NATURESCAPE

A Burnet Woods Plan

Zach Bradford, Earl Elder, Kendall Knoke, Kelsey Pace, and Rebecca Pinney
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http://s3-media3.fl.yelpcdn.com/bphoto/agElfFR-xOfqPAU0_grhIA/s.jpg
Abstract

Our vision is to bring into reality the picture of an “Urban Oasis” that has been painted by the Park Board. By adding amenities such as a playscape or high ropes course as well as lighting the interior trails of Burnet Woods we are hoping to increase the interest and activity in the park. We believe this will help to minimize the negative stigma of that park that some have described as “crime-ridden” or “scary”. Burnet Woods has a unique history in Cincinnati but over the years it has become underutilized and some perceive it as being unsafe. The reason for this paper is to propose particular design interventions in Burnet Woods that will hopefully create an interest in and a desire for people to go into the park. The proposal consists of three major design aspects that will preserve the unique natural landscape that the park offers in a dense urban landscape while updating the park and making it more attractive to the public.

The first aspect covered in the proposal is a natural playscape, which is a play area made from natural materials and uses the existing landscape to create a play area that promotes learning while playing. Incorporating a playscape into the park retains the natural “oasis” feel of the park. The second aspect proposed is a high ropes course through the trees. By designing a high ropes course into the trees, there is very little destruction of the natural environment but it has the potential to make the park more desirable. Aside from conserving the natural forest, a high ropes course in the park will bring in a large source of revenue. The final proposed aspect is to design a lighting system through the hiking trails to increase the safety perception of the park.

Each of the proposed design aspects is talked about in detail in its particular section. In each section the report goes into scope, background research, and engineering interventions. The background research includes case studies as well as economic, political, and social aspects. The engineering interventions include a proposal, comparison of locations, standards, and proposed cost. This report also outlines the detailed design deliverables that will be looked further into during the spring semester.
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Introduction
In 1874, what we now know as Burnet Woods was created as a City of Cincinnati park. Its picturesque forests are in stark contrast to the spick-and-span parks that are typically seen in other major cities. A music pavilion was added in 1911 as well as the Trailside Nature Museum in 1939. These features have added to the park’s history and popularity over the years. Burnet Woods is now underutilized with the stigma of being crime-ridden and unsafe. While statistics show that our beloved city park is safe, improvements to the park will encourage visitors. Over time, this should help abolish the stigma Burnet Woods has as an unsafe park.

Playscape
The City of Cincinnati Mater Plan presents Burnet Woods as “The Oasis” and plans to improve the existing playground as well as the parking and picnic areas near the playground. We plan to expand the current plan by designing a playscape to replace the current playgrounds. Playscapes are play areas that look and feel like a natural environment. Using a playscape instead of a traditional playground allows for a continuation of the natural forest environment instead of a harsh contrast of plastic, manmade equipment. Not only are natural materials used but the design and layout of playscapes enhance the existing landscape rather than being built on top of them.

Scope
We propose to complete the following scope of services:

A. Preliminary Design
   o Obtain Topographic map
   o Choose suitable location(s)
     ▪ Weigh several potential sites by ranking process
   o Determine desired features (slides, sandbox, tree house, forts, climbing features, swings, sensory items, etc.)
   o Ball Park Cost $200,000

B. Detailed Design
   o Finalize playscape location
   o Engineering
     ▪ Geotechnical analysis for location
       ▪ Foundation design for any structures
     ▪ Research potential borrow material sites
     ▪ QA/QC
   o Prepare drawings
     ▪ Demolition Plan
       • Determine what (if any) trees/underbrush needs to be cleared
       • What existing manmade structures, utilities, etc. need to be removed
     ▪ Location Plan
       • Proposed structures
       • Detailed Design of playscape (types and quantities of features, layout of features, foundations
       • Proposed Parking and drives
• Proposed walks
  ▪ Utility Plan
    • Proposed Utilities
    • Proposed relocated utilities (if necessary)
  ▪ Grading Plan
    • Cut/Fill required for playscape and associated structures, walks, drives, etc.
  o Explore Legal issues
    ▪ Liability
    ▪ Safety
    ▪ Security
    ▪ Standards
  o Consider security measures needed
    ▪ Cameras
  o Determine the materials to be used
  o Consider Constructability (site access, etc.)
  o Specify Speciation Sections that would be needed
    ▪ QA/QC inspection requirements
  o Maintenance
    ▪ Yearly maintenance inspections of features
    ▪ Cost
  o Lifespan of course

Background Research
There are currently two play areas located within Burnet Woods. The first location is being considered for the proposed North location for a playscape and in at the picnic area and has the concrete slide. The second play area is at the West side of the park near Clifton Avenue. This playground is relatively new and in good condition. This is not considered for the proposed playscape due to the satisfactory existing condition and the poor choice in location.

Bonython Park
Located in Adelaide, South Australia, Bonython Park has features like many parks: picnic areas, bathrooms, parking, and open green spaces. But one thing different at Bonython Park is their new playscape which they call the “All Access” playground. This new type of playground, or playscape, has “water play . . . ‘mouse wheel’ and flying foxes” (Adelaide 2014b). Figure 1 shows the mouse wheel in action. The park also has an archaeologist activity area, zip line, hammock, wheelchair accessible merry go round, with all park features handicap accessible (Adelaide 2014a). From the Design Statement, “the incorporation of natural play elements will connect users more effectively with the diversity of their surroundings and their connectivity with the broader environmental context” (Adelaide 2014a).
The design plan, see Figure 2, shows the use of rubber soft-fall (salmon areas) and soft-fall mulch (tan areas) used around the major features of the playscape.

Bonython Park, 17 hectare (42.01 acres), is located in an urban environment which is similar to Burnet Woods. As shown in Figure 2, there is a significant amount of canopy cover (from trees) with most of it from existing trees; lighter green depicts existing while the darker green trees are existing on the conceptual design. There are 24 individual features in this design, while we are considering at least nine to twelve individual features for the proposed playscapes.
The total cost for the project was $2,923,000 ($2,400,000 US), which included the play space, renovations to a model boat pond, connecting park trails, relocating the road safety school, and securing a kiosk operator (Case Studies 2014). The Adelaide City Council’s budget shows $918,000 ($760,000 US) of funding for the play space and kiosk (Adelaide 2014a). The kiosk features a café and has catering options. The kiosk has estimated an average of 200 daily visitors to the park and there has been a significant increase of weekday visitors so it is determined to be a success (Case Studies 2014). While Bonython Park is about half the size of Burnet Woods, the area for the playscape, approximately 5.7 acres, is more than double the areas considered for the proposed playscapes which would be no more than 2 acres. Since a kiosk is not in the proposal for Burnet Woods and the proposed space is 35% smaller than the case study, a construction cost of $200,000.

**Homer Lake**

The University of Illinois Department of Human and Community Development did a study in order to evaluate the use and benefits of the Homer Lake Playscape and found that it attracted more people to the Champaign County Homer Lake Forest Preserve and had an overall benefit to the preserve as well as to the people who came to use it. The study showed that not only were children using the playscape but teens and adults also came to use the playscape. In the article “Connecting Children and Families to Nature” it says that the range in age of people who came to the playscape was from a few months old to mid-70's (Izenstark 2014). Due to the wide range of ages of people who come to use it, a natural playscape would work well in Burnet Woods. Since the surrounding area of Burnet Woods consists of college students as well as families who reside in the Clifton area, a natural playscape would be something that people of all ages can use.

The study also looked at the question “why do people use the playscape?” 61.2 percent of people who were surveyed said they used it because it provided access to nature (Izenstark 2014). Again, this would fit well in Burnet Woods since the park was originally made to be natural and picturesque. Incorporating a playscape at Burnet Woods would not compromise the natural aspect of the park and would potentially add to the scenery.

The forest preserve in total is 814 acres, which is much bigger than Burnet Woods, however the ideas about preserving nature and increasing learning are very similar. Within the preserve there is an interpretive center, similar to the Nature Center in Burnet Woods that increases learning about nature and encourages children to visit the natural playscape during their visit to the preserve as well. It was hard to find an exact size of the natural playscape at the Homer Lake Forest Preserve, however from looking at pictures and maps it can be assumed that the size of the playscape is of similar size as the proposed North location in Burnet Woods.

There are six major features in the Homer Lake Playscape along with other smaller features. The playscape includes a large water feature in the form of a creek, shown below in Figure 3.
There are also features that invoke learning, one of which being “The Compass Stone,” pictured in Figure 4, in which children can use to find which way is north. Aside from the learning aspects of the playscape, it also includes features that are more just for play; Figure 5 shows a spiderweb that children can play on.
The project took about a year and a half to complete, beginning in April 2011 and completed in September 2012. Information is not readily available on the total cost of the playscape, however, $38,171 was budgeted for the completion of the playscape in 2012 (Baker 2012). It can be estimated that the total cost of the project is at least double since the project was a year and a half long and the $38,171 covers 9 months of the project. Using this cost as a reference, it can be assumed that the cost of putting a playscape in Burnet Woods would be around $80,000 to $100,000.

Economic, Political, Social Aspects
The economics of the inclusion of a playscape at Burnet Woods would be the construction cost which is estimated based on relevant case studies and maintenance costs, which will be explored next semester based on the chosen location and features. There is not a proposed revenue for the playscape, but the Park Board may wish to rent out the playscape like other park amenities. Renting the playscape would allow the Park Board to recoup some of the construction costs and potentially fund for yearly maintenance.

There might be public opposition for this proposal, especially for the South location which would require relocating the “Stonehenge” monument. If this location is chosen, relocation areas would need to be considered. Overall, the playscape would enhance the park’s characteristics by inviting a younger generation and their families to the park while preserving the natural environment.

Social opportunities stem from an increase in daily visitors which encourages new programs. A playscape within Burnet Woods would encourage extended hours for the Nature Center as well as use of the park by local educational institutions. Families with young children will also have another attraction to spend time without high costs.
Engineering Interventions

Proposal

We are proposing renovating the playground near the Nature Center into a playscape and constructing a playscape where “Stonehenge” is currently located, see Figure 3. The renovated playscape at the Nature Center will be denoted as the North Playscape while the one replacing “Stonehenge” will be called the South Playscape. It is suggested that “Stonehenge” is relocated to another location rather than eliminating it from the park. The current playground near Clifton Avenue, as mentioned earlier, will not be considered as a proposed playscape location.

The North location poses a great opportunity for the Nature Center to host programs and learning events and incorporate the playscape in. This location is also away from busy roads and safe from traffic hazards. Currently at this location there is parking along the park street, which allows for easy access to the proposed playscape.

The South location is desirable in that it is easily seen from the road and would draw people into the park. Currently at this location there is only permit parking which could pose some problems for people trying to get to the proposed playscape.

With the conducted research it is hard to know an exact estimate of the cost of the proposed playscapes. However, an estimated range based solely on our case studies will be around $80,000 to $200,000 for each location. The cost will depend on the number of features we chose to incorporate into our design as well as the size of the playscape design. A more detailed cost estimate will be put together during the spring semester as our playscape design becomes more finalized.

As far as security goes, based on the shape of the current playground in Burnet Woods, it does not seem like we will need any added security measures. However, further investigation into vandalism will be necessary to determine if more security measures will need to be taken. One potential security measure to be looked into is gates around the playscape areas that are locked when the park closes, similar to the fence around the Arlitt Playscape on UC’s campus.

One last thing we will look further into next semester is creating the playscapes to be ADA accessible. We would like to include multiple features in the playscapes to make this a possibility. One example of an ADA accessible feature is pictured below in Figure 6.
Figure 6 – ADA Accessible Sand Area (http://www.ripleyplayscape.org/universal-accessibility.html)

Figure 7 – Proposed locations for Playscape (www.cincyparks.com)
Below is a list of features to be added in each of the playscape locations

North Playscape Features

- Refinish existing concrete slide
- Replace existing swing set with tire swings and a hammock swing (see Figure 8)
- Add a dry stream bed with a water pump (see Figure 9)
- Add several landforms (small hills)
- Add a natural play structure (see Figure 10)
- Add a sand play area
- Add a zipline (see Figure 11)
- Create pathways out of stones and logs

South Playscape Features

- Add tire swings and a hammock swing
- Add a water play station with a water pump (see Figure 12)
- Add large concrete slide into the hillside (see Figure 13), similar to North Playscape
- Add a natural play structure (see Figure 10)
- Add a sand play area
- Create pathways out of stones and logs

Figure 8 – Hammock Swing (http://1startingpoint.files.wordpress.com)
Figure 9 – Arlitt Playscape Water Play (magazine.uc.edu)

Figure 10 – Example of a Play Structure (http://earthplay.net/playscape-design/medford-ma/)
Figure 11 – Zipline (http://playandgo.com.au)

Figure 12 – Water Play Station (http://earthplay.net/playscape-design/syracuse-ny/)
Comparison of Locations

Rating:

Each category is rated on a scale of 1 to 5 with 1 being negative, 3 being neutral, and 5 being positive. Categories have various weights based on importance.

Categories:

- Visibility – How easy to see is the playscape by motorists, bicyclists, and pedestrians passing on streets adjacent to the park?
- Safety – Do nearby components contribute to the overall safety of the location (busy streets, steep topography, water features, etc)?
- Existing Features – What is currently there and will be reused versus what needs to be removed?
- Desirability – How appealing is the location for other park amenities?
- Sustainability – What opportunities are there to incorporate “green” technologies? Minimalizing the effect on the environment and supporting long-term ecological balance

Table 1 – North Playscape Location

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Visibility – Only visible from park roads, not from any adjacent streets.
Safety – Away from busy adjacent streets and the lake.
Existing Features – A concrete slide which needs repair and a swing set which would be removed (few existing features but little demolition needed).
Desirability – Low area could be susceptible to flooding which limits other amenities at this location.
Sustainability – This location is sustainable since there is minimal impact to the existing environment.

Table 2 – South Playscape Location

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Visibility – Clearly visible from Martin Luther King Drive.
Safety – Steep topography nearby could pose a safety issue.
Existing Features – “Stonehenge” monument would need to be either incorporated or relocated.
Desirability – Attractive location given the location; however steep topography presents challenges for locating other amenities at this location.
Sustainability – This location is sustainable since there is minimal impact to the existing environment.

Standards

*Nature Play & Learning Places* is a National Guideline for natural playgrounds which “offers a set of guidelines for those who create, manage or promote development of nature areas in the everyday environments of children, youth, and families, especially in urban/suburban communities. The goal is to attract kids and families outdoors to interact more directly with nature” (Moore 2014).

Not only has Moore published guidelines for playscape design and management, he writes of the importance of using playscapes:

City, county, and regional parks often include standardized, manufactured playgrounds that can be naturalized to make them more attractive to both children and accompanying adults. Complete nature play and learning spaces can also be added to provide opportunities for more extensive, hands-on nature play. Because they are easily accessible, larger neighborhood parks may be an excellent option for incorporating nature play and learning in bounded wild zones. Spacious metro, county, and regional parks may offer larger scale facilities to accommodate extended family visits for nature play at weekends and educational programs during the week and activities during summer months. Park professionals are stewards of urban green space, for which missions often include balancing conservation and recreational objectives. Implementation can engage park users in recreational experiences that also help them
appreciate the need for nature conservation. Ball park estimate of the cost. Implementation, design, safety, economics, legal issues, sustainability, and human factors. (Moore 2014)

Options for Burnet Woods includes renovation, new construction, and ecological restoration. Renovation is ideal for minimizing costs and including current play equipment in the new design while new construction would start with a blank slate for the site. The University of Cincinnati’s Arlitt Nature PlayScape is referenced with mostly being new construction but with the conservation of semi-mature trees (Moore 2014).

Risk Management is another aspect of the National Guidelines which is relevant to Burnet Woods. Since a playscape does not have typical playground parts (elevated slides, swings, etc.) the ASTM standards for manufactured play structures does not apply. The document presents an eight step process for developing a risk management protocol which is neither legal advice on the author’s behalf nor to create design standards, but to assist with management of this new type of playground while reducing risk.

Engineering
Next semester we will explore the engineering aspects for the proposed playscape which includes: geotechnical analysis, researching potential borrow sites, and quality control and assurance during construction.
High Ropes Course

Burnet Woods, soon to be known as “The Oasis,” is envisioned to function as a getaway from the concrete jungle that surrounds it. However, Burnet Woods has been described by many as a “worn down area that is unsafe and underutilized.” Bringing life to this park would not only bring in revenue for the city, but revitalize this part of the Uptown area and make Burnet Woods into “The Oasis” that it is meant to. Adding a high ropes course to the park is just one element that would greatly boost the attractiveness of Burnet Woods. A high ropes course, by definition, is a challenging outdoor personal development and potentially team building activity that takes place close to the ground, on utility poles, or up in the trees. There are many different activities within a high ropes course that would attract a wide variety of patrons. A small list of activities that might be included within high ropes courses are climbing walls, zip lines, low ropes, and high ropes.

Scope

We propose to complete the following scope of services:

A. Preliminary Design
   - Obtain Topographic map
   - Choose suitable location
     - Consider any areas that should be avoided
       - Safety Issues
     - Weigh several potential sites by ranking process (pro/con)
   - Ballpark Cost

B. Detailed Design
   - Finalize location
     - Determine desired features
     - Provide a preliminary layout of the course
   - Explore Legal issues
     - Liability
     - Safety
     - Security
     - Standards
   - Engineering
     - Soil testing for foundation design
       - Soil classification
       - Ground water level analysis
     - General survey of existing trees
     - Develop and execute testing program to choose mature trees to be used as structural members
     - Design structural elements for the course following ANSI standards
   - Prepare drawings
     - Demolition Plan
       - Determine what (if any) trees/underbrush needs to be cleared
       - What existing manmade structures/utilities/etc. need to be removed
Background Research

At the current moment there is not a high ropes course located within the park. However there a trapeze school located in Burnet Woods that was installed in 2012. It is managed by the Cincinnati Circus Company.

High ropes courses are growing in popularity in the United States and in Europe. Many universities have rock walls that are in their recreation centers, and UC is no exception. From what I was able to gather through searching and asking UC students, there are two major rock wall climbing places in the greater tri-state area other than the one located at UC. From what I have witnessed and asked from other UC students the rock climbing wall gets a lot of use in the recreation center. This makes adding a rock climbing wall as one of our main amenities even more a priority.

One case study we looked at is the zip lines and high ropes course at the Creation Museum located in Petersburg Ky. The course was installed at the Museum during the initial construction and opened in 2007. The course is a way for the museum to earn income and help support the non-profit’s operating costs. Since most new businesses fail within the first year of operation and the high ropes course is still in operation after seven years, this is considered to be a success. This high ropes course/zip line has an estimated operating income of $320,000.00 minus operating costs and maintenance costs of $100,000.00 for a net operating profit of $220,000.00 per year. The projected income is based off of the Creation Museum fees and estimated yearly attendance of 5,000 people. The course would be a great way for the Cincinnati Park Board to raise revenue to help operate Burnet Woods Park.

More recently, it was brought to our attention the need to research migratory bird patterns. It has been said that over 150 species of birds have been seen in the diverse flora in Burnet Woods. Each year the
number of birds visiting the park when migrating in the spring and fall differs, but remains consistently large. Doing any kind of major construction in this area can have a huge impact on this migration and disrupt this pattern and potentially cause harm to these birds. Approximately 60% of the 90 acres that make up Burnet Woods are forested.

**Engineering Interventions**

**Proposal**

We are proposing two locations for a potential high ropes course. The first location is near the existing monument (Figure 14). This location would be a desirable location to install the high ropes course due to this being the highest point in the park. This would be an excellent location for the starting point of potential zip lines. The downfall to putting the high ropes course in this area would be the presence of the “Stonehenge” monument. The course would be built near and also cross over top of the monument and obstruct the view of it from the street. This may be negatively received by the general public. Another reason for not putting the course near the monument that is there are not currently any existing structures that could be renovated to provide the operating and storage facilities for operating the high ropes course.

The second proposed location is near the existing restrooms. This location would be desirable because it would eliminate the need to build a structure to operate the high ropes course. It is also the second highest elevation in the park. Figure 15 shows the existing building.

The type of engineering design for this project will include:

- A complete soil analysis with the standard proctor, sieve analysis, moisture content, and water table. All soil testing will be done in accordance with ASTM standards.
- Other engineering controls involved are, designing the dead man foundations for the guy wire, specifying what type of anchors, ropes, safety wires, and support cables to use in the project.
- Design for the foundations for the support poles that need to be installed as well as the testing methods and support ratings for the existing trees to be used.
- All renovation work to be done on the exiting building in the north location will be done in accordance to the Uniform Building Code.
Figure 14 – Trail Map of Burnet Woods (cincyparks.com)

Figure 15 – Existing Building for North Location (Photo provided by Earl Elder)
Figure 14 shows not only a trail map of Burnet Woods, but much valuable information about the park. Added into the drawing are preliminary locations for the starting point of the high ropes courses. Each course location is marking with a red diamond. The arrow on the right side of the picture tells us that the red diamond located on the “R” is north of the other red diamond. Tables 3 and 4 present an analysis on both locations.

**Comparison of Locations**

**Rating:**

Each category is rated on a scale of 1 to 5 with 1 being negative, 3 being neutral, and 5 being positive. Categories have various weights based on importance.

**Categories:**

- Visibility – How easy to see is the high ropes course by motorists, bicyclists, and pedestrians passing on streets adjacent to the park?
- Safety – Do nearby components contribute to the overall safety of the location (busy streets, steep topography, water features, etc)?
- Existing Features – What is currently there and will be reused versus what needs to be removed?
- Large Trees – Necessary for a high ropes course to be able to use trees as the main supports for the course
- Desirability – How appealing is the location for other park amenities?
- Sustainability – Minimalizing the effect on the environment and supporting long-term ecological balance

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- **Visibility** - This location, since it is up high, cannot be seen from the major roadway that it sits right next to, Clifton Ave. If some of the brush is cleared away this problem could be partially fixed.
- **Safety** – This location is very flat and offers very little safety concerns, except if the road to the north stays where it is. If a zip line were to go in that direction down towards the nature center that roadway would prove to be an issue and would need to be moved. In the proposed plan that we have seen this roadway is moved to better suit a zip line heading north.
- **Existing Features** - This location also has a small structure that has restrooms in it. This structure contains seating and was basically a little place for get-togethers right next to the picnic area and playground. This structure could be easily converted into serving as a place to store the equipment used for the course and potentially sell people their tickets. Not to mention that this location is also right near a playground, giving something for younger kids to do, and a picnic
area. This opens the doors for this structure to potentially sell lunch foods for the patrons as well. There is also a parking lot that is located right next to this structure so that people will have a place to park. However, the parking lot mentioned is very small and cannot hold a lot of cars, meaning that if the course is having a busy day that this lot would fill up very quickly and not be able to hold all of the cars. The structure that is intended on being used is a little rough around the edges and would require some work to get it into working order for what we intend to use it for. The restrooms would also probably need the same touch up as our group could not access them because they were locked.

- Large Trees – This location has many trees that could be used as the main foundation for many of the amenities that would be included in the high ropes course.
- Desirability – With the existing structure already here and a picnic area with a playground this area could be utilized to be much more than just a high ropes course.
- Sustainability – With the large trees and high point in the park this location would have little impact on the environment.

### Table 4 – Southern Location Analysis

<table>
<thead>
<tr>
<th></th>
<th>Visibility</th>
<th>Safety</th>
<th>Existing Features</th>
<th>Large Trees</th>
<th>Desirability</th>
<th>Sustainability</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating (1-5)</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>3.2</td>
</tr>
<tr>
<td>Weight (%)</td>
<td>20</td>
<td>30</td>
<td>20</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>Weighted Rating</td>
<td>80</td>
<td>60</td>
<td>40</td>
<td>50</td>
<td>30</td>
<td>30</td>
<td>48.3</td>
</tr>
</tbody>
</table>

- Visibility – It is the highest point in the park and if the existing roadways through the park were to remain this location would have direct access to a major roadway as well as being able to be seen directly from that major roadway.
- Safety – There is a steep slope that goes down to the major roadway, MLK Drive. This could pose issues if someone were to fall and potentially slide down the slope.
- Existing Features – There is no parking lot, and a lack of free parking. There is no existing structures at this location and a monument that would need to be moved.
- Large Trees – Very large trees at this location that can be utilized in the high ropes course.
- Desirability – This is an open area that is very high up in relation to the rest of the park. Therefore, other amenities could be built at this point it would just have some downsides to what is already at this point.
- Sustainability – Again since this location has large trees and the high ropes course is pretty compact we could say that the impact would be minimal on the environment.

**Safety and Legal**

Both of these areas are very suitable for what we would use them for. Each area, however, has its own dangers and safety measures that would need to be taken if the course was to be set up around these locations. The northern location would probably be heavily dependent on the relocation of the road the runs directly through the park to the northeast of it. If this road were to remain certain measures would need to be taken if the course planned to use this area for a zip line or part of the high ropes area. There are some other types of courses that would better suit going over a road and would be safer in this
situation. The forests around this area are also very dense and would need to be heavily cleaned up so that they could be properly utilized in the courses. The southern area has a monument by the site which would require it to be moved otherwise it would pose a potential issue for safety. This site also has steep slopes and a road that might impede on certain courses and have safety impacts on them. At all times on high ropes courses you are tied off so that you cannot just fall out of the course. However, typically with courses like these there is a training that occurs and a waiver has to be signed so that all legal issues can be taken care of.

The recommended amount of insurance to adequately protect the park board is as follows:

1. Comprehensive General Liability 1M per persons / 3M per occurrence
2. Medical and professional liability 1M per persons / 3M per occurrence
3. Misc. errors and omissions 1M per persons / 3M per occurrence
4. Product liability 1M per persons / 3M per occurrence


The safety will follow all ANSI/PRCA 1.0-.3-2014 Ropes Challenge Course Installation, Operation & Training Standards. Proper training for the course will help negate the human factor, but not entirely prevent it. This is why the large limits on the insurance policy listed above.

Economics, Politically, and Socially

<table>
<thead>
<tr>
<th>Table 5 – Return on Investment for High Ropes Course</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Cost</strong></td>
</tr>
<tr>
<td>Advertising</td>
</tr>
<tr>
<td>Annual Training</td>
</tr>
<tr>
<td>Annual Inspection and Repairs</td>
</tr>
<tr>
<td>Annual Income</td>
</tr>
<tr>
<td>Total Initial Investment</td>
</tr>
<tr>
<td>Labor and Burdon</td>
</tr>
<tr>
<td>Annual Income minus operating</td>
</tr>
<tr>
<td>ROI*100</td>
</tr>
<tr>
<td>Years to Pay Off</td>
</tr>
</tbody>
</table>

Table 5 shows the economics of the high ropes course. Listed in this table is the initial cost of construction at $625,000.00, a yearly operating expense of $100,000.00, and a yearly estimated income of $320,000.00. The yearly income is based on a yearly attendance of 7000 patrons at an admission fee set at $40.00. After labor and burden the High Ropes course should net an average yearly income of $220,000. The return on investment is at 33.6%, which would pay back the initial investment of the Cincinnati Park Board within 8.2 years of the High Ropes Course opening.
Politically speaking Burnet Woods is a hot topic. This is because everyone knows that Burnet Woods is underutilized, but doing something about the issue is difficult. This is because there are a lot of things to factor in that could potentially lead to the general public being upset over what is decided. This is why we are suggesting something that is intended to build upon the existing nature and features. Any political leader that would potentially back our project would be seen in positive light since nothing is being destroyed, only added.

The high ropes course should bring in plenty of people into the park. The courses themselves are usually very cool to look at and attract onlookers to watch as people try to maneuver through them. These courses are very family-friendly as there are typically lower courses for younger kids. These courses are always monitored by workers that are appropriately trained and certified as well, making them very safe for all ages. The courses are also great for team building. Meaning that these courses can attract corporations so that they can have team building retreats and activities. Overall the course should attract many people from all age groups and economic backgrounds.

**Standards**
The course will be designed and installed per the ANSI/PRCA 1.0-.3-2014 Ropes Challenge Course Installation, Operation & Training Standards.

**Conceptual Designs**
Figure 16 shows a type of high ropes course that could be easily implemented. This is a higher course and requires larger trees, which are plentiful in Burnet Woods. Figures 17 – 20 show the typical obstacles that can be installed within the course. Please keep in mind that number and type of obstacles depend on the client.

![Figure 16 – Proposed Conceptual Design](http://www.whtimes.co.uk)
Figure 17 – The Tower of Fun Rock Climbing Wall (http://www.uvic.ca)

Figure 18 – Canopy Tours: “See Burnet Woods through a bird’s eye view with the Zip Line” (http://www.theactivetimes.com)
Figure 19 – The Leap of Faith; you don't always have to look before you leap. (http://www.camriverbend.wordpress.com)

Figure 20 – Stair Swing (http://www.parkriverbiblecamp.org)
Lighted Trails
The Cincinnati Park Board’s current Master Plan calls for the enhancement of the trails with the addition of new trails and renovation of existing trails. We propose the expansion of the current plan by designing a lighting system to illuminate some of the non-paved hiking trails. Not only do we believe that these lights will create a safer perception of the park, but that they will also allow for extended use of the trails. Currently the park is open until 10 p.m. and the addition of lighting to the trails allows use between sunset and 10 p.m., which can add hours of usable time depending on the season.

Scope
We propose to complete the following scope of services:

A. Preliminary Design
   - Obtain Topographic map
   - Explore Legal issues
     - Safety
     - Security
     - Standards
   - Provide a preliminary layout of the lights

B. Detailed Design
   - Determine if a survey of chosen locations is needed
   - Public Input
     - Use established methods to receive public input on this proposed intervention
     - Work closely with course heads and Park Board
   - Prepare drawings
     - Demolition Plan
       - Determine what (if any) trees/underbrush needs to be cleared
       - What existing manmade utilities need to be removed or relocated
     - Location Plan
       - Proposed trail improvements/new trails
     - Utility Plan
       - Proposed Utilities
       - Proposed relocated utilities (if necessary)
     - Electric Plan
       - Location of lights
       - Locations of conduit
       - Lighting details
     - Grading Plan
       - Cut/Fill Required for course and associated structures/walks/drives/etc
   - Consider security measures needed
     - Cameras
     - Anti-theft measures
   - Determine the materials to be used
   - Consider Constructability (site access, etc)
   - Specify Speciation Sections that would be needed
Background Research
Since its founding in 1874, Burnet Woods has always been an area where city dwellers could escape from the dirty and busy city life and enjoy the fresh, clean air only a forest can provide. Areas for walking and hiking have always been an important part of this park. These trails provide something that the built environment never could. These trails are a fantastic park amenity that we believe should be made better rather than neglected.

One such park that already employs the concept of lighted trails, albeit only seasonally at this time, is the Three Rivers Park District near Minneapolis, Minnesota. During the Fall hiking season, the park district operates seven lighted trails at four different parks from sundown to 9pm. Similarly, in Libertyville, Illinois, two lighted hiking trails are provided November through March each year. These trails are also lit until 9pm. In both cases, the local communities found a way to take advantage of their wonderful trails during the time of year when it gets dark extremely early.

At present time, the hiking trails that currently exist in Burnet Woods are in fair condition. However, some work will be required to ensure way finding signs are clear and free of graffiti and trails are free of trees and overgrowth. We believe that this intervention will increase the popularity of the trails to the point that the Park Board will be encouraged to designate more funds for the maintenance and care of these trails.

Engineering Interventions
Our proposal is to install small outdoor light fixtures along the hiking trails in Burnet Woods. The reasons for this are as follows:

- The cool factor (romantic, unique, etc)
- Brings more people into the park after dark
- Takes advantage of park amenity that is currently unable to be used after dark
- Increase perception of safety during twilight and evening hours while park is open (sunset – 10pm)
- Smaller landscape lights are lower impact than the large streetlights currently along some of the trails and complement the natural forest rather than distract from it
- Potential for green infrastructure with solar powered lights
- Can be installed in phases (not necessary to illuminate entire trail system
- Defines wooded sections of trails during the daytime similar to trail markers, but spaced closer together

The applicable standards that apply to this intervention are the 2011 Ohio Building Code electrical standards which point to the national electric code (NFPA 70).

Here is an example of a light fixture that could be used.
Figure 21 – Lighting Option (Lampsplus.com)

“This reference light is the perfect landscape light for path and walkways. Finished in stone with a clear glass lens, this light provides low ambient lighting, so you can maintain a natural, unobtrusive feel. Works with existing low voltage landscape lighting” (from Lampsplus.com).

Cost
The costs of installation vary based upon the setup. There are two primary different kinds of lights that can be installed: hard wired or solar powered. The costs of both to install are shown in Table 6 and Table 7.

Table 6 – Hard Wired Lights

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty (low)</th>
<th>Qty (high)</th>
<th>Unit</th>
<th>Unit Price</th>
<th>Total Price (low)</th>
<th>Total Price (high)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Fixture (includes post, foundation, etc)</td>
<td>800</td>
<td>1000</td>
<td>EA</td>
<td>100</td>
<td>80000</td>
<td>100000</td>
</tr>
<tr>
<td>Electric Conduit (buried)</td>
<td>8000</td>
<td>10000</td>
<td>LF</td>
<td>4</td>
<td>32000</td>
<td>40000</td>
</tr>
<tr>
<td>Connection to Existing/Transformers/Meters/Misc</td>
<td>1</td>
<td>1</td>
<td>LS</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>11</strong></td>
<td><strong>14</strong></td>
<td></td>
<td></td>
<td><strong>113000</strong></td>
<td><strong>141000</strong></td>
</tr>
</tbody>
</table>

**Average:** $127,000

Table 7 – Solar Powered Lights

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty (low)</th>
<th>Qty (high)</th>
<th>Unit</th>
<th>Unit Price</th>
<th>Total Price (low)</th>
<th>Total Price (high)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic Solar LED Light</td>
<td>800</td>
<td>1000</td>
<td>EA</td>
<td>15</td>
<td>12000</td>
<td>15000</td>
</tr>
<tr>
<td>Grouted Foundations</td>
<td>800</td>
<td>1000</td>
<td>EA</td>
<td>5</td>
<td>4000</td>
<td>5000</td>
</tr>
<tr>
<td><strong>Total (includes 25% Contingency)</strong></td>
<td><strong>800</strong></td>
<td><strong>1000</strong></td>
<td><strong>EA</strong></td>
<td><strong>15</strong></td>
<td><strong>20000</strong></td>
<td><strong>25000</strong></td>
</tr>
</tbody>
</table>

**Average:** $22,500

It may be desirable to illuminate only a certain portion of the trail system. The costs of illuminating only certain portions of the trial system is shown in Table 8.

Table 8 – Percentage of System Illuminated

<table>
<thead>
<tr>
<th>Percentage</th>
<th>10%</th>
<th>25%</th>
<th>50%</th>
<th>75%</th>
<th>100%</th>
</tr>
</thead>
</table>
Maintenance costs would include the cost of electricity for hard wired lights and replacing the lights at the end of their life spans.

The lights could be placed approximately every ten feet on alternating sides of the trails. The idea is that the light fixtures would be low impact. See Figure 22 and Figure 23 below for some examples.
The lights can be turned off at the park closing time since everyone is supposed to be out of the park at that time. There may be measures that will need to be taken to discourage vandalism.

Even though the lighted trails intervention may not require as much engineering as our other proposed interventions, we wanted to present these ideas to perhaps inspire some of the other groups, both in engineering and beyond as well as the general public and local stakeholders to see what “could be” in Burnet Woods. Ideas like this that are beyond the ordinary are truly what make places extraordinary.
Contributions

Summary of what each team member did:

Posters – Zach Bradford, Earl Elder, Kendall Knoke, Kelsey Pace, and Rebecca Pinney

Written Report

  Playscape – Kelsey Pace and Rebecca Pinney
  High Ropes Course – Zach Bradford and Earl Elder
  Lighted Trails – Kendall Knoke
  Abstract – Kelsey Pace
  Formatting – Rebecca Pinney
  Editing – Kendall Knoke

Final Presentation – Zach Bradford, Earl Elder, Kendall Knoke, Kelsey Pace, and Rebecca Pinney
References


