

NORTH AVENUE CORRIDOR STUDY

City of Norwalk, Iowa | November 19, 2019

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Prepared for:

City of Norwalk
705 North Avenue
Norwalk, Iowa 50211

Snyder & Associates, Inc. Project No. 119.0234.01

Prepared by:

	I hereby certify that this Engineering Document was prepared by me or under my direct personal supervision and that I am a duly Licensed Professional Engineer under the Laws of the State of Iowa.	
		<u>11-19-2019</u>
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	License Number P21147	
	My License Renewal Date is December 31, 2019	
	<u>All</u>	

EXECUTIVE SUMMARY

The North Avenue study corridor extends from 40th Avenue (Orilla Road/ County Rd R45) east to 80th Avenue (E 27th Street), a distance of approximately 4 miles. Throughout the study area, North Avenue is a two-lane corridor, providing a pavement width of 22-24 ft. The two-lane roadway cross section generally provides a 22 ft asphalt pavement with 4 ft gravel shoulder and rural ditch drainage west of IA 28 (Sunset Drive), and 24 ft PCC pavement with curb/gutter drainage and trail or sidewalk east of IA 28 (Sunset Drive). The speed limit along the corridor varies from 25 mph to 45 mph, and adjacent land uses vary from agricultural, residential, public (school and parks), and commercial.

North Avenue is classified as a “Minor Arterial” for City planning purposes, and is also signed as Warren County Road G14. To the west, it connects through the City of Cumming to an interchange of I-35. As the City continues to grow, North Avenue will continue to be a primary corridor for east/west traffic.

No segments or intersections along the corridor were above the statewide average for crash rate. The west end of the corridor had more Animal crashes, as well as more Driving Too Fast/Ran Off Road/Lost Control crashes due to the roadway’s more rural, higher speed character in those segments, along with Failure To Yield intersection crashes. This was also the only segment with injury crashes. The middle two segments experienced more failure to Yield ROW at intersection crashes, as well as Followed Too Close and Ran Traffic Signal crashes consistent with the more urban, higher access/intersection density and lower speed characteristics. The intersections near the High School included the distracted driving crash types (Inattentive/Adjusting Devices/Other Interior Distraction).

The following table summarizes existing and projected traffic along the corridor.

Existing and Future Traffic Volumes		
Segment	Length (mi)	Volume Range (veh/day) Year 2019 (Year 2030) [Year 2030+]
1 – 40 th Ave (Orilla Rd/R45) to Orchard Hills Elementary	2.0	3,700 (8,400) [12,000]
2 – Orchard Hills Elementary to IA 28	0.9	4,400 (10,500) [13,000]
3 – IA 28 to E 18 th St	0.85	3,400 (8,400) [11,000]
4 – E 18 th St to E 27 th St (80 th Ave)	0.65	2,650 (5,100) [7,000]

Future land use along the North Avenue corridor will be a mix of single family and multifamily residential and commercial. Traffic forecasts for year 2030 range from 5,000-11,000 veh/day, and long term beyond 2030 from 7,000-13,000 veh/day.

Pavement condition analysis showed generally fair pavement condition with transverse and longitudinal cracking. Recent maintenance projects include resurfacing east of IA 28 and shoulder improvements west of IA 28. Additional overlays/patching are recommended by segment and phase.

Concerns from public and stakeholder meetings identified concerns with lack of turn lanes west of IA 28 with continued development, minimal existing shoulders and ditches, speeds and safety with the existing ‘s-curve’ near 50th Avenue, and lack of pedestrian/bicycle facilities. Overall, the priorities identified were to maintain and improve travel time/efficiency, maintain/improve traffic and roadway safety, and to provide biking and walking accommodations. The survey also showed a strong preference for separated shared use paths (i.e. trails) over on-street bicycle facilities.

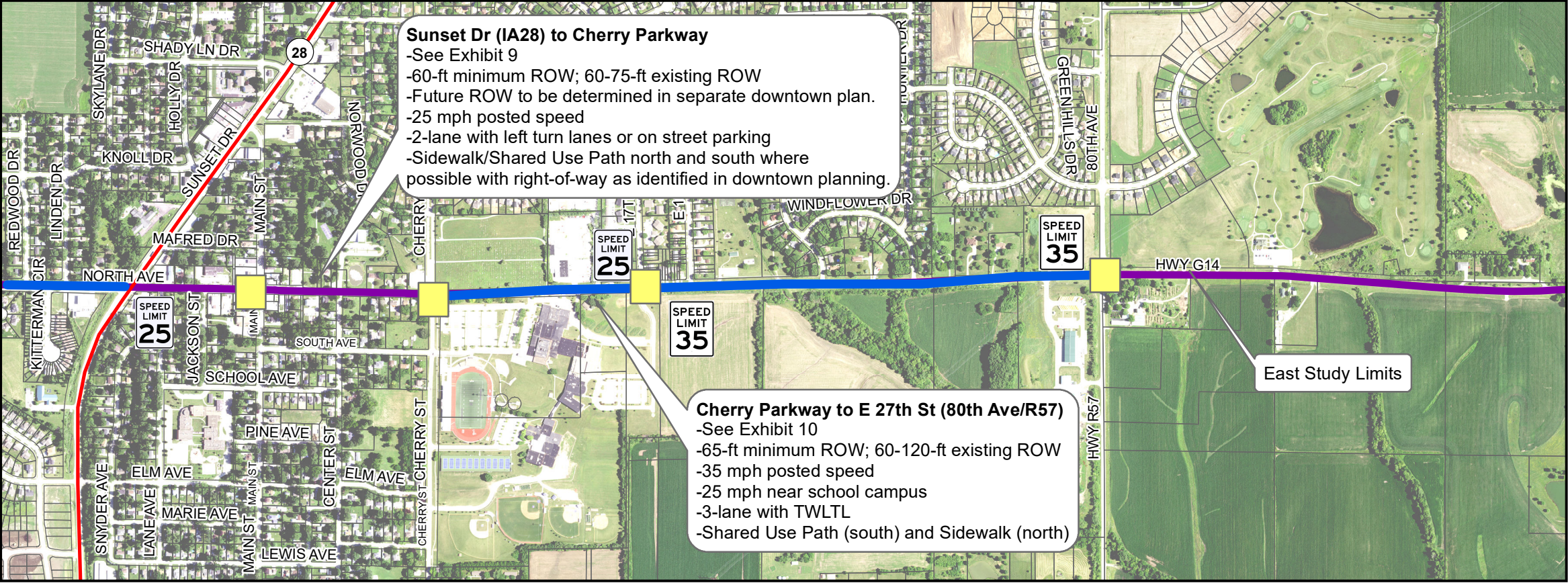
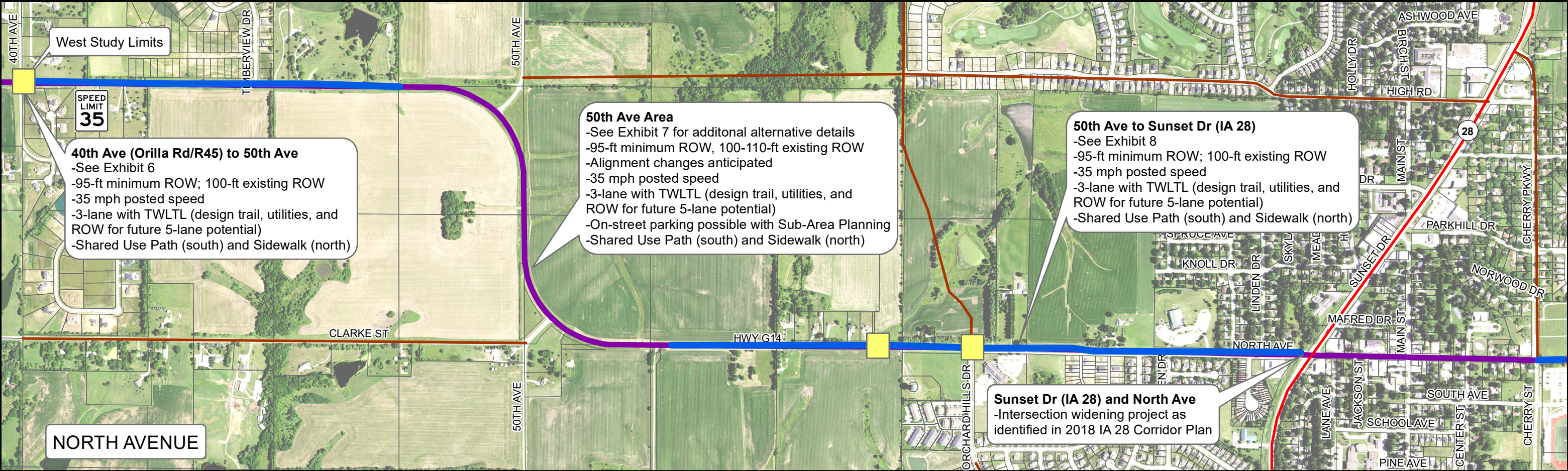
Based on the analysis performed and input received from general public, identified stakeholders, and City staff, the primary recommendation is for phased improvements along the corridor for an ultimate 3-lane corridor with an urban cross section (i.e. curb and gutter), providing designated left turn lanes or two-way left turn lanes. Generally, this facility will be within existing right of way, and additional needs are identified in exhibits. In addition, pedestrian/bicycle facilities and utilities should be designed to accommodate potential for 5-lane widening west of IA 28 long term. Increased traffic control (signal or roundabout) and/or additional turn lanes may be needed at major intersections as shown on the Recommendations Summary exhibit. Additional widening will be required at the IA 28 intersection as identified in the 2018 IA 28 Corridor Study.

Development of a continuous shared use path and sidewalk network is recommended, building on the recommendations of the 2018 Open Space and Park Plan. Specifically, this includes a 10’ shared use path on the south side of North Avenue, with the exception of segment from Main Street to Cherry Parkway. A 5’ sidewalk on the other side of the street from the shared use path segments.


The following table summarizes the recommendations by segments (some segments repeat with multiple phases) in order of priority/implementation timeline. Additional details are provided throughout the report.

North Avenue Segment Recommendations				
Priority ¹	Segment	Length (mi)	Magnitude of Cost ⁴	Notes
1	Orilla Rd to School	2.0	\$1.7M	Rehab / Overlay ²
2	IA 28 & North Ave	--	\$2.0M	TSIP / USTEP / City Project ³
3	School to IA 28	0.9	\$700,000	Rehab / Overlay
4	E 18 th St to E 27 th (80 th Ave)	0.65	\$150,000	Spot Pavement / Drainage Rehab
5	Cherry Pkwy to E 18 th St	0.4	\$3.0M	New 3-lane / sidewalk
6	School to IA 28	0.9	\$5.6M	New 3-lane / sidewalk
7	Orilla Rd to School	2.0	\$11.5M	New 3-lane / sidewalk / trail
8	E 18 th St to E 27 th (80 th Ave)	0.65	\$3.8M	New 3-lane / sidewalk / trail
9	Orilla Rd to IA 28	2.9	\$9.2M	Widen to 5-lane if needed

¹ May change due to adjacent development timing, funding opportunities, and CIP programming
² Evaluate rehab strategy through S-Curve section based on timing of alignment changes
³ Currently programmed for 2021 construction
⁴ Opinions of probable cost are based on conceptual design, 2019 construction costs, and will need to be further refined prior to project development



Legend

 Recommended Posted Speed Limit

 Recommended Segment Design Criteria


 Intersections which may need increased Traffic Control (e.g. signal, roundabout) and/or additional Turn Lanes

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1. EXISTING CONDITIONS

The North Avenue study corridor extends from 40th Avenue (Orilla Road/ County Rd R45) east to 80th Avenue (E 27th Street), a distance of approximately 4 miles. Throughout the study area, North Avenue is a two-lane corridor, providing a pavement width of 22-24 ft. The two-lane roadway cross section generally provides a 22 ft asphalt pavement with 4 ft gravel shoulder and rural ditch drainage west of IA 28 (Sunset Drive), and 24 ft PCC pavement with curb/gutter drainage and trail or sidewalk east of IA 28 (Sunset Drive). The speed limit along the corridor varies from 25 mph to 45 mph, and adjacent land uses vary from agricultural, residential, public (school and parks), and commercial. Figure 1 below shows photos of characteristic segments of the corridor.

North Avenue is classified as a “Minor Arterial” for City planning purposes, and is also signed as Warren County Road G14. To the west it connects through the City of Cumming to an interchange of I-35. As the City continues to grow, North Avenue will continue to be a primary corridor for east/west traffic.

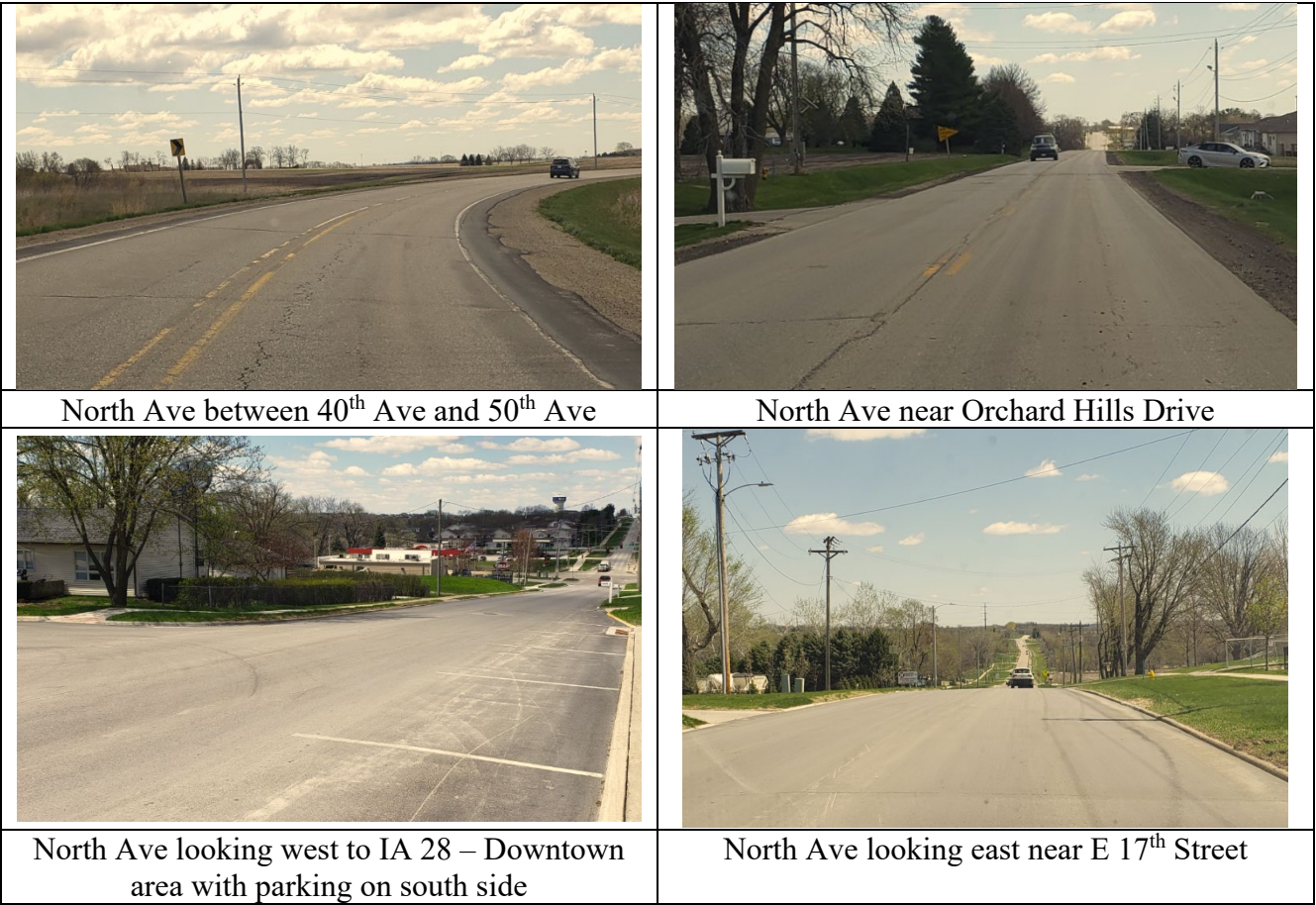


Figure 1: North Avenue (County Hwy G14) Segments

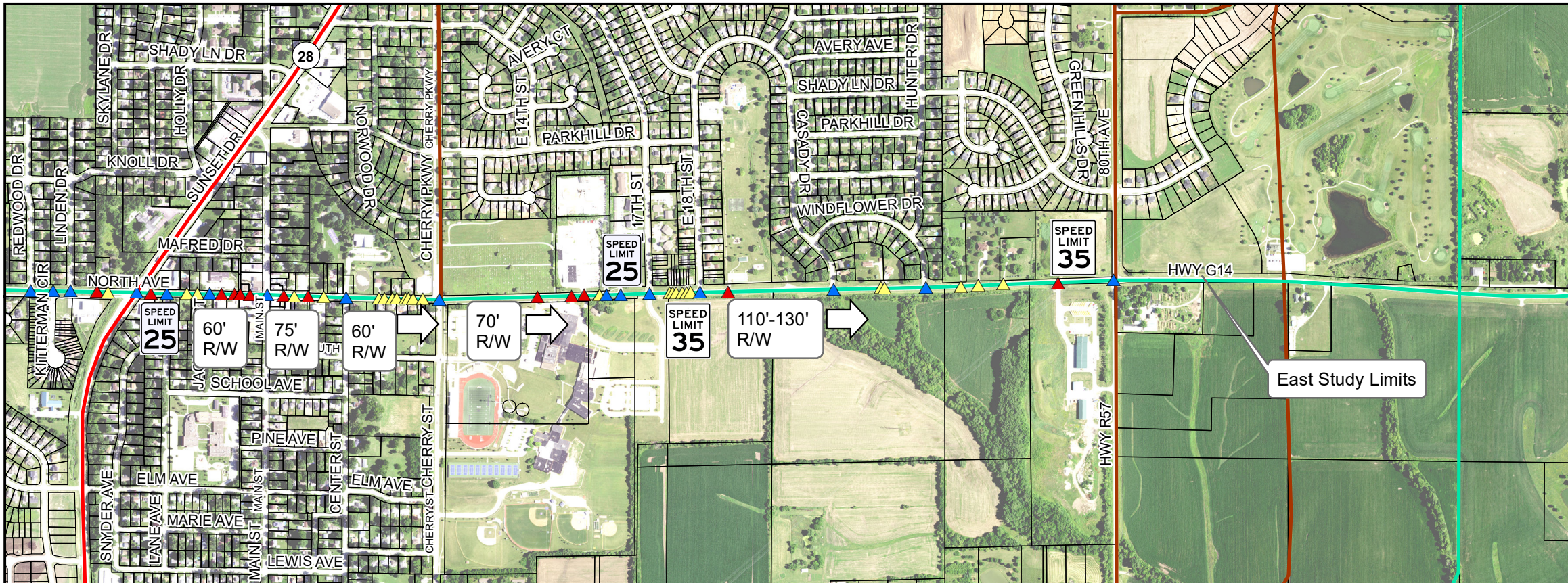
Table 1 summarizes the segmentation of the different parts of the North Avenue corridor. These segments describe portions of the corridor with relatively uniform existing roadway cross sections, adjacent land uses, speed limit ranges and traffic volumes

Table 1: North Avenue (County Hwy G14) Segments

Segment	Length (mi)	Existing Cross Section	Posted Speed Limit (mph)	Existing Volume Range	Access Characteristics
1- 40 th Ave (Orilla Rd/R45) to Orchard Hills Elementary	2.0	2-Lane rural	45-55	3,700 vpd	1-mile public / Rural driveway
2- Orchard Hills Elementary to West of IA 28	0.9	2-Lane rural	35	4,350-4,700 vpd	300-800 ft Public Street intersections, driveways
3 – IA 28 to E 18 th St	0.85	2-Lane curb and gutter	25-35	4,700-3,500 vpd	300-500 ft Public street intersections, driveways
4 – E 18 th St to E 27 th St (80 th Ave)	0.65	2-Lane rural	45-55	3,500-2,600 vpd	300-800 ft Public Street intersections, driveways







The middle segments listed as #2 and #3 are currently have the most built-up adjacent land uses and higher traffic and access density. However development is anticipated along the entire corridor, primarily single-family residential anticipated through segment #1 and #2 with multi-family and commercial land used in the area around 50th Avenue, and continued single family and multi-family residential east of E 18th Street in the area labeled Segment #4.

Exhibit 1 shows existing roadway network classifications, posted speed limits, access types and density, and existing right-of-way widths.



Legend

Access Type

-  Commercial/Civic
-  Private Residential
-  Public Street
-  Future Principal Arterial
-  Future Minor Arterial
-  Future Collector

110' Right of Way width

 Posted Speed Limit

2. CRASH HISTORY

As summarized in following tables, the crash trends for the study area are consistent with statewide trends on similar roadways. There is variation along the corridor with respect to adjacent land use, roadway cross section, speed, and traffic volumes along North Avenue, the corridor is summarized according to segmentation in Table 2 (from west to east along North Avenue).

Table 2: Year 2014-2018 Crash Frequency – North Avenue Corridor Segments

Segment	Crash Frequency	Crash Severity					Crash Rate (cr/HMVT)	Above State Avg? >291?
		Fatal	Maj	Min	Pos	PDO		
1- 40 th Ave (Orilla Rd/R45) to Orchard Hills Elementary	15	0	3	0	4	8	111	No
2- Orchard Hills Elementary to West of IA 28	12	0	0	1	1	10	175	No
At IA 28 Intersection	10	0	0	0	2	8	-	-
3- IA 28 to E 18 th St	16	0	0	0	5	11	240	No
4- E 18 th St to E 27 th St (80 th Ave/R57)	3	0	0	1	0	2	79	No

a. Crash Segment Discussion

Consistent with the variety of corridor segments described in Table 1, the predominant crash types and major causes varied along the corridor. The west end of the corridor had more Animal crashes, as well as more Driving Too Fast/Ran Off Road/Lost Control crashes due to the roadway’s more rural, higher speed character in those segments, along with Failure To Yield intersection crashes.

The middle two segments (new Orchard Hills Elementary School through IA 28 to the east side of the High School campus) experienced more failure to Yield ROW at intersection crashes, as well as Followed Too Close and Ran Traffic Signal crashes consistent with the more urban, higher access/intersection density and lower speed characteristics. These crashes were predominantly Rear End, Broadside, and Angle-Oncoming Left Turn crash types. It is notable that the intersections near the High School (Cherry, school driveways, E 17th Street) included the distracted driving crash types (Inattentive/Adjusting Devices/Other Interior Distraction)

No segments or intersections along the corridor were above the statewide average for crash rate. In addition, none of the segments had a higher than average Fatal + Injury crash rate, as expected based on the low severity. As the corridor continues to develop, additional traffic, access locations, and turning movements may lead to higher crash frequency and/or rates, and may also lead to reactive or proactive access modifications via access consolidation, movement restrictions (right-in/right-out, medians, etc), traffic signals, or other treatments which are discussed in the report.

b. Injury Crash Details

There were no fatal injury crashes along North Avenue during the analysis period. The three major injury crashes resulted in three major injuries and one possible injury. The first major injury crash occurred in December 2016. This two-vehicle crash involved an eastbound driver losing control under snow/ice conditions and crossing the centerline before colliding with a westbound vehicle, resulting in one major

and one possible injury. The second major injury crash occurred in October 2018. The crash involved a westbound motorcycle reported as traveling at excessive speed and failing to negotiate the North Avenue curve before losing control and entering the ditch. The third occurred in March 2019. This crash involved a southbound driver failing to stop at a stop sign in foggy conditions and strike a fixed object post.

There is no distinct pattern in these higher severity crashes correlated with a direct safety counter-measure and all involved some degree of relatively random and circumstantial driver error. However, it is notable that all occurred in the higher speed segment between 40th Avenue (Orilla Road) and 50th Avenue, and all involved lane departure (i.e. crossing shoulder edge line or crossing centerline), and that two of the three were single-vehicle crashes. In the short term, the City has recently added paved shoulders in this area, which provides a safety improvement for driver recovery if they cross the shoulder edge line. In the longer term the alignment of the curves in this area will be modified, and posted speed limits (and observed speeds) will decrease with adjacent development, access, and increased traffic, likely resulting in improved safety performance and reduction of injury crashes.

Exhibit 2 following Section 3 shows crash locations along North Avenue for years 2014-2018.

3. TRAFFIC DATA

Traffic counts were collected along the corridor in April 2019, as well as historic Iowa DOT traffic counts from 2004-2016.

Figure 2 shows historic and current daily traffic count data (annual average daily traffic, or AADT, expressed as vehicles per day) along the corridor.

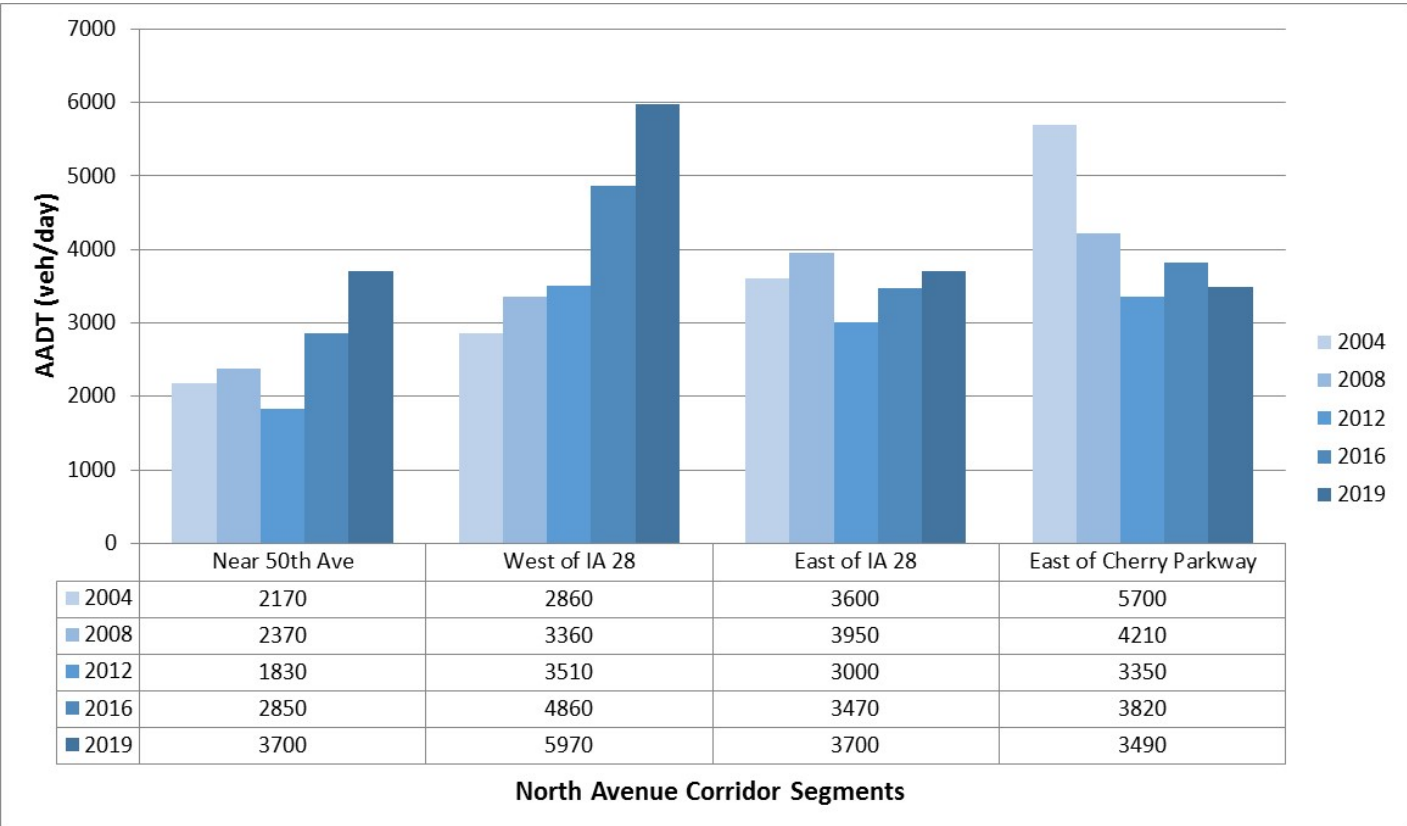


Figure 2: North Avenue Daily Traffic Volume History

This data shows consistent growth to the west of the IA 28, and steady traffic east of IA 28. As development occurs along the corridor and throughout the City, traffic volumes will continue to increase as discussed in Section 4.

Truck percentages are moderate, at approximately 3% or less than 10 trucks per hour.

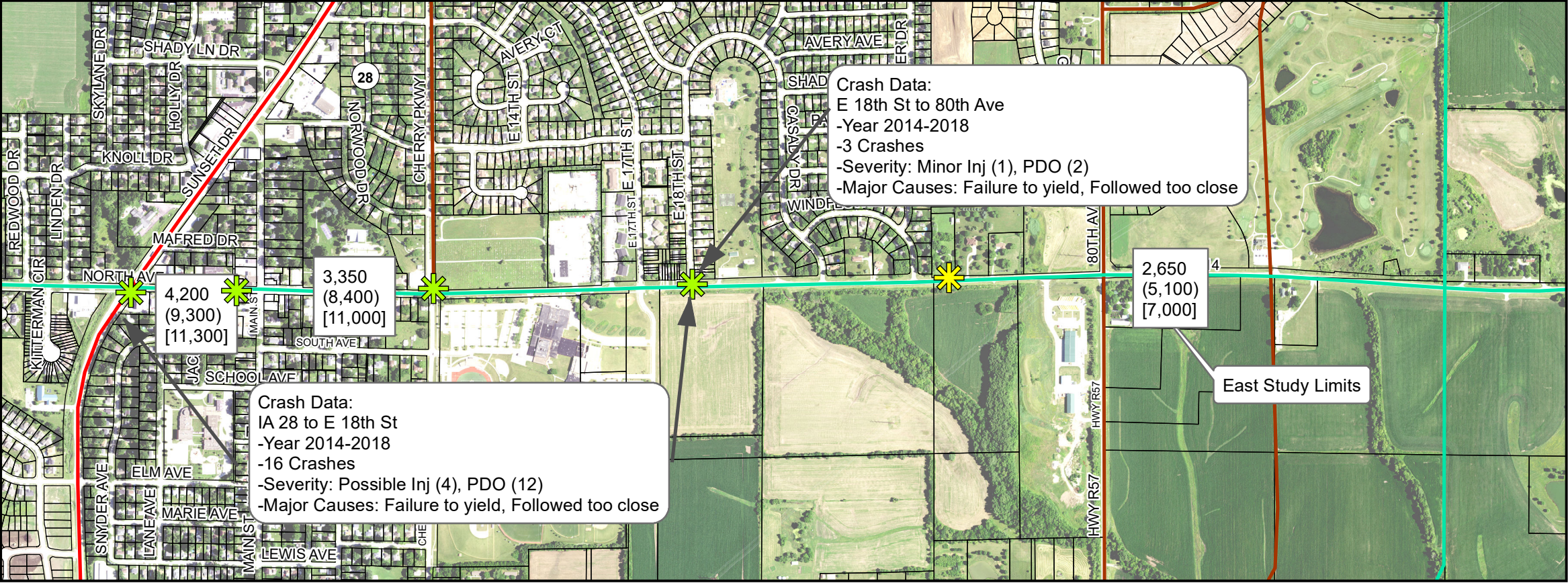
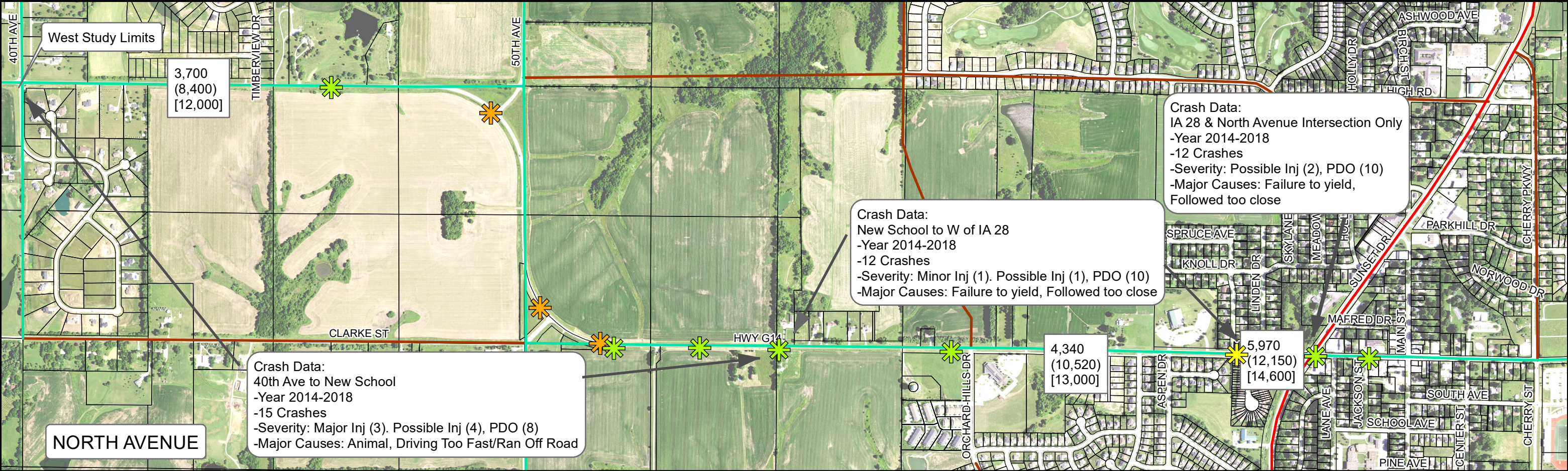
a. Daily Traffic Patterns

The peak hour are at 7 am and 5pm, with 10-12% of daily traffic occurring during the peak hour period. This percentage is typical distribution of traffic, while each hour is (1/24=) 4% of the day, since most traffic occurs during the daytime hours the peak hours typically account for approximately 10% with 5-8% per hour during rest of the daytime period between 7am-8pm.

West of IA 28, traffic is directionally split 55-60% westbound and 40-45% eastbound in the AM peak hour, while the PM peak hour is the opposite. The percentage closer to 50% at IA 28

East of IA 28 the PM peak hour slightly higher at 3:30pm than 5pm due to the multiple school campuses in the area. In Fall 2019 the Orchard Hills Elementary School will open west of IA 28 along North Avenue which will increase mid-afternoon traffic along that segment. The directional splits east of IA 28 are relatively even, with approximately 55% eastbound in the AM, and 55% westbound in the school dismissal peak and PM peak hour.

Exhibit 2 following shows traffic volumes locations along North Avenue.



Legend

- Future Principal Arterial
- Future Minor Arterial
- Future Collector

Injury Crashes (2014-2018)

- Major Injury
- Minor Injury
- Possible Injury

Year 2019 (Year 2030) [Year 2030+]

Existing and Future Daily Traffic Volumes

4. TRAFFIC FORECASTS

a. Future Land Use

The City of Norwalk’s most recent Comprehensive Land Use Planning process in was in 2016. A major component of this process was the Future Land Use map, which will guide existing and future zoning, annexation, infrastructure investment and development. The Future Land Use Map in the vicinity of the corridor is shown on Exhibit 3.

Along North Avenue, the future land uses west of IA 28 will be primarily residential. From 40th Avenue (Orilla Rd/R45) east to near 50th Avenue, low density residential is expected. This category is detached single family homes at less than 6.5 dwelling units per acre.

The area ½ mile on either side of 50th Avenue is planned as “residential commercial flex”, and this area is identified as Sub Areas 3. City “sub-area” developments are intended to result from a more detailed and site specific development master plan proposal in cooperation with a developer, including future local streets and mix and location of land uses. Likely development concepts will include a mix of residential uses, specifically single family attached homes such as multifamily townhomes and 1-3 story apartment buildings with density decreasing away from North Avenue. Commercial lots could include single use commercial medium sized “box stores” or mixed use (e.g. commercial on ground floor with apartments above) commercial lots to provide an additional location in the City besides IA 28 and Main Street area for neighborhood commercial, office and restaurants. Residential density will range from 5-20 dwelling units per acre, with review and coordination of on-street and off-street parking, right of way trees and landscaping, and pedestrian/bicycle accommodations in the area.

East of 50th Street through Orchard Hills Drive to IA 28 will be continued residential land use, with medium density residential as the “highest” land use while continued single family residential is likely based on preliminary development plan proposals.

East of IA 28 through Cherry Street a continued mix of residential and commercial land uses are anticipated, with potential of some parcels redeveloping with higher density, as well as public and recreational uses such as City Hall, Norwalk Park and Brownie Park, Norwalk Easter Public Library, cemetery, and Norwalk Community Schools secondary schools campus.

East of Cherry Street continued residential (single family and high density (townhomes, apartments, with density of 5-18 dwelling units per acre) land uses are expected, along with potential for residential-commercial flex around 80th Avenue and the existing Public Works facility at south side of that intersection.

The future street plans shown on the Future Land Use exhibit are conceptual and while North Avenue and Beardsley Street will remain minor arterials, the future collector routes may vary with proposed developments and upcoming updates to the City Comprehensive Plan.

b. Future School Plans

Orchard Hills Elementary is planned to open Fall 2019 south of North Avenue, west of Orchard Hills Drive. This new school will be used for grades Kindergarten through 2nd grade until renovations to Oviatt Elementary east of North Avenue are completed in 2020/21 when it will be for 2nd and 3rd grade only. In

the long term, it may become a K-5 neighborhood school. A July 2017 Traffic Impact Study prepared for the school and adjacent residential land uses recommended widening along the school frontage on North Avenue to provide a three lane cross section. This widening is being completed in Summer 2019 and will provide a center two-way left turn lane (primarily for westbound school and bus intersection entrance movements) and an eastbound right turn lane.

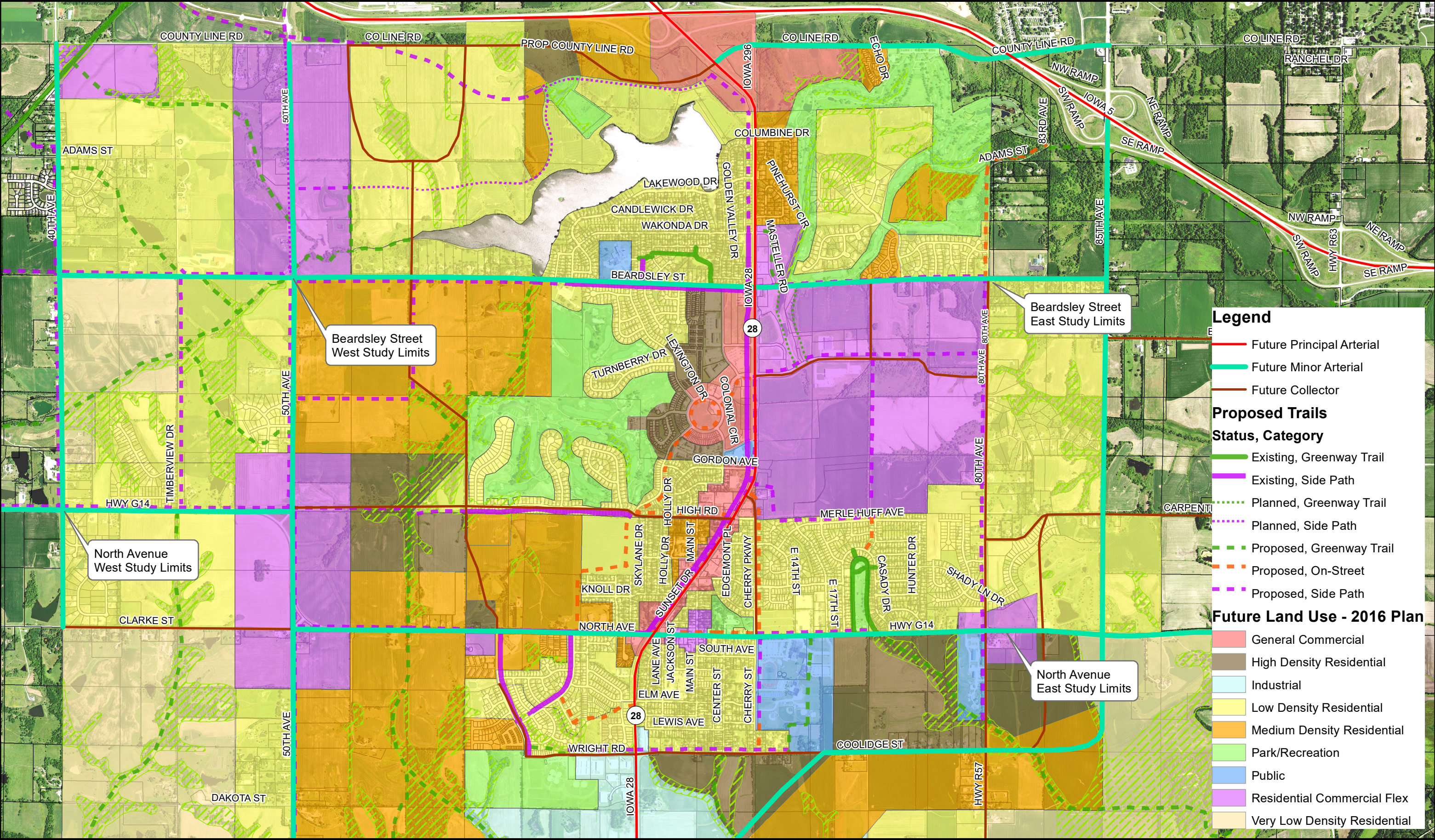
As discussed in the Section 6 public involvement, an additional elementary school is anticipated sometime in the future though a location for this is not known at this time.

c. Future Traffic Volumes

Future traffic growth estimates were prepared based on historic traffic data, general City population growth, as well as traffic generation potential of future land use developments along the North Avenue corridor as described above, based on the City of Norwalk Future Land Use Plan (2016). These calculations were made using the Institute for Transportation Engineers *Trip Generation Manual, 10th Edition*. Exhibit 2 summarizes future traffic volumes for Year 2030 based on proposed and committed developments, as well as beyond year 2030 with continued extension of development roadway and utility infrastructure. Table 3 summarizes general traffic volume ranges along the corridor segments. These volumes guide recommendations for future lane and right-of-way planning.

Table 3: Existing and Future Traffic Volumes

Segment	Length (mi)	Volume Range (veh/day) Year 2019 (Year 2030) [Year 2030+]
1 – 40 th Ave (Orilla Rd/R45) to Orchard Hills Elementary	2.0	3,700 (8,400) [12,000]
2 – Orchard Hills Elementary to IA 28	0.9	4,400 (10,500) [13,000]
3 – IA 28 to E 18 th St	0.85	3,400 (8,400) [11,000]
4 – E 18 th St to E 27 th St (80 th Ave)	0.65	2,650 (5,100) [7,000]



5. PAVEMENT CONDITION

Pavement condition along the study corridor was reviewed in April 2019. Further details are included in a separate memo available in the Appendix, however the primary information is provided below.

As summarized in Table 4 and Exhibit 4, the pavement condition along the corridor is generally fair with transverse and longitudinal cracking. Overlay improvements are recommended and/or planned west of IA 28, and were recently completed east of IA 28 to E 17th Street. Full depth patching is also recommended at specified locations.

Figure 3 provides illustrative photographs of pavement condition at the various segments along the corridor.

Table 4: Pavement Condition - Segments					
Segment	Length (mi)	Cross Section	Posted Speed Limit (mph)	Volume Range	General Condition / Recommendations
1- 40 th Ave (Orilla Rd/R45) to Orchard Hills Elementary	2.0	2-Lane rural	45-55	3,700 vpd	Fair condition, transverse cracking. Full depth patching recommended in selected areas as well as mill and overlay recommended. This mill and overlay is planned for year 2020.
2- Orchard Hills Elementary to West of IA 28	0.9	2-Lane rural	35	4,350-4,700 vpd	Full depth patch of specified PCC panels west of IA 28. Planned reconstruction/widening west of IA 28 will also address PCC deficiencies and subgrade.
3 – IA 28 to E 18 th St	0.85	2-Lane curb and gutter	25-35	4,700-3,500 vpd	Recent HMA overlay in 2018.
4 – E 18 th St to E 27 th St (80 th Ave)	0.65	2-Lane rural	45-55	3,500-2,600 vpd	Fair condition, full depth patching at specific location, specifically in EB lanes.

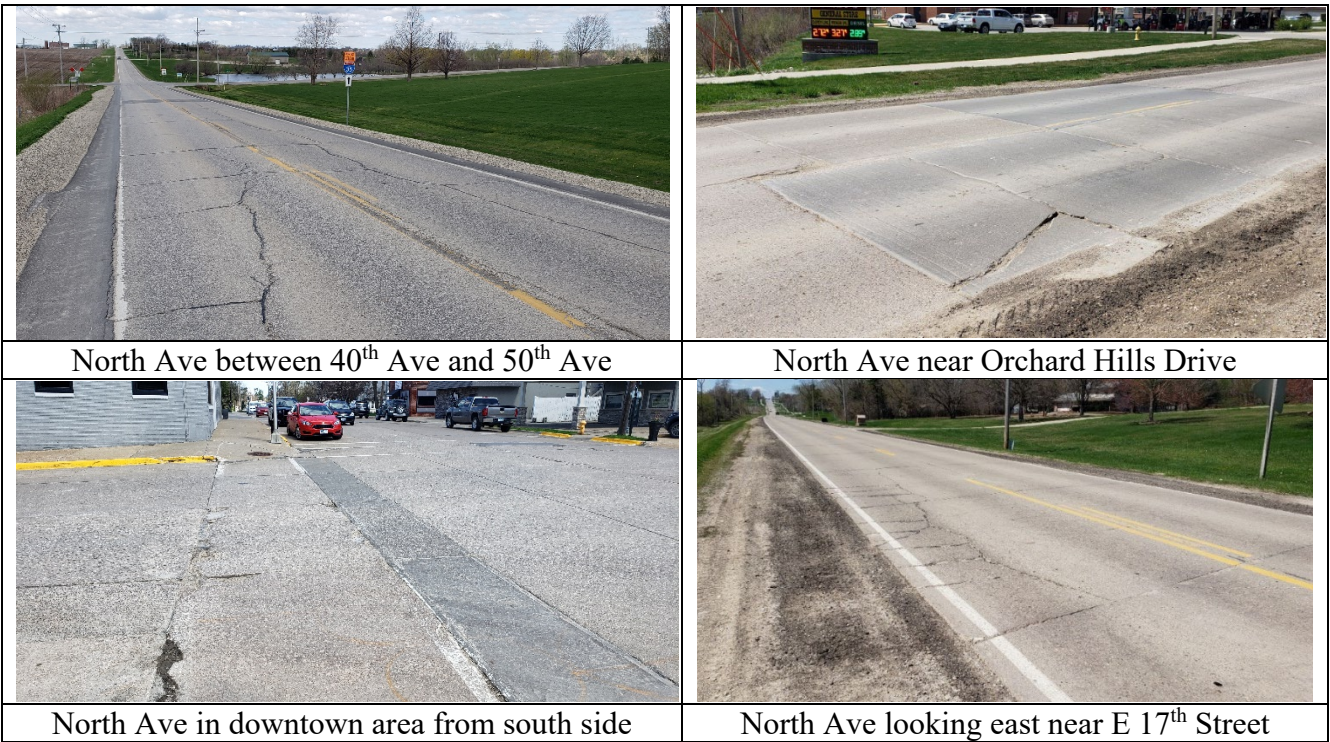
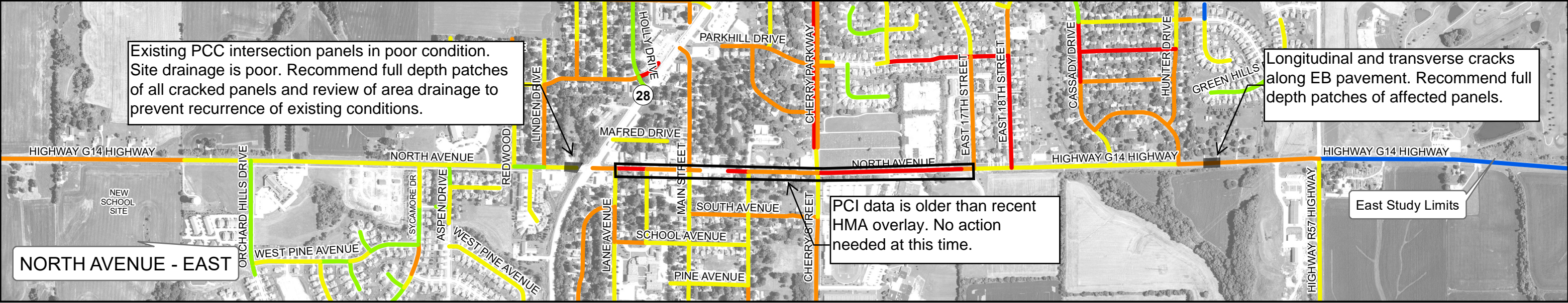
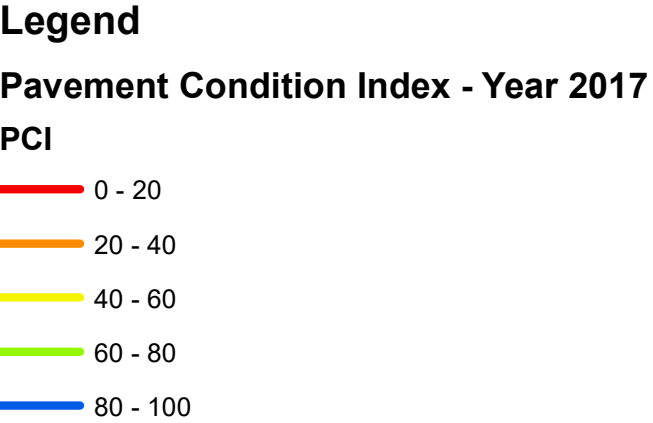
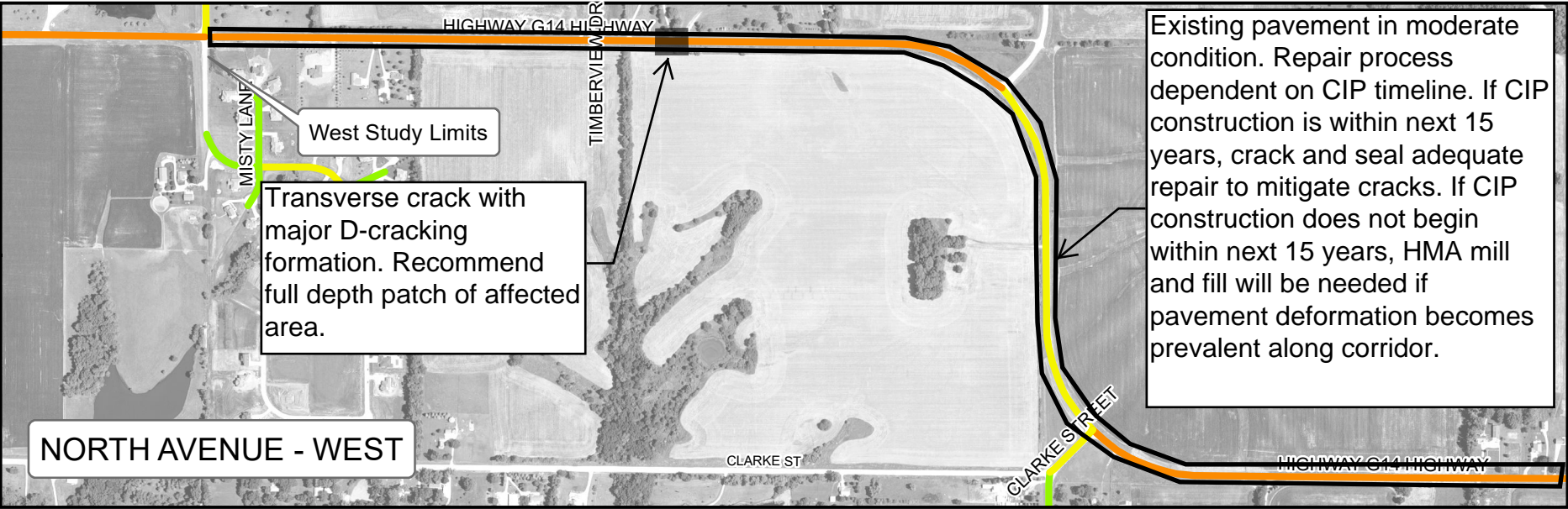
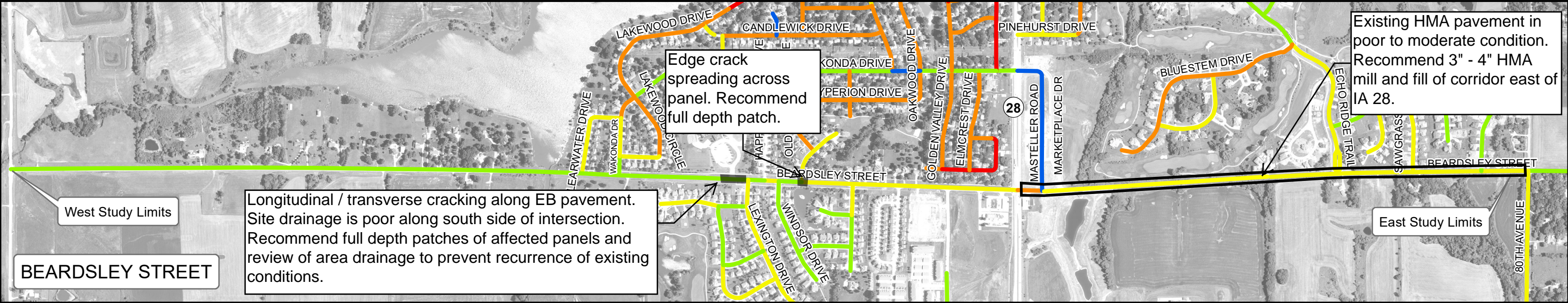


Figure 3: North Avenue (County Hwy G14) Pavement Condition Examples



6. PUBLIC / STAKEHOLDER INPUT

a. Public Input (Meeting / Survey)

A public input meeting was held on May 7, 2019. Approximately 40 citizens, staff, and consultant team members attended. The existing condition information as well as future projected traffic volumes were presented. Some of the prominent items of discussion and feedback included:

- Strong preference of separated bicycle trails / shared use paths over on-street bicycle facilities
- Existing congestion issues near Lakewood Elementary School
 - Mix of school traffic, local neighborhood traffic, and some traffic from the Legacy development contribute to congestion on Beardsley Street and on Lexington Drive
 - Concerns with school children crossing Lexington Drive and Beardsley Street travelling to/from school
 - Concerns with emergency vehicle access along Beardsley when school traffic is backed up
- Safety concerns regarding high travel speeds through the existing “S” curves on North Avenue near the west end of the corridor
- Concerns regarding traffic on North Avenue with the new school opening in Fall 2019
- Strong desire to improve Beardsley east of IA 28 for pedestrians / bicyclist accommodations due to the existing narrow nature of the street and vertical curves limiting sight distance
- The majority of attendees were in favor of exploring roundabout intersections as an alternative to traditional stop controlled or signalized intersections
- General questions / concerns regarding the future street network and land use map (information from the 2016 Comprehensive Plan update)

A listing of the comments received can be found in the Appendix.

In addition to the public input meeting, a public survey was posted to the City Website as well. The survey collected preference data from 216 people on several components to the corridors including the importance of walking and biking, reducing crashes, travel times, the incorporation of street scape elements, and other related items. The survey also asked participants to rank various bicycle facility types and intersection types for locations at nodes (major intersections where there is, or will be, development of commercial or mixed use destinations) and along the corridors between the major intersections.

The following priorities were identified at nodes and along corridors and are shown graphically below. Participants were asked to rank their top three priorities for each category. Figures 4 and 5 include both the number of times participants ranked items within their top three choices as well as the average ranking of each item (1 represents highest priority and 3 represents lowest priority of the top three)

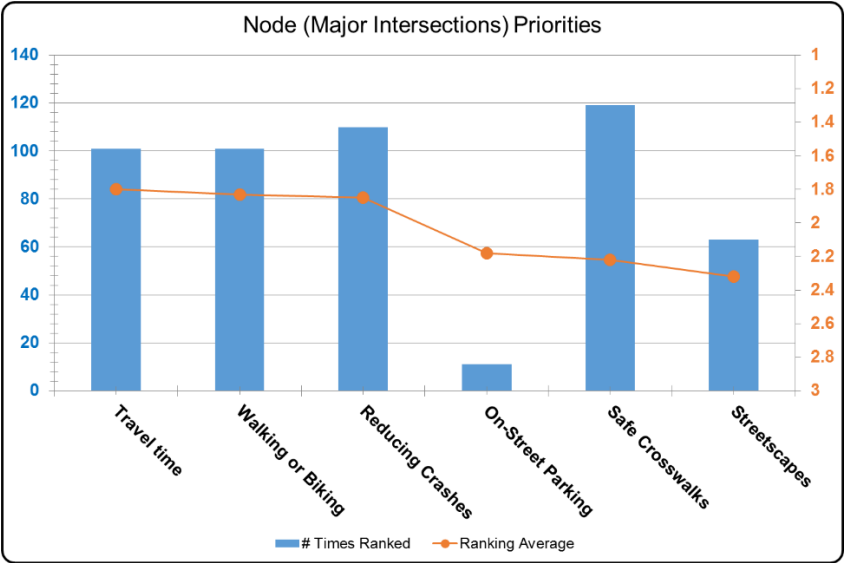


Figure 4: Public Survey Intersection Priorities

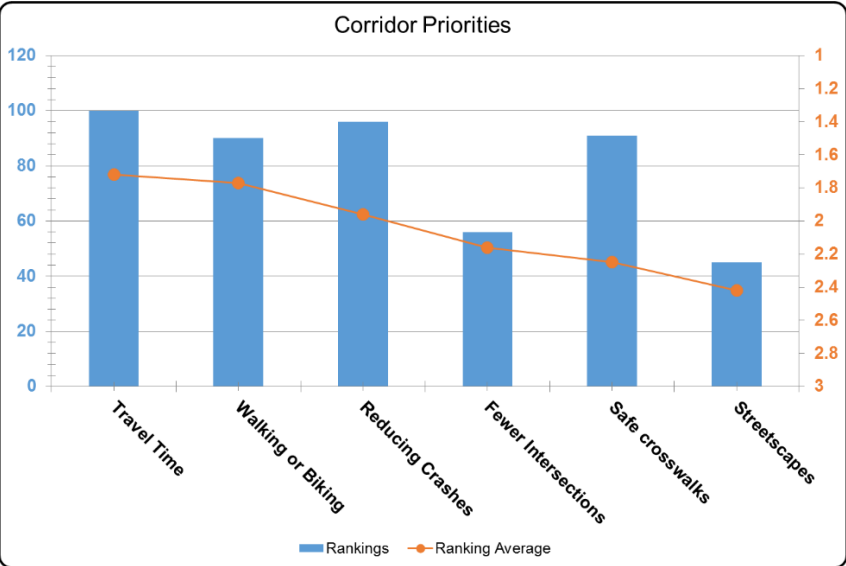


Figure 5: Public Intersection Survey Corridor Priorities

Travel Time (time it takes to get from Point A to Point B), having walking and biking accommodations, and reducing crashes ranked as the highest priorities for both nodes and corridors. As shown the graphics above, although providing safe crosswalks ranked 5th in both preference polls, the number of respondents that chose safe crosswalks as one of their top three priorities was greater than the 4th category in both cases and was chosen the most as one of the top three items for the nodes survey.

Survey participants were asked to rank several design options at nodes and along corridors as well as rank various types of intersection designs from 1 (least preferred) to 5 (most preferred).

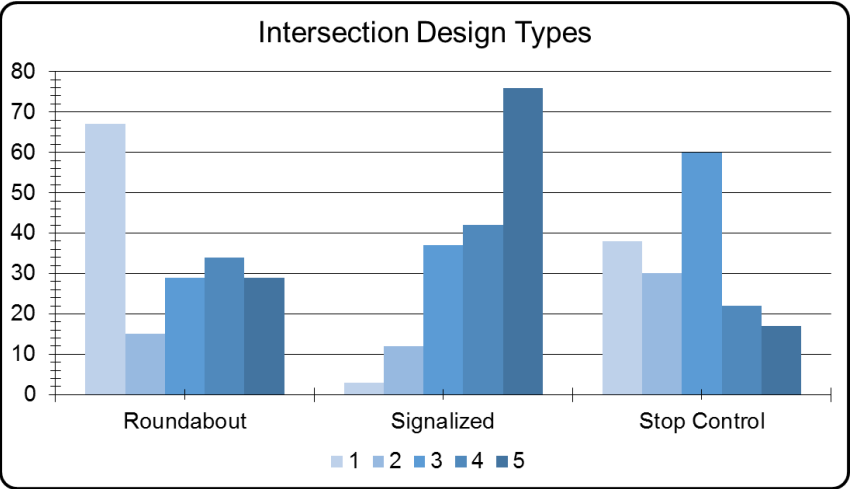


Figure 6: Public Survey Intersection Types

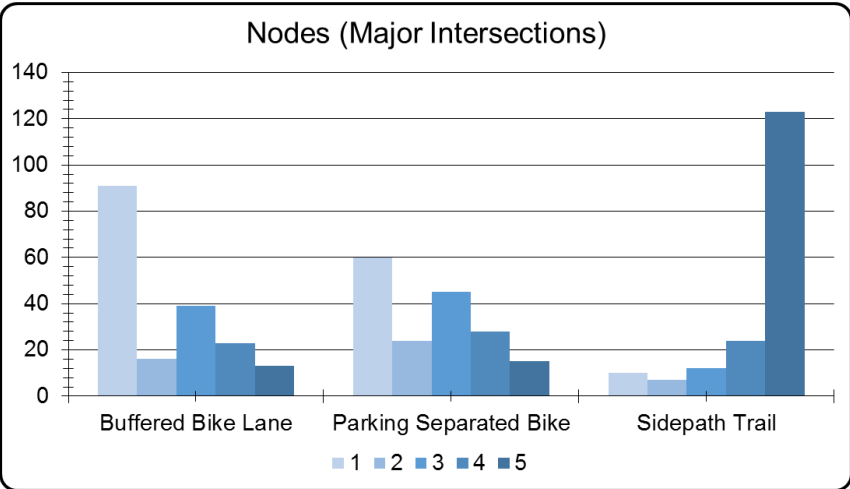


Figure 7: Public Survey Multimodal Types at Nodes/Major Intersections

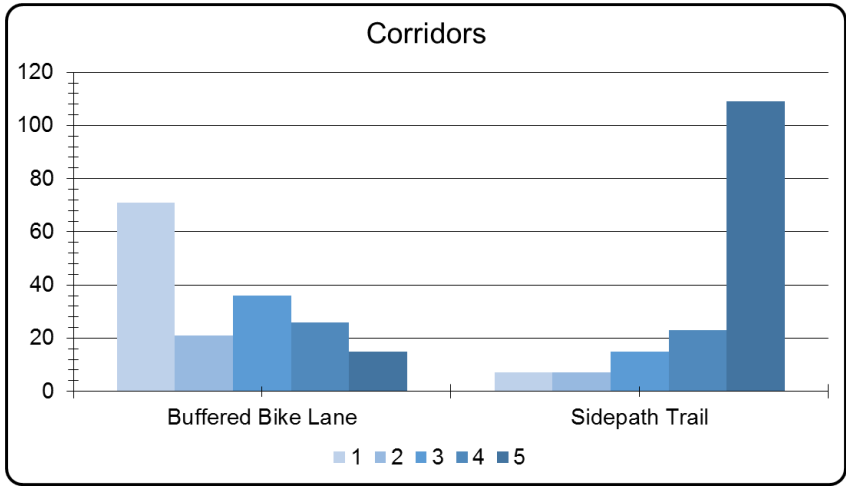


Figure 8: Public Survey Multimodal Types along Corridors

As can be seen in Figures 6 - 8:

- Sidepath trails are preferred both at nodes and along corridors
- Parking Separated (or generally protected) bike lanes are slightly more preferred over buffered bike lanes within nodes
- Signalized intersections received the highest number of “4” and “5” rankings
- Although roundabout intersections received 82 “1” or “2” rankings, they also received 63 “4” or “5” rankings, more than the 39 “4” and “5” rankings received for stop control intersections.

Participants were also welcome to leave comments as a part of the survey tool. The comments were similar in nature to those received at the public input meeting, and can be found in the Appendix for additional details.

b. Norwalk Community School District

A meeting with representatives from the Norwalk Community School District was held on May 15, 2019. Issues and opportunities discussed at the meeting included:

- Orchard Hills Elementary will open in fall 2019 and will serve K – 2nd grade while Oviatt Elementary is renovated
- Lakewood Elementary currently serves 3rd – 5th grade
- Beginning with the 2020 – 2021 school year, Orchard Hills will serve 2nd and 3rd grade and Lakewood Elementary will serve 4th and 5th grade
- As Norwalk grows, there will likely be a need for an additional elementary school. The timeframe and location will be dependent on growth, and the school may discuss converting the elementary schools to K – 5th grade at that time
- The School District generally prefers off-street walking/biking paths to on-street routes
- The School District understands the traffic concerns on Beardsley before and after school, and believes that traffic will be reduced in 2020 with the relocation of 3rd grade to Orchard Hills Elementary
- The School District offered that they would work with the City on potential site changes to alleviate traffic concerns in the future if necessary

c. Local Development Community

Several meetings were held with local developers either involved in current developments or future anticipated developments to discuss the corridor study and gather any perspectives. The discussions involved the importance of connectivity with trails, sidepaths, and the potential of an underpass on Beardsley Street (east of IA 28), understanding right of way needs as soon as practical, the timing of new traffic signals as developments continue to expand, and concerns / opportunities with the S curves and the connection of High Road on the North Avenue corridor.

d. Norwalk Police Department

Feedback from the Norwalk Police Department for North Avenue and the cities arterials in general include:

General Comments and Concerns

- The lack of adequate shoulder width along both corridors make it very difficult to perform traffic stops
- Additional capacity / mobility on the major East / West routes through town is needed for better emergency response activities as Norwalk grows

North Avenue Comments and Concerns

- Widening to provide additional turning lanes and traffic signal improvements (to include dedicated left turn phasing) would be beneficial at the IA 28 and North Avenue intersection
- Concerns that traffic at Orchard Hills Elementary School west of IA 28 is going to cause similar issues that are experienced on Beardsley Street near Lakewood Elementary School before and after school
- Significant congestion at the North Avenue and Cherry Street intersection before and after school and during events at the gym
- Significant congestion at the North Avenue and E 17th Street intersection during events at the Performing Arts Center

7. MULTI-MODAL CONSIDERATIONS

Throughout the City of Norwalk, the primary existing method of accommodating bicycles and pedestrians modes of transportation and recreation in Norwalk has been through sidewalks (less than 5 ft wide) and shared use paths (8 ft-10 ft wide). Most neighborhoods have sidewalk along at least one side of the street, Cherry Street has bike lanes between IA 28 and Main Street, and a shared-use path has been constructed along west side of IA 28 (Sunset Drive) between North Avenue and Wakonda Drive.

a. Existing North Avenue Facilities (west to east)

West of IA 28, a sidewalk has been constructed north of North Avenue from Aspen Drive to IA 28, and a shared use path south of North Avenue from Orchard Hills Drive east to IA 28.

East of IA 28, sidewalks are present on the south side to Jackson Street, then both sides east to Center Street at the Norwalk Easter Public Library, then along the south side only to the school campus terminating at E 17th Street. From 500 ft west of E 17th Street to Casady Dr, a sidewalk is also provided on the north side. This network technically provides continuous sidewalk between IA 28 east past potential destination of the library, school campus, and aquatic center, though with multiple North Avenue crossings required. Marked crosswalks are provided at all-way stop controlled intersections at Main Street, Cherry Street, and E 17th Street, and an unmarked crossing has been installed north of the school campus between Cherry Parkway and E 17th Street.

b. City of Norwalk Park and Trail Planning

As discussed in the public stakeholder input sections, public feedback indicated a strong preference for continued development of off-street bicycle facilities. These shared use paths are also called trails, bike trails, sidepaths, greenways, and bikeways. To maintain route connectivity, reduce crossings at non-marked crosswalks, and control costs, it is generally recommended along the corridor to prioritize shared use path development on one side of the street and sidewalk development along the other side.

The *Comprehensive Plan* (2016) and *Comprehensive Park and Open Space Plan* (2018) identify continued sidewalk and shared use path development as a city priority to connect neighborhoods to recreational, school, and commercial land uses. Specifically, along North Avenue from the west end of corridor at (and High Road connecting to North Avenue/G14 west of 50th Avenue). These shared use paths will provide connectivity to other street right-of-way sidepaths along 40th Avenue and 50th Avenue and off-street greenway trails, and possibly the Great Western Trail near Cumming and connecting to Des Moines.

Shared use paths and sidewalks should be therefore planned for with adjacent land use development and North Avenue corridor reconstruction.

Shared Use Path planning and design, in particular design of signing, pavement markings, signalized and un-signalized intersection and mid-block crossings, should follow the latest guidance from Federal Highway Association *Manual on Uniform Traffic Control Devices*, American Association of State Highway Transportation Officials (AASHTO) *Guide for Development of Bicycle Facilities*, National Association of City Transportation Official (NACTO) *Urban Bikeway Design Guide*. In addition, the City should work to coordinate of standards and best practices with the Des Moines Area Metropolitan

Planning Organization (DMAMPO) and the Iowa Statewide Urban Design and Specifications (SUDAS Design manual Chapter 12).

Specific design criteria include:

- 10-ft minimum shared use path width
- Preferred 8-ft clearance from edge of shared use path to edge of North Avenue lanes/curb, minimum of 5-ft clearance
- Minimum 6-ft width marked crosswalks, typical crossing width 10 ft to match shared use path.
- Locate shared use path crossings at intersection corners (see comparisons in Figure 9)
- Stop sign or yield signs (depending on intersection sight distance) for trail approaches to public street and driveway intersections



Figure 9: Shared Use Path Crossing Locations at Intersection Corners

8. RECOMMENDATIONS

a. Number of Lanes, Lane Widths, and Cross Section

Based on projected future traffic volumes and development plans, the primary recommendation throughout the corridor is to reconstruct North Avenue from current rural, two-lane cross section to a three-lane urban cross-section (with curb and gutter) providing one through lane in each direction and a center two-way left turn lane, and a shared use path and sidewalk. This generally results in a recommended 110 ft right of way west of IA 28, and an 80 ft right-of way east of IA 28. In most segments, the existing right-of-way is sufficient for this cross section.

The daily traffic volumes support two through lanes (one in each direction) as summarized in Iowa SUDAS planning criteria. The provision of left turn lanes (via a continuous center two-way left turn lanes due to access spacing) is supported by left turn volume warrant criteria in the Transportation Research Board (TRB) National Cooperative Highway Research Program (NCHRP) reports, such as Report 745: “Left-Turn Accommodations at Unsignalized Intersections” and NCHRP Report 457: “Evaluating Intersection Improvements: An Engineering Study Guide”.

West of IA 28, right of way, utilities, shared use path and sidewalk locations should be designed with potential future widening to five lanes urban cross section to accommodate potential future traffic growth.

Lane widths of 11-ft for through lane and 12-ft for TWLTL should be strongly considered. While standard highway and street lane widths are 12-ft wide, narrower lanes such as 11 ft are recommended in established relevant design guidance, such AASHTO’s “A Policy on Geometric Design of Highways and Streets” (commonly called the Green Book) and Iowa Statewide Urban Design and Specifications (SUDAS) Design Manual (e.g. Chapter 5C). There is an established traffic calming benefit to 11-ft lanes. Traffic calming relates to designing the roadway and surrounding environment for driver behavior consistent with posted speed limits, in this case 35 mph through majority of corridor, with 25 mph segments near Main Street and the school campus sites during school hours.

Exhibit 5 shows the general corridor lane recommendations, and Exhibits 6 - 10 show segment specific cross sections and representative sample sections with pavement markings, etc.

West of IA 28, the sidewalk along the north side and shared use path along the south side would be extended. East of IA, the existing shared use path and sidewalks would be maintained through Main Street and Cherry Parkway, and continued shared use path to south and sidewalks to north are recommended. Raised median pedestrian crossing islands should be considered utilizing the two-way left turn lane width at any marked mid-block crossing locations.

At North Avenue, intersection reconstruction is recommended in the 2018 IA 28 Corridor Study and subsequent DMAMPO STBG and Iowa DOT TSIP funding applications, providing eastbound and westbound left turn lanes and updated traffic signal phasing

b. Intersection Traffic Control – Roundabouts and Traffic Signals

The majority of intersections along North Avenue are currently and will remain controlled as two-way stop control, where the minor approach (north and south) stop and wait for a gap in the eastbound and

westbound North Avenue traffic stream. Existing intersections with additional traffic control include IA 28 (two-phase traffic signal), and Main Street, Cherry Street, and E 17th Street (all-way stop). These locations could potentially become roundabouts or traffic signalized intersections in the future. Other intersection to monitor include intersections with collector streets such as E 27th Street (80th Avenue) to the east, and 40th Avenue, 50th Avenue, new Orchard Hills Elementary School Access, and Orchard Hills Drive. These intersections should be monitored as development continues and analyzed in development site-specific traffic impact studies for increased traffic control (signal or roundabout) and/or additional turn lanes.

Opinions in the public survey summarized in Section 6 were clearly split on roundabouts, receiving 82 rankings as “least preferred” (#1 and #2), and 63 rankings as “most preferred” (#4 and #5). As seen in Table 5, roundabouts and traffic signals have pros and cons, and should be compared to each other and all-way stop controlled intersections and not compared to two-way stop controlled intersections with no stop condition on the main route (e.g. North Avenue). If the City considers roundabouts, public education about the benefits of roundabouts as described below, and education about driver behavior and operations will be important due to lack of existing roundabouts in the City. Public opinion typically increases in from 30% to 60-70% in favor following installation, based on an Insurance Institute of Highway Safety studies.

Table 5: Roundabout and Traffic Signal Comparisons

Criteria	Single Lane Roundabout	Traffic Signal
Safety	Significant reduction in overall crashes (37%) and injury (-75%) and fatal (-90%) crashes, due to reduction in higher severity head-on, right angle, and left turn crashes.	Reduction in right angle crashes, left turns depend on phasing, may result in new rear end crashes.
Capacity	Higher traffic flow capacity. More continuous flow of traffic, slow to yield when stop unnecessary, reduced ‘lost time’ due to red-green start up and yellow light phases.	Clearly assigns right of way to conflicting traffic. Operations can be optimized with added detection and frequent timing updates.
Peak Hour Delay – North Avenue / Side Streets	Varies depending on balance of traffic from major and minor direction. Some traffic may yield vs stop.	Additional turn lanes may be needed to handle peak hour turn movements.
Off-peak Hour Delay – North Avenue / Side Streets	Less ‘off-peak’ delay due to yield movements instead of stop at red signal indication.	More off-peak delay since major road must stop for red signal to allow traffic on minor approach to proceed.
Aesthetic Design Opportunities	Center island landscaping. Decorative poles for roadway lighting.	Decorative and/or painted poles. Pole mounted decorations.
Pedestrian/Bicyclists	Crossings use splitter islands to cross in two stages, one direction of traffic at a time. Drivers are slowing down for yield.	Accommodated via pedestrian signal phases. Potential conflicts with right turn vehicles and permissive left turns.
Maintenance	Landscaping. Special snow removal planning.	Equipment and electricity costs, battery back-up.

The primary roundabout benefits to consider along North Avenue are safety (roundabouts have been shown to greatly reduce or eliminate severe crashes due to reduction in right angle crashes and left turn crashes) and traffic calming (lower average speeds and higher compliance with posted speed limit and fewer extreme speeding incidents). Roundabouts are listed in the Federal Highway Administration’s publications of “Proven Safety Countermeasures”, along with two-way left turn lanes and Access Management. In addition, roundabouts are well suited to these North Avenue intersections due to recommended three-lane cross section, which results in a single-lane roundabout that is intuitive for drivers, especially if it is the first roundabout in a community. Single lane roundabouts can be designed for potential future widening without need for closure/reconstruction. Other characteristics of North Avenue that are positive for roundabout alternative consideration include relatively wide existing right-of-way, low truck percentage, commuter characteristics and variation in peak hour vs off-peak hour traffic which would result in additional off-peak delay at future traffic signals, and potential for pedestrian accommodation.

c. Access Management

As described by the Federal Highway Administration, “Access management refers to the design, application, and control of entry and exit points along a roadway. This includes intersections with other roads and driveways that serve adjacent properties. Thoughtful access management along a corridor can simultaneously enhance safety for all modes, facilitate walking and biking, and reduce trip delay and congestion.”

As adjacent North Avenue parcels develop or redevelop, special attention should be paid to maintaining or improving these characteristics, especially limiting direct access at street and driveway locations, aligning nearby driveways on north and south sides of North Avenue, and providing adequate queuing, storage distance to first internal development street or driveway.

Specifically, through the majority of the North Avenue corridor, existing and future access locations should align on north and south sides where possible, be limited to 300-ft spacing minimum to allow left turn lane usage for adjacent intersections/driveways without overlap, and minimum ¼-mile (1,320) ft spacing for traffic signals (1/2-mile or 2,640 ft preferred). The established IA 28 to Cherry Street segments have a higher density and any redevelopments should be evaluated on a case-by-case basis.

Additional information can be found at these resources:

- Iowa DOT Access Management Policy
 - <https://iowadot.gov/traffic/access-management/access>
- Iowa Statewide Urban Design Standards (SUDAS) Chapter 5L: Access Management
 - <http://www.iowasudas.org/manuals/design/Chapter05/5L-1.pdf>
- Iowa Access Management Handbook (Iowa DOT/ISU Institute for Transportation)
 - <http://www.ctre.iastate.edu/research/access/amhandbook/AMhandbook.pdf>

e. 50th Avenue Realignment Alternatives

Exhibit 7 illustrates three potential realignments of the 50th Avenue intersections along the existing North Avenue/County Road G14 “S-curves”. These curves are where the majority of the injury crashes have occurred, and while acceptable for through traffic movements, as cross street and turning traffic movements increase, the curves, sight distance, and skew angles will be inadequate.

One alternative involves re-aligning as a pair of 90-degree intersections. Future extension of High Road to 50th Avenue would be realigned away from the proposed intersection; this is recommended due to High Road’s status as a collector but also to reduce its attractiveness as a direct cut-through route due to existing development as residential street with numerous direct driveway connection along the Legacy Golf Club.

The second and third alternatives would realign North Avenue with gentler curves to prioritize through traffic movements while also allowing for traditional intersection alignments and speed control. The conceptual alignment was chosen to maximize access to adjacent land that is planned for future sanitary sewer service.

The resulting intersections with North Avenue could be traffic signals or roundabouts, as discussed in section 8b above. It is recommended to strongly consider roundabout intersections to slow traffic down as this area of Norwalk develops due to the higher speed nature of North Avenue to the west.

The ultimate alignment of North Avenue in this area will be dependent on further coordination and discussions of future land use planning and development potential in the area.

f. Concept Drawings and Typical Sections

Exhibit 5 illustrates the general recommendations for the North Avenue Corridor, and Exhibits 6 - 10 describe and illustrate specific design criteria and cross-section characteristics of the distinct segments along the North Avenue corridor.

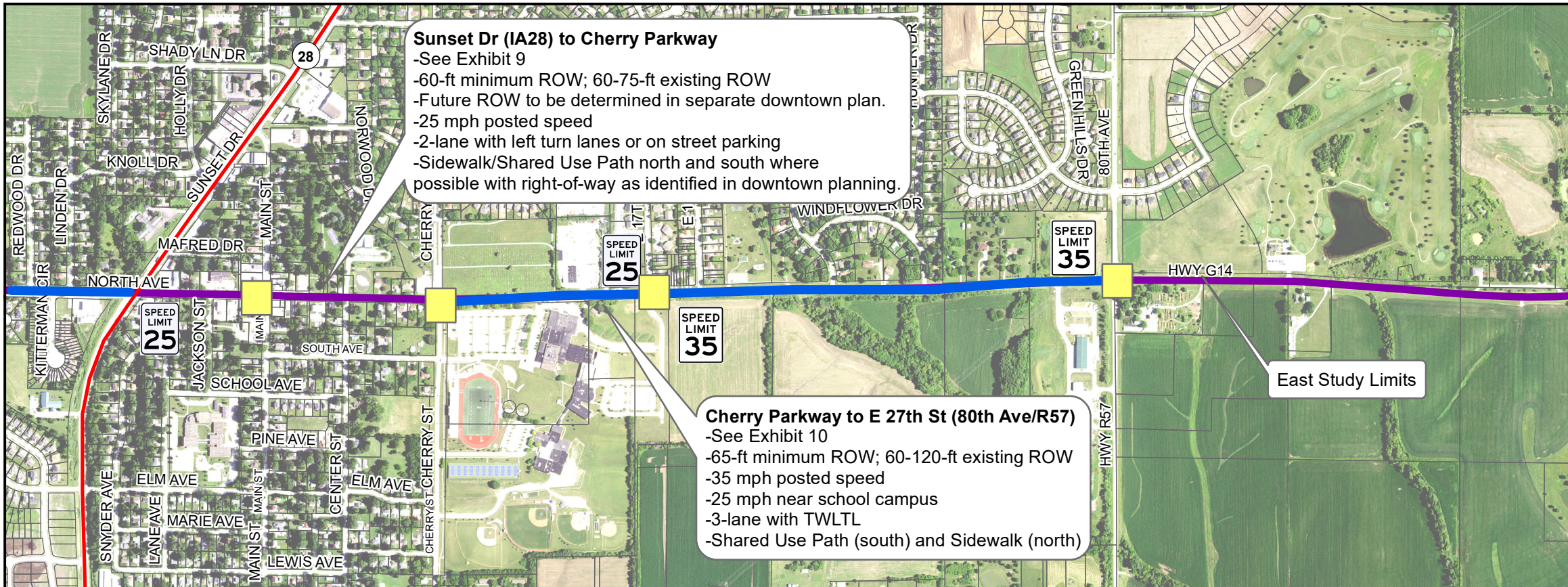
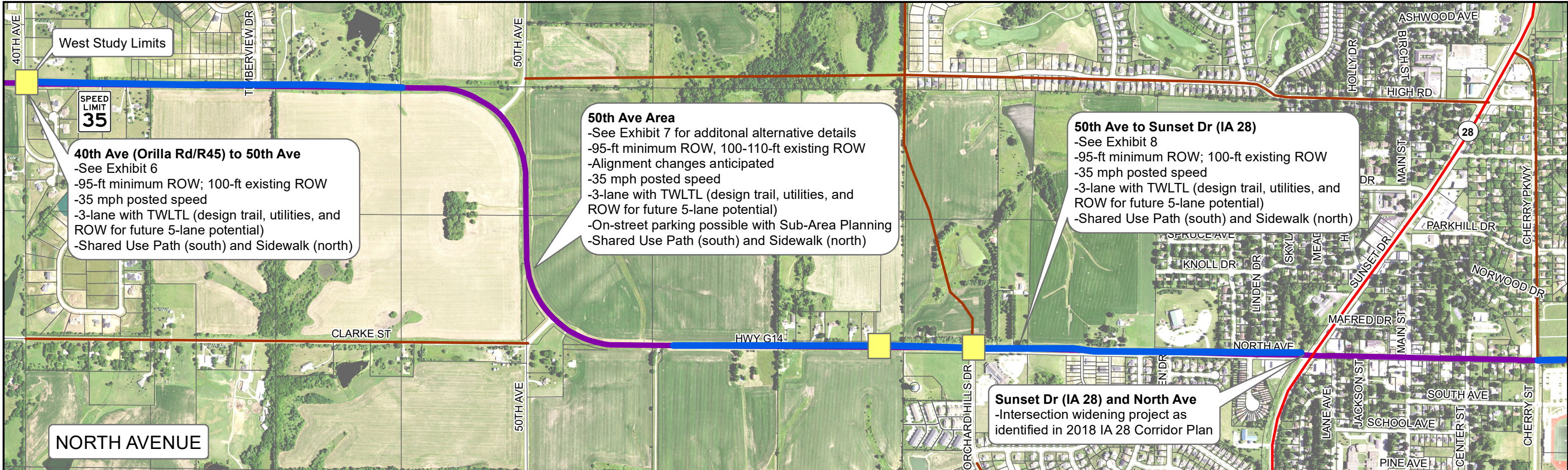
g. Implementation

Based on the input received, the analysis found in this report, and input from City staff, Table 6 summarizes the recommendations by North Avenue Corridor segments.


Table 6: North Avenue Segment Recommendations

Priority ¹	Segment	Length (mi)	Magnitude of Cost ⁴	Notes
1	Orilla Rd to School	2.0	\$1.7M	Rehab / Overlay ²
2	IA 28 & North Ave	--	\$2.0M	TSIP / USTEP / City Project ³
3	School to IA 28	0.9	\$700,000	Rehab / Overlay
4	E 18 th St to E 27 th (80 th Ave)	0.65	\$150,000	Spot Pavement / Drainage Rehab
5	Cherry Pkwy to E 18 th St	0.4	\$3.0M	New 3-lane / sidewalk
6	School to IA 28	0.9	\$5.6M	New 3-lane / sidewalk
7	Orilla Rd to School	2.0	\$11.5M	New 3-lane / sidewalk / trail
8	E 18 th St to E 27 th (80 th Ave)	0.65	\$3.8M	New 3-lane / sidewalk / trail
9	Orilla Rd to IA 28	2.9	\$9.2M	Widen to 5-lane if needed


¹ May change due to adjacent development timing, funding opportunities, and CIP programming
² Evaluate rehab strategy through S-Curve section based on timing of alignment changes
³ Currently programmed for 2021 construction
⁴ Opinions of probable cost are based on conceptual design, 2019 construction costs, and will need to be further refined prior to project development



Legend

 Recommended Posted Speed Limit

Segment - Criteria	Recommended Segment Design Criteria
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 Intersections which may need increased Traffic Control (e.g. signal, roundabout) and/or additional Turn Lanes

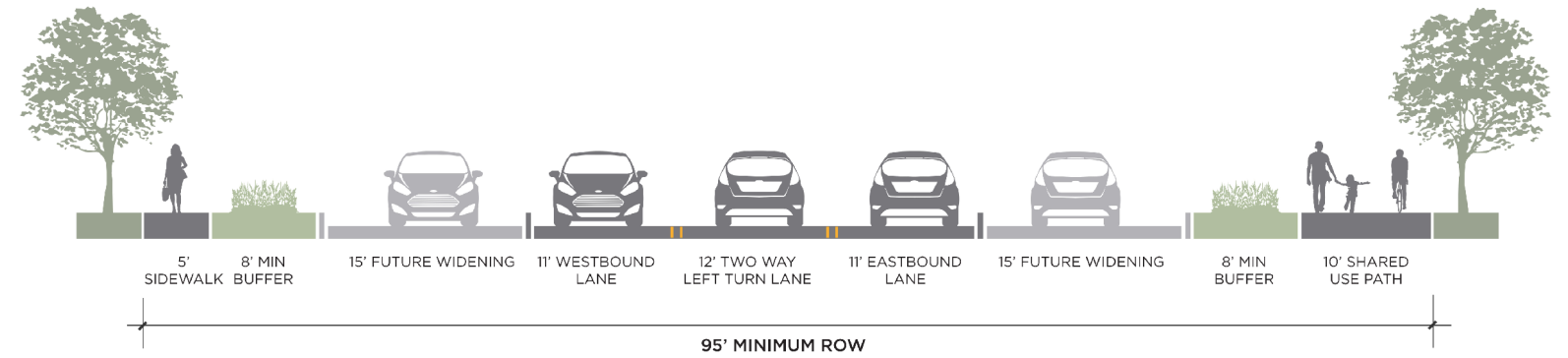
RECOMMENDATION

- Corridor Reconstruction as three-lane urban cross section (by 2030)
- 10-ft shared use path south of North Ave
- Locate trail and ROW for potential five-lane widening in long term (2030+)

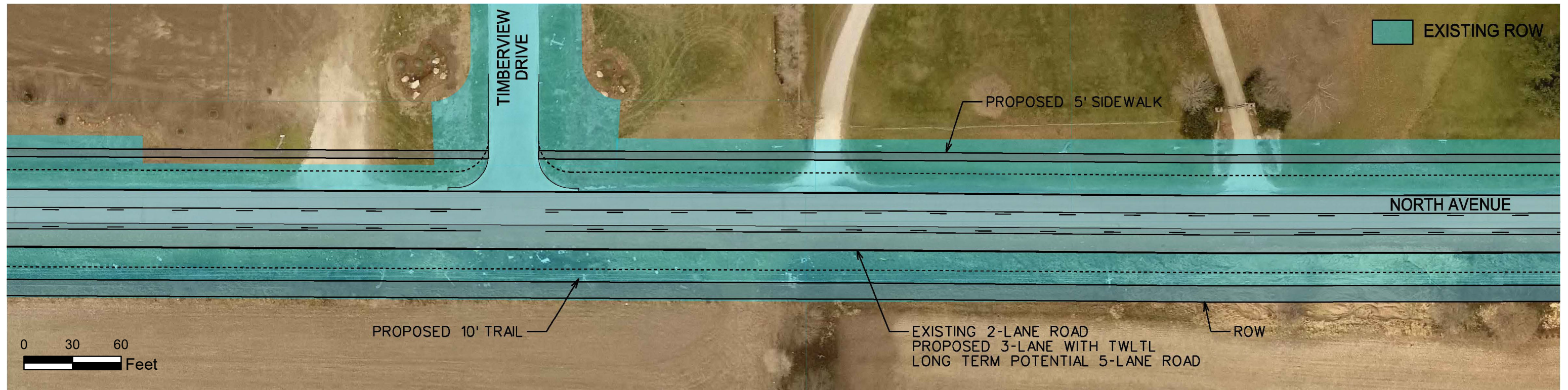
FUNCTIONAL DESIGN CRITERIA

- 95-ft minimum ROW; 100'ft existing ROW
- 35 mph Posted Speed
- 34-ft Roadway Width (11-ft 12-ft 11-ft) plus curb and gutter
- Urban Cross Section (curb and gutter)
- Shared Use Path - south side - 10-ft width
- Sidewalk - north side - 5-ft width

CROSS SECTION



SEGMENT CONCEPT



NORTH AVENUE CORRIDOR - SEGMENT LIMITS



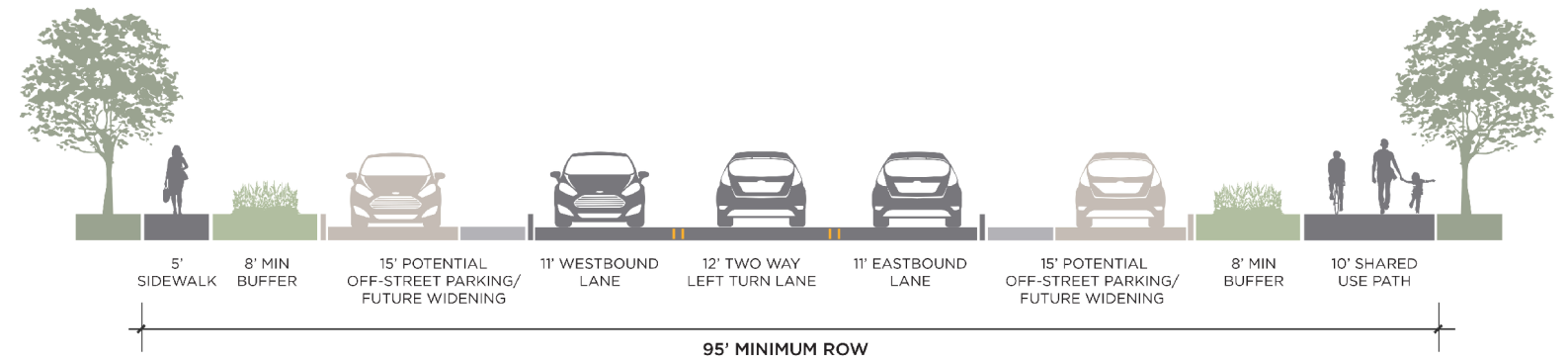
RECOMMENDATION

- Corridor Reconstruction as three-lane urban cross section (by 2030)
- 10-ft shared use path south of North Ave
- Locate shared use path, utilities, and ROW for potential five-lane widening in long term (2030+)

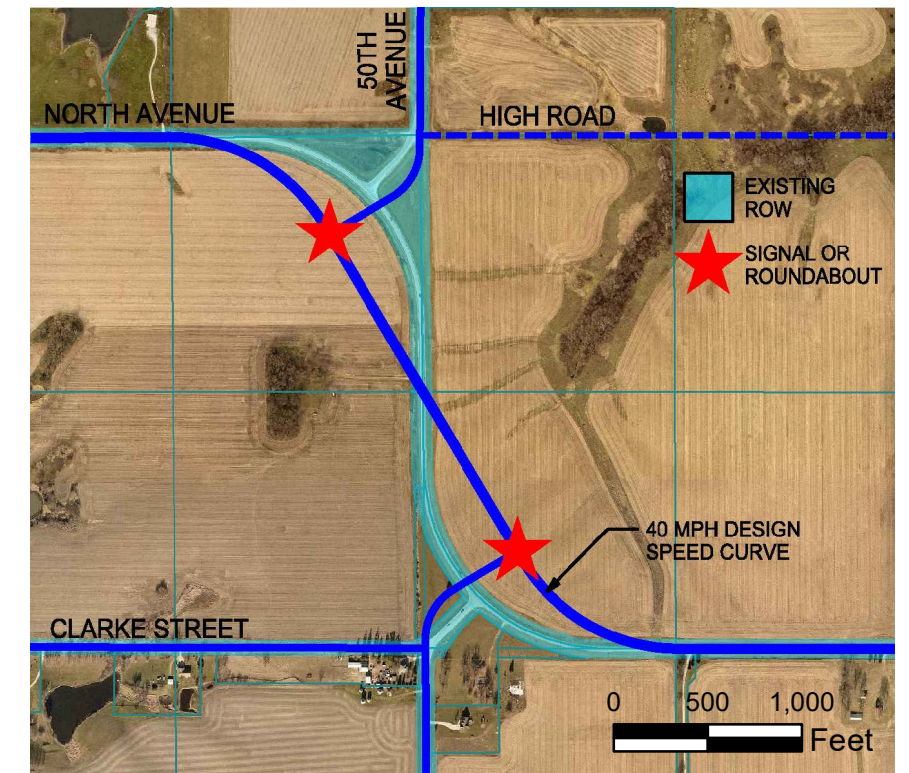
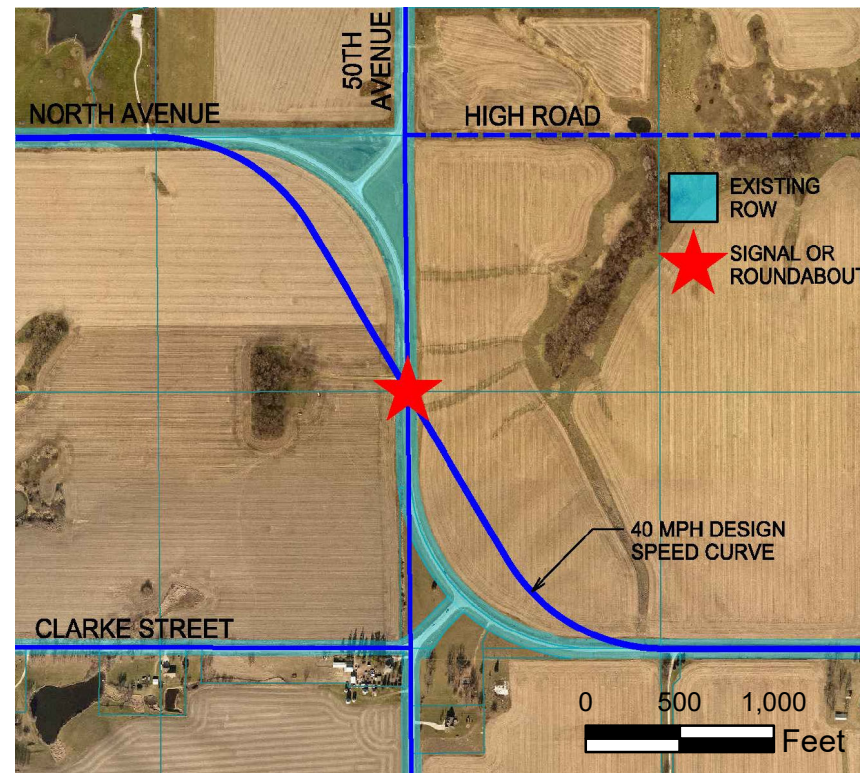
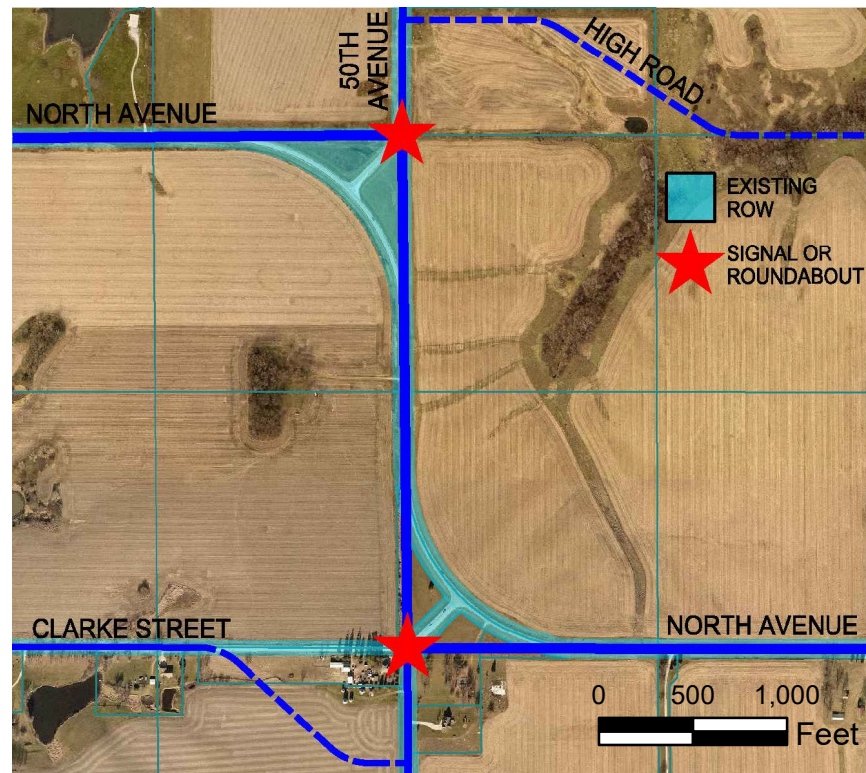
FUNCTIONAL DESIGN CRITERIA

- 95-ft minimum ROW; 100-110-ft existing ROW
- 35 mph Posted Speed
- 34-ft Roadway Width (11-ft 12-ft 11-ft) plus curb and gutter
- Urban Cross Section (curb and gutter)
- Shared Use Path - south side - 10-ft width
- Sidewalk - north side - 5-ft width

CROSS SECTION



SUB-AREA 2 INTERSECTION REALIGNMENT CONCEPTS



NORTH AVENUE CORRIDOR - SEGMENT LIMITS



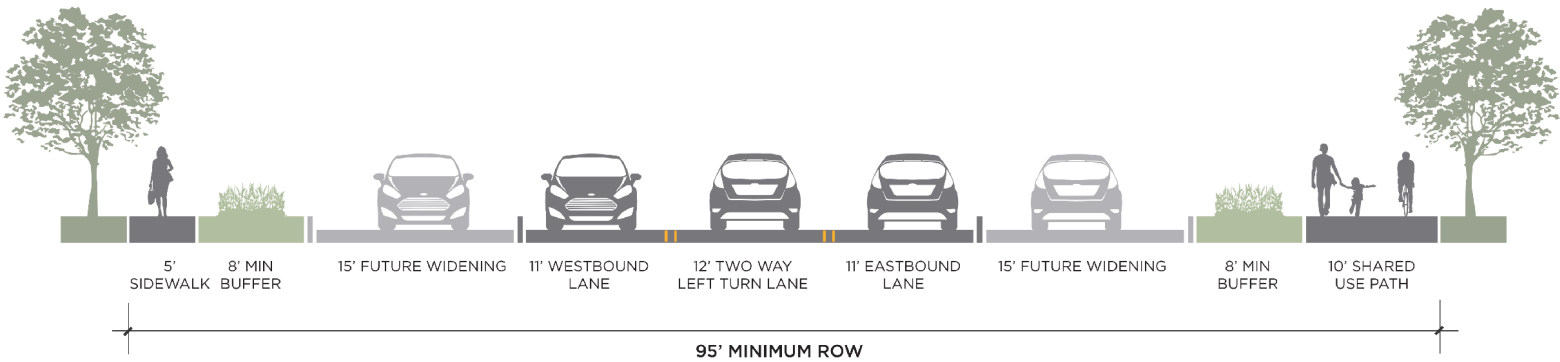
RECOMMENDATION

- Corridor Reconstruction as three-lane urban cross section (by 2030)
- 10-ft shared use path south of North Ave
- Locate trail and ROW for potential five-lane widening in long term (2030+)

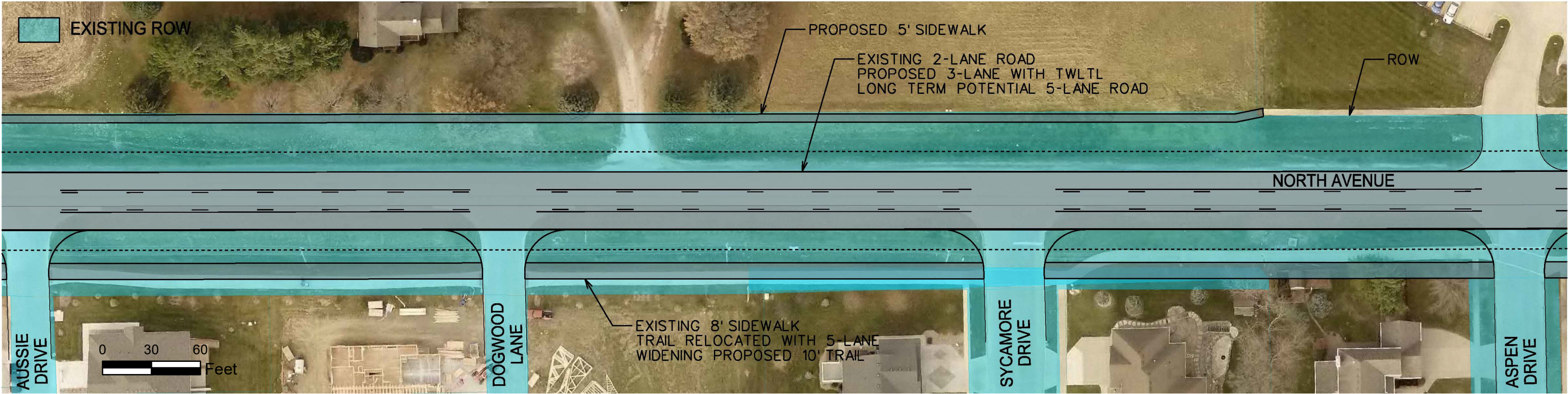
FUNCTIONAL DESIGN CRITERIA

- 95-ft minimum ROW; 100-ft existing ROW
- 35 mph Posted Speed
- 34-ft Roadway Width (11-ft 12-ft 11-ft) plus curb and gutter
- Urban Cross Section (curb and gutter)
- Shared Use Path- south side - 10-ft width (when extending ex. 8-ft trail)
- Sidewalk - north side - 5-ft width

CROSS SECTION



SEGMENT CONCEPT



NORTH AVENUE CORRIDOR - SEGMENT LOCATION



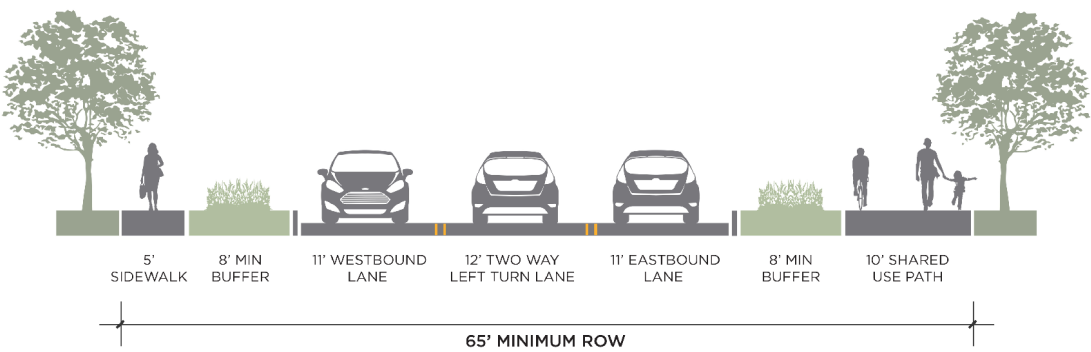
RECOMMENDATION

- Maintain existing urban cross section.
- Maintain/provide shared use path/sidewalk on both sides of street for downtown pedestrian movements.
- Construct left turn lanes at Cherry Parkway, or consider as a potential single-lane roundabout location.

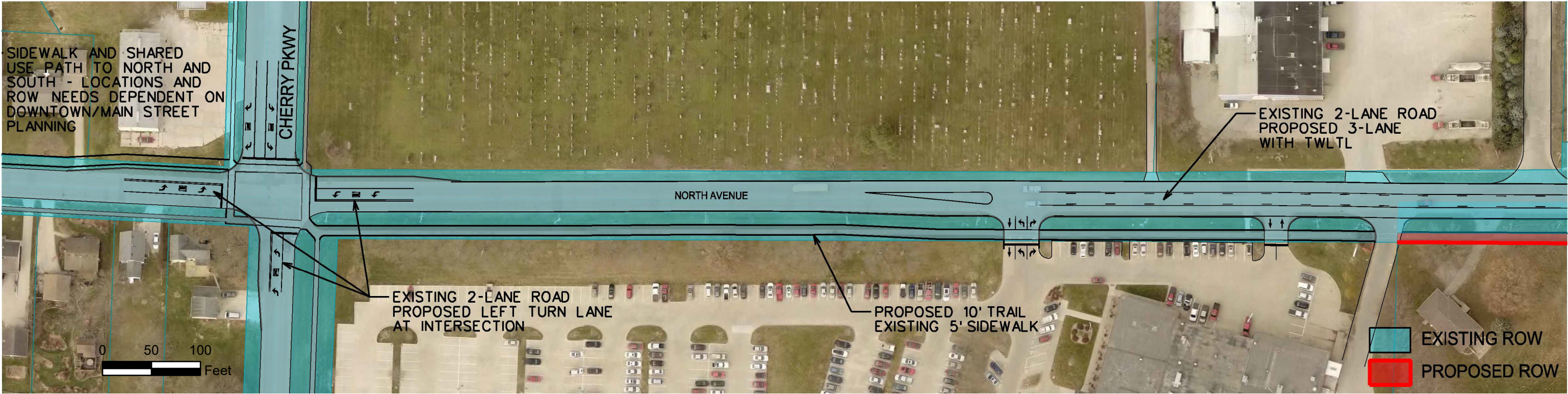
FUNCTIONAL DESIGN CRITERIA

- 60-ft minimum ROW; 60-75-ft existing ROW
- Future ROW to be determined in separate downtown plan
- 25 mph and 35 mph Posted Speed
- 34-ft Roadway Width (11-ft 12-ft 11-ft) plus curb and gutter
- Urban Cross Section (curb and gutter)
- Multi-use Trail 10-ft width; Sidewalk 5-ft width

CROSS SECTION



SEGMENT CONCEPT



NORTH AVENUE CORRIDOR - SEGMENT LIMITS



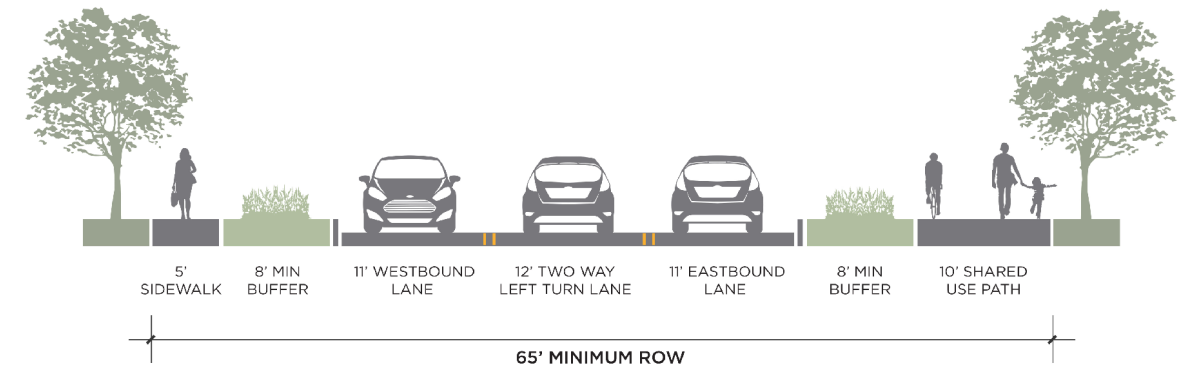
RECOMMENDATION

- Corridor Reconstruction as three-lane urban cross section (by 2030)
- 10-ft shared use path south of North Avenue
- Cherry Parkway, E 17th Street, E 27th Street (80th Avenue) potential right turn lanes, traffic signals/roundabout locations.

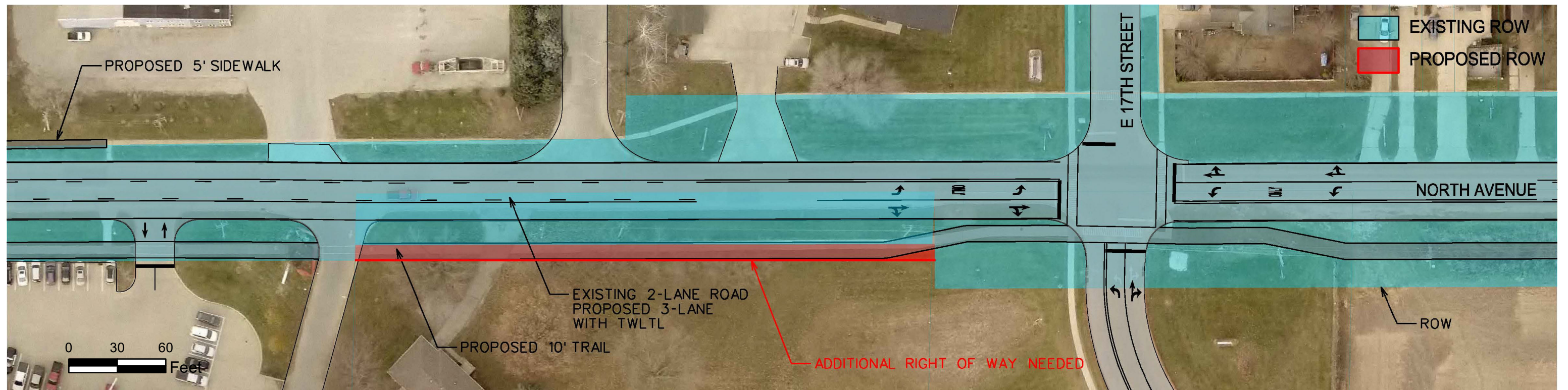
FUNCTIONAL DESIGN CRITERIA

- 65-ft minimum ROW; 60-130-ft existing ROW
- 25 mph and 35 mph Posted Speed
- 34-ft Roadway Width (11-ft 12-ft 11-ft) plus curb and gutter
- Urban Cross Section (curb and gutter)
- Multi-use Trail - south side - 10-ft width
- Sidewalk - north side - 5-ft width

CROSS SECTION



SEGMENT CONCEPT



NORTH AVENUE CORRIDOR - SEGMENT LIMITS

