West Side Trail Study

City of Muscatine

Final Report – March 13, 2018
Addendum No. 1 – March 19, 20108




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Addendum No. 1
West Side Trail Study
3/19/2018

The information provided in this addendum should be consider part of the overall West Site Trail study and should be used to help with the completion of this project.

The City of Muscatine has received a final West Side Trail study and is working on developing the next phase of the trail project. The City needs to start conversations with the Ag Center and get authorization to encroach on their property for the completion of the cultural resource study (CRS). The CRS is typically completed after a final route alignment has been selected, but it is being recommended to be completed early because it could save the city a significant cost if nothing is found along the preferred route alignment.

The CRS requires a qualified person to complete a dig test along the trail alignment. This next phase of the CRS should take one week to complete. The archaeologist will then provide a report of their findings to the city and to the state archaeology department. If a significant site is uncovered with the initial dig along the recommended route then the time constraint of having a completed trail project by October 31st, 2019, is not likely. This completion date is important because it is tied to the funding of the project. To help protect the funding, the City could decide to move the trail alignment to the Houser St. route and forego the more invasive archaeological investigation if nothing is found on that route.

When the city staff makes a final decision on which trail alignment they want designed, then the next step for the City should be to work on completing any required negotiations with the Ag Center for any necessary right-of-way acquisition along the final trail alignment. To help stay on schedule the final design should be started no later than June 1st, 2018 so that the project can go through the DOT letting process for an approximate November bid letting date.

One concern that needs to be addressed further is the requirement for a retaining wall along Houser Street. There is a potential that the trail could be raised 1-foot above the back of curb. This would be achieved by using a 3:1 slope from the back of curb for three feet and then grading the remaining two feet of shoulder at a 2% slope. In Section II.D of the study it assumed that this would not be a desirable design option; however, the city does have an effective way of maintaining a steep grassy slope adjacent to a roadway. This design consideration would effectively decrease the retaining wall by 1-foot and also help reduce the overall length of the retaining wall.

The other design aspect of the trail when adjacent to the retaining wall is that the recommended pavement section would be 12' wide to obtain an effective 10' wide trail. The purpose of the additional pavement width is due to the AASHTO requirement of a minimum 2' buffer between the trail and any objects adjacent to the trail. The additional pavement would help reduce additional long-term maintenance for the city's department of parks and recreation.

Sincerely,

MARTIN & WHITACRE SURVEYORS & ENGINEERS, INC.

Ricky Teed, P.E.

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I. Executive Summary

The City of Muscatine has been focused on connecting all the trails throughout the city since they adopted a Complete Streets Program. As part of this, they tasked a study team with determining the best trail route to connect Kent-Stein Park to the county's Discovery Park. Steve Ford Landscape Architecture and Martin & Whitacre Surveyors & Engineers, Inc. looked at many options through the study corridor (Figure 1, pg. 3). The team was able to narrow down the potential trail routes to two options based on reports provided by Tallgrass Archaeology LLC and EarthView Environmental as well as various design constraints and challenges. After discussing the two options with the steering committee and determining a cost estimate for both routes, the team recommends that the city staff considers the Farm Road route.

The trail will start at Kent-Stein Park, travel north along the west side of Houser Street. There is an existing farm road a quarter of the way up Houser Street hill between Hershey Avenue and Lucas Street that the trail will utilize to ascend the bluff. At the top, the trail will make its way along the east side of the Ag Learning Center Property and turn west to follow Lucas Street out towards the Highway 61 Bypass. The trail then travels north on the east side of the bypass up to Discovery Park where it connects to the existing trail system.

The main components of the design are placing a new ten-foot-wide trail from Kent-Stein Park north to the county's Discovery Park. A new continental bridge will be placed within Discovery Park to span the creek, a few culverts will be needed to not obstruct flow of existing ditches and drainage ways. Portions of Houser will require retaining walls as there is not enough room between the back of curb and the toe of the bluff.

The estimated project cost for the Farm Road route is $1,038,000. This route option is $197,000 less than the Houser Street route. Both routes are comparable in scope and have their unique advantages, and the cost estimate helped make the final determination of which route to recommended. One of the next steps is to complete a Phase I Cultural Resource study to help identify any archaeologically sensitive areas along the proposed route. If the Phase I study identifies an archaeological site that requires extensive mitigation, then estimate time for completion and the overall project cost could potentially exceed the Houser Street route. It is also recommended that the city staff reevaluate the selected route after the Phase I study is completed to determine if the city staff's recommendation needs to be changed.

II. Introduction

A. Objective

In 2017, the City of Muscatine adopted a "complete street design" for any new developments within the city. Since that decision, Muscatine has significantly improved the community's ability to safely travel through town using alternative modes of transportation. One focus that the City has been pursuing is the development of the multi-use trail system. The City has already completed several miles of the Mississippi River Trail (MRT) as it travels along existing earthen levees next to the river. This section of the MRT works its way along difficult terrain using a series of continental bridge sections over several steep bluffs. Another section in the process travels south to Louisa County where a multi-mile section of the MRT has been preliminarily designed. In 2017 the City nearly doubled their trail system with the completion of the 4.1-mile trail from Kent-Stein Park to Deep Lakes Park. Currently there are approximately 12.6 miles of multi-use trails that the City maintains today.

The City is currently investigating a new trail alignment called the West Side Trail Project. This link will connect the expanding system of trails in Muscatine and the County of Muscatine. The new proposed West Side Trail will start at the existing Kent-Stein Park entrance on Musser Street and end at the County's Discovery Park where it will connect to existing trails. This trail would add another two (2) miles to the trail system and it would close the gap on the County and City-wide trail system. In 2014, the City of Muscatine teamed up with the University of Iowa: The Iowa Initiative for Sustainable Communities for a similar investigation. A student led team. from the University of Iowa submitted a proposal.

The scope of the project was established in the request for proposal (RFP) in August 2017. The City of Muscatine wanted help to identify a trail alignment that met the American Association of State Highway and Transportation Officials (AASHTO), set of standards for multipurpose trails. These standards comply with the latest Americans with Disabilities Act (ADA) regulations. Steve Ford Landscape Architecture was awarded the project on November 2, 2017 during the City Council meeting. Many challenges were faced when determining viable trail options including land acquisition, utilities, and steep grades. The study team was tasked with determining the best route based on the design criteria.

The study corridor was defined in the RFP (see Figure 1, pg. 3). The design objectives and constraints were clarified when the team met with the steering committee. The steering committee was made up of selected city officials, county officials, and citizens that were tasked with assisting the study team to fully understand the scope and direction of the study.

Photo 1 (left) is a proposed trail head at Discovery Park.
Photo 2 (below) is near the Kent-Stein trail head.

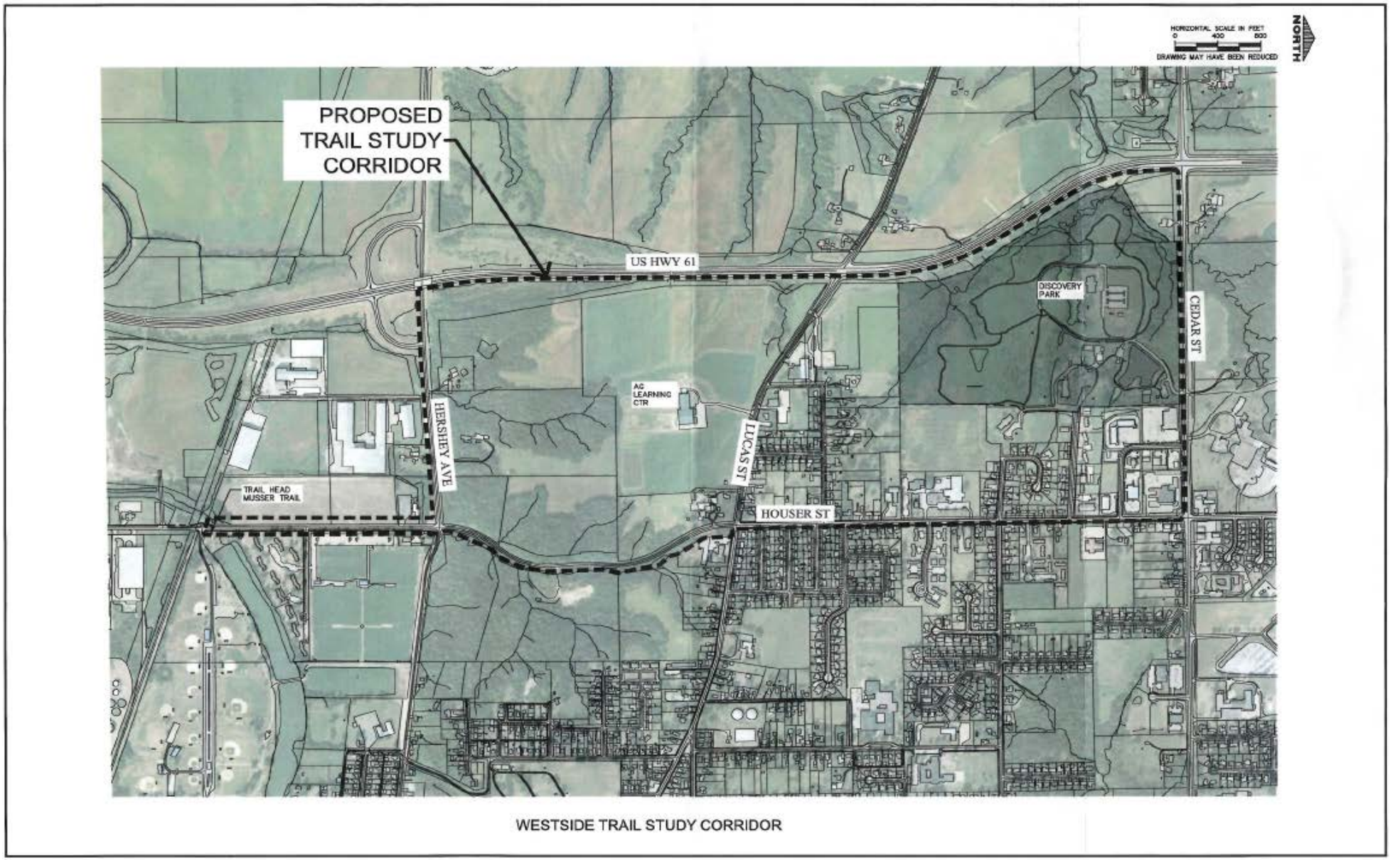

Figure 1: Westside Trail study corridor.

B. Approaches

The team adopted the approach that followed guidelines and necessary permitting processes as established by appropriate manuals and agencies. That approach was balanced between the theoretical effectiveness of the designs and the practical feasibility of its execution. Environmental and archaeological mitigation played a large role as it could add a few hundred thousand dollars to the project. Another important aspect that the study team took into consideration was public input, understand future maintenance requirements, and provide the most aesthetically pleasing trail while minimizing costs.

The study team followed the standards as described in the AASHTO Guide for the Planning, Design, and Operation of Bicycle Facilities. These guidelines were supplemented with the Iowa Statewide Urban Design and Specifications manual (SUDAS). In the instance where the manuals held conflicting information, the more conservative guideline took precedence. Where neither guideline could be met, an exclusion was added to the report.

Based on the location and size of the proposed route an Iowa Department of Transportation (IDOT) permit, a National Pollutant Discharge Elimination System (NPDES) permit, and a grading permit will be required for the construction of the trail. The team, along with the committee members, will hold a final meeting to present this proposal and the alignment chosen to the public.

C. Constraints

Typical to any civil engineering project, there were several constraints that needed to be considered for the West Side Trail Project. The study team was able to identify two solutions that existed within those established constraints. These constraints were considered "hard" or "soft". Hard constraints for this project included the design guidelines identified in the AASHTO, SUDAS and ADA standards, trail width, and time of construction. These manuals were considered a hard constraint due the nature of one of the funding sources for this project. A portion of the funding dictated that the most recent standards must be upheld and where that was not feasible a list of exclusions must be submitted and accepted by the funding agencies. The soft constraints consisted of environmental impact, archaeologically sensitive areas, maintenance, cost, aesthetics, public access, and public input. A soft constraint is something that can be mitigated or modified. The most influential constraint to crafting the final alignments were the archaeological sensitive areas and property owner's recommendations in the project corridor.

As part of the study, a Phase IA Cultural Resource Study, an archaeological survey, and a Wetland identification study was conducted by Tallgrass Archaeology LLC and EarthView Environmental, Inc., respectively. It was determined that previously identified archaeologically sensitive areas would be avoided. The archaeologically sensitive areas proved themselves to be a significant challenge due to the nature of the funding. Based on the Phase IA archaeology study, it was determined that any right of way acquisition or areas that have not been fully disturbed would require a Phase I Cultural Resource study (CRS) to determine if any archaeological sites would be disturbed by construction activity. If significant archaeological artifacts are discovered, then an environmental assessment (EA) will need to be completed prior to construction. The estimated time to complete an EA is 18 months. If nothing is found during Phase I, then the Iowa Department of Transportation (IDOT) and Federal Highway Administration may sign off on a Categorical Exclusion for the EA.

The cost estimate for this project played a major role. The City of Muscatine had previously applied for federal funding and a grant to fund this portion of the master trail plan. The cost was not listed as a hard constraint because although it would be more difficult to complete if the project exceeded the original estimate, the project is fully funded by outside sources, so the city would need to fund the remaining costs.

D. Challenges

This project posed many challenges for the study team ranging from trail width, maximum grade restrictions and archaeological impacts, which are all associated with the bluff area. The challenges faced are outlined in detail including how the team addressed them.

According to AASHTO the maximum grade allowed for a shared use path is a 12.5% slope for a maximum of 10 feet. Table 1 below from the Iowa DOT standards clearly outlines the maximum grades with the allowed lengths. The length of trail is approximately two (2) miles, with over 120 feet of vertical drop in approximately 3,000 feet of trail. Each trail option posed different challenges when it came to addressing the vertical change in elevation.

Table 1: Vertical alignment grades for ADA compliance.

Grade Range	Maximum Segment Length (feet)		
	Preferred	***Acceptable***[1]	***Allowed***[2]
< 5%	Any length	Any Length	Any Length
≥ 5% and < 8.33%	--	50	200
≥ 8.33% and < 10%	--	30	30
≥ 10% and < 12.50%	--	--	10

[1] Derived from AGODA Section 1016 (Outdoor Recreation Access Routes)

[2] Derived from AGODA Section 1017 (Trails)

The trail width developed into a major challenge as the width from the back of curb to the toe of the bluff along Houser narrowed. The consensus was to avoid cutting into the toe of the bluff if possible. There were three options that the study team considered when trying to mitigate the disturbance of the toe of the bluff, they were 1) reduce the trail width, 2) raise the trail, and 3) move the trail closer to the road. After discussing these option with the steering committee is was determined that reducing the trail width was not possible due to the funding source requirements. It was also determined that raising the trail would cause maintenance to be more difficult so that left the design team with one option if needed, move the trail closer to the road. Moving the trail closer to the road was only considered if it would significantly impact the constructability of the trail.

The bluff that Houser Street cuts through is known as Houser Hill. On the west side of Houser Street, the ground slopes up and away from the road at a severe grade with occasional ravines where water has eroded the hillside. On the east side of Houser Street, the ground slopes up and away from the road on the north end, but halfway down the hill the ground begins to slope down away from the road. Near the bottom of Houser Street there is a drop off on the east side of the road with a creek at the bottom. It was decided that the west side of Houser Street was more feasible for the trail alignment.

This bluff has been identified as highly sensitive for cultural resources by the State Archaeology Department. The creek that migrates down the bluff in this area is believed to be a pathway for the Native Americans. The tribe that lived in this area of the continent would live at the bottom of the bluff during the winter months and migrate to the top of the bluff during the summer months. There have been significant archaeological discoveries in the area and if a major discovery is identified, it could add as much as $250,000 to the project cost to mitigate the archaeological sensitivity of the site.

E. Societal Impact

The societal impact of the proposed trail is believed to be significant to local residents. People that have enjoyed the city's trail system do not have an easy way to travel up or down the bluff. This would not only allow easier access to more of the town, but it would also significantly increase the safety. There will be some temporary negative impacts during the construction of the trail. The community should expect to deal with noise pollution, road closures, and construction equipment. The most disruptive portion will be along Houser Street because it will impact a high volume of traffic that travels down Houser Street.

III. Design Selection Process

A. Design Criteria

Two design alternatives were crafted by the study team to meet the objectives of the project. Each alternative had to be weighed against the design criteria and challenges. When each alternative was defined, it had to be scrutinized for multiple design criterion. The criterion utilized for this project consisted of safety, constructability, public access, public input, feasibility, maintenance and upkeep, aesthetics, and environmental impact. Each alternative was objectively considered with each of these design criteria in mind.

1. Safety

Safety always plays a major role in any design project. For the trail, this addressed pedestrian safety, minimizing interactions between pedestrians and vehicles. That encompassed things like the posted traffic speed on the roadway, the buffer zone between the back of curb and the trail, and at what point along the road will a motorist be able to see pedestrians. Another consideration of safety is how isolated the trail is from a public roadway. Based on a survey conducted by Schoenbauer Consulting, LLC, the incidents of unlawful behavior on trails is minimal.

2. Constructability

Constructability addressed how difficult it would be to construct the trail. Things that factored into that were ease of access to the site, traffic controls when working next to a road, and ease of construction itself. It also accounts for how difficult it would be to move supplies, materials, and equipment around.

3. Public Access

Public Access addressed how easily the trail is accessible to citizens and the surrounding neighborhoods. That includes whether there are areas for people to park and access the trail. There is parking in Discovery Park as well as in Kent-Stein Park, which would be the beginning and end of this portion of trail. Additional sidewalks should be considered to help bring the public to the trail.

4. Public Input

During the course of the project a public meeting was held to explain the intent of the project and get feedback on the trail options. Based on the public meeting a few citizens were concerned with the trail crossing near their property. The team was able to get an overall temperature from the community about which of the options presented was preferred. It was determined that the majority of the community preferred trails away from roads, like the trails in Discovery Park or the new trail the runs down to Deep Lakes Park.

5. Feasibility

Feasibility pertains to how easily the trail can be designed. It looks at which parts of the trail might require more detailed design work. Precautions will need to be taken in certain areas to ensure the trail is constructed properly to allow for adequate drainage while minimizing the potential for damage to the trail and soil. Stormwater runoff, if not adequately addressed, has the potential for serious negative consequences for the trail. Those consequences include things like erosion, washing out of pieces of the trail, and high maintenance costs. Various parts of the trail will require a retaining wall where the width between the back of curb and the toe of the bluff is not sufficient for the trail profile.

6. Maintenance and Upkeep

Maintenance and upkeep addressed year-round concerns. Currently most of the trails throughout the city do not get maintained during the winter. Where trails are the main pedestrian or commuter route, such as along roads, or they have high traffic volumes, they should be maintained year-round. Trails or sidewalks within five feet of the road will have snow pushed on top of them from snow plows clearing the street. That adds an additional difficulty factor to maintaining trails. Trails with grass or decorative topiary need to be maintained during the spring, summer, and fall, which may add to the existing workload of the city maintenance staff.

7. Aesthetics

Aesthetics concentrated on the audio and visual aspects of each trail alternative. Trails that are set near roads with high posted speed limits can be very loud depending on the quality of the road. The noise associated with a road that needs repairs or does not have level concrete slabs is much louder than a well-maintained road with a lower posted speed. Trails that are visually appealing and away from traffic draw more hikers than a typical sidewalk. Pedestrians and bicyclists prefer trails that provide a change of pace compared to their normal routes when utilizing a trail for pleasure.

8. Environmental Impact

As discussed in the challenges, the environmental impact encompasses both environmental and archaeological concerns. Due to the location of the trails, both alternatives will require a Phase I CRS. If the Phase I study turns up an archaeological find, then one alternative would clearly be preferred to the other. If an artifact is found, the process becomes very lengthy; a minimum of 18 months to complete. Until the Phase I study is completed, this criterion is based on conjecture, therefore it will not be big factor when it comes to recommending a trail.

IV. Development of Alternative Solutions

Throughout the study, many potential trail routes were considered based on the boundaries of the study (see Figure 1, pg. 3). All alternatives had to start at the Kent-Stein Park trail head on Houser Street. Every option followed Houser Street up to Hershey Avenue. From the intersection of Houser Street and Hershey Avenue, the study corridor was significantly larger. It stretched from the east side of Houser Street west to the Highway 61 Bypass. Many different alternatives were considered to ascend the bluff to get to Lucas Street and continue to Discovery Park.

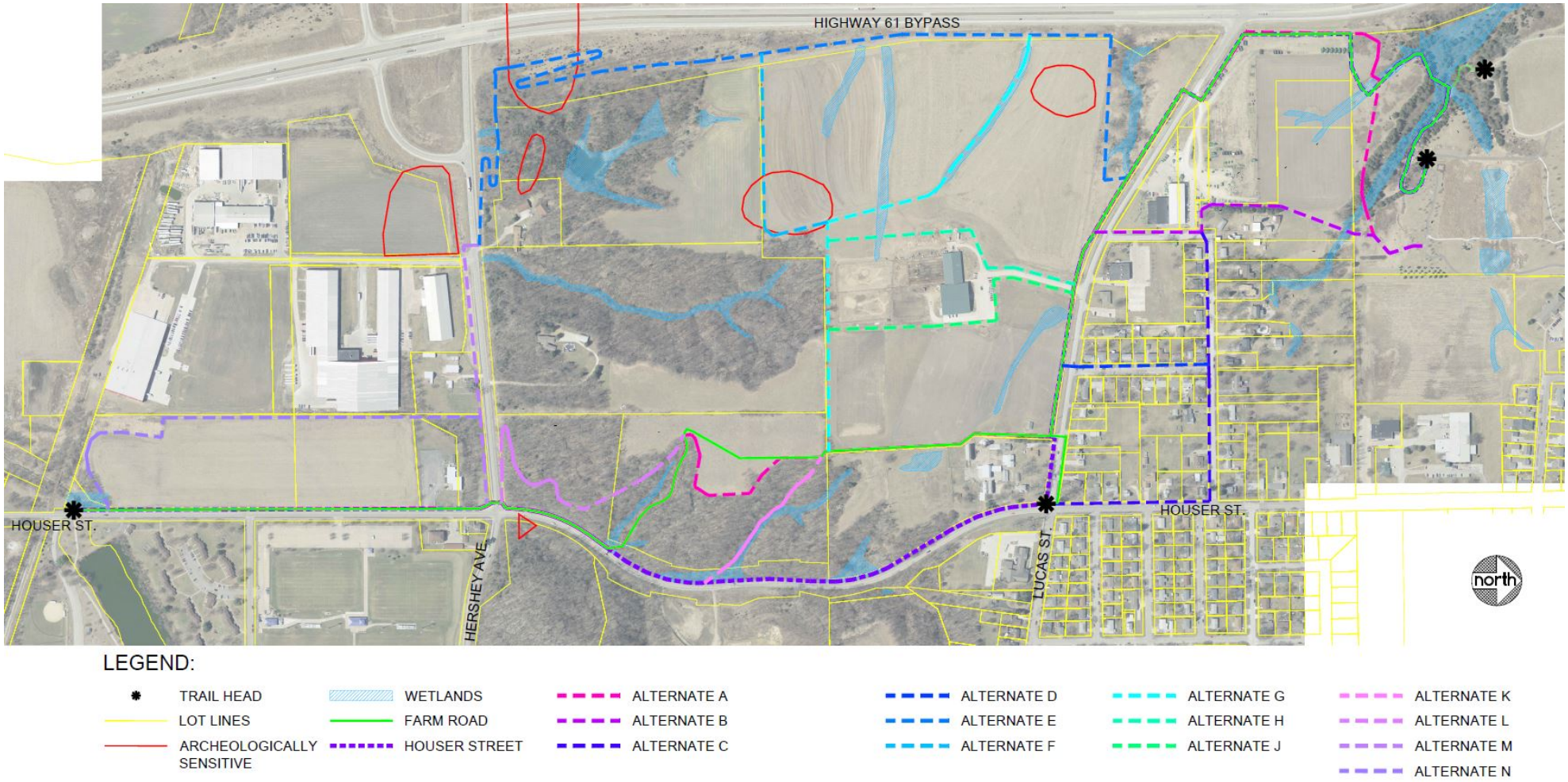

Figure 2: All alignment alternatives considered.

A. Alternates Considered

When the study corridor was established, there were a significant number of route options that were assessed. Figure 2 (pg. 8) illustrates all the various route options that were considered when looking to connect the existing trails. Routes E, F, G, and N were eliminated for their proximity to known archaeological sites. The Phase 1A Cultural Resource study recommended avoidance of known sites. Alternates H and J were eliminated after the Ag Center was consulted. They expressed concerns with a trail coming too close to their operations and buildings, they were more willing to consider an alternative that stayed on the edge of their property. Alternate A was eliminated during a site visit due to the severe banks on either side of the creek and the steep grade coming off the bridge or require a much longer bridge. Alternate B would require an easement from multiple land owners and the trail would be right next to the road. Alternates C and D would follow the initial route of alternate A, so they would require an easement. Another concern with those two routes is the number of driveways that they cross. Each driveway crossing has the potential for pedestrian and vehicle collisions. Alternates K and L were eliminated due to their location and the steep grades. Both paths would require significant grading and shoring to bench a trail into the side of the bluff.

B. Final Alternates

1. General Comparison

After looking at all the various options the study team narrowed down to two potential routes (see Figure 3, pg. 11). The Houser Street route is the secure route that was submitted with the grant and federal funding applications. The Houser Street route begins at the Kent-Stein Park trail head and traveled north along Houser Street up to Lucas Street. Once the route arrived at Lucas Street, it continued west to the Highway 61 Bypass, and north along the bypass and onto Muscatine County's Discovery Park. The Farm Road route considers a similar route to the Houser Street route; the only deviation is how the trail ascends the bluff. There is an old farm road near the bottom of the bluff that has been abandoned for several years but is still in good condition. Both routes present unique challenges with respect to their design. The positives and negatives of each challenging design criteria are outlined below.

The Houser Street route allows for a more gradual ascension of the bluff, but in return requires more structural components such as retaining walls and ground stabilization. Each route has positives when considering safety. The Houser Street route is in a more visible location which makes it more accessible for emergency vehicles. However, the Farm Road route removes the people from higher speed traffic. Crime on trails is not typical; the majority of crimes on trails happen at the trail heads in the parking lots.

2. Major Route Benefits

There are three major benefits that the Houser Street route has that make it a more appealing route at this time than the Farm Road route. They include existing right-of-way, environmental impact, and public accessibility. Both trails would require some right-of-way acquisition from the Ag Center along Lucas. The Farm Road alternative would require an additional section of right-of-way from the Ag Center as that trail goes along the east side of their property. If the city cannot negotiate the required right-of-way for the Farm Road route, then the Houser Route might be the only option. The environmental impact benefit will be determined during final design. A Phase I study will be completed after a final route is selected. If any significant archaeological sites are located, then the final route may be adjusted to avoid disturbing the archaeological sensitive areas. Based on previous archaeological investigations, the Houser Street route is less likely to disturb any existing archaeological sensitive sites. Another major benefit to this route is that it is adjacent to an existing roadway which would make it more accessible to the public. The Farm Road route requires an additional 400 feet of sidewalk from the major intersection of Houser St. and Lucas St, which makes it slightly more difficult to access.

The Farm Road route was determined to be significantly less expensive during construction because it reduces the amount of retaining walls. The most difficult part for the Farm Road route is the road down the bluff itself. This route utilized an existing road bed that was established decades ago and is still in good condition. Another difficulty that might be encountered is the steep drop offs on the ravine side of the farm road and a few guardrails will be required for safety. Another significant factor that supports the Farm Road route is the public support. When the typical trail users are shown the two different routes, they tend to favor the Farm Road route over the Houser Street route.

3. Major Route Disadvantages

Even though there are significant benefits with the Houser Street route, the biggest disadvantage against the Houser Street route is cost. This route was determined to be less constructible than the other alternative due to various elements. When constructability was considered elements such as traffic controls, room for materials and equipment, and the difficulty of the trail construction played a role. A retaining wall, for example, is much more difficult to construct at the toe of a large bluff or on a property with a several of utilities when compared to excavating to a one-foot depth of soil to place subbase and pavement. Prior to any in-depth investigations the Houser Street route seemed to be the more obvious route since it would be constructed adjacent to a roadway. The difficulty arose when trying to design a typical trail section which included a 5-foot buffer from the back of curb, a 10-foot trail width, and then a 2-foot grass buffer. There was adequate right-of-way to construct the trail, but it would require a retaining wall in three separate sections of the trail and then ground stabilization in one area that has a high-water table. These two design challenges made the cost of this route go up significantly. One design consideration was to raise the trail to help minimize the retaining wall section. The trail could be raised slightly but then long-term maintenance would be more difficult when considering mowing a steep slope adjacent to a busy street. A narrower sidewalk would be more practical along Houser Street because it could potentially eliminate the need for some of the shorter retaining walls. Unfortunately, the funding restricts the design of the trail to a minimum of 10 feet in width.

As discussed previously, the two major disadvantages for the Farm Road route include right-of-way acquisition and environmental impact. Both of these requirements could determine this route impractical. This route requires additional right-of-way from the Ag Learning Center and could cause negotiations to be more complicated due to the location of the required right-of-way. Also, the Farm Road route is more likely to uncover an existing archaeological site. The cost to mitigate a major archaeological site can be as much as $250,000 and take as long as 18 months. If this happens, the Houser Street route would be comparable in cost.

4. Other Route Considerations

Some of the more minor but important design consideration include maintenance and aesthetics. Maintenance and upkeep played a significant role when looking at both trail options because the steering committee had stressed that whatever option is chosen, they would like minimal to no maintenance. The benefit of a trail along Houser Street is that the city already maintains the shoulder. The Houser Street route would minimize the area that would need to be mowed during the growing season. A negative for this route option is that the trail may also be considered a sidewalk along Houser Street, that may require the trail to be cleaned after snows. If the Farm Road route is constructed, then the trail would not be negatively impacted by the snow because the City would not maintain the trail during the winter months. The more significant impact is that the maintenance area would increase for the parks and recreational department.

The trail along Houser Street would have some aesthetically pleasing aspects as the area round this portion of the road has some older woodland and other natural features. One thing that will detract from this is the fast-paced vehicles right next to the trail and the litter along the road. This route would not be very audibly pleasing because of the traffic noise.

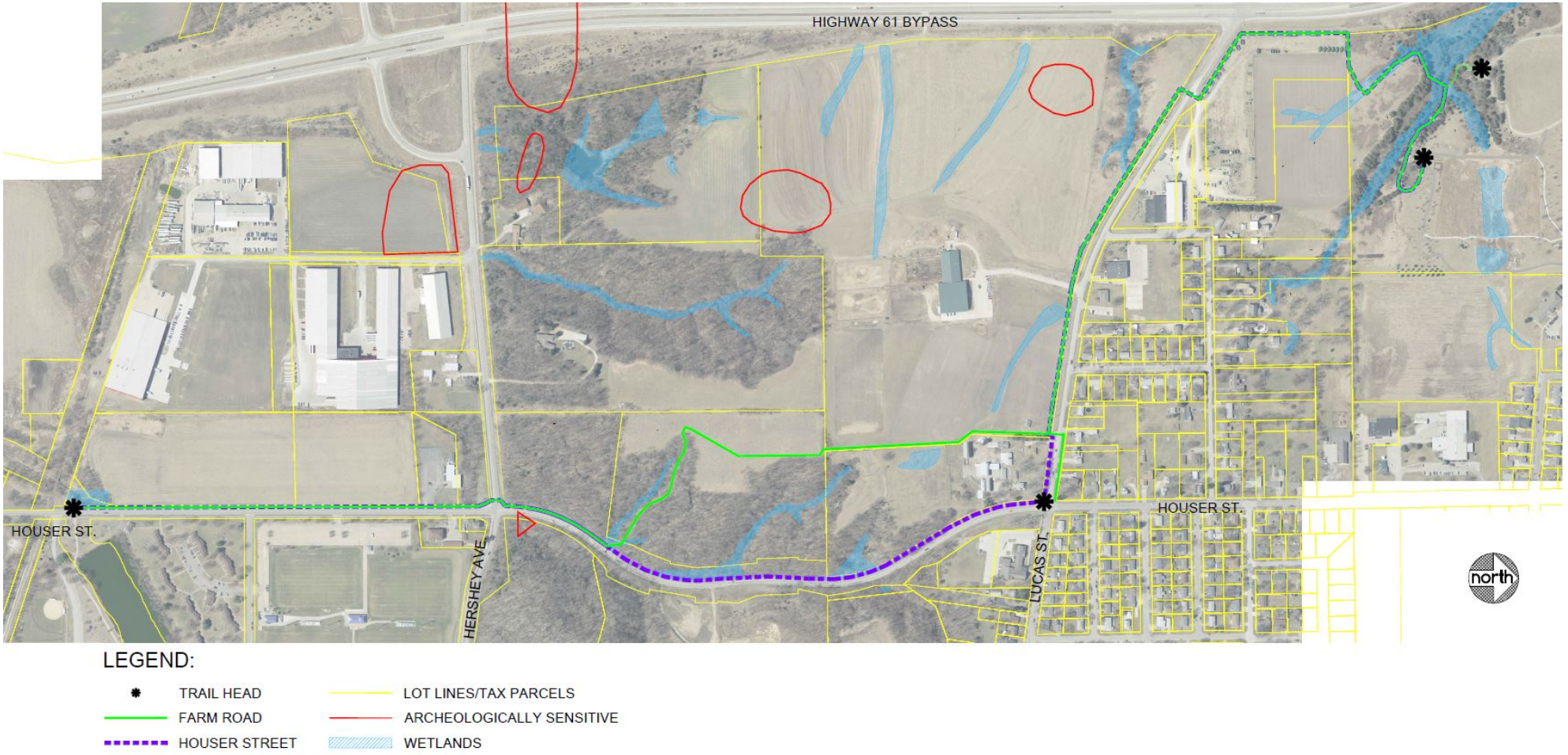

Figure 3: Final two alignments.

V. Project Cost Estimates

The project cost estimate was developed to help the City identify both the cost for construction but also most of the costs design and permitting. The only items that were not quantified included tasks associated with right-of-way acquisition. It is expected that the City will negotiate as needed to acquire the necessary land and identify how the newly acquired easement or right-of-way will be funded.

The process of developing a valid cost estimate started by procuring the construction bid tabulation for the Deep Lakes Trail that was completed last year. The West Side Trail that is being proposed in this report will be constructed using similar methods. There were six bidders that responded to the City's request for the Deep Lakes Trail bid letting. The average of all six bids was taken and used for the West Side Trail study. The average cost added approximately 15% to the Deep Lakes Trail low bid. The inflated cost estimate should help adjust for inflation and a slightly less competitive bid environment.

The line item quantities were determined using four different methods:

1. Estimated the expected quantity and used the averaged unit price (i.e. Trail HMA surface)
2. Compared the length of trail to the Deep Lakes Trail length and applied that percentage to the average unit price (i.e. Lump sum items, excavation, seeding)
    a. Houser Street Route is 43% the length of Deep Lakes Trail
    b. Farm Road Route is 45% the length of Deep Lakes Trail
3. Requested updated costs from the manufacturer or other contractors (i.e. Bridge, retaining walls)
    a. These items were not accounted for in the Deep Lakes Trail project
    b. Two separate sources were obtained to get the retaining wall costs estimate
4. If a construction item did not apply, then the quantity remained at zero

Using the averaged unit prices and the updated quantities helped the study team develop a detailed construction cost estimate based on the preliminary design. Additional services like archaeological, environmental, engineering, and survey services, were added to the construction cost to help identify the overall cost of the project. One item that has not been accounted for at this time is any required cost after the Phase 1 study is completed. Best case scenario is that no additional cost will be required, and worst-case scenario is that it would increase the cost by $50,000 to $250,000. Refer to the Appendix A for the project cost estimate.

VI. Recommended Solution

A. Trail Route Recommendation

Based on the information gathered at this time the study team recommends the Farm Road Alternative as the best solution to connect Kent-Stein park with the county's Discovery Park. The driving factor in this recommendation is based on the total project cost estimate. The Farm Road route is estimated to cost $1,038,000, which is $197,000 less than the Houser Street route at $1,235,000. This recommendation is contingent on a Phase 1 study that benefits this route and positive negotiations to acquire the necessary right-of-way. It is strongly believed by the study team that if the Farm Road route is constructed, that the trail users will be more likely to use this trail for their leisure walks.

Either route will be a positive addition to the existing trail system in Muscatine and create a significant link between the north and south end of town. Probably the most important aspect is that it will make traveling up and down the bluff much safer for the end user. One future consideration for Houser Street is a 5-foot sidewalk up Houser Street instead of a 10-foot trail. A narrower sidewalk would more than likely eliminate the need for any additional retaining walls.

B. ADA Compliant Exclusions

As part of the funding requirements the trail must meet the most current ADA Standards for Accessible Design. Most of the trail will use this standards as part of the design criteria when practical. The only segment of the tail that will exceed the maximum slope requirement is when the trail traverses the bluff. For the Farm Road route this would include approximately 900 feet of trail when it is diverted to the old farm road. For the Houser Street route this would include the trail segment between the old farm road entrance on Houser Street. and Lucas Street. It should be specified that the exclusions from ADA requirements is the standard to not exceed a slope of 5 percent for an accessible sidewalk and the standard of providing a level landing area. Even with this exclusion in place the design team will work on making the trail route as accessible as possible.

VII. Appendix

A. Appendix A – Cost Estimate

WEST SIDE TRAIL STUDY
CITY OF MUSCATINE
PRELIMINARY TRAIL STUDY COST ESTIMATE

ITEM NO.	DESCRIPTION	HOUSER QUANTITY	FARM ROAD	UNIT	UNIT PRICE	HOUSER EXTENSION	FARM ROAD EXTENSION
1	CLEARING AND GRUBBING	0.125	0.498	ACRE	$6,141.67	$767.71	$3,058.55
2	CLEARING AND GRUBBING TRESS HAVE BEEN FELLED AND PILED	0	0	ACRE	$6,691.67	$0.00	$0.00
3	SPECIAL BACKFILL MATERIAL, PLACE ONLY	2274	2371	CY	$23.33	$53,054.86	$55,321.70
4	EXCAVATION, CLASS 10, ROADWAY AND BORROW	6363	6635	CY	$9.68	$61,560.55	$64,190.81
5	TOPSOIL, STRIP, SALVAGE AND SPREAD	4290	4473	CY	$8.26	$35,428.00	$36,941.71
6	SUBGRADE STABILIZATION MATERIAL, Non-woven per Table 4196.01-3	12498	13032	SY	$1.86	$23,225.19	$24,217.52
7	SHOULDER FINISHING, EARTH	80	50	STA	$226.50	$18,120.00	$11,325.00
8	REMOVAL OF CURB	0	0	STA	$1,843.17	$0.00	$0.00
9	STD. OR SLIP FORM PORTLAND CEMENT CONC. PVMT, CLASS C, CLASS 3	0	0	SY	$66.67	$0.00	$0.00
10	HOT MIX ASPHALT PAVEMENT SAMPLES	0.43	0.45	-	$3,216.67	$1,397.27	$1,456.97
11	EXCAVATION, CLASS 20	0	0	SY	$22.35	$0.00	$0.00
12	APRONS, CONCRETE, 18 IN. DIA.	3	5	EA	$1,573.33	$4,720.00	$7,866.67
13	APRONS, CONCRETE, 36 IN. DIA.	0	0	EA	$2,953.33	$0.00	$0.00
14	CULVERT, CONCRETE ROADWAY PIPE, 18 IN. DIA.	30	100	LF	$72.40	$2,172.00	$7,240.00
15	CULVERT, CONCRETE ROADWAY PIPE, 36 IN. DIA.	0	0	LF	$118.83	$0.00	$0.00
16	REVETMENT, CLASS E	100	100	TON	$53.38	$5,338.33	$5,338.33
17	RECREATIONAL TRAIL, HOT MIX ASPHALT, 5 IN.	10922	11733	SY	$21.42	$233,972.20	$251,347.56
18	RECREATIONAL TRAIL, PORTLAND CEMENT CONCRETE, 6 IN.	0	0	SY	$41.22	$0.00	$0.00
19	REMOVAL OF SIDEWALK	0	0	SY	$7.03	$0.00	$0.00
20	SIDEWALK, P.C. CONCRETE, 6 IN.	0	222	SY	$59.93	$0.00	$13,318.52
21	DETECTABLE WARNINGS	180	170	SF	$39.00	$7,020.00	$6,630.00
22	DRIVEWAY, P.C. CONCRETE, 7 IN.	200	200	SY	$58.10	$11,620.00	$11,620.00
23	REMOVAL OF PAVED DRIVEWAY	118	118	SY	$9.92	$1,174.57	$1,174.57
24	FENCE, FIELD Standard Field Fence	600	1750	LF	$4.88	$2,930.00	$8,545.83
25	FENCE, FIELD Three (3) Wire Smooth #9	0	0	LF	$3.52	$0.00	$0.00
26	FIELD FENCE BRACE PANELS	0	0	EA	$212.67	$0.00	$0.00

27	FENCE, SAFETY	0	100	LF	$4.63	$0.00	$463.33
28	REMOVAL OF FENCE, FIELD	0	0	LF	$1.93	$0.00	$0.00
29	FIELD OFFICE	1	1	EA	$5,516.67	$5,516.67	$5,516.67
30	CONSTRUCTION SURVEY	0.43	0.45	LS	$34,866.67	$15,145.50	$15,792.61
31	PAINTED PAVEMENT MARKING, WATERBORNE OR SOLVENT-BASED	20.64	21.52	STA	$44.42	$916.84	$956.02
32	TRAFFIC CONTROL	1	1	LS	$5,516.67	$5,516.67	$5,516.67
33	MOBILIZATION	0.43	0.45	LS	$97,520.00	$42,361.07	$44,171.00
34	RAILROAD PROTECTIVE LIAB. INSURANCE FOR DAK, MIN, AND EASTERN RR	0	0	LS	$9,681.67	$0.00	$0.00
35	SEEDING AND FERTILIZING (RURAL)	7.30	7.61	ACRE	$1,062.50	$7,753.74	$8,085.03
36	SEEDING AND FERTILIZING (URBAN)	2.00	2.08	ACRE	$2,100.00	$4,196.14	$4,375.43
37	SLOPE PROTECTION, WOOD EXCELSIOR MAT	100	300	SQ	$32.68	$3,268.33	$9,805.00
38	SILT FENCE	781.89	815.30	LF	$2.79	$2,182.78	$2,276.04
39	SILT FENCE FOR DITCH CHECKS	32.58	33.97	LF	$6.67	$217.19	$226.47
40	MAINTENANCE OF SILT FENCE OR SILT FENCE FOR DITCH CHECK	43.44	45.29	LF	$2.67	$115.84	$120.78
41	MOBILIZATIONS, EROSION CONTROL SECTION TOTALS	1.74	1.81	EA	$500.00	$868.77	$905.89
42	BRIDGE, 100 FT SPAN	1	1	LS	$115,000.00	$115,000.00	$115,000.00
43	RETAINING WALL, 2' TALL, LEVEL BACK SLOPE	1000	0	SF	$30.00	$30,000.00	$0.00
44	RETAINING WALL, 2' TALL, STEEP BACK SLOPE	3900	0	SF	$40.00	$156,000.00	$0.00
45	RETAINING WALL, 5' TALL LEVEL BACK SLOPE	1050	0	SF	$40.00	$42,000.00	$0.00
46	RETAINING WALL, 5' TALL STEEP BACK SLOPE	2800	2800	SF	$40.00	$112,000.00	$112,000.00
47	LANDSCAPING, SIGNAGE, SLOPE STABILIZATION	1	1	LS	$15,000	$20,000	$20,000
48	**CONTRACT TOTALS**					**$1,025,560.22**	**$854,804.68**
49	$/LF					$104.33	$80.95
50							
51	PHASE 1 STUDY	1	1.9	LS	$10,000.00	$10,000.00	$19,000.00
52	WETLAND DELINEATION & PERMITTING	1	1	LS	$6,000.00	$6,000.00	$6,000.00
53	WETLAND MITIGATION	0.19	0.09	ACRE	$70,000.00	$13,177.23	$6,427.92
54	GEOTECHNICAL (SOIL BORES)	12	6	EA	$700.00	$8,400.00	$4,200.00
55	CONTINGENCY (5%)					$51,278.01	$42,740.23
56	ENGINEERING DESIGN (8%)					$82,044.82	$68,384.37
57	SURVEY DESIGN					$30,000.00	$30,000.00
58	LANDSCAPE ARCHITECT					$8,500.00	$6,500.00
59	**TOTAL PROJECT COST**					**$1,234,960.28**	**$1,038,057.20**

*PROJECT COST DOES NOT INCLUDE EASEMENT OR LAND ACQUISITION

DIFFERENCE $196,903.08