

ORDINANCE 85 - 21

AN ORDINANCE AMENDING THE CITY OF CAPE CORAL ENGINEERING DESIGN STANDARDS BY REPEALING PAGES H-1 THROUGH H-9 OF SECTION H. SEAWALLS, AND REPLACING THE REPEALED PAGES WITH PAGES H-1A THROUGH H-1M, H-2A THROUGH H-2K, AND H-3A THROUGH H-3G, ATTACHED HERETO AND INCORPORATED HEREIN BY REFERENCE; PROVIDING SEVERABILITY AND AN EFFECTIVE DATE.

NOW, THEREFORE, THE CITY OF CAPE CORAL, FLORIDA, HEREBY ORDAINS THIS ORDINANCE AS FOLLOWS:

SECTION 1. The City of Cape Coral Code Engineering Design Standards are hereby amended by repealing Pages H-1 through H-9 of Section H. Seawalls and replacing the repealed pages with Pages H-1A through H-1M, H-2A through H-2K, and H-3A through H-3G, attached hereto and incorporated herein by reference.

SECTION 2. Severability. In the event that any portion or Section of this ordinance is determined to be invalid, illegal, or unconstitutional by a court of competent jurisdiction, such decision shall in no manner affect the remaining portions or Sections of this ordinance which shall remain in full force and effect.

SECTION 3. Effective Date. This ordinance shall become effective on March 1, 2022. Notwithstanding the foregoing effective date, if a seawall permit application is submitted to the United States Army Corps of Engineers ("USACE") prior to such effective date, such seawall permit shall be processed and subject to current seawall regulations until USACE approval or denial of such permit.

ADOPTED BY THE COUNCIL OF THE CITY OF CAPE CORAL AT ITS REGULAR SESSION THIS _____ DAY OF _____, 2021.

JOHN GUNTER, MAYOR

VOTE OF MAYOR AND COUNCILMEMBERS:

GUNTER	_____	NELSON	_____
TATE	_____	WELSH	_____
SHEPPARD	_____	LONG	_____
HAYDEN	_____	COSDEN	_____

ATTESTED TO AND FILED IN MY OFFICE THIS _____ DAY OF _____, 2021.

KIMBERLY BRUNS
CITY CLERK

APPROVED AS TO FORM:

JOHN E. NACLERIO III
ASSISTANT CITY ATTORNEY

PRECAST CONCRETE SEAWALL GENERAL NOTES

1. THESE SPECIFICATIONS SHOW TYPICAL DETAILS FOR PRECAST CONCRETE SEAWALLS WHICH ARE TO BE CONSTRUCTED IN THE CITY OF CAPE CORAL. INDIVIDUAL SEAWALL DESIGN IS THE RESPONSIBILITY OF THE PERMITTEE 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 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 NEW PRECAST CONCRETE SEAWALL WITH A 6' EXPOSED HEIGHT ABOVE THE MUDLINE. THESE SPECIFICATIONS MAY NOT BE USED TO PLACE A NEW PRECAST CONCRETE SEAWALL IN FRONT OF AN EXISTING SEAWALL.
 - 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 BUILDING 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. DESIGN LOAD COMBINATIONS: (OR AS APPROVED BY THE EOR)
 - c.1. LOW TIDE CANAL WATER (WATERWARD OF WALL) AT 4.5' BELOW SEAWALL CAP, PLUS WATER LEVEL LANDWARD OF WALL AT 2' BELOW SEAWALL CAP, PLUS EARTH PRESSURE, PLUS 200 psf SURCHARGE LOAD.
 - c.2. CANAL WATER (WATERWARD OF WALL) AT MUDLINE (6' MAXIMUM BELOW SEAWALL CAP), PLUS WATER LANDWARD OF WALL AT 2' BELOW SEAWALL CAP, PLUS EARTH PRESSURE, AND NO SURCHARGE LOAD.
 - d. SOIL ASSUMED AS LOOSE FINE SAND. ALTERNATE SOIL TYPES MAY BE CONSIDERED IF A SITE SPECIFIC GEOTECHNICAL SOILS ENGINEERING REPORT IS PERFORMED AND PROVIDED.
 - e. SEABED (WATERWARD OF WALL) SLOPING DOWN AND AWAY FROM WALL AT 1:5 (V:H) SLOPE MAXIMUM.
 - f. FINISHED GRADE (LANDWARD OF WALL) SLOPING UP AND AWAY FROM SEAWALL CAP AT 1:4 (V:H) SLOPE MAXIMUM.
 - g. PRECAST CONCRETE SEAWALL PANEL:
 - g.1. DEPTH = 5"
 - g.2. PANEL WIDTH = 5'
 - g.3. CONCRETE COMPRESSIVE STRENGTH = 5,000 psi

ADOPTED BY CITY COUNCIL	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="text-align: center;">TITLE</td> </tr> <tr> <td colspan="2" style="text-align: center;">PRECAST CONCRETE SEAWALL GENERAL NOTES</td> </tr> <tr> <td style="width: 50%;">REVISIONS:</td> <td style="width: 50%; text-align: center;">09-14-2021</td> </tr> </table>	TITLE		PRECAST CONCRETE SEAWALL GENERAL NOTES		REVISIONS:	09-14-2021	SHEET NO. H-1A
TITLE									
PRECAST CONCRETE SEAWALL GENERAL NOTES									
REVISIONS:	09-14-2021								

- g.4. REBAR = LOW-CARBON CHROMIUM STEEL REBAR ASTM A1035 CS, GRADE 100 (DO NOT WELD OR FIELD BEND), -OR- GLASS FIBER REINFORCED POLYMER (GFRP) REBAR ASTM D578 (NO FIELD FABRICATION, BENDING, COUPLING, THERMAL CUTTING, OR SHEAR CUTTING PERMITTED EXCEPT FIELD CUTTING PER ACI 440.5) (OR AS APPROVED BY THE EOR)
 - g.5. COLOR = GRAY
 - g.6. INSTALLED VERTICAL ALIGNMENT TOLERANCE = ¼ PER FOOT
 - g.7. PROJECTION ABOVE MUDLINE = 6' (TOP OF CAP) (SEE SEAWALL MATRIX)
 - g.8. EMBEDMENT BELOW MUDLINE = 50% PENETRATION OF PANEL (OR AS APPROVED BY THE EOR)
 - g.9. IF LIMESTONE ROCK IS ENCOUNTERED PRIOR TO FULL EMBEDMENT DEPTH, EMBED PRECAST CONCRETE SEAWALL PANEL 2' INTO LIMESTONE ROCK AFTER EXCAVATING LIMESTONE ROCK TO FORM A KEYWAY FOR NEW PRECAST CONCRETE SEAWALL PANEL. IF LIMESTONE ROCK IS LESS THAN 2' THICK, PANEL MUST BE ADVANCED DOWN TO FULL 50% PENETRATION.
 - g.10. ALTERNATE PINNING IN ROCK MAY BE ALLOWED AS FOLLOWS. LIMESTONE ROCK MUST BE EXCAVATED TO FORM A 1' KEYWAY AND BE LEVEL ACROSS BOTTOM OF EACH 5' PRECAST PANEL TO WITHIN ± 3". DRILL 2 ¼" Ø HOLES x 3'-0" DEEP VERTICALLY INTO ROCK TIGHT AGAINST BASE OF PANEL, SET 1'-0" IN FROM EACH SIDE OF PANEL. PLACE #18 CARBON STEEL ASTM A615, GRADE 60, REBAR x 5'-0" MIN INTO HOLES AND HAMMER TIGHT FULLY DOWN INTO PRE-DRILLED HOLES (2 REBAR PINS PER 5' PANEL). REBAR PINS SHALL NOT EXTEND ABOVE MEAN LOWER LOW WATER LEVEL (MLLW).
 - g.11. SEAWALL ELEVATION OPTIONS PER SEAWALL MATRIX. IN CASES WHERE NEW SEAWALL ELEVATION IS HIGHER AT PROPERTY LINE, NEW SEAWALL ENDS SHALL BE LEVEL WITH A SITE SPECIFIC DESIGN RETURN.
 - g.12. WORK TO BE PERFORMED IN ACCORDANCE WITH ARMY CORPS OF ENGINEERS (ACOE) PERMITTING GUIDELINES.
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 LOCATION.
 5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PRESERVATION OF ALL CONSTRUCTION STAKES UNTIL THE SEAWALL IS INSTALLED AND APPROVED.
 6. CONCRETE IS TO HAVE THE FOLLOWING MINIMUM COMPRESSIVE STRENGTHS AT 28 DAYS AND COMPLY WITH FDOT SPECIFICATION PORTLAND CEMENT CONCRETE:
 - a. SEAWALL PANEL = 5,000 psi (TYPE II CEMENT, CLASS III CONCRETE)
 - b. SEAWALL CAP = 5,000 psi (TYPE II CEMENT, CLASS III CONCRETE)
 - c. DEADMAN = 5,000 psi (TYPE II CEMENT, CLASS III CONCRETE)
 7. REINFORCING STEEL SHALL BE AS FOLLOWS AND SHALL BE PLACED IN ACCORDANCE WITH FDOT SPECIFICATION REINFORCING STEEL.
 - a. SEAWALL PANEL: LOW-CARBON CHROMIUM STEEL REBAR ASTM A1035 CS, GRADE 100 (DO NOT WELD OR FIELD BEND), -OR- GLASS FIBER REINFORCED POLYMER (GFRP) REBAR ASTM D578 (NO FIELD FABRICATION, BENDING, COUPLING, THERMAL CUTTING, OR SHEAR CUTTING PERMITTED EXCEPT FIELD CUTTING PER ACI 440.5). (OR AS APPROVED BY THE EOR)
 - b. SEAWALL PANEL LIFTING RINGS: 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 AS APPROVED BY THE EOR)

ADOPTED BY CITY COUNCIL	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	TITLE	SHEET NO.
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- c. SEAWALL CAP AND DEADMAN: LOW-CARBON CHROMIUM STEEL REBAR ASTM A1035 CS, GRADE 100 (DO NOT WELD OR FIELD BEND), -OR- GLASS FIBER REINFORCED POLYMER (GFRP) REBAR (ASTM D578) (OR AS APPROVED BY THE EOR).
 - d. 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)
 - e. TIE REINFORCING USING PLASTIC, POLYMER, OR NYLON COATED PLIABLE STEEL WIRE THAT READILY BENDS AND TWISTS WITHOUT BREAKING.
8. 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.
 9. 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.
 10. 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 THE SEAWALL SHALL BE REBAR TIE-ROD (WITH PVC SLEEVE) OR STAINLESS STEEL (NO SLEEVE REQUIRED). THREADED ROD TIE-RODS SHALL BE PROVIDED WITH SUBSTANTIAL ANCHORS IN SEAWALL CAP DESIGNED IN ACCORDANCE WITH ACI 318 (OR AS APPROVED BY THE EOR).
 11. THE CANAL FACE OF THE SEAWALL SLABS IS TO BE PLACED ON THE PROPERTY LINE (+/- 6") UNLESS INSTRUCTED OTHERWISE BY PERMIT.
 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	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<p>TITLE</p> <p>PRECAST CONCRETE SEAWALL GENERAL NOTES</p>	SHEET NO.
		<p>REVISIONS:</p> <p style="text-align: right;">09-14-2021</p>	H-1C

**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)**

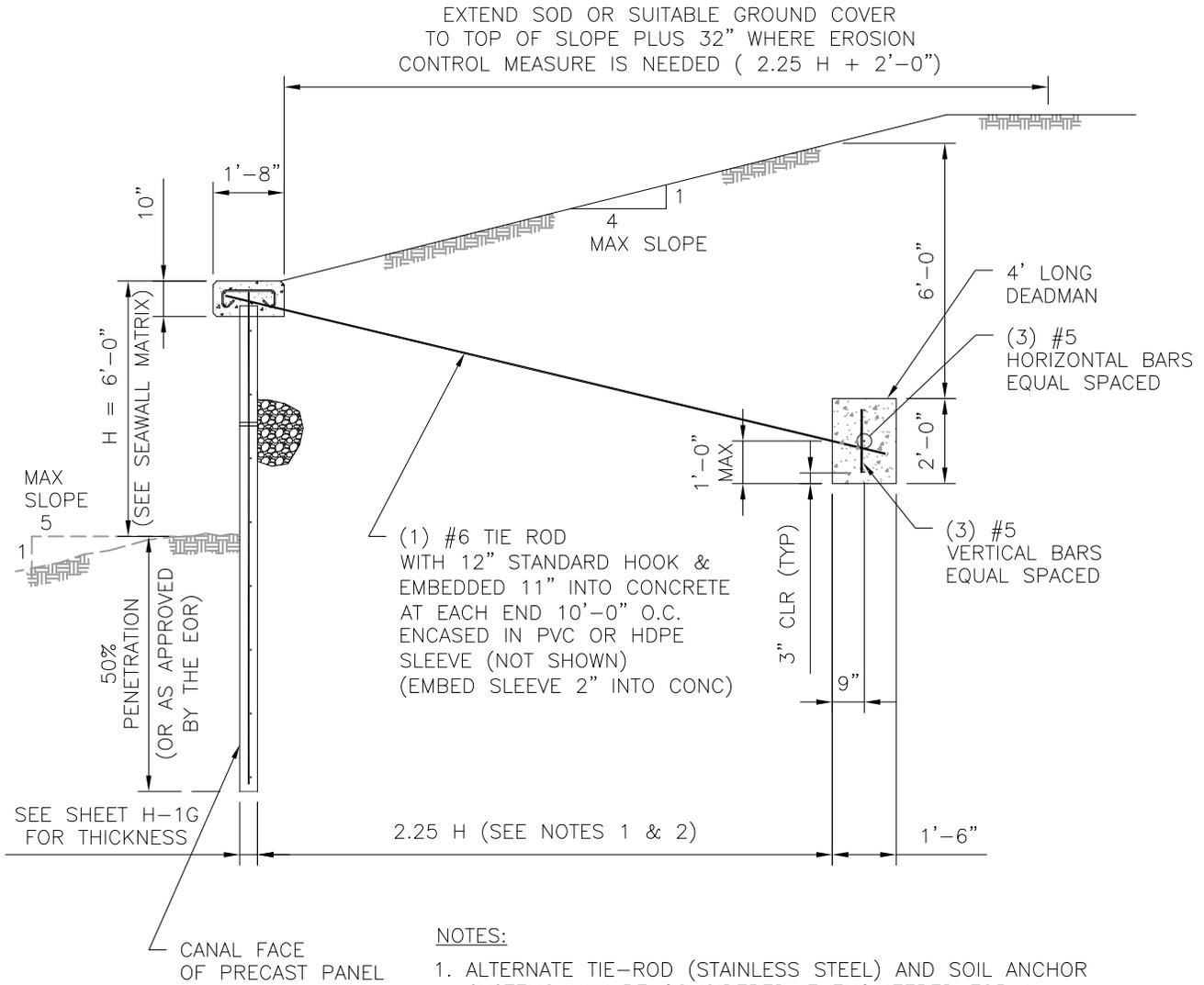
Seawall System		Seawall Construction	Seawall Height Increases Allowed (Inches)		
			24	12	Match
1	New or Replacement	Precast Concrete Panels & Cast-In-Place Concrete in Flat Vinyl Forms	New house - New seawall construction		
			X		X
		Existing house - Replacement of existing seawall - full property	X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

- 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.

ADOPTED BY CITY COUNCIL	 CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD	TITLE		SHEET NO. H-1C-A
		PRECAST CONCRETE SEAWALL GENERAL NOTES		
		REVISIONS:	09-14-2021	

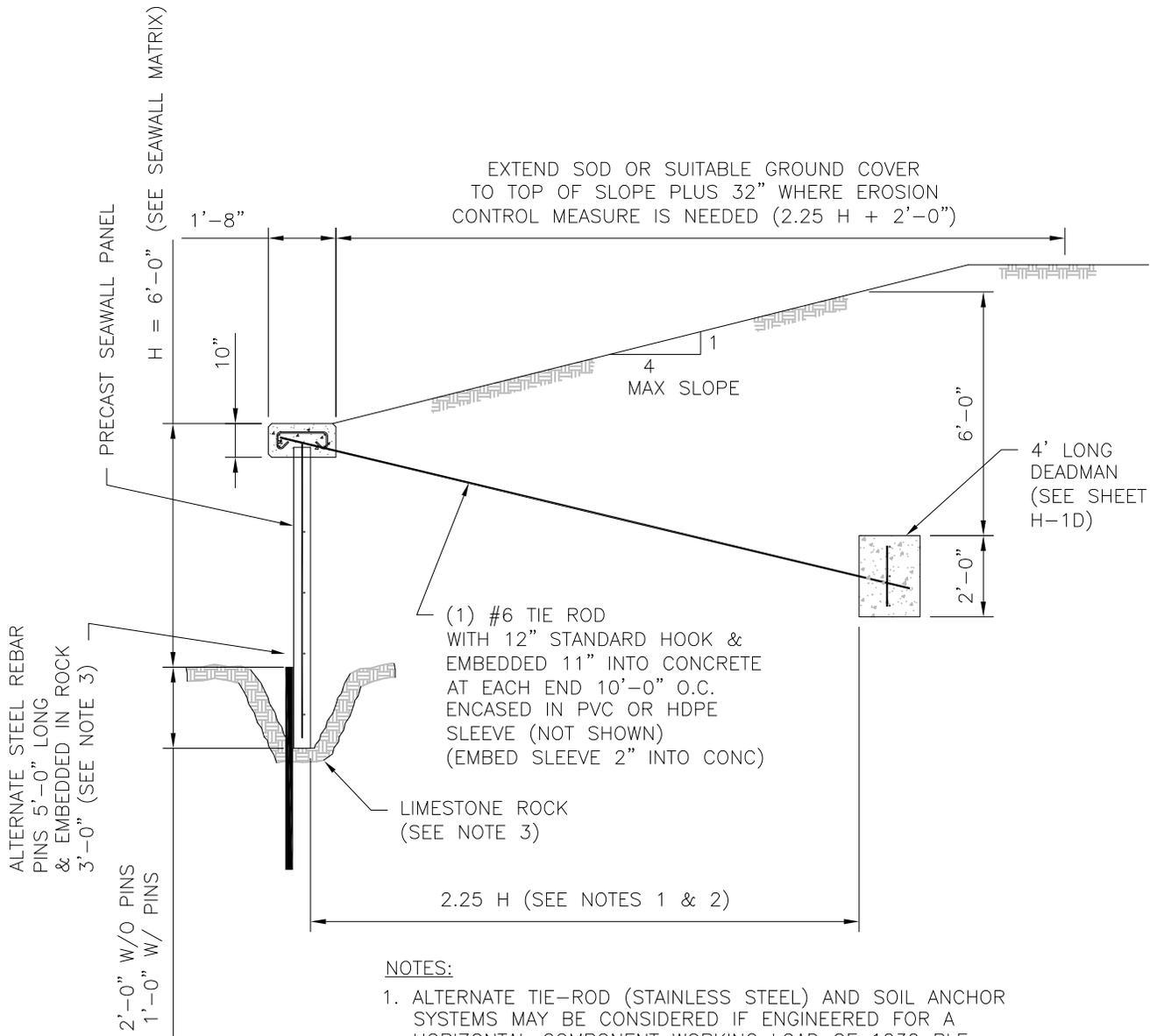


NOTES:

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.) AND EMBEDDED 2.25 H BEHIND SEAWALL.
2. ANCHORS EMBEDDED BEHIND SEAWALL MUST BE SITE-SPECIFIC ENGINEERED.

PRECAST CONCRETE SEAWALL ELEVATION

<p>ADOPTED BY CITY COUNCIL</p>	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<p>TITLE</p> <p>PRECAST CONCRETE SEAWALL TYPICAL ELEVATION</p> <p>REVISIONS:</p>	<p>SHEET NO.</p> <p>H-1D</p>
		<p>09-14-2021</p>	

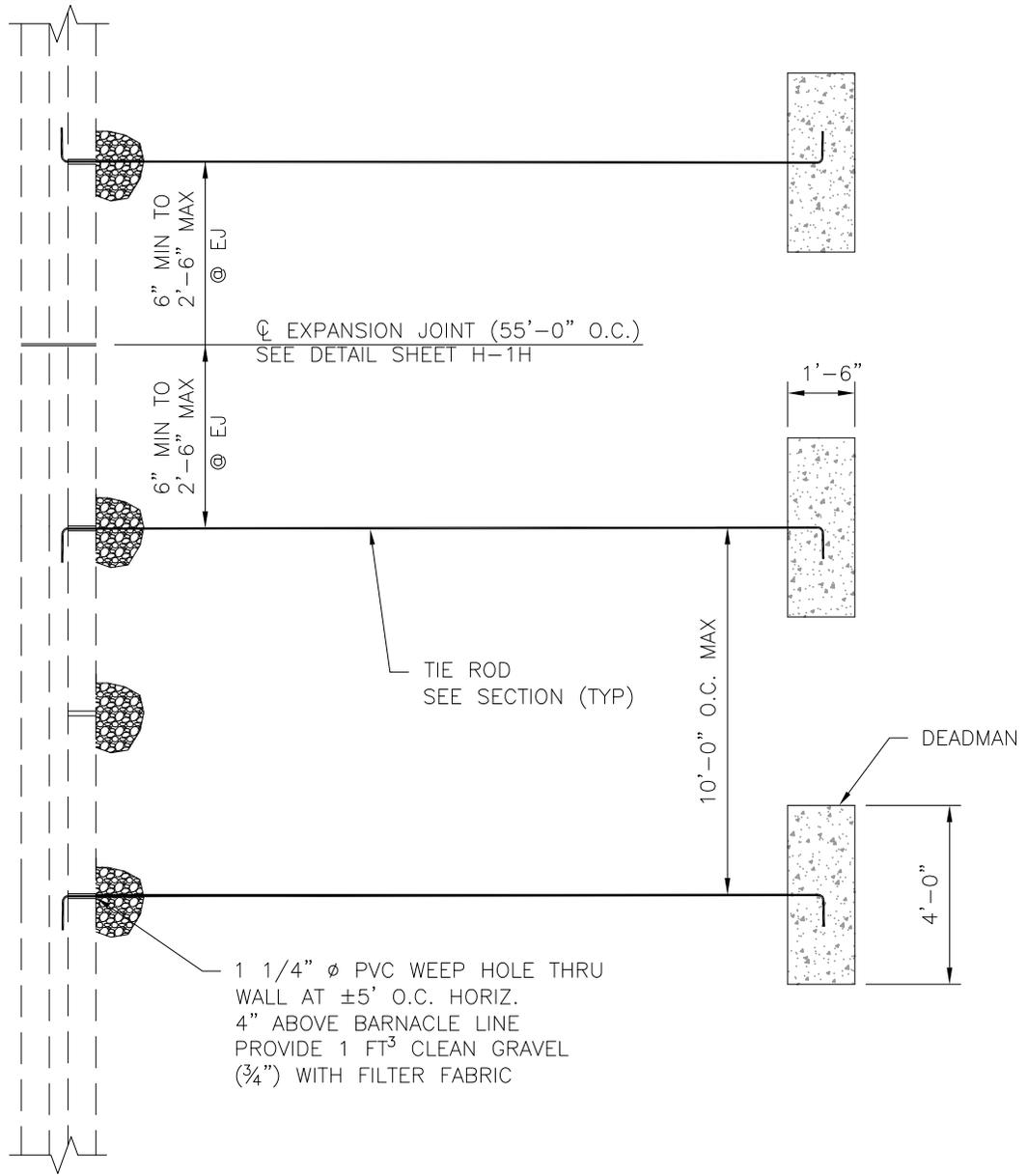


NOTES:

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.) AND EMBEDDED 2.25 H BEHIND SEAWALL.
2. ANCHORS EMBEDDED BEHIND SEAWALL MUST BE SITE-SPECIFIC ENGINEERED.
3. REFERENCE PRECAST SEAWALL GENERAL NOTES 3.g.9 & 3.g.10.

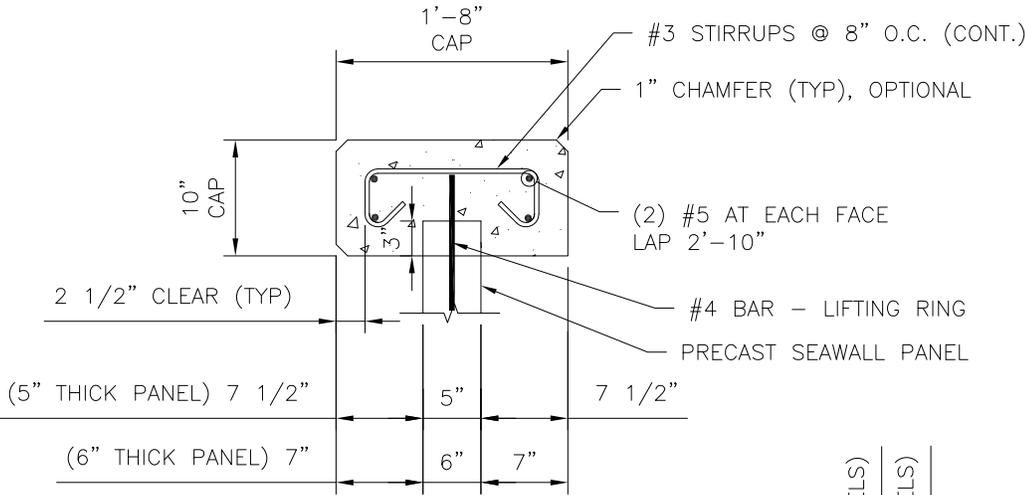
PRECAST CONCRETE SEAWALL
EMBEDDED IN ROCK DETAIL

ADOPTED BY CITY COUNCIL	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	TITLE		SHEET NO.
		<p>PRECAST CONCRETE SEAWALL TYPICAL DETAIL</p>		H-1E
		REVISIONS:	09-14-2021	

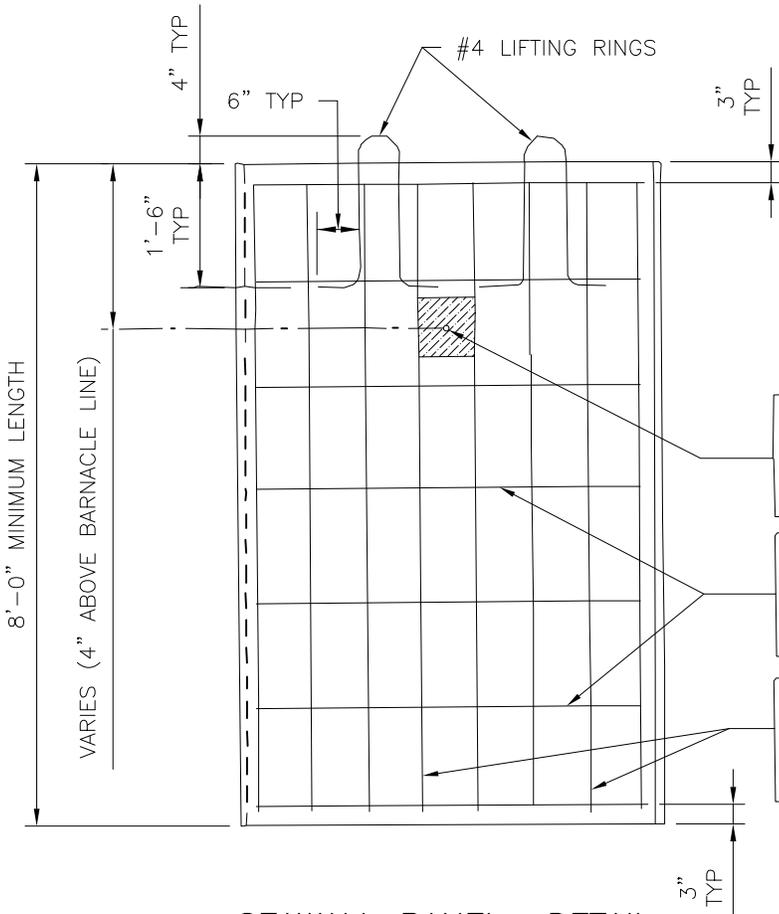


PRECAST CONCRETE SEAWALL PLAN

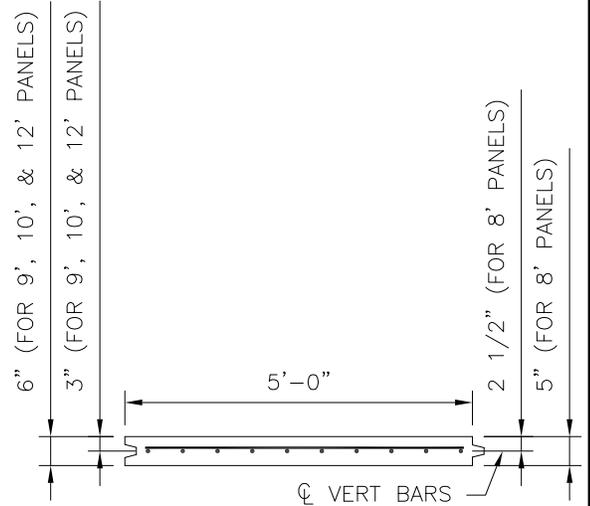
ADOPTED BY CITY COUNCIL	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	TITLE		SHEET NO.
		<p>PRECAST CONCRETE SEAWALL TYPICAL PLAN</p>		H-1F
		REVISIONS:	09-14-2021	



CAP DETAIL



SEAWALL PANEL DETAIL



SECTION

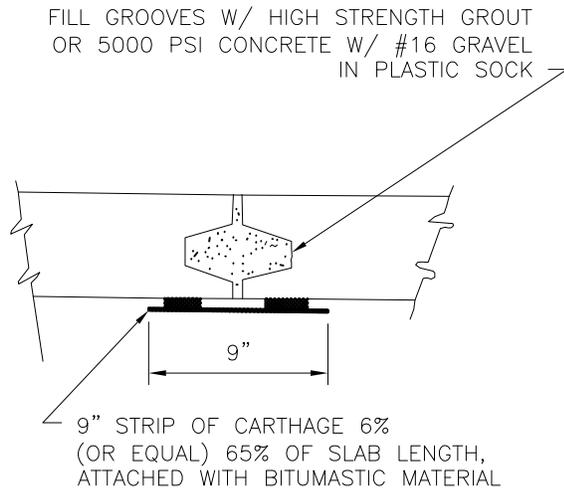
1 1/4" DIA. WEEP HOLE W/9" SQ. CARTRIDGE 6% PATCH ATTACHED W/BITUMASTIC MAT'L. (SLABS W/GROUTED JOINTS ONLY)

8' PANELS: #3 AT 24" O.C. (5-REQ'D.)
 9' PANELS: #3 AT 24" O.C. (6-REQ'D.)
 10' PANELS #3 AT 24" O.C. (6-REQ'D.)
 12' PANELS #3 AT 24" O.C. (7-REQ'D.)

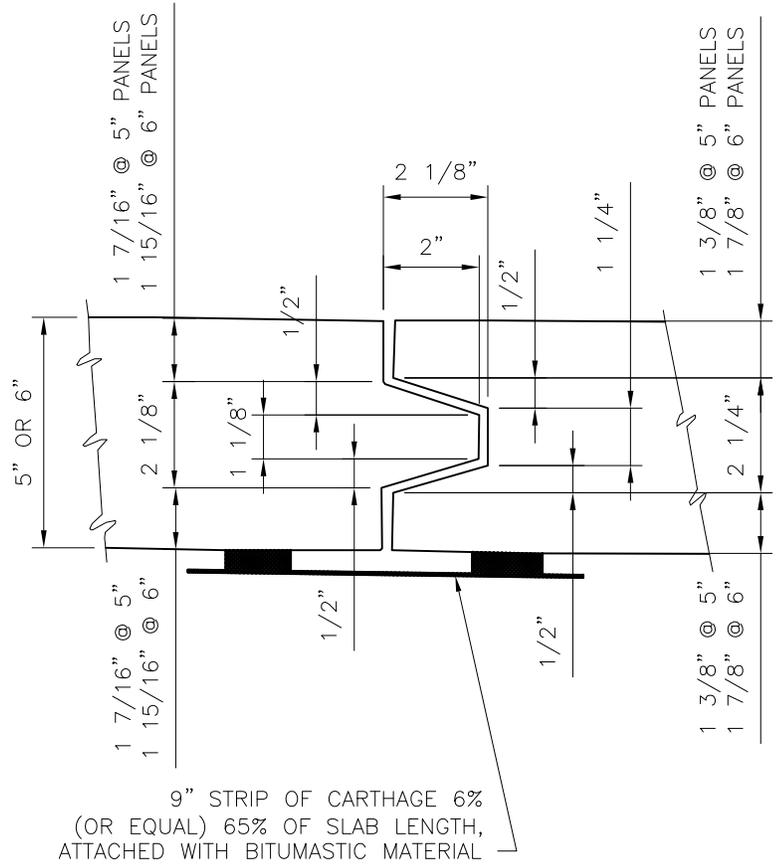
8' PANELS: #3 AT 4 1/2" O.C. (12 REQ'D.)
 9' PANELS: #3 AT 4 1/2" O.C. (12 REQ'D.)
 10' PANELS #4 AT 6" O.C. (10 REQ'D.)
 12' PANELS #4 AT 6" O.C. (10 REQ'D.)

(OR AS APPROVED BY THE EOR)

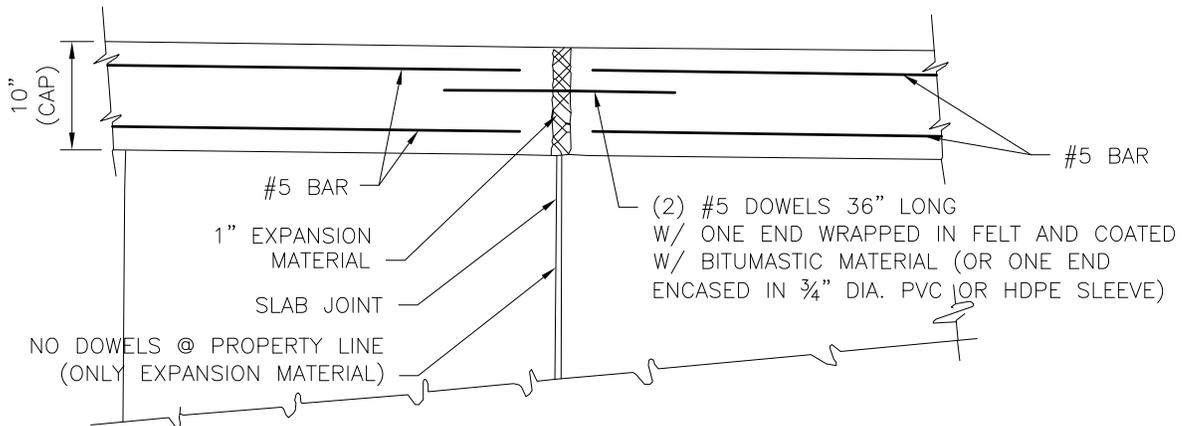
ADOPTED BY CITY COUNCIL	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	TITLE		SHEET NO.
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ALTERNATE PANEL JOINT DETAIL

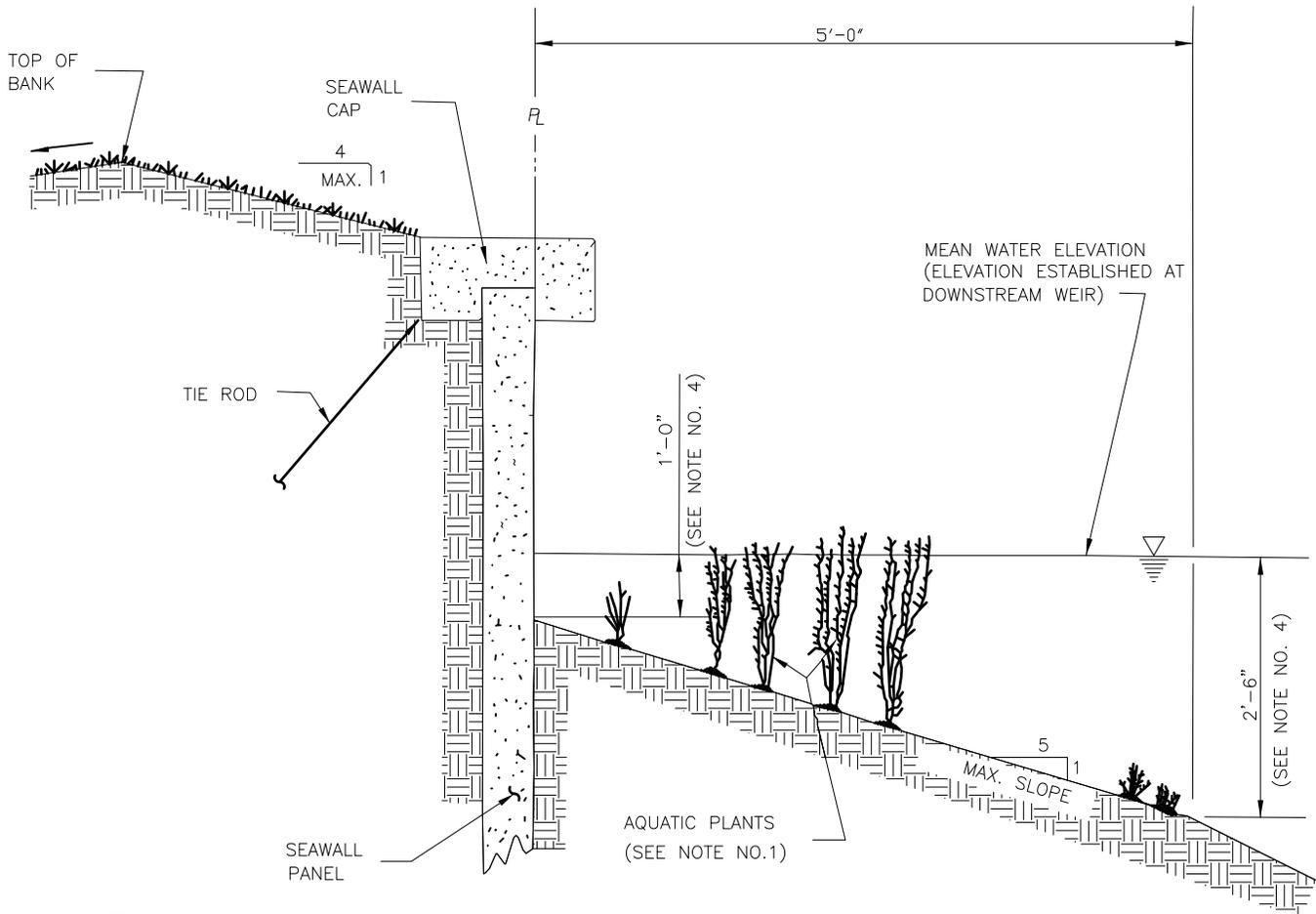


PANEL JOINT DETAIL



EXPANSION JOINT DETAIL

<p>ADOPTED BY CITY COUNCIL</p>	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<p>TITLE</p> <p>PRECAST CONCRETE SEAWALL TYPICAL DETAILS</p> <p>REVISIONS:</p>	<p>SHEET NO.</p> <p>H-1H</p>
		<p>09-14-2021</p>	

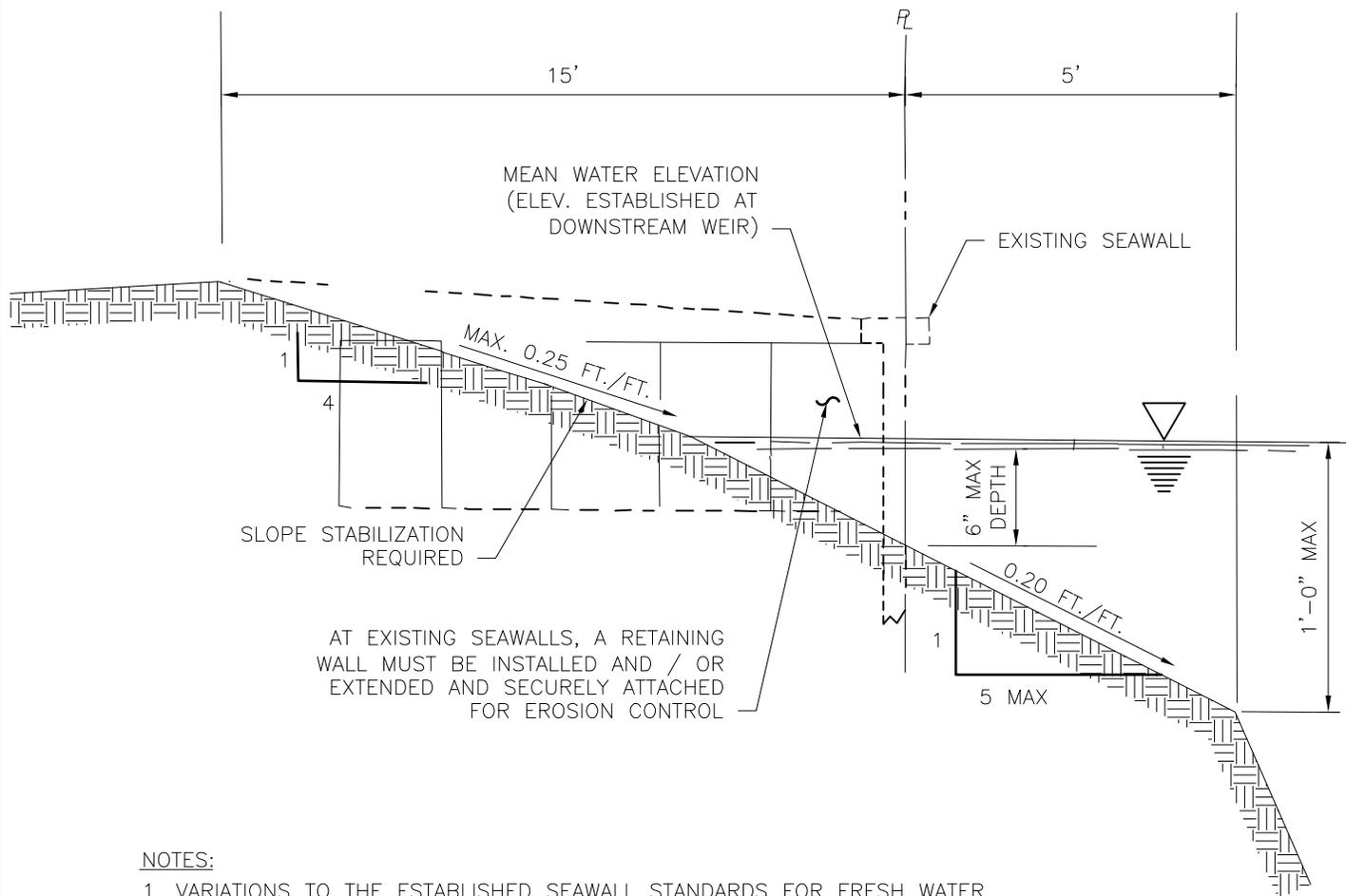


NOTES:

1. THE PLANTING OF EMERGENT AQUATIC PLANTS FOR LANDSCAPING IS OPTIONAL. (ONLY APPROVED VEGETATION WILL BE PERMITTED.)
2. VARIATIONS TO THIS STANDARD MUST BE APPROVED BY THE CITY PUBLIC WORKS DEPARTMENT.
3. CAP ELEVATION TO MATCH EXISTING SEAWALL CAPS OR MATCH EXISTING DOWNSTREAM WEIR WINGWALL CAP ELEVATION.
4. TOLERANCE FOR WATER DEPTH AT SEAWALL AND AT 5'-0" FROM PROPERTY LINE SHALL BE +/- 6".
5. IN CASES WHERE ELEVATIONS OF EXISTING SEAWALL CAP DIFFERS WITH THE NEW SEAWALL CAP, ELEVATION OF THE NEW CAP SLOPE SHOULD NOT EXCEED 10%.

PRECAST SEAWALL FRESHWATER CANAL

ADOPTED BY CITY COUNCIL	 CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD	TITLE PRECAST CONCRETE SEAWALL FRESHWATER CANAL TYPICAL DETAIL	SHEET NO. H-11
		REVISIONS:	09-14-2021

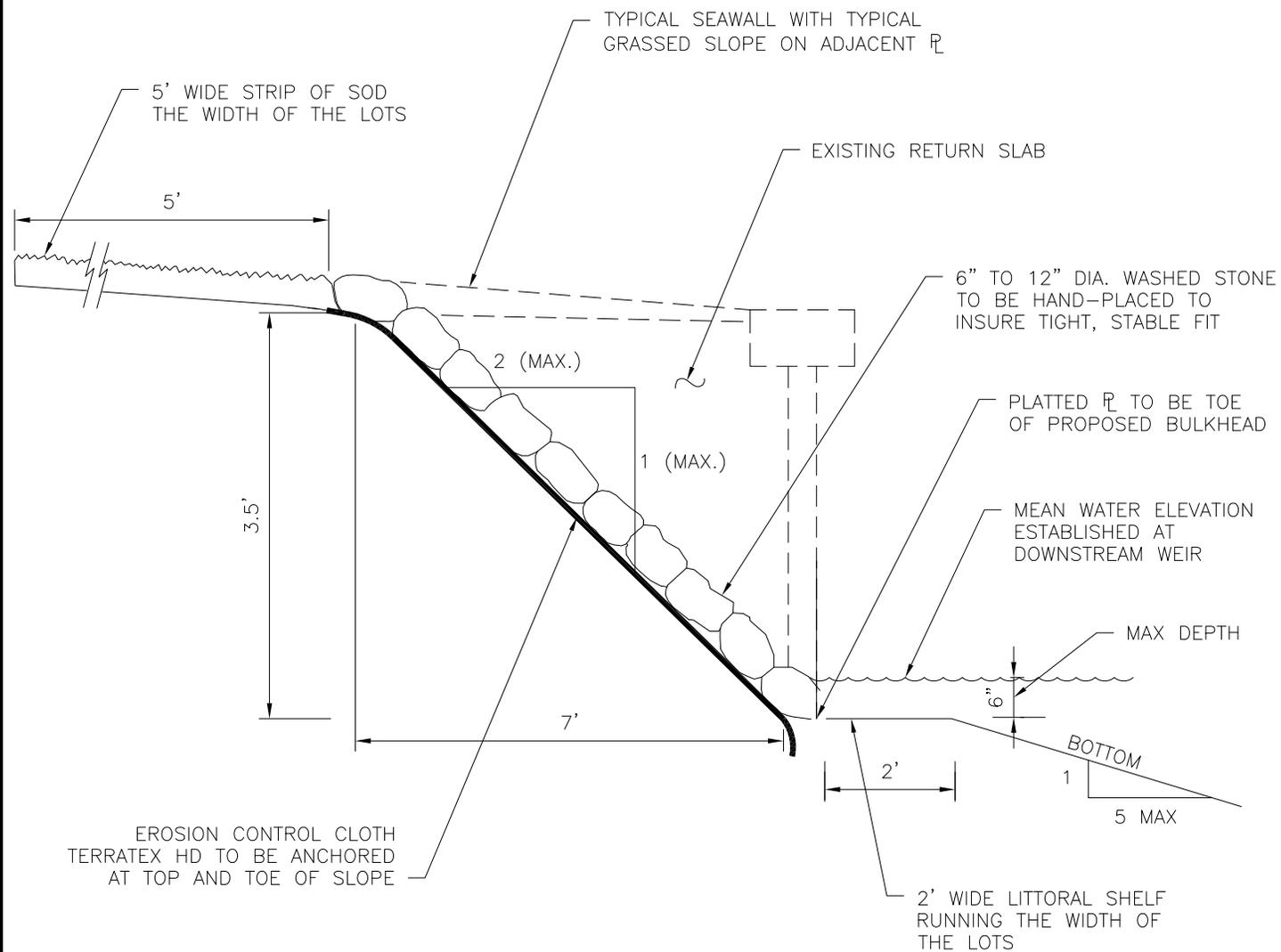


NOTES:

1. VARIATIONS TO THE ESTABLISHED SEAWALL STANDARDS FOR FRESH WATER SYSTEMS MAY BE CONSIDERED BY THE CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT.
2. THE FOLLOWING MINIMUM DESIGN CRITERIA MUST BE INCORPORATED INTO THE PROPOSED DESIGN.
 - A. MAXIMUM ALLOWABLE SLOPE TO WATERLINE IS 1:4 (V:H).
 - B. SLOPE TO BE STABILIZED WITH APPROVED MATERIALS / METHODS FOR EROSION CONTROL.
 - C. MAXIMUM WATER DEPTH AT PROPERTY LINE IS TO BE 6 INCHES.
 - D. TERRACING MAY BE USED TO ESTABLISH PROPER SLOPES.
 - E. ALL PLANS MUST BE SEALED BY A PROFESSIONAL ENGINEER, REGISTERED IN FLORIDA WITH STRUCTURAL EXPERIENCE.

VERTICAL BULKHEAD ALTERNATE 1

ADOPTED BY CITY COUNCIL	 CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD	TITLE SEAWALLS - FRESHWATER CANAL ALTERNATE 1 TYPICAL DETAIL	SHEET NO. H-1J
		REVISIONS:	09-14-2021

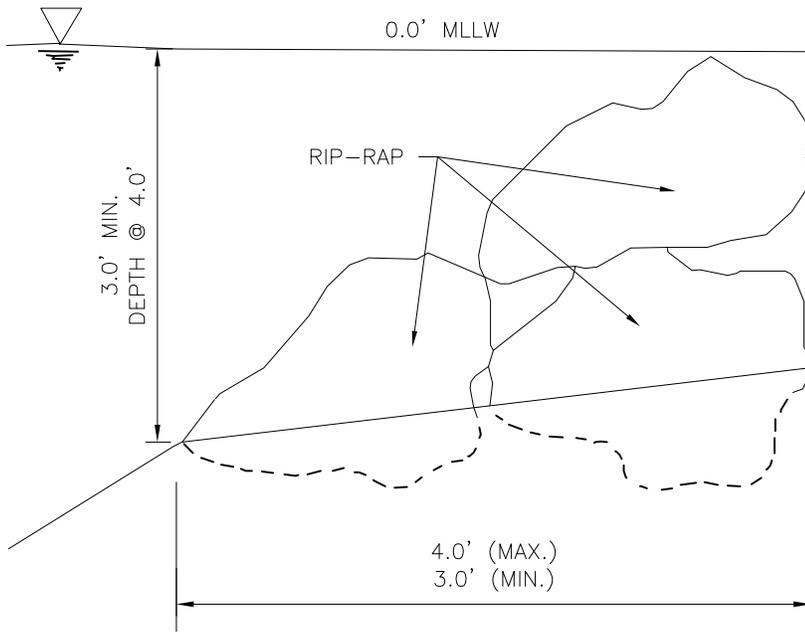
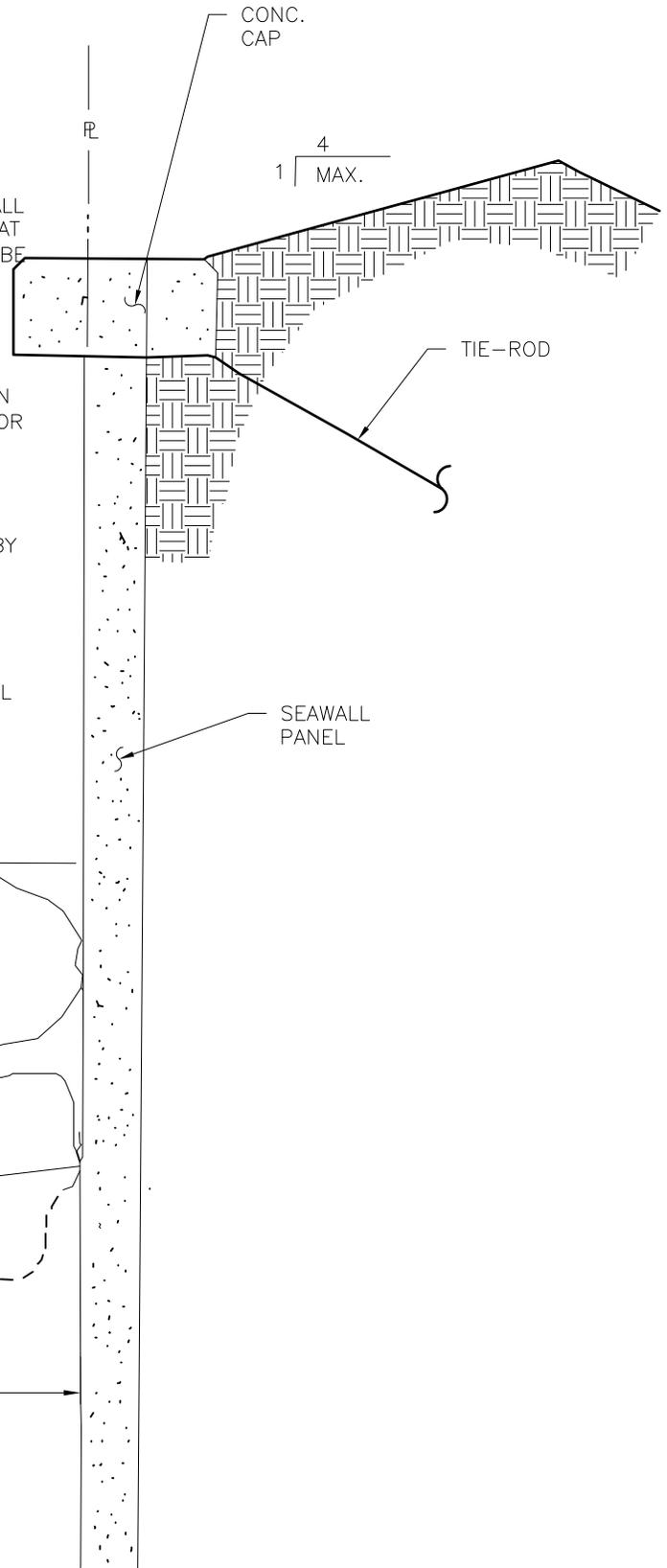


VERTICAL BULKHEAD ALTERNATE 2

<p>ADOPTED BY CITY COUNCIL</p>	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<p>TITLE</p> <p>SEAWALLS - FRESHWATER CANAL ALTERNATE 2 TYPICAL DETAIL</p> <p>REVISIONS:</p>	<p>SHEET NO.</p> <p>H-1K</p>
		<p>09-14-2021</p>	

NOTES:

1. AS A STANDARD, RIP-RAP IS NOT ALLOWED.
2. WHERE RIP-RAP IS ALLOWED BY CURRENT ACOE AND FDEP PERMIT CRITERIA, RIP-RAP MAY ONLY BE INSTALLED IN ACCORDANCE WITH THE PERMIT CRITERIA.
3. RIP-RAP MAY BE INSTALLED ALONG THE TOE OF THE SEAWALL WHEN THE TOE OF THE SEAWALL IS DEEPER THAN 3- FEET AT MEAN LOWER LOW WATER (MLLW). ON-SITE MATERIAL MAY BE USED IF IT MEETS THE SIZE AND TYPE OF MATERIAL REQUIREMENTS.
4. RIP-RAP MAY BE PLACED UNDER DOCKS.
5. NO RIP-RAP SHALL BE PLACED WITHOUT A PERMIT.
6. ALL RIP-RAP SHALL BE CAREFULLY PLACED.
7. RIP-RAP SHALL BE CLEAN STONE OR ROCK, 6" TO 3'-0" IN SIZE, FREE OF FOREIGN MATERIAL (SUCH AS: SAND, WOOD OR STEEL). CLEAN CONCRETE RUBBLE WILL BE ALLOWED.
8. TOLERANCE FOR RIP-RAP ELEVATION SHALL BE 0" TO -6" NGVD.
9. RIP-RAP SHALL BE IRREGULAR SIZES WITH NOMINAL DIMENSIONS FROM 6" MIN. TO 36" MAX. OR AS REQUIRED BY THE APPROPRIATE REGULATORY AGENCY.
10. CAP ELEVATIONS THAT ARE GREATER THAN 4.0', RIP-RAP ELEVATION SHALL BE 4.0' BELOW PROPOSED CAP ELEVATION TO A MAXIMUM OF 1.0', OR AS REQUIRED BY THE APPROPRIATE REGULATORY AGENCY.
11. NO RIP-RAP SHALL BE ALLOWED TO OBSTRUCT THE CENTRAL NAVIGABLE SECTION OF THE CANAL.

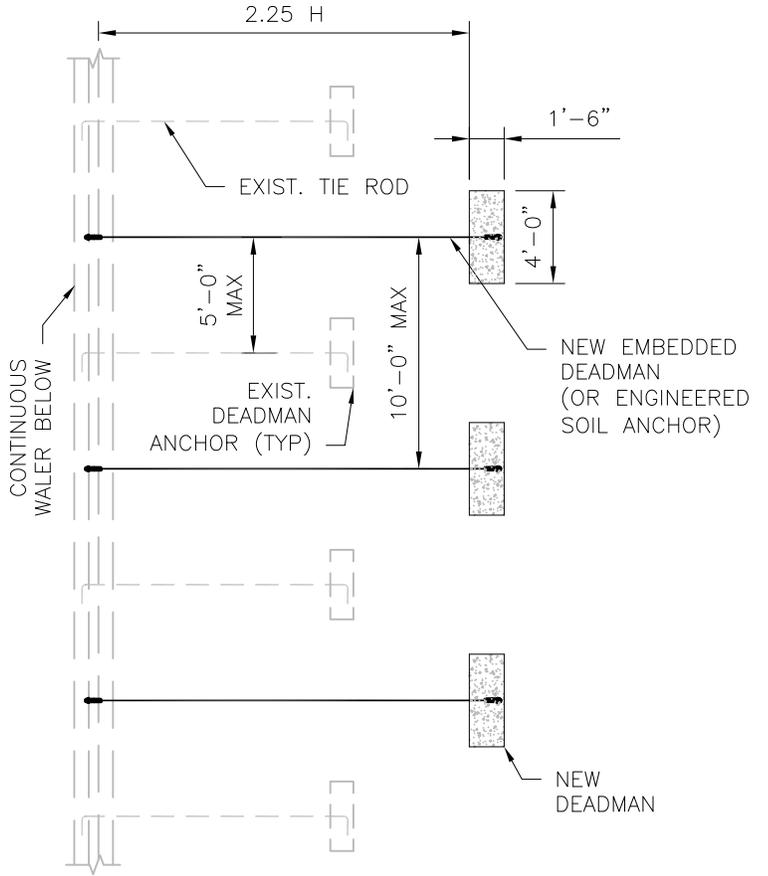


RIP-RAP - DETAIL

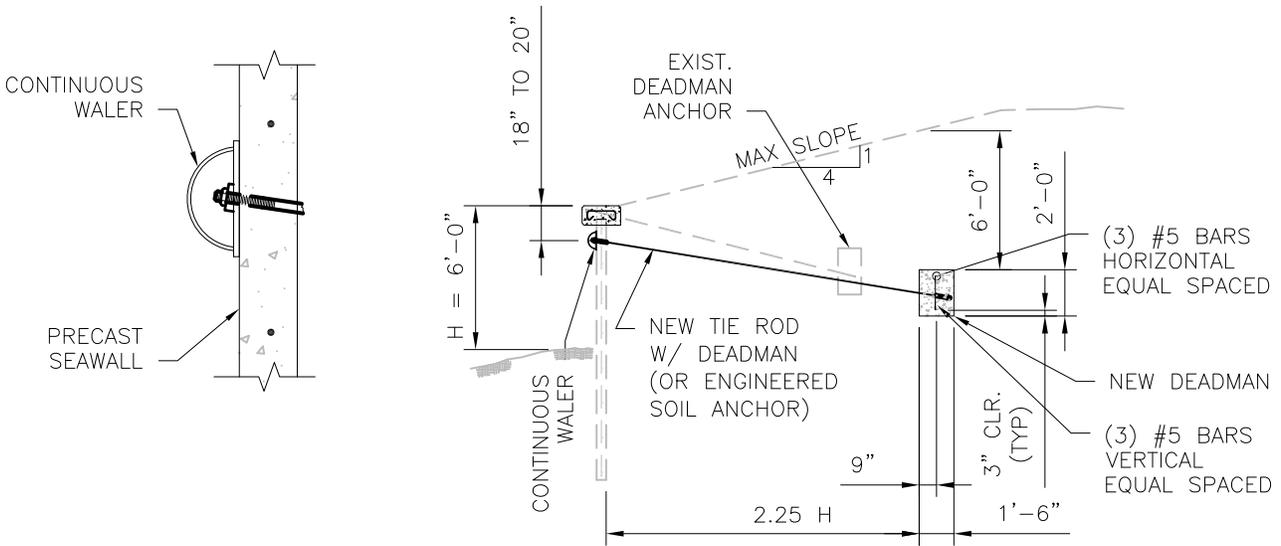
<p>ADOPTED BY CITY COUNCIL</p>	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<p>TITLE</p> <p>PRECAST CONCRETE SEAWALL - RIP-RAP TYPICAL DETAIL</p> <p>REVISIONS:</p>	<p>SHEET NO.</p> <p>H-1L</p>
		<p>09-14-2021</p>	

NOTES:

1. WALER AND TIE RODS MUST BE ENGINEERED TO ACCOMMODATE SITE CONDITIONS.
2. CONTRACTOR TO OBTAIN APPROVAL FROM PUBLIC WORKS DEPT. BEFORE CONSTRUCTING.
3. ALLOWABLE WALER MATERIALS: STAINLESS STEEL, ALUMINUM, STRUCTURAL PLASTIC.
4. HORIZONTAL COMPONENT WORKING LOAD OF WALER = 1030 PLF.



TIE-BACK PLAN



WALER DETAIL

TIE-BACK ELEVATION

<p>ADOPTED BY CITY COUNCIL</p>	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<p>TITLE PRECAST CONCRETE SEAWALL TIE-BACK FOR SPECIAL CONDITIONS TYPICAL DETAILS</p> <p>REVISIONS: 09-14-2021</p>	<p>SHEET NO. H-1M</p>
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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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ADOPTED BY CITY COUNCIL	 CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD	TITLE FLAT VINYL FORM SEAWALL GENERAL NOTES	SHEET NO. H-2A
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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 in⁴/ft MIN
 - h.4. SECTION MODULUS, Z = 16.6 in³/ft MIN
 - h.5. ALLOWABLE DESIGN STRESS = 3200 psi MIN
 - h.6. COLOR = GREY
 - h.7. INSTALLED VERTICAL ALIGNMENT TOLERANCE = 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" Ø 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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ADOPTED BY CITY COUNCIL	 <p style="text-align: center;">CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	TITLE		SHEET NO.
		FLAT VINYL FORM SEAWALL GENERAL NOTES		H-2B
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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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		FLAT VINYL FORM SEAWALL GENERAL NOTES		H-2C
		REVISIONS:	09-14-2021	

**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)**

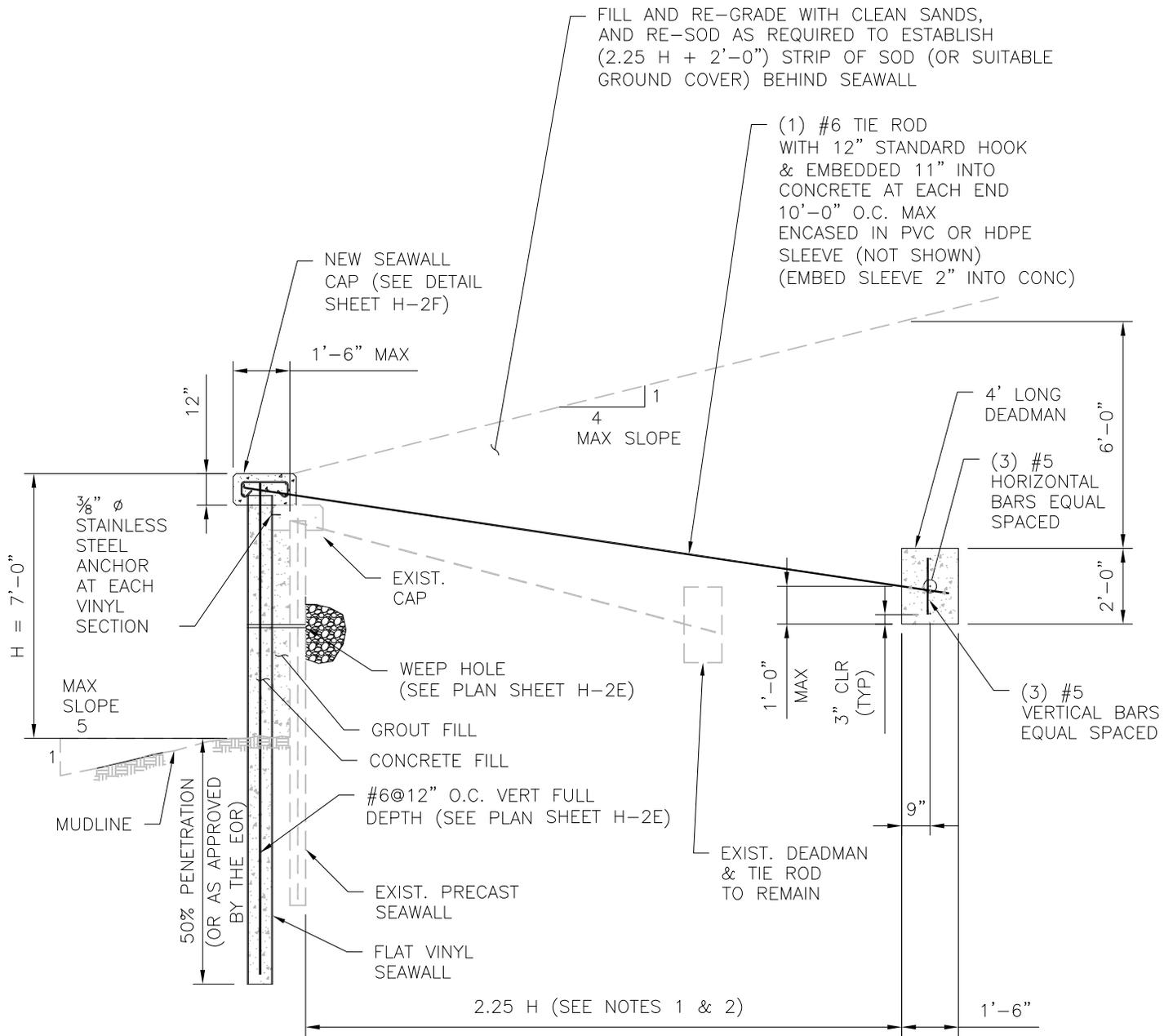
Seawall System		Seawall Construction		Seawall Height Increases Allowed (Inches)		
				24	12	Match
1	New or Replacement	Precast Concrete Panels & Cast-In-Place Concrete in Flat Vinyl Forms	New house - New seawall construction	X		X
			Existing house - Replacement of existing seawall - full property	X	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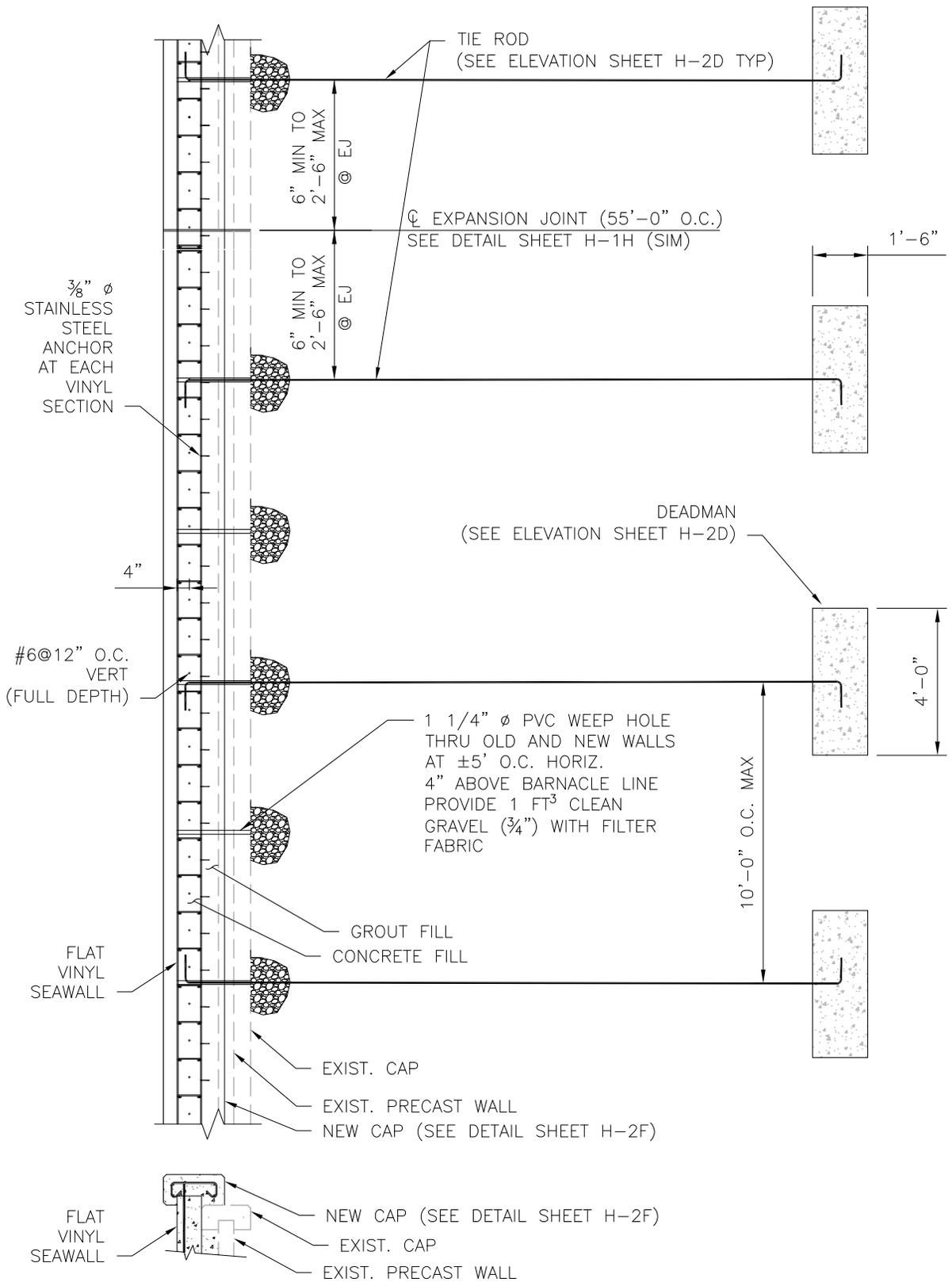


NOTES:

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. ANY ANCHORS EMBEDDED BEHIND SEAWALL MUST BE SITE-SPECIFIC ENGINEERED.

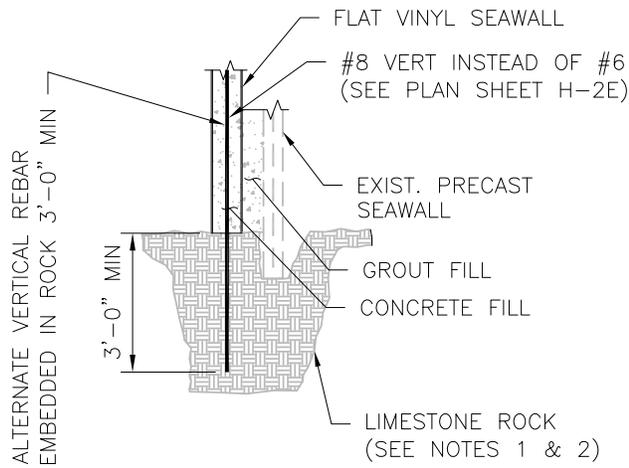
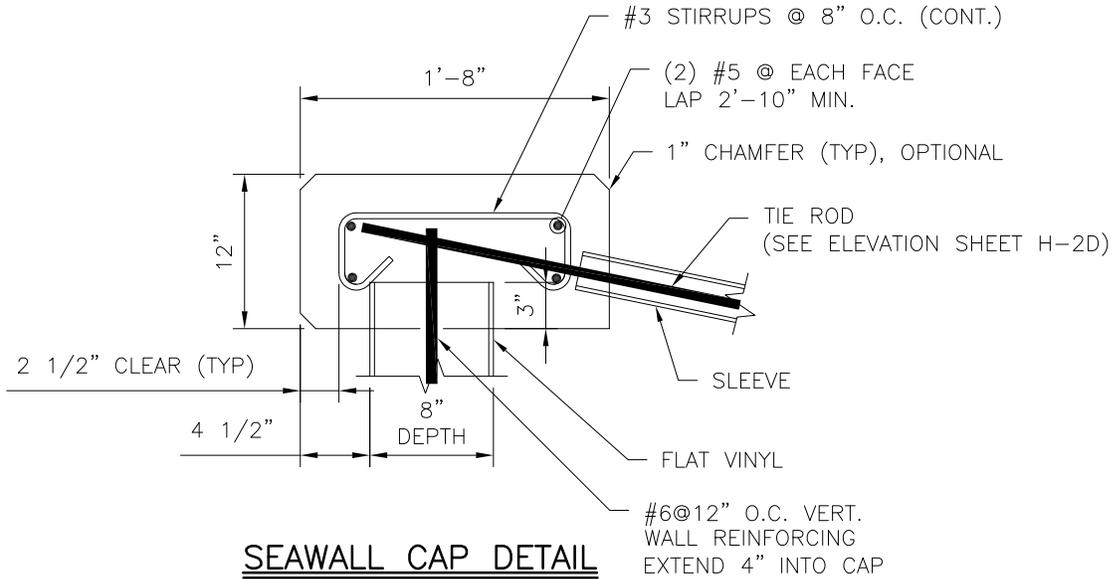
SEAWALL ELEVATION

ADOPTED BY CITY COUNCIL	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	TITLE		SHEET NO.
		<p>FLAT VINYL FORM SEAWALL TYPICAL ELEVATION</p>		H-2D
REVISIONS:		09-14-2021		



SEAWALL PLAN

<p>ADOPTED BY CITY COUNCIL</p>	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<p>TITLE</p> <p>FLAT VINYL FORM SEAWALL TYPICAL PLAN</p> <p>REVISIONS:</p>	<p>SHEET NO.</p> <p>H-2E</p>
		<p>09-14-2021</p>	

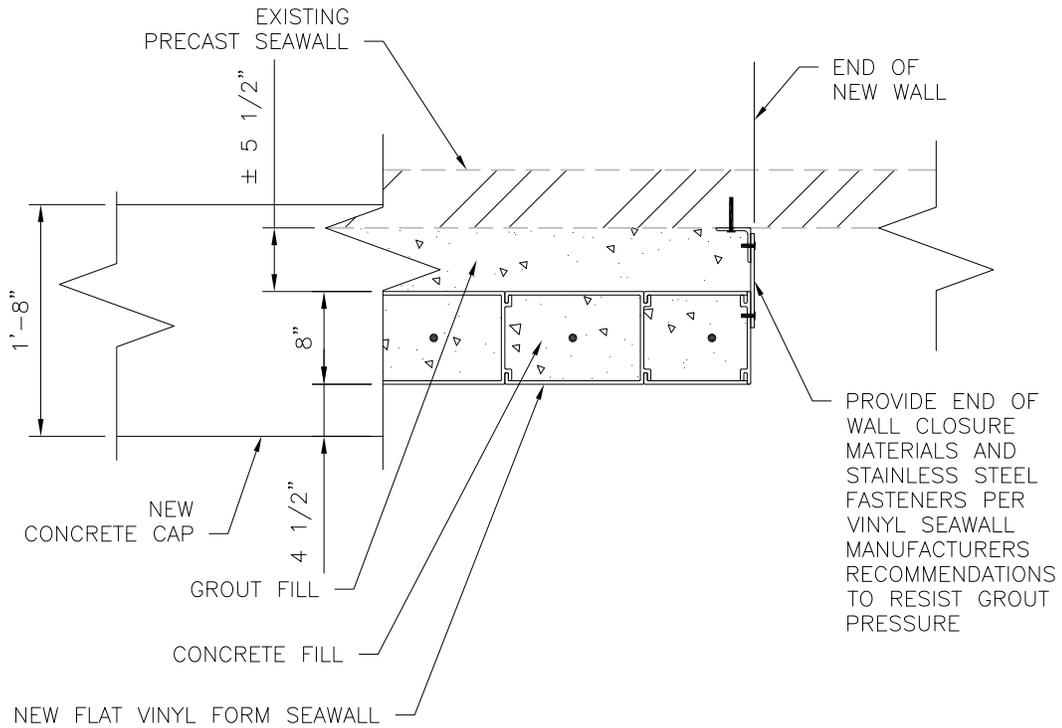


NOTES:

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.

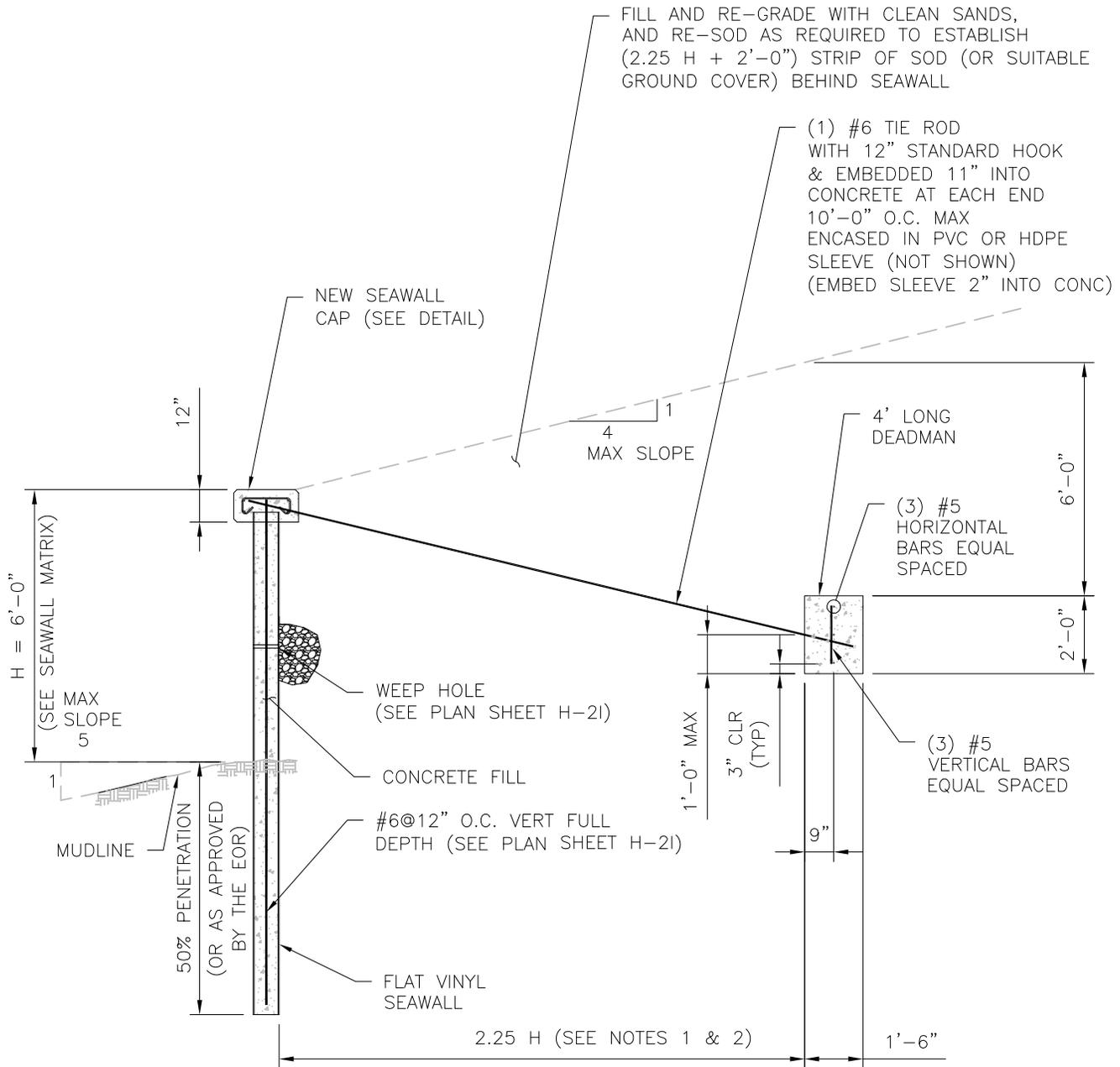
SEAWALL WITH EXISTING PRECAST CONCRETE SEAWALL PINNED IN ROCK DETAIL

<p>ADOPTED BY CITY COUNCIL</p>	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<p>TITLE</p> <p>FLAT VINYL FORM SEAWALL TYPICAL DETAILS</p> <p>REVISIONS:</p>	<p>SHEET NO.</p> <p>H-2F</p>
		<p>09-14-2021</p>	



END OF WALL DETAIL

<p>ADOPTED BY CITY COUNCIL</p>	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<p>TITLE</p> <p>FLAT VINYL FORM SEAWALL TYPICAL DETAIL</p> <p>REVISIONS:</p>	<p>SHEET NO.</p> <p>H-2G</p>
		<p>09-14-2021</p>	

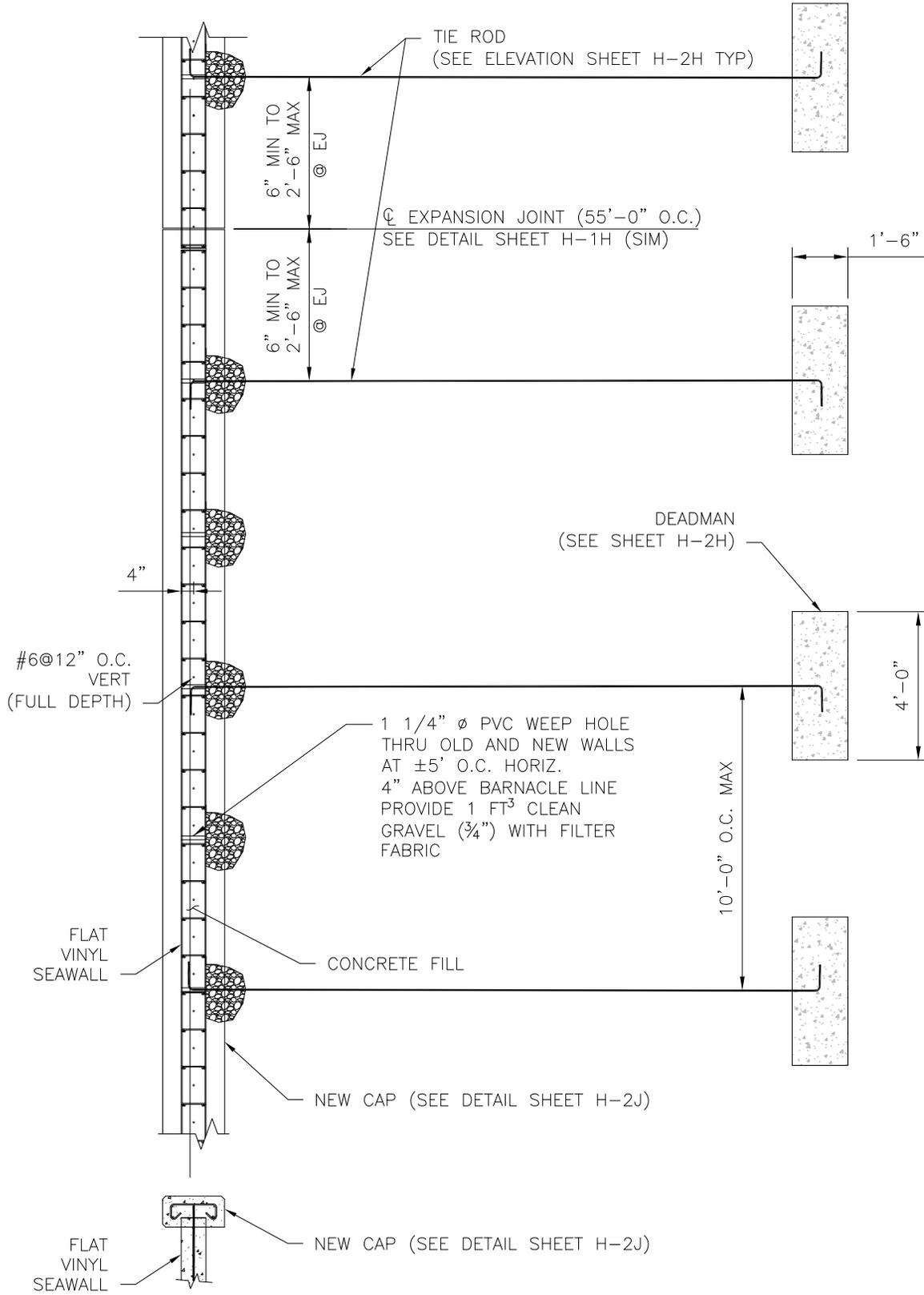


NOTES:

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.

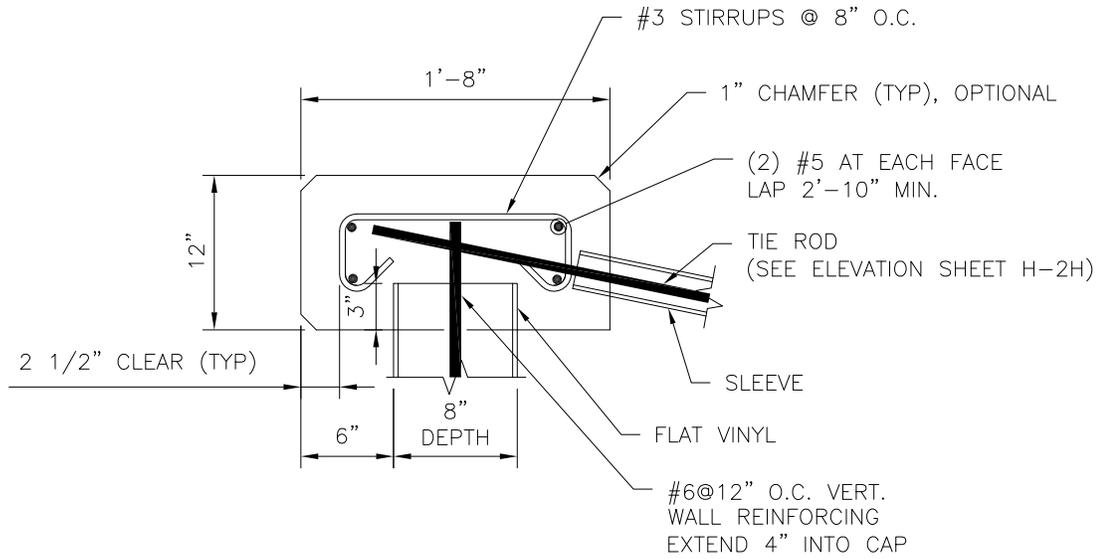
ALTERNATE SEAWALL ELEVATION

<p>ADOPTED BY CITY COUNCIL</p>	<p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<p>TITLE</p> <p>FLAT VINYL FORM SEAWALL ALTERNATE TYPICAL ELEVATION</p>	<p>SHEET NO.</p> <p>H-2H</p>
		<p>REVISIONS:</p>	<p>09-14-2021</p>

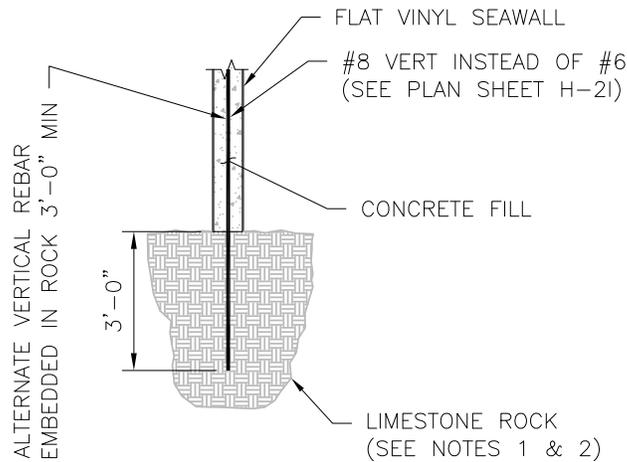


ALTERNATE SEAWALL PLAN

<p>ADOPTED BY CITY COUNCIL</p>	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<p>TITLE</p> <p>FLAT VINYL FORM SEAWALL ALTERNATE TYPICAL PLAN</p> <p>REVISIONS:</p>	<p>SHEET NO.</p> <p>H-2I</p>
		<p>09-14-2021</p>	



ALTERNATE SEAWALL CAP DETAIL

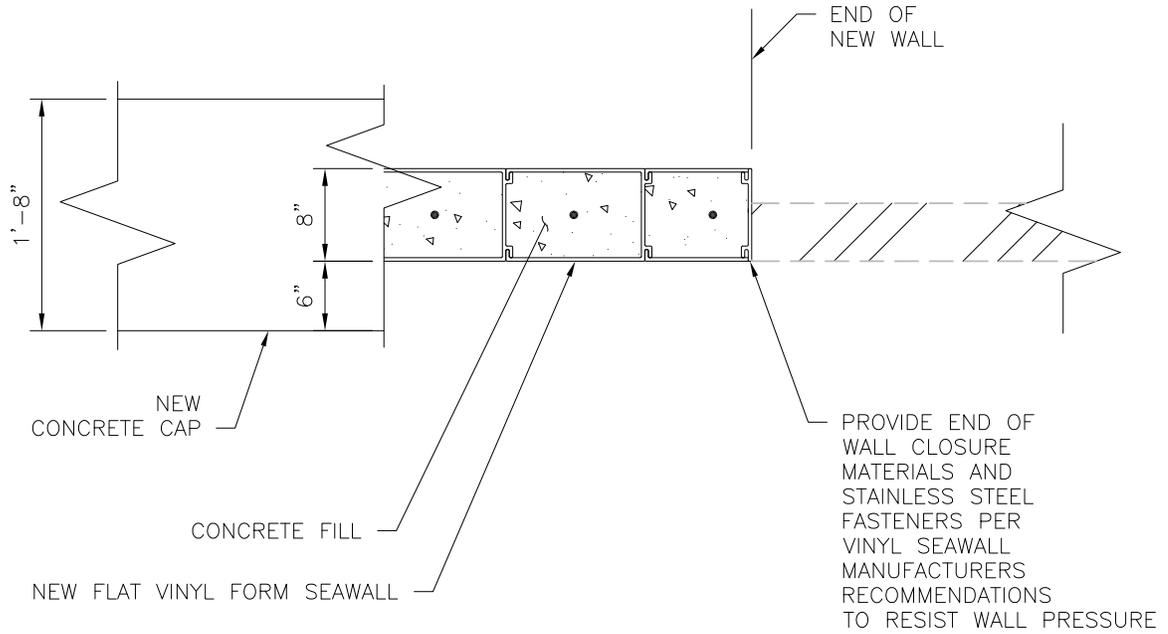


NOTES:

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

<p>ADOPTED BY CITY COUNCIL</p>	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<p>TITLE</p> <p>FLAT VINYL FORM SEAWALL ALTERNATE TYPICAL DETAILS</p> <p>REVISIONS: 09-14-2021</p>	<p>SHEET NO.</p> <p>H-2J</p>
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ALTERNATE END OF WALL DETAIL

<p>ADOPTED BY CITY COUNCIL</p>	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<p>TITLE</p> <p>FLAT VINYL FORM SEAWALL ALTERNATE TYPICAL DETAIL</p> <p>REVISIONS: 09-14-2021</p>	<p>SHEET NO.</p> <p>H-2K</p>
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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 CORR. VINYL WITH CONC SEAWALL GENERAL NOTES	SHEET NO.
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- 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.
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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 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.

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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)**

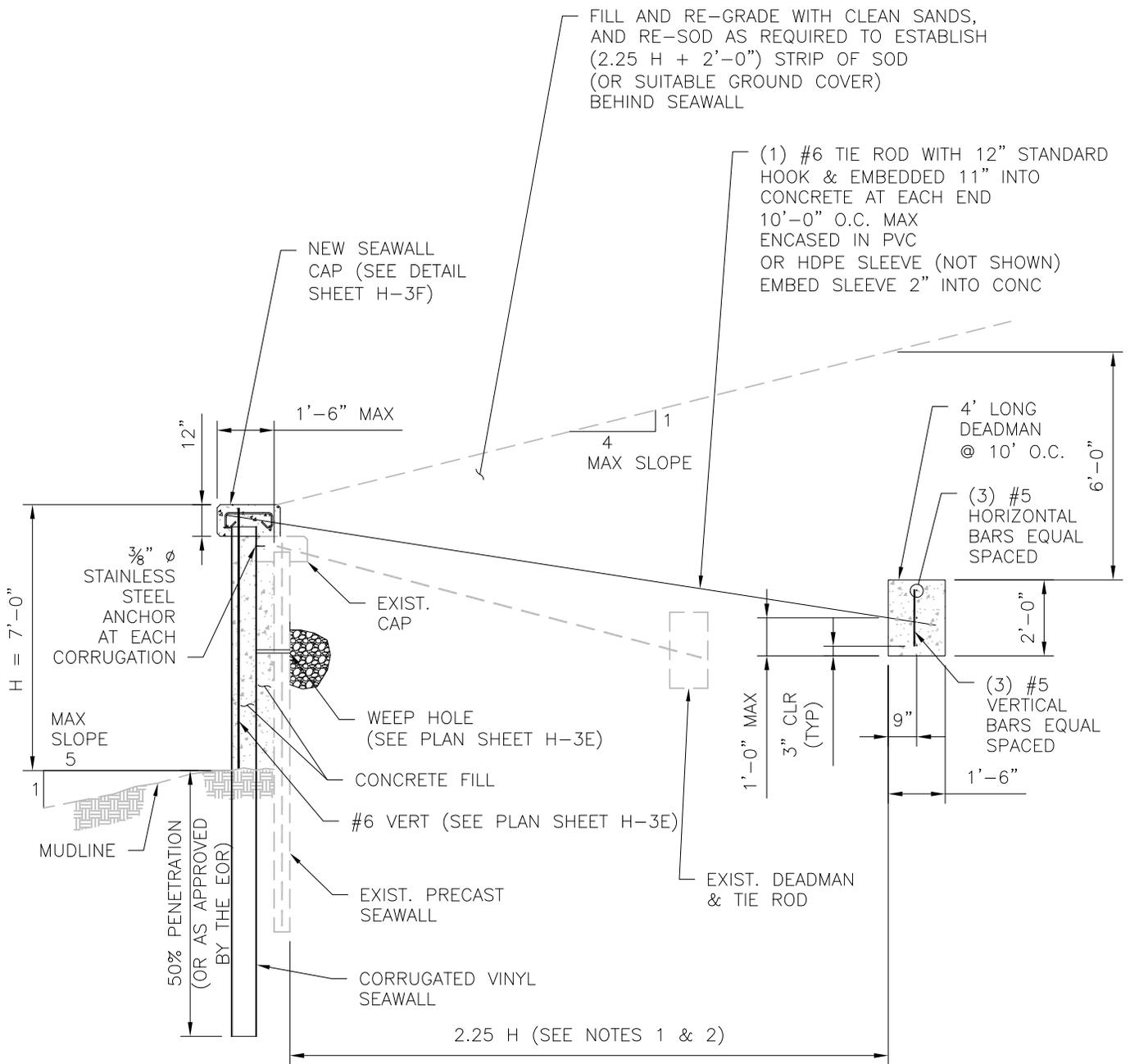
Seawall System		Seawall Construction	Seawall Height Increases Allowed (Inches)					
			24	12	Match			
1	New or Replacement	Precast Concrete Panels & Cast-In-Place Concrete in Flat Vinyl Forms	New house - New seawall construction			X		X
			Existing house - Replacement of existing seawall - full property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

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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		<p>REVISIONS:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;"></td> <td style="width: 40%; text-align: center;">09-14-2021</td> </tr> </table>		09-14-2021	H-3CA
	09-14-2021				

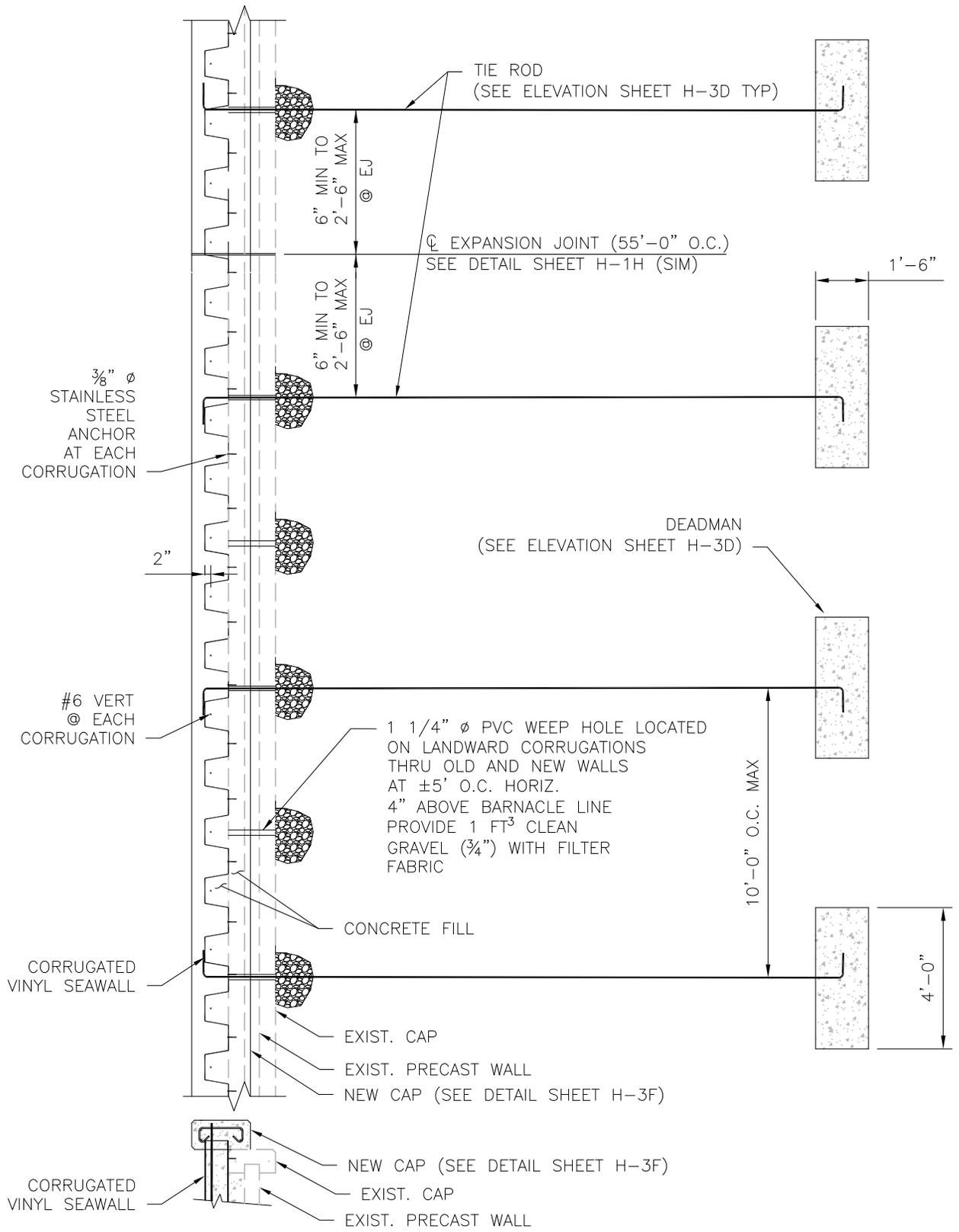


NOTES:

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.

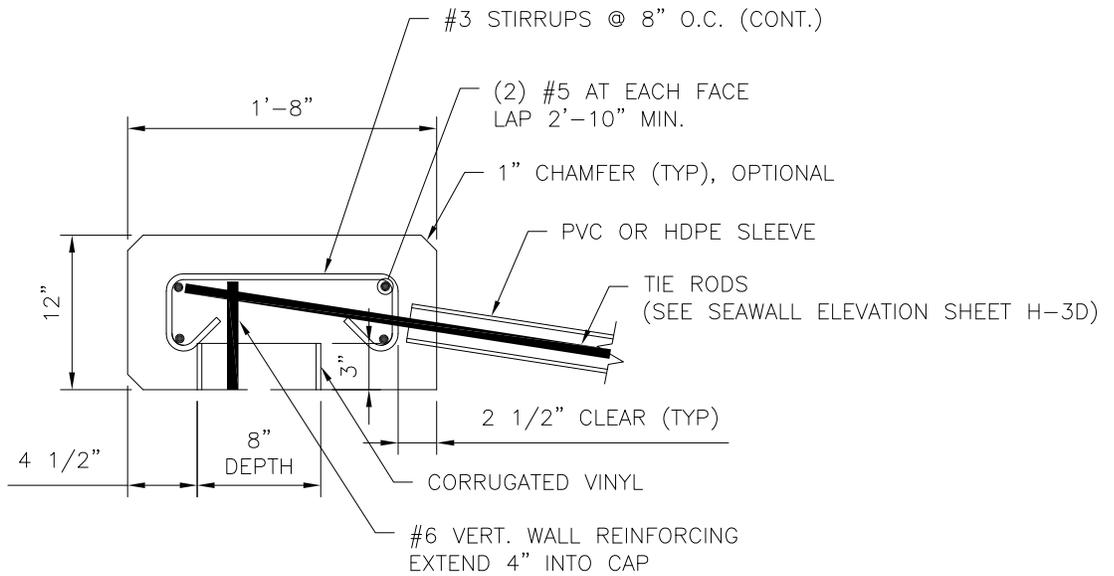
SEAWALL ELEVATION

ADOPTED BY CITY COUNCIL	 <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	TITLE		SHEET NO.
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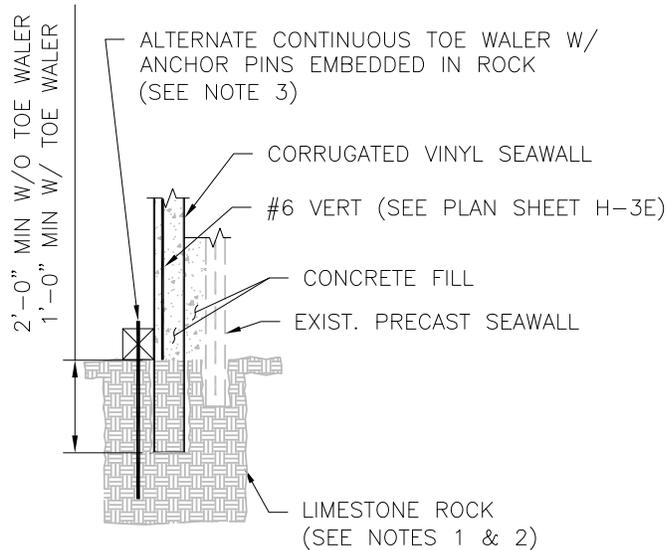


SEAWALL PLAN

ADOPTED BY CITY COUNCIL	 CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD	TITLE		SHEET NO.
		CORR. VINYL WITH CONC SEAWALL TYPICAL PLAN		H-3E
REVISIONS:		09-14-2021	(Empty)	



SEAWALL CAP DETAIL

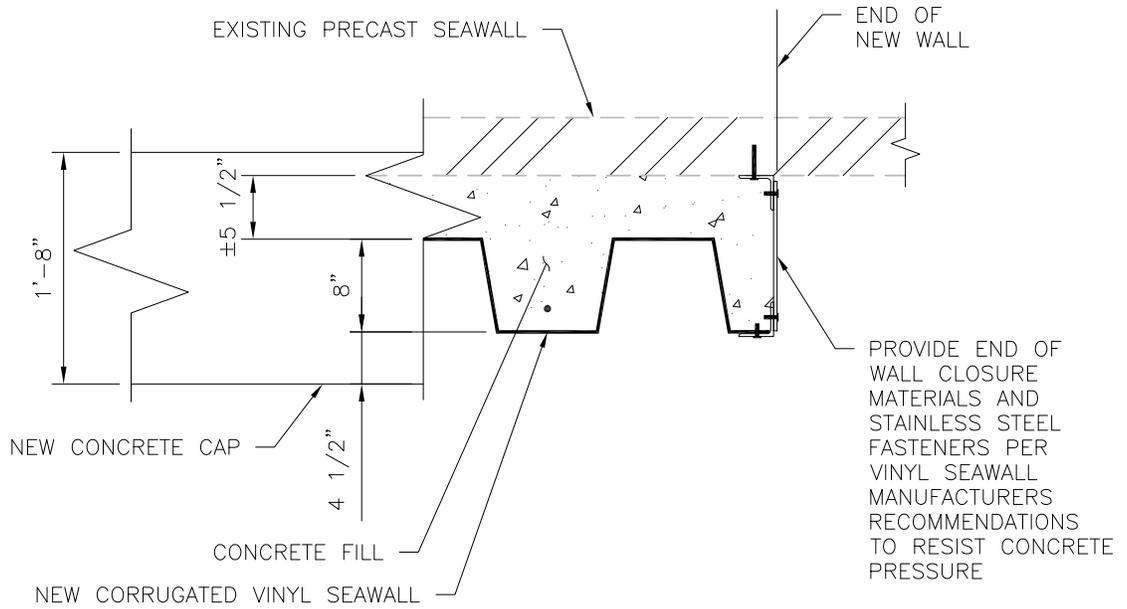


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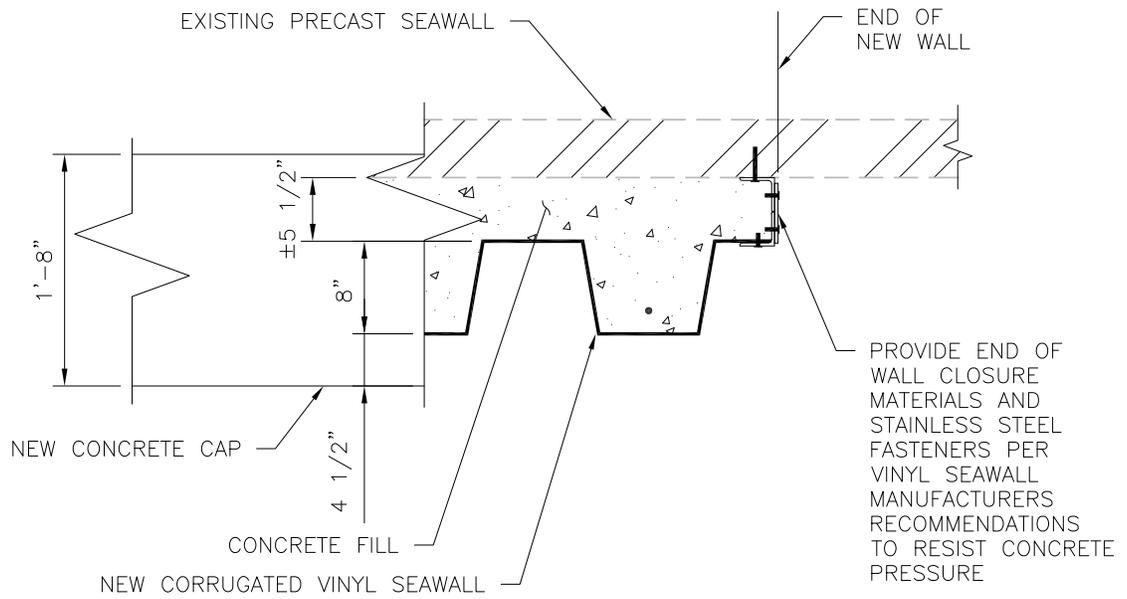
1. REFERENCE CORRUGATED VINYL WITH CAST IN PLACE CONCRETE SEAWALL SPECIFICATION GENERAL NOTE 3.h.10.
2. IF LIMESTONE ROCK IS LESS THAN 2' THICK, PANEL MUST BE ADVANCED DOWN TO FULL 50% PENETRATION.
3. REFERENCE CORRUGATED VINYL WITH CAST IN PLACE CONCRETE SEAWALL SPECIFICATION GENERAL NOTE 3.h.11.

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>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: 09-14-2021</p>	<p>SHEET NO.</p> <p>H-3G</p>
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