

Redeveloping an Abandoned Religious House in a Midwestern Suburban City

Project Background

This project centers on the redevelopment of a three-story farmhouse that was built in the 1890s on the lakeshore of a Midwestern suburb. The building was a residential home for many years before it was utilized by several religious orders as a residence from the early 20th to 21st centuries. Recently, the house and the 10-acre property it's located on were purchased by the surrounding city. The land is now a public park, despite having limited amenities. The city wishes to transform the property into a community resource that enhances its recreational use, while preserving the natural scenery.

A team of four senior students wrote a formal engineering proposal for the city. Study emphases of the students spans construction management, structural engineering, geotechnical engineering, and transportation engineering. The team was mentored by a registered architect and a licensed engineer. Additional guidance was provided by the three class instructors, all of whom are licensed engineers. A city representative served as the client liaison and contact.

Specific goals identified by the city in the RFP include:

- Maintaining the historical characteristics of the site
- Respecting the unique natural beauty of the forested lakeshore
- Providing appropriate treatment of Native American burial grounds
- Generating revenue and supporting the local economy
- Providing additional recreational facilities for the community



Proposed site plan.

Preliminary Design

The team visited the project site to familiarize themselves with the area and measure the existing building. Afterwards, they developed three alternative design options for the city to consider. Conceptual designs were created for each, using three-dimensional CAD models. An opinion of probable cost was calculated for each alternative and projected operating expenses and revenues were developed.

The team created a slide show that illustrates the designs and the pros and cons of each option. The presentation includes a decision matrix that reflects the city's priorities. It was presented to a panel of judges that included engineers, architects, and members of the public.

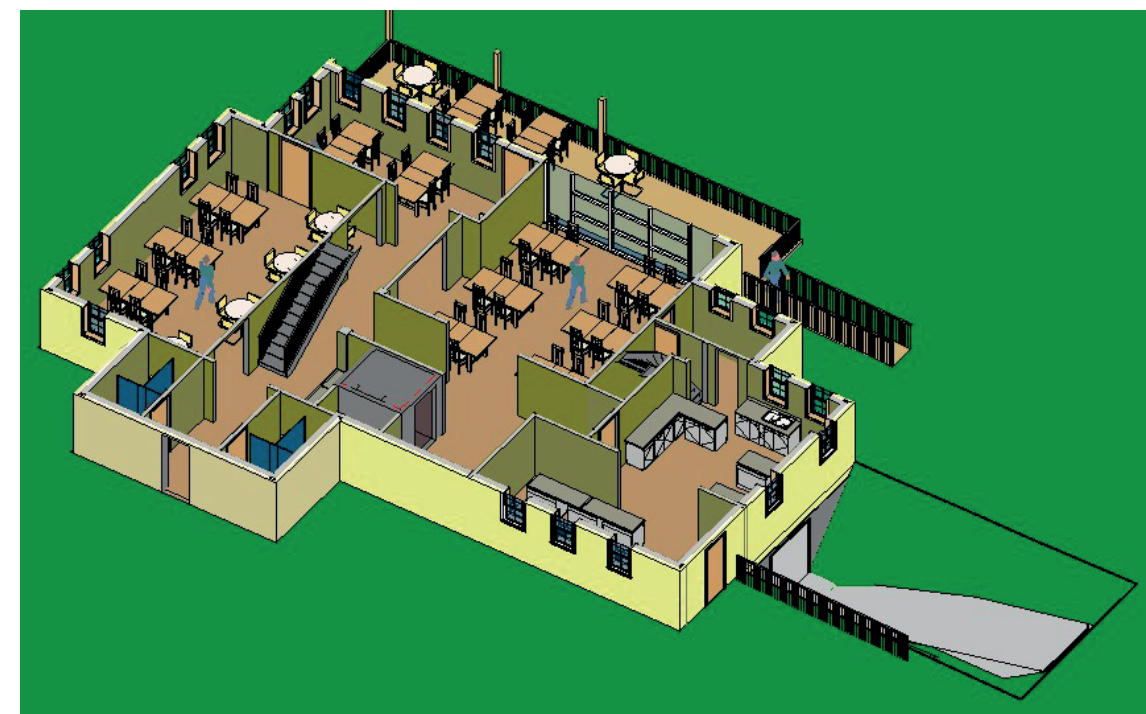
Design Alternatives

Three design alternatives were considered and presented to the city. Each alternative considered the addition of a new building with split face concrete masonry units for easy, sustainable construction. The new building will house a refreshment stand, boat and canoe rentals, restrooms, and a first aid area. The new building is positioned closer to the lake than the existing building for easy access to the water. All alternatives also include additional vehicle parking, including several spaces for the disabled.

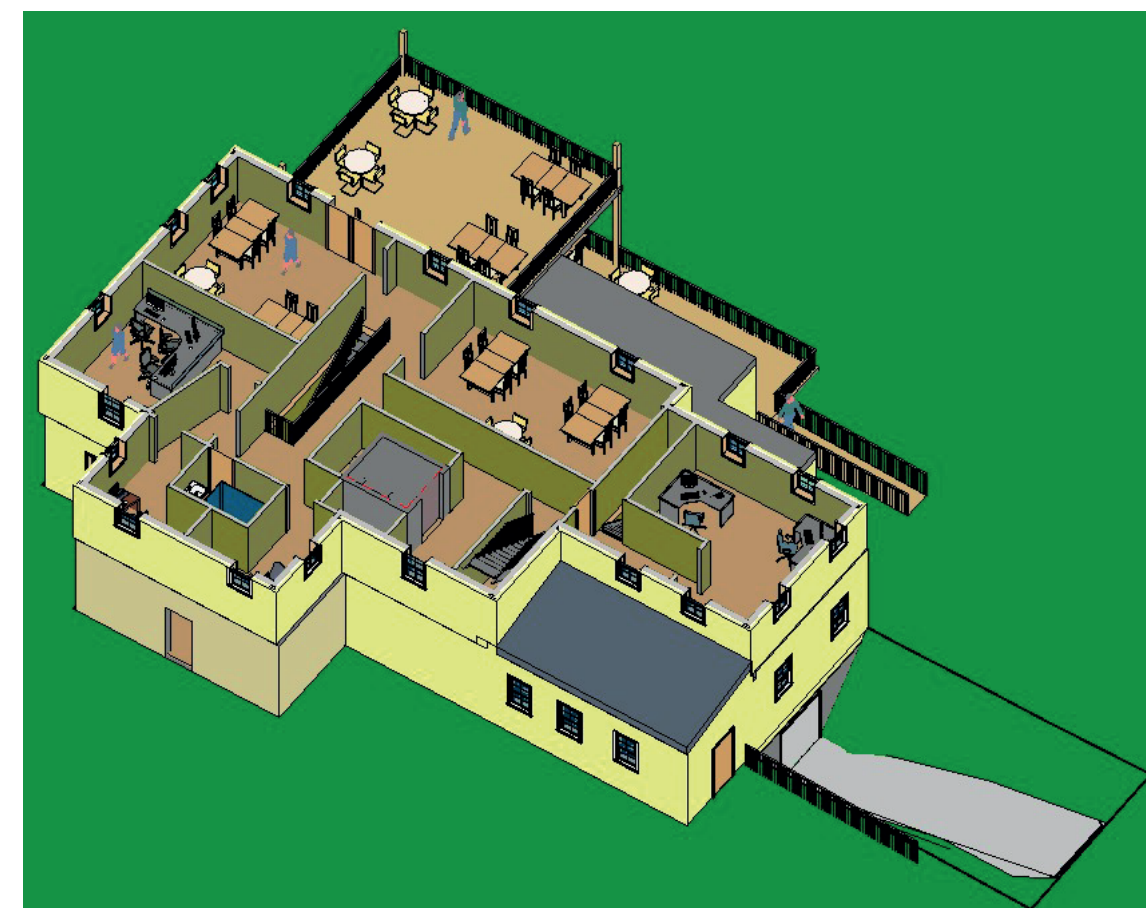
The first alternative rehabilitates the existing house for contemporary facilities. This option converts the first floor into a coffee shop and catering kitchen and adds an elevator.

The second alternative includes an addition of external dry and cold storage space on the northeast corner of the building. It also incorporates a restaurant, event space, industrial kitchen, elevator, and a two-story deck facing the lake.

The third alternative proposes demolition of the existing house and replacing it with a new open pavilion complete with a fireplace for community members to sit and enjoy the lake. This alternative did not incorporate all requested amenities and could only be used for part of the year, making the least suitable of all three.



Proposed first floor plan for Alternative 2.



Proposed second floor plan for Alternative 2.

Evaluating the Design Alternatives

An evaluation matrix was developed to quantify the merits of each design alternative. Factors evaluated included the objectives in the RFP, the team's opinion of probable cost, a present worth analysis, and an evaluation of environmental impact.

The evaluation of community acceptance included a consideration of the recreational opportunities, maintaining the unique aesthetic and historical nature of the site, and minimizing the environmental impact of construction. Care was given to protect Native American burial grounds on the site.

The team recommended the second alternative, which the city agreed was the preferred alternative.

Goal * Max or Min?	Criteria	Weight	Units	Alternative 1	Alternative 2	Alternative 3
Min	Construction Cost	30%	\$	639,000	1,003,000	497,000
Max	Meeting Community Needs/Desires	25%	Percentage Met	0.7	1	0.2
Max	Generated/Economic Impact	20%	Percent Profit	2.5%	6.0%	25.0%
Max	Operational Duration	20%	Months/Year	9	12	5
Min	Environmental/Sustainability Impact	5%	kg CO2	2918380.85	3508672.75	7152674.1
Totals:		100%		30.11%	35.79%	34.10%

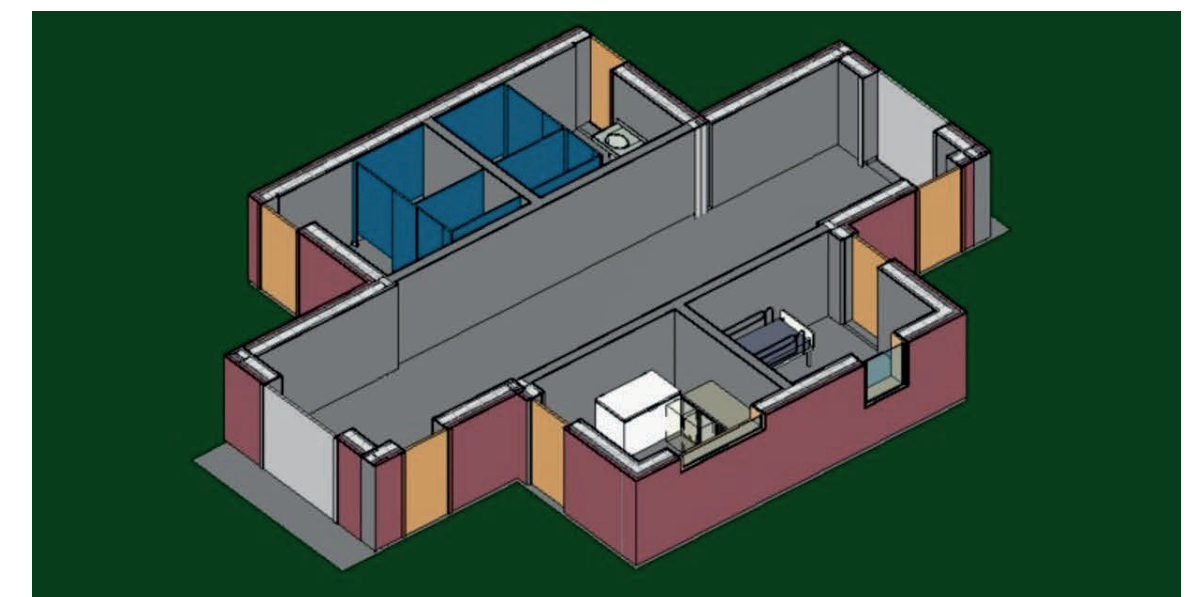
Decision matrix for all three alternatives.

Final Design

With the city's approval of the second alternative, the team proceeded with final design. Their work product included a geotechnical report, evaluation of codes, and structural calculations. Construction drawings were prepared for site renovations, the rental building, and a remodel of the existing building. Specifications included bid forms, terms and conditions, and technical sections for key project elements. A student serving as the project manager tracked and coordinated the team's effort and project schedule.

A formal presentation of the final design was made to the client and a panel of judges. The entire student team participated and explained the details of their design and the considerations used in establishing final configuration. A projected construction schedule and final opinion of probable cost were delivered. Copies of the plans, specifications, and a project manual were included in the presentation materials.

This successful design project presented the students with a real-world, open-ended, multidisciplinary project and pushed them to creatively problem solve while employing civil engineering best practices.



Proposed rental building for all three design alternatives.