



**ARGENTA TRAIL (CSAH 63) REALIGNMENT  
77<sup>TH</sup> STREET AREA STUDY**

Preliminary Design Report

February 2015

*Prepared For:*

City of Inver Grove Heights

Dakota County

**Kimley»»Horn**

# ARGENTA TRAIL (CSAH 63) REALIGNMENT 77<sup>TH</sup> STREET AREA STUDY

## Preliminary Design Report



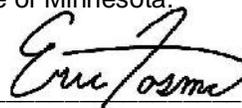
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I hereby certify that this plan, specification  
or report was prepared by me or under my  
direct supervision and that I am duly  
Licensed Professional Engineer under the  
laws of the State of Minnesota.

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

  
Eric Fosmo, P.E.

File: 160509025

Date: February 23, 2015 Lic. No. 48761

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## 1. INTRODUCTION, STUDY PURPOSE AND NEED

Dakota County, MnDOT, and the City of Inver Grove Heights are planning a project for the Argenta Trail (CSAH 28 south of TH 55, CSAH 63 north of TH 55) and TH 55 intersection including extending the current 4-lane divided section through TH 55 to Amana Trail (CSAH 28). The project will include turn lanes on all approaches, and the installation of a permanent signal system at the intersection. These improvements will require the realignment of Argenta Trail to address the currently substandard horizontal and vertical curves through the project area. The existing Argenta Trail (CSAH 28) and 77<sup>th</sup> Street intersection (south of TH 55) will be removed with the project due to the shift in Argenta Trail (CSAH 28) to the east. The draft MnDOT Geometric Layout for the project is included as Appendix A to this report.

The existing 77<sup>th</sup> Street intersection with Argenta Trail (CSAH 28) also does not meet minimum spacing requirements with the TH 55 intersection. County design standards require an approximate intersection spacing of ¼ mile which requires the new 77<sup>th</sup> Street connection to be relocated to the existing Yankee Doodle Road/Argenta Trail intersection or further west towards the City of Eagan along Yankee Doodle Road. This purpose of the study is to evaluate potential realignment alternatives for 77<sup>th</sup> Street to meet the following goals for the proposed connection with Argenta Trail/Yankee Doodle Road (CSAH 28)

- Provide adequate intersection spacing from TH 55 and Argenta Trail (CSAH 28/63) intersection to accommodate traffic movements
- Provide a new full access intersection from the 77<sup>th</sup> Street neighborhood to Argenta Trail/Yankee Doodle Road (CSAH 28)

## 2. PRELIMINARY DESIGN ALTERNATIVES

Based on the need to relocate the existing 77<sup>th</sup> Street intersection along Argenta Trail/Yankee Doodle Road (CSAH 28), three preliminary design alternatives were developed for evaluation. The following summary of preliminary design alternatives details the approach to each alignment alternative and the impacts associated with each alignment. The illustration of all three alignments are included in Appendix B of this report.

### ***Alignment Option A***

Alignment Option A connects the existing 77<sup>th</sup> Street intersection at the current Yankee Doodle Road/Argenta Trail intersection. Alignment Option A is consistent with past City planning studies for the future alignment of 77<sup>th</sup> Street, which utilizes a 90 degree intersection and two 30 mph curves to connect 77<sup>th</sup> Street at the existing Yankee Doodle Road/Argenta Trail intersection location. The proposed layout for Alignment Option A is shown in Appendix B of this report. The following is a summary of the design elements and outcomes of the alignment.

- Maintains existing neighborhood traffic routing as 77<sup>th</sup> Street is extended to the proposed intersection with Yankee Doodle Road/Argenta Trail.
- Uses a 90 degree intersection with two 30 mph reverse curves to make connection from existing 77<sup>th</sup> Street to the new intersection location.
- The design speed of the proposed alignment is 30 mph (except for 90-degree intersection).
- Meets minimum sight distance requirements at Yankee Doodle Road (CSAH 28).

Alignment Option A would have the following impacts:

- 3 properties would be impacted, approximately 1.5 acres
- Increases average peak hour intersection delay for left turns existing neighborhood
- Minor impacts to existing stormwater features (0.5 acre-feet storage needed)

### ***Alignment Option B***

Alignment Option B was developed to connect the existing 77<sup>th</sup> Street neighborhood through a modified connection point at Rolling Hills Circle within the City of Eagan. Alignment Option B connects to the existing Argenta Trail/Yankee Doodle Road intersection similar to Alignment Option A. The proposed layout for Alignment Option B is shown in Appendix B of this report. The following is a summary of the design elements and outcomes of the alignment.

- Modifies the connection point of 77<sup>th</sup> Street via Rolling Hills Circle which alters the neighborhood traffic routing.
- Provides the most direct alignment connection to Yankee Doodle Road.
- The design speed of the proposed alignment is 30 mph.
- Meets minimum sight distance requirements at Yankee Doodle Road (CSAH 28).

Alignment Option B would have the following impacts:

- 6 properties would be impacted, approximately 1.5 acres
- Increases average peak hour intersection delay for left turns existing neighborhood
- Major impacts to existing stormwater features (1.9 acre-feet storage needed)
- Increases traffic volume on neighborhood streets (2 block area) with redistribution of neighborhood trips

### ***Alignment Option C***

Alignment Option C was developed to connect the existing 77<sup>th</sup> Street neighborhood through a modified connection point at Rolling Hills Circle (same as Alignment Option B) within the City of Eagan and connects to Yankee Doodle Road approximately ¼ mile west of the existing Yankee Doodle Road/Argenta Trail intersection. Alignment Option C utilizes a 20 mph curve to provide the connection to Yankee Doodle Road directly south of Rolling Hills Circle. The connection provides a tee intersection with Yankee Doodle Road. The proposed layout for Alignment Option C is shown in Appendix B of this report. The following is a summary of the design elements and outcomes of the alignment.

- Modifies the connection point to the 77<sup>th</sup> Street neighborhood via Rolling Hills Circle which alters the neighborhood traffic routing.
- Utilizes a 20 mph reverse curves to make connection to the existing intersection.
- The design speed of the proposed alignment is 30 mph (except for 20 mph curve).
- Meets minimum sight distance requirements at Yankee Doodle Road (CSAH 28).

Alignment Option C would have the following impacts:

- 1 total acquisition
- 4 properties would be impacted, approximately 1.2 acres
- Decreases average peak hour intersection delay for left turns existing neighborhood
- Minor impacts to existing stormwater features (0.5 acre-feet storage needed)
- Increases traffic volume on neighborhood streets (2 block area) with redistribution of neighborhood trips

### 3. EVALUATION CRITERIA

All preliminary design alignment alternatives generally meet City roadway design standards, but result in varying impacts to the properties, traffic patterns, and natural resources within the project area. The project management team (PMT) developed the following evaluation criteria to compare the impacts that would occur with the implementation of each of the design alternatives.

- Roadway Operations and Safety
- Impacts to existing stormwater basins/features
- Right-of-Way Acquisition and Property Impacts
- Impacts to Private Utilities (Magellan Pipeline)
- Construction and Right-of-Way Costs

The evaluation matrix generated from the criteria listed above is included in the report as Appendix C. A ranking system was also generated to provide a comparative assessment for each alternative within each of the evaluation criteria. A following is a summary of the ranking system:

- Green – Indicates a comparatively low level of impact (most preferred) of the alignments for the particular evaluation criteria
- Yellow – Indicates a comparatively medium level of impact of the alignments for the particular evaluation criteria
- Red – Indicates a comparatively high level of impact (least preferred) of the alignments for the particular evaluation criteria

### 4. PUBLIC AND AGENCY INVOLVEMENT

The preliminary design alternatives process has included regular project management team (PMT) meetings. The PMT includes the following members, who have met nine times:

- City of Inver Grove Heights
- City of Eagan
- Dakota County
- MnDOT

The study was led by the City of Inver Grove Heights, with the participation of the agencies listed above. The study has been jointly funded by the City of Inver Grove Heights and Dakota County.

Public and agency input has been gathered from regular PMT meetings and public involvement meetings with affected property and area residents. The following public meetings were held as part of the public and agency involvement process:

- Open House #1 – November 19, 2014
- Open House #2 – January 7, 2015
- 77<sup>th</sup> Street Neighborhood Meeting – February 11, 2015

Notices for open houses were placed in the paper and direct mailings were sent to area property owners. The open houses and neighborhood meeting were completed as part of the study process to inform the public and solicit their input on the proposed design alternatives. The project website was also updated on a regular basis to keep interest parties informed of the study progress. A summary of the comments and input received from the public involvement process has been provided as Appendix D to this report.

## 5. 77<sup>TH</sup> STREET AREA TRAFFIC STUDY

The realignment of a connection from the 77<sup>th</sup> Street neighborhood to Yankee Doodle Road will impact the operations of traffic entering and exiting the neighborhood and has the potential, depending on the alignment option, to alter the traffic patterns within the neighborhood. A traffic study of the 77<sup>th</sup> Street neighborhood was completed to understand the operational impact of the proposed 77<sup>th</sup> Street realignment. Details of the traffic study, included as Appendix E to this report, are as follows

- Traffic counts were taken at Yankee Doodle Road/Argenta Trail and existing 77<sup>th</sup> Street intersections on January 6, 2015.
- A sight line visibility assessment was completed for each alignment option.
- Intersection operations were analyzed for the AM and PM peak hours for traffic exiting the 77<sup>th</sup> Street neighborhood.
- A crash summary analysis was completed for the segment of Yankee Doodle Road between TH 55 and the Alignment Option C connection point.
- A signal analysis was completed for existing conditions and each alignment option.

The general findings of the traffic study were as follows.

- The Alignment Option C connection point provides better operations for traffic exiting the neighborhood than the other two alignment options. A summary of the traffic operations is included in Appendix E.
- Alignment Options B and C significantly alter the traffic pattern within the existing 77<sup>th</sup> Street neighborhood. These alignment options also isolate significant portions of the existing neighborhood to one roadway in and out of the neighborhood (Rolling Hills Drive south of 77<sup>th</sup> Street). A summary of the impacts to the traffic operations of the existing neighborhood is included in Appendix E.
- Adequate sight lines exist for each of the alignment options.
- Current crash rates for the existing intersections are near state-wide averages.
- A signal is not currently justified for any of the alignment options at the Yankee Doodle Road/Argenta Trail intersection.

## 6. SUMMARY AND RECOMMENDATION

The study of preliminary design alternatives was completed to provide an evaluation of the options to realign the 77<sup>th</sup> Street connection to Yankee Doodle Road. The evaluation matrix summarizing the preliminary design work is attached as Appendix C to this report. Following the evaluation of the alignment alternatives and these potential impacts with each alignment, the project management team recommends ***the approval of Alignment Option A*** as the preferred alignment for the realignment of 77<sup>th</sup> Street. The following is a summary of the proposed Alignment Option A recommendation.

### ***Alignment Option A***

- Alignment Option A provides a full access intersection at the existing Yankee Doodle Road/Argenta Trail intersection. Intersection operations are at an acceptable level of service per current design standards.
- The alignment maintains the existing traffic patterns of the neighborhood, where Alignment Options B and C create significant changes to existing traffic patterns resulting in large increases in traffic for some areas of the neighborhood (Neighborhood Traffic Volumes in Appendix E).
- Alignment Option A provides the lowest combination of construction and right-of-way costs.
- The alignment has support from both the City of Eagan and Inver Grove Heights engineering staff based on existing neighborhood impacts.

## 7. IMPLEMENTATION SCHEDULE

The 77<sup>th</sup> Street realignment is proposed to be constructed as part of the Argenta Trail Realignment project (County Project 63-25). The implementation of the preferred alignment option would follow the implementation schedule of CP 63-25 as follows:

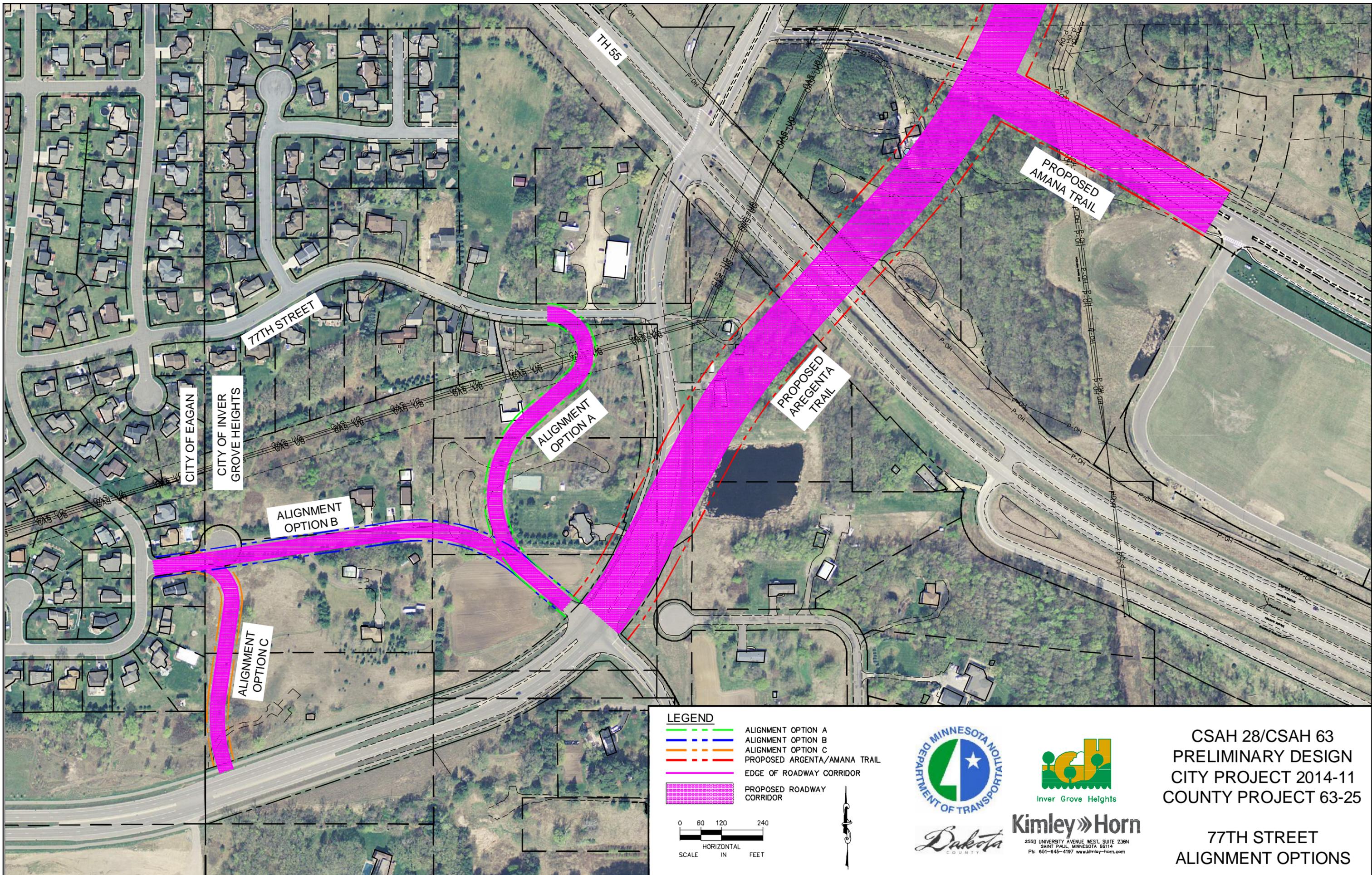
- Inver Grove Heights City Council receives recommendation – February 23, 2015
- Inver Grove Heights City Council action anticipated on or before – March 9, 2015
- Dakota County Board of Commissioners action – March 17, 2015
- Inver Grove Height City Council and Dakota County Board of Commissioners consider approval of Joint Powers Agreement for project cost share – March 2015
- Inver Grove Heights holds public hearing to consider ordering the project – April 2015
- Right-of-Way acquisition process begins –April 2015
- Final design, ROW acquisition, and bidding complete – Spring 2016
- Construction start – Summer 2016

## APPENDICES

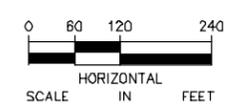
### APPENDIX A – DRAFT MNDOT GEOMETRIC LAYOUT



## APPENDIX B – ALIGNMENT ALTERNATIVES



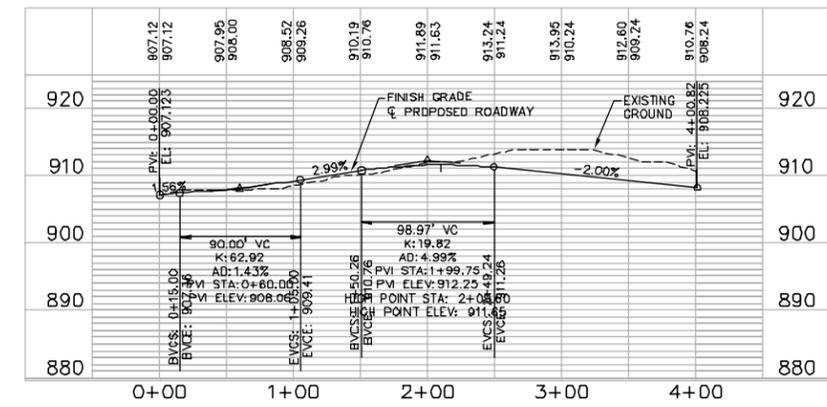
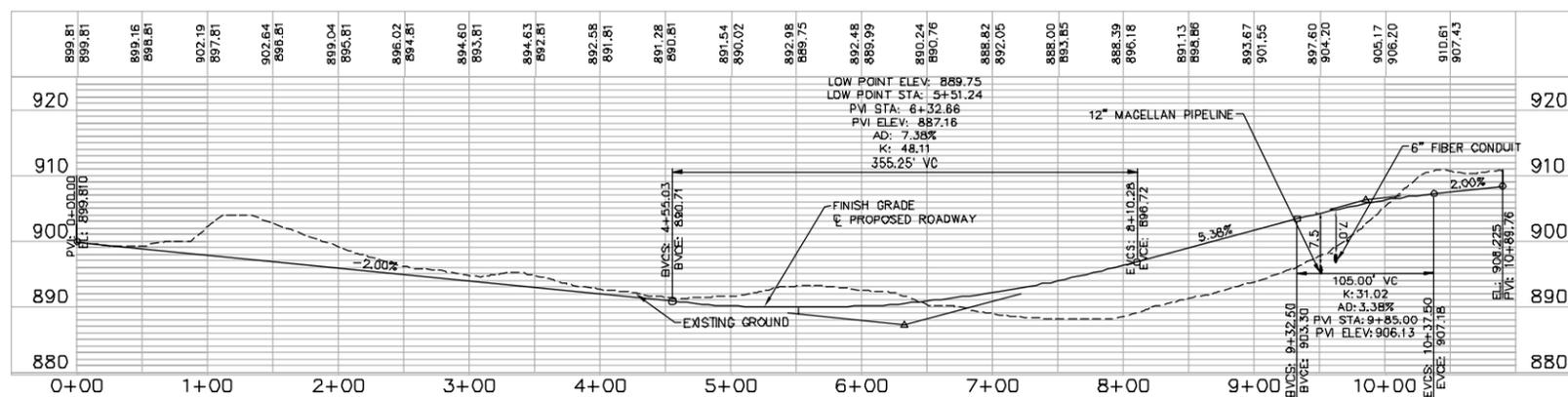
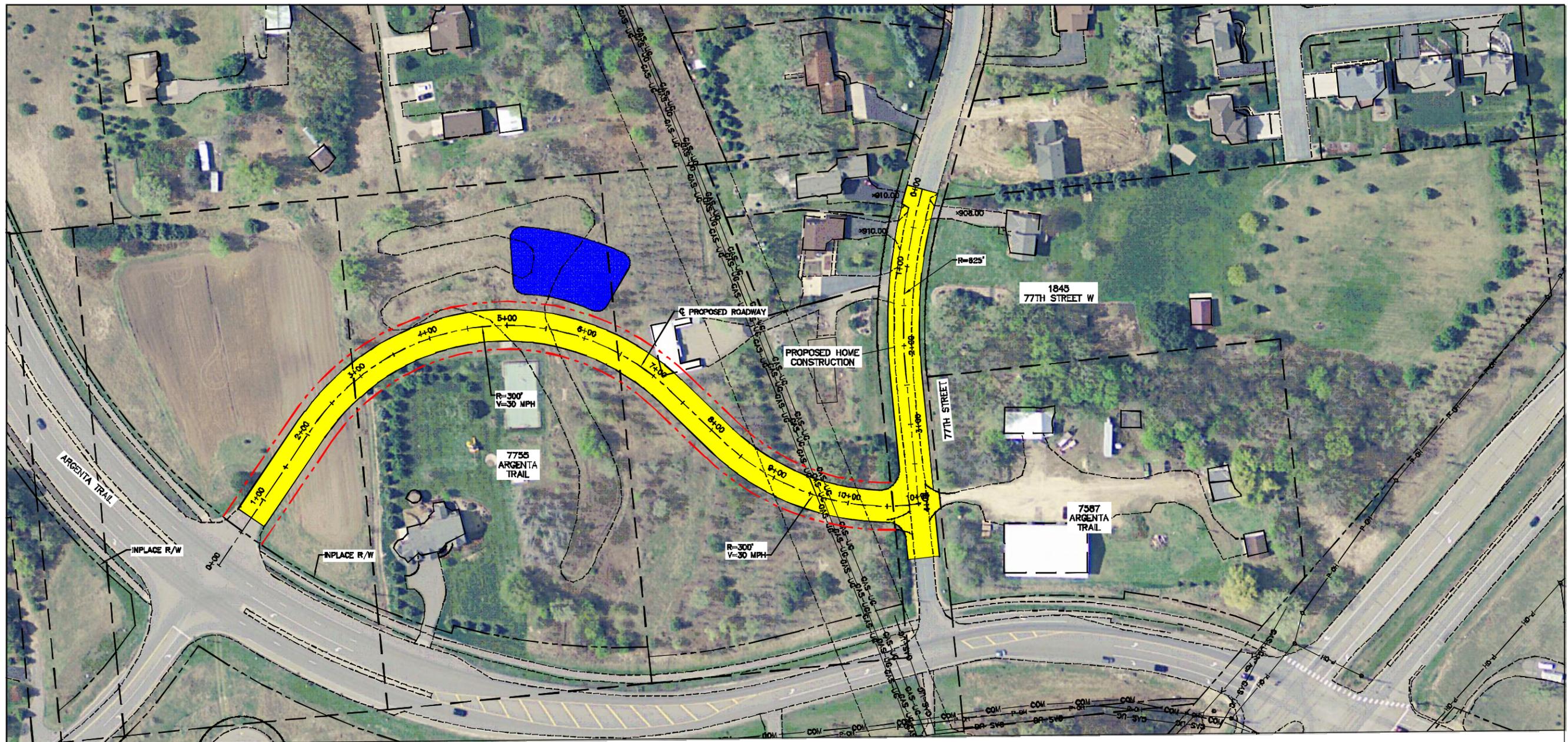
- LEGEND**
- ALIGNMENT OPTION A
  - - - ALIGNMENT OPTION B
  - - - ALIGNMENT OPTION C
  - - - PROPOSED ARGENTA/AMANA TRAIL
  - EDGE OF ROADWAY CORRIDOR
  - PROPOSED ROADWAY CORRIDOR



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CSAH 28/CSAH 63  
 PRELIMINARY DESIGN  
 CITY PROJECT 2014-11  
 COUNTY PROJECT 63-25

77TH STREET  
 ALIGNMENT OPTIONS



**LEGEND**

- PROPOSED ROADWAY IMPROVEMENTS
- WETLAND/DRAINAGE FEATURE IMPACTS
- PROPOSED WETLAND/DRAINAGE MITIGATION AREA
- PROPOSED RIGHT-OF-WAY
- CONSTRUCTION LIMITS

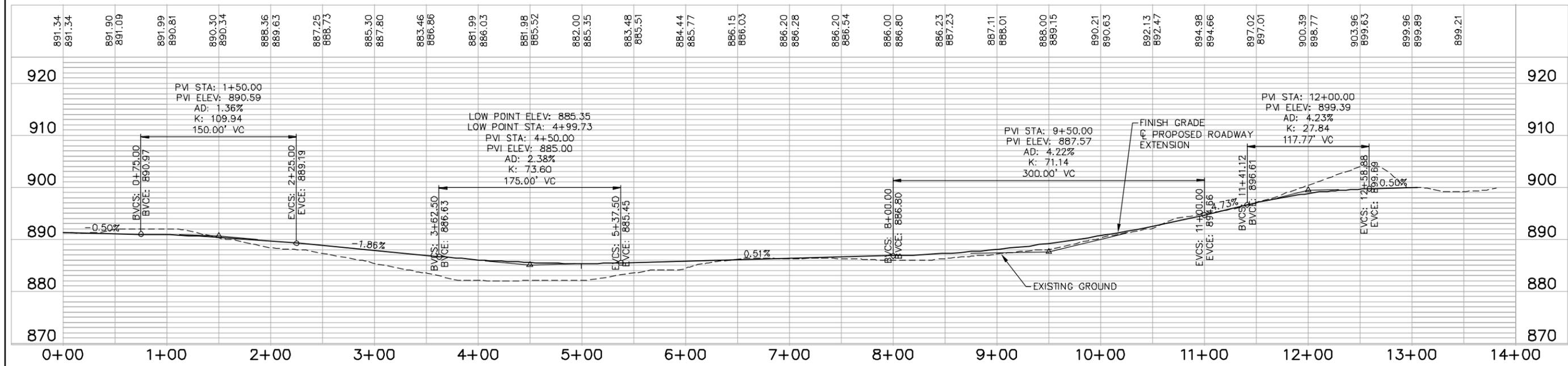
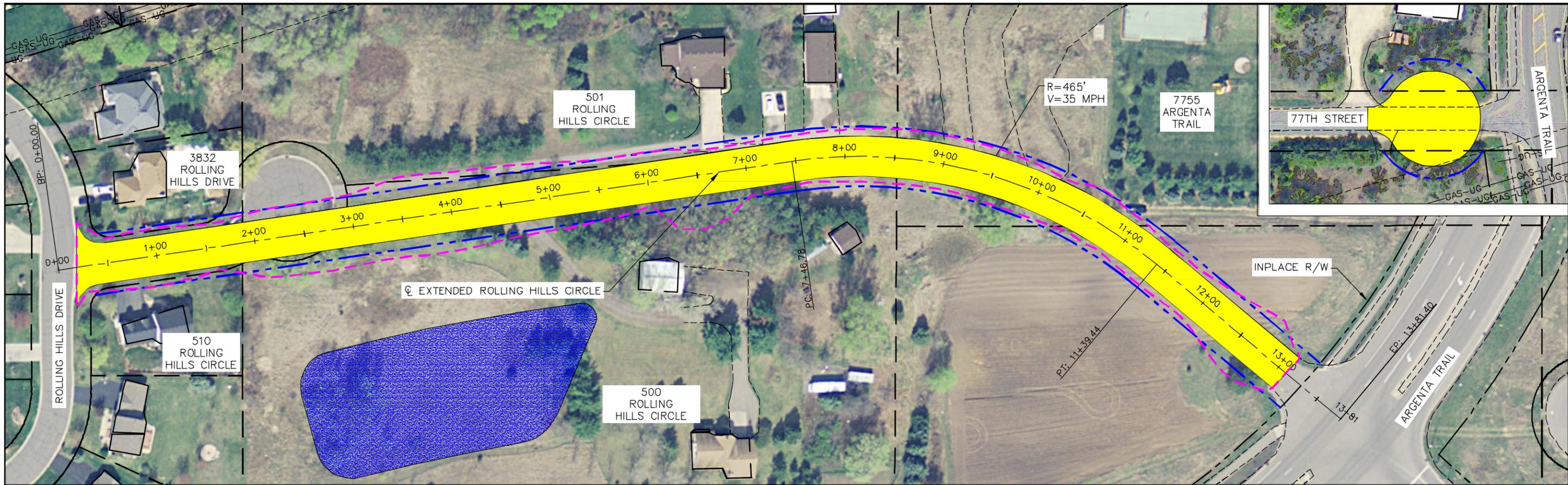
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SCALE IN FEET

MINNESOTA  
DEPARTMENT OF TRANSPORTATION

**IGH**  
Invar Grove Heights

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CSAH 28/CSAH 63  
PRELIMINARY DESIGN  
CITY PROJECT 2014-11  
COUNTY PROJECT 63-25  
77TH STREET - OPTION A



**LEGEND**

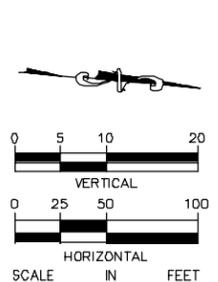
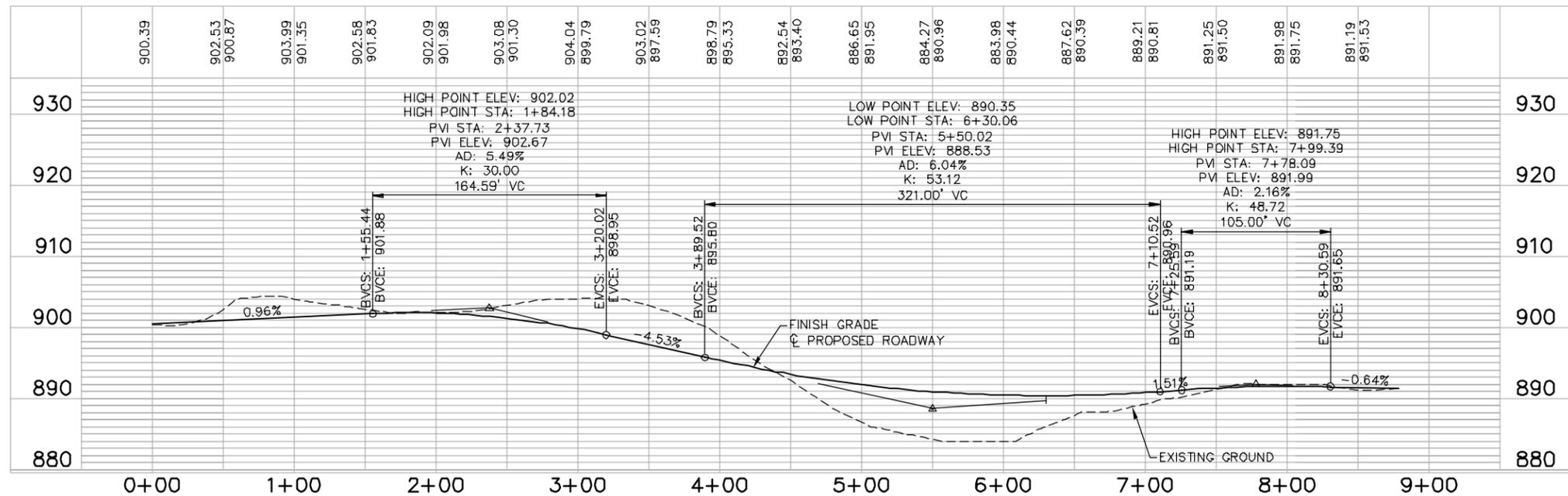
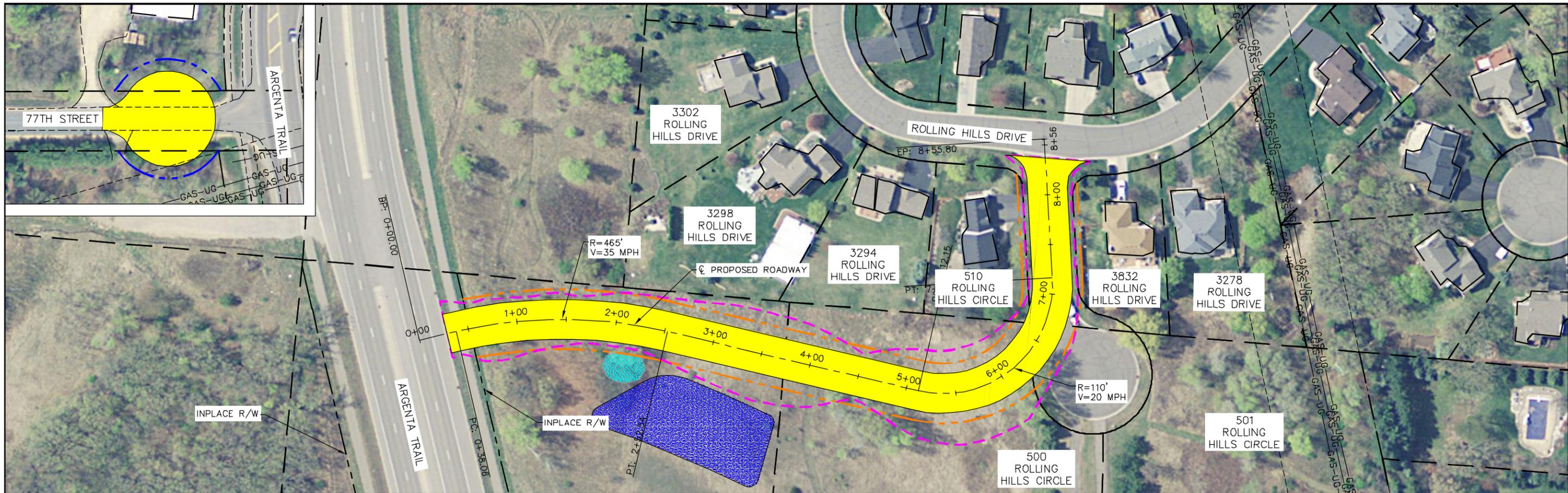
- PROPOSED ROADWAY IMPROVEMENTS
- WETLAND/DRAINAGE FEATURE IMPACTS
- PROPOSED WETLAND/DRAINAGE MITIGATION AREA
- PROPOSED RIGHT-OF-WAY
- CONSTRUCTION LIMITS

VERTICAL SCALE: 0, 5, 10, 20 FEET

HORIZONTAL SCALE: 0, 25, 50, 100 FEET

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**CSAH 28/CSAH 63**  
**PRELIMINARY DESIGN**  
**CITY PROJECT 2014-11**  
**COUNTY PROJECT 63-25**  
**77TH STREET - OPTION B**



- LEGEND**
- PROPOSED ROADWAY IMPROVEMENTS
  - WETLAND/DRAINAGE FEATURE IMPACTS
  - PROPOSED WETLAND/DRAINAGE MITIGATION AREA
  - PROPOSED RIGHT-OF-WAY
  - CONSTRUCTION LIMITS



CSAH 28/CSAH 63  
 PRELIMINARY DESIGN  
 CITY PROJECT 2014-11  
 COUNTY PROJECT 63-25  
 77TH STREET - OPTION C

APPENDIX C – EVALUATION MATRIX

# Argenta Trail Improvement Project



## 77<sup>TH</sup> STREET ALTERNATIVES RATING MATRIX

### RECOMMENDED

Project Goals	Considerations	Alternative A	Alternative B	Alternative C
Operations/ Safety	Provides a connection from the neighborhood to Argenta Trail	Maintains existing neighborhood connection routing to Argenta Trail	Alters existing traffic flow through neighborhood (re-routes up to 1,400 vehicles a day)	Alters existing traffic flow through neighborhood (re-routes up to 1,400 vehicles a day)
	Access to future development	No access changes/restrictions	No access changes/restrictions	Impacts access to future development on Yankee Doodle Road
	Horizontal and vertical roadway alignments meet 30 MPH design speed	Requires 90-degree intersection to accommodate Magellan Pipeline crossing	Meets project goal	Some horizontal curves require 20 MPH design speed (matches existing neighborhood)
	Intersection sight distance met at Yankee Doodle Road connection	Meets project safety goals	Meets project safety goals	Meets project safety goals
	Yankee Doodle Road intersection operations compared to existing	Increases average peak hour intersection delay for left turns exiting neighborhood (12-13 seconds)	Increases average peak hour intersection delay for left turns exiting neighborhood (15-19 seconds)	Decreases average peak hour intersection delay for left turns exiting neighborhood (1-2 seconds)
	Future Yankee Doodle Road intersection operations	Future growth of Yankee Doodle Road and Argenta Trail traffic will increase peak-hour delays	Future growth of Yankee Doodle Road and Argenta Trail traffic will increase peak-hour delays	Future growth of Yankee Doodle Road and Argenta Trail traffic has less impact on intersection delays
Project Cost	Construction cost	<b>\$500,000</b>	<b>\$550,000</b>	<b>\$450,000</b>
	Minimize total acquisitions	<b>Right-of-Way</b> <ul style="list-style-type: none"> <li>Approximately 1.5 acres of new ROW</li> <li>0 total acquisitions</li> <li>Impacts 3 parcels</li> <li>\$250,000*</li> </ul>	<b>Right-of-Way</b> <ul style="list-style-type: none"> <li>Approximately 1.5 acres of new ROW</li> <li>0 total acquisitions</li> <li>Impacts 6 parcels</li> <li>\$250,000</li> </ul>	<b>Right-of-Way</b> <ul style="list-style-type: none"> <li>Approximately 1.2 acre of new ROW</li> <li>1 total acquisition</li> <li>Impacts 4 parcels</li> <li>\$650,000</li> </ul>
	Utility impacts/relocation cost	No significant impact – modified roadway geometry and profiles to accommodate Magellan Pipeline standards	No significant impact	No significant impact
Stormwater Treatment	Stormwater treatment capacity meets northwest area (NWA) requirements	0.5 ac-ft storage needed Minor impacts to existing stormwater features/ponds	1.9 ac-ft storage needed Major impact to existing stormwater features/ponds	0.5 ac-ft storage needed Minor impacts to existing stormwater features/ponds

\* Actual costs will be finalized through right-of-way acquisition process.

APPENDIX D – PUBLIC INVOLVMENT SUMMARY AND  
COMMENTS RECEIVED

## PUBLIC COMMENTS

Open House #1 (Nov. 19, 2014), Exceptions Neighborhood Meeting (Dec. 30, 2014), Open House #2 (Jan. 7, 2015)

Comments Received thru 2/9/15

	Comments	Number	Response
1	Traffic speeds on existing 77th St. W. are a problem.	5	The City of Inver Grove Heights Police Department completed a speed survey over a nine day period (May 30 - June 7, 2013) on 77th Street between Argenta Trail and the Eagan border. Of 893 vehicles that were clocked, seven (7) exceeded the 30 MPH speed limit (1@35 -stopped, 3@33, 1@32, 2@31). The average speed for all of the vehicles was 25 mph. These results are not indicative of a speeding problem.
2	Can the speed limit be lowered to 20 M.P.H.	1	The speed limit on all urban residential streets statewide is 30 mph by State Statute. Cities do not have the ability by law to lower a speed limit to 20 mph.
3	Option C is preferred because a large amount of UPS trucks use Argenta Trail/ Yankee Doodle Road	1	The traffic study noted that UPS trucks are using Yankee Doodle Rd./ Argenta Trail. The volume of trucks was taken into account in assessing the operations at Argenta Trail for Option A and Option B.
4	Intersection at Yankee Doodle Rd./ Argenta Trail will be more dangerous to make a left from the neighborhood to northbound Argenta Trail with Option A or B	1	The traffic assessment does show that drivers will experience a longer delay making a left turn out of the neighborhood during peak periods under Options A and B in comparison with Option C (approximately 13 seconds more than today for Option A and 19 seconds more than today for Option B). Drivers that don't want to wait would have the option to turn right and then make a U-turn at the next median opening.
5	Option B & C change the traffic patterns of the neighborhood	6	The analysis of the options (as shown in the matrix) does reflect traffic pattern changes through the neighborhood as a factor to consider, consistent with public comments received previously. Both Options B and C do substantially change the traffic flow through the neighborhood, potentially rerouting up to 1400 vehicles per day.

## PUBLIC COMMENTS

Open House #1 (Nov. 19, 2014), Exceptions Neighborhood Meeting (Dec. 30, 2014), Open House #2 (Jan. 7, 2015)

Comments Received thru 2/9/15

	Comments	Number	Response
6	Options B and C are preferred because the neighborhood access is centered within the neighborhood	2	Option B and C do provide a more central access to the County road system from the neighborhood, but also increase traffic volumes substantially in this immediate area, even pulling some traffic that currently use the TH 149 intersection today.
7	How does the potential future interchange at TH 55 impact the access decision?	1	Options A, B, and C are all unlikely be impacted by a potential future interchange at TH 55 and Argenta Trail. Options A and B will be closest, but if there is an interchange at TH 55 someday, the ramps on the south side will most likely be a tight diamond configuration due to existing development.
8	Will City (IGH) water and sewer be available to this neighborhood in the future?	1	The City of Inver Grove Heights does not have plans for installing water and sewer to this neighborhood at this time. Water and sewer will likely be installed when the area south of TH 55 develops/ redevelops.
9	Will a change in traffic control be installed at the new intersection under any of the options?	8	Based on the information from the traffic study, side-street stop signs is the safest and most efficient traffic control for the intersection with Yankee Doodle Road for all three options. It is possible that the existing Yankee Doodle Road/Argenta Trail intersection could be considered for a traffic control change in the future considering projected traffic volumes at this intersection. This will depend on traffic growth along Argenta south of Yankee Doodle Road.
10	What is the status of the traffic study? When will a copy be publically available?	1	The draft traffic study will be discussed at the neighborhood meeting on Wednesday February 11, 2015. The traffic study will be available later this month on the project's webpage.
11	When is construction going to begin? How long will it take?	1	Construction is scheduled to begin in the spring of 2016 and be substantially complete in the fall of 2016.

## PUBLIC COMMENTS

Open House #1 (Nov. 19, 2014), Exceptions Neighborhood Meeting (Dec. 30, 2014), Open House #2 (Jan. 7, 2015)

Comments Received thru 2/9/15

	Comments	Number	Response
12	Traffic will be on three sides of a property under Option C	1	This is true. Under this scenario, it is possible that this property would need to be fully acquired due to right of way impacts and related damages.
13	When will the preferred alignment be determined?	FAQ	The Project Management Team will be presenting a preferred alignment at the February 11 neighborhood meeting. Ultimately, the Inver Grove Heights City Council will need to approve the alignment, and, if Option B or C are preferred, the Eagan City Council would need to approve the alignment as well.
14	Existing Argenta Trail south of TH 55 has existing sight line issues. If the 77th Street realignment connects at the intersection of Yankee Doodle Rd. and Argenta Trail, what will be done to improve this intersection?	FAQ	The PMT has evaluated the sight lines at both of the potential intersection locations and determined that both locations have adequate sight lines based on time needed to make a decision and accelerate.

APPENDIX E – 77<sup>TH</sup> STREET AREA TRAFFIC STUDY

## 1. Reason for Study

The CSAH 28 (Yankee Doodle) / CSAH 63 (Argenta Trail) and TH 55 intersection is planned to be reconstructed to address capacity and safety issues. The existing 77<sup>th</sup> Street connection is proposed to be closed to CSAH 28 to address intersection spacing and alignment needs with the CSAH 63 roadway changes to ensure safe and efficient access. Three southerly alignment options for realigning 77<sup>th</sup> Street are proposed:

- 1) Alignment A – Roadway connection from 77<sup>th</sup> Street to Argenta Trail and CSAH 28
- 2) Alignment B – Roadway connection from Rolling Hills Circle at Argenta Trail and CSAH 28
- 3) Alignment C – Roadway connection from Rolling Hills Circle 1150' w of Argenta Trail at CSAH 28

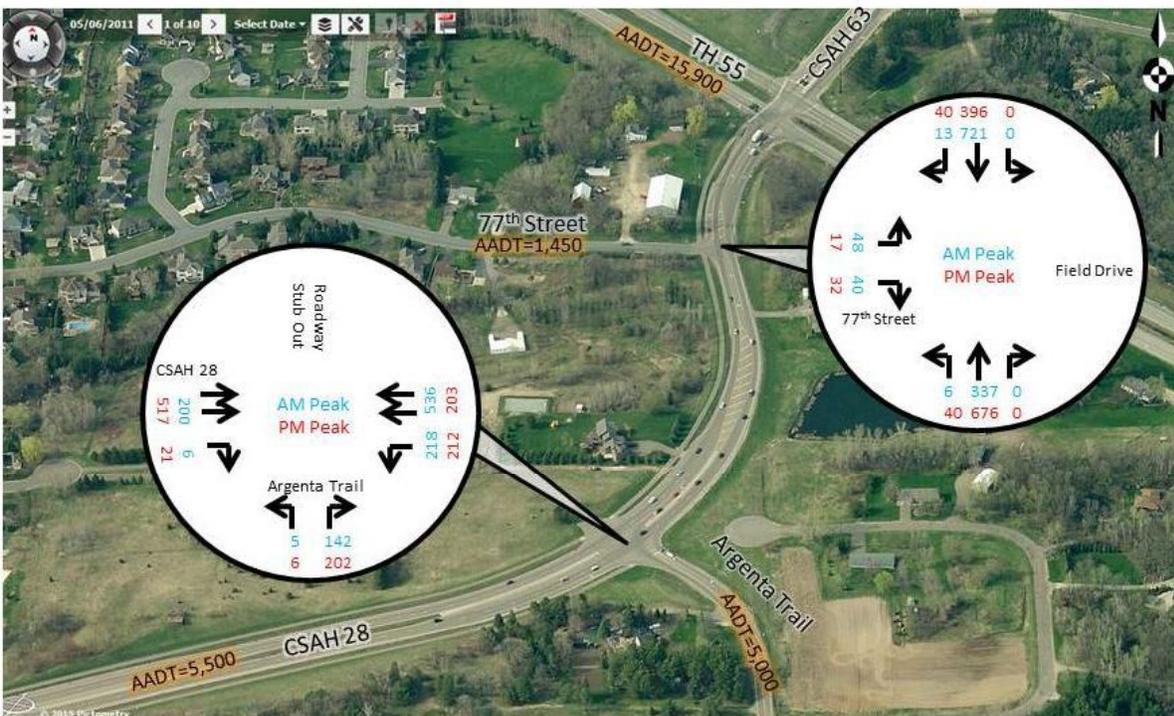
The change in traffic distribution based on the local road connections and intersection location where evaluated to determine how traffic would operate under all three alignment options.

## 2. Existing Conditions

### Traffic Volumes and Operations

Current traffic counts were collected at the intersections of CSAH 28 at 77<sup>th</sup> Street and CSAH 28 at Argenta Trail as shown in Figure 1.

Figure 1: Existing Average Annual Daily Traffic and Peak Hour Traffic Volumes



The Highway Capacity Manual (HCM) documents procedures for determining the performance of different traffic control at intersections. Intersections and the roadway approaches are assigned a "Level of Service" letter grade for the peak hour of traffic based on attributes such as traffic control and traffic volumes. Level of Service (LOS) A represents light traffic flow (free flow conditions) while LOS F represents heavy traffic flow (over capacity conditions). LOS D is considered acceptable operations.

The existing AM and PM one-hour peak operations were assessed using HCM methodologies for side-street stop operations (see Table 1). The trips utilizing this intersection are estimated to be generated from the area highlighted in orange in Figure 2.

Table 1 – Existing Peak Hour Operations

AM Peak Hour	77 <sup>th</sup> Street @						CSAH 28					
Direction	Eastbound						Northbound			Southbound		
Movement	LT	TH	RT				LT	TH	RT	LT	TH	RT
Count (veh)	48		40				6	337			721	13
Delay (sec)	15.6		14.2				9.1					
LOS (mvnt)	C		B				A					
LOS (apprch)		B										
PM Peak Hour	77 <sup>th</sup> Street @						CSAH 28					
Direction	Eastbound						Northbound			Southbound		
Movement	LT	TH	RT				LT	TH	RT	LT	TH	RT
Count (veh)	17		32				40	676			396	40
Delay (sec)	11.3		10.8				8.3					
LOS (mvnt)	B		B				A					
LOS (apprch)		B										
AM Peak Hour	CSAH 28 @						Argenta Trail					
Direction	Eastbound			Westbound			Northbound					
Movement	LT	TH	RT	LT	TH	RT	LT	TH	RT			
Count (veh)		200	6	218	536		5		142			
Delay (sec)				8.1			16.3		9.4			
LOS (mvnt)				A			C		A			
LOS (apprch)								A				
PM Peak Hour	CSAH 28 @						Argenta Trail					
Direction	Eastbound			Westbound			Northbound					
Movement	LT	TH	RT	LT	TH	RT	LT	TH	RT			
Count (veh)		517	21	212	203		6		202			
Delay (sec)				9.3			16.8		11.2			
LOS (mvnt)				A			C		B			
LOS (apprch)		B						B				

### Field-Observed Delay

The observed delays for these movements are higher than the calculated delay:

Table 2 – Observed Intersection Delay

Intersection / Movement	Delay
CSAH 28 & 77 <sup>th</sup> Street – EB Left Turn	AM Pk – 21 sec
	PM Pk – 17 sec
CSAH 28 & Argenta Trail – NB Left Turn	AM Pk – 78 sec
	PM Pk – 33 sec

On the day of the observation, the roads were partially snow covered and drivers may have been exercising more caution by choosing larger gaps due to the roadway conditions.

### Safety

Crash data for the years 2012 through 2014 was assessed for the segment and existing intersections. Crash and severity rates are calculated based on the number of crashes and the extent of injuries occurring per million entering vehicles. The CSAH 28 and Argenta Trail intersection crash rate is higher than the state-wide average for side-street stop control, but has a lower severity rate due to the crashes involving property damage only (N). The segment (non-intersection crashes) has a little higher than statewide average for similar roadways with 4 crashes occurring and a severity rate that is over double the average due to 3 of the 4 crashes resulting in injuries and fatality (K).

Table 3 – Crash Summary

Intersection	Entering Vehicle Volume	Number of Crashes	Crash Type	Crash Severity	Crash Rate	Severity Rate	State Ave Crash Rate	State Ave Severity Rate
CSAH 28 & 77 <sup>th</sup> Street	6,225	1	Right Angle	N	0.15	0.15	0.18	0.26
CSAH 28 & Argenta Trail	8,000	2	Right Angle	N	0.23	0.23	0.18	0.26
Segment Crashes (non-intersection)	5,500	4	Run Off Road Run Off Road Right Turn Head On	N B C K	0.78	2.15	0.63	0.92

Source: Minnesota Crash Mapping Analysis Tool (MnCMAT)

### Signal Warrants

A traffic signal warrant analysis was performed for each intersection. To justify a signal, one major 8-hour signal warrant needs to be met for consideration of a traffic signal installation. Neither intersection met any hour of any signal warrants.

Warrant 1A requires 420 total vehicles on the major roadway and 140 total vehicles on the minor roadway for the same 8 hours of a day. Warrant 1B requires 630 total vehicles on the major roadway and 70 total vehicles on the side road for the same 8 hours of a day. CSAH 28 meets the major road volumes needed for Warrant 1A at both intersections, but does not meet the major road volumes for Warrant 1B at either. The side road volumes needed for Warrant 1A and 1B are not met for any hours with the highest volume on 77<sup>th</sup> Street being 65 vehicles and 10 vehicles on Argenta Trail.

Table 4 – Signal Warrant Analysis

Intersection	Warrant 1A		Warrant 1B		Warrant 1C		Warrant 2		Warrant 3	
	Hours Met	Warrant Met?	Hours Met	Warrant Met?	Hours Met	Warrant Met?	Hours Met	Warrant Met?	Hours Met	Warrant Met?
CSAH 28 & 77 <sup>th</sup> Street	0 of 8	No	0 of 8	No	0 of 8	No	0 of 4	No	0 of 1	No
CSAH 28 & Argenta Trail	0 of 8	No	0 of 8	No	0 of 8	No	0 of 4	No	0 of 1	No

### 3. Traffic Generation and Distribution

The neighborhood area consists of 262 Single-Family Detached housing generating approximately 2620 daily trips that access the neighborhood by way of TH 149 and 77<sup>th</sup> Street. This is depicted by the entire shaded areas shown in Figure 2 on page 5. Utilizing the existing traffic counts, it is estimated 1470 trips (56%) (orange area in Figure 2) are currently utilizing the 77<sup>th</sup> Street intersection.

It is expected that the trips generated and distributed with Alignment A will be similar to the existing conditions. Forty-three more homes (blue area in Figure 2) are expected to utilize Alignment Options B and C compared to the current 77<sup>th</sup> Street access due to proximity of the new connection to these homes.

Figure 2: Trip Generation Areas



- Existing and Alignment A Trip Generation – 147 Single Family Homes
- Alignment B and C Additional Trip Generation – 43 Single Family Homes
- Trip Generation Destined to/from TH 149 – 72 Single Family Homes

Utilizing the ITE Trip Generation Manual for Single-Family Detached Housing (Code 210), the 43 homes will generate the following peak hour trips and distributions as shown in Table 1:

Table 5 – Additional Trip Generation and Distribution

	Trip Generation	Exiting Trip Distribution	Number of Exiting Trips	Entering Trip Distribution	Number Of Entering Trips	Total Number of Trips
AM Peak	0.75	75%	24	25%	8	32
PM Peak	1.0	37%	16	63%	27	43

The existing directional distribution was used to assign direction for the additional generated trips in each of the alignment options.

#### 4. Operational Assessment of Alignment Options

The three alignment options with the redistributed trip assignments were assessed using HCM methodologies for side-street stop operations. For Alignments A and B, the side roads were assessed to have a right turn lane and a shared left/thru lane.

## Alignment Option A

The trips generation and distribution utilizing the new intersection are expected to be similar to the existing 77<sup>th</sup> Street intersection (area highlighted in orange in Figure 2). The traffic volumes and AM and PM peak one hour operational assessment associated with this alignment are shown in Figure 3 and Table 6.

Figure 3: Peak Hour Traffic Volumes – Alignment Option A

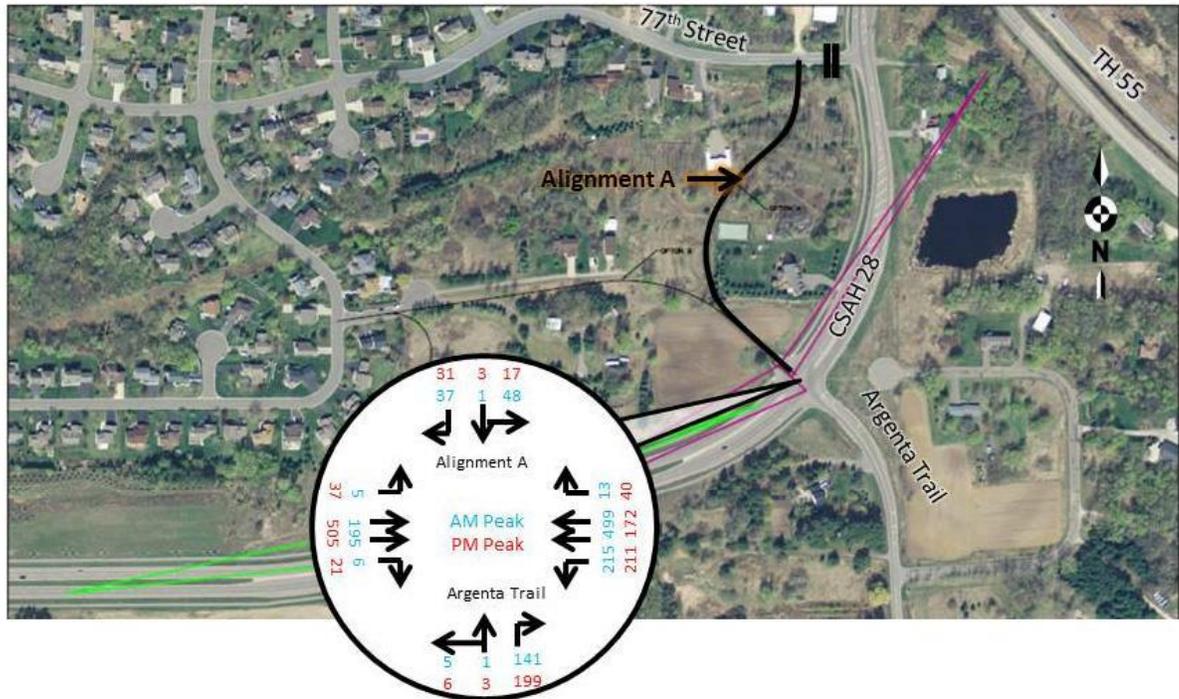


Table 6 – Alignment Option A Intersection Operations

AM Peak Hour	CSAH 28 @						Argenta Trail			Alignment A		
Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Count (veh)	5	195	6	215	499	13	5	1	141	48	1	37
Delay (sec)	8.4			8.1			18.6		9.4	27.8		9.8
LOS (mvnt)	A			A			C		A	D		A
LOS (apprch)								A			C	
PM Peak Hour	CSAH 28 @						Argenta Trail			Alignment A		
Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Count (veh)	37	505	21	211	172	4	6	3	199	17	3	31
Delay (sec)	7.6			9.3			20.0		11.1	24.5		8.8
LOS (mvnt)	A			A			C		B	C		A
LOS (apprch)								B			B	

## Alignment Option B

It is expected that some of the current trips exiting to the west of TH 149 will now use Alignment B (area highlighted in blue in Figure 2). The traffic volumes and AM and Peak one hour operational assessment associated with this alignment are shown in Figure 4 and Table 7.

Figure 4: Peak Hour Traffic Volumes – Alignment Option B

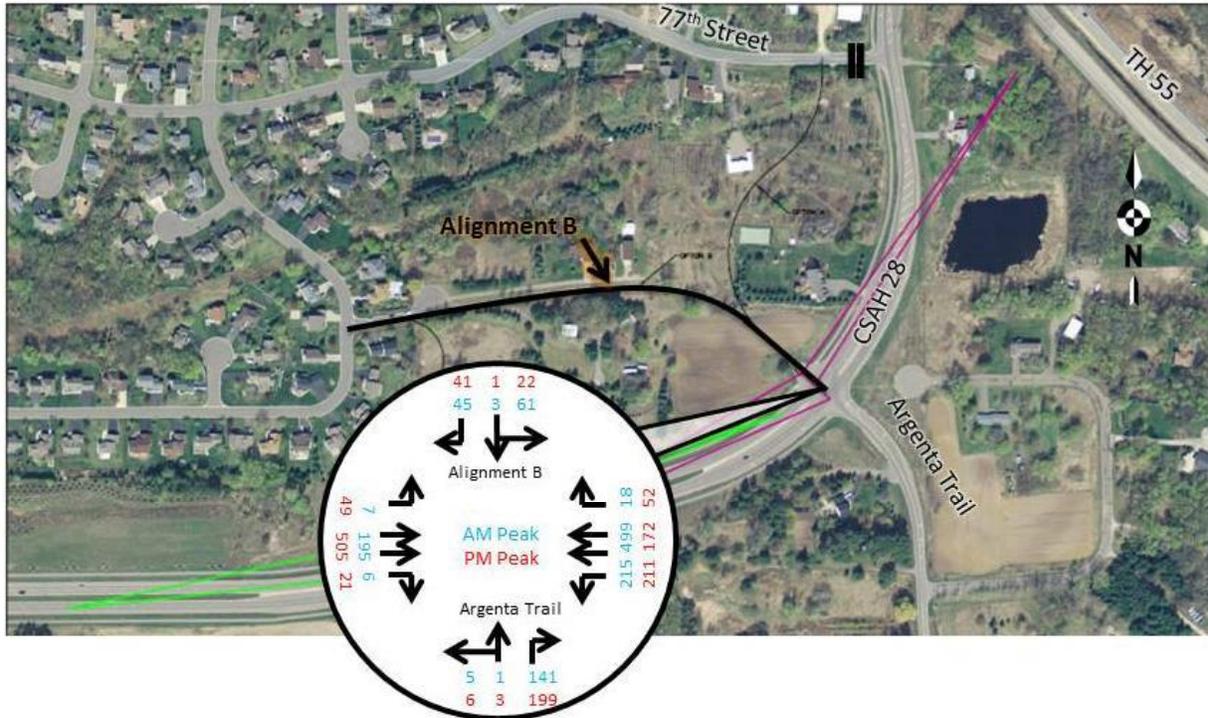


Table 7 – Alignment Option B Operations

AM Peak Hour	CSAH 28 @						Argenta Trail			Alignment B		
Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Count (veh)	7	195	6	215	499	18	5	1	141	61	3	45
Delay (sec)	8.4			8.1			18.9		9.4	30.3		9.8
LOS (mvnt)	A			A			C		A	D		A
LOS (apprch)								A			C	
PM Peak Hour	CSAH 28 @						Argenta Trail			Alignment B		
Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Count (veh)	49	505	21	211	172	52	6	3	199	22	1	41
Delay (sec)	7.8			9.3			22.6		11.1	30.0		8.8
LOS (mvnt)	A			A			C		B	D		A
LOS (apprch)								B			C	

### Alignment Option C

It is expected that some of the current trips exiting to the west of TH 149 will divert to Alignment (area highlighted in blue in Figure 2), similar to alignment option B. The traffic volumes and AM and PM peak one hour operational assessment associated with this alignment are shown in Figure 5 and Table 8.

Figure 5: Peak Hour Traffic Volumes – Alignment Option C

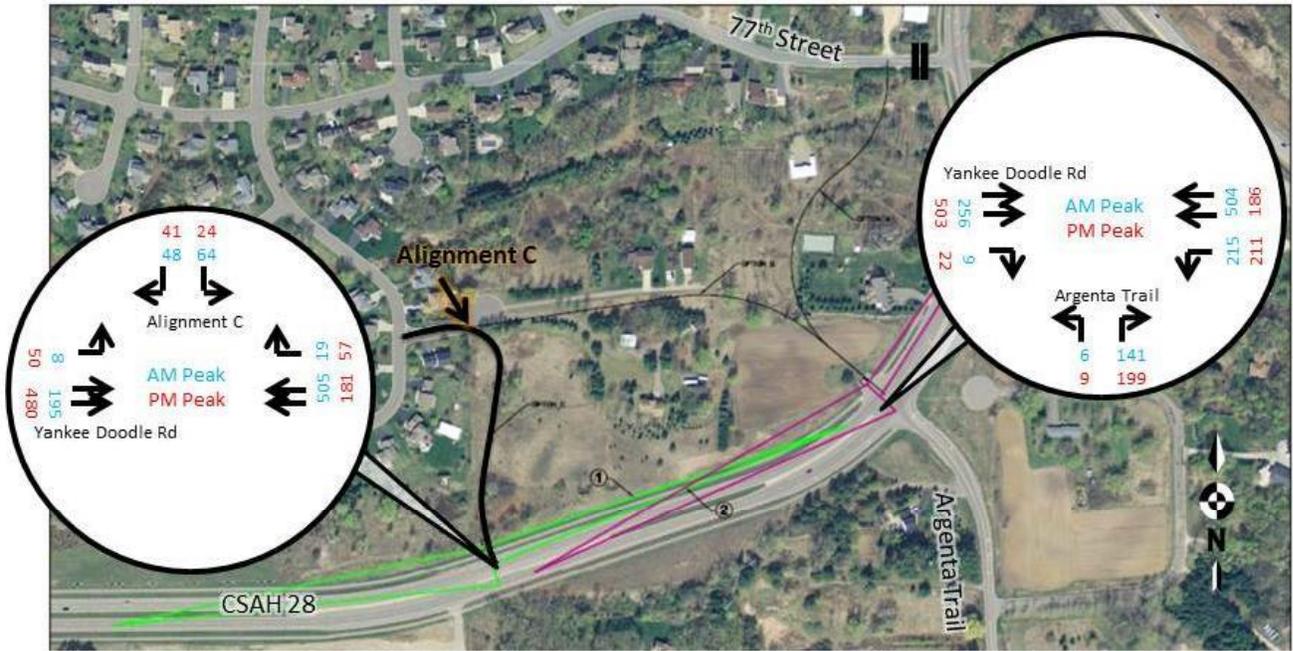


Table 8 – Alignment Option C Intersection Operations

AM Peak Hour	CSAH 28 @						Alignment C		
Direction	Eastbound			Westbound			Southbound		
Movement	LT	TH	RT	LT	TH	RT	LT	TH	RT
Count (veh)	8	195			505	19	64		48
Delay (sec)	8.4						13.4		9.8
LOS (mvnt)	A						B		A
LOS (apprch)								B	
PM Peak Hour	CSAH 28 @						Alignment C		
Direction	Eastbound			Westbound			Southbound		
Movement	LT	TH	RT	LT	TH	RT	LT	TH	RT
Count (veh)	50	480			181	57	24		41
Delay (sec)	7.8						11.9		8.9
LOS (mvnt)	A						B		A
LOS (apprch)								A	

The operational assessment of the intersection of CSAH 28 and Argenta Trail for Alignment Option C yields very similar delay results as in the existing condition due to minimal traffic redistribution (see Table 1).

## 5. Assessment Summary

### Operations Comparison

Comparing to the delay experienced today at 77<sup>th</sup> Street, the exiting left turns from the neighborhood will experience 12 to 20 seconds more delay in both the AM and PM Peak Hours with Alignments A and B, and will have 2 seconds less delay in the AM Peak with Alignment C. The level of service for the left turn movement will decrease to a LOS of C/D with Alignment A and LOS D with Alignment B.

Table 9 - Operations Comparison of Exiting Side Road Trips North Of CSAH 28

AM Peak Hour	Existing 77 <sup>th</sup> Street			Alignment A			Alignment B			Alignment C		
Movement	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Count (veh)	48		40	48	1	37	61	3	45	64		48
Delay (sec)	15.6		14.2	27.8		9.8	30.3		9.8	13.4		9.8
LOS (mvnt)	C		B	D		A	D		A	B		A
LOS (apprch)		B			C			C			B	
PM Peak Hour	Existing 77 <sup>th</sup> Street			Alignment A			Alignment B			Alignment C		
Movement	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Count (veh)	17		32	17	3	31	22	1	41	24		41
Delay (sec)	11.3		10.8	24.5		8.8	30.0		8.8	11.9		8.9
LOS (mvnt)	B		B	C		A	D		A	B		A
LOS (apprch)		B			B			C			A	

### Traffic Signal Control Assessment

After redistribution of trips, the exiting left turn / through traffic movement volumes for Alignment A increased 2% (1 trip) from the existing 77<sup>th</sup> Street exiting volumes in the AM peak hour and 18% (3 trips) in the PM peak hour. These percentages were then applied accordingly for the 8 highest side road volume hours of the day to assess if a major signal warrant would be met. The same approach was applied for Alignments B and C. Alignment B exiting volumes increased 33% (16 trips) from the existing 77<sup>th</sup> Street exiting volumes in the AM peak hour and 35% (6 trips) in the PM peak hour. Alignment C volumes increased 33% (16 trips) in the AM peak hour and 41% (7 trips) in the PM peak hour.

In all of the alignment options, adjusted traffic volumes are not at levels in which signal warrants are met and installation of a signal would be justified as shown in Table 10.

Table 10 – Signal Warrant Comparison of Alignments

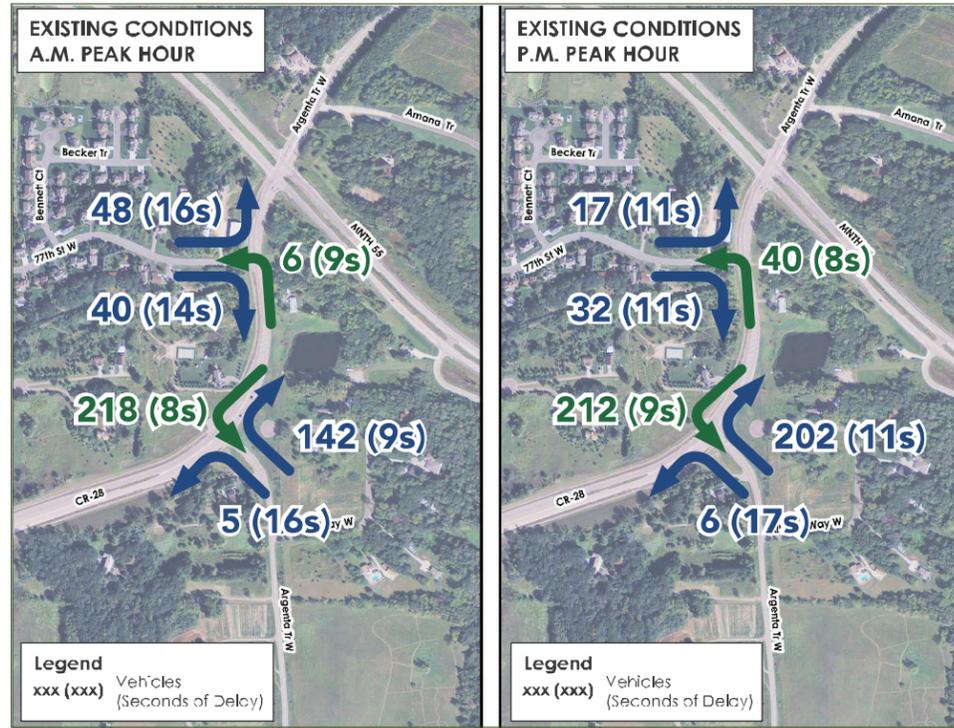
Hour	Existing 77 <sup>th</sup> St	Alignment A			Alignment B			Alignment C			Major Appr Vol	
	Minor Appr Vol	Largest Minor Appr Vol	Warrant Vol Met		Largest Minor Appr Vol	Warrant Vol Met		Largest Minor Appr Vol	Warrant Vol Met			
			140	70		140	70		140	70	420	630
6 - 7 AM	39	39			51			51			X	
7 - 8 AM	65	66			86	X		86	X		X	X
8 - 9 AM	37	37			49			49			X	X
9 - 10 AM	21	21			28			28			X	
10 - 11 AM												
11 - 12 AM	15	15			19			19			X	X
12 - 1 PM												
1 - 2 PM												
2 - 3 PM												
3 - 4 PM	19	25			26			26			X	X
4 - 5 PM	17	22			22			23			X	X
5 - 6 PM	15	19			20			21			X	X
6 - 7 PM												
Warrant		Alignment A Hours Met		Alignment B Hours Met		Alignment C Hours Met		Hours Required		Warrant Met/ Not Met		
Warrant 1A:		0		0		0		8		Not Met		
Warrant 1B:		0		1		1		8		Not Met		
Warrant 1C:		0		0		0		8		Not Met		
Warrant 2: 4 Hour		0		1		1		4		Not Met		
Warrant 3: Peak Hour		0		0		0		1		Not Met		

## 6. Recommendation

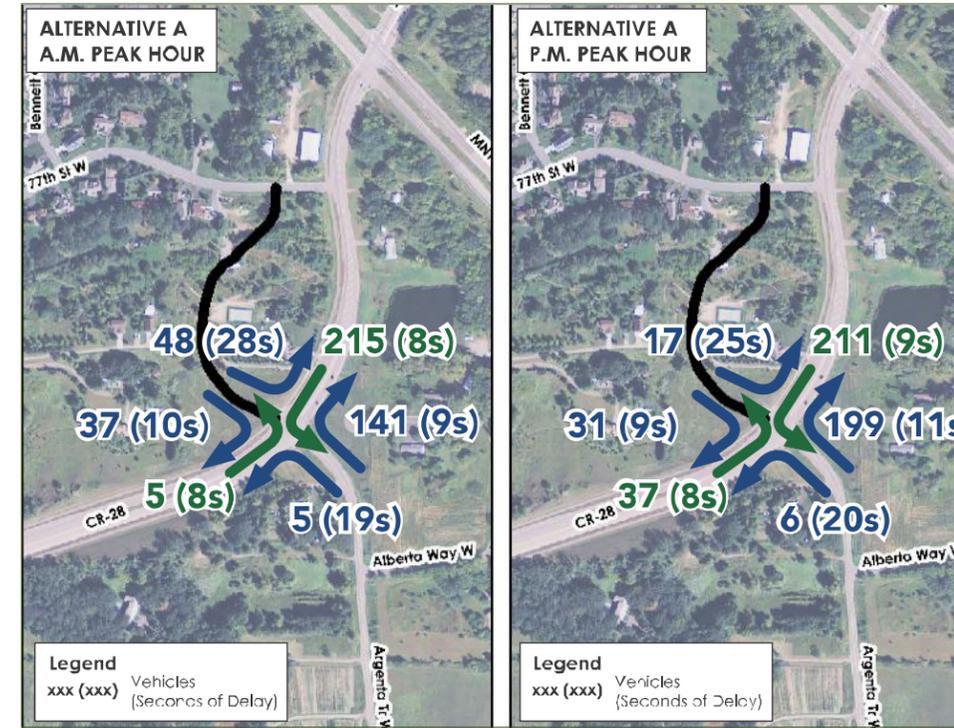
The recommended alternative decision will be based on assessment of several factors including operations, safety, right of way impacts, and construction costs.

# Traffic Operations Summary

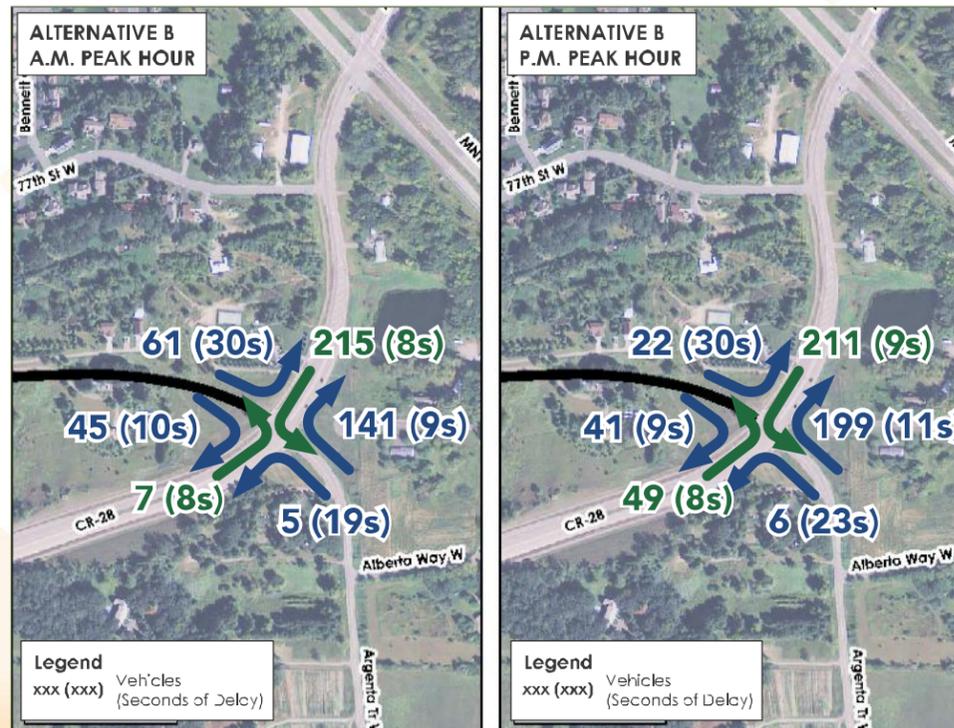
Existing Conditions



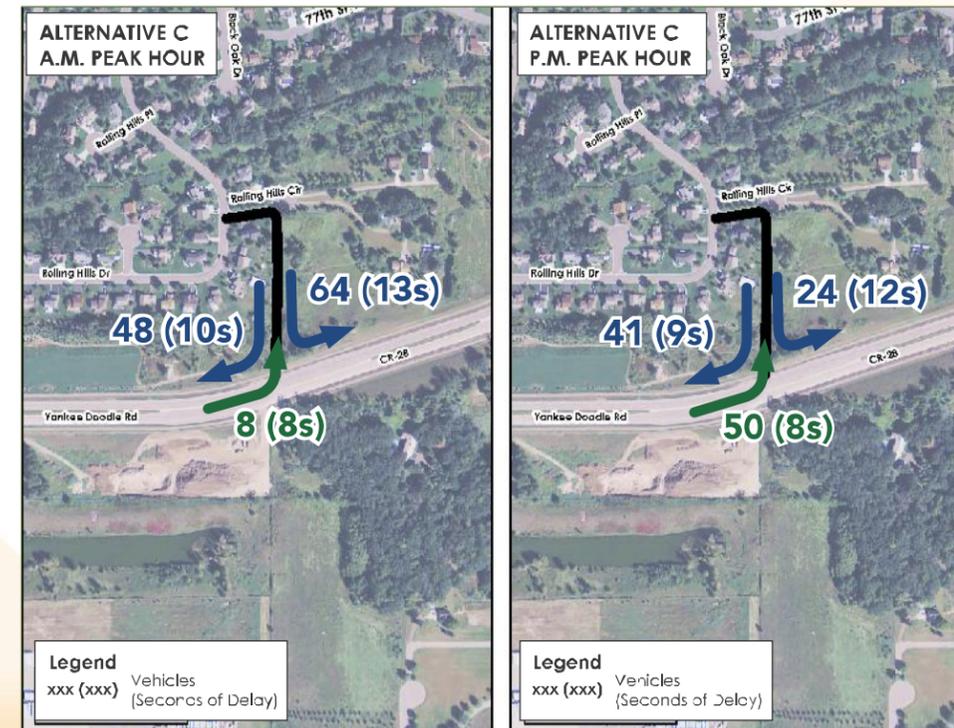
Alignment A



Alignment B

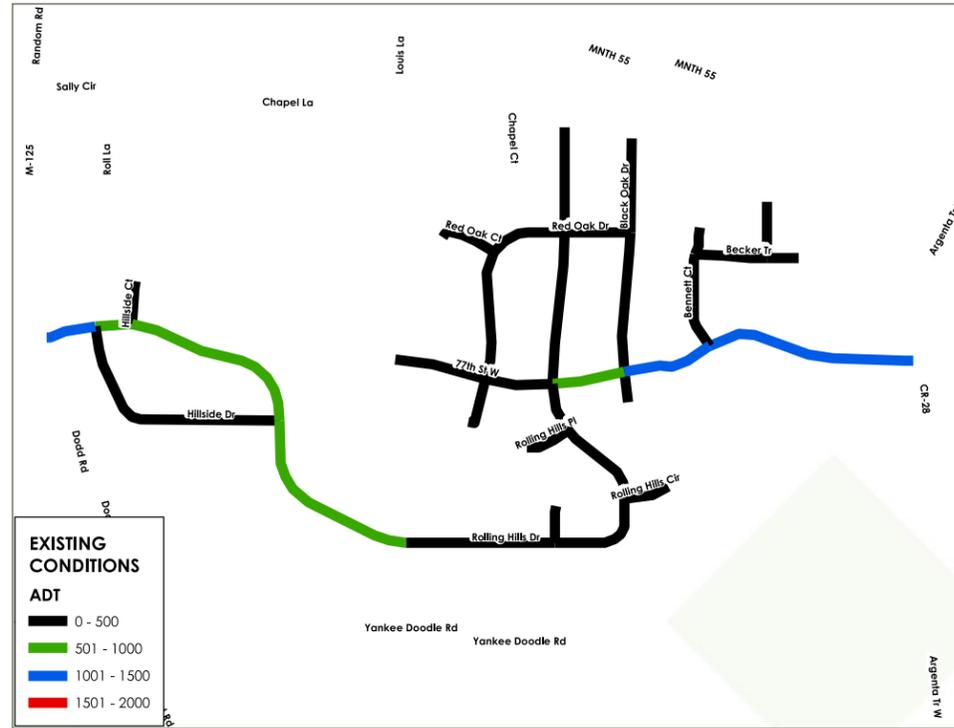


Alignment C

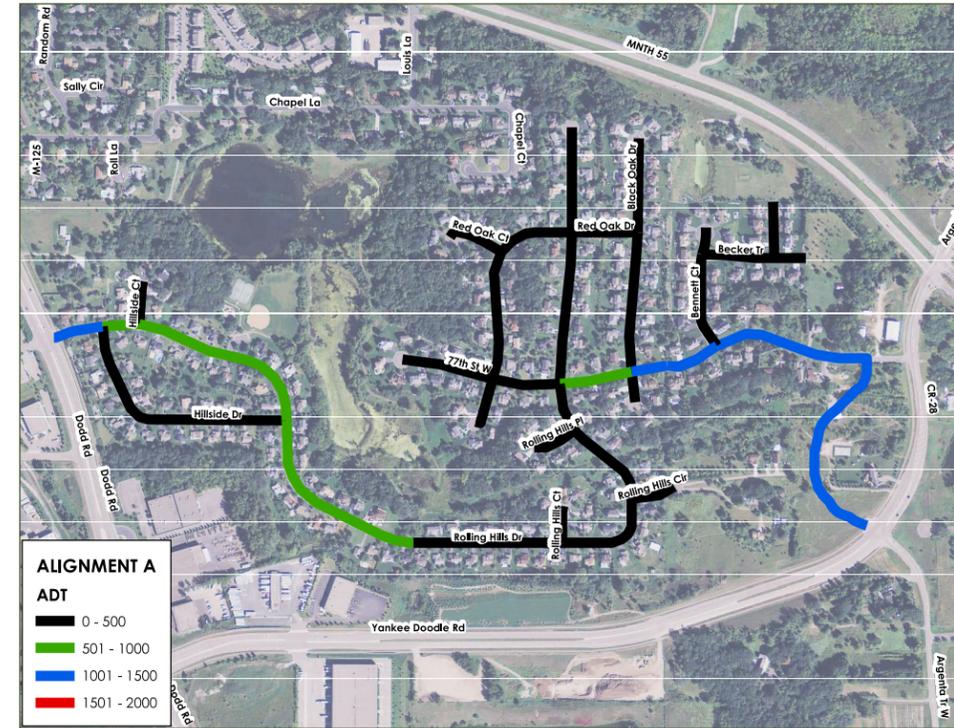


# 77th Street Realignment Neighborhood Traffic Volumes

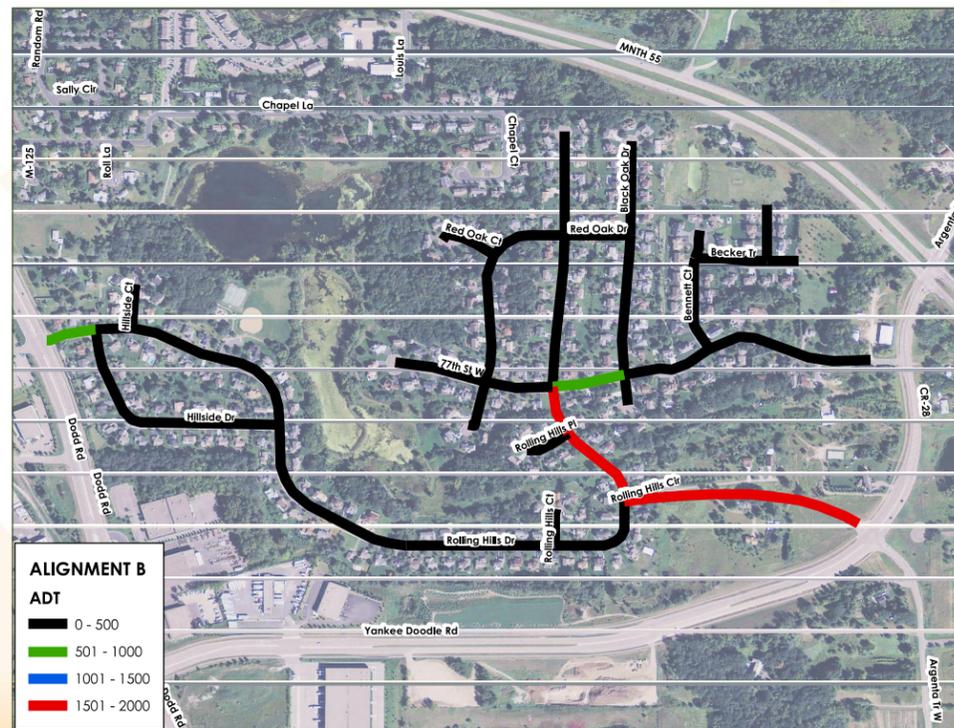
Existing Conditions



Alignment A



Alignment B



Alignment C

