

FINAL DRAFT

190th Street Corridor Study

OT4.128714

City of Ames
July 12, 2023

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Real People. Real Solutions.

Certification

190th Street Corridor Study:
George Washington Carver Avenue to Highway 69 (Grand Avenue)

for

City of Ames, IA

OT4.128714

July 12, 2023

PROFESSIONAL ENGINEER

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

FINAL DRAFT

Signature: _____

Typed or Printed Name: _____

Date: _____ License Number: _____

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I. EXECUTIVE SUMMARY



The north side of Ames is growing. 190th Street is an important corridor in this area of the city, providing one of the only east-west connections on the north side. This study focused on the 2-mile-long section from George Washington Carver Avenue to Hwy 69/Grand Avenue. The study examined volumes, crashes, access, trail/sidewalk connectivity, and proposed land use to provide a path forward for recommended corridor improvements. Understanding these needs will support community growth and help strengthen the connections between the developing neighborhoods on the north and south sides of 190th Street to recreational, regional, and educational amenities in the area.

This corridor study evaluated existing year (2022), interim year (2030), and future year (2045) conditions to identify system deficiencies and examine overall operations and safety. The effort also included comprehensive data collection, stakeholder outreach, a speed study, intersection capacity analyses, traffic forecasting, safety analyses, and multi-modal review – resulting in a plan for transportation improvements now and in the future.

In addition, this study served as a follow-up to several other planning efforts undertaken by the Ames Area MPO (AAMPO), the City of Ames, and Story County over the past several years; including the *AAMPO's Metropolitan Transportation Plan (Forward 2045)*, *Ames' Complete Streets Plan*, *Ames' Comprehensive Plan 2040*, and *Story County's Comprehensive Plan 2036*. Many of the themes noted in the previous plans, including pedestrian/multimodal needs and safety, were relevant throughout this project as well. Roadway capacity/congestion, safety, and turning traffic were further studied as part of the detailed analysis portion of this corridor study.

Several key stakeholder groups with an interest in the future of this corridor were included in this study development; the Iowa Department of Transportation (DOT), Story County, the City of Ames, the AAMPO, and area residents from Ames and Gilbert. Meetings were held with the agencies from early on and throughout the study to keep their needs and concerns in focus. Online and In-person engagement was conducted to ensure the comments and concerns of area residents were gathered. This study was often communicated to stakeholders as a process of identifying the existing and anticipated challenges as this area has grown and continues to develop and finding the most beneficial future solutions for the corridor.

All analysis and recommendations in this report are based upon the land use assumptions in the AAMPO's approved Metropolitan Transportation Plan, Forward 2045. This land use scenario assumes the land north of W 190th Street remains agricultural land, which is in line with the *Story County Comprehensive Plan 2036*.

Discussions continue between Story County and the City of Ames about this northern fringe area and the anticipated future land use. The City of Ames has explored a land use scenario that includes a combination of residential, retail, and commercial uses north of W 190th Street. A discussion of this “High Growth Scenario” and how it impacts the intersection and roadway cross section recommendations is included in the conclusions section of this report.

Results of this corridor study analyses guided a process of design concepting that resulted in the following traffic control recommendation for each intersection to support the anticipated land use growth in Forward 2045:

- George Washington Carver Avenue - Single Lane Roundabout with northbound right-turn slip lane or Signal with left turn lanes and northbound right turn lane
- Hyde Avenue/Grant Avenue - Single Lane Roundabout or Signal with left turn lanes (based upon land acquisition)
- Hwy 69/Grand Avenue - Signal with single northbound left, single southbound left, and single eastbound right turn lanes

For the cross sections to support the anticipated land use growth in Forward 2045, the following is recommended:

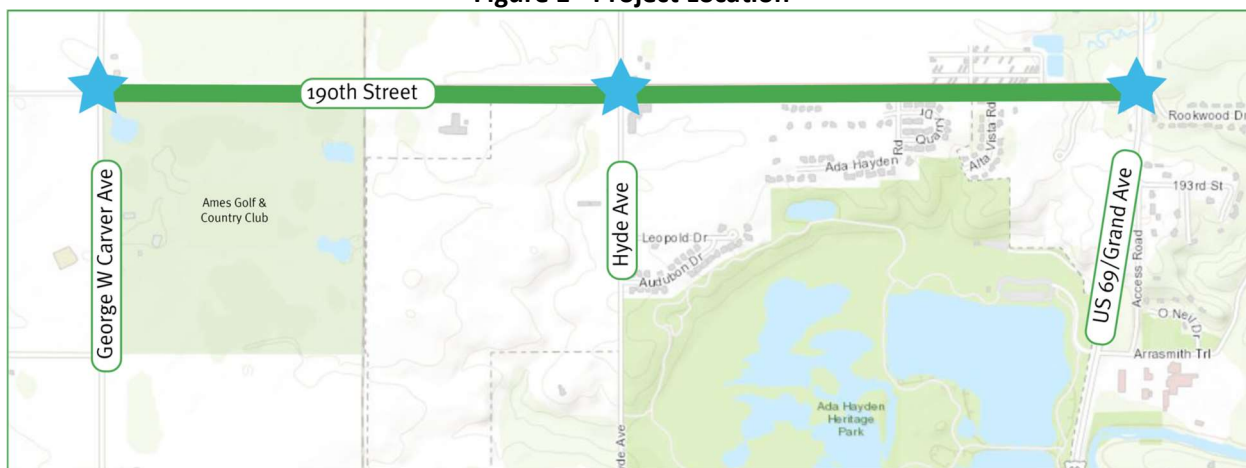
- The cross section for W 190th Street should be 2 lanes plus turn lanes at the public roadway connections. A 10-foot width trail should be provided on the south side of the roadway and a 5-foot sidewalk on the north side. The roadway should transition towards an urban section with curb and gutter, as this will aid in slowing speeds on W 190th Street.
- Hwy 69/Grand Avenue, an Iowa DOT Roadway, is assumed to be 5 lanes south of W 190th Street and two lanes with turn lanes north of W 190th Street.

II. INTRODUCTION

A. Project Location and Background

This corridor study summarizes the analysis completed for the 190th Street Corridor in Ames, Iowa. The study corridor runs east-west from the intersection at US Highway 69 (Hwy 69) to George Washington Carver (GW Carver) Avenue and includes three study intersections. The area surrounding the corridor is agriculture fields on the north with residential developments on the south. There are single-family residential homes on the east end of the study area near Hwy 69 (Grand Avenue) and along the south side of the corridor. Ames Golf and Country Club and Ada Hayden Heritage Park are located south of the corridor. The City of Gilbert is located north of the corridor. Gilbert High School is located 1.75 miles north of 190th St on Grant Avenue. See **Figure 1** for a map of the project area.

Figure 1 - Project Location



Forward 2045 recommended several locations within the region where detailed traffic studies would be beneficial to inform future planning efforts and capital improvements projects. This corridor study was one of these identified studies. 190th Street is a two-lane roadway with a rural cross section serving as one of the few east-west connectors in the north side of Ames. 2019 Iowa DOT traffic volumes along the corridor are 1,960 vehicles/day west of Hyde Avenue and 2,740 east of Hyde Avenue. However, 2040 estimates show these volumes growing by more than double. The goal of this study was to determine the needed cross section, traffic control, access spacing, and turn lanes to support the anticipated future development of this area.

B. Past Area Planning and Study Efforts

Several past planning efforts have included this area and helped shape the recommendations of this study. The north edge of Ames is challenged by lack of direct connectivity to I-35. Many residents in this area rely on 190th Street to connect them to Hwy 69/Grand Avenue to travel south further into Ames or east over to I-35. The numerous subdivisions and large recreation areas like the golf course and Ada Hayden Heritage Park create many areas of discontinuous roadways south of W 190th Street, making 190th Street a key to east-west connectivity.

Ames Plan 2040 – Comprehensive Plan

- The Ames Plan 2040 states that the city's population could increase by 15,000 people in the next 15 years. This plan provides the north area of the city as a key growth area for residential development. The infrastructure component of this plan also discussed a future arterial expansion of 190th Street and a potential bridge over the UPRR.

- South of 190th is anticipated to be primarily residential with the southwest corner of Hyde Avenue/190th Street identified as neighborhood core/mixed use node. Neighborhood cores are planned to have improved bike and pedestrian access and connection to nearby paths and trails.
- The complete streets portion of this plan does not specifically show any active transportation routes for 190th Street; however, it states that the city has a goal of providing facilities that address the safety and mobility for all.
- Recommendations of this corridor study should consider different alternatives to connect the future trail planned on George Washington Carver Avenue and the trail along Hyde Avenue/Grant Avenue, as the area develops.

Forward 2045 (Metro Transportation Plan)

- 190th Street is within the MPO planning boundary and is under capacity today. The corridor is shown as an “existing+committed+planned” roadway with a 2045 ADT of 4,700 west of Hyde and 5,700 east of Hyde.
- The plan does not show residential growth north of 190th Street and leaves this land as agricultural.
- Intersection improvements at Hyde Avenue & 190th Street shown as short-term (2025-2029) project in the fiscally constrained plan.
- Widening of Hwy 69/Grand Avenue to 5-lane up to 190th Street shown as a long-term (2038-2045) project in the fiscally constrained plan.

Complete Streets Plan

- W 190th Street has a complete streets typology of an Avenue. The Ames Complete Streets Plan states that an avenue is defined as having a balance of access and throughput surrounded by primarily residential use and may have on-street bike lanes or off-street trails encouraged for connectivity.
- Special attention should be provided to the crossing of W 190th Street at Hyde Avenue and George Washington Carver by pedestrians and bicyclists.

Story County Comprehensive Plan 2036

- Urban Expansion Areas are defined as a 2-mile radius around existing cities. This area reflects those areas outside of an existing city boundary but requires joint planning and coordination as these cities grow.
- This plan identifies the area north of W 190th Street as a rural urban transition area and has its land use as agricultural/long-term industrial reserve for farming and agricultural production, farmsteads, pre-existing homes, and future large-scale industrial uses.

Story County Parks and Trail Plan

- Story County has the Arrasmith Trail which connects into Ada Hayden Heritage Park in the study area. This trail is on the east side of Hwy 69 and connects south of 190th by crossing Hwy 69 into the Park.

C. Stakeholder Outreach

Early in the study process, it was recognized that there were several key stakeholder groups with a strong interest in the future of this corridor. These stakeholders included the Iowa Department of Transportation (DOT), Story County, the City of Ames, the AAMPO, and area residents from both Ames and Gilbert.

Stakeholder outreach was conducted at two important times within the study process – at the beginning of the study to gather thoughts and concerns on existing conditions and towards the end of the study to present the options for intersection traffic control and the proposed roadway cross section for 190th.

INPUTiD™, a web-based public engagement platform, was developed for the study corridor allowing the public to provide comments on existing conditions and interact in a visual, user-friendly mapping interface through a link from the city’s project webpage. These comments on existing conditions were used to inform the options and recommendations presented at the project Open House on March 07, 2023. Boards and informational project flyers were posted on the city’s project website after the Open House.

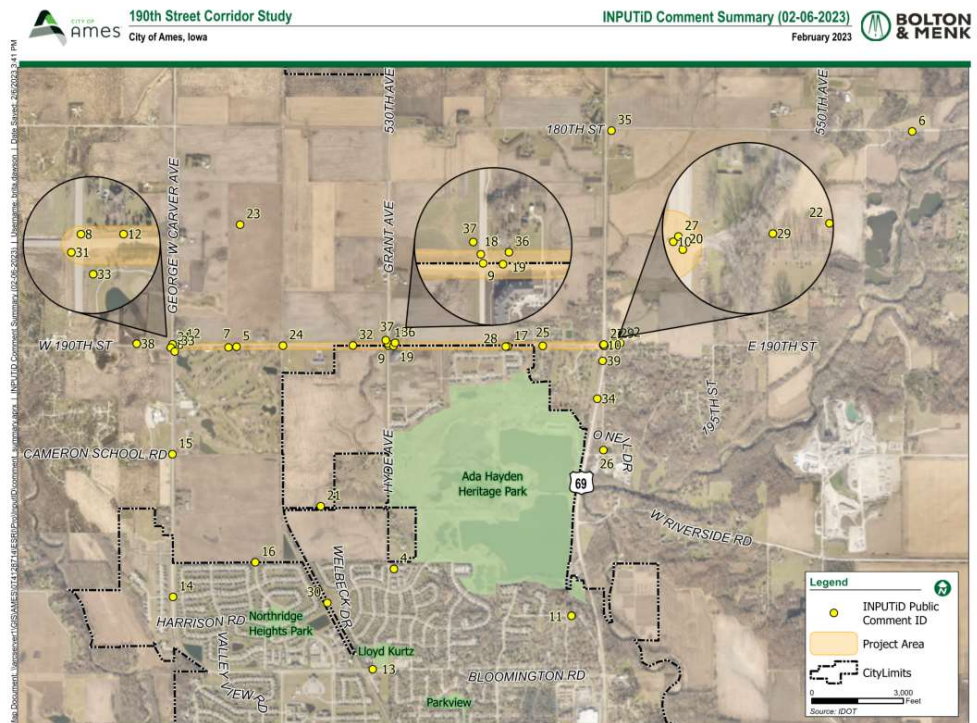
The general themes heard from the online INPUTiD™ included:

- Roadway and intersection lighting needed, dark corridor
- Speeding issues
- Add bicycle and pedestrian infrastructure
- Ensure traffic control can handle school related traffic
- TWSC at GWC and Hwy 69 is not enough to handle growing traffic
- Difficult to turn out onto US 69 from 190th

The general themes heard from the Open House were:

- Roundabout better than traffic signal to control speeding and improve safety
- Lighting needed on the corridor and at intersections
- Like the bike facilities and trails
- Improve pedestrian crossings at Hyde and GWC intersections

A comprehensive list of stakeholder comments, from INPUTiD™ and the Open House, is provided in the Appendix.



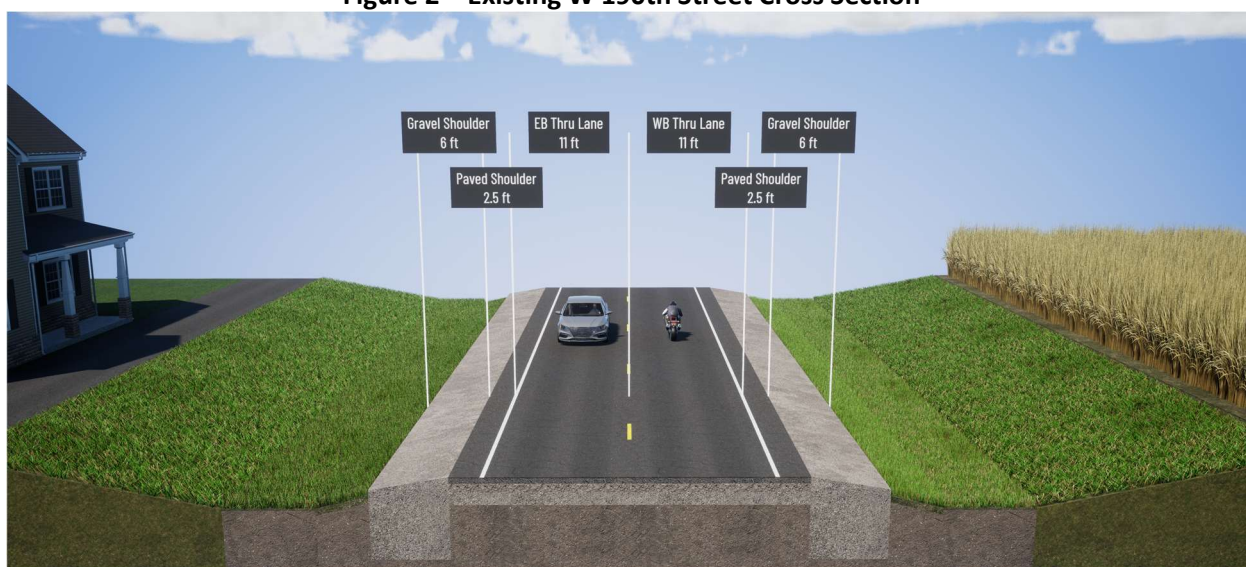
III. EXISTING ROADWAY CHARACTERISTICS

A. Local Roadway Network

190th Street

Within the study area, 190th Street is a two-lane roadway, with a posted speed limit ranging from 45-55 mph between GW Carver Avenue and Grant Avenue/Hyde Avenue. Between Grant Avenue/Hyde Avenue and Hwy 69, the posted speed limit ranges from 35-45 mph. The existing cross section of the roadway consists of 11-foot driving lanes and 6-foot gravel shoulders on both sides. There are no existing pedestrian or bike facilities along W 190th St. In addition, UPRR Railroad tracks intersect 190th Street between GW Carver Avenue and Grant Avenue/Hyde Avenue. W 190th Street is a minor collector with an AADT of 1,960 west of the railroad tracks. East of the railroad tracks, it is a major collector with an AADT of 2,470. There are no turn lanes at any of the intersections. The *Ames 2040 Plan* classifies this roadway from George Washington Carver Avenue to Grant Avenue/Hyde Avenue as a minor arterial in the future. The existing cross section is shown in **Figure 2** below.

Figure 2 – Existing W 190th Street Cross Section



George Washington Carver Avenue

George Washington Carver Avenue (GW Carver) is a major collector with an AADT of 2,370 to the south of W 190th Street and an AADT of 1,170 north of 190th St. It has a posted speed of 45 mph and is a two-lane paved roadway with 12-foot driving lanes and 5-foot gravel shoulders. George Washington Carver Avenue has the right-of-way at the intersection with W 190th Street as W 190th Street is stop-controlled. There are no turn lanes at this intersection. A pedestrian path was recently constructed on the east side of George Washington Carver Avenue to the south of W 190th Street.

Grant Avenue/Hyde Avenue

Grant Avenue, which runs north of W 190th Street, is a local road with an AADT of 1,990 and posted speed limit of 45 mph. It has a six-foot gravel shoulder and six-foot paved shoulders between the driving lane on the west side, with 10-foot concrete curb and sidewalk on the east side. The driving lanes are 12-feet wide and paved. Grant Avenue continues 2 miles north of 190th St into the City of Gilbert.

Hyde Avenue runs south of W 190th Street and has a posted speed limit of 35 mph. It has 15-foot-wide lanes with curb. There is a 10-foot trail with an approximately 28-foot buffer on the east side of the road north of W 190th Street. The intersection currently has a temporary traffic signal with no turning lanes. Hyde Avenue ends at Bloomington Road 1.5 miles south of W 190th Street.

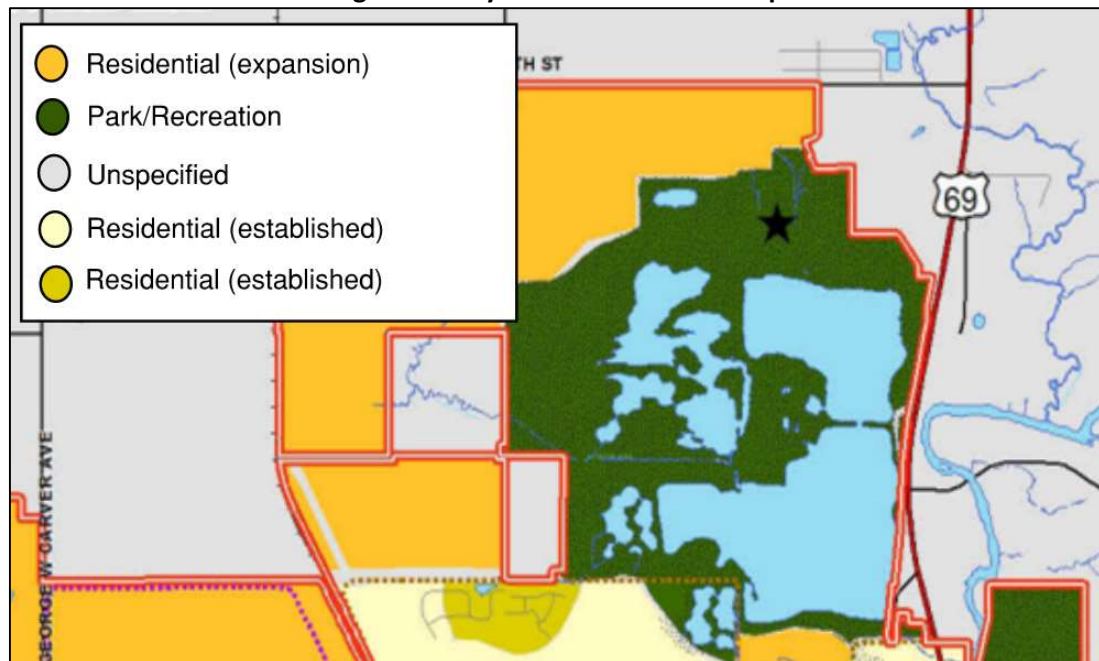
Hwy 69 (Grand Avenue)

Hwy 69 (Grand Avenue) is a minor arterial with an AADT of 6,200 north of W 190th St, and a principal arterial with an AADT of 9,300 south of W 190th St. Near W 190th Street, Hwy 69 has a 60-foot wide cross section with 12-foot thru lanes in each direction, a 14-foot striped median (which becomes turn lanes at the intersection), and 10-foot shoulders on either side (six feet are paved and four feet are gravel). Hwy 69 is an Iowa DOT roadway in this area with a posted speed limit of 50 mph. 190th Street turns into Rookwood Drive east of Hwy 69. At Hwy 69, Rookwood Dr and W 190th Street are stop controlled with no turn lanes. Hwy 69 has both a left and right turn lane in the southbound direction, and a left turn lane in the northbound direction. There are no pedestrian or bicycle facilities at the intersection. Hwy 69 (Grand Avenue) runs 5 miles south providing access into downtown Ames and Iowa State University.

B. Land Use and Access

190th Street is located on the northern fringe of the City of Ames in one of the city's growing areas. The roadway is currently a rural cross section with open ditches on both sides and limited roadway lighting. Today, the land north of 190th Street is primarily agriculture land apart from the Homestead Colony Mobile Home Park near Hwy 69. South of 190th Street, the area is primarily single family residential. Ames Golf and Country Club and Ada Hayden Heritage Park are also located just south of W 190th Street. **Figure 3** presents the city's current land use map from the Land Use Policy Plan for the study area.

Figure 3 - City of Ames Land Use Map



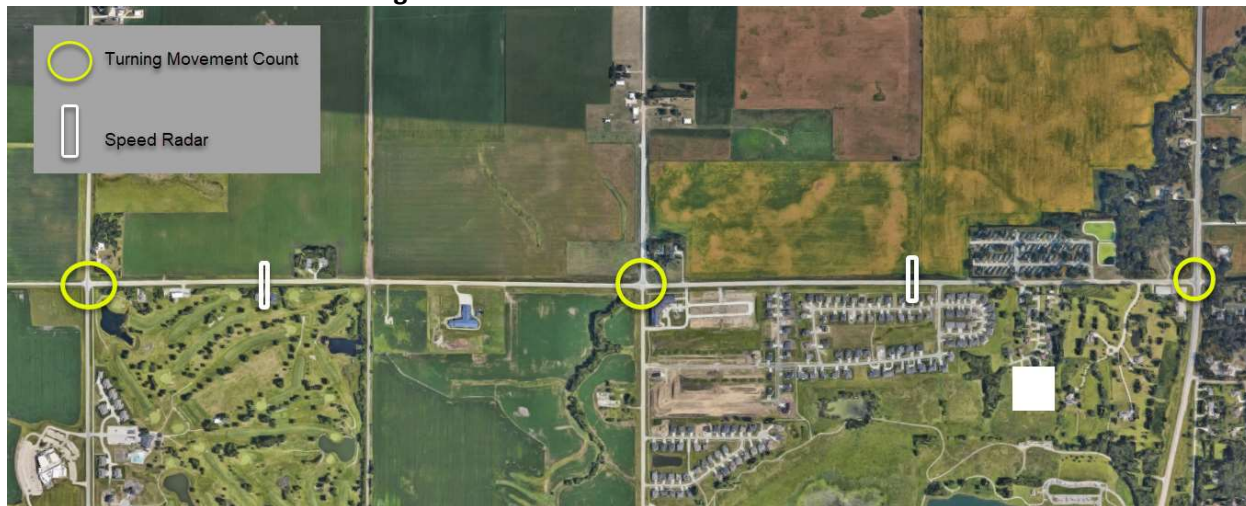
The City of Ames boundary is on the south side of W 190th Street. The land north of W 190th Street is in Story County. The City of Gilbert is located just two miles north of W 190th Street. From Hwy 69 to Hyde Avenue there are 13 direct access points. From Hyde Ave to GW Carver Ave there are six direct access points.

IV. DATA COLLECTION

A. Traffic Counts

The traffic analysis evaluated the three study intersections within the W 190th Street corridor study. 13-hour Turning Movement Counts were collected Thursday October 20th, 2022, at the study intersections. Turning movements were collected from 6:00 am to 7:00 pm. Peak hours were identified from the collected data as AM (7:15-8:15 am) and PM (4:30-5:30 pm). Locations of the turning movement counts, and speed radar setups are shown in **Figure 4**. The existing intersection traffic counts collected for the AM and PM peak hours are provided in the **Appendix**.

Figure 4 – Traffic Data Collection Locations



B. Speed Data

Speed data was collected over a seven-day period from October 6th to October 12th, 2022. Collection occurred between each intersection. **Table 1** summarizes the data collected. The posted speed limit is 45 mph in the area where data was collected. It drops to 35 mph closer to Grand Avenue. This data shows that there is a speeding issue along the corridor with over 70% of the vehicles exceeding the posted speed limit.

Table 1 – Speed Data

Location	85 th Percentile	10 mph Pace	Existing Speed Limit (mph)	% of Veh > Speed Limit
W 190th St E of Grant Ave/Hyde Ave	54	44-54	45	70%
W 190th St W of Grant Ave/Hyde Ave	55	45-55	45	78%

C. Train Crossings

A UPRR train track crossing is located roughly 2,600 feet east of the intersection of George Washington Carver Ave and W 190th Street. Observation of this crossing was completed April 19-20, 2023. One train was observed during this time at 3am. The gate was down for 4min 04 sec. Based on observation, a grade separated crossing is not warranted or recommended at this crossing.

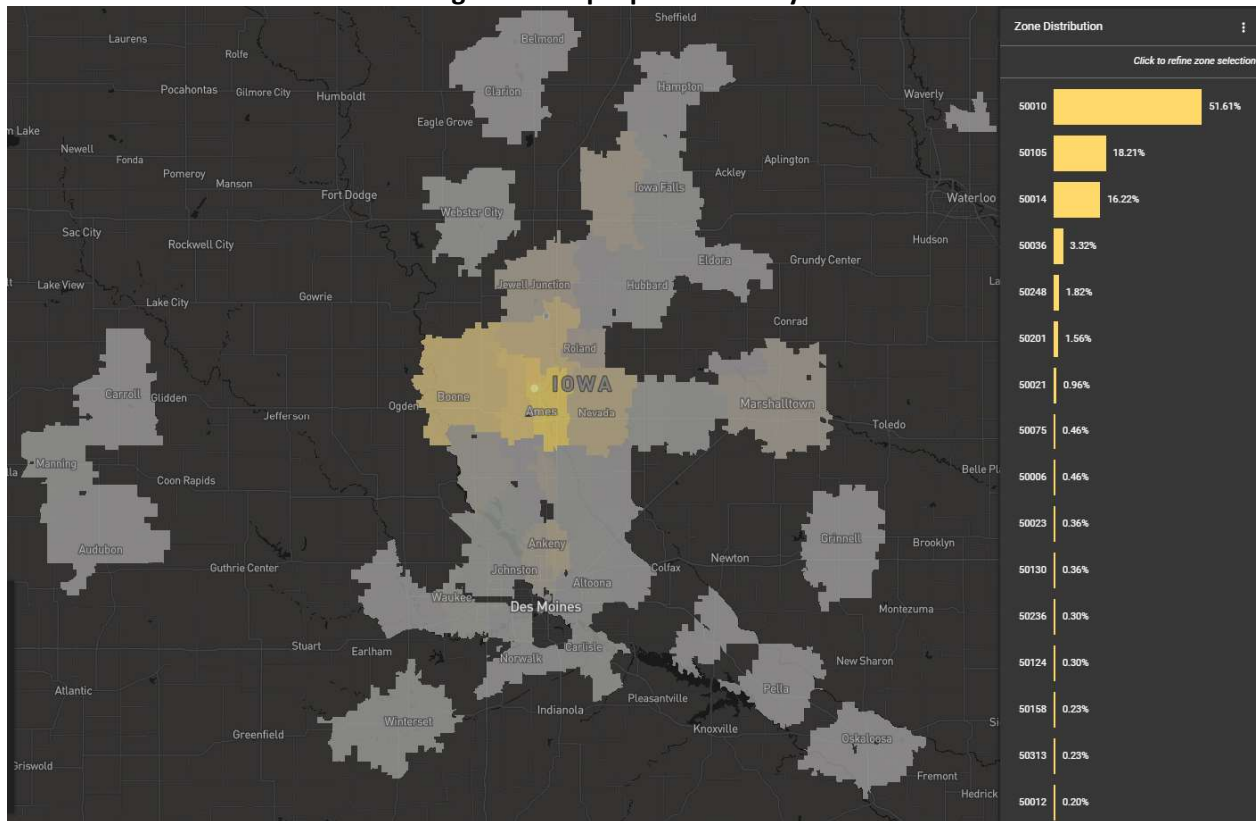
D. Streetlight Data Analysis

StreetLight Insight was used to identify corridor users and travel patterns, analyze travel time, and compare speed data. All analyses were completed considering traffic on a typical day (Tuesday-Thursday) in 2022.

Top Zip Codes Analysis:

The top origin and destination zip codes of traffic driving along W 190th Street were analyzed. The results of the analysis are shown in Figure 5. The Ames city limits are within the zip codes of 50010 and 50014. The zip code of 50105 is for the City of Gilbert. Figure 5 shows how 86% of traffic is starting or ending their trip in one of those three zip codes with Ames traffic accounting for about 68% and Gilbert traffic accounting for about 18%. This indicates that most of the traffic along W 190th Street is local traffic.

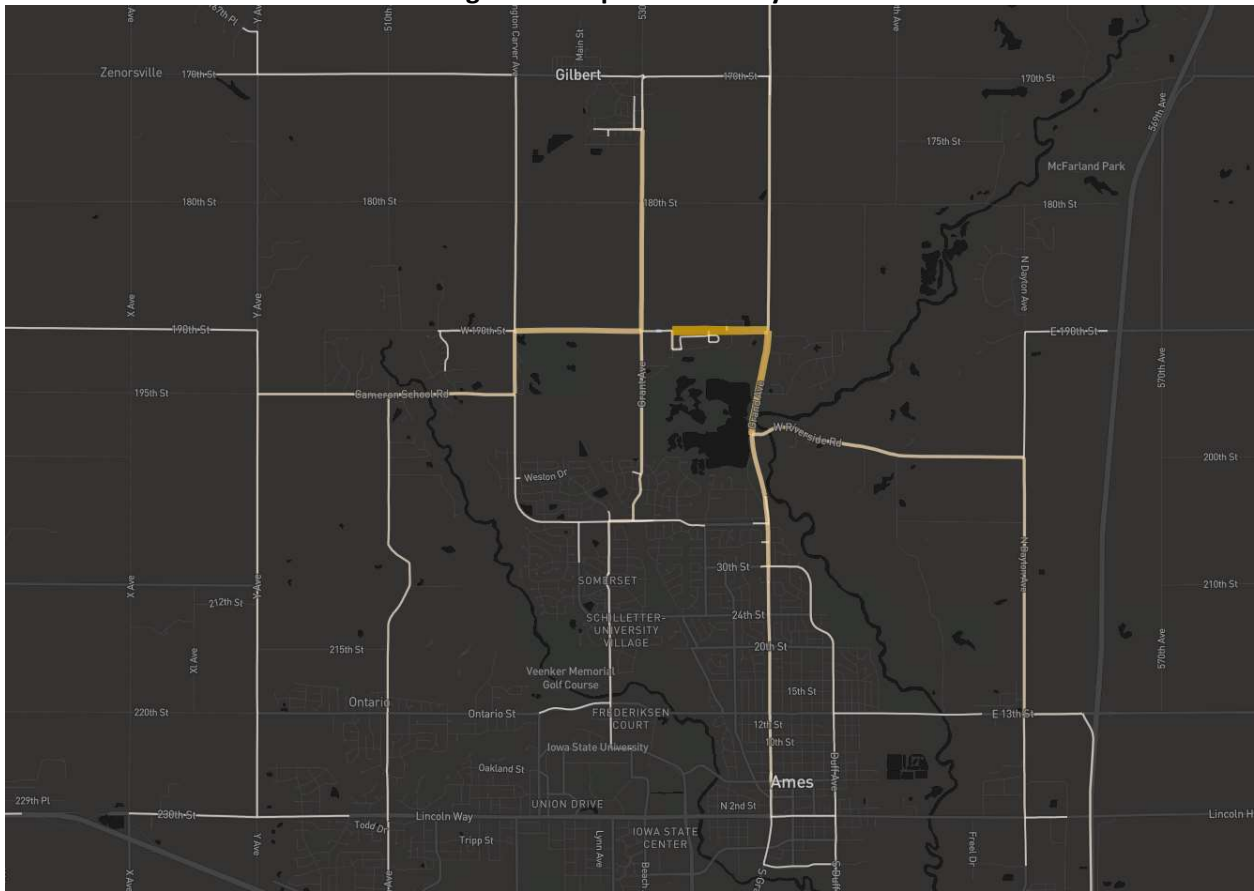
Figure 5 – Top Zip Codes Analysis



Top Routes Analysis:

A top routes analysis was completed in StreetLight Insight to see what roadways traffic is coming from or going to after driving along W 190th Street. **Figure 6** shows the results of the top routes analysis. The numbers shown in **Figure 6** are the estimated number of trips per day. The volumes were rounded to the nearest 25. This shows how most of the traffic passing through W 190th Street takes Hwy 69 into or from Ames. Other popular routes include Grant Avenue to and from Gilbert, Hyde Avenue to and from Ames, Cameron School Road to and from the west, and Riverside Road to and from the east. Only 50 vehicles a day are estimated to use W 190th Street to get to and from E 190th Street and only 100 vehicles use W 190th Street to get to southbound I-35. Showing that most traffic on W 190th Street is using local Ames roadways to get to/from their destinations, not I-35.

Figure 6 – Top Routes Analysis



Speed Data and Travel Time Comparison

Speed data from StreetLight was also compared to the field data that was previously discussed in the report. This is shown in **Table 2** below.

Table 2 – Speed Data Comparison

Location	Field Collected Data (2022)		StreetLight Data (2021)		Existing Speed Limit (mph)
	85th Percentile (mph)	Average Speed (mph)	85th Percentile (mph)	Average Speed (mph)	
<i>W 190th St E of Grant Ave/Hyde Ave</i>	54	49	54	45	45
<i>W 190th St W of Grant Ave/Hyde Ave</i>	55	50	57	48	45

Table 2 shows how the speed data between the sources is consistent, confirming the speeding issues along this corridor.

Finally, a travel time analysis was completed in StreetLight. Travel times were compared for each direction of 190th Street between the three study intersections along the project corridor. The findings are shown in **Table 3** below. This shows how travel times were found to be consistent through the day with travel times varying by 9 seconds or less from the overall daily average except during the morning peak along westbound W 190th Street between Grant Avenue and George Washington Carver Avenue where the travel time was found to be 18 seconds longer than the daily average.

Table 3 – Travel Time Comparison

Segment	Time of Day	Travel Time (s)
Eastbound W 190th St - Grant Ave to HWY 69	All Day (12 am-12 am)	98
	Early AM (12 am-6 am)	95
	Peak AM (6 am-10 am)	99
	Mid-Day (10 am-3 pm)	98
	Peak PM (3 pm-7 pm)	97
	Late PM (7 pm-12 am)	104
Eastbound W 190th St - George Washington Carver Ave to Grant Ave	All Day (12 am-12 am)	88
	Early AM (12 am-6 am)	89
	Peak AM (6 am-10 am)	87
	Mid-Day (10 am-3 pm)	92
	Peak PM (3 pm-7 pm)	84
	Late PM (7 pm-12 am)	92
Westbound W 190th St - Hwy 69 to Grant Ave	All Day (12 am-12 am)	86
	Early AM (12 am-6 am)	83
	Peak AM (6 am-10 am)	92
	Mid-Day (10 am-3 pm)	86
	Peak PM (3 pm-7 pm)	84
	Late PM (7 pm-12 am)	86
Westbound W 190th St - Grant Ave to George Washington Carver Ave	All Day (12 am-12 am)	92
	Early AM (12 am-6 am)	N/A – insufficient data
	Peak AM (6 am-10 am)	110
	Mid-Day (10 am-3 pm)	83
	Peak PM (3 pm-7 pm)	96
	Late PM (7 pm-12 am)	88

E. Strava Analysis

Data was reviewed from Strava to understand how the roadways in the study area are being utilized now by pedestrians and bicyclists. Strava is a social network for athletes recording data from its users who upload cycle rides and running or walking activities via their smartphone or GPS devices. This user data can then be accessed and examined using GIS to determine where the higher levels of bicycle and pedestrian activity are occurring. The heat maps below show usage for bikes and pedestrians/walkers. Routes shown in red have the highest usage.

Bikes

For bikes, the highest routes in the area were north-south travel on Hyde Avenue/Grant Avenue and George Washington Carver (GWC), along with east-west travel on W 190th Street between GWC and Hyde Avenue/Grant Avenue. There was also a lot of activity shown around Ada Hayden Heritage Park. Traffic on W 190th Street appears to utilize Hyde Avenue or Hwy 69, south of W 190th Street, to access the lake area.

The area along 190th shows higher activity east-west between GW Carver and Grant Avenue/Hyde Avenue, showing that making an on-street or off-street bike facility connection between these two trails would be beneficial to the usage in this area. See **Figure 7**.

Figure 7 – Strava Bike Data Heat Map



Pedestrians/Runners

For pedestrians walking or running, the highest routes in the area were north-south along the trail on Hyde Avenue/Grant Avenue, east-west between GW Carver and Valley Road. There was also higher activity shown within the neighborhood southeast of Grant/Hyde/190th and around Ada Hayden Heritage Park. See **Figure 8**.

Figure 8 – Strava Ped/Runner Data Heat Map



V. SAFETY REVIEW

A review of the crash history within the study area was completed utilizing Iowa DOT’s Crash Analysis Tool (ICAT). Five years of data was analyzed (2017-2021). There were 28 reported crashes within the study area: 22 at the study intersections, and the remaining six within segments along the corridor. There were no fatal or severe injury crashes within the study area.

Three minor injury crashes were reported:

- At the intersection of GW Carver Avenue and W 190th Street, a northbound pickup truck failed to yield right-of-way to a southbound SUV while making a left turn.
- At the intersection of Grant Avenue and W 190th Street, a southbound passenger car failed to yield right-of-way (at the time, southbound and northbound had a stop sign) to a westbound motorcycle.
- At the intersection of Hwy 69 and W 190th Street, a northbound passenger car lost control due to operator inexperience and struck a tree.

Of the remaining 25 total crashes along the corridor, there were eight possible injury crashes with seven of them occurring at the study intersections and one between the study intersections. 17 crashes along the corridor were property damage only, with 12 at the study intersections and five between intersections.

Figure 9 shows the breakdown of crash severity by intersection and **Figure 10** shows the breakdown of crash severity by segment. **Table 4** shows the breakdown of crash types for intersections and segments. Most of the crashes along the corridor were broadside and rear end.

Figure 9 – Intersection Crashes by Severity (2017-2021)

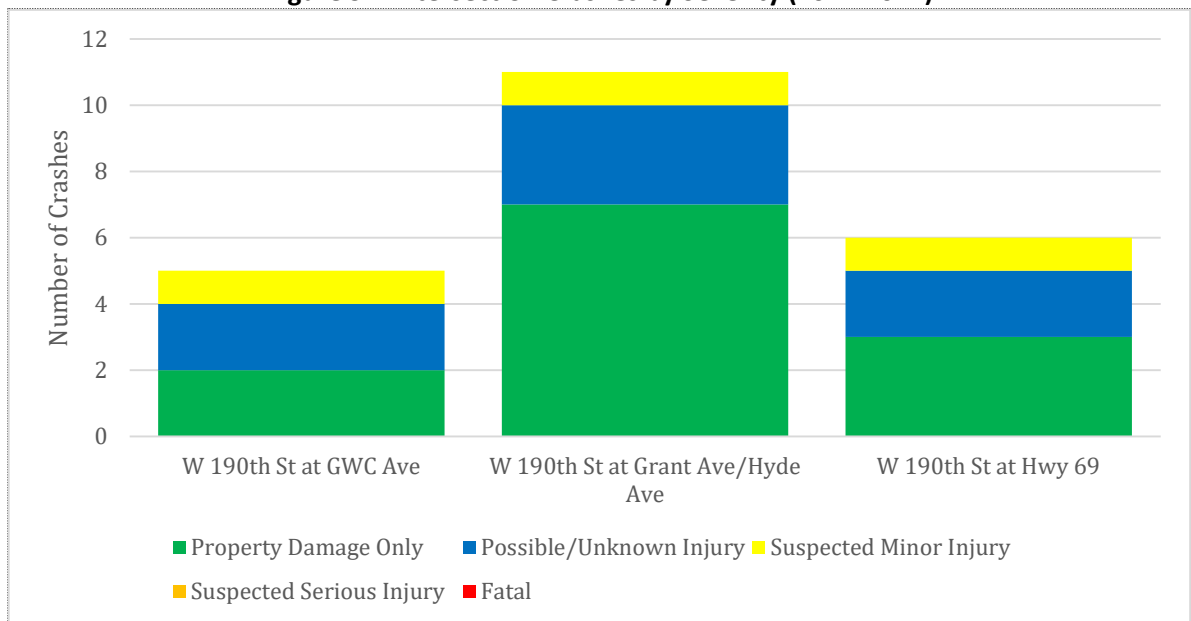


Figure 10 – Segment Crashes by Severity (2017-2021)

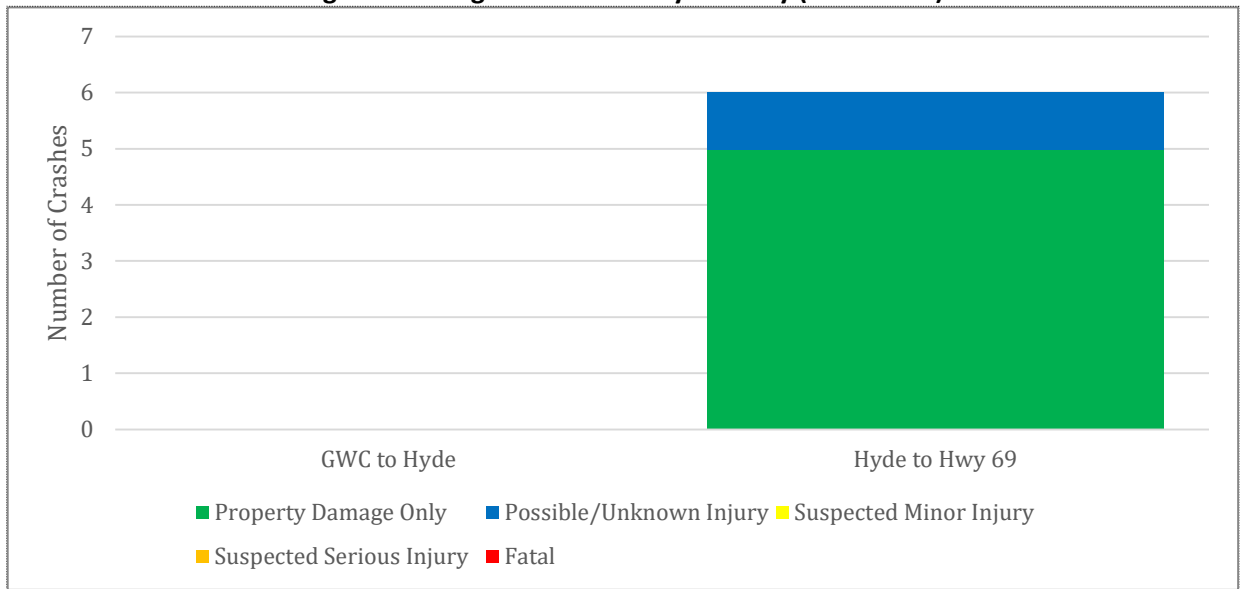


Table 4 – Crashes by Type (2017-2021)

	W 190th St at GWC Ave	GWC Ave to Grant Ave/Hyde Ave	W 190th St at Grant Ave/Hyde Ave	Grant Ave/Hyde Ave to Hwy 69	W 190th St at Hwy 69	Crash Type Total
Non-Collision (Single Vehicle)	0	0	0	1	2	3
Head-on (Front to front)	1	0	0	0	0	1
Rear End (front to rear)	0	0	3	3	0	6
Angle, Oncoming Left Turn	1	0	2	0	1	4
Broadside (front to side)	3	0	6	1	3	13
Sideswipe, Same Direction	0	0	0	0	0	0
Sideswipe, Opposite Direction	0	0	0	0	0	0
Rear to Rear	0	0	0	0	0	0
Rear to Side	0	0	0	0	0	0
Not reported	0	0	0	0	0	0
Other	0	0	0	0	0	0
Unknown	0	0	0	0	0	0
Not reported	0	0	0	1	0	1
Total	5	0	11	6	6	28

The two non-collision crashes at the intersection of W 190th Street and Hwy 69 involved drivers striking trees: one due to driver inexperience, one due to the influence of alcohol. The non-collision crash that occurred on the segment between Hyde Avenue and Hwy 69 involves a driver striking a tree while drowsy or asleep. Along the study area, nearly 50% of crashes were broadside crashes. No directional primacy was observed at any of the study intersections.

Crash rates were reviewed for the intersections and the segments within the study corridor to see if issues are present. Crash rates above the statewide average for a similar type of intersection or roadway segment are often indicative of an issue on the corridor that needs to be examined further. The crash rates were calculated using AADTs collected with the most recent traffic counts. The crash rates for intersections are determined as a rate per million vehicles entering. The crash rates for segments are determined as a rate per 100 million vehicle miles traveled, which is the industry standard for this calculation. The rates for the study intersections and segments can be found in **Table 5** and **Table 6**, respectively.

Table 5 – Intersection Crash Rates

Intersection	Crash Rate	Statewide Average
190th Ave at GW Carver Ave	0.71	1
190th Ave at Hyde Ave	1.1	1
190th Ave at Hwy 69	0.32	0.8

Table 6 – Segment Crash Rates

Segment	Crash Rate	Statewide Average
GW Carver Ave to Hyde	0	176
Hyde Ave to Hwy 69	118	176

As shown in **Table 5**, the intersection of 190th Street and Hyde Avenue has a crash rate above the statewide average for intersections of this type. The remainder of the intersection crash rates are below the statewide average. Per **Table 6**, both study segments had crash rates below the statewide average, indicating they are performing at a level of safety that does not induce concern.

Additionally, the potential for crash reduction was considered. PCR is based on traffic volumes, speeds, and intersection characteristics. As shown in **Table 7**, no intersections in the study area are at a high PCR level (>1.0) for all crashes (KABCO) or injurious crashes (KAB). This indicates that the study intersections are experiencing less of all types of crashes than would be expected.

Table 7 – Potential for Crash Reduction (PCR)

Intersection	PCR (Total)	PCR (Injurious)
W 190th St at GW Carver Ave	0.1	-0.03
W 190th St at Grant Ave/Hyde Ave	0.16	0
W 190th St at Hwy 69	-0.1	0.03

VI. EXISTING TRAFFIC OPERATIONS/CAPACITY ANALYSIS

A level of service (LOS) analysis of the peak hours was completed using the 2022 turning movement counts. The LOS results are based on average delay per vehicle as calculated by the Highway Capacity Manual (HCM) 6th Edition, which defines the level of service, based on control delay. Control delay is the delay experienced by vehicles slowing down as they are approaching the intersection, the wait time at the intersection, and the time for the vehicle to speed up through the intersection and enter the traffic stream. The average intersection control delay is a volume weighted average of delay experienced by all motorists entering the intersection on all intersection approaches.

Intersections and each intersection approach are given a ranking from LOS A through LOS F. LOS A indicates the best traffic operation, with vehicles experiencing minimal delays. LOS A through D is generally perceived to be acceptable to drivers. LOS E indicates that an intersection is operating at, or very near, its capacity and that drivers experience considerable delays. LOS F indicates an intersection where demand exceeds capacity and drivers experience substantial delays. **Table 8** summarizes the timing limits based on type of intersection control. The City of Ames targets LOS D for overall intersection performance and LOS E for individual movement performance for the design year of 2045.

Table 8 – Level of Service Parameters

LOS	Control Delay per Vehicle (sec)		
	<i>Signalized</i>	<i>Unsignalized</i>	<i>Roundabout</i>
A	≤ 10	≤ 10	≤ 10
B	>10 and ≤ 20	>10 and ≤ 15	>10 and ≤ 15
C	>20 and ≤ 35	>15 and ≤ 25	>15 and ≤ 25
D	>35 and ≤ 55	>25 and ≤ 35	>25 and ≤ 35
E	>55 and ≤ 80	>35 and ≤ 50	>35 and ≤ 50
F	>80	>50	>50

The 2022 AM and PM peak hour volumes were analyzed with current geometry. Operational and queuing results (95th Percentile) are summarized in **Table 9**. Detailed intersection summaries can be found in the *Appendix*.

Table 9 – Existing Conditions Analysis

George Washington Carver Ave & W 190th St			George Washington Carver Ave & W 190th St															
Intersection 1	No Build (TWSC)		NB				SB				EB				WB			
	AM	A -- 5	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	
Existing Volumes	AM	A -- 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	PM	A -- 6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
			Storage Length				Storage Length				Storage Length				Storage Length			
			>1000				>1000				>1000				>1000			

Hyde Ave/Grant Ave & W 190th St			Hyde Ave/Grant Ave & W 190th St															
Intersection 2	No Build (Signal)		NB				SB				EB				WB			
	AM	B -- 12	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	
Existing Volumes	AM	B -- 12	75	-	-	100	-	-	100	-	-	100	-	-	50	-	-	
	PM	A -- 9	50	-	-	75	-	-	50	-	-	75	-	-	75	-	-	
			Storage Length				Storage Length				Storage Length				Storage Length			
			>1000				>1000				>1000				>1000			

Grand Ave & W 190th St			Grand Ave & W 190th St															
Intersection 3	No Build (TWSC)		NB				SB				EB				WB			
	AM	A -- 6	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	
Existing Volumes	AM	A -- 6	25	-	0	-	-	100	-	-	25	-	-	75	-	-	25	
	PM	A -- 5	25	-	25	-	-	75	-	-	25	-	-	25	-	-	25	
			Storage Length				Storage Length				Storage Length				Storage Length			
			325	>1000	150	>1000	415	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	

AM Peak Hour

- The intersection at Hyde/Grant operates at LOS B, with the other intersections operating at LOS A.
- The eastbound leg at Hwy 69 operates at LOS C.
- The westbound leg at Hwy 69 operates at LOS D. This only impacts 11 total vehicles over the course of the AM Peak Hour.
- All other movements operate at LOS B or better.
- The most consistently extensive queue in the area is the southbound queue on Grant, where the average queue is around 75 feet and the maximum queue is 150 feet for all movements. This could potentially block a driveway on the property located to the northeast when the queue is at its maximum length.
- All other queues are acceptable and do not block property entrances.

PM Peak Hour

- All intersections operate at LOS A.
- The eastbound leg at Hwy 69 operates at LOS C.
- The westbound leg at Hwy 69 operates at LOS D. This only impacts 4 total vehicles during PM Peak Hour.
- All other movements operate at LOS B or better.
- All queues are acceptable and do not block property entrances.

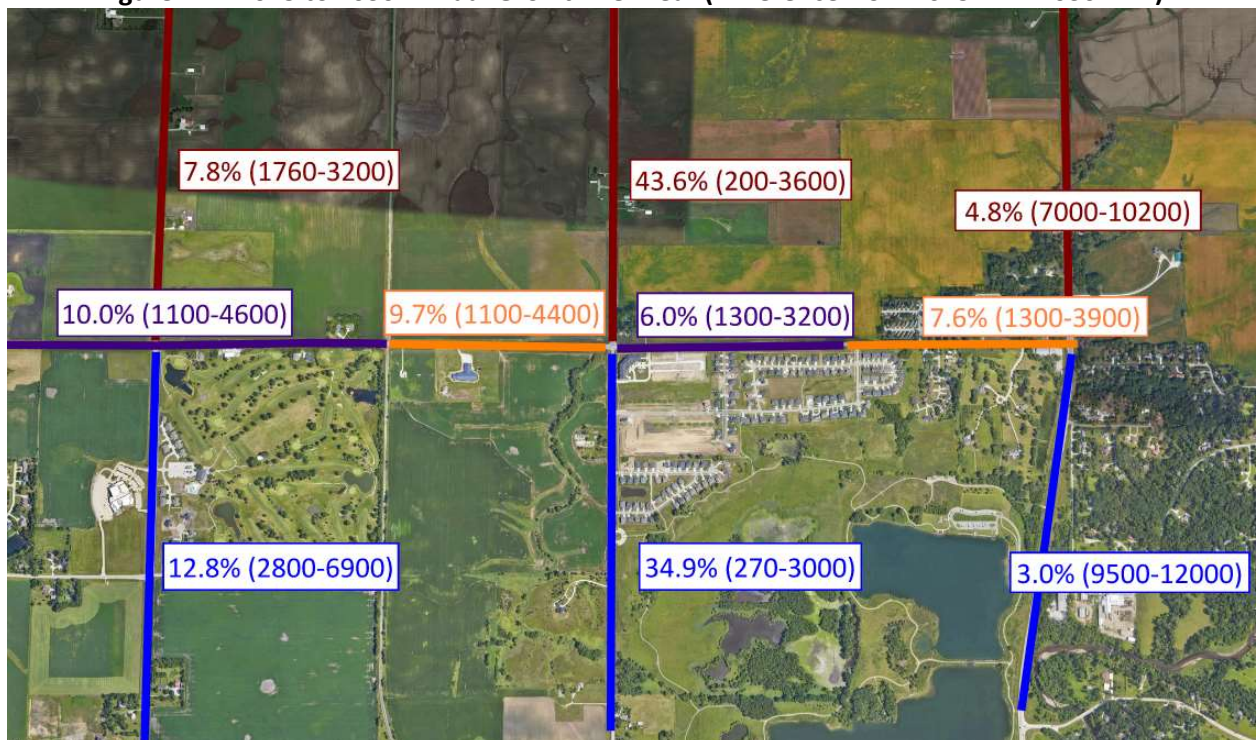
VII. FUTURE NO BUILD

A. Future Traffic Volumes

The AAMPO provided the regional travel demand model (used in Forward 2045) that provided annual average daily traffic (AADT) from 2015 for each of the road segments in the study area. The model also provided projections for the daily volumes of these same segments in 2030 and 2045. Using these 3 volume sets (2015, 2030, 2045), the annual growth between 2015 and 2030 was projected.

Figure 11 details the annual growth projected at each road segment by percentage rate and ADT Difference from 2015 to 2030. For both 2030 and 2045 volume sets, existing heavy vehicle percentage (HV%) and peak hour factors (PHF) were applied.

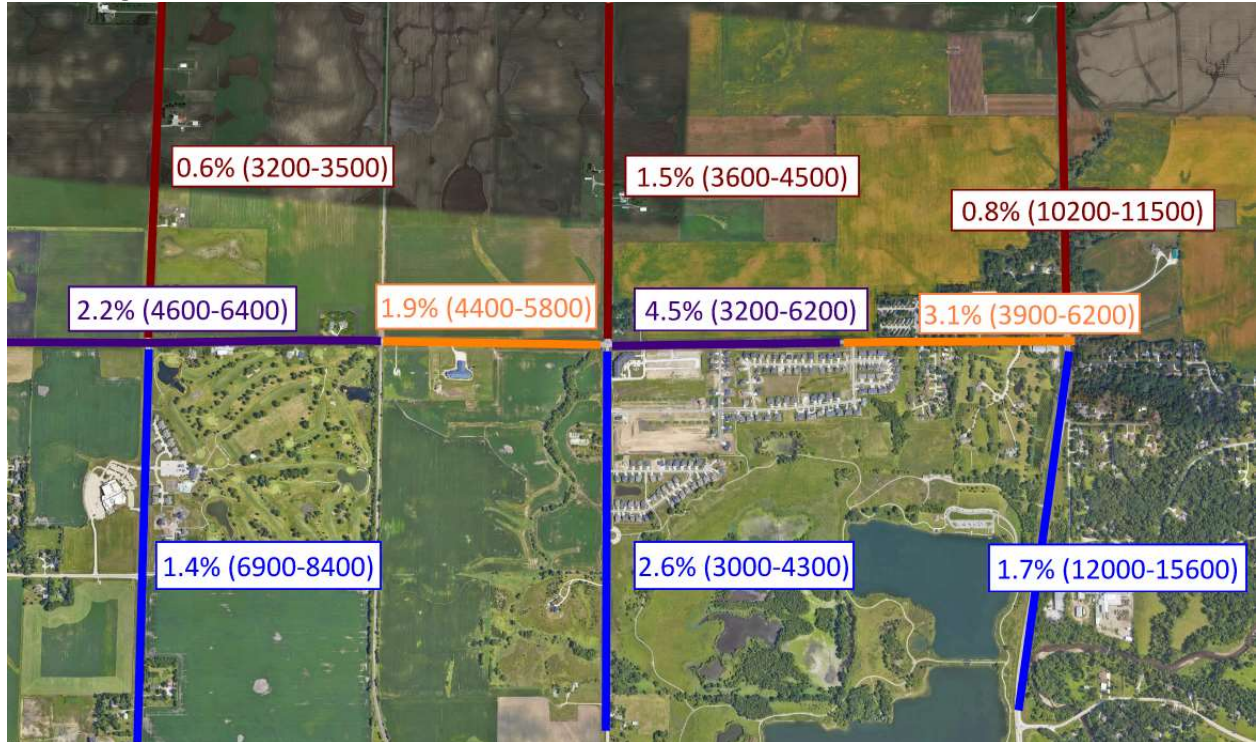
Figure 11 – 2015 to 2030 Annual Growth Per Year (Difference from 2015 ADT-2030 ADT)



Projected 2030 turning movements were developed by taking the existing counts (2022) and scaling each segment leg by the growth factor shown in **Figure 11** for eight years. For 2045 turning movements, the same methodology was applied.

The projected 2030 turning movements were determined for each leg by using the growth factor shown in **Figure 12** for 15-years to estimate the total growth from 2030 to 2045.

Figure 12 – 2030 to 2045 Annual Growth Per Year (Difference from 2030 ADT-2045 ADT)



B. Scenarios

Six scenarios were studied in addition to the existing conditions analysis:

1. 2030 No Build
2. 2030 with Signalized Intersections
3. 2030 with Roundabout Intersections
4. 2045 No Build
5. 2045 with Signalized Intersections
6. 2045 with Roundabout Intersections

VIII. ANALYSIS OF INTERSECTION ALTERNATIVES

A. No Build

2030 and 2045 peak hour volumes were applied to the existing road configuration. For the signal at the intersection of Grant Avenue/Hyde Avenue and W 190th St, phasing was not altered but signal timings were optimized using the traffic analysis software Synchro.

B. Signalized Intersections

2030 and 2045 peak hour volumes were applied to road network and full signals were added to each of the 3 study intersections. Signal warrants were met for each intersection in 2030, see **Table 10**.

George Washington Carver Ave & W 190th St

150-foot left turn lanes were added to all but the westbound approach which has 225-foot left turn lane. A 150-foot right turn lane was added to the northbound approach. Protected-permitted phasing was considered for left turns on all approaches. A right turn overlap phase was added for the northbound approach.

Grant Ave/Hyde Ave & W 190th St

150-foot left turn lanes were added for the north-south approaches. A 250-foot left turn lane was added for the eastbound approach and a 100-foot left turn lane was added for the westbound approach. Protected-permitted phasing was considered for left turns on all approaches.

Hwy 69 (Grand Ave) & W 190th St

A 325-foot northbound left turn lane, a 150-foot southbound left turn lane, and a 415-foot southbound right turn lane are present in existing conditions. A 475-foot eastbound right turn lane was added. Protected-permitted phasing was considered for left turn lanes on all approaches. A right turn overlap phase was added for the eastbound approach.

C. Roundabouts

2030 and 2045 peak hour volumes were applied to the road network and single lane roundabouts were added to each of the 3 study intersections. Roundabout layouts for each intersection can be found in the *Appendix*.

George Washington Carver Ave & W 190th St

Roundabout was analyzed as a single lane with a northbound right-turn slip lane.

Grant Ave/Hyde Ave & W 190th St

Roundabout was analyzed as a single lane.

Hwy 69 (Grand Ave) & W 190th St

Roundabout was analyzed as a single lane with an eastbound right-turn slip lane.

IX. FUTURE BUILD ALTERNATIVES

A. Warrants

Signal Warrants

Signal warrants were completed for each of the 3 study intersections using 2030 projected volumes based upon growth rates from the Forward 2045 model. The results can be found in **Table 10**. Warrants met are shown boxed in yellow.

Table 10 – Signal Warrant Summary (2030 Volumes)

	2030					
	George Washington Carver Ave & W 190th St		Grant Ave/Hyde Ave & W 190th St		Hwy 69 (Grand Ave) & W 190th St	
	Met (Hr)	Required (Hr)	Met (Hr)	Required (Hr)	Met (Hr)	Required (Hr)
Warrant 1A	5	8	4	8	12	8
Warrant 1B	1	8	1	8	9	8
Warrant 2	4	4	2	4	12	4
Warrant 3	1	1	1	1	8	1
Warrant 7	10	8	6	8	13	8

Turn Lane Warrants

Turn lane decisions were based upon guidelines for signalized intersections in Chapter 19 of the Highway Capacity Manual 6th Edition (HCM 6th), pages 19-33, and are summarized as follows:

1. Exclusive Left Turn Lanes
 - a. A single exclusive left turn lane should be considered when the minimum left turn volume is 100 vehicles/hr
 - b. Dual exclusive left turn lanes should be considered when the minimum left turn volume is 300 vehicles/hr
2. Exclusive Right Turn Lanes
 - a. An exclusive right turn lane should be considered when the right turn volume exceeds 300 vehicles/hr and the adjacent mainline volume exceeds 300 vehicles/hr/lane

At intersections where a left turn lane is needed on one approach but not the oncoming approach, a left turn lane was added to both approaches to provide the best roadway geometry. **Table 11** shows a summary of turn lane needs in 2030 and 2045 at each intersection.

Table 11 – Turn Lane Needs

Intersection		2030		2045	
		Left	Right	Left	Right
W 190th Street @ George Washington Carver Ave	AM	WBL	NBR	WBL	NBR
	PM	WBL	-	WBL	-
W 190th Street @ Grant Ave/Hyde Ave	AM	EBL	-	EBL*	-
	PM	-	-	-**	-
W 190th Street @ Grand Ave	AM	NBL	EBR	NBL	EBR
	PM	NBL	-	NBL	EBR

*SBL=97 veh/hr

**WBL=99 veh/hr

B. Future Build Operations Analysis

Delay

Each intersection alternative was analyzed with 2030 and 2045 projected volumes. **Table 12** shows the level of service and the delay for each intersection-alternative pair. It is to be noted that at some intersections, the roundabout option provides less delay despite having a worse level of service. This is due to the different level of service thresholds for different intersection types (see **Table 8**). Detailed intersection summary tables can be found in the *Appendix*.

Table 12 – Future Build Alternatives Operational Analysis (LOS – Delay in seconds)

George Washington Carver Ave & W 190th St				
Intersection 1		No Build (TWSC)	Roundabout	Signal
2030	AM	F -- 222	A -- 5	C -- 23
	PM	F -- 57	A -- 5	B -- 14
2045	AM	F -- 300+	A -- 9	C -- 24
	PM	F -- 195	A -- 9	C -- 22

Hyde Ave/Grant Ave & W 190th St				
Intersection 2		No Build (Signal)	Roundabout	Signal
2030	AM	D -- 37	B -- 13	C -- 28
	PM	C -- 22	A -- 7	B -- 19
2045	AM	F -- 168	F -- 56	E -- 78
	PM	D -- 36	D -- 26	C -- 32

Hwy 69 (Grand Ave) & W 190th St				
Intersection 3		No Build (TWSC)	Roundabout	Signal
2030	AM	F -- 129	A -- 7	B -- 18
	PM	D -- 53	C -- 18	B -- 12
2045	AM	F -- 300+	A -- 9	D -- 39
	PM	F -- 300+	F -- 68	B -- 20

The following conclusions can be made about the delay of the intersections:

- At both the intersections along 190th Street with George Washington Carver Avenue and Hyde/Grant, the AM is consistently worse than the PM due to a high number of vehicles making a northbound right on George Washington Carver and then an eastbound left from 190th Street onto Grant to head towards Gilbert in the AM Peak. This is traffic likely associated with Gilbert High School, including school buses.
- The no build scenario fails at every intersection without improvements.
- The roundabout operates well at Grand Avenue in the AM, but in the PM, high volume of northbound left turns results in excessive conflict with the southbound through vehicles, causing the intersection to fail.
- The signal and roundabout have reduced LOS in the AM at Hyde/Grant due to a high volume of eastbound left turns. The left turns are limited to a single left turn lane as there is only one receiving lane on Grant. According to Forward 2045, Grant Avenue is projected to have an AADT of 4,500 vehicles/day in 2045. The high influx of eastbound left turns occurs for 20-30 min in the AM, therefore, despite this sharp peak in the AM, it is not justified to widen Grant to accommodate and eastbound dual left for this short time period of failing operations.

Queuing

No Build Scenario: The 95th percentile queuing results for the future No Build scenarios using existing road geometry with 2030 and 2045 projected volumes can be found in **Table 13**. Every intersection experiences queues over 1000 feet (in addition to having failing level of service/delay).

Signal Scenario: The 95th percentile queuing results for the 2030 and 2045 projected volumes with the signal build scenario with signals at all 3 intersections can be found in **Table 14**.

- The highest 95th percentile queues along W 190th Street are the westbound left at George Washington Carver Avenue at 225-feet, the eastbound left at Hyde Avenue/Grant Avenue at 250-feet, and the eastbound right at Hwy 69 (Grand Ave) at 475-feet.
- For each of the queues mentioned above, the queue is less than the proposed storage length.

Roundabout Scenario: The 95th percentile queuing results for the 2030 and 2045 projected volumes with the roundabout build can be found in **Table 15**.

- As indicated in the level of service/delay results in **Table 12**, at Hwy 69/Grand Avenue, the roundabout option is unable to operate adequately with a high number of northbound left turns conflicting with the southbound through movement in the PM Peak Hour.
- The westbound and eastbound queues at Hyde Avenue/Grant Avenue have higher 95th percentile queuing in both peak hours, up to 1,000-feet. The average queue in the AM Peak Hour is 250 feet and in the PM Peak Hour is 400 feet. The nearest access point in the westbound direction, Aikman Drive, is located just over 400 feet away from the intersection.

Detailed roundabout queuing information can be found in the *Appendix*.

Table 13 – Future No Build Queuing Results

No Build	Intersection 1	George Washington Carver Ave & W 190th St											
		NB			SB			EB			WB		
		L	T	R	L	T	R	L	T	R	L	T	R
2030	AM	-	-	-	-	-	-	-	-	300	-	-	1000+
	PM	-	-	-	-	-	-	-	-	25	-	-	450
	Storage Length	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000
2045	AM	-	-	-	-	-	-	-	-	1000+	-	-	1000+
	PM	-	-	-	-	-	-	-	-	25	-	-	475
	Storage Length	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000

No Build	Intersection 2	Hyde Ave/Grant Ave & W 190th St											
		NB			SB			EB			WB		
		L	T	R	L	T	R	L	T	R	L	T	R
2030	AM	150	-	-	250	-	-	425	-	-	-	-	75
	PM	100	-	-	100	-	-	75	-	-	-	-	150
	Storage Length	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000
2045	AM	450	-	-	475	-	-	1000+	-	-	-	-	275
	PM	225	-	-	275	-	-	125	-	-	-	-	650
	Storage Length	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000

No Build	Intersection 3	Hwy 69 (Grand Ave) & W 190th St											
		NB			SB			EB			WB		
		L	T	R	L	T	R	L	T	R	L	T	R
2030	AM	25	-	-	0	-	-	725	-	-	-	-	1000+
	PM	50	-	-	25	-	-	500	-	-	-	-	75
	Storage Length	325	>1000	>1000	150	>1000	415	>1000	>1000	>1000	>1000	>1000	>1000
2045	AM	50	-	-	0	-	-	1000+	-	-	-	-	1000+
	PM	75	-	-	25	-	-	1000+	-	-	-	-	1000+
	Storage Length	325	>1000	>1000	150	>1000	415	>1000	>1000	>1000	>1000	>1000	>1000

Table 14 – Future Signal Build Queuing Results

Signal		George Washington Carver Ave & W 190th St														
		Intersection 1			NB			SB			EB			WB		
			L	T	R	L	T	R	L	T	R	L	T	R		
2030	AM	25	100	25	25	100	25	50	75	25						
	PM	25	75	50	25	50	0	50	125	25						
	Storage Length	150	>1000	150	150	>1000	150	>1000	150	>1000	225			>1000		
2045	AM	25	150	25	50	125	25	75	100	25						
	PM	25	100	50	25	75	0	50	225	25						
	Storage Length	150	>1000	150	150	>1000	150	>1000	150	>1000	225			>1000		

Signal		Hyde Ave/Grant Ave & W 190th St														
		Intersection 2			NB			SB			EB			WB		
			L	T	R	L	T	R	L	T	R	L	T	R		
2030	AM	25	150	50	125	100	125	25	100							
	PM	25	100	50	100	50	100	50	100	50						
	Storage Length	150	>1000	150	>1000	250	>1000	100	>1000	100				>1000		
2045	AM	25	325	150	225	250	200	50	425							
	PM	50	200	100	150	75	125	75	650							
	Storage Length	150	>1000	150	>1000	250	>1000	100	>1000					>1000		

Signal		Hwy 69 (Grand Ave) & W 190th St														
		Intersection 3			NB			SB			EB			WB		
			L	T	R	L	T	R	L	T	R	L	T	R		
2030	AM	50	75	25	325	0	25	150	25							
	PM	75	150	25	175	25	25	50	25							
	Storage Length	325	>1000	150	>1000	415	>1000	475	>1000					>1000		
2045	AM	50	100	25	550	0	50	475	25							
	PM	125	275	25	300	25	25	100	25							
	Storage Length	325	>1000	150	>1000	415	>1000	475	>1000					>1000		

Table 15 – Future Roundabout Build Queuing Results

Roundabout		George Washington Carver Ave & W 190th St														
		Intersection 1			NB			SB			EB			WB		
			L	T	R	L	T	R	L	T	R	L	T	R		
2030	AM	25		50	25	25		25			25					
	PM	25		25	25	25		25			50					
	Storage Length	>1000		200	>1000	>1000		>1000			>1000			>1000		
2045	AM	75		100	50	50		50			100					
	PM	50		25	25	25		25			175					
	Storage Length	>1000		200	>1000	>1000		>1000			>1000			>1000		

Roundabout		Hyde Ave/Grant Ave & W 190th St														
		Intersection 2			NB			SB			EB			WB		
			L	T	R	L	T	R	L	T	R	L	T	R		
2030	AM	125			50			225			75					
	PM	25			50			50			75					
	Storage Length	>1000			>1000			>1000			>1000			>1000		
2045	AM	650			50			950			625					
	PM	50			75			50			1025					
	Storage Length	>1000			>1000			>1000			>1000			>1000		

Roundabout		Hwy 69 (Grand Ave) & W 190th St														
		Intersection 3			NB			SB			EB			WB		
			L	T	R	L	T	R	L	T	R	L	T	R		
2030	AM	75			175			25			25					
	PM	475			125			25			25					
	Storage Length	>1000			>1000			>1000			>1000			>1000		
2045	AM	125			375			25			25					
	PM	4125			175			25			25					
	Storage Length	>1000			>1000			>1000			>1000			>1000		

X. MULTIMODAL REVIEW

A. Bicycle System

Existing Bikeway System and Characteristics

190th Street is a two-lane roadway with speed limits along the corridor varying from 35 mph to 55 mph. The roadway lacks a designated bikeway infrastructure along the study area, but this does not mean people do not travel 190th Street by bike. According to State of Iowa Statutes, bicyclists are permitted to ride on roads unless expressly restricted – primarily controlled access freeways. Lack of bike infrastructure only means that cyclists currently lack the proper facilities to safely navigate the corridor.

Existing Bikeways

There are no bicycle facilities along W 190th Street. Within the study area there are no trails, signage, or paved shoulders that can sometimes be seen on similar roadways making W 190th St not very conducive for cycling. There is currently a 10-foot multi-use trail along Grant Ave from Cedar Dr to W 190th St (**Figure 13**).

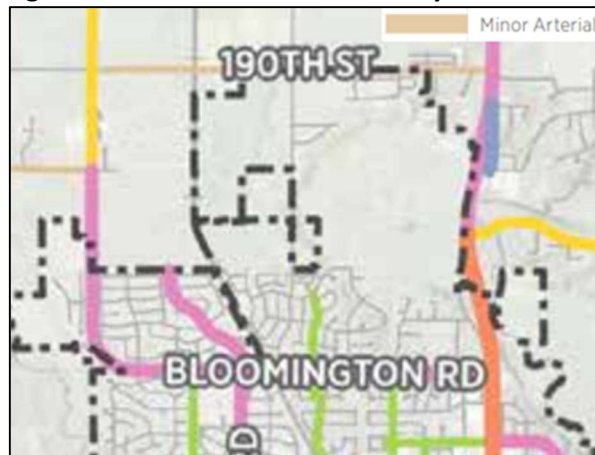
Figure 13 – Grant Avenue Bike Path at W 190th Street



Ames Plan 2040/ Ames Mobility 2040/Forward 2045

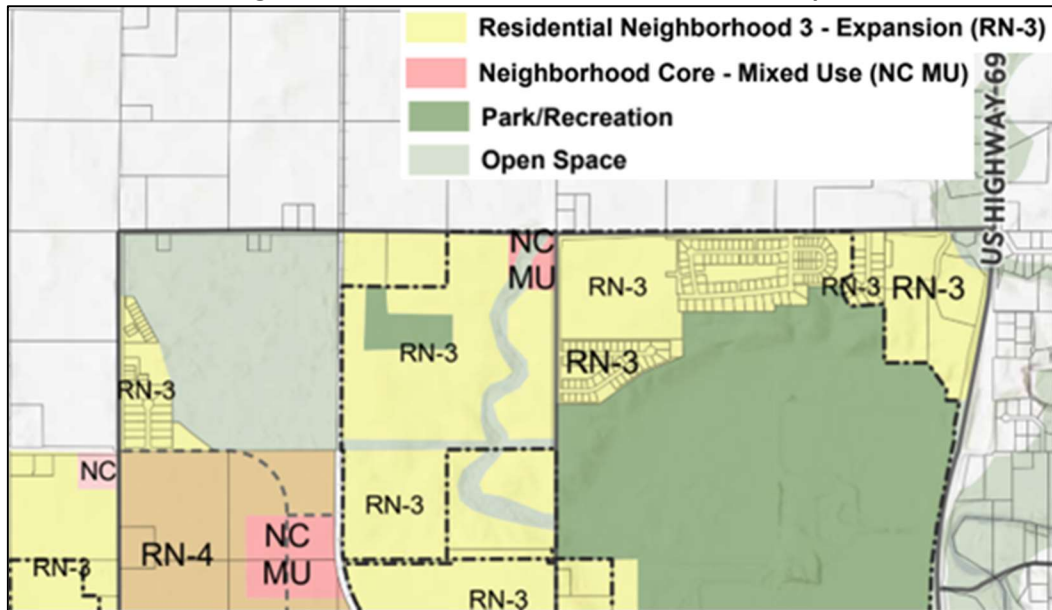
Ames Plan 2040 is Ames' comprehensive plan that was adopted in 2021. *Ames Plan 2040* covers a wide range of topics relating to the city, the most relevant to this study being the transportation section. The W 190th St corridor is defined as a minor arterial by *Ames Plan 2040* and has characteristics most similar to what could be seen as a rural highway (**Figure 14**).

Figure 14- Ames Plan 2040 Roadway Classification



The area to the south of the corridor is classified as Residential Neighborhood 3-Expansion, Neighborhood Core, Open Space, and Parks/Recreation (Figure 15).

Figure 15 - Ames Plan 2040 Future Land Use Map



Complete Streets

In 2018, the City of Ames adopted a Complete Streets Plan which outlines the policy goals and shows existing conditions of bicycle and pedestrian safety. The Complete Streets plan has W 190th Street omitted from a large portion of created maps (Figure 16). The Ames Mobility 2040 plan has bike crash data along the corridor from 2004-2013 (Figure 17). It shows no crashes in that 10-year period.

Figure 16 - Complete Streets Ames Bicycle Crash Data

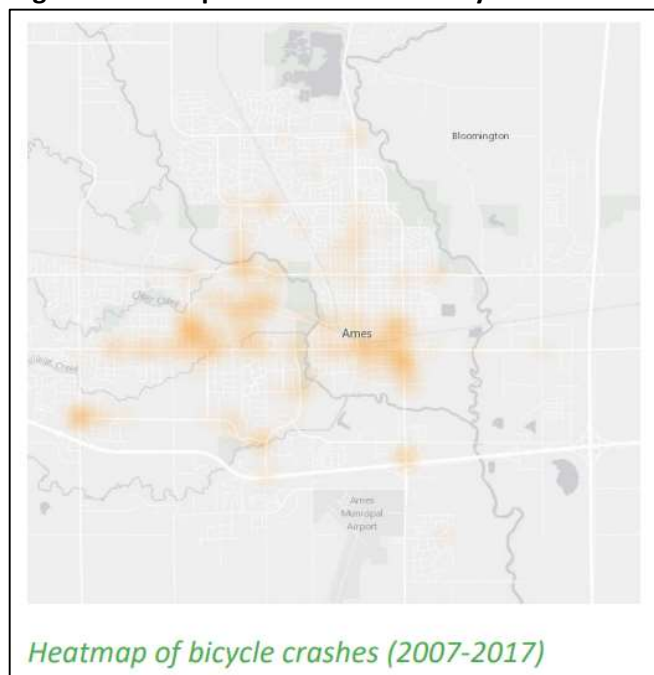
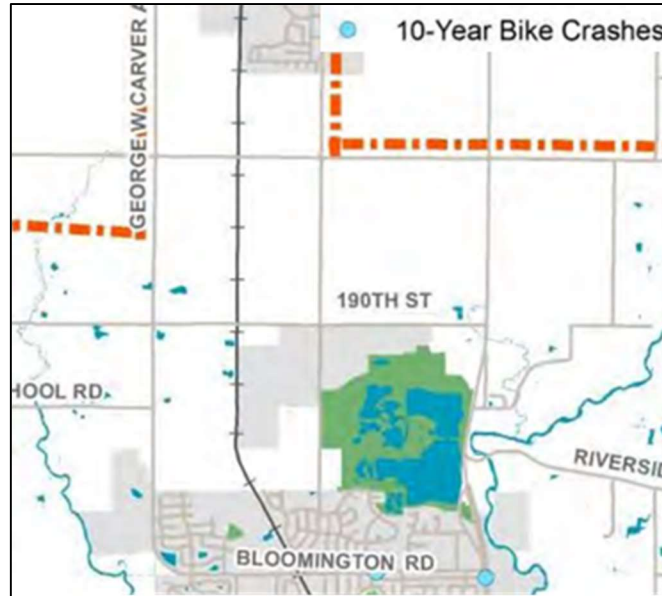


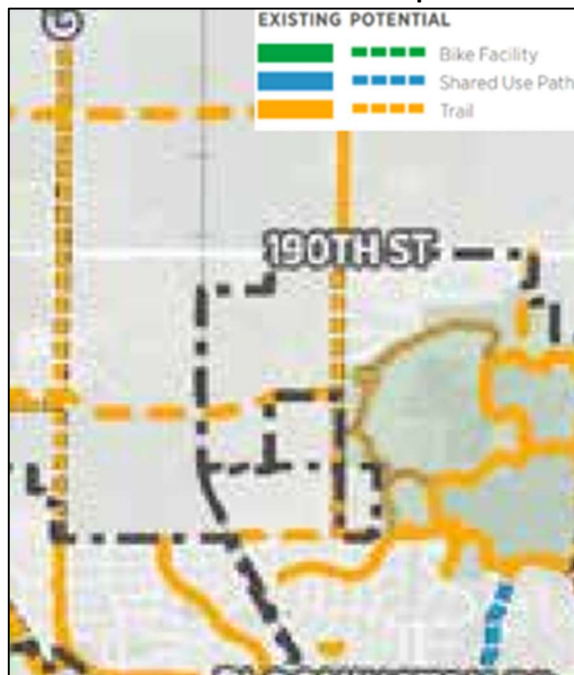
Figure 17 - Ames Mobility 2040, 2004-2013 Bicycle-Related Crashes



Future Network

The future bikeway network in all plans reviewed do not plan for this portion of W 190th Street to have any type of bike facilities. Ames Plan 2040 shows that there are planned trails along Hyde Avenue and GW Carver Avenue which both will cross the study area (**Figure 18**).

Figure 18 - Ames Plan 2040 Future Active Transportation Facilities Concept



The Ames Mobility 2040 plan shows that there is moderate bike demand within the study area (**Figure 19**). Forward 2045 considers the roadway to have low levels of stress regarding biking (**Figure 20**). The intersection of W 190th Street and Hyde Avenue/Grant Avenue being a level 3 out of 4 for level of stress for biking.

Figure 19 - Ames Mobility 2040 Bike Demand

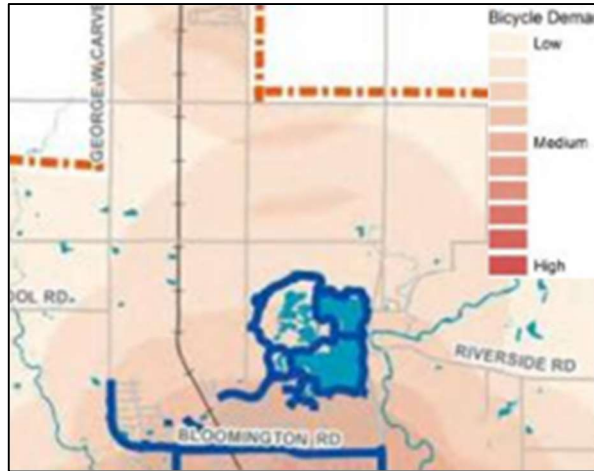


Figure 20 - Forward 2045 Bike Stress Level



B. Pedestrian System

Existing Pedestrian Environment

The pedestrian environment is limited in the corridor due to the limited number of sidewalks. The study area is at the northern edge of the City of Ames, with much of the environment in a transitional phase from open space to residential use (**Figure 21**). A new property in the southeast quadrant of the intersection at Hyde Avenue/Grant Avenue includes a sidewalk on the south side of W 190th Street. It is new, in good condition, and is assumed to meet all aspects of ADA requirements (**Figure 22**). There are limited crossing points along the corridor with no painted crosswalks along the entire section, including the signalized intersection at Hyde Ave/Grant Avenue and W 190th Street. The speed along the corridor varies from 35 mph to 55 mph.

Figure 21 - Eastward View of W 190th St at Grant Ave/Hyde Ave

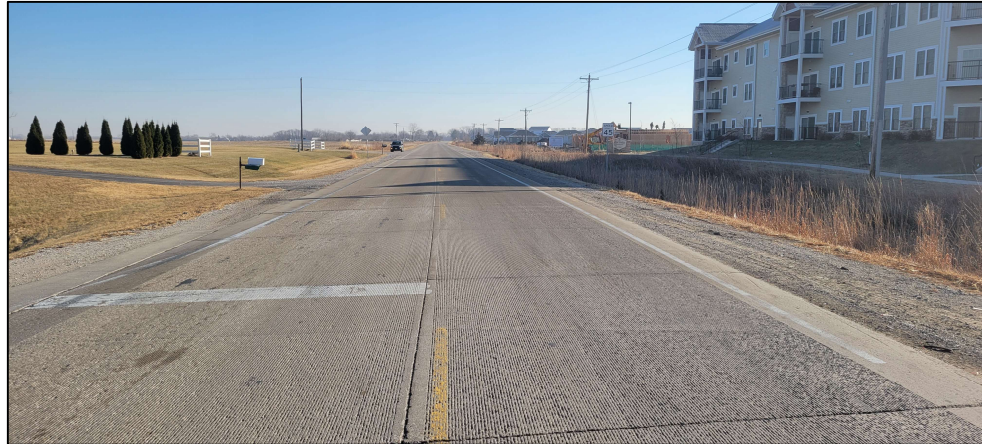
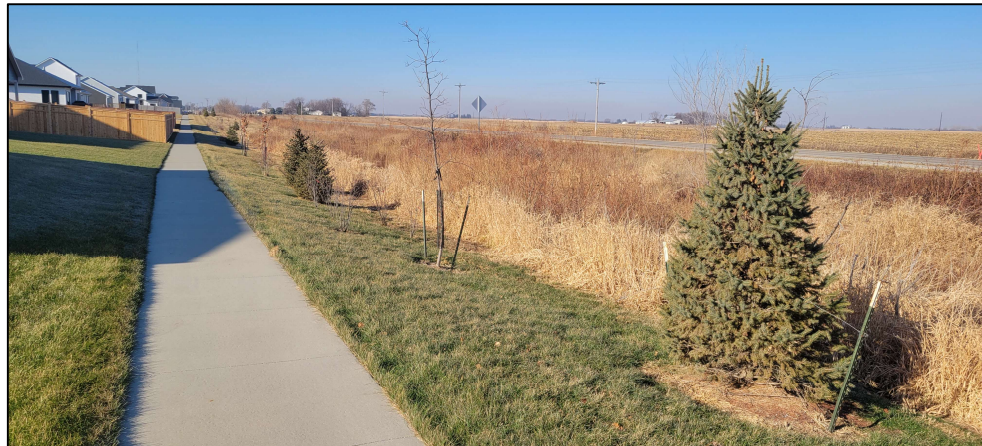


Figure 22 - Westward View of Sidewalk along W 190th St



Existing Sidewalk Conditions

There are large gaps within the sidewalk network along W 190th Street. The entire study area has no sidewalks on the north side of the road. The south side of W 190th Street has sidewalk from Hyde Avenue to Aikman Drive and from just west of McFarland Avenue to Ada Hayden Road. These were both installed with new development in the area. There are no sidewalks on the rest of the study area (**Figure 23**).

Figure 23 – W 190th Street and George Washington Carver Ave



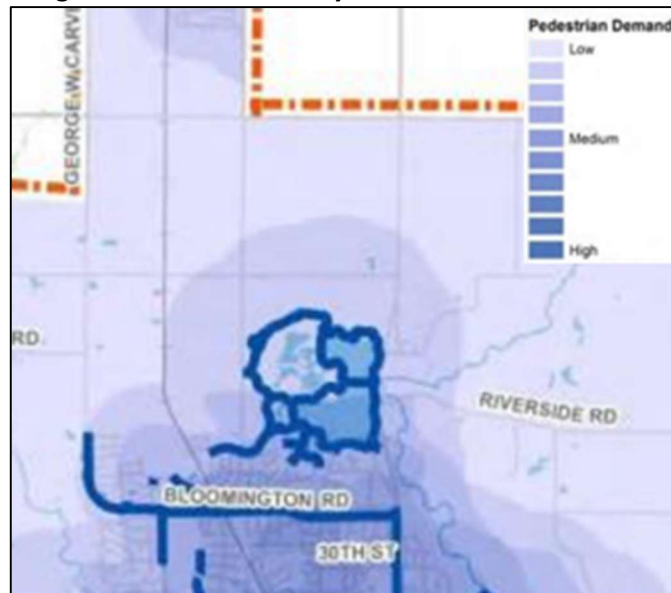
Pedestrian Policy

The *Ames Mobility 2040*, *Complete Streets Ames, Forward 2045*, and *Ames Plan 2040* all advise on pedestrian policy goals for Ames and the region. The *Ames Mobility 2040* contains information regarding pedestrian level of service for GW Carver Ave and Hwy 69, but doesn't include the study area intersections (**Figure 24**). Both roadways have a scoring of E due to not having any sidewalks. None of the plans have data on existing and missing sidewalks. *Ames Mobility 2040* also contains a map describing the pedestrian demand for the city (**Figure 25**). The map shows that there is increasing pedestrian demand in the eastern portion of the study area.

Figure 24 - Ames Mobility 2040 Pedestrian Level of Service

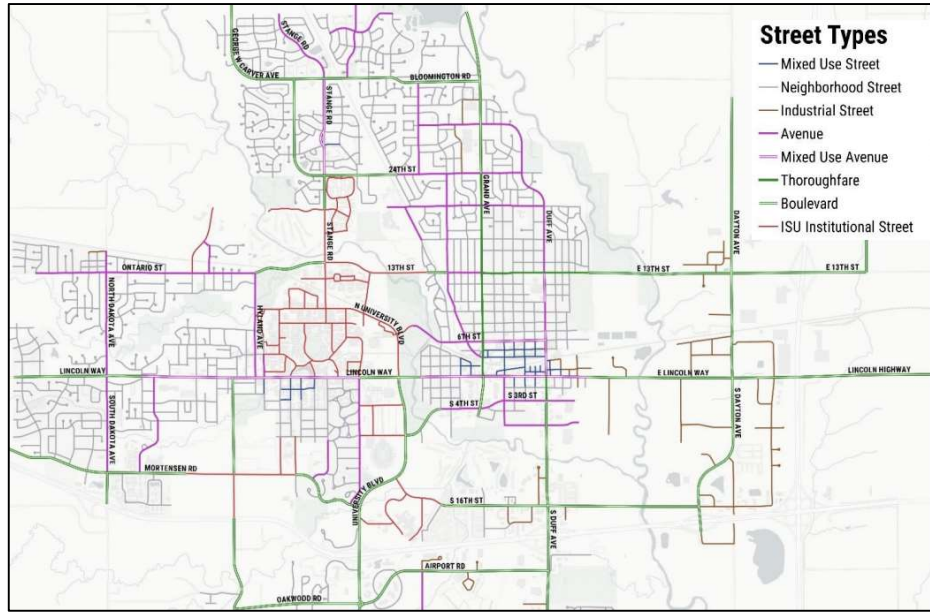


Figure 25 - Ames Mobility 2040 Pedestrian Demand



Complete Streets Ames has a map of street types, descriptions, and corresponding map showing where each is located (**Figure 26**). The study area intersections are not included in the map. The *Ames Plan 2040* and *Forward 2045* has policy goals that focus on increasing the safety of the transportation system and requiring new construction to have ADA complying sidewalk. Each plan has a larger focus on dense areas and locations with a high occurrence of crashes, which is not applicable to the study area.

Figure 26 - Complete Streets Street Types



Pedestrian Crashes

Ames Mobility 2040 plan has no pedestrian related crashes from 2004-2013 in the study area (**Figure 27**). The Complete Streets plan omits W 190th St from its bicycle crash data (**Figure 28**).

Figure 27 - Ames Mobility 2040, 2004-2013 Pedestrian-Related Crashes

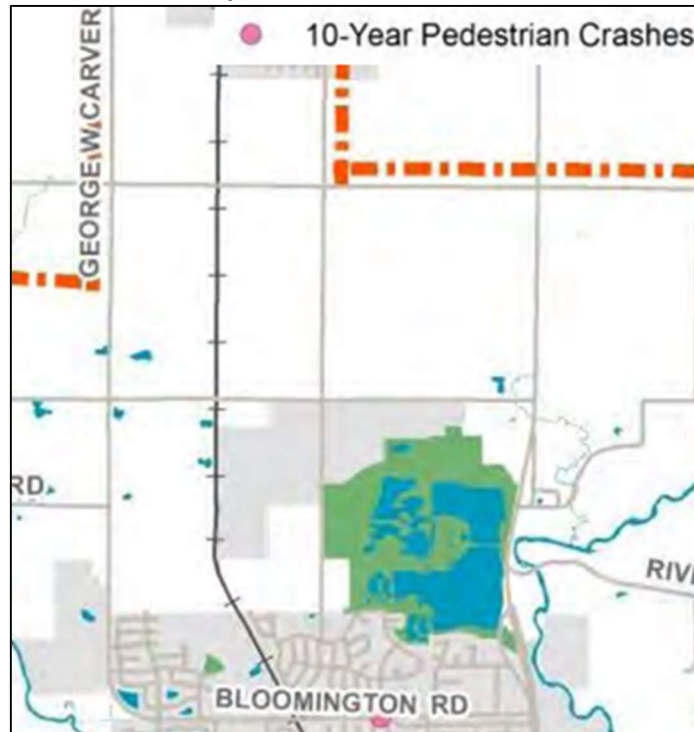
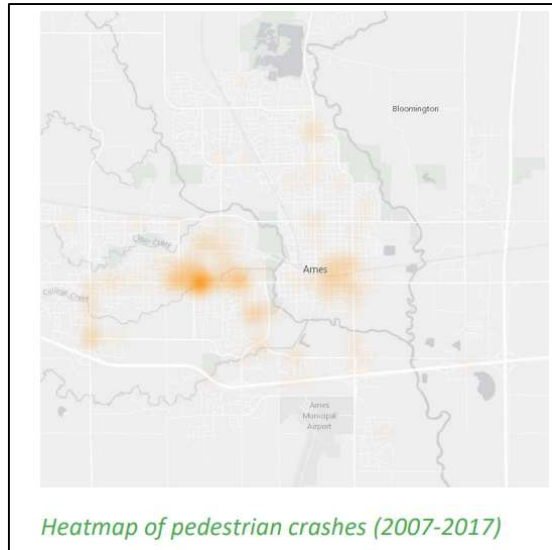


Figure 28 - Complete Streets Ames Bicycle Crash Data



C. Existing Transit System

Transit Routes

Transit for 190th Street is served locally by CyRide and HIRTA, the regional service. There is no fixed route service from CyRide to the Study area, but CyRide does provide Dial-A-Ride ADA Paratransit during the same hours fixed routes are running (**Figure 29**). HIRTA provides on call service to the service area with service for all of Story County Weekdays from 6:30 am – 5:00 pm, Saturday service for the City of Ames from 7:30 am – 6:00 pm, and 8:30 am – 6:00 pm on Sundays.

Figure 29 - CyRide 2022-2023 System Map



Transit Policy

The 2017 CyRide System Redesign Study does not have include W 190th St within its transit system demand (**Figure 30**). The area south of W 190th Street between Hyde Avenue and Hwy 69 is considered the lowest amount of demand on the scale. Neither Scenario 1 nor 2 of the future planned redesigns of routes have any transit along W 190th Street. The closest future route is Route 6 along Bloomington Road, which runs parallel to W 190th Street for 1.5 miles in both scenarios (**Figure 31 and Figure 32**).

Figure 30 - CyRide System Redesign Transit Demand Map

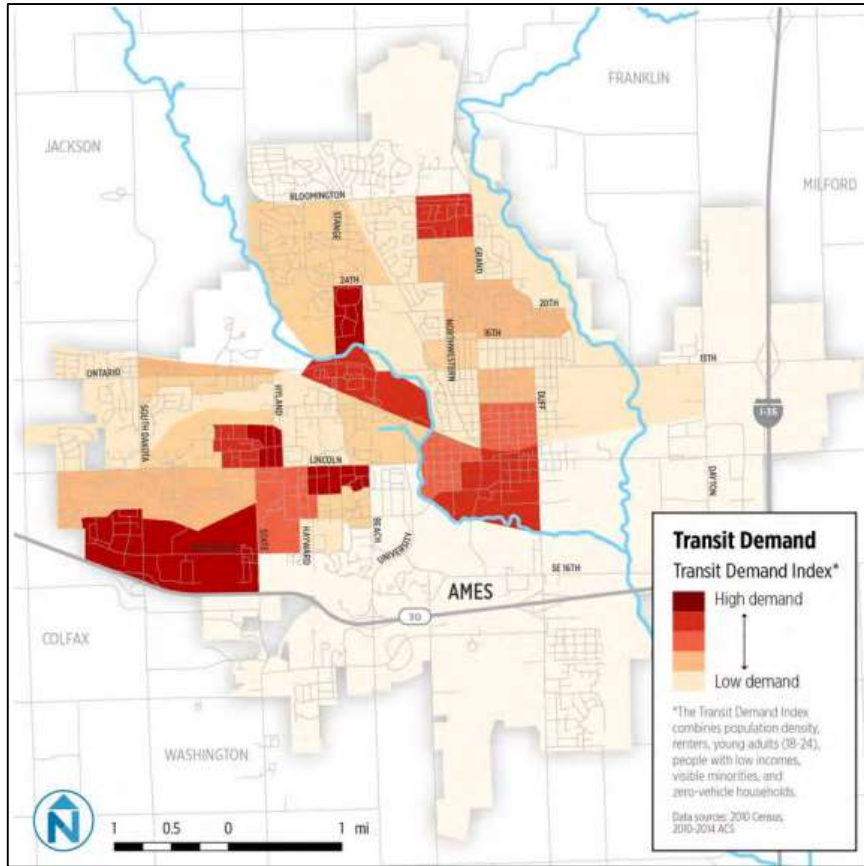
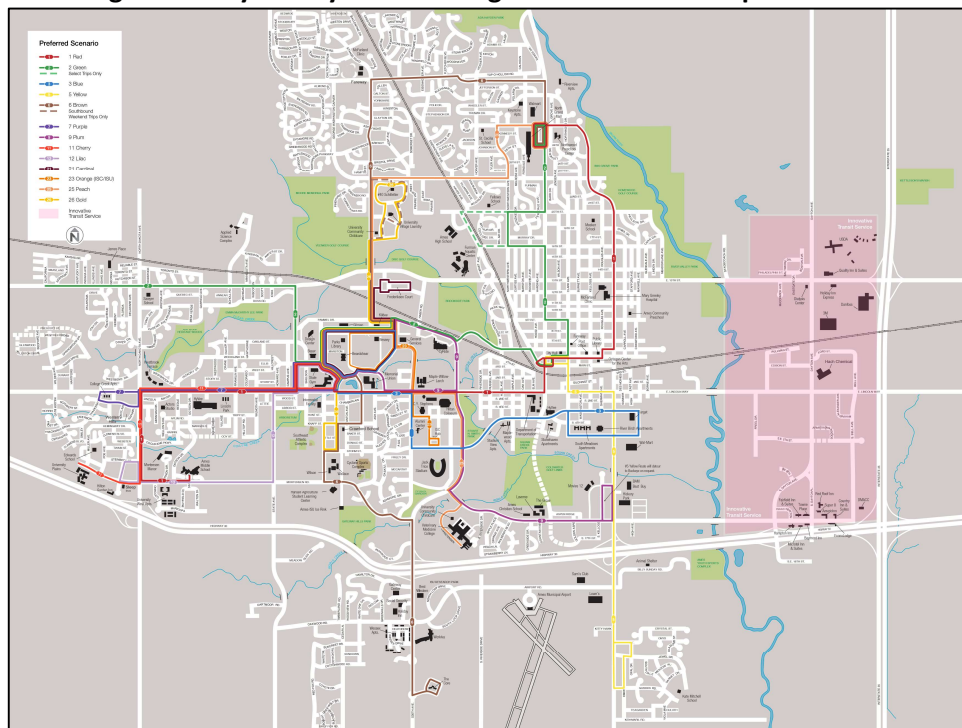
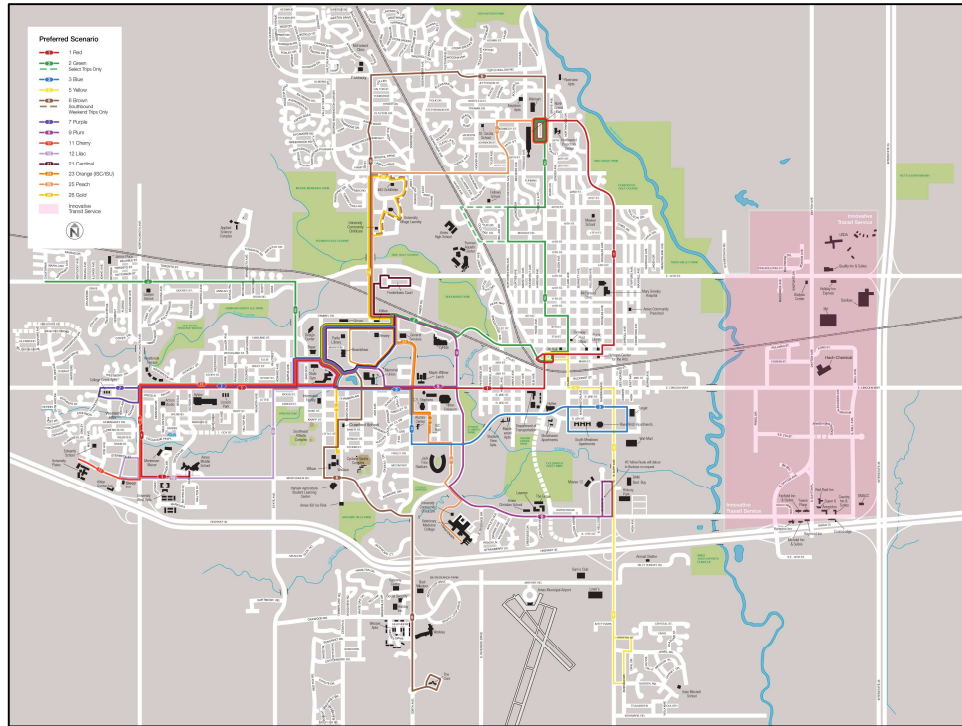


Figure 31 - CyRide System Redesign Future Transit Map Scenario 1



Forward 2045 study reviews all mobility needs for Ames metropolitan area. Forward 2045 has limited information for future transit for the W 190th St corridor. HIRTA has no future plans published on their website.

Figure 32 -CyRide System Redesign Future Transit Map Scenario 2



XI. ALTERNATIVES COMPARISON

A. Alternative Safety Benefit Comparison

Crash modification factors were taken from the 2019 Iowa DOT Planning-Level Crash Reduction Factor (CRF) list. The crash rate was calculated based on 2017-2021 crash data. The crash reduction factor was applied to the existing crash rate. The factored reduced crash rate was applied to the projected 2045 annual entering traffic volume to calculate the predicted number of crashes per year with each intersection alternatives. The predicted safety of each intersection alternative can be found in **Table 16**.

Table 16 – Predicted Safety Benefit Summary

Intersection	Alternative	Safety Benefit	Predicted Crashes Per Year
<i>W 190th Street @ George Washington Carver Ave</i>	No Build	Crash Rate (all): 0.71 Crash Rate (fatal & injury): 0.43	2.96 (all) 1.77 (Fatal & Injury)
	Signal	Crash Rate (all): 0.71 Crash Rate (fatal & injury): 0.43	2.22 (all) 1.77 (Fatal & Injury)
	Roundabout	Crash Rate (all): 0.25 Crash Rate (fatal & injury): 0.06	1.03 (all) 0.27 (Fatal & Injury)
<i>W 190th Street @ Grant Ave/Hyde Ave</i>	No Build	Crash Rate (all): 1.10 Crash Rate (fatal & injury): 0.40	5.11 (all) 1.86 (Fatal & Injury)
	Signal	Crash Rate (all): 0.82 Crash Rate (fatal & injury): 0.40	3.83 (all) 1.86 (Fatal & Injury)
	Roundabout	Crash Rate (all): 0.38 Crash Rate (fatal & injury): 0.06	1.79 (all) 0.28 (Fatal & Injury)
<i>W 190th Street @ Grand Ave</i>	No Build	Crash Rate (all): 0.32 Crash Rate (fatal & injury): 0.16	2.33 (all) 1.17 (Fatal & Injury)
	Signal	Crash Rate (all): 0.32 Crash Rate (fatal & injury): 0.16	2.33 (all) 1.17 (Fatal & Injury)
	Roundabout	Crash Rate (all): 0.11 Crash Rate (fatal & injury): 0.02	0.82 (all) 0.17 (Fatal & Injury)

B. Pedestrian Crossing Impact Comparison

The distance that a pedestrian must travel to cross the intersection was taken from the intersection layouts. The rate of driver yielding to pedestrians at different intersection types was noted based upon Minnesota Local Road Research Board (LRRB) and NCHRP research. The rate of drivers yielding to pedestrians at single lane roundabouts (83%) can be found in NCHRP Report 572. Level of service and delay calculations used Highway Capacity Manual 7 and 2045 volumes. It is to be noted that while delay has an impact on the pedestrian level of service at signalized intersections, it is not the only factor.

Table 17 – Pedestrian Crossing Summary

		Intersection											
		George Washington Carver Ave & W 190th St				Hyde Ave/Grant Ave & W 190th St				Hwy 69 (Grand Ave) & W 190th St			
		AM		PM		AM		PM		AM		PM	
		LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY
Signalized	NORTH	B	34.7	B	27.3	B	34.7	B	27.3	B	34.7	B	27.3
	EAST	C	34.7	B	27.3	B	34.7	B	27.3	B	34.7	B	27.3
	SOUTH	B	34.7	C	27.3	B	34.7	B	27.3	C	34.7	C	27.3
	WEST	B	34.7	B	27.3	B	34.7	B	27.3	B	34.7	B	27.3
Roundabout	STAGE 1 (BUSIEST LEG)	B	7.0 seconds	B	5.7 seconds	B	3.6 seconds	B	3.2 seconds	B	3.9 seconds	B	5.8 seconds
	STAGE 2 (BUSIEST LEG)	B		B		B		A					
	STAGE 3 (BUSIEST LEG)	N/A		N/A		N/A		B					
Two-Way Stop	BUSIEST LEG	F	518.7 seconds	F	203.1 seconds	N/A	N/A	N/A	N/A	F	203.1 seconds	F	203.1 seconds

C. Emissions Comparison for Alternatives

The daily intersection emissions (carbon monoxide, nitrogen oxides, hydrocarbons/volatile organic compounds) were calculated for each intersection-alternative pair by evaluating the emissions provided directly from the analysis programs SIDRA and Synchro for the 2045 AM and PM peak hours and extrapolated into daily values. Synchro reports VOC (volatile organic compounds) whereas SIDRA reports HC (hydrocarbons). Hydrocarbons were converted into VOC using factors in the following table from *Conversion Factors for Hydrocarbon Emission Components* United States EPA December 2005. The daily emissions results can be found in **Table 18**.

Table for Conversion Factors for Hydrocarbon Exhaust Emission Results

Engine Type	TOG/THC	NMOG/THC	NMHC/THC	VOC/THC
2-Stroke Gasoline [2]	1.044	1.035	0.991	1.034
4-Stroke Gasoline [2, 3]	1.043	0.943	0.900	0.933
Diesel [4]	1.070	1.054	0.984	1.053
LPG [5]	1.099	1.019	0.920	0.995
CNG [5]	1.002	0.049	0.048	0.004

Table 18 – Daily Intersection Emissions, 2045

Daily Intersection Emissions (kg)			
	W 190th St @ GWC Ave	W 190th St @ Grant Ave/Hyde Ave	W 190th St @ Grand Ave
No Build	239	49	1187
Signal	22	38	43
Roundabout	14	22	35

D. Intersection Alternative Evaluation Matrix

Each of the alternatives were compared in an evaluation matrix comparing the categories of vehicle delay, multi-modal impact, safety, right-of-way impact, environmental impacts, and sustainability. The squares highlighted in blue show the best score in each category. The alternative shown in **BOLD** for each intersection is the recommended alternative based on the findings of the report and the information shown in **Table 19**.

Table 19 – Intersection Alternatives Evaluation Matrix

Intersection	Alternative	Delay		Queues		Multi-Modal	Safety	ROW	Environmental Impact	Sustainability
		2045 Total Veh-Min (AM)	2045 Total Veh-Min (PM)	Worst Movement (AM)	Worst Movement (PM)	Pedestrian Crossing	Predicted Crashes Per Year	Right-of-Way Impact (width in ft)	Total Daily Emissions (kg)	25-yr Life Cycle Cost (\$)
190th Street @ George Washington Carver Ave	No Build	2692	3338	EBL/T/R, WBL/T/R 1000+ ft	WBL/T/R 475 ft	Crossing Distance: 50' Yield Rate: 7% Worst Leg--LOS F (519)	2.96 (all) 1.77 (Fatal & Injury)	-	239	\$3,000
	Signal	523	514	NBT 150 ft	WBL 225 ft	Crossing Distance: 60' Yield Rate: 99% Worst Leg--LOS C (35)	2.22 (all) 1.77 (Fatal & Injury)	85	23	\$4,460,000
	Roundabout	196	163	WBL/T/R 100 ft	WBL/T/R 175 ft	Crossing Distance: 65', staged with median Yield Rate: 83% Worst Leg--LOS B (7)	1.03 (all) 0.27 (Fatal & Injury)	145	14	\$5,875,000
190th Street @ Grant Ave/Hyde Ave	No Build	4196	641	EBL/T/R 1000+ ft	WBL/T/R 650 ft	Crossing Distance: 60' Yield Rate: 99% Worst Leg--LOS F (86)	5.11 (all) 1.86 (Fatal & Injury)	-	49	\$300,000
	Signal	1942	587	WBT/R 425 ft	WBT/R 650 ft	Crossing Distance: 60' Yield Rate: 99% Worst Leg--LOS B (35)	3.83 (all) 1.86 (Fatal & Injury)	75	38	\$4,460,000
	Roundabout	1394	544	EBL/T/R 950 ft	WBL/T/R 1000+ ft	Crossing Distance: 65', staged with median Yield Rate: 83% Worst Leg--LOS B (4)	1.79 (all) 0.28 (Fatal & Injury)	135	22	\$5,125,000
190th Street @ Hwy69/Grand Ave	No Build	12173	29651	EBL/T/R, WBL/T/R 1000+ ft	EBL/T/R, WBL/T/R 1000+ ft	Crossing Distance: 50' Yield Rate: 7% Worst Leg--LOS F (203)	2.33 (all) 1.17 (Fatal & Injury)	-	1187	\$2,500
	Signal	1169	638	SBT 550 ft	SBT 300 ft	Crossing Distance: 60' Yield Rate: 99% Worst Leg--LOS C (35)	2.33 (all) 1.17 (Fatal & Injury)	110	43	\$3,860,000
	Roundabout	270	2170	SBL/T/R 375 ft	NBL/T/R 1000+ ft	Crossing Distance: 100', staged with medians Yield Rate: 83% Worst Leg--LOS B (6)	0.82 (all) 0.17 (Fatal & Injury)	195	35	\$4,425,000

These intersection traffic control recommendations are based on the following:

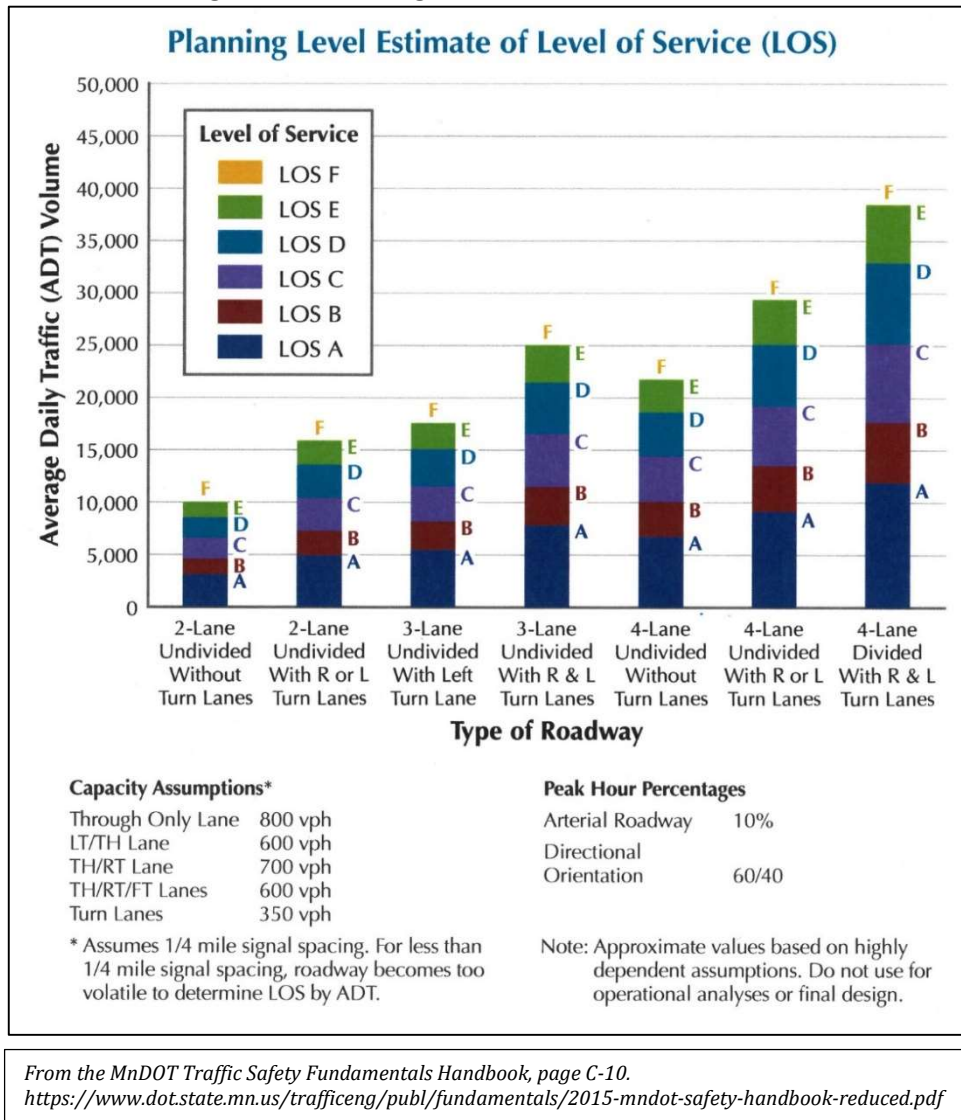
- The existing speeding problem on W 190th Street
- The lack of easy way for pedestrians and bicyclists to cross W 190th Street
- Roundabouts at George Washington Carver Avenue and Hyde/Grant Avenue will slow speeds, reduce crashes, decrease conflict points, and simplify pedestrian crossings - Average queues are manageable at both of intersections. 95th percentile queues at Hyde/Grant can reach 1000+ft at the highest peak times.
 - A signal with left turn lanes and a northbound right turn lane at George Washington Carver could be an alternative if right-of-way at the intersection cannot be acquired. The signal has acceptable operations at this intersection.
 - A signal with turn lanes at Hyde/Grant Avenue has similar operations to the roundabout and could also be an alternative if right-of-way at the intersection cannot be acquired.
- A signal at W 190th Street and Hwy 69/Grand Avenue is recommended as the roundabout breaks down due to the large number of northbound lefts conflicting with southbound throughs at this intersection. In addition, a roundabout here would require an eastbound slip lane to maintain adequate operations which would be impactful to the existing Moose Lodge. The intersections to the south of W 190th Street on Hwy 69/Grand Avenue are also signalized. A signalized intersection here would be in line with drivers' expectations.

XII. CONCLUSIONS

A. Recommended Street Cross-Section

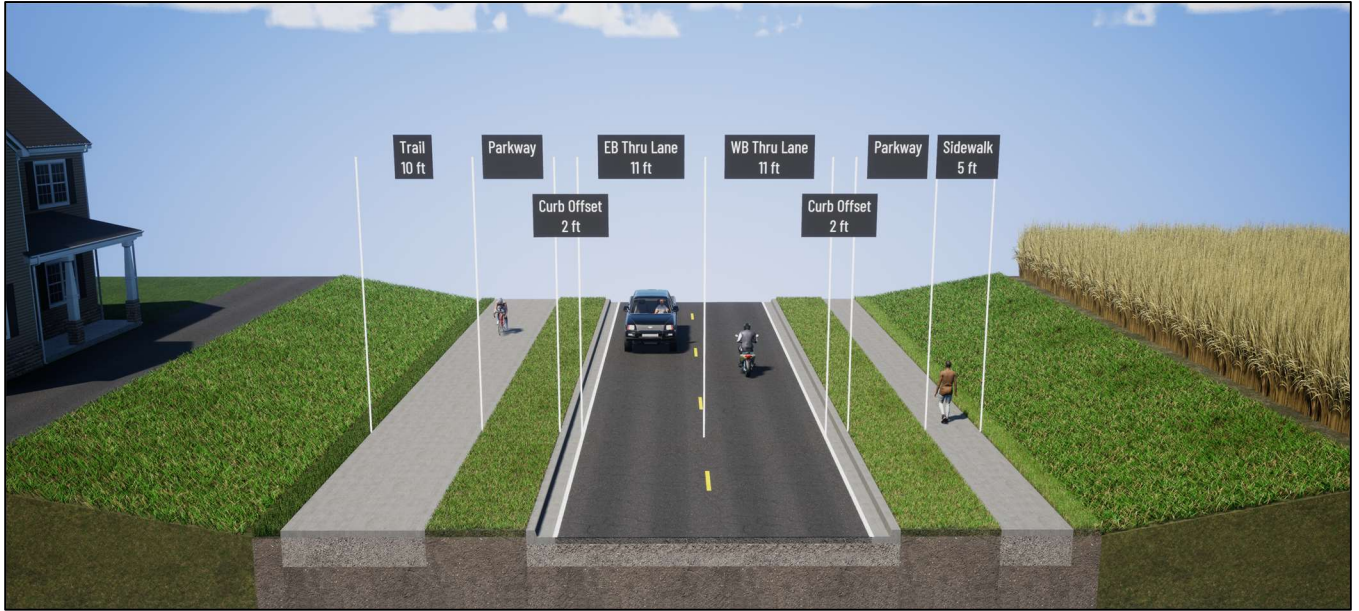
The 2045 AADT for W 190th Street in the Forward 2045 Plan is up to 9,000 vehicles/day. A 2-lane roadway plus turn lanes will operate at LOS C at 10,000 vehicles/day or less (see **Figure 33**).

Figure 33 - Planning Level Estimate of LOS



The cross-section for W 190th Street from George Washington Carver Avenue to Hwy 69/Grand Avenue is proposed to be two lanes with turn lanes at the intersections, as shown in **Figure 34**. For this cross-section to adequately move traffic, access control must be maintained on this corridor.

Figure 34 – Proposed W 190th Street Cross Section (Forward 2045)



B. Access Control

The Iowa Department of Transportation adopted the *Access Management Manual*, First Edition, in 2022, which provides Primary Highway System Access Categories. From a description of the different municipal categories, W 190th Street in this area would fall into the category of Municipal 1000 (M-1000). Per Table 7, M-1000 roadways are “*Important regional and intra-city primary highways that are within a municipality, and where system continuity and preservation of a high level of mobility and through traffic capacity are considered a higher priority than access.*”

The Access Management Manual recommends that public road connections are allowed a minimum of 1,000 feet and preferred at 1,320 feet and right-in, right-out connections are allowed at 600 feet with a restrictive median. These access guidelines should be followed to maintain adequate traffic flow along W 190th Street with a two-lane roadway. Turn lanes should be provided at public road access points. The principles for access location and spacing provided in *SUDAS Chapter 5 Roadway Design* should be followed for George Washington Carver Avenue and Hyde/Grant Avenue as arterial roadways.

C. Recommendations/Preferred Intersection Alternatives

A signal and a roundabout were analyzed at each of the three study intersections. Based upon the information provided in the analysis of this report and the alternative evaluation matrix presented earlier in this section, the following traffic control is recommended for each intersection to support the anticipated land use growth in the Forward 2045 Plan:

- **George Washington Carver Avenue** – Single Lane Roundabout with northbound right-turn slip lane or Signal with left turn lanes and northbound right turn lane. (Either traffic alternative provides acceptable intersection operations. The roundabout alternative requires more right-of-way than the traffic signal but has a greater safety benefit. The ultimate decision on traffic control for this intersection will be based upon how much right-of-way can be acquired at this intersection.)
- **Hyde Avenue/Grant Avenue** – Single Lane Roundabout or Signal with turn lanes. (Either traffic alternative provides equivalent intersection operations. The roundabout alternative requires more right-of-way than the traffic signal but has a greater safety benefit. The ultimate decision on traffic control for this intersection will be based upon how much right-of-way can be acquired at this intersection.)
- **Highway 69/Grand Avenue** – Signal with single northbound left, single southbound left, and single eastbound right turn lanes

For the street cross sections to support the anticipated land use growth in Forward 2045, the following is recommended:

- The cross section for 190th Street should be 2 lanes plus turn lanes at the public roadway connections. A 10-foot-wide trail should be provided on the south side of the roadway and a 5-foot wide sidewalk on the north side. The roadway should transition towards an urban section with curb and gutter, as this will aid in slowing speeds on W 190th Street.
- Hwy 69/Grand Avenue is assumed to be 5 lanes south of 190th Street and two lanes with turn lanes north of W 190th Street.

Concepts

Concepts for a signal and roundabout alternative considered for each intersection are provided in the *Appendix*.

Cost Estimates

Planning level 25-yr life-cycle cost estimates were prepared for the intersection alternatives and details are provided in the *Appendix*. **Table 19** summarizes these overall costs. These costs include pavement widenings, subsurface, storm/sanitary sewer changes, traffic control, landscaping, construction, and mobilization. Also included were maintenance related items related to markings, signage, decorative pavement, and snow removal items as shown below:

- George Washington Carver Intersection
 - Roundabout
 - \$5.75 million construction cost, \$5,000 annual maintenance
 - 25-year life, \$235,000/year annual cost with maintenance
 - Signal
 - \$4.2 million construction cost, \$10,000 annual maintenance, \$10,000 at year 13 for controller and cabinet replacement
 - 25-year life, \$178,400/year annual cost with maintenance
- Hyde Avenue/Grant Avenue Intersection
 - Roundabout
 - \$5 million construction cost, \$5,000 annual maintenance
 - 25-year life, \$205,000/year annual cost with maintenance
 - Signal
 - \$4.2 million construction cost, \$10,000 annual maintenance, \$10,000 at year 13 for controller and cabinet replacement
 - 25-year life, \$178,400/year annual cost with maintenance
- US Highway 69 Intersection
 - Roundabout
 - \$4.3 million construction cost, \$5,000 annual maintenance
 - 25-year life, \$177,00/year annual cost with maintenance
 - Signal
 - \$3.6 million construction cost, \$10,000 annual maintenance, \$10,000 at year 13 for controller and cabinet replacement
 - 25-year life, \$154,400/year annual cost with maintenance

Implementation Timeline

Table 20 shows the proposed timeline in 5-year increments for the different improvements recommended based on the Ames 2045 Forward plan land use. Improvements on Hwy 69/Grand Avenue will be led by the Iowa DOT in coordination with the City of Ames and Story County. The pavement life on 190th Street has approximately 20 years remaining. Reconstructing 190th has been pushed to 15-20 years out to coincide with this remaining pavement life.

Table 20 – Implementation of Improvements Timeline

Location	2023-2025	2025-2030	2030-2035	2035-2040	2040-2045
190th Street @ George Washington Carver Ave	Intersection Destination Lighting	Single Lane Roundabout with NB Slip Lane (or) Signal with Left Turn Lanes, NB Right Turn Lane by 2030	-	-	-
190th Street @ Grant Ave/Hyde Ave	Intersection Destination Lighting. Maintain Existing Temp Signal ¹	Single Lane Roundabout (or) Signal with Turn Lanes by 2030	-	-	-
190th Street @ Hwy69/Grand Ave	Intersection Destination Lighting	Add Eastbound Right Turn Lane	Signalize Intersection	-	-
190th Street: Hyde/Grant to Hwy69/Grand Ave	Install Roadway Lighting. Plan For Shared Use Path Along One Side	-	-	Urban 2-Lane Section With Turn Lanes at Public Streets From HWY 69 to Hyde	Urban 2-Lane Section With Turn Lanes at Public Streets From Hyde to GW Carver
Hwy 69/Grand Avenue South of 190th St (Iowa DOT)	-	-	-	-	5-Lane section With Trail Connection on West Side to ADA Hayden
Hwy 69/Grand Avenue North of 190th St (Iowa DOT)	-	-	-	-	2-Lane Section With Turn Lanes At Public Road Intersections

¹-If the signal option is pursued, the recommendation would be to install permanent signal poles in 2025-2030. This would also address intersection destination lighting.

D. High Growth Scenario Discussion

The area surrounding the corridor is agriculture fields on the north with new residential developments on the south. The City of Gilbert is located north of the corridor. Story County and the City have been discussing how to best handle this roadway to accommodate future growth in this urban fringe area. Forward 2045 shows the land use remaining agriculture north of W 190th Street. The City of Ames has discussed changing the anticipated land use to include residential, commercial, and retail growth north of W 190th Street to 180th Street/Gilbert City Limits from the UPRR tracks to Arrasmith Trail on the east side of Hwy 69/Grand Avenue. This land use change was deemed the “High Growth Scenario” and is anticipated to take over 20 years or more to be built out. While this scenario was not analyzed in detail in this study, daily intersection and roadway segment projections were calculated to help determine what traffic control changes and roadway cross sections would be needed if the city were to move forward with a higher land use scenario than currently included in Forward 2045.

Table 21 provides the estimated daily intersection and roadway segment volumes for Forward 2045 and the High Growth Scenario along with the recommended traffic control and roadway cross section under each land use scenario. As shown, if the city moves forward with the higher land use scenario additional lanes will be needed on W 190th Street and Hwy 69/Grand Avenue and widening would be needed at the intersections. To account for the unknown, the city should look to reserve enough right-of-way along W 190th Street and at the intersections to accommodate the intersection and roadway geometrics needed with the High Growth Scenario.

Table 21 – Comparison of Improvements with Forward 2045 vs. High Growth

Location	Forward 2045 Volume (2045 estimated daily)	High Growth Volume (2045 estimated daily)	Forward 2045 Recommendation	High Growth Recommendation
190th Street @ George Washington Carver Ave	13,000	20,000	Single Lane Roundabout with NB Slip Lane or Signal with Turn Lanes	Multi-lane Roundabout or Signal with Turn Lanes
190th Street @ Grant Ave/Hyde Ave	15,500	28,000	Single Lane Roundabout or Signal with Turn lanes	Multi-lane Roundabout or Signal with Turn Lanes
190th Street @ Hwy69/Grand Ave	20,500	38,500	Signal with Single NB/SB Left and Single EB Right Turn Lane	Signal with Dual NB Left, Single SB Left, and Single EB Right
190th Street: Hyde/Grant to Hwy69/Grand Ave	9,000	19,000	2-lane section with turn lanes at street intersections	5-lane section
Hwy 69/Grand Avenue South of 190th St	19,000	32,000	5-lane section	5-lane section
Hwy 69/Grand Avenue North of 190th St	12,000	26,000	2-lane section with turn lanes at street intersections	5-lane section