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

DRAFT - August 8, 2019

1. THESE SPECIFICATIONS SHOW MINIMUM REQUIREMENTS 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 LICENSED 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 FLAT VINYL FORM 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 (± ½”), 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 (LANDWARD) FROM ITS ORIGINAL PLUMB INSTALLATION. NO HORIZONTAL MOVEMENT (WATERWARD) IS ALLOWED.
      b.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.
   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. FLAT VINYL FORM SHEETING:
   g.1. DEPTH = 8” MAX
   g.2. MODULUS OF ELASTICITY = 380,000 psi MIN
   g.3. MOMENT OF INERTIA, I = 66 in^4/ft MIN
   g.4. SECTION MODULUS, Z = 16.6 in^3/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 MUMLINE = 7’ (TOP OF CAP)
   g.9. MINIMUM EMBEDMENT BELOW MUMLINE = 50% PENETRATION OF PANEL
   g.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.

   g.11. ALTERNATE PINNING IN ROCK MAY BE ALLOWED AS FOLLOWS. DRILL 1” Ø HOLES x 3’–0” MIN 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.

   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%.

   g.13. WORK TO BE PERFORMED IN ACCORDANCE WITH ARMY CORPS OF ENGINEERS (ACOE) PERMITTING GUIDELINES.

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 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.

j. VOID BETWEEN EXISTING PRECAST SEAWALL AND NEW FLAT VINYL FORM WALL SHALL BE FILLED DOWN TO MUMLINE 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.
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),

8. TIE REINFORCEMENT 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.
SEAWALL ELEVATION

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 TIE ROD 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-2F)

1'-6" MAX

1"-6" MAX

3/8" Ø STAINLESS STEEL ANCHOR AT EACH VINYL SECTION

MAX SLOPE 5

MUDLINE

H = 7'-6" MAX

50% PENETRATION

EXIST. PRECAST SEAWALL

FLAT VINYL SEAWALL

2.25 H MIN (SEE NOTES 1 & 2)

GROUT FILL CONCRETE FILL

#6@12" O.C. VERT FULL DEPTH (SEE PLAN SHEET H-2E)

EXIST. CAP

EXIST. DEADMAN & TIE ROD TO REMAIN

(3) #5 HORIZONTAL BARS EQUAL SPACED

3' CLR (TYP)

NEW SEAWALL SLEEVE (NOT SHOWN) CAP (SEE DETAIL SHEET H-2F)

(EMBED SLEEVE 2" INTO CONC)

(3) #5 VERTICAL BARS EQUAL SPACED

4' LONG DEADMAN 6'-0"

2'-0"

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

3/8" Ø STAINLESS STEEL ANCHOR AT EACH VINYL SECTION

4"

#6@12" O.C. VERT (FULL DEPTH)

FLAT VINYL SEAWALL

GROUT FILL

CONCRETE FILL

EXIST. CAP

EXIST. PRECAST WALL

NEW CAP (SEE DETAIL SHEET H-2F)

FLAT VINYL SEAWALL

NEW CAP (SEE DETAIL SHEET H-2F)

EXIST. CAP

EXIST. PRECAST WALL

1 1/4" Ø PVC WEEP HOLE 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

TIE ROD

SEE SHEET H-2D (TYP)

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

DEADMAN (SEE SHEET H-2D)
#3 TIES @ 8" O.C.
(2) #5 @ EACH FACE
LAP 2'-6" MIN.
1" CHAMFER (TYP)

(2) #5 TIE ROD
(SEE ELEVATION SHEET H–2D)

2 1/2" CLEAR (TYP)
4 1/2" DEPTH

FLAT VINYL

#6@12" O.C. VERT.
WALL REINFORCING
EXTEND 4" INTO CAP

FLAT VINYL SEAWALL

#8 VERT INSTEAD OF #6
(SEE PLAN SHEET H–2E)

EXIST. PRECAST SEAWALL
GROUT FILL
CONCRETE FILL
LIMESTONE ROCK
(SEE NOTES 1 & 2)

NOTES:
1. REFERENCE FLAT VINYL FORMS WITH CAST–IN–PLACE CONCRETE SEAWALL SPECIFICATION GENERAL NOTES 3.g.10 & 3.g.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
NEW CONCRETE CAP

EXISTING SEAWALL

NEW FLAT VINYL FORM SEAWALL

CONCRETE FILL

GROUT FILL

+ 5 1/2"

4 1/2"

1 1/8"

8"

END OF WALL DETAIL

PROVIDE END OF WALL CLOSURE MATERIALS AND STAINLESS STEEL FASTENERS PER VINYL SEAWALL MANUFACTURERS RECOMMENDATIONS TO RESIST GROUT PRESSURE
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 MIN. (SPACED AT 10'-0" O.C. MAX) AND EMBEDDED 2.25 H MIN BEHIND SEA WALL.

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

ALTERNATE SEA WALL ELEVATION
ALTERNATE SEAWALL PLAN

- **TIE ROD**
  - See Sheet H-2H (Typ)

- **C. EXPANSION JOINT (55'-0" O.C.)**
  - See Detail Sheet H-1H (SIM)

- **DEADMAN**
  - (See Sheet H-2H)

- **#6@12" O.C. VERT (FULL DEPTH)**

- **1 1/4" Ø PVC WEEP HOLE THRU WALL**
  - AT ±5' O.C. HORIZ.
  - 4" ABOVE BARNACLE LINE
  - PROVIDE 1 FT³ CLEAN GRAVEL (¾") WITH FILTER FABRIC ATTACHED W/ BITUMASTIC

- **CONCRETE FILL**

- **NEW CAP (SEE DETAIL SHEET H-2J)**

- **FLAT VINYL SEAWALL**

- **NEW CAP (SEE DETAIL SHEET H-2J)**

**DRAFT - August 8, 2019**
ALTERNATE SEAWALL WITHOUT PRECAST CONCRETE PINNED IN ROCK DETAIL

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

ALTERNATE SEAWALL CAP DETAIL

ALTERNATE VERTICAL REBAR EMBEDDED IN ROCK 3'-0" MIN

LIMESTONE ROCK (SEE NOTES 1 & 2)

FLAT VINYL SEAWALL

#8 VERT INSTEAD OF #6 (SEE PLAN SHEET H-2I)

CONCRETE FILL

#3 TIES @ 8" O.C.
1" CHAMFER (TYP)

(2) #5 AT EACH FACE LAP 2'-6" MIN.

(2) #5 TIE ROD (SEE ELEVATION SHEET H-2H)

#6@12" O.C. VERT. WALL REINFORCING EXTEND 4" INTO CAP

2 1/2" CLEAR (TYP)
6" DEPTH
ALTERNATE END OF WALL DETAIL

NEW CONCRETE CAP

CONCRETE FILL

NEW FLAT VINYL FORM SEAWALL

END OF NEW WALL

PROVIDE END OF WALL CLOSURE MATERIALS AND STAINLESS STEEL FASTENERS PER VINYL SEAWALL MANUFACTURERS RECOMMENDATIONS TO RESIST WALL PRESSURE