



G:\Engineering Design Standards\UPDATED STANDARDS\H - SEAWALLS\Sht H-1ABC bei.dwg, 11/23/2021 9:04:27 AM, Adobe PDF

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 11-03-2021	 CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD	TITLE PRECAST CONCRETE SEAWALL GENERAL NOTES			SHEET NO. H-1A
		REVISIONS:			

- 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 = $\frac{1}{4}$ 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 $\pm 3"$. DRILL 2 $\frac{1}{4}"$ ϕ HOLES $\times 3'-0"$ 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 $\times 5'-0"$ 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)

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		REVISIONS:			

- 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.

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11-03-2021		PRECAST CONCRETE SEAWALL GENERAL NOTES				H-1C
		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

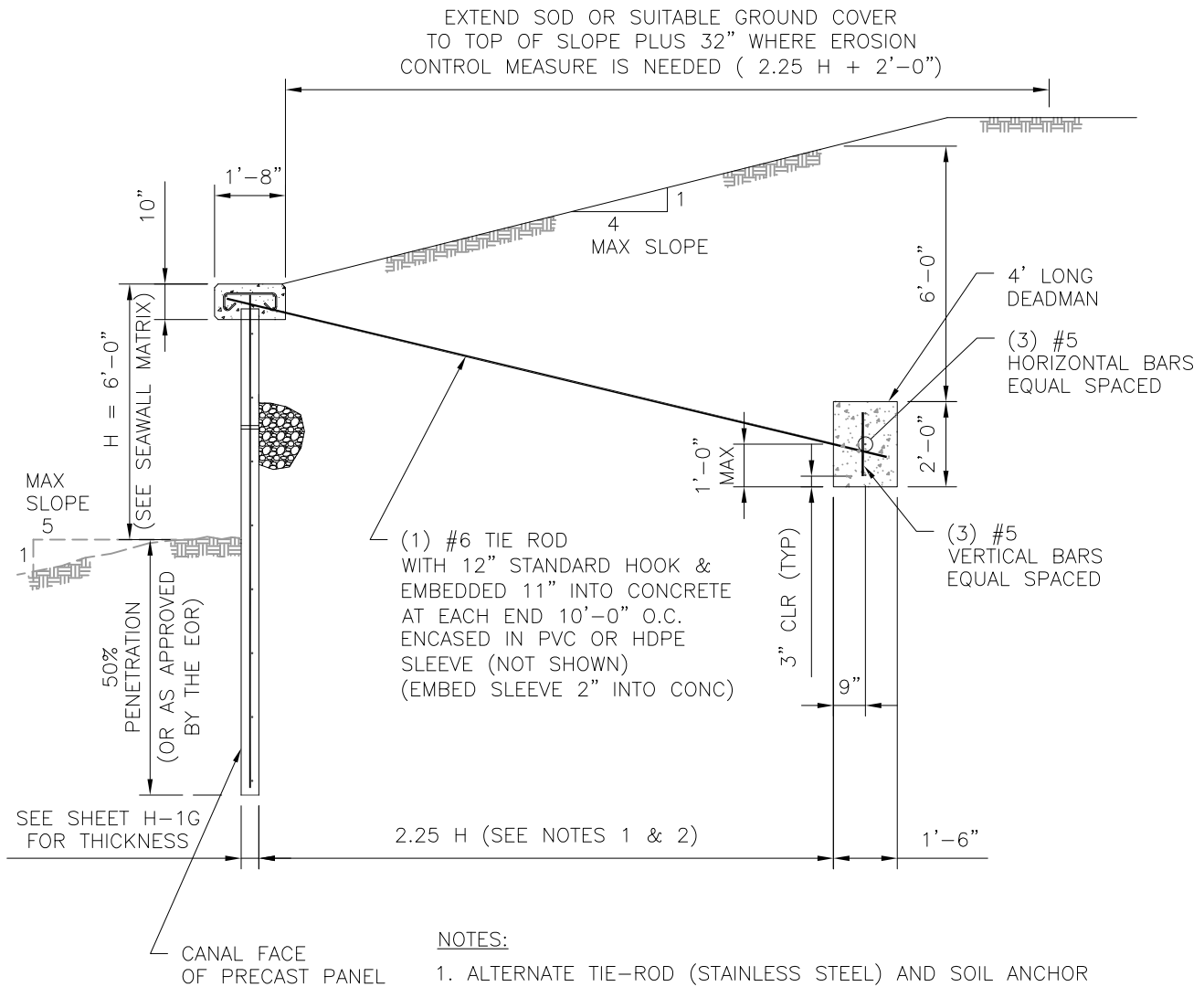
TABLE 2 SALTWATER CANAL SEAWALL MATRIX ENGINEERING DESIGN STANDARDS (EDS)						
Seawall System			Seawall Construction	Seawall Height Increases Allowed (Inches)		
				24	12	Match
1	New or Replacement	Precast Concrete Panels & Cast-In-Place Concrete in Flat Vinyl Forms	New house - New seawall construction	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:

- 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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		REVISIONS:				

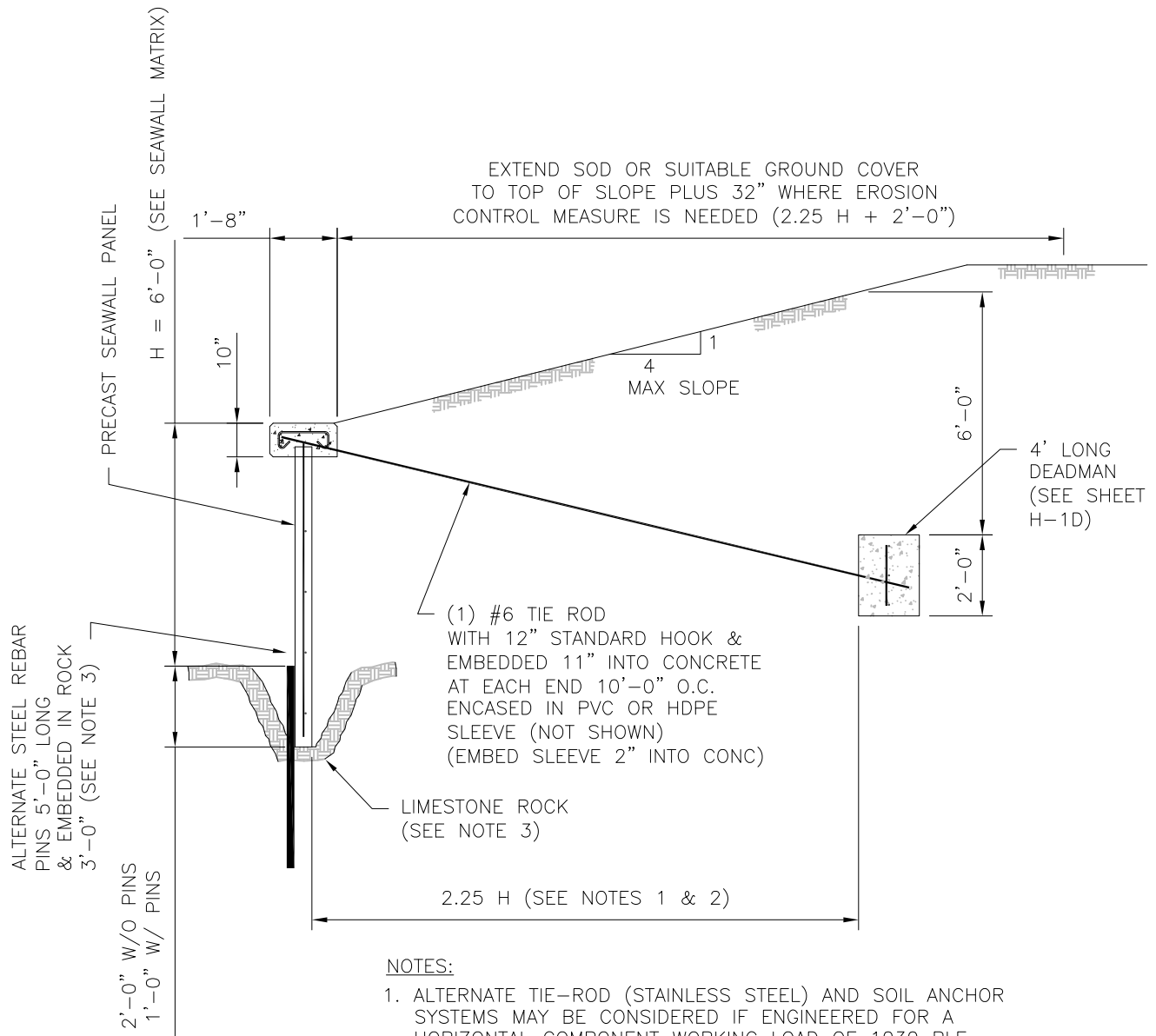


NOTES:

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>11-03-2021</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>
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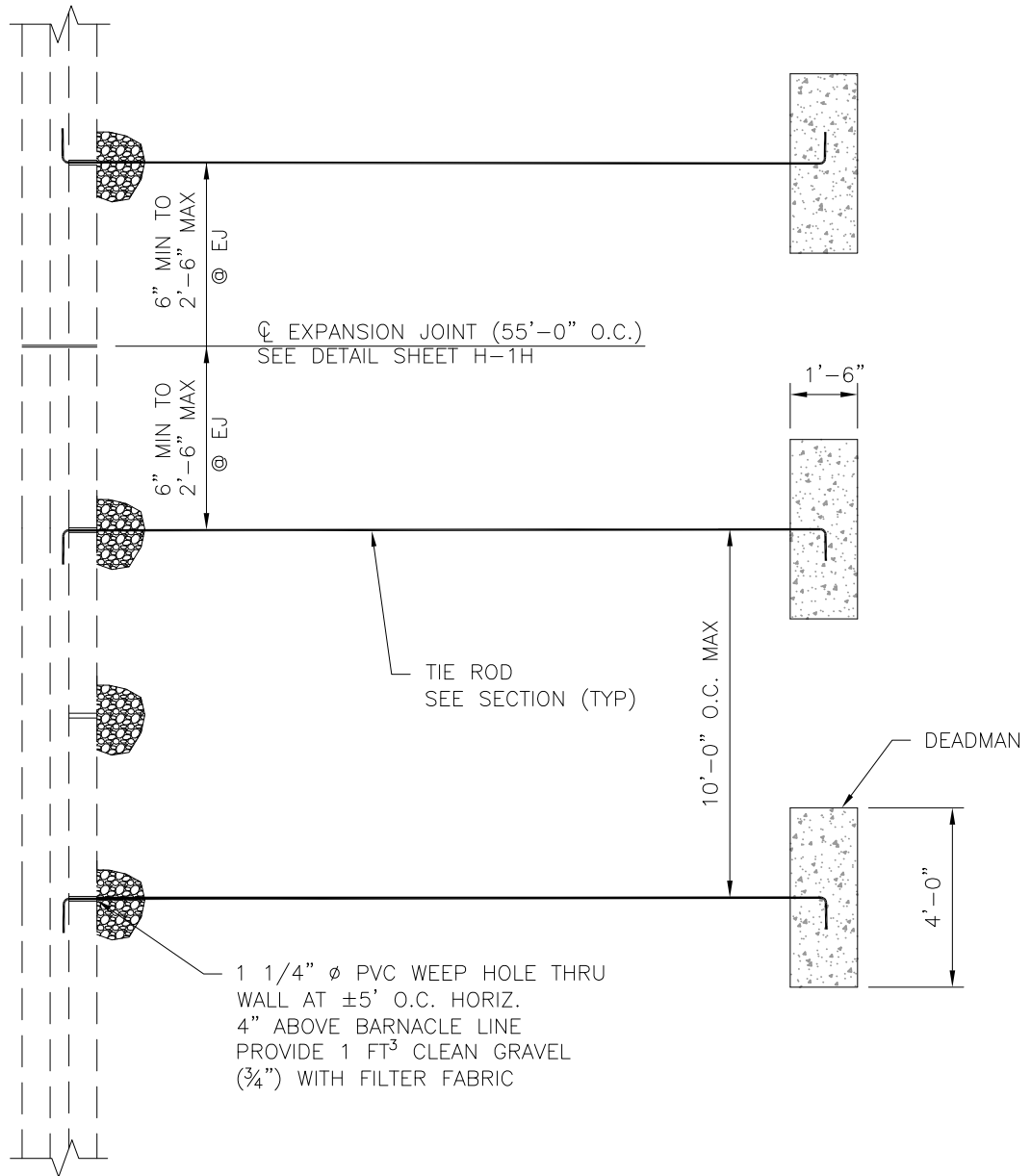


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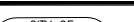
1. ALTERNATE TIE-ROD (STAINLESS STEEL) AND SOIL ANCHOR SYSTEMS MAY BE CONSIDERED IF ENGINEERED FOR A HORIZONTAL COMPONENT WORKING LOAD OF 1030 PLF (SPACED AT 10'-0" O.C.) AND EMBEDDED 2.25 H BEHIND SEAWALL.
2. ANCHORS EMBEDDED BEHIND SEAWALL MUST BE SITE-SPECIFIC ENGINEERED.
3. REFERENCE PRECAST SEAWALL GENERAL NOTES 3.g.9 & 3.g.10.

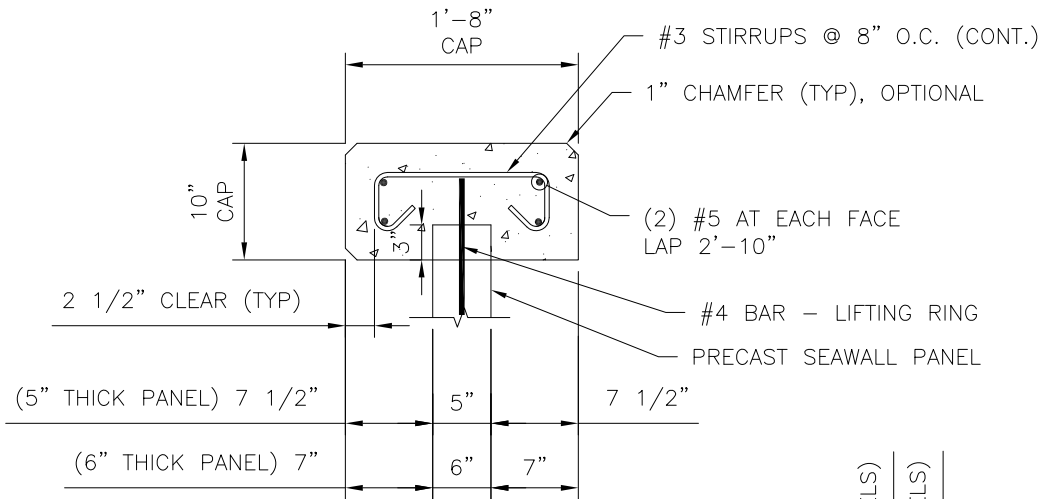
**PRECAST CONCRETE SEAWALL
EMBEDDED IN ROCK DETAIL**

<p>ADOPTED BY CITY COUNCIL</p> <p>11-03-2021</p>	<p>CITY OF CAPE CORAL</p> <p>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<p>TITLE</p> <p>PRECAST CONCRETE SEAWALL TYPICAL DETAIL</p> <p>REVISIONS:</p>	<p>SHEET NO.</p> <p>H-1E</p>
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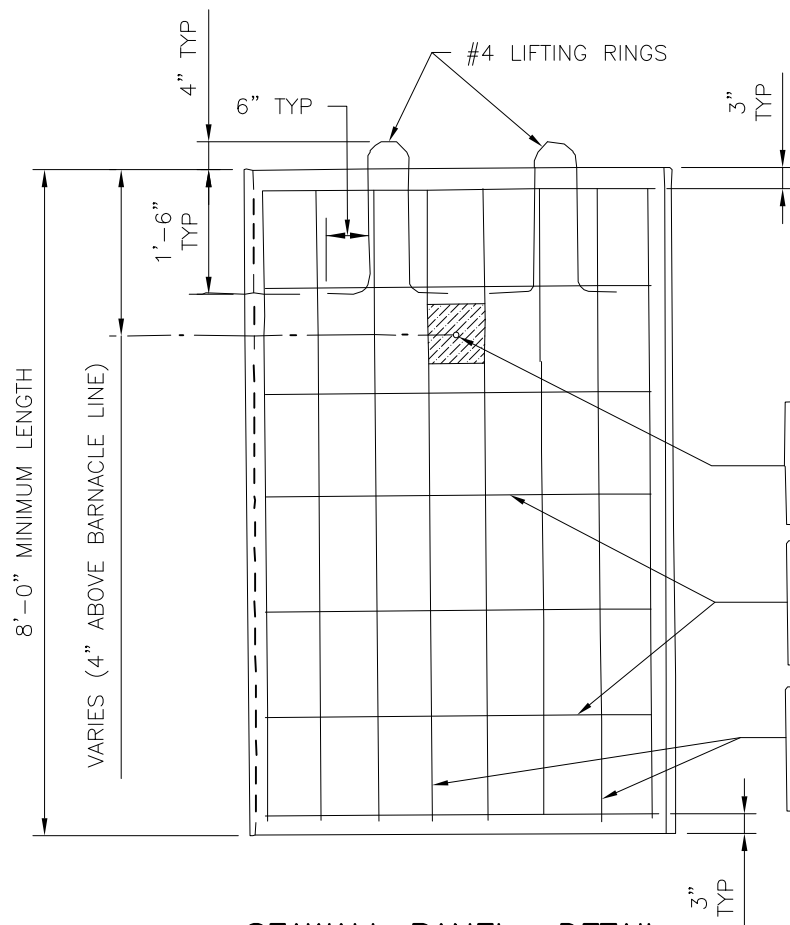


PRECAST CONCRETE SEAWALL PLAN

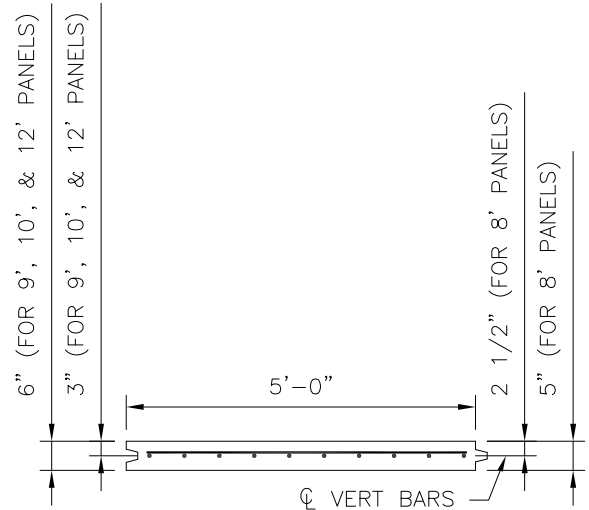
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11-03-2021		PRECAST CONCRETE SEAWALL TYPICAL PLAN			H-1F
		REVISIONS:			



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)

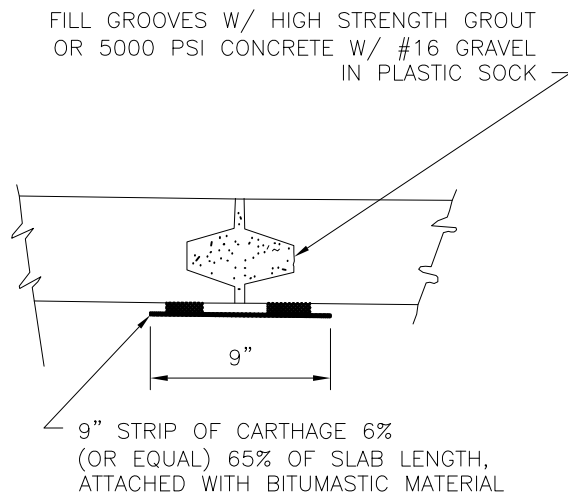
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11-03-2021



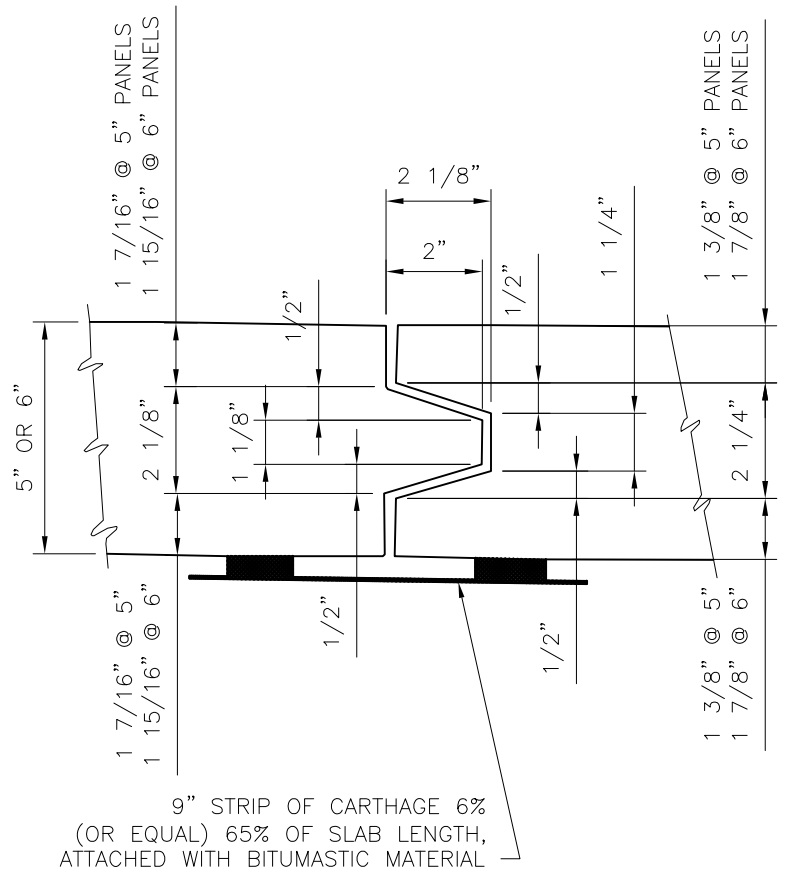
CITY OF CAPE CORAL
PUBLIC WORKS DEPARTMENT
ENGINEERING DESIGN STANDARD

TITLE
PRECAST CONCRETE SEAWALL TYPICAL DETAILS
REVISIONS:

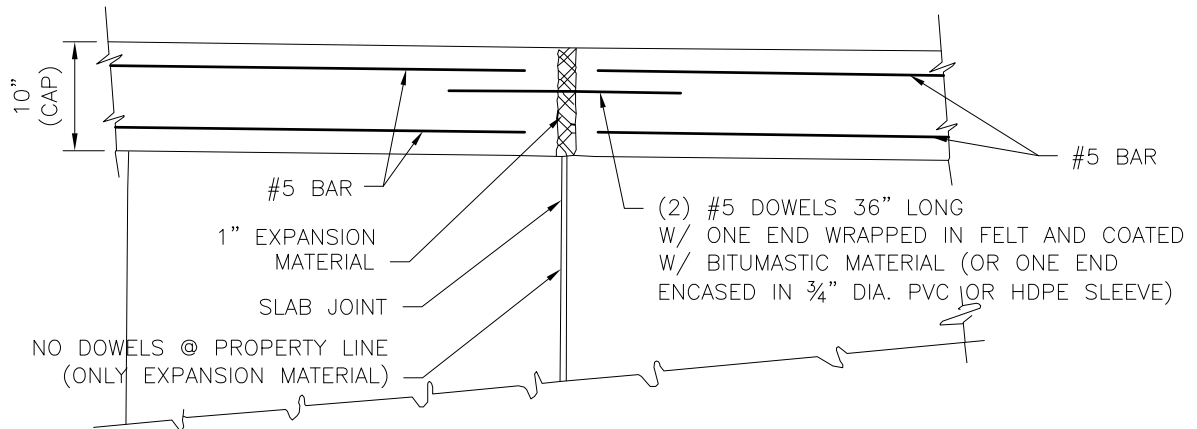
SHEET NO.
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ALTERNATE PANEL JOINT DETAIL

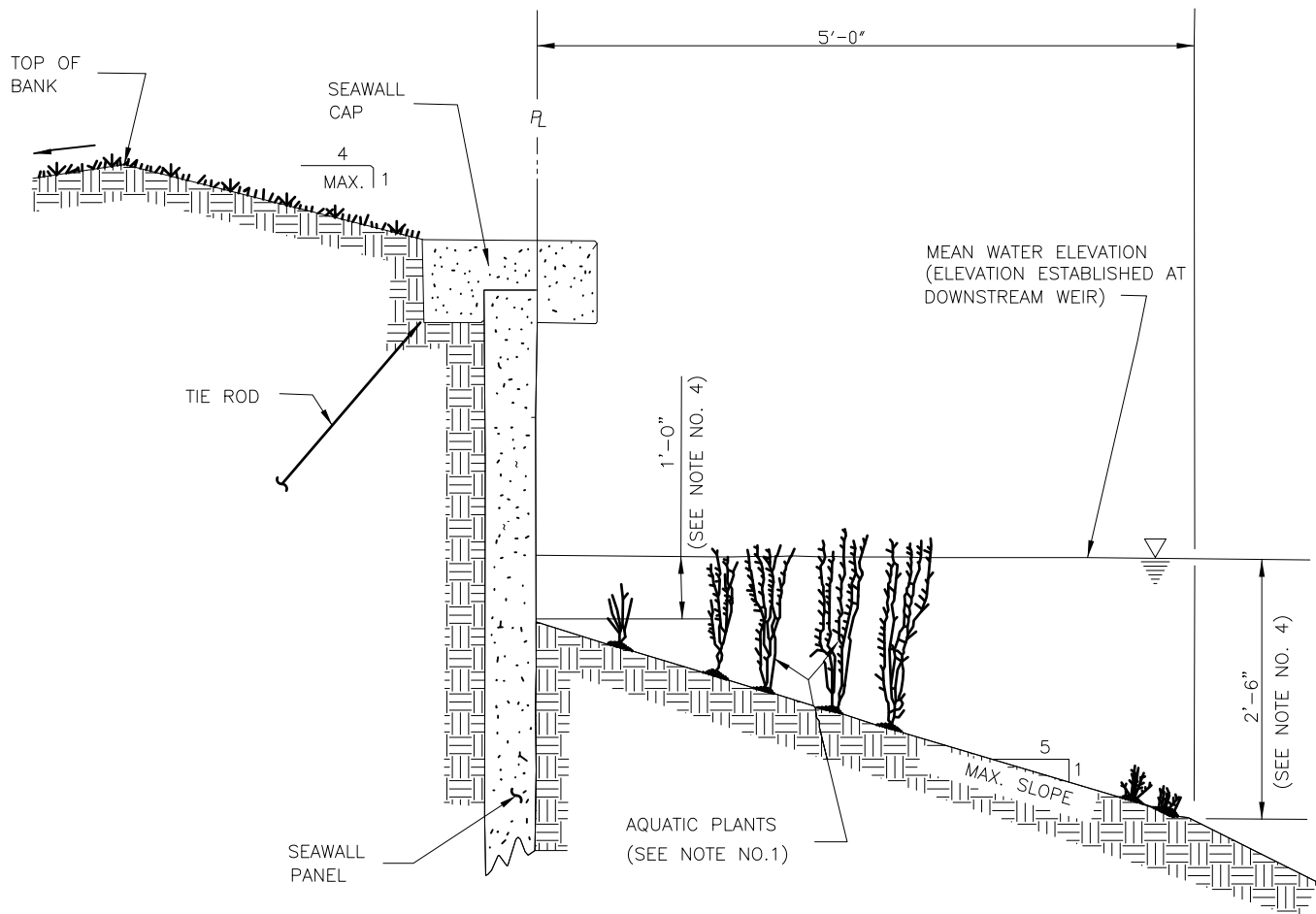


PANEL JOINT DETAIL



EXPANSION JOINT DETAIL


ADOPTED BY CITY COUNCIL	 CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD	TITLE	SHEET NO.
11-03-2021		PRECAST CONCRETE SEAWALL TYPICAL DETAILS REVISIONS:	H-1H

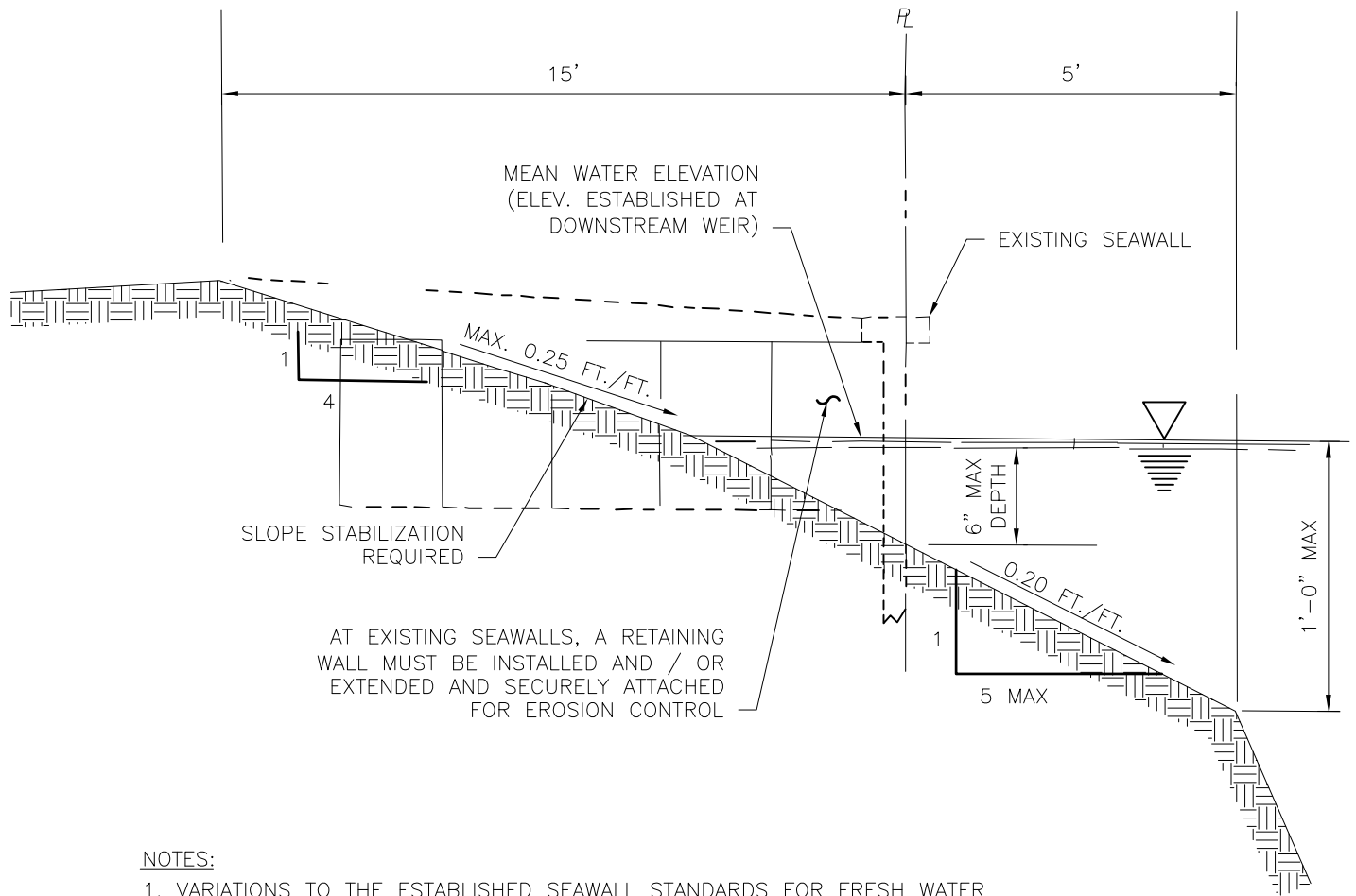


NOTES:

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	 <div>CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</div>	TITLE				SHEET NO.
11-03-2021		PRECAST CONCRETE SEAWALL FRESHWATER CANAL TYPICAL DETAIL				H-11
		REVISIONS:				

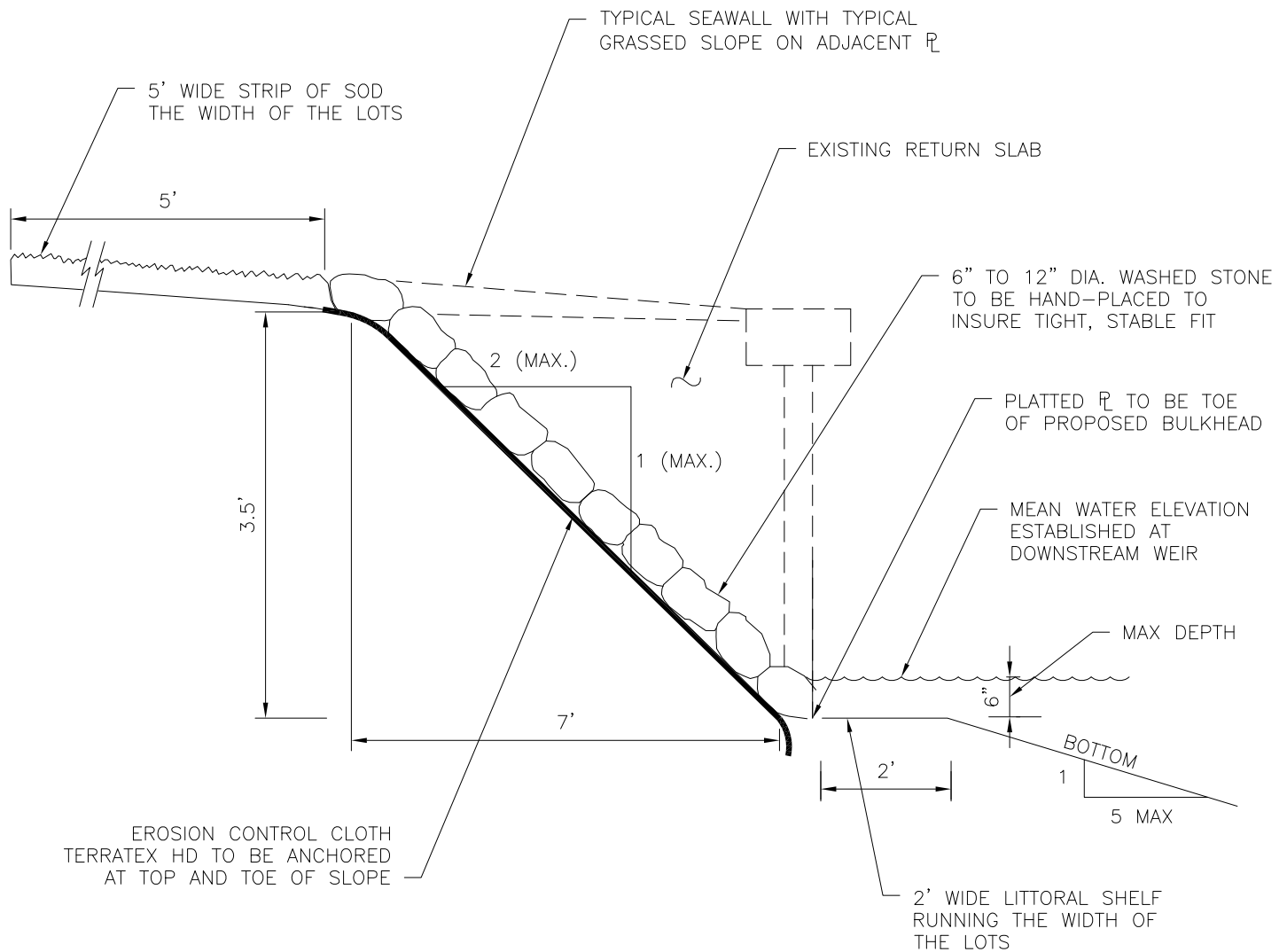


NOTES:


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	SHEET NO.
11-03-2021		SEAWALLS - FRESHWATER CANAL ALTERNATE 1 TYPICAL DETAIL REVISIONS:	H-1J

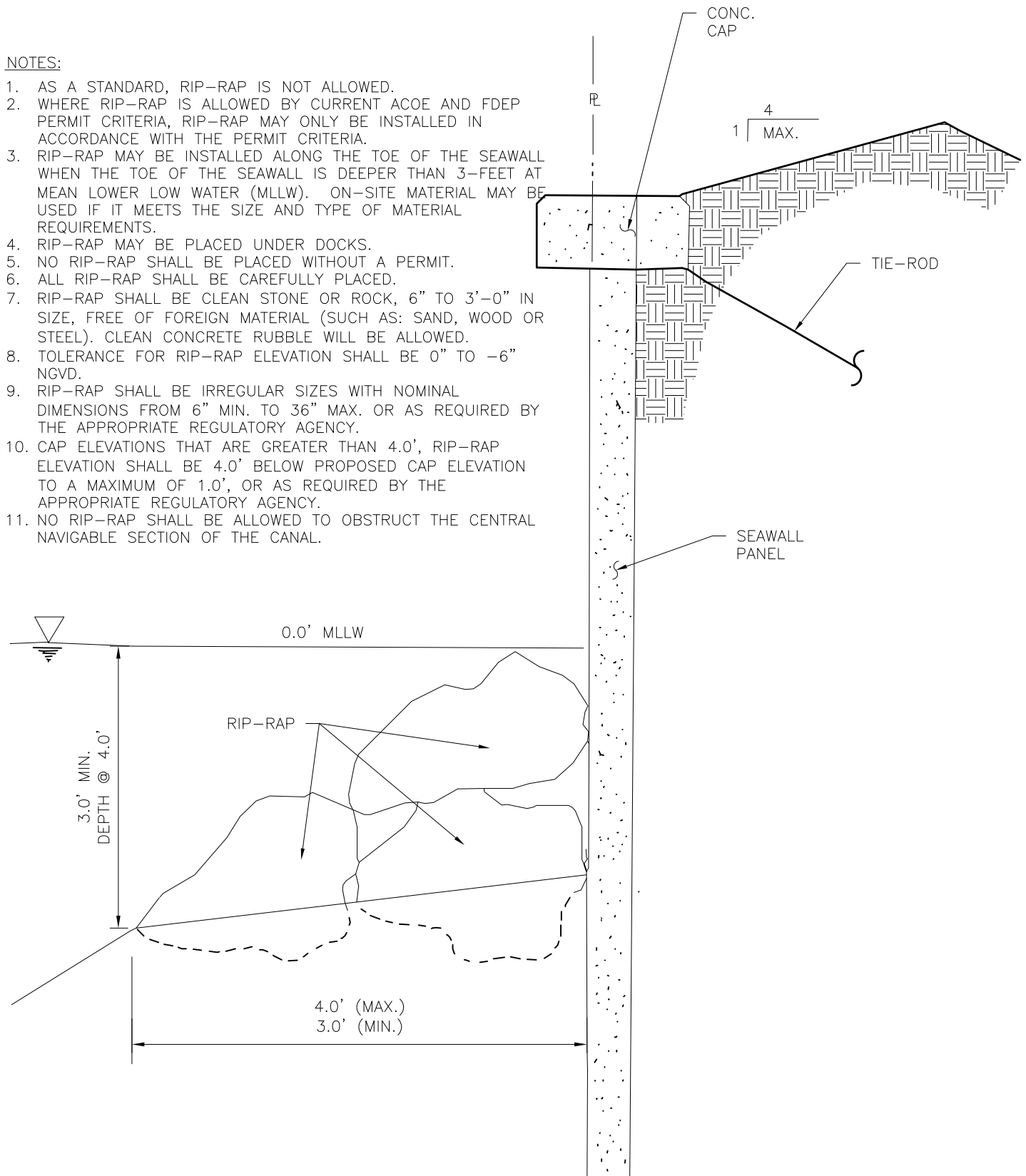


VERTICAL BULKHEAD ALTERNATE 2


ADOPTED BY CITY COUNCIL	 CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD	TITLE	SHEET NO.
11-03-2021		SEAWALLS - FRESHWATER CANAL ALTERNATE 2 TYPICAL DETAIL	H-1K
		REVISIONS:	

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.

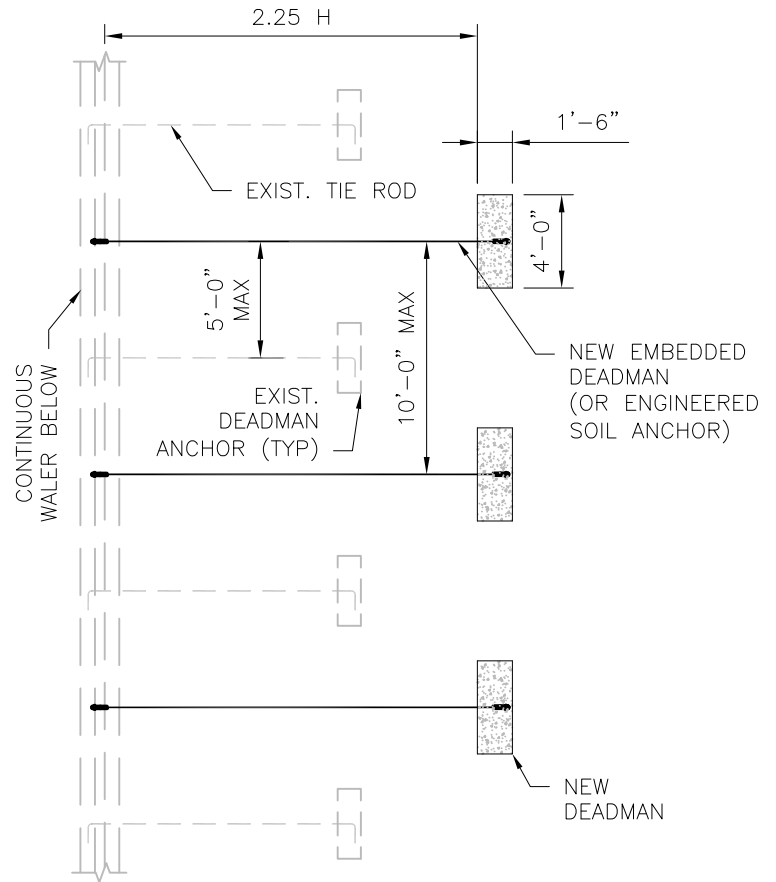


RIP-RAP - DETAIL

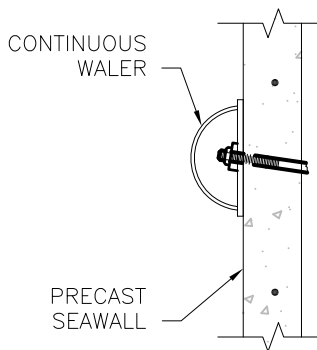
<p>ADOPTED BY CITY COUNCIL</p> <p>11-03-2021</p>	<p> CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<p>TITLE</p> <p>PRECAST CONCRETE SEAWALL - RIP-RAP TYPICAL DETAIL</p> <p>REVISIONS:</p>	<p>SHEET NO.</p> <p>H-1L</p>
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NOTES:

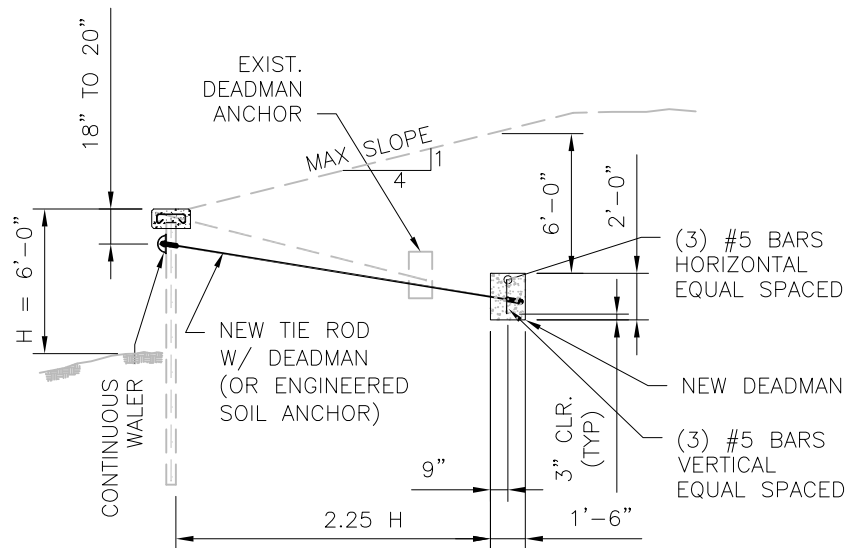
1. WALER AND TIE RODS MUST BE ENGINEERED TO ACCOMMODATE SITE CONDITIONS.
2. CONTRACTOR TO OBTAIN APPROVAL FROM PUBLIC WORKS DEPT. BEFORE CONSTRUCTING.
3. ALLOWABLE WALER MATERIALS: STAINLESS STEEL, ALUMINUM, STRUCTURAL PLASTIC.
4. HORIZONTAL COMPONENT WORKING LOAD OF WALER = 1030 PLF.




TIE-BACK PLAN



WALER DETAIL



TIE-BACK ELEVATION

<p>ADOPTED BY CITY COUNCIL</p> <p>11-03-2021</p>	<p> CITY OF CAPE CORAL PUBLIC WORKS DEPARTMENT ENGINEERING DESIGN STANDARD</p>	<p>TITLE</p> <p>PRECAST CONCRETE SEAWALL TIE-BACK FOR SPECIAL CONDITIONS TYPICAL DETAILS</p> <p>REVISIONS:</p>	<p>SHEET NO.</p> <p>H-1M</p>
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