



The Riverwalk Pavilion

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Design Features

- A 3 story concrete parking garage with 1200 parking spots
- Attached 65,000 sq. ft. building that serves as office space, retail space, restaurant, and function space
- An artificial turf athletic field on top of the roof of the parking garage.
- Two entrance and exit points of parking garage
- Paved walkway along river and perimeter of entire structure.
- 180° panoramic curtain wall for function space overlooking athletic field and lot entrance.
- Rooftop deck overlooking the Merrimack River

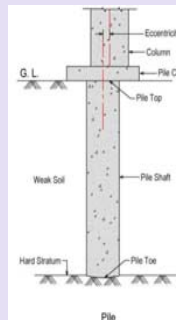
Site Design

- Many conceptual alternatives
- Building size constrained by size of the athletic field
- Required parking from Lawrence MA zoning ordinance=800
- Provided parking spaces =1200 due to expected increase in traffic from future development
- Existing utilities must be relocated
- Multiuse Building: 65,000SF of total floor area

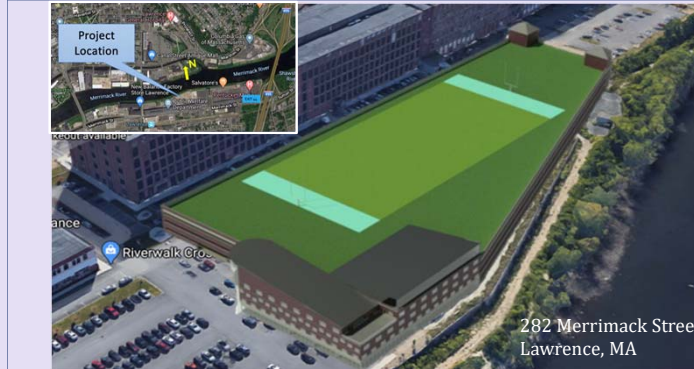


Geotechnical Design

- Used column loads based on ASCE 7-10 and self-weight of the column designed
- Reviewed geotechnical report to evaluate soil conditions
- Used toe bearing and side friction equations to design a driven pile in the drained condition
- Calculated a required cross sectional area for a concrete driven pile



Final Design

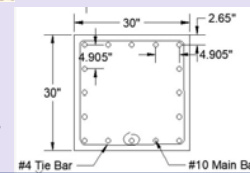


Structural Design



- Developed a column layout
- A one-way joist floor system was used
- LRF load combinations= 1524 kip column axial load

- Column dimensions= 30" x 30"
- Reinforced Concrete Column designed according to ACI 318-19
- A concrete strength of 10ksi was used as well as a steel strength of 75ksi
- 5 layers of steel, all main reinforcing steel - #10 bar, tie bars - #4 tie bars



Floodplain Considerations



- Storage provided: slender, narrow hole that goes around the perimeter of the building with a H20 rated grate on top of it in order to allow vehicles to pass over it. This would act as a continuous catch basin.

- The 100-year flood elevation =34 ft using FEMA
- Site elevation was 32 ft
- Parking garage= open structure and no displaced water
- Water displaced requires equivalent compensator y storage =1222 cubic yards
- Storage provided: slender, narrow hole that goes around the perimeter of the building with a H20 rated grate on top of it in order to allow vehicles to pass over it. This would act as a continuous catch basin.

Design Features and Site Layout

- Transportation around the site involves the use of three entrances and two exits.
- The design minimizes congestion on the primary road, Merrimack Street.
- The east side of the garage is an entrance/exit, while the west side is an exit only.
- Taking exit 44 off of I-495, the main entrance point to the site is labeled 1 on the transportation design below. If traveling eastbound, the main entrance is labeled 3, with entrance 2 used in case of driver personal error.
- Exit 1 will be used for cars traveling east and west out of the stadium, and exit 2 will be used for north-south travel
- Exit 2 will also be used for emergency vehicle access.

Transportation Design Plan



Acknowledgements

The Riverwalk Engineers would like to acknowledge TEC for sponsoring this project. A big thank you to the sponsor contact, Chris Raymond and faculty advisor, Anthony Puntin. The project team would also like to thank the University of New Hampshire for providing the resources to complete this project. The conclusions and recommendations are not to be used for construction purposes.

References

TEC, Inc.

FEMA.gov

ASCE. 2018. *Minimum Design Loads for Buildings and Other Structures*. ASCE/SEI Standard 7-10.

ACI (American Concrete Institute). (2019). "Building code requirement for reinforced concrete."