Fall 2025, CIVE 4392 – Civil Engineering Senior Design EXPO

CIVE 4392 – CE Senior Design Project Presentations
Time: 9:00 am – 12:00 pm
Friday, December 12, 2025
In-person: Classrooms EENGR 1.268 & EENGR 1.272
Zoom: https://utrgv.zoom.us/j/5268601090?omn=88462231252

Presentations Timetable

Team	Presentation time	Location
Team 1: Solace Engineering Firm **Project**: City of McAllen – McAllen Brackish Groundwater Treatment Facility	9:00 – 9:30 am	**EENGR 1.268**
Team 2: StrucTerra **Project**: Soil Erosion Stabilization	9:30 – 10:00 am	**EENGR 1.268**
Team 3: Civil Engineering Innovation and Solutions (CEIS) **Project**: Mi Casita Affordable Housing Project at 5617 E. Trenton Rd. Edinburg, TX	10:00 – 10:30 am	**EENGR 1.268**
Team 4: Nexus Civil Consultants **Project**: City of Donna Road Flood Damage Assessment and Redesign	10:30 – 11:00 am	**EENGR 1.268**
Team 5: Purlin Engineers **Project**: Balboa Acres Stormwater Pump Station Improvements	9:00 – 9:30 am	**EENGR 1.272**
Team 6: CREAVITAL **Project**: Benton Road Detention Ponds and Culvert	9:30 – 10:00 am	**EENGR 1.272**
Team 7: Anchor Point Innovation **Project**: Roosevelt Commercial Subdivision and Roosevelt Shopping Center	10:00 – 10:30 am	**EENGR 1.272**
Team 8: Lone Star Transit Solutions **Project**: Pharr-Reynosa International Bridge Expansion	10:30 – 11:00 am	**EENGR 1.272**

Each team is scheduled for 30 minutes. Plan for a 20–25-minute PowerPoint presentation, 5-7 minutes for questions and 3-5 minutes for judges to complete their assessments and transition to the next group.

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Instructions for Senior Design EXPO Practitioners and Judges

Thank you for attending the Civil Engineering Senior Design EXPO and your willingness to serve as a judge for this year's Senior Design Conference. On behalf of the Department of Civil Engineering, we sincerely appreciate your support.

As a judge, your role is very important to help the Civil Engineering Department with assessing the effectiveness of its academic programs to meet ABET accreditation standards.

Judging may be conducted either virtually or in person. A Zoom link has been provided above for those who prefer to participate virtually. The conference schedule is also included so you are aware of each project.

Each senior design team will have 20-25 minutes to present and then there will be 5-7 minutes for questions, and then the last 3-5 minutes will be for completing your assessments.

You will be given the rubric to assist in judging prior to the conference to aid in judging as the students present. There will be plenty of copies of the rubric in each room. It is important though that the assessment must be completed for each team. The moderator will make the announcement after every session to complete your assessments of each project. The first session will begin at 9:00 am and will continue until noon.

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Abstracts

Team Name: Solace Engineering Firm
Project: City of McAllen – McAllen Brackish Groundwater Treatment Facility
Team Members: Valik Villareal, Lorena Astudillo, Ericka Salinas, Andy Navarro, Yahir Rincon, and Andres Rayon
External Advisor/Point of Contact: Carlos Gonzalez (cagonzalez@mcallen.net), McAllen Public Utilities, Kevin Spencer (kevin.spencer@rwharden.com), RW Harden & Associates Inc and Sergio Espinoza (sespinoza@carollo.com), Carollo Engineers.

Abstract:

South Texas continues to face growing pressure on its freshwater supplies due to population growth, seasonal droughts, and longevity concerns regarding the Rio Grande River. To improve regional water security, the City of McAllen is planning a major Brackish Water Reverse Osmosis (BWRO) facility. This senior design project supports the long-term effort by developing a conceptual design for key components of the future system, including the groundwater wells, well field conveyance system, treatment processes, and essential structural elements. The primary scope for this work focuses on six proposed production wells (three shallow and two deep) using regional geological well logs and aquifer data from the Chicot and Evangeline aquifers. Well design tasks included selecting screen intervals, evaluating pipe specifications, and choosing casing materials based on expected salinity levels. A complete well conveyance network was modeled to simulate delivery of up to 12 MGD of brackish water to the treatment site. Conceptual treatment designs include microfiltration pretreatment, RO membrane sizing for a future 9 MGD potable water expansion, and a post-treatment degasifier system. Structural components were also developed to include two 2.25-million-gallon concrete ground storage tanks and a slab-on-grade foundation system for the main RO facility to be expected. This project integrates hydrogeologic, hydraulic, treatment, and structural considerations to support McAllen's long-term water supply resilience.

Team Name: StrucTerra
Project: Soil Erosion Stabilization
Team Members: Molly Gonzalez, Arthur Cabo, Arely Cantu, Andrea Gonzalez, and Adam Sanchez
External Advisor/Point of Contact: Dr. Mustapha Rahmaninezhad (m.rahmaninezhad@utrgv.edu)

Abstract:

StrucTerra's project focuses on stabilizing a severely eroded riverbank slope that endangered an existing pump station after a historical flooding event that created a gully and exposed the structure's foundation along the east–south faces. This loss of soil support contributed to approximately 12 inches of settlement in the adjacent concrete slab. The goal of this design is to restore soil stability, protect the pump station, and create a long-term, maintainable solution that prevents future erosion. To address this, StrucTerra developed an integrated remediation plan combining geotechnical, structural, environmental, and construction design. The proposed solution includes re-grading the existing gully, installing Flexamat along the west side of the gully to control surface erosion, and implementing a bamboo crib system with vetiver vegetation on the south side of the pump structure to enhance drainage and provide natural reinforcement. A deep sheet-pile wall is incorporated to prevent further undercutting and protect the pump station. The existing damaged slab will be demolished and replaced, along with a new doweled utility shed slab to restore operational reliability. Construction elements such as sequencing, estimating, and material placement were integrated to ensure a practical and buildable design. StrucTerra maintains project compliance with applicable regulations and guidelines from USACE, ASCE, TCEQ, FEMA, and USDA.

Team Name: Civil Engineering Innovation and Solutions (CEIS)
Team: Catherine Garcia, Sebastian Silguero, Alexandra Herrera Solis, Julian Arteaga, and Marco Soriano
Project: Mi Casita Affordable Housing Project at 5617 E. Trenton Rd. Edinburg, TX
External Advisor/Point of Contact: Mr. Ivan Garcia (ivan@riodeltaengineering.com), Rio Delta Eng., and Mr. Marco A. Cordova (borderissuesoftexas@gmail.com), Border Issues of Texas, Inc.

Abstract:

The Mi Casita Project is a comprehensive land-development initiative designed to support sustainable growth and expand essential community infrastructure in Hidalgo County, Texas. The project integrates residential, commercial, recreational, and utility components into a cohesive development plan that prioritizes long-term functionality and public benefit. The proposed site will include 30 single-family homes, two commercial plazas, a public park, and a fully designed lift station to support wastewater needs for the surrounding service area. Throughout the development process, the project team has worked collaboratively across engineering disciplines, contributing to the design of utilities, structural features, and transportation elements to ensure compliance with county and state requirements. A significant milestone was achieved on September 16, when the project secured a partnership with the North Alamo Water Supply Corporation, allowing the team to move forward with planning and coordination of water and wastewater infrastructure. On October 17, the team met with the Hidalgo County Urban County Program to pursue funding opportunities and initiate a request to the Texas Department of Agriculture for additional support. The Mi Casita Project focuses on creating a functional, accessible, and community-oriented development that enhances local quality of life. By integrating residential housing, commercial services, and public amenities, the project aims to stimulate economic activity while addressing essential infrastructure needs. Once completed, Mi Casita will serve as a model for balanced land development, supporting both community growth and regional sustainability.

Team Name: Nexus Civil Consultants
Project: City of Donna Road Flood Damage Assessment and Redesign
Team Members: Gabriela Gutierrez, Jose Ayala, Eduardo Sanchez, Robert Jaramillo, Zachary Gibson, and Yaletsi Guerrero.
External Advisor/Point of Contact: Jorge Pena City Manager, (jpena@cityofdonna.org), Javier Hinojosa City Engineer (javier@javierhinojosaeng.com).

Abstract:

The City of Donna Road Flood Damage Assessment and Redesign Project focus on evaluating roadway conditions and developing solutions for flood related pavement and drainage failures. In Phase 1, our team assessed more than 90 roads by documenting pavement defects, drainage issues, and resident feedback through field visits and photographs. Also, our team created a custom GIS map using field photos and assessment data to document pavement defects and drainage issues. A ranking system was then developed to identify the most critical roadway for reconstruction. Goolie Road was selected for Phase 2. The redesign includes a 24-ft concrete roadway with a 2% cross-slope, lime-treated subgrade, improved heavy-vehicle turning radius, an 8-ft sidewalk, and a single-ditch drainage system with an 88 cfs capacity. Culvert designs follow AASHTO LRFD and HL 93 loading requirements. Final deliverables include plan and profile sheets, pavement and culvert designs, erosion control, traffic control planning, scheduling, and a cost estimate. The proposed improvements enhance safety, drainage, and long-term resilience for the City of Donna.

Team Name: Purlin Engineers
Project: Balboa Acres Stormwater Pump Station Improvements
Team Members: Ava Martin, Humberto Martínez, Regina Nava, Daniel Borjas, Brianna Chávez, and Eriberto Cerecedo
External Advisor/Point of Contact: Jody Galindo, PE, SE, FBRSE (j.galindo@datumrios.com), Director of Engineering, Datum Rios, LLC.

Abstract:

Purlin Engineers aims to design an improved floodwater pump station to serve the Balboa Acres Subdivision, located in South McAllen, TX. The Balboa Acres subdivision falls within a federally mandated flood zone, leaving residents highly vulnerable to flood damage after heavy rainfall and storm events. Currently, there is a recently constructed pump station, sized with two 25,500 gpm pumps that serve the area. This pump station was built to replace an older pump station, which was equipped with only one pump. The previously existing pump station suffered from differential settlement of its foundation, causing a crack in the concrete slab, and rendering that pump station inoperable. Given this history, the project team was conscious of making design decisions that would prevent past issues from recurring. The goal of the project team was to expand upon the newly constructed pump station, designing for an additional third pump, to account for the potential future residential conversion and development of an agricultural area to the north end of the site. The team's scope focused on designing the additional concrete wet well for the pump, a steel building to house the pump engines, as well as the foundation and framing plans.

Team Name: CREAVITAL
Project: Benton Road Detention Ponds and Culvert Project
Team Members: Isaac A. Martinez, Jennifer Herrera, Abdullah Alharbi, Karla Garza, and Jesus Adrian Abularach Campos
External Advisor/Point of Contact: Ahmed Mahmoud (amahmoud@wga-llc.com); Heba Gaber (hgaber@entechhou.com)

Abstract:

Fort Bend County is a rapidly growing area. This growth has presented a few issues for some of the communities. The increase in traffic on Benton Road and Ricefield Road has created the need to expand Benton Road to Koeblen Road. This will create a direct path to the local High school, Middle school, and Junior High school. The new road, however, will increase the water runoff produced in the area. Our project will take on the task of mitigating this new runoff production. This expansion will require the development of a storm system with two detention ponds able to withstand a 100-year storm event. Furthermore, this new road will pass over an existing channel and will require the construction of a culvert to allow the road to go over. To best design these, we will use a variety of programs, like HEC-HMS, to determine the appropriate detention sizes to help assist in keeping the community safe from flooding.

Team Name: Anchor Point Innovation
Project: Roosevelt Commercial Subdivision and Roosevelt Shopping Center
Team Members: Enrique Armas Jr., Marco Zertuche, Samuel Mendiola, Angel Peña, Jared Guevara, and Yousef Almutairi
External Advisors: Antonio L. Reyna, P.E. (A.Reyna@ferrisandflinn.com)

Abstract:

The Roosevelt Commercial Subdivision and Roosevelt Shopping Center project focuses on the development of approximately 65 acres within the Industrial Park at Roosevelt in Harlingen, Texas. Owned by the Harlingen Economic Development Corporation (HEDC), this property is strategically positioned with direct access to Interstate 69E, offering substantial potential for commercial expansion. Anchor Point Innovation's proposal aims to design a commercial subdivision that supports future business growth in northwest Harlingen and provides essential infrastructure for long-term economic development. The project includes subdivision layout planning, roadway design, utility coordination, drainage analysis, and the structural design of a new shopping center intended to attract retailers and service providers to the area. By integrating land development engineering with structural design, the team seeks to deliver a functional, market-ready commercial district that aligns with HEDC's vision for build-to-suit development opportunities. Throughout the process, the team has collaborated with professional advisors to ensure compliance with local codes, industry standards, and future build-out requirements. This project aims to enhance commercial accessibility, stimulate local investment, and contribute to Harlingen's continued economic growth.

Team Name: Lone Star Transit Solutions
Project: Pharr-Reynosa International Bridge Expansion
Team Members: Kaley Enriquez, Ezra Steele, Vivian Cantu, Abdulaziz Alrasheedy, and Pedro Meza
External Advisors: Ms. Arleene Garcia (Arleene.Garcia@txdot.gov)

Abstract:

Throughout the world, bridges are important structures that encourage connections, economic development, and regional progress through the movement of people and goods. The Pharr-Reynosa International Bridge Expansion Project is designed to improve international trade, reduce traffic congestion at the Pharr-Port of Entry, and strengthen the economic relationship between the United States and Mexico. This approximately 3-mile expansion will accommodate both public and commercial transportation, improving overall mobility from Pharr to Reynosa. Over the past year, Lone Star Transit Solutions has collaborated with the Department of Transportation, receiving guidance and mentorship while planning the 1.35-mile expansion on the Texas portion of the project.