



International Code Council (ICC) /
National Association of Home Builders (NAHB)

COMMON CODE VIOLATIONS SURVEY

February 2013

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Overview

In December 2012 the International Code Council (ICC) and the National Association of Home Builders (NAHB) Building Product Issues Committee 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 a similar survey deployed in January 2006 by the ICC and NAHB. The survey's purpose was to highlight for builders, remodelers, and building 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.

This collaboration is intended to build upon data generated by the 2006 survey. The survey questions were not designed to count problems, but to identify specific areas during construction that builders needed to correct. 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:

- Highlight common code violations frequently found during construction
- Provide builders with a method to reduce overall project costs by identifying problem areas needing correction as they occur and before trade contractors leave the job site
- 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
- Provide clearer guidance for manufacturers in the preparation of their specifications and building designers in the preparation of their design documents

Respondents from jurisdictions of various sizes were invited to take part in a 10 minute survey online hosted by ICC. ICC emailed invitations to code officials and invited them to take the survey online.

- 6,265 emails were deployed
- 1,260 respondents
- 20% response rate

This response rate compares favorably to previous ICC efforts, and by marketing research industry standards represents a strong showing.

Cross-tabulations were calculated for several segments. It is important to note that cross-tabulations for “select-all” questions were calculated with the base of all respondents, and not based on responses for that specific question. Cross-tabulation segments include:

- Population
- Jurisdiction authority
- Position
- Tenure with code enforcement
- Region¹

Overall response percentages were calculated on respondents who answered each individual question (as opposed to percentages being based on the total number of respondents in the survey) – the most accurate representation of data. Conversely, cross-tabulations (for “select all” questions) were calculated using the total number of respondents in the survey (as opposed to being based on just the number of respondents answering each individual question). As a result, when a respondent did not answer a question, or if they had only partially completed the survey and had “dropped out” they were still “counted” in the denominator of the percentage calculation. This can lead to percentages seeming lower than they were, as well as more drastic segment comparisons.

As a general rule several trends emerged throughout the cross-tabulations:

- As jurisdiction population went up, percentage went down.
- Fire officials and fire inspectors had a lower percentage on most survey questions than building inspectors, building officials and plan reviewers.
- Respondents in code enforcement for 0-2 years had consistently lower percentages.

Alterations from (or embellishments to) these themes are noted throughout the report.

The survey had a 1.94% margin of error at a 95% confidence level. Typically, a 5% margin of error is considered the standard in association research.

¹ Due to low responses, the region segment “Pacific” was not used for cross-tabulations.

Key Research Findings

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

- **Survey respondents are primarily building officials who work in departments at the city level.** The majority come from cities with small populations – less than 50,000 people. Over two-thirds have more than ten years of experience and almost half have more than 15 years experience in code enforcement. The majority of respondents have ICC certifications as Residential Building Inspectors and Commercial Building Inspectors.
- **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. One-third of departments also offer electronic plan submittal. Additionally, just over half (51%) allow plans, permit applications, or other documents to be submitted electronically for review. Departments performed building finals (95%), footing inspections (88%), framing concealment inspections (88%), foundation inspections (86%), and mechanical final inspections (83%). Over half of respondents use the 2009 version for all ICC Codes.
- **The majority of time is spent working on residential construction and code violations were predominant in residential construction.** Over half (54%) of the respondent’s time is spent working on residential construction, however the largest populations have a higher percentage of commercial construction. One-third (33%) of residential construction (and 38% of commercial construction) is denied because of code violations. On average, 45% of residential field inspections (and 39% of commercial) result in a code violation. Respondents indicate violations occur in new homes of all types. Starter homes and apartments tend to have more violations than more expensive homes. However manufactured homes have the least number of violations occurring.
- **A lack of knowledge and attentiveness ultimately resulted in code violations.** Code officials felt that workers ignoring the manufacturers’ installation instructions was the biggest cause of code violations (mean value of 4.22). Contractors’ lack of code knowledge (4.11) and cost-cutting shortcuts (3.97) also resulted in code violations.

Longitudinal Analysis

- Officials say the predominant problem area resulting flashing violations centered on windows (49%), wood decks (38%) and roofs (36%). Code violations decreased in roofs (from 46% to 36%) and chimneys (from 43% to 33%) from 2006 to 2012. Respondents predominantly cite installation problems (66%) as the root cause of these violations, with 18% indicating a combination of flaws in products and installation as the cause.
- The most common grading and site drainage violations are when erosion control measures are not in place, at 43%. Other violations center on “grading” (42%). The biggest improvements from 2006 to 2012 were “grading” (from 62% to 42%), “downspouts and drainage” (60% to 38%) and backfilling violations (48% to 31%).

- **Foundation**-related code violations stem from improper reinforcement or support of rebar (47%), standing water/mud in footing or on rebar (42%), and improper anchor bolts (41%). There was a large decrease in the amount of improper anchor bolts (53% to 41%) and incorrect drain installation (38% to 23%) from 2006 to 2012.
- **Wall**-related framing problems occur as a result of missing fire-blocking (63%), studs cut or notched to an impermissible depth (57%), and missing hold-downs, straps, etc. (51%). There was a decrease in violations involving studs cut or notched to an impermissible depth from 2006 to 2012 (77% down to 57%).
- **Floor**-related framing violations stemmed from “notches in areas not permitted” (61%), missing anchor bolts (43%) and sheathing nails missing joists (32%). There was a decrease in violations that resulted from notches in areas not permitted (71% to 61%) as well as from sheathing nails missing joists (45% to 32%). However, 2012 revealed an increase in violations from missing anchor bolts, up nine percent from 2006, to 43%.
- The majority of truss-related violations are caused by bracing not being installed (68%) and improperly connected wall plates (55%). The number of violations caused by impermissible alterations leading to additional load decreased over the past six years from 60% to 42%.
- **Roof coverage** violations are most commonly caused by either a lack of nails (or missing nails/fasteners, 39%) or too much force applied to the nail (over-driving of nails through shingles, 33%). Both instances showed a ten percent decrease in violations from 2006 to 2012.
- **Window- or door**-related code violations that have to do with “improper flashing” as reported by one third (36%) of cases and “inadequate fire rating” one-quarter (22%) of the time. 2012 results revealed a 21% decrease in violations due to improper flashing, from 57% to 36%.
- The most common handrail-related code violations stem from “improper height or spacing” (64%), and “improper graspable surface” (60%), and “missing handrails” (49%). The number of violations due to improper graspable surfaces remained steady at 60% from 2006 to 2012. However, there was a decrease in violations due to missing handrails, from 60% to 49%.
- Violations from guardrail issues are most commonly due to the guardrail opening being too large (63%). Violations are also caused because height criteria has not been met (56%), and because the guardrail was not properly fastened or installed (50%). The percentage of guardrail related code violations went up just one percent from 2006 to 2012, from 49% to 50%.
- The most common stair-related code violations are stair rise and run violations (72%) and stair headroom (52%). There was an increase in violations due to improper stair construction since 2006 – from 31% to 37% in 2012.

Survey Findings

Participant Profile

Which of the following choices best describes your position at your building department?		
	2006	2012
<i>Sample Size</i>	?	969
Building Official	48%	46%
Building Inspector	27%	27%
Plan Reviewer	8%	11%
Fire Official	4%	9%
Fire Inspector	3%	7%
Other	11%	
Which of the following choices best describes your department's level of authority?		
<i>Sample Size</i>	?	1006
City level	73%	71.8%
County level	18%	24.0%
State level	8%	5.7%
Federal level	1%	0.8%
What is the approximate population of the jurisdiction in which you work?		
<i>Sample Size</i>	?	1045
Under 50,000	56%	52%
50,000 to 149,999	21%	25%
150,000 to 999,999	15%	18%
1,000,000 or more	8%	5%
What state/region do you live?		
<i>Sample Size</i>	-	1090
South	-	31%
West	-	27%
Midwest	-	27%
Northeast	-	15%
Pacific	-	1%

- ← Similar to 2006 respondents, 2012 survey participants are primarily building officials (46%). Nearly one-quarter (27%) of respondents are building inspectors, and eleven percent are plan reviewers.
- ← Like the 2006 survey, the majority of participants (72%) work in a department with authority at the city level. About one-quarter (24%) of participants have authority at the county level – a slight jump from 2006 respondents.
- ← The majority of survey respondents work in a jurisdiction with a population under 50,000. One-quarter (25%) have a population of 50,000 to 149,000. Only five percent have a population of one million or more.
- ← Respondents were primarily from the South (31%), the West (27%) and the Midwest (27%).

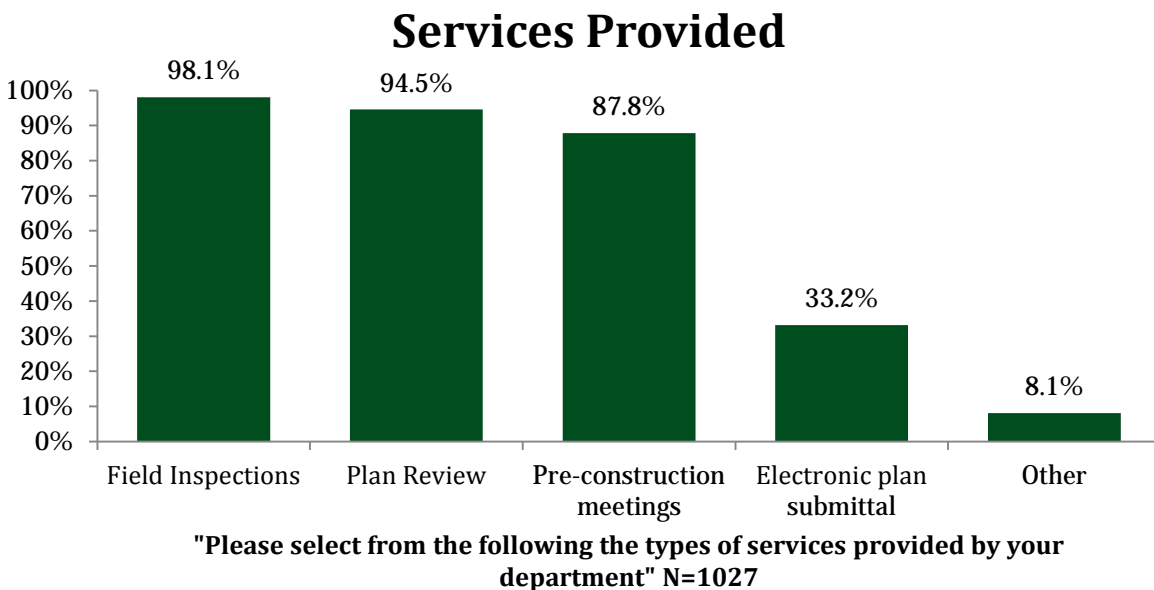
Please select the number of years you have been in code enforcement:		
	2006	2012
<i>Sample Size</i>	-	1121
0-2 years	-	5%
3-5 years	-	6%
6-10 years	-	21%
11-15 years	-	21%
16 or more years	-	47%
Please select all ICC Certifications that you currently hold		
<i>Sample Size</i>	-	931
Residential Building Inspector	-	62%
Commercial Building Inspector	-	52%
Building Plans Examiner	-	40%
Residential Mechanical Inspector	-	39%
Residential Plumbing Inspector	-	36%
Certified Building Official	-	36%
Commercial Mechanical Inspector	-	32%
Commercial Plumbing Inspector	-	29%
Residential Electrical Inspector	-	29%
Fire Inspector	-	22%
Residential Plans Examiner	-	19%
Commercial Electrical Inspector	-	18%
Property Maintenance and Housing Inspector	-	16%
Residential Energy Inspector	-	15%
Mechanical Plans Examiner	-	14%
Plumbing Plans Examiner	-	14%
Commercial Energy Inspector	-	12%
Fire Plans Examiner	-	10%
Electrical Plans Examiner	-	7.8%
Commercial Energy Plans Examiner	-	7.7%
Zoning Inspector	-	6.7%
Master Code Professional	-	5.7%
Certified Fire Marshal	-	5.2%
Permit Technician	-	3.1%
Green Building- Residential Examiner	-	1.5%
IgCC Commercial Inspector	-	1.0%
IgCC Plans Examiner	-	0.3%
Special Inspector or Other	-	12%

← 2012 survey respondents have a long tenure in code enforcement. The majority (68%) have been in code enforcement for more than 10 years, and 47% for 16 or more years.

← The primary certifications held are Residential Building Inspector (62%), Commercial Building Inspector (52%), and Building Plans Examiner (40%).

Departments and Jurisdictions

ICC 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 (95%) indicated they provide plan reviews. Additionally, a majority of respondents (88%) provide pre-construction meetings. Only one-third (33%) provide electronic plan submittals. Only one-third (33%) provide electronic plan submittals.

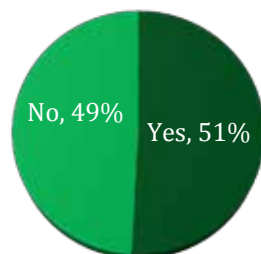


Respondents with the least amount of tenure (0-2 years of working in code enforcement) were the least likely to select any of services provided.

Certain segments were more likely to provide electronic plan submittals than others.

- In terms of population, the largest segment was the most likely to provide electronic plan submittals, as indicated by 38% of respondents from 1M+ populations compared to the smallest populations (32%).
- Respondents with authority on the county level were most likely to use electronic plan submittal (35%) compared to 25% of respondents with authority on the federal level.
- Plan reviewers and building officials were more likely to use electronic plan submittals than fire officials (38% and 36% respectively, compared to 25% of fire officials).
- Respondents from the West were more likely to provide electronic plan submittals than respondents from the Northeast (36% vs. 26%).

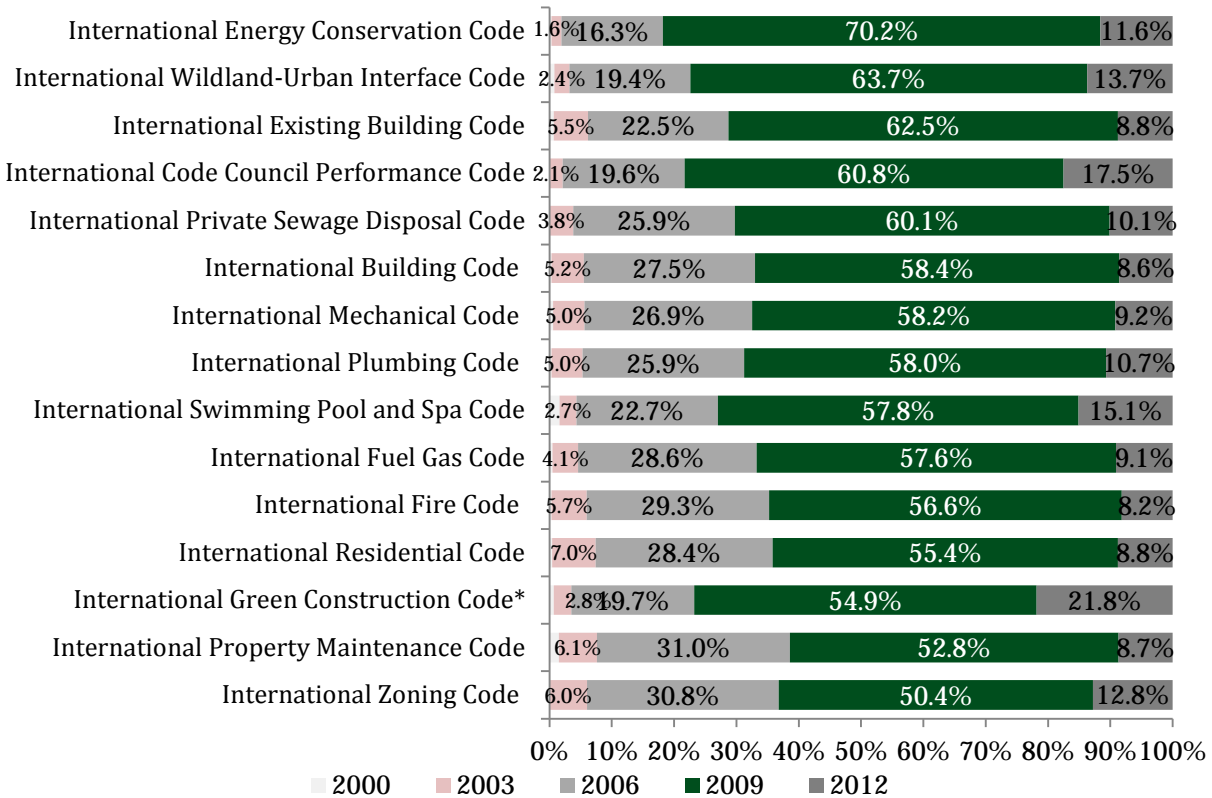
Does your building department allow plans, permit applications, or other documents to be submitted electronically for review?
N=1015



Just over half (51%) of respondents' building departments allow plans, permit applications, or other documents to be submitted electronically for review.

Survey respondents were asked to indicate what version of ICC Codes is used in their jurisdictions. Over half of all respondents said their jurisdiction was using the 2009 version of all ICC Code types. In particular, seven out of ten (70%) of respondents use the 2009 version for the International Energy Conservation Code. Respondents also use 2009 for the International Wildland-Urban Interface Code (64%), the International Existing Building Code (63%), International Code Council Performance Code (61%), and the International Private Sewage Disposal Code (60%).

Version of ICC Codes Used



"Please select the version(s) of the ICC Codes your jurisdiction uses" N=970

*Please note: IgCC first became available in 2012, but some jurisdictions may have made their selection on earlier releases of IgCC Public Version 1.0 or 2.0

When Respondents were asked to indicate what types of inspections are performed by their departments, almost all (95%) said the building final is performed. Framing concealment (88%), footing (88%), foundation (86%), mechanical final (83%), and underground plumbing (82%) are all very common inspections. Drywall inspections are the least performed, but still by over half (53%).

Types of Inspections Performed²						
	Total	Building Inspector	Building Official	Fire Inspector	Fire Official	Plan Reviewer
<i>Sample Size</i>	969	263	447	65	83	111
Building Final	95%	89%	89%	63%	61%	89%
Footing	88%	88%	87%	32%	20%	87%
Framing Concealment	88%	87%	88%	35%	28%	86%
Foundation	86%	86%	87%	31%	22%	85%
Mechanical Final	83%	81%	81%	32%	27%	82%
Underground Plumbing	82%	77%	82%	34%	23%	82%
Plumbing Final	80%	76%	82%	23%	19%	81%
Plumbing Concealment	79%	76%	82%	23%	16%	78%
Insulation Inspection	79%	77%	80%	25%	13%	78%
Use and Occupancy Inspection	79%	71%	72%	68%	63%	69%
Slab	76%	76%	74%	28%	22%	76%
Electrical Concealment Electrical Service Inspection	73%	65%	77%	28%	18%	70%
Drain, Waste and Vent Testing	73%	69%	77%	23%	14%	69%
Duct Inspection	73%	73%	72%	28%	17%	76%
Electrical Final	73%	65%	76%	28%	19%	73%
Energy Concealment Mechanical Concealment	72%	67%	75%	22%	14%	75%
Exterior Wall/Roof Flashing Inspection	62%	60%	60%	18%	18%	59%
Energy Final	62%	55%	67%	25%	14%	59%
Drywall Inspection	53%	45%	52%	28%	17%	56%

When examining the results by segments, it is not surprising that fire inspectors as well as fire officials are the least likely respondents to perform inspections. However, both fire respondents are most likely to perform building finals (63% and 61%, respectively) as well as use and occupancy inspections (68% and 63%, respectively).

Departments with authority at the state level are most likely not to perform inspections involving plumbing: Underground plumbing (33%), plumbing concealment (37%), and plumbing final (39%) versus departments with authority at the city level (75%, 73%, and 73% respectively).

Regionally, the Midwest performed more building finals (81%), framing concealment (76%), and footing (74%) inspections than other regions. The western region performed more foundation (74%) and mechanical final (71%) inspections.

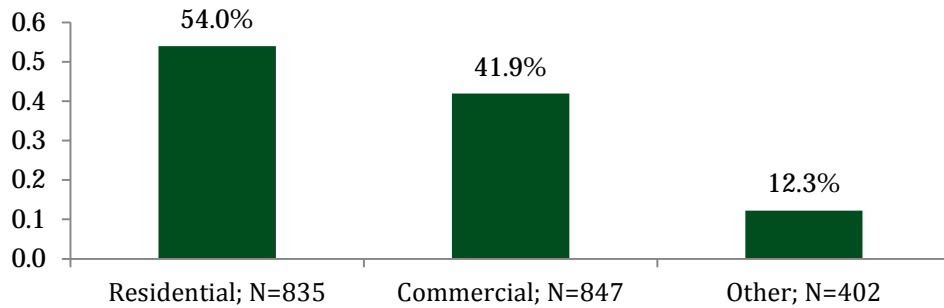
² Total column is based on only respondents answering the question. Cross-tabulation columns are based on all respondents.

Types of Inspections Performed ³ (By Region)					
	Total	Northeast	Midwest	South	West
Building Final	95%	74%	81%	74%	80%
Framing Concealment	88%	70%	76%	69%	73%
Footing	88%	71%	74%	68%	73%
Foundation	86%	72%	72%	65%	74%
Mechanical Final	83%	61%	69%	66%	71%
Underground Plumbing	82%	63%	70%	62%	70%
Plumbing Final	80%	63%	66%	63%	68%
Use and Occupancy Inspection	79%	71%	64%	60%	68%
Plumbing Concealment	79%	63%	65%	61%	68%
Insulation Inspection	79%	71%	59%	61%	68%
Slab	76%	61%	60%	64%	61%
Electrical Final	73%	52%	65%	62%	55%
Electrical Concealment Electrical Service Inspection	73%	53%	65%	62%	54%
Drain, Waste and Vent Testing	73%	61%	54%	55%	69%
Duct Inspection	73%	55%	59%	58%	64%
Energy Concealment Mechanical Concealment	72%	58%	58%	57%	63%
Energy Final	62%	58%	47%	48%	55%
Exterior Wall/Roof Flashing Inspection	62%	45%	45%	51%	59%
Drywall Inspection	53%	41%	37%	31%	63%

³ Total column is based on only respondents answering the question. Cross-tabulation columns are based on all respondents.

More time is dedicated to residential construction than commercial – 54% compared to 42%.

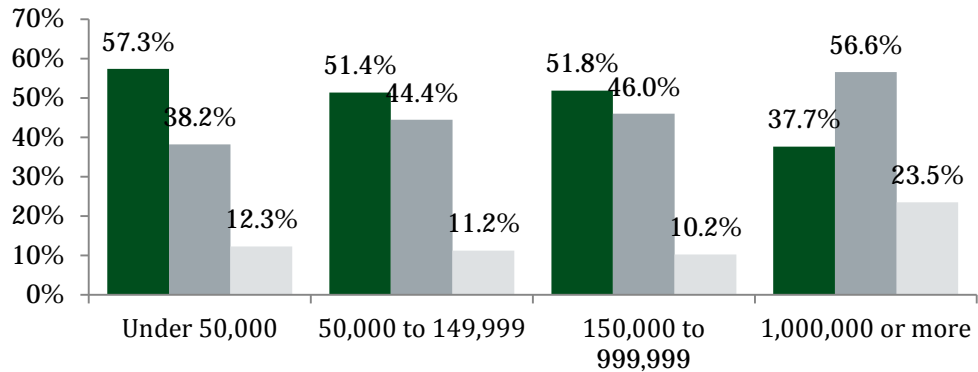
% Residential vs. Commercial



"Based on the number of permits issued and inspections performed annually, please indicate the percentage of time dedicated to commercial versus residential and other construction"

The graph to the right demonstrates the trend that the smaller a jurisdiction's population, the higher percentage of residential construction. Conversely, the larger the population, more time is dedicated to commercial construction.

% Residential vs. Commercial (By Population)



"Percentage of time dedicated to commercial versus residential and other construction" by Population of Jurisdiction

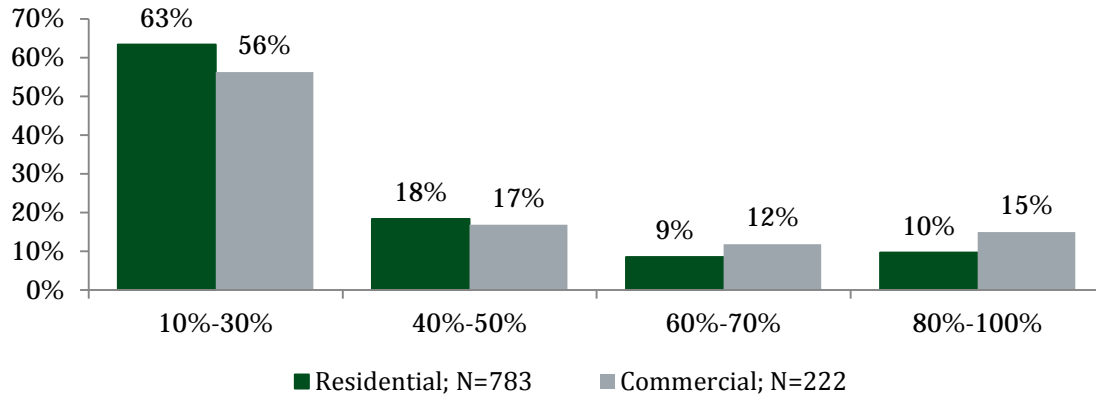
■ Residential ■ Commercial ■ Other

Additionally, in terms of region, time is dedicated to commercial (and residential) construction fairly evenly throughout the regions, as shown in the chart below.

Percentage of time dedicated residential or commercial (by region)				
	Northeast	Midwest	South	West
Residential	55%	53%	55%	54%
Commercial	40%	43%	42%	42%
Other	13%	12%	13%	11%

On average, residential plans are the least likely to be denied due to code violations. Sixty-three percent (63%) of respondents indicated that 10 to 30 percent of residential codes were denied due to code violations. More respondents indicated that there was a higher frequency of commercial plan denials, and 15% said that 80-100% of commercial plans were denied – compared to ten percent of residential plans. On average, respondents rated the frequency of residential plans denied as **33.2%** and commercial plans were denied at **38.2%**.

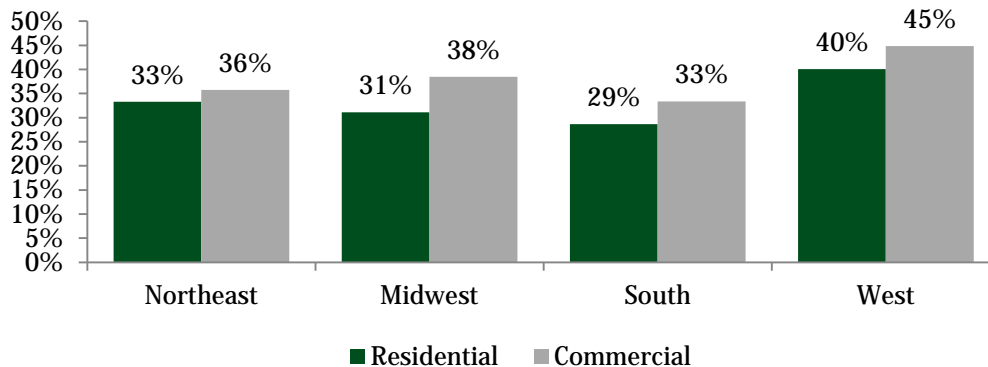
Frequency of Plan Denial (due to code violations)



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

Respondents from the West saw more plans denied for both residential (40%) and commercial (45%) construction. Respondents from the south saw the least number of plans denied to both residential (29%) and commercial (33%) construction.

% Plans Denied Due to Code Violations (By Region)



"On average, how often are plans denied due to code violations?"
by Region

Respondents indicated that for those mostly involved with commercial construction, most plan deficiencies were found in terms of general design (53%), as well as accessibility (38%). Commercial plans with the least amount of deficiencies were energy (13%) and plumbing (14%). For residential, the majority of plan deficiencies were found in general design (62%) and accessibility (52%), while areas with the least problem areas were in mechanical (19%) and plumbing (14%). However, in residential plan reviews, the violations noted for accessibility should exclude single-family dwellings and should be limited to those multifamily projects that must adhere to Americans with Disabilities Act and Fair Housing Act guidelines.

Areas with Plan Deficiency By Residential and Commercial Construction				
	Mostly (75%+) Commercial	Somewhat (50-74%) Commercial	Somewhat (50-74%) Residential	Mostly (75%+) Residential
General Design	53.2%	62.2%	60.0%	61.8%
Accessibility*	37.9%	69.3%	55.1%	51.8%
Structural	17.7%	40.9%	45.7%	45.7%
Energy	12.9%	40.2%	33.4%	40.2%
Electrical	18.5%	16.5%	22.3%	21.1%
Mechanical	18.5%	22.8%	19.1%	18.6%
Plumbing	13.7%	14.2%	14.9%	13.6%
Other	33.1%	12.6%	8.3%	10.6%

* The violations noted for accessibility exclude single- family dwellings and should be limited to those multifamily projects that must adhere to Americans with Disabilities Act and Fair Housing Act guidelines.

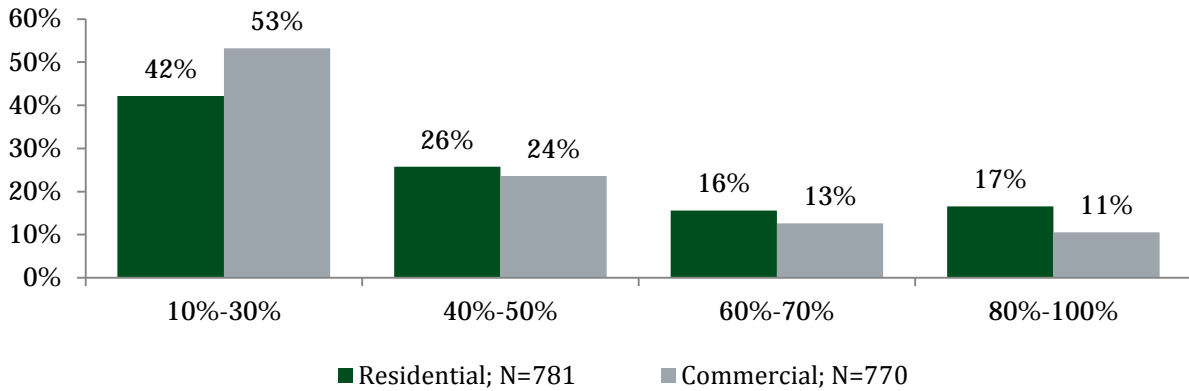
Plan reviewers saw plan deficiencies more often than other positions in general design (63%) and accessibility (58%), compared to the average of 53% and 49%, respectively. Additionally, building officials saw more structural deficiencies with (43%, compared to the average of 36%).⁴ Regionally, the Midwest was the most deficient in general design (53%), and the West was the most deficient when it came to the areas of accessibility (50%) and structural (41%).

In what three (3) areas are plans most often deficient?				
	Northeast	Midwest	South	West
General design	43%	53%	45%	51%
Accessibility	46%	43%	38%	50%
Structural	23%	32%	31%	41%
Energy	35%	24%	23%	29%
Electrical	13%	16%	20%	17%
Mechanical	18%	17%	15%	14%
Plumbing	14%	11%	11%	9%
Other	9%	13%	11%	12%

⁴ Cross-tabulation statistics are based on all respondents, so anomalies may exist.

On average, code violations were found less often in commercial buildings than in residential buildings. Over half (53%) of respondents said there were code violations found in 10-30% of the field inspections for commercial buildings (compared to 42% of residential field inspections). However, on an average, respondents rated the frequency of residential code violations found at **45.0%** and commercial plan code violations were found to be slightly lower at **38.8%**.

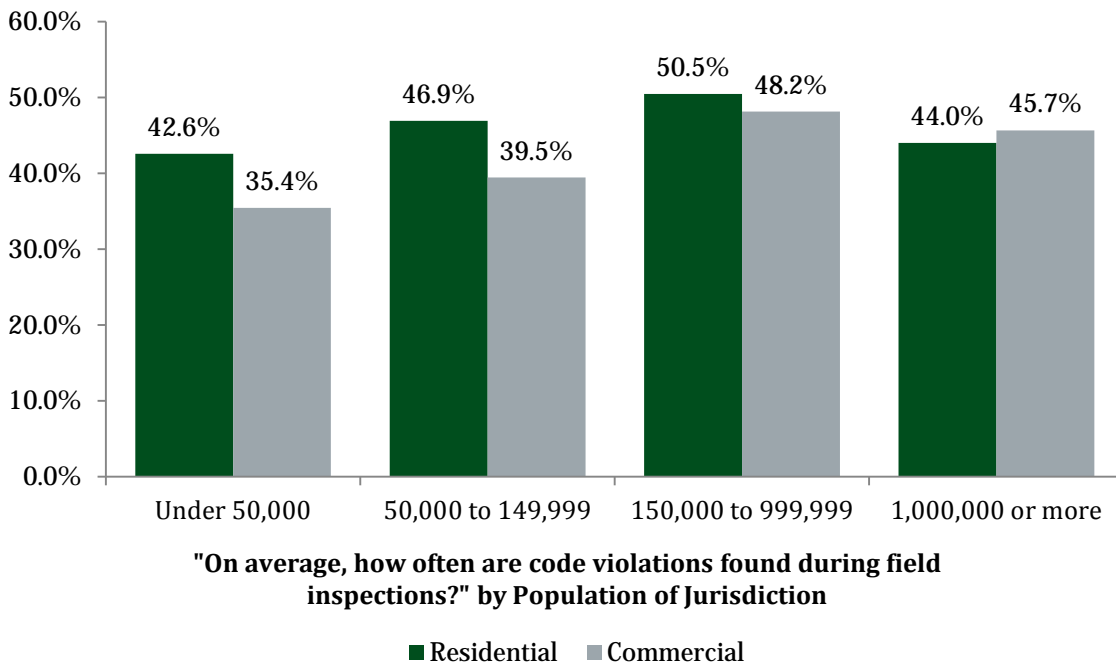
Frequency of Code Violations



"On average, how often are code violations found during field inspections?"

The graph below illustrates that as population size increases, the number of code violations found in commercial construction also increases.

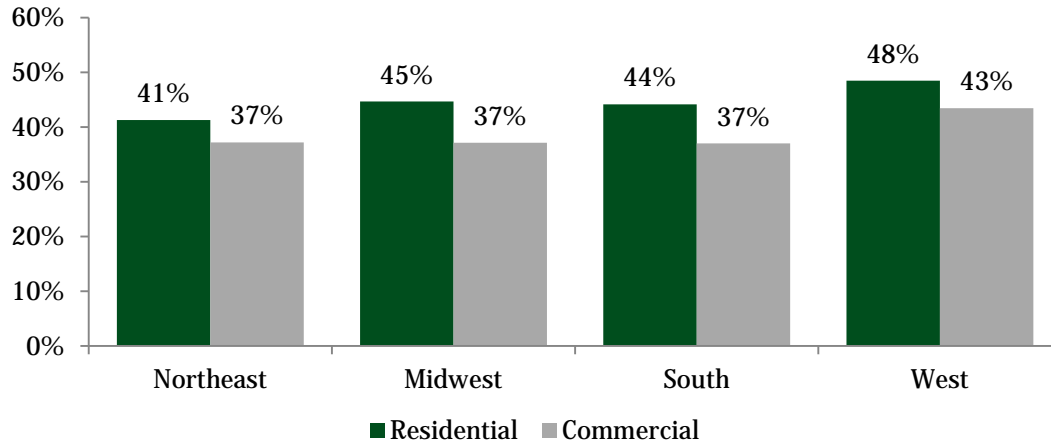
Frequency of Code Violations Found (By Population)



"On average, how often are code violations found during field inspections?" by Population of Jurisdiction

Regionally there were few differences in the frequency of code violations found. However, respondents from the West region had more code violations both in residential (48%) and commercial (43%) construction.

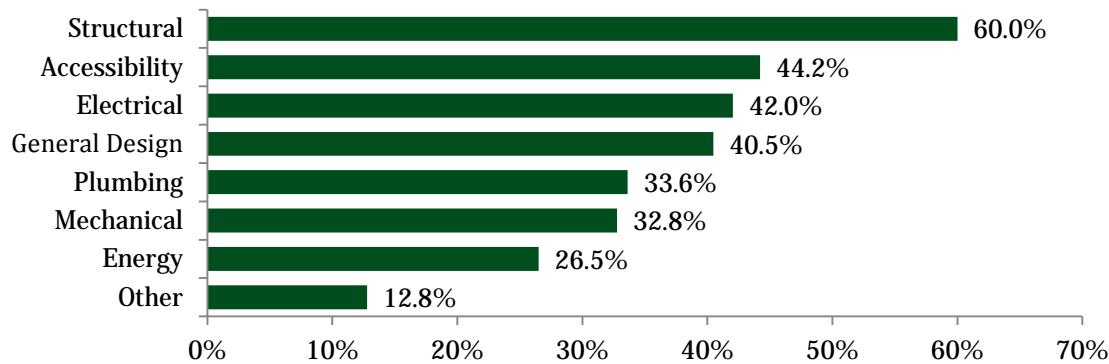
Frequency of Code Violations Found (By Region)



"On average, how often are code violations found during field inspections" by Region

Survey respondents were asked what three areas field inspections were most often deficient, and respondents indicated there was a structural deficiency, at 60%. Accessibility (44%), electrical (42%), and general design (41%) were also identified as deficiencies in the field inspections.

Deficiency in Field Inspections

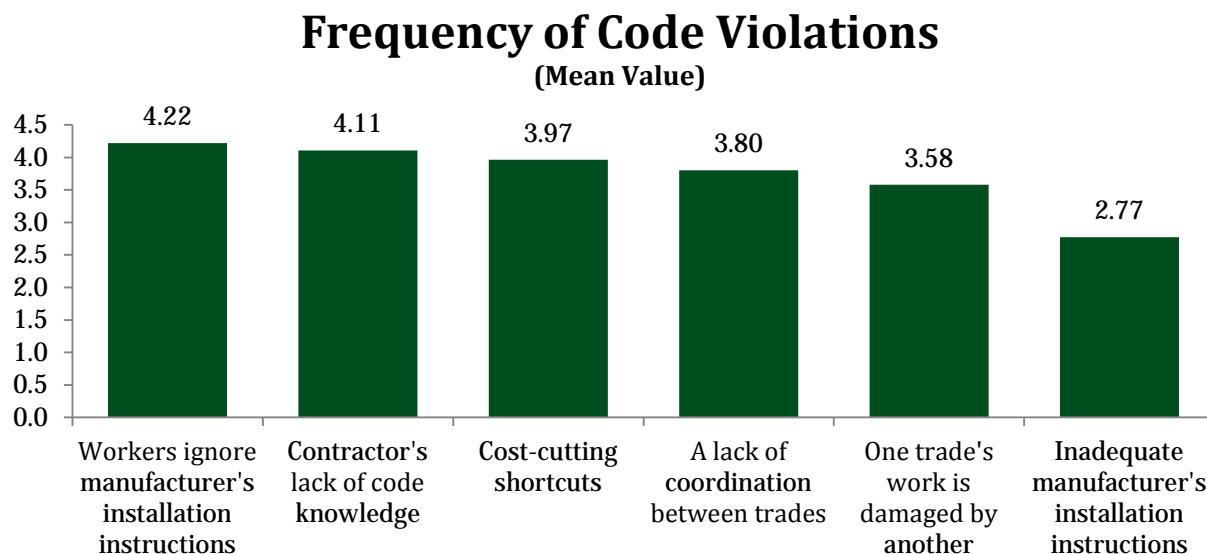


"In what three (3) areas are field inspections most often deficient?"; N=830

While departments from the largest jurisdictions typically displayed the smallest percentage in most areas, they were the most likely to report a deficiency in the general design of field inspections (38% compared to the average of 32%).⁵ Respondents from the South region were more likely to report deficiencies in electrical field inspections than respondents in the Northeast (39% vs. 24%, respectively).

⁵Cross-tabulation statistics are based on all respondents, so anomalies may exist.

Respondents were asked to rate how often certain actions ultimately resulted in a code violation. On a scale of 1 to 5, where 1="never causes code violations" and 5="causes a large number of code violations," respondents said workers ignoring manufacturer's installation instructions was the most likely reason for a code violation (mean value of 4.22). The contractor's lack of code knowledge was also a frequent code violation (mean value of 4.11). The most common code violations tend to result ultimately from human error, and code violations were least frequently caused by inadequate manufacturer's installation instructions (mean value of 2.77).



"Using the scale of 1 to 5 below, please rate how often you feel each of the following result in code violations" (1=Never causes code violations, 5=Causes a large number) N=774

Segmenting this data revealed that building officials were the most likely to feel that workers ignoring manufacturer's installation instructions result in a code violation, especially compared to fire officials (a mean value of 4.32 compared to 3.84). Fire inspectors were more likely to feel a lack of coordination between trades would lead to a code violation than building inspectors (mean value of 4.22 versus 3.59). Fire officials were also the least likely to feel that a contractor's lack of code knowledge (3.91) and inadequate manufacturer's installation instructions (2.47) would lead to code violations.

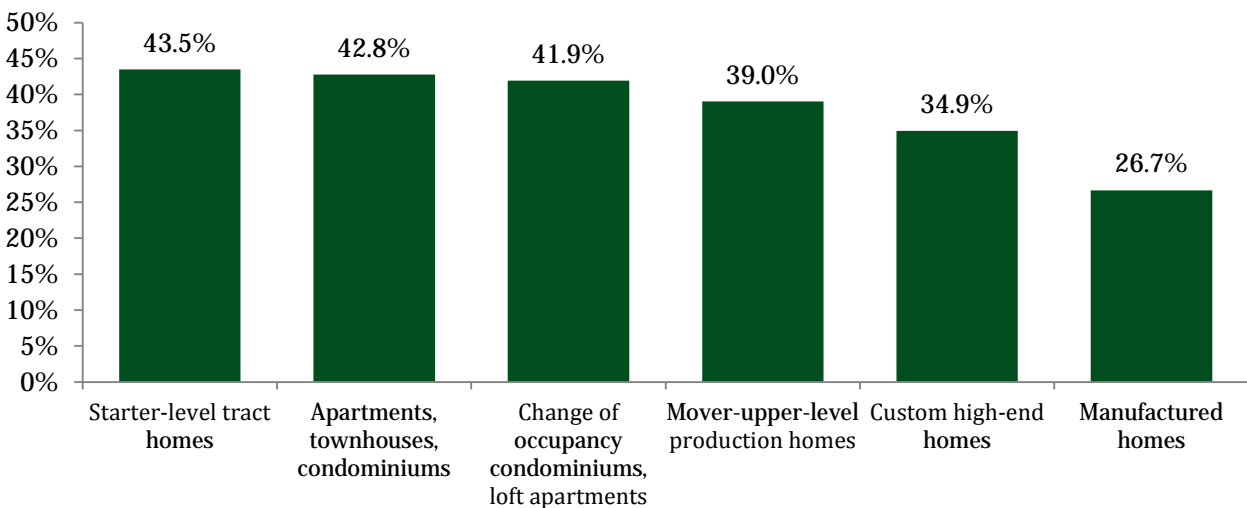
Using the scale of 1 to 5 below, please rate how often you feel each of the following result in code violations						
	Total	Building Inspector	Building Official	Fire Inspector	Fire Official	Plan Reviewer
Workers ignore manufacturer's installation instructions	4.22	4.16	4.32	4.03	3.84	4.17
Contractor's lack of code knowledge	4.11	4.09	4.17	4.11	3.91	4.08
Cost-cutting shortcuts	3.97	3.83	3.99	4.11	4.00	4.14
A lack of coordination between trades	3.80	3.59	3.88	4.22	3.91	3.89
One trade's work is damaged by another	3.58	3.57	3.62	3.41	3.45	3.64
Inadequate manufacturer's installation instructions	2.77	2.79	2.87	2.54	2.47	2.66

Segmenting by region revealed that jurisdictions in the South were the most likely to feel that workers ignoring manufacturer’s installation instructions result in a code violation and resulted in a mean value of 4.19. Respondents from the South were also the most likely to feel that cost-cutting shortcuts resulted in a code violations, especially compared to respondents from the Midwest (a mean value of 4.04 compared to 3.66).

Using the scale of 1 to 5 below, please rate how often you feel each of the following result in code violations.				
	Northeast	Midwest	South	West
Workers ignore manufacturer's installation instructions	4.14	4.06	4.19	4.07
Contractor's lack of code knowledge	4.10	4.00	4.04	3.99
Cost-cutting shortcuts	3.82	3.66	4.04	3.87
A lack of coordination between trades	3.70	3.67	3.68	3.77
One trade's work is damaged by another	3.47	3.44	3.55	3.44
Inadequate manufacturer's installation instructions	2.53	2.63	2.72	2.69

Less expensive homes were more likely to have code violations than more expensive homes. Starter-level tract homes had the highest percentage of code violations, at 44%. Apartments, townhouses and condominiums (43%) and change of occupancy condominiums (42%) had a high percentage of code violations. However, manufactured homes were least likely to have any code violations, at 27%.

% of Code Violations (By Type of Home)



"In your experience, what percent of each type of new home would you estimate have code violations? Enter a number for each between 0 and 100"

The chart below illustrates that the largest populations were the most likely to have code violations in each type of home. Particularly, the respondents from 1M+ populations see more code violations in change of occupancy condominiums and loft apartment construction (63%) than mid-populated jurisdictions (38%). Jurisdictions with 1M+ were also more likely to have code violations in starter-level tract homes (60%) compared to mid-populated jurisdictions (41%).

In your experience, what percent of each type of new home would you estimate have code violations? Enter a number for each between 0 and 100. (By Population Size)					
	Total	Under 50,000	50,000 to 149,999	150,000 to 999,999	1,000,000 or more
Starter-level tract homes	43.4%	41.9%	41.3%	47.8%	60.0%
Apartments, townhouses, condominiums	42.8%	40.9%	42.5%	46.2%	52.0%
Change of occupancy condominiums, loft apartments	41.9%	41.2%	38.1%	44.1%	62.9%
Mover-upper-level production homes	39.0%	37.2%	38.4%	42.8%	52.3%
Custom high-end homes	34.9%	32.8%	34.0%	40.7%	46.2%
Manufactured homes	26.7%	27.1%	22.7%	26.8%	41.1%

Segmenting the data by region revealed that respondents from the West felt code violations happened at a higher rate for all home types. Conversely, respondents from the Northeast reported that code violations happened at a lower rate for all home types.

In your experience, what percent of each type of new home would you estimate have code violations? Enter a number for each between 0 and 100. (By Region)				
	Northeast	Midwest	South	West
Starter-level tract homes	39%	42%	45%	45%
Apartments, townhouses, condominiums	37%	44%	41%	47%
Change of occupancy condominiums, loft apartments	40%	42%	40%	45%
Mover-upper-level production homes	34%	39%	39%	42%
Custom high-end homes	27%	36%	34%	39%
Manufactured homes	24%	29%	25%	27%

Longitudinal Analysis

Flashing Violations

Respondents indicated that flashing violations were the most apparent at the windows by almost half (49%). Flashing violations were also apparent at the wood deck (38%), roof (36%), and chimney (33%). According to results, there is an apparent decrease in flashing violations at the roof (36%, down from 46% in 2006) and chimney (33%, down from 43% in 2006).

Where on the home are flashing violations most apparent? (Select all that apply.)		
	2006	2012
<i>Sample Size</i>	1193	788
Windows	47%	49%
Wood Deck	39%	38%
Roof	46%	36%
Chimney	43%	33%
Brick Veneer	27%	27%
Doors	25%	26%
Siding	20%	19%
Not Applicable	-	15%
Other	4%	-

Respondents indicated that flashing violations were most likely related to installation, according to two-thirds of respondents (66%). Eighteen percent (18%) said there were flashing violations with both the products and installation, and only one percent had flashing violations with products. Results revealed a decrease in flashing violations from 2006 to 2012 for installation, down 16 percent. However, a portion of this difference is likely made up from the addition of a “not applicable” option in the 2012 survey, chosen by 16% of respondents.

Are most flashing violations you see related to problems with products, installation or both?		
	2006	2012
<i>Sample Size</i>	1191	785
Installation	82%	66%
Products	1%	1%
Both	17%	18%
Not Applicable	-	16%

Grading and Site Drainage

The most common grading and site drainage violations were erosion control measures not in place (43%), grading (42%), and downspouts and drainage controls (38%). Comparing results from 2006 and 2012 revealed that there was a decrease in grading and site drainage violations in grading (down 20% from 62% to 42%), downspouts/drainage controls (down 22%), backfilling (down 17%), and grade too high (down 13%).

Please select the three grading and site drainage violations you see most often.		
	2006	2012
<i>Sample Size</i>	1260	791
Erosion control measures not in place	-	43%
Grading	62%	42%
Downspouts/ drainage controls	60%	38%
Backfilling	48%	31%
Grade too high	42%	29%
Soil conditions	18%	14%
Driveways	15%	7%
Sidewalks	7%	5%
Stoops	5%	4%
Other	5%	
Not applicable	-	5%

Foundation

The most common foundation-related code violations were improper reinforcement or support of rebar (47%), standing water/mud in footing or on rebar (42%), and improper anchor bolts (41%). The most noticeable difference in results revealed a decrease in improper anchor bolts (down 12% from 53% to 41%), and incorrect footing depth (down 15% from 38% to 23%).

Please select the three most common foundation-related code violations you see		
	2006	2012
<i>Sample Size</i>	1132	780
Improper reinforcement or support of rebar	55%	47%
Standing water/mud in footing or on rebar	-	42%
Improper anchor bolts	53%	41%
Incorrect footing depth	37%	34%
Incorrect drain installation	38%	23%
Missing vapor barrier	28%	19%
Improper foundation size	18%	8%
Incorrect fasteners	8%	4%
Other	11%	-
Not Applicable	-	5%

Framing Violations

Respondents were asked to share the most common wall-related framing violations seen in buildings. Almost two-thirds of respondents see missing fire-blockings (63%), studs cut or notched to impermissible depth (57%), and missing hold-downs, straps, etc. (51%).

Examining results from year-to-year revealed a noticeable difference in violations from studs cut or notched to an impermissible depth (down 20% from 77% to 57%). There was also a decrease in violations from installation of sheathing, from 31% to 17%. Additionally, there was the addition of two wall-related violations from 2006 to 2012. Violations from truss not installed according to approved plans happened at 33% and violations involving sheer wall insulation happened at 12%.

Please select the three most common wall-related framing violations you see		
	2006	2012
<i>Sample Size</i>	1208	788
Missing fire-blocking	75%	63%
Stud cut or notched to an impermissible depth	77%	57%
Missing hold-downs, straps, etc.	59%	51%
Truss not installed according to approved plans	-	33%
Installation of sheathing	31%	17%
Sheer wall insulation	-	12%
Missing studs	9%	5%
Improper spacing	10%	4%
Other	11%	-
Not applicable	-	3%

The most common floor-related framing violations were notches in areas not permitted (61%), missing anchor bolts (43%), and sheathing nails missing the joist (32%). Only six percent of respondents reported a violation with the wrong joist grade. The past six years showed a decrease in violations from notches in areas not permitted (down ten percent from 71% to 61%). There was also a decrease in violations from sheathing nails missing the joist (45% to 32%). However, violations from missing anchor bolts increased from 2006 to 2012, from 34% to 43%.

Please select the three (3) most common floor-related framing violations you see		
	2006	2012
<i>Sample Size</i>	?	763
Notches in areas not permitted	71%	61%
Missing anchor bolts	34%	43%
Sheathing nails missing joist	45%	32%
Inadequate splices	27%	26%
Wrong joist size	22%	16%
Improperly installed sheathing	18%	15%
Wrong joist grade	12%	6%
Other	11%	-
Not Applicable	8%	5%

Truss

The most common truss-related violations were when the bracing was not installed (68%) and improper connection to the wall plate (55%). Another common truss-related violation was an impermissible alteration leading to additional load – four-tenths of respondents (42%) saw this violation, a decrease from 60% in 2006.

Please select the three (3) most common truss-related violations you see		
	2006	2012
<i>Sample Size</i>	?	782
Bracing not installed	74%	68%
Improperly connected to wall plate	57%	55%
Impermissible alteration leading to additional load	60%	42%
Specific truss not approved	21%	14%
Metal plates not secured	20%	17%
Other	12%	-
Not Applicable	8%	5%

Roof

Missing nails or fasteners and over-driving nails through shingles were the most common roof coverage violations in 2012 at 39% and 33%, respectively. Both of these violations showed a ten percent improvement from the 2006 survey results.

Please select the three (3) most common roof coverage violations you see:		
	2006	2012
<i>Sample Size</i>	?	745
Missing nails or fasteners	49%	39%
Over-driving of nails through shingles	43%	33%
Absence of felt, or incorrect type	35%	28%
Inadequate overlap of tiles, shingles or asphalt	27%	18%
Improper materials	13%	15%
Product not approved or listed	8%	11%
Improper course spacing	13%	8%
Broken roof tiles	9%	5%
Other	13%	-
Not Applicable	17%	12%

Window and Door

Improper flashing is the most common window or door related code violation seen by survey respondents, at 36%. This is down over 20% from the 2006 survey, where 57% of respondents saw improper flashing violations.

Please select the single most common window- or door-related code violation you see		
	2006	2012
<i>Sample Size</i>	?	748
Improper flashing	57%	36%
Inadequate fire rating	22%	22%
Improper door weather-stripping	-	10%
Insulation rating	-	9%
Egress	7%	-
Safety Glazing	6%	-
Other	6%	-
Footings	1%	0%
Not Applicable	-	9%

Handrail, Guardrail, and Stairs

The most common handrail-related code violations were improper height or spacing (64%) and improper graspable surface (60%). The percentage of improper height or spacing violations decreased from the 2006 survey by seven percent. However, the most noticeable difference from the 2006 survey is the decrease in missing handrail violations, down eleven percent from 60% in 2006 to 49% in 2012.

Please select the three (3) most common handrail-related code violations you see		
	2006	2012
<i>Sample Size</i>	?	782
Improper height or spacing	71%	64%
Improper graspable surface	60%	60%
Missing handrails	60%	49%
Not properly fastened or installed	44%	44%
Other	9%	-
Not Applicable	6%	3%

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.

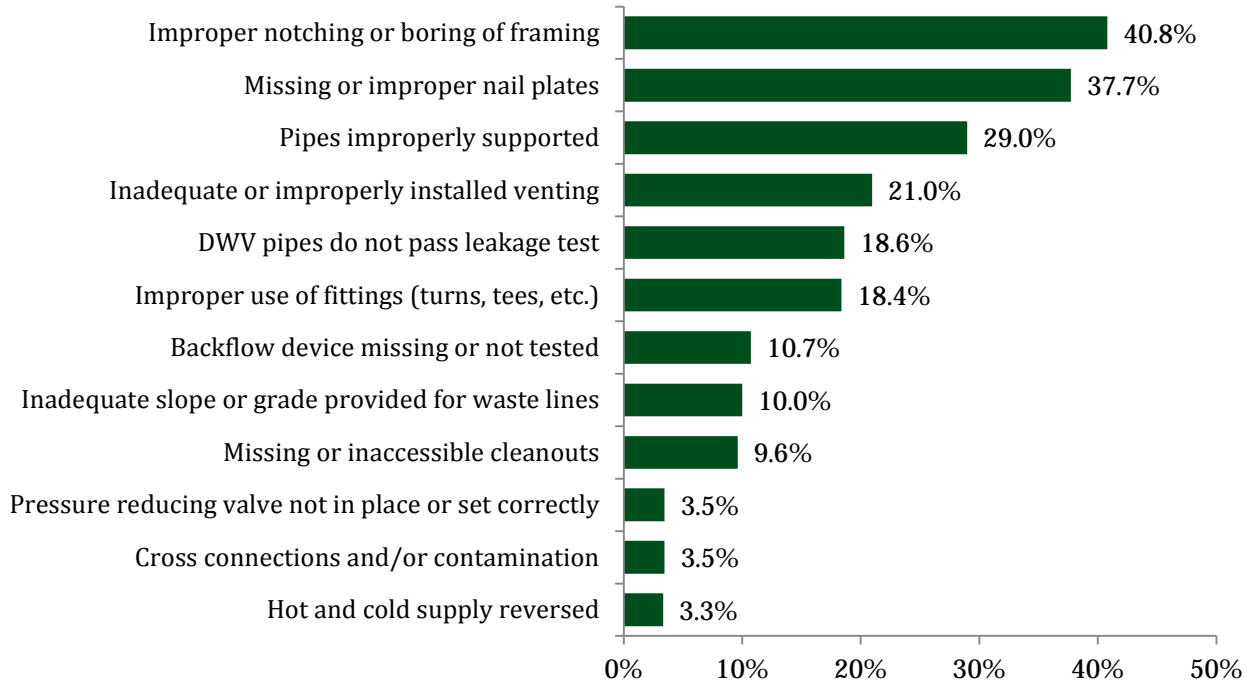
Please select the three (3) most common guardrail-related code violations you see		
	2006	2012
<i>Sample Size</i>	?	775
Guardrail opening too large	69%	63%
Height criteria not met	60%	56%
Not properly fastened or installed	49%	50%
Missing guardrail	45%	35%
Improper placing	21%	16%
Not Applicable	8%	4%
Other	3%	-

Two stair-related code violations stood out to survey respondents. About three-fourths (72%) of respondents said they saw stair rise and run violations. Over half (52%) saw stair headroom violations. While the stair headroom violation was a ten percent decrease from 2006, there was a slight increase in improper stair construction violations in the past six years – 31% reported a stair construction violation in 2006, compared to 37% in 2012.

Please select the three (3) most common stair-related code violations you see		
	2006	2012
<i>Sample Size</i>	?	781
Stair rise and run violations	78%	72%
Stair headroom	63%	52%
Improper stair construction	31%	37%
Improper stair tread	35%	34%
Stair geometry issues	36%	27%
Not Applicable	7%	4%
Other	5%	-

Survey respondents were asked to identify the most common plumbing code violations they saw. Improper notching or boring of framing was the most common, with 41% of respondents saying they saw that plumbing violation. Also common was missing or improper nail plates (38%) and pipes improperly supported (29%).

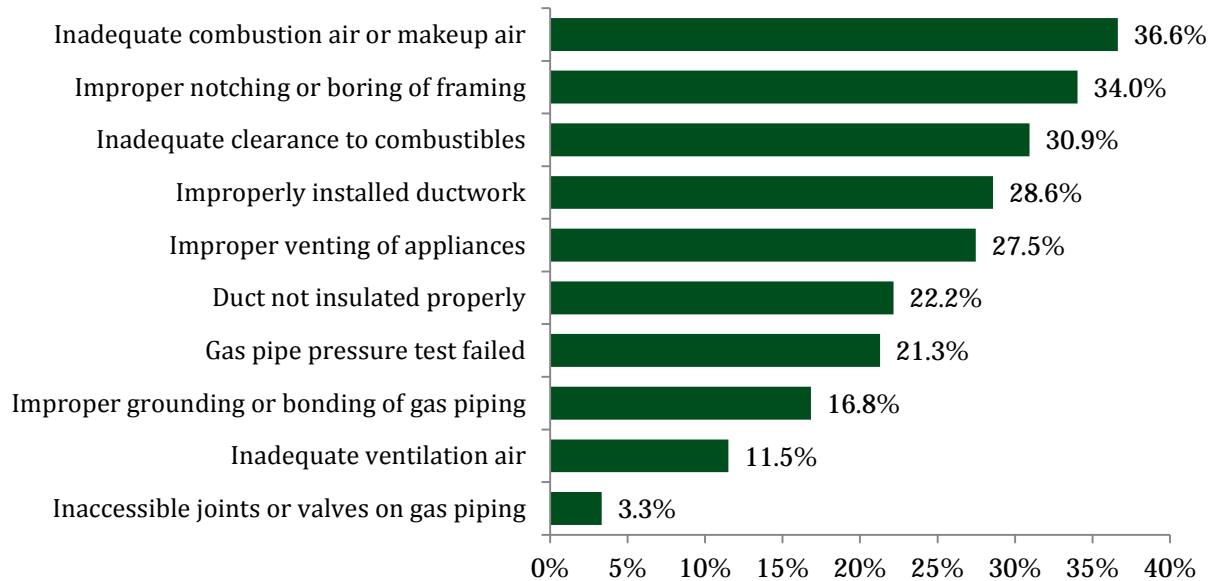
Plumbing Code Violations



"Please indicate the three (3) most common plumbing code violations you see,"
N=811

Survey respondents were asked to identify the top three most common mechanical/fuel gas system violations. The most common was inadequate combustion air or makeup air, at 37%. Improper notching or boring of framing (34%) and inadequate clearance to combustibles (31%) were also common mechanical/fuel gas system violations. Violations involving inaccessible joints or valves on gas piping was a very rare violation, at three percent.

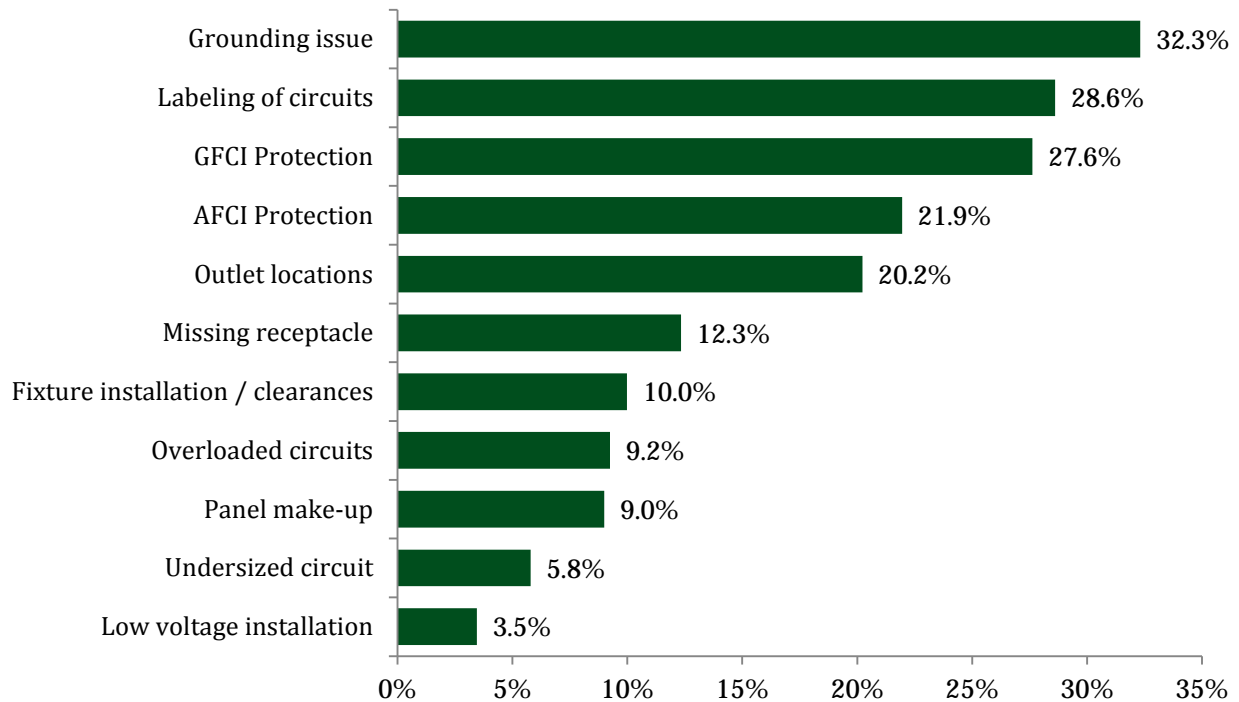
Mechanical/Fuel Gas System Violations



"Please indicate the three (3) most common code violations you see in mechanical/fuel gas systems; N=808"

One third of respondents (32%) indicated that they saw grounding issues, the most common electrical code violation. Labeling of circuits (29%), GFCI Protection (28%), AFCI Protection (22%), and outlet locations (20%) were also common electrical code violations.

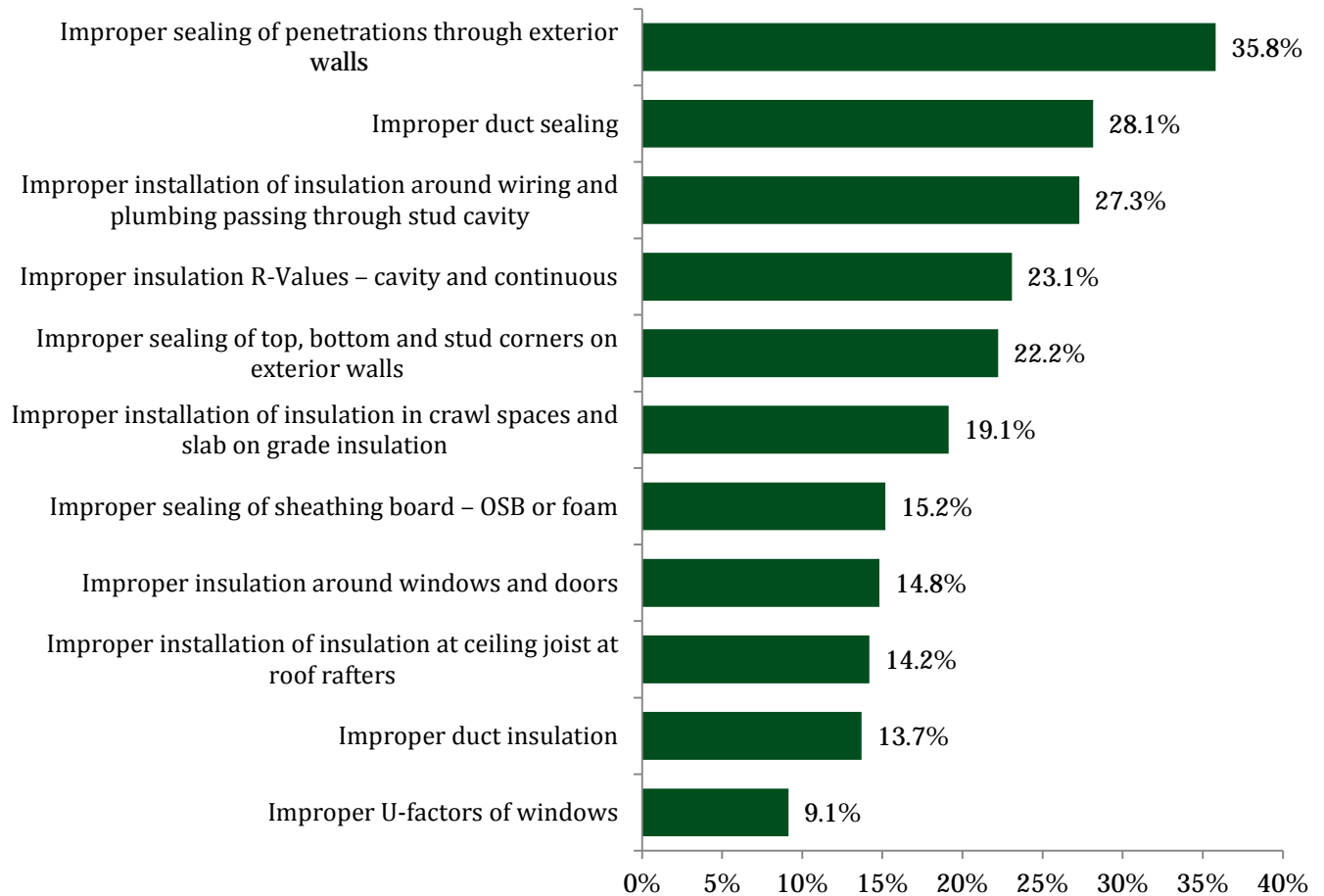
Electrical Code Violations



**"Please indicate the three (3) most common electrical code violations you see";
N=811**

Survey respondents were asked to identify the most common energy code violations. Over one-third of respondents (36%) reported they saw improper sealing of penetrations through exterior walls. Improper duct sealing (28%), improper installation of insulation around wiring and plumbing passing through stud cavity (27%), improper insulation R-values (23%), and improper sealing of top, bottom and stud corners on exterior walls (22%) were also frequently seen energy code violations.

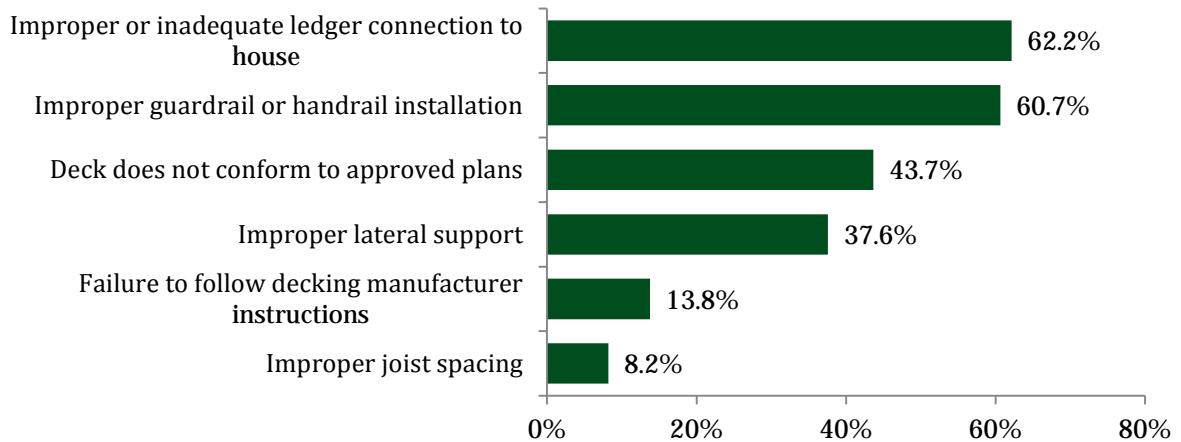
Most Common Energy Code Violations



"Please indicate the three (3) most common energy code violations you see"; N=810

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 (62%) and improper guardrail or handrail installation (61%). Forty-four percent (44%) of respondents saw cases where the deck does not conform to approved plans and 38% saw decks with improper lateral support. Failure to follow decking manufacturer instructions (13.8%) and improper joist spacing (8.2%) were also common violations.

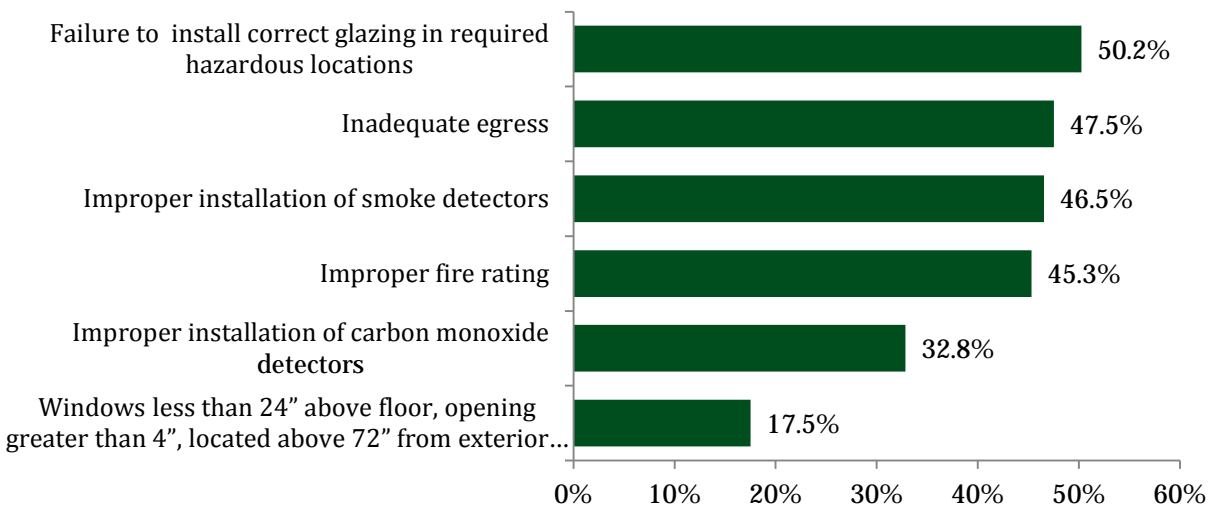
Common Deck-Related Code Violations



"Please select the three (3) most common deck-related code violations you see"
N=806

Respondents were asked to identify the most common life safety code violations they saw. Half (50%) of respondents saw cases where there was a failure to install correct glazing in required hazardous locations. Inadequate egress (48%), improper installation of smoke detectors (47%), and improper fire rating (45%) were also common life safety code violations.

Common Life Safety Code Violations



"Please select the three (3) most common life safety code violations you see"
N=810