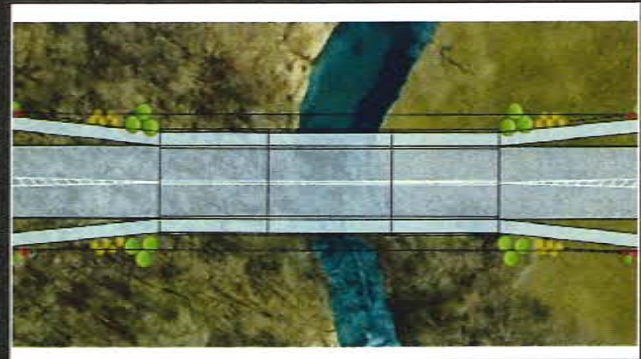
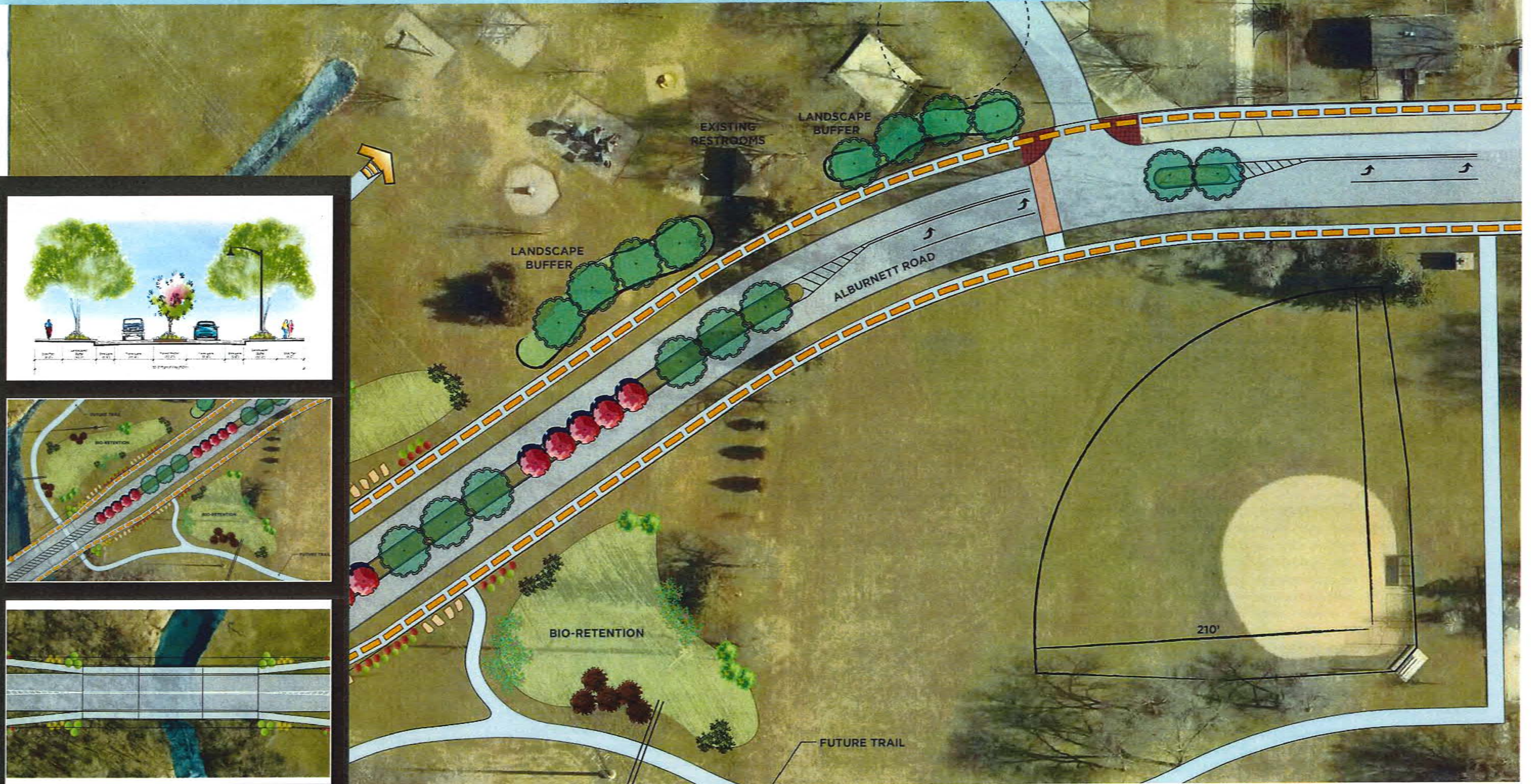


# 2016 ALBURNETT ROAD CORRIDOR EXTENSION

CITY OF MARION, IOWA



September 18, 2017

DRAFT

**SHUCK-BRITSON** INC  
CONSULTING ENGINEERS

**SNYDER**  
& ASSOCIATES

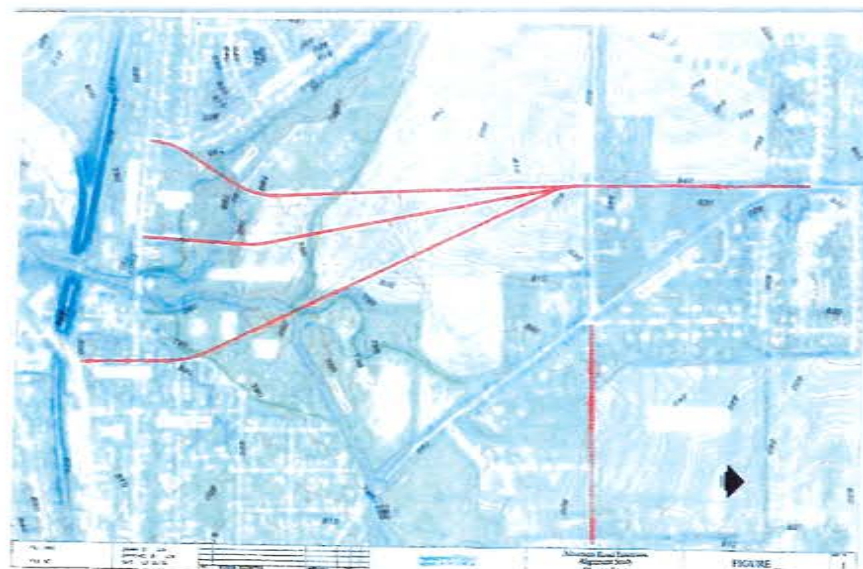


Figure 1: 2000 Feasibility Study Alternatives

## INTRODUCTION

The City of Marion has identified the extension of Alburnett Road as an important capital improvement project for the development and growth of the community as it relates to land, economy, traffic, and quality of life. As the City continues to grow, not only with population, but also with business and industry, the need to accommodate multi-modal traffic also increases. This Design Concept Report includes a Traffic Evaluation Report, Geotechnical Report, Wetland Delineation Report, Cultural Resources Investigation, and Environmental Evaluation Report.

### Background

In 2000 the City of Marion contracted with a civil engineering consulting firm to develop an Alburnett Road Extension Feasibility Study. The study provided four alignment alternatives. These alignments were presented to City Council, City Staff, and a Citizen's Advisory Group, and evaluated and ranked each alternative based on a comparison matrix using 8 criteria including cost, displacement of residents/businesses, impact to development, traffic operational impacts, environmental impacts, conformance with long term need, impacts to neighborhoods, and impacts to parks. The City Staff, City Council, and public selected Alignment Option 3 – Extend Alburnett Road south, across Boyson Road to 7<sup>th</sup> Avenue/Marion Boulevard, via 2<sup>nd</sup> Street. See Figure 1 above.

In February of 2001, Ordinance No. 01-02 was passed amending the future land use map and transportation map of the comprehensive plan and major street ordinance to show the Alburnett Road Extension to follow Alignment Option 3 as recommended by City staff and the Marion Planning and Zoning Commission.

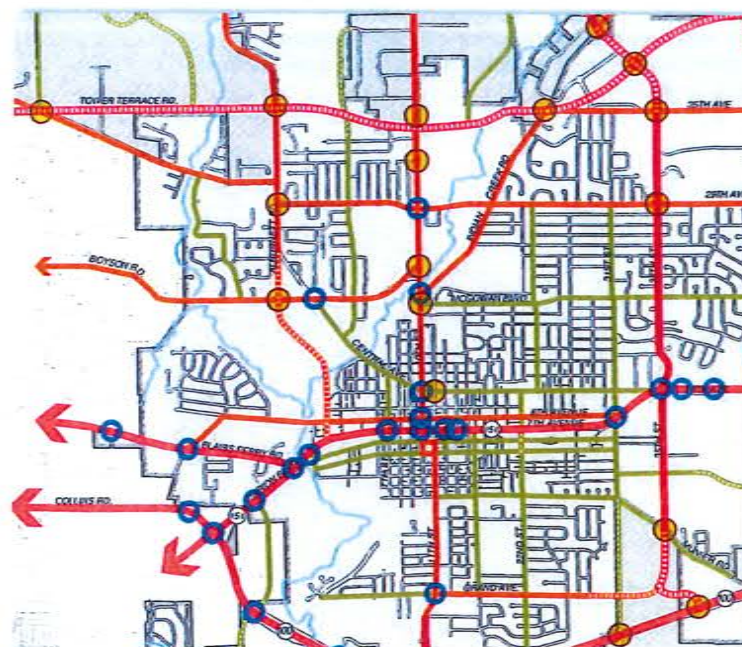


Figure 2: City of Marion Transportation Plan

### Corridor Vision

The Alburnett Road extension is a planned minor arterial street in accordance with the City of Marion Transportation Plan adopted in July 2010. The Alburnett Road extension connects the residential areas north of the project area to the business and downtown districts at the south end of the project area. The roadway design and cross section is planned to incorporate the policies and vision of the Transportation and Circulation Plan including inviting streetscape features, accommodating future growth through vehicular and pedestrian linkages and circulation, and a landscaped intimate atmosphere to maintain the neighborhood's unique identity.

### Neighborhood Considerations

- **Speed:** Speed limit of 35 mph. The corridor will serve as a minor arterial for the area, so drivers will include commuter traffic traveling to specific destinations, such as to and from work, school, or shops, etc. However, as portions of the corridor run through parks and residential neighborhoods, drivers' speed should be controlled for the safety of residents, pedestrians, park visitors, and drivers.
- **Multi-modal Accommodations:** Parks, nature trails, walkable/bikeable amenities are located in the region of the Alburnett Road extension project. To allow access to these facilities for all types of transportation and persons of varying abilities, multiple outlets are proposed including trail head connections, sidewalk and multi-use sidepaths, on-street bike lanes, and accessible sidewalk ramps at all intersections.



Figure 3: Public Meeting

- **Streetscape/Theme:** Street trees, green medians, themed street lights, intersection enhancement features, and bridge aesthetic enhancements are to be incorporated into the project. City Engineer Dan Whitlow and Assistant City Engineer Mike Barkalow emphasized a balance between theming/enhancements and functionality.

The foundation of the vision for the Alburnett Road extension stems from the City of Marion's Comprehensive Plan, but it is molded and improved by public involvement and City Staff and City Council input, and finally carried out by designers and construction contractors.

### Public Coordination

1. **Letter of Notification** – On August 9, 2016 the City of Marion mailed a notification letter to property owners adjacent to the proposed new portions of Alburnett Road. The letter outlined the extents of the project and notified residents that the City Council had selected an engineering firm to complete a concept study of the corridor.
2. **Park Board Meeting** - On April 12, 2017 City engineering staff and Snyder & Associates, Inc. met with the City of Marion Park Board to discuss the progress on the Alburnett Road Extension project. A strip map of the project was provided along with detailed exhibits illustrating specific impacts to Willow Park and possible corridor enhancements. The Park Board was generally in agreement with the proposed alignment and accepting of the proposed impacts to Willow Park.
3. **Public Information Meeting** – May 23, 2017 - Illustrated the selected alignment and provided opportunity for comments on design features.

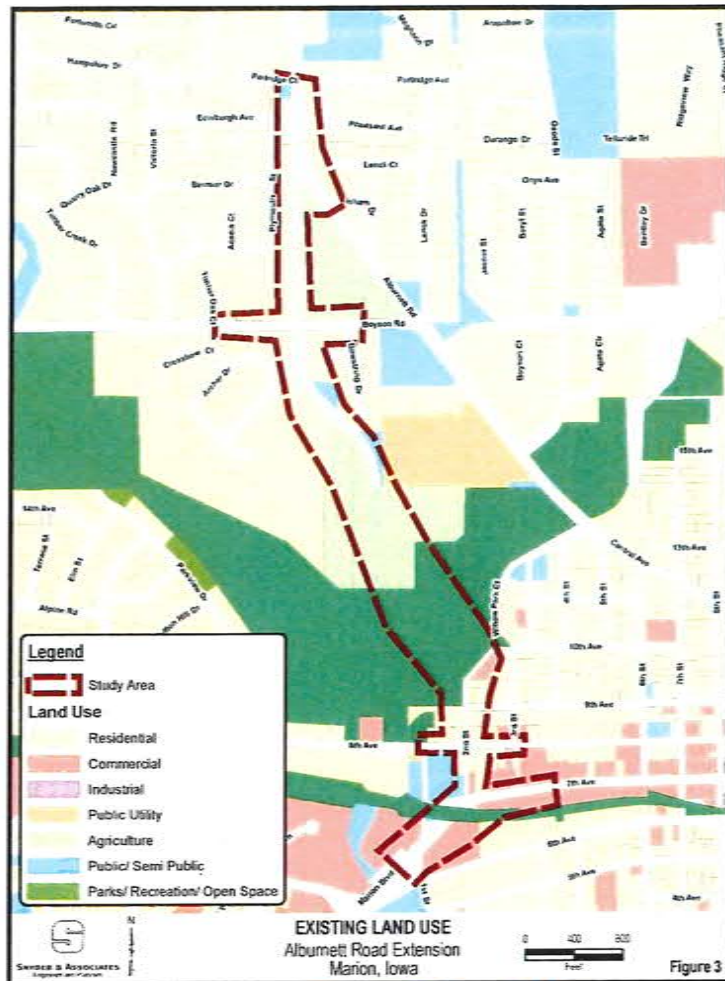


Figure 4: Existing Land Use

**Land Use**

The land use in proximity to the proposed Alburnett Road varies along the length of the corridor. At the south, the corridor is dominated by small lot general commercial uses but transitions quickly into single family residential along 2<sup>nd</sup> Street. Heading north, the proposed roadway passes through Willow Park and over Indian Creek floodplain area before reaching the Planned Development Residential and Medium Density Single-Family Residential of Bowman Meadows immediately south of Boyson Road. North of Boyson Road are two properties designated as Rural Restricted and then Medium Density Single-Family Residential near the connection to existing Alburnett Road, just south of Edinburgh Avenue.

**Corridor Goals**

The goals associated with the Alburnett Road extension project are to:

- alleviate traffic congestion on 10<sup>th</sup> Street
- reduce traffic cutting through residential neighborhoods in proximity to the corridor
- provide a north-south corridor for future growth north
- improve pedestrian and bicycle access and mobility



Figure 5: 2nd St at 9th Ave Intersection

**EXISTING CONDITIONS**

**Roadway Geometry and Intersection Traffic Control**

2<sup>nd</sup> St from 7<sup>th</sup> Ave to 10<sup>th</sup> Ave - 25' B-B. Two lanes (one each direction) with on-street parking allowed on one side. Curb and gutter with underground storm sewer system. Residential district speed limit is 25 mph (Section 321.285 of the Code of Iowa), not posted. Concrete pavement. 7<sup>th</sup> Ave intersection, tee intersection. Stop control SB, no control EB and WB. 8<sup>th</sup> Ave intersection, stop control SB and NB, no control EB and WB. Sidewalk along back of curb on east side at 200 7<sup>th</sup> Ave.



Figure 6: Alburnett Rd south of Boyson Rd

Alburnett Rd south of Boyson Rd - 43' B-B. Three lanes (one each direction with center turn lane), 5' bike lanes and 8' side paths on each side of the street. Curb and gutter with underground storm sewer system. No posted speed limit. Concrete pavement. Boyson Rd intersection, stop control NB and SB, no control EB and WB.



Figure 7: Alburnett Rd north of Boyson Rd

Alburnett Rd north of Boyson Rd - 28' chip seal/gravel dead end on old alignment. Serves as access for two properties (one residential, one residential/agriculture). Rural section with ditch drainage.



Figure 8: Alburnett Rd at north Project Limits

Alburnett Rd at north project limits - 24' with 5' gravel shoulder on both sides. Two lanes (one each direction). Rural section with ditch drainage. 35 mph posted speed limit. Asphalt pavement.



Figure 9: 7th Ave and 2nd St Intersection

7<sup>th</sup> Ave - varies 49' to 62' B-B. Four lanes (two each direction) with raised median west of the 2<sup>nd</sup> St intersection. Existing abandoned railroad overpass west of the 2<sup>nd</sup> St intersection. Urban section with curb and gutter. 4' wide sidewalk along both sides in project area. Concrete pavement with asphalt overlay. 35 mph posted speed limit.



Figure 11: West 8th Ave and 2nd St Intersection

8<sup>th</sup> Ave west of 2<sup>nd</sup> St - 41' B-B. Three lanes (one each direction with center turn lane). Urban section with curb and gutter drainage. 25 mph posted speed limit. Concrete pavement. 4' sidewalk along north side of 8<sup>th</sup> Ave.



Figure 10: 8th Ave east of 2nd St

8<sup>th</sup> Ave east of 2<sup>nd</sup> St - 30' B-B. Two lanes (one each direction) with on-street parking allowed at specified times/days on one side. Urban section with curb and gutter drainage. 25 mph posted speed limit. Asphalt overlay on concrete pavement. 4' sidewalk along north side of 8<sup>th</sup> Ave.



Figure 12: Boyson Rd

Boyson Rd - 28' wide with curb and gutter along the south side and 6' gravel shoulder with ditch drainage along the north side. Two lanes (one each direction). 35 mph posted speed limit. Concrete pavement.

**Traffic Analysis**

As part of the design concept process, Snyder & Associates completed a Traffic Study of the proposed Alburnett Road corridor. The purpose of this study was to determine the capacity, functional geometry and traffic control needs for the proposed intersections along the Alburnett Road extension from Boyson Road to 7<sup>th</sup> Avenue. The study included traffic forecasts, intersection capacity analysis, traffic signal warrant analysis, analysis of possible roundabouts, and recommendations.



Figure 13: Opening Year PM Peak Hour Traffic

**Traffic Forecasts**

Peak hour opening year (2018) and design year (2040) traffic forecasts were developed for the Alburnett Road extension, based on traffic count data, planned area development and previous travel demand models. The peak hour forecasts correspond to the following average daily traffic volumes.

**Alburnett Road Estimated Daily Traffic (vehicles per day)**

Location	Opening Year - 2018	Design Year -2040
South of Boyson Road	5,000	10,000
North of 8 <sup>th</sup> Avenue	8,000	14,000

**Intersection Capacity Analysis**

Traffic operations were evaluated at each intersection along the Proposed Alburnett Road extension using projected opening year and design year peak hour traffic volumes. A 3-lane cross-section with left turn lanes was assumed

for Alburnett Road. At the major intersections (Boyson Road, 8<sup>th</sup> Avenue, and 7<sup>th</sup> Avenue) the overall opening year level of service (LOS) was determined to be LOS B for each intersection, with traffic signal control. As projected traffic increases between opening year and the design year, these intersections are projected to operate at LOS B-C.

The Alburnett Road intersections with Boyson Road, 8<sup>th</sup> Avenue, and 7<sup>th</sup> Avenue were analyzed to evaluate roundabouts. In order to provide acceptable operations, it was determined that two-lane approaches (two lanes approaching roundabout) would be needed for all approaches at the 7<sup>th</sup> Avenue and 8<sup>th</sup> Avenue intersections, and for the north-south approaches at the Boyson Road intersection.

Due to the relatively close spacing of 7<sup>th</sup> Avenue and 8<sup>th</sup> Avenue intersections, additional simulation analysis was performed to determine if vehicle queues would block the intersection. The simulation analysis showed that northbound vehicle queues at the 8<sup>th</sup> Avenue roundabout would extend south into the 7<sup>th</sup> Avenue roundabout, significantly impacting traffic operations at this intersection. Simulation analysis with properly coordinated traffic signals at both intersections showed that queuing would not be an issue.

At the Boyson Road intersection, providing four north-south through lanes through the roundabout would result in lane continuity issues, need for reconstruction of the existing south leg of the intersection, and significant property impacts at the intersection. Therefore, roundabouts were not recommended for any of the intersections.

**Traffic Signal Warrant Analysis**

The proposed Alburnett Road intersections with Boyson Road, 8<sup>th</sup> Avenue and 7<sup>th</sup> Avenue were evaluated to determine if *Manual on Uniform Traffic Control Devices* (MUTCD) traffic signal warrant criteria are projected to be met. The planning level warrant analysis determined that warrant criteria will be met at all three intersections with the projected at opening year and design year traffic.

**Traffic Study Recommendations**

**Multi-modal**

The Marion Master Trails Plan includes side paths along the Alburnett Road extension. The recently constructed portion of the extension south of Boyson Road (approximately 530 linear feet) includes 8' wide side paths on both sides of the street. It is recommended that side paths be provided along at least one side, and preferably both sides of the extension, south

of Boyson Road to 7<sup>th</sup> Avenue. Bike lanes (5' minimum width) within the street pavement should also be provided, if feasible. The inclusion of the on-street bikeways is consistent with the recently completed Master Trails Plan.

Cedar Rapids Transit currently provides two bus routes (5N and 5S) through the City of Marion. If the 5N route is modified or an additional route is added in the future to include the Alburnett Road extension corridor, bus stops should be located to minimize impacts to intersection traffic operations and to avoid potentially unsafe stopping and passing conditions. Bus stop locations on the far side of an intersection are generally preferred.

**Arterial Cross-Section**

Based on traffic projections and analyses performed, the Alburnett Road extension should be constructed as a three-lane roadway with one lane in each direction and a continuous center left turn lane. At the intersections along the roadway between Boyson Road and 8<sup>th</sup> Avenue, no additional lanes are recommended for projected opening year or design year traffic. STOP control and single lane approaches should be provided for all minor street approaches to Alburnett Road within this section of the corridor.

**Major Intersections**

**Boyson Road & Alburnett Road**

- Provide a 150' dedicated left turn lane for each approach.
- Install a traffic signal for opening year. Although the MUTCD recommends adequate trial of other alternatives prior to installing a signal where traffic volumes meet only the 80% values of Warrant 1A and 1B, analysis of opening year traffic shows that two-way or all-way STOP control would provide LOS E-F for at least one approach during peak hours.

**8<sup>th</sup> Avenue & Alburnett Road**

- Provide a 150' dedicated left turn lane on each approach.
- Install a traffic signal for opening year.

**7<sup>th</sup> Avenue & Alburnett Road**

- Provide 150' dedicated left turn lanes for the eastbound and southbound approaches.
- Maintain four through lanes on 7<sup>th</sup> Avenue.
- Install a traffic signal for opening year.
- Provide traffic signal interconnect for coordinated operation of 7<sup>th</sup> Avenue and 8<sup>th</sup> Avenue traffic signals.

## Environmental Evaluation

In the fall of 2016, Snyder & Associates, Inc. performed an initial limited environmental evaluation of the proposed Alburnett Road extension project area, and prepared an Environmental Evaluation Report. Following is a list of the environmental related reports (and author) prepared in conjunction with this Design Concept Report. All reports are bound separate from this document and were submitted to the City engineering staff under separate cover.

- Environmental Evaluation Report (Snyder & Associates, Inc.)
- Wetland Delineation (Snyder & Associates, Inc.)
- Phase I Intensive Archaeological Survey & Geomorphological Analysis (Wapsi Valley Archeology)
- Intensive Level Architectural History Survey (Wapsi Valley Archeology)
- Preliminary Geotechnical Engineering Report (Terracon Consultants, Inc.)

Section 4 of the report describes the environmental analysis of impacts for both the No Build Alternative and the Proposed Alternative of several aspects of the project area including:

- Socioeconomic Impacts
  - Land Use
  - Community Cohesion
  - Economic
  - Park & Recreation
  - Transportation



Figure 14: Willow Park

- Cultural Impacts
  - Historical Sites or Districts
  - Archaeological Sites
- Natural Environment Impacts
  - Floodplains and Floodways
  - Wetlands
  - Surface Water and Water Quality
  - Threatened and Endangered Species
  - Woodlands
  - Farmland Soils



Figure 15: Indian Creek

- Physical Impacts
  - Noise
  - Air Quality/MSAT
  - Contaminated and Regulated Material Sites
  - Utilities

### Wetland Delineation Report

Snyder & Associates, Inc. delineated the project area of the proposed Alburnett Road Extension for the presence of wetlands in accordance with the proposal and general conditions. Residential use, transportation corridors, and riparian areas adjoin the project boundary.

The scope of this investigation was to indicate the presence/absence of wetlands, identify wetlands that could be impacted by the project, and delineate the upper boundaries of potential jurisdictional wetlands within the project area. In addition to wetlands, Waters of the United States (WUS), which include lakes, ponds, rivers, and streams, were included in the delineation.

Field investigations identified potential WUS, including wetlands within the project boundary. Three (3) emergent wetlands, one (1) forested wetland, one (1) pond and one (1) perennial stream (Indian Creek) were identified within the project boundary. Discharges of dredged or fill material, excavation, and mechanized land clearing in the WUS will require authorization from the USACE. Final determination of the limit of WUS, including wetlands, for permitting purposes rests with the USACE. For final authorization for activities in WUS, the USACE must approve these findings.

### Phase 1, Cultural Resources Investigation Architectural History Survey

In September of 2016, Wapsi Valley Archeology, Inc completed an intensive level architectural and historical survey for the Alburnett Road extension project and prepared a report of the results.

Two properties in the project area had been previously surveyed and previously determined not eligible for the National Register of Historic Places. Field investigation and archival research revealed that seven properties within the project area contain resources that are eligible for the National Register of Historic Places. Two of these properties lie within the proposed boundaries for the Alburnett Road extension project. The other five properties are located immediately adjacent to the project corridor.

It is recommended that adverse effects to these historic properties, both direct and indirect, be avoided by the proposed project. If avoidance is not possible, then mitigation of adverse effects is recommended.

### Archaeological Survey and Geomorphological Analysis

In August of 2016, Wapsi Valley Archeology, Inc. conducted a Phase I intensive archaeological survey and geomorphological analysis for the proposed extension of Alburnett Road and prepared a report of the results. Background research showed that only a very small portion of the project area had been subject to an intensive archaeological survey and that no previously recorded archaeological sites had been reported within the project area. The archaeological survey identified two previously unrecorded archaeological sites, designated 13LN1176 and 13LN1177. Neither site is considered eligible for the National Register of Historic Places. It is recommended that no additional archaeological investigations are necessary for the proposed project.

If any prehistoric or historic artifacts or features are unexpectedly uncovered during the course of the proposed construction activities, the responsible agency must be contacted without delay. In addition, if any human remains are encountered, it is required by Iowa law that all work in the area of the remains be temporarily stopped, security provided for the remains, local law enforcement officials notified to help protect the remains, and the Bioarchaeology Program Director contacted immediately.



View of Indian Creek



View of Wetland 2



View of Wetland 4



View of Wetland 1



View of Wetland 3

## PROPOSED CONCEPT

Snyder & Associates, Inc. has developed alternatives and recommendations for the concept design elements associated with the realignment of Alburnett Road. The recommendations are based on field investigations, research, and reports outlined previously in this Design Concept Report. Additionally, background information provided by City Staff, the 2000 Alburnett Road Extension Feasibility Study, and input from local stakeholders and the general public were necessary components to achieve a plan that addresses the needs of the community.

### Corridor Alignment

The general horizontal alignment for the proposed Alburnett Road was established with the 2000 Feasibility Study. As part of this Concept Design, the City requested Snyder & Associates to review the details of the previous alignment and determine if any slight modifications would benefit the project.

Two alignments similar to Alignment Option 3 from the 2000 Feasibility Study were evaluated. Figure 16 illustrates the two alignments; Options 3A and 3B. Both alignments fully utilize the newly constructed pavement south of Boyson Road and connect to 2<sup>nd</sup> Street adjacent to Willow Park. The primary differentiators among the two options are the alignment immediately north of Indian Creek, the location/orientation of the bridge crossing Indian Creek, and how the alignments bisect Willow Park.

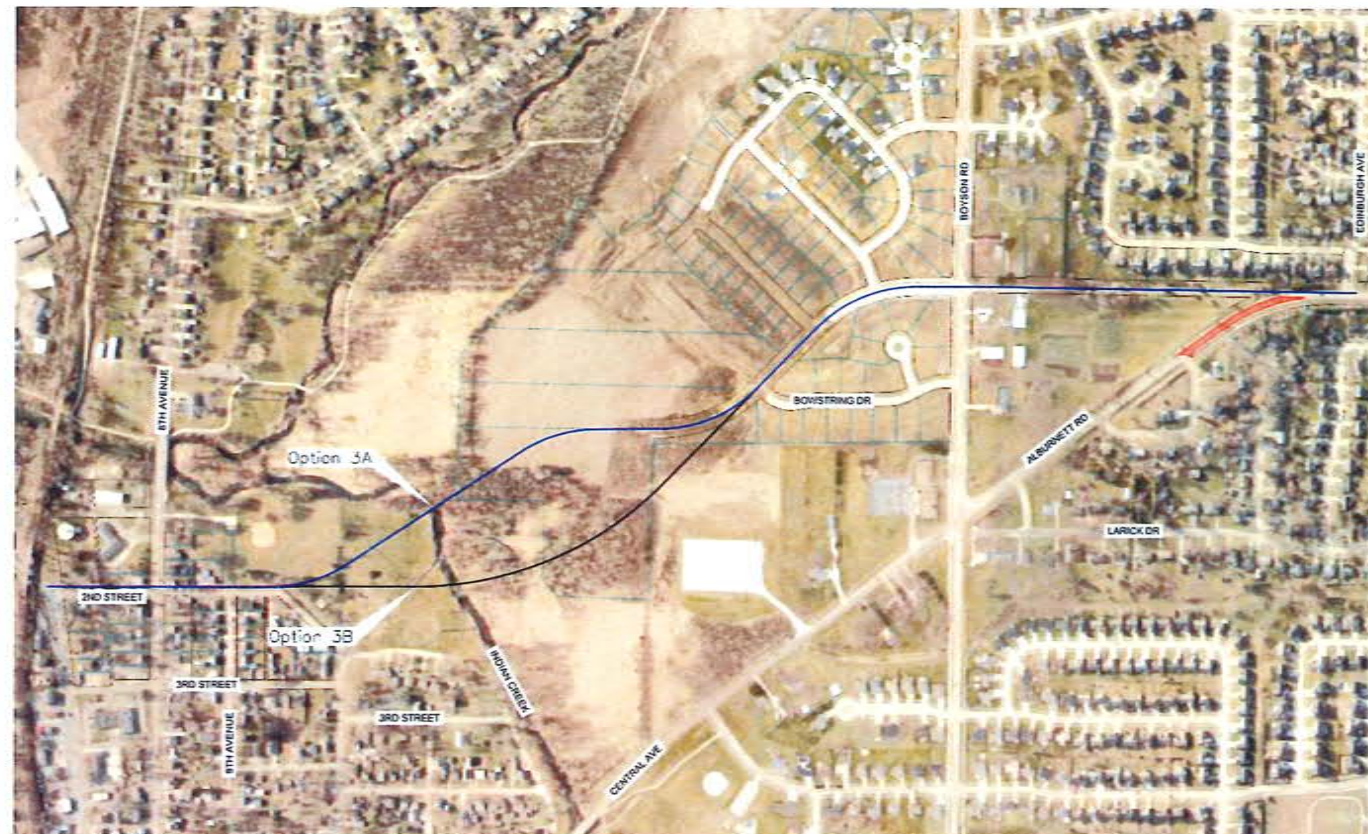


Figure 16: Alignment Alternates

Several factors were considered to determine the preferred alignment. Examples include impacts to private property, the environment, utilities, public spaces/parks, future land use, and cost. Alignment Option 3A was selected as the recommended alignment. Following is a list highlighting the justification for this determination.

#### Recommended Alignment Option 3A:

- Avoids Interstate Power & Light Company property
- Bowman Meadows future plats already considered in this alignment
- Less impact to wetland and forested area
- Provides a better division of Willow Park
- Less earthwork/less disturbance
- Better alignment with Indian Creek/shorter bridge
- Lower cost

The plan sheets 9 through 11 following this section illustrate the proposed alignment of the revised Alburnett Road Extension. The new roadway will connect at the south to 7<sup>th</sup> Avenue at the intersection of 2<sup>nd</sup> Street. This intersection, and the new Alburnett Road as it runs north, is shifted west to accommodate the wider pavement section while avoiding the commercial business and residences on the east side of 2<sup>nd</sup> Street. The typical roadway sections for Alburnett Road in this section of corridor, are illustrated in Figures 17 & 18.

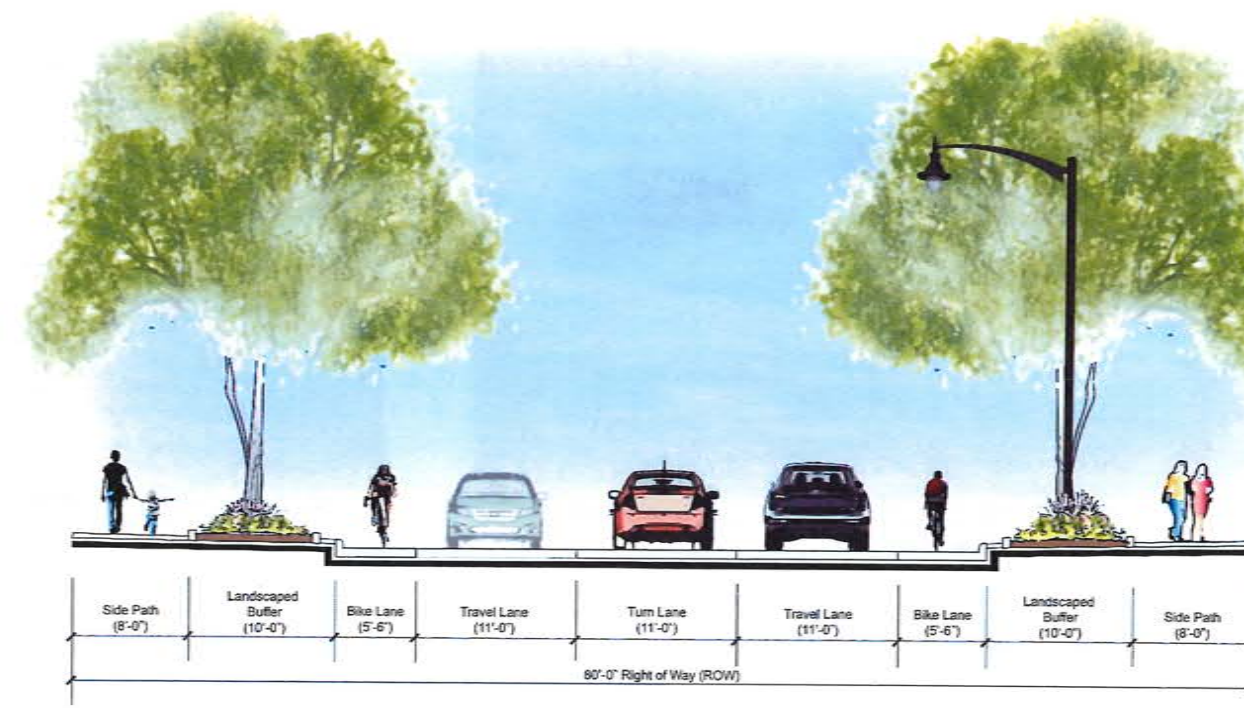


Figure 17: 44' B/B with TWLTL



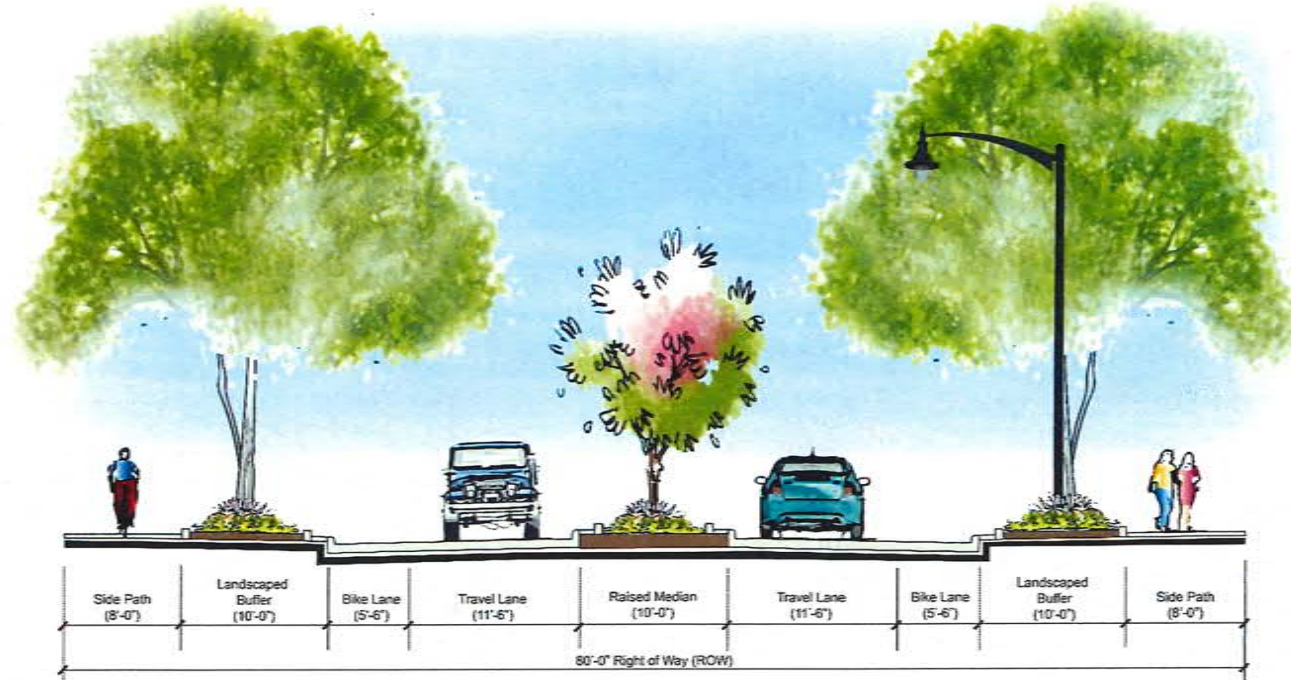


Figure 18: 44' B/B with Median

The City owns much of the property on the west side of 2<sup>nd</sup> Street and therefore the private owner impacts are minimized. City properties impacted include Merrill Garden and property just south of 8<sup>th</sup> Avenue (both owned by the Water Department) along with Willow Park. The properties at 184 8<sup>th</sup> Avenue and 880 2<sup>nd</sup> Street will be impacted to the point that total buyouts, and removal of existing homes, are required. The home on the Water Department property will also be removed.

The roadway alignment leaves the 2<sup>nd</sup> Street corridor just north of 9<sup>th</sup> Avenue and turns northwest through Willow Park. While any impact to the park is not ideal, this alignment follows a path along a separation of uses within the park. The ball field and the shelter/playground area will be split by the proposed alignment. Each of the uses may be maintained in their current capacity. During a meeting with the Park Board, support was provided for the chosen alignment. The board noted the roadway would benefit and coincide with planned projects for Willow Park that address future shelter and playground area needs.

Pedestrian access across new Alburnett Road within Willow Park will be accommodated with an at-grade crossing located at the new intersection with 2<sup>nd</sup> Street. A future trail under the proposed bridge will also provide pedestrian access across the roadway. Benched slopes will be provided on both sides of Indian Creek to accommodate future trail access with a minimum of 10' of vertical clearance.

The roadway alignment remains within City of Marion property and crosses over Indian Creek at a perpendicular angle; thereby reducing bridge length and optimizing hydraulic capacity. Additionally, this crossing location reduces the impact to wetland and forested areas. Appropriate city staff planning during the installation of the electric transmission lines resulted in a sufficient window of clearance for the roadway to pass under the electric lines while also providing necessary clearances and hydraulic capacity at Indian Creek.

Continuing north, new Alburnett Road alignment connects with the existing street improvements within the recently developed Bowman Meadows subdivision. A section of this new roadway was constructed by the developer during the fall of 2016 and therefore necessitated coordination of alignment efforts.

New Alburnett Road alignment will utilize old roadbed and existing right of way north of Boyson Road. The roadway

section will be narrowed to two lanes due to limited access and to reduce impacts to adjacent developed properties. Figure 19 illustrates the typical roadway section north of Boyson Road. The proposed connection to existing Alburnett Road is located just south of Edinburgh Avenue.

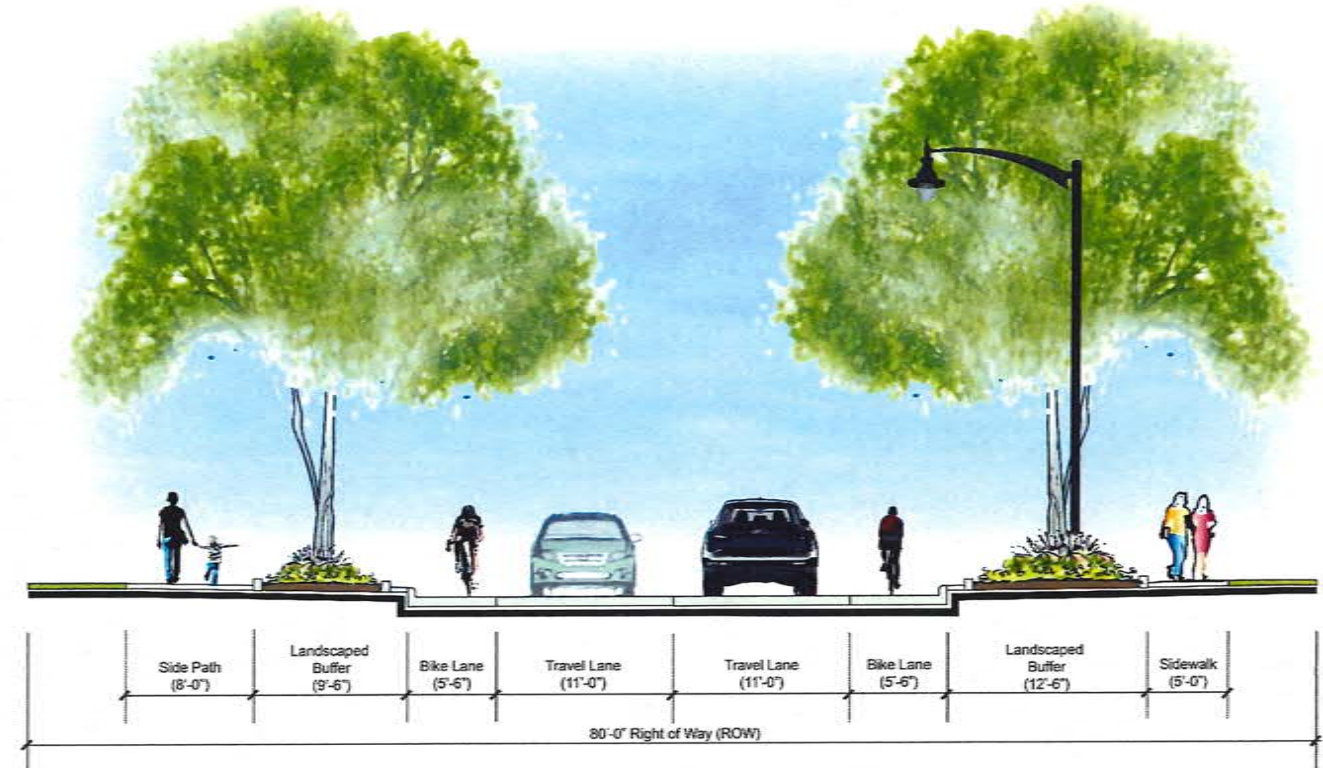
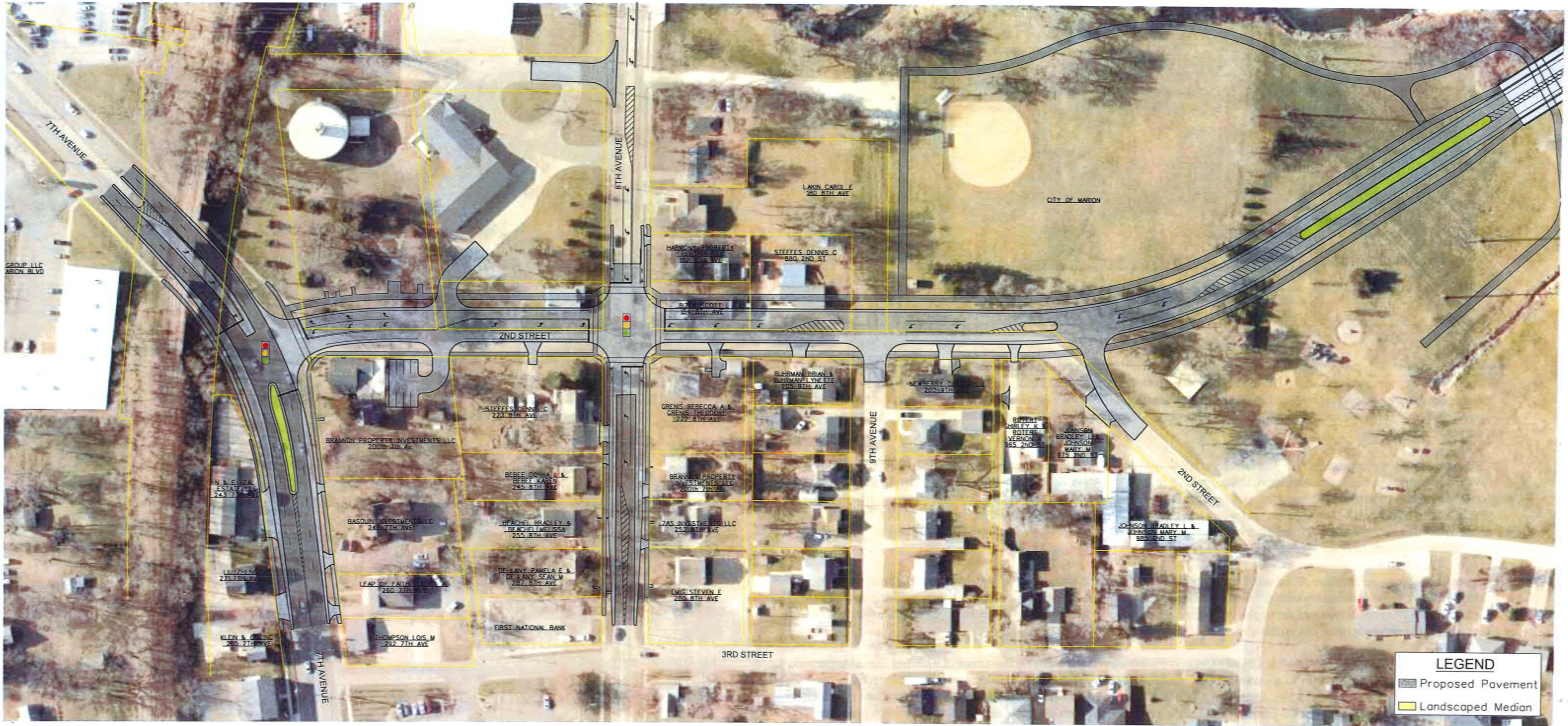
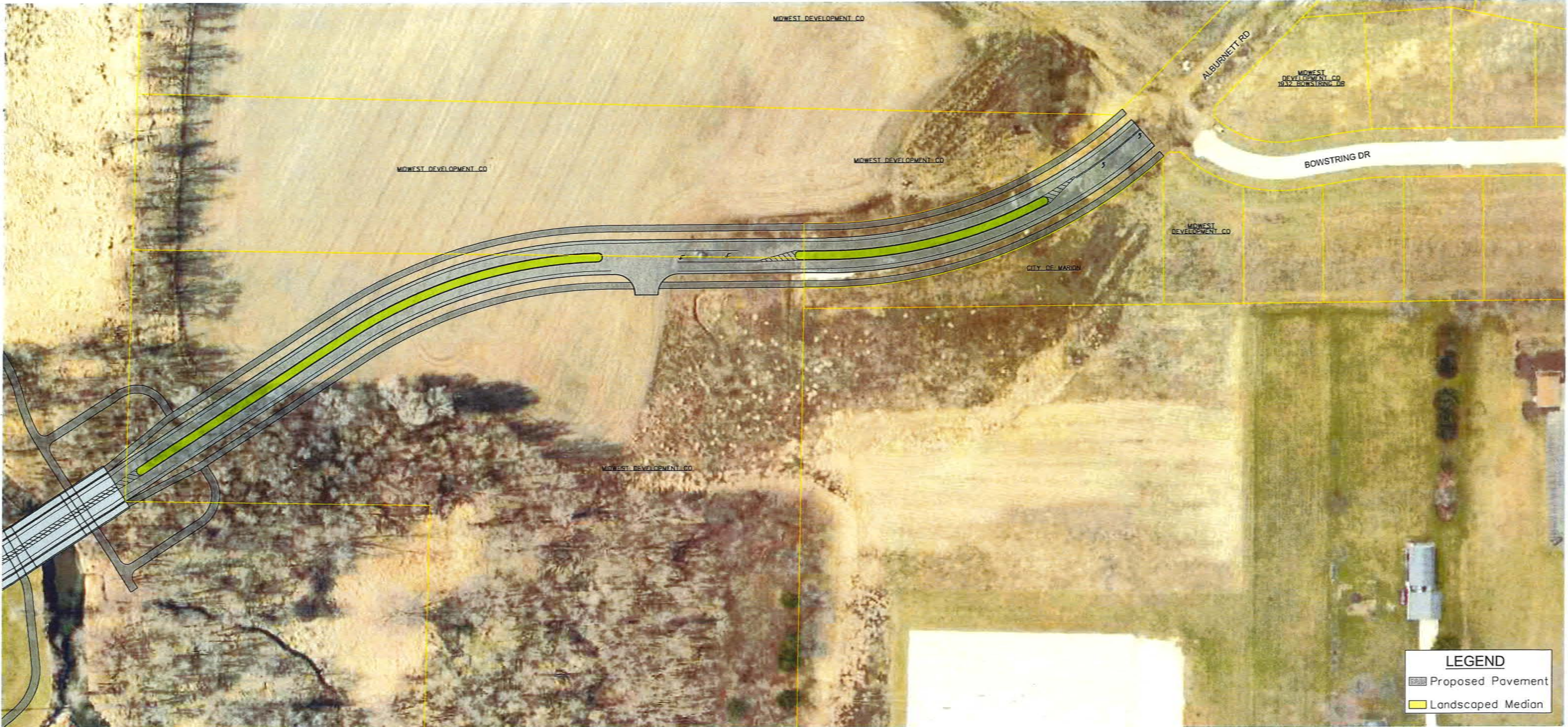


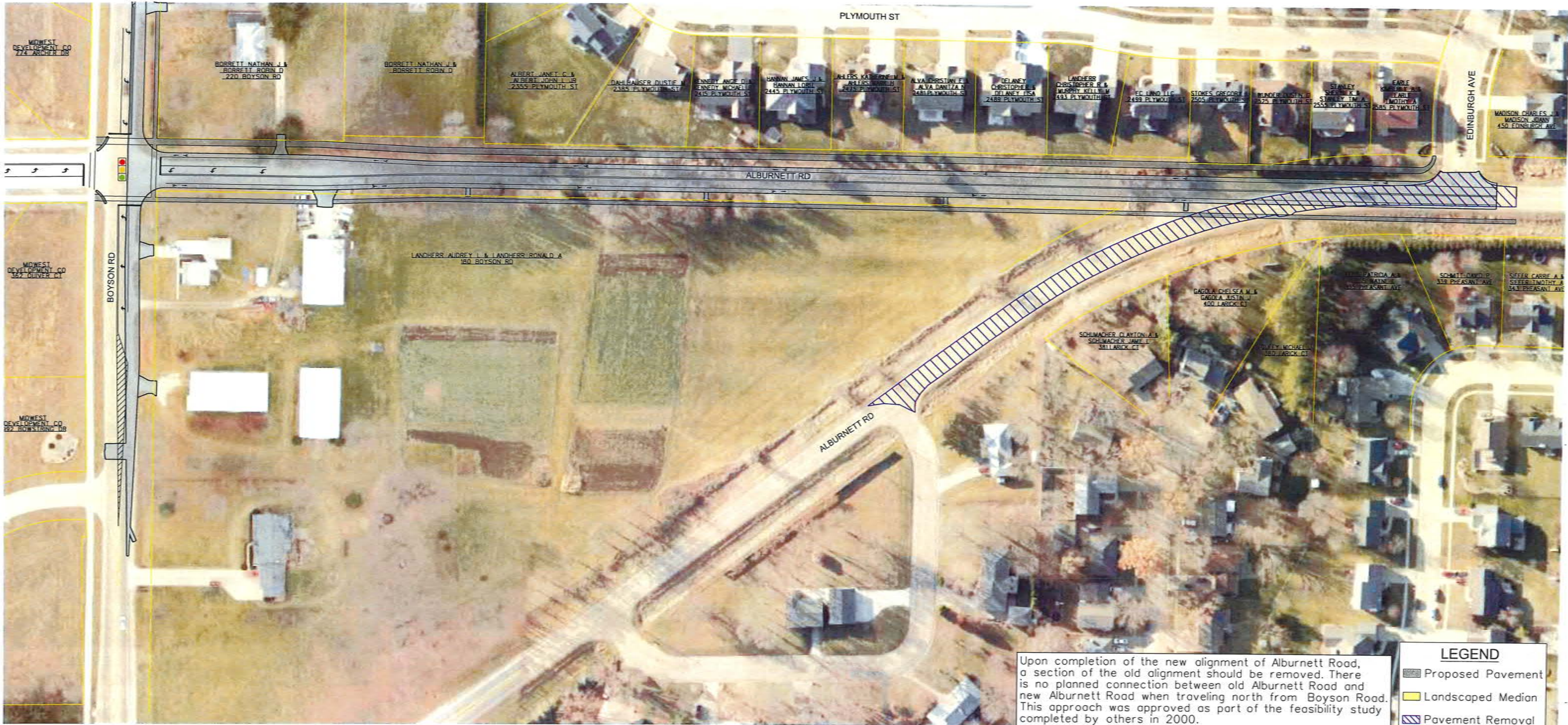
Figure 19: 33' B/B Two-Way Section

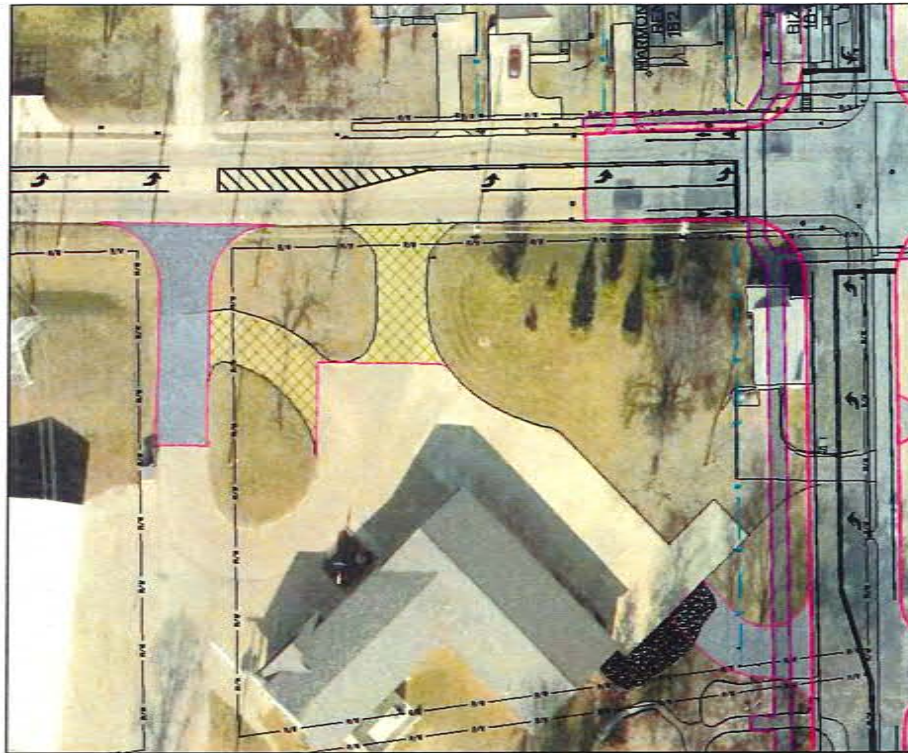
Along the new roadway alignment, several opportunities were presented to improve safety or better accommodate users. Page 12 of this report includes illustrations and provides these design considerations.

Pages 13-15 illustrate the anticipated acquisitions associated with the Alburnett Road Extension project. While several acquisitions are needed, the vast majority of the improvements will be completed on city owned property. Two total buy outs are necessary at 184 8<sup>th</sup> Avenue and 880 2<sup>nd</sup> Street. The homes on these properties will be removed along with the home on the water department property.

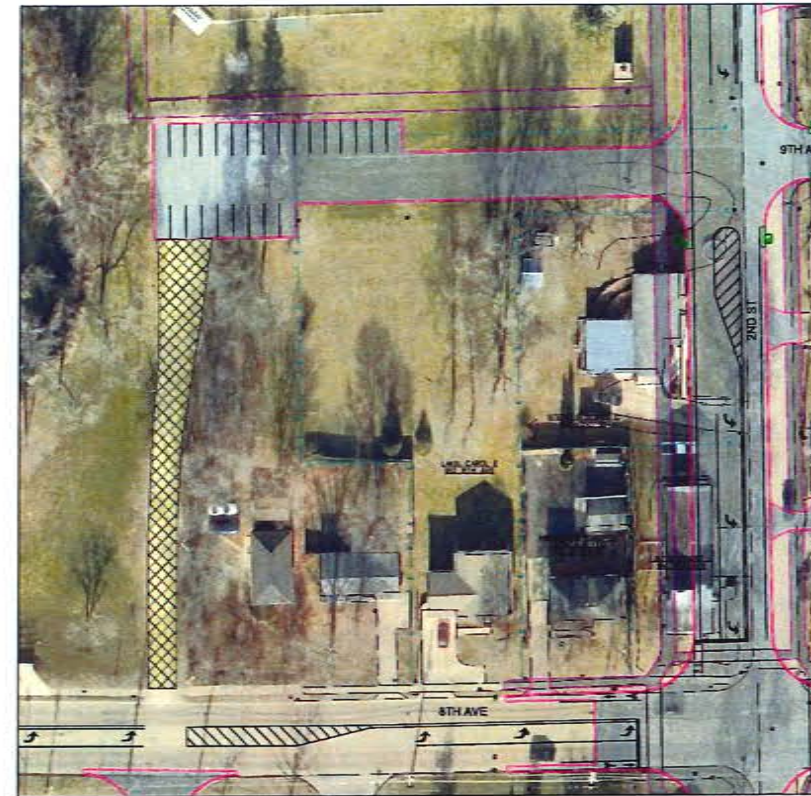




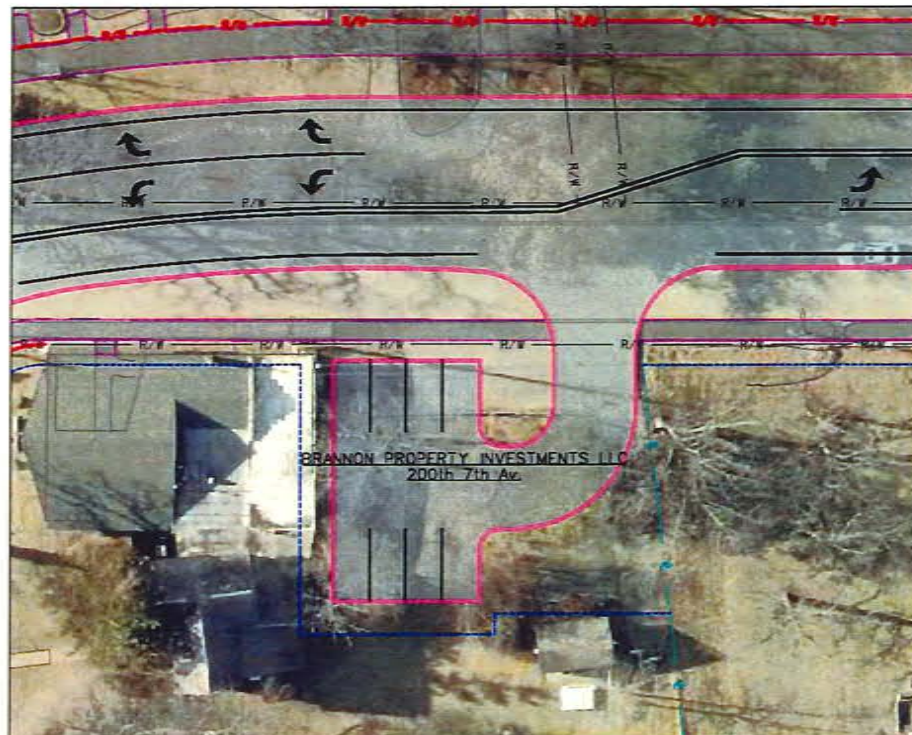




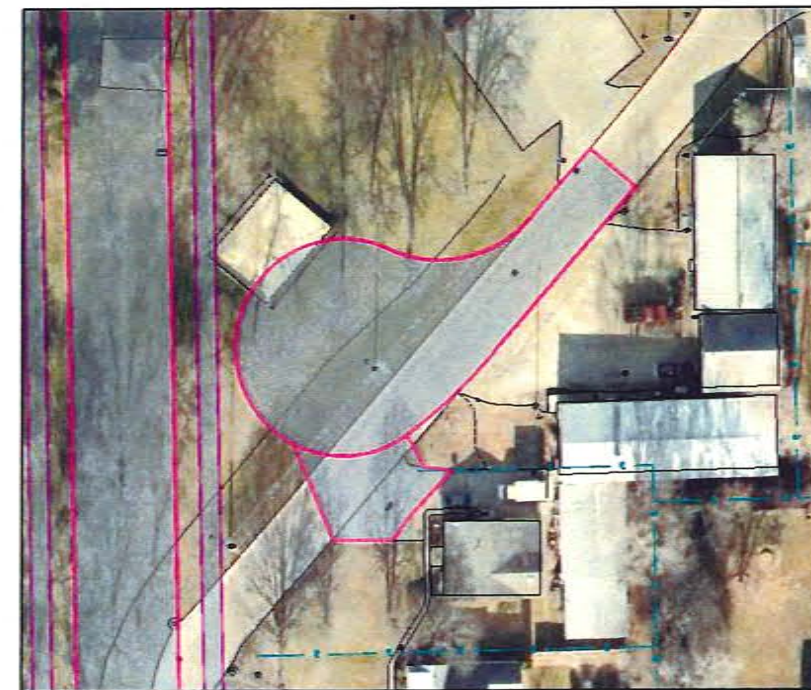
**Water Department Accesses**  
 The existing 8<sup>th</sup> Avenue access will be located at a transition to an eastbound left turn lane; thereby creating multiple opportunities for driver conflict. Consider relocating the access west, out of the transition, and aligning with the park access. Also consider relocating or eliminating the water department access to Alburnett Road.



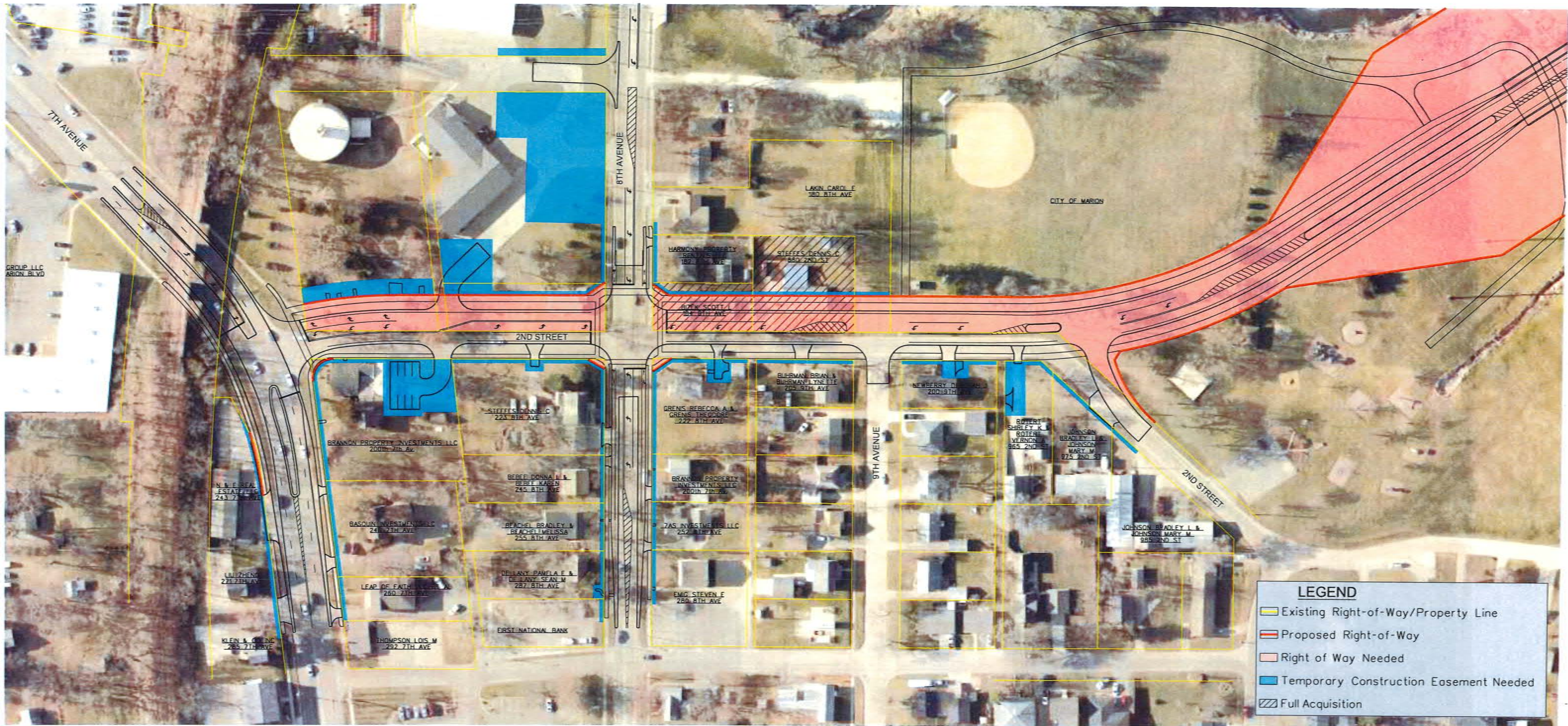
**Willow Park Ball Field Access & Parking**  
 Option to relocate ball field access to Alburnett Road and 9<sup>th</sup> Street. Acquisition from 180 8<sup>th</sup> Avenue would be necessary.

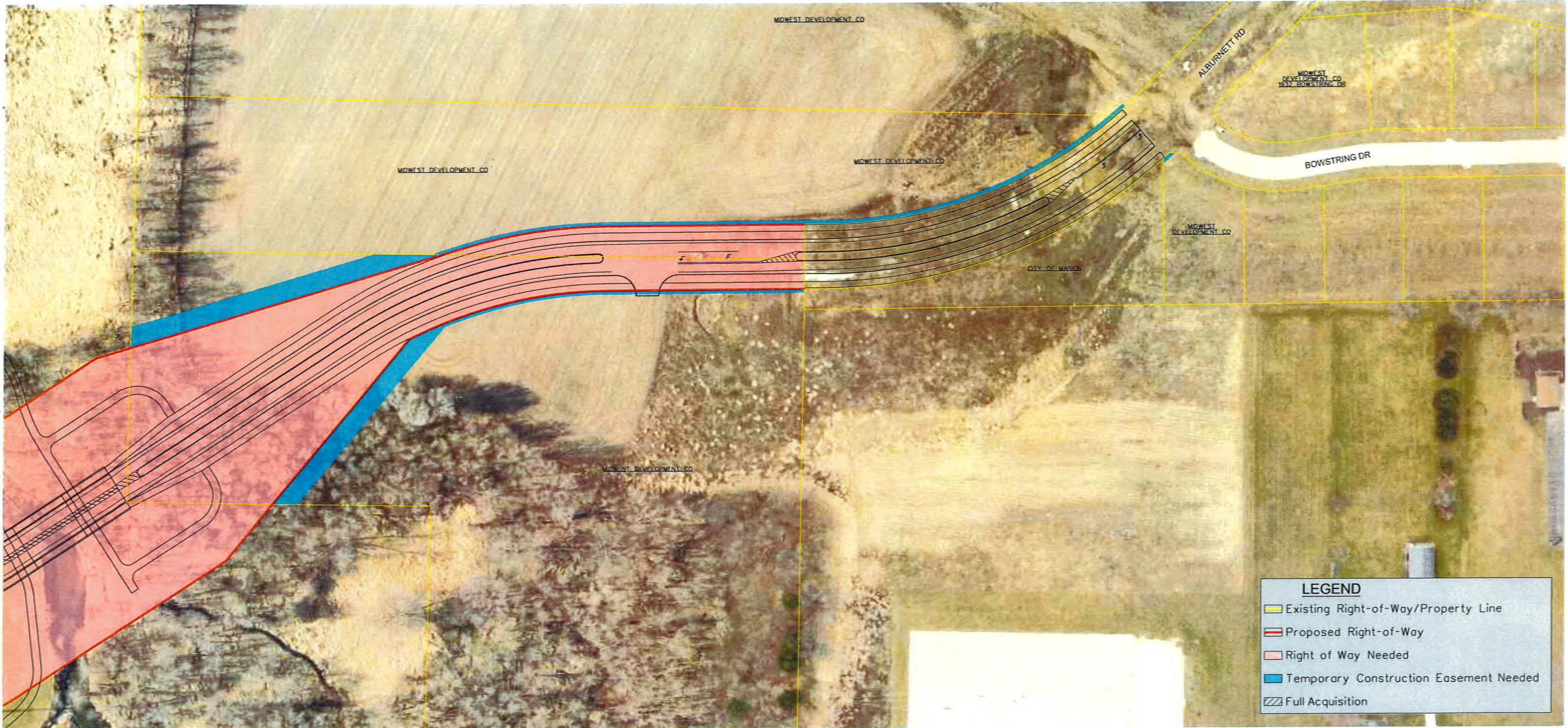


**Novak & Brannon Monuments Parking**  
 Construct off-street parking lot to reduce conflict with Alburnett Road traffic.

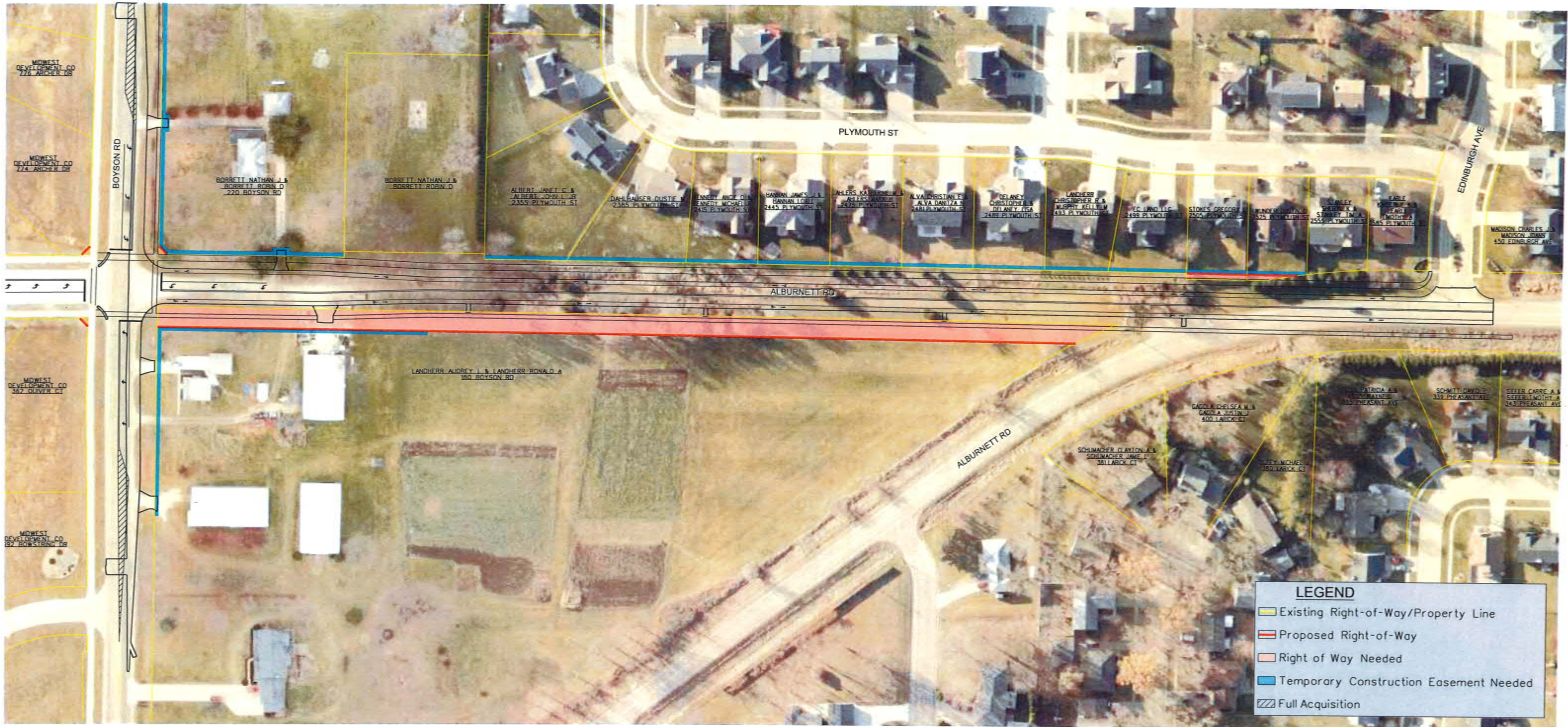


**2<sup>nd</sup> Street Cul de Sac**  
 Consideration given to eliminating the 2<sup>nd</sup> Street access to Alburnett Road and construction of a cul de sac. Layout eliminates a noted concern of cut through traffic from the neighborhoods to the north/northeast.





LEGEND	
	Existing Right-of-Way/Property Line
	Proposed Right-of-Way
	Right of Way Needed
	Temporary Construction Easement Needed
	Full Acquisition





### Bridge Type

The bridge superstructure type selection considers multiple factors but ultimately is seeking the most economical solution while meeting the physical needs of the specific site. For this application, two bridge types were evaluated:

- 1) 3-span, pretensioned prestressed concrete beam bridge (PPCB bridge)
- 2) 3-span, cold rolled steel beam bridge (CRSB bridge)

For this application, the PPCB bridge was selected as the preferred superstructure type. The beam details are standardized by the Iowa DOT providing ease of manufacture and installation, the bridge is durable with very limited maintenance, and the overall cost is anticipated to be 5-8% less than the CRSB bridge. The bridge cross section is illustrated below.

### Bridge Design and Hydraulic Analysis

The bridge design required significant hydraulic and hydrologic evaluations to appropriately size the bridge opening, overall structure length and to establish low chord elevation.



Figure 20: Wetlands, Surface Waters, Floodplains and Floodwater

The effective FEMA hydraulic model for Indian Creek in the project area was acquired from the FEMA Project Library and utilized as the basis for hydraulic analysis. The effective model was modernized into an existing conditions model using channel and floodplain geometry developed from field survey and statewide LiDAR data, which more accurately depicts the natural floodplain. In addition, field survey and design plans were utilized to update the model to include the present-day geometry of the existing Central Avenue, Eighth Avenue, and Marion Boulevard bridges.

Peak flow values for the 2%, 1%, and 0.2% annual chance recurrence intervals (50, 100, and 500-year event) used in hydraulic modeling were obtained from the effective FEMA model and match the values presented in the effective Linn County Flood Insurance Study. These values were compared to values derived from the USGS's StreamStats application, which is used to estimate peak flows on ungauged streams. Since the values from StreamStats were similar to the flows presented in the effective FEMA model and Linn County Flood Insurance Study, the effective values were used in the hydraulic design of the bridge. The flows from StreamStats were utilized to evaluate lower flow events such as the 50% and 20% annual chance recurrence intervals (2 and 5-year event).

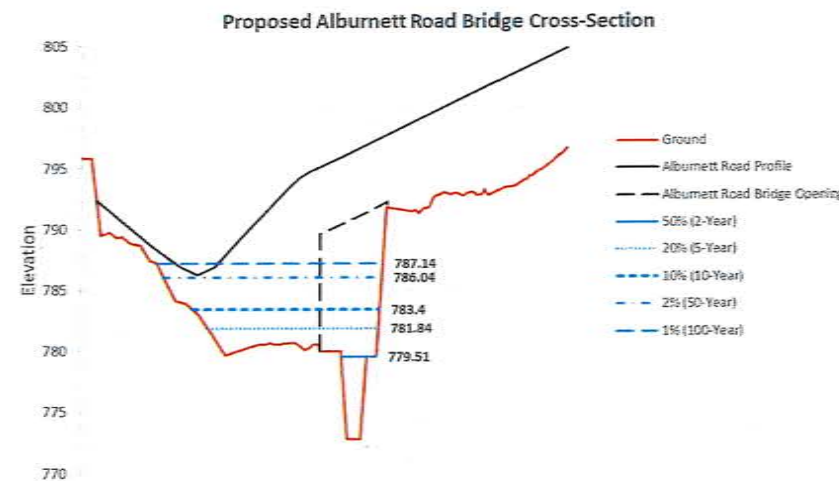


Figure 21: Proposed Alburnett Rd Bridge Cross-Section

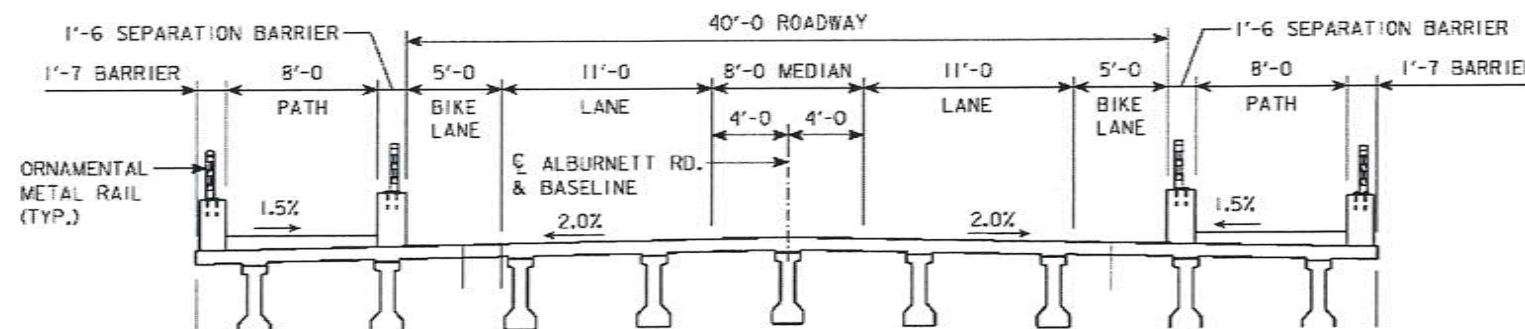


Figure 22: Bridge Typical Section

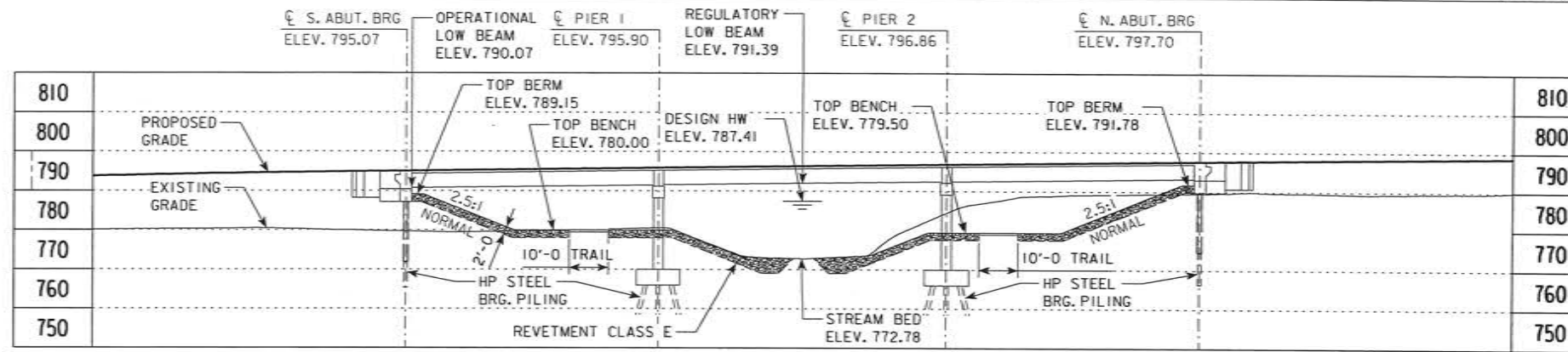
Indian Creek was modeled from roughly 1000 feet south of Marion Boulevard up to the area just north of the intersection of 17<sup>th</sup> Avenue and 8<sup>th</sup> Street. The stretch of Indian Creek downstream of the proposed Alburnett Road bridge was included in order to accurately analyze the effect of the Marion Boulevard and Eighth Avenue bridges on potential flooding upstream. Likewise, the area upstream of the proposed Alburnett Road bridge was examined for the potential effects of the new bridge on upstream property owners. Field survey was performed to obtain critical elevations around at-risk properties. Figure 21 provides a schematic illustration of the water surface elevation for multiple storm events. Note that the 20% storm (5-year event) overtops the creek banks and inundates Willow Park. Also, the 1% storm (100-year event) will overtop the proposed Alburnett Road at the low point south of the bridge. A break in the raised median is planned to accommodate this overflow area.

After an iterative approach analyzing multiple bridge designs for impacts on upstream flooding, a 201'-4" pre-tensioned, pre-stressed concrete beam bridge was selected. This bridge size provides an optimal price with limited effect on flooding upstream during high flow events. The following page of this report includes the Situation Plan of the proposed bridge structure.

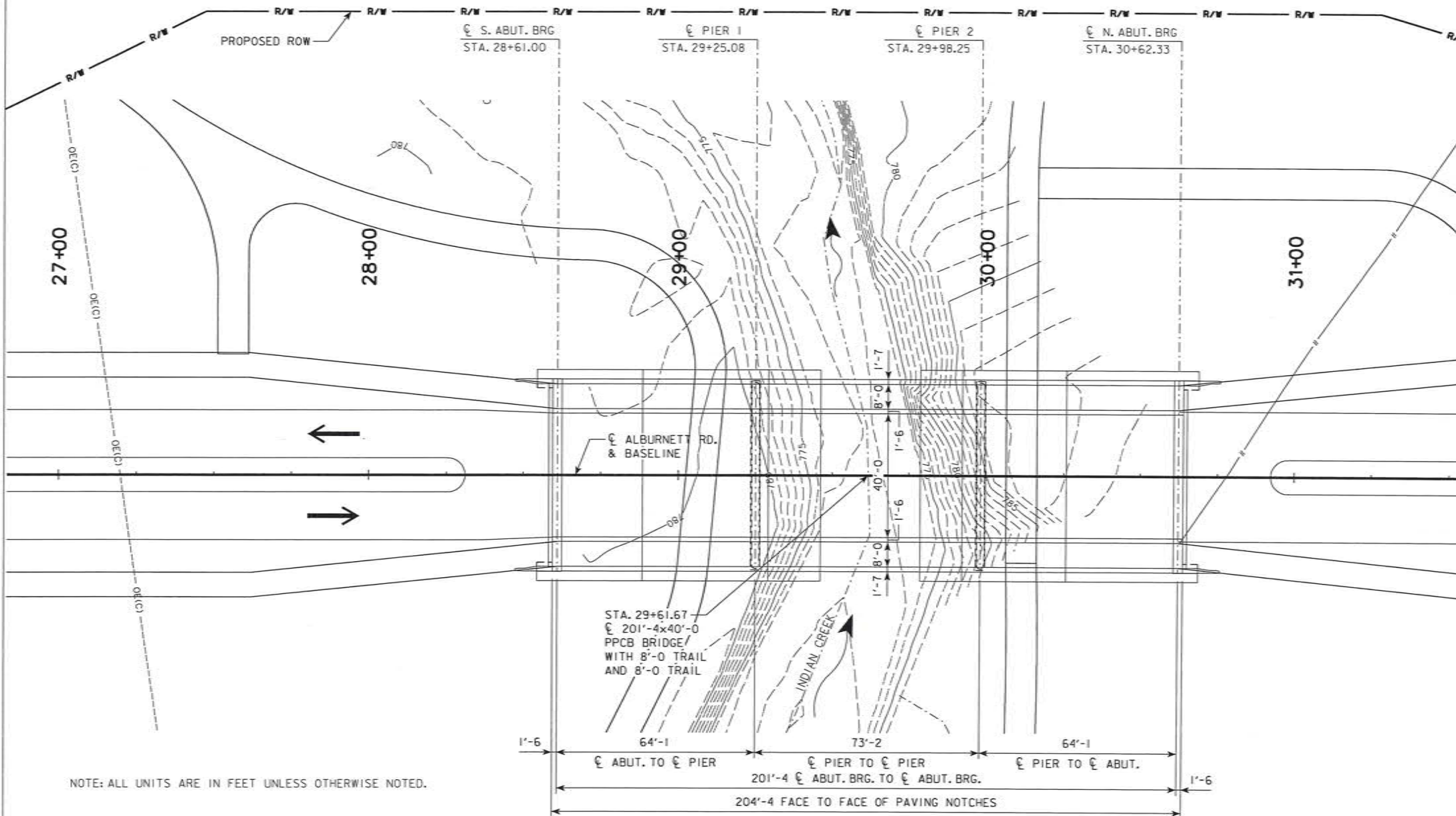
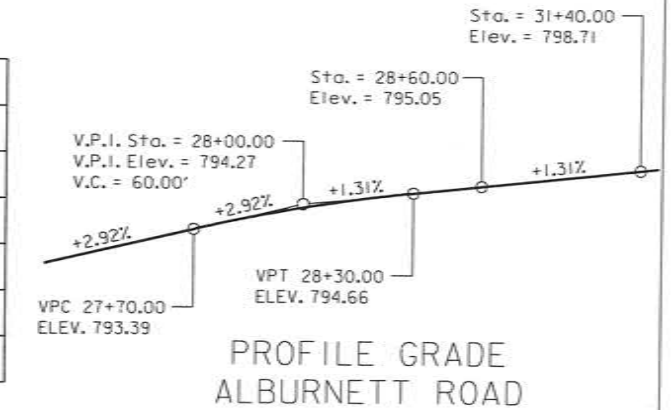
Since the new bridge will constrict the active floodplain, a 12'x10' overflow culvert is necessary underneath Central Avenue in order to provide adequate protection for upstream property owners. This option is significantly more cost effective than constructing a longer bridge at Alburnett Road. In addition, the culvert can be used as an underpass structure for the City's trail system when the culvert is dry.

Floodplain benches under the proposed bridge are included on both sides of Indian Creek in order to accommodate the development of pedestrian trails. Bench elevations will match floodplain elevations in areas adjacent to the bridge while maintaining a minimum of 10' of vertical clearance for trail users. Doing so will minimize fill in the floodplain and reduce disturbances in the channel resulting from grading the area under the bridge. Based on the post-project hydraulic analysis, trails underneath the bridge are expected to be inundated during the 20% annual chance recurrence interval event (5-year event).

Since flood water will spill out of the banks of Indian Creek in adjacent areas to the bridge during this event, the trail in the surrounding floodplain will also be inundated.



LONGITUDINAL SECTION ALONG  $\bar{C}$  ROADWAY  
(BARRIER RAIL BEYOND NOT SHOWN)



**HYDRAULIC DATA**

DRAINAGE AREA = 36.0 SQ. MI.  
STREAM SLOPE = 8.37 FT./MI.  
AVG. LOW WATER STAGE = TBD

$Q_{200} = 9,880$  CFS  
STAGE = 788.41  
CALCULATED DESIGN SCOUR = TBD

$Q_{50} = 6,660$  CFS  
STAGE = 786.09  
REGULATORY LOW BEAM = 791.39  
BACKWATER = 0.71 FT.  
AVG. BRIDGE VELOCITY = 5.10 FPS

$Q_{OVERTOP} = 6,840$  CFS  
AVG. BRIDGE VELOCITY = 5.12 FPS  
CALCULATED CHECK SCOUR = TBD  
ROADWAY OVERTOP 786.23  
STA. 25+00.00

$Q_{100} = 8,140$  CFS  
STAGE = 787.23  
OPERATIONAL LOW BEAM = 790.07  
BACKWATER = 0.82 FT.  
AVG. BRIDGE VELOCITY = 5.47 FPS

$Q_{500} = 12,100$  CFS  
EXTREME HW STAGE = TBD  
DATE = TBD

50, 100 & 500 YR. STAGES AND DISCHARGES FROM  
LINN COUNTY F.I.S., DATED APRIL 5, 2010.  
F.I.S. DATUM 0.08 FT. ABOVE PROJECT DATUM.

**UTILITIES LEGEND:**

--(C)(C)-- OVERHEAD ELECTRIC

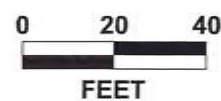
**LOCATION**

ALBURNETT ROAD  
OVER INDIAN CREEK  
T-84N R-7W  
SECTION 36  
MARION TOWNSHIP  
PART OF CITY OF MARION  
LINN COUNTY  
FHWA NO. TBD  
LATITUDE TBD  
LONGITUDE TBD

PRELIMINARY

DESIGN FOR 0° SKEW  
**201'-4x40'-0 PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGE WITH (2) 8'-0 TRAILS**  
64'-1 END SPANS (C BEAM TYPE) 73'-2 INTERIOR SPAN  
**SITUATION PLAN**  
STATION 29+61.67 LINN COUNTY MAY, 2017  
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION  
DESIGN SHEET NO. OF FILE NO. DESIGN NO.

NOTE: ALL UNITS ARE IN FEET UNLESS OTHERWISE NOTED.



**SITUATION PLAN**

Marion, IA

08/15/2017



**Project Details**

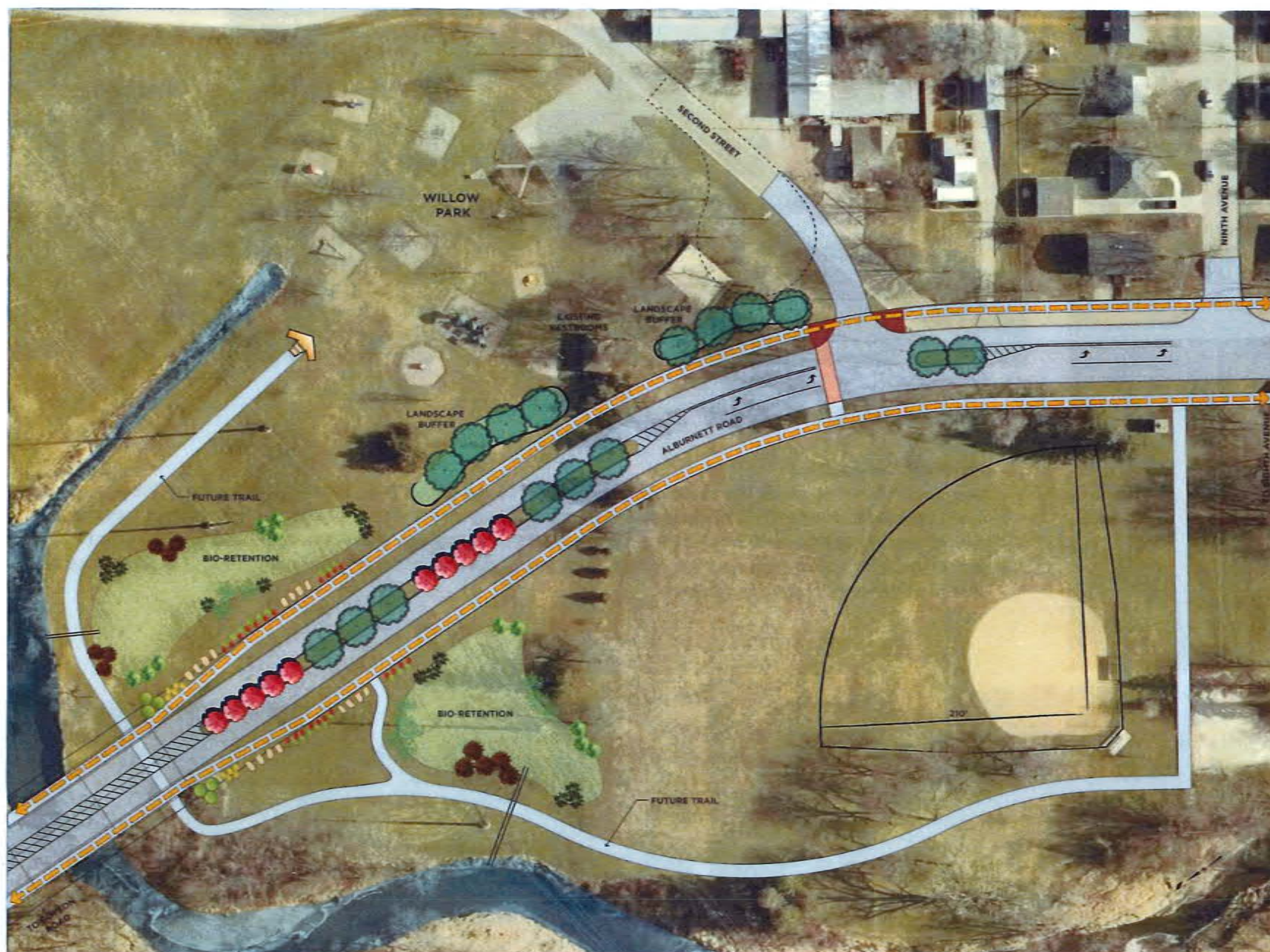
**Limestone Outcropping**

One option considered for the planted areas adjacent to the bridge is limestone outcroppings. These outcroppings could be used in Willow Park as a way to enhance the connection to Alburnett Road. The city could also require any developers along Alburnett Road to include limestone outcroppings within the landscape buffer behind residential properties which abut Alburnett Rd. Willow Park has opportunities to incorporate limestone outcroppings as well, should a trailhead be designed there.



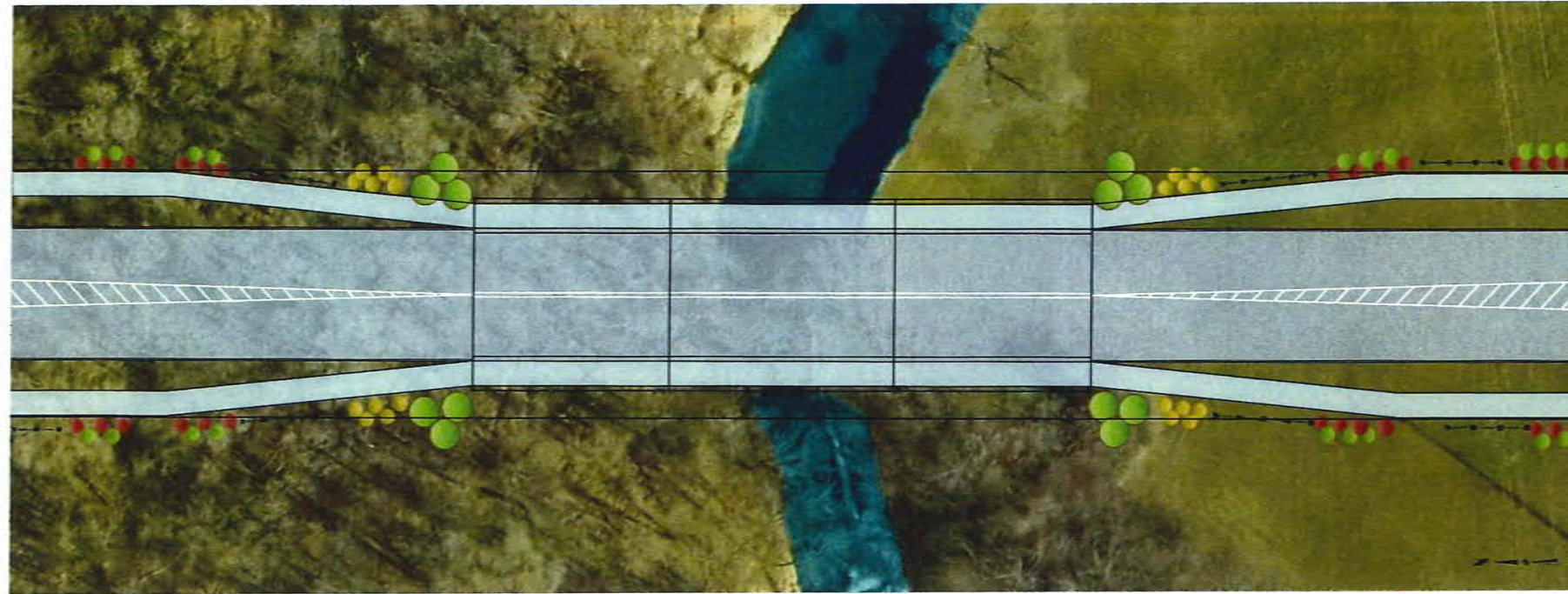
**Bio-Retention**

There are two bio-retention cells proposed within Willow Park adjacent to the trail. Bio-retention cells capture rainwater and allow it to infiltrate into the soil rather than running into a storm sewer system. These cells would be planted with native grasses, shrubs, and perennials which perform well in these types of environments. Should the cells become full, overflow pipes would direct the extra rainwater into the creek adjacent to the trail and park.



**Willow Park Trailhead**

Due to its proximity to the proposed trail, Willow Park would make a great trailhead location for the community. The park currently has an existing restroom facility as well as a small parking lot both necessary elements for the trailhead. With the proposed Alburnett Road corridor splitting the park into two sections, connections across the roadway would be an important aspect in the revitalization of the park. Landscape buffers are proposed along this portion of the corridor to not only add trees back into the park, but to aid in directing pedestrians to crossing lanes.

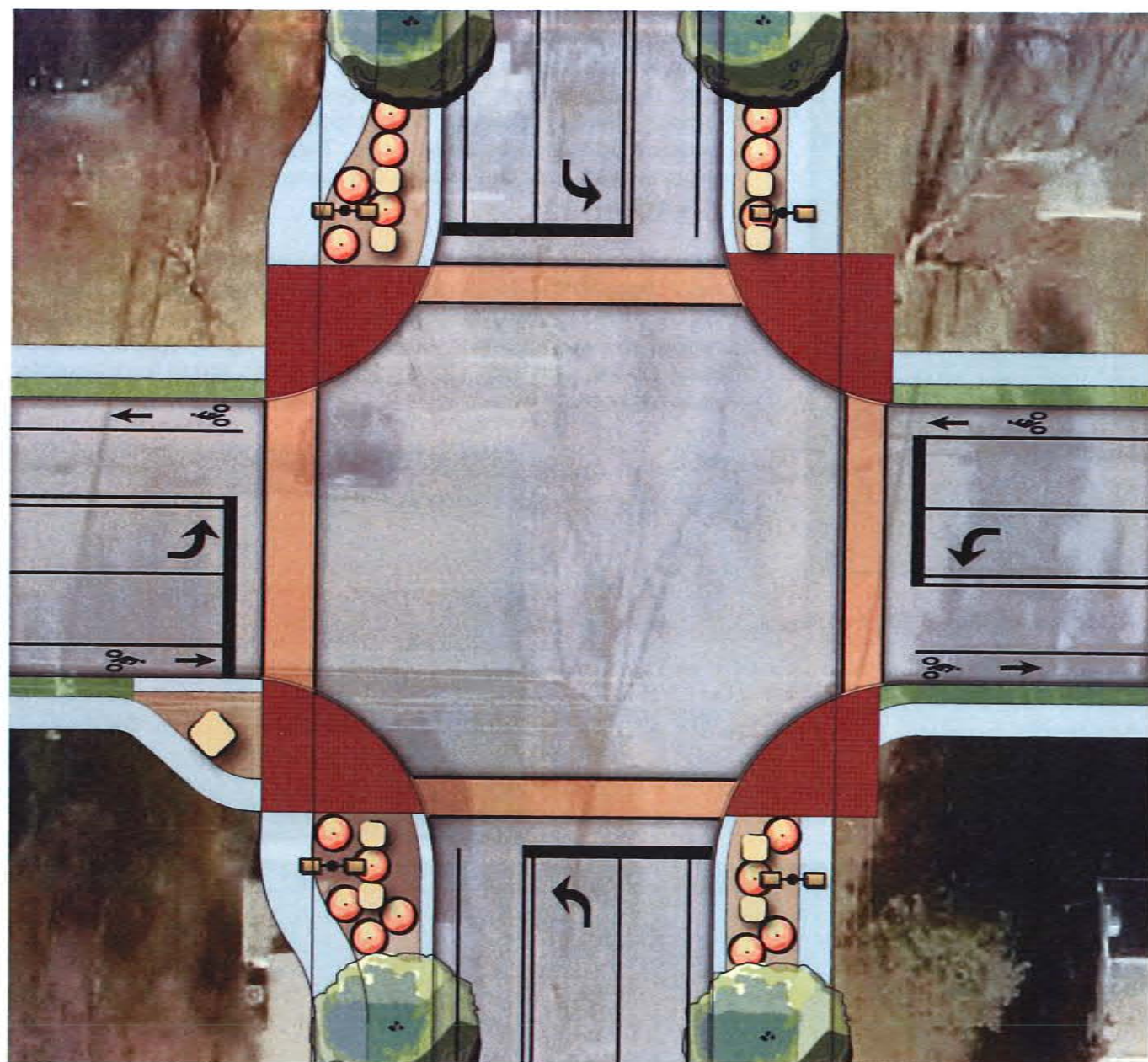


**Bridge**

The proposed corridor requires a bridge be installed across Indian Creek. The bridge is a great opportunity to connect the corridor with its adjacent land uses. The materials and railings are opportunities to bring a theme to the corridor. Precast formliner is an inexpensive option for the concrete abutment on both sides of the creek. There are numerous patterns and colors available with this option. Cut stone is another option but would increase the cost.

Decorative railings on the bridge could be used to introduce an additional metal component to the corridor. There are multiple finishes and colors the city could choose. The color and/or finish could become a theme through the corridor and be added to proposed site furnishings or even as decorative fencing in the plant beds adjacent to Willow Park and at the intersections along Alburnett Road.





**Typical Intersection Improvements & Site Furnishings**

There are three major intersections proposed along the corridor all of which have traffic signals, pedestrian crosswalks, and areas for plantings to occur. Options for pavement improvements include brick paver corners, colored and/or stamped concrete crosswalks, and the incorporation of either limestone outcroppings or the decorative panels that mimic the bridge railing. The plants selected would be drought tolerant and low maintenance and would be similar to the plantings adjacent to the bridge. Where appropriate, benches and litter receptacles would be included in the corridor and would be of the same style as those found Uptown.

## NEXT STEPS

### Roadway

- Complete full buy out acquisitions associated with 184 8<sup>th</sup> Avenue and 880 2<sup>nd</sup> Street.
- Select phasing of project to align with community needs and budget limitations
- Identify corridor theme
- Collaborate with other adjacent City improvements – parks, utility infrastructure, etc.
- Complete preliminary design
- Negotiate terms with impacted Bowman Meadows Developer
- Initiate acquisitions along corridor
- Complete Final Design of selected phase(s)

### Bridge

- Complete preliminary bridge design
- Conduct borings at designed abutment locations
- Select rail, form liner, other bridge enhancements

### Environmental

Upon completion of preliminary design of the roadway and bridge, the Project Team will determine the environmental impacts within the projected study area. Based on the information developed to date, it appears over 1/2 acre of wetland but less than 500 linear feet of stream will be impacted by the project.

#### Wetland & Stream Impacts

Identify where wetlands and streams are impacted by the proposed action. Impacts to waters of the U.S., including wetlands, require permitting from the USACE prior to impact. Impacts to wetlands resulting in less than 1/2 acre and/or less than 500 linear feet of stream are typically permitted through the Nationwide Permit (NWP) process. Obtaining a NWP takes approximately 6-8 weeks from the application submittal.

If greater than 1/2 acre and/or 500 linear feet of stream is impacted, the proposed action will require an Individual Permit (IP) from the USACE as well as a 401 water quality certification from the Iowa DNR. An IP typically requires the following for submittal and approval from the USACE and Iowa DNR:

1. Wetland delineation – completed
2. Cultural resources survey – completed
3. Alternatives analysis – framework provided by this study
4. Wetland mitigation plan

An IP can typically be obtained between 6-12 months upon application submittal to the USACE and Iowa DNR.

#### Architectural Impacts

Consultation is required with the Iowa State Historical Preservation Office (SHPO) because structures identified as eligible for the National Register of Historical Places will be impacted by the proposed action. Mitigation may be required depending on SHPO determination. Mitigation ranges from documentation and publication of the history of the structure to full removal and relocation of the structure. Consultation will typically be completed in conjunction with the IP process.

Engineers Opinion of Probable Construction Costs		
Alburnett Road Extension		
Conceptual Design - Alignment 3A		
Snyder & Associates Project No. 116.0663		
September 15, 2017		
Item Number	Item Description	Estimated Cost
1	REMOVALS	\$98,000
2	EARTHWORK	\$608,000
3	SUBGRADE	\$592,000
4	STORM SEWER	\$537,000
5	PAVEMENT	\$1,374,000
6	BRIDGE / STRUCTURES	\$1,958,000
7	UTILITIES	\$246,000
8	LIGHTING	\$200,000
9	TRAFFIC CONTROL	\$65,000
10	TRAFFIC SIGNALIZATION	\$600,000
11	MISCELLANEOUS	\$1,302,000
		Sub Total: \$ 7,580,000
		Contingency (15%+-): \$ 1,137,000
		<b>Construction Sub-Total: \$ 8,717,000</b>
		Design Costs (8%): \$ 698,000
		<b>Total Project Cost: \$ 9,415,000</b>

