TRC Worldwide Engineering

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Mr. Jim Vacherlon – President
Lighthouse Pointe Condominiums,
17980 Gulf Boulevard,
Redington Shores, FL 33708

April 26, 2022

RE: Report of Structural Condition Survey and Analysis
Lighthouse Pointe Condominiums

EXECUTIVE SUMMARY

TRC Worldwide Engineering has been engaged by the Lighthouse Pointe Condominium Association to perform a condition assessment of the structural systems of the building and to perform a structural analysis of the building. On February 24, & April 18, 2022, a representative of TRC performed visual observations of the building, took photographic documentation, and recorded their observations.

Observations:

1) No significant signs of structural distress were observed.
2) TRC observed instances of stucco and exterior finish cracking and delamination throughout the property.
3) TRC observed some balcony slabs and balcony slab edges which presented with minor concrete cracks, and minor concrete spalls. TRC also observed balconies which were tiled that presented with efflorescence and mineral deposits along the slab edge. In some instances, a noticeable void was detected under the tile where grout should be, allowing for potential water intrusion.
4) In addition to these balcony observations, TRC observed some balcony handrail mounting plates which were corroding.
5) Within the parking garage, TRC observed minor concrete spalls as well as instances of cracked and delaminated stucco.
6) Along the common walkways/corridors, TRC observed confirmed instances of concrete spalling and delaminating finish stucco.
7) On multiple columns throughout the property, TRC observed vertical stucco ridges that seem to align with the underlying rebar reinforcement. In some instances, corrosion was observed to percolate to the surface.
8) TRC observed multiple column bases with deep cracking/ potential concrete spalling.
9) Steel reinforcement of the exterior stairwells was observed to have areas presenting with minor corrosion.
10) Heavier interior floor finishes observed generally consisted of approximately 1/4” to 1/2” tile flooring on a 1/4” to 1/2” grout base.

Analysis & Conclusions:

1) The structural drawings provided did not list the design superimposed dead loads (SDL). However, the structural codes at the time of design of your structure indicate that the minimum design SDL for the living areas is between 15 and 20 pounds per square foot (psf).
2) Typical finishes of 1/4" to 1/2" tile flooring on a 1/4" to 1/2" grout base weigh between 6 psf to 12 psf.
3) Given the isolated locations of the thicker floors, and accounting for the weight of other common dead load materials (i.e, drywall, framing, conduit) TRC used 20 psf SDL for the verification of floor slabs only.
4) During analysis, it became evident that not all foundations would support the full 20 psf on all floors at all locations. Therefore, the SDL implemented in analysis was reduced stepwise from 20 psf - 10 psf to identify at what loading the foundation would be of sufficient capacity indicated in Appendix B Figure 3 (as per structural drawings).
5) Analysis results are as follows:
    a. The columns were of sufficient capacity to support a SDL of 20 psf.
    b. The floor slabs were of sufficient capacity to support a SDL of 20 psf.
        i. Note that a portion of the structural drawings was not legible and assumptions had to be made for slab reinforcement where marked in red in Figure 3 of Appendix B.
    c. The foundations were of sufficient capacity to support a SDL of 20 psf except at grid line J6 (as per structural drawings).
        i. TRC reduced SDL to 15 psf and 10 psf to determine what SDL would allow for the piles at the foundation of the column to not be overstressed. At 15 psf the foundation is overstressed 10.8%, and at an SDL equal to 10 psf the foundation is overstressed 7.6%. Typically for foundations it is acceptable to observe up to 10% overstressing at foundations.

Recommendations:

1) TRC recommends that the association review all proposed renovations and to adopt a limitation of floor finish weights. The weight of floor finishes should be limited to 12 psf, which is in accordance with the designed superimposed dead loads at the time of building construction. This is to help ensure that the total floor loads do not exceed 20 psf.
2) Given that TRC had to make assumptions due to illegible portions of the structural drawings, TRC recommends finding the original structural set, or a set that is more legible, to confirm the slab reinforcement analysis.
3) As our structural analysis revealed that the foundations at gridline J-6 are potentially overstressed, TRC recommends survey monitoring of column J-6 to

measure any potential movement/settlement at this location over time. TRC will be able to assist in this process.

4) During TRCs visit, some balconies were observed with evidence of potential water intrusion underneath the applied tile and in some instances along the slab edge. TRC recommends a full building balcony forensic investigation of the waterproofing applications and the integrity of the concrete. This investigation should map all concrete spalls, hollow stucco, as well as instances of hollow and delaminating tile. Further, the balcony railings (including their fasteners and anchors) should also be inspected at that time.
5) TRC recommends that all identified instances of concrete spalling be professionally restored.
6) TRC recommends that columns with vertical surface corrosion have the stucco removed to assess the extent of underlying corrosion to the steel reinforcement, prior to restoration.
7) TRC recommends that all other instances of stucco cracking and stucco delamination be restored during the buildings next cycle of exterior maintenance.

NARRATIVE REPORT

On February 22nd & April 18th of 2022, in accordance with your request, a representative from TRC Worldwide Engineering conducted structural observations of The Lighthouse Pointe Condominiums, 17980 Gulf Boulevard, Redington Shores, FL 33708. The purpose of the inspection was to document the existing conditions of the building, gather pertinent data and information in order to perform a representative structural analysis, and subsequently determine if there is any reason to be concerned about the structural integrity of your building, and if so, how best to address the issues in order to optimize the quality and longevity of the structure.

BACKGROUND

This report is intended to address the building structural systems as well as the parking garage of the Lighthouse Pointe Condominiums. TRC was provided with full sets of structural and architectural drawings for their work. TRC was provided with full access to all pertinent elements of the site. TRC performed a walkthrough of the exterior and interior of the building, but interior observations were limited to only those units that where have scheduled to access or with some concerns regarding the pitch of their floors.

The building is a 7-story condominium constructed predominately of one-way and two-way flat plate reinforced concrete slabs. The slabs are supported by reinforced concrete columns and concrete walls. The structure is supported on foundational piles, which are essentially reinforced concrete columns installed below the ground level.

BUILDING PLANS:

The set of plans utilized for analysis was created by: Comprehensive Architects, Inc., and John Stephenson Consultants, Inc.
Plans Included:

- Structural Set: "Lighthouse Pointe Condominiums." Prepared by John Stephenson Consultants Inc., Sarasota, FL, dated 10/17/80. Revision Date – 10/21/80.
- Architectural Set: "Lighthouse Pointe Condominiums." Prepared by Comprehensive Architects, Inc., Sarasota, FL, dated 9/30/80. Revision Date – 11/30/80.

DESIGN CODES AND LATEST CODES:

TRC used a complete set of the structural drawings of the existing building prepared by John Stephenson Consultants, Inc. dated 10/17/80, with latest revision dates of 10/21/80. The existing structural drawings listed the following applicable design codes:

1) General Building Code: Standard Building Code 1980 Edition
2) Codes for Concrete Design and Detailing:
    a. Building Code Requirements for Reinforced Concrete (ACI 318-77)

When the word Code is used in this report, it is intended to refer to the above listed codes. TRC used the above Codes in conjunction with the below listed codes to perform their analysis:

1) 2020 Florida Building Code
2) Building Code Requirements for Reinforced Concrete (ACI 318 – 14)
3) 2020 Florida Building Code: Existing Buildings

When the word Latest Codes is used, it is intended to refer to the above listed codes. Please note that the 2020 Florida Building Code is in affect at the time this letter was written.

OBSERVATIONS:

Interior observations were based on room units provided by Mr. Jim Vacherlon, Association Board President as being units that have undergone alterations to the original design/layout of the structure and/or underwent renovations that could have added significant load to the unit and/or units reported with concerns regarding their existing condition. Additionally, TRC independently observed the interior of the parking garage to assess the exposed structural concrete. Photographs were taken of room interiors, balconies, and the interior levels of the parking garages to document information such as the type and thickness of flooring inside the unit, alterations to the structural makeup of the unit, condition of exposed concrete, slab, slab edges, evidence of water infiltration (at balcony guardrail posts), etc. This information was utilized in formulating the estimated loads that were applied in the structural analysis, as well as in formulating TRC's recommendations described in this document. See the below summary of observations

of floor finishes and observed damage patterns.

- Generally, heavier finishes were observed in the rooms at the foyer, kitchen, family or living rooms, and the dining rooms.
    - Throughout all the interior units inspected (Units 506, 603, 206, 406, 304, 201, 502, 104) the heaviest observed flooring systems was comprised of ceramic tile approximately 1/4” to 1/2” tile flooring on a 1/4” to 1/2” grout base.
- Balcony modifications:
    - TRC did not observe any balcony with extensive modifications from the original design such as glass enclosure. TRC did observe some balconies with ceramic tile finishes. TRC also observed balconies where cementitious material was added to increase the constructed pitch of the balcony.
- Balcony damages:
    - Throughout the observed balconies, general damages observed included vertical surface corrosion on columns, improper grouting and waterproofing of balcony tiling, minor concrete cracking, and minor concrete spalling (See Photo 3-14).
- Parking Garage:
    - Within the parking garage TRC observed instances of concrete spalling on the ceiling, as well as vertical surface corrosion on columns (See Photo 19-21).
- Within Unit 603, The Owner reported concerns regarding the pitched interior floors of the unit. The interior floors are covered with hardwood flooring, making the review of the original concrete substrate non-permitted. TRC measured the hardwood flooring slope utilizing a 4-foot water level. In general, the flooring pitch was observed to be acceptable. Certain locations reveal pitched locations were found inside the kitchen area, master bedroom, and near the SGD inside the living room. The pitch floor is likely due to application error of the flooring as no signs of cracks and/or distress were found on the walls and ceiling adjacent to the mentioned locations (See Photos 24 - 27).

Exterior observations by TRC representatives were predominately visual and did not involve heavily destructive testing. In some instances, putative concrete spalls were mechanically struck to assess the integrity of the concrete and confirm the presence of corroding steel. TRC performed observations of the exterior walls of the garage as observed from grade at the perimeter of the building. Additionally, TRC was able to gain access to the roof in order to assess the integrity of the roofing membrane system as well as assess the general loads the roof is subjected to. See the attached photo-exhibit for general representation of observations of the exterior portions of the building. Generally,

there were no significant signs of structural distress. See the below summary of exterior observations:

1) Throughout the property, TRC observed many columns with vertical surface corrosion that appeared to align with the active cathode protection wire/line system. (See Photo 1,4,10).
2) The roof was not overloaded and was generally in good condition. Some minor granular washout was observed at select locations of the roof. (See Photo 23).
3) Along the common walkways/corridors, TRC observed confirmed instances of concrete spalling and delaminating finish (See Photo 15-17).
4) Steel reinforcement of the exterior stairwells was observed to have areas presenting with minor corrosion (See Photo 18)

OBSERVED LOADS:

There are varying loads on the floor slabs throughout the building. Loads on the floor slab are generally considered to be inclusive of the physical weights of building materials and finishes on the floors or attached to the ceilings as well as the weight of non-permanent type loads such as furnishing and people. A dead load is defined in the Code as "the weight of all permanent construction, including walls, floors, roofs, ceilings, stairways, and fixed service equipment, plus the net effect of prestressing." A live load is defined in the Code as "the weight superimposed by the use of occupancy of the building, not including crane load, dead load, earthquake load, snow load, or wind load." The superimposed dead load is intended to refer to all loads in addition to the self-weight of the structure. The dead loads for this building are the interior walls, floor finishes, gypsum board ceilings, etc. Other dead loads such as duct work for HVAC, electrical, sprinkler pipes, etc. are light compared to the floor finishes. Furnishing typically take up floor space and can be considered as part of the live load versus the dead load. Interior walls for residential construction typically weigh approximately 2 pounds per square foot (psf) vertically which is equivalent to 8 psf on the floor for 9-foot-tall walls surrounding a 10x10 room. Gypsum board ceilings used to hide mechanical ducts typically weigh approximately 3 psf.

The weights of floor finishes can vary substantially. Carpet weighs anywhere from ½ psf to 2 psf. Wood flooring can range in weight from 1 ½ psf for engineered hardwoods to around 4 psf for thick dense hardwoods. Ceramic tile with grout typically weighs anywhere from 6 to 12 psf depending on thickness. Natural or cultured stone will typically weigh the most and can range between 10 to 30 psf depending upon the stone type, thickness, and thickness of grout.

During TRC's site visit there were not any balconies that were observed as being enclosed with sliders or windows. The only substantial modification that was observed was the common practice of adding ceramic tile to the unit balconies as well as hurricane shutters.

TRC focused predominately on the heavier observed finishes, but it is often difficult to ascertain thicknesses where the floor material is throughout the rooms. TRC was able to measure some of the thicknesses directly where the material would end at mechanical closets, or at the edge of the balcony. Using the above noted thickness of the heavier observed materials, TRC approximated the superimposed dead loads as follows:

Rooms:	Tile Flooring	6- 12 psf (1/2" - 1" total thickness)
	Ceiling	1 psf (drop ceilings isolated)
	Walls	7 psf
	TOTAL LOADS	14-20 psf
Balconies:	Tile Flooring	6- 12 psf (1/2" - 1" total thickness)
	Walls/Shutters	7-9 psf
	TOTAL LOADS	13 to 19 psf

The isolate loads on some floors up to 20 psf will be analyzed independently for floor capacity. The 20 psf will be used to calculated overall column and foundation loads.

OBSERVED LOADS VERSUS DESIGN LOADS:

Normally, the first step in evaluating the allowable capacity of structural systems is to compare the posted design loads on the drawings to the observed loads in the building. This gives the engineer a general idea of the percentage of additional loads being demanded. It is important to remember the distinction between design load and the actual capacity. Some designers tend to be conservative during design and there is often some additional capacity in buildings that is not necessarily posted on the drawings.

An analysis can be performed based upon the loads derived from the design codes at the time of structural design. Focusing on the floor slabs alone and ignoring any live load reductions, the total service design load (where the term service is meant to mean loads that are not factored, which will be discussed in more detail below) can be calculated as follows:

TL = SW + SDL + LL = 107 psf + 15 psf + 40 psf = 162 psf
TL = Total Service Load
SW = Self Weight of typical floor slab, 8.5" thick
SDL = Superimposed Dead Load
LL = Live Load (Confirmed to SBC '80)

The Code allows designers to reduce Live Load for based upon the square footage and the particular element that is being analyzed. If the live load was fully reduced for the floor slabs, where applicable, then the total service load will be as follows:

TL = 107 psf + 15 psf + 24 psf = 146 psf

As noted above, the maximum loads observed on the floors is 20 psf. This would mean the total load of the floor increased to 167 psf for the unreduced live load case and 151 psf for the reduced live load increase. This equates to a 3.1% and 3.5% increase respectively for the unreduced live load and reduced live load case, respectively. Generally, a load increase of 5% or less is considered acceptable; however, as TRC has made assumptions in assigning the original design SDL, additional consideration is required.

CONSIDERATION OF CODE CHANGES:

The next step in the evaluation of an existing floor slab for heavier loads is noting the considerations for the Current Code requirements. Since the design of the Lighthouse Pointe Condominiums, there have been considerable changes to codes that govern the design of reinforced concrete structures. Specifically, from the original Design Code to the Current Code, the load factors for dead and live loads have been reduced. Generally speaking, for calculations of strength design in the columns and floor slabs, the Latest Code will permit a greater superimposed dead load given the less stringent requirements of load factors for dead and live loads. See below excerpts from ACI 318-80, original design code, and ACI 318-14, Latest Code:

ACI 318 - 80: U = 1.4 D + 1.7 L *equation (9-1)
ACI 318 - 14: U = 1.4 D *equation (5.3.1a)
U = 1.2 D + 1.6 L *equation (5.3.1b)
U = Required Strength
D = Dead Load
L = Live Load

*Note that loads that are not applicable have been removed from the equation for clarity.

The total factored design loads for ACI 318-80 can then be calculated as follows using reduced live loads for floor slabs:

ACI 318 - 80: U = 1.4 (122 psf) + 1.7 (24 psf) = 211.6 psf

Through back-calculation to determine the allowable superimposed dead load using the ACI 318 – 14 equations noted above, the allowable superimposed design dead load can be restated in the below equation:

ACI 318 - 14: U = 1.2 (107 psf) + 1.2 (SDL) + 1.6 (24 psf) = 211.6 psf

Solving for allowable superimposed dead load for strength consideration you get a capacity as follows:

Allowable SDL = 37 psf

Hence, without significant effort, an engineer could justify that the floor slab moment capacity is sufficient for the 20 psf superimposed loads observed. This will be verified in the Analysis performed by TRC in the section that follows.

STRUCTURAL ANALYSIS AND RESULTS:

TRC performed an analysis using SAFE software of the floor slabs to verify that the slabs would support a superimposed dead load (SDL) of 20 psf. Live loads (LL) were set to the code limits designated on the structural drawings, 40 psf for interior unit areas, and 60 psf for balcony areas. This computer analysis is typically used for the design of reinforced concrete floor slabs. TRC modeled and loaded a typical floor slab, under the loads mentioned, and used the program to determine if the reinforcement in the slab was sufficient.

Figure 2 in Appendix B shows the modeled floor slab that was used to confirm that additional slab reinforcement was not needed. It is important to keep in mind that the red labeled reinforcement on the floor slab in Appendix B Figure 3 is assumed reinforcement. The structural drawing set provided is not legible in certain areas of the slab, thus TRC had to make assumptions as to what reinforcement is likely in place at this bottom slab reinforcement. Based upon our analysis of the floor slab in accordance with the Latest Codes, it is our professional opinion that the existing concrete slab has sufficient capacity to safely support the weight of the finishes described above. However, in the areas where assumptions were made it would be recommended to find more complete existing drawings and confirm TRC's assumptions.

In addition to the above noted analysis, TRC computed the loads in the columns and foundations and verified the capacity of columns using a finite element analysis software program, ETABS. See Appendix B Figure 1 for isometric view of the model. The columns were loaded under the same loads applied to the floor slab (SDL=20 psf, LL Balcony=60 psf, LL Rooms= 40 psf). Based upon our analysis of the columns and loads on the columns in accordance with the Latest Codes, it is our professional opinion that the existing columns have sufficient capacity to safely support the weight of the finishes described above. However, when verifying the capacity of the foundations, it was found that 20 psf of SDL exceeded capacity of one column foundation.

In order to check the capacity of the foundation was not exceeded, TRC reduced the SDL from 20 psf (which was the *heaviest* loading combination observed) to 15 psf and 10 psf to determine what SDL would allow for the piles at the foundation of the column to not be overstressed. At 15 psf the foundation is overstressed 10.8%, and at an SDL equal to 10psf the foundation is overstressed 7.6%. Typically for foundations it is acceptable to be up to 10% overstressing at foundations (See Appendix B Figure 4 for the building layout as per the structural drawings). The highlighted location on this figure shows the one foundation which experienced overstressing in TRC's analysis model. Based upon our analysis of the foundations and loads on the foundation in accordance with the Latest Codes, it is our professional opinion that the existing foundations, with the exception of the indicated foundation in Figure 4 of Appendix B, have sufficient capacity to safely support the weight of the finishes described above.

CONCLUSION & RECOMMENDATIONS:

TRC performed field observations of the existing building interior and exterior to look for obvious signs of structural distress and to comment on the loads that are present in the building. Based upon our review of the field observations, TRC did not see any significant signs of structural distress. In addition to these observations, TRC performed an analysis of the typical floors and analyzed the columns and foundations. All members tested were of sufficient capacity to support the observed loads, with the exception of the column/foundation at gridline J-6 (Figure #4).

Based upon our observations and findings, TRC recommends the following:

1) TRC recommends that the association review all proposed renovations and to adopt a limitation of floor finish weights. The weight of floor finishes should be limited to 12 psf, which is in accordance with the designed superimposed dead loads at the time of building construction. This is to help ensure that the total floor loads do not exceed 20 psf.
2) Given that TRC had to make assumptions due to illegible portions of the structural drawings, TRC recommends finding the original structural set, or a set that is more legible, to confirm the slab reinforcement analysis.
3) As our structural analysis revealed that the foundations at gridline J-6 are potentially overstressed, TRC recommends survey monitoring of column J-6 to measure any potential movement/settlement at this location over time. TRC will be able to assist in this process.
4) During TRCs visit, some balconies were observed with evidence of potential water intrusion underneath the applied tile and in some instances along the slab edge. TRC recommends a full building balcony forensic investigation of the waterproofing applications and the integrity of the concrete. This investigation should map all concrete spalls, hollow stucco, as well as instances of hollow and delaminating tile. Further, the balcony railings (including their fasteners and anchors) should also be inspected at that time.
5) TRC recommends that all identified instances of concrete spalling be professionally restored.
6) TRC recommends that columns with vertical surface corrosion have the stucco removed to assess the extent of underlying corrosion to the steel reinforcement, and/or cathodic protection lines prior to restoration.
7) TRC recommends that all other instances of stucco cracking and stucco delamination be restored during the buildings next cycle of exterior maintenance.

Personnel at TRC can draft proposals for additional forensics and repairs to address the above-mentioned items.

LIMITATIONS:

The scope of work performed by TRC Worldwide Engineering was limited to structural observations and the services necessary to provide the informed opinions described herein regarding the general condition and integrity of the building structure. TRC performed an analysis of the structural elements utilizing SAFE software and ETABS to determine its general gravity and load bearing capacity as described within this report. Given the nature of the on-site investigation, being predominately visual in nature, any deficiency in the structure which is related to hidden defects would not be able to be addressed.

TRC's visits to the site and observations were limited to gathering the necessary information to perform the specific work described herein. TRC's site work involved a walkthrough of the structure to visually observe, without aid of magnification instruments, areas which were readily accessible and visible at the time of our visit.

TRC was provided with an almost complete set of structural drawings of the existing building. Some pages were very difficult to read and forced TRC to make assumptions for slab reinforcement. TRC's scope of work did not include material testing to verify existing structural drawings or to determine structural member sizes or properties. TRC assumed that structural drawings provided accurately depict existing conditions. The scope of work performed by TRC did not include field measurement of structural member's sizes and properties contained within the building structure, nor did TRC implement destructive field testing to expose any hidden conditions of concrete slabs and steel connections.

This report is based upon a scope of work that was limited by time and cost and is not intended to be exhaustive or all encompassing, but rather to obtain enough information to construct a well-informed opinion on the current structural condition of the building. Should any additional site visits or additional relevant documents or information become available, TRC reserves the right to amend and supplement this report and modify any conclusions or opinions based upon the review and interpretation of the new information or documentation obtained.

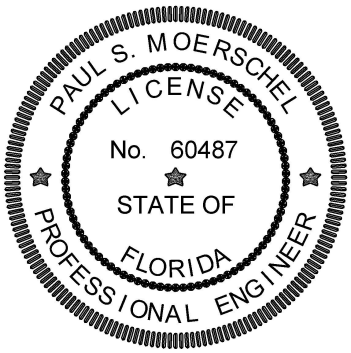
TRC appreciates the opportunity to provide structural services with regard to your building. Please do not hesitate to call or email with any questions or concerns.

Sincerely,
TRC Worldwide Engineering

DIGITALLY SIGNED BY
PAUL MOERSCHEL, PE 60487
STATE OF FLORIDA

Digitally signed by Paul Moerschel, PE
Date: 2022.04.26 15:28:17 -04'00'

Paul Moerschel, PE
President, Florida Group
TRC Worldwide Engineering



This item has been digitally signed and sealed by Paul Moerschel, PE on the date adjacent to the seal.

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

Enclosures:
Appendix A: Representative Photo Exhibit
Appendix B: Models Used for Analysis

APPENDIX A: Representative Photo Exhibit

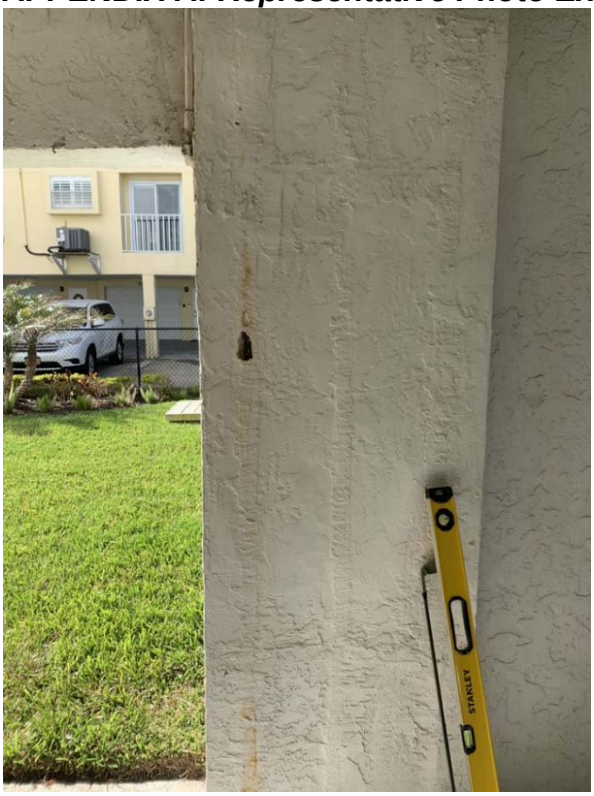


Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

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Photo 12

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Photo 14

Photo 15

Photo 16

Photo 17

Photo 18

Photo 19

Photo 20

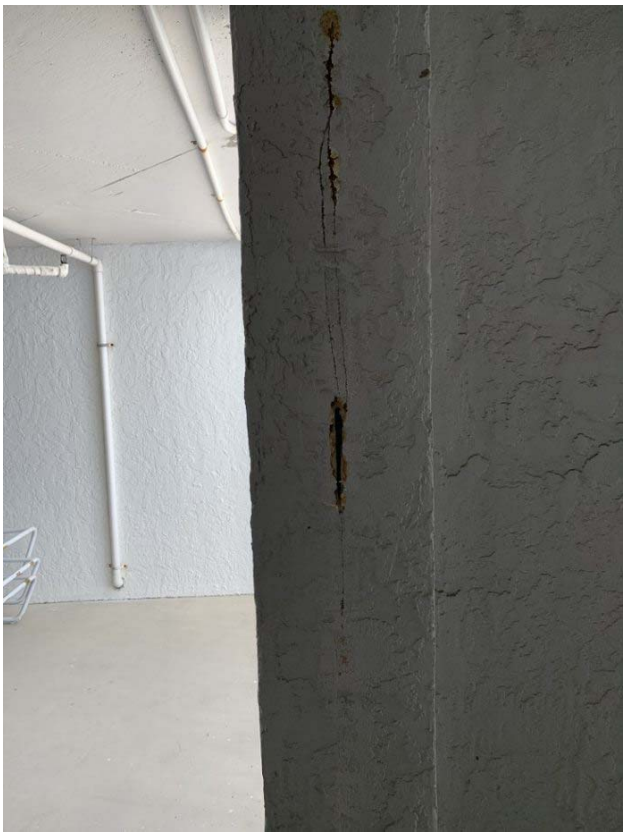

Photo 21

Photo 22

Photo 23

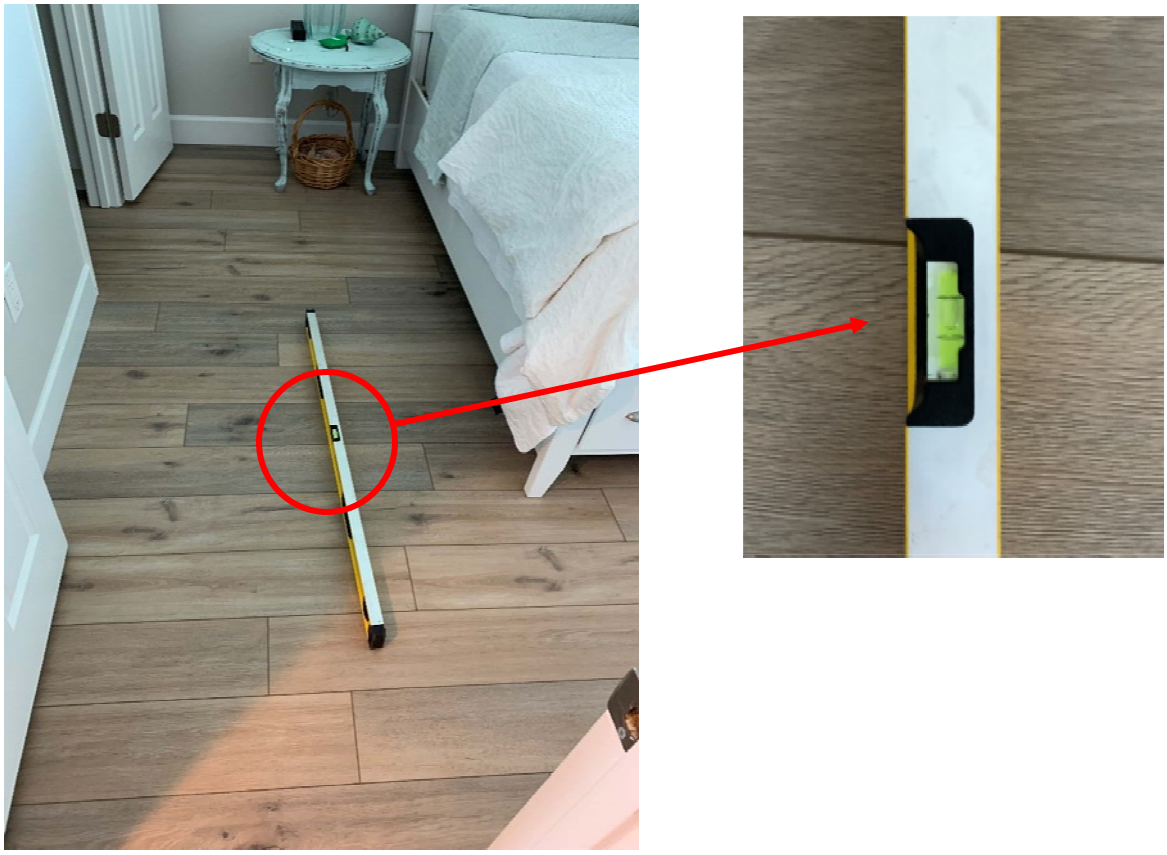

Photo 24

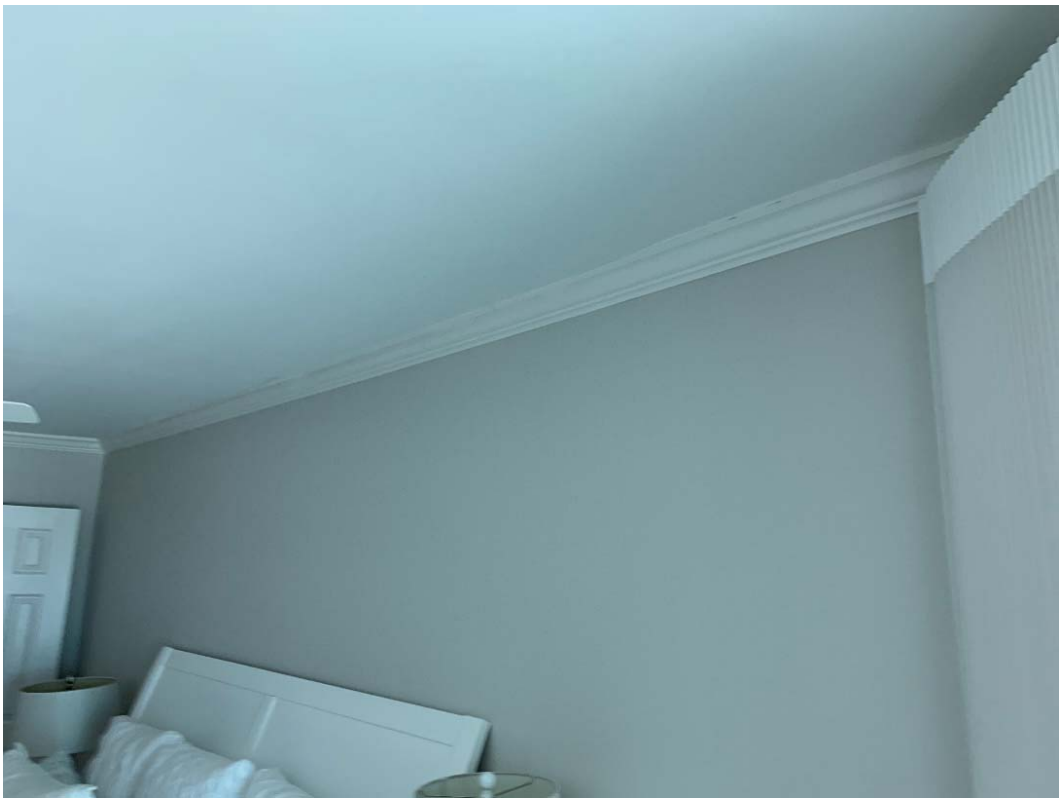

Photo 25

Photo 26

Photo 27

Photo 28

APPENDIX B: Models Used for Analysis

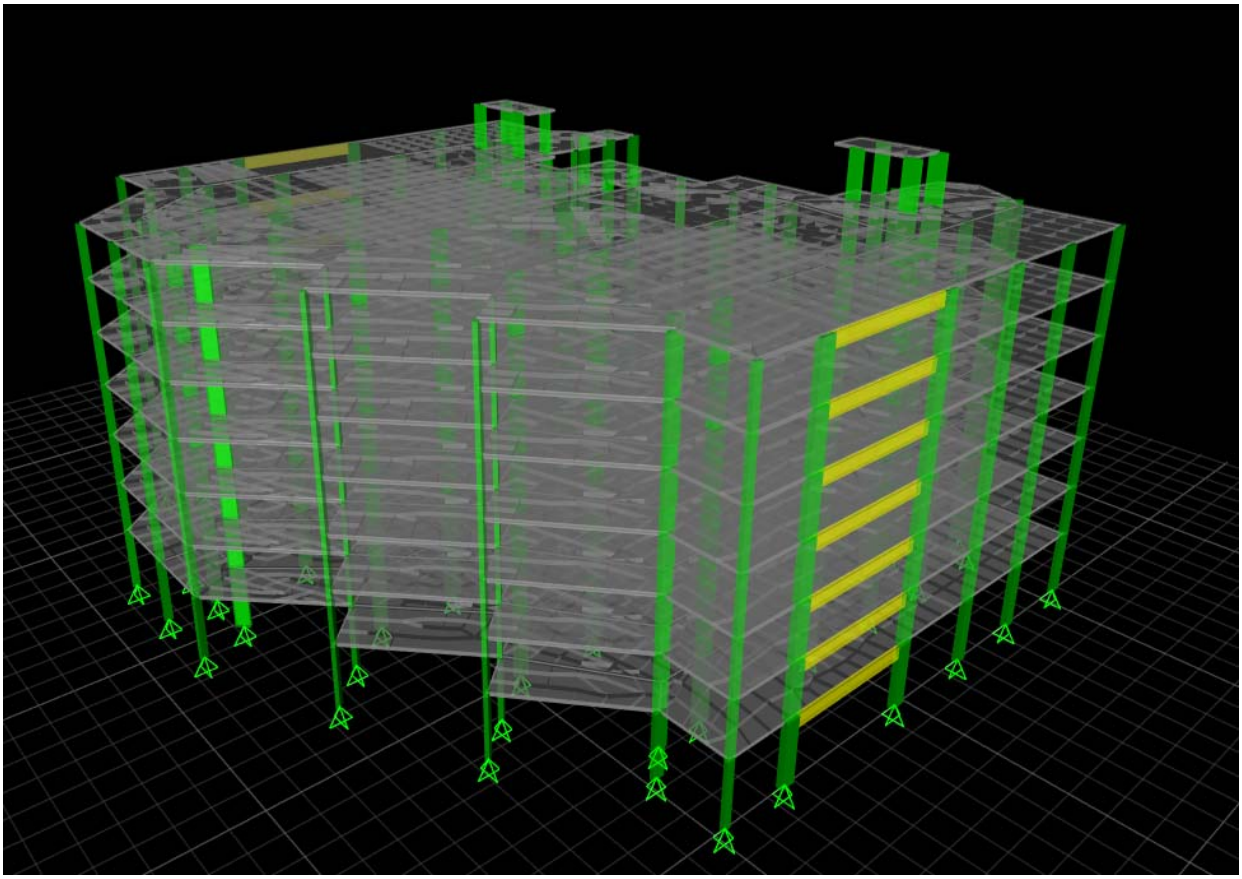

Figure 1. Etabs Model used for analysis.

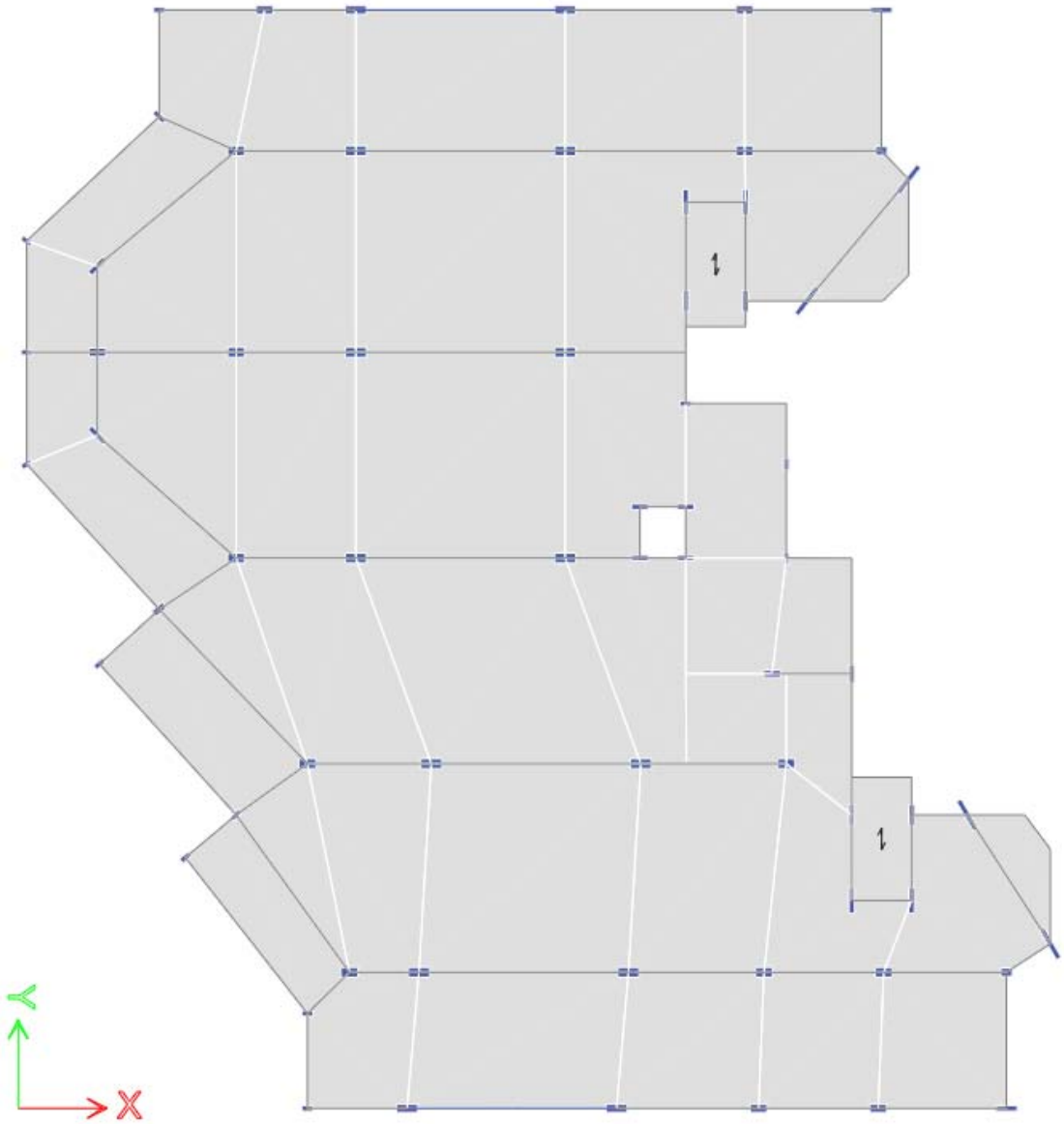

Figure 2. SAFE typical floor plate model.

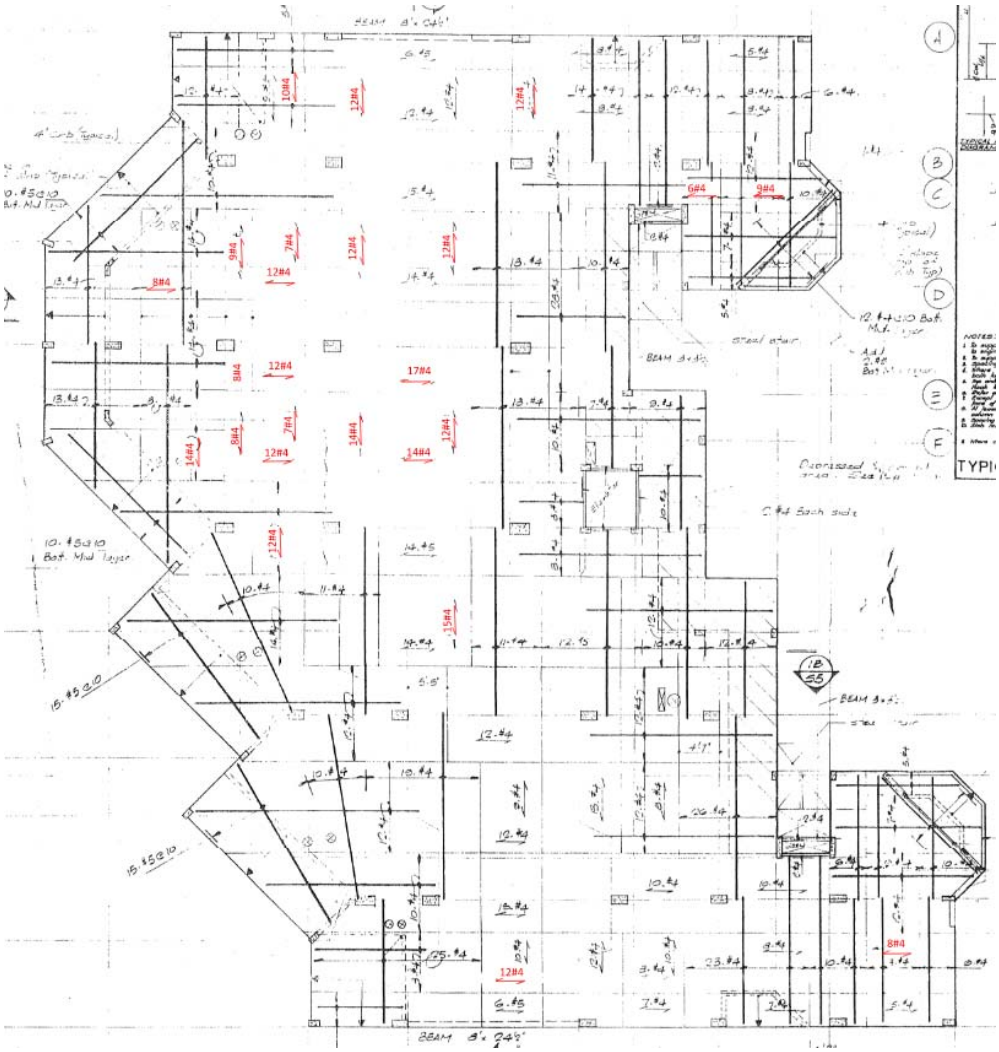

Figure 3. Assumed reinforcement at areas of structural drawings that are illegible from provided scanned set (See assumptions made in red).

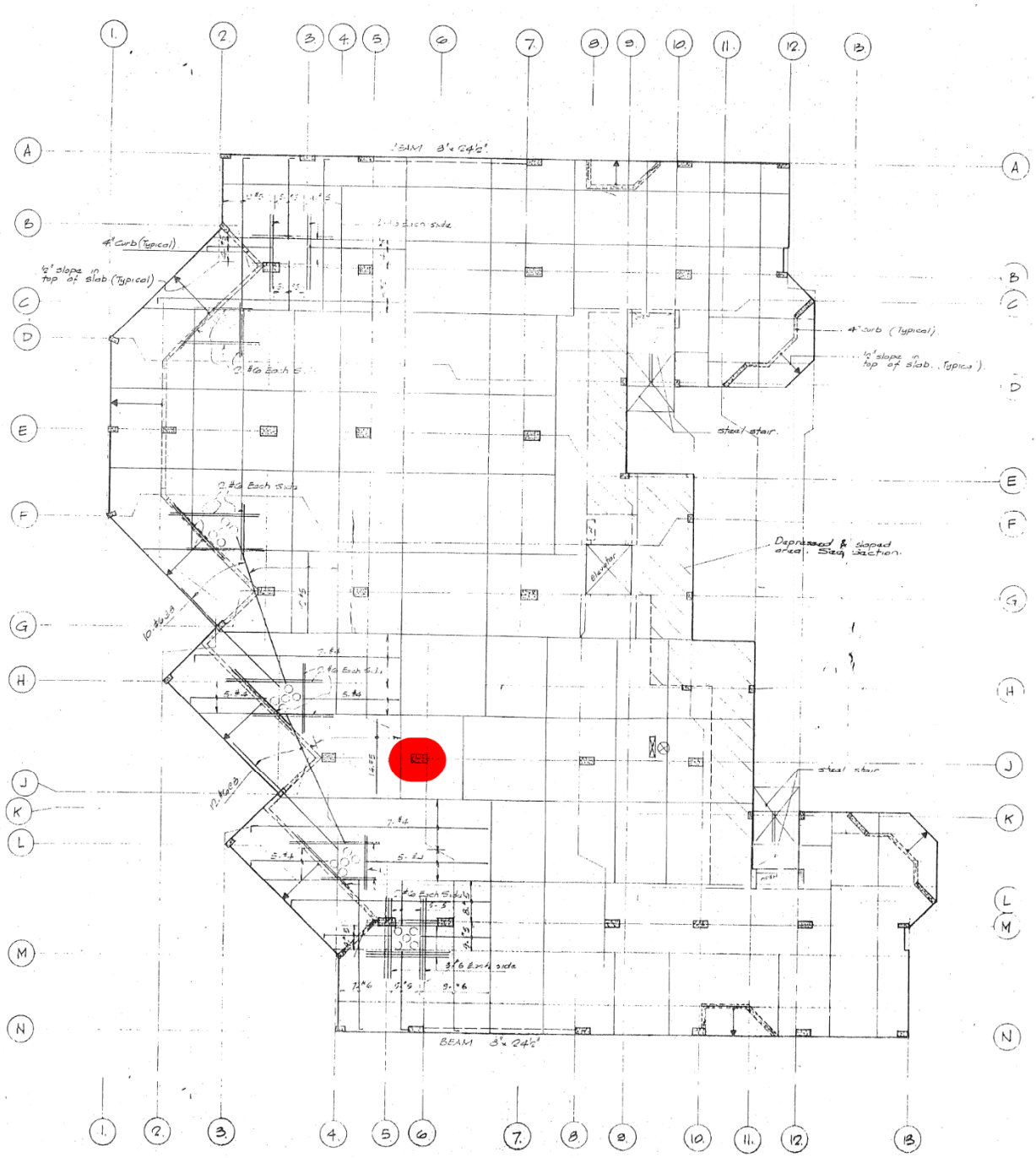

Figure 4. Foundation/column line overstressed at SDL of 20 psf.