

BEARDSLEY STREET CORRIDOR STUDY

City of Norwalk, Iowa | November 19, 2019



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City of Norwalk, Iowa | November 19, 2019

Prepared for:

City of Norwalk
705 North Avenue
Norwalk, Iowa 50211

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Prepared by:

	<p>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.</p>
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EXECUTIVE SUMMARY

The Beardsley Street study corridor extends from 50th Avenue east to 80th Avenue (E 27th Street), a distance of approximately 3 miles. Throughout the study area, Beardsley Street is a two-lane corridor, providing a pavement width of 22-24 ft, except for a 1,000-ft three lane section at the intersection of IA 28 (Sunset Drive). The two-lane roadway cross section generally provides a 24 ft PCC pavement with 4 ft gravel shoulder and rural ditch drainage west of IA 28 (Sunset Drive), and 22 ft asphalt pavement with rural ditch drainage 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.

Beardsley Street is classified as a “Minor Arterial” for City planning purposes. 50th Avenue is currently the west terminus, and 50th Avenue provides a route to IA 5 via Maffitt Lake Road. To the east Beardsley Street is named Border Street beyond the current corporate limits at E 27th Street (80th Avenue), which continues eastward to connect to IA 5 and the City of Des Moines via Fleur Drive. As the City continues to grow, Beardsley Street 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. As the corridor continues to develop, additional traffic, access locations, and turning movements may lead to higher crash frequency and/or rates, and may lead to reactive or proactive access modifications via access consolidation, movement restrictions (right-in/right-out, medians, etc), traffic signals, or other treatments as discussed in the report.

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 – 50 th Avenue to Lake Colechester bridge	1.0	1,140 (2,500) [7,000]
2 – Lake Colechester bridge to west of IA 28	0.9	2,760 (3,600) [8,000]
West leg of IA 28 intersection	-	6,800 (7,600) [12,100]
East leg of IA 28 intersection	-	4,300 (8,300) [9,500]
3 – IA 28 to E 27 th St (80 th Ave)	1.0	3,600 (5,500) [7,000]

Future land use along the Beardsley Street corridor will be primarily residential. Connections to land north and west of Beardsley Street along 50th Avenue and north of Lake Colechester may provide include commercial or higher density residential land uses. Traffic forecasts for year 2030 range from 2,500-8,300 veh/day, and long term beyond 2030 from 7,000-12,000 veh/day.

Pavement condition analysis showed generally good pavement condition west of IA 28 (Sunset Drive) with poor pavement condition east of IA 28 (Sunset Drive). In addition, the vertical profile has curves, slopes, and sight distance deficiencies that do not meet current design criteria.

Concerns from public and stakeholder meetings identified similar deficiencies east of IA 28 regarding lack of shoulders, existing ditches and roadway profile, and lack of pedestrian/bicycle facilities. School traffic near Lakewood elementary was another frequent concern. 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 general public, identified stakeholders, and City staff, the primary recommendation is for phased improvements along the corridor for an ultimate 3-lane corridor providing designated left turn lanes or two-way left turn lanes. This corridor would have an urban cross section (i.e. curb and gutter). Generally, this facility will be within existing right of way, and additional needs are identified in exhibits. 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 Beardsley Street from 50th Avenue to the Lake Colechester bridge, and to the north between Lake Colechester bridge IA 28, and to the south from IA 28 to 80th Avenue, with a 5’ sidewalk on the other side of the street.

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.

Beardsley Street Segment Recommendations

Priority ¹	Segment	Length (mi)	Magnitude of Cost ⁶	Notes
1	IA 28 to E 27 th (80 th Ave)	1.0	--	Minimum Rehab ²
2	50 th Ave to Clearwater Dr	1.2	\$700,000	New trail ³
3	Lakewood School to Windsor Dr	0.1	\$350,000	Add WB right turn lane
4	50 th Ave to IA 28	1.9	\$200,000	Spot pavement / drainage rehab
5	IA 28 & Beardsley St	--	\$2.0M	STP / USTEP/ City Project ⁴
6	IA 28 to E 27 th (80 th Ave)	1.0	\$5.9M	New 3-lane / sidewalk / trail
7	Lake Colechester bridge to IA 28	0.9	\$5.6M	New 3-lane / sidewalk / trail
8	50 th Ave to Lake Colechester bridge	1.0	\$4.3M	Widen to 3-lane ⁵ / add sidewalk

¹ May change due to adjacent development timing, funding opportunities, and CIP programming

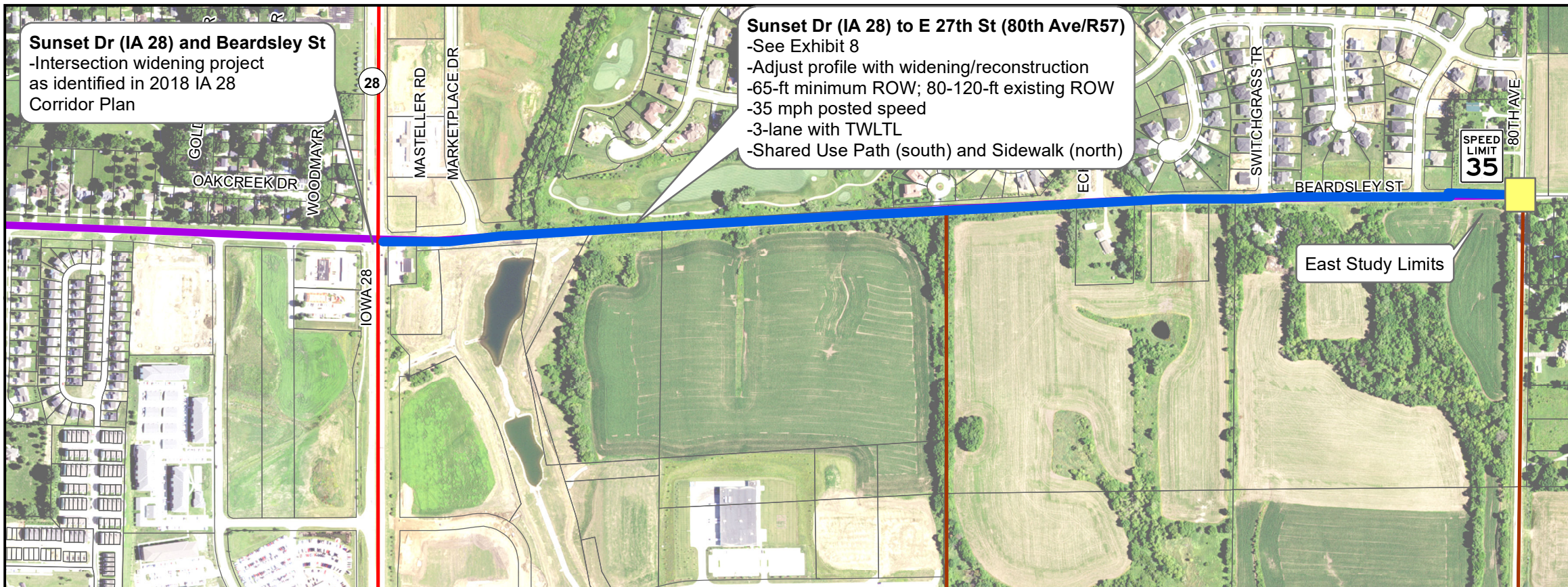
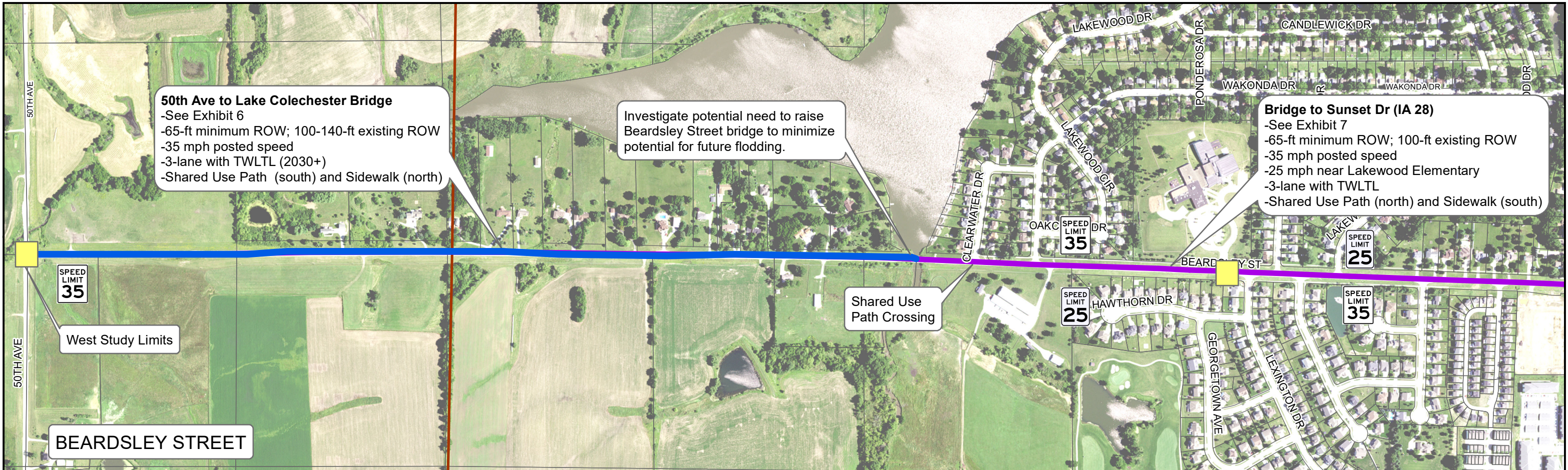
² Due to pending development on the south side of the street and the need for street profile adjustments

³ Currently programmed for 2021 construction

⁴ Currently programmed for 2023 construction

⁵ Or reconstruction depending on pavement condition at the time

⁶ Opinions of probable cost are based on conceptual design, 2019 construction costs, and will need to be further refined prior to project development



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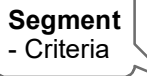

-  Recommended Posted Speed Limit
-  Recommended Segment Design Criteria
-  Intersections which may need increased Traffic Control (e.g. signal, roundabout) and/or additional Turn Lanes

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1. EXISTING CONDITIONS

The Beardsley Street study corridor extends from 50th Avenue east to 80th Avenue (E 27th Street), a distance of approximately 3 miles. Throughout the study area, Beardsley Street is a two-lane corridor, providing a pavement width of 22-24 ft, except for a 1,000-ft three lane section at the intersection of IA 28 (Sunset Drive). The two-lane roadway cross section generally provides a 24 ft PCC pavement with 4 ft gravel shoulder and rural ditch drainage west of IA 28 (Sunset Drive), and 22 ft asphalt pavement with rural ditch drainage 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.

Beardsley Street is classified as a “Minor Arterial” for City planning purposes. 50th Avenue to the west is currently the west terminus, and 50th Avenue provides a route to IA 5 via Maffitt Lake Road. To the east Beardsley Street is named Border Street beyond the current corporate limits at E 27th Street (80th Avenue), which continues eastward to connect to IA 5 and the City of Des Moines via Fleur Drive. As the City continues to grow, Beardsley Street will continue to be a primary corridor for east/west traffic.

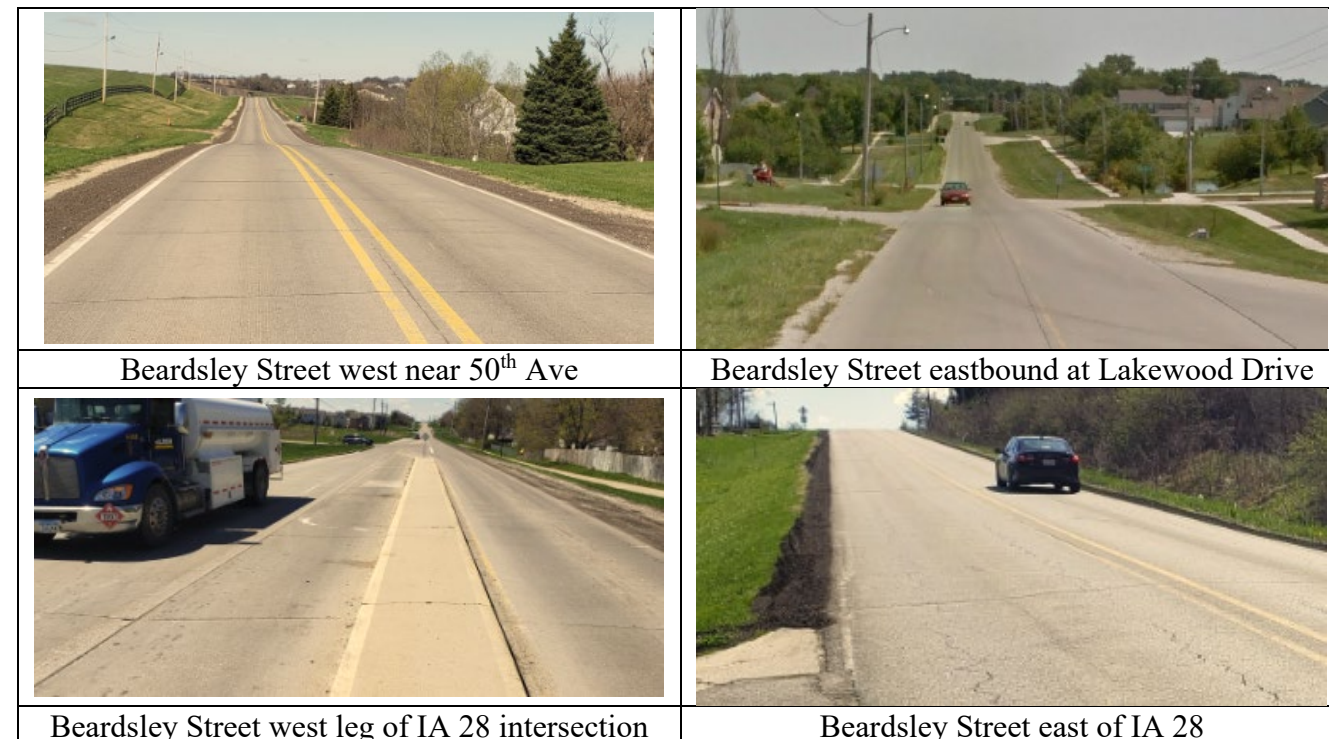


Figure 1: Beardsley Street Avenue (County Hwy G14) Segments

Table 1 summarizes the segmentation of the different parts of the Beardsley Street 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: Beardsley Street Segments

Segment	Length (mi)	Existing Cross Section	Posted Speed Limit (mph)	Existing Volume Range	Access Characteristics
1 – 50 th Avenue to Lake Colechester bridge	1.0	2-Lane rural	45	3,800 vpd	1-mile public / Rural driveway
2 – Lake Colechester bridge to west of IA 28	0.9	2-Lane rural/3-lane urban	25-35	4,000-6,000 vpd	100-500 ft Public street intersections, driveways
3 – IA 28 to E 27 th St (80 th Ave)	1.0	2-Lane rural	35	3,600 vpd	300-1,200 ft – PDA Only

Segments listed as #2 and #3 are currently have the most built-up adjacent land uses and higher traffic and access density, with Lakewood Elementary School and single family residential west of IA 28, commercial and access to multi-family near IA 28, and single family residential north of Beardsley Street east of IA 28. However development is anticipated along the entire corridor, primarily continued single-family residential anticipated through segment #1 and #2 with commercial potential near 50th Avenue, and southwest and east adjacent to IA 28 intersection. Additional multi-family townhome style land uses have been proposed south of Beardsley Street between Elizabeth Holland Park and E 27th Street (80th Avenue) along Segment #3.

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'
R/W Right of Way Width
- SPEED LIMIT
35 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 Beardsley Street, the corridor is summarized according to segmentation in Table 2 (from west to east along Beardsley Street).

Table 2: Year 2014-2018 Crash Frequency – Beardsley Street Corridor Segments

Segment	Crash Frequency	Crash Severity					Crash Rate (cr/HMVT)	Above State Avg? >291?
		Fatal	Maj	Min	Pos	PDO		
1 – 50 th Avenue to Lake Colechester bridge	2	0	0	0	0	2	30	No
2 – Lake Colechester bridge to west of IA 28	17	0	0	2	0	15	207	No
At IA 28 intersection	25	0	0	2	8	15	-	-
3 – IA 28 to E 27 th St (80 th Ave)	6	0	0	0	1	5	91	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, with few intersections beyond residential driveways, had only Animal crashes.

The middle segment (Lake Colechester bridge past Lakewood Elementary School to IA 28) experienced more failure to yield ROW at intersection crashes, as well as Followed Too Close 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.

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 or major injury crashes along Beardsley Street during the analysis period. The four minor injury crashes resulted in four minor injuries and one possible injury. The first major injury crash occurred in November 2015, involving one vehicle, a single unit truck west of the Lakewood Elementary School entrance and described as ‘vision obstruction’ and road departure. The second minor injury crash occurred in February 2018 near Lakewood Pointe Drive. The crash involved a southbound vehicle with a 16-year old driver failing to yield from stop sign in snowy conditions. The other two minor

injury crashes involved failure to yield when turning left from IA 28, with a northbound left turning driver in September 2016. There was also a possible injury crash involving three

Beardsley Street has a very narrow cross section east of IA 28, with narrow shoulders and slopes along a series of vertical curves. In the short term, the City has recently added paved shoulders along the corridor, which provides a safety improvement for driver recovery if they cross the shoulder edge line..

Exhibit 2 following Section 3 shows crash locations along Beardsley Street 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.

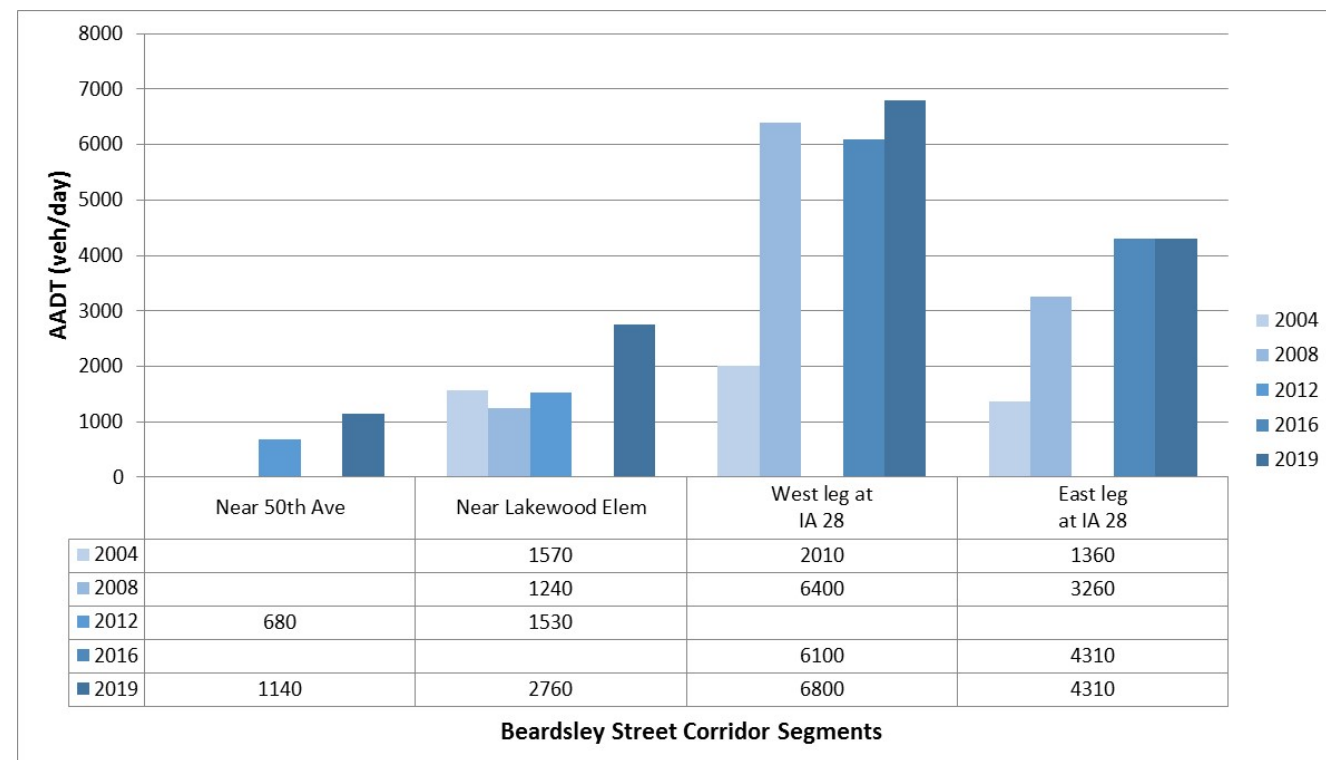


Figure 2: Beardsley Street Daily Traffic Volume History

Historic count data were not collected at all segments for each period, but the data do show the expected trend of sustained growth as development has increased along the corridor and population growth in Norwalk has occurred. As development occurs along the corridor and throughout the City, traffic volumes will continue to increase as discussed in Section 4.

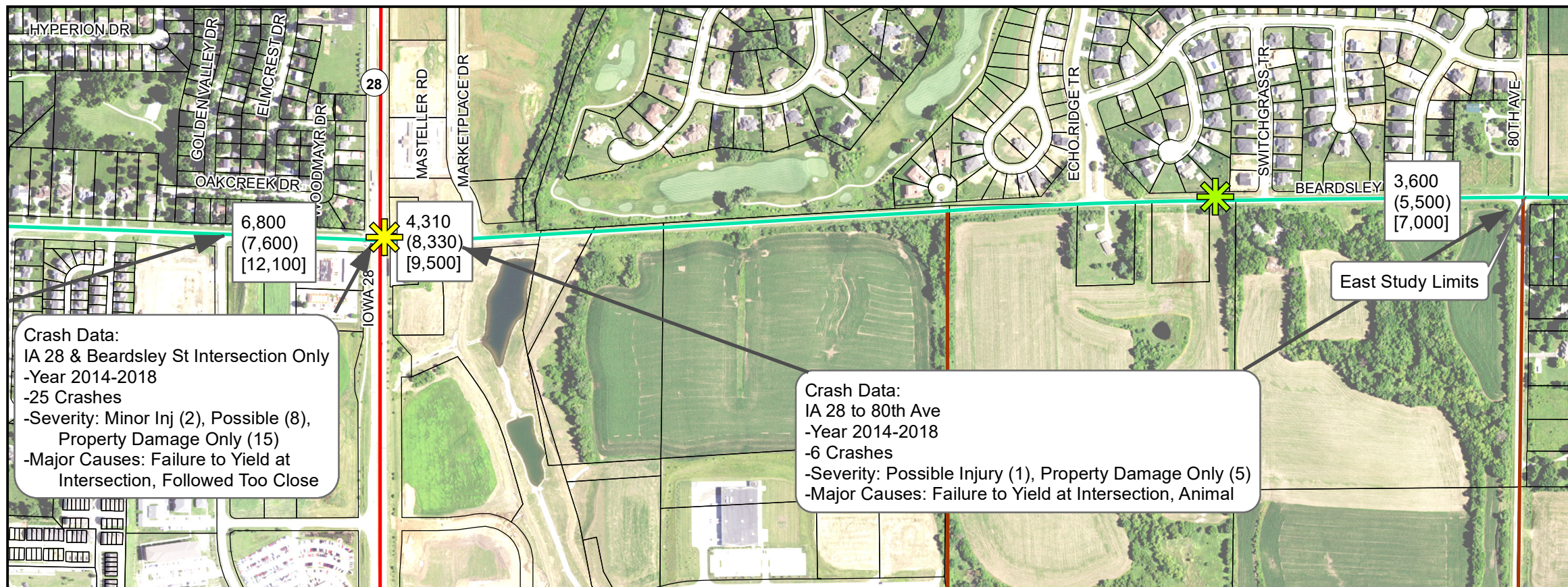
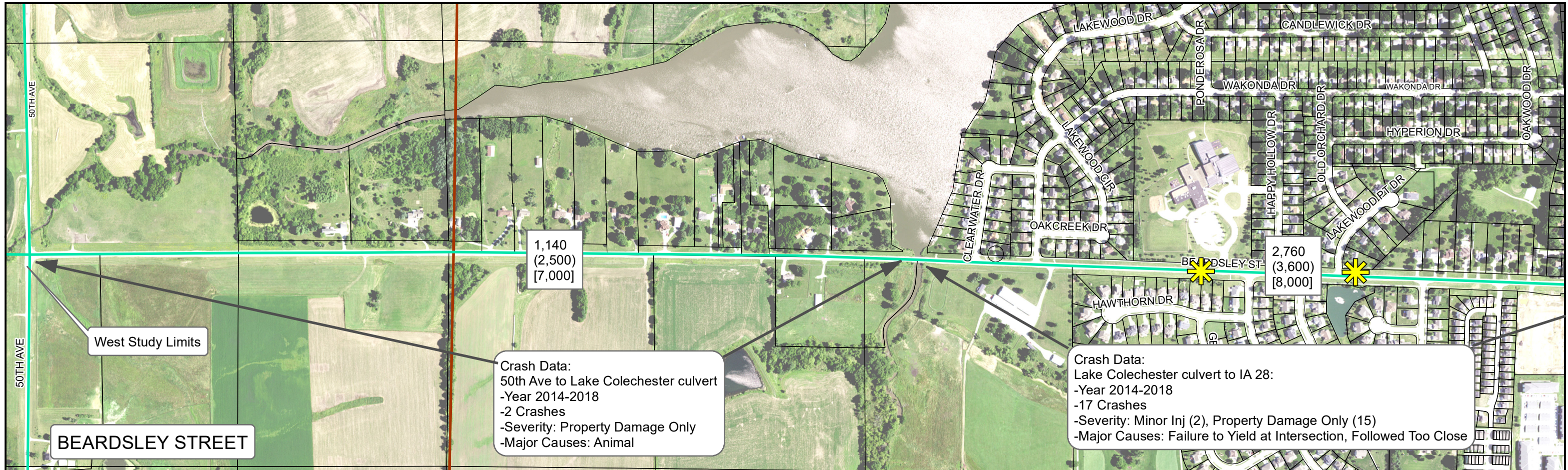
Truck percentages are moderate, at approximately 3% or less than 10 trucks per hour.

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 Lakewood Elementary, AM traffic is 60% EB due to school traffic in AM, and also 60% EB in evening peak hour. Further east, west of IA 28, AM peak hour traffic is nearly 70% eastbound, while PM peak hour traffic is more evenly distributed. East of IA 28, AM peak hour is 55% is directionally evenly distributed in AM peak and 55% WB in PM peak, while closer to E 27th Street (80th Ave), traffic is 65% EB in AM, and 60% westbound in PM.

Exhibit 2 shows daily traffic volumes locations along Beardsley Street.



Legend

- Future Principal Arterial
- Future Minor Arterial
- Future Collector

Injury Crashes (2014-2018)

- ✱ Major Injury
- ✱ Minor Injury
- ✱ Possible Injury

Year 2019
 (Year 2030) Existing and Future
 [Year 2030+] 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 Beardsley Street, the future land uses west of IA 28 will be primarily residential. The west end of the study area is at 50th Avenue where Beardsley Street currently terminates as a T-intersection. Most of the land west of IA 28 and north of Beardsley Street has been built out as single family residential. North of the lake, more single family residential is expected, and a road may connect the land north of Lake Colechester to Beardsley Street near the west end of the lake, therefore a portion of that traffic is assumed to route to Beardsley Street, while the rest would connect to 50th Avenue or IA 28 north of Beardsley Street. The south side of Beardsley Street is planned as medium density residential, which could include single-family homes, duplexes, and townhomes. Southeast of this are is expected to be medium density residential.

North of the 50th Avenue & Beardsley Street is shown as Sub-Area 2, identified as “residential commercial flex”. 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 IA 28, commercial development is existing or is planned around Marketplace Drive and west of Elizabeth Holland Park. East of Marketplace Drive, single-family residential land use is mostly built out around the Echo Valley golf course. The land south of Beardsley Street is mostly undeveloped and planned as residential commercial flex related to the overall Sub-Area 1. Specifically, this area has been proposed as a mixed residential district with single family, townhomes, row homes and apartments with park and drainage areas mixed throughout. The light industrial area around Colonial Parkway is south of this area but is not anticipated to route directly through this development to Beardsley Street, and will continue to be accessed via IA 28 or possibly E 27th Street (80th Avenue) in the long term. .

Other development plans southwest of Beardsley Street & E 27th Street (80th Avenue/R57) are not determined, but may include additional residential commercial flex, or sports complex alternatives.

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. Lakewood Elementary School

Lakewood Elementary School currently serves grades 3-5. Following Orchard Hills Elementary opening in 2019 and Ovaitt Elementary renovations completed 2020/21, Lakewood Elementary will serve grades 4-5. In the long term, it may become a K-5 neighborhood school.

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.

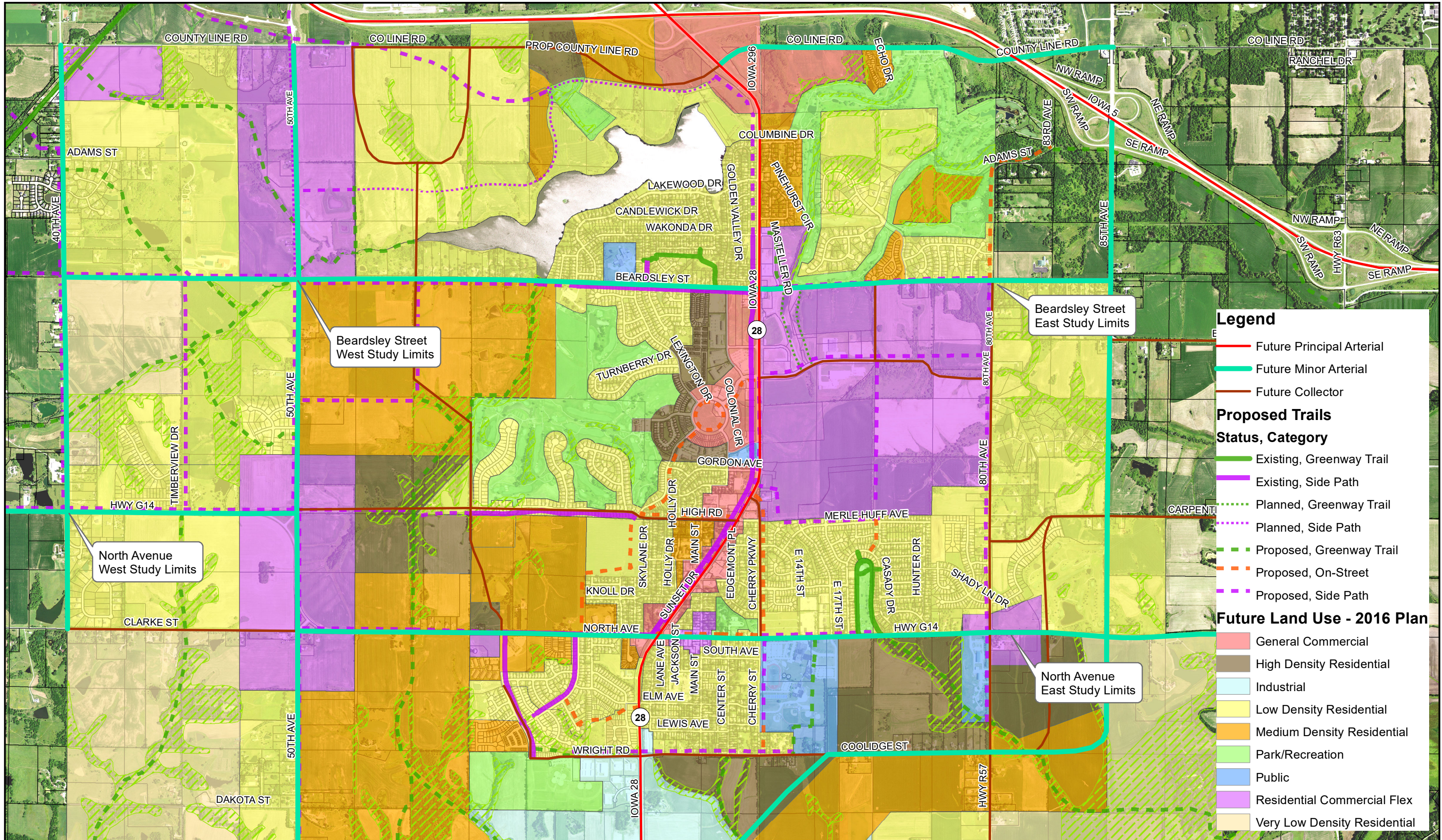
c. Future Traffic Volumes

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 Beardsley Street 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*, and reviewing the Des Moines Area MPO (DMAMPO) traffic forecast model.

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 – 50 th Avenue to Lake Colechester bridge	1.0	1,140 (2,500) [7,000]
2 – Lake Colechester bridge to west of IA 28	0.9	2,760 (3,600) [8,000]
West leg of IA 28 intersection	-	6,800 (7,600) [12,100]
East leg of IA 28 intersection	-	4,300 (8,300) [9,500]
3 – IA 28 to E 27 th St (80 th Ave)	1.0	3,600 (5,500) [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.

As summarized in Table 4 and Exhibit 4, the pavement condition along the corridor is generally in good condition west of Lakewood Elementary, and good to fair condition between Lakewood Elementary and IA 28, with more transverse and longitudinal cracking. Overlay improvements are recommended and planned east of IA 28. 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 – 50 th Avenue to Lake Colechester bridge	1.0	2-Lane rural	45	3,800 vpd	Generally in good condition. Full depth patching recommended in selected areas.
2 – Lake Colechester bridge to west of IA 28	0.9	2-Lane rural with sections of curb & gutter to north / 3-lane urban	25-35	4,000-6,000 vpd	Generally in good condition. Longitudinal, transverse, and edge cracking concerns in EB lanes, as well as drainage and subgrade concerns. Full depth patch of specified PCC panels.
3 – IA 28 to E 27 th St (80 th Ave)	1.0	2-Lane rural	35	3,600 vpd	Pavement in fair to poor condition. Patching and overlay from Marketplace Drive east to 80 th Avenue recommended and planned for Fall 2019. Monitor for shoulder/edge cracking.

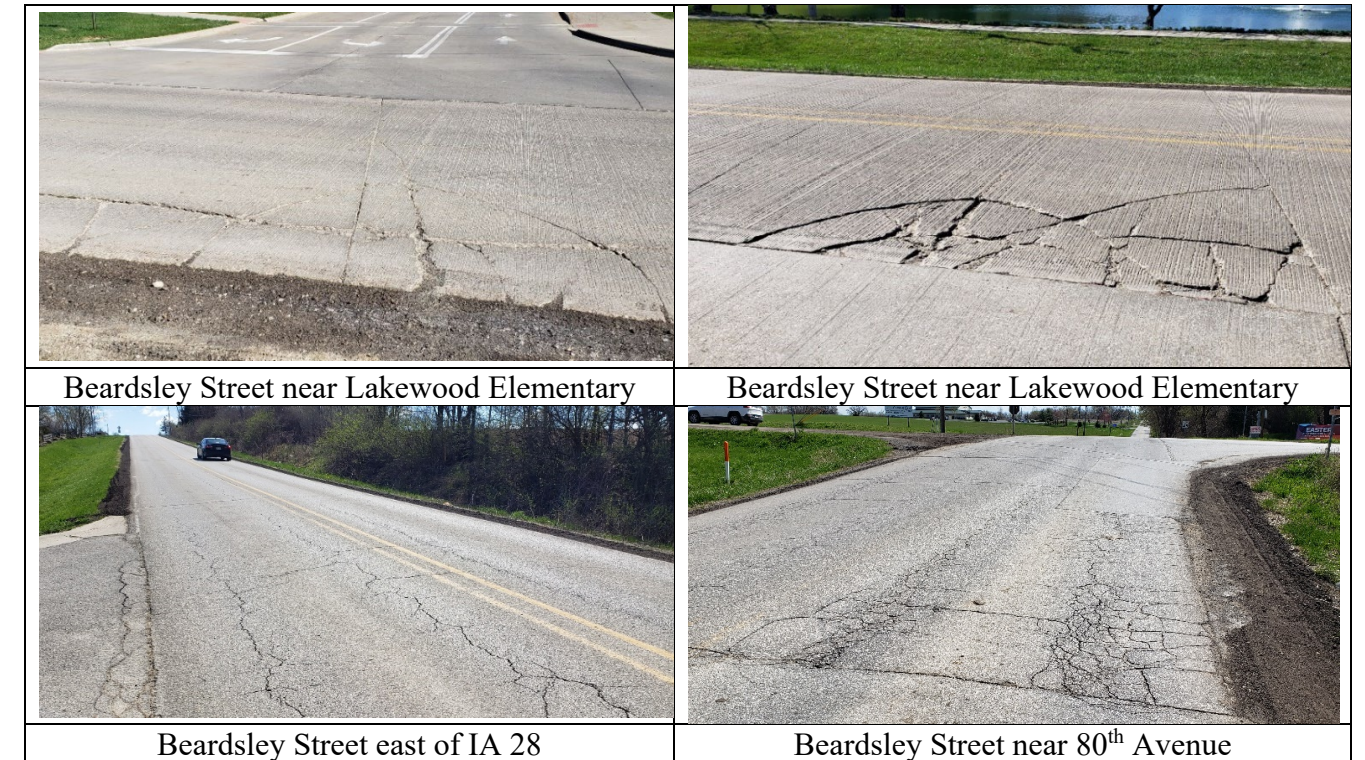
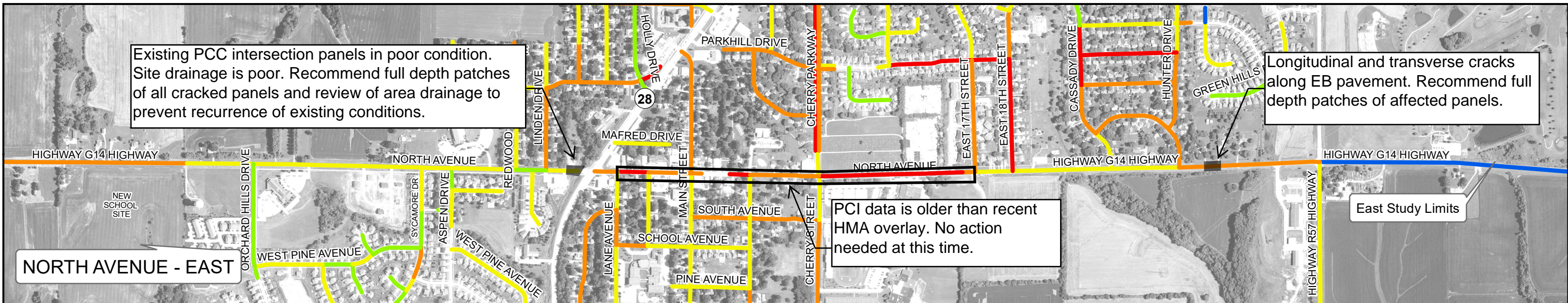
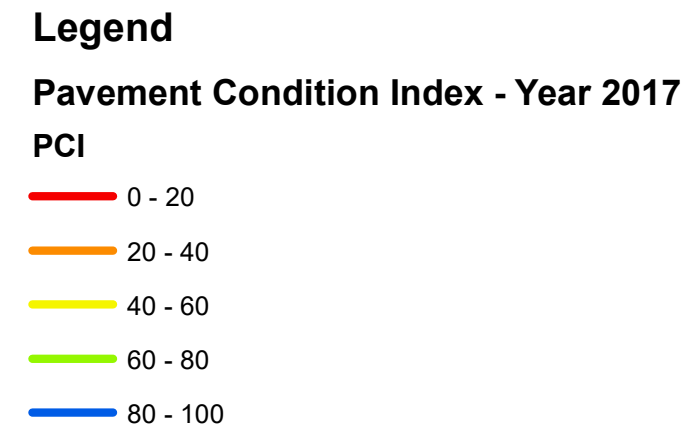
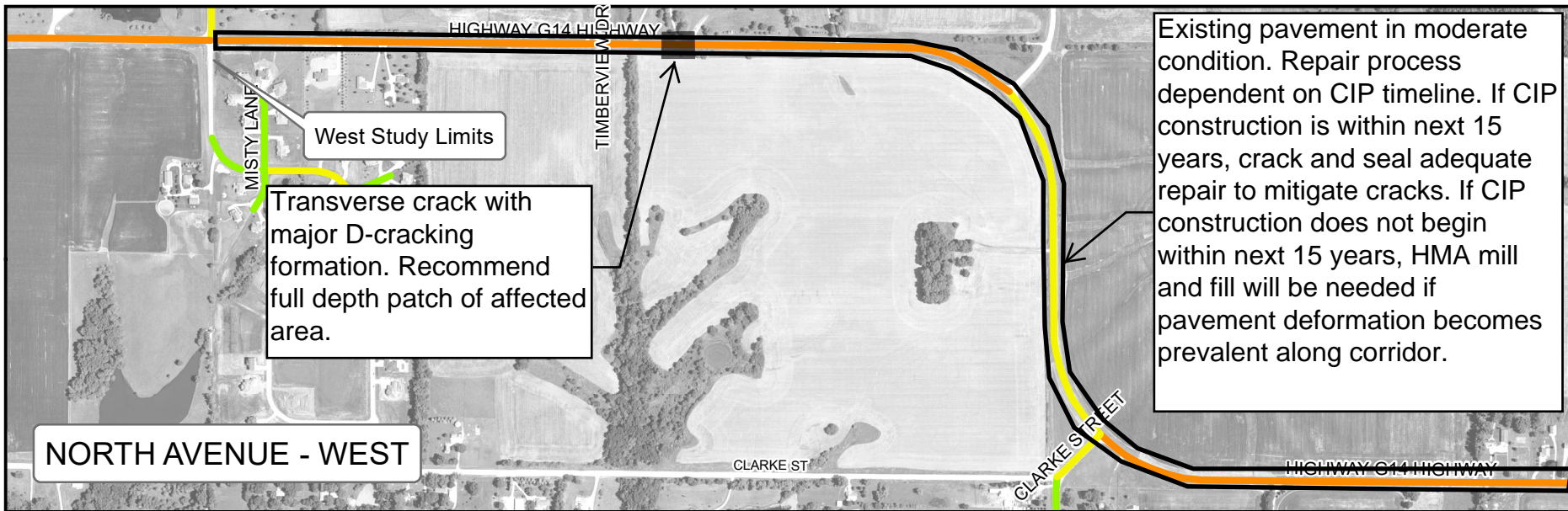
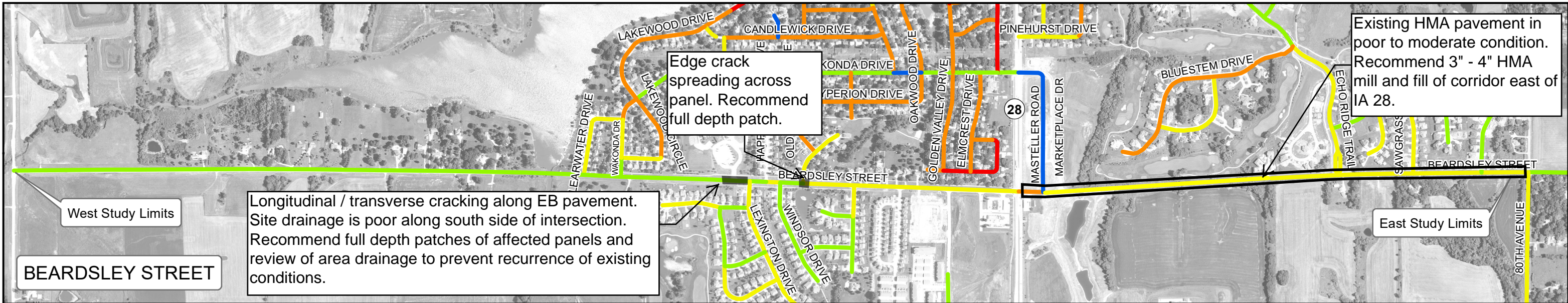


Figure 3: Beardsley Street Pavement Condition Examples



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 in Figures 4 and 5. Participants were asked to rank their top three priorities for each category. The graphs below 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)

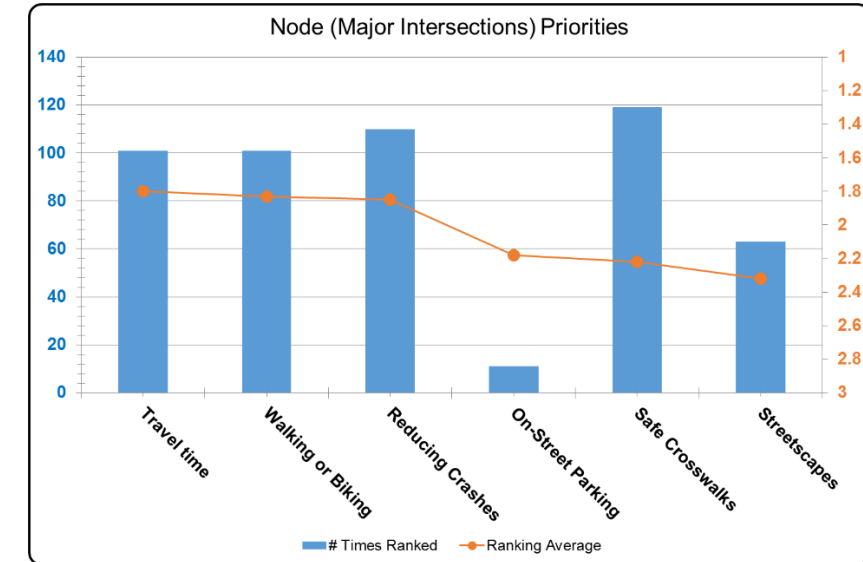


Figure 4: Public Survey Intersection Priorities

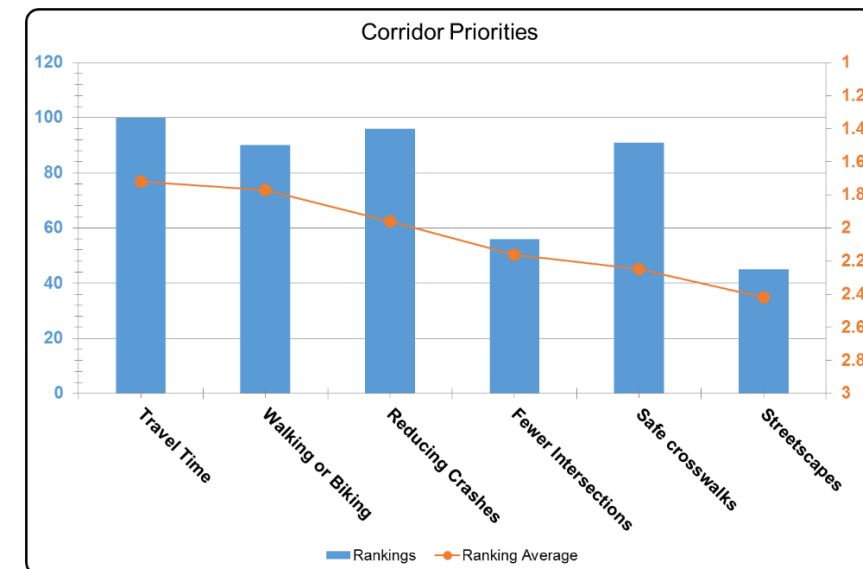


Figure 5: Public Survey Corridor Priorities

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).

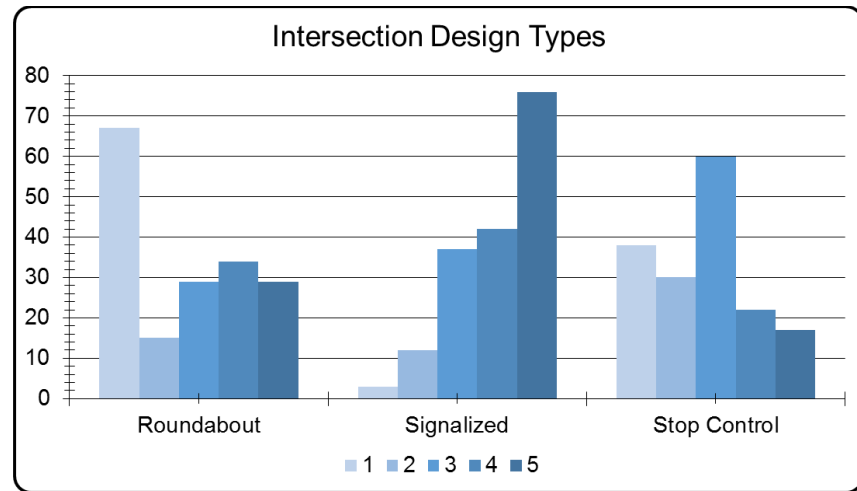


Figure 6: Public Survey Intersection Types

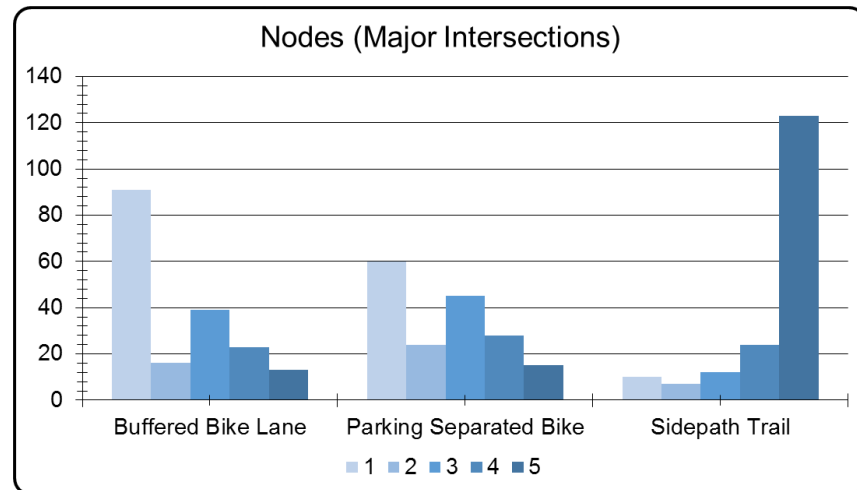


Figure 7: Public Survey Multimodal Types at Nodes/Major Intersections

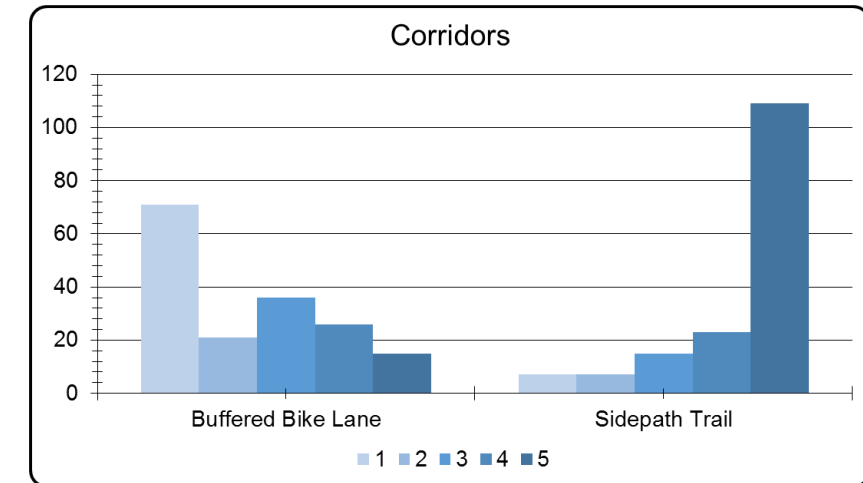


Figure 8: Public Survey Multimodal Types along Corridors

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 Beardsley Street 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

Beardsley Street Comments and Concerns

- IA 28 & Beardsley Street needs to be addressed regarding access points too close to the intersection and widened for additional capacity
- During the school year, the traffic congestion before and after school on Beardsley Street make it nearly impossible to get through

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 Beardsley Street Facilities (west to east)

West of IA 28, a 4-ft sidewalk has been constructed north of Beardsley Street from Clearwater Drive to a point approximately 900 ft west of IA 28. At this point it connects to an 8-ft shared use path routing from Oakcreek Park to the shared use path along IA 28. No other pedestrian facilities have been constructed along Beardsley Street west of this location or east of IA 28.

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 Beardsley Street a shared-use path is recommended along the entire corridor from 50th Avenue to E 27th Street (80th Avenue). These shared use paths will provide connectivity to other street right-of-way sidepaths along IA 28, 50th Avenue, and 80th Avenue, as well as a proposed off-street greenway trail southwest of the Lake Colechester bridge, and proposed greenway trail west of 50th Avenue to the Great Western Trail near Cumming.

Shared use paths and sidewalks should be therefore planned for with adjacent land use development and Beardsley Street 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 Beardsley Street 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

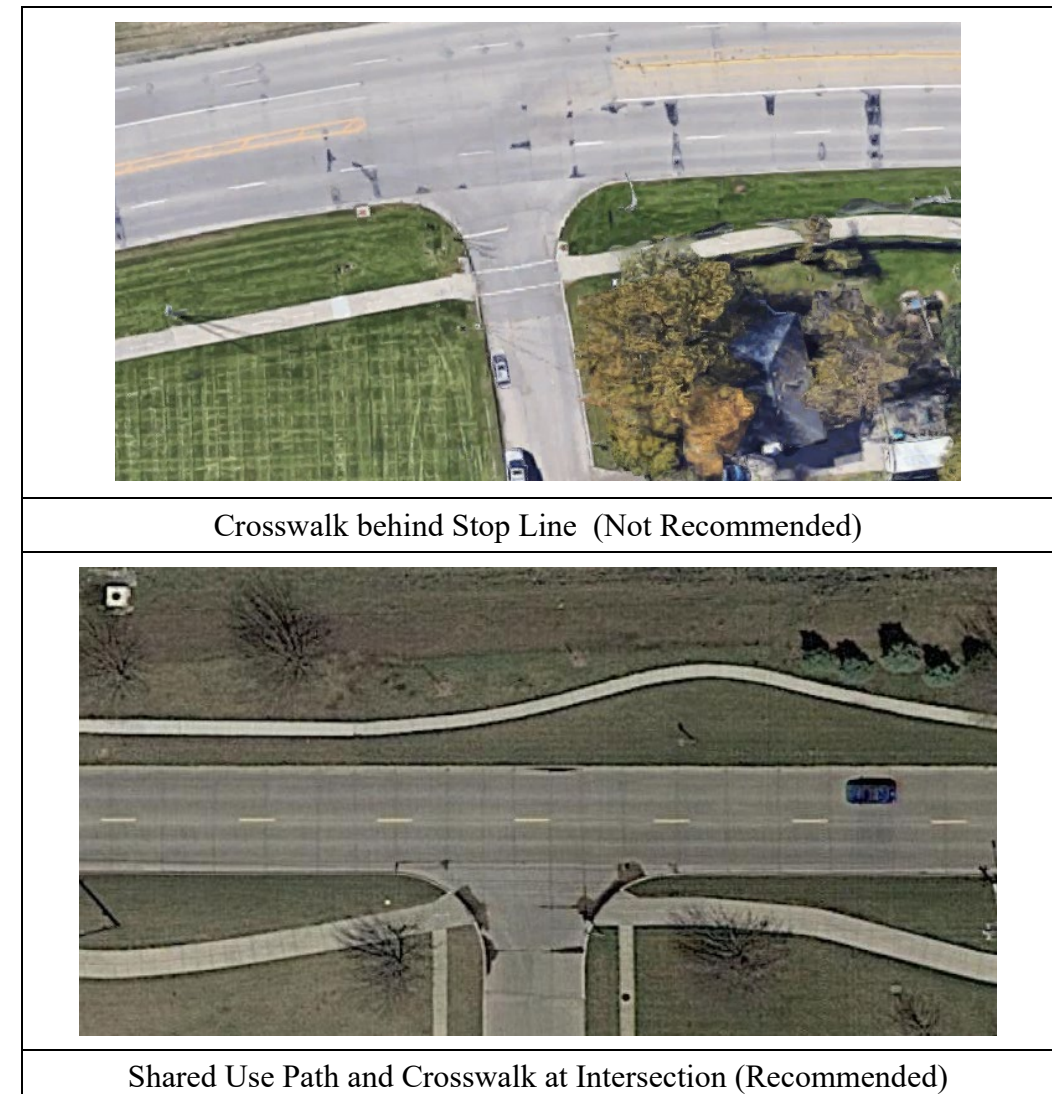


Figure 9: Shared Use Path Crossing Locations at Intersection Corners

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 Beardsley Street 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 an 80-ft right-of way. 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”).

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 the school campus.

Exhibit 5 shows the general corridor lane recommendations, and Exhibits 6 - 8 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 Beardsley Street, intersection reconstruction is recommended in the 2018 IA 28 Corridor Study and subsequent DMAMPO STBG funding application. This proposed reconstruction will provide widening for eastbound and westbound capacity, signal reconstruction, and reconstruction of the vertical profile between IA 28 to east of Marketplace Drive.

b. Intersection Traffic Control – Roundabouts and Traffic Signals

The majority of intersections along Beardsley Street 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 Beardsley Street traffic stream. The only current intersection with more than minor street stop control is the traffic signal at IA 28. Future intersections that could potentially become roundabouts or traffic signalized intersections in the future include existing or future collector street intersections of 50th

Avenue, a future collector street to properties north of Lake Colechester, Echo Ridge Trail, and E 27th Street (80th Avenue). 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 (Table X) 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 where there is no stop condition on the main route (e.g. Beardsley Street). 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 – Beardsley Street / 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 – Beardsley Street / 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 Beardsley Street are safety (roundabouts have been shown to greatly reduce or eliminate sever 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 Beardsley Street 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 Beardsley Street 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 Beardsley Street 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 Beardsley Street, and providing adequate queuing, storage distance to first internal development street or driveway.

Specifically, through the majority of the Beardsley Street 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).

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>

d. Beardsley Street Vertical Profile – Sunset Drive (IA 28) to E 27th Street (80th Ave)

In addition to the pavement condition, the existing street profile was reviewed for Beardsley Street east of IA 28 for longitudinal grade and sight distance requirements at the existing intersections and the future intersections proposed with future development on the south side of the street. The review was completed using LiDAR information for a general understanding of the profile, further review would be needed with actual survey information to confirm the recommendations. The stopping sight distance and intersection sight distance reviews were based on a 40 MPH design speed (35 MPH posted speed). Per the profile review, the existing stopping sight distance and intersection sight distance are adequate, but there will likely need to be some level of profile adjustment in conjunction with the addition of some of the proposed entrances on the south side of the street to satisfy the intersection sight distance required

and to accommodate a maximum longitudinal grade of 5% per Iowa SUDAS requirements. Refer to Exhibit 9 for more details.

e. Beardsley Street near Lakewood School

To address the existing congestion issues during school drop off and pick up at Lakewood Elementary School, it is recommended to construct a westbound right turn lane at the school entrance as soon as funding is available as well as in addition to the proposed 3-lane section as recommended.

f. Beardsley Street Bridge

It is recommended to further study the potential for future flood impacts at the Beardsley Street bridge. Due to the importance of keeping Beardsley Street open at all times, it may be necessary and beneficial to raise the bridge and roadway approaches at some time in the future.

g. Concept Drawings and Typical Sections

Exhibit 5 illustrates the general recommendations for the Beardsley Street Corridor, and Exhibits 6 - 8 describe and illustrate specific design criteria and cross-section characteristics of the distinct segments along the Beardsley Street corridor.

h. Implementation

Based on the input received, the analysis found in this report, and input from City staff, Table 6 summarizes the recommendations by Beardsley Street corridor segments.

Table 6: Beardsley Street Segment Recommendations

Priority ¹	Segment	Length (mi)	Magnitude of Cost ⁶	Notes
1	IA 28 to E 27 th (80 th Ave)	1.0	--	Minimum Rehab ²
2	50 th Ave to Clearwater Dr	1.2	\$700,000	New trail ³
3	Lakewood School to Windsor Dr	0.1	\$350,000	Add WB right turn lane
4	50 th Ave to IA 28	1.9	\$200,000	Spot pavement / drainage rehab
5	IA 28 & Beardsley St	--	\$2.0M	STP / USTEP/ City Project ⁴
6	IA 28 to E 27 th (80 th Ave)	1.0	\$5.9M	New 3-lane / sidewalk / trail
7	Lake Colechester bridge to IA 28	0.9	\$5.6M	New 3-lane / sidewalk / trail
8	50 th Ave to Lake Colechester bridge	1.0	\$4.3M	Widen to 3-lane ⁵ / add sidewalk

¹ May change due to adjacent development timing, funding opportunities, and CIP programming

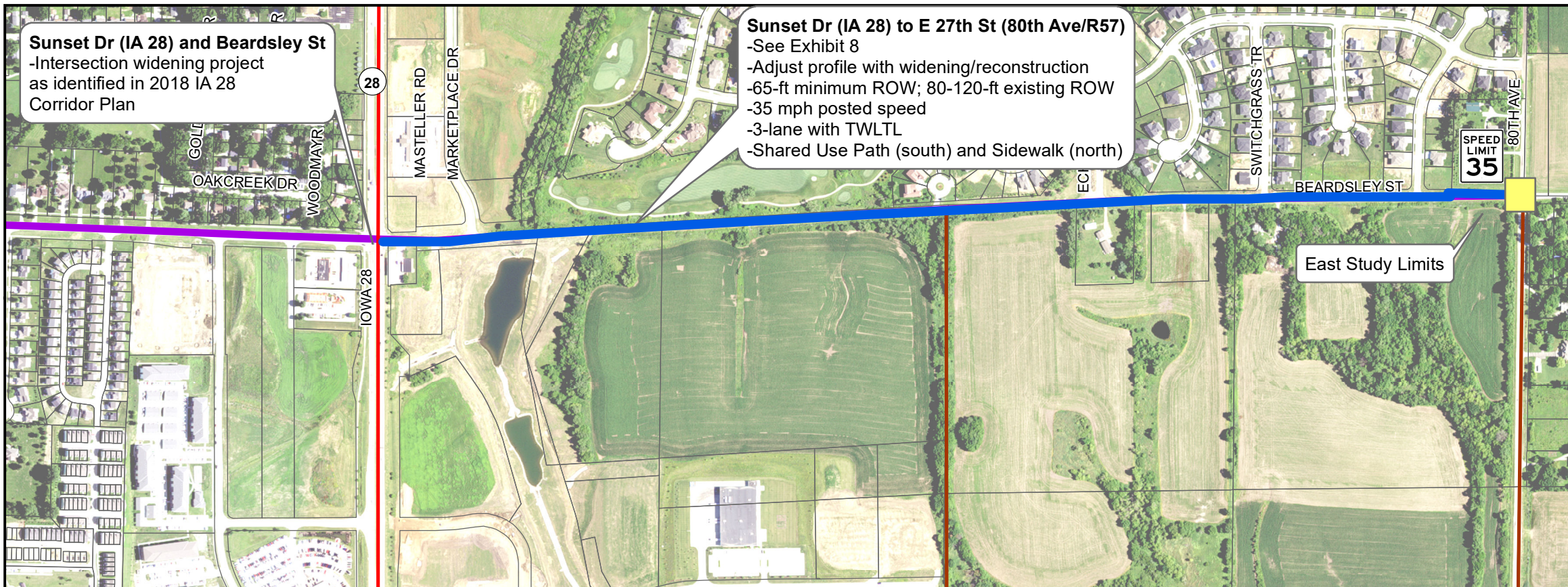
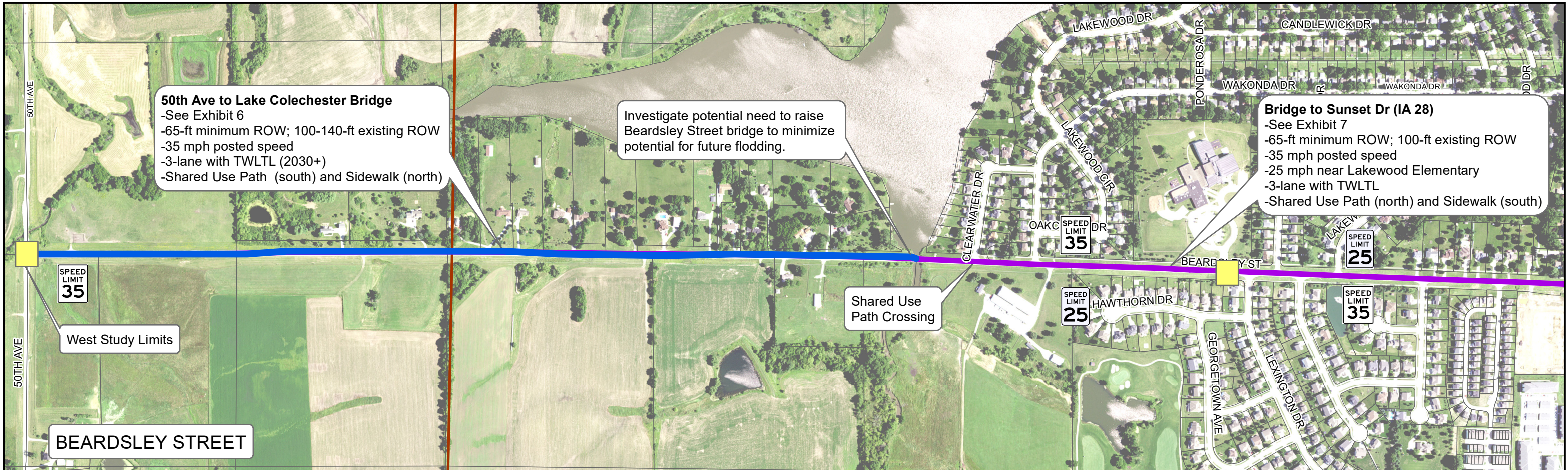
² Due to pending development on the south side of the street and the need for street profile adjustments

³ Currently programmed for 2021 construction




⁴ Currently programmed for 2023 construction

⁵ Or reconstruction depending on pavement condition at the time

⁶ 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

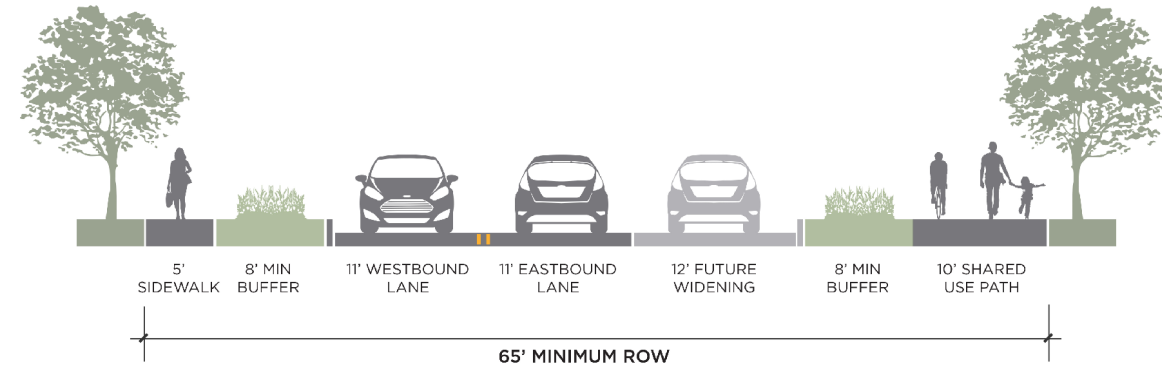
RECOMMENDATION

- Corridor Reconstruction as three-lane urban cross section
- 10-ft shared use path south of Beardsley Street
- NOTE: Design shared use path to follow Beardsley Street profile if located adjacent (approx. 10 ft), or follow independent profile if near property line/fences.

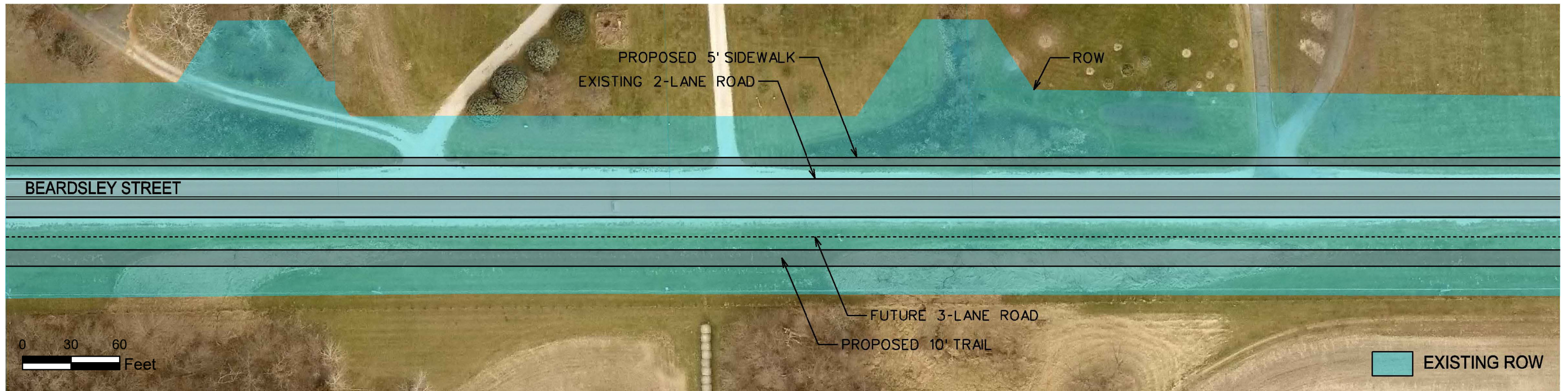
FUNCTIONAL DESIGN CRITERIA

- 65-ft minimum ROW; 100-140-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



BEARDSLEY STREET CORRIDOR - SEGMENT LOCATION



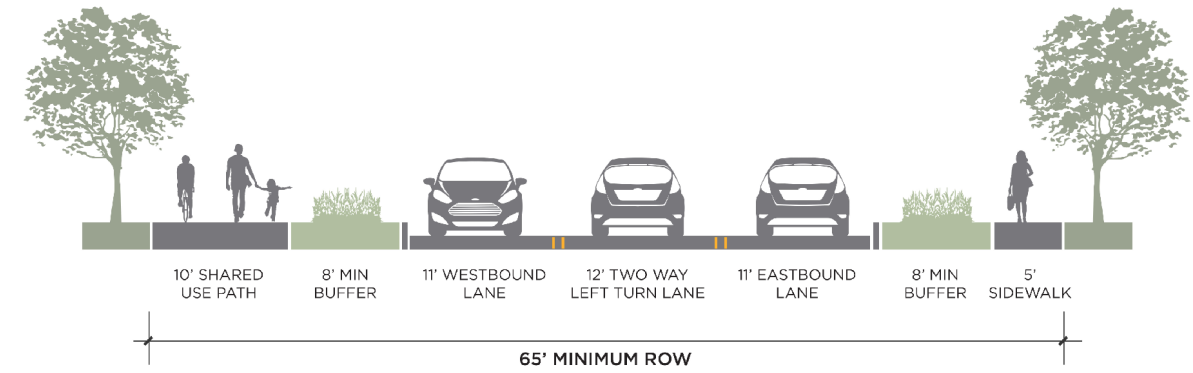
RECOMMENDATION

- Corridor Reconstruction as three-lane urban cross section (by 2030)
- 10-ft shared use path north of Beardsley Street. Reconstruct existing sidewalk.

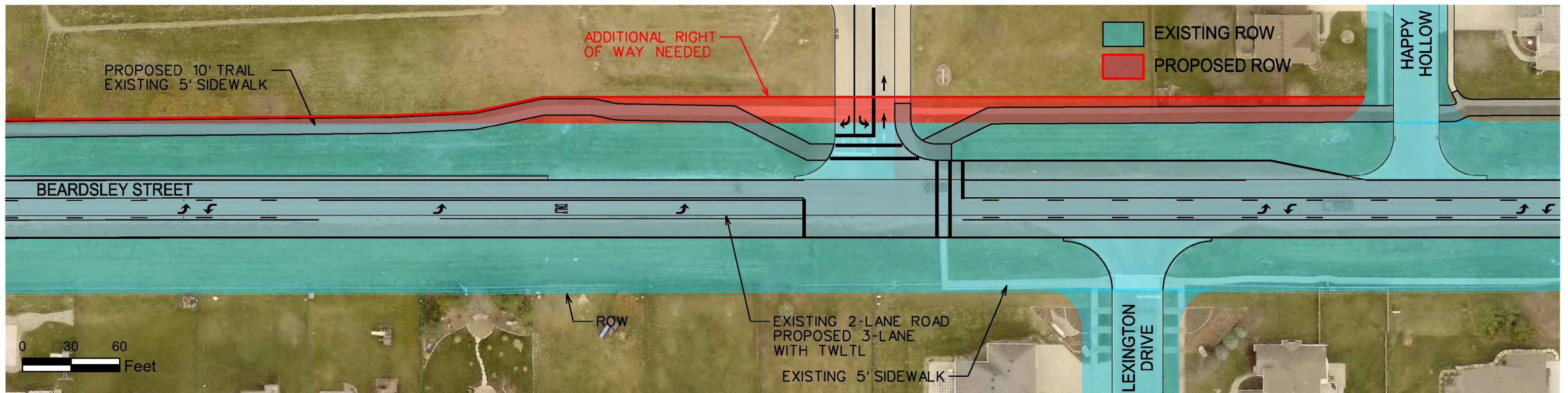
FUNCTIONAL DESIGN CRITERIA

- 65-ft minimum ROW; 100-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)
- Shared Use Path - north side - 10-ft width
- Sidewalk - south side - 5-ft width

CROSS SECTION



SEGMENT CONCEPT



BEARDSLEY STREET CORRIDOR - SEGMENT LOCATION



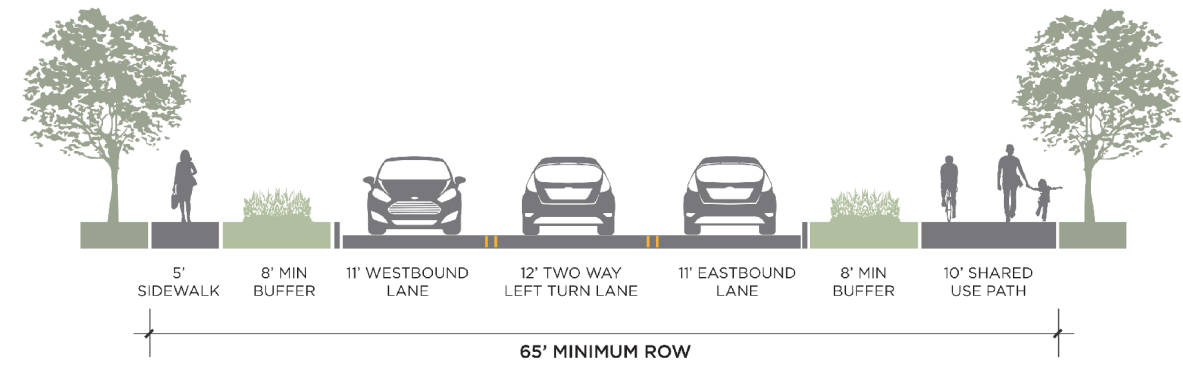
RECOMMENDATION

- Corridor Reconstruction as three-lane urban cross section (by 2030)
- Profile adjustments (see Exhibit 9)
- 10-ft shared use path south of Beardsley Street

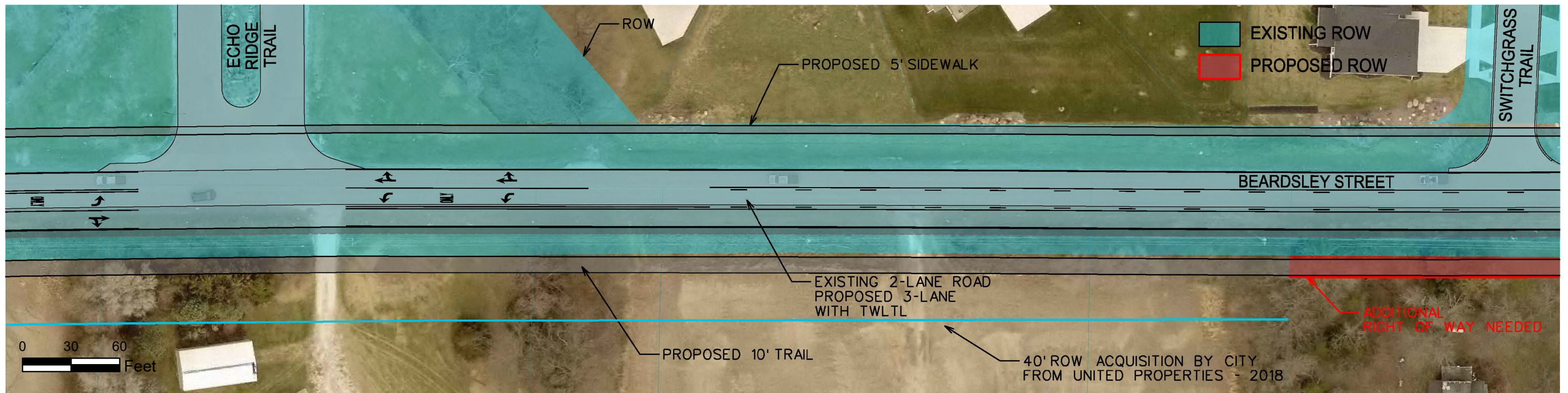
FUNCTIONAL DESIGN CRITERIA

- 65-ft minimum ROW; 80-120-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



BEARDSLEY STREET CORRIDOR - SEGMENT LIMITS



Exhibit 8 - Beardsley Street - IA 28 to E 27th St (80th Ave)

