1. THESE SPECIFICATIONS SHOW MINIMUM REQUIREMENTS 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 MINIMUM REQUIREMENTS 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 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. MINIMUM 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).

   b. EXISTING PRECAST CONCRETE SEAWALL MAY REMAIN IN PLACE SUBJECT TO THE FOLLOWING CRITERIA:

      b.1. EXISTING SEAWALL CAP MUST BE SOUND, WITHIN ORIGINAL VERTICAL ALIGNMENT (± ¼"), AND WITHIN ORIGINAL HORIZONTAL ALIGNMENT (WITH NO OUTWARD MOVEMENT IN TOWARDS THE CANAL).
      b.2. EXISTING PRECAST SEAWALL PANEL MUST HAVE LESS THAN 2" HORIZONTAL MOVEMENT (WATERWARD OR LANDWARD) FROM ITS ORIGINAL PLUMB INSTALLATION.
      b.3. THESE SPECIFICATIONS MAY NOT BE USED IF THE EXISTING PRECAST SEAWALL (TO REMAIN IN PLACE) DOES NOT MEET THE ABOVE CRITERIA.

   c. DESIGN LOAD COMBINATIONS:

      c.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.
      c.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.

   d. SOIL ASSUMED AS LOOSE FINE SAND.
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. CORRUGATED VINYL SHEETING:
   g.1. DEPTH = 8” MAX
   g.2. MODULUS OF ELASTICITY = 380,000 psi MIN
   g.3. MOMENT OF INERTIA, I = 57 in⁴/ft MIN
   g.4. SECTION MODULUS, Z = 14.3 in³/ft MIN
   g.5. ALLOWABLE DESIGN STRESS = 3200 psi MIN
   g.6. COLOR = GREY
   g.7. INSTALLED VERTICAL ALIGNMENT TOLERANCE = ¼” per foot
   g.8. MAXIMUM PROJECTION ABOVE MUDLINE = 7’ (TOP OF CAP)
   g.9. MINIMUM EMBEDMENT BELOW MUDLINE = 50% PENETRATION OF PANEL.
   g.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.
   g.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.
   g.12. SEAWALL CAP ELEVATION TO MATCH EXISTING SEAWALL CAP. IN CASES WHERE ELEVATIONS OR EXISTING CAP differs, NEW CAP SLOPE SHOULD NOT EXCEED 20%.

h. MAXIMUM DISTANCE FROM CANAL FACE OF EXISTING PRECAST SEAWALL PANEL (JUST BELOW EXISTING CAP) TO CANAL FACE OF NEW SEAWALL CAP = 18”.

i. 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.
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).
   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 ASTM A193, GRADE B8M CLASS 2.

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.

12. ROCK 3” 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.

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 4” FROM THE WATER–FACE OF THE SEAWALL.

20. REFER TO THE FDOT SPECIFICATION ON EROSION CONTROL FOR PROTECTION OF SLOPES.
FILL AND RE-GRADE WITH CLEAN SANDS, AND RE-SOD AS REQUIRED TO ESTABLISH (MIN 2.25 H + 2' - 0") STRIP OF SOD (OR SUITABLE GROUND COVER) BEHIND SEAWALL.

(2) #5 WITH 10" STANDARD HOOK & EMBEDDED 1'-0" INTO CONCRETE AT EACH END 10'-0" O.C. MAX ENCASED IN PVC OR HDPE SLEEVE (NOT SHOWN) EMBED SLEEVE 2" INTO CONC.

NEW SEAWALL CAP (SEE DETAIL SHEET H-3F)

4' LONG DEADMAN @ 10' O.C. 6'-0"

(3) #5 HORIZONTAL BARS EQUAL SPACED

(3) #5 VERTICAL BARS EQUAL SPACED

1'-0" MAX

1'-0" MAX

1'-6" MAX

1'-6" MAX

1'-6" MAX

WEEP HOLE (SEE PLAN SHEET H-3E)

EXIST. CAP

EXIST. PRECAST SEAWALL

CORRUGATED VINYL SEAWALL

2.25 H MIN (SEE NOTES 1 & 2)

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 MIN. (SPACED AT 10'-0" O.C. MAX) AND EMBEDDED 2.25 H MIN BEHIND SEAWALL.

2. ANY ANCHORS EMBEDDED < 2.25 H BEHIND SEAWALL MUST BE SITE-SPECIFIC ENGINEERED AND SUBMITTED FOR APPROVAL.

SEAWALL ELEVATION


SEAWALL PLAN

6" MIN TO 2'-6" MAX

TIE ROD
(SEE ELEVATION SHEET H-3D TYP)

6" MIN TO 2'-6" MAX

EXPANSION JOINT (55'-0" O.C.)
SEE DETAIL SHEET H-1H (SIM)

2'-6" MIN

1' - 6"

10'-0"

DEADMAN
(SEE ELEVATION SHEET H-3D)

2"

1 1/4" PVC WEEP HOLE LOCATED
ON LANDWARD CORRUGATIONS
THRU OLD AND NEW WALLS
AT ±5" O.C. HORIZ.
4" ABOVE BARNACLE LINE
PROVIDE 1 FT³ CLEAN
GRAVEL (3/4") WITH FILTER
FABRIC ATTACHED W/ BITUMASTIC

CONCRETE FILL

EXIST. CAP

EXIST. PRECAST WALL

NEW CAP (SEE DETAIL SHEET H-3F)

CORRUGATED VINYL SEAWALL

#6 VERT @ EACH CORRUGATION

3/8" STAINLESS STEEL ANCHOR AT EACH CORRUGATION

CORRUGATED VINYL SEAWALL

NEW CAP (SEE DETAIL SHEET H-3F)

EXIST. CAP

EXIST. PRECAST WALL

CITY OF CAPE CORAL
PUBLIC WORKS DEPARTMENT
ENGINEERING DESIGN STANDARD

TITLE
CORR. VINYL WITH CONC SEAWALL PLAN

SHEET NO.
H-3E

REVISIONS:

ADOPTED BY CITY COUNCIL
DRAFT
SEAWALL CAP DETAIL

NOTES:
1. REFERENCE CORRUGATED VINYL WITH CAST IN PLACE CONCRETE SEAWALL SPECIFICATION GENERAL NOTE 3.g.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.g.11.

SEAWALL WITH EXISTING PRECAST CONCRETE
SEAWALL EMBEDDED IN ROCK DETAIL
ALTERNATE 1

NEW CONCRETE CAP

CONCRETE FILL

NEW CORRUGATED VINYL SEAWALL

ALTERNATE 2

NEW CONCRETE CAP

CONCRETE FILL

NEW CORRUGATED VINYL SEAWALL

END OF WALL DETAILS