


CORR. VINYL WITH CAST-IN-PLACE CONC. SEAWALL GENERAL NOTES

1. THESE SPECIFICATIONS SHOW TYPICAL DETAILS FOR CORRUGATED VINYL FORMS WITH CAST-IN-PLACE CONCRETE SEAWALLS WHICH ARE TO BE CONSTRUCTED IN THE CITY OF CAPE CORAL. INDIVIDUAL SEAWALL DESIGN IS THE RESPONSIBILITY OF THE PERMITEE AND MUST BE PERFORMED BY A FLORIDA REGISTERED PROFESSIONAL ENGINEER WHO SHALL BE THE ENGINEER OF RECORD FOR THE PROJECT. THESE SPECIFICATIONS ARE TYPICAL DETAILS ONLY AND ARE NOT INTENDED TO BE A FINAL SEAWALL DESIGN RELATING TO A SPECIFIC SITE.

2. THE ENGINEER OF RECORD (EOR) SHALL BE RESPONSIBLE FOR CERTIFYING THE FOLLOWING AS PART OF THE FINAL SEAWALL DESIGN:
 - a. EOR OR THEIR REPRESENTATIVE VISITED THE PROJECT SITE, AND INCORPORATED ALL SITE-SPECIFIC CONDITIONS, METHOD OF CONSTRUCTION, AND LOADS INTO FINAL DESIGN.
 - b. FINAL SEAWALL DESIGN CALCULATIONS AND CONSTRUCTION DOCUMENTS MUST BE SIGNED AND SEALED BY A FLORIDA REGISTERED PROFESSIONAL ENGINEER WITH STRUCTURAL EXPERIENCE.
 - c. IN ADDITION TO FINAL SEAWALL DESIGN, THE EOR SHALL CERTIFY THAT THE FOLLOWING SEAWALL ELEMENTS WERE CONSTRUCTED IN ACCORDANCE WITH THEIR PLANS AND SPECIFICATIONS:
 - c.1. ALIGNMENT OF SEAWALL
 - c.2. PENETRATION OF SEAWALL INTO SEABED
 - c.3. SEAWALL CAP REINFORCING AND PLACEMENT
 - c.4. DEADMAN ANCHORS, REINFORCING, AND TIE-BACK PLACEMENT


3. SEAWALL DESIGN CRITERIA:
 - a. THE FOLLOWING DESIGN CRITERIA IS APPLICABLE FOR A CORRUGATED VINYL SHEET PILE WALL WITH CAST-IN-PLACE CONCRETE SEAWALL PLACED IN FRONT OF AN EXISTING PRECAST CONCRETE SEAWALL (TO REMAIN IN PLACE) WITH A 7' EXPOSED HEIGHT ABOVE THE MUDLINE.
 - b. DESIGN SPECIFICATIONS: DESIGN SHALL BE IN ACCORDANCE WITH THE CURRENT EDITION OF FLORIDA BUILDING CODE RESIDENTIAL, ASCE/SEI 24 FLOOD RESISTANT DESIGN AND CONSTRUCTION, ASCE 7 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES, ACI 318 BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE, AND U.S. ARMY CORPS OF ENGINEERS ENGINEERING AND DESIGN MANUAL EM 1110-2-2504 DESIGN OF SHEET PILE WALLS.
 - c. EXISTING PRECAST CONCRETE SEAWALL MAY REMAIN IN PLACE SUBJECT TO THE FOLLOWING CRITERIA:
 - c.1. EXISTING SEAWALL CAP MUST BE SOUND, WITHIN ORIGINAL VERTICAL ALIGNMENT ($\pm\frac{1}{2}$ ") AND WITHIN ORIGINAL HORIZONTAL ALIGNMENT (WITH NO OUTWARD MOVEMENT IN TOWARDS THE CANAL).
 - c.2. EXISTING PRECAST SEAWALL PANEL MUST HAVE LESS THAN 2" HORIZONTAL MOVEMENT (WATERWARD OR LANDWARD) FROM ITS ORIGINAL PLUMB INSTALLATION.
 - c.3. THESE SPECIFICATIONS MAY NOT BE USED IF THE EXISTING PRECAST SEAWALL (TO REMAIN IN PLACE) DOES NOT MEET THE ABOVE CRITERIA.
 - d. DESIGN LOAD COMBINATIONS: (OR AS APPROVED BY THE EOR)
 - d.1. LOW TIDE CANAL WATER (WATERWARD OF WALL) AT 5.5' BELOW NEW SEAWALL CAP, PLUS WATER LEVEL LANDWARD OF WALL AT 3' BELOW NEW SEAWALL CAP, PLUS EARTH PRESSURE, PLUS 200 psf SURCHARGE LOAD.
 - d.2. CANAL WATER (WATERWARD OF WALL) AT MUDLINE (7' MAXIMUM BELOW NEW SEAWALL CAP), PLUS WATER LEVEL LANDWARD OF WALL AT 3' BELOW NEW SEAWALL CAP, PLUS EARTH PRESSURE, AND NO SURCHARGE LOAD.
 - e. SOIL ASSUMED AS LOOSE FINE SAND. ALTERNATE SOIL TYPES MAY BE CONSIDERED IF A SITE SPECIFIC GEOTECHNICAL SOILS ENGINEERING REPORT IS PREFORMED AND PROVIDED.

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ADOPTED BY CITY COUNCIL	 CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD	TITLE	SHEET NO.
11-03-2021		CORR. VINYL WITH CONC SEAWALL GENERAL NOTES	H-3A
		REVISIONS:	

- f. SEABED (WATERWARD OF WALL) SLOPING DOWN AND AWAY FROM WALL AT 1:5 (V:H) SLOPE MAXIMUM.
 - g. FINISHED GRADE (LANDWARD OF WALL) SLOPING UP AND AWAY FROM SEAWALL CAP AT 1:4 (V:H) SLOPE MAXIMUM.
 - h. CORRUGATED VINYL SHEETING:
 - h.1. DEPTH = 8" MAX
 - h.2. MODULUS OF ELASTICITY = 380,000 psi MIN
 - h.3. MOMENT OF INERTIA, I = 57 in⁴/ft MIN
 - h.4. SECTION MODULUS, Z = 14.3 in³/ft MIN
 - h.5. ALLOWABLE DESIGN STRESS = 3200 psi MIN
 - h.6. COLOR = GREY
 - h.7. INSTALLED VERTICAL ALIGNMENT TOLERANCE = ¼" per foot
 - h.8. PROJECTION ABOVE MUDLINE = 7' (TOP OF CAP) (SEE SEAWALL MATRIX)
 - h.9. EMBEDMENT BELOW MUDLINE = 50% PENETRATION OF PANEL. (OR AS APPROVED BY THE EOR)
 - h.10. IF LIMESTONE ROCK IS ENCOUNTERED PRIOR TO FULL EMBEDMENT DEPTH, EMBED VINYL SHEETING 2' MINIMUM INTO LIMESTONE ROCK AFTER USING A STEEL PUNCH TO PUNCH A KEYWAY IN LIMESTONE ROCK FOR NEW VINYL SHEETING. IF LIMESTONE ROCK IS LESS THAN 2' THICK, PANEL MUST BE ADVANCED DOWN TO FULL 50% PENETRATION.
 - h.11. ALTERNATE TOE WALER BRACING IN ROCK MAY BE ALLOWED AS FOLLOWS. EMBED VINYL SHEETING 1' MINIMUM INTO LIMESTONE ROCK AFTER USING A STEEL PUNCH TO PUNCH A KEYWAY IN LIMESTONE ROCK FOR NEW VINYL SHEETING. A CONTINUOUS TOE WALER WITH ANCHOR PINS BRACING SYSTEM MUST BE ENGINEERED TO ACCOMMODATE SITE CONDITIONS AND BE DESIGNED FOR A MINIMUM HORIZONTAL COMPONENT WORKING LOAD OF 1150 PLF. ANCHOR PINS SHALL BE DESIGNED CONSIDERING BOTH SHEAR AND BENDING. PREDRILL ANCHOR PINS 3'-0" MINIMUM INTO ROCK. ALLOWABLE WALER MATERIALS: STAINLESS STEEL, STRUCTURAL PLASTIC, OR PRECAST CONCRETE. ALLOWABLE PIN MATERIALS: CARBON STEEL REBAR ASTM A615, GRADE 60 (ALLOW FOR 0.20" CORROSION ALL AROUND), –OR– STAINLESS STEEL REBAR ASTM A995, GRADE 60 (NO ALLOWANCE FOR CORROSION REQUIRED). CONTRACTOR TO OBTAIN APPROVAL FROM PUBLIC WORKS DEPT. BEFORE CONSTRUCTING.
 - h.12. SEAWALL ELEVATION OPTIONS PER SEAWALL MATRIX. IN CASES WHERE NEW SEAWALL ELEVATION IS HIGHER AT PROPERTY LINE, NEW SEAWALL ENDS SHALL BE LEVEL WITH SITE SPECIFIC DESIGN RETURN.
 - h.13. WORK TO BE PERFORMED IN ACCORDANCE WITH ARMY CORPS OF ENGINEERS (ACOE) PERMITTING GUIDELINES.
 - i. MAXIMUM DISTANCE FROM CANAL FACE OF EXISTING PRECAST SEAWALL PANEL (JUST BELOW EXISTING CAP) TO CANAL FACE OF NEW SEAWALL CAP = 18".
 - j. CONCRETE INSTALLED BETWEEN EXISTING PRECAST SEAWALL AND NEW CORRUGATED VINYL WALL PANEL SHALL BE POURED DOWN TO MUDLINE AND INSTALLED PER FDOT SPECIFICATION TREMIES AND PUMPS.
4. CONSTRUCTION IS TO CONFORM TO CURRENT FLORIDA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION. FDOT SPECS APPLY WHERE REFERENCE IS MADE TO A SPECIFIC SECTION.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PRESERVATION OF ALL CONSTRUCTION STAKES UNTIL THE SEAWALL IS INSTALLED AND APPROVED.

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ADOPTED BY CITY COUNCIL	 <p style="text-align: center;">CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	TITLE		SHEET NO.
11-03-2021		CORR. VINYL WITH CONC SEAWALL GENERAL NOTES		H-3B
		REVISIONS:		

6. CONCRETE SHALL BE TYPE II CEMENT, CLASS III CONCRETE AND HAVE A MINIMUM COMPRESSIVE STRENGTH OF 5000 psi AT 28 DAYS AND COMPLY WITH FDOT SPECIFICATION PORTLAND CEMENT CONCRETE.
7. REINFORCING STEEL SHALL BE AS FOLLOWS AND SHALL BE PLACED IN ACCORDANCE WITH FDOT SPECIFICATION REINFORCING STEEL.
 - a. SEAWALL PANEL, SEAWALL CAP, AND DEADMAN: LOW-CARBON CHROMIUM STEEL REBAR ASTM A1035 CS, GRADE 100 (DO NOT WELD OR FIELD BEND). (OR AS APPROVED BY THE EOR)
 - b. TIE RODS: LOW-CARBON CHROMIUM STEEL REBAR ASTM A1035 CS, GRADE 100 (DO NOT WELD OR FIELD BEND), -OR- STAINLESS STEEL REBAR ASTM A995, GRADE 60, -OR- STAINLESS STEEL THREADED ROD 316 L (UNS S31603). (OR AS APPROVED BY THE EOR)
8. TIE REINFORCING USING PLASTIC, POLYMER, OR NYLON COATED PLIABLE STEEL WIRE THAT READILY BENDS AND TWISTS WITHOUT BREAKING.
9. ALL EXPOSED SURFACES SHALL HAVE A CLASS 3 FINISH IN ACCORDANCE WITH FDOT SPECIFICATION FINISHING CONCRETE. ALL UNEXPOSED SURFACES ARE TO BE FREE OF HONEYCOMBING AND MAJOR IMPERFECTIONS.
10. BACK FILL BELOW TIE-RODS SHALL BE HAND-COMPACTED TO PROVIDE FULL SUPPORT OF THE TIE-RODS TO PREVENT BENDING OR FRACTURING DURING COMPACTION. BACK FILL IS TO BE COMPACTED TO A STABLE DENSITY SUCH THAT NO APPRECIABLE SETTLEMENT OCCURS AFTER COMPLETION OF WALLS.
11. THE DEAD MAN ANCHORS ARE TO BE CONSTRUCTED BY PLACING CONCRETE INTO THE SPECIFIED SIZE HOLE EXCAVATED IN UNDISTURBED GROUND. ALTERNATIVELY, ENGINEERED SOIL ANCHOR SYSTEMS MAY BE CONSIDERED IF SITE-SPECIFIC ENGINEERED AND SUBMITTED FOR APPROVAL. ENGINEERED SOIL ANCHOR SYSTEMS MAY BE GALVANIZED STEEL SYSTEMS BEYOND 5' UPLAND OF THE SEAWALL. THE FIRST 5' OF TIE ROD UPLAND OF THIS SEAWALL SHALL BE REBAR TIE ROD (WITH PVC SLEEVE) OR STAINLESS STEEL (NO SLEEVE REQUIRED). THREADED TIE RODS SHALL BE PROVIDED WITH SUBSTANTIAL ANCHORS IN SEAWALL CAP DESIGNED IN ACCORDANCE WITH ACI 318. (OR AS APPROVED BY THE EOR).
12. ROCK 6" NOMINAL DIAMETER AND LESS MAY BE LEFT IN BACKFILL. ALL OTHER ROCK IS TO BE REMOVED.
13. THE CONTRACTOR WILL BE RESPONSIBLE TO COMPLETE THE CONSTRUCTION OF THE SEAWALL IN ACCORDANCE WITH THE PERMIT CRITERIA.
14. THE CONTRACTOR WILL BE RESPONSIBLE TO PEG THE TOP ROW OF THE SOD (AT TOP OF SLOPE) WITH STANDARD SURVEY STAKES AT LEAST 12" LONG SPACED 24" APART.
15. CONTRACTOR TO SEED ALL DISTURBED AREAS UNLESS A BUILDING PERMIT IS POSTED ON SITE.
16. ALL JOB SITES SHALL HAVE SEAWALL PERMITS POSTED ON AN APPROVED PERMIT BOARD WITH RAIN SHIELD PRIOR TO BEGINNING ANY CONSTRUCTION.
17. THE CONTRACTOR SHALL BE RESPONSIBLE TO INSTALL APPROVED TURBIDITY SCREENS IN PLACE DURING ANY AND ALL CLEARING, EXCAVATING, JETTING, AND BACK FILLING OPERATIONS WHICH TOTALLY ENCLOSES THE CONSTRUCTION SITE. SCREENS ARE TO REMAIN IN PLACE 24 HOURS MINIMUM AFTER CONSTRUCTION CEASES OR UNTIL TURBIDITY LEVEL IS 20 OR LESS NTU ABOVE THE PRE-CONSTRUCTION TURBIDITY LEVEL. SCREENS MUST EXTEND FROM THE WATER SURFACES TO THE BOTTOM AND BE ADEQUATELY WEIGHTED TO KEEP THEM IN PLACE DURING ALL OPERATIONS. THERE SHALL BE ADEQUATE FLOATATION AT THE SURFACE TO PREVENT OVERFLOW. THIS FLOATATION MUST BE BRIGHTLY COLORED TO MAXIMIZE VISIBILITY.
18. ANY LOOSE DIRT OR STOCK PILES SHALL BE SURROUNDED BY SILT SCREENS AND MAINTAINED IN GOOD WORKING ORDER (AT THE EDGE OF THE TOE OF THE SLOPE) TO PREVENT RUNOFF INTO CANAL.
19. CULVERT PIPE WHERE APPLICABLE SHALL NOT PROJECT MORE THAN 6" FROM THE WATER-FACE OF THE SEAWALL OR AS APPROVED BY THE CITY.
20. REFER TO THE FDOT SPECIFICATION ON EROSION CONTROL FOR PROTECTION OF SLOPES.

ADOPTED BY CITY COUNCIL 11-03-2021	 CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD	TITLE CORR. VINYL WITH CONC SEAWALL GENERAL NOTES	SHEET NO. H-3C
		REVISIONS:	

**TABLE 1
RIVER SEAWALL MATRIX
ENGINEERING DESIGN STANDARDS (EDS)**

Seawall System		Seawall Construction		Seawall Height Increases Allowed (Inches)		
				24	12	Match
1	New or Replacement	Precast Concrete Panels & Cast-In-Place Concrete in Flat Vinyl Forms	New house - New seawall construction	M		
			Existing house - Replacement of existing seawall - full property	M		V
			Existing house - Replacement of existing seawall - partial property			X
2	Repair in front of existing seawall	Cast-In-Place Concrete in Flat Vinyl Forms or Corrugated Vinyl Sheeting	Existing house - Repair in front of existing seawall - full property	M	V	V
			Existing house - Repair in front of existing seawall - partial property			X

M = Mandatory
V = Variance
X = Allowed


**TABLE 2
SALTWATER CANAL SEAWALL MATRIX
ENGINEERING DESIGN STANDARDS (EDS)**

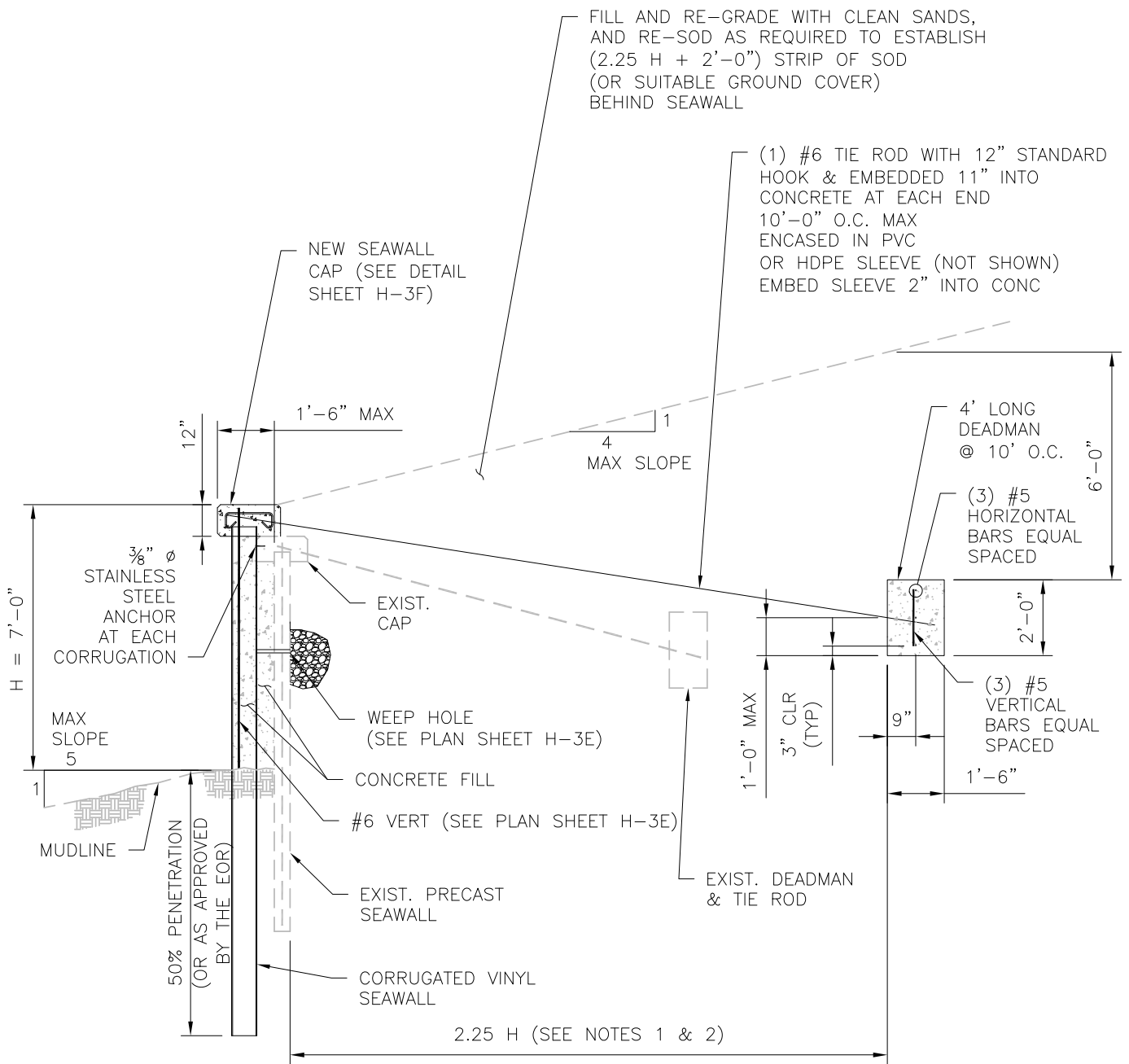
Seawall System		Seawall Construction		Seawall Height Increases Allowed (Inches)		
				24	12	Match
1	New or Replacement	Precast Concrete Panels & Cast-In-Place Concrete in Flat Vinyl Forms	New house - New seawall construction	X		X
			Existing house - Replacement of existing seawall - full property	X		X
			Existing house - Replacement of existing seawall - partial property			X
2	Repair in front of existing seawall	Cast-In-Place Concrete in Flat Vinyl Forms or Corrugated Vinyl Sheeting	Existing house - Repair in front of existing seawall - full property		X	X
			Existing house - Repair in front of existing seawall - partial property			X

X - ALLOWED

NOTES:

1. FRESH WATER CANALS – MATCH EXISTING SEAWALL ELEVATIONS.
2. SEAWALL CAPS WHICH ARE RAISED 24" ABOVE ORIGINAL SEAWALL CAP ELEVATION, CONCRETE RETURNS SHALL BE CONSTRUCTED JUST INSIDE OF EACH PROPERTY LINE EXTENDING A MINIMUM OF 5 FEET FROM THE LANDWARD EDGE OF THE REINFORCED CONCRETE SEAWALL CAP, AT AN ANGLE OF 90 DEGREES FROM THE CAP. RETURNS AND CAPS SHALL BE CONSTRUCTED IN A NEAT AND WORKMANLIKE MANNER WHICH RETAINS ALL MATERIALS FROM WASHING AWAY INTO ADJOINING PROPERTIES AND WATERWAYS. RETURNS AND CAPS SHALL HAVE A UNIFORM, SOLID, AND CONTINUOUS EXTERIOR APPEARANCE WHEN VIEWED FROM THE ADJOINING PROPERTIES AND WATERWAYS.
3. FINISHED TOP SURFACE ELEVATION OF NEW OR REPAIRED SEAWALL CAPS AND RETURNS SHALL BE LEVEL AND ELEVATED 24" ABOVE ORIGINAL CAP ELEVATION FOR NEW AND 12" ABOVE THE ORIGINAL CAP ELEVATION FOR A REPAIR.


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		REVISIONS:	

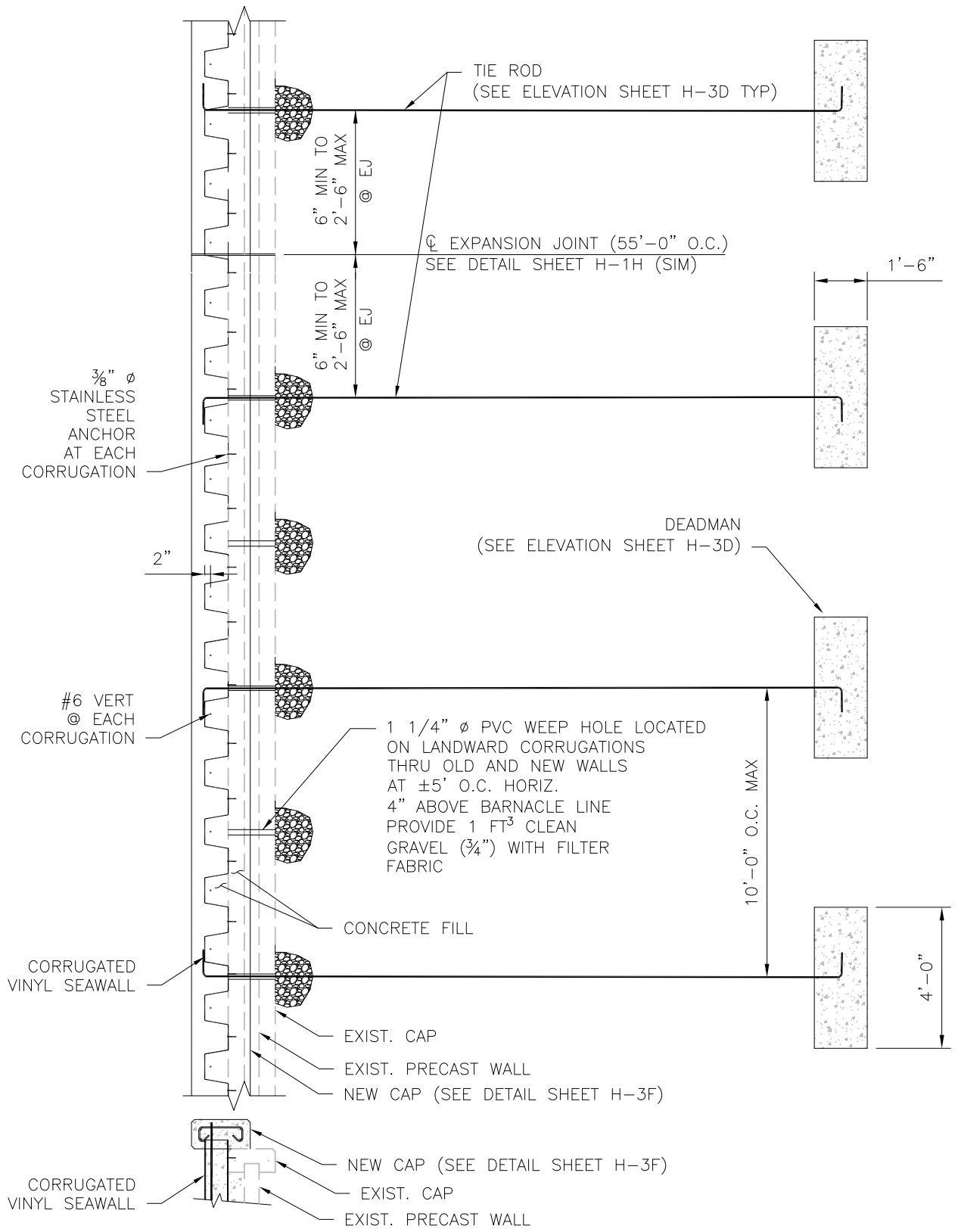


NOTES:


1. ALTERNATE TIE-ROD (STAINLESS STEEL) AND SOIL ANCHOR SYSTEMS MAY BE CONSIDERED IF ENGINEERED FOR A HORIZONTAL COMPONENT WORKING LOAD OF 1220 PLF (SPACED AT 10'-0" O.C. MAX) AND EMBEDDED 2.25 H BEHIND SEAWALL.
2. ANCHORS EMBEDDED BEHIND SEAWALL MUST BE SITE-SPECIFIC ENGINEERED.

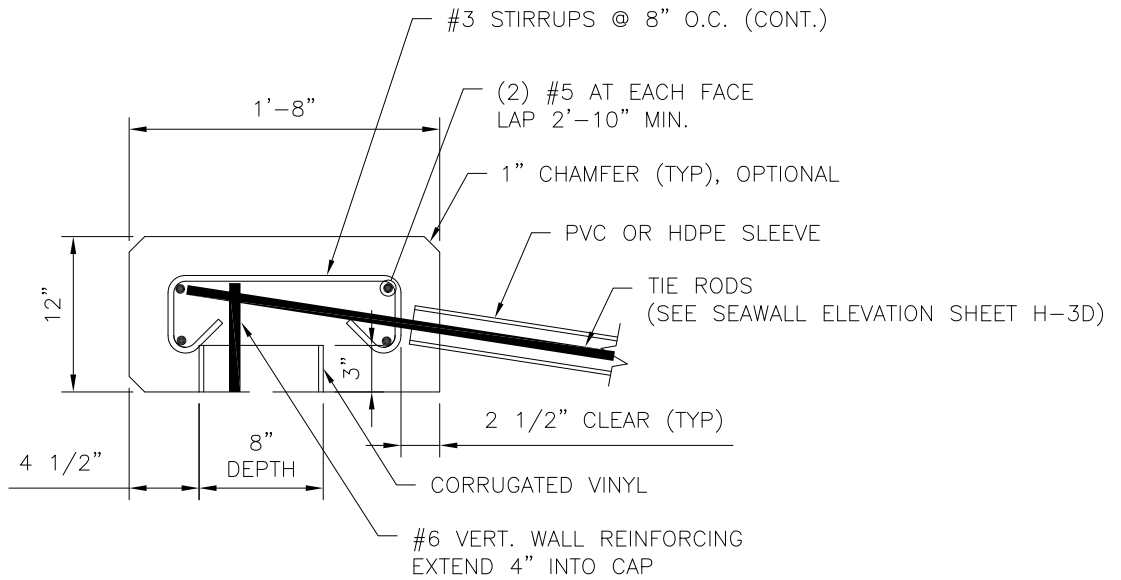
SEAWALL ELEVATION

<p>ADOPTED BY CITY COUNCIL</p> <p>11-03-2021</p>	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<p>TITLE</p> <p>CORR. VINYL WITH CONC SEAWALL TYPICAL ELEVATION</p> <p>REVISIONS:</p>	<p>SHEET NO.</p> <p>H-3D</p>
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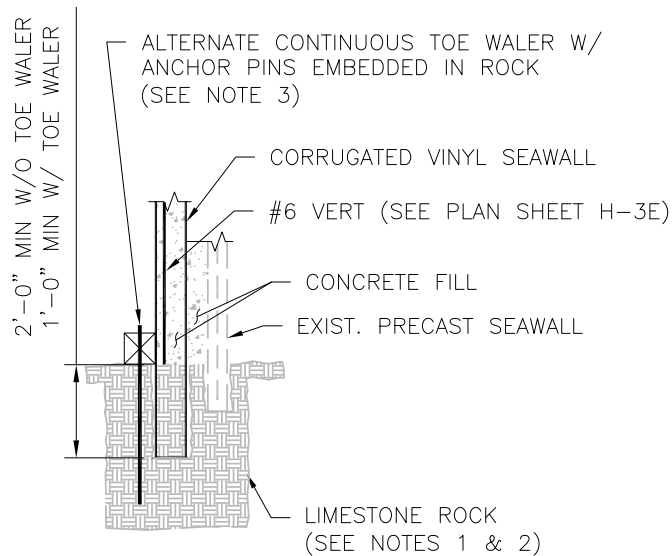


SEAWALL PLAN

<p>ADOPTED BY CITY COUNCIL</p> <p>11-03-2021</p>	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<p>TITLE</p> <p>CORR. VINYL WITH CONC SEAWALL TYPICAL PLAN</p> <p>REVISIONS:</p>	<p>SHEET NO.</p> <p>H-3E</p>
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SEAWALL CAP DETAIL

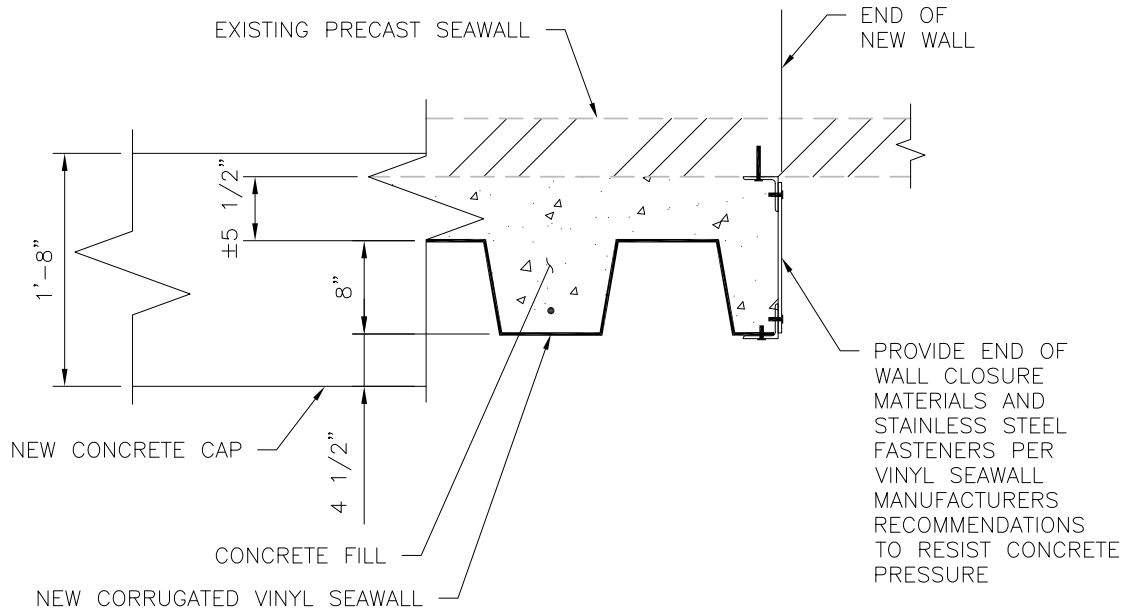


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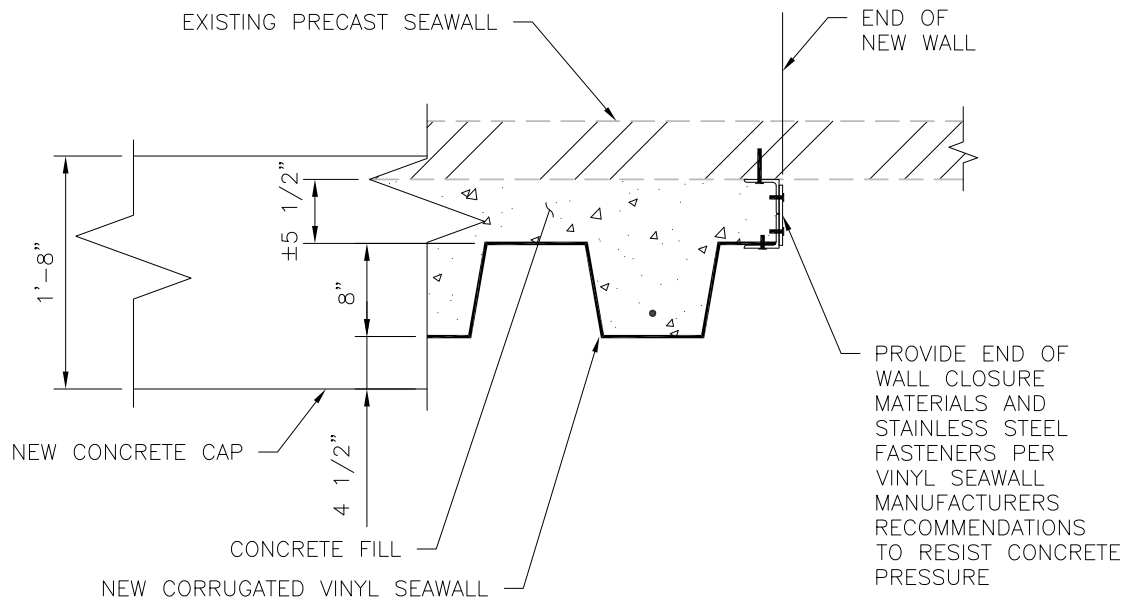
1. REFERENCE CORRUGATED VINYL WITH CAST IN PLACE CONCRETE SEAWALL SPECIFICATION GENERAL NOTE 3.h.10.
2. IF LIMESTONE ROCK IS LESS THAN 2' THICK, PANEL MUST BE ADVANCED DOWN TO FULL 50% PENETRATION.
3. REFERENCE CORRUGATED VINYL WITH CAST IN PLACE CONCRETE SEAWALL SPECIFICATION GENERAL NOTE 3.h.11.

SEAWALL WITH EXISTING PRECAST CONCRETE SEAWALL EMBEDDED IN ROCK DETAIL

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ALTERNATE 1



ALTERNATE 2

END OF WALL DETAILS

<p>ADOPTED BY CITY COUNCIL</p> <p>11-03-2021</p>	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<p>TITLE</p> <p>CORR. VINYL WITH CONC SEAWALL TYPICAL DETAILS</p> <p>REVISIONS:</p>	<p>SHEET NO.</p> <p>H-3G</p>
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