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Babcock Street Pedestrian Underpass

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Babcock Street Pedestrian Underpass

J-MAACK Consulting

For the Florida Institute of Technology

Department of Civil Engineering- Advisor Professor Richard Schroeder

Project Description

The pedestrian underpass was developed in order to fulfill the needs of our client, The Florida Institute of Technology (FIT). The client goal was to improve pedestrian safety and access crossing Babcock Street (SR-507). The project provides a safe path of travel for pedestrians to move from the buildings and apartments on the east side of Babcock St. to the main campus on the west side of Babcock St.

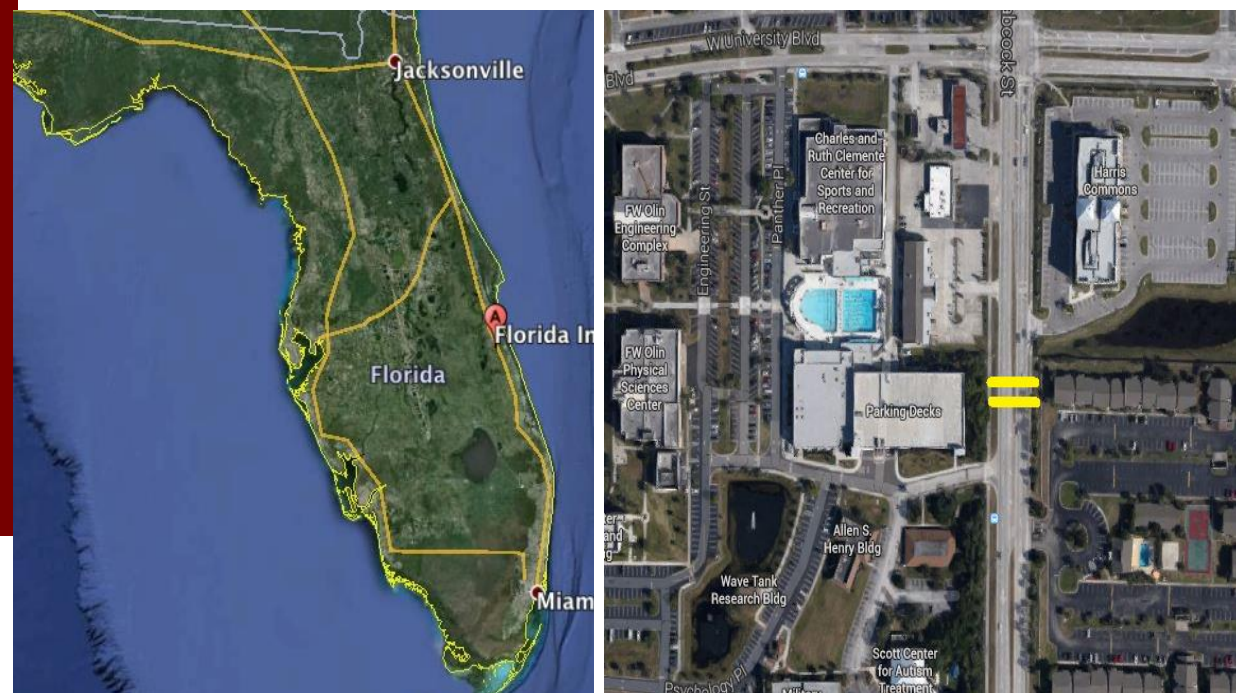
Design Benefits

In the design consideration process, multiple designs, including a pedestrian overpass were examined. An underpass was chosen as the preferred solution due to the following benefits.

- Eliminate Pedestrian-Vehicle interactions
- Greater access and range of users
- Shorter travel distance on structure
- Illegal crossing deterrent
- Speed reduction and traffic calming

Project Location

The project is located on the campus of the Florida Institute of Technology in Melbourne, FL. The entry points will be located south of the Florida Tech Commons and north of Panther Place.

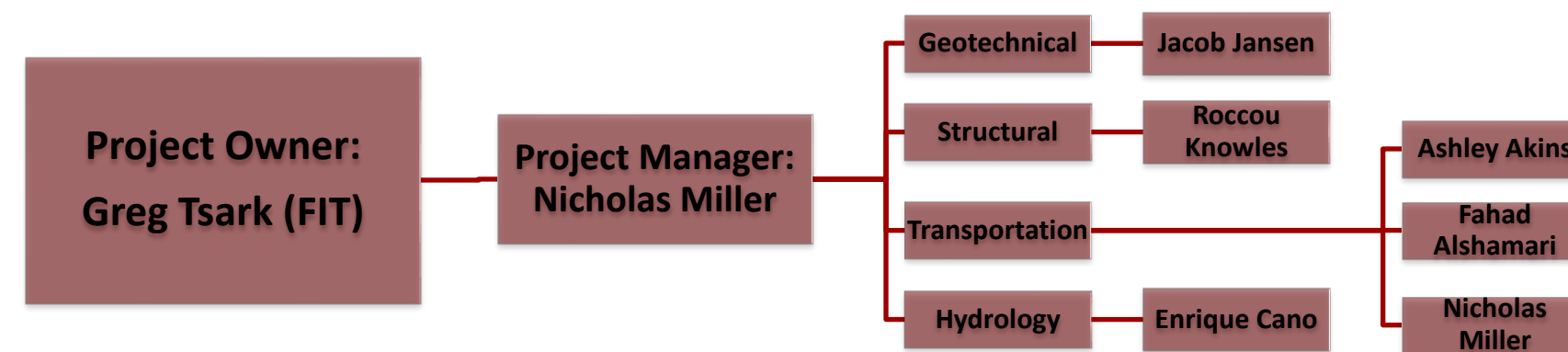


Left: State view location Right: Campus view location

Projected Costs

Design Cost-	\$45,797.40
Material Cost-	\$1,310,703.98
Labor Cost-	\$1,124,475.13
Total Cost-	\$2,480,976.51

Team Structure

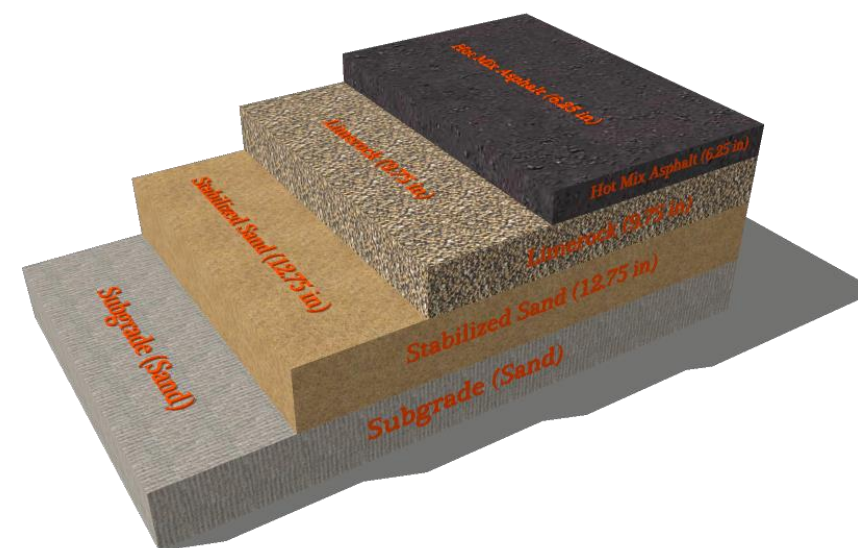


Underpass Design



Transportation

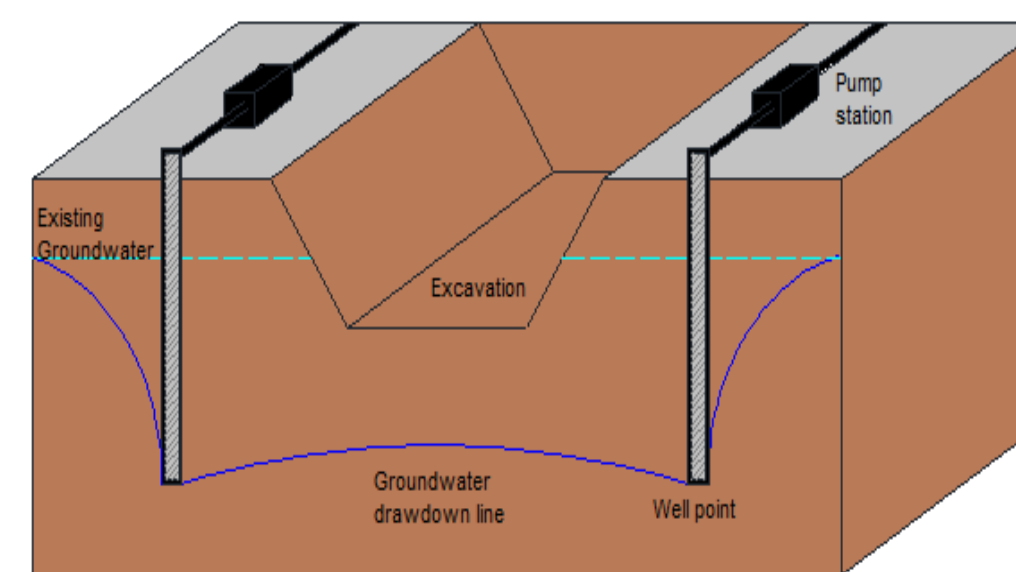
A pavement design for the section of Babcock St. under construction was completed. The design assumes 8.5 million 18 kip ESAL's for the 20 year design life. In addition a Maintenance of Traffic (MOT) plan will be submitted to the Florida Dept. of Transportation (FDOT) to allow for traffic management during the construction of the underpass



Pavement design cut-away

Site Hydrology

A well point system will be used to dewater the excavation site. The system will consist of two pumping stations at ground level with 35 ft deep well points. The system will discharge into the city storm water system. This will provide a dry and stable construction site.

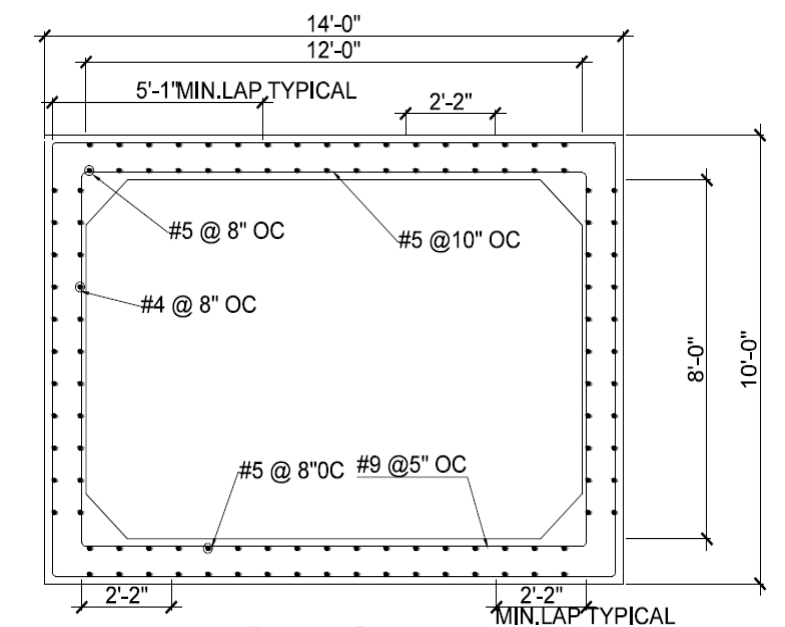


Site dewatering cross section

Structural Design

A pre-fabricated box culvert will be the underpass structure. Structure weight is 6000 pounds per foot. The loads were calculated as: dynamic (13.8 psi), vertical soil (266.24 pcf) and lateral (101.4 pcf).

Typical box culvert section, with rebar detail.

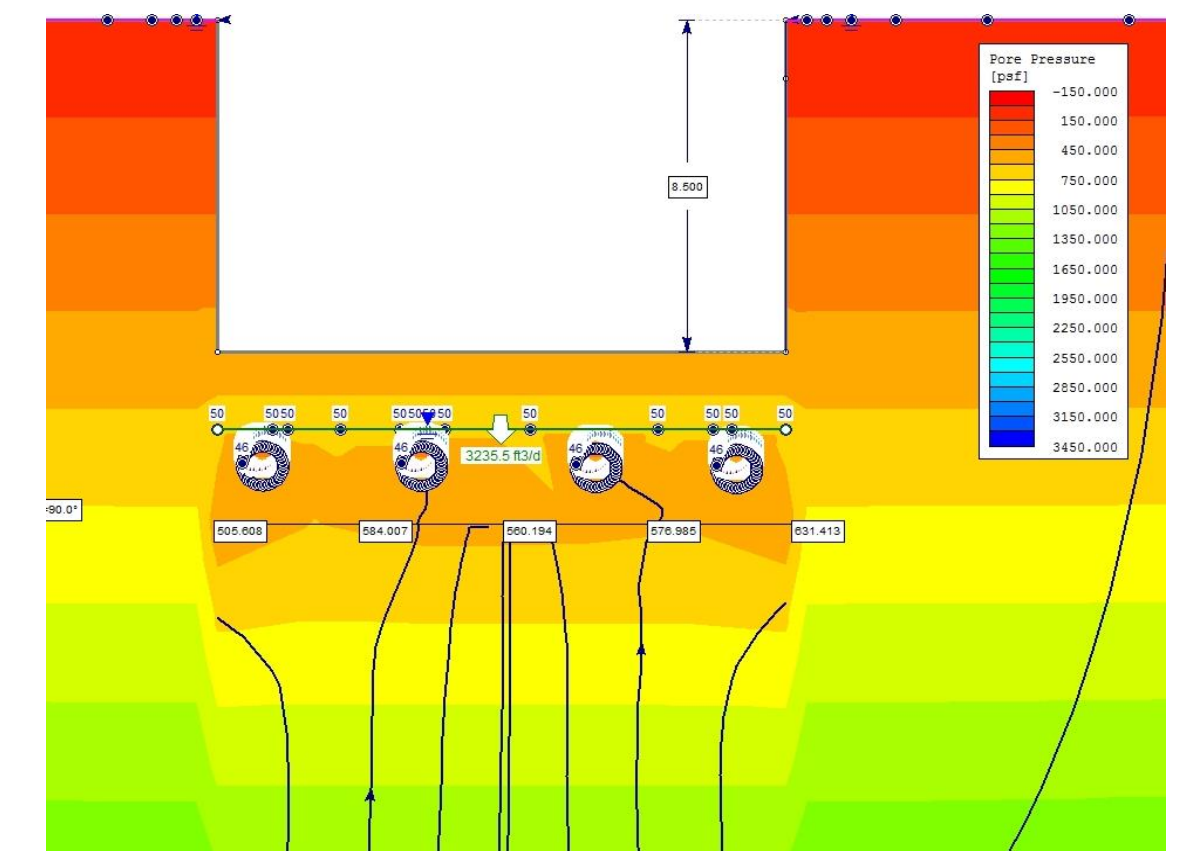


Geotechnical

The main geotechnical considerations were:

- Groundwater management
- Settlement and bearing capacity
- Embankment stability

The soil flownets were created using a steady state Finite Element Analysis. An underdrain system will relieve excess pore pressures during periods of high groundwater conditions. A Mechanically Stabilized Earth (MSE) wall will be used for the embankment stability.



Finite Element Analysis of pore pressures under structure

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