Value Engineering Study Report – Draft

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

Workshop Dates: September 17-21, 2018

Contact: Renee L. Hoekstra, CVS
(602) 493-1947

October 2, 2018

DEPARTMENT OF TRANSPORTATION

RHA

Guiding Teams – Building Success

October 2, 2018

Minnie Milkert, Project Manager
Minnesota Department of Transportation
395 John Ireland Boulevard, Mail Stop 696
St. Paul, MN 55155-1800
Phone (651) 366-4648
Email Minnie.milkert@state.mn.us

RE: Value Engineering Study Report – Draft
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

Dear Minnie:

Transmitted herewith is an electronic copy (PDF) of the draft Value Engineering Study Report for the above referenced project.

I appreciate your leadership and cooperation as well as that from the Value Engineering study team and all other stakeholders. Should you have any questions, please contact me at (602) 493-1947.

Thank you for the opportunity to work with you and your team!

Sincerely,

RHA, LLC

Renee L. Hoekstra, CVS
Managing Partner

Value Engineering Study
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

Contents

Executive Summary
Background 1
Summary Project Description 2
Performance Criteria 3
Risk Identification 3
Summary Workshop Results 3
- Summary of Alternatives (table) 4
- Design Comments (table) 5

Description of Study 6
Value Engineering Study Team 6

Value Engineering Workbooks
Introduction 7
Value Engineering Proposals 8
- Facilitate Movement 8
- Mitigate Conflict 37
- Meet Budget 43
- Miscellaneous 49

Design Suggestions
- Meet Schedule 67

Not Recommended by Value Engineering Study Team 73

Support Data
Value Engineering Study Documents 87
Project/Workshop Constraints 87
Value Engineering Study Team Observations 87
Value Methodology 88
Cost Model 90
Function Analysis 91
Creative Idea List 93
Evaluation Process 93
Out-brief Presentation 99
Agenda 134
Attendee List 136

Implementation
Introduction 139
Value Engineering Study Team Recommendations 139
Value Engineering Recommendations Approval Form 141

EXECUTIVE SUMMARY

Value Engineering Study
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

Executive Summary

Background

A Value Engineering (VE) study was conducted on the design documents for the **TH169 and 101st Avenue Interchange Project** for the Minnesota Department of Transportation (MnDOT) and the City of Brooklyn Park on September 17-21, 2018, for the project described below.

The City of Brooklyn Park representatives presented the project during the kick-off meeting on September 17, 2018. The workshop objectives were reviewed at the start of the workshop as follows:

- Additional approaches to the existing utilities
    - Sewer
    - Electrical
    - Others as identified
- Reduce right-of-way
- Opportunities to tighten the loop at TH169 and 101st Avenue – west side
- Review using a wall versus slope at the church property
- Remove access on north side
- Identify ways to improve the schedule and minimize risk
- Identify opportunities to meet the funding goals
- Minimize impacts to the other MnDOT existing traffic interchanges

Additionally, the project's goals and objectives were identified as they related to project success:

- Schedule was identified as a project driver
    - Bid letting summer of 2019 and complete within one year - 2020
- Complete within budget, which is identified as all inclusive of $31M
- Improve access to development and reduce congestion by redistributing trips
- Accommodate future transportation and development investments
- Ensure the project meets federal requirements to obtain funding
- Effective maintenance of traffic during construction
- Maintain two lanes of traffic in each direction during construction

Following the kick-off meeting, the VE study team along with MnDOT representatives visited the project site to gain a better understanding of the project.

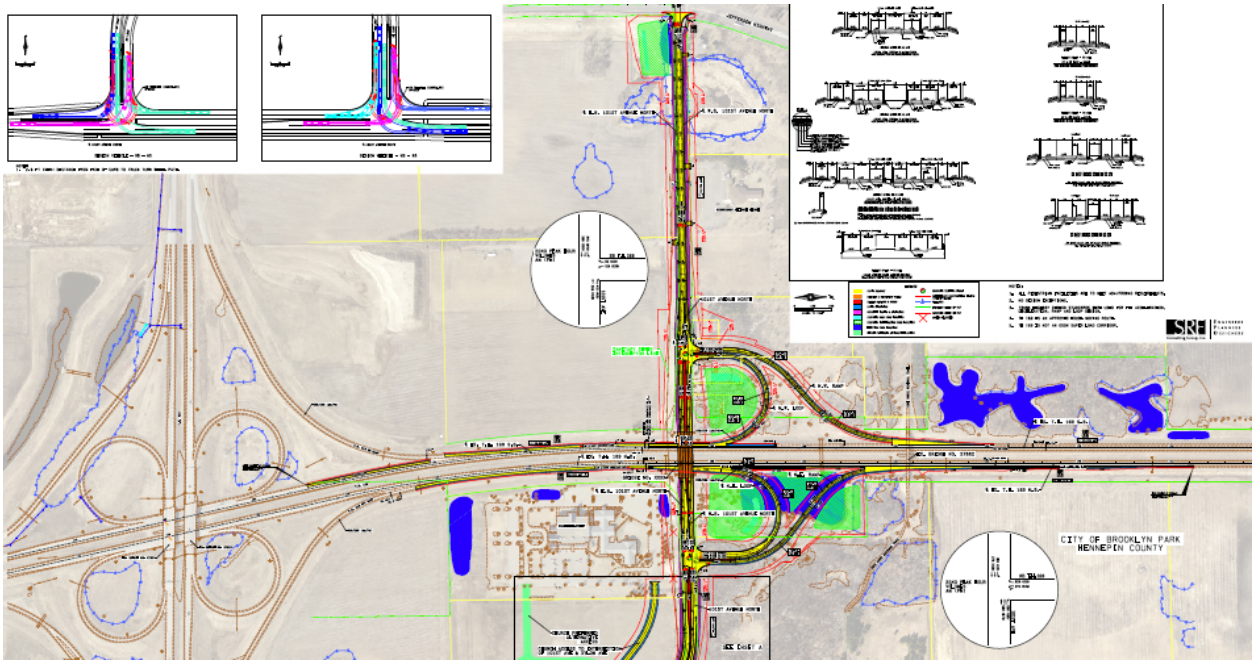
Value Engineering Study
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

Summary Project Description

This is a new full access interchange with the local roadway, 101st Avenue over TH169. Ramps are folded to the north with auxiliary lanes connecting to the southerly system interchange at TH169 and TH610. There is a five-lane bridge with signal systems at both ramp terminals. 101st Avenue will be a four-lane section to the east of TH169 and three lanes to the west where it connects with Jefferson Highway. The roadway is considered an urban section with storm sewer and ponding. The existing TH169 has 42,500 ADT. The route includes right-in\right-out access along TH169 at 101st Avenue which creates conflict issues; future Light Rail Transit will have a station close to the interchange which will spur additional local development; current and projected traffic use other access points which cause congestion and service issues in the general area.

This project is very typical; a folded diamond interchange. Several alternatives were developed and studied prior to choosing the final configuration. The bridge width is dictated by required geometry and a pedestrian trail. Bridge foundations are not yet determined, however, sandy soils in the project area would suggest a possibility of spread footings. There are no other structures (retaining walls, etc.) on the project.

The Design-Bid-Build project is due to let on August 1, 2019 with construction completion in 2020.



Performance Criteria

During the kick-off meeting on September 17, 2018, the decision makers helped the VE study team understand what defined project success for the TH169 and 101st Avenue Interchange project. Using a paired-comparison matrix, performance criteria were scored and ranked (see Support Data section of this report). These criteria were used in the workshop by the VE study team for both evaluating and developing alternatives.

- **Schedule (short-term)** – Meet 2020 completion.
- **Access (long-term)** – Direct connection to TH169 and balance local road congestion.
- **Maintenance of Traffic Mainline (short-term)** – Maintain access during construction and minimize impacts on TH169.
- **Maintainability (long-term)** – Minimize long-term costs and ease of maintenance.
- **Maintenance of Traffic Local Operations (short-term)** – Maintain access during construction and minimize impacts on local operations.
- **Mainline Operations (long-term)** – TH169, TH610 and Level of Service.
- **Local Operations (long-term)** – Conflicts and Level of Service.

Risk Identification

When brainstorming alternatives during the creative phase, the VE study team considered the following risks that were identified during the kick-off meeting as follows:

Risk	High, Medium, Low
Soils	Low
Construction pricing and labor	Medium-High
Development schedule	Low

Summary Workshop Results

Summary workshop results are shown in the table below.

Workshop Outcome	Number	Section of Report / Result
Ideas Brainstormed	46	See Creative Idea List (Support Data section of this report)
Ideas Developed into VE Proposals (costed)	12	See Value Engineering Workbooks section of this report
Ideas Developed into Design Suggestions (DS, not costed)	2	See Value Engineering Workbooks section of this report
Design Comments (DC), not developed	5	Table provided in this section, Executive Summary

Workshop Outcome	Number	Section of Report / Result
ALL VE Proposals – Cost Avoidance or Deferral (potentially reduces initial and/or O&M cost without sacrificing function and/or performance)	10	Potential Total Cost (all proposals): $11,633,000
ALL VE Proposals – Value Enhancements (a cost add to the project, potentially improves function and/or performance)	1	Potential Total Cost (all proposals): ($532,000)
VE Proposals Dropped or Not Recommended by the VE Study Team	3	FM-09, PR-01, M-01

The description and further discussion of these are included in the Value Engineering Workbooks section of this report. The alternatives are categorized by the following—

- Facilitate Movement
- Mitigate Conflict
- Meet Budget
- Miscellaneous
- Design Suggestions ("Meet Schedule")
- VE Proposals Dropped or Not Recommended

The following table summarizes the alternatives, overall performance score (from performance criteria explained earlier and further detailed in the Support Data Section of this report) and potential savings (or cost add) to the project. These listings should be viewed as menus of opportunities, as opposed to listings of recommendations. Several of the proposals overlap or represent different ways of approaching the same issue. As a result, the savings/cost is not cumulative.

Summary of Alternatives

Idea No.	Idea Title	Overall Performance Score	Initial Cost Savings / (Add)
FM	**Facilitate Movement**		
FM-01	Use roundabouts at ramp terminals on both sides; reduce bridge to two lanes	3.81	$3,516,000
FM-03	Use an overpass at 101st Avenue with a signalized RCUT at Oxbow Creek Drive	1.43	$2,802,000
FM-06	Reduce the loop radii from 230 feet to 190 feet on both sides	0.00	$721,000
FM-15	Minimize the cross section on the bridge	-0.71	$595,000
FM-20	Reduce the 101st Avenue bridge from five lanes to three lanes	1.07	$879,000

Summary of Alternatives

Idea No.	Idea Title	Overall Performance Score	Initial Cost Savings / (Add)
MC	**Mitigate Conflict**		
MC-04	Use the high wall abutment in lieu of the stub abutment to reduce span length	0.24	$283,000
PR	**Purchase Right-of-way**		
PR-01	Use retaining walls in lieu of slopes on the south side within the interchange for both quadrants to reduce right-of-way needs	0.00	($208,000)
MB	**Meet Budget**		
MB-01	Defer local work	0.24	$2,658,000
MS	**Meet Schedule**		
MS-03	Use A+B contracting strategy	2.50	DESIGN SUGGESTION
MS-06	Procure a separate utility package ahead of the main project	0.95	DESIGN SUGGESTION
M	**Miscellaneous**		
M-01	Separate southbound vehicles going to TH610 in a Collector Distributor (CD) lane	1.31	($324,000)
M-03	Defer the path to the future	1.19	$49,000
M-04	Delete the escape lane at southbound TH169	1.31	$59,000
M-05	Reduce lane width from 13.5 ft./14 ft./13.5 ft. to 12.5 ft./12 ft. /12.5 ft.	1.19	$71,000

Additionally, the following Design Comments are provided for the design team to consider during the next phase of design development.

Design Comments (No Workbook Prepared)

Idea No.	Idea Title
AU	**Avoid Utilities**
AU-01	Provide adequate documentation in the specification to describe sewer limitations to ensure the contractors understand the risk and their responsibilities at bid time
MC	**Mitigate Conflict**
MC-01	Use spread footings in lieu of deep foundations
MC-02	To eliminate corrosion as a long-term maintenance strategy, use glass-fiber reinforcement, where appropriate

Design Comments (No Workbook Prepared)

Idea No.	Idea Title
MS	**Meet Schedule**
MS-04	Consider using an early completion bonus contracting strategy
MS-05	Provide interim substantial completion dates to aid in meeting the essential access that is required for the current development in lieu of the entire project completion and then allow the remainder of the project to be completed in additional time

Description of Study

The study was conducted in accordance with the SAVE International Value Methodology, found in the Support Data section of this report.

Details of the Value Engineering proposals can be found in the Value Engineering Workbooks section of this report. A presentation of the VE study recommendations and findings was given to the decision makers on September 21, 2018; a copy is included in the Support Data section of this report.

Value Engineering Study Team

- Sean Delmore, WSB & Associates – Traffic
- Chris Hoberg, MnDOT – Project Manager
- Renee Hoekstra, RHA, LLC – CVS Team Leader
- Kevin Jullie, SRF Consulting – Design Lead
- Tim Lamkin, Bolton & Menk – Highway Design
- Jamal Love, MnDOT – Geometrics
- Minnie Milkert, MnDOT – State Value Engineer
- Patrice Miller, RHA, LLC – CVS Assistant Team Leader

VALUE ENGINEERING

WORKBOOKS

Value Engineering Workbooks

Introduction

The VE study team brainstormed 46 ideas. 12 ideas were identified for further development into Value Engineering proposals, including cost impacts. Of the 12, two were dropped for further consideration, however the proposals are included. The description and further discussion of these are included in this section and are categorized by function. Several of the proposals overlap or represent different ways of approaching the same issue.

Cost savings are shown as positive costs while any added costs are noted in parenthesis. Total Life Cycle Costs are the summation of the initial plus O&M costs as estimated by the VE study team.

The VE study team also identified two Design Suggestions and five Design Comments. A list of these was provided in the Executive Summary section of the report.

The following pages detail the Value Engineering Proposals developed as part of the study by the VE study team and include the following information:

- Unique Identifying Number (XX-##)
- Creative Idea Title
- Function Identification
- Baseline Assumption – brief description
- Proposed Alternative – brief description
- Benefits
- Risks/Challenges
- Overall Performance Score
- Cost Summary
- Discussion/Justification
- Implementation Considerations, if applicable
- Impact to Performance – alternative scored against performance criteria
- Initial Cost Detail
- Baseline and Proposed Sketches, if applicable

The costs used are those provided by the design team. Where the VE study team has offered alternate costs, they are provided for information only, reflective of the short duration of the VE study and should be evaluated by the design team. Value Engineering ideas are provided for their evaluation and implementation exclusively by MnDOT and the City of Brooklyn Park.

FACILITATE MOVEMENT

VALUE ENGINEERING PROPOSAL

FM-01

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Use roundabouts at ramp terminals on both sides; reduce bridge to two lanes
FUNCTION:	**Facilitate Movement**

BASELINE ASSUMPTION:

The current design shows signals at ramp terminals.

PROPOSED ALTERNATIVE:

Use roundabouts at ramp terminals.

BENEFITS	RISKS/CHALLENGES
• Reduces bridge size	• City Council approval
• Reduces overall roadway footprint	•
• Improves traffic operations	•
• Reduces conflict points	•
• Allows for future expansion	•
•	•
•	•

OVERALL PERFORMANCE SCORE **3.81**

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 11,418,000	$ -	$ 11,418,000
PROPOSED ALTERNATIVE:	$ 7,902,000	$ -	$ 7,902,000
TOTAL (Baseline less Proposed)	$ 3,516,000	$ -	**$ 3,516,000**
			SAVINGS

VALUE ENGINEERING PROPOSAL

FM-01

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

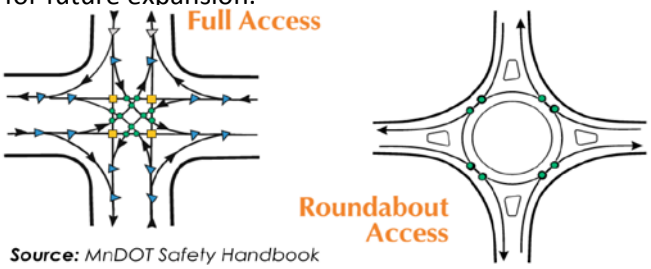
State Project Number: 2750-92

TITLE:	Use roundabouts at ramp terminals on both sides; reduce bridge to two lanes

DISCUSSION/JUSTIFICATION:

Roundabouts at the ramp terminals would decrease the overall footprint of the roadway construction, which will decrease the overall cost of the project. Traffic volumes at this location show that single lane roundabouts at both ramp terminals will function the same (or better) then that current signal that is designed. The reduction in lanes will allow for a narrower bridge, which recognizes the largest construction savings on the project and this focuses on a single lane roundabout. Additionally, a roundabout will allow for future expansion.

Benefits of a Roundabout versus Signal:
Reduced Conflict Points; reduces 32 to 8 for vehicles and reduces 16 to 8 for pedestrians.



Source: MnDOT Safety Handbook

Operational Performance – Roundabouts typically have lower overall delay than signalized and all-way stop-controlled intersections. The delay reduction is often most significant during non-peak traffic periods. These performance benefits can often result in reduced lane requirements between intersections. When used at the terminals of freeway interchanges, roundabouts can often reduce lane requirements for bridges over or under the freeway, thus substantially reducing construction costs. *Source: FHWA*

Local Examples:
TH610 & Zachary Ln
TH610 & Elm Creek Pkwy
TH36 & Hilton Trail
TH52 & Wentworth Ave
TH61 & Jamaica Ave
TH7 & Louisiana Ave

Other MN Examples:
TH14 & CSAH 12 (Mankato)
TH14 & Lookout Dr (North Mankato)
TH14 & TH15 (New Ulm)
TH60 & I90 (Worthington)
TH10 & CSAH 3 (Sauk Rapids)

IMPLEMENTATION CONSIDERATIONS:

Requires City Council approval.

VALUE ENGINEERING PROPOSAL

FM-01

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Use roundabouts at ramp terminals on both sides; reduce bridge to two lanes

IMPACT TO PERFORMANCE

Performance Attribute	Definition	Weight	Impact (use Scale)	Score
Schedule (short-term)	Meet 2020 completion	19.05%	5	0.95
Justification	Smaller bridge and smaller roadway footprint will result in less to construct, shortening the schedue			
Access (long-term)	Direct connection to TH169 and balance local road congestion	23.81%	5	1.19
Justification	Maintains connection to TH169; roundabouts are more efficient for the local system			
Maintenance of Traffic (short-term)	Maintain access during construction and minimize impacts on TH169	11.90%	0	0.00
Justification				
Maintainability (long-term)	Minimize long-term costs and ease of maintenance	4.76%	5	0.24
Justification	Better than partial cloverleaf interchange (parclo) for plows			
Mainline Operations (long-term)	TH169 conflicts and Level of Service	26.19%	0	0.00
Justification				
Local Operations (long-term)	Conflicts and Level of Service	14.29%	10	1.43
Justification	Reduces conflict points at both intersections			
	OVERALL PERFORMANCE SCORE	**100.00%**		**3.81**

SCALE

10 Large increase in performance
5 Small increase in performance
0 No impact to performance
-5 Small negative impact to performance
-10 Large negative impact to performance

VALUE ENGINEERING PROPOSAL
FM-01
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Use roundabouts at ramp terminals on both sides; reduce bridge to two lanes						
DESIGN ELEMENT	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Excavation - Common and Subgrade	CY	77,700	7.00	$ 543,900	57,700	7.00	$ 403,900
Common Borrow (CV)	CY	123,300	14.00	$ 1,726,200	91,500	14.00	$ 1,281,000
Granular Subgrade (CV)	CY	62,100	16.00	$ 993,600	46,100	16.00	$ 737,600
Mainline Pavement	SY	19,900	35.00	$ 696,500	12,800	35.00	$ 448,000
Ramp Pavement	SY	9,600	35.00	$ 336,000	7,000	35.00	$ 245,000
Ramp Shoulder Pavement	SY	4,300	35.00	$ 150,500	3,500	35.00	$ 122,500
Concrete Walk / Trail / Median	SY	7,300	38.00	$ 277,400	7,200	38.00	$ 273,600
ADA Pedestrian Ramp	EA	5	1,500.00	$ 7,500			$ -
Concrete Curb and Gutter	LF	18,000	16.00	$ 288,000	12,400	16.00	$ 198,400
Bridge	SF	21,169	170.00	$ 3,598,730	12,304	170.00	$ 2,091,680
Signal	EA	2	200,000.00	$ 400,000			$ -
Right-of-way	AC	8	300,000.00	$ 2,400,000	7	300,000.00	$ 2,100,000
Total				**$ 11,418,000**			**$ 7,902,000**
						CWE (BASELINE LESS PROPOSED)	**$ 3,516,000**

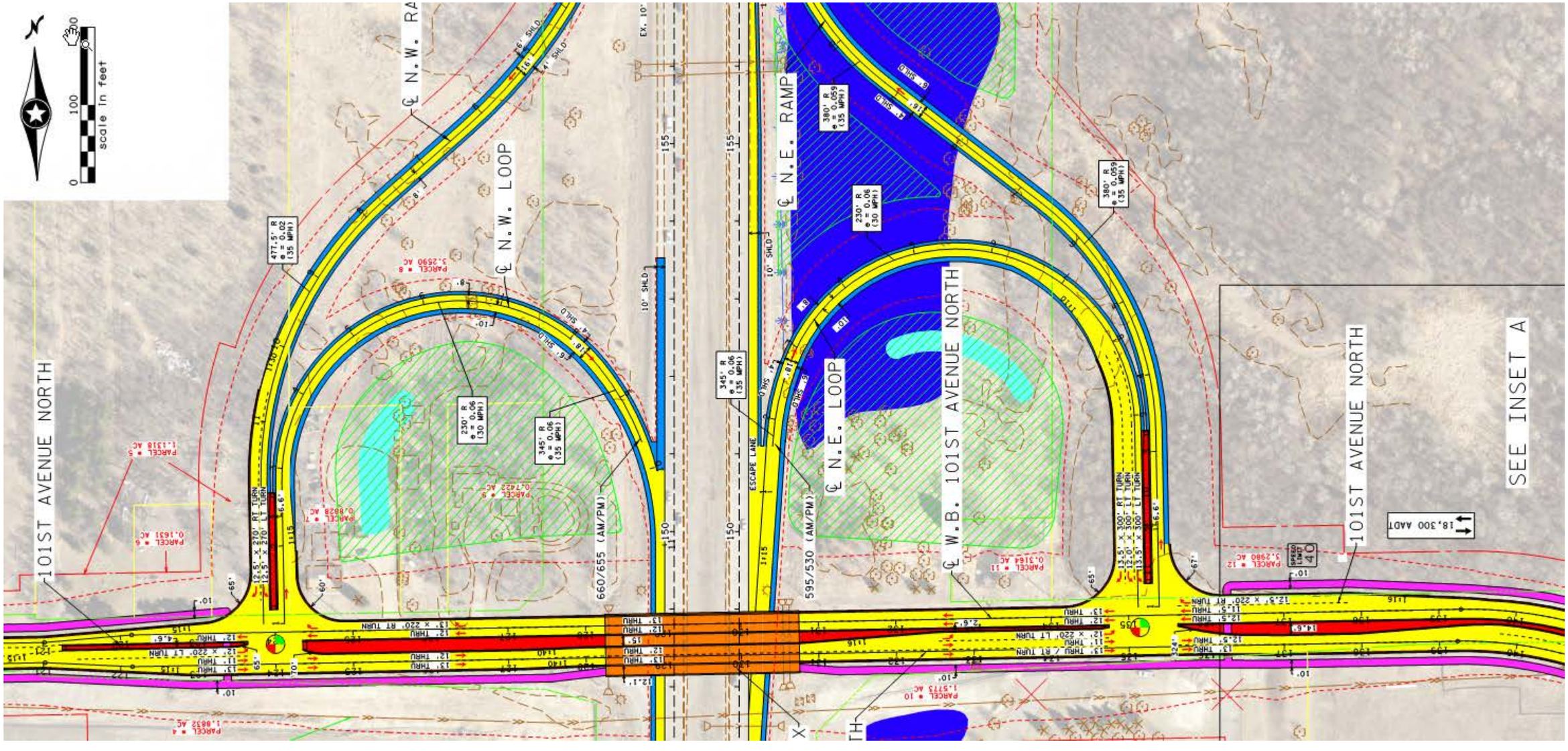
Note: Total costs are rounded to the nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL
FM-01
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Use roundabouts at ramp terminals on both sides; reduce bridge to two lanes

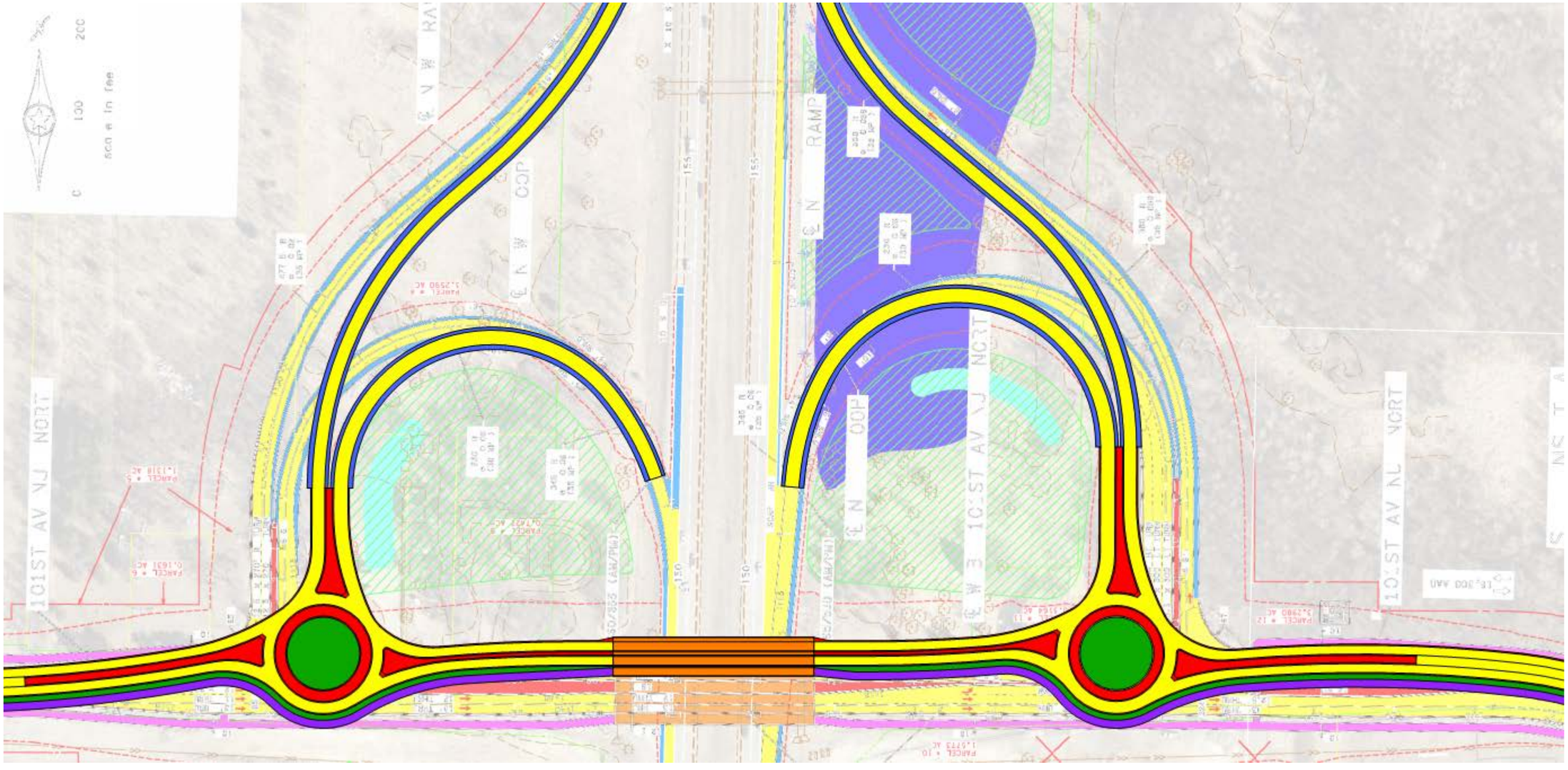
SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL
FM-01
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Use roundabouts at ramp terminals on both sides; reduce bridge to two lanes

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL

FM-03

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Use an overpass at 101st Avenue with a signalized RCUT at Oxbow Creek Drive
FUNCTION:	**Facilitate Movement**

BASELINE ASSUMPTION:

The base condition is to add a folded diamond interchange to TH169 at 101st Avenue to improve local road connectivity and increase access to developable area.

PROPOSED ALTERNATIVE:

Build an overpass at 101st Avenue to improve local road connectivity and use a Superstreet intersection (signalized RCUT) at Oxbow Creek Drive and 109th Avenue to provide increased access to developable area while improving traffic flow on TH169.

BENEFITS	RISKS/CHALLENGES
• Avoids closely spaced interchange	• Different than City expectation
• Addresses delay on TH169	• Acceptance of new approach
• Addresses delay at 109th Avenue	• Change to environmental document/project schedule may be impacted
• Beginning of corridor solution for TH169	•
•	•
•	•
•	•

OVERALL PERFORMANCE SCORE **1.43**

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 15,849,000	$ -	$ 15,849,000
PROPOSED ALTERNATIVE:	$ 13,047,000	$ -	$ 13,047,000
TOTAL (Baseline less Proposed)	$ 2,802,000	$ -	**$ 2,802,000**
			SAVINGS

VALUE ENGINEERING PROPOSAL

FM-03

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Use an overpass at 101st Avenue with a signalized RCUT at Oxbow Creek Drive

DISCUSSION/JUSTIFICATION:

The base condition interchange increases access to TH169, but the spacing to TH610 will likely result in a negative impact to crash performance on TH169, and it does not address any of the existing functional concerns on TH169. This proposal focuses on meeting the project goals of connecting the local road system and increasing access for development, and scrutinizes the context of the roadway segment and performance of the highway system.

TH169 north of TH610 functions as an expressway, and the eight closely spaced and fully developed intersections, along with the limited ability of the river crossing and Anoka to accept more traffic, make it unlikely to change in the future. Superstreet intersections have been shown to reduce delay, improve capacity, and reduce crashes, and they are a viable treatment for this corridor.

Installing Superstreet intersections at Oxbow Creek Drive and 109th Avenue will avoid the interchange spacing concern of the base condition, provide access consistent with the context of the corridor, and improve performance of TH169 and 109th Avenue. 3000-foot queues already exist so this proposal would result in a twenty percent increase in throughput and reduce impact on local roads. In addition, this proposal results in a reduction in severe crashes and crashes overall. If treated like a one-way road, this would result in an increase in throughput.

Recognizing the local desire to provide local road connectivity, an overpass at 101st Avenue can be provided now or in the future. Functionally it is desirable to have local connectivity that does not require interaction with the highway. Cost-wise, this local connection would require less capacity and can be constructed economically with steeper grades and alignment changes to minimize right-of-way and utility costs.

North Carolina is using the Superstreet design extensively and they have found a 20% overall reduction in travel time compared with similar intersections. MnDOT is installing its first Superstreet intersection at TH65 and Viking Drive. The $2.8M bid price from that project is used in this estimate, although this bid price was higher than anticipated. There is potential that future Superstreet intersections will be more economical.

IMPLEMENTATION CONSIDERATIONS:

Schedule impacts due to concept changes. Local acceptance of approach (local versus regional corridor).

VALUE ENGINEERING PROPOSAL

FM-03

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Use an overpass at 101st Avenue with a signalized RCUT at Oxbow Creek Drive

IMPACT TO PERFORMANCE

Performance Attribute	Definition	Weight	Impact (use Scale)	Score
Schedule (short-term)	Meet 2020 completion	19.05%	-5	-0.95
Justification	Impacts environmental documents and may change schedule, but bridge could be delayed			
Access (long-term)	Direct connection to TH169 and balance local road congestion	23.81%	10	2.38
Justification	Addresses existing concerns while providing appropriate level of access			
Maintenance of Traffic (short-term)	Maintain access during construction and minimize impacts on TH169	11.90%	-5	-0.60
Justification	Additional work would be needed along TH169			
Maintainability (long-term)	Minimize long-term costs and ease of maintenance	4.76%	0	0.00
Justification	RCUT would be worse, an interchange would be easier; MnDOT may propose that they don't own the new proposed bridge			
Mainline Operations (long-term)	TH169 conflicts and Level of Service	26.19%	5	1.31
Justification	Added access, improvements at 109th Avenue			
Local Operations (long-term)	Conflicts and Level of Service	14.29%	-5	-0.71
Justification	RCUT won't provide as ready access as interchange			
	OVERALL PERFORMANCE SCORE	**100.00%**		**1.43**

SCALE

10 Large increase in performance
5 Small increase in performance
0 No impact to performance
-5 Small negative impact to performance
-10 Large negative impact to performance

VALUE ENGINEERING PROPOSAL
FM-03
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

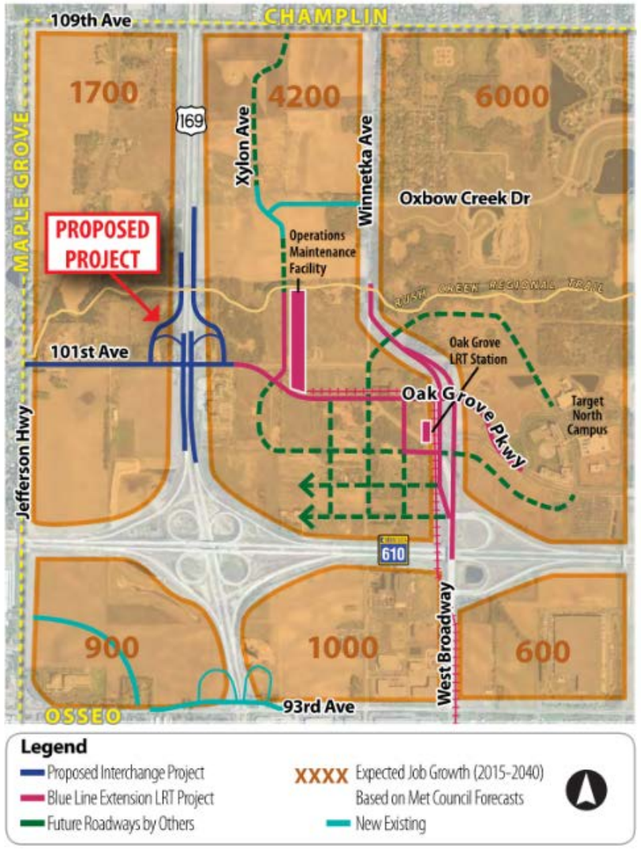
TITLE:	Use an overpass at 101st Avenue with a signalized RCUT at Oxbow Creek Drive						
DESIGN ELEMENT	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Bridge	SF	21,169	170.00	3,598,730	16,450	170.00	2,796,500
Ramps and Loops	EA	1	4,600,000.00	4,600,000			
Right-of-way	LS	1	7,650,000.00	7,650,000	1	4,650,000.00	4,650,000
Superstreet	EA				2	2,800,000.00	5,600,000
Total				**15,849,000**			**13,047,000**
						CWE (BASELINE LESS PROPOSED)	**2,802,000**
							SAVINGS

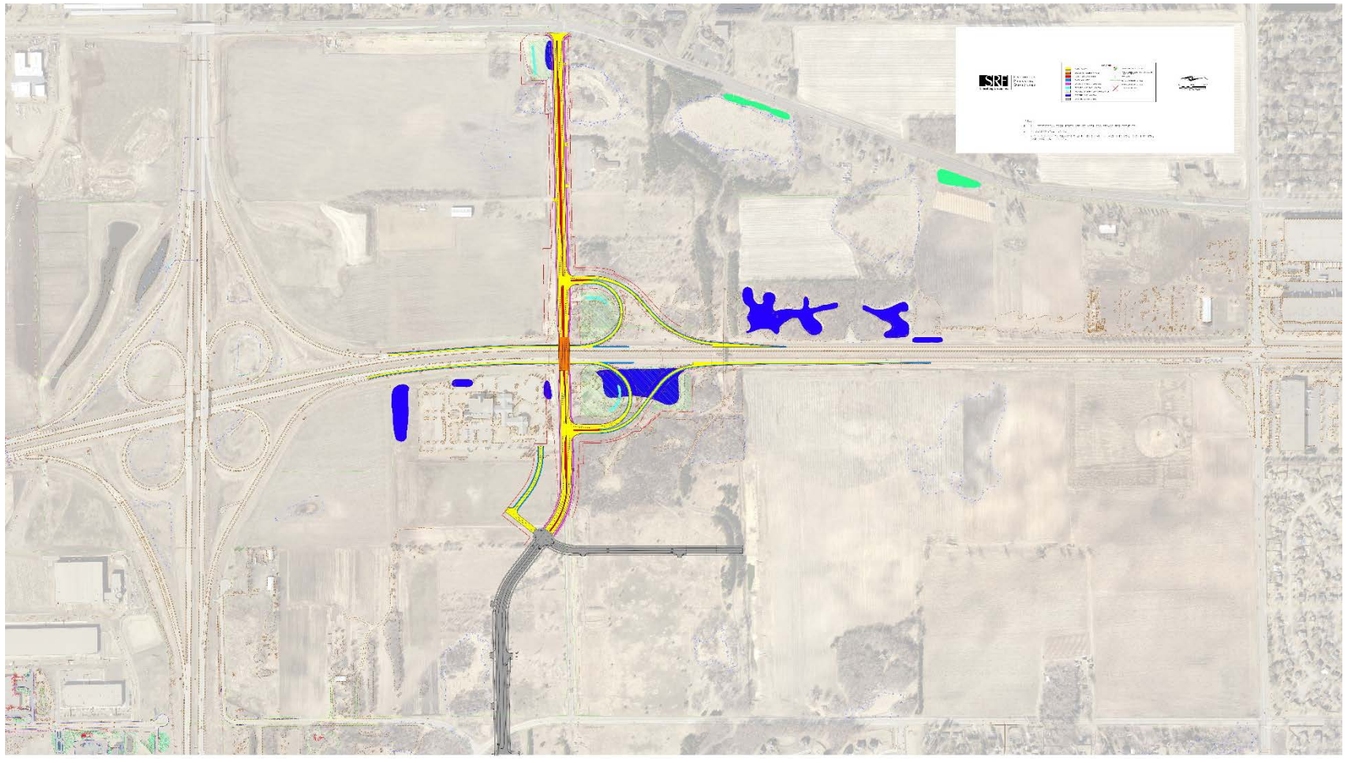
Note: Total costs are rounded to the nearest thousand dollars.

VALUE ENGINEERING PROPOSAL
FM-03
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Use simplified overpass at 101st Avenue and a signalized RCUT at Oxbow Creek Drive

SKETCH OF BASELINE ASSUMPTION

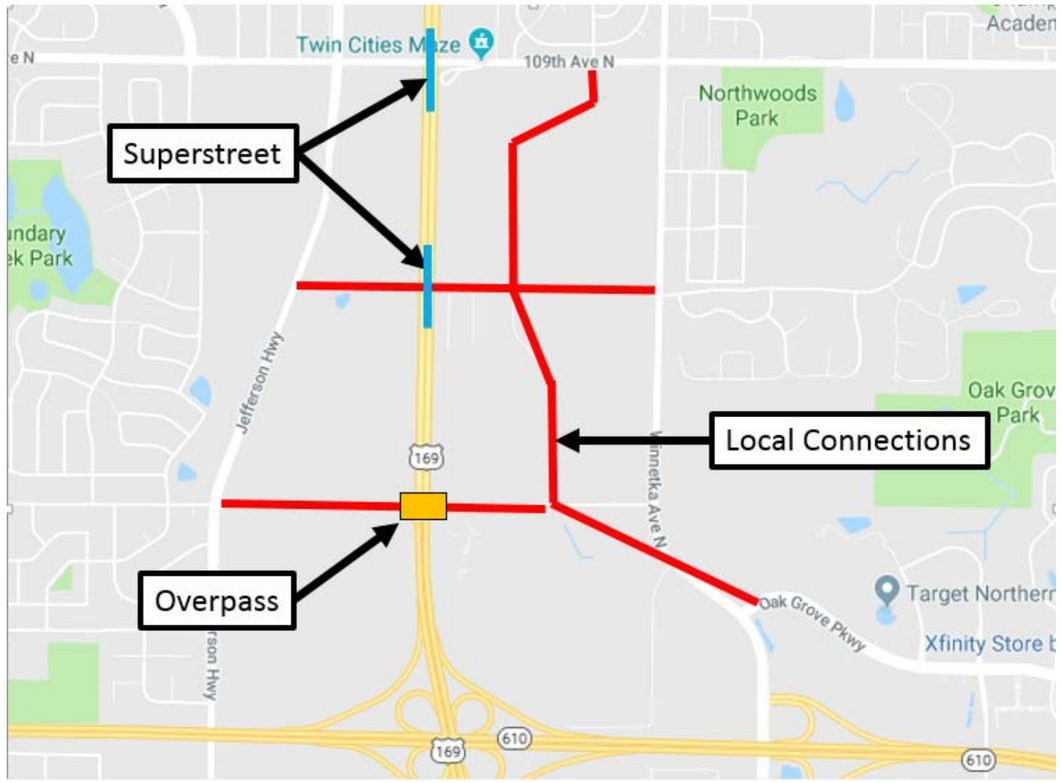


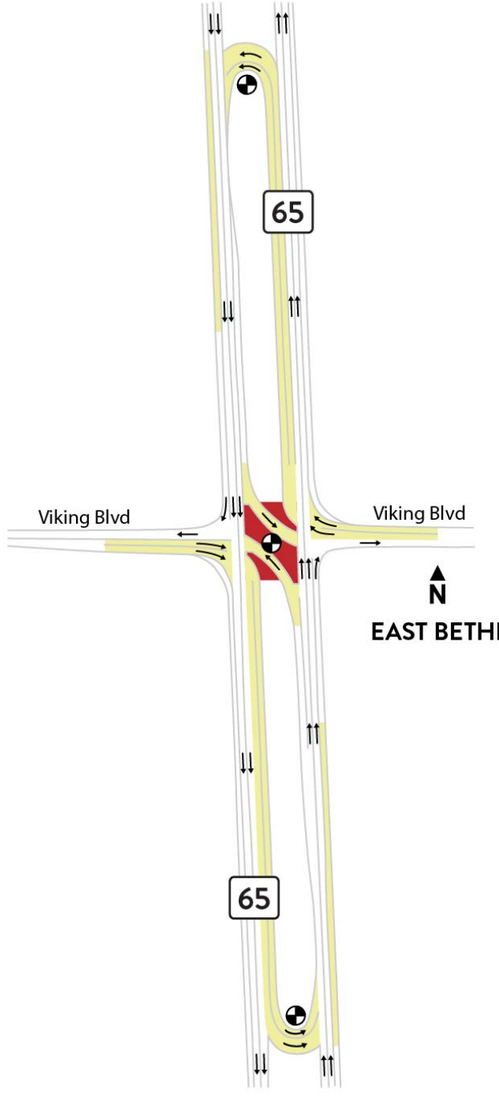


VALUE ENGINEERING PROPOSAL
FM-03
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Use simplified overpass at 101st Avenue and a signalized RCUT at Oxbow Creek Drive

SKETCH OF PROPOSED ALTERNATIVE





Potential solution: Reduced Conflict Intersections

Improved safety
- Studies show a 70% reduction in fatalities and a 42% reduction in injury crashes

Economic benefits
- Good access to local businesses
- Smaller footprint than an interchange or larger intersection designs
- Peak period travel time savings
- Fraction of the cost of building an interchange

Decreased delay
- Reduce delay at signalized intersections
- Requires fewer signal phases

The so-called "superstreet" traffic design results in significantly faster travel times, and leads to a drastic reduction in automobile collisions and injuries, according to North Carolina State University researchers who have conducted the largest-ever study of superstreets and their impacts.

Superstreets are surface roads, not freeways. It is defined as a thoroughfare where the left-hand turns from side streets are re-routed, as is traffic from side streets that needs to cross the thoroughfare. In both instances, drivers are first required to make a right turn and then make a U-turn around a broad median. While this may seem time-consuming, the study shows that it actually results in a significant time savings since drivers are not stuck waiting to make left-hand turns or for traffic from cross-streets to go across the thoroughfare.

"The study shows a 20 percent overall reduction in travel time compared to similar intersections that use conventional traffic designs," says Dr. Joe Hummer, professor of civil, construction and environmental engineering at NC State and one of the researchers who conducted the study. "We also found that superstreet intersections experience an average of 46 percent fewer

VALUE ENGINEERING PROPOSAL

FM-06

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Reduce the loop radii from 230 feet to 190 feet on both sides
FUNCTION:	**Facilitate Movement**

BASELINE ASSUMPTION:

The current design has a 230-foot radius loops which is the preferred radius per the Road Design Manual.

PROPOSED ALTERNATIVE:

The proposed is to reduce the radius to a 190-foot loop radius.

BENEFITS	RISKS/CHALLENGES
● Reduces needed right of way	● Tighter radius for large trucks to navigate
● Slight reduction in impervious area	● Exiting traffic must decel to 30 mph or less to navigate the curve
● Reduces pavement and embankment	●
● Allows increase in spacing to TH610	●
●	●
●	●
●	●

OVERALL PERFORMANCE SCORE **0.00**

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 2,577,000	$ -	$ 2,577,000
PROPOSED ALTERNATIVE:	$ 1,856,000	$ -	$ 1,856,000
TOTAL (Baseline less Proposed)	$ 721,000	$ -	**$ 721,000**
			SAVINGS

VALUE ENGINEERING PROPOSAL

FM-06

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Reduce the loop radii from 230 feet to 190 feet on both sides

DISCUSSION/JUSTIFICATION:

The folded diamond interchange configuration requires loops in both quadrants. Roadway Design Manual identifies 230-foot radii as preferred and a 190-foot minimum. In order to minimize right-of-way take from adjacent property owners, smaller radius loop may reduce impacts.

Experience has shown that the method of introducing a loop can have a greater impact on safety performance than the chosen radius. 230-foot radius loops have exhibited performance problems, while 170-foot radius loops with good entry designs have performed well. Entry design (as shown on Proposed Sketch) are recommended regardless of loop radius. Reducing the loop radius would require 25 mph recommended signage.

Please note that this is a currently accepted practice at MnDOT.

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL

FM-06

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Reduce the loop radii from 230 feet to 190 feet on both sides

IMPACT TO PERFORMANCE

Performance Attribute	Definition	Weight	Impact (use Scale)	Score
Schedule (short-term)	Meet 2020 completion	19.05%	0	0.00
Justification				
Access (long-term)	Direct connection to TH169 and balance local road congestion	23.81%	0	0.00
Justification				
Maintenance of Traffic (short-term)	Maintain access during construction and minimize impacts on TH169	11.90%	0	0.00
Justification				
Maintainability (long-term)	Minimize long-term costs and ease of maintenance	4.76%	0	0.00
Justification				
Mainline Operations (long-term)	TH169 conflicts and Level of Service	26.19%	0	0.00
Justification				
Local Operations (long-term)	Conflicts and Level of Service	14.29%	0	0.00
Justification				
	OVERALL PERFORMANCE SCORE	**100.00%**		**0.00**

SCALE

10 Large increase in performance
5 Small increase in performance
0 No impact to performance
-5 Small negative impact to performance
-10 Large negative impact to performance

VALUE ENGINEERING PROPOSAL
FM-06
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Reduce the loop radii from 230 feet to 190 feet on both sides						
DESIGN ELEMENT	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Right-of-way	AC	4	300,000.00	1,200,000	2	300,000.00	600,000
Ramp Pavement	SY	18,095	35.00	633,325	16,695	35.00	584,325
Embankment	CY	53,112	14.00	743,568	48,000	14.00	672,000
Total				**2,577,000**			**1,856,000**
						CWE (BASELINE LESS PROPOSED)	**721,000**

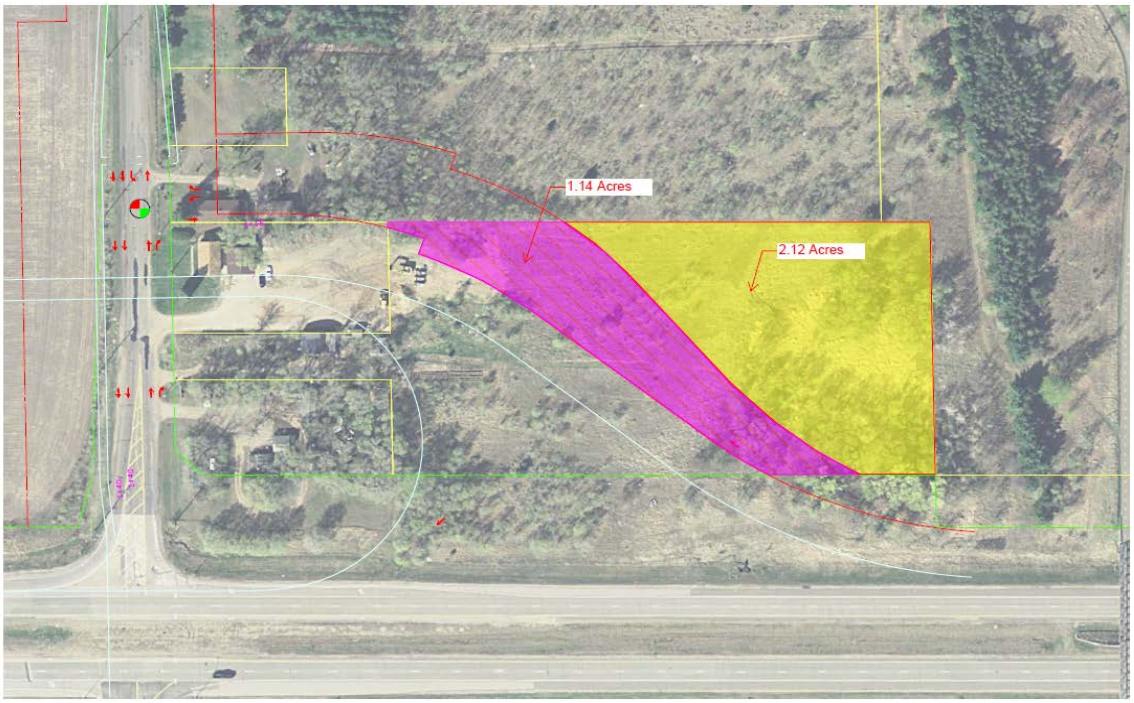
Note: Total costs are rounded to the nearest thousand dollars.

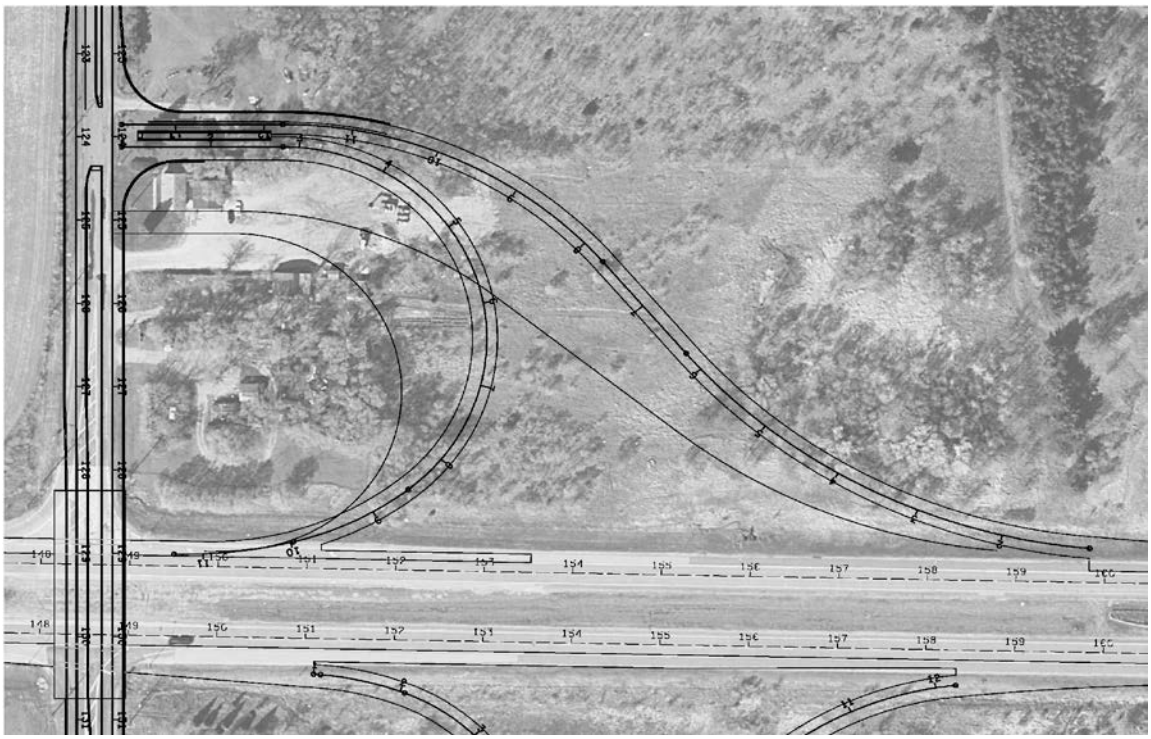
SAVINGS

VALUE ENGINEERING PROPOSAL
FM-06
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Reduce the loop radii from 230 feet to 190 feet on both sides

SKETCH OF BASELINE ASSUMPTION

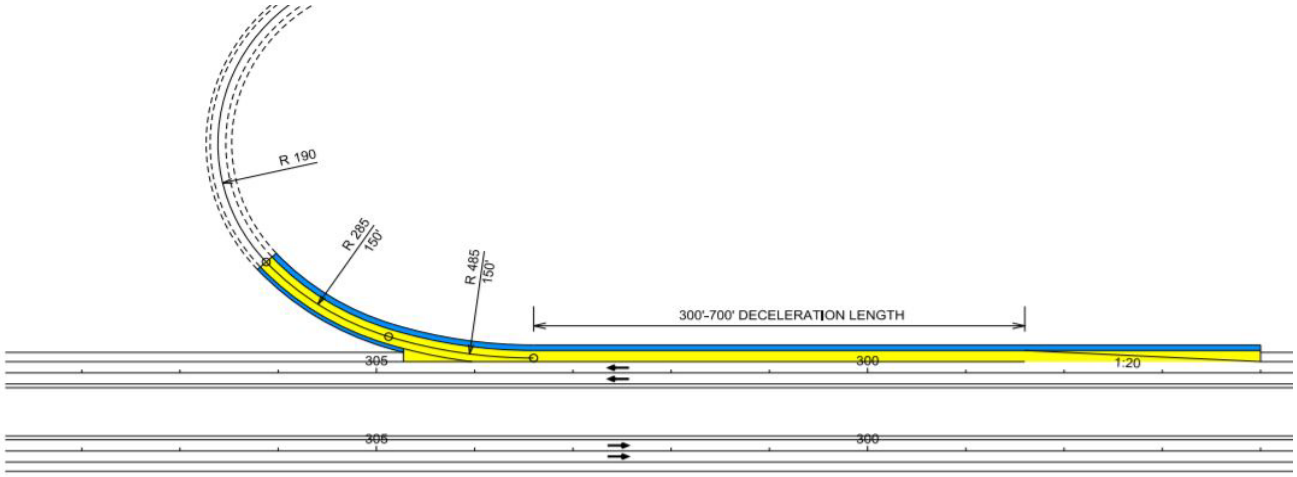




VALUE ENGINEERING PROPOSAL
FM-06
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Reduce the loop radii from 230 feet to 190 feet on both sides

SKETCH OF PROPOSED ALTERNATIVE



DISCUSSION:
EXPERIENCE HAS SHOWN THAT THE METHOD OF INTRODUCING A LOOP CAN HAVE A GREATER IMPACT ON SAFETY PERFORMANCE THAN THE CHOSEN RADIUS. 230-FT. RADIUS LOOPS HAVE EXHIBITED PERFORMANCE PROBLEMS, WHILE 170-FT. RADIUS LOOPS WITH GOOD ENTRY DESIGNS HAVE PERFORMED WELL. ENTRY DESIGN (AS SHOWN ABOVE) ARE RECOMMENDED REGARDLESS OF LOOP RADIUS.

RECOMMENDATION:
USE A ~300-FT. SPIRAL TRANSITION TO INTRODUCE LOOP RAMPS. A 3-CENTERED CURVE CAN BE USED AS AN ALTERNATIVE TO THE SPIRAL CURVE. THE 3-CENTERED CURVE SHOULD BE DESIGNED WITH A PAIR OF EQUAL LENGTH CURVES OF DIMINISHING RADII USING A 1.5: OR FLATTER (2:1 MAX) RATIO AS SHOWN ABOVE.

PARALLEL DECELERATION IS RECOMMENDED PRIOR TO LOOPS ON HIGH SPEED FACILITIES WHEN FEASIBLE, PARTICULARLY ON ROADWAYS WITH DOWNGRADES OF 3% OR GREATER. RESEARCH HAS SHOWN THAT DECELERATION LENGTH GREATER THAN 700-FT. CAN LEAD TO A REDUCTION IN SAFETY PERFORMANCE.

RAMP DETAIL 1
LOOP RAMP ENTRY TREATMENT

VALUE ENGINEERING PROPOSAL

FM-15

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Minimize the cross section on the bridge
FUNCTION:	**Facilitate Movement**

BASELINE ASSUMPTION:

The current geometry across the bridge includes four lanes with a 15-foot raised median and trail.

PROPOSED ALTERNATIVE:

The proposed geometry eliminates the raised median by introducing 40 mph reverse curves on the eastbound alignment.

BENEFITS	RISKS/CHALLENGES
• Reduces bridge width	• Adds reverse curves on EB 101st Avenue alignment
• Slight reduction in impervious area	• A raised median to channelize traffic is desirable
•	•
•	•
•	•
•	•
•	•

OVERALL PERFORMANCE SCORE **-0.71**

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 3,599,000	$ -	$ 3,599,000
PROPOSED ALTERNATIVE:	$ 3,004,000	$ -	$ 3,004,000
TOTAL (Baseline less Proposed)	$ 595,000	$ -	**$ 595,000**
			SAVINGS

VALUE ENGINEERING PROPOSAL

FM-15

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Minimize the cross section on the bridge

DISCUSSION/JUSTIFICATION:

Four lanes across the bridge plus a 15-foot wide median leads to a large bridge over TH169. Reducing width across the bridge will save costs and reduce maintenance issues.

101st Avenue is a local roadway designed for 40 mph speed. Projected traffic volumes are approximately 18,000 trips per day.

This option does not work with the reduced radii (190 feet) due to the intersections moving in and conflicting with the curvature of the alignment.

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL
FM-15
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Minimize the cross section on the bridge

IMPACT TO PERFORMANCE

Performance Attribute	Definition	Weight	Impact (use Scale)	Score
Schedule (short-term)	Meet 2020 completion	19.05%	0	0.00
Justification				
Access (long-term)	Direct connection to TH169 and balance local road congestion	23.81%	0	0.00
Justification				
Maintenance of Traffic (short-term)	Maintain access during construction and minimize impacts on TH169	11.90%	0	0.00
Justification				
Maintainability (long-term)	Minimize long-term costs and ease of maintenance	4.76%	0	0.00
Justification				
Mainline Operations (long-term)	TH169 conflicts and Level of Service	26.19%	0	0.00
Justification				
Local Operations (long-term)	Conflicts and Level of Service	14.29%	-5	-0.71
Justification				
	OVERALL PERFORMANCE SCORE	**100.00%**		**-0.71**

SCALE

10 Large increase in performance
5 Small increase in performance
0 No impact to performance
-5 Small negative impact to performance
-10 Large negative impact to performance

VALUE ENGINEERING PROPOSAL
FM-15
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Minimize the cross section on the bridge						
DESIGN ELEMENT	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Bridge	SF	21,169	170.00	3,598,730	17,669	170.00	3,003,730
Total				**3,599,000**			**3,004,000**
						CWE (BASELINE LESS PROPOSED)	**595,000**

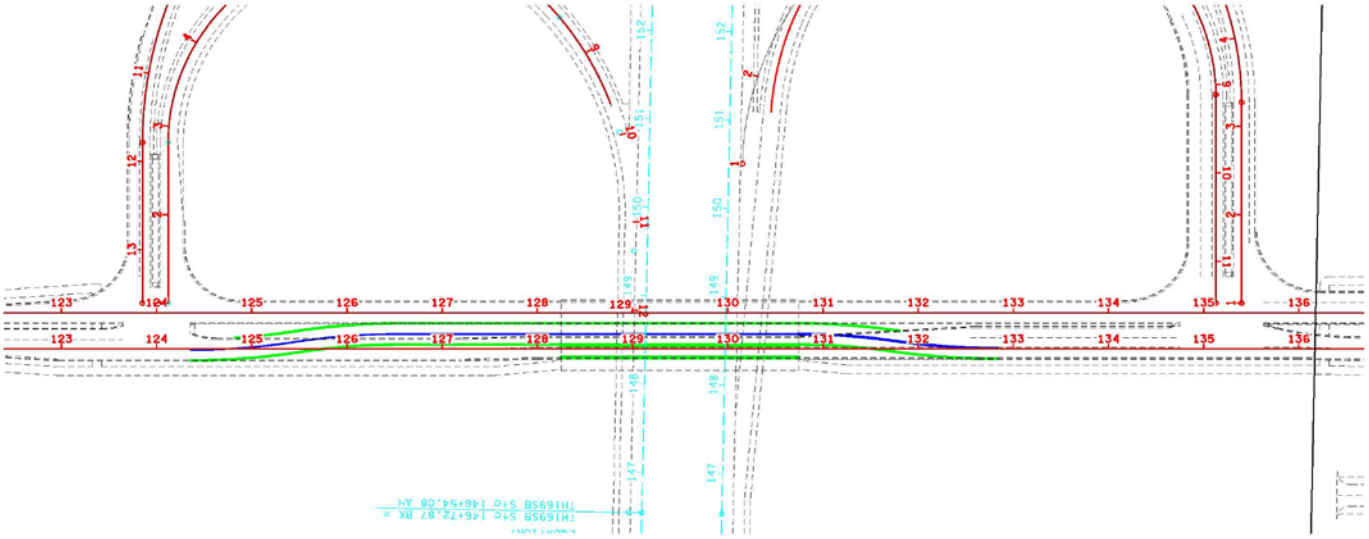
Note: Total costs are rounded to the nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL
FM-15
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Minimize the cross section on the bridge

SKETCH OF BASELINE & PROPOSED ALTERNATIVE



Black = existing
Green = proposed

VALUE ENGINEERING PROPOSAL

FM-20

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Reduce the 101st Avenue bridge from five lanes to three lanes
FUNCTION:	**Facilitate Movement**

BASELINE ASSUMPTION:

The base condition is an urban three-lane roadway west of the proposed bridge and an urban five-lane divided section to the east.

PROPOSED ALTERNATIVE:

Use the updated traffic forecast and reduce the proposed structure width by extending the three-lane section to the east side of the proposed structure.

BENEFITS	RISKS/CHALLENGES
● Reduces project cost	● Lower future Level of Service on local system
● Reduces construction duration	●
● Reduces operations and maintenance/long term costs of ownership	●
● Avoids large under-utilized structure prior to full development	●
● Allows for future widening	●
●	●
●	●

OVERALL PERFORMANCE SCORE **1.07**

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 3,599,000	$ -	$ 3,599,000
PROPOSED ALTERNATIVE:	$ 2,720,000	$ -	$ 2,720,000
TOTAL (Baseline less Proposed)	$ 879,000	$ -	**$ 879,000**
			SAVINGS

VALUE ENGINEERING PROPOSAL

FM-20

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Reduce the 101st Avenue bridge from five lanes to three lanes

DISCUSSION/JUSTIFICATION:

The base condition interchange provides capacity for minimal delay in the design year. The *Arterial Analysis Memo* used 2030 projected volumes that exceed the 2040 forecast volumes of the base condition, and found 18-19 s/vehicles of delay (Level of Service B) for the base condition.

Due to the moderate forecast volumes and high level of service of the base condition, the Value Engineering Study Team proposes to reduce the 101st Avenue bridge from five lanes to three. This will benefit the project by reducing the overall cost and reduce the construction duration to help with timeline constraints. This will benefit MnDOT by reducing the size of the bridge thus reducing overall maintenance efforts.

This change will also result in a more appropriately sized structure in the time prior to the area being fully developed. This is reasonable since traffic growth and development rarely meet the projected timeline. Discussion will likely be needed to gain consensus on a design with a lower LOS during the peak hour of the design year.

IMPLEMENTATION CONSIDERATIONS:

Acceptance of change by local agency. Have to overcome tendency to add conservatism on top of design year projections. Southbound to eastbound volumes may inform capacity needs.

VALUE ENGINEERING PROPOSAL

FM-20

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Reduce the 101st Avenue bridge from five lanes to three lanes

IMPACT TO PERFORMANCE

Performance Attribute	Definition	Weight	Impact (use Scale)	Score
Schedule (short-term)	Meet 2020 completion	19.05%	5	0.95
Justification	Smaller structure reduces construction timeline			
Access (long-term)	Direct connection to TH169 and balance local road congestion	23.81%	0	0.00
Justification				
Maintenance of Traffic (short-term)	Maintain access during construction and minimize impacts on TH169	11.90%	5	0.60
Justification	Reduces construction length			
Maintainability (long-term)	Minimize long-term costs and ease of maintenance	4.76%	5	0.24
Justification	Less bridge to own and maintain			
Mainline Operations (long-term)	TH169 conflicts and Level of Service	26.19%	0	0.00
Justification				
Local Operations (long-term)	Conflicts and Level of Service	14.29%	-5	-0.71
Justification	Will decrease delay compared to additional lanes of base condition			
	OVERALL PERFORMANCE SCORE	**100.00%**		**1.07**

SCALE

10 Large increase in performance
5 Small increase in performance
0 No impact to performance
-5 Small negative impact to performance
-10 Large negative impact to performance

VALUE ENGINEERING PROPOSAL
FM-20
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Reduce the 101st Avenue bridge from five lanes to three lanes						
DESIGN ELEMENT	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Bridge	SF	21,169	170.00	3,598,730	16,000	170.00	2,720,000
Total				**3,599,000**			**2,720,000**
						CWE (BASELINE LESS PROPOSED)	**879,000**

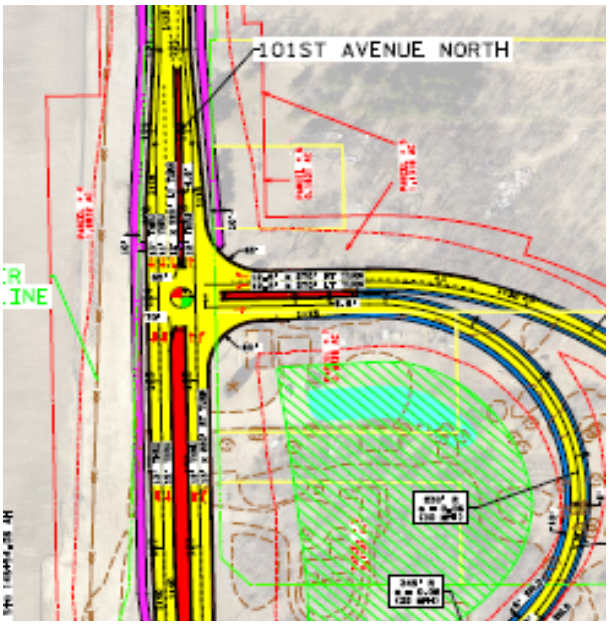
Note: Total costs are rounded to the nearest thousand dollars.

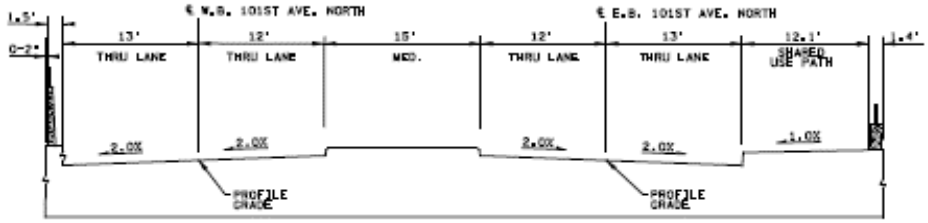
SAVINGS

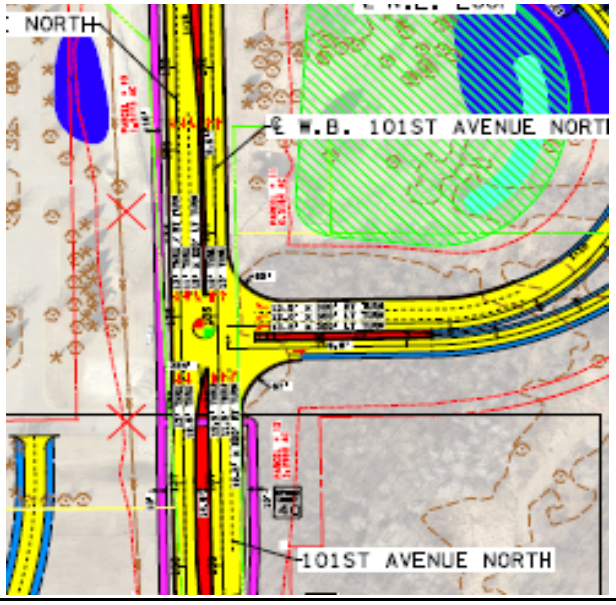
VALUE ENGINEERING PROPOSAL
FM-20
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Reduce the 101st Avenue bridge from five lanes to three lanes

SKETCH OF BASELINE ASSUMPTION



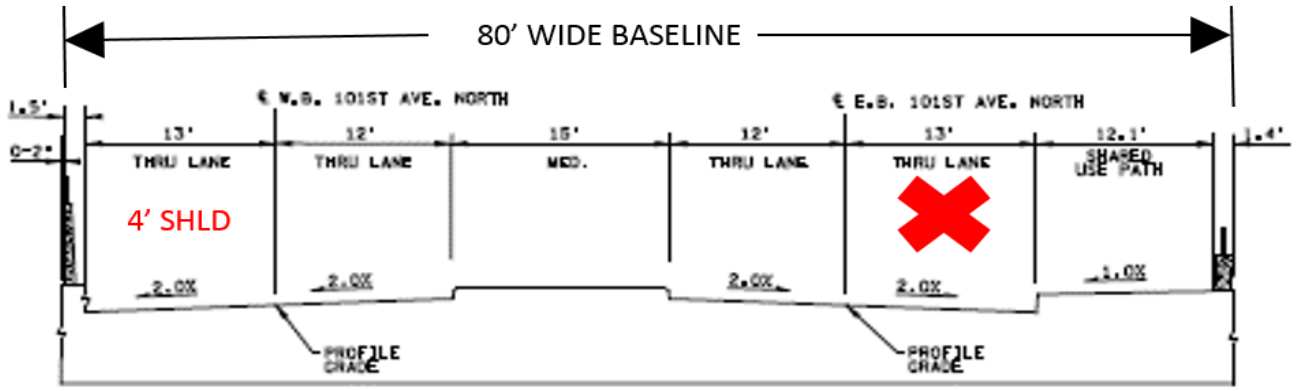




VALUE ENGINEERING PROPOSAL
FM-20
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Reduce the 101st Avenue bridge from five lanes to three lanes

SKETCH OF PROPOSED ALTERNATIVE



22' WIDTH REDUCTION

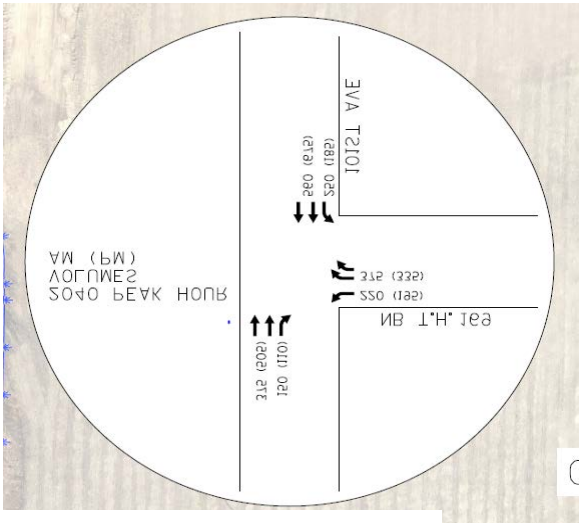


Table 5. Future Build Traffic Operations Analysis Results

Intersection	Scenario	A.M. Peak hour		P.M. Peak Hour	
		Delay (s/veh)	LOS	Delay (s/veh)	LOS
101st Avenue/Jefferson Highway	Signalized Scenario 1	26	C	12	B
	Signalized Scenario 2	27	C	12	B
	Signalized Scenario 3	29	C	13	B
	Signalized Scenario 4	29	C	13	B
	Roundabout	17	C	9	A
101st Avenue/SB TH 169	Signalized	12	B	18	B
	Roundabout	12	B	21	C
101st Avenue/NB TH 169	Signalized	18	B	19	B
	Roundabout	30	D	22	C
101st Avenue/Xylon Avenue	Signalized	29	C	39	D

MITIGATE CONFLICT

VALUE ENGINEERING PROPOSAL

MC-04

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Use the high wall abutment in lieu of the stub abutment to reduce span length
FUNCTION:	**Mitigate Conflict**

BASELINE ASSUMPTION:

Current bridge abutment is designed with slope paving from ground up to bridge.

PROPOSED ALTERNATIVE:

The proposed bridge abutments are proposed to be vertical to decrease the bridge span length.

BENEFITS	RISKS/CHALLENGES
• Reduces bridge length	• May need to protect wall corner from traffic
• Less maintenance of bridge	• Additional embankment needed
• Cost reduction only	•
•	•
•	•
•	•
•	•

OVERALL PERFORMANCE SCORE **0.24**

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 5,460,000	$ -	$ 5,460,000
PROPOSED ALTERNATIVE:	$ 5,177,000	$ -	$ 5,177,000
TOTAL (Baseline less Proposed)	$ 283,000	$ -	**$ 283,000**
			SAVINGS

VALUE ENGINEERING PROPOSAL

MC-04

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Use the high wall abutment in lieu of the stub abutment to reduce span length

DISCUSSION/JUSTIFICATION:

Vertical bridge abutments will shorten the span length and decrease bridge cost and maintenance issues in the long term. This approach has been used on numerous MnDOT bridges throughout the state.

Reduced span length may result in a reduction in structure depth which would reduce embankment needs.

This cost impacts of this proposal did not account for the potential shallower beams and reduction in dirt which would result in additional savings for the project.

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL

MC-04

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Use the high wall abutment in lieu of the stub abutment to reduce span length

IMPACT TO PERFORMANCE

Performance Attribute	Definition	Weight	Impact (use Scale)	Score
Schedule (short-term)	Meet 2020 completion	19.05%	0	0.00
Justification				
Access (long-term)	Direct connection to TH169 and balance local road congestion	23.81%	0	0.00
Justification				
Maintenance of Traffic (short-term)	Maintain access during construction and minimize impacts on TH169	11.90%	0	0.00
Justification				
Maintainability (long-term)	Minimize long-term costs and ease of maintenance	4.76%	5	0.24
Justification	Requires less maintenance of bridge			
Mainline Operations (long-term)	TH169 conflicts and Level of Service	26.19%	0	0.00
Justification				
Local Operations (long-term)	Conflicts and Level of Service	14.29%	0	0.00
Justification				
	OVERALL PERFORMANCE SCORE	**100.00%**		**0.24**

SCALE

10 Large increase in performance
5 Small increase in performance
0 No impact to performance
-5 Small negative impact to performance
-10 Large negative impact to performance

VALUE ENGINEERING PROPOSAL
MC-04
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Use the high wall abutment in lieu of the stub abutment to reduce span length						
DESIGN ELEMENT	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Bridge	SF	21,169	170.00	3,598,730	19,469	170.00	3,309,730
Embankment	CY	132,973	14.00	1,861,622	133,373	14.00	1,867,222
Total				**5,460,000**			**5,177,000**
						CWE (BASELINE LESS PROPOSED)	**283,000**

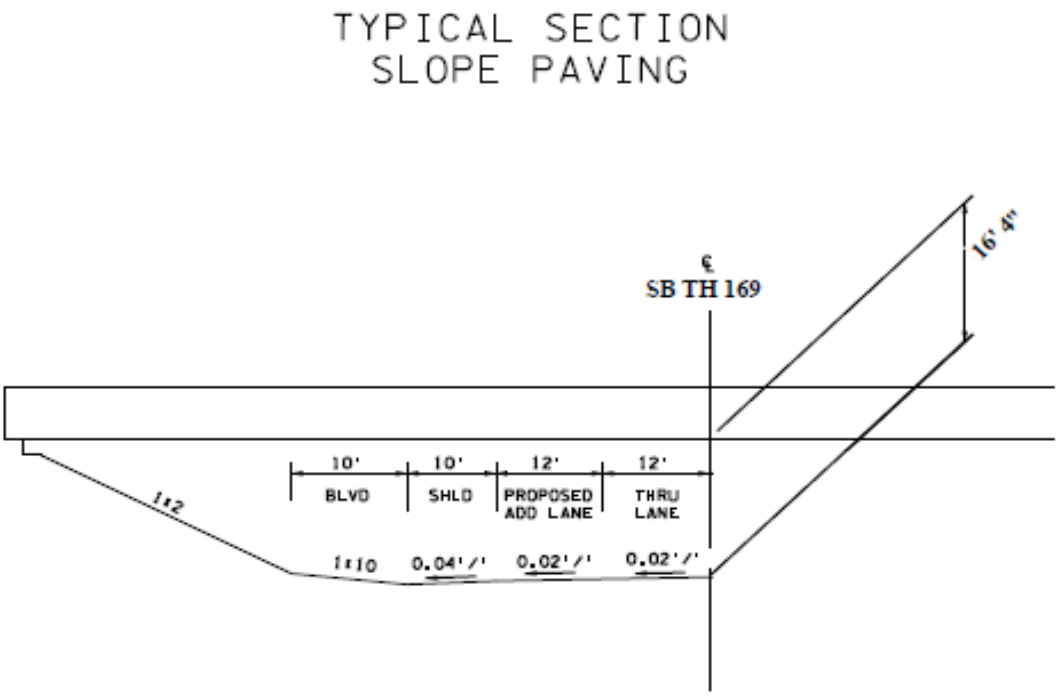
Note: Total costs are rounded to the nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL
MC-04
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Use the high wall abutment in lieu of the stub abutment to reduce span length

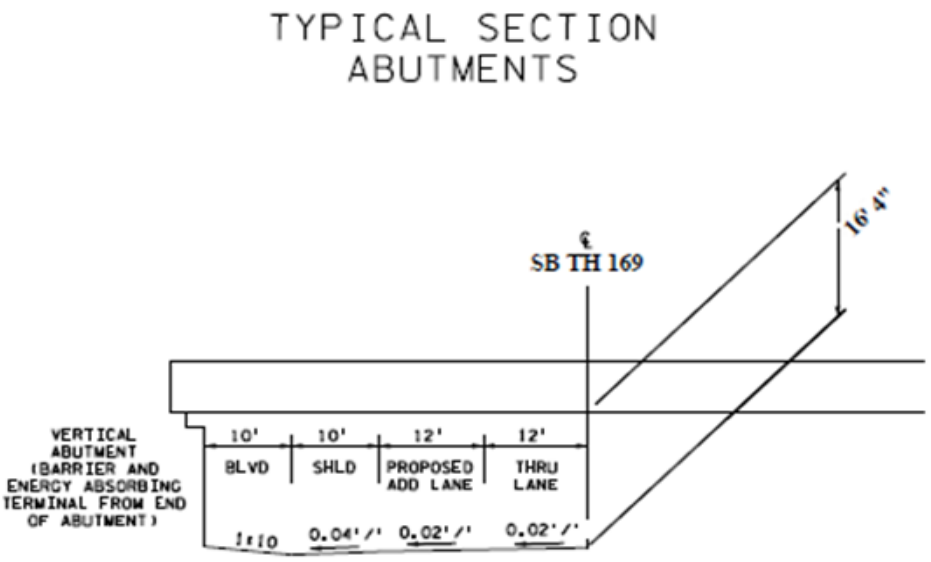
SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL
MC-04
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Use the high wall abutment in lieu of the stub abutment to reduce span length

SKETCH OF PROPOSED ALTERNATIVE



MEET BUDGET

VALUE ENGINEERING PROPOSAL

MB-01

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Defer local work
FUNCTION:	**Meet Budget**

BASELINE ASSUMPTION:

The current scope of work on 101st Avenue includes improvements outside of the tie-in point on the west side of the project to the intersection of Jefferson Highway.

PROPOSED ALTERNATIVE:

Local work on the west end of the project (west of approximately station 119+00) can be deferred as a way to meet the current budget. The project could be terminated at the tie in point of the vertical alignment change needed for the interchange.

BENEFITS	RISKS/CHALLENGES
• Reduces project budget	• Future costs to finalize the project
• Reduces risk of meeting project schedule	• Limits benefit to properties west of TH169
• Reduces right-of-way costs	•
• Reduces impacts to Excel power poles	•
•	•
•	•
•	•

OVERALL PERFORMANCE SCORE **0.24**

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 2,658,000	$ -	$ 2,658,000
PROPOSED ALTERNATIVE:	$ -	$ -	$ -
TOTAL (Baseline less Proposed)	$ 2,658,000	$ -	**$ 2,658,000**
			SAVINGS

VALUE ENGINEERING PROPOSAL

MB-01

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Defer local work

DISCUSSION/JUSTIFICATION:

Based on the current vertical profile, the project could be terminated at approximately station 119+00 and the project work west of this point could be deferred until additional funding is available. This would reduce the overall scope of the project, reduce the right-of-way cost associated with this portion of the project, and reduce the risk of completing the project scope within the current project schedule. The current volumes should allow this to be deferred and there should be time to continue the remainder of the work for the City's developments full build-out.

The costs will need to be considered to complete this work in the future.

IMPLEMENTATION CONSIDERATIONS:

Requires approval from the City.

VALUE ENGINEERING PROPOSAL

MB-01

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Defer local work

IMPACT TO PERFORMANCE

Performance Attribute	Definition	Weight	Impact (use Scale)	Score
Schedule (short-term)	Meet 2020 completion	19.05%	5	0.95
Justification	Deferring this work will help meet schedule			
Access (long-term)	Direct connection to TH169 and balance local road congestion	23.81%	0	0.00
Justification				
Maintenance of Traffic (short-term)	Maintain access during construction and minimize impacts on TH169	11.90%	0	0.00
Justification				
Maintainability (long-term)	Minimize long-term costs and ease of maintenance	4.76%	0	0.00
Justification				
Mainline Operations (long-term)	TH169 conflicts and Level of Service	26.19%	0	0.00
Justification				
Local Operations (long-term)	Conflicts and Level of Service	14.29%	-5	-0.71
Justification				
	OVERALL PERFORMANCE SCORE	**100.00%**		**0.24**

SCALE

10 Large increase in performance
5 Small increase in performance
0 No impact to performance
-5 Small negative impact to performance
-10 Large negative impact to performance

VALUE ENGINEERING PROPOSAL
MB-01
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Defer local work						
DESIGN ELEMENT	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Excavation - Common and Subgrade	CY	12,064	7.00	84,451			
Granular Subgrade	CY	9,637	16.00	154,199			
Mainline Pavement	SY	5,922	35.00	207,278			
Driveway Pavement	SY	200	20.00	4,000			
Concrete Walk/ Trail/ Median	SY	2,889	38.00	109,778			
ADA Pedestrian Curb Ramp	EA	2	1,500.00	3,000			
Concrete Curb and Gutter	LF	2,600	16.00	41,600			
Pavement Edge Drains	LF	2,814	10.00	28,139			
Removals - Pavement	SY	7,140	7.50	53,551			
Drainage - Urban	20%			233,550			
Turf Establishment & Erosion Control	10%			116,775			
Landscaping	2%			23,566			
Mainline Signing	MILE		35,000.00	8,617			
Mainline Striping	MILE		5,000.00	1,231			
Non Quantified Minor Items	LS	1		200,000			
Traffic Control	LS	1		35,000			
Right-of-way Acquisitions	AC	4.5125	300,000.00	1,353,750			
Total				**2,658,000**			
						CWE (BASELINE LESS PROPOSED)	**2,658,000**

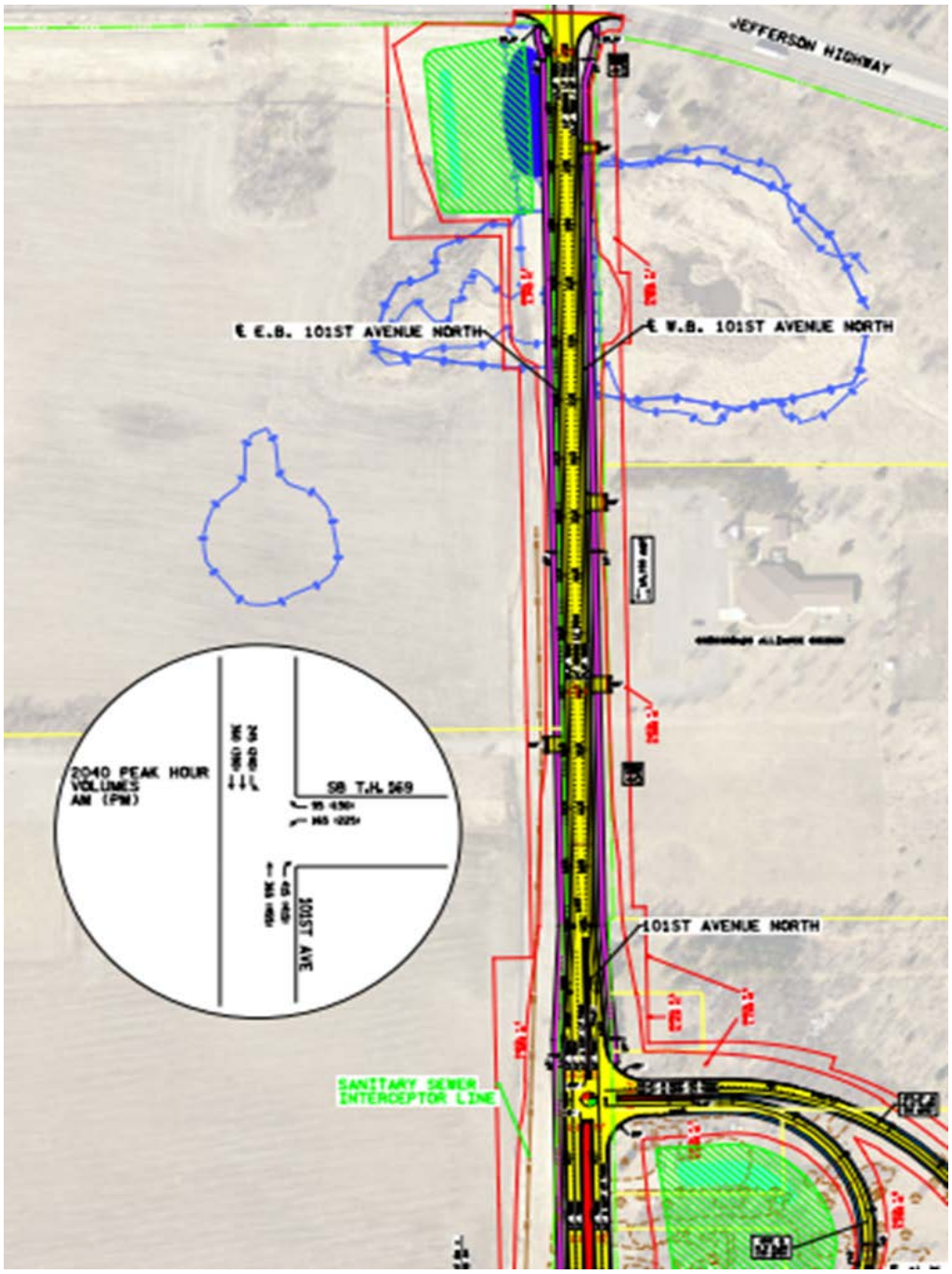
Note: Total costs are rounded to the nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL
MB-01
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Defer local work

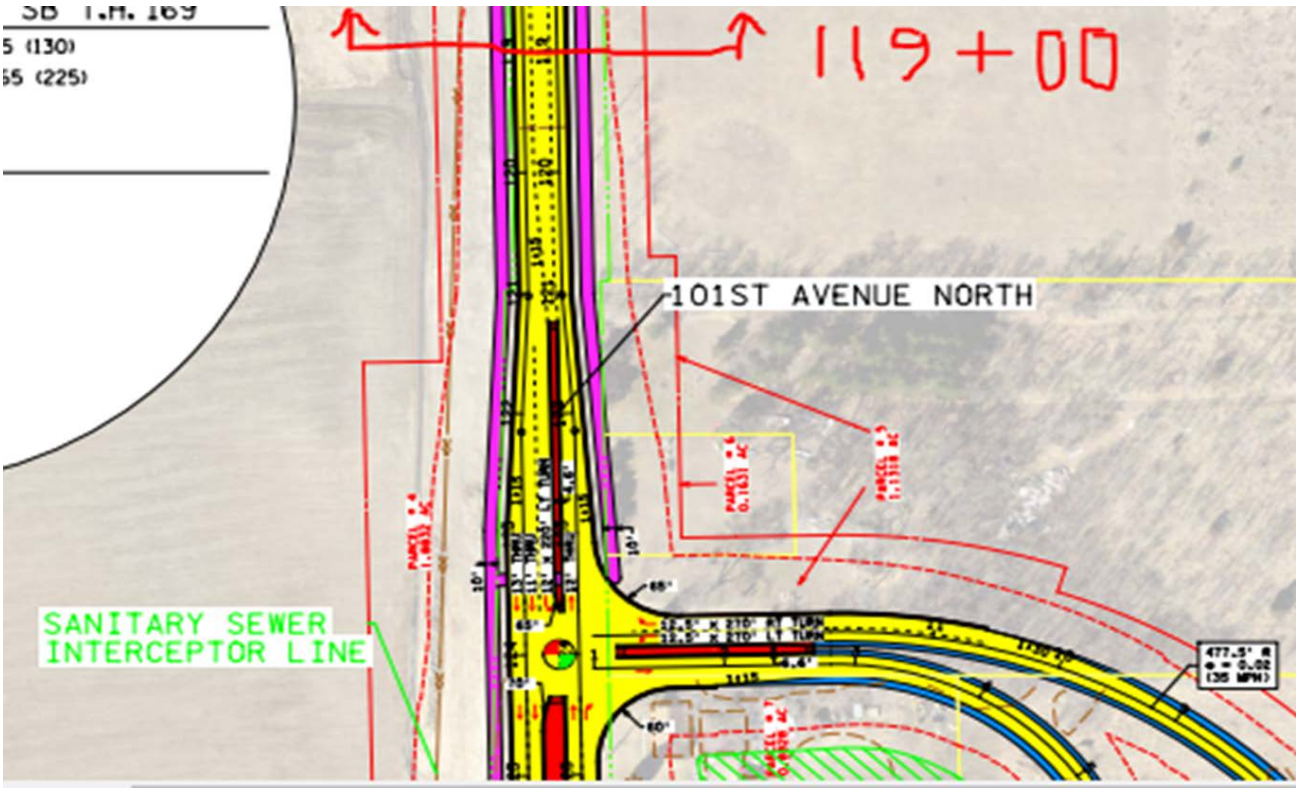
SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL
MB-01
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Defer local work

SKETCH OF PROPOSED ALTERNATIVE



MISCELLANEOUS

VALUE ENGINEERING PROPOSAL

M-03

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Defer the path to the future
FUNCTION:	**Miscellaneous**

BASELINE ASSUMPTION:

The base condition includes a continuous trail on the south side of 101st Avenue and a discontinuous trail on the north side.

PROPOSED ALTERNATIVE:

Do not build the trail on north side of 101st Avenue.

BENEFITS	RISKS/CHALLENGES
• Defers cost	• Future land development may dictate larger facilities than provided for in current design
• Facilities can be added later	•
• Avoids building and maintaining trails until the area is developed	•
•	•
•	•
•	•
•	•

OVERALL PERFORMANCE SCORE **1.19**

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 49,000	$ -	$ 49,000
PROPOSED ALTERNATIVE:	$ -	$ -	$ -
TOTAL (Baseline less Proposed)	$ 49,000	$ -	**$ 49,000**
			SAVINGS

VALUE ENGINEERING PROPOSAL

M-03

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Defer the path to the future

DISCUSSION/JUSTIFICATION:

The base condition provides a continuous trail on the south side of 101st Avenue and a discontinuous trail on the north side.

The Value Engineering Study Team proposes that only the continuous trail on the south side be constructed with the project. Once the area develops additional facilities consistent with the land use, the trail can be added.

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL

M-03

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Defer the path to the future

IMPACT TO PERFORMANCE

Performance Attribute	Definition	Weight	Impact (use Scale)	Score
Schedule (short-term)	Meet 2020 completion	19.05%	5	0.95
Justification	Less to build			
Access (long-term)	Direct connection to TH169 and balance local road congestion	23.81%	0	0.00
Justification				
Maintenance of Traffic (short-term)	Maintain access during construction and minimize impacts on TH169	11.90%	0	0.00
Justification				
Maintainability (long-term)	Minimize long-term costs and ease of maintenance	4.76%	5	0.24
Justification	Avoids maintaining additional trail			
Mainline Operations (long-term)	TH169 conflicts and Level of Service	26.19%	0	0.00
Justification				
Local Operations (long-term)	Conflicts and Level of Service	14.29%	0	0.00
Justification	Can be added when appropriate			
	OVERALL PERFORMANCE SCORE	**100.00%**		**1.19**

SCALE

10 Large increase in performance
5 Small increase in performance
0 No impact to performance
-5 Small negative impact to performance
-10 Large negative impact to performance

VALUE ENGINEERING PROPOSAL
M-03
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Defer the path to the future						
DESIGN ELEMENT	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
ADA Pedestrian Curb Ramp	EA	5	1,500.00	7,500			
Concrete Walk/Trail/ Median	SY	1,100	38.00	41,800			
Total				**49,000**			
						CWE (BASELINE LESS PROPOSED)	**49,000**

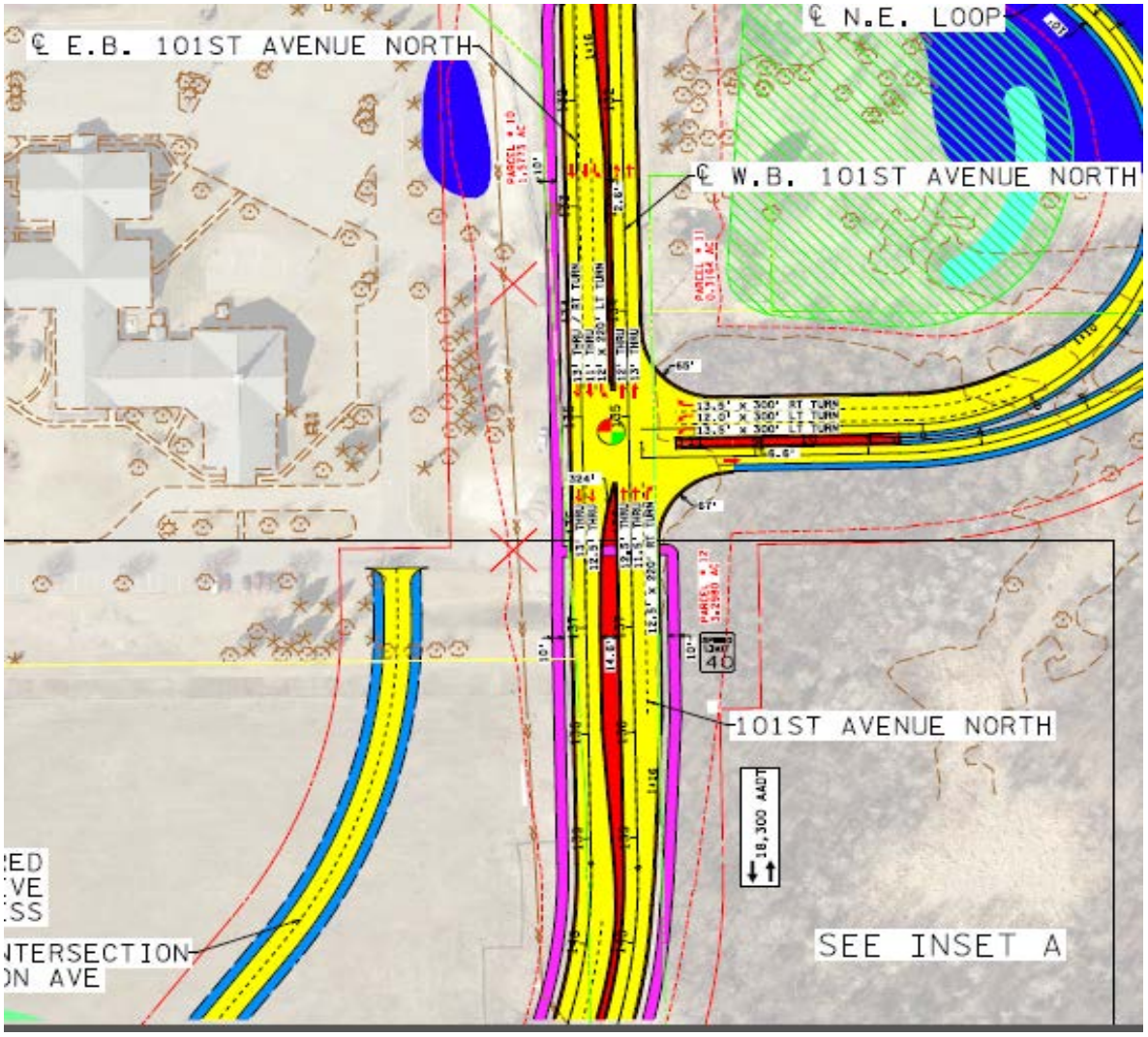
Note: Total costs are rounded to the nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL
M-03
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Defer the path to the future

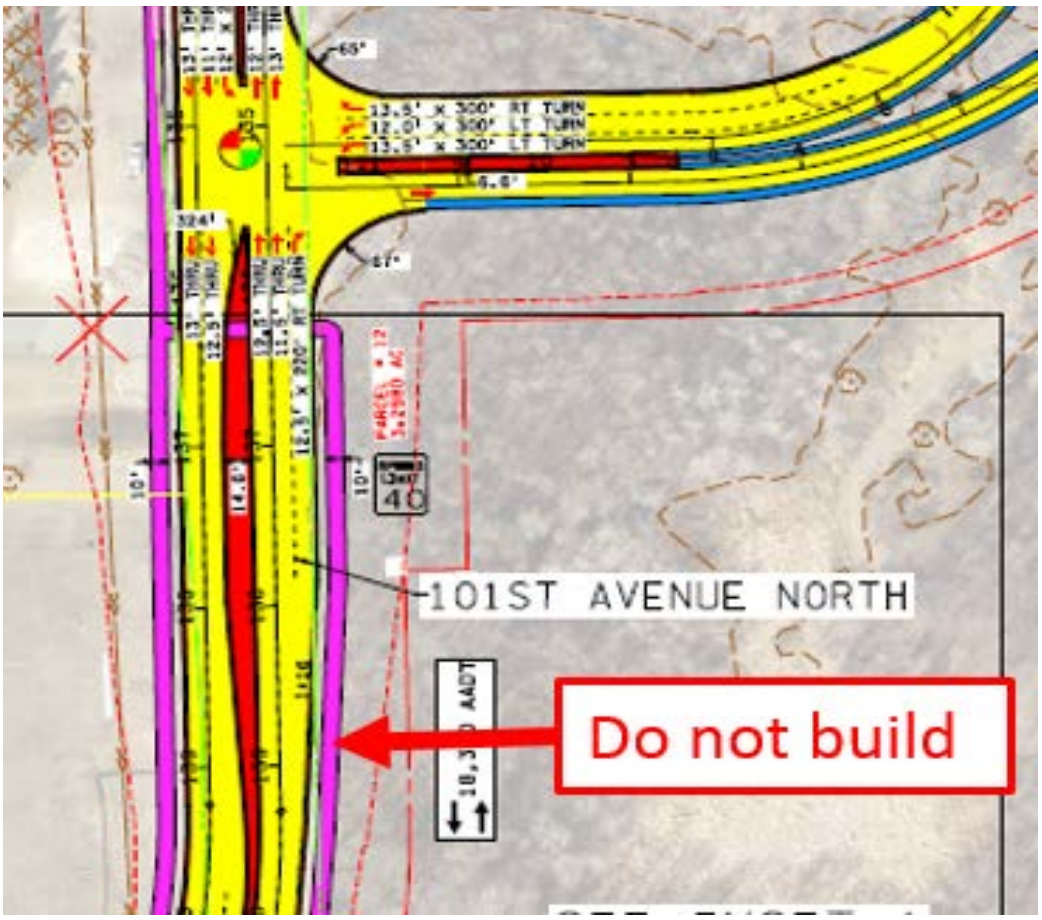
SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL
M-03
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Defer the path to the future

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL

M-04

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Delete the escape lane at southbound TH169
FUNCTION:	**Miscellaneous**

BASELINE ASSUMPTION:

The current layout shows an escape lane for TH169 southbound from approximately stations 128+00 to 134+75.

PROPOSED ALTERNATIVE:

Remove escape lane from the scope of work and revise construction impacts for southbound ending at approximately station 135+60.

BENEFITS	RISKS/CHALLENGES
• Reduces TH169 southbound construction limits	• None apparent
•	•
•	•
•	•
•	•
•	•
•	•

OVERALL PERFORMANCE SCORE **1.31**

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 59,000	$ -	$ 59,000
PROPOSED ALTERNATIVE:	$ -	$ -	$ -
TOTAL (Baseline less Proposed)	$ 59,000	$ -	**$ 59,000**
			SAVINGS

VALUE ENGINEERING PROPOSAL

M-04

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Delete the escape lane at southbound TH169

DISCUSSION/JUSTIFICATION:

The original purpose of the escape lane was thought to help with reducing weaving patterns; however, the lanes are not functioning as intended. They are being used as an opportunity for last minute acceleration. Based on discussion with MnDOT staff, this added escape lane would no longer be included to the scope of this work and should be removed from consideration.

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL

M-04

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Delete the escape lane at southbound TH169

IMPACT TO PERFORMANCE

Performance Attribute	Definition	Weight	Impact (use Scale)	Score
Schedule (short-term)	Meet 2020 completion	19.05%	0	0.00
Justification				
Access (long-term)	Direct connection to TH169 and balance local road congestion	23.81%	0	0.00
Justification				
Maintenance of Traffic (short-term)	Maintain access during construction and minimize impacts on TH169	11.90%	0	0.00
Justification				
Maintainability (long-term)	Minimize long-term costs and ease of maintenance	4.76%	0	0.00
Justification				
Mainline Operations (long-term)	TH169 conflicts and Level of Service	26.19%	5	1.31
Justification	Reduces the opportunity for people to use the escape lane as an acceleration lane thus reducing potential conflicts			
Local Operations (long-term)	Conflicts and Level of Service	14.29%	0	0.00
Justification				
	OVERALL PERFORMANCE SCORE	**100.00%**		**1.31**

SCALE

10 Large increase in performance
5 Small increase in performance
0 No impact to performance
-5 Small negative impact to performance
-10 Large negative impact to performance

VALUE ENGINEERING PROPOSAL
M-04
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Delete the escape lane at southbound TH169						
DESIGN ELEMENT	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Removals - pavement	SY	1,173	7.50	8,800			
Granular subgrade	CY	244	16.00	3,911			
Mainline pavement	SY	880	35.00	30,800			
Mainline shoulder pavement	SY	440	35.00	15,400			
Total				**59,000**			
						CWE (BASELINE LESS PROPOSED)	**59,000**

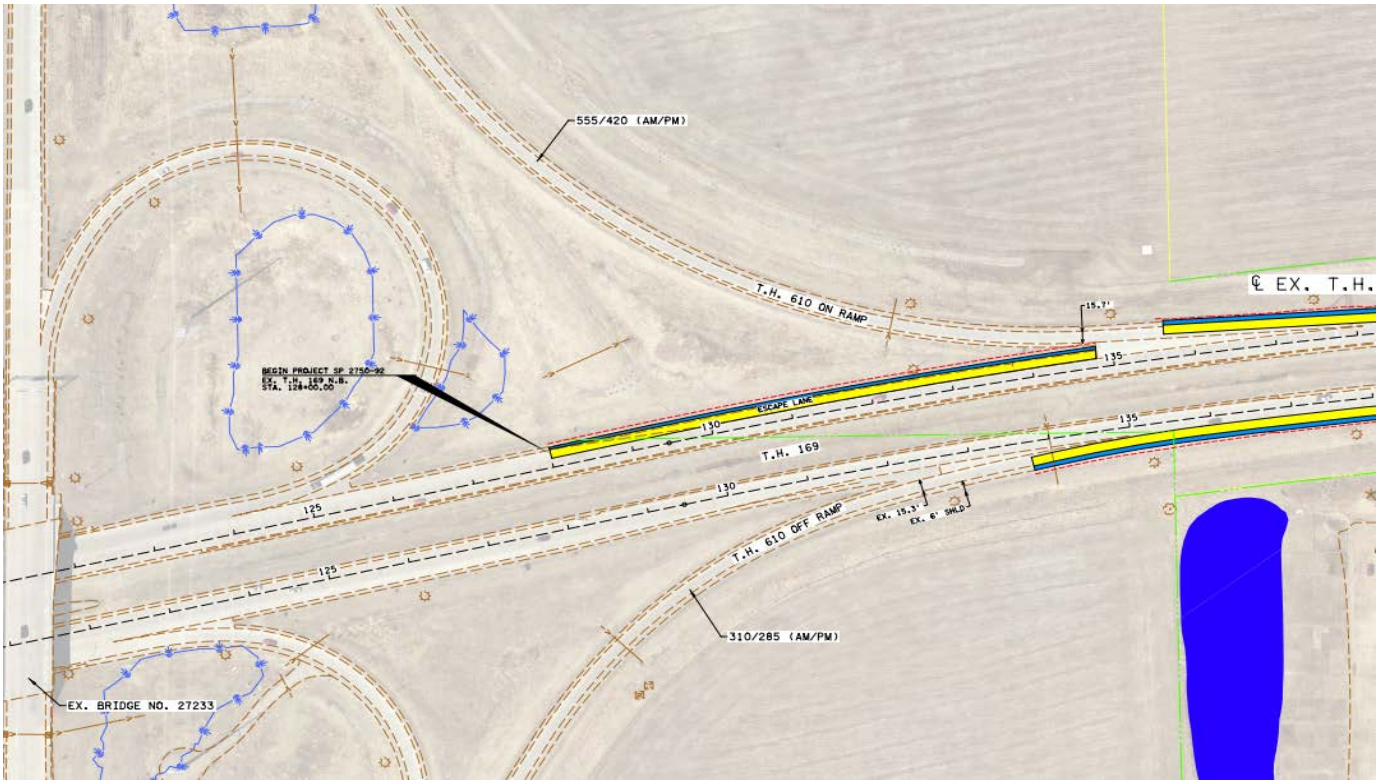
Note: Total costs are rounded to the nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL
M-04
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Delete the escape lane at southbound TH169

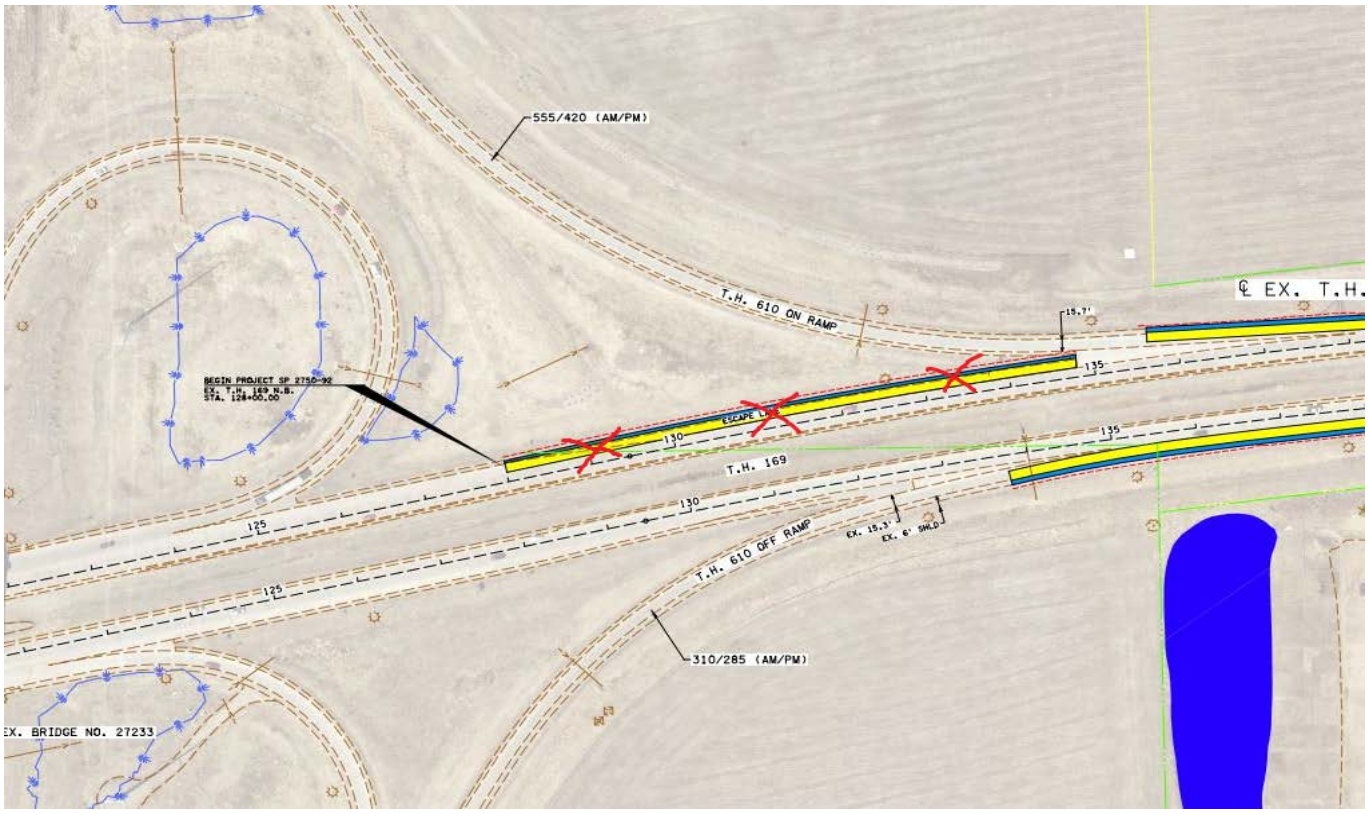
SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL
M-04
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Delete the escape lane at southbound TH169

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL

M-05

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Reduce lane width from 13.5 ft./14 ft./13.5 ft. to 12.5 ft./12 ft. /12.5 ft.
FUNCTION:	**Miscellaneous**

BASELINE ASSUMPTION:

On the west side of 101st Avenue, the typical section for this design is 13.5-foot through lanes (with gutter) and a 14-foot center left-turn lane.

PROPOSED ALTERNATIVE:

On the west side of 101st Avenue, this proposal changes the typical section to 12.5-foot through lanes (with gutter) and a 12-foot center left-turn lane.

BENEFITS	RISKS/CHALLENGES
• Decreases overall roadway footprint	• None apparent
• Increases separation from utilities along the south side of 101st Avenue	•
• Helps mitigate risks of utility conflicts on the south side of 101st Avenue	•
• Reduces right-of-way	•
•	•
•	•
•	•

OVERALL PERFORMANCE SCORE **1.19**

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 3,813,000	$ -	$ 3,813,000
PROPOSED ALTERNATIVE:	$ 3,742,000	$ -	$ 3,742,000
TOTAL (Baseline less Proposed)	$ 71,000	$ -	**$ 71,000**
			SAVINGS

VALUE ENGINEERING PROPOSAL

M-05

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Reduce lane width from 13.5 ft./14 ft./13.5 ft. to 12.5 ft./12 ft. /12.5 ft.

DISCUSSION/JUSTIFICATION:

Reducing lane widths in general will decrease construction costs and construction schedule, since there is less to construct. It will also decrease long-term maintenance, since there is less infrastructure to maintain.

101st Avenue is a State-Aid Roadway, which allows the MN Statute 8820 to apply to this design change. 101st Avenue is projected to have greater than 10,000 ADT and a design speed of 40MPH; therefore, 11-foot through lanes with an 1.5-foot curb reaction is appropriate for this facility.

8820.9936 MINIMUM DESIGN STANDARDS, URBAN; NEW OR RECONSTRUCTION PROJECTS.

New or reconstruction projects for urban roadways without a designated on-road bicycle facility must meet or exceed the minimum dimensions indicated in the following design chart.

Projected Traffic Volume	Design Speed	Lane Width (a)	Curb Reaction Distance (c)	Parking Lane Width (e)
	mph	feet	feet	feet
ADT < 10,000	30-45	(b) 10-11	1-2 (d)	7-8
	50 or over	11-12	2	8-10
ADT ≥ 10,000	30-35	(b) 10-11	1-2 (d)	7-10
	40-45	11-12	1-4	7-10
	50 or over	11-12	2-4	Not allowed

MN Statute 8820, does not address the required width of a two-way center left-turn lane. Guidance from MnDOT for this type of facility recommends one foot wider then the through lane; 12-foot in relationship to this project.

This proposal also helps mitigate the risk of utility conflicts on the south side of 101st Avenue.

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL

M-05

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Reduce lane width from 13.5 ft./14 ft./13.5 ft. to 12.5 ft./12 ft. /12.5 ft.

IMPACT TO PERFORMANCE

Performance Attribute	Definition	Weight	Impact (use Scale)	Score
Schedule (short-term)	Meet 2020 completion	19.05%	5	0.95
Justification	Less roadway footprint results in less time to construct			
Access (long-term)	Direct connection to TH169 and balance local road congestion	23.81%	0	0.00
Justification				
Maintenance of Traffic (short-term)	Maintain access during construction and minimize impacts on TH169	11.90%	0	0.00
Justification				
Maintainability (long-term)	Minimize long-term costs and ease of maintenance	4.76%	5	0.24
Justification	Less roadway footprint results in less to maintain in the future			
Mainline Operations (long-term)	TH169 conflicts and Level of Service	26.19%	0	0.00
Justification				
Local Operations (long-term)	Conflicts and Level of Service	14.29%	0	0.00
Justification				
	OVERALL PERFORMANCE SCORE	**100.00%**		**1.19**

SCALE

10 Large increase in performance
5 Small increase in performance
0 No impact to performance
-5 Small negative impact to performance
-10 Large negative impact to performance

VALUE ENGINEERING PROPOSAL
M-05
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Reduce lane width from 13.5 ft./14 ft./13.5 ft. to 12.5 ft./12 ft. /12.5 ft.						
DESIGN ELEMENT	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Excavation - Common & Subgrade	CY	83,900	7.00	587,300	83,620	7.00	585,340
Granular Subgrade (CV)	CY	67,100	16.00	1,073,600	66,980	16.00	1,071,680
Mainline Pavement	SY	22,903	35.00	801,605	22,203	35.00	777,105
Right-of-way	AC	4.5	300,000.00	1,350,000	4.36	300,000.00	1,308,000
Total				**3,813,000**			**3,742,000**
						CWE (BASELINE LESS PROPOSED)	**71,000**

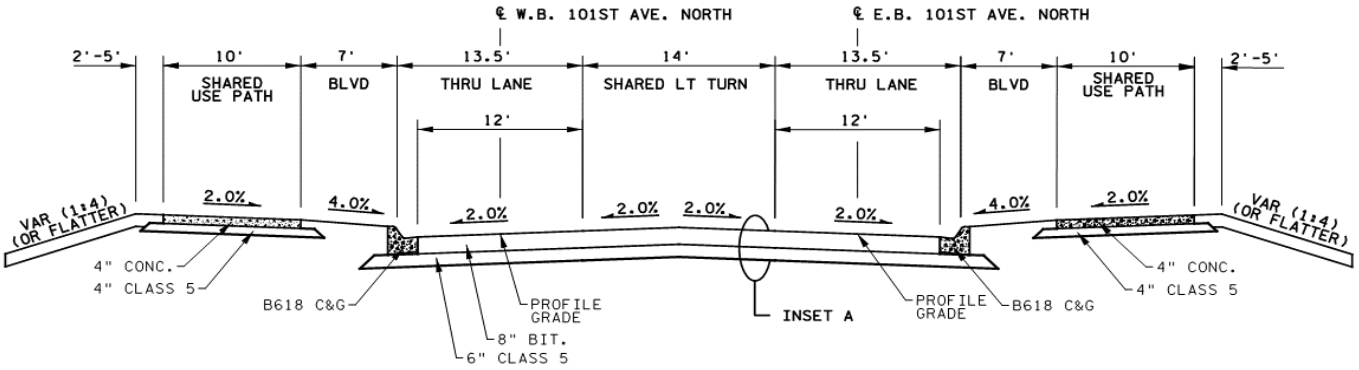
Note: Total costs are rounded to the nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL
M-05
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Reduce lane width from 13.5 ft./14 ft./13.5 ft. to 12.5 ft./12 ft. /12.5 ft.

SKETCH OF BASELINE ASSUMPTION



DESIGN SPEED = 40 MPH

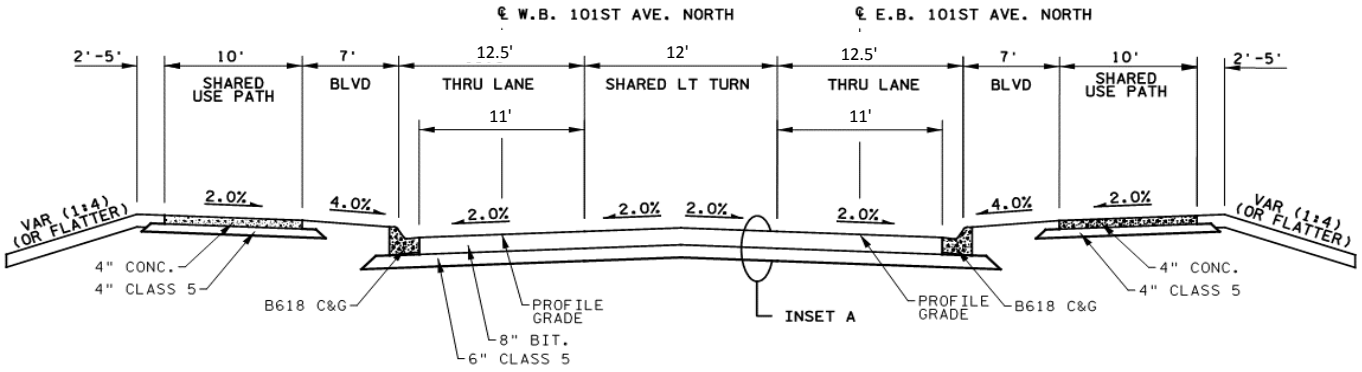
101ST AVE. NORTH: 3 LANE URBAN

STA. 105+33.06 WB/EB TO STA. 121+23.64 EB (101ST)

VALUE ENGINEERING PROPOSAL
M-05
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Reduce lane width from 13.5 ft./14 ft./13.5 ft. to 12.5 ft./12 ft. /12.5 ft.

SKETCH OF PROPOSED ALTERNATIVE



DESIGN SPEED = 40 MPH

101ST AVE. NORTH: 3 LANE URBAN

STA. 105+33.06 WB/EB TO STA. 121+23.64 EB (101ST)

MEET SCHEDULE

(DESIGN SUGGESTIONS)

VALUE ENGINEERING PROPOSAL

MS-03DS

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Use A+B contracting strategy
FUNCTION:	**Meet Schedule**

BASELINE ASSUMPTION:

The current approach is to use a standard design-bid-build contracting method.

PROPOSED ALTERNATIVE:

The proposal suggest using an A+B contracting method.

BENEFITS	RISKS/CHALLENGES
• Improves the schedule	• Requires quick responses from construction management to not delay the contractor
• May increase the number of bidders	•
• Reduces impact to the travelling public	•
•	•
•	•
•	•
•	•

OVERALL PERFORMANCE SCORE **2.50**

DESIGN SUGGESTION

VALUE ENGINEERING PROPOSAL

MS-03DS

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Use A+B contracting strategy

DISCUSSION/JUSTIFICATION:

The City of Brooklyn Park is on a fast-track to complete the project in conjunction with the current development on 101st Avenue. Although the City believes that the current approach to design and construction will ensure that the project is done by the Summer of 2020, this assumes a best-case scenario, which may be a challenge. In order to help reduce the potential challenges that may occur during construction, an A+B contracting approach would help to reduce the potential risks and help to ensure that the desired schedule can be met.

The A+B method would have the contractor bid the project, similar to a design-bid-build but also provide a schedule, number of days for construction. The City would need to assign a dollar amount for each day and that number would be added to the bid amount for a total bid amount. The contract would be written to show the number of days approved as the contract time.

The City and/or MnDOT, depending on who will be managing the construction contract, will need to be aware that responsiveness to RFIs. Submittal reviews and responses to issues and conflicts will need to be responded to in a timely manner. This may mean that responses may be needed in less time than normally specified. This will need to be reflected in the contract specifications to ensure the contractors are comfortable with how these will be managed to ensure their schedule is not negatively impacted.

One other approach when using alternative contracting methods is to introduce Partnering to the contract to help the team meet at the very beginning of the project to develop a team approach to accomplishing the project including behaviors, project goals and an issue resolution plan. This will help the team to stay on track with their working relationship and the project goals.

IMPLEMENTATION CONSIDERATIONS:

Project documents would need to reflect the change to the contracting method.

VALUE ENGINEERING PROPOSAL
MS-03DS
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Use A+B contracting strategy

IMPACT TO PERFORMANCE

Performance Attribute	Definition	Weight	Impact (use Scale)	Score
Schedule (short-term)	Meet 2020 completion	19.05%	10	1.91
Justification	Would help to speed up the schedule or at a minimum help to maintain the schedule			
Access (long-term)	Direct connection to TH169 and balance local road congestion	23.81%	0	0.00
Justification				
Maintenance of Traffic (short-term)	Maintain access during construction and minimize impacts on TH169	11.90%	5	0.60
Justification	Takes advantage of the contractor's ability to speed up construction			
Maintainability (long-term)	Minimize long-term costs and ease of maintenance	4.76%	0	0.00
Justification				
Mainline Operations (long-term)	TH169 conflicts and Level of Service	26.19%	0	0.00
Justification				
Local Operations (long-term)	Conflicts and Level of Service	14.29%	0	0.00
Justification				
	OVERALL PERFORMANCE SCORE	**100.00%**		**2.50**

SCALE

10 Large increase in performance
5 Small increase in performance
0 No impact to performance
-5 Small negative impact to performance
-10 Large negative impact to performance

VALUE ENGINEERING PROPOSAL

MS-06DS

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Procure a separate utility package ahead of the main project
FUNCTION:	**Meet Schedule**

BASELINE ASSUMPTION:

If this project can be let in the summer of 2019, the City is confident the project can be completed by the end of the 2020 construction season.

PROPOSED ALTERNATIVE:

Consider procuring a separate utility contract to expedite the relocation of several utilities that are known to be in conflict ahead of the main project.

BENEFITS	RISKS/CHALLENGES
● Reduces risk related to meeting project schedule	● Changes to proposed layout may create additional conflicts
● Allows the contractor to be confident in proposed schedule	● Changes to proposed layout may eliminate the need to remove the conflict
● May result in lower bids	●
●	●
●	●
●	●
●	●

OVERALL PERFORMANCE SCORE **0.95**

DESIGN SUGGESTION

VALUE ENGINEERING PROPOSAL

MS-06DS

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Procure a separate utility package ahead of the main project

DISCUSSION/JUSTIFICATION:

Procuring a separate utility contract may reduce the risk associated with possible utility relocation delays. Many projects see large delays due to utility conflicts from utilities that are not known and as-builts which are not correct. An early package would allow the utility work to begin earlier than the rest of the project. A smaller package may also encourage smaller DBE/SBE firms to be able to bid on this work. Once the utility work is complete, this may also encourage more competitive bids because the risk of the unknowns will have been reduced. The designer would need to focus their efforts on the utility package and potentially get the utility companies to move ahead with their design earlier than usual to allow the package to be bid earlier.

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL

MS-06DS

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Procure a separate utility package ahead of the main project

IMPACT TO PERFORMANCE

Performance Attribute	Definition	Weight	Impact (use Scale)	Score
Schedule (short-term)	Meet 2020 completion	19.05%	5	0.95
Justification	Reduces the risk of not meeting the schedule			
Access (long-term)	Direct connection to TH169 and balance local road congestion	23.81%	0	0.00
Justification				
Maintenance of Traffic (short-term)	Maintain access during construction and minimize impacts on TH169	11.90%	0	0.00
Justification				
Maintainability (long-term)	Minimize long-term costs and ease of maintenance	4.76%	0	0.00
Justification				
Mainline Operations (long-term)	TH169 conflicts and Level of Service	26.19%	0	0.00
Justification				
Local Operations (long-term)	Conflicts and Level of Service	14.29%	0	0.00
Justification				
	OVERALL PERFORMANCE SCORE	**100.00%**		**0.95**

SCALE

10 Large increase in performance
5 Small increase in performance
0 No impact to performance
-5 Small negative impact to performance
-10 Large negative impact to performance

ALTERNATIVES NOT RECOMMENDED BY THE VE STUDY TEAM

VALUE ENGINEERING PROPOSAL

FM-09

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Relocate the interchange to Oxbow Creek Drive
FUNCTION:	**Facilitate Movement**

BASELINE ASSUMPTION:

The City of Brooklyn Park is proposing a folded diamond interchange on the north half of the intersection of TH169 and 101st. Avenue.

PROPOSED ALTERNATIVE:

The proposal considered was to move the interchange and construct a folded diamond interchange to the north of Oxbow Creek Drive. The interchange would need to be an inverted version of the proposed folded diamond as proposed at 101st Avenue because of the building in the southwest quadrant.

After further consideration, the Value Engineering Study Team does not recommend this Value Engineering Proposal; it is fatally flawed.

BENEFITS	RISKS/CHALLENGES
• Allows more distance for weaving between traffic entering southbound TH169 and exiting southbound TH169 to westbound TH610	• Requires an additional bridge at 101st Avenue
•	• Would be too close to 109th Avenue
•	• New building in the southeast quadrant of TH169 and Oxbow Creek Drive requires the inverse of baseline folded diamond
•	•
•	•
•	•
•	•

FATALLY FLAWED

VALUE ENGINEERING PROPOSAL

FM-09

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Relocate the interchange to Oxbow Creek Drive

DISCUSSION/JUSTIFICATION:

This proposal is fatally flawed for the following reasons:

1. This proposal would require two bridges. One at the interchange and one cross over bridge at 101st Avenue. The cost of the second bridge would add too much additional cost to the project.

2. The proposed interchange is too close to 109th Avenue and the cost for the bridge that will still be needed at 101st Ave.

IMPLEMENTATION CONSIDERATIONS:

Not recommended.

VALUE ENGINEERING PROPOSAL
FM-09
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Relocate the interchange to Oxbow Creek Drive

SKETCH OF PROPOSED ALTERNATIVE

VALUE ENGINEERING PROPOSAL

PR-01

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Use retaining walls in lieu of slopes on the south side within the interchange for both quadrants to reduce right-of-way needs
FUNCTION:	**Purchase Right-of-way**

BASELINE ASSUMPTION:

Current design has standard 4 to 1 slopes graded out to touch down point which runs out over underground MCES 54" sewer line.

PROPOSED ALTERNATIVE:

This proposal is to use retaining walls to reduce grading limits over the MCES line along the south side of 101st Avenue.

After further consideration, the Value Engineering Study Team does not recommend this Value Engineering Proposal.

BENEFITS	RISKS/CHALLENGES
• Reduces amount of fill needed	• Adds structure to maintain
• Avoids material placed over the MCES utility line	•
• Helps avoid existing overhead utilities near the interchange	•
•	•
•	•
•	•
•	•

OVERALL PERFORMANCE SCORE **0.00**

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 2,162,000	$ -	$ 2,162,000
PROPOSED ALTERNATIVE:	$ 2,370,000	$ -	$ 2,370,000
TOTAL (Baseline less Proposed)	$ (208,000)	$ -	**$ (208,000)**
			COST

VALUE ENGINEERING PROPOSAL

PR-01

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Use retaining walls in lieu of slopes on the south side within the interchange for both quadrants to reduce right-of-way needs

DISCUSSION/JUSTIFICATION:

There is not currently any retaining wall on the project. Assumed 200 feet long on both the east and west of the bridge along the south side of 101st Avenue.

There is an existing MCES sanitary sewer line that must not be adversely impacted with added fill over the pipe. A retaining wall of approximately three feet (exposed) high will pull the slope back sufficiently to avoid filling any material over the sewer.

There will be a savings in embankment of material also. this was calculated by looking at a cross section and using average end areas to calculate a volume of decreased common embankment at $14 per yard.

IMPLEMENTATION CONSIDERATIONS:

Would require adding retaining wall to the contract.

VALUE ENGINEERING PROPOSAL

PR-01

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Use retaining walls in lieu of slopes on the south side within the interchange for both quadrants to reduce right-of-way needs

IMPACT TO PERFORMANCE

Performance Attribute	Definition	Weight	Impact (use Scale)	Score
Schedule (short-term)	Meet 2020 completion	19.05%	0	0.00
Justification				
Access (long-term)	Direct connection to TH169 and balance local road congestion	23.81%	0	0.00
Justification				
Maintenance of Traffic (short-term)	Maintain access during construction and minimize impacts on TH169	11.90%	0	0.00
Justification				
Maintainability (long-term)	Minimize long-term costs and ease of maintenance	4.76%	0	0.00
Justification				
Mainline Operations (long-term)	TH169 conflicts and Level of Service	26.19%	0	0.00
Justification				
Local Operations (long-term)	Conflicts and Level of Service	14.29%	0	0.00
Justification				
	OVERALL PERFORMANCE SCORE	**100.00%**		**0.00**

SCALE

10 Large increase in performance
5 Small increase in performance
0 No impact to performance
-5 Small negative impact to performance
-10 Large negative impact to performance

VALUE ENGINEERING PROPOSAL
PR-01
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Use retaining walls in lieu of slopes on the south side within the interchange for both quadrants to reduce right-of-way needs						
DESIGN ELEMENT	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Retaining Wall	SF		100.00		2,400	100.00	240,000
Embankment	CY	132,973	14.00	1,861,622	132,840	14.00	1,859,760
Right-of-way	AC	1.00	300,000.00	300,000	0.90	300,000.00	270,000
Total				**2,162,000**			**2,370,000**
						CWE (BASELINE LESS PROPOSED)	**(208,000)**

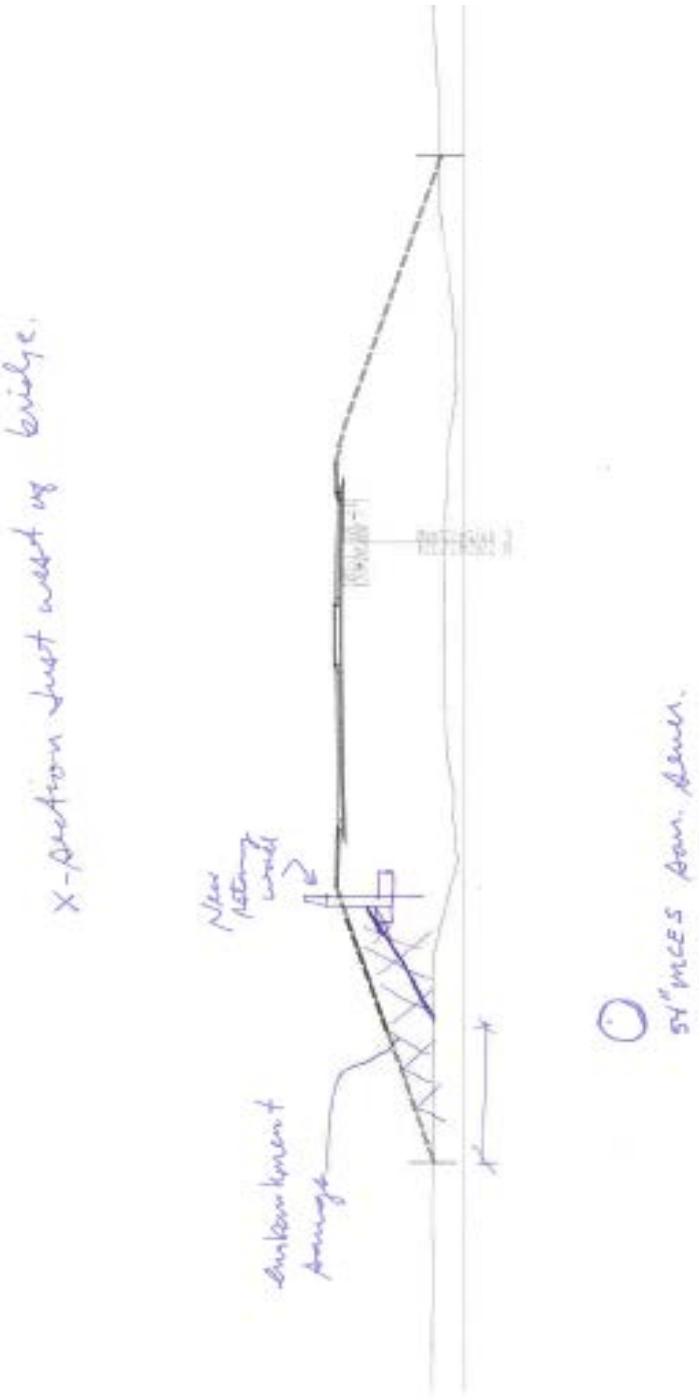
Note: Total costs are rounded to the nearest thousand dollars.

COST

VALUE ENGINEERING PROPOSAL
PR-01
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Use retaining walls in lieu of slopes on the south side within the interchange for both quadrants to reduce right-of-way needs

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL

M-01

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Separate southbound vehicles going to TH610 in a Collector Distributor (CD) lane
FUNCTION:	**Miscellaneous**

BASELINE ASSUMPTION:

The current layout shows the NW Loop entering a ~ 1500 ft. auxiliary lane on 169 southbound just north of the 101st Avenue interchange at station 150+00.

PROPOSED ALTERNATIVE:

Create a southbound collector distributor (CD) lane to separate southbound TH169 traffic destined for TH610 westbound from mainline traffic.

After further consideration, the Value Engineering Study Team does not recommend this Value Engineering Proposal.

BENEFITS	RISKS/CHALLENGES
• Reduces the number of vehicles weaving south of 101st Avenue interchange	• None apparent
• Traffic is able to enter traffic to accelerate and merge onto TH169 southbound	•
•	•
•	•
•	•
•	•
•	•

OVERALL PERFORMANCE SCORE **1.31**

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ -	$ -	$ -
PROPOSED ALTERNATIVE:	$ 324,000	$ -	$ 324,000
TOTAL (Baseline less Proposed)	$ (324,000)	$ -	**$ (324,000)**
			COST

VALUE ENGINEERING PROPOSAL

M-01

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Separate southbound vehicles going to TH610 in a Collector Distributor (CD) lane

DISCUSSION/JUSTIFICATION:

Creating a southbound Collector Distributor (CD) lane will improve operations of the short weave (1200 feet nose-to-nose) area available south of the 101st Avenue interchange by making southbound TH169 traffic destined for TH610 westbound enter the CD lane north of the future interchange. This work includes the addition of a raised concrete median from approximately 500 feet north of the exit for the northwest ramp. Adding the median to the outside of the existing southbound lanes will push the baseline auxiliary lane further to the west resulting in some additional removal, subgrade, median shoulder and roadway pavement.

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL

M-01

Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Separate southbound vehicles going to TH610 in a Collector Distributor (CD) lane

IMPACT TO PERFORMANCE

Performance Attribute	Definition	Weight	Impact (use Scale)	Score
Schedule (short-term)	Meet 2020 completion	19.05%	0	0.00
Justification				
Access (long-term)	Direct connection to TH169 and balance local road congestion	23.81%	0	0.00
Justification				
Maintenance of Traffic (short-term)	Maintain access during construction and minimize impacts on TH169	11.90%	0	0.00
Justification				
Maintainability (long-term)	Minimize long-term costs and ease of maintenance	4.76%	0	0.00
Justification				
Mainline Operations (long-term)	TH169 conflicts and Level of Service	26.19%	5	1.31
Justification	Separates weave from through traffic			
Local Operations (long-term)	Conflicts and Level of Service	14.29%	0	0.00
Justification				
	OVERALL PERFORMANCE SCORE	**100.00%**		**1.31**

SCALE

10 Large increase in performance
5 Small increase in performance
0 No impact to performance
-5 Small negative impact to performance
-10 Large negative impact to performance

VALUE ENGINEERING PROPOSAL
M-01
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Separate southbound vehicles going to TH610 in a Collector Distributor (CD) lane						
DESIGN ELEMENT	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Removals - Pavement	SY				2,777.78	7.50	20,833
Concrete Curb and Gutter	LF				5,000.00	16.00	80,000
Granular Subgrade	CY				195.56	16.00	3,129
Mainline Pavement	SY				3,333.33	35.00	116,667
Mainline Shoulder Pavement	SY				1,666.67	35.00	58,333
Common Borrow	CY				185.19	14.00	2,593
Concrete Median	SY				1,111.11	38.00	42,222
Total							**324,000**
						CWE (BASELINE LESS PROPOSED)	**(324,000)**

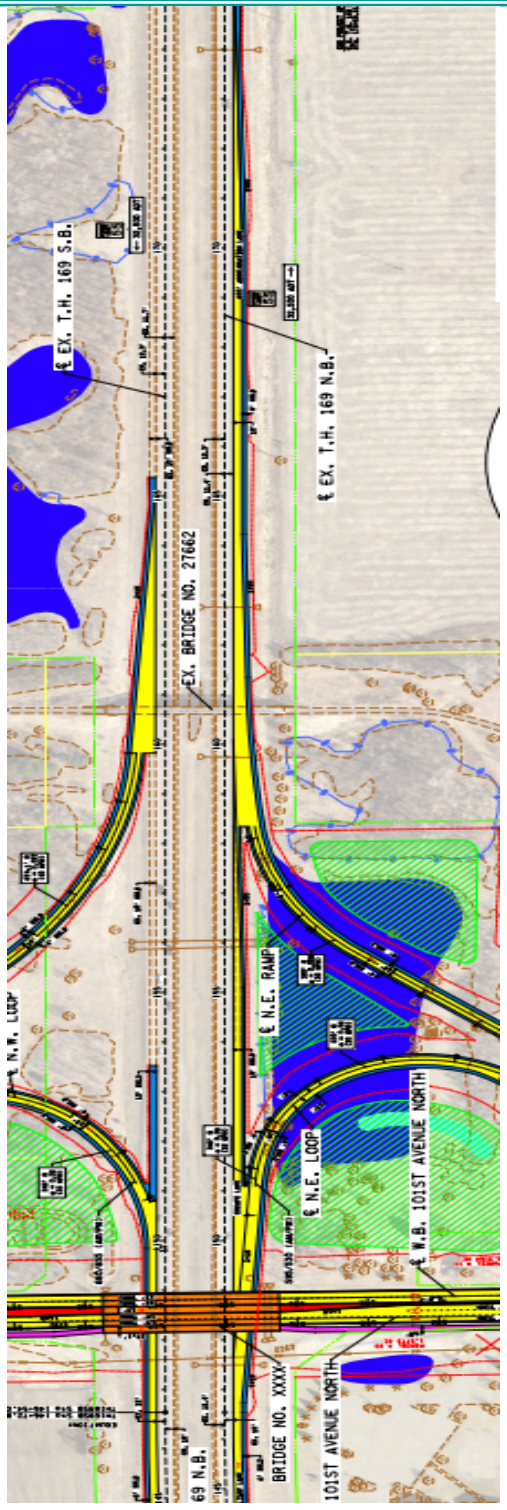
Note: Total costs are rounded to the nearest thousand dollars.

COST

VALUE ENGINEERING PROPOSAL
M-01
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

TITLE:	Separate southbound vehicles going to TH610 in a Collector Distributor (CD) lane

SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL

M-01

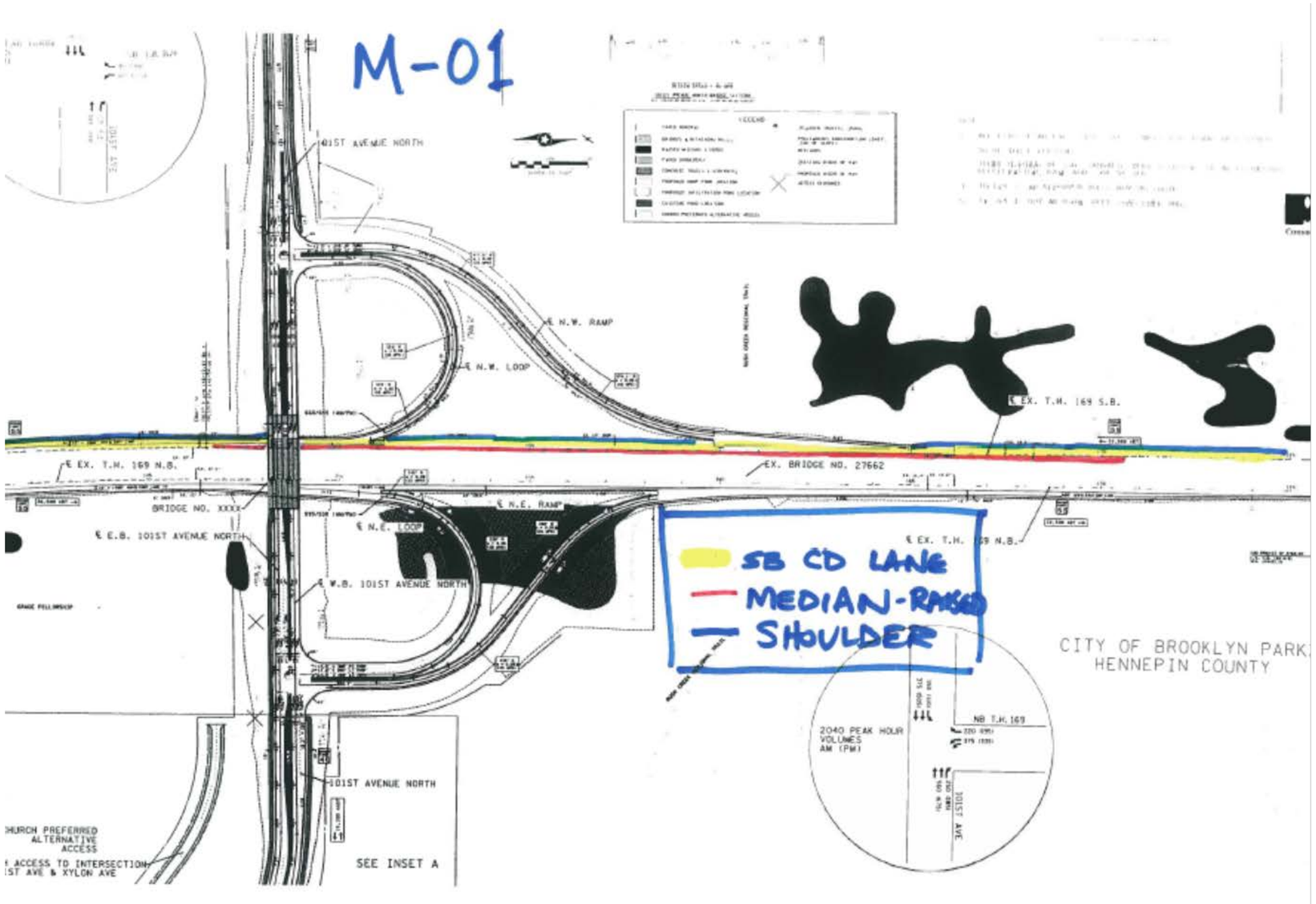
Minnesota Department of Transportation (MnDOT)

TH169 & 101st Avenue Interchange

State Project Number: 2750-92

TITLE:	Separate southbound vehicles going to TH610 in a Collector Distributor (CD) lane

SKETCH OF PROPOSED ALTERNATIVE



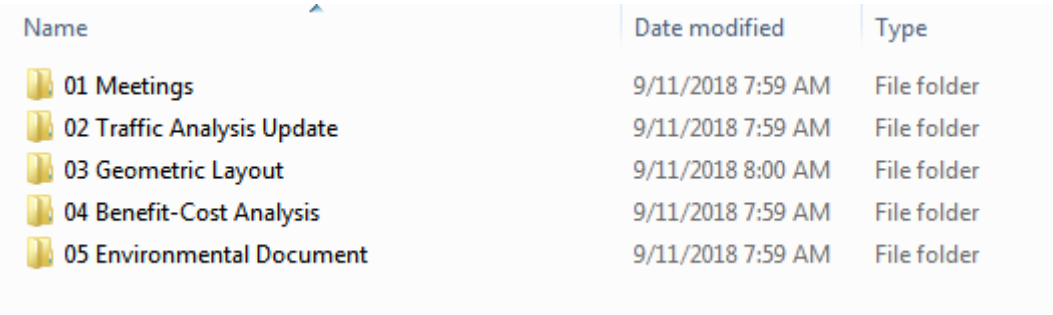
SUPPORT DATA

Value Engineering Study
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number 2750-92

Support Data

Value Engineering Study Documents

The following documents were provided for the VE study prior to the workshop:



Name	Date modified	Type
01 Meetings	9/11/2018 7:59 AM	File folder
02 Traffic Analysis Update	9/11/2018 7:59 AM	File folder
03 Geometric Layout	9/11/2018 8:00 AM	File folder
04 Benefit-Cost Analysis	9/11/2018 7:59 AM	File folder
05 Environmental Document	9/11/2018 7:59 AM	File folder

In addition, the following documents were also provided:

- Layouts, including Preliminary Phasing Layout
- Preliminary Cost Estimate

Project/Workshop Constraints

The decision makers/stakeholders identified the project constraints to the VE team at the start of the VE study. The following are those constraints:

- No impact to the timber bridge over TH169
- Sanitary sewer must stay in place with no impact
- Environmental impacts which delay the project

Value Engineering Study Team Observations

The VE study team identified observations, concerns and opportunities to be addressed during the creative generation of potential ideas and alternatives. The following is a list of the VE study team's observations:

- The site is fairly flat and will require quite a bit of fill which will need to be imported
- There is newly refurbished pavement on a section of TH169
- There is an existing gas line near right-of-way line – northeast, southwest and southeast
- Communication utilities are on the site
- The team could not identify the location of a local water line if there is one on the site
- The City may want to include additional utilities during construction to accommodate future development

- Traffic on 101st Avenue has a very low volume
- Right-of-way has yet to be purchased
- Some of the future improvements are only a proposed approach
- There are still some opportunities where other local routes could be rerouted to accommodate future projects to help to alleviate the congestion concerns
- Not sure why the Oxbow Creek area was not considered further for the interchange, however, there are queuing issues at 109th Avenue
- The existing cloverleaf at TH610 and TH169 have quite a few impacts and may require potential revisions
- Development is a priority to the City and the project and is considered a project driver
- Providing additional access to local operations will not improve the congestion on TH169
- The sewer line is not to be impacted and must be protected in place
- There are no concerns with the availability of fill
- The west leg of 101st Avenue will not see significant development due to the park
- City of Champlin will not agree to anything that increases traffic on 109th Avenue
- There appear to be opportunities to look at some phased approaches with some project elements to help meet the schedule
- Alternative delivery options are available

Value Methodology

The value methodology (Synonyms: value analysis, value engineering and value management) is a function-oriented, systematic, team approach to add customer value to a program, facility, system, or service. Improvements like performance, quality, initial and life cycle cost are paramount in the value methodology. The workshop is conducted in accordance with the methodology as established by SAVE International, the value society, and is structured using the Job Plan as outlined as follows:

- **Pre-Study**
  - Identify team members
  - Define workshop location
  - Review project documentation
  - Prepare for the Value Study (workshop)

- **Value Study (Workshop) Job Plan**
  - *Information Phase*

        - Gather, organize and analyze data,
        - Define costs and cost models,
        - Define the problem/purpose of the study,
        - Define study scope, define project goals and workshop goals
    - *Function Analysis Phase*
        - Define and evaluate functions
        - Define needs versus wants
    - *Creative Phase*
        - What else will perform the functions?
        - Is this function required?
    - *Evaluation Phase*
        - Rank and rate the ideas to select
        - Refine the best ideas for further development
    - *Development Phase*
        - Develop the best ideas into VE Alternatives with support and justification
    - *Presentation/Implementation*
        - VE Team presents results
        - Prepare and issue the report
        - Report implementation ideas

- **Post Study**
    - Implement approved alternatives
    - Monitor status

Value Engineering Study
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number 2750-92

Cost Model

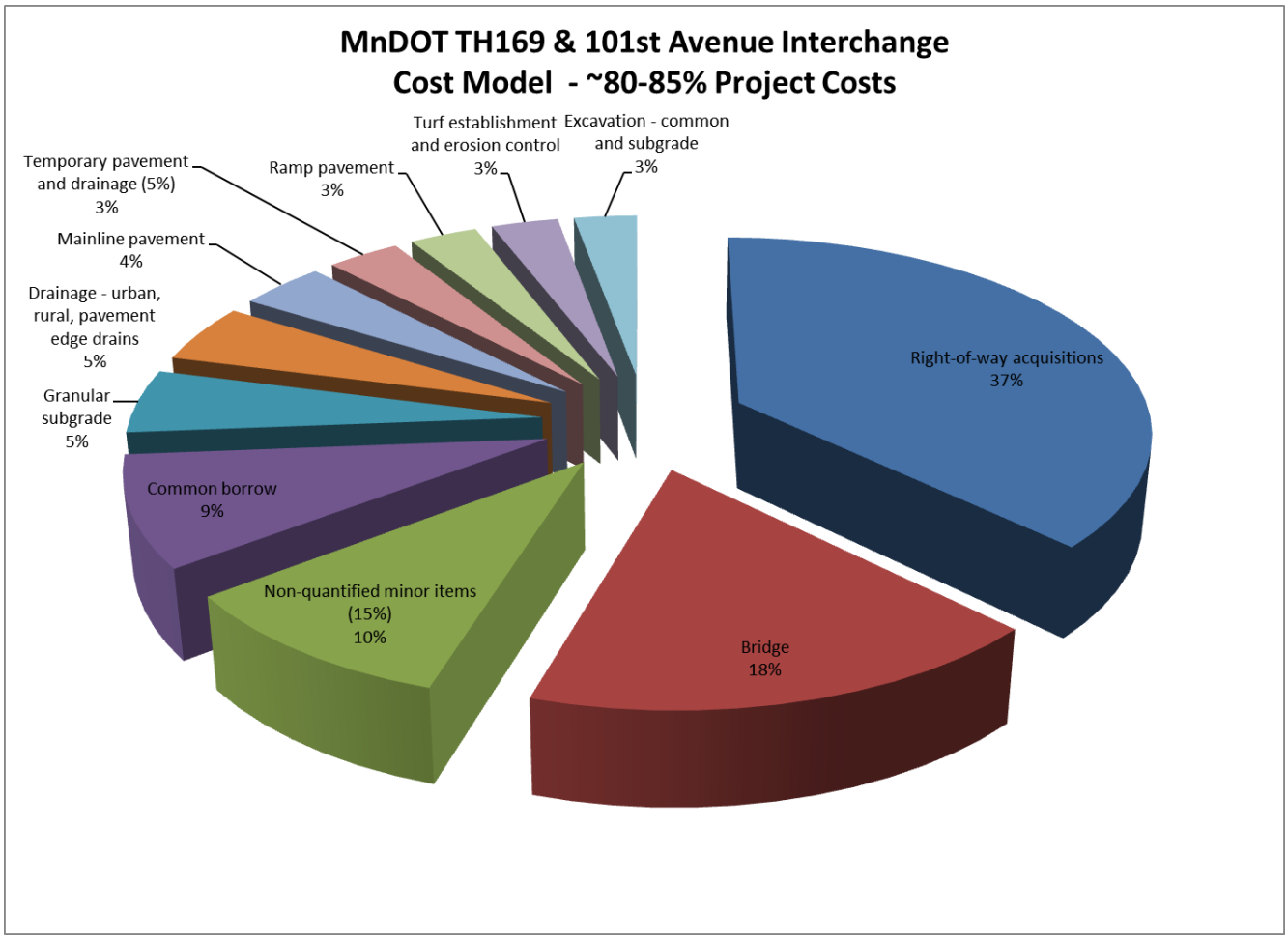
A cost model was prepared from the cost data provided in the study documents. The model is organized to identify major tasks and the City's estimated costs of total project cost for the significant cost items. The cost model clearly illustrated the cost drivers for the project and was used to guide the VE study team during the workshop.

MnDOT TH169 & 101st Avenue Interchange
Cost Model - ~80-85% of Project Costs
(based on Concept Cost Estimate prepared by SRF Consulting Group on 11/17/2017)

Item Description	Amount	% of Total	Cumulative %
Right-of-way acquisitions	$ 7,650,000	31.39%	31.39%
Bridge	$ 3,598,730	14.77%	46.16%
Non-quantified minor items (15%)	$ 2,039,000	8.37%	54.52%
Common borrow	$ 1,861,622	7.64%	62.16%
Granular subgrade	$ 1,073,600	4.41%	66.57%
Drainage - urban, rural, pavement edge drains	$ 988,000	4.05%	70.62%
Mainline pavement	$ 801,607	3.29%	73.91%
Temporary pavement and drainage (5%)	$ 680,000	2.79%	76.70%
Ramp pavement	$ 633,329	2.60%	79.30%
Turf establishment and erosion control	$ 625,000	2.56%	81.86%
Excavation - common and subgrade	$ 587,300	2.41%	84.27%
Permanent ITS	$ 530,000	2.17%	86.45%
Concrete walk/trail/median	$ 427,010	1.75%	88.20%
Traffic control (3%)	$ 407,000	1.67%	89.87%
Water quality ponds	$ 400,000	1.64%	91.51%
Signals (permanent)	$ 400,000	1.64%	93.15%
Concrete curb and gutter	$ 295,280	1.21%	94.37%
Temporary ITS	$ 265,000	1.09%	95.45%
Ramp shoulder pavement	$ 253,011	1.04%	96.49%
Mainline Signing (A, OH, BR Mtd)	$ 240,000	0.98%	97.48%
Removals - pavement	$ 152,767	0.63%	98.10%
Lighting - at grade intersection, interchange	$ 150,000	0.62%	98.72%
Landscaping	$ 125,000	0.51%	99.23%
Mainline signing (C&D)	$ 92,750	0.38%	99.61%
Mainline shoulder pavement	$ 61,270	0.25%	99.86%
Mainline striping	$ 13,250	0.05%	99.92%
Driveway pavement	$ 12,678	0.05%	99.97%
ADA pedestrian curb ramp	$ 7,500	0.03%	100.00%
	$ 24,370,704		

~80-85% of Project Costs

Does not include Mobilization, Contingency, Design Eng. & Construction Admin.



Function Analysis

Function definition and analysis is the heart of Value Engineering. It is the primary activity that separates VE from all other "improvement" programs. The objective of this phase is to ensure the entire team agrees upon the purposes for the project elements. Furthermore, this phase assists with development of the most beneficial areas for continuing study.

The VE study team identified the functions of the **TH169 and 101st Avenue Interchange Project** using active verbs and measurable nouns. This process allowed the team to truly understand the functions associated with the project.

Active Verb	Measurable Noun	Function Classification
Access	*Development*	*Higher Order*
Connect	**Systems**	**Basic**
Meet	Budget	Project Objective
Meet	Schedule	Project Objective
Meet	Standards	Project Objective
Manage	Stormwater	Secondary
Facilitate	Movement	Secondary
Illuminate	Facilities	Secondary
Accommodate	Paths	Secondary
Avoid	Utilities	Secondary
Accommodate	Utilities	Secondary
Separate	Traffic	Secondary
Balance	Network	Secondary
Protect	Operations	Secondary
Mitigate	Conflict	Secondary
Inform	Drivers	Secondary
Manage	Traffic	Secondary
Beautify	Roadway	Secondary
Reduce	Confusion	Secondary
Purchase	Right-of-Way	One-Time
Ensure	Safety	All-the-time
Build	*Project*	*Lower Order (Assumed)*

The definitions of the classifications are:

- **Higher Order Function** defines the problem (study) goal and is outside the scope of the study.
- **Basic Function** defines a performance feature that *must* be obtained to satisfy only user's needs not desires. It answers the question, "What must it do?"
- **Secondary Function** defines performance features other than those that must be accomplished. These are the user's desires and answer the question, "What else do we want or does it do?"
- **One-Time Function** is a function that only happens one time.
- **All-the-time Function** is a secondary function that happens all the time.
- **Lower Order Function** defines the element that initiates the subject or project under study. Not interpreted as lowest importance.

The VE study team identified **Connect Systems** as the basic function of the project. The functions were discussed but a function model, or Function Analysis System Technique (FAST) diagram, was not developed.

Creative Idea List

The list of ideas from the study is shown on successive pages. Some of the ideas were selected for further development as represented in the previous alternatives.

Evaluation Process

The project decision makers identified, defined and ranked the performance attributes using a paired comparison matrix, shown below.

										TOTAL	%
Schedule (short-term) - meet 2020 completion	**A**	b	a	a	a	f	a			**4.0**	**19.05%**
Access (long-term) - direct connection to TH169 and balance local road congestion		**B**	b/c	b	b	b/f	b			**5.0**	**23.81%**
Maintenance of Traffic Mainline (short-term) - maintain access during construction and minimize impacts on TH169			**C**	c	c	f	g			**2.5**	**11.90%**
Maintainability (long-term) - minimize long-term costs and ease of maintenance				**D**	d	f	g			**1.0**	**4.76%**
Maintenance of Traffic Local Operations (short-term)* - maintain access during construction and minimize impacts on local operations					**E**	f	g			**0.0**	**0.00%**
Mainline Operations (long-term) - TH169 and TH610 conflicts and Level of Service						**F**	f			**5.5**	**26.19%**
Local Operations (long-term) - conflicts and Level of Service							**G**			**3.0**	**14.29%**
a	More Important									**21.0**	**100.00%**
a/b	Equal Importance										

***Note:** Although this performance attribute did not have any weight during the initial assessment, the VE team acknowledges it is an attribute that should be considered in the evaluation of alternatives.

The VE study team members evaluated the ideas using a two-step process. The first step, to shorten the list, identified ideas that scored as follows:

- FF – Unacceptable Impacts/Fatal Flaw (Has at least one fatal/unacceptable flaw)
- DS – Design Suggestions (No cost impact, Workbook)
- DC – Design Comment (No cost impact, no Workbook)
- OS – Out of Scope
- ABC – Already Being Considered

This first-step evaluation scored the ideas as appropriate to eliminate them from further evaluation.

The second step scored the remaining ideas using the **Value Relationship Key shown on the following page** along with the idea's alignment with previously identified project goals, functions and performance criteria. The prioritization for further development and documentation is as follows:

Score =

- 5 – Great Value meeting the criteria (Workbook)
- 4 – Good Value meeting the criteria (Workbook)
- 3 – Moderate Value meeting the criteria (Workbook)
- 2 – Poor Value (No Workbook)

Value Engineering Study
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number 2750-92

Value Relationship Key		Value = Function / Cost					
Rating							
5.	Great Opportunity	F C--	F+ C--	F++ C	F++ C-	F++ C--	F++ C+
4.	Good Opportunity	F- C--	F C-	F+ C	F+ C-	F+ C+	F++(*) C++
3.	Moderate Value	F-- C-	F- C-	F++(*) C++			
2.	Poor Value	F-- C	F-- C--	F C+	F C++	F++(*) C++	

*Is the Function improved to the point that it overcomes the high cost?

VALUE CUE KEY –
MAGNITUDE OF CHANGE

F	=	No impact to function
F-	=	Small negative impact to function
F--	=	Large negative impact to function
F+	=	Small increase in function
F++	=	Large increase in function
C	=	No impact to cost
C-	=	Small decrease in cost
C--	=	Large decrease in cost
C+	=	Small increase in cost
C++	=	Large increase in cost

Value Engineering Study
Minnesota Department of Transportation
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

Creative Idea List

Idea No.	Resp	Idea Title	Score
FM		**Facilitate Movement**	
FM-01	TL	Use roundabouts at ramp terminals on both sides; reduce bridge to two lanes	5
FM-02		Use a restricted crossing U-turn (RCUT) in lieu of a folded diamond interchange	2
FM-03	JL	Use an overpass at 101st Avenue with a signalized RCUT at Oxbow Creek Drive	4
FM-04		Eliminate the northbound on-ramp and southbound off-ramp	2
FM-05		Use a signalized intersection in lieu of an interchange	FF
FM-06	KJ	Reduce the loop radii from 230 feet to 190 feet on both sides	5
FM-07		Use a button hook interchange in lieu of a folded diamond interchange	2
FM-08		Eliminate the north loops on TH610 to increase the distance to the new interchange	OS
FM-09	MM	Relocate the interchange to Oxbow Creek Drive	NR
FM-10		Reverse the folded diamond interchange within the same footprint	2
FM-11		Use flyover for southbound only and eliminate the connection to TH169	FF
FM-12		Use Michigan left intersection in lieu of an interchange	FF
FM-13		Use grade-separated roundabout in lieu of an interchange	FF
FM-14		Eliminate the sidewalk on the north side of the bridge	ABC
FM-15	JK	Minimize the cross section on the bridge	4
FM-16		Reduce the cross section on 101st Avenue	w/M-05
FM-17		Lower TH169 to reduce the elevation of the bridge to fill in approaches	2
FM-18		Move ramps closer to the loops	w/FM-06
FM-19		Use stop control in lieu of ramps for a low speed turn on the southbound	2
FM-20	JL	Reduce the 101st Avenue bridge from five lanes to three lanes	4
FM-21		Use a split interchange at 101st Avenue and Oxbow Creek Drive	2

OS=Out of Scope
FF=Fatal Flaw
ABC=Already Being Considered
NR=Not Recommended

DS=Design Suggestion (Workbook)
DC=Design Comment (No Workbook)

Value Engineering Study
Minnesota Department of Transportation
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

Creative Idea List

Idea No.	Resp	Idea Title	Score
AU		**Avoid Utilities**	
AU-01		Provide adequate documentation in the specification to describe sewer limitations to ensure the contractors understand the risk and their responsibilities at bid time	DC
AU-02		Locate 101st Avenue under TH169 in lieu of over TH169	2
MU		**Minimize Utility-impacts (Accommodate Utilities)**	
MU-01		Shift the alignment slightly to the north to avoid the power poles	ABC
MC		**Mitigate Conflict**	
MC-01		Use spread footings in lieu of deep foundations	DC
MC-02	CH	To eliminate corrosion as a long-term maintenance strategy, use glass-fiber reinforcement, where appropriate	DC
MC-03		Build a three-span bridge in lieu of a two-span bridge	2
MC-04	KJ	Use the high wall abutment in lieu of the stub abutment to reduce span length	4
MC-05	CH	Consider Accelerated Bridge Construction (ABC) for bridge construction	2
MC-06		Use full-depth panels for the bridge deck in lieu of cast-in-place	2
MC-07		Narrow the TH169 corridor to reduce the width of the bridge	2
MC-08		Use Bulb-T concrete girders in lieu of a center pier to remove the center pier and reduce maintenance of traffic requirements/costs	2
MC-09	JL/CH	Use 16 ft. clearance in lieu of 16 ft.-4 in. (performance-based practical design)	FF
PR		**Purchase Right-of-way**	
PR-01	KJ	Use retaining walls in lieu of slopes on the south side within the interchange for both quadrants to reduce right-of-way needs	4
MB		**Meet Budget**	
MB-01	SD	Defer local work	3
MS		**Meet Schedule**	
MS-01		Use design-build contracting strategy	FF
MS-02		Use CMGC contracting strategy	FF
MS-03		Use A+B contracting strategy	DS
MS-04		Consider using an early completion bonus contracting strategy	DC

OS=Out of Scope
FF=Fatal Flaw
ABC=Already Being Considered
NR=Not Recommended

DS=Design Suggestion (Workbook)
DC=Design Comment (No Workbook)

Value Engineering Study
Minnesota Department of Transportation
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

Creative Idea List

Idea No.	Resp	Idea Title	Score
MS-05		Provide interim substantial completion dates to aid in meeting the essential access that is required for the current development in lieu of the entire project completion and then allow the remainder of the project to be completed in additional time	DC
MS-06		Procure a separate utility package ahead of the main project	DS
MS-07		City of Brooklyn to hire their own construction management firm in lieu of using MnDOT	ABC
M		**Miscellaneous**	
M-01	SD	Separate southbound vehicles going to TH610 in a Collector Distributor (CD) lane	4
M-02		Increase the weave distance on TH169 in both directions	ABC
M-03		Defer the path to the future	3
M-04	SD	Delete the escape lane at southbound TH169	5
M-05	TL	Reduce lane width from 13.5 ft./14 ft./13.5 ft. to 12.5 ft./12 ft. /12.5 ft.	4

OS=Out of Scope
FF=Fatal Flaw
ABC=Already Being Considered
NR=Not Recommended

DS=Design Suggestion (Workbook)
DC=Design Comment (No Workbook)

TH169 & 101ST AVENUE INTERCHANGE
SP 2750-92

VALUE ENGINEERING STUDY
OUT-BRIEF PRESENTATION

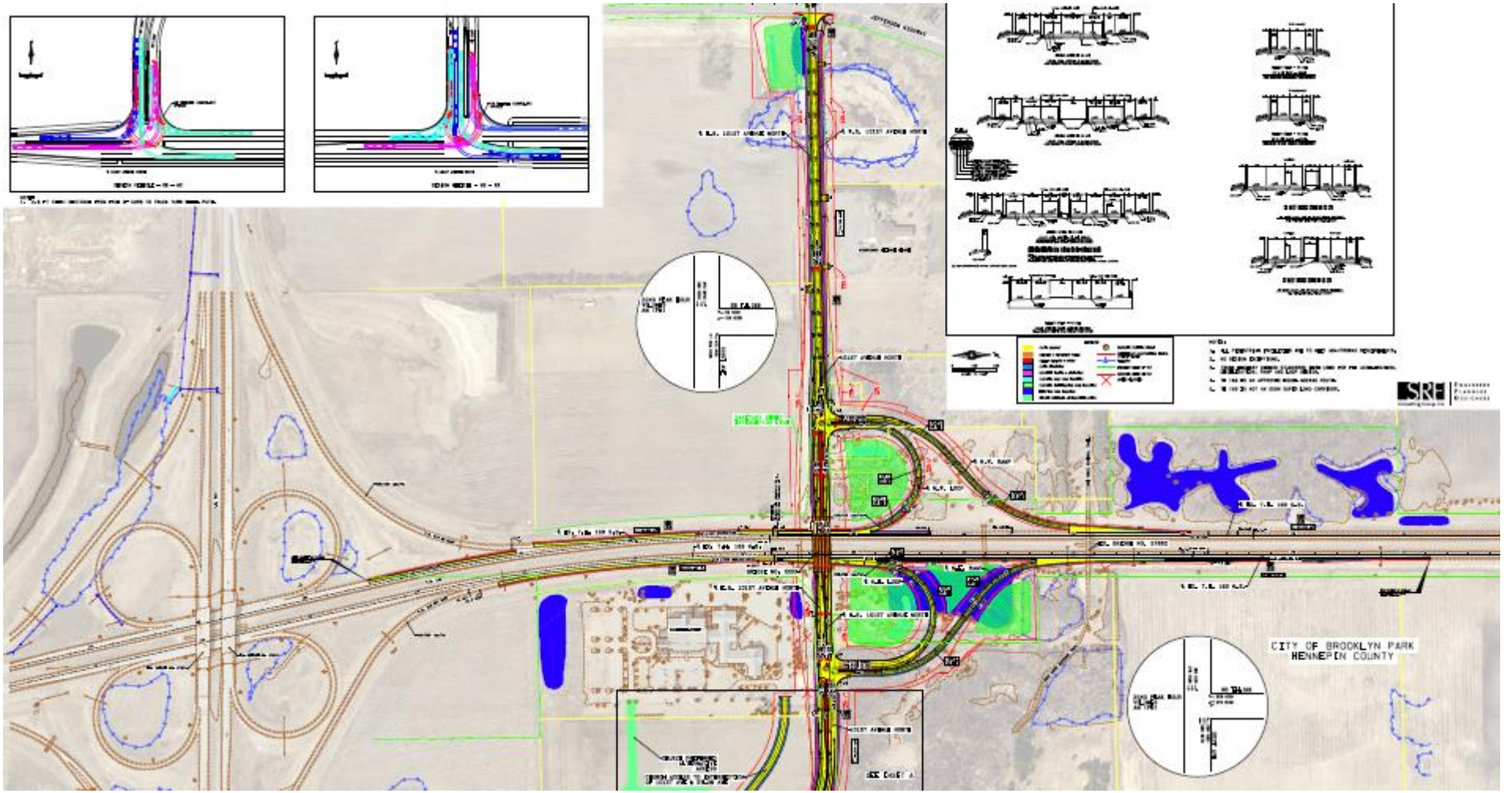
DEPARTMENT OF TRANSPORTATION

September 21, 2018

VE Study Team

- Sean Delmore, WSB & Associates – Traffic
- Chris Hoberg, MnDOT – Project Manager
- Renee Hoekstra, RHA, LLC – CVS Team Leader
- Kevin Jullie, SRF Consulting – Design Lead
- Tim Lamkin, Bolton & Menk – Highway Design
- Jamal Love, MnDOT – Geometrics
- Minnie Milkert, MnDOT – State Value Engineer
- Patrice Miller, RHA, LLC – CVS Assistant Team Leader

Project Overview



VE Job Plan

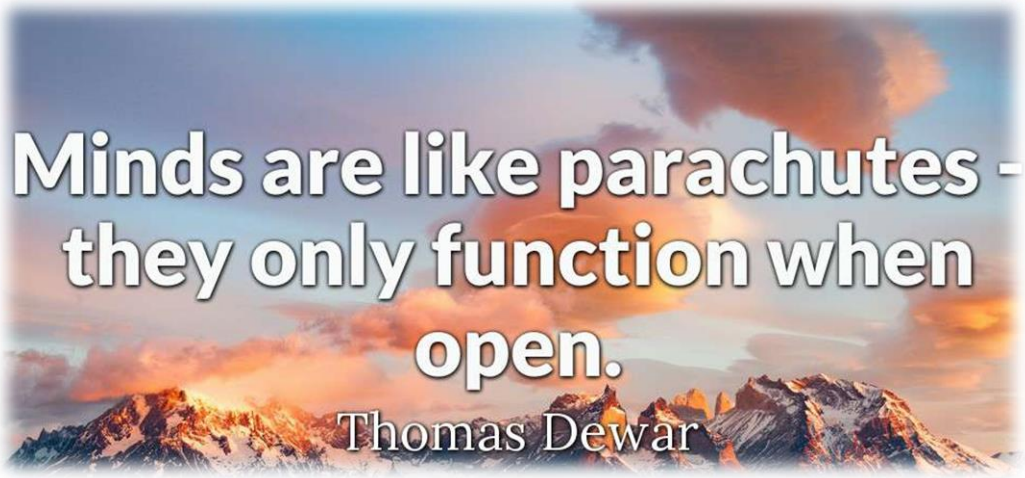
Information – Analyze Information
Function Analysis – Define Functions
Creative – Generate Ideas
Evaluation – Select Ideas
Development – Develop Ideas
Presentation – Present Alternatives

Workshop Objectives

- Approach to utilities (sewer, electrical, gas, communications)
- Reduce right-of-way
- Tighter loop at TH169 and 101st Avenue – west side
- Wall versus slope at church
- Remove access on north side
- Identify ways to improve schedule – minimize risk
- Identify ways to help meet budget goals
- Minimize impacts to existing traffic interchanges

Project Functions

- Basic Function (What must this project do?)
  - Connect Systems
- Higher Order Function (Project Goal)
  - Access Development
- Brainstormed alternatives to baseline design using <u>key functions</u>
  - Facilitate Movement
  - Mitigate Conflict
  - Purchase Right-of-way
  - Meet Schedule
  - Meet Budget



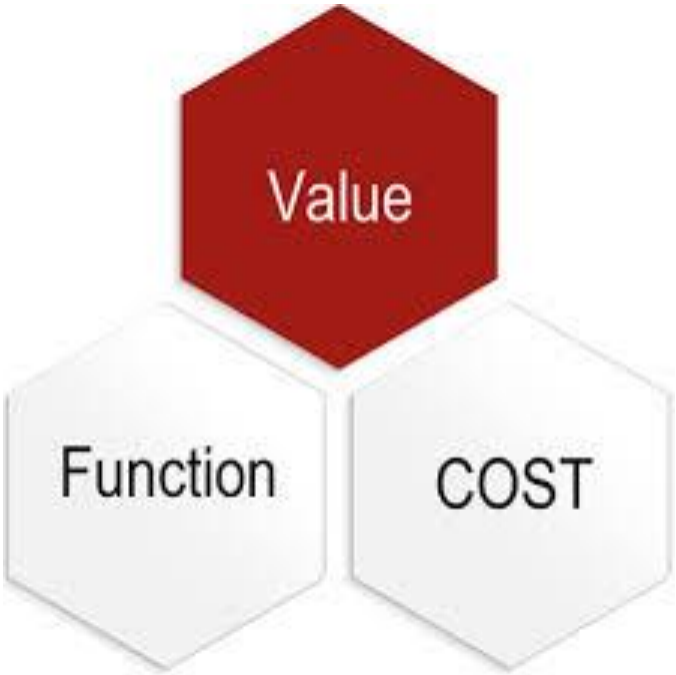
PERFORMANCE ATTRIBUTES

							TOTAL	%
Schedule (short-term) - meet 2020 completion	A	b	a	a	a	f	a	4.0	19.05%
Access (long-term) - direct connection to TH169 and balance local road congestion	B	b/c	b	b	b/f	b	5.0	23.81%
Maintenance of Traffic (short-term) - maintain access during construction and minimize impacts on TH169	C	c	c	f	g	2.5	11.90%
Maintainability (long-term) - minimize long-term costs and ease of maintenance	D	d	f	g	1.0	4.76%
Maintenance of Traffic (short-term)* - maintain access during construction and minimize impacts on local operations	E	f	g	0.0	0.00%
Mainline Operations (long-term) - TH169 conflicts and Level of Service	F	f	5.5	26.19%
Local Operations (long-term) - conflicts and Level of Service	G	3.0	14.29%
							21.0	100.00%

a	More Important
a/b	Equal Importance

Creative Ideas

- **46** Ideas
  - **12** VE Alternatives developed
  - **2** Design Suggestions developed
  - **5** Design Comments identified

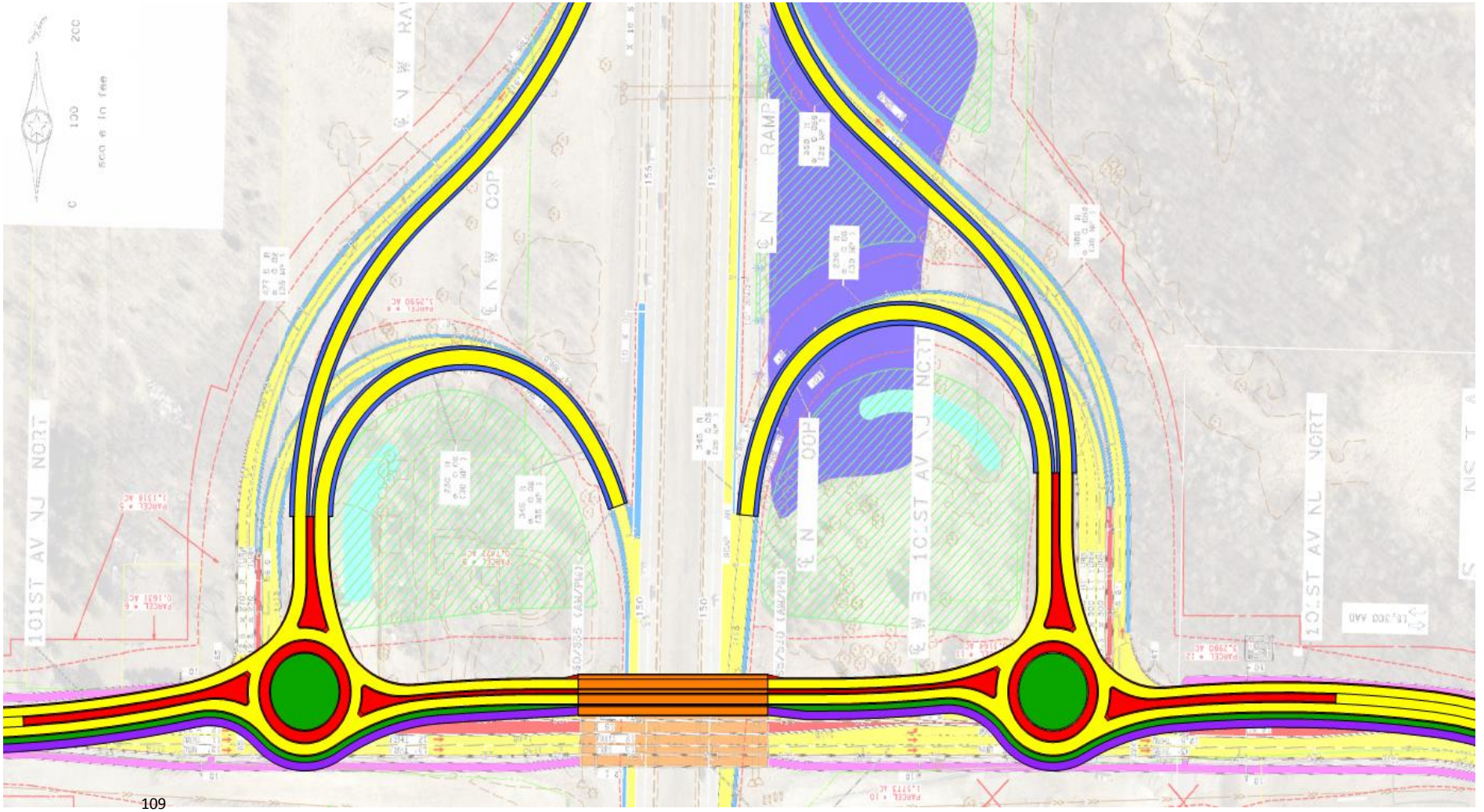


Evaluation

Value Relationship		Value = Function / Cost					
Rating							
5.	Great Opportunity	F C--	F+ C--	F++ C	F++ C-	F++ C--	F++ C+
4.	Good Opportunity	F- C--	F C-	F+ C	F+ C-	F+ C+	F++(*) C++
3.	Moderate Value	F-- C-	F- C-	F++(*) C++			
2.	Poor Value	F-- C	F-- C--	F C+	F C++	F++(*) C++	
1.	Unacceptable Impacts/Fatal Flaw						

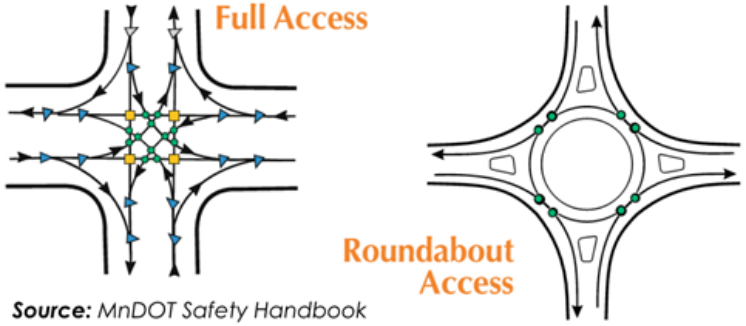
Value Engineering Proposals

Use roundabouts at ramp terminals on both sides; reduce bridge to two lanes (FM-01)



Use roundabouts at ramp terminals on both sides; reduce bridge to two lanes (FM-01)

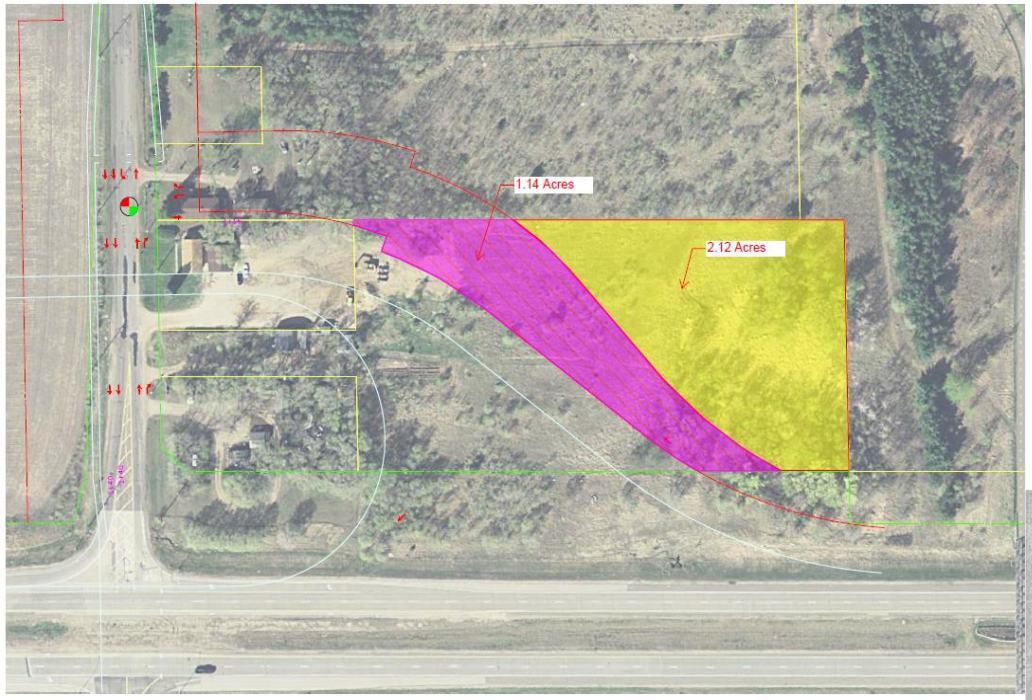
- Benefits
  - Similar or better operational performance
  - Reduces overall roadway footprint and bridge size
  - Reduces conflict points
- Risks/Challenges
  - Requires City Council approval



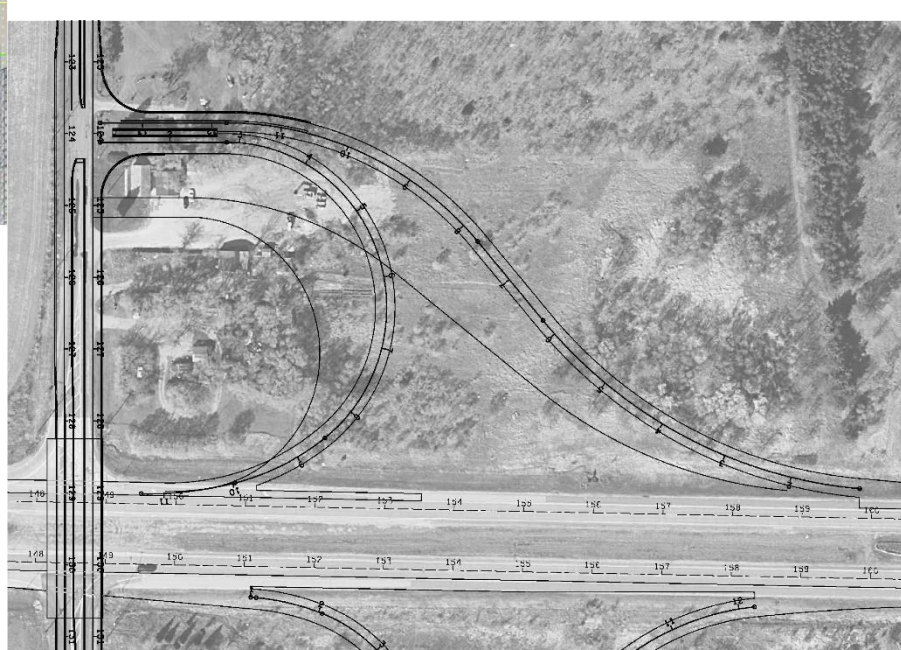
Source: MnDOT Safety Handbook

Potential Cost Avoidance: $3,516,000

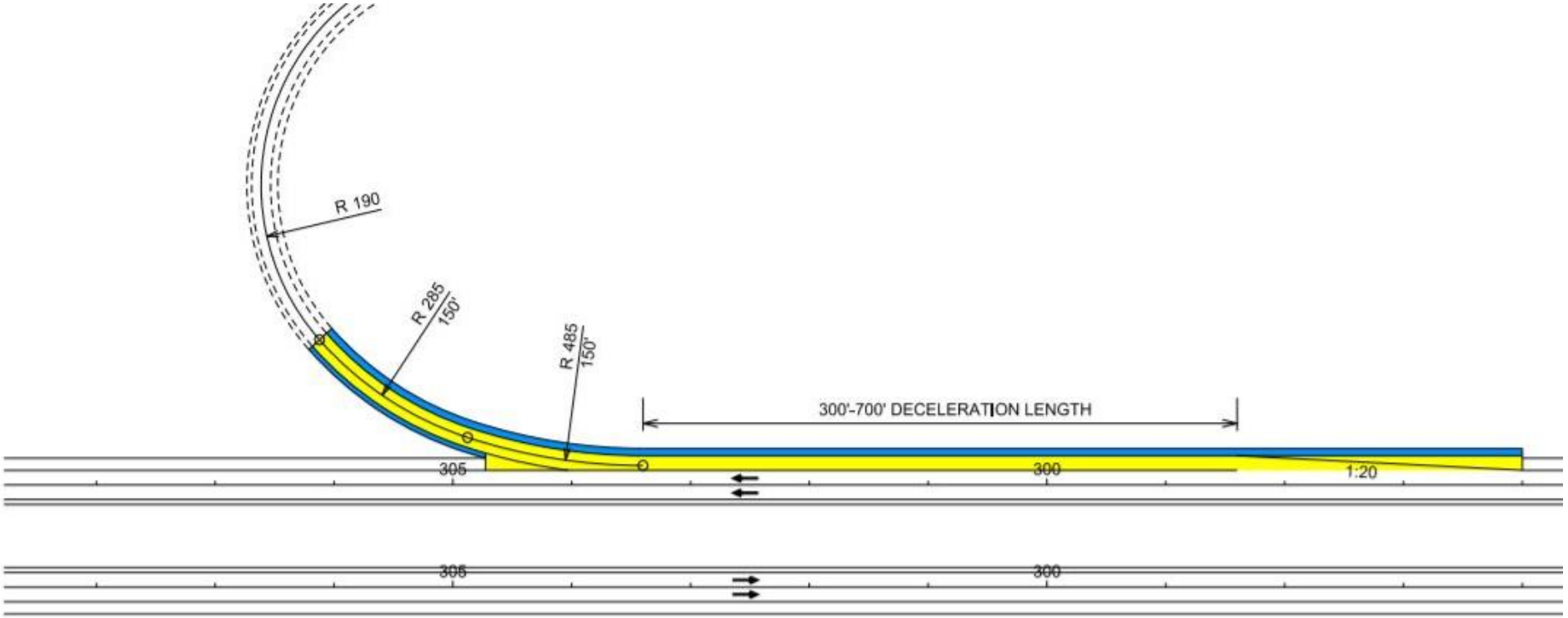
Reduce the loop radii from 230 ft. to 190 ft. on both sides (FM-06)



Baseline



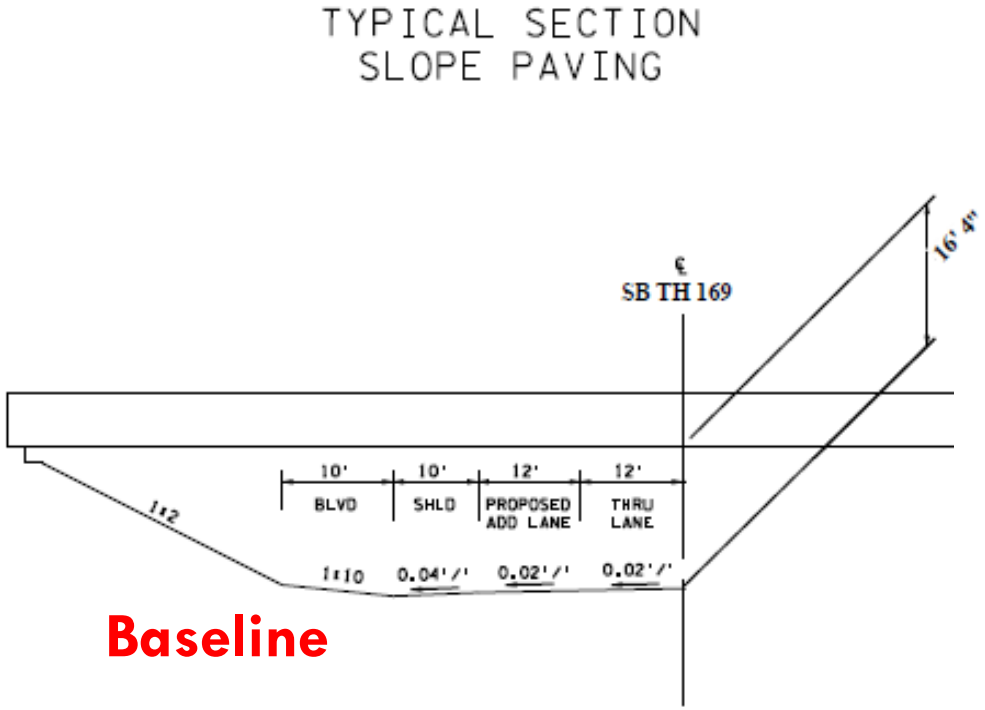
Reduce the loop radii from 230 ft. to 190 ft. on both sides (FM-06)



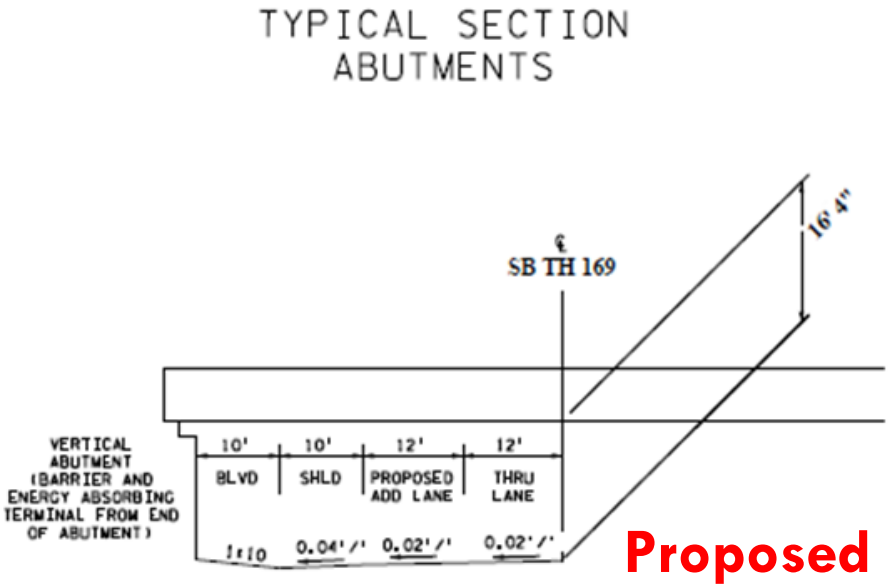
Proposed

Potential Cost Avoidance: $721,000

Use the high wall abutment in lieu of the stub abutment to reduce span length (MC-04)



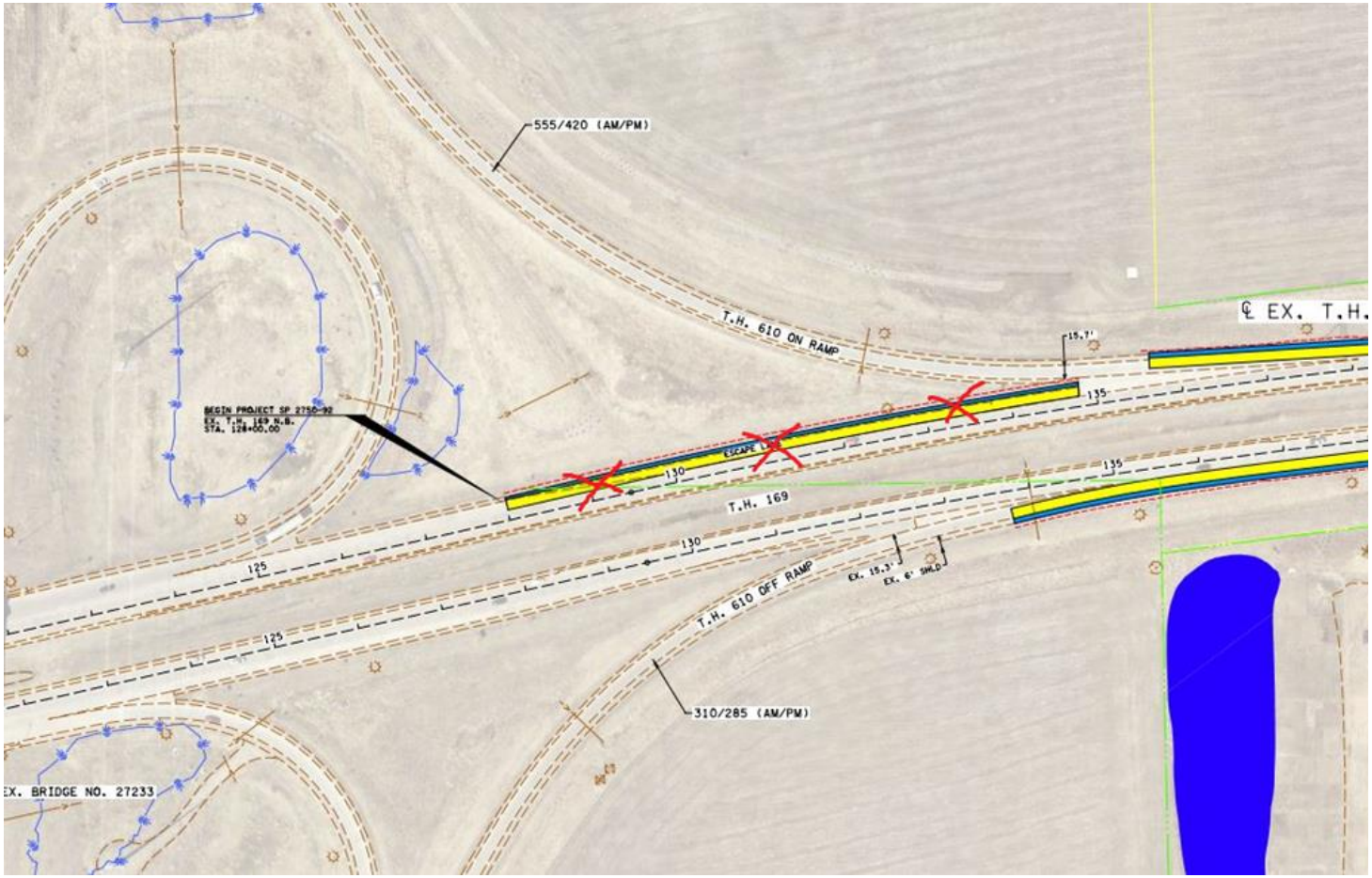
Baseline



Proposed

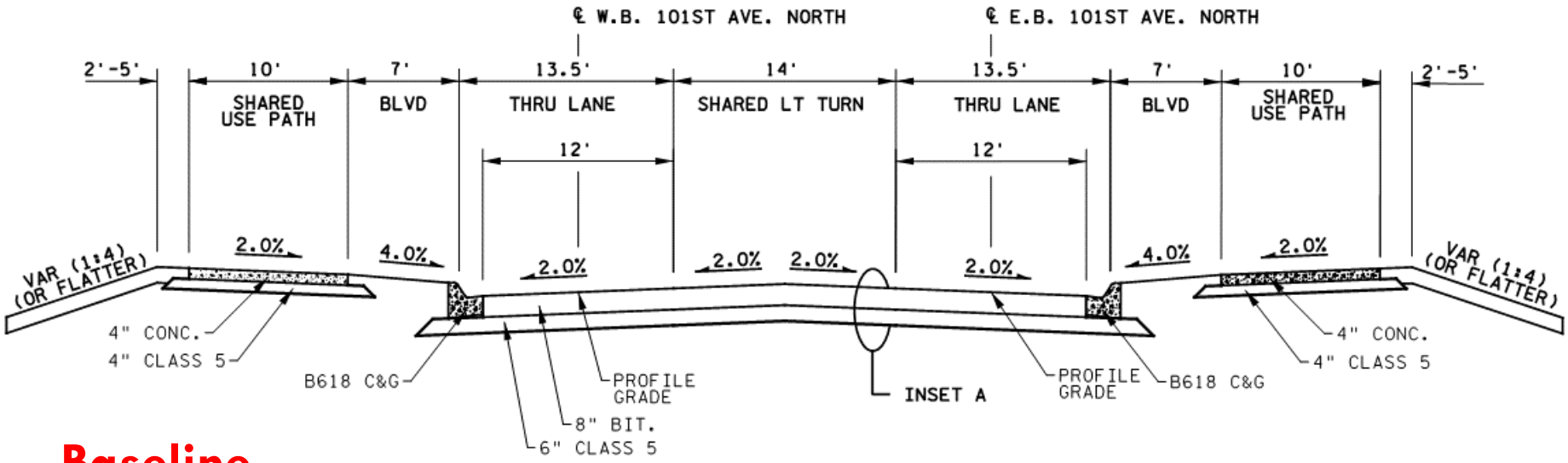
Potential Cost Avoidance: $283,000

Delete the escape lane at southbound TH169 (M-04)



Potential Cost Avoidance: $59,000

Reduce 101st Avenue lane width from 13.5 ft./14 ft./13.5 ft. to 12.5 ft./12 ft. /12.5 ft. (M-05)



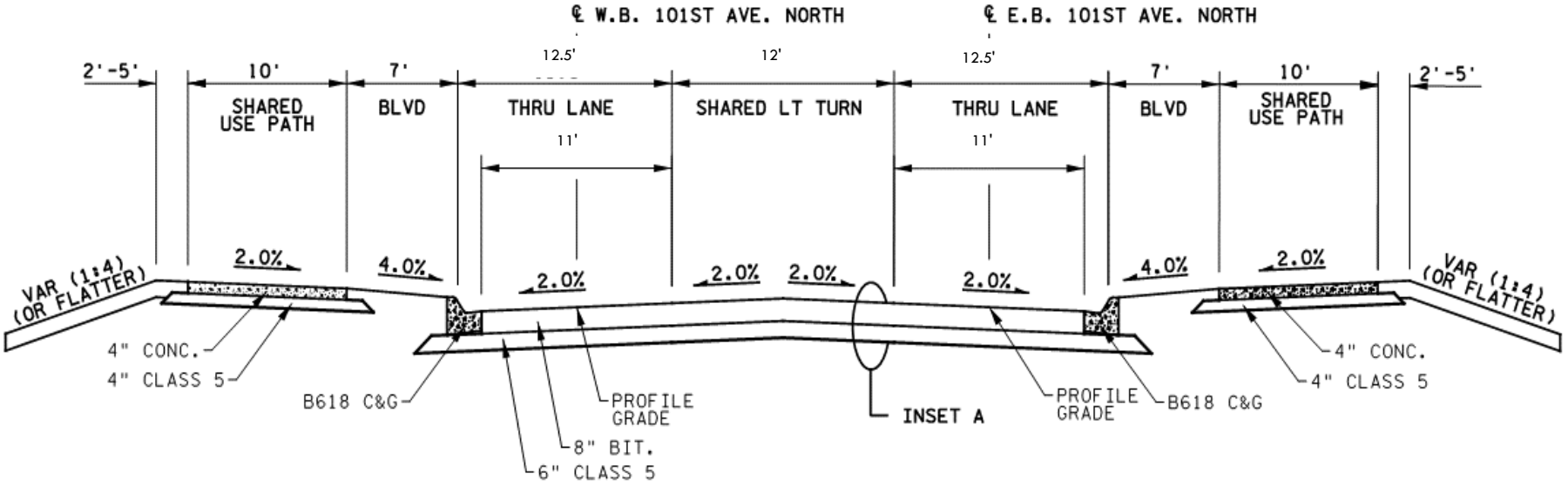
Baseline

DESIGN SPEED = 40 MPH

101ST AVE. NORTH: 3 LANE URBAN

STA. 105+33.06 WB/EB TO STA. 121+23.64 EB (101ST)

Reduce 101st Avenue lane width from 13.5 ft./14 ft./13.5 ft. to 12.5 ft./12 ft. /12.5 ft. (M-05)



Proposed

DESIGN SPEED = 40 MPH

101ST AVE. NORTH: 3 LANE URBAN

STA. 105+33.06 WB/EB TO STA. 121+23.64 EB (101ST)

Reduce 101st Avenue lane width from 13.5 ft./14 ft./13.5 ft. to 12.5 ft./12 ft. /12.5 ft. (M-05)

- Benefits
  - Increases separation from utilities on south side
  - Decreases right-of-way costs

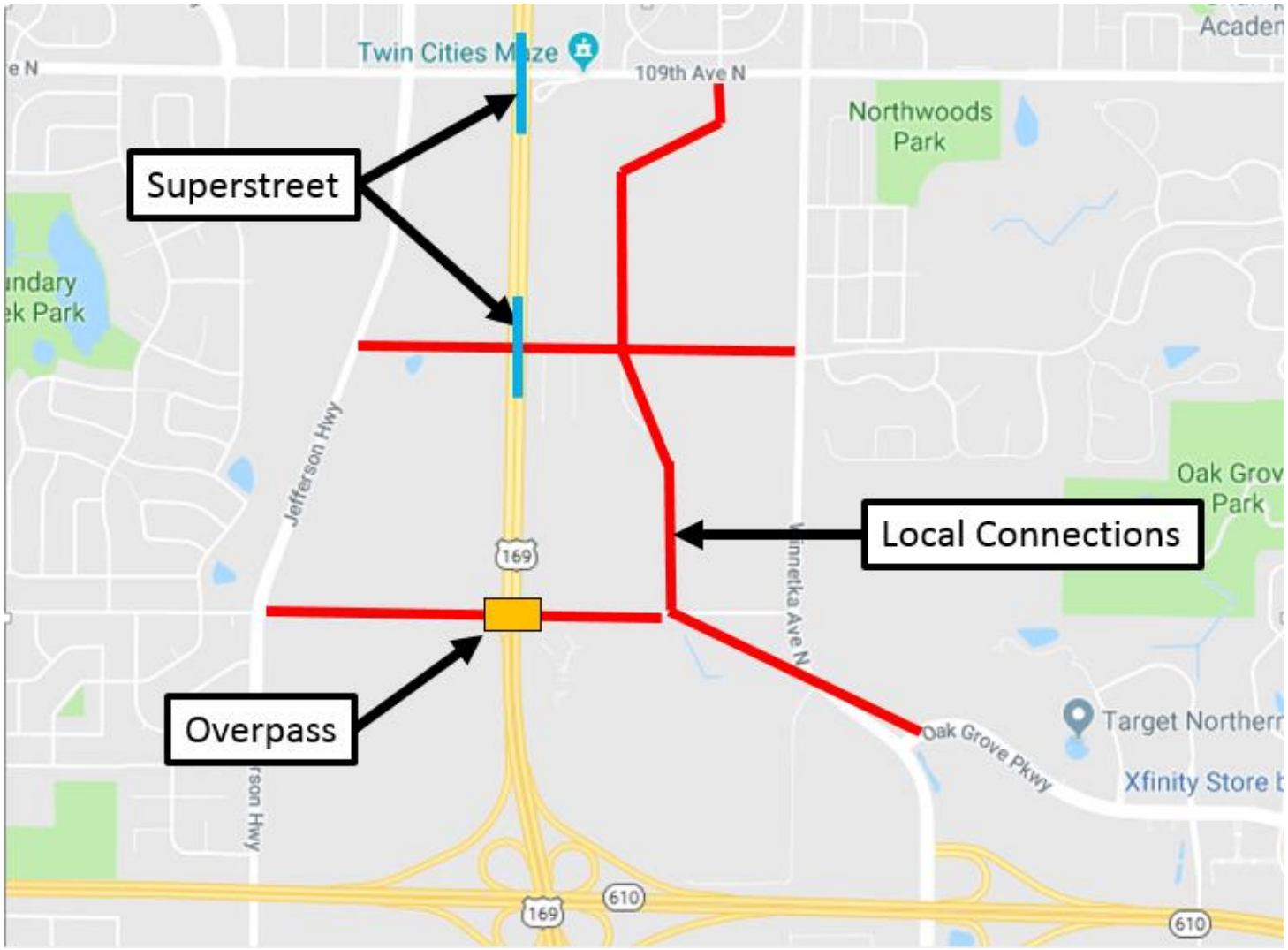
8820.9936 MINIMUM DESIGN STANDARDS, URBAN; NEW OR RECONSTRUCTION PROJECTS.

New or reconstruction projects for urban roadways without a designated on-road bicycle facility must meet or exceed the minimum dimensions indicated in the following design chart.

Projected Traffic Volume	Design Speed	Lane Width (a)	Curb Reaction Distance (c)	Parking Lane Width (e)
	mph	feet	feet	feet
ADT < 10,000	30-45	(b) 10-11	1-2 (d)	7-8
	50 or over	11-12	2	8-10
ADT ≥ 10,000	30-35	(b) 10-11	1-2 (d)	7-10
	40-45	11-12	1-4	7-10
	50 or over	11-12	2-4	Not allowed

Potential Cost Avoidance: $71,000

Use an overpass at 101st Avenue with a signalized RCUT at Oxbow Creek Drive (FM-03)



Use an overpass at 101st Avenue with a signalized RCUT at Oxbow Creek Drive (FM-03)

Potential solution: Reduced Conflict Intersections

Improved safety

- Studies show a 70% reduction in fatalities and a 42% reduction in injury crashes

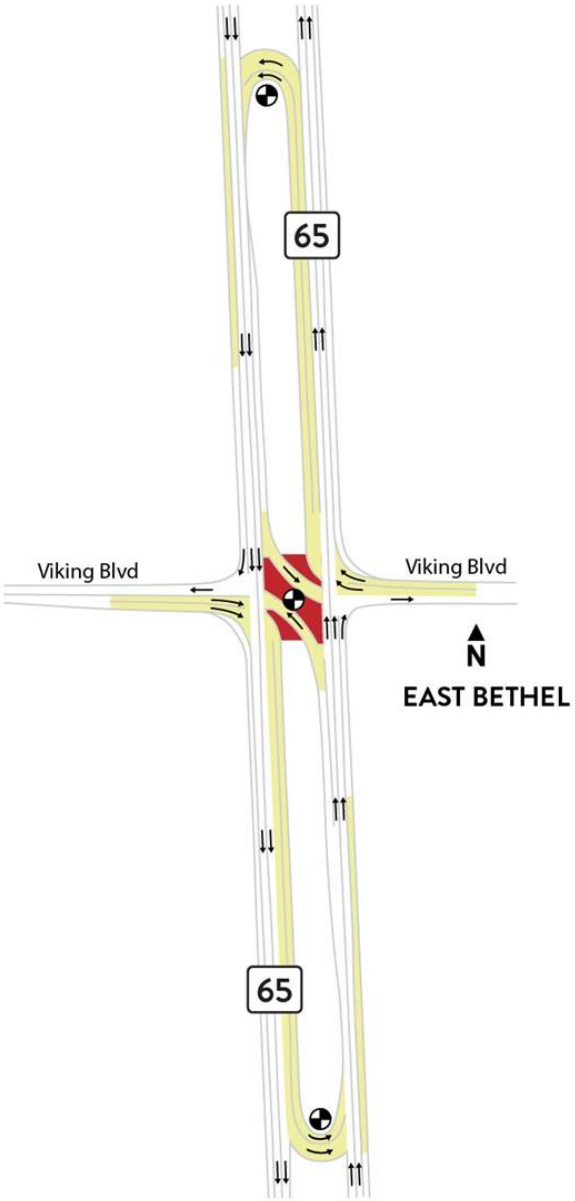
Economic benefits

- Good access to local businesses
- Smaller footprint than an interchange or larger intersection designs
- Peak period travel time savings
- Fraction of the cost of building an interchange

Decreased delay

- Reduce delay at signalized intersections
- Requires fewer signal phases

https://www.youtube.com/watch?v=QQsR55YLw8M#

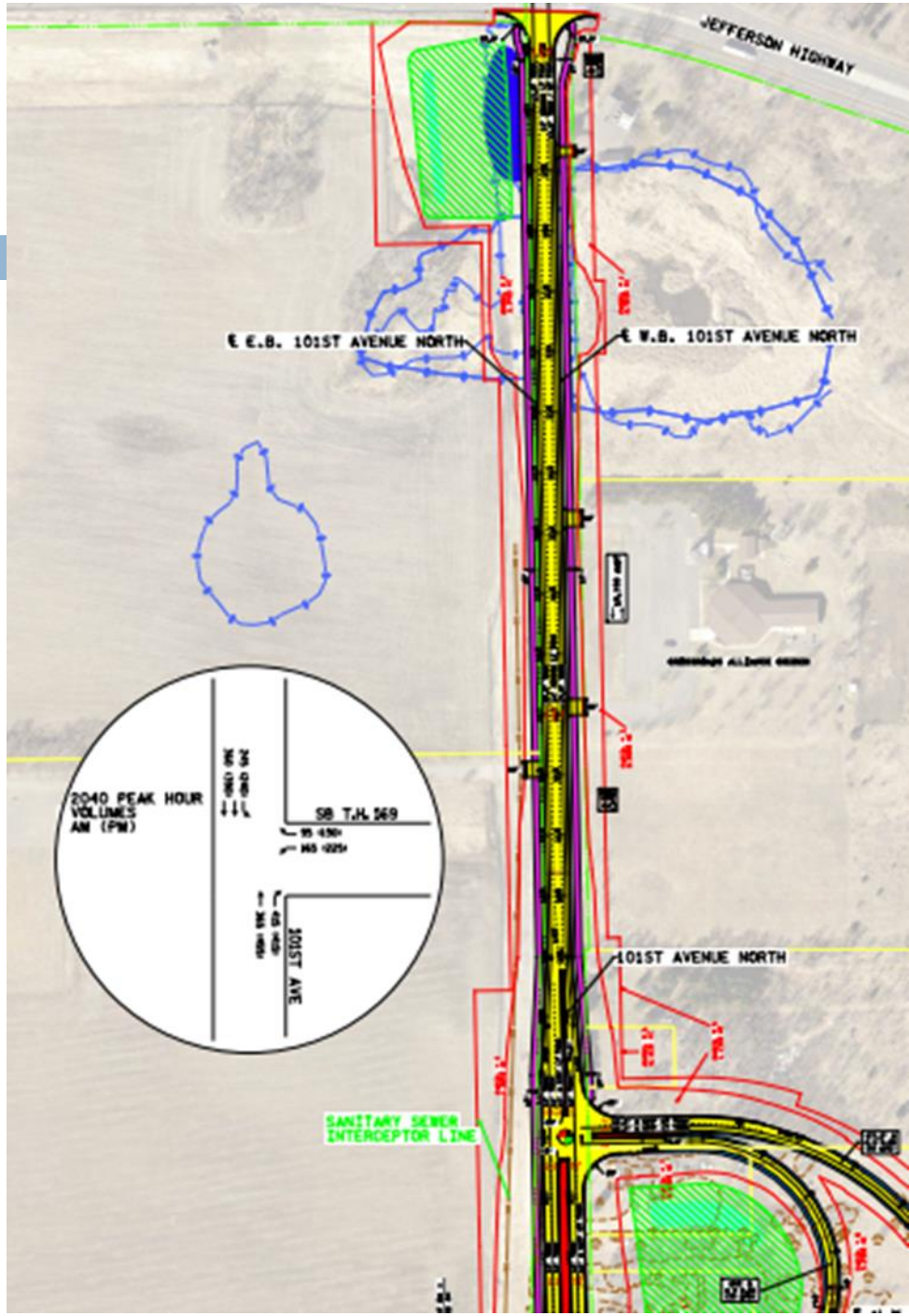


Use an overpass at 101st Avenue with a signalized RCUT at Oxbow Creek Drive (FM-03)

- Benefits
  - Avoids closely spaced interchange
  - Addresses delay on TH169 and at 109th Avenue
  - Beginning of corridor solution for TH169
- Risks/Challenges
  - Different than City expectation
  - Acceptance of new approach
  - Change to environmental document; project schedule may be impacted

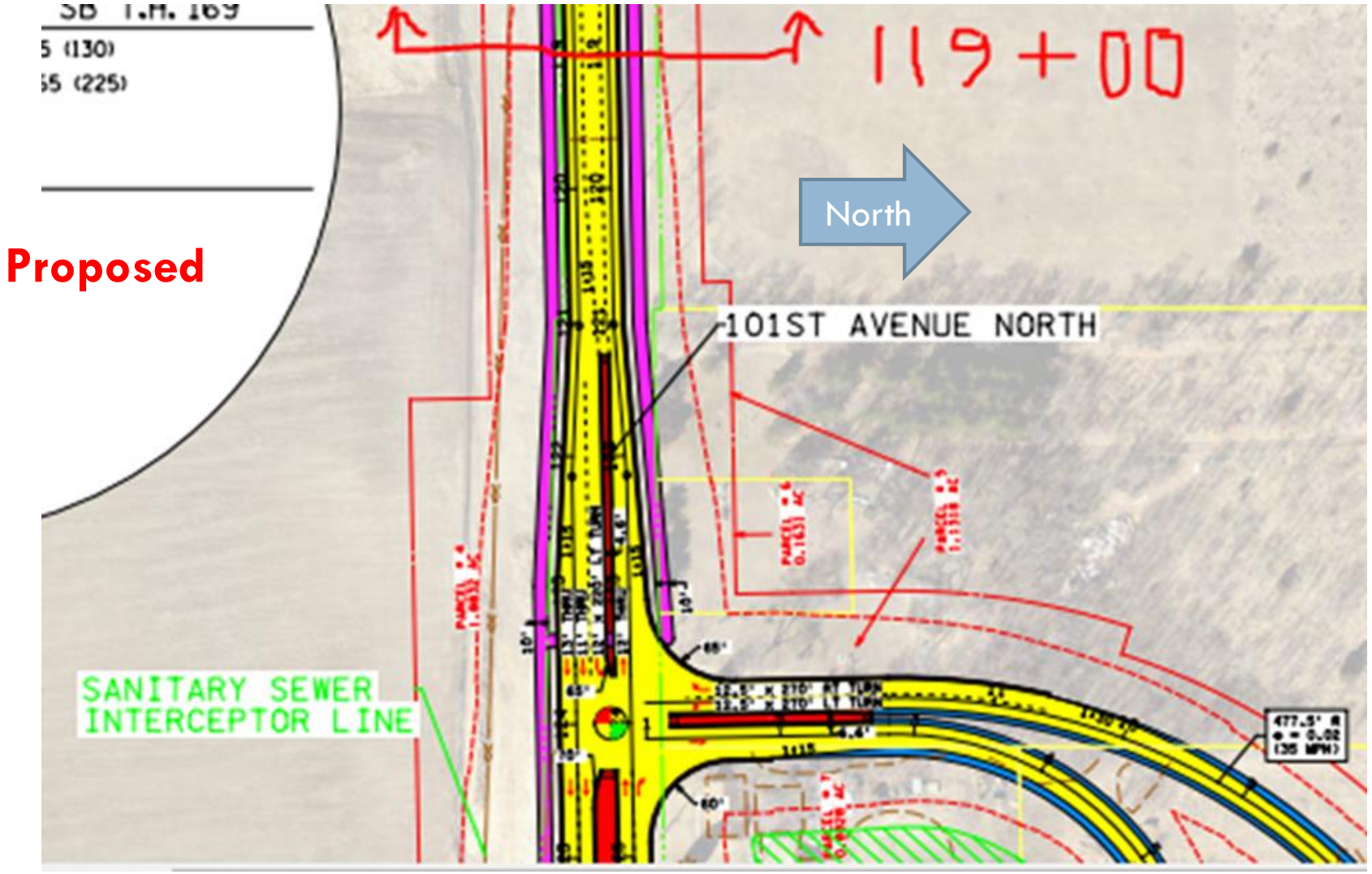
Potential Cost Avoidance: $2,802,000

Defer local work (MB-01)



Baseline

Defer local work (MB-01)

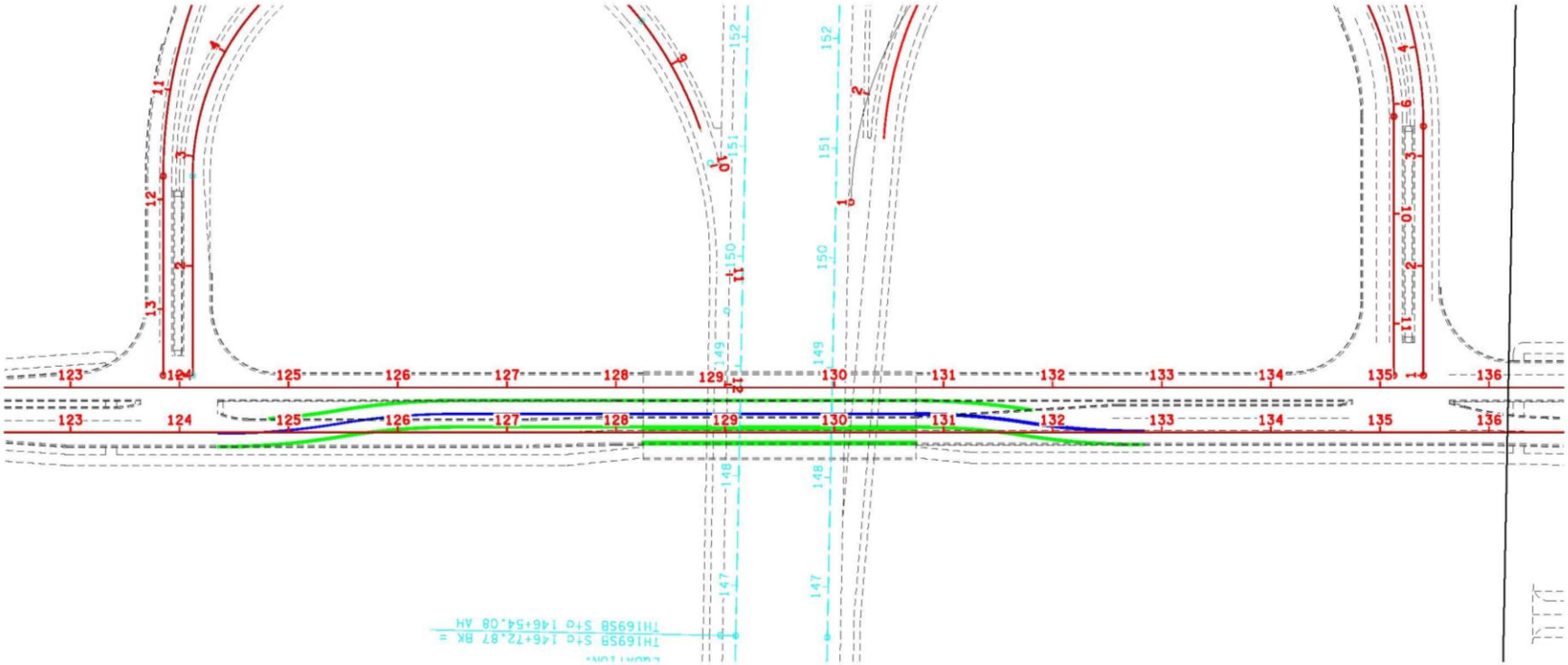


Defer local work (MB-01)

- Benefits
  - Reduces project budget
  - Reduces risk of meeting project schedule
  - Reduces right-of-way costs
  - Reduces impacts to power poles
- Risks/Challenges
  - Future costs to finalize the project
  - Limits improvements west of TH169

Potential Cost Deferral: $2,658,000

Minimize the cross section on the bridge (FM-15)



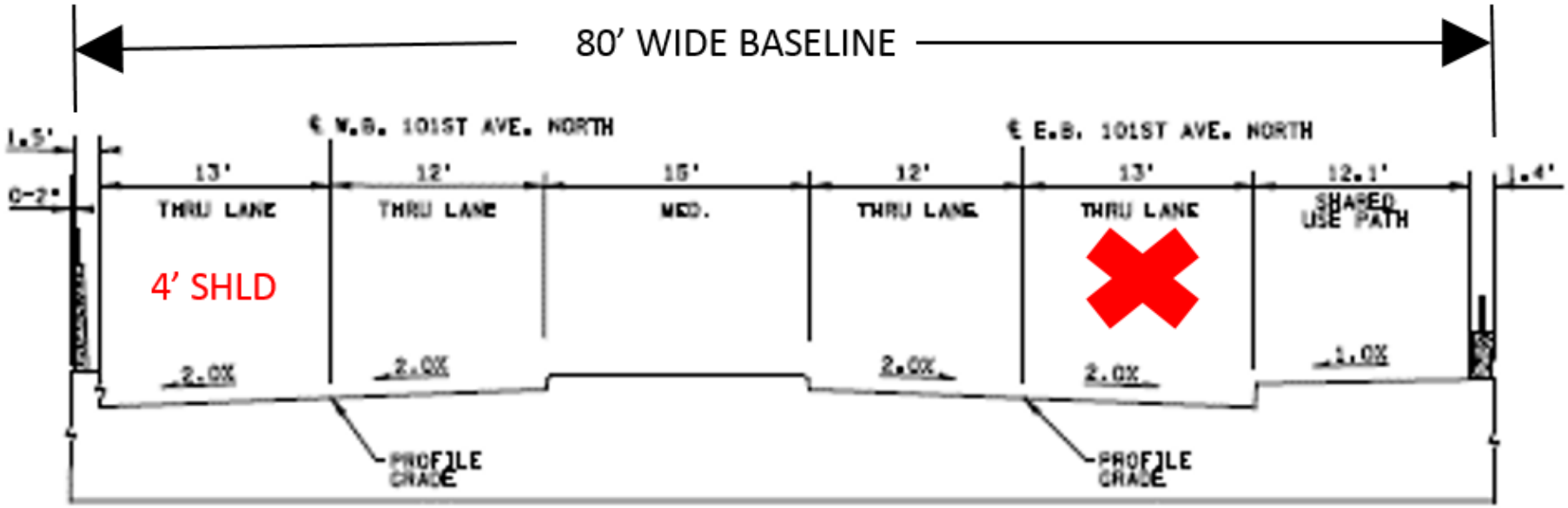
Minimize the cross section on the bridge (FM-15)

- Benefits
  - Reduces bridge width
  - Slight reduction in impervious area

- Risks/Challenges
  - Adds reverse curves on eastbound 101st Avenue alignment
  - A raised median to channelize traffic is desirable

Potential Cost Avoidance: $595,000

Reduce 101st Avenue bridge from five lanes to three lanes (FM-20)



22' WIDTH REDUCTION

Reduce 101st Avenue bridge from five lanes to three lanes (FM-20)

- Benefits
  - Reduces bridge size
  - Reduces construction duration
- Risks/Challenges
  - Reduces future LOS on local system

Potential Cost Avoidance: $879,000

Summary – Set 1

Idea No.	Idea Title	Overall Performance Score	Potential Cost Avoidance
FM-01	Use roundabouts at ramp terminals on both sides; reduce bridge to two lanes	3.57	$3,516,000
FM-06	Reduce the loop radii from 230 ft. to 190 ft. on both sides	0.00	$721,000
MC-04	Use the high wall abutment in lieu of the stub abutment to reduce span length	0.00	$283,000
M-04	Delete the escape lane at southbound TH169	1.31	$59,000
M-05	Reduce 101st Avenue lane width from 13.5 ft./14 ft./13.5 ft. to 12.5 ft./12 ft. /12.5 ft.	1.19	$71,000
	Total Potential Cost Avoidance		**$4,650,000**

Summary – Set 2

Idea No.	Idea Title	Overall Performance Score	Potential Cost Avoidance
FM-03	Use an overpass at 101st Avenue with a signalized RCUT at Oxbow Creek Drive	1.43	$2,802,000
M-04	Delete the escape lane at southbound TH169	1.31	$59,000
M-05	Reduce 101st Avenue lane width from 13.5 ft./14 ft./13.5 ft. to 12.5 ft./12 ft. /12.5 ft.	1.19	$71,000
	Total Potential Cost Avoidance		**$2,932,000**

Summary – Set 3 (can go with Sets 1 or 2)

Idea No.	Idea Title	Overall Performance Score	Potential Cost Avoidance/ Deferral
FM-15	Minimize the cross section on the bridge	-0.71	$595,000
FM-20	Reduce 101st Avenue bridge from five lanes to three lanes	1.07	$879,000
MB-01	Defer local work	0.24	$2,658,000
	Total Potential Cost Avoidance/Deferral		**$4,132,000**

Design Suggestions

- MS-03: Use A+B contracting strategy
- MS-06: Procure a separate utility package ahead of the main project

Questions

Next Steps

- Draft Report to Minnie Due – October 5, 2018
- Decision Memo
- Debrief Meeting
- Final Report – due one week after comments received

Value Engineering Study - Agenda

Agenda September 17-21, 2018

Study Location: ***Monday thru Thursday***
MnDOT Shoreview Training and Conference Center – Conf. Room 11
1900 County Road I West
Shoreview, MN 55126

Friday
MnDOT Waters Edge – Conf. Room 176
Waters Edge Building
1500 W. County Road B2
Roseville, MN 55113

Day 1: Monday, September 17

INFORMATION PHASE

8:00-8:15	Introductions (All)
8:15-8:30	Brief Overview of the VE Process *(Team Leader-Renee Hoekstra)*
8:30-10:30	Additional Project Details *(Designer)*
10:30-10:45	Break
10:45-12:30	Project Goals, VE Study Objectives and Constraints Identify Key Performance Attributes, Risk Discussion Review Cost Model
12:30-1:30	Lunch *(provided)*
1:30-5:00	Site Visit
5:00	Adjourn

Day 2: Tuesday, September 18

INFORMATION PHASE (continued)

8:00-8:15	Recap of Day 1/Additional Information Review *(as needed)*
8:15-9:15	Team Observations

FUNCTION ANALYSIS PHASE

9:15-10:30	Function Analysis
10:30-10:45	Break

CREATIVE PHASE

10:45-12:00	Brainstorm Ideas / Alternatives
12:00-1:00	Lunch *(provided)*
1:00-3:00	Brainstorm Ideas / Alternatives
3:00-3:15	Break
3:15-5:00	Brainstorm Ideas / Alternatives
5:00	Adjourn

Day 3: Wednesday, September 19

8:00 – 8:30 Recap Day 2 / Any additional ideas

EVALUATION PHASE

8:30-10:00 Evaluation of Ideas / Alternatives (two-step process)
10:00-10:15 Break
10:15-11:30 Finalize Evaluation

DEVELOPMENT PHASE

11:30-12:00 Introduce Alternatives Development Phase
12:00-1:00 Lunch *(provided)*
Mid-point Review of VE Alternatives (if necessary)
1:00-3:00 Develop / Cost Alternatives
3:00-3:15 Break
3:15-5:00 Develop/Cost Alternatives
5:00 Adjourn

Day 4: Thursday, September 20

DEVELOPMENT PHASE (continued)

8:00-10:00 Develop / Cost Alternatives
10:00-10:15 Break
10:15-12:00 Develop / Cost Alternatives
12:00-1:00 Lunch *(provided)*
1:00-3:00 Develop / Cost Alternatives
3:00-3:15 Break
3:15-5:00 Develop/Cost Alternatives
Begin Group Review of VE Alternatives
Prepare Presentation
5:00 Adjourn

Day 5: Friday, September 21

PRESENTATION PHASE

8:00-9:30 Finalize Presentation
Finalize Group Review of VE Alternatives
10:00-12:00 Out-brief Meeting - Presentation of Key Alternatives
(Attendance by Stakeholders, Decision Makers, Designer and VE Team)
12:00-12:30 Wrap-up, Next Steps, Workshop Closeout
12:30 Adjourn

VALUE ENGINEERING STUDY ATTENDEES

Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

September					Name	Organization	Position	Office Phone Mobile Phone	Email
17	18	19	20	21					
				T	Anderson, Debra	MnDOT			
				T	Beer, Michael	MnDOT			
				T	Blanchard, Amber	MnDOT			
				T	Bucan, Peter	MnDOT			
				✓	Crockett, April	MnDOT	West Area	651-234-7728	april.crockett@state.mn.us
✓	✓	✓	✓	✓	Delmore, Sean	WSB & Associates	Traffic	763-512-5248 612-360-1322	sdelmore@wsbeng.com
✓	✓		✓	✓	Hoberg, Christian	MnDOT	Project Manager	651-234-7720	christian.hoberg@state.mn.us
✓	✓	✓	✓	✓	Hoekstra, Renee	RHA, LLC	CVS Team Leader	602-493-1947 623-764-7490	renee@teamrha.com
				✓	Holstein, Jeff	City of Brooklyn Park		763-493-8102	jeff.holstein@brooklynpark.org
				T	Jabr, Amr	MnDOT			
				T	Jansen, Eric	MnDOT			
✓	✓	✓	✓	✓	Jullie, Kevin	SRF Consulting	Design Lead		kjullie@srfconsulting.com

T=via Telephone

VALUE ENGINEERING STUDY ATTENDEES

Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

September					Name	Organization	Position	Office Phone Mobile Phone	Email
17	18	19	20	21					
				T	Junge, Jason	MnDOT			
✓	✓	✓	✓	✓	Lamkin, Tim	Bolton & Menk	Highway Design	612-845-5265	Tim.Lamkin@bolton-menk.com
				T	Lohr, Bill	FHWA			
✓	✓	✓	✓	✓	Love, Jamal	MnDOT	Geometrics	651-366-4681	jamal.love@state.mn.us
				T	Martinson, Jody	MnDOT			
✓	✓	✓	✓	✓	Milkert, Minnie	MnDOT	Value Engineering Project Manager	651-366-3657	minnie.milkert@state.mn.us
✓	✓	✓	✓	✓	Miller, Patrice	RHA, LLC	CVS Assistant Team Leader	602-493-1947 480-773-8533	patrice@teamrha.com
				✓	Pedersen, Scott	MnDOT	Project Management Manager	651-234-7726	scott.pedersen@state.mn.us
				✓	Radde, Jason	MnDOT	State Aid	651-234-7772	jason.radde@state.mn.us
				T	Roy, Chris	MnDOT			
				✓	Sahebjam, Khani	SRF Consulting		612-801-5150	ksahebjam@srfconsulting.com
				T	Schleugsner, Matt	MnDOT			

T=via Telephone

VALUE ENGINEERING STUDY ATTENDEES

Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

September					Name	Organization	Position	Office Phone Mobile Phone	Email
17	18	19	20	21					
✓				✓	Struve, Jesse	City of Brooklyn Park	City Engineer	952-484-0347	jesse.struve@brooklynpark.org
				T	Western, Kevin	MnDOT			
				T	Yoo, Nancy	MnDOT			

T=via Telephone

IMPLEMENTATION

Implementation

Introduction

The Value Engineering Recommendation Approval Form on the following pages should be completed by all who review the VE Study Report. The form is provided in Excel format from Renee Hoekstra (Renee@TeamRHA.com). The information on this form is used to guide the stakeholders and decision makers as they determine the ultimate disposition of each VE alternative.

The reader is requested to enter their comments related to each VE Proposal after reading each proposal in detail (provided in the VE Alternatives section of this report). In addition, the reader should check the appropriate column that represents their individual opinion relative to whether they agree or disagree with the intent of the VE Proposal. If the reader disagrees and can suggest modifying the alternative to perhaps make it more desirable, that would be helpful.

The reviewers decide upon the status of the VE alternatives in one of three ways:

1. Accept – The VE alternative will be accepted and the original design concept will be modified accordingly.
2. Reject – The VE alternative will not be accepted and the original design concept will be implemented.
3. Accept for further review or modification – The VE alternative disposition will be decided at a future date.

The completed comment form should be returned via e-mail to Minnie Milkert, MnDOT State Value Engineer, minnie.milkert@state.mn.us.

Value Engineering Study Team Recommendations

The following is a list of the key, "most preferred" VE alternatives by the VE team, if combined, would result in meeting the project requirements; these are presented as "Set 1", "Set 2," and "Set 3" below.

Set 1

Idea No.	Idea Title	Overall Performance Score	Initial Cost Savings / (Add)
FM-01	Use roundabouts at ramp terminals on both sides; reduce bridge to two lanes	3.81	$3,516,000
FM-06	Reduce the loop radii from 230 feet to 190 feet on both sides	0.00	$721,000

Value Engineering Study
Minnesota Department of Transportation (MnDOT)
TH169 & 101st Avenue Interchange
State Project Number: 2750-92

Set 1

Idea No.	Idea Title	Overall Performance Score	Initial Cost Savings / (Add)
MC-04	Use the high wall abutment in lieu of the stub abutment to reduce span length	0.24	$283,000
M-04	Delete the escape lane at southbound TH169	1.31	$59,000
M-05	Reduce lane width from 13.5 ft./14 ft./13.5 ft. to 12.5 ft./12 ft. /12.5 ft.	1.19	$71,000
			$4,650,000

Set 2

Idea No.	Idea Title	Overall Performance Score	Initial Cost Savings / (Add)
FM-03	Use an overpass at 101st Avenue with a signalized RCUT at Oxbow Creek Drive	1.43	$2,802,000
M-04	Delete the escape lane at southbound TH169	1.31	$59,000
M-05	Reduce lane width from 13.5 ft./14 ft./13.5 ft. to 12.5 ft./12 ft. /12.5 ft.	1.19	$71,000
			$2,932,000

Set 3 (can go with Sets 1 or 2)

Idea No.	Idea Title	Overall Performance Score	Initial Cost Savings / (Add)
FM-15	Minimize the cross section on the bridge	-0.71	$595,000
FM-20	Reduce the 101st Avenue bridge from five lanes to three lanes	1.07	$879,000
MB-01	Defer local work	0.24	$2,658,000
			$4,132,000

Value Engineering Recommendation Approval Form

Project: TH169 and 101st Avenue Interchange, SP 2750-92
VE Study Date: September 17-21, 2018

		Recommendation	FHWA Functional Benefit					Estimated Savings (Total Life Cycle Cost=Initial Cost+O&M)	Added Cost (Total Life Cycle Cost=Initial Cost+O&M)	Agency Response	
			Safety	Traffic Operation	Environment	Construction	Right-of-Way			Accept / Reject / Accept for further review	Reason (Or use the pages at the end of this memo)
1	FM-01	Use roundabouts at ramp terminals on both sides; reduce bridge to two lanes						$3,516,000	$0		
2	FM-03	Use an overpass at 101st Avenue with a signalized RCUT at Oxbow Creek Drive						$2,802,000	$0		
3	FM-06	Reduce the loop radii from 230 feet to 190 feet on both sides						$721,000	$0		
4	FM-15	Minimize the cross section on the bridge						$595,000	$0		
5	FM-20	Reduce the 101st Avenue bridge from five lanes to three lanes						$283,000	$0		
6	MC-04	Use the high wall abutment in lieu of the stub abutment to reduce span length						$2,658,000	$0		
7	M-03	Defer the path to the future						$49,000	$0		
8	M-04	Delete the escape lane at southbound TH169						$59,000	$0		
9	M-05	Reduce lane width from 13.5 ft./14 ft./13.5 ft. to 12.5 ft./12 ft. /12.5 ft.						$71,000	$0		

NOTE: Two VE Proposals, PR-01 and M-01, were not included on this list because they were not recommended by the VE study team and, therefore, dropped from further consideration. In addition, one VE Proposal, FM-09, was fatally flawed and dropped during the Development Phase.

Total for 9 recommendations	0	0	0	0	0	$ 10,754,000	$ -
Total for XX accepted recommendations						$ -	$ -
Total number of Design Suggestions **(see next page for details)**	2						
Total Project Cost Estimate (TPCE)							

Let Date: August 1, 2019
Team Members - MnDOT - 4

Team Members - Consultant - 2 (two full-time)
Team Members - FHWA - 0

Value Engineering Recommendation Approval Form

Project: TH169 and 101st Avenue Interchange, SP 2750-92
VE Study Date: September 17-21, 2018

		Design Suggestion	FHWA Functional							Agency Response	
			Safety	Traffic Operation	Environment	Construction	Right-of-Way	Estimated Savings (Total Life Cycle Cost=Initial Cost+O&M)	Added Cost (Total Life Cycle Cost=Initial Cost+O&M)	Accept / Reject / Accept for further review	Reason (Or use the pages at the end of this memo)
1	MS-03	Use A+B contracting strategy						N/A	N/A		
2	MS-06	Procure a separate utility package ahead of the main project						N/A	N/A		

Please provide justification if the value engineering study recommendations are **not** approved or are implemented in a modified form.
MnDOT is required to report Value Engineering results annually to FHWA. If the District elects to reject or modify a recommendation, please include a brief explanation of why. Please complete

Signature Project Manager

Date

revised 1/22/2018

FHWA Functional Benefit Criteria

Each year, State DOT's are required to report on VE recommendations to FHWA. In addition to cost implications, FHWA requires the DOT's to evaluate each approved recommendation in terms

Safety: Recommendations that mitigate or reduce hazards on the facility.
Operations: Recommendations that improve real-time service and/or local, corridor, or regional levels of service of the facility.
Environment: Recommendations that successfully avoid or mitigate impacts to natural and or cultural resources.
Construction: Recommendations that improve work zone conditions, or expedite the project delivery.
Right of Way: Recommendations that affect property ownerships or easements.