City of Marco Island Ordinance No. 06-18

AN ORDINANCE RELATING TO THE CONSTRUCTION, RECONSTRUCTION, REPAIR, AND ALTERATION OF SEAWALLS AND REVETMENTS ADJACENT TO SALT WATER BODIES; REPEALING SECTION 6-81 OF THE CODE OF ORDINANCES, AND REPLACING SAID ORDINANCE WITH NEW REGULATIONS FOR SEAWALLS AND REVETMENTS; PROVIDING DEFINITIONS; PROVIDING THAT A FAILED SEAWALL OR REVETMENT IS UNLAWFUL AND A PUBLIC NUISANCE; PROVIDING THAT THE CODE ENFORCEMENT BOARD SHALL HAVE JURISDICTION TO HEAR AND DECIDE ALLEGED VIOLATIONS OF THIS ORDINANCE; PROVIDING FOR OTHER ENFORCEMENT REMEDIES AND PENALTIES; PROVIDING A TECHNICAL SPECIFICATON AND QUALITY CONTROL SCHEDULE FOR SEAWALLS AND REVETMENTS; PROVIDING FOR CONFLICT AND SEVERABILITY; PROVIDING AN EFFECTIVE DATE.

WHEREAS, there are many areas in the City which are adjacent to natural or man-made bodies of water; and

WHEREAS, many of these areas adjacent to bodies of water are bordered by seawalls and revetments; and

WHEREAS, properly designed and constructed seawalls and revetments serve to protect waterfront upland property and improvements located thereon against wave action and serve to stabilize the position of the shoreline; and

WHEREAS, seawalls and revetments have a tendency to fail and fall into bodies of water because of the passage of time, strong winds, heavy rains, erosion, corrosion, and high and low tides among other reasons, and improper maintenance or lack of maintenance results in seawall failure; and

WHEREAS, a failed seawall or revetment with accompanying loss of soil, unless promptly replaced or repaired, may cause continuing loss of soil on adjoining properties which can seriously and adversely affect the stability of seawalls and revetments on those adjoining properties as well as the value of adjoining properties; and

WHEREAS, individual property owners are currently responsible for maintenance, repair, and replacement of seawalls and revetments along their property; and

WHEREAS, there exists a threat to public health, safety, and welfare because of the failure of some individual property owners to maintain, repair, or replace their failed seawalls or revetments; and

WHEREAS, in the construction of replacement seawalls, some contractors are placing large quantities of sand into the waterways; and

WHEREAS, after considering the recommendation of the Planning Board, Waterways Advisory Committee and City Staff, and following a public hearing on the subject, the City Council has determined that it is in the best interest of the City of Marco Island to adopt this Ordinance.

NOW THEREFORE BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MARCO ISLAND:

SECTION ONE: Repeal: Section 6-81 of the Code of Ordinances is hereby deleted in its entirety and replaced with the text contained in Sections Two through Ten herein.

SECTION TWO: Applicability: This Ordinance applies to all seawalls on salt water bodies. This Ordinance shall not apply to seawalls surrounding fresh water bodies.

SECTION THREE: Definitions: As used in this Ordinance, the following words shall have the following meanings:

"Anchor": The buried portion of the tie-back that is typically a reinforced concrete block, which engages the soil to resist the pull on the tie-rod.

"Batter": The angle from plumb (vertical) deliberately constructed for a bearing pile.

"Concrete Cap": The Structural Element on top of the seawall panels.

"City": The City of Marco Island, Collier County, Florida

"Exposed height": The distance measured from the top of the toe-berm to the top of the seawall cap.

"Failed seawall or revetment": A seawall or revetment that has failed structurally or that has moved from its original position and no longer stabilizes the position of the shoreline, or that is allowing significant amounts of soil from the landward property to migrate through the wall or revetment into the adjacent body of water.

"Filter fabric": A geosynthetic fabric manufactured specifically as a filter to inhibit soil movement through the fabric while allowing water to move through it. The fabric shall comply with Florida Department of Transportation specification for woven fabric specifically used for shore protection and filter applications.

"French Drain": Stone wrapped with filter fabric to direct water to seawall weep holes to reduce hydrostatic pressure on the seawall.

"Minor Repairs": Those repairs that do not include work on existing reinforcing steel or tiebacks, epoxy injection of concrete cracks, or replacement of seawall components. Examples of minor repairs include exterior coatings and repair of concrete spalling that does not have exposed reinforcing steel.

"NGVD": National Geodetic Vertical Datum of 1929.
"Pre-construction Depth": The depth profile of the waterway in front of and to either side of the seawall requiring repairs prior to initiation of construction. Impact from soil migration into the waterway from the seawall property does not affect pre-construction depth.

"Return wall": The portion of a seawall that is parallel to and abutting the adjacent property line. Usually, this wall is short and is approximately one foot below grade. The wall provides anchorage and stability to the seawall and provides soil containment.

"Revetment": A sloping structure that serves to separate real property and/or improvements thereon from any natural or man-made body of water.

"Rip-Rap": Stone placed on filter fabric to aid in stabilizing soil.

"Seawall": Any solid vertical structure, which serves to separate landward real property and/or any improvements thereon from any natural or man-made body of water.

"Sheet pile": Preformed structural element providing vertical stability and separation of soil from an adjacent waterway.

"Tie-back System": The structural system installed to laterally support the seawall. This system typically consists of a steel rod with one end embedded into the cap and a buried concrete anchor attached to the other end of the rod. However, it could be another assembly performing the same function such as a screw anchor.

"T-Pile Seawall": Seawall consisting of specially formed support piles that support sheet piles horizontally with a concrete cap and tie-back at each pile.

"Technical Specification": Construction Regulations for Seawalls and Revetments adopted by resolution by the City Council.

"Tie-rod": The rod connecting the cap to the anchor; part of the tie-back system.

"Toe-berm": Soil on waterward side of seawall, typically underwater.

"Turbidity Barrier": A floating geotextile barrier that confines turbid water to the immediate construction area in accordance with state law.

"Wale": A horizontal structural element laterally supporting sheet piles. A concrete cap typically performs this function, but a wale can be positioned vertically anywhere along the height of the sheet piles.

"Weep Hole": A hole through a sheet pile to allow water from behind the sheet pile to drain though the wall without allowing loss of soil.

SECTION FOUR: Failed Seawall or Revetment Declared To Be Unlawful And A Public Nuisance

It is hereby declared unlawful and a public nuisance for any property owner in the City to allow, or fail to repair or reconstruct, any failed seawall or revetment on the owner's property.

SECTION FIVE: Other Enforcement Remedies and Penalties

A. Violation of the provisions of this Ordinance, or failure to comply with any of the provisions of this Ordinance shall be subject to those penalties set forth in Section 1-14 of this code. The City may take any other lawful action in any court of competent jurisdiction as is necessary to prevent or remedy any failure or refusal to comply with any of the provisions of the Ordinance. Nothing in this Section shall be construed to prohibit the City from prosecuting any violation of this Ordinance by means of a Code Enforcement Board established pursuant to the authority under Chapter 162, Florida Statutes and Chapter 14, Article II of this Code. All remedies and penalties provided for in this Ordinance shall be cumulative and independently available to the City.

SECTION SIX: Technical Specification For Seawalls and Revetments

The City shall adopt by resolution the Technical Specification that establishes minimum performance based standards for seawall and revetment construction and repair. Site-specific designs and specifications are required and shall be appropriate for conditions at each location and construction materials employed. All seawalls and revetments constructed, reconstructed, repaired, or altered in the City after the effective date of this Ordinance shall meet or exceed this Technical Specification as follows:

A. Minor repairs to the seawall or revetment that do not require physical alteration to the existing structural support system are exempt from the Technical Specification.

B. Major repairs to the seawall or revetment that require replacement of any portion of the structural support system, shall comply with all applicable provisions of the Technical Specification for that portion of the seawall or revetment. Repairs shall restore the original integrity of the seawall or revetment.

C. Reconstruction of any seawall or revetment requiring complete reinstallation of the sheet pile portion of the structural support system, or any new seawall or revetment section installed adjacent to or independent from any existing seawall or revetment shall comply with all applicable provisions of the Technical Specification for that portion of the seawall or revetment.

D. Seawalls shall be placed so that the waterward face of the wall is coincidental with the platted property or bulkhead line, if one exists, or at the intersection of the mean high water line with the existing shoreline. New seawalls shall not be placed waterward of existing seawalls. Upon specific request to the City, an administrative variance to the above may be approved by the City for seawalls that were originally constructed with an intentional offset from the property line provided the offset shall not be increased.

E. The top of cap elevation for all replacement and new seawalls and top elevation for all other revetments shall be equal to or greater than 4.5' NGVD but not exceeding 5.5 NGVD. If the top of a seawall cap is constructed at an elevation differing from the adjacent property owner top of cap

elevation by greater than one foot, then a return wall is required to sufficiently provide for the break in grade at the property line

F. The Community Development Director or his designee may approve after-the-fact height encroachments of up to three inches for seawall caps for which a Certificate of Completion or a Final Development Order has not been granted. After-the-fact encroachments are subject to the following criteria:1) a survey must be prepared and certified by a Florida licensed registered engineer or surveyor identifying the exact location and size of the encroachment; 2) a statement of how and when the encroachment was created; 3) a statement of current ownership and ownership at the time the encroachment was created; 4) a letter of no objection from each adjacent property owner; 5) any other factors which may show the encroachment was not intentionally created; and 6) payment of any applicable fees imposed by the City Council.

G. A property owner desiring shoreline protection may request permission from the City to construct a seawall or revetment. In general, revetments would be constructed adjoining natural bodies of water (if allowed by the State of Florida), and seawalls adjoining manmade channels.

H. A building permit is required for all seawall and revetment work. The Building and Planning Divisions shall review the plans and specifications to determine compliance with the minimum requirements set forth herein.

1. For minor repairs only, the application for permit shall include a drawing prepared by a licensed contractor with the legal description of the property signed by the owner or contractor as owner's representative.

2. For all other seawall and revetment repair, alteration, reconstruction, or replacement, the application for permit shall include two copies of scaled plans and specifications signed and sealed by a Professional Engineer registered in the state of Florida including the legal description of the property.

3. Seawall construction shall be subject to inspections by the Building and Planning Division for the purpose of determining conformance of seawall construction with the permitted plans and this Ordinance. A schedule of quality control and inspections is given in the Technical Specification.

4. Note there are State of Florida environmental regulations (Chapter 40E—4 Florida Administrative Code) governing seawall and revetment work including exemptions to the state permit process. It remains the responsibility of the property owner where seawall and revetment work is to be performed to comply with all state and federal regulations governing the work. Additionally, the property owner shall comply with State and Federal Regulations concerning vegetation affected by the work, including the restoration of mangroves.

I. Existing seawall construction does not coordinate with location of perpendicular platted property lines throughout the City. Accordingly, a burden exists on the property owners to cooperate during seawall repair or replacement. If the permitted seawall or revetment repair or replacement would require entry onto neighboring properties to properly locate and construct the seawall expansion, joint tie-in or return wall, the owner seeking the repair or replacement should seek permission from the neighboring property owner. If said neighbor owner consents to entry, a temporary construction easement or license should be obtained of approximately 6' x 17' adjacent to the seawall and

common boundary to accommodate the construction. The property owner undertaking the repairs shall be responsible for restoring the neighboring property to pre-work condition prior to receipt of a Certificate of Completion. These repairs shall be completed prior to final inspection.

J. Seawalls shall include adequate provision for pipe penetrations through the seawall as required by the City. The seawall design details for such penetrations shall be provided as part of the engineered design seawall plans for building permit.

SECTION SEVEN: Other Restrictions

It shall be unlawful to:

A. Place an in-ground swimming pool or retaining wall waterward of seawall anchors or within 15' of an existing seawall. Property owners are cautioned not to plant trees near the seawall because of the possibility of damage to the wall by the root system.

SECTION EIGHT: Manufacture of Precast Seawall Panels on Vacant Lots

A. The following criteria provide regulations for utilizing vacant lots for manufacturing seawall panels and marine construction activities:

1. The contractor shall notify the City, as part of the building permit application process for seawall work, of intentions to use a vacant lot for such purpose;

2. The contractor shall have written permission of the property owner of the vacant lot. A copy shall be submitted to the City Building Services Division and be made part of the permit application;

3. The contractor shall post the subject property and/or vacant lot with a permit board and all applicable permits;

4. Manufacture of precast seawall panels and/or marine construction activities on a vacant lot shall only be performed for a maximum of 120 days. Upon completion of use and prior to the expiration of the 120 day period, the contractor shall restore the lot to pre-use condition. Any vacant lot so used shall not be used more than 120 days within a consecutive 365 day period;

5. Failure to comply with provisions of this code shall constitute a violation of this code. Contractors in violation shall not be granted additional permits for the period of time a violation exists;

6. Special exceptions: The contractor may seek an administrative extension beyond the 120 day period provided the Community Development Director is presented sufficient information justifying the contractors need to stay on-site beyond the 120 day period. Justification may be as follows: multiple seawall contracts in vicinity of the vacant lot, length of seawall greater than 100 feet, inclement weather, and availability of materials. Staff may provide a maximum 60-

day extension, provided the request is justified. Exceptions shall not be used to extend use of the vacant lot beyond 180 consecutive days;

7. No work shall be conducted within the setback areas established for the applicable zoning district; and

8. Dumpsters may not be located on the lot for more than 14 days within the 120 day period.

SECTION NINE: Incorporation, Conflict and Severability

A. The provisions of this Ordinance shall become and be made part of the Code of Ordinances of the City of Marco Island, Florida, the sections of this Ordinance may be renumbered or re-lettered and the word "ordinance" may be changed to "section," "article" or other appropriate word.

B. All sections or parts of sections of the Code of Ordinances, all ordinances or parts of ordinances, and all resolutions in conflict herewith, be, and the same are hereby repealed to the extent of such conflict.

C. If any word, phrase, clause, subsection or section of this Ordinance is declared unconstitutional or invalid by any court of competent jurisdiction, the validity thereof shall not affect the validity of any remaining portions of this Ordinance.

SECTION TEN: Effective Date

This Ordinance shall take effect immediately upon adoption by the Marco Island City Council.

Passed in open and regular session through roll call by the City Council of the City of Marco Island, Florida this 4th day of December, 2006.

Attest:

Laura Litzan, City Clerk

CITY OF MARCO ISLAND, FLORIDA

By: Terri DiSciullo
Terri DiSciullo, Chairwoman

Approved as to form and
Legal Sufficiency:

Richard D. Yovanovich
City Attorney

EXHIBIT A

CITY OF MARCO ISLAND SEAWALL & REVETMENT REGULATIONS
TECHNICAL SPECIFICATION

SECTION 1: DESCRIPTION

The work described herein consists of the design and construction of waterfront upland property and building protection structures such as seawalls and revetments, which serve to protect against wave action and to stabilize the position of the shoreline.

These design and construction standards provide minimum requirements for all seawalls and revetments constructed, reconstructed, repaired or altered.

SECTION 2: DESIGN CONSIDERATIONS

A. General

A professional engineer registered in the State of Florida shall prepare all plans and specifications for seawalls and revetments. The professional engineer shall be qualified by training and experience to provide seawall and revetment design.

B. Criteria

1. Figure 1 (attached) provides soil and site parameters for structural design.

2. As a minimum, the seawall shall be adequate to sustain the loads shown on Figure 1.

3. Design of seawalls shall be in accordance with generally accepted engineering design methodologies such as those published by the Portland Cement Association, American Concrete Institute, U S Steel Sheet Pile Manual, Aluminum Association, Composite wall manufacturers, and "Pile Buck" sheet pile wall design. New technologies exhibiting acceptable engineering standards are also acceptable for design. Maximum initial panel deflection shall be the exposed face (inches) divided by 12.

4. Seawalls may be designed as cantilever walls without the use of a tieback system. An expansion joint is required where a cantilever wall abuts a tied-back wall. Initial deflection at the top of the cantilever seawall shall not exceed 1".

5. T-pile seawalls shall not be used to replace existing seawalls.

6. Structural repairs to seawalls shall comply with the applicable specifications contained herein.

SECTION 3: GENERAL REQUIREMENTS

A. Location: See Ordinance, SECTION SIX, Paragraph D.

B. Top of Seawall Construction Elevation: See Ordinance, SECTION SIX, Paragraph E.

C. Fill (soil)

The only fill authorized herein shall be for fill behind the seawalls or revetments and shall not exceed any further waterward than the face of the new seawall construction or the face of the existing seawall for repairs or the highest elevation of revetment construction. Fill behind the seawall extending a minimum of 5' from the wall shall be from upland sources and consist of clean granular material (less than 10% passing no. 200 sieve) free from pollutants. The filling of wetlands is not allowed. The toe-berm may be restored after the construction by moving displaced soil under water back into its original position. Fill in the form of small toe-berm rip-rap protection in front of the seawall is allowed as shown on Figure 2.

D. Clean-up after construction/repairs

Upon completion of construction/repairs, restore waterway to pre-construction depths, including the removal of displaced soils from the lot due to sheet pile jetting, and other construction activities, removal of soil that leaked through the seawall joints prior to construction, and removal of construction debris from the waterway. Extent of clean-up shall be all areas impacted, including directly in front of the property and extending as necessary onto the waterway in front of adjacent properties. Restore the toe-berm to its preconstruction depth unless permit specifies otherwise.

SECTION 4: RESTRICTIVE SPECIFICATIONS

A. General

1. The Standard Specifications of the Florida Department of Transportation for Road and Bridge Construction, Latest Edition, shall govern all construction. The American Concrete Institute Standard 318. "Building Code Requirements for Reinforced Concrete", Latest Edition shall govern concrete and reinforcing steel. Concrete Class designated herein refers to Section 346 of the Florida Department of Transportation Specification.

2. References to tie-back rods and anchors in the following sections do not restrict seawall design to tied-back seawall design. Where required, the tieback rods shall be straight between the wall cap and the anchors.

3. Seawall construction shall conform to the following tolerances of construction and placement:

Fabrication Tolerances:

Sheet pile width: + or – 1/4" per 10' length.
Sheet pile length: + or – 2"
Concrete sheet pile thickness: +or - 1/4"

Erection/Placement Tolerances:

Concrete sheet pile reinforcing clear distance to concrete surface: +1/2", -1/2"
Concrete sheet pile reinforcing bar spacing: + or – 1"
Seawall cap top and formed surfaces: + or – ½"
Horizontal alignment of front face of sheet pile: + or – 1"
In plane plumbness: 2" per 10' sheet pile length.
Transverse plumbness: 2" per 10' sheet pile length
Key Joint separation: Maximum ½" except maximum ¾" allowed for up to 10% of key joints.
Exposed height: 6"

4. Sheet piling shall penetrate into firm soil a minimum of 40% of the total length of the sheet pile but not less than 4 feet. This penetration may be adjusted if the bottom of the sheet pile can be embedded a minimum of 12 inches into solid bedrock.

5. The toe-berm of all sheet pile seawalls shall be protected by a rip-rap revetment placed on filter fabric as follows:

a. At locations where soils will not adequately resist toe-out failure by additional penetration depth alone

b. At locations where lateral tidal flows create excessive scour and erosion of the toe-berm.

c. At any other location where the design Engineer deems it necessary for the preservation of the integrity of the seawall.

6. Acceptable materials for seawall construction are:

a) Precast reinforced concrete sheet pile units
b) Prestressed concrete sheet pile units
c) Aluminum sheet piles
d) Vinyl (PVC) sheet piles
e) Fiber reinforced/carbon enhanced resin composite sheet piles
f) Steel sheet piles with protective marine coating (Commercial only-special permit only)

Color of seawalls shall be solid tones of gray.

Timber is unacceptable for seawalls. Steel is unacceptable for residential seawalls.

All seawall caps shall be of reinforced concrete to provide uniformity to the City's seawalls. Provide cap expansion joints at panel tongue and groove joint nearest to a property line.

Tie-back rods shall be Grade 60 reinforcing or hot dipped galvanized as a minimum. Series 300 Stainless steel is also acceptable for use for reinforcing and tie-back rods. Do not use MMFX reinforcing as tie-back rods. Additionally, hot dipped galvanized rods shall be wrapped with polyethylene. Concrete for concrete anchors shall have a 28-day minimum compressive strength of 3,000 psi.

Provide a positive means to reduce the build-up of hydrostatic pressure behind the seawall by the use of weep holes protected by filter fabric and "French drains" consisting of gravel wrapped with filter fabric.

Figures 1, 2, and 3 provide other minimum requirements for seawalls.

B. Concrete Sheet Pile Seawalls

1. All seawalls and caps shall consist of one of the following combinations of materials:

a) Florida Department of Transportation Class IV concrete (Section 346-extremely aggressive environment) with either or both prestressing strand (ASTM A416 Grade 270) and grade 60 reinforcing steel. For caps only, dense concrete mix with a compressive strength of 5,000 psi, low water/cement ratio (0.4) and smaller aggregate suitable for pumps may be substituted for the FDOT concrete.

b) 4,000 psi minimum 28-day compressive strength concrete with maximum water-cement ratio of .45 and MMFX or stainless reinforcing steel.

c) Florida Department of Transportation Class IV concrete (Section 346-extremely aggressive environment) with MMFX or stainless reinforcing steel. The substitution for cap concrete in a) above is applicable here.

2. Each panel shall have tongue and groove side joints, and be a minimum of 6" in thickness with the reinforcing centered. If 8" thickness or greater is required, a double mat of reinforcing is allowed, but with a minimum cover of 2".

3. Provide minimum 2' wide woven filter fabric strip behind each tongue and groove joint from bottom of cap down to 1' below the top of the toe-berm.

4. Do not grout or plaster over keyway joints between the sheet piles.

5. Minimum seawall standards are shown in Figures 2 and 3, attached.

C. Aluminum Sheet Pile Seawalls

1. No aluminum shall be used in contact with non-draining cohesive soils.

2. Use only structural grade aluminum sheeting that has been demonstrated to be suitable for marine use.

3. Provide protection for the portion of the aluminum sheeting to be embedded into the concrete cap such as coal tar epoxy or mechacrylate lacquer.

4. Provide minimum .125" thick material.

D. Vinyl (PVC) Seawall panels and Fiber reinforced/carbon enhanced resin composite sheet piles

1. Seawall panels shall be manufactured with UV resistant material.

E. Revetments

1. The work under this Section includes heavy armoring consisting of large rip-rap placed on a stable sloping sub-grade to protect upland property.

2. The revetment shall be placed on a uneven, possibly stepped compacted slope with a gradient not exceeding one foot vertical drop for every two feet of horizontal distance (top of revetment stone). The uneveness is intended to restrain the revetment stone from sliding on the fabric.

3. All revetments shall be placed on a woven plastic filter fabric in accordance with FDOT Specifications, Section 514. Filter fabric shall be approved by FDOT for shoreline stabilization use. The fabric shall be folded over and anchored by larger stone at the toe of the revetment slope. A layer of 1" to 4" stone shall be placed directly on the fabric as a cushion for the rip-rap stone.

4. As a minimum, the rip-rap stone shall comply with FDOT Specifications, Section 530, Rubble (Bank and Shore).

5. Other approved armoring systems may be approved by the City on a specific basis. However, the use of sand-cement bags is not approved for revetments.

6. See Figure 4 for revetment standards.

7. The above does not apply to toe-berm protection.

SECTION 5: PERFORMANCE REQUIREMENTS

This specification provides minimum requirements for seawalls and revetments, which are constructed within the City. Individual design is the responsibility of the landowner, based upon specific site conditions, type of shore stabilization structure desired, method of construction, and all other factors affecting the stability of the structure. This specification is not to be considered a final design relating to a specific site or any other affecting conditions.

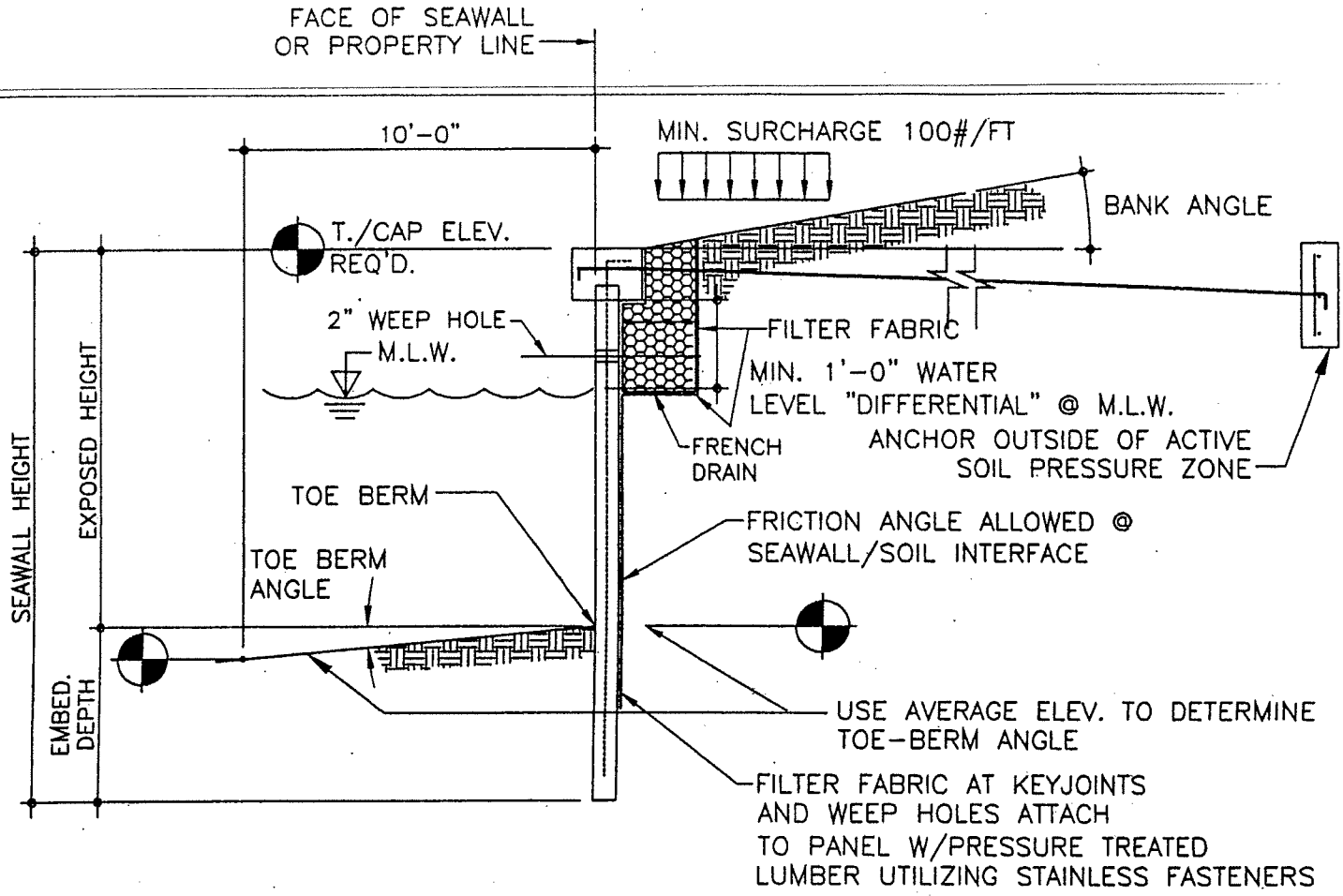
SECTION 6: SEAWALL INSPECTION AND QUALITY CONTROL SCHEDULE

Building and Planning Division personnel shall conduct site visits for observation of seawall construction to determine compliance with permitted construction plans and specifications. These inspections shall occur at the following construction "milestones"(where applicable):

1) Prior to construction, recording of exposed height above toe-berm at a minimum of three locations: center and each end at property lines
2) Forming of concrete sheet piles and placement of reinforcing prior to concrete placement
3) Seawall placement, with filter fabric, including proper length, and weep holes prior to backfilling.
4) Anchor reinforcement/tieback placement, and concrete cap forming and reinforcement, including expansion joints.
5) Toe-berm riprap, french drains, final grades, final exposed height, and post-construction clean-up.

Test all concrete used in seawall sheet pile and cap construction for 28 day compressive cylinder strength as per ASTM C-39, using a minimum of 2 cylinders for testing. Cast an additional cylinder to hold for later testing. Cast a 3 cylinder set for each day's pour. Separate tests shall be performed for concrete sheet piles and seawall cap. Use a qualified independent engineering testing laboratory Provide written test results to the City upon completion.

Alternatively, 7 day tests are acceptable in lieu of 28 day tests of concrete cylinders. The average 7 day compressive strength for each 2 cylinder test shall be a minimum of 70% of the specified 28 day compressive strength.



SHEET PILE WALL SECTION

SOIL PARAMETERS:

DRY DENSITY..... PCF.
SATURATED DENSITY..... PCF.
BUOYANT DENSITY..... PCF.
ANGLE OF INTERNAL FRICTION = DEGREES (ANGLE OF REPOSE).
SOIL SEAWALL FRICTION ANGLE = DEGREES.

SITE PARAMETERS:

EXPOSED HEIGHT..... FEET.
ANCHOR LOCATION..... FEET.
BANK ANGLE..... DEGREES.
TOE-BERM ANGLE..... DEGREES.
SURCHARGE..... PSF.
LAG..... FT.

JENKINS & CHARLAND INCORPORATED Consulting Engineers
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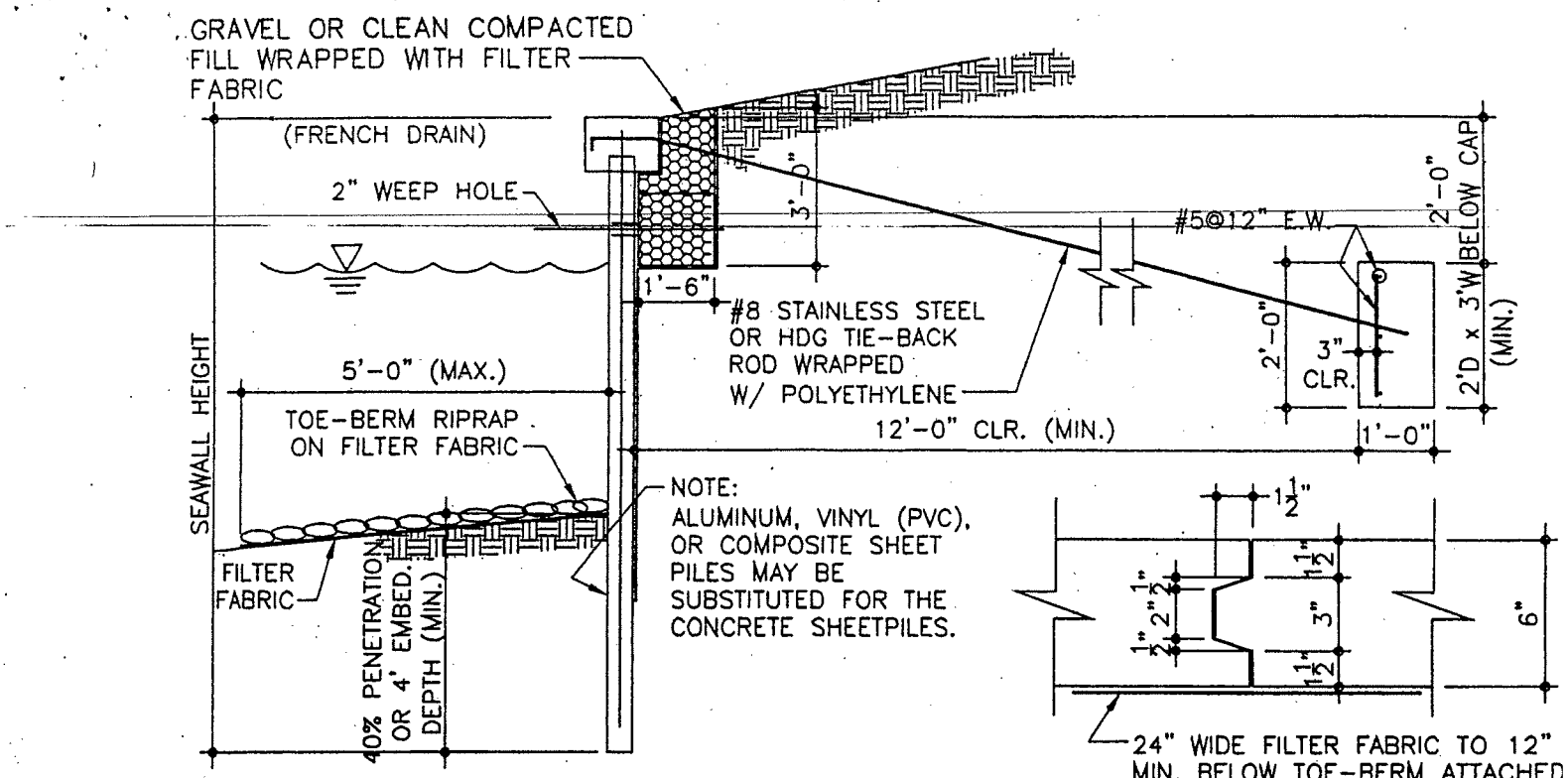
C.A. No. 650

DATE: MARCH 2008 PROJ. NO: 05FTM406 DRAWN BY: DEF APPD. BY: PC DRAW. NO: 1/4 SCALE: NTS	CITY OF MARCO ISLAND PUBLIC WORKS 50 BALD EAGLE DRIVE MARCO ISLAND, FLORIDA 34145	FIGURE 1 CITY OF MARCO ISLAND SEAWALL DESIGN CRITERIA	SHEET 7 OF 1(

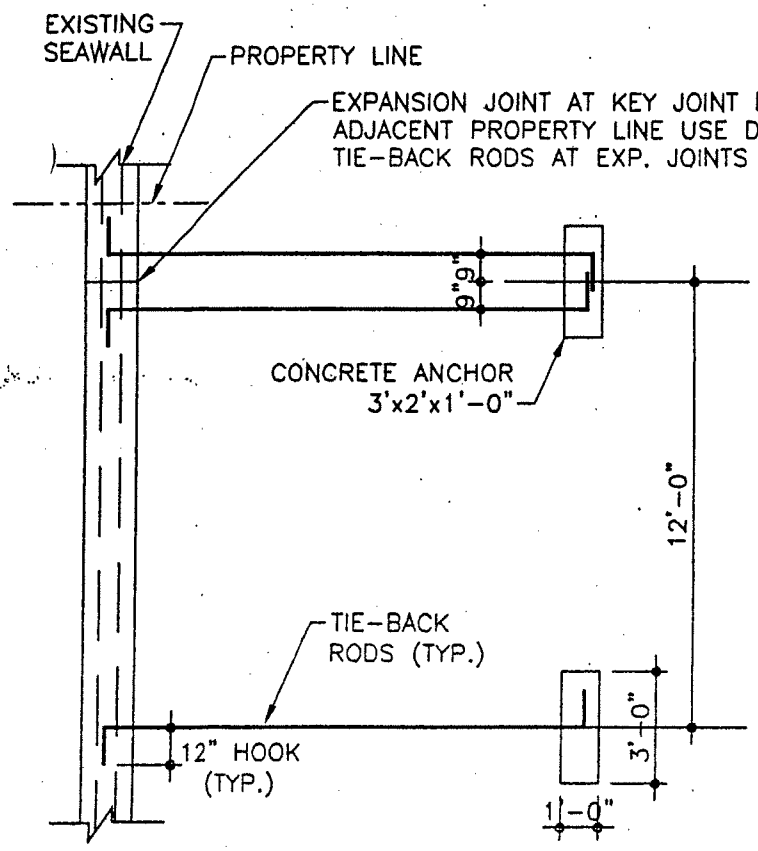


SECTION TYPICAL SEAWALL

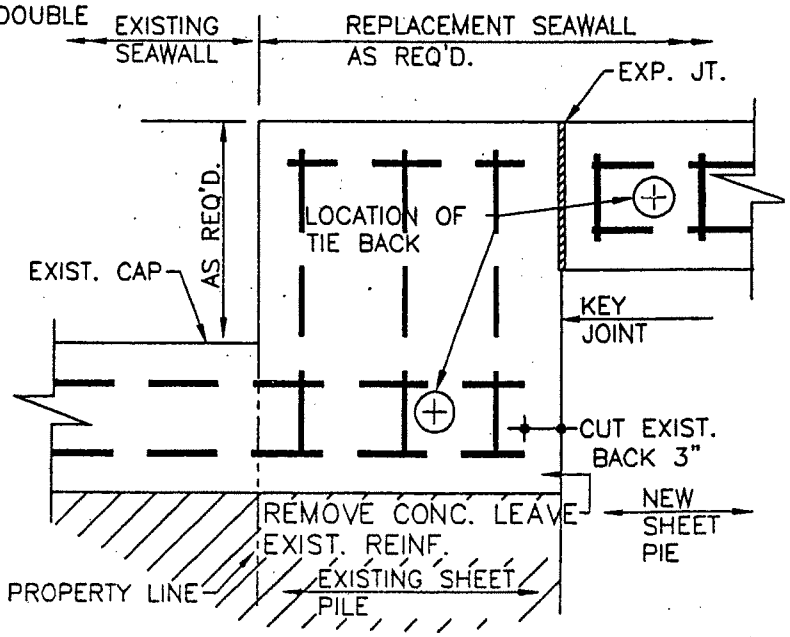
24" WIDE FILTER FABRIC TO 12" MIN. BELOW TOE-BERM ATTACHED TO CONC. PANEL W/PRESSURE TREATED LUMBER

KEY JOINT

REINFORCED CONCRETE SHEET PILES



PLAN TYPICAL SEAWALL



EXPANSION JOINT DETAIL

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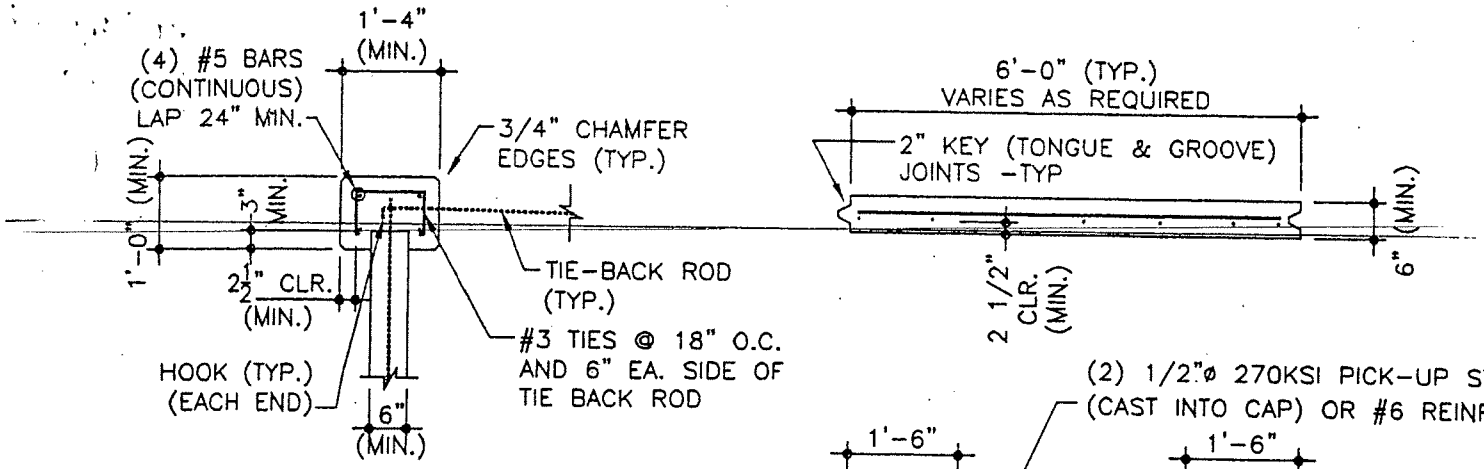
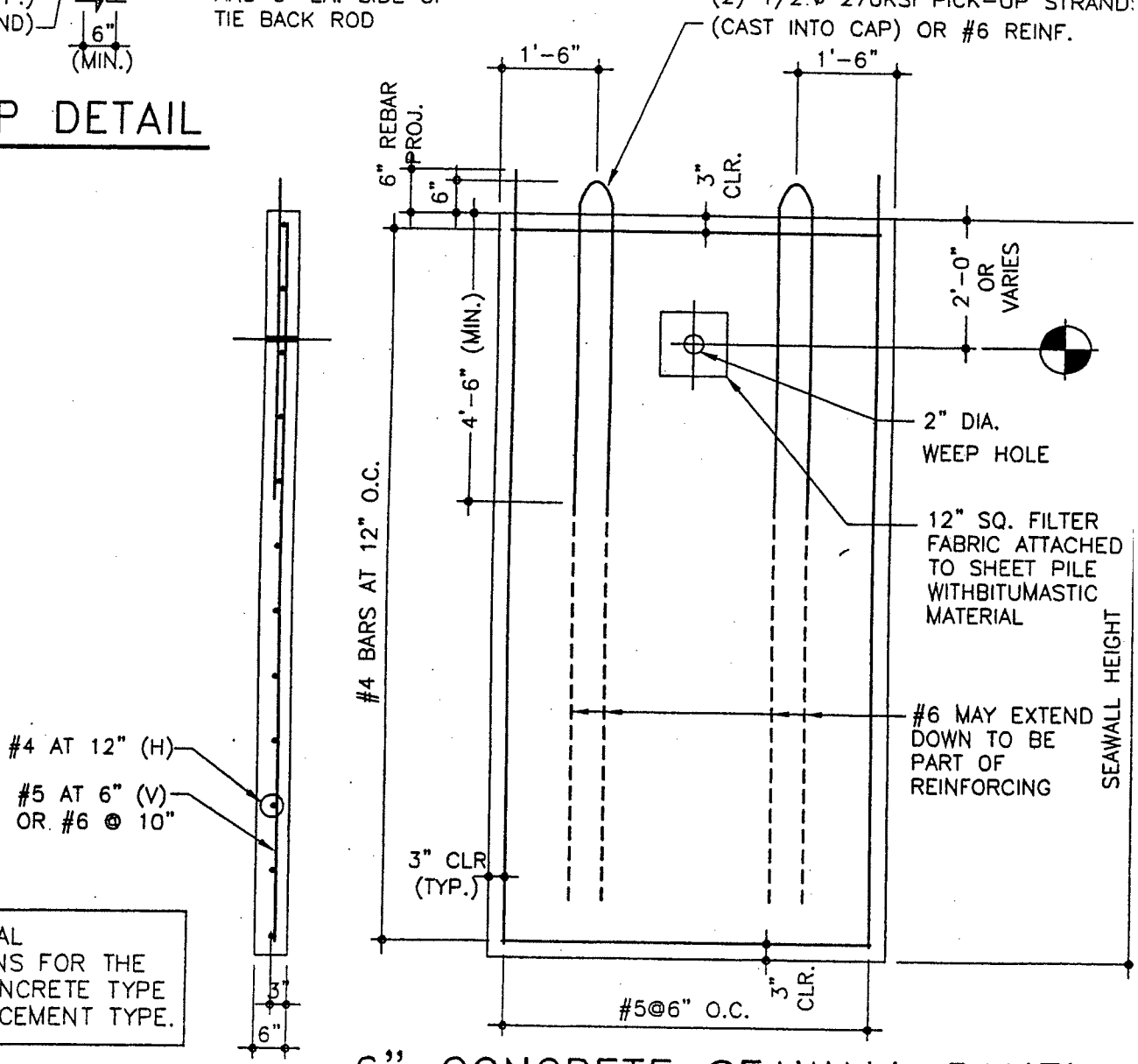
DATE:	MARCH 2008
PROJ. NO:	05FTM405
DRAWN BY:	DEF
APPD. BY:	PC
DRAW. NO:	2/4
SCALE:	NTS

CITY OF MARCO ISLAND
PUBLIC WORKS
50 BALD EAGLE DRIVE
MARCO ISLAND, FLORIDA 34145

FIGURE 2
CITY OF MARCO ISLAND
SEAWALL STANDARDS



CAP DETAIL



SEE TECHNICAL SPECIFICATIONS FOR THE REQUIRED CONCRETE TYPE AND REINFORCEMENT TYPE.

6" CONCRETE SEAWALL PANEL

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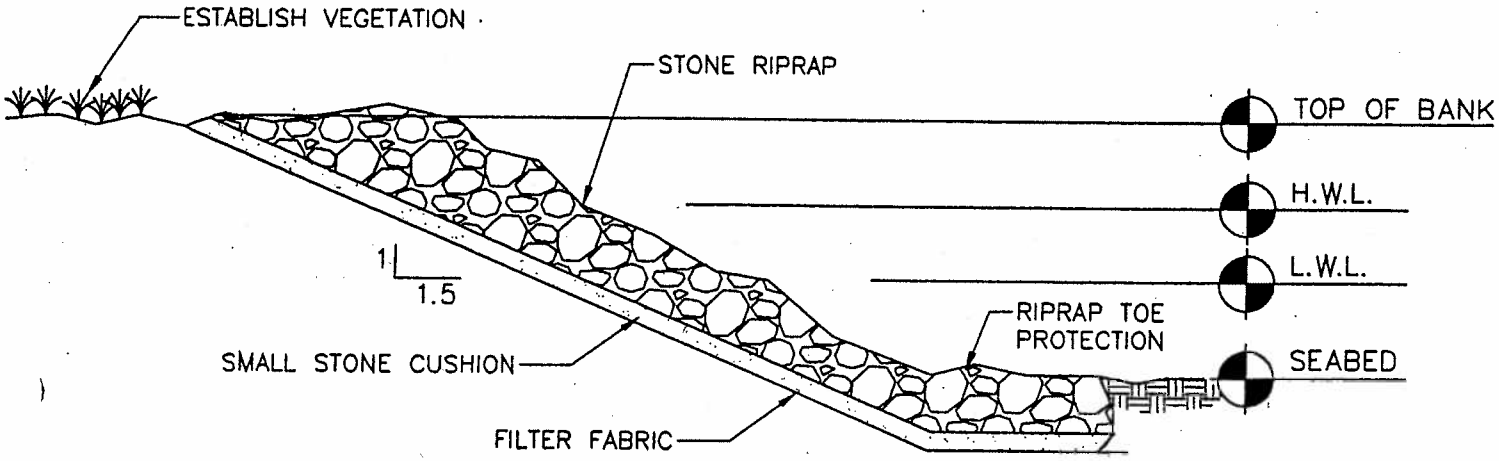
DATE:	MARCH 2008
PROJ. NO:	05FTM4405
DRAWN BY:	DEF
APPD. BY:	PC
DRAW. NO:	3/4
SCALE:	NTS

CITY OF MARCO ISLAND
PUBLIC WORKS
50 BALD EAGLE DRIVE
MARCO ISLAND, FLORIDA 34145

FIGURE 3
CITY OF MARCO ISLAND
SEAWALL STANDARDS



TYPICAL STONE REVETMENT

JENKINS & CHARLAND INCORPORATED
Consulting Engineers
12381 Cleveland Avenu
Suite 204
Fort Myers, FL 33907
PH.(239) 939-1414
FAX (239) 278-4289
C.A. No. 650

DATE:	MARCH 2006
PROJ. NO:	05FTM405
DRAWN BY:	DEF
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DRAW. NO:	4/4
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CITY OF MARCO ISLAND
PUBLIC WORKS
50 BALD EAGLE DRIVE
MARCO ISLAND, FLORIDA 34145

FIGURE 4
CITY OF MARCO ISLAND
REVETMENT STANDARD

93
0266

NOW THEREFORE BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MARCO ISLAND:

SECTION ONE: Applicability: This Ordinance applies to all seawalls on salt water bodies of water. It does not apply to seawalls surrounding fresh water lakes.

SECTION TWO: Definitions: As used in this Ordinance, the following words shall have the following meanings:

"Anchor": The buried portion of the tie-back such as a reinforced concrete block, which engages the soil to resist the pull on the tie-rod,.

"Batter": The angle from plumb (vertical) deliberately constructed for a bearing pile.

"Cap": The Structural Element on top of the seawall panels.

"City": The City of Marco Island, Collier County, Florida

"Exposed height": The distance measured from the top of the toe-berm to the top of the seawall cap.

"Failed seawall or revetment": A seawall or revetment that has failed structurally or that has moved from its original position and no longer stabilizes the position of the shoreline, or that is allowing significant amounts of soil from the landward property to migrate through the wall or revetment into the adjacent body of water.

"Filter fabric": A geosynthetic cloth manufactured specifically as a filter to inhibit soil movement through the fabric while allowing water to move through it. It complies with Florida Department of Transportation specifications for woven fabric specifically for use for shore protection.

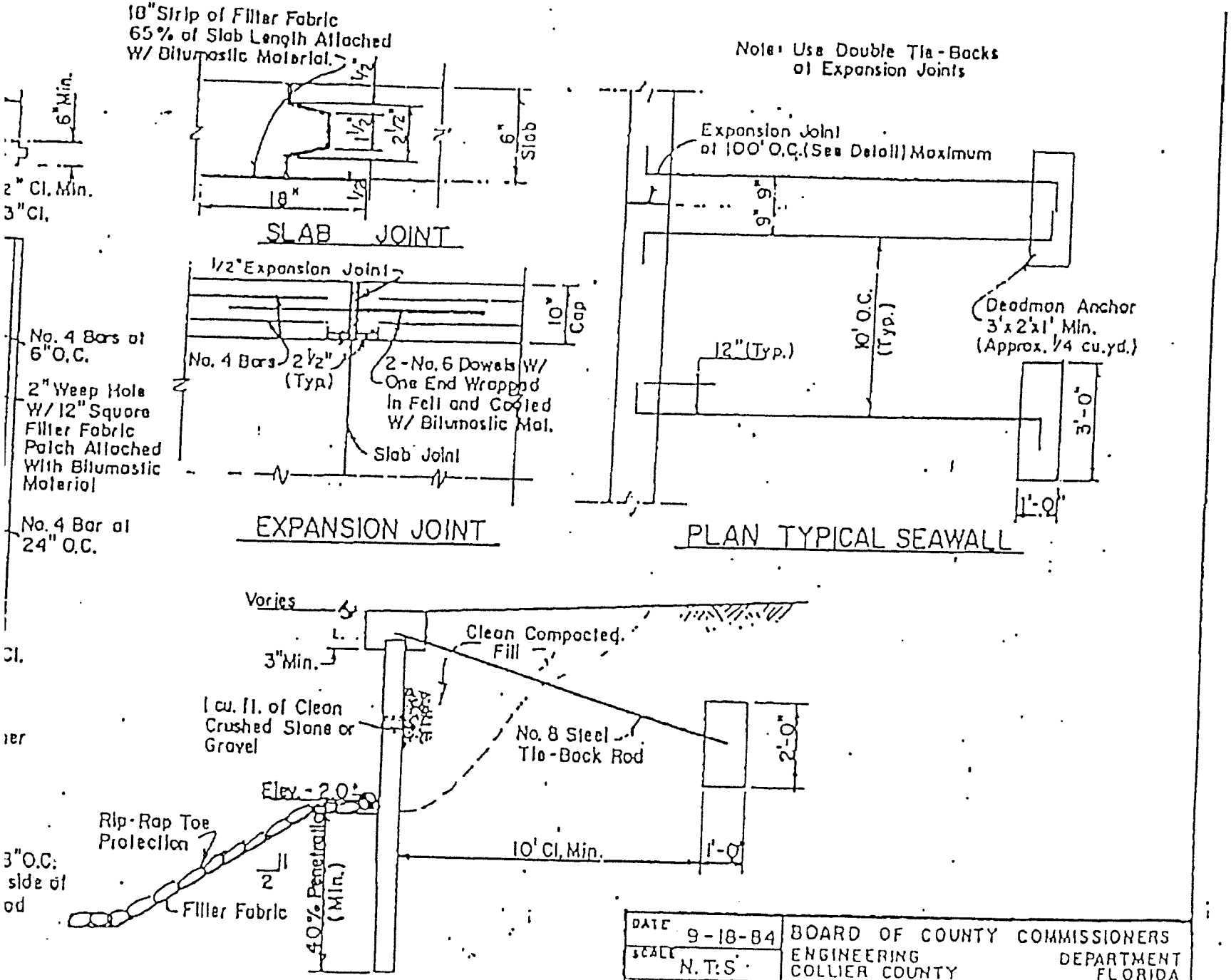
"French Drain": Stone wrapped with filter fabric to direct water to seawall weepholes to reduce hydrostatic pressure on the seawall.

"Minor Repairs": Those repairs that do not include work on existing reinforcing steel or tiebacks, epoxy injection of concrete cracks, or replacement of seawall components. Examples of minor repairs include exterior coatings and repair of concrete spalling that does not have exposed reinforcing steel.

"NGVD": National Geodetic Vertical Datum of 1929

"Return wall": The portion of a seawall that is immediately adjacent to the adjacent property line, constructed parallel to that property line. Usually, this wall is short and only long enough to effectively prevent soil on the property where the seawall repairs are being accomplished from entering unto the adjacent property.

"Revetment": A sloping structure that serves to separate real property and/or improvements thereon from any natural or man-made body of water.



DATE 9-18-84	BOARD OF COUNTY COMMISSIONERS	
SCALE N.T.S.	ENGINEERING	DEPARTMENT
DRAWN BY D.C.	COLLIER COUNTY	FLORIDA