

Iowa Homeland Security & Emergency Management  
7900 Hickman Rd, Ste 500  
Windsor Heights, IA 50324

**Iowa Flood Mitigation Program (FMP)  
Flood Recovery Project Application**

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**What is the Flood Recovery Fund?**

A Flood Recovery Fund is established in the state treasury under the control of the Flood Mitigation Board to provide funding to eligible political subdivisions of the state to implement flood response, flood recovery, or flood mitigation projects.

**Eligibility:**

- 1) An eligible applicant is a political subdivision of the state located in a county designated under presidential disaster declaration DR-4421-IA and also located in a county where the federal emergency management agency individual assistance program has been activated.
- 2) Eligible projects must support flood response, flood recovery, or flood mitigation. Eligible project types include construction and reconstruction of levees, embankments, impounding reservoirs, conduits or other means that are necessary for the protection from the effects of floodwaters and may include the deepening, widening, alteration, change, diversion, or other improvement of watercourses if necessary for the protection of such property from the effects of flood waters. A project may consist of one or more phases of construction or reconstruction that are contracted for separately if the larger project, of which the project is a part, otherwise meets the requirements of this subrule.

**Application Process:**

This application is designed to capture the necessary information to meet program requirements.

- 1) Description of the project and how the project supports flood response, flood recovery, or flood mitigation activities.
- 2) Description of financial assistance need through the Flood Recovery Fund.
- 3) Description of the necessary expense or serious need of the political subdivision.
- 4) Details on any additional funds to be applied to the project.

**Flood Mitigation Board Process:**

- 1) Review the application.
- 2) Approve, defer, or deny the application.

**Iowa Flood Mitigation Program (FMP)  
Flood Recovery Project Application**

**I. Applicant Information**

<b>A. Applicant/Community Name</b>	<b>B. Address</b>		<b>City, State, Zip Code</b>	
Fremont County, Iowa	506 Filmore St / PO Box 610		Sidney, Iowa 51652	

<b>C. Point of Contact (POC) Name for Project</b>	<b>POC Title</b>	<b>POC Agency</b>	<b>POC Email</b>	
Terry Graham	County Supervisor	Fremont County	<a href="mailto:tgraham@co.fremont.ia.us">tgraham@co.fremont.ia.us</a>	

<b>POC PO Box and Zip Code</b>	<b>POC Street Address</b>	<b>POC City, State, Zip Code</b>	<b>POC Phone</b>
PO Box 610 51652	506 Filmore St	Sidney, IA 51652	712-374-2031

<b>Alternate POC Name or Authorized Representative</b>	<b>Alt POC Title</b>	<b>Alt POC Agency</b>		<b>Alternate POC Email</b>
Dee Owen	Auditor	Fremont County		<a href="mailto:dowen@co.fremont.ia.us">dowen@co.fremont.ia.us</a>

<b>Alt POC PO Box and Zip Code</b>	<b>Alt POC Street Address</b>	<b>Alt POC City, State, Zip Code</b>	<b>Alt POC Phone</b>
PO Box 61051652	506 Filmore St	Sidney, IA 51652	712-374-2031

<b>D. Federal Tax ID # / FEIN</b>	<b>E. County Name</b>	<b>F. US Congressional District(s)</b>	<b>State Legislative Districts</b>	
[REDACTED]	Fremont	3	<b>Senate</b>	<b>House</b>
			12	23

<b>G. Is the Applicant/Community participating in the National Flood Insurance Program (NFIP)?</b>	<b>Community's CID Number</b>
Yes	190868#

**II. Project Cost Information**

A. Identify the requested funding source:

**Permanent Work**

**B. Project Budget Summary**

Mortgage Buy-Down Assistance	\$	8,437,372.00
Housing Construction Assitance	\$	8,437,372.00
Hamburg Low Rent Housing Agency	\$	811,000.00
<b>Sidney &amp; Fremont County - Knox Rd Foot St Infrastructure</b>	<b>\$</b>	<b>986,700.00</b>
<b>Total Project Budget Summary</b>	<b>\$</b>	<b>18,672,444.00</b>

**C. Project Funding Source**

Identify all anticipated funding sources for the project and the amounts.

State that you have applied for and/or received approved federal, state and/or local financial assistance.

Please insert additional rows as needed.

Identify source	Applied/Received	Federal \$	State \$	Local \$	TOTAL
Iowa Flood Recovery Fund - Housing	Application			\$ 17,685,744.00	\$ 17,685,744.00
Iowa Flood Recovery Fund - Infrastructure	Application			<b>\$ 986,700.00</b>	<b>\$ 986,700.00</b>
					\$ -
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					\$ -
<b>Total Project Funding Source</b>		\$ -	\$ -	\$ 18,672,444.00	\$ 18,672,444.00

### III. Project Plan Summary

**A. Provide a brief description of the project and how the project supported flood response or will support future flood recovery and flood mitigation activities. This is a summary of Tab B - Project Plan.**

In analyzing the need for viable replacement housing after 2019 flooding, City, County, Council of Government, Case Management and State Officials estimate a significant shortfall between assistance received by Fremont County and the City of Hamburg, as well as City and County Citizens, and the actual cost to replace housing that will require demolition. This project will support future flood recovery and mitigation by providing financial assistance to replenish Fremont County and Hamburg's housing needs in an area outside of the Special Flood Hazard Area, as well as providing an option to offer mortgage buy-down assistance.

**B. Provide a brief description of the financial assistance need through the Flood Recovery Fund.**

This funding request is based on information and estimates compiled by City Officials, Council of Government Staff, Case Management, State and Federal Officials. Using information available from Fremont County and Hamburg's Buyout and Demolition project applications, FEMA Individual Assistance Received, NFIP Structural Claims assistance received, and Small Business Administration assistance received, a total "Assistance Received" amount was calculated. This amount was compared to the estimated costs to construct replacement housing, which includes the acquisition of property and adding utilities and streets/roads. The shortfall of assistance received vs. estimated costs is equal to the request from the Flood Recovery Fund. Half of the requested funding will be used for housing construction and half will be used for mortgage buy-down assistance. This is anticipated to mirror the needs of Fremont County and Hamburg Citizens who will have the means to purchase housing with mortgage buy-down assistance, as well as hope those who are unable or unwilling to secure a mortgage.

**C. Explain how financial assistance through the Flood Recovery Fund is essential to meet the necessary expenses or serious needs of the applicant related to flood response, flood recovery, and flood mitigation.**

This assistance is essential because of the critical nature of the unmet housing need. At this time, ## (or a general estimate) homes and dwellings impacted by flooding are abandoned and/or require demolition, and up to ## will be deed restricted with future development prohibited. The Buyout is imminent, which will further intensify the housing shortage and need for financial assistance to remedy the issue. Pre-flood market values of flood damaged homes are significantly less than the cost to purchase/build outside of the risk zone. Approximately 2/3 of Hamburg and much of Fremont County is within the boundary of the SFHA, so a development outside of this area will be critical to replace housing lost to flooding. Costs to construct new housing will significantly exceed the financial means of Fremont County and Hamburg residents, even when considering all types of assistance available. Mortgage buydown assistance will be offered as an option for situations where occupiable housing is available, but the price is outside of the financial means of a flood victim.

**D. Provide details of any additional funds that can be applied to the project.**

In the sense of this being an overall "housing" replacement project within Fremont County and Hamburg, several funding sources come into play. FEMA Individual Assistance funding, NFIP structural flood insurance claims and SBA loans were made available to those who qualify and/or carried flood insurance. FEMA Hazard Mitigation Grant Program and Public Assistance funds will assist with compensation for the flood damaged home and demolition. HMGP funds can also be used to supplement increased replacement housing costs, but only to a Federal maximum of \$31,000. The cost differential in southwest Iowa is significantly higher than this maximum. Department of Housing & Urban Development Community Development Block Grant funding may also be available in the future to supplement this cause, but only to those who are income qualified. Many victims incomes will exceed the CDBG threshold.

**E. Description of Project Location (i.e. Latitude and Longitude (minimum 6 digits after the decimal), Neighborhood, Subdivision, Geographic Boundaries, Driving Directions, etc.)**

Project is located near the Sidney, Iowa high school south of Knox/Foote Road and crosses to the west side of Maple Street.

**IV. Work Schedule**

A. List the major milestones for this project.

Task	Months/Years from Award			Responsible Party
	Start	Complete		
Design - Complete				Fremont County, ASA Engineering
Sewer, Stormwater, Water System Update	1	6		Fremont County, Contractor
<b>Total Project Duration:</b>	<b>6 months</b>			

**V. Certifications**

To the best of my knowledge and belief, I certify that all data in this application packet is complete, true and correct. The governing body of the applicant has duly authorized this document and hereby applies for assistance as documented in this application. The applicant understands that the project shall not proceed until Flood Mitigation Board approval is granted.

Signature of the Chief Executive Officer

Name of the Chief Executive Officer

Title

Organization

Date

Phone Number

Signature of the Authorized Representative

Name of Authorized Representative

Title

Organization

Date

PO Box / Street Address

City, State and Zip Code

Phone Number

Email Address

## Project Plan

Applicant: **0** \_\_\_\_\_

Political subdivision shall attach to the Flood Recovery Project Application the project plan.

### Project plan shall include:

1. a. **A detailed description of the project Scope of Work.**
  - i. How the project supported flood response or will support future flood recovery and flood mitigation activities.
  - ii. Map(s) identifying project area.
2. a. **An estimated cost of the project (detailed budget):**
  - i. A detailed description of the amount of funds expended to date and the funding source.
3. a. **If available: A copy of the application(s) from other funding sources and subsequent approval letter(s).**

## Knox Road /Foote Street Infrastructure Project

This funding request will provide assistance to Fremont County and the City of Sidney to address the need to replace housing that was lost due to the 2019 flood in Fremont County. The Knox road infrastructure project will provide the area with adequate curb and gutter, sanitary sewer and water main infrastructure. This infrastructure project is important for faster economic growth and reduces the cost to construct new housing in a rural area.

*Project Scope:* Sidney Hometown Pride Group looked at designs for a cost effective, safe and inclusive trail that connects the city of Sidney to the Sidney High School. The route chosen travels south of Knox/Foote Rd. and crosses by crosswalk on the west side of Maple St. Currently there is no infrastructure or trail connecting the city to the high school. The trail connecting the town to the school creates an opportunity for a housing development along Knox Road /Foote Street. Infrastructure systems tend to be high cost investments and are vital to a county's development and prosperity. For rural housing to be affordable, state and federal infrastructure funding must be utilized to the highest degree to ease construction cost, as well as fund in a way that ensures completion in a timely manner. The trail plan also carries additional support in updating the town's current sewer, storm water and water systems to the school. Currently, there are no sewer connections from city sewer to the high school. The addition of a sewer line for the high school will allow for the removal of the septic system and leech field behind the high school, allowing for building expansions or recreational facilities. A 6-inch secondary water line from the high school to the connection on Maple St. will allow for a looped system creating more capacity and more reliability for fire safety measures. With a future development in mind, a curb and gutter storm water system will be designed on the South side of Knox Road /Foote St. The addition of this drainage system is necessary for the construction of the trail, but will have the added benefit of fixing erosion problem near the front of Sidney High School by eliminating the ditch system currently in use. These three new features will create an opportunity for further growth in the area. All of the infrastructure will be in place so that housing development can be built along Knox Road/Foote St.

The project will be designed and drafted using design standards to make the project eligible to be funded through DOT Grants, Recreational Trail Grants, Federal Trail Grants, Wellmark Foundation Match Grant, CDBG, Fremont County Community Foundation Grant, Fremont County Tourism Grant and private donations.

Total estimated cost of the project: \$ 986,700



# Sidney High School Trail

Sidney, Iowa

Prepared For Terry Graham, Vice President of Sidney Pride  
May 3rd, 2019

Submitted by: ASA Engineering

Stefan Kaplarevic, Project Manager  
Abbey Teubel  
Alex Kraft



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## **Section I: Executive Summary**

ASA Engineering is a student-based engineering firm headquartered in Iowa City, Iowa providing civil and environmental services. ASA staff bring unique skills to each project with skills in fields of utility work, road design and project management in extremely time-sensitive environments.

ASA Engineering was provided the task of designing a cost effective, safe and inclusive trail for the town of Sidney by the Sidney Hometown Pride Group. Currently, there is no existing path or trail from town to high school; the only accessible mode of transportation to school is by vehicle. ASA Engineering looked at three designs for an optimal trail and decided, with the help of Sidney Pride, on the path that starts at Sidney High School, stay in the current Right of Way south of Knox/Foote Rd and crosses at Maple St. The trail will be 10 ft wide and 5ft after the crosswalk. ASA proposes to add a yield sign and implement a zebra stripe crossing to ensure the safety of the pedestrians while keeping traffic flow consistent when no pedestrians are present.



*Showing the potential trail leading to the school*

ASA Engineering is excited to design a path for students to have the option to walk or ride their bikes to school rather than drive. Active transportation can be cost effective and have positive health impacts on the community. Though the trail is connecting the town to the school, it is designed for all members to use. At 10 ft wide and no more than 5% grade, the trail makes an easy walking path for all ages. All

athletics, clubs and community members will can make this trail part of their daily routine for leisure, exercise, or family outings.



*Aerial image of proposed trail*

ASA Engineering suggests after building the sidewalk to add benches and lighting to help create a more recreational feel. Per request of the client, ASA designed the trail to blend in with the current landscaping but added floral arrangements near the school. ASA found native plants representing school colors. This leaves an open canvas for school classes to contribute projects, such as bird houses in art class or planting plant species in science classes.



*Examples of "school spirit" plants to add around the walkway*

The trail plan also carries additional support in updating the town's current sewer, stormwater and water systems to the school. The addition of a sewer line for the high

school to Maple St. will allow for removal of the septic system and leach field behind Sidney High School, allowing an open area for building expansions or recreational facilities. A 6-inch secondary water line from the high school to the connection on Maple St. will allow for a looped system creating more capacity and more reliability for fire safety measures. Finally, a curb and gutter stormwater system will be designed on the South Side of Knox/Foote. Rd. The addition of this drainage system is necessary for the construction of the trail but will have the added benefit of fixing erosion problem near the front of Sidney High School by eliminating the ditch system currently in use. These three new features will create an opportunity for further growth in the town, if wanted. All of the infrastructure will be in place so that houses could be placed along Knox/Foote Rd.

The total project cost is \$986,700. This amount includes the trail design along with all utility improvements. The water main and sanitary sewer line could be removed to lower the cost of the project. The water line and sanitary sewer line cost \$225,000 and \$231,000 respectively. This could bring the project cost down to as little as \$393,000. However, it is recommended to include the water and sanitary sewer lines in the initial project. It has the added benefits of future development and added fire protection. Also, it will be more cost effective in the long run to include all utilities in this project. If utilities had to be added later, the new trail would have to be removed and replaced to correctly implement the sanitary sewer line. All updates to this area of Sidney, Iowa will help promote a growing community.

ASA Engineering is very humbled by the opportunity to design and present the Safe Route to School/recreational trail for and to all community members of Sidney, Iowa.

\$593,700



*Final Rendering of Sidney High School Trail*

## **Section II: Organization Qualifications and Experience -**

**Name: ASA Engineering**

**Project Manager: Stefan Kaplarevic**

**Phone: (630)-946-9289**

**Email: [stefan-kaplarevic@uiowa.edu](mailto:stefan-kaplarevic@uiowa.edu)**

ASA Engineering is a student-based design team at the University of Iowa Civil and Environmental Engineering program participating in capstone senior design. The Team consists of:

**Stefan Kaplarevic**, our project manager, is a 4th-year senior receiving a degree in civil engineering and minor in business administration. Stefan's focuses are in Fluid Mechanics, Principles of Hydraulics and Hydrology and Water Resource Design and will be lead on all hydraulic design for the project. Outside of the classroom, he has interned with HBK Engineering focusing on utility design and surveying on a multitude of jobs ranging from Google Headquarters to I-90 interchange. After graduation he will be working full time with Mortenson as a field engineer.

**Abbey Teubel** is a senior receiving a degree in civil engineering and an art minor at Iowa. Abbey's focuses are in Transportation Design, ArcGIS, Science and Reinforced Concrete Design and will be lead on all ArcGIS and ADA compliance for the project. She is currently taking sustainable systems to learn more about ENVISION activities and how to help promote building with less waste. Outside of the classroom, she has interned with Linn County Secondary Roads learning out how to survey and all the steps that go into building roads. She has also worked for HDR on their I-80/I-380 interchange project. She will be working full time with HDR after graduation. Her mixture of art classes and engineering have given her a good foundation for seeing a project from all sides.

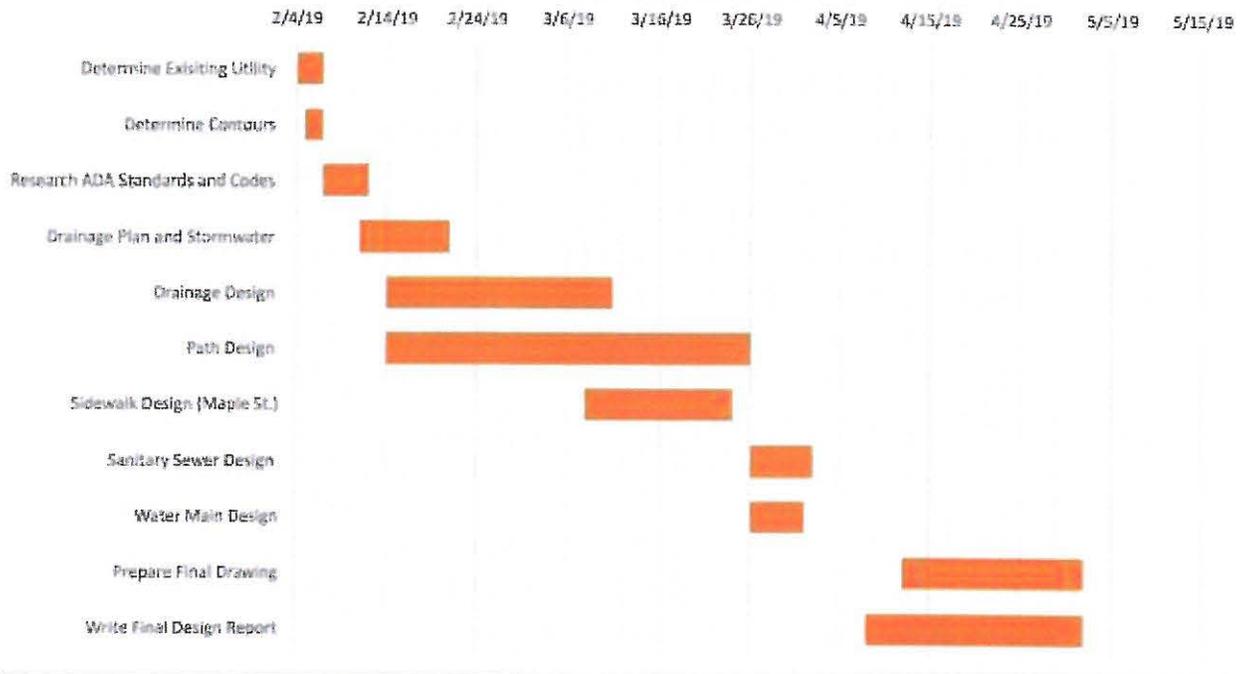
**Alex Kraft** is a senior focusing on the management side of civil engineering during his studies at the University of Iowa. Alex will also be lead on Civil 3D and ADA of the Project. This gives Alex a background in civil engineering, along with management styles gained through business courses. He is currently taking Design of Steel Structures to better understand the design software AUTODESK ROBOT. Outside of the classroom, Alex has interned with Walsh Construction working with Project Managers, Project Engineers, and Construction Superintendents. The project was a railroad bridge demolition and reconstruction. He also worked for Rush University Medical Center as a

Construction Management Intern. At Rush, Alex managed a multitude of projects that were ongoing in the hospital system. Alex is experienced in the planning and construction of civil engineering projects.

### **Section III: Design Services**

1. *Project Scope:* The “Safe Route to School” project will connect Sidney High School by trail to Maple St. ASA Engineering presented three options for the client to choose. The route chosen travels south of Knox/Foote Rd. and crosses by crosswalk on the west side of Maple St. The project was designed and drafted using design standards to make the project eligible to be funded through DOT Grants. The trail will be 10 ft wide from the school until crossing Knox Rd. at Maple St. where the sidewalk will continue at 5 ft until completion. ASA created a Master Plan of underground utilities for Sidney High School. Currently, there are no sewer connections from city sewer to the high school. The school uses a leach field making any future expansion plans challenging. The Masterplan proposes to connect sewer line to the school creating a more reliable sewer system and eliminating the leach field located behind the high school. This also creates potential for future housing developments along Knox Rd. Additionally, a secondary water line will be proposed creating a looped system. This will ensure a more reliable water line and significantly improve fire protection. To plan for future development in the area, ASA decided to eliminate the ditch to the south of Knox Rd. and add an urban stormwater curb and gutter system. These will connect into the current culverts. Furthermore, ASA Engineering suggests incorporating aesthetically pleasing features such as lights, benches and natural plants into the trail design. ASA will incorporate green spaces between the road and the trail to ensure clear zone requirements are satisfied. Lastly, ASA engineering will investigate and propose an option on how to fix the erosion at the culvert just east Sidney School’s driveway. ASA infers that much of the erosion will be fixed once the new curb and gutter are implemented into Knox Rd.
2. *Work Plan:* Throughout the project, ASA engineering followed the Gantt Chart found below. ASA Engineering sent an updated chart periodically to the client to keep them in the loop of how the project is performing.

## Safe Route to School



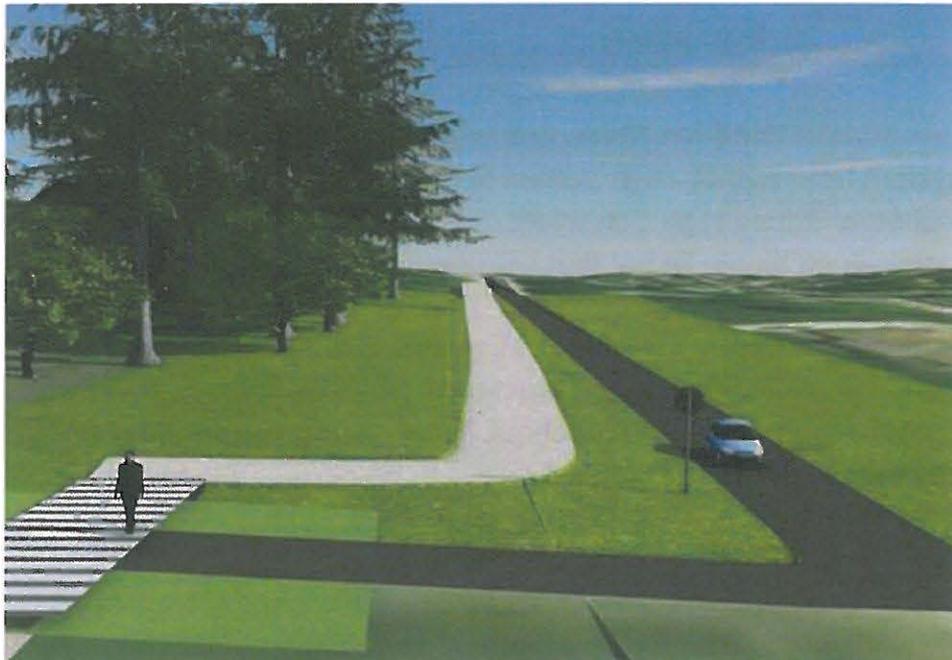
### **Section IV: Constraints, Challenges, and Impacts**

1. *Constraints:* The Safe Route to School project will connect a sidewalk trail system from Sidney High School to Maple Street. The route will be a 10 ft wide trail from Sidney High School along Foote/Knox Rd. to Maple Street, and a 5 ft sidewalk on Maple Street that will connect to the currently existing sidewalk. The trail will meet Iowa Department of Transportation Standards and will be ADA compliant to qualify for Iowa DOT grants. SUDAS codes will be followed in the design process. Finally, construction will be phased to minimally impact the school day at Sidney High School. The construction will be scheduled during the summer when Knox/Foote Rd needs to be closed. If the road can stay open one lane, construction will be able to pursue.
2. *Challenges:* One of the main challenges with creating the trail was the steep elevation change on the south side of Knox Rd. The steep grades made ADA and SUDAS compliance difficult to follow without drastically raising the cost of the project. ASA Engineering suggests moving fill dirt from the farmland directly south to the uneven ground for a cheaper, locally sourced fill turn to create a smoother grade. ASA advises removing the topsoil of the highly elevated farmland, taking fill dirt and then replacing the topsoil back to the farmland and grading the new land at a 2% grade to help with water runoff for the farmer. This will leave the farmland with nutrient soils and an easier terrain to plow/plant.

These changes will also maximize opportunity to develop out the land near Knox/Foote Road if the farmer ever decides to sell.

Another issue brought up by our client was the erosion near the culvert to the northeast of Sidney High Schools exiting drive. Our client stated they have tried several different options to fix the erosion issues in the area but none have worked. ASA will propose filling and seeding the eroded area and adding a curb and gutter system. This will remove a significant amount of runoff and eliminate the need for a ditch. Curb and gutters were designed for water from the elevated sidewalk to drain into them. The culvert will attach into a storm water system. ASA will propose a Master plan to add sewer and water connections to Sidney High School within the schools right of way (ROW). The sewer, trail, and water main will all stay within the current ROW.

The property owner at the corner of Maple St. has quite a few trees in the area of the proposed sidewalk. The owner asked for ASA to design the trail while taking out a minimal number of trees. ASA worked hard to keep as many trees as possible, but in order to create to ADA compliance, many will have to be taken out. ASA estimates that around 15 trees and bushes will be cleared from the owner's land.



ASA Engineering will work to create a recreational trail for broad community use and appeal with characteristics such as aesthetically pleasing features to fit the town of Sidney.

3. *Societal Impacts:* The societal impacts from the project will be mostly positive. The following community elements were evaluated for impacts and factored into the design of the trail:

*Population Characteristics:* Sidney has a population of 1,001 people with 40 years being the median age. The population has been steadily decreasing since 2000 (-20.62%). Our path design can help both the students get to class and senior citizens have a recreation area to walk. Since 25% of the population is below 18, we can infer that many of them are still in school. Around 20% of the population is over 65. Our client stated that recently the community center was shut down; the trail can lead to more activities. The other 55% of the population can use the trail for recreational purposes, as a bike path, to walk to school events for their children, or to get out and walk around the town.

*Community and institutional structures:* Adding the urban curb and gutter and sewer/water pipelines will create an opportunity for growth in the area along the trail. Population in many small, rural towns are declining in population due to a lack of new housing. Adding a new development along the trail can help with increasing the population in the town.

*Individual/Family changes:* 50.1% of the community are married, 37.24% are married with kids, which is higher than the national average. Sidney is a family community so adding a trail to education facilities can help families get their students to school. For younger students who still have a parent drive them to school, the trail can help free up time for them to leave earlier for work.

*Personal/Property Rights:* Though our project will stay within the current right of way, there will be temporary construction easements. ASA Engineering plans on creating a borrow area from the farmland to the south of Knox Rd. for fill. Cut and fill tables for this borrow area can be found in Appendix C. Finally, topsoil will be stripped, stockpiled, and redistributed to the farmland to ensure the land will remain productive.

*Community Resources:* Currently, Sidney Iowa does not have any trails. The implementation of the trail will create an opportunity for the community of Sidney to get out and get active with their family and friends. The trail will host benches and lights so all community member can enjoy walking and relaxing if they need a break. The lights on the trail will help keep the environment safe for all ages.

*Sustainable Practices:* Adding a trail from Sidney High School to Maple St. can help promote a sustainable lifestyle in the Sidney Community. Having a trail wide enough for bike usage can help the community travel more efficiently while lowering emissions in the air. The size of Sidney is approximately 1.378 square miles, so travel would not be long. Students choosing to bike or walk the short distance could save on gas, car maintenance and could help promote a healthier

lifestyle in the community. Lastly, the trail will incorporate native plants near the front of the school to help maintain the native environment.

### **Section V: Alternative Solutions That Were Considered**

Three options were considered in the Safe Trail to Sidney High School design. ASA Engineering created concepts for a “Cross at McClure Ave. Design”, a “Cross with a Tunnel Design” and a “Cross at Maple Design”. The “Cross at Maple Design” was chosen by the client to be designed by ASA Engineering. All options are discussed below.

Option one represented the “cross at McClure Ave.” design. An image rendered in ArcGIS of the trail can be found in figure 2.1 below. The trail would have started at the entrance of Sidney High school, travelled east down Knox Rd, crossed north at McClure Ave, and then continued until it reached Maple St. This option highlighted the McClure Ave crossing as a vantage point; cars on both sides of the road would be able to see pedestrians crossing easily. Cons of this design included utilities on the Northside of Knox being in the way of construction and our client shared they would have to purchase a new fence for the owner of the land to the north of Knox.



**Figure 5.1 represents the design route crossing at McClure Dr.**

Option two represented the “cross with a tunnel” design. An image rendered in ArcGIS can be found in figure 2.2. This option featured the same start at Sidney High School as the first but before McClure Dr., the path would have tunneled under the road. This design would have given the students at Sidney High School potential to make the tunnel their own by creating murals on the walls. The dotted blue line featured

potential for a future fitness loop that connected the high school to the rodeo grounds to downtown helps bring the town of Sidney closer together. This option would erase all concerns with traffic safety issues because the citizens wouldn't be on the road. Cons included everything listed in option one plus the cost of boring the hole, potential for becoming a multi-phase project, and this option needed guardrail over the tunnel area adding an extra cost.



**Figure 5.2 represents the design crossing with a tunnel**

Our client chose the “cross at Maple St. design” route as the design they wanted to move forward with. A rendering of the design can be found in figure 2.3 below. Ultimately, the final design was chosen after ASA suggested it would be the most cost effective and have the least impact on existing utilities. ASA will add a yield sign at the intersection of Knox Rd. and Maple St leading to safety even though it is not at a vantage point. This will also lead to less queuing during peak hours of traffic flow. The design was a new, fresh take on what the client had previously suggested to ASA. Another major pro for the design selected is the fill from the farmland to the south will not have to be hauled across the road, like the first two designs. A con for this option is the property owner where the trail is being paved would be in charge of maintenance, such as shoveling and deicing. We would recommend for the property owner to form a contract with Sidney High School maintenance for snow removal and deicing in the winter.



**Figure 5.3: shows the Maple St. route**

## **Section VI: Final Design Details**

### **Trail**

Trail design followed the Iowa DOT Design Manual 12A-2 Standards for Accessibility and Shared Use Path Design 12B-2. Type 2 trail determination was based on the following criteria of a path serving as a transportation route to facilities that fulfill a basic life need, provide access to a program or service, or provide a safe route for non-drivers. ASA design incorporates a 10ft portland cement shared path trail from the Sidney High School to the intersection of Knox/Foote St. Standard sidewalk design was implemented in the design using a target value of 1.5% cross slope and a longitudinal slope within 2% of the current's streets profile (Knox/Foote St.). Curb Ramps at Maple St. and Foote St. intersection are designed within ADA compliance, with cross slopes within the 6.25% and 8.3% longitudinal slope and incorporating detectable warnings to help indicate crossings to person with low vision and location of the back of curb. Turning spaces are exhibited on the top of each curb ramp allowing users to stop, rest, and change direction on the top or bottom of a curb ramp (R304.2.1). Zebra stripe 2ft. detectable warnings are 2 ft across and recommend across entirety of paved surface (R304.1.4). Remaining trail will consist of a 5ft portland cement sidewalk running north on Maple St. The sidewalk will implement previously discussed standard sidewalk design of a 1.5% target value cross slope and longitudinal slope within 2% of current streets profile (Maple St.).

## **Curb and Gutter**

Curb and Gutter design followed Sudas Design Manual 5C-2 Geometric Design Elements. Curb and gutter installation were implemented on the south portion of Knox/Foote St. to the west of Maple St. and Foote St. intersection. The design comprised of a standard 6" Curb and standard 2' curb and gutter section. Existing pavement on Knox/Foote St. was jointed to the designed 2' curb and gutter section using "BT-5" abutting pavement joint. Sections of the proposed curb and gutter design incorporated Intake design and spacing for stormwater management which followed Section 2C-3 of the Sudas Design Manual. ASA design proposes using an open throat 8'x6" curb, SW-508 large box intake and 15" RCP pipe. Placement of open throats and intakes were analyzed based on the existing roads profile and was placed at lowest elevation of the Knox/Foote St. and distances no greater than 400 ft between intakes.



**Figure 5.4: shows an aerial shot of the proposed sidewalk**

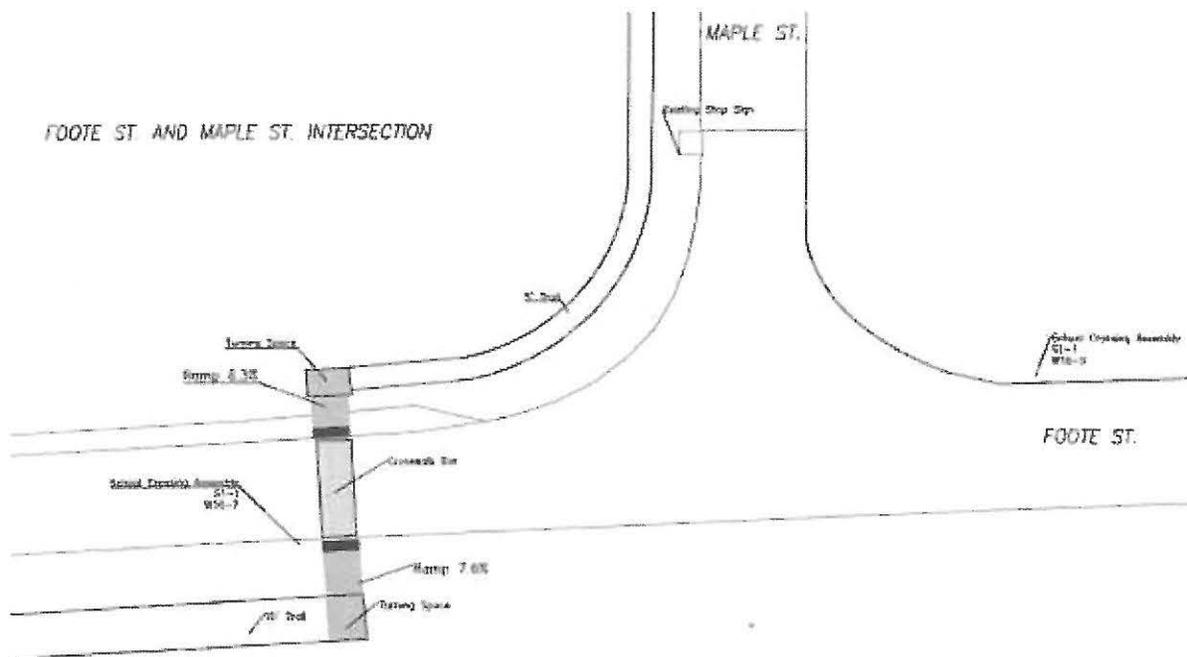
## **Roadway Modification/Grading**

The Grading of the design follows the Iowa SUDAS Design Manual 12A-2E (2) Standards for Accessibility and SUDAS Design Manual Section 2A-1. The elevations of the land area south of Knox Road was filled to match the elevations of Knox Road. After a volumetric analysis, in Civil 3D, the Cut/Fill statistics equalled a net of 5368.02 cubic yards of fill. Per 2A-1 (C12), Land grading of the project site should be performed to take advantage of existing contours and minimize soil disturbance. The cross slope the sidewalk is 1.5%. The clear zone between the sidewalk and Knox Road will match the cross slope of the sidewalk at 1.5%. This will ensure adequate drainage to the storm

sewer. The inner and outer boulevard will also be seeded using native grass to match the surroundings. The total area of land that needs seeding is 0.96 acres. The area around the culvert near the east driveway of the school is experiencing erosion. A riprap erosion stone will be used to fix the damaged area. The volume of the eroded area is 267.75 cubic feet. According to Iowa DOT design manual section 1-04, the density of erosion stone is 120 pounds per cubic foot. Converted to tons, the amount of Class 3 Riprap needed for the erosion control will be 16.07 tons.

**Crosswalk**

The Crosswalk connecting the south and north side of Knox Road follows the Iowa DOT Design Manual sections 3B-1, 3B-2, and 9B-2. Crosswalk lines are solid white lines, not less than 6 inches and not greater than 24 inches in width marking both edges of the crosswalk. The Crosswalk follows the standard road plan PM-110 found within Iowa DOT 3B-2. The crossing is 10 ft wide with 24 inches thick white bars that are spaced 24 inches edge to edge. The Iowa Traffic and safety manual cites the U.S DOT Manual on Uniform Traffic Control Devices for the specifications of Yield Signs. Determination of yield signs was based on keeping same traffic pattern for the intersection and keeping pedestrians safe during times of trail usage. The standard S1-1 yield sign is designed to be 2 foot by 2 foot south and west of the cross walk.



**Figure 5.4: Location of Crosswalk**



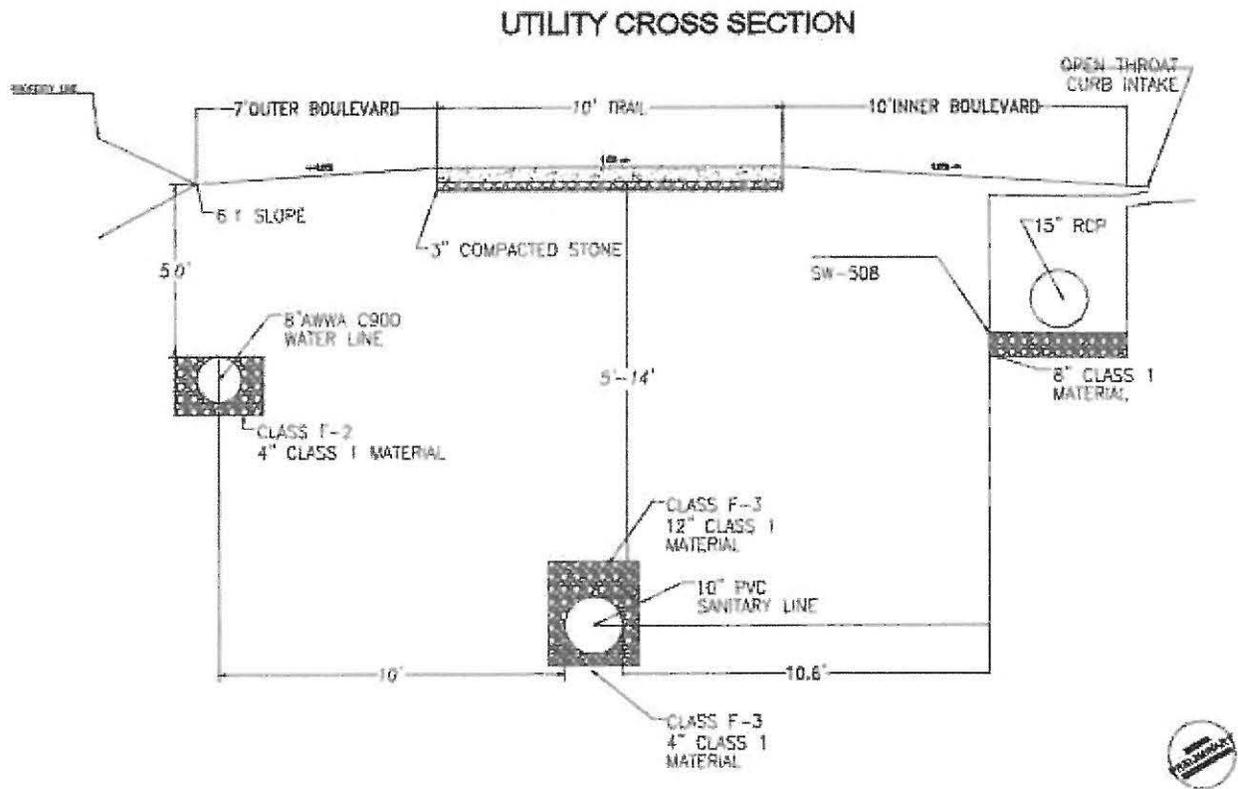
**Figure 5.5: Final crosswalk**

### **Sanitary Sewer**

Design for Sanitary sewer on the Safe Route to School Project had been designed for future opportunity of development in the area of Knox/Foote Road and Sidney High School. The main objective for city sanitary installation is to remove the current sanitary leach field located directly behind the school. Removal of the leach field allows the school to build on top of the land where the underground structure had existed. The next objective for the sanitary sewer installation is for the opportunity for future development on Knox/Foote Rd. with installation of sanitary and water a new neighborhood would have the necessities for hooking up to city utilities allowing for future development.

Sanitary sewer design follows SUDAS Design Manual 3B-1 Flow Determination and 3C-1 Facility Design. Flow discharge for the average daily flow was calculated using Equation 3B-1.01 found in appendix A to determine daily usage rates for the school and proposed single-family residential community. Diameter calculations are found in appendix A and based on Manning's equation which determined pipe sizes of 10" PVC gravity main and 10" DIP force main are appropriate for the school and future development. The sanitary sewer system is to lay between the back of curb and ROW. 3C-1(G) Crossing and Clearance states horizontal clearances of 5 ft or greater from storm sewer and 10ft horizontal clearance from water main. 3C-1(H) Depth of Sewer should have a minimum depth to the top of pipe of 8 feet unless the sewer can serve

existing basements at a lesser depth. Design shows a depth of 12 ft. to the top of the pipe. 3C-1(L) Circular Sanitary Sewer Manhole design size 48 inches in diameter for the project with connections at end of sewer lines, at all changes in pipe size or grade, at all sewer pipe intersections and at intervals not exceeding 400 ft. for sewers 24 in. or less. Lift station package from Romtec Utilities delivers a sanitary sewer lift station with low flow lift between (5-50 gpm), a duplex pump configuration of 1 hp Goulds Pumps, a 4' diameter wet well, and two 2" discharge pipes. Opportunities for equals will be assessed in final design and cost estimation. Sanitary sewer will connect with the school and current system on north side of Foote St. and West St. at a later date.



**Figure 5.6: Final cross section of water line, sanitary line and curb and gutter**

**Water Main**

A water main was designed for this project to create a closed loop system connecting Sidney High School to downtown. This was done to improve fire protection abilities and create assurance that water will reach the school in the event of a pipe burst/blockage. The water main design follows SUDAS Design Manual 4B-1 Size Determination, SUDAS Design Manual 4C-1 Facility Design, and Appendix B of the International Fire Code from the International Code Council. The town of Sidney, IA

uses an 8 inch PVC AWWA C900 pipe for their existing water mains. The design reflects that. Per 4C-1, fire hydrants connected to the water main should not exceed 400 ft of spacing. Hydrants should also be placed at high and low points. 6 hydrants along Knox Road was implemented to the design. Also per 4C-1, hydrants should not be located within 10 feet of a sanitary sewer line. 6 8 inch Butterfly valves will be added to the water main in the event of necessary shutoffs. The valves will be located at the east and west end of the project scope, where the new mains connect to the existing mains.

### **Landscaping**

Landscaping for the majority of the sidewalk will fit the rural, farm feel of the surrounding area. The client stated they wanted the sidewalk to blend in with the town and did not want to add too much flare. The winding portion of the sidewalk leading up to the school will have a little more curb appeal. ASA Engineering suggests adding the following plants for the area to help enhance the school colors: yellow stargrass, wild flax, black eyed susan and tall dropseed. A complete list of native plants can be found on Plant Iowa Native. To enhance learning near the school, ASA also suggests putting up plaques stating the native plants and information about them. The final suggestion ASA has is adding benches and lighting along the entire trail to help promote a safe and inclusive walkway for the entire community of Sidney, Iowa.



**Figure 6.1: Examples of Sidney Landscaping**

### **Construction**

ASA Engineering recommends two separate phases for the construction project. Phase one would consist of placing utilities. This would include storm sewer, watermain and sanitary sewers. Since no work will be done on the road, this phase can be done

during normal working hours. Placing utilities in a first stage can help with any settling issues in the future

Second phase would consist of creating the sidewalk, curb and gutter and culvert extension. This phase would not be able to disrupt the traffic to the school and we recommend it is done before and after school hours or during the summer. We recommend bidding this phase by March so the contractor can begin grading during the end of the school year and have the summer to work on the road.

### **Design Drawings**

*Refer to drawing sets for design details\*\*\*\*\**

### **Section VII: Engineer's Cost Estimate**

Below is the cost estimate for the Safe Route to School project. The cost is split up into water, sanitary, storm, concrete and crosswalk.

ITEM	UNITS USED	QUANTITY	\$ PER UNIT	TOTAL \$
<b>STORM</b>				
Open Throat, Small Box Intake SW-507	EA	6.00	\$ 4,637.59	\$ 27,825.54
Storm Gravity Main 15"	LF	1225.00	\$ 54.27	\$ 66,480.75
Culvert CMP 24"	LF	1.00	\$ 45.51	\$ 45.51
<b>CONCRETE</b>				
Portland cement concrete - Curb/Gutter	CYS	87.86	\$ 81.64	\$ 7,172.89
Portland cement concrete - Trail	SY	938.40	\$ 37.43	\$ 35,124.31
<b>EARTHWORK</b>				
Topsoil, spread	CYS	5368.02	\$ 25.00	\$ 134,200.50
Fine Grading and Seeding	ACRE	0.96	\$ 1,181.62	\$ 1,134.36
Erosion Control	TON	16.07	\$ 38.24	\$ 614.33
<b>CROSS WALK</b>				
Stop Line Paint	STA	0.22	\$ 10.60	\$ 2.33
Cross Walk Paint	STA	1.20	\$ 10.60	\$ 12.72
Yield Sign Post	EA	2.00	\$ 98.12	\$ 196.24
Yield Sign	EA	2.00	\$ 18.23	\$ 36.46
				\$ 272,845.94

ITEM	UNITS USED	QUANTITY	\$ PER UNIT	TOTAL \$
<b>WATER</b>				
Standard Hydrant	EA	6.00	\$ 5,293.59	\$ 31,761.54
Tee 8" AWWA C900	EA	6.00	\$ 350.00	\$ 2,100.00
Bend 90 8" AWWA C900	EA	1.00	\$ 350.00	\$ 350.00
Bend 45 8" AWWA C900	EA	1.00	\$ 350.00	\$ 350.00
Pipe DR 18 8" AWWA C900	LF	2636.00	\$ 52.13	\$ 137,414.68
Butterfly Valve	EA	6.00	\$ 8,841.67	\$ 53,050.02
				\$ 225,026.24

ITEM	UNITS USED	QUANTITY	\$ PER UNIT	TOTAL \$
<b>SANITARY</b>				
Circular SSM 48" SW-301	EA	8.00	\$ 6,435.65	\$ 51,485.20
SAN Gravity Main 10" PVC	LF	1222.00	\$ 53.04	\$ 64,814.88
SAN Force Main 2" DIP	LF	364.00	\$ 40.00	\$ 14,560.00
Romtec 4' Wet Well Lift Station	EA	1.00	\$ 100,000.00	\$ 100,000.00
				\$ 230,860.08

Figure 7.1: Individual Construction Cost

\$ 273,000.00	Total Construction Cost
\$ 30,000.00	Easements
\$ 30,300.00	10% Contingencies
\$ 60,600.00	20% Engineering Overhead and Administration
\$ 393,900.00	Total Project Cost

Figure 7.2: Least Cost Option

\$ 729,000.00	Total Construction Cost
\$ 30,000.00	Easements
\$ 75,900.00	10% Contingencies
\$ 151,800.00	20% Engineering Overhead and Administration
\$ 986,700.00	Total Project Cost

**Figure 7.3: Project Cost Including Water and Sewer Utilities**



**Figure A.1: The Final Rendering of the Trail Leaving the School**



**Figure A.2: The Final Rendering of future development**



Figure A.3: Aerial image of the sidewalk leading to the entrance of the school.

Appendices B: Sanitary Calculations

## **A.) Sanitary Sewer Pipe Calculations**

### **Average Daily Flow (Q)**

Area x Area Density x Flow Rate = Average Daily Flow (Eq.1)

### **Low Density (Single Family) Residential**

Area = 8.7 Acre    Area Density = 10 People/Acre    Flow Rate = 100 gcpd

8.7 Acre \* 10 People/Acre \* 100 gcpd = **8,700 gpd**

### **Office and Institutional (School)**

Area = 4.1 Acre    Area Density = 5,000 gpd/Acre

4.1 Acre \* 5,000 gpd/Acre = **20,500 gpd**

School (Q)

20,500 gpd converted to **0.032 ft<sup>3</sup>/sec**

Residential and School Combined (Q)

29,200 gpd converted to **0.045 ft<sup>3</sup>/sec**

## **B.) Pipe Size Determination**

Mannings Equation

$$D = \left( \frac{4^{5/3} * n * Q}{1.49 * \pi * S} \right)^{3/8}$$

### **School Pipe**

n=0.013    Q=0.032 ft<sup>3</sup>/sec    S= 0.40 ft/100ft

$$D = \left( \frac{4^{5/3} * 0.013 * 0.032}{1.49 * \pi * 0.0040} \right)^{3/8} = 0.65 \text{ ft} * 12\text{in/ft} = 7.8 \text{ in}$$

Size up pipe to **10 inch**

### **School/Residential Pipe**

n=0.013    Q=0.045 ft<sup>3</sup>/sec    S= 0.28 ft/100ft

$$D = \left( \frac{4^{5/3} * 0.013 * 0.045}{1.49 * \pi * 0.0028} \right)^{3/8} = 0.74 \text{ ft} * 12\text{in/ft} = 8.89 \text{ in}$$

Size up pipe to **10 inch**

## **Appendix C: Cut and Fill Report**

## Cut/Fill Report

Generated: 2019-03-26 15:43:57

By user: alkraft

Drawing: \\iowa.iowa.edu\shared\engineering\home\alkraft\windowsdata\Desktop\iowa.iowa.edu\shared\engineering\home\alkraft\windowsdata\Desktop\Senior Design 1 try 2 (1).dwg

Volume Summary							
Name	Type	Cut Factor	Fill Factor	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
CF_SCHOOL	fill	1.000	1.000	14616.18	10.05	1487.95	1477.90<Fill>
CF_ROAD	fill	1.000	1.000	115516.30	1137.06	4998.21	3861.15<Fill>
CF_CURVE	fill	1.000	1.000	6578.53	0.85	314.63	313.79<Fill>
CF_MAPLE	fill	1.000	1.000	18112.37	345.26	60.43	284.82<Cut>
Totals							
				2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Total				154823.38	1493.21	6361.23	5368.02<Fill>

\* Value adjusted by cut or fill factor other than 1.0

### Citation

Office of Design. (n.d.). Retrieved April 12, 2019, from <https://iowadot.gov/design/design-manual>

Design Manual. (n.d.). Retrieved April 12, 2019, from <https://iowasudas.org/manuals/design-manual/>

Iowa Traffic Manual. Retrieved April 2019, from [www.iowadot.gov/traffic/manuals/pdf/02b-02.pdf](http://www.iowadot.gov/traffic/manuals/pdf/02b-02.pdf).



(Please print or type except for signature)

In order for the State of Iowa to pay you the amount that is due to you and to comply with the IRS regulations on reporting these payments, we are requesting the following information. Failure to provide this information will result in withholding of payment.

**BOX A**

Are you/your business: YES NO

Individual [I]  YES  NO  
or Sole Proprietorship [S]  YES  NO

If the answer to both was no, please complete Box B.

If you answered yes to either item, please provide Your Social Security number:

\_\_\_\_ - \_\_\_\_ - \_\_\_\_

**AND**

Complete the Name and Address below:

Last Name: First Name: MI

Doing Business As:

Address:

Address:

City: State Zip

**BOX B**

Is your business: YES NO

Corporation [C]  YES  NO  
Partnership [P]  YES  NO  
Estate of Trust [E]  YES  NO  
Public Service Corp [U]  YES  NO  
Government [G]  YES  NO  
Other [O]  YES  NO

Please Explain: \_\_\_\_\_

Please provide us with your

**Federal Employer Identification number:**

0

**AND**

Complete the Name and Address below:

Last Name: First Name: MI

Doing Business As:

0

Address:

0

Address:

City, State Zip

0

**CERTIFICATION MUST BE SIGNED BY VENDOR**

Certification - Under penalties of perjury, I certify that:

- (1) The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), and
- (2) I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividend, or (c) the IRS has notified me that I am no longer subject to backup withholding.

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

**FOR OFFICE USE ONLY (Refer to Procedure 270.450 for more details)**

From:  Add  
Dept.  Change  
\_\_\_\_\_  
(Include vendor code and changes only)  
Contact: \_\_\_\_\_  
\_\_\_\_\_  
Added For Purchasing: Reason:  
 Yes  No

## Minority Impact Statement

Pursuant to 2008 Iowa Acts, HF 2393, Iowa Code Section 8.11, all funding applications submitted to the State of Iowa shall include a Minority Impact Statement. This is the state's mechanism to require applicants to consider the potential impact of the project's proposed programs or policies on minority groups.

**Please choose the statement(s) that pertains to this application. Complete all the information requested for the chosen statement(s).**

The proposed project programs or policies could have a disproportionate or unique **positive** impact on minority persons.

Describe the positive impact expected from this project

Indicate which group is impacted:

- Women
- Persons with a Disability
- Blacks
- Latinos
- Asians
- Pacific Islanders
- American Indians
- Alaskan Native Americans
- Other

The proposed project programs or policies could have a disproportionate or unique **negative** impact on minority persons.

Describe the negative impact expected from this project

Present the rationale for the existence of the proposed program or policy.

Provide evidence of consultation of representatives of the minority groups impacted.

Indicate which group is impacted:

- Women
- Persons with a Disability
- Blacks

- Latinos
- Asians
- Pacific Islanders
- American Indians
- Alaskan Native Americans
- Other

The proposed project programs or policies are **not expected to have** a disproportionate or unique impact on minority persons.

Present the rationale for determining no impact.

I hereby certify that the information on this form is complete and accurate, to the best of my knowledge:

Printed Name

Title

Signature

Date

**Definitions**

"Minority Persons", as defined in Iowa Code Section 8.11, mean individuals who are women, persons with a disability, Blacks, Latinos, Asians or Pacific Islanders, American Indians, and Alaskan Native Americans.

"Disability", as defined in Iowa Code Section 15.102, subsection 5, paragraph "b", subparagraph (1):

b. As used in this subsection:

- (1) "*Disability*" means, with respect to an individual, a physical or mental impairment that substantially limits one or more of the major life activities of the individual, a record of physical or mental impairment that substantially limits one or more of the major life activities of the individual, or being regarded as an individual with a physical or mental impairment that substantially limits one or more of the major life activities of the individual.

"*Disability*" does not include any of the following:

- (a) Homosexual or bisexuality.
- (b) Transvestism, transsexualism, pedophilia, exhibitionism, voyeurism, gender identity disorders not resulting from physical impairments or other sexual behavior disorders.
- (c) Compulsive gambling, kleptomania, or pyromania
- (d) Psychoactive substance abuse disorders resulting from current illegal use of drugs.

"State Agency", as defined in Iowa Code Section 8.11, means a department, board, bureau, commission, or other agency or authority of the State of Iowa.