

Architectural Significance in Metal Buildings: An Educational Series

HAULOVER MARINE CENTER

North Miami Beach, FL



Created in coordination with Architectural Alliance Architecture, Inc.
and Martin Case Construction, Inc.

Photo courtesy of Behlen Building Systems



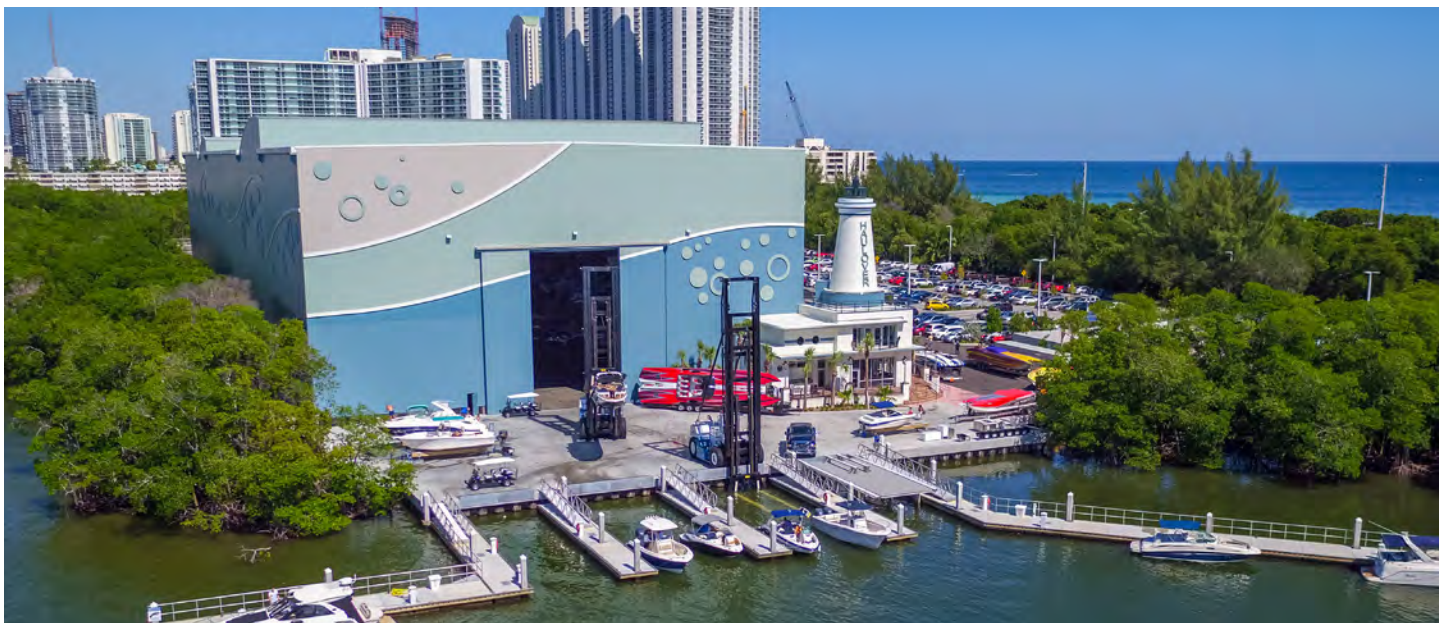


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PROJECT DETAILS

Building: Haulover Marine Center

Location: North Miami Beach, Florida

Client/Owner: Miami-Dade County

Size: 104,940 square feet (636 feet long, 82 feet tall, 165 feet wide)

Site: Located within a 177-acre park

Budget: \$10 million

Completion: 2017

Developer: Westrec Marinas (Westrec Equities, Inc.)

Marina Operator: Haulover SMI Westrec, LLC

General Contractor: Martin Case Construction, Inc.

Metal Building Structural Engineering and Erecting: Trident Building Systems, LLC

Metal Building Manufacturer: Trident Building Systems, LLC

Architecture and Landscape Architecture: Architectural Alliance Architecture, Inc.

Other Major Equipment and Materials Manufacturers: Sto Products (primer and adhesive), Wiggins Lift Company, Inc., Sherwin Williams (paint), Struktoroc (metal wall panels) (1)

Structural Engineering: Peter Wallis & Associates

Civil Engineering: Coastal Systems International, Inc.

Mechanical, Electrical and Plumbing Engineering: KAMM Consulting, Inc.

Fire Protection Systems Engineering: Southern Fire Control



PROJECT DESCRIPTION

Located on the intercoastal waterway near Bakers-Haulover Inlet in North Miami, FL, Haulover Marine Center includes the largest dry-stack boat storage building in South Florida. (2) This monumental, 104,940-square-foot, seaside structure was engineered and built using metal building components as part of the \$25 million Haulover Park renovation completed by Westrec Marinas and Miami-Dade County.





The boat storage building's key features include five tiers of fully enclosed dry storage for boats and watercraft up to 60 feet long, innovative lift technology, a custom-designed and fabricated roof drainage system, an attractive architectural design and the ability to withstand a Category 5 hurricane.

Haulover Marine Center also includes a new concrete, steel and stucco structure that abuts the boat storage building. The emblematic, 72-foot-tall lighthouse that accentuates the main entry of this retail center contains a mechanical room with equipment that serves a bait-and-tackle shop, restrooms, offices and related spaces.

History and Community Engagement

While there are multiple accounts of how the historic Bakers-Haulover property earned its name, the common thread of each story is that, in the early 1800s, a man with the last name of "Baker" was able to haul his boat over a narrow strip of land on this site to reach the ocean. Although the property first began to appear on maps in 1823, work to carve out the inlet that now connects the northern end of Biscayne Bay with the Atlantic Ocean didn't occur until 1925. In 1940, The Miami-Dade County Commission purchased the property for \$2 million (approximately \$32.8 million in current dollars). (3) (4) (5)

William Lyman Phillips, a landscape architect working for the National Park Service and the Dade County Parks Department, created the park master plan, which called for clearing the land, adding fill and constructing underpasses to provide pedestrian access across the nearby highway. (6) Construction began on beach facilities in 1941, was suspended during World War II, and resumed in 1945. Haulover Park opened to the public in 1948. (7) Since that time, it has grown to become one of the most popular boating access points in Miami-Dade County. (8)

In 2010, the Miami-Dade Board of County Commissioners amended its facility operation agreement with Westrec Equities, Inc., and the updated contract required Westrec to construct new marina buildings and make other improvements in exchange for securing a lease to operate, manage and maintain the dry boat storage operation at Haulover Marine Center through 2040.



Photo courtesy of Behlen Building Systems

After holding preliminary working meetings to complete the layout of the proposed facilities and park amenities, staff from the Miami-Dade Parks, Recreation and Open Spaces Department (PROS) held seven public meetings with local community groups between September 2011 and August 2012 to review concepts and gather additional input. This due diligence, followed by the completion of the county's formal review processes, led the Miami-Dade County Board of Commissioners to approve plans for the Haulover Park renovation on December 4, 2012. (9) (10)

Planning & Design Priorities

Miami-Dade County's and Westrec's overarching, collaborative goals were to enhance and modernize Haulover Marine Center's existing facilities while nearly doubling the dry storage capacity for boats.

As part of lease negotiations with the county, Westrec agreed to construct a five-tier, fully enclosed dry-stack storage facility for 508 boats of varying sizes that employed innovative technology, was architecturally attractive and could withstand a Category 5 hurricane. The broader scope for park improvements included constructing a new commercial building with a bait-and-tackle shop, offices, and restrooms, renovating the existing boat basin to provide a launch area and completing other site remedial work and improvements. They included demolishing and removing existing dry-stack boat storage racks, removing the underground fuel storage tanks and associated piping/dispensers, and providing a 653-space, illuminated surface parking lot.

Architect's Statement

The architectural design for the boat storage building conveys a key aspect of the original master plan for Haulover Park, which strove to unify elements of the landscape—the forms, colors and scale of plant life and the water—into an integrated whole.

To achieve this beauty and unity, Pete Ebersole, architect and partner at Architectural Alliance, emphasized the importance of “not being discouraged...when making good design is shown to be more difficult and costly.”

Carefully reviewing logistical challenges, understanding the benefits metal building technology can offer and working with the owner and fellow team members to creatively resolve challenges all played important roles in achieving the artistic vision for the boat storage building.

“This building is massive and the function of pulling and inserting boats into storage bays is very challenging—especially the higher bays,” Ebersole explained. He emphasized that the only way to fully understand the scale of the boat storage building was to make a site visit. He said other key considerations influencing the architectural design included the forklift machines' functional requirements, the need for a wide, clear-span center aisle and a dry-rack storage system strong enough to support large boats.

Once he'd worked through these practical considerations, Ebersole shifted his attention to the “pushing and pulling of the building's envelope to break the scale of the overall box.” The architectural design for the facade includes a whimsical wave and bubble motif.



Photo courtesy of Behlen Building Systems

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— Pete Ebersole, Architect and Partner,
Architectural Alliance Architecture, Inc.

PROJECT GOALS & OBJECTIVES

Haulover Marine Center's high-profile location places it adjacent to one of South Florida's busiest marine ramps so that boaters can have easy access to rental, repair, maintenance, fuel, sanitary pump-out and dry storage facilities, commercial retail services, 1.4 miles of beach front and a range of recreational amenities within a 177-acre public park.

However, this seaside site also places the boat storage building and the adjacent commercial structure at risk for damage from extreme weather events, such as hurricanes and tropical storms. In fact, a 1,100-foot fishing pier that extended from this site into the Atlantic Ocean was completely destroyed by Hurricane Andrew in 1992.

Significant design objectives include:

1. Increase Dry Storage Capacity and Employ Innovative Technology

The boat storage building was designed specifically to hold 508 large, multi-outboard-engine boats, which have become more popular in recent years and are too big and cumbersome to easily transport via trailer.

Its five-rack-high storage and retrieval system serves watercraft up to 60 feet long and employs two of the world's largest marine forklifts, capable of lifting vessels weighing up to 10,000 pounds to the top rack, 75 feet above ground.

"The sheer size of the boat storage building—particularly its height and the amount of open space inside—made this project especially interesting. I don't think you could build a structure like this using a conventional construction process because of its scale and volume and how the boats are racked," said general contractor Bill Martin, president of Martin Case Construction, Inc.

Trident Building Systems, LLC Project Executive Gary Bergstrom agreed. He said using a traditional delivery method would have been far more time-consuming and much more expensive. "Since we do air traffic control towers that are nearly twice as tall—up to 150

feet high—and we are the only hybrid structural steel and metal building manufacturer in the region, this project was right in our wheelhouse. We were able to blend conventional structural steel with custom-engineered metal building components to efficiently achieve a cost-effective design. For example, our engineers integrated the boat storage racks into the primary framing for this building. You can only do this with a metal building system."

2. Create an Architectural Design that Compliments the Massive Building Scale

The storied history of the site and its prime location, combined with the gigantic size of the boat storage building, required unique architectural considerations in order to meet the needs of the owner, developer and project team.

According to Bergstrom, feedback from the community influenced the architect's and owner's decision to use natural forms and pastel hues that were found in the building's oceanfront setting. "They didn't want fluorescent or dark colors, for example," he said. "We manufactured the exterior metal wall panels with three custom colors to achieve the desired branded look. These concealed-fastener panels provided a smooth surface for the contractor to add the finishing touches. Our ability to give the structure a curved roof that simulates the movement of passing waves was also a plus."

Martin described how his crew used a multistep process for creating the wave and bubble motif. "To create the waves, we made curved bands to serve as guides, painted the exterior panels as needed to complete the wave pattern and mounted the bubbles in relation to the bands. The bands and bubble shapes were made out of an exterior insulation finish system (EFIS) typically used to clad a building. We used a latex paint on the EIFS forms and an acrylic coating on the metal panels. The colors haven't faded. They have really held up, even though the building is 50 feet from the ocean and exposed to the sun and salt air."



Photo courtesy of Behlen Building Systems

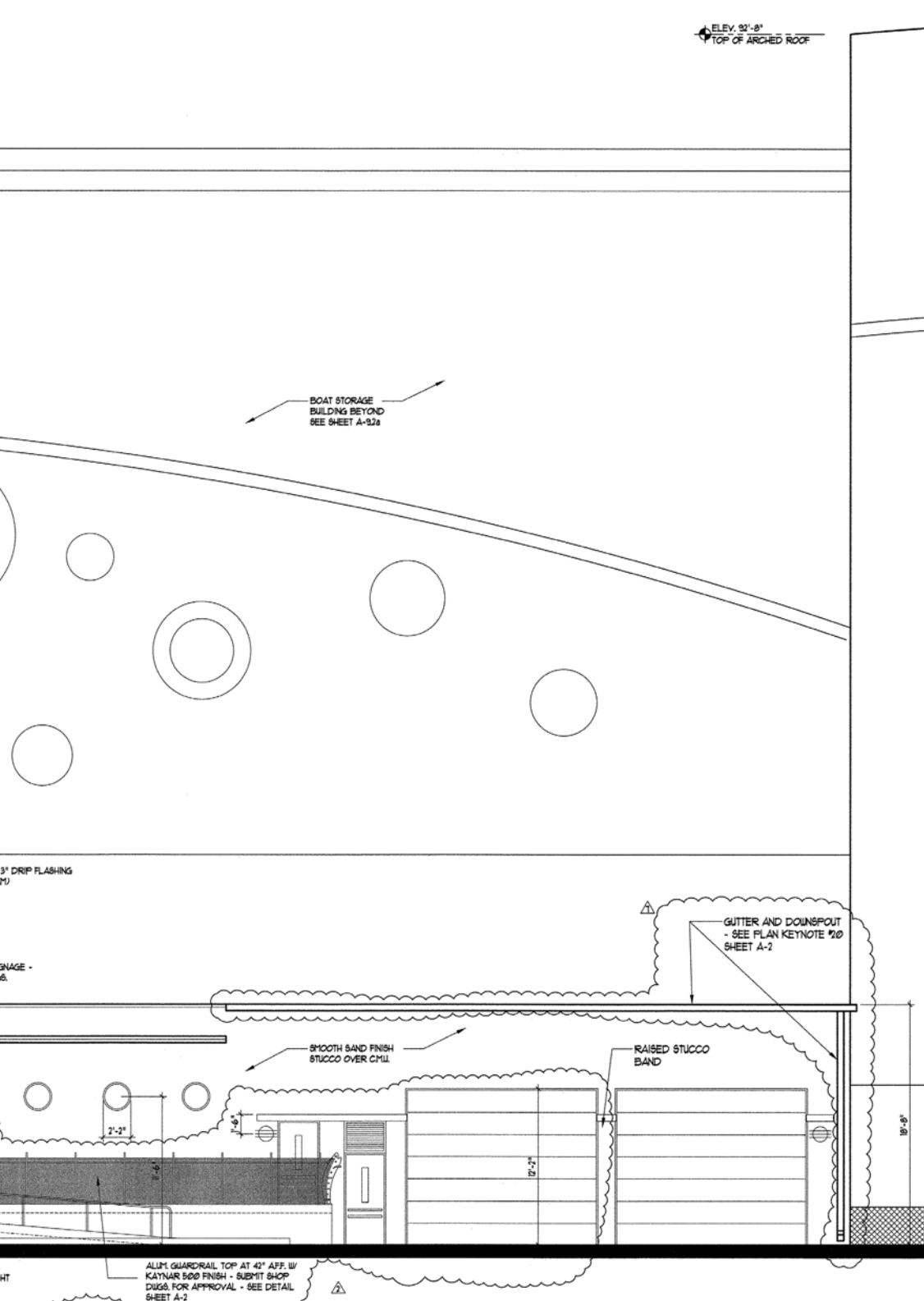
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— Bill Martin, President,
Martin Case Construction, Inc.

3. Engineer the Building to Withstand a Category 5 Hurricane

The attention the team paid to ensuring the marina’s buildings could withstand extreme weather conditions was personal as well as professional. “I grew up in Miami,” Martin said. “I lived through Hurricane Andrew, and you can’t believe the devastation and destruction I saw afterward. Since then, some unbelievable codes have been created to make sure we construct buildings that can withstand storms like that.”

To meet the prevailing code requirements for the state of Florida and Miami-Dade County, the boat storage building’s structural system was designed to withstand winds up to 175 mph for Risk Category II. (11) The project team took numerous steps to achieve this metric.



MIAMI-DADE COUNTY
 BUILDING DEPARTMENT
 BUILDING SECTION
 APPROVED: *[Signature]*
 DATE: *[Signature]*

FINAL CONSTRUCTION PLAN
 JULY 10, 2013



ARCHITECTURE LANDSCAPE ARCHITECTURE LAND PLANNING INTERIOR DESIGN GOVERNMENTAL PROCESSING AA20001446 LCC000237 ARCHITECTURAL ALLIANCE 23 SW 14TH AVE. SUITE 100 MIAMI, FL 33135 TEL: (305) 764-8888 FAX: (305) 764-0731 E-MAIL: info@archalliance.com
PETE MEADOR EBERSOLE AR0011638 <i>[Signature]</i> 4-27-13 seal
CORO REVISIONS PLAN REVIEW 1-23-14 PLAN REVIEW 1-26-14 PLAN REVIEW 03-03-15 PLAN REVIEW 04-15-15 revision dates
DRY STACK BUILDING OFFICE ~ RETAIL ~ BAIT CENTER Westrec Haulover Marine Center Haulover Park, Miami-Dade County Florida project name
sheet description EAST ELEVATION
release date 07-10-13
project number 1154
drawing number A-4



Since the sturdiness, stability and strength of a metal building is directly related to the design and construction of its foundation, the project team started by focusing on this detail. While foundations are typically thought of in terms of how they support buildings, they can also serve as a large counterweight that helps to keep a building connected to the ground during high-wind conditions.

“We made the piles and grade beams to support and anchor the boat storage building’s structure,” Martin said. “Trident sent us templates indicating where they wanted anchor bolts embedded in the concrete. The steel columns were attached to these bolts via column caps. There were two auger-cast concrete piles per column with a grade beam between them. We installed roughly 650 piles that are 43 feet deep.”

Bolting each column to the concrete foundation also helped to stabilize the steel framing as construction progressed and expedited the erecting process. “We finished the grade beams, piles and column caps, then Trident started erecting the structure at the south end,” Martin continued. “As they were doing this, our concrete crew shifted to finishing its work for the commercial retail building.”

According to Bergstrom, the boat storage building’s roof and walls were engineered to withstand exceptional amounts of pressure in each of its zones. “The lower two to three feet of the building has a chain-link perimeter,” he added. “If there is a flash flood, the immediate water would pass through the building.”

The project team also carefully selected resilient exterior cladding materials. The 20-gauge steel, single-skin panels used to clad the boat storage

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— Gary Bergstrom, Project Executive,
Trident Building Systems, LLC

building’s exterior provide proven resistance to damaging winds and, thus, achieved the product approval for building envelope components required by the state of Florida as part of the construction permitting process. (1) (12)

Due to the enormous size of the roof surface and the fact that heavy rainfall typically accompanies hurricanes and tropical storms, the metal building engineers also designed a custom gutter and downspout system to move rainwater quickly and efficiently.

“When you have a building that is over 630 feet long and 165 feet wide, the roof is massive,” Bergstrom said. “So, we developed and installed gutters that are so large you can literally lie down inside of them. The gutters are suspended on outriggers hung from each column. Then, on the inside of the building, we installed downspouts made from 12-inch PVC pipe about every 20 feet. When you look up, you see the gutter and then just beneath this, you see the elbows that turn in at a 90-degree angle to connect the gutter to the downspouts that, in turn, send rainwater into a subsurface collection and discharge system. By using these 12-inch pipes, we saved the owner hundreds of thousands of dollars. Those gutters can hold in excess of 5,000 pounds of water at any given time.” Routing the downspouts through the building’s interior also kept exterior facades unobstructed, so there were no unnecessary distractions from the beauty of the architect’s design.



Photos courtesy of Behlen Building Systems

RELEVANCE FOR STUDENTS

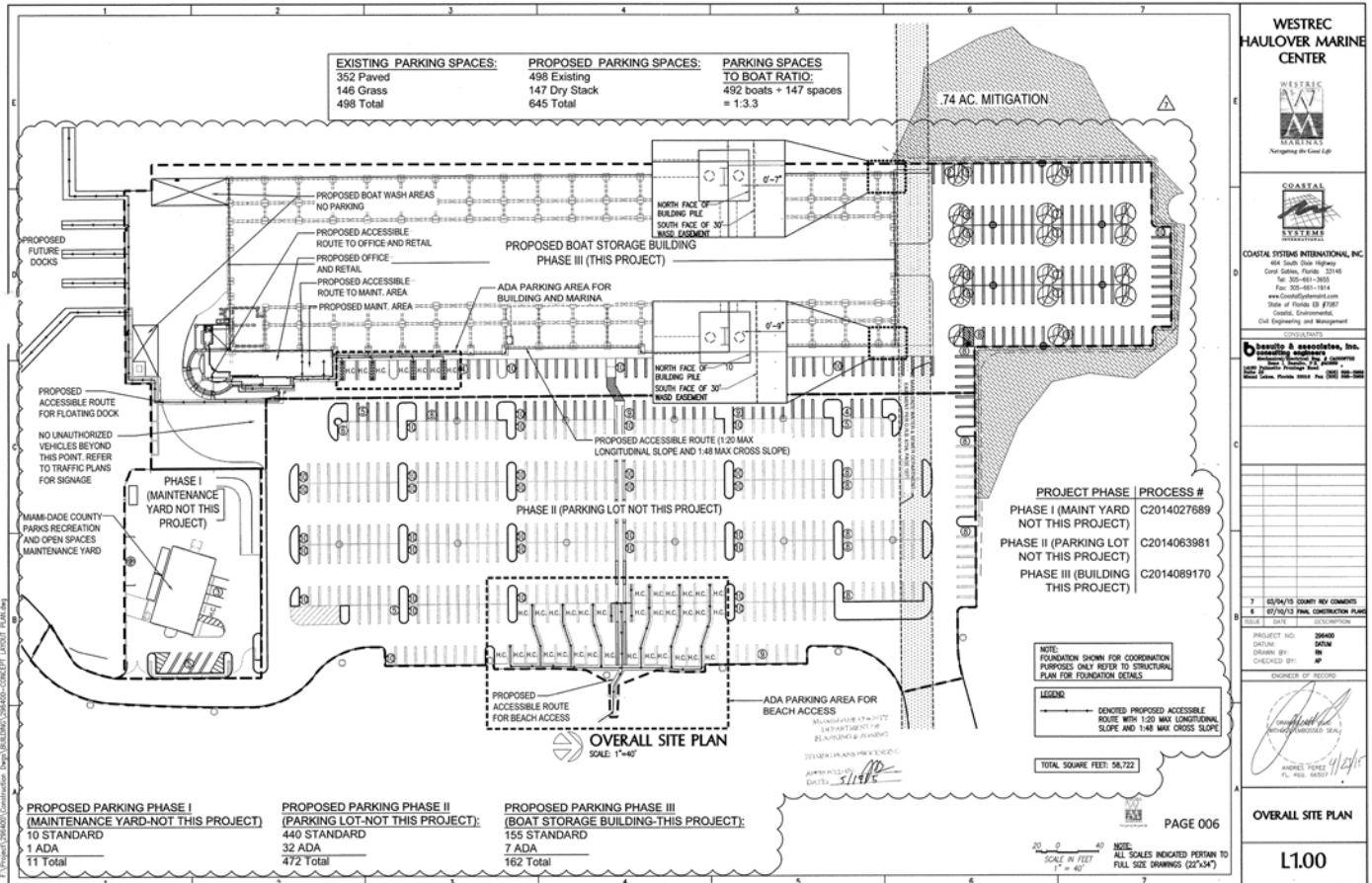


Image courtesy of Martin Case Construction, Inc.

Martin and Bergstrom both stressed how important it is to thoroughly review preliminary drawings provided by an owner before submitting a bid.

Martin found the knowledge he and his team acquired while building a similar marine complex particularly valuable. "I learned a lot when we built Marina One in Dearfield Beach," he said. (13) "That was during the recession in 2008, so I was on site every day working with my guys and learning every aspect of constructing this type of building." This experience helped him realize that the fire-suppression system design shown in the owner's original documents for Haulover's boat storage building was incomplete.

"There have to be fire sprinklers at every level for a boat storage building to meet code requirements," he explained. "For example, if you pull a boat out from the second level and the boat below it catches fire, the flames will travel upward if you don't have sprinkler heads above

each level. Then, because there are fuel and other highly flammable materials inside buildings like this, the fire will quickly engulf the entire structure. The drawings we initially received only had fire sprinklers at the roof level. So, we had to redesign to provide fire-suppression systems that can isolate and extinguish a fire in a specific location or be operated simultaneously. There are seven sets of valves that can be turned on individually or all at one time—and there is an electric fire pump on a 480-amp service that is very powerful."

Practical Application

- Which of the following is NOT normally considered part of a metal building package?
 - Concrete foundation work.
 - Structural steel fabrication and erection.
 - Roof and wall enclosure systems.
 - Doors and windows.

2. The benefits of a collaborative approach in the design and construction of metal buildings include all of the following EXCEPT:
 - a. A fully integrated design and construction team is at the table from the conceptual planning phase.
 - b. A typical, linear design and construction process must be followed.
 - c. The collaboration is made up of all parties to provide input, expertise and informed decision-making.
 - d. The design and construction process can be concurrent and multilevel.
3. Which of the benefits you've identified above played an important role in the successful design and construction of Haulover Marine Center's boat storage building? How?
4. With good reason, a top design priority for Haulover Marine Center's boat storage building was to ensure that it could withstand a Category 5 Hurricane. Based on 126 years of hurricane and storm data, experts rank Miami as No. 1 among the top five cities that are most vulnerable to being hit by a hurricane. Since Miami has a 16% chance of experiencing the effects of a hurricane in any given year, its building officials have developed a testing and approval process for specific building components, including those made by metal building manufacturers. (12) (14)

Professional organizations, such as the Metal Building Manufacturers Association (MBMA), have also conducted research and developed resources for construction industry professionals who are designing and constructing buildings in hurricane areas. Review these articles and resources, then respond to the questions that follow them.

Historical perspective regarding the evolution of building codes in Florida after Hurricane Andrew struck in 1992:

- [30 Years Later: Hurricane Andrew Redesigned Modern Building Codes - USGlass Magazine & USGNN Headline News](#)

Information about "Notice of Approval" requirements for building products:

- [Florida Product Approval and Miami-Dade NOA](#)
- [Miami-Dade County - Building - Metal Buildings](#)
- [Metal Building Systems: Wind Design and Performance](#)
- [Metal Construction News: Wind Requirements \(especially the "Florida is Different" section\)](#)

5. In addition to the metal panels described in this educational folio, which other metal building components need to achieve a "Notice of Acceptance" (NOA)? What is the rationale behind this highly localized process? In addition to choosing products that successfully met Miami-Dade's NOA standards, what steps did the project team take to help ensure Haulover Marine Center's boat storage building could withstand a Category 5 hurricane? Do their creative solutions spark additional ideas that you might propose?
6. Although the sea breeze tends to keep the exterior temperature below 100 degrees Fahrenheit, the heat, high humidity levels, and long hours of exposure to the sun and salt air are important factors to consider when designing buildings in this geographic area.

Review these resources:

- [Contractor Guide](#)
- [Common Industry Practices for Metal Building Systems](#)
- [Condensation Fact Sheet](#)
- [11 Ways Metal Buildings are Protected & Stand Against Extreme Weather](#)

What are the top recommendations you would make to ensure that this metal building is durable and resilient enough to brave the elements? How would you balance the need to address the existing climatic conditions with achieving innovative design solutions for marina structures like Haulover Marine Center's boat storage building?

RESOURCES/RELATED READING

Related Reading

- [11 Ways Metal Buildings are Protected & Stand Against Extreme Weather](#)
- [30 Years Later: Hurricane Andrew Redesigned Modern Building Codes - USGlass Magazine & USGNN Headline News](#)
- [Common Industry Practices for Metal Building Systems](#)
- [Condensation Fact Sheet](#)
- [Contractor Guide](#)
- [Florida Product Approval and Miami-Dade NOA](#)
- [Metal Building Systems: Wind Design and Performance](#)
- [Metal Construction News: Wind Requirements](#)
- [Miami-Dade County - Building - Metal Buildings](#)

Video Resources

Over 50 videos highlighting metal building architecture, engineering, design and application can be accessed at www.youtube.com/mbmamedia. We recommend you begin your educational process with the following programs:

- [How It's Made: Metal Building Innovations Are Revolutionizing Low-Rise Commercial Construction](#)
- [How It's Built: Metal Building Construction Raises the Bar for Low-Rise Commercial Structures](#)
- [An Introduction to Metal Building Systems](#)
- [Metal Building Systems 101](#)

Additional Videos

An interesting array of videos that showcase Haulover Marine Center can be found here:

- [Aerial of Haulover Marine Center](#)
- [Haulover Marine Center and Miami Beach, Florida](#)
- [Time Lapse Video of Haulover Marine Center Construction](#)
- [Welcome to Haulover Marine Center in North Miami Beach, Florida](#)

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For more information about the educational programs available through the Metal Building Manufacturers Association, visit www.mbma.com and www.mbmaeducation.org or speak directly with MBMA General Manager Tony Bouquot at mbma@mbma.com.

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