



International Code Council
National Association of Home Builders

COMMON CODE NONCOMPLIANCE SURVEY REPORT

February 2019

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EXECUTIVE SUMMARY

In November 2018 the International Code Council and the National Association of Home Builders (NAHB) conducted a joint survey to code officials across the U.S. as part of their ongoing effort to improve the quality of construction in residential and commercial buildings. This survey was a follow-up to similar surveys deployed in April 2006 and December 2012. The purpose of the surveys was to highlight for builders, remodelers, and code officials items most likely to be flagged during construction. This information should prove valuable in helping builders and remodelers focus more intently on these potential problem areas before and during construction, thereby contributing to the overall satisfaction of their customers and also saving time during construction.

It is difficult to make specific comparisons from survey to survey based on the changes in questions and details required from the respondents. But the following broad points can be made.

1. Technology has made some inroads into the development, review, and issuance of construction plans. Although there seems to be more that can be accomplished to increase the efficiency and effectiveness of the processes.
2. In general, here are some issues that report mixed improvement results from survey to survey:
 - Common grading and site drainage
 - Windows continue to be an issue
 - Electrical grounding and bonding violations have increased
 - Most railing and guard rail issues have decreased
 - High percentage of life safety issues
3. There is an indication of a rising trend in new home code violations on apartments, townhouses, condominiums, and custom high-end homes (See graph on page 32 for specifics).

Future surveys with the same scope will ensure a level of consistency that will help identify on-going problems and successes for the industry.

OVERVIEW

This 2018 survey builds upon data generated by the 2006 and 2012 surveys. The survey questions were not designed to count problems, but to identify specific areas during construction on which builders need to focus. Consequently, all problems noted in the survey are ones that require correction *before* a certificate of occupancy can be issued.

Goals of the survey include:

- Highlighting common code violations frequently found during construction.
- Providing builders with a method to reduce overall project costs by focusing more attention to the problem areas identified in this survey so corrections may be made while the trade contractors are performing their work
- Identifying those areas within the design and construction phase that most often result in building code violations, which allows builders to proactively manage their project.
- Providing clearer guidance for manufacturers in the preparation of their specifications and building designers in the preparation of their design documents.

Code officials from jurisdictions of various sizes were invited to take part in a 10-minute survey online hosted by the Code Council.

Note that the data below shows a year to year increase in survey invitations issued, but a static return rate. This then has caused a significant reduction in response rate percentage. Also, note that the number of responses is exactly the same from 2006 to 2012, and only 100 fewer in 2018. This suggests repeat responders even with the significant increase in potential targeted responders.

Year of Survey	2006	2012	2018
Invitations Issued	4,895	6,265	11,400
Responses Received	1,260	1,260	1,165
Percentage (%) Response Rate	26%	20%	10%

Although 1,165 responses were received for the 2018 survey, the response rate of 10% is half that of the 2012 and the 2006 survey. By marketing research industry standards, the 10% response rate represents the low end of expected responses.

Survey sample size was based on these two major factors:

1. Level of confidence required. In this survey a level of 95% (.05) was required.
2. Required Margin of Error per answer was ± 4 .

Question to question the survey had up to a 10% variation in responder answers. The survey standard deviation (sd) for number of completed responses was 119; with a low of 779 responses for Question 22 (*Select up to the three (3) of the most common flashing violations most apparent in homes*), and a high of 1,165 for Question 1 (*Provide the state and zip code for your office location*).

Based on the invitations issued (11,400) and the respondent sample size (1,165), the standard deviation of 119, the allowable margin of error (4), and the level of confidence required (95%; .05), the minimum number of required survey responses was approximately 800.

While the number of respondents (1,165) was an overall percentage drop compared with previous years, 1,165 respondents was still much greater than the sample size required (800) and sufficient to be statistically significant.

This year's survey has had a number of changes, including: changed questions, questions removed, question sequence reordered, and the survey analysis streamlined to provide easier use and interpretation of the data. Many subsets of the data have been reduced or eliminated to provide clearer meanings and analysis of the results.

Key Research Findings

The following is a summary of key findings that emerged from the research and that are outlined in this report.

- **The majority of respondents have a long tenure in code enforcement.**
Similar to 2006 and 2012 survey respondents, 2018 survey respondents have a long tenure in code enforcement. The majority (70%) have been in code enforcement for more than 10 years, and approximately 53% for 16 or more years.
- **Survey respondents are primarily building officials who work in city level departments.**
Although most of the respondents serve in cities, almost half also work in small population areas of under 50,000. The building official title has dropped to just above 41% from 46% in 2012 and 48% in 2006. There has also been a rise of “Other” titles to almost 13%.

Of note is that combined the “Fire Official” and “Fire Inspector” titles have decreased to 14%. This is down from the 2012 survey of 16%, but still double the combined percentage of 7% in 2006. The building inspector title also fell from 27% (2006, 2012) to 18%.

- **Participants’ departments offer and perform a multitude of inspections for commercial and residential construction.**
Respondents’ departments offer field inspections, plan reviews, and pre-construction meetings. Over one-half of departments also offer electronic plan submittal. Additionally, just over two-thirds (68%) allow plans, permit applications, or other documents to be submitted electronically for review.

Ninety percent of the departments performed final building inspections. These inspections were all performed by over 75% of the respondents: ready to occupy, rough framing, footing, foundation, mechanical final, fire resistance rated construction, and underground plumbing. In addition, over half of respondents use the 2015 version for all the International Codes (I-Codes).

- **The time spent working on residential versus commercial construction and code violations was about evenly divided.**
Slightly more time is dedicated to commercial construction than residential (42% - commercial to 40% - residential). This is a reversal from the 2012 survey findings. There was also a significant increase (33%) in other construction.
- **Code violations have shown an overall upward trend.**
Forty-eight percent of respondents indicated there was a slightly lower frequency of commercial plan denials (49%); where 50% of the respondents indicated that about 51% of residential plans were denied due to code violations. This is an upward trend compared to the 2012 survey average of 45% for commercial.
- **Field inspections have shown mixed results.**
The three most frequently found code violations in field inspections were: fire resistance-rated construction (53%), structural (50%), and accessibility (38%). Fire resistance rated construction was not evaluated in the 2012 survey.

However structural and accessibility field inspection code violations were down 10% and 6% respectively in 2018, and the third highest field inspection code violation for 2012 (electrical at 41%), did not make the three most frequently found field inspection violations in 2018. **Note:** Electrical field inspection code violations were found at 35% in 2018, down from 41% in 2012.

- **Indirect causes for code violations show a slight increase based on respondents' opinions.**
When asked to rate on a scale of 1 (lowest impact or no impact) to 6 (highest impact), a list of causes based on their impact resulting in code violations, the respondents indicated the following:
 - "Workers ignoring the manufacturer's installation instructions" (4.81) was the greatest cause of code violations.
 - "Inadequate manufacturer's installation instructions" (2.95) was rated as the least cause of code violations.

Both of these scores were above the 2012 survey of 4.22 for "Workers ignore manufacturer's installation instructions" and 2.77 for "Inadequate manufacturer's installation instructions".

- **All types of new homes with code violations have significantly increased compared to the last survey.**
A significantly higher number of respondents found all types of new construction to have code violations (over 60%).

This is an upward trend of over 17% from the highest respondent code violation of 2012 (44%) to the lowest respondent rating of code violation in 2018 (61%).

Specific examples include:

The highest percentage of respondents found new construction of apartments, townhouses, and condominiums as having code violations (90%). This was a significant increase above the 2012 survey results of 43%. New construction of high-end (expensive) homes was also significantly higher (88%) than the 2012 survey (35%).

Survey Findings

Participant Profile

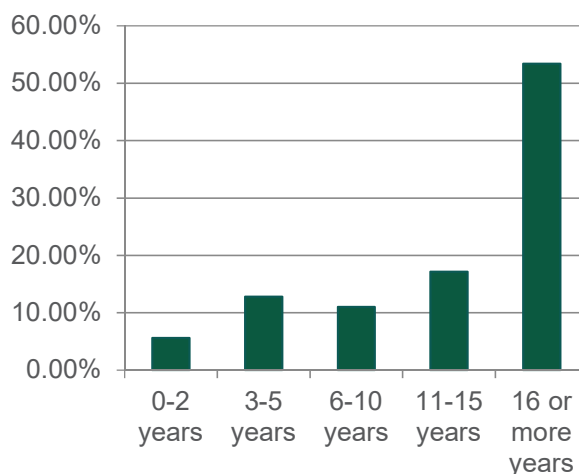
Select the number of years you have been in code enforcement:

Survey Year *	2012	2018
Sample Size	1,121	1,169
0-2 years	5%	6%
3-5 years	6%	13%
6-10 years	21%	11%
11-15 years	21%	17%
16 or more years	47%	53%

*Note: 2006 Survey data not available

Similar to 2012 survey respondents, 2018 survey respondents have a long tenure in code enforcement. The majority (70%) have been in code enforcement for more than 10 years, and approximately 53% for 16 or more years.

Percentage of Respondents by Years In Code Enforcement



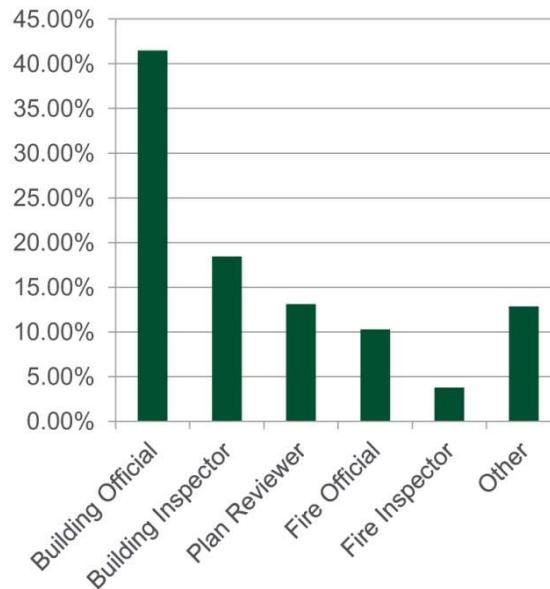
Which of the following titles best describes your position at your building department?

Survey Year	2006	2012	2018
Sample Size	*	969	1,159
Building Official	48%	46%	42%
Building Inspector	27%	27%	18%
Plan Reviewer	8%	11%	13%
Fire Official	4%	9%	10%
Fire Inspector	3%	7%	4%
Other	11%	N/A*	13%

*Note: Survey data not available

Similar to 2006 and 2012 survey respondents, the 2018 participants are primarily building officials (41.5%). The number of respondents that are building inspectors has dropped below 20%, and the other category has increased to almost 13%.

Percentage of Respondents by Their Areas of Responsibilities



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The respondents of the 2018 survey indicated that the primary Council Code certifications they held are Residential Building Inspector (55%), Commercial Building Inspector (47%), and Building Plans Examiner (38%).

All of these percentages of Council Code certifications are down several points from the 2012 survey.

(*Note: No 2006 survey data available).



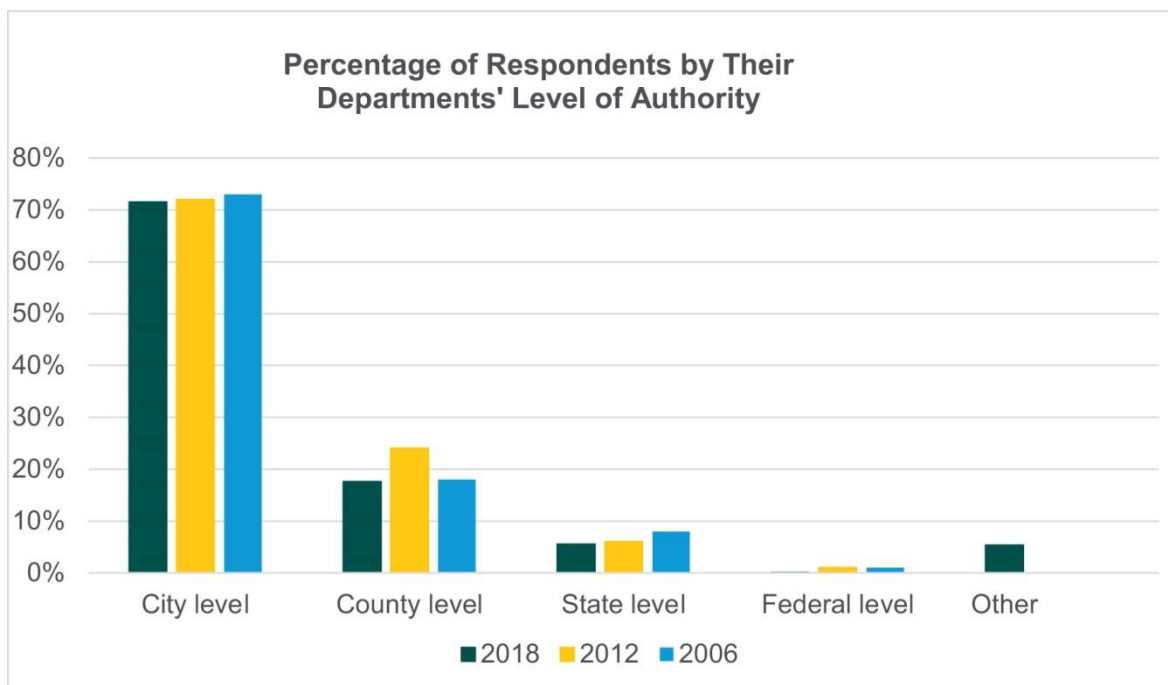
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Which of the following choices best describes your department's level of authority?

Survey Year	2006	2012	2018
Sample Size	N/A*	1,006	1,165
City level	73%	71.8%	71.47%
County level	18%	24%	17.59%
State level	8%	5.7%	5.52%
Federal level	1%	0.8%	0.09%
Other (please specify):	N/A*	N/A*	5.34%

Like the 2006 and 2012 surveys, the majority of participants (71%) work in a department with authority at the city level. The county level of authority has decreased to the 2006 level (18%). Of note is the other category at just over 5%.

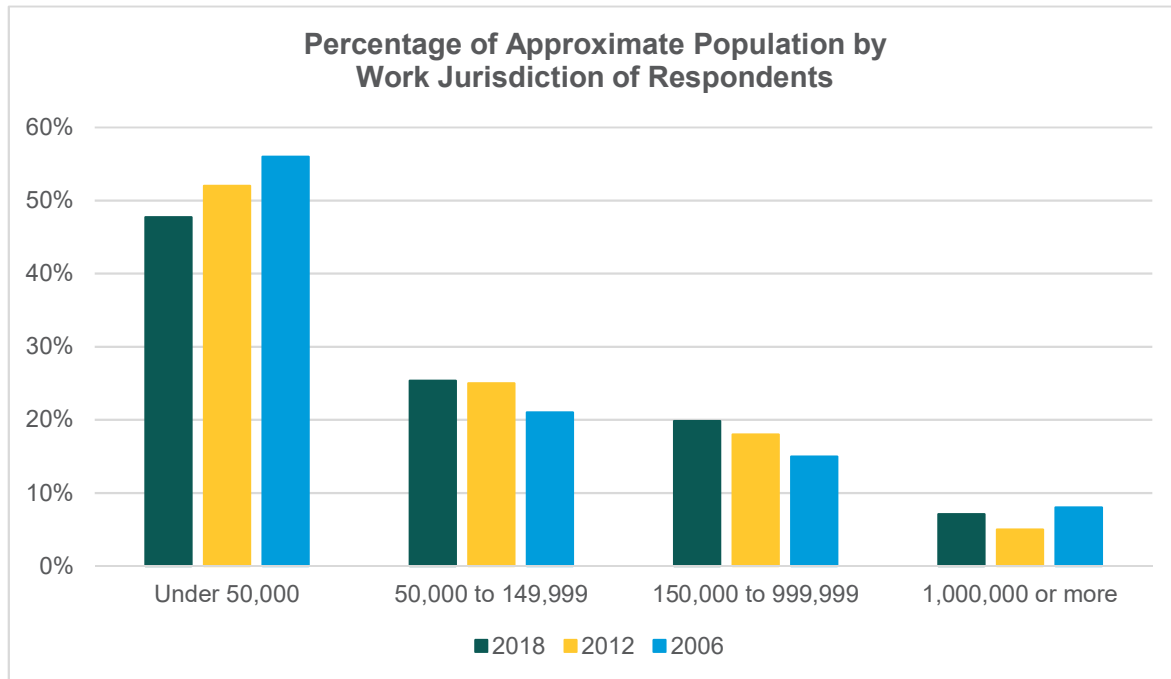
***Note:** Survey data not available



Which is the approximate population of the jurisdiction in which you work?

Survey Year	2018	# of Responses	2012	# of Responses	2006	# of Responses
Under 50,000	48%	553	52%	543	56%	706
50,000 to 149,999	25%	294	25%	261	21%	264
150,000 to 999,999	20%	230	18%	188	15%	189
1,000,000 or more	7%	82	5%	52	8%	101

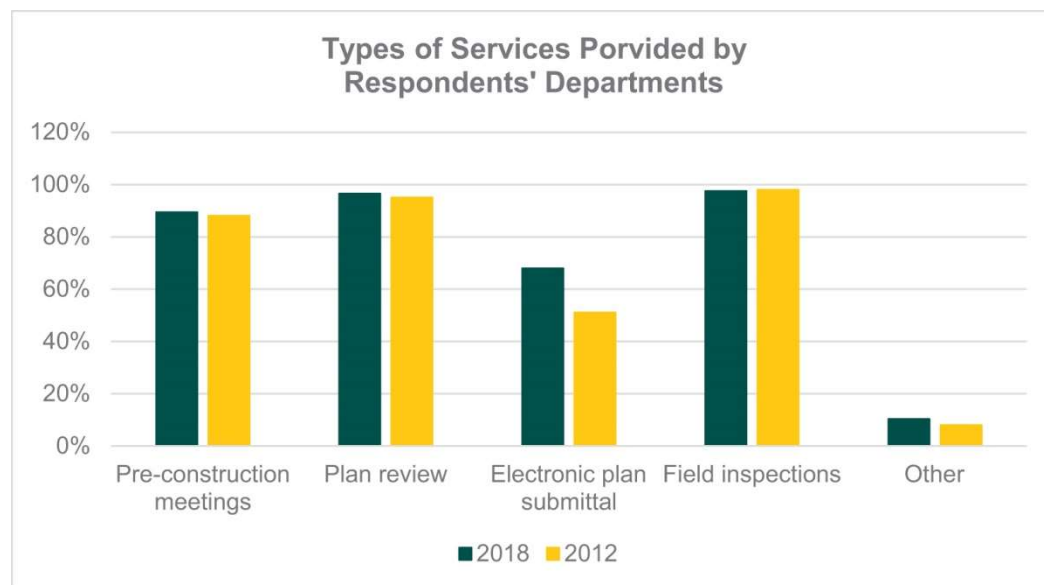
The majority of survey respondents work in a jurisdiction with a population under 50,000; this has declined by 5%. One-quarter (25%) have a population of 50,000 to 149,000. A growing number (7%) have a population of one million or more.



Departments and Jurisdictions

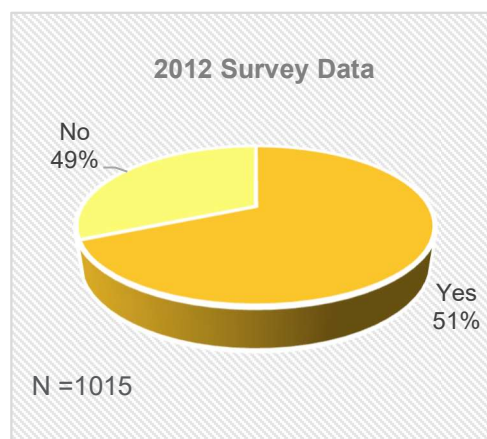
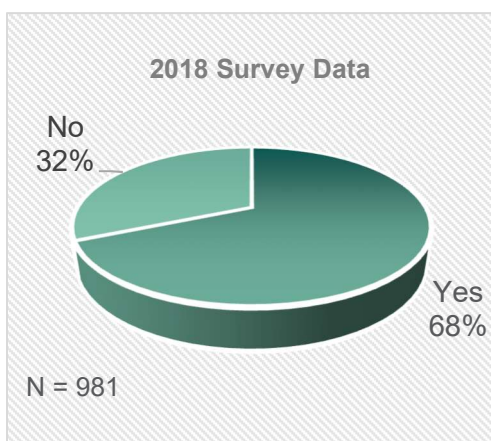
Code officials were asked to identify the types of services that are provided by their department. Almost all respondents (98%) said they provide field inspections, and almost as many (97%) indicated they provide plan reviews. Additionally, a majority of respondents (89%) provide pre-construction meetings.

Well over half (68%) of respondents' building departments allow plans, permit applications, or other documents to be submitted electronically for review. This is a significant increase over the 51% from the 2012 survey.



***Note: No 2006 Survey data not available**

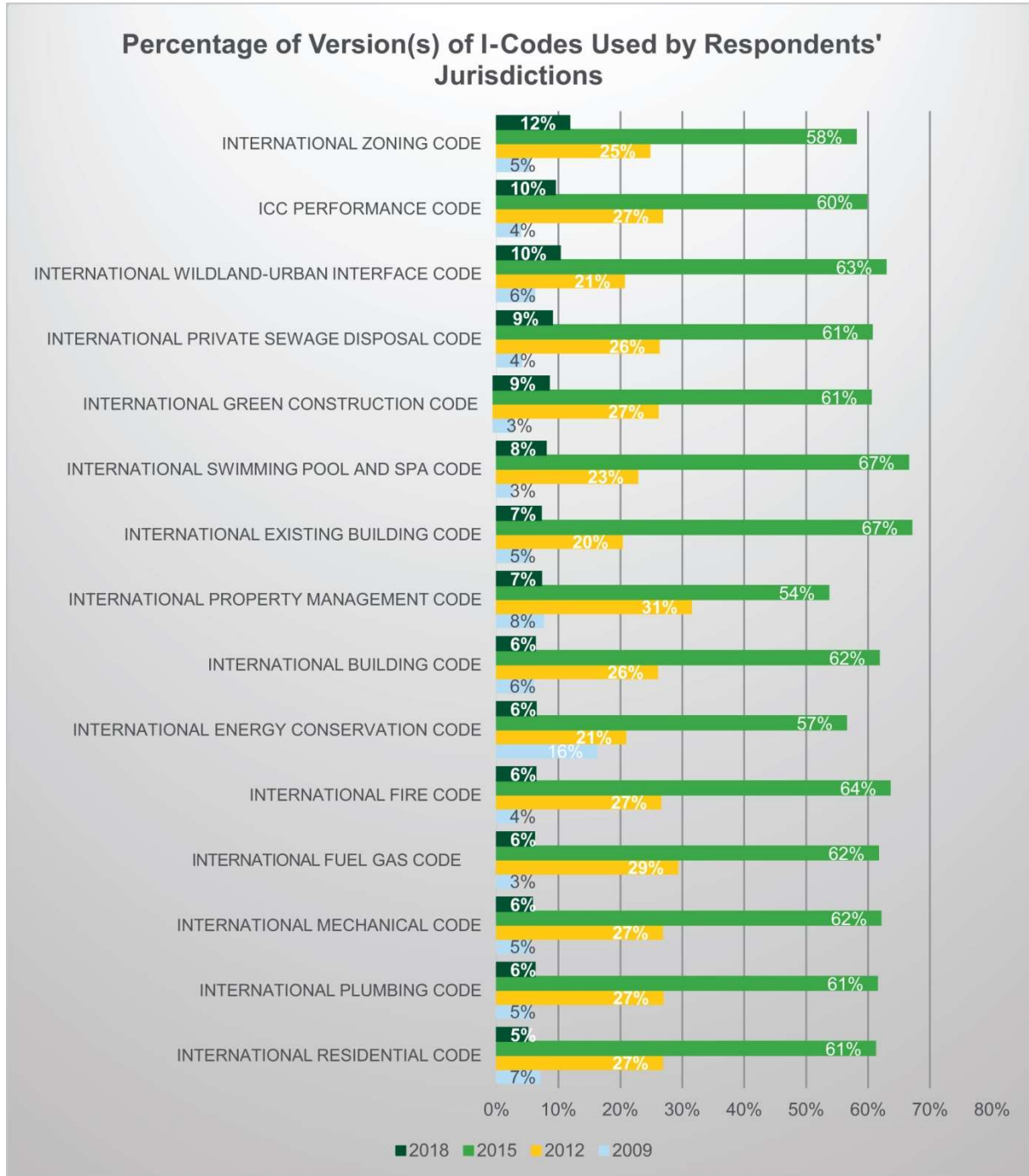
The following data indicates the percentage of building departments that allow review of electronically submitted plans, permit applications, or other documents.



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Survey respondents were asked to indicate what version of the I-Codes are used in their jurisdictions. Over half of all respondents said their jurisdiction was using the 2015 version of all the I-Codes.

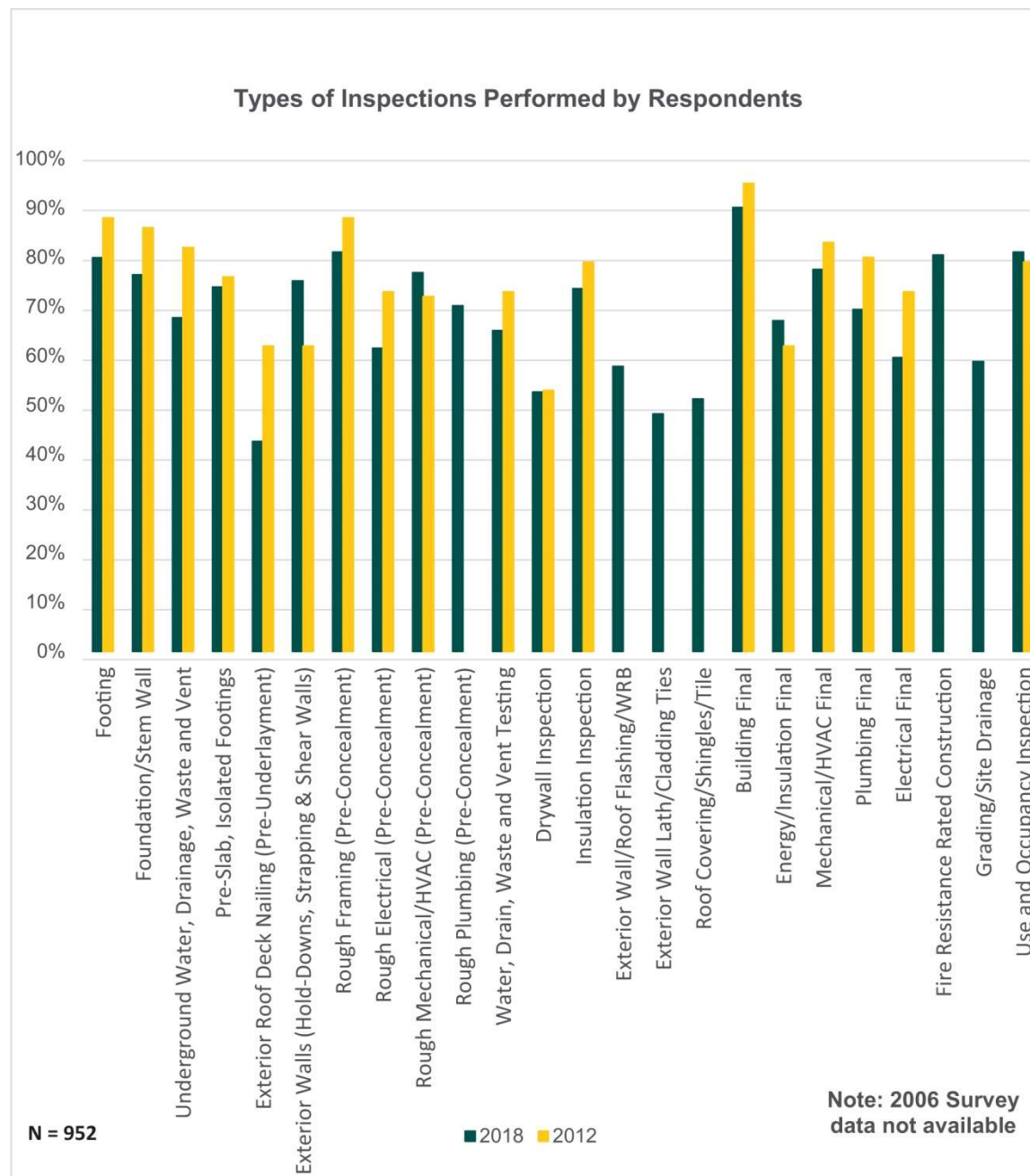
The four codes that garnered the highest usage by respondents were: International Existing Building Code (67%); International Swimming Pool and Spa Code (67%); International Fire Code (64%); and the International Wildland-Urban Interface Code (63%).



When respondents were asked to indicate what types of inspections are performed by their departments, most all (90%) said the building final is performed. Rough Framing (81%) and Use and

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Occupancy Inspections (81%) tied for second place. These inspections represent a substantial change from 2012 when Building Final Inspections was 95%, and all of the following very common inspections were performed at or over 82% by the respondents: Footing, Foundation, Mechanical Final, and Underground Plumbing. The only other inspection to be performed above 80% on this survey was Fire Resistance Rated Construction (80%). Drywall inspection was replaced as the lowest inspection performed by Exterior Roof Deck Nailing (pre-underlayment), (43%). This inspection and Exterior Wall Lath/Cladding Ties were the only inspections performed below 50% by respondents on the 2018 survey.



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Slightly more time is dedicated to commercial construction than residential; 42% compared to 40%. This is a reversal from the 2012 survey findings. Also, note this survey showed a 33% increase in time spent on other construction.



	2018	2012
Commercial	N = 977	847
Residential	N = 944	835
Other	N = 423	402

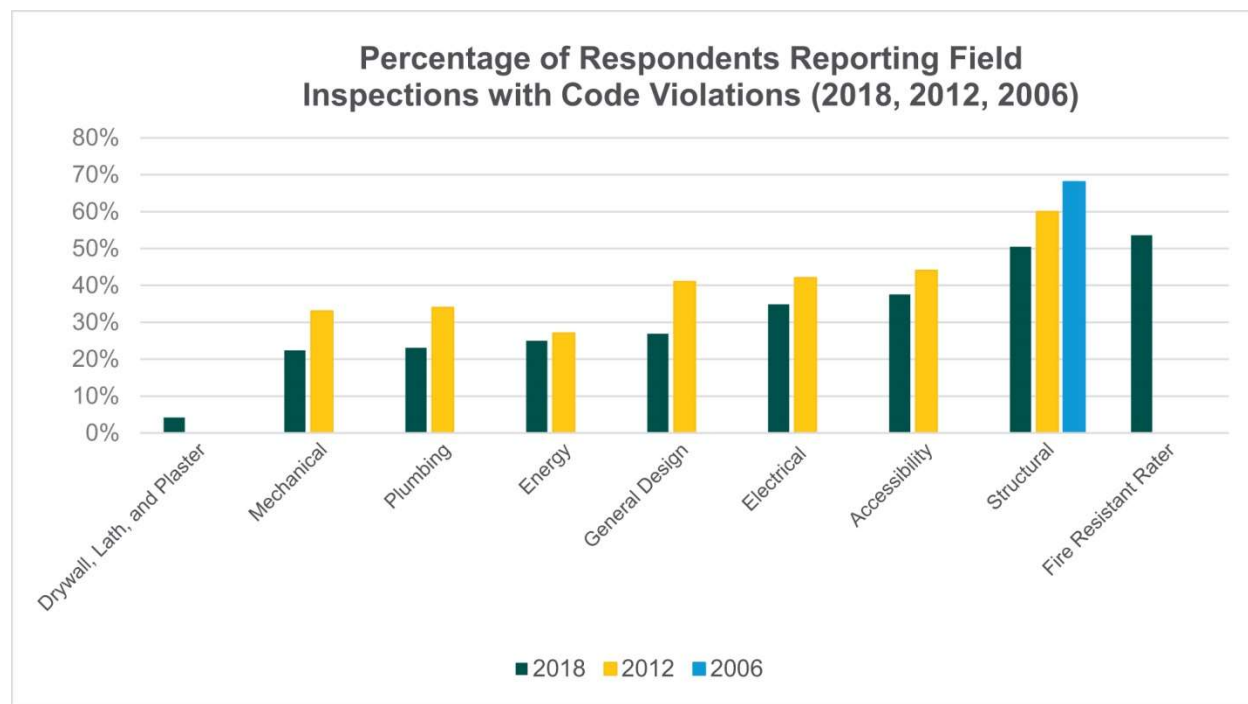
Code Violations

This section compares individual results of field inspection data and code violations from the 2006, 2012, and 2018 surveys. Due to question and grouping changes from survey year to survey year, some of the data has not been acquired or has been rolled up into different groupings. This prevented specific survey to survey comparisons on some field inspection and code violation data.

Because of question differences and groupings, only one grouping could be overlapped for all three surveys, (structural). The detailed breakout by building elements (when possible) is included in the individual categories of code violations in this section (**CODE VIOLATIONS**).

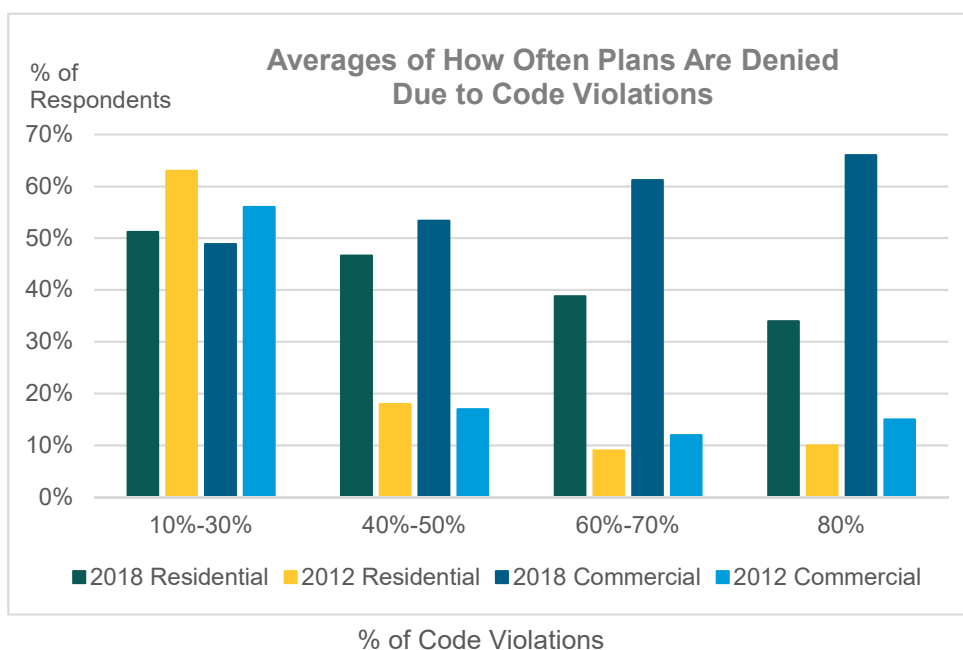
The individual code violation areas are listed before each presentation of data specific to that code violation area. Comparison results between or among the surveys (if the data is available for that code violation) are also presented.

The graph below compares the percentage of respondents who reported code violations based on field inspections' data from the 2006, 2012, and 2018 survey results. **Note the graph also shows the relative difference among the common areas that were reported on in the surveys.**



Plans

The chart below shows the respondents' ratings of how often plans are denied based on code violations. 2018 and 2012 residential and commercial respondent data is compared. The overall weighted averages of 2018 residential and commercial code violations have increased from 2012. In 2012, the overall weighted average for residential code violations was 33%; in 2018, it was 43%. A higher overall weighted average for commercial code violations was indicated between 2012 and 2018. 2012 had an overall commercial weighted average of 38%, in 2018, overall weighted code commercial code violations were 57%.



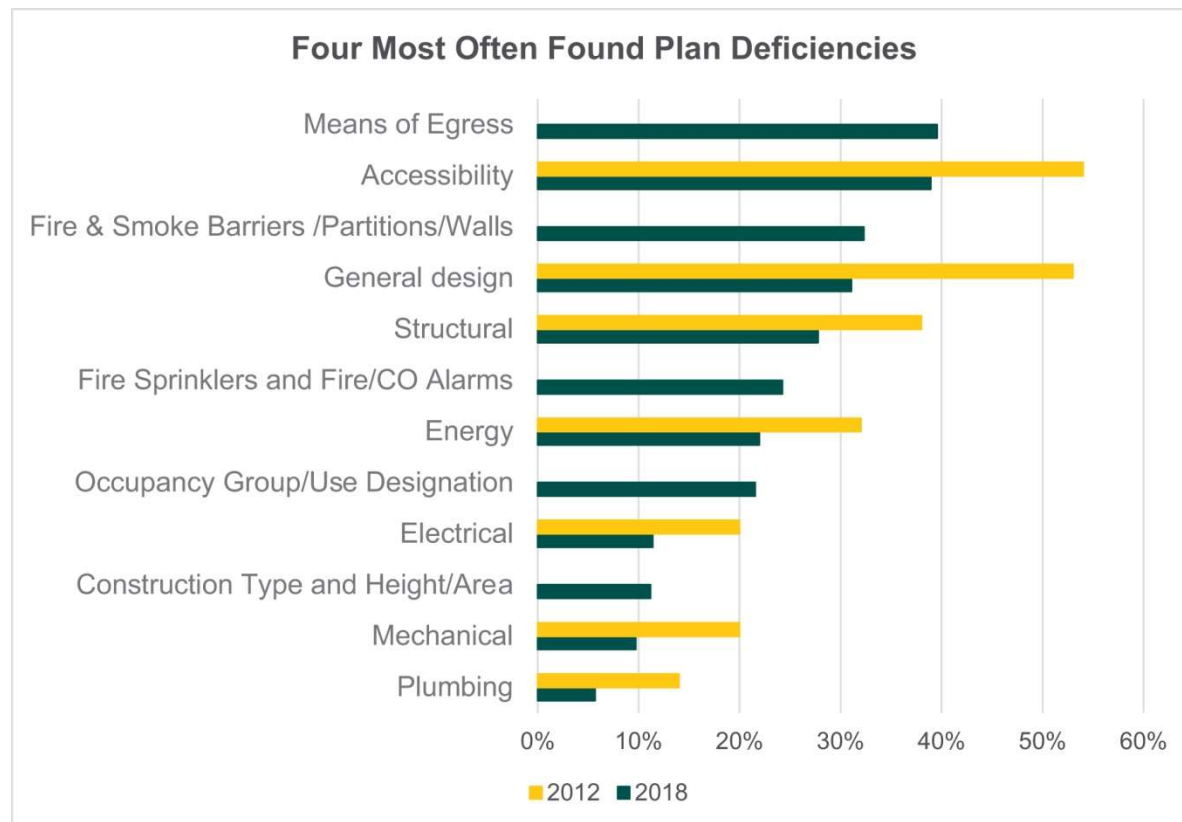
Overall Weighted Code Violations

	2018	2012
Residential	43%	33%
Commercial	57%	38%

*No 2006 Survey Data Available

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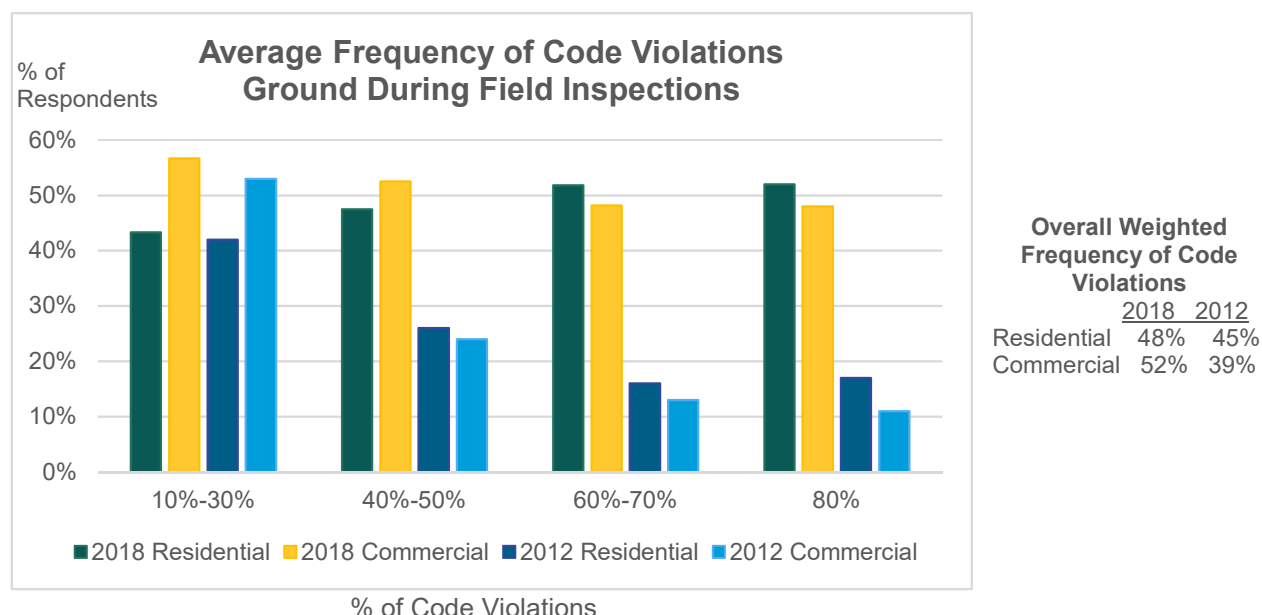
Respondents indicated that *most* plan deficiencies were found in the areas of Accessibility (40%), Means of Egress (32%), and Fire and Smoke Barriers/Partitions/Walls (32%). General Design was fourth (31%). These areas are quite different than the 2012 survey results. Improvement is most noted in General Design – a 30% drop; all areas of residential and commercial in the 2012 survey were above 60%.



* No 2006 Survey Data Available

Field Inspections

The next chart shows the respondents ratings of how often code violations are observed during field inspections. 2018 and 2012 residential and commercial respondent data is compared. The overall weighted averages of 2018 residential and commercial frequency of observed code violations during field inspections have increased from 2012. In 2012, the overall weighted average frequency for residential code violations during field inspections was 45%; in 2018, it was 48%. A higher overall weighted average for frequency of commercial code violations was also observed between 2012 and 2018. 2012 had an overall commercial weighted average of 39%; in 2018, the overall weighted commercial code violations found during field inspections was observed at 52%.



* No 2006 Survey Data Available

Survey respondents were asked what three areas field inspections were most often deficient, and respondents indicated the following: Fire Resistance-Rated Construction (53%), Structural (50%), and Accessibility (38%) The table below compares the top three findings of this survey with the 2006 and 2012 survey results.

Comparison of Top 3 Deficient Field Inspection Areas			
Survey Year	2018	2012	2006
Areas Deficient			
Fire Resistance-Rated Construction	53%	N/A*	N/A*
Structural	50%	60%	68%
Accessibility	38%	44%	N/A*
Electrical	N/A*	41%	N/A*

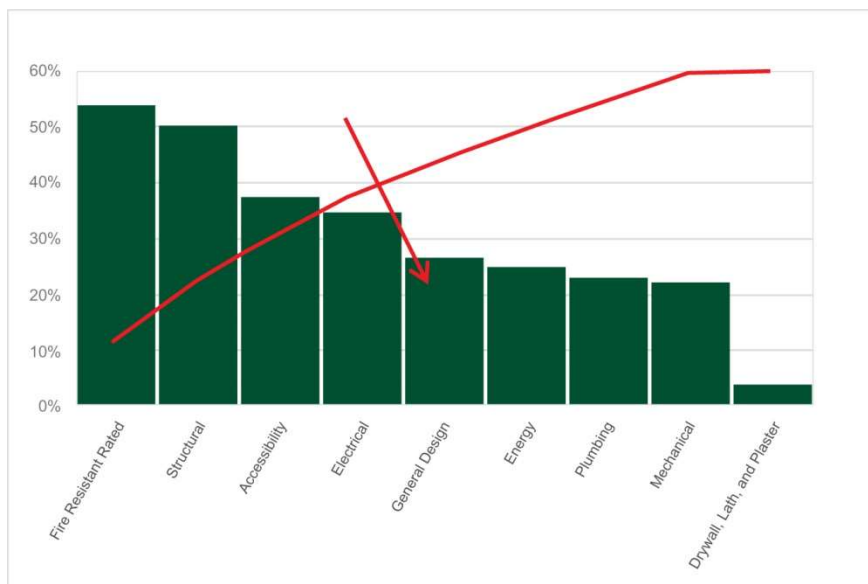
NOTE: *No Data Available

Note that 2 of the 3 areas overlap from both the 2012 and 2018 surveys, and that the overlapped areas of structural and accessibility have both declined over the past 6 years.

The next chart shows just the 2018 survey responses to the same question as the table above, “In what three (3) areas are field inspections most often deficient?”

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Note that **red arrow** points to an area on the red line indicating that half of the field inspection deficiencies are found in the areas on the left of the point indicated by the arrow and half are in the areas on the right.



Plumbing

Survey respondents were asked to identify the four (4) most common plumbing code violations they saw. Improper Notching or Boring of Framing was the most common with 51% of respondents saying they saw that plumbing violation. The three other top code violations cited were, Missing or Improper Nail Plates (44%), Pipes Improperly Supported (36%), with DWV Pipes Do Not Pass Leakage Test and Inadequate or Improperly Installed Venting both at (24%). These top 4 plumbing code violations match the top 4 violations of the 2012 survey. All plumbing code violations reported in this survey (2018) have significantly increased from 2012. The only exceptions are the lowest percentage responses, Pressure Reducing Valve Not In Place or Set Correctly and Cross Connections and/or Contamination (both down only 1% from 2012).

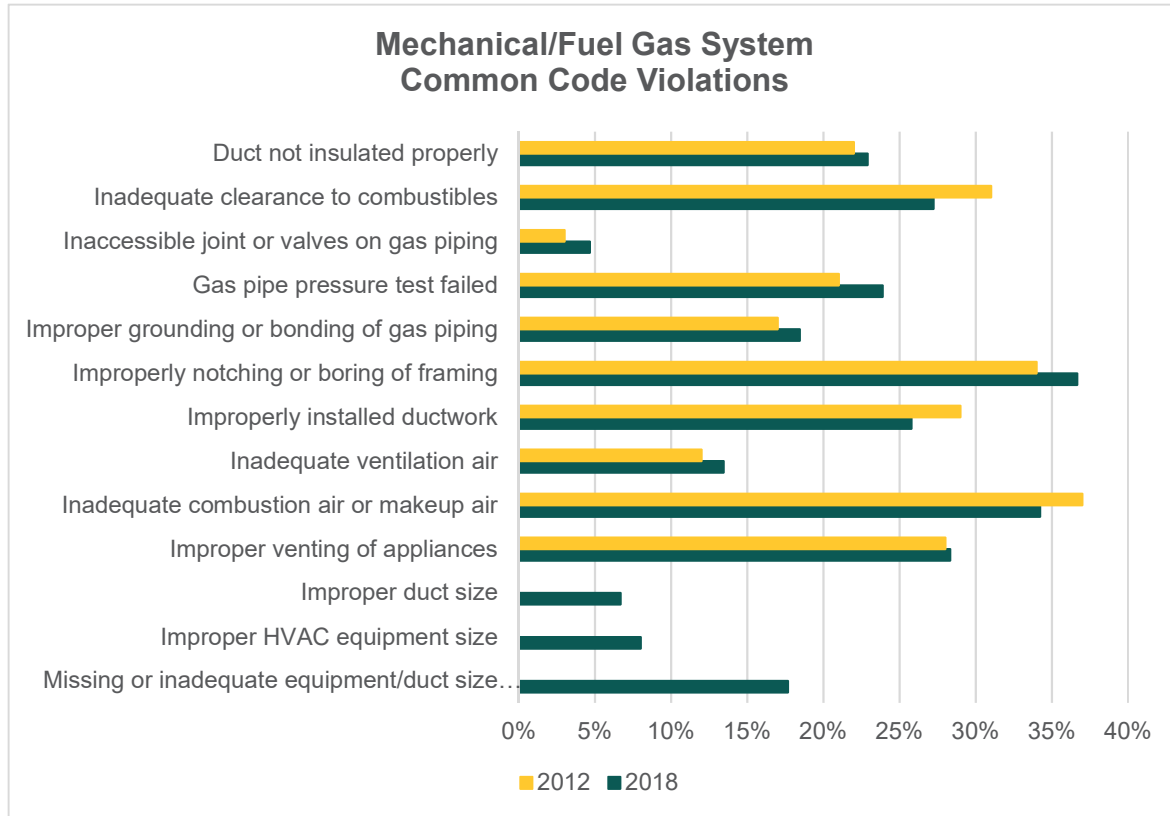
The Most Common Plumbing Code Violations			
Survey Year	2018	2012	2006
Improper notching or boring of framing	51%	41%	n/a
Missing or improper nail plates	43%	38%	n/a
Pipes improperly supported	36%	29%	n/a
DWV pipes do not pass leakage test	24%	19%	n/a
Inadequate or improperly installed venting	24%	21%	n/a
Improper use of fittings (turns, tees, etc.)	22%	18%	n/a
Missing or inaccessible cleanouts	15%	10%	n/a
Backflow device missing or not tested	14%	11%	n/a
Inadequate slope or grade provided for waste lines	14%	10%	n/a
Hot and cold supply reversed	5%	3%	n/a
Pressure reducing valve not in place or set correctly	3%	4%	n/a
Cross connections and/or contamination	3%	4%	n/a

Note: 28% of the respondents indicated this was not one of the field inspections they performed.

Mechanical/Fuel Gas System

Survey respondents were asked to identify the 4 most common mechanical/fuel gas system violations. They were Improper Notching or Boring of Framing (37%), Inadequate Combustion Air or Makeup Air (34%), Improper Venting of Appliances (28%), and Inadequate Clearance to Combustibles (27%).

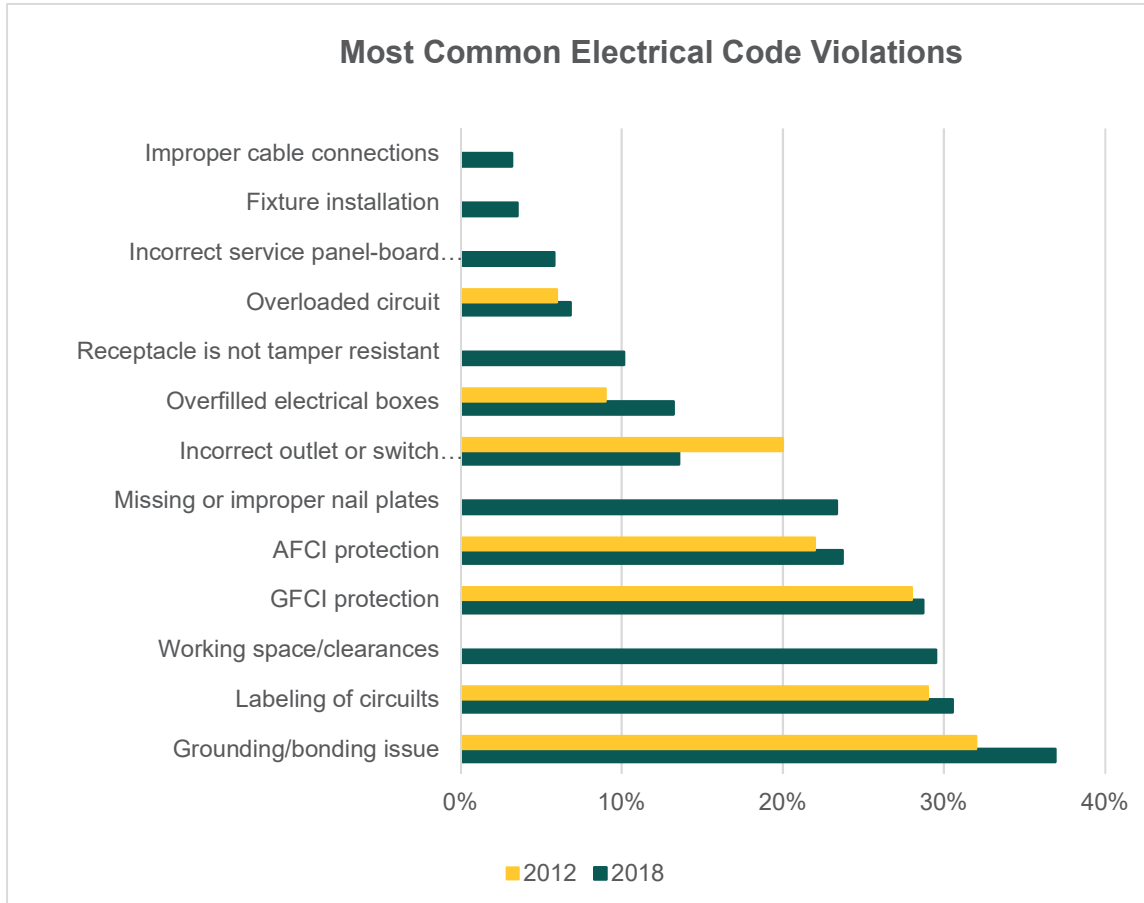
The chart below shows the common code violations of 2012 compared to 2018.



*No 2006 survey data available.

Electrical

Survey respondents were asked to identify the four (4) most common electrical code violations. The four (4) most common were: Grounding/Bonding Issue (37%), Labeling of Circuits (31%), Working Space/Clearances (30%), and GFCI Protection (29%). Note that 6 of 13 questions on the 2018 survey do not match or are not included in the 2012 survey.



Note: 36% of the respondents indicated this was not one of the field inspections they performed.

Note: No data for 2006

Energy

Survey respondents were asked to identify the four (4) most common energy code violations. The respondents reported the following: forty-two percent (42%) improper sealing of penetrations (e.g., electrical, ducts, venting), thirty-seven percent (37%) improper sealing of exterior walls, twenty-seven percent (27%) improper installation of insulation around wiring and plumbing passing through stud cavity and twenty-six percent (26%) improper insulation R-values walls/floors/ceiling/basement/slab/crawl space, were also among the 4 most frequently seen energy code violations.

Most Common Energy Code Violations

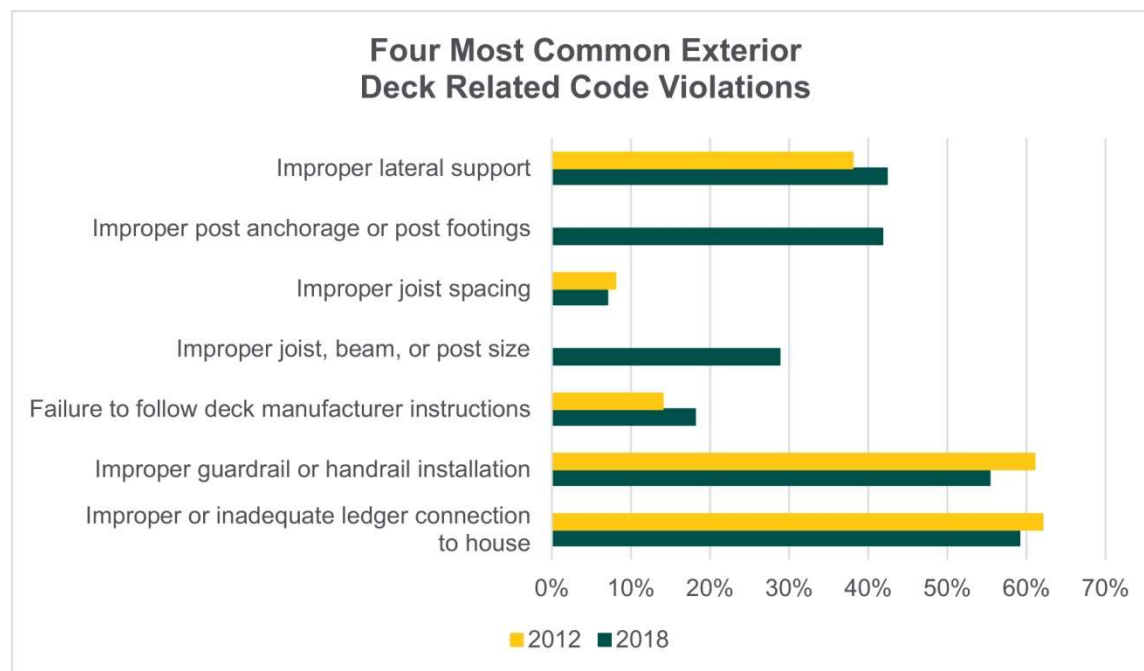
Answer Choices	2018	2012
Improper sealing of exterior walls	36%	36%
Improper air sealing of penetrations (e.g. electrical, ducts, venting)	42%	N/A*
Improper insulation R-Values, wall/floors/ceiling/basement/slab/crawl	26%	15%
Improper performance path calculations	12%	N/A*
Improper installation of insulation around wiring and plumbing passing through stud cavity	27%	27%
Improper installation of insulation at ceiling joist at roof rafters	17%	14%
Improper installation of insulation in crawl spaces and slab on grade insulation	21%	19%
Improper U-factors/SHGC of windows	10%	N/A*
Improper duct sealing (visual)	24%	28%
Failed or missing duct tightness test	16%	N/A*
Improper duct installation	12%	14%
Insufficient high-efficiency lighting	8%	N/A*

*NOTE: No data for 2006

Note: 27% of the respondents indicated this was not one of the field inspections they performed.

Exterior Deck Code Violations

When survey respondents were asked to identify common deck-related code violations, two violations stood out among the rest. The majority of respondents said they saw improper or inadequate ledger connections to the house (59%) and improper guardrail or handrail installation (55%). Forty-two percent (42%) of respondents saw cases where the deck had improper lateral support and another 42% saw decks with improper post anchorage or post footings. Although the top two code violations are down by 3% and 5% respectively, lateral support violations were up 5% and post anchorage was new at 42%.

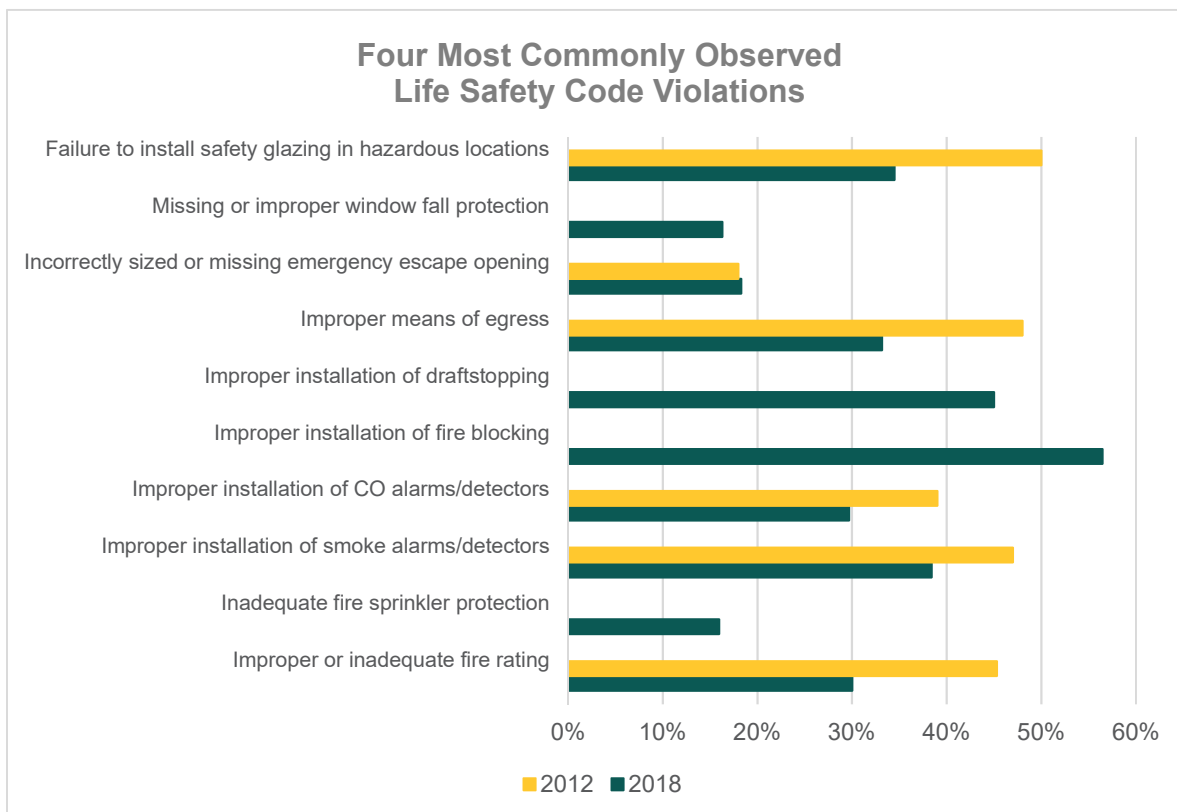


Note: No data for 2006

Note: 21% of the respondents indicated this was not one of the field inspections they performed.

Common Life Safety

Respondents were asked to identify the four (4) most common life safety code violations they saw. Over half (56%) of respondents saw cases where there was a failure to install proper fireblocking in required hazardous locations and almost half saw cases of improper installation of draftstopping (48%). Only two of the top four most common code violations were listed on the 2018 and 2012 surveys. They were failure to install correct safety glazing in required hazardous locations (35%) and improper installation of smoke detectors (38%). The graph below shows the comparison for all the identified areas in both the 2012 and 2018 surveys.

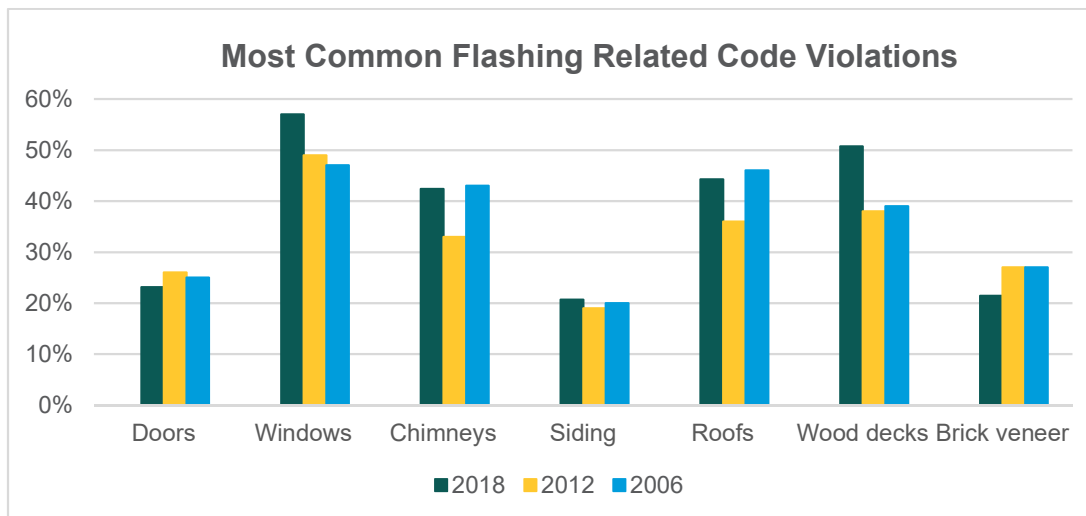


Note: 2006 survey did not have this category of data.

Note: Only 7% of the respondents indicated this was not one of the field inspections they performed.

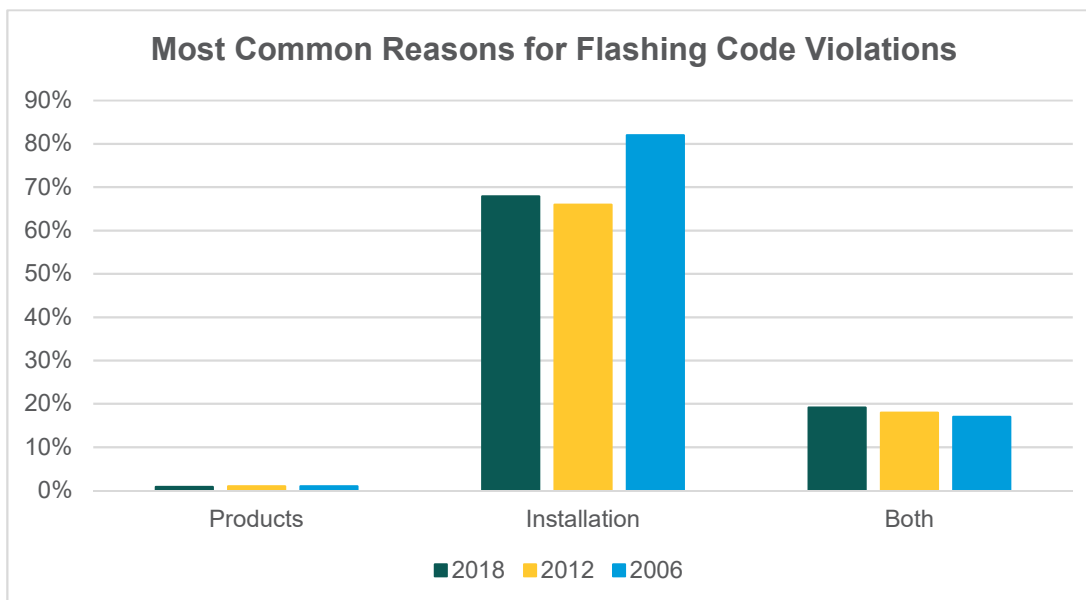
Flashing

Respondents indicated that flashing violations were the most apparent at the windows by over half (57%). Flashing violations were also apparent by half for the wood deck (51%), roof (44%), and chimney (42%). According to results, there is an apparent increase in flashing violations at the windows (51%, up from 49% in 2012, and 47% in 2006), wood deck (51% up from 38% in 2012, and 37% in 2006), roof (44% up from 36% in 2012, but down from 46% in 2006), and chimney (42%, up from 33% in 2012, and down 1% from 2006 of 43%).



Note: Over 33% of all the respondents failed to answer if they performed this field inspection.

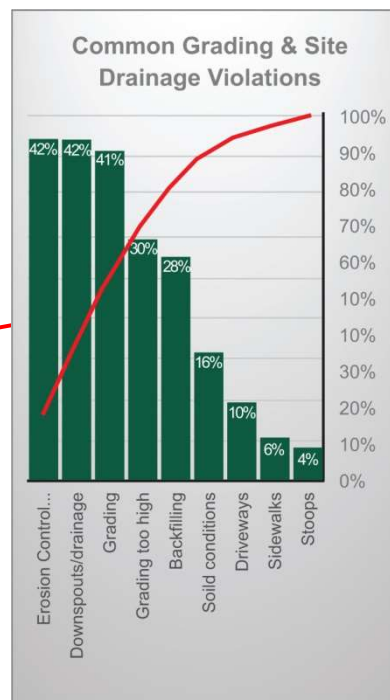
Respondents indicated that flashing violations were most likely related to installation, according to two-thirds of respondents (68%). Eighteen percent (19%) said there were flashing violations with both the products and installation, and less than one percent had flashing violations with products. Results revealed very little change in flashing violations from 2012 to 2018 for installation. However, in 2006 installation violations were 82%, 14 percent higher than 2012 and 12 percent higher than 2018. Overall there has been a significant decrease in installation code violations while the product code violations have remained the same at 1% or less.



Grading and Site Drainage

The most common grading and site drainage violations were erosion control measures not in place (42%), downspouts and drainage controls (42%), grading (41%), and grading too high (30%). Comparing results from 2012 revealed that there was only a percentage point or two difference between all the areas rated by the respondents. The only exception was: Over one-fourth of the 2018 respondents said this was not an area that they inspected for code violations.

Overall, all rated areas show a significant improvement trend from 2006 to 2018. Areas have from 1% to 21% improvement in code violations.



Note that **red arrow** points to an area on the red line indicating that half of the field inspection deficiencies are found in the areas on the left of the point indicated by the arrow and half are in the areas on the right.

Select the Top 4 Most Common Grading and Site Drainage Violations You See.			
Survey Year	2018	2012	2006
Sample Size	1,169	1,121	N/A
Erosion Control Measures Not in Place	42%	43%	N/A
Downspouts/drainage Controls	42%	38%	60%
Grading	41%	42%	62%
Grading Too High	30%	29%	42%
Backfilling	28%	31%	48%
Soil Conditions	16%	14%	18%
Driveways	10%	7%	15%
Sidewalks	6%	5%	7%
Stoops	4%	4%	5%

Foundation

The most common foundation-related code violations were improper reinforcement or support of rebar (52%), standing water/mud in footing or on rebar (47%), and improper anchor bolts (41%). The most noticeable difference in results revealed an increase of improper reinforcement or support of rebar (up 5% from 47% in 2012 to 52% in 2018, but still less than the 55% in 2006), standing water/mud in footing or on rebar (up 5% from 42% in 2012 to 47% in 2018), and improper foundation size (up 4% from 8% in 2012 to 12% in 2018, but still less than the 18% in 2006). Overall, all areas have improved since 2006. However, only “incorrect drain installation” has seen a reduced number of code violations since 2006 and 2012.

Select the Top 4 Most Common Grading and Site Drainage Violations You See.			
Survey Year	* 2018	2012	2006
Sample Size	1,169	1,121	1,120
Areas Deficient			
Improper reinforcement or support of rebar	52%	47%	55%
Standing water/mud in footing or on rebar	47%	42%	N/A**
Improper anchor bolts	41%	41%	53%
Incorrect footing depth	35%	34%	37%
Incorrect drain installation	21%	23%	38%
Missing vapor barrier	20%	19%	28%
Improper foundation size	12%	8%	18%
Incorrect fasteners for use below grade to attach plywood	5%	4%	8%

*Note: over 35% of all the respondents indicated this inspection does not apply to their job.

**No data available

Framing – Wall

Respondents were asked to share the most common wall-related framing violations seen in buildings. Almost two-thirds of respondents (64%) see studs cut or notched to impermissible depth; this is a 7% increase over 2012. Missing fire-blockings (60%), missing hold-downs, straps, etc. (53%), and installation of braced or shear walls (48%) round out the top four violations.

Examining results from year-to-year (2006, 2012, and 2018) revealed all rated areas had a reduction in code violations. There was also a noticeable difference in violations from installation of braced or shear walls (up in 2018 by 36 points from 12% to 48%). All other categories had a mixed increase or decrease in violations from 2006 to 2012 and 2018.

Select the Top 4 Most Common Wall Framing Violations You See			
Survey Year	*2018	2012	2006
Sample Size	1,169	1,121	1,120
Areas Deficient			
Stud cut or notched to an impermissible depth	64%	57%	77%
Missing fire-blocking	60%	63%	75%
Missing hold-down, straps, etc.	53%	51%	59%
Installation of braced or shear walls	48%	12%	N/A**
Installation of sheathing	20%	17%	31%
Improper spacing	8%	4%	10%
Missing studs	8%	5%	9%
Incorrect fasteners for use below grade to attach plywood	5%	N/A**	N/A**

*Note: over 35% of all the respondents indicated this inspection does not apply to their job.

**No data available

Framing – Floor

The most common floor-related framing violations were notches in areas not permitted (62%), missing anchor bolts (43%), sheathing nails missing the joist (33%), and inadequate splices (29%). Nineteen percent of respondents reported a violation with the wrong joist size. This is an increase of 3% from the past six years. Inadequate splices were also up 3% from 2012. The other areas had no or only 1% variance. Of note was that the largest reduction in code violations from 2006 to 2018 was in sheathing nails missing joist (down 12%) and next was missing anchor bolts and notches/holes in areas not permitted; both had code violations down by 9% from 2006 to 2018.

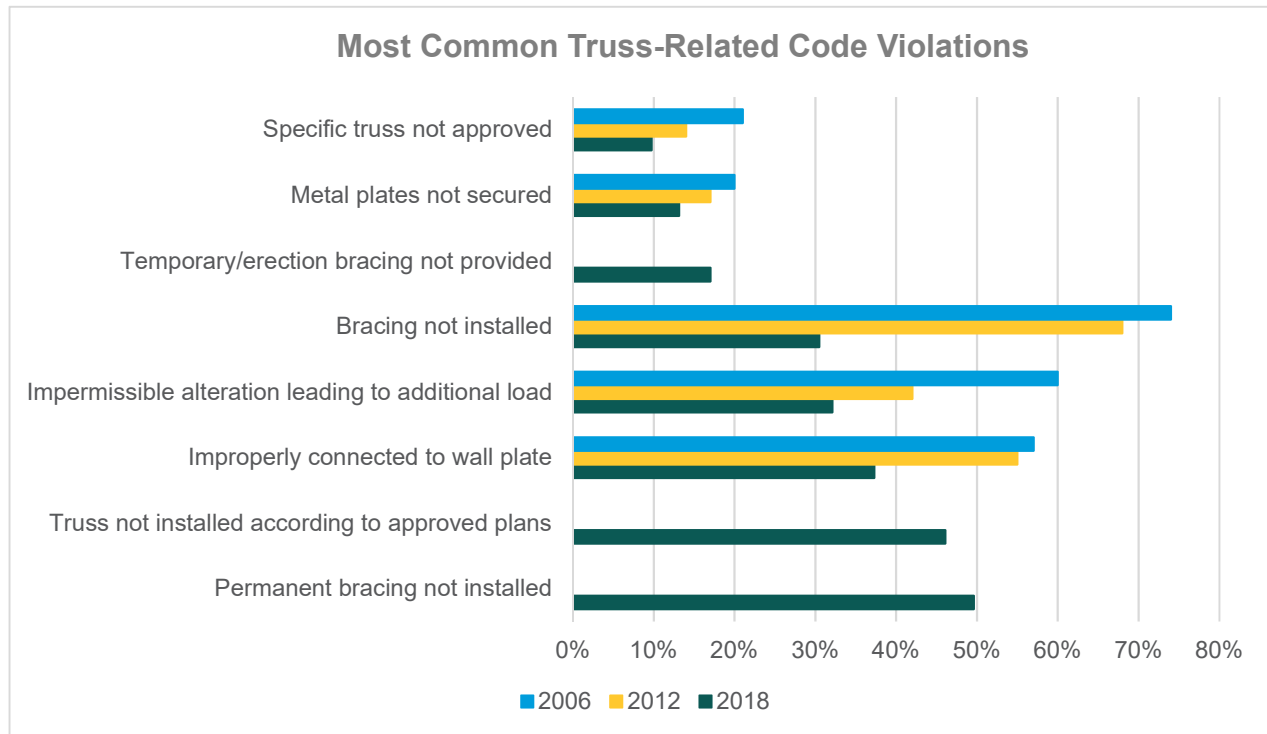
Select the Top 4 Most Common Floor-Related Framing Violations You See			
Survey Year	*2018	2012	2006
Sample Size	1,169	1,121	N/A**
Areas Deficient			
Notches/holes in areas not permitted	62%	61%	71%
Missing anchor bolts	43%	43%	34%
Sheathing nails missing joist	33%	32%	45%
Inadequate splices	29%	26%	27%
Wrong joist size	19%	16%	22%
Improperly installed sheathing	14%	15%	18%
Wrong joist grade	7%	6%	12%

*Note: over 35% of all the respondents indicated this inspection does not apply to their job.

**No data available

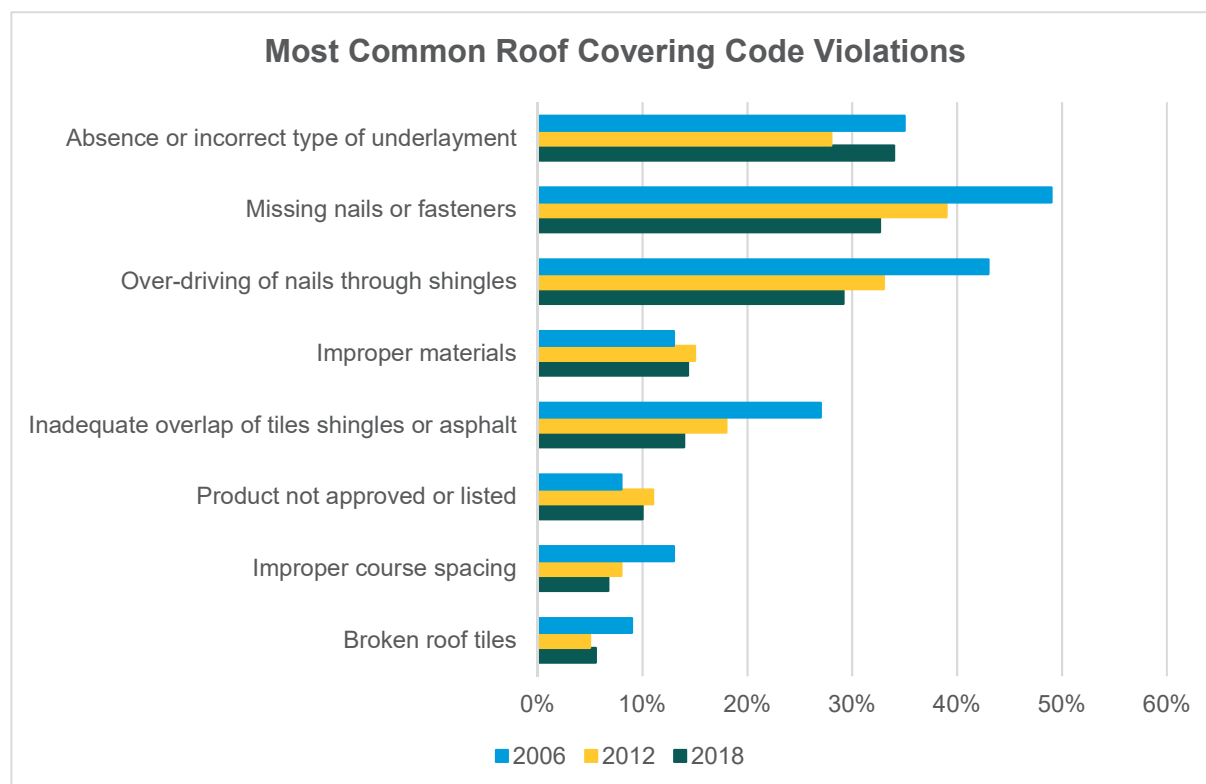
Truss-Related

The four (4) most common truss-related violations were when the permanent bracing was not installed (50%); truss not installed according to approval (46%); an improper connection to the wall plate (37%), a decrease of 18% from 2012 and a decrease of 20% from 2006; and an impermissible alteration leading to additional load (32%), a 10% decrease from 2012 and a decrease from 2006 of 28%.



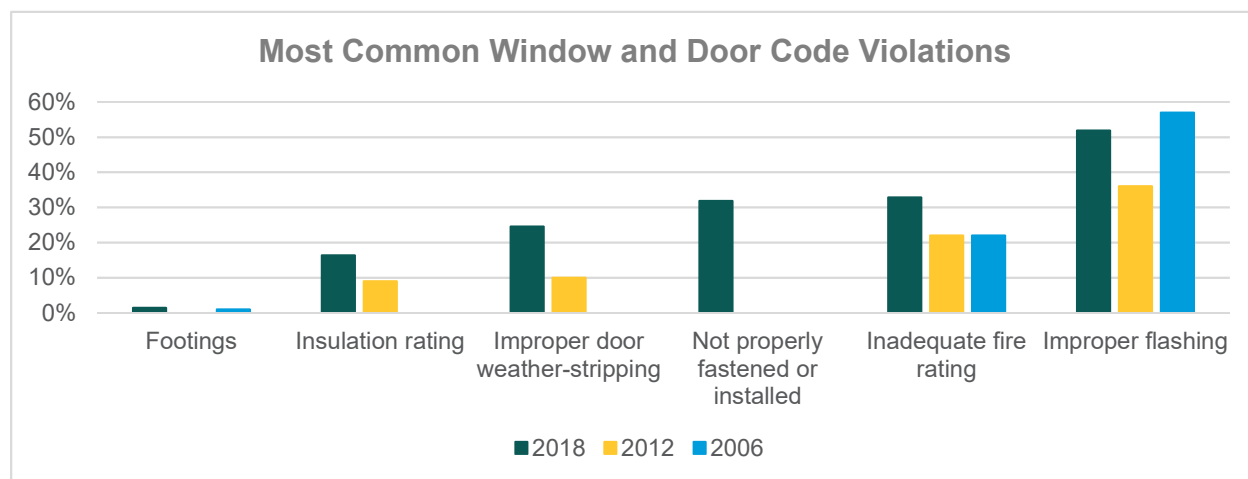
Roof Covering

In the 2018 survey, absence or incorrect type of underlayment (34%) replaced the 2012 and 2006 surveys' number one finding of missing nails or fasteners (39% for 2012 and 49% for 2006). The remaining two of the top four areas were overdriving nails through shingles (29%) and improper materials (14%) of these top 4, improper materials (14%) increased slightly over 2006 (13% and absence or incorrect type of underlayment (34%) had an increase of code violations above 2012 (28%) and a 1% decrease from 2006 (35%).



Window or Door

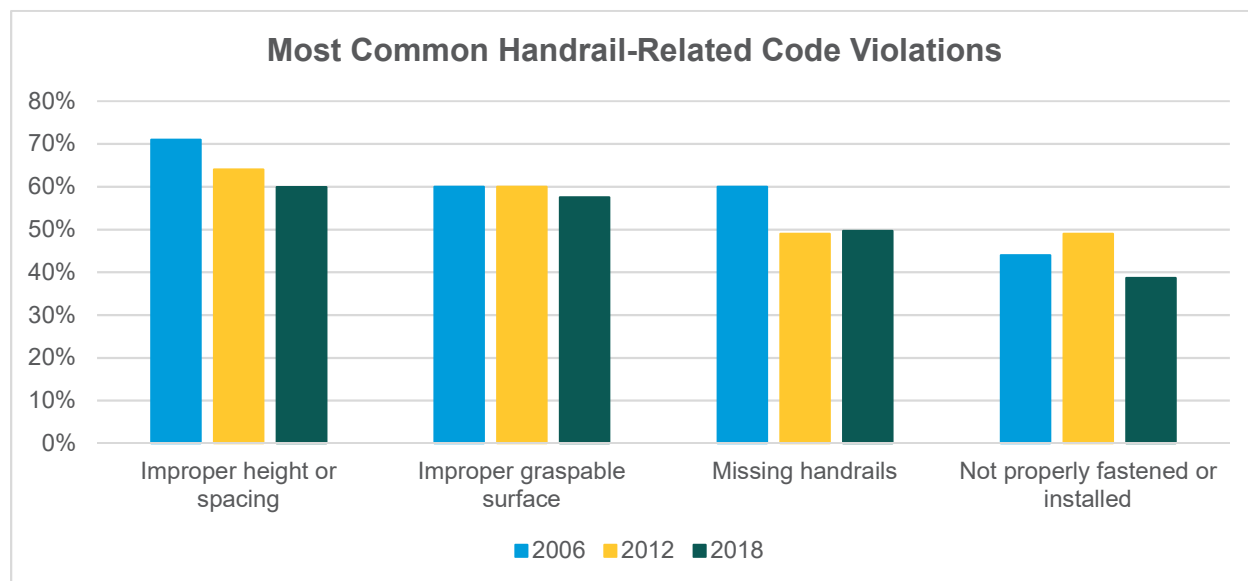
Improper flashing is the most common window or door related code violation seen by survey respondent, at 52%. This is an increase of over 16% from the 2012 (36%) and a decrease of 5% from the 2006 (57%) survey. Inadequate fire rating was 33%. This is also an increase of over 11% from 2012 and 2006 (22%). The third most observed violation was windows not properly fastened or installed (32%).



Handrails, Guardrails, Stairs

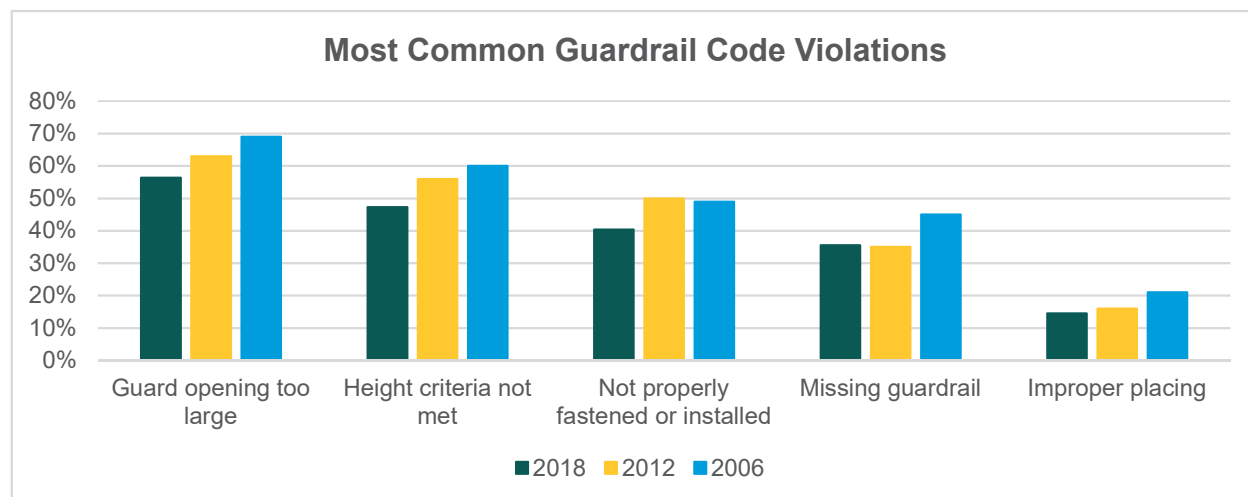
Handrails

The most common handrail-related code violations were improper height or spacing (60%), a 4% decrease from 2012 and an 11% decrease from 2006. Improper graspable surface (57%), a decrease of 3% from 2012 and 2006. The percentage of missing handrails (50%) was only 1% up from 2012 and down by 10% from 2006. The most noticeable difference from the 2012 survey is the decrease in not properly fastened or installed handrails. This violation was down 10% from 49% in 2012, and down 5% from 2006 to 39% in 2018.



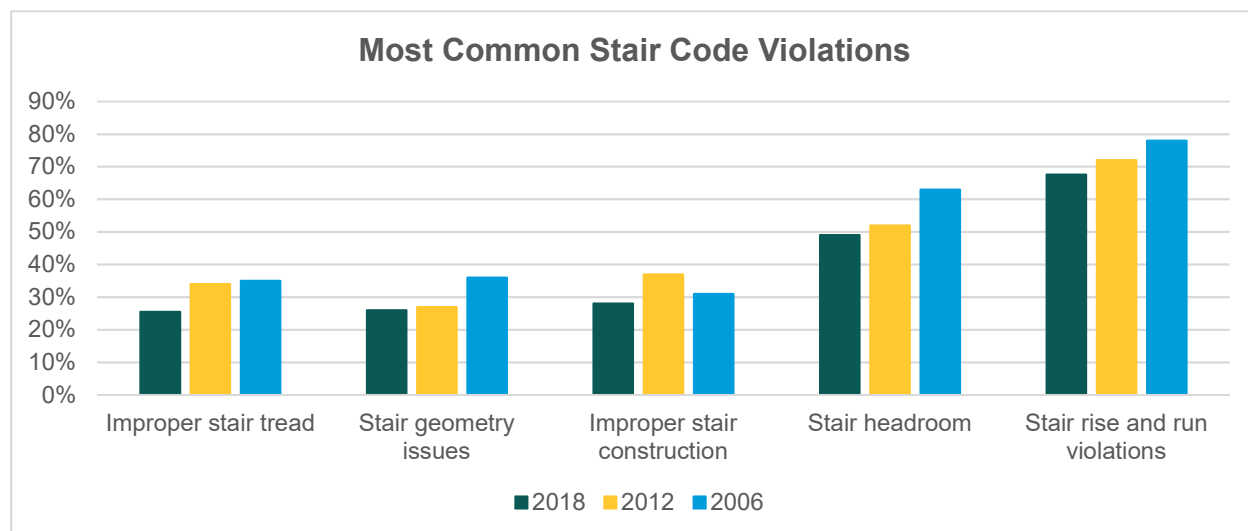
Guardrails

Survey respondents commonly saw three guardrail-related code violations at least 50% of the time. The most common violation was the guardrail opening too large, at 63%. Other violations were height criteria not met (56%) and the guardrail not properly fastened or installed (50%). The only guardrail-related code violation showing significant improvement since 2006 was a missing guardrail violation, down 10% in 2012. There was a slight increase (1%) in violations from guardrails not being properly fastened or installed.



Stairs

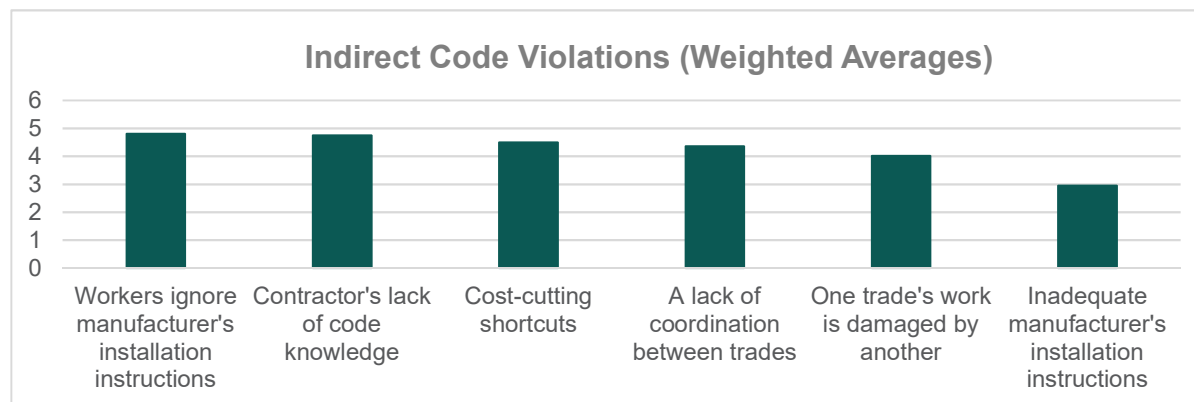
Respondents were asked to rate the three most common stair-related code violations that they observed. Two of these code violations stood out to the survey respondents. Over two-thirds (68%) of respondents in all three surveys (2006, 2012, and 2018) said they saw stair rise and run violations. Just about half (49%) or more in all three surveys (2006, 2012, and 2018) still saw stair headroom violations. Both of these code violations were down from the 2012 levels by 4% and 3% and from 2006 by 10% and 14% respectively. The next highest area of code violation observed was improper stair construction (28%). This was a decrease from the 2012 survey of 37% and from 31% in 2006.



INDIRECT CODE VIOLATION CAUSES

NOTE: The following section is respondents' opinions only and has no 2012 supporting data. 2006 data is very general and would require a conversion scale for a consistent comparison.

Respondents were asked to express their opinions concerning how often the following result in code violations. The scale was from 1 to 6, with 6 being the highest impact resulting in a code violation. The results are weighted averages per statement/event. The respondents felt that "workers ignoring the manufacturer's installation instructions" (4.81) was the greatest cause of code violations. This rating stands opposed to the relatively low cause rating of "inadequate manufacturer's installation instructions" (2.95). Lack of contractor code knowledge was the second most rated cause of code violations (4.75).



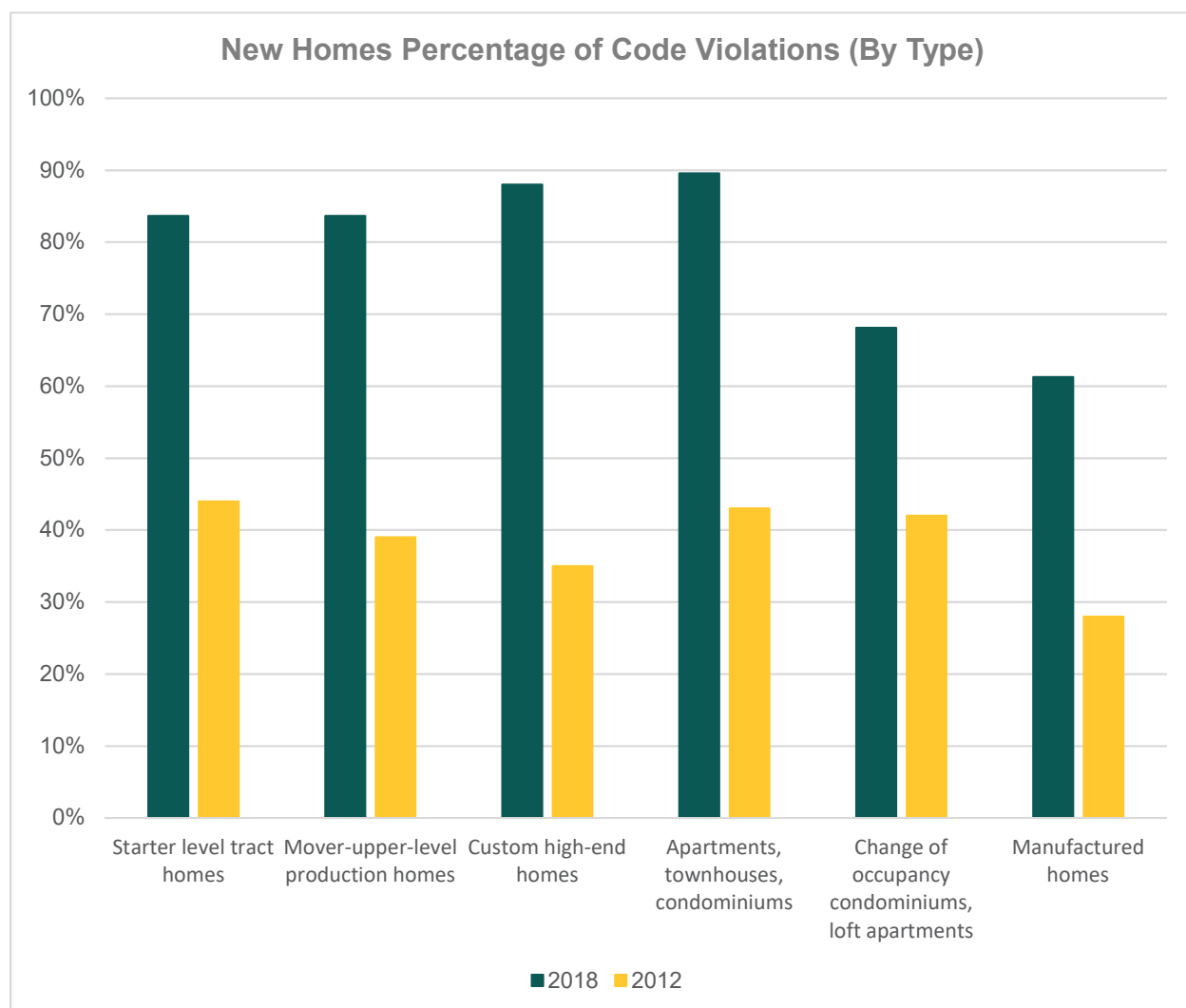
***Note:** 30% of respondents chose not to respond to this question.

TYPES AND PERCENTAGES OF NEW HOMES WITH CODE VIOLATIONS

Based on their experience, respondents were asked to estimate by type and by percent how many new homes have code violations. If the respondents had no experience with the new home type, they were to leave the type of new home construction response blank. The number ratings could have ranged from 0 to 100%.

Of significance is that over 60% of respondents indicated that all types of new homes have code violations; those manufactured (61%) and even the custom high-end (88%) have code violations. The respondents' agreement on the highest new home type with code violations was the apartments, townhouses, condominiums grouping (90%).

***No 2006 data available**



APPENDIX A – 2018 COMMON CODE NONCOMPLIANCE SURVEY

International Code Council and National Association of Home Builders Common Code Noncompliance Survey

I. Information on Code Officials and Building Code Departments

1. Provide the state and zip code for your office location:

2. Select the number of years you have been in code enforcement:

- ☐ 0-2 years
- ☐ 3-5 years
- ☐ 6-10 years
- ☐ 11-15 years
- ☐ 16 or more years

3. Select all ICC certifications that you currently hold:

- ☐ Master Code Professional
- ☐ Certified Building Official
- ☐ Certified Fire Marshal
- ☐ Commercial Building Inspector
- ☐ Commercial Electrical Inspector
- ☐ Commercial Mechanical Inspector
- ☐ Commercial Plumbing Inspector
- ☐ Commercial Energy Inspector
- ☐ IgCC Commercial Inspector
- ☐ Fire Inspector
- ☐ Residential Building Inspector
- ☐ Residential Electrical Inspector
- ☐ Residential Mechanical Inspector
- ☐ Residential Plumbing Inspector
- ☐ Residential Energy Inspector
- ☐ Building Plans Examiner
- ☐ Commercial Energy Plans Examiner
- ☐ Electrical Plans Examiner
- ☐ Mechanical Plans Examiner
- ☐ Plumbing Plans Examiner
- ☐ Fire Plans Examiner
- ☐ Green Building-Residential Examiner
- ☐ IgCC Plans Examiner
- ☐ Residential Plans Examiner

- ☐ Permit Technician
 - ☐ Property Maintenance and Housing Inspector
 - ☐ Zoning Inspector
 - ☐ Special Inspector
 - ☐ Other (please specify): _____
4. Which of the following choices best describes your position at your building department? (Select only one.)
- ☐ Building Official
 - ☐ Building Inspector
 - ☐ Plan Reviewer
 - ☐ Fire Official
 - ☐ Fire Inspector
 - ☐ Other (please specify): _____
5. Which of the following choices best describes your department's level of authority?
- ☐ City level
 - ☐ County level
 - ☐ State level
 - ☐ Federal level
 - ☐ Other (please specify): _____
6. What is the approximate population of the jurisdiction in which you work?
- ☐ Under 50,000
 - ☐ 50,000 to 149,999
 - ☐ 150,000 to 999,999
 - ☐ 1,000,000 or more
7. Select from the following types of services provided by your department (Check all that apply.):
- ☐ Pre-construction meetings
 - ☐ Plan review
 - ☐ Electronic plan submittal
 - ☐ Field inspections
 - ☐ Other (please specify): _____
8. Does your building department allow plans, permit applications or other documents to be submitted electronically for review?

- ☐ Yes
☐ No
☐ Describe any circumstances in which electronic submission are allowed:

9. Select version(s) of the ICC codes your jurisdiction uses:

2009	2012	2015	2018
<input type="checkbox"/> IBC	<input type="checkbox"/> IBC	<input type="checkbox"/> IBC	<input type="checkbox"/> IBC
<input type="checkbox"/> ICCPC	<input type="checkbox"/> ICCPC	<input type="checkbox"/> ICCPC	<input type="checkbox"/> ICCPC
<input type="checkbox"/> IEBC	<input type="checkbox"/> IEBC	<input type="checkbox"/> IEBC	<input type="checkbox"/> IEBC
<input type="checkbox"/> IECC	<input type="checkbox"/> IECC	<input type="checkbox"/> IECC	<input type="checkbox"/> IECC
<input type="checkbox"/> IFC	<input type="checkbox"/> IFC	<input type="checkbox"/> IFC	<input type="checkbox"/> IFC
<input type="checkbox"/> IFGC	<input type="checkbox"/> IFGC	<input type="checkbox"/> IFGC	<input type="checkbox"/> IFGC
<input type="checkbox"/> IgCC	<input type="checkbox"/> IgCC	<input type="checkbox"/> IgCC	<input type="checkbox"/> IgCC
<input type="checkbox"/> IMC	<input type="checkbox"/> IMC	<input type="checkbox"/> IMC	<input type="checkbox"/> IMC
<input type="checkbox"/> IPC	<input type="checkbox"/> IPC	<input type="checkbox"/> IPC	<input type="checkbox"/> IPC
<input type="checkbox"/> IPMC	<input type="checkbox"/> IPMC	<input type="checkbox"/> IPMC	<input type="checkbox"/> IPMC
<input type="checkbox"/> IPSDC	<input type="checkbox"/> IPSDC	<input type="checkbox"/> IPSDC	<input type="checkbox"/> IPSDC
<input type="checkbox"/> IRC	<input type="checkbox"/> IRC	<input type="checkbox"/> IRC	<input type="checkbox"/> IRC
<input type="checkbox"/> ISPSC	<input type="checkbox"/> ISPSC	<input type="checkbox"/> ISPSC	<input type="checkbox"/> ISPSC
<input type="checkbox"/> IWUIC	<input type="checkbox"/> IWUIC	<input type="checkbox"/> IWUIC	<input type="checkbox"/> IWUIC
<input type="checkbox"/> IZC	<input type="checkbox"/> IZC	<input type="checkbox"/> IZC	<input type="checkbox"/> IZC
<input type="checkbox"/> Other: _____	<input type="checkbox"/> Other: _____	<input type="checkbox"/> Other: _____	<input type="checkbox"/> Other: _____

10. Indicate all types of inspections you perform:

- ☐ Footing
☐ Foundation/Stem wall
☐ Underground water, drainage, waste and vent (plumbing)
☐ Pre-Slab, isolated footings
☐ Exterior roof deck nailing (pre-underlayment)
☐ Exterior walls – (hold-downs, strapping and shear walls)
☐ Rough Framing (pre-concealment)
☐ Rough Electrical (pre-concealment)
☐ Rough Mechanical/HVAC (pre-concealment)
☐ Rough Plumbing (pre-concealment)

- ☐ Water, drain, waste and vent testing
- ☐ Drywall inspection
- ☐ Insulation inspection
- ☐ Exterior wall/roof flashing/WRB
- ☐ Exterior wall lath/Cladding Ties
- ☐ Roof Covering/Shingles/Tile
- ☐ Building Final
- ☐ Energy/Insulation Final
- ☐ Mechanical/HVAC Final
- ☐ Plumbing Final
- ☐ Electrical Final (Power Required: Yes or No?)
- ☐ Fire resistance rated construction
- ☐ Grading/Site Drainage
- ☐ Use and Occupancy Inspection
- ☐ Other (please specify): _____

11. Based on the number of permits issued and inspection performed annually, indicate the percentage of time dedicated to commercial versus residential and other construction (amounts should add up to 100%):

- ☐ _____ % Commercial
- ☐ _____ % Residential
- ☐ _____ % Other

12. On average, how often are plans denied due to code violations?

Residential	Commercial
<input type="checkbox"/> 10%	<input type="checkbox"/> 10%
<input type="checkbox"/> 20%	<input type="checkbox"/> 20%
<input type="checkbox"/> 30%	<input type="checkbox"/> 30%
<input type="checkbox"/> 40%	<input type="checkbox"/> 40%
<input type="checkbox"/> 50%	<input type="checkbox"/> 50%
<input type="checkbox"/> 60%	<input type="checkbox"/> 60%
<input type="checkbox"/> 70%	<input type="checkbox"/> 70%
<input type="checkbox"/> 80%	<input type="checkbox"/> 80%

Other (please specify): _____

13. In what three (3) areas are plans most often deficient?

- ☐ General design
- ☐ Occupancy group/use designation
- ☐ Construction type and height/area

- ☐ Fire and smoke barriers/partitions/walls
- ☐ Fire sprinklers and fire/CO alarms
- ☐ Means of egress
- ☐ Accessibility
- ☐ Structural
- ☐ Electrical
- ☐ Energy
- ☐ Mechanical
- ☐ Plumbing
- ☐ Other (please specify):

14. On average, how often are code violation found during field inspections?

Residential	Commercial
<input type="checkbox"/> 10%	<input type="checkbox"/> 10%
<input type="checkbox"/> 20%	<input type="checkbox"/> 20%
<input type="checkbox"/> 30%	<input type="checkbox"/> 30%
<input type="checkbox"/> 40%	<input type="checkbox"/> 40%
<input type="checkbox"/> 50%	<input type="checkbox"/> 50%
<input type="checkbox"/> 60%	<input type="checkbox"/> 60%
<input type="checkbox"/> 70%	<input type="checkbox"/> 70%
<input type="checkbox"/> 80%	<input type="checkbox"/> 80%

Other (please specify): _____

15. In what three (3) areas are field inspection most often deficient?

- ☐ General design
- ☐ Fire resistance-rated construction
- ☐ Drywall, lath and plaster
- ☐ Accessibility
- ☐ Structural
- ☐ Electrical
- ☐ Energy
- ☐ Mechanical
- ☐ Plumbing
- ☐ Other (please specify): _____

II. Plumbing

- ☐ If this section does not apply to your job function, check this box and continue to the next section.

16. Indicate up to four (4) of the most common plumbing code violations you see:

- ☐ Hot and cold supply reversed
- ☐ Pipes improperly supported
- ☐ DWV pipes do not pass leakage test
- ☐ Inadequate or improperly installed venting
- ☐ Improper use of fittings (turns, tees, etc.)
- ☐ Cross connections and/or contamination
- ☐ Missing or inaccessible cleanouts
- ☐ Improper notching or boring of framing
- ☐ Inadequate slope or grade provided for waste lines
- ☐ Missing or improper nail plates
- ☐ Backflow device missing or not tested
- ☐ Pressure reducing valve not in place or set correctly
- ☐ Other (please specify): _____
- ☐ If this section does not apply to your job function, check this box and continue to the next section.

17. Indicate up to four (4) of the most common code violations you see in mechanical/fuel gas systems:

- ☐ Missing or inadequate equipment/duct size calculations
- ☐ Improper HVAC equipment size
- ☐ Improper duct size
- ☐ Improper venting of appliances
- ☐ Inadequate combustion air or makeup air
- ☐ Inadequate ventilation air
- ☐ Improperly installed ductwork
- ☐ Improperly notching or boring of framing
- ☐ Improper grounding or bonding of gas piping
- ☐ Gas pipe pressure test failed
- ☐ Inaccessible joint or valves on gas piping
- ☐ Inadequate clearance to combustibles
- ☐ Duct not insulated properly
- ☐ Other (please specify): _____

- ☐ If this section does not apply to your job function, check this box and continue to the next section.

III. Electrical

- ☐ If this section does not apply to your job function, check this box and continue to the next section.

18. Indicate up to four (4) of the most common electrical code violations you see:

- ☐ Overloaded circuit
- ☐ GFCI protection
- ☐ AFCI protection
- ☐ Incorrect outlet or switch location/spacing
- ☐ Labeling of circuits
- ☐ Fixture installation
- ☐ Working space/clearances
- ☐ Grounding/bonding issue
- ☐ Incorrect service panelboard installation
- ☐ Overfilled electrical boxes
- ☐ Receptacle is not tamper resistant
- ☐ Missing or improper nail plates
- ☐ Improper cable connections
- ☐ Other (please specify):

- ☐ If this section does not apply to your job function, check this box and continue to the next section.

IV. Energy

19. Indicate up to four (4) most common energy code violations you see:

- ☐ Improper sealing of exterior walls
- ☐ Improper air sealing of penetrations (e.g. electrical, ducts, venting)
- ☐ Improper insulation R-Values, wall/floors/ceiling/basement/slab/crawl
- ☐ Improper performance path calculations (e.g. ResCheck)
- ☐ Improper installation of insulation around wiring and plumbing passing through stud cavity
- ☐ Improper installation of insulation at ceiling joist at roof rafters
- ☐ Improper installation of insulation in crawl spaces and slab on grade insulation
- ☐ Improper U-factors/SHGC of windows
- ☐ Improper duct sealing (visual)
- ☐ Failed or missing duct tightness test

- ☐ Improper duct insulation
- ☐ Insufficient high-efficiency lighting
- ☐ Other (please specify):

- ☐ If this section does not apply to your job function, check this box and continue to the next section.

V. Exterior

20. Please select up to four (4) of the most common exterior deck related code violations you see:

- ☐ Improper or inadequate ledger connection to house
- ☐ Improper guardrail or handrail installation
- ☐ Failure to follow decking manufacturer instructions
- ☐ Improper joist, beam or post size
- ☐ Improper joist spacing
- ☐ Improper post anchorage or post footings
- ☐ Improper lateral support
- ☐ Other (please specify):

- ☐ If this section does not apply to your job function, check this box and continue to the next section.

VI. Life Safety

21. Please select up to four (4) of the most common life safety code violations you see:

- ☐ Improper or inadequate fire rating
- ☐ Inadequate fire sprinkler protection
- ☐ Improper installation of smoke alarms/detectors
- ☐ Improper installation of CO alarms/detectors
- ☐ Improper installation of fire blocking
- ☐ Improper installation of draftstopping
- ☐ Inadequate means of egress
- ☐ Incorrectly sized or missing emergency escape/rescue opening
- ☐ Missing or improper window fall protection
- ☐ Failure to install correct safety glazing in required hazardous locations
- ☐ Other (please specify):

- ☐ If this section does not apply to your job function, check this box and continue to the next section.

VII. Additional Questions

22. Select up to the three (3) of the most common flashing violations most apparent in homes?

- ☐ Doors
- ☐ Windows
- ☐ Chimneys
- ☐ Siding
- ☐ Roofs
- ☐ Wood decks
- ☐ Brick veneer
- ☐ Other (please specify):

23. Are most flashing violations you see related to problems with products, installation or both?

- ☐ Products
- ☐ Installation
- ☐ Both
- ☐ Not applicable

24. Select up to four (4) of the most common grading and site drainage violations you see:

- ☐ Grade too high
- ☐ Grading
- ☐ Backfilling
- ☐ Soil conditions
- ☐ Erosion control measures not in place
- ☐ Downspouts/drainage controls
- ☐ Driveways
- ☐ Sidewalks
- ☐ Stoops

☐ Other (please specify): _____

- ☐ If this question does not apply to your job function, check this box and continue to the next question.

25. Select up to four (4) of the most common foundation-related code violations you see:

- ☐ If this question does not apply to your job function, check this box and continue to the next question.
- ☐ Incorrect footing depth
- ☐ Incorrect drain installation
- ☐ Incorrect fasteners for use below grade to attach plywood (i.e., wood foundations)
- ☐ Improper reinforcement or support of rebar
- ☐ Improper anchor bolts
- ☐ Improper foundation size
- ☐ Standing water/mud in footing or on rebar
- ☐ Missing vapor barrier
- ☐ Other (please specify): _____
- ☐ If this question does not apply to your job function, check this box and continue to the next question.

26. Select up to four (4) of the most common wall-related framing violations you see:

- ☐ Stud cut or notched to an impermissible depth
- ☐ Missing fire-blocking
- ☐ Missing studs
- ☐ Missing hold-down, straps, etc.
- ☐ Improper spacing
- ☐ Installation of sheathing
- ☐ Installation of braced or shear walls Other (please specify): _____
- ☐ If this question does not apply to your job function, check this box and continue to the next question.

27. Select up to four (4) of the most common floor-related framing violations you see:

- ☐ Notches/holes in areas not permitted
- ☐ Missing anchor bolts
- ☐ Improperly installed sheathing

- ☐ Sheathing nails missing joist
- ☐ Wrong joist size
- ☐ Wrong joist grade
- ☐ Inadequate splices
- ☐ Other (please specify): _____
- ☐ If this question does not apply to your job function, check this box and continue to the next question.

28. Select up to four (4) of the most common truss-related violations you see:

- ☐ Truss not installed according to approved plans
- ☐ Improperly connected to wall plate
- ☐ Impermissible alteration leading to additional load
- ☐ Specific truss not approved
- ☐ Temporary/erection bracing not provided
- ☐ Permanent bracing not installed
- ☐ Bracing not installed
- ☐ Metal plates not secured
- ☐ Other (please specify): _____
- ☐ If this question does not apply to your job function, check this box and continue to the next question.

29. Select up to four (4) of the most common roof covering violations you see:

- ☐ Absence or incorrect type of underlayment
- ☐ Over-driving of nails through shingles
- ☐ Broken roof tiles
- ☐ Inadequate overlap of tiles shingles or asphalt
- ☐ Improper materials
- ☐ Improper course spacing
- ☐ Missing nails or fasteners
- ☐ Product not approved or listed
- ☐ Other (please specify): _____
- ☐ If this question does not apply to your job function, check this box and continue to the next question.

30. Select up to three (3) of the most common window- or door-related code violation you see:

- ☐ Inadequate fire rating

- ☐ Footings
- ☐ Improper flashing
- ☐ Improper door weather-stripping
- ☐ Insulation rating
- ☐ Not properly fastened or installed
- ☐ Other (please specify):

- ☐ If this question does not apply to your job function, check this box and continue to the next question.

31. Select up to three (3) of the most common handrail-related code violations you see:

- ☐ If this question does not apply to your job function, check this box and continue to the next question.
- ☐ Not properly fastened or installed
- ☐ Missing handrails
- ☐ Improper graspable surface
- ☐ Improper height or spacing
- ☐ Other (please specify):

- ☐ If this question does not apply to your job function, check this box and continue to the next question.

32. Select up to three (3) of the most common guard-related code violations you see:

- ☐ Guard opening too large
- ☐ Improper placing
- ☐ Not properly fastened or installed
- ☐ Missing guardrail
- ☐ Height criteria not met
- ☐ Other (please specify):

- ☐ If this question does not apply to your job function, check this box and continue to the next question.

33. Select the three (3) most common stair-related code violations you see:

- ☐ Improper stair construction
- ☐ Stair rise and run violations
- ☐ Stair geometry issues
- ☐ Stair headroom
- ☐ Improper stair tread

☐ Other (please specify):

☐ If this question does not apply to your job function, check this box and continue to the next question.

34. Using a scale of 1 to 6 with 6 being the highest, please rate how often you feel each of the following result in code violations.

- ☐ A lack of coordination between trades
- ☐ One trade's work is damaged by another
- ☐ Inadequate manufacturer's installation instructions
- ☐ Workers ignore manufacturer's installation instructions
- ☐ Contractor's lack of code knowledge
- ☐ Cost-cutting shortcuts

35. In your experience, what percent of each type of new home has code violations? Enter a number for each between 0 and 100. Leave blank answer choices for which you have no experience or do not know the answer. (Do not enter percent signs or decimal points.)

- ☐ Starter level tract homes
- ☐ Mover-upper-level production homes
- ☐ Custom high-end homes
- ☐ Apartments, townhouses, condominiums
- ☐ Change of occupancy condominiums, loft apartments
- ☐ Manufactured homes