TOWN OF SURFSIDE
Office of the Town Manager
MUNICIPAL BUILDING
9293 HARDING AVENUE
SURFSIDE, FLORIDA 33154-3009
Telephone (305) 861-4863

LETTER TO COMMISSION

No.: 217-2025

To:	Mayor Charles W. Burkett, Vice Mayor Tina Paul, and Members of the Town Commission
From:	Mark Blumstein, Town Manager *MB*
Date:	July 7, 2025
Subject:	**Town of Surfside – Emergency Operations Center Adaption Plan Feasibility Report**

The purpose of this Letter to Commission (LTC) is to transmit the attached Emergency Operations Center ("EOC") Adaption Plan Feasibility Report ("Report") prepared by Kimley-Horn and Associates, Inc., for your review.

The Report concludes that our current Town Hall "**<u>does not have sufficient capacity to resist the loads required for an emergency operations center</u>. The overall structure will require strengthening that would be classified as a level III Alteration**."

The estimated cost to adapt Town Hall into an EOC totals just over **<u>$2M</u>**.

If you have any questions or need additional information, feel free to contact me.

Town of Surfside - Emergency Operations Center Adaption Plan Feasibility Report

Prepared for

Town of Surfside
9293 Harding Avenue
Surfside, Florida 33154

Prepared by:

Kimley-Horn and Associates, Inc.
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Registry No. 696

Plantation, Florida 143332009

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This report was funded, in part, through a grant agreement from the Florida Department of Environmental Protection, Florida Resilient Coastlines Program, by a grant provided by the Florida Coastal Office. The views, statements, findings, conclusions, and recommendations expressed herein are those of the author(s) and do not necessarily reflect the views of the State of Florida or any of its sub agencies.

1. EXECUTIVE SUMMARY

At the request of the **Town of Surfside Capital Improvement Projects Division ("Client"), Kimley-Horn and Associates, Inc. (Kimley-Horn")** completed a limited adaptation plan feasibility study of the existing two-story town hall as part of the agreement dated June 6, 2024, and signed on June 20, 2024. The intent is to determine if the existing building can be converted to an Emergency Operations Center ("EOC") in accordance with the 2023 Florida Building Code, Eighth Edition, the Florida Adaptation Planning Guidebook, and the International Standard for the Design and Construction of Storm Shelters.

The existing structure serves as offices for the City Manager, Town Council, Police and Building Departments, and is located at 9293 Harding Avenue, in Surfside, Florida. The two-story, 28,000 S.F., Concrete Block System ("CBS") structure, was originally constructed in the late 1950's with several modifications and renovations through the years. The most significant renovation was completed in 2001, where the existing, 4,000 S.F. water tank, was removed and replaced with a two-story steel structure. The building's gravity system consists of a mix of pre-cast concrete double tees, steel joists and girder trusses supported by reinforced concrete columns, masonry load-bearing walls and steel columns. The foundation of the original structure consists of reinforced concrete grade beams and concrete pile caps at isolated locations. The ground floor slab is a 4-inch reinforced concrete slab on grade. The structure's main wind force resisting system is composed of a mix of reinforced concrete and masonry walls supported by concrete grade beams.

A limited existing condition assessment site walk-through was performed during the day of December 17, 2024, with a second site visit on January 27, 2025, where non-destructive tests were performed on several existing structural elements. The purpose of the condition assessment and subsequent visit, was to observe the general condition of the structure, observe as-built conditions, identify the gravity and lateral framing systems, and obtain baseline material strength properties. Calculations have been performed to verify the adequacy of the design and construction of the overall existing building's structural systems with the increased loading criteria for a hurricane storm shelter. Kimley-Horn assumes no responsibility for the structural design and construction of this existing building.

Based on the results of our code review and analysis, the existing structure does not have sufficient capacity to resist the loads required for an emergency operations center. The overall structure will require strengthening that would be classified as a Level III Alteration. Below is a summary of the required strengthening to adapt the Town Hall to be used as an emergency operations center:

- Replace existing windows and doors with components with approved building products for use in high velocity, hurricane zones per International Standard for the Design and Construction of Storm Shelters ("ICC 500-23").
- Strengthen existing connections between open web steel joists to concrete and masonry walls to resist increased lateral load requirements for a storm shelter.
- Strengthen existing masonry walls to resist increased lateral load requirements for a storm shelter. Strengthening measures include installation of additional reinforcement (#5 vertical reinforcement) in existing masonry walls.
- Flood-proof first floor for continued operational use of building during a 100-year storm event.
- Retain a Florida licensed architect to assist determining the occupancy required for the storm shelter and any other upgrades required (bathrooms, life safety system).

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2. INTRODUCTION

SCOPE OF WORK

At the request of the Town of Surfside Capital Improvements Projects Division **("Client"), Kimley-Horn and Associates, Inc. ("Kimley-Horn")** has performed a feasibility assessment for the existing Town Hall structure to be converted to a storm shelter. The objective of this report is to determine if the existing building can be converted to an Emergency Operations Center ("EOC") in accordance with the 2023 Florida Building Code ("FBC"), Eighth Edition, the Florida Adaptation Planning Guidebook, and the International Standard for the Design and Construction of Storm Shelters ("ICC 500-23"). Additionally, this report also provides the Client with a condition assessment report to document the general condition of the existing structure, identify deficient items, and recommend repairs to maintain operational use of the structure.

As part of the scope of services, a visual, non-destructive limited condition assessment of the building structural components, waterproofing components, and drainage deficiencies was conducted.

In addition, Kimley-Horn reviewer the drawings below as part of the assessment:

1. Original as-built architectural, structural, electrical and mechanical plans, provided by the Client and prepared by Don Reiff – Architect, Morton R. Fellman – Structural Engineer and J.E. Curley and Associates – Mechanical and Electrical Engineers, dated March 18, 1957.
2. Renovation drawings that include civil, demolition, architectural, interior, structural, mechanical, plumbing and electrical plans, provided by the Client and prepared by Ojito and Associates, Inc., Architectural Design Collaborative and Gartek Engineering Corporation, dated April 19, 1999.

Kimley-Horn observed structural framing elements including cast-in-place (CIP) slabs and beams, pre-cast double tees, steel joists roof and floor systems, reinforced concrete columns and masonry walls to be in general conformance with plans. Kimley-Horn also observed miscellaneous items including the roofing systems, roof top mechanical units, doors, windows and façade. Observations of the exterior façade were conducted from grade level.

In this report, the elements observed during the condition assessment are categorized into three types of systems: the primary structural framing system, operational system, and aesthetic system. Destructive and/or intrusive testing was not performed as a part of our visit. Defining structural characteristics and items indicative of overall current conditions along with specific items requiring attention were documented with photographs.

Storm shelters are designed for more extreme hazard levels than conventional buildings. For instance, storm shelters are designed to withstand wind speeds having a 10,000-year mean recurrence interval ("MRI") as opposed to 700-year MRI for conventional buildings. The Florida Adaptation Planning Guidebook prepared by the Florida Department of Environmental Protection provides a framework to perform a Vulnerability Assessment and identify adaptation strategies to allow existing structures to impact of potential sea level rise and inland flooding. Disruptions at response centers such as fire and police stations, emergency centers located in high-risk areas could prevent effective response and have public safety risks. This report looks at identifying adaption methods to convert the existing Town Hall into an Emergency Operations Center ("EOC").

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GENERAL DESCRIPTION

Provided below is a general description of the existing Town Hall structure, based on the walk-through performed and the use of Google Earth.

- **Property:** The property is located at 9293 Harding Avenue in Surfside, Florida. The facility currently serves as City Hall, Building and Police Department.

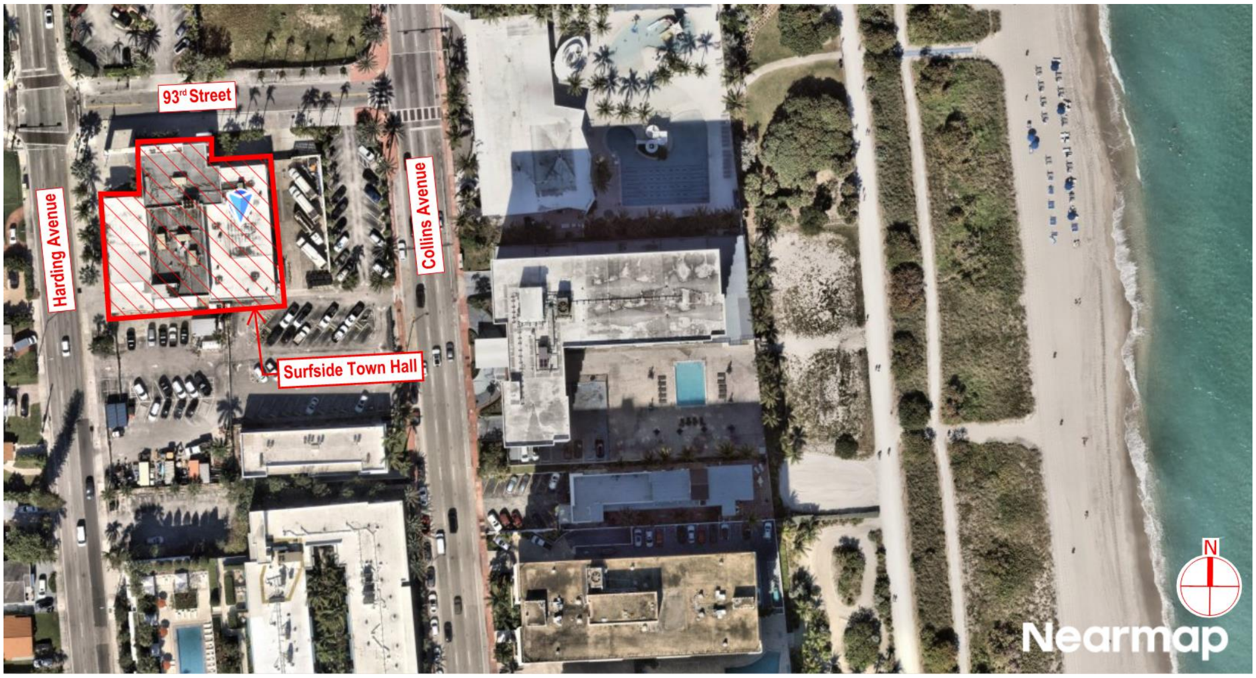

FIGURE 1: AERIAL IMAGE COURTESY OF NEARMAPS

- **Year Constructed:** Construction completed in 1957 with major renovation completed in 1999.
- **Construction Type:** The two-story, 28,000 square feet ("S.F."), Concrete Block System ("CBS") structure, was originally built in the late 1950's but had several modifications and renovations through the years. The most significant renovation was completed in 2001, where the existing, 4,000 S.F. water tank, was removed and replaced with a two-story steel frame office addition. The building's gravity system consists of a mix of pre-cast concrete double tee's, open web steel joists and girder trusses supported by reinforced concrete columns, steel columns, and load bearing masonry walls. The foundation of the original structure consists of reinforced concrete isolated and continuous wall footings. The ground floor is a 4-inch reinforced concrete slab on grade. The structure's main lateral resisting system consists of a mix of reinforced concrete and masonry walls supported by reinforced concrete grade beams and deep foundations.
- **Expansion Joints:** Refer Figure 2 for location of 1" expansion joint between concrete walls for water tank and building structure for town hall from original construction in 1957.
- **Parking and Vehicular Access:** This structure is separate from the parking lot.

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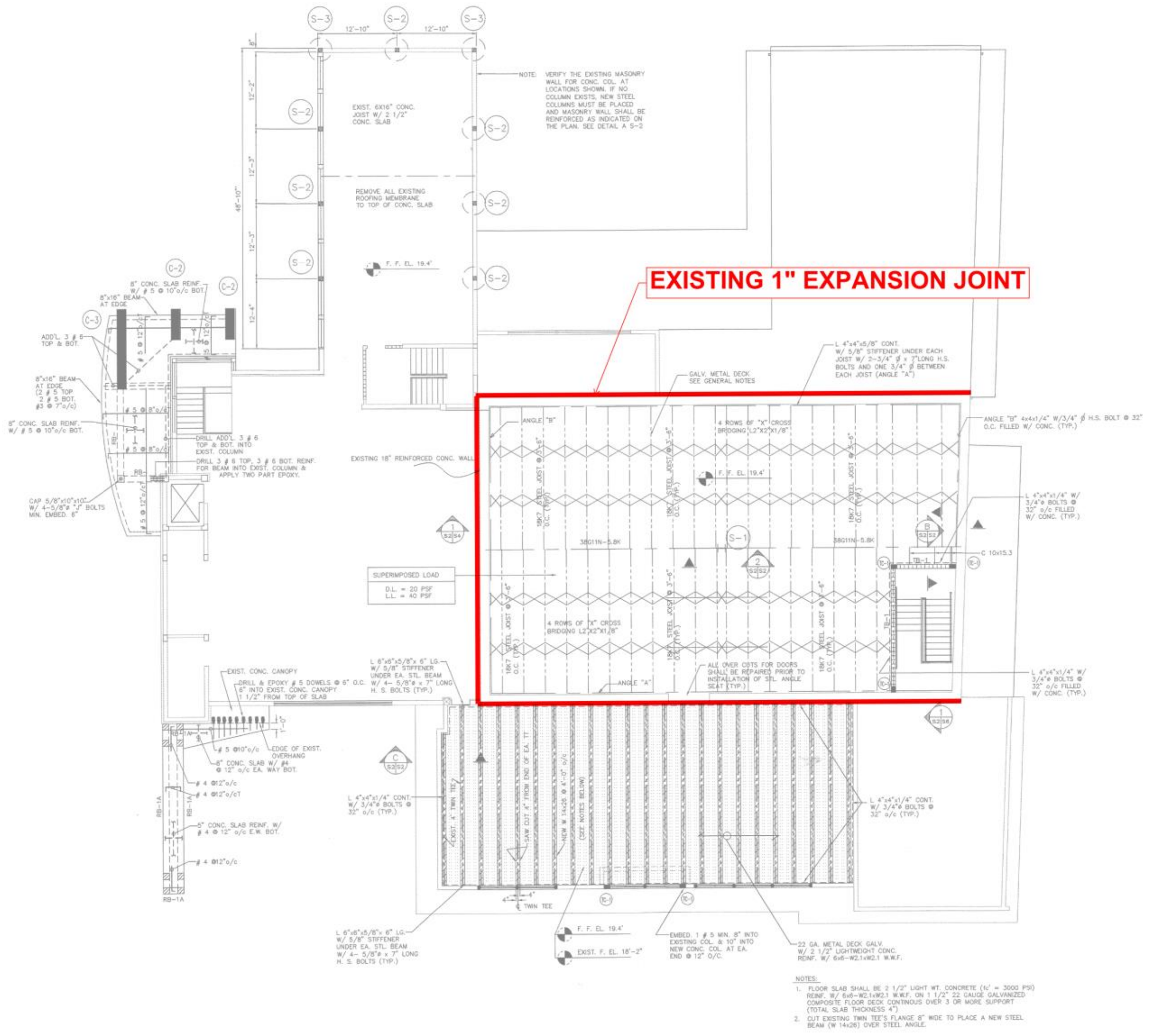

FIGURE 2: LOCATION OF 1" EXPANSION JOINT FROM ORIGINAL CONSTRUCTION IN 1957

3. CODE REVIEW

The Florida Adaptation Planning Guidebook prepared by the Florida Department of Environmental Protection provides a framework to perform a Vulnerability Assessment and identify adaptation strategies to allow existing structures to impact of potential sea level rise and inland flooding. Disruptions at response centers such as fire and police stations, emergency centers located in high-risk areas could prevent effective response and have public safety risks. This report looks at identifying adaption methods to convert the existing Town Hall into an Emergency Operations Center ("EOC").

For information on converting an existing structure to an EOC, the existing 2023 Florida Building Code, Existing, Eighth Edition ("FBC-E") does not provide guidance for retrofitting/strengthening the structural framing to comply with the EOC requirements. In addition to structural capacity, converting an existing

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building into an EOC has other requirements such as change of occupancy to assembly, egress, fire protection, and bathrooms.

The 2024 Statewide Emergency Shelter Plan provides guidance for storm shelters. Our review of 2024 Statewide Emergency Shelter Plan specifies Enhanced Hurricane Protection Areas ("EHPA") criteria for new shelters that follows 2023 Florida Building Code, Building, Eighth Edition ("FBC"). In addition, the statewide emergency shelter plan specifies owners, planners, and designers to incorporate the American Red Cross Hurricane Evacuation Shelter Selection Standards ("HESSS") for minimum hurricane evacuation shelter safety guidelines. HESSS indicates the hazards of a hurricane like surge inundation, rainfall flooding, high winds, and hazardous materials and how to select a structural system that can resist them. The document does not indicate how to strengthen an existing structure to be a designated hurricane storm shelter but does reference ICC 500-23 ("ICC") as emergency shelter criteria to follow. It is our professional opinion to follow FBC and ICC for this study.

FBC provides requirements for the design and construction of new storm shelters. The code begins by assigning buildings different risk categories (I to IV). These categories assign the appropriate loading based on their importance to its occupants but also for its importance to remain operational during a storm event. For example, a barn will be assigned a risk category I while a hospital will be assigned a risk category III. A storm shelter requires a building classification of Risk Category IV. Similar to HESSS, both FBC and ASCE 7-22 refer to ICC 500-23 for criteria specific for designated hurricane storm shelters (refer to Figure 3). It is our professional opinion that the existing town hall building will need to conform to Risk Category IV to serve as an Emergency Operations Center, resulting in an increase of the design wind speed.

> **User Note:** A building or other structure designed for wind loads determined exclusively in accordance with Chapter 26 cannot be designated as a storm shelter without meeting additional critical requirements provided in the applicable building code and ICC 500, the *ICC/NSSA Standard for the Design and Construction of Storm Shelters*. See Commentary Section C26.1.1 for an in-depth discussion on Storm Shelters.

FIGURE 3: DESIGNATED STORM SHELTER REQUIREMENTS
SOURCE: ASCE 7-22 CHAPTER 26

STORM CRITERIA

The following requirements are from ICC 500-23:

The storm design criteria is based on ASCE 7-22 with increases to certain minimum loadings. Rain loads increase due to storms causing potential blockages of primary and/or secondary drainage systems. The design rainfall rate is 10.5 inches per hour (60 min. precipitation intensity) for a hurricane storm shelter per ASCE 7-22. To account for loads due to nonspecific debris hazards like large projectiles, roof live loading will be 50 pounds per square foot. Floor live loading will be designed for not less than the minimum uniform live load for the normal occupancy of the space.

Wind speeds will follow ASCE 7-22 with exceptions listed in ICC. Wind speeds in ICC are determined from design wind speed maps. The design wind speed for hurricanes in the location of this report is 210 MPH (refer to Figure 4).

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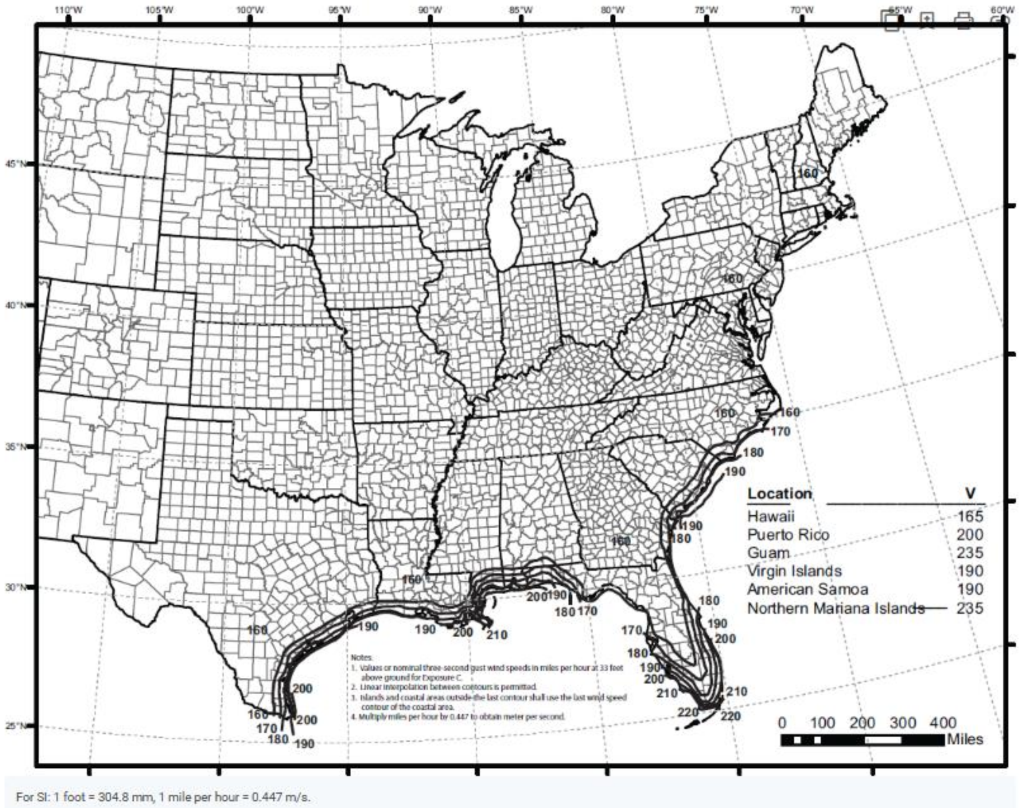

FIGURE 4: DESIGN WIND SPEEDS FOR HURRICANES
SOURCE: ICC 500-23

If the storm shelter is located within the building that has not been designed for the storm loads, the storm shelter will be designed considering the building has been destroyed and the storm shelter is fully exposed. Additionally, the storm shelter walls, roof, and components must be designed and tested for impact loads of wind-borne debris. Hurricane impact loads are based on a 9-pound sawn lumber 2 by 4 traveling at 85 MPH for walls and 17 MPH for horizontal surfaces. The roof is considered a horizontal surface because the angle of the roof incline is less than 30 degrees (ICC 500-23 305.2.1). Tornado loads are not considered in this vulnerability assessment. Flood criteria will need to be considered as the building location is within flood zone AE. Refer section on Coastal Flood Hazard for adaptability requirements.

To understand the severity of the wind loads on the structure, a comparison of the wind speeds to the Saffir-Simpson Hurricane Wind Scale is shown below. ICC references ASCE 7-22 which specifies the relationship between wind speeds and the Saffir-Simpson Hurricane Wind Scale (ASCE 7-22 Table C26.5-2) which is the same in ASCE 7-22, refer to Table 1.

TABLE 1: WIND SPEEDS FOR SUBJECT PROPERTY LOCATION

Condition	$V_{ultimate}$ (mph)	Approximate Hurricane Category*
Original design	110	2
ICC 500-23 (Risk Cat IV or Shelter)	210	5

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*Hurricane wind category is based on ASCE 7-22 Table C26.5-2 titled "*Approximate Relationship between Wind Speeds in ASCE 7 and Saffir-Simpson Hurricane Wind Scale*".

OCCUPANCY

Because of the long duration of hurricanes, occupant comfort is critical, resulting in more space per occupant than a tornado shelter. Based on ICC, the design occupant capacity served by the storm shelter shall be assigned or calculated. The assigned design occupant capacity is the actual number of occupants the shelter is intended to protect. The designer and the owner / owner's authorized agent may be required to justify to the authority having jurisdiction how the assigned design occupant capacity has been determined for their approval. The calculated design occupant capacity shall be determined by the usable floor area divided by the unit of area prescribed for standing/sitting, wheelchair, and bed-ridden occupants. The usable floor area is a percentage of gross floor area based on the amount of furnishings. For areas with concentrated furnishings or fixed seating, the usable floor area is maximum 50% of the gross floor area. For areas with unconcentrated furnishings or without fixed seating, the usable floor area is maximum 65% of the gross floor area. For areas with open plan furnishings and without fixed seatings, the usable floor area is maximum 85% of the gross floor area. Standing/sitting, wheelchair, and bed-ridden occupants require a minimum usable floor area of 20 S.F., 20, and 40 respectively. Each storm shelter shall be sized to accommodate a minimum of one wheelchair space for every 200 storm shelter occupants. Kimley-Horn recommends the Town retain a Florida licensed architect to assist determining the occupancy required for the storm shelter and any other upgrades required (bathrooms, life safety system). **The overall structure will require strengthening that would be classified as a Level III Alteration.**

SIGNAGE

All storm shelters shall have a sign on or within the shelter with the design occupant capacity, the storm type, the design wind speed, the edition of the ICC used for the design, and the name of the manufacturer/builder of the storm shelter (refer to Figure 5).

TORNADO/HURRICANE STORM SHELTER

WIND SPEED: V_T-200 MPH; V_H-220 MPH
DESIGN OCCUPANT CAPACITY-200
2020 EDITION OF ICC 500
BUILDER/MANUFACTURER: STORM CONSTRUCTION

FIGURE 5: DESIGN INFORMATION SIGN EXAMPLE
SOURCE: ICC 500-23

CODE REQUIREMENTS FOR MODIFICATIONS TO EXISTING BUILDINGS

Whenever an existing building in the State of Florida is renovated, repaired, or modified, the design professional must follow the existing building code provisions depending on the size and extents of the renovation. These code provisions may cause additional work to be completed because of the renovation size. For example, if more than 30% of roof plywood is replaced during a re-roof of an existing one-story building, the code would require the structural and electrical components of the building to meet current code.

The code provides three methodologies to determine repair/alteration levels- prescriptive, work area, and performance. The design professional decides which methodology to follow in its entirety (structural, fire protection, etc.). Please note, the code has other requirements such as egress, fire protection, energy conservation that may affect the methodology decision.

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The prescriptive method is the simplest. The work area method is the most common of the three. Each alteration level builds on the previous. Alteration levels are defined based on the type and size of work (i.e. reconfiguration, window replacement, etc.).

- Alteration Level 1 is defined as equipment, fixtures, or façade replacement.
- Alteration Level 2 is reconfiguration of space/system, addition/elimination of window/door, or adding equipment.
- Any existing gravity member may be overstressed by 5% before it requires strengthening. If loads are increased on the lateral system, the members may be overstressed by 10%. Any overstress beyond these limits requires their conformance with the current code.
- Any new element needs to be in conformance with current code.
- If 30% of the roof deck is removed, the entire roof deck must be strengthened to conform with current code.
- If alteration decreases building lateral capacity, the lateral system shall comply with the current code.
- Alteration Level 3 is defined when the work area exceeds 50% of the building area (includes floors and roof).
- An alteration in which the gravity load-carrying structural elements altered within a 5-year period support more than 30 percent of the total floor and roof area of the building or structure is considered a Substantial Structural Alteration and will be considered as Alteration Level 3.

The performance method offers the most flexibility. It requires the owner to retain an engineer and analyze the existing building/alteration under the current code to determine if strengthening is needed. Kimley-Horn anticipates a Level 3 Alteration for the proposed upgrade of the existing town hall to a hurricane storm shelter.

4. STRUCTURAL ANALYSIS

To understand the difference in wind loading from the time of construction to current code, the wind pressures acting on the building are calculated below. The wind pressure is defined in units of pounds per square foot ("psf"). Wind pressures are categorized into two groups: main wind force resisting system ("MWFRS") and components and cladding ("C&C"). MWFRS refers to wind acting on the overall structure and is used in the overall stability analysis of the structure. MWFRS will be utilized for the roof diaphragm and masonry shear wall analysis. The C&C refer to wind acting on isolated components of the walls and roof like windows or roof top equipment and will be utilized in masonry wall and steel roof deck analysis. In certain cases, MWFRS can be used for individual components. C&C pressures are used for a building's components and MWFRS are for the entire building. MWFRS pressures for the walls and roof are classified by the direction of the wind. Windward pressures will occur on the surfaces facing the wind while leeward pressures occur on surfaces away from the wind (refer to Figure 6).

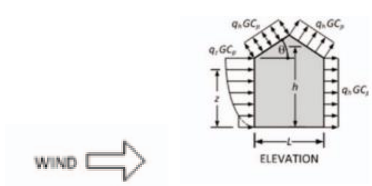

FIGURE 6: WINDWARD AND LEEWARD WALLS & ROOF
SOURCE: ASCE 7-22

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MAIN WIND FORCE RESISTING SYSTEM

The design wind pressures per the governing codes at the time of construction and renovation are used as a baseline to evaluate the Main Wind Force Resisting System. The design wind pressures for a hurricane storm shelter are calculated for the design wind speed per ICC 500-23 and compared against the baseline to determine if the MWFRS will require strengthening to resist lateral wind loads.

The first edition of the FBC was adopted in 1957, while no mention of the code is in the original Town Hall drawings, the code requirements for masonry construction were followed. We can assume that the building design, most likely, was also based on section 2306 of the 1957 code, which specify a minimum design wind of 120 MPH at a height of 30 feet above ground. Based on these requirements, and applying the shape factor and the height variation coefficient, the calculated velocity pressure for the building will be about 44.8 Pounds per Square Feet (“psf”).

The renovation refers to ASCE 7-93 and the South Florida Building Code. Following ASCE 7-93, the wind pressures are calculated for the walls and roof. In comparison, the wind pressures are found for risk category IV with wind speeds per ICC 500-23. Both wind pressures are based on Allowable Stress Design methodology to maintain consistency between the values. The MWFRS pressures for the walls and the roof are calculated and shown in Figure 7. Refer Table 2 for comparison of the MWFRS wind pressures from the original construction to wind pressures calculated in accordance with ICC 500-23 for a hurricane storm shelter.

TABLE 2: MWFRS WALL & ROOF WIND PRESSURES (SERVICE)
SOURCE: CALCULATIONS BASED ON ICC 500-23 AND ASCE 7-93

ASCE 7-93		
MWFRS Wall & Roof Wind Pressures		
Surface	**Walls**	**Roof**
Windward	32.4	-39.5
Leeward	-31.0	-39.5
Total	63.4	-

ICC 500-23		
MWFRS Wall & Roof Wind Pressures		
Surface	**Walls**	**Roof**
Windward	27.8	-52.6
Leeward	-33.7	-24.2
Total	61.5	-

ASCE 7-93 vs ICC 500-23		
% Change		
Surface	**Walls**	**Roof**
Windward	-14	33
Leeward	9	-39
Total	-3	-

The MWFRS pressures from original construction are generally lower when compared to pressures calculated per ICC 500-23 storm shelter design criteria. The walls experience a decrease of 14% for windward pressure. The roof pressure increased by over 32%. When using these pressures in analysis, the windward pressures work in tandem with the leeward pressures as to illustrate how the wind will affect the overall structure.

There are two (2) MWFRS to be considered for the existing building. The first MWFRS is for the original construction completed in 1957 which is a combination of load bearing masonry walls, concrete tie columns and tie beams to resist lateral loads. Additional masonry walls added during the renovation completed in 2001 are reinforced with #5 vertical reinforcement spaced at 48” center to center spacing. A limited analysis of the existing walls show they are not sufficient to resist lateral loads.

The second system is for the two-story building part of the renovation completed in 2001. This utilizes concrete walls framing the abandoned water tank as the main wind force resisting system. Information regarding the existing reinforcement in the concrete walls is not available on plans. Non-destructive tests performed in the field provide a baseline for material strengths and reinforcement spacing. Code minimum requirements are assumed for the size and grade of reinforcement since it could not be confirmed using non-destructive tests performed in the field.

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COMPONENTS & CLADDING

For components, C&C pressures will be used. C&C pressures for the walls and roof are classified by zones for the different pressures the respective surfaces will encounter. For walls, zone 5 will occur at corners of the building while zone 4 occurs everywhere else. For the roof, zone 2 will follow the roof ridge, zone 3 will follow the perimeter of the roof, and zone 1 will fill in between (Refer to Figure 7).

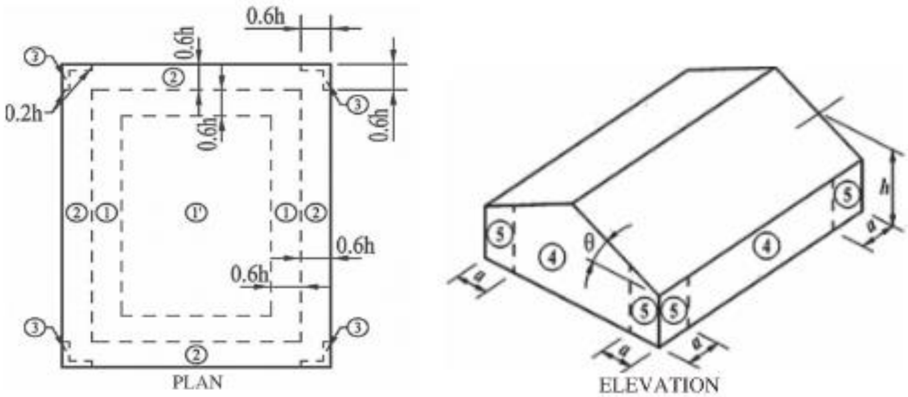

FIGURE 7: C&C WALL & ROOF WIND ZONES
SOURCE: ASCE 7-22

For the original construction, the governing code is ASCE 7-93. The C&C pressures are calculated for the walls and roof and compared with C&C wind pressures found for risk category IV with wind speeds per ICC 500-23. The C&C design wind pressures per ICC 500-23 is 16% higher for Zone IV and 23% for Zone V than the original design criteria. The C&C roof pressures per ICC 500-23 is between 84% to 142% higher when compared to the original design criteria. Refer Table 3a for comparison of C&C wall pressures and Table 3b for comparison of C&C roof pressures.

TABLE 3A: STORM SHELTER C&C WALL WIND PRESSURES (ALLOWABLE)

ASCE 7-93 C&C Wall Wind Pressures		
Zone	**(+)**	**(-)**
4	44.3	-45.8
5	44.3	-53.4

ICC 500-23 C&C Wall Wind Pressures		
Zone	**(+)**	**(-)**
4	51.3	-56.3
5	51.3	-62.5

ASCE 7-93 vs ICC 500-23 % Change		
Zone	**(+)**	**(-)**
4	16	23
5	16	17

TABLE 3B: STORM SHELTER C&C ROOF WIND PRESSURES (SERVICE)
SOURCE: CALCULATIONS BASED ON ICC 500-23 AND ASCE 7-93

ASCE 7-93 C&C Roof Wind Pressures		
Zone	**(+)**	**(-)**
1	-	-44.3
2	-	-53.4
3	-	-53.4

ICC 500-23 C&C Roof Wind Pressures		
Zone	**(+)**	**(-)**
1	21.2	-81.7
2	21.2	-108.6
3	21.2	-129.2

ASCE 7-93 vs ICC 500-23 % Change		
Zone	**(+)**	**(-)**
1	-	84
2	-	103
3	-	142

From the values above, the walls will see an increase of approximately 10 psf for zone 4 and zone 5 from original construction to the proposed renovation of a storm shelter. The roofs will see an increase

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of approximately 50 psf. Building appurtenances and support structures for rooftop equipment will need to be strengthened for the increased roof wind pressures.

Additional exterior masonry walls added during the renovation completed in 2001 are reinforced with #5 vertical reinforcement spaced at 48” center to center spacing. These walls will need to be reinforced with additional #5 vertical reinforcement to resist increased C&C wind pressures.

ROOF FRAMING

The existing open web steel joists are designed for a live load of 30 psf and net uplift of 58.8 psf for zone 1, 73 psf zones 2 & 3. The original roof gravity live loading is 30 psf for live load. The roof live load shelter requirement is 50 psf. The joists will need to be designed for 81.7 psf for Zone 1, 108.6 psf for Zone 2. This results in an increase in live load of 67% and increase in wind pressures of 48%.

The roof framing is composed of open web steel joists for the new two-story structure addition inside the abandoned water tank. As part of the renovation completed in 2001, the existing pre-cast double tees for the roof framing above the police station was abandoned in-place with new W14x26 added to support a new steel roof deck. New open-web steel joists and a steel roof deck was added as part of the renovation in the north-east corner of the building above the conference rooms.

The steel roof deck was found to have sufficient capacity to support the increased wind pressures. The open web steel joists for the roof framing inside the abandoned water tank were found to have sufficient capacity to resist the increased storm shelter loading criteria. The open web steel joists and W14x26 have sufficient strength capacity to resist the increased storm shelter loading criteria. However, the diaphragm connections between the steel roof deck and the steel beams, open web steel joists were found to be inadequate for the increased storm shelter loading criteria. Additionally, the connections between the open web steel joists and the concrete walls will need to be strengthened to resist the increased loads.

Based on the results of our code review and analysis, the existing structure does not have sufficient capacity to resist the loads required for a hurricane storm shelter. The overall structure will require strengthening that would be classified as a Level III Alteration.

To keep the strengthening to a Level II alteration, a limited portion of the building can be converted to an Emergency Operations Center. The extents of the limited portion of the building that will need to be adapted is shown in Figure 8. The “Limited Operations Emergency Center” will include the first floor and second floor as shown in Figure 8. Areas outside the proposed extents will not be included in the Adaptation Plan.

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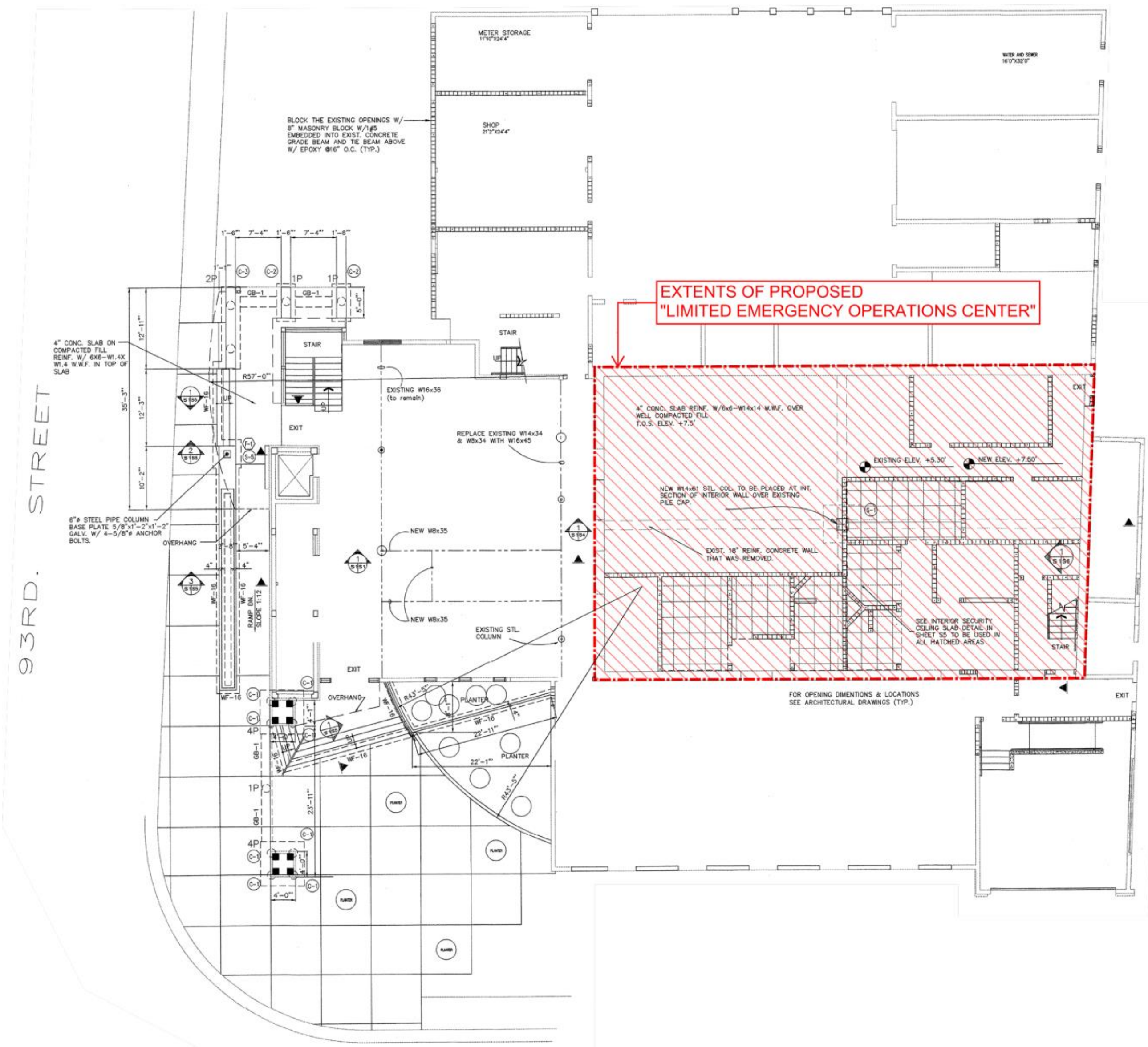

FIGURE 8: EXTENTS OF "LIMITED OPERATIONS EMERGENCY CENTER"

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5. NON-DESTRUCTIVE TESTING OF STRUCTURAL COMPONENTS

Kimley-Horn conducted a site visit on January 29, 2025, to perform non-destructive testing ("NDT") on existing structural members. The objective of NDT was to obtain baseline material strength properties for various structural components. Two different NDT methods were performed, the Schmidt Hammer and the Ferro Scanner. The Schmidt Hammer test, also known as Swiss Hammer test, estimates the compressive strength of concrete by measuring surface hardness. This method evaluates the relative strength of concrete by. It is important to note that test results vary depending on surface conditions and requires proper calibration for accurate results.

Additionally, a ferro scanner was used to detect and map the location, depth, and size of reinforcement bars (rebar) within concrete and masonry walls. This technique provides information about embedded rebar locations, aiding in structural assessments and ensuring safe modifications without damaging the concrete.

The main objective of these tests was to estimate the concrete strength of the reinforced concrete walls and tie beam in the garage, as well as to map the rebar location and size in the masonry walls. The Schmidt hammer measurements were taken as follows: at the parapet cap beam for reference, on the garage concrete wall on the first floor, and on the concrete tie beam on the same floor in the garage. The east walls of the staircase well on floors 1 and 2 were also tested with the Schmidt hammer. Ferro scanner measurements were taken at the masonry walls in the staircase well on floors 1 and 2. Refer Figure 9 and Figure 10 for locations of non-destructive testing completed on the existing structure.

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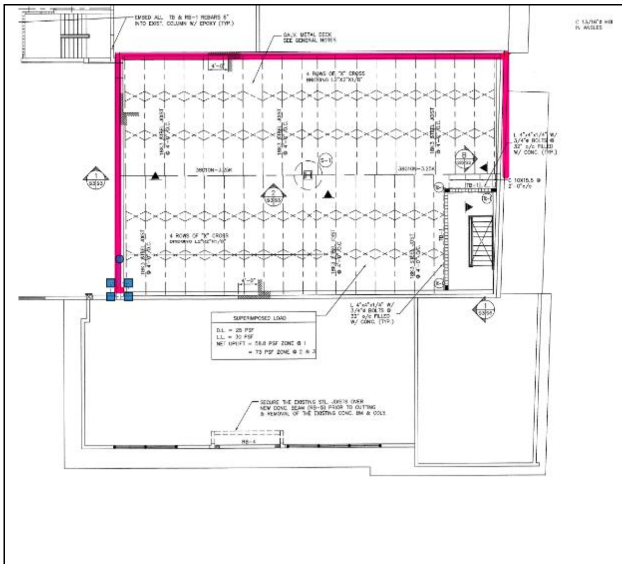
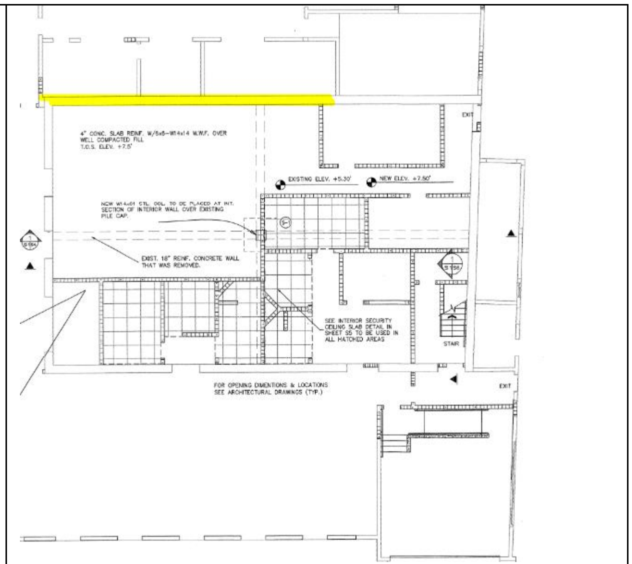
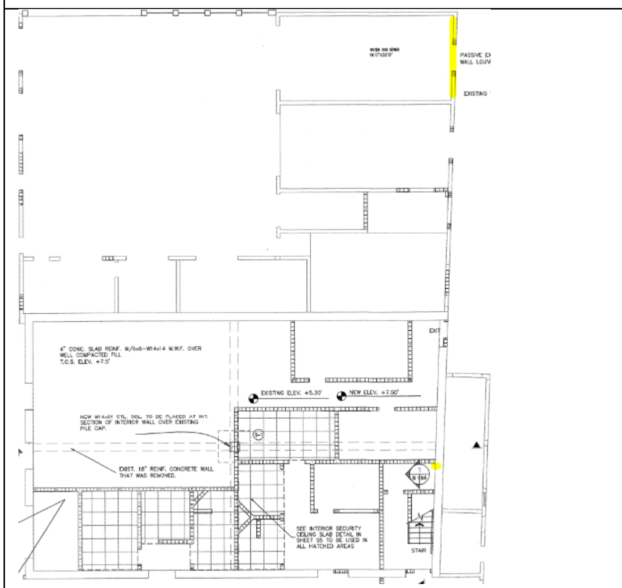


Roof Level: Parapet Cap Beam



First Floor, Garage, Concrete Wall



First Floor, Garage, Concrete Tie Beam

FIGURE 9: LOCATION OF SCHMIDT HAMMER TESTS

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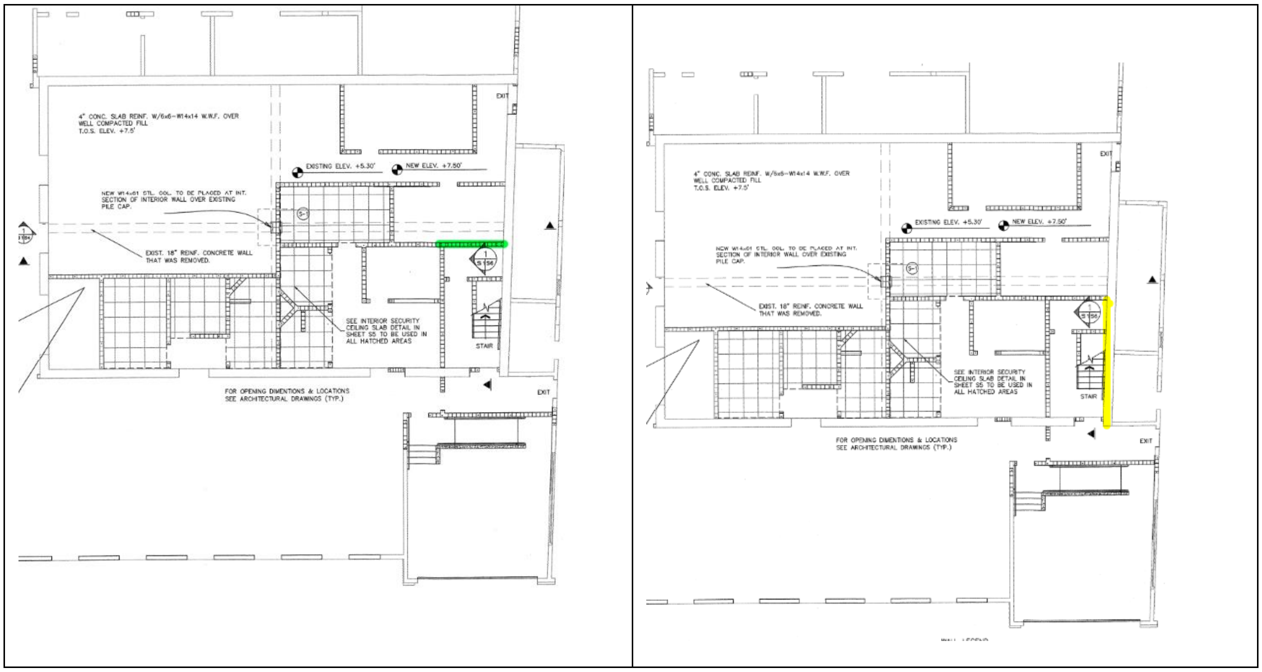

FIGURE 10: LOCATION OF FERRO SCANNER TESTS

SCHMIDT HAMMER OBSERVATIONS

The results of the Schmidt hammer tests are presented in Table 4 below. It can be concluded that the concrete elements have a compressive strength of 3000 psi minimum, as all tested elements show strengths exceeding this value.

TABLE 4: SCHMIDT HAMMER OBSERVATIONS

Item	Location	Average Strength (psi)
1.	Roof Level: Parapet Cap Beam	3000*
2.	First Floor, Garage, Concrete Wall	3187
3.	First Floor, Garage, Concrete Tie Beam	3183

** Presented values are scaled to reflect 3,000 psi for existing parapets added during 2001 renovation*

FERRO SCANNER OBSERVATIONS

The results from the ferro scanner confirmed the location and spacing of reinforcement in existing concrete walls. However, the existing size and grade of reinforcement could not be verified due to limitations of the equipment. One potential reason for this inconsistency is the thick layer of stucco on the wall surfaces, which likely interfered with the scanner's ability to obtain accurate measurements. One of the more reliable measurements was taken at the ground floor garage east wall, as shown in Figure 11. The reinforcement was detected at 12-inch intervals, with varying cover depths between 0.79 inches and 1.3 inches.

All other measurements, including two from each floor of the south stairwell, showed inconsistent readings, making it difficult to identify the spacing and diameter of the reinforcement. The observations are recorded in Figure 11 below.

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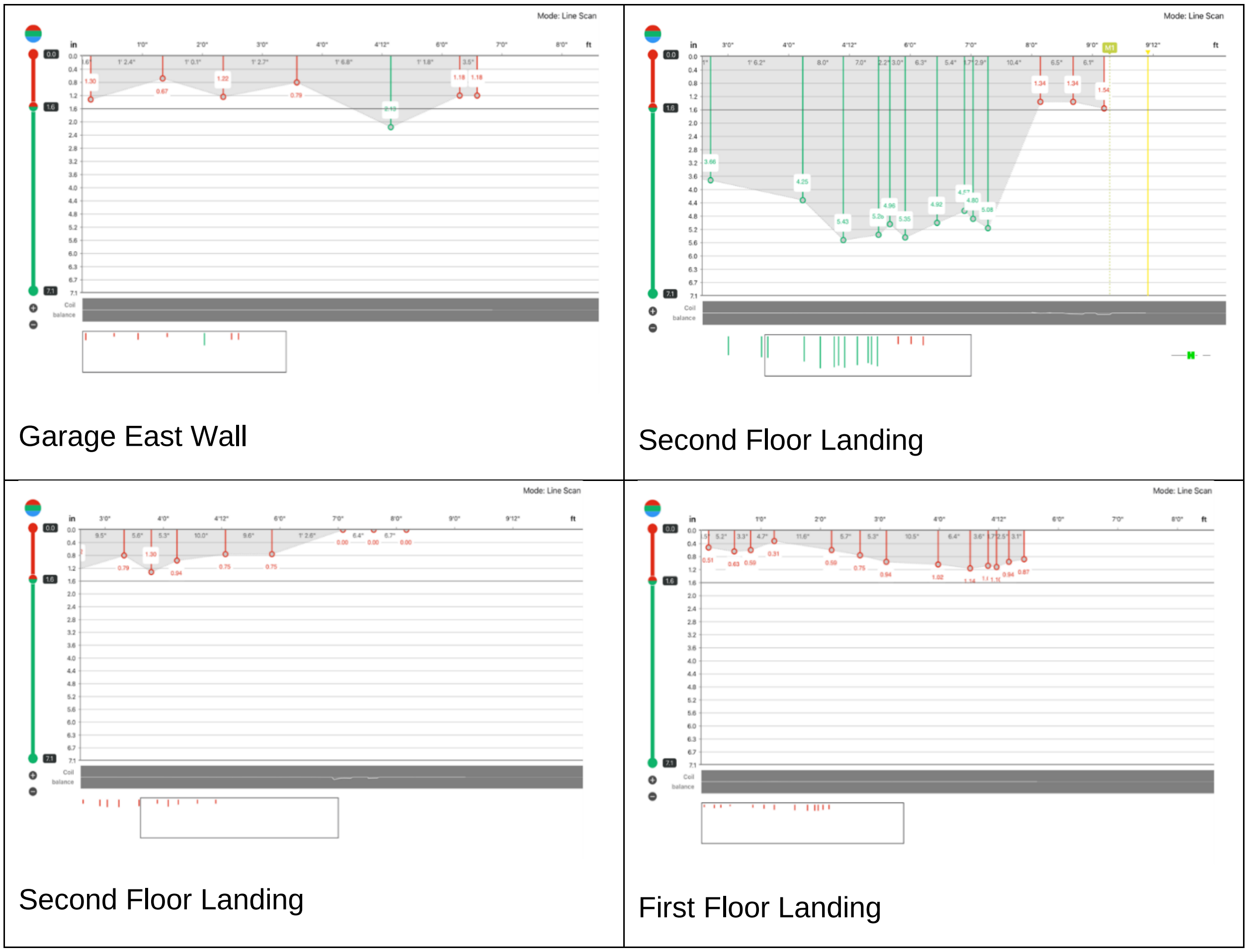

FIGURE 11: SCANS OF FERRO SCANNER TESTS

6. CURRENT AND FUTURE EXPOSURE TO COASTAL FLOOD HAZARD

The Surfside Town Hall building was originally built between 1957-58 with a major renovation completed in 2001. The existing building falls under Flood Zone AE per the Flood Zone Map dated June 6, 2017, and prepared by the CGA Geographic Information System Services.

The existing first floor structural concrete slab was constructed with a top of slab elevation of +3.758 NAVD88. During the renovation in 2000, the first floor slab was raised to an elevation of +5.948 NAVD88 using compacted limerock fill. Table 5 shows the base flood elevation, storm surge elevations for Category 3 and Category 5 storm surge.

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TABLE 5: FLOOD DEPTH SCENARIOS AND ELEVATIONS

Flood Depth Scenario	Elevation NAVD88
FEMA Effective BFE	6.5
Category 3 Storm Surge	6.1
Category 3 Storm Surge + 100-year 72-hour rainfall	7.6
Category 5 Storm Surge	9.2
Category 5 Storm Surge + 100-year 72-hour rainfall	11.43

The 2023 Florida Building Code, Eight Edition has provisions applicable to habitable structures seaward of the Coastal Construction Control Line (CCCL) or 50-foot setback line. The east edge of the property line is located approximately 175 feet west of the CCCL line. The CCCL provisions for structures located in a special flood area do not apply to the existing structure.

Since the existing structure is located in a special flood area and subject to flood hazards, the provisions listed in Section 1612 of the FBC will be applicable. For intended use as a designated storm shelter, the building will need to comply with the requirements of Flood Design Class 4 as defined in ASCE 24-14 (Flood Resistant Design and Construction). Currently, the building does not have independent structural systems. Required egress, HVAC and electrical power pass through or depend on different portions of the building. Kimley-Horn recommends for the entire structure to adhere to the requirements of Section 1612 and ASCE 24-14. The design flood elevation will be BFE + 2.00, or 500-year flood elevation, whichever is higher.

Non-residential structures and nonresidential portions of mixed-use structures shall be allowed to have the lowest floor below the DFE, provided the structures meet dry floodproofing requirements.

Kimley-Horn recommends one of the following adaption strategies to meet Code requirements:

- Raise existing first floor elevation to be above 8.5 NAVD88
- Dry flood-proof first floor in lieu of raising elevation of first floor. This will require a substantial structural alteration since the structure can be exposed to substantial hydrostatic pressures.
- Wet flood-proof first floor by using materials that do not corrode when flood waters occupy the first floor during a 100-year storm event.
- Install flood panels to as part of a building envelope system.

7. OPINION OF PROBABLE COST (OPC)

At the request of the Client, Kimley-Horn and Associates, Inc. has developed an Opinion of Probable Construction Cost ("OPC") for the adaptation of the existing Town Hall into an Emergency Operations Center. The OPC estimates presented is limited to the structural scope of work. Converting an existing building into an EOC has other requirements such as change of occupancy to assembly, egress, fire protection, and bathrooms which are not included in this OPC.

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Table 6 presents an OPC estimate for adapting the existing Town Hall building into an Emergency Operations Center. Table 7 presents an OPC estimate for adapting the existing Town Hall building to include a Limited Emergency Operations Center.

TABLE 6: OPC for Level III Alteration

Item	Unit	Quantity	Unit Price	Price
General				
Soil Preparation	-		$ -	$ 74,312.13
Excavation	CY	1244	$ 8.89	$ 11,058.50
Crushed Limestone Fill - 2 FT	CY	1244	$ 50.85	$ 63,253.63
1st Floor Slab-on-Grade	-	-	$ -	$ 149,457.70
Demolition	SQ. FT	16793	$ 1.42	$ 23,846.06
Construction	SQ. FT	16793	$ 7.48	$ 125,611.64
1st Floor Exterior Masonry Wall	-	-	$ -	$ 269,789.66
Demolition	SQ. FT	7829	$ 0.95	$ 7,437.61
Construction	SQ. FT	7829	$ 33.51	$ 262,352.05
1st Floor Interior Masonry Wall	-	-	$ -	$ 276,985.63
Demolition	SQ. FT	8038	$ 0.95	$ 7,635.99
Construction	SQ. FT	8038	$ 33.51	$ 269,349.64
1st Floor Flood Proofing	SQ. FT		$ -	$ 32,914.28
Elastomeric water proofing 45 mils thick	SQ. FT	16793	$ 1.96	$ 32,914.28
2nd Floor Exterior Masonry Wall	-	-	$ -	$ 201,090.63
Demolition	SQ. FT	5835	$ 0.95	$ 5,543.71
Construction	SQ. FT	5835	$ 33.51	$ 195,546.92
2nd Floor Interior Masonry Wall	-	-	$ -	$ 28,723.01
Demolition	SQ. FT	834	$ 0.95	$ 791.84
Construction	SQ. FT	834	$ 33.51	$ 27,931.17
Open web steel joist connections	-	-	$ -	$ 6,000.00
Steel Plate 1/4"	EA	24	$ 250.00	$ 6,000.00
Waterproofing				
Waterproofing	-	-	$ -	$ 916,695.38
Roof slab waterproofing	SQ. FT	15465	$ 31.00	$ 479,429.88
Exterior walls waterproofing	SQ. FT	13665	$ 32.00	$ 437,265.50
Components & Cladding				
Windows	-	-	$ -	$ 98,752.00
Window 2'-4"x2'-4"	EA	3	$ 2,034.43	$ 6,103.29
Window 2'x2'	EA	7	$ 2,034.43	$ 14,241.01
Window 4'-6"x4'-6"	EA	12	$ 2,371.55	$ 28,458.60
Window 6'x8'	EA	11	$ 2,529.27	$ 27,821.97
Window 6'x10'	EA	8	$ 2,529.27	$ 20,234.16
Doors	EA	6	$ 922.00	$ 5,532.00
Grand Total				$ 2,060,252.42

DISCLAIMER: THE ENGINEER HAS NO CONTROL OVER THE COST OF LABOR, MATERIALS, EQUIPMENT OR OVER THE CONTRACTOR'S METHOD OF DETERMINING PRICES OR OVER COMPETITIVE BIDDING OR MARKET CONDITIONS. OPINIONS OF PROBABLE COSTS PROVIDED HEREIN ARE BASED ON THE INFORMATION KNOWN TO THE ENGINEER AT THIS TIME AND REPRESENT ONLY THE ENGINEER'S JUDGEMENT AS A DESIGN PROFESSIONAL FAMILIAR WITH THE CONSTRUCTION INDUSTRY. THE ENGINEER CANNOT AND DOES NOT GUARANTEE THAT PROPOSALS, BIDS, OR ACTUAL CONSTRUCTION COSTS WILL NOT VARY FROM THIS OPINION OF PROBABLE COSTS.

AACE CLASS 4 ESTIMATE – STUDY OF FEASIBILITY
EXPECTED ACCURACY RANGE
L: -15% TO -30%
H: +20% TO +50%

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TABLE 7: OPC for Level II Alteration

Subject	Unit	Quantity	Unit Price	Price
General				
Soil Preparation	-		$ -	$ 35,189.07
Excavation	CY	589	$ 8.89	$ 5,236.54
Crushed Limestone Fill - 2 FT	CY	589	$ 50.85	$ 29,952.53
1st Floor Slab-on-Grade	-	-	$ -	$ 35,386.40
Demolition	SQ. FT	3976	$ 1.42	$ 5,645.92
Construction	SQ. FT	3976	$ 7.48	$ 29,740.48
1st Floor Flood Proofing	SQ. FT		$ -	$ 10,814.72
Elastomeric water proofing 45 mils thick	SQ. FT	3976	$ 2.72	$ 10,814.72
Open web steel joist connections	-	-	$ -	$ 6,000.00
Steel Plate 1/4"	EA	24	$ 250.00	$ 6,000.00
Waterproofing				
Waterproofing	-	-	$ -	$ 560,521.50
Roof slab waterproofing	SQ. FT	3976	$ 31.00	$ 123,256.00
Exterior walls waterproofing	SQ. FT	13665	$ 32.00	$ 437,265.50
Components & Cladding				
Windows	-	-	$ -	$ 183,233.11
Window 2'-4"x2'-4"	EA	3	$ 760.05	$ 2,280.14
Window 2'x2'	EA	7	$ 560.00	$ 3,920.00
Window 4'-6"x4'-6"	EA	12	$ 2,835.00	$ 34,020.00
Window 6'x8'	EA	11	$ 6,720.00	$ 73,920.00
Window 6'x10'	EA	8	$ 8,400.00	$ 67,200.00
Doors	EA	6	$ 2,000.00	$ 12,000.00
Grand Total				$ 843,144.80

DISCLAIMER: THE ENGINEER HAS NO CONTROL OVER THE COST OF LABOR, MATERIALS, EQUIPMENT OR OVER THE CONTRACTOR'S METHOD OF DETERMINING PRICES OR OVER COMPETITIVE BIDDING OR MARKET CONDITIONS. OPINIONS OF PROBABLE COSTS PROVIDED HEREIN ARE BASED ON THE INFORMATION KNOWN TO THE ENGINEER AT THIS TIME AND REPRESENT ONLY THE ENGINEER'S JUDGEMENT AS A DESIGN PROFESSIONAL FAMILIAR WITH THE CONSTRUCTION INDUSTRY. THE ENGINEER CANNOT AND DOES NOT GUARANTEE THAT PROPOSALS, BIDS, OR ACTUAL CONSTRUCTION COSTS WILL NOT VARY FROM THIS OPINION OF PROBABLE COSTS.

AACE CLASS 4 ESTIMATE – STUDY OF FEASIBILITY
EXPECTED ACCURACY RANGE
L: -15% TO -30%
H: +20% TO +50%

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8. RATINGS

As part of the adaptation plan study, Kimley-Horn observed the condition of the existing structure and components in order to determine where future maintenance and/or repairs may be required as part of the adaptation plan. A visual, non-destructive condition assessment of the readily accessible structural elements was conducted on December 17, 2024.

The tables in this section contain categories of structural and waterproofing components that were observed during the on-site limited condition assessment with each element receiving a rating of 'Good', 'Fair', or 'Poor', which represents the average condition of all individual similar elements within that category. Rating descriptions are defined in **Appendix A**. Tables are also provided summarizing assessment ratings for several readily accessible operational and aesthetic elements.

TABLE 8: STRUCTURAL ELEMENTS RATINGS

Item	Rating	Description
CIP Concrete Structural Slab on Grade	Good	Hairline cracks on the concrete slab on grade, were found at some areas of the Covered Yard, most likely due to age, wear and tear.
CIP Concrete Columns	Good	Concrete columns that were readily accessible, observed in good condition.
CIP Concrete Beams	Good	Exposed concrete beams were found to be in good condition. Most were hidden by stucco or wall finishes.
Pre-Cast Concrete Roof and Floor Double Tees	Good	Roof and floor precast concrete double Tee's and joists were found to be in good condition.
Steel Joists	Good	Roof and floor steel joists and their connections were found in good condition. All observed interior joists were sprayed with fireproofing material.
Masonry Walls	Good	Masonry walls were in generally good condition. No sign of distress was observed.

TABLE 9: OPERATIONAL ELEMENTS RATINGS

Item	Rating	Description
Doors	Good	All exterior doors were found in good condition. Overhead roll-up door at the Apparatus Room, Covered Yard and some exist doors are not rated.
Windows	Good	All exterior glazed windows were found in good condition.
Roofing System	Poor	Multiple areas of the roof show signs of water damage with roofing bubbling and cracking in some areas.
Roof-Tops Units	Poor	Most of the units show multiple rusted areas with general deterioration on the support platforms. Some units have inadequate anchorage to the roof system.

TABLE 10: AESTHETIC ELEMENTS RATINGS

Item	Rating	Description
Façade	Fair	The façade was found to be in generally good condition. Shrinkage cracks and minor stucco delamination was observed in some areas.
ADA Facilities	Good	ADA access ramp and railing system was in observed in good condition and meeting code requirements.

9. OBSERVATIONS

Outlined below are the key findings of our limited condition assessment of the structure. The intent of this summary is not to list every deficiency observed or recommended for repair, but rather to provide a more detailed description of key items included in the list of elements in the ratings tables above. Representative photographs were taken to provide examples of the observed deficiencies and can be seen below.

STRUCTURAL ELEMENTS – CONCRETE AND MASONRY

- CIP Concrete Beams
  Cast-in-place beams are in good condition, no sign of distress was observed on the few exposed elevated beams.

TYPICAL ELEVATED CONCRETE BEAM IN GOOD CONDITION

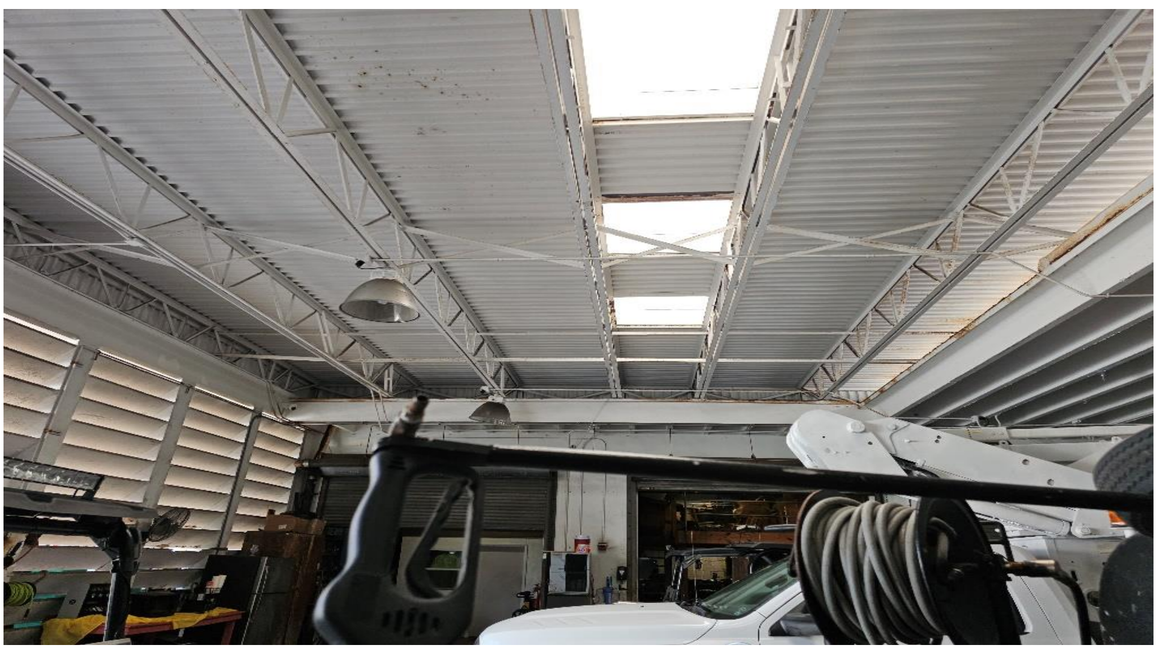
- Precast Concrete Joists and Double Tee's System
  Roof framing system (Double Tees and Joists) were observed in good condition. Connections of Tee's and joints were not accessible and were not observed.

ROOF DOUBLE TEES AT INTERIOR YARD IN GOOD CONDITION

FLOOR DOUBLE TEES IN GOOD CONDITION

INTERIOR FLOOR PRECAST JOISTS IN GOOD CONDITION

- <u>Steel Joists System</u>
  Roof and floor steel joists systems were found to be in good condition. All of the joist bearing locations were in good condition too.



ROOF JOISTS AT INTERIOR YARD IN GOOD CONDITION

STEEL JOISTS CONNECTION IN GOOD CONDITION

- <u>Reinforced Masonry Walls</u>
  Masonry walls were on fair conditions. No major cracks were detected, but some bulging and stucco delamination was observed.

EAST FAÇADE SECOND FLOOR WALL IN GOOD CONDITION

ENTRANCE WALL AT WEST FACADE IN FAIR CONDITION

OPERATIONAL ELEMENTS

- Doors and Windows

CRACKS OBSERVED AT DOOR JAMB

EAST FAÇADE WINDOWS IN GOOD CONDITION

RUST OBSERVED ON EAST ENTRANCE STOREFRONT FRAMING

- <u>Roofing System</u>

  Several areas of bubbling were observed throughout the roof. Roofing also showing signs of cracking, water damage and general deterioration.

EAST LOWER ROOFING SYSTEM SHOWS BUBBLING AND SIGNS OF DETERIORATION

LOSS OF MEMBRANE AND CRACKING WAS OBSERVED IN THE ROOFING SYSTEM

WEST ROOFING SYSTEM IN FAIR CONDITION

- <u>Roof Top Units</u>

RUST WAS OBSERVED ON THE CHILLERS SUPPORT PLATFORM

RUST OBSERVED AT RTU BASE CONNECTION

RUST OBSERVED ON THE CHILLERS SUPPORT PLATFORM BEAMS

AESTHETIC ELEMENTS

- Facade

  Fine cracks and stucco deterioration in exterior wall finishes, were observed. Paint chipping in certain locations of roof.

BUILDING WEST ENTRANCE WALL IN GOOD CONDITION

BUILDING WEST FAÇADE IN GOOD CONDITION

BUILDING EAST FAÇADE IN FAIR CONDITION

EAST FAÇADE SHOWS SIGN OF STUCCO PEALING AND DETERIORATION

- <u>ADA Facilities</u>

  ADA ramp meets current code.

10. RECOMMENDATIONS

Beachfront structures are exposed to the environment and require diligent upkeep to maintain structural components in good condition. Anywhere water intrusion is observed should be addressed, as ignoring these items can limit the useful life of the structure. While operational and aesthetic issues may not directly affect the structure's life span in the same way that structural issues can, they should not be ignored solely on that basis. The town of Surfside interest is to convert the existing building into a hurricane shelter, to achieve that, the existing structure will need to implement a series of enhancements to the structural system of the building that will require reinforcement or total replacement of the existing building.

Based on the results of our code review and analysis, the existing structure does not have sufficient capacity to resist the loads required for a building storm shelter. The structure will require strengthening that would require the existing structural framing and life safety system to meet current code (Level II Alteration) requirements. Below is a summary of the required strengthening to meet the storm shelter requirements for a partial building storm shelter:

- Replace existing windows and doors with components with approved building products for high velocity, hurricane zone.
- Strengthen existing connections between open web steel joists to concrete and masonry walls to resist increased lateral load requirements for a storm shelter.
- Strengthen existing masonry walls to resist increased lateral load requirements for a storm shelter. Strengthening measures include installation of additional reinforcement (#5 vertical reinforcement) in existing masonry walls.
- Wet flood-proof first floor for continued operational use of building during a 100-year storm event.
- Install flood panels to as part of a building envelope system
- Retain a Florida licensed architect to assist determining the occupancy required for the storm shelter and any other upgrades required (bathrooms, life safety system).

Owner has also a vested interest in maintaining a user friendly, appealing structure in the same way it has an interest in protecting its investment from the effects of disregarding the structural improvements. The recommendations in this report are primarily structural issues; however, some operational issues are also addressed.

11. LIMITATIONS

Kimley-Horn and Associates, Inc. endeavors with this report to assist the Owner in the understanding of the existing conditions of the existing structure in an effort to plan for the repair and maintenance of the structures. This report is based on the specific observations made and the professional opinion and experience of Kimley-Horn. Our recommendations do not provide specific repair details or specifications. The report is not a warranty or guarantee of the items noted. The extent of our evaluation was limited, and we cannot guarantee that the assessment discovered every possible condition that has or will occur.

Throughout the existing structure's service life, it will be exposed to environmental conditions detrimental to the structural integrity and the aesthetic and operation system conditions. Kimley-Horn cannot guarantee further deterioration will not occur over time. However, preventative maintenance performed by the Owner can help to minimize the long-term repair needs.

This report has been prepared in accordance with the professional standard of care. No other warranties or guarantees, express or implied, are made or intended. This report has been prepared solely for The Town of Surfside CIP Department for the purpose stated herein and should not be relied upon by any other party for any other purpose. Specifically, this report may not be used in connection with actual renovation or construction of any kind. The conclusions in this report are based on the limited investigation described above. Any reliance on this report by any party other than The Town of Surfside CIP Department shall be without liability to Kimley-Horn and Associates, Inc., or its employees.

APPENDIX A

GUIDELINES AND DEFINITIONS

Rating Guidelines:

The following narrative provides a summary of the rating guidelines and brief definitions of some items that were observed in the garage and noted in this report.

Good – rating denotes no life-safety issues, no immediate losses of strength or performance, including aesthetics, and no short-term changes in performance with regular maintenance and observation. A structural system is said to be in good condition if there is minor concrete damage, minimal rust, and no leaks or leaching. An operational system is said to be in good condition if the system is in good working order with minor cleaning or routine maintenance required.

Fair – rating denotes no life-safety issues and functional performance but repairs are needed to maintain the current level of service. There are some aesthetic issues and inconveniences to patrons. Without repairs, the deterioration will continue to accelerate. Fair condition is assigned to the structural system if moderate damage, rust, leaks, or leaching is found in several locations or if severe damage is found in a few locations.

Poor – rating denotes obvious problems, even to the casual observer, that without immediate remediation will result in further loss of structural member capacity. This condition can produce noticeable deflections in members, cause loose concrete to spall away, and presents the possibility of an unsafe condition to pedestrians in the near future. The system may still be functioning at this state but repair costs will increase rapidly with the amount of time that passes before the item is corrected. The structural system is considered poor if severe damage is found in several locations. A poor assessment is assigned to any operational system that requires replacement.

N/A – Not Applicable to this structure. While typically included as a part of our normal condition assessment, this particular category of items was not originally installed in this structure or was not part of the scope of this evaluation.