The Aging of America's Housing and Infrastructure

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This paper examines issues common to defending construction claims, especially on aging sites which may have been completed decades ago. The paper focuses on the subject from three perspectives: those of an engineer evaluating a project, a housing professional looking ahead to future liability, and an attorney defending claims arising from an aging project. This paper can be used as a quick-reference guide to understand the impacts of an aging housing stock and infrastructure projects

I. A View from the Housing Sector: Resiliency and Financing

In the U.S., new homes are needed to replace older ones and accommodate growth in the number of households. Recent production, however, has fallen short, creating an increasing need to keep existing homes in service longer. According to data from the 2019 American Housing Survey, over half of the nation's 124 million homes were built prior to 1980. This statistic coupled with low rates of replacement mean that the built environment in the U.S. will change slowly and continue to be dominated by structures that are at least several decades old. Indeed, optimistic estimates suggest that if 1.2 million homes were built every year, after 20 years only 16 percent of the conventional housing stock would consist of new homes built between now and then. In comparison, 68 percent would still consist of homes built before 1990. *See* Paul Emrath, *More New Homes Needed to Replace Older Stock*, NAT'L ASSOC. OF HOME BUILDERS (August 2, 2018), www.eyeonhousing.org/2019/01/more-homes-needed-to-replace-older-stock/.

Like homes, much of the infrastructure that supports those homes, neighborhoods, and communities has long passed its useful life. One needs to look no further than the growing multitude of broken water mains, potholes, bridge collapses and wastewater upsets in the news seemingly every day. Continued pressure to keep these systems in use longer, serve a growing population, and perform under varying and changing conditions only add to the stresses and uncertainties associated with much of the nation's infrastructure.

While problematic on their own, these statistics secured their place in the spotlight most recently due to the increasing and unprecedented number of natural disasters and the destruction that disproportionately falls upon the older homes and infrastructure. While addressing the nation's aging structures and infrastructure may provide opportunities for some, it will present a number of challenges. Beyond the uncertainties associated with rehabilitating and upgrading existing structures and systems, having the right data, understanding what questions to ask, and knowing what's at stake when dealing with existing buildings and infrastructure is critical to being able to effectively manage risks and avoid unexpected pitfalls.

Resiliency Mandates

In the wake of recent natural disasters and the expectation that they will continue, there are efforts at all levels of government to improve the resiliency of the nation's homes, neighborhoods, and communities. To do so, many have enacted or are considering adopting new or updated requirements to improve the ability of buildings and related infrastructure to withstand disasters and better manage their recovery. Examples include conducting thorough risk assessments, updating building codes, placing restrictions on where and how new building can occur, and increasing disclosure requirements so that buyers have a better idea of risks prior to purchase. While many of these mandates are typically associated with new construction, they often impact legacy development.

Indirect Impacts

The construction and very existence of new structures and infrastructure can adversely impact existing homes, neighborhoods, and communities if not integrated properly. For example, earthmoving activities during construction can create subsidence, undermine foundations or contribute pollution to waterways. Likewise, new structures can create or exacerbate flooding, place additional pressures on already-taxed roadways, or overwhelm waste treatment facilities. According to the latest Annual Builder Practices Survey, one in four new single-family detached homes were built in established neighborhoods in 2020. Although these shares vary significantly across the United States, one thing is clear, completing through engineering studies, considering the full array of potential effects, and taking steps to avoid and minimize impacts to exiting developments will become increasingly important undertakings.

Paying for Infrastructure

While certain repairs or upgrades many be needed to restore infrastructure or create additional capacity, how those improvements are paid for will continue to be the subject of considerable debate. The challenge of providing infrastructure is not new, but it has become increasingly difficult. As citizens want and expect local governments to provide broader and more comprehensive services, are less willing to give local governments the authority to seek the tax revenues needed to meet those expectations, and contributions from state and federal sources continue to decline, local governments are being squeezed more than ever. Unable to raise the necessary revenues, many local governments have sought to enact financing policies that are largely borne by developers, such as proffers, impact fees or other mechanisms. But these additional and/or unexpected expenses can have significant impacts on project feasibility and acceptance. Fortunately, there are a number of innovative ways to better leverage community resources to meet current and future infrastructure needs, including special districts and state infrastructure banks.

Project Financing

Although the current scrutiny of the financial system and the mortgage industry is aimed at how their actions address climate change, it has compelled many businesses to better assess the risks, liabilities, and obligations associated with their portfolios and lending practices and take steps to reduce their impacts across the board. Because many view the financial sector as being in an ideal position to direct funds toward the common good, many banks and other lenders are feeling growing pressure to consider and disclose their risks and take steps to reduce their collective impacts. One expected outcome is additional due diligence and risk assessment measures, along with better aligning their products and underwriting processes to reflect those risks. This could mean higher interest rates for loans on riskier properties, placing additional requirements on holdings, or refusing to purchase certain types of assets.

New Uses

Historic trends and market demands continue to favor development that is in reasonable proximity to employment centers, commerce and transportation hubs, and recreational areas. At the same time, government policies are increasingly seeking to discourage development, redevelopment, and investment in highest risk areas – many of which are dominated by existing development. While changing circumstances, demographics, and market realities have rendered some development patterns obsolete and certain properties less desirable, some of those properties may still have useful life. For example, there are currently 8.5 billion square feet of retail space in the U.S., but with the migration to online shopping in lieu of sticks and bricks retail, some percentage of that development has been rendered obsolete. If 25 percent of retail space goes away, that will free up approximately 100,000 acres that can be repurposed. Importantly, many of the malls that may be victims of this demise are located near major roadways and are already serviced with water, sewer, and electricity – potentially making them even more attractive for putting to new use. Given the current shortage of lots on which to build new homes, creative reuse of these spaces could help to fill and important need.

II. An Engineer's Role: Documentation and Assessment

Owners and managers of aging assets in the built environment often engage the services of engineers and architects specializing in repair/rehabilitation/forensics to help them understand the nature and implications of observed distress and to help make decisions regarding repair and management of the asset. Forensic engineers are often retained at discrete intervals throughout the asset lifecycle including:

1. After a natural disaster, fire, vehicle collision, or other adverse event;
2. As part of a proposed sale or acquisition;
3. When a change of use is planned;
4. When a building failure or distress mechanism is identified; or

5. As part of long-term capital planning;

Less commonly, an engineer may be retained on a regularly recurring basis (i.e. every 2-3 years) to provide regular facility assessments and to identify required maintenance activities. Engaging an engineer specialized in the assessment, repair, and rehabilitation of existing structures is important for risk management and determining the best course of action.

Building Documentation

The availability of accurate and comprehensive information regarding aging assets is a common problem facing building owners and forensic engineers. Within several years after completion and commissioning of a new asset it is common for original design and construction documentation to begin being lost to history. The loss of original documentation only accelerates as the asset ages, as parties involved in the initial design and construction are bought, sold, and dissolve and as the asset itself changes hands. Many buildings have a janitorial closet somewhere where the last of the rolls of plans end up for a time. Even for recently constructed buildings it is common for submittals, specifications, deferred design documents, material testing reports and other construction documents not to be archived.

Incomplete information creates significant challenges for a forensic engineer in understanding both the original design basis and intent as well as the configuration of concealed elements. This is particularly true for specialty or proprietary systems which are most likely to be furnished as a deferred design by a specialty design-build subcontractor. These systems commonly include post-tensioning, curtain wall systems, and mechanical systems. During initial construction, it is common for the Engineer or Architect of Record to provide performance criteria for these systems on their drawings but to defer the final detailed designs to a third-party. In the author's experience it is much more common for the Engineer of Record and Architect of Record's drawings to be archived than it is for deferred submittals to survive. In some cases, the owner of the facility may not have even received copies of all deferred submittal during construction or at project close out. The absence of these records for key systems can greatly complicate a forensic review.

Similarly, material testing and onsite installation reports for fill soils, concrete, structural steel, reinforcing steel, and post-tensioning tendons can be key to evaluation of a building and are less likely to be properly archived and available for use. Owners should strive to retain and archive as much of the original construction documentation as possible. In the event of a dispute arising during or after construction, it is important for the owner and their attorney to work closely with the retained forensic engineer to request this information through the discovery process.

The Assessment Process

An assessment or forensic review most commonly begins with a visual review of the building and review of any available historical construction information. In recent years these assessments have been aided by the wide availability of drones and 3D-scanning technologies to

provide more comprehensive documentation and to supplement information in areas that are inaccessible or hazardous to enter. However, visual assessment does not always allow for an adequate understanding of the building performance or issues. While symptoms of a problem may be visible, further investigation is often required to understand the root cause and options moving forward. Particularly when important design and construction documentation is missing, it may be necessary to perform specialty testing to understand an issue. Forensic engineers may rely on a combination of non-destructive testing, in-situ testing, material testing, and exploratory openings to fill in the gaps in information that may exist if only a visual assessment were performed.

Non-Destructive Testing

As its name implies non-destructive testing generally allows the practitioner to gain information about the structure without significantly altering the structure. Common types of non-destructive testing include:

1. Infrared Thermography
2. Ground Penetrating Radar (a/k/a Surface Penetrating Radar)
3. Impact Echo
4. Impulse Response
5. Magnetic Particle Testing
6. Vibration Testing

When used appropriately these techniques and more can assist in locating reinforcement in concrete and masonry, detect moisture entrapped in walls and below roofs, identify cracking or inclusions in concrete, and benchmark the performance of the structure. It is sometimes advantageous to couple non-destructive techniques with exploratory openings or material testing to better define the system properties or to confirm the results of the non-destructive testing.

Other Test Methods

Depending on the nature of the structure and the distress observed other testing procedures may be warranted. Discuss the pros and cons of such testing with your retained forensic engineer. These may include:

1. In-situ load testing of concrete structures to determine if the behavior of the structure conforms to the strength and performance requirements of the building code.
2. Leak testing of installed window assemblies by use of a spray rack and calibrated pressure chamber.
3. Sampling and laboratory testing of materials such as structural steel, rebar, concrete and masonry to determine strength, identify microscopic features, or to determine composition.

Building Code Considerations

Determining compliance with the applicable Building Code requirements is often one of the key questions posed when a concern arises with an existing structure. The applicable codes will vary based on the type of structure and occupancy. Different codes will generally apply for commercial structures, bridges, industrial facilities, and residential structures and application of these codes can vary in different jurisdictions. Most jurisdictions utilize model building codes developed by the International Code Council, Inc. and develop specific local amendments to the model code. Perhaps the most commonly used model codes are the International Building Code (IBC) and the International Residential Code (IRC) both developed and updated on a regular cycle by the International Code Council. These codes in turn reference many other codes and provisions developed by other technical organizations such as the American Concrete Institute and the American Institute of Steel Construction among many others.

An important note regarding analysis of code compliance is that generally, an existing structure is only required to conform to the provisions of the building code under which it was originally permitted by the authority having jurisdiction. Unless specific modifications or alterations above defined thresholds are planned, there is typically no statutory requirement to upgrade existing structures to comply with new provisions of the code which post-date permitting. By way of example a building originally permitted in 2012 and substantially completed in 2015 would likely have been permitted under the provisions of IBC 2009 (assuming IBC 2009 was the current model code in the jurisdiction in 2012). Note that formal adoption of model code versions generally lags several years behind their issuance. Subsequent analysis of this structure would generally be performed under the permitted code rather than the current code. The exception being when substantial modifications are planned. Most jurisdictions have rules and guidelines to determine when the current code is triggered by planned modifications.

III. The Lawyer's Perspective: Defending Claims Under the Statute of Repose

A statute of repose acts as an absolute bar to certain claims by limiting the time within which an action may be brought. The beginning of the clock is usually not related to the accrual of any cause of action. STATUTE OF REPOSE, Black's Law Dictionary (11th ed. 2019). Its function is somewhat similar to a statute of limitations, but there are a few key differences. The main difference between them is that the injury need not have occurred, much less have been discovered for the statute of repose to run and bar future claims. Unlike an ordinary statute of limitations which begins running upon accrual of the claim, the period contained in a statute of repose begins when a specific event occurs, regardless of whether a cause of action has accrued or whether any injury has resulted." 54 C.J.S. *Limitations of Actions* § 4, at 20–21 (1987).

Statutes of repose function as a defense to bar liability after a certain date – usually ten or fifteen years. However, it is important to note that these periods vary from state to state. Sometimes, even within one jurisdiction, the period may run differently based on the identity of the parties and the causes of action asserted. One common area where statutes of repose play a significant role for the defense is in construction design and defect claims. Typically, for construction defect claims, the statutory period begins to run from the date that the contractor

notifies the owner of substantial completion. However, some states use a different triggering mechanism. This paper examines the contours of the statutes of repose for three states: Texas, California, and Florida.

Texas Statute of Repose

Texas rules for statutes of repose are found in two sections of Chapter 16 of the Civil Practices and Remedies Code. The first section, 16.008 applies to architects, engineers, interior designers, and landscape architects. The other, section 16.009 applies to contractors furnishing construction or repair of improvements to real property. Both sections lay forth the same general rule for liability – that a construction or design defect claim can only be brought within ten years of substantial completion of the project. Both sections of the CPRC cover various causes of action, including injury, damage, or loss of real/personal property, personal injury, wrongful death, contribution, and indemnity. The statutory period runs from the date that the contractor notifies the owner of substantial completion.

The ten-year limit is rigid in Texas, as it is not subject to tolling for the same reasons a statute of limitation might be paused. The Texas Supreme Court has ruled that "[s]tatutes of repose begin to run on a readily ascertainable date, and unlike statutes of limitations, a statute of repose is not subject to judicially crafted rules of tolling or deferral." *Methodist Healthcare Sys. of San Antonio, Ltd., L.L.P. v. Rankin*, 307 S.W.3d 283, 286 (Tex. 2010). However, there are circumstances in which the passage of ten years may not be enough to protect from all liability. The statute has an extension provision that adds two years from the date a plaintiff issues a written claim against the contractor for damages, contribution, or indemnity. TEX. CIV. PRAC. & REM. CODE ANN. § 16.009 (West). So, under the statute, the maximum theoretical period for the statute of repose to run is 12 years.

Texas recently made a change to its statutes of repose that is especially important in infrastructure cases. House Bill 3069 went into effect on June 14, 2021, and it shortens the statutory period of repose for contractors and design professionals working on governmental projects. Prior to this amendment, the statewide 10-year statute of repose applied equally to all disputes regardless of the parties involved. This change shortens the statute of repose for projects completed for a governmental entity. Under the new law, governmental entities only have eight years to bring claims for defects. This is welcome news for contractors and design professionals defending defect claims, as those contracting with government entities may now rely on the Statute of Repose two years earlier than they can for other clients. Practitioners should be aware that there are a few statutory exceptions to the shortened statutory period which mainly apply to road construction. The statute exempts (1) contracts for the Texas Department of Transportation, (2) projects that receive money from state or highway federal funds or mass transit spending, and (3) "civil works" projects as defined by statute. TEX. CIV. PRAC. & REM. CODE ANN. § 16.009 (West).

Texas Exceptions

While the Statute of Repose is a powerful tool to protect design professionals and contractors from litigation years after a project is completed, it is important to note that this is not always an ironclad defense. When the cause of action is based on a contractual guarantee, the statute of repose likely won't afford protection. The Texas statute specifically exempts claims based on a written warranty, guarantee, or another contractual provision that expressly provides the project will be free of defects for a longer period. TEX. CIV. PRAC. & REM. CODE ANN. § 16.009(e)(3) (West).

Texas also has a statutory exception for fraudulent concealment or willful misconduct. TEX. CIV. PRAC. & REM. CODE ANN. § 16.009(e)(3) (West). However, when the legislature passed this part of the statute, they limited the scope of the fraud exception to fraud that occurs in the *performance* of the construction or repair. "This language indicates the legislature's concern about contractors physically concealing defects so that the deficiency is not visually noticeable." *Dallas Mkt. Ctr. Dev. Co. v. Beran & Shelmire*, 824 S.W.2d 218, 222 (Tex. App. 1991).

California Statute of Repose Equivalent:

California is unique among jurisdictions since it does not have a separate statute of repose. Rather, in California, claims based on construction defects are handled under the applicable statute of limitations with distinct timing requirements for latent and patent defects. The statutory period in California begins to run from the date the cause of action accrues which means once the essential elements are all present and the claim becomes legally actionable. *Glue-Fold, Inc. v. Slautterback Corp.*, 82 Cal. App. 4th 1018 (Cal. App. 2000). Despite these technical differences, the timing requirements are very similar to statutes of repose in other states. The exact period depends on what type of defect forms the basis of the litigation.

Latent defects are construction defects that *are not* "apparent by reasonable inspection." CAL. CODE CIV. PROC. § 337.15. The statute says that no one can bring an action against a developer, design professional, or contractor who builds an improvement to real property more than ten years after the project reaches substantial completion. See *Inco Dev. Corp. v. Superior Ct.*, 131 Cal. App. 4th 1014, 1020 (2005) ("Section 337.15 does have characteristics of a statute of repose . . . [it] is tied to an independent, objectively determined and verifiable event, i.e., the date of substantial completion of the improvement.").

Patent defects are defects that *are* apparent by reasonable inspection. *Tomko Woll Grp. Architects, Inc. v. Superior Ct.*, 46 Cal. App. 4th 1326, 1338 (Cal. App. 1996). The difference for patent defects in California is that claims must be brought within four years of substantial completion. This period is quite short compared to other states but does have one exception. If an injury to property or person occurs during the fourth year after substantial completion, a tort action may be brought for up to one year after the period. However, California law is clear that in no circumstance can a claim based on a patent defect be brought later than the fifth year after substantial completion. CAL. CODE CIV. PROC. § 337.1.

Since California does not have a separate statute of repose, the exceptions to its statute of limitations may apply depending on the exact cause of action asserted. However, California has

specifically recognized one exception, the delayed discovery rule in the construction context. The delayed discovery rule provides that the cause of action does not accrue until the plaintiff discovers the injury or could have discovered it through the exercise of reasonable diligence. *San Francisco Unified School Dist. v. W.R. Grace & Co.*, 37 Cal. App. 4th 1318 (1995).

Florida Statute of Repose:

Florida has been slowly re-working aspects of its statute of repose for several years – and the efforts have been brought into the limelight because of the recent tragic collapse of the Champlain Tower in Surfside. Florida's statute lays out a strict, ten-year deadline on legal claims based on the design, planning, or construction of improvements to real property. FLA. STAT. § 95.11(3)(c). Florida's statutes are written very broadly to afford wide protection to engineers, architects, and contractors. Because of this, the Florida statute is unique in lacking major exceptions, and it has been interpreted so broadly that it covers work that most other states would not classify as construction.

The "clock" in the Florida statute begins to run on the later of several possible dates: (1) the date of actual possession by the owner, (2) the date a certificate of occupancy is issued, (3) the date construction is abandoned, or (4) the of the completion or termination of the contract. FLA. STAT. § 95.11(3)(c). This means that a would-be plaintiff has ten years from whichever occurrence happens last. However, the statute is clear that repairs made to the building, whether under warranty or not, do not extend the amount of time under the statute. *Id.*

Florida also has no exception for hidden or latent defects built into its statute of repose. Even if a would-be plaintiff discovers a defect 9 years into the statutory period, they will only have one year to bring the claim. In some circumstances, this could bar an action for defects before they are even discovered. The statute also applies for a variety of causes of action including breach of contract and breach of warranty, in addition to negligence.

Florida's statute of repose also applies outside what is traditionally thought of as the construction context. This is significant since Florida's statute has no discovery rule, so it can be used to bar claims that would otherwise be allowed under a traditional statute of limitations scheme. In addition to applying to new construction, courts have found that the statute of repose can apply to component repairs of a building as well. *Bernard Schoninger Shopping Ctrs., Ltd. v. J.P.S. Elastomerics, Corp.*, 102 F.3d 1173, 1175 (applying Florida's statute of repose provisions to a claim regarding the installation of a new roof on an existing building). The statute has also been used to find that the defective installation of an attic latter was "founded on the construction of an improvement to real property." *Harrell v. Ryland Grp.*, 277 So. 3d 292, 298 (Fla. 1st DCA 2019). Because of Florida's unique statutory construction, designers and contractors may be able to benefit by barring untimely litigation for aged construction projects.