

6. Albany Street Bridge: Read the geotechnical engineering report for the South Albany Street Bridge Replacement over Six Mile Creek. Summarize the report for a non-engineer such as an elected member of the City Council. Will still need to include at least one calculation (or recalculation) from the report.

To: Ithaca City Council Members

From: Jakobi Davis

Re: South Albany Street Bridge Replacement over Six Mile Creek

Date: November 15, 2023

Dear City Council Members,

I hope this message finds you well. After a thorough review of the South Albany Street Bridge Replacement Project, several key considerations emerge. These considerations have been compiled into a geotechnical report, that I have extrapolated only the most pertinent information from for you here in this summary paper.

Where do you all fit into this assessment? Great Question, here are the things that the construction/engineering crew will need from you all in order to move forward on this project:

- Geotechnical and Earthwork Approval
- Bridge Design and Community Integration
- Financial Allocation and Collaboration
- Community Engagement and Communication

Disclaimer: The information presented is for enlightenment purposes only, these are not to be used for cost estimations by third parties. If you would like for my company to include a cost estimate report, please contact my office.

Best Regards,

Jakobi Davis

Introduction

This report presents the results of our investigation for the upcoming South Albany Street Bridge Replacement Project. We've looked into critical aspects to guide the project's success, focusing on what's most relevant for your role as a member of the city council. We've examined the ground beneath the proposed bridge site to understand what kind of soil we're dealing with. This info is crucial for building a solid foundation. Based on our findings, we have suggestions for the best types of foundations to ensure the bridge stands strong and safe. We've considered how groundwater in the area might affect construction plans, as it can play a big role in project success. We've estimated how much the bridge foundations might settle over time, helping us plan for any potential adjustments needed. We've outlined recommendations for getting the site ready and managing earthwork (road detours, ditches, etc.) during construction. We've factored in the potential for earthquakes in the area, suggesting ways to make sure the bridge can withstand them. To help you and the city, We've considered the hurdles we might face when digging, giving you all a heads up on potential obstacles.

Description of Problem

Here is what you need to know:

Site Location: South Albany Street, between North Titus Avenue and South Titus Avenue, in the City of Ithaca, Tompkins County, New York.
Approximate site coordinates are Latitude 42.4344° and Longitude -76.5015°.

In essence, the goal is to replace the existing bridge with a new, well-supported structure, considering factors like load capacity, bridge deck elevation, retaining structures, and pavement surfaces (none of which is of great concern to you). The project aims to seamlessly integrate with the current alignment, minimizing disruptions of day to day life for Ithaca locals and keep costs in a reasonable range. The provided documents offer comprehensive insights into the project's scope and requirements, which we will debrief you on next.

Review of Geotechnical Site Results

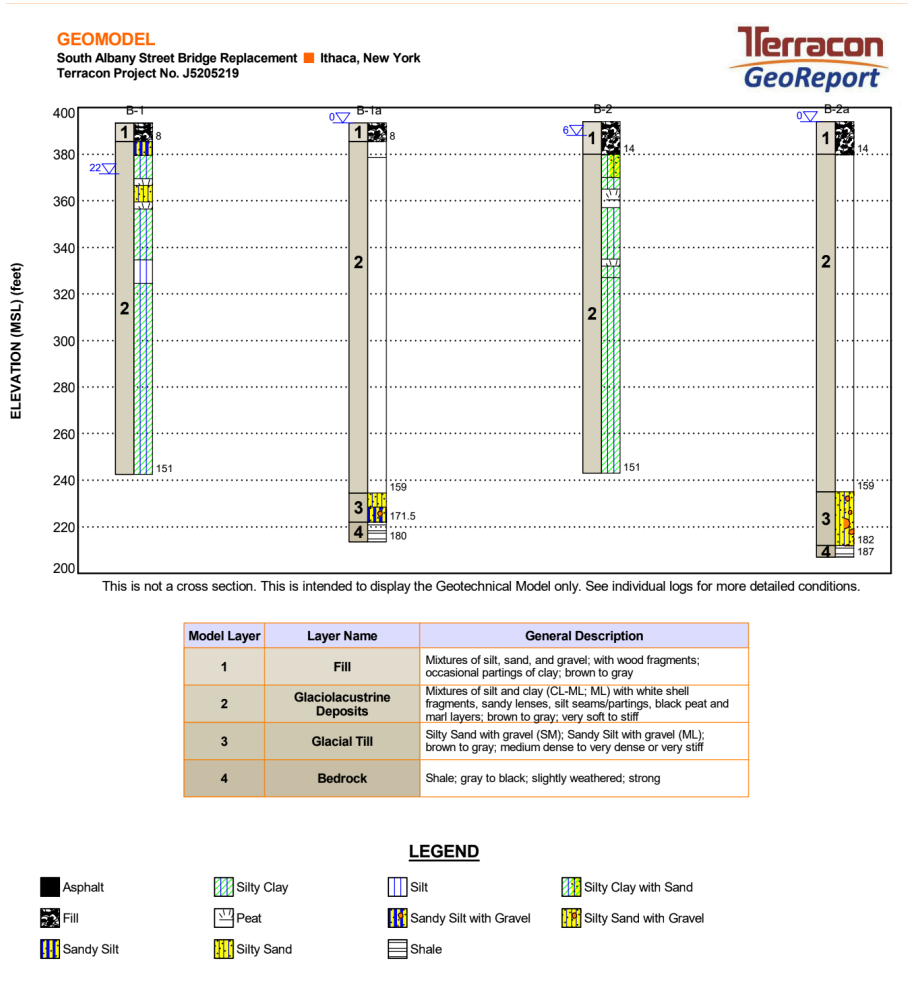


Figure 1. Model showing the types of soils at depths up to 187 feet underground

Based upon soil samples taken from the actual site of the current Albany street bridge, my team was able to create a comprehensive breakdown of the soil types found here. For each, I will give you a brief description of some of the problems we may encounter dealing with this specific combination of soils:

- 1) Surface: Asphalt or Grass. No major concerns here, excavation of these materials will be cost and time efficient.
- 2) Sub-Surface (10-150 ft below): Fill (Mixtures of silt, sand, and gravel; with wood fragments; occasional partings of clay; brown to gray). Anytime we are dealing with clays on a near subsurface level, we are concerned about the amount of settlement we will see once construction is finished. To mitigate this, we will usually pack in the soil to

try to “get rid” of the settlement before construction begins. This will incur some extra short term costs, but save you and the city money in the long run.

- 3) Deep-Surface to Bedrock (180-187 ft below): Silty Sands to Shale bedrock. Depending on depth to bedrock, we can see some cost accumulation simply because of how far we must drill into the earth in order to find sufficient support for our structure (we usually like to have bedrock as our foundation).

This section outlines key considerations for the earthwork phase in the South Albany Street Bridge Replacement Project.

- 1) Demolition: The existing bridge and associated structures will be removed, emphasizing the complete removal of materials from the site.
- 2) Temporary Excavation Support: During construction, the bridge may be fully closed with detours in place. Temporary excavation support, potentially using sheet pile systems, might be needed to maintain safety and protect existing structures.
- 3) Site Safety and Compliance: Excavations will adhere to safety regulations, with the contractor responsible for ensuring continuous monitoring and safety during the process.
- 4) Site Preparation: Before adding fill, disturbed soils will be addressed, ensuring stable subgrades. Reuse of on-site soils is considered but depends on proper compaction and monitoring. Imported structural fill may be necessary, particularly during wet seasons.
- 5) Settlement of Piles: Piles will be driven to bedrock, minimizing anticipated settlement, ensuring stability for the new bridge.

Conclusion and Recommendations

In light of the comprehensive analysis presented in this report regarding the South Albany Street Bridge Replacement Project, the following recommendations are proposed for the City Council members of Ithaca:

- **Geotechnical and Earthwork Approval**

We recommend the approval of geotechnical engineering recommendations outlined in the report, ensuring a solid foundation for the new bridge. Additionally, endorse the earthwork plan encompassing demolition, temporary excavation support, and site safety measures. These elements are pivotal for a seamless construction process, placing utmost importance on safety compliance and effective soil management.

- **Bridge Design and Community Integration**

Support the proposed bridge design involving a single-span, bridge with multiple supporting beams that are supported by columns driven deep into the ground. This design, coupled with careful consideration of estimated maximum loads, underscores a commitment to safety and longevity. Endorse the decision to complete the bridge replacement along the current alignment, minimizing disruptions and maintaining traffic flow. Furthermore, support the use of concrete pavement on the approaches and bridge deck.

- **Financial Allocation and Collaboration**

Allocate the necessary financial resources for the project's successful execution while providing oversight to ensure compliance with safety standards, environmental considerations, and community needs. Encourage collaborative efforts among the Owner, Geotechnical Engineer, Structural Engineer, and Contractor, particularly in matters related to temporary excavation support. This collaborative approach is crucial for the smooth execution of earthwork operations.

- **Community Engagement and Communication**

Facilitate transparent and informative communication with the public, addressing project progress, timelines, and potential disruptions. By endorsing these measures, the City Council can contribute significantly to the creation of a structurally sound, safe, and well-integrated bridge that effectively serves the community.

Disclaimer: Site characteristics provided in this report are designed for project planning, **NOT** excavation cost estimation. Reliance on this report for such purposes is at the **estimator's risk**, given potential variations impacting costs. Parties estimating excavation expenses should conduct their own site characterization for accurate costing. Any project changes **require a review** of our conclusions, ensuring validity through written verification or modification.