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Scoping Study

Fordice Road Reconstruction
From Grant Street to John Bart Road
City of Lebanon, Indiana
Boone County, Indiana

GAI Project Number: D190409.00

July 2020



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Prepared for: City of Lebanon
401 South Meridian Street
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1.0 Purpose of Report

This report is the scoping study for proposed roadway and stormwater improvements along Fordice Road. It includes the necessary background information and provides conclusions with recommendations that will be used in the development and construction of the project.

1.1 Project Location

This project is located within the City of Lebanon from Grant Street east to John Bart Road. The overall project length is approximately 0.65 miles. The project location is shown in Figure 1 and the project limits are shown in Figure 2. This project is anticipated to also include a multi-use trail along the north side of Fordice Street from N. East Street to N. Grant Street. The scope of this study is based only on the section from N. Grant Street to John Bart Road.

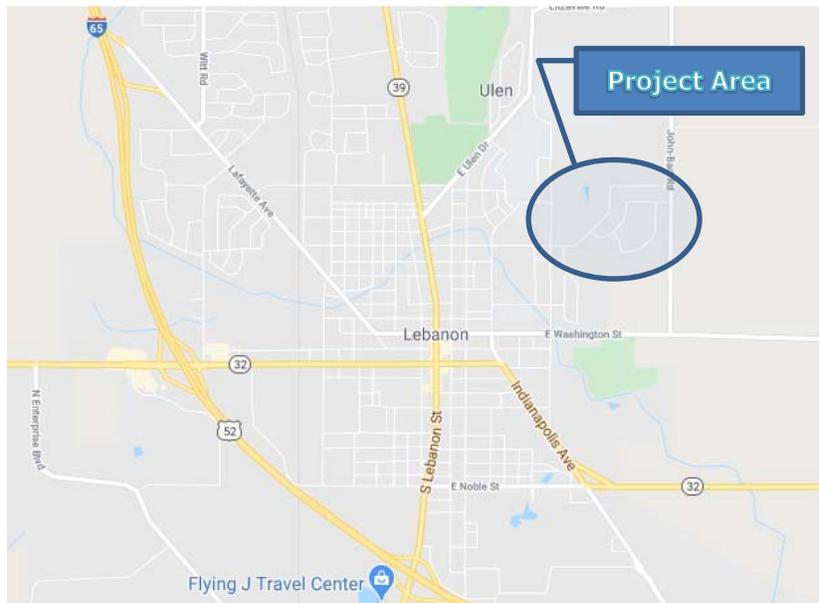


Figure 1. Fordice Road Project Location Map

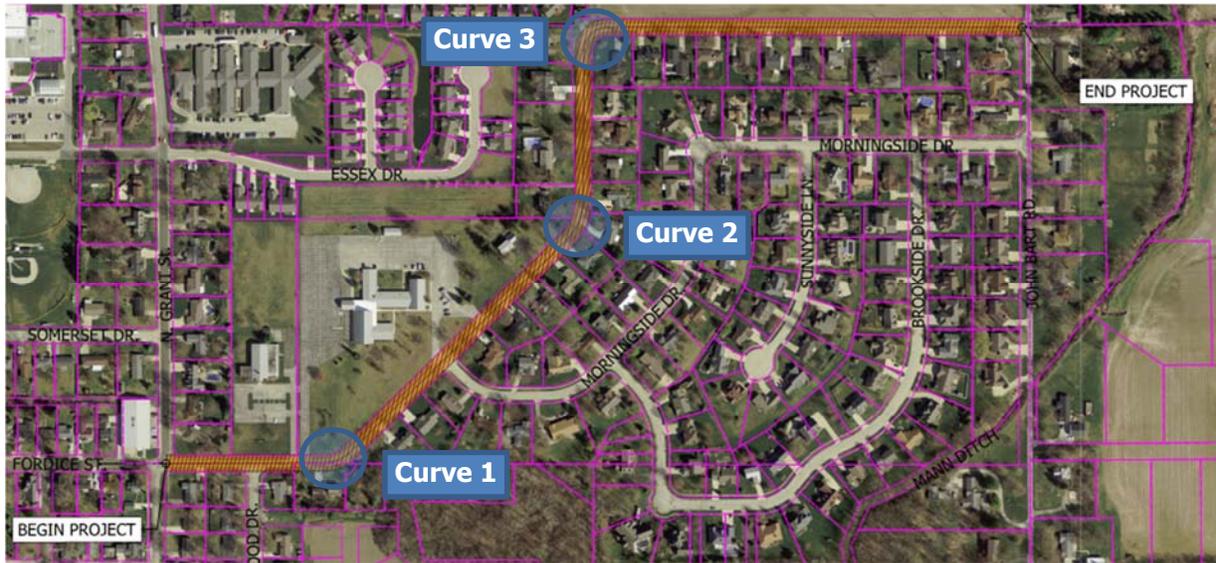


Figure 2. Fordice Road Project Limits

1.2 Project Description

Fordice Road will be rehabilitated by reconstructing the existing pavement and adding new sidewalk, curb and gutter, and storm drainage infrastructure. The addition of a multi-use trail on the west side of Fordice Road is also being evaluated. The current number of lanes will remain the same, however lanes will be widened as necessary to meet minimum lane widths. Fordice Road is currently a two-lane Urban Minor Arterial on a non-NHS route.

2.0 Project Purpose and Need

The primary purpose of this project is to improve pedestrian mobility and storm drainage along Fordice Road. Currently, Fordice Road within the project limits is drained by open roadside ditches, however the ditches are very shallow or have been partially filled in, and have mild grades. Some areas adjacent to the road are level with the roadway and have no ditch. Other areas surrounding Fordice Road have poor positive drainage and ponding is frequent next to Fordice Road and in surrounding areas.

Currently there are no sidewalks or other pedestrian facilities on either side of Fordice Road within the project limits. The roadway is bordered by residential properties on both sides, as well as the Centenary United Methodist Church and the Boone County Masonic Lodge on the west side, which owns approximately 1,325 ft. of frontage along the roadway. Therefore, there are sources and destinations for pedestrian traffic within the project limits. There are also three City Schools in close proximity to the project, which are not currently accessible by foot from the residences along Fordice Road within the project limits.

A public information meeting was held for this project at the Centenary United Methodist Church November 19, 2019. Most in attendance were agreeable that sidewalks are needed. Several in attendance also noted areas of ponding near Fordice Road in the in the neighboring subdivision along the east side of Fordice Road. Notes from this meeting are included in Appendix A.

3.0 Existing Facility

Fordice Road is an east/west city street which begins at N. Lebanon Street and extends eastward to John Bart Road for an overall length of approximately 6,250 ft. West of N. Lebanon Street, the roadway becomes W. Royal Street. The entire roadway is asphalt and has a posted speed limit of 30 mph. From N. Lebanon Street to N. East Street, the roadway is approximately 16 to 18 ft. wide with curb and gutter, and sidewalk on each side separated by a grass buffer. No parking is allowed in this section. From N. East Street to N. Park Street, the roadway is approximately 30 ft wide with curb and gutter, and sidewalk on each side. The sidewalk on the north side is adjacent to the curb and the sidewalk on the south side is separated by a grass buffer. Parking is allowed on the north side only in this section. From N. Park Street to N. Grant Street, the roadway is approximately 20 ft. wide with no curb and gutter or shoulder on either side. Sidewalk runs along the south side only, separated by a grass buffer.

Within the project limits, the roadway is approximately 20 to 21 ft. wide, with no curb and gutter, shoulder, or sidewalks on either side. No parking is allowed on either side through these limits.

3.1 Pavement Condition

The condition of the existing pavement throughout the project limits is fairly uniform. There is moderate fatigue cracking in the transverse and longitudinal directions, with alligator cracking and small potholes in isolated areas. Approximately 75% of the cracks are sealed and most cracks are narrow in width. The most evident distress is raveling and polishing of aggregate due to loss of asphalt surface binder. During a field inspection on 10/13/2019, the entire roadway within the project limits was rated at a 6, using the PASER rating system. The primary need for reconstructing the roadway is due to the need to lower the roadway to provide positive drainage, as explained in the drainage section of this report.

3.2 Local Schools

Local schools close to the project that generate significant periodic vehicular and pedestrian traffic include the Lebanon High School, the Lebanon Middle School, and Central Elementary School. The Lebanon High School is located approximately 1,200 ft. north of the west end of the project, the Lebanon Middle School is approximately 2,700 ft. north of the west end of the project, and the Central Elementary School is approximately 1,500 ft. southwest of the west end of the project.

Central Elementary School houses grades kindergarten through fifth grade and had a 2019 enrollment of 369 students. Lebanon Middle School houses grades six through eight and had a 2019 enrollment of 805 students. Lebanon High School housed grades nine through twelve and had a 2019 enrollment of 1,009 students. Central Elementary school has a one-mile walk boundary, which puts most of the houses along the project, and within the Morningside subdivision within walking distance to the school. Approximately 8 to 9 elementary students live in the Morningside subdivision and are bussed to and from school due to the fact that there are no sidewalks along Fordice Road within their route to the school. According to School Transportation Officials, bus pick-up and drop-off would still be provided, however sidewalks along Fordice Road would allow those students the option to walk to and from school. There is only one bus pick-up and drop-off along Fordice road within the project limits for a single middle school student.

Connecting streets between all three schools and the west end of the project all have existing sidewalk, therefore this project would make all three schools pedestrian accessible from the residents along Fordice Road within the project limits, and within the Morningside Subdivision.

3.3 Horizontal and Vertical Alignments

Fordice Road is generally an east to west roadway, however within the project limits, the roadway turns northeast from east of Edgewood Drive to north of Morningside Drive, then turns north for

approximately 540 ft., then turns east again for approximately 1,350 ft. Topographic survey was used to approximate a best-fit centerline alignment. There are three horizontal curves within the project limits (See Figure 2). All three curves have substandard radii. It appears only one curve (curve 3) has substandard sight distance currently (for a design speed of 35 mph), however for all curves, the sight lines fall outside of the anticipated right-of-way needed for the proposed section, meaning sight distance could be inhibited if trees or other obstructions are introduced outside the right-of-way in these areas. Table 1 provides stopping sight distance for a design speed of 35 mph according to INDOT criteria.

Table 1. Horizontal Alignment Information

Curve #	PI Station	Curve Radius (feet)		Stopping Sight Distance (feet)	
		Existing	Required	Existing	Required
1	15+49.07	150.0	340.0	>250	250
2	25+85.19	180.0	340.0	>250	250
3	31+71.90	70.0	340.0	135	250

Curves 2 and 3 should be maintained as increasing the curve radii would encroach further into residential properties and increase setback damages to the structures. It may be desirable however, to increase the radii for curve 1 to the minimum radius shown above. This was discussed at the public information meeting held November 19, 2019 as a way to bring the curve up to standard, and minimize right-of-way impacts to residences on the outside (south and east) of the curve. The area to the inside of the curve is comprised of one parcel owned by the Centenary United Methodist Church, and land improvements are farther offset from the roadway than the houses on the east side.

The possibility of shifting the roadway alignment eastward in the area between curves 1 and 2 was also discussed. However, upon completion of the field survey it was discovered that there is sufficient existing right-of-way along the east side of the road in this area to accommodate curb and gutter with separated sidewalk. Therefore an alignment shift is not recommended. Existing overhead utility poles also appear to be located at an offset that would put them in the grass buffer between the curb and sidewalk using the existing roadway centerline as the alignment. The proposed horizontal alignment with increased curve radii for curve 1 is shown in Appendix H.

3.4 Intersections

There are four at-grade intersections with Fordice Road throughout the corridor. A description of each intersection follows.

Fordice Road at Grant Street: This intersection is the western project boundary. It is an offset four-way intersection with a four-way stop. Both roadways have a single lane in each direction and no auxiliary lanes. This intersection will be reconstructed in a separate project along Grant Street in 2023.

Fordice Road at Edgewood Drive: This is a three-way intersection with Edgewood Drive intersecting Fordice Road on the south with no skew. Edgewood Drive is stop controlled and Fordice Road is free flow. Both roadways have a single lane in each direction and no auxiliary lanes.

Fordice Road at Morningside Drive: This is a three-way intersection with Morningside Drive intersecting Fordice Road on the southeast side. An entrance to the Centenary United Methodist Church is located across from Morningside Drive. Morningside Drive is stop controlled and Fordice Road is free flow. Both roadways have a single lane in each direction and no auxiliary lanes.

Fordice Road at John Bart Road: This is a three-way intersection with Fordice Road intersecting John Bart Road on the west with no skew. Fordice Road is stop controlled and John Bart Road is free flow. Both roadways have a single lane in each direction and no auxiliary lanes.

No intersection or segment traffic counts were included in the scope of this study and INDOT’s Traffic Count Database Sytem does not show any counts along Fordice Road within the project limits. There are no noted issues with congestion or accident frequency that would warrant intersection improvements including additional auxiliary lanes or changes to traffic control.

3.5 Utilities

Table 2 provides a list of utilities that exist within the project area obtained from Indiana Underground Plant Protection Service (IUPPS).

Table 2. Fordice Road Utility Information

Utility	Company	Contact	Phone Number	Email Address
Communication	AT&T - Distribution	Curtis Miller	(765) 454-4054	cm5432@att.com
Communication	Boone County REMC	Randy Campbell	(765) 483-2485	rcampbell@bremc.com
Communication	Comcast	Will Morris	(317) 275-6443	william_morris@comcast.com
Electric	Lebanon Utilities	Matt Hutton	(765) 482-8367	mhutton@lebanon-utilities.com
Sanitary Sewer	Lebanon Utilities	Ryan Ottinger	(765) 482-8751	rottinger@lebanon-utilities
Water	Lebanon Utilities	Ryan Ottinger	(765) 482-8751	rottinger@lebanon-utilities
Communication	Metronet	Korie Nellis	(812) 213-1378	korie.nellis@metronetinc.com
		Mark Deckard	(812) 253-2196	Mark.Deckard@metronetinc.com
Gas	Vectren Gas - D	Public Project	(812) 491-4765	publicproject@vectren.com
		Jon Eastham	(765) 287-2119	Jonathan.Eastham@CenterPointEnergy.com
Gas	Vectren Gas - T	Jeff Donnelly	(812) 491-5558	Jeff.Donnelly@centerpointenergy.com
		Barry Knowles		Barry.Knowles@centerpointenergy.com
Communication	Zayo Bandwidth	Waylon Higgins	(765) 341-1199	waylon.higgins@zayo.com

An initial contact was made to each utility listed on the IUPPS (Indiana 811) search, to verify if they own facilities within the project limits, and to gather any preliminary location information available. Below is a summary of the information received from each utility.

- **AT&T Distribution** –Aerial and buried lines within the project area. AT&T has provided maps of their utilities.
- **Boone County REMC** –Single phase power line along John Bart Road. A map was provided.
- **Comcast** – Utilities in the Fordice Road right-of-way from approximately Grant Street to where Fordice Road curves to the northeast and again when Fordice turns east to John Bart Road. Utility maps were provided.
- **Lebanon Utilities Electric** –Power throughout the project area. A map was provided.
- **Lebanon Utilities Sanitary** – Sewers are located in the right-of-way from Grant Street east to where Fordice Road turns to the northeast. A utility map was provided.
- **Lebanon Utilities Water** – Watermain present along Fordice Road for the project extents. A map was provided.
- **Metronet** – Both aerial and underground fiber in the project area. The aerial fiber is primarily along the road. A map was provided.

- **Vectren Gas (Distribution)** – Gas is located along Fordice Road for the entire project area. A map was provided.
- **Vectren Gas (Transmission)** – No transmission within the project area.
- **Zayo Bandwidth** – No facilities within the project area.

No utilities indicated their facilities were in easement, therefore no reimbursable relocations are expected. The City desires to relocate aerial utilities underground, therefore this will be coordinated and negotiated with the aerial utilities during project design. The maps provided by each utility are included in Appendix B.

3.6 Land Use

Land use along the project corridor is predominantly residential, but also includes agricultural, and institutional (Centenary United Methodist Church and Masonic Temple). Both agricultural areas along the project area are in the preliminary phases of development for residential subdivisions.

4.0 Design Criteria

This project is expected to be funded locally, therefore the design will follow the City’s standard drawings as well as the ITE-CNU manual, which has been adopted by the City for design of urban thoroughfares. For elements not applicable to these standards, the design will follow INDOT criteria to the extent reasonable. The design criteria listed in Table 3 will be utilized for the reconstruction of Fordice Road.

Table 3. Fordice Road Design Criteria

Design Feature	Value
Functional Classification	Minor Arterial
Urban/Rural	Urban (Intermediate)
Road Design Standards	Reconstruction
Design Speed	35 mph
Travel Lane Width	11 ft.
Travel Lane Curb Offset	0 ft.
Travel Lane Cross Slope	2%
Auxiliary Lane Width	11 ft.
Auxiliary Lane Curb Offset	0 ft.
Stopping Sight Distance	250 ft.
Intersection Sight Distance	PC: 390 ft. / SUT: 490 ft.
Minimum Radius	4% emax: 371 ft. / 6% emax: 340 ft.
Vertical Curvature (K)	Crest: 29 / Sag: 49

5.0 Drainage

The proposed roadway section will consist of curb and gutter on each side throughout the project limits regardless of sidewalk and/or trail placement. Therefore, the roadway will be drained utilizing curb inlets and a closed storm sewer system. Consequently, the roadway will be lowered slightly to provide positive drainage for the roadway.

In order to evaluate the potential drainage pattern and potential outfall locations, the existing City infrastructure in GIS was initially utilized. A map of the provided GIS data is included in Appendix C. This information was received from the City in the form of shapefiles and included all storm, sanitary, water, and electric infrastructure along Fordice Road. The shapefiles show locations of structures and

pipes; however, existing invert elevations, flow direction, and ditch information were not available with the supplied information. A topographical survey was completed in April of 2020 verifying the existing structure locations with the City’s shapefiles. The survey also provided invert elevations and pipe flow directions.

Existing inlets and storm sewer infrastructure are present on the west end of the project between Grant Street and Edgewood Drive. The remainder of the project area is drained by ditches with culverts under driveways and Morningside Drive. The primary outlet location for the swale behind the homes along Fordice is east of 919 Morningside Drive which then drains to Mann Ditch. Plan and profiles of the swale behind the homes is provided in Appendix D.1. In general the swale has positive slope to the outlet; however there is one area where the swale is relatively flat. During a July 17, 2020 phone call with Kevin Krulik, the City Engineer, it was determined that regrading of the swale would not be included in the design scope for the Fordice Road project.

Frequent ponding in the ditches is reported by homeowners. Refer to Appendix D.2 which includes pictures provided by Mr. Derek Warren, a property owner along Fordice Road, of water ponding resulting from storm events in 2014.

Multiple potential outlet points have been identified for stormwater along Fordice Road. Each option assumes that the swale in the backyards of the homes along Fordice will continue to function as it currently does without any improvements. Each potential outlet point is summarized below.

- Discharge Location 1: Proposed Grant Street stormwater system. The Grant Street storm system has an excess capacity of 4.97 cfs and 3.28 cfs for the 10-year and 100-year events, respectively. GAI will coordinate with the engineers for the Grant Street during design.
- Discharge Location 2: Existing storm sewer in Morningside Drive. The proposed storm sewer from Fordice Road will flow into the existing storm sewer in Morningside Drive. The storm sewer ultimately drains to Mann Ditch.
- Discharge Location 3: Storm sewer to Mann Ditch west of John Bart Road. Obtain easement and install a new outlet.
- Discharge Location 4: Development north of Fordice Road, east of John Bart Road. Coordinate with the developer to discharge stormwater into their proposed stormwater infrastructure.
- Discharge Location 5: Development south of Fordice Road with proposed entrance at 815 Fordice Road (the existing home will be demolished). Coordinate with developer to discharge stormwater into their proposed stormwater infrastructure.

After evaluating the potential discharge locations, the areas that could potentially drain to each location were determined and six potential drainage options were found. The options are outlined in Table 4.

Table 4. Fordice Road Proposed Drainage Options

Options	Description ¹	Discharge Locations	Appendix
Option A	<ul style="list-style-type: none"> • Fordice Road southwest of Morningside Drive will flow to proposed Grant Street system (1). • Fordice Road from John Bart Road to north of Morningside Drive will flow south into Mann Ditch (2). 	1 and 2	D.3

Options	Description ¹	Discharge Locations	Appendix
Option B	<ul style="list-style-type: none"> Fordice Road from approximately 160 feet east of Edgewood Drive to Grant Street will utilize either existing stormwater infrastructure or connect to proposed Grant Street system (1). Stormwater between Morningside Drive southwest to 815 Fordice will discharge to proposed development (5). Fordice Road from John Bart Road to north of Morningside Drive will flow south into Mann Ditch (2). 	1, 2, and 5	D.4
Option C	<ul style="list-style-type: none"> Fordice Road southwest of Morningside Drive will flow to Grant Street system (1). Fordice Road between north of Morningside Drive and where it turns east will flow to Mann Ditch to the south (2). Fordice Road from when it turns east to John Bart Road will outlet to Mann Ditch through a proposed easement to the east (3). 	1, 2, and 3	D.5
Option D	<ul style="list-style-type: none"> Fordice Road from approximately 160 feet east of Edgewood Drive to Grant Street will utilize either existing stormwater infrastructure or connect to proposed Grant Street system (1). Stormwater between Morningside Drive southwest to 815 Fordice will discharge to proposed development (5). Fordice Road between north of Morningside Drive and where it turns east will flow to Mann Ditch to the south (2). Fordice Road from when it turns east to John Bart Road will outlet to Mann Ditch through a proposed easement to the east (3). 	1, 2, 3, and 5	D.6
Option E	<ul style="list-style-type: none"> Fordice Road southwest of Morningside Drive will flow to Grant Street system (1). Fordice Road between north of Morningside Drive and where it turns east will flow to Mann Ditch to the south (2). Fordice Road from when it turns east to John Bart Road will outlet to the developer's property north of Fordice Road (4). 	1, 2, and 4	D.7
Option F	<ul style="list-style-type: none"> Fordice Road from approximately 160 feet east of Edgewood Drive to Grant Street will utilize either existing stormwater infrastructure or connect to proposed Grant Street system (1). Stormwater between Morningside Drive southwest to 815 Fordice will discharge to proposed development (5). Fordice Road between north of Morningside Drive and where it turns east will flow to Mann Ditch to the south (2). Fordice Road from when it turns east to John Bart Road will outlet to the developer's property north of Fordice Road (4). 	1, 2, 4, and 5	D.8

¹Discharge Locations are denoted in parenthesis for each section of network.

Discharge locations 1 and 4, and 5 are dependent on other projects, the time frames of the projects, and the capacity of their stormwater systems. The Grant Street project is planned to be constructed after Fordice Road therefore, a connection to the proposed Grant Street system will require temporary connections. Two potential temporary locations are outlined below:

- Temporary Connection 1: Connect proposed network to existing manhole structure #251 that eventually flows south down Edgewood Drive.

- Temporary Connection 2: Connect to existing culvert underneath Centenary United Methodist Church’s driveway. This ultimately flows west to the existing storm network that outlets to Prairie Creek.

The discharge locations listed above each have multiple watersheds that would contribute flow to them. Approximate existing flow rates for each watershed were calculated. Further analysis will be needed for proposed flow rates due to the future roadway having a curb and gutter system. The results of the existing hydrology are summarized in Table 5. Watershed delineations are included in Appendix D.9.

Table 5. Fordice Road Existing Watersheds

Watershed	Area (acres)	Flow Rate (cfs)
1	0.42	2.20
2	0.66	1.60
3	0.64	1.20
4	1.91	6.60
5	3.02	4.40
6	1.56	3.90
7	1.98	4.50
8	2.05	2.90
9	5.52	11.70
10 ¹	7.86	28.3

¹Watershed 10 is also an outlet for other watersheds, therefore the longest flow path uses watershed 9’s flow path into the swale and then to the outlet.

Areas 4 and 6 currently drain to the storm system along Edgewood Drive. Areas 1, 2, 3 and 5 currently drain to the system which outlets to Prarie Creek. Areas 9 and 10 utilize the swale behind the homes along Fordice and eventually outlet to Mann Dtich. Areas 7 and 8 do not have a clear outlet point and appear to pond in low spots within the drainage areas.

The proposed drainage options all include adding curb and gutter along Fordice Road. The watershed sizes will be approximately the same size, but the time of concentration will change with the addition of curb inlets and the amount of impervious area will also change. This will decrease the time for flow to reach the ultimate discharge location of Mann Ditch. Due to this increase in velocity, detention may be needed to store some flow before connecting into the existing networks along Morningside Drive and Grant Street.

GAI has identified four potential locations for detention. The first option would be to increase pipe sizes for inline detention underneath the roadway. The second option adds a dry detention basin along Centenary United Methodist Church’s property. The final options would be to connect to any proposed detention structures that would be installed with the development of the property north of Fordice Road or the development near 815 Fordice Road.

Based on the current information available, the recommended drainage strategy is Option C or Option D. Both of these options improve drainage along Fordice Road and provide drainage for the Fordice Road improvements. The difference between Option C and D is at the west end of the project area. Option C assumes connection to the Grant Street project whereas, Option D assumes connection to the proposed development near 815 Fordice Road. The final discharge location for stormwater between Grant Street and Morningside Drive will be determined during design. Both options include obtaining an

easement east of Jon Bart Road to add in a new discharge to Mann Ditch. This discharge will include capacity for the proposed development north of Fordice Road.

6.0 Crash Data & Analysis

The Lebanon Police Department provided data in Table 5 for all crashes recorded within the project limits from January 1, 2015 through September 30, 2019. Records show a total of six crashes over the span of 4 years and 9 months. There were no accidents recorded in 2018.

Table 5. Fordice Road Crash Data

Crash #	Crash Date	Crash Type	Location
2015-00001760	01/09/2015	Property Damage	John Bart Rd. & Fordice Rd.
2015-00026433	05/01/2015	Property Damage	921 Fordice Rd.
2016-00014829	02/28/2016	Property Damage	John Bart Rd. & Fordice Rd.
2016-00014815	02/28/2016	Property Damage	N. Grant St. & Fordice Rd.
2017-00005005	01/21/2017	Property Damage	1111 Fordice Rd.
2019-00013888	02/21/2019	Property Damage	N. Grant St. & Fordice Rd.

Four of the accidents were intersection crashes, with 2 at John Bart Road and 2 at N. Grant Street, leaving only 2 segment crashes in the 4 year and 9 month time span. This represents a very low accident history for both intersections and segments within the project limits. Based on this data, the accident frequency does not warrant safety improvements, although some planned improvements do have added safety benefits. The widening of curve #1 will improve sight distance, and the use of narrow lanes and street trees along each side of the road will provide a traffic calming effect.

7.0 Project Alternates

As noted in section 2.0, the primary needs of the project are drainage and pedestrian mobility. Pavement condition is a secondary need. Three main alternatives were considered as part of this study to address the purpose and need.

All alternates include curb and gutter, and a new storm sewer system, therefore there is no difference between the alternates based on drainage. All alternates also include full depth reconstruction of pavement due to the goal of lowering the roadway to facilitate drainage, as discussed in Section 5.

The main differences between the alternates pertain to the location of sidewalk. Therefore, as all alternates satisfy the purpose and need nearly equally, the comparison of alternates in this study serves to evaluate the differences in overall project cost, and right-of-way impacts of each alternate.

The alternates are listed as follows:

Alternate 1 – This alternate includes a 5 ft. wide sidewalk on the east side only, separated by a 5 ft. grass buffer.

Alternate 2 – This alternate includes 5 ft. wide sidewalk on each side, separated by 5 ft. grass buffers on each side.

Alternate 3 (Preferred) – This alternate includes a 5 ft. wide sidewalk on the east side, and a 10 ft. wide multi-use asphalt path on the west side.

The typical cross sections in Appendix E show the sidewalk locations for each alternate.

8.0 Right of Way Impact

Proposed right-of-way half-widths for each alternate have been shown on the typical cross sections in Appendix E. These widths have been used to estimate the cost of proposed right-of-way and the number of parcels anticipated to be impacted by each alternate. These widths were drawn on the topographic survey drawing with existing right-of-way lines and property lines shown. Wherever the proposed right-of-way fell outside the existing right-of-way, each parcel was counted, and the area between existing and proposed right-of-way was counted as new right-of-way. Wherever proposed right-of-way fell inside the existing right-of-way, it was assumed that the existing right-of-way is sufficient within that section. The existing right-of-way information was gathered during the field survey from recorded sub-division plats, right-of-way markers, and individual property plats. There appears to be approximately 26 to 30 feet of existing right-of-way along the east side of the roadway through most of the project limits. There is very little existing right-of-way along the west side of the roadway as most parcels extend to the roadway centerline. The proposed drainage outfall to Mann Ditch described in section 5 above, will affect 2 additional parcels, however a drainage easement is anticipated to be obtained from these parcels rather than fee simple right-of-way. Table 6 shows the anticipated proposed right-of-way information for each alternate.

Table 6. Fordice Road Proposed Right-of-Way

Alternate	Total Area (acres)	# of Fee Simple Parcels	# of Easement Parcels	Estimated R/W Cost
Alternate 1	1.70	14	2	\$180,060
Alternate 2	2.30	14	2	\$215,970
Alternate 3	2.52	14	2	\$229,430

All alternates affect the same 14 parcels, with 10 parcels on the west side and 4 parcels on the east side. Two parcels are commercial, owned by the Centenary United Methodist Church and the Masonic Temple, and the remaining parcels are residential. Right-of-way costs are not based on actual appraisals or comparison of land comps, but were estimated based on assumed costs per square foot for residential and commercial properties, and assumed percentages for damages and cost to cure. All costs include land acquisition service fees including title research, staking, right-of-way engineering, appraisals, negotiating, and management. Right-of-Way costs estimates are included in Appendix F.

9.0 Cost Estimate

Detailed quantities have been prepared for each alternate, and proposed construction costs estimates have been developed from these quantities. Cost estimates are included in Appendix G. Pavement reconstruction and drainage improvements account for much of the construction cost, and are common to each alternate. Table 7 shows the anticipated proposed construction costs for each alternate. All costs include a 10% contingency and are based on 2020 pay item costs.

Table 7. Opinion of Probable Construction Costs

Alternate	Road Construction	Contingency	Construction Subtotal (Rounded)
Alternate 1	\$ 1,764,141	\$ 176,414	\$ 1,940,600
Alternate 2	\$ 1,909,804	\$ 190,980	\$ 2,100,800
Alternate 3	\$ 1,924,675	\$ 192,467	\$ 2,117,200

10.0 Funding

The Fordice Road project will be constructed using all local funding. The estimates for land acquisition and construction assume no federal funding is used.

11.0 Environmental Issues

A review for potential red flags, primarily wetland features, along the project corridor was completed by GAI Environmental Services staff using IndianaMap, Indiana StreamStats, National Park Service data, IDEM's Virtual Filing Cabinet (VFC), and the Indiana State Historic Architectural and Archaeological Research Database (SHAARD). The following features were identified:

- One "notable" resource was identified along the project corridor.
- Two NWI-mapped wetlands were identified adjacent to the project corridor.

It is suggested that a routine wetland determination be completed during the environmental review to confirm any impacts to these resources that will occur as a result of this project.

Environmental documentation and regulatory permitting anticipated for this locally funded project are summarized below:

- Section 401 Water Quality Certification (IDEM) – Impacts exceeding 0.1 acre of wetland or 300 ft. of waterway will require an Individual Section 401 Permit with mitigation.
- Section 404 Permit (USACE) – Impacts exceeding 0.1 acre of wetland and 300 ft. of waterway will require mitigation. Impacts exceeding 1 acre of wetland and 1,500 ft. of waterway will require an Individual Section 404 Permit with mitigation.
- Rule 5 Construction Site Run-off Permit (IDEM) – Will be required where ground disturbance exceeds one acre. Coordination of the proposed erosion control plan and Storm Water Pollution Prevention Plan with the local Soil and Water Conservation District will be required prior to publication of the Notice of Intent and application to IDEM.

The need for a USACE Section 404 Dredge or Fill Permit is a federal action that will initiate the need for Section 106 process to ensure that the notable structure or any other archaeological features eligible for the National Register of Historic Places will be impacted by the project. Coordination with the IDNR, SHPO will likely be required for the completion of the Section 106 process prior to Section 404 permit submittal and approval.

Coordination with the IDNR, Division of Fish and Wildlife will occur for a listing of the National Heritage Database. The database will provide information on federal and state listed endangered species and high-quality natural areas that may be present near the proposed project. This information will also accompany the permit applications for agency review and approval.

A review of IDEM's Office of Water Quality Source Water Proximity Determination Tool verified that the project area along Fordice Road is not located within a Wellhead Protection or Source Water area.

One Underground Storage Tank (UST) was identified directly west of the project area and one Leaking Underground Storage Tank (LUST) was identified approximately 0.06 mile north of the project area. A review of IDEM's VFC should occur before further site investigation activities are conducted. It is recommended that additional coordination with IDEM's Office of Land Quality and site investigation activities be completed during the design phase of the project.

12.0 Comparison of Alternatives

The project alternates are introduced in Section 7 and construction and right-of-way costs are shown in Sections 8 and 9, respectively. Table 8 includes a side by side summary of the costs of each alternate.

Table 8. Alternate 1 Opinion of Probable Construction Cost

	Alternate 1 Cost	Alternate 2 Cost	Alternate 3 Cost
Road Construction	\$ 1,764,141	\$ 1,909,804	\$ 1,924,675
Contingency 10%	\$ 176,414	\$ 190,980	\$ 192,467
Construction Subtotal	\$ 1,940,600	\$ 2,100,800	\$ 2,117,200
Right of Way	\$ 180,060	\$ 215,970	\$ 229,430
Total	\$ 2,120,660	\$ 2,316,770	\$ 2,346,630

Each alternate satisfies the purpose and need by providing pedestrian facilities and improved drainage. As the same drainage approach will be used regardless of alternate, the primary components of comparison are cost, and pedestrian access and mobility.

All alternates include sidewalk on the east side due to the availability of right-of-way on the east side and the number of houses that would be directly served without needing to cross a street. Sidewalk on the east side would directly serve 28 houses, while sidewalk on the west side would directly serve 6 houses. Therefore, sidewalk on the west side only was not considered as it would directly serve less houses with a negligible cost difference, compared to alternate 1. Therefore, sidewalk on the east side only is considered the minimal improvement required to improve pedestrian mobility.

Alternate 2 would improve upon alternate 1 by directly serving an additional 6 houses on the west side, and would eliminate the need to cross Fordice Road without a stop condition. Alternate 3 would further improve upon alternate 2 by providing a wider bi-directional path on the west side. This will safely allow the separated pedestrian facility to be used by other users such as bicyclists. Due to the fact that the existing ground along each side of the roadway is fairly flat and most improvements are offset from the roadway, there are minimal ancillary impacts associated with the wider construction widths associated with alternates 2 and 3. Also due to the fact that all alternates are the same on the east side, and there is no existing right-of-way for several parcels along the west side, the number of parcels impacted for each alternate is the same. This results in similar service fees for land acquisition for each alternate and limits the difference in right-of-way costs to the differences in the amount of land required. Therefore the overall cost difference between the lowest and highest cost alternate is \$225,000. The difference between alternates 2 and 3 is only \$29,600.

Due to the small difference in cost between alternate 2 and 3, alternate 2 is not recommended, as alternate 3 would provide a wider facility serving multiple uses, for a minimal cost difference. Although alternate 1 would directly serve 28 houses, it would not provide connectivity to the Centenary United Methodist Church, which is one of the potential destinations for pedestrian traffic within the project limits, without crossing Fordice Road in a free-flow area. Alternate 3 is the recommended alternate for development and construction.

13.0 Traffic Maintenance

During construction it is recommended to close Fordice Road to through traffic throughout the limits of the project. The signed detour route would route traffic to the south to utilize N. Grant Street,

Washington Street (CR E 75N), and John Bart Road. This detour would only add 0.8 miles of distance to the standard through route.

In order to maintain access to residences, the roadway would need to be constructed half at a time. Due to the proposed alignment shift, the north (west) side of the roadway would need to be constructed first. This would allow one lane of traffic to be maintained on the existing roadway on the south (east) side of the road for access. This lane would need to be signed to be one-way, with the desired direction of travel to be coordinated with the City. A phased description of the proposed maintenance of traffic plan is as follows:

Phase 1 – Construct north (west) half of roadway and trail from the west Church entrance to John Bart Road. Maintain local access on the south (east) half of the existing roadway. Houses along the south (east) side of the road will have direct access to the existing roadway. For houses along the north (west) side of the road, construction of the new roadway will need to be gapped at each driveway to allow access through the construction zone until a time when the roadway can be constructed across their access point, as coordinated with the homeowners.

Phase 2 – Construct north (west) half of roadway and trail from Grant Street to the west Church entrance. Continue to maintain local access on the south (east) half of the existing roadway as in phase 1. Temporary wedging will need to be constructed across the newly constructed roadway at each driveway along the north (west) side of the roadway (the new roadway will be lower than the existing roadway).

Phase 3 – Construct south (east) half of roadway and sidewalk from Grant Street to John Bart Road. Maintain local access on the newly constructed north (west) half of the roadway. Temporary stone drives will need to be constructed across the excavation at each driveway along the south (east) side of the roadway.

It may be possible to combine phases 1 and 2, and eliminate the temporary accesses to the Masonic Temple and the Centenary United Methodist Church from Fordice Road by constructing a temporary to the north side of the Church parking lot from Essex Drive.

14.0 Concurrence

Kevin Krulik (City Engineer)