

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

1. THESE SPECIFICATIONS SHOW TYPICAL DETAILS FOR FLAT 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 FLAT VINYL FORM 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 (LANDWARD) FROM ITS ORIGINAL PLUMB INSTALLATION. NO HORIZONTAL MOVEMENT (WATERWARD) IS ALLOWED.
 - c.3. IF THE EXISTING PRECAST SEAWALL (TO REMAIN IN PLACE) DOES NOT MEET THE ABOVE CRITERIA, THE EXISTING PRECAST WALL MAY BE DEMOLISHED ENTIRELY AND A NEW FLAT VINYL FORM WITH CAST-IN-PLACE CONCRETE SEAWALL MAY BE INSTALLED IN THE ORIGINAL LOCATION MEETING THE BELOW SPECIFICATIONS.
 - 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.

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- e. SOIL ASSUMED AS LOOSE FINE SAND. ALTERNATE SOIL TYPES MAY BE CONSIDERED IF A SITE SPECIFIC GEOTECHNICAL SOILS ENGINEERING REPORT IS PERFORMED AND PROVIDED.
 - 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. FLAT VINYL FORM SHEETING:
 - h.1. DEPTH = 8" MAX
 - h.2. MODULUS OF ELASTICITY = 380,000 psi MIN
 - h.3. MOMENT OF INERTIA, $I = 66 \text{ in}^4/\text{ft}$ MIN
 - h.4. SECTION MODULUS, $Z = 16.6 \text{ in}^3/\text{ft}$ MIN
 - h.5. ALLOWABLE DESIGN STRESS = 3200 psi MIN
 - h.6. COLOR = GREY
 - h.7. INSTALLED VERTICAL ALIGNMENT TOLERANCE = $\frac{1}{4}$ " 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, ALTERNATE PINNING IN ROCK MAY BE UTILIZED. IF LIMESTONE ROCK IS LESS THAN 2' THICK, PANEL MUST BE ADVANCED DOWN TO FULL 50% PENETRATION.
 - h.11. ALTERNATE PINNING IN ROCK MAY BE ALLOWED AS FOLLOWS. DRILL 1" $\varnothing$ HOLES x 3'-0" DEEP VERTICALLY INTO ROCK. PLACE #8 LOW-CARBON CHROMIUM STEEL REBAR ASTM A1035 CS, GRADE 100, INTO HOLES AND HAMMER TIGHT FULLY DOWN INTO PRE-DRILLED HOLES (1 REBAR PIN EVERY 1'-0" O.C.). REBAR PINS SHALL BE CONTINUOUS FULL HEIGHT OF VINYL PANEL.
 - 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 WITHIN FLAT VINYL FORMS SHALL BE POURED DOWN TO EMBEDMENT DEPTH AND INSTALLED PER FDOT SPECIFICATION TREMIES AND PUMPS AFTER ALL SEABED SOILS HAVE BEEN EVACUATED WITHIN VINYL FORMS.
 - k. VOID BETWEEN EXISTING PRECAST SEAWALL AND NEW FLAT VINYL FORM WALL SHALL BE FILLED DOWN TO MUDLINE WITH GROUT OF 3000 PSI MINIMUM COMPRESSIVE STRENGTH (GROUT 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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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 316L (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 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.

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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

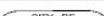
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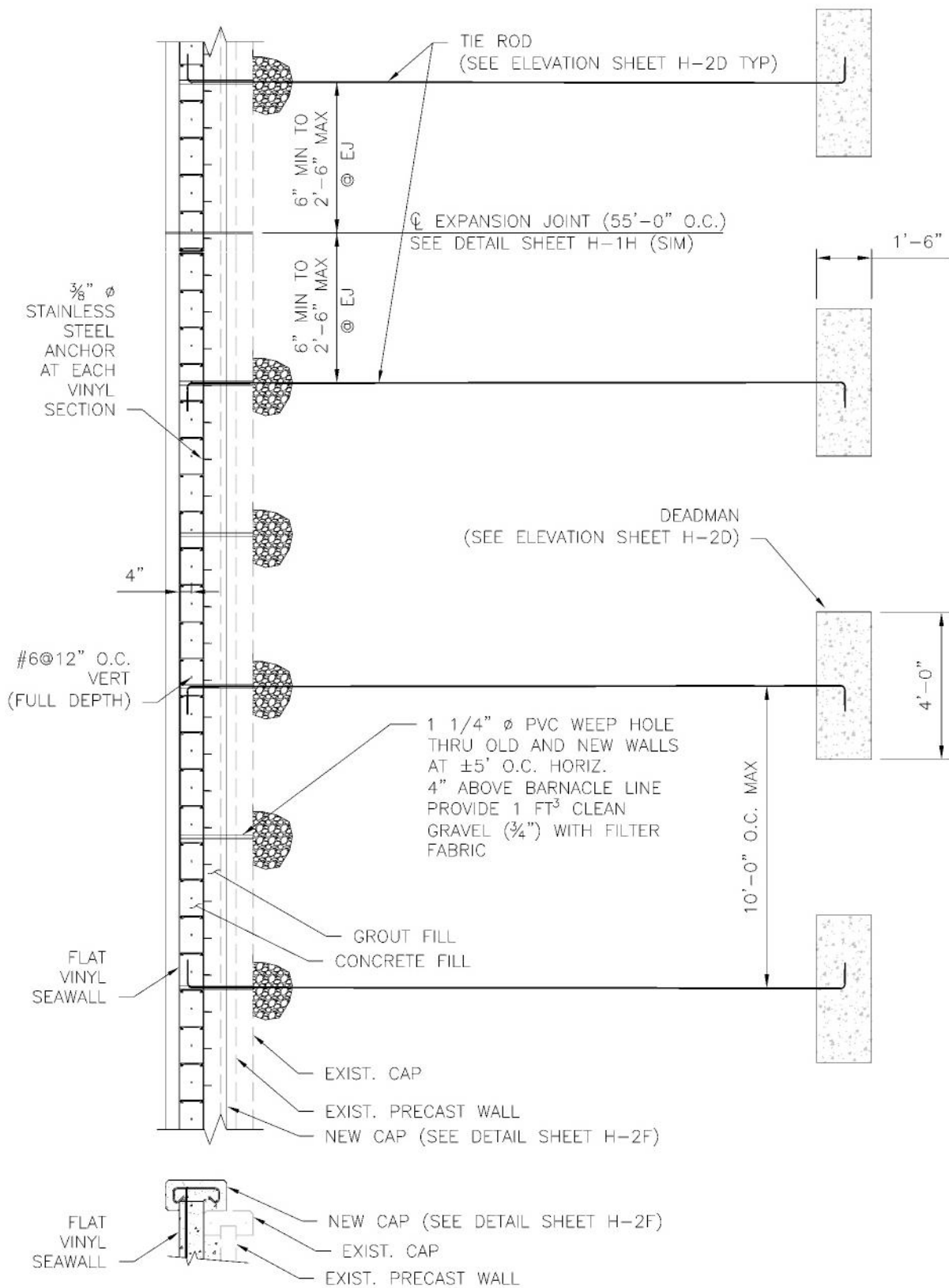
- FRESH WATER CANALS — MATCH EXISTING SEAWALL ELEVATIONS.
- SEAWALL CAPS WHICH ARE RAISED 24" ABOVE ORIGINAL SEAWALL CAP ELEVATION, CONCRETE RETURNS SHALL BE CONSTRUCTED JUST INSIDE OF EACH PROPERTY LINE EXTENDING A MINIMUM OF 5 FEET FROM THE LANDWARD EDGE OF THE REINFORCED CONCRETE SEAWALL CAP, AT AN 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.
- 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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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. ANY ANCHORS EMBEDDED BEHIND SEAWALL MUST BE SITE-SPECIFIC ENGINEERED.

SEAWALL ELEVATION

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SEAWALL PLAN

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CITY OF CAPE CORAL
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ENGINEERING DESIGN STANDARD

TITLE

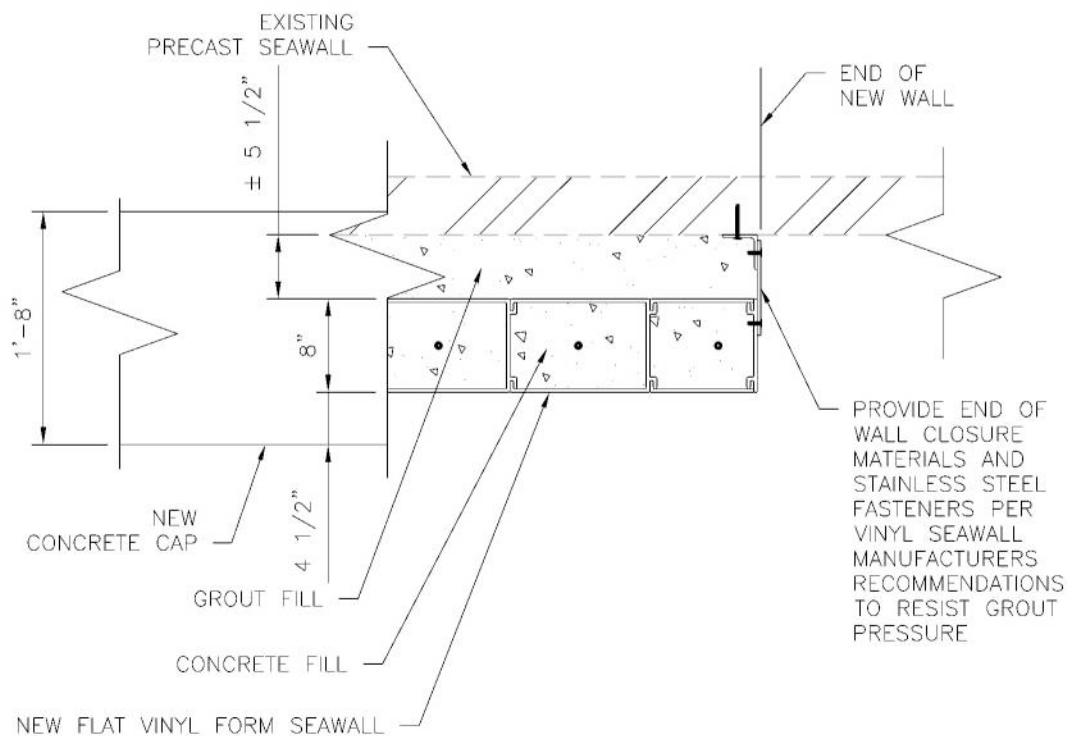
FLAT VINYL FORM SEAWALL
TYPICAL PLAN

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END OF WALL DETAIL

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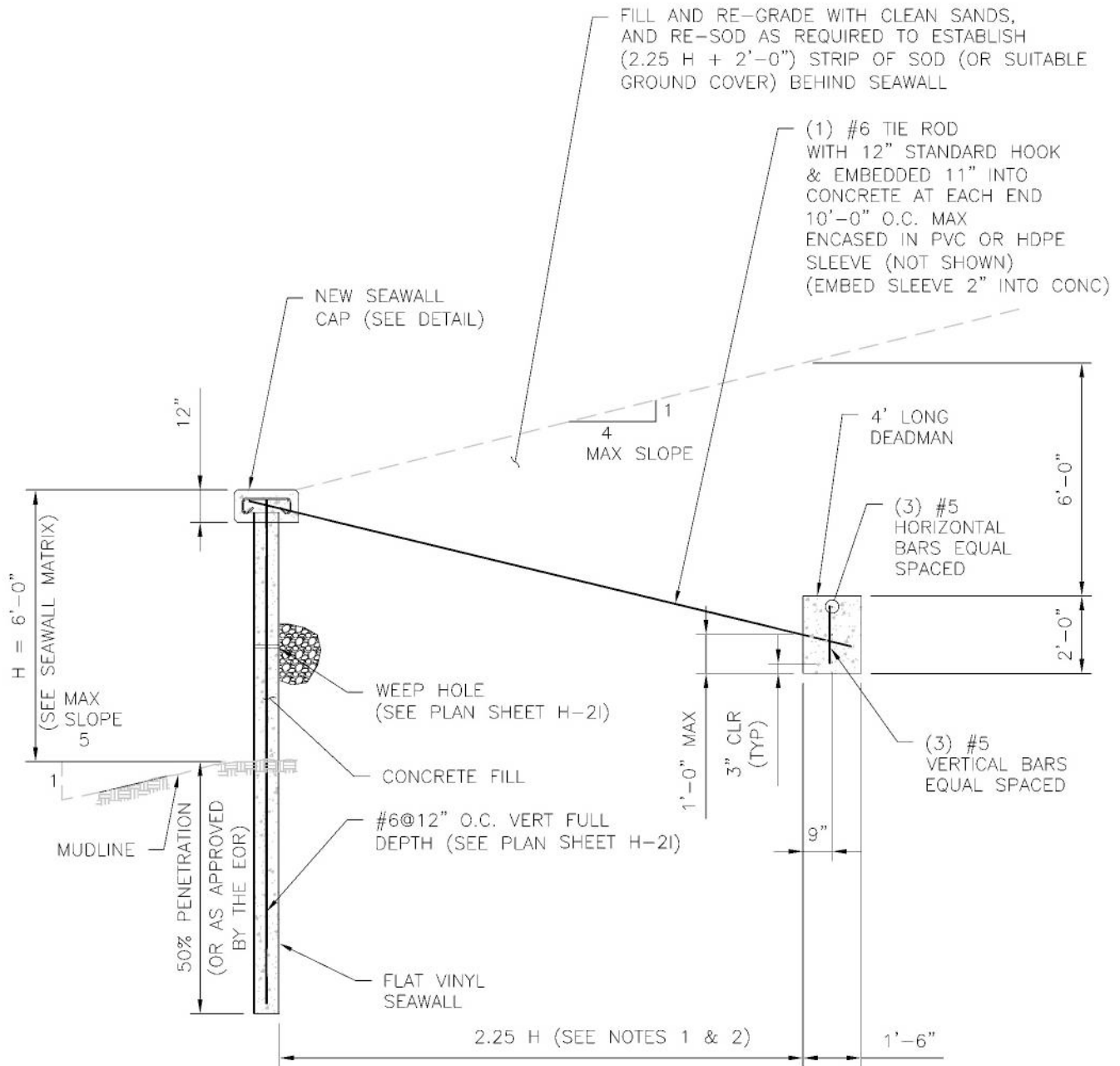
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FLAT VINYL FORM SEAWALL
TYPICAL DETAIL

REVISIONS:

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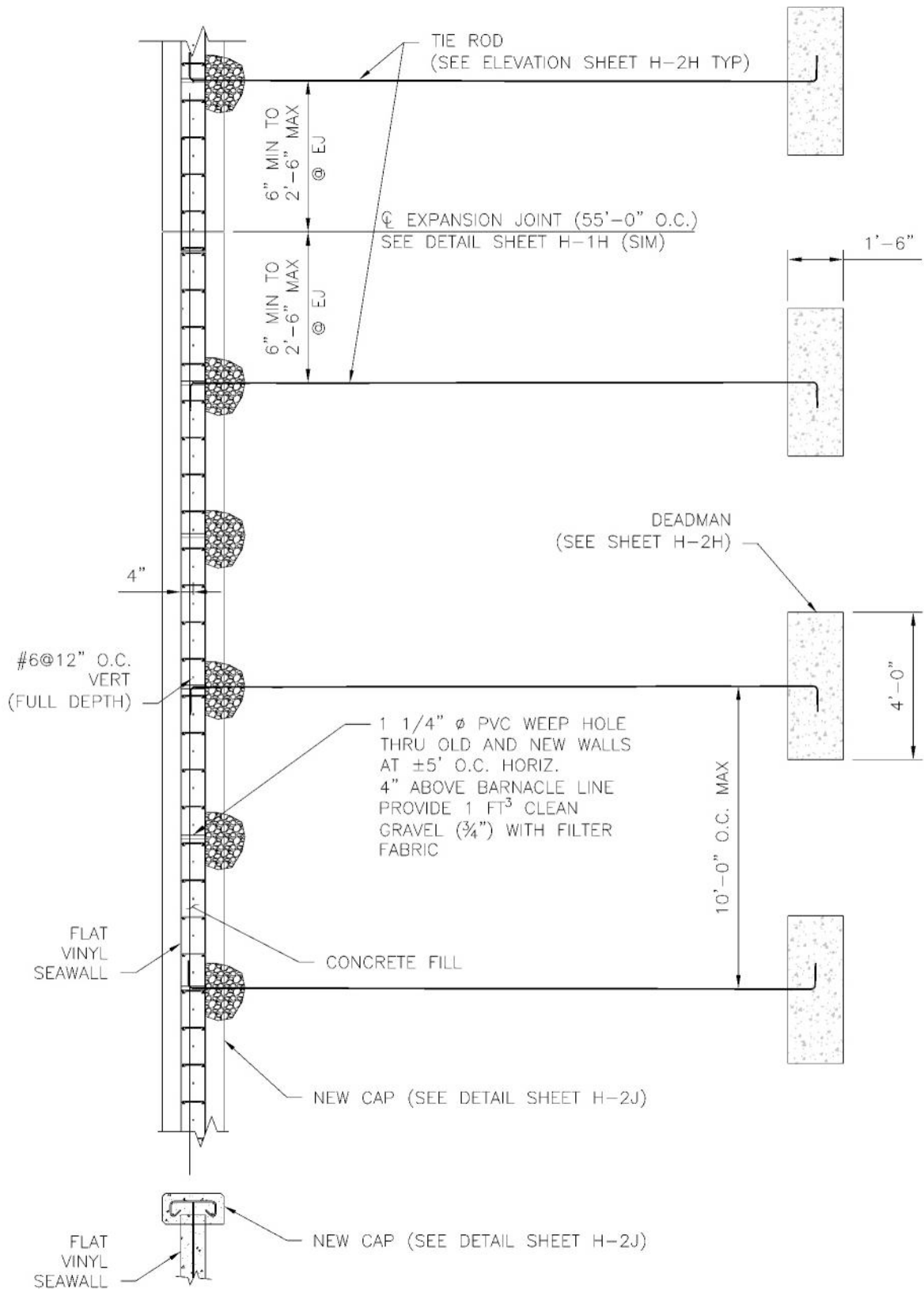


NOTES:

1. ALTERNATE TIE-ROD (STAINLESS STEEL) AND SOIL ANCHOR SYSTEMS MAY BE CONSIDERED IF ENGINEERED FOR A HORIZONTAL COMPONENT WORKING LOAD OF 1030 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.

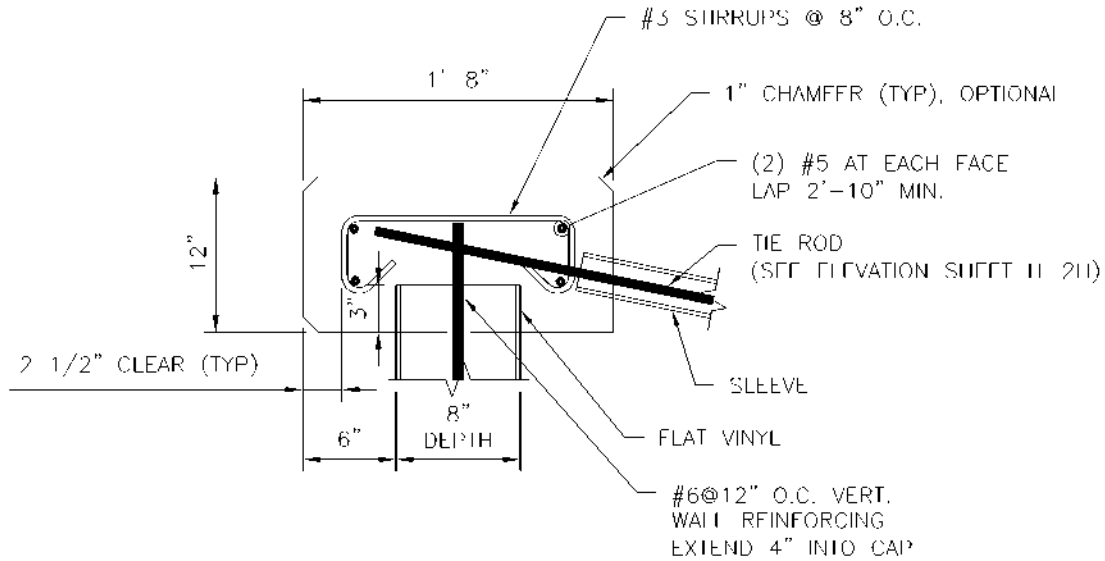
ALTERNATE SEAWALL ELEVATION

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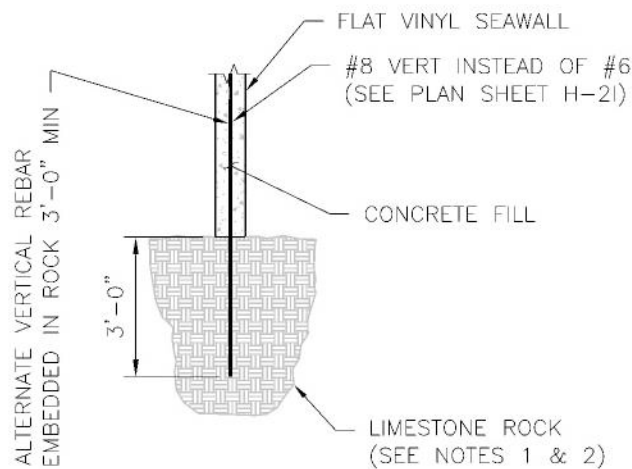


ALTERNATE SEAWALL PLAN

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ALTERNATE SEAWALL CAP DETAIL

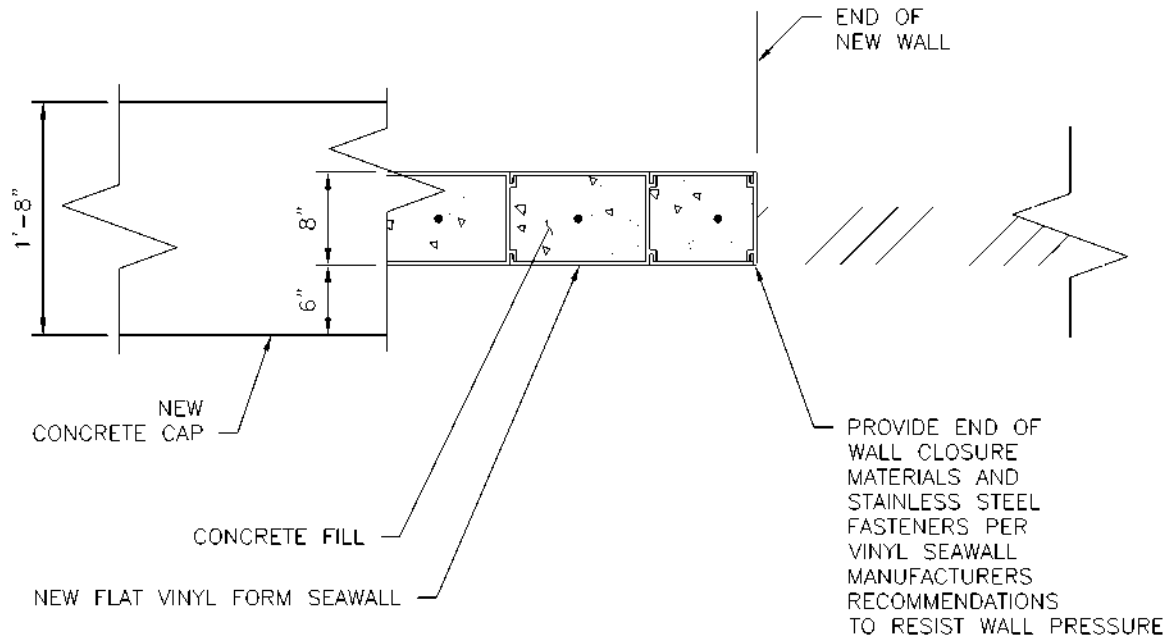


NOTES:

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

ALTERNATE SEAWALL WITHOUT PRECAST CONCRETE PINNED IN ROCK DETAIL

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ALTERNATE END OF WALL DETAIL

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