HOME OWNER'S
SEAWALL
MANUAL

COMPLIMENTS OF DANN SAPP AND SON, INC.
SERVING FLORIDA'S SEAWALL NEEDS FOR OVER 45 YEARS
INFORMATION IN THIS MANUAL WAS COMPILED BY DANN SAPP & SON, INC. DANN SAPP AND SON, INC. HAS OVER 45 YEARS OF EXPERIENCE IN THE STATE OF FLORIDA, PRIMARILY PINELLAS COUNTY, BUILDING, DESIGNING, REPAIRING, AND REPLACING SEAWALLS, BOTH COMMERCIAL AND RESIDENTIAL.

DANN SAPP & SON HAS PUBLISHED THIS MANUAL TO BENEFIT THE CONSUMER IN MAKING AN EDUCATED DECISION WHEN DECIDING HOW TO REPAIR OR REPLACE THEIR SEAWALL.

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HISTORY OF LOCAL SEAWALLS

The majority of waterfront properties on the west coast of Florida were developed during the 1950's and 60's. The seawalls used to contain these large developments were concrete and on the most part the same basic design. (as can be seen below).

Some developers paid extra for better designed seawalls, but on the most part developers chose the least expensive seawall design. The reason for this was to stay competitive with their competition. The less expensive seawalls were expected to last 20 to 30 years. In most cases they have exceeded their designed structural life span.

Since the late 1970's large amounts of seawalls have failed in Pinellas County. Most of the failures were caused by heavy rain fall, tropical storms, hurricanes, and high winds have also played a part in the failures, but for the most part rainfall seems to do the most damage.

The weight from the heavy rainfall has caused many seawall failures. It should be noted that as years proceed and the seawalls age and deteriorate that it has been taking less amounts of rainfall to cause a seawall to collapse. In some cases over watering has been the culprit.

TYPICAL SEAWALL DETAIL

![Seawall Diagram](image-url)

- Reinforced concrete seawall cap
- Steel anchor rod
- Reinforced concrete anchor
- Reinforced concrete sheet pile
MAJOR TYPES OF SEAWALL FAILURE

ANCHOR FAILURE

CAUSES:

AGE

PROLONGED EXPOSURE TO SALTWATER WHERE CORROSION HAS DETEriorated THE anchor rod AND fasteners TO A point WHEN EXPOSED TO EXCESS LOADING FROM BEHIND POSSIBLE FAILURE OF THE WALL CAN OCCUR.

WARNING SIGNS THAT INDICATE POSSIBLE FAILURE:

OUTWARD MOVEMENT

MISALIGNMENT OF THE SEAWALL

DETERIORATION OF THE ANCHOR ROD

NOTE: TO FULLY DETERMINE THAT AN EXISTING ANCHOR ROD IS NOT RELIABLE, THE ROD NEEDS TO BE EXPOSED COMPLETELY FROM THE SEAWALL CAP TO THE ANCHOR BLOCK. DUE TO THE AMOUNT OF EXCAVATING REQUIRED, THIS IS NOT ECONOMICALLY FEASIBLE.

SEAWALL CAP FAILURE:

CAUSES:

AGE

PROLONGED EXPOSURE TO SALTWATER WHERE CORROSION HAS CAUSED THE REINFORCING STEEL IN THE SEAWALL CAP TO CORRODE AND EXPAND CAUSING CRACKS TO DEVELOP. AS THE STEEL CONTINUES TO CORRODE AND EXPAND, PORTIONS OF THE CAP WILL BREAK OFF, THUS WEAKENING THE CAP, LEADING TO FAILURE OF THE SEAWALL.

WARNING SIGNS THAT INDICATE POSSIBLE FAILURE:

OUTWARD MOVEMENT.

MISALIGNMENT OF THE SEAWALL.

HORIZONTAL CRACKS IN FACE AND TOP OF THE EXISTING SEAWALL CAP.

ARE PIECES OF THE CAP MISSING OR SIGNS WHERE SECTIONS OF THE CAP ARE ABOUT TO FALL OFF.

NOTE: HAIRLINE CRACKS PERPENDICULAR TO THE SEAWALL CAP ARE IN MOST CASES NORMAL SHRINKAGE CRACKS.

CONTINUED ON NEXT PAGE
SEAWALL SHEET PILE FAILURE:

CAUSES:
AGE.

LOSS OF BERM IN FRONT OF THE SEAWALL CAUSING THE TOE OF THE SEAWALL TO MOVE OUTWARD AT THE BOTTOM.

EXCESS LOADING FROM BEHIND CAUSING HORIZONTAL CRACKS TO DEVELOP IN THE SEAWALL SHEET PILES, EXPOSING THE REINFORCING STEEL IN THE SHEET PILES TO SALTWATER. PROLONGED EXPOSURE TO THE HARSH ELEMENTS, WEAKENS THE SHEET PILES, WHICH WILL LEAD TO FAILURE OF THE SEAWALL.

WARNING SIGNS THAT INDICATE POSSIBLE FAILURE:
MISALIGNMENT OF THE SEAWALL.

OUTWARD MOVEMENT OF THE SEAWALL SHEET PILES (NORMALLY AT BARNACLE LINE)

HORIZONTAL CRACKING IN FACE OF THE SEAWALL SHEET PILES (NORMALLY LOCATED AT BOTTOM OF SEAWALL CAP OR MID POINT OF THE SEAWALL)
NOTE: IT MAY BE NECESSARY TO REMOVE SOME OF THE BARNACLES FROM FACE OF THE SHEET PILES TO EXPOSE THE CRACKS.

SETTLING OF FILL FROM BEHIND THE SEAWALL DUE TO OUTWARD MOVEMENT OF THE SHEET PILES.

CAN ANYTHING BE DONE TO PREVENT A FAILURE:

YES, BUT DECIDING WHAT TO DO CAN BE VERY COMPLICATED. TO MAKE MATTERS WORST SOME INDIVIDUALS, AND SOME MARINE CONTRACTORS PROFESSING TO BE EXPERTS HAVE LITTLE OR NO EXPERIENCE IN UNDERSTANDING THE CAUSES OF PREMATURE SEAWALL FAILURE. IN SOME CASES THEY GIVE POOR ADVICE ON REPAIRING ONLY THE OBVIOUS PROBLEMS. THE MORE SIGNIFICANT PROBLEMS ARE IGNORED, LEAVING THE SEAWALL PRONE TO FAILURE AND MORE EXPENSE FOR THE HOMEOWNER. AN EASY GUIDE TO DETECT COMMON SIGNS OF SEAWALL PROBLEMS IS INCLUDED IN THIS MANUAL AS A VISUAL INSPECTION QUESTIONER.
# Most Widely Excepted Forms of Seawall Repair & Replacement

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<th>Seawall Repair Method</th>
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<tbody>
<tr>
<td>Sealing Leaks</td>
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<td>Drains</td>
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</table>

These methods are **not considered structural repairs**.

### Oversized Cap & Anchor System

![Diagram of Oversized Cap & Anchor System](image1)

### Beam & Anchor System

![Diagram of Beam & Anchor System](image2)

### Beam & Anchor System & New Cap

![Diagram of Beam & Anchor System & New Cap](image3)

### Beam & Anchor System with Cap & Anchors

![Diagram of Beam & Anchor System with Cap & Anchors](image4)

### New Low Seawall in Front of Existing Seawall

![Diagram of New Low Seawall in Front of Existing Seawall](image5)

### New Seawall in Front of Existing

![Diagram of New Seawall in Front of Existing](image6)
SEALING LEAKS

DESCRIPTION:
SEALING LEAKS IS NORMALLY DONE BY FILLING OBVIOUS LEAKS, CRACKS, AND VERTICAL SEAMS ABOVE THE WATER WITH A MIXTURE OF MASONRY, OR PORTLAND CEMENT & SAND. BELOW THE WATER A SPECIAL CEMENT MIXTURE DESIGNED FOR UNDERWATER USE SUCH AS WATER PLUG IS USED.

PROS:
SEALS THE SEAWALL & STOPS EROSION OF SOIL FROM BEHIND THE SEAWALL.

CONS:
IT IS IMPORTANT TO REMEMBER THAT SEALING LEAKS CAUSES MORE WATER PRESSURE TO BUILD UP BEHIND THE SEAWALL AND CAN CAUSE THE SEAWALL TO FAIL.

SEALING SHOULD ONLY BE DONE ON SEAWALLS THAT ARE STRUCTURALLY SOUND OR HAVE BEEN PROPERLY REPAIRED.

GUIDELINES:
GROUTING OF VERTICAL SEAMS SHOULD FILL THE ENTIRE SEAM, INCLUDING 1 FOOT BELOW THE MUDLINE.

DRAINS

DESCRIPTION:
DRAINS ARE HOLES INSTALLED IN A SEAWALL, NORMALLY JUST ABOVE THE BARNACLE LINE. AFTER DRILLING A HOLE THROUGH THE SEAWALL, A SHORT PIECE OF PVC PIPE WITH SOME TYPE OF FILTER CLOTH IS INSTALLED.

PROS:
IN THEORY THE RELIEVING OF WATER PRESSURE FROM BEHIND THE SEAWALL IS WISE.

CONS:
EVEN THE BEST OF DRAINS DO LITTLE MORE THAN ALLOW A SLOW DRIP. DURING A HEAVY RAINFALL A HANDFUL OF DRIPPING PIPES DO LITTLE OR NOTHING TO RELIEVE THE ENORMOUS PRESSURE FROM THE RAIN FALL.

IT SHOULD BE NOTED THAT STRUCTURAL REPAIRS DO MUCH MORE TO PREVENT SEAWALL FAILURE.

INSTALLING DRAINS ONLY, WITHOUT STRUCTURAL REPAIRS TO THE SEAWALL, IS CONSIDERED A WASTE OF MONEY. THE OWNER WOULD BE BETTER OFF TO CONSERVE HIS FUNDS UNTIL SUCH TIME HE CAN AFFORD TO DO A STRUCTURAL REPAIR TO THE SEAWALL.

GUIDELINES:
IF ONLY DRAINS ARE TO BE INSTALLED, THEN THE HOLES DRILLED THROUGH THE SEAWALL FOR THE DRAINS SHOULD BE LOCATED AT THE VERTICAL JOINTS IN THE SEAWALL PANELS TO PREVENT STRUCTURAL DAMAGE TO THE SEAWALL.
DESCRIPTION:
SECONDARY ANCHORS WERE DESIGNED AS A SUPPLEMENT TO THE EXISTING ANCHORS. THEY CONSIST OF A 1 INCH DIAMETER COAL TAR EPOXY COATED STEEL RODS, 12' LONG, BUT PREFERABLY 16', (WHERE POSSIBLE), ENCASED IN PVC AND ANCHORED WITH A REINFORCED CONCRETE DEADMAN. (APR. 48" WIDE X18"HIGHX 12"THICK.

PROS:
STRUCTURALLY SUPPORTS THE PORTION OF THE SEAWALL THAT IS ANCHORED.

CONS:
SUPPORTS ONLY THAT PORTION OF THE WALL ANCHORED LEAVING THE SEAWALL PRONE TO FAILURE IN OTHER AREAS.

SHOULD BE USED PRIMARILY WHEN A SEAWALL ONLY NEEDS UPPER SUPPORT.

IF NOT RE-COATED PERIODICALLY (WHICH IS SELDOM DONE) HAS LIFE SPAN OF APPROXIMATELY 10 YEARS.

GUIDELINES:
SHOULD BE ONLY INSTALLED WHEN ONLY UPPER SUPPORT IS REQUIRED. ANCHORS DO LITTLE TO STOP A MID POINT OR MUDLINE FAILURE.

ANCHORS BLOCKS SHOULD BE INSTALLED AS DEEP AS POSSIBLE. (IN MOST CASES 3'-6" TO 4'-6" TO THE BOTTOM OF THE BLOCK IS A GOOD RULE OF THUMB.)

ANCHOR BLOCKS SHOULD BE INSTALLED LANDWARD OF THE SEAWALL AS FAR BACK AS POSSIBLE PREFERABLY 16' AND IF NECESSARY CUTTING A POOL DECK TO ACHIEVE THIS DISTANCE IS NOT OUT OF THE QUESTION.
DESCRIPTION:
The oversized cap was designed to replace an existing cap which is in poor condition. The large cap is designed to extend further down the face of the existing seawall than the previous cap. (Normally 24" deep on the front side). Therefore reducing the load on the seawall panels as much as 50%.

The new cap is to be connected to a system of new anchors spaced 10 foot on center.

PROS:
When properly installed on a seawall with no horizontal cracks and good ground penetration, it can extend the life of the structure 20 years or more. The new cap and anchors should last 50 years.

CONS:
This system only supports the upper portion of the seawall. This will leave the wall prone to midpoint or mudline failures.

The cap & anchors should last 50 years, but the lower portion of the seawall may not last as long.

CONTINUED ON NEXT PAGE
GUIDELINES:
NEW CAP SHOULD ONLY BE INSTALLED AFTER DETERMINING THE SEAWALL PANELS ARE IN GOOD CONDITION, AND STILL HAVE ADEQUATE PENETRATION.

THE NEW CAP ANCHORS SHOULD BE INSTALLED & TIGHTENED PRIOR TO REMOVING THE EXISTING CAP. NEW ANCHORS SHOULD FOLLOW THE SAME GUIDELINES AS SECONDARIES, BUT BE SPACED 10 FOOT ON CENTER.

IF THE OWNER ELECTS TO INSTALL A NEW CAP USING EXISTING ANCHORS WHICH IS NOT RECOMMENDED BECAUSE THE CAP IS ONLY AS GOOD AS ITS ANCHOR SYSTEM, THEN THE PRICE SHOULD BE ABOUT 1/2 OF THE PRICE OF A NEW COMPLETE CAP AND ANCHOR SYSTEM.
DESCRIPTION:
THE BEAM AND ANCHOR SYSTEM CONSIST OF A POURED IN PLACE REINFORCED CONCRETE BEAM. THE NEW BEAM IS TO BE INSTALLED ALONG THE WATER SIDE OF THE SEAWALL, NORMALLY AT MID POINT BETWEEN THE TOP AND BOTTOM OF THE EXISTING SEAWALL. THE BEAM IS ATTACHED TO THE SEAWALL BY A SYSTEM OF NEW ANCHORS SPACED 8 FOOT ON CENTER ALONG THE SEAWALL.

PROS:
STRUCTURALLY SUPPORTS A LARGER PORTION OF THE SEAWALL THAN JUST SECONDARY ANCHORS.
REQUIRES NO MAINTENANCE.

WHEN A BEAM AND ANCHOR SYSTEM IS INSTALLED PROPERLY ON A SEAWALL THAT IS IN FAIR CONDITION, AND STILL HAS ADEQUATE PENETRATION INTO THE GROUND, THE BEAM AND ANCHOR SYSTEM CAN PREVENT A WALL FAILURE FOR 20 YEARS OR MORE.

CONS:
DURING THE PERIOD THE BEAM AND ANCHOR SYSTEM IS IN SERVICE, IT IS TO BE EXPECTED THAT THE EXISTING SEAWALL CAP MAY NEED REPLACING.

NOTE: WITH A PROPERLY INSTALLED BEAM AND ANCHOR SYSTEM IN PLACE, THE CAP IS NOT RELIED UPON AS MUCH FOR STRUCTURAL SUPPORT, AND CAN BE REPLACED AT THE OWNERS CONVIENCE.

CONTINUED ON NEXT PAGE
GUIDELINES:

BEFORE CHOOSING A BEAM AND ANCHOR SYSTEM, THE SEAWALL SHOULD HAVE ADEQUATE PENETRATION, AND BE IN FAIR CONDITION.

SEVERE HORIZONTAL CRACKS, OR MOVEMENT OF THE SEAWALL MAY INDICATE THAT THE SEAWALL NEEDS MORE STRUCTURAL SUPPORT THAN THE BEAM AND ANCHOR SYSTEM.

NEW ANCHOR SYSTEMS SHOULD FOLLOW THE SAME GUIDELINES AS SECONDARIES, BUT BE SPACED 8 FOOT ON CENTER.

A FULL 45 DEGREE ANGLE SHOULD BE INSTALLED AT THE BOTTOM OF THE NEW BEAM. THIS 45 DEGREE ANGLE IS IMPORTANT AS IT DEFLECTS WAVE ACTION AND ACTS AS NOISE ABATEMENT.
DESCRIPTION:
THIS REPAIR SYSTEM IS THE SAME AS A NORMAL BEAM AND ANCHOR SYSTEM, BUT IS USED IN CASES WHERE A NEW CAP IS NECESSARY. THE EXISTING CAP IS REMOVED AFTER THE BEAM & ANCHOR SYSTEM IS IN PLACE. THEN A NEW CAP IS INSTALLED USING THE EXISTING ANCHORS FROM THE PREVIOUS CAP.

PROS:
IN A LOT OF CASES THIS REPAIR SYSTEM COVERS ENOUGH OF THE MOST COMMON PROBLEMS THAT ANY FUTURE WORK SHOULD NOT BE EXPECTED FOR 20 YEARS OR MORE.

CONS:
THE NEW CAP IS RELYING UPON THE EXISTING ANCHORS FOR STRUCTURAL SUPPORT. THE EXISTING ANCHORS SHOULD BE AT LEAST IN FAIR CONDITION. IN CASES WHERE THE EXISTING ANCHORS ARE IN POOR CONDITION AND CANNOT BE RELIED UPON, THEN IT MUST BE DETERMINED IF THE NEW BEAM CAN BE TOTALLY RELIED UPON FOR STRUCTURAL SUPPORT OF THE SEAWALL.

OWNER SHOULD COMPARE COST OF THIS REPAIR TO COST FOR A NEW SEAWALL, IN MANY CASES THE COST FOR A NEW SEAWALL INSTALLED IN FRONT OF THE EXISTING SEAWALL IS ABOUT 25 PERCENT MORE.

GUIDELINES:
FOLLOW THE SAME GUIDELINES AS A NEW BEAM AND ANCHOR SYSTEM.

THE EXISTING SEAWALL CAP SHOULD NOT BE REMOVED UNTIL AFTER THE BEAM AND ANCHOR SYSTEM IS IN PLACE.

BEFORE CHOOSING THIS REPAIR, IT SHOULD BE DETERMINED IF THE EXISTING SEAWALL HAS ADEQUATE PENETRATION INTO THE GROUND.
DESCRIPTION:
THIS REPAIR SYSTEM IS THE SAME AS A NORMAL BEAM AND ANCHOR SYSTEM, BUT IS USED IN CASES WHERE A NEW CAP AND ANCHORS ARE ALSO REQUIRED. THE EXISTING CAP IS REMOVED AFTER THE BEAM AND ANCHOR SYSTEM IS IN PLACE. THEN A NEW CAP IS INSTALLED WITH NEW ANCHORS. IN MOST CASES THE NEW CAP UTILIZES THE SAME ANCHOR BLOCK AS THE NEW BEAM SYSTEM.

PROS:
THIS SYSTEM COVERS THE MOST COMMON PROBLEMS, AND ANY FUTURE WORK SHOULD NOT BE EXPECTED FOR 20 YEARS OR MORE.

CONS:
The repair cost on this system is close to the cost for a new seawall. If the funds are available, it is recommended that a new seawall in front of the existing seawall be installed.

GUIDELINES:
FOLLOW THE SAME GUIDELINES AS A NEW BEAM AND ANCHOR SYSTEM.

THE NEW BEAM AND NEW CAP ANCHORS ARE NORMALLY INSTALLED IN THE SAME CONCRETE ANCHOR BLOCK.

THE EXISTING SEAWALL SHOULD HAVE ADEQUATE PENETRATION INTO THE GROUND.
DESCRIPTION:
THE NEW LOW SEAWALL IS INSTALLED DIRECTLY IN FRONT OF AN EXISTING SEAWALL. THE TOP ELEVATION OF THE NEW SEAWALL IS LOWER THAN THE EXISTING, NORMALLY 2 TO 3 FEET BELOW TOP OF THE EXISTING SEAWALL CAP.

THE DESIGN REQUIRES THAT ALUMINUM SHEET PILES OR PRECAST CONCRETE SHEET PILES BE INSTALLED DIRECTLY IN FRONT OF THE EXISTING SEAWALL. AFTER PILE INSTALLATION IS COMPLETE, A NEW REINFORCED CONCRETE CAP AND NEW ANCHOR SYSTEM IS INSTALLED.

PROS:
THIS SYSTEM CAN BE INSTALLED PRIOR TO FAILURE OR WERE MODERATE MOVEMENT HAS OCCURRED.

A NEW LOW SEAWALL CAN BE INSTALLED AT A LESSER COST THAN A COMPLETE NEW SEAWALL

IF THIS SYSTEM IS INSTALLED PROPERLY, IT CAN BE EXPECTED TO LAST 50 YEARS.

CONTINUED ON NEXT PAGE
CONS:
THIS IS AN EXCELLENT SYSTEM, UNLESS IT IS INSTALLED INCORRECTLY, OR THE DESIGN IS
INFERIOR. IT SHOULD BE NOTED THAT DESIGNS AND SPECIFICATIONS DIFFER FROM
CONTRACTOR TO CONTRACTOR. IT IS IMPORTANT THAT BEFORE CHOOSING A
CONTRACTOR THAT THE OWNER COMPARE MORE THAN THE PRICE. MANY INFERIOR
DESIGNS HAVE NO ANCHOR SYSTEM OR REINFORCED CONCRETE CAP, AND RELY ON
BOLTING THE SHEET PILES TO THE EXISTING SEAWALL BY USING EITHER WOOD OR
ALUMINUM WHALERS. IN MOST CASES, THE LOWER PRICE IS DUE TO LESSER
SPECIFICATIONS AND WILL NOT BE THE BETTER DEAL.

GUIDELINES:
THE NEW SEAWALL SHEET PILES SHOULD PENETRATE THE EXISTING GROUND A MINIMUM
OF 40 PERCENT OF THEIR LENGTH.

THE NEW SHEET PILES USED SHOULD BE STRUCTURALLY DESIGNED TO MEET THE REQUIRED LOADS.

WHEN CHOOSING ALUMINUM SEAWALL SHEET PILES, THE THICKNESS OF THE METAL IS
VERY IMPORTANT & CAN EFFECT THE COST DRASTICALLY. SHEET PILES LESS THAN .125"
SHOULD NOT BE USED.

CONCRETE SHEET PILES UP TO 12 FOOT LONG SHOULD BE A MINIMUM OF 6 INCHES THICK.
SIZE OF THE HORIZONTAL AND VERTICAL REINFORCING STEEL IN SHEET PILES UP TO 12
FOOT LONG SHOULD HAVE #5 VERTICAL BARS SPACED 6 INCHES ON CENTER AND #3
HORIZONTAL BARS SPACED 24 INCHES ON CENTER.

CHOOSING ALTERNATIVE SHEET PILES SUCH AS VINYL, PLASTIC, FIBERGLASS AND PVC ARE
NOT RECOMMENDED FOR SEAWALLS EXCEEDING 5 FOOT IN HEIGHT. NOTE: THESE
PRODUCTS HAVE ONLY BEEN IN USE IN THIS AREA FOR ONLY A SHORT PERIOD OF TIME.
USE OF THESE PRODUCTS SHOULD BE DONE CAUTIOUSLY.

FILLING THE VOID BETWEEN THE OLD & NEW SEAWALL SHEET PILES WITH CONCRETE IS
VERY IMPORTANT, AND SHOULD BE INSISTED UPON BY THE OWNER, NO MATTER WHICH
SHEET PILES ARE TO BE INSTALLED.

IF ALUMINUM SHEET PILES ARE USED, CONTACT OF DISSIMILAR METALS SHOULD NOT BE
ALLOWED.

CONTRACTOR SHOULD PROVIDE A TEN YEAR STRUCTURAL WARRANTY FOR THE NEW
SEAWALL.
NEW SEAWALL IN FRONT OF EXISTING SEAWALL

DESCRIPTION:
THIS IS A NEW SEAWALL, WHICH IS INSTALLED DIRECTLY IN FRONT OF AN EXISTING SEAWALL. THIS DESIGN REQUIRES THAT ALUMINUM OR PRECAST CONCRETE SHEET PILES BE INSTALLED DIRECTLY IN FRONT OF THE EXISTING SEAWALL. AFTER THE SHEET PILES HAVE BEEN INSTALLED, THEN A NEW REINFORCED CONCRETE CAP IS INSTALLED THAT IS LARGE ENOUGH TO COVER BOTH THE OLD AND NEW SHEET PILES. THIS CAP IS CONNECTED TO A NEW ANCHOR SYSTEM.

PROS:
THIS SYSTEM CAN BE INSTALLED PRIOR TO FAILURE OR WHERE MODERATE MOVEMENT HAS OCCURRED. THE NEW SEAWALL CAN BE USED TO CORRECT SOME MISALIGNMENT AND RAISE THE ELEVATION OF THE EXISTING SEAWALL.

IF THE NEW SEAWALL IS INSTALLED PROPERLY IT CAN BE EXPECTED TO LAST 50 YEARS.

CONS:
THERE ARE NO PROBLEMS WITH THIS TYPE OF NEW SEAWALL SYSTEM, UNLESS IT IS INSTALLED INCORRECTLY, OR THE DESIGN IS INFERIOR. IT SHOULD BE NOTED THAT DESIGNS & SPECIFICATIONS FOR NEW SEAWALLS DIFFER FROM CONTRACTOR TO CONTRACTOR. IT IS IMPORTANT THAT BEFORE CHOOSING A CONTRACTOR THAT THE OWNER COMPARES MORE THAN THE PRICE. IN A MAJORITY OF CASES, THE LOWER PRICE WILL GIVE THE OWNER LESS IN THE SPECIFICATIONS AND WOULD NOT ALWAYS BE THE BETTER DEAL.

CONTINUED ON NEXT PAGE
GUIDELINES:
THE NEW SEAWALL SHEET PILES SHOULD PENETRATE THE EXISTING GROUND A MINIMUM OF 40 PERCENT OF THEIR LENGTH.

THE NEW SHEET PILES USED SHOULD BE STRUCTURALLY DESIGNED TO MEET THE REQUIRED LOADS.

WHEN CHOOSING ALUMINUM SEAWALL SHEET PILES, THE THICKNESS OF THE METAL IS VERY IMPORTANT & CAN EFFECT THE COST DRASTICALLY. SHEET PILES LESS THAN .125" SHOULD NOT BE USED.

CONCRETE SHEET PILES UP TO 12 FOOT LONG SHOULD BE A MINIMUM OF 6 INCHES THICK. SIZE OF THE HORIZONTAL AND VERTICAL REINFORCING STEEL IN SHEET PILES UP TO 12 FOOT LONG SHOULD HAVE #5 VERTICAL BARS SPACED 6 INCHES ON CENTER AND #3 HORIZONTAL BARS SPACED 24 INCHES ON CENTER.

CHOOSING ALTERNATIVE SHEET PILES SUCH AS VINYL, PLASTIC, FIBERGLASS AND PVC ARE NOT RECOMMENDED FOR SEAWALLS EXCEEDING 5 FOOT IN HEIGHT. NOTE: THESE PRODUCTS HAVE ONLY BEEN IN USE IN THIS AREA FOR ONLY A SHORT PERIOD OF TIME. USE OF THESE PRODUCTS SHOULD BE DONE CAUTIOUSLY.

FILLING THE VOID BETWEEN THE OLD & NEW SEAWALL SHEET PILES WITH CONCRETE IS VERY IMPORTANT, AND SHOULD BE INSISTED UPON BY THE OWNER, NO MATTER WHICH SHEET PILES ARE TO BE INSTALLED.

THE NEW SEAWALL CAP SHOULD BE LARGE ENOUGH TO COVER THE OLD AND NEW SHEET PILES.

IF ALUMINUM SHEET PILES ARE USED, CONTACT OF DISSIMILAR METALS SHOULD NOT BE ALLOWED.

CONTRACTOR SHOULD PROVIDE A TEN YEAR STRUCTURAL WARRANTY FOR THE NEW SEAWALL.

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FINAL NOTES ON ALUMINUM AND VINYL SHEET PILES.

DANN SAPP AND SON, INC., HAS BEEN USING ALUMINUM SHEET PILES IN THE CONSTRUCTION OF SEAWALLS SINCE 1977. SINCE THEN, DANN SAPP AND SON, INC. HAS INSTALLED OVER 30 MILES OF SEAWALL USING THIS PRODUCT. OVER 95% OF THESE INSTALLATIONS INVOLVED INSTALLING A NEW ALUMINUM SEAWALL IN FRONT OF AN EXISTING CONCRETE SEAWALL AND FILLING THE VOID BETWEEN THE ALUMINUM SHEET PILES AND THE EXISTING SEAWALL WITH CONCRETE, TO GROUND LEVEL.

THE REMAINING 5% WERE INSTALLATIONS WHERE THERE WAS NO EXISTING SEAWALL AND THE ALUMINUM SHEETS PILES ALONG WITH A CONCRETE CAP AND ANCHOR SYSTEM WHERE INSTALLED THEN BACKFILLED WITH FILL DIRT.

OVER THE YEARS DANN SAPP AND SON, INC., HAS HAD MANY OPPORTUNITIES TO OBSERVE THESE INSTALLATIONS, AND OTHERS INSTALLED BY OTHER CONTRACTORS. THE ONLY SEAWALLS INSTALLED BY DANN SAPP AND SON, INC. FOUND TO HAVE ANY PROBLEMS WERE OF THE 5% WHERE THERE WAS NO EXISTING SEAWALL. IT WAS DISCOVERED THAT CONTAMINATES IN THE SOIL ON THE LANDWARD SIDE OF THE SHEET PILES CAUSED MINOR CORROSION IN RANDOM AREAS OF THE ALUMINUM SHEET PILES. THE REMAINING 95% OF INSTALLATIONS BY DANN SAPP AND SON, INC. HAVE NOT BEEN OBSERVED HAVING ANY TYPE OF CORROSION PROBLEM.

IT HAS BECOME APPARENT THAT BY INSTALLING THE ALUMINUM SHEET PILES IN FRONT OF AN EXISTING SEAWALL AND FILLING THE VOID BETWEEN THE OLD WALL AND THE NEW SEAWALL WITH CONCRETE, THAT THE EXISTING SEAWALL AND CONCRETE FILLER SHIELDS THE ALUMINUM FROM ANY SOIL CONTAMINATES, BUT IT SHOULD BE NOTED, THAT DANN SAPP AND SON, INC. HAS ALSO OBSERVED MANY ALUMINUM INSTALLATIONS BY OTHER CONTRACTORS WHERE THE ALUMINUM WAS CORRODING. IT WAS DISCOVERED THAT THE CONTRACTORS DID NOT FILL THE VOID BETWEEN THE OLD AND NEW SEAWALLS WITH CONCRETE, BUT RATHER USED DIRT OR NOTHING AT ALL.

WITH ALMOST 30 YEARS OF EXPERIENCE USING ALUMINUM, IT IS THE OPINION OF DANN SAPP AND SON, INC., THAT THE CORROSION PROBLEMS WITH ALUMINUM WERE CAUSED BY EITHER SOIL COMING IN CONTACT WITH THE ALUMINUM ON THE LANDWARD SIDE OF THE ALUMINUM SHEET PILES OR ELECTROLYSIS, CAUSED BY TWO DISSIMILAR METALS COMING IN CONTACT WITH EACH OTHER, A SITUATION THAT IS EASILY AVOIDED.

DUE TO OUR SUCCESS WITH ALUMINUM, WE RECOMMEND IT OVER VINYL WHEN INSTALLING IN FRONT OF AN EXISTING SEAWALL. IN MOST CASES WHERE SHEET LENGTHS ARE 12 FT OR LESS DANN SAPP AND SON, INC. WILL OFFER VINYL AS AN OPTION, BUT WARNS THE PRODUCT HAS ONLY BEEN USED IN THIS AREA FOR APPROXIMATELY 10 YEARS AND HAS BEEN OBSERVED HAVING STRUCTURAL PROBLEMS WHERE WALLS INSTALLED HAVING A VERTICAL HEIGHT OF 7 FT OR MORE FROM THE BAY BOTTOM TO TOP OF SEAWALL. IT SHOULD BE NOTED THAT THESE PROBLEMS IN MOST CASES MAY HAVE BEEN CAUSED BY THE CONTRACTOR NOT USING THE PROPER SHEET PILE OR FILLING THE VOID BETWEEN THE OLD AND NEW SEAWALL WITH DIRT, GRAVEL, OR NOTHING AT ALL TO AVOID THE COST OF FILLING THE VOID WITH CONCRETE.

IN CLOSING DANN SAPP AND SON, INC. FEELS THE MOST IMPORTANT FACTORS A HOMEOWNER SHOULD OBSERVE WHEN HAVING A NEW SEAWALL INSTALLED IS TO CHOOSE A CONTRACTOR WITH A LONG HISTORY OF INSTALLING SEAWALLS. BE SURE THE SEAWALL DESIGN HAS BEEN APPROVED BY AN ENGINEER AND MOST IMPORTANTLY INSISTING THE VOID BETWEEN THE OLD AND NEW SEAWALL BE FILLED WITH CONCRETE.
### GRADING CHART FOR COMMON SEAWALL REPAIRS

Grading is based on numbers from 1 to 20 (20 being the best)

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<tr>
<th>Types of Repairs</th>
<th>Structural Value</th>
<th>Long Term Value</th>
<th>Average Cost Compared to Cost for New Seawall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seal Leaks</td>
<td>0</td>
<td>0</td>
<td>3%</td>
</tr>
<tr>
<td>Install Drains</td>
<td>0</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Secondary Anchors</td>
<td>5</td>
<td>4</td>
<td>30%</td>
</tr>
<tr>
<td>Spaced 8' on Center</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cap and Anchors</td>
<td>8</td>
<td>8</td>
<td>50%</td>
</tr>
<tr>
<td>Beam and Anchors</td>
<td>11</td>
<td>10</td>
<td>45%</td>
</tr>
<tr>
<td>Beam and Anchors</td>
<td>14</td>
<td>13</td>
<td>75%</td>
</tr>
<tr>
<td>With New Cap</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beam and Anchors</td>
<td>16</td>
<td>16</td>
<td>85%</td>
</tr>
<tr>
<td>With New Cap and Anchors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Low Seawall</td>
<td>18</td>
<td>17</td>
<td>90%</td>
</tr>
<tr>
<td>In Front of Existing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Seawall In Front of Existing</td>
<td>20</td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>

### COST COMPARISON: (BASED ON 80 LIN. FT.)

#### AFTER MAJOR FAILURE

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Seawall</td>
<td>$27,700.00</td>
</tr>
<tr>
<td>Sprinklers</td>
<td>$1,400.00</td>
</tr>
<tr>
<td>Sod Damaged Area</td>
<td>$1,700.00</td>
</tr>
<tr>
<td>Landscape</td>
<td>$1,200.00</td>
</tr>
<tr>
<td>Fill Dirt</td>
<td>$1,000.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$33,000.00</strong></td>
</tr>
</tbody>
</table>

#### BEFORE FAILURE

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Seawall</td>
<td>$22,000.00</td>
</tr>
<tr>
<td>Sprinklers</td>
<td>Included</td>
</tr>
<tr>
<td>Sod Damaged Area</td>
<td>$500.00</td>
</tr>
<tr>
<td>Landscape</td>
<td>N/A</td>
</tr>
<tr>
<td>Fill Dirt</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$22,500.00</strong></td>
</tr>
</tbody>
</table>

This cost comparison is based upon 2006 average cost for 80 lineal feet of new seawall. Prices subject to change without notice.
CHOOSING A MARINE CONTRACTOR

COMPARE PLANS & SPECS. MAKE SURE YOU ARE COMPARING APPLES TO APPLES. IN MANY CASES THE LOWEST BID IS NOT THE BEST VALUE.

COMPARE QUALITY & WORKMANSHIP.

PHYSICALLY LOOK AT CONTRACTORS PREVIOUS WORK IN MOST CASES THIS WILL BE THE DECIDING FACTOR.

CHECK FOR LICENSE, THERE CAN BE A FINE IMPOSED UPON THE HOMEOWNER IF FOUND GUILTY OF HIRING A CONTRACTOR WITHOUT A PROPER LICENSE.

CHECK TO SEE IF THE CONTRACTOR IS IN GOOD STANDING WITH LOCAL BUILDING DEPARTMENT.

REQUIRE THAT THE CONTRACTOR SUPPLY YOU WITH PROOF OF WORKMAN’S COMPENSATION. IF A CONTRACTOR DOES NOT HAVE IT, AND ONE OF HIS EMPLOYEES ARE INJURED ON YOUR PROPERTY, YOU COULD BE LIABLE.

WILL THE CONTRACTOR GIVE ANY TYPE OF STRUCTURAL WARRANTY?

HOW LONG HAS THE CONTRACTOR BEEN IN BUSINESS, WILL HE BE THERE TO HONOR THE WARRANTY, IF NECESSARY.

DOES THE CONTRACTOR HAVE AN EXPERIENCED WORKFORCE THAT IS LARGE ENOUGH TO COMPLETE THE CONTRACT IN A TIMELY MANNER.

EVERY CONTRACTOR HAS THEIR OWN DESIGNS, SOME ARE BETTER THAN OTHERS.

ASK FOR REFERENCES FROM OTHER CUSTOMERS.

BE CAREFUL OF CONTRACTORS REQUIRING MONEY UP FRONT. THERE HAVE BEEN CASES WHERE CONTRACTORS HAVE OBTAINED A DEPOSIT AND NEVER RETURNED TO COMPLETE THE CONTRACT. PAYMENTS SHOULD BE MADE ONLY ON COMPLETED WORK. THE OWNER SHOULD RETAIN A LARGE ENOUGH PORTION OF THE CONTRACT AMOUNT TO INSURE THE JOB’S COMPLETION. FINAL PAYMENT SHOULD NOT BE PAID UNTIL WORK IS COMPLETED TO OWNER’S SATISFACTION, AND THE CONTRACTOR PROVIDES A FINAL RELEASE OF LIEN.
VISUAL INSPECTION QUESTIONER

1. DOES THE SEAWALL APPEAR TO BE OUT OF LINE
   TOP OF CAP NOT LEVEL OR IRREGULAR IN ANY WAY
   WALL LEANING OUT AT TOP
   YES__NO__
   YES__NO__

2. IS THERE SIGNS OF SOIL ERODING FROM BEHIND THE SEAWALL
   YES__NO__

3. DOES THE SEAWALL CAP HAVE HORIZONTAL CRACKS
   NOTE: HAIR LINE CRACKS PERPENDICULAR TO THE CAP ARE IN
   MOST CASES NORMAL SHRINKAGE CRACKS.
   YES__NO__

4. ARE THERE PIECES OF THE CAP MISSING, OR SIGNS OF SECTIONS
   OF THE CAP ABOUT TO FALL OFF.
   YES__NO__

5. ARE THERE ANY HORIZONTAL CRACKS IN THE SEAWALL SLABS
   JUST BELOW THE SEAWALL CAP.
   YES__NO__

6. ARE THERE ANY HORIZONTAL CRACKS IN THE SEAWALL SLABS
   IN OR AROUND THE BARNACLE LINE.
   YES__NO__

NOTE: IF ANY OF THE QUESTIONS ABOVE WERE ANSWERED WITH A YES, IT IS ADVISABLE TO
RECOMMEND THAT A QUALIFIED ENGINEER OR MARINE CONTRACTOR DO A MORE EXTENSIVE
INSPECTION OF THE SEAWALL.

IN MANY CASES, EVEN IF ALL OF THE ANSWERS ARE NO, THE SEAWALL SHOULD STILL BE
LOOKED AT BY A QUALIFIED ENGINEER OR MARINE CONTRACTOR, WHO CAN RECOMMEND
POSSIBLE PREVENTIVE MEASURES, TO INSURE THE SEAWALL WILL CONTINUE TO PROTECT THE
PROPERTY FOR MANY YEARS TO COME.
A BRIEF HISTORY OF DANN SAPP AND SON, INC.

DANN SAPP AND SON, INC IS A FAMILY OWNED AND OPERATED MARINE CONSTRUCTION BUSINESS SPECIALIZING IN THE PLANNING, DESIGN, AND CONSTRUCTION OF NEW SEAWALLS, AND CUSTOMIZED REPAIRS TO EXISTING SEAWALLS, BOTH RESIDENTIAL AND COMMERCIAL, OFFERING STATE WIDE SERVICE.

THE COMPANY WAS FORMED IN 1977. IT'S PRESIDENT, PETER SAPP HAS OVER 30 YEARS EXPERIENCE, AND HOLDS STATE LICENSES FOR THE FOLLOWING

**MARINE SPECIALTY CONTRACTOR**
C-3886

**BUILDING CONTRACTOR**
CB-CO25120

**SWIMMING POOL CONTRACTOR**
CP-CO26510

SINCE THE START, DANN SAPP AND SON HAVE LEAD THE WAY IN DESIGNING, INSTALLING, AND REPAIRING SEAWALLS IN PINELLAS COUNTY. THEIR DESIGNS AND QUALITY WORKMANSHIP HAVE DOMINATED THE PINELLAS COUNTY CONSTRUCTION INDUSTRY.

PETER SAPP IS VERY PROUD OF HIS OUTSTANDING REPUTATION FOR HONESTY, QUALITY, AND MOST OF ALL CUSTOMER SATISFACTION.

PLEASE KEEP OUR PHONE NUMBER FOR ANY OF YOUR SEAWALL NEEDS.

DANN SAPP AND SON, INC.
MARINE DIVISION
STATE CERT. #CB-CO25120 / PCCLB #C-3886
(727) 528-1555 FAX: (727) 528-1288
4211 31ST STREET NORTH
ST. PETERSBURG, FL 33714