# Assessment of Inspection Reporting and Building Conditions in South Florida (Miami-Dade and Broward Counties)

## Draft Final Report

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and

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## Executive Summary

The objectives of this study were to assess the implementation and outcomes of the 40-year building inspection programs in Broward and Miami-Dade Counties, provide recommendations on improved inspection, data collection, and maintenance of records, and to survey building departments across Florida to determine what type of building safety inspection programs are under consideration, if any. Data aggregation and analysis of information contained in structural inspection reports associated with the 40-year inspection programs in each county were required to fulfill the primary objectives of this study. While the counties issue the inspection program guidance and forms, building departments in individual jurisdictions are responsible for administering the inspection program and maintaining relevant records.

To achieve a representative sample of inspection reports for analysis, reports were requested from five municipalities in each of Broward and Miami-Dade Counties. These municipalities were selected based on their relative size and number or relevant building types, as well as guidance from County Board of Rules and Appeals representatives. Within the selected municipalities, a sampling of building addresses was compiled to achieve a reasonable distribution of building use, age, and number of stories. Inspection records for 261 buildings were received, resulting in over 300 inspection reports for analysis.

While inspectors use the same basic inspection template and guidelines (with some differences between the two counties), a large amount of variation was observed in the inspection reports, especially in how deficiencies were classified and the level of report completeness. To ensure consistent data extraction from the inspection reports, a spreadsheet was developed with sections and fields corresponding to the standard structural inspection forms. Data field inputs were then standardized with dropdown menus to enable data aggregation for analysis. As a result, some interpretation by the research team was required to map the variable inspector-provided data to the fixed categories in the spreadsheet. Some of the reports reviewed did not include adequate information or they deviated too far from the inspection guidelines to enable an overall assessment of the structure.

Two-thirds of the inspection reports reviewed were generated within two years from when they were due; however, 13% of inspections were still not conducted after five years. The results of the data analysis shows that roughly a quarter of buildings assessed for their 40-year inspection required some type of repair. Further analysis indicates a slightly higher rate of required repairs for buildings closer to the coast. 85% of the buildings in the dataset are reinforced concrete. At 40 years, 23% of these buildings had a general concrete condition reported as fair or poor and 22% had visible corrosion. Furthermore, 17% had balconies in fair or poor condition, though balconies are not a specific section for assessment in the inspection report. Analysis of subsequent 10-year anniversary inspection report datasets (50-year, 60-year, etc.), show that later inspections report lower rates of required repairs and visible corrosion than the initial 40-year inspections. These results indicate that the structures benefit from the maintenance and repairs required as a result of defect identification during the 40-year inspections and highlight the positive impact of age-based building inspection programs on building safety.

Based on the findings in this study, several recommendations are made to streamline the inspection process, provide more standardization and relevant detail in the inspection reports, and ensure accurate and accessible building inspection records. The recommendations include: 1) the addition of fields in the inspection form for the specific assessment of balconies and guards, as well as additional detail on roof systems and condition, 2) the creation of an electronic inspection form that standardizes inspector condition assessments and provides automated reporting quality control, and 3) the integration of inspection reporting with a comprehensive database for managing inspection notices, reports, recertifications, and permits. Additional recommendations include research to further investigate the appropriate timeline for the initiation of inspections for buildings on the coast and the investigation and incorporation of nondestructive testing methods to enable the assessment of hidden defects, such as reinforcement corrosion, during the inspection process. It should be noted that several of the building departments included in this study are actively working toward improving the administration of their building inspection and recertification programs and some of the recommendations in this study are aligned with their ongoing efforts.

A survey of building officials throughout the State of Florida was distributed to capture whether inspection programs similar to the 40-year recertification programs in Miami-Dade and Broward Counties are being carried out or considered for adoption in other Florida building jurisdictions. At the time of the survey (October and November 2021) there were no jurisdictions in Florida with building age-based inspection or recertification programs outside of Broward and Miami-Dade Counties. Only 14% of these jurisdictions reported having problems with buildings older than 40 years. However, several building departments are planning to or considering implementing such programs and at least one (the City of Boca Raton) has since adopted an inspection program.

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# 1 Introduction and Background

## 1.1 Project Objectives

The recent collapse of the Champlain Towers South in Surfside, Florida highlights the need for a broad assessment of building inspection and maintenance practices in the State of Florida. The goal of this project was to conduct a preliminary assessment of the 40-year inspection reports for non-exempt structures in Miami-Dade and Broward Counties to provide a broad account of the reported condition of the region's building inventory and insight on how inspections are conducted and how reports are recorded and maintained. The goal for these data was to build the foundation for a comprehensive assessment of current building structural inspection practices that could be used to develop recommendations for new inspection practices to enhance the safety of Florida's building stock. An additional objective of this project was to assess whether inspection programs similar to the 40-year recertification programs in Miami-Dade and Broward Counties are being carried out or considered for adoption in other Florida building jurisdictions.

The scope of work for this project consisted of six tasks and accompanying deliverables:

- Task 1: Scope assessment
- Task 2: Data classification methodology development
- Task 3: Data aggregation and classification
- Task 4: Data analysis
- Task 5: Inspection recommendations
- Task 6: Statewide inspection survey

## 1.2 Building Inspection Programs

At the initiation of this study, the only age-based building inspection programs in Florida were in Miami-Dade and Broward County. Section 6 of this report, provides information on considerations for such programs in the rest of Florida. The 40-year building inspection programs in Miami-Dade and Broward Counties are similar; however, they vary in their histories and current implementation. In Miami-Dade County, the 40-year Building Recertification code has been in place since 1976 while the Broward County 40-year Building Safety Inspection Program was initiated in 2006 and fully phased in by 2011. Both codes exempt minor buildings, single-family residences, and duplexes. In Miami-Dade County buildings less than 2,000 sq. ft. are exempt while in Broward County buildings less than 3,500 sq. ft. are exempt. In both counties, inspections are required every ten years following the first 40-year inspection. Both counties require inspectors to be either a Professional Engineer or Registered Architect licensed in the State of Florida. There is currently no qualification program or requirement for inspectors beyond licensure in either county.

The Boards of Rules and Appeals in each county issue the guidelines and inspection forms for the programs. The general inspection forms for both counties are in Appendix A. In Broward County there are 32 jurisdictions – 31 municipalities and unincorporated Broward County. Each year, the Broward County Board of Rules and Appeals (BORA) staff generates a list of properties that are due for their 40-year or 10-year anniversary inspection. The list is distributed to each jurisdiction in June, who then have the responsibility to notify building owners and follow up on the inspection process. In contrast, the 34 jurisdictions in Miami-Dade County (33

municipalities and Unincorporated Miami-Dade) are responsible for generating their own list of properties (based on property appraiser information) due for recertification each year and administering the program. Inspection reports and recertification outcomes are maintained by the individual jurisdictions; neither county has historically collected nor maintained records at the county level associated with the inspection programs.

## 2 Project Scope

### 2.1 Scope Assessment

With tens of thousands of buildings in the 40-year inspection programs across both Broward and Miami-Dade Counites, project scope definition was driven by the need to achieve a manageable but representative sample size of buildings for which inspection reports would be requested and analyzed. While the initial motivation for this project was the collapse of a high-rise condominium on the coast, the research team wanted to ensure that a broad range of structural types, heights, ages, and locations were also captured in this study. An initial goal to obtain approximately 2% of the available inspection reports was set, with a plan to reassess this goal once the times for accessing and processing the reports were determined.

The research team met with representatives from each county (Broward County Board of Rules and Appeals and Miami-Dade County Board and Code Administration Division) to solicit input on approaches to requesting records from the jurisdictions and managing the scope of the project. The representatives provided suggestions on which municipalities to reach out to first, based on size and relevant building stock. Each county provided a contact list for relevant building department staff in each jurisdiction, as well as an introduction letter to be used in initiating contact with them. Miami-Dade County provided an Excel spreadsheet generated by the property appraiser with information for all properties in the county, both exempt and non-exempt. Broward County BORA provided several Excel spreadsheets (one corresponding to each year of the program since inception in 2006) with a list of non-exempt addresses due for inspection in the respective year.

Following meetings with county staff and preliminary assessment of the furnished spreadsheets, it was determined that requests for inspection records would be made to the municipalities with the largest number of non-exempt buildings in addition to those with a higher percentage of high-rise structures near the coastline. Emails were sent to the Building Official or inspection program contact in each jurisdiction to request information regarding their inspection program and availability of records. For the responsive building departments, follow-up discussions sought any additional city-specific guidance on methods for acquiring relevant inspection reports while maintaining a reasonable size record requests (both to limit the burden on city staff and ensure appropriate scope of this project).

To select the subset of addresses for the municipalities of interest in both counties, exempt addresses were eliminated, in addition to addresses with land and building uses irrelevant to this project (e.g., mobile home parks, golf courses, agricultural). Approximately 2.0% of the resulting properties in each of the selected municipalities were required to fulfill the initial project goal of 300 inspection reports. These lists were compiled by selecting addresses to achieve a representative distribution of building use, age, and number of stories. (Note that number of stories were determined from additional data pulled from Google Maps and the

Property Appraisers site when not available in the provided data). In some cities with a higher proportion of coastal high-rise condominiums, a higher percentage of these buildings was included in the request.

## 2.2 Record Availability and Acquisition

In Broward County, inspection records were requested from Deerfield Beach, Fort Lauderdale, Hallandale Beach, Hollywood, and Pompano Beach and in Miami-Dade County inspection reports were requested from Coral Gables, Hialeah, Miami, Miami Beach, and Sunny Isles Beach. Depending on the guidance received from building department personnel, some requests were made to and fulfilled directly by the building department, while others were made through a standard records request and processed by the city clerk's office. Some municipalities requested fees for the reports. The first requests for data started in November 2021 and the most recent requests, to date, were made in February 2022.

There was an average of 42 days between the request for records and the receipt of the reports or notice of report unavailability. Some of the municipalities completed their response to the request with a number of reports missing or with incomplete responses. Reasons provided for missing reports were most often that the inspection and/or recertification is overdue and thus no inspection report exists. In other cases, missing reports were simply noted as "unavailable" with no reason provided.

Table 1 summarizes the number of buildings for which inspection reports were requested and received by county, as well as the average number of days between report request and receipt (or notice of unavailability).

Table 1. Inspections reports requested and inspection records received by county.

| | **Broward** | **Miami-Dade** | **Total** |
|---|---|---|---|
| **Number Requested** | 116 | 224 | 340 |
| **Number Received** | 78 | 183 | **261** |
| **Percent Received** | 67% | 82% | 77% |
| **Average Days to Receive Reports** | 45 | 41 | 42 |

Most of the inspection reports received were scanned copies of printed paper documents. It is not known whether the documents were scanned as part of the records request made for this project or if they are scanned and stored electronically as part of regular record keeping. A few municipalities were able to provide records in a few days, indicating that the records may have been kept electronically.

There was a mix of detail provided in the responses by different municipalities. Some included only the completed inspection form, without an accompanying report and/or photos, while other records were extensive and include all correspondence, permits, and follow-up inspections. The preliminary inspection form (prior to repairs being made, if required) was adequate for this

project; however, supplementary information was useful in cases where the inspection report responses were inconsistent or incomplete.

For some properties, the municipality only sent the final recertification letter without any inspection report or only provided documentation of the notification for required inspection. In cases where buildings were found to have structural deficiencies requiring repairs, some municipalities only provided the final inspection report (after repairs have been made), making it difficult to record the original deficiencies. For some municipalities in Miami-Dade County, multiple inspection reports were sent for some buildings, including the 40-year inspection and subsequent 10-year anniversary inspections (50-year, 60-year, etc.).

# 3 Data Classification

## 3.1 Approach

Property appraiser data and the standard inspection forms provided the general framework for the data categories developed for this project and a comprehensive Excel spreadsheet was created for data extraction and recording. The standard inspection report formats for Miami-Dade and Broward Counties (see Appendix A) are very similar but not identical. Although common inspection forms are in use in each county, the way that inspectors complete the forms and present the results has a tremendous amount of variation. The approach to the development of a data extraction methodology was to consistently capture relevant information on the building, inspector, inspection/recertification process, and structural condition with minimum possible interpretation. For this project, each data collection category was assigned fixed response options using dropdown menus so that the results could be aggregated for consistent data reporting and analysis. This approach enabled standardization of the inspection results but required the research team to make judgements for some inspection form responses. Careful documentation on how responses were standardized was part of the data extraction process.

## 3.2 Data Collection Spreadsheet

The Excel spreadsheet created for data collection was divided into sections based on the type of information being recorded. The first section in the spreadsheet captures all relevant information about the building (address, building use, year built, number of stories, etc.). The next two sections capture information about the inspection process (inspector name, inspector company, inspector qualifications, date building due for inspection, date of inspection, date of recertification, etc.). The largest section of the sheet captures information about the building and its condition as reported on the inspection forms. The data recording sections are as follows:

- Property Appraiser Data
- Inspection Program Information
- Inspection Reporting Data
- Inspection Form Data
    1. Description of Structure
    2. Present Condition of Structure
    3. Inspections
    4. Supporting Data
    5. Masonry Bearing Wall

6. Floor and Roof System
7. Steel Framing System
8. Concrete Framing System
9. Windows
10. Wood Framing

Most of the data reported in the inspection form is either the identification of the presence of a structural component or defect or identification of the condition of a structural component or defect. For these data fields, a dropdown menu in the data collection Excel sheet includes the value assignment options listed below. Examples of inspector responses being assigned these values is provided in parentheses, illustrating how the research team accounted for minor inconsistencies in inspection report responses.

- Good (overall good, good where visible, no noticeable damage, functional, adequate, satisfactory)
- Fair (fair to good, good/fair, good w/exceptions)
- Poor (fair to poor, needs repair)
- None (none visible, not significant, none noted, none observed, none evident, none noticed, not apparent)
- N/A
- No Data Reported ('X' given for a condition rating)

Additional dropdown menus were developed for data fields including building use, inspector title, primary structure type, window type, exterior cladding, and defect severity. Some reports indicated the presence of a defect with different severity in different locations. In these cases, the most severe defect was reported in the data collection spreadsheet, and the other degrees of severity were kept in notes.

# 4 Data Analysis Results

The aggregated inspection and building data were analyzed to generate statistics on reported building conditions and inspection practices for a wide range of building use, age, height, and location. This section provides information on the approach to the data analysis along with the resulting findings.

## 4.1 Dataset Information

### *4.1.1 Inspection Reports*

A total of 302 inspection records make up the dataset for analysis in this study, though only 293 had enough information for subsequent analysis. Multiple reports were received for some building addresses. In some cases, inspection reports were provided for both before and after repairs and for some buildings all historical reports were included from different 10-year interval reporting periods (e.g., 40-year, 50-year, 60-year, etc.). When reporting on structural condition, only reports generated prior to repairs being made were used in analysis, when possible. The number of inspection reports prior to repairs for each inspection year that were evaluated in this study are shown in Table 2.

Table 2. Count of inspection report types, prior to repairs being made.

| Inspection Report Type | Number of Reports for Inspection Prior to Repairs |
|---|---|
| 40-Year | 135 |
| 50-Year | 78 |
| 60-Year + | 73 |
| Total | 286 |

Several inspection reports were deemed too incomplete for analysis beyond the basic information about the building (e.g., information available from the property appraiser), as discussed in Section 4.2. As a result, not all analysis results provided in this report include data from all records. When relevant, the size of the dataset used in each analysis, N, is provided in the figure caption for the presented results.

### *4.1.2 Building Information*

Reports were received for a total of 267 unique property addresses, with approximately 30% from Broward County and 70% from Miami-Dade County. Figure 1 shows the breakdown property addresses by municipality.

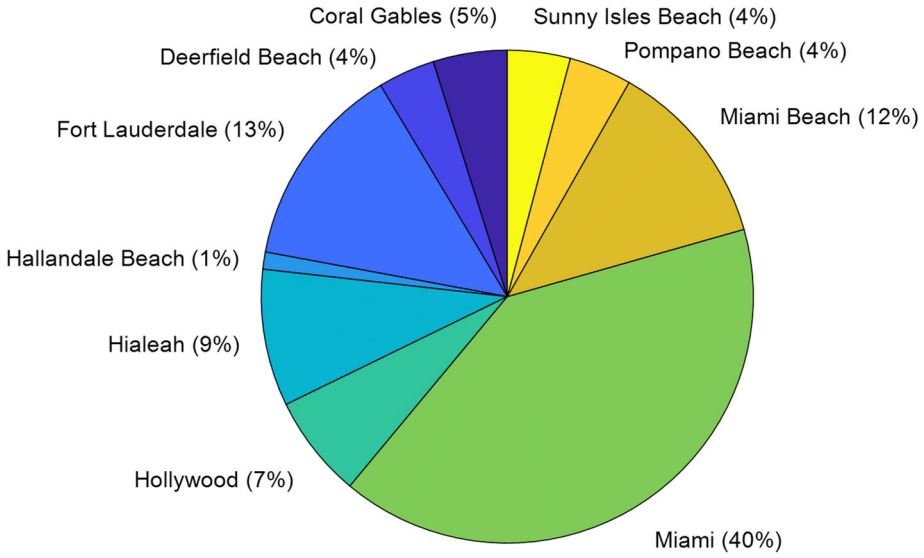


Figure 1. Buildings by municipality (N=267).

Figure 2 shows the building use categories represented by the buildings included in this study. Most of the buildings analyzed are residential condominiums or multifamily complexes.

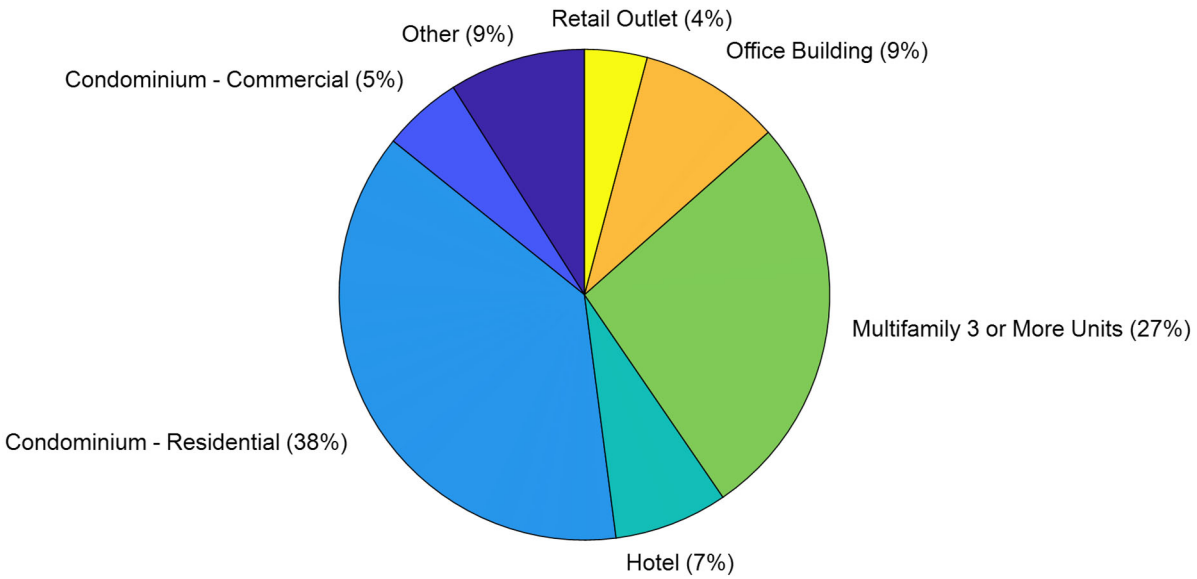

Figure 2. Building use category (N=267)

Figure 3 shows the distribution of buildings by year built, ranging from 1919 to 1981. The distribution of building story height is shown in Figure 4.

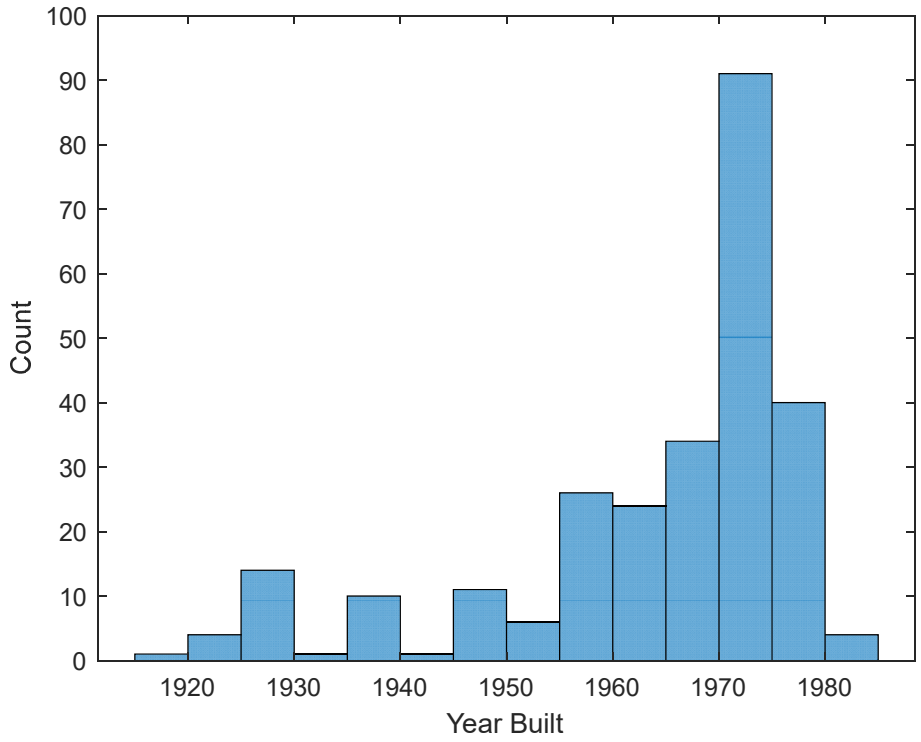

Figure 3. Distribution of buildings by year built (five-year increment).

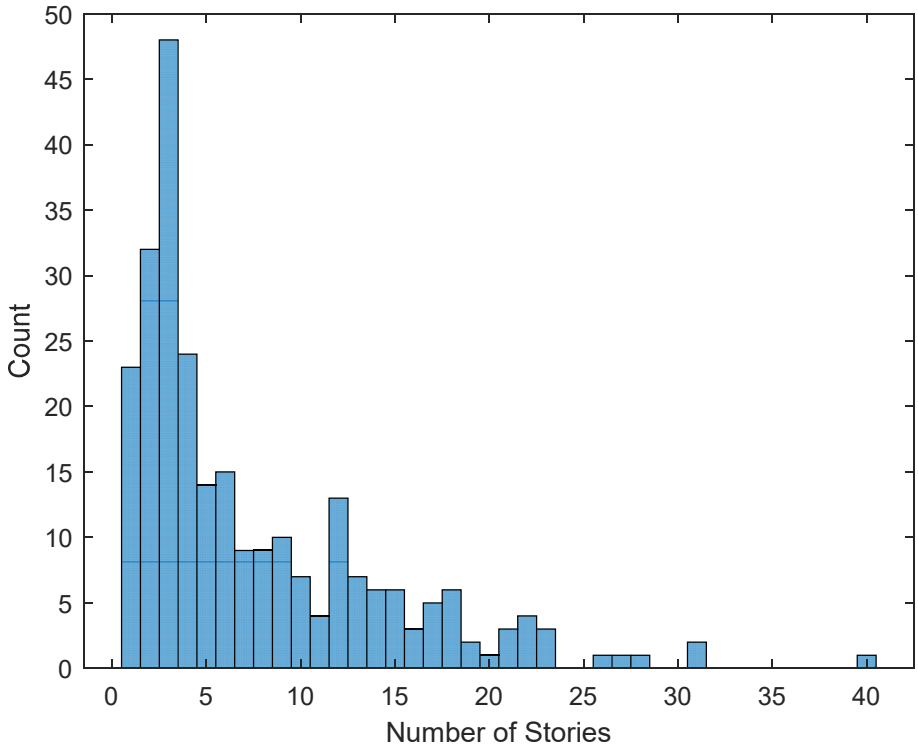


Figure 4. Distribution of buildings by number of stories.

As anticipated, a large majority of the structures included in this dataset are reinforced concrete frame, as illustrated in Figure 5.

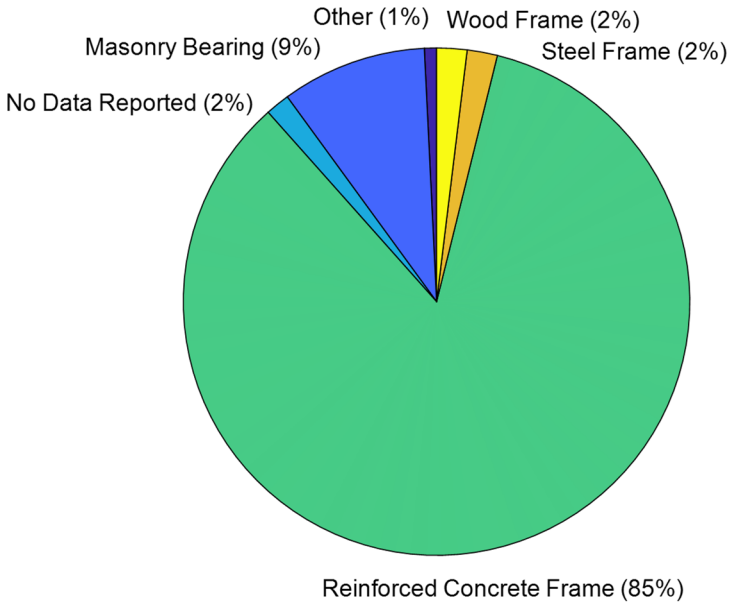


Figure 5. Primary structural type as reported in inspection reports (N=259).

### *4.1.3 Distance to the Coast*

One of the considerations for the adoption of age-based building inspection programs in Florida is whether to impose different requirements for buildings closer to the coast, and thus subject to harsher conditions. These requirements may include an earlier age at which inspections are initiated (e.g., 25 years) and/or a shorter interval between subsequent inspections (e.g., five years instead of ten years). Some proposals for building age-based inspection programs in Florida use Interstate 95 (running north-south along the eastern coast of the state) as the dividing line to determine the age threshold for initial inspection, with buildings eastward of I-95 initiating inspections at an earlier age and/or with shorter inspection intervals. The distance of I-95 to the coast ranges from approximately 1.5 to over 10 miles throughout the state.

In this study, the coastline definition used to calculate the distance of each property to the coast is Florida's Coastal Construction Control Line (CCCL) as defined by the Florida Department of Environmental Protection (DEP) and shown in Figure 6.

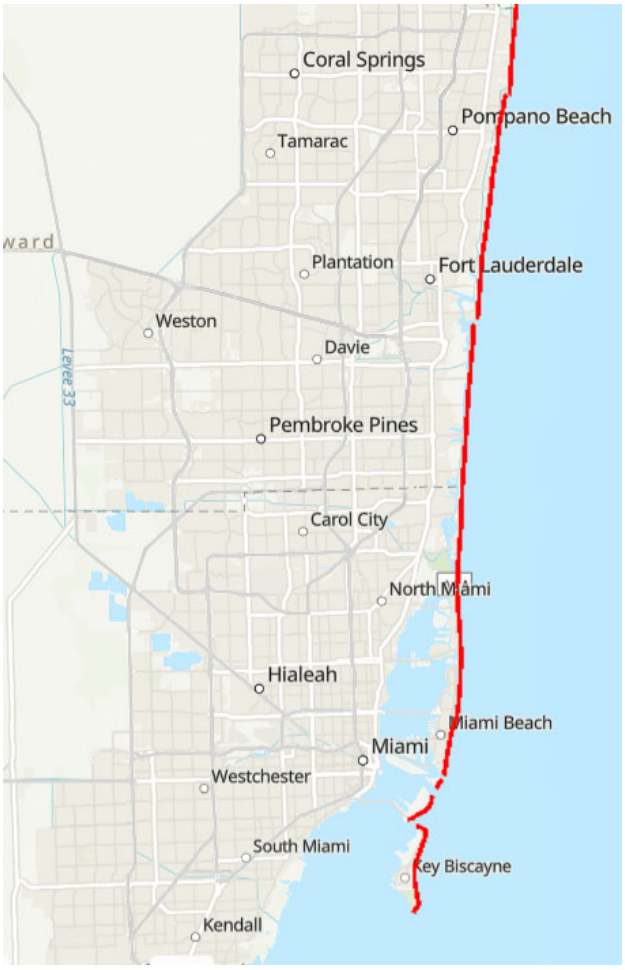


Figure 6. CCCL definition, shown in red
(Image from Florida DEP site: https://ca.dep.state.fl.us/mapdirect/).

To determine the distance to the coast (CCCL), each property address was converted to coordinates (latitude and longitude) using a mapping tool. The coordinates of the CCCL were

acquired from the Florida DEP website. Finally, the distance between the address coordinates and the CCCL line were determined using built-in MATLAB mapping toolbox functions.

The building distances to the coast were further binned for analysis: 1) less than 1,500 ft from the coast, 2) between 1,500 ft and 5,000 ft, and 3) greater than 5,000 ft. 1,500 feet was chosen as the first breakpoint since the 1999 South Florida Building Code defines the Coastal Building Zone as 1,500 feet landward of the CCCL. The second breakpoint was to define structures approximately one mile from the CCCL. Figure 7 shows the distance to the coast for buildings in this study according to the selected breakpoints.

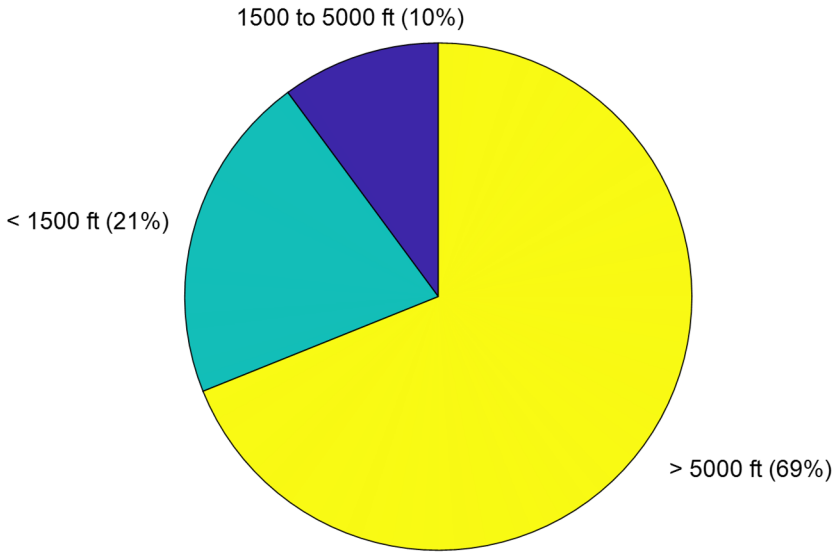


Figure 7. Buildings by distance to the coast (N=267).

## 4.2 Inspection Program

### *4.2.1 Inspectors*

Of the total inspection records received, most inspections were carried out by a Professional Engineer (P.E.), with only 5% of inspectors with a Special Inspector (S.I.) certification in addition to a P.E. The remaining inspections were conducted by Registered Architects, as shown in Figure 8. Of the 302 inspection records reviewed, inspections were carried out by 167 different inspectors. The most inspections performed by a single inspector in the reviewed dataset (including some reports for both before and after repairs were completed) was 10, while most inspectors were responsible for only one to two inspections. These results indicate a reasonable distribution of the inspection workload and no inspectors dominating within the region.

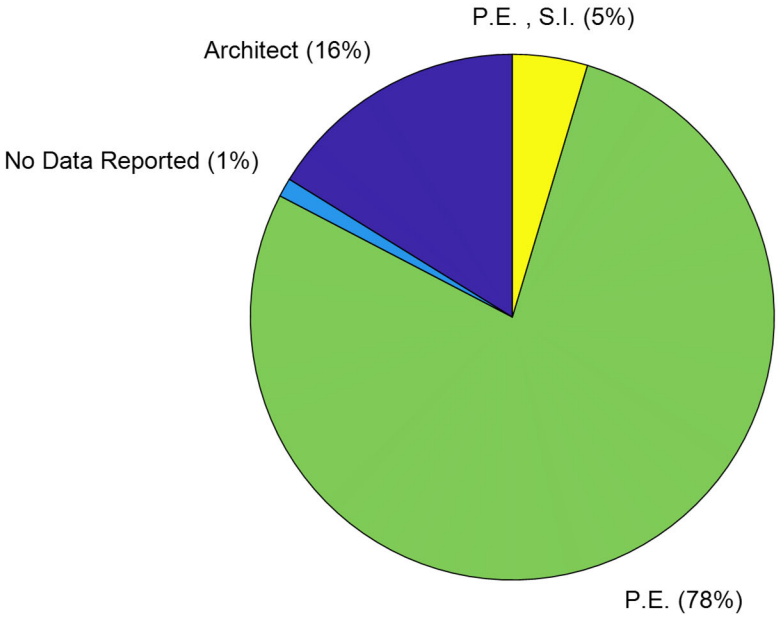

Figure 8. Inspections by inspector title (N=302).

### *4.2.2 Inspection Timeliness*

To determine when buildings are being inspected relative to when they are required to be inspected (at 40 years of age and every 10 years thereafter), the date of the most recent initial inspections for each address in the dataset was reviewed and compared to the date on which their most recent inspection was due (measured from January 1 on the year the inspection is due). The time elapsed from the initial inspection (not any required follow-up inspection or the recertification date) and the due date for inspection are shown in Figure 9. Two-thirds of the initial inspections occurred within the first two years of the inspection due date, 20% occurred between two and five years from the due date, while over 13% of inspections occurred more than five years after the inspection due date. The actual average delay in inspections may be longer than this data suggests given that a number of the requested inspection reports were not provided by the municipalities because they were currently overdue for inspection.

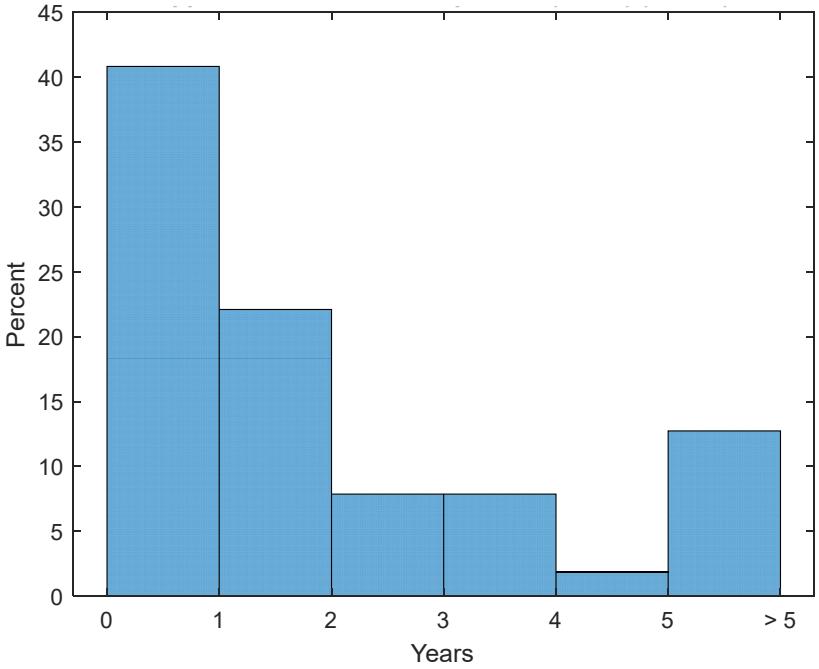


Figure 9. Time between when inspection is required (measured from the first of the year in which it is required) to the date of the initial inspection.

### *4.2.3 Reporting Completeness*

As discussed in Section 3.1, there was a significant amount of variability in how each inspector competed the inspection forms. Some of the more common deviations from the requirements of the inspection forms included:

- Marking the presence of a structural component (with an X or check) when a condition rating is expected
- Leaving sections blank or not providing adequate information to assess the condition of the structure
- Providing inspection information without using the required reporting template (e.g., only providing a cover letter or a narrative report)

When the inspection form was not followed or inadequate information was reported to provide a structural condition assessment, the research team deemed that the report "did not substantially follow the inspection report template". Of the inspection reports reviewed, 11% did not follow the required format as shown in Figure 10. Even when the template was mostly followed, many inspectors left some responses blank or provided irrelevant or ambiguous information. In the analysis that follows, these responses are noted as "No Data Reported".

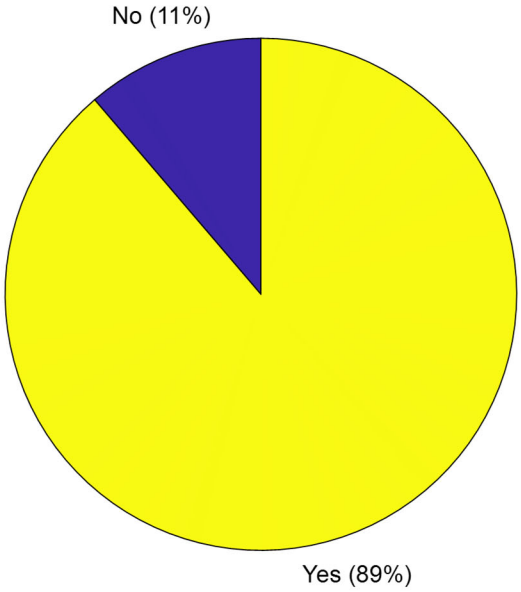


Figure 10. Assessment of whether inspection reports substantially follow the inspection report template (N=293).

## 4.3 Reported Structural Conditions, Most Recent Inspection Reports

This section provides an overview of the results of the reported building conditions from the initial inspection report (before repairs, when available) from the most recent inspection period. The results of this dataset are intended to provide information on the current state of the buildings analyzed. Most of these reports in this analysis were conducted in the last ten years, as shown in Figure 11. 40-year inspection report analysis is provided in Section 4.4.

This section focuses on the overall requirement for repairs and the general condition of the concrete. Additional results on the floor, windows, and roof conditions are provided in Appendix B.

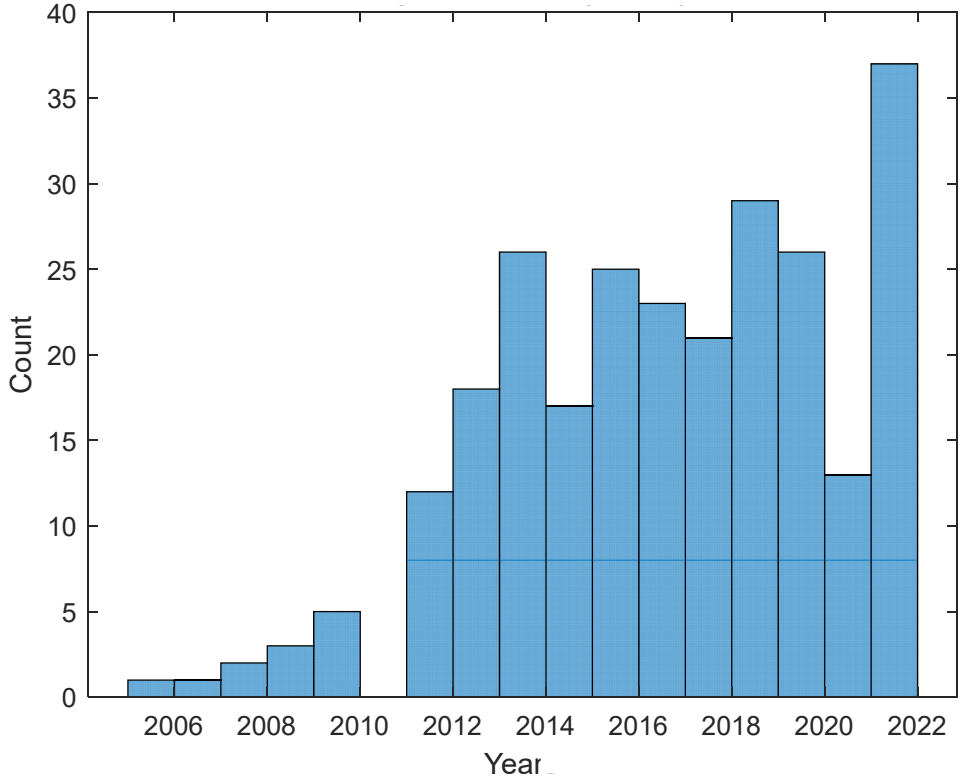


Figure 11. Date of most recent inspection for the reports analyzed.

### *4.3.1 Repairs Required*

Almost a quarter (22%) of the buildings in the recently inspected dataset required repair of some kind, as shown in Figure 12. The Broward County inspection form has a specific indicator for whether repairs are required while the research team inferred this from the information provided in throughout the Miami-Dade County inspection reports. It is important to note that this is a very general assessment and does not provide any information on the type or severity defects that were discovered.

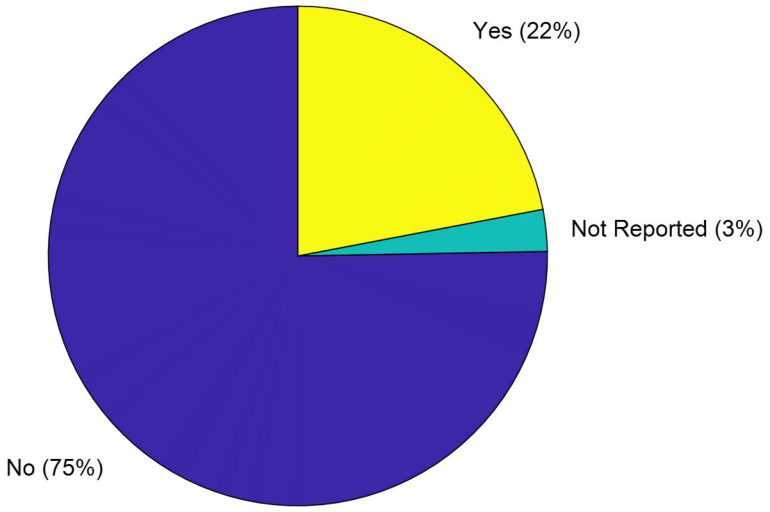


Figure 12. Requirement for building repair in as indicated in the recent inspection reports (N=259).

The requirement for repairs was examined according to the building use category as shown in Figure 13. The highest requirement for repairs was for residential condominiums (>30%) while approximately 20% of both commercial condominiums and hotels required some repair.

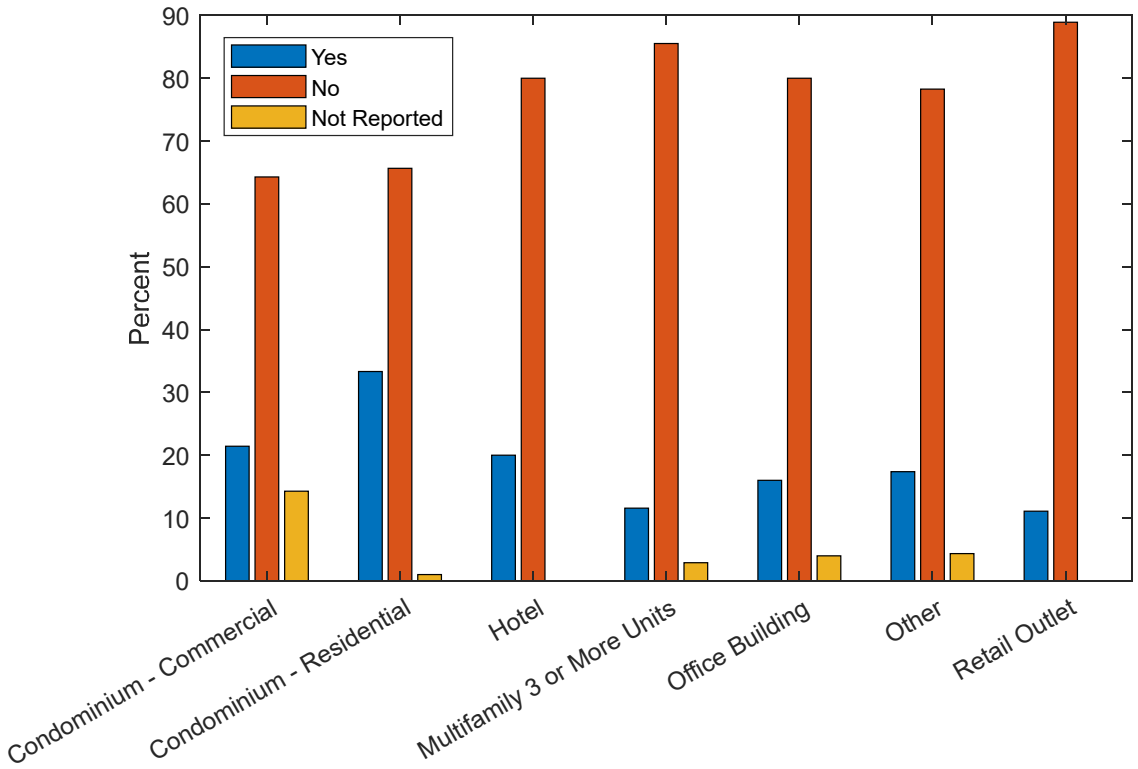


Figure 13. Repairs required by building use for recent inspection reports.

The requirement for repairs was also examined according to the building distance to the coast as shown in Figure 14. There is a very slight decrease in the requirement for repairs as the building is further from the coast with 25% requiring repairs for the closest buildings and 21% for those over 5,000 feet from the coast. This result is consistent with hotels and condos having higher rates of repair requirements coupled with their relative concentration on the coast.

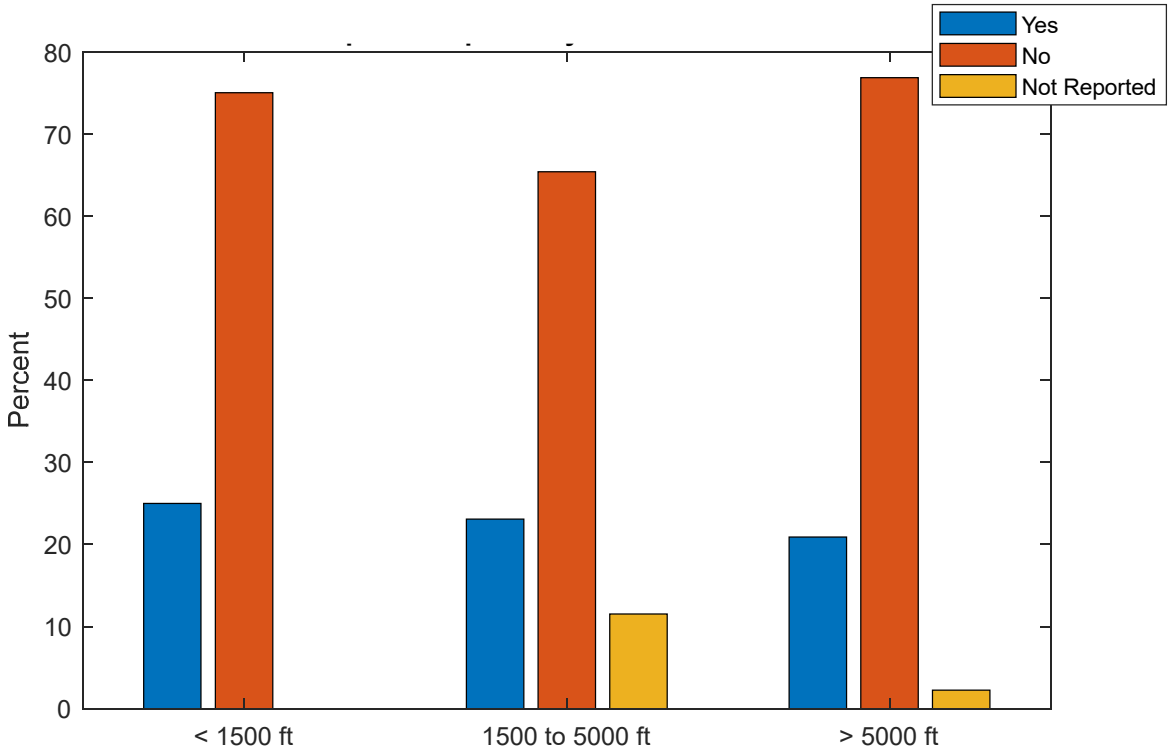


Figure 14. Repairs required by distance to the coast for the most recent inspection reports.

### *4.3.2 Concrete Condition*

The inspection reports provided information on the general condition of the concrete as well as the presence and significance of cracking and corrosion. 66% of buildings were reported to have concrete in good general condition while 25% were reported as either fair or poor, as shown in Figure 15. There is no observable trend in the reported general concrete condition with proximity to the coast, as shown in Figure 16.

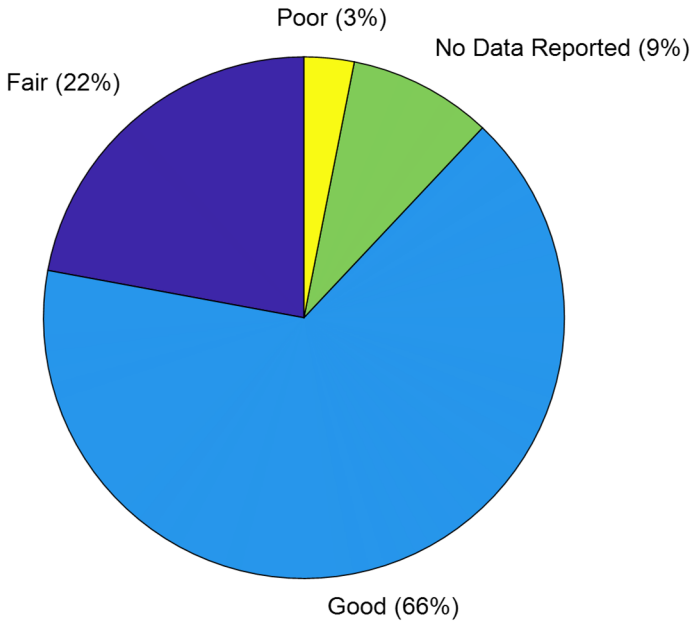


Figure 15. General concrete condition reported in the most recent inspection reports (N=258).

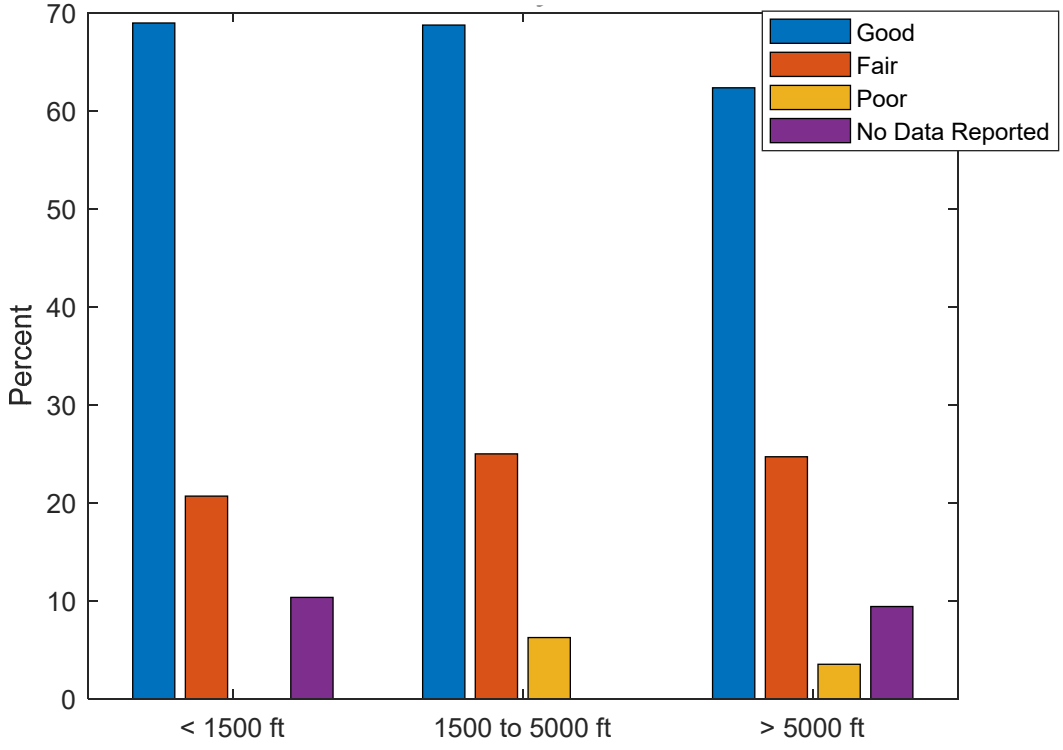


Figure 16. Concrete general condition reported by distance to the coast for the most recent inspection reports.

12% of buildings were reported to have significant concrete cracking in the most recent inspection reports, as shown in Figure 18.

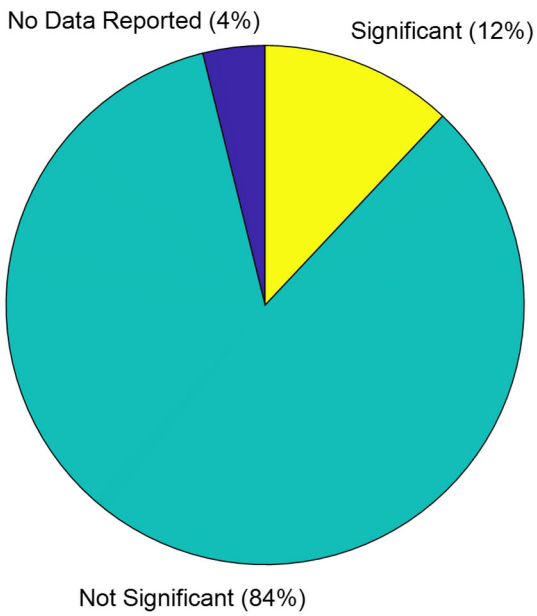


Figure 17. Concrete cracking reported in the most recent inspection reports (N=258).

The corrosion of concrete reinforcement as reported in the most recent inspection reports is shown in Figure 18. 16% of buildings were reported to have visible corrosion with 11% reported as significant and 4% determined to be minor. The 81% of buildings that were reported to have no visible corrosion may in part be due to the limitations of visual inspection. The reported reinforcement corrosion was also evaluated according to the distance of the building to the coast, as shown in Figure 19. More corrosion was reported in buildings farther from the coast; however, this finding is more likely the result of the difficulty in detecting corrosion in embedded reinforcement with visual inspection techniques rather than a true measure of the presence of corrosion.

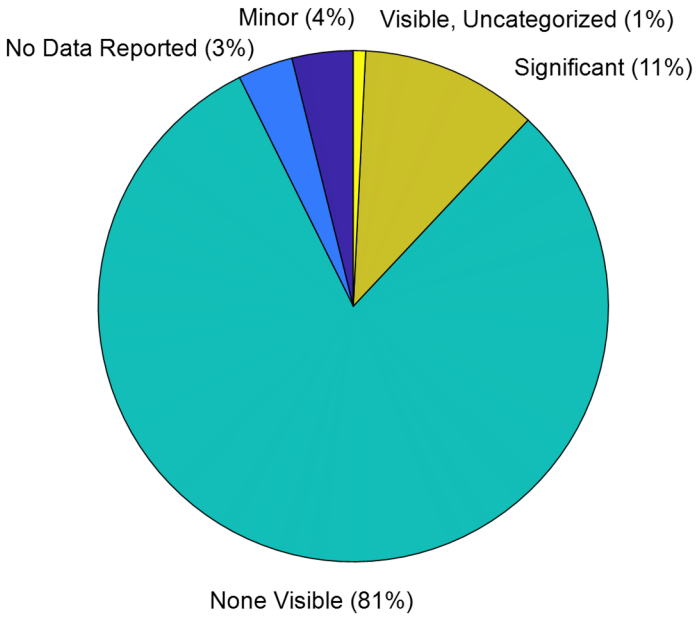


Figure 18. Concrete reinforcement corrosion reported in the most recent inspection reports (N=258).

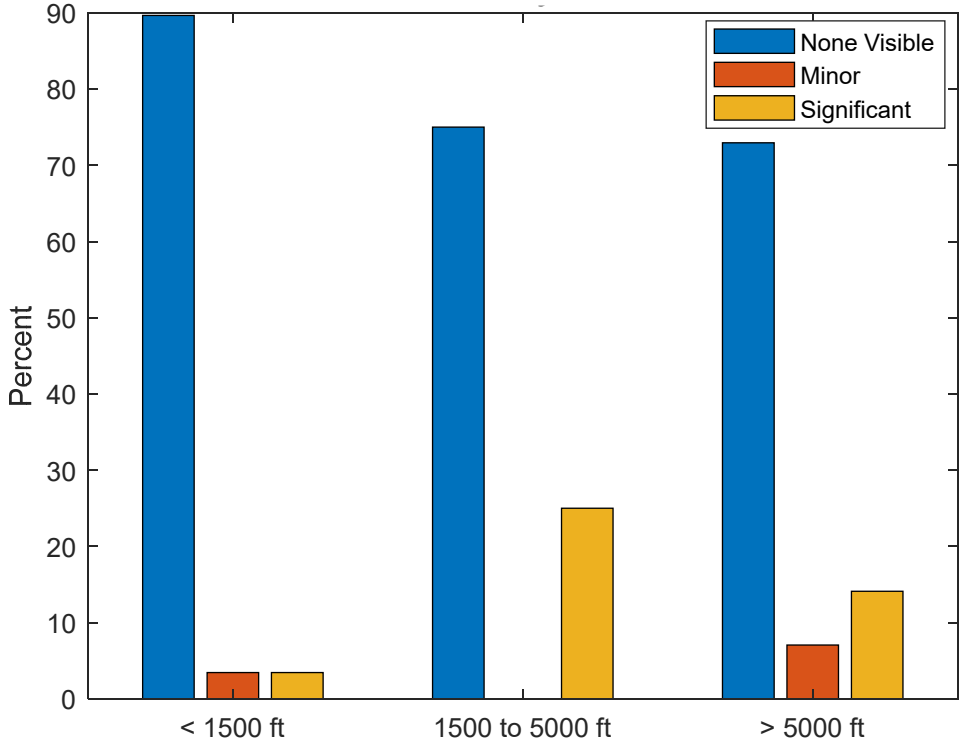


Figure 19. Concrete reinforcement corrosion according to distance to the coast reported in the most recent inspection reports.

### *4.3.3 Other Components and Systems*

Based on discussion with building officials and the experience of the research team, balconies and guards tend to experience high rates of deterioration due to their exposure (especially on the ocean facing side of buildings). Given their susceptibility to damage and their importance for life safety, the research team sought to glean any indication of guard and balcony condition from the analyzed reports, though they are not called out specifically in either county's inspection form. Figure 20 and Figure 21 show that 12% of buildings reported balconies and 5% of buildings reported guards that were either fair or poor condition. Approximately 90% of reports omitted information about the condition of balconies or guards. In many cases this is because these components are not present in the structure; however, it may also indicate that inspectors are only likely to report on a component if it is specifically included as a field in the inspection report.

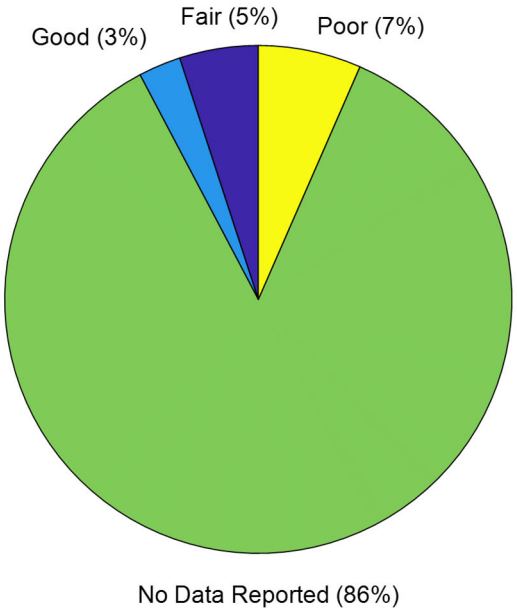


Figure 20. Balcony condition reported in the most recent inspection reports (N=259).

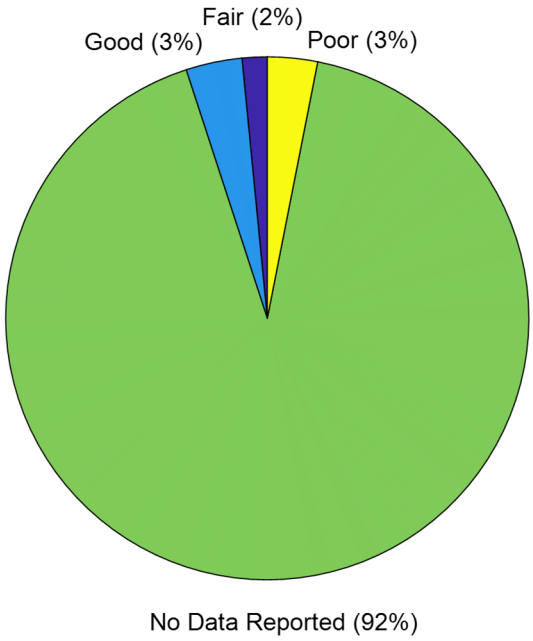


Figure 21. Guard condition reported in the most recent inspection reports (N=259).

Appendix B provides detailed information on the types and conditions of the roof systems, roof cladding, and windows from the most recent inspection reports. In general, approximately 45-55% of the roof, flooring, and window systems were reported to be in good condition.

## 4.4 Reported Structural Conditions, 40-Year Inspection Reports

This section provides an overview of the results of the reported building conditions in 40-year inspection reports (before repairs, when available). The results of this dataset are intended to provide information on the condition of buildings when they reach 40 years of age. This dataset includes reports from as far back as 1978, with most inspections conducted in the last 15 years, as shown in Figure 22. Figure 23 and Figure 24 show the representation of building use and municipality, respectively, for the 40-year inspection reports analyzed.

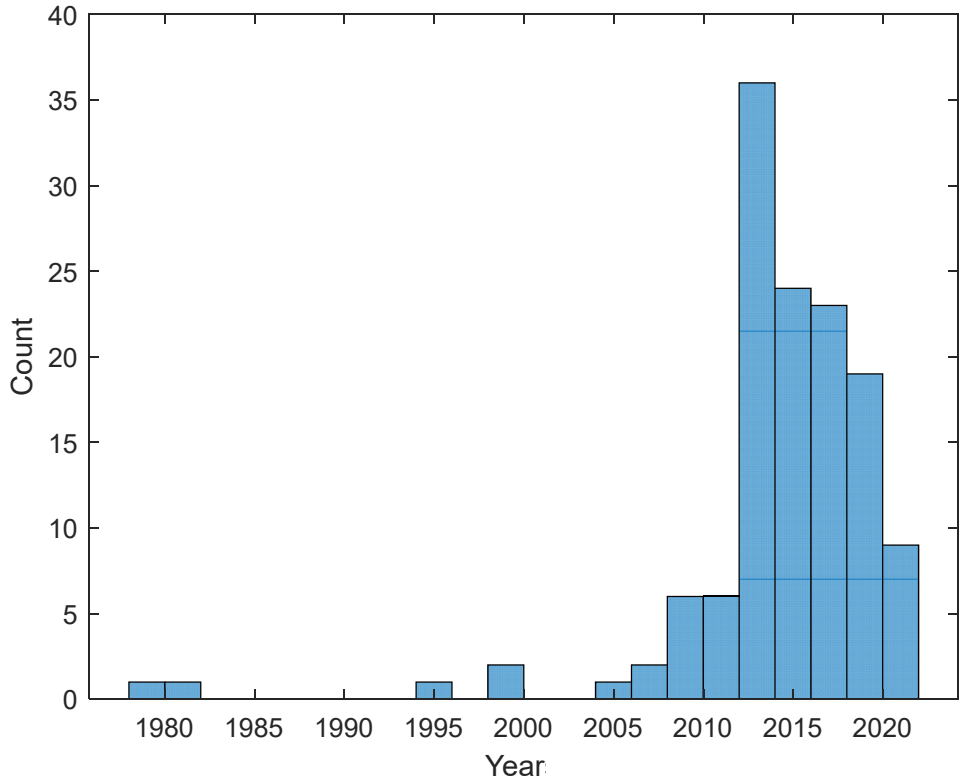


Figure 22. Date of 40-year inspection reports analyzed.

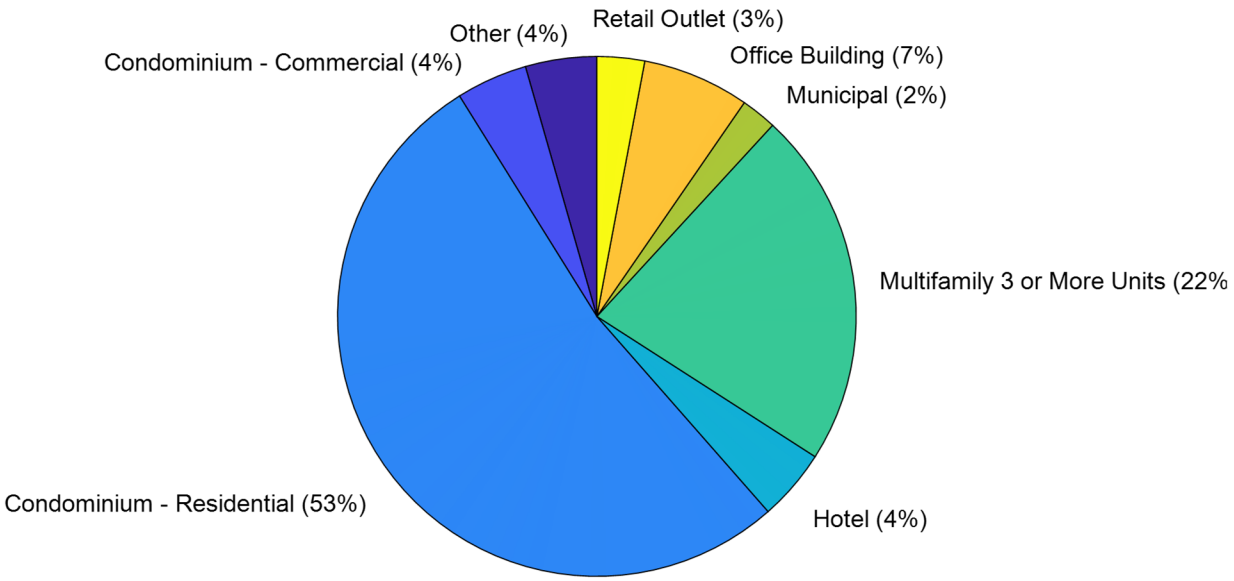


Figure 23. Building use categories for 40-year inspection reports (N=135).

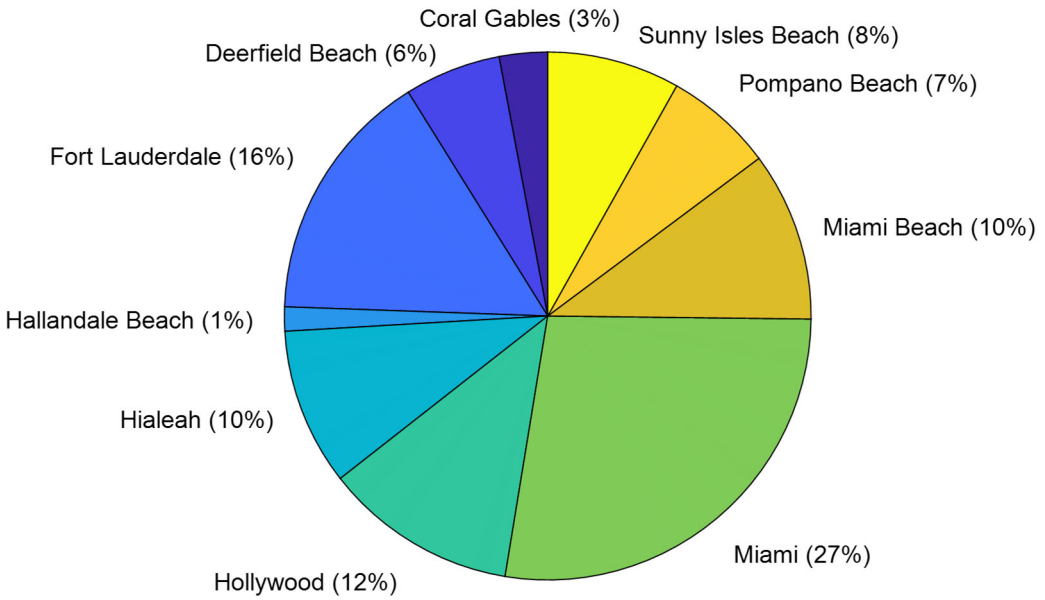


Figure 24. Building municipalities for 40-year inspection reports (N=135).

### *4.4.1 Repairs Required*

26% of the 40-year inspection reports indicated that some type of repair was required, as shown in Figure 25. As was the case for the recent inspection reports, residential condominiums and hotels had the highest rates of required repairs, as indicated in Figure 26. Figure 27 shows the relationship between the requirement for repairs and the distance to the coast. Also like the recent inspection report data, there is a slight trend toward a higher percentage of buildings requiring repair the closer they are to the coast (32% closest to the coast versus 24% farther from the coast).

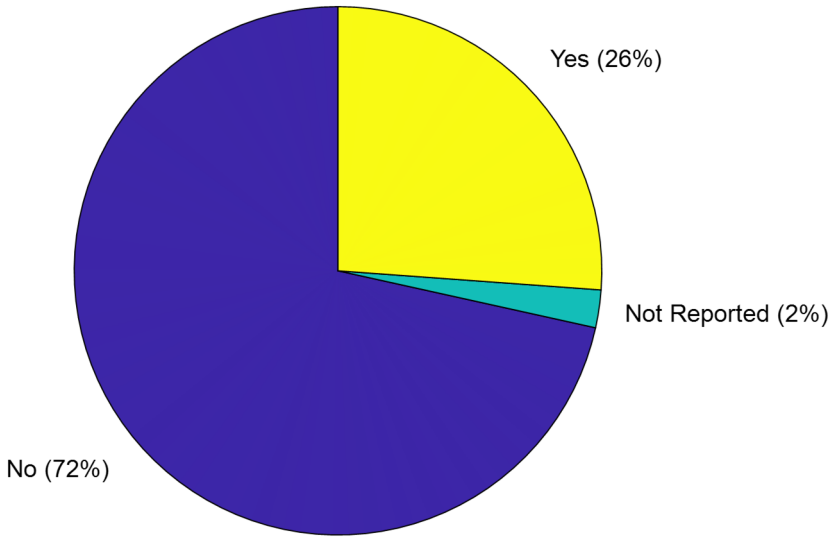


Figure 25. Requirement for building repair as indicated in the 40-year inspection reports (N=130).

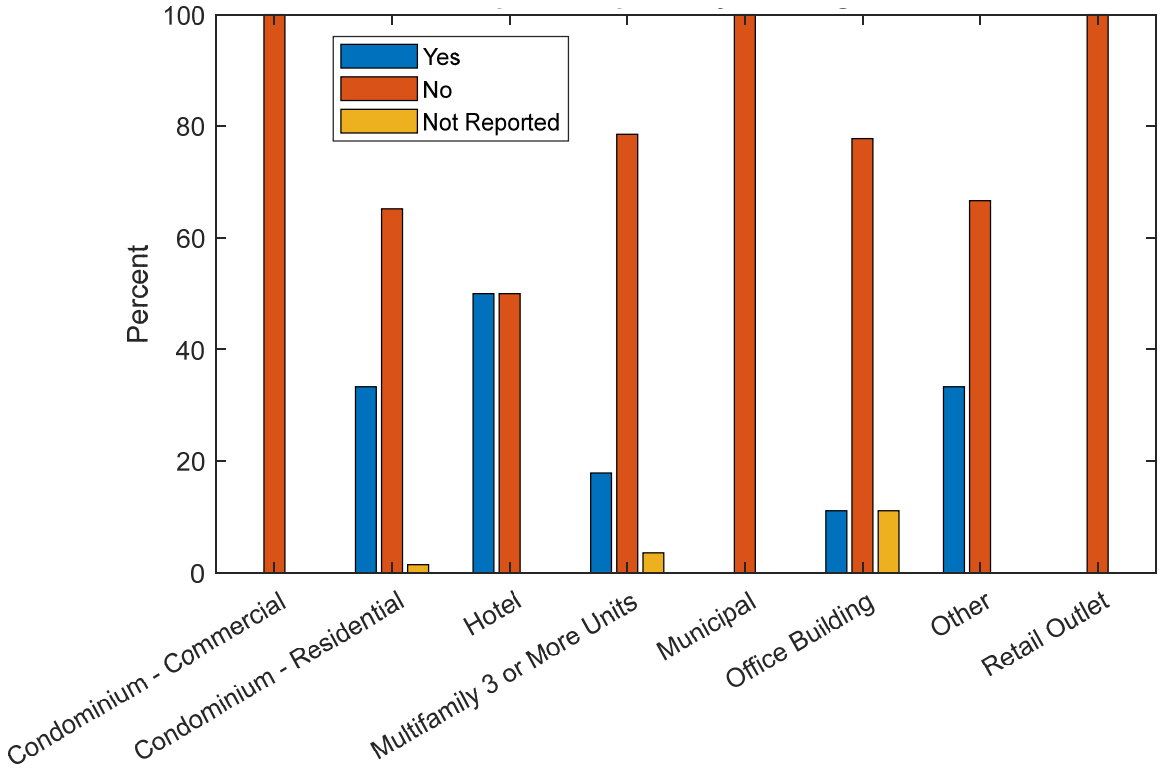


Figure 26. Repairs required by building use in the 40-year inspections.

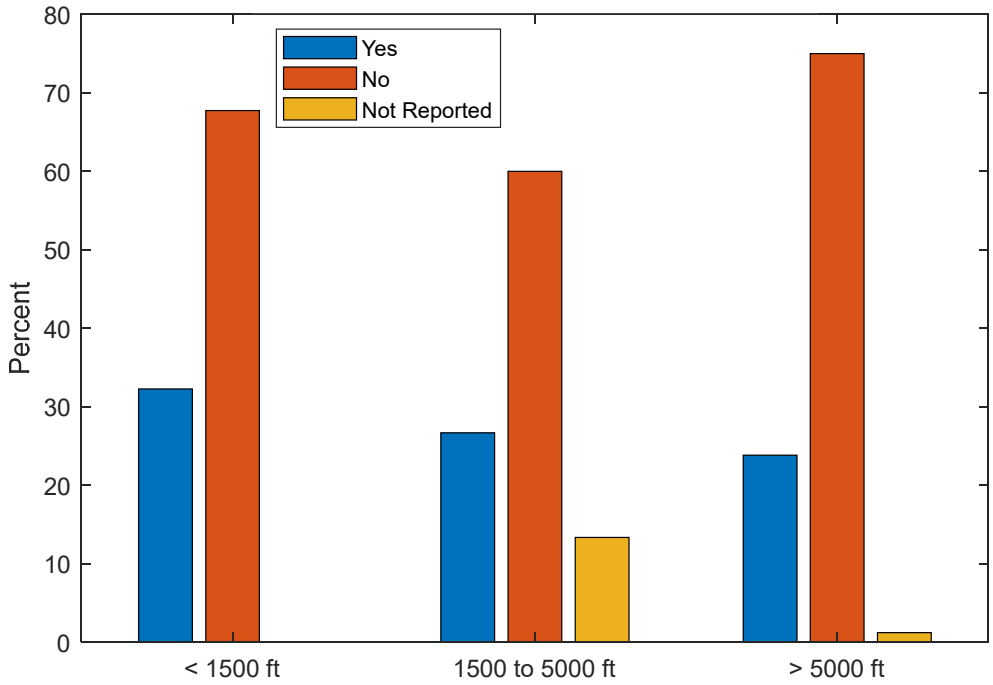


Figure 27. Repairs required by distance to the coast in the 40-year inspection reports.

### *4.4.2 Concrete Condition*

The general concrete condition was reported to be good in 70% of the 40-year inspection reports, while 23% were reported as fair or poor, as shown in Figure 28. Figure 29 shows no observable trend in the general condition of the concrete as a function of the distance to the coast.

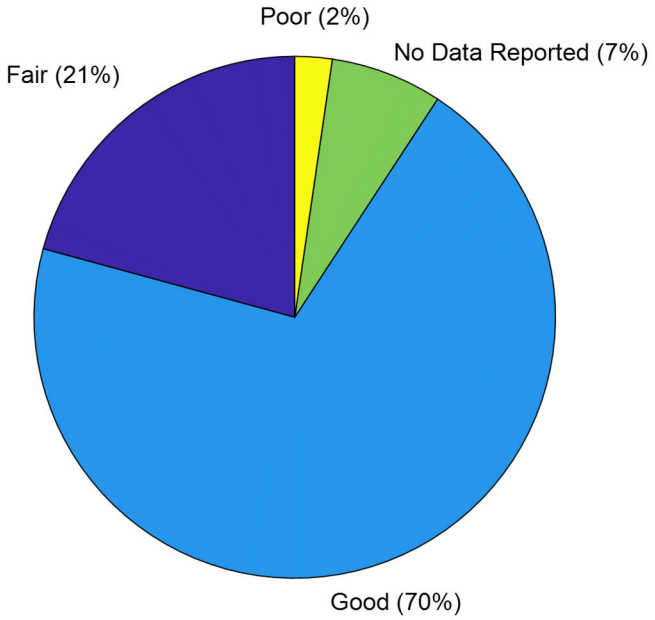


Figure 28. Concrete general condition reported in the 40-year inspection reports (N=130).

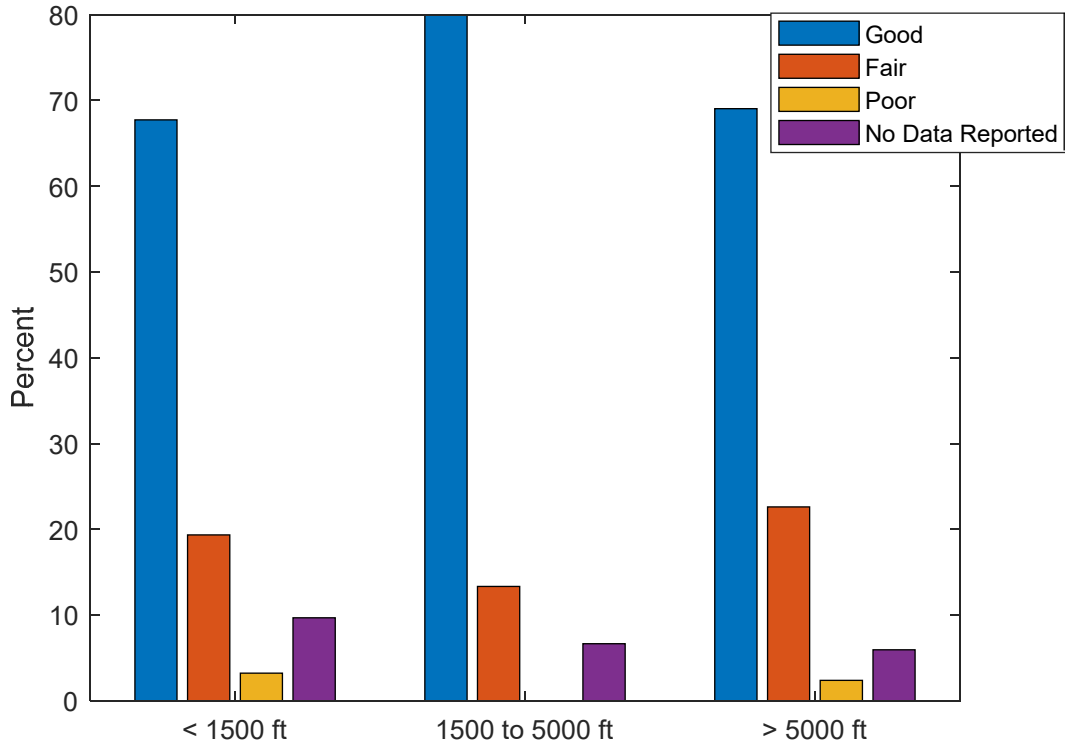


Figure 29. Concrete general condition reported by distance to the coast for the 40-year inspection reports.

Figure 30 shows that significant cracking was reported in 13% of the buildings in the 40-year inspection reports.

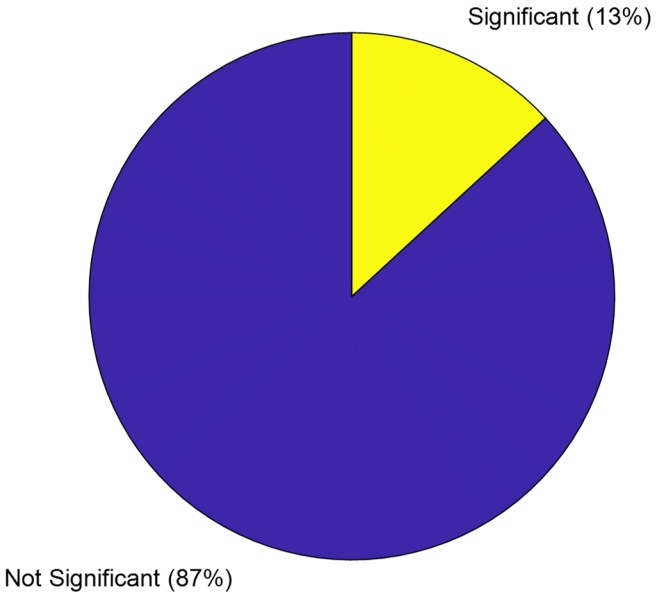


Figure 30. Concrete cracking reported in the 40-year inspection reports (N=129).

Reinforcement corrosion was observed in 22% of the buildings in the 40-year inspection reports while 70% of the reports indicated that no corrosion was visible (Figure 31). Unlike the most

recent inspection reports, the 40-year inspection reports do indicate more corrosion is seen in structures as they get closer to the coast, as shown in Figure 32.

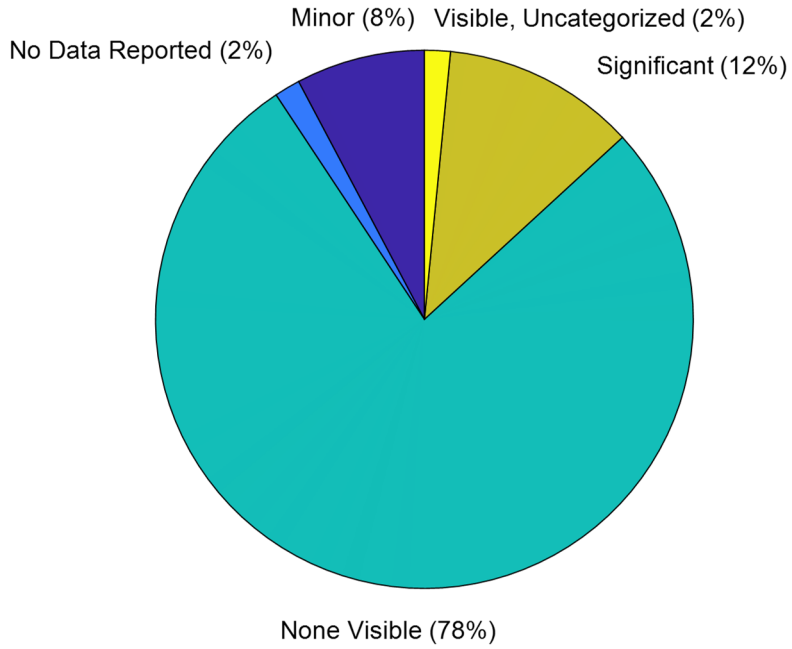


Figure 31. Concrete reinforcement corrosion reported in the 40-year inspection reports (N=129).

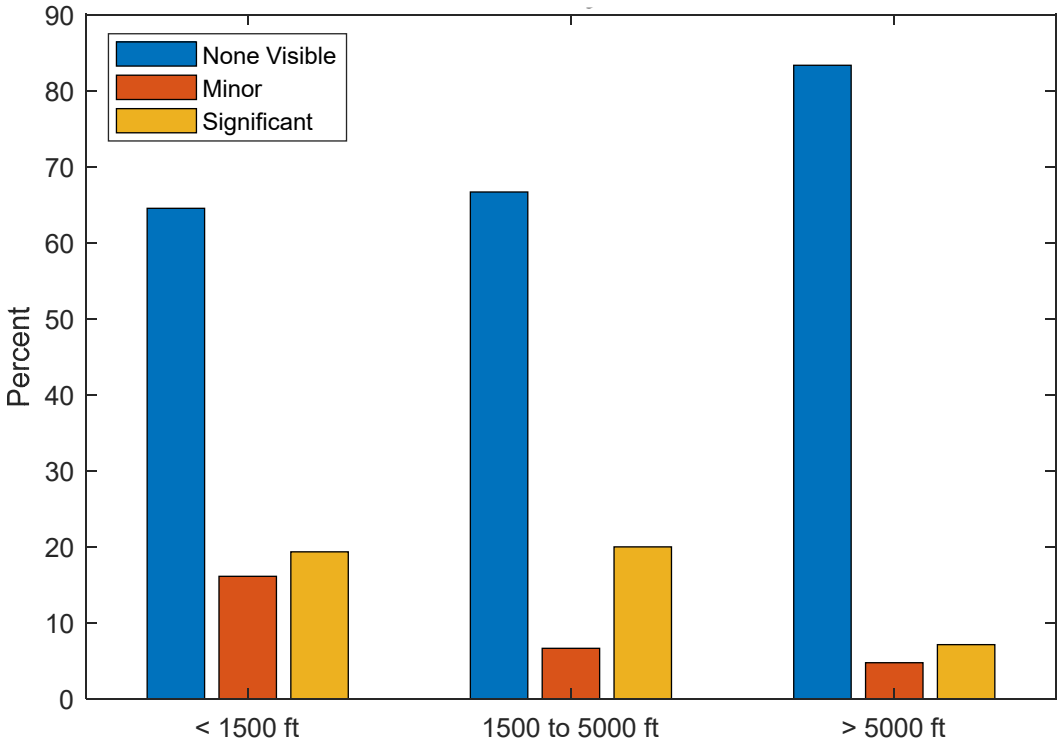


Figure 32. Concrete reinforcement corrosion according to distance to the coast reported in the 40-year inspection reports.

### *4.4.3 Other Components and Systems*

As with the most recent inspection report findings, the 40-year inspection reports did not provide much information on the condition of balconies and guards. However, for the data that was reported, the 40-year inspection reports indicated a higher rate of reported poor and fair balcony condition (17%) and a higher rate of guards reported to be in fair or poor condition (7%) relative to the most recent inspection reports (12% and 5%, respectively). It is difficult to determine if these higher reported rates of deterioration are due to this dataset including more residential condominiums (thus more likely to have balconies) or whether buildings are not as well maintained prior to their first 40-year inspection.

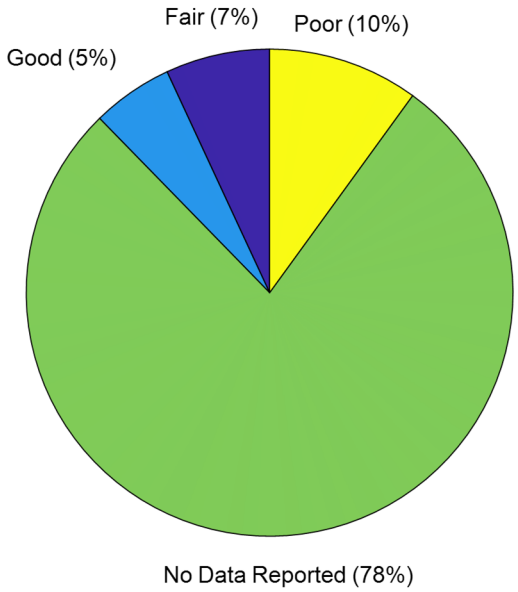


Figure 33. Balcony condition reported in the 40-year inspection reports (N=130).

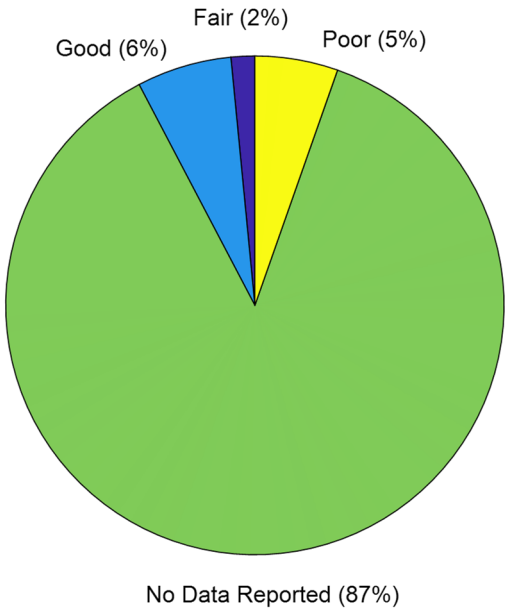


Figure 34. Guard condition reported in the 40-year inspection reports (N-130).

The roof cladding systems were reported to have a lower percentage of good ratings (34%) in the 40-year inspections compared to the most recent inspections. The reported conditions of the roof structural systems, windows, and floor systems had similar results as the most recent inspection reports (40-50% of these systems were reported to be in good condition). Detailed results are provided in Appendix C.

## 4.5 Comparative Analysis

Table 3 shows how reported conditions varied between the 40-year inspection report dataset and the most recent report dataset. More repairs were required for the 40-year inspection reports than the most recent inspection reports. Likewise, there is also a reduction in visible corrosion, concrete cracking, and balcony and guard defects from the 40-year inspection dataset to the most recent inspection dataset. These results may indicate that the repairs motivated by the initial 40-year inspection process have carryover effects for subsequent inspections.

Table 3. Comparison between inspection metrics reported in the 40-year and most recent inspection reports.

| Inspection Metric Percent | 40-Year Inspection Reports | Most Recent Inspection Reports | Change |
|---|---|---|---|
| Repairs required | 26% | 22% | -4% |
| General concrete condition fair or poor | 23% | 25% | 2% |
| Concrete with significant cracking | 13% | 12% | -1% |
| Concrete with visible corrosion | 22% | 16% | -6% |
| Balconies fair or poor | 17% | 12% | -5% |
| Guards fair or poor | 7% | 5% | -2% |
| Roof structural systems fair or poor | 25% | 28% | 3% |
| Roof cladding fair or poor | 24% | 27% | 3% |
| Floor system fair or poor | 15% | 19% | 4% |
| Window general condition fair or poor | 39% | 37% | -2% |

To further investigate the impact of the initial 40-year inspection on building maintenance, the percentage of buildings requiring repair for these inspection reports was compared to 50-year inspection reports and inspection reports for buildings 60-years and older, as shown in Table 4. A decrease in the number of buildings requiring repairs is observed after the initial 40-year inspection. Though the datasets do not represent inspection reports for the same buildings, the results may generally indicate that the building inspection programs are encouraging maintenance by building owners.

Table 4. Repairs required by age of building at time of inspection.

| Report | Sample Size (N) | Percent Requiring Repair |
|---|---|---|
| 40-year | 130 | 26% |
| 50-year | 77 | 21% |
| 60-year + | 71 | 21% |

It is expected that a more reliable assessment of the impact of the initial 40-year inspection on how a structure is maintained would result from the analysis of inspection reports from the same buildings over time. This analysis was attempted with the existing datasets; however, only six buildings had initial 40-year inspection reports and subsequent anniversary reports (50-year, 60-year, etc.), thus not allowing a meaningful statistical analysis.

# 5 Inspection Recommendations

Effective building safety inspection programs require accurate, consistent, and timely inspections as well as building departments that have the authority and resources to efficiently track the recertification process and respond meaningfully to inspection violations. The process of compiling the data for this study and the results of the analysis are the basis for recommendations provided herein. Some of the recommendations require resources (funding) and/or inspector training, while others may require regulatory changes.

## 5.1 Inspection Forms and Records

The current inspection forms in both Miami-Dade and Broward County provide some guidance for standardizing inspection reporting; however, this study has revealed that there is a high degree of variability in how individual inspectors complete the forms and often required fields are left incomplete. The primary recommendation to ensure more standard and complete inspection reporting responses is an electronic inspection form that implements standard response options (i.e., dropdown menus) and does not allow for widespread deviation from the intended information to be collected. Such a form should be coupled with clear instructions on when a component description is required and when a component condition assessment is required. It is recommended that condition assessment categories be standardized to:

- Good
- Fair
- Poor
- Not visible or accessible
- Not applicable

The meaning of each of the condition assessment categories will vary by the component being inspected and should be clearly defined for inspectors. In addition to the standard responses, the inspectors should be provided fields for each inspection section to allow more detailed descriptions and explanations. The inspection form submission process should incorporate automatic reviews for completeness before the submission is accepted.

To enable efficient tracking of inspection due dates, inspection results, relevant permits, and recertifications, the electronic inspection form may be integrated with an inspection program database. The inspection databases may be implemented and maintained at the building department level; however, consistent data collection and tracking methods across jurisdictions within each county will further enable data aggregation and promote accountability.

Additional benefits of an electronic inspection and tracking system include reduced paperwork burden for building departments, reduced workload in reviewing inspections for completeness due to automated review and acceptance, automated transmission of inspection notification letters (if the system can be linked with property appraiser databases), more expedited response time for records requests, and ultimately more confidence in the quality of the inspection data being collected.

It should be noted that some of the building departments included in this study have already implemented or are in the process of implementing some of these recommendations. Some building departments already have electronic systems in place for tracking permitting and other building records that may be leveraged for building inspection report submission and tracking.

Both Miami-Dade and Broward Counties may consider jointly developing a single electronic inspection form for use in both counties. Advantages may include being able to share development costs across both counties, and the ability to aggregate data on a regional basis to develop policy.

### 5.2 Additional Inspection Data

To aid in scalable analysis if inspection report data, the following additional fields are suggested in the section for general building information (some of these may already be in one of the county inspection forms but are suggested for adoption in both):

- Number of stories
- Building footprint area (square footage)
- Total building area (square footage)
- Distance to the coast (this may be automated if the inspection forms are integrated with a database with a GIS component)

More specific information is recommended to be recorded on the roof structural system and cladding to standardize the responses and subsequent analysis of performance:

- Roof pitch
    - Flat
    - Pitched
- Roof structural framing
    - Wood
    - Steel
    - Concrete
- Structural framing condition
    - Good
    - Fair
    - Poor
- Roof deck material
    - Concrete
    - Wood

    - Structural concrete on steel deck
    - Non-structural / insulating concrete on steel deck
    - Bare steel deck
- Roof cladding type
    - Tile
    - Asphalt shingles
    - Built-up roofing (BUR)
    - Single ply (Membrane)
    - Metal
    - Other
- Roof covering condition
    - Good
    - Fair
    - Poor
    - N/A

A section in the inspection form for balconies and guards is recommended due to their high risk for deterioration and importance for life safety. The following information is recommended for collection (when these components are present):

- Balcony structural system
    - Edge and building face supported
    - Cantilever
- Balcony exposure (if structure is on the coast)
    - Ocean facing
    - Non-ocean facing
- Balcony construction
    - Concrete
    - Steel framing with concrete topping
    - Wood
    - Other (define in narrative)
- Balcony condition rating
    - Good
    - Fair (e.g., minor cracking, minor rebar corrosion – patching will suffice)
    - Poor (e.g., significant cracking, rebar corrosion requiring repairs)
- Balcony condition description (e.g., spalling, cracking, rebar corrosion)
- Guard system
    - Wood
    - Metal
        - Aluminum
        - Stainless steel
        - Galvanized steel
        - Ungalvanized steel
    - Concrete kneewall
    - CMU kneewall

    - Glass
    - Other
- Guard condition (define ratings depending on guard system)
    - Good
    - Fair
    - Poor

### 5.3 Inspection Timing

The data analyzed in this study does not provide conclusive evidence that initiating building inspections before 40 years will result in safer buildings; however, earlier inspections are likely to promote more proactive maintenance by owners. There is some evidence that the requirement for repairs is higher for building closer to the coast, possibly supporting the initiation of inspections for these buildings at an earlier age. However, there is inadequate data in this study conclude what the appropriate age to initiate inspections for coastal buildings should be or what impact this choice may have on building safety.

### 5.4 Inspection Technologies

It is recommended that the Florida Building Commission investigate available destructive and nondestructive inspection technologies for detecting hidden structural defects, especially reinforcement corrosion and foundation settlement or ground movement. An approved product or vendor list may be established for proven and vetted technologies to ensure consistent and reliable assessment results. Approved product lists already exist within the Florida Product Approval program for materials, and this could possibly be integrated within the framework of that system to reduce development costs. The inspection reporting form should be updated to accommodate reporting on the outcomes of these tests.

### 5.5 Inspection Program Implementation

It is recommended that building departments continue their efforts to work with building owners and inspectors to promote timely and accurate inspection reports. Specific recommendations include:

- Limiting the acceptance and approval of inspection reports that do not comply with the form requirements, including reports with missing responses
- Reducing delays in inspections by automating the generation of notices (see recommendations above) and targeting their transmission to occur within the first quarter of the year due
- Automating record collection and tracking to reduce the administrative burden of program implementation

Many building departments are actively working toward streamlining the administration of their building inspection and recertification programs and their continued efforts will provide ongoing improvement of their systems. It is also important to note that building departments may not always have the legal mechanisms available to effectively enforce all aspects of the building safety inspection programs; regulatory changes may be required at the county and even state level to provide such authority.

## 6 Inspection Program Considerations in Florida

In parallel with the assessment of the 40-year building safety inspection programs in Broward and Miami-Dade counties, this study also assessed whether similar programs are being considered in other parts of Florida. An electronic survey (administered via Qualtrics) was developed for distribution to building officials throughout the State of Florida. The questions were created to determine if a current age-based building inspection program is in place and, if not, whether it is being considered in the jurisdiction of the respondent. The survey was designed primarily with multiple choice questions to ensure consistent responses; however, some questions required fill-in, short answer responses. The survey was also designed with several branches to allow follow up questions based on the responses provided. While the survey did ask the position and jurisdiction of the respondent, these questions were optional, and the survey was otherwise anonymous. The survey is provided in Appendix D.

The survey was distributed in October and November of 2021 via the Building Officials Association of Florida (BOAF) email list and direct emails to building officials in some jurisdictions. The last recorded response was received on November 15, 2021. 70 survey responses were received. A geographic representation of the responses is shown in Figure 35 for the 58 respondents that provided information on their department/jurisdiction.

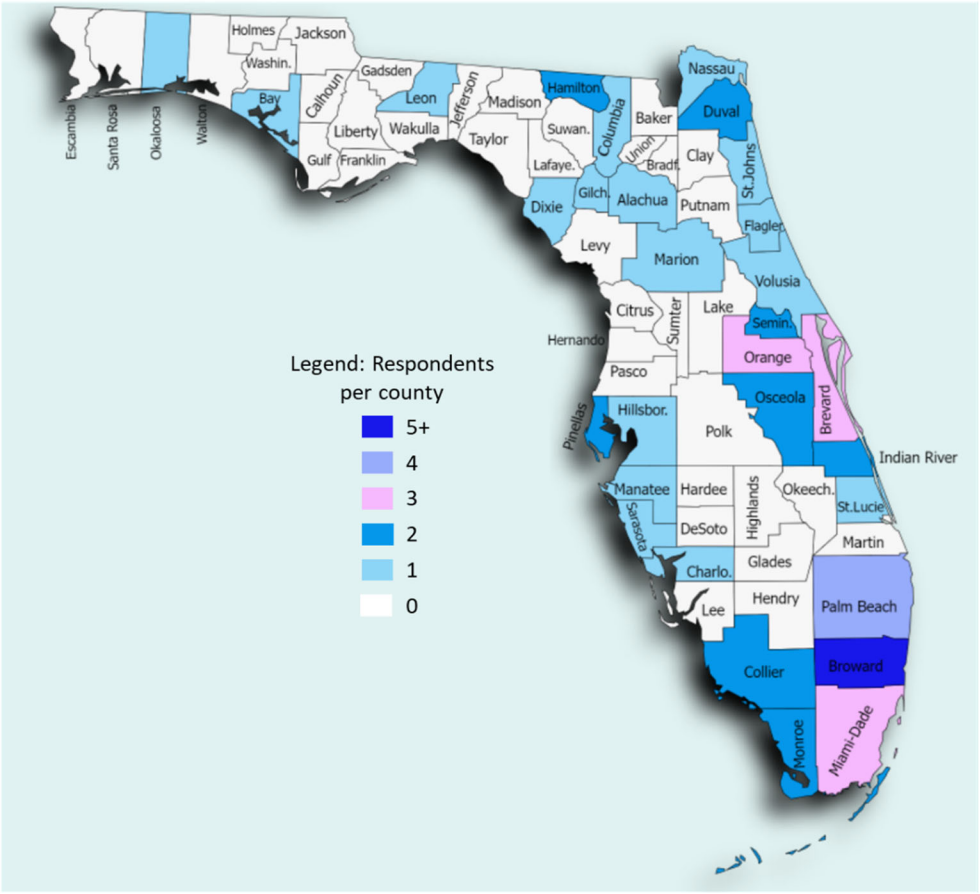


Figure 35. Q1: Statewide inspection survey responses per county (N=58).

Since the goal of the survey was to assess the status of, or plans for, inspection programs beyond Miami-Dade and Broward Counties, the results presented in this section for Questions 2, 3, and 8 are only for the respondents outside of these counties (N=51). Appendix E provides the results for these questions including Miami-Dade and Broward Counties. Not all respondents completed all questions.

Figure 36 shows the distribution of positions of the respondents, with most being the Chief Building Official for their jurisdiction.

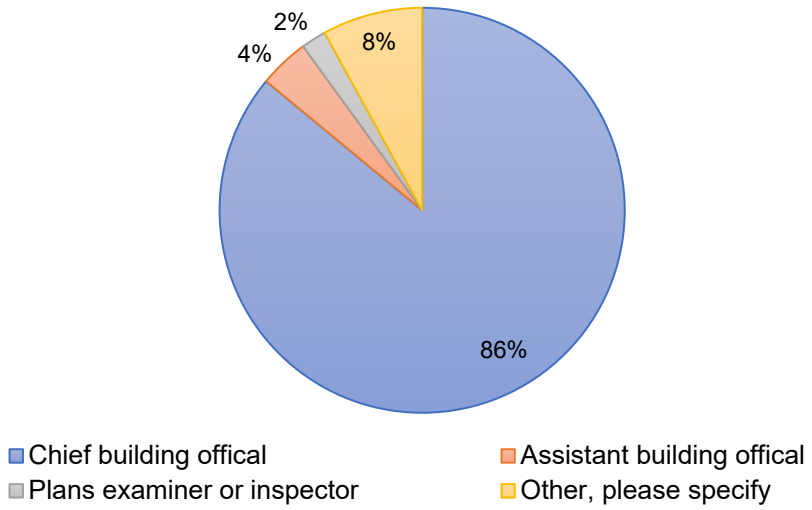


Figure 36. Q2: What is your position with the building department? (N=50)

Figure 37 illustrates that none of the jurisdictions outside of Miami-Dade and Broward Counties responded that they have a building age-based inspection program in place.

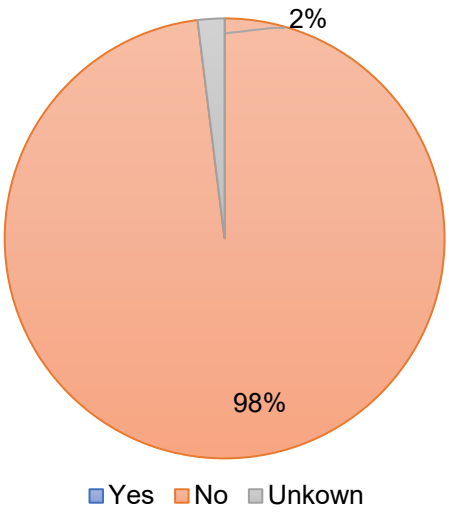


Figure 37. Q3: Does your building department currently have a building age-based safety inspection program in place? (N=51)

Figure 38 shows that 45% of the building departments that responded to the survey are either planning to implement or are considering implementation of an age-based building inspection program, while 20% are not currently considering such a program.

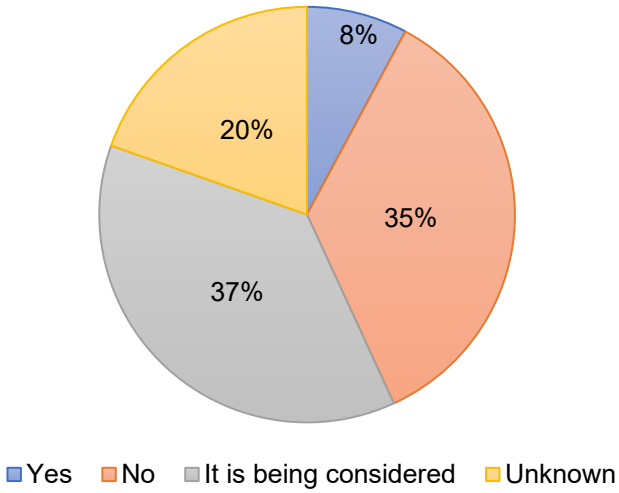


Figure 38. Q4: Is your building department planning to implement a building age-based safety inspection program in the future? (N=51).

For those jurisdictions considering an age-based inspection program, only two provided a specific year that it would be implemented (Q5). The Cities of Destin and Satellite Beach both reported their programs would begin in 2022. Ten jurisdictions provided the building age being considered for their program (Q6), ranging from 20 to 50 years, as summarized in Table 5. None of the jurisdictions planning or considering an age-based inspection program provided a link to their ordinance (Q7).

Table 5. Q6: What building age/timeline is being considered for your building safety inspection program (e.g. 40 years)? (N=10)

| **Building Age for Inspection** | **Building Department** |
|---|---|
| 20 | Monroe County |
| 30 | City of Titusville, City of Boynton Beach, City of Sarasota, unknown department |
| 35* | City of West Palm Beach |
| 40 | Manatee County |
| 40-50 | New Smyrna Beach, City of Kissimmee |
| 50 | City of Ocala |

* Possibly sooner for buildings near the coast

72% of survey respondents outside of Miami-Dade and Broward Counties reported that they are not having problems with buildings older than 40 years, while 14% responded that these buildings do have issues, as shown in Figure 39.

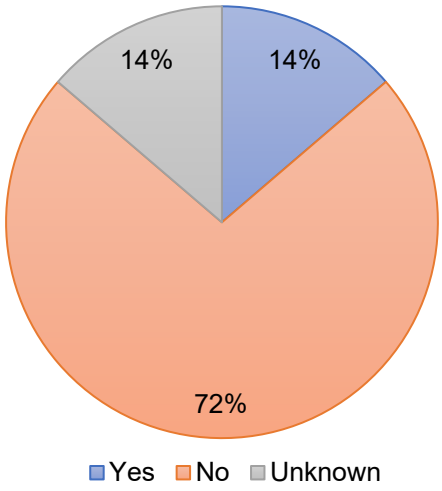


Figure 39. Q8: Is your jurisdiction experiencing problems/issues with buildings 40 years or older? (N=51)

The list below summarizes the structural problems observed in buildings 40 years and older for all respondents, including those in Miami-Dade and Broward Counties [Q9: Describe the typical issues observed in buildings older than 40 years in your jurisdiction (N=11)]:

- Wood framed buildings: water penetration and termites
- Concrete: spalling, cracks, balcony/walkway slab deterioration, rebar/post-tensioning corrosion, delamination, exposed rebar
- Foundations: settlement
- Fenestrations: water infiltration, improper sealing
- Roofs: leaks, system deterioration

The majority of responses cited lack of building maintenance as primary cause for deterioration.

The list below summarizes the general comments provided by respondents, including those in Miami-Dade and Broward Counties [Q10: Are there any details or comments you would like to provide about your building safety inspection program or building safety inspection programs in general? (N=14)]:

- The challenges of inspection programs are the cost (who will pay?) and personnel requirements. There is already a shortage of inspectors.
- There is concern that jurisdictions will have some liability if owner does not fix the issues identified during inspection.
- Program enforcement may be a challenge in cases where HOAs lack the reserves to make necessary repairs.
- Inspection programs should avoid placing responsibility on building departments rather than on the owners.
- Thorough inspection is difficult without destructive investigation and without access to foundation components. The time to complete proper documentation and complete repairs may be prohibitive.

- Age-based inspection programs are onerous and overkill given that older buildings are not generally in danger of collapse. Programs are too far reaching given that most buildings in safe condition.
- Threshold inspectors should be considered a requirement for certain building heights.
- Municipalities may be reluctant to "volunteer" to do safety inspections given their potential to reveal costly and/or unsafe building conditions.
- It is recommended buildings over four stories be inspected for recertification every 20 years (30 and 40 years is too long). Major issues may warrant re-inspection after 10 years.
- In addition to 40-year recertification programs, jurisdictions should consider how well a building is maintained, the design criteria used, possible design/construction flaws, construction quality, and errors made throughout the design, review, construction, and inspection of life of structure. Responsibility for building failure should not rest solely on these inspection programs (or lack thereof).

General comments are provided in Appendix D as they were written by survey respondents, with identifying information redacted.

At the time of the survey, the results indicated that there were no jurisdictions in Florida with building age-based inspection or recertification programs outside of Broward and Miami-Dade Counties. Only 14% of these jurisdictions reported having problems with buildings older than 40 years. However, many building departments are planning to or considering implementing such programs, with a range of building ages being considered. The City of Boca Raton, in Palm Beach County, passed a 30-year threshold building inspection ordinance in 2021 following the administration of this survey. The qualitative responses indicate a variety of feelings about such programs, with some respondents in favor, some in opposition, and some with some concerns about cost, labor requirements, and the potential burden (including liability) to the building departments that implement them.

## 7 Conclusions

This study looked at the 40-year building inspection programs in Broward and Miami-Dade counties to provide a broad assessment of how the programs are implemented and what information they provide on the structural condition of inspected buildings. To manage the scope of the project, structural building inspection reports were requested from ten municipalities in proportion to their size. A representative distribution of building use, age, height, and distance to the coast was sought and ultimately over 300 inspection records were received for 267 buildings. A large portion of the analyzed inspection reports were for 40-year inspections; however, some municipalities provided reports for the most recent 10-year anniversary inspection (e.g., 50-year or 60-year inspections).

Aggregating the inspection report data for analysis was one of the primary challenges of this project due to variability in the records provided by each building department and differences in in inspector responsiveness to the required inspection forms in each county. As a result, one of the primary recommendations resulting from this project is for counties and municipalities to work towards the increased standardization in inspection reporting by using an electronic inspection form to ensure completeness and consistency.

An Excel spreadsheet was created to extract and record the data from the inspection reports. The Excel sheet was built with sections and fields corresponding to the standard structural inspection forms in each county; however, the data field inputs were standardized with relevant dropdown menus to enable data aggregation for analysis. As a result, some interpretation by the research team was required to map the variable inspector-provided data to the more consistent categorization in the Excel spreadsheet. The research team also made assessments of the adherence of each inspection report to the required inspection form and the overall completeness of the reporting. Over ten percent of the reports reviewed did not substantially follow the requirements of the inspection form and data were routinely omitted even for those that did.

Most inspections are occurring within the first two years of their due date; however, approximately 13% of inspections are taking place more than five years after they are required to be inspected. It is recommended that additional administrative and regulatory measures be put in place to encourage compliance with the required inspection timelines.

The results of analyzing the aggregated and standardized data show that the building safety inspection programs in Miami-Dade and Broward County found that 26% the buildings inspected at 40 years required some repair prior to being recertified. The number of buildings requiring repairs at subsequent 10-year inspections is reduced to 21%. This finding indicates that the inspection programs are encouraging building maintenance that may not otherwise occur, which in turn is likely to broadly improve building safety. The percentage of buildings requiring repair and with visible concrete reinforcement corrosion increases slightly for buildings that are closer to the coast. These structures may benefit from earlier or more frequent inspections; however, the appropriate intervals cannot be determined from the data collected in this study.

Based on a comprehensive review of the inspection records acquired for this study, recommendations have been made to improve the administration efficiency of the inspection programs and the quality of the data collected during inspections. The creation of digitized inspection reporting integrated with a comprehensive inspection database will streamline the generation of notices to building owners, the timeliness of inspections, the quality and completeness of the inspection data, and is likely to lead to better outcomes for building safety.

The results of the statewide survey of building officials distributed in October and November 2021 show that over half of the respondents outside of Miami-Dade and Broward counties are considering or planning to implement age-based building inspection programs in their jurisdictions. Survey respondents expressed some concern about the cost and administrative burden of such programs. There was additional concern about the inability for visual structural inspections to detect hidden defects, such as concrete reinforcement corrosion. This issue was evident in the high percentage of inspection reports in Miami-Dade and Broward Counties that noted no corrosion was visible. As a result, it is recommended that the Florida Building Commission, building departments, and inspectors look for opportunities to include vetted corrosion detection and other nondestructive testing technologies in the structural evaluation process.

**Appendix A: Standard 40-year building inspection forms for Broward and Miami-Dade Counties**

# Building Safety Inspection Report Form Amended 03/15/12
# STRUCTURAL

**Building Information**

Building / Structure address _____

Legal description _____

Folio # of Building /Structure _____

Owner's name _____

Owner's mailing address _____

Building Code Occupancy Classification _____ In accordance with Building Code Edition _____

Type of Construction _____ In accordance with Building Code Edition _____

Size ( Square footage ) _____

Number of Stories _____

**Inspection Firm**

Inspection Firm or Individual _____

Address _____

Phone _____

Inspection Commencement Date ___/___/_____ Inspection Completion Date ___/___/_____

Inspection made by _____

**In accordance with Section 110.15 of the Broward County Administrative provisions of the Florida Building Code and the Broward County Board of Rules and Appeals Policy # 05-05 the required safety inspection has been completed.**

☐ No Repairs required

☐ Repairs are required as outlined in the attached inspection report.

Licensed Professional Engineer / Architect _____

License # _____

" I am qualified to practice in the discipline in which I am hereby signing."

**Seal**

Signature and Date _____

As a routine matter, and in order to avoid possible misunderstanding, nothing in this inspection Report Form, attached Minimum Inspection Guideline and our Non-Destructive Observations, should be construed directly, or indirectly, as guaranteed or warrantee for any portions of the structure. To the best of my knowledge and ability, this report represents an accurate appraisal of the present condition of the structure, based upon careful evaluation of observed conditions, to the extent reasonably possible.

# MINIMUM INSPECTION GUIDELINES FOR BUILDING SAFETY INSPECTION STRUCTURAL

## I. Masonry Walls

### A. General Description

**1**. Concrete masonry units

**2.** Clay tile or terra cotta units

**3.** Reinforced concrete tie columns

**4.** Reinforced concrete tie beams

**5.** Lintels

**6.** Other type bond beams

**B. Cracks:** Identify crack size as **HAIRLINE** if barely discernible; **FINE** if less than 1 mm in Width: **MEDIUM** if between 1 and 2 mm in width; **WIDE** if over 2 mm

**1.** Location - note beams, columns, other

**2.** Description

### C. Spalling:

**1.** Location - note beams, columns, other

**2.** Description

### D. Rebar corrosion

**1.** None visible

**2.** Minor

**3.** Significant - structural repairs required (describe)

## II. Floor and Roof Systems:

### A. Roof:

**1.** Describe type of framing system (flat, slope, type roofing, type roof deck, condition)

**2.** Note water tanks, cooling towers, air conditioning equipment, signs, other heavy equipment and condition of supports.

**3.** Note types of drains and scuppers and condition.

**B. Floor system(s):**

**1.** Describe (type of system framing, material, condition)

**2.** Heavy equipment and conditions of support

**C**. **Inspection** - note exposed areas available for inspection, and where it was found necessary to open ceilings, etc. for inspection of typical framing members.

**III. Steel Framing Systems:**

**A.** Description

**B.** Exposed Steel - describe condition of paint & degree of corrosion.

**C.** Concrete or other fireproofing - note any cracking or spalling, and note where any covering was removed for inspection.

**D.** Elevator sheaves beams & connections, and machine floor beams - note Condition.

**IV. Concrete Framing Systems:**

**A.** Full description of structural system.

**B.** Cracking:

**1.** Not significant.

**2.** Location and description of members affected and type cracking.

**C.** General condition.

**D.** Rebar corrosion

**1.** None visible

**2.** Minor

**3.** Significant - structural repairs required (describe)

**V. Windows:**

**A.** Type (Wood, steel, aluminum, jalousie, single hung, double hung, casement, awning, pivoted, fixed, other)

**B.** Anchorage - type & condition of fasteners and latches.

**C.** Sealants - type & condition of perimeter sealants & at mullions.

**D.** Interior seals - type & condition at operable vents.

**E.** General condition.

**VI. <u>Wood Framing:</u>**

**A.** Describe floor system

**B.** Note condition connector or stress

**C.** Note rotting or termite damage

**D.** Note alignment problems

**E.** Note bearing deficiencies

**F.** Note any significant damage that might affect safety and stability of building structure.

**VII. <u>Exterior Finishes / Note any structural deficiencies in the following.</u>**

A. Stucco

B. Veneer

C. Soffits

D. Ceiling

E. Other

MIAMI-DADE COUNTY

REGULATORY AND ECONOMIC RESOURCES DEPARTMENT

# MINIMUM INSPECTION PROCEDURAL GUIDELINES FOR BUILDING STRUCTURAL RECERTIFICATION

**INSPECTION COMMENCED**
**Date:**_____

**INSPECTION COMPLETED**
**Date:** _____

**INSPECTION MADE BY:** _____

**SIGNATURE:** _____

**PRINT NAME:** _____
**TITLE:** _____

**ADDRESS:** _____
_____

| 1. DESCRIPTION OF STRUCTURE |
|---|
| a. Name on Title: |
| b. Street Address: |
| c. Legal Description: |
| d. Owner's Name: |
| e. Owner's Mailing Address: |
| f. Folio Number of Property on which Building is Located: |
| g. Building Code Occupancy Classification: |
| h. Present Use: |
| i. General Description: |
| |
| |
| Addition Comments: |
| |
| |
| |
| |
| |
| |

| |
|---|
| |
| j. Additions to original structure: |
| |
| |
| |
| |
| |

| **2. PRESENT CONDITION OF STRUCTURE** |
|---|
| a. General alignment (Note: good, fair, poor, explain if significant) |
| 1. Bulging |
| 2. Settlement |
| 3. Deflections |
| 4. Expansion |
| 5. Contraction |
| b. Portion showing distress (Note, beams, columns, structural walls, floor, roofs, other) |
| |
| |
| |
| |
| |
| |
| c. Surface conditions – describe general conditions of finishes, noting cracking, spalling, peeling, signs of moisture penetration and stains. |
| |
| |
| |
| |
| d. Cracks – note location in significant members. Identify crack size as HAIRLINE if barely discernible; FINE if less than 1 mm in width; MEDIUM if between 1 and 2 mm width; WIDE if over 2 mm. |
| |
| |

| |
|---|
| e. General extent of deterioration – cracking or spalling of concrete or masonry, oxidation of metals; rot or borer attack in wood. |
| |
| |
| f. Previous patching or repairs |
| |
| |
| g. Nature of present loading indicate residential, commercial, other estimate magnitude. |
| |
| |

| **3. INSPECTIONS** |
|---|
| a. Date of notice of required inspection |
| b. Date(s) of actual inspection |
| c. Name and qualifications of individual submitting report: |
| |
| d. Description of laboratory or other formal testing, if required, rather than manual or visual procedures |
| |
| |
| e. Structural repair-note appropriate line: |
| 1. None required |
| 2. Required (describe and indicate acceptance) |
| |

| **4. SUPPORTING DATA** |
|---|
| a. _____ sheet written data<br><br>b. _____ photographs<br><br>c. _____ drawings or sketches |

| **5. MASONRY BEARING WALL = Indicate good, fair, poor on appropriate lines:** |
| --- |
| a. Concrete masonry units |
| b. Clay tile or terra cota units |
| c. Reinforced concrete tie columns |
| d. Reinforced concrete tie beams |
| e. Lintel |
| f. Other type bond beams |
| g. Masonry finishes -exterior |
| 1. Stucco |
| 2. Veneer |
| 3. Paint only |
| 4. Other (describe) |
| |
| h. Masonry finishes - interior |
| 1. Vapor barrier |
| 2. Furring and plaster |
| 3. Paneling |
| 4. Paint only |
| 5. Other (describe) |
| |
| i. Cracks |
| 1. Location – note beams, columns, other |
| 2. Description |
| |
| j. Spalling |
| 1. Location – note beams, columns, other |
| 2. Description |
| |
| k. Rebar corrosion-check appropriate line |
| 1. None visible |
| 2. Minor-patching will suffice |
| 3. Significant-but patching will suffice |

| |
|---|
| 4. Significant-structural repairs required |
| l. Samples chipped out for examination in spall areas: |
| 1. No |
| 2. Yes – describe color, texture, aggregate, general quality |
| |

| **6. FLOOR AND ROOF SYSTEM** |
|---|
| a. Roof |
| 1. Describe (flat, slope, type roofing, type roof deck, condition) |
| |
| |
| 2. Note water tanks, cooling towers, air conditioning equipment, signs, other heavy equipment and condition of support: |
| |
| |
| 3. Note types of drains and scuppers and condition: |
| |
| b. Floor system(s) |
| 1. Describe (type of system framing, material, spans, condition) |
| |
| |
| |
| c. Inspection – note exposed areas available for inspection, and where it was found necessary to open ceilings, etc. for inspection of typical framing members. |
| |
| |
| |
| |

| **7. STEEL FRAMING SYSTEM** |
|---|
| a. Description |
| |
| |

| |
|---|
| b. Exposed Steel- describe condition of paint and degree of corrosion |
| |
| |
| |
| c. Concrete or other fireproofing – note any cracking or spalling and note where any covering was removed for inspection |
| |
| |
| |
| d. Elevator sheave beams and connections, and machine floor beams – note condition: |
| |
| |

| **8. CONCRETE FRAMING SYSTEM** |
|---|
| a. Full description of structural system |
| |
| |
| b. Cracking |
| 1. Not significant |
| 2. Location and description of members affected and type cracking |
| |
| c. General condition |
| |
| |
| d. Rebar corrosion – check appropriate line |
| 1. None visible |
| 2. Location and description of members affected and type cracking |
| 3. Significant but patching will suffice |
| 4. Significant – structural repairs required (describe) |
| e. Samples chipped out in spall areas: |
| 1. No |
| 2. Yes, describe color, texture, aggregate, general quality: |
| |

| **9. WINDOWS** |
| --- |
| a. Type (Wood, steel, aluminum, jalousie, single hung, double hung, casement, awning, pivoted, fixed, other) |
| |
| b. Anchorage- type and condition of fasteners and latches |
| c. Sealant – type of condition of perimeter sealant and at mullions: |
| d. Interiors seals – type and condition at operable vents |
| e. General condition: |
| |

| **10. WOOD FRAMING** |
| --- |
| a. Type – fully describe if mill construction, light construction, major spans, trusses: |
| |
| b. Note metal fitting i.e., angles, plates, bolts, split pintles, other, and note condition: |
| |
| c. Joints – note if well fitted and still closed: |
| d. Drainage – note accumulations of moisture |
| e. Ventilation – note any concealed spaces not ventilated: |
| f. Note any concealed spaces opened for inspection: |
| |

## Appendix B: Detailed Inspection Report Results – Most Recent Inspection Reports

Roof Systems

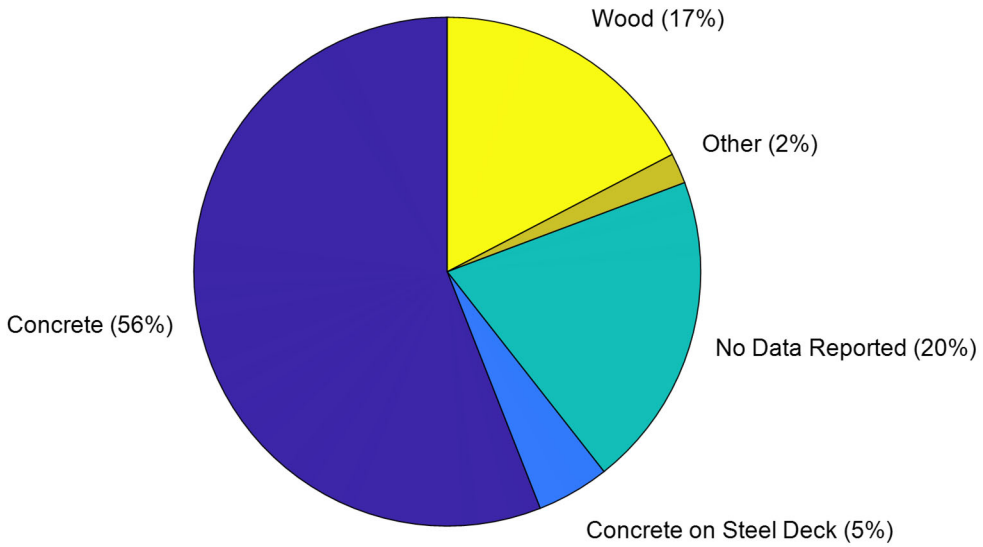


Figure 40. Roof structural system as reported in the most recent inspection reports (N=259).

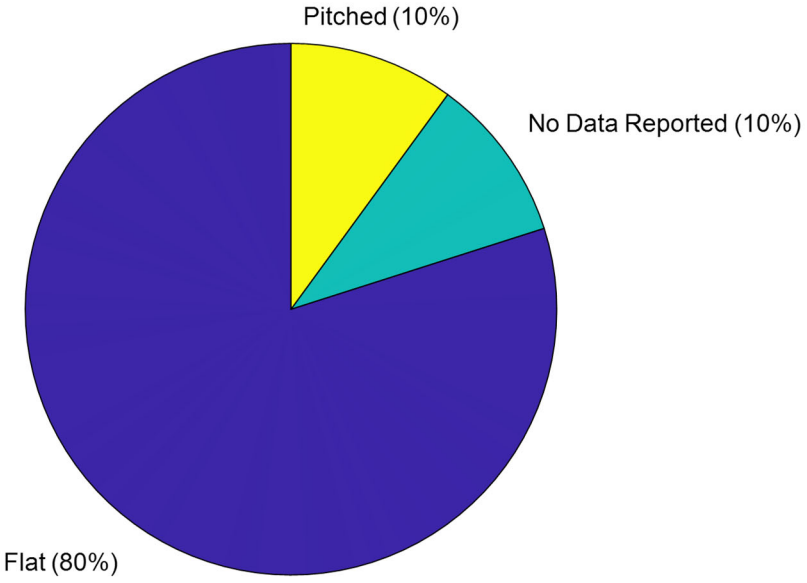


Figure 41. Roof category as reported in the most recent inspection reports (N=259).

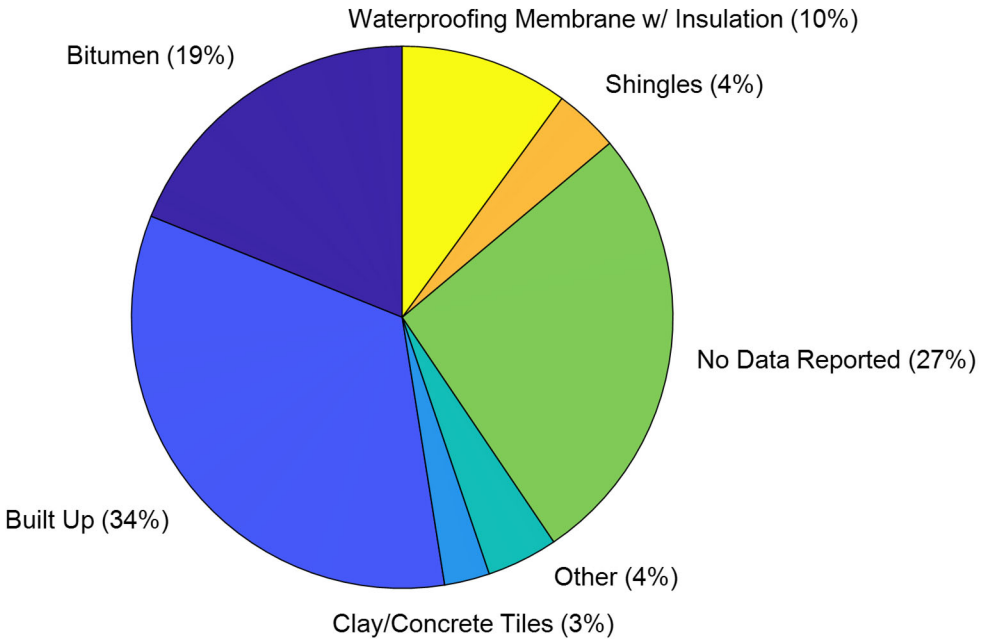


Figure 42. Roof cladding system as reported in the most recent inspection reports (N=259).

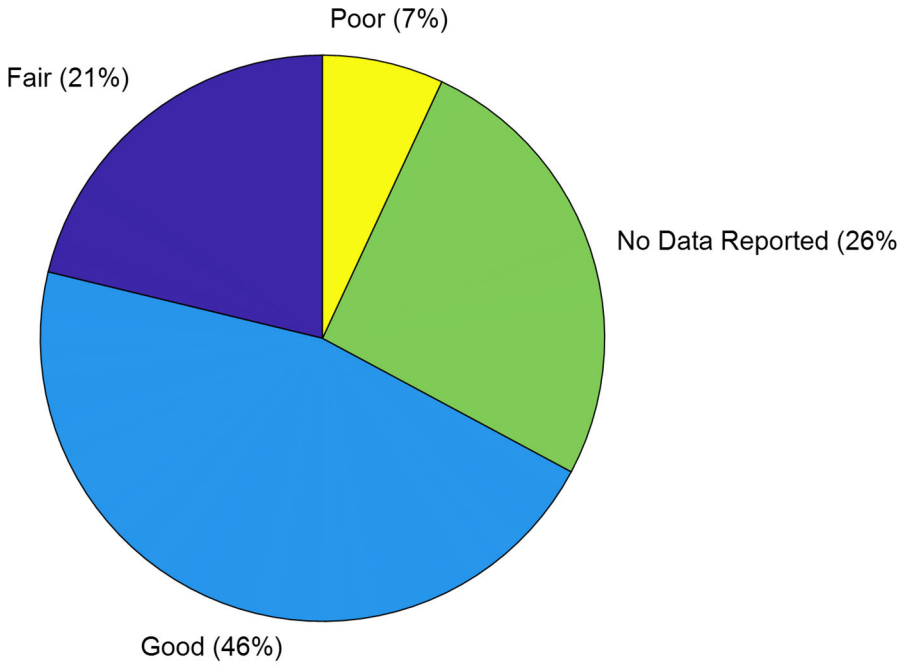


Figure 43. Roof structural system condition as reported in the most recent inspection reports (N=259).

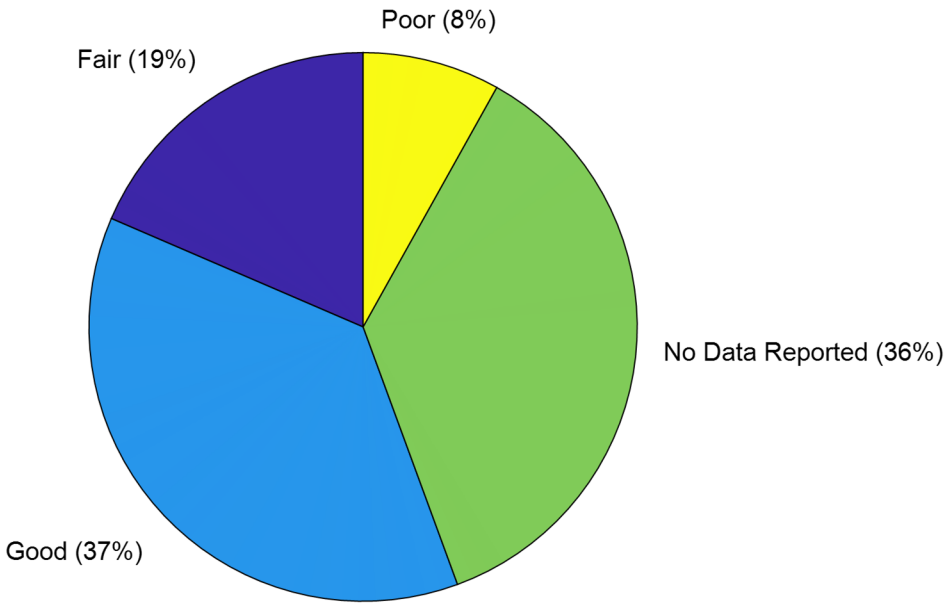


Figure 44. Roof cladding condition as reported in the most recent inspection reports (N=259).

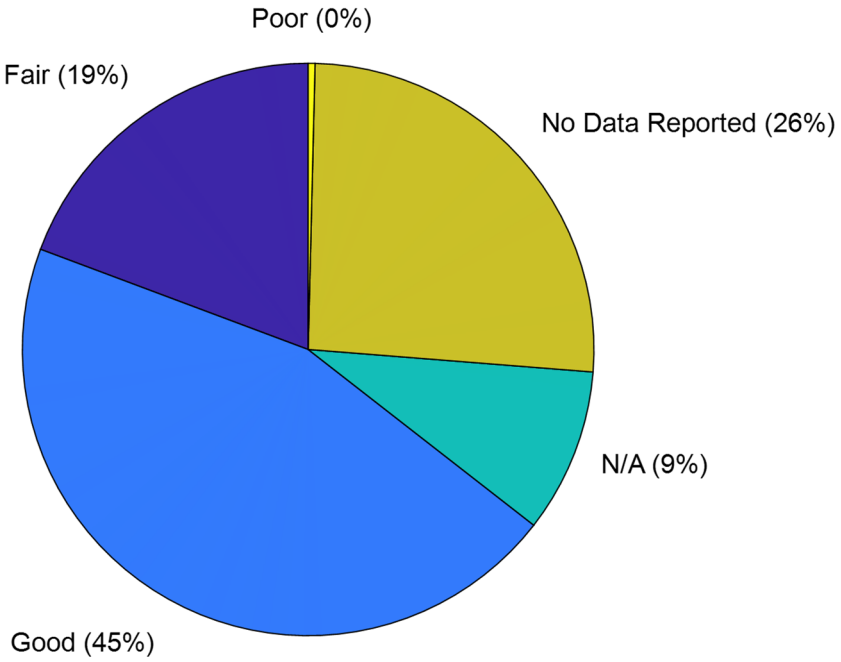


Figure 45. Roof drain condition as reported in the most recent inspection reports (N=259).

Floor Systems

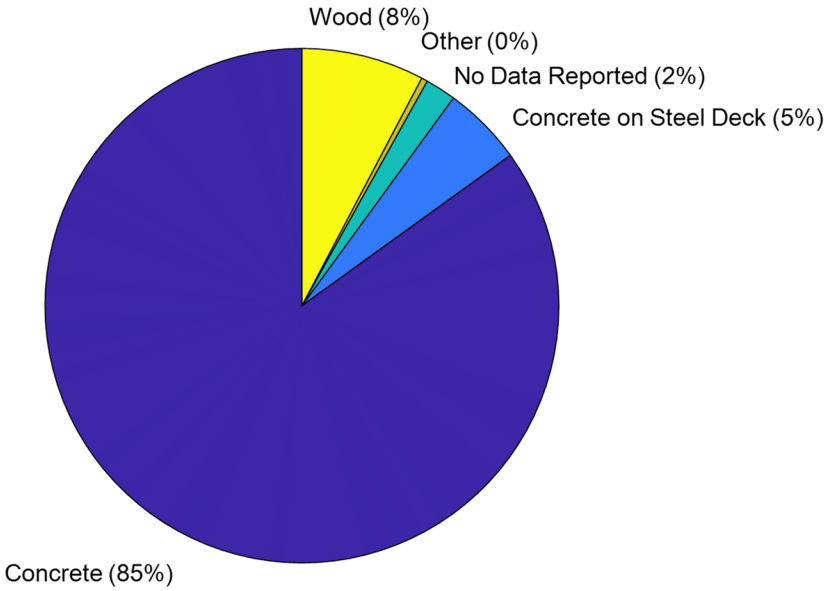


Figure 46. Floor system type as reported in the most recent inspection reports (N=259).

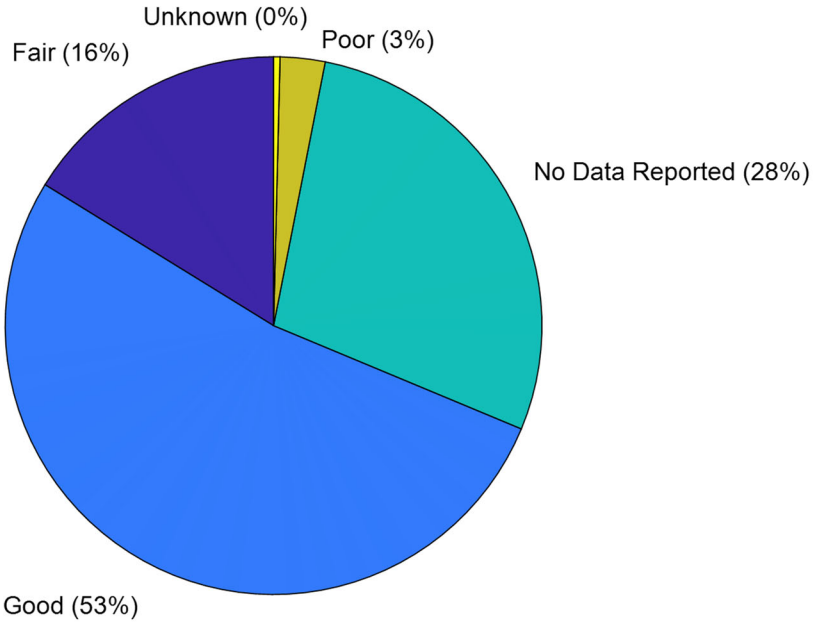


Figure 47. Floor system condition as reported in the most recent inspection reports (N=259).

Window Systems

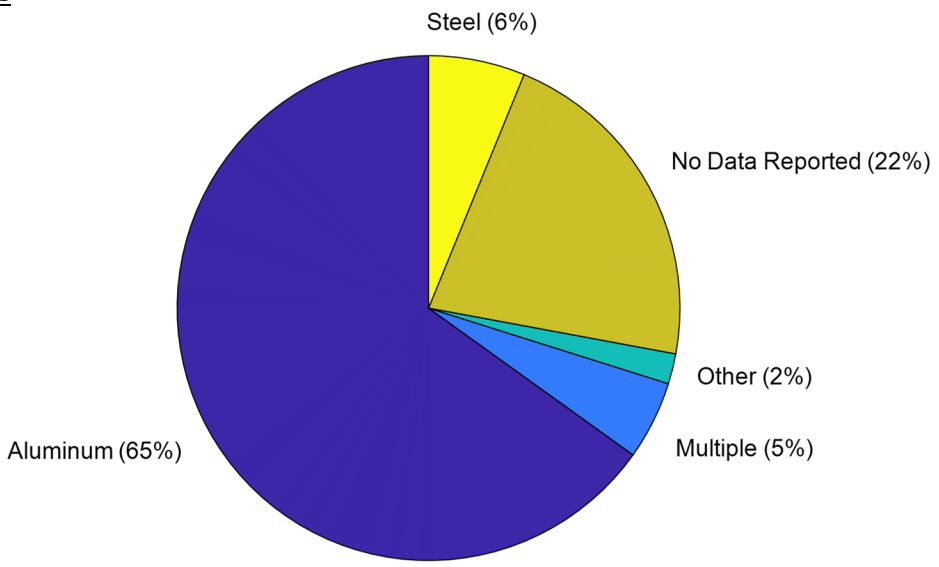


Figure 48. Window category as reported in the most recent inspection reports (N=258).

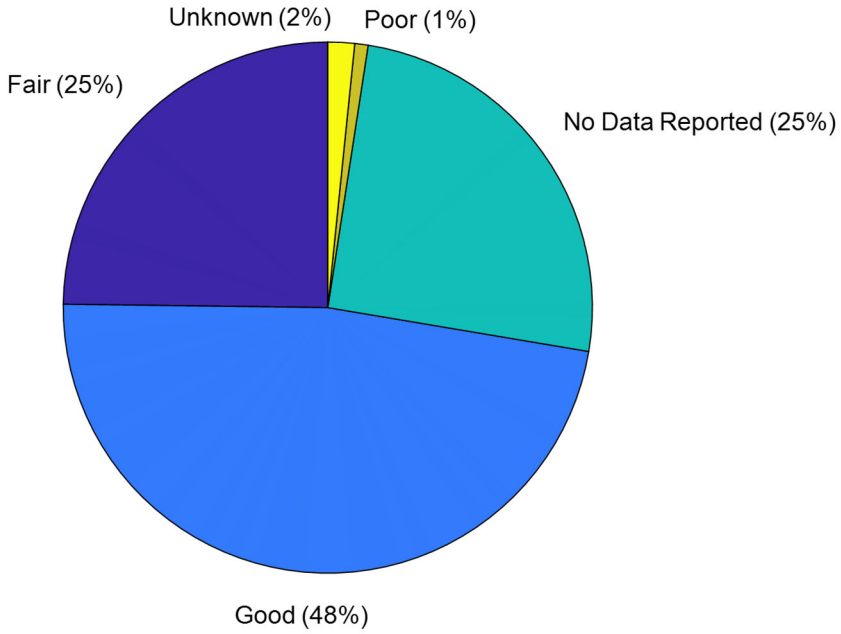


Figure 49. Window anchorage as reported in the most recent inspection reports (N=246).

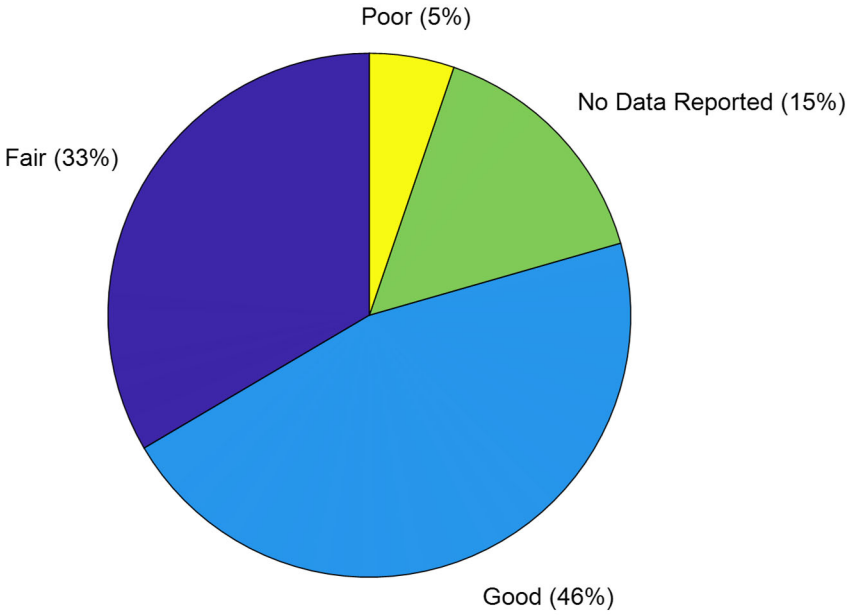


Figure 50. Window seal condition as reported in the most recent inspection reports (N=248).

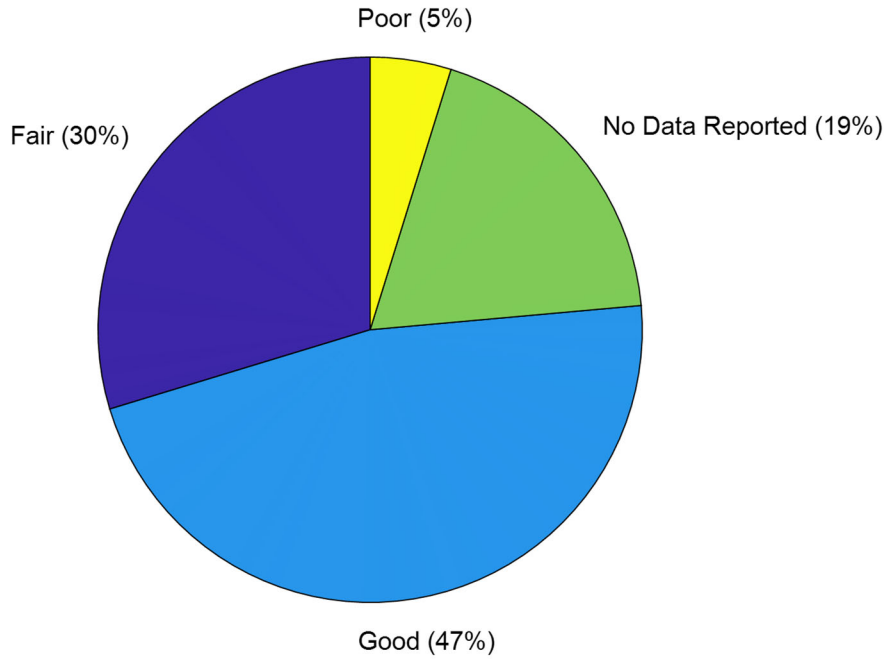


Figure 51. Window interior seal condition as reported in the most recent inspection reports (N=229).

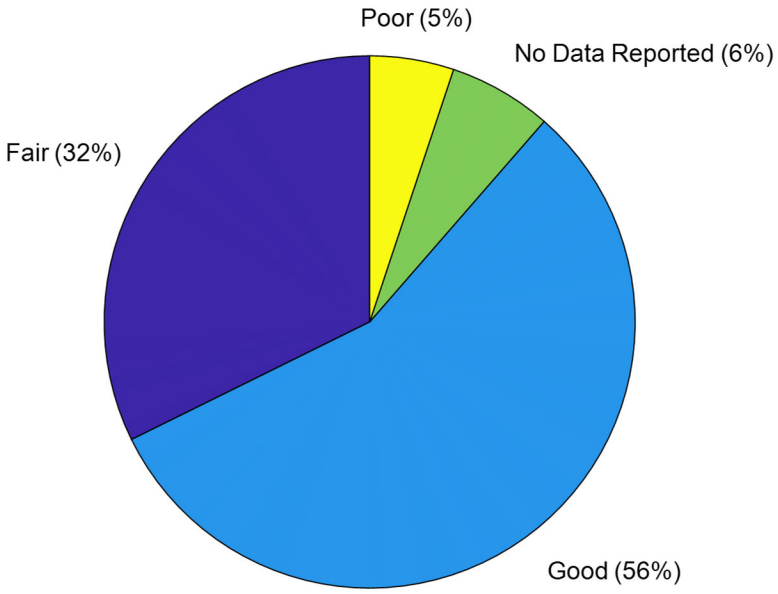


Figure 52. Window general condition as reported in the most recent inspection reports (N=254).

## Appendix C: Detailed Inspection Report Results – 40-Year Inspection Reports

Roof Systems

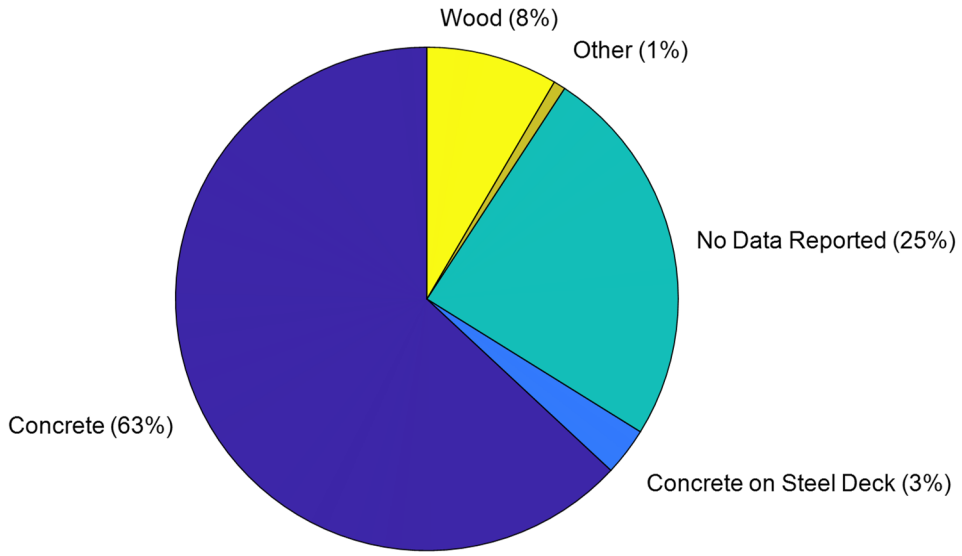


Figure 53. Roof structural system as reported in the 40-year inspection reports (N=130).

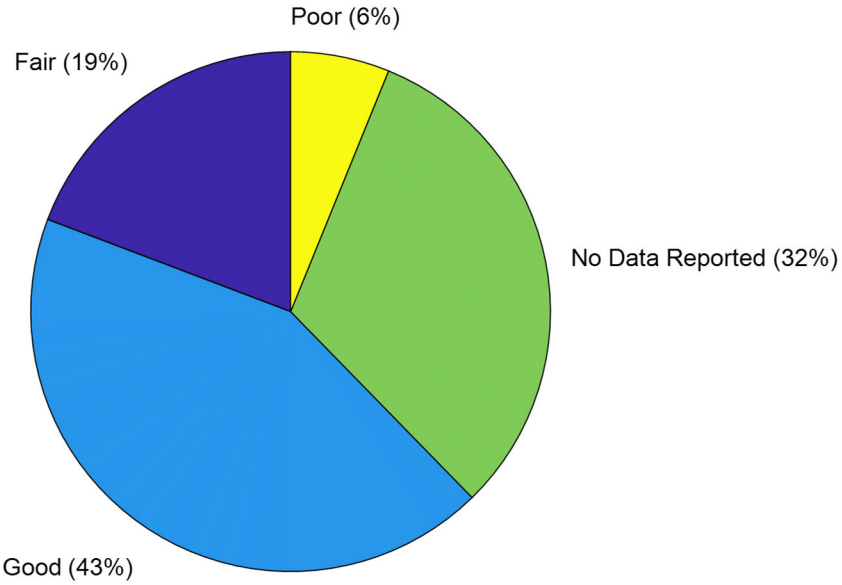


Figure 54. Roof structural system condition as reported in the 40-year inspection reports (N=130).

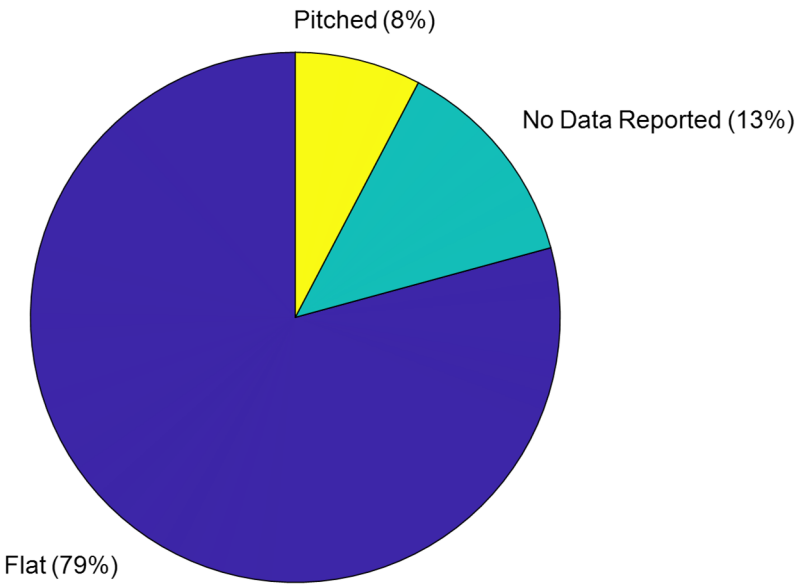


Figure 55. Roof category as reported in the 40-year inspection reports (N=130).

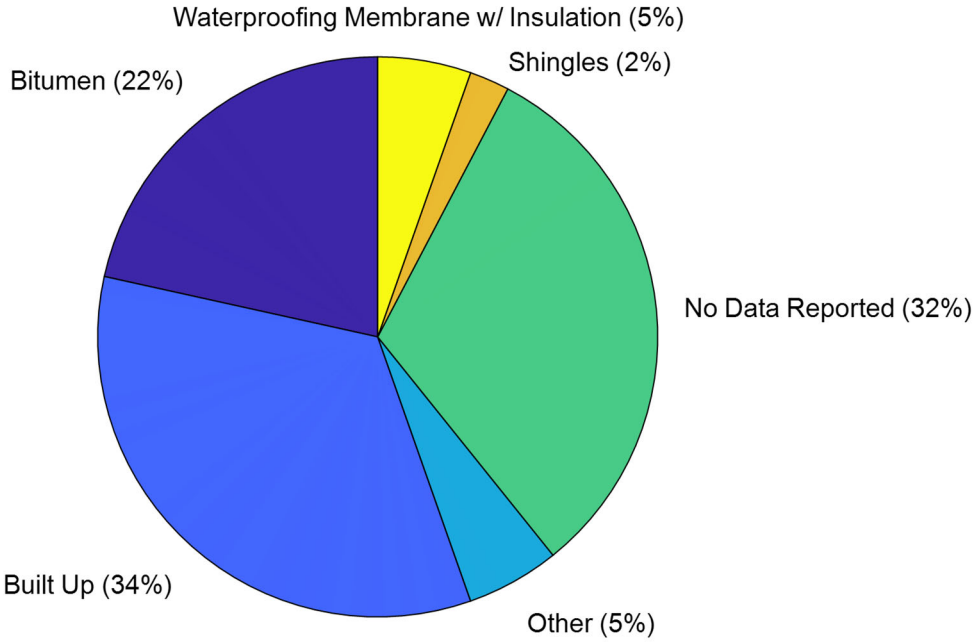


Figure 56. Roof cladding system as reported in the 40-year inspection reports (N=130).

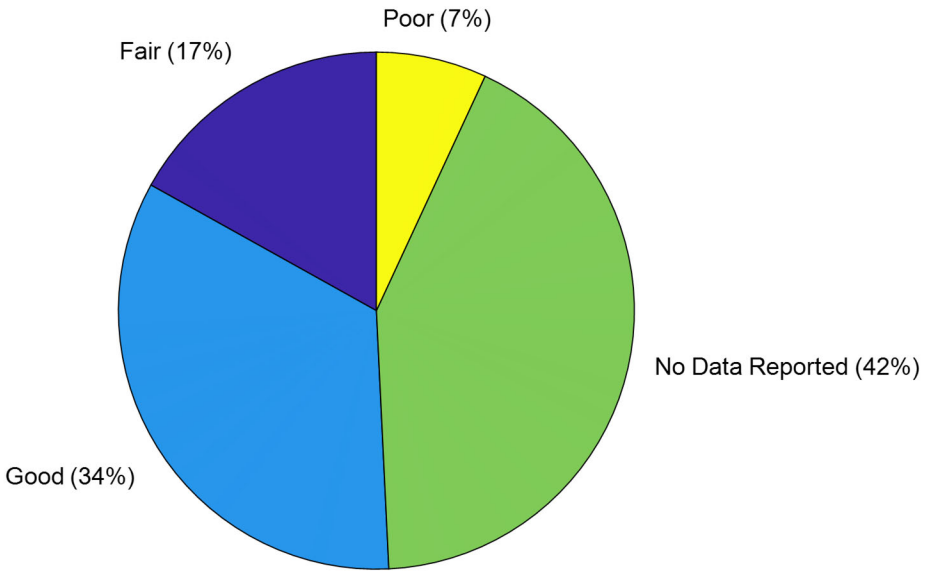


Figure 57. Roof cladding condition as reported in the 40-year inspection reports (N=130).

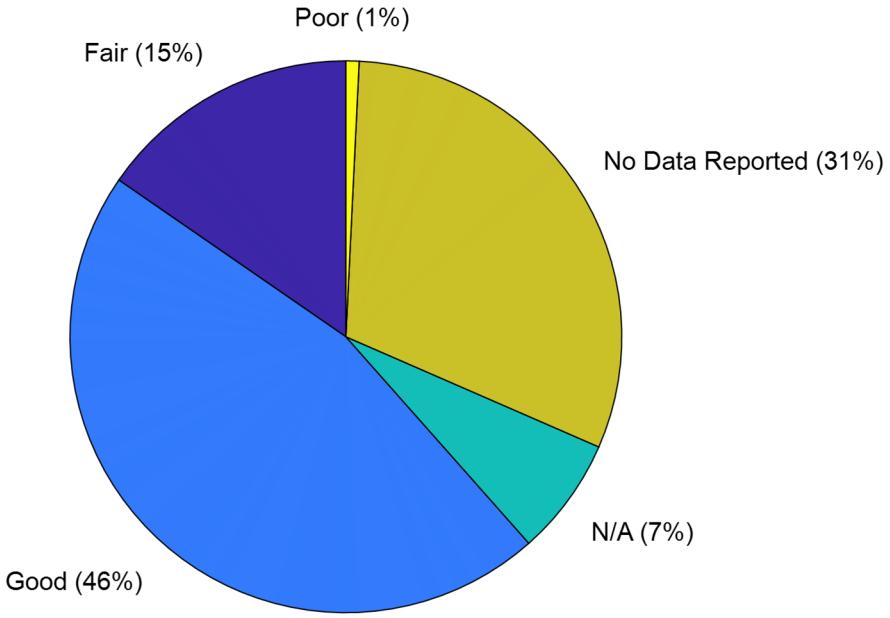


Figure 58. Roof drain condition as reported in the 40-year inspection reports (N=130).

Floor Systems

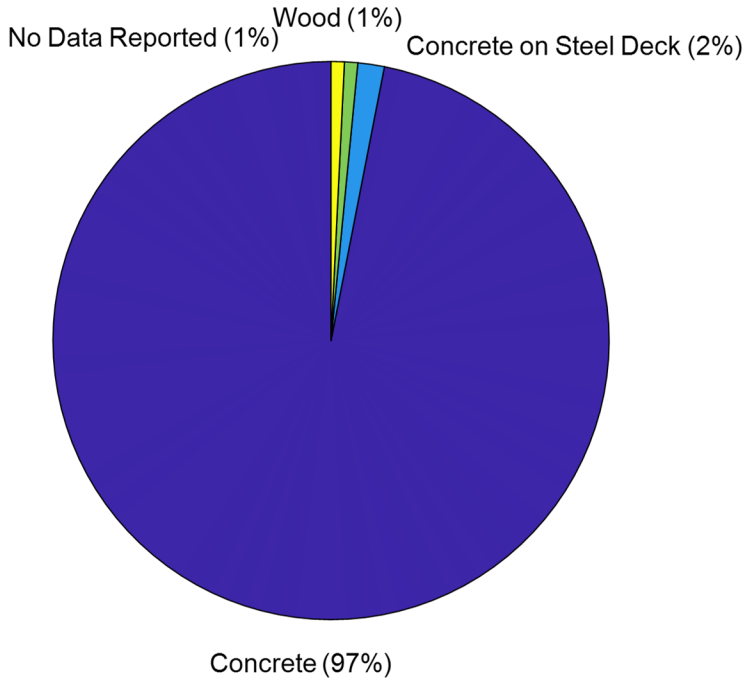


Figure 59. Floor system as reported in the 40-year inspection reports (N=130).

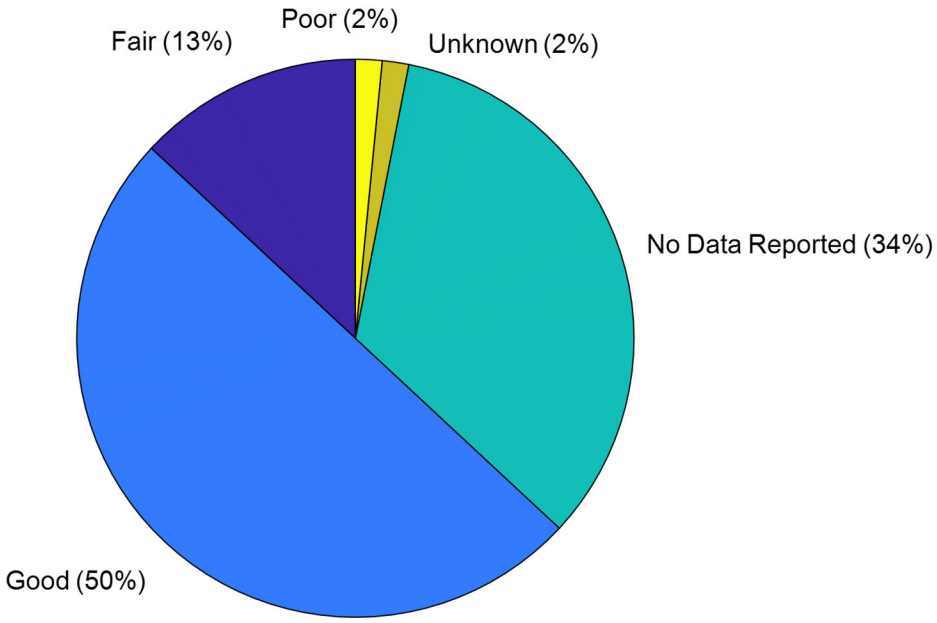


Figure 60. Floor system condition as reported in the 40-year inspection reports (N=130).

Window Systems

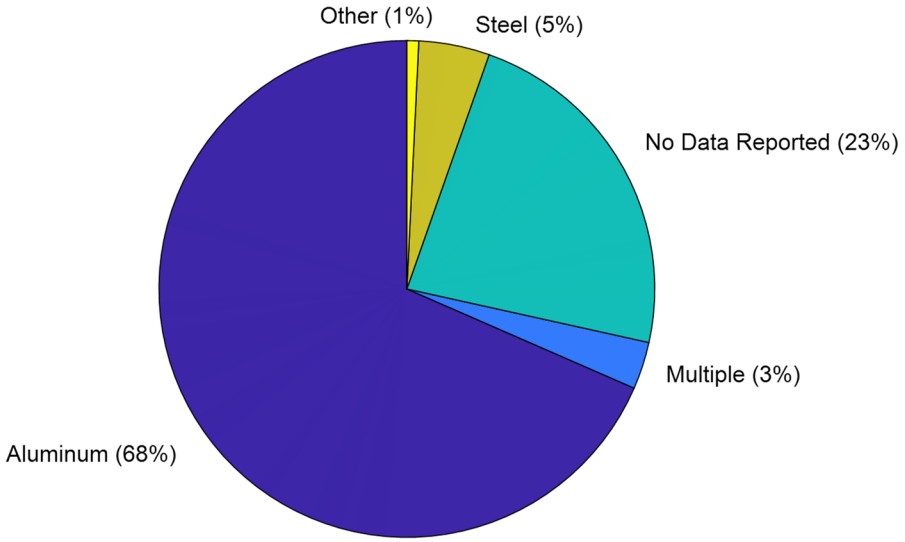


Figure 61. Window type as reported in the 40-year inspection reports (N=130).

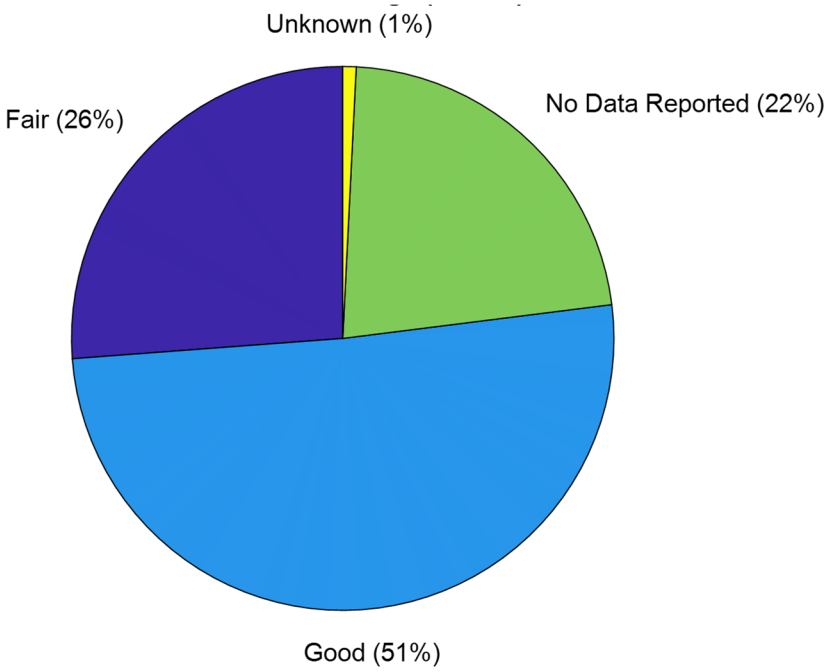


Figure 62. Window anchorage as reported in the 40-year inspection reports (N=126).

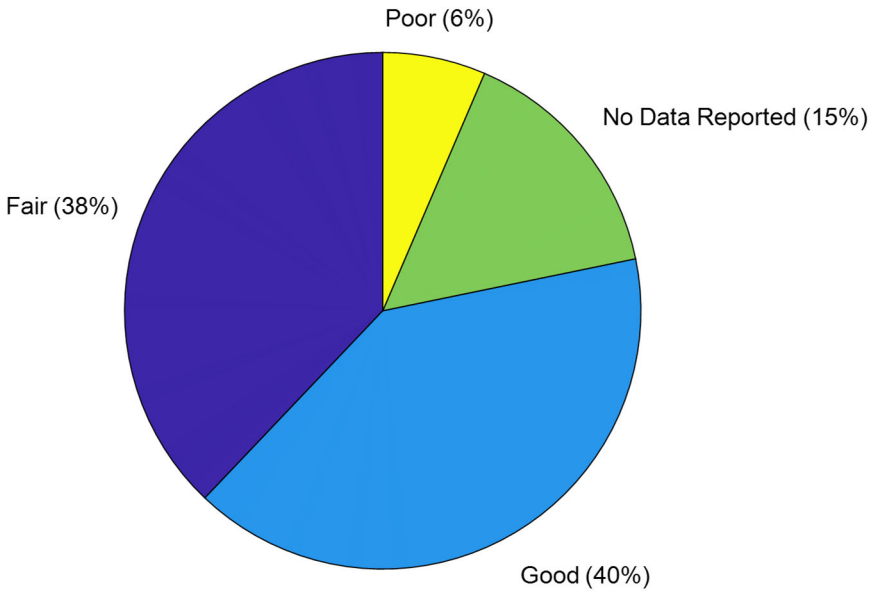


Figure 63. Window seal condition system as reported in the 40-year inspection reports (N=124).

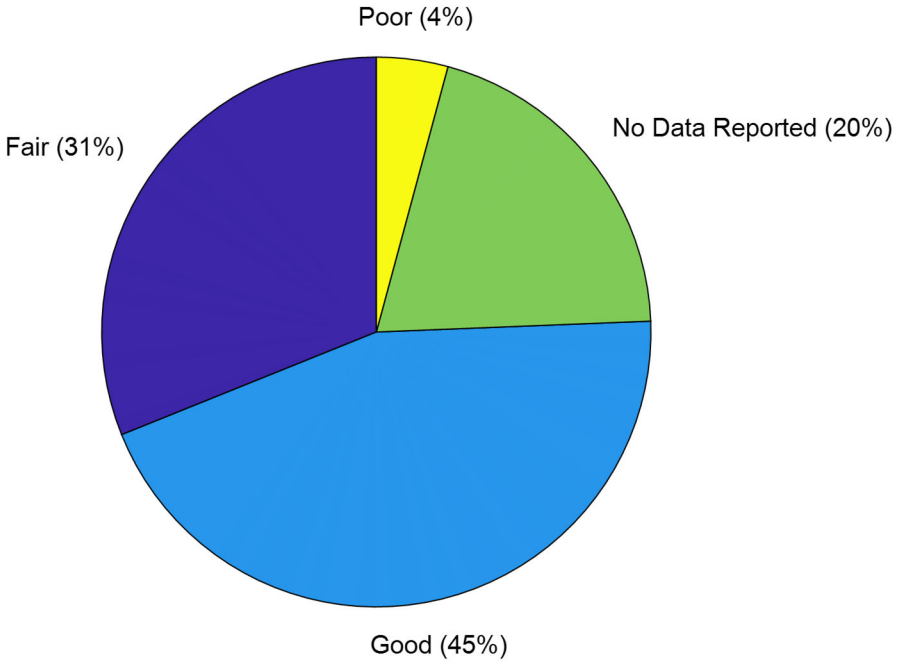


Figure 64. Window interior seal condition as reported in the 40-year inspection reports (N=119).

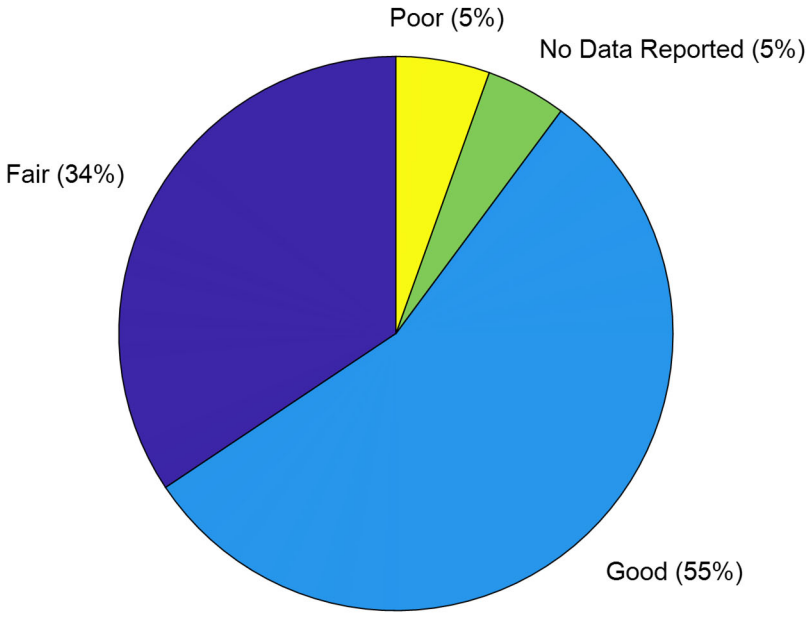


Figure 65. Window general condition as reported in the 40-year inspection reports (N=128).

**Appendix D: Statewide Survey of Building Officials – Building Safety Inspection Programs**

The University of Florida is conducting a research study on behalf of the Florida Building Commission to assess the 40-year building safety inspection programs in Miami-Dade and Broward Counties. As part of this study, we have also been asked to survey building officials across the state of Florida to determine if any similar inspection programs are in place, planned for the future, or under consideration.

- Q1: What building department do you work for? [*fill in*]
- Q2: What is your position with the building department? [*multiple choice*]
    - Chief Building Official
    - Assistant Building Official
    - Plans Examiner or Inspector
    - Other, please specify [*fill in*]
- Q3: Does your building department currently have building age-based safety inspection program in place? [*multiple choice*]
    - Yes (skips to Q7)
    - No (skips to Q4)
    - Unknown (skips to Q4)
- Q4: Is your building department planning to implement a building age-based safety inspection program in the future? [*multiple choice*]
    - Yes (skips to Q6)
    - No (skips to Q8)
    - It is being considered (skips to Q8)
    - Unknown (skips to Q8)
- Q5: What year will the building safety inspection be initiated in your jurisdiction [*fill in*]
- Q6: What building age/timeline is being considered for your building safety inspection program (e.g. 40 years)? [*fill in]*
- Q7: If available, please provide a link to the relevant ordinance. [*fill in*]
- Q8: Is your jurisdiction experiencing problems/issues with buildings 40 years or older? [*multiple choice*]
    - Yes (skip to Q9)
    - No (skip to Q10)
    - Unknown (skip to Q10)
- Q9: Describe the typical issues observed in buildings older than 40 years in your jurisdiction. [*fill in*]
- Q10: Are there any details or comments you would like to provide about your building safety inspection program or building safety inspection programs in general? [*fill in*]

**Appendix E: Survey Results (Q2, Q3, and Q8) with Miami-Dade and Broward County Responses**

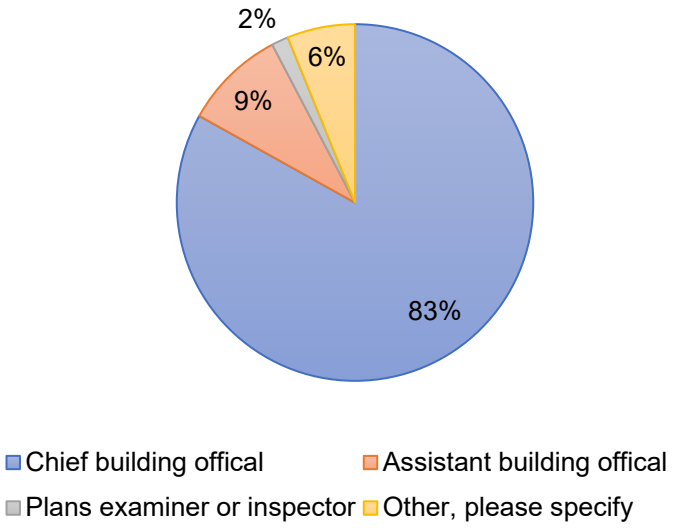


Figure 66. Q2: What is your position with the building department? (N=65)

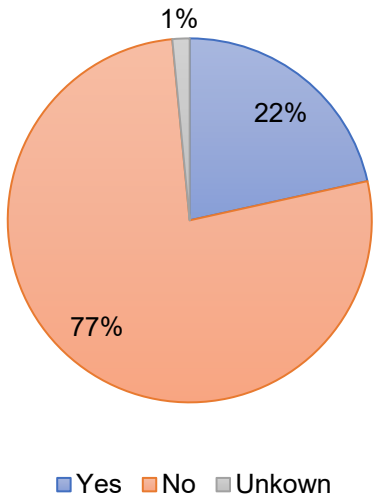


Figure 67. Q3: Does your building department currently have a building age-based safety inspection program in place? (N=65)

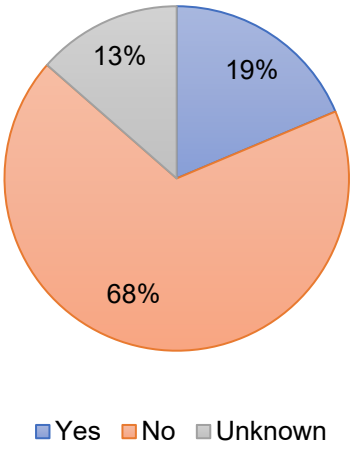


Figure 68. Q8: Is your jurisdiction experiencing problems/issues with buildings 40 years or older? (N=59)

**Appendix F: Responses to Q10: Are there any details or comments you would like to provide about your building safety inspection program or building safety inspection programs in general? (N=14)**

| |
|---|
| Our jurisdiction initiated the the original program in 1974, later a similar program was to be adopted by Broward County. Currently we are working to revise and amend our inspection guidelines and template forms. |
| Who will pay for this and where is this Personel coming from. It's already a struggle to get inspectors and plans examiners. Who will be authorized to conduct these safety inspections ? Engineers, architects, building code admin, threshold inspectors? And how will PP be involved ? My hopes are an engineer or architect. Maybe for a specific height of building it's a threshold inspector. Many variables to work out and it will be a challenge to work out something for the entire state. |
| Enacted by Broward County Board of Rules and Appeals. As such, all Broward County municipalities must adhere to the rule. |
| My concern about a building inspection program is will it make a jurisdiction legally liable if the owner of the property does not fix the issues within the timeframe, as in what happened in south Florida. |
| Ii is difficult to perform a thorough safety inspection without performing destructive inspections in areas of slabs, columns and walls covered by finishes, and without access to areas of the foundation and footings of columns and other load bearing elements. Time that takes to produce proper documentation to apply for permits, higher contractors, obtain approval from HOAs for the costs of performing repair work in builfdings with deficiencies, as reported by engineers. |
| We are only considering the possibility and that it should be County wide wide regulation. One concern is placing responsibility for maintenance on the Building Department rather than the Condo Association. Certification should be the Condos Responsibility. |
| a program that includes all buildings of a certain age or older (except single family homes) will likely be deemed onerous, overkill and quite expensive when compared to the fact that older buildings in general are not falling down or causing harm to life safety. The potential may exist but the experience in this country do not support this supposition. In other words, because a building is old does not mean it is automatically unsafe. The existing built environment is much more complex. Lets carefully study the cause of why and when do existing building threaten life safety, and perhaps build a science based program that would assist local governments in addressing those existing building conditions that are likely to cause harm within their communities. An all or nothing approach to existing building recertification will likely not be effective and cause the public to oppose such a far reaching program when most existing buildings are basically maintained in safe conditions. |
| Please try to inform as many jurisdictions as possible |
| We are not pursuing an inspection program. Only looking into it and what all might be required. |

| |
|---|
| Building Safety 40 recertification is only one aspect when considering the serviceability and life expectancy for any structure. One must consider in addition to the maintenance and upkeep, the Design Criteria used for the structure, Safety factor used by the designers, possible design miscalculations and flaws, the Construction Quality provided by the contractors, workmanship, Inspection errors or omissions made by inspectors, plan review errors or omissions, natural phenomenon and type of weather exposure and the frequency or even the quantity of tolerated extreme events that the structure might have been subjected to, the additional loads that might not have been calculated for or foreseen by the original designers. |
| I think having a state wide safety inspection on all multi family and commercial buildings 4 stories and above would be prudent. I would recommend re-certification every 20 years. I believe 40 & 30 years is too long to wait for the first inspection. After the first re-certification is completed and passed after 20 years I believe a reinspection after another 20 period interval would be sufficient if no issues were found. If there were major issues discovered at the first 20 year certification I believe a reinspection after 10 years would be necessary. |
| Typically the Fire Marshal's office is responsible by Statute. The permitting process is where usually when we get involved in addressing existing conditions of a building. |
| We perform site visits to all buildings over 3 stories to verify the adequacy of the report provided prior to recertification. |
| We are not aware of any building issues in our jurisdiction. Questions by residents have been made and inquires addressed. Enforcement of any programs could be a problem. While the AHJ may be able to implement a violation or sanction the HOA may not have the reserves to make the necessary repairs. |
| There are no provisions under the Florida Building Code to inspect buildings once the Certificate of Occupancy is issued. To implement a program to inspect existing buildings of a certain age after the C/O is issued would require additional personnel and resources that is not readily available. Also, building inspectors are trained to inspect new work, alterations and repairs in accordance with the building code. To inspect existing building for potential failures would be the job of a licensed professional engineer or architect unless additional training becomes available for licensed inspectors to be able to recognize failures and their causes, beyond what's in the building code. |
| The owner conducts a comprehensive building condition assessment on all facilities on a 5 year cycle |
| some reports are received with little or no problems, where some have timely concrete restoration necessary. |
| This is going to be a hard task in general. You have aging buildings across the state but the department staff work for municipalities, who are governed by elected officials, No one wants to hear that a building needs repairs or even worse its unsafe. So for a municipality to "volunteer" to do safety inspections is going to be a long road. |
| Recent meetings by the Ad Hoc committee formed by Broward Mayor Steve Geller will be sending 17 recommendations to the Florida Legislature covering a myriad of issues from structural integrity, inspection dates, education requirements for Condominium Association members and reserve funds for mitigation of building deterioration |

The program will require all owners of all Post CO threshold buildings be inspected by a certified professional engineer/architect as defined in Florida Statutes. A report must be written under seal of the special inspector and shall attest to the required maintenance, structural integrity, useful life and replacement costs of the common elements. This report shall be provided to the City of [redacted] Building Division and the Building owner of their findings and recommended repairs within (90) ninety days of such inspection or (90) ninety days of the end of the 10-year period. Any structure that is deemed in immediate threat to the structure's