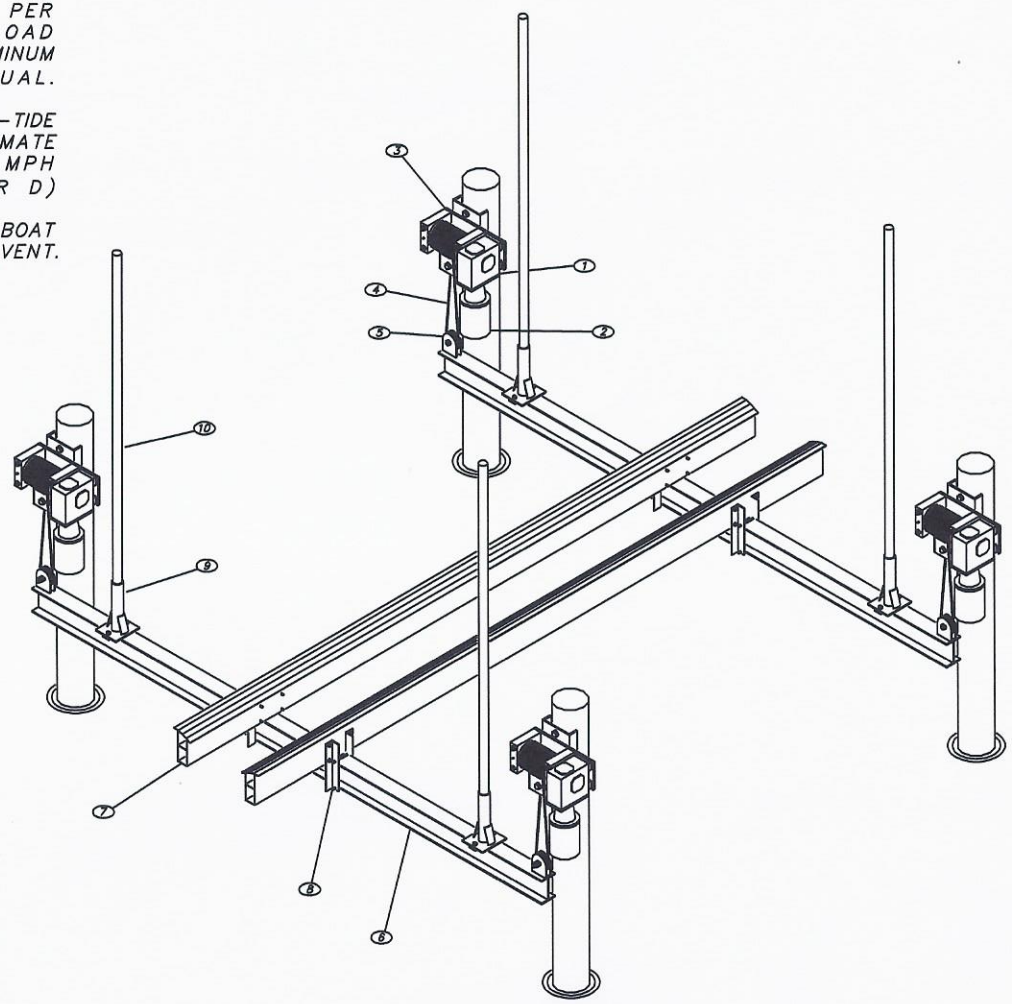
ENGINEERING REVIEW:
BOAT LIFT DRIVE UNITS AND SPECIFIED MOUNTING HARDWARE COMPLY WITH WIND LOAD REQUIREMENTS OF THE 2014 FLORIDA BUILDING CODE, PER ASCE 7, AND PER DESIGN LOAD REQUIREMENTS OF THE 2010 ALUMINUM ASSOCIATION'S DESIGN MANUAL.

DRIVE UNITS, INSTALLED AS PER HI-TIDE INSTRUCTIONS, WILL EXCEED ULTIMATE DESIGN WIND SPEED OF 170 MPH (EXPOSURE CATEGORY C OR D)

BOATS ARE TO BE REMOVED FROM BOAT LIFTS PRIOR TO A MAJOR WIND EVENT.

PILINGS:
PILING PENETRATION TO BE 10' INTO THE SAND BOTTOM OR 5' INTO ROCK STRATA, SUB-SURFACE CONDITIONS CAN VARY GREATLY, THE CONTRACTOR SHALL VERIFY ALL PILE CAPACITIES TO COMPLY WITH FBC 2014. ALL PILINGS TO BE 10" MINIMUM DIAMETER 2.5 C.C.A PRESSURE TREATED WOOD, PRE-STRESSED CONCRETE OR COMPARABLE EQUIVALENT.



ELECTRICAL REVIEW:
1-1/2 HP ELECTRIC MOTOR
-- AMPS @ 115V EACH
9.6 AMPS @ 230V EACH
QUANTITY: 4
TOTAL WATTS: 8832

NOTE TO EXAMINER:
THIS CERTIFIED ENGINEERED DRAWING HAS BEEN PREPARED SPECIFICALLY FOR USE ONLY BY:

_____

ROGER M BABER
LICENSE
NO. 43855
APPROVED MAR 24 2017
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

ROGER BABER
P.E. NO. 43855
MCR PROFESSIONAL ENGINEERING
C.A. NO. 26967
8528 SW KANSAS AVE. STUART, FL 34997

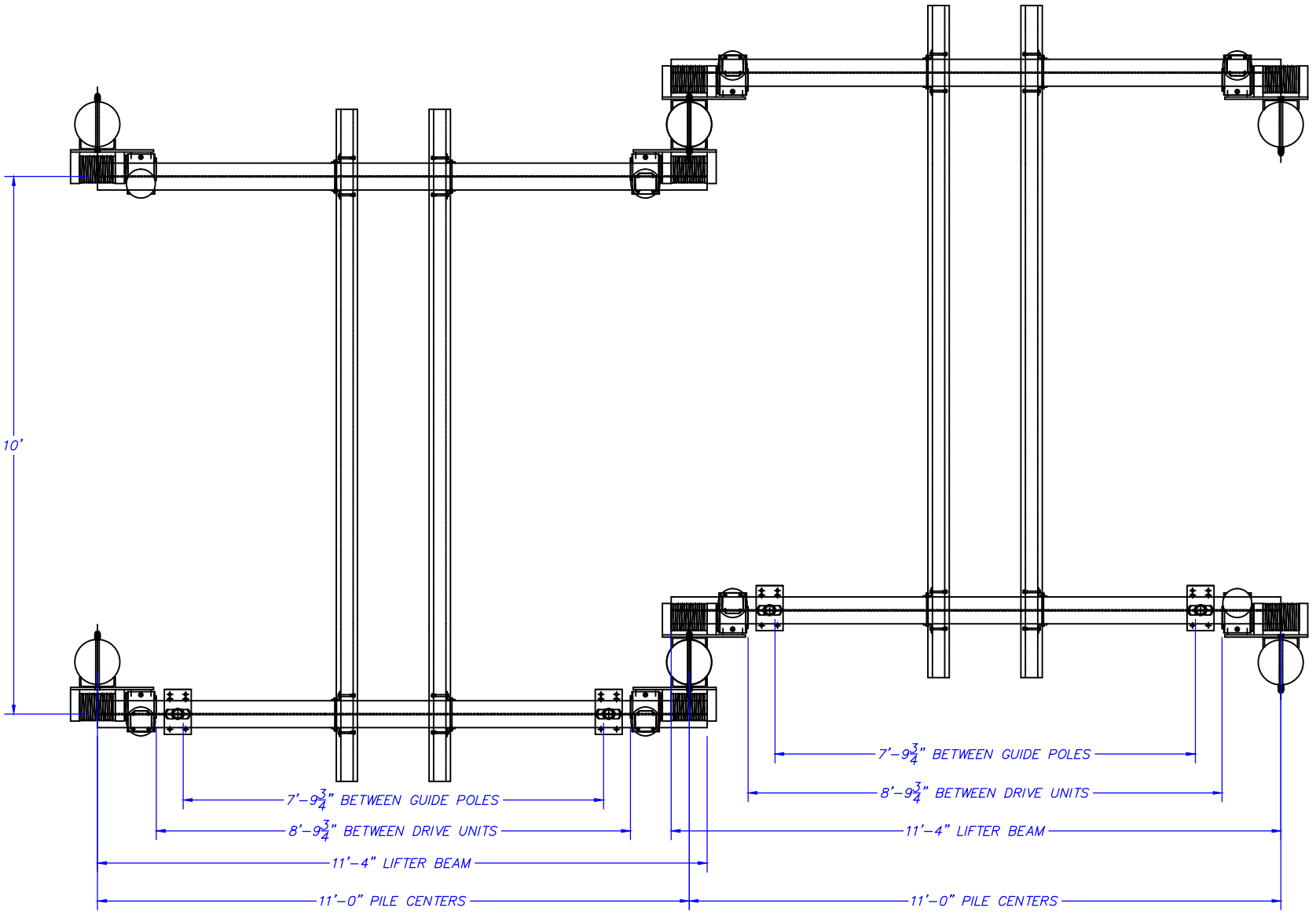
PILING MOUNTING
MINIMUM (2) 3/4" DIA. SS THRU BOLTS FOR WOOD AND CONCRETE PILINGS REQUIRED PER PILING TO SECURE DRIVE UNITS PER FBC 2014.

	DESCRIPTION	QTY
10	PVC GUIDE POLES	4
9	GUIDE POLE BRACKETS	4
8	BUNK BRACKETS W/ HARDWARE	4
7	ALUMINUM BUNKS OR CARPETED WOOD BUNKS	2
6	LIFTER BEAM ASSEMBLY	2
5	4" ALUMINUM SHEAVE	4
4	5/16" X 30' SSAC TYPE 304	4
3	DRIVE UNIT ASSEMBLY	4
2	1-1/2 HP SS MOTOR	4
1	GEAR DRIVE GEAR BOX	4

16,000 LB. T2 TOPLESS X2 BOAT LIFT

R. HYDE SCALE: NTS DATE: 7/1/15 REV: 1

HI-TIDE
BOATLIFTS AND MARINE PRODUCTS
4050 SELVITZ ROAD
FORT PIERCE, FL 34981
1-800-544-0735 www.hi-tide.com



TOLERANCE:

FRACT. = ±1/16"
.XX = ±.015
.XXX = ±.005
.XXXX = ±.001

16,000 LB. T2 BOATLIFT
ON SHARED PILINGS (11'–0" CENTERS)

R. HYDE SCALE: NTS DATE: 3/24/17 #0000–000–00 REV: 1

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4050 SELVITZ ROAD
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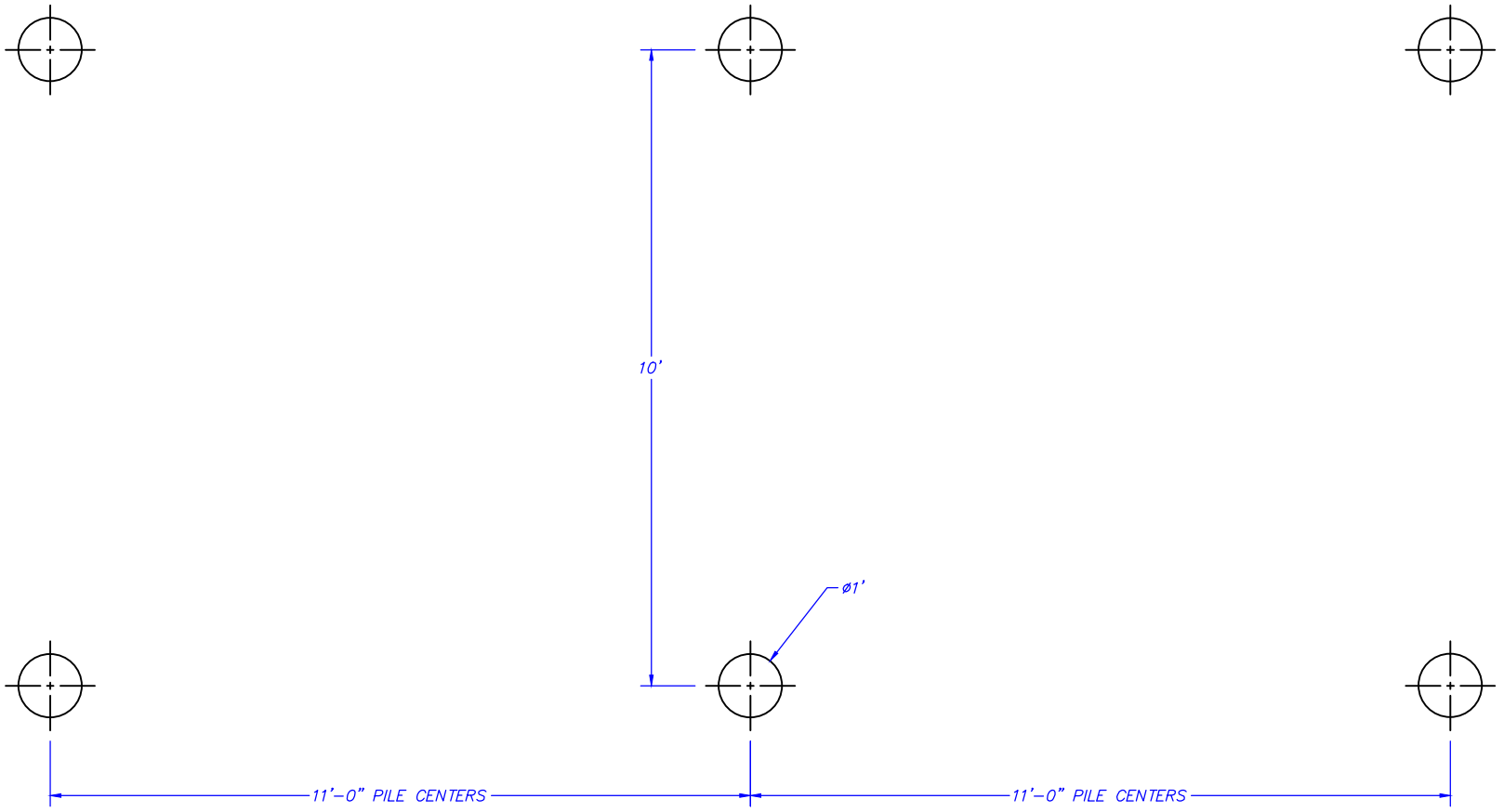

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16,000 LB. T2 BOATLIFT
ON SHARED PILINGS (11'-0" CENTERS)

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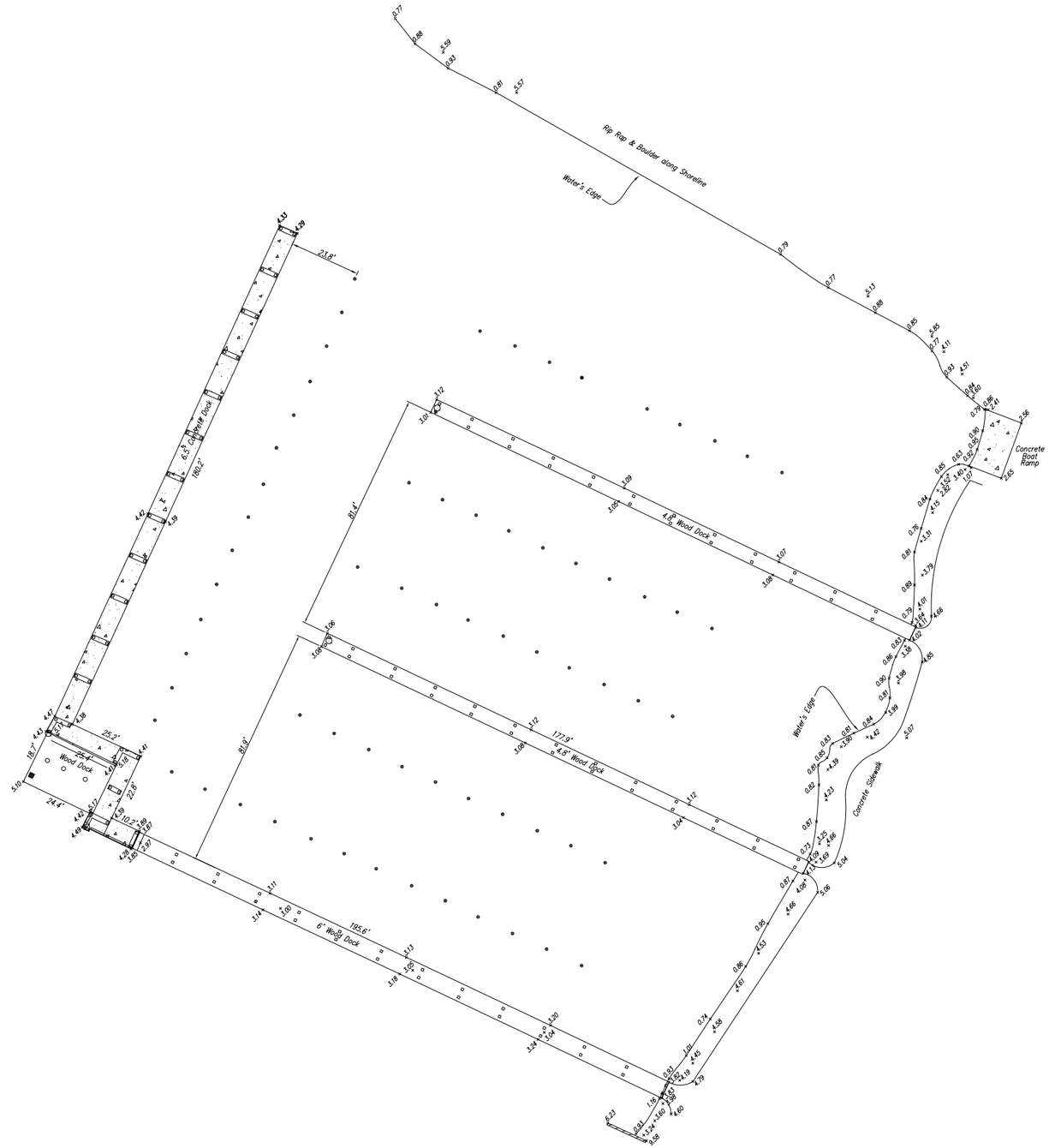
1-800-544-0735 www.hi-tide.com

LEGEND:

- AERIAL TARGET
- AL — ALUMINUM LIGHT POST
- ALUMINUM LIGHT POST (SINGLE)
- ALUMINUM LIGHT POST (DOUBLE)
- ALUMINUM LIGHT POST (TRIPLE)
- ALUMINUM LIGHT POST (QUAD)
- ANCHOR/GUY WIRE
- BACKFLOW PREVENTER ASSEMBLY
- CABLE TELEVISION BOX
- CATCH BASIN
- CENTERLINE
- CHECK VALVE ASSEMBLY
- CIRCULAR DRAIN
- COLUMN (CIRCULAR)
- COLUMN (SQUARE)
- CL — CONCRETE LIGHT POLE
- CL — CONCRETE LIGHT POLE (DOUBLE)
- CP — CONCRETE POWER POLE
- CONTROL POINT
- CB — CURB INLET
- ELECTRIC BOX
- ELECTRIC HAND HOLE
- 4.58 — ELEVATIONS PER N.G.V.D.
- FIRE HYDRANT
- FLOW LINE
- FORCE MAIN MANHOLE
- FORCE MAIN VALVE
- F.P.L. ELECTRIC MANHOLE
- F.P.L. TRANSFORMER PAD
- FPL — F.P.L. TRANSMISSION POLE
- GAS METER
- GAS PUMP
- GAS VALVE
- GREASE TRAP MANHOLE
- GROUND LIGHTING
- GUARD POST
- IRRIGATION HAND HOLE
- IRRIGATION VALVE
- MAILBOX
- MONITOR WELL
- MONUMENT LINE
- P-5 INLET
- P-6 INLET
- PARKING METER
- PEDESTRIAN CROSSING SIGNAL
- PRM — PERMANENT REFERENCE MONUMENT
- POST INDICATOR VALVE
- PRESSURE VACUUM BREAKER ASSEMBLY
- PROPERTY LINE
- SANITARY SEWER CLEANOUT
- SS — SANITARY SEWER MANHOLE
- SIAMESE CONNECTION
- SIGN POST
- SPRINKLER PUMP
- STANDPIPE
- STORM DRAIN
- STORM SEWER MANHOLE
- STREET LIGHT HAND HOLE
- SWALE INLET
- TELEPHONE BOX (SOUTHERN BELL)
- TELEPHONE HAND HOLE
- TELEPHONE MANHOLE (SO. BELL)
- TELEPHONE PAYPHONE
- TRAFFIC HAND HOLE
- TRAFFIC UTILITY BOX
- TP — TRAFFIC SIGNAL POST
- UNDERGROUND UTILITY MARKER
- UTILITY HAND HOLE
- WATER MANHOLE
- WATER METER
- WATER VALVE
- WL — WOOD LIGHT POLE
- WP — WOOD POWER POLE
- HANDICAP SYMBOL
- PARKING BY PERMIT

R denotes RADIUS
D denotes DELTA ANGLE
A denotes ARC DISTANCE
T denotes TANGENT DISTANCE
PCP denotes PERMANENT CONTROL POINT
PRM denotes PERMANENT REFERENCE MONUMENT
OHW denotes OVERHEAD UTILITY WIRES
ORB denotes OFFICIAL RECORDS BOOK
PC denotes POINT OF CURVATURE
CBS denotes CONCRETE BLOCK STRUCTURE
CONC denotes CONCRETE
CLF denotes CHAINLINK FENCE
WF denotes WOOD FENCE
F.I.P. denotes FOUND IRON PIPE
S.I.P. denotes SET IRON PIPE & LB-87 CAP
F.N.D. denotes FOUND BRASS DISC & NAIL
S.N.D. denotes SET LB-87 BRASS DISC & NAIL
CL denotes CLEAR
ENC. denotes ENCROACHMENT
(C) denotes CALCULATED DISTANCE
(D) denotes DEED DISTANCE
(M) denotes MEASURED DISTANCE
(R) denotes RECORD OR PLATTED DISTANCE
(PRO) denotes PRORATED DISTANCE



SURVEYOR'S NOTES:

1. *This sketch represents a "SPECIFIC PURPOSE SURVEY" to show existing locations and elevations of the lands shown hereon only. This is not a "Boundary" survey.*
2. *This sketch has been prepared for the exclusive use of the entity (entities) named hereon. The certification affixed hereto does not extend to any unnamed parties.*
3. *This sketch is subject to easements, rights-of-way and other matters which may be reflected by a search of title to the subject lands.*
4. *Visible indicators of utilities are shown hereon, however, no attempt was made to locate underground items.*
5. *The elevations shown hereon refer to National Geodetic Vertical Datum (N.G.V.D.) of 1929..*
6. *Benchmark A: NGS Brass Disc (D 343 1979) set in rock outcrop 2' below highway grade 50.2' N.W. of the centerline of Southbound lane of U.S. Highway No.1 and 109' East of South corner of the "Caribbean Club" bar. Elelvation=10.14 NAVD88 (11.71 N.G.V.D.).*
7. *Benchmark B: 2" square cut by concrete bench 30' +/- South of Barbeque Area at "Moon Bay Marina." Elevation=3.52 NAVD88 (5.09 N.G.V.D.).*
8. *Prepared For: CORZO CASTELLA CARBALLO THOMPSON & SALMAN, PA*

I HEREBY CERTIFY:

That the attached "SPECIFIC PURPOSE SURVEY" of the land shown hereon is true and correct to the best of my knowledge and belief as recently surveyed and drawn under my supervision and direction. This survey complies with the applicable Minimum Technical Standards adopted by the Florida State Board of Professional Surveyors and Mappers contained in Chapter 61G17-6, Florida Administrative Code, pursuant to Chapter 472.027, Florida Statutes.

SCHWEBKE-SHISKIN & ASSOCIATES, INC.

By: _____
Mark Steven Johnson Vice President
Professional Land Surveyor No.4775
State of Florida

Schwebke-Shiskin & Associates, Inc.
ARCHITECTS • LAND PLANNERS • ENGINEERS • LAND SURVEYORS
1740 CORPORATE DR. SUITE 1000 BOCA RATON, FLORIDA 33431
TEL:(561) 750-1410 FAX:(561) 750-1452 BROWARD(954) 435-7010 FAX(954) 435-3288
(LB-87)

NOTE: This sketch is not valid unless it bears the signature and the original raised seal of a Florida licensed surveyor and mapper.

Drawn By: DMO	Survey Date: 3-10-2005	Checked By: MSJ	Date:
Order No.: 443650	F.B. No.: BC-319 Pg.22	Scale: AS SHOWN	
FILE NO.: FK-108 AJ		Sheet 1 of 1	Sheet(s)

CADD FILE: X:\Proj\SD1161.91\WORKAND SHORES\dwg\Tract 4 - Moon Bay Marina.dwg

SPECIFIC PURPOSE SURVEY

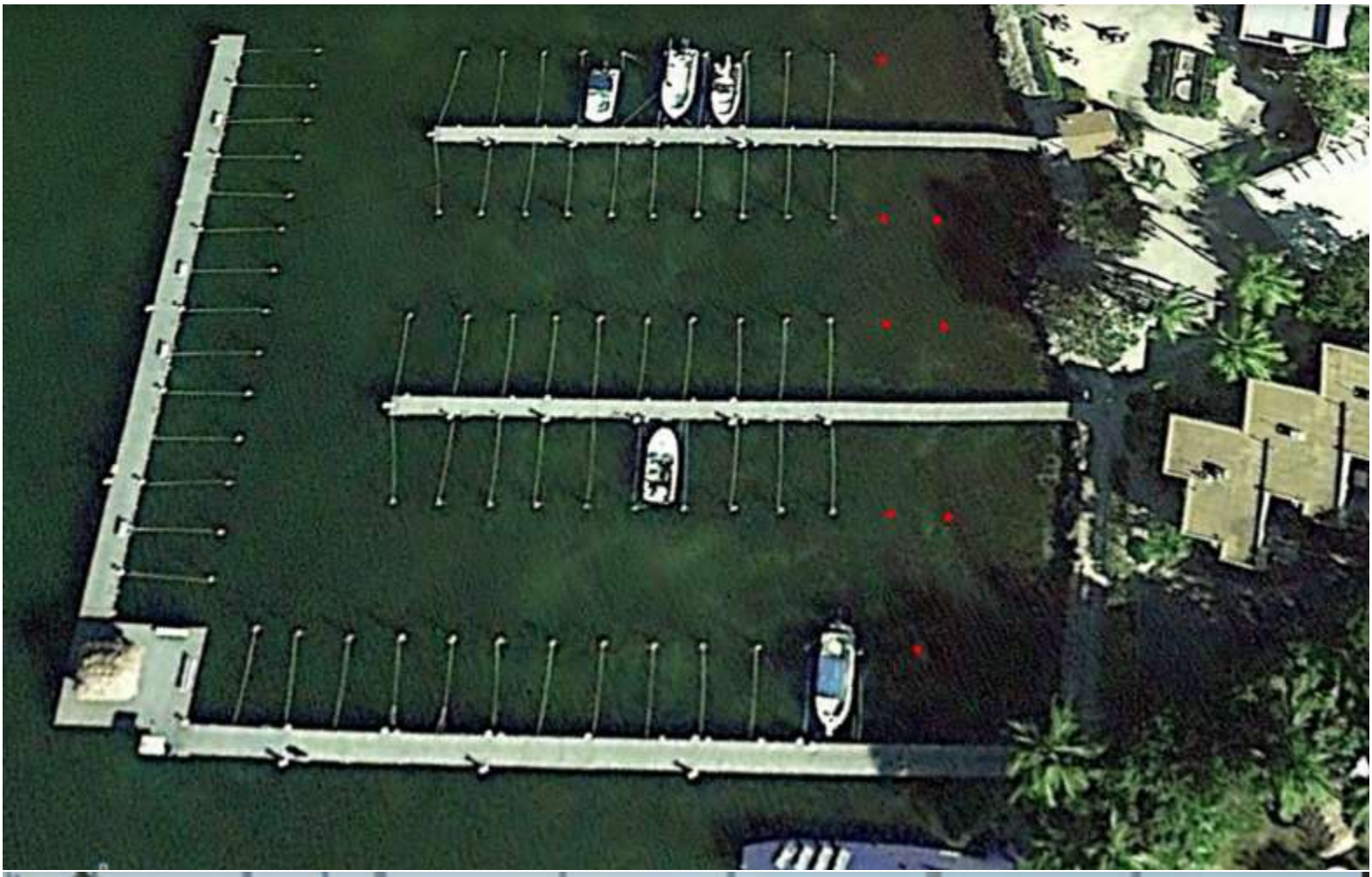
Prepared For:
Corzo Castella Carballo Thompson & Salman, PA
901 Ponce De Leon Boulevard, Suite 900
Coral Gables, Florida 33134

Section 11, Township 63 South, Range 39 East, Monroe County, Florida

REVISIONS

Date:	Remarks:	By:

FILE NO. FK-108 AJ



CUMMINS | CEDERBERG
Coastal & Marine Engineering

December 17, 2015 34801

MOON BAY CONDOMINIUM ASSOCIATION
104350 Overseas Hwy
Key Largo, FL 33037

MOON BAY MARINA BOAT LIFT EVALUATION

Dear Board of Directors:

The following is a summary evaluation of proposed and alternative boat lift installations for the Moon Bay Marina (Marina) in Key Largo, Florida. The Marina consists of three (3) piers. The approximate north and middle pier can be characterized as inner piers and consist of perpendicular slips along both sides. The southernmost pier extends northwest, then turns 90 degrees and continues northeast, defining the perimeter of the marina basin. Slips are orientated perpendicular to this pier as well, but only exist on the side within the marina basin. There are no finger piers extending from the three (3) main piers. Individual slips are delineated with timber mooring piles along the outer edge from the pier.

OVERVIEW

It is our understanding the approximate slip width in the Marina is 12'3", and an estimated required lift capacity is 12,000 pounds (lbs). Due to the presence of slips immediately adjacent, all lift components (i.e. piles, motor, cradle, etc.) are should be positioned within the approximate slip width. Although many standard lifts exceed the width limitation, modifications to certain lifts might be feasible, but may result in other constraints, which are discussed further herein.

The following boat lifts were evaluated:

Proposed
- Hi-Tide T2 Topless X2

Alternatives
- Golden Boat Lifts GatorVator (2 and 4 motor)
- Hurricane Boat Lifts Category 2
- Sunstream Sunlift
- HydroHoist Boat Lifts HarborHoist

The following models were considered, but discarded early in the review process for the below noted reasons:

- HydroHoist Ultralift 2
  - Manufacturer advised against installation in tidal waters.
- JetDock Air Dock
  - Slip width limitations would limit lift capacity below desired threshold.
- Neptune Boat Lifts Beamless
  - Similar to other four post, cradle lifts, but standard design significantly wider.
- Sunstream FloatLift
  - Required width for 10,000 lb and 13,000 lb, exceeds available slip width

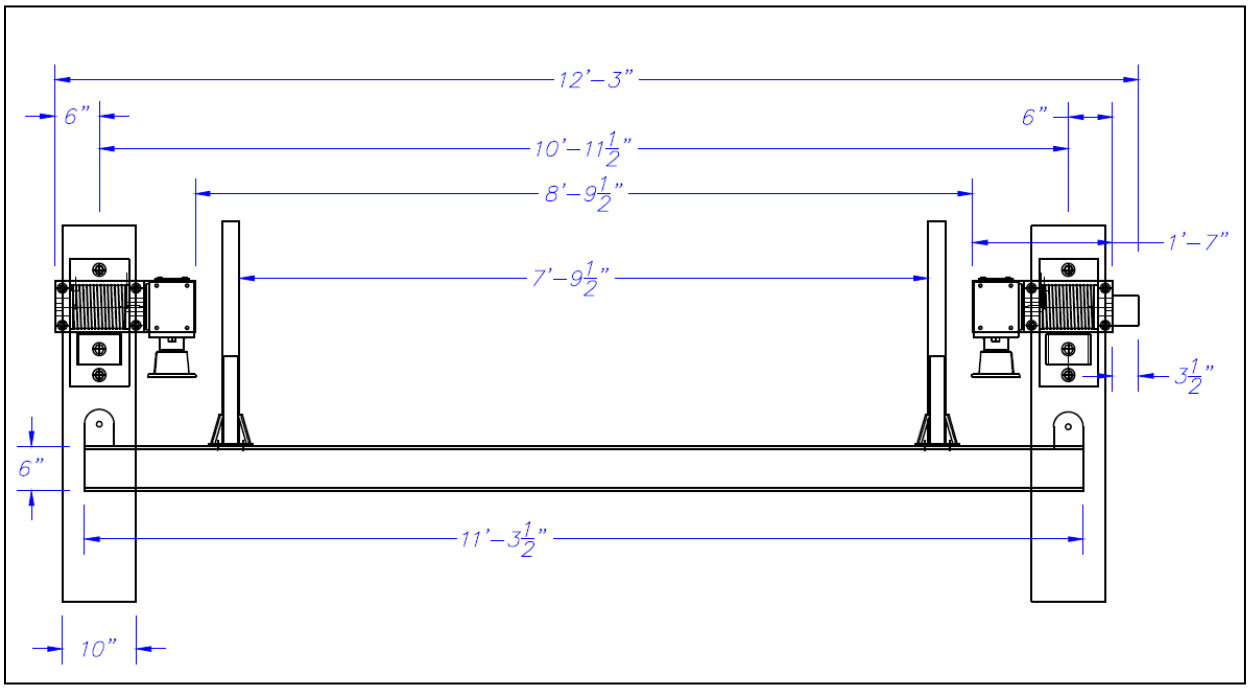
BOATLIFT EVALUATION

Hi-Tide T2 Topless X2

The T2 Topless X2, is a four-motor, four-post, beamless, cradle boat lift model from Hi-Tide Boat Lifts. The original configuration stipulates a 12" diameter piles with a center-to-center distance between piles of 12'2", and a maximum beam size of 9'6". To fit within the aforementioned slip width of 12'3", the piles could be positioned closer together. In addition to the support piles, the lift motor extends beyond the pile approximately 3.5" and should be considered in the overall dimension. Standard specifications include all motors facing the same direction and orientation, however, the outer pair of motors could be orientated towards the vessel to maximize pile locations. As a result, the center-to-center distance of the lift piles would be reduced to approximately 10'11.5". Approximately, 1'7" from the side of the slip would be lost to account for the pile and motor, resulting in an available width of 8'9.5". Including manufacturer the recommended 6" of separation from the lift motors through the use of guide posts on each side, the resulting maximum vessel beam would be 7'9.5". Please refer to Figure 1 below provided by manufacturer.

It should be noted, a wider available beam could be achieved utilizing the Gear Drive Lift model, which is not beamless and includes top rails running from bow to stern pilings at the top. For a 12'3" slip width the potential vessel beam could increase to approximately 10'.

Figure 1: Section of modified T2 Topless X2 provided by Hi-Tide Boat Lifts.

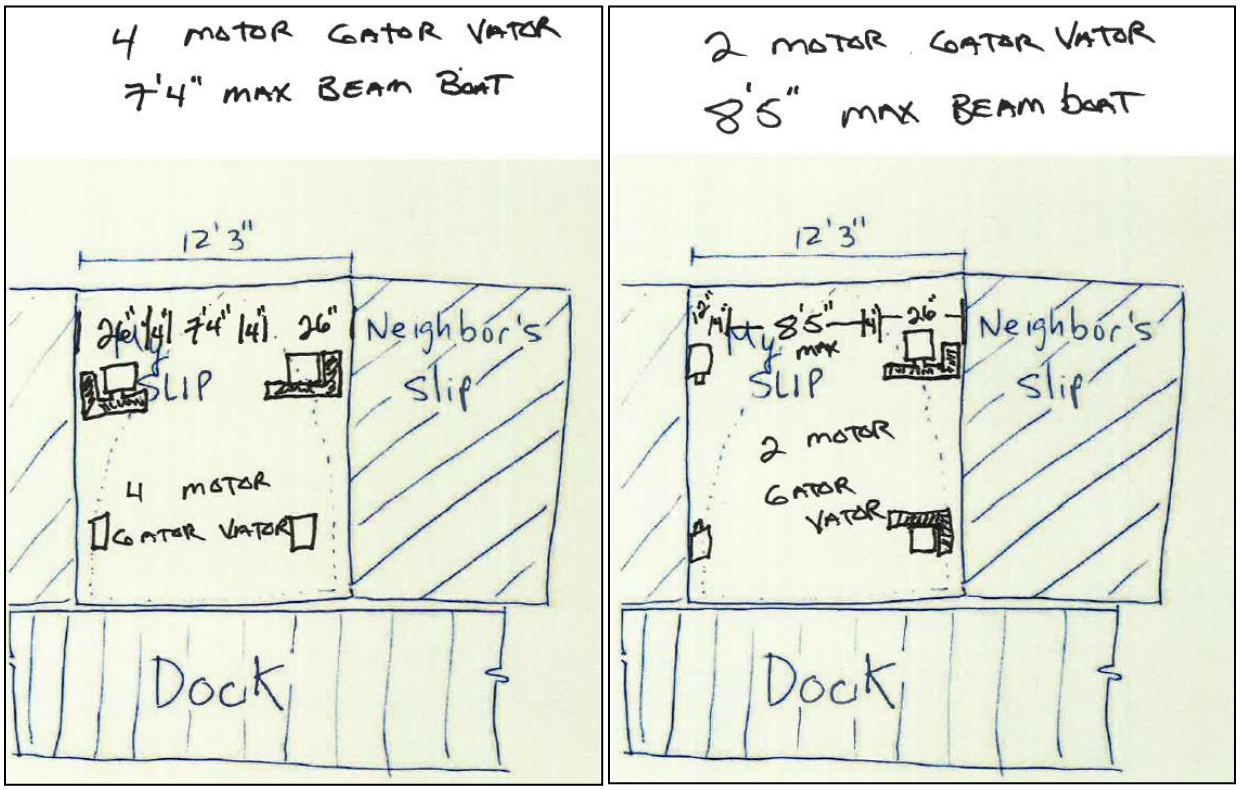


Golden Boat Lifts GatorVator

The GatorVator is a four-post, beamless, cradle boat lift, with the option of two (2) or four (4) motors, from Golden Boat Lifts. Both motor configurations include a capacity of 14,000 lbs. The two (2) motor configuration requires less space for the reduced number of motors, and so the maximum vessel beam for a 12'3" wide slip would be approximately 9'1"; accounting for a manufacturer recommended 4" offset from guideposts on each side results in a vessel beam of 8'5". The maximum vessel beam for the four (4) motor configuration would be approximately 7'11", which would reduce to 7'3" with the aforementioned guidepost offsets. Please refer to Figure 2 below provided by manufacturer. According to the manufacturer, the advantages of the four (4) motor lift as compared to the two (2) motor, is the speed and a reduction in mechanical parts, as the cabling extends along the cradle over to the opposite pair of piling.

It should again be noted, a wider vessel beam could be achieved utilizing a lift with lift beams positioned at top of piles. The manufacturer stated the potential vessel beam could increase to approximately 10'2" with a beam cradle lift as compared to a beamless.

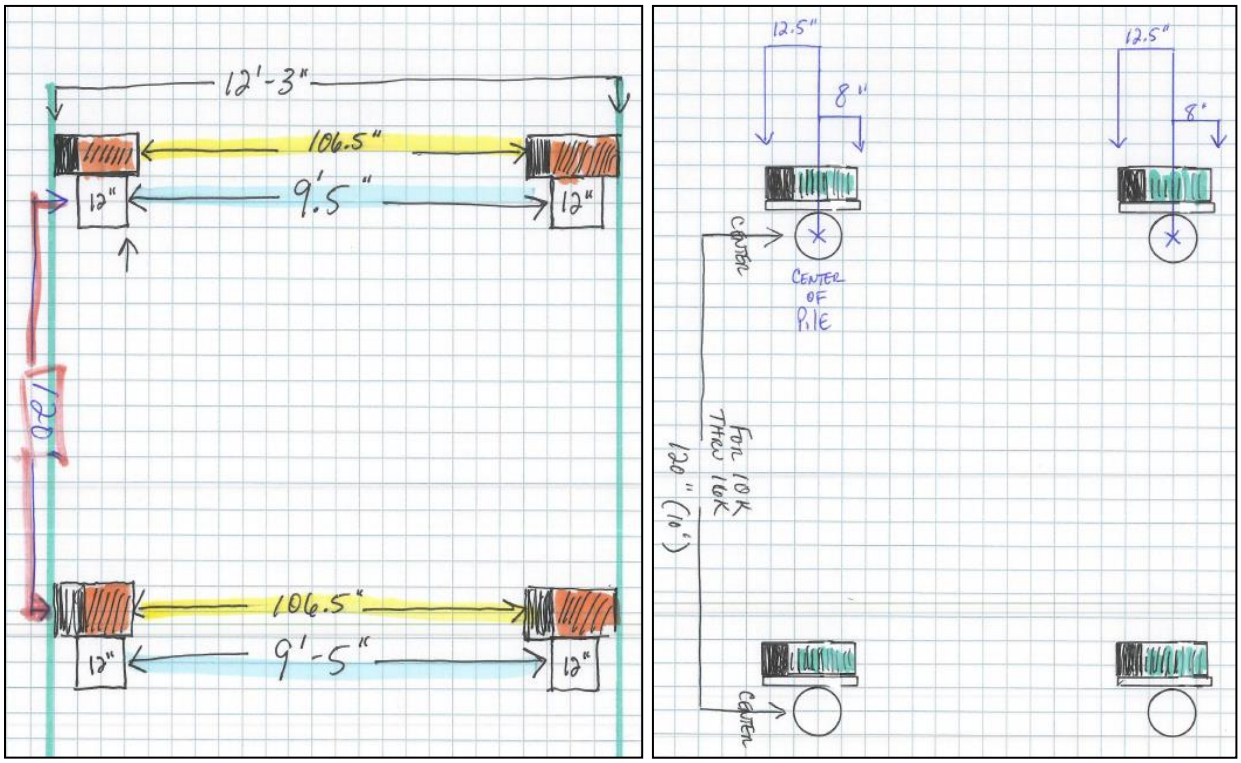
Figure 2: Sketch of 2-motor and 4-motor boat lift layouts provided by Golden Boat Lifts.



Hurricane Boat Lifts Category 2

The Category 2, is a four-motor, four-post, beamless, cradle boat lift model from Hurricane Boat Lifts, with 10,000 lbs, 13,000 lbs and 16,000 lbs capacities available. The four (4) motors of the Category 2 boat lift would be mounted facing the marina pier. The manufacturer recommended mounting motors high enough on the piles to limit interference with the boat in an elevated position. For a slip width of 12'3", the center-to-center distance between the piles was estimated at 10'5", considering 12" piles and motor extension beyond pile footprint. Therefore, the resulting available width between piles would be approximately 9'5". Please refer to Figure 3 below provided by manufacturer. However, the manufacturer recommended a maximum vessel beam of 8'5" to accommodate guide posts and allow efficient navigation into slip. Utilizing 10" piles would result in a 2" increase of available width.

Figure 3: Sketch of boat lift layout with square and round piles provided by Hurricane Boat Lifts.

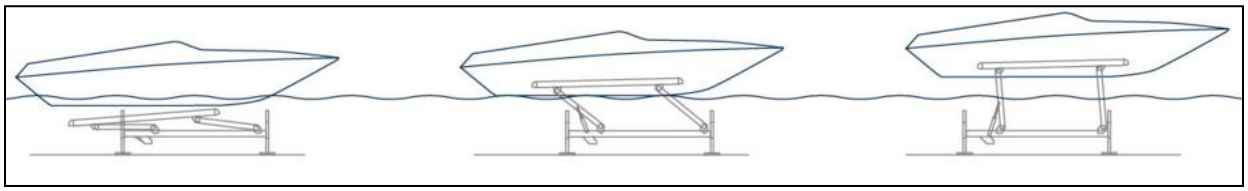


Sunstream Sunlift

The Sunlift is a hydraulic boat lift system by Sunstream. The Sunlift is positioned on the seabed, and therefore does not require piles or beams (i.e. beamless). Depending on the composition of the seabed (i.e. rock, sand, silt, etc.), the lift may require larger footings. The lift is stated to require a minimum water depth of 44", and can be positioned in water depths up to 20'. The 12,000 lbs model includes a support frame width of 11', and will lift the boat up to 60". It is our understanding the lift range should also consider the tidal variations in the water level. Due to the bottom support configuration the maximum vessel beam is equal to the slip width of 12'3". Guiding posts are stated to be optional, but would reduce the maximum vessel beam.

It should be noted regulatory approval from applicable environmental agencies to install the Sunlift on the seabed would likely be extremely difficult if not impossible.

Figure 3: Illustration of the Sunlift operation obtained from Sunstream.



HydroHoist Boat Lifts HarborHoist

The HarborHoist is a buoyancy cell boat lift available in 12,000 lbs and 16,000 lbs capacities. The width of the HarborHoist is customizable, with a minimum overall width of 9'. The available vessel beam is stated to be 2' less than the overall width of the lift. Therefore, for a slip width of 12'3", the theoretical maximum vessel beam is 10'3". However, the lift is required to be anchored in place either through the use of side piling or a cable system. The cable system would likely be difficult to employ within the confines of the available slip footprint. The minimum recommended pile size is 8", thus reducing the maximum vessel beam to 9'7". The manufacturer stated the potential for anchoring the lift with piles located at the front of the lift, but would require additional evaluation.

It should be noted, the HarborHoist is a buoyancy lift system and thus would still be exposed to wave energy and the potential for movement while accessing the vessel. However, the large, flat footprint, relative to the typical v-shaped hull of a vessel, and the anchorage to adjacent piles would help to dampen movement.

In order to position a vessel above potential wave energy and avoid significant movement, all boat lifts would likely require raising the forward deck, transom and/or gunnels of the vessel

above the elevation of the Marina pier. Therefore, a gangway might be required to safely access the vessel. The vessel could be positioned at a low enough elevation to provide level access with the Marina pier; however, this might introduce vessel movement due to wave energy, specifically at higher tide levels. In most cases, offsetting the buoyancy with partial support from the lift system will help to dampen vessel movement.

SUMMARY

Nine (9) boat lift models were evaluated with regards to installation within a 12'3" slip at the Moon Bay Marina. Four (4) were discarded early in the process due to site constraints. Of the remaining five (5) lifts, four (4) were deemed feasible, as the bottom mounted Sunstream model by Sunlift would likely be difficult to obtain regulatory approval. Each of the four (4) remaining lifts offered variations in pile and motor layouts, as well as maximum vessel beam. The greatest recommended vessel beam provided with a cradle-type lift was 8'5", provided by both the GatorVator 2-motor setup from Golden Boat Lifts and the Category 2 from Hurricane Boat lifts. The greatest overall vessel beam was 9'7", provided by the HarborHoist from HydroHoist Boat Lifts. In general, beamless, cradle-type lift models appeared to result in a reduction of maximum vessel beam as compared to lifts with beams spanning piles. It should also be noted the maximum vessel beam considers alignment of vessel with slip upon entry and does not account for potential navigational limitations. For example a vessel protruding from a slip across the navigational fairway may limit the turning radius and alignment of vessel upon entry.

Although not part of this evaluation, additional means of access to a vessel from the Marina pier exist, including but not limited to, vertical platform lifts, davit crane lifts, amongst others. These alternative access options may require modification to existing Marina pier elements or separate support systems. In addition, during adverse conditions (e.g. increased wave energy), movement of the vessel may result in more difficult access.

Should there be any questions or comments relative to the above provided information, please do not hesitate to contact us.

Sincerely,
CUMMINS CEDERBERG, INC.

Jason Cummins, M.Sc., P.E.
Principal

Florida Professional Engineering No. 71538
Florida Certificate of Authorization No. 29062