



Delray Beach Golf Clubhouse, Delray Beach, FL Emergency Operation Center Feasibility Report



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Introduction

On March 31, 2017 Wantman Group, Inc. performed a condition assessment of the Delray Golf Club at 2200 Highland Ave, Delray Beach for the purpose of evaluating the Clubhouse building for possible use as an Emergency Operations Center (EOC) for the City of Delray Beach. Record information pertaining to the original construction of the Clubhouse was limited based on research of the permit archive microfiche records at Delray Building Department.

General Building Structure Observations

In general, the Clubhouse is well maintained and exhibits no major signs of structural deterioration. The building was originally designed and constructed between 1994 and 1995. Historic aerials from 1995 indicate the building was under construction at that time. An addition to the southeast section of the building was completed in 1996.

The building is comprised of sloped standing seam metal roof deck, in a hip roof type configuration, flat roof sections over the open conference room spaces and kitchen area, and a raised octagonal cupola with windows at the center of the roof structure. From available building construction documents and site observations the roof deck and roof structure is a plywood deck with premanufactured wood trusses, both pitched and flat. The roof structure generally spans from north to south with exterior and intermediate interior bearing walls. From the limited document information available and site observations, both the exterior and intermediate bearing walls are masonry. Documents relating to the 1996 designed addition indicate that the masonry walls are constructed out of eight inch reinforced masonry blocks. The reinforcing was indicated to be #6 bars spaced between 32 inches and 48 inches on center. Calculations performed to establish the probable strength of the wall system should use the more conservative spacing.



NE Elevation of Clubhouse



NW Elevation of Clubhouse

The field assessment reviewed the general protection of the doors and windows of the structure. The windows were found to be protected by roll-down shutters or have window glazing systems indicating a Metro-Dade County Approval 91-0905.5 (expired June 1995). Because of the age of the window systems, it would be prudent to consider these windows non-impact resistant.



SW Elevation of Clubhouse

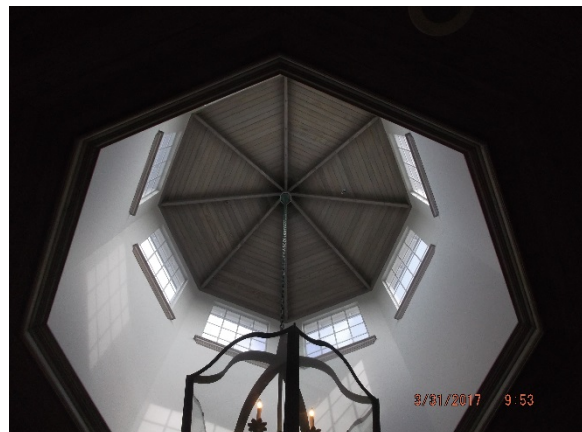


SE Elevation of Clubhouse

No structural plans for the octagonal cupola could be obtained. Based on visual inspection the structure appears to be constructed of timber framing. The cupola is open to below with windows on each side. Due to its height and configuration, the cupola is at risk of being damaged during a hurricane event. Damage to either the cupola's roof or walls will jeopardize the structure's resistance to hurricane force winds. Without having the ability to verify the anchorage and construction of the cupola before the building is used as an EOC this structure should be removed to enhance the roof's integrity. The proceeding evaluation of the building will be completed assuming the removal of the cupola.



Octagonal Cupola



Interior of Cupola

This report follows the Florida Department of Emergency Management Guidelines, in particular the American Red Cross recommendations for Hurricane Evacuation Shelter Selection and Evaluation (ARC 4496) also known as Least Risk Decision Making Process (LRDM). Additional information regarding the Hurricane Evacuation Shelter Selection can be found at <http://floridadisaster.org/Response/engineers/HES.htm>. As a part of the LRDM review, Hillers Electrical Engineering reviewed the existing electrical lines and capacity of the clubhouse.

LRDM Review and Summary

The following is an item by item breakdown of the Delray Beach Golf Clubhouse LRDM Review for its use as a temporary EOC. The LRDM Review consists of fifteen criteria that are rated as being either preferred, marginal, and non-compliant. For a building to be recommended for use as a hurricane shelter it needs to have all criteria rated as either preferred or marginal. Any items found to be non-compliant will need to be modified if the clubhouse is to serve as a temporary EOC. The fifteen criteria for the buildings are storm surge inundation, rainfall flooding / dam consideration, hazmat and nuclear power plant considerations, lay-down hazard exposure, wind and debris exposure, wind design verification, construction type / load path exposure, building condition, exterior wall construction, fenestrations / window protections, roof construction / roof slope, roof open span, roof drainage / ponding, interior safe space, and life safety / emergency power.

Storm Surge Inundation (LRDM Item #1)

This criteria is not applicable as the building is not located within a storm surge zone.

Rainfall Flooding / Dam Consideration (LRDM Item #2)

The building is located in flood zone X500 which describes an area between the 100-year and 500-year flood elevation. Buildings in this flood zone elevation are considered to be marginal.

Hazmat and Nuclear Power Plant Considerations (LRDM Item #3)

This criteria is not applicable as the building is not located within a hazmat or nuclear power plant zone.

Lay-Down Hazard (LRDM Item #4)

This is a criteria considered by the LRDM which can deem a structure as non-compliant. Several trees that are large enough to inflict a significant breach of the envelope were observed within the lay-down range of the building. Having large trees within range of falling on the building is considered to be in the non-compliant category.

Wind and Debris Exposure (LRDM Item #5)

In our opinion, the site is considered as having an unsheltered exposure. As per the LRDM, unsheltered exposure is defined as an open area that extends more than a quarter mile in any direction. The clubhouse is located in the center of a golf course which has large open areas that extend upwards of a half mile from the building. An unsheltered exposure is considered to be in the non-compliant category as per the LRDM. The LRDM provides an exception in areas where there is no significant debris exposure, the building may be used as a shelter if the remaining LRDM criteria are classified as preferred or marginal. With this exception, special attention is

required for the wind design, construction type, roof and wall characteristics, and aperture protections.

Wind Design Verification (LRDM Item #6)

No plans for the building were provided that could be used to determine the methodology used to design the building for hurricane loadings. Based off of the limited plans and historical records that were obtained the building was designed and constructed in the mid-1990s. At that time the building would have been designed in accordance with the Standard Building Code. In regards to the LRDM, this design is ranked as a four out of a possible four. The ranking scale is from zero to four, with zero being the least wind resistant and four being the most wind resistant. A ranking of four is considered to be marginal or acceptable.

Construction Type / Load Path Verification (LRDM Item #7)

The most important aspect of the LRDM evaluation process is the identification of a definable and continuous load path for resistance to wind induced loads. The structure in question must be capable of transferring all wind induced loads to the building's foundation. The clubhouse is a single story building constructed with masonry walls bearing on concrete footings. The roof is primarily constructed as a sloped standing seam metal roof attached to plywood roofing bearing on wood trusses. A section of the roof over the ballrooms is constructed as a flat light-weight roof supported by wood trusses. Positive anchorage was observed between the trusses and masonry walls. Based on inspection, the load path is considered to be preferred.

Building Condition / Wind Damage History (LRDM Item #8)

This section captures the observed overall condition of the building. The condition of a building's envelope can play a significant role in determining its wind vulnerability to a potential hurricane. The building was found to be in good condition with no evidence of previous wind damage. Based on the observed condition of the building it can be classified as preferred.

Exterior Wall Construction (LRDM Item #9)

The building's walls are constructed of reinforced masonry walls with no soft spots observed in the building's exterior wall construction. Reinforcement in the masonry walls is spaced at four feet on center or less which meets the criterion for fully reinforced masonry. An exterior wall constructed with fully reinforced masonry and having less than five percent of the wall composed of soft spots is classified as preferred. The clubhouse's exterior wall construction is considered to be preferred.

Fenestration / Window Protection (LRDM Item #10)

Damaged exterior cladding components can be a soft spot in a building's envelope. Once breached by wind loads or by wind borne debris impact, the opening will allow hurricane force winds and rain access into the building's interior. This can result in over pressurization, interior

damage, and subsequent roof system failures. The required design pressures for the building's fenestrations have been included at the end of this report. Before using the building as an EOC all exterior windows and doors should be protected against the pressures shown and meet current large and small missile impact criteria.

All of the windows on the building were observed to have either permanently installed roll down hurricane shutters or permanently installed tracks for the placement of temporary hurricane panels. The roll down protection is labelled as having Dade County Approval (93-1105.14). Several of the windows which are protected by the temporary hurricane panels were observed to have a Metro Dade County Approval (91-0905.5). Based on the age of these approvals it is believed that neither the existing windows nor the roll down protection were designed to provide the impact resistance that is required by current code requirements. The current hurricane shutters and panels for the windows do meet the criteria needed to be considered marginal. For the building to be used as an EOC, we recommend that all of the windows in the meeting/ballroom be replaced with hurricane rated windows that have current Miami Dade County Notices of Approval.

All but two of the existing glass doors are protected with temporarily installed hurricane panels. The two remaining glass doors are protected by a permanently installed roll down hurricane shutter of the same design as on the windows. There are seven non-glass exterior doors which are not rated for hurricane protection and were observed to have no method for temporarily installed protection. When the temporary hurricane protection is in place only three of these doors are capable of being used as an exit from the main interior of the building. Based on the current hurricane protection system for the building, none of the main means of egress from the building are operable during a hurricane event. We recommend that all of the doors be replaced with hurricane rated doors that have current Miami Dade County Notices of Approval. As a result of the existing doors not being hurricane rated or having temporary hurricane protection the building's fenestrations are considered to be non-compliant.

Roof Construction / Roof Slope (LRDM Item #11)

Generally, flat lightweight roof systems perform poorly in high winds and are very vulnerable to uplift forces present under hurricane conditions. The LRDM recommends avoiding buildings with flat roofs unless they are heavily reinforced concrete with a four inch minimum thickness. The clubhouse's roof is composed of both sloped and flat lightweight roofs supported by wood trusses. Standing seam metal roofs are installed over the sloped roofs while asphalt roofing is found on the flat roofs. Flat roofs that have engineered mechanical anchorages to the structure below can be classified as marginal. Mechanical anchorages consisting of hurricane tie-down straps were observed connecting the trusses to the masonry walls. The sloped roof sections have a moderate slope with eaves longer than one foot. These eaves are an architectural feature that is attached to the building's trusses with the roofing material constructed over the eave. During high wind events the underside of a building's overhangs are subjected to very high uplifting pressures. This high wind pressure located near critical roof anchorages can be very dangerous. Any damage

along an eave overhang will jeopardize the remaining roof system. Based on the moderate sloped roof and eave overhang size of the clubhouse, its roof can be classified as non-compliant.

Several roof mounted air handling units and vents were observed without hurricane resistant restraints. Unanchored roof appendages will lead to the roof being classified as non-compliant.



Unsecured Roof Mount Air Handling Units



Unsecured Roof Mount Air Handling Units

Based on the type of roof construction that was observed the building's roof is considered to be non-compliant.

Roof Open Span (LRDM Item #12)

Historically, long open span roofs have performed poorly in major hurricanes. These roofs undergo large deflections, reverse bending, and excessive vibrations. As per LRDM guidelines, roof spans less than 40 feet are considered to be preferred. Light to medium-weight roofs with a hip roof can span up to 50 feet and meet the criteria of a marginal roof. This roof configuration, with maximum spans between 40 and 50 feet, is considered marginal.

Roof Drainage / Ponding (LRDM Item #13)

Standing water or ponding on a roof can result in a collapse under the weight of torrential rainfall during a hurricane. Ponding can be a hazard only in situations where there is an area that is fully enclosed by a drainage confining parapet. Based on the configuration of the roof, there is only one 600 square foot area of the roof where hazardous ponding can occur. This roof area has two roof drains but no overflow scuppers to prevent ponding. Based on the size of area at risk of ponding and the number of drains present the roof is considered to be marginal to prevent ponding.

Interior Safe Space (LRDM Item #14)

The focus of this criterion is to identify an interior corridor or room that can be isolated from the rest of the building and used as a storm shelter. A “preferred” interior safe space requires that an interior area of the building is enclosed with reinforced masonry or concrete walls with a definable

and continuous load path from the roof or ceiling to the foundation. Please note that the LRDM does not require a building to have an interior safe space if the remainder of the building is found to be “compliant.” The clubhouse has a 36 feet by 15 feet storage room that could be used as an interior safe space, therefore this item is considered to be compliant.

Life Safety / Emergency Power (LRDM Item #15)

The purpose of the criterion is to verify that the building complies with the fire and life safety codes and if there is an emergency power source. The clubhouse has a 1600 Amp, 208 Volt, three phase electrical service powered via a Florida Power & Light (FPL) 300KVA pad mounted transformer located on the north-east corner of the clubhouse. The pad mounted transformer and associated utility meter are both located exterior to the clubhouse, while a 1600 Amp switchboard and various panel boards are within the electrical room. No standby emergency power system is connected to the existing electrical distribution system. However, the clubhouse electrical distribution system does have a generator receptacle connection point for a temporary roll-up emergency generator. Operation of this facility was not intended for public use during power outage, thus only necessitates a generator connection for maintaining food storage under refrigeration during prolonged power outages. FPL records for this service show a maximum kilowatt demand (KWD) of 168 KWD over the past year. Based on this 168 KWD, equivalent to 570 Amps, less than half of the available electrical capacity is being utilized. The building’s life safety and emergency power rating is considered to be marginal.

Miscellaneous Items Noted During Investigation

Several air conditioning units installed on the ground were observed to not be adequately secured for hurricane force winds. It has been our experience that the units themselves are not designed to withstand hurricane wind forces. In addition to the air conditioner units several other unsecured items were located adjacent to or below the club house. These items include a fuel tank, ice machines, patio furniture, dumpsters, and golf carts. If these items are not secured they can become wind borne debris during hurricane events. We recommend that these items be either strapped down or relocated prior to any hurricanes.



Unsecured Fuel Tank and Ice Machine



Unsecured Air Conditioning Units

On the west side of the clubhouse a canvas covered canopy is attached to the walls of the building. This canvas canopy needs to be removed prior to a high wind event.



Canvas Canopy to be Removed



Canvas Canopy to be Removed

LRDM Summary

A summary of the LRDM compliance review is provided on the following pages.

Least-Risk Decision Making: ARC 4496 Guideline Compliance Summary			
CRITERIA	PREFERRED	MARGINAL	NON-COMPLIANT
Survey Date: _____ County: Palm Beach Facility Name: Delray Beach Golf Club – Temporary EOC Address: 2200 Highland Avenue City: Delray Beach State: FL Zip Code: 33445			
1. Storm Surge Inundation	Not Applicable		
2. Rainfall Flooding - Dam Considerations		Building is located between 100-year and 500-year flood elevations.	
3. Hazmat and Nuclear Power Plant Considerations	Not Applicable		
4. Lay-down Hazard Exposure			*1 – Trees large enough to breach the building envelope are within lay-down range of building.
5. Wind and Debris Exposure			*2 – The building site has an unsheltered exposure.

Least-Risk Decision Making: ARC 4496 Guideline Compliance Summary			
CRITERIA	PREFERRED	MARGINAL	NON-COMPLIANT
6. Wind Design Verification		Standard Building Code in 1990s (Rank 4 of 4)	
7. Construction Type / Load path Verification	Positive anchorages observed between the roof trusses and masonry walls.		
8. Building Condition	Building is in good condition with no sign of previous wind damage		
9. Exterior Wall Construction	Building has fully reinforced masonry walls.		
10. Fenestrations / Window Protection			*3 – Building has unprotected doors.
11. Roof Construction / Roof Slope			*4 – Building has a light-weight roof with moderate slope and overhangs greater than one foot. Roof has unsecured appendages.
12. Roof Open Span		Light-weight hipped and flat roof with maximum span less than 50 feet.	

Least-Risk Decision Making: ARC 4496 Guideline Compliance Summary			
CRITERIA	PREFERRED	MARGINAL	NON-COMPLIANT
13. Roof Drainage / Ponding		Small roof area (600 square feet) enclosed by parapet with two drains.	
14. Interior Safe Space	Building has an interior safe space		
15. Life Safety / Emergency Power		Building complies with fire and life safety codes.	

*1 - Removal of the trees within the lay-down range will lead to a compliant building.

*2 - With special attention being made to review the wind design, wall and roof characteristics, construction type, and aperture protections the building may be used as a shelter.

*3 – Replacement of the exterior doors with hurricane rated doors will lead to a compliant building.

*4 – Removing part of the roof eaves and securing roof top appendages will lead to a compliant building.

Findings and Recommendations

Based on the LRDM evaluation of the clubhouse, the building was found to be non-compliant for use as a shelter during hurricane events. The building's non-compliance is the result of the clubhouse being in an area of open wind and debris exposure, having large palm trees within the lay-down range of the building, having a roof that is at risk to damage from hurricane force winds, and having unprotected exterior doors. In order to bring the building into compliance the following modifications should be made:

- All the trees within the lay-down range of the building should be removed,
- All exterior doors should be replaced with hurricane rated doors,
- The octagonal cupola at the top of the roof should be removed,
- Roof top equipment should be strapped down to the roof, and
- Roof overhangs should be cut back closer to the walls with the eaves refinished.

With the removal of the lay-down hazards, exterior door replacements, and non-compliance of the roof corrected the building will be in compliance with the LRDM criteria. In addition to the modifications to bring the building into LRDM compliance we also recommend:

- Replace all windows in the meeting/ballroom area,
- Strap down air conditioning units on the ground,
- Secure unsecured items on the building exterior (i.e. fuel tank, ice machines, patio furniture, dumpsters, and golf carts), and
- Remove canvas canopy prior to hurricane events

Before the clubhouse serves as an EOC, the existing electrical system needs to be upgraded to meet the preferred LRDM requirements. Pursuant to LRDM criteria, it is imperative that the electrical system be equipped with a backup emergency generator with 72-96 hours of fuel capable of supporting life safety, branch outlets and lighting circuits, air-conditioning, and other system critical to the well-being of the clients, staff, and care-givers. In addition to the LRDM requirements, the City of Delray Beach has requested electrical capacity for approximately forty laptops, three printers, and at least one refrigerated conex enclosure that will be delivered to the clubhouse when the EOC stands-up. There is sufficient available electrical capacity for these additional loads within the current electrical service.

Based on the KWD provided by FPL, the LRDM criteria, and the City of Delray Beach's requirements, Hillers Electrical Engineering recommends the existing electrical distribution system be modified to include a minimum generator size of 400KW with a 72-hour minimum subbase fuel tank in a weatherproof enclosure; a new outdoor service entrance rated automatic transfer switch (ATS); and a new 225 Amp panel board, see the attached proposed electrical one-line diagram. The proposed generator and subbase fuel tank should be located as close to the electrical room as possible while maintaining the proper working space clearances. As the existing electrical room layout cannot accommodate the size of the ATS, an exterior mounted ATS will be

required. New conduit and conductor systems will be required between the generator and the ATS, between the FPL transformer and ATS, and between the ATS and the existing switchboard. A new electrical distribution panel board (Panel EOC) along with various receptacles will be needed to distribute the electrical power to the EOC's laptops, printers, and refrigerated conex enclosure. A proposed electrical one line diagram has been attached to this assessment.

A cost estimate for the recommended building and electrical modifications that should be completed prior using the Delray Beach Golf Course Clubhouse into the EOC has been attached to this assessment.

If there are any questions please do not hesitate to contact this office.

WANTMAN GROUP, INC.

Jeffrey Bergmann, PE

Encl. Cost Estimate
Encl. Fenestration Map
Encl. Electrical Line Diagram

Delray Beach Golf Course Clubhouse Emergency Operation Center
for
City of Delray Beach

ENGINEERS ESTIMATE OF PROBABLE CONSTRUCTION COST

Description	Quantity	Unit	Unit Cost	Extended Cost
TOTAL Architectural-Structural-Electrical				\$ 1,023,270
10% Bonds & Insurance,				\$ 102,327
TOTAL Architectural-Structural-Electrical				\$ 1,125,597
Architectural Structural	1	LS	\$ 519,225	\$ 519,225
Engineering Design, Construction Documents, Construction Services	1	LS	\$ 103,845	\$ 103,845
Electrical	1	LS	\$ 333,500	\$ 333,500
Engineering Design, Construction Documents, Construction Services	1	LS	\$ 66,700	\$ 66,700

Delray Beach Golf Course Clubhouse Emergency Operation Center
for
City of Delray Beach

ENGINEERS ESTIMATE OF PROBABLE CONSTRUCTION COST

Description	Quantity	Unit	Unit Cost	Extended Cost
Division One- Nine - Architectural-Structural				\$ 451,500
15% contingency				\$ 67,725
Division One- Nine - Architectural-Structural				\$ 519,225
Removal of Cupola, Re-Roofing/Re-Finishing Center Lobby	1	LS	\$ 123,750	\$ 123,750
Exterior Tree Relocation	1	LS	\$ 64,000	\$ 64,000
Replace Meeting Room Windows with Impact Resistant	1	LS	\$ 78,750	\$ 78,750
Replace Exterior Doors	1	LS	\$ 75,000	\$ 75,000
Eave Trimming to Reduce Uplift Exposure	1	LS	\$ 110,000	\$ 110,000

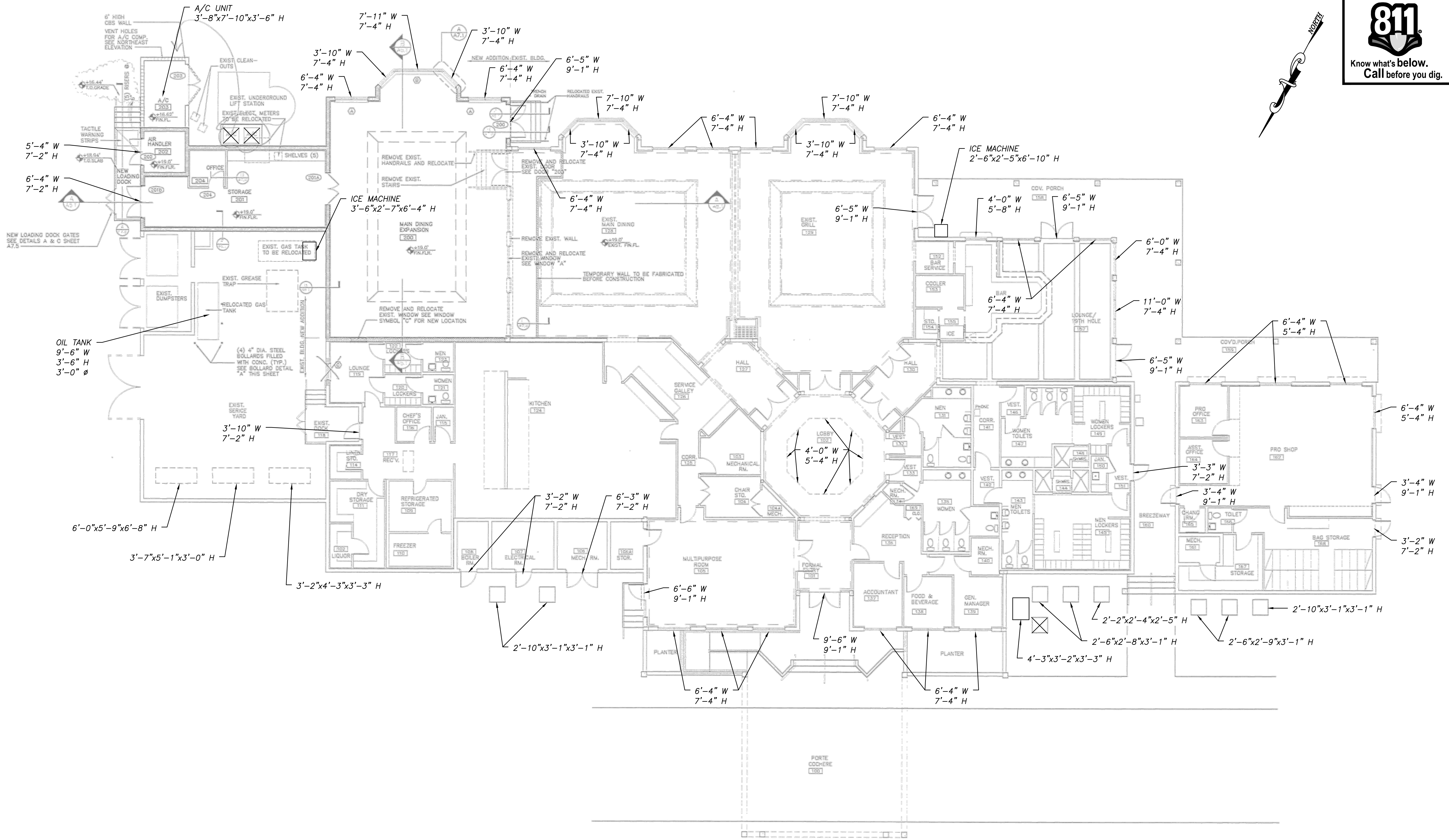
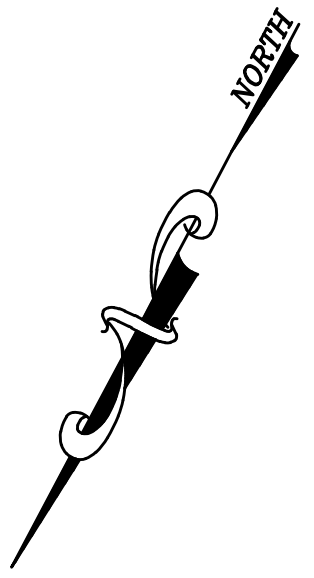
Delray Beach Golf Course Clubhouse Emergency Operation Center
for
City of Delray Beach

ENGINEERS ESTIMATE OF PROBABLE CONSTRUCTION COST

Description	Quantity	Unit	Unit Cost	Extended Cost
Division Sixteen - Electrical Equipment				\$ 290,000
15% contingency				\$ 43,500
Division Sixteen - Electrical Equipment				\$ 333,500
Electrical System Study	1	LS	\$ 12,000	\$ 12,000
Conduit/Ductbank	1	LS	\$ 48,000	\$ 48,000
Conductors/Cables/Feeders/Comms	1	LS	\$ 48,000	\$ 48,000
Grounding	1	LS	\$ 2,000	\$ 2,000
Electrical Equipment	1	LS	\$ 5,000	\$ 5,000
Automatic Transfer Switch	1	LS	\$ 55,000	\$ 55,000
Generator, Enclosure, and Subbase Fuel Tank	1	LS	\$ 120,000	\$ 120,000



Know what's below.
Call before you dig.



FLOOR PLAN

NOT TO SCALE

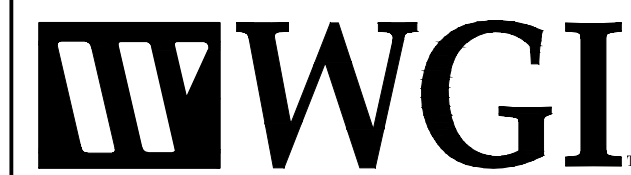


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ENGINEERING // SURVEYING // ENVIRONMENTAL // PLANNING

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P.E., LIC. NO. 50159

DESIGNED BY

JRB

DATE

DRAWN BY

DAM

APRIL 2017

CHECKED BY

CBLL

REVISION

DATE

DESCRIPTION

BY

CITY OF DELRAY BEACH
DELRAY GOLF CLUBHOUSE
EMERGENCY OPERATIONS CENTER

DOOR AND WINDOW EXHIBIT

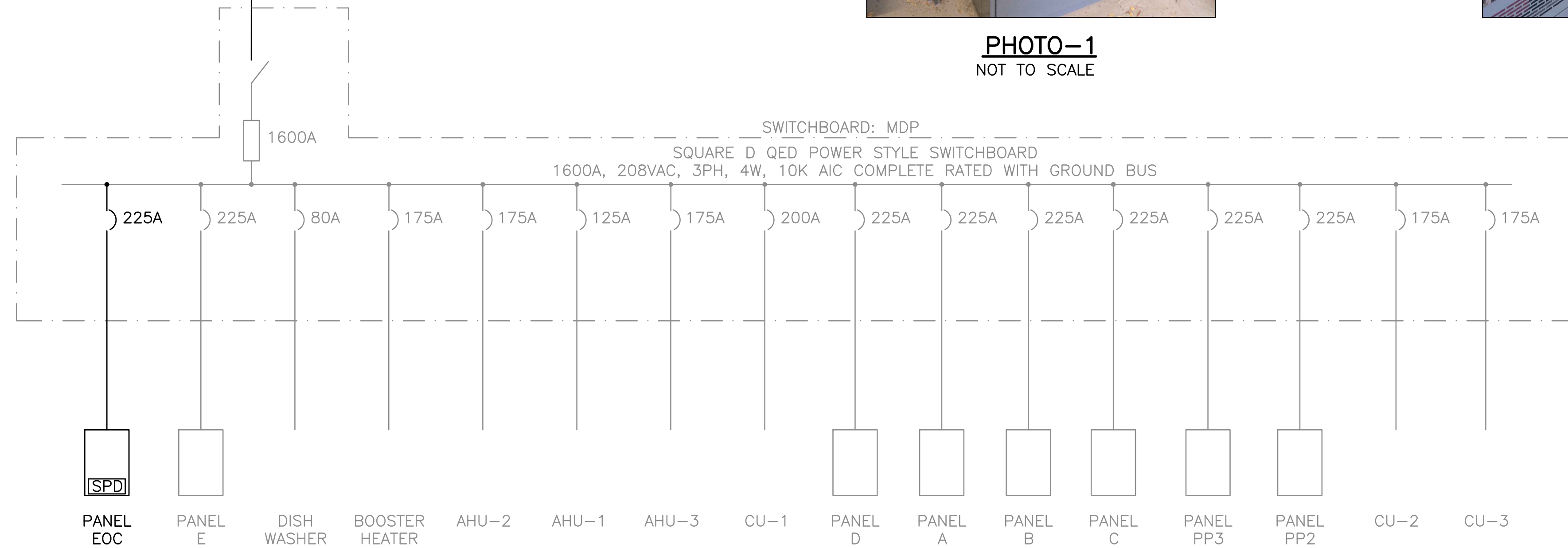
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41011004.22

SHEET NO.


S1.0 OF 1

FILE ID.



A photograph of a large, grey metal electrical cabinet with its doors open, revealing internal components. The cabinet has a yellow 'ON' label on the left door and a 'PANEL IN CHARGE' label on the top right. A fire extinguisher is visible on the floor next to the cabinet.

GOLF CLUBHOUSE
DELRAY BEACH FLORIDA

VERIFY SCALES
BAR IS ONE INCH ON
ORIGINAL DRAWING
0  1"
IF NOT ONE INCH ON
THIS SHEET, ADJUST
SCALES ACCORDINGLY.

EMERGENCY OPERATION CENTER
EMERGENCY GENERATOR

PROPOSED ELECTRICAL ONE LINE DIAGRAM

DATE: 05/01/17
P.A. NO. —
DR. NO. E-1
SHEET <u>1</u> OF <u>1</u>

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