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Pedestrian Bridge Over Babcock Street

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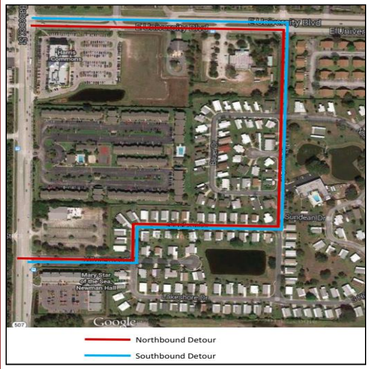
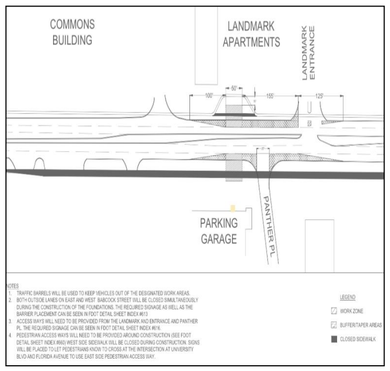
Faculty Advisor/s: (Prof. Schroeder), Dept of CVE , Florida Institute of Technology

Transportation

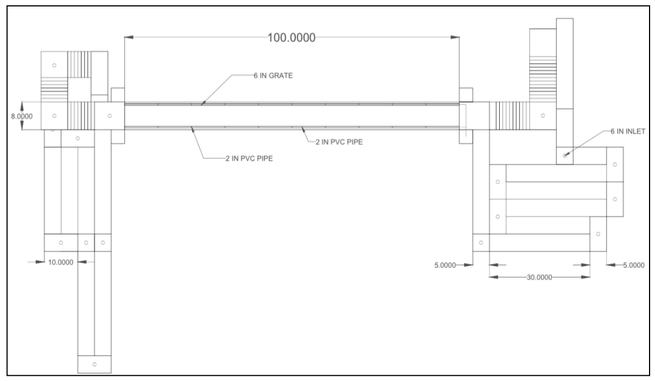
As the Transportation Engineers, we had two main tasks for this project. First, we had to generate a traffic report to prove that a pedestrian bridge was actually necessary in this area. We did this by completing multiple studies including: Pedestrian study, Vehicle Gap Study, Origin-Destination Study and a vehicle study. The next phase of our report was to show how the bridge was going to be constructed through the use of a Maintenance of Traffic (MOT) Plan. The MOT Plan is created in two phases. First, the lanes closest to the shoulder on either side will be closed to allow for the building of the foundations. The second phase is to shut down Babcock Street to place the bridge supports over top. The phase one and detour routes are shown below. We also needed to think about societal impacts for the bridge. From the Transportation stand point the biggest issue is making sure that it applied to all ADA compliances. The ramps on either side are set at a 1:12 slope for no more than a 30 foot stretch making them ADA Compliant.



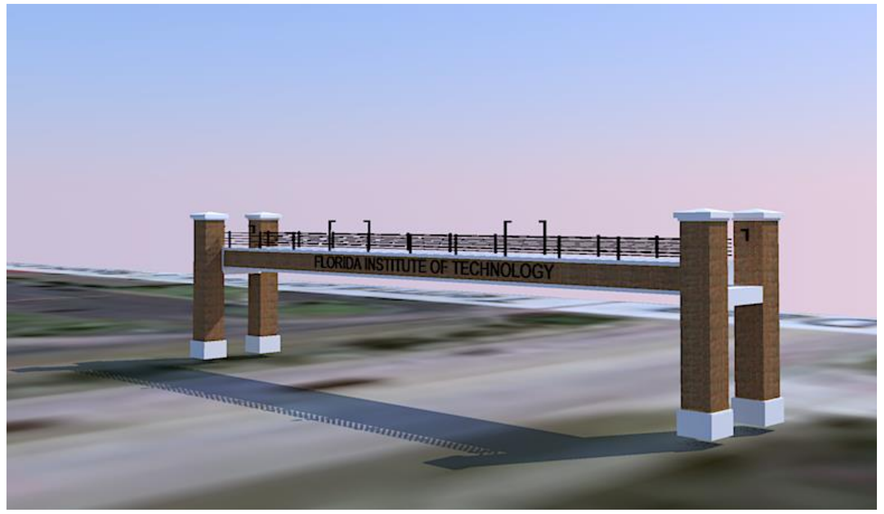


Stormwater

As the stormwater engineer is was important that we determined where the water was going to go during a storm. We decided that the bridge would be sloped at 1% to the parking garage side to allow all water to run in a retention pond located between the bridge and the parking garage. The ramps on the parking garage side also have inlets at each break area to allow the water to drain down into that pond as well. The stormwater on the east side of Babcock Street will drain down into the existing drainage pipes that run a long Babcock Street. The image above shows the exact placement of all the drainage pipes and inlets. The amount of stormwater work completed for this project was minimal.



Final Design



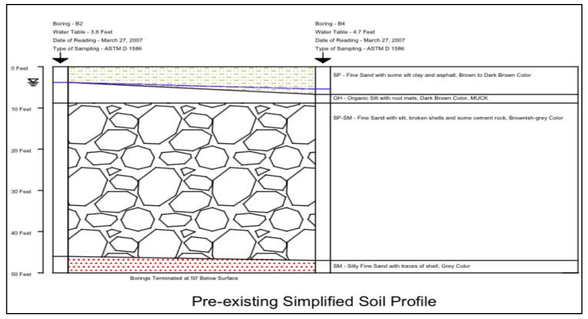
At Sapper Engineering, we strive to design structures that uphold our philosophy of building safe, reliable, and economical futures. After first being approached by Mr. Greg Tsark on behalf of Florida Institute of Technology, it became our goal to verify the need for a pedestrian bridge and to choose the best possible location to suit the needs of Florida Tech. As a group, we determined the location in between the Panther Dining Garage and Landmark at Grand Meadows as the most ideal location based on five categories; Usability, Line of Sight, Room for Ramps, Flexibility, and Location of Gateway. In addition to this we determine the best design for the bridge based on six categories while paying special attention to cost, sustainability and feasibility. The final design is a combination of simple, yet traditional styling while still complimenting the campus architecture throughout the structure.

Decision Matrix			
Constraints	Location 1	Location 2	Location 3
Useable	3	5	1
Line of Sight	1	2	4
Room for Ramps/Stairs	2	2	3
Allow Flexibility	2	2	1
Best Location for Gateway	1	1	0
	9	12	9

Design Decision Matrix				
Constraints	Design 1	Design 2	Design 3	Design 4
Feasibility	4	4	6	2
ADA standards	5	3	5	5
Gateway to Campus	4	2	4	2
Materials Blend with Campus	3	2	2	3
Sustainability	2	1	2	1
Cost	1	1	1	1
TOTAL	19	13	20	14

Geotechnical

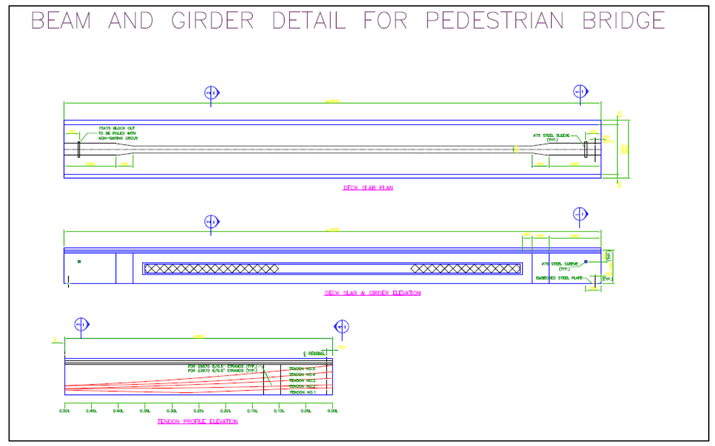
As the geotechnical engineer, determining the pre-existing soil conditions is critical in starting any design process. Once a boring is made, a simplified soil profile (as listed below) can be generated in order to estimate these subsurface conditions. From this, the parameters for the foundation can be calculated along with the settlement of the bridge and any reinforcement requirements and connections to the columns. One major issue to be addressed in the design is the organic muck layer which will be removed and replaced will soil from the hill in front of Landmark at Grand Meadows on Babcock Street, Melbourne, FL. With this in mind, a square foundation was selected with a size of 6.5 feet by 6.5 feet which will support the structure based on the bearing capacity of the soil.



Pre-existing Simplified Soil Profile

Structural

As the structural engineers, it was our job to design all of the structural components for the bridge. We started this process by finding all of the applicable codes and determining which bridge type would be best for this project. The next step was to determine all of the load conditions. From this information we designed all of the structural members and connections for the bridge. After completing the design we had to go back and check to make sure that our members would be able to support the maximum loading of the bridge. We drew up all of the members in AutoCAD the image above shows our final structural design.



NORTHROP GRUMMAN

Engineering & Science Student Design Showcase at Florida Institute of Technology