PIC-Circleville Railroad Grade Separation (PID 115981) Feasibility Study

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May 10, 2024

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1.0 Introduction

1.1 Executive Summary

The City of Circleville is located approximately 25 miles south of Columbus in Pickaway County, Ohio. Established in 1810, Circleville welcomed the arrival of railroads to central Ohio in the mid-1800s to bolster the economy, mobility, and overall development of the city. The railroad tracks are positioned to the northwest and southeast of the city, with east-west tracks sweeping through the center of town. Over the years, the railroad industry in Circleville has experienced various changes and challenges, but remains an essential part of Circleville's transportation infrastructure.

Today, all public roadways in this region intersect the railroad tracks at-grade. The nearest railroad grade separation north of Circleville is near the County Road 511 and U.S. 23 intersection, and at County Road 16 south of Circleville. Additionally, no grade separations exist east and south of Clinton Street until travelers reach County Road 16. This leaves the 7 square miles within Circleville city limits with 14 at-grade crossings.

The railroad network experiences high levels of activity. With an average of 23 train crossings per day and roadway delays averaging more than 1.5 hours per day, the presence of the railroad is deeply felt in the daily lives of Circleville's residents. The intermodal facility, which serves as a hub for transferring freight between different modes of transportation, is a key component of Circleville's railroad infrastructure. However, the length of trains serving this facility can lead to extended stoppages that block all at-grade intersections throughout the city. Moreover, the presence of spur tracks west of Court Street, serving the Cargill grain mill, adds to the complexity of railroad operations in the city. Frequent train stoppages for loading, especially during the peak season for the mill, further disrupts and delays traffic. **The railroad tracks divide Circleville into distinct north and south halves, each functionally isolated from the other during blockages.**

Cargill facility in Circleville that uses railroad to load and transport grain.

The incorporated limits of Circleville extend both north and south of all existing 14 at-grade railroad crossings. Police, fire, and emergency medical services (EMS) response times have been impacted due to the number of trains per day and the queuing of vehicles at intersections. Furthermore, the OhioHealth Berger Hospital, Pickaway County EMS, Circleville Police Department, and Circleville Fire Department are all located north of the at-grade railroad crossings. Accessing both north and south of the at-grade railroad crossings has become a challenge for emergency services with the frequent blockages of the rail crossings. Detouring around the blocked traffic or train crossings is not feasible due to the distance and travel time. Because of this, grade-separated crossing alternatives were developed to provide a route that remains uninterrupted by the presence of active trains at railroad crossings.

The following crossing locations were considered for a grade separation:

- S Court Street
- Pickaway Street
- Washington Street
- Progress Parkway Extension

The four options listed above and a no-build option were rate on a number of factors: right-of-way impacts, construction cost, congestion reduction, maintenance of traffic, environmental impacts, and

construction duration, and is included in **Section 5.0**. Refinements to the preferred alternative are anticipated during the detailed design phase when the field survey is performed and the structure type studies are completed. Other crossing locations were considered but dismissed from consideration, including Island Road Extension, Crites Road Extension, and W Main Street. Details for the dismissed alternatives are included in **Section 3.0**.

1.2 Previous Studies

Several studies and plans have been completed over the past decades documenting the importance of the mobility of the travelling public due to the number of train crossings bisecting Circleville.

In 1997, Circleville established land use recommendations in the Circleville Land Use Plan (Edsall & Associates) pertaining to the railroad crossings within the city limits. The full report is available in the Project File. These recommendations included:

- Extending Crites Road east to Kingston Pike with a grade separation across the railroad; and
- Railroad crossing on Main Street/US 22 near the US 23 interchange has a major impact on congestion.

On December 19, 2012, Norfolk Southern (NS), the Public Utilities Commission of Ohio (PUCO), and the Ohio Rail Development Commission (ORDC) entered into an agreement for the installation of warning devices and closures of at-grade crossings along the NS Heartland Corridor from Columbus to South Point. The intent of the study included a 25% closure goal, equipment improvements and modifications at open crossings, and evaluation of a grade-separated crossing location. In 2015, the City of Circleville had 18 NS at-grade railroad crossings throughout the center of the incorporated limits, bisecting the city from north and south.

Under the direction of the ORDC, HDR conducted the Circleville Norfolk Southern Railroad Crossing Study (January 23, 2015) of the 18 NS at-grade crossings in Circleville. Ten of the crossings were on the "Main Line" railroad tracks with the eight remaining crossings on "Other Lines". The purpose of the study was to evaluate the existing conditions, recommend crossing improvements, evaluate and make recommendations for possible crossing closures, and a grade-separated crossing location. The study area included the 18 at-grade crossings and 31 adjacent roadway intersections.

The 2015 Circleville Norfolk Southern Railroad Crossing Study collected data and evaluated the existing conditions in Circleville. This study evaluated traffic data during the morning and afternoon peak periods, railroad crossing inventory data, and travel time data. The main traffic routes were found to be South Court Street, South Pickaway Street, and South Washington Street in the north/south direction and West High Street, West Main Street, and West Ohio Street for the east/west direction. The full report is available in the Project File.

Based on the results of the 2015 study, the following recommendations were made:

- At-grade railroad closure recommendations included Huston Street, West Ohio Street (just west of Scioto Street), West Mill Street, and Harrison Avenue.
- Additional recommendations included circuitry upgrades, LED lighting upgrades, and the addition of flashing lights at various locations. The addition of crossbucks, advanced warning signage, turn restriction access signage, and advanced warning clearance timing at various locations were recommended.
- Grade separated railroad crossing locations evaluated included South Court Street, South Pickaway Street, South Washington Street, and Clinton Street.

Since the conclusion of the 2015 study, the Huston Street, West Ohio Street (just west of Scioto Street), and the Mill Street at-grade railroad crossings have been closed to vehicular traffic diverting existing traffic onto surrounding roadways utilizing other railroad crossings. Additionally, the railroad tracks at the Harrison Avenue location have been removed. However, no grade separated railroad crossing has been constructed in Circleville. The frequent crossings cause major traffic disruptions which often take multiple traffic signal cycles to correct.

In 2021, American Structurepoint completed the Circleville Railroad Grade Separation Study to evaluate three locations for a grade separated crossing within or near the corporation limits. The three locations included: Court Street, Washington Street, and Crites Road. Additional conversations with the City of Circleville have occurred since this study, opening the possibility of other locations to be studied. The full report is available in the Project File.

A typical train traveling through the City of Circleville.

In 2023, American Structurepoint completed the Circleville Railroad Grade Separation Study Existing Traffic Analysis Report. Per the capacity analyses, the City of Circleville does not have a congestion issue at the intersections near each of the existing at grade railroad crossings due to existing traffic volumes. The results of the study determined congestion and delays experienced by the traveling public are largely due to the railroad tracks bisecting the City of Circleville and closing multiple roadways every time a train travels through Circleville. The full report is available in the Project File.

Commented [FA1]: Do all folks reading this have access to it or should it be an appendix add?

1.3 Summary of Feasibility Study

This Feasibility Study evaluates four design alternatives as well as a "no-build" alternative and rates them based on a number of factors including right-of-way impacts, congestion reduction, time-savings for EMS, construction duration, impact of detour, construction cost, environmental impacts, and public support. These factors are weighed on its effectiveness of meeting the primary and secondary goals of the Purpose and Need Statement to an overall rating. Detailed descriptions for each alternative are located in **Section 3.0**. Plan and profile sheets and cross sections for each alternative are in **Appendix C** and **Appendix D**, respectively. Also, high-level construction cost estimates for all design alternatives are provided in **Appendix E**.

Of those four design alternatives, all were identified as both feasible for construction and met the goals of the Purpose and Need. A comparison matrix for the alternatives is provided in **Section 5.0** of this document based on qualitative analysis. **Based on the results of this Feasibility Study, a preferred option was clearly identified.** American Structurepoint recommends developing the S Court Street Overpass as the Preferred Alternative to be advanced into the detailed design phase. There are numerous advantages of this alignment over other alternatives, specifically the congestion reduction opportunity and time-savings on existing EMS routes. Evident by the highest ADT of alternatives considered and classification as a Minor Arterial, S Court Street is the primary north-south connector through the city and a grade separation location would provide a turn-key solution. During the Public Involvement meeting, the Court Street alternative also received the most documented support.

2.0 Purpose and Need Summary

2.1 Purpose and Need Statement

The purpose of the project is to improve mobility and reduce traffic disruptions for the public (motorists, pedestrians, and emergency responders) in the City of Circleville caused by train delays on the Norfolk Southern Rail Lines.

Need Element(s)

The primary need elements of the project is to improve the flow of traffic (mobility) in the City across the Norfolk Southern Rail Lines for the travelling public and EMS services.

Mobility

In 2022, American Structurepoint, Inc., with the assistance of the Mid-Ohio Regional Planning Commission (MORPC), collected existing traffic patterns throughout Circleville. Collected traffic patterns occurred at the existing at grade railroad crossings at Main Street, Court Street, Pickaway Street, and Washington Street. Other potential crossings could not be used in this analysis as MORPC does not have data for other potential crossings.

Traffic volumes were collected at nineteen (19) intersections within Circleville. These traffic volumes were then used to calculate the existing annual average daily traffic (AADT) at each of the existing at-grade crossing locations. Summarized in the table below are the existing traffic numbers collected for each existing at-grade crossing. Main Street is the most heavily used at-grade crossing in Circleville followed by Court Street, Pickaway Street, and Washington Street.

Existing Railroad Crossing	Existing At-Grade Crossing Information	
	Existing AADT	Section
Main Street	10,390	2 Lanes
Court Street	6,500	4 Lanes
Pickaway Street	2,960	2 Lanes
Washington Street	1,610	2 Lanes

Average Annual Daily Traffic (AADT) for Existing At-Grade Crossings within Circleville

An analysis of the at-grade railroad crossing bisecting Circleville was conducted to determine the impacts of trains on traffic. Two 24-hour videos were recorded at the Court Street at-grade crossing on a typical weekday in December of 2022. Please note that these train induced delays are at the Court Street at-grade crossing and that these gate closure durations can be applied to the other existing at grade crossings within the Circleville city limits. The video recording was used to determine the number and time of the trains, the duration of the closing, and the length of the queue that resulted from the gates being closed. A total of 15 trains were observed during the analysis period. Overall, the travelling public experiences gate closures of up to six (6) minutes plus the additional delays due to the resulting queues. Per conversations with ORDC, the NS line averages between 22 and 24 trains per day, roughly one (1) per hour. With an average of four (4) minutes of closure (plus the additional queuing time), the average day results in more than 1.5 hours of delay due to the gate closures. The grain and oil/gas carrying trains

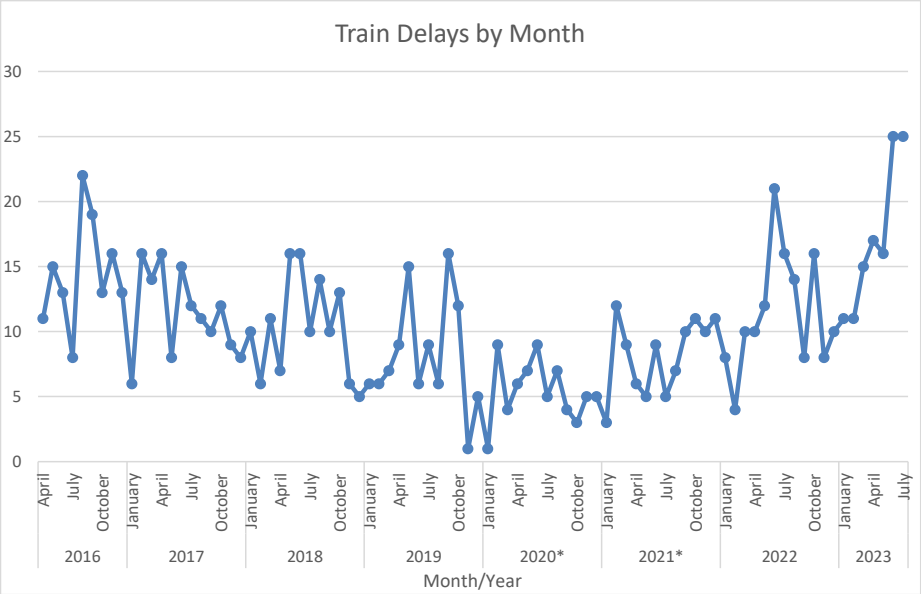
also run throughout the year, but they run on an as-needed basis and therefore their schedules are more difficult to predict. This queueing is often higher during the high season in late summer/early fall at the grain mill due to the loading and unloading of materials. The results of the train crossing analysis are included in the table below.

Time of Day	Duration of Gate Closure (Minutes)	Vehicles Queued	
		Southside	Northside
12:52 AM	3	0	0
4:36 AM	6	0	3
4:51 AM	6	1	0
6:14 AM	2	3	0
7:22 AM	6	12	10
9:06 AM	1	5	3
11:50 AM	5	19	23
1:10 PM	5	20	21
3:01 PM	3	16	19
3:30 PM	3	12	21
4:03 PM	2	13	19
7:30 PM	6	19	14
8:50 PM	4	12	8
9:07 PM	7	20	15
10:25 PM	5	4	6
Averages	**4.3**	**11**	**11**

Train Crossing Analysis

This data illustrates the frequent blockages of the rail crossings in Circleville. Detouring around the blocked traffic or train crossings on the local roadway network is not possible because the railroad tracks bisect Circleville. Detouring further away from the closures utilizing U.S. 23 is feasible but inefficient for the traveling public. Police, fire, and EMS services would have to know the presence of a train stoppage prior to responding, and would need to use circuitous routing thereafter.

Furthermore, the Circleville Police Department provided radio log data for each time the department reported a response delay due to a train from March 25, 2016 through August 5, 2023. The graphs below demonstrates the uptick in the number of reported delays experienced by the police department responding to calls since COVID restrictions were lifted. Overall, the reported delays in 2023 are projected to surpass the previous high of 158 that were reported in 2018. Note that the lengths of the response delays were not included in the radio log data provided by the police department.



Summary of Reported Circleville Police Department Response Delays by Month

Summary Statement

In summary, the purpose of this transportation improvement project is to improve mobility and reduce traffic disruptions for the travelling public in Circleville, caused by train delays on the Norfolk Southern rail lines.

Logical Termini and Independent Utility

The logical termini were established based on existing transportation problems at the existing at-grade railroad crossings within the City of Circleville.

The proposed project is not dependent on other planned projects to meet the established purpose and need. Additionally, the proposed project can be constructed independent of any other transportation

improvement in the area, does not restrict consideration of alternatives for other foreseeable improvements throughout the corridors and does not force any other improvement project(s). Therefore, independent utility is established for this transportation improvement.

3.0 Alternatives Considered and Dismissed

Candidate locations were determined through a comprehensive process involving analysis of the existing traffic network, emergency vehicle routing considerations, examination of Circleville's comprehensive plan, and consultation with representatives from the City of Circleville. Subsequently, the following alternative options were determined:

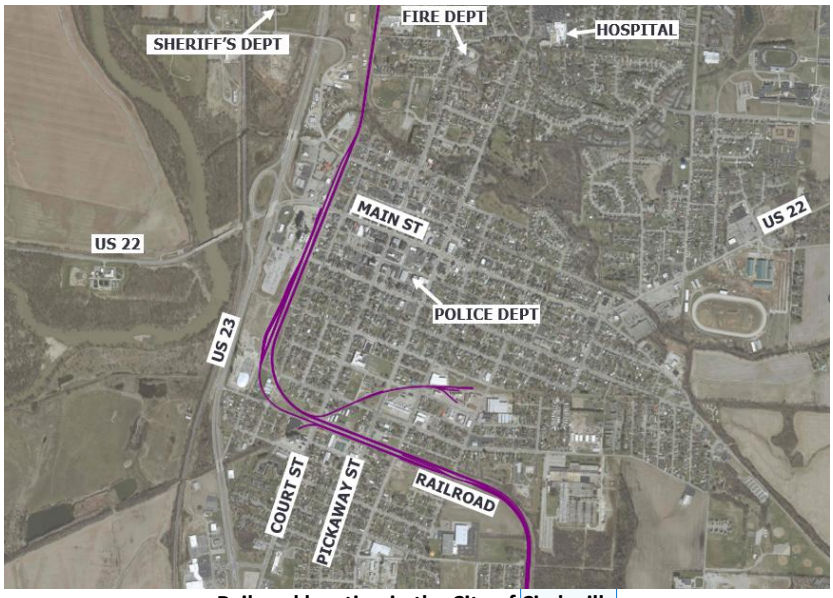
- S Court Street Overpass
- Pickaway Street Overpass
- Washington Street Overpass
- Progress Parkway Extension and Overpass
- Island Road Extension and Overpass
- Crites Road Extension and Overpass
- W Main Street Underpass

The design basis for these alternatives assumed the following: a maximum 5 percent grade for the approaches to the overpass, a 23.5’ vertical clearance over the existing railroad tracks, bridge abutments set outside of the railroad right-of-way, a minimum 25’ horizontal clearance from the center of the tracks to a bridge abutment or pier.

After development, these alternatives underwent preliminary evaluation to ascertain their capability to fulfill the purpose and need of the project. Based on this assessment, two alignment alternatives were deemed inadequate in effectively meeting the purpose and need of the project and eliminated:

- Island Road Extension and Overpass
- Crites Road Extension and Overpass

Both of the eliminated alternatives are east-west routes. Given the placement of the railroad within the city and the positioning of existing Police, Fire, and Hospital services, it is imperative to establish efficient routing to the southern portion of Circleville. The Island Road and Crites Road alternatives failed to provide this essential connectivity, being geographically situated a significant distance to the north and south, respectively, of the primary obstructed area.



Railroad location in the City of Circleville

The W Main Street underpass was another east-west roadway option considered, but ultimately it was deemed unsuitable for further consideration. Despite its central location, the adverse effects from construction of the project outweighs the anticipated benefits of the roadway improvement. Tunneling W Main Street beneath the existing railroad would necessitate a lowering of the roadway elevation by approximately 23 feet to ensure adequate bridge clearance with the superstructure beam depth. This alteration would have profound implications for the surrounding businesses, including the removal of several longstanding buildings and the imposition of tall retaining walls that would partition the sunken roadway. The project would also have negative implications for parking availability, significant utility relocations, and would create a low point for drainage necessitating pumping to reach the existing Scioto River outlet. This work would also impact adjacent street intersections to a significant extent, resulting in the conversion of the intersections of Island Road and Western Avenue into cul-de-sacs. Preserving connectivity for W Main Street with Scioto Street could be achieved by substantially lowering its elevation to align with the new depressed intersection. However, this adjustment in profile would consequently affect the intersections of Scioto Street with Franklin Street and Pickney Street.

Of particular concern is the potential disruption to the Circleville annual Pumpkin Show, a tradition dating back to 1903, which draws approximately 400,000 visitors to Circleville each year. The success of this event is heavily reliant on the cohesive downtown transportation grid. Implementing the proposed

Commented [FA2]: It would help to move Main Street closer to the crossing to avoid any confusion. Is it E Main by the crossing location we studied?

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improvement would significantly compromise the viability of downtown businesses and disrupt the logistical framework of the festival.

Moreover, the construction of shoo fly tracks for the railroad, along with the installation of switches and turnouts, would entail additional property impacts extending beyond the immediate project area. Considering these factors, the W Main Street underpass was deemed impractical for further pursuit and eliminated from consideration.

W Main Street underpass alternative location in historical Downtown Circleville.

Downtown Circleville during annual Pumpkin Show

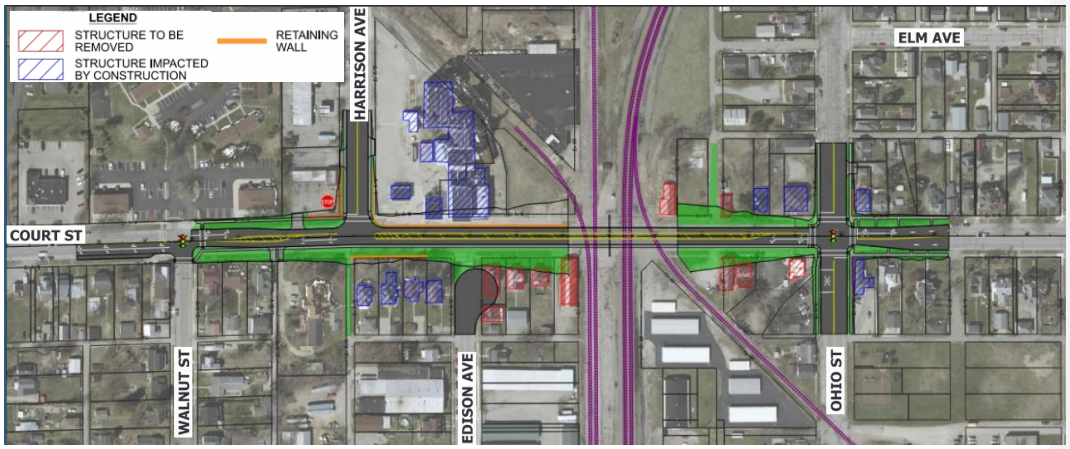
3.1 S Court Street Overpass

Key Features of the S Court Street Overpass alternative include:

- A curbed roadway section with closed drainage exists and will be perpetuated.
- Northbound through/right lane is converted into a right turn only lane at Walnut Street.
- The roadway profile transitions to 5% upgrade toward the railroad just north of the Walnut Street intersection.
- The stop-controlled intersection with Harrison Avenue is elevated to match the raised S Court Street elevation.
- A three-lane section is carried from Harrison Avenue through the intersection with E Ohio Street.
- Retaining walls are developed on the east side of Court Street to protect the residential home frontage from encroaching back slopes south of Edison Avenue.
- Retaining walls are viable to retain fill from the property at 901 S Court Street on the west side immediately south of the railroad bridge, but may not be desired.
- The S Court Street intersection with Edison Avenue is cut off due to the elevation difference. Edison Avenue is converted into a cul-de-sac, tilted to the north to minimize property impacts to the south.

- The 4 properties south east, 3 properties north east, and 2 properties north west of the bridge will require acquisition.
- Over the bridge, the profile crests to a 5% downgrade toward E Ohio Street.
- Retaining walls aren't viable on the north side of the bridge due to lack of alternate property access and roadway elevation relative to the residences.
- The signalized intersection with E Ohio Street is elevated to match the raised S Court Street elevation.
- Roadway work is extended just beyond the intersection of E Ohio Street in all directions to facilitate tie-in elevation.
- The S Court Street grade separation would eliminate 5 existing at-grade crossings, one more than the other alternatives considered.
- **The construction cost for S Court Street Overpass is estimated to be $21.15 M.** The construction cost estimates mentioned in this section are based on the cost for detailed design, construction, and construction inspection work, but exclude right-of-way costs at the time of construction.

Existing at-grade railroad crossing at S Court Street, looking south.



Proposed grade separation alternative at S Court Street

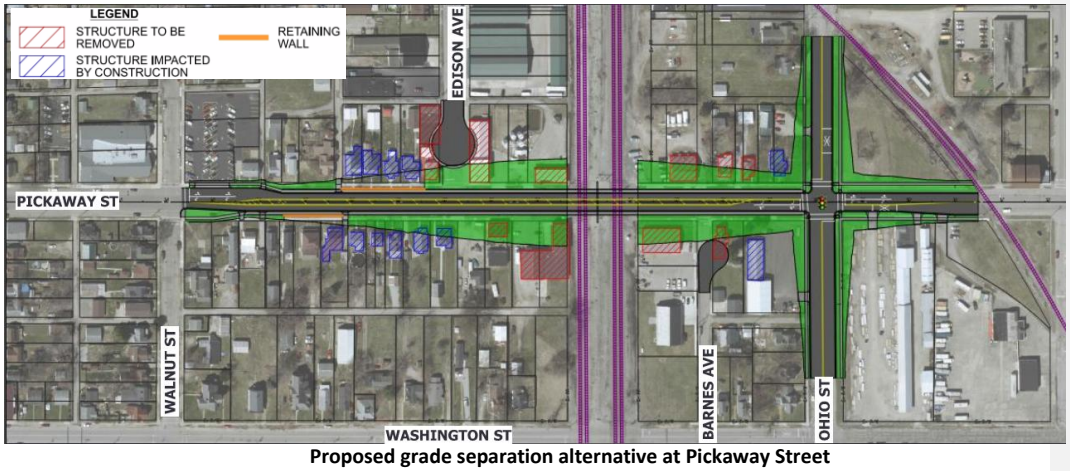
3.2 Pickaway Street Overpass

Key Features of the Pickaway Street Overpass alternative include:

- A curbed roadway section with closed drainage exists and will be perpetuated.
- The roadway profile transitions to 5% upgrade toward the railroad just north of the Walnut Street intersection.
- The Pickaway Street intersection with Edison Avenue is cut off due to the elevation difference. Edison Avenue is converted into a cul-de-sac.
- A three-lane section is carried from just north of Walnut Street through the intersection with E Ohio Street.
- Retaining walls are developed on both sides of Pickaway Street to protect the residential home frontage from encroaching back slopes south of Edison Avenue.
- The 2 properties south east, 2 properties north east, and 3 properties south west, and 3 properties north west of the bridge will require acquisition.
- Over the bridge, the profile crests to a 5% downgrade toward E Ohio Street.
- Retaining walls aren't viable on the north side of the bridge due to lack of alternate property access and roadway elevation relative to the residences.
- The Pickaway Street intersection with Barnes Avenue is cut off due to the elevation difference. Barnes Avenue is converted into a cul-de-sac tilted to the north to be out of conflict with the proposed grading limits.
- The signalized intersection with E Ohio Street is elevated significantly to match the raised Pickaway Street elevation.

- Roadway work is extended beyond the intersection of E Ohio Street in all directions to facilitate tie-in elevation.
- **The construction cost for Pickaway Street Overpass is estimated to be $19.50 M.**

Existing at-grade railroad crossing at Pickaway Street

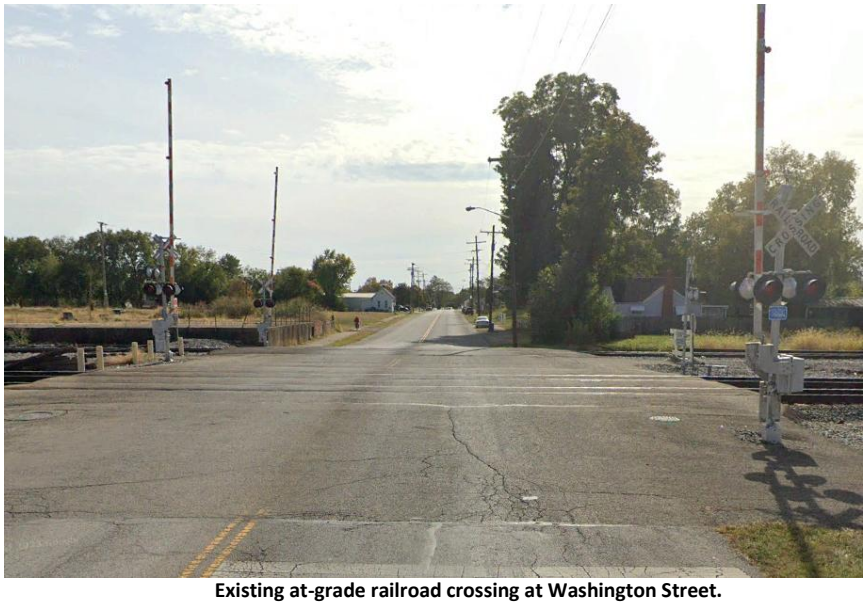


Proposed grade separation alternative at Pickaway Street

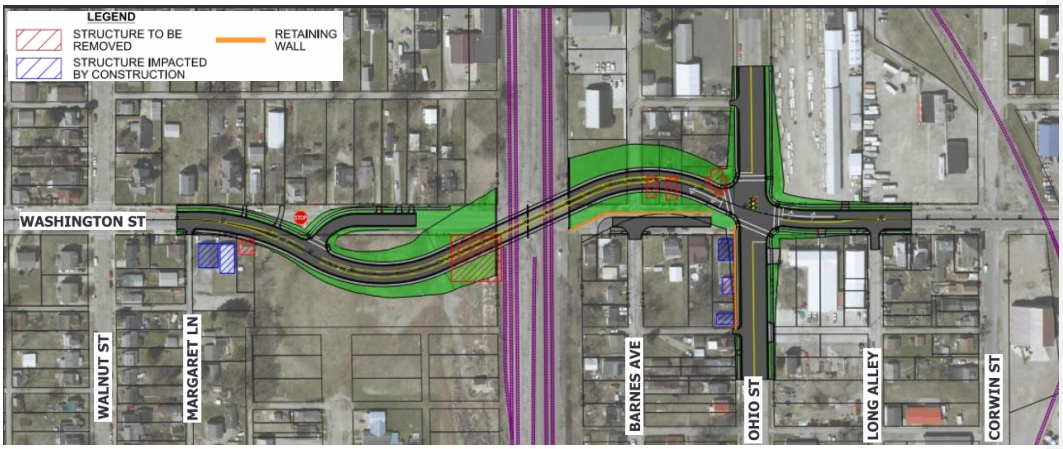
3.3 Washington Street Overpass

Key Features of the Washington Street Overpass alternative include:

- A curbed roadway section with closed drainage exists and will be perpetuated.
- The roadway profile transitions to 5% upgrade toward the railroad just north of the Margaret Lane intersection.
- A three-lane section is carried from just south of Margaret Street through the intersection with Long Alley.
- Retaining walls are developed on the east side of Washington Street to protect the residential home access from encroaching back slopes.
- The 1 property south east and 3 properties north west of the bridge will require acquisition.
- Over the bridge, the profile crests to a 5% downgrade toward E Ohio Street.
- The Washington Street intersection with Barnes Avenue is cut off due to the elevation difference. An alley is extended perpendicular from Barnes Avenue for residential access.
- The signalized intersection with E Ohio Street is elevated significantly to match the raised Washington Street elevation. Roadway work is extended well beyond the intersection of E Ohio Street in all directions to facilitate tie-in elevation.
- **The construction cost for Washington Street Overpass is estimated to be $19.92 M.**



Existing at-grade railroad crossing at Washington Street.



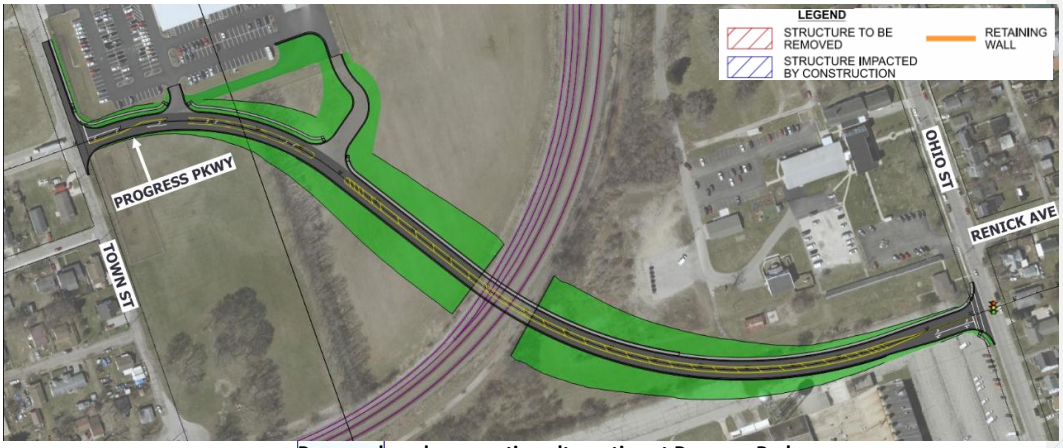
Proposed grade separation alternative at Washington Street

3.4 Progress Parkway Extension and Overpass

Key Features of the Progress Parkway Extension and Overpass alternative include:

- A curbed roadway section with closed drainage will be proposed on the extended roadway
- The roadway profile transitions to 5% upgrade toward the railroad just north of the southern driveway into Health Care Logistics.
- An additional driveway will be constructed for the rear of the property for parking lot access to Health Care Logistics.
- A three-lane section is carried from the intersection of Progress Parkway with Town Street through the intersection with E Ohio Street.
- No existing buildings will require acquisition.
- Over the bridge, the profile crests to a 5% downgrade toward E Ohio Street.
- Retaining walls are not required. Grading limits will slope at 2:1 toward the existing ground.
- Progress Parkway will tie-in to a new signalized intersection with E Ohio Street.
- The proposed roadway extension of Progress Parkway will directly impact the site layout for Health Care Logistics expansion plan.
- The **construction cost for Progress Parkway Extension and Overpass is estimated to be $16.06M**

Intersection of Progress Parkway at Town Street, looking north toward the proposed extension and overpass.



Proposed grade separation alternative at Progress Parkway

Commented [FA4]: Can we superimpose the development on here? Is that a key feature?

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3.5 No-Build Alternative

For comparison sake, a "no-build" alternative was included for evaluation. While the no-build alternative would free up available funds to use on other pressing issues, a grade separated railroad crossing in Circleville ranks near the top of the list of transportation priorities. Backups occur daily along the city routes when trains are active. During the peak seasons for the industries in Circleville, the backups can be severe. This improvement is critical for public safety, continued growth and mobility, and to eliminate major traffic issues which have plagued the area for years.

If an infrastructure improvement is not pursued, there exists a potential avenue for investment aimed at providing duplicate essential services, such as police, fire, and medical assistance in the southern portion of Circleville. However, such an investment entails acquisition of real estate, construction, procurement of specialized equipment, and the ongoing operational costs associated with staffing renders this option unfeasible. Notably, Circleville formerly operated a Fire Station situated at 1220 S Court Street, catering specifically to the needs of the southern sector. Nonetheless, the considerable logistical challenges and financial burdens entailed in its maintenance prompted the municipality to opt for the closure of the facility in 2019.

The former Fire Station at 1220 S Court Street that served the south side of Circleville, demolished in 2019.

While the no-build alternative does not meet the goals of the Purpose and Need, the NEPA process requires that the no-build option to be analyzed.

4.0 Key Issues

4.1 Traffic Analysis

Capacity analysis for the study intersections were performed for the AM and PM peak hour volumes using Highway Capacity Software (HCS2022) that utilizes the Highway Capacity Manual (HCM) methodologies. Turning movement counts were collected from 6 AM to 9 AM and 3 PM to 6 PM on a typical weekday. The complete turning movement counts can be found in the Existing Traffic Analysis Report, **Appendix F**. The existing traffic control for each of the intersections studied are as follows:

1. Court Street & E Ohio Street – Signalized
2. Court Street & Edison Avenue – Two-way stop controlled
3. Court Street & Harrison Avenue – Two-way stop controlled
4. Washington Street & Barnes Avenue – Two-way stop controlled
5. Washington Street & E Ohio Street – All-way stop controlled
6. Washington Street & Walnut Street – All-way stop controlled
7. Pickaway Street & E Ohio Street – All-way stop controlled
8. Pickaway Street & Edison Avenue – Two-way stop controlled
9. Pickaway Street & Walnut Street – Two-way stop controlled
10. Progress Parkway & Renick Avenue – Two-way stop controlled
11. Progress Parkway & Town Street – Two-way stop controlled

The standard parameter used to evaluate traffic operating conditions is referred to as Level of Service (LOS). There are six LOS (A through F) which relate to driving conditions. LOS for signalized intersections is defined in terms of control delay per vehicle, which is a direct correlation to driver discomfort, frustration, fuel consumption, and lost travel time.

LOS	Signalized Intersection Control Delay per Vehicle (seconds)
A	≤ 10
B	> 10 and ≤ 20
C	> 20 and ≤ 35
D	> 35 and ≤ 55
E	> 55 and ≤ 80
F	> 80

LOS Thresholds

The operating conditions at intersections are generally considered to be acceptable if found to operate at LOS D or better for the overall intersection, with no individual approach operating worse than LOS E.

The capacity analysis for the study intersections are summarized in the table below. The table summarizes the capacity analyses that were performed for the five intersections for both AM and PM peak hours using the traffic volumes during 2022. The detailed capacity analysis can be found in **Appendix F**.

Study	Traffic	Approach	AM Peak Delay (sec) / LOS	PM Peak Delay (sec) / LOS
Court St / E Ohio Ave	Signal	NB	14.2 / B	15.5 / B
		SB	14.4 / B	15.6 / B
		EB	12.7 / B	13.6 / B
		WB	14.2 / B	14.4 / B
		Overall	**14.0 / B**	**15.4 / B**
Court St / Edison Ave	2-Way Stop Control	SB	0.1 / A	0.1 / A
		WB	10.4 / B	13.2 / B
Court St / Harrison Ave	2-Way Stop Control	NB	1.0 / A	1.1 / A
		EB	9.7 / A	13.2 / B
Washington St / Barnes Ave	2-Way Stop Control	NB	0.7 / A	0.4 / A
		SB	0.8 / A	2.0 / A
		EB	10.0 / A	12.3 / B
		WB	10.0 / A	11.9 / B
Washington St / E Ohio Ave	All-Way Stop Control	NB	7.3 / A	8.4 / A
		SB	7.5 / A	8.5 / A
		EB	7.6 / A	8.7 / A
		WB	7.6 / A	8.5 / A
		Overall	**7.5 / A**	**8.5 / A**
Washington St / Walnut St	All-Way Stop Control	NB	7.2 / A	7.8 / A
		SB	7.3 / A	7.7 / A
		EB	7.2 / A	7.7 / A
		WB	7.3 / A	7.5 / A
		Overall	**7.3 / A**	**7.7 / A**
Pickaway St / E Ohio Street	All-Way Stop Control	NB	7.5 / A	9.4 / A
		SB	7.9 / A	9.6 / A
		EB	7.8 / A	9.1 / A
		WB	7.9 / A	9.0 / A
		Overall	**7.8 / A**	**9.4 / A**
Pickaway St / Edison Ave	2-Way Stop Control	NB	0.3 / A	0.2 / A
		EB	9.3 / A	11.1 / B
Pickaway St / Walnut St	2-Way Stop Control	NB	0.2 / A	0.3 / A
		SB	0.5 / A	0.6 / A
		EB	9.7 / A	11.3 / B
		WB	9.6 / A	11.4 / B

Progress Pkwy / Renick Ave	2-Way Stop Control	NB	9.4 / A	10.1 / B
		SB	9.1 / A	9.3 / A
		EB	0.7 / A	0.8 / A
		WB	0.4 / A	0.2 / A
Progress Pkwy / Town St	2-Way Stop Control	NB	9.1 / A	8.7 / A
		SB	8.6 / A	9.0 / A
		EB	4.4 / A	0.3 / A
		WB	3.6 / A	3.0 / A

As evident by the assessed Level of Service (LOS), the intersections in proximity to the proposed grade separation alternatives are currently exhibiting satisfactory performance levels. There is no immediate need for increased intersection capacity nor for alterations to the type of intersection control. In fact, a lane-reduction on S Court Street from 4-lanes to 3-lanes would result in acceptable Level of Service and would facilitate a more economical bridge design.

4.2 Right-of-Way Impacts

Right-of-way acquisition costs will be a major cost driver for the project regardless of what alternative is selected for detailed design. The use of retaining walls to limit right-of-way impacts to high value areas such as commercial parking lots & single-family homes will be more closely analyzed when the retaining wall justification study is completed during the detailed design phase. For preliminary engineering purposes, the feasibility of retaining walls was evaluated for height relative to the proximity and setback of the building, and negative impact for to the accessibility of the parcel. Below is a table with estimated right-of-way take areas and costs:

Alternative	Proposed R/W Areas				
	Prop LA R/W	Prop R/W	Total	Estimated R/W Cost 2024 Dollars	Total Take Parcels
S Court Street	0 Ac	1.741 Ac	1.741 Ac	$2,218,440	9
Pickaway Street	0 Ac	3.629 Ac	3.629 Ac	$3,859,260	19
Washington Street	0 Ac	2.998 Ac	2.998 Ac	$936,840	5
Progress Parkway	2.732 Ac	0.389 Ac	3.121 Ac	$803,426	0

Right-of-way costs were calculated based off the appraised values on the Pickaway County Auditor's website plus 100 percent. The right-of-way costs shown do not include damages, relocation costs, or negotiation.

Commented [AF6]: As comparison, how did using this process shake out on Hunt/Plainfield? Feels like I have had better luck doubling the audtior's site in most places as a starting point. Remember, we are offering up an 'all in' number so we have to estimate all the costs at some point.

The two proposed alternatives along existing alignments, S Court Street and Pickaway Street, are anticipated to have the most significant right-of-way impact and associated costs. The proximity of residential and commercial buildings to these roads presents challenges, exacerbated by the steep incline of the bridge and the elevation changes near the property frontage. To mitigate this impact, retaining walls have been utilized where feasible, as elaborated upon in **Section 4.7** of the report.

Specifically, the S Court Street alternative currently includes provisions for a retaining wall to safeguard the Ralston Purina Feed Plant located at 901 S Court Street. However, feedback received during our Public Involvement meeting and consultations with Circleville city officials has revealed that the structures on the property are deteriorating, with instances of sheet metal debris being dislodged from the building exterior during high winds.

Should the grading limits for this alternative be permitted to naturally slope back to the existing ground level, the building in question would be acquired and demolished as part of the project. While this would constitute a right-of-way impact, it is crucial to note the potential significant benefit to the community.

Ralston Purina Feed Plant on S Court Street

The Washington Street and Progress Parkway alternatives were strategically routed to leverage available green spaces and minimize the need for acquiring structures. Consequently, these alternatives exhibit lower right-of-way costs. However, it's important to note that the extension of Progress Parkway would directly intersect with the expansion plans of Health Care Logistics. The company has plans underway for a 350,000 square foot facility expansion, aimed at doubling their operational capacity. See **Appendix H** for the provided site plan detailing the expansion. As one of Circleville's premier employers, the Health Care Logistics expansion promises to generate additional employment opportunities and tax revenue for the city. While the estimated right-of-way costs may not fully capture the magnitude of this impact, the Progress Parkway extension would have a substantial negative impact.

4.3 Roadway Geometrics

Tangent Alignments

The two proposed alternatives along existing alignments, S Court Street and Pickaway Street, will have tangent alignments that follow the existing roadway. S Court Street is functionally classified as an Urban Minor Arterial, while Pickaway Street is an Urban Major Collector. Both alternatives have a design speed and posted speed of 35 mph, and will feature a curbed roadway section with 12’ travel lanes and a 12’ two-way left turn lane. The horizontal alignments will match the existing and the profiles will feature +5% to -5% crest curves arcing over the railroad property. Sag curves at the project terminus will tie back into the existing elevations. No Design Exceptions are anticipated.

Curved Alignments

The realignment of Washington Street and the extension of Progress Parkway will introduce new horizontal curves to existing tangent alignments. Washington Street and Progress Parkway are both classified as Urban Local Roads and have a design speed and posted speed of 35 mph. The proposed new alignments will feature a curbed roadway section with 12’ travel lanes, a 12’ two-way left turn lane, and an adjacent sidewalk. The horizontal reverse curves will be done within standard design criteria and will not require superelevation. Vertical profiles will feature +5% to -5% crest curves arcing over the railroad property. Sag curves at the project terminus will tie back into the existing elevations. No Design Exceptions are anticipated.

4.4 Total Project Cost

High-level construction cost estimates for the 4 alternatives detailed in this report are listed below (detailed construction cost estimates for each alternative can be found in **Appendix E** and are based on 2024 dollars). To make the cost comparisons consistent, it is assumed that roadways would be widened symmetrically, and all alternatives would have an identical typical section. **ODOT Estimator was used to generate all construction costs with the following exceptions: proposed structure costs were**

generated from $350/SF of deck area, retaining wall costs as detailed in Section 4.7, and right-of-way costs as detailed in Section 4.2. Costs in 2024 dollars.

Alternative	Cost		
	Construction Cost	Right of Way Cost	Total Cost
S Court Street Overpass	$21.15 M	$2.22 M	$23.37 M
Pickaway Street Overpass	$19.50 M	$3.86 M	$23.36 M
Washington Street Overpass	$19.92 M	$0.94 M	$20.86 M
Progress Parkway Overpass	$16.06 M	$0.80 M	$16.86 M

4.5 Maintenance of Traffic

Maintenance of traffic (MOT) was investigated at a preliminary level to understand if utilizing an existing alignment or a proposed extended alignment for the grade separated bridge would yield significant benefits or ramifications.

For the S Court Street and Pickaway Street alternatives, the existing roadway alignment will be retained, necessitating detours during construction. With traffic detoured, much of the work zone without adjacent traffic. Measures must be implemented to ensure continued access to residences and businesses throughout the project. Integration with roadways near the project limits will be phased and detoured when work is imminent, as the roadway profile change is too substantial to accommodate traditional construction activities adjacent to work zones in these areas.

In contrast, the Washington Street and Progress Parkway alternatives involve a significant portion of work on new alignments, enabling more offline construction separate from existing traffic. Washington Street will feature phasing for service roads on the north and south sides of the bridge to guarantee access to residences and businesses. The Progress Parkway extension will need to address Health Care Logistics business traffic and access but is otherwise anticipated to have minimal impact on the existing roadway network at tie-in locations.

Irrespective of the chosen alternative, comprehensive signage detailing detour routes and active community engagement regarding construction milestones will be imperative for the project's success. Overall completion of the roadway work for each alternative is anticipated to span two construction seasons, contingent upon the project sale date.

4.6 Drainage Design

The extent and complexity of the drainage design required varies slightly between the alternatives developed as part of this Feasibility Study. All facilities are low-speed with pedestrian facilities included, so curb and gutter with a closed drainage design would be required during the detailed design stage of the project.

In the case of the realigned alternatives, specifically Washington St and Progress Parkway, there will be increased imperious area, with substantial impervious areas outside of existing Right-of-way. This will necessitate implementation of post-construction Best Management Practices (BMPs) for treatment. Remediation can be facilitated through various methods, ranging from the utilization of engineered water quality systems to the integration of vegetated slopes and/or biofilters.

4.7 Retaining Walls

This Feasibility Study assumes retaining wall cost and usage rational with the following assumptions:

- If a residential property is affected, a wall is used. Otherwise, grading is assumed to be the preferred alternative.
- If sidewalk is present, the proposed face of wall is located at the edge of sidewalk.
- All wall locations are approximate, and limits will be refined during the detailed design phase.
- The area of wall is based on the exposed height of wall. Unit costs used for estimates account for the buried portion of the wall and foundation costs.
- All walls are assumed to be Mechanically Stabilized Earth (MSE), with an estimated cost of $100/SF. The cost could be greater depending on soil conditions.

4.8 Environmental Analysis

Based on a quick review of secondary literature, the presence of history/architecture resources and hazardous materials properties are the primary concerns with the alternatives. Environmental studies will be conducted during detailed design. Furthermore, a stakeholder meeting, an open-house public meeting, and a virtual open-house opportunity were conducted in February and March 2024. Public input has been and will continue to be considered in the design development of this project.

4.9 Geotechnical Analysis

A desktop Geotechnical Analysis was conducted as a preliminary assessment for the alternative locations in Circleville. This analysis served as a red flag evaluation, aiming to identify any potential high-level concerns. No red flags were identified based on the available information.

In the detailed design stage, a full site-specific geotechnical exploration report will be performed with soil borings to make specific recommendations for foundation types and subgrade improvements needed for the roadway work. The full Geotechnical Desktop Study is found in **Appendix G**.

5.0 Comparison of Alternatives

5.1 Alternative Evaluation Matrix

Below is an evaluation matrix that rates each of the alternatives on a number of factors including: Right-of-way impacts, congestion reduction, time-savings for EMS routes, maintenance of traffic impact, total project cost, public support, and an overall rating.

Alternative	Evaluation Matrix Criteria						
	ROW Impacts	Congestion Reduction	Time-savings for EMS Routes	MOT / Impact of Detour	Total Project Cost	Public Support	Overall
No Build	●	○	○	●	●	○	○
S Court Street Overpass	◗	●	●	◗	◗	●	◕ REC.
Pickaway Street Overpass	◔	◗	◕	◗	◗	◔	◔
Washington Street Overpass	◕	◗	◗	◗	◗	◔	◔
Progress Parkway Extension and Overpass	◗	◔	◔	◕	◕	◕	◗

5.2 Comparison of Alternatives

Commented [AF7]: Should we denote that Court eliminates the most existing crossings?

- The Pickaway Street Alternative has the greatest number of Right-of-way Impacts and associated property acquisition cost. Progress Parkway has the lowest property acquisition cost but directly impacts key expansion plans for a premier employer in Circleville.
- S Court Street has the highest volume of traffic among the compared alternatives. Mitigation of train delays along this route presents an immediate opportunity to alleviate congestion without altering the inherent flow of traffic. In fact, S Court Street spans 5 tracks while other alternatives considered span only 4. Conversely, the extension of Progress Parkway may not yield substantial traffic diversion due to the absence of trip generators in proximity and a lack of public familiarity with utilizing this newly extended route.
- S Court Street provides the most direct routing for emergency responders from the north half of the city to the southern region. Progress Parkway creates a circuitous path for EMS that adds critical mileage and time.
- Progress Parkway is built offline from existing roadway alignments and will have the least impact on traffic during construction. S Court Street, Pickaway Street, and Washington Street all pose challenges to detour traffic and maintain access to businesses and homes.

- Progress Parkway is the least expensive option for Right-of-way Acquisition and Construction Cost at $16.86 M. S Court Street, Pickaway Street, and Washington Street are in a similar project cost range of $20.86 M - $23.37 M.
- Feedback from meeting with emergency response providers, from the Stakeholder Meeting, and from the Public Involvement Meeting has resounding support for the S Court Street alternative. The Pickaway Street and Washington Street alternatives received the least supportive feedback.
- **Overall, the S Court Street Overpass Alternative ranks highest in congestion reduction, provides the most direct routing for emergency services, has the most documented support from the community, and most effectively addresses the Purpose and Need of the project. It also eliminates the most existing railroad track crossings by spanning a third siding track. The S Court Street Overpass is the preferred alternative.**

6.0 Next Steps

6.1 Funding

Since the preferred alternative has been determined, the next step of the project is to acquire funding for the S Court Street Overpass for the detailed design and construction phases. A refined geometric layout based on the field survey will provide future opportunity to optimize horizontal and vertical alignments for S Court Street, preliminary drainage, etc. that will more accurately depict construction limits and right-of-way impacts.

Commented [AF8]: I would make sure we are consistent with Right of Way throughout of the R and W are supposed to be capitalized.

Appendix A – Project Area Map

Appendix B – Typical Sections

Appendix C – 1” = 20’ Scale Plan and Profile Sheets

Appendix D – Cross Sections

Appendix E – Construction Cost Estimates

Appendix F – Circleville Railroad Grade Separation Study
Existing Traffic Analysis Report

Appendix G – Geotechnical Desktop Study

Appendix H – Health Care Logistics

Property Development Plan