CROSS US

COLLABORATIVE REPORTING FOR SAFER STRUCTURES

SEI STRUCTURAL ENGINEERING INSTITUTE

CROSS Newsletter

CROSS-US Newsletter 4 | **May 2023**

Partial collapse of a shopping mall roof under drifting snow | Report ID 1009

Erroneous design snow loading assumption for indoor sports facility causes structural distress | Report ID 1012

Structural misunderstanding leads to historic church tower nearly being demolished | Report ID 1013

Share knowledge to help create a safer built environment

Editorial

CROSS has attained much prominence and progress since our last newsletter. Following the recommendations of the Hackitt Report after the tragic Grenfell Tower fire in London, the CROSS system was expanded and extended to fire in the UK. Reflecting a new look and feel, expanded mission, enhanced reporting structure, and more powerful database and content search capability, Confidential Reporting on Structural Safety is now known as Collaborative Reporting for Safer Structures. Confidentiality however remains as a fundamental feature. The more robust and powerful system is now being used in CROSS-UK, CROSS-Australasia, and CROSS-US.

The vision for CROSS International progresses. We now enjoy greater international collaboration, and the German proof engineering association is participating in discussions about joining CROSS.

Having transitioned into the new system, CROSS-US is poised for growth through its collaboration with the ASCE Forensic Engineering Division and is expanding and diversifying its volunteer leadership base to increase capacity. These strategic activities are described elsewhere herein.

Three catastrophic, life-taking failures in the US in less than five years are sobering reminders that our work is never done. When we fail to learn, and we repeat mistakes, disasters result.

- FIU Bridge Collapse, March 2018: six fatalities
- Hard Rock Hotel Collapse, October 2019: three fatalities
- Champlain Towers South Collapse, June 2021: 98 fatalities

CROSS plays a vital role in structural safety. By careful study of the lesser failures and near misses, we can avoid disasters.

This newsletter contains recent CROSS-US reports highlighting important lessons:

- Report 1009: *Partial Collapse of a Shopping-Mall Roof Under Drifting Snow*. Latent defects can reveal themselves catastrophically decades after a structure is put into service.
- Report 1012: *Erroneous Design Snow Loading Assumption for Indoor Tennis Court Facility Causes Structural Distress*. Application of building codes in structural loading requires knowledge of use, environmental conditions, and application of sound engineering judgement.
- Report 1013: *Misunderstanding Causes Historic Church Tower to Narrowly Avoid Demolition*. Performance appraisals and structural evaluations require rigorous collection of evidence and analysis of cause and effect.

We are grateful to Alastair Saone for his assistance in processing these reports.

Please **submit CROSS reports**, make a habit of studying the invaluable information provided by the submitted reports and our Expert Panel's commentary, and encourage others to do so. There are many opportunities to get involved in CROSS-US as we grow. If you are interested, please reach out to either of us.

You can look at our database **here** for previous reports, including those from other regions, and you can access Newsletters from all regions **here**, including the latest from CROSS-AUS **Newsletter 9**, April 2023.

Glenn and Andy

Glenn R. Bell, Director

Andrew W. Herrmann, Director

glenn.bell@cross-safety.org | andy.herrmann@cross-safety.org

Contents

Reporting to CROSS

Your report will make a difference. It will help us to create positive change and improve safety.

Find out more >

Visit:
www.cross-safety.org/us

Email:
team.us@cross-safety.org

CROSS-US/ASCE Forensic Engineering Division Collaboration

News

CROSS-US and the **ASCE Forensic Engineering Division** share a common mission to leverage lessons learned on failures and other performance problems into improved practice. Since the inception of CROSS-US the two groups have collaborated informally in their missions, most notably in the planning and conduct of the ASCE 9th Forensic Engineering Congress.

Through the efforts of Andy Herrmann, a long-term relationship between the two entities was explored through the creation of an *ASCE Task Committee on SEI CROSS-US and ASCE FED Collaboration*. The Task Committee prepared a report, dated May 12, 2022, recommending that a permanent joint committee be formed to collaborate on the following goals:

- Solicitating new CROSS reports on failures
- Discovering and processing materials on legacy failures to create additional CROSS reports and CASE histories for CROSS Alerts
- Reviewing Wikipedia articles on failures for accuracy
- Establishing and maintain complementary descriptive links between CROSS and FED websites
- Announcing relevant ASCE publications in CROSS Newsletters
- Announcing CROSS-US publications in ASCE Collaborate websites
- Preparing and presenting educational programs

In August 2022 the recommended permanent *Committee on CROSS-US/FED Collaboration* was formed with Mike Drerup as Chair. Other committee members include Randy Bernhardt, John Cleary, Norb Delatte, Andy Herrmann, and Kevin Parfitt.

If you are interested in participating in the Committee's activities, please contact Mike Drerup at **mike@drerupllc.com**.

CROSS at the 9th ASCE Forensic Congress

News

The international CROSS community participated prominently in the 9th ASCE Forensic Engineering Congress held in Denver, November 4-7, 2022, presenting nine papers dedicated to CROSS in two sessions. The papers covered the founding, development, and future of CROSS in the UK, the expansion of CROSS into Australasia and the US, future international expansion, and the extension of CROSS into fire topics. Related papers included reflections on CROSS's role in learning from failures and its influence on codes and standards. International participant/presenters included Alastair Soane, Principal Consultant and acknowledged grandfather of CROSS; Paul Livesey, Scheme Manager of CROSS-UK; Phil Latham, Director of CROSS-Australasia; Neil Gibbons, Fire Lead, CROSS-UK; and Robert Hertle, Proof Engineer, Germany. A dedicated compendium of the CROSS papers presented at the Congress is available through the **ASCE Library**.

In addition to excellent sessions and presentations, CROSS held three organizational meetings at the Congress related to (1) The development of CROSS internationally, (2) expansion of

Contents

Request a talk from CROSS-US>

The CROSS Team is available to give presentations to firms and organizations. These give insight into the work of CROSS on structural and fire safety which include examples of failures and the lessons that can be learned. To request a talk please complete the **form>** and we will be in touch to organize.

Reporting to CROSS

Your report will make a difference. It will help us to create positive change and improve safety.

Find out more >

Visit:
www.cross-safety.org/us

Email:
team.us@cross-safety.org

CROSS Fire, including interest in the US fire community, and (3) collaboration between CROSS and the ASCE Forensic Engineering Division. (See separate sidebar on CROSS-FED collaboration.)

Our thanks to Jennifer Goupil, Director of Codes and Standards and Technical Initiatives at the Structural Engineering Institute of ASCE, for her enthusiastic support of CROSS activities at the Congress.

Partial collapse of a shopping mall roof under drifting snow

Report ID: 1009 | Region: CROSS-US

Overview

Partial collapse of a shopping mall roof under drifting snow caused by lack of building code provisions for drifting snow and poor fabrication of open web steel joists.

Key Learning Outcomes

For owners:

- Consider periodic structural reviews of older buildings
- Note that satisfactory performance over 20 or more years is not a guarantee that all is well
- Be aware that abnormal loads, from snow or other environmental effects, may be higher in future than have previously been experienced.

For designers and structural engineers:

- When assessing older buildings be mindful of structures designed for previous codes that may not be relevant to current circumstances
- If there have been roof failures due to snow loads in the region, then consider whether there may be any general issues with structural members such as roof joists
- In the event of a failure always ask why did it happen now?

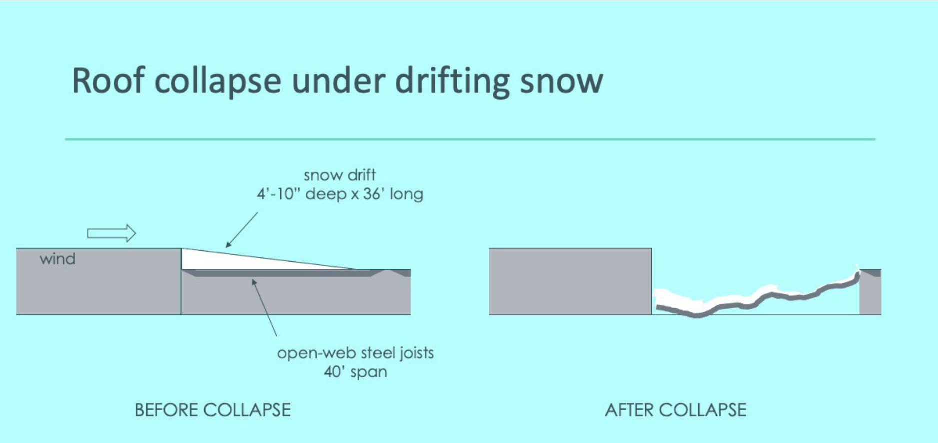
R Full Report

In 1985 a portion of a roof of a shopping mall in central Ohio collapsed during a winter storm, which produced deep drifts of snow in some areas of the roof. The one-story structure was built around 1966. In the area of the collapse the structure was steel framed with 40 ft x 20 ft bays, consisting of 1-1/2 in. metal deck, 24 in. deep open web steel joists spaced at 6'-8" and spanning the 40 ft bay dimension, and 12 in. deep wide flange beams cantilever-framed in the 20 ft bay dimension. Adjacent to the collapse area there was a 4'-6" upward step in roof elevation, causing 50 to 60 in. deep drifts of snow, 24 to 36 ft long, to accumulate on the lower roof section that collapsed. The open web steel joists were perpendicular to the change in roof elevation and framed into a beam that ran along the terminus of the low roof.

Thorough investigations by two experienced investigating engineering firms showed that the collapse initiated by failure of the open web steel joists on the low roof. The modes of failure were buckling of the first compression diagonals of the joists, brittle fracture of the end-tension diagonals, or both. The investigations included (1) careful measurements of snow drift depth, length, and density and (2) laboratory load testing to failure of several joists extracted from areas of the structure near the collapse area.

The investigations concluded that several factors caused the failure, as summarized below:

- Design snow load: The building was designed under an older code that did not include provisions for drifting snow. The actual drifting snow produced end-shears in the open web steel joists that were 38% higher than required by the code.
- Selection of roof open web steel joists: The joists shown on the design drawings had 32% greater design strength than required by code, but the joists used in the actual construction had only 82% of design rating of the joists shown on the design drawings. The result was that the joists used in the actual construction had an 8% (1.32 x 0.82 = 1.08) greater design rating than required by code.
- Capacity of roof joists relative to expectation: The load tests of joists removed from the structure showed they had only 73% of their expected strength. (Rather than an expected strength of 1.65 times rated design capacity, the joists had an ultimate strength of only 1.20 times the rated design capacity.) The joists were produced by a manufacturer no longer in business. Their members were cold-formed steel, hat-shaped for the top and bottom chords and V-shaped for the web members. The fabrication resulted in large member eccentricities at the joints, non-uniform stress flow in members, and embrittlement of the cold-formed steel. These fabrication deficiencies caused premature buckling of the compression diagonals and premature, brittle fracture in the end-tension diagonals.



The result of the above is that rather than an expected minimum factor of safety against failure of 1.65, the structure had the following factor of safety at the time of failure:

FS = (1/degree to which the loads exceeded code) x (the excess “design strength” of the open web steel joists over code) x (the measured factor of safety of the joists relative to design rated capacity (cf. 1.65))

FS = (1/1.38) x (1.08) x (1.20) = 0.94

Failure is expected at 1.0 or less.

Why did the structure fail almost twenty years after construction and not before? The summer/fall before the winter of the failure there was a non-structural renovation of the mall. In that renovation, several non-loadbearing steel-stud-and-gypsum board partitions that had been built up tight to the underside of joists that failed were removed. Those areas of the structure that experienced the same drifting snow but for which the partitions were not removed did not collapse.

Based on the findings of the investigation, approximately 270,000 SF of the mall roof structure employing the defective joists was reinforced.

C Expert Panel Comments

This is a report of an historic failure from which lessons can be learned today. In 1966, few codes even had very specific values for snow loads and even those that did were not very specific by today’s standards. Because of the age of the collapse we do not know all the details that might be considered relevant now. However the IBC has been revised and upgraded several times over the last twenty years to more adequately address snow loads, and especially drifting snow loads.

As with many failures, this one had multiple contributing factors and may not have been just a building code issue. Manufacturing and quality control issues with the joists may also have been a factor, if not in this case, then in other similar buildings. Another factor may have been additional dead load due to re-roofing and/or additional insulation which may have led to a greater build-up of snow than had been experienced previously. Were there any changes to the adjacent terrain / buildings that would have resulted in a changed drift pattern from past years? That said, the biggest cause of snow failures is drift and those structures built before drift was included in the codes and standards are the most at risk.

Owners are not generally expected to re-check their structures against the current code provisions at specified intervals and upgrade/update as necessary, so this kind of failure may continue to happen as we keep pushing the limit of materials and technology. However the fact that the structure collapsed after 20 years of apparently satisfactory performance is a worry.

Other structures that haven’t considered drifting snow are more at risk, but are not necessarily in imminent danger of collapse. However once there is a failure from a storm, especially if more than one structure has had a problem, other similar buildings, of a similar vintage, in the area should have their roofs checked for damage or load capacity.

The quality of the joists is questioned by the reporter and of course there can be a risk with off the shelf products but the situation is much better today with SJI and AISC member certification. That said, production problems still occur, and CROSS-US knows of a number of retail and storage buildings that have experienced quality problems in more recent years and required remediation. Of course, the SEOR is always responsible for the adequacy of any products, such as open web steel joists, that are designed by third parties and incorporated into the SEOR's design. Not all products are equal, and an SEOR should specify that joists must be provided from a SJI certified company with complete shop drawings and PE sealed calculations.

When an older structure collapses we must always ask; why did it happen now? Just because it has stood for 40 years doesn't mean it can't or won't fail.

Submit Report

Submit Feedback

CROSS-US ExCom Rotation

News

On September 30, 2022, John Tawresey completed a four-year term on the CROSS-US Executive Committee. Retired from KPFF Consulting Engineers where he was Chief Financial Officer, John is an expert in construction claims and management.

John was one of the drivers of CROSS-US from the beginning. He brought passion and wise counsel to our meetings, and constantly reminded us of our obligation to confidentiality and correspondents' sensitivities to reporting. He was our Policies and Procedures guru.

Thank you, John, for our invaluable service on the ExCom. We look forward to your continued contributions on our Expert Panel.

Craig Durgarian will take up John's seat on the ExCom. Craig is a Principal Risk Engineer / AVP with Zurich North America – Insurance and Risk Management. He has over 32 years of experience in design, construction management and insurance risk assessment of multiple general building projects in North America. In his current role as Western U.S. Regional Manager, Craig leads a team of risk engineers specializing in construction professional liability and builders' risk insurance assessments, claim reconciliation and claim prevention consulting services for design professionals, contractors, subcontractors, and owners. You may find further information on Craig's background on the **CROSS-US website**.

Erroneous design snow loading assumption for indoor sports facility causes structural distress

Report ID: 1012 | Region: CROSS-US

Overview

An indoor sports facility in a mid-western city suffered snow-related damage one winter. The pre-engineered structure was comprised of a fabric shell stretched over a series of structural steel arches and was reportedly installed ten years prior. The shell reportedly exhibited visible deflections in several of the arches, causing the owners to close the facility.

Key Learning Outcomes

For structural engineers:

- When using proprietary fabric clad buildings, ensure that snow, and other, loads are suitable for the site location in all conditions
- Check assumptions made in the design against the circumstances that are likely to be encountered
- If the full snow load, following storm conditions, cannot be accommodated by the structure withing normal limits have a fail-safe method of removing snow, e.g. heating

R Full Report

An indoor sports facility in a mid-western city suffered snow-related damage one winter. Averaging 76 inches (1.9m) of snow annually, the region recorded over 132 inches (3.4m) of snow and fewer warming/thawing cycles during this season, thereby leading to more significant overall snow accumulations. The pre-engineered structure was comprised of a fabric shell stretched over a series of structural steel arches and was reportedly installed ten years prior. The shell reportedly exhibited visible deflections in several of the arches, causing the owners to close the facility and engage snow removal services. During the following spring, a structural engineering professional was engaged to document the extent of damage and provide a causation analysis. Field investigation and deflection measurements along the length of the frame segments found plastic deformation in six of the nine arches, ranging from less than 1/8 inch (0.32cm) to as large as 5 inches (12.7cm).

A review of available proprietary information, followed up with lengthy phone conversations with the pre-engineered system provider, revealed that the designer, manufacturer, original installer, and the presumptive repair contractor were all the same entity. The manufacturer's published deflection criteria provided more stringent deflection criteria than the International Building Code (IBC) general serviceability criteria.

The provider's technical representative explained the arches were not intended ever to hold snow, and the restrictive deflection criteria were intended to ensure snow accumulations on the fabric did not occur. That statement of assumption was both enlightening and concerning, considering the structure is near a historically documented heavy snow zone. The provider's designer contended that the fabric surface, structure's slope, and arch stiffness collectively prevent snow from accumulating. Actual events and structure performance suggested otherwise. Simply, snow accumulating on the roof caused expected deflection, which allowed for additional accumulation and additional deflection. Later reviews of sliding snow criteria and the roof slope indicated that indeed this structure should have expected snow accumulation.

In this case, the designer applied incorrect assumptions. The proprietary design/manufacture/install model was generically applied in a location susceptible to snow loading contradicting the baseline assumptions. Anticipating that the sloped segment of the arches would shed the snow prior to deflections led to improper application of the code-required loading and, eventually, poor material selections. Ultimately, the flawed assumptions were exposed when snow fell and accumulated, liberally selected materials plastically deformed, and design parameters were unacceptably violated.

As structural design professionals, it is imperative to revisit assumptions regularly, especially those used repetitively. Different locations and situations always require renewed attention and verification of previous expectations. In the end, this site narrowly avoided a collapse and instead only suffered the arch deformations. All arches with permanent deflections out of manufacturer's strict tolerances were replaced, operational heating recommendations were refined, and the building management implemented removal instructions for any future snow accumulations.

C Expert Panel Comments

This is another legacy report about a snow loading problem with the added complication that the design did not, apparently, consider the full effects of a severe fall.

There does not appear to be any indication of fabrication or erection error with the frame. Further, there appears to be no indication of design error except for significant underestimation of snow loads and the ability of those loads to accumulate over time.

Fabric structures are becoming increasingly common. The design/build method of procurement for these structures is a natural consequence of the proprietary, or claimed proprietary, nature of their design and construction. There is nothing inherently wrong with this practice. However, there have been too many failures of fabric structures. One prominent example was the 1988 collapse of the Dallas Cowboys Practice Facility (Anatomy of a Collapse, the National Institute of Standards and Technology's **Final Report on the Collapse of the Dallas Cowboys Indoor Practice Facility, May 2, 2009 (NIST IR 7661) | NIST**

In this case there was an assumption that the nature of the fabric, the slope, and the inherent shape and stiffness would prevent any snow accumulation. However there is a code to follow; sections 3102 and 3102.7 of the IBC are dedicated to membrane structures and they require consideration of snow load. ASCE 7-16 has numerous instructions for snow load including cold and warm surfaces, shapes and slopes. Only in the cases where the slopes exceed 70 degrees is the designer permitted to omit snow, per ASCE 7-16 7.4.3 and the related Fig 7.4-3. It may be noted that the relevant text existed even in ASCE 7-05. Snow load based on locality and shape, material or roof are not assumptions, but data to be used in design. The behaviour of snow and its movements is a specialist subject and any deviations from code recommendations should be deferred to an expert in the subject. Any loading condition that doesn't apply, particularly if it is typically prevalent in the area of use, should be backed by evidence.

Another example is the failure of the Metrodome fabric roof in 2010. A storm came in fast and workers trying to remove snow via firehoses had to be brought down for safety. Because the dome was flattening and increased heating couldn't keep up with the storm, the fabric failed and was captured on dramatic video. Story and multiple video at **The Moment the Metrodome Roof Collapsed (vikings.com)**

In the event of abnormal accumulations thought should be given to avoiding the consequences of severe overload. These might include operational heating procedures or other methods of shedding load. Furthermore, especially since this structure was apparently a repeatedly manufactured product, the assumption that snow would slide off the fabric and not accumulate could have been verified by field testing.

Submit Report

Submit Feedback

Kevin Parfitt Appointed CROSS-US Designated Person

News

As part of our strategy to engage more volunteer leaders and distribute workload as CROSS-US grows, Kevin Parfitt assumed Andy Hermann's position as a CROSS-US Designated Person effective January 1, 2023.

CROSS Designated Persons manage the process of triage and anonymization when a CROSS report is submitted to the CROSS portal. They are the only persons with access to non-anonymized reports on submittal. The other CROSS-US Designated Person is Glenn Bell. Alastair Soane, Paul Livesey, and David Hastings are Designated Persons in the UK.

Kevin is recently retired after more than 40 years on faculty of the Architectural Engineering Department of Penn State University. He is an expert in building performance & failures, building damage assessment, building collapses, architectural systems failures, disaster response, forensic engineering, structural engineering, and university & continuing education. You may find more information on Kevin on the **CROSS-US website**.

Kevin's appointment will allow Andy Herrman to concentrate on CROSS-US visibility, relationship development, and strategy as a member of the CROSS-US ExCom and a Director of CROSS-US.

Structural misunderstanding leads to historic church tower nearly being demolished

Report ID: 1013 | Region: CROSS-US

Overview

A historic church stands at the center of a charming town. Highlighted among many striking features is the iconic 170-foot (52m) bell tower, which looms over the town. For decades, the tower has become the centerpiece for cultural events in addition to being the original community center of worship.

Key Learning Outcomes

For owners of historic churches:

- Regularly inspect the facades of old stone churches and similar buildings and look for cracks and displacements
- Consult a suitably experienced and qualified structural engineer if there is ongoing deterioration

For structural engineers:

- Thoroughly investigate the form of historic towers and load paths to determine the reasons for cracking or other defects
- Restore the facades using original type materials and techniques whenever possible

R Full Report

A historic church stands at the center of a charming town. Constructed in 1888, the church celebrates architectural influences from the heritage of the original parishioners. Highlighted among many striking features is the iconic 170-foot (52m) bell tower, which looms over the town, offering a welcoming beacon to visitors. For decades, the tower has become the centerpiece for cultural events in addition to being the original community center of worship.

The community regularly gathered in the lawns around the steeple to attend free concert offerings from a twelve-bell carillon housed within the tower. The idyllic tradition was recently cast into shadow when caretakers noted the existence of cracks, localized spalling, and general masonry disrepair. These concerns led parish leaders to adopt the understanding that the tower was falling apart. The presumed culprit? Vibrations and other dynamic forces from the motions of carillon bells. This justification led leadership to suspend concerts, eliminate all carillon usage, close the facility, and begin planning for the demolition of the historic building.

These steps were taken without any input from outside the church organization. In hope of saving the building, concerned staff and community members sought an independent technical opinion from a structural design professional. Grade-level exterior inspections revealed a series of cracks that existed in the exterior brick masonry at windows, doors, and near building corners. Presenting at areas of expected stress concentration throughout the building, these cracks are common in masonry of this vintage and are not related solely to structural behaviors of the tower.

Significant gaps between the exterior masonry wall of the tower and the perpendicular flying buttresses of the adjacent side aisles were observed from windows of adjacent structures. Previous reports and assumptions had asserted that these gaps were specifically attributable to the usage of the carillon bells. Implementing some respectful skepticism of established assumptions, however, the structural design professional climbed several flights of stairs and a few seldom-used ladders, which afforded admission to the rarely accessed carillon belfry. One notable feature became immediately apparent: the aged timber structure supporting the bells was structurally isolated (Figure 1).

Over a century ago, the original designer astutely determined to keep the support of the carillon independent from the surrounding masonry facade. This was likely more challenging and less efficient for the builders, constructing one frame inside the other, but allowed for two completely isolated structures.

A second critical observation was that the bells were permanently affixed in a stationary position, either by design or decades-old retrofitting. Instead of a bell rotating/swinging and sounding with an internal clapper, the ringing of each bell is activated by a side-mounted, electronically-activated hammer. Since they are stationary, the bells do not create significant dynamic forces within the tower. Further, whatever minimal forces are initiated are not transferred to the masonry walls due to the as-designed structural isolation. Combined, these two realities painted the originally voiced concerns as potentially costly misconceptions.

Though this review occurred well beyond the original design timeline, the grasp of the current situation featured misunderstandings that led to significant problems. Incorrect assumptions grossly mischaracterized common masonry problems and led to misinformed decisions. The actual designer, of course, could not have been consulted, but grave consequences for a historic structure and the surrounding community were quickly unfolding.

As structural design professionals, it is critical to ask difficult questions, challenge the presented 'facts,' and take extra steps to physically verify the actual conditions. Assuming the provided information is correct can be a mistake. Instead, skeptical review and verification are often appropriate.

Fortunately, in this case, the involvement of a structural professional furnished the church with a fact-based assessment and detailed explanations regarding typical exposure-related masonry cracking and separations due to long-term differential building movements. Armed with renewed insight, a phased masonry restoration program was initiated, the carillon restrictions lifted, and the community gathered around the spire once again to hear the bells ring.

Figure 1: Timber structure supporting bells is structurally isolated from the exterior masonry walls

C Expert Panel Comments

An interesting example of preservation and restoration engineering in a historic building. Churches dating back from centuries past exemplify what our forefathers were able to achieve with craftsmanship and long experience. In this case the core of the matter is the construction and condition of the bellframe. Bellframes are used to cope with large forces and are subject to dynamic loads from rotating bells coupled with mechanical wear of the moving parts.

The real heroes of this saga are the concerned staff and community members who had the wisdom to seek the services of a qualified structural engineer. Far too often, decisions related to building and bridge structures are made without the involvement of a structural engineer. This is particularly problematic with historic structures. The structural engineer should also be commended for their skepticism of the initial information that was provided, choosing instead to thoroughly investigate and establish the facts.

Information on stone towers can be found in literature such as *The Stone Skeleton: Structural Engineering of Masonry Architecture* by Jacques Heyman published online in 2014. Heyman identifies 'ringing cracks' and says: *Indeed, wind forces can help to propagate the 'ringing cracks' attributed to the bells. Wind forces, although greater than the bell forces, are however, intermittent; 40,320 combinations of an eight-bell ring can be achieved in something over 3 hours, during which time the tenor bell will have sounded 5,040 times.*

In this case there were indications in the report that the bell sounding method had been changed at some stage from full circle ringing to activation by a side-mounted hammer. If indeed the bells had originally been full circle mounted the above quotation indicates that there must have been an enormous number of cycles of soundings over the years. Nowadays, purists, might say that the original mechanism should have been restored instead of installing a different (electrically powered) system.

The fact that the ringing mechanism was changed may indicate that historic cracks were induced by the ringing and had started to form before the alteration which might have just slowed their development. More might have been learned by a study of the location and shape of the cracks. It is also interesting to note that there was an independent structure supporting the bellframe, so the original designer/builder had come across the problem before.

It is also an excellent example of why it is important to "consult your local structural engineer" for issues that appear to be structural in nature prior to making big decisions. For structural engineers this is also a reminder of the need to verify information presented as facts, particularly if they are simply presented by the users/owner. Taking the time to do due diligence and investigate all aspects/possibilities prior to drawing conclusions is important.

Finally, it is important to remember that the assessment and remediation of old stonework are specialist tasks and it is always well worth consulting a specialist before making irrevocable decisions about historically valuable buildings.

Submit Report

Submit Feedback

Expansion of CROSS-US Expert Panel

News

CROSS volunteer expert panels are the value-added component of the CROSS system, offering their considerable expertise in the analysis of lessons learned and recommendations following from each CROSS report. We are pleased to announce the addition of three distinguished members to the already-formidable CROSS-US Expert Panel.

Norb Dellatte is the M.R. Lohmann Endowed Professor of Engineering and the Head of the School of Civil and Environmental Engineering at Oklahoma State University. Norb is author of *Beyond Failure: Forensic Case Studies for Civil Engineers* and Editor of ASCE's *Journal of Performance of Constructed Facilities*.

Mike Drerup is President of Drerup Building Performance Engineering. He has 25 years of structural engineering and building technology experience, with an emphasis on the performance, maintenance, repair, and retrofit of existing buildings and structures. He has served on ASCE's Forensic Engineering Division for more than 15 years, including a term as Division Chair.

Scott Silvester is Principal in the Structures Group at Simpson Gumpertz & Heger (SGH). He has 22 years of experience in design, investigation, and rehabilitation of structures, specializing in investigations and remedial designs for concrete, steel, timber, and masonry structures. Scott works with Glenn Bell in processing Expert Panel input on CROSS-US reports to create impactful final reports.

You may find more information on Norb, Mike, and Scott as well as information on the other CROSS-US Expert Panel members on the **CROSS-US website**.

Jim Rossberg Retires

News

Jim Rossberg, Managing Director of Engineering Programs at ASCE and former ASCE staff member of the CROSS-US Executive Committee, retired from ASCE in October 2022.

Jim was pivotal in the establishment of CROSS-US as an entity of the ASCE Structural Engineering Institute, encouraged early collaboration between CROSS-US and the ASCE Forensic Engineering Division, and provided sage advice to the CROSS-US ExCom in its early years.

Jim was a member of ASCE staff for nearly 30 years. In this time, Jim helped develop and/or lead many ASCE technical activities including the Civil Engineering Research Foundation and The Highway Innovative Technology Evaluation Center. Jim became ASCE's Director of Codes and Standards, growing the program from 10 to over 50 standards. In 1997 Jim launched the Structural Engineering Institute, one of ASCE's first two institutes, while still heading up work on codes and standards. He was involved with several ASCE disaster response teams.

Thank you, Jim, and best wishes in your retirement.

Recognitions

News

Glenn Bell received the *2022 ASCE President's Award* for "his dedication to the safety of the public as evidenced through his work on the CROSS US failure database, the Florida condominium collapse, and service as President of SEI."

Bell was also admitted to the *National Academy of Construction* for "extraordinary leadership, exceptional achievements, and lasting improvements to the industry over many years."

Andy Herrmann received the *2022 Oscar Faber Award from IStructE* for this presentation "Florida Bridge Collapse: lessons learnt."

Norma Jean Mattei was appointed to President Biden's *National Infrastructure Advisory Council* (NIAC).

Judith Mitrani-Reiser has been named the *EERI 2023 Distinguished Lecturer* "in recognition of her exemplary work on and support for investigations of building and infrastructure failures, disaster recovery and community resilience, and multi-hazard mitigation, and contributions that lead to statutory and technical standards changes for a safer world against earthquakes and other extreme events."

Mitrani-Reiser was also inducted into the *UC Berkeley Civil and Environmental Engineering Academy of Distinguished Alumni*.

Jim Rossberg received the ASCE William H. Wisely Award for "continuing efforts to better the history, tradition, development, and technical and professional activities of the Society."

Alastair Soane received the *ASCE Forensic Engineering Award* at the 9th ASCE Forensic Engineering Congress in Denver for "Leadership in the conception and development of Confidential Reporting on Structural Safety and extension of it to an international network of CROSS entities, thereby enhancing structural safety worldwide through learning from failures, incidents, and other safety concerns."

Soane also was made an *Honorary Fellow of the Institution of Fire Engineers* "in recognition of exceptional work, over a sustained period of time, driving safety in the built environment."

Peter Wilkinson, Joint leader for fire safety at CROSS-UK, has been elected President of the *Institution of Fire Engineers*.

About CROSS-US

We help professionals to make structures safer. We do this by publishing safety information based on the reports we receive and information in the public domain.

We are a trusted provider of free safety information for the built environment.

Visit the website>

Contact CROSS-US>

How we are structured

SEI ASCE STRUCTURAL ENGINEERING INSTITUTE

Sign up for our emails

If this Newsletter has been forwarded to you, please **sign up>** for email updates from CROSS-US.

Email updates are the best way to receive the latest safety information and news from us, including our Newsletter.

CROSS on social media