Proposal: Boardwalk Trail Replacement

Company: Nittany Lion Restorations Inc.
Team Members: Ali Kazmi, Zak Marinko, Tanner Sherry, and Jared Brower

Technical Section

a. Understanding of the need

Being the most heavily-used trail in the Stone Valley Recreation Area, it will at some point need substantial repairs and maintenance. Currently, there are multiple reasons the boardwalk needs to be completely replaced with an updated boardwalk that will eliminate any of the problems prior. For example, since the installation of the boardwalk in the 1980s the boardwalk has seen its fair share of wear and tear resulting in warped boards, shifting base supports, and loose structural elements. All of which correlate directly to the safety of this platform. Also, the boardwalk is currently not spacious enough to comfortably hold interpretive signage or wheelchair rest areas that are crucial for many families that visit Stone Valley. Plus, being the most heavily used trail, the boardwalk needs to be made safer as it currently has no railings, but instead a half-foot high lip on each edge. On top of that all, the current boardwalk has no sort of lighting obscuring the visibility in the dark.

That is why this boardwalk must be designed to meet all of those needs and successfully tolerate the wetlands area, allow for maximum viewing of the wetlands, and not damage the wetlands in the process. The entire process, from demolition to installation, must be completed in 6 weeks in the winter months. Lastly, staying under the budget of $850,000.

b. Proposed approach or solution

After evaluating and understanding the need of this project our company has come up with a proposed solution that will incorporate everything you need and much more. Starting with the boardwalk we plan to make it more stable while preserving surrounding nature and still remaining cost effective. This will be done using high-quality outdoor wood for the boardwalk and wood chips on trails to maintain the nature of the area. However, wood chips wash away during flooding so we may want to consider using crushed stone or pebbles. Before we begin construction it's necessary to navigate the rivers that are located on the trail by building the trail away from low-elevation areas near the river. During the process of construction, we will apply a weather-resistant coating on all of the wooden material used to make the boardwalk. This will prevent further weather damage to the new boardwalk from the surrounding wetlands. Plus, we want to make sure the designs and colors used will blend with the natural scenery.

We have learned that a popular position is the viewing area at the intersection of the 2.9-mile loop trail around Lake Perez. Spacious enough to host a wheelchair rest area as well. So, it's important for this boardwalk to be wheelchair and stroller friendly with wider wheelchair rest areas. With that in mind we want to elevate the boardwalk so it begins to cross the river, and incorporate guard rails so that users of the trail are safe. The boardwalks must have safer sustainable railings. Taller than 2.5ft minimum. Tension cable strand railings for transparency, blends into the scenery. Additionally, for signage we want to make them simple, using weather-resistant materials, and have them placed in visible areas at least three feet into the wetlands to reduce vandalism. Types of signs will have general information, types of plants, and animal descriptive signs. Lastly, some important features we would add

is litter containers in convenient locations to reduce littering and blue-light emergency phones to make the boardwalks safer.

c. Benefits to the customer

Our company will be able to implement effective processes that will save you money during the construction of the boardwalks. One way is reducing the processing time to construct each boardwalk, reducing the number of resources needed for each task, and constantly providing timely information throughout the project. In the past, our team has used Gantt charts to keep track of the project progress, this has proved effective in the past with multiple reviews saying that we are consistently on time with the schedule we lay for the project. Our team will continue to employ this method to keep track of the boardwalk project. Moreover, the new boardwalk will be safer than the existing boardwalk since it will feature higher railings (2.5ft minimum) as well as a blue-light emergency phone as seen on college campuses around the country.

We have also been successful in completing dozens of similar projects that involve similar needs as this project, and the feedback we obtained from previous projects has always been positive. Previous customers remind us all the time how our work never needs maintenance for a long period of time. In the past, this has been achieved by specifically using outdoor treated wood combined with a protective coating to ensure longevity.

Another benefit that our solution will bring is providing a safe walkway and resting areas to facilitate ADA access and public safety. This will open up multiple doors for more people to begin coming to the Stone Valley Recreation Area.

Management Section

a. Description of major tasks

In order to effectively build the new boardwalk at Stone Valley Recreation Area, the team must break the project down into individual steps. Breaking the project down into smaller and more specific tasks allows for better planning and tracking of the project. The tasks for the project were obtained from the RFP, and then refined by the project team to create a more concrete plan to execute. The three stages of our project are going to be effective removal of the current boardwalk, construction of the new boardwalk, and updating the signage and Wetland viewing area to suit the needs of our customers. Removing the boardwalk is the necessary first step for creating a more durable and accessible boardwalk trail. Some of the goals for a successful removal of the boardwalk are getting it accomplished quickly, removing the previous components sustainably and safely, and preparing the area for the new boardwalk to be placed. The timeline of removing the existing boardwalk is critical, especially to meet the 6-week requirement of the project. However, in order to get the task accomplished quickly, the team must properly close the trail and surrounding area. This first step will be for our company to notify the patrons of the park that this area will be closing on a certain date. This will be accomplished through utilizing the parks newsletter program. After notifying the public, the construction team will begin to block off the trail on the day that construction begins. Signage will also be brought in to warn patrons from entering onto the boardwalk. In addition, signs will be placed in the nearby parking lot, as well as parking spaces closed off. After that process has been completed, then the physical demolition and removal of the previous boardwalk will take place. While the previous boardwalk is being removed, the

lead engineers and biologists will begin their surveying of the area in preparation for building. The two teams will collaborate to devise their plan for where to construct the boardwalk to maximize safety and minimize the effect on the wetland environment. The lead engineer and biologist will then bring their plan to the authorities to apply for a permit. This will allow for the two specialists to give their reasoning for the efficacy of the project. Once the boardwalk has been successfully removed and sent away from the area in a dumpster and the permit has been received, then the lead engineer will begin the process of building the boardwalk.

Building the boardwalk will be the longest of the 3 stages of this project. Once the plan has been finalized by the engineer and biologist, then the contractor will be debriefed and begin the building process. The first step will be to place the concrete supports that the team has chosen to use, for their durability in a wetlands area. The contractor's team will also store all of their equipment in the parking lot area that was closed off previously, in order to deter patrons and give the contractor adequate space. After setting the concrete supports, the pressure-treated wooden planks will be placed along the trail. The main trial is going to be built first, with viewing areas being tackled after. Once the main trail has been built, then testing will be conducted on the boardwalk to verify that it is safe for patrons. The viewing area will then be constructed, with concrete supports going in first, followed by the wooden planks. At this point, more testing will be done, and then an educator will be contacted to begin the process of updating signs along the trail. In conjunction, emergency lighting will be ran throughout the trail and will be handled by the contractor. Once the trail and viewing area have been built, then the contractor can begin to clean up their area in the parking lot and along the trail. This will allow for a seamless transition to the next step, and grant others the ability to conduct testing on the boardwalk.

After the boardwalk has been created and the educators have created their material for the boardwalk, then the process to implement that material will begin. The contractors will be used to physically place the signage throughout the trail, while the educator will be present to notify where each sign goes. The contractors will have much less equipment for this segment, so they can continue to use the parking lot for storage. Once all signage has been placed, then the contractors can clean up the last of their material, and the boardwalk can prepare for patrons to begin using it. The team will utilize the newsletter to then inform all park members that the boardwalk trail is now open, and park employees will be stationed to take on the upkeep from this point forward.

b. Deliverables

In order to verify that this project is moving forward and achieving its goals, it is important to break each stage up into important deliverables to the customer. Each stage of the project will have a few deliverables that will be coming from different sources. As each deliverable gets accomplished, then the next stage will have the green light to complete their portion of the project. The following paragraphs will go into the deliverables for each stage of the project.

The first stage of the project, removing the previous boardwalk, will contain deliverables for closing down that trail, physically removing the previous trail, and obtaining a plan of action from the engineer and biologist. For closing down the trail, evidence of said closure will be provided at this point in the project. The contractors will also provide updates throughout the demolition process of their status. Removal of the wooden planks will be done first, with notification being sent to the team as a deliverable. Then removing the support system will be their final deliverable for this segment. Lastly, the engineer and biologist will then have a deliverable of their in-depth plan on the placement of the boardwalk, and where certain precautions need to be taken. This will be delivered in a document, and

then debriefed to the contractor in order to stay on the same page. In addition, that team will obtain permits.

The second stage of the project is going to have the most deliverables, since it is the largest portion of the project. The first deliverable is going to be the contractor finishing the concrete supports. This deliverable will be provided in a memo to the rest of the project team and sponsors. After this process is complete, then the setting of the wooden planks and the concrete supports for the viewing area will be the next deliverable. These two will be done in conjunction, so that when the wooden planks are finished, testing can be done. Then, the emergency lighting system, wooden planks for the viewing area, and structural testing on the main boardwalk will be the final deliverables for this section. This allows for multiple aspects of the project to be done in conjunction in order to speed up the process.

The last step of the project will have a few deliverables in order to wrap up the project. The first deliverables will be for the educator on the project to provide the signs and material to be placed along the trail, while the engineers finish their structural testing on the viewing area. Then, the contractor will finish the project by providing the deliverable of all of the signs being successfully placed on the trail. With the project completed at this point, the sponsors will be provided with a brief of the final stages of the project and how the team plans to pass the project on to the authorities of the park. Upon agreement of these deliverables from the sponsor, the team will have successfully completed the project.

c. Project schedule

Figure 1: Schedule for the Renovation of the Boardwalk

d. Project organization

The project team utilizes their unique and specialized skills in order to execute this project. Zak Marinko is the project lead and is the manager of all other team leaders. His role is to plan the project and run team meetings, as well as holding members accountable for their respective deadlines. His qualifications are working in a construction management position, as well as being an avid birdwatcher. Due to those qualifications, he was motivated to lead this project. Jared Brower is the Engineering Manager for the project team. His role is to work in conjunction with the contractor, but mainly plan and test the area. The lead engineer will provide deliverables to the project lead which are included in the section above. Jared has experience in leading an engineering firm in building a bridge. Due to this experience, he has adequate experience in structural engineering and navigating bodies of water. Next

on the project team, Tanner Sherry is the lead contractor. The lead contractor works closely with the engineering team to remove and reproduce the boardwalk. They will have deliverables to the project lead as well that are explained above. His qualifications include working as a master carpenter for 20 years in an area with lakes. He not only built houses, but also decks on a lake. This gives him a lot of experience in building piers that work through water. The last leader on this team is Ali Kazmi, who is our lead biologist. His experience has been working as a research associate for Penn State, and specializing in Wetland areas. His input on the efficacy of where to place the boardwalk is very important to the success of the project.

e. Related Experience & References

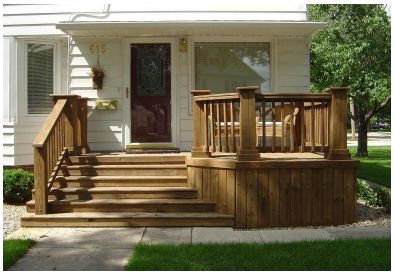
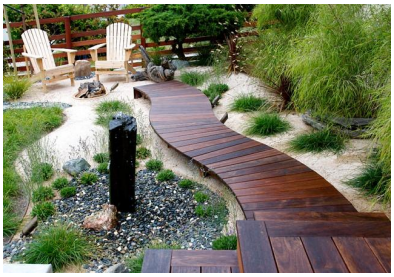
Project #1	Project #2	Project #3
Porch for residential unit	**Private boardwalk extension**	**Floating bridge across bay**
		
A local realtor reached out to us to get a porch for one of their college rental houses done. These houses are notorious for getting worn down by constant use and abuse as they are subject to high traffic. Moreover, since the area is uncovered, our company designed and assembled a new porch protected with our weather-resistant coating.	Here, we collaborated with a local homeowner who wanted a stylish boardwalk that matched the existing stained porch. Our company designed and installed the extension to the porch seen above. The stain-color was matched with the existing porch and curved edges were added to style the boardwalk.	On this project, the client reached out asking for help with the development of a new bridge. This bridge connects two separate trails coming from different mountains while offering a spectacular view of the horizon. Since the water bay is not used by any water vehicles, a floating style bridge was designed. The wooden-boards here have been treated and have a weather-resistant coating to prevent common issues such as molding and warping.
Client: Nittany Property Management	**Client:** Jonathan Smithy	**Client:** Muskoka Trails Council
Contact: (814) 231-2100	**Contact:** (814) 786-2020	**Contact:** (705) 762-3203

Table 1: 3 sample projects we've done in the past that may be relevant to the project scope

f. Equipment and facilities

- Large assembly warehouse where we are able to initially build the boardwalk if necessary and then drive it to the project site
- Off-site warehouse to store equipment, materials and tools being used
- Work trucks, tool trailers, and material trailers to transport stuff
- Own most of the general equipment needed to construct a bridge
- OSHA compliant “caution”, “warning” and “danger” labels
- PPE: Safety glasses, gloves, earmuffs, gas monitors, safety helmets, steel-toe boots, whistles
- Signage lamination and weather-proofing equipment and working area
- Wood weather-coating equipment and working area

Cost Section

a. Labor

Total labor is estimated to be about 30% of the total cost of the project. This brings the estimated total for labor to be $255,000.

b. Materials

Material price is estimated to also be about 30% of the total cost. The total for materials is estimated to be about $245,000.

c. Equipment/Facilities

Equipment cost is estimated to be about 15% of the total cost. The total for equipment is about $128,000.

d. Travel:

Travel cost is estimated to be about 10% of the total cost, bringing the total to $87,000.

e. Documentation

The cost for documentation is also about 10%, resulting in a total of $86,000.

f. Profit

Contractor profit is estimated to be around $60,000.

	Rate	Area	Total = Rate * Area	
Demolition Estimation	$6 / SQFT	7,290 SQFT	$43,740	
Installation Estimation	$92 / SQFT	7,290 SQFT	$670,680	Including labor, material, and equipment costs
Installation	$110 / LF	1,215 LF	$133,650	Railing

Estimation				
Total			$850,000	

Table 2: Cost estimate breakdown

Our construction plan addresses what is necessary but also in a financially efficient way. With the underlying wetlands in and around the area, a deep foundation is required. Deeper foundations are more expensive but we are implementing a technique to reduce the price. The more precast concrete piles that we have to use, the pricer it gets. To avoid this, we are increasing the length of the beams, which also decreases the number of concrete foundations. Another cost reduction would be placing signage at least three feet into the wetlands. Money spent on maintenance of vandalized signs is something small but adds up quick. To prevent this, placing signs farther away from the boardwalk itself will make it harder to destroy. The railings used in this project will be aluminum cable railings. These address the concern of staying transparent to nature but are much cheaper than stainless steel cable railings.