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Structural Assessment – Existing Condition Report

Project #21RS-0851
February 16th, 2022

Project for:

Sea Shell Condominium Association, Inc.
6500 Midnight Pass Road
Sarasota, FL 34242

2/16/2022

David G. Kairns, PE #52677
Florida Certificate of Authorization Number 8371

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February 16th, 2022

Maria Mitchell
Sea Shell Condominium Association, Inc.
6500 Midnight Pass Road
Sarasota, FL 34242

Via Email: maria@seashellcondos.com

RE: Sea Shell - Existing Condition Survey
6500 Midnight Pass Road, Sarasota, FL 34242
KEG File# 21RS-0851

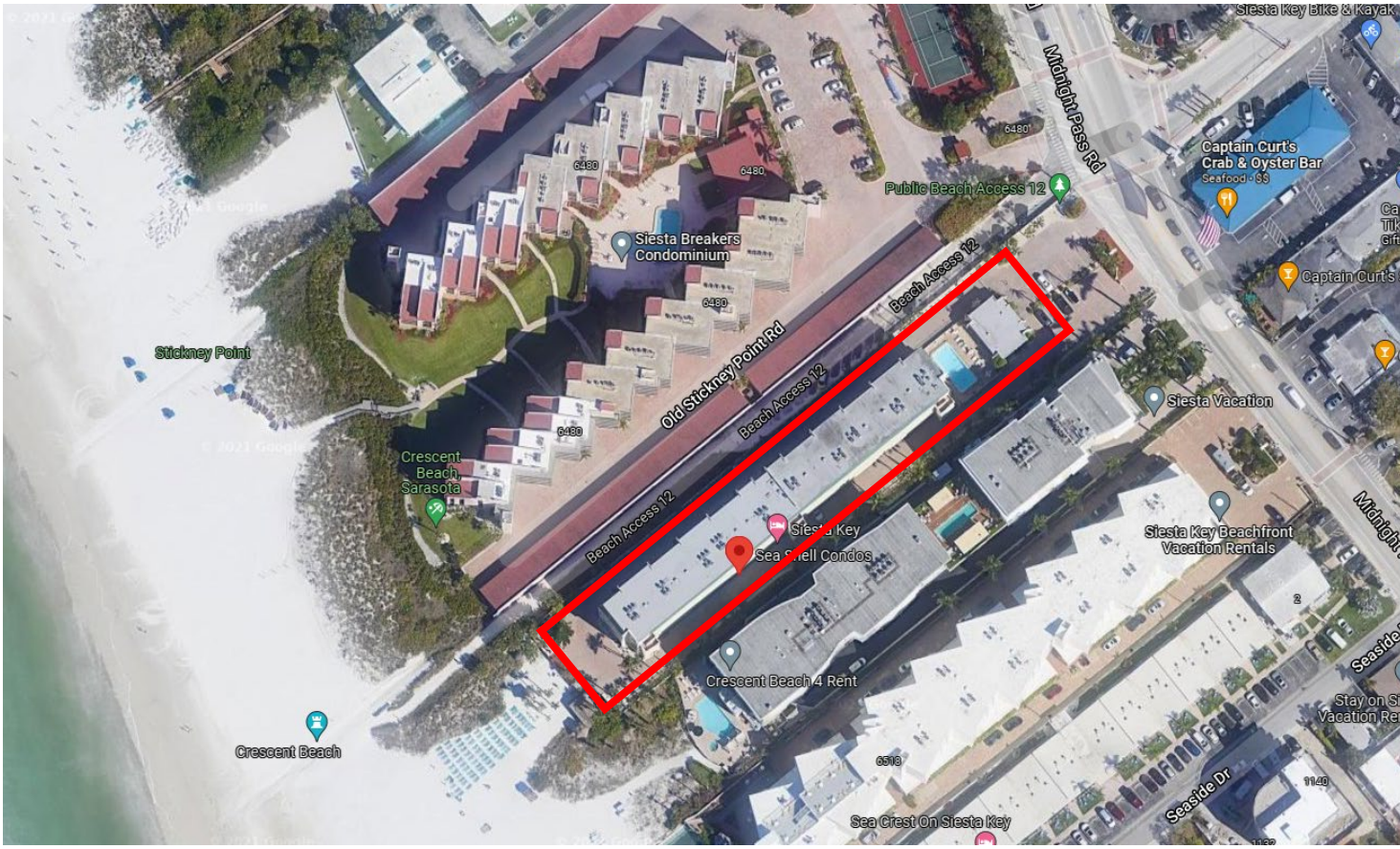
Dear Mrs. Mitchell:

Karins Engineering Group, Inc. (KE) agreed to render professional engineering services in connection with a Building Envelope and Structural Component Existing Condition Survey at **Sea Shell Condominium Association, Inc., 6500 Midnight Pass Road, Sarasota, FL 34242 (**hereinafter called the "Project" and the "Client") on August 6, 2021. Per the signed agreement dated August 11th, 2021, KE made site visits to Sea Shell between the months of October and December to complete a limited condition observation and evaluation of the building conditions and construction, as it relates to the building envelope and related structural components that are readily accessible.

Our observations are intended to identify significant deficiencies, problems or on-going maintenance concerns that are visible at the time of our observations; the intent of our review was to ascertain the general condition of these components and to make recommendations for appropriate repair and protection. This included an inspection from the exterior ground as well as walkways and balconies.

This structural inspection is for the sole purpose of identifying structural deficiencies of the building or structure that pose an immediate threat to life, safety, or where failure of a critical component is imminent. This structural inspection shall be for the purpose of determining the structural condition of the building or structure to the extent reasonably possible of any part, material, or assembly of a building or structure which affects the safety of such building or structure and/or which supports any dead or designed live load.

Neither our observations nor this report is intended to address hidden defects, mechanical, electrical, architectural, code compliance, or other areas of the building not specifically mentioned herein. Our investigation was not intended to be exhaustive or to detect deficiencies except as specifically mentioned herein. Due to the limited scope of this investigation, we cannot attest to the structure's compliance with applicable building codes and/or accepted construction techniques, except as noted herein. KE did not attempt to verify the adequacy of the original design or supplant the responsibility of the Engineer of Record.



Aerial View of Sea Shell from Google Maps

NOTE:

Under Miami-Dade County code, all buildings that have stood for 40 years must go through an inspection for structural and electrical safety and then issue a report to the local building department. After the initial 40-year inspection, those buildings must be recertified every ten years. The rule excludes single-family homes, duplexes, and buildings with a capacity of ten or fewer occupants.

At the time of the writing of this report, Sarasota County has no in force policy requiring inspections on buildings over the age of 40 years.

This report is not to be used to supplant any type of 40 Year Building Safety Inspection Report.

EXECUTIVE SUMMARY

Sea Shell Condominiums is located at 6500 Midnight Pass Road, Sarasota, FL 34242. Sea Shell, located on Siesta Key, offers a private section of beach and is equipped with a swimming pool located on the property. Sea Shell offers views of the Gulf of Mexico from its balconies. The amenities and configuration include elevators, a pool and balconies in all units. The building sits within 100 feet of a shoreline and paving and sloping appear to be used for drainage.

Based on the scope of the inspection and for the areas that were able to be assessed, within a reasonable degree of engineering certainty, the building is safe for its intended use. We reserve the right to amend our opinion should new information be brought to our attention.

Structurally, it appears that Sea Shell was built with reinforced concrete columns, beams, floor slabs. All joints appear to be cold joints with an expansion joint in the middle of the building. The walls appeared to be made of CMU block.

GENERAL INFORMATION

KE visited Sea Shell between the months October and December of 2021. During our visits, Karins observed the following building components with the maintenance staff:

- Roof systems
- Accessible Ground Floor Structural Columns
- Unit Balconies
- General Overview of the exterior
- Ponding of water in driveway on the South side of the building

No destructive testing was undertaking during our time at Sea Shell under this scope of work.

TO BE NOTED:

All units were entered. At no time did KEG move or alter any unit configuration to view components or access items whether structural or non-structural (drywall over a structural wall was not inspected beyond a visual overview). Karins did not take note of the following components due to access or scope limits:

- Doors and windows beyond visual inspection of sealants, tracks and sills
- Foundations or groundwork
- Major drainage systems beyond its influence on erosion as this was outside of our scope
- Major electrical components beyond corrosion

- Major mechanical components beyond obvious deterioration
- Major plumbing components beyond obvious and present leaks
- Exterior inspection of exterior finished beyond a ground floor level
- Evacuation routes

A set of incomplete plans were reviewed to understand the structural components of the building. No set of signed and sealed Building plans were provided to Karins. Subsequently, Karins did not review every subsection of the drawings. No attempts to pull public records were made. Historical or association documents provided by the client at the time of this report included past projects and a few photos of construction.

SCOPE OF STRUCTURAL INSPECTION:

1) Foundation
2) Concrete Systems, Structural Beams and Columns
3) Roofing Systems
4) Exterior Finishes
5) Windows and Doors
6) Life Safety
7) Balconies and Walkway

REFERENCES AND CONTACTS:

Karins had access to the following documents and discussed the making of this report with the following contacts:

Contacts:

- Maria Mitchell – Property Manager
- Tony – Maintenance Staff

OBSERVATIONS

1. Foundations

The foundation, soils and accompanying systems were not observed or investigated at Sea Shell (SS). No evidence of distress was noted. The foundation is made of 8"x16"footings.

2. Concrete Systems, Structural Beams and Columns

A. Concrete masonry units

8" concrete masonry unit (CMU) walls at the project are non-gravity-load-bearing infill and non-fill walls. Except as noted below, no evidence of major distress was noted.

B. Reinforced concrete columns and beams

Reinforced concrete columns and beams are utilized throughout the building along with stair and elevator shaft walls as the primary vertical and horizontal load bearing components of the building. Columns appeared sound with minimal to no evidence of distress noted.

C. Noted items

Cracks – Identifying crack sizes as HAIRLINE (HLC) if barely discernible; FINE if less than 1mm in Width; MEDIUM if between 1 and 2 mm in width; WIDE if over 2 mm.

Hairline cracks are visible on the exterior walls and balconies at SS. These hairline cracks are global to these areas. Wide cracks were not visible on any columns inspected. These cracks would be more than 2mm in width indicating concrete repairs as soon as possible. Some beams on the ground level showed signs of spalling.

The hairline or fine cracks are not of significant structural concern. However, chlorides in the water migrating through the structural concrete can result in corrosion of the reinforcing steel. This corrosion will eventually lead to structural failure of the concrete components if waterproofing measures are not taken.

No active water leaching through the wall and window assembly is observed and confirmed with the representative of SS while performing the inspections. Unit 410, 110 and 101 were reported to have leaked in the past. KEG could not perform a water test to validate the cause of the problem observed in these units. KEG did not visually see any concrete deterioration that could lead to water intrusion but is suspecting the sealant and HLC in the stucco to be a possible source of water intrusion.

Figure 1. HLC on balcony knee wall

Figure 2. Spalling observed over the sliding glass doors

Figure 3. Minor Spall on beam in Garage/Carport

Figure 4. Beam Spall in Garage /Carport

Figure 5. Beam Spalling

Figure 6. Medium Crack – Potential spall

Karins observed areas of concern on some of the ground level beams. Minor signs of spalling is observed on the beams throughout the building. Spalls should be repaired as soon as possible but does not put a threat to the integrity of the structure.

HLC, small and medium cracks are observed by KEG at some locations on the balconies, walkways and walls. KEG does not believe this is of major concern but recommends the unit owner to periodically observe if the crack become wider and longer. Please report to Engineer as needed.

3. Roofing Systems

A. Flat Roofing Systems

Sea Shell employs a flat roofing system. The building is composed of a modified bitumen system. The roofs employ internal drains. Each unit has their own condenser unit on the roof and is either installed on aluminum stands or roof curbs. The roof curbs on the East side of the roof does not meet current code as opposed to the West side of the A/C aluminum stands. The entire roof perimeter is acting as an overflowing scupper. The modified bitumen roof is in good condition with most granule still well attached to the membrane. There has been no report of leaks from unit owners. Blistering, thermal cracking (crazing), membrane peeling at the seams, and wrinkling could be a potential problem in the future if maintenance is neglected. The counterflashing and sealants around the perimeter of the roofs appeared to be in fair to bad condition. The roof appears to be in good condition with minor areas of ponding water.

Figure 7. General View of the modified bitumen Roofing System

Figure 8. Boot vent extends less than 6” above roof line

Figure 9. Sealant at counter-flashing is cracking throughout the perimeter of the roof

Figure 10. Aluminum Stands connection to condenser units up to current codes

Figure 11. A/C stands on West side of the roof are meeting current code

Figure 1. Sheathing roof deck appears to be in good condition

Figure 2. A/C curbs on East side of the roof does not meeting current code

A. Exterior Finishes

Stucco & Paint

A stucco rough finish directly applied to poured concrete as well as concrete masonry unit (CMU) and is used as the exterior finish of SS. This cementitious finish is a very versatile finish and can be done using synthetic stucco. It is usually applied by hand and rub in odd patterns. KEG observed some instances of hairline cracks & delaminated "hollow" stucco at the exterior elevations of the buildings that were accessible. These areas observed may be allowing water to migrate into the structure. Paint blisters were also observed at some areas around the building. These paint blisters are formed by hairline cracks in the paint film that eventually "swell up" with the accumulation of rainwater. The rainwater sits in the membrane of paint until it eventually permeates into the structure, following the path of least resistance. Also, these areas mentioned are not an immediate major structural concern but could lead to potential issues in the future if left unaddressed for an extended amount of time. The paint/sealants are in fair condition and the building is recommended for a painting & sealant project in the next 3-4 years. This would be the appropriate time to address the stucco deficiencies observed by KEG.

Figure 14. Typical Stucco Hair Line Crack

Figure 15. Stucco damage from vehicular impact

Figure 16. Corroding rebar support chair without enough clearance

Figure 17. Paint Peeling and flaking

Figure 18. Stucco delamination

Figure 19. Rust spot on walkways knee wall

Figure 20. Typical Paint Blister

Figure 21. Cracked Sealant

B. Windows and Doors

The windows and doors systems were not exhaustively observed or investigated at SS. The unit entry doors are located on the exterior walkways of the building and appear to be in good condition from general observation. The sliding glass doors (SGDs) leading out to the balconies range from poor to good condition. Some SGDs and doors are not impact rated and are not meeting current code. The following photos depict a sampling of the existing conditions identified. Some of the windows on the exterior of the building were not observable from ground level so the sealant condition cannot be commented upon. Although, with a general observation from the ground level, most of the windows appear to be in fair to good condition, but a more in-depth survey with high-reach access would be necessary to confirm this statement.

Figure 22. Typical non code compliant single door to access balcony

Figure 23. Typical impact rated and code compliant windows

Figure 24. Typical code compliant SGD on balconies

C. Life Safety

The life-safety systems were not exhaustively observed or investigated at SS. Although, KEG did verify the stability of the staircases railing systems to confirm that they could resist an approximate 200-pound point load at all vertical post locations, which could create a potential fall hazard in the event they become unstable. The CMU knee wall is acting as railing on most of the balconies, walkways, and staircase. The wall does resist the 200lbs lateral force required by code, but it does not appear to be 42” minimum in height. The railings on the last floor balconies meet current code.

Figure 25. Poor Handrail to wall Connection

Figure 26. Staircase Railings made on CMU blocks

Figure 27. CMU Block Wall on each balcony except last floor

Figure 28. Railings on last floor balconies appears to be up to current code

D. Balconies and Walkways

KEG inspected all unit balconies at SS with access provided & accompanied by maintenance personnel. Some of the unit owners have opted to put tile as the flooring finish, leaving the underlying substrate unobservable by KEG. Although, KEG mechanically sounded all balcony floors, columns, and walls to identify any "hollow" sounding areas. During our time at SS, KEG has become aware of few issues arising at the balconies that could be of concern to SS in the future. Things such as spalled concrete, delaminated/cracking stucco, failed sealants, areas of ponding water and >50% surface area of "hollow" sounding tile. The constant exposure to moisture will accelerate the deterioration of the waterproofing membrane (if any), and the water will eventually permeate into the concrete balcony deck and affect the reinforcing steel. This is how concrete deterioration occurs. The tiles and grout are in poor to good condition with signs of cracked tiles and efflorescence on grout in some case. The overflow scupper on the balconies are most of the time obstructed by the tiles installed too high. The walkways appear to be in great condition with a waterproofing membrane system.

Figure 29. Overflow scupper at balconies obstructed by tiles

Figure 30. Typical Balcony on last floor with membrane

Figure 31. Blistering of membrane at walkway

Figure 32. Typical walkway membrane in good condition

Figure 33. Ponding of water and efflorescence on grout lines

OPINIONS AND RECOMMENDATIONS

Based upon our visual observations of the above listed systems at Sea Shell, Karins has provided a list of recommendations for implementation. These recommendations are further listed based on priority ranging from important and urgent to not important and not urgent. These items are listed for the prudent implementation and scheduling by Sea Shell.

It is our professional opinion that the following course of action should be taken to protect the building in the future:

1. The existing deteriorated concrete should be repaired in accord with International Concrete Restoration Institute (ICRI) industry standards. Some areas may need to be further inspected to identify any rebar corrosion. No spalling or concrete deterioration requiring shoring was noted.

2. The current modified bitumen roof appears to be in good condition. A/C stands are up to code and minimal ponding is observed at the time of inspection. A/C roof curbs on the East side of the roof are not code compliant and will need to be replaced with aluminum stands on the next roofing project. Sealant at the counter flashing is recommended to be removed and replace as soon as possible. Granules are starting to detach from the bitumen, acute maintenance check should be done periodically to avoid water intrusion.

3. KE recommends the following for the balconies:
    - Clean the grout and tiles of all tiled balconies.
    - Apply new membrane finishes along any balconies where the concrete slab is exposed.
    - Remove and replace areas of hollow or cracked tiles if any.
    - All areas expressing cracks and spalling should be repaired and resealed to prevent further deterioration. Units where spalling was observed are listed: 408, 401, 409, and 302.
    - KEG recommends having either impacted rated windows and doors or hurricane shutters. KEG recommends going with impact rated SGDs and windows and avoid shutters. Please note that any future alterations to the sliding glass doors and windows will have to be replaced in compliance with the current Florida building code. Units where non-impact rated windows was observed are listed: 405, 306, 308, 307, 309, 209, 206, 205, 201, 102, 104, 108, and 305.
    - KEG recommends considering requiring the unit owners to remove their tile if >50% of hollow tile is observed, it becomes of general concern for KEG meaning that water has been introduced underneath the tile over time and has de-bonded the thin set from the tile and concrete

substrate, leaving the water to sit on the concrete surface contained. Units where hollow sounding tiles were significant are listed: 507, 408, and 201.

- In the case the tile is removed, KE does not recommend putting tiles back on top of the concrete balcony and membrane. There is no guarantee that once the tile is replaced, water will not start making its way to the slab concrete rebar under the tile. It is also easier to maintain a waterproofing membrane on a concrete balcony if it is not covered.

4. Areas where moisture builds up between the concrete slab and waterproof membrane along the balconies, walkways, and exterior of the building should be cut open and recoated. These areas are easily identified by a "bubble" or pocket appearance.
5. Develop and adhere to a strict painting/sealant cycle to ensure the protection of the exterior building envelope and its components. KEG recommends repainting/resealing the building every 7 to 10 years depending on the quality of paint chosen. The next painting project is thus expected in 2024.
6. KEG recommends inspecting via camera and thermography the storm drainage pipe on the South side of the driveway at Seashell. KEG recommends to pay close attention to the following while inspecting via camera:
    - Seepage bed junction with drainage pipe. Make sure the pipe is not capped.
    - Inspect the drainage pipe for damage such as cracks and root penetrations or RCP (Reinforced Concrete Pipe) imperfections
    - Monitor slope towards seepage bed in drainage pipe

SUMMARY

This structural inspection is for the sole purpose of identifying structural deficiencies of the building or structure that poses an immediate threat to life, safety, or where failure of a critical component is imminent. This structural inspection was for the purpose of determining the structural condition of the building to the reasonable extent possible that any part, material, or assembly of a building which affects the safety of such building or structure and/or which supports any dead or designed live load may be affected by internal or external elements, components, or forces.

The structural deficiencies that require immediate attention are:

1. Repairing all spalling of concrete

Based on the scope of the inspection and for the areas that were able to be assessed, within a reasonable degree of engineering certainty, the building is safe for its intended use. We reserve the right to amend our opinion should new information be brought to our attention.

CONCLUSION

Our statements referencing the structural integrity of the building at Sea Shell are in reference to the original installation and observed existing conditions only. Our statements are not intended to verify compliance with building codes or accepted.

Our opinion is that the existing conditions of Sea Shell are due to the age of the building and the proximity to salinized water sources; this is highly probably wherein evidenced with verbal reports and our observations.

We believe that the most prudent action to be taken would be to maintain the aggressive maintenance schedule while planning to implement our above listed recommendations based on urgency and incidence. This would allow time for Sea Shell to appropriately exhaust insurance avenues and build up balances to pay for the recommended actionable.

Special Assessments may be required to fully and completely institute our recommendations. Our office would be more than happy to review these avenues and provide you with appropriate services.

We trust this information is helpful. Should questions arise, please do not hesitate to call.

Sincerely,
Karins Engineering

Index: Exhibit A – 40 Year Building Safety Inspection Program

GENERAL CONSIDERATIONS

SCOPE OF STRUCTURAL INSPECTION

The fundamental purpose of the required inspection and report is to confirm in reasonable fashion that the building or structure under consideration is safe for continued use under the present occupancy. As implied by the title of this document, this is a recommended procedure, and under no circumstances are these minimum recommendations intended to supplant proper professional judgment.

Such inspection shall be for the purpose of determining the general structural condition of the building or structure to the extent reasonably possible of any part, material or assembly of a building or structure which affects the safety of such building or structure and/or which supports any dead or designed live load, and the general condition of its electrical systems pursuant to the Building Code.

In general, unless there is obvious overloading, or significant deterioration of important structure elements there is little need to verify the original design. It is obvious that this has been “time tested’ if still offering satisfactory performance. Rather, it is of importance that the effects of time with respect to deterioration of the original construction materials be evaluated. It will rarely be possible to visually examine all concealed construction, nor should such be generally necessary. However, a sufficient number of typical structure members should be examined to permit reasonable conclusions to be drawn.

Visual Examination will, in most cases, be considered adequate when executed systematically. The visual examination must be conducted throughout all habitable and non-habitable areas of the building, as deemed necessary by the inspecting professional to establish compliance. Surface imperfections such as cracks, distortion, sagging, excessive deflections, significant misalignment, signs of leakage, and peeling of finishes should be viewed critically as indications of possible difficulty.

Testing Procedures and quantitative analysis will not generally be required for structural members or systems except for such cases where visual examination has revealed such need, or where apparent loading conditions may be critical.

Manual Procedures such as chipping small areas of concrete and surface finishes for closer examinations are encouraged in preference to sampling and/or testing where visual examination alone is deemed insufficient. Generally, unfinished areas of buildings such as utility spaces, maintenance areas, stairwells and elevator shafts should be utilized for such purposes. In some cases, to be held to a minimum, ceilings or other construction finishes may have to be opened for selective examination of critical structural elements. In that event, such locations should be carefully located to be least disruptive most easily repaired and held to a minimum. In an event, a sufficient number of structural members must be examined to afford reasonable assurance that such are representative of the total structure.

Evaluating an existing structure for the effect of time, must take into account two, basic considerations; movement of structural components with respect to each other, and deterioration of materials.

With respect to the former, volume change considerations, principally from ambient temperature changes, and possible long-time deflections, are likely to be most significant. Foundation movements will frequently be of importance, usually settlement, although upward movement due to expansive soils actually may occur. However, it is infrequent in this area. Older buildings on spread footings may exhibit continual, even recent settlements if founded on deep unconsolidated fine grained or cohesive soils or from subterraneous losses or movements from several possible causes.

With very little qualification, such as rather rare chemically reactive conditions, deterioration of building materials can only occur in the presence of moisture, largely to metals and their natural tendency to return to the oxide state in the corrosive process.

In this marine climate, highly aggressive conditions exist year-round. For most of the year, outside relative humidity may frequently be about 90 or 95%, while within air-conditioned buildings, relative humidity will normally be about 35 to 60%. Under these conditions moisture vapor pressures ranging from about 1/3 to 1/2 pounds per square inch will exist much of the time. Moisture vapor will migrate to lower pressure areas. Common building materials such as stucco, masonry and even concrete, are permeable even with these slight pressures. Since most of our local construction does not use vapor barriers, condensation will take place within the enclosed walls of the building. As a result, deterioration is most likely adjacent to exterior walls, or wherever else moisture or direct leakage has been permitted to penetrate the building shell.

Structural deterioration will always require repair. The type of repair, however, will depend on the importance of the member in the structural system and degree of deterioration. Cosmetic type repairs may suffice in certain non-sensitive members such as tie beams and columns, provided that the remaining sound material is sufficient for the required function. For members carrying assigned gravity or other loads, cosmetic type repairs will only be permitted if it can be demonstrated by rational analysis that the remaining material, if protected from further deterioration can still perform its assigned function at acceptable stress levels. Failing that, adequate repairs or reinforcement will be considered mandatory.

Written Reports shall be required attesting to each required inspection. Each such report shall note the location of the structure, description of type of construction, and general magnitude of the structure, the existence of drawings and location thereof, history of the structure to the extent reasonably known, and description of the type and manner of the inspection, noting problem areas and recommending repairs, if required to maintain structural integrity.

FOUNDATION:

If all of the supporting subterranean materials were completely uniform beneath a structure, with no significant variations in grain size, density, moisture content or other mechanical properties; and if dead load pressures were completely uniform, settlements would probably be uniform and of little practical consequence. In the real world, however, neither is likely. Significant deviations from either of these two idealisms are likely to result in unequal vertical movements.

Monolithic masonry, generally incapable of accepting such movements will crack. Such cracks are most likely to occur at corners, and large openings. Since, in most cases, differential shears are involved, cracks will typically be diagonal.

Small movements, in themselves, are most likely to be structurally important only if long term leakage through fine cracks may have resulted in deterioration. In the event of large movements, continuous structural elements such as floor and roof systems must be evaluated for possible fracture or loss of bearing.

Pile foundations are, in general, less likely to exhibit such difficulties. Where such does occur, special investigation will be required.

ROOFING SYSTEMS:

Sloping roofs, usually having clay or cement tiles, are of concern in the event that the covered membrane may have deteriorated, or that the tiles may have become loose. Large deflections, if merely resulting from deteriorated rafters or joists will be of greater importance. Valley Flashing, and Base Flashing at roof penetration will also be matters of concern.

Flat roofs with built up membrane roofs will be similarly critical with respect to deflection considerations. Additionally, since they will generally be approaching expected life limits at the age when building recertification is required, careful examination is important. Blisters, wrinkling, alligatoring, and loss of gravel are usually signs of difficulty. Punctures or loss of adhesion of base flashing, coupled with loose counterflashing will also signify possible problems. Wind-blown gravel, if excessive, and the possibility of other debris, may result in pounding, which if permitted, may become critical.

MASONRY BEARING WALLS

Random cracking, or if discernible, definitive patterns of cracking, will of course, be of interest. Bulging, sagging, or other signs of misalignment may also indicate related problems in other structural elements. Masonry walls where commonly constructed of either concrete masonry remits or scored clay tile, may have been constructed with either reinforced concrete columns tie beams, or lintels.

Steel bar joists are, of course, sensitive to corrosion. Most critical locations will be web member welds, especially near supports, where shear stresses are high possible failure may be sudden, and without warning.

Cold formed steel joists, usually of relatively light gage steel, are likely to be critically sensitive to corrosion, and are highly dependent upon at least normal lateral support to carry designed loads. Bridging and the floor or roof system itself, if in good condition, will serve the purpose.

Wood joists and rafters are most often in difficult from “dry rot”, or the presence of termites. The former (a misnomer) is most often prevalent in the presence of sustained moisture or lack of adequate ventilation. A member may usually be deemed in acceptable condition if a sharp pointed tool will penetrate no more than about one eighth of an inch under moderate hand pressure. Sagging floors will most often indicate problem areas. Gypsum roof decks will usually perform satisfactorily except in the presence of moisture. Disintegration of the material and the foam-board may result from sustained leakage. Anchorage of the supporting bulb tees against uplift may also be of importance, with significant deterioration. Floor and roof systems of case in place concrete with self-centering reinforcing, such as paper backed mesh and rib-lath, may be critical with respect to corrosion of the unprotected reinforcing. Loss of uplift anchorage on roof decks will also be important if significant deterioration has taken place, in the event that dead loads are otherwise inadequate for that purpose.

STEEL FRAMING SYSTEM

Corrosion, obviously enough, will be the determining factor in the deterioration of structural steel. Most likely suspect areas will be fasteners, welds, and the interface area where bearings are embedded in masonry. Column bases may often be suspect in areas where flooding has been experienced, especially if salt water has been involved.

Thin cracks may indicate only minor corrosion, requiring minor patching. Extensive spalling may indicate a much more serious condition requiring further investigation.

Of most probable importance will be the vertical and horizontal cracks where masonry units abut tie columns, or other frame elements such as floor slabs. Of interest here is the observation that although the raw materials of which these masonry materials are made may have much the same mechanical properties as the reinforced concrete framing, their actual behavior in the structure, however, is likely to differ with respect to volume change resulting from moisture content, and variations in ambient thermal conditions.

Moisture vapor penetration, sometimes abetted by salt laden aggregate and corroding rebars, will usually be the most common cause of deterioration. Tie columns are rarely structurally sensitive, and a fair amount of deterioration may be tolerated before structural impairment becomes important. Usually, if rebar loss is such that the remaining steel area is still about 0.0075 of the concrete area, structural repair will not be necessary. Cosmetic type repair involving cleaning, and patching to effectively seal the member, may often suffice. A similar approach may not be unreasonable for tie beams, provided they are not also serving as lintels. In that event, a rudimentary analysis of load capability using the remaining actual rebar area, may be required.

FLOOR AND ROOF SYSTEMS

Cast in place reinforced concrete slabs and/or beams and joists may often show problems due to corroding rebars resulting from cracks or merely inadequate protecting cover of concrete. Patching procedures will usually suffice where such damage has not been extensive. Where corrosion and spalling has been extensive in structurally critical areas, competent analysis with respect to remaining structural capacity, relative to actual supported loads, will be necessary. Type and extent or repair will be dependent upon the results of such investigation.

Precast members may present similar deterioration conditions. End support conditions may be important. Adequacy of bearing, indications of end shear problems, and restraint conditions are important, and should be evaluated in at least a few typical locations.

CONCRETE FRAMING SYSTEMS

Concrete deterioration will, in most cases be similarly related to rebar corrosion possibly abetted by the presence of salt-water aggregate or excessively permeable concrete. In this respect, honeycomb areas may contribute adversely to the rate of deterioration. Columns are frequently most suspect. Extensive honeycomb is most prevalent at the base of columns, where fresh concrete was permitted to segregate, dropping into form boxes. This type of problem has been known to be compounded in areas where flooding has occurred, especially involving salt water.

In spall areas, chipping away a few small loose samples of concrete may be very revealing. Especially, since loose material will have to be removed even for cosmetic type repairs, anyway. Fairly reliable

quantitative conclusions may be drawn with respect to the quality of the concrete. Even though our cement and local aggregate are essentially derived from the same sources, cement will have a characteristically dark grayish brown color in contrast to the almost white aggregate. A typically white, almost alabaster like coloration will usually indicate reasonably good overall strength. The original gradation of aggregate can be seen through a magnifying glass. Depending upon the structural importance of the specific location, this type of examination may obviate the need for further testing if a value of 2000 psi to 2500 psi is sufficient for required strength, in the event that visual inspection indicates good quality for the factors mentioned.

WINDOWS

Window condition is of considerable importance with respect to two considerations. Continued leakage may have resulted in other adjacent damage and deteriorating anchorage may result in loss of the entire unit in the event of severe windstorms short of hurricane velocity. Perimeter sealant, glazing, seals, and latches should be examined with a view toward deterioration of materials and anchorage of units for inward as well as outward (section) pressures, most importantly in high buildings.

WOOD FRAMING

Older wood framed structures, especially of the industrial type, are of concern in that long term deflections may have opened important joints, even in the absence of deterioration. Corrosion of ferrous fasteners will in most cases be obvious enough. Dry rot must be considered suspect in all sealed areas where ventilation has been inhibited, and at bearings and at fasteners. Here too, penetration with a pointed tool greater than about one eighth inch with moderate hand pressure, will indicate the possibility of further difficulty.

LOADING

It is of importance to note that even in the absence of any observable deterioration, loading conditions must be viewed with caution. Recognizing that there will generally be no need to verify the original design, since it will have already been “time tested”, this premise has validity only if loading patterns and conditions remain **unchanged**. Any material change in type and/or magnitude or loading in older buildings should be viewed as sufficient jurisdiction to examine load carrying capability of the affected structural system.

SCOPE OF ELECTRICAL INSPECTION

The purpose of the required inspection and report is to confirm with reasonable fashion that the building or structure and all habitable and non-habitable areas, as deemed necessary by the inspecting professional to establish compliance, are safe for continued use under present occupancy. As mentioned before, this is a recommended procedure, and under no circumstances are these minimum recommendations intended to supplant proper professional judgement.

ELECTRIC SERVICE

A description of the type of service supplying the building or structure must be provided, stating the size of amperage, if three (3) phase or single (1) phase, and if the system is protected by fuses or breakers. Proper grounding of the service should also be in good standing. The meter and electric rooms should have sufficient clearance for equipment and for the serviceman to perform both work and inspections. Gutters and electrical panels should all be in good condition throughout the entire building or structure.

BRANCH CIRCUITS

Branch circuits in the building must all be identified, and an evaluation of the conductors must be performed. There should also exist proper grounding for equipment used in the building, such as an emergency generator, or elevator motor.

CONDUIT RACEWAYS

All types of wiring methods present in the building must be detailed and individually inspected. The evaluation of each type of conduit and cable, if applicable, must be done individually. The conduits in the building should be free from erosion and checked for considerable dents in the conduits that may be prone to cause a short. The conductors and cables in these conduits should be chafe free, and their currents not over the rated amount.

EMERGENCY LIGHTING

Exit signs lighting and emergency lighting, along with a functional fire alarm system must all be in good working condition.