2026

City of Bondurant – Trail Design Project Proposal

University of Iowa Department of Civil and Environmental Engineering

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Section I Executive Summary

The Trail Connections Project is a design project that aims to improve connectivity in the city of Bondurant through the development of multi-use trail connections linking neighborhoods, schools, and the regional Chichaqua Valley Trail. This project is comprised of three corridors that the city has targeted for connecting to existing and future plans, including the Ross Certified Site, Ditch 2, and Pleasantview Park. The connections provide routes that are safe and accessible as well as environmentally conscious, which allows for an increase in community engagement and sustainability.

Students from the University of Iowa's Department of Civil and Environmental Engineering make up the design team for this project as part of a capstone course CEE:4850: Project Design and Management in CEE. Members of the team include Ada Tazegul, the project manager, an Environmental Engineering major with a focus on sustainability, Delaney Miller, a Civil Engineering major focused in civil practice, Nicholas Natarajan, a Civil Engineering major with a focus in transportation, and Corbin Leisner, a Civil Engineering major with a focus in civil practice. Ada's role in the project consisted of coordination with the client and group members as well as hydraulic and hydrologic modeling. Delaney's role was as an editor, in addition to prefabricated bridge specifications, aesthetics and native plantings. Nicholas worked as the technical support, specifically modeling of hydraulic and hydrologic as well as supporting CAD design. Corbin acted as another editor and led transportation and CAD design. Prior experience in transportation and water resource design was used to create the final design for each site in the project.

The project scope encompasses the design of trail alignments within the three corridors. The design takes into consideration shared-use accessibility, ADA requirements, and integration with existing schools, neighborhoods and trails as well as future development. It also integrates environmental considerations, like avoidance of wetlands, inclusion of native vegetation, and appropriate creek crossings. The final project includes aesthetic features such as trees and benches alongside trail, as well as material recommendations for each trail. The horizontal and vertical alignments, grading, as well as detailed plan and profile sheets are included in the final project. Hydrologic and hydraulic conditions at streams and drainage areas were evaluated along with a construction phasing plan and cost estimate based on the final design.

The work plan for the project began with initiation and data collection, which included collecting useful information such as GIS and topography data, and existing plans as provided by the city, assessment of site conditions, environmental constraints, right-of-way boundaries, and hydraulic and hydrologic features. Following the initial stages, multiple trail alignment options were created for each corridor and evaluated for safety, environmental impact, connectivity, and cost. The final design alignments were selected based on the client's preferences which were developed into an intermediate design. This design was then finalized with horizontal and vertical alignments, trail cross-sections, grading plans, pavement design, and structural selection

of an appropriate bridge and culvert. Considerations of stormwater management, erosion control, and hydraulic modeling were used in design for trail design that is compliant with standards. Finally, the work plan concluded with the creation of final plan sheets, materials and quantities, cost estimates, a construction phasing plan, and a comprehensive final report. The design methods and standards used in the final design include WinTR-55, HEC-RAS, USGS StreamStats, AASHTO guidelines for bicycle facilities, ADA accessibility standards, the Iowa SUDAS Manual, and the Iowa DOT Design Manual. This ensures engineering compliance and feasibility for each final site design.

The project completion required the navigation of many fixed constraints, including property boundaries, natural features such as ponds and creeks, and a strict project timeline. Throughout the process, there were also many challenges that were overcome. Some of these challenges include environmental impacts, hydraulic design difficulties for crossings and bridge abutments, coordination of trail amenities as well as collaboration with the local school district. These challenges were addressed through stakeholder engagement and clear communication, which resulted in a final design that balances functionality, aesthetics, constructability, and environmental stewardship.

The trail connections have a societal impact on the community of Bondurant, including increased multimodal connectivity and safe, accessible routes for residents of all ages and abilities. The trails link neighborhoods, schools, parks, and regional trail systems, which allows non-motorized access to schools and neighborhoods. It also cements Bondurant as a trail designation in the Des Moines metropolitan area, increasing tourism in the town. The design promotes active transportation, recreational opportunities, and community health in society. The environmental considerations such as intentional designs and native landscaping, allow for the project to support sustainability and preserve local ecosystems. This contributes to Iowa’s broader goals of promoting outdoor recreation and sustainable infrastructure.

Alternatives for the trail design were considered in many aspects of the project in order to determine the best trail design for each site. These included the exploration of alternative solutions for trail materials, amenities, and landscaping. Additionally, alternatives were explored for trail alignments as the environment, client and stakeholder preferences, and other factors were considered. Ultimately, the plan and profile sheets show the final designs selected that create functional, visually appealing, and environmentally sustainable trail segments. The trial system designed will create a safe, accessible, and engaging trail system for the city of Bondurant that enhances community connectivity, supports sustainable transportation, and contributes to the health, recreation, and quality of life for residents.

The final design details lay out the design for each trail segment, including size, materials, and drawing sets. The Ross certified site spans over 3200 ft with a 10 ft width of PCC. The Pleasantview Park site utilizes PCC and gravel for the trail materials with associated lengths of 2,654 ft and 786 ft. The design for Ditch 2 follows a trail that is ¾ mile long and 10 ft wide. In addition, it includes two crossings of Mud Creek, a 2 ft culvert and a prefabricated steel truss bridge with a span of 115 feet long and 14 feet wide. These values are determined based on design standards as well as analysis of the sites themselves. A summary of these details by site location is presented in the final design details section.

A cost estimate based on the trail segments concludes the project, incorporating construction, contingencies, engineering and design costs. The total cost for the Pleasantview Site was estimated to be $321,375.00 and the Ditch 2 site is expected to be around $1,262,125.00. The total cost estimate for the Ross Certified Site was found to be $540,625.00 for the completion of the project. Overall, the project presents a final design for the Ross Certified Site, Ditch 2, and Pleasantview Park that includes a full report of details pertaining to design.

Section II Organization Qualifications and Experience

Organization and Design Team Description

We are a team of students at the University of Iowa in the capstone design class, CEE:4850: Project Design and Management in CEE. Ada Tazegul is the project manager and is an environmental engineering major with a focus area in sustainability. Her role primarily consisted of coordinating meetings with team members, advisors, and the client. She also assisted with hydraulic and hydrologic modeling. Delaney Miller is the editor as well as a civil engineering major with a focus area of civil practice. Delaney focused mainly on aesthetics, cost estimates, and any additional support for other sections. Nicholas Natarajan fills the project technical support role, and is a civil engineering major with a focus area in transportation. Nicholas' main focus was in hydraulic and hydrologic modeling as well as design development. Corbin Leisner is a civil engineering major with a focus in civil practice. His role was related to design development, drafting, and sheet set preparation for sites by collaboration with other members, specifically regarding hydrologic and hydrology related to design. Each member collaborated to design a final project that is in alignment with the client's needs and wants for each site.

Description of Experience with Similar Projects

The design team has prior experience with multiple projects similar to that of the Trail Connections Project. Students have completed a transportation design course focusing on roadway design including alignments, grading, and other considerations. The design team also has experience with projects similar to the Trail Connections Project through completion of a water resources design course. Students designed detention ponds and bridge crossings using HEC-HMS and HEC-RAS, gaining experience in design flow development, stormwater management systems, drainage channels, and hydraulic structures. Corbin Leisner has prior experience working on projects similar in scope through multiple civil engineering internship projects that focused on trail design projects across the state of Iowa. Through this work, he contributed to the planning and design of multi-use trail alignments, development of construction drawings, and preparation of plan sheets in accordance with applicable design standards. His experience includes coordinating geometric layout, grading considerations, and surface design while accounting for environmental constraints and site conditions

Section III: Proposed Services

Project Scope

The project evaluated and developed multi-use trail connections in order to improve pedestrian and bicycle connectivity between neighborhoods, schools, and the Chichaqua Valley Trail in the city of Bondurant. Three sites were designed to improve trail connectivity in the Bondurant area, including the Ross Certified Site, Ditch 2, and Pleasantview Park. The Pleasantview Park site connected a trail to the high school, new elementary school and nearby neighborhoods. The Ditch 2 trail connected the Chichaqua Valley Trail, the existing parking lot for the elementary school and future neighborhood growth.

Originally, the client's proposal requested the scope of work to include the evaluation and development of feasible trail alignments that address shared-use conditions, land ownership considerations, and environmental constraints. They requested that the trail design is integrated with existing and future plans in the area to provide continuity with regional trail networks as well as safe access to neighborhoods and schools. Throughout the completion of the project, the same scope of the project remained, although adjustments were made. In Ditch 2, the original scope of the project included connecting the trail to directly approach the elementary school entrance, while the final project resulted in a trail connection to the parking lot of the school due to the design constraints and the school district's preferences.

In addition, the scope of work at the beginning of the project and at completion of the project includes horizontal and vertical trail alignments for each corridor. The design incorporated ADA accessibility requirements, trail grades, cross-sections, and grading concepts with balanced cut-and-fill where feasible. Ultimately, the design resulted in plan and profile sheets that demonstrate the trail alignments and design features. The recommended materials and their associated cost estimates are found and summarized as requested in the original project scope.

In terms of the hydrologic and hydraulic considerations, the scope of work originally included drainage conditions and floodplain constraints for each site and their effect on the trail design. There was an intent to focus on the crossing at Mud Creek as it was clear that a crossing would be required in the design. For the final design, the scope of the project expanded to include two crossings of Ditch 2 due to the fact that an additional drainage outlet had to be crossed that wasn't clear in the initial plans. As a result, the hydraulic and hydrologic modeling found that the design required one crossing with a prefabricated bridge and another that will use a culvert after consideration of options for these crossings.

The original scope of the project required environmental considerations including wetland area considerations and incorporating native vegetation. The Ditch 2 site had to be adapted in the final design because the initial path that the client requested encroached on wetlands. Consequently, the final scope of work also included making adaptations to the client's vision in order to account for these environmental considerations. In addition, the final design achieved this scope by incorporating prairie seed mix along corridors as well as trees with the requested spacing. The City of Bondurant also requested in the initial project scope that aesthetic elements of the design are consistent with existing trails. This is consistent with the final design, specifically the prefabricated bridge that uses the same materials and aesthetics as another trail bridge in Bondurant designed by Shive-Hattery.

The initial project scope included a cost estimate based on the Iowa Public Works Service Bureau bid cost tables, which is consistent with the final project. The final project cost estimation for each trail segment incorporates materials, construction labor, equipment as well as overhead and profit. These result in the final design and administration cost for constructing the final project, as seen in the cost estimation section.

Initially, the project scope included a construction phasing plan for implementing the trail construction. In the final design, this will not be included due to the variety of factors that will impact construction as well as coordination with multiple entities, like, the Bondurant School District, the City of Bondurant, and private landowners. Another change from the initial project scope is the pier design for the retention ponds which was originally requested by the client. Due to lack of expertise in pier design as well as restricted time constraints, the pier design is not included in the final design.

In summary, the tasks completed for this assignment are listed below for completion. An initial design layout was completed according to the client's requests and feedback, wetland considerations, property boundaries, and other restrictions. Each site was then surveyed along the initial design pathways, which were used to develop elevations of site locations. Hydraulic and hydrologic modeling was completed, resulting in the determination of a culvert and prefabricated bridge as well as their sizing for the two required crossings at Ditch 2 site. Prefabricated bridge options were considered and determined based on client's needs, which reflected a similar crossing in Bondurant. From here, final design alignments were completed, and drawings were created for each site. Aesthetics for the design sites were collected from the client's requests, including native plantings and benches alongside trails. Finally, a cost estimate was conducted to include materials, labor, equipment, overhead, profit as well as final design and administration costs for construction the trail connections

Work Plan

The contract period for this project began on February 9th, 2026, and ended on May 8th, 2026. The work plan progressed through project initiation, multiple field assessments, development of alternatives, detailed design and engineering, and project coordination, and ended with the delivery of the final report, drawings, and presentation.

The project began with initiation and data collection activities, including compilation and review of background information, GIS and topography data, and existing plans. An assessment of existing site conditions was conducted for each corridor, including collection of survey data, evaluation of environmental constraints, right-of-way and property boundaries, existing paths, physical barriers, utilities, ADA compliance and feasibility, and hydraulic and hydrologic conditions at existing streams and crossings.

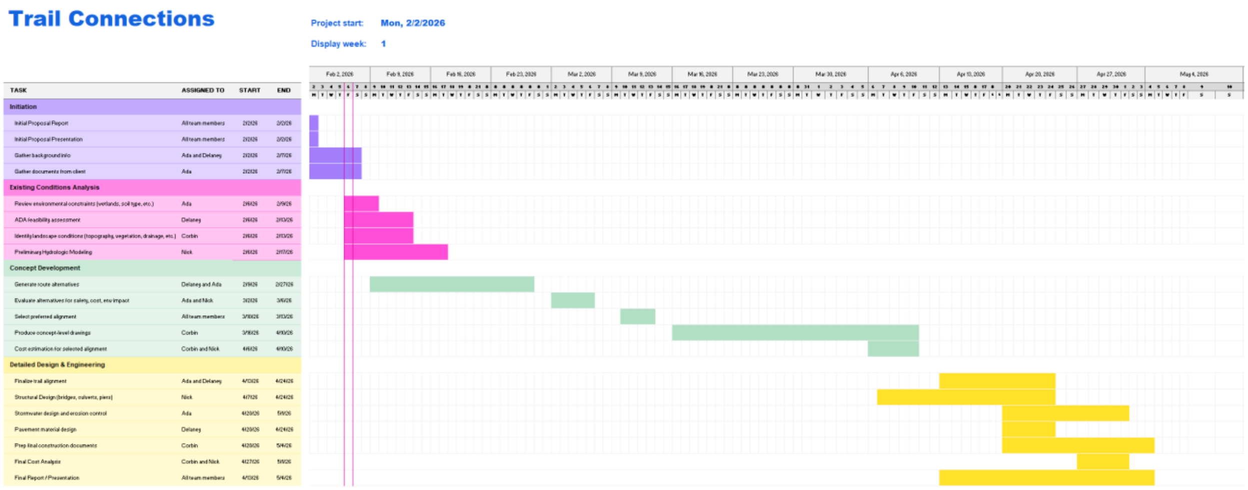
Following the site assessments, the project advanced into alternative concept development. Multiple alignment alternatives were developed for each of the three corridors and evaluated on safety, connectivity, constructability, and anticipated costs. Alternatives were documented through drawings and sketches, and a preferred alignment for each corridor was selected in coordination with the client.

Once the preferred alignments were selected, the project proceeded into detailed design and engineering. This phase included the development of finalized horizontal and vertical alignments, trail cross-sections, and concluded with grading plans, pavement section design, and cut-and-fill calculations. The hydraulic and structural designs of a pedestrian bridge and culvert were also completed as part of this phase. Stormwater management and erosion and sediment control measures were designed to support creek crossings and drainage features.

Final plan sheets were prepared, including plan and profile drawings, cross-sections, details, and design notes in accordance with the RFP requirements. A list of materials and quantities was developed as well as a detailed project cost estimate using unit costs from the Iowa Public Works Service Bureau bid cost tables.

Project management and coordination activities occurred throughout the project, including regular communication with the client and instructors, documentation of progress, and schedule tracking. The project concluded with preparation and submission of the final design report, drawings, cost estimate, project poster, and presentation. Final project deliverables were completed by May 4, 2026 to allow for review and presentation prior to the end of the contract period.

The work plan followed the Gantt chart shown below:



Section IV Constraints, Challenges and Impacts

Constraints

Several key constraints have governed the scope and development of the Bondurant trail project and have remained in place throughout the design process. One primary constraint has been the location of the trailheads and connection points, which were predetermined by existing schools, neighborhoods, roadways, and the Chichaqua Valley Trail. These fixed connection points limited flexibility in horizontal alignment and required the trail design to conform to existing infrastructure and land use patterns. Additionally, right-of-way and land ownership presented unavoidable constraints, as trail alignments were required to remain within publicly owned land or established easements. The project team designed within these legal boundaries and could not modify property limits or acquire additional land.

Natural features within the project area, including existing ponds, creeks, and drainage corridors, also acted as fixed constraints. These features could not be relocated and therefore had to be preserved, requiring the trail alignment to be designed around them. Creek crossings and proximity to water bodies introduced fixed hydraulic and environmental conditions that were addressed through compliant design solutions. Similarly, shared-use requirements for both pedestrians and bicyclists remained a non-negotiable constraint, requiring minimum trail widths, appropriate sight distances, and ADA-compliant grades throughout the system.

The project has also been constrained by a defined timeline, with design work occurring between February 9, 2026, and May 8, 2026. This schedule established firm milestones and submission deadlines that guided the progression of the work and could not be extended. As an academic project developed in accordance with an RFP and course requirements, adherence to these deadlines has remained mandatory and influenced the sequencing and prioritization of design tasks.

In addition to these original constraints, an aesthetic constraint was introduced by the client during the design process. The client requested that the trail maintain a consistent visual character, including a unified sense of place and similar bridge design elements throughout the corridor. This requirement influenced material selection, structural detailing, and overall visual cohesion, further limiting design flexibility while ensuring a cohesive and recognizable trail identity.

Challenges

The trail project presented several challenges that increased the complexity of the design. Throughout the project, these challenges have been addressed through iterative design decisions, resulting in solutions that balance functionality, safety, and environmental considerations.

One primary challenge has been the incorporation of environmental considerations into the trail design. The design team assessed multiple alignment options, and grading strategies to maintain trail continuity and user safety. Erosion control measures, and integration of native plantings were considered and incorporated where feasible within constructability and cost.

Another significant challenge involved the detailed hydraulic analysis required for both culverts and bridge crossings. Culvert hydraulic analysis was conducted to ensure adequate conveyance of stormwater while preventing upstream flooding and downstream erosion. Similarly, bridge hydraulic analysis played a critical role in determining appropriate deck height to safely pass design storm events without overtopping or causing adverse impacts. These analyses required accurate flow estimation, consideration of regulatory requirements, and iterative adjustments to the design to meet safety and performance criteria.

Bridge abutment design also emerged as a key challenge during the project. The abutments had to be designed to safely support structural loads while accounting for soil conditions, potential scour, and hydraulic forces from adjacent waterways. This required coordination between structural and hydraulic considerations, as well as the integration of geotechnical assumptions in the absence of detailed subsurface data.

Surveying the proposed trail path presented another important challenge that influenced the accuracy and feasibility of the design. Field data collection was necessary to verify existing conditions, elevations, and alignment feasibility. Any discrepancies between assumed and actual site conditions required adjustments to the design, reinforcing the importance of accurate survey data in minimizing construction conflicts and ensuring proper grading and drainage.

Additionally, the design of trail amenities, such as green stops, benches, and aesthetic elements, remained a challenge throughout the project. These features were ultimately incorporated in a way that complements both the natural environment and the overall trail system, while maintaining accessibility, proper drainage, and ease of maintenance. Their placement was refined to avoid sensitive environmental areas and minimize disruption to trail flow.

Coordination with local schools also continued to align trail connections with safe access points for students and staff. This required consideration of the schools future and current land use. Through iterative planning, communication, and design adjustments, these challenges were addressed.

Overall, these challenges have been addressed through a responsive and adaptive design process. By integrating engineering analysis, field verification, and stakeholder considerations, the project team has developed solutions that overcome site-specific difficulties while meeting the City of Bondurant's goals for a safe, functional, and cohesive trail system.

Societal Impact within the Community and/or State of Iowa

Societal Impact

The proposed trail connections will generate meaningful and measurable societal benefits for the surrounding community and the State of Iowa. By enhancing connectivity to, accessibility, and environmental sustainability, the project supports long-term improvements to quality of life, economic vitality, and public health.

Population Characteristics

The project is designed to serve a diverse sector of the population, including residents of varying ages, income levels, and mobility needs. By improving non-motorized connectivity, the trail will provide equitable transportation alternatives for individuals without reliable vehicle access, including students, elderly residents, and individuals with disabilities. Additionally, the project may accommodate seasonal fluctuations in population, particularly through increased recreational use during warmer months and potential tourism-related visitation.

Community and Institutional Structures

This project strengthens connections between key community institutions, including schools and surrounding residential developments. By improving safe routes to school, the trail supports educational access and reduces reliance on vehicle transportation during peak hours, helping to alleviate congestion. The integration with existing trails enhances Bondurant's role within the broader regional recreation network, supporting local economic development through increased usage of nearby amenities and potential growth in recreation-based activity. The project aligns with community development goals that emphasize livability, walkability, and sustainable growth.

Individual and Family Changes

The trail will positively impact daily life by providing safe, convenient opportunities for walking, biking, and outdoor recreation. Families will benefit from direct, low-stress connections between homes, schools, and open spaces, encouraging more active lifestyles and increasing time spent outdoors. The routing around detention ponds in the Pleasantview Park site creates aesthetically appealing and engaging environments, enhancing mental well-being and fostering stronger community interaction. The presence of well-design infrastructure also improves perceptions of safety, particularly for children traveling to and from school.

Property and Personal Rights

The project has been designed to integrate with existing land uses, including residential areas, schools, and public parks, while minimizing disruption to property owners. Careful alignment and planning ensure that access, privacy, and land value considerations are respected. In many cases, proximity to trail systems enhances property desirability and value, providing a positive economic effect for nearby residents. The project balances public benefit with respect for individual property rights through thoughtful design and stakeholder coordination.

Community Resources

The trail design enhances access to key community resources, including schools, residential areas, stormwater management features, and existing recreational trails. By connecting these elements, the project maximizes the utility of current infrastructure and promotes efficient land use. Routing the trail around detention ponds not only utilizes underdeveloped land but also transforms these areas into functional community assets, supporting passive recreation and environmental education opportunities. The improved connectivity also supports access for emergency services by maintaining clear and organized pathways within the community.

Sustainable Practices

Sustainability is a central component of this project. By encouraging non-motorized transportation, the trail reduces vehicle emissions and supports improved air quality. The alignment around detention ponds highlights opportunities for integrating green infrastructure and promoting stormwater awareness. The project design incorporates durable, low-maintenance materials and erosion control strategies to ensure long-term performance. Additionally, by leveraging existing corridors and infrastructure, the project minimizes environmental disturbance while maximizing community benefit. This approach supports both environmental stewardship and economic sustainability over the lifecycle of the project.

Section V Alternative Solutions That Were Considered

Ditch 2 Crossing and Alignment Alternatives

Multiple alternatives were evaluated for the Ditch 2 site, including the use of full bridge structures, culverts, and hybrid configurations. A full bridge option was initially considered to span the two stream crossings, due to its ability to span the channel without alternating flow conditions, minimize hydraulic impacts, and provide long-term resilience to flooding and debris accumulation. However, this option was determined to have significantly higher construction and maintenance costs. Conversely, a culver-only solution offered a more cost-effective approach but introduced potential concerns related to hydraulic capacity, debris clogging, and long-term maintenance.

As a result, a hybrid approach consisting of one culvert and one bridge crossing was selected. This solution balances cost efficiency with hydraulic performance by placing a bridge at the more hydraulically sensitive location and a culvert where flow conditions are less critical. Additionally, the bridge structural design follows previously established bridge elements within the broader trail system, ensuring visual and structural consistency across the network.

Alternative trail alignments for the Chicaqua Valley Trail connection near the north end of the Ditch 2 site were also considered. One option involved offsetting the trail to avoid environmental disturbance, particularly tree and shrub removal. However, the client wanted to prioritize continuity with the existing trail to avoid potential confusion for users. Therefore, the selected alignment follows the existing trail corridor to maintain consistency, improve wayfinding, and provide a more intuitive user experience. While this option requires the removal of select tree and shrub species, it was determined that the benefits of connectivity and user clarity outweighed the localized environmental impact.

For the school connection near the southern end of the Ditch 2 site, multiple routing alternatives were explored. One option included routing the trail closer to the school's central area, following the existing cross-country track, while another placed the connection at the southern end of the school's parking lot and routing the trail along the existing stream to the west. The southern alignment was ultimately selected to preserve open space for future school expansion and to avoid interference with existing cross-country running routes. This alignment requires the trail to follow closely along the stream corridor to avoid construction through the existing detention pond next to the school, which introduces some design constraints; however, it minimizes conflicts with school activities and supports long-term institutional flexibility.

Ross Certified Site Alignment Alternatives

For the Ross Certified Site, both winding and straight trail alignments were evaluated. A more winding alignment was initially considered to enhance aesthetic appeal, but this option would have increased construction complexity, required additional grading, and raised overall project costs. A straighter alignment was ultimately selected to simplify construction, reduce material and labor costs, and improve overall constructability. In addition, a straighter path enhances visibility and safety for users by providing clearer sightlines, which is particularly beneficial in areas with higher pedestrian and cyclist traffic. While this approach is less visually dynamic than a winding path, it was determined to best meet the project's goals of cost efficiency, safety, and ease of implementation.

Pleasantview Park Site Alternatives

The Pleasantview Park site did not leave much room for alternative considerations, since the team was given a preferred alignment at the beginning of the project. Despite this, the material for the path was one aspect of the design that required considering the alternatives. One option was to use PCC for the entirety of the path, including around both detention ponds. This provides a path that is more accessible yet has a higher cost for the client. Another option for Pleasantview Park is the use of a gravel path around the south detention pond at this site while keeping the remaining alignment paved with PCC. This alternative allows for a cheaper cost due to lower material and labor cost, which is also reduced because the trail is required to be less wide as it isn't required to follow ADA requirements. The partial gravel trail alternative was preferred by the client mainly due to the fact that it reduces the cost. The path around the south detention pond will primarily be used for maintenance and not recreation as the other parts of the trail prioritize. For these reasons, the second alternative was selected for the Pleasantview Park design, resulting in the final design being a gravel trail around the south detention pond and PCC around the rest of the alignment.

VI. Final Design Details

6.1 General Design Elements (All Sites)

To maintain consistency across the Bondurant trail network, a standard typical section was applied to the primary alignments at Ditch 2, Pleasantview Park, and the Ross Certified Site. All primary trails are 10 feet wide and consist of 6-inch Portland Cement Concrete (PCC) placed on a 6-inch granular subbase. This section was selected in accordance with SUDAS Section 7010 for heavy-duty shared-use paths (Iowa Statewide Urban Design Specifications [SUDAS], 2026).

The standard typical section includes a 2-foot clear zone on both sides of the trail to provide lateral recovery space and improve user safety. While section lengths vary between sites, the B-series design sheets consistently present cross sections for all three locations. Horizontal and vertical alignments were designed in Autodesk Civil 3D using criteria from SUDAS Chapter 12 and AASHTO guidelines. A minimum horizontal radius of 60 feet was applied based on an 18 mph design speed. Cross slopes were set at 1.5% (2.0% maximum), and running slopes were limited to 5.0% to meet ADA accessibility requirements (SUDAS, 2026).

Material quantities for PCC and granular subbase were computed using the Average End Area method through Civil 3D corridor reports. These calculations provided total estimated construction quantities for each site; detailed results are included in Appendix D. Typical sections and cross-sectional views are shown in the B-series Design Sheets for each site.

6.2 Ditch 2: Crossing and Connectivity

The Ditch 2 site serves as a critical regional connection linking local schools to the Chichaqua Valley Trail. To achieve this connectivity, two crossings were required: a culvert crossing and a bridge crossing.

Watershed delineation and peak discharge estimation for the culvert were performed using USGS StreamStats. Hydraulic design was completed in accordance with Iowa DOT Design Manual Chapter 4 (Iowa Department of Transportation, 2025). Based on the calculated peak flow, a single 24-inch diameter concrete culvert was selected to convey flow while maintaining existing drainage patterns. Supporting calculations are provided in Appendix B, and the culvert location and profile are shown in Design Sheet V.4.

For the Mud Creek crossing, a span of approximately 115 feet required a bridge structure. A prefabricated steel truss bridge was selected to match existing municipal aesthetics and minimize construction complexity. The bridge width was set at 14 feet to accommodate emergency access requirements (SUDAS, 2026). Abutments were designed using adapted municipal standard details to fit site-specific topography. The bridge provides a safe and direct connection between the trail and the adjacent elementary school parking lot. Structural layout and profile details are shown in Design Sheets V.1–V.3.

6.3 Pleasantview Park (PVP): Multi-Surface Connectivity

The Pleasantview Park site emphasizes neighborhood-to-school connectivity while incorporating recreational trail elements. The horizontal alignment was constrained by a City-provided layout, requiring the trail to navigate around existing detention ponds while maintaining connectivity to the high school, as shown in Design Sheet A.2.

Primary trail segments follow the standard PCC section described in Section 6.1; however, modifications were made near the detention ponds to improve safety and eliminate the need for railings. Along pond-adjacent segments, the cross section includes a 5-foot clear zone on the water side and a 2-foot clear zone on the opposite side. For the segment between the two ponds, a 5-foot clear zone was provided on both sides of the trail. These increased clear zones provide adequate recovery space and reduce fall risk, eliminating the need for a safety railing.

In addition to the PCC trail, a secondary recreational loop was incorporated around the southern detention pond. This segment consists of a 6-foot-wide gravel trail designed to provide a more natural-surface alternative. The section includes 4 inches of Class V aggregate placed over 2 inches of ASTM No. 57 stone, as provided by the City, to ensure adequate drainage and structural support.

Plan views for the main trail are shown in Design Sheets D.1–D.8, while the gravel trail is shown in Design Sheets E.1–E.2. Cross sections and transitions are provided in Design Sheets B.1–B.3.

6.4 Ross Certified Site: Industrial Buffer

The Ross Certified Site design addresses land-use constraints by integrating the trail as a buffer between industrial and residential zones. The alignment was positioned within the westernmost 140 feet of the site to create separation between proposed industrial development to the east and existing residential areas to the west. This alignment also reflects planned future zoning, preserving the eastern portion of the site for industrial use while maintaining compatibility with adjacent residential areas.

Grading design was performed in Civil 3D to maintain a relatively flat trail profile while ensuring positive drainage away from adjacent properties. Minor grading adjustments were made to prevent ponding and to maintain compliance with accessibility slope requirements.

This configuration provides a safe and continuous corridor for residents while accommodating long-term land-use planning objectives. The site layout and buffer dimensions are shown in Design Sheet A.2

Section VII Engineer's Cost Estimate

Table 1 Pleasantview Park Construction Cost

Project: Bondurant Trail Connections- Pleasantview Park						
Task	**Item Number**	**Item Description**	**Unit**	**Unit Cost**	**Quantity**	**Cost**
Site Preparation	2010-B					
		Clearing and Grubbing	ACRE	$ 6,950.00	1.8	$ 12,510.00
Cut	2010-E					
		Excavation – Class 10	CY	$ 8.36	1400	$ 11,704.00
Fill	2010-E					
		Excavation – Class 10	CY	$ 8.36	400	$ 3,344.00
Subbase						
	2010-J	GRANULAR SUBBASE	SY	$ 16.95	1800	$ 30,510.00
	2010-I	Geogrid	SY	$ 3.28	525	$ 1,722.00
Pavement	7030-C					
		SHARED USE PATH, PCC, 6"	SY	$ 76.00	1800	$136,800.00

	2010-I	ASTM #57 Stone	SY	$ 4.68	525	$ 2,457.00
	7070-B-1	Aggregate	TON	$ 46.55	125	$ 5,818.75
Site Restoration						
	9040-A-1	SWPPP PREPARATION	LS	$11,600.00	1	$ 11,600.00
	9040-A-2	SWPPP MANGEMENT	LS	$ 4,000.00	1	$ 4,000.00
	2010-D-1	Topsoil, On-site	CY	$ 7.25	1050	$ 7,612.50
	9010-B	Prairie Seeding Mix	AC	$ 600.00	1.5	$ 900.00
	Special	Oak/Linden Trees	EA	$ 200.00	55	$ 11,000.00
MISCELLANEOUS						
	11020-A	MOBILIZATION	LS	$14,200.00	1	$ 14,200.00
	11050-A	CONCRETE WASHOUT	LS	$ 2,675.00	1	$ 2,675.00

Table 2 Pleasantview Park Project Cost

Project: Bondurant Trail Connections- Pleasantview Park		
Task		Cost
Site Preparation/Restoration		$ 62,700.00
Trail Pavement		$ 177,500.00
Miscellaneous		$ 16,900.00
Construction		$ 257,100.00
Contingency	15%	$ 38,565.00
Engineering/Administration	10%	$ 25,710.00
Total Project Cost		$ 321,375.00

Table 3 Ditch 2 Construction Cost

Project: Bondurant Trail Connections- Ditch 2						
Task	**Item Number**	**Item Description**	**Unit**	**Unit Cost**	**Quantity**	**Cost**
Site Preparation	2010-B					
		Clearing and Grubbing	ACRE	$ 6,950.00	2.01	$ 13,969.50
Cut	2010-E					
		Excavation – Class 10	CY	$ 8.36	3250	$ 27,170.00

Fill	2010-E					
		Excavation – Class 10	CY	$ 8.36	2100	$ 17,556.00
Subbase						
	2010-J	GRANULAR SUBBASE	SY	$ 16.95	5775	$ 97,886.25
Pavement						
	7030-C	SHARED USE PATH, PCC, 6"	SY	$ 76.00	5200	$ 395,200.00
Site Restoration						
	9040-A-1	SWPPP PREPARATION	LS	$ 11,600.00	1	$ 11,600.00
	9040-A-2	SWPPP MANGEMENT	LS	$ 4,000.00	1	$ 4,000.00
	2010-D-1	Topsoil, On-site	CY	$ 7.25	0.82	$ 5.95
	9010-B	Prairie Seeding Mix	AC	$ 600.00	0.82	$ 492.00
	Special	Oak/Linden Trees	EA	$ 200.00	70	$ 14,000.00
Miscellaneous						
	SPECIAL	ABUTMENTS	CY	$ 1,500.00	39	$ 58,500.00
	9080-B	APPROACH RAILING, STEEL	LF	$ 200.00	1	$ 200.00
	SPECIAL	PRE-ENGINEERING BRIDGE	LS	$ 200,000.00	1	$ 200,000.00
	11020-A	MOBILIZATION	LS	$ 14,200.00	1	$ 14,200.00
	11050-A	CONCRETE WASHOUT	LS	$ 2,675.00	1	$ 2,675.00
	SPECIAL	RIP RAP, CLASS E	TON	$ 80.00	180	$ 14,400.00
	SPECIAL	PILES, STEEL, HP 14X73	LF	$ 90.00	360	$ 32,400.00

Table 4 Ditch 2 Project Cost

Project: Bondurant Trail Connections- Ditch 2	
Task	Cost
Site Preparation/Restoration	$ 89,000.00
Trail Pavement	$ 493,500.00
Bridge	$ 291,500.00
Miscellaneous	$ 135,700.00

Construction		$ 1,009,700.00
Contingency	15%	$ 151,455.00
Engineering/Administration	10%	$ 100,970.00
Total Project Cost		$ 1,262,125.00

Table 5 Ross Certified Site Construction Cost

Project: Bondurant Trail Connections- Ross Certified Site						
Task	**Item Number**	**Item Description**	**Unit**	**Unit Cost**	**Quantity**	**Cost**
Site Preparation						
	2010-B	Clearing and Grubbing	ACRE	$ 6,950.00	1.5	$ 10,425.00
Cut						
	2010-E	Excavation – Class 10	CY	$ 8.40	1325	$ 11,130.00
Fill						
	2010-E	Excavation – Class 10	CY	$ 8.40	500	$ 4,200.00
Subbase						
	2010-J	GRANULAR SUBBASE	SY	$ 16.95	5000	$ 84,750.00
Pavement						
	7030-C	SHARED USE PATH, PCC, 6"	SY	$ 76.00	3575	$271,700.00
Site Restoration						
	9040-A-1	SWPPP PREPARATION	LS	$11,600.00	1	$ 11,600.00
	9040-A-2	SWPPP MANAGEMENT	LS	$ 4,000.00	1	$ 4,000.00
	2010-D-1	Topsoil, On-site	CY	$ 7.25	565	$ 4,096.25
	9010-B	Prairie Seeding Mix	AC	$ 600.00	0.7	$ 420.00
	Special	Oak/Linden Trees	EA	$ 200.00	64	$ 12,800.00
MISCELLANEOUS						
	11020-A	MOBILIZATION	LS	$14,200.00	1	$ 14,200.00
	11050-A	CONCRETE WASHOUT	LS	$ 2,675.00	1	$ 2,675.00

Table 6 Ross Certified Site Project Cost

Project: Bondurant Trail Connections- Ross Certified Site		
Task		Cost
Site Preparation/Restoration		$ 59,000.00
Trail Pavement		$ 356,500.00
Miscellaneous		$ 17,000.00
Construction		$ 432,500.00
Contingency	15%	$ 64,875.00
Engineering/Administration	10%	$ 43,250.00
Total Project Cost		$ 540,625.00

Table 7 Total Project Cost (all trails)

Project: Bondurant Trail Connections- Total Project Cost	
Project Location/ Site	Cost
Site Preparation/Restoration	$ 321,375.00
Trail Pavement	$ 1,262,125.00
Ross Certified Site	$ 540,625.00
Total Project Cost	$ 2,124,125.00

Appendices

Appendix A: Geometric Design and ADA Accessibility

A.1 Horizontal Curvature

Horizontal alignment design for all trail segments was developed using the geometric criteria outlined in SUDAS Chapter 12 and AASHTO guidance for shared-use paths. A design speed of 18 mph was selected for the trail network. Based on this design speed, the corresponding minimum horizontal curve radius of 60 feet was obtained directly from the SUDAS design guidance rather than through independent calculation (SUDAS, 2026). This criterion was applied during alignment development in Civil 3D to ensure safe trail operation while maintaining consistency throughout the project sites.

Table A.1 SUDAS Horizontal Curve Minimum Radii

Table 12B-2.02: Minimum Radii for Horizontal Curves at Lean Angle

Design Speed (mph)	Minimum Radius (feet)
12	27
14	36
16	47
18	60
20	74
25	115
30	166

Source: *AASHTO Bicycle Guide* Exhibit 5.6

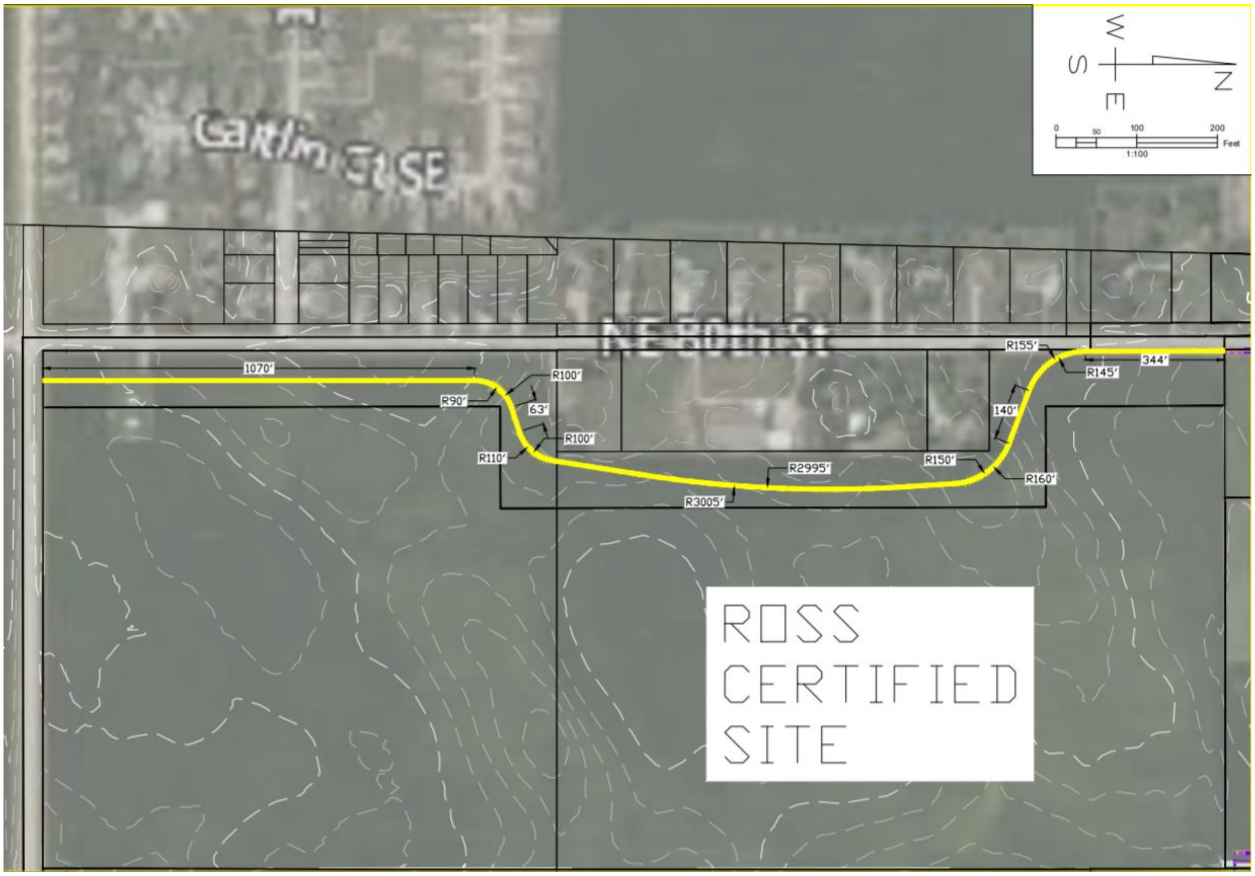


Figure A.1 Ross Certified Site Horizontal Curves

Figure A.2 Ditch 2 Site Horizontal Curves

Figure A.3 Pleasantview Park Site Horizontal Curves

A.2 Vertical Grading and ADA Compliance

Vertical alignments were designed to satisfy ADA accessibility requirements while maintaining connectivity between neighborhoods, schools, and recreational areas. Trail grades were designed with a maximum running slope of 5.0%, consistent with SUDAS recommendations for accessible shared-use facilities (SUDAS, 2026).

Civil 3D profile tools were used to establish proposed grades and vertical transitions while maintaining constructability and minimizing excessive earthwork. Vertical profiles were reviewed to verify compliance with maximum slope requirements.

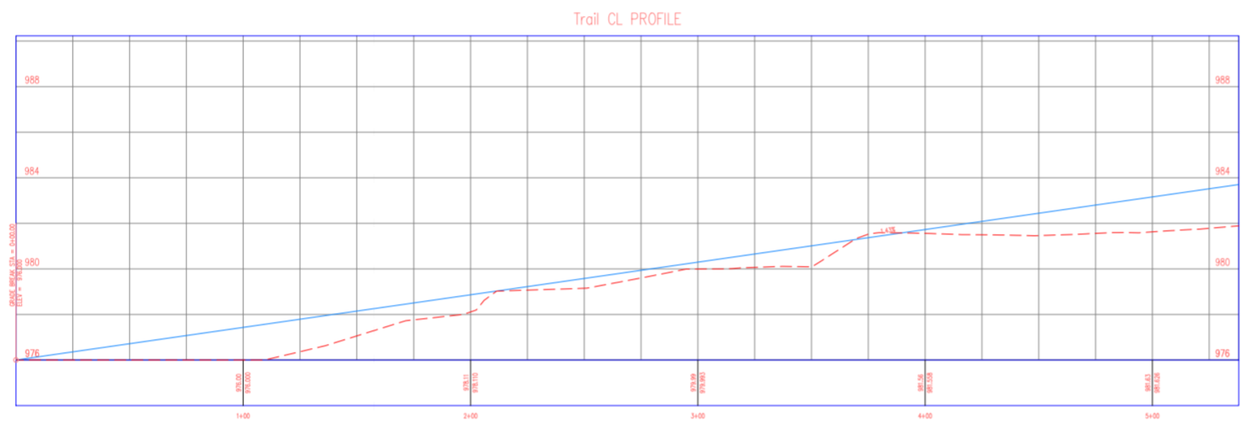


Figure A.4 Ross Certified Site ADA Compliance Example

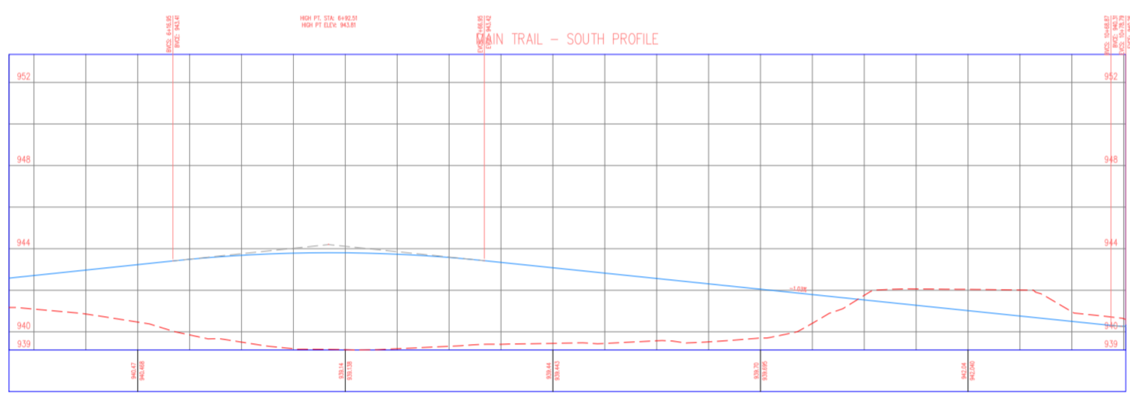


Figure A.5 Ditch 2 Site ADA Compliance Example

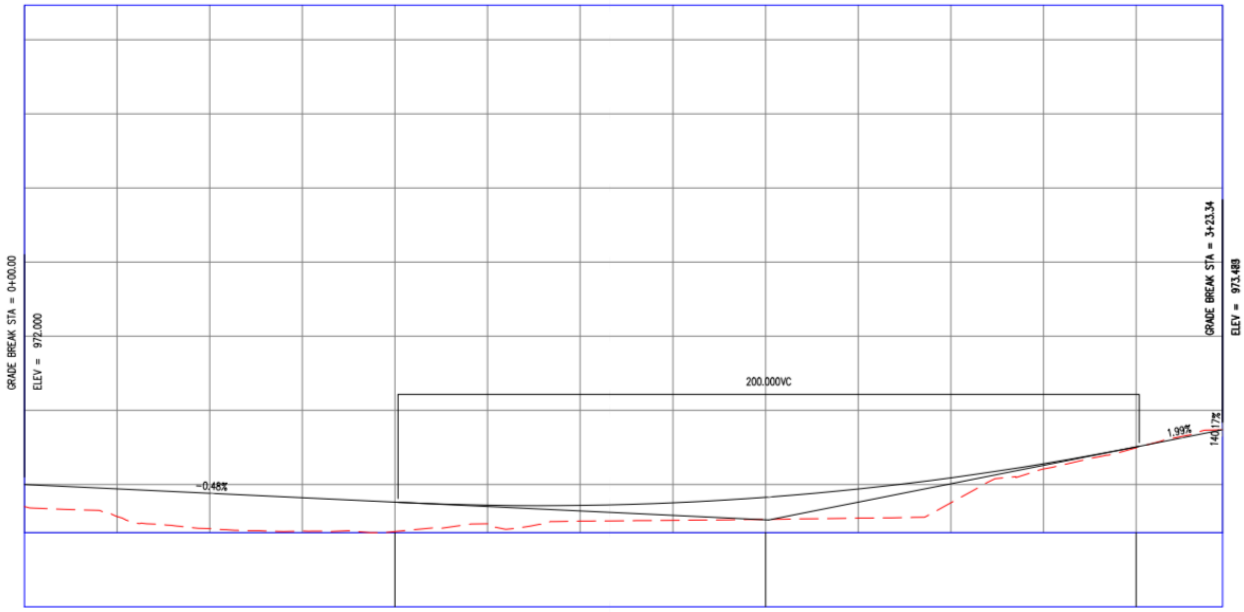
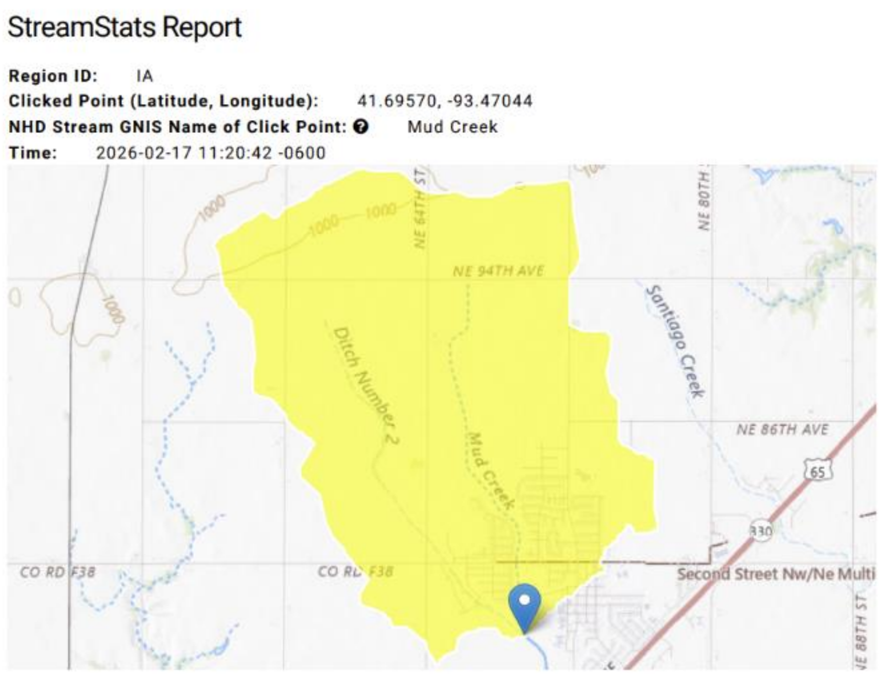


Figure A.6 Pleasantview Park Site ADA Compliance Example

Appendix B: Hydrologic and Hydraulic Analysis

B.1 Watershed Delineation and Peak Flow

The Ditch 2 site required a detailed drainage analysis to ensure the trail crossing does not impede existing flow. Watershed delineation for the bridge location was conducted using the USGS StreamStats tool, which provides automated basin boundary extraction based on national elevation datasets. The delineation identified the drainage area and key hydrologic parameters, including drainage area, slope, land cover, and hydrologic soil characteristics, which are required for peak flow estimation.

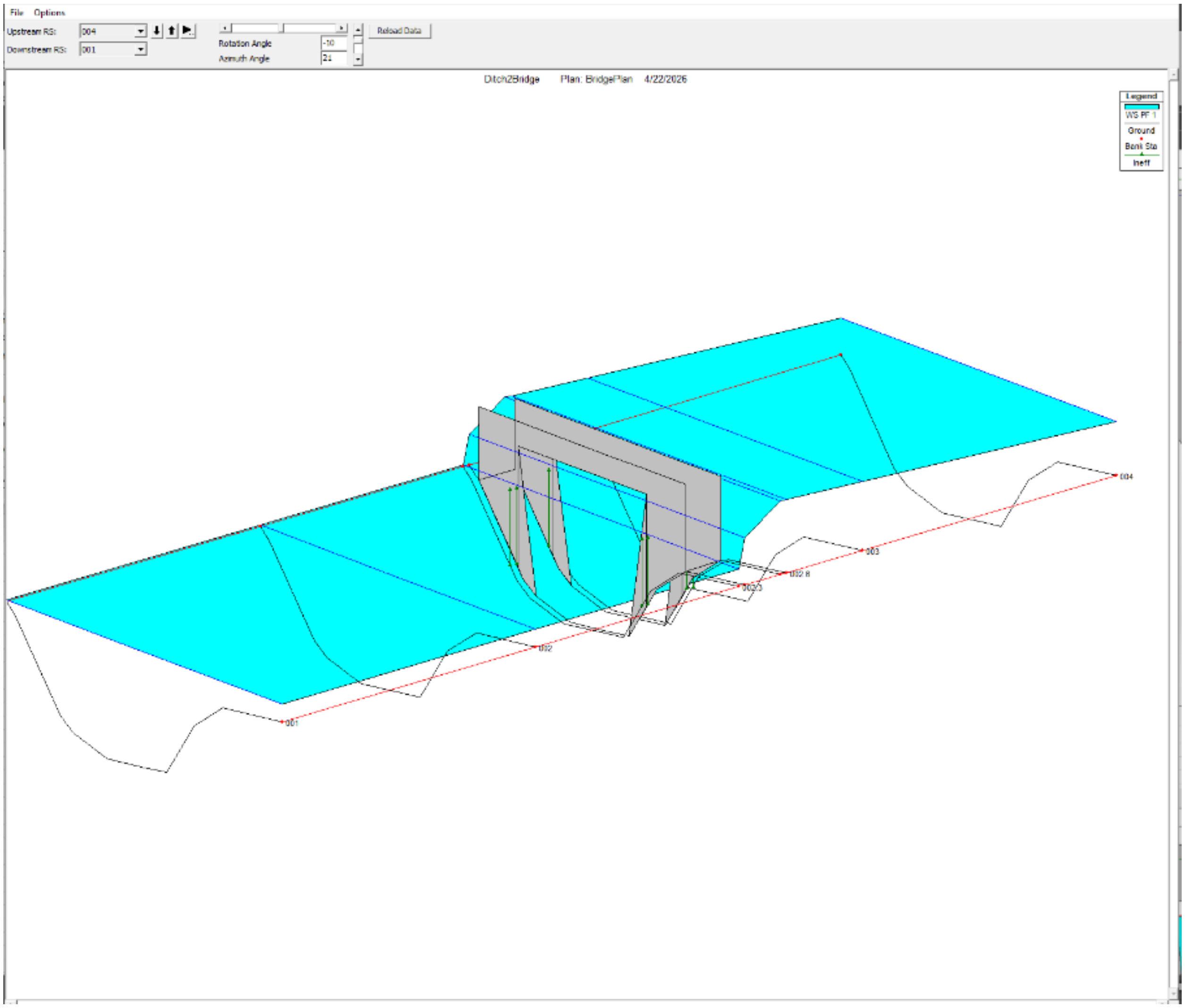


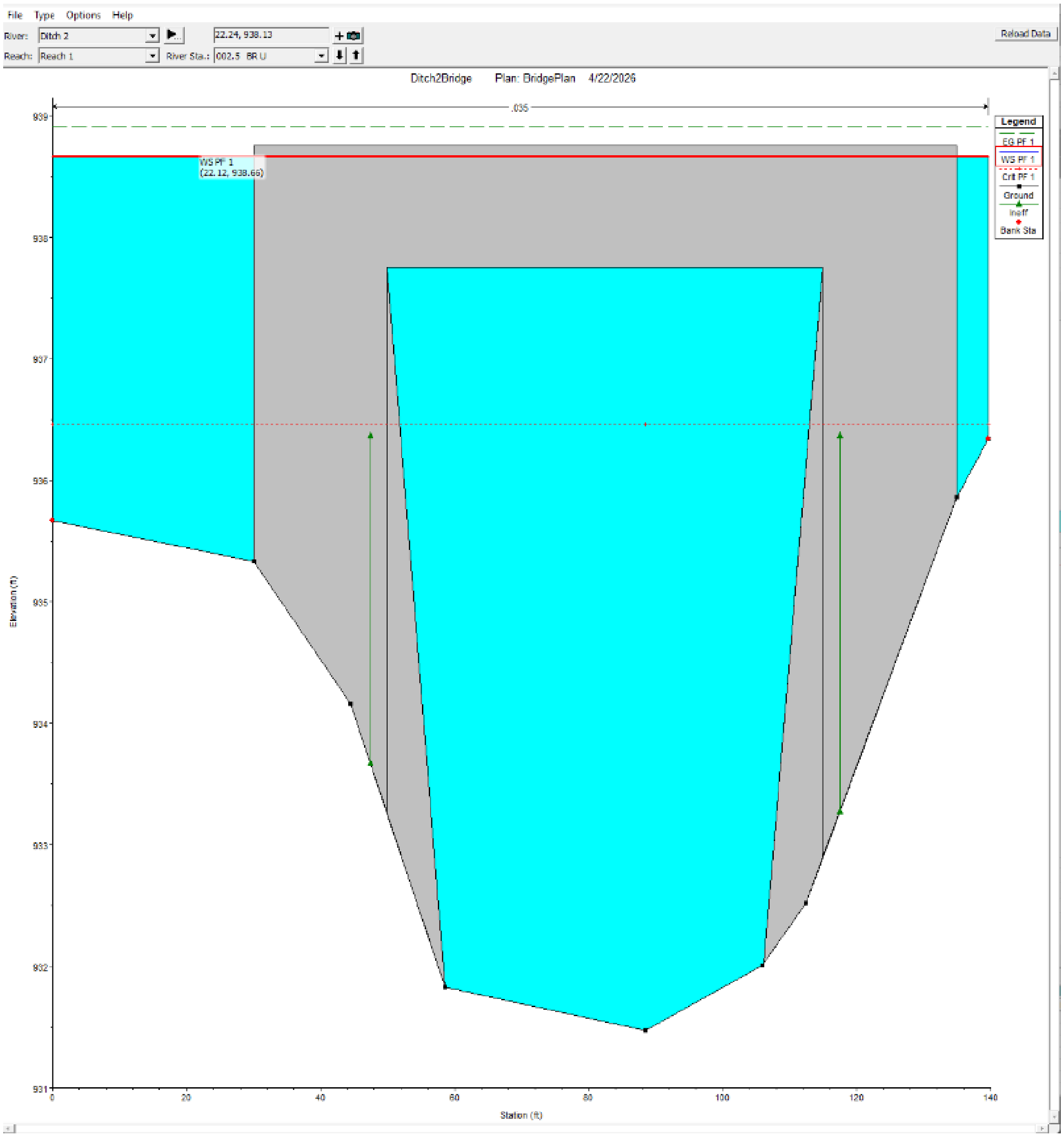
Hydraulic analysis was performed using WinTR-55, which applied NRCS methods to estimate storm runoff and peak discharge for design storms. The curve number and time of concentration for the basin had to be determined prior to using WinTR-55. The curve number was computed using land-use and soil data from StreamStats, and the time of concentration was calculated using the following equation:

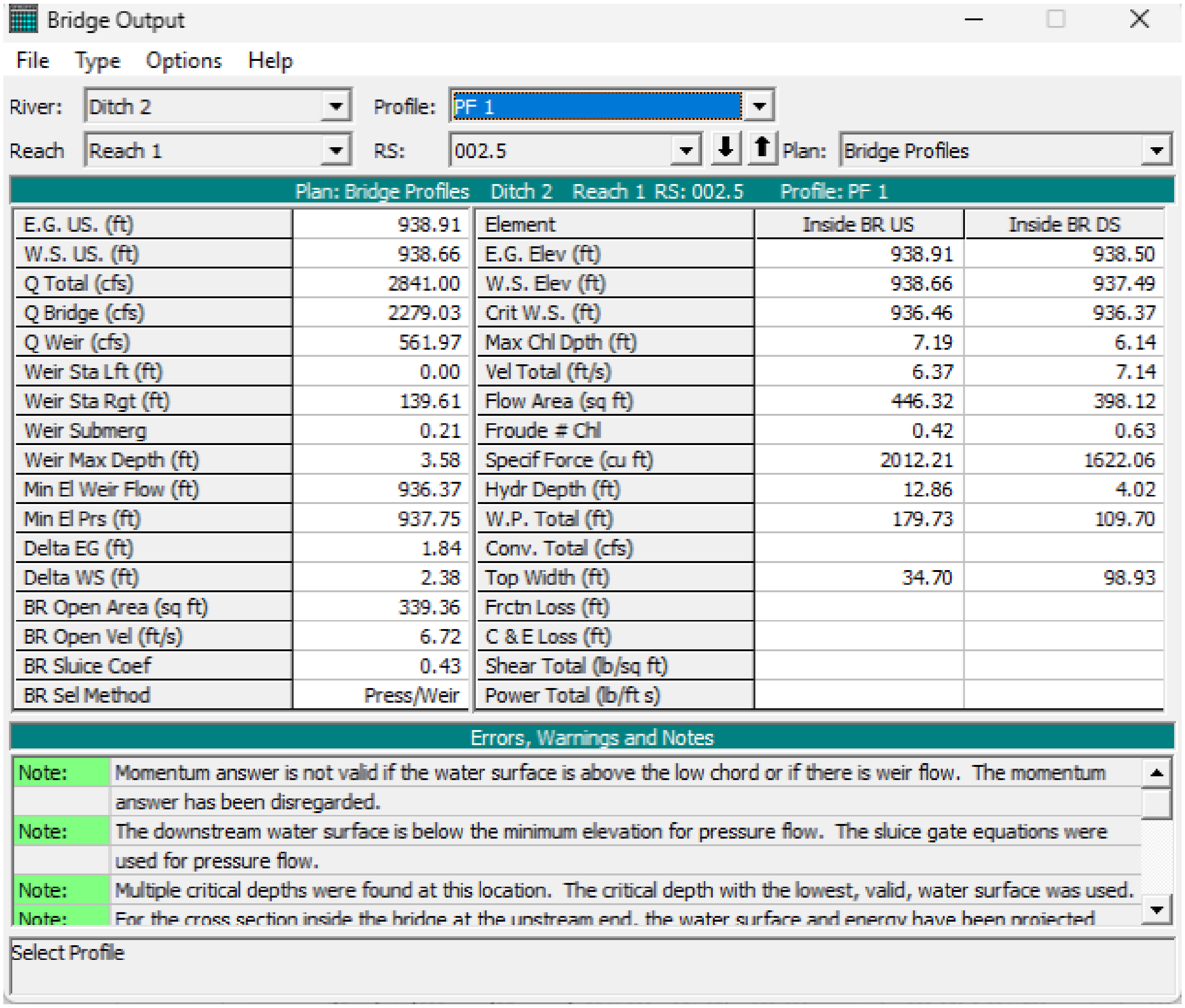
$$t_c = \frac{l^{0.8}(S+1)^{0.7}}{1{,}140Y^{0.5}}$$

Where l is the longest travel path through the watershed, S is a parameter related to the curve number, and Y is the slope of the land in the watershed.

HEC-RAS is the modeling tool used for completing the hydraulic analysis of the bridge along the Ditch 2 site. The bridge was designed to meet the freeboard requirements of greater than 0 feet for the 100-year flood per Chapter 3 of the Iowa DOT Preliminary Bridge Design Manual. The model included cross-sections upstream and downstream of the bridge, bridge geometry, and roughness coefficients based on site conditions. The output for the model and summary table are shown below:




File Type Options Help
River: Ditch 2
Reach: Reach 1
River Sta.: 002.5 BR U
22.24, 938.13
Reload Data
Ditch2Bridge Plan: BridgePlan 4/22/2026
.035
WS PF 1
(22.12, 938.66)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Bridge Output

File Type Options Help

River: Ditch 2 Profile: PF 1

Reach Reach 1 RS: 002.5 Plan: Bridge Profiles

Plan: Bridge Profiles Ditch 2 Reach 1 RS: 002.5 Profile: PF 1

E.G. US. (ft)	938.91	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	938.66	E.G. Elev (ft)	938.91	938.50
Q Total (cfs)	2841.00	W.S. Elev (ft)	938.66	937.49
Q Bridge (cfs)	2279.03	Crit W.S. (ft)	936.46	936.37
Q Weir (cfs)	561.97	Max Chl Dpth (ft)	7.19	6.14
Weir Sta Lft (ft)	0.00	Vel Total (ft/s)	6.37	7.14
Weir Sta Rgt (ft)	139.61	Flow Area (sq ft)	446.32	398.12
Weir Submerg	0.21	Froude # Chl	0.42	0.63
Weir Max Depth (ft)	3.58	Specif Force (cu ft)	2012.21	1622.06
Min El Weir Flow (ft)	936.37	Hydr Depth (ft)	12.86	4.02
Min El Prs (ft)	937.75	W.P. Total (ft)	179.73	109.70
Delta EG (ft)	1.84	Conv. Total (cfs)		
Delta WS (ft)	2.38	Top Width (ft)	34.70	98.93
BR Open Area (sq ft)	339.36	Frctn Loss (ft)		
BR Open Vel (ft/s)	6.72	C & E Loss (ft)		
BR Sluice Coef	0.43	Shear Total (lb/sq ft)		
BR Sel Method	Press/Weir	Power Total (lb/ft s)		

Errors, Warnings and Notes

Note:	Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Note:	The downstream water surface is below the minimum elevation for pressure flow. The sluice gate equations were used for pressure flow.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	For the cross section inside the bridge at the upstream end, the water surface and energy have been projected

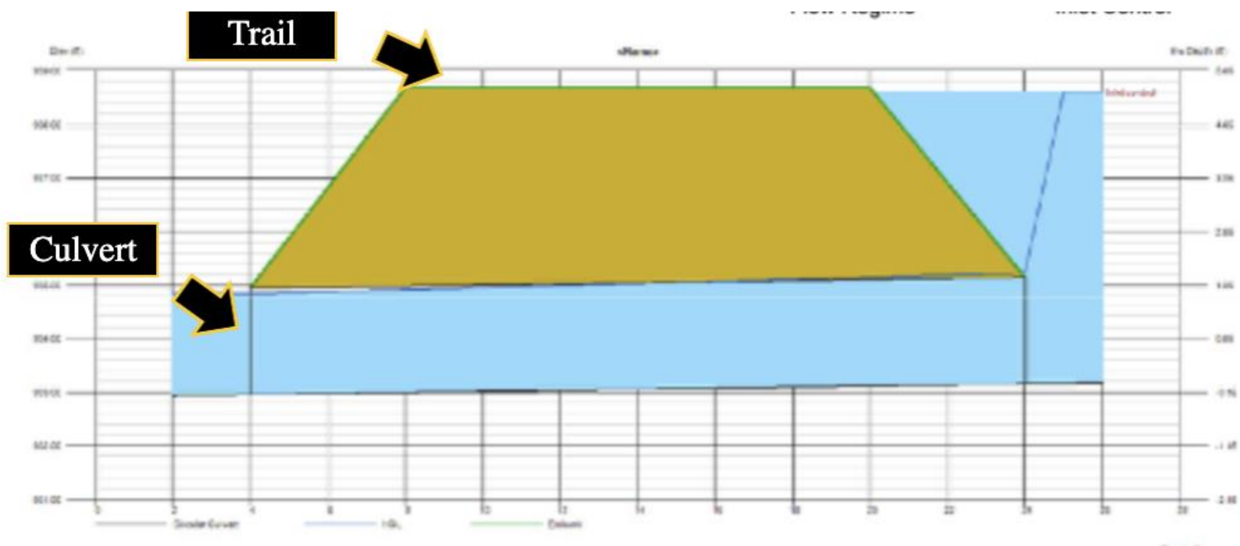
Select Profile

B.2 Culvert Sizing

The culvert was sized per the Iowa DOT Design Manual, Chapter 4, ensuring the headwater elevation remains within allowable limits (Iowa Department of Transportation, 2025).

Invert Elev Dn (ft)	= 932.95
Pipe Length (ft)	= 20.00
Slope (%)	= 1.00
Invert Elev Up (ft)	= 933.15
Rise (in)	= 24.0
Shape	= Circular
Span (in)	= 24.0
No. Barrels	= 1
n-Value	= 0.012
Culvert Type	= Circular Concrete
Culvert Entrance	= Square edge w/headwall (C)
Coeff. K,M,c,Y,k	= 0.0098, 2, 0.0398, 0.67, 0.5
Embankment	
Top Elevation (ft)	= 938.68
Top Width (ft)	= 12.00
Crest Width (ft)	= 5.00

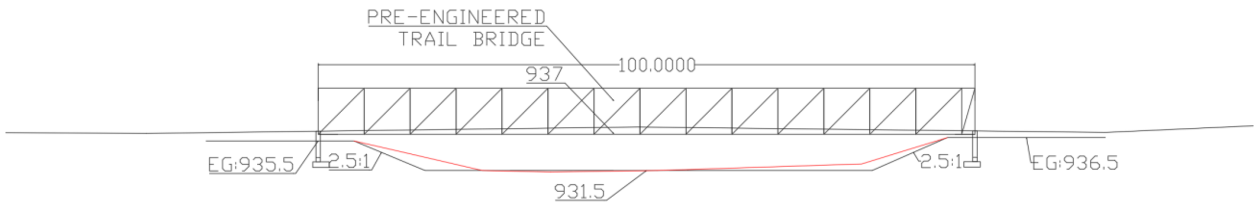
Calculations	
Qmin (cfs)	= 0.00
Qmax (cfs)	= 32.00
Tailwater Elev (ft)	= Critical
Highlighted	
Qtotal (cfs)	= 32.00
Qpipe (cfs)	= 32.00
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 10.41
Veloc Up (ft/s)	= 10.19
HGL Dn (ft)	= 934.84
HGL Up (ft)	= 935.23
Hw Elev (ft)	= 938.61
Hw/D (ft)	= 2.73
Flow Regime	= Inlet Control

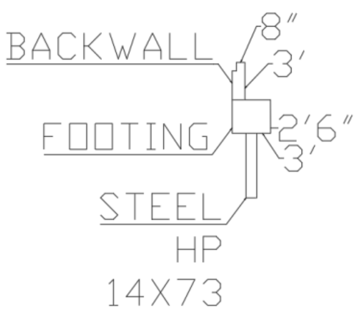


Appendix C: Structural Abutment Adaptation

C.1 Abutment Methodology

The bridge abutments for the Ditch 2 site were adapted from a comparative analysis of previous City of Bondurant bridge projects. This method ensured the substructure was compatible with the pre-fabricated bridge aesthetics and structural loads.





Appendix D: Quantity Estimates and Cost Estimation

D.1 Quantity Estimation Method

Material quantities for trail construction were estimated using the Average End Area method within Civil 3D. Quantities were generated by comparing proposed corridor surfaces against existing ground surfaces. This process was used to estimate pavement materials, subbase requirements, and earthwork volumes for each project site.

Primary trail sections consisted of:

- 6-inch PCC pavement
- 6-inch granular subbase

The Pleasantview Park gravel trail consisted of:

- 4-inch Class V aggregate
- 2-inch ASTM No. 57 stone

Civil 3D corridor reports and quantity takeoff tools were used to generate estimated material quantities for each site. These reports provided values for pavement areas, material volumes, and earthwork quantities necessary for construction planning.

Table D.1 Ross Certified Site Project Quantities

Estimated Project Quantities				
Item No.	Item Code	Item	Unit	Total
1	2010-B	CLEARING AND GRUBBING	AC	1.5
2	2010-E	EXCAVATION - CLASS 10	CY	1825
3	2010-J	GRANULAR SUBBASE	SY	5000
4	7030-C	SHARED USE PATH, 6" PCC	SY	3575
5	9040-A-1	SWPPP PREPARATION	LS	1
6	9040-A-2	SWPPP MANAGEMENT	LS	1
7	2010-D-1	TOPOSOIL, ON-SITE	CY	565
8	9010-B	PRAIRIE SEEDING MIX	AC	0.7
9	SPECIAL	OAK/LINDEN TREES	EA	64
10	11020-A	MOBILIZATION	LS	1
11	11050-A	CONCRETE WASHOUT	LS	1

Table D.2 Ditch 2 Site Project Quantities

Estimated Project Quantities				
Item No.	Item Code	Item	Unit	Total
1	2010-B	CLEARING AND GRUBBING	AC	2.01
2	2010-E	EXCAVATION - CLASS 10	CY	5350
3	2010-J	GRANULAR SUBBASE	SY	5775
4	7030-C	SHARED USE PATH, 6" PCC	SY	5200
5	9040-A-1	SWPPP PREPARATION	LS	1
6	9040-A-2	SWPPP MANAGEMENT	LS	1
7	2010-D-1	TOPOSOIL, ON-SITE	CY	0.82
8	9010-B	PRAIRIE SEEDING MIX	AC	0.82
9	SPECIAL	OAK/LINDEN TREES	EA	70
10	11020-A	MOBILIZATION	LS	1
11	11050-A	CONCRETE WASHOUT	LS	1
12	SPECIAL	ABUTMENTS	CY	39
13	9080-B	APPROACH RAILING, STEEL	LS	1
14	SPECIAL	PRE-FABRICATED STEEL BRIDGE	LS	1
15	SPECIAL	RIP RAP, CLASS E	TON	180
16	SPECIAL	PILES, STEEL, HP 14X73	LF	360

Table D.3 Pleasantview Park Site Project Quantities

Estimated Project Quantities				
Item No.	Item Code	Item	Unit	Total
1	2010-B	CLEARING AND GRUBBING	AC	1.8
2	2010-E	EXCAVATION - CLASS 10	CY	1800
3	2010-I	GEOGRID	SY	525
4	2010-J	GRANULAR SUBBASE	SY	1800
5	7030-C	SHARED USE PATH, 6" PCC	SY	1800
6	2010-I	ASTM #57 STONE	SY	525
7	7070-B-1	AGGREGATE	TON	125
8	9040-A-1	SWPPP PREPARATION	LS	1
9	9040-A-2	SWPPP MANAGEMENT	LS	1
10	2010-D-1	TOPOSOIL, ON-SITE	CY	1050
11	9010-B	PRAIRIE SEEDING MIX	AC	1.5
12	SPECIAL	OAK/LINDEN TREES	EA	55
13	11020-A	MOBILIZATION	LS	1
14	11050-A	CONCRETE WASHOUT	LS	1

D.2 Construction Cost Estimate

Estimated construction costs were developed using Iowa DOT bid tabulations and average unit prices. Unit costs obtained from Iowa DOT bid tables were applied to the calculated material quantities to estimate total project construction costs for each site.

Cost estimates were developed by multiplying the measured quantities from Civil 3D by corresponding unit bid prices for construction materials and activities, including PCC pavement, granular subbase, aggregate surfacing, and applicable earthwork items.

The resulting estimates provide a planning-level cost comparison between project sites and allow evaluation of design alternatives during project development.

Table D.4 Ross Certified Site Construction Cost

Project: Bondurant Trail Connections- Ross Certified Site						
Task	**Item Number**	**Item Description**	**Unit**	**Unit Cost**	**Quantity**	**Cost**
Site Preparation						
	2010-B	Clearing and Grubbing	ACRE	$ 6,950.00	1.5	$ 10,425.00
Cut						
	2010-E	Excavation – Class 10	CY	$ 8.40	1325	$ 11,130.00
Fill						
	2010-E	Excavation – Class 10	CY	$ 8.40	500	$ 4,200.00
Subbase						
	2010-J	GRANULAR SUBBASE	SY	$ 16.95	5000	$ 84,750.00
Pavement						
	7030-C	SHARED USE PATH, PCC, 6"	SY	$ 76.00	3575	$271,700.00
Site Restoration						
	9040-A-1	SWPPP PREPARATION	LS	$11,600.00	1	$ 11,600.00
	9040-A-2	SWPPP MANAGEMENT	LS	$ 4,000.00	1	$ 4,000.00
	2010-D-1	Topsoil, On-site	CY	$ 7.25	565	$ 4,096.25

	9010-B	Prairie Seeding Mix	AC	$ 600.00	0.7	$ 420.00
	Special	Oak/Linden Trees	EA	$ 200.00	64	$ 12,800.00
MISCELLANEOUS						
	11020-A	MOBILIZATION	LS	$14,200.00	1	$ 14,200.00
	11050-A	CONCRETE WASHOUT	LS	$ 2,675.00	1	$ 2,675.00

Table D.5 Ross Certified Site Project Cost

Project: Bondurant Trail Connections- Ross Certified Site		
Task		Cost
Site Preparation/Restoration		$ 59,000.00
Trail Pavement		$ 356,500.00
Miscellaneous		$ 17,000.00
Construction		$ 432,500.00
Contingency	15%	$ 64,875.00
Engineering/Administration	10%	$ 43,250.00
Total Project Cost		$ 540,625.00

Table D.6 Ditch 2 Construction Cost

Project: Bondurant Trail Connections- Ditch 2						
Task	**Item Number**	**Item Description**	**Unit**	**Unit Cost**	**Quantity**	**Cost**
Site Preparation	2010-B					
		Clearing and Grubbing	ACRE	$ 6,950.00	2.01	$ 13,969.50
Cut	2010-E					
		Excavation – Class 10	CY	$ 8.36	3250	$ 27,170.00
Fill	2010-E					
		Excavation – Class 10	CY	$ 8.36	2100	$ 17,556.00
Subbase						
	2010-J	GRANULAR SUBBASE	SY	$ 16.95	5775	$ 97,886.25
Pavement						

	7030-C	SHARED USE PATH, PCC, 6"	SY	$ 76.00	5200	$ 395,200.00
Site Restoration						
	9040-A-1	SWPPP PREPARATION	LS	$ 11,600.00	1	$ 11,600.00
	9040-A-2	SWPPP MANGEMENT	LS	$ 4,000.00	1	$ 4,000.00
	2010-D-1	Topsoil, On-site	CY	$ 7.25	0.82	$ 5.95
	9010-B	Prairie Seeding Mix	AC	$ 600.00	0.82	$ 492.00
	Special	Oak/Linden Trees	EA	$ 200.00	70	$ 14,000.00
Miscellaneous						
	SPECIAL	ABUTMENTS	CY	$ 1,500.00	39	$ 58,500.00
	9080-B	APPROACH RAILING, STEEL	LF	$ 200.00	1	$ 200.00
	SPECIAL	PRE-ENGINEERING BRIDGE	LS	$ 200,000.00	1	$ 200,000.00
	11020-A	MOBILIZATION	LS	$ 14,200.00	1	$ 14,200.00
	11050-A	CONCRETE WASHOUT	LS	$ 2,675.00	1	$ 2,675.00
	SPECIAL	RIP RAP, CLASS E	TON	$ 80.00	180	$ 14,400.00
	SPECIAL	PILES, STEEL, HP 14X73	LF	$ 90.00	360	$ 32,400.00

Table D.7 Ditch 2 Project Cost

Project: Bondurant Trail Connections- Ditch 2		
Task		Cost
Site Preparation/Restoration		$ 89,000.00
Trail Pavement		$ 493,500.00
Bridge		$ 291,500.00
Miscellaneous		$ 135,700.00
Construction		$ 1,009,700.00
Contingency	15%	$ 151,455.00
Engineering/Administration	10%	$ 100,970.00
Total Project Cost		$ 1,262,125.00

Table D.8 Pleasantview Park Construction Cost

Project: Bondurant Trail Connections- Pleasantview Park						

Task	Item Number	Item Description	Unit	Unit Cost	Quantity	Cost
Site Preparation	2010-B					
		Clearing and Grubbing	ACRE	$ 6,950.00	1.8	$ 12,510.00
Cut	2010-E					
		Excavation – Class 10	CY	$ 8.36	1400	$ 11,704.00
Fill	2010-E					
		Excavation – Class 10	CY	$ 8.36	400	$ 3,344.00
Subbase						
	2010-J	GRANULAR SUBBASE	SY	$ 16.95	1800	$ 30,510.00
	2010-I	Geogrid	SY	$ 3.28	525	$ 1,722.00
Pavement	7030-C					
		SHARED USE PATH, PCC, 6"	SY	$ 76.00	1800	$136,800.00
	2010-I	ASTM #57 Stone	SY	$ 4.68	525	$ 2,457.00
	7070-B-1	Aggregate	TON	$ 46.55	125	$ 5,818.75
Site Restoration						
	9040-A-1	SWPPP PREPARATION	LS	$11,600.00	1	$ 11,600.00
	9040-A-2	SWPPP MANGEMENT	LS	$ 4,000.00	1	$ 4,000.00
	2010-D-1	Topsoil, On-site	CY	$ 7.25	1050	$ 7,612.50
	9010-B	Prairie Seeding Mix	AC	$ 600.00	1.5	$ 900.00
	Special	Oak/Linden Trees	EA	$ 200.00	55	$ 11,000.00
MISCELLANEOUS						
	11020-A	MOBILIZATION	LS	$14,200.00	1	$ 14,200.00
	11050-A	CONCRETE WASHOUT	LS	$ 2,675.00	1	$ 2,675.00

Table D.9 Pleasantview Park Project Cost

Project: Bondurant Trail Connections- Pleasantview Park	
Task	Cost

Site Preparation/Restoration		$ 62,700.00
Trail Pavement		$ 177,500.00
Miscellaneous		$ 16,900.00
Construction		$ 257,100.00
Contingency	15%	$ 38,565.00
Engineering/Administration	10%	$ 25,710.00
Total Project Cost		$ 321,375.00

Table D.10 Total Project Cost for All Sites

Project: Bondurant Trail Connections- Total Project Cost	
Project Location/ Site	Cost
Site Preparation/Restoration	$ 321,375.00
Trail Pavement	$ 1,262,125.00
Ross Certified Site	$ 540,625.00
Total Project Cost	$ 2,124,125.00

Appendix E: Bibliography

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