



Preliminary Design Report

57th Street Extension Feasibility Study

Sioux Falls, South Dakota

November 2005



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**57th Street Extension Feasibility Study
Preliminary Design Report
Sioux Falls, South Dakota**

SEH No. SIOCP0403.00

November 2005

I hereby certify that this report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of South Dakota.



Eric A. Johnson
Name

12/16/05
Date

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1.0 Management Summary

Analysis of available site data and a review of recommended design requirements indicate that it is feasible to extend 57th Street from 1000 ft. east of the Sycamore Avenue intersection to Iowa County Road A10, including a crossing of the Big Sioux River. Three primary alignments were developed and evaluated for costs and performance, and two variations of Alternative 1 (Alternatives 1A and 1B), the northernmost alignment option, were selected as alternatives recommended for further study. Alternatives 1A and 1B will receive additional investigation during a future river crossing preliminary design and Environmental Assessment process.

Alternatives 1A and 1B achieve the project purpose and need, including utilization of the existing developable land and roadbeds, with the least amount of environmental impact. These alternatives meet City of Sioux Falls and American Association of State Highway and Transportation Officials (AASHTO) requirements for horizontal and vertical design for a minor arterial road. The construction cost, including the bridge, is estimated to be approximately \$13,500,000.

West of the Big Sioux River, the proposed 57th Street extension will be designed as a four-lane divided minor arterial roadway with a 50 mph design speed. Access will be allowed at half-mile openings and left and right turn lanes will be integrated at the intersections. The future roadway will also include curb and gutter, and sidewalks on both sides, all of which will be located within a 100 ft. right of way section. At the intersections, additional right of way will be required to allow for proper sight distance and the right turn lanes.

The intersection of 57th Street and the future Eastside Corridor (SD 100) will be designed as an interim at-grade intersection with dual left turn lanes at each intersection leg until the need for an interchange is determined.

The proposed crossing of the Big Sioux River will be a two-lane, approximately 415 feet long structure with four spans and three piers. The bridge would also have 10-foot shoulders and a 12-foot pedestrian path and, with railings, will be an estimated 59-feet wide. The bridge will be constructed so that it will be expandable in the future so 4-lanes of traffic can be accommodated.

East of the Big Sioux River, the proposed 57th Street will cross the river floodplain, a small stream, and match into the Iowa County Road A10 elevation. This section of roadway will be designed as a two-lane facility, although right-of-way will be preserved for the construction of a four-lane roadway if traffic warrants the need in the future.

The proposed construction of the 57th Street extension will occur between 2010 and 2015, depending on the pace of development growth. A future crossing of the Big Sioux River is not planned to occur until after 2015.

2.0 Introduction

2.1 Purpose and Need

The City of Sioux Falls continues to plan for and design its future system of minor arterial roadways in its 2025 Growth Area. The minor arterials will complete a hierarchy to provide planned capacity to alleviate future congestion on principal arterials (i.e., the Eastside Corridor) and local collector streets. As the Split Rock and Springdale Township Growth Areas develop and become part of Sioux Falls through annexation, the 57th Street minor arterial corridor will need to be upgraded and conform to the City's minor arterial expansion standards. In addition, and somewhat unique among the City's other expanding minor arterials, is an opportunity to potentially cross the Big Sioux River. This potential crossing will provide an east-west minor arterial connection to the southeast corner of Minnehaha County, which is currently isolated by the Big Sioux River, a natural barrier. This potential opportunity will provide commuters and other travelers with an alternative route to the Sioux Falls region from the East and provide a complementary hierarchy system roadway to SD Highway 42. The continued development of the Eastern 57th Street Corridor is also consistent with the findings of the SDDOT's Highway 42 Corridor Study completed in 2004.

This report details the results of the Third Phase of the Feasibility Study (Preliminary Design) that was performed for the proposed project. It includes preliminary designs and cost considerations based on the preferred alternative for the corridor, between the planned realignment of Sycamore Avenue and River Bluff Road crossings. The process and analyses that were performed to address the feasibility of the project, including recommendation of an alternative for further study, is found in the Phase I (Scoping) and Phase II (Alternatives) Technical Memorandum dated September 26, 2005, included in Appendix A.

2.2 Goals and Objectives

A 57th Street Extension Feasibility Steering Committee was assembled and included representatives from the City of Sioux Falls, SDDOT, and SECOG. The Lyon County (Iowa) Engineer was also invited to attend the Steering Committee meetings. The Steering Committee's primary goal was to determine if a Big Sioux crossing is feasible, and, if so, its location so that preliminary and final design plans can be prepared and construction can be programmed. The advancement of this segment of 57th Street is also important to implement growth plans and so that interconnecting collector streets can be planned to accommodate future development. Finally, it was the Steering Committee's desire to step the project through a process that conforms to Federal and State standards for roadway development, including an alternatives analysis, in order to ensure the project's ability to retain eligibility, if needed, for federal and/or state funding.

2.3 Authorization

In July 2005 the City of Sioux Falls entered into a contract with SEH, Inc. to analyze the feasibility of extending 57th Street from 1000 feet east of Sycamore Avenue to Iowa County Road A10, over the Big Sioux River. A schedule of deliverables was determined by Phase (Scoping, Alternative Development, and Preliminary Design), with a presentation of findings and recommendations at the November Metropolitan Planning Organization (MPO) transportation committee meetings.

2.4 Project Scope

The 57th Street project study limits are the eastern taper of the planned 57th Street-Sycamore Avenue intersection on the west, and County Road A10 in Lyon County, Iowa, on the east. North-south intersecting streets in the study area include SD 11 (the future Eastside Corridor), Six Mile Road, and River Bluff Road west of the Big Sioux River, and 481st Avenue east of the Big Sioux River. The proposed street will consist of a four-lane urban divided section constructed to engineering design standards for a Minor Arterial roadway. The proposed right-of-way width will be 100 feet. The project will include the extension of utilities along the street alignment.

Deliverables included a Technical Memorandum discussing the feasibility of the project, a Preliminary Design Report documenting the needs and preliminary plan drawings for the preferred alternative, cost estimates, and electronic drawing files.

2.5 Feasibility Background Data and Resources

Information and materials used in the analysis of alternatives and in the preparation of this report include:

- Contour information, aerial photography and development layouts provided by the City of Sioux Falls.
- Eastside Sanitary Sewer (ESSS) lift station and service road access information from HR Green, HDR Engineering, and the City of Sioux Falls.
- Traffic forecasts from the City of Sioux Falls.
- Public and private utility mapping provided by the City of Sioux Falls.
- Property lines and their respective owners provided by the City of Sioux Falls.
- Field survey verifications performed by Dakota Land Surveying and Engineering.

Field survey checks were made at half-mile locations along the corridor to confirm the accuracy of the digitized contour elevations. With the selection of the preferred alternative, a field survey was also executed to acquire topographic data east of 481st Avenue in Minnehaha County, at the approach and match to Iowa County Road A10. The survey data obtained was merged with existing topographic data to complete the topographic elevations and further enhance the accuracy of the data for preliminary design. A summary of these findings is included in Appendix B.

3.0 Preliminary Design

Alternative 1 and its eastern variations (Alternatives 1A and 1B) were identified as the recommended alternatives for further study. These alternatives are illustrated in Figures 1 and 2. In addition to achieving the project purpose and need, Alternative 1 best utilizes the existing developable land and roadbeds. Alternative 1 is further detailed in the following sections.

Attached in this document is a CD that contains PDF's of the actual layouts of Alternatives 1A and 1B. Also contained on this CD are the proposed westbound and eastbound profiles for Alternatives 1A and 1B, cross sections for both alternatives, and a PDF of this report.

3.1 Horizontal Alignment

Beginning at the west end of the project, the alignment is developed to carry a four-lane divided roadway. The goal was to tie into the future 57th Street/Sycamore Avenue intersection taper using the existing roadbed (and section line between Lincoln and Minnehaha Counties) to minimize the construction cost. The City of Sioux Falls supplied SEH with a plan set from HDR that provided a preliminary gradeline from Sycamore Avenue to SD 11. This horizontal alignment was held on 57th Street to SD 11 with this project.

SDDOT is currently studying free-flow travel versus signalized traffic control along the Eastside Corridor. A long-term access management plan is being developed that will determine the design of the major crossings, including 57th Street. An at-grade crossing of the future Eastside Corridor was assumed, although it is understood that planning for the intersection continues and that land may be preserved from development for the construction of a future interchange. Proceeding eastward, the alignment continues along the existing 57th Street centerline toward the approach to the major ravine network and Eastside Sanitary Sewer system alignment. West of Six Mile Road, the alignment shifts north as it utilizes a 100 ft. service road corridor that was acquired to provide access from near the existing 57th Street eastern terminus to the ESSS lift station near the Big Sioux River.

West of River Bluff Road both Alignment 1A and Alignment 1B are the same. The only differences between the two are variations of the Six Mile Road intersection. These different alignments are interchangeable for both Alignment options.

Alternative 1A, east of River Bluff Road, continues to utilize the 100 ft. service road corridor that was acquired to provide access from near the existing 57th Street eastern terminus to the ESSS lift station near the Big Sioux River. As the alignment travels towards the river it descends down the ravine. The four-lane section diverges to two lanes at the bottom of the grade. The alignment then extends onto the floodplain and crosses the Big Sioux River at a 50-degree angle to the flow of the river at the crossing

location. As the alignment shifts back to the south, it crosses a small creek and then intersects with 481st Avenue. The alignment then matches into Lyon County Road A10.

Alternative 1B east of River Bluff Road does not continue to utilize the 100 ft. service road alignment and instead stays farther south of Alternative 1A. Alternative 1B traverses the south side of the ravine rather than crossing the ravine as in Alternative 1A. Alternative 1B descends more gradually than Alternative 1A towards the river. The four-lane section diverges to two lanes at the bottom of the grade. The alignment then extends onto the floodplain and crosses the Big Sioux River at a 75-degree angle to the flow of the river at the crossing location. As the alignment shifts back to the south, it crosses a small creek and then intersects with 481st Avenue. The alignment then matches into Lyon County Road A10.

The proposed horizontal alignments achieve the minimum City, State, and AASHTO design standards for horizontal curvature of a Minor Arterial roadway with a 50-mph design speed.

The alternatives include provisions for 5 ft. sidewalks constructed on both sides of 57th Street. A 12 ft. wide pedestrian crossing of the Big Sioux River will be provided on the north side of the bridge to accommodate the meeting of two bicyclists. Additional planning for pedestrian/bicyclist needs and facilities east of the Big Sioux River will be completed in the future.

The City of Sioux Falls is currently investigating an area east of the lift station for the site of a future wastewater treatment plant. The construction of either alternative would not preclude the treatment plant being constructed at this site. The proposed wastewater treatment site is shown on Figures 1 and 2.

3.2 Vertical Alignment

The profile of 57th Street matches into what is planned for the corridor from Sycamore Avenue to SD 11 based on plans received from the City of Sioux Falls prepared by HDR Engineering. Several substandard vertical curves for the design speed of 50 mph were observed and required the lengthening of some curves as a result; however, the alignment generally remains in the planned location. East of SD 11 the alignment closely follows the existing ground line using the minimum grade of .5 percent on much of the corridor, rolling over the existing ground elevation until reaching the Big Sioux River Valley.

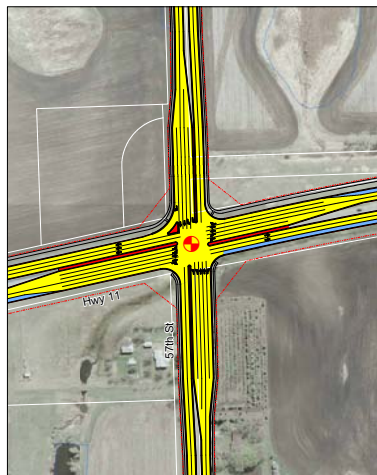
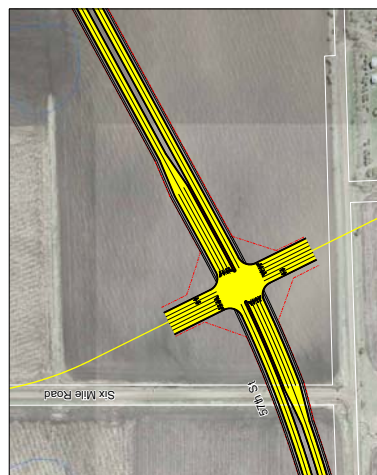
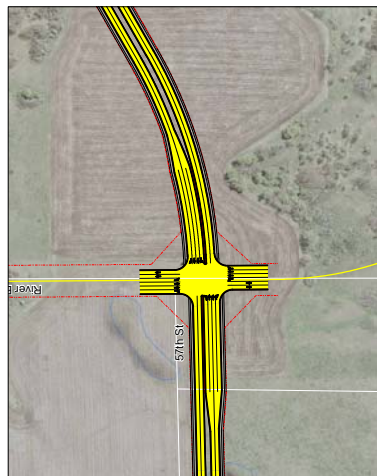
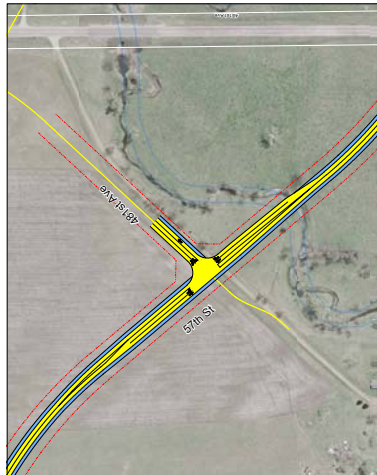
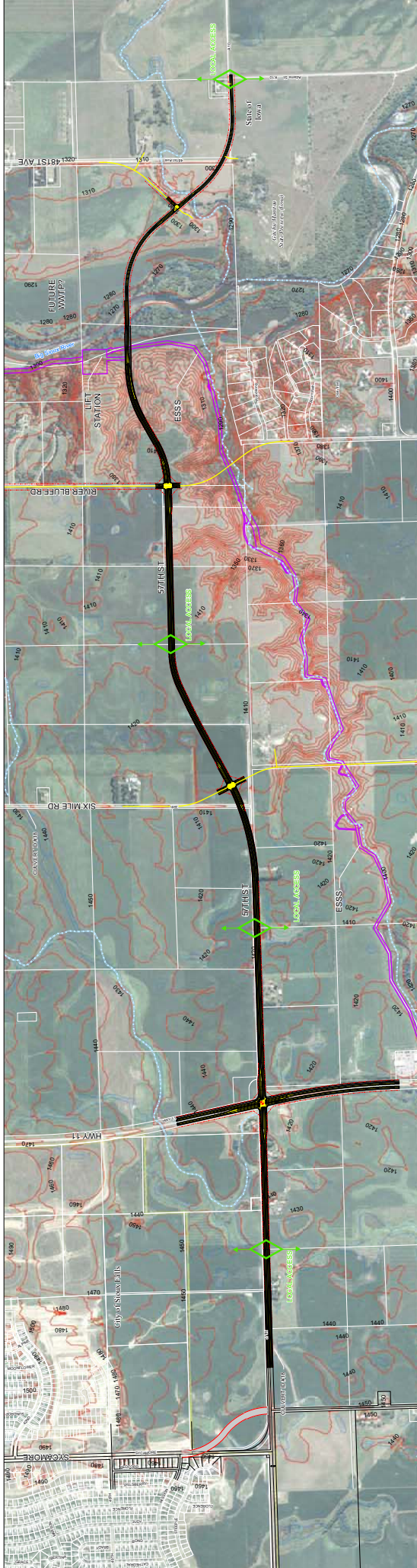
Alternative 1A differs from Alternative 1B east of River Bluff Road. Alternative 1A follows the alignment of the service road for the lift station. The profile drops starting east of River Bluff Road at a 6 percent grade and reaches the appropriate elevation to cross the Big Sioux River where it does so at .5 percent sloping to the east. The 4-lane section ends where the grade changes from 6 percent to .5 percent so the westbound traffic can utilize the lane addition as a passing lane up the steep slope.


Once across the Big Sioux River, there is a shallow stream to cross and then Alternative 1A matches into the Iowa County Road A10 elevation. Small creek crossings such as this will likely be treated with box culverts.

East of River Bluff Road, Alternative 1B traverses the south side of the ravine using the natural slope down to the river. Alternative 1B avoids crossing the low point of the ravine as does Alternative 1A. The slope down the ravine is 4.5 percent. At the bottom of the 4.5 percent slope the 4-lane section diverges to 2-lanes. The westbound traffic can utilize the lane addition as a passing lane up the 4.5 percent slope. The profile crosses the river at a .5 percent slope to the east. Once across the Big Sioux River, there is a shallow stream to cross and then Alternative 1B matches into the Iowa County Road A10 elevation. As with Alternative 1A, small creek crossings such as this will likely be treated with box culverts.

The road will be designed so that cut and fill would be balanced with the ravine slope. The ravine slope will become the primary location to adjust the elevations to balance the earthwork. Earth from the bluffs would be used to fill in the floodplain around the river to reduce the span length necessary for the river crossing. The tie-in slopes on most of the corridor are 1:4. In the area of the river bluffs and the river crossing these tie-in slopes are reduced to 1:2 in cut sections and 1:3 in fill sections outside of the 30 ft. clear zone to minimize the amount of earthwork, easement, and right-of-way area needed. The construction limits in the bluff area extend far beyond the 100 ft. right-of-way corridor that most of the corridor fits in. In this location there are cuts of up to 40 ft. and the slopes are tied in at 1:2. This study recommends that tie in slopes be acquired as right-of-way since the land will have no utility to the landowner. The slopes should be established with grasses. Retaining walls were not considered because they would be large, difficult to maintain, and cost-prohibitive.

Soil borings were not performed for this study to further aid in determining the amount of work and funds that would be needed to complete the 57th Street project. A rock layer may exist that would interfere with the current design. The cost estimates associated with this project do not account for rock excavation.





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Figure 1



Alternative 1A

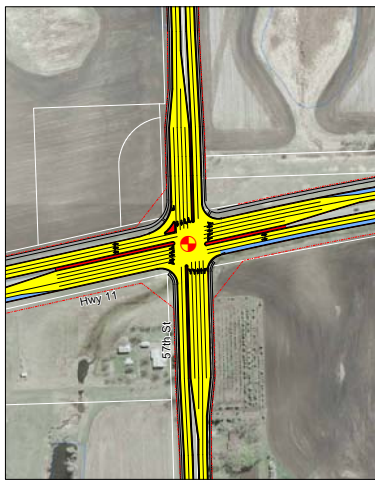
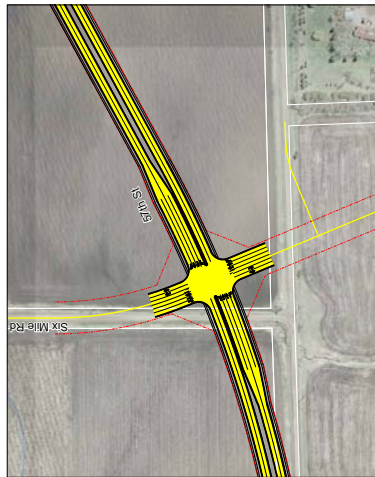
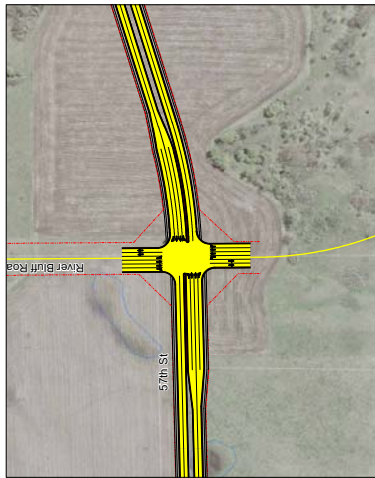
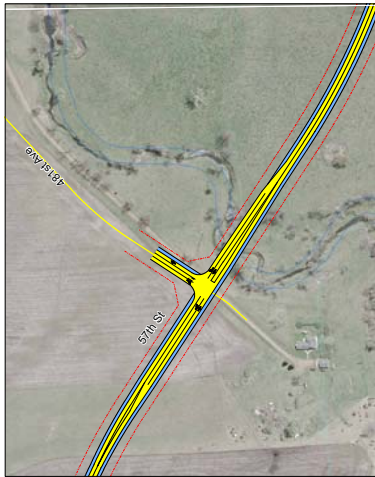
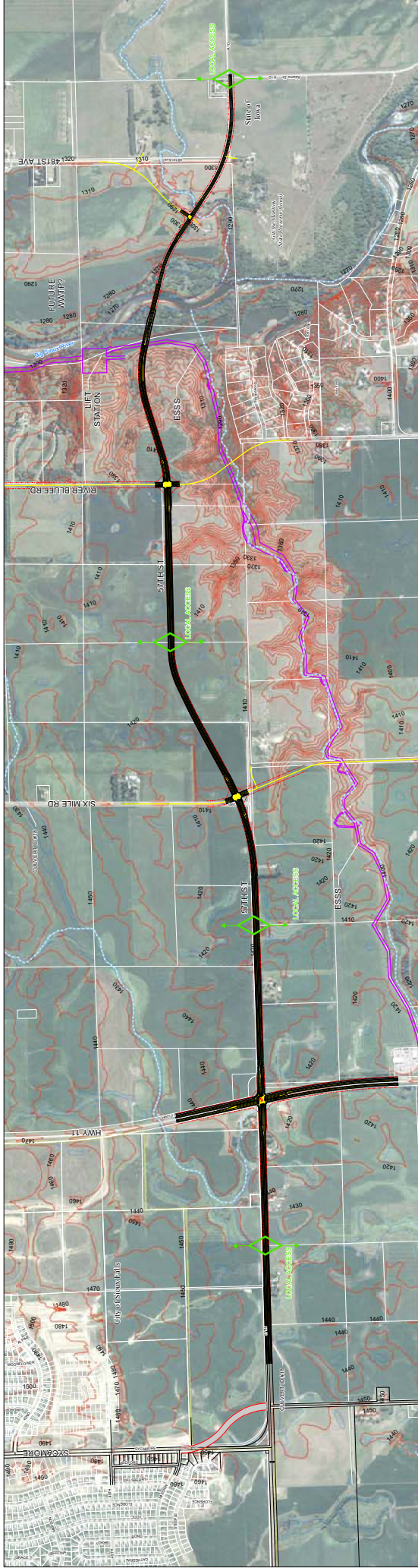
57th Street Corridor Study

Sioux Falls, South Dakota

- Proposed Roadways
- Proposed Bridges
- Proposed Shoulder, Paved
- Proposed Raised Median, Curb

- Proposed Sidewalk
- Proposed Right of Way
- Potential Future Access Location
- Proposed Signal



Alternative 1B
57th Street Corridor Study
Sioux Falls, South Dakota

- Proposed Roadways
- Proposed Right of Way
- Proposed Shoulder, Paved
- Proposed Raised Median, Curb

- Potential Future Access Location
- Proposed Signal

0 200 400 600 800 1000 Feet

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Figure 2

3.3 Bridges

The nearest bridge crossing to the 57th Street study area is the SD Highway 42 bridge over the Big Sioux River, less than two miles to the north. This bridge was constructed in 1995 and is 454 ft. long and skewed 20 degrees to the river. Approximately four miles south of the 57th Street study area is another river crossing. This bridge is 430 ft. long and skewed 20 degrees to the river.

Two different bridge types to cross the Big Sioux River were considered in the feasibility study. These bridge types include prestressed and truss bridges. The following differences between the two bridges were observed to assist in determining the recommended bridge type:

- A truss bridge would not fit the bridge geometrics or the surrounding geography.
- Truss bridges are expensive to build due to the labor-intensive joint connections.
- Truss bridges are expensive to maintain due to painting requirements.
- The typical cost of a truss bridge varies from \$250 to \$500 per square foot, while the typical cost of a prestressed bridge varies from \$90 to \$120 per square foot.
- Aesthetics can be incorporated into the prestressed bridge economically.

The proposed 57th Street bridge is recommended for construction as a prestressed bridge like other area bridges due to the construction and maintenance cost efficiencies compared to a truss bridge. The proposed bridge consists of prestressed concrete deck girders. The floodplain would be filled with earth cut from the slope of the ravine. The bridge would consist of 4 spans and 3 piers. Two of the piers would be near the water's edge and the other would be in the middle of the river. The bridge would drain to the east and water would be collected and distributed to a storm water pond for proper treatment before it is discharged into the Big Sioux River. The embankments of the bridge would receive riprap treatment. Based on the soil boring information from the proposed East Side Sanitary Sewer (ESSS) Lift Station, the soil conditions seem favorable for the construction of a bridge in the area. The bridge foundation would be resting on the bedrock. SEH proposes that the bridge be constructed as a 2-lane facility with 10 ft. shoulders and a 12 ft. pedestrian path. Including the railings, the total width of the bridge is estimated to be 59 ft. wide. (See the typical section of the bridge in Figure 2B in Appendix A.) The bridge would be constructed so that it is expandable to carry 4 lanes of traffic in the future. The proposed 57th Street bridge would be approximately 415 ft. long. The surrounding area will consist of residential development and to keep the bridge unobtrusive to residents and the natural environment, it would not be illuminated.

The bridge would cross the Big Sioux River on a tangent horizontal and vertical alignment. The bridge will have a total length of approximately 415 feet. This structure would likely be constructed of low concrete abutments and solid shaft piers. Alternative 1A would be skewed approximately 40-degrees to the river and Alternative 1B would be skewed approximately 25-degrees to the river. The superstructure would be designed with prestressed concrete girders with spans of 110 to 120 feet in length. This type of structure fits well with the roadway and creek geometry, is the most economical, and

requires the least maintenance compared with other bridge types considered.

The preliminary bridge depth is assumed to be nine feet from low member to the deck crown. The bottom of the bridge would be designed so that it will be no less than 2 feet from the river's 100-year flood elevation.

3.4 Traffic Volumes

The anticipated 2025 daily traffic along proposed 57th Street from Sycamore Avenue to the future Eastside Corridor is forecast to be 21,000 vehicles per day. East of this intersection, 28,000 vehicles per day are forecast. Approximately 7,000 vehicles per day are anticipated to cross the Big Sioux River in 2025.

A traffic analysis of the corridor, with an emphasis on the existing 57th Street / SD11 (Future Eastside Corridor) intersection was prepared for this project. Mike Kotila, Senior Traffic Engineer for SEH, prepared a memorandum, dated August 26, 2005, to address forecast analysis needs related to future design. This memorandum is included as an attachment in Appendix C.

3.5 Lane Configurations

The proposed 57th Street extension typically consists of a four-lane urban section built to Engineering Design Standards for a Minor Arterial roadway. Additional lane configurations, including turn lanes on the west end are proposed, based on forecasted turning movements and capacity needs. The typical sections for the project are presented in Figures 2A and 2B located in Appendix A.

Based on projected traffic volumes, Figures 1 and 2 display concepts of how the 57th Street interim intersection with the Eastside Corridor would appear with the required lane configurations on each leg of the intersection.

3.6 Collector Street Network

A collector street network will be necessary to support growth and distribute traffic to the study area. Access spacing of one-half mile is desirable for major collectors while ¼ mile spacing may be considered for intersections with less importance. The Eastside Corridor (SD 100) will be a major arterial roadway carrying large traffic volumes. Access will be limited on the Eastside Corridor, which will further the need for north/south connectivity to serve the local traffic. In the area around the Eastside Corridor, there may be a need to have major collectors spaced as little as one-third of a mile to support future land uses.

The City of Sioux Falls has identified a need for River Bluff Road to be extended north because it represents an important local transportation system connection where the Big Sioux River creates a natural barrier except at river crossings. River Bluff Road would need to cross a significant ravine, intersect with 57th Street and then continue north to

connect with a developing area south of SD Highway 42. This concept should be further studied and analyzed for cost effectiveness. This step will involve the MPO's study of the collector street network from 69th Street to Highway 42 to determine the best collector street system to support 57th Street and the surrounding area.

3.7 Utility Coordination

A project utility coordination meeting was held on September 26, 2005. Attending utility representatives included McLeod USA; SDM Communications; MidAmerican Energy; Sioux Valley Energy; PrairieWave Communications; Lincoln County Rural Water; Minnehaha Community Water; Southeastern Electric; Qwest Corporation; and the City of Sioux Falls.

The meeting was facilitated by the City of Sioux Falls (Shannon Ausen) and SEH (Scott McBride).

A brief description of the proposed project and the proposed construction schedule was given. The current alignment, with possible variations, was also discussed. Each utility representative present was asked to describe facilities, which were then drawn on the large map. These facilities were mapped together and are documented in Appendix D.

Plans to add or modify existing utilities with the 57th Street extension project were discussed as follows:

1. PrairieWave Communications plans to extend fiber optic cable east of SD11 along the 57th Street alignment.
2. Southeastern Electric will provide temporary power to the Eastside Sanitary Sewer System lift station and permanent power transmission facilities will be provided by summer 2006.
3. Qwest will relocate and retain existing fiber cables in the 57th/SD 11 intersection area.
4. MidAmerican has no facilities in the project area now but may plan projects here in the future. There would be no plan to cross the river.
5. SDN will likely plan facilities in the 57th Street project area and may choose to cross the river.
6. McLeod USA has no future plans to extend west of the river.

3.8 ESSS Conservation Corridor

Appendix E contains a mitigation plan prepared by the City of Sioux Falls for the conservation of a corridor for preservation of the East Side Sanitary Sewer (ESSS). Stipulation No. 3 in the mitigation plan describes that the ESSS corridor should remain in

its natural state with the exception of the construction of an arterial street. Proposed 57th Street will become a Minor Arterial roadway and does cross the ESSS east of the lift station at a 90-degree angle. Near this intersection, the future 57th Street will be graded and the ESSS conservation corridor will be disturbed. At this time, there are no other impacts to the ESSS conservation corridor associated with the future development of 57th Street.

3.9 Public Involvement

Opportunities to discuss the project with members of the public were solicited. With the understanding that the current ESSS service road would be used for the future 57th Street Corridor, affected property owners were made aware of the proposed street extension during the service road's acquisition negotiations. There were also efforts made by City of Sioux Falls staff to discuss the project with the Getting Addition Neighborhood Association (including Woodsong Place residents, south of the proposed alignment). Discussions for a future River Bluff Road extension and potential connection to 57th Street will continue. The future intersection of 57th Street with the Eastside Corridor (SD 100) and property owners east of the Big Sioux River in Minnehaha County will also continue. Iowa property owners along County Road A10 (connection of 57th Street in Lyon County) have also been notified and will continue to be informed of future roadway planning, design and construction activities. An information letter that was sent to property owners in Iowa is illustrated in Appendix F. In addition, the Sioux Falls MPO will engage its formally adopted public involvement process for the completion of roadway design details and an Environmental Assessment (EA) documentation process as it concludes its selection of a preferred Big Sioux River crossing alternative.

3.10 Drainage

Storm sewers servicing the 57th Street corridor will be designed to correspond to the appropriate storm event (i.e., 5, 10, 50, 100 year) under open channel flow conditions. The storm sewers will be sized to convey the flows from all pavements and turf from within the right of way and any areas that drain from outside of the right of way at the present time. These storm sewers will outlet to existing natural drainage swales which make their way to the Big Sioux River.

The proposed 57th Street corridor will traverse three different Best Management Practice (BMP) planning zones for stormwater management. The planning zones are referred to as BMP 7-5, BMP 401-1, and BMP 401-2. These BMP's are three of twenty-eight regional stormwater management facilities that were identified during the City of Sioux Falls Stormwater BMP Master Plan effort. The BMP Master Plan's purpose is to plan ahead for forthcoming development within the City of Sioux Falls to appropriately manage water quantity and water quality.

From Sycamore Avenue to approximately 2500 feet east, 57th Street is within the BMP 7-5 planning area. Surface water runoff from this area will need to be directed to BMP 7-5, a pond to be located 1600 feet west and 1000 feet north of Rushmore Avenue. Pond 7-

5 will contain a tributary area of approximately 741 acres. On 57th Street, from the east boundary of BMP planning zone 7-5 to approximately 3700 feet east of Highway 11, the surface water runoff will be directed to Pond 401-2. Pond 401-2 is planned to be located approximately 1800 feet south of the intersection of the extended section line of Six Mile Road and 57th Street. Pond 401-2 contains a tributary area of approximately 1,351 acres. From the eastern boundary of BMP planning zone 401-2 to the Big Sioux River, the planned alignment of 57th Street will be contained within BMP planning zone 401-1. Pond 401-1 is located approximately 4000 feet east of the extended section line from the intersection of Six Mile Road and 57th Street. Pond 401-1 contains a tributary drainage area of 834 acres.

Although the currently proposed alignment of the 57th Street corridor does not impact any of the BMP's described directly, design features will need to be incorporated into 57th Street to accommodate the City of Sioux Falls BMP Master Plan. Within BMP planning zone 401-3, there are two culvert crossings that help to attenuate the flows directed at BMP 401-2. The first culvert is located across 57th Street just west of the Highway 11 intersection. The second is located across Highway 11 approximately 1700 feet north of 57th Street. The storage created by these culverts was modeled with the BMP Master Plan effort and is needed to reduce flow rates directed to BMP 401-2 to allowable levels. During the detailed design phase for 57th Street, these culverts must be maintained and the associated storage areas must be modeled to determine the 100-year high water levels. The final design grades of 57th Street must be developed to include one foot of free board above the 100-year high water levels at a minimum.

As future development occurs, there will need to be several new storm sewer crossings constructed to convey surface water runoff from the developing areas north of 57th Street across 57th street and towards the BMP's. It is suggested that the City of Sioux Falls conduct a stormwater conveyance master plan to supplement the BMP Master planning effort. The conveyance master plan is needed to plan the storm trunk line framework need to service these developing areas of the city and insure that stormwater runoff is directed to the appropriate BMP facility. The Stormwater Conveyance master plan would then be utilized to pinpoint the location and sizing of the 57th Street storm sewer crossings during the final design of the 57th Street improvements.

4.0 Permits

Permits needed prior to construction include, but are not limited to, the following:

- A 404 Permit from the U.S. Army Corps of Engineers will be needed for the proposed bridge crossing over the Big Sioux River.
- An NPDES Permit will be required for any storm water discharge into the Big Sioux River.
- If Federal funding is used to construct any part of the project, there are also numerous approvals and potential mitigation commitments needed for the filling of wetlands. A survey of potential cultural resources and potentially threatened and endangered species will likely be required for an Environmental Assessment

(EA) associated with a planned river crossing.

NEPA guidelines must be followed for erosion control and construction within rivers and streams.

5.0 Easements

5.1 Permanent Right-of-Way

A 100 ft. right-of-way corridor is planned for the proposed 57th Street extension to accommodate the proposed four-lane roadway section with 16 ft. boulevards. This is further illustrated as Figures 2A and 2B in Appendix A.

At intersections a wider right-of-way width is required to provide room to add right-turn lanes. The intersection of 57th Street with SD 11 will require a larger section to allow for the dual left-turn lanes and right-turn lanes. Some intersections may also require extra right-of-way to maintain proper sight distance.

The construction limits in the bluffs area extend far beyond the 100 ft. right-of-way of the majority of the corridor. In these locations there are cuts of up to 40 ft. and the slopes are tied in at a 1:2. This study recommends that tie in slopes be acquired as right-of-way since the land will have no utility to the landowner. The slopes should be established with grasses. Retaining walls were not considered because they would be large, difficult to maintain, and cost-prohibitive.

5.2 Maintenance Agreement

Minnehaha County, South Dakota and Lyon County, Iowa have a long-standing agreement to maintain and repair the roadway that separates them, which is known as Iowa County Road A10. This roadway is identified on Figures 1 and 2. The agreement will remain in effect with the transition of 57th Street to A10, although it may be appropriate to revisit the terms of the agreement for maintenance in the future as design and maintenance standards are determined for the new connecting roadway. A copy of this agreement is located in Appendix G.

6.0 Construction Costs

Preliminary construction cost estimates for the proposed 57th Street extension are included in Appendix E. Measurable roadway construction items are quantified for construction and right of way costs. A detailed breakdown of quantities is located in Appendix H.

The assumed roadway structural section for the concrete section west of the Big Sioux River Crossing for estimating purposes consists of 9 inches of concrete, 5 inches of aggregate base, and 24 inches of granular borrow. The assumed roadway structural

section for the bituminous section east of the Big Sioux River Crossing for estimating purposes consists of 8 inches of bituminous, 7 inches of aggregate base, and 12 inches of granular borrow. Shoulders are estimated to consist of 4 inches of bituminous.

Other quantities have been computed by assigning a reasonable percentage of the paving and grading costs. Average construction costs are based on the year 2005 construction season. The bridge structure components are not itemized; however, engineering experience predicts the bridge cost will be approximately \$85/sq. ft. of bridge deck.

The cost estimates do not include the cost of rock excavation (if needed.)

The preliminary construction cost breakdown for Alternative 1A is as follows:

Construction Cost	\$10,622,600
Right of Way Cost	\$858,360
Engineering Cost	\$1,912,068
<u>Total</u>	<u>\$13,393,000</u>

The preliminary construction cost breakdown for Alternative 1B is as follows:

Construction Cost	\$10,561,900
Right of Way Cost	\$946,290
Engineering Cost	\$1,901,142
<u>Total</u>	<u>\$13,409,300</u>

Appendix A

Phase I (Scoping) and Phase II (Alternatives) Technical Memorandum



TECHNICAL MEMORANDUM

TO: 57th Street Steering Committee - Sioux Falls MPO

FROM: Ross Harris, SEH Project Manager
Eric Johnson, SEH Project Engineer

DATE: September 26, 2005

RE: 57th Street Extension to the Iowa Border Feasibility Study - Phase I (Scoping) and Phase II (Alternatives)
SEH No. SIOCP0403.00

The 57th Street Extension Feasibility project has been divided into three phases -- Phase I (Scoping), Phase II (Alternatives), and Phase III (Preliminary Design). The Phase I Technical Memorandum summarizes the project's purpose and need; goals and objectives; design considerations and constraints, including preliminary horizontal and vertical alignment development; preliminary concept alternatives and Big Sioux River crossing feasibility; and commenting agency feedback. The goal of the Phase I is to answer the question "Can 57th Street feasibly extend (across the Big Sioux River) to the Iowa border"? SEH's recommended response to this question concludes this technical memorandum and Phases I and II.

I. Study Area Limits

The 57th Street project study limits are from the western taper of the planned 57th Street-Sycamore Avenue intersection on the west, and County Road A10 in Lyon County, Iowa, on the east. North-south intersecting streets in the study area include SD 11 (the future Eastside Corridor), Six Mile Road, and River Bluff Road west of the Big Sioux River, and 481st Avenue east of the Big Sioux River.

II. Project Purpose and Need

Currently, 57th Street is an unimproved section line road dividing Minnehaha and Lincoln Counties. It is bisected by SD Highway 11, the future alignment of the Sioux Falls Eastside Corridor. As a "dead end", it currently functions as a collector street and is a very low traffic volume roadway, with direct access from several rural residential properties and Six Mile Road. The study area is predominantly rural and engaged in agricultural activities; however, the City of Sioux Falls' growth management planning expects the study area to become fully urbanized in the next 10 to 15 years.

The City of Sioux Falls continues to plan for and design its future system of minor arterial roadways in its 2025 Growth Area. The minor arterials will complete a hierarchy to provide planned capacity to alleviate future congestion on principal arterials (i.e., the Eastside Corridor) and local collector streets. As the Split Rock and Springdale Township Growth Areas develop and become part of Sioux Falls through annexation, the 57th Street minor arterial corridor will need to be upgraded and conform to the City's minor arterial expansion standards. In addition, and somewhat unique among the City's other expanding minor arterials, is an opportunity to potentially cross the Big Sioux River. This potential crossing will provide an east-west minor arterial connection to the southeast corner of Minnehaha County, which is currently isolated by the Big Sioux River, a natural barrier. This potential opportunity will provide commuters and other travelers with an alternative route to the Sioux Falls region from the East and provide a complementary hierarchy system roadway (the importance of which was previously discussed)

to SD Highway 42. The continued development of the Eastern 57th Street Corridor is also consistent with the findings of the SDDOT's Highway 42 Corridor Study completed in 2004.

III. Goals and Objectives

The Steering Committee's primary goal is to determine if a Big Sioux crossing is feasible, and, if so, its location so that preliminary and final design plans can be prepared and construction can be programmed. The advancement of this segment of 57th Street is also important to implement growth plans and so that interconnecting collector streets can be planned to accommodate future development.

IV. Design Considerations and Constraints

The primary design considerations were based upon achieving the project's purpose and need, goals and objectives, utilization of existing roadbed where possible, ability to attract vehicle trips from planned north-south collector streets in the Study Area, and the ability to minimize potential environmental and construction impacts and costs where possible. City of Sioux Falls Design standards, SDDOT's Road Design Manual along with the AASHTO manual were applied to create the design framework. Basic steps used to develop the future design standards included:

- Analyzing the feasibility of a functional roadway and bridge structure that would connect the western project terminus, cross the Big Sioux River at the required minimum elevation and intersect with Iowa County Road A10, while meeting the design standards of a minor arterial roadway;
- Intersecting the future Eastside Corridor at grade level, and using 2025 traffic forecasts to apply the appropriate traffic control and geometry for the intersection and its approaches;
- Assessing the reasonableness and responsiveness of each alternative considering the purpose and need of the project.
- Evaluating right-of-way acquisition costs vs. construction costs.

The development of alternatives for the 57th Street extension considered the physical constraints of the area as well as the social, economic and environmental impacts associated with each alternative. The study area is generally engaged in crop production and contains intermittent wetlands, and floodplains and wooded areas along the Big Sioux River. The existing man-made physical constraints (identified as "Issues" in attached Figure 1) include roadways, driveways, residential developments, and the planned Eastside Sanitary Sewer (ESSS), and future ESSS lift station/service roads.

Future land use plans for the area were also considered during the design development process and a conceptual north-south collector roadway connection to provide illustrative future 57th Street intersections were integrated. One recorded archaeological site (MH0255) was located within one of the ravines and was determined to be the remains of a former bridge. The 91-acre Gitchie Manitou State Preserve is located in the extreme northwest corner of Iowa, along the state/county line and existing 57th Street alignment east of the river. Gitchie Manitou is owned by the State of Iowa and contains the oldest exposed rock (Sioux Quartzite) in the state. It was dedicated as a geological, archaeological, historical, and biological preserve in 1969 and is therefore considered to be "untouchable".

The undeveloped topography consists of relatively flat terrain with the exception of several steep ravines leading to the Big Sioux River and the bluffs above the river, which contain moderately sloped riverbanks on the west side of the river.

The natural environment also contains known rare, threatened, or endangered species known to occupy habitats in or near the study area.

The following considerations were used in development of the horizontal and vertical alignment alternatives through the project area:

A. Horizontal Alignment

At the west end of the project, the goal was to tie into future 57th Street/Sycamore Avenue intersection taper using the existing roadbed (and section line between Lincoln and Minnehaha Counties) to minimize the construction cost. An at-grade crossing of the future Eastside Corridor was assumed, although it is understood that planning for the intersection continues and that land may be preserved from development for the construction of a future interchange. Proceeding eastward, the alignment continues along the existing 57th Street centerline toward the approach to the major ravine network and Eastside Sanitary Sewer system alignment. Alignment alternatives have been developed here to either avoid or cross the ravines in search of a reasonable approach to the Big Sioux River crossing. The alignment had to function with adjacent existing residential developments and allow proper development of a corresponding roadway profile that meets design standards for a minor arterial road.

The skew of the horizontal alignment is also considered in crossing the Big Sioux River. From a bridge construction standpoint, it is desirable to cross as close to 90 degrees to the river alignment as possible. It is also desirable to keep the bridge structure on a tangent section if possible.

At the east end of the project all alternative alignments tie into Iowa County Road A10 along the Iowa/South Dakota border. The goal here was to minimize impacts to the adjacent properties and to limit needed right-of-way acquisitions. To achieve this goal, various alignments were analyzed.

For all alignment alternatives considered, minimum SDDOT standards were achieved for horizontal curvature of a minor arterial road with a 50 mph design speed. Future 57th Street is proposed to be a 4-lane divided roadway with curb and gutter that requires a 100 ft. right-of-way section. Figures 2A and 2B display the proposed typical section for the proposed 57th Street.

B. Vertical Alignment

Working west to east, the profile of 57th Street will match into what is planned for the corridor from Sycamore Avenue to SD 11 and then will closely follow the existing ground line until the Big Sioux River valley is reached. At this juncture, the profile will use the existing valleys that slope down to the river. The road will be properly designed so that cut and fill will be balanced with the ravine slope being the prime location to adjust the elevations to balance the earthwork. Earth from the bluffs will be used to fill in the floodplain around the river to reduce the span length necessary for the crossing.

The nearest bridge crossing to the 57th Street study area is the SD Highway 42 bridge over the Big Sioux River, which is less than 2 miles north. This bridge was constructed in 1995 and is 454 ft. long and skewed 20 degrees to the river. Approximately 4 miles south of the 57th Street study area is another river crossing. This bridge is 430 ft. long and skewed 20 degrees to the river. The proposed 57th Street bridge will be much like these bridges. The proposed bridge would consist of prestressed concrete deck girders. The floodplain would be filled with earth cut from the slope of the ravine. The bridge would consist of 4 spans and 3 piers. Two of the piers would be near the water's edge and the other would be in the middle

of the river. The bridge would drain to the east and water would be collected and distributed to a storm water pond for proper treatment before it is discharged into the Big Sioux River. The embankments of the bridge would receive riprap treatment. Based on the soil boring information from the proposed East Side Sanitary Sewer (ESSS) Lift Station, the soil conditions seem favorable for the construction of a bridge in the area. The bridge foundation would be resting on the bedrock. SEH proposes that the bridge be constructed as a 2-lane facility with 10 ft. shoulders and a 12 ft. pedestrian path. Including the railings, the total width of the bridge is estimated to be 59 ft. wide. The proposed 57th Street bridge would be approximately 400 to 415 ft. long. The surrounding area will consist of residential development and to keep the bridge unobtrusive to residents and the natural environment, it is not assumed to be illuminated.

The preliminary bridge depth is assumed to be nine feet from low member to the deck crown. The bottom of the bridge will be designed so that it is no less than 2 feet from the 100-year flood elevation. SEH recommends that this study identify a wider corridor for preservation that would allow an identical bridge to be constructed next to the proposed 57th Street bridge when (if) traffic warrants the need.

Once across the Big Sioux River, there is a shallow stream to cross and the profile will then match into the Iowa County Road A10 elevation. Small creek crossings are proposed to be treated with box culverts. According to city design standards, 0.5 percent is the minimum and 6 percent is the maximum profile grade to be used in design of a minor arterial street. Alternatives developed were designed to meet city standards and vertical curves will meet minimum SDDOT standards.

Based on this initial investigation of the requirements and constraints associated with the horizontal and vertical alignments, a set of preliminary alignment alternatives were developed for the project area.

V. Preliminary Concept Alternatives and Big Sioux River Crossing Feasibility (Benefit-Cost Analysis)

At its initial meeting on July 22, 2005, the 57th Street Steering Committee reviewed three preliminary roadway and bridge concept alignments for 57th Street prepared by SEH. Of the initial alignments that were considered, two alternatives (Alternative 1 and Alternative 2) were chosen for further analysis by the Steering Committee, which is presented in the following discussion. At its July 22 meeting, the Steering Committee concluded that Alternative 3 should be eliminated from further consideration because of its numerous disadvantages, including existing residential property displacement. Reasons for its dismissal were formally documented and compared to the other alternatives below.

The following is a brief summary and comparison of the performance characteristics, including advantages and disadvantages, of Alternatives 1, 2, and 3. Sketches of these alternatives are presented in the exhibit at the end of this memorandum in Figure 3.

A. Alternative 1

Alternative 1 utilizes a 100 ft. service road corridor that was acquired to provide access from near the existing 57th Street eastern terminus to the ESSS lift station near the Big Sioux River. Traveling east, this alternative veers north after the intersection with Six Mile Road and avoids the ravines. It then intersects with River Bluff Road, as the vertical alignment will begin to drop down on the side of a ravine down to the Big Sioux River at a 6 percent grade. The alignment then goes out on the floodplain and crosses the Big Sioux River. As the alignment shifts back to the south, a small creek is crossed and then intersects with 481st Avenue. Then the alignment matches into Lyon County Road A10.

The bridge is estimated to be 415 ft. long. This alternative is 4.23 miles long from east of Sycamore Avenue to the tie down on Lyon County Road A10. The estimated cost of this alternative is \$10.6 million. A more detailed cost estimate, including assumptions and high level unit costs, is attached as Figure 4.

Advantages:

- Utilizes an existing service road corridor for the ESSS lift station
- Bridge structure on a tangent alignment
- Avoids residential impacts
- Avoids Gitchie Manitou State Preserve

Disadvantages:

- Crosses river at 52 degrees
- Significant retaining wall structure and/or slopes which requires additional easements beyond the current city-owned land will be needed

B. Alternative 2

Traveling east, this alternative stays on the section line much longer than Alternative 1. The alignment then veers slightly north and begins its descent toward the Big Sioux River. Alternative 2 follows the ESSS and a creek as it descends to the Big Sioux River. As the alignment is going down the ravine, it intersects River Bluff Road. This intersection will require a more detailed engineering study to determine the best solution to deal with the different elevations and the creek that 57th Street is following. The alignment will descend to the Big Sioux River at a 4 percent grade. The alignment then goes out on the floodplain and crosses the Big Sioux River. As the alignment shifts back to the south, a small creek is crossed and then intersects with 481st Avenue. The alignment then matches into Lyon County Road A10.

The bridge is estimated to be 400 ft. in length. This alternative is 4.08 miles long from east of Sycamore Avenue to the tie down on Lyon County Road A10. The estimated cost of this alternative is \$10.7 million. A more detailed cost estimate, including assumptions and high level unit costs, is attached as Figure 4.

Advantages:

- Utilizes the natural grade to the river
- Avoids residential impacts
- Avoids Gitchie Manitou State Preserve
- Crosses river at 90 degrees
- Alignment is straight over the bridge

Disadvantages:

- ESSS impacts
- Alignment follows creek down ravine
- Intersection with River Bluff Road in ravine next to creek

C. Alternative 3

Traveling east, this alternative deviates from the section line before Six Mile Road. The alignment then veers south and crosses a ravine with a creek flowing in it. The alignment follows on the south side of the

creek and then curves to the north. The alignment descends towards the Big Sioux River along the creek on the south side of the ravine. River Bluff Road intersects this alternative in the ravine much like Alternative 2. The alignment then runs through the northern row of homes on the edge of the ravine down to the Big Sioux River at a 4 percent grade. The alignment crosses the Big Sioux River. As the alignment shifts back to the south, a small creek is crossed and then intersects with 481st Avenue. The alignment then matches into Lyon County Road A10.

The bridge is estimated to be 400 ft. in length. This alternative is 4.23 miles long from east of Sycamore Avenue to the tie down on Lyon County Road A10. The estimated cost of this alternative is \$13.5 million. A more detailed cost estimate, including assumptions and high level unit costs, is attached as Figure 4.

Advantages:

- Utilizes the natural grade to the river
- Avoids Gitchie Manitou State Preserve
- Crosses river at 90 degrees
- Alignment is straight over the bridge

Disadvantages:

- High number of residential impacts
- Alignment follows creek down ravine
- 2 creek crossings
- Bridge structure on a horizontal curve
- Intersection with River Bluff Road in ravine next to creek

Due to the residential and environmental impacts associated with Alternative 3, this alternative was eliminated from further study.

VI. Commenting Agency Feedback

Government agencies in South Dakota and Iowa were contacted and provided a project explanation and graphic of Alternatives 1 and 2 to provide guidance for the feasibility assessment, including alignment selection and anticipated permits and approvals prior to construction. Funding sources for the 57th Street extension right-of-way and construction have not been determined at this time, and therefore, early comments were solicited from Federal, State, and local agencies to plan for a full-range of possible approval requirements and impact mitigation scenarios to preserve the MPO's funding options. Agencies contacted included the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, South Dakota Departments of Environment and Natural Resources, Game Fish and Parks, and Historical Society; Iowa Department of Transportation; and Lyon County (Iowa).

The Sioux Falls MPO has experience in seeking comments from planned roadway improvement crossings of the Big Sioux River, including SD Highway 42 and the Eastside Corridor. Therefore, the same agencies were contacted for a possible 57th Street crossing of the Big Sioux River. The MPO anticipated the following potential issues and concerns:

- Big Sioux River Valley issues, including non-renewable resources such as archaeological and historical sites; rare, threatened, or endangered species (federal and state-listed); floodplain and

water quality impacts; and, a limit on potential suspended solids entering the river.

- Upland issues, including potential petroleum and contaminant spill sites (from farm accidents and vehicle crashes), sediment and soil erosion controls in ravines and other areas, wetland and farmland impacts.

Responses

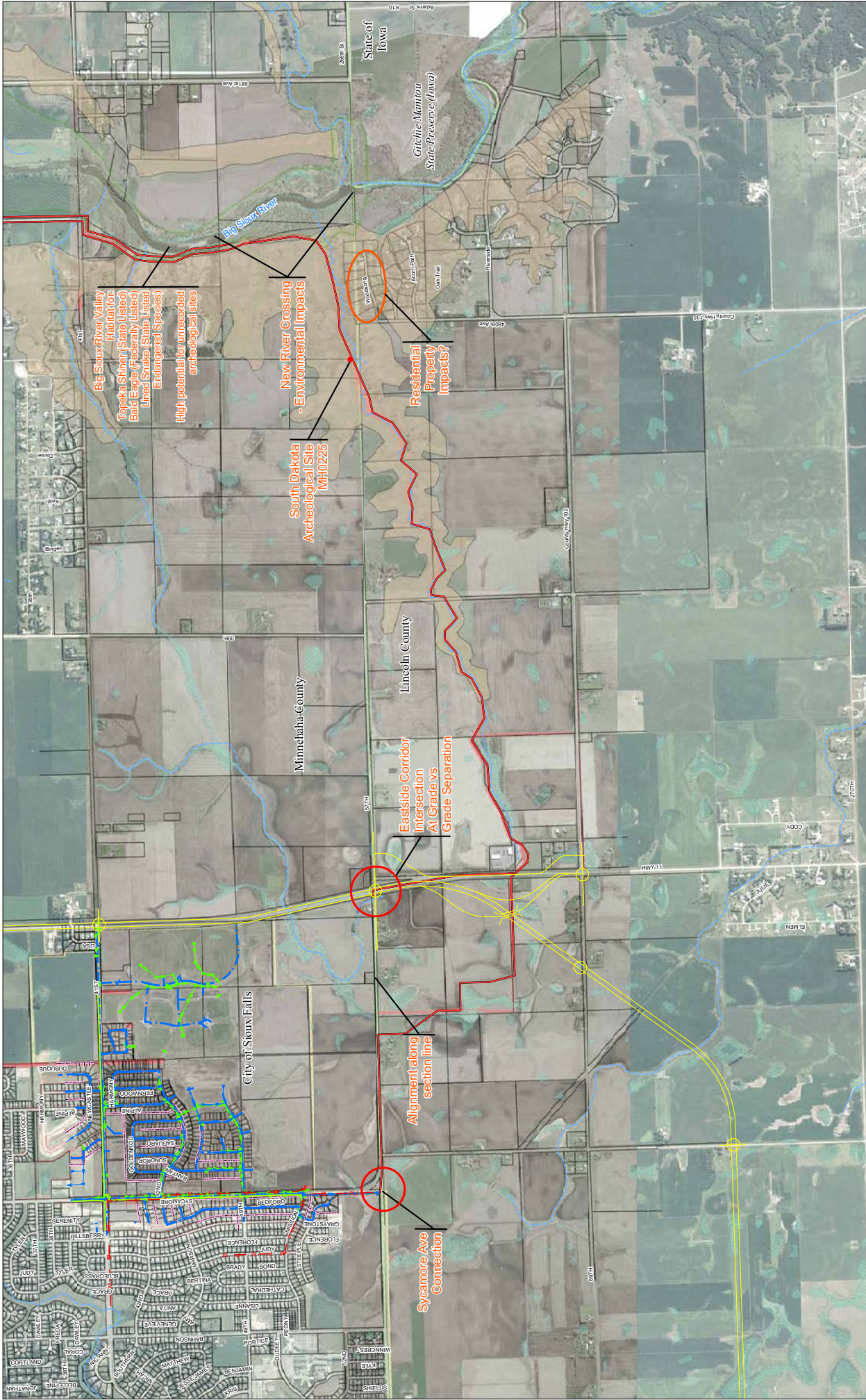
The following agencies offered responses. Follow-up telephone calls were made to encourage early communications. Written replies received are appended to this memorandum.

- The SD State Historical Society provided one recorded archaeological site in the area, which was identified as an issue for avoidance. Neither of the project build alternatives impacts this site. The potential for archaeological or historical resources in the Big Sioux River Valley is significant, however, and the area where the potential build candidates will cross the river remains unsurveyed. A survey would need to be conducted with the selection of a preferred alternative to determine the presence of cultural resources and the follow-up plan for their disposition (i.e., avoidance, impact minimization, and mitigation for impacts).
- The SD - DENR responded with concerns for monitoring best management practices to prevent sediment and soil erosion. Depending on the severity of wetland impacts and project funding, the US Army Corps may require a Section 404 permit as well as a permit for wetland and floodplain impacts of crossing the Big Sioux River and a tributary to its east. In addition, a Section 401 storm water permit for construction activities, a surface water discharge (SWD) permit for potential dewatering, and a special bridge construction management program to ensure the propagation of plants, fish and wildlife in the river valley will likely be required.
- The SD Department of Game Fish & Parks confirmed that it would need to evaluate the potential impact on State-listed threatened or endangered species typically found in Minnehaha County in the Big Sioux River valley and system of local ravines, including the topeka shiner and the lined snake.

None of the agencies providing responses indicated that the project should not be allowed to cross the Big Sioux River. Rather, they offered advice on approval steps that will need to be taken if the MPO does proceed with a river crossing. Other agencies not providing responses will be recontacted. Any additional comments will be recorded and noted during the Phases III (Preliminary Design).

VII. Conclusion and Recommendation

Assuming that all of the information acquired during the preliminary review is accurate, and based on the initial design analysis performed, it is feasible to extend 57th Street over the Big Sioux River, to tie into the intersection of Lyon County Road A10. In addition to achieving the project's purpose and need, Alternative 1 best utilizes the existing developable land and roadbeds, minimizes right-of-way costs and impacts, and best achieves City, State, and AASHTO design requirements.



Big Sioux River Valley
Habitat for
Topoke Shiner (State Listed)
Bald Eagle (Federally Listed)
Lined Snake (State Listed)
Endangered Species)
High potential for unrecorded
archeological sites

South Dakota
Archeological Site
MH0226

New River Crossing
- Environmental Impacts

Residential
Property
Impacts?

Eastside Corridor
Intersection
At Grade vs
Grade Separation

Alignment along
section line

Sycamore Ave
Connection

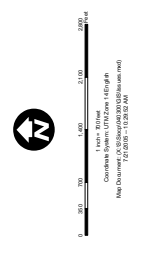
- Legend**
- East Side Saniway Sewer
 - Sanitary Force Main
 - Light UG ST Conductor
 - East Side Corridor
 - Sanitary Sewer
 - Storm Sewer
 - Floodplain
 - Steep Slopes
 - County Boundary
 - Sioux Falls
 - Wetlands
 - Sump Pipe
 - Water Main
 - Streams
 - Easements



Issues

57th Street Corridor Study

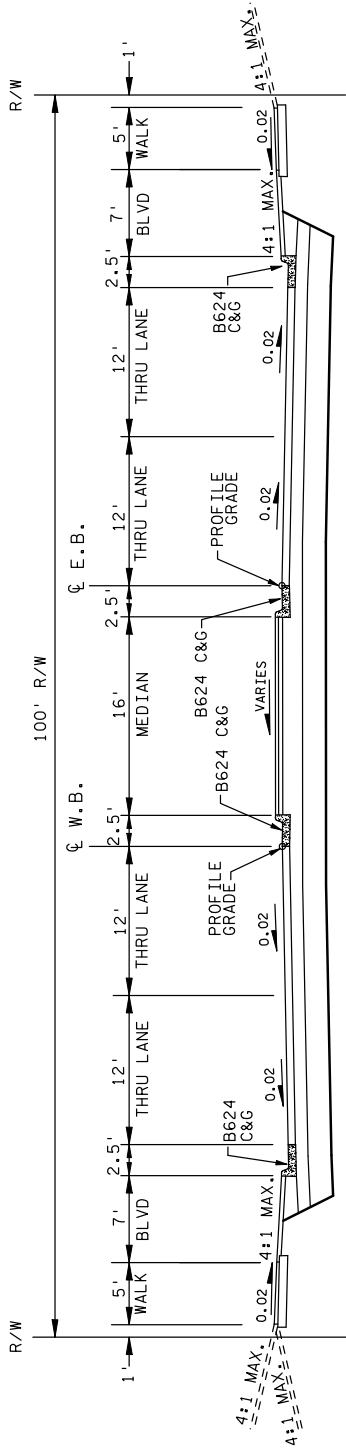
Sioux Falls, South Dakota



Source: City of Sioux Falls, USGS, Minnehaha County, SEH

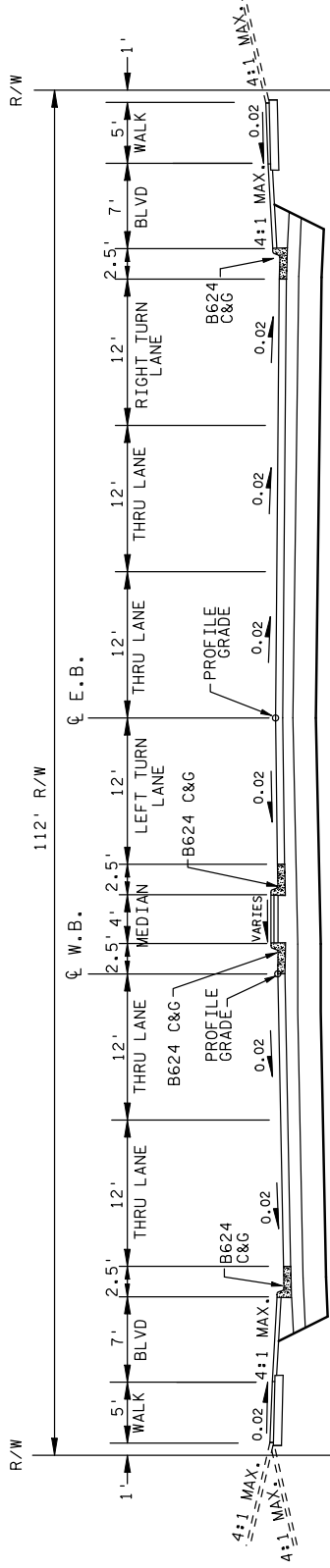
DESIGN SPEED = 45-50 MPH

4-LANE URBAN DIVIDED ROADWAY



DESIGN SPEED = 45-50 MPH

4-LANE URBAN DIVIDED ROADWAY WITH TURN LANES



NO SCALE

PHONE: 952.912.2600
 10901 RED CIRCLE DRIVE, SUITE 200
 MINNETONKA, MN 55343-9301

OCTOBER 2005

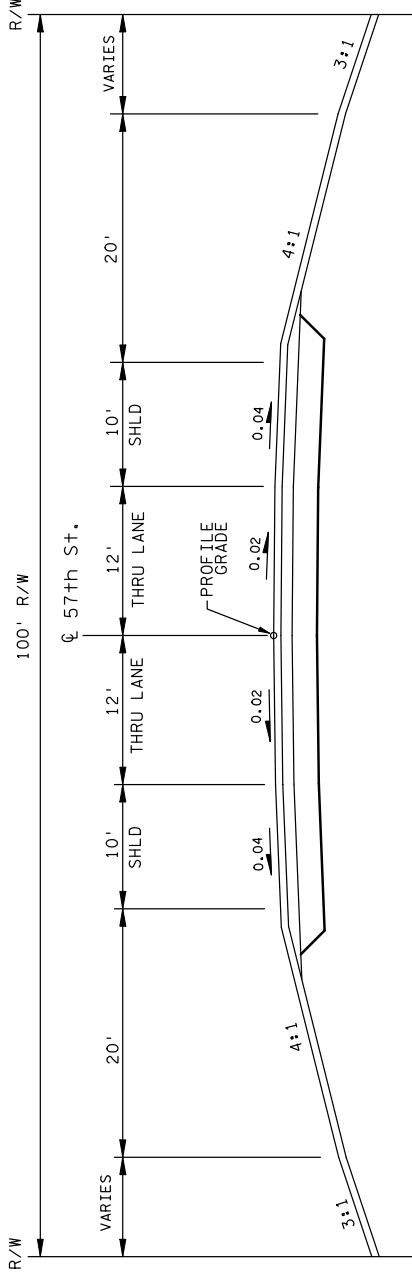
57th Street Extension Feasibility Analysis City of Sioux Falls, South Dakota

TYPICAL SECTIONS

FIGURE NO. 2A
 FILE NO. SDCPP063.00

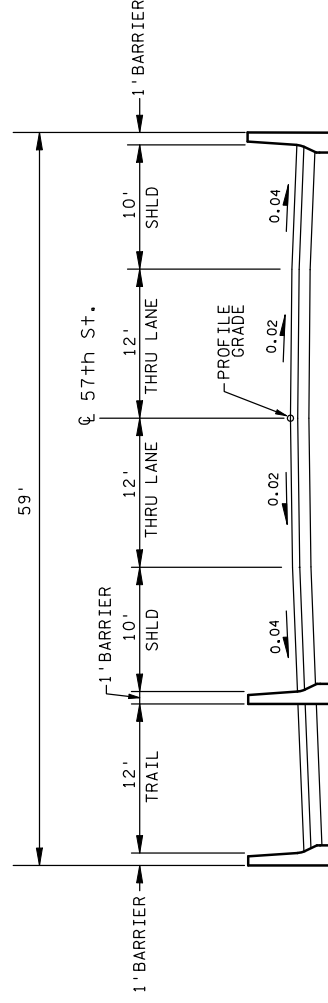
DESIGN SPEED = 45-50 MPH

2-LANE RURAL ROADWAY



DESIGN SPEED = 45-50 MPH

BRIDGE SECTION



NO SCALE

PHONE: 952.912.2600
 10901 RED CIRCLE DRIVE, SUITE 200
 MINNETONKA, MN 55343-9301

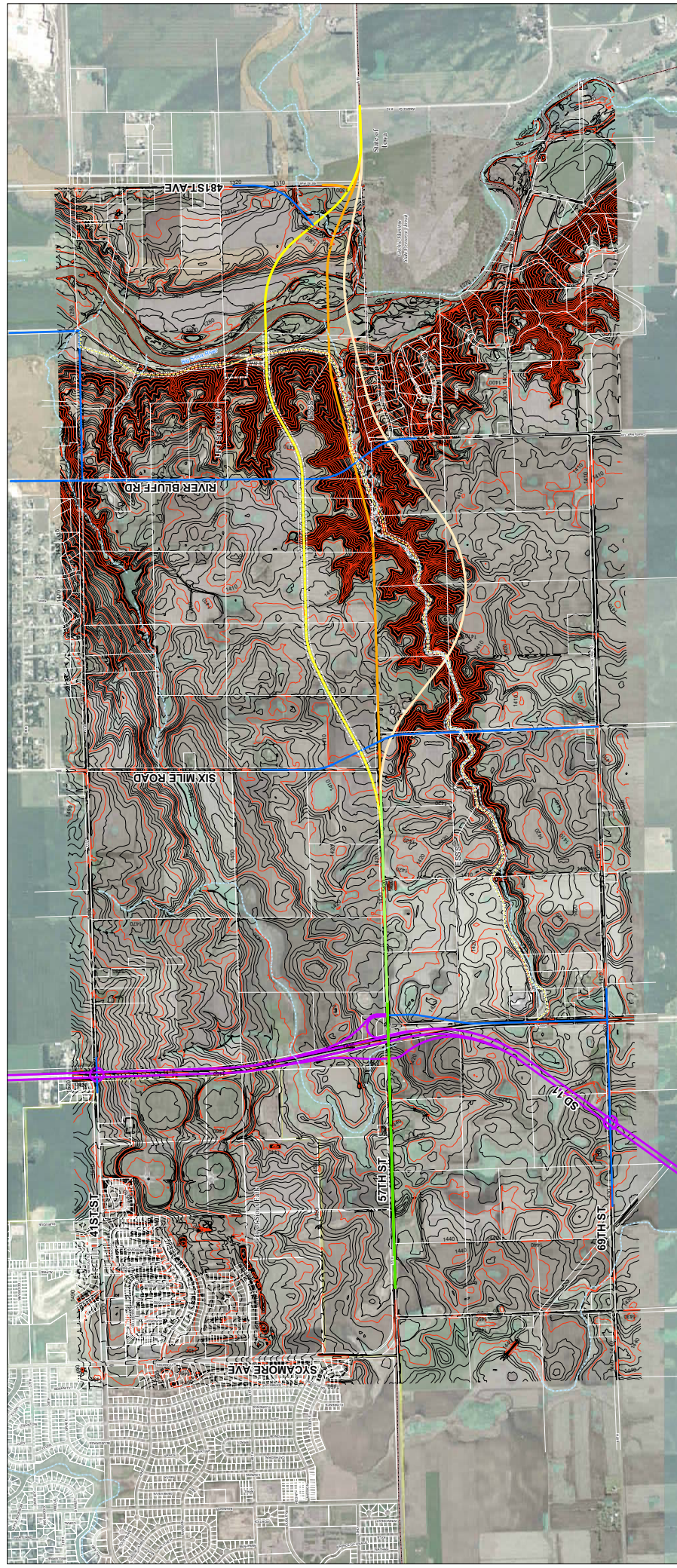


OCTOBER 2005

57th Street Extension Feasibility Analysis
 City of Sioux Falls, South Dakota

TYPICAL SECTIONS

FIGURE NO. 2B
 FILE NO. SDCPP063.00



- Alternatives**
- Western Section - Build Alternative 2
 - Central Section - Build Alternative 3
 - East Side Corridor
 - Eastern Section - Build Alternative 1

- Eastern Section - Build Alternative 2
- Eastern Section - Build Alternative 3
- City Connections

Alternatives
57th Street Corridor Study
 Sioux Falls, South Dakota

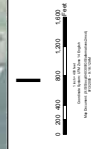


Figure 4 - Cost Estimate
57th Street Extension to the Iowa Border Feasibility Study
Phase 1 - Scoping

Unit	Measurement	Alternative		
		1	2	3
Length	(miles)	4.23	4.08	4.23
Concrete Roadway	(\$ / Mile)	\$1,750,000	\$1,750,000	\$1,750,000
Concrete Roadway Cost		\$7,402,500	\$7,140,000	\$7,402,500
Right-of-way estimate	(acres)	32	49	51
Right-of-way Cost	(\$ / acre)	\$30,000	\$30,000	\$30,000
Residential Property Acquisitions	(each)	\$300,000	\$300,000	\$300,000
Number of Residential Property Acquisitions	(each)	0	0	8
Right-of-way Cost		\$967,521	\$1,483,636	\$3,938,182
Bridge Length	(ft)	415	400	400
Bridge Width	(ft)	59	59	59
Bridge Area	(Sq. Ft.)	24,485	23,600	23,600
Bridge Cost	(\$ / Sq. Ft.)	\$85	\$85	\$85
Bridge Cost		\$2,081,225	\$2,006,000	\$2,006,000
Box Culverts	(each)	2	1	2
Box Culvert Cost	(each)	\$50,000	\$50,000	\$50,000
Box Culvert Cost		\$100,000	\$50,000	\$100,000
Total Cost		\$10,551,246	\$10,679,636	\$13,446,682

Note: Alternative 2 cost does not include 57th Street intersection with River Bluff Road.



Iowa Department of Transportation

HIGHWAY DIVISION – DISTRICT #3 OFFICE
2800 GORDON DRIVE, P.O. BOX 987
SIOUX CITY, IA 51102-0987

712-276-1451
FAX: 712-276-2822

September 8, 2005

REF: Lyon County
57th Street Extension
Sioux Falls, SD

City of Sioux Falls
Attn: Shannon Ausen, Asst. City Engineer
224 W 9th Street
Sioux Falls, SD 57104-6407

Dear Ms. Ausen:

Thank you for the opportunity to comment on the proposed extension of 57th Street in Sioux Falls. Since this extension would have no direct impact to a primary highway, the Iowa Department of Transportation has no concerns to express regarding the proposed project. We would encourage the City of Sioux Falls and the Sioux Falls MPO to work with the Lyon County Engineer regarding the proposed improvement.

If you have questions or would like additional information, please contact me at (712) 276-1451.

Sincerely,

A handwritten signature in black ink, appearing to read "Daryn Schultz", with a long horizontal flourish extending to the right.

Daryn Schultz
Transportation Planner, District 3
Iowa Department of Transportation

cc: Rich Michaelis, District 3
File

*Sorry for
the late response.*

A handwritten signature in black ink, appearing to read "D. Michaelis", written in a cursive style.



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

August 30, 2005

Shannon Ausen
City of Sioux Falls
224 West Ninth Street
Sioux Falls SD 57104-6407

Dear Ms. Ausen:

The South Dakota Department of Environment and Natural Resources (DENR) has reviewed the proposed project concerning the 57th Street Extension Feasibility Study. The DENR finds that this construction, using conventional construction techniques, should not cause violation of any statutes or regulations administered by the DENR based on the following recommendations:

1. Best Management Practices (BMP) for sediment and erosion control should be incorporated into the planning, design, and construction of this project.
2. A Surface Water Discharge (SWD) permit may be required if any construction dewatering should occur as a result of this project. Please contact this office for more information.
3. A General Storm Water Permit for Construction Activities may be required. If you have any questions, please contact Al Spangler at 1-800-SDSTORM (1-800-737-8676).
4. The Big Sioux River is classified by the South Dakota Surface Water Quality Standards and Uses Assigned to Streams for the following beneficial uses:
 - (5) Warmwater semipermanent fish life propagation waters;
 - (7) Immersion recreation waters;
 - (8) Limited contact recreation waters;
 - (9) Fish and wildlife propagation, recreation, and stock watering waters; and
 - (10) Irrigation waters.

Because of these beneficial uses, special construction measures may have to be taken to ensure that the total suspended solids standard of 150 mg/L is not violated.

5. Wetlands may be impacted by this project. These water bodies are considered waters of the state and are protected under the South Dakota Surface Water Quality Standards. The discharge of pollutants from any source, including indiscriminate use of fill material, may not cause destruction or impairment except where authorized under Sections 402 or 404 of the Federal Water Pollution Control Act. Please contact the U.S. Army Corps of Engineers concerning these permits.

If you have any questions concerning these comments, please contact me at the number listed below.

Sincerely,

A handwritten signature in cursive script that reads "John Miller".

John Miller
Environmental Program Scientist
Surface Water Quality Program
(605) 773-3351



DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
SOUTH DAKOTA REGULATORY OFFICE
28563 POWERHOUSE ROAD, ROOM 118
PIERRE SD 57501-6174

REPLY TO
ATTENTION OF:

August 17, 2005

South Dakota Regulatory Office
28563 Powerhouse Road, Room 118
Pierre, South Dakota 57501

City of Sioux Falls
Attn: Ms. Shannon Ausen
Assistant City Engineer
224 West Ninth Street
Sioux Falls, South Dakota 57104-6407

Dear Ms. Ausen:

Reference is made to the preliminary information received August 10, 2005, concerning Department of the Army authorization requirements for the extension of 57th Street from Sycamore Avenue to the Iowa state line located in Minnehaha and Lincoln Counties, South Dakota.

The Corps' jurisdiction is derived from Section 404 of the Clean Water Act passed by Congress in 1972. Section 404 calls for Federal regulation of the discharge of dredged or fill material into certain waterways, lakes and/or wetlands (i.e. waters of the United States).

Based on the preliminary information provided, it can not be determined if the proposed construction activities involves the discharge of dredged or fill material in jurisdictional waterways. Therefore, a Department of the Army permit may be required. For our final determination and for processing of permits, we would ask that you submit final plans when they become available.

Enclosed is the necessary application form (ENG Form 4345) and information pamphlet. When completing the application form, we would request from the applicant (a) a detailed description of the work activity [i.e., explain precisely what you are going to do and how you are going to accomplish it; include fill and/or excavation quantities and dimensions to be performed below the ordinary high water elevation (if in a lake, river, or stream) or to be performed within the boundary of jurisdictional wetlands (if the project involves wetlands), along with the source/type of fill and the type of equipment to be used during construction]; (b) the purpose, need, and/or benefits of the proposed project; and (c) any alternative project designs or locations considered.

Along with the completed application form, we would request from the applicant (1) detailed drawings (plan and cross-sectional views; the drawings may be submitted on 8-1/2x11 inch paper), (2) a location map showing the project site, (3) a delineation of affected wetlands if the project involves wetlands, (4) if available, colored pictures showing at least two views of the proposed project site and (5) any ecological or environmental information available that you feel may be pertinent to your project (i.e., area wildlife activity, area vegetation, area land use, quality of fishery, etc.).


Adherence to the above information requests will speed up the application evaluation and permit processing time. The requested information is used to help the Corps determine the type of permit to process if a permit is required and is used in the public review.

If we do not hear from you within sixty (60) days from the date of this letter, we will assume that you have decided not to complete your proposed project and that this proposal requires no further action. You may however, at any time in the future, submit an application for this project or any other proposal to conduct work in waters of the United States.

You can obtain additional information about the Regulatory Program and download forms from our website: <https://www.nwo.usace.army.mil/html/od-rsd/frame.html>

If you have any questions or need any assistance, please feel free to contact this office at the above Regulatory Office address or telephone Carolyn Kutz at (605) 224-8531 and reference action ID 200530312.

Sincerely,

For 
Steven E. Naylor
Regulatory Program Manager,
South Dakota

Enclosures

The public reporting burden for this collection of information is estimated to average 10 hours per response, although the majority of applications should require 5 hours or less. This includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302; and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington, DC 20503. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies. Submission of requested information is voluntary, however, if information is not provided, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO. <u>200530312</u>	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETED
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(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE <i>(an agent is not required)</i>
6. APPLICANT'S ADDRESS	9. AGENT'S ADDRESS
7. APPLICANT'S PHONE NUMBERS WITH AREA CODE a. Residence b. Business	10. AGENT'S PHONE NUMBERS WITH AREA CODE a. Residence b. Business

STATEMENT OF AUTHORIZATION

11. I hereby authorize _____ to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

APPLICANT'S SIGNATURE

DATE

NAME, LOCATION AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE *(see instructions)*

13. NAME OF WATERBODY, IF KNOWN *(if applicable)*

14. PROJECT STREET ADDRESS *(if applicable)*

15. LOCATION OF PROJECT

COUNTY

STATE

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN *(see instructions)*

LEGAL DESCRIPTION - SECTION, TOWNSHIP, RANGE

17. DIRECTIONS TO THE SITE

18. Nature of Activity (Description of project, include all features)

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

23. Is Any Portion of the Work Already Complete? Yes _____ No _____ IF YES, DESCRIBE THE COMPLETED WORK

24. Addresses of Adjoining Property Owners, Lessees, etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list).

25. List of Other Certifications or Approvals/Denials Received from other Federal, State, or Local Agencies for Work Described in This Application

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED

*Would include but is not restricted to zoning, building and flood plain permits

26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT

DATE

SIGNATURE OF AGENT

DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States, knowingly and willfully falsifies, conceals, or covers up any trick scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than \$10,000 or imprisoned not more than five years or both.

Instructions for Preparing a
Department of the Army Permit Application

Blocks 1 through 4. To be completed by Corps of Engineers.

Block 5. Applicant's Name. Enter the name of the responsible party or parties. If the responsible party is an agency, company, corporation, or other organization, indicate the responsible officer and title. If more than one party is associated with the application, please attach a sheet with the necessary information marked Block 5.

Block 6. Address of Applicant. Please provide the full address of the party or parties responsible for the application. If more space is needed, attach an extra sheet of paper marked Block 6.

Block 7. Applicant Telephone Number(s). Please provide the number where you can usually be reached during normal business hours.

Blocks 8 through 11. To be completed, if you choose to have an agent.

Block 8. Authorized Agent's Name and Title. Indicate name of individual or agency, designated by you, to represent you in this process. An agent can be an attorney, builder, contractor, engineer, or any other person or organization. Note: An agent is not required.

Blocks 9 and 10. Agent's Address and Telephone Number. Please provide the complete mailing address of the agent, along with the telephone number where he / she can be reached during normal business hours.

Block 11. Statement of Authorization. To be completed by applicant, if an agent is to be employed.

Block 12. Proposed Project Name or Title. Please provide name identifying the proposed project, *e.g.*, Landmark Plaza, Burned Hills Subdivision, or Edsall Commercial Center.

Block 13. Name of Waterbody. Please provide the name of any stream, lake, marsh, or other waterway to be directly impacted by the activity. If it is a minor (no name) stream, identify the waterbody the minor stream enters.

Block 14. Proposed Project Street Address. If the proposed project is located at a site having a street address (not a box number), please enter it here.

Block 15. Location of Proposed Project. Enter the county and state where the proposed project is located. If more space is required, please attach a sheet with the necessary information marked Block 15.

Block 16. Other Location Descriptions. If available, provide the Section, Township, and Range of the site and / or the latitude and longitude. You may also provide description of the proposed project location, such as lot numbers, tract numbers, or you may choose to locate the proposed project site from a known point (such as the right descending bank of Smith Creek, one mile downstream from the Highway 14 bridge). If a large river or stream, include the river mile of the proposed project site if known.

Block 17. Directions to the Site. Provide directions to the site from a known location or landmark. Include highway and street numbers as well as names. Also provide distances from known locations and any other information that would assist in locating the site.

Block 18. Nature of Activity. Describe the overall activity or project. Give appropriate dimensions of structures such as wingwalls, dikes (identify the materials to be used in construction, as well as the methods by which the work is to be done), or excavations (length, width, and height). Indicate whether discharge of dredged or fill material is involved. Also, identify any structure to be constructed on a fill, piles, or float-supported platforms.

The written descriptions and illustrations are an important part of the application. Please describe, in detail, what you wish to do. If more space is needed, attach an extra sheet of paper marked Block 18.

Block 19. Proposed Project Purpose. Describe the purpose and need for the proposed project. What will it be used for and why? Also include a brief description of any related activities to be developed as the result of the proposed project. Give the approximate dates you plan to both begin and complete all work.

Block 20. Reasons for Discharge. If the activity involves the discharge of dredged and/or fill material into a wetland or other waterbody, including the temporary placement of material, explain the specific purpose of the placement of the material (such as erosion control).

Block 21. Types of Material Being Discharged and the Amount of Each Type in Cubic Yards. Describe the material to be discharged and amount of each material to be discharged within Corps jurisdiction. Please be sure this description will agree with your illustrations. Discharge material includes: rock, sand, clay, concrete, etc.

Block 22. Surface Areas of Wetlands or Other Waters Filled. Describe the area to be filled at each location. Specifically identify the surface areas, or part thereof, to be filled. Also include the means by which the discharge is to be done (backhoe, dragline, etc.). If dredged material is to be discharged on an upland site, identify the site and the steps to be taken (if necessary) to prevent runoff from the dredged material back into a waterbody. If more space is needed, attach an extra sheet of paper marked Block 22.

Block 23. Is Any Portion of the Work Already Complete? Provide any background on any part of the proposed project already completed. Describe the area already developed, structures completed, any dredged or fill material already discharged, the type of material, volume in cubic yards, acres filled, if a wetland or other waterbody (in acres or square feet). If the work was done under an existing Corps permit, identify the authorization, if possible.

Block 24. Names and Addresses of Adjoining Property Owners, Lessees, etc., Whose Property Adjoins the Project Site. List complete names and full mailing addresses of the adjacent property owners (public and private) lessees, etc., whose property adjoins the waterbody or aquatic site where the work is being proposed so that they may be notified of the proposed activity (usually by public notice). If more space is needed, attach an extra sheet of paper marked Block 24.

Information regarding adjacent landowners is usually available through the office of the tax assessor in the county or counties where the project is to be developed.

Block 25. Information about Approvals or Denials by Other Agencies. You may need the approval of other federal, state, or local agencies for your project. Identify any applications you have submitted and the status, if any (approved or denied) of each application. You need not have obtained all other permits before applying for a Corps permit.

Block 26. Signature of Applicant or Agent. The application must be signed by the owner or other authorized party (agent). This signature shall be an affirmation that the party applying for the permit possesses the requisite property rights to undertake the activity applied for (including compliance with special conditions, mitigation, etc.).

DRAWINGS AND ILLUSTRATIONS

General Information.

Three types of illustrations are needed to properly depict the work to be undertaken. These illustrations or drawings are identified as a Vicinity Map, a Plan View or a Typical Cross-Section Map. Identify each illustration with a figure or attachment number.

Please submit one original, or good quality copy, of all drawings on 8½ x11 inch plain white paper (tracing paper or film may be substituted). Use the fewest number of sheets necessary for your drawings or illustrations.

Each illustration should identify the project, the applicant, and the type of illustration (vicinity map, plan view, or cross-section). **While illustrations need not be professional (many small, private project illustrations are prepared by hand), they should be clear, accurate, and contain all necessary information.**

Appendix B

Field Survey Findings (Dakota Land Surveying & Engineering)

Appendix B – Summary of Survey Work Performed for the 57th Street Extension Feasibility Study

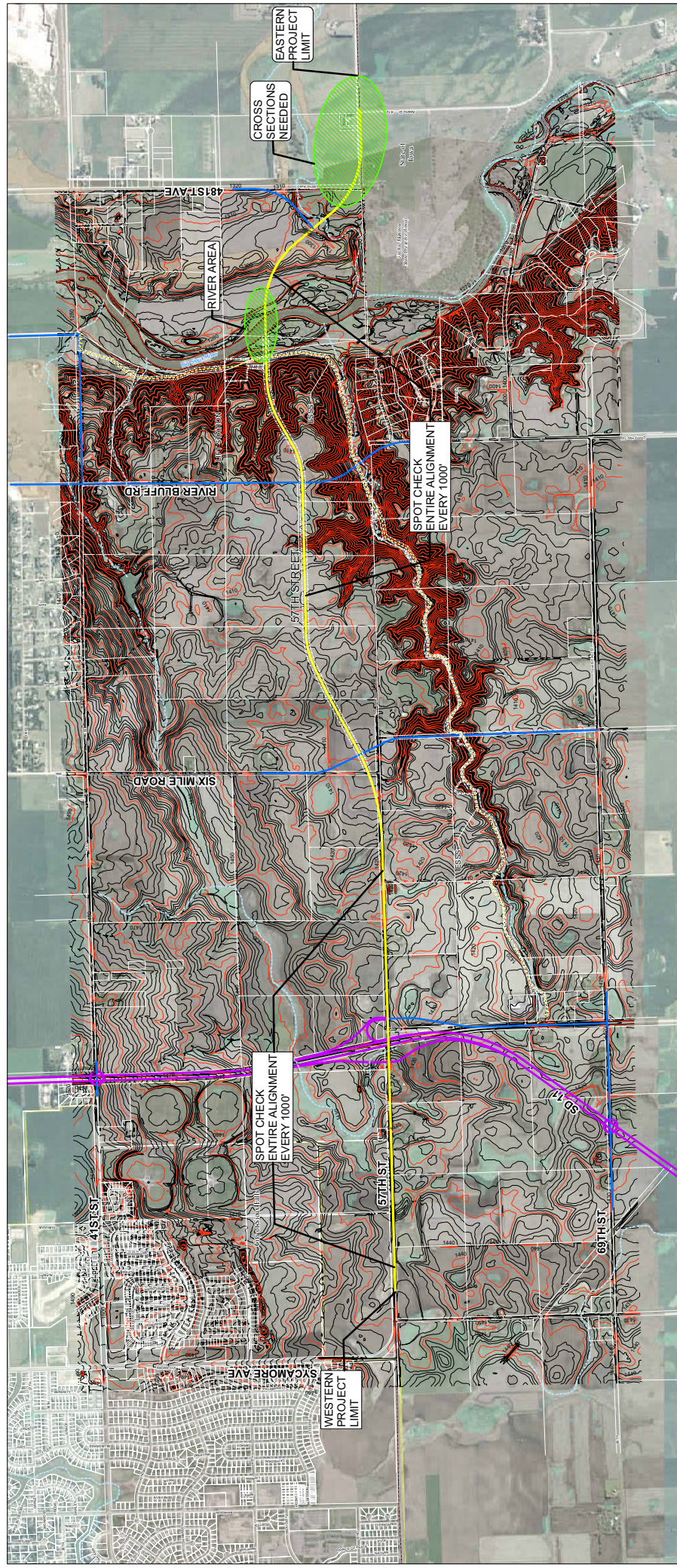
SEH subcontracted with Dakota Land Survey and Engineering, Inc. of Sioux Falls for two primary survey tasks, including checking the GIS contours that were furnished by the City of Sioux Falls and filling in the voids in the City's model. Dakota Land Surveying performed their work in early October 2005.

Dakota Land Surveying ran spot checks along the proposed 57th Street alignment approximately every 1000 feet and at major elevation changes to verify the GIS data through the 4 mile study corridor. The area on either side of the river was checked more thoroughly in the area of the proposed river crossings. At the time of survey, the Eastside Sanitary Sewer lift station was under construction along with the access road that follows the alignment under study. It was found that the access road had a couple of places where the spot check elevations had varied by more than 10 feet from the GIS contour information, but these were areas that were filled in with the construction of the access road and so the differences were not significant.

Most of the spot checks on average were less than .5 feet different from the GIS contour information that was received from the City. The spot checks verify the GIS contours will provide adequate information to develop the preliminary design.

The other major task was picking up the area that was out of the boundary of the GIS contours. The attached figure displays the area where vertical information was unknown, which was east of 481st Avenue on Iowa A10. In this area Dakota Land Surveying collected cross sections (200 feet wide) approximately every 100 feet.

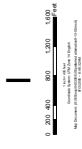
Dakota Land Surveying verified the contour information throughout the project area and supplemented the vertical information on the east side to develop a reliable model of the existing contours so SEH could develop a complete proposed roadway profile.



Legend

- East Side Corridor
- Preferred Alternative
- City Connections

Survey Needs
 57th Street Corridor Study
 Sioux Falls, South Dakota



September 2005

Appendix C

57th Street Traffic Analysis



SEH MEMORANDUM

TO: Shannon Ausen, Sam Trebilcock, Rick Laughlin

FROM: Mike Kotila

DATE: October 24, 2005

RE: 57th Street at SD 11 Traffic Analysis
SEH No. ASIOCP0403.00 F-14.00

This Memorandum updates the email sent on August 26, 2005 which provided a preliminary assessment of 2025 capacity needs for the intersection of 57th Street and SD 11 as an at-grade intersection and as a grade separated diamond interchange. The original email and its supporting documents are attached for reference purposes.

The preliminary layout reflects design and operational choices made subsequent to the preliminary analysis. The following points clarify issues left undetermined at the time of the original email.

- Double left turn lanes are provided on all four approaches to the intersection
- The westbound right turn movement is served by a channelized right turn lane operating without signal control flowing into a northbound auxiliary lane departing from the intersection. The auxiliary lane may be extended to the next major intersection or dropped downstream dependent upon design decisions to be made for SD 11.
- The southbound, eastbound and northbound right turn lanes would operate under signalized control.

As stated in the original email, the 2025 PM peak period controls most design decisions for the intersection with the exception of the westbound to northbound right turn configuration which is influenced by the demand expected in the 2025 AM peak period demand.

Attachments

August 26, 2005 email
Peak Hour Traffic Volume Worksheet (57th Street 8-2-05.xls)
Synchro file

x:\s\siocp\040300\draft reports\tech memo\10-25-05 traffic.doc



Mike Kotila

08/26/2005 02:59 PM

To: sausen@siouxfalls.org, strebilcock@siouxfalls.org,
Rick.Laughlin@state.sd.us
cc: Scott McBride/seh, Ross Harris/seh@SEH, Eric Johnson/seh@SEH
Subject: 57th St at SD 11 - preliminary findings

Hi Shannon, Sam & Rick,

I am assisting Scott & Ross with traffic analysis for our work on 57th Street. We have reviewed and analyzed 57th Street at SD 11 based upon the 2025 forecast volumes provided by the City and have the following preliminary findings to report.

Forecast review & observations

We have reviewed the entire set of AM and PM turn moves along the corridor. There is a fairly high demand to turn from WB to NB in the AM and the opposite (SB to EB) in the PM. The values seem to be pretty well balanced with respect to the inflow in the morning and corresponding opposite outflow in the afternoon. At the 57th Street/SD 11 intersection the turning demands are quite large between the east intersection leg and the north leg. Given that employment destinations are predominantly north and west of the study intersection - this pattern seems to be reasonable.

Attached are the 57th Street counts and forecasts configured in a spreadsheet to represent an intersection schematic for ease of comparison. There are three tabs in this spreadsheet, AM, PM, and SD 11 - 57th Street. The worksheet tab entitled, "SD 11 - 57th Street," is a comparison schematic for the various scenarios. The left half of each section displays AM peak hour intersection volumes while the right column shows the PM peak hour volumes. The top schematic shows the 2005 existing counts. The next sets of numbers are the 2025 "without link" as provided by the City. We interpreted "without link" to be the condition without the Big Sioux River crossing. The next sets of values are 2025 peak hour forecasts with the bridge crossing. The last set of numbers is the difference between the "without the bridge crossing" and the "with bridge crossing" volumes. This set of numbers demonstrates the increment of change due to the bridge crossing alone.



57th Street 8-2-05.xls

The PM peak hour schematics for each scenario are supplemented with an estimated ADT value computed from the 2-way volume on each leg of the intersection (These assume that 10% of the daily traffic occurs in the PM peak - they may differ somewhat from the daily volumes generated by your travel demand model). From these estimated ADT's, we see that SD 11 will carry 32,000 - 41,000 vpd and 57th Street will carry 19,000 - 28,000 vpd depending upon the location and scenario. These magnitudes clearly suggest the need to be plan for 4 lane roadways. We see a differential of 6000 ADT on the east leg of the intersection between the "with" and "without" bridge scenarios. From this we conclude that a 2-lane bridge might be adequate through the 2025 time frame.

Intersection Analysis

The 2025 PM Peak - with the bridge scenario appears to be the volume set that would control design decisions. The SB to EB volume is 704 vph indicating a need for double left turn lanes. The WB right turn volume of 522 vph (900 in the AM) indicates a need for a channelized right turn lane that would probably work best flowing into its own NB lane going away from the intersection. It should run out at least 1000 feet before dropping - or, could be extended to the next major intersection. The EB left turn volume is over 300 - this may need a double left turn lane.

We ran this through SYNCHRO - to determine how well an at-grade intersection might operate. Then considered the same volume set being served by a diamond interchange. Both conditions are built into

the SYNCHRO file attached.



57th Street PM w-Bridge.sy

Analysis results show that the at-grade intersection could operate at LOS D - with some movements at operating at LOS E. We could further improve LOS by showing double left turn lanes on all approaches and channelized rights- this would not have a significant width impact because we've already established the width for double lefts on the opposite side of the intersection.

A diamond interchange removes the NB and SB through volumes from the controlled - this results in LOS B at each ramp signal.

Conclusions

The forecast leads to an estimate of 6,000 vehicles per day crossing the Big Sioux River in the 2025 build condition. A 2-lane bridge would be adequate. Preserving R/W to construct another 2 lane structure sometime in the future would make sense.

The 57th Street/SD 11 intersection could operate through the 2025 design year as an at-grade intersection (although this is a fairly large intersection). It would make sense to preserve R/W for an interchange.

We would appreciate any comments you may have on these preliminary findings. This will be topic of discussion at next week's project steering committee meeting.

Let me know if you have questions on any of this.

Thanks!

Michael E. Kotila, P.E.
Associate, Transportation Engineering
SEH, Inc. - Minnetonka Office
952.912.2626

57th Street Counts

Sioux Falls, SD



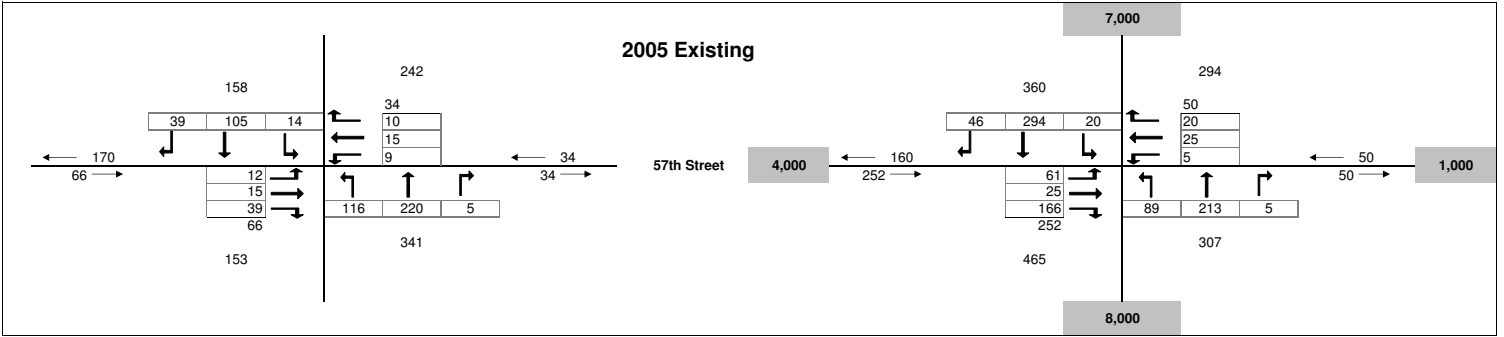
AM Peak Hour
7:00 - 8:00 AM

PM Peak Hour
5:00 - 6:00 PM

SD 11

SD 11

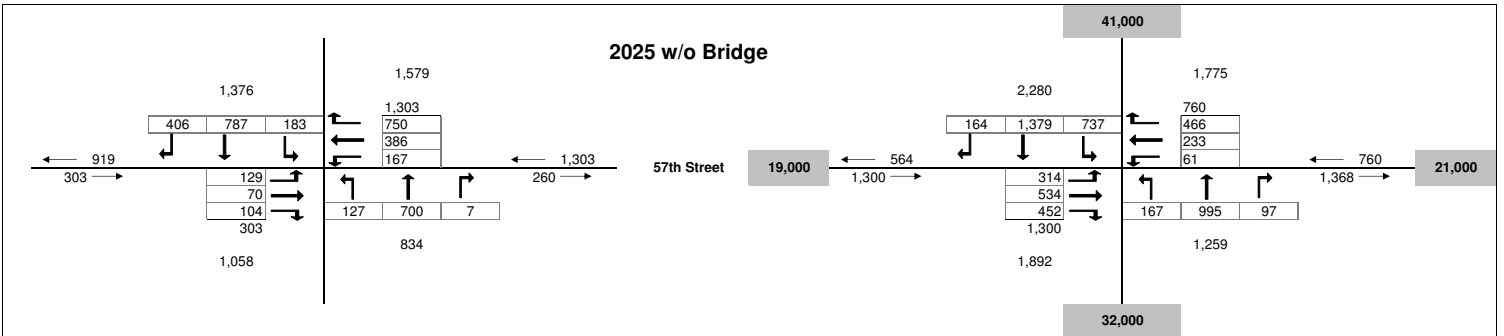
2005 Existing



SD 11

SD 11

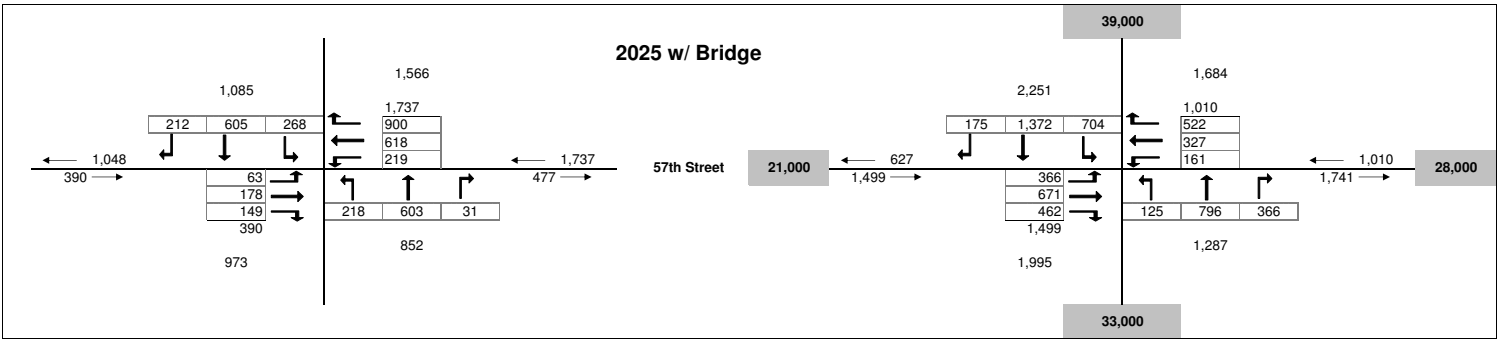
2025 w/o Bridge



SD 11

SD 11

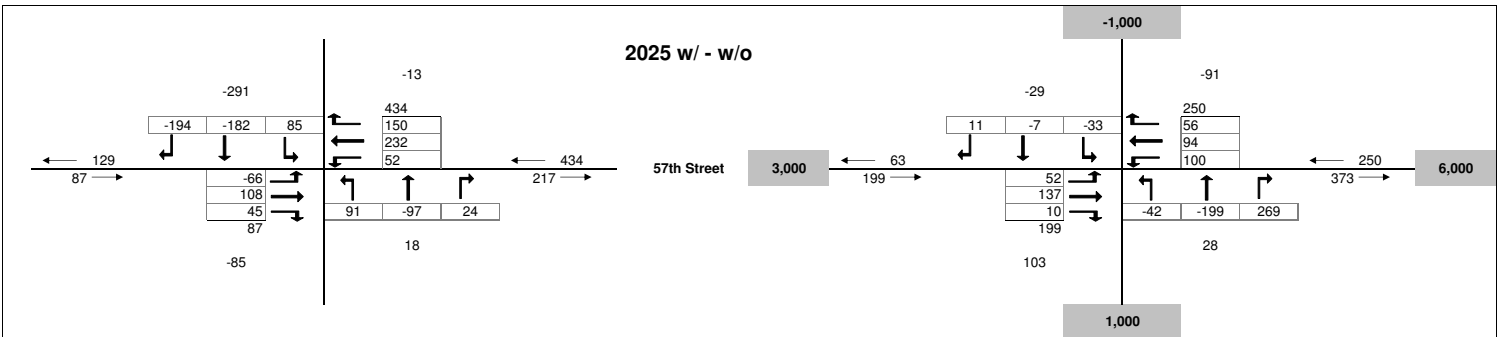
2025 w/ Bridge



SD 11

SD 11

2025 w/ - w/o



Timings
3: 57th Street & SD11

11/1/2005

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	366	671	462	161	327	522	125	796	366	704	1372	175
Turn Type	Prot		Free	Prot		Free	Prot		Perm	Prot		Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			2			Free
Detector Phases	7	4		3	8		5	2	2	1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.0	20.0		8.0	20.0		8.0	20.0	20.0	8.0	20.0	
Total Split (s)	15.0	22.0	0.0	14.0	21.0	0.0	12.0	29.0	29.0	25.0	42.0	0.0
Total Split (%)	17%	24%	0%	16%	23%	0%	13%	32%	32%	28%	47%	0%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None		None	None		None	Min	Min	None	Min	
Act Effct Green (s)	11.0	18.0	90.0	10.0	17.0	90.0	8.0	25.0	25.0	21.0	38.0	90.0
Actuated g/C Ratio	0.12	0.20	1.00	0.11	0.19	1.00	0.09	0.28	0.28	0.23	0.42	1.00
v/c Ratio	0.95	1.03	0.32	0.89	0.53	0.36	0.87	0.88	0.64	0.96	1.00	0.12
Uniform Delay, d1	39.2	36.0	0.0	39.4	32.9	0.0	40.5	31.1	9.4	34.0	25.9	0.0
Delay	64.4	71.5	0.0	69.4	33.2	0.0	72.9	36.2	10.4	50.9	45.0	0.0
LOS	E	E	A	E	C	A	E	D	B	D	D	A
Approach Delay		47.7			21.8			32.4			43.4	
Approach LOS		D			C			C			D	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.03

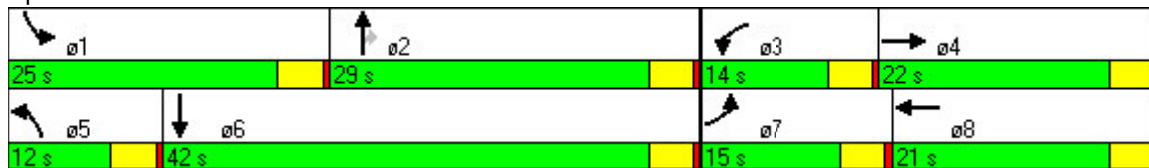
Intersection Signal Delay: 38.5

Intersection LOS: D

Intersection Capacity Utilization 91.9%

ICU Level of Service E

Splits and Phases: 3: 57th Street & SD11



Appendix D
Utility Coordination

**57th Street Extension Feasibility
Utility Coordination Meeting
September 29, 2005
Sioux Falls City Hall**

Attending utility representatives:

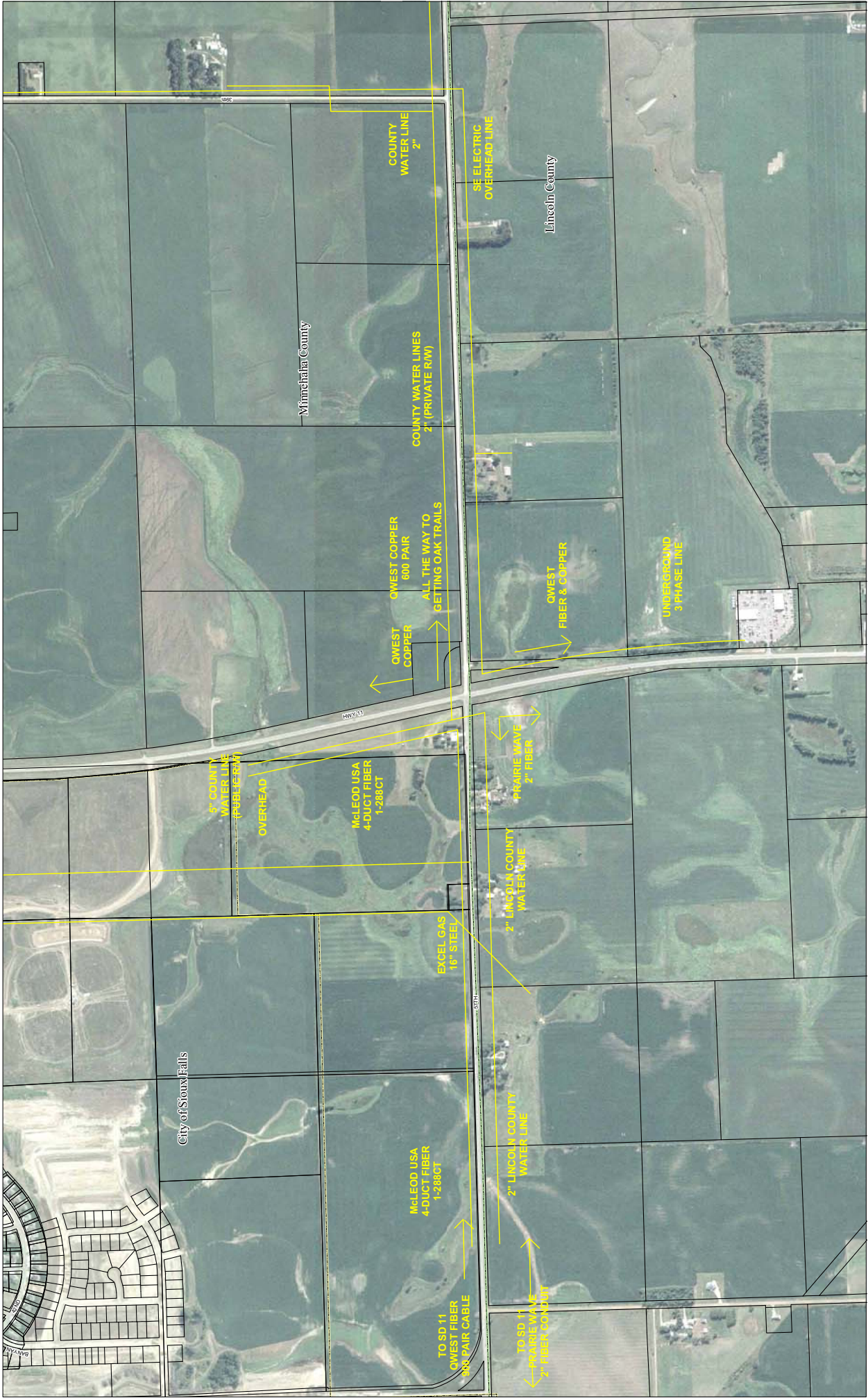
McLeod USA; SDM Communications; MidAmerican Energy; Sioux Valley Energy; PrairieWave Communications; Lincoln County Rural Water; Minnehaha Community Water; Southeastern Electric; Qwest Corporation; and the City of Sioux Falls.

The meeting was facilitated by the City of Sioux Falls (Shannon Ausen) and SEH (Scott McBride).

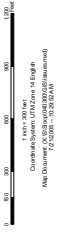
A brief description of the proposed project and the proposed construction schedule was given. The current alignment, with possible variations, was also discussed. Each utility representative present was asked to describe facilities, which were then drawn on the large map. These facilities will be mapped together and documented as part of the feasibility study process.

Plans to add or modify existing utilities with the 57th Street extension project were discussed as follows:

1. PrairieWave Communications plans to extend fiber optic cable east of SD11 along the 57th Street alignment.
2. Southeastern Electric will provide temporary power to the Eastside Sanitary Sewer System lift station and permanent power transmission facilities will be provided by summer 2006.
3. Qwest will relocate and retain existing fiber cables in the 57th/SD 11 intersection area.
4. MidAmerican has no facilities in the project area now but may plan projects here in the future. There would be no plan to cross the river.
5. SDN will likely plan facilities in the 57th Street project area and may choose to cross the river.
6. McLeod USA has no future plans to extend west of the river.
7. MCI will be contacted for suspected facilities along the SD 11 right-of-way at the 57th Street intersection (NW quadrant).

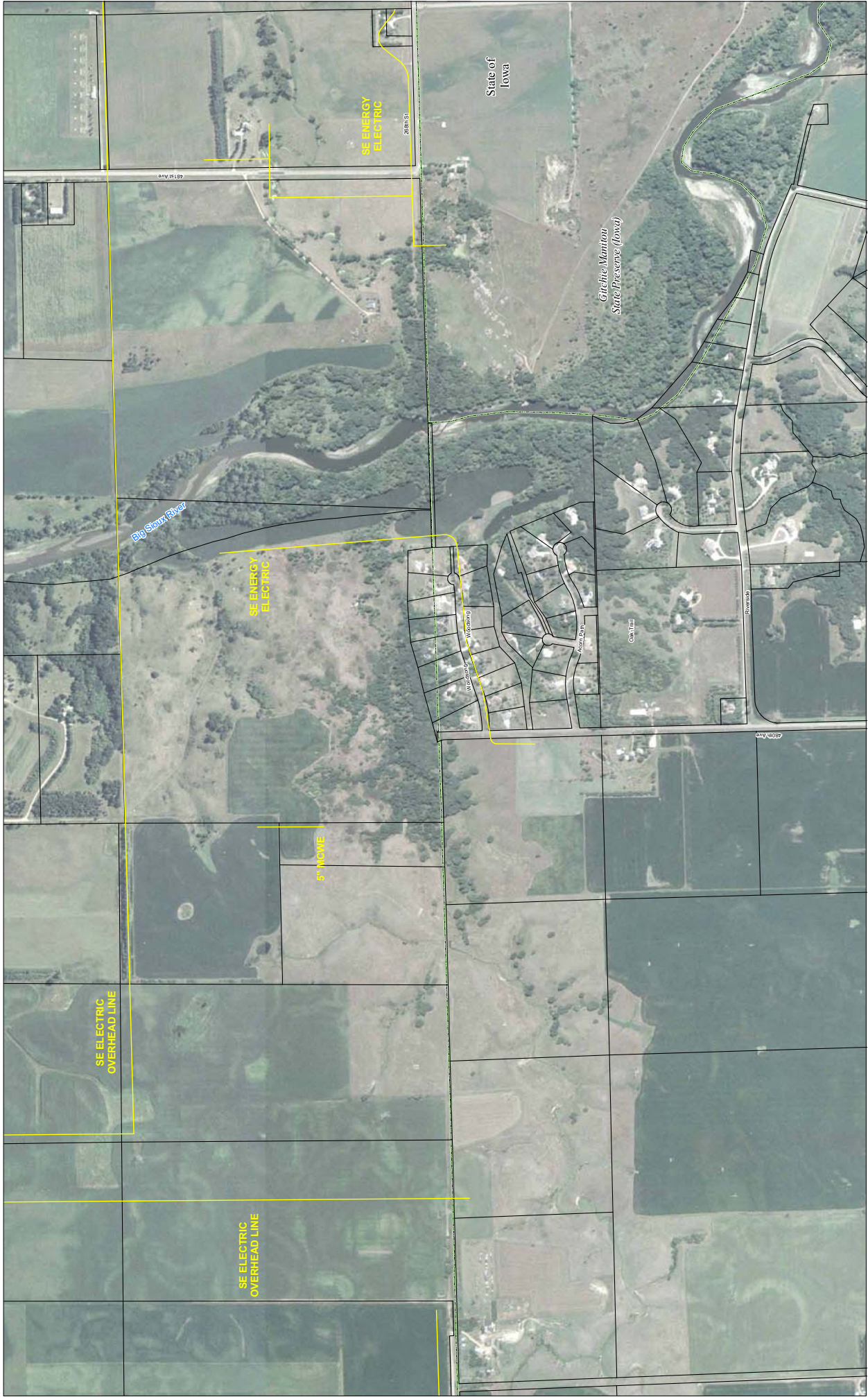


Utilities
 57th Street Corridor Study
 Sioux Falls, South Dakota



October, 2005

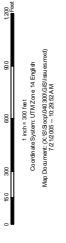
Figure 2A



Utilities

57th Street Corridor Study

Sioux Falls, South Dakota



October, 2005

Figure 2B

Appendix E
ESSS Mitigation Plan

Notice of Hearing _____
Date of Hearing _____
Date Adopted _____
Date Published _____
Date Effective _____

RESOLUTION NO. _____

A RESOLUTION OF THE CITY OF SIOUX FALLS TO ESTABLISH A CONSERVATION CORRIDOR ON THE ALIGNMENT OF THE INTERMITTENT STREAM AND BASIN 26 EASTSIDE SANITARY SEWER SYSTEM PROJECT CONSTRUCTION IN MINNEHAHA AND LINCOLN COUNTIES.

WHEREAS, the City of Sioux Falls, South Dakota, is authorized pursuant to SDCL 9-4-1.1 to establish an agreement with any landowner specifying the conditions under which the landowner's property may be annexed; and.

WHEREAS, the conservation corridor property described in Exhibits A and B which is not contiguous with the current city limits of Sioux Falls, but is within the Sioux Falls 2015 Growth Area as designated by the Sioux Falls 2015 Growth Management Plan; and

WHEREAS, the City of Sioux Falls and the property owners along the conservation corridor agree to the terms of the Mitigation Plan Agreement.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY OF SIOUX FALLS, SOUTH DAKOTA:

Section 1. Upon the eventual annexation of the conservation area, the City of Sioux Falls shall abide to the Exhibit A and B.

Date adopted: _____.

Mayor

ATTEST:

Dianne Metli
City Clerk

Exhibit A

Mitigation Plan

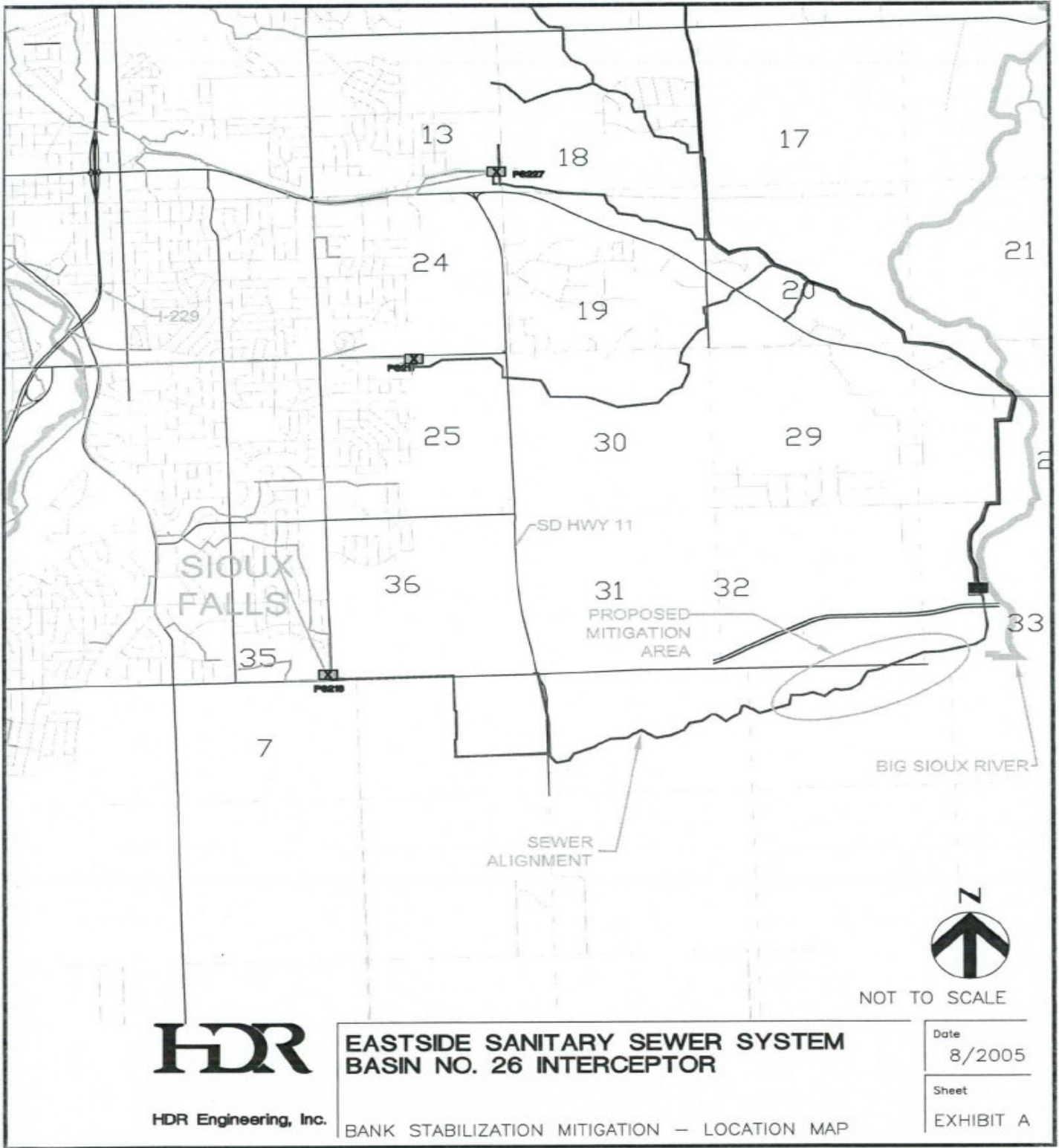
by

City of Sioux Falls

In conjunction with the Department of the Army authorization under Section 404 of the Clean Water Act for Basin 26 Sanitary Sewer Construction in Minnehaha and Lincoln Counties, the City of Sioux Falls proposes to implement the following compensatory mitigation plan. This plan is in accordance with subdivision ordinances of City of Sioux Falls.

1. The City of Sioux Falls shall establish a conservation corridor on the alignment of the intermittent stream and Basin 26 Eastside Sanitary Sewer line as compensatory mitigation for stream impacts from the sewer line and appurtenances. The conservation corridor property, as defined in Exhibit A and B, is not contiguous with the current city limits but is within the Sioux Falls 2015 Growth Area. The City agrees to require and establish the conservation corridor once the property is annexed into the City and a development plan is submitted for the area within the corridor. The corridor will be dedicated to the City of Sioux Falls for management purposes and development restrictions. The City of Sioux Falls agrees to establish the conservation corridor by resolution action by the City Council and the resolution shall be filed with the City Clerk's Office.
2. The conservation corridor is located in Sections 32 and 33, T 101, R 48, Minnehaha and Section 10, T 100, R 49, Lincoln Co., South Dakota. The conservation corridor limits shall be defined as 50 feet from the center of the unnamed creek, on both sides, and from station 1+00 to 95+00, as shown in Exhibit A and B.
3. The conservation corridor will be preserved in its natural state and no filling, burning, mowing, or construction of structures within the corridor will be allowed. Exception to the above stipulation is if construction of a main arterial street becomes necessary, upon the City of Sioux Falls' approval, street construction in the conservation corridor will be allowed no closer than 3,000 feet from another street; and if construction of a storm water detention pond becomes necessary, upon City of Sioux Falls approval, one detention structure will be allowed within the corridor. The allowable potential structures and construction may require additional Department of the Army authorization.
4. The City of Sioux Falls will provide bank stabilization and stream enhancement at three locations on the intermittent stream. The locations and design will be submitted to the SD Regulatory Field Office within 90 days of the date of this letter for approval and subsequent construction.
5. The conservation corridor provisions shall remain in effect for the life of the sewer project.

Exhibit A



HDR Engineering, Inc.

**EASTSIDE SANITARY SEWER SYSTEM
BASIN NO. 26 INTERCEPTOR**

BANK STABILIZATION MITIGATION – LOCATION MAP

EXHIBIT B



Appendix F

Public Involvement (Property Owner Letter)



CITY OF SIOUX FALLS MEMORANDUM

Date: October 31, 2005
To: Iowa County Road A10 – Residents and Property Owners
From: Shannon Ausen, City of Sioux Falls Assistant City Engineer
Subject: 57th Street Extension - Feasibility Study

The City of Sioux Falls, with its transportation planning partners of the Sioux Falls Metropolitan Planning Organization (MPO), including Minnehaha and Lincoln Counties, the Southeast Council of Governments, and SDDOT, are studying the feasibility of extending the current 57th Street alignment from Sycamore Avenue in Sioux Falls to the Iowa border, including a potential crossing of the Big Sioux River. The proposed project is being studied in response to planned growth in the area and is consistent with the City's long-term transportation plan, 2015 Growth Management Plan, and Sanitary Sewer Master Plan.

The 57th Street extension construction schedule will likely advance easterly from Sycamore Avenue to the Big Sioux River. Construction projects are expected to occur between 2010 and 2015. It has been determined that the street extension across the river is feasible, although it will not be constructed until after 2015.

Two alignments will be studied further across the Big Sioux River as shown on the attached graphics. Each of these alignments will reconnect with Iowa County Road A10. A decision on which alignment will be constructed is expected to occur in the next 5 – 10 years. Approximately 6,000 vehicles per day are expected by 2025 to cross the river. Most of these vehicle trips are expected to originate from commuters into the Sioux Falls area from Iowa, with employment and shopping destinations in the city. The future roadway connection will be constructed as a modern standard two-lane highway with a planned speed of 50 mph.

The Lyon County Engineer is aware of the MPO's project and is attending its Steering Committee meetings. At this time, there are no changes planned on Iowa A10 but the increase in forecasted traffic volumes suggest that safety improvements may need to be studied at existing intersections in the future. The Lyon County Engineer's office will keep you informed of any plans it has for such improvements. The Sioux Falls MPO will also keep you informed of project updates.

If you have any questions or comments, please contact me at the address, phone, or email address below. Thank you.

Ms. Shannon Ausen
Assistant City Engineer
City of Sioux Falls
224 West Ninth Street
Sioux Falls, SD 57104-6407
Phone: (605) 367-8601
Email: sausen@siouxfalls.org

Appendix G

County Road A10 Maintenance Agreement

Miscellaneous Record "O", Lyon County, Iowa

1. Minnehaha County, South Dakota, agrees to continue to maintain, repair, and construct as a public highway that portion of the public highway on the dividing line between said counties along the south

= 2 =

section line of Sections Thirty-four (34), Thirty-five (35) and Thirty-six (36) in Township One Hundred One (101), Range Forty-eight (48), in Minnehaha County, South Dakota, being three miles in length, more or less, and said Minnehaha County also agrees to maintain, repair and construct as a public highway that portion of the public highway, being the south boundary line of the Southwest Quarter (SW $\frac{1}{4}$) of Section Thirty-one (31), Township One Hundred One (101), Range Forty-seven (47) in Minnehaha County, South Dakota, and that the above three and one-half miles of continuous public highway, hereinbefore described, ~~XXXXXXXXXXXXXXXXXXXX~~ shall be maintained, repaired and constructed by said Minnehaha County, South Dakota, and all the cost and expense, labor and material of such maintenance, repairs and construction shall be borne and paid for and furnished by said Minnehaha County, South Dakota.

2. Lyon County, Iowa, agrees to maintain, repair and construct as a public highway that portion of the public highway on the dividing line between said counties, extending in an easterly direction and including the highway running along the south line of the Southeast Quarter (SE $\frac{1}{4}$) of said Section Thirty-one (31), and continuing along the south section line of Sections Thirty-two (32), Thirty-three (33) and Thirty-four (34), all in Township One Hundred One (101), Range Forty-seven (47), Minnehaha County, South Dakota, and being three and one-half miles in length, more or less, and that said Lyon County, Iowa, shall maintain, repair and construct said public highway on the dividing line between said counties as above described, and that all the cost and expense, labor and material of such maintenance, repairs, and construction shall be borne and paid for and furnished by said Lyon County, Iowa.

IN WITNESS WHEREOF, the respective counties hereto have by virtue of a Resolution duly adopted by their respective Board of County

- 3 -

Commissioners and Board of Supervisors under date of July 29, 1955 caused this Contract to be signed by their respective Chairmen, and the Corporate Seal of the County to be affixed hereto and attested by the respective County Auditors of each county.

Dated at Sioux Falls, South Dakota, this 2nd day of August, 1955.

ATTEST: Edwin Aker
County Auditor, Minnehaha
County, South Dakota.

MINNEHAHA COUNTY, SOUTH DAKOTA
BY: Geo. R. Barnett
Chairman, Board of County
Commissioners

ATTEST: Paul R. Roach

LYON COUNTY, IOWA
BY: Leo H. Klippenborg

Appendix H
Cost Estimate

Construction Cost Estimate

57th Street Extension Project

Summary

Alternative 1A

Item Description	Unit	Basic Construction			Amount Rounding
		Unit Price	Quantity	Amount	
COMMON EXCAVATION	c.y.	\$3.00	127,422	\$382,266	
SUBGRADE EXCAVATION	c.y.	\$3.50	0	\$0	
COMMON BORROW (CV)	c.y.	\$5.00	0	\$0	
GRANULAR BORROW (CV)	c.y.	\$8.50	75,696	\$643,420	
AGGREGATE BASE	c.y.	\$15.25	20,161	\$307,460	
BITUMINOUS PAVEMENT	ton	\$40.00	7,873	\$314,913	
BRIDGE	s.f.	\$95.00	24,485	\$2,326,075	
CONCRETE (9")	s.y.	\$3.50	101,417	\$354,958	
CONCRETE MEDIAN	s.f.	\$3.00	8,068	\$24,203	
CONCRETE WALK	s.f.	\$3.00	172,870	\$518,610	
CONCRETE CURB AND GUTTER (B624)	l.f.	\$11.00	67,997	\$747,968	
(a) Subtotal Grading and Paving:				\$5,619,873	\$5,619,900
REMOVALS/PAVEMENT	s.f.	\$0.60	111,123	\$66,674	
REMOVALS/CLEAR AND GRUB		5%		\$280,994	
UTILITIES		10%		\$561,987	
SIGNING AND STRIPING		5%		\$280,994	
TURF ESTABLISHMENT		3%		\$168,596	
LANDSCAPING		5%		\$280,994	
MISCELLANEOUS CONSTR.		8%		\$449,590	
(b) Subtotal Percentages:				\$2,089,828	\$2,089,800
(a+b) Subtotal Construction:					\$7,709,700
MOBILIZATION		5%		\$385,485	
DRAINAGE		10%		\$770,970	
STAGING/TRAFFIC CONTROL		5%		\$385,485	
CONTINGENCIES		10%		\$770,970	
TRAFFIC SIGNALS	ea.	\$200,000	3	\$600,000	
RETAINING WALL	s.f.	\$55.00	0	\$0	
CHAIN LINK FENCE	l.f.	\$6.50	0	\$0	
(c) Subtotal Miscellaneous:				\$2,912,910	\$2,912,900
(a+b+c) Total Construction:					\$10,622,600
Other Costs:					
RIGHT-OF-WAY	acre	\$30,000	28.6	\$858,360	
ADMINISTRATIVE AND ENGINEERING		18%		\$1,912,068	
Subtotal Other Costs:				\$2,770,428	\$2,770,400
TOTAL ESTIMATED COST:					\$13,393,000

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Construction Cost Estimate

57th Street Extension Project

Summary

Alternative 1B

Item Description	Unit	Basic Construction			Amount Rounding
		Unit Price	Quantity	Amount	
COMMON EXCAVATION	c.y.	\$3.00	126,402	\$379,207	
SUBGRADE EXCAVATION	c.y.	\$3.50	0	\$0	
COMMON BORROW (CV)	c.y.	\$5.00	0	\$0	
GRANULAR BORROW (CV)	c.y.	\$8.50	75,382	\$640,744	
AGGREGATE BASE	c.y.	\$15.25	19,674	\$300,035	
BITUMINOUS PAVEMENT	ton	\$40.00	6,901	\$276,025	
BRIDGE	s.f.	\$95.00	24,485	\$2,326,075	
CONCRETE (9")	s.y.	\$3.50	102,429	\$358,503	
CONCRETE MEDIAN	s.f.	\$3.00	7,641	\$22,922	
CONCRETE WALK	s.f.	\$3.00	174,914	\$524,743	
CONCRETE CURB AND GUTTER (B624)	l.f.	\$11.00	68,842	\$757,258	
(a) Subtotal Grading and Paving:				\$5,585,512	\$5,585,500
REMOVALS/PAVEMENT	s.f.	\$0.60	111,123	\$66,674	
REMOVALS/CLEAR AND GRUB		5%		\$279,276	
UTILITIES		10%		\$558,551	
SIGNING AND STRIPING		5%		\$279,276	
TURF ESTABLISHMENT		3%		\$167,565	
LANDSCAPING		5%		\$279,276	
MISCELLANEOUS CONSTR.		8%		\$446,841	
(b) Subtotal Percentages:				\$2,077,458	\$2,077,500
(a+b) Subtotal Construction:					\$7,663,000
MOBILIZATION		5%		\$383,148	
DRAINAGE		10%		\$766,297	
STAGING/TRAFFIC CONTROL		5%		\$383,148	
CONTINGENCIES		10%		\$766,297	
TRAFFIC SIGNALS	ea.	\$200,000	3	\$600,000	
RETAINING WALL	s.f.	\$55.00	0	\$0	
CHAIN LINK FENCE	l.f.	\$6.50	0	\$0	
(c) Subtotal Miscellaneous:				\$2,898,891	\$2,898,900
(a+b+c) Total Construction:					\$10,561,900
Other Costs:					
RIGHT-OF-WAY	acre	\$30,000	31.5	\$946,290	
ADMINISTRATIVE AND ENGINEERING		18%		\$1,901,142	
Subtotal Other Costs:				\$2,847,432	\$2,847,400
TOTAL ESTIMATED COST:					\$13,409,300

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