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The Goodbee Regional Wastewater Treatment Plant, St. Tammany Parish, Louisiana

FEATURES:

Engineering a Scalable Regional Wastewater Treatment Facility Under Extreme Site and Community Constraints

Extension of the API Standard 650 Equivalent Mechanical Model and Its Application to LNG Vessel Stability Under Wave Excitation

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President's Message

By Katherine Foreman Castille, PE, Section President

Katherine Foreman Castille, PE

Louisiana Civil Engineer | February 2026

It is a privilege to serve alongside such a dedicated and accomplished community of engineers. This issue of *Louisiana Civil Engineer* reflects the strength of our Louisiana Section and the collective effort of our members, volunteers, Branches, Institutes, and student chapters who continue to advance the civil engineering profession through service, leadership, and technical excellence.

I am especially proud to recognize two individuals whose careers exemplify the values of ASCE. Andrew K. Woodroof, PE, named the 2025 Region 5 Civil Engineer of the Year, represents the highest standards of professional integrity, technical leadership, and commitment to mentoring the next generation of engineers. We also honor Ronald L. Schumann, Jr., PE, F.ASCE, as a 2025 Region 5 Wall of Fame recipient, recognizing decades of service, leadership, and lasting contributions to infrastructure across Louisiana and beyond. Their achievements reflect the impact that sustained involvement and service can have on our profession.

This issue also highlights the important work being done across our state. The featured article on the Goodbee Regional Wastewater Treatment Plant demonstrates how thoughtful planning, collaboration, and innovative design can deliver scalable infrastructure solutions under complex site and community constraints. In addition, our second technical paper advances engineering practice by extending the API Standard 650 model to more accurately account for sloshing and vessel behavior under dynamic loading. Together, these articles showcase the depth of expertise and problem-solving capacity within our membership.

Equally important is the continued engagement of our members at every career stage. Coverage of the Multi-Regional Leadership Conference highlights the value of leadership development and regional collaboration, particularly for younger members who are beginning their journeys within ASCE. That engagement will continue this spring at the **2026 ASCE Louisiana Section Spring Conference** hosted by the Acadiana Branch in **Lafayette** on May 7th and 8th, where engineers from across the state will come together to learn, connect, and strengthen our professional community. I encourage all ASCE members to attend, as your participation is essential in making the conference a true success and a meaningful gathering for our engineering community.

I would also like to extend my appreciation to all members who participated in the Publication Preferences Poll distributed last month. Your feedback is invaluable and will play an important role in guiding the Board's upcoming decisions regarding the future of the *Louisiana Civil Engineer* publication.

As I reflect on the work represented in this issue, I am encouraged by the dedication, professionalism, and collaborative spirit of our Section. Together, we are not only advancing technical excellence, but also building a strong and supportive community of engineers committed to serving Louisiana. I look forward to continuing this work alongside each of you in the months ahead.

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The Section is evaluating how the Louisiana Civil Engineer Journal should be delivered in the coming years.
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Engineering a Scalable Regional Wastewater Treatment Facility Under Extreme Site and Community Constraints

The Goodbee Regional Wastewater Treatment Plant, St. Tammany Parish, Louisiana

By Bren McNeely

Bren McNeely

Introduction

Rapid growth on the Northshore of Lake Pontchartrain has placed increasing pressure on municipal wastewater infrastructure. In St. Tammany Parish, aging treatment facilities, limited available land, and sensitive surrounding communities required a new approach to wastewater treatment plant development. This article documents the planning, engineering, permitting, and construction of the Goodbee Regional Wastewater Treatment Plant, a modular precast concrete facility designed to provide immediate treatment capacity while remaining expandable toward multi-million-gallon-per-day service.

The project illustrates how structural engineering, construction best practices, innovative hydraulic design, and community constraints can be reconciled through collaborative efforts. Key innovations included oversized modular precast tanks, precision-engineered joints, site-specific crane and logistics modeling, advanced concrete durability strategies, and process layouts that allowed high treatment capacity within a tight footprint. The result is a treatment system that not only met regulatory and operational needs, but also established a scalable framework for future regional wastewater expansion.

1. Background and Regional Need

St. Tammany Parish has been one of the fastest-growing regions in southeast Louisiana for more than two decades, driven by suburban expansion along the I-12 and Highway 21 corridors and increasing demand for housing outside the New Orleans metropolitan area. This growth has significantly increased hydraulic loading on the Parish's wastewater treatment infrastructure, much of which was originally designed to serve small, decentralized developments rather than large, interconnected service areas.

Historically, wastewater service in the Parish relied heavily on small, above-ground steel package plants. While these systems provided rapid deployment and relatively low initial capital cost, they were never intended to support sustained high-flow regional service. Many of these units are approaching or exceeding their design capacity, which led to increased maintenance costs, reduced process stability, and greater vulnerability to corrosion and storm damage. From a regulatory standpoint, these facilities also struggled to maintain consistent effluent quality as influent loading increased, exposing the Parish to compliance risk under its Louisiana Department of Environmental Quality (LDEQ) and National Pollutant Discharge Elimination System (NPDES) permits.

The Parish's long-term wastewater master plan called for consolidation of these smaller facilities into a centralized regional plant capable of treating up to 5 MGD. Such a facility would provide improved nutrient removal, better resilience to peak wet-weather flows, and a more efficient long-term operational footprint. However, the development timeline for a full regional plant, including site acquisition, environmental review, hydraulic modeling, funding, and regulatory approval, was measured in years rather than months. In the meantime, new subdivisions and commercial developments were put on hold despite rising housing demands in the popular market, creating an urgent need for interim treatment capacity.

The Goodbee site was selected as a strategic interim hub to provide intermediate capacity relief while remaining compatible with the ultimate regional system. The engineering mandate was therefore not simply to build a temporary plant, but to create a scalable infrastructure asset that would retain value when the permanent regional facility was constructed.

2. Project Constraints

The Goodbee project faced an unusual combination of physical, regulatory, and community constraints that would normally push designers toward either a minimal temporary solution or a costly permanent facility. Instead, the project required an transitional approach that satisfied both short-term urgency and long-term system planning.

2.1 Limited and Constrained Footprint

Although the Parish owned additional land for the future 5-MGD plant, the interim system had to be installed in a narrow corridor next to the two current operating steel wastewater treatment units (Figure 1). This constraint dictated nearly every aspect of the project, from tank geometry to crane placement and material delivery. Traditional cast-in-place construction would have required large forming footprints, extended on-site labor, and significant concrete staging areas that simply were not available. The confined layout also limited access for heavy equipment, requiring precise sequencing and lift planning to avoid interference with active treatment operations.

Location of St. Tammy Parish, Open Domain, Wikipedia

Figure 1: Aerial view of the Goodbee WWTP site showing the compact footprint and modular precast tank layout

2.2 Community Sensitivity

The proximity of residential neighborhoods created additional design drivers that extended beyond conventional wastewater engineering. Aeration blowers, mechanical equipment, and hydraulic turbulence are all sources of noise and vibration that can generate complaints and political opposition if not properly managed. Odor control and visual appearance were also important considerations. These factors necessitated a plant layout that physically separated the loudest mechanical equipment from property lines and incorporated acoustically controlled enclosures and building design features.

2.3 Regulatory Expectations

Because the project relied on large modular precast tanks rather than cast-in-place structures, regulators required a higher level of technical justification. St. Tammany Parish Government Utility District reviewers sought assurance that the tanks could resist buoyant uplift, maintain watertightness, and provide structural reliability over decades of service. Hydraulic process performance also had to be demonstrated for both the interim operating condition and the future expanded system. This placed an extraordinary emphasis on structural modeling, joint design, and durability analysis during the permitting process.

3. Design Philosophy: Thinking Like a Constructor

The complexity of the Goodbee site made it clear that conventional sequential design and construction would not succeed. Instead, the project adopted a design-for-constructability philosophy in which structural engineers, process engineers, precast fabricators, certified riggers, and installation crews collaborated from the earliest design stages.

Tank dimensions, wall thickness, and module segmentation were driven not only by structural and hydraulic requirements, but also by crane capacity, hauling limits, and field tolerances. Each precast section was engineered to fall within the safe working load of available cranes while still providing sufficient stiffness to resist lifting stresses and in-service loads. Joint geometry was developed to enable rapid field assembly without compromising watertightness, and installation sequencing was modeled to avoid re-handling or temporary storage within the tight site footprint.

This approach enabled the Goodbee project to achieve what is rarely possible on constrained municipal sites: industrial-scale infrastructure delivered with precision, speed, and minimal disruption. By embedding construction realities into engineering decisions, the project team transformed what would normally be a high-risk site into a predictable and controlled build environment.

4. Modular Tank Architecture

The defining physical feature of the Goodbee facility is its use of oversized modular precast concrete tanks as the primary process vessels. While precast has long been used for manholes, vaults, and small treatment units, the 25,000-gallon aeration and equalization tanks required at Goodbee represented a substantial increase in scale. Each tank was designed with internal dimensions of 26 ft by 12 ft, creating structural spans and hydrostatic loading conditions more commonly associated with cast-in-place tanks.

To make these tanks constructible, each vessel was divided into four vertically stacked precast modules: a base section with starter walls, two riser sections, and a flat top slab (Figure 2). This segmentation balanced competing requirements. Larger modules would have reduced the number of joints but exceeded crane and highway hauling limits. Smaller modules would have increased field labor, alignment risk, and leak paths. The four-piece configuration was selected as the optimal compromise between structural continuity, weight handling, and installation efficiency.

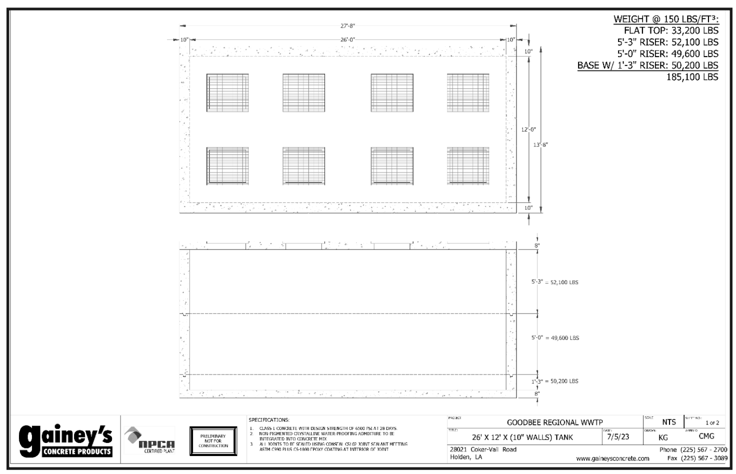

Figure 2: Plan and section view of the four-piece precast tank used for the Goodbee aeration tank

The heaviest individual section weighed approximately 60,000 pounds. Each module was engineered not only for in-service loads but also for lifting stresses, which often govern precast design. Lifting points, embedded hardware, and reinforcement were all designed to control cracking and prevent overstress during transport and placement.

5. Structural Design and Reinforcement

5.1 Load Conditions and Structural Demands

Wastewater treatment tanks are subjected to a unique combination of loads. Internally, the walls must resist hydrostatic pressure from water and mixed liquor. Externally, the tanks are subjected to soil pressure, groundwater uplift, and surcharge loads from equipment and traffic. These loads vary throughout the life of the structure and can reverse direction during empty or maintenance conditions.

At Goodbee, groundwater levels were expected to fluctuate significantly due to rainfall and the proximity of surface water features. This made buoyancy a critical design consideration. Tanks had to remain stable even when empty, with groundwater fully surrounding the structure. Structural modeling evaluated the uplift forces and the resisting weight of the tank, overburden soil, and any mechanical anchorage. The resulting design ensured a positive factor of safety against flotation under worst-case groundwater conditions.

5.2 Wall and Slab Design

All 25,000 gallon tank walls were designed with a nominal thickness of 10 inches and reinforced with double-layer steel (Figure 3). The exterior faces utilized #8 bars (1-inch diameter) to resist soil and groundwater pressure, while the interior faces used #6 bars at 6-inch spacing to control cracking and resist internal hydraulic loads. The dual-mat reinforcement system allowed the walls to behave as true flexural members rather than relying on mass concrete.

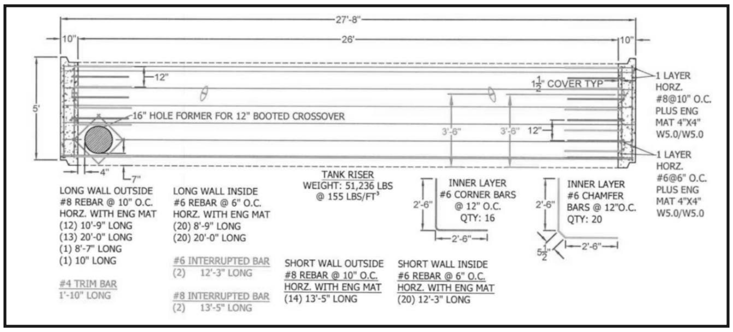

Figure 3: Reinforcement layout for the 10-inch tank walls, showing rebar spacing and structural detailing

Finite element modeling was used to evaluate wall stresses, crack width, and deflection under combined loading conditions. These models also accounted for the additional stresses induced during lifting and handling, when the tank modules behave as beams suspended at discrete pickup points rather than as soil-supported shells.

This level of structural analysis was essential for regulatory approval, as it demonstrated that the modular precast tanks met or exceeded the performance of traditional cast-in-place basins.

6. Watertightness and Joint Engineering

6.1 Precision Joint Design

Because each tank consisted of stacked precast modules, the integrity of the horizontal joints was critical. Over a 26-ft tank width, the cumulative dimensional tolerance had to be held within approximately ±½ inch to ensure proper joint seating and uniform seal compression.

Each riser section was cast with a precision tongue-and-groove profile similar to that used in large-diameter manholes, but scaled to unprecedented dimensions (Figure 4).

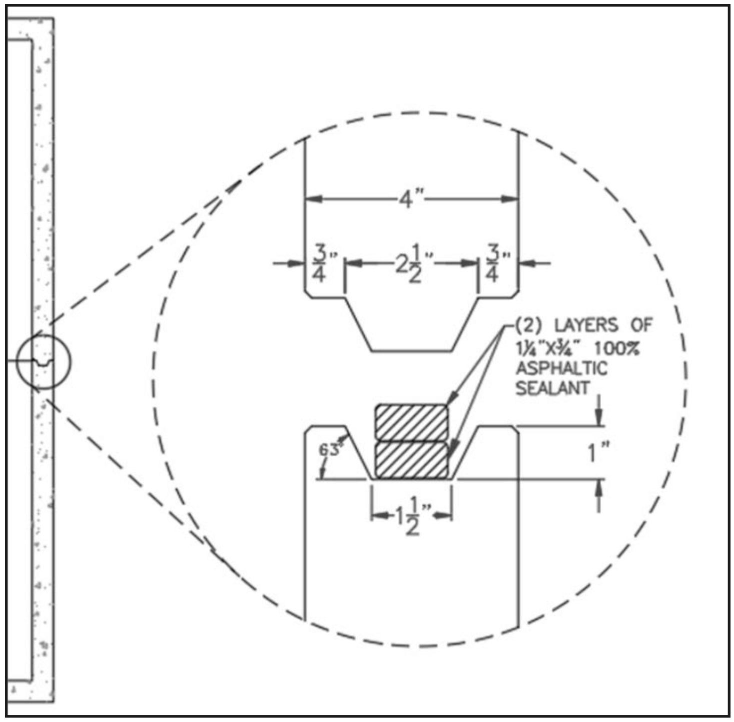

Figure 4: Joint detail showing sealant layers and interlocking geometry used to ensure watertight performance between precast tank segments

The tongue provided alignment and shear transfer, while the groove housed the elastomeric sealant.

6.2 Elastomeric Sealing System

The joint sealing system used a high-performance elastomeric compound designed to remain flexible under temperature variation, resist chemical attack from wastewater, and maintain adhesion under constant submergence. This material also had self-sealing characteristics that allow it to bridge small cracks or voids that might develop over time.

After assembly, the tanks were filled and observed for leakage. No measurable leakage occurred across any joint, validating both the manufacturing precision and the joint design.

7. Concrete Durability Strategy

7.1 High-Performance Concrete Mix

Wastewater environments are among the most aggressive for concrete. Sulfates, chlorides, and biologically generated acids can attack cement paste and reinforcing steel, leading to premature deterioration. To address this, the Goodbee tanks were cast using a 6,000-psi concrete mix incorporating a crystalline waterproofing admixture.

This admixture reacts chemically with water to form insoluble crystals within the concrete's pore structure, blocking pathways for moisture and aggressive chemicals. Unlike surface coatings, crystalline systems remain active throughout the life of the structure, sealing newly formed microcracks as they develop.

7.2 Type 1L Cement and Crack Management

The project coincided with the industry's transition to Type 1L cement, which contains finely ground limestone to reduce carbon footprint. While environmentally beneficial, this cement exhibits higher shrinkage and lower early-age strength, increasing the risk of hairline cracking.

Hairline cracks appeared at some form tie locations during curing. Rather than rejecting the tanks, engineers allowed the crystalline admixture to activate under moist curing conditions. Within seven days, the cracks were fully sealed, restoring watertightness and confirming the effectiveness of the durability strategy.

This outcome demonstrated how modern materials science can enhance sustainability while maintaining structural and hydraulic performance.

8. Crane and Logistics Engineering

Large modular precast systems place unique demands on construction logistics, particularly when installed on constrained sites with limited access and variable soil conditions. At the Goodbee site, the excavation depth of approximately 12 feet, combined with the need to place tank modules more than 90 feet from the crane pad, made crane selection and lift geometry critical design considerations (Figure 5).

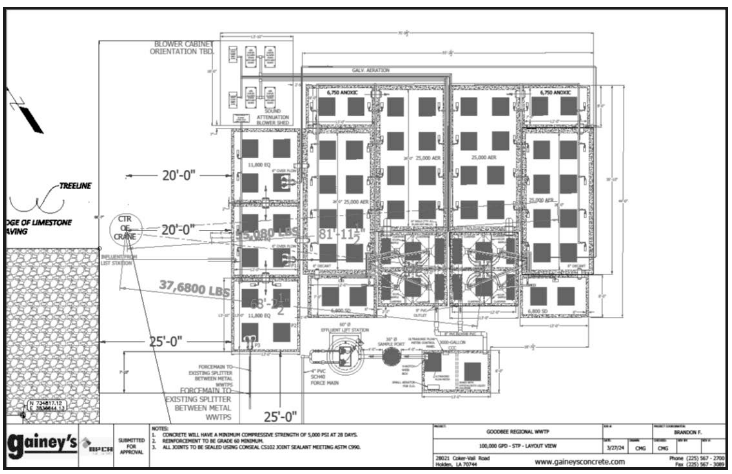

Figure 5: Installation plan illustrating crane positioning, lift radii, and placement of large precast tanks within the constrained site

A detailed lift plan was developed for each tank placement. This plan evaluated crane radius, boom length, load weight, and swing path to ensure that every lift remained within safe working limits. Outrigger reactions were calculated based on soil bearing capacity, which was affected by frequent rainfall and saturated subgrade conditions. Temporary crane mats and ground improvement were used where necessary to distribute loads and prevent differential settlement of the crane during lifting operations.

The modular design also reduced on-site congestion. Each tank section was delivered, lifted, and set directly into place without intermediate staging. This minimized rehandling and eliminated the need for large storage areas, which were unavailable due to the narrow footprint between existing treatment facilities. The importance of logistics planning was underscored when a 60,000-lb tank module experienced a flat tire during transport. Because the system was designed around modular delivery, this delay affected only one unit rather than halting the entire project.

9. Process Engineering

The Goodbee facility was not only unique in its structural design, but also as a hybrid modular municipal wastewater treatment plant capable of integrating existing flows and accommodating future expansion. The process train includes trash removal, flow equalization, aeration and anoxic treatment, clarification, liquid chlorine disinfection, flow measurement, dissolved oxygen injection, and effluent pumping.

A key design feature was the use of equalization tanks to absorb hydraulic surges from the central influent lift station for both new development and the existing incoming waste streams. This reduced peak loading on the biological process and improved effluent stability. The aeration and anoxic zones were arranged to support nutrient removal while maintaining operational simplicity. Clarifier design minimized sludge-return piping, reducing maintenance requirements and head loss. The EQ system not only distributed flow to the new WWTP but also was sized to equalize and distribute flow to the two existing steel treatment plants.

Liquid chlorination and V-notch weir flow measurement provided precise disinfection control and regulatory reporting. An effluent lift station was included to ensure reliable discharge under varying hydraulic conditions.

10. Noise Mitigation and Community Design

The proximity of residential neighborhoods required a level of acoustic and visual control that is rarely applied to municipal wastewater facilities. Blowers were housed in a pile-supported acoustic building designed to isolate vibration and attenuate sound (Figure 6). Equipment layout minimized turbulent airflow and pressure surging, further reducing noise.

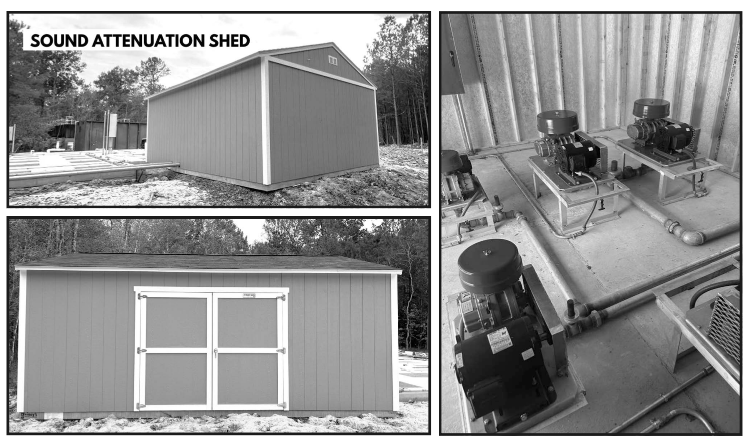

Figure 6: Sound attenuation shed housing dedicated blower equipment used to reduce noise at the Goodbee WWTP

Separate blower systems were provided for clarifiers, preventing pressure fluctuations from propagating through the system. Control panels were distributed across multiple enclosures to improve operational efficiency and maintenance access.

These measures ensured that the facility could operate at full capacity without generating community complaints, preserving public support for the project and the broader regional wastewater program.

11. Future Expansion Strategy

Perhaps the most important engineering achievement of the Goodbee project is its role as a scalable platform rather than a disposable interim plant. The modular precast tanks, piping layouts, and hydraulic profiles were designed to integrate seamlessly into the future regional system.

Additional aeration tanks, mechanical clarifiers, bar screens, and sludge handling units can be added without abandoning existing infrastructure. This approach preserves capital investment and allows the Parish to phase expansion in response to actual growth rather than speculative projections.

From a financial and regulatory standpoint, this reduces risk and improves long-term accountability.

12. Lessons for Louisiana Engineers

The Goodbee Regional Wastewater Treatment Plant demonstrates that large-scale modular precast systems can be engineered to meet the structural, hydraulic, and regulatory demands of regional wastewater treatment when constructability and durability are addressed early in the design process (Figure 7). Key lessons include the importance of integrating crane logistics into design, selecting materials based on long-term chemical exposure, and using precision joint systems to achieve watertight performance in stacked modular tanks. The project also shows how equalization and modular process layouts can improve operational stability while preserving future expansion options.

Figure 7: Fully assembled Goodbee WWTP showing installed precast tanks, piping, and mechanical equipment

For Louisiana engineers working in growth corridors, constrained sites, or environmentally sensitive communities, Goodbee provides a replicable technical framework for delivering high-capacity wastewater infrastructure with reduced construction risk, faster deployment, and improved life-cycle performance compared to traditional cast-in-place facilities.

Conclusion

The Goodbee Regional Wastewater Treatment Plant represents a shift in how regional wastewater infrastructure can be delivered in fast-growing communities. Rather than forcing municipalities to choose between short-term temporary solutions and long-term capital-intensive facilities with prolonged timelines, the Goodbee approach shows how scalable, modular systems can bridge that gap while preserving public investment and regulatory integrity. By uniting structural engineering, process design, advanced materials, and construction logistics into a single coordinated strategy, the project demonstrates that infrastructure can be built quickly without being disposable and built economically without sacrificing durability and performance.

As Louisiana continues to face population growth, environmental pressure, and funding constraints, projects like Goodbee Regional illustrate how civil engineers can lead with solutions that are not only technically sound, but also socially responsible and fiscally sustainable. In doing so, they help ensure that today's infrastructure investments become the foundation of tomorrow's resilient regional systems rather than temporary responses to immediate need.

Author Biography

Bren McNeely is the Marketing Manager at Gainey's Concrete Products, where she leads brand strategy, digital marketing, and industry outreach for the company's precast concrete and wastewater infrastructure solutions. With more than five years at Gainey's and a Bachelor of Science in Marketing from Southeastern Louisiana University, she oversees content, events, web, and email marketing. Bren is passionate about using storytelling, design, and data-driven marketing to connect engineers, contractors, and communities with reliable infrastructure solutions.

ASCE Region 5 News

By Karena Gringenas, Younger Member

Chris Humphreys

Tonja Koob Marking

Attending the Multi-Regional Leadership Conference in Jacksonville, FL was a valuable opportunity to connect with and learn from industry leaders and peers. I gained meaningful leadership, networking, and programming skills from professionals across the country, which I look forward to implementing within the Louisiana Section. As a younger member, MRLC helped build my confidence and provided insight into the leadership skills needed to take the next steps in my career. Overall, the conference strengthened my commitment to continued involvement in ASCE at the branch, section, and regional levels.

ASCE Louisiana Section at the Multi-Regional Leadership Conference (MRLC) in Jacksonville, FL (Left to Right) Karena Grigenas, Luke Haney, Sarah Finnegan Berman, Christopher Humphreys, and Kylie Beadle

2025 Region 5 Civil Engineer of the Year Award

Andrew K. Woodroof, P.E. – Louisiana Section

▶ Andrew Woodroof, P.E., is a respected industry executive with a nationally recognized record of engineering. His proactive approach to technical innovation and community advocacy defines him as a leader both professionally and personally. Andrew's leadership journey reflects integrity, professionalism and a commitment to industry betterment. His career growth stands as a true testament to the engineering profession and to our community. Starting in 2014, Andrew has held various ASCE leadership positions throughout his career. He currently serves as Past President for the ASCE Louisiana Section and was recently recognized as the recipient of the 2025 ASCE Louisiana Outstanding Civil Engineer Award. As a leader both professionally and personally, Andrew values educating younger community members in and beyond the classroom. Andrew inspires our future leaders through volunteering for different programs and objectives. His outreach is focused on promoting civil engineering as a profession for high school and college students.

2025 Region 5 Wall of Fame Recipient

Ronald L. Schumann, Jr., P.E., ASCE Life Member
Louisiana Section

▶ Ronald L. Schumann, Jr. P.E., M. ASCE, has been involved in a broad range of civil engineering projects, such as large flood control projects; the planning and design of numerous highways; and as a Construction Manager on projects such as the Canal Streetcar, Triple A Jefferson Baseball Park, and the New Orleans Saints Practice Facility. His involvement in ASCE includes serving in every officer position, including President, for the New Orleans Branch and the Louisiana Section Board. He previously served as the ASCE Region 5 Governor-at-Large from 2018-2024. He has received the 2018 Outstanding Civil Engineer, 2021 Lifetime Achievement, and the 2025 Wall of Fame Awards from both the ASCE New Orleans Branch and the Louisiana Section.

In Memoriam

David E. Lourie, PE

David E. Lourie, PE, died February 11, 2026, at age 69.

Born April 6, 1956, in Chicago, he graduated from Lane Technical High School and earned both his BSCE (1979) and MSCE (1981) in geotechnical engineering from the Illinois Institute of Technology.

He began his career with Soil Testing Services (now part of AECOM), later joining McClelland Engineers and serving as President of Fugro-McClelland (Southeast), Inc. In 1992 he founded Lourie Consultants, where he served as CEO for more than three decades.

Lourie practiced across foundation engineering, ground improvement, earth support systems, and soft-soil behavior. Rather than being associated with a single landmark structure, his professional legacy was reflected across the built environment through decades of subsurface problem solving and forensic evaluation. His work informed the safe construction of numerous facilities, and many practicing engineers learned geotechnical engineering directly from his teaching.

He also served as an adjunct professor at the University of New Orleans, teaching undergraduate and graduate geotechnical courses and earning the respect of students for connecting theory to field practice.

He was a member of ASCE, the Louisiana Engineering Society, NSPE, ACEC/Louisiana, the Institute of Brownfield Professionals, Chi Epsilon, and the Geoprofessional Business Association.

He is survived by his brother, Walter Lourie; Stephanie Bialobok; and many colleagues, students, and friends.

Memorial contributions may be made to the Civil and Environmental Engineering Department, University of New Orleans, Attn: Gianna M. Cothren, PhD, PE, Department Chair, 2000 Lakeshore Drive, New Orleans, LA 70148.

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Extension of the API Standard 650 Equivalent Mechanical Model Application to LNG Vessel Stability Under Wave Excitation

By Wen-Huai Tsao, PhD, PE
Assistant Professor, Department of Engineering and Computer Science, McNeese State University

Wen-Huai Tsao, PhD, PE

ABSTRACT

Mechanical analog models are widely used in engineering design standards. In API (American Petroleum Institute) standard 650 [1], liquid sloshing in storage tanks is represented by an equivalent model of lumped masses and springs. However, the current formulation neglects hydrodynamic damping, implicitly assuming lossless fluid motion. This simplification can lead to inaccurate predictions when tank motion interacts with supporting structures under wave or seismic excitation. This paper presents an extended equivalent mechanical model in which a linear damping term is incorporated into the governing equations of sloshing motion. The damping coefficient represents energy dissipation due to viscous effects, wave radiation, and free-surface breaking. The resulting formulation retains the simplicity of the API standard 650 spring-mass representation while extending it to include physically meaningful fluid damping. For freshwater tanks, a damping ratio of 0.1 is shown to be appropriate based on experimental and numerical validation. The extended model is further applied to solve the response of a floating LNG vessel subjected to wave excitation. Predicted vessel motions are compared with higher-fidelity numerical simulations, demonstrating that the proposed model accurately reproduces both the frequency responses and the decay characteristics of vessel motions. The proposed formulation provides a simple yet physically grounded enhancement of the API standard 650 mechanical model, allowing engineers to provide accurate predictions of tank and vessel dynamics with minimal computational effort.

KEYWORDS: Sloshing; Fluid-structure interaction; API standard 650.

Background

Over the past decades, sloshing phenomena have been extensively studied in civil, ocean, and nuclear engineering. Sloshing refers to the dynamic motion of the free surface in a container that is partially filled with liquid and subjected to external excitation. It is a critical consideration in the design of water and petroleum storage tanks, which are typically rigidly anchored to their foundations and lack dedicated vibration control devices, particularly under seismic loading. The resulting dynamic fluid pressures can produce severe structural demands and lead to various forms of damage, including elephant-foot buckling, roof or cover failure, anchor rupture, and foundation settlement. These observed failures have motivated extensive research into sloshing behavior and liquid-tank interaction, leading to the development of simplified mechanical models that are now widely used in seismic design practice.

The equivalent mechanical model is used in design codes to convert complex fluid sloshing dynamics into an equivalent set of forces and moments that can be readily incorporated in standard structural analyses. Such an equivalent mechanical model was originally developed by Abramson [2]. Under these formulas, the equivalent mechanical model is dynamically consistent with the sloshing motion in a tank and therefore produces the same horizontal force and overturning moment acting on the tank. The equivalent mechanical model provides a physically consistent and computationally efficient way to represent sloshing-induced forces and moments within standard structural dynamic analysis frameworks.

Conventional Equivalent Mechanical Model

Consider a rectangular tank of length L and width B, or a cylindrical tank of radius R, partially filled with fluid to a depth H, and subjected to horizontal and rotational excitations. The sloshing motion of the liquid can be represented by an equivalent mechanical model consisting of a set of lumped masses, springs, and rigidly attached components, as illustrated in Figure 1(a). The total liquid mass is decomposed into an impulsive component m_f that moves rigidly with the tank and a convective component m_n that represents the oscillatory sloshing motion. Each convective mode is modeled as a mass attached to the tank wall through a linear spring, with stiffness k_n determined by the natural sloshing frequency ω_n obtained from linear potential flow theory. Hence, for the rectangular tank, the equivalent mass and stiffness can be expressed as:

$$m_f = \rho BLH - \sum_{n=0}^{\infty} \frac{8\rho B}{a_n^3 L} tanh a_n H \quad (1)$$

$$m_n = \frac{8\rho}{a_n^3 L} tanh a_n H \quad (2)$$

$$k_n = \frac{8\rho g B}{a_n^2 L} tanh^2 a_n H \quad (3)$$

$$\omega_n = \sqrt{g a_n tanh a_n H} \quad (4)$$

where ρ is the fluid density, g is the gravitational acceleration, $a_n = \frac{(2n+1)\pi}{L}$, $n = 0, 1, 2, \cdots$. The vertical distances from the tank bottom to the points of application of the lateral forces associated with m_f and m_n, respectively, and are given by:

$$Z_f = \frac{1}{m_f}\left[\rho B\left(\frac{LH^2}{2} + \frac{L^3}{12}\right) - \sum_{n=0}^{\infty} m_n Z_n\right] \quad (5)$$

$$Z_n = h + \frac{2}{a_n sinh a_n H} - \frac{1}{a_n tanh a_n H} \quad (6)$$

For the cylindrical tank, the equivalent mass and stiffness can be expressed as:

$$m_f = \rho \pi R^2 H - \sum_{n=0}^{\infty} \frac{2\rho \pi R^3}{\lambda_n(\lambda_n^2 - 1)} tanh \bar{\lambda}_n H \quad (7)$$

$$m_n = \frac{2\rho \pi R^3}{\lambda_n(\lambda_n^2 - 1)} tanh \bar{\lambda}_n H \quad (8)$$

$$k_n = \frac{2\rho g \pi R^2}{\lambda_n^2 - 1} tanh^2 \bar{\lambda}_n H \quad (9)$$

$$\omega_n = \sqrt{g \bar{\lambda}_n tanh \bar{\lambda}_n H} \quad (10)$$

where $\bar{\lambda}_n = \frac{\lambda_n}{R}$, λ_n is the n^{th} root of the derivative of the Bessel function, which gives λ_1 =1.841, λ_2=5.331, etc.

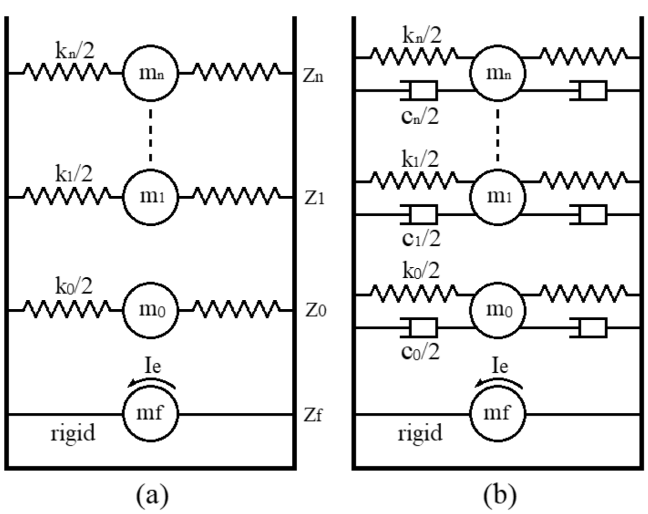

Figure 1. The equivalent mechanical system representing the response of actual sloshing: (a) conventional mechanical model, (b) extended mechanical model

Implementation of the Conventional Equivalent Mechanical Model in API Standard 650

Due to the conventional equivalent mechanical model's simplicity and its ability to capture the dominant sloshing behavior in engineering applications, this model has been widely adopted in design standards, including API Standard 650. API Standard 650 is an American Petroleum Institute standard that provides design, construction, and analysis requirements for welded steel tanks used for the storage of petroleum and liquid products. Based on Abramson's formulation, API 650 further simplifies the sloshing representation into a single-degree-of-freedom (SDOF) mechanical model. The effective impulsive weight is defined by (API 650, Appendix E, E.6.1.1-1 and E.6.1.1-2):

$$W_i = \frac{tanh\left(0.866\frac{D}{H}\right)}{0.866\frac{D}{H}} W_p, \text{ for } \frac{D}{H} \geq 1.333 \quad (11)$$

$$W_i = \left(1 - 0.218\frac{D}{H}\right) W_p, \text{ for } \frac{D}{H} < 1.333 \quad (12)$$

where W_p is the total product weight. The effective convective weight connected by a spring is defined by (API 650, Appendix E, E.6.1.1-3):

$$W_c = 0.23\frac{D}{H} tanh\left(\frac{3.67H}{D}\right) W_p \quad (13)$$

The heights from the bottom of the tank shell to the center of action of the lateral seismic forces applied to W_i and W_c, X_i and X_c may be determined by (API 650, Appendix E, E.6.1.2.1-1 to E.6.1.2.1-3):

$$X_i = 0.375H, \text{ for } \frac{D}{H} \geq 1.333 \quad (14)$$

$$X_i = \left(0.5 - 0.094\frac{D}{H}\right) H, \text{ for } \frac{D}{H} < 1.333 \quad (15)$$

$$X_c = \left[1 - \frac{cosh\left(\frac{3.67H}{D}\right) - 1}{\frac{3.67H}{D} cosh\left(\frac{3.67H}{D}\right)}\right] H \quad (16)$$

Finally, the equivalent lateral design force shall be determined by the general relationship (API 650, Appendix E, E.5.1-1):

$$F = A \cdot W_{eff} \quad (17)$$

where A is the lateral acceleration coefficient in %g and W_{eff} is the effective weight W_i or W_c.

It is noticeable that neglecting hydrodynamic damping in the equivalent mechanical model can significantly affect seismic and wave-induced design forces. In the absence of damping, the predicted dynamic amplification becomes unbounded at resonance, leading to unrealistic sloshing forces and overturning moments. In practice, fluid motion dissipates energy (e.g., through viscous effects or wave breaking), which substantially reduces the response. This limitation is especially critical in fluid-structure interaction problems such as floating LNG vessels, where sloshing and vessel motion are strongly coupled. Without accounting for damping, both tank loads and vessel stability may be significantly misestimated under wave and seismic excitation.

Extended Equivalent Mechanical Model of Sloshing

Tsao and Hwang [3] developed a physically based damping model to account for energy dissipation induced by porous media in sloshing flows. Although originally formulated for tanks with porous damping devices, subsequent analysis showed that the same formulation is also applicable to freshwater tanks, where viscous effects provide finite hydrodynamic damping. The resulting extended equivalent mechanical model preserves the natural frequencies predicted by linear wave theory while introducing a realistic damping term into the sloshing equations. The natural frequencies predicted by the model have been validated through laboratory experiments [4]. The extended equivalent mechanical model, illustrated in Figure 1(b), includes an additional dashpot connected to the convective mass, and the linear damping coefficient is given by:

$$c_n = 2m_n\omega_n\xi_n \tag{18}$$

where ξ_n is the damping ratio.

Chen et al. **Error! Reference source not found.** evaluated a range of damping ratios using nonlinear numerical simulations and compared the resulting wave heights with experimental measurements, as shown in Figure 2. A damping ratios of 0.05 (5%) for a rectangular tank and 0.01 (1%) for a cylindrical tank were found to provide the best agreement for both harmonic base excitation and seismic loading. Their results demonstrate that including a damping term is essential for achieving accurate and numerically stable predictions, particularly under resonant conditions during earthquakes and under long-duration wave excitation.

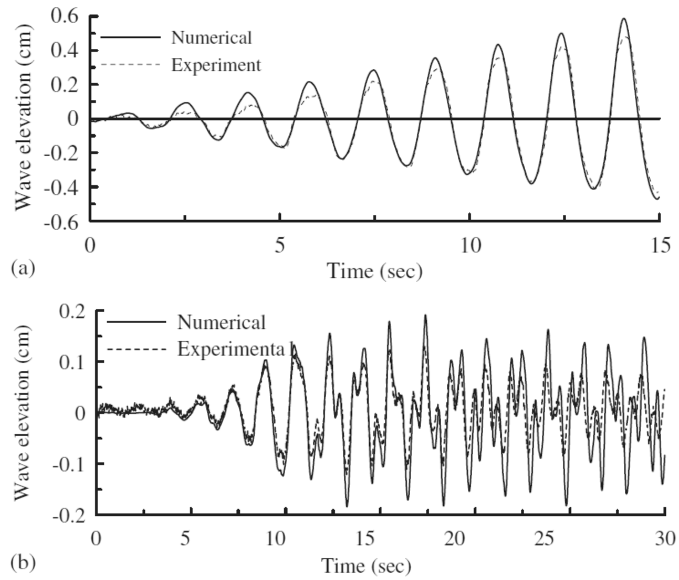

Figure 2. Wave elevations at the lateral wall of the rectangular tank subjected to (a) harmonic excitations, (b) seismic excitation of 1% Chi-Chi earthquake

Tsao et al. [6] derived the sloshing force using standard structural dynamics principles. The total horizontal sloshing force, which acts as a base shear on the supporting structure, is obtained as the sum of the inertial forces associated with the impulsive and convective liquid masses and can be expressed as:

$$F = -A\rho LBH\omega^2 sin\omega t + AB\rho\sum_{n=0}^{\infty}\frac{8}{a_n^3 L}\frac{tanh a_n H}{p_n^2+q^2}(-p_n\omega^4\, sin\omega t + q\omega^4\, cos\omega t) \tag{19}$$

where $p_n = \omega_n^2 - \omega^2$ and $q = \gamma\alpha\omega$. Tsao et al. [6] also established a direct correlation between the wave elevation η on the tank wall and the equivalent displacement x_n of the moving convective masses m_n as shown below.

$$\eta = \sum_{n=0}^{\infty}\frac{4}{a_n L} tanh a_n H \cdot x_n \tag{20}$$

This relationship is formulated such that the wave height can be directly obtained from the structural response of the equivalent mechanical model. The full derivation and additional parameter definitions for other configurations are available in the cited references [7][8].

Equations of Motion of the Vessel–Tank System

Consider a vessel-tank system as shown in Figure 3, the floating vessel in an open-water wave field with a sloshing tank mounted on its deck. The vessel has a semi-submerged, V-shaped hull floating at the water surface, while a rectangular liquid tank is installed at the top of the structure. The surrounding domain is divided into air (upper region) and water (lower region), and the free surface interfaces are resolved to capture both external wave-vessel interaction and internal sloshing dynamics within the tank. Both the extended equivalent mechanical model and a nonlinear Eulerian-Lagrangian method are employed to simulate wave-induced sloshing in a floating tank and its interaction with a vessel-like floating body. For brevity, the nonlinear Eulerian-Lagrangian method is not described in detail in this paper. Interested readers are referred to the cited literature **Error! Reference source not found.**.

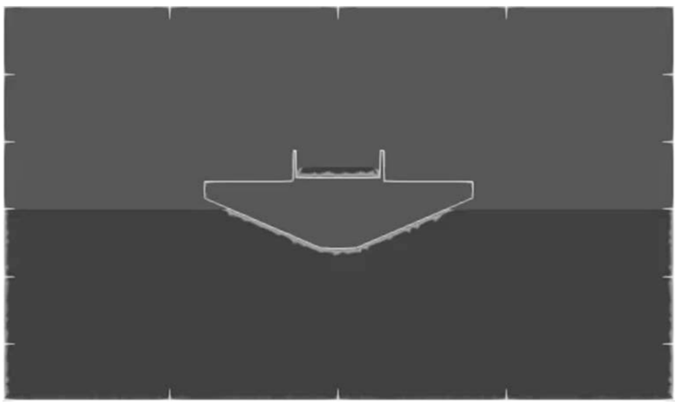

Figure 3. Numerical configuration of a floating vessel with an onboard sloshing tank in waves

When the equivalent mechanical model is applied to the floating body, the equations of motion can be expressed as:

$$m_n\ddot{x}_n + c_n\dot{x}_n + k_n x_n = -m_n\ddot{x}_G + m_n Z_n\ddot{\theta}_G \quad (21)$$

where $\ddot{x}_G$ and $\ddot{\theta}_G$ are the translational and angular accelerations of the floating body center, respectively. Therefore, the sway motion equation of the floating body can be obtained as:

$$M_b\ddot{x}_G = \int_{S_w} p n_x dS + m_f Z_f\ddot{\theta}_G + \sum_{n=0}^{\infty}\left(c_n\dot{x}_n + k_n x_n + m_n z_n\ddot{\theta}_G\right) \quad (22)$$

where M_b is the mass of the floating body, S_w is the wetted boundaries of the floating body contact with the ambient waves, p is the wave pressure, n_x is the sway component of vector normal to the hull.

For heave motion, the equivalent mechanical model assumes no masses move vertically relative to the tank, so the entire system will be regarded as a dead load to the floating body. Therefore, the heave motion equation of the floating body can be obtained as:

$$M_b\ddot{z}_G = \int_{S_w} p n_z dS - m_w g \quad (23)$$

For roll motion, the movement of the equivalent masses will produce an external moment on the floating body. The overturning moment induced by the impulsive mass has to be taken into account as well. Accordingly, the corresponding moment of inertia is given by:

$$I_e = 8\rho B\sum_{n=0}^{\infty}\left(\frac{3sinhb_n\frac{L}{2} - b_n\frac{L}{2}coshb_n\frac{L}{2}}{b_n^5 H coshb_n\frac{L}{2}} + \frac{2cosha_n H - 1}{a_n^5 L sinha_n H} - m_n Z_n^2\right) - m_f Z_f^2 \quad (24)$$

The roll motion equation of the floating body equation can be obtained as:

$$I_b\ddot{\theta}_G = \int_{S_w} p(\boldsymbol{r}\times\boldsymbol{n})\,dS - \left(I_e + m_f Z_f^2\right)\ddot{\theta}_G - \sum_{n=0}^{\infty}\left(c_n\dot{x}_n + k_n x_n + m_n Z_n\ddot{\theta}_G\right)Z_n \quad (25)$$

where I_b is the moment of inertia of the floating body, and $\boldsymbol{r}$ is the position vector of a fluid particle with respect to the floating body center.

Optimal Tuning of the Sloshing Damper

Sloshing generates out-of-phase hydrodynamic forces, and in the presence of damping, a liquid tank can act as a dynamic vibration absorber for floating structures in marine environments, thereby enhancing the stability of LNG vessels. Such a device is commonly referred to as a tuned liquid damper (TLD). Because the sloshing liquid can be represented by an equivalent mechanical model, its optimal design can be guided by the well-established theory of tuned mass dampers (TMDs). The tuning frequency ratio f_t and optimal damping ratio ξ_{opt} can be obtained by [9]:

$$f_t = \frac{\omega_0}{\omega_v} = \frac{1}{1+R_m} \quad (26)$$

$$\xi_{opt} = \sqrt{\frac{3R_m}{8(1+R_m)}} \quad (27)$$

where ω_v is the natural frequency of the vessel and $R_m = \frac{m_0}{m_f+M_b}$ is the mass ratio. These expressions are derived under simplified assumptions and therefore may not be strictly optimal for all configurations. However, they provide close and practically useful design guidance. More general formulations for optimal mass damper parameters can be found in standard references [10]. Once R_m is specified, the corresponding target natural frequency and damping ratio are determined, from which the tank dimensions can be selected.

Free-Vibration Analysis for the Vessel

Since the natural frequency of the vessel is required in the design formula of the liquid damper, it is first identified through a free-vibration test prior to dynamic analysis. In a benchmark case, a vessel with a length of 1 m, a height of 0.5 m, and a density of 450 kg/m³ floating in a water depth of 2 m is considered. The initial draft of 0.25 m and inclination of 5° are imposed, and no incident waves are applied. The resulting free-vibration responses in sway and roll are shown in Figure 4, with the corresponding response spectra presented in Figure 5. From the frequency-domain analysis, both sway and roll exhibit a dominant oscillation frequency of 0.58 Hz. The response remains linear, so the linear equations of vessel motion are applicable.

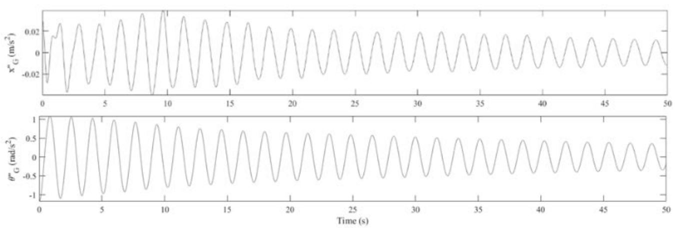

Figure 4. The acceleration time histories of the vessel's sway and roll motions under free vibration at an initial 5° roll

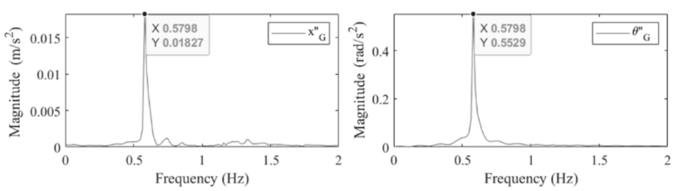

Figure 5. The response spectra of the floating body under free vibration at an initial 5° pitch

Floating Vessel with a Sloshing Tank Under Resonant Wave Excitations

Harmonic waves with a frequency equal to the vessel's resonant frequency (0.58 Hz) are imposed, with a wave height of 0.03 m. The sloshing tank has a length of 0.64 m and a water depth of 0.047 m, resulting in a fundamental sloshing frequency of 0.53 Hz. The masses of the tank structure and porous media are neglected. When applying the mechanical model, both an SDOF system, representing only the fundamental sloshing mode, and a 5-DOF system, including the first five sloshing modes, are considered.

The sway and roll responses of the floating body are shown in Figure 6. Although nonlinear effects are generally important in sloshing problems, they are negligible in this example. The sway and roll motions predicted by the Eulerian-Lagrangian method, the SDOF model, and the 5-DOF mechanical system are essentially identical. This agreement not only validates the equivalent mechanical model but also indicates that the fundamental sloshing mode dominates the response, while higher-order modes contribute negligibly to the fluid-structure interaction. These results further justify liquid damper design strategies that focus primarily on the first sloshing mode, as discussed in the previous section.

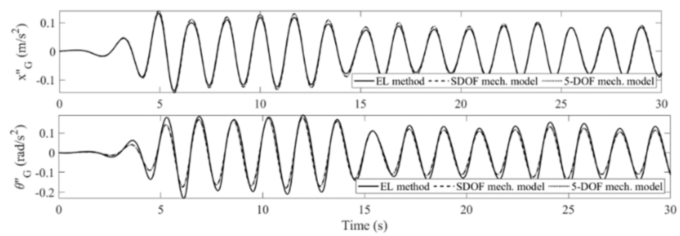

Figure 6. Sway and roll responses of the floating vessel equipped with a water tank under wave excitation

Frequency Response Analysis

To construct the frequency response curves, the near-resonance region is examined over the range β = 0.85~1.15, where β is the ratio of the incident wave frequency to the vessel's roll natural frequency. The frequency responses of the root-mean-square (RMS) steady-state angular displacement and acceleration are shown in Figure 7. The presence of the sloshing tank significantly improves operational performance and motion comfort, with an average reduction of approximately 80% in both RMS displacement and acceleration.

With respect to tuning, the sloshing tank can be readily optimized using the design procedure described in the previous section. In the uncontrolled case, a single resonance peak occurs at β = 1.0, whereas two peaks appear at β = 0.925 and 1.1 when the tank is installed. Although the sloshing fluid has infinitely many degrees of freedom, the body–tank system behaves effectively as a low-order multi-degree-of-freedom system because the fundamental sloshing mode dominates, as demonstrated in the previous example. Consequently, the frequency response curves exhibit only two prominent peaks corresponding to the two primary vibration modes of the coupled vessel-tank system.

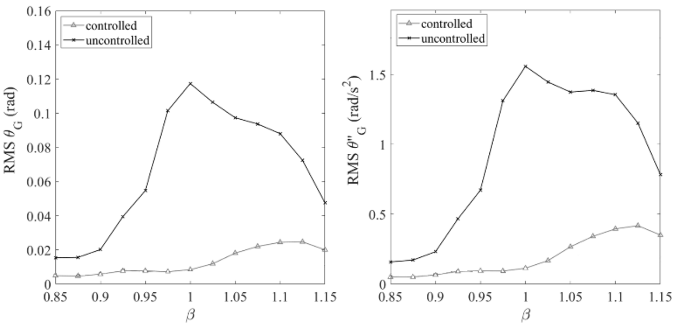

Figure 7. Frequency response curves of the RMS motions for the controlled and uncontrolled floating vessel

Conclusions

This paper presents an extended equivalent mechanical model of liquid sloshing by incorporating hydrodynamic damping into the conventional API Standard 650 formulation. While the API 650 mechanical model provides an efficient framework for representing sloshing-induced forces, its neglect of damping leads to unrealistic dynamic amplification and inaccurate prediction of tank forces and vessel motions under wave and seismic excitation. By introducing a physically based damping term derived from potential-flow theory and validated through laboratory experiments and nonlinear numerical simulations, the proposed model provides a more realistic representation of sloshing dynamics without sacrificing computational efficiency.

The extended model was further coupled with the equations of motion of a floating LNG vessel to study fluid-structure interaction under wave excitation. Comparisons between the extended mechanical model and a nonlinear Eulerian-Lagrangian method demonstrated excellent agreement in both sway and roll responses, confirming the dynamic consistency of the reduced-order formulation. These results also showed that the fundamental sloshing mode dominates the coupled response, which allows higher-order modes to be neglected for practical engineering applications.

Because the sloshing fluid is represented by a small number of mechanical degrees of freedom, the computational cost is extremely low compared with full CFD simulations. This allows efficient and inexpensive evaluation of vessel response, response amplitude operators (RAOs), and decay characteristics. Frequency response analyses further confirmed that the sloshing tank acts as an effective tuned liquid damper, reducing vessel motions by approximately 80% near resonance.

Overall, the proposed approach provides a physically grounded and computationally efficient framework for analyzing and designing sloshing tanks and LNG vessel stabilization systems. By extending the API 650 mechanical model to include damping, the method enables more accurate prediction of dynamic forces and vessel stability while remaining suitable for routine engineering design and optimization.

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Biographical sketch

Wen-Huai Tsao is an Assistant Professor in the Department of Engineering and Computer Science at McNeese State University, with expertise in digital twin technologies for coastal and ocean engineering. He received his B.S. and Ph.D. degrees in Civil Engineering from National Taiwan University. He has seven years of academic experience at The University of Texas at Austin, Louisiana State University, and McNeese State University, as well as one and a half years of industry experience at COWI. Dr. Tsao is a licensed Professional Engineer in Texas and a member of ASCE, ASME, the Louisiana Engineering Society, and the Society for Floating Solutions and Singapore.

ASCE-COPRI Louisiana Chapter News

By Kiara Horton, PE, Director – Communications

COAST, OCEANS, PORTS AND RIVERS INSTITUTE
Louisiana Chapter

Hayden Franklin, PE
Director – Communications

ASCE-COPRI Louisiana Chapter News

By Hayden Franklin, Director – Communications

The Louisiana Chapter of the Coasts, Oceans, Ports, and Rivers Institute (L.COPRI) of the American Society of Civil Engineers (ASCE) promotes membership, professional development, and visibility throughout the State of Louisiana by conducting virtual webinars and in-person events.

YPG and Student Chapter Updates

On January 30th, ASCE and COPRI kicked off the spring semester with a student happy hour that brought together students from across civil and coastal engineering disciplines. The event provided a relaxed setting for students to reconnect after the break, meet new faces, and spend time building relationships outside the classroom.

The happy hour offered an opportunity to strengthen connections within the student engineering community while encouraging informal conversation and networking. Events like this help foster collaboration, professional growth, and a sense of community among students as they move through the semester.

Both the L.COPRI YPG and LSU COPRI Student Chapter are excited to kick the year off with many events and lectures this year. Please reach out to Carlie Dutile (Student Chapter President, cdutil1@lsu.edu) and Phil Zito (YPG Director, Phil.Zito@worley.com) for information on how to get involved as an LSU Student or Younger Member.

Scholarship Announcement

L.COPRI traditionally awards annual scholarships to students (1 graduate and 1 undergraduate) studying Civil, Coastal, Ocean or Environmental Engineering, or a Coasts, Oceans, Ports, or rivers related field. Be on the lookout for scholarship application form. Scholarship winners are typically presented their checks during L.COPRI's annual spring seminar.

For application inquires please contact Sergio Aviles, Scholarship Director at sergio@aps-testing.com

Upcoming Events

Our half-day Spring Seminar is currently being planned and updates will be coming soon. Keep a look out for future event announcements via email and Linkedin.

If you have any general event questions, please contact Programs director Samantha McKisson at smckisson@moffattnichol.com

Port Engineering Certificate Program

ASCE's Port Engineering Certificate Program is a series of career-focused courses taught by practicing

construction, and management of port facilities, types of seismic design classifications, and how to interpret geotechnical data.

Other Information

The activities of L.COPRI includes seminars, workshops, and other activities to benefit all ASCE and COPRI members. Members do not have to be an engineer to join COPRI. The Institutes of ASCE are formed for the benefit of ASCE and non-ASCE members to participate and interact with other professionals interested in coastal, oceans, ports, and riverine efforts in Louisiana. We would like to extend an invitation to our members to submit feedback and ideas for upcoming webinars and events. Please submit these ideas to haydencfrank@gmail.com, and stay-tuned for a meeting invite if you are a member of our L.COPRI email list.

Also, please don't forget to follow us on LinkedIn! We have a new L.COPRI page!!

Professional Achievement Awards

National COPRI offers several opportunities to recognize our colleagues for their professional achievements. For more information on individual, project, research, and younger member award opportunities, please visit https://www.asce.org/communities/institutes-and-technical-groups/coasts-oceans-ports-rivers-institute/awards.

ASCE-G-I Louisiana Chapter News

By Benjamin M. Cody, PE

GEO-INSTITUTE
LOUISIANA CHAPTER

Benjamin M. Cody, PE

Welcome to a new year! We, The LA-GI Chapter Board, look forward to an exciting spring/ 2026! We are in the process of scheduling free webinars for professional development focusing on all aspects of geotechnical engineering as well as in-person activities to actively engage with our members and community, including collegiate chapters and K-12 outreach. Our first webinar will be in the March time frame, with a presentation from members of the ASCE – LA Digital Innovation Committee, so pls be on the lookout for an email advertisement. We are actively pursuing other potential webinar speakers so we can continue this program throughout the year. To that end, we encourage anyone with ideas for potential speakers (or a desire to potentially provide a technical presentation themselves) to reach out to any of our Committee members, or myself at bcody@eustiseng.com.

For the Spring we are planning in-person gatherings and joint events with other ASCE chapters and student groups. These will reconnect our professional community, spotlight student research, and encourage mentorship across generations of geotechnical engineers. Watch for announcements and registration links via email and on our LinkedIn page: https://www.linkedin.com/company/geo-institute-louisiana-chapter/

To support these activities, we are also offering sponsorship opportunities, including general annual sponsorship and event-specific sponsorship opportunities. Moneys collected from these sponsorships will be utilized to further our outreach activities as well as to offset the costs for in-person events. It is our hope that the economics will allow for us to make our in-person events free for our members like our webinars, but that will not be possible without the generosity of our corporate partners. Event-specific sponsorships will also include recognition before the event, and we are proud to announce that almost all of our webinars in 2025 achieved an attendance of over 100 guests. If you're interested in having your firm sponsor an event or be a corporate sponsor for the LA-GI for 2026, please reach out to our Past Chair, Ricardo C. de Abreu, PhD, PE at ricardo@fdaengineers.com.

I would like to take this opportunity to thank Dr. de Abreu for his leadership for the last few years as well as his continued service serving on our committee as Past Chair. He has set a high standard that I will try to live up to as we continue building the future of geotechnical engineering.

ASCE Government Relations Committee

Nedra Davis Hains, MA
Government Relations Secretary

From March 17 - 20, 2026, ASCE members from across the country will gather in Washington, DC, for the Legislative Fly-In to engage directly with federal policymakers on the infrastructure issues shaping our communities. Louisiana ASCE representatives will participate in these discussions to advocate for policies that support resilient, reliable, and well-funded infrastructure systems that protect public health, safety, and welfare.

National ASCE has identified several priority government relations issues that are particularly relevant to Louisiana, including sustained infrastructure funding, water and wastewater investment, transportation system modernization, hazard mitigation, and climate resilience. Additional focus areas include workforce development, STEM education, and the protection of critical infrastructure systems. These priorities closely align with Louisiana's ongoing challenges related to flooding, aging infrastructure, and the need for long-term, resilient solutions.

The Legislative Fly-In provides a vital opportunity for engineers to share practical experience and technical expertise with elected officials and their staffs. By participating in these conversations, Louisiana ASCE members help ensure that public policy decisions are informed by engineering judgment and real-world conditions. Advocacy remains a core responsibility of our profession, and continued engagement at the federal level is essential to strengthening infrastructure and supporting our communities.

ASCE outlines priorities for WRDA 2026

This week, ASCE announced its policy priorities[1] for the 2026 Water Resources Development Act (WRDA). Considered every two years, WRDA authorizes new water resources infrastructure projects supporting flood control, navigation, hazard mitigation, and other priorities, and adjusts federal laws governing water resources infrastructure. In 2024[2], ASCE successfully advocated several key priorities, including reauthorization of the National Dam Safety Program, incorporation of low-head dams into the National Inventory of Dams, and adjusting the cost share formula for the Inland Waterways Trust Fund.

This year, ASCE is asking Congress to take significant steps once again to support dam safety, ports and inland waterways, and the nation's levee system. This year's priorities include reauthorization of the High Hazard Potential Rehabilitation Grant Program, which is set to expire at the end of Fiscal Year (FY) 2026; fully utilizing the Harbor Maintenance Trust Fund to support maintenance dredging activities; adjustment of the National Dam Safety Program State Assistance Grant allocation formula to help ensure states receive the funds they need; addressing the growing water resources project backlog which has been cited to be over $100 billion; and reauthorization of the National Levee Safety Program, which continues to develop but is set to lapse at the end of FY 2028.

For more on ASCE's WRDA 2026 priorities, we invite you to view our most recent blog post[3].

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1 https://infrastructurereportcard.org/wp-content/uploads/2026/01/asce-wrda-priorities-2026.pdf

2 https://infrastructurereportcard.org/congress-announces-2024-wrda-agreement/

3 https://infrastructurereportcard.org/asce-2026-wrda-priorities-water-resources/

ASCE-T&DI Louisiana Chapter News

By Ronald Schumann, Jr, PE, Chairman & Elba Urbina Hamilton, PE, Editor

Elba Urbina Hamilton, PE
T&DI Newsletter Editor

Ethics, Virtual Seminar

On December 18th, the T&DI Louisiana Chapter hosted our annual virtual seminar on the topic of Ethics. Our common purpose as professional engineers is to safeguard life, health, and property and to promote the public welfare. Professional ethics concerns the standard of professional conduct and responsibility required of a professional engineer. Our seminar discussion addressed issues like perception of wrong-doing, correcting mistakes, character, competency, accountability, conflicts of interest, trust, integrity, and avoiding deceptive acts.

The seminar was presented by Chris Knotts, PE, F. ASCE, BC.WRE. Chris has over 40 years of civil engineering experience. He began his career in the private sector, then devoted over 25 years in various roles for the Louisiana Department of Transportation and Development (LADOTD) and the Louisiana Department of Natural Resources. He held the position of LADOTD Chief Engineer – supervising 550 employees and overseeing the agency's Office of Engineering – for the final six years before retiring from LADOTD in 2023.

Chris' dedication to the engineering professionalism is evident through his service to the National Council of Examiners for Engineering & Surveying (NCEES), where he served as national President in 2020-2021. Additionally, he was Member President for the Louisiana Engineering Society in 2019-2020 and was on the Louisiana Professional Engineering and Land Surveying Board (LAPELS) from 2013 through 2019. He also served as the Louisiana Section President of ASCE in 2009-2010.

Chris holds two degrees from Louisiana State University: A Bachelor of Engineering Technology and a Bachelor of Science in Civil Engineering. He earned a Master of Engineering in Civil Engineering (Structures) from the University of Texas at Arlington.

In November 2023, Chris joined the Baton Rouge office of Neel-Schaffer as Director of Business Development for Louisiana operations.

Louisiana T&DI Scholarship Program

Since 2012 T&DI has been awarding two $500 scholarships to junior and senior level university students who intend to pursue a career in the field of transportation. Funding for the scholarships is provided by the T&DI seminar proceeds. Applicants are required to submit a transcript with two academic recommendations, along with an essay regarding their interest in transportation studies to their advisers early in the Fall semester. The applications are then reviewed, and the recipients are selected by the T&DI Scholarship Subcommittee.

The Subcommittee will be releasing the applications soon and reaching out to university advisors for distribution. The process is relatively simple. If you know of a junior or senior level university student that is interested in pursuing a career in transportation, encourage him/her to apply for one of our scholarships.

Louisiana State Science and Engineering Fair

T&DI will again be participating in the Louisiana State Science and Engineering Fair this year. The event will take place April 7-9. As in past years, members of T&DI will serve as judges and present awards to the students with the top transportation and development related projects.

Looking Ahead

The intent of T&DI is to promote transportation and development as a career path, and to provide training and networking opportunities for all professionals involved in the transportation industry. If you are interested in co-sponsoring a seminar at your branch, the T&DI Louisiana Chapter has prepared a Seminar Coordinator's Check List to assist you in your preparation. Contact Roy Payne, PE at rpayne@rclconsultants.com for a copy of the checklist. Historically our seminars are two hours in length and are typically presented from 5:30-7:30 pm in either the New Orleans or Baton Rouge areas. We have also presented outreach seminars with the ASCE Acadiana Branch and Shreveport Branch. We are open to co-hosting seminars in additional Louisiana cities if requested. In keeping with the intent of the Institute to provide training and networking opportunities for all professionals involved in transportation projects, the Chapter is planning the following future seminars:

- Bus Rapid Transit in New Orleans
- Connecting New Orleans East for Pedestrian and Bicyclist Safey and Mobility
- New Orleans Ferries
- I-220 and I-20 Barksdale Interchange
- DOTD Construction Cost Estimating
- Federal Benefit-Cost Analysis for Grant Applications in Shrevepor

Roy Payne, PE
TD&I Chair

ACADIANA BRANCH

By Colten Doré, Branch President

ASCE Acadiana is busy planning the upcoming State Conference on **May 7th and 8th**! The State conference will be hosted by the Acadiana branch at the **Double Tree Hotel** located at 1521 W Pinhook Rd, Lafayette, LA. We look forward to hosting special speakers with engaging technical topics. If you are interested in a speaking, sponsoring, or exhibiting at this event, please reach out to me at colten@fenstermaker.com.

In addition to the state conference, we are working with speakers to continue our regular luncheons. We are working on finalizing a date with Mr. Brian Patin with Lambright Construction and will discuss ACI Field Testing for Concrete. If you are interested in presenting at a luncheon, please reach out to me at my email above.

In recent news, on Thursday December 11, we partnered with the local LES and ACEC professional chapters to host a Holiday Social at Rock 'n' Bowl. We enjoyed an evening of fun and "giveback" to our memberships who make our chapter possible.

NEW ORLEANS BRANCH

By Jesse D. Noel, PE, Branch President

The ASCE New Orleans Branch had a busy and productive fall. In November we heard from the new Regional Director of the Southeast Louisiana Flood Protection Authority – East, Jeff Williams. He presented his plans to shepherd the agency moving forward and create transparency with the public by developing new web based dashboards.

In December, former ASCE National President Norma Jean Mattei provided a presentation on Ethics and AI in engineering. We also cohosted a Holiday Party with several professional organizations at the Vintage Rock Club. This was our third year cohosting the event and we had over 175 people in attendance.

In January we had Taylor Chassaignac from CPRA's New Orleans office give an update on the future plans to restore the Barataria Basin. As we move into the spring, we are focusing on outreach activities with the Louisiana Children's Museum's Mud Fest, providing volunteers for MathCOUNTS, and participating as a sponsor and judge at the Greater New Orleans Science and Engineering Fair.

Taylor Chassaignac presents on the Barataria Basin restoration

SHREVEPORT BRANCH

By Tanner Hines, EI, Branch President

I hope that everyone had a wonderful holiday and New Year celebration!

Within the last few months, we've had a transition of officers. I will be stepping in as president for the rest of the fiscal year and I'm looking forward to it!

In October, we hosted our last monthly luncheon for 2025. The presentation was on the topic of the Community Rating System (CRS) and how it helps to provide more current information related to flooding in different parts of Louisiana. Our annual golf tournament was held in November and was a major hit as 13 teams competed in a scramble for the chance to win door prizes, top place gift cards, and bragging rights. In December, ASCE joined the local LES chapter to celebrate the Christmas holiday at Bossier City's newest attraction, Chasing Aces driving range. Our January Luncheon is still TBD but we are in the process of planning the next few monthly luncheons.

BATON ROUGE BRANCH

By Josh Olivier, PE, Branch President

The Baton Rouge Branch of ASCE closed out 2025 with our annual Christmas Party on December 12th. This was another great year-end celebration, and we also had more student attendance than we have seen in many years. Adding to the event's success, we had our largest food bank drive on record, and we want to thank our membership for their generosity during the holiday season. All donations were passed on to the Greater Baton Rouge Food Bank prior to the Christmas Party.

John Hains, Dr. Nedra Davis Hains, Dr. Jack Koban, PE, and Ashley Saucier enjoying the ASCE Baton Rouge Christmas Party at the Bocage Raquet Club

LSU Students Attend the ASCE Baton Rouge Christmas Party

We kicked off our 2026 luncheon series with a presentation from Senior Forensic Engineer Calvin Thomas who shared his experience and expertise with attendees. We are working to secure similarly unique and engaging topics throughout the year, and we will continue to prioritize requests and suggestions from our membership. In February we will join LES for the E-week luncheon where we will present the ASCE Scholarship awards along with the Melissa Young Doucet, PE Memorial Scholarships to the selected recipients.

Calvin C. Thomas, Jr., PE, Presents at the January 14th Luncheon

In early January, Vice President Sarah Berman and Director of Education/Younger Member Chair Kylie Beadle attended the ASCE Multi Regional Leadership Conference in Jacksonville, Florida. This is a conference centered around training and collaboration to inspire new ideas that attendees can bring back to their local Branch of ASCE.

At the start of this board cycle, the Baton Rouge Branch made the switch to an annual sponsorship structure. Many tiers filled within the first month, but there are still several sponsorship options available if your company would like to support Branch activities and receive company recognition. Reach out to any Board member for details. Additional event-specific sponsorship opportunities will also be available throughout the year, such as evening socials and a large multi-organizational Pickleball tournament which is currently in the planning stages. We have several exciting events planned for the year, and I look forward to more opportunities to connect with our membership!

Student News

LSU STUDENT CHAPTER

By ASCE LSU Student Chapter

Competition season is in full swing with the Louisiana State University Concrete Canoe and Steel Bridge teams ready to compete and advance at the upcoming Gulf Coast Symposium at the University of Alabama! With a third place finish in last year's Steel Bridge competition, captain Cayden Winslow, a graduating senior, is ready to compete for a first place finish to guarantee admission to the National Finals taking place in El Paso, Texas. Concrete Canoe is also ready to make a splash in the competition with captain William Latiolais, another graduating senior, leading the charge. After a brief hiatus and difficulties in competition last year, the team is poised to compete strongly with a new lightweight concrete mixture and extensive collaboration between the faculty and students.

Overall, LSU ASCE has had a successful year with strong representation from engineering companies at the student-led Networking Social and Bayou Regional Career Fair with several companies participating and over 50 new members joining our organization through outreach events like Tiger Engineering Connections and Involvement Fest. We are looking forward to exciting events this year with an upcoming field trip along coastal Louisiana in collaboration with GIS Engineering and the LSU Department of Civil and Environmental Engineering and future outreach events planned including Geaux Big Baton Rouge, LSU's largest student service event in the Baton Rouge community. Our student chapter is always looking to host civil engineering companies and government entities in order to build connections and gain insight into the civil engineering industry. If your company would be interested in participating in one of our General Body Meetings to present the work you do, please feel free to contact us at ASCE@lsu.edu. We host biweekly meetings on Thursdays from 4:30-6:00 PM and look forward to hearing from you!

LSU ASCE Steel Bridge team at Mississippi State Gulf Coast Symposium
Left to Right: Augustus Mondragon, Marco Herbert, Vincent Pepe, Cayden Winslow, Sarah Christopher, and Andy Tran

LSU ASCE Concrete Canoe team applying concrete mix to canoe mold.
Left to Right: Matthew Lacour, Skylar DeWerff, Mae Edel, Asher Mudge, Kevin Yanez, Daniel Carmouche, Ariel Sully, Claire Fielder, Jack Goodwin

Call for Student Chapter Submissions — ASCE Louisiana Civil Engineer Journal

ASCE Student Chapters are invited to share their work with the broader professional community through the *Louisiana Civil Engineer Journal*. Each issue highlights the activity, initiative, and leadership emerging from our universities across the state.

Submissions should include one or two concise paragraphs describing a recent chapter activity, project, competition, outreach effort, or professional development event. Please include high-resolution photographs suitable for publication.

Publication deadlines occur four times each year:
November 5 • January 5 • April 5 • July 5

This is an opportunity to document your chapter's impact, build professional visibility, and contribute to the historical record of engineering practice in Louisiana.

You could be featured in an upcoming issue.
For additional information, please contact Dr. Nedra Davis Hains, Editor in Chief, at nedrahains@gmail.com.

— Calendar of Events —

2026

March 4 – 5, 2026 - Joint Engineering Societies Conference (JESC) at the Cajundome.
https://www.les-state.org/

March 12–14, 2026 - ASCE Gulf-Coast Student Symposium hosted by the ASCE chapter at The University of Alabama, together with the chapter at The University of Alabama at Birmingham, will be happening in Tuscaloosa. Most of our student chapters and Region 5 Governors should be attending.

March 18-20, 2026 - Legislative Fly-In in Washington, DC

May 7-8, 2026 - 2026 ASCE Louisiana Section Spring Conference.
Double Tree Hotel - 1521 W Pinhook Rd, Lafayette, LA 70503

Events are constantly being updated online:

For ASCE Society events please see online:
https://www.asce.org/conferences_events/
https://www.asce.org/student_conferences/

For ASCE Baton Rouge events please see online:
http://branches.asce.org/baton-rouge/events

For ASCE Shreveport events please see online:
https://www.facebook.com/ASCEShreveport/

For ASCE Acadian events please see online:
http://branches.asce.org/acadiana/events

For ASCE NOLA events please see online:
http://asceneworleans.org/events/

For more events visit the ASCE Events Calendar:

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