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DeWitt RISE Grant
TIS – Technical Memorandum

Summary of Findings

Intersection of South 6th Avenue and US Highway 30 EB Off-Ramp
Intersection of South 6th Avenue and Industrial Street
Intersection of US Highway 30 and 300th Avenue
Intersection of US Highway 30 and 330th Avenue

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SUMMARY OF FINDINGS

This memorandum supplements the original traffic impact study for the DeWitt RISE Grant development at US 30 and 300th Avenue. In addition to the intersection treatment at US 30 and 300th Avenue, at the conclusion of the original study (Option 0), three additional treatments were analyzed (Options 1 through 3).

OPTION 0 – ORIGINAL STUDY FINDINGS

This option maintains a full access intersection at US 30 and 300th Avenue and is the design condition in the original study.

Exhibit A, at the back of this memo, shows the proposed configuration for each option.

OPTION 1 – RIGHT-IN/RIGHT-OUT ONLY CONDITIONS

Opening Day Conditions - Right-In/Right-Out (RIRO)

The restriction of right-in/right-out only traffic at 300th Avenue, results in the redirection of trips turning left to and from US 30 to and from 300th Avenue. These trips are redirected to use the US 30 EB Off Ramp at South 6th Avenue. During the AM peak hour, the volume of left turning trips from US 30 EB Off Ramp onto South 6th Avenue will increase. The intersection will experience minor delays during the AM peak hour.

In the PM peak hour, the EB left-turning traffic from US 30 EB Off Ramp onto NB South 6th Avenue will experience delays up to 75 seconds per vehicle and poor LOS due to the increase in SB traffic leaving the proposed Industrial Park via South 6th Avenue and the interchange under existing two-way stop control (TWSC).

We propose the intersection of US 30 EB Off Ramp at South 6th Avenue be converted to an 'All Way Stop Controlled' (AWSC) intersection. This change improves the overall intersection delay during the PM peak hour from 23.8 seconds per vehicle to 14.4 seconds per vehicle.

At the intersection of S 6th Avenue and Industrial Street, the increase in traffic leaving the proposed Industrial Park during the PM peak hour and making a left turn onto South 6th Avenue creates a delay up to 70.6 seconds per vehicle. However, increasing the signal cycle length to 80 seconds will improve this turning movement delay to 24.2 seconds per vehicle. Exhibit B shows a summary table of the overall LOS and delay for each intersection analyzed for Opening day and Future conditions.

Future Conditions – Right-In/Right-Out (RIRO)

Under future growth conditions, and with the addition of the Industrial Park site generated traffic from the 200 acres east of 300th Avenue, traffic volumes are increased. The additional traffic adds to the existing traffic movements and creates increased delays.

We propose the same mitigation suggestions highlighted in Option 1; AWSC intersection at South 6th Avenue and US 30 EB Off Ramp, as well as 80 second signal timing cycle at South 6th Avenue and Industrial Street.

At the intersection of South 6th Avenue and US 30 EB Off Ramp, the traffic increase is such that an AWSC intersection will experience unacceptable delays of 96.1 seconds per vehicle and LOS F, during the PM peak hour. Specifically, the SB vehicles turning left from S 6th Avenue onto HWY 30 EB will experience LOS F and a delay of 148.5 seconds per vehicle. Because of this delay in both directions, a traffic signal is recommended to be added to this intersection under future conditions. (See Exhibit B)

Although not shown in Exhibit B, under future conditions, signalization of this intersection brings the overall intersection LOS to C in both the AM and PM peak hours. Intersection delays are reduced to acceptable 21 seconds per vehicle and 32 seconds per vehicle respectively. This mitigation effort improves the overall condition of the intersection under future conditions.

OPTION 2 – OPENING DAY REDUCED CONFLICT U-TURN (RCUT)

Opening Day Conditions – Reduced Conflict U-Turn (RCUT)

This option evaluates a Reduced Conflict U-Turn intersection (RCUT), which allows vehicles wanting to turn left from US 30 EB onto 300th Avenue to still make this movement. Instead of directly turning left, vehicles will make a U-turn at the designated lane and merge into traffic, moving into the right turn lane. Likewise, SB left-turns from 300th onto US 30 EB can make a right-turn onto US 30 EB then make a U-turn to go WB. This configuration will help left-turning traffic to reduce the number of conflicts the driver has to evaluate at one given time.

With this lane configuration, the volume of traffic at US 30 EB Off Ramp & South 6th Avenue decreases. In turn, the overall LOS and delay at this intersection decrease to 11.6 seconds per vehicle in the PM peak hour. With the RCUT intersection configuration, an AWSC intersection at US 30 EB Off Ramp & South 6th Avenue would not be necessary but is suggested in the Future scenario to improve the overall intersection delay.

At the intersection of South 6th Avenue and Industrial Street, left-turning movements heading WB on Industrial Street will experience minimal delays at LOS B under Opening Day conditions.

Additionally, the vehicles turning onto US 30 EB using the US 30 WB - RCUT will function with a LOS A in the AM and a delay of 9.6 seconds per vehicle, LOS B in the PM with a delay of 11.3 seconds per vehicle. Similarly, the vehicles turning onto US 30 WB from US 30 EB using the RCUT will experience LOS B in both the AM and PM with an approximate delay of 10.5 seconds per vehicle.

Future Conditions – Reduced Conflict U-Turn (RCUT)

Under future development conditions for Option 2, with the additional site generated trips from the 200 acres east of 300th Avenue, the same intersections will experience increased delays at Future conditions.

The intersection of South 6th and Industrial Street will experience unacceptable delays of 83.7 seconds per vehicle under Future conditions. It is recommended that the signal timing cycle be increased to an 80 second cycle to decrease overall intersection delays, and to specifically decrease the WB left-turn movement delay.

An AWSC intersection was evaluated at South 6th Street and US 30 EB Off Ramp which resulted in a delay of 49.1 seconds per vehicle and LOS E. Signalization at this intersection is recommended to mitigate delays. Although not shown in Exhibit B, overall intersection delays will decrease to 22.2 seconds per vehicle and LOS C. This mitigation effort helps reduce the overall intersection delay.

OPTION 3 – FUTURE GRADE SEPARATED INTERCHANGE

There is a significant amount of undeveloped land between US 30 and the railroad tracks that has no other access than S 6th Avenue. As such, this option explores a grade separated interchange at the intersection of 300th Avenue and US 30 as a mitigation effort for future improvements. Due to the significant increase in traffic from the combined 350 acres of proposed Industrial Park, our analysis shows that a grade separated interchange will keep future delays consistent with existing delays and mitigate the future traffic to safer and more efficient routes.

Safety Analysis

The intersection at 330th Avenue and US 30 has crash experience that includes one crash that resulted in 2 fatalities. Increasing SB left-turning traffic from 330th Street onto US 30 EB presents more exposure for crashes.

It is not immediately clear why 40% of the crashes, including the fatalities, are predominantly involving WB traffic. The hill and curvature to the west of the intersection probably do not make the decision process easier when SB left-turning drivers are evaluating gaps in the oncoming EB US 30 traffic. Either way, it would be beneficial to avoid routing additional traffic to this intersection to prevent future crashes.

The table below summarizes the crashes that occurred at the intersection of 330th Avenue and US Highway 30 between the years 2018-2025. SB/WB and SB/EB crashes are highlighted in yellow, as these movements are similar to the movements that vehicles leaving the Industrial Park would be making.

ICAT Crash Data 2018-2025

Intersection of US Highway 30 and 330th Avenue					
Date	Direction of Travel	Driver at Fault	Crash Type	PDO/INJ/FAT	Time of Day
1/21/2018	NB	NB - VISION OBSTRUCTED	NON-COLLISION	PDO	NIGHT
4/29/2018	WB/WB	WB - FTYROW	SIDESWIPE	PDO	AFTERNOON
9/27/2018	WB	WB - OTHER	NON-COLLISION	PDO	NIGHT
10/26/2018	WB/WB	WB - OTHER	REAR-END	PDO	NIGHT
5/13/2019	WB	WB - ANIMAL	NON-COLLISION	PDO	DAWN
8/22/2019	SB/WB	SB - SWERVE/EVASIVE ACTION	OTHER	PDO	AFTERNOON
11/30/2019	WB	WB - RAN OFF ROAD	NON-COLLISION	PINJ	AFTERNOON
4/21/2020	EB/SB	SB - FTYROW	OTHER	SMINJ	AFTERNOON
5/25/2020	SB/EB	SB - DISREGARDED ROAD SIGNAGE	BROADSIDE	SMINJ	EVENING
8/10/2020	WB	WB - RAN OFF ROAD	NON-COLLISION	SMINJ	AFTERNOON
8/11/2020	WB/SB	SB - FTYROW	BROADSIDE	PINJ	MORNING
10/24/2020	UNKNOWN	N/A - ANIMAL	NON-COLLISION	PDO	NIGHT
1/5/2021	EB	EB - VISION OBSTRUCTED	NON-COLLISION	SMINJ	NIGHT
2/11/2021	SB/WB	SB - FTYROW, SNOW	BROADSIDE	PDO	MORNING
4/16/2021	WB/SB	SB - FTYROW	BROADSIDE	PDO	NIGHT
4/24/2021	WB/SB	SB - UNKNOWN	BROADSIDE	PDO	NIGHT
5/15/2021	WB/SB	SB - FTYROW	BROADSIDE	PINJ	MORNING
8/11/2021	EB	EB - RAN OFF ROAD	NON-COLLISION	SSINJ	AFTERNOON

1/1/2022	WB	WB - TOO FAST FOR CONDITIONS, SNOW	NON-COLLISION	PDO	NIGHT
6/9/2022	UNKNOWN	ANIMAL	UNKNOWN	PDO	NIGHT
11/17/2023	EB	EB - DRIVING LESS THAN POSTED SPEED	REAR-END	PDO	MORNING
1/26/2024	SB/WB	SB - FTYROW	BROADSIDE	SSINJ	AFTERNOON
5/5/2024	WB/SB	SB - FTYROW FROM STOP SIGN	BROADSIDE	FAT - 2	NIGHT
6/23/2024	SB/WB	SB - FTYROW FROM STOP SIGN	BORADSIDE	PDO	MORNING
6/28/2024	WB	WB - RAN OFF ROAD	NON-COLLISION	PINJ	AFTERNOON
7/19/2024	EB/EB	EB - ERRATIC LANE CHANGE	SIDESWIPE	PDO	MORNING
8/5/2024	UNKNOWN	ANIMAL	NON-COLLISION	PDO	NIGHT
11/20/2024	EB/EB	EB - FAILURE TO STAY IN PROPER LANE	SIDESWIPE	PDO	MORNING

SSINJ - Suspected Serious Injury

SMINJ - Suspected Minor Injury

PINJ - Possible Injury

FAT - Fatality
PDO - Property Damage Only

ROUTE SELECTION

Because the proposed study site (and the other vacant land to the east of the study site) have access to Old US 30 to the north (via 300th Avenue) there is the concern that as delay and queuing increase at S 6th Avenue and Industrial Street and at the US 30 interchange, the travel time from the study site to the intersection of US 30 and 330th Avenue become equal. As such, traffic from the new development may choose to access EB US 30 at 330th Avenue via Old US 30.

Exhibit C & D show an estimated travel time diagram for each option under Opening Day conditions, as well as Future conditions. Under existing conditions, trips originating in the study site have an almost equal travel time going EB on US 30 whether traveling west (out of their desired line of travel) to S 6th Avenue versus traveling north, then east to 330th Avenue and US 30 (in the same direction as their desired line of travel). As stated in the Safety Analysis section earlier in this document, we do not want to increase traffic exposure at the intersection of US 30 and 330th Avenue.

Based on the analyses, we estimate the Right-In/Right-Out only option will likely send the most site generated traffic to 330th Avenue. Under Opening Day conditions, we estimate approximately 11 vehicles in the AM and 43 vehicles in the PM to leave the study site using Old US 30 and 330th Avenue.

Under Future conditions, we estimate about 25 vehicles in the AM and 87 in the PM. An approximate calculation from the Iowa DOT AADT, concludes about 84 vehicles use this intersection each way during the PM peak hour. To add 87 vehicles to this existing traffic would result in a 100% increase in traffic using this road. This is a significant increase in traffic at this intersection.

FINDINGS AND CONCLUSIONS

1. Any of the 3 options analyzed can be developed to provide adequate performance and LOS. However, Option 1, Right-in/Right Out at 300th Avenue, is most likely to divert traffic to the 330th and US 30 intersection, which already has a crash problem.

2. In our opinion based on the City's long term plan and input from local development leaders, the existing roadway network, serving about 300 acres of industrial/ag development, and a greater part of the City of DeWitt, will be tasked with serving about another 300+ acres of undeveloped land between US 30 and the railroad west of Ames Creek. This is too much for one full access to US 30. (S 6th Avenue and US 30)

3. As the interchange of S 6th Avenue and US 30 experiences increased delays, more traffic will be expected to divert to US 30 EB via 330th Avenue, which already has a crash history including fatalities.

4. In our opinion and based on the actual build-out schedule of the previous two phases of the Crossroads Business Park, the study site the City proposes to develop will not reach 100% development by "Opening Day" but rather will likely develop over 10 to 20 years. Therefore, the expected traffic increases associated with development of the proposed site would also follow a similar schedule of 10 to 20 years before the full impacts of increased traffic are realized.

5. Based on Iowa DOT concerns about the safety of a full access intersection at 300th Avenue and US 30, we propose an RCUT intersection which has been successfully implemented by the DOT elsewhere in Iowa.

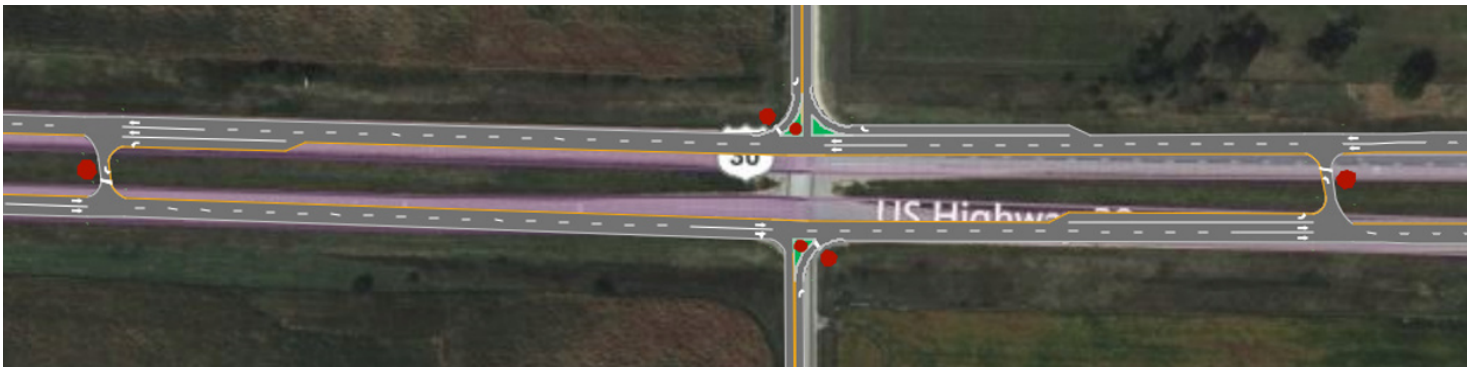
6. It is our opinion that the RCUT intersection is a short-term solution (perhaps 10 to 20 years) and that planning and budgeting should be considered for a grade-separated interchange at 300th Avenue and US 30, in the 10 to 20 year time horizon, depending on actual growth of the study area.

Exhibit A - Options Layout

Option 0 - Original TIS Configuration/TWSC Intersection with Eastbound Acceleration Lane

Option 1 - Right-In/Right-Out Only Intersection Opening Day & Future Conditions

Option 2 - Reduced Conflict U-Turn Intersection Opening Day & Future Conditions



Option 3 - Grade Separated Interchange Opening Day & Future Conditions

Exhibit B - Intersection LOS/Delay

Intersection	Option 0 - ORIGINAL				Option 1 - RIRO				Option 2 - RCUT				Option 3 - GRADE SEP.		Notes
	Opening Day		Future		Opening Day		Future		Opening Day		Future		Future		
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
South 6th Avenue & Industrial Street															
Intersection LOS/Delay (s/veh)	A/6.3	B/18.9	A/6.0	B/18.4	A/6.2	C/29.2	B/11.5	F/128.1*	A/5.9	B/14.3*	A/9.5	F/83.7*	A/8.9	C/32.9	Experiences long delays during the PM peak
Worst Movement/LOS/Delay (s/veh)	WBR C/30.1	WBL D/42.6	WBR C/30.1	WBL D/42.6	WBR C/29.1	WBL F/70.6	WBR C/29.9	WBL F/357.8	WBR C/29.8	WBL C/25.1	WBR C/30.3	WBL F/243.2	WBR C/30.5	WBL F/85.7	WBR & WBL experience the longest delays
South 6th Avenue & Westbound 30 Ramp															
Intersection LOS/Delay (s/veh)	A/1.6	A/1.7	A/1.5	A/1.8	A/1.5	A/1.7	A/2.2	A/2.2	A/1.5	A/1.7	A/2.0	A/2.0	A/2.1	A/1.9	Operates at an overall LOS of A
Worst Movement/LOS/Delay (s/veh)	WB B/10.0	WB B/11.2	WB B/10.7	WBL B/13.0	WB 12.3	WB B/13.3	WB C/22.4	WB C/23.7	WB B/11.5	WB B/12.6	WB C/17.3	WB C/19.6	WB B/11.8	WB C/15.4	The WB lane experiences the longest delays
South 6th Avenue & Eastbound 30 Ramp															
Intersection LOS/Delay (s/veh)	A/5.0	A/8.8	A/4.5	A/9.2	B/11.3**	B/14.4**	F/57.3**	F/96.1**	A/10.0**	B/12.1**	C/19.8**	E/49.1**	A/9.6**	C/17.5**	LOS and delays reflect AWSC intersection conditions
Worst Movement/LOS/Delay (s/veh)	EB B/11.5	EB D/25.1	EB B/12.2	EB D/31.6	EB B/12.7	SB C/17.1	EB F/84.4	SB F/148.5	EB B/10.9	SB B/13.7	EB D/25.9	SB F/73.4	EB A/9.8	SB C/22.2	EB & SB lanes experience the longest delays
300th Avenue & US HWY 30					**US Highway 30 Westbound & 300th Avenue**										
Intersection LOS/Delay (s/veh)	A/4.2	A/7.5	B/13.2	D/24.1	A/0.6	A/1.7	A/1.0	A/3.3	A/1.1	A/3.6	A/2.0	A/9.7	A/6.1	A/1.1	Options 1, 2, and 3 improve the overall LOS of the intersection
Worst Movement/LOS/Delay (s/veh)	SBL D/34.3	SBL D/26.8	NBT F/629.7	SBL F/95.2	SB A/9.7	SB B/10.4	SB B/10.7	SB B/13.1	SB A/9.9	SB B/11.6	SB B/11.3	SB C/23.1	WB C/18.9	WB A/8.9	SB & WB lanes experience the lonest delays
300th Avenue & US HWY 30					**US Highway 30 Eastbound & 300th Avenue**										
Intersection LOS/Delay (s/veh)	^	^	^	^	A/0.3	A/0.2	A/0.3	A/0.2	A/0.6	A/0.2	A/0.6	A/0.2	C/15.5	B/13.0	Delays under Option 3 could be decreased by AWSC
Worst Movement/LOS/Delay (s/veh)	^	^	^	^	NBR A/9.3	NBR B/10.1	NBR A/9.8	NBR B/11	NBR A/9.4	NBR B/10.7	NBR B/10.2	NBR B/12.4	EB C/17.5	EB D/28.6	

**Under future conditions retime signal for the PM peak to a total cycle of 80 seconds.*

***Recommended signalization at Future conditions*

^ Same as above

= Under Option 1, the most site traffic is pushed through the S 6th Avenue and Industrial Street intersection. Options 2 and 3 experience less traffic and therefore better performance.

= US 30 EB Ramp and S 6th Avenue will need to be signlized long term with the worst performance under Option 1 and the best under Option 3.

Exhibit C - Opening Day Travel Time by Option

Option 0 - Original TIS TWSC

= Approx. 5 Minutes

= Approx. 9 Minutes

Option 1 - RIRO

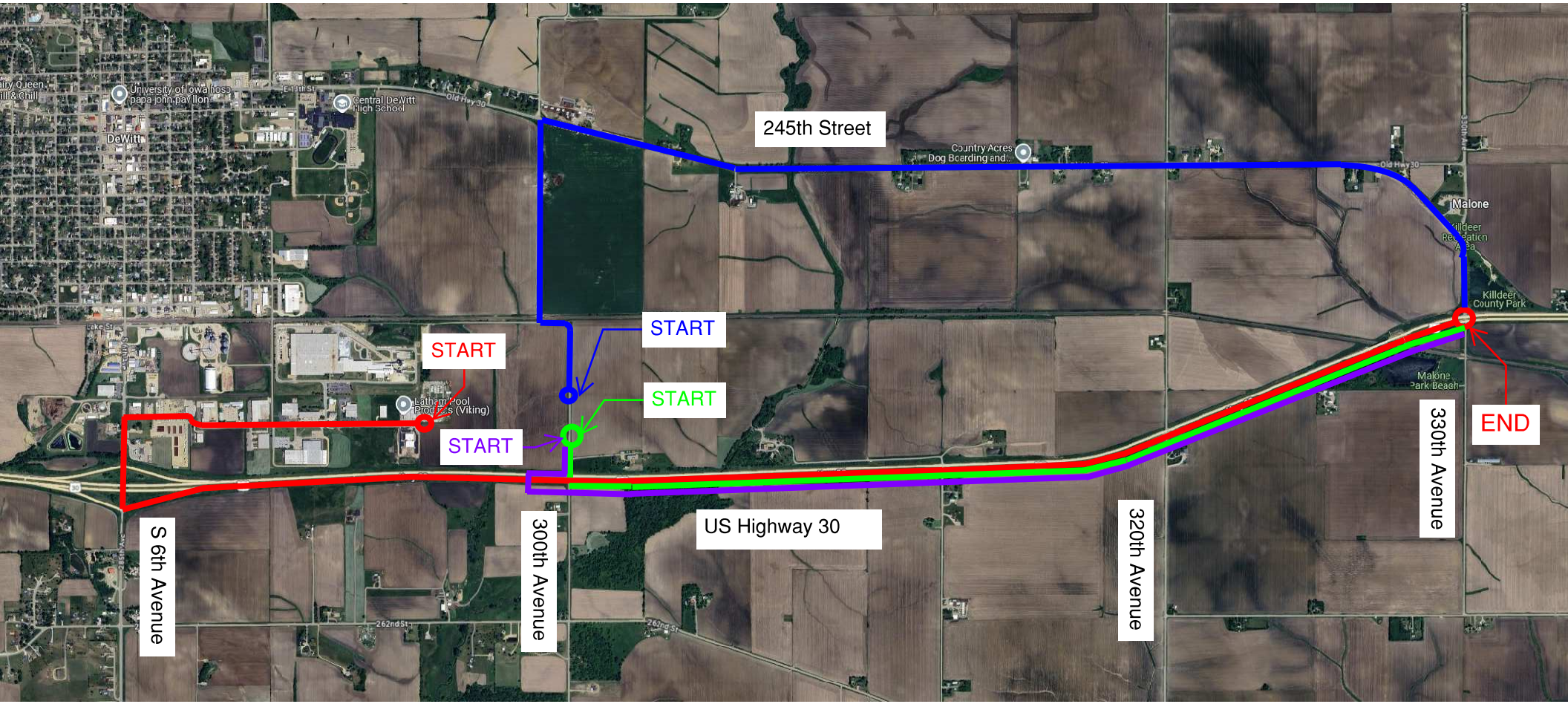
= Approx. 8 Minutes

= Approx. 9 Minutes

Option 2 - RCUT

= Approx. 5 Minutes

= Approx. 9 Minutes



**Option 2 (RCUT) is least likely to divert site traffic to 330th Avenue (Excluding Option 0).*

Exhibit D - Future Travel Time by Option

Option 0 - Original TIS TWSC

= Approx. 6 Minutes

= Approx. 9 Minutes

Option 1 - RIRO

= Approx. 10 Minutes

= Approx. 9 Minutes

Option 2 - RCUT

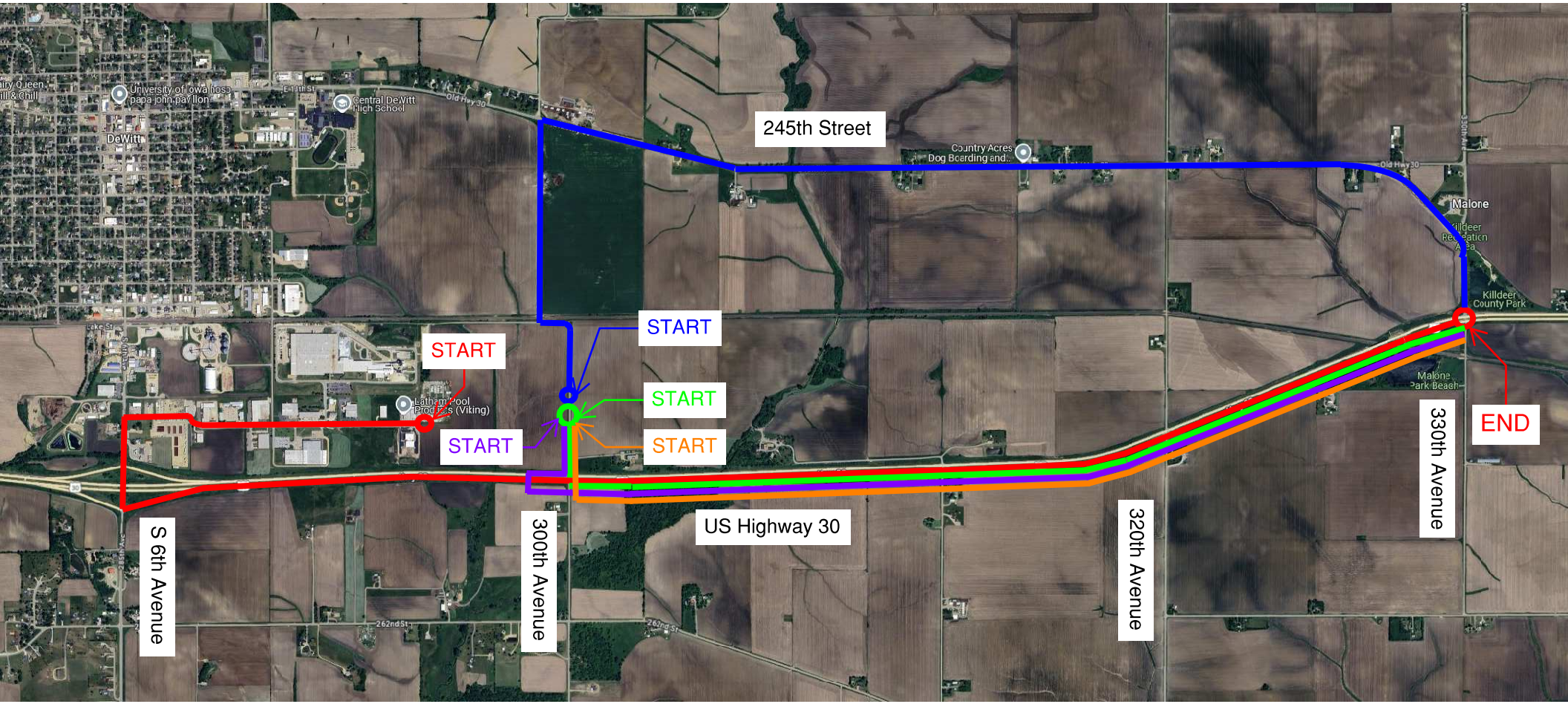
= Approx. 6.5 Minutes

= Approx. 9 Minutes

Option 3 - Grade Separated

= Approx. 4 Minutes

= Approx. 9 Minutes



**Long term Option 3 (Grade Separated Interchange) is least likely to divert traffic to 330th Avenue and Option 1 is most likely to divert traffic to 330th Avenue.*