

WATER TRAILS DESIGN REPORT

May 3rd, 2024

Prepared for: Mahaska County Conservation Board



Prepared by:

Anna Teeple

Paul Zambrano

Travis Meyer

Tyler Roy

Wimar Widiatmo

IOWA

Table of Contents

- Section I: Executive Summary..... 3
- Section II: Organization Qualifications and Experience 6
 - Organization and Design Team Description 6
- Section III: Design Services..... 6
 - Project Scope 6
 - Work Plan..... 7
- Section IV: Constraints, Challenges, and Impacts 7
 - Constraints 7
 - Challenges 7
 - Societal Impacts 8
- Section V: Alternative Solutions..... 8
 - Glendale Access 8
 - Rose Hill Access..... 9
 - Eveland Access 9
 - 310th St. Access 10
- Section VI: Final Design Details 10
 - Parking 11
 - Kayak/Non-motorized Boat Launch..... 11
 - Primitive Campsites 12
 - Restrooms..... 12
 - Planting 12
 - Shelters 12
- Section VII: Cost Estimate 13
- State Designation of Water Trails 19
- Funding and Grants..... 21
- Appendix A..... 23
- Appendix B..... 27

Section I: Executive Summary

Our team of University of Iowa civil & environmental engineering students is pleased to present our design report for the Water Trail project in Mahaska County, Iowa. This design report outlines how our team developed water trail designs to fulfill the requirements of the Mahaska County Conservation Board. We are a group of five senior undergraduate engineering students from the University of Iowa's capstone design class, applying the skills we've developed in civil engineering design, surveying methods, project management, and utilizing advanced software tools like ArcGIS and Civil 3D.

The project's primary objective is to establish family-friendly destinations along the South Skunk River and the Des Moines River in Mahaska County. Emphasizing creating an immersive water trail experience, the designs seek to highlight the region's natural beauty while providing opportunities for outdoor activities such as kayaking, fishing, and camping. In Mahaska County, both rivers receive between 200 and 400 visits a year for canoe/kayaking, inner tubing, and swimming. The goal of this design is to increase the number of visits to these water trails and draw more tourism to Mahaska County. The designs for the South Skunk River entail enhancements to both the Glendale Access point and the Rose Hill Access point. Similarly, the water trail design for the Des Moines River involves minor upgrades to the Eveland Access Campground and the establishment of an access point at the 310th Street site. These sites, currently equipped with concrete boat launches, except 310th Street, and road access, are further enhanced with non-motorized boat launches, restroom facilities, camping sites, and expanded parking areas.

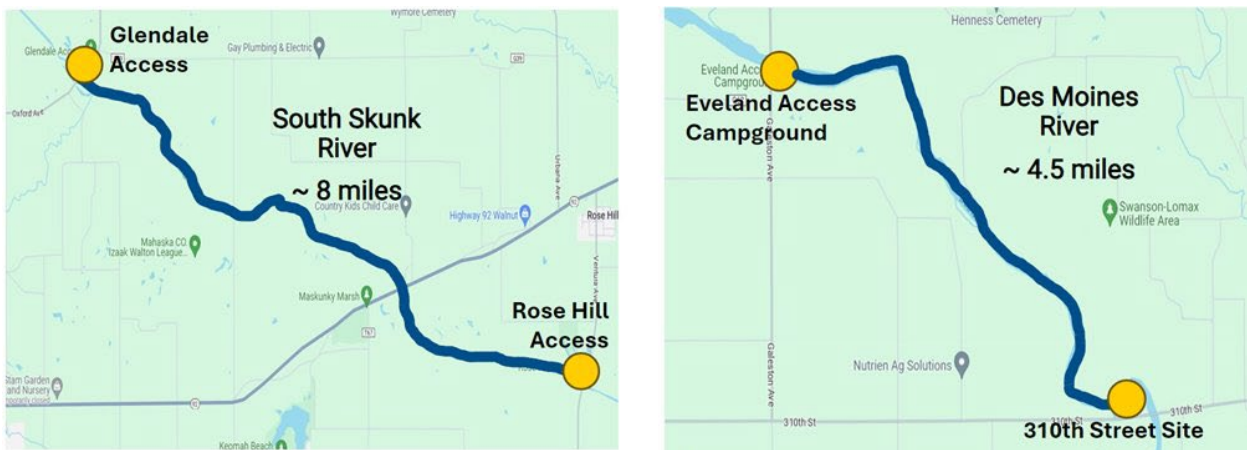


Figure 1: Locations of Glendale Access & Rose Hill Access along the South Skunk River are shown on the left, and Eveland Access & 310th Street Access along the Des Moines River are shown on the right.

We considered all our client's main goals along with each site's existing topography and 100-year floodplain to build our final designs. Along with that, we designed each site to include amenities that followed all necessary standards and codes outlined by the Iowa Department of Natural Resources and the Americans with Disabilities Act (ADA). Six primary additions/improvements were made to the four sites: parking, non-motorized boat launches, primitive campsites, restrooms, a tree planting plan, and an open-air shaded shelter on concrete pads.

Parking spaces were designed for the Glendale Access, Rose Hill Access, 310th Street Access, and Eveland Access sites, with each utilizing compacted limestone for construction. Fence posts were placed strategically to guide visitors to specific areas, such as ADA-accessible parking spaces and spots for parking boat trailers, ensuring easy navigation for all vehicles. This arrangement allows both standard vehicles and those towing trailers to maneuver smoothly.

The design of pedestrian boat launches adopts a stair-step layout comprised of precast concrete slabs, facilitating a seamless transition from the rivers to the campgrounds. The uniformity of these precast slabs enables efficient implementation within project timelines and budget constraints while minimizing disruption to shoreline habitats, ensuring sustained performance and reliability across all sites.

Primitive campsites at Glendale Access, Rose Hill Access, and 310th Street Access feature mulch, providing spacious areas for multiple tents on one site with proper water drainage. Metal fire pit rings with tip-back anchors enhance ease of maintenance and cleaning. The ADA campsites will be located at the sites most accessible to parking. The sizeable campgrounds enable patrons to navigate the site without encroaching on neighboring campsites.

Prefabricated restroom structures at Rose Hill Access and 310th Street Access are situated on elevated points outside the floodplain, ensuring accessibility and minimizing disruption to campsite and communal areas. Landscaping efforts incorporate native grasses and trees to maintain a natural environment, with planting strategies aimed at restoring any disturbed areas and replenishing trees removed during construction.

Lastly, Glendale Access, Rose Hill Access, and 310th Street Access feature concrete pads for prefabricated shelters, designed with minimal slopes to facilitate water drainage away from shelter areas. Open-air shaded shelters are envisioned as 30' x 36' rectangular wood structures with asphalt shingles, providing refuge for visitors from the elements while blending harmoniously with the natural surroundings. ADA parking and access are provided for each shelter.



Figure 2: Image of a rectangular, open-air shaded structure from Poligon.

In conclusion, our team worked to develop comprehensive design improvements to the Mahaska County water trail. Our focus on enhancing visitor comfort and ensuring site reliability is aimed at attracting more visitors to enjoy the water trails. The cost for the project's design and construction is \$932,000.

Section II: Organization Qualifications and Experience

Organization and Design Team Description

The project team is comprised of five engineering students from the University of Iowa's capstone design class. Wimar Widiatmo leads as Project Manager, leveraging expertise in Civil Practice, while Anna Teeple and Travis Meyer provide technical support with insights from Urban Studies and Business, respectively. Paul Zambrano is focusing on Civil Practice, alongside Tyler Roy, who specializes in Transportation. The team possesses extensive knowledge in civil engineering design, surveying techniques, and project management. The technical support team utilizes advanced software tools, such as ArcGIS, Civil 3D, and other Autodesk programs, to streamline design processes. This combination of skills allows the team to create a fully inclusive design focused on maximizing client interest, optimizing project resources, and ensuring regulatory compliance for all aspects of the project.

Section III: Design Services

Project Scope

Our main goal for this project was to craft appealing spots tailored to families and outdoor enthusiasts, offering an immersive water trail experience. We sought to improve access points along the South Skunk River and the Des Moines River in Mahaska County, aiming to showcase natural beauty while enabling activities such as kayaking, fishing, and camping. The main goal was to revamp the Glendale and Rose Hill access points along the South Skunk River, and the Eveland access point along the Des Moines River. Additionally, the creation of an access point at 310th Street was needed to complete the water trail connection for the Des Moines River. After several deliberations and site visits, we have deduced what improvements were needed for each site. The following is a list of tasks that were completed leading to the finalized design:

- 1) Project Kickoff and Data Collection
 - Generated a summary of the team's understanding of the project scope prior to the first client meeting.
 - Held a project kickoff meeting with the client.
 - Conducted general research on the project.
- 2) Field Assessment and Concept Development
 - Conducted site visits along the water trails to assess the current conditions of the access points, existing infrastructure, and potential amenities.
 - Identified suitable areas for parking, camping, and other facilities at the trailheads.
- 3) Concept Design
 - Developed conceptual drawings to illustrate the alternative design options.
 - Developed the pros and cons of each alternative design option.
 - Conducted meetings with client to review and select the preferred design concepts.
 - Design elements will include non-motorized boat launches, campsites, parking lots, restrooms, and shaded picnic structures.
- 4) Final Design

- Finalized the project design to meet the client’s objectives.
- Developed detailed Civil3D site drawings with new improvements.
- Prepared construction drawing set, design report, poster, and presentation.
- Presented final designs to the client.

Work Plan

Project Contract Timeline: 1/19/2024 to 5/10/2024

PROCESS	QUARTER 1				QUARTER 2			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Planning	■							
Research		■						
Design Process			■					
Final Design Process					■			

Figure 3: Gantt chart displaying the project work plan.

Section IV: Constraints, Challenges, and Impacts

Constraints

The project faces three important limitations, time constraints, land ownership issues, and ADA regulations. The project's duration is scheduled to run from January 19 to May 10, 2024.

Furthermore, the sites must be confined to land owned by Mahaska County, without encroaching onto adjacent private farmlands. This approach aims to minimize the requirement for additional land purchases. ADA regulations for the access points had to be followed. The implementation of the of ADA required stalls for van-accessible ADA parking was made. Other ADA standards were decided upon and applied to the campsites such as ADA fire pits and access to shelters.

Challenges

We tackle challenges such as spatial limitations and ecological considerations to meet both client requirements and environmental needs. Campsite areas along the South Skunk River face space constraints due to neighboring farmland and road proximity, while the southern access point of the Des Moines River presents challenges for parking and boat ramp placement. To minimize disruption to the area, our focus remains within Mahaska County's property boundaries.

Furthermore, the sites' proximity to forests and wetlands requires careful planning to select suitable areas for campgrounds and parking. In addition, the challenge of keeping the restroom structures outside of the 100-year floodplain was significant and required attention while designing. Another goal was to minimize the impact on the water resources from the construction of our design. There were challenges to minimize this impacting the drainage

system with the additional gravel parking, concrete sidewalks, and mowed grass campsites. The site's grading had to ensure that rainwater runoff was not creating flooding and drained towards the river.

Societal Impacts

The campsites aim to foster community growth by offering an inclusive environment. With its inviting ambiance and scenic surroundings, families and friends are anticipated to gather around firepits and boat docks for leisure activities on tranquil summer days. Besides accommodating a larger influx of visitors, the site is poised to drive economic development by drawing tourists from neighboring counties. Ultimately, the water trails will serve as a recreational asset accessible to all residents of Iowa. With the update to these access points, we expect a sizeable increase in the visits to the water trails with them currently being between 200-400 visits per year. With a more inviting aesthetic to the access points and an increase to number of campsites, parking, and accessibility to the water trails themselves there will be an increase in usage. With the additional usage of the sites this will in return contribute to Mahaska County's economy for not only the use of the campsites but additional spending by tourists on shopping, eating, drinking, etc.

Section V: Alternative Solutions

Based on our analysis and evaluation after visiting each of the water trail locations, we have identified two alternative layouts for each site that could effectively cater to the client's preferences and meet all standards. Each layout is designed to optimize space utilization, improve user experience, and follow all environmental requirements of the site. Below are the alternatives offered to the client.

Glendale Access

At Glendale Access along the South Skunk River, our client's main goals were to create campsites that would cater to the needs of the visitors, add a boat ramp for non-motorized boats, and add a shaded structure. The client also requested a walking path in the woods. To meet all requirements, we designed two alternatives that fit in with the goals. The client believed that the existing motorized boat ramp and parking lot were sufficient and did not need to be upgraded. The two alternatives can be seen in Appendix A (Fig. 1A and Fig. 1B).

The first option (Fig. 1A, Appendix A) contained primitive campsites and campsites for RVs. Both campsites used gravel and contained firepits at each campsite. This option contained a gravel walking path through the woods that connected the primitive campsites to the existing parking lot. Along with that, a shelter would be included that would be placed on a concrete pad. The pad included a concrete sidewalk to enter the shelter from the parking lot. Lastly, we included a concrete non-motorized boat ramp next to the existing boat ramp. The pros of this option include different campsite options for several types of patrons, and a nice walking path through the woods. The cons of this option include the northeast campsites not being located within the property boundaries, and the client thinking there were too many campsites.

The second option (Fig. 1B, Appendix A) had the same layout as the first option but contained only primitive campsites and did not include spaces for RVs. The pro of this option includes different options for campsites so the patrons may camp in either the woods or the grassy area.

The client chose option B (Fig. 1B, Appendix A) as their preferred option. The client requested the removal of the campsites on the west side of the site due to the property boundary's location.

Rose Hill Access

At Rose Hill Access, also along the South Skunk River, our client's main goals were to update the existing parking lot, add primitive campsites along with a path that connects them to the parking lot, update the existing motorized boat ramp, and add a non-motorized boat ramp. The design also needed to allow for space for a car with a boat trailer to turn around and exit the site properly. We designed two alternatives for this site that fit each of the goals of the client.

The first option (Fig. 2A, Appendix A) contained primitive campsites connected to the parking lot with a gravel road that passenger cars could use. The road, parking lot, and campsites were designed using gravel. Along with this, the site contained an upgraded motorized boat and a new non-motorized boat ramp. The pro of this option is that it includes campsites accessible by foot or by vehicle. The main con of this option is that it does not include a shelter or restrooms.

The second option (Fig. 2B, Appendix A) also contained primitive campsites but were connected to the parking lot with a walking path. The other difference between the two options is the addition of a shelter and prefabricated restroom structure in the site's parking lot area. The parking lot, roadway, and boat ramps are the same as the first option. The pros of this option include the addition of a shelter and restrooms, and the walking path connecting the campsites. The main con of this option is that the bathroom and shelter were placed in the 100-year floodplain.

The client chose option B (Fig. 2B, Appendix A) as their preferred option. The client requested the restroom and shelter to be moved to the opposite side of the parking area.

Eveland Access

The Eveland Access, along the Des Moines River, is already a previously developed campground, so the updates needed were minimal. The client requested the addition of parking spaces for both passenger vehicles and trailers. The existing motorized boat ramp was already in good condition, but the client requested a new non-motorized boat ramp. Another important request from the client was to protect the large sycamore tree in the center of the site.

The first option (Fig. 3A, Appendix A) contained multiple gravel parking lots wrapped around the center's sycamore tree. In this option, there are designated areas for trailers and passenger vehicles. An additional parking lot was added in front of the existing restroom structure and includes a concrete path to the restrooms from the parking area. The site also included a non-motorized boat ramp that runs adjacent to the existing ramp and is connected to the existing gravel road. The pros for this site include the increased parking and the protection of the tree in the center of the site. The con of this site is that there a slightly less trailer parking included in this option.

The second option (Fig. 3B, Appendix A) also contained gravel parking lots that surrounded the tree. The parking layout for this option was slightly different and instead included trailer parking that allowed the vehicle to drive through the spot to park. The additional passenger vehicle parking was the same as the first option, along with the non-motorized boat ramp. The pros for this option are the same as the first option but also include the increased parking stalls for trailers. The con of this site is that it could be difficult for vehicles to navigate the angled parking.

The client chose option A (Fig. 3A, Appendix A) as their preferred option. The client did not request any alterations to the option.

310th St. Access

For the 310th St access, along the Des Moines River, our client's goals were to make the space more inviting to patrons. The client requested primitive campsites, a new parking lot, a non-motorized boat ramp, a shelter, and a prefabricated restroom. The existing site also lacked vegetation, so the client requested a landscaping plan to complete the site.

The first option (Fig. 4A, Appendix A) contained primitive campsites in two separate locations on the site. One set of campsites was closer to the boat launch and was connected to the main path with a gravel walking path. The other set of campsites was connected to the new gravel parking lot with a gravel path for passenger vehicles. The site also included a concrete pad connected to the gravel parking lot that contained a shelter and restrooms. The site also includes a non-motorized boat ramp connected to the gravel walking path. The main pro for this option is that the campsites are in multiple areas throughout the site, which offers multiple options for the user. The main con for this option is that the client did not think there needed to be vehicle access to the campsites.

The second option (Fig. 4B, Appendix A) also contained primitive campsites but were all in the same area on the site. The campsites were closer to the river and did not include a walking path. The site included a concrete pad with a shelter and restrooms and was connected to the new gravel parking lot. The site also contained a non-motorized boat ramp connected to the gravel walking path. The pros of this option include the curved boat ramp that makes it less steep for users, and the increased parking space. The cons of this site include the lack of a path connecting the campsites and that they are all in the same area.

The client chose option B (Fig. 4B, Appendix A) as their preferred option. Although the client preferred this option, the client requested primitive campsites to be included on the north side of the parking lot.

Section VI: Final Design Details

To create the final design for the water trail locations, we considered all our client's main goals along with each site's existing topography to build our final designs for each. Along with that, we had to make sure that each added amenity followed all necessary standards and codes. Many of our design standards followed Chapter 3: Design Development from the Iowa Department of

Natural Resources Water Trail Development Tools. The final designs catered to the unique landscape for each site and all standards of the design guide and all other codes.

Parking

The first design element to be considered was the parking layout. Rose Hill Access, 310th St. Access, and Eveland Access sites each included additional parking. Glendale Access contains parking updates that only include ADA parking spaces. Each parking area will use a gravel surface and will be in areas with minimal clearing required. According to Chapter 3 of the Iowa DNR Water Trail Development Tools, the parking areas should be setback from the riverbed at least 50 feet and should have slopes less than 5%. Along with that, the parking stalls need to be 8 feet in width and 20 feet in length. Since our parking areas are gravel, meaning there will be no pavement markings, we included fence posts to show vehicles where to park. Each stall was designed with these criteria. With the additional parking, we also needed to include accessible parking spaces, per Chapter 12: Pedestrian and Bicycle Requirements, section H, Table 12A-2.01 from the Iowa DOT. The Iowa DOT states that there needs to be 1 ADA parking space per 25 non-accessible spaces. The requirement meant we would need to include 2 accessible spaces at Glendale Access, 2 accessible spaces at Rose Hill Access, 2 accessible spaces at the 310th St Access, and 3 accessible parking spaces at Eveland Access. The accessible parking spaces will be 8 feet in width and 20 feet in length, with a 5-foot aisle between the spaces. The accessible parking spaces will each have a sign at the front of each stall with the sign located 60” above the ground, per the Americans with Disabilities Act parking requirements. Each of the parking areas will be constructed with compacted limestone (Chapter 3: Design Development, Iowa DNR Water Trail Development Tools). With no specific guidelines for boat trailer parking, we created 12-foot-wide spaces that were 40 feet long. Each site contains turning areas acceptable to both passenger vehicles and vehicles pulling a boat trailer.

Kayak/Non-motorized Boat Launch

Ensuring easy water access for water trail users remains a fundamental priority across all sites. The kayak launch design adopts a stair-step layout, employing precast concrete slabs anchored into the shoreline using #5 rebar stakes. The precast stair slab section will measure 5 feet by 6 feet and be placed with varying overlaps depending on specified site shoreline slopes. This innovative choice amplifies durability and stability and caters to the needs of kayakers and tubers. Design outlines from Chapter 3 of the Iowa Water Trail Development Tool, outlines crucial considerations when completing a water access launch. The uniformity and standardized dimensions of these precast slabs streamline implementation within project timelines and budget constraints. This adaptability extends across all sites, highlighting versatility and ensuring consistent performance and reliability throughout the project's lifespan. Chapter 3 of the Iowa Water Trail Development Tool emphasizes constructing step treads with a 2 to 3 percent slope towards the stream to prevent water ponding on the step surfaces while maintaining consistent width and length for all stair treads. These practices underscore our commitment to implementing the standards outlined in the water design book, maintaining high client satisfaction, and ensuring a well-designed and user-friendly kayak launch site for all visitors.

Primitive Campsites

Our designs also included primitive tent campsites. These campsites were located at 3 of the 4 sites; Glendale Access, Rose Hill Access, and 310th St Access. Chapter 3: Design Development, Iowa DNR Water Trail Development Tools suggest that tent pads are at least 14 feet by 14 feet in size. We designed our tent spaces to be 30 feet by 30 feet to allow for multiple tents to be placed in one pad. Each tent pad is mostly flat and allows water to drain away from the pedestrian area. Lastly, the layout of the campsites should also allow patrons to walk through the campsite without entering another camping area, per Iowa DNR requirements. The campsites will be made using mulch.

Restrooms

Another design element included for our sites was prefabricated restroom structures. These structures were placed at two of the sites, Rose Hill Access and 310th St Access. We did not include restrooms at Eveland Access because a restroom structure already existed, and we did not include one at Glendale Access because of flood-plain requirements. According to Chapter 3: Design Development, Iowa DNR Water Trail Development Tools, restrooms were required for sites that expected to see at least 200 visitors per season. We were informed by the client that the sites would see over 200 visitors per season, so they were included in the design. The other requirements to be considered were the location of the restrooms. The first requirement is that it is placed out of the 100-year floodplain. At the two locations, the restrooms are on the highest point of the site and stay out of the flood plain. The restrooms were also placed at least 200 feet from the river edge per the Iowa DNR requirement. We also made sure the structures were away from any campsite or communal areas. The prefabricated restrooms should be HUFFCUTT's "Golden Eye" restroom structures, or an approved equal design.

Planting

All four of our sites will also require landscaping. The Iowa DNR recommends the use of native grasses and trees wherever possible. Each of our sites will be replanted with native grass and will contain trees and shrubs that are also native to the area. The planting of native grass will be in any disturbed area of the site, and the trees and shrubs will be planted throughout each site to restore any trees removed during construction.

Shelters

Lastly, Glendale Access, Rose Hill Access, and 310th St Access contain concrete pads where the prefabricated shelters will be placed. Each pad was designed with minimal slopes that allowed water to easily drain away from the shelter area. The pads will be designed using 6" PCC to allow for the shelter footing to be included. The footing was designed to be below Mahaska County's frost line. The open-air shaded shelters will be 30'x36' rectangular wood structures with asphalt shingles. These open-air shaded structures should be Poligon's "Low Pitched Gable Wood Structure", or an approved equal design.

Section VII: Cost Estimate

In this section, we present the comprehensive cost estimate for the preliminary design of your project. Our team has calculated the expenses associated with materials, labor, equipment, overhead, profit, and contingency. To ensure accuracy, we have utilized references such as RS Means Cost Handbooks and IDOT's Bid Tabs for obtaining unit costs. Construction and material costs have been determined from mean bid prices for the construction tasks and employed line item pricing methodologies, aligning with industry standards. This allows us to provide a transparent and detailed breakdown of anticipated expenditures for the project. It is important to note that our estimates adhere to industry standards and guidelines, with particular attention paid to rounding total project costs as outlined in the RSMeans Cost Handbooks. The individual expenses for each site design provide a transparent and detailed breakdown of anticipated expenditures to facilitate informed decision-making and successful project planning. This breakout of services between sites would allow for a phased approach for completing all the sites as funding permits.

Table 1: Eveland Access Cost Estimate

Eveland Access Site				
Description	Units	Amount	Unit Price	Cost
Site Work				
Excavation	CY	215.79	\$ 4.36	\$ 941.00
Soil Fill	CY	56.6	\$ 25.04	\$ 1,417.00
Clearing and Grubbing	ACRE	0.351	\$ 5,434.48	\$ 1,908.00
Tree Removal	EACH	1.000	\$ 112.00	\$ 112.00
Silt Fence	LF	140	\$ 1.78	\$ 249.00
6" PCC	SY	70.44	\$ 97.41	\$ 6,862.00
Precast Stair Slab	EACH	12	\$ 510.00	\$ 6,120.00
8" Riprap	TON	15	\$ 82.00	\$ 1,209.00
Class A Road Stone	TON	297	\$ 45.10	\$ 13,412.00
ADA Signage	EACH	5	\$ 147.10	\$ 736.00
Access Ramp Signage	EACH	1	\$ 131.79	\$ 132.00
Trash Receptacle	EACH	2	\$ 150.00	\$ 300.00
Parking Bollard	EACH	58	\$ 60.37	\$ 3,501.00
Native Grass Seeding	ACRE	0.0247	\$ 986.50	\$ 24.00
Trees	EACH	1	\$ 699.82	\$ 700.00
Shrubs	EACH	11	\$ 85.34	\$ 939.00
			Construction Cost	\$ 38,562.00
			Contingency Factor 15%	\$ 5,438.00
			Total Construction Cost	\$ 44,000.00

Table 2: 310th Street Cost Estimate

310th St Access Site				
Description	Units	Amount	Unit Price	Cost
Site Work				
Excavation	CY	2074.22	\$ 4.36	\$ 9,044.00
Soil Fill	CY	4033.15	\$ 25.04	\$ 101,000.00
Clearing and Grubbing	ACRE	0.602	\$ 5,434.48	\$ 3,270.00
Silt Fence	LF	209.41	\$ 1.78	\$ 373.00
Mulch	ACRE	0.124	\$ 543.22	\$ 67.00
6" PCC	SY	314	\$ 97.41	\$ 30,595.00
Precast Stair Slab	EACH	20	\$ 510.00	\$ 10,200.00
8" Riprap	TON	15	\$ 82.00	\$ 1,209.00
Class A Road Stone	TON	541	\$ 45.10	\$ 24,410.00
Restroom Structure	EACH	1	\$ 42,000.00	\$ 42,000.00
ADA Sign	EACH	2	\$ 147.10	\$ 294.00
Access Ramp Signage	EACH	1	\$ 131.79	\$ 132.00
Shelter Structure	EACH	1	\$ 45,000.00	\$ 45,000.00
Trash Receptacle	EACH	2	\$ 150.00	\$ 300.00
Parking Bollard	EACH	35	\$ 60.37	\$ 2,113.00
Fire Pit	EACH	6	\$ 214.00	\$ 1,284.00
Native Grass Seeding	ACRE	0.860	\$ 986.50	\$ 848.00
Trees	EACH	7	\$ 699.82	\$ 4,899.00
Shrubs	EACH	26	\$ 85.34	\$ 2,219.00
Construction Cost				\$ 279,257.00
Contingency Factor 15%				\$ 41,743.00
Total Construction Cost				\$ 321,000.00

Table 3: Glendale Access Cost Estimate

Glendale Access Site				
Description	Units	Amount	Unit Price	Cost
Site Work				
Excavation	CY	226.51	\$ 4.36	\$ 988.00
Soil Fill	CY	1354	\$ 25.04	\$ 33,904.00
Clearing and Grubbing	ACRE	0.712	\$ 5,434.48	\$ 3,870.00
Tree Removal	EACH	25.000	\$ 112.00	\$ 2,800.00
Silt Fence	LF	165	\$ 1.78	\$ 294.00
Mulch	ACRE	0.165	\$ 543.22	\$ 90.00
6" PCC	SY	333.33	\$ 97.41	\$ 32,470.00
Precast Stair Slab	EACH	14	\$ 510.00	\$ 7,140.00
8" Riprap	TON	15	\$ 82.00	\$ 1,209.00
Class A Road Stone	TON	382	\$ 45.10	\$ 17,229.00
Access Ramp Signage	EACH	3	\$ 131.79	\$ 395.00
Shelter Structure	EACH	1	\$ 45,000.00	\$ 45,000.00
Trash Receptacle	EACH	2	\$ 150.00	\$ 300.00
Parking Bollard	EACH	4	\$ 60.37	\$ 241.00
Fire Pit	EACH	8	\$ 214.00	\$ 1,712.00
Native Grass Seeding	ACRE	0.531	\$ 986.50	\$ 524.00
Trees	EACH	10	\$ 699.82	\$ 6,998.00
Shrubs	EACH	40	\$ 85.34	\$ 3,414.00
Construction Cost				\$ 158,578.00
Contingency Factor 15%				\$ 23,422.00
Total Construction Cost				\$ 182,000.00

Table 4: Rose Hill Access Cost Estimate

Rose Hill Access Site				
Description	Units	Amount	Unit Price	Cost
Site Work				
Excavation	CY	330.5	\$ 4.36	\$ 1,441.00
Soil Fill	CY	4746	\$ 25.04	\$ 118,840.00
Clearing and Grubbing	ACRE	1.258	\$ 5,434.48	\$ 6,837.00
Tree Removal	EACH	20	\$ 112.00	\$ 2,240.00
Silt Fence	LF	310	\$ 1.78	\$ 552.00
Mulch	ACRE	0.186	\$ 543.22	\$ 101.00
6" PCC	SY	198.44	\$ 97.41	\$ 19,330.00
Precast Stair Slab	EACH	10	\$ 510.00	\$ 5,100.00
8" Riprap	TON	15	\$ 82.00	\$ 1,209.00
Class A Road Stone	TON	656.45	\$ 45.10	\$ 29,606.00
Restroom Structure	EACH	1	\$ 42,000.00	\$ 42,000.00
ADA Sign	EACH	2	\$ 147.10	\$ 294.00
Access Ramp Signage	EACH	3	\$ 131.79	\$ 395.00
Shelter Structure	EACH	1	\$ 45,000.00	\$ 45,000.00
Trash Receptacle	EACH	2	\$ 150.00	\$ 300.00
Parking Bollard	EACH	32	\$ 60.37	\$ 1,932.00
Fire Pit	EACH	9	\$ 214.00	\$ 1,926.00
Native Grass Seeding	ACRE	0.863	\$ 986.50	\$ 851.00
Trees	EACH	10	\$ 699.82	\$ 6,998.00
Shrubs	EACH	35	\$ 85.34	\$ 2,987.00
			Construction Cost	\$ 287,939.00
			Contingency Factor 15%	\$ 43,061.00
			Total Construction Cost	\$ 331,000.00

Table 5: Design Cost Estimate

Description	Units	Amount	Unit Price	Multiplier	Cost
Site Work					
Surveying and Data Acquisition	hr	90	\$30.00	2.5	\$ 6,750.00
Design of Site Layout	hr	200	\$30.00	2.5	\$ 15,000.00
Design of Site Grading	hr	110	\$30.00	2.5	\$ 8,250.00
Design of Site Facilities	hr	90	\$30.00	2.5	\$ 6,750.00
Plan Production	hr	150	\$30.00	2.5	\$ 11,250.00
Report and Presentation Production	hr	60	\$30.00	2.5	\$ 4,500.00
Materials/Supplies/Travel					\$ 1,500.00
Total Cost					\$ 54,000.00

Table 6: Summary of Cost Estimate

Cost Components	
Design Cost	\$ 54,000.00
Construction Costs	
Eveland Access	\$ 44,000.00
310 St Access	\$ 321,000.00
Glendale Access	\$ 182,000.00
Rose Hill Access	\$ 331,000.00
Total Project Cost	\$ 932,000.00

The above pricing breakout shows the different line-item costs incurred at each site. Some sites require significantly larger budgets to achieve the desired product for the client. In addition to the mean costs for construction tasks, a contingency factor of 15% has been added to each construction total for the sites. This additional budget will ensure that any additional costs or issues that arise during construction can be handled and minimize additional costs for the client after the initial estimate. The total construction cost for all the sites to be built to plan is \$932,000.00, including design and construction.

State Designation of Water Trails

The vision for Iowa's statewide water trail program was developed through collaborative efforts involving the input of many wildlife enthusiasts including paddlers, wildlife managers, conservationists, farmers, and environmental educators. Being part of this statewide program can help gain access to DNR funding and bring visitors from outside the Oskaloosa area. Trails selected for state designation represent those that offer safe and diverse experiences across different landscapes, stream conditions, and locations. The type of experience varies based on these conditions. Experiences for the state designated water trail include a gateway, recreational, challenging, and wilderness. The program strives to present a variety of experience types, to provide users of multiple boat-handling skills and physical abilities.

State-designated trails are held to a small but consistent set of standards for organization and construction. Our team has followed these standards set in place using the *Developing Water Trails in Iowa* manual. State designation of water trails does more than point out that recreational opportunities exist. For users, the designation signals that planning has been done to connect the user with the experience that they seek. It ensures certain expectations of service that the trail provides for a given experience type. That could mean a higher degree of infrastructure aimed for ease of use and accessibility, or it might mean water experiences with varying difficulties or lengths.

The Iowa Water Trails Program aims to provide consistency and predictability through standardized signage, boat launches, and trail designs, along with a classification system to assist users in selecting suitable trail segments. Effective communication through online mapping tools, water trail brochures, or websites is considered as crucial as the physical infrastructure improvements.

The Iowa Water Trails Program supports the responsible development of water trails in all parts of the state. Those trails meeting specific criteria to promote successful experiences are chosen for state designation. Designation, the official recognition that a water trail is part of the state system, occurs after all program requirements have been met and is subject to reversion if conditions are not maintained. Trail projects seeking state designation are generally new trails developed to meet designation criteria, although existing trails are also encouraged to consider their eligibility by modifying elements as needed. Development of a state designated water trail generally takes three to five years. This timeline includes pre-planning, early review, development planning, funding, implementation and, if appropriate, designation.

Water trail development is better known for the intensively thoughtful and deliberate planning rather than the speed of the process. The first phase, Pre-planning, generally requires six to 12 months to complete. Most of the pre-planning of the two water trails that we have designed for would just to be expressing interest to the DNR to become state designated since they are existing water trails. As well as taking to the local landowners with bordering property to the trails, as well as the rest of the community about the opportunities and benefits of state designation. After Early Review approval from DNR, the development of final plans and final approval from DNR generally requires six to 18 months. The final plans are the designs our team has developed for the sites and have presented to our client. A water trail project is eligible for

state designation after DNR approval of final design plans and the construction or implementation of amenities included in it, including the installation of all wayfinding and hazard warning signs. Construction implementation, including fundraising, often requires two or more years. Funding is generally sought from multiple public and private sources and often arrives in segments rather than all at one time.

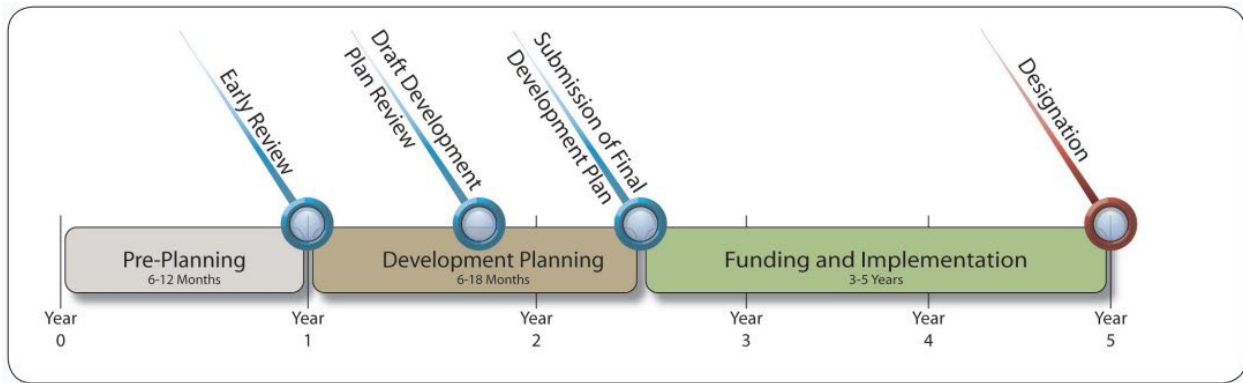


Figure 4: Conceptual Timeline for New Water Trail Development

There are many benefits to becoming a state designated water trail including enhancement funding from the Iowa DNR, marketing assistance from the DNR water trails program, water trail crew assistance, and consistency with neighboring water trails.

Designated water trails gain access to financial assistance from the DNR. This funding aids in the improvement of trail infrastructure, ensuring that users can enjoy high-quality facilities and amenities.

The DNR's water trails program provides designated trails with marketing support, including promotional campaigns and outreach initiatives. By raising awareness and attracting more visitors, this assistance contributes to the economic vitality of local communities.

Designated water trails may receive assistance from specialized trail crews organized by the DNR. These crews play a vital role in trail maintenance, undertaking tasks such as debris clearance and infrastructure repairs to uphold safety standards and preserve the natural environment.

State designation aligns designated water trails with neighboring water trails that share official recognition. This alignment facilitates consistency in trail management practices, signage, and user experiences, fostering a cohesive and seamless journey for trail enthusiasts.

Water trails that become state designated can utilize state resources such as technical assistance and review, prioritized DNR-managed funding assistance, listing on the DNR Web site, gain possible future maintenance or enhancement assistance and informational updates. Designation also includes a review of existing environmental and cultural information to steer launch

construction away from locations that may have negative impacts. Launches, new parking areas, and portage trails are designed and built to repair existing damaged landscapes and minimize new impact.

For these reasons stated above, we suggest our client apply for state designation of these water trails. The application for state designation can be found on Iowa's official DNR website. The application is found under the things to do page and canoeing and kayaking section. The application is called water trail planning application. Here is a direct link to the page for application for state designation. <https://www.iowadnr.gov/Things-to-Do/Canoeing-Kayaking>.

Funding and Grants

In addition to our projects design, we researched grants and different funding we could apply for. The Iowa DNR has a couple of different funding options specifically for water trails. Funding and grants for water trails is very competitive and many of the grants are reserved for state designated water trails or those looking to become state designated. Currently, the Iowa DNR is taking on one water trail project each year. Applying for water trail planning for this program will lead toward state designation. Some of the requirements for state designation include a water trail sponsor (typically the county conservation board), a network of agreements identifying each land manager's commitments to management of the water trail infrastructure, state standardized water trail signage (access, wayfinding, dam hazard, etc.), and a comprehensive water trail plan. Following the *Developing Water Trails in Iowa* manual is needed for state designation. Our team has followed this manual in our designs. The state designation is a long process and can take up to 3-5 years to be implemented. Once again that link can be found here <https://www.iowadnr.gov/Things-to-Do/Canoeing-Kayaking>.

The DNR also offers a water trails enhancement grant. For the year 2024, \$500,000 will be available for enhancements to water trails that are state designated or are on track to becoming state designated. These funds are available to local divisions of Iowa government for infrastructure or infrastructure improvement projects (water accesses, parking areas, water trail campsites, etc.) that enhance water trails at a minimum of 20 percent cost to the project sponsor. The application for this program can also be found in the same section where you can apply for state designation. The application for the water trails enhancement grant can be found on Iowa's official DNR website. The application is found under the things to do page and canoeing and kayaking section. The application is called water trail enhancement grant. Here is a direct link to the page for application for the water trail enhancement grant. <https://www.iowadnr.gov/Things-to-Do/Canoeing-Kayaking>.

Though it helps to be a state designated water trail, it is not required for all funding though the state. Iowa DNR provides is The Water Recreation Access Cost-Share Program. This program is available for constructing or improving boat access facilities to Iowa's lakes and streams. Projects can include boat ramps, loading/off-loading docks and other structures to enhance use by the public. Approved projects are funded on a 75% state to 25% local cost share. If a political subdivision is managing DNR property under a long-term agreement, the funding can be 100% state. Sponsors wishing to furnish their own equipment and labor can receive 100% of the cost of

materials for the project. The application for the water recreation cost share program can be found on Iowa's official DNR website. The application is found under the things to do page and the boating section. In the boating section there is a subsection called water rec access cost-share where the application can be found. The application is called application to collaborate with others. Here is a direct link to the page for application for cost share program.

[https://www.iowadnr.gov/Things-to-Do/Boating/Water-Rec-Access-Cost-Share.](https://www.iowadnr.gov/Things-to-Do/Boating/Water-Rec-Access-Cost-Share)

Pathfinders Research Conservation and Development Inc. has many services they can provide to help with the application of grants. Pathfinders provides grant writing, research, and administration services for groups or organizations. Pathfinders help tell the project's story so funders can understand the vision and provide the support needed. They can meet to understand the scope of the project and then write a grant to the criteria of the funding source. They also help identify grant funds that might be available to support the project.

Appendix A

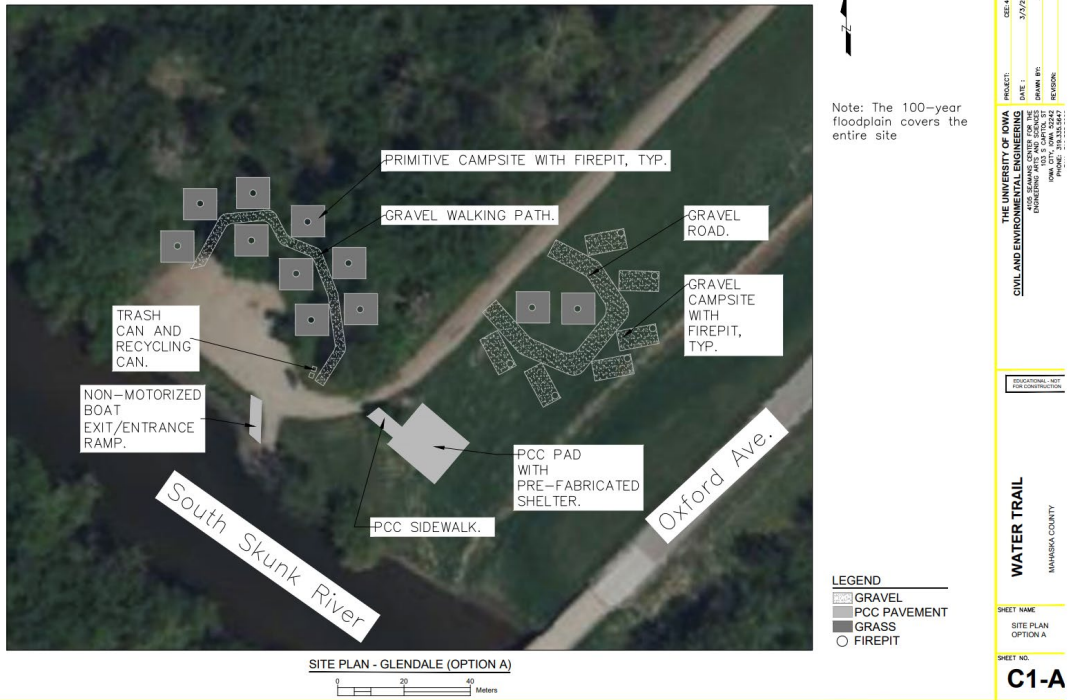


Figure 1A: Site plan option A for Glendale Access.

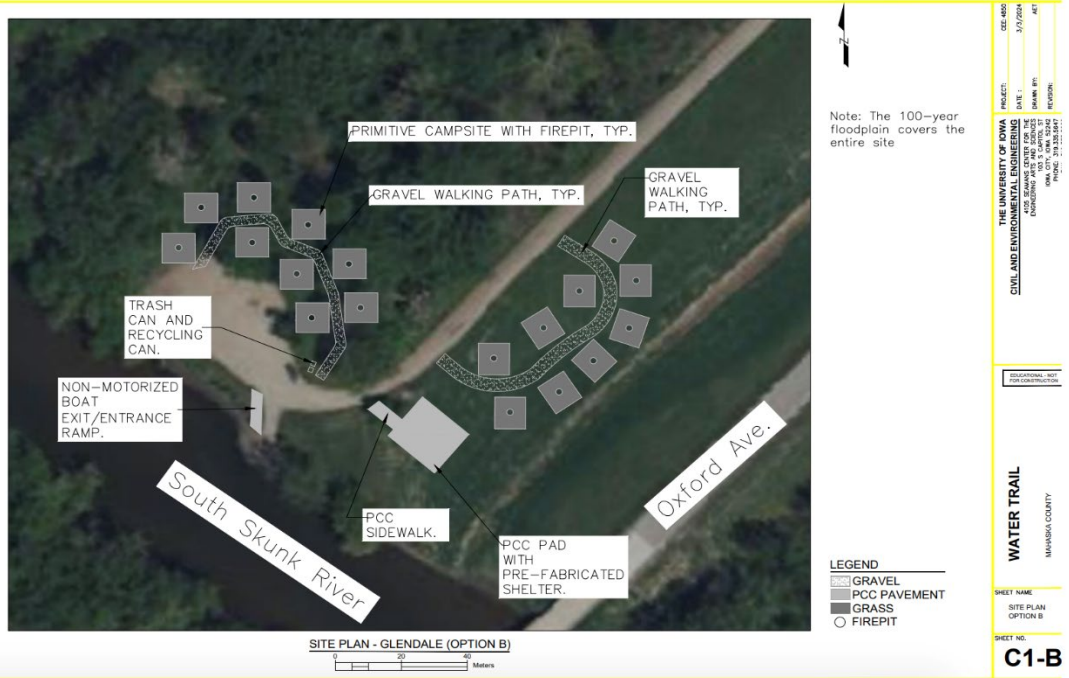


Figure 1B: Site plan option B for Glendale Access.



Figure 2A: Site plan option A for Rose Hill Access.



Figure 2B: Site plan option B for Rose Hill Access.

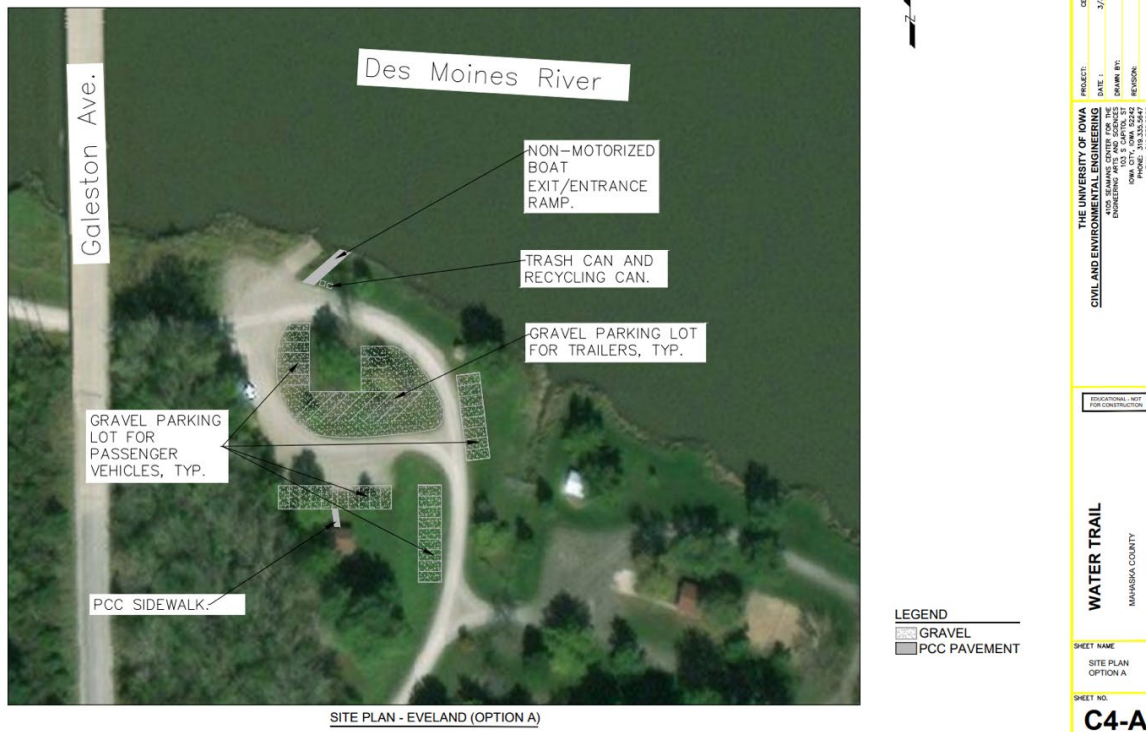
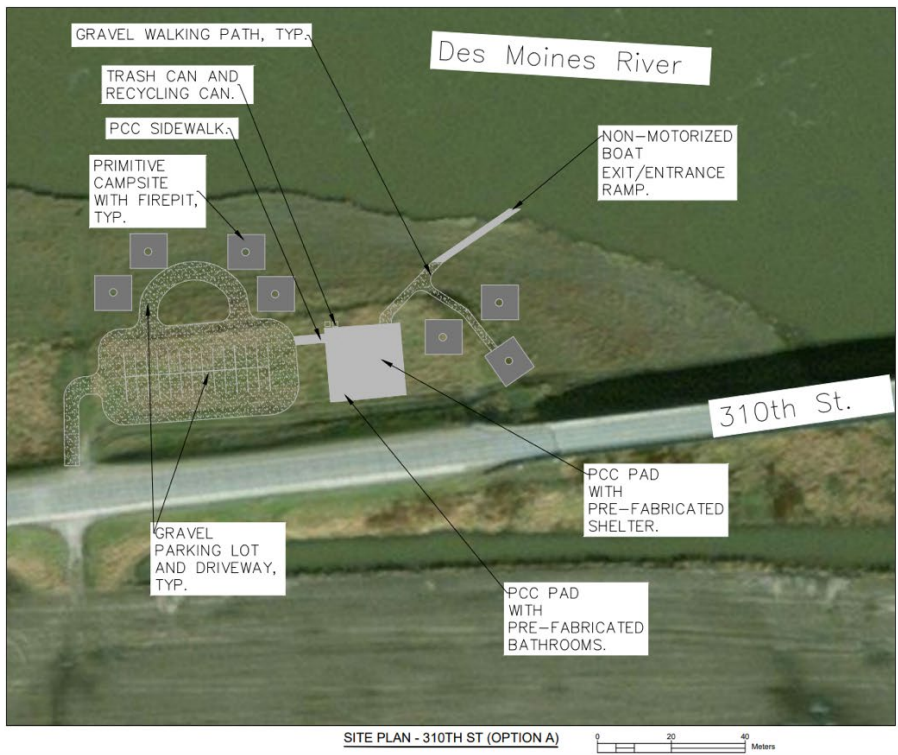


Figure 3A: Site plan option A for Eveland Access.



Figure 3B: Site plan option B for Eveland Access.



Note: The 100-year floodplain covers the entire site

CEC 4800 PROJECT: 3/7/2024 DATE: 3/7/2024 DRAWN BY: ACT REVISION:

THE UNIVERSITY OF IOWA CIVIL AND ENVIRONMENTAL ENGINEERING CENTER FOR THE ENVIRONMENTAL ENGINEERING CENTER 103 S CARROLL ST IOWA CITY, IA 52242-1517 PHONE: 319.335.5941 FAX: 319.335.5941

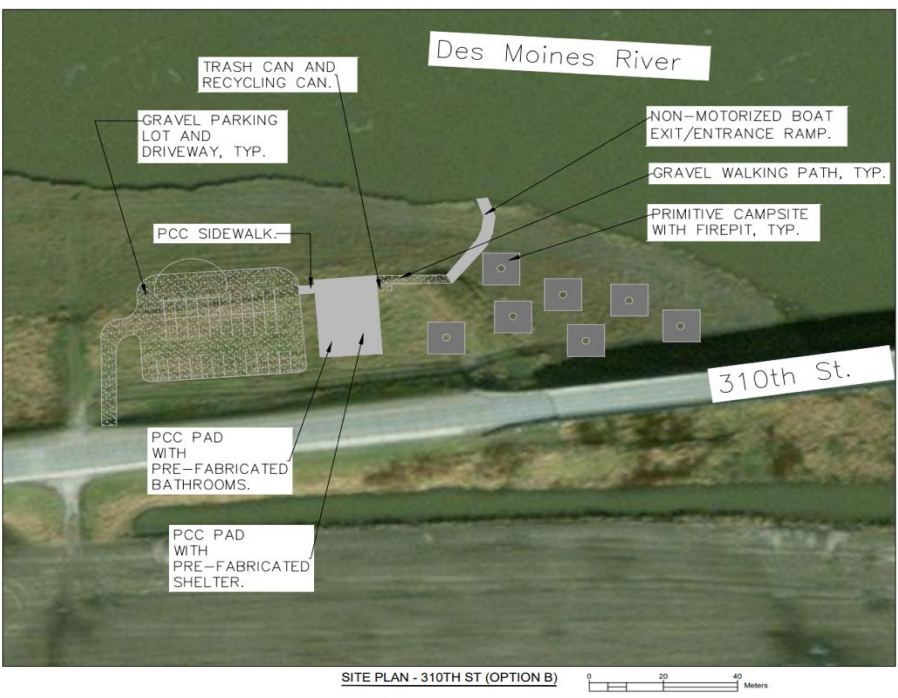
EDUCATIONAL NOT FOR CONSTRUCTION

WATER TRAIL
MAHASKA COUNTY

SHEET NAME: SITE PLAN OPTION A

SHEET NO.: **C3-A**

Figure 4A: Site plan option A for 310th St. site.



Note: The 100-year floodplain covers the entire site

CEC 4800 PROJECT: 3/7/2024 DATE: 3/7/2024 DRAWN BY: ACT REVISION:

THE UNIVERSITY OF IOWA CIVIL AND ENVIRONMENTAL ENGINEERING CENTER FOR THE ENVIRONMENTAL ENGINEERING CENTER 103 S CARROLL ST IOWA CITY, IA 52242-1517 PHONE: 319.335.5941 FAX: 319.335.5941

EDUCATIONAL NOT FOR CONSTRUCTION

WATER TRAIL
MAHASKA COUNTY

SHEET NAME: SITE PLAN OPTION B

SHEET NO.: **C3-B**

Figure 4B: Site plan option B for 310th St. site.

Appendix B

A Solid Foundation: Existing Iowa Water Trails. In IowaDNR.gov. Retrieved April 3, 2024, from https://www.iowadnr.gov/portals/idnr/uploads/riverprograms/wt_existing.pdf

Accessible Parking Spaces. (n.d.). In ADA.gov. Retrieved March 31, 2024, from <https://www.ada.gov/topics/parking/>

Infotech. (2024). Iowa Department of Transportation Bid Tab. Retrieved April 5, 2024. <https://ui.bidx.com/IADOT/lettings/24%2F03%2F19>

Iowa Department of Natural Resources. (2010). Iowa Statewide Water Trails Plan (not yet completed). Retrieved April 5, 2024. <https://bit.ly/3Jf12RT>

Iowa Department of Natural Resources. (n.d.). Water Trail Development Guidelines. Retrieved April 5, 2024. <https://bit.ly/3LrdP1U>

Iowa Department of Transportation. (n.d.). Iowa DOT Design Manuals. Retrieved April 5, 2024. <https://bit.ly/3KGzTXc>

Mimi Wagner. (2010). Chapter 2: State Designation of Water Trails. *Developing Water Trails in Iowa*. Iowa Department of Natural Resources.

Mimi Wagner. (2010). Chapter 3: Design Development. *Developing Water Trails in Iowa*. Iowa Department of Natural Resources.

SUDAS. (2013). Design Manual: Chapter 8 - Parking Lots (8B - Layout and Design). Retrieved from April 5, 2024. <https://bit.ly/3tCcqIU>