# STRUCTURAL CONDITION ASSESSMENT
7801 Atlantic Way,
Miami Beach, Florida 33141

Prepared for
Suzy Wahba
H212520

November 22, 2021

PREPARED BY

www.yhengineering.com

99 NW 27 Ave, Miami, FL. 33125, (305) 969-9423, Fax (305) 969-9453

Youssef Hachem Consulting Engineering

YOUSSEF H. HACHEM
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No. 43302
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

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Youssef H Hachem
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ou=A01410C00000175
701B89930000158E,
cn=Youssef H Hachem
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STRUCTURAL CONDITION ASSESSMENT for
7801 Atlantic Way,
Miami Beach, Florida 33141

# I. INTRODUCTION

## General

We have conducted a visual structural condition assessment on the existing structure located 7801 Atlantic Way, Miami Beach FL 33141.

The purpose of the inspection is to assess the structural condition of the structure. We also perform destructive and non-destructive test on the structure, to evaluate the structural capacity of the building.

## Property appraiser information

Based on Miami Dade County property appraiser, the structure was built in 1935, the building rises 2 stories with a living area of 2,542, square feet approximate.

# II. METODOLOGY

This inspection was visual in nature from the exterior and interior of the building. Our office did not perform any destructive or non-destructive testing; however, Ownership did engage NV5 to perform concrete core samples to test for:

1- Concrete compressive strength
2- Extent of Carbonation
3- Chloride Content

The report in its entirety is in Appendix B. Discussion of the results are to follow in this report.

No structural analysis was performed on the building to determine the capacity of the structural systems. It's our opinion that the current structural system of the building does not comply Florida Building Code 2020 (7th edition), HVHZ (High Velocity Hurricane Zone) edition.

## III. STRUCTURAL SYSTEMS

The structure is a two-story building, The building's structural system is as follows:

- Crawl Space Flooding Level
    - Wood Joist
    - CMU wall unreinforced.
- First Floor- Second floor:
    - Plywood
    - Wood Joist.
    - CMU wall unreinforced.
- Roof:
    - Flat built-up roof system

Performing the inspection visually was useful to determine spalling and cracking issues, on the concrete structure. Our office coordinate to perform some destructive and non-destructive test, to determine the capacity of the structural systems. Notice in this report we are addressing the results of the test in the appendix b

## IV. STRUCTURAL EVALUATION

Building construction and standards of the 1930's are considered deficient in today's standards. This applies to this structure and other structures built in the 1930's. This building under current building code is deemed deficient. The structure's roof connections for wind uplift forces, and for wind lateral resistance are non-existent. Moreover, openings protection, and CMU reinforcing is also non-existent. To develop this building, it has to undergo level III alteration of the Florida Building Code 2020 (7th edition) for existing structures. This means that the building has to be strengthened to comply with the current Florida Building Code. Which means that the roof connection tie downs have to be implemented to strengthen the roof, and lateral load structural systems have to be installed such as shear walls. Wall openings such as doors and windows and the exterior CMU walls have to reinforced. All corners of the building would need concrete columns. Hence, the foundations also have to be strengthened to resist such lateral loads.

According the structural inspection we determine areas to need repair describing below:

- Several linear cracking on the walls
- Concrete Lintels beams have linear cracking exposing longitudinal rebar
- Some areas on the structure with concrete spalling

- The concrete masonry unit wall is unreinforced and has linear cracking along the perimeter of the building
- Notice the wall that is more damaged with linear crack is that is facing the north next to the new building construction
- The fence wall facing the north, next to the new building also has issues of severe linear cracking.

All the issues describing above are addressed according our visual inspections (see appendix a).

We did not find any structural as built plan or historical plan available to review.

We performed a GPR test on the wall, we noted the cells of the blocks were empty, therefore we conclude the concrete masonry walls are unreinforced. (See image 1)

Image 1. GPR on the wall.

According this fact described above, the concrete masonry walls do not comply with the current code (ACI -530-Specifications for Masonry Structures) Chapter 7.3.2.3.1.

The concrete condition is not adequate, presents damage already described above like cracking and spalling (See images in appendix a). there are some concrete tie beams that present severe damage, as ticker linear cracking and spalling exposing the reinforcement (See image 2 below).

Image 2. Remove drywall to verify the situation of the concrete tie beam

As showed image 2 above this type of damage was frequent in all the concrete lintel beams.

In this present report – Appendix d we have performed structural analysis calculation to figure out the structural capacity of the wall to compare with the design load (calculated with the current codes), based on all the information available, we got the wind pressures out of plane of the wall, to calculate the maximum bending stress ratio.

We use the current code ASCE 7-16/FBC -2020 to determine the Basic wind parameters describes below:

Wind Design Speed= 175.0 mph (Miami Dade County)- ASCE Wind Map.

Structure type = Building

Exposure = D (Open Water)

Risk Category = II (Normal)

Building type = Enclosed

According the wind basic parameters above we run calculation and get the wind pressure (w=-39.93 ASD/66.68 LRFD psf) zone 4, therefore using this load patterns we note the wall fall by moment capacity check for the following load combination: 0.9D + W.

Where D is the dead load (weight of the structure plus other super imposed loads) and W represent the wind pressure calculated. (See appendix c & d)

## V. SITE OBSERVATIONS

Walls along the perimeter of the structure presents linear cracking (close to the openings elements as windows and doors).

Concrete lintel beams present several critical linear cracking corroding the rebar reinforced.

Crawl space presents wood framing deteriorated.

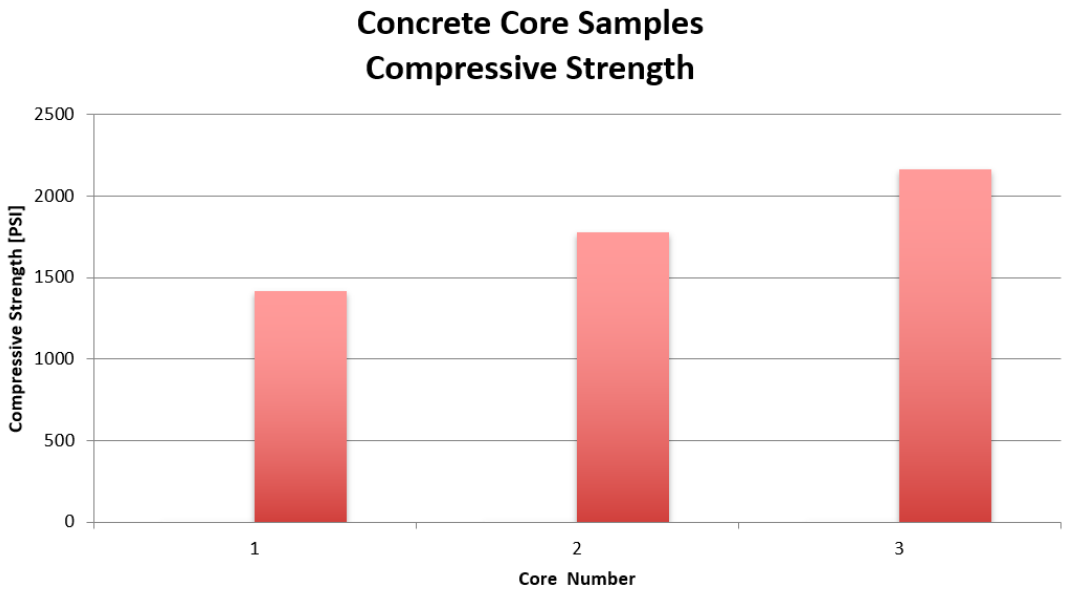
Based on the second inspection performed to extract the concrete cores to test them we note the walls is unreinforced there do not comply with the current codes and standards.

## VI. LAB CONCRETE TESTING

Ownership engaged NV5, Inc. to conduct concrete laboratory testing, on the building, to obtain compressive strength, carbonation depth and chloride content. The laboratory extracted (6) concrete cores samples of sizes of 1.5 in diameter by 3.0 in length approximately, of which (3) were used to test them for compressive and the other (3) rest were used to carbonation and chloride.

-Concrete compressive: the results of the testing for concrete strength are tabulated and charted as follows:

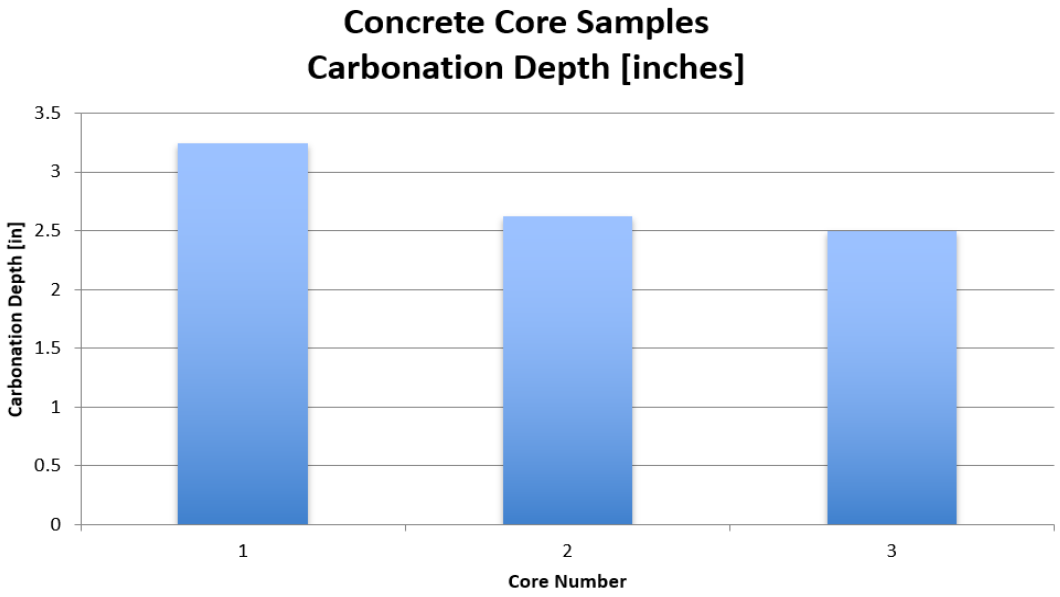
| Core Number | Compressive Strength [PSI] |
|---|---|
| 1-CS | 1420 |
| 2-CS | 1780 |
| 3-CS | 2160 |




The Concrete compressive strength ranged from 1420 to 2160 psi. Note the first concrete core 1-CS, does not comply with the current code and compliances for masonry concrete, that specify the minimum compressive strength f'c shall be at least 1,500 psi.

-Carbonation depth: Carbon dioxide from air reacts with the calcium hydroxide in concrete to form calcium carbonate, this process is called carbonation. Carbonation, naturally starts from the exterior surface and progresses inwards. Carbonation actually increases the compressive strength of concrete; however, it also decreases alkalinity, which is essential for corrosion prevention of the reinforcement steel. The results of the testing for carbonation depth are tabulated and charted as follows:

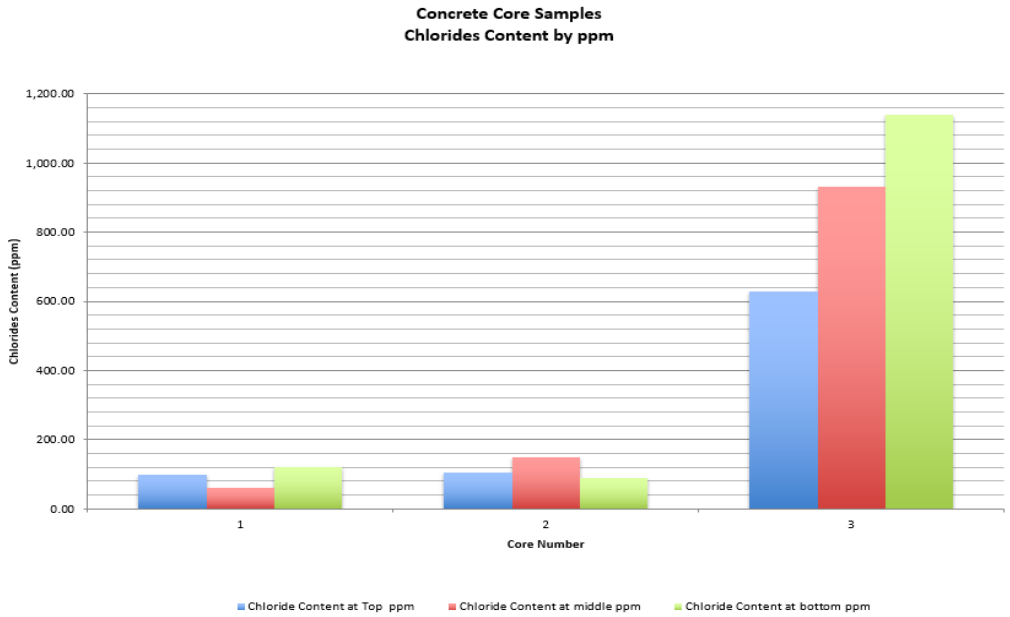
| Core Number | Carbonation Depth [inches] |
|---|---|
| 1-CH | 3.25 |
| 2-CH | 2.625 |
| 3-CH | 2.5 |




The carbonation was founded in the present samples ranged between 2 ¼" – 3 ¼", values denote the concrete mix is actually being attacked by carbonate and is deteriorating the reinforcement.

- Chloride Content: Chloride salts react with the concrete and reduce its alkalinity, when that happens, the protective layer surrounding the rebars is broken, and rebar corrsion starts, the cores were tested at the bottom, middle and top , in based on the results, the chloride conctent obteined ranged from 100 to 630 parts per million (ppm) at the top sections of the cores, from 60 to 930 ppm at the middle and from 90 to 1,140 ppm at the bottom of the section of the cores.

| Core Number | Chloride Content at Top (ppm) | Chloride Content at middle (ppm) | Chloride Content at bottom (ppm) |
|---|---|---|---|
| 1-CH | 100 | 60 | 120 |
| 2-CH | 105 | 150 | 90 |
| 3-CH | 630 | 930 | 1140 |




According to the publication 'Design and Control of Concrete Mixtures', chlorides may be introduced into concrete with the separate mix ingredients (admixtures, aggregates, cement, and mixing water) or through exposure to deicing salts, seawater, or salt laden air in coastal environments. An acceptable limit depends primarily upon the type of structure and the environment to which it is exposed during its service life. ACI 318R-14, table 19.3.2.1 shows that the maximum water-soluble chloride ion (Cl-) content in concrete (percent by weight of cement) shall be 0.30% for non-pre-stressed concrete exposed to moisture but not to an external source of chloride and 0.15% for non-pre-stressed concrete exposed to moisture and an external source of chloride from deicing chemical, salt, brackish water, seawater, or spray from these sources. 2 out of the 5 cores shows elevated values of chloride content.

## VII. CONCLUSIONS

The structure elements of the building do not comply the current code normative. (ACI - 530 & FBC 2020).

According to the structural analysis using the current codes and standards the wall will not be able to resist wind pressure for 175 mph of wind speed. (See appendix c & d).

Based on our inspection, we conclude the wall is composed by concrete masonry units and the cells of this units are empty, without grout and therefore are unreinforced. All the lintel concrete beams inspected present critical linear crack corroding the rebar reinforced.

The concrete compressive strength ranged from 1,420 to 2,160 psi. Note that one core 1-CS extracted from exterior SW Corner does not comply with the minimum strength required by the code ACI-530. (See appendix b).

The content of chloride obtained in the concrete core 3-CH exceeds the limits allowable by code (ACI 22R) which specified the limits shall be ranged from 263 ppm to 395 ppm. (See appendix b).

Carbonation was found in the samples of cores tested. (See appendix b). Notice the carbonation and chloride attack are main causes of corrosion of steel in concrete and grout.

## VIII. RECOMMENDATIONS

Based on the site observation of the conditions of the structural members of the building and level III alteration required by the Florida Building Code, the structural members of this building need to undergo extensive rehabilitation, including CMU reinforcement, lateral systems construction, and strengthening of the foundations. Moreover, repairs to the roof and spalled concrete have to be done, and foundations augmentation has to be done to remedy the settlement.

In order to raise the structure, scaffolding and temporary framing will be installed under the foundation to jack up the structure. The foundation of the house is weak enough to crumble under such loads during the jacking process, due to the footer of being on shallow foundation. Hence in order to raise the structure a complete foundation rehabilitation and redesign need to occur to sustain the jacking loads.

Level III alteration would require demolition of the corners of the house to add corner columns.

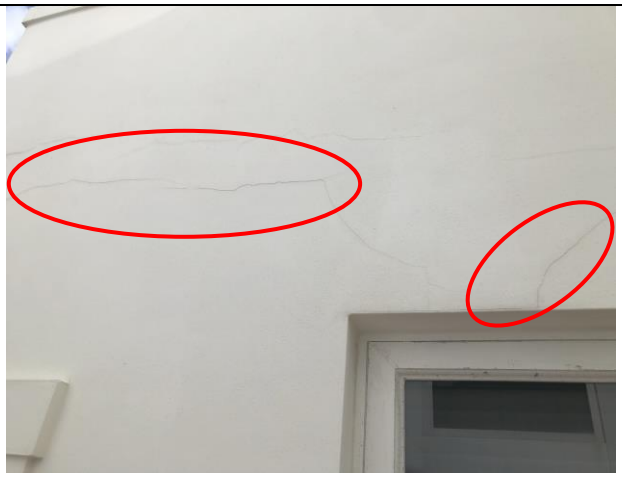
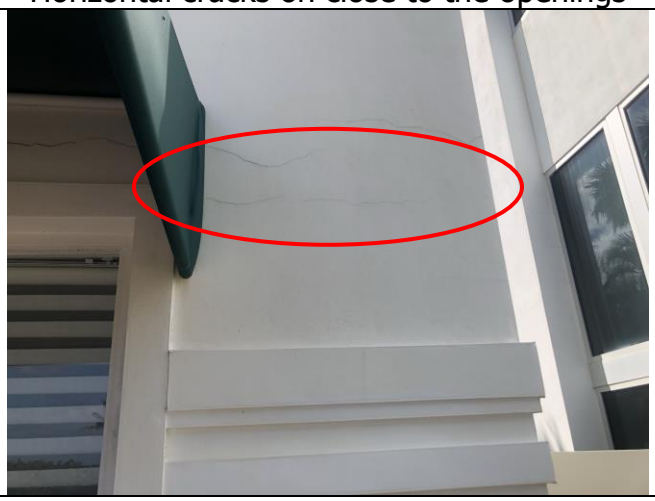
Floor ledgers (2$^{nd}$ floor) need to be installed with add to comply with the level III alteration.

Pursuant to FEMA, if the cost of the renovations exceeds 50% of the value of the structure without the land, the structure has to be elevated to meet current flood requirements. According FBC 3109.3.3 the lowest horizontal member of the first habitable floor for the existing building shall be located above 18.2 feet NGVD; therefore, raising the house up to needed elevations for compliance is not feasible, the whole structure would have to be upgraded for level III alteration required by Florida Building Code 2020 – 907.3 Existing structural elements carrying gravity loads and 907.4 Existing structural elements resisting lateral loads.

We have the professional opinion that is more safer to demolish the structure rather than renovate.

APPENDIX A

PHOTOS

| | |
|---|---|
|  |  |
| Linear Crack on the wall | Cracking on the beam and wall |
|  |  |
| Horizontal cracks on close to the openings | Concrete crack on the balcony |
|  |  |
| Linear crack on the corner | Critical Linear Crack on the lintel beam |

APPENDIX B

NV5- Report

November 10, 2021

Ms. Suzy Wahba
7801 Atlantic Way
Miami Beach, FL 33141

**Re:** **Report of Core Compressive Strength and Chemical Analysis Tests**
7801 Atlantic Way
7801 Atlantic Way
Miami Beach, Florida
NV5 Project No. 17527

Dear Ms. Wahba:

NV5, Inc. submits this report in fulfillment with the Scope of Services described in our proposal No. 21-0975 dated October 15, 2021. The work was authorized by acceptance of our professional agreement. This report contains the data collected, describes the procedures used, and presents results for the laboratory tests conducted.

## PROJECT INFORMATION

The project site is located at 7801 Atlantic Way in Miami Beach, Florida. The site is bounded to the north by a two-level residential structure, to the south by 78th Street, to the east by the Atlantic Ocean, and to the west by Atlantic Way. The site is rectangular in shape and is currently occupied by a two-level residential structure. Based on the Miami-Dade County property appraiser's webpage, the lot corresponds to Folio No. 02-3202-004-0230.

We have not been provided with any documentation or drawing related to the building itself. NV5 received a request for concrete testing by Youssef Hachem Consulting Engineering (YHCE) via email correspondence dated October 8, 2021. On October 21, 2021, NV5 met at the site with an owner's representative and YHCE personnel to conduct a site visit and identify test locations. We were requested to conduct Ground Penetrating Radar (GPR) to identify coring locations, extract concrete cores to be tested for compressive strength as well as chemical analysis tests (depth of carbonation and acid-soluble chloride content).

## FIELD WORK

On October 22, 2021, NV5 conducted a GPR scan in order to identify the presence and configuration of reinforcement steel prior to core drilling at the locations indicated below and at the approximate locations depicted in Figure 1.

1. Exterior southwest corner of building (south façade)
2. Exterior northwest corner of building (north façade)
3. Exterior northeast corner of building (north façade)


*Figure 1. Approximate location of concrete cores.*

A total of three cores, one at each location referenced above, were extracted for compressive strength testing. Similarly, one core at each location was extracted for a total of three cores for depth of carbonation and acid-soluble chloride content testing.

The core samples were bagged within the time limit indicated in ASTM C42-18 and classified for testing. The core samples were transported to our laboratory for testing.

## LABORATORY TESTING

### A. Cores - Compressive Strength

Three (3) cores samples identified as 1-CS, 2-CS, and 3-CS were extracted. The extraction and compressive strength testing of the concrete cores were performed in general accordance with ASTM C42-18, *Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete*. In general, each core was cut for appropriate test correction factor of approximately 2:1 length to diameter ratio. The core samples were capped with a high-strength capping compound (TMI CA-0100 Capping Compound) and later subjected to compressive strength testing. The compressive strength results ranged from 1,420 to 2,160 pounds per square inch (psi).

Details of the compressive strength results of the individual core samples are summarized in Appendix A - Core Compressive Strength Results.

### B. Cores – Depth of Carbonation Test

Three (3) core samples identified as 1-CH, 2-CH, and 3-CH were extracted. The cores were subjected to testing to determined Depth of Carbonation. The concrete cores were labeled and bagged separately and sent to A&S Laboratories to be tested. A specific testing method for the Depth of Carbonation testing was not provided. However, a reference to depth of carbonation testing is

included in ASTM C856-18, *Standard Practice for Petrographic Examination of Hardened Concrete.* Photographs of the depth of carbonation testing are presented in Appendix B.

Carbonation is one of the two main causes of corrosion of steel in concrete and grout; the other is chloride attack. The depth of carbonation was performed on the freshly exposed section of the core samples by spraying with an indicator spray such as phenolphthalein. The concrete core sample turns pink when the concrete is alkaline (above pH 9.2) but remains colorless where the concrete is carbonated, usually as a more-or-less even zone extending from the surface. It should be noted that the pH at which the color changes may be lower than that at which passivity has been lost. Carbonation was found present in all samples between 2 ¼" and 3 ¼" from the external face of the core.

## C. Cores – Chloride Ion Content

The same three cores identified in section B above (1-CH, 2-CH, and 3-CH) were subjected to Acid-Soluble Chloride Ion Content. The chemical analysis concrete cores were labeled and bagged separately and sent to A&S Laboratories to be tested. Chloride testing was performed in approximately equal lengths of material at the top, middle, and bottom sections of the cores in general accordance with the test method described in ASTM C1152, *Standard Test Method for Acid-Soluble Chloride in Mortar and Concrete.*

Based on the core samples tested, the chloride content obtained ranged from 100 to 630 parts per million (ppm) at the top sections of the cores, from 60 to 930 ppm at the middle sections of the cores, and from 90 to 1,140 ppm at the bottom sections of the cores. The chloride concentration of each individual sample has been included in A&S Laboratories Test Reports shown in Table 1 and in Appendix C.

**Table 1: Core Samples**
**NV5 Test Results and A&S Laboratories Chemical Test Results**

| Core Number | Core Locations | Core Compressive Strength Results (psi) | Acid-Soluble Chloride Ion Content (ppm) | | | Depth of Carbonation (in) |
|---|---|---|---|---|---|---|
| | | | Top section | Middle Section | Bottom Section | From Top |
| 1-CS | Exterior SW Corner | 1,420 | Not Tested | Not Tested | Not Tested | Not Tested |
| 1-CH | Exterior SW Corner | Not tested | 100 | 60 | 120 | 3.25 |
| 2-CS | Exterior NW Corner | 1,780 | Not Tested | Not Tested | Not Tested | Not Tested |
| 2-CH | Exterior NW Corner | Not tested | 105 | 150 | 90 | 2.625 |
| 3-CS | Exterior NE Corner | 2,160 | Not Tested | Not Tested | Not Tested | Not Tested |
| 3-CH | Exterior NE Corner | Not tested | 630 | 930 | 1,140 | 2.25 (mortar)<br>2.375 – 2.625 (concrete) |

## CLOSURE

We appreciate the opportunity to provide engineering and material testing services on this project. This report has been prepared for the exclusive use of the current project owners, and other members of the design team for the specific application to the project described in this report. This report has been prepared in accordance with generally accepted local engineering practices; no other warranty is expressed or implied.

If you have questions about information contained in this report, please contact the undersigned at 305-666-3563.

Sincerely,

**NV5, Inc.**

Esteban Rios, E.I.
Project Engineer

RICHARD FESDJIAN LICENSE No. 79312 STATE OF FLORIDA PROFESSIONAL ENGINEER

Richard Fesdjian, P.E.
Project Manager
Florida License No. 79312

This document has been digitally signed and sealed by:

Printed copies of this document are not considered signed and sealed, and the signature must be verified on any electronic copies

Distribution: Copy to Addressee via Email
Copy to NV5 File

Attachments:
Appendix A: Core Compressive Strength Report (1 page)
Appendix B: A&S Lab Report: Depth of Carbonation (3 pages)
Appendix C: A&S Lab Report: Acid-Soluble Chloride Ion Content (9 pages)

F:\DOC\NV5 Reports\17527_7801 Atlantic Way_7801 Atlantic Way, Miami Beach, FL_Concrete Core Compressive Strength, Chloride, Carbonation Test Report_Suzy Wahba_11-10-2021.docx

# APPENDIX A
# CORE COMPRESSIVE STRENGTH REPORT

14486 Commerce Way | Miami Lakes, FL 33016 | www.NV5.com | Office 305.666.3563 | Fax 305.666.3069

# CORES COMPRESSIVE STRENGTH REPORT

**NV5, INC.**
14486 COMMERCE WAY, MIAMI LAKES FL 33016
TELEPHONE NO. 305-666-3563 FAX NO.: 305-666-3069

**PROJECT NAME:** 7801 Atlantic Way **PROJECT NUMBER:** 17527 **DATE:** 11/10/2021

**CLIENT:** Suzy Wahba **SAMPLE BY:** NV5 **SET NO.:**

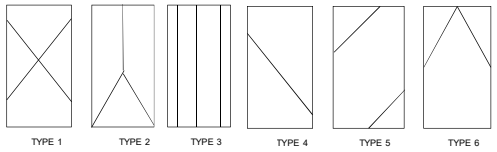
**CONTRACTOR:** N/P **SPECIFIED STRENGTH:** N/P AT 28 DAYS **PAGE NO.:** 1

**TEST METHOD:** In general accordance with ASTM C42-18 **CONCRETE SUPPLIER:** N/P

| Core Number | Core Location | Structural Element | Core Dimensions | | | | | Compressive Strength | | | | Fracture Type | Maximum Nominal Aggregate Size | Pour Date | Core Date | Preparation Date | Test Date | Core Weight (lbs.) | Core Unit Weight (lbs./ft³) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Diameter (inches) | Lengths | | | Cross Sectional Area (sq. inches) | Maximum Load (lbs.) | L/D | Correction Factor | Approx. Compressive Strength (psi) | | | | | | | | |
| | | | | Original (inches) | w/o cap (inches) | with cap (inches) | | | | | | | | | | | | | |
| 1-CS | Exterior SW Corner | Column | 1.27 | 4.00 | 2.14 | 2.34 | 1.27 | 1,800 | 1.84 | 1.0000 | **1,420** | 3 | #57 | N/P | 10/22/2021 | 10/25/2021 | 10/30/2021 | 0.24 | 150.43 |
| 2-CS | Exterior NW Corner | Column | 1.26 | 3.53 | 2.20 | 2.35 | 1.25 | 2,220 | 1.87 | 1.0000 | **1,780** | 5 | #57 | N/P | 10/22/2021 | 10/25/2021 | 10/30/2021 | 0.20 | 128.19 |
| 3-CS | Exterior NE Corner | Column | 2.73 | 5.22 | 2.08 | 2.25 | 5.85 | 14,520 | 0.82 | 0.8700 | **2,160** | 3 | #57 | N/P | 10/22/2021 | 10/25/2021 | 10/30/2021 | 0.86 | 121.84 |

Notes
1. According to ACI 318 and Note 4 of ASTM C42, "The concrete represented by the cores is considered structurally adequate if the average strength of three cores is at least 85% of the specified strength and no single core strength is less than 75% of the specified strength." Compressive strength results should be reviewed by the Engineer of Record for acceptance.
2. According to ASTM C42-20, Section 7.3.3., "Allow the cores to remain in the sealed plastic bags or nonabsorbent containers for at least 5 days after last being wetted and before testing, unless stipulated otherwise by the specified of tests."
3. Direction of load application is parallel to the axial direction of the cores. Moisture condition is bagged.
4. Due to concrete thickness restrictions, the core diameter sizes had to be reduced under the recommended diameter described by ASTM C42-18.
5. N/P = Not provided

FRACTURE TYPE



# APPENDIX B
# A&S LAB REPORT: DEPTH OF CARBONATION

# A&S LABORATORIES

*CARBONATION OF CONCRETE BY PHENOLPHTHALEIN*

DATE: 11/02/21

PROJECT: NV5 / 7801 Atlantic Way

SAMPLE DATE: N/A

SAMPLE ID: 1-CH

TOP

CARBONATION PRESENT: YES X NO

CARBONATION PRESENT AT DEPTH: 0" – 3.25"

# A&S LABORATORIES

*CARBONATION OF CONCRETE BY PHENOLPHTHALEIN*

DATE: 11/02/21

PROJECT: NV5 / 7801 Atlantic Way

SAMPLE DATE: N/A

SAMPLE ID: 2-CH

TOP

CARBONATION PRESENT: YES X NO

CARBONATION PRESENT AT DEPTH: 0" – 2 5/8"

# A&S LABORATORIES

*CARBONATION OF CONCRETE BY PHENOLPHTHALEIN*

DATE: 11/02/21

PROJECT: NV5 / 7801 Atlantic Way

SAMPLE DATE: N/A

SAMPLE ID: 3-CH

TOP

**MORTAR COVER**

CARBONATION PRESENT: YES X NO

CARBONATION PRESENT AT DEPTH: 0" – 2 1/4"

**CONCRETE**

CARBONATION PRESENT: YES X NO X

CARBONATION PRESENT AT DEPTH: 0" – 1/4"(Yes) 1/4" - 2" 3/8"(No) 2" 3/8" – 2" 5/8"(Yes)

# APPENDIX C
# A&S LAB REPORT: ACID-SOLUBLE CHLORIDE ION CONTENT

APPENDIX C

Wind Analysis

**A & S Laboratories**
**2550 Success Dr.**
**Odessa, FL 33556**
**Phone: (727)375-0388**

## TEST REPORT

| | |
|---|---|
| A & S Project Number: | 111868 |
| Purchase Order Number | N/A |
| Customer: | NV5 |
| Plant: | None |
| Attention: | Richard Fesdjian |

The results of tests performed in accordance with ASTM C1152 Acid Soluble Chloride in Mortar and Concrete are as follows:

| | |
|---|---|
| Client ID Number: | 1-CH |
| Mix Number: | top 0-1 1/16" |
| Project Number: | N/A |
| Class: | N/A |
| Date Sample Cast: | 11/5/2021 |
| Date Sample Tested: | 11/9/2021 |
| Core Weight (lbs./c.y.): | 4,000 |
| Cement Weight (lbs.): | 0 |
| Chloride Content (mg/kg) | 100 ppm |
| Percent Chloride Content: | 0.0100% |
| Percent Chloride by Mass of Cement: | N/A |

Gregory P. Allen
Lab Director

**A & S Laboratories**
**2550 Success Dr.**
**Odessa, FL 33556**
**Phone: (727)375-0388**

## TEST REPORT

| | |
|---|---|
| A & S Project Number: | 111869 |
| Purchase Order Number | N/A |
| Customer: | NV5 |
| Plant: | None |
| Attention: | Richard Fesdjian |

The results of tests performed in accordance with ASTM C1152 Acid Soluble Chloride in Mortar and Concrete are as follows:

| | |
|---|---|
| Client ID Number: | 1-CH |
| Mix Number: | mid 1 1/16-2 1/8" |
| Project Number: | 7801 Atlantic Way |
| Class: | N/A |
| Date Sample Cast: | 11/5/2021 |
| Date Sample Tested: | 11/9/2021 |
| Core Weight (lbs./c.y.): | 4,000 |
| Cement Weight (lbs.): | 0 |
| Chloride Content (mg/kg) | 60 ppm |
| Percent Chloride Content: | 0.0060% |
| Percent Chloride by Mass of Cement: | N/A |

Gregory P. Allen
Lab Director

**A & S Laboratories**
**2550 Success Dr.**
**Odessa, FL 33556**
**Phone: (727)375-0388**

## TEST REPORT

| | |
|---|---|
| A & S Project Number: | 111870 |
| Purchase Order Number | N/A |
| Customer: | NV5 |
| Plant: | None |
| Attention: | Richard Fesdjian |

The results of tests performed in accordance with ASTM C1152 Acid Soluble Chloride in Mortar and Concrete are as follows:

| | |
|---|---|
| Client ID Number: | 1-CH |
| Mix Number: | bott 2 1/8-3 3/16" |
| Project Number: | 7801 Atlantic Way |
| Class: | N/A |
| Date Sample Cast: | 11/5/2021 |
| Date Sample Tested: | 11/9/2021 |
| Core Weight (lbs./c.y.): | 4,000 |
| Cement Weight (lbs.): | 0 |
| Chloride Content (mg/kg) | 120 ppm |
| Percent Chloride Content: | 0.0120% |
| Percent Chloride by Mass of Cement: | N/A |

Gregory P. Allen
Lab Director

**A & S Laboratories**
**2550 Success Dr.**
**Odessa, FL 33556**
**Phone: (727)375-0388**

## TEST REPORT

| | |
|---|---|
| A & S Project Number: | 111871 |
| Purchase Order Number | N/A |
| Customer: | NV5 |
| Plant: | None |
| Attention: | Richard Fesdjian |

The results of tests performed in accordance with ASTM C1152 Acid Soluble Chloride in Mortar and Concrete are as follows:

| | |
|---|---|
| Client ID Number: | 2-CH |
| Mix Number: | top 0-15/16" |
| Project Number: | 7801 Atlantic Way |
| Class: | N/A |
| Date Sample Cast: | 11/5/2021 |
| Date Sample Tested: | 11/9/2021 |
| Core Weight (lbs./c.y.): | 4,000 |
| Cement Weight (lbs.): | 0 |
| Chloride Content (mg/kg) | 105 ppm |
| Percent Chloride Content: | 0.0105% |
| Percent Chloride by Mass of Cement: | N/A |

Gregory P. Allen
Lab Director

**A & S Laboratories**
**2550 Success Dr.**
**Odessa, FL 33556**
**Phone: (727)375-0388**

## TEST REPORT

| | |
|---|---|
| A & S Project Number: | 111872 |
| Purchase Order Number | N/A |
| Customer: | NV5 |
| Plant: | None |
| Attention: | Richard Fesdjian |

The results of tests performed in accordance with ASTM C1152 Acid Soluble Chloride in Mortar and Concrete are as follows:

| | |
|---|---|
| Client ID Number: | 2-CH |
| Mix Number: | mid 15/16-1 7/8" |
| Project Number: | 7801 Atlantic Way |
| Class: | N/A |
| Date Sample Cast: | 11/5/2021 |
| Date Sample Tested: | 11/9/2021 |
| Core Weight (lbs./c.y.): | 4,000 |
| Cement Weight (lbs.): | 0 |
| Chloride Content (mg/kg) | 150 ppm |
| Percent Chloride Content: | 0.0150% |
| Percent Chloride by Mass of Cement: | N/A |

Gregory P. Allen
Lab Director

**A & S Laboratories**
**2550 Success Dr.**
**Odessa, FL 33556**
**Phone: (727)375-0388**

## TEST REPORT

| | |
|---|---|
| A & S Project Number: | 111873 |
| Purchase Order Number | N/A |
| Customer: | NV5 |
| Plant: | None |
| Attention: | Richard Fesdjian |

The results of tests performed in accordance with ASTM C1152 Acid Soluble Chloride in Mortar and Concrete are as follows:

| | |
|---|---|
| Client ID Number: | 2-CH |
| Mix Number: | bott 1 7/8-2 13/16" |
| Project Number: | 7801 Atlantic Way |
| Class: | N/A |
| Date Sample Cast: | 11/5/2021 |
| Date Sample Tested: | 11/9/2021 |
| Core Weight (lbs./c.y.): | 4,000 |
| Cement Weight (lbs.): | 0 |
| Chloride Content (mg/kg) | 90 ppm |
| Percent Chloride Content: | 0.0090% |
| Percent Chloride by Mass of Cement: | N/A |

Gregory P. Allen
Lab Director

**A & S Laboratories**
**2550 Success Dr.**
**Odessa, FL 33556**
**Phone: (727)375-0388**

## TEST REPORT

| | |
|---|---|
| A & S Project Number: | 111874 |
| Purchase Order Number | N/A |
| Customer: | NV5 |
| Plant: | None |
| Attention: | Richard Fesdjian |

The results of tests performed in accordance with ASTM C1152 Acid Soluble Chloride in Mortar and Concrete are as follows:

| | |
|---|---|
| Client ID Number: | 3-CH |
| Mix Number: | top 0-7/8" |
| Project Number: | 7801 Atlantic Way |
| Class: | N/A |
| Date Sample Cast: | 11/5/2021 |
| Date Sample Tested: | 11/9/2021 |
| Core Weight (lbs./c.y.): | 4,000 |
| Cement Weight (lbs.): | 0 |
| Chloride Content (mg/kg) | 630 ppm |
| Percent Chloride Content: | 0.0630% |
| Percent Chloride by Mass of Cement: | N/A |

Gregory P. Allen
Lab Director

**A & S Laboratories**
**2550 Success Dr.**
**Odessa, FL 33556**
**Phone: (727)375-0388**

## TEST REPORT

| | |
|---|---|
| A & S Project Number: | 111875 |
| Purchase Order Number | N/A |
| Customer: | NV5 |
| Plant: | None |
| Attention: | Richard Fesdjian |

The results of tests performed in accordance with ASTM C1152 Acid Soluble Chloride in Mortar and Concrete are as follows:

| | |
|---|---|
| Client ID Number: | 3-CH |
| Mix Number: | mid 7/8-1 3/4" |
| Project Number: | 7801 Atlantic Way |
| Class: | N/A |
| Date Sample Cast: | 11/5/2021 |
| Date Sample Tested: | 11/9/2021 |
| Core Weight (lbs./c.y.): | 4,000 |
| Cement Weight (lbs.): | 0 |
| Chloride Content (mg/kg) | 930 ppm |
| Percent Chloride Content: | 0.0930% |
| Percent Chloride by Mass of Cement: | N/A |

Gregory P. Allen
Lab Director

**A & S Laboratories**
**2550 Success Dr.**
**Odessa, FL 33556**
**Phone: (727)375-0388**

## TEST REPORT

| | |
|---|---|
| A & S Project Number: | 111876 |
| Purchase Order Number | N/A |
| Customer: | NV5 |
| Plant: | None |
| Attention: | Richard Fesdjian |

The results of tests performed in accordance with ASTM C1152 Acid Soluble Chloride in Mortar and Concrete are as follows:

| | |
|---|---|
| Client ID Number: | 3-CH |
| Mix Number: | bott 1 3/4-2 5/8" |
| Project Number: | 7801 Atlantic Way |
| Class: | N/A |
| Date Sample Cast: | 11/5/2021 |
| Date Sample Tested: | 11/9/2021 |
| Core Weight (lbs./c.y.): | 4,000 |
| Cement Weight (lbs.): | 0 |
| Chloride Content (mg/kg) | 1,140 ppm |
| Percent Chloride Content: | 0.1140% |
| Percent Chloride by Mass of Cement: | N/A |

Gregory P. Allen
Lab Director

# MecaWind v2396



| Calculations Prepared by: | Calculations Prepared For: |
|---|---|
| YHCE | Client: 0 |
| Date: Nov 01, 2021 | Project #: 0 |
| Designer: 0 | Location: 0 |

File Location : Y:\2021\TEMP\7801 Atlantic Way\Win_Analysis_House.wnd

**Basic Wind Parameters**

| | | | |
|---|---|---|---|
| Wind Load Standard | = ASCE 7-16 | Exposure Category | = D |
| Wind Design Speed | = 175.0 mph | Risk Category | = II |
| Structure Type | = Building | Building Type | = Enclosed |

**General Wind Settings**

| | | |
|---|---|---|
| Incl_LF | = Include ASD Load Factor of 0.6 in Pressures | = True |
| DynType | = Dynamic Type of Structure | = Rigid |
| Zg | = Altitude (Ground Elevation) above Sea Level | = 0.000 ft |
| Bdist | = Base Elevation of Structure | = 0.000 ft |
| SDB | = Simple Diaphragm Building | = True |
| Reacs | = Show the Base Reactions in the output | = False |
| MWFRSType | = MWFRS Method Selected | = Ch 27 Pt 1 |

**Topographic Factor per Fig 26.8-1**

| | | |
|---|---|---|
| Topo | = Topographic Feature | = None |
| Kzt | = Topographic Factor | = 1.000 |

**Building Inputs**

| | | | |
|---|---|---|---|
| Roof : Building Roof Type | = Monoslope | W : Width Perp to Ridge | = 41.000 ft |
| L : Length Along Ridge | = 71.000 ft | EHt : Eave Height | = 23.000 ft |
| RE : Roof Entry Method | = Slope | Slope: Slope of Roof | = 0.0 :12 |
| Theta: Roof Slope | = 0.0 Deg | Par : Is there a Parapet | = False |

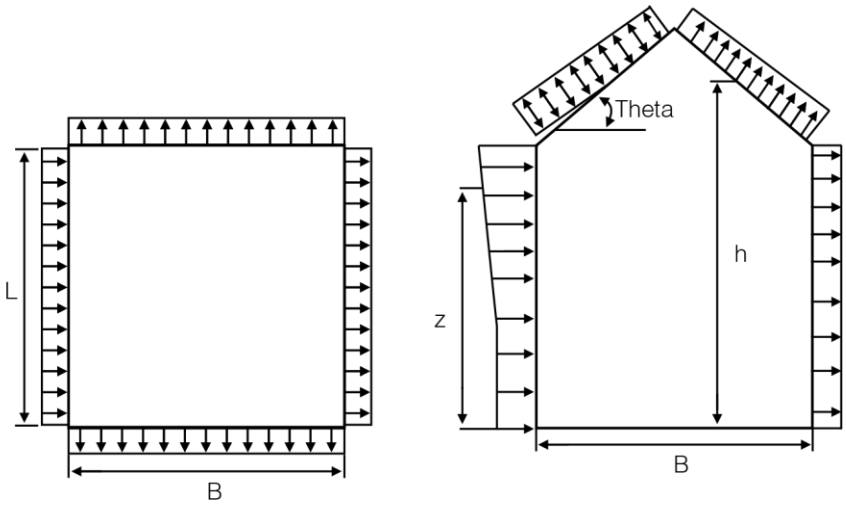
**Exposure Constants per Table 26.11-1:**

| | | | |
|---|---|---|---|
| Alpha: Table 26.11-1 Const | = 11.500 | Zg: Table 26.11-1 Const | = 700.000 ft |
| At: Table 26.11-1 Const | = 0.087 | Bt: Table 26.11-1 Const | = 1.070 |
| Am: Table 26.11-1 Const | = 0.111 | Bm: Table 26.11-1 Const | = 0.800 |
| C: Table 26.11-1 Const | = 0.150 | Eps: Table 26.11-1 Const | = 0.125 |

**Overhang Inputs:**

| | | |
|---|---|---|
| Std | = Overhangs on all sides are the same | = True |
| OHType | = Type of Roof Wall Intersections | = None |

**Main Wind Force Resisting System (MWFRS) Calculations per Ch 27 Part 1:**




| | | |
|---|---|---|
| h | = Mean Roof Height above grade | = 23.000 ft |
| Kh | = 15 ft [4.572 m]< Z <Zg -->(2.01*(Z/zg)^(2/Alpha) {Table 26.10-1} | = 1.110 |
| Kzt | = Topographic Factor is 1 since no Topographic feature specified | = 1.000 |
| Kd | = Wind Directionality Factor per Table 26.6-1 | = 0.85 |
| Zg | = Elevation above Sea Level | = 0.000 ft |
| Ke | = Ground Elevation Factor: Ke = e^-(0.0000362*Zg) {Table 26.9-1} | = 1.000 |
| GCPi | = Ref Table 26.13-1 for Enclosed Building | = +/-0.18 |
| RA | = Roof Area | = 2911.00 sq ft |

```
LF        = Load Factor based upon ASD Design                                  = 0.60
qh        = (0.00256 * Kh * Kzt * Kd * Ke * V^2) * LF                          = 44.37 psf
qin       = For Negative Internal Pressure of Enclosed Building use qh*LF      = 44.37 psf
qip       = For Positive Internal Pressure of Enclosed Building use qh*LF      = 44.37 psf
```

**Gust Factor Calculation:**

```
Gust Factor Category I Rigid Structures - Simplified Method
G1        = For Rigid Structures (Nat. Freq.>1 Hz) use 0.85                    = 0.85
Gust Factor Category II Rigid Structures - Complete Analysis
Zm        = 0.6 * Ht                                                           = 13.800 ft
Izm       = Cc * (33 / Zm) ^ 0.167                                             = 0.173
Lzm       = L * (Zm / 33) ^ Epsilon                                            = 582.887
Q         = (1 / (1 + 0.63 * ((B + Ht) / Lzm)^0.63))^0.5                       = 0.930
G2        = 0.925*((1+1.7*lzm*3.4*Q)/(1+1.7*3.4*lzm))                          = 0.893
Gust Factor Used in Analysis
G         = Lessor Of G1 Or G2                                                 = 0.850
```

**MWFRS Wind Normal to Ridge (Ref Fig 27.3-1}**

```
h         = Mean Roof Height Of Building                                       = 23.000 ft
RHt       = Ridge Height Of Roof                                               = 23.000 ft
B         = Horizontal Dimension Of Building Normal To Wind Direction          = 71.000 ft
L         = Horizontal Dimension Of building Parallel To Wind Direction        = 41.000 ft
L/B       = Ratio Of L/B used For Cp determination                             = 0.577
h/L       = Ratio Of h/L used For Cp determination                             = 0.561
Slope     = Slope of Roof                                                      = 0.0 Deg
Roof      = **Roof Coeff (0 to h/2) (0.000 ft to 11.500 ft)                    = -0.18, -0.917
Roof      = Roof Coeff (h/2 to h) (11.500 ft to 23.000 ft)                     = -0.18, -0.876
Roof      = Roof Coeff (h to 2h) (23.000 ft to 41.000 ft)                      = -0.18, -0.524
**Includes Reduction Factor 0.8 For roof area, applied To Cp=-1.3 For h/L>=1 & (0 To h/2)

Cp_WW     = Windward Wall Coefficient (All L/B Values)                         = 0.80
Cp_LW     = Leward Wall Coefficient using L/B                                  = -0.50
Cp_SW     = Side Wall Coefficient (All L/B values)                             = -0.70
GCpn_WW   = Parapet Combined Net Pressure Coefficient (Windward Parapet)       = 1.50
GCpn_LW   = Parapet Combined Net Pressure Coefficient (Leeward Parapet)        = -1.00
```

**Wall Wind Pressures based On Positive Internal Pressure (+GCPi) - Normal to Ridge**
**All wind pressures include a load factor of 0.6**

| Elev ft | Kz | Kzt | qz psf | GCPi Windward | GCPi Leeward | Windward Press psf | Leeward Press psf | Side Press psf | Total Press psf | Minimum Pressure* psf |
|---|---|---|---|---|---|---|---|---|---|---|
| 23.00 | 1.110 | 1.000 | 44.37 | 0.18 | 0.18 | 22.19 | -26.84 | -34.39 | 49.03 | 9.60 |

**Wall Wind Pressures based on Negative Internal Pressure (-GCPi) - Normal to Ridge**
**All wind pressures include a load factor of 0.6**

| Elev ft | Kz | Kzt | qz psf | GCPi Windward | GCPi Leeward | Windward Press psf | Leeward Press psf | Side Press psf | Total Press psf | Minimum Pressure* psf |
|---|---|---|---|---|---|---|---|---|---|---|
| 23.00 | 1.110 | 1.000 | 44.37 | -0.18 | -0.18 | 38.16 | -10.87 | -18.41 | 49.03 | 9.60 |

```
Notes Wall Pressures:
Kz        = Velocity Press Exp Coeff          Kzt      = Topographical Factor
qz        = 0.00256*Kz*Kzt*Kd*V^2             GCPi     = Internal Press Coefficient
Side      = qh * G * Cp_SW - qip * +GCPi      Windward = qz * G * Cp_WW - qip * +GCPi
Leeward   = qh * G * Cp_LW - qip * +GCPi      Total    = Windward Press - Leeward Press
* Minimum Pressure: Para 27.1.5 no less than 9.60 psf (Incl LF) applied to Walls
+ Pressures Acting TOWARD Surface           - Pressures Acting AWAY from Surface
```

**Roof Wind Pressures for Positive & Negative Internal Pressure (+/- GCPi) - Normal to Ridge**
**All wind pressures include a load factor of 0.6**

| Roof Var | Start Dist ft | End Dist ft | Cp_min | Cp_max | GCPi | Pressure Pn_min* psf | Pressure Pp_min* psf | Pressure Pn_max psf | Pressure Pp_max psf |
|---|---|---|---|---|---|---|---|---|---|
| Roof (All) | 0.000 | 11.500 | -0.180 | -0.917 | 0.180 | 1.20 | -14.78 | -26.60 | -42.58 |
| Roof (All) | 11.500 | 23.000 | -0.180 | -0.876 | 0.180 | 1.20 | -14.78 | -25.04 | -41.01 |
| Roof (All) | 23.000 | 41.000 | -0.180 | -0.524 | 0.180 | 1.20 | -14.78 | -11.79 | -27.76 |

```
Notes Roof Pressures:
Start Dist = Start Dist from Windward Edge  End Dist = End Dist from Windward Edge
Cp_Max     = Largest Coefficient Magnitude  Cp_Min   = Smallest Coefficient Magnitude
Pp_max     = qh*G*Cp_max - qip*(+GCPi)      Pn_max   = qh*G*Cp_max - qin*(-GCPi)
Pp_min*    = qh*G*Cp_min - qip*(+GCPi)      Pn_min*  = qh*G*Cp_min - qin*(-GCPi)
```

OH = Overhang  X = Dir along Ridge  Y = Dir Perpendcular to Ridge  Z = Vertical
* The smaller uplift pressures due to Cp_Min can become critical when wind is combined with roof live load or snow load; load combinations are given in ASCE 7
+ Pressures Acting TOWARD Surface  - Pressures Acting AWAY from Surface

**MWFRS Wind Normal to Eave (Ref Fig 27.3-1)**

| | | |
|---|---|---|
| h | = Mean Roof Height Of Building | = 23.000 ft |
| RHt | = Ridge Height Of Roof | = 23.000 ft |
| B | = Horizontal Dimension Of Building Normal To Wind Direction | = 71.000 ft |
| L | = Horizontal Dimension Of building Parallel To Wind Direction | = 41.000 ft |
| L/B | = Ratio Of L/B used For Cp determination | = 0.577 |
| h/L | = Ratio Of h/L used For Cp determination | = 0.561 |
| Slope | = Slope of Roof | = 0.0 Deg |
| Roof | = **Roof Coeff (0 to h/2) (0.000 ft to 11.500 ft) | = -0.18, -0.917 |
| Roof | = Roof Coeff (h/2 to h) (11.500 ft to 23.000 ft) | = -0.18, -0.876 |
| Roof | = Roof Coeff (h to 2h) (23.000 ft to 41.000 ft) | = -0.18, -0.524 |

**Includes Reduction Factor 0.8 For roof area, applied To Cp=-1.3 For h/L>=1 & (0 To h/2)

| | | |
|---|---|---|
| Cp_WW | = Windward Wall Coefficient (All L/B Values) | = 0.80 |
| Cp_LW | = Leward Wall Coefficient using L/B | = -0.50 |
| Cp_SW | = Side Wall Coefficient (All L/B values) | = -0.70 |
| GCpn_WW | = Parapet Combined Net Pressure Coefficient (Windward Parapet) | = 1.50 |
| GCpn_LW | = Parapet Combined Net Pressure Coefficient (Leeward Parapet) | = -1.00 |

**Wall Wind Pressures based On Positive Internal Pressure (+GCPi) - Normal to Eave**
**All wind pressures include a load factor of 0.6**

| Elev ft | Kz | Kzt | qz psf | GCPi Windward | GCPi Leeward | Windward Press psf | Leeward Press psf | Side Press psf | Total Press psf | Minimum Pressure* psf |
|---|---|---|---|---|---|---|---|---|---|---|
| 23.00 | 1.110 | 1.000 | 44.37 | 0.18 | 0.18 | 22.19 | -26.84 | -34.39 | 49.03 | 9.60 |

**Wall Wind Pressures based on Negative Internal Pressure (-GCPi) - Normal to Eave**
**All wind pressures include a load factor of 0.6**

| Elev ft | Kz | Kzt | qz psf | GCPi Windward | GCPi Leeward | Windward Press psf | Leeward Press psf | Side Press psf | Total Press psf | Minimum Pressure* psf |
|---|---|---|---|---|---|---|---|---|---|---|
| 23.00 | 1.110 | 1.000 | 44.37 | -0.18 | -0.18 | 38.16 | -10.87 | -18.41 | 49.03 | 9.60 |

Notes Wall Pressures:
Kz = Velocity Press Exp Coeff  Kzt = Topographical Factor
qz = 0.00256*Kz*Kzt*Kd*V^2  GCPi = Internal Press Coefficient
Side = qh * G * Cp_SW - qip * +GCPi  Windward = qz * G * Cp_WW - qip * +GCPi
Leeward = qh * G * Cp_LW - qip * +GCPi  Total = Windward Press - Leeward Press
* Minimum Pressure: Para 27.1.5 no less than 9.60 psf (Incl LF) applied to Walls
+ Pressures Acting TOWARD Surface  - Pressures Acting AWAY from Surface

**Roof Wind Pressures for Positive & Negative Internal Pressure (+/- GCPi) - Normal to Eave**
**All wind pressures include a load factor of 0.6**

| Roof Var | Start Dist ft | End Dist ft | Cp_min | Cp_max | GCPi | Pressure Pn_min* psf | Pressure Pp_min* psf | Pressure Pn_max psf | Pressure Pp_max psf |
|---|---|---|---|---|---|---|---|---|---|
| Roof (All) | 0.000 | 11.500 | -0.180 | -0.917 | 0.180 | 1.20 | -14.78 | -26.60 | -42.58 |
| Roof (All) | 11.500 | 23.000 | -0.180 | -0.876 | 0.180 | 1.20 | -14.78 | -25.04 | -41.01 |
| Roof (All) | 23.000 | 41.000 | -0.180 | -0.524 | 0.180 | 1.20 | -14.78 | -11.79 | -27.76 |

Notes Roof Pressures:
Start Dist = Start Dist from Windward Edge  End Dist = End Dist from Windward Edge
Cp_Max = Largest Coefficient Magnitude  Cp_Min = Smallest Coefficient Magnitude
Pp_max = qh*G*Cp_max - qip*(+GCPi)  Pn_max = qh*G*Cp_max - qin*(-GCpi)
Pp_min* = qh*G*Cp_min - qip*(+GCPi)  Pn_min* = qh*G*Cp_min - qin*(-GCPi)
OH = Overhang  X = Dir along Ridge  Y = Dir Perpendcular to Ridge  Z = Vertical
* The smaller uplift pressures due to Cp_Min can become critical when wind is combined with roof live load or snow load; load combinations are given in ASCE 7
+ Pressures Acting TOWARD Surface  - Pressures Acting AWAY from Surface

**MWFRS Wind Parallel to Ridge (Ref Fig 27.3-1)**

| | | |
|---|---|---|
| h | = Mean Roof Height Of Building | = 23.000 ft |
| RHt | = Ridge Height Of Roof | = 23.000 ft |
| B | = Horizontal Dimension Of Building Normal To Wind Direction | = 41.000 ft |

```
L         = Horizontal Dimension Of building Parallel To Wind Direction     = 71.000 ft
L/B       = Ratio Of L/B used For Cp determination                           = 1.732
h/L       = Ratio Of h/L used For Cp determination                           = 0.324
Slope     = Slope of Roof                                                   = 0.0 Deg
Roof      = Roof Coeff (0 to h/2) (0.000 ft to 11.500 ft)                   = -0.18, -0.9
Roof      = Roof Coeff (h/2 to h) (11.500 ft to 23.000 ft)                  = -0.18, -0.9
Roof      = Roof Coeff (h to 2h) (23.000 ft to 46.000 ft)                   = -0.18, -0.5
Roof      = Roof Coeff (>2h) (>46.000 ft)                                   = -0.18, -0.3

Cp_WW     = Windward Wall Coefficient (All L/B Values)                      = 0.80
Cp_LW     = Leward Wall Coefficient using L/B                               = -0.35
Cp_SW     = Side Wall Coefficient (All L/B values)                          = -0.70
GCpn_WW   = Parapet Combined Net Pressure Coefficient (Windward Parapet)    = 1.50
GCpn_LW   = Parapet Combined Net Pressure Coefficient (Leeward Parapet)     = -1.00
```

**Wall Wind Pressures based On Positive Internal Pressure (+GCPi) - Parallel to Ridge**
**All wind pressures include a load factor of 0.6**

| Elev ft | Kz | Kzt | qz psf | GCPi Windward | GCPi Leeward | Windward Press psf | Leeward Press psf | Side Press psf | Total Press psf | Minimum Pressure* psf |
|---|---|---|---|---|---|---|---|---|---|---|
| 23.00 | 1.110 | 1.000 | 44.37 | 0.18 | 0.18 | 22.19 | -21.33 | -34.39 | 43.51 | 9.60 |

**Wall Wind Pressures based on Negative Internal Pressure (-GCPi) - Parallel to Ridge**
**All wind pressures include a load factor of 0.6**

| Elev ft | Kz | Kzt | qz psf | GCPi Windward | GCPi Leeward | Windward Press psf | Leeward Press psf | Side Press psf | Total Press psf | Minimum Pressure* psf |
|---|---|---|---|---|---|---|---|---|---|---|
| 23.00 | 1.110 | 1.000 | 44.37 | -0.18 | -0.18 | 38.16 | -5.35 | -18.41 | 43.51 | 9.60 |

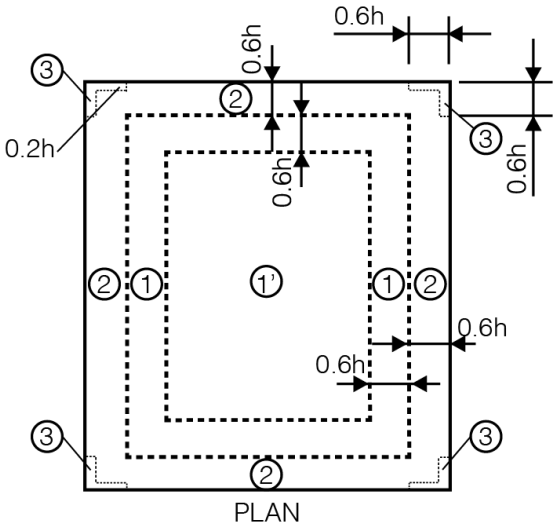
Notes Wall Pressures:
Kz = Velocity Press Exp Coeff — Kzt = Topographical Factor
qz = 0.00256*Kz*Kzt*Kd*V^2 — GCPi = Internal Press Coefficient
Side = qh * G * Cp_SW - qip * +GCPi — Windward = qz * G * Cp_WW - qip * +GCPi
Leeward = qh * G * Cp_LW - qip * +GCPi — Total = Windward Press - Leeward Press
* Minimum Pressure: Para 27.1.5 no less than 9.60 psf (Incl LF) applied to Walls
+ Pressures Acting TOWARD Surface — - Pressures Acting AWAY from Surface

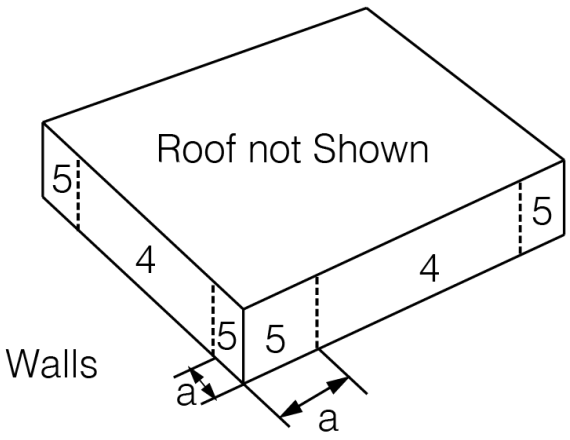
**Roof Wind Pressures for Positive & Negative Internal Pressure (+/- GCPi) - Parallel to Ridge**
**All wind pressures include a load factor of 0.6**

| Roof Var | Start Dist ft | End Dist ft | Cp_min | Cp_max | GCPi | Pressure Pn_min* psf | Pressure Pp_min* psf | Pressure Pn_max psf | Pressure Pp_max psf |
|---|---|---|---|---|---|---|---|---|---|
| Roof (All) | 0.000 | 11.500 | -0.180 | -0.900 | 0.180 | 1.20 | -14.78 | -25.96 | -41.93 |
| Roof (All) | 11.500 | 23.000 | -0.180 | -0.900 | 0.180 | 1.20 | -14.78 | -25.96 | -41.93 |
| Roof (All) | 23.000 | 46.000 | -0.180 | -0.500 | 0.180 | 1.20 | -14.78 | -10.87 | -26.84 |
| Roof (All) | 46.000 | 71.000 | -0.180 | -0.300 | 0.180 | 1.20 | -14.78 | -3.33 | -19.30 |

Notes Roof Pressures:
Start Dist = Start Dist from Windward Edge — End Dist = End Dist from Windward Edge
Cp_Max = Largest Coefficient Magnitude — Cp_Min = Smallest Coefficient Magnitude
Pp_max = qh*G*Cp_max - qip*(+GCPi) — Pn_max = qh*G*Cp_max - qin*(-GCpi)
Pp_min* = qh*G*Cp_min - qip*(+GCPi) — Pn_min* = qh*G*Cp_min - qin*(-GCPi)
OH = Overhang X = Dir along Ridge Y = Dir Perpendcular to Ridge Z = Vertical
* The smaller uplift pressures due to Cp_Min can become critical when wind is combined with roof live load or snow load; load combinations are given in ASCE 7
+ Pressures Acting TOWARD Surface — - Pressures Acting AWAY from Surface

**Components and Cladding (C&C) Calculations per Ch 30 Part 1:**




| | | |
|---|---|---|
| h/W | = Ratio of mean roof height to building width | = 0.561 |
| h/L | = Ratio of mean roof height to building length | = 0.324 |
| h | = Mean Roof Height above grade | = 23.000 ft |
| Kh | = 15 ft [4.572 m]< Z <Zg -->(2.01*(Z/zg)^(2/Alpha) {Table 26.10-1} | = 1.110 |
| Kzt | = Topographic Factor is 1 since no Topographic feature specified | = 1.000 |
| Kd | = Wind Directionality Factor per Table 26.6-1 | = 0.85 |
| GCPi | = Ref Table 26.13-1 for Enclosed Building | = +/-0.18 |
| LF | = Load Factor based upon ASD Design | = 0.60 |
| qh | = (0.00256 * Kh * Kzt * Kd * Ke * V^2) * LF | = 44.37 psf |
| LHD | = Least Horizontal Dimension: Min(B, L) | = 41.000 ft |
| a1 | = Min(0.1 * LHD, 0.4 * h) | = 4.100 ft |
| a | = Max(a1, 0.04 * LHD, 3 ft [0.9 m]) | = 4.100 ft |
| h/B | = Ratio of mean roof height to least hor dim: h / B | = 0.561 |

**C&C entries with Zones which are Not Applicable to Ch 30 Pt 1 and/or Building Selections**

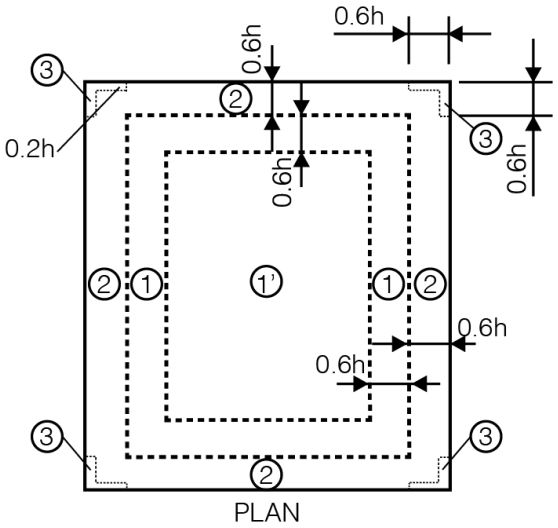
| Description | Zone | Width | Span Length |
|---|---|---|---|
| | | ft | ft |
| Zone 1_OH | 1_OH | 1.000 | 1.000 |
| Zone 1'_OH | 1'_OH | 1.000 | 1.000 |
| Zone 2_OH | 2_OH | 1.000 | 1.000 |
| Zone 3_OH | 3_OH | 1.000 | 1.000 |

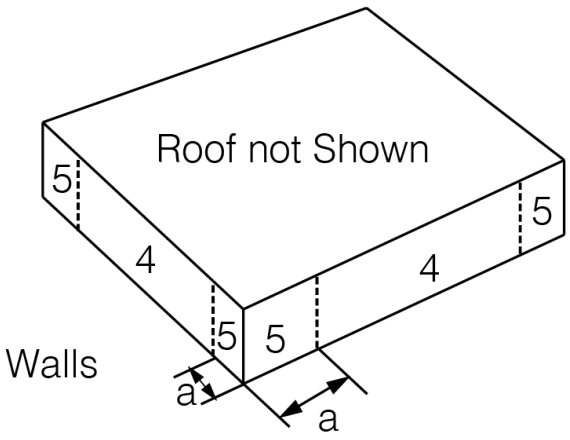
**Wind Pressures for C&C Ch 30 Pt 1**
**All wind pressures include a load factor of 0.6**

| Description | Zone | Width | Span | Area | 1/3 Rule | Ref Fig | GCp Max | GCp Min | p Max | p Min |
|---|---|---|---|---|---|---|---|---|---|---|
| ft | | ft | ft | sq ft | | | | | psf | psf |
| Zone 1 | 1 | 1.000 | 1.000 | 1.00 | No | 30.3-2A | 0.300 | -1.700 | 21.30 | -83.42 |
| Zone 1' | 1' | 1.000 | 1.000 | 1.00 | No | 30.3-2A | 0.300 | -0.900 | 21.30 | -47.92 |
| Zone 2 | 2 | 1.000 | 1.000 | 1.00 | No | 30.3-2A | 0.300 | -2.300 | 21.30 | -110.04 |
| Zone 3 | 3 | 1.000 | 1.000 | 1.00 | No | 30.3-2A | 0.300 | -3.200 | 21.30 | -149.98 |
| Zone 4 | 4 | 1.000 | 1.000 | 1.00 | No | 30.3-1 | 0.900 | -0.990 | 47.92 | -51.91 |
| Zone 5 | 5 | 1.000 | 1.000 | 1.00 | No | 30.3-1 | 0.900 | -1.260 | 47.92 | -63.90 |

Area = Span Length x Effective Width
1/3 Rule = Effective width need not be less than 1/3 of the span length
GCp = External Pressure Coefficients taken from Figures 30.3-1 through 30.3-7
p = Wind Pressure: qh*(GCp - GCpi) [Eqn 30.3-1]*
* Per Para 30.2.2 the Minimum Pressure for C&C is 9.60 psf [0.460 kPa] {Includes LF}
Since Roof Slope <= 10 Deg, the GCp value is reduced by 10%

**Components and Cladding (C&C) Zone Summary per Ch 30 Pt 1:**




| | | |
|---|---|---|
| h/W | = Ratio of mean roof height to building width | = 0.561 |
| h/L | = Ratio of mean roof height to building length | = 0.324 |
| h | = Mean Roof Height above grade | = 23.000 ft |
| Kh | = 15 ft [4.572 m]< Z <Zg -->(2.01*(Z/zg)^(2/Alpha) {Table 26.10-1} | = 1.110 |
| Kzt | = Topographic Factor is 1 since no Topographic feature specified | = 1.000 |
| Kd | = Wind Directionality Factor per Table 26.6-1 | = 0.85 |
| GCPi | = Ref Table 26.13-1 for Enclosed Building | = +/-0.18 |
| LF | = Load Factor based upon ASD Design | = 0.60 |
| qh | = (0.00256 * Kh * Kzt * Kd * Ke * V^2) * LF | = 44.37 psf |
| LHD | = Least Horizontal Dimension: Min(B, L) | = 41.000 ft |
| a1 | = Min(0.1 * LHD, 0.4 * h) | = 4.100 ft |
| a | = Max(a1, 0.04 * LHD, 3 ft [0.9 m]) | = 4.100 ft |
| h/B | = Ratio of mean roof height to least hor dim: h / B | = 0.561 |

**Wind Pressure Summary for C&C Zones based Upon Areas Ch 30 Pt 1 (Table 1 of 2)**
**All wind pressures include a load factor of 0.6**

| Zone | Figure | A <= 10.00 sq ft psf | A = 20.00 sq ft psf | A = 50.00 sq ft psf | A = 100.00 sq ft psf |
|---|---|---|---|---|---|
| 1 | 30.3-2A | 21.30 -83.42 | 19.96 -77.92 | 18.20 -70.64 | 16.86 -65.14 |
| 1' | 30.3-2A | 21.30 -47.92 | 19.96 -47.92 | 18.20 -47.92 | 16.86 -47.92 |
| 2 | 30.3-2A | 21.30 -110.04 | 19.96 -102.97 | 18.20 -93.61 | 16.86 -86.54 |
| 3 | 30.3-2A | 21.30 -149.98 | 19.96 -135.82 | 18.20 -117.12 | 16.86 -102.97 |
| 4 | 30.3-1 | 47.92 -51.91 | 45.80 -49.79 | 42.99 -46.99 | 40.87 -44.86 |
| 5 | 30.3-1 | 47.92 -63.90 | 45.80 -59.65 | 42.99 -54.04 | 40.87 -49.79 |

**Wind Pressure Summary for C&C Zones based Upon Areas Ch 30 Pt 1 (Table 2 of 2)**
**All wind pressures include a load factor of 0.6**

| Zone | Figure | A = 200.00 sq ft psf | A = 500.00 sq ft psf | A > 1000.00 sq ft psf |
|---|---|---|---|---|
| 1 | 30.3-2A | 16.86 -59.63 | 16.86 -52.36 | 16.86 -52.36 |
| 1' | 30.3-2A | 16.86 -41.24 | 16.86 -32.41 | 16.86 -25.74 |
| 2 | 30.3-2A | 16.86 -79.46 | 16.86 -70.11 | 16.86 -70.11 |
| 3 | 30.3-2A | 16.86 -88.81 | 16.86 -70.11 | 16.86 -70.11 |
| 4 | 30.3-1 | 38.75 -42.74 | 35.94 -39.93 | 35.94 -39.93 |
| 5 | 30.3-1 | 38.75 -45.55 | 35.94 -39.93 | 35.94 -39.93 |

* A is effective wind area for C&C: Span Length * Effective Width
* Effective width need not be less than 1/3 of the span length
* Maximum and minimum values of pressure shown.
* + Pressures acting toward surface, - Pressures acting away from surface
* Per Para 30.2.2 the Minimum Pressure for C&C is 9.60 psf [0.460 kPa] {Includes LF}
* Interpolation can be used for values of A that are between those values shown.

# APPENDIX D

## Structural Analysis

Project Title:
Engineer:
Project ID:
Project Descr:

# Masonry Slender Wall

File: cmu_wall.ec6

Lic. # : KW-06010668
YOUSSEF HACHEM CONSULTING ENGINEERING INC

DESCRIPTION: CMU wall - 7801 Atlantic Way , Miami Beach Fl 33141

## Code References

Calculations per ACI 530-11, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : ASCE 7-16

## General Information

**Calculations per ACI 530-11, IBC 2012, CBC 2013, ASCE 7-10**

Construction Type : Grouted Hollow Concrete Masonry

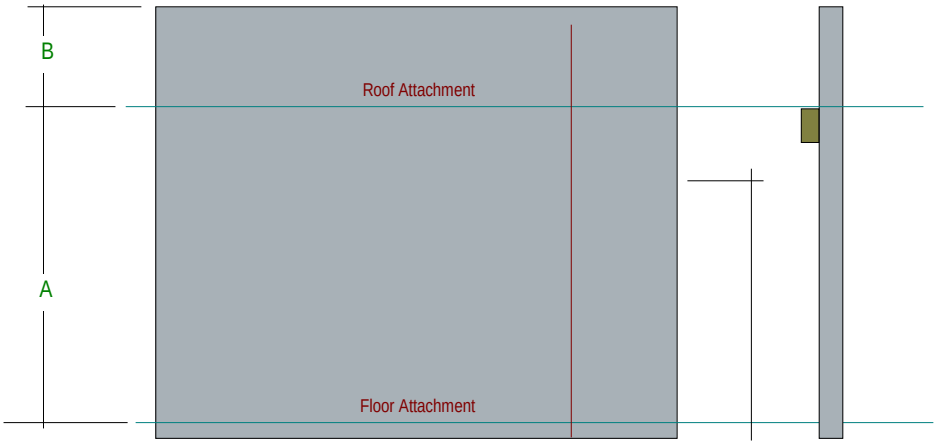
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| F'm | = | 0.780 ksi | Nom. Wall Thickness | 8 in | Temp Diff across thickness | = | | deg F |
| Fy - Yield | = | 60.0 ksi | Actual Thickness | 7.625 in | Min Allow Out-of-plane Defl Ratio | = | 0.0 | |
| Fr - Rupture | = | 75.0 psi | Rebar "d" distance | 3.8125 in | | | | |
| Em = f'm * | = | 780.0 | Lower Level Rebar . . . | | Minimum Vertical Steel % | = | 0.0020 | |
| Max % of ρ bal. | = | 0.004632 | Bar Size # | 3 | | | | |
| Grout Density | = | 105 pcf | Bar Spacing | 32 in | | | | |
| Block Weight | | Normal Weight | | | | | | |
| Wall Weight | = | 54.0 psf | | | | | | |

Wall is grouted at rebar cells only

## One-Story Wall Dimensions

A Clear Height = 13.920 ft
B Parapet height = ft

Wall Support Condition Top Pinned, Bottom F




## Lateral Loads

Wind Loads :
Full area WIND load 66.20 psf

Seismic Loads :
Wall Weight Seismic Load Input Method : Direct entry of Lateral Wall Weight
Seismic Wall Lateral Load psf

Fp 1.0 = 0.0 psf

Project Title:
Engineer:
Project ID:
Project Descr:

# Masonry Slender Wall

File: cmu_wall.ec6

Lic. # : KW-06010668
YOUSSEF HACHEM CONSULTING ENGINEERING INC

DESCRIPTION: CMU wall - 7801 Atlantic Way , Miami Beach Fl 33141

## DESIGN SUMMARY

**Results reported for "Strip Width" of 12.0 in**

| | Governing Load Combination . . . | Actual Values . . . | | Allowable Values . . . | |
|---|---|---|---|---|---|
| FAIL | Moment Capacity Check | Maximum Bending Stress Ratio = | **2.744** | | |
| | +0.90D+W | Max Mu | -2.169 k-ft | Phi * Mn | 0.7903 k-ft |
| PASS | Service Deflection Check | Actual Defl. Ratio L/ | 232 | Allowable Defl. Ratio | 150.0 |
| | W Only | Max. Deflection | 0.7198 in | | |
| PASS | Axial Load Check | Max Pu / Ag | 11.489 psi | Max. Allow. Defl. | 1.114 in |
| | +0.90D+W | Location | 0.2320 ft | 0.2 * f'm | 156.0 psi |
| PASS | Reinforcing Limit Check | | | | |
| | | Actual As/bd | 0.000902 | Max Allow As/bd | 0.004633 |

Maximum Reactions . . . *for Load Combination....*

| | | |
|---|---|---|
| Top Horizontal | W Only | 0.2915 k |
| Base Horizontal | W Only | 0.630 k |
| Vertical Reaction | +D+0.450W | 0.7517 k |

## Design Maximum Combinations - Moments

**Results reported for "Strip Width" = 12 in.**

| Load Combination | Axial Load Pu k | 0.2*f'm*b*t k | Moment Values Mcr k-ft | Mu k-ft | Phi | Phi Mn k-ft | As in^2 | As Ratio | 0.6 * rho bal |
|---|---|---|---|---|---|---|---|---|---|
| | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.0000 | 0.0000 |
| | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.0000 | 0.0000 |
| +1.20D+0.50W at 0.00 to 0.46 | 0.902 | 9.173 | 0.56 | 0.80 | 0.90 | 0.85 | 0.041 | 0.0009 | 0.0043 |
| +1.20D+W at 0.00 to 0.46 | 0.901 | 9.173 | 0.56 | 2.11 | 0.90 | 0.85 | 0.041 | 0.0009 | 0.0043 |
| +0.90D+W at 0.00 to 0.46 | 0.676 | 9.173 | 0.56 | 2.17 | 0.90 | 0.79 | 0.041 | 0.0009 | 0.0044 |
| | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.0000 | 0.0000 |
| | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.0000 | 0.0000 |

## Design Maximum Combinations - Deflections

**Results reported for "Strip Width" = 12 in.**

| Load Combination | Axial Load Pu k | Moment Values Mcr k-ft | Mactual k-ft | Stiffness I gross in^4 | I cracked in^4 | I effective in^4 | Deflections Deflection in | Defl. Ratio |
|---|---|---|---|---|---|---|---|---|
| | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.0 |
| +D+0.60W at 7.89 to 8.35 | 0.326 | 0.56 | 0.32 | 342.40 | 21.60 | 342.400 | 0.164 | 1,018.9 |
| +D+0.450W at 7.89 to 8.35 | 0.326 | 0.56 | 0.40 | 342.40 | 21.60 | 342.400 | 0.050 | 3,321.5 |
| +0.60D+0.60W at 7.89 to 8.35 | 0.195 | 0.56 | 0.31 | 342.40 | 20.78 | 342.400 | 0.167 | 1,002.2 |
| | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.0 |
| | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.0 |
| | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.0 |
| W Only at 8.35 to 8.82 | 0.000 | 0.56 | 0.61 | 342.40 | 19.54 | 32.736 | 0.720 | 232.1 |
| | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.0 |

## Reactions - Vertical & Horizontal

| Load Combination | Base Horizontal | Top Horizontal | Vertical @ Wall Base |
|---|---|---|---|
| D Only | 0.0 k | 0.00 k | 0.752 k |
| +D+0.60W | 0.4 k | 0.17 k | 0.752 k |
| +D+0.450W | 0.3 k | 0.16 k | 0.752 k |
| +0.60D+0.60W | 0.4 k | 0.17 k | 0.451 k |
| +D+0.70E | 0.0 k | 0.00 k | 0.752 k |
| +D+0.5250E | 0.0 k | 0.00 k | 0.752 k |
| +0.60D+0.70E | 0.0 k | 0.00 k | 0.451 k |
| W Only | 0.6 k | 0.29 k | 0.000 k |

Project Title:
Engineer:
Project ID:
Project Descr:

# Masonry Slender Wall

File: cmu_wall.ec6

Lic. # : KW-06010668
YOUSSEF HACHEM CONSULTING ENGINEERING INC

DESCRIPTION: CMU wall - 7801 Atlantic Way , Miami Beach Fl 33141

| | | | |
|---|---|---|---|
| E Only | 0.0 k | 0.00 k | 0.000 k |

## Deflections - Service Loads

| Load Combination / Location | Axial Load (k) | Moments (k-ft) Mcr | Mu | Inertia (in^4) Igross | Icracked | Ieff | Iterated Deflection (in) Deflection | Ratio |
|---|---|---|---|---|---|---|---|---|
| Overall MAXimum Envelope | | | | | | | | |
| . . . .W Only at 13.46 to 13.92 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.043 | 999.0 |
| . . . .W Only at 12.99 to 13.46 | 0.00 | 0.56 | 0.19 | 342.400 | 19.54 | 342.400 | 0.129 | 999.0 |
| . . . .W Only at 12.53 to 12.99 | 0.00 | 0.56 | 0.29 | 342.400 | 19.54 | 342.400 | 0.215 | 777.7 |
| . . . .W Only at 12.06 to 12.53 | 0.00 | 0.56 | 0.38 | 342.400 | 19.54 | 342.400 | 0.300 | 556.9 |
| . . . .W Only at 11.60 to 12.06 | 0.00 | 0.56 | 0.46 | 342.400 | 19.54 | 342.400 | 0.383 | 435.7 |
| . . . .W Only at 11.14 to 11.60 | 0.00 | 0.56 | 0.53 | 342.400 | 19.54 | 342.400 | 0.463 | 361.1 |
| . . . .W Only at 10.67 to 11.14 | 0.00 | 0.56 | 0.58 | 342.400 | 19.54 | 50.241 | 0.534 | 312.7 |
| . . . .W Only at 10.21 to 10.67 | 0.00 | 0.56 | 0.61 | 342.400 | 19.54 | 32.601 | 0.596 | 280.2 |
| . . . .W Only at 9.74 to 10.21 | 0.00 | 0.56 | 0.63 | 342.400 | 19.54 | 29.216 | 0.647 | 258.3 |
| . . . .W Only at 9.28 to 9.74 | 0.00 | 0.56 | 0.64 | 342.400 | 19.54 | 28.432 | 0.685 | 244.0 |

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# Masonry Slender Wall

File: cmu_wall.ec6

Lic. # : KW-06010668
YOUSSEF HACHEM CONSULTING ENGINEERING INC

DESCRIPTION: CMU wall - 7801 Atlantic Way , Miami Beach Fl 33141

## Deflections - Service Loads

| Load Combination / Location | Axial Load (k) | Moments (k-ft) Mcr | Mu | Inertia (in^4) Igross | Icracked | Ieff | Iterated Deflection (in) Deflection | Ratio |
|---|---|---|---|---|---|---|---|---|
| . . . .W Only at 8.82 to 9.28 | 0.00 | 0.56 | 0.63 | 342.400 | 19.54 | 29.255 | 0.709 | 235.6 |
| . . . .W Only at 8.35 to 8.82 | 0.00 | 0.56 | 0.61 | 342.400 | 19.54 | 32.736 | 0.720 | 232.1 |
| . . . .W Only at 7.89 to 8.35 | 0.00 | 0.56 | 0.58 | 342.400 | 19.54 | 51.490 | 0.717 | 232.9 |
| . . . .W Only at 7.42 to 7.89 | 0.00 | 0.56 | 0.53 | 342.400 | 19.54 | 342.400 | 0.702 | 237.9 |
| . . . .W Only at 6.96 to 7.42 | 0.00 | 0.56 | 0.46 | 342.400 | 19.54 | 342.400 | 0.675 | 247.4 |
| . . . .W Only at 6.50 to 6.96 | 0.00 | 0.56 | 0.38 | 342.400 | 19.54 | 342.400 | 0.638 | 261.7 |
| . . . .W Only at 6.03 to 6.50 | 0.00 | 0.56 | 0.29 | 342.400 | 19.54 | 342.400 | 0.593 | 281.6 |
| . . . .W Only at 5.57 to 6.03 | 0.00 | 0.56 | 0.18 | 342.400 | 19.54 | 342.400 | 0.542 | 308.3 |
| . . . .W Only at 5.10 to 5.57 | 0.00 | 0.56 | 0.06 | 342.400 | 19.54 | 342.400 | 0.487 | 343.2 |
| . . . .W Only at 4.64 to 5.10 | 0.00 | 0.56 | 0.07 | 342.400 | 19.54 | 342.400 | 0.430 | 388.1 |
| . . . .W Only at 4.18 to 4.64 | 0.00 | 0.56 | 0.22 | 342.400 | 19.54 | 342.400 | 0.375 | 445.0 |
| . . . .W Only at 3.71 to 4.18 | 0.00 | 0.56 | 0.39 | 342.400 | 19.54 | 342.400 | 0.323 | 516.6 |
| . . . .W Only at 3.25 to 3.71 | 0.00 | 0.56 | 0.57 | 342.400 | 19.54 | 74.194 | 0.275 | 607.3 |
| . . . .W Only at 2.78 to 3.25 | 0.00 | 0.56 | 0.76 | 342.400 | 19.54 | 22.837 | 0.230 | 727.7 |
| . . . .W Only at 2.32 to 2.78 | 0.00 | 0.56 | 0.97 | 342.400 | 19.54 | 20.729 | 0.186 | 899.0 |
| . . . .W Only at 1.86 to 2.32 | 0.00 | 0.56 | 1.19 | 342.400 | 19.54 | 20.097 | 0.144 | 999.0 |
| . . . .W Only at 1.39 to 1.86 | 0.00 | 0.56 | 1.42 | 342.400 | 19.54 | 19.837 | 0.104 | 999.0 |
| . . . .W Only at 0.93 to 1.39 | 0.00 | 0.56 | 1.67 | 342.400 | 19.54 | 19.712 | 0.067 | 999.0 |
| . . . .W Only at 0.46 to 0.93 | 0.00 | 0.56 | 1.94 | 342.400 | 19.54 | 19.646 | 0.032 | 999.0 |
| . . . .W Only at 0.00 to 0.46 | 0.00 | 0.56 | 2.36 | 342.400 | 19.54 | 19.595 | 0.008 | 999.0 |
| D Only | | | | | | | | |
| . . . .13.46 to 13.92 | 0.03 | 0.56 | 0.00 | 342.400 | 19.70 | 342.400 | 0.000 | 0.0 |
| . . . .12.99 to 13.46 | 0.05 | 0.56 | 0.00 | 342.400 | 19.86 | 342.400 | 0.000 | 0.0 |
| . . . .12.53 to 12.99 | 0.08 | 0.56 | 0.00 | 342.400 | 20.02 | 342.400 | 0.000 | 0.0 |
| . . . .12.06 to 12.53 | 0.10 | 0.56 | 0.00 | 342.400 | 20.18 | 342.400 | 0.000 | 0.0 |
| . . . .11.60 to 12.06 | 0.13 | 0.56 | 0.00 | 342.400 | 20.34 | 342.400 | 0.000 | 0.0 |
| . . . .11.14 to 11.60 | 0.15 | 0.56 | 0.00 | 342.400 | 20.50 | 342.400 | 0.000 | 0.0 |
| . . . .10.67 to 11.14 | 0.18 | 0.56 | 0.00 | 342.400 | 20.65 | 342.400 | 0.000 | 0.0 |
| . . . .10.21 to 10.67 | 0.20 | 0.56 | 0.00 | 342.400 | 20.81 | 342.400 | 0.000 | 0.0 |
| . . . .9.74 to 10.21 | 0.23 | 0.56 | 0.00 | 342.400 | 20.97 | 342.400 | 0.000 | 0.0 |
| . . . .9.28 to 9.74 | 0.25 | 0.56 | 0.00 | 342.400 | 21.13 | 342.400 | 0.000 | 0.0 |
| . . . .8.82 to 9.28 | 0.28 | 0.56 | 0.00 | 342.400 | 21.28 | 342.400 | 0.000 | 0.0 |
| . . . .8.35 to 8.82 | 0.30 | 0.56 | 0.00 | 342.400 | 21.44 | 342.400 | 0.000 | 0.0 |
| . . . .7.89 to 8.35 | 0.33 | 0.56 | 0.00 | 342.400 | 21.60 | 342.400 | 0.000 | 0.0 |
| . . . .7.42 to 7.89 | 0.35 | 0.56 | 0.00 | 342.400 | 21.75 | 342.400 | 0.000 | 0.0 |
| . . . .6.96 to 7.42 | 0.38 | 0.56 | 0.00 | 342.400 | 21.91 | 342.400 | 0.000 | 0.0 |
| . . . .6.50 to 6.96 | 0.40 | 0.56 | 0.00 | 342.400 | 22.06 | 342.400 | 0.000 | 0.0 |
| . . . .6.03 to 6.50 | 0.43 | 0.56 | 0.00 | 342.400 | 22.21 | 342.400 | 0.000 | 0.0 |
| . . . .5.57 to 6.03 | 0.45 | 0.56 | 0.00 | 342.400 | 22.37 | 342.400 | 0.000 | 0.0 |
| . . . .5.10 to 5.57 | 0.48 | 0.56 | 0.00 | 342.400 | 22.52 | 342.400 | 0.000 | 0.0 |
| . . . .4.64 to 5.10 | 0.50 | 0.56 | 0.00 | 342.400 | 22.67 | 342.400 | 0.000 | 0.0 |
| . . . .4.18 to 4.64 | 0.53 | 0.56 | 0.00 | 342.400 | 22.83 | 342.400 | 0.000 | 0.0 |
| . . . .3.71 to 4.18 | 0.55 | 0.56 | 0.00 | 342.400 | 22.98 | 342.400 | 0.000 | 0.0 |
| . . . .3.25 to 3.71 | 0.58 | 0.56 | 0.00 | 342.400 | 23.13 | 342.400 | 0.000 | 0.0 |
| . . . .2.78 to 3.25 | 0.60 | 0.56 | 0.00 | 342.400 | 23.28 | 342.400 | 0.000 | 0.0 |
| . . . .2.32 to 2.78 | 0.63 | 0.56 | 0.00 | 342.400 | 23.43 | 342.400 | 0.000 | 0.0 |
| . . . .1.86 to 2.32 | 0.65 | 0.56 | 0.00 | 342.400 | 23.58 | 342.400 | 0.000 | 0.0 |
| . . . .1.39 to 1.86 | 0.68 | 0.56 | 0.00 | 342.400 | 23.73 | 342.400 | 0.000 | 0.0 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Masonry Slender Wall

File: cmu_wall.ec6

Lic. # : KW-06010668
YOUSSEF HACHEM CONSULTING ENGINEERING INC

DESCRIPTION: CMU wall - 7801 Atlantic Way , Miami Beach Fl 33141

## Deflections - Service Loads

| Load Combination / Location | Axial Load (k) | Moments (k-ft) Mcr | Mu | Inertia (in^4) Igross | Icracked | Ieff | Iterated Deflection (in) Deflection | Ratio |
|---|---|---|---|---|---|---|---|---|
| . . . .0.93 to 1.39 | 0.70 | 0.56 | 0.00 | 342.400 | 23.88 | 342.400 | 0.000 | 0.0 |
| . . . .0.46 to 0.93 | 0.73 | 0.56 | 0.00 | 342.400 | 24.03 | 342.400 | 0.000 | 0.0 |
| . . . .0.00 to 0.46 | 0.75 | 0.56 | 0.00 | 342.400 | 24.18 | 342.400 | 0.000 | 0.0 |
| +D+0.60W | | | | | | | | |
| . . . .13.46 to 13.92 | 0.02 | 0.56 | 0.00 | 342.400 | 19.69 | 342.400 | 0.009 | 999.0 |
| . . . .12.99 to 13.46 | 0.05 | 0.56 | 0.11 | 342.400 | 19.85 | 342.400 | 0.027 | 999.0 |
| . . . .12.53 to 12.99 | 0.07 | 0.56 | 0.17 | 342.400 | 20.02 | 342.400 | 0.045 | 999.0 |
| . . . .12.06 to 12.53 | 0.10 | 0.56 | 0.22 | 342.400 | 20.18 | 342.400 | 0.063 | 999.0 |
| . . . .11.60 to 12.06 | 0.13 | 0.56 | 0.27 | 342.400 | 20.33 | 342.400 | 0.080 | 999.0 |
| . . . .11.14 to 11.60 | 0.15 | 0.56 | 0.30 | 342.400 | 20.49 | 342.400 | 0.097 | 999.0 |
| . . . .10.67 to 11.14 | 0.18 | 0.56 | 0.33 | 342.400 | 20.65 | 342.400 | 0.113 | 999.0 |
| . . . .10.21 to 10.67 | 0.20 | 0.56 | 0.35 | 342.400 | 20.81 | 342.400 | 0.128 | 999.0 |
| . . . .9.74 to 10.21 | 0.23 | 0.56 | 0.36 | 342.400 | 20.97 | 342.400 | 0.142 | 999.0 |
| . . . .9.28 to 9.74 | 0.25 | 0.56 | 0.36 | 342.400 | 21.13 | 342.400 | 0.153 | 999.0 |
| . . . .8.82 to 9.28 | 0.28 | 0.56 | 0.36 | 342.400 | 21.28 | 342.400 | 0.160 | 999.0 |
| . . . .8.35 to 8.82 | 0.30 | 0.56 | 0.34 | 342.400 | 21.44 | 342.400 | 0.164 | 999.0 |
| . . . .7.89 to 8.35 | 0.33 | 0.56 | 0.32 | 342.400 | 21.60 | 342.400 | 0.164 | 999.0 |
| . . . .7.42 to 7.89 | 0.35 | 0.56 | 0.28 | 342.400 | 21.75 | 342.400 | 0.160 | 999.0 |
| . . . .6.96 to 7.42 | 0.38 | 0.56 | 0.24 | 342.400 | 21.91 | 342.400 | 0.154 | 999.0 |
| . . . .6.50 to 6.96 | 0.40 | 0.56 | 0.19 | 342.400 | 22.06 | 342.400 | 0.144 | 999.0 |
| . . . .6.03 to 6.50 | 0.43 | 0.56 | 0.14 | 342.400 | 22.21 | 342.400 | 0.133 | 999.0 |
| . . . .5.57 to 6.03 | 0.45 | 0.56 | 0.07 | 342.400 | 22.37 | 342.400 | 0.120 | 999.0 |
| . . . .5.10 to 5.57 | 0.48 | 0.56 | 0.01 | 342.400 | 22.52 | 342.400 | 0.106 | 999.0 |
| . . . .4.64 to 5.10 | 0.50 | 0.56 | 0.09 | 342.400 | 22.67 | 342.400 | 0.093 | 999.0 |
| . . . .4.18 to 4.64 | 0.53 | 0.56 | 0.18 | 342.400 | 22.82 | 342.400 | 0.080 | 999.0 |
| . . . .3.71 to 4.18 | 0.55 | 0.56 | 0.28 | 342.400 | 22.98 | 342.400 | 0.067 | 999.0 |
| . . . .3.25 to 3.71 | 0.58 | 0.56 | 0.39 | 342.400 | 23.13 | 342.400 | 0.054 | 999.0 |
| . . . .2.78 to 3.25 | 0.60 | 0.56 | 0.51 | 342.400 | 23.28 | 342.400 | 0.043 | 999.0 |
| . . . .2.32 to 2.78 | 0.63 | 0.56 | 0.64 | 342.400 | 23.43 | 34.134 | 0.032 | 999.0 |
| . . . .1.86 to 2.32 | 0.65 | 0.56 | 0.77 | 342.400 | 23.58 | 27.165 | 0.023 | 999.0 |
| . . . .1.39 to 1.86 | 0.68 | 0.56 | 0.92 | 342.400 | 23.73 | 25.468 | 0.014 | 999.0 |
| . . . .0.93 to 1.39 | 0.70 | 0.56 | 1.07 | 342.400 | 23.88 | 24.852 | 0.008 | 999.0 |
| . . . .0.46 to 0.93 | 0.73 | 0.56 | 1.23 | 342.400 | 24.03 | 24.621 | 0.003 | 999.0 |
| . . . .0.00 to 0.46 | 0.75 | 0.56 | 1.49 | 342.400 | 24.18 | 24.491 | 0.001 | 999.0 |
| +D+0.450W | | | | | | | | |
| . . . .13.46 to 13.92 | 0.02 | 0.56 | 0.00 | 342.400 | 19.70 | 342.400 | 0.003 | 999.0 |
| . . . .12.99 to 13.46 | 0.05 | 0.56 | 0.10 | 342.400 | 19.86 | 342.400 | 0.010 | 999.0 |
| . . . .12.53 to 12.99 | 0.08 | 0.56 | 0.16 | 342.400 | 20.02 | 342.400 | 0.016 | 999.0 |
| . . . .12.06 to 12.53 | 0.10 | 0.56 | 0.21 | 342.400 | 20.18 | 342.400 | 0.022 | 999.0 |
| . . . .11.60 to 12.06 | 0.13 | 0.56 | 0.26 | 342.400 | 20.34 | 342.400 | 0.027 | 999.0 |
| . . . .11.14 to 11.60 | 0.15 | 0.56 | 0.30 | 342.400 | 20.50 | 342.400 | 0.032 | 999.0 |
| . . . .10.67 to 11.14 | 0.18 | 0.56 | 0.33 | 342.400 | 20.65 | 342.400 | 0.037 | 999.0 |
| . . . .10.21 to 10.67 | 0.20 | 0.56 | 0.36 | 342.400 | 20.81 | 342.400 | 0.041 | 999.0 |
| . . . .9.74 to 10.21 | 0.23 | 0.56 | 0.38 | 342.400 | 20.97 | 342.400 | 0.044 | 999.0 |
| . . . .9.28 to 9.74 | 0.25 | 0.56 | 0.40 | 342.400 | 21.13 | 342.400 | 0.047 | 999.0 |
| . . . .8.82 to 9.28 | 0.28 | 0.56 | 0.40 | 342.400 | 21.28 | 342.400 | 0.049 | 999.0 |
| . . . .8.35 to 8.82 | 0.30 | 0.56 | 0.41 | 342.400 | 21.44 | 342.400 | 0.050 | 999.0 |
| . . . .7.89 to 8.35 | 0.33 | 0.56 | 0.40 | 342.400 | 21.60 | 342.400 | 0.050 | 999.0 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Masonry Slender Wall

File: cmu_wall.ec6

Lic. # : KW-06010668
YOUSSEF HACHEM CONSULTING ENGINEERING INC

DESCRIPTION: CMU wall - 7801 Atlantic Way , Miami Beach Fl 33141

## Deflections - Service Loads

| Load Combination / Location | Axial Load (k) | Moments (k-ft) Mcr | Mu | Inertia (in^4) Igross | Icracked | Ieff | Iterated Deflection (in) Deflection | Ratio |
|---|---|---|---|---|---|---|---|---|
| . . . .7.42 to 7.89 | 0.35 | 0.56 | 0.39 | 342.400 | 21.75 | 342.400 | 0.050 | 999.0 |
| . . . .6.96 to 7.42 | 0.38 | 0.56 | 0.37 | 342.400 | 21.91 | 342.400 | 0.049 | 999.0 |
| . . . .6.50 to 6.96 | 0.40 | 0.56 | 0.35 | 342.400 | 22.06 | 342.400 | 0.047 | 999.0 |
| . . . .6.03 to 6.50 | 0.43 | 0.56 | 0.32 | 342.400 | 22.21 | 342.400 | 0.045 | 999.0 |
| . . . .5.57 to 6.03 | 0.45 | 0.56 | 0.28 | 342.400 | 22.37 | 342.400 | 0.042 | 999.0 |
| . . . .5.10 to 5.57 | 0.48 | 0.56 | 0.24 | 342.400 | 22.52 | 342.400 | 0.039 | 999.0 |
| . . . .4.64 to 5.10 | 0.50 | 0.56 | 0.19 | 342.400 | 22.67 | 342.400 | 0.035 | 999.0 |
| . . . .4.18 to 4.64 | 0.53 | 0.56 | 0.13 | 342.400 | 22.82 | 342.400 | 0.031 | 999.0 |
| . . . .3.71 to 4.18 | 0.55 | 0.56 | 0.07 | 342.400 | 22.98 | 342.400 | 0.027 | 999.0 |
| . . . .3.25 to 3.71 | 0.58 | 0.56 | 0.00 | 342.400 | 23.13 | 342.400 | 0.023 | 999.0 |
| . . . .2.78 to 3.25 | 0.60 | 0.56 | 0.08 | 342.400 | 23.28 | 342.400 | 0.018 | 999.0 |
| . . . .2.32 to 2.78 | 0.63 | 0.56 | 0.16 | 342.400 | 23.43 | 342.400 | 0.014 | 999.0 |
| . . . .1.86 to 2.32 | 0.65 | 0.56 | 0.25 | 342.400 | 23.58 | 342.400 | 0.010 | 999.0 |
| . . . .1.39 to 1.86 | 0.68 | 0.56 | 0.34 | 342.400 | 23.73 | 342.400 | 0.007 | 999.0 |
| . . . .0.93 to 1.39 | 0.70 | 0.56 | 0.44 | 342.400 | 23.88 | 342.400 | 0.004 | 999.0 |
| . . . .0.46 to 0.93 | 0.73 | 0.56 | 0.55 | 342.400 | 24.03 | 342.400 | 0.001 | 999.0 |
| . . . .0.00 to 0.46 | 0.75 | 0.56 | 0.72 | 342.400 | 24.18 | 29.271 | 0.000 | 999.0 |
| +0.60D+0.60W | | | | | | | | |
| . . . .13.46 to 13.92 | 0.01 | 0.56 | 0.00 | 342.400 | 19.63 | 342.400 | 0.009 | 999.0 |
| . . . .12.99 to 13.46 | 0.03 | 0.56 | 0.11 | 342.400 | 19.73 | 342.400 | 0.028 | 999.0 |
| . . . .12.53 to 12.99 | 0.04 | 0.56 | 0.17 | 342.400 | 19.82 | 342.400 | 0.046 | 999.0 |
| . . . .12.06 to 12.53 | 0.06 | 0.56 | 0.22 | 342.400 | 19.92 | 342.400 | 0.064 | 999.0 |
| . . . .11.60 to 12.06 | 0.08 | 0.56 | 0.27 | 342.400 | 20.02 | 342.400 | 0.081 | 999.0 |
| . . . .11.14 to 11.60 | 0.09 | 0.56 | 0.30 | 342.400 | 20.11 | 342.400 | 0.098 | 999.0 |
| . . . .10.67 to 11.14 | 0.11 | 0.56 | 0.33 | 342.400 | 20.21 | 342.400 | 0.115 | 999.0 |
| . . . .10.21 to 10.67 | 0.12 | 0.56 | 0.35 | 342.400 | 20.30 | 342.400 | 0.130 | 999.0 |
| . . . .9.74 to 10.21 | 0.14 | 0.56 | 0.36 | 342.400 | 20.40 | 342.400 | 0.144 | 999.0 |
| . . . .9.28 to 9.74 | 0.15 | 0.56 | 0.36 | 342.400 | 20.50 | 342.400 | 0.155 | 999.0 |
| . . . .8.82 to 9.28 | 0.17 | 0.56 | 0.35 | 342.400 | 20.59 | 342.400 | 0.163 | 999.0 |
| . . . .8.35 to 8.82 | 0.18 | 0.56 | 0.34 | 342.400 | 20.69 | 342.400 | 0.167 | 999.0 |
| . . . .7.89 to 8.35 | 0.20 | 0.56 | 0.31 | 342.400 | 20.78 | 342.400 | 0.167 | 999.0 |
| . . . .7.42 to 7.89 | 0.21 | 0.56 | 0.28 | 342.400 | 20.88 | 342.400 | 0.163 | 999.0 |
| . . . .6.96 to 7.42 | 0.23 | 0.56 | 0.24 | 342.400 | 20.97 | 342.400 | 0.156 | 999.0 |
| . . . .6.50 to 6.96 | 0.24 | 0.56 | 0.19 | 342.400 | 21.06 | 342.400 | 0.146 | 999.0 |
| . . . .6.03 to 6.50 | 0.26 | 0.56 | 0.13 | 342.400 | 21.16 | 342.400 | 0.134 | 999.0 |
| . . . .5.57 to 6.03 | 0.27 | 0.56 | 0.06 | 342.400 | 21.25 | 342.400 | 0.121 | 999.0 |
| . . . .5.10 to 5.57 | 0.29 | 0.56 | 0.01 | 342.400 | 21.34 | 342.400 | 0.108 | 999.0 |
| . . . .4.64 to 5.10 | 0.30 | 0.56 | 0.10 | 342.400 | 21.44 | 342.400 | 0.094 | 999.0 |
| . . . .4.18 to 4.64 | 0.32 | 0.56 | 0.19 | 342.400 | 21.53 | 342.400 | 0.080 | 999.0 |
| . . . .3.71 to 4.18 | 0.33 | 0.56 | 0.29 | 342.400 | 21.62 | 342.400 | 0.067 | 999.0 |
| . . . .3.25 to 3.71 | 0.35 | 0.56 | 0.40 | 342.400 | 21.72 | 342.400 | 0.055 | 999.0 |
| . . . .2.78 to 3.25 | 0.36 | 0.56 | 0.52 | 342.400 | 21.81 | 342.400 | 0.043 | 999.0 |
| . . . .2.32 to 2.78 | 0.38 | 0.56 | 0.65 | 342.400 | 21.90 | 30.978 | 0.032 | 999.0 |
| . . . .1.86 to 2.32 | 0.39 | 0.56 | 0.78 | 342.400 | 22.00 | 25.179 | 0.023 | 999.0 |
| . . . .1.39 to 1.86 | 0.41 | 0.56 | 0.93 | 342.400 | 22.09 | 23.651 | 0.014 | 999.0 |
| . . . .0.93 to 1.39 | 0.42 | 0.56 | 1.08 | 342.400 | 22.18 | 23.061 | 0.008 | 999.0 |
| . . . .0.46 to 0.93 | 0.44 | 0.56 | 1.24 | 342.400 | 22.27 | 22.811 | 0.003 | 999.0 |
| . . . .0.00 to 0.46 | 0.45 | 0.56 | 1.50 | 342.400 | 22.37 | 22.651 | 0.001 | 999.0 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Masonry Slender Wall

File: cmu_wall.ec6

Lic. # : KW-06010668
YOUSSEF HACHEM CONSULTING ENGINEERING INC

DESCRIPTION: CMU wall - 7801 Atlantic Way , Miami Beach Fl 33141

## Deflections - Service Loads

| Load Combination / Location | Axial Load (k) | Moments (k-ft) Mcr | Mu | Inertia (in^4) Igross | Icracked | Ieff | Iterated Deflection (in) Deflection | Ratio |
|---|---|---|---|---|---|---|---|---|
| +D+0.70E | | | | | | | | |
| . . . .13.46 to 13.92 | 0.03 | 0.56 | 0.00 | 342.400 | 19.70 | 342.400 | 0.000 | 0.0 |
| . . . .12.99 to 13.46 | 0.05 | 0.56 | 0.00 | 342.400 | 19.86 | 342.400 | 0.000 | 0.0 |
| . . . .12.53 to 12.99 | 0.08 | 0.56 | 0.00 | 342.400 | 20.02 | 342.400 | 0.000 | 0.0 |
| . . . .12.06 to 12.53 | 0.10 | 0.56 | 0.00 | 342.400 | 20.18 | 342.400 | 0.000 | 0.0 |
| . . . .11.60 to 12.06 | 0.13 | 0.56 | 0.00 | 342.400 | 20.34 | 342.400 | 0.000 | 0.0 |
| . . . .11.14 to 11.60 | 0.15 | 0.56 | 0.00 | 342.400 | 20.50 | 342.400 | 0.000 | 0.0 |
| . . . .10.67 to 11.14 | 0.18 | 0.56 | 0.00 | 342.400 | 20.65 | 342.400 | 0.000 | 0.0 |
| . . . .10.21 to 10.67 | 0.20 | 0.56 | 0.00 | 342.400 | 20.81 | 342.400 | 0.000 | 0.0 |
| . . . .9.74 to 10.21 | 0.23 | 0.56 | 0.00 | 342.400 | 20.97 | 342.400 | 0.000 | 0.0 |
| . . . .9.28 to 9.74 | 0.25 | 0.56 | 0.00 | 342.400 | 21.13 | 342.400 | 0.000 | 0.0 |
| . . . .8.82 to 9.28 | 0.28 | 0.56 | 0.00 | 342.400 | 21.28 | 342.400 | 0.000 | 0.0 |
| . . . .8.35 to 8.82 | 0.30 | 0.56 | 0.00 | 342.400 | 21.44 | 342.400 | 0.000 | 0.0 |
| . . . .7.89 to 8.35 | 0.33 | 0.56 | 0.00 | 342.400 | 21.60 | 342.400 | 0.000 | 0.0 |
| . . . .7.42 to 7.89 | 0.35 | 0.56 | 0.00 | 342.400 | 21.75 | 342.400 | 0.000 | 0.0 |
| . . . .6.96 to 7.42 | 0.38 | 0.56 | 0.00 | 342.400 | 21.91 | 342.400 | 0.000 | 0.0 |
| . . . .6.50 to 6.96 | 0.40 | 0.56 | 0.00 | 342.400 | 22.06 | 342.400 | 0.000 | 0.0 |
| . . . .6.03 to 6.50 | 0.43 | 0.56 | 0.00 | 342.400 | 22.21 | 342.400 | 0.000 | 0.0 |
| . . . .5.57 to 6.03 | 0.45 | 0.56 | 0.00 | 342.400 | 22.37 | 342.400 | 0.000 | 0.0 |
| . . . .5.10 to 5.57 | 0.48 | 0.56 | 0.00 | 342.400 | 22.52 | 342.400 | 0.000 | 0.0 |
| . . . .4.64 to 5.10 | 0.50 | 0.56 | 0.00 | 342.400 | 22.67 | 342.400 | 0.000 | 0.0 |
| . . . .4.18 to 4.64 | 0.53 | 0.56 | 0.00 | 342.400 | 22.83 | 342.400 | 0.000 | 0.0 |
| . . . .3.71 to 4.18 | 0.55 | 0.56 | 0.00 | 342.400 | 22.98 | 342.400 | 0.000 | 0.0 |
| . . . .3.25 to 3.71 | 0.58 | 0.56 | 0.00 | 342.400 | 23.13 | 342.400 | 0.000 | 0.0 |
| . . . .2.78 to 3.25 | 0.60 | 0.56 | 0.00 | 342.400 | 23.28 | 342.400 | 0.000 | 0.0 |
| . . . .2.32 to 2.78 | 0.63 | 0.56 | 0.00 | 342.400 | 23.43 | 342.400 | 0.000 | 0.0 |
| . . . .1.86 to 2.32 | 0.65 | 0.56 | 0.00 | 342.400 | 23.58 | 342.400 | 0.000 | 0.0 |
| . . . .1.39 to 1.86 | 0.68 | 0.56 | 0.00 | 342.400 | 23.73 | 342.400 | 0.000 | 0.0 |
| . . . .0.93 to 1.39 | 0.70 | 0.56 | 0.00 | 342.400 | 23.88 | 342.400 | 0.000 | 0.0 |
| . . . .0.46 to 0.93 | 0.73 | 0.56 | 0.00 | 342.400 | 24.03 | 342.400 | 0.000 | 0.0 |
| . . . .0.00 to 0.46 | 0.75 | 0.56 | 0.00 | 342.400 | 24.18 | 342.400 | 0.000 | 0.0 |
| +D+0.5250E | | | | | | | | |
| . . . .13.46 to 13.92 | 0.03 | 0.56 | 0.00 | 342.400 | 19.70 | 342.400 | 0.000 | 0.0 |
| . . . .12.99 to 13.46 | 0.05 | 0.56 | 0.00 | 342.400 | 19.86 | 342.400 | 0.000 | 0.0 |
| . . . .12.53 to 12.99 | 0.08 | 0.56 | 0.00 | 342.400 | 20.02 | 342.400 | 0.000 | 0.0 |
| . . . .12.06 to 12.53 | 0.10 | 0.56 | 0.00 | 342.400 | 20.18 | 342.400 | 0.000 | 0.0 |
| . . . .11.60 to 12.06 | 0.13 | 0.56 | 0.00 | 342.400 | 20.34 | 342.400 | 0.000 | 0.0 |
| . . . .11.14 to 11.60 | 0.15 | 0.56 | 0.00 | 342.400 | 20.50 | 342.400 | 0.000 | 0.0 |
| . . . .10.67 to 11.14 | 0.18 | 0.56 | 0.00 | 342.400 | 20.65 | 342.400 | 0.000 | 0.0 |
| . . . .10.21 to 10.67 | 0.20 | 0.56 | 0.00 | 342.400 | 20.81 | 342.400 | 0.000 | 0.0 |
| . . . .9.74 to 10.21 | 0.23 | 0.56 | 0.00 | 342.400 | 20.97 | 342.400 | 0.000 | 0.0 |
| . . . .9.28 to 9.74 | 0.25 | 0.56 | 0.00 | 342.400 | 21.13 | 342.400 | 0.000 | 0.0 |
| . . . .8.82 to 9.28 | 0.28 | 0.56 | 0.00 | 342.400 | 21.28 | 342.400 | 0.000 | 0.0 |
| . . . .8.35 to 8.82 | 0.30 | 0.56 | 0.00 | 342.400 | 21.44 | 342.400 | 0.000 | 0.0 |
| . . . .7.89 to 8.35 | 0.33 | 0.56 | 0.00 | 342.400 | 21.60 | 342.400 | 0.000 | 0.0 |
| . . . .7.42 to 7.89 | 0.35 | 0.56 | 0.00 | 342.400 | 21.75 | 342.400 | 0.000 | 0.0 |
| . . . .6.96 to 7.42 | 0.38 | 0.56 | 0.00 | 342.400 | 21.91 | 342.400 | 0.000 | 0.0 |
| . . . .6.50 to 6.96 | 0.40 | 0.56 | 0.00 | 342.400 | 22.06 | 342.400 | 0.000 | 0.0 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Masonry Slender Wall

File: cmu_wall.ec6

Lic. # : KW-06010668
YOUSSEF HACHEM CONSULTING ENGINEERING INC

DESCRIPTION: CMU wall - 7801 Atlantic Way , Miami Beach Fl 33141

## Deflections - Service Loads

| Load Combination / Location | Axial Load (k) | Moments (k-ft) Mcr | Mu | Inertia (in^4) Igross | Icracked | Ieff | Iterated Deflection (in) Deflection | Ratio |
|---|---|---|---|---|---|---|---|---|
| . . . .6.03 to 6.50 | 0.43 | 0.56 | 0.00 | 342.400 | 22.21 | 342.400 | 0.000 | 0.0 |
| . . . .5.57 to 6.03 | 0.45 | 0.56 | 0.00 | 342.400 | 22.37 | 342.400 | 0.000 | 0.0 |
| . . . .5.10 to 5.57 | 0.48 | 0.56 | 0.00 | 342.400 | 22.52 | 342.400 | 0.000 | 0.0 |
| . . . .4.64 to 5.10 | 0.50 | 0.56 | 0.00 | 342.400 | 22.67 | 342.400 | 0.000 | 0.0 |
| . . . .4.18 to 4.64 | 0.53 | 0.56 | 0.00 | 342.400 | 22.83 | 342.400 | 0.000 | 0.0 |
| . . . .3.71 to 4.18 | 0.55 | 0.56 | 0.00 | 342.400 | 22.98 | 342.400 | 0.000 | 0.0 |
| . . . .3.25 to 3.71 | 0.58 | 0.56 | 0.00 | 342.400 | 23.13 | 342.400 | 0.000 | 0.0 |
| . . . .2.78 to 3.25 | 0.60 | 0.56 | 0.00 | 342.400 | 23.28 | 342.400 | 0.000 | 0.0 |
| . . . .2.32 to 2.78 | 0.63 | 0.56 | 0.00 | 342.400 | 23.43 | 342.400 | 0.000 | 0.0 |
| . . . .1.86 to 2.32 | 0.65 | 0.56 | 0.00 | 342.400 | 23.58 | 342.400 | 0.000 | 0.0 |
| . . . .1.39 to 1.86 | 0.68 | 0.56 | 0.00 | 342.400 | 23.73 | 342.400 | 0.000 | 0.0 |
| . . . .0.93 to 1.39 | 0.70 | 0.56 | 0.00 | 342.400 | 23.88 | 342.400 | 0.000 | 0.0 |
| . . . .0.46 to 0.93 | 0.73 | 0.56 | 0.00 | 342.400 | 24.03 | 342.400 | 0.000 | 0.0 |
| . . . .0.00 to 0.46 | 0.75 | 0.56 | 0.00 | 342.400 | 24.18 | 342.400 | 0.000 | 0.0 |
| +0.60D+0.70E | | | | | | | | |
| . . . .13.46 to 13.92 | 0.02 | 0.56 | 0.00 | 342.400 | 19.63 | 342.400 | 0.000 | 0.0 |
| . . . .12.99 to 13.46 | 0.03 | 0.56 | 0.00 | 342.400 | 19.73 | 342.400 | 0.000 | 0.0 |
| . . . .12.53 to 12.99 | 0.05 | 0.56 | 0.00 | 342.400 | 19.83 | 342.400 | 0.000 | 0.0 |
| . . . .12.06 to 12.53 | 0.06 | 0.56 | 0.00 | 342.400 | 19.92 | 342.400 | 0.000 | 0.0 |
| . . . .11.60 to 12.06 | 0.08 | 0.56 | 0.00 | 342.400 | 20.02 | 342.400 | 0.000 | 0.0 |
| . . . .11.14 to 11.60 | 0.09 | 0.56 | 0.00 | 342.400 | 20.11 | 342.400 | 0.000 | 0.0 |
| . . . .10.67 to 11.14 | 0.11 | 0.56 | 0.00 | 342.400 | 20.21 | 342.400 | 0.000 | 0.0 |
| . . . .10.21 to 10.67 | 0.12 | 0.56 | 0.00 | 342.400 | 20.31 | 342.400 | 0.000 | 0.0 |
| . . . .9.74 to 10.21 | 0.14 | 0.56 | 0.00 | 342.400 | 20.40 | 342.400 | 0.000 | 0.0 |
| . . . .9.28 to 9.74 | 0.15 | 0.56 | 0.00 | 342.400 | 20.50 | 342.400 | 0.000 | 0.0 |
| . . . .8.82 to 9.28 | 0.17 | 0.56 | 0.00 | 342.400 | 20.59 | 342.400 | 0.000 | 0.0 |
| . . . .8.35 to 8.82 | 0.18 | 0.56 | 0.00 | 342.400 | 20.69 | 342.400 | 0.000 | 0.0 |
| . . . .7.89 to 8.35 | 0.20 | 0.56 | 0.00 | 342.400 | 20.78 | 342.400 | 0.000 | 0.0 |
| . . . .7.42 to 7.89 | 0.21 | 0.56 | 0.00 | 342.400 | 20.88 | 342.400 | 0.000 | 0.0 |
| . . . .6.96 to 7.42 | 0.23 | 0.56 | 0.00 | 342.400 | 20.97 | 342.400 | 0.000 | 0.0 |
| . . . .6.50 to 6.96 | 0.24 | 0.56 | 0.00 | 342.400 | 21.06 | 342.400 | 0.000 | 0.0 |
| . . . .6.03 to 6.50 | 0.26 | 0.56 | 0.00 | 342.400 | 21.16 | 342.400 | 0.000 | 0.0 |
| . . . .5.57 to 6.03 | 0.27 | 0.56 | 0.00 | 342.400 | 21.25 | 342.400 | 0.000 | 0.0 |
| . . . .5.10 to 5.57 | 0.29 | 0.56 | 0.00 | 342.400 | 21.35 | 342.400 | 0.000 | 0.0 |
| . . . .4.64 to 5.10 | 0.30 | 0.56 | 0.00 | 342.400 | 21.44 | 342.400 | 0.000 | 0.0 |
| . . . .4.18 to 4.64 | 0.32 | 0.56 | 0.00 | 342.400 | 21.53 | 342.400 | 0.000 | 0.0 |
| . . . .3.71 to 4.18 | 0.33 | 0.56 | 0.00 | 342.400 | 21.63 | 342.400 | 0.000 | 0.0 |
| . . . .3.25 to 3.71 | 0.35 | 0.56 | 0.00 | 342.400 | 21.72 | 342.400 | 0.000 | 0.0 |
| . . . .2.78 to 3.25 | 0.36 | 0.56 | 0.00 | 342.400 | 21.81 | 342.400 | 0.000 | 0.0 |
| . . . .2.32 to 2.78 | 0.38 | 0.56 | 0.00 | 342.400 | 21.91 | 342.400 | 0.000 | 0.0 |
| . . . .1.86 to 2.32 | 0.39 | 0.56 | 0.00 | 342.400 | 22.00 | 342.400 | 0.000 | 0.0 |
| . . . .1.39 to 1.86 | 0.41 | 0.56 | 0.00 | 342.400 | 22.09 | 342.400 | 0.000 | 0.0 |
| . . . .0.93 to 1.39 | 0.42 | 0.56 | 0.00 | 342.400 | 22.18 | 342.400 | 0.000 | 0.0 |
| . . . .0.46 to 0.93 | 0.44 | 0.56 | 0.00 | 342.400 | 22.28 | 342.400 | 0.000 | 0.0 |
| . . . .0.00 to 0.46 | 0.45 | 0.56 | 0.00 | 342.400 | 22.37 | 342.400 | 0.000 | 0.0 |
| W Only | | | | | | | | |
| . . . .13.46 to 13.92 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.043 | 999.0 |
| . . . .12.99 to 13.46 | 0.00 | 0.56 | 0.19 | 342.400 | 19.54 | 342.400 | 0.129 | 999.0 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Masonry Slender Wall



Lic. # : KW-06010668
YOUSSEF HACHEM CONSULTING ENGINEERING INC

DESCRIPTION: CMU wall - 7801 Atlantic Way , Miami Beach Fl 33141

## Deflections - Service Loads

| Load Combination / Location | Axial Load (k) | Moments (k-ft) Mcr | Mu | Inertia (in^4) Igross | Icracked | Ieff | Iterated Deflection (in) Deflection | Ratio |
|---|---|---|---|---|---|---|---|---|
| . . . .12.53 to 12.99 | 0.00 | 0.56 | 0.29 | 342.400 | 19.54 | 342.400 | 0.215 | 777.7 |
| . . . .12.06 to 12.53 | 0.00 | 0.56 | 0.38 | 342.400 | 19.54 | 342.400 | 0.300 | 556.9 |
| . . . .11.60 to 12.06 | 0.00 | 0.56 | 0.46 | 342.400 | 19.54 | 342.400 | 0.383 | 435.7 |
| . . . .11.14 to 11.60 | 0.00 | 0.56 | 0.53 | 342.400 | 19.54 | 342.400 | 0.463 | 361.1 |
| . . . .10.67 to 11.14 | 0.00 | 0.56 | 0.58 | 342.400 | 19.54 | 50.241 | 0.534 | 312.7 |
| . . . .10.21 to 10.67 | 0.00 | 0.56 | 0.61 | 342.400 | 19.54 | 32.601 | 0.596 | 280.2 |
| . . . .9.74 to 10.21 | 0.00 | 0.56 | 0.63 | 342.400 | 19.54 | 29.216 | 0.647 | 258.3 |
| . . . .9.28 to 9.74 | 0.00 | 0.56 | 0.64 | 342.400 | 19.54 | 28.432 | 0.685 | 244.0 |
| . . . .8.82 to 9.28 | 0.00 | 0.56 | 0.63 | 342.400 | 19.54 | 29.255 | 0.709 | 235.6 |
| . . . .8.35 to 8.82 | 0.00 | 0.56 | 0.61 | 342.400 | 19.54 | 32.736 | 0.720 | 232.1 |
| . . . .7.89 to 8.35 | 0.00 | 0.56 | 0.58 | 342.400 | 19.54 | 51.490 | 0.717 | 232.9 |
| . . . .7.42 to 7.89 | 0.00 | 0.56 | 0.53 | 342.400 | 19.54 | 342.400 | 0.702 | 237.9 |
| . . . .6.96 to 7.42 | 0.00 | 0.56 | 0.46 | 342.400 | 19.54 | 342.400 | 0.675 | 247.4 |
| . . . .6.50 to 6.96 | 0.00 | 0.56 | 0.38 | 342.400 | 19.54 | 342.400 | 0.638 | 261.7 |
| . . . .6.03 to 6.50 | 0.00 | 0.56 | 0.29 | 342.400 | 19.54 | 342.400 | 0.593 | 281.6 |
| . . . .5.57 to 6.03 | 0.00 | 0.56 | 0.18 | 342.400 | 19.54 | 342.400 | 0.542 | 308.3 |
| . . . .5.10 to 5.57 | 0.00 | 0.56 | 0.06 | 342.400 | 19.54 | 342.400 | 0.487 | 343.2 |
| . . . .4.64 to 5.10 | 0.00 | 0.56 | 0.07 | 342.400 | 19.54 | 342.400 | 0.430 | 388.1 |
| . . . .4.18 to 4.64 | 0.00 | 0.56 | 0.22 | 342.400 | 19.54 | 342.400 | 0.375 | 445.0 |
| . . . .3.71 to 4.18 | 0.00 | 0.56 | 0.39 | 342.400 | 19.54 | 342.400 | 0.323 | 516.6 |
| . . . .3.25 to 3.71 | 0.00 | 0.56 | 0.57 | 342.400 | 19.54 | 74.194 | 0.275 | 607.3 |
| . . . .2.78 to 3.25 | 0.00 | 0.56 | 0.76 | 342.400 | 19.54 | 22.837 | 0.230 | 727.7 |
| . . . .2.32 to 2.78 | 0.00 | 0.56 | 0.97 | 342.400 | 19.54 | 20.729 | 0.186 | 899.0 |
| . . . .1.86 to 2.32 | 0.00 | 0.56 | 1.19 | 342.400 | 19.54 | 20.097 | 0.144 | 999.0 |
| . . . .1.39 to 1.86 | 0.00 | 0.56 | 1.42 | 342.400 | 19.54 | 19.837 | 0.104 | 999.0 |
| . . . .0.93 to 1.39 | 0.00 | 0.56 | 1.67 | 342.400 | 19.54 | 19.712 | 0.067 | 999.0 |
| . . . .0.46 to 0.93 | 0.00 | 0.56 | 1.94 | 342.400 | 19.54 | 19.646 | 0.032 | 999.0 |
| . . . .0.00 to 0.46 | 0.00 | 0.56 | 2.36 | 342.400 | 19.54 | 19.595 | 0.008 | 999.0 |
| E Only | | | | | | | | |
| . . . .13.46 to 13.92 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .12.99 to 13.46 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .12.53 to 12.99 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .12.06 to 12.53 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .11.60 to 12.06 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .11.14 to 11.60 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .10.67 to 11.14 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .10.21 to 10.67 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .9.74 to 10.21 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .9.28 to 9.74 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .8.82 to 9.28 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .8.35 to 8.82 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .7.89 to 8.35 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .7.42 to 7.89 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .6.96 to 7.42 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .6.50 to 6.96 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .6.03 to 6.50 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .5.57 to 6.03 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .5.10 to 5.57 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Masonry Slender Wall

File: cmu_wall.ec6

Lic. # : KW-06010668
YOUSSEF HACHEM CONSULTING ENGINEERING INC

DESCRIPTION: CMU wall - 7801 Atlantic Way , Miami Beach Fl 33141

## Deflections - Service Loads

| Load Combination / Location | Axial Load (k) | Moments (k-ft) Mcr | Mu | Inertia (in^4) Igross | Icracked | Ieff | Iterated Deflection (in) Deflection | Ratio |
|---|---|---|---|---|---|---|---|---|
| . . . .4.64 to 5.10 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .4.18 to 4.64 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .3.71 to 4.18 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .3.25 to 3.71 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .2.78 to 3.25 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .2.32 to 2.78 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .1.86 to 2.32 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .1.39 to 1.86 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .0.93 to 1.39 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .0.46 to 0.93 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |
| . . . .0.00 to 0.46 | 0.00 | 0.56 | 0.00 | 342.400 | 19.54 | 342.400 | 0.000 | 0.0 |