THE UNIVERSITY OF IOWA
IOWA INITIATIVE
FOR SUSTAINABLE COMMUNITIES

FINAL DELIVERABLE

Title	Shelly Park Redevelopment in Manchester, Iowa
Completed By	Natalie Wirtz, Jason Hua, Bruce Liu, Alec Nelson
Date Completed	May 2021
UI Department	Department of Civil & Environmental Engineering
Course Name	CEE:4850:0001 Project Design & Management
Instructor	Richard Fosse
Community Partners	City of Manchester

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This publication may be available in alternative formats upon request.

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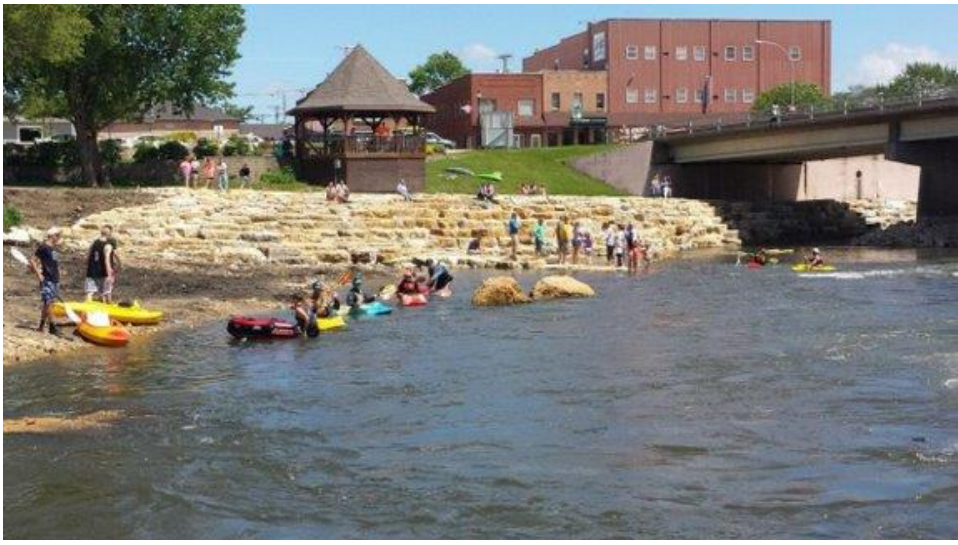
Shelly Park Redevelopment

Prepared for

The City of Manchester

May 25, 2021



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Section I: Executive Summary

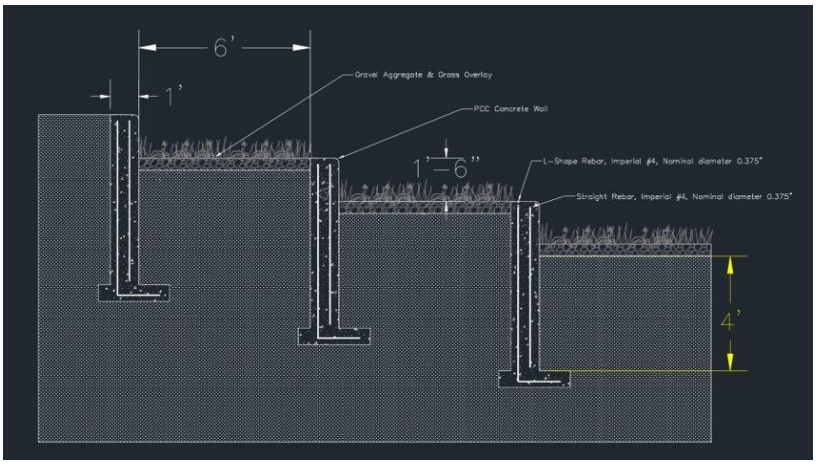
The University of Iowa Civil & Environmental project team is pleased to submit this preliminary design report for the City of Manchester. We are excited to share the development of the original ideas for this project and the methods behind how this design will be executed. This design will satisfy the objectives given by the clients which include the design of new retaining walls, inclusion of an ADA accessible sidewalk, maintenance of needed shade in the day and adequate lighting after dark, an incremental reduction in flood threat and the reimagination of how people interact with the Maquoketa River from Shelly Park. These objectives will be met while working with the constraints and challenges presented by this project. These include maintaining the current cottonwood tree on site, the drastic elevation changes from the west to east side of the park, inclusion of ADA accessible pathways and seating areas, the existing gazebo structure, and the relocation or replacement of underground utilities. The following components are parts of the preliminary design that are discussed in further detail later in this report.

As part of this project, the existing sidewalks will be removed. A shared use trail that meets ADA standards will be added that will extend from the NW corner of the park (parking lot) to the SE corner of the park, which will connect to Franklin St. By following these standards, this path will be accessible to people of all ages and abilities. To comply with ADA slope requirements a slope of 5% will be implemented on all spans, except for the span between the two lookouts. This span will have a slope of 6.5% and will have handrails to comply with the standards. A second pathway will be added that extends from the NW corner of the park (parking lot) to the NE corner of the park, where it will connect to Franklin St. This path will be comprised of a sidewalk and stairs, which will not be ADA compliant, but will provide direct access from the parking lot to the businesses downtown Manchester.

The current gazebo will be demolished and removed from Shelly Park. The gazebo is reaching a point in its life where it will require major maintenance as well as modifications to comply with ADA requirements. This, combined with the fact that it is in the floodway and its removal can help reduce flood levels, led us to explore other opportunities. The project team is proposing two concrete lookouts to replace the gazebo. These lookouts will be perfect semicircles with a seven and half foot radius. They will be concrete slabs with reinforced concrete walls built up on the outside to accommodate the elevation difference between the slab and the ground to the west. The slab concrete will be colored concrete to add an aesthetically

pleasing and different visual aspect to the park. Both lookouts will be accessible from the pathway through the park for an excellent viewing area of the river.

We have designed a space for a new prefabricated pavilion structure to be added in the middle area of the park, close to the lookouts. A new pavilion structure will maximize unobstructed views through the park as there are no walls and a flatter roof as opposed to the existing gazebo. With the knowledge that a large overhaul of the gazebo is needed, we believe that a new structure that is ADA compliant is a better investment of time and resources. There will be a short pathway that leads to the pavilion off the ADA compliant path. This pavilion will be on a 21.5-foot by 21.5-foot concrete slab and will provide shade to park visitors and shelter for events. There will be adequate space for picnic tables for additional seating below the structure. There will be outlets provided on each corner of the pavilion for electrical connection.



A grass amphitheater will be added on the south end of the park between the lookout areas and the pathway along the river. There will be three concrete knee walls in the shape of arcs that will look out over the river. These walls will be one foot in width and one and half feet tall. There will be six feet of flat area in between each wall where blankets and chairs can be sat out for additional seating area. This area is designed for people to have a unique place to sit and watch the activities on the river. This space has been previously underutilized and will add an interactive area to the park that has not been seen before. The addition of this amphitheater will also make this area much easier to mow and maintain and will be less of a hassle for maintenance personnel. The amphitheater is located in the 100-year floodplain and part of it is remarkably close to the floodway. The design has been completed carefully to ensure no fill will be added in the floodway. However, since construction will be taking place in the floodplain, a Floodplain

Development Permit will be required to complete this project. Information regarding this permit can be found in Appendix D.

All existing segmented block retaining walls will be disassembled. These blocks can either be salvaged by the contractor for use on another project which should result in lower bid prices, or it can be specified that the contractor palletize the blocks and deliver them to the City for future use. The new retaining walls will be concrete poured in place walls with a limestone veneer. This veneer will add texture and visually tie into the other retaining walls downtown. The retaining walls along the east side of the park will be straightened out into a clear rectangular shape and eliminate the existing jagged pattern. The existing stairs will be removed, and the new retaining wall will occupy this space. All retaining walls will have planters that will transition from Franklin Street to the park. We recommend a landscaping plan for these planters that will not exceed 3 feet so that the plants will not block the view of the river valley to the west.

Two new trees will be planted on the west side of the park. One will be planted north of the existing cottonwood, and the other to the south. Although the existing cottonwood tree has some hollow spots, it has been inspected by an arborist and is not considered a significant safety risk at this time. We recommend leaving it for the time being so that its shade and beauty can be enjoyed while the new trees are getting established. Ultimately, it will be up to the City of Manchester to select the trees that they would prefer planted in the proposed locations.

The water service line beneath the park will be replaced as part of this project. It will remain in approximately its current location. There will be one water fountain and two hose spigots. One hose spigot will be located at the bottom of the west retaining wall, and the other will be located on the base of the water fountain.

Two new light poles will be added to provide adequate lighting. There will also be specialty lighting installed on the lookouts. These lights will be color changing and add a beautiful ambiance to the lookout areas. Handrail lighting will also be utilized on the lookout areas in order to provide additional light features in the evenings.

The total project cost estimate comes to a total of $380,077. This includes construction costs, and the engineering design costs. The detailed cost estimate can be found in Section VII of this report.

Our entire team thanks you for the opportunity to create this plan. We hope you will find Shelly Park’s makeover to be a source of community pride and enjoyment for decades to come.

Section II: Organization Qualifications and Experience

1. Organization Location and Contact Information

The Civil & Environmental Engineering department team is located at 103 South Capitol St, Iowa City, IA 52241 (Seamans Center, University of Iowa). Due to the Covid-19 requirement on social distancing, all services have been provided remotely and all contents in the contract will be managed remotely. Team members are listed below.

Natalie Wirtz (Project Manager):
Jason Hua (Editor)
Bruce Liu (Editor)
Alec Nelson (Technical Support)

Rick Fosse (Faculty Advisor): rick-fosse@uiowa.edu

2. Organization and Design Team Description

All team members are senior Civil or Environmental Engineering students at the University of Iowa and currently in the capstone design class. All members are experienced and equipped with the skills required for this project. Team members can develop assessment of the current conditions, determine the extent of the problems, and provide potential solutions. Team members also have previous experience using design software which makes this team qualified to present the required work products. Natalie is a civil engineering student focusing on project management. She has managed the project in a larger scale and has coordinated between the design team and clients. Bruce and Jason are both civil engineers who have led primarily on developing site information such as pavement and amenities based on different design standards and converting design details into software drawings. Alec is the only environmental engineer in the group, and he has led the design team in tree protection and erosion plans.

Section III: Design Services

1. Project Scope

The Shelly Park Redevelopment Project will provide key improvements to this space that links the south end of downtown Manchester to Whitewater Park. The scope of services includes:

- ADA compliant pedestrian access in and around the park, with an emphasis on access to Franklin Street from the parking lot behind the buildings downtown Manchester
- Replacement of the retaining walls for flower beds and the gazebo area
- Removal of the existing gazebo
- Outdoor amphitheater-style seating
- Maintaining riverfront visibility
- Maintaining needed shade
- Openness and flexibility of the space
- Park amenities such as area lighting, water supply for hoses and drinking fountains, electricity and power, benches, and tables
- Presenting design alternatives for the Client
- Putting together site drawings and plans with CAD
- Ensuring all aspects of the design comply with standards such as ADA and SUDAS
- Compiling all of the design into a final report, a presentation, and design sheets
- Completing costs estimates

Details of the final design are discussed in Section VI: Final Design Details.

2. Work Plan

A simplified Gantt chart outlining the progress of the project and the tasks breakdown from the chart are provided below. A detailed project schedule can be found in Appendix B.

Shelly Park Redevelopment

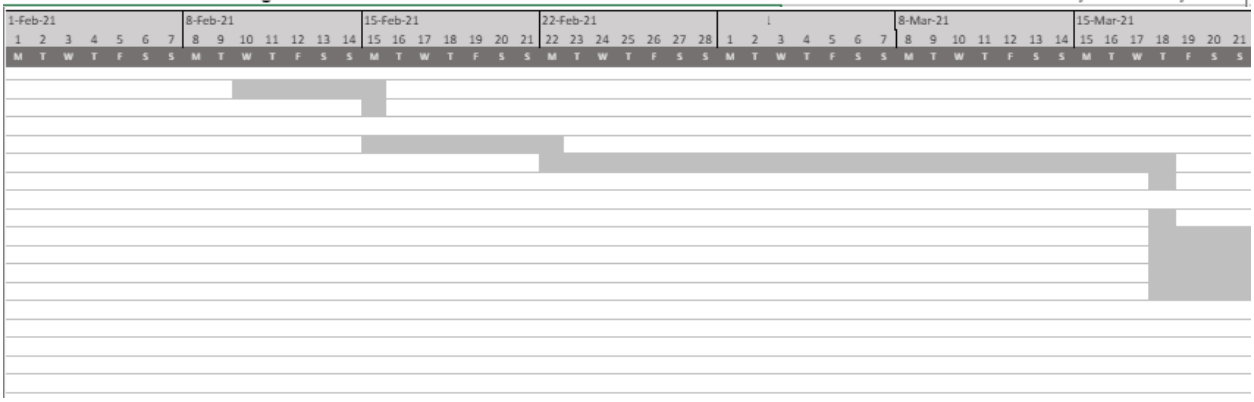
BANJ Consultants

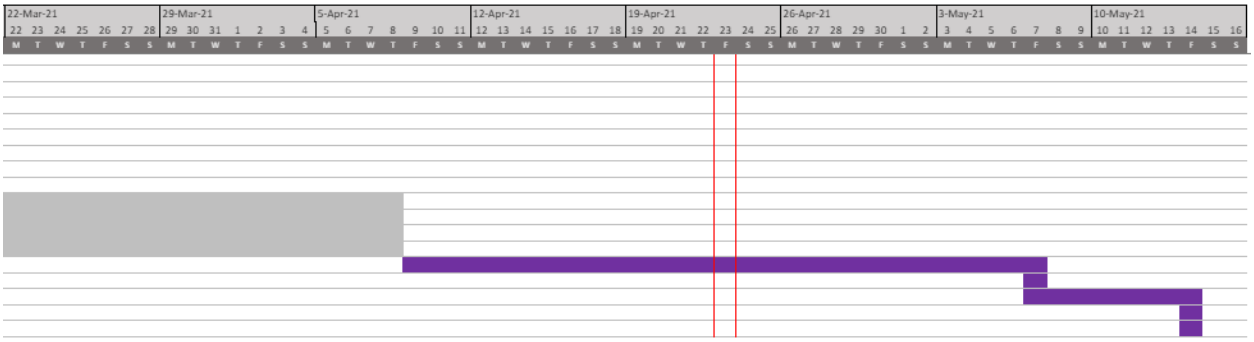
Project Manager: Natalie Wirtz

PROJECT START: Mon, 1-Feb-2021

DISPLAY WEEK: 1

TASK	ASSIGNED TO	PROGRES	START	END
Phase 1: Project Kickoff and Data Collection				
Task 1.1: Develop list of questions for the client	All	100%	1-Feb-21	3-Feb-21
Task 1.2 Project kickoff meeting with client	All	100%	5-Feb-21	5-Feb-21
Phase 2: Field Assessment and Concept Development				
Task 2.1: Site Visit with client	All		9-Feb-21	9-Feb-21
Phase 3: Design Concept Development				
Task 3.1: Develop conceptual drawings for each design alternative	All	100%	8-Feb-21	10-Feb-21
Task 3.2: Develop summary of advantages and disadvantages for each alternative	All	100%	8-Feb-21	10-Feb-21
Phase 4: Written Proposal				
Task 4.1: Prepare Written Proposal	All	100%	10-Feb-21	11-Feb-21
Task 4.2: Prepare any Proposal Attachments	Jason	100%	10-Feb-21	11-Feb-21
Phase 5: Proposal Presentation				
Task 5.1: Develop Proposal Slides	All	100%	10-Feb-21	11-Feb-21
Task 5.2: Present proposal in class	All	100%	15-Feb-21	15-Feb-21
Phase 6: Preliminary Design				
Task 6.1 Alternative Design Concept Development	All	100%	15-Feb-21	22-Feb-21
Task 6.2 Create General CAD Drawings Descricicption of each Design Alternative Concept	All	100%	24-Feb-21	28-Feb-21
Task 6.3 Send Design Concept Powerpoint to Client	Natalie	100%	18-Mar-21	18-Mar-21
Phase 7: Design				
Task 7.1: Client Meeting to review and select the preferred design concept	All	100%	8-Mar-21	8-Mar-21
Task 7.2: Prepare Design Report Draft	All	100%	5-Apr-21	8-Apr-21
Task 7.3: Prepare Design Sheet Drafts	All	100%	5-Apr-21	8-Apr-21
Task 7.4: Prepare Design Presentation Draft	All	100%	5-Apr-21	8-Apr-21
Task 7.5: Prepare Design Poster Draft	All	100%	5-Apr-21	8-Apr-21
Task 7.6: Revise Draft	All		9-Apr-21	1-May-21
Task 7.7: Present final design to client, instructors, and department	All		7-May-21	7-May-21
Task 7.8: Seek final comments and amend work products based on feedback	All		7-May-21	14-May-21
Task 7.9: Submit Final Design materials to instructors via ICON	All		14-May-21	14-May-21
Task 7.10: Submit Final Design materials via flash drive for the client	All		14-May-21	14-May-21

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Section IV: Constraints, Challenges and Impacts

1. Constraints

There are a few constraints that this project presents. One main constraint for this project is the slope of the park. There is an 11-foot elevation difference between the east and west side of the park, forcing creative design options to be utilized. In addition to this constraint, the park and the existing gazebo are sitting next to the riverbank of the Maquoketa River. The western and southern areas of the park are within the floodplain and the existing gazebo is located in the floodway. Due to this, the design had to be completed carefully to ensure there was no fill in the floodway and that new structure would not be located in the 100-year floodplain to lessen the chances of impact by flooding. Lastly, the cottonwood tree on the site is currently designed to be kept, as it is the wish of the client for it to not be removed now, but the design considers the chance that it will be removed in the next 20 years. All design options needed to work with this existing feature.

2. Challenges

Throughout the design phase of this project, unexpected challenges significantly impacted the design process. The base survey map provided by the client showed an approximate 11-foot elevation change across the park from west to east. With the necessity to apply ADA standards to at least one pathway, a maximum of 5% slope without handrails can be used which restricts the number of layouts of the trail paths. Calculations were performed carefully to ensure the slope of the ADA compliant path is under 5%. Handrails will have to be used between the lookout areas, as there will be a slope of 6.5% in this area. Because this slope is below 8%, this still complies with ADA standards. There will be stairs needed in the north pathway that directly connects to Franklin St. since the elevation change is too large in this area and grading is not feasible. The height of the newly designed pavilion structure should be limited in height to maintain the view from Franklin Street to the river. Tree and plant choices should also keep visibility in mind. The utility conduits underground should keep clear with the existing or proposed trees' root systems. Buried utilities need to be kept in mind during the design and construction phases of this project. As mentioned by the client, the final design needs to contain as much flexible space as possible, so that the park is not limited in its functionality. Lastly, the design needs to follow the principles of minimizing the cost.

3. Societal Impact within the Community and/or State of Iowa

There may be some minor societal impact after the reconstruction of the site. The park is designed to be a public recreational facility. With the updated view, flexibility, and functionality, it is anticipated that more citizens will come to the park during their leisure time. The park is located in Manchester, Iowa which has a population of around 5,000. This park is likely to be more populated and even a potential tourist attraction. The finished reconstruction of this park

could increase in visitors and tourism. The unique advantage of this park is its location right next to the Maquoketa River and Whitewater Park. With the amphitheater style concrete seating, people from different ages and of various abilities have the opportunity to experience entertainment next to the river during the summer with limited safety concerns as it is set back from the water. The communities near the park will have the opportunity to attend different amusement and recreational activities such as some small festival celebrations and Whitewater events. The flexible space in the center of the park also allows people to do things they choose such as picnics, play frisbee, or simply relax. Based on the size of the park and City of Manchester, there may be small earnings to the local government as well. The redesigned park has the possibility of stimulating the small businesses nearby. The park has the potential to become a landmark to represent the City of Manchester to attract more investments which may lead to an increase of public revenues. The new park will be rebuilt entirely on the existing site, no extra space will be involved, so there will not be any personal or property rights issues. The construction area contains multiple natural resources, and it is a good habitat for lots of animals. With more trees planted in the future, the site will become an even more complete ecological system. The park also can provide police and fire protection with the lights and water pipes. It is also a perfect space to be used as a public zone for preserving historical and cultural resources. The planters, flower beds and new trees are the major factors making this site environmentally and economically sustainable in the long term. The improved park will complement the regional draw of the Whitewater Park and be an additional space for visitors to enjoy.

Section V: Alternative Solutions That Were Considered

At the beginning of the design process, initial ideas catered to the functional aspects of the park and did not focus on creative elements. Many ADA compliant pathway options were considered as part of this process. Pathway options included a modular ramp system, a winding pathway, and a diagonal pathway through the park. Ultimately, the diagonal pathway was chosen. This design was chosen to maximize the green space in the park and to make the connection to Franklin St as seamless as possible. The downside of this choice is that if a person's goal is to go directly from the parking lot to Franklin St, they are directed through the entire park. However, given the terrain of the park this is the best way to meet the slope compliances set in the ADA standards. After speaking to the client, it was determined that a second pathway would also be desired. A second pathway extends across the north end of the park. This pathway is not ADA compliant and is composed of a sidewalk and stairs. This path acts as direct access from the parking lot to Franklin St for those that do not require ADA access.

Multiple options for a shade structure in the park were considered. Early on, it was anticipated that the gazebo structure would remain on site because that was the interpretation of the client's wishes. Considerations included moving the gazebo to various locations around the site and also looked at keeping it in its existing location. However, the gazebo is reaching a point in its life where it will require major maintenance as well as modifications to comply with ADA requirements. This, combined with the fact that it occasionally floods, led to exploration of other opportunities. The Engineering Team decided to produce a creative solution. The gazebo will be demolished and removed from the site, and in its place, there will be two concrete lookouts. After brainstorming various shapes and sizes for these lookouts, a semi-circle shape was selected and allows for an all-encompassing view of the Maquoketa River. The choice to include two lookouts was made to maximize space for visitors to have a great view of the river and to also encourage multiple groups to occupy the park at one time. These lookouts will be composed of a concrete slab that is colored concrete and supported by a reinforced concrete wall. This will add a neat design element to the park be aesthetically pleasing. Because the removal of the gazebo decreases shade in the park, it was also decided that a new pavilion will be added in a central location in the park. This structure will provide shade to visitors and minimally obstruct the view of the Maquoketa River and Whitewater Park.

Many options were considered when brainstorming ways to utilize the underutilized areas of the park. The Engineering Team had the idea to incorporate a playground on the north end of the park to encourage children and families to spend time in the park, or for a place for kids to play while their parents are enjoying their after-dinner coffee at the outdoor restaurant next door. After meeting with the client, they deemed that there was not a strong need for a playground and that the area could be utilized differently. Instead of a playground it was suggested that areas for swinging benches be considered. Originally, it was planned that these would be located in the northern end of the park. However, after seeing the site plan the clients made the recommendation to move the designated bench locations closer to the river for a better view. These are now incorporated on the southern end of the park. There will be room for three benches, either swinging or regular style. The other underutilized area of the park is on the southernmost end. This area of the park has a very heavy slope towards the sidewalk along the river and makes it extremely hard to utilize. However, The Engineering Team came up with the idea to incorporate a grass amphitheater in this area. The amphitheater styled seating will have three rows separated by knee walls designed for viewers to enjoy the river. There will be six feet of flat space between each wall. This area will have plenty of seating for park visitors and includes an ADA seating area that is accessible off the sidewalk along the river.

Options for the retaining wall replacement were considered as well. Because the client expressed an interest in a new planter that is more durable than the existing segmented block retaining walls, concrete walls with an aesthetic flair were considered. Both stamped walls and limestone veneer were explored. The client expressed high interest in utilizing limestone veneer on the retaining walls, and that is what has been chosen. The limestone veneer will tie in nicely to the existing retaining walls downtown and are graffiti resistant which will aid in keeping the park a clean area.

Section VI: Final Design Details

1. Pathways

The project utilizes design standards applicable to the state of Iowa for the design of the two proposed pathways. The pathway on the north side of the park is designed to be a sidewalk for pedestrians only, as it will incorporate stairs. All the dimension and detail requirements can be found in Iowa DOT Design Manual, Chapter 12A-1 “General Sidewalk Requirements”. Based on the definitions listed, the path on the north should be classified as “pedestrian access route”. All the paving requirements should be consistent with standard sidewalks. - See appendix A Pathway Design for the Iowa DOT Design Manual details and Appendix B for design drawings. The sidewalk will be 5 feet wide, and its thickness should be constructed of PCC with a minimum thickness of 4 inches. The specified sidewalk thickness is 6 inches which is recommended by the standards, with a subbase layer 6 inches under the PCC pavement. Gravel aggregates should be used as the subbase material.

For design of the pathway on the west side of the park, the clients requested the path be compliant with all ADA standard requirements. The slope and other requirements of any ADA compliant pathway can be found in 2010 ADA Standards for Accessible Design. The design standards state the slope of an ADA complaint path shall be less than 5% without handrails. By discussing ideas with the clients, it was agreed to design the path on the west as a shared use path for both pedestrians and cyclists. From Iowa SUDAS standards, Chapter 12B-2 Shared Use Path Design, the typical path width is 10 feet to accommodate two-way traffic. However, the client requested the path be designed to 8 feet wide, as they would prefer less space be taken up by the pathway. It is also specified that the cross slope of the path be 1.5% which is recommended for better drainage performance. For local projects, the pavement depth for both PCC and HMA pavements should have a minimum of 4 inches and a recommended thickness of 5 inches. The pavement depth has been set to be 6 inches thick using PCC pavement and 6 inches subbase to be consistent with the design of the pathway on the north side of the park. The design speed for the bike path is 14 mph for grades less than or equal to 5% and the minimum radius for horizontal alignment is 38 ft. - See Appendix A for Iowa SUDAS standards for shared use path and Design Drawings for all the detailed dimensions in drawing.

2. Grass Amphitheater Seating

The proposed design concept includes a plan for amphitheater style seating located in the southeast corner of the park to provide space for people to sit on or to place their personal belongings when they want to have fun in the river or enjoy its view. The specific location of the amphitheater can be seen on the site plan. The design proposes three rows of concrete knee walls. Each wall is 18 inches above ground and 6 feet apart. The distance between walls can be used for seating, setting up chairs, or placing blankets. There were no specific design manuals for amphitheater seating, so typical retaining walls design standards were used as a reference to create the knee walls. The material for the knee walls should be PCC and reinforced with rebar in both vertical and horizontal directions. The rebar number is #4 with a nominal diameter of 0.375 inches since it is anticipated that the walls are not designed to bear large vertical or horizontal

loads. Each knee wall is set to 12 inches wide. It was recommended that frost footings be utilized at a depth of 4 feet underground since it is very likely that the ground will freeze during the winter which may cause damage to the walls. Bevels will be placed in the concrete forms to reduce the sharp edge on the walls and provide a more comfortable and safer place to sit. -See Design Drawings for knee walls cross section drawings.

3. Lookout Area

Two lookouts have been designed on the site west of the ADA bike path to provide an area for people to enjoy the views of the Maquoketa River. The platforms of the two lookouts will have the same elevation height as the ADA pathway for easy access. The lookouts will be constructed using concrete slabs to replace the existing gazebo. No canopy style structure will be placed on the lookouts which eliminates the concerns of blocking the view from the adjacent streets. Each lookout has a semi-circle geometry with a radius of 7.5 feet. The framework for the pouring of these lookouts needs to be in the shape of an arc, as opposed to a series of chords. It is crucial to the design, aesthetic, and longevity of the structure that these be true semi-circles. Handrails will be installed on the perimeter of the lookouts for safety and in between the lookouts for ADA compliance. These handrails will include plexiglass between each baluster, to minimally obstruct the view of the river. The concrete slab will be 5 inches thick PCC and #4 rebars will be used in both lateral and longitudinal directions. The minimum flexural tension for each concrete slab is 60 ksi. The concrete will be colored using integral dye for better decoration of the park and will be left with a broom finish to enhance the ease and comfort of sitting directly on the lookouts or placing tables on these spaces.

Specialty lighting will be installed on the handrails to provide better visibility during nights and provide a gentle ambiance to the park area overlooking the river. Additionally, colored bollard LEDs would be placed on the lookouts or in the retaining walls to provide an aesthetically capturing view in the evenings. Because the bridge south of Shelly Park will most likely undergo a rehabilitation project in the near future, this as an opportunity to tie Shelly Park and the bridge together through the specialty lighting design. The right most picture above shows a conceptual lighting design idea for the bridge. By utilizing coordinating lighting in these areas, a sense of unity will be brought to the space and enhance the natural beauty of the Maquoketa River. Specific details regarding recommended handrail and specialty lighting can be found in Appendix C.

4. Pavilion

A new pavilion structure will replace the existing gazebo in the park. The existing gazebo is reaching a point in its life where it will require major maintenance as well as modifications to comply with ADA requirements. It is also located in the floodway of the Maquoketa River and is consistently impacted by flooding when heavy rain occurs. With this in mind, it would be in the best interest of the park to remove the gazebo and replace it with a structure that could be enjoyed by all outside of the floodway.

The Engineering Team recommends that a prefabricated pavilion be used for the structural component. Due to the constraints of the semester, prefabricated options were evaluated rather than a designing a unique structure. Shown here are two pavilion options for Shelly Park. The left is a Holiday Shadow pavilion from NeoOutdoor.com, and the right is a Laminated Wood Arch Beam Hexagon pavilion from CedarStore.com. Both options have unique features, fit in with the current aesthetic of the park and surrounding areas, and have a striking design. Because the current gazebo is not a cookie cutter structure and has a unique and captivating appearance, any structure that is to replace the gazebo should offer the same enthralling aesthetic. The view of the river is paramount to the client. Both structures shown here have open and flatter roofs, as opposed to the closed off gazebo that has a very tall roof. Because of these differences, the new structure will minimally obstruct the view of the Maquoketa River, so visitors can continue to enjoy the view from surrounding areas. Another concern the new structure addresses is accessibility. The pavilion will be located off the sidewalk that is ADA accessible through the park. The path from the sidewalk leading to the structure will also be ADA compliant. Currently, the gazebo is not located in an area that is easily accessible for people of all abilities. By moving the location of the pavilion to an area that all visitors can utilize and enjoy brings a new dimension of inclusivity to Shelly Park for all to experience. The pavilion will sit on a concrete slab that is 6 inches thick and reinforced with #4 rebar in both lateral and longitudinal directions. Gravel aggregate will be placed under the slab for the general subbase. The City should choose a prefabricated structure and then pour the slab in the size and shape and with the proper footings that best corresponds to the pavilion chosen.

The final concern the new structure addresses is the floodplain. The current gazebo is located in the floodway and the 100-year floodplain. The client expressed frustrations with the base of the

gazebo being impacted by flooding at times. By moving the new structure to the northeast, these impacts will no longer exist. The pavilion will now be located on the edge of the 500-year floodplain and be out of the floodway entirely. This change will allow the river more room to expand during flood events and incrementally reduce the flood threat to Shelly Park and downtown Manchester. Specific information about where to purchase the pavilions shown can be found in Appendix C.

Because the pavilion will be the central gathering place for park visitors, a WiFi hotspot should be considered for this area. The device can be concealed within the pavilion, as not to look out of place. This feature will provide additional benefits to visitors and help attract people to the park.

5. Erosion & Sediment Control

Proper planning for erosion and sediment control is a crucial step to prevent sediments from going onto the trail along the river and it addresses the prevention of Total Suspended Solids (TSS) from entering the surrounding water bodies and stormwater structures. When considering erosion and sediment control for the project site, Best Management Practices (BMPs) outlined within SUDAS guided design decisions. These designs are presumed to meet the performance standards, ensuring fulfilment of the environmental protection goals. During the design process, this team focused primarily on the strategies and methods of preventing sediment traveling into the project area's bordering water body. During the design process, the first step was determining the right sediment control BMPs that are needed for the project area. It was decided to use two different check structures which were determined based on their practicality for the design area, longevity to storm events and possible human interference, and their proficiency in controlling sediment and water-runoff velocity. Based on this criterion, it was decided to use wattles along the steeper slopes within the design area to ensure the control of velocity and turbulence of the water-runoff during a storm event. As opposed to silt fences, wattles are less prone to common wear-and-tear from minor storm events making it the better choice for areas of higher slope. Silt fences will be used on the eastern side of the trail that follows the river, as they have a high efficiency for collecting larger particles in the storm water. These two choices and their placements were coordinated so that the wattles on the higher gradient of slope will both reduce the velocity of the runoff and help remove finer particles from the water and the silt fences will be better at handling a lower runoff velocity and remove the larger particles. When determining how many rows of wattles will be needed during construction, recommendations found in Section 7E-6 of SUDAS were followed which state the required space between structures can be estimated based on the slope between current wattle location and the proposed location.

6. Retaining Walls

When planning for the design of the retaining walls, Civil3D aided in determining the current conditions and elevations based on the data received from the client. Based on the client's interests in an aesthetically pleasing design, the retaining walls are designed to consist of a limestone veneer which will be attached to a poured in place concrete cantilever retaining wall. The retaining wall dimensions for the stem, toe, heel, base and footing were approximated using a set of standardized ratios to comply with ACI and ASCE specifications. The proposed

cantilever design specifically utilizes codes ACI 318-14 which is for the concrete design, and ASCE 7-16 for evaluating the load combinations acting on the cantilever retaining wall. The retaining wall cross sections were approximated, so that quantities could be evaluated for the construction cost estimate. However, the final structural design was not completed due to time limitations and the need for actual geotechnical information for the site.

The design calls for all retaining walls to be poured in place concrete walls with limestone veneer, as desired by the client. However, a segmented block retaining wall should be considered for part of the western wall. A portion of this wall lies beneath the canopy and drip line of the existing cottonwood tree that is being left in its place as part of this design. The construction of a poured in place concrete wall will require frost footings to be placed at a depth of 4 feet in this area. These have the potential to severely disturb the root system of the cottonwood and quicken its ultimate demise. A segmented block retaining wall does not require these deep frost footings and would have less impact on the cottonwood tree.

7. Amenities

Added throughout the park are various amenities for use by park visitors. Trash cans are placed around the park along pathways for convenience and to keep the area litter free. A drinking fountain is included towards the center of the park by the lookouts and pavilion. The slab containing the fountain is ADA accessible with a 54” diameter circle to ensure that it is wheelchair accessible. The design of the fountain includes two spigots at different heights and a small valve towards the bottom for filling bowls for pets. On the fountain is also a hose hookup for watering plants. A second hose hookup is included in the base of the retaining wall along the northwestern side of the central path. Electrical outlets will be fitted around the park as well. These are outdoor, 20-amp, GFCI-protected receptables. There are outlets on each post of the pavilion structure, one on the central light post by the lookouts, and one on each lookout. Two new light poles will be added to maintain necessary lighting in the evenings. Details of the recommended light structures can be found in Appendix C.

Along with the amphitheater seating are benches placed throughout the park. There are four typical park benches, three on the lower, western path, and one by the central path. To the southern side of the park are swinging benches that are also seen around Manchester, IA. One slab can accommodate two benches and one slab can accommodate one bench.

8. Stairs

Due to time constraints of the project, the staircase that connects the north sidewalk to Franklin Street has not been designed. From the elevation difference between where the stairs begin and Franklin Street, the Engineering Team determined general dimensions for these stairs. There will be 15 stairs each with a 22.5” tread and a 6” riser height.

Section VII: Cost Estimates

1. Construction Cost Estimate

Item Description	Unit Price in U.S. Dollars Wt. Avg.	Amount Needed on Project	Unit	Estimate
Removal of Sidewalks	$ 11.00	536.01	SY	$ 5,896.11
Removal of Segmented Block Retaining Wall	$ 5.00	1315	SF	$ 6,575.00
Removal of Concrete Foundations of Light Poles	$ 70.00	5	EACH	$ 350.00
Removal of Light Poles	$ 50.00	5	EACH	$ 250.00
Removal of Gazebo and Handrails	$ 4,500.00	1	EACH	$ 4,500.00
Clearing and Grubbing of Tree	$ 125.00	1	EACH	$ 125.00
Topsoil, Strip, Salvage, and Spread	$ 11.00	322.5	CY	$ 3,547.50
Excavation, Class 10, Roadway and Borrow	$ 6.84	352	CY	$ 2,407.68
P.C. Concrete Retaining Walls	$ 2,998.14	50	CY	$149,907.00
Limestone Retaining Wall Veneer	$ 15.00	1080	SF	$ 16,200.00
Colored Concrete, 6 IN.	$ 90.00	20	SY	$ 1,800.00
Sidewalks and Bench Slabs, P.C. Concrete, 6 IN.	$ 41.53	314	SY	$ 13,040.42
Electrical Circuits and Conduit	$ 17.67	270	LF	$ 4,770.90
Handholes and Junction Boxes	$ 1,091.12	2	EACH	$ 2,182.24
Control Cabinet, Complete	$ 11,735.17	1	EACH	$ 11,735.17
Lighting Poles	$ 6,081.47	2	EACH	$ 12,162.94
Lookout Handrail Lighting	$ 141.75	71	LF	$ 10,064.25
Colored Lookout Lights	$ 400.00	2	EACH	$ 800.00
Straw Wattle	$ 2.84	125	LF	$ 355.00
Silt Fences	$ 3.06	160	LF	$ 489.60
Sodding	$ 52.21	86	SQ	$ 4,490.06
Ornamental Metal Railing	$ 229.02	71	LF	$ 16,260.42
Trees	$ 233.96	2	EACH	$ 467.92
Water Service Stub, 1 IN	$ 34.46	173	LF	$ 5,961.58
Tapping Valve Assembly, 6 IN	$ 3,666.67	1	EACH	$ 3,666.67
Water Fountain	$ 500.00	1	EACH	$ 500.00
Hose Spiggots	$ 250.00	2	EACH	$ 500.00
Subdrain Tiles	$ 8.93	254	LF	$ 2,268.22
Pavilion Structure and Slab	$ 33,600.00	1	EACH	$ 33,600.00
		SUBTOTAL		$314,873.68
		Contingency (10%)		$ 31,487.37
		TOTAL		$346,361.05

This cost estimate was prepared using Iowa DOT bid letting information for the month of April 2021. The estimated construction cost is $346,361.05 and includes a 10% contingency that accounts for any underbid items above or any unforeseen issues that may arise during construction. Iowa DOT bid letting prices include materials, labor, and overhead.

The Pavilion Structure and Slab bid item includes both the cost estimate for the prefabricated pavilion structure as well as the supporting concrete slab. An allowance of $30,000 has been included for the pavilion structure, as price will vary depending on what the client prefers. The $30,000 recommendation is based on the two recommended pavilion styles that were referred to earlier in this report.

2. Design Services Cost Estimate

Budget Summary					
Task	**Hours**	**Hourly Salary**	**Multiplier for Overhead and Profit**	**Total**	
Research and Data Collection	48	$ 32.00	2	$ 3,072.00	
Concept Development	96	$ 32.00	2	$ 6,144.00	
Grading Plan	80	$ 32.00	2	$ 5,120.00	
ADA Path Design	200	$ 32.00	2	$ 12,800.00	
Retaining Wall Design	75	$ 32.00	2	$ 4,800.00	
Meetings and Project Coordination	20	$ 32.00	2	$ 1,280.00	
				$ 33,216.00	Sub-total
				$ 500.00	Travel, Materials, and Supplies
				$ 33,716.00	Total Cost

The estimated design services cost is $33,716 and is broken down based on major sections of the overall project. The multiplier for overhead and profit is based on a target profit of 20% for the engineering design firm.

3. Total Project Cost Estimate

Item Description	Unit Price in U.S. Dollars Wt. Avg.	Amount Needed on Project	Unit	Estimate
Removal of Sidewalks	$ 11.00	536.01	SY	$ 5,896.11
Removal of Segmented Block Retaining Wall	$ 5.00	1315	SF	$ 6,575.00
Removal of Concrete Foundations of Light Poles	$ 70.00	5	EACH	$ 350.00
Removal of Light Poles	$ 50.00	5	EACH	$ 250.00
Removal of Gazebo and Handrails	$ 4,500.00	1	EACH	$ 4,500.00
Clearing and Grubbing of Tree	$ 125.00	1	EACH	$ 125.00
Topsoil, Strip, Salvage, and Spread	$ 11.00	322.5	CY	$ 3,547.50
Excavation, Class 10, Roadway and Borrow	$ 6.84	352	CY	$ 2,407.68
P.C. Concrete Retaining Walls	$ 2,998.14	50	CY	$149,907.00
Limestone Retaining Wall Veneer	$ 15.00	1080	SF	$ 16,200.00
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Control Cabinet, Complete	$ 11,735.17	1	EACH	$ 11,735.17
Lighting Poles	$ 6,081.47	2	EACH	$ 12,162.94
Lookout Handrail Lighting	$ 141.75	71	LF	$ 10,064.25
Colored Lookout Lights	$ 400.00	2	EACH	$ 800.00
Straw Wattle	$ 2.84	125	LF	$ 355.00
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Sodding	$ 52.21	86	SQ	$ 4,490.06
Ornamental Metal Railing	$ 229.02	71	LF	$ 16,260.42
Trees	$ 233.96	2	EACH	$ 467.92
Water Service Stub, 1 IN	$ 34.46	173	LF	$ 5,961.58
Tapping Valve Assembly, 6 IN	$ 3,666.67	1	EACH	$ 3,666.67
Water Fountain	$ 500.00	1	EACH	$ 500.00
Hose Spiggots	$ 250.00	2	EACH	$ 500.00
Subdrain Tiles	$ 8.93	254	LF	$ 2,268.22
Pavilion Structure and Slab	$ 33,600.00	1	EACH	$ 33,600.00
		SUBTOTAL		$314,873.68
		Engineering Design Services		$ 33,716.00
		Contingency (10%)		$ 31,487.37
		TOTAL		$380,077.05

The total project cost including $346,361 for construction costs and $33,716 for final design services will be $380,077.

Section VIII: Appendices

Appendix A – Design Standards Bibliography

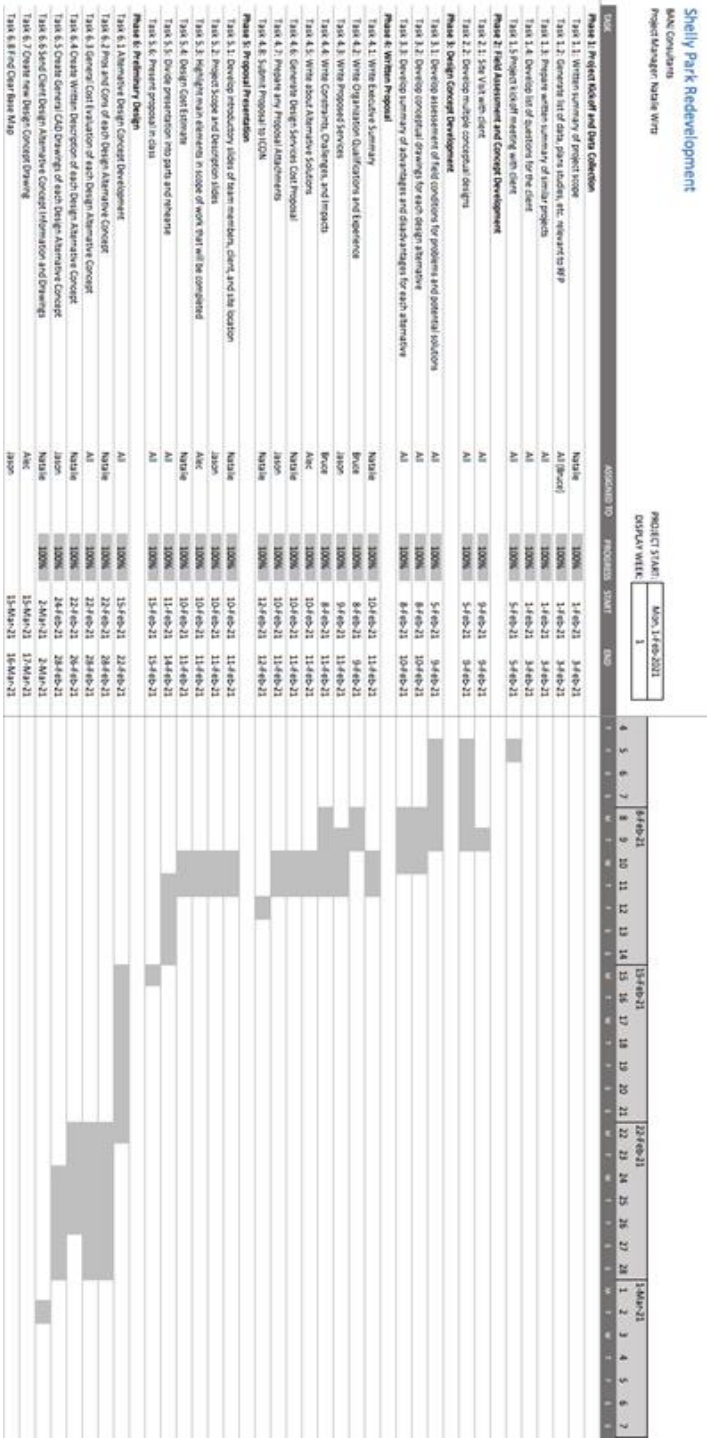
Iowa DOT, (revised: 11/12/2020), Iowa SUDAS Design Standards (2021 Edition), Chapter 12 – Sidewalks and Bicycle Facilities, Section 12B-2 –Shared Use Path Design. Section 12B-2 - Shared Use Path Design (iowadot.gov)

Iowa DOT, (Revised: 7/17/2014), Iowa SUDAS Design Standards (2015 Edition), Chapter 12 – Sidewalks and Bicycle Facilities, Section 12A-2 –Sidewalks. Section 12A-2 - Accessible Sidewalk Requirements (iastate.edu)

Iowa DOT, (Revised: 7/17/2014), Iowa SUDAS Design Standards (2015 Edition), Chapter 12- Sidewalks and Bicycle Facilities, Section 12A-2 –Sidewalks, Accessible Sidewalk Requirements. Section 12A-2 - Accessible Sidewalk Requirements (iastate.edu)

United States department of Justice Civil Rights Divisions, ADA Standards for Accessible Design, (Revised: 2010), Chapter 4 Accessible Routes: 403.3 Slope. 2010 ADA Standards for Accessible Design

Appendix B – Project Schedule

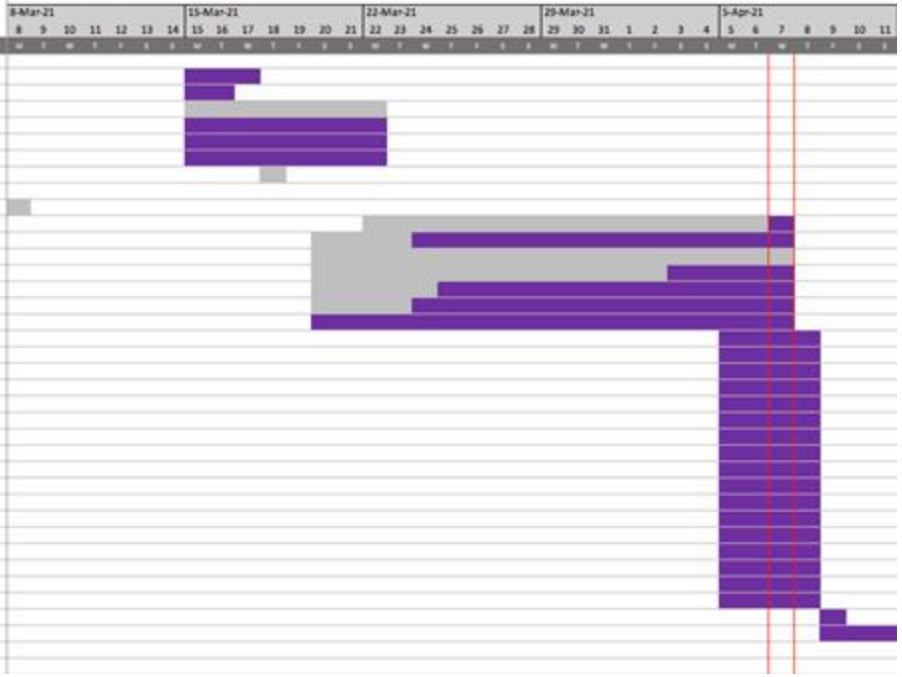


Shelly Park Redevelopment

BAN Consultants
Project Manager: Natalie Wirtz

PROJECT START: Mon, 1-Feb-2021
DISPLAY WEEK: 1

TASK	ASSIGNED TO	PROGRESS	START	END
Task 6.6 Send Client Design Alternative Concept Information and Drawings	Natalie	100%	2-Mar-21	2-Mar-21
Task 6.7 Create new Design Concept Drawing	Alec		15-Mar-21	17-Mar-21
Task 6.8 Find Clear Base Map	Jason		15-Mar-21	16-Mar-21
Task 6.9 Research Playground Surfaces	Natalie	100%	15-Mar-21	22-Mar-21
Task 6.10 Reserach Erosion Control	Jason		15-Mar-21	22-Mar-21
Task 6.11 Research Tree Protection Plan	Bruce		15-Mar-21	22-Mar-21
Task 6.12 Research Paving Requirements	Natalie		15-Mar-21	22-Mar-21
Task 6.13 Send Design Concept Powerpoint to Client	Natalie	100%	18-Mar-21	18-Mar-21
Phase 7: Design				
Task 7.1: Client Meeting to review and select the preferred design concept	All	100%	8-Mar-21	8-Mar-21
Task 7.2: Prepare Site Plan	Jason & Natalie	95%	22-Mar-21	7-Apr-21
Task 7.3 Prepare Grading Plan	Jason & Natalie	25%	20-Mar-21	7-Apr-21
Task 7.4 Prepare Utilities Plan	Jason & Natalie	100%	20-Mar-21	7-Apr-21
Task 7.5 Prepare Paving Plan	Alec & Bruce	75%	20-Mar-21	7-Apr-21
Task 7.6 Prepare Retaining Wall Design	Alec & Bruce	30%	20-Mar-21	7-Apr-21
Task 7.8: Prepare Erosion Control and Tree Protection Plan	Alec & Bruce	25%	20-Mar-21	7-Apr-21
Task 7.9: Prepare Details Sheet	All		20-Mar-21	7-Apr-21
Task 7.10: Prepare Design Report Executive Summary	Natalie		5-Apr-21	8-Apr-21
Task 7.11: Prepare Design Report Oranization Qualifications and Experience	Bruce		5-Apr-21	8-Apr-21
Task 7.12: Prepare Design Report Design Services	Jason		5-Apr-21	8-Apr-21
Task 7.13: Prepare Design Report Constraints, Challenges, and Impacts	Bruce		5-Apr-21	8-Apr-21
Task 7.14: Prepare Design Report Alternative Solutions That Were Considered	Alec		5-Apr-21	8-Apr-21
Task 7.15: Prepare Design Report Final Design Details [Pathways]	Bruce		5-Apr-21	8-Apr-21
Task 7.16: Prepare Design Report Final Design Details [Retaining Walls]	Alec	20%	5-Apr-21	8-Apr-21
Task 7.17: Prepare Design Report Final Design Details [Amphi. Seating and Knee Walls]	Bruce		5-Apr-21	8-Apr-21
Task 7.18: Prepare Design Report Final Design Details [Lookouts]	Bruce		5-Apr-21	8-Apr-21
Task 7.19: Prepare Design Report Final Design Details [Tree Plan]	Alec		5-Apr-21	8-Apr-21
Task 7.20: Prepare Design Report Final Design Details [Amenities [i.e. pavilion & benches]]	Jason		5-Apr-21	8-Apr-21
Task 7.21: Prepare Design Report Engineer's Cost Estimate	Natalie		5-Apr-21	8-Apr-21
Task 7.22: Prepare Appendices	All		5-Apr-21	8-Apr-21
Task 7.23: Prepare Details Sheets	All		5-Apr-21	8-Apr-21
Task 7.24: Prepare Design Sheets to be submitted	Jason or Alec		5-Apr-21	8-Apr-21
Task 7.25: Prepare Project poster	Alec & Bruce		5-Apr-21	8-Apr-21
Task 7.26: Prepare Project Presentation	Jason & Natalie		5-Apr-21	8-Apr-21
Task 7.27: Submit Draft	Natalie		9-Apr-21	9-Apr-21
Task 7.28: Revise Draft			9-Apr-21	1-May-21
Task 7.29: Present final design to client, instructors, and department			7-May-21	7-May-21
Task 7.30: Seek final comments and amend work products based on feedback			7-May-21	14-May-21



Shelly Park Redevelopment

BANJ Consultants

Project Manager: Natalie Wirtz

PROJECT START: Mon, 1-Feb-2021

DISPLAY WEEK: 1

TASK	ASSIGNED TO	PROGRESS	START	END
Task 6.12 Research Paving Requirements	Natalie		15-Mar-21	22-Mar-21
Task 6.13 Send Design Concept Powerpoint to Client	Natalie	100%	18-Mar-21	18-Mar-21
Phase 7: Design				
Task 7.1: Client Meeting to review and select the preferred design concept	All	100%	8-Mar-21	8-Mar-21
Task 7.2: Prepare Site Plan	Jason & Natalie	95%	22-Mar-21	7-Apr-21
Task 7.3 Prepare Grading Plan	Jason & Natalie	25%	20-Mar-21	7-Apr-21
Task 7.4 Prepare Utilities Plan	Jason & Natalie	100%	20-Mar-21	7-Apr-21
Task 7.5 Prepare Paving Plan	Alec & Bruce	75%	20-Mar-21	7-Apr-21
Task 7.6 Prepare Retaining Wall Design	Alec & Bruce	30%	20-Mar-21	7-Apr-21
Task 7.8: Prepare Erosion Control and Tree Protection Plan	Alec & Bruce	25%	20-Mar-21	7-Apr-21
Task 7.9: Prepare Details Sheet	All		20-Mar-21	7-Apr-21
Task 7.10: Prepare Design Report Executive Summary	Natalie		5-Apr-21	8-Apr-21
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Task 7.16: Prepare Design Report Final Design Details [Retaining Walls]	Alec	20%	5-Apr-21	8-Apr-21
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Task 7.18: Prepare Design Report Final Design Details [Lookouts]	Bruce		5-Apr-21	8-Apr-21
Task 7.19: Prepare Design Report Final Design Details [Tree Plan]	Alec		5-Apr-21	8-Apr-21
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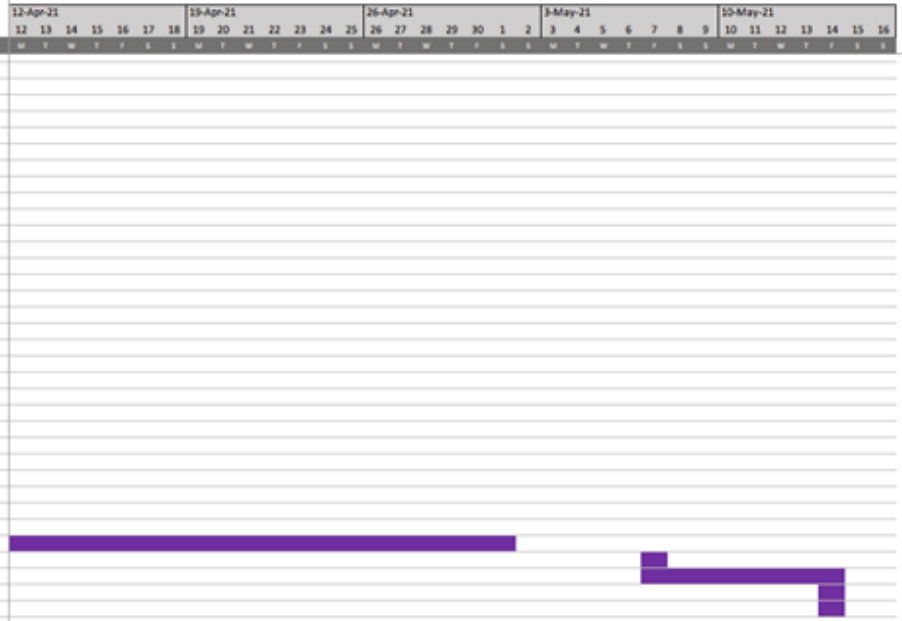
Task 7.27: Submit Draft	Natalie		9-Apr-21	9-Apr-21
Task 7.28: Revise Draft			9-Apr-21	1-May-21
Task 7.29: Present final design to client, instructors, and department			7-May-21	7-May-21
Task 7.30: Seek final comments and amend work products based on feedback			7-May-21	14-May-21
Task 7.31: Submit Final Design materials to instructors via ICON			14-May-21	14-May-21
Task 7.32: Submit Final Design materials via flash drive for the client			14-May-21	14-May-21



Appendix C - Amenity Details

Pavilion Options

The Holiday Shadow pavilion can be purchased from NEO Outdoor and found at this website: https://neoutdoor.com/holiday-shadow-pavilions/ and retails anywhere from $20,000 - $25,000. The Laminated Wood Arch Beam Hexagon pavilion can be purchased from Cedar Store and found at this website: https://www.cedarstore.com/structurepath /142/charleston/pavilion/. This pavilion retails for $30,000.

Lookout Lighting

For handrail lighting, LED strips beneath the handrails are recommended. The preferred LED strips can be purchased from Atlantic Marine at the following website: https://www.atlanticmarineinc.com/v-line-gen3-v3280/?sku=V3280A-3-6-DC.

For specialty colored lighting, colored bollards are recommended. Lighting of this type can be purchased from the Outdoor Solar Store at the following website: https://www.outdoorsolarstore.com/products/premium-solar-bollard-color-leds?variant=39273029566511.

In addition to these options, the Engineering Team also explored a subcontracting option for the City. JTH Lighting based in Des Moines, IA is a highly reputable business who could complete the lighting design for the lookout areas, likely at a comparable cost to the options above. JTH Lighting could also be a potential source to complete the bridge lighting if that is a desired component of the bridge rehabilitation project. This business can be contacted at the following website: https://www.jthlighting.com/.

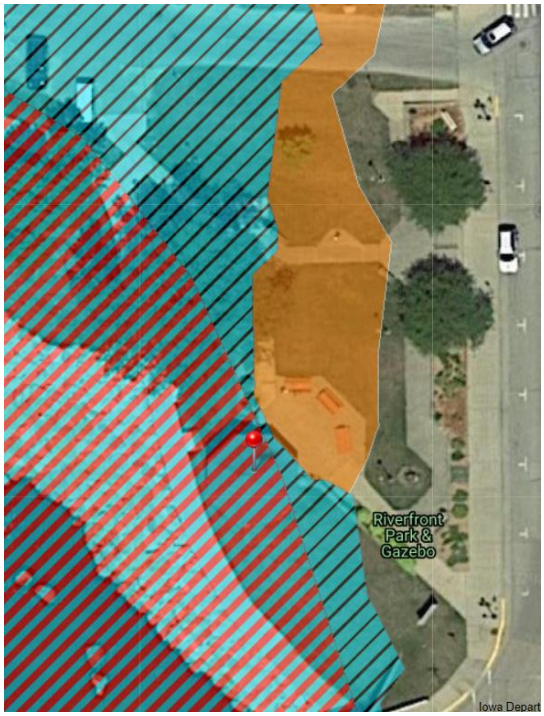
Park Lighting

Options for overhead park lighting are shown in the adjoining images. The light pole is similar to the current light poles in the park and will maintain the overall feel and authenticity of the park. The poles can be purchased at Light Poles Plus at the following website: https://lightpolesplus.com/8ft-4in-od-fluted-round-straight-huntington-style-light-pole/.

The recommended light fixture is different than what currently exists in the park. However, this top is still a decorative top that fits into the aesthetic of downtown Manchester. This light fixture can be purchased from Hubbell Lighting at the following website: https://www.hubbell.com/hubbelllightingci/en/Products/Lighting-Controls/Commercial-Outdoor-Lighting/Decorative-Post-Top/Providence-Small/p/220832.

A more modern overall lighting option is a different avenue for the City to pursue if they would like more of a change to the current lighting that can be found in the park. This modern style of light can be purchased from Cooper Lighting Solutions at the following website: https://www.cooperlighting.com/global/brands/invue/lxs-luxescape-arm-mount.html.

Appendix D - Permits



A Floodplain Development Permit will be required for this project. Most of Shelly Park is located within the floodplain of the Maquoketa River, except for the eastern most area. This can be seen on the map to the right. The red and blue striped lines represent the floodway, the blue area is the 100-year floodplain, and the orange area is the 500-year floodplain. The design ensures that no fill will be added in the floodway during the construction of the amphitheater on the southern end of the park. Because the City of Manchester has been working to reduce the flood threat to their downtown area, this project has been carefully designed to not contribute to the existing problem. In fact, this project may provide a small, incremental improvement with the removal of the gazebo and lower retaining wall. Removing obstacles from the floodway will allow the Maquoketa River more room to expand when a flood event occurs. This will decrease the flood threat to Shelly Park and downtown Manchester. The new pavilion will be located in the 500-year floodplain, as opposed to the 100-year floodplain and floodway where the gazebo is now and will have a reduced chance of being impacted by flooding.