES:
PROVIDE SUPPLEMENTAL REINFORCEMENT FOR EXISTING REINFORCEMENT THAT:

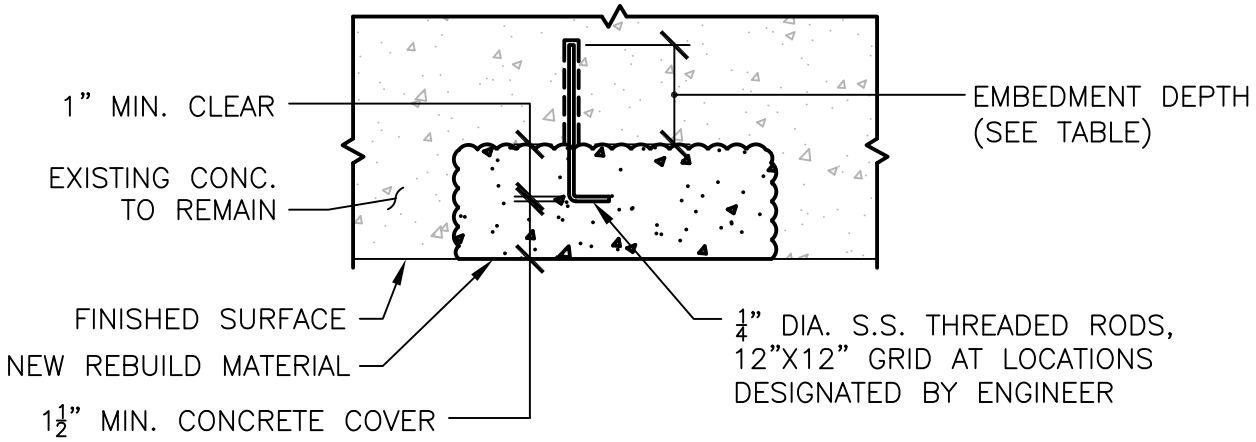
1. IS LOCATED 3" OR MORE BELOW NEW CONCRETE SURFACE; OR

2. HAS PROVIDED 2" MINIMUM CLEAR COVER, BUT SPACED GREATER THAN 12" O.C.

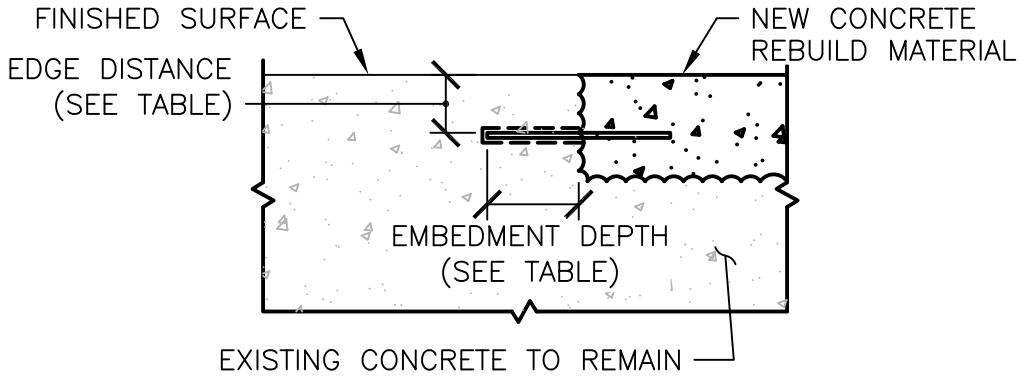
3. IS LOCATED 6" OR MORE FROM EXISTING CONCRETE TO REMAIN.

NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 639
		SHEET 1 OF 1
	SUPPLEMENTAL REINFORCEMENT REQUIREMENTS	DATE 1/2021



TYPICAL SECTION AT CONC. REMOVAL AREAS – VERTICAL AND OVERHEAD SURFACES



ADHESIVE–GROUTED DOWEL LAYOUT DIMENSIONS

DOWEL SIZE	ALLOWABLE TENSION LOAD PER ANCHOR, lbs	MINIMUM EMBEDMENT DEPTH, in.	MINIMUM CONCRETE THICKNESS, in.	MINIMUM EDGE DISTANCE, in.	MINIMUM SPACING, in.
¼"ø	950	3	6	4.0	8.0
#3	2,100	4	6	6.0	12.0
#4	2,800	4	6	6.0	12.0

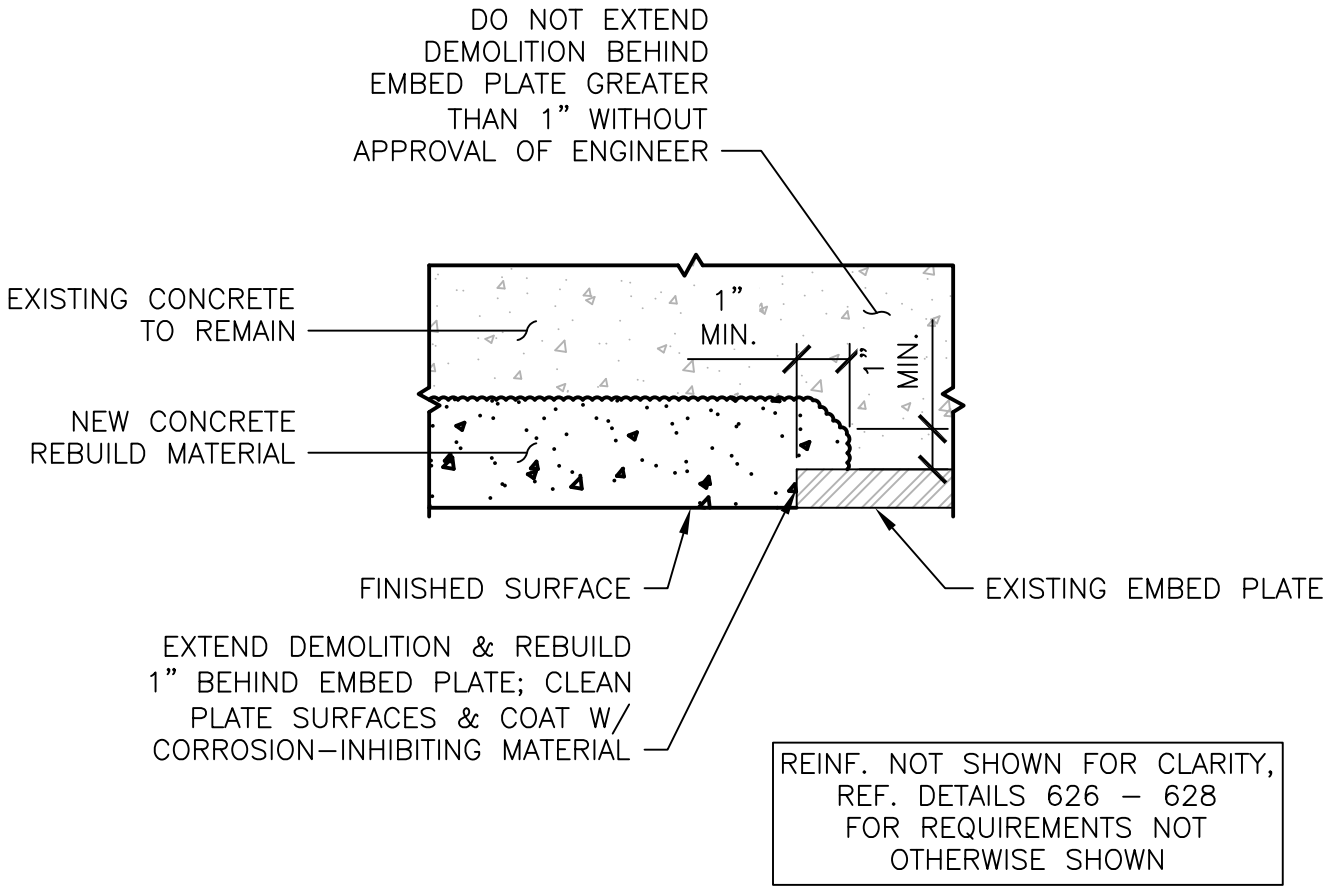
NOTES:

1. TABLE VALUES FOR SINGLE ANCHORS IN TENSION ONLY; REINFORCING STEEL YIELD STRENGTH OF 60 KSI; THREADED RODS A276, TYPE 316, YIELD STRENGTH OF 30 KSI; HILTI HIT–HY 200 OR HILTI HIT–RE 500 V3 ADHESIVE, 4,000 PSI CONCRETE.

2. IF CONDITIONS ARE DIFFERENT THAN THOSE LISTED ABOVE, TABLE VALUES SHALL BE ADJUSTED BY A LICENSED PROFESSIONAL ENGINEER BASED ON ACTUAL DOWEL SYSTEM USED AND REQUIRED DOWEL CAPACITY.

NOT TO SCALE

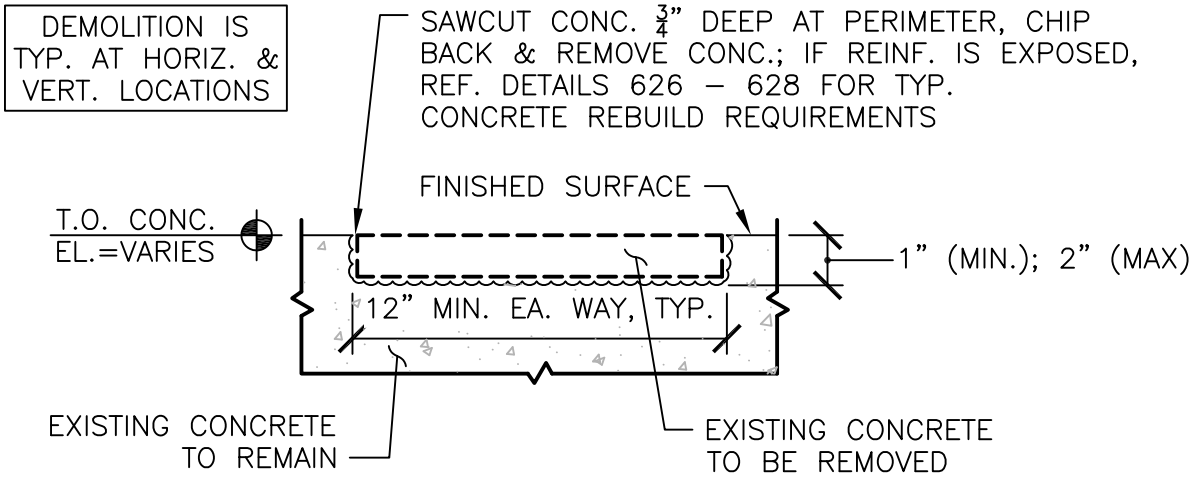
HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 640
		SHEET 1 OF 1
	ADHESIVE–GROUTED DOWEL LAYOUT	DATE 1/2021



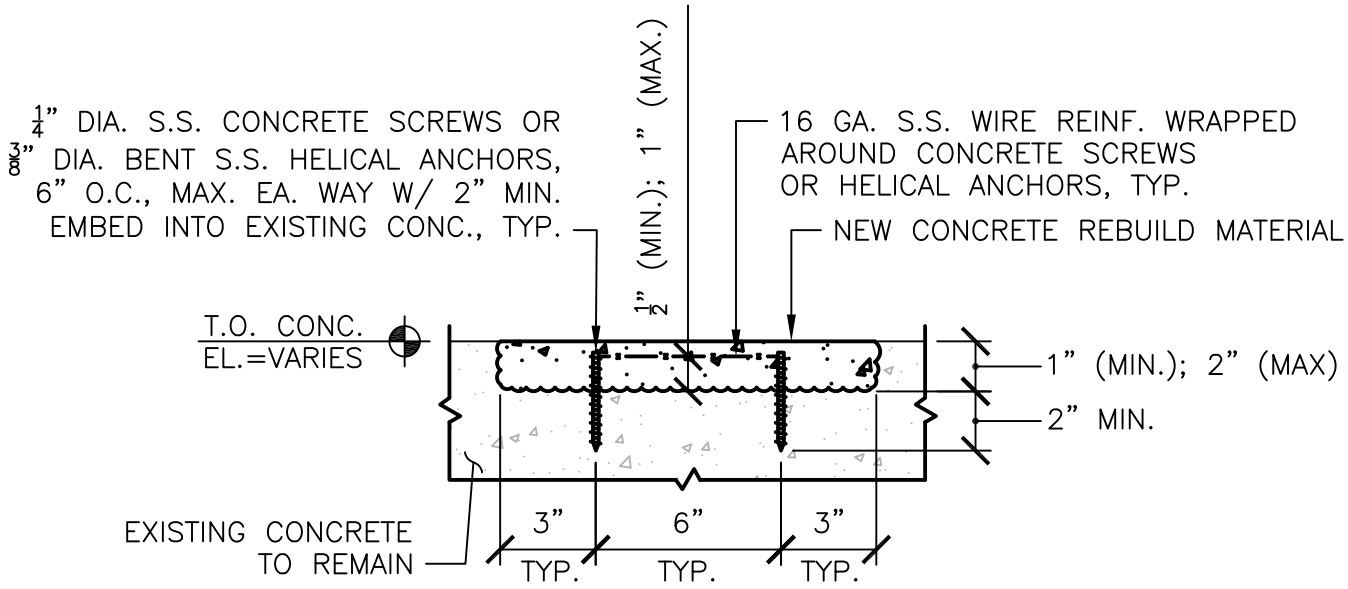
REINF. NOT SHOWN FOR CLARITY, REF. DETAILS 626 – 628 FOR REQUIREMENTS NOT OTHERWISE SHOWN

NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 641
	TYPICAL CONCRETE REBUILD SECTION AT EMBED PLATE	SHEET 1 OF 1
		DATE 1/2021



DEMOLITION

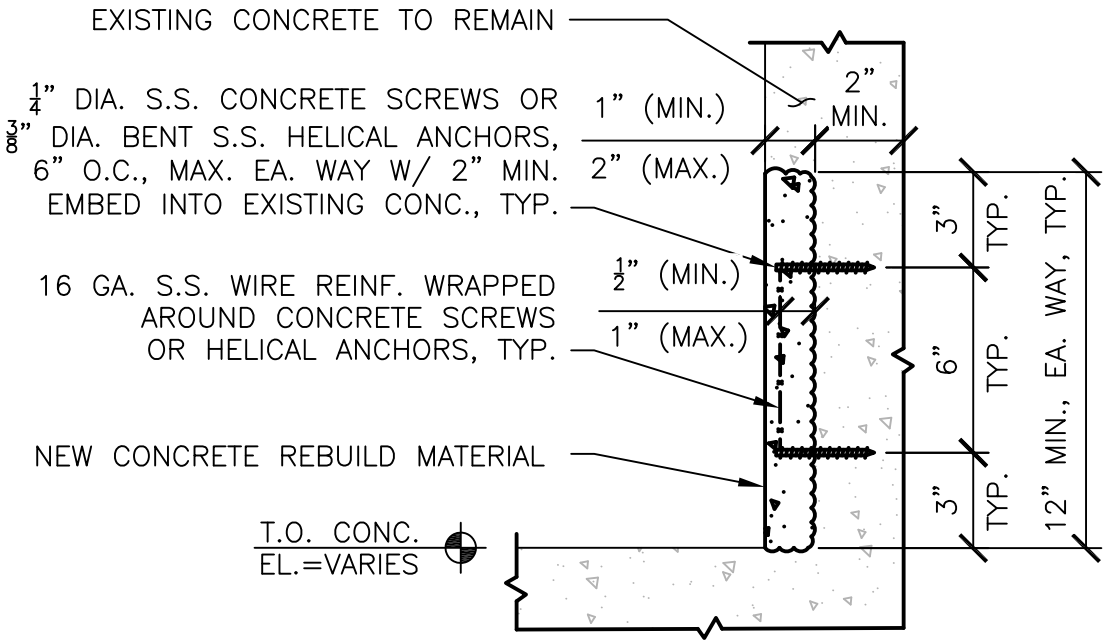


SHALLOW CONCRETE REBUILD – HORIZONTAL

NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 642
	SHALLOW DEPTH (2" MAX) CONCRETE REBUILD HORIZONTAL	SHEET 1 OF 1
		DATE 1/2021

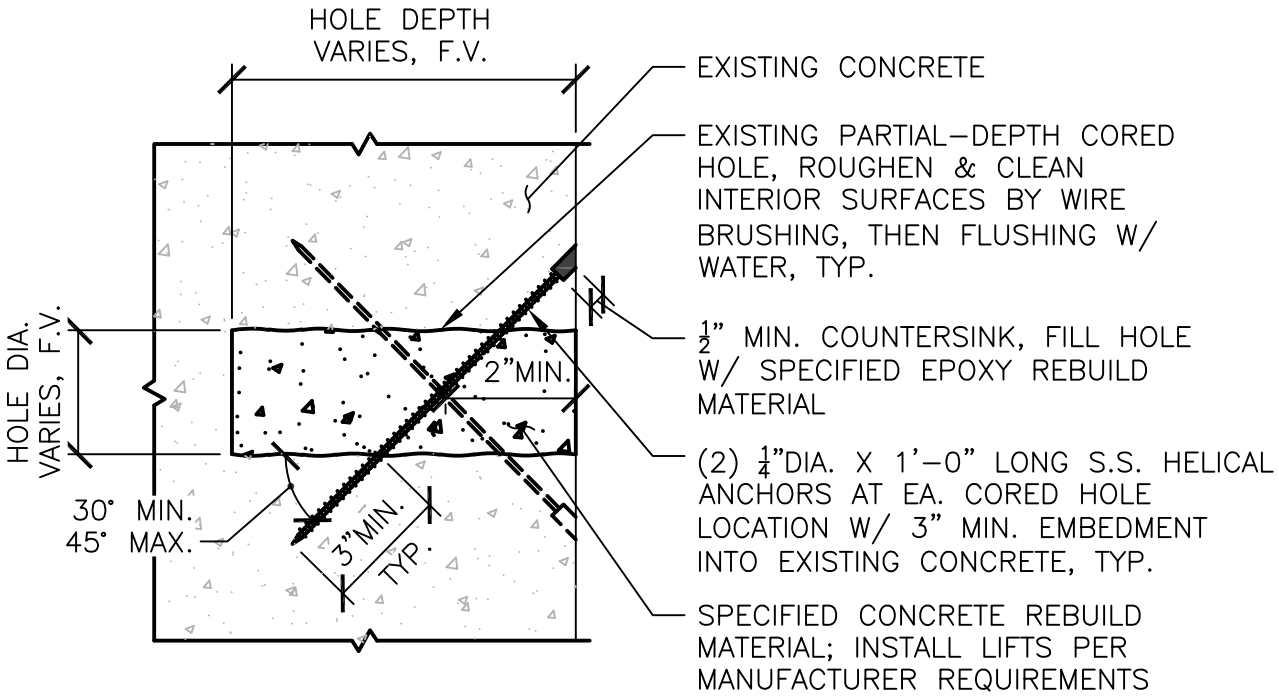
REF. DETAIL #642 FOR TYPICAL DEMOLITION REQUIREMENTS



SHALLOW CONCRETE REBUILD – VERTICAL

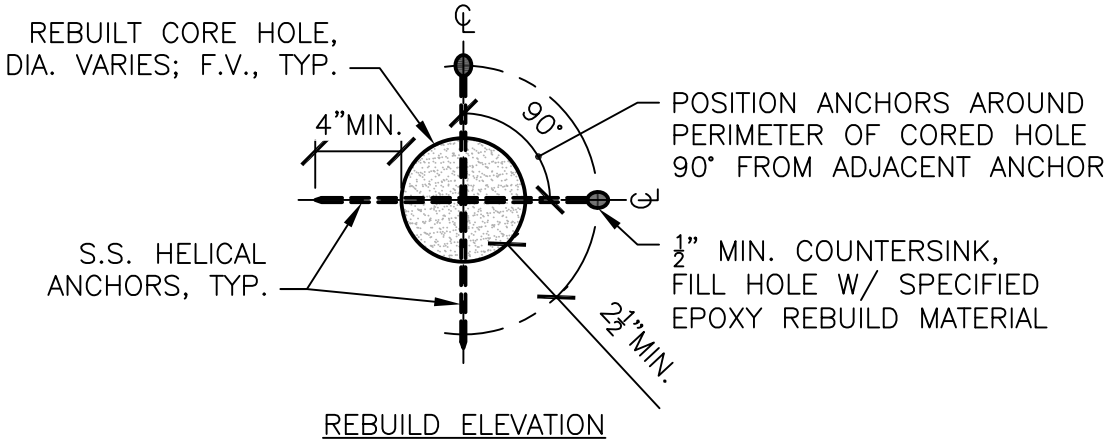
NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 643
	SHALLOW DEPTH (2" MAX) CONCRETE REBUILD VERTICAL	SHEET 1 OF 1
		DATE 1/2021



REBUILD SECTION

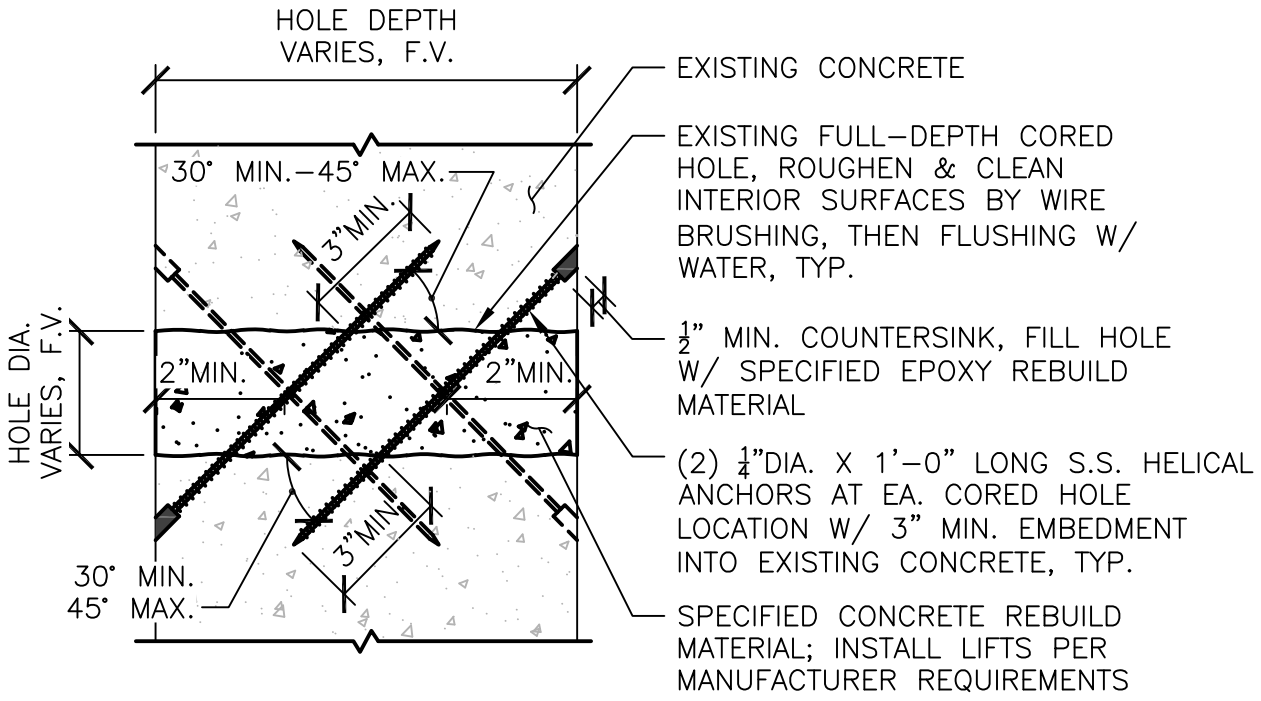
INSTALL ANCHORS AROUND PERIMETER OF CORED HOLE PER FIGURE BELOW, TYP.



REBUILD ELEVATION

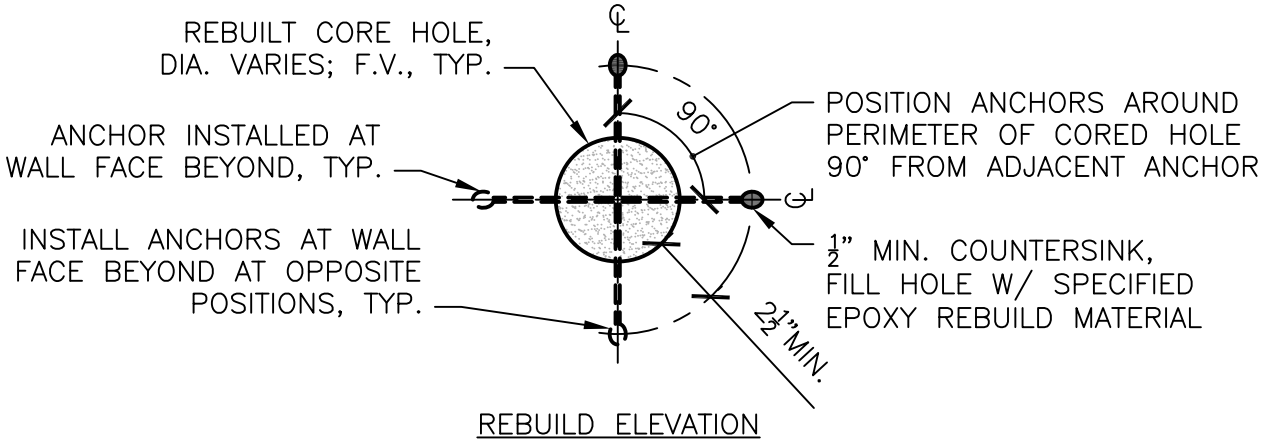
NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 644
		SHEET 1 OF 1
	PARTIAL–DEPTH CORE HOLE CONCRETE REBUILD	DATE 1/2021



REBUILD SECTION

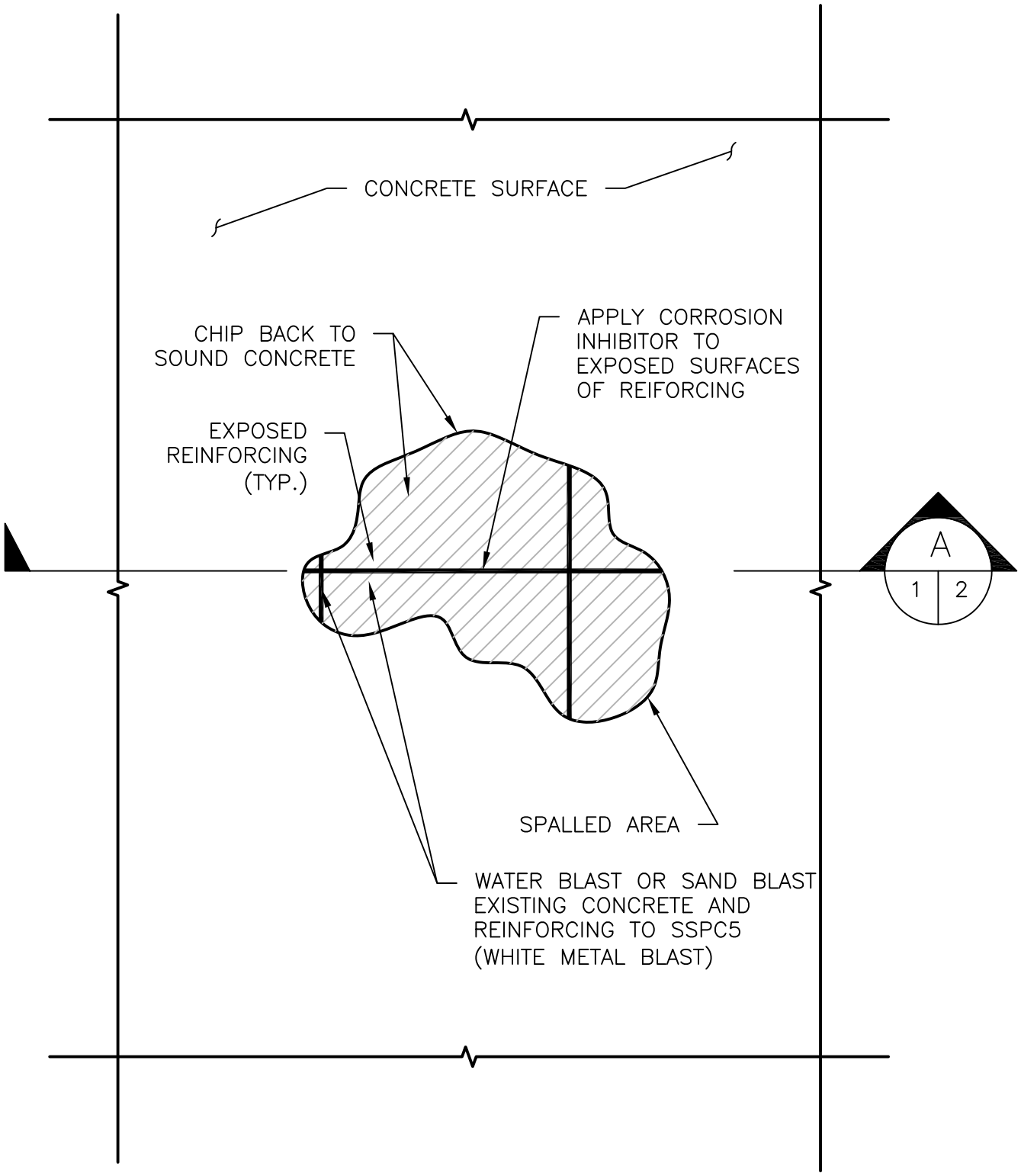
INSTALL ANCHORS AROUND PERIMETER OF CORED HOLE PER FIGURE BELOW, TYP.



REBUILD ELEVATION

NOT TO SCALE

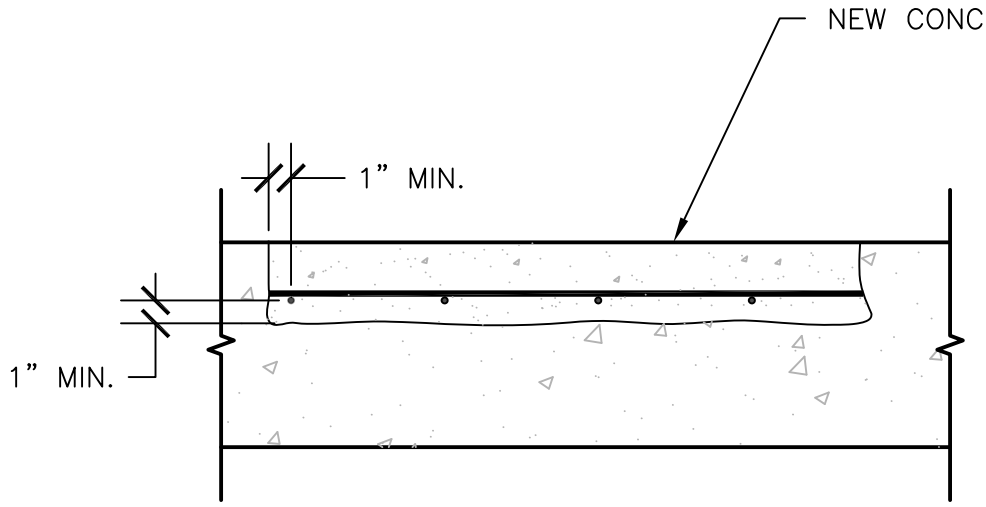
HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 645
		SHEET 1 OF 1
	FULL–DEPTH CORE HOLE CONCRETE REBUILD	DATE 1/2021



SEE DETAIL 646B FOR SECTION VIEW AND NOTES

NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 646A
	TYPICAL SPALL REPAIR WITH EXPOSED REINFORCING STEEL	SHEET 1 OF 2
		DATE 1/2021



SECTION A-1-2

SCALE: NTS

NOTES:

1. IF SECTION LOSS OF REBAR IN A MEMBER (SLAB AREA, BEAM OR COLUMN) EXCEEDS 25% THIS REPAIR SHALL BE REVIEWED BY A STRUCTURAL ENGINEER.

2. WATER BLAST OR SAND BLAST EXPOSED CONCRETE AND REBAR (SSPC5 WHITE METAL BLAST) IN SPALLED AREA.

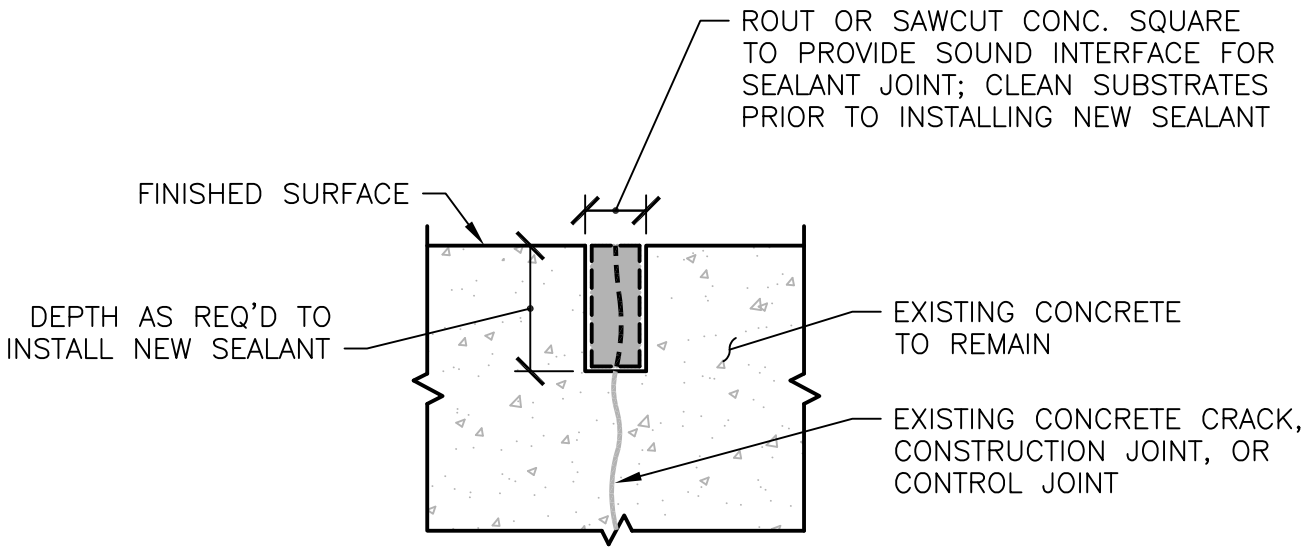
3. CHIP OUT CONCRETE AROUND EXISTING REBAR TO LEAVE A ONE INCH SPACE (MIN.) BETWEEN REBAR AND CONCRETE. CHIP BACK FURTHER IF NECESSARY TO ACHIEVE SOUND CONCRETE.

4. ROUGHEN CONCRETE SURFACE, CLEAN DEBRIS AND DIRT FROM REPAIR AREA, COAT REBAR WITH CORROSION INHIBITOR. WET CONCRETE SURFACE PRIOR TO PLACING NEW CONCRETE.

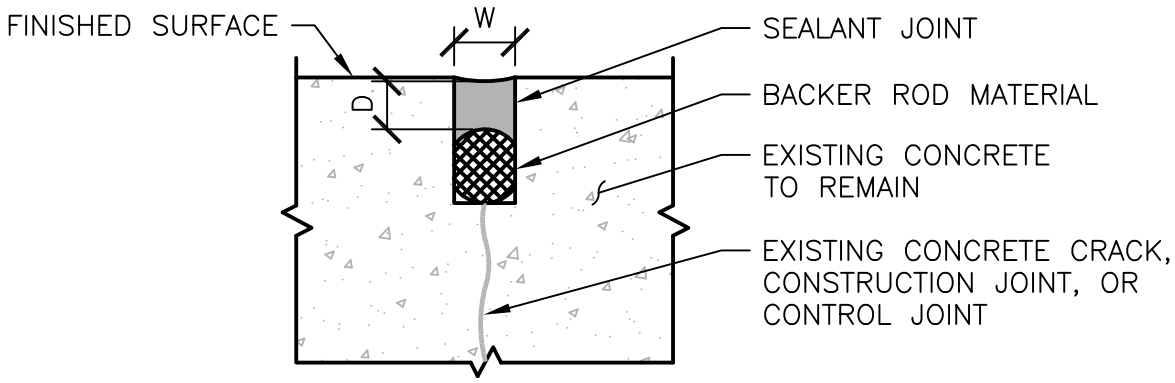
5. CORROSION INHIBITOR SHALL MEET REQUIREMENT OF ASTM C1582.

6. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF (f'c) 5000 psi AT AN AGE OF 28 DAYS. MAXIMUM WATER–CEMENT RATIO (W/C) SHALL BE 40% BY WEIGHT. CEMENT SHALL BE ASTM C150 TYPE II WITH A MAXIMUM OF 0.6% ALKALIS BY WEIGHT. CONCRETE SHALL CONTAIN 7% SILICA FUME OR 15% FLYASH AS WEIGHT PERCENT OF CEMENTITIOUS MATERIALS.

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 646B
	TYPICAL SPALL REPAIR WITH EXPOSED REINFORCING STEEL	SHEET 2 OF 2
		DATE 1/2021



CONCRETE REMOVAL & SURFACE PREPARATION



SEALANT JOINT INSTALLATION

HORIZONTAL SEALANT JOINT NOTES

1. IF $W<\frac{1}{2}$"; D=W; $\frac{1}{4}$" MIN.
2. IF $W>\frac{1}{2}$" TO 1"; $D=(\frac{1}{2})W$
3. IF $W>1$"; D=$\frac{1}{2}$"
4. ENSURE BACKER ROD DIA. IS 25%(±) LARGER THAN WIDTH OF THE JOINT, TYP.

NOT TO SCALE

HRSD	STANDARD DESIGN DETAIL	DRAWING NO. 651
		SHEET 1 OF 1
	TYPICAL SEALANT DETAILS	DATE 1/2021