

TOP 10

Construction Defects

Prevent defects and avoid costly repairs.



To gain a deeper understanding of the building industry's needs, **Quality Built** set out to observe and record the most common best practices and inconsistencies on the job site.

Using our proprietary QB Builder Link® app, we collected millions of data points on over a million structures. From this research, we were able to identify significant trends in the building industry, along with practical methods that address construction risk and remediate defects.

This guide will outline the **top ten construction defects**, based on our data, listed in order of construction sequence and the cost to repair them. (The post-construction repair costs are rough estimates and reflect nationwide averages.)

ABOUT QUALITY BUILT

Quality Built is the nationwide leader in third-party quality assurance and insights. We combine a vast network of experienced, boots-on-the-ground inspectors and domain experts with the industry's most robust technology solutions.



PREVENTING CONSTRUCTION DEFECTS AND WHY IT'S IMPORTANT

With the average cost of a comprehensive inspection ranging from several hundred to a thousand dollars per home, depending on the scope, builders have experienced ROI of up to eight times their investment. They also avoid the consequences of poor building practices that lead to complications and defects.

1 Foundation – Vapor Retarder

Slab, crawlspace, and basement moisture intrusion remains a persistent and expensive issue for builders nationwide. When present under cabinets, moisture intrusion through the slab can cause damage to the flooring and contribute to poor indoor air quality. If moisture intrudes into the crawlspace, it can also create bio-organic growth and, in severe cases, compromise the structural framing.

To avoid or repair a breach, all seams and penetrations must be sealed with the proper materials under the appropriate conditions to meet the requirements of regional building codes and manufacturers' specifications. Any damage to the membrane must be repaired to effectively retard the moisture vapor transmission.

We observed inconsistencies with the vapor barrier in

65%
of the data points collected



Repairs using a topical vapor barrier cost approximately \$2.00 per square foot, including product and labor. This does not include the disposal and replacement of any damaged flooring, cabinets, or other items.

2 Framing – Incorrectly Constructed Trusses

While we saw a variety of issues related to framing in nationwide inspections, those linked to trusses incorrectly attached or bearing on non-bearing walls were the most prominent issues identified.

Truss issues generally resulted in drywall cracking and erratic popping sounds as the trusses deflected the underload shift. The expansion and contraction of the truss members or the wall framing can also cause some movement. These issues most commonly lead to homeowner complaints and claims.

The next most frequently observed irregularity linked to framing was overdriven fasteners at shear or braced wall assemblies. This irregularity can reduce the load capacity that the assembly can resist without failing. Because these walls are designed to prevent or reduce structural damage during an earthquake or high winds, the loss of load resistance can lead to injuries and even fatalities.



Repairs for trusses bearing on non-bearing walls can run \$50 per linear foot. Those repairs include removing drywall, double top plate and patching. The expense to remediate incorrect attachments is significantly less, depending on the level of access to the damage.

3 Fire Blocking – Missing or Damaged

Fire blocking is installed to reduce the spread of fire, particularly between vertical and horizontal spaces. Builders need to understand the importance of accurate installation of fire blocking at all required locations and the purpose of the feature.

The risk that could occur from damaged or disassembled fire blocking is enormous. Without proper installation, a fire would likely spread more rapidly, reducing evacuation time and leading to injuries or death.



Adequate repairs can only be accomplished before the drywall is installed. Otherwise, the condition would be difficult to locate. Estimated repairs cost around \$500-\$800 per location, which includes repainting the wall plane.



4 Insulation – Incorrect Installation

As municipal energy requirements expand, we are seeing a rise in defects and claims related to the performance of buildings. The most common defect is the incorrect installation of insulation, causing significant energy loss.

Typically, real estate due diligence inspectors use infrared cameras to advise purchasers of inadequate insulation and associated energy loss. And now, homeowners can buy or rent inexpensive infrared cameras or use thermal imaging phone applications to find errors and initiate callbacks. As energy codes continue to become increasingly strict and more jurisdictions require energy-related testing, the risk of claims related to improper installation is sure to increase.

Our research found deficiencies in

90+%

of the units inspected for insulation



Repairs can cost approximately \$100 per square foot including the infrared inspection needed to determine where the insufficiencies are located. That cost also includes drywall removal and replacement necessary for access to the defective location.

5 Windows – Installation

Window installation deficiencies are common in building construction. These deficiencies are often caused by issues with window transportation and storage, sealing, fastening, flashing or framing.

Transportation and storage issues can result in...

- ◆ Bent or broken window fins and jambs
- ◆ Frame distortion
- ◆ Damaged glass
- ◆ Screen damage
- ◆ Locking mechanism damage

Sealing issues include...

- ◆ Incompatible sealant products
- ◆ Gaps in the applied sealant
- ◆ Improper location of sealant

Fastening issues include...

- ◆ Improper fastener types
- ◆ Fastener installation too close to window corners
- ◆ Over and under-driven fasteners
- ◆ Improper fastener spacing
- ◆ Incorrect installation affecting the fins and jambs
- ◆ Incorrect opening sizes that hinder proper sealant to surface contact

Flashing issues include...

- ◆ Incompatible flashing materials
- ◆ Improper sequencing or placement of flashings
- ◆ Folds or wrinkles in the flashing
- ◆ Gaps in the window flashing system typically in the lower corners

Improper installation or damaged windows can cause significant moisture and air infiltration to the building envelope resulting in substantial ramifications. Leaks through windows or building walls caused by the incorrect installation are one of the main causes of construction defect litigation.



REPAIR
COST

Cost of repair will depend on the specific issue. Expenses can range from several hundred to several thousand dollars based on the defect. The cost for leaks caused by inefficient flashing or defective window products or installation will vary. Isolating the leak location can be challenging and result in more construction on the surrounding wall which will drive the cost up. The cost will also be greater if the window product is defective and cannot be fixed in position as it will void the warranty even if the repair is functional.



6 Exterior Wall Weatherization – Improper Integration & Use of Exterior Penetration Flashing

The increasing use of exterior penetration flashing for exterior walls has resulted in a growing number of defective installations.

Failure to use the proper exterior penetration flashing for penetrating items not only voids the warranty, but also creates the risk of water intrusion because the panel fails to properly seal. While the risk of water intrusion is common amongst all weather-resistive barriers (WRB), it's particularly prominent with house wrap and sheathing-based WRBs that require tape flashing to properly seal the panel to the WRB.

Common issues include failure to bibb the bottom of the flashing or terminating the bottom over the WRB using the weatherboard method. When flashing tape is used to integrate with sheathing-based WRBs, the improper installation creates a bird-mouth and does not allow for a proper seal, causing water intrusion. We must note that flashing can be missed since there is not one responsible party for installation or without a final inspection just prior to concealment.

Repairing just one location can cost up to

\$750



Repairing these issues would involve removing stucco or exterior cladding, properly integrating the flashing panels, and patching the exterior cladding. The approximate cost could amount to \$750 per location. The size of the wall, paint, or fog coating would also need to be factored into the cost of repair.



7 Exterior Wall Weatherization – Holes, Rips, or Tears in WRB

The use of traditional asphalt-impregnated building paper is becoming less common in the industry, while house wraps, sheathing-based WRBs and other water/weather-resistive barriers are becoming the standard. During our inspections, we found one of the most common issues is improperly correcting damage to the WRB.

Holes, rips, and tears in the WRB must be repaired or sealed to maintain water resistance in the membrane. Unfortunately, builders often run into issues with seam tapes and reverse laps with some WRB systems. Improperly sealing the seams not only leads to water intrusion, but also negatively affects the performance of the air barrier.

Attention to detail is critical for exterior wall weatherization. Any water intrusion or air intrusion through the WRB can have negative and costly consequences both for the builder and homeowner. With more jurisdictions implementing stricter codes for energy efficiency, a meticulous installation of the WRB is crucial.



The cost of repair will depend on the specific issue. Isolating the leak location can be challenging and result in more deconstruction of the surrounding wall, driving up costs. Expenses will range from several hundred to several thousand dollars based on the defect.



8 Roofing – Flashings

Roof flashings, roof felt, and other roof assemblies all require precise installation using the weatherboard method. Because each of these components is vital to roof performance, builders need to pay special attention to them during installation in order to avoid defects that compromise the roofing construction overall. Roofing flaws and failures often lead to an increased risk of defect litigation for the builder.

The most common mistakes include improper laps of materials and failure to meet the code or manufacturer's requirements. Reverse laps at penetration flashings installed without a babb can also be detrimental to the condition of the roof.

Other common defective conditions include:

- **Roofing mastic used in place of properly installed flashings**

While roofing mastic is a great product when used in proper applications and installation, it does not have as much service life longevity as properly installed flashings, roofing felts and roof claddings carry. It also requires regular inspection and maintenance that many owners fail to perform, resulting in a high risk for water damage and other devastating consequences.

- **Roof eave drip edges installed over the roofing felt instead of under it**

For example, Florida code requires the roof eave drip edge to be installed over the roofing felt to prevent the wind from catching the felt, but it is often installed underneath instead.

- **Roof jacks that are not correctly babb (woven) into the roof underlayment in a weatherboard fashion relying on mastic as a final seal**

This is common in asphalt shingle installations where the flashings are installed after the shingles rather than simultaneously.

- **Holes and rips in roof underlayment repaired with mastic instead of a babb of felt from the next highest seam**

- **Closed rake kick-outs installed improperly or not at all**



Cost of repair will depend on the type and extent of the defect. However, most repairs will result in a minimum of \$250 and may be as high as several thousand dollars.



9 Exterior Cladding – Stucco

The majority of stucco cracks are due to improper lath installation. During our inspections in 2019, we noted improper lath installations on up to 75% of the units inspected.

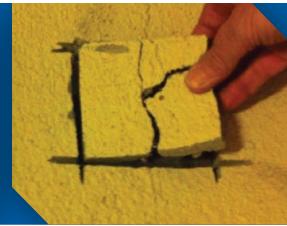
Other factors that cause stucco cracking include improper mixing of the stucco, improper applications of the stucco, and improper hydration during the curing process. These can result in cracking and also efflorescence of the stucco. Testing has shown that these four items result in the majority of stucco issues.

While many of the cracks and efflorescence issues are cosmetic in nature, they often result in homeowner complaints and help fuel construction defect claim cases. Modified stuccos have fewer claims than traditional hard-coat but they still occur.

Our inspections revealed that
75% of the inspected locations exhibited improper lath installation



Repair costs will vary depending on the cause of the cracking. Estimated costs range from \$1 per square foot of affected wall plane to \$16 per square foot.

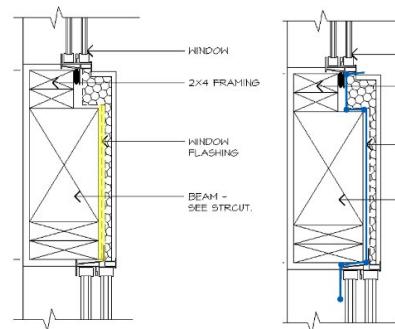


10 Failure to Follow or Complete Plans, SOW, Product Specifications

As part of our **Geotechnical Review**, we often report an apparent disconnect between the Geotechnical Engineer of Record and other professionals, the client and the builder. These inconsistencies lead to inaccurate recommendations reported on construction plans.

Failure of the trades to follow their Scope of Work (SOW), plans, specifications or manufacturer's recommendations can be risky and have a devastating impact. Poorly installed products or systems as a result of these gaps and communication failures can lead to risks escalating from a cosmetic issue to potential structural failure, injuries, or fatalities. Incorrect installation can also often void the warranty and make obtaining insurance coverage for repairs more difficult.

To reduce these risks, an active quality assurance or quality control (QC) program is necessary to catch and correct issues as they arise during planning and construction. **Technical Plan Reviews** (TPR) and Geotechnical Design Reviews (CDR) are fundamental parts of this. They ensure proper material integration and design team coordination. We recommend a review at 80% completion.



An effective QA program starts well before construction begins with a detailed review of the plans. Quality Built strongly suggests that plan details include clear diagrams and written directions for all issues and failures. Once construction begins, an inspection by an independent third-party helps to verify that trades are following industry best practices, complete details, integration of systems and components, constructability, compatibility, consistency, manufacturer's requirements and recognized industry standards.



What Builders Can Do

Today's construction practices demand a higher frequency of inspections with a greater depth of scrutiny well beyond the inspection of broad code compliance. To discover, report and remediate the above issues, builders have found it necessary to employ third-party inspectors. They provide an additional level of on-site supervision over evolving installation practices beyond what the builder's own field managers and local city inspectors are providing.

To bring that higher level of inspection, education, and observation to the job site, skilled inspectors need to focus on the most common areas of installation errors. With a vast wealth of data from over one million structures inspected, the Quality Built team knows exactly how to find the most common issues.

Let's work together as an industry to help minimize and eliminate the top 10 most common construction defects.

ADDITIONAL RESOURCES

WINDOWS

For further discussion on window installation, read this series of articles:

PART 1:

[**Window Flashing Installation**](#)

PART 2:

[**Air Barrier Fundamentals**](#)

PART 3:

[**Stucco Over Dupont™
Tyvek® HomeWrap**](#)

[**The Size of the Window Opening
Determines the Size of the Risk**](#)

EXTERIOR WALL WEATHERIZATION

For more information related to the building envelope, consult these resources:

[**FLASHING PANELS FOR
EXTERIOR WALL PENETRATIONS**](#)
TECH ALERT

[**THE EVER-EVOLVING
BUILDING ENVELOPE SERIES**](#)

