



Granite Columns



President's Letter



These are unprecedented times. Although most of us can work, we are all still affected by the Corona Virus pandemic. Concerns about family members, friends and coworker's wellbeing are on our minds. We are working from home, avoiding social contact and trying to adjust to the new normal. Leaders of our businesses are concerned about keeping productive and maintaining workload. We are all challenged by this situation.

SENH and NCSEA will continue to support our members throughout this challenge. The board of directors will continue to work towards the goals of our strategic plan and maintain benefits for our membership. Here is what we have planned:

The free NCSEA webinars will continue. These will be followed by a web-based conversation for members to share and discuss the webinar's subject. I encourage all to participate.

We will continue to have bi-monthly meetings. The meetings will be web based. Obviously, the meetings will not include dinner. Given the times we are in, there will not be a set meeting fee, we will be asking attendees for a donation at your discretion to support SENH. I encourage all to attend these. They are more accessible than ever.

The Excellence in Structural Engineering Awards will continue. Thankyou to all who have participated. The awards will be announced at the meeting in May. This is a great opportunity to gain exposure for your firm both in the engineering community and beyond.

We will continue to advance the strategic plan. We recently provided a survey to membership. If you have not answered, there is still time. So far, the answers to the questions have been helpful to provide direction on what the greatest priorities of the strategic plan are. Please take this opportunity to provide some input.

I hope that the steps that we have taken to adapt to what we all face will be helpful. Please don't hesitate to contact me or any other board member if there is something you believe SENH can do to support our membership. I am confident that we will all get through this challenge and encourage everyone to stay positive, adapt and be well.

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Special Points of Interest/ Reminders:

- *Mark you calendars! The next meeting is scheduled for May 13th—See inside for details!*
- *Check out the nominees for the annual Excellence in Structural Engineering Awards!*

SENH May Meeting Announcement

NEXT MEETING: Wednesday, May 13, 2020

PLACE: **ONLINE**

Members: A calendar invite will be sent with a link to the meeting.

Non-Members and Students: Register following the RSVP instructions below.

AGENDA: 5:30 pm – 6:00 pm Business Meeting
6:00 pm – 6:30 pm Awards Program
6:30 pm – 7:30 pm Presentation

COST: Member: **FREE**—Discretionary donations can be made through the SENH website here:

<https://www.senh.org/meeting-calendar>

Non-Members and Students: **FREE**

RSVP: Members: No RSVP required.

Non-Members and Students: To RSVP, email the SENH Admin, Cassi Beroney, at cbberoney@tfmoran.com. Please register by Monday, May 11, 2020.

NOTE: 2.0 PDHs have been assigned for attendance. Attendees are responsible for signing into the Zoom call with first and last name in order to receive PDHs.

PRESENTATION: **Top Things You Should Know About HSS Connections**

Connections are often the most overlooked part of structural design. We as structural engineers are educated in school of the many ways to analyze structural systems and to design beams and columns. But for many reasons, little time is spent on actual connection design. Perhaps in graduate school we have the chance to take an advance course on connection design, but often we are not truly exposed to the subtleties and complexities of steel connections until we are on the job, where, too often, we learn the biases and bad habits of our mentors.

In addition, most engineers in the US and Canada delegate the responsibility of connection design to the project's fabricator. While this can be a good way to get cost effective connections, the Engineer of Record (EOR) often provides member designs that make it challenging for the fabricator's engineer to get the connections to work for the loads given without reinforcing the members or choosing a costly connection type. This is especially true for connections that involve Hollow Structural Sections (HSS).

HSS connections have often been a source of additional mystery for even the most experienced engineers. For many years, there were not many resources here in the US that we as engineers could turn to for guidance on HSS connections. In the mid to late 1990's, this started to change and over the past 20 years many excellent resources have evolved, especially with the inclusion of Chapter K in AISC 360.



SPEAKER: **Brad Fletcher, S.E.**, is the senior sales engineer at Atlas Tube. In this role, Brad leverages his 28 years of experience in engineering design and the steel industry to provide technical expertise on the use of steel hollow structural sections (HSS) and pipe piling products to design engineers, detailers, fabricators and architects.

Meeting Announcement *(Continued from page 2)*



A registered structural engineer in the state of Illinois, Brad has held senior positions at leading architecture and engineering firms, Skidmore, Owings & Merrill; Sargent & Lundy; and Halvorson and Partners. For the past twelve years, while working at Tata Steel (formerly known as Corus) and now with Atlas Tube, Brad has focused his efforts on serving as a liaison between structural designers and the steel industry.

Brad holds a Bachelor of Science and a Master of Science in Civil Engineering (BSCE, MSCE) from Purdue University. He is active in many industry groups, including the American Institute of Steel Construction (AISC), the Structural Engineers Association of Illinois (SEAOI) and ASTM International. Brad participates in the Technical Committees responsible for the AISC Specification as well as the HSS Committee of the Steel Tube Institute. Brad is also on the Board of the CISC Education and Research Council (formerly SSEF) in Canada and the S16 Technical Committee for the Canadian Standards Association (CSA).

Board of Director Vacancy and Nomination

Looking for a way to be more involved with SENH? Consider volunteering your time to serve on the Board of Directors!

There will be two board of director positions up for renewal. Tim Polson has been nominated to serve another term to fill one of the positions. The remaining position is still open. Anyone interested in serving on the board of directors should contact Tom Lamb at tlamb@tfmoran.com. An announcement of the remaining nominee will be made at the May web meeting. Voting for the nominees will follow via online survey.

NCSEA Survey Invitation

The banner features the SE3 logo on the left, the NCSEA logo on the right, and the text "2020 SURVEY IS NOW LIVE" in the center. Below this, a grey bar contains the text "JOIN THE CONVERSATION AND PARTICIPATE!" and the website "WWW.SE3COMMITTEE.COM". At the bottom, three icons represent "SURVEY" (a document), "DISCUSSION" (a speech bubble), and "IMPROVEMENT" (a line graph with an upward arrow).

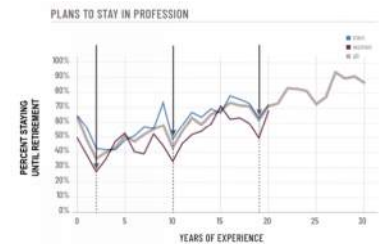
Invitation to Participate in the 2020 SE3 Survey

The NCSEA SE3 Committee is currently administering its third nationwide survey of structural engineers across the profession and **we invite you to participate!**

The Structural Engineering Engagement and Equity (SE3) Committee is composed of a diverse group of engineers across the United States. Our mission is to attract and retain the best and brightest into our profession; and to ensure ALL structural engineers have a clear pathway to success. The SE3 survey is an ongoing effort to identify trends, understand the underlying factors, and initiate industry-wide conversations.

For example, did you know that roughly 60% of survey respondents have considered leaving the profession at some point in their career? When comparing a respondent's years of experience with their inclination to stay until retirement, the 2018 SE3 survey identified three (3) career pinch-points--occurring at year two (2), ten (10), and eighteen (18).

Based on key survey findings, the committee utilizes presentations, panel discussions, and networking events to provide actionable information for industry improvement. Survey topics include career development, compensation, work flexibility, and overall engagement. For more information, including past events and publications, check out www.SE3committee.com.



The SE3 Committee looks forward to your participation!

Excellence in Structural Engineering Award Nominees

Awards Category: **Bridge Structures**



DESIGN CHALLENGES

- The new structure will need to appear as a scaled-down model of the original bridge with similar truss geometry, but as a one-lane pedestrian bridge instead of a two-lane vehicle bridge.
- The consultant's responsibility includes leading charrettes to build consensus among 8 groups holding jurisdiction over the project—in a short period of time.
- The consultant is responsible for developing economical, constructible alternatives that resemble the previous structure.

CONSTRUCTION CHALLENGES

- The 1909 bridge would not support snow loads in the coming winter for this two-year project.
- The sewer line cannot be maintained in place during construction.
- Planned construction access employs nearly exclusive use of bridge boats. At the time of the contract award, the team is notified that the river will be drawn down for a dam project downstream. Water levels will not support the boats.

DESIGN SOLUTIONS

- The consultant collected input from all 8 groups to develop alternatives for parties to review.
- The consultant worked with the Town, two historical groups, and NHDHR to select a look that is constructable, and facilitated the salvage of one original bridge portal for an interpretive display.
- Using modern practices, the consultant designed an economical prefabricated structure with the appearance of a historic structure. (38-second timelapse installation video: youtu.be/p1Ds0ZE2UQg)

CONSTRUCTION SOLUTIONS

- Explosive demolition was selected (34-second demolition video: youtu.be/F4s6J_rj2Y)
- The contractor installs an innovative and cost-effective temporary sewer bypass.
- The contractor builds a causeway in the river to provide safe construction access at no additional cost to the client.

Project Name: Lilac Pedestrian Bridge

Project Location: Hooksett, New Hampshire

Structural Design Firm: Dubois & King, Inc., Laconia, NH

Project Highlight:

DuBois & King led study and design for a replacement of the Lilac Bridge with a prefabricated truss bridge. The new bridge maintained the appearance of the previous bridge—a historic high Pratt through truss bridge constructed in 1909 over the Merrimack River. The existing bridge was bypassed and closed to vehicles in 1976 and closed to pedestrians in 1995. The new bridge reestablished a safe sewer crossing and pedestrian connectivity in the historic district.

Excellence in Structural Engineering Award Nominees

Awards Category: **Bridge Structures** *(continued)*

Project Name: Stage Road over Nighthawk Hollow Brook and Unnamed Brook Bridge Replacements

Project Location: Gilmanton, New Hampshire

Structural Design Firm: Hoyle, Tanner & Associates, Inc.; Manchester, NH

Project Highlight:

Many bridges throughout New Hampshire have been damaged or washed away due to large storms over the past two decades. Fortunately, funding from NHDOT's Municipally-Managed State Bridge Aid Program allowed the Town of Gilmanton to upgrade two pieces of aging infrastructure ahead of this fate. The bridge replacements will greatly reduce the chances of flooding on the Stage Road Bridge over Nighthawk Hollow Brook and bank erosion on the Stage Road Bridge over Unnamed Brook.

STAGE ROAD
over Nighthawk Hollow Brook & Unnamed Brook Bridge Replacements

The former bridge at the Unnamed Brook crossing was built in 1930 and consisted of concrete abutments with a concrete slab superstructure. The supporting earth was washed away around the existing bridge because of ponding on the roadway and poor drainage. Hoyle, Tanner partnered with the Town of Gilmanton to design the replacement structure, a 22-foot-span precast concrete rigid frame (completed in late 2018). To combat poor roadway drainage, a 6.4% super-elevation was used across the bridge and approach roadway. This allows water during a storm to quickly run off the roadway and to the side slopes, which are armored with large stones to prevent erosion. Two catch basins were also included as a part of the design in areas where stormwater could not run off the road quickly.

The former bridge crossing of Nighthawk Hollow Brook was comprised of steel beams with a concrete deck. Originally built in 1930 and rehabilitated in 1960, the bridge was undersized to convey water flow, which would cause frequent roadway flooding by over a foot. A hydraulic analysis of the bridge revealed that to prevent future flooding, the roadway should be raised by several feet and the bridge span should increase. The design of a new 54-foot-span bridge over Nighthawk Hollow Brook was completed in late 2018. In order to prevent recurring roadway flooding, the roadway profile was raised over 3 feet. This raise required extending the roadway work to meet the design speed requirements and to adequately convey the stormwater.

Hoyle, Tanner
ASSOCIATES, INC.
www.hta.com

A.D. SRETT

Excellence in Structural Engineering Award Nominees

Awards Category: **Bridge Structures** *(continued)*

Project Name: NH Route 107A Superstructure Replacement over Pan Am Railways

Project Location: East Kingston, New Hampshire

Structural Design Firm: McFarland Johnson.; Concord, NH

Project Highlight:

This Accelerated Bridge Construction (ABC) project consisted of the superstructure replacement of a three-span steel girder bridge carrying NH Route 107A over PanAm Railways and a private residential drive. The project utilized innovative materials and structural systems including Ultra-High Performance Concrete (UHPC) and modular Prefabricated Bridge Units (PBU's), both being the first use of these technologies by the NHDOT. The bridge superstructure was replaced during a 25-day bridge closure, minimizing impacts to the traveling public.

McFarland-Johnson, Inc. (MJ) recently partnered with the New Hampshire Department of Transportation (NHDOT) to develop an innovative rehabilitation solution for a structurally deficient bridge located in East Kingston, New Hampshire. This Accelerated Bridge Construction (ABC) project consisted of the superstructure replacement of a three-span steel girder bridge carrying NH Route 107A over PanAm Railways and a private residential drive.

This project utilized innovative materials and structural systems including Ultra High Performance Concrete (UHPC) and modular Prefabricated Bridge Units, both being the first use of these technologies by the NHDOT. UHPC is a cementitious, concrete material that has a minimum specified compressive strength of 21,000 pounds per square inch, and provides exceptional durability, tensile ductility, and bond strength. UHPC is revolutionizing the way bridges are constructed by allowing more of the structural elements to be prefabricated offsite and later connected at the project site with small field-cast closure pours. Because of the unique properties of this high-performance material, the connections between elements are no longer the weakest link, and increased service life can be expected for bridges using UHPC.

Prefabricated Bridge Units (PBU's) are modular prefabricated superstructure systems consisting of two steel beams connected by a cast-in-place deck. These units were designed and detailed by MJ for this specific project, and they were constructed offsite on temporary supports well in advance of the planned onsite construction. These modular units were transported to the site using normal flatbed trailers and lifted into their final position using a single 275-ton high capacity hydraulic crane. In recognition of the innovative solutions, this project was awarded more than \$600,000 by the Federal Highway Administration as part of the Accelerated Innovation Deployment (AID) demonstration program.

The design team listened to the needs of the owner and responded by developing an engineering solution fulfilling the stated project goals. The use of prefabricated modular elements in combination with high performance concrete materials provided a durable structural system that will last for many generations. Additionally, the special federal demonstration funding secured for this project reduced the financial burden for the State resulting in a wise investment for the citizens of New Hampshire. Through reuse of the existing abutments and implementing Accelerated Bridge Construction methods, the project greatly minimized impacts for all project stakeholders by completing the majority of the construction during a short 25-day roadway closure period. This project successfully tested and implemented two new technologies, and the knowledge gained will undoubtedly be utilized on future bridge improvement projects throughout New Hampshire.



Route 107A Bridge
EAST KINGSTON, NEW HAMPSHIRE



Excellence in Structural Engineering Award Nominees

Awards Category: **Bridge Structures** *(continued)*



WILLOW STREET BRIDGE

PELHAM, NH

ENGINEER

Quantum Construction Consultants, LLC

GENERAL CONTRACTOR

Evroks Corporation

CLIENT

Town of Pelham, NH



PROJECT

Willow Street Bridge over Beaver Brook was a 39-foot span steel beam bridge originally constructed within a floodplain in 1955. Although not on the New Hampshire Department of Transportation's (NHDOT) Municipal Redlist, it had been rated as functionally obsolete. The existing bridge was narrow and subjected to flooding at flows less than the 50-year storm.

The new replacement structure is a 104-foot span steel beam superstructure with integral abutments consisting of cast-in-place concrete pile caps supported on steel H-piles. The new bridge was constructed with 12-foot travel lanes, 2-foot shoulders, and a 6-foot sidewalk for an out to out width of 37.5 feet. The project also featured construction of approximately 400 linear feet of connected sidewalk along the north side of Willow Street. The newly constructed sidewalk will tie into the sidewalk system programmed into the Town's Master Plan.

The bridge replacement structure was funded by the Town of Pelham and the NHDOT Municipal Bridge Aid Program and was completed in the fall of 2019.

Project:

Willow Street over Beaver Brook NHDOT Bridge No. 105/069

Project Location: Pelham, New Hampshire

Structural Design Firm: Quantum Construction Consultants, Concord, NH

Project Highlight:

The Willow Street Bridge was a 39-foot span steel beam bridge originally constructed within a floodplain in 1955. The existing bridge was very narrow and was subjected to flooding at flows less than the 50-year storm.

The replacement structure is a 104-foot span steel beam superstructure with integral abutments consisting of cast-in-place concrete pile caps supported on steel H-piles. The new bridge was constructed with 12-foot travel lanes, 2-foot shoulders, and a 6-foot sidewalk.



Excellence in Structural Engineering Award Nominees

Awards Category: **Building Structures**

TURNER GROUP

HAMPTON ACADEMY

Hampton, NH

Project:

Hampton Academy Renovation and Addition

Project Location:

Hampton, New Hampshire

Design Firm:

The H.L. Turner Group, Concord, NH

Project Highlights:

The Turner Group was selected to perform a site analysis in order to identify potential locations for building additions for Hampton Academy, a public middle school located in Hampton, NH. The building committee selected a design that included a 70,000 square foot renovation of the preserved structure and a 50,000 square foot addition. The largest engineering challenge on the project included the removal

ENGINEER

The Turner Group

CONSTRUCTION MANAGER

Bonnette, Page & Stone, Inc.

OWNER

SAU 90

PROJECT

In 2015 the Turner Group was selected by SAU 90 to assist with the revitalization of their historic, undersized school. Through numerous programming meetings with the school and town it was determined that the most important design feature was to preserve the view of the 1939 structure from the intersection of Academy Avenue and High Street. With that directive TTG was able to develop a design that provides an addition and the needed additional space, while better organizing the site.

With the removal of a separate classroom wing, a new gymnasium and classroom wing was constructed. The existing undersized gymnasium was repurposed to a new auditorium to hold all students and staff. All remaining existing spaces were fully renovated and updated. New insulation systems, in conjunction with new mechanical systems provide an efficient and durable building to serve the Hampton community for years to come.

Photo: Derrick Feole
Doug Proctor, AIA



Excellence in Structural Engineering Award Nominees

Awards Category: **Special Structures**



The cyclones rise 62 feet above the concrete foundations. The cyclones use vacuum pressure to draw the sawdust away from the indoor facility, then drop it onto the blue conveyor system where it heads back inside for packaging.

Project: Durgin & Crowell Lumber Dust Cyclones

Location: Springfield, NH

Structural Engineer: Team Engineering (Bedford, NH)

Project Highlight:

Durgin & Crowell Lumber Co. required a structure to house three new cyclones, vacuums that remove sawdust from the indoor processing facility and transports it to a bagging machine. The sawdust is sold for many uses including horse barns and composting toilets. The cyclones rise 62 feet above the concrete piers. While the result of the design is a common steel braced frame, the multitude of loads and combinations for the top-heavy vacuums made the design challenging and fun.



The result of the design is a common braced frame, but the complicated loading conditions made the design challenging.



Project Name:

Durgin & Crowell Dust Collection Cyclones Structure

Project Location:

Springfield, New Hampshire

Design Firm:

Team Engineering, Bedford, NH

Project Highlights:

Durgin & Crowell Lumber Co. required a structure to house three new cyclones, vacuums that remove sawdust from the indoor processing facility and transports it to a bagging machine. The sawdust is sold for many uses including horse barns and composting toilets. The cyclones rise 62 feet above the concrete piers. While the result of the design is a simple steel braced frame, the multitude of loads and combinations for the top-heavy structures made the design challenging and fun.

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