

# CHADWICK FLYER TRAIL US-65 CROSSING







# LOCATION STUDY REPORT

Ozark, Missouri

April 4th, 2022

Prepared by:



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### 1.0 INTRODUCTION

The primary goal of this study is to develop and evaluate overpass and underpass crossing alternative locations and methods for the Chadwick Flyer Trail at US-65 in Ozark, Missouri. The crossing is a vital connection piece for the Chadwick Flyer Trail which is ultimately going to provide an important bicycle and pedestrian corridor between the cities of Springfield and Ozark, Missouri. A high-level interchange alternative study was also developed to determine an appropriate location and program budget for a separated trail crossing of US-65 adjacent to the future Longview Road interchange.

Regular meetings were held between CMT and a core group of stakeholders including the Ozarks Transportation Organization (OTO), the City of Ozark, Ozark Greenways, and the Missouri Department of Transportation (MoDOT) to develop and lead the project study.

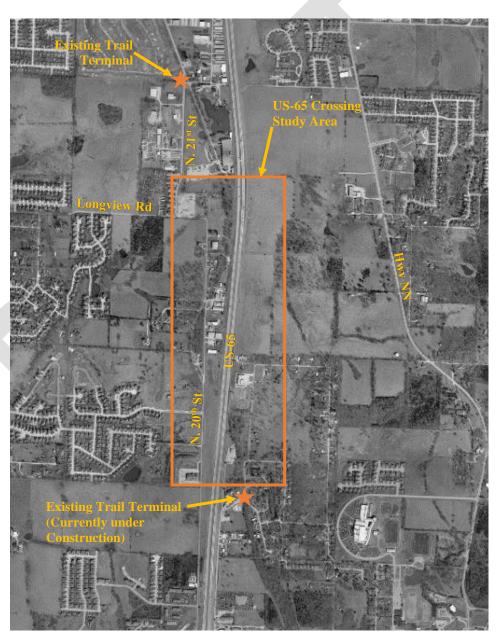


Figure 1: Chadwick Flyer Trail Crossing Project Corridor

### 2.0 PURPOSE AND NEED

The OTO Trail Investment Study completed in October 2017 identified the Chadwick Flyer Trail as a priority trail alignment for the region. This trail, once completed, will provide an important regional bicycle and pedestrian connection between the cities of Springfield and Ozark, Missouri. Once a section of the former Frisco rail system named the "Chadwick Flyer," the old rail corridor was identified as a guiding alignment for the Trail.

The Chadwick Flyer Trail is a key priority for many local and agency partners, with a focus on the following community benefits:

- Utilize an important piece of Ozarks transportation history by utilizing much of the former Chadwick Flyer Rail corridor as the basis for the proposed trail alignment
- Promote regional connection for multi-use transportation by connecting the cities of Springfield and Ozark, Missouri
- Provide a safe transportation corridor for all trail users through congested urban and suburban areas.

With US-65 effectively dividing the trail corridor in two, a grade-separated crossing of the high-volume highway is a critical piece of the Chadwick Flyer Trail corridor. With much of the abandoned railroad right-of-way now owned by various third parties, exploration of several crossing locations and methods is warranted.

As such, the Ozarks Transportation Organization (OTO) contracted Crawford, Murphy & Tilly (CMT) to conduct a study to determine the safest and most practical location and method for the crossing of US-65 by the Chadwick Flyer Trail in Ozark, Missouri that aligns with the community benefits described above.

### 3.0 ALTERNATIVES ANALYSIS

### 3.1 PROPOSED DESIGN CRITERIA

The proposed Chadwick Flyer Trail crossing at US-65 will be a multi-use trail facility serving predominantly bicycle and pedestrian traffic. In accordance with design sources as noted, the following standards will be used when designing this facility:

Criteria	Standard	Source/Remarks
Bicycle Design Speed	30 mph (max.) 18 mph (min.)	AASHTO Bicycle Facilities Guide
Design Bicycle Lean Angle	20°	AASHTO Bicycle Facilities Guide
Superstructure Clearance Over Roadway	17'-6"	MoDOT EPG (Sec. 751.1.2.6.1)

		,
Minimum Structure Width	14'-0" (10' two-way bikes	AASHTO Bicycle Facilities Guide
	& 2' shy distance)	This is a biegere i demines durine
Minimum Path Width	10'-0"	OTO Bicycle & Pedestrian Trail
William Fam Widdi	10 -0	Investment Study, ADA
Minimum Path Radius	60'-0''	AASHTO Bicycle Facilities
William Fam Radius	00 -0	Guide, ADA
Maximum Path Cross Slana	2%	OTO Bicycle & Pedestrian Trail
Maximum Path Cross Slope	270	Investment Study, ADA
Minimum Path Shoulder Width	2'-0"	OTO Bicycle & Pedestrian Trail
William Fam Shoulder Width	2 -0	Investment Study
Standard Maximum Path Grade	5%	AASHTO Bicycle Facilities Guide
Standard Maximum 1 am Grade	(1% at structures)	AASITTO Bicycle Pacificles Oulde
	0' to $2' - 6:1$ or flatter	
Foreslopes (Fill)	2' to $5' - 4:1$ max.	
	>5' - 3:1 max.	AASHTO Bicycle Facilities Guide
		& OTO Bicycle & Pedestrian Trail
	0' to $2' - 6:1$ or flatter	Investment Study
Backslopes (Cut)	2' to $5' - 4:1$ max.	
	>5' - 3:1 max.	
Path Clear Zone Width	2'-0"	AASHTO Bicycle Facilities Guide

Table 1: Proposed Design Criteria

### 3.2 ALTERNATIVES DEVELOPMENT

Initially, several locations were explored for the Chadwick Flyer trail to cross U.S. Highway 65, but were dismissed early on due to topographic complications, residential or commercial property impacts, or significant associated costs. These locations included various points along US-65 between the original Chadwick Flyer Rail location and the Tracker Marine property. Although undeveloped land largely exists on the east side of US-65 in this area, a high density of established residences and businesses closely abut US-65 on the west side which makes establishing reasonable trail geometry a challenge and would likely require long structure lengths with high costs due to the required skew angle. Other options were explored where undeveloped land could be better utilized, however discussions with the core group identified a desire to consider future economic development opportunities in the immediate area. Due to trail geometry and the long approach lengths for overpass and underpass alternatives to meet required clearances, significant right-of-way would be needed to construct the crossings. Underpass crossings generally have smaller footprints due to shorter clearance requirements, however roadside ditches along US-65 and the condition of adjacent topography would require significant right-of-way or permanent easement to properly convey the water from MoDOT right-of-way to the appropriate and feasible downstream location. This initial investigation resulted in three crossing alternatives to be carried forward for further study:

- Option 1 Overpass structure near original Chadwick Flyer Rail alignment at US-65
- Option 2 Underpass structure near original Chadwick Flyer Rail alignment at US-65
- Option 3 Overpass structure adjacent to future Longview Rd & US-65 interchange

Vertical profiles and approximate grading limits were developed to evaluate potential right-of-way impacts and magnitude of cost for each alternative.

Alternatives were developed consistent with the AASHTO Guide for the Development of Bicycle Facilities (2012, 4<sup>th</sup> Edition), the OTO Trail Investment Study (October 2017), and MoDOT's *Engineering Policy Guide (EPG)*. Appendix A shows detailed conceptual layouts of the alternatives that were further analyzed.

### 3.3 OVERVIEW OF ALTERNATIVES

# Option 1 – Overpass Structure Near Original Chadwick Flyer Rail Alignment at US-65 (South Overpass)

Appendix A - Option 1 Exhibit and Figure 2 below show the conceptual layout. Major features of Option 1 include:

- Approximately 275-foot ADA-compliant bike/ped bridge over US-65 with 14-foot width for 10-foot trail width and 2-foot shy distance on each side
- Earth embankment on bridge approaches with safety rail along trail, 3:1 side slopes and a maximum 5% trail profile grade for ADA compliance
- Accommodations for US-65 drainage discharge on the south bridge approach
- Total length of improvements of approximately 1,910 feet for construction of the overpass structure and trail approaches

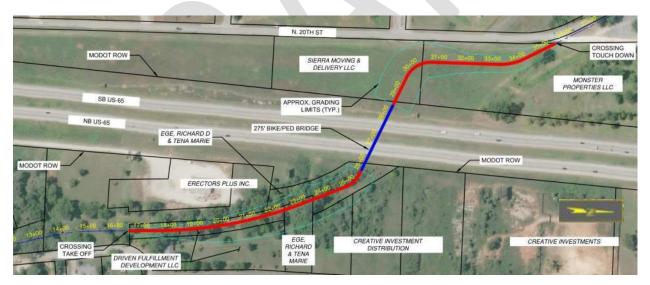


Figure 2: Crossing Option 1 – South Overpass

### **Benefits**

- Closely follows the original Chadwick Flyer rail alignment
- Provides a more isolated user experience versus following an adjacent roadway
- Independent of future Longview Road and US-65 interchange which will allow for minimal trail closures during construction of the interchange
- Less significant impact to US-65 traffic operations during construction versus an underpass option

• Opportunity for enhanced aesthetics to promote the trail and provide an attractive monument along US-65

### Disadvantages

- Narrow right-of-way on south bridge approach may require impacts to adjacent properties if retaining walls or an elevated trail concept are not utilized
- Bridge will be at a skew with relation to US-65 to limit right-of-way impacts and provide a better trail user experience

# Option 2 – Underpass Structure Near Original Chadwick Flyer Rail Alignment at US-65 (South Underpass)

Appendix A - Option 2 Exhibit and Figure 3 below shows the conceptual layout. Major features of Option 2 include:

- Approximately 243-foot ADA-compliant box culvert sized to accommodate bicyclists constructed under US-65
- Special ditch profiles and other grading to accommodate drainage through the box culvert from US-65 roadside ditches
- 5% maximum trail profile grades for ADA compliance
- Total length of improvements of approximately 825 feet for construction of the box culvert and trail approaches

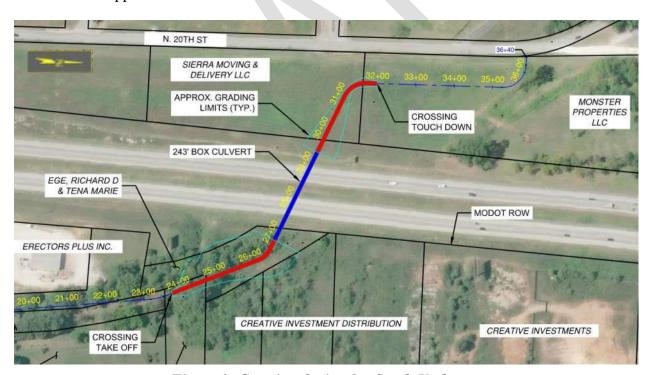


Figure 3: Crossing Option 2 – South Underpass

### **Benefits**

- Less impact to adjacent parcels due to shorter take-off and touchdown limits of approaches to the box culvert
- Reduced maintenance costs

### **Disadvantages**

- Less opportunity for enhanced aesthetics for trail users and exposure to traveling public on US-65
- Poor user experience for pedestrians and bicyclists traveling underground for approximately 240 feet under US-65
- Greater impact to traffic operations on US-65 for construction of the box culvert. This would require an open cut of the roadway for installation and utilize significantly more traffic control
- Avoiding a newly installed water main west of US-65 could require slower bicycle design speeds of the trail while approaching the underpass to achieve a more perpendicular crossing of US-65 while limiting excavation limits of the trail construction

## Option 3 – Overpass Structure Adjacent to Future Longview Rd & US-65 Interchange (North Overpass)

Appendix A-Option 3 Exhibit shows the conceptual layout. Potential future interchange configurations were explored and developed as part of the Option 3 evaluation and summarized in the Interchange Alternatives Executive Summary seen in Appendix B. Major features of Option 3 include:

- Approximately 362-foot ADA-compliant bike/ped bridge over US-65 and future Longview Road interchange ramps with 14-foot width for 10-foot trail width and 2-foot shy distance on each side
- Earth embankment on bridge approaches with safety rail along trail, 3:1 side slopes and a maximum 5% trail profile grade for ADA compliance
- Chadwick Flyer Trail stays on east side of US-65 to the south prior to crossing
- Total length of improvements of approximately 1,960 feet for construction of the overpass structure and trail approaches

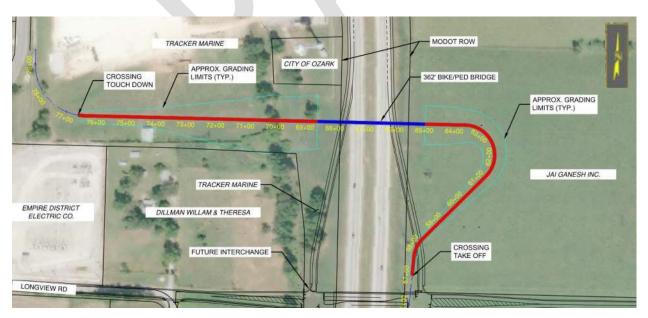


Figure 4: Crossing Option 3 – North Overpass

### **Benefits**

- Trail users would cross US-65 closer to a future interchange which may promote more use of the bridge structure and/or Chadwick Flyer Trail
- Lesser impact of trail alignment on established parcels west of US-65
- Opportunity for enhanced aesthetics to promote the trail and provide an attractive monument along US-65

### Disadvantages

- The bridge would need to be longer and thus more expensive than the Option 1 overpass due to accommodation of the future interchange ramps. Details about the US-65 and Longview Road future interchange can be found in the Interchange Executive Summary located in the appendix.
- Trail users would travel adjacent to US-65 and the user experience would lack a feeling of off-road or isolation from traditional roadway corridors
- Longer trail closures would be expected during construction of the future Longview Road interchange due to a need for significant reconstruction of the trail alignment.

### 3.4 MAINTENANCE OPERATIONS

### <u>Prefabricated Steel Overpass Structures</u>

The baseline design for overpass structures assumes the selection of a prefabricated steel bridge to achieve the long spans across US-65 in a cost-effective and efficient manner. Depending on the type of prefabricated structure type and bridge deck material chosen, a variety of maintenance activities should be considered to prolong the life of the structure. Such activities should include:

- Annual inspection of all safety rails, handrails, rubrails, fencing or other types of safety features
- Annual inspection of all deck surfaces for gaps, cracks, or projections to maintain a safe structure and ADA compliance of the trail
- Annual inspection of decking to ensure it is in satisfactory condition
- Annual inspection of steel structure surfaces, welded and bolted connections, any impact damage from strikes, abutments and bents, bearings and expansion joints, and any other structural component of the bridge
- Re-painting of painted structures every 5-10 years, depending on realized deterioration during annual inspections
- Rinsing of the steel surfaces on weathering steel bridges frequently if de-icing salts are used. This can severely damage the weathering steel
- Removal of vegetation or debris from weathering steel surfaces to encourage naturally
- Replacement of wood decking planks that have deteriorated past a useful and safe life or have cause unacceptable gaps, faults, or other uneven or slippery surfaces for ADA compliance
- Annual inspection of concrete or asphalt decking for excessive cracking and deterioration and replacement of failing pavement

Annual maintenance costs for prefabricated steel structures in Option 1 and Option 3 are estimated to be between \$2,500 and \$5,000 per year. The actual realized maintenance costs will depend on the preferred structure type, additional aesthetic enhancements to the bridge requiring maintenance, unfavorable or unexpected environmental impacts, and frequency of routine maintenance activities. Additional costs beyond regular maintenance such as replacement or repair of structural elements,

safety features, or other non-annual maintenance activities to preserve the structure are not included in the estimated regular maintenance costs.

### Concrete Box Culvert Underpass Structure

The baseline design for the underpass structure assumes use of a reinforced concrete box culvert large enough to accommodate bicyclists for vertical clearance and shy distance on either side of the trail. Due to the topography west and east of US-65 at the crossing location, excavation below grade would be required for the structure approaches to avoid any impacts to the US-65 roadway pavement structure. This will inherently introduce drainage from the US-65 roadside ditches and adjacent parcels into the box culvert. The following maintenance activities should be expected on the box culvert underpass option:

- Regular flushing of debris and sediment from the box culvert to maintain normal flow and avoid ponding on the trail surface
- Regular inspection of the box culvert condition should take place every five years. Specific
  items to evaluate and assess should include corrosion of concrete or reinforcement, abrasion
  of the culvert surface, coating loss of the culvert walls, cracks, joints, seams, changes in shape
  or deflection, undermining of the culvert, and other structural elements of the culvert.

Annual maintenance costs for the box culvert in Option 2 are estimated to be between \$1,000 and \$2,000 per year. Actual realized maintenance costs may differ depending on frequency of maintenance activities or unexpected environmental factors such as frequent rain events that may cause more frequent maintenance efforts. Additional costs beyond regular maintenance involving replacement or repair of structural elements, safety features, or other components of the structure are not included in the estimated regular maintenance costs.

### Other General Maintenance Activities

Outside the limits of the overpass and underpass structures, general maintenance of City-owned right-of-way and trail pavement will be required. Expected activities may include:

- Mowing, trimming or pruning of grasses, trees, shrubs or other vegetation will be required on regular intervals to prevent overgrowth on the trail surface or impacts to bicyclist clerances
- Regular inspection of trail pavement surface to discover and replace concrete or asphalt pavement causing gaps, tripping hazards, or slippery surfaces deemed out of compliance by ADA standards
- Regular flushing of drainage culverts to prevent sedimentation within the pipe and sediment removal of inlet or outlet rock linings
- Replacement of lighting elements

Costs associated with general maintenance activities of the trail outside the structure limits would be in addition to other similar City maintenance activities already being performed. Due to the increase right-of-way area for crews to maintain, the annual cost to maintain the trail outside the structure limits are estimated to be between \$2,000 and \$5,000 per year. Actual realized costs will depend on amount of vegetation present and higher than expected deterioration of the trail pavement surface. Additional costs beyond regular maintenance involving replacement or repair of structural elements, safety features, or other components of the structure are not included in the estimated regular maintenance costs.

### 3.5 COST ESTIMATES

In order to evaluate and compare the costs of the trail alternatives, high-level conceptual construction costs were determined for each alternative. A fully developed program cost estimate that includes construction, preliminary engineering, construction engineering, right of way, right of way incidental, and utility relocation costs was not performed until the core group agreed on a recommended alternative. A full program budget was performed on the recommended alternative and this budget can be found in Section 4.0 of this report.

The following estimated construction costs were developed for each option:

	Option 1 -	Option 2 -	Option 3 -
	South Overpass	South Underpass	North Overpass
Total	\$2,755,000	\$2,775,000	\$3,585,000

Table 2: Estimated Construction Costs for Each Crossing Option

### 3.6 UTILITY IMPACTS AND RELOCATIONS

Utility impacts are estimated to be minimal at the south crossing alternatives given the absence of many aerial or underground utilities. The City of Ozark recently installed a water main under US-65 north of the proposed overpass and underpass options (Options 1 and 2) which could require encasement of the pipe if large fills or loads were added atop the pipe location. However, it is anticipated that the trail crossing layout can be revised in future design phases to minimize or avoid impacts to the newly installed water main infrastructure. Other public or private utilities such as sanitary sewers or gas mains were not visible during a desktop review of the site and are not expected to have significant impacts as part of either crossing option. A more thorough field investigation should be anticipated in the future to locate any unexpected utilities in the area.

An existing electrical substation at the northeast corner of N. 21<sup>st</sup> Street and Longview Road contributes to aerial utilities present at the north overpass (Option 3) site. These aerial utilities run east-west along the Longview Road corridor and cross US-65 before branching off into north-south lines. Relocation of these distribution lines would be required as part of the Option 3 option. Other public or private utilities such as sanitary sewers or gas mains are not expected to be impacted for the Option 3 crossing, but are present closer to the N. 21<sup>st</sup> Street and Longview Road corridors. With underground utilities present nearby, a more thorough field investigation should be anticipated in the future.

### 3.7 RIGHT-OF-WAY IMPACTS

Each crossing option was evaluated with a baseline design including 3:1 fill slopes with earthen embankments for the overpasses and 3:1 cut slopes for the underpass. This design method is more intrusive on adjacent right-of-way but can be significantly more cost-effective than its structural alternatives such as retaining walls or bridges. The concept drawings in Appendix A visually reflect the slope limits evaluated for each crossing option.

Options 1 and 2 closely follow the original railroad right-of-way which has since been abandoned and is owned by private third parties. Due to the narrow and relatively unusable nature of the resulting parcels on the east side of US-65, full takings of these parcels are expected regardless of the approach option chosen (sloped or structural approaches). The west side of US-65 contains larger, more usable parcels and the trail approach type could limit impacts with higher construction costs.

Option 3 differs from the other options due to its distance away from the original Chadwick Flyer railroad corridor. This crossing alternative would leave more freedom for a larger embankment footprint on the east side, but the west side would significantly impact the Tracker Marine parcel with high embankments. As with Options 1 and 3, other structural alternatives could be chosen to limit right-of-way impacts on trail approaches to the overpass structure, but would require additional construction costs to do so. Option 3 would also require significant dedicated right-of-way from the immediate crossing location to the existing trail terminals north and south of the study limits. Unlike Options 1 and 2, the trail would not have any existing roadways or old railroad corridors to follow and would need significant donations or takings to implement.

The following table summarizes the total estimated right-of-way acquisition required for each crossing alternative within the crossing limits only. Right-of-way acquisition totals for the remaining trail gap are not included:

	Option 1 -	Option 2 -	Option 3 –
	South Overpass	South Underpass	North Overpass
Estimated Right-of-Way Acquisition Area (Acres)	6.3 AC	1.7 AC	6.9 AC

Table 3: Program Budget for Preferred Crossing and Alternative Section 2 Alignments

### 3.8 AESTHETICS

The proposed alternative construction costs are based on a baseline design of a standard pre-fabricated pedestrian structure with no aesthetic upgrades and the utilization of 3:1 fill slopes for the take off and touch down rather than MSE walls or elevated trail. Additionally, no extra costs were estimated for specialized signage or elements along the trail. If aesthetic elements are desired, any associated costs from the aesthetic elements will be above and beyond the construction costs shown above and in Appendix A.

The OTO hosted a Visioning Committee meeting on January 6, 2022 that consisted of local stakeholders. No decisions were made with regards to aesthetic enhancements on the overpass structure but ideas were noted for further discussion.

\*\*Include additional information and results from future public engagement session regarding aesthetic enhancements upon completion.

### 3.9 SATISFACTION OF THE PURPOSE AND NEED

The proposed separated grade crossing of the Chadwick Flyer Trail at US-65 provides a safe, multimodal transportation alternative for the planned bicycle and pedestrian corridor between the cities of Ozark and Springfield, Missouri. The three options evaluated as part of this study satisfy the purpose and needs of the trail corridor.

### 4.0 RECOMMENDED ALTERNATIVE

An evaluation matrix was developed to summarize the advantages of each crossing alternative as it relates to five important criteria set forth by the Ozarks Transportation Organization (OTO) at the start of the study. Those five criteria include: cost, safety, aesthetics, maintenance, and user comfort. The following matrix indicates the south overpass (Option 1) as the preferred alternative with the most benefit.

	South Overpass	South Underpass	North Overpass
Cost	3	3	1
Safety	3	3	3
Aesthetics	3	1	3
Maintenance	2	3	2
User Comfort	3	1	3
<b>Total Score</b>	14	11	12

Table 4: Evaluation matrix with scoring to indicate a preferred alternative with relation to five categores.

3=Most Advantageous, 1=Least Advantageous

The South Overpass alternative provides a safe and economical crossing of US-65 while also providing a level of aesthetic customization to make the crossing a signature piece along the Chadwick Flyer trail corridor. Unlike the North Overpass option, the South Overpass closely follows the original Chadwick Flyer Rail alignment and pays homage to the rail line that was once prominent in the area. This overpass offers ample opportunity to provide aesthetic elements highlighting the railroad history and bringing attention to the trail corridor. This aesthetic enhancement is more challenging with the South Underpass and lacks the same effect when done at the North Overpass due to its location away from the original rail line. Historical elements aside, the South Overpass alternative provides a more isolated user experience off-alignment from adjacent roadway corridors when compared to the North Overpass, and decreases complications and costs when staying away from the future US-65 and Longview Road interchange. Due to all these factors, the South Overpass alternative is the recommended alternative to carry forward as the preferred method and location for the crossing of US-65.

A refined conceptual cost estimate was developed for Option 1 (South Overpass) as the preferred alternative, and was provided to the OTO for program budgeting purposes. The estimate includes three structure width options to accommodate any future trail standard updates, along with two trail alignment options to the north of the overpass limits. This refined cost estimate for Option 1 is attached in Appendix C.

### 5.0 ENVIRONMENTAL CONSTRAINTS SUMMARY

A high-level environmental review was performed as part of this conceptual study with the assumption that federal permits or funding may be sought out for future design or construction of the Chadwick Flyer Trail crossing of US-65. The review was performed to identify constraints for both the crossing alternative locations and the trail alignment alternatives leading to each crossing.

The environmental review included the following environmental categories summarized below. Some of these constraints can be found in the environmental constraints map in Appendix D.

### 5.1 NOISE ASSESSMENT

This project would be classified as a Type II project which means a noise analysis would not be required.

### 5.2 SECTION 4(F) AND SECTION 6(F)

No 4(f) or 6(f) resources were identified within the project study area.

### 5.3 THREATENED AND ENDANGERED SPECIES

According to a USFWS Information for Planning and Consultation (IPaC) review, the following federally-listed species may occur in the study area:

- Indiana bat (*Myotis sodalist*, endangered), Northern long-eared bat (*Myotis septentrionalis*, threatened)
  - o Tree clearing of suitable habitat will require seasonal restrictions
- Gray bat (*Myotis grisescens*, endangered)
  - o Project alignment will need to be assessed in the field for suitable cave habitats
  - o MDNR GeoSTRAT reports no sinkholes in the study area
- Ozark cavefish (*Amblyopsis rosae*, threatened)
  - Based on a high-level review, cave streams are not likely to be located within the study area. A closer field evaluation will be required to confirm absence of suitable habitats

Further coordination will be required with MDC Natural Heritage Review to determine if there are records of federally or state-listed species or state-ranked species near the preferred trail alignment.

### 5.4 404 PERMIT – WETLANDS/STREAMS

Multiple National Hydrography Dataset (NHD) streams and National Wetland Inventory (NWI) wetlands are mapped within the study area. The South Overpass crossing alternative crosses one mapped stream, the South Underpass alternative does not impact any streams or wetlands, and the North Overpass may impact one mapped wetland area. Conceptual trail alignments beyond the crossing alternatives limits cross two mapped stream and impact one mapped wetland area. Based on aerial imagery, these features may no longer be present along the alignments. Field investigation will be required to determine if streams and wetlands are present. Impacts to federally jurisdictional streams and/or wetlands will require compliance with 404/401 permitting

### 5.5 CULTURAL RESOURCES

If the project requires a federal permit or receives federal funding, an architectural and/or archaeological survey will likely be needed for the proposed alignment along the former railroad bed and areas previously undisturbed.

### 5.6 FLOODPLAIN

FEMA floodplain areas are located within the western portion of the study area. The proposed alignments do not cross the floodplains. Any construction within a floodplain will require a floodplain development permit.

### 5.7 HAZARDOUS WASTE SITES

Based on the MDNR Environmental Site Tracking and Research Tool (E-Start), one former underground storage tank (UST) is mapped within the study area. The site is mapped in the new residential development in the northwest corner of the study area and should have no impact on the project.

### 5.8 FARMLAND

Study area is located within the designated urbanized area of Springfield, MO. Project will not be subject to Farmland Protection Policy Act.

### 6.0 PUBLIC INVOLVEMENT

Public Involvement for this project is currently ongoing. Upon completion of the public involvement, this section will be updated with the final results of the survey and a summarizations of comments heard.

### 7.0 FULL TRAIL SECTION

The original study limits for the project focused on the location and method for the crossing of U.S. Highway 65 by the Chadwick Flyer Trail as summarized above. However, the core group decided that

the preliminary study of the trail segments needed to connect the existing trail termini with the crossing location take off and touch down points was necessary to determine overall feasibility and costs. A summary of the sections evaluated is outlined below:

- Section 1 Begins at the existing trail terminal at W. Garton St. and follows the Tracker Marine frontage to connect with Section 2A or 2B
- Section 2 (2A & 2B options) Two alignment options from Section 1 to the preferred South Overpass alternative
- Section 3 South Overpass location evaluated during the Crossing Study and the approximate section limits
- Section 4 Connects Section 3 to the trail terminal at Clay St.

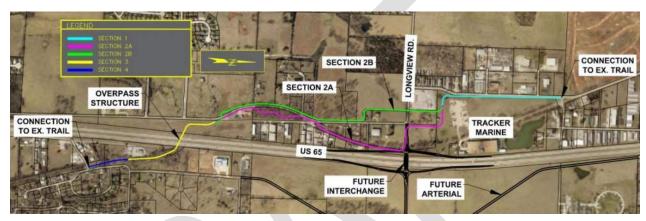


Figure 5: Preferred Crossing and Alternative Section 2 Trail Alignments

Section 2A partially utilizes the original Chadwick Flyer railroad alignment and provides an enhanced user experience for bicyclists and pedestrians by going off-alignment of adjacent roadways. Section 2B follows the west side of N. 20<sup>th</sup> St. and deviates from the original railroad alignment to skirt the east side of a future development southwest of the N. 20<sup>th</sup> St. and Longview Rd. intersection. Further evaluation of Section 2A identified opportunity for use of an existing wooded parcel east of N. 20<sup>th</sup> St. for an improved user experience and the potential for park land or Chadwick Flyer trailhead parking.

Program costs for each section, including Sections 2A and 2B as separate alternatives, are listed below for the recommended Option 1 (South Overpass) crossing alternative. These program costs are intended to recommend a high-level programming budget for the trail gap and may increase with the inclusion of aesthetic enhancements, more expensive structure approaches, increases in property values, or other factors. A detailed estimate of the full program costs for each section and the entire project from existing trail connections (for the baseline and additional designs) can be found in Appendix E.

	Section 1 Program Budget	Section 2A Program Budget	Section 2B Program Budget	Section 4 Program Budget
<b>Construction Cost</b>	\$372,525	\$614,160	\$572,760	\$165,576
Preliminary Engineering	\$37,253	\$61,416	\$57,276	\$16,558
Construction Engineering	\$37,253	\$61,416	\$57,276	\$16,558
Right-of-Way	\$0	\$520,000	\$223,000	\$125,000
Right-of-Way Incidentals	\$0	\$30,000	\$55,000	\$5,000
Utility Relocation Costs	\$100,000	\$100,000	\$150,000	\$10,000
TOTAL	\$547,030	\$1,386,992	\$1,115,312	\$338,691

Table 5: Program Budgets for Sections 1, 2 (2A & 2B), and 4

	Section 2A Alignment	Section 2B Alignment
Entire Trail Program Budget (Connection to Connection)	\$6,520,000	\$6,240,000

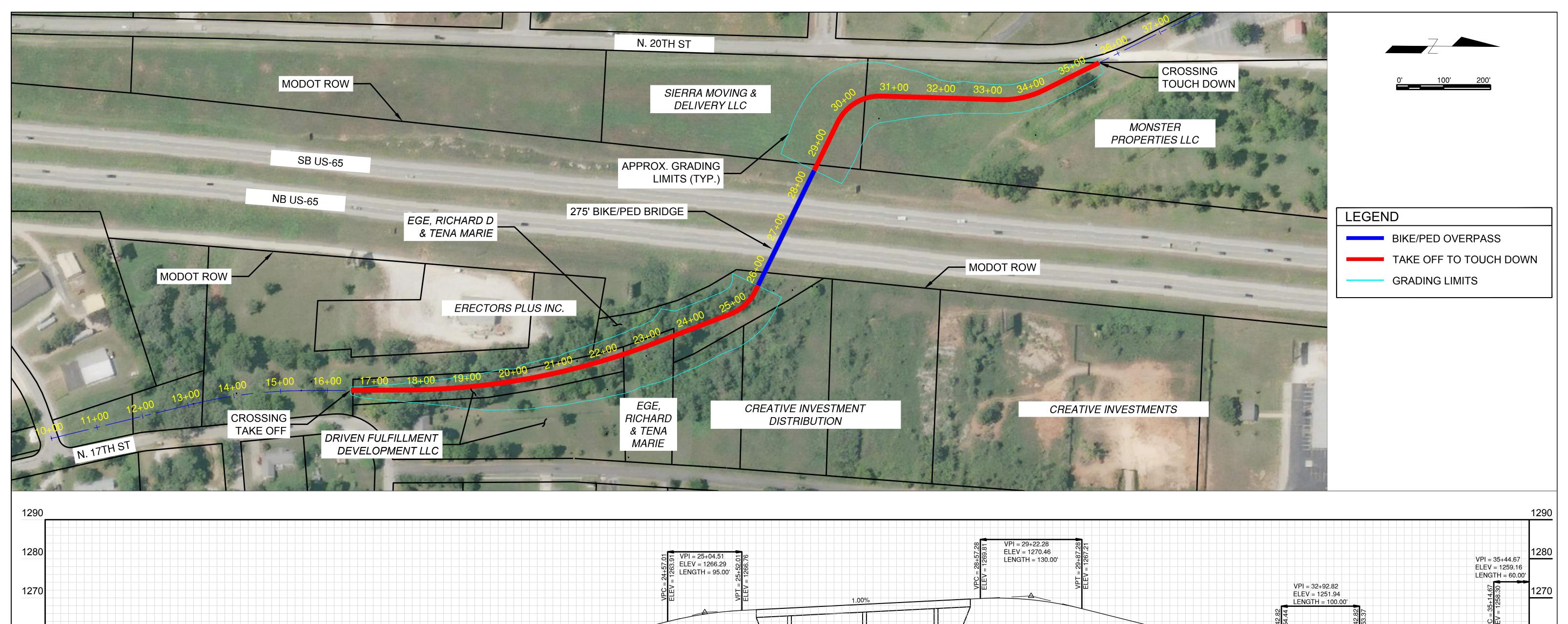
Table 6: Program Budget for Preferred Crossing and Alternative Section 2 Alignments (Baseline Design for Section 3)

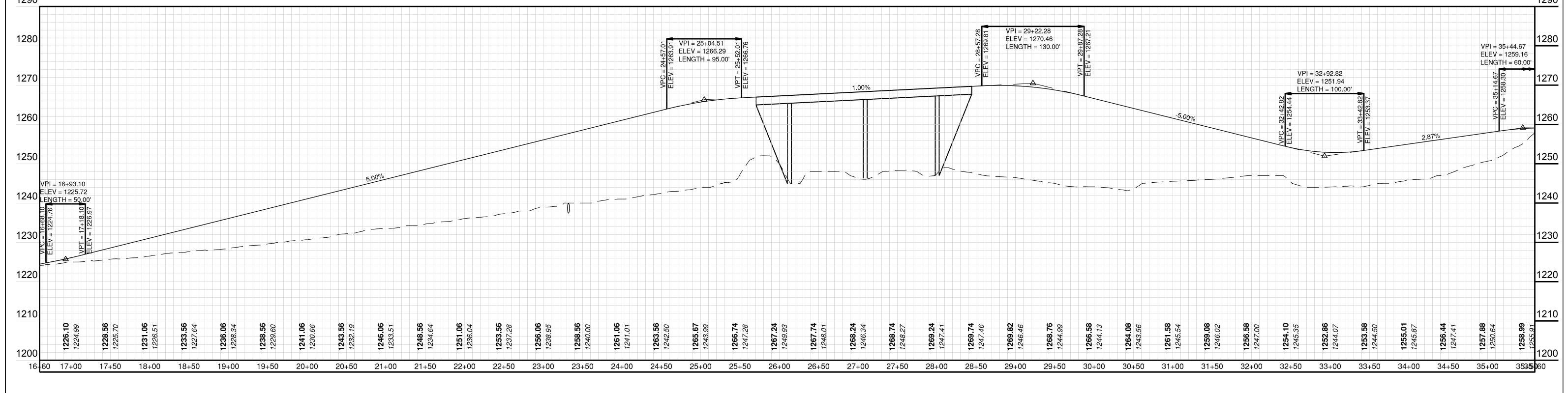
Submitted by:

Ryan Stehn, P.E.

CMT Project Manager

# **APPENDIX A**



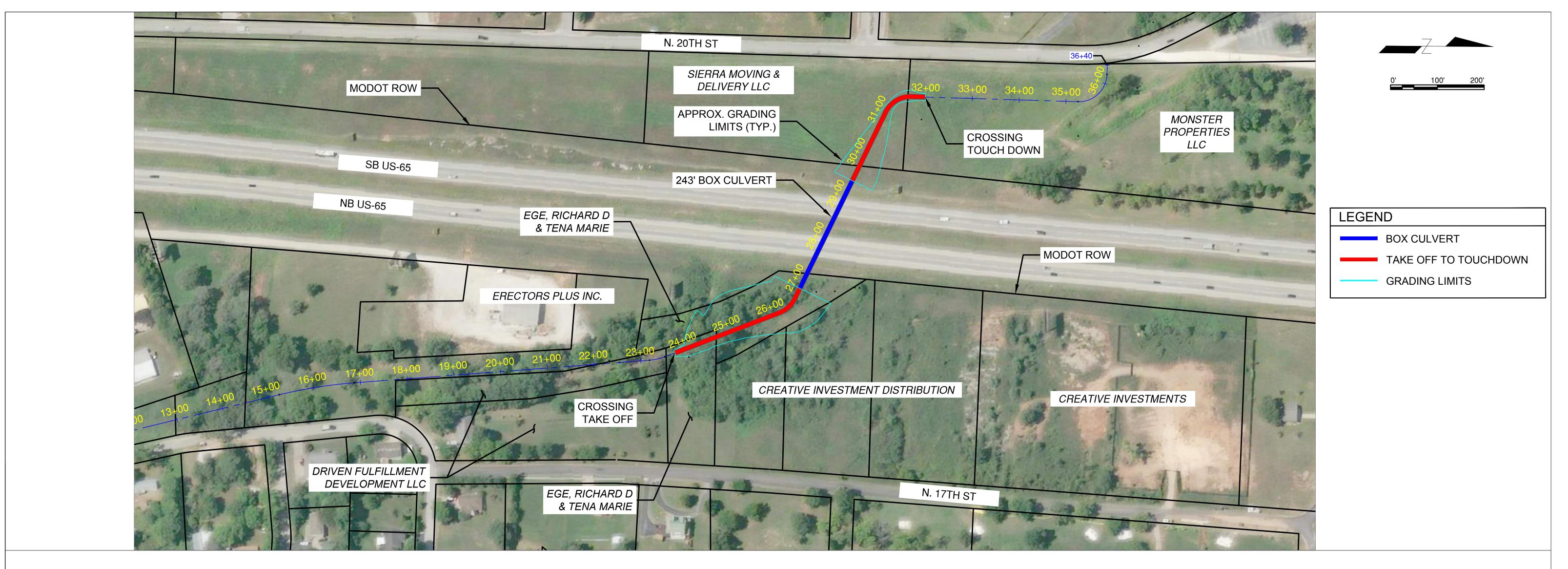


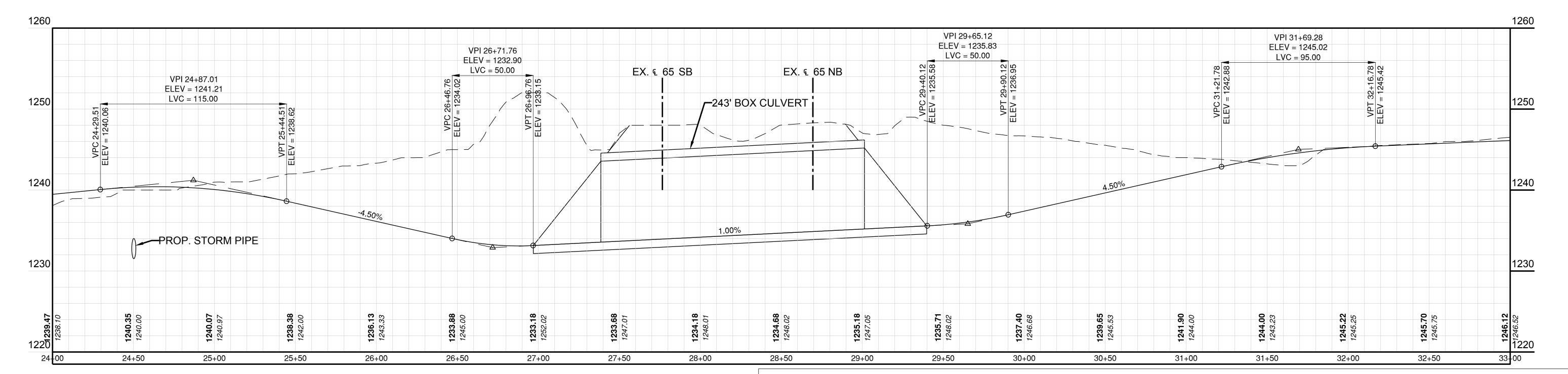
CROSSING OPTION 1
SOUTH
OVERPASS STRUCTURE









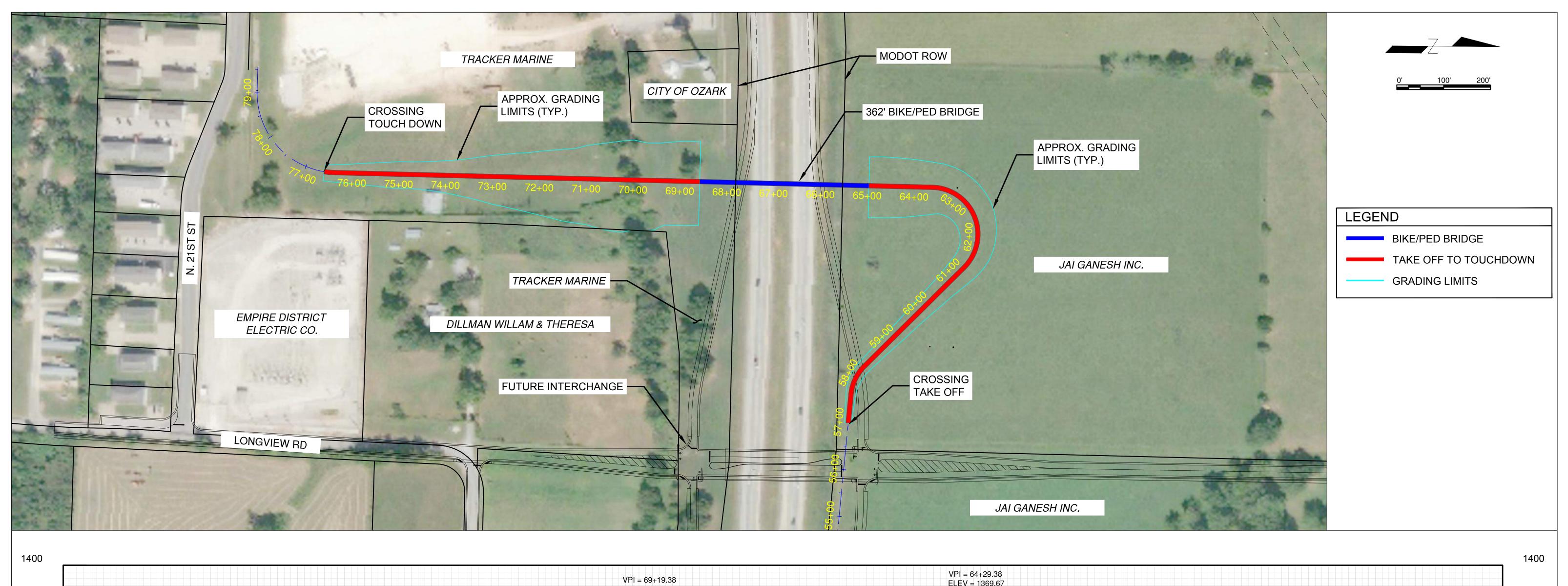


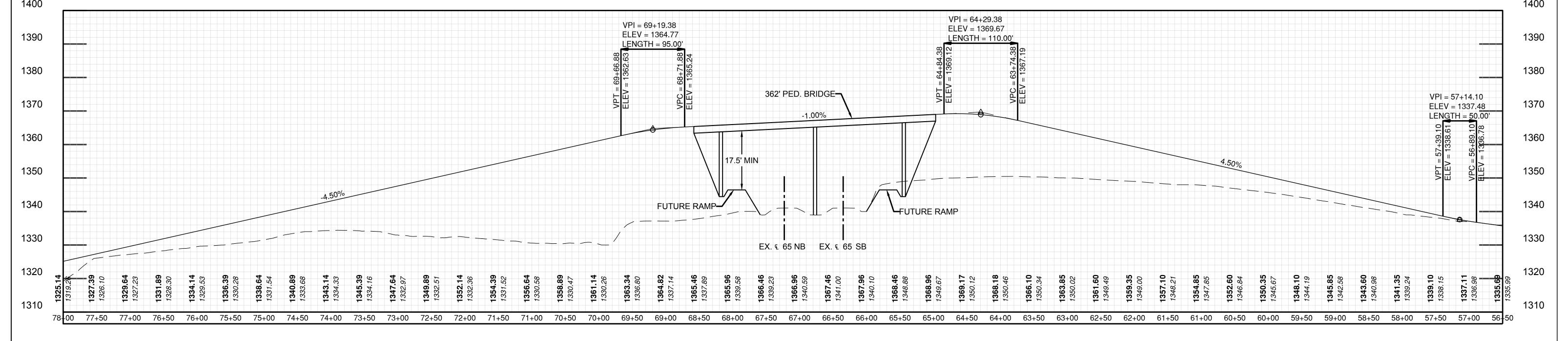
CROSSING OPTION 2
BOX CULVERT
UNDERPASS









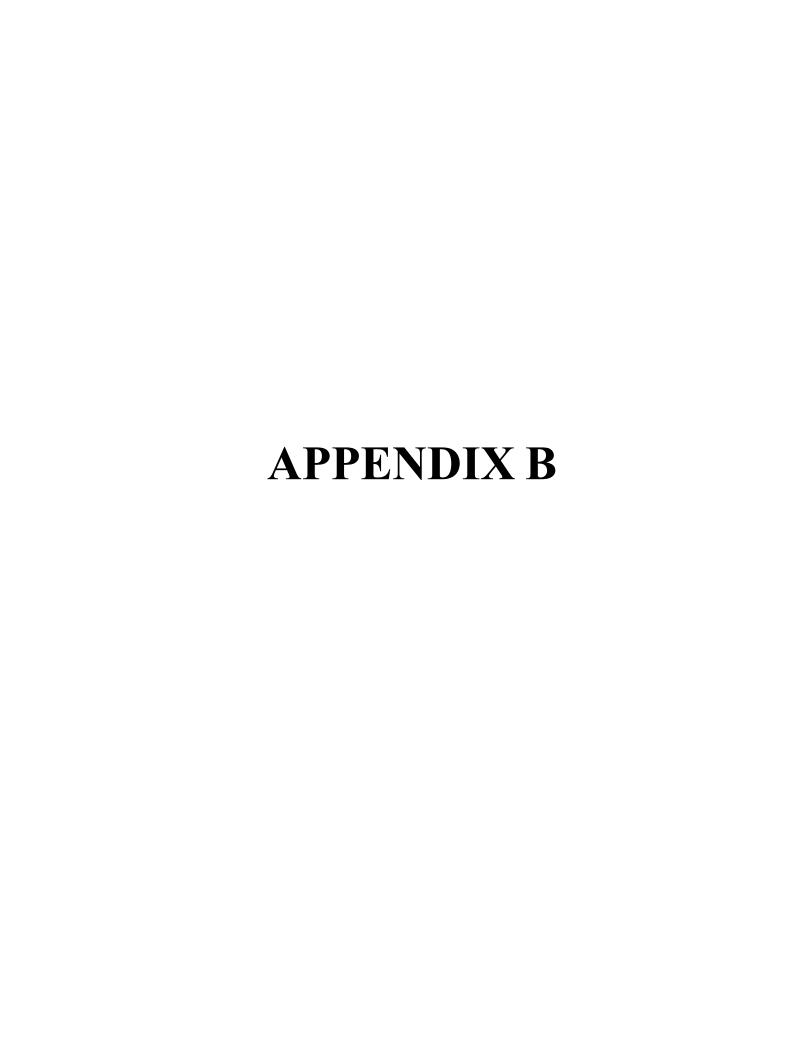


CROSSING OPTION 3
NORTH
OVERPASS STRUCTURE















### Introduction

Crawford, Murphy & Tilly, Inc. (CMT) was retained by Ozarks Transportation Organization (OTO) and the City of Ozark, Missouri to develop potential future interchange configurations at US-65 and Longview Road to aid in the evaluation of trail crossing alternatives as part of the Chadwick Flyer Trail US-65 Crossing Study. The purpose of this exploratory conceptual development was to determine a realistic future interchange location and footprint for different interchange types using the OTO "Destination 2045" and City of Ozark "Major Thoroughfare Plan" documents. Determination of approximate interchange footprints allowed for a more accurate program budgets associated with the proposed Chadwick Flyer Trail crossing alternative adjacent to the future interchange.

As a result, CMT developed two interchange concepts deemed the most realistic from a cursory review of high-level traffic volume projections, estimated conceptual construction costs, available right-of-way, area topography, and other design considerations. More in-depth traffic and travel demand analyses would be required to determine actual interchange types and configurations to best address the needs of the Longview Road corridor and future land development in the area. Further described below are summaries for each interchange type explored as part of Chadwick Flyer Trail US-65 Crossing Study.

### **Option 1 – Tight Diamond Interchange**

The tight diamond interchange option was considered a suitable option due to its ability to handle the anticipated traffic with a relatively small footprint. This interchange option would include traffic signals at each ramp intersection along with dedicated left turn lanes across the overpass structure, as shown in Figure 1 and Appendix B.1. The left turn lanes are necessary for the interchange to operate at a level of service (LOS) B according to a high-level estimate of future 2045 peak hour traffic volumes. A 5' wide sidewalk is also included along the south side of Longview Road and connecting entirely from the east project limit to the west across the new structure.



Figure 1: Tight Diamond Interchange Concept

If Trail Section 2A is chosen by the OTO as a preferred alignment for the Chadwick Flyer Trail, then reconstruction and accommodation of a portion of the trail would be required as part of the interchange construction.

Right-of-way acquisitions are anticipated to be smaller than the dogbone interchange concept (see Option 2 below) given the smaller footprint of a signalized intersection. A high-level vertical profile was applied to Longview Road through the interchange, along with interchange ramp profiles, to develop estimated grading and right-of-way limits for this option. As represented in Figure 1, the estimated right-of-way acquisitions from adjacent landowners total approximately 15 acres for the interchange construction. This includes the interchange and additional right-of-way required for an improved 2-lane typical section of Longview Road with sidewalk. Land values were estimated using recent real estate data to provide approximated costs if the land was acquired today. Further detailed design could differ from the anticipated acquisition area with more accurate topographic information, different structure grades, and/or use of space-saving design elements such as retaining walls.

Upon completion of a high-level environmental evaluation focusing on site conditions and habitats common to federal NEPA clearance, no major conflicts are anticipated for construction of this interchange option. A map showing potential environmental constraints within the study area can be found in Appendix B.2. Further field

### US-65 & Longview Road Interchange Alternative Executive Summary 02/25/2022







evaluation of mapped streams and wetlands, along with threatened and endangered species habitats, should be performed to confirm absence of various environmental resources. Architectural and archaeological surveys should also take place in areas of previously undisturbed land or known locations of the former Chadwick Flyer railroad bed. These are all environmental resources that are either expected to be within the interchange project area or may be present upon a high-level review. More thorough investigations should be expected during future design phases. A map of environmental resources within the project area can be found in Appendix B.2.

The total program cost for this alternative is shown below in Table 1 with the detailed cost breakdown attached in Appendix B.3.

### **Advantages:**

- Reduced footprint results in minimal right-of-way takings for construction
- Most cost-effective option
- Minimal environmental impacts

### **Disadvantages:**

- Larger structure required for accommodation of dedicated left turn lanes
- Lower estimated level of service in 2045 (LOS B peak hours)
- Higher maintenance costs with the larger structure and traffic signals
- Future planned north-south arterial (identified in the City of Ozark "Major Thoroughfare Plan") would not be accommodated by the interchange and would require an additional intersection east of the interchange along Longview Road.

Option 1 – TIGHT DIAMOND INTERCHANGE PROGRAM DOLLARS			
Construction Cost \$14,591,			
Preliminary Engineering (10%)	\$1,459,118		
Construction Engineering (15%)	\$2,188,677		
Right-of-Way	\$1,330,000		
Right-of-Way Incidentals	\$180,000		
<b>Utility Relocation Costs</b>	\$750,000		
TOTAL	\$20,498,974		

Table 1: Tight Diamond Interchange Program Budget (2022 Dollars)







### Option 2 – Dogbone Interchange

Option 2 is a dogbone interchange and the preferred option as it relates to safety and future traffic operations. Roundabouts provide significant intersection safety benefits given their reduced conflict points and reduced severe collisions when compared to traditional intersections. This concept is projected to operate at a LOS A or B during estimated 2045 peak hours and can be sized to accommodate the future north-south arterial, as shown in Figure 2 and Appendix B.1, planned east of US-65. Allowing the arterial to favor the west side of the parcels improves economic development potential of the east parcels by resulting in a larger useable area free of bisecting



Figure 2: Dogbone Interchange Concept

thoroughfares. A 5' wide sidewalk is also included along the south side of Longview Road and connecting entirely from the east project limit to the west across the new structure. If Trail Section 2A is chosen by the OTO as a preferred alignment for the Chadwick Flyer Trail, then reconstruction and accommodation of a portion of the trail would be required as part of the interchange construction.

The dogbone concept will likely require larger right-of-way acquisitions to account for the roundabout sizes. It should be noted that the addition of the future north-south arterial in the roundabout design also adds to the anticipated right-of-way taking totals. Right-of-way totals are estimated at approximately 18.3 acres for the dogbone concept. However, as previously discussed, the economic development benefits may outweigh the additional right-of-way costs for inclusion of the arterial in the east roundabout design. Other roadway network configurations could be evaluated as well to reduce the roundabout and overall interchange size, as well as use of retaining walls, profile grades, and more accurate topographic information. Anticipated right-of-way needs for the interchange construction are depicted in Figure 2.

Upon completion of a high-level environmental evaluation focusing on site conditions and habitats common to federal NEPA clearance, no major conflicts are anticipated for construction of this interchange option. Further field evaluation of mapped streams and wetlands, along with threatened and endangered species habitats, should be performed to confirm absence of various environmental resources. Architectural and archaeological surveys should also take place in areas of previously undisturbed land or known locations of the former Chadwick Flyer railroad bed. These are all environmental resources that are either expected to be within the interchange project area or may be present upon a high-level review. More thorough investigations should be expected during future design phases. A map of environmental resources within the project area can be found in Appendix B.2.

The total program cost for this alternative is shown below in Table 2 with the detailed cost breakdown attached in Appendix B.3.

### **Advantages:**

- Higher estimated level of service (LOS A or B) during estimated 2045 peak hours
- Increased safety for pedestrians and motorists
- Can accommodate the future north-south arterial (identified in the City of Ozark "Major Thoroughfare Plan") on the east side of the interchange for improved economic development potential
- Minimal environmental impacts

### US-65 & Longview Road Interchange Alternative Executive Summary 02/25/2022







### Disadvantages:

• Higher construction and right-of-way acquisition costs due to larger footprint

Option 2 – DOGBONE INTERCHANGE PROGRAM DOLLARS			
Construction Cost	\$15,397,113		
Preliminary Engineering (10%)	\$1,539,711		
Construction Engineering (15%)	\$2,309,567		
Right-of-Way	\$1,615,000		
Right-of-Way Incidentals	\$180,000		
<b>Utility Relocation Costs</b>	\$750,000		
TOTAL	\$21,791,391		

Table 2: Dogbone Interchange Program Costs (2022 Dollars)

### **Environmental Constraints Summary**

A high-level environmental review was performed as part of this study with the assumption that federal permits or funding may be sought out for future design or construction of an interchange at US-65 and Longview Road. The environmental review was performed to identify constraints for various interchange alternatives to be explored in this Interchange Location Study.

The review included the following environmental categories summarized below. Some of these constraints can be found in the environmental constraints map in Appendix B.2.

### Noise Assessment

This project would be classified as a Type II project which means a noise analysis would not be required.

### Section 4(f) and Section 6(f)

No 4(f) or 6(f) resources were identified within the project study area.

### Threatened and Endangered Species

According to a USFWS Information for Planning and Consultation (IPaC) review, the following federally-listed species may occur in the study area:

- Indiana bat (Myotis sodalist, endangered), Northern long-eared bat (Myotis septentrionalis, threatened)
  - o Tree clearing of suitable habitat will require seasonal restrictions
- Gray bat (Myotis grisescens, endangered)
  - o Project alignment will need to be assessed in the field for suitable cave habitats
  - MDNR GeoSTRAT reports no sinkholes in the study area
- Ozark cavefish (Amblyopsis rosae, threatened)
  - Based on a high-level review, cave streams are not likely to be located within the study area. A
    closer field evaluation will be required to confirm absence of suitable habitats

Further coordination will be required with MDC Natural Heritage Review to determine if there are records of federally or state-listed species or state-ranked species near the preferred trail alignment.

### <u>404 Permit – Wetlands/Streams</u>

Multiple National Hydrography Dataset (NHD) streams and National Wetland Inventory (NWI) wetlands are mapped within the study area. The interchange options evaluated at US-65 and Longview Road, along with the extension of Longview Road to the east to intersection Route NN, cross one mapped stream and could potentially

### US-65 & Longview Road Interchange Alternative Executive Summary 02/25/2022







impact one wetland depending on resulting roadway alignment and grading limits. Based on aerial imagery, these features may no longer be present along the alignments. Field investigation will be required to determine if streams and wetlands are present. Impacts to federally jurisdictional streams and/or wetlands will require compliance with 404/401 permitting

### Cultural Resources

If the project requires a federal permit or receives federal funding, an architectural and/or archaeological survey will likely be needed for the proposed alignment along the former railroad bed and areas previously undisturbed.

### Floodplain

FEMA floodplain areas are located within the western portion of the study area. The proposed alignments do not cross the floodplains. Any construction within a floodplain will require a floodplain development permit.

### **Hazardous Waste Sites**

Based on the MDNR Environmental Site Tracking and Research Tool (E-Start), one former underground storage tank (UST) is mapped within the study area. The site is mapped in the new residential development in the northwest corner of the study area and should have no impact on the project.

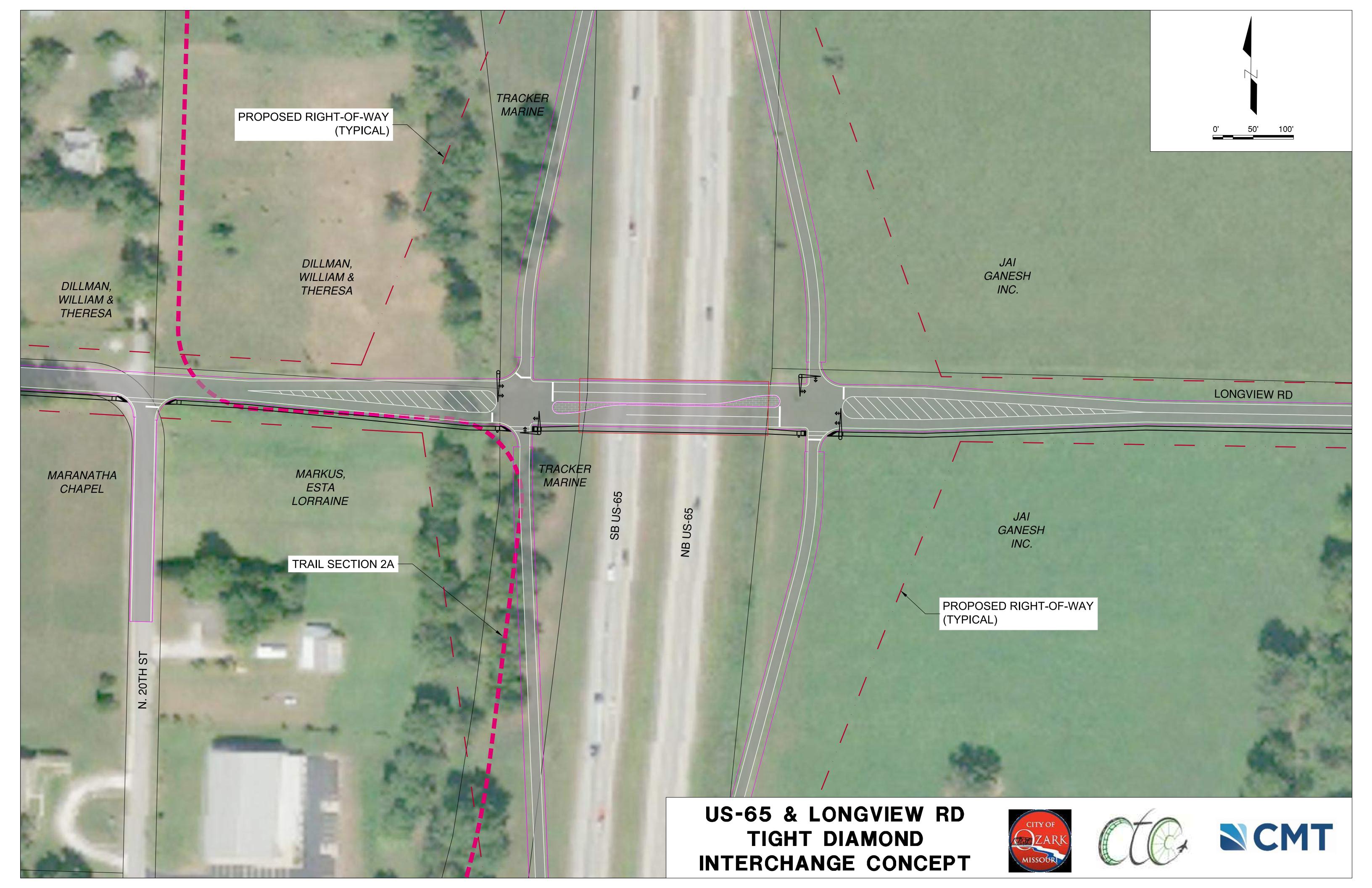
### Farmland

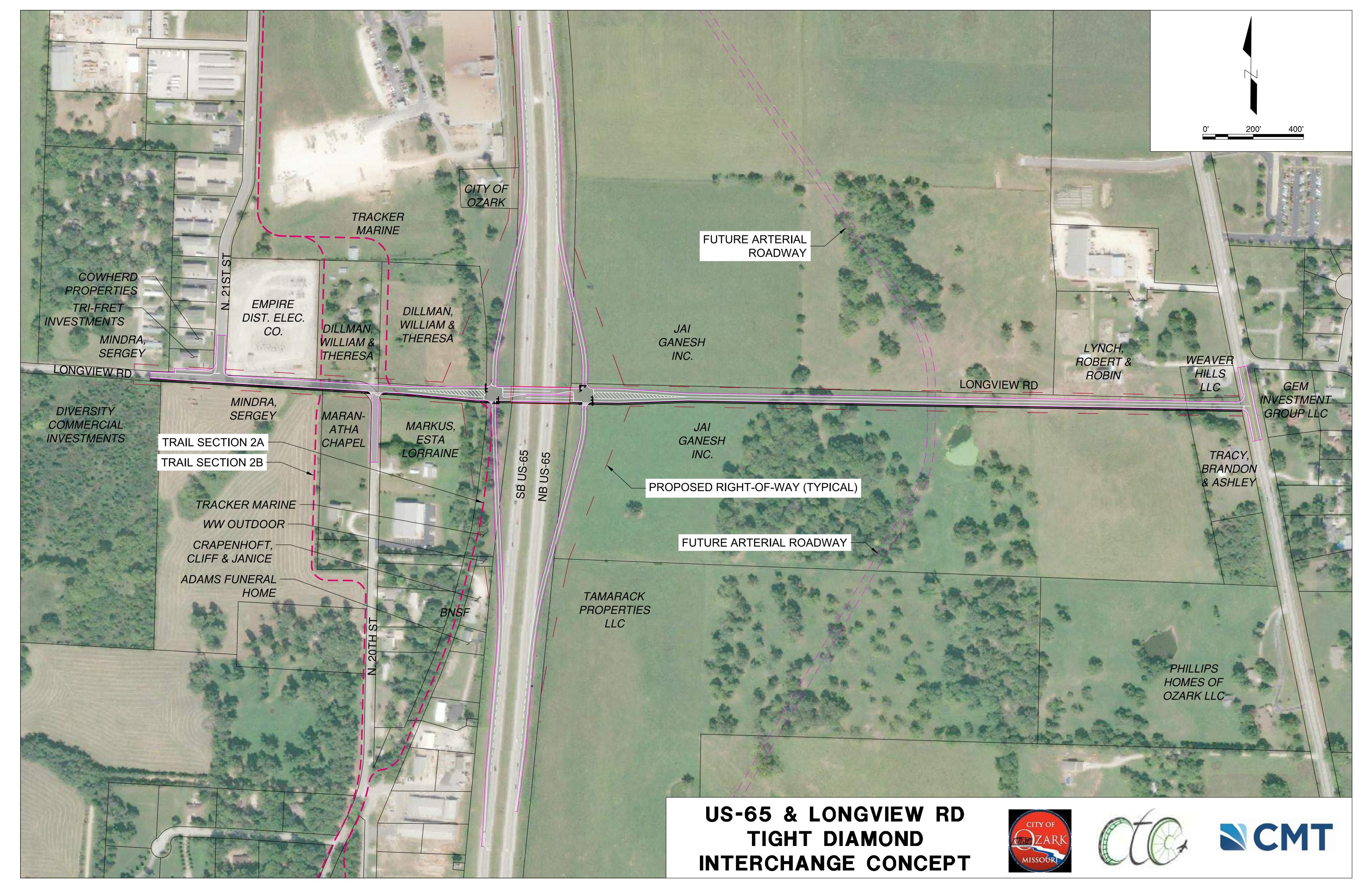
Study area is located within the designated urbanized area of Springfield, MO. Project will not be subject to Farmland Protection Policy Act.

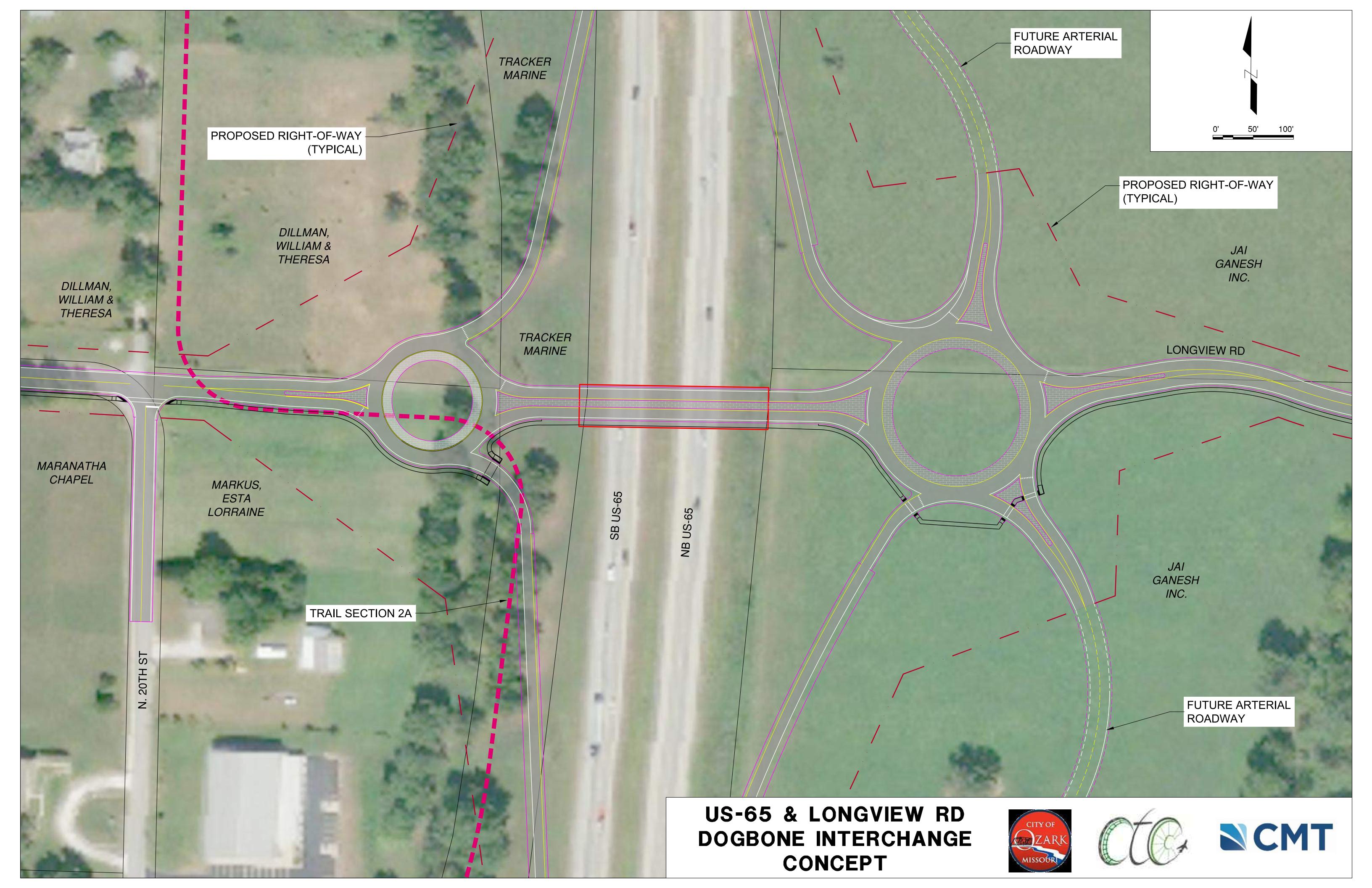
### **Summary**

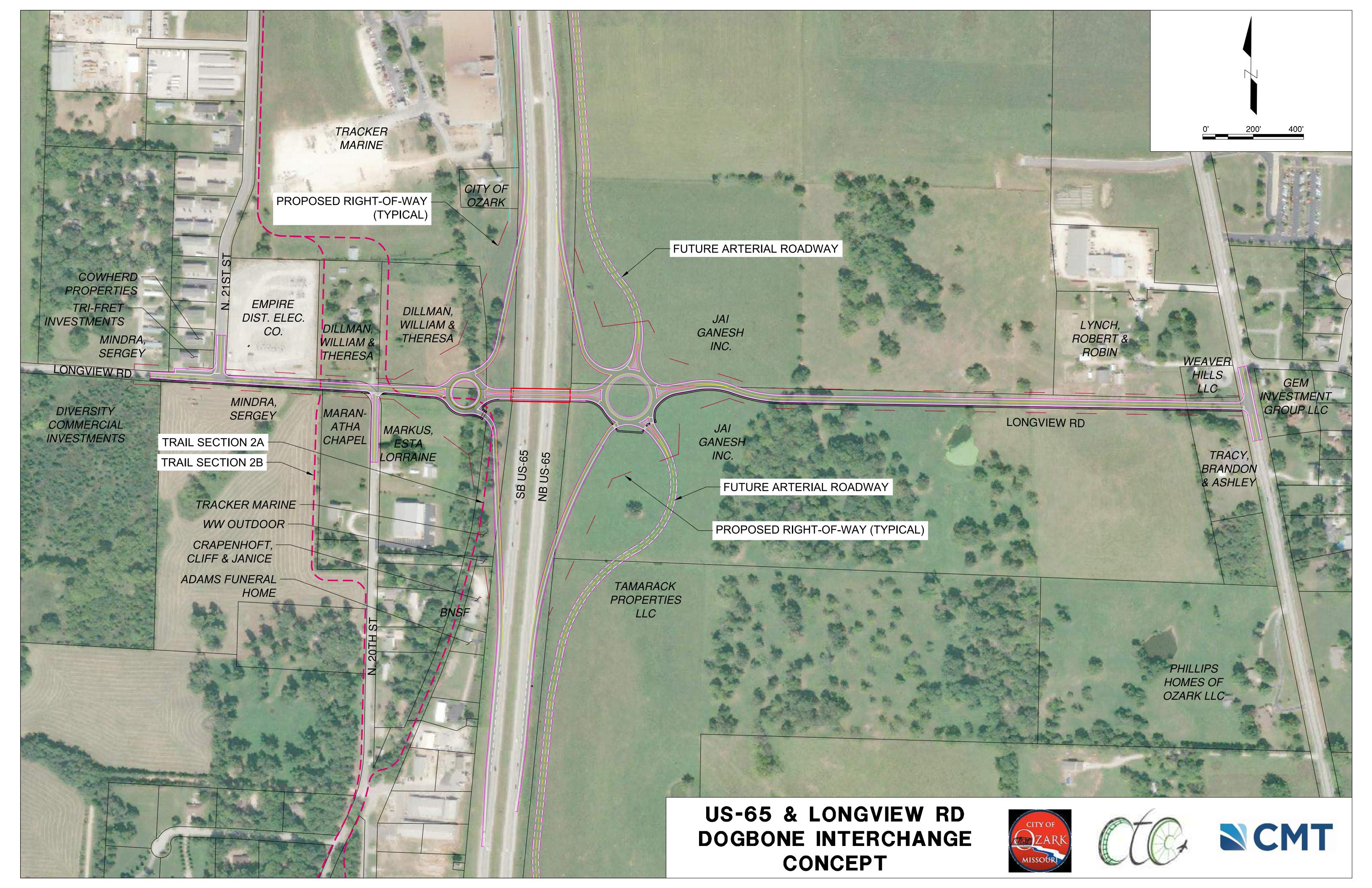
Each interchange concept described herein will sufficiently provide residents and business owners with a reliable access point to the greater regional and national transportation system for the estimated future travel demands. The different interchange options offer their own unique characteristics that provide advantages and disadvantages from an initial cost and economic development standpoint but would ultimately prove beneficial to improving the regional transportation network. Enhanced connectivity for the region can have a significant positive impact on the surrounding communities. An interchange at US-65 and Longview Road would be a big step toward realizing that goal.

# **APPENDIX B.1**

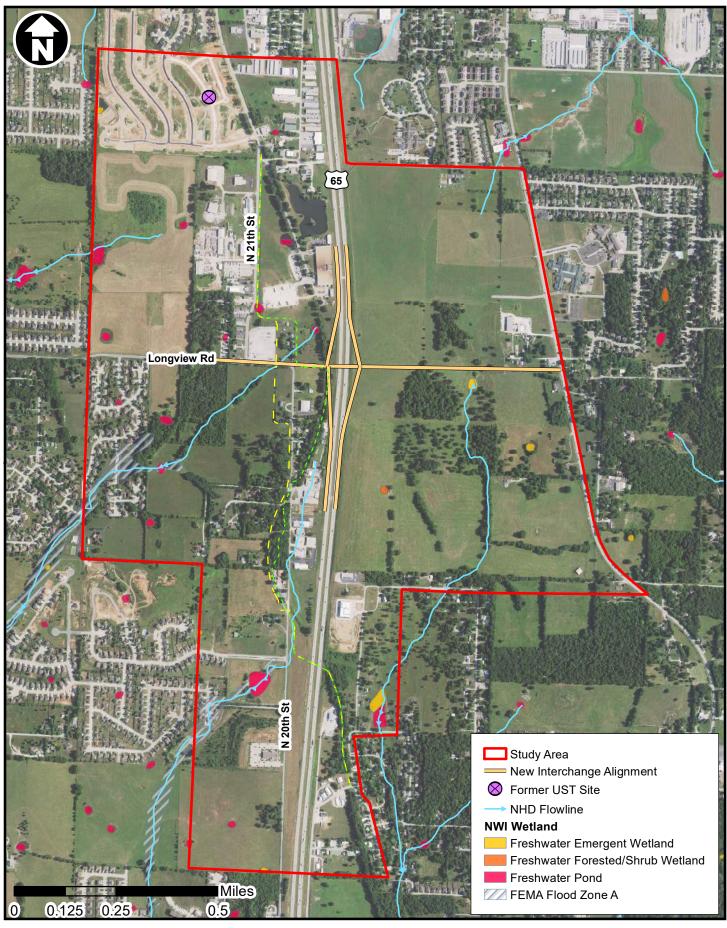








# **APPENDIX B.2**



Chadwick Flyer Trail - Christian Co., MO Environmental Resources Map



# **APPENDIX B.3**





# US-65 & LONGVIEW RD INTERCHANGE STIP ESTIMATE February 4, 2022



### ITEM UNIT COSTS Dogbone Interchange Option **Tight Diamond Interchange Option** \$200,000 Removal of Improvements \$200,000.00 / LS 1.00 \$200,000 1.00 Clearing and Grubbing / AC \$3,000.00 23.00 \$69,000 22.00 \$66,000 Class A Excavation \$10.00 / CY 15,700.00 \$157,000 15,700.00 \$157,000 \$50.00 \$90,000 Class C Excavation / CY 1,800.00 \$90,000 1,800.00 Compacting Embankment \$5.00 / CY 13,300.00 \$66,500 13,300.00 \$66,500 Embankment In Place \$12.50 / CY 350,000.00 \$4,375,000 250,000.00 \$3,125,000 Full Depth Pavement \$65.00 / SY \$1,657,500 \$1,512,550 25,500.00 23,270.00 Full Depth Shoulder \$55.00 / SY 6,430.00 \$353,650 7,110.00 \$391,050 \$9.00 \$229,500 \$209,430 Base / SY 25,500.00 23,270.00 CONSTRUCTION DOLLARS (2022) Curb and Gutter \$40.00 / LF 10,460.00 \$418,400 8,615.00 \$344,600 \$250,000.00 Interchange Signal / EA \$0 2.00 \$500,000 Lighting \$150,000.00 / EA 1.75 \$262,500 \$150,000 1.00 Sidewalk/Medians/Truck Aprons \$70.00 / SY 2,350.00 \$164,500 2,223.00 \$155,610 \$500,000.00 Drainage / LS 1.25 \$625,000 1.00 \$500,000 Longview Rd & US-65 Overpass \$175.00 / SF 12,180.00 15,690.00 \$2,745,750 \$2,131,500 MSE Walls \$70.00 / SF 5,800.00 \$406,000 5,800.00 \$406,000 Subtotal \$11,206,050 \$10,619,490 Mobilization 6.0% \$672,363 6.0% \$637,169 **Erosion Control** \$168,091 1.5% 1.5% \$159,292 Traffic Control 3.0% \$336,182 3.0% \$318,585 Signing 2.0% \$224,121 2.0% \$212,390 Pavement Marking 1.0% \$112,061 1.0% \$106,195 Contractor Furnished Surveying and Staking 1.0% \$112,061 1.0% \$106,195 Subtotal \$1,624,877 \$1,539,826 Contingency 20% \$2,566,185 \$2,431,863 Subtotal \$14,591,179 \$15,397,113 Subtotal EARTHWORK ASSUMES ENTIRE PROJECT IS BUILT WITH DIRT STAYING ON EACH SIDE OF THE INTERSTATE. **ESTIMATE ASSUMPTIONS & KEY NOTES** ASSUMES NO ENVIRONMENTAL MITIGATION COSTS CONCEPT DESIGN PHASE WITH MANY ASSUMPTIONS

			Dogbone Interchange Option	Tight Diamond Interchange Option
RS	Construction Cost		\$15,397,113	\$14,591,179
A A	Preliminary Engineering (10%)		\$1,539,711	\$1,459,118
=	Construction Engineering (15%)		\$2,309,567	\$2,188,677
00	Right of Way		\$1,615,000	\$1,330,000
	Right of Way Incidentals		\$180,000	\$180,000
Σ	Utility Relocation Costs		\$750,000	\$750,000
36		TOTAL	\$21,791,390.88	\$20,498,974.08
PROGR,			DESIGN ESTIMATE IS BASED ON CONCEPT DESIGN & APPROVAL	CAN CHANGE BASED ON FINAL DESIGN
	ESTIMATE ASSUMPTIONS & KEY NOTES		ANTICIPATED UTILITY CONFLICTS INCLUDE OVERHEAD DISTRIBUTION LINE N. OF LONGVIEW ROAD ROW IMPACTS ARE BASED ON CONCEPT DESIGN & 2022 DOLLARS.	

# **APPENDIX B.4**

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		P		1	<b>^</b>						4	
Traffic Volume (vph)	0	410	90	78	173	0	0	0	0	120	0	79
Future Volume (vph)	0	410	90	78	173	0	0	0	0	120	0	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.976									0.946	
Flt Protected				0.950							0.971	
Satd. Flow (prot)	0	1818	0	1770	1863	0	0	0	0	0	1711	0
Flt Permitted				0.166							0.971	
Satd. Flow (perm)	0	1818	0	309	1863	0	0	0	0	0	1711	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21									94	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		662			283			348			394	
Travel Time (s)		15.0			6.4			7.9			9.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	446	98	85	188	0	0	0	0	130	0	86
Shared Lane Traffic (%)									•			
Lane Group Flow (vph)	0	544	0	85	188	0	0	0	0	0	216	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	2010	12	rugiit	2010	12	rugiit	20.0	0	ı üğili	2011	0	rugiit
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		10			10						10	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	1.00	9	15	1.00	9	15	1.00	9	15	1.00	9
Number of Detectors		2		1	2					1	2	
Detector Template		Thru		Left	Thru					Left	Thru	
Leading Detector (ft)		100		20	100					20	100	
Trailing Detector (ft)		0		0	0					0	0	
Detector 1 Position(ft)		0		0	0					0	0	
Detector 1 Size(ft)		6		20	6					20	6	
Detector 1 Type		CI+Ex			CI+Ex						CI+Ex	
Detector 1 Channel		OI · LX		OI LX	OI · LX					OI LX	OI LX	
Detector 1 Extend (s)		0.0		0.0	0.0					0.0	0.0	
Detector 1 Queue (s)		0.0		0.0	0.0					0.0	0.0	
Detector 1 Delay (s)		0.0		0.0	0.0					0.0	0.0	
Detector 2 Position(ft)		94		0.0	94					0.0	94	
Detector 2 Size(ft)		6			6						6	
Detector 2 Type		CI+Ex			CI+Ex						CI+Ex	
Detector 2 Channel		CITLX			CITLX						CITLX	
Detector 2 Extend (s)		0.0			0.0						0.0	
Turn Type		NA		pm+pt	NA					Perm	NA	
Protected Phases				риі+рі 3	NA 8					I CIIII	6	
Permitted Phases		4		ა 8	0					6	Ü	
Detector Phase		4			8						6	
		4		3	ō					6	Ö	
Switch Phase		ΕO		F 0	ΕO					F 0	ΕO	
Minimum Initial (s)		5.0		5.0	5.0					5.0	5.0	

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)		22.5		9.5	22.5					22.5	22.5	
Total Split (s)		36.0		10.4	46.4					23.6	23.6	
Total Split (%)		51.4%		14.9%	66.3%					33.7%	33.7%	
Maximum Green (s)		31.5		5.9	41.9					19.1	19.1	
Yellow Time (s)		3.5		3.5	3.5					3.5	3.5	
All-Red Time (s)		1.0		1.0	1.0					1.0	1.0	
Lost Time Adjust (s)		0.0		0.0	0.0						0.0	
Total Lost Time (s)		4.5		4.5	4.5						4.5	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?		Yes		Yes								
Vehicle Extension (s)		3.0		3.0	3.0					3.0	3.0	
Recall Mode		None		None	None					C-Max	C-Max	
Walk Time (s)		7.0			7.0					7.0	7.0	
Flash Dont Walk (s)		11.0			11.0					11.0	11.0	
Pedestrian Calls (#/hr)		0			0					0	0	
Act Effct Green (s)		25.6		33.9	33.9						27.1	
Actuated g/C Ratio		0.37		0.48	0.48						0.39	
v/c Ratio		0.80		0.31	0.21						0.30	
Control Delay		28.3		12.1	12.0						12.1	
Queue Delay		0.0		0.0	0.0						0.0	
Total Delay		28.3		12.1	12.0						12.1	
LOS		С		В	В						В	
Approach Delay		28.3			12.0						12.1	
Approach LOS		С			В						В	
Intersection Summary												
Aron Tuno:	Othor											

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 43 (61%), Referenced to phase 2: and 6:SBTL, Start of Green

Natural Cycle: 60

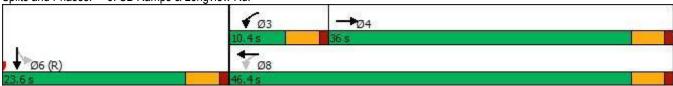
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80 Intersection Signal Delay: 20.6 Intersection Capacity Utilization 55.8%

Intersection LOS: C ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: SB Ramps & Longview Rd.



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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	<b>^</b>			1			4				
Traffic Volume (vph)	248	262	0	0	184	198	61	0	92	0	0	0
Future Volume (vph)	248	262	0	0	184	198	61	0	92	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.930			0.919				
Flt Protected	0.950							0.981				
Satd. Flow (prot)	1770	1863	0	0	1732	0	0	1679	0	0	0	0
Flt Permitted	0.179							0.981				
Satd. Flow (perm)	333	1863	0	0	1732	0	0	1679	0	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					85			100				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		283			816			354			363	
Travel Time (s)		6.4			18.5			8.0			8.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	270	285	0.02	0.02	200	215	66	0.02	100	0.02	0.02	0.02
Shared Lane Traffic (%)	210	200			200	210			100			
Lane Group Flow (vph)	270	285	0	0	415	0	0	166	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	Loit	12	rtigiit	LOIL	12	rtigrit	LOIL	0	rtigrit	Loit	0	ragiit
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		10			10			10			10	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	1.00	1.00	9	1.00	1.00	9	1.00	1.00	9	1.00	1.00	9
Number of Detectors	13	2	3	10	2	3	1	2	3	10		3
Detector Template	Left	Thru			Thru		Left	Thru				
Leading Detector (ft)	20	100			100		20	100				
Trailing Detector (ft)	0	0			0		0	0				
Detector 1 Position(ft)	0	0			0		0	0				
Detector 1 Size(ft)	20	6			6		20	6				
. ,	CI+Ex	Cl+Ex			CI+Ex		CI+Ex	CI+Ex				
Detector 1 Type Detector 1 Channel	CITLX	CITLX			CITLX		CITLX	CITLX				
Detector 1 Extend (s)	0.0	0.0			0.0		0.0	0.0				
Detector 1 Queue (s)	0.0	0.0			0.0		0.0	0.0				
Detector 1 Delay (s)	0.0	0.0			0.0		0.0	0.0				
Detector 2 Position(ft)	0.0	94			94		0.0	94				
. ,		94			94			94				
Detector 2 Size(ft)												
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex				
Detector 2 Channel		0.0			0.0			0.0				
Detector 2 Extend (s)		0.0			0.0		D	0.0				
Turn Type	pm+pt	NA			NA		Perm	NA				
Protected Phases	7	4			8			2				
Permitted Phases	4	4			_		2					
Detector Phase	7	4			8		2	2				
Switch Phase	- ^	- ^			- ^			- ^				
Minimum Initial (s)	5.0	5.0			5.0		5.0	5.0				

	•	-	•	1		•	1	1	1	/	<b>↓</b>	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	9.5	22.5			22.5		22.5	22.5				
Total Split (s)	17.8	47.0			29.2		23.0	23.0				
Total Split (%)	25.4%	67.1%			41.7%		32.9%	32.9%				
Maximum Green (s)	13.3	42.5			24.7		18.5	18.5				
Yellow Time (s)	3.5	3.5			3.5		3.5	3.5				
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0				
Lost Time Adjust (s)	0.0	0.0			0.0			0.0				
Total Lost Time (s)	4.5	4.5			4.5			4.5				
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0				
Recall Mode	None	None			None		C-Max	C-Max				
Walk Time (s)		7.0			7.0		7.0	7.0				
Flash Dont Walk (s)		11.0			11.0		11.0	11.0				
Pedestrian Calls (#/hr)		0			0		0	0				
Act Effct Green (s)	36.0	36.0			18.9			25.0				
Actuated g/C Ratio	0.51	0.51			0.27			0.36				
v/c Ratio	0.63	0.30			0.78			0.25				
Control Delay	11.5	5.9			29.0			9.8				
Queue Delay	0.3	0.5			0.0			0.0				
Total Delay	11.8	6.4			29.0			9.8				
LOS	В	Α			С			Α				
Approach Delay		9.0			29.0			9.8				
Approach LOS		Α			С			Α				

#### Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.78 Intersection Signal Delay: 16.5 Intersection Capacity Utilization 55.8%

Intersection LOS: B
ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 6: NB Ramps & Longview Rd.



	٨		•	•	634550	•	1	1	1	1	1	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		1		7	<b>†</b>						4	
Traffic Volume (vph)	0	251	104	116	336	0	0	0	0	243	0	223
Future Volume (vph)	0	251	104	116	336	0	0	0	0	243	0	223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.960									0.935	
Flt Protected				0.950							0.975	
Satd. Flow (prot)	0	1788	0	1770	1863	0	0	0	0	0	1698	0
Flt Permitted				0.219							0.975	
Satd. Flow (perm)	0	1788	0	408	1863	0	0	0	0	0	1698	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		36									109	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		662			283			348			394	
Travel Time (s)		15.0			6.4			7.9			9.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	273	113	126	365	0	0	0	0	264	0	242
Shared Lane Traffic (%)				0			•		•		•	
Lane Group Flow (vph)	0	386	0	126	365	0	0	0	0	0	506	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	Loit	12	rtigit	Loit	12	rtigit	Loit	0	rugiit	Loit	0	rugiit
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		10			10			10			10	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		2		1	2					1	2	
Detector Template		Thru		Left	Thru					Left	Thru	
Leading Detector (ft)		100		20	100					20	100	
Trailing Detector (ft)		0		0	0					0	0	
Detector 1 Position(ft)		0		0	0					0	0	
Detector 1 Size(ft)		6		20	6					20	6	
Detector 1 Type		CI+Ex		CI+Ex	CI+Ex					CI+Ex	CI+Ex	
Detector 1 Channel		OI LX		OI - EX	OI LX					OI - EX	OI LX	
Detector 1 Extend (s)		0.0		0.0	0.0					0.0	0.0	
Detector 1 Queue (s)		0.0		0.0	0.0					0.0	0.0	
Detector 1 Delay (s)		0.0		0.0	0.0					0.0	0.0	
Detector 2 Position(ft)		94		0.0	94					0.0	94	
Detector 2 Size(ft)		6			6						6	
Detector 2 Type		Cl+Ex			CI+Ex						CI+Ex	
Detector 2 Channel		OI LX			OI · EX						OI · EX	
Detector 2 Extend (s)		0.0			0.0						0.0	
Turn Type		NA		pm+pt	NA					Perm	NA	
Protected Phases		4		3	8					1 01111	6	
Permitted Phases				8	U					6	U	
Detector Phase		4		3	8					6	6	
Switch Phase		7		J	U					U	U	
Minimum Initial (s)		5.0		5.0	5.0					5.0	5.0	
wiii iii iiiii ii ii ii ii (5)		5.0		5.0	5.0					5.0	5.0	

	۶		•	•	69455	•	1	1	1	1	1	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)		22.5		9.5	22.5					22.5	22.5	
Total Split (s)		23.0		9.6	32.6					27.4	27.4	
Total Split (%)		38.3%		16.0%	54.3%					45.7%	45.7%	
Maximum Green (s)		18.5		5.1	28.1					22.9	22.9	
Yellow Time (s)		3.5		3.5	3.5					3.5	3.5	
All-Red Time (s)		1.0		1.0	1.0					1.0	1.0	
Lost Time Adjust (s)		0.0		0.0	0.0						0.0	
Total Lost Time (s)		4.5		4.5	4.5						4.5	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?		Yes		Yes								
Vehicle Extension (s)		3.0		3.0	3.0					3.0	3.0	
Recall Mode		None		None	None					C-Max	C-Max	
Walk Time (s)		7.0			7.0					7.0	7.0	
Flash Dont Walk (s)		11.0			11.0					11.0	11.0	
Pedestrian Calls (#/hr)		0			0					0	0	
Act Effct Green (s)		15.9		23.5	23.5						27.5	
Actuated g/C Ratio		0.26		0.39	0.39						0.46	
v/c Ratio		0.77		0.46	0.50						0.61	
Control Delay		29.4		9.4	10.6						15.0	
Queue Delay		0.0		0.0	1.0						0.0	
Total Delay		29.4		9.4	11.6						15.0	
LOS		С		Α	В						В	
Approach Delay		29.4			11.0						15.0	
Approach LOS		С			В						В	
Intersection Summary												

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 23 (38%), Referenced to phase 2: and 6:SBTL, Start of Green

Natural Cycle: 55

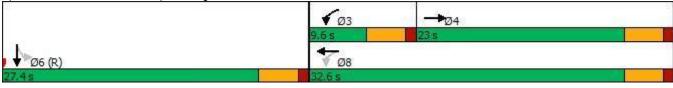
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77 Intersection Signal Delay: 17.6 Intersection Capacity Utilization 90.8%

Intersection LOS: B
ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 3: SB Ramps & Longview Rd.



	٠	-	7	1		•	1	1	1	<b>\</b>	Į.	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	-	<b>^</b>			ħ			4				
Traffic Volume (vph)	145	349	0	0	348	161	95	0	104	0	0	0
Future Volume (vph)	145	349	0	0	348	161	95	0	104	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.957			0.929				
Flt Protected	0.950							0.977				
Satd. Flow (prot)	1770	1863	0	0	1783	0	0	1691	0	0	0	0
Flt Permitted	0.159		•	•				0.977				
Satd. Flow (perm)	296	1863	0	0	1783	0	0	1691	0	0	0	0
Right Turn on Red	200	1000	Yes	•	1100	Yes	•	1001	Yes		•	Yes
Satd. Flow (RTOR)			100		44	100		109	100			100
Link Speed (mph)		30			30			30			30	
Link Opeca (mpn) Link Distance (ft)		283			816			354			363	
Travel Time (s)		6.4			18.5			8.0			8.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	158	379	0.32	0.92	378	175	103	0.92	113	0.92	0.92	0.92
Shared Lane Traffic (%)	130	313	U	U	310	175	103	U	113	U	U	U
Lane Group Flow (vph)	158	379	0	0	553	0	0	216	0	0	0	0
Enter Blocked Intersection	No		No	No	No	No	No	No	No	No	No	No
		No										
Lane Alignment	Left	Left 12	Right	Left	Left 12	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)								0			0	
Link Offset(ft)		0 16			0 16			0 16			0 16	
Crosswalk Width(ft)		16			16			16			10	
Two way Left Turn Lane	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	0	9	15	0	9	15	0	9	15		9
Number of Detectors	1	2			2		1	2				
Detector Template	Left	Thru			Thru		Left	Thru				
Leading Detector (ft)	20	100			100		20	100				
Trailing Detector (ft)	0	0			0		0	0				
Detector 1 Position(ft)	0	0			0		0	0				
Detector 1 Size(ft)	20	6			6		20	6				
Detector 1 Type	CI+Ex	CI+Ex			CI+Ex		CI+Ex	CI+Ex				
Detector 1 Channel		0.0			0.0		0.0	2.2				
Detector 1 Extend (s)	0.0	0.0			0.0		0.0	0.0				
Detector 1 Queue (s)	0.0	0.0			0.0		0.0	0.0				
Detector 1 Delay (s)	0.0	0.0			0.0		0.0	0.0				
Detector 2 Position(ft)		94			94			94				
Detector 2 Size(ft)		6			6			6				
Detector 2 Type		CI+Ex			CI+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				
Turn Type	pm+pt	NA			NA		Perm	NA				
Protected Phases	7	4			8			2				
Permitted Phases	4						2					
Detector Phase	7	4			8		2	2				
Switch Phase												
Minimum Initial (s)	5.0	5.0			5.0		5.0	5.0				

	•		*	1		•	1	1	1	1	1	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	9.5	22.5			22.5		22.5	22.5				
Total Split (s)	10.2	37.2			27.0		22.8	22.8				
Total Split (%)	17.0%	62.0%			45.0%		38.0%	38.0%				
Maximum Green (s)	5.7	32.7			22.5		18.3	18.3				
Yellow Time (s)	3.5	3.5			3.5		3.5	3.5				
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0				
Lost Time Adjust (s)	0.0	0.0			0.0			0.0				
Total Lost Time (s)	4.5	4.5			4.5			4.5				
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0				
Recall Mode	None	None			None		C-Max	C-Max				
Walk Time (s)		7.0			7.0		7.0	7.0				
Flash Dont Walk (s)		11.0			11.0		11.0	11.0				
Pedestrian Calls (#/hr)		0			0		0	0				
Act Effct Green (s)	28.8	28.8			20.6			22.2				
Actuated g/C Ratio	0.48	0.48			0.34			0.37				
v/c Ratio	0.56	0.42			0.86			0.31				
Control Delay	13.0	9.7			32.2			9.8				
Queue Delay	0.0	0.9			0.0			0.0				
Total Delay	13.0	10.7			32.2			9.8				
LOS	В	В			С			Α				
Approach Delay		11.3			32.2			9.8				
Approach LOS		В			С			Α				

#### Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:, Start of Green

Natural Cycle: 60

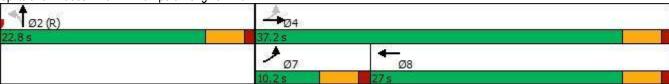
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86 Intersection Signal Delay: 19.9 Intersection Capacity Utilization 90.8%

Intersection LOS: B
ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 6: NB Ramps & Longview Rd.



**♥** Site: 101 [SB Ramps-2045 AM (Site Folder: General)]

US 65 & Longview Road 2045 AM

Site Category: (None)

Roundabout

Vehi	cle Mo	vement	Perfor	mance										
Mov ID	Turn	INP VOLU [ Total	IMES HV]	DEM. FLO [ Total	WS HV]	Deg. Satn	Delay	Level of Service	QUI [ Veh.	ACK OF EUE Dist ]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
Fast:	WRIC	veh/h ongview	%	veh/h	%	v/c	sec		veh	ft				mph
1	L2	72	3.0	78	3.0	0.199	4.3	LOS A	0.0	0.0	0.00	0.00	0.00	37.2
6	T1	173	3.0	188	3.0	0.199	4.3	LOSA	0.0	0.0	0.00	0.00	0.00	37.2
Appro	oach	245	3.0	266	3.0	0.199	4.3	LOSA	0.0	0.0	0.00	0.00	0.00	37.2
North	: Road	Name												
7	L2	120	3.0	130	3.0	0.214	5.6	LOS A	1.0	25.3	0.45	0.33	0.45	33.2
14	R2	79	3.0	86	3.0	0.214	5.6	LOS A	1.0	25.3	0.45	0.33	0.45	32.2
Appro	oach	199	3.0	216	3.0	0.214	5.6	LOS A	1.0	25.3	0.45	0.33	0.45	32.8
West	: EB Lo	ngview												
2	T1	410	3.0	446	3.0	0.505	9.2	LOS A	3.3	84.1	0.55	0.41	0.55	33.1
12	R2	90	3.0	98	3.0	0.505	9.2	LOS A	3.3	84.1	0.55	0.41	0.55	32.1
Appro	oach	500	3.0	543	3.0	0.505	9.2	LOS A	3.3	84.1	0.55	0.41	0.55	32.9
All Ve	ehicles	944	3.0	1026	3.0	0.505	7.2	LOS A	3.3	84.1	0.39	0.29	0.39	33.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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**♥** Site: 101 [NB Ramps-2045 AM (Site Folder: General)]

US 65 & Longview Road 2045 AM

Site Category: (None)

Roundabout

Vehi	cle Mo	vement	Perfori	mance										
Mov ID	Turn	INP VOLU [ Total veh/h		DEM. FLO [ Total veh/h		Deg. Satn v/c	Aver. Delay sec	Level of Service		ACK OF EUE Dist ] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South	n: NB R		/0	VEII/II	70	٧/٥	360		VCII	- 11				Шрп
3 18	L2 R2	61 92	3.0 3.0	66 100	3.0 3.0	0.227 0.227	7.5 7.5	LOS A LOS A	1.0 1.0	24.6 24.6	0.61 0.61	0.60 0.60	0.61 0.61	32.8 31.8
Appro		153	3.0	166	3.0	0.227	7.5	LOSA	1.0	24.6	0.61	0.60	0.61	32.2
East:	WB Lo	ngview												
6 16	T1 R2	184 198	3.0 3.0	200 215	3.0 3.0	0.441 0.441	9.0 9.0	LOS A LOS A	2.4 2.4	62.4 62.4	0.60 0.60	0.53 0.53	0.60 0.60	33.1 32.2
Appro	ach	382	3.0	415	3.0	0.441	9.0	LOS A	2.4	62.4	0.60	0.53	0.60	32.6
West	EB Lo	ngview												
5	L2	248	3.0	270	3.0	0.430	6.8	LOS A	0.0	0.0	0.00	0.00	0.00	36.6
2	T1	282	3.0	307	3.0	0.430	6.8	LOS A	0.0	0.0	0.00	0.00	0.00	36.6
Appro	ach	530	3.0	576	3.0	0.430	6.8	LOSA	0.0	0.0	0.00	0.00	0.00	36.6
All Ve	hicles	1065	3.0	1158	3.0	0.441	7.7	LOS A	2.4	62.4	0.30	0.27	0.30	34.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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▼ Site: 101 [NB Ramps-2045 PM (Site Folder: General)]

US 65 & Longview Road 2045 PM

Site Category: (None)

Roundabout

Vehi	cle Mo	vement	Perfori	nance										
Mov ID	Turn	INP VOLU [ Total	JMES HV]	DEM. FLO [ Total	WS HV]	Deg. Satn	Delay	Level of Service	QUI [ Veh.	ACK OF EUE Dist]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
South	n: NB R	veh/h	%	veh/h	%	v/c	sec		veh	ft				mph
		•												
3	L2	95	3.0	103	3.0	0.284	8.0	LOS A	1.3	32.2	0.62	0.60	0.62	32.4
18	R2	104	3.0	113	3.0	0.284	8.0	LOS A	1.3	32.2	0.62	0.60	0.62	31.4
Appro	ach	199	3.0	216	3.0	0.284	8.0	LOS A	1.3	32.2	0.62	0.60	0.62	31.9
East:	WB Lo	ngview												
6	T1	348	3.0	378	3.0	0.543	10.4	LOS B	4.1	106.0	0.62	0.54	0.70	32.5
16	R2	161	3.0	175	3.0	0.543	10.4	LOS B	4.1	106.0	0.62	0.54	0.70	31.6
Appro	ach	509	3.0	553	3.0	0.543	10.4	LOS B	4.1	106.0	0.62	0.54	0.70	32.2
West	EB Lo	ngview												
5	L2	145	3.0	158	3.0	0.401	6.5	LOS A	0.0	0.0	0.00	0.00	0.00	37.2
2	T1	349	3.0	379	3.0	0.401	6.5	LOS A	0.0	0.0	0.00	0.00	0.00	37.2
Appro	ach	494	3.0	537	3.0	0.401	6.5	LOS A	0.0	0.0	0.00	0.00	0.00	37.2
All Ve	hicles	1202	3.0	1307	3.0	0.543	8.4	LOS A	4.1	106.0	0.37	0.33	0.40	34.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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**♥** Site: 101 [SB Ramps-2045 PM (Site Folder: General)]

US 65 & Longview Road 2045 PM

Site Category: (None)

Roundabout

Vehi	cle Mo	vement	Perfor	mance										
Mov ID	Turn	INP VOLU [ Total	MES HV]	DEM, FLO [ Total	WS HV]	Deg. Satn	Delay	Level of Service	QUI [ Veh.	ACK OF EUE Dist]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
East:	MD La	veh/h ngview	%	veh/h	%	v/c	sec		veh	ft				mph
East.	VVD LC	nigview												
1	L2	116	3.0	126	3.0	0.359	6.0	LOS A	0.0	0.0	0.00	0.00	0.00	37.3
6	T1	327	3.0	355	3.0	0.359	6.0	LOS A	0.0	0.0	0.00	0.00	0.00	37.3
Appro	oach	443	3.0	482	3.0	0.359	6.0	LOS A	0.0	0.0	0.00	0.00	0.00	37.3
North	: Road	Name												
7	L2	243	3.0	264	3.0	0.627	14.8	LOS B	6.1	156.8	0.79	0.99	1.32	29.5
14	R2	223	3.0	242	3.0	0.627	14.8	LOS B	6.1	156.8	0.79	0.99	1.32	28.7
Appro	oach	466	3.0	507	3.0	0.627	14.8	LOS B	6.1	156.8	0.79	0.99	1.32	29.1
West	EB Lo	ngview												
2	T1	251	3.0	273	3.0	0.434	9.3	LOS A	2.5	63.6	0.63	0.60	0.68	33.0
12	R2	104	3.0	113	3.0	0.434	9.3	LOS A	2.5	63.6	0.63	0.60	0.68	32.1
Appro	oach	355	3.0	386	3.0	0.434	9.3	LOS A	2.5	63.6	0.63	0.60	0.68	32.7
All Ve	hicles	1264	3.0	1374	3.0	0.627	10.2	LOS B	6.1	156.8	0.47	0.53	0.68	32.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

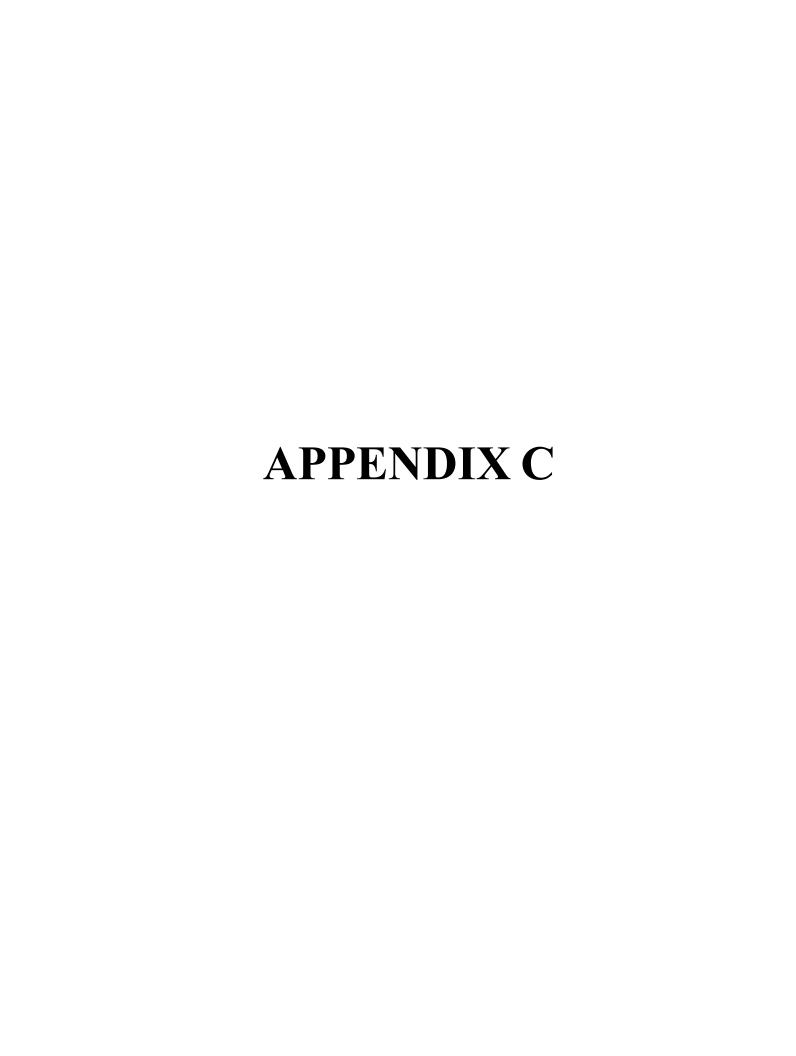
Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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#### SECTION 3 - OVERPASS

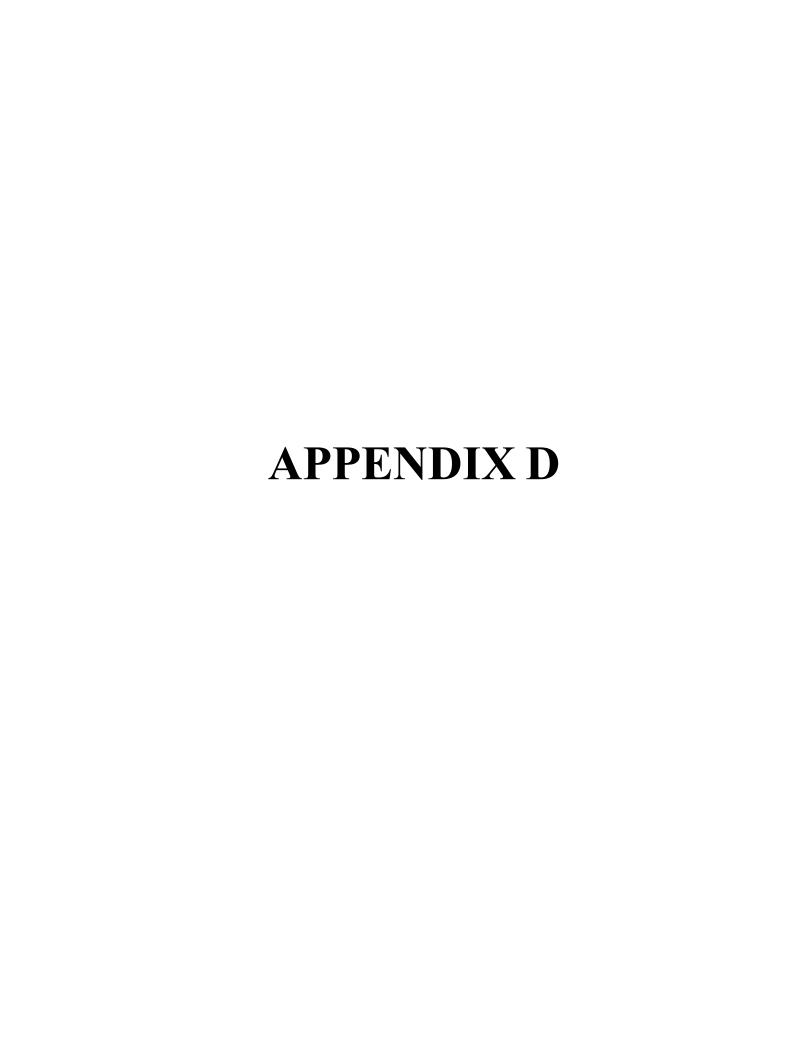
#### STIP ESTIMATE

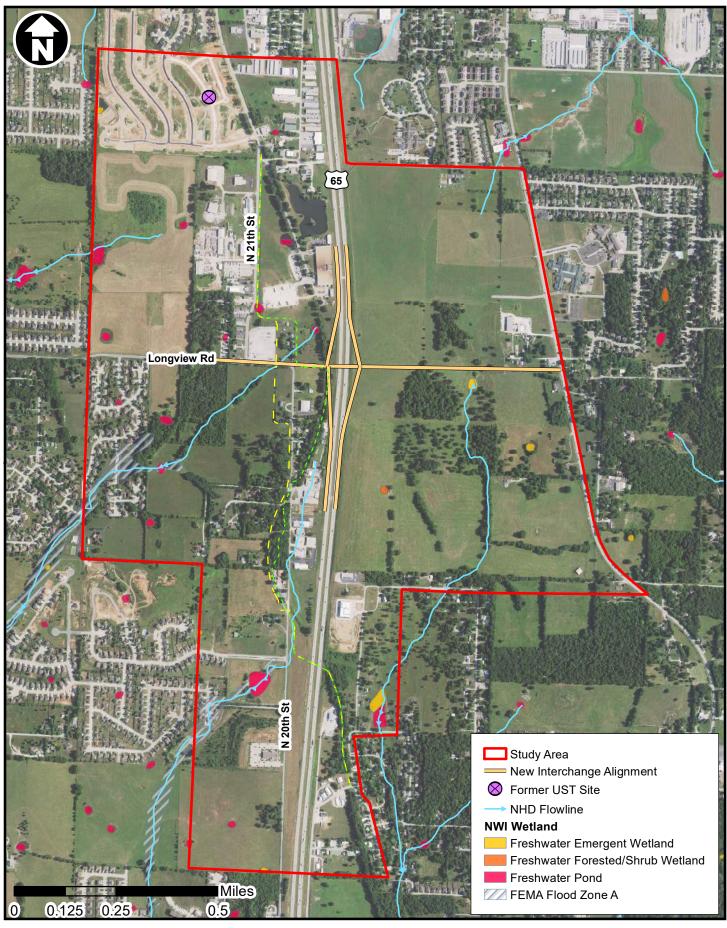




				12' Trail Width or	n Structures					14' Trail Width or	Structures					16' Trail Width or	n Structures		
ITEM	UNIT COSTS	3:1 Fill Slo	opes	Elevated <sup>-</sup>	Trail	MSE Wa	ills	3:1 Fill Slo	opes	Elevated <sup>-</sup>	Гrail	MSE Wa	alls	3:1 Fill Slo	opes	Elevated '	Trail	MSE Wa	alls
Embankment In Place	\$20.00 / CY	40,000.00	\$800,000	-	\$0	-	\$0	41,000.00	\$820,000	-	\$0	-	\$0	42,000.00	\$840,000	-	\$0	-	
4" Concrete Trail	\$50.00 / SY	2,245.00	\$112,250	-	\$0	2,245.00	\$112,250	2,245.00	\$112,250	-	\$0	2,245.00	\$112,250	2,245.00	\$112,250	-	\$0	2,245.00	\$112,2
4" Aggregate Base	\$10.00 / SY	2,245.00	\$22,450	-	\$0	2,245.00	\$22,450	2,245.00	\$22,450	-	\$0	2,245.00	\$22,450	2,245.00	\$22,450	-	\$0	2,245.00	\$22,4
Safety Railing	\$80.00 / LF	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,60
Lighting	\$150,000.00 / LS	1.00	\$150,000	1.00	\$150,000	1.00	\$150,000	1.00	\$150,000	1.00	\$150,000	1.00	\$150,000	1.00	\$150,000	1.00	\$150,000	1.00	\$150,0
Drainage	\$30,000.00 / LS	1.00	\$30,000	-	\$30,000	1.00	\$30,000	1.00	\$30,000	-	\$30,000	1.00	\$30,000	1.00	\$30,000	-	\$30,000	1.00	\$30,0
Precast Pedestrian Overpass	\$210.00 / SF	3,850.00	\$808,500	3,850.00	\$808,500	3,850.00	\$808,500	4,400.00	\$924,000	4,400.00	\$924,000	4,400.00	\$924,000	4,950.00	\$1,039,500	4,950.00	\$1,039,500	4,950.00	\$1,039,50
Elevated Trail Structure	\$110.00 / SF	-	\$0	17,400.00	\$1,914,000	-	\$0	-	\$0	20,300.00	\$2,233,000	-	\$0	-	\$0	23,200.00	\$2,552,000	- /	9
MSE Walls	\$70.00 / SF	-	\$0	-	\$0	36,820.00	\$2,577,400	-	\$0	-	\$0	36,920.00	\$2,584,400	-	\$0	-	\$0	37,020.00	\$2,591,4
Subtotal			\$2,192,800		\$3,172,100		\$3,970,200		\$2,328,300		\$3,606,600		\$4,092,700		\$2,463,800		\$4,041,100		\$4,215,2
Mobilization		6.0%	\$131,568	6.0%	\$190,326	6.0%	\$238,212	6.0%	\$139,698	6.0%	\$216,396	6.0%	\$245,562	6.0%	\$147,828	6.0%	\$242,466	6.0%	\$252,9
Erosion Control		1.0%	\$21,928	1.0%	\$31,721	1.0%	\$39,702	1.0%	\$23,283	1.0%	\$36,066	1.0%	\$40,927	1.0%	\$24,638	1.0%	\$40,411	1.0%	\$42,1
Traffic Control			\$100,000		\$100,000		\$100,000		\$100,000		\$100,000		\$100,000		\$100,000		\$100,000		\$100,0
Signing			\$10,000		\$10,000		\$10,000		\$10,000		\$10,000		\$10,000		\$10,000		\$10,000		\$10,00
Contractor Furnished Surveying and Stak	ng	1.0%	\$21,928	1.0%	\$31,721	1.0%	\$39,702	1.0%	\$23,283	1.0%	\$36,066	1.0%	\$40,927	1.0%	\$24,638	1.0%	\$40,411	1.0%	\$42,15
Subtotal			\$285,424		\$363,768		\$427,616		\$296,264		\$398,528		\$437,416		\$307,104		\$433,288		\$447,2
Contingency			\$300,000		\$300,000		\$300,000		\$300,000		\$300,000		\$300,000		\$300,000		\$300,000		\$300,0
		Subtotal	\$2,778,224 S	ubtotal	\$3,835,868 Su	ubtotal	\$4,697,816	Subtotal	\$2,924,564	Subtotal	\$4,305,128	Subtotal	\$4,830,116	ubtotal	\$3,070,904 Sul	ototal	\$4,774,388	Subtotal	\$4,962,4
		EARTHWORK BASED (	ON GIS INFORMAT	ION AND MAY CHAN	GE WITH MORE AC	CURATE INFORMATI	ON	•		•	•	•	•	-	•	•	-		
ESTIMATE ASSUMPTIO	IS & KEV NOTES	ASSUMES NO ENVIRO	NMENTAL MITIGA	TION COSTS															
ESTIMATE ASSOMPTION	13 G RET HOTES	CONCEPT DESIGN PH	ASE WITH MANY A	SSUMPTIONS															-
		PROJECT SCHEDULE 8	k INFLATION																

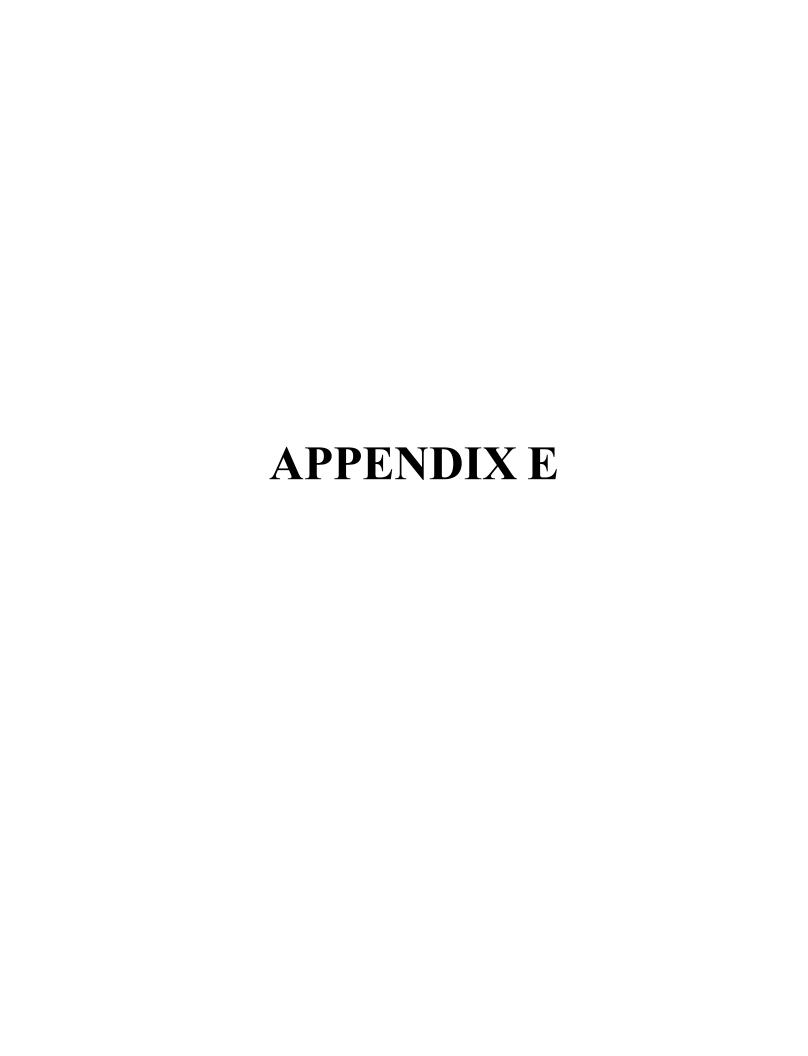
2		12' Trail on Structure w/ 3:1 Fill Slopes	12' Trail on Structure w/ Elevated Trail	12' Trail on Structure w/ MSE Walls	14' Trail on Structure w/ 3:1 Fill Slopes	14' Trail on Structure w/ Elevated Trail	14' Trail on Structure w/ MSE Walls	16' Trail on Structure w/ 3:1 Fill Slopes	16' Trail on Structure w/ Elevated Trail	16' Trail on Structure w/ MSE Walls	
Construction Cost		\$2,778,224	\$3,835,868	\$4,697,816	\$2,924,564	\$4,305,128	\$4,830,116	\$3,070,904	\$4,774,388	\$4,962,416	
Preliminary Engineering (10%)		\$277,822	\$383,587	\$469,782	\$292,456	\$430,513	\$483,012	\$307,090	\$477,439	\$496,242	
Construction Engineering (10%)	[	\$277,822	\$383,587	\$469,782	\$292,456	\$430,513	\$483,012	\$307,090	\$477,439	\$496,242	
Right of Way		\$725,000	\$625,000	\$625,000	\$725,000	\$625,000	\$625,000	\$725,000	\$625,000	\$625,000	
Right of Way Incidentals		\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	
Utility Relocation Costs		\$150,000	\$150,000	\$150,000	\$150,000	\$150,000	\$150,000	\$150,000	\$150,000	\$150,000	
8	TOTAL	\$4,238,868.80	\$5,408,041.60	\$6,442,379.20	\$4,414,476.80	\$5,971,153.60	\$6,601,139.20	\$4,590,084.80	\$6,534,265.60	\$6,759,899.20	
ž		DESIGN ESTIMATE IS BASED ON CON-	CEPT DESIGN & CAN CHANGE BASED O	N FINAL DESIGN APPROVAL							
ESTIMATE ASSUMPTIONS & KEY NOTES		ANTICIPATED UTILITY CONFLICTS INC	INTICIPATED UTILITY CONFLICTS INCLUDE WATER MAIN NEAR PROPOSED US-65 OVERPASS								
		ROW IMPACTS ARE BASED ON CONC	PT DESIGN & 2022 DOLLARS								





Chadwick Flyer Trail - Christian Co., MO Environmental Resources Map









### SECTION 1

#### STIP ESTIMATE



#### February 4, 2022

	ITEM	UNI	T COSTS	SECTI	ON 4
	Unclassified Excavation	\$10.00	/ CY	1,000.00	\$10,000
	Embankment In Place	\$20.00	/ CY	1,000.00	\$20,000
	4" Concrete Trail	\$50.00	/ SY	2,500.00	\$125,000
	4" Aggregate Base	\$10.00	/ SY	2,500.00	\$25,000
_	8" Aggregate Shoulder	\$20.00	/ SY	-	\$0
(2022)	Lighting	\$0.00	/ LS	1.00	\$0
02	Drainage	\$20,000.00	/ LS	1.00	\$20,000
S ()	Fencing	\$25.00	/ LF	2,450.00	\$61,250
DOLLARS	Subtotal				\$261,250
	Mobilization			6.0%	\$15,675
	Erosion Control			5.0%	\$13,063
ō	Traffic Control			3.0%	\$7,838
1 E	Signing				\$10,000
2	Contractor Furnished Surveying and Staking			1.0%	\$2,613
CONSTRUCTION	Subtotal				\$49,188
8	Contingency		20%		\$62,088
				Subtotal	\$372,525
				EARTHWORK BASED ON GIS INFORMA	ATION AND MAY CHANGE WITH
	ECTIA AATE ACCUM ACTIONS OF VENTAGE	TEC		MORE ACCURATE INFORMATION	
	ESTIMATE ASSUMPTIONS & KEY NO	)1E2		ASSUMES NO ENVIRONMENTAL MITI	
				CONCEPT DESIGN PHASE WITH MANY	ASSUMPTIONS
				PROJECT SCHEDULE & INFLATION	

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		SECTION 4
Construction Cost		\$372,525
Preliminary Engineering (10%)		\$37,253
Construction Engineering (10%)		\$37,253
Right of Way		\$0
Right of Way Incidentals		\$0
Utility Relocation Costs		\$100,000
	TOTAL	\$547,030.00
		DESIGN ESTIMATE IS BASED ON CONCEPT DESIGN & CAN CHANGE BASED
		ON FINAL DESIGN APPROVAL
ESTIMATE ASSUMPTIONS & KEY NOTES		ANTICIPATED UTILITY CONFLICTS INCLUDE WATER MAIN NEAR PROPOSED
		US-65 OVERPASS
		ROW IMPACTS ARE BASED ON CONCEPT DESIGN & 2022 DOLLARS





## OTO - CHADWICK FLYER TRAIL OVERPASS SECTION 2A

#### STIP ESTIMATE



#### February 4, 2022

	ITEM	UNI	T COSTS	SECTI	ON 4
	Unclassified Excavation	\$10.00	/ CY	5,000.00	\$50,000
	Embankment In Place	\$20.00	/ CY	1,000.00	\$20,000
	4" Concrete Trail	\$50.00	/ SY	5,200.00	\$260,000
	4" Aggregate Base	\$10.00	/ SY	5,200.00	\$52,000
7	8" Aggregate Shoulder	\$20.00	/ SY	-	\$0
22	Lighting	\$0.00	/ LS	1.00	\$0
(2022)	Drainage	\$50,000.00	/ LS	1.00	\$50,000
DOLLARS	Subtotal				\$432,000
0.11	Mobilization			6.0%	\$25,920
	Erosion Control			5.0%	\$21,600
	Traffic Control			3.0%	\$12,960
	Signing				\$15,000
<u>:</u>	Contractor Furnished Surveying and Staking			1.0%	\$4,320
CONSTRUCTION	Subtotal				\$79,800
5	Contingency		20%		\$102,360
•				Subtotal	\$614,160
				EARTHWORK BASED ON GIS INFORM	ATION AND MAY CHANGE WITH
		MORE ACCURATE INFORMATION			
	ESTIMATE ASSUMPTIONS & KEY NOT	ASSUMES NO ENVIRONMENTAL MITI			
				CONCEPT DESIGN PHASE WITH MANY	ASSUMPTIONS
				PROJECT SCHEDULE & INFLATION	

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		SECTION 4
Construction Cost		\$614,160
Preliminary Engineering (10%)		\$61,416
Construction Engineering (10%)		\$61,416
Right of Way		\$520,000
Right of Way Incidentals		\$30,000
Utility Relocation Costs		\$100,000
	TOTAL	\$1,386,992.00
		DESIGN ESTIMATE IS BASED ON CONCEPT DESIGN & CAN CHANGE BASED
		ON FINAL DESIGN APPROVAL
ESTIMATE ASSUMPTIONS & KEY NOTES		ANTICIPATED UTILITY CONFLICTS INCLUDE WATER MAIN NEAR PROPOSED
		US-65 OVERPASS
		ROW IMPACTS ARE BASED ON CONCEPT DESIGN & 2022 DOLLARS





### SECTION 2B

#### STIP ESTIMATE





	ITEM	UNI	T COSTS	SECTION 4		
	Unclassified Excavation	\$10.00	/ CY	5,000.00	\$50,000	
	Embankment In Place	\$20.00	/ CY	1,000.00	\$20,000	
	4" Concrete Trail	\$50.00	/ SY	4,700.00	\$235,000	
	4" Aggregate Base	\$10.00	/ SY	4,700.00	\$47,000	
7	8" Aggregate Shoulder	\$20.00	/ SY	-	\$0	
25	Lighting	\$0.00	/ LS	1.00	\$0	
(2022)	Drainage	\$50,000.00	/ LS	1.00	\$50,000	
DOLLARS	Subtotal				\$402,000	
011	Mobilization			6.0%	\$24,120	
۵	Erosion Control			5.0%	\$20,100	
	Traffic Control			3.0%	\$12,060	
⊢	Signing				\$15,000	
LON	Contractor Furnished Surveying and Staking			1.0%	\$4,020	
CONSTRUCTION	Subtotal				\$75,300	
NO	Contingency		20%		\$95,460	
				Subtotal	\$572,760	
			EARTHWORK BASED ON GIS INFORMATION AND MAY CHANGE WITH			
				MORE ACCURATE INFORMATION		
	ESTIMATE ASSUMPTIONS	S & KEY NOTES		ASSUMES NO ENVIRONMENTAL MITIGATION CO		
			CONCEPT DESIGN PHASE WITH MANY ASSUMPTIONS			
				PROJECT SCHEDULE & INFLATION		

		SECTION 4
RS	Construction Cost	\$572,760
A A	Preliminary Engineering (10%)	\$57,276
=	Construction Engineering (10%)	\$57,276
00	Right of Way	\$223,000
	Right of Way Incidentals	\$55,000
Į	Utility Relocation Costs	\$150,000
RA.	TOTAL	\$1,115,312.00
PROGI		DESIGN ESTIMATE IS BASED ON CONCEPT DESIGN & CAN CHANGE BASED
×		ON FINAL DESIGN APPROVAL
	ESTIMATE ASSUMPTIONS & KEY NOTES	ANTICIPATED UTILITY CONFLICTS INCLUDE WATER MAIN NEAR PROPOSED
		US-65 OVERPASS
		ROW IMPACTS ARE BASED ON CONCEPT DESIGN & 2022 DOLLARS





## OTO - CHADWICK FLYER TRAIL OVERPASS SECTION 4

#### STIP ESTIMATE





	ITEM	UNI	T COSTS	SECT	ION 4
	Unclassified Excavation	\$10.00	/ CY	1,000.00	\$10,000
	Embankment In Place	\$20.00	/ CY	2,000.00	\$40,000
	4" Concrete Trail	\$50.00	/ SY	700.00	\$35,000
	4" Aggregate Base	\$10.00	/ SY	700.00	\$7,000
2)	8" Aggregate Shoulder	\$20.00	/ SY	-	\$0
02	Lighting	\$0.00	/ LS	1.00	\$0
(2022)	Drainage	\$30,000.00	/ LS	1.00	\$30,000
DOLLARS	Subtotal				\$122,000
001	Mobilization			6.0%	\$7,320
	Erosion Control			1.0%	\$1,220
	Traffic Control			1.0%	\$1,220
	Signing				\$5,000
l S	Contractor Furnished Surveying and Staking			1.0%	\$1,220
CONSTRUCTION	Subtotal				\$15,980
6	Contingency		20%		\$27,596
				Subtotal	\$165,576
				EARTHWORK BASED ON GIS INFORM	ATION AND MAY CHANGE WITH
		MORE ACCURATE INFORMATION			
	ESTIMATE ASSUMPTIONS & KEY NO	TES		ASSUMES NO ENVIRONMENTAL MITI	
		CONCEPT DESIGN PHASE WITH MANY	/ ASSUMPTIONS		
				PROJECT SCHEDULE & INFLATION	

		SECTION 4
SS .	Construction Cost	\$165,576
l A	Preliminary Engineering (10%)	\$16,558
=	Construction Engineering (10%)	\$16,558
8	Right of Way	\$125,000
	Right of Way Incidentals	\$5,000
}	Utility Relocation Costs	\$10,000
%	TOTAL	\$338,691.20
PROGI		DESIGN ESTIMATE IS BASED ON CONCEPT DESIGN & CAN CHANGE BASED
%		ON FINAL DESIGN APPROVAL
-	ESTIMATE ASSUMPTIONS & KEY NOTES	ANTICIPATED UTILITY CONFLICTS INCLUDE WATER MAIN NEAR PROPOSED
		US-65 OVERPASS
		ROW IMPACTS ARE BASED ON CONCEPT DESIGN & 2022 DOLLARS





#### TRAIL ALIGNMENT OPTION 2A - SECTIONS 1-4 STIP ESTIMATE





		12' Trail Width on Structures						14' Trail Width on Structures						16' Trail Width on Structures								
ITEM	UNIT COSTS	UNIT COSTS	UNIT COSTS	UNIT COSTS	3:1 Fill Sl	opes	Elevated T	rail	MSE Wa	lls	3:1 Fill Slo	pes	Elevated 1	Trail	MSE Wa	lls	3:1 Fill Slo	ppes	Elevated T	rail	MSE Wa	alls
Unclassified Excavation	\$10.00 / CY	7,000.00	\$70,000	7,000.00	\$70,000	7,000.00	\$70,000	7,000.00	\$70,000	7,000.00	\$70,000	7,000.00	\$70,000	7,000.00	\$70,000	7,000.00	\$70,000	7,000.00	\$70,0			
Embankment In Place	\$20.00 / CY	44,000.00	\$880,000	4,000.00	\$80,000	4,000.00	\$80,000	45,000.00	\$900,000	4,000.00	\$80,000	4,000.00	\$80,000	46,000.00	\$920,000	4,000.00	\$80,000	4,000.00	\$80,0			
4" Concrete Trail	\$50.00 / SY	10,645.00	\$532,250	8,400.00	\$420,000	10,645.00	\$532,250	10,645.00	\$532,250	8,400.00	\$420,000	10,645.00	\$532,250	10,645.00	\$532,250	8,400.00	\$420,000	10,645.00	\$532,			
4" Aggregate Base	\$10.00 / SY	10,645.00	\$106,450	8,400.00	\$84,000	10,645.00	\$106,450	10,645.00	\$106,450	8,400.00	\$84,000	10,645.00	\$106,450	10,645.00	\$106,450	8,400.00	\$84,000	10,645.00	\$106,			
8" Aggregate Shoulder	\$20.00 / SY	-	\$0	-	\$0	-	\$0	-	\$0	-	\$0	-	\$0	-	\$0	-	\$0	-				
Safety Railing	\$80.00 / LF	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,			
Lighting	\$150,000.00 / LS	1.00	\$150,000	1.00	\$150,000	1.00	\$150,000	1.00	\$150,000	1.00	\$150,000	1.00	\$150,000	1.00	\$150,000	1.00	\$150,000	1.00	\$150,0			
Drainage	\$130,000.00 / LS	1.00	\$130,000	1.00	\$130,000	1.00	\$130,000	1.00	\$130,000	1.00	\$130,000	1.00	\$130,000	1.00	\$130,000	1.00	\$130,000	1.00	\$130,0			
Precast Pedestrian Overpass	\$210.00 / SF	3,850.00	\$808,500	3,850.00	\$808,500	3,850.00	\$808,500	4,400.00	\$924,000	4,400.00	\$924,000	4,400.00	\$924,000	4,950.00	\$1,039,500	4,950.00	\$1,039,500	4,950.00	\$1,039,5			
Elevated Trail Structure	\$110.00 / SF	-	\$0	17,400.00	\$1,914,000	-	\$0	-	\$0	20,300.00	\$2,233,000	-	\$0	-	\$0	23,200.00	\$2,552,000	-				
MSE Walls	\$70.00 / SF	-	\$0	-	\$0	36,820.00	\$2,577,400	-	\$0	-	\$0	36,920.00	\$2,584,400	-	\$0	-	\$0	37,020.00	\$2,591,4			
Fencing	\$25.00 / LF	2,450.00	\$61,250	2,450.00	\$61,250	2,450.00	\$61,250	2,450.00	\$61,250	2,450.00	\$61,250	2,450.00	\$61,250	2,450.00	\$61,250	2,450.00	\$61,250	2,450.00	\$61,			
Subtotal			\$3,008,050		\$3,987,350		\$4,785,450		\$3,143,550		\$4,421,850		\$4,907,950		\$3,279,050		\$4,856,350		\$5,030,4			
Mobilization			\$180,483		\$239,241		\$287,127		\$188,613		\$265,311		\$294,477		\$196,743		\$291,381		\$301,			
Erosion Control			\$57,811		\$67,604		\$75,585		\$59,166		\$71,949		\$76,810		\$60,521		\$76,294		\$78,			
Traffic Control			\$122,018		\$122,018		\$122,018		\$122,018		\$122,018		\$122,018		\$122,018		\$122,018		\$122,			
Signing			\$40,000		\$40,000		\$40,000		\$40,000		\$40,000		\$40,000		\$40,000		\$40,000		\$40,			
Contractor Furnished Surveying and Staking	3		\$30,081		\$39,874		\$47,855		\$31,436		\$44,219		\$49,080		\$32,791		\$48,564		\$50,			
Subtotal			\$430,392		\$508,736		\$572,584		\$441,232		\$543,496		\$582,384		\$452,072		\$578,256		\$592,1			
Contingency			\$492,044		\$492,044		\$492,044		\$492,044		\$492,044		\$492,044		\$492,044		\$492,044		\$492,			
		Subtotal	\$3,930,485 Sul	ntotal	\$4,988,129 Su	htotal	\$5,850,077	uhtotal	\$4,076,825	Subtotal	\$5,457,389 S	Subtotal	\$5,982,377	Subtotal	\$4,223,165 \$	Subtotal	\$5,926,649	Subtotal	\$6,114,6			

S		12' Trail on Structure w/ 3:1 Fill Slopes	12' Trail on Structure w/ Elevated Trail	12' Trail on Structure w/ MSE Walls	14' Trail on Structure w/ 3:1 Fill Slopes	14' Trail on Structure w/ Elevated Trail	14' Trail on Structure w/ MSE Walls	16' Trail on Structure w/ 3:1 Fill Slopes	16' Trail on Structure w/ Elevated Trail	16' Trail on Structure w/ MSE Walls			
AR	Construction Cost	\$3,930,485	\$4,988,129	\$5,850,077	\$4,076,825	\$5,457,389	\$5,982,377	\$4,223,165	\$5,926,649	\$6,114,677			
]	Preliminary Engineering (10%)	\$393,049	\$498,813	\$585,008	\$407,683	\$545,739	\$598,238	\$422,317	\$592,665	\$611,468			
Q	Construction Engineering (10%)	\$393,049	\$498,813	\$585,008	\$407,683	\$545,739	\$598,238	\$422,317	\$592,665	\$611,468			
	Right of Way	\$1,370,000	\$1,270,000	\$1,270,000	\$1,370,000	\$1,270,000	\$1,270,000	\$1,370,000	\$1,270,000	\$1,270,000			
≥	Right of Way Incidentals	\$65,000	\$65,000	\$65,000	\$65,000	\$65,000	\$65,000	\$65,000	\$65,000	\$65,000			
~ ≥	Utility Relocation Costs	\$360,000	\$360,000	\$360,000	\$360,000	\$360,000	\$360,000	\$360,000	\$360,000	\$360,000			
9	TOTAL	\$6,511,582.00	\$7,680,754.80	\$8,715,092.40	\$6,687,190.00	\$8,243,866.80	\$8,873,852.40	\$6,862,798.00	\$8,806,978.80	\$9,032,612.40			
×		DESIGN ESTIMATE IS BASED ON CONCEPT DESIGN & CAN CHANGE BASED ON FINAL DESIGN APPROVAL											
-	ESTIMATE ASSUMPTIONS & KEY NOTES	ANTICIPATED UTILITY CONFLICTS INCL	INTICIPATED UTILITY CONFLICTS INCLUDE OVERHEAD TRANSMISSION LINE (ACROSS ROUTE 13), OVERHEAD ELECTRIC (ACROSS 1-44), COS SANITARY SEWER AND FIBER IN MEDIAN OF 1-44										
		ROW IMPACTS ARE BASED ON CONCE	PT DESIGN & 2022 DOLLARS.										



#### TRAIL ALIGNMENT OPTION 2B - SECTIONS 1-4 STIP ESTIMATE





			12' Trail Width on Structures							14' Trail Width on Structures						16' Trail Width on Structures					
ITEM	UNIT COSTS		Slopes	Elevated Trail		MSE Walls		3:1 Fill Slopes		Elevated Trail		MSE Walls		3:1 Fill Slo	opes	Elevated Trail		MSE Walls			
Unclassified Excavation	\$10.00 / CY	7,000.00	\$70,000	7,000.00	\$70,000	7,000.00	\$70,000	7,000.00	\$70,000	7,000.00	\$70,000	7,000.00	\$70,000	7,000.00	\$70,000	7,000.00	\$70,000	7,000.00	\$70,00		
Embankment In Place	\$20.00 / CY	44,000.00	\$880,000	4,000.00	\$80,000	4,000.00	\$80,000	45,000.00	\$900,000	4,000.00	\$80,000	4,000.00	\$80,000	46,000.00	\$920,000	4,000.00	\$80,000	4,000.00	\$80,00		
4" Concrete Trail	\$50.00 / SY	10,145.0	\$507,250	7,900.00	\$395,000	10,145.00	\$507,250	10,145.00	\$507,250	7,900.00	\$395,000	10,145.00	\$507,250	10,145.00	\$507,250	7,900.00	\$395,000	10,145.00	\$507,2		
4" Aggregate Base	\$10.00 / SY	10,145.0	\$101,450	7,900.00	\$79,000	10,145.00	\$101,450	10,145.00	\$101,450	7,900.00	\$79,000	10,145.00	\$101,450	10,145.00	\$101,450	7,900.00	\$79,000	10,145.00	\$101,4		
8" Aggregate Shoulder	\$20.00 / SY		\$0	-	\$0	-	\$0	-	\$0	-	\$0	-	\$0	-	\$0	-	\$0	-			
Safety Railing	\$80.00 / LF	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,600	3,370.00	\$269,6		
Lighting	\$150,000.00 / LS	1.00	\$150,000	1.00	\$150,000	1.00	\$150,000	1.00	\$150,000	1.00	\$150,000	1.00	\$150,000	1.00	\$150,000	1.00	\$150,000	1.00	\$150,00		
Drainage	\$130,000.00 / LS	1.00	\$130,000	1.00	\$130,000	1.00	\$130,000	1.00	\$130,000	1.00	\$130,000	1.00	\$130,000	1.00	\$130,000	1.00	\$130,000	1.00	\$130,0		
Precast Pedestrian Overpass	\$210.00 / SF	3,850.00	\$808,500	3,850.00	\$808,500	3,850.00	\$808,500	4,400.00	\$924,000	4,400.00	\$924,000	4,400.00	\$924,000	4,950.00	\$1,039,500	4,950.00	\$1,039,500	4,950.00	\$1,039,5		
Elevated Trail Structure	\$110.00 / SF		\$0	17,400.00	\$1,914,000	-	\$0	-	\$0	20,300.00	\$2,233,000	-	\$0	-	\$0	23,200.00	\$2,552,000	-			
MSE Walls	\$70.00 / SF		\$0	-	\$0	36,820.00	\$2,577,400	-	\$0	-	\$0	36,920.00	\$2,584,400	-	\$0	-	\$0	37,020.00	\$2,591,40		
Fencing	\$25.00 / LF	2,450.00	\$61,250	2,450.00	\$61,250	2,450.00	\$61,250	2,450.00	\$61,250	2,450.00	\$61,250	2,450.00	\$61,250	2,450.00	\$61,250	2,450.00	\$61,250	2,450.00	\$61,2		
Subtotal			\$2,978,050		\$3,957,350		\$4,755,450		\$3,113,550		\$4,391,850		\$4,877,950		\$3,249,050		\$4,826,350		\$5,000,4		
Mobilization			\$178,683		\$237,441		\$285,327		\$186,813		\$263,511		\$292,677		\$194,943		\$289,581		\$300,0		
Erosion Control			\$56,311		\$66,104		\$74,085		\$57,666		\$70,449		\$75,310		\$59,021		\$74,794		\$76,5		
Traffic Control			\$121,118		\$121,118		\$121,118		\$121,118		\$121,118		\$121,118		\$121,118		\$121,118		\$121,1		
Signing			\$40,000		\$40,000		\$40,000		\$40,000		\$40,000		\$40,000		\$40,000		\$40,000		\$40,0		
Contractor Furnished Surveying and Sta	king		\$29,781		\$39,574		\$47,555		\$31,136		\$43,919		\$48,780		\$32,491		\$48,264		\$50,0		
Subtotal			\$425,892		\$504,236		\$568,084		\$436,732		\$538,996		\$577,884		\$447,572		\$573,756		\$587,68		
Contingency			\$485,144		\$485,144		\$485,144		\$485,144		\$485,144		\$485,144		\$485,144		\$485,144		\$485,1		
		Subtotal	\$3,889,085	Subtotal	\$4,946,729 S	ubtotal	\$5,808,677	Subtotal	\$4,035,425	Subtotal	\$5,415,989	Subtotal	\$5,940,977	Subtotal	\$4,181,765 S	ubtotal	\$5,885,249	Subtotal	\$6,073,2		
			EARTHWORK ASSUMES ENTIRE PROJECT IS BUILT WITH DIRT STAYING ON EACH SIDE OF THE INTERSTATE.																		
ESTIMATE ASSUMPTION	ONS & KEY NOTES		IRONMENTAL MITIG																		
			PHASE WITH MANY A	SOUMPTIONS																	
		PROJECT SCHEDU	E & INFLATION																		

S		12' Trail on Structure w/ 3:1 Fill Slopes	12' Trail on Structure w/ Elevated Trail	12' Trail on Structure w/ MSE Walls	14' Trail on Structure w/ 3:1 Fill Slopes	14' Trail on Structure w/ Elevated Trail	14' Trail on Structure w/ MSE Walls	16' Trail on Structure w/ 3:1 Fill Slopes	16' Trail on Structure w/ Elevated Trail	16' Trail on Structure w/ MSE Walls				
AR	Construction Cost	\$3,889,085	\$4,946,729	\$5,808,677	\$4,035,425	\$5,415,989	\$5,940,977	\$4,181,765	\$5,885,249	\$6,073,277				
	Preliminary Engineering (10%)	\$388,909	\$494,673	\$580,868	\$403,543	\$541,599	\$594,098	\$418,177	\$588,525	\$607,328				
Q	Construction Engineering (10%)	\$388,909	\$494,673	\$580,868	\$403,543	\$541,599	\$594,098	\$418,177	\$588,525	\$607,328				
	Right of Way	\$1,073,000	\$973,000	\$973,000	\$1,073,000	\$973,000	\$973,000	\$1,073,000	\$973,000	\$973,000				
≥	Right of Way Incidentals	\$90,000	\$90,000	\$90,000	\$90,000	\$90,000	\$90,000	\$90,000	\$90,000	\$90,000				
≥	Utility Relocation Costs	\$410,000	\$410,000	\$410,000	\$410,000	\$410,000	\$410,000	\$410,000	\$410,000	\$410,000				
9	TOTAL	\$6,239,902.00	\$7,409,074.80	\$8,443,412.40	\$6,415,510.00	\$7,972,186.80	\$8,602,172.40	\$6,591,118.00	\$8,535,298.80	\$8,760,932.40				
×		DESIGN ESTIMATE IS BASED ON CONCEPT DESIGN & CAN CHANGE BASED ON FINAL DESIGN APPROVAL												
_ <u>~</u>	ESTIMATE ASSUMPTIONS & KEY NOTES	ANTICIPATED UTILITY CONFLICTS INCL	NTICIPATED UTILITY CONFLICTS INCLUDE OVERHEAD TRANSMISSION LINE (ACROSS ROUTE 13), OVERHEAD ELECTRIC (ACROSS 1-44), COS SANITARY SEWER AND FIBER IN MEDIAN OF I-44											
		ROW IMPACTS ARE BASED ON CONCE	ROW IMPACTS ARE BASED ON CONCEPT DESIGN & 2022 DOLLARS.											