



**North Hamilton Crossing
(NHX)
PID 115755
Feasibility Study**



**North Hamilton
CROSSING**

Report Date

Revised May 24, 2023

Revised July 17, 2023

Prepared for:

Butler County Transportation
Improvement District (BCTID)

and

City of Hamilton, Ohio

Prepared by:

Stantec Consulting Services Inc.



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North Hamilton Crossing (NHX)
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Executive Summary

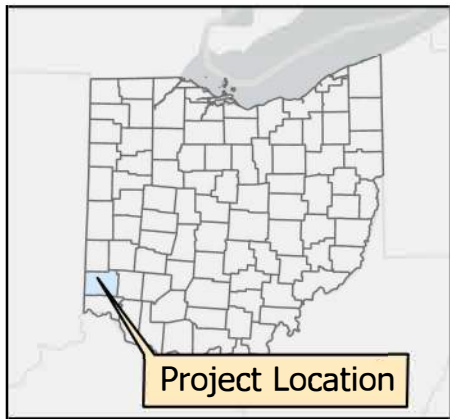
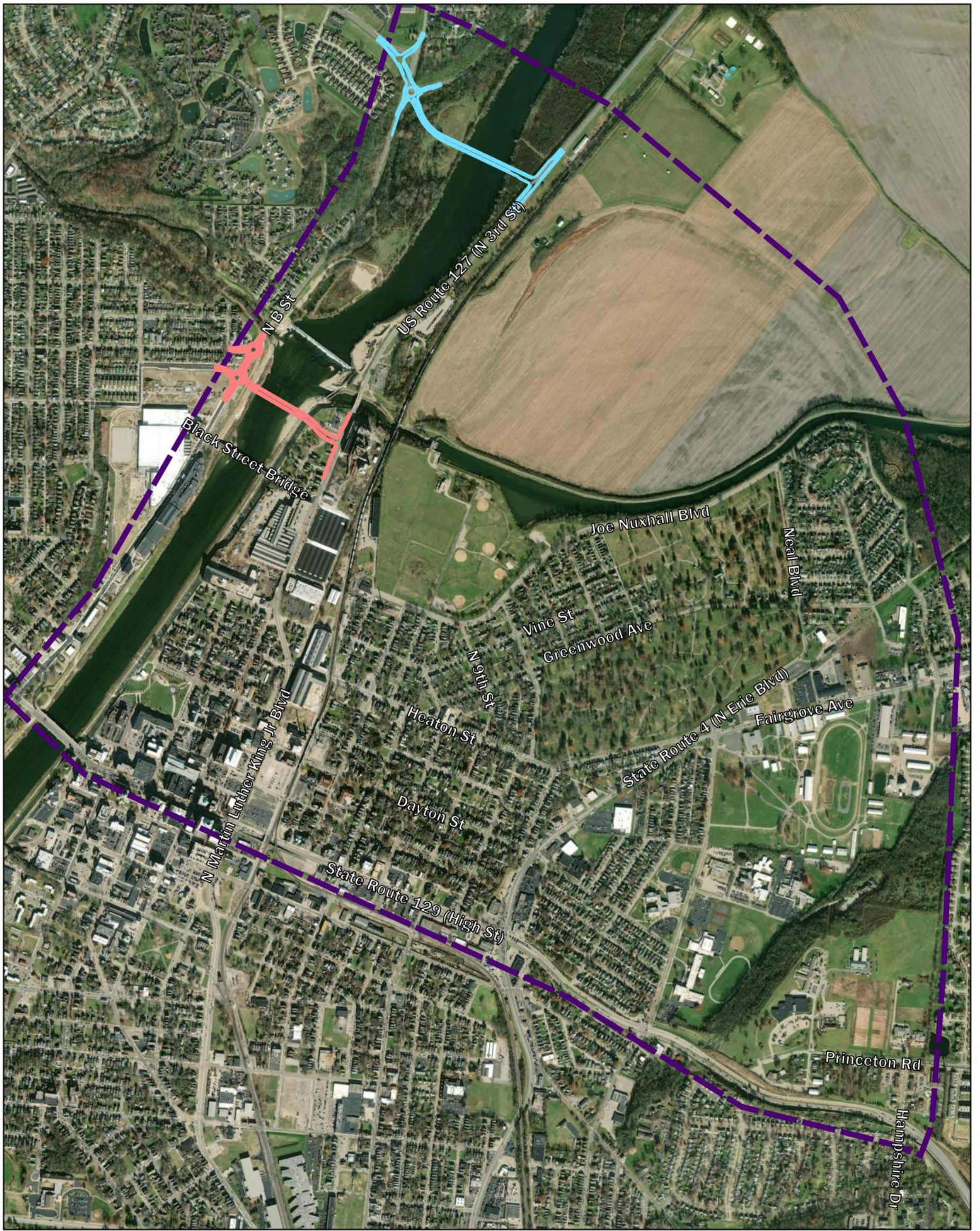
The City of Hamilton, in conjunction with the Butler County Transportation Improvement District (BCTID), has undertaken the proposed North Hamilton Crossing (NHX) project (PID 115755) to improve mobility and reduce congestion in the northeastern portion of Hamilton. The proposed NHX project is in northeast Hamilton and extends between an eastern terminus at the intersection of SR 129 and Hampshire Drive and a western terminus at North B Street. The study includes 18 concepts to address transportation needs identified through a public needs survey, as well as several meetings with project stakeholders. This feasibility study was prepared as part of ODOT's Project Development Process (PDP) to document the process used to evaluate preliminary alternatives and select those that should be further studied for the North Hamilton Crossing (NHX) project. This report provides a summary of the engineering and environmental studies that were undertaken throughout the feasibility study, as well as the public involvement activities that were conducted.

Recommendations

Based on the engineering and environmental information developed, as well as the public input received on the preliminary alternatives, the City of Hamilton, Butler County TID, and ODOT selected several alternatives to evaluate further in an Alternatives Evaluation Report (AER), the next phase of project development. The recommended alternatives are ABE, EBE, AF1 and EF1. Due to funding considerations, it is anticipated that the project will be constructed in three phases: Phase 1 extends from the western terminus at North B Street, includes the new bridge over the Great Miami River and terminates at US 127; Phase 2 extends from US 127, includes a new overpass of the CSX railroad, and terminates at SR 4 and Phase 3 extends from SR 4 to the eastern terminus at SR 129. Therefore, recommendations for alternatives to advance for further study are presented for each phase.

Phase 1 – North B Street to US 127, including a new river crossing: Two alternative river crossings will be evaluated: a northern and southern crossing. The northern bridge alignment, which is included in Alternatives ABE and AF1, crosses the river north of the hydraulic dam and then connects to local streets on the west bank in the vicinity of NW Washington Boulevard. A southern bridge crossing was included in Alternatives EBE and EF1 which crossed the river at a skew over the hydraulic dam and connected on the west bank in the vicinity of the Rhea Avenue/North B Street intersection. Based on comments received from ODOT, this alignment was modified to eliminate the skewed crossing to reduce the design complexity and costs of the bridge, as well as potential impacts to the hydraulic dam. The southern crossing which will be advanced to the AER crosses the river south of the hydraulic dam, still connecting on the west bank in the vicinity of the Rhea Avenue/North B Street intersection. Both the northern and southern river crossings, which are shown on **Figure ES-1**, could connect with any of the recommended alignments from Phases 2 & 3 (US 127 to SR 129), which are described in the following section.

Phases 2 & 3 – US 127 to SR 129, including an overpass of the CSX Railroad: In Phases 2 and 3, the alignments for ABE and EBE are the same, since the only difference between these alternatives is the bridge crossing included in Phase 1. Similarly, the alignments for Alternatives AF1 and EF1 are the same in Phases 2 and 3. Phases 2 and 3 are as follows:



Notes
 1. Coordinate System: NAD 1983 StatePlane Ohio South FIPS 3402 Feet
 2. Base Features Produced from Project Map Designs
 3. Background: Light Gray Base: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA
 World Imagery: Maxar

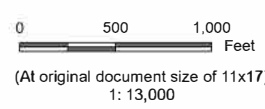
Legend

River Crossing Alternatives

- Northern River Crossing
- Southern River Crossing

Study Area

- - - Study Area



<i>Project Location</i> City of Hamilton Butler County, Ohio	Prepared by RG on 2023-01-06
<i>Client/Project</i> North Hamilton Crossing (NHX) PID 115755 Feasibility Study	173620130

Figure No.
ES-1

Recommended River Crossing Alternatives

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Phase 2 – Alternatives ABE and EBE: Alternatives ABE and EBE (now one alignment ABE/EBE) will connect with US 127 using a traditional T-type intersection just north of the hydraulic dam, then continue east, bridging over the CSX railroad, traveling across the southwest corner of the floodplain on the Bonham Farm, and continuing across the hydraulic canal. From there, ABE/EBE travels south through LJ Smith Park and follows either North 9th Street or Miami Street to Heaton Street. ABE/EBE continues east to an intersection with SR 4 in the vicinity of the fire station.

Phase 2 – Alternatives AF1 and EF1: Alternatives AF1 and EF1 (now one alignment AF1/EF1) also begin at a T-type intersection with US 127, then follow US 127 to a new intersection just north of the existing US 127/Vine Street intersection. AF1/EF1 then cross the CSX railroad tracks and continue in a southeasterly direction, following Vine Street, N. 8th Street, and Heaton Street until reaching SR 4.

Phase 3 – All Alternatives: In Phase 3, which extends from SR 4 to SR 129, Alternatives ABE, EBE, AF1, and EF1 follow the same alignment. At SR 4 the alternatives continue along Gilmore Avenue and south of the Butler County Fairgrounds before turning south to the intersection of SR 129 and Hampshire Drive.

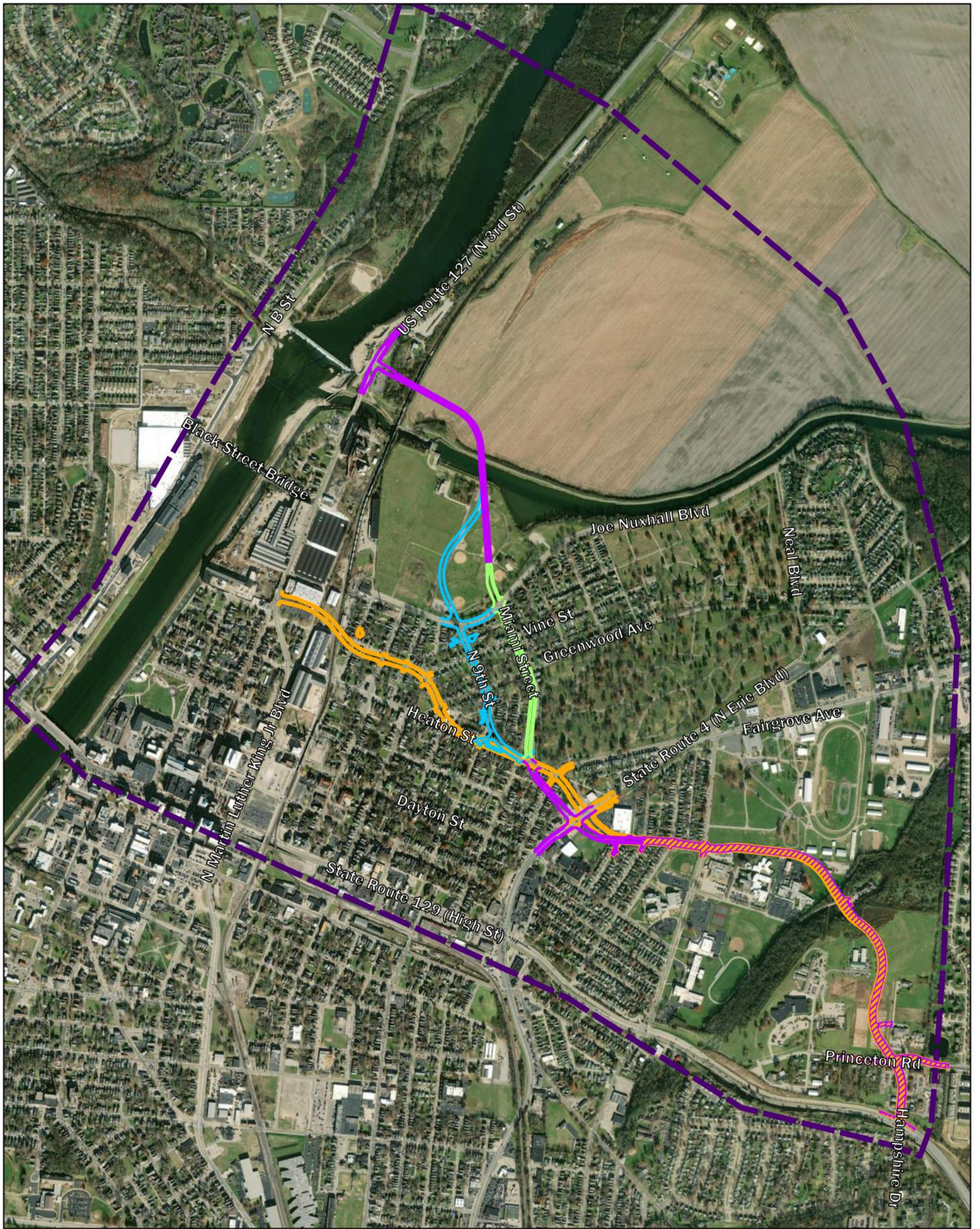
The Phase 2 and 3 alignments for recommended Alternatives ABE, EBE, AF1, and EF1 are shown on **Figure ES-2**. Alternatives ABE, EBE, AF1 and EF1 were selected because they best balance the transportation benefits and impacts of the eighteen conceptual alternatives evaluated in the Feasibility Study.

Next Steps

The next steps to be undertaken include the preparation of the Alternatives Evaluation Report (AER) and the pursuit of project funding. During the AER, the key features of the recommended alternatives will be developed in greater detail and additional engineering and environmental studies will be undertaken, which will include field surveys. Coordination will be initiated with resource agencies, CSX railroad, and other agencies with interests in the NHX project area. In addition, public involvement will continue with the communities in the NHX study through the refinement of the project alternatives.

Funding

The project was awarded \$2 million from TRAC funding, with a \$2 million local match. These funds will be disbursed as follows: \$0.5 million for fiscal year (FY) 2023, \$1.5 million total for FY 2023 - 2026. These funds will be used to develop the Alternatives Evaluation Report (AER). Additional federal and state funding is being pursued to cover the costs of the project through construction. It is anticipated that the project will be constructed in three Phases: Phase 1 includes extends from the western terminus at North B Street, over the Great Miami River (includes the new bridge) and terminates at US 127; Phase 2 extends from US 127, includes the new bridge over the CSX railroad, and terminates at SR 4; and Phase 3 extends from SR 4 to the eastern terminus at US 129.



Notes
 1. Coordinate System: NAD 1983 StatePlane Ohio South FIPS 3402 Feet
 2. Base Features Produced from Project Map Designs
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 World Imagery: Maxar

Legend

Roadway Alternatives

- Alternatives AF1/EF1
- Alternatives ABE/EBE
- Alternatives ABE/EBE 9th Street Variation
- Alternatives ABE/EBE Miami Street Variation

Study Area

- Study Area

(At original document size of 11x17)
1: 13,000

Stantec

Project Location City of Hamilton
Butler County, Ohio

Client/Project North Hamilton Crossing (NHX)
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Figure No.
ES-2

Title
Recommended Alignments

Prepared by RG on 2023-01-06

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1.0 INTRODUCTION

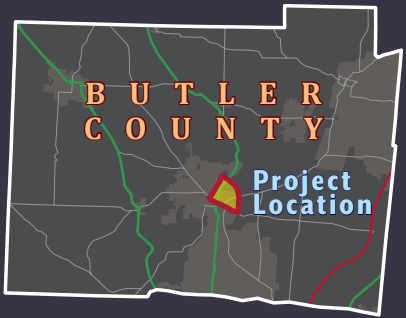
The City of Hamilton, in conjunction with the Butler County Transportation Improvement District (BCTID) has undertaken the proposed North Hamilton Crossing (NHX) project (PID 115755) to improve mobility and reduce congestion in the northeastern portion of Hamilton. The proposed NHX project is located in northeast Hamilton and extends between an eastern terminus at the intersection of SR 129 and Hampshire Drive and a western terminus at North B Street. (See **Figure 1, Project Location Map**). The project includes 18 concepts to address transportation needs identified through a Public Needs Survey, as well as several meetings with project stakeholders. This Feasibility Study was prepared as part of ODOT's Project Development Process (PDP) to document the process used to evaluate preliminary alternatives and select those that should be further studied for the North Hamilton Crossing (NHX) project.

1.1 PROJECT HISTORY

The North Hamilton Crossing (NHX) project is located in the City of Hamilton, situated approximately 20 miles north of Cincinnati and 30 miles south of Dayton (See **Figure 2, Study Area Map**). Over the past two decades, automobile travel from Hamilton's east side to its west side has become slow and congested. This is due in large part to the lack of grade-separated crossings of the CSX & Norfolk Southern Railways that run north-south across the center of Hamilton, the insufficient number of bridge crossings of the Great Miami River, which also runs north-south through the center of Hamilton, and the increase in traffic. In the center of Hamilton, SR 129 (Main St./High St.) has an underpass that allows cars to go under the railroad tracks and provides the only continuous east-west through route unimpeded by trains that also provides a bridge crossing over the Great Miami River. As the only continuous east-west through route in Hamilton, SR 129 is often highly congested and experiences a high crash rate, with four intersections listed in the top 60 on ODOT's Highway Safety Improvement Program's 500 priority urban intersections. Traffic on streets without grade-separated crossings can be at a standstill for several minutes multiple times per day due to the wait time for trains to clear intersections. This causes congestion on these streets and significantly impacts east-west travel through Hamilton.

Hamilton has implemented several projects to improve the flow of east-west traffic through Hamilton, including the construction of the South Hamilton Crossing (SHX) overpass. The SHX overpass project, which replaced an at-grade railroad crossing with a bridge and created a new connection between SR 4 and University Boulevard, provided the second grade-separated rail crossing in the city and improved east-west travel in southern Hamilton. However, in the northern half of Hamilton, there is no grade-separated crossing to alleviate train disruptions.

Hamilton has invested millions of dollars over the past two decades to invigorate housing and commercial space in vacant and underutilized spaces. Since 2000, Hamilton's commercial vacancy rate has declined from 90% to 2% (Greater Ohio Policy Center, 2021). In addition, the Spooky Nook Sports Complex (Spooky Nook Sports) has recently begun development in the former Champion Mill, located on the west bank of the Great Miami River in the heart of downtown Hamilton. Spooky Nook Sports is investing \$144 million to



NHX Project Study Area

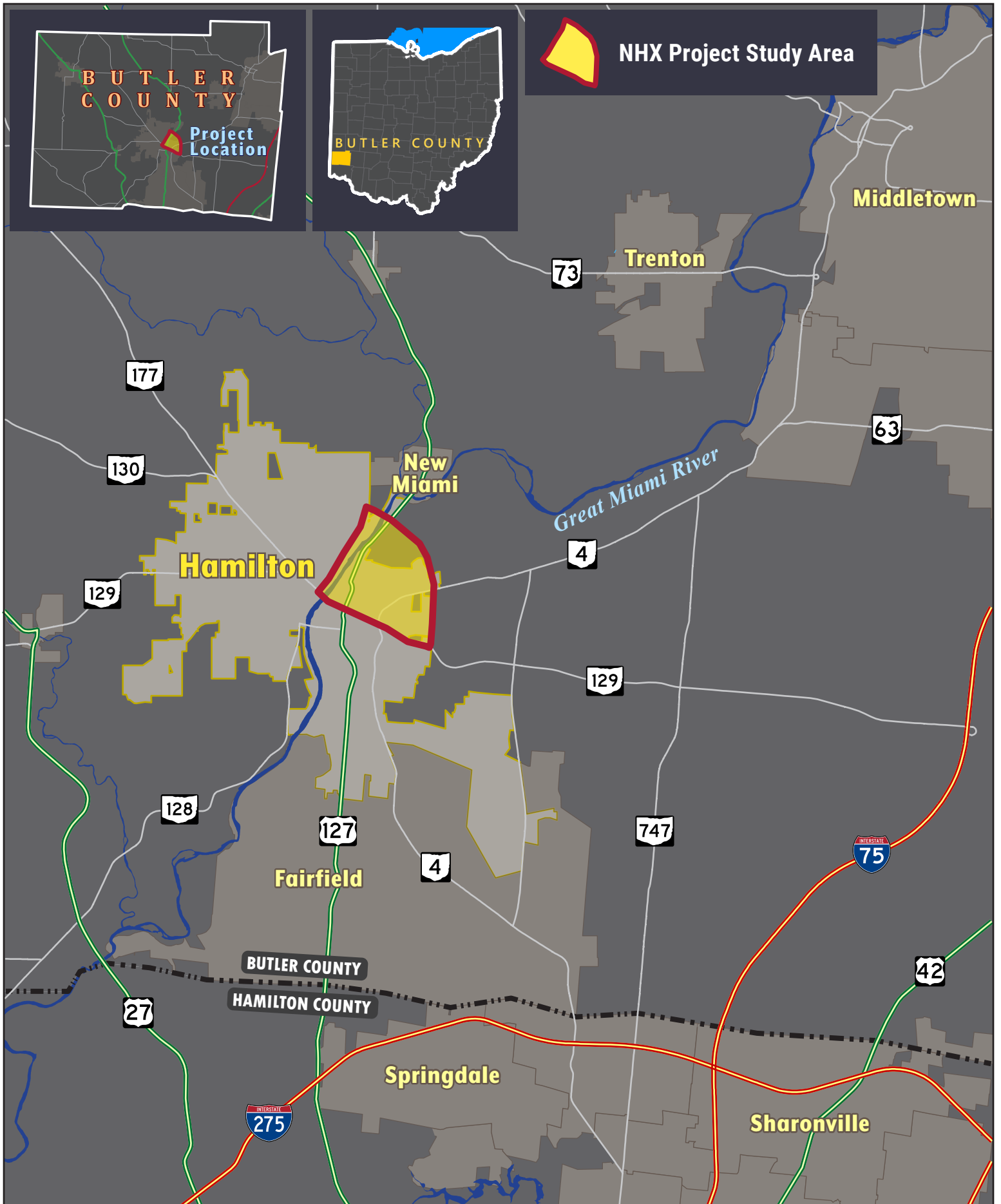


FIGURE 1
Project Location Map

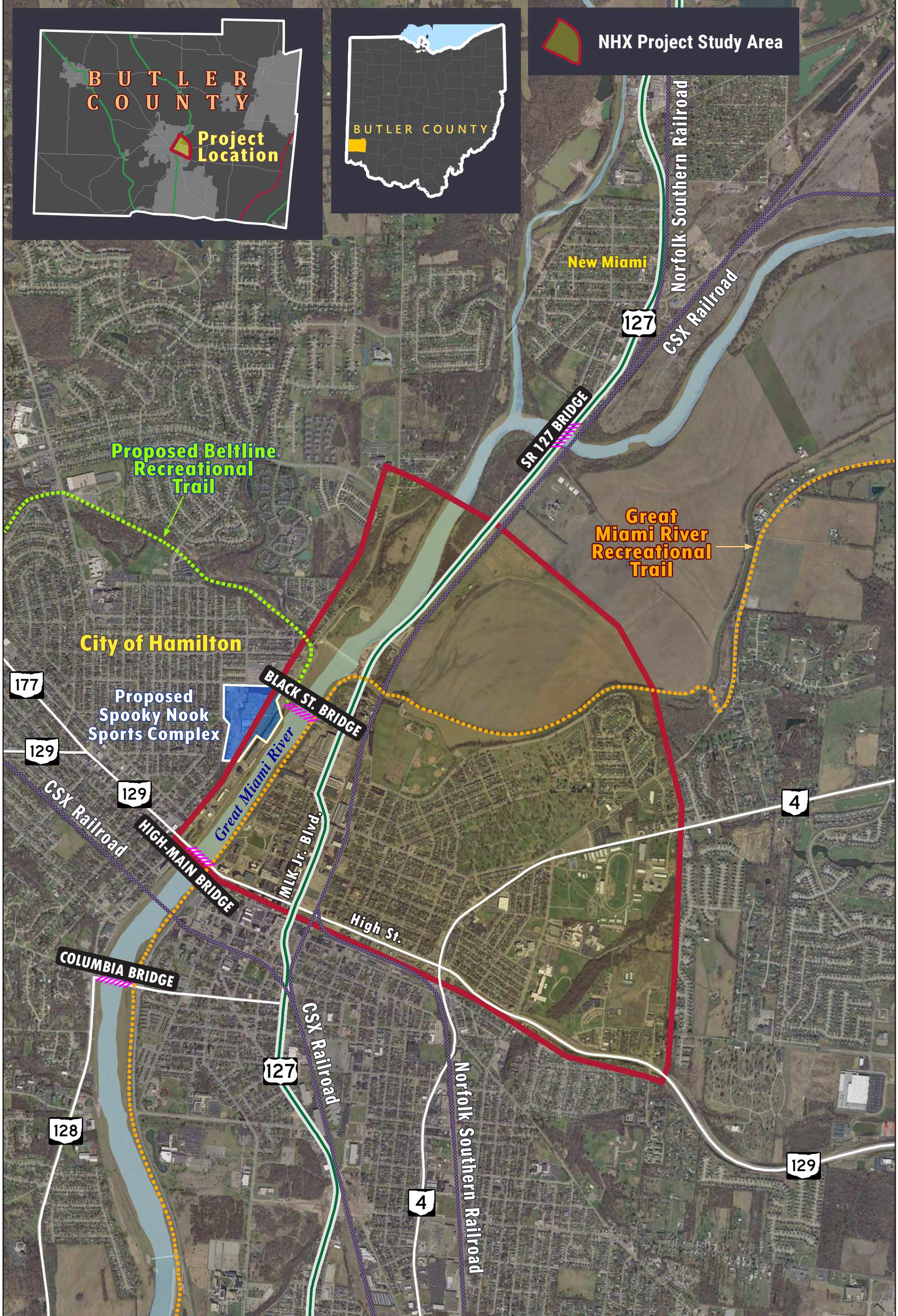
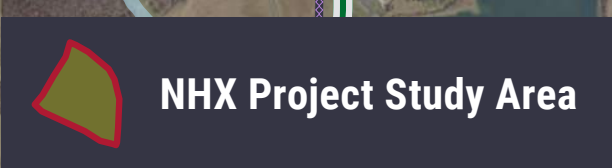
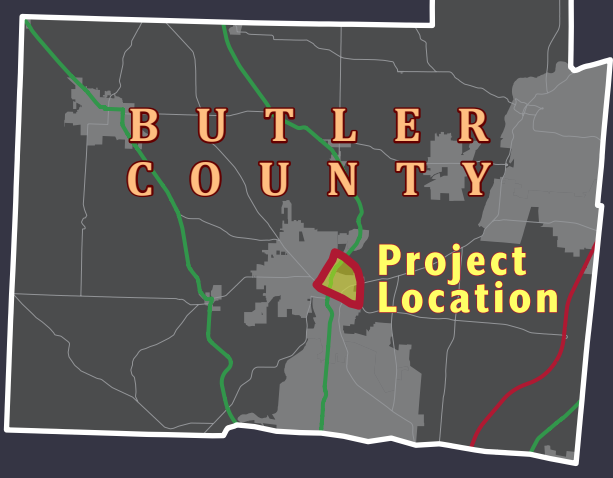


FIGURE 2
Project Area Map

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create a sports and event center shown in **Figure 2**. This multi-use center is estimated to draw an anticipated 1.1 million visitors annually (City of Hamilton, 2020). Without an additional east-west through route through northern Hamilton, which could serve as an alternative to SR 129, traffic congestion will continue to get worse as traffic generated by ongoing development increases.

The North Hamilton Crossing (NHX) project was conceptualized over twenty years ago to improve east-west connectivity through the northern part of Hamilton, where existing at-grade railroad crossings and limited river crossing options create significant traffic congestion. Over the past twenty years, the NHX project has been identified as a priority project in local and regional transportation plans. The NHX project was first identified in the 2002 study, "Preliminary Evaluation of Transportation Improvements in the Hamilton North/New Miami Area." Since that time, elements of the project have been included in Butler County's Throughfare Plan (2007, updated in 2017), as well as the OKI's (Ohio-Kentucky-Indiana) Regional Council of Government's 2040 and 2050 Metropolitan Transportation Plans and the City of Hamilton's recently updated comprehensive plan, *Plan Hamilton*, 2019. The project also aligns with the goals and recommendations of other recent planning initiatives including: the City of Hamilton Bikeway Master Plan (2019), which identifies the city's goal to encourage alternate forms of transportation throughout the community and build connections to current and future trail projects; and the City of Hamilton's Riverfront Master Plan (2018), which provides a guide to increasing investment in the river corridor, including promoting ease of travel along the riverfront. The City of Hamilton also prepared an Active Transportation Plan in 2020, which included recommendations for increasing pedestrian and trail projects in the City of Hamilton – including shared-use paths across the river to provide connectivity between the developing Spooky Nook complex on the west side of the river and Downtown Hamilton on the east.

In 2020, the City of Hamilton and the Butler County Transportation Improvement District (BCTID) committed funds to move the NHX project forward. The City committed \$750,000 and the BCTID committed \$250,000, for a total of \$1 million, to fund the planning and preliminary design phases of the NHX project. In November of 2020, the City of Hamilton began to develop the Purpose and Need for the NHX project. To assist in the identification of transportation needs in the NHX study area, a visioning exercise was conducted with sixteen government stakeholders from the City of Hamilton and Butler County to identify the need for the NHX project in February 2021. In addition, a Public Needs Survey was conducted between August 30, 2021 and September 30, 2021 to identify the transportation issues of greatest concern in the NHX project area. The Needs Survey had approximately 1600 participants and received 4,188 comments. Based on input received from the government stakeholders and the public, the draft Purpose and Need was developed for the NHX project.

2.0 PURPOSE AND NEED SUMMARY

The purpose and need for the project were documented in a *Purpose and Need Statement* (Stantec, February 2022). It was approved by ODOT's Office of Environmental Services on February 28, 2022.

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2.1 PROJECT PURPOSE

The purpose of the proposed project is to improve east-west connectivity north of SR 129 in the City of Hamilton in order to reduce congestion and improve mobility in support of current and planned economic growth in the City of Hamilton and western Butler County, as identified in *Plan Hamilton*.

2.2 PRIMARY NEEDS

To accomplish the project purpose, primary and secondary needs were identified through input received from the Stakeholder Visioning Exercise held in February 2021, as well as the Public Needs Survey conducted between August 30, 2021 and September 30, 2021. These needs were confirmed through origin-destination studies which identified travel patterns within the NHX study area, as well as operational traffic studies, which identified areas of existing and future congestion. The project's primary needs, which must be addressed to the extent feasible to satisfy the purpose and need, are summarized below:

- **Improve East-West Connectivity** -Improved connectivity between the east and west sides of Hamilton north of SR 129 is needed to reduce travel times through the city and improve access to regional and national highways including SR 4 (Erie Blvd.), SR 129, US 127 (MLK Jr. Blvd.), and I-75. Currently, the primary east-west arterial for traffic flow through the City of Hamilton is SR 129. SR 129 runs through downtown Hamilton and includes the Jack Kirsch Underpass (one of only two grade-separated rail crossings in Hamilton), and the SR 129 (High-Main) Bridge (one of four bridge crossings over the Great Miami River) and is the only continuous east-west route in the city. Because SR 129 provides the only continuous east-west through route in the city, it has become very congested. An alternative route to SR 129 that spans the Great Miami River and provides a grade-separated crossing of the railroad is needed to relieve congestion on SR 129, Heaton, and Dayton Streets.
- **Insufficient Crossings of the Great Miami River** - A major contributor to traffic congestion within the study area is the lack of crossings of the Great Miami River. Currently, there are four bridge crossings within and adjacent to the project area. They are (from south to north): the Pershing Avenue Bridge (also known as the Columbia Bridge), the SR 129 (High-Main) Bridge, the Black Street Bridge, and the US 127 Bridge. There is insufficient capacity on these bridges to accommodate existing traffic demand, resulting in traffic congestion at both the Black Street Bridge and High-Main Bridge. Of these bridges, the Black Street Bridge is nearing the end of its serviceable life, and increased maintenance will be required in order to keep the bridge operational. Also, due to structural constraints, the bridge cannot be widened to add additional lanes and will, therefore, be unable to accommodate future traffic demand. Due to the existing traffic congestion occurring at the Black Street and High-Main bridges, combined with the obsolescence of the Black Street Bridge, the addition of a new river crossing is a primary transportation need.
- **Lack of Grade-Separated Railroad Crossings** - Another major contributor to the traffic congestion within the study area is the presence of the CSX & Norfolk Southern Railways, which traverse the center of Hamilton. There are only two grade-separated railroad crossings within the city limits: the SR 129 underpass and the recently opened South Hamilton Crossing overpass on

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Grand Boulevard. However, there are 26 at-grade crossings in Hamilton which cause significant commuter delays and traffic congestion on streets which are blocked, causing traffic to shift onto SR 129, and contributing to congestion on that road. In addition to impacting commuter response time, the delays caused by the railroad crossings directly impact emergency response time, resulting in potential loss of life or increased injury severity due to inadequate response time to emergency situations.

- **Mobility/Congestion on Local Road Network** - Related to the transportation needs of east-west connectivity, insufficient crossings of the Great Miami River, and lack of grade-separated railroad crossings, is the overall need of enhanced mobility and reduced congestion on the local road network. The root causes of much of this congestion are bottlenecks which occur at the bridge crossings, as well as the delays at rail crossings. Traffic congestion is expected to get worse in the study area as traffic demand increases due to ongoing residential development, redevelopment of the Main Street corridor, redevelopment of the Cohen property, and the Spooky Nook development.
- **Safety** – A primary need of the project is to improve safety on the roads within the NHX project area and at the railroad crossings as roadway safety is highly correlated with congestion. Based on crash data from 2016 to 2020, there were over 1200 crashes reported, with 43% being confirmed as rear-end collisions, which are typically caused due to congestion-related factors. In addition, of the intersections within the study area, four are listed in ODOT's Highway Safety Improvement Program's 500 priority urban intersections. These intersections and their statewide ranking are:
 - SR 129 & 7th Street - #24
 - SR 129 & SR 4 (Erie Blvd) - #31
 - SR 129 & US 127 (MLK Jr. Blvd) – #40
 - SR 129 & B Street - #57

The 26 at-grade railroad crossings in the study area also present a safety issue for both pedestrians and motorists. Despite technological advances in warning devices, at-grade crossing risks remain. Between 2014 and 2018, the City of Hamilton had three reported crashes involving pedestrians and trains and one crash involving a bicyclist and train. (City of Hamilton and ODOT, 2020).

2.3 SECONDARY NEEDS

The project's secondary transportation needs, which are considered discretionary and are not the deciding factor in alternative development, include the following:

- **Economic Development** - Over the past decade, the City of Hamilton has been actively working toward attracting businesses to its urban core to replace the jobs and tax revenue lost with the decline of its manufacturing sector. More than \$188 million has been invested into downtown redevelopment projects since 2013, in addition to over \$247 million invested by private companies. These dollars have translated into over 1.25 million square feet of redeveloped space in the urban core, leading to 76 new small businesses and 188 new downtown residential units (City of Hamilton, 2020). In addition, a private developer is redeveloping the former Champion Mill property along

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North B Street and the Great Miami River into the Spooky Nook Sports complex, a 500,000 sq. ft. multiuse development which will include courts and fields for soccer, volleyball, basketball, baseball, and field hockey, a 225-room hotel, and 55,000 sq. ft. of retail/restaurant/conference space. The complex, which opened in 2022, is expected to attract over 20,000 people in a single weekend day and a million visitors a year to Hamilton (Cincinnati Enquirer, 2020). The NHX project is needed to support planned and proposed economic development in Hamilton by improving transportation infrastructure to meet the traffic demands of ongoing development.

- **Improve Bike/Pedestrian Connectivity** - A secondary transportation need, as identified in *Plan Hamilton*, is to improve bike/pedestrian connectivity within the City of Hamilton and build connections to the broader regional and state trail system, including the Miami 2 Miami Regional Trail (City of Hamilton, 2019). *Plan Hamilton* also identified the goal to make Hamilton a walkable city by requiring pedestrian amenities with new developments, prioritizing sidewalk improvements, and ensuring all residents have safe and accessible connections to community facilities and services. The NHX project provides an opportunity to improve bike and pedestrian facilities in the NHX corridor.
- **Improve Multimodal Linkage** - As stated in *Plan Hamilton*, the City of Hamilton has made it a goal to encourage alternative modes of transportation to improve mobility and decrease traffic congestion. In addition to expanding opportunities for bicycle/pedestrian users as discussed above, the city wants to improve and expand bus transportation opportunities to connect transit-dependent individuals to jobs. The Butler County Regional Transit Authority's (BCRTA) Hamilton transit hub, located on Market Street between North 2nd and North 3rd Streets, is less than a mile from the NHX study area. Bus lines that travel both east and west throughout the county pass within walking distance of this project area. Improving east-west connectivity in the city would increase access to BCRTA's transit hub and improve bus service throughout the city.

3.0 ALTERNATIVES CONSIDERED

3.1 NO BUILD ALTERNATIVE

The No Build Alternative serves as the baseline or benchmark against which the build alternatives are evaluated. For the purposes of this study, the No Build Alternative is defined as the existing transportation facilities within the NHX study area. This consists of the current physical and operational condition of the

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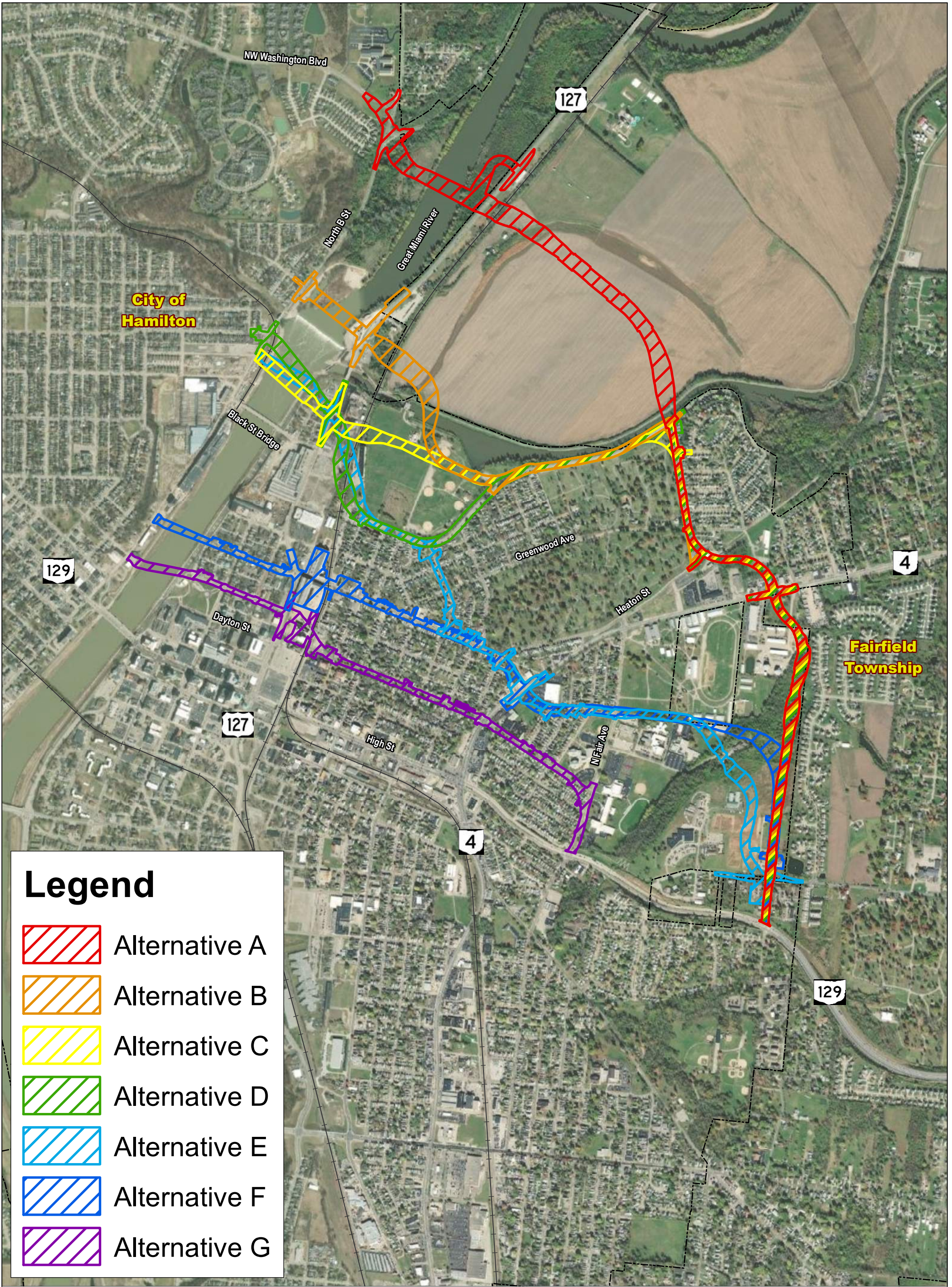
facility, plus those improvements that were under construction at the time of the analysis. No improvements to the transportation network north of SR 129 in the City of Hamilton would occur.

Due to the lack of grade-separated crossings of the CSX & Norfolk Southern Railways, which run north-south across the center of Hamilton; the insufficient vehicular capacity on bridge crossings of the Great Miami River, which also runs north-south through the center of Hamilton; and the increase in traffic due to ongoing and planned development, automobile travel from Hamilton's east side to its west side has become slow and congested. This congestion is expected to increase in the future as traffic demand increases due to ongoing residential development, redevelopment of the Main Street corridor and the Cohen Recycling property along US 127, and the Spooky Nook Development. Five segments of SR 129 are currently operating at Level of Service (LOS) E or F during PM peak hour and one segment of North B Street is operating at LOS F during PM peak hour. With the additional growth in traffic volumes, the existing congestion along SR 129 will continue to get worse. The entire length of SR 129 is expected to operate at LOS E or F during the PM peak hour by the design year of 2050. Three segments of North B Street and the Black Street Bridge are also expected to operate at LOS F during the PM peak hour by the design year of 2050. (Stantec, 2021). In addition, under the No Build Alternative, there would be no improvement of facilities for pedestrians and bicyclists in Hamilton or improvements in linkage to public transit facilities. Although there would be no improvements to existing transportation facilities under the No Build Alternative, it will be carried through the Feasibility Study, as well as the next phases of project development in compliance with the National Environmental Policy Act (NEPA) to serve as a baseline for comparison with the build alternatives.



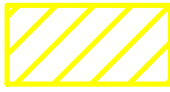




3.2 CONCEPTUAL BUILD ALTERNATIVES

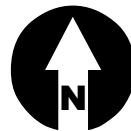
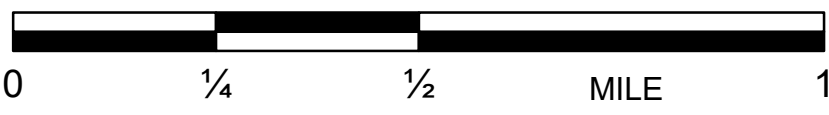
Based on input received from the Visioning Exercise held with the government stakeholders and the Public Needs Survey, as well as the traffic analyses and origin-destination studies conducted for the NHX project area, seven conceptual build alternatives were developed and presented to the project stakeholders meeting held on February 2, 2022. The conceptual alternative alignments presented included a general footprint which would accommodate a boulevard-style road that would have four lanes (two each way) and a turning lane, with a speed limit of 35 mph or less. A "Complete Street" is envisioned which would include bike, pedestrian, and transit. At this stage of alternative development, further details of the alignments including typical sections which would show such details as curb and gutter, sidewalks and/or shared-use paths, and other details are not yet developed. The seven alignments are briefly described below and shown on **Figure 3**.

Alternative A: This alternative begins at the intersection of NW Washington Boulevard, North B Street and W Elkton Road and crosses the Great Miami River at the north end of Combs Park. The alignment has a connector ramp to US 127 and would be grade-separated at the CSX railroad. The alignment crosses the 100-year floodplain and the hydraulic canal, then follows Neal Boulevard before intersecting SR 4, east of the Butler County Fairgrounds. At the fairgrounds, the alignment proceeds south to the intersection of Hampshire Drive and SR 129.



Legend

-  Alternative A
-  Alternative B
-  Alternative C
-  Alternative D
-  Alternative E
-  Alternative F
-  Alternative G



Stantec



FIGURE 3
Conceptual Alternatives A-G

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Alternative B: This alternative begins near Lagonda Avenue and North B Street and crosses the Great Miami River north of the hydraulic dam. The alignment intersects US 127, crosses the CSX railroad with a grade-separated crossing, then crosses the floodplain and hydraulic canal before passing into LJ Smith Park. The alignment then follows Joe Nuxhall Boulevard and Neal Boulevard before intersecting SR 4 east of the Butler County Fairgrounds. At the fairgrounds, the alignment proceeds south to the intersection of SR 129 and Hampshire Drive.

Alternative C: This alternative begins near Rhea Avenue and North B Street and crosses the Great Miami River between Black Street and the hydraulic canal. The alignment intersects US 127 and would be grade-separated at the CSX railroad. Alternative C crosses the Chem-Dyne superfund site and LJ Smith Park, then follows Joe Nuxhall Boulevard and Neal Boulevard before intersecting SR 4 east of the Butler County Fairgrounds and turning south to the intersection of SR 129 and Hampshire Drive.

Alternative D: This alternative begins near Gordon Avenue and North B Street and crosses the Great Miami River between Black Street and the hydraulic canal. The alignment intersects US 127 and would be grade-separated at the CSX railroad. Alternative D then follows Joe Nuxhall Boulevard and Neal Boulevard before intersecting SR 4 east of the Butler County Fairgrounds. At the fairgrounds, the alignment proceeds south to the intersection of SR 129 and Hampshire Drive.

Alternative E: This alternative begins near Rhea Avenue and North B Street and crosses the Great Miami River between Black Street and the hydraulic canal. The alignment intersects US 127 and would be grade-separated at the CSX railroad. The alignment then follows Joe Nuxhall Boulevard to North 9th Street and then to Heaton Avenue before intersecting SR 4. At SR 4, the alignments continue east along Gilmore Avenue and south of the Butler County Fairgrounds before turning south to the intersection of SR 129 and Hampshire Drive.

Alternative F: This alternative begins at North B Street north of Wayne Avenue and crosses the Great Miami River between Black Street and High/Main Street. The alignment follows Village Street to an intersection at US 127 and then crosses the CSX railroad at a grade-separated crossing. The alignment then follows Heaton Street, intersecting at SR 4 and continuing east along Gilmore Avenue, south of the Butler County Fairgrounds. Just east of the fairgrounds, the alignment proceeds south to the intersection of SR 129 and Hampshire Drive.

Alternative G: This alternative begins near Wayne Avenue and North B Street and crosses the Great Miami River between Black Street and High/Main Street. The alignment follows Buckeye Street to an intersection at US 127 and then crosses the CSX railroad with a grade-separated crossing. From there, the alignment follows Dayton Street before intersecting SR 4, then continues east along Dayton Street to North Fair Avenue before turning south to SR 129.

These alternatives were evaluated based on how well they satisfy the primary and secondary needs identified for the project, as well as constructability considerations, utility relocation issues, roadway design issues, maintenance of traffic concerns, construction and right-of-way costs, and potential environmental impacts. The results of the engineering and environmental evaluation of the seven conceptual alternative alignments were shared for consideration by the project stakeholders in the February 2, 2022 stakeholder

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meeting. The detailed materials that were shared with the stakeholders and the minutes from this meeting are provided in **Attachment D**.

3.2.1 Preliminary Build Alternatives

Based on input received from the project stakeholders, modifications were made to several of the conceptual alternatives to avoid sensitive resources or communities. In addition, several hybrid alternatives were developed which combine sections of the conceptual alternatives. The refined alternatives, as well as the new hybrid alternatives, are shown in **Attachment A**. The modifications made to each of the alternatives are described briefly below and the new hybrid alternatives are described.

Alternative A, B, C, and D (See Attachments A-1, A-2, A-3, and A-4 respectively): Each of these alternatives were modified between SR 4 and SR 129 to minimize impacts to residential areas in Fairfield Township. These alignments were moved further west between SR 4 and SR 129 and cross the Butler County Fairgrounds property between the track and the Butler County Engineer's Office.

Alternative E (See Attachment A-5): Alternative E was not modified from the conceptual alignment described in Section 3.2.

Alternative E1 (See Attachment A-6): A new alternative, which is a modification of Alternative E, was developed and is identified as Alternative E1. This alternative has the same bridge crossing location as Alternative E, however after crossing US 127, Alternative E1 shifts north of the Alternative E alignment and travels through the corner of the Power Plant and crosses the CSX railroad before crossing through the middle of LJ Smith Park. On the east side of the park, the alignment then crosses Joe Nuxhall Blvd. and proceeds south on Miami Street. It then crosses Heaton Street, SR 4, N. Fair Avenue, and Princeton Road before terminating at the intersection with SR 129 (High Street).

Alternative F (See Attachment A-7): Alternative F was not modified from the conceptual alignment described in Section 3.2.

Alternative G (See Attachment A-8): Alternative G was not modified from the conceptual alignment described in Section 3.2.

Alternative AC (See Attachment A-9): A hybrid of Alternatives A and C, this alternative follows Alternative A from its northwest terminus at the intersection of NW Washington Boulevard, North B Street and W Elkton Road to its crossing of the Great Miami River on the north end of Combs Park. Immediately after crossing the river, this alignment connects to US 127, at which point the alignment follows US 127 south to the point where Alternative C crosses US 127. From this point onward, this alternative follows Alternative C to its southeastern terminus at SR 129.

Alternative AD: (See Attachment A-10): A hybrid of Alternatives A and D, this alternative follows Alternative A from its northwest terminus at the intersection of NW Washington Boulevard, North B Street and W Elkton Road to its crossing of the Great Miami River on the north end of Combs Park. Immediately after crossing the river, this alignment connects to US 127, at which point the alignment follows US 127 south to the point where Alternative D crosses US 127. From this point onward, this alternative follows Alternative D to its southeastern terminus at SR 129.

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Alternative AE (See Attachment A-11): A hybrid of Alternatives A and E, this alternative follows Alternative A from its northwest terminus at the intersection of NW Washington Boulevard, North B Street and W Elkton Road to its crossing of the Great Miami River on the north end of Combs Park. Immediately after crossing the river, Alternative AE connects to US 127, at which point the alignment follows US 127 south to the point where Alternative E crosses US 127. From this point onward, this alternative follows Alternative E to its southeastern terminus at SR 129.

Alternative BC (See Attachment A-12): A hybrid of Alternatives B and C, this alternative follows Alternative B from its northwest terminus near Lagonda Avenue and North B Street and across the Great Miami River north of the hydraulic dam. The alignment then follows US 127 south to the point where it connects with the Alternative C alignment at US 127. From this point onward, this alternative follows Alternative C to its southeastern terminus at SR 129.

Alternative BD (See Attachment A-13): A hybrid of Alternatives B and D, this alternative follows Alternative B from its northwest terminus near Lagonda Avenue and North B Street and across the Great Miami River north of the hydraulic dam. The alignment then follows US 127 south to the point where it connects with the Alternative D alignment at US 127. From this point onward, this alternative follows Alternative D to its southeastern terminus at SR 129.

Alternative BE (See Attachment A-14): A hybrid of Alternatives B and E, this alternative follows Alternative B from its northwest terminus near Lagonda Avenue and North B Street and across the Great Miami River north of the hydraulic dam. The alignment then follows US 127 south to the point where it connects with the Alternative E alignment at US 127. From this point onward, this alternative follows Alternative E to its southeastern terminus at SR 129.

Alternative ABE (See Attachment A-15): This hybrid of Alternatives A, B and E begins with a proposed roundabout connecting NW Washington Boulevard and North B Street, crosses Combs Park, and then crosses a new bridge over the Great Miami River. The alignment connects with US 127 using a traditional intersection and then turns south on US 127. Just north of the hydraulic dam, the alignment turns east and bridges over the CSX railroad. The alignment traverses the southwest corner of the floodplain, then travels across the hydraulic canal. From there, it travels south through LJ Smith Park and follows either North 9th Street or Miami Street to Heaton Street. ABE continues east to an intersection with SR 4 in the vicinity of the fire station, then crosses through the parking lot of the Butler County Educational Service Center building, connects to Gilmore Avenue, and continues across North Fair Avenue. At this point, the alignment runs east behind the Butler County Children Services Board, Juvenile Justice Center and Butler County Board of Developmental Services buildings, turns southeast to go behind the Humane Society, and then turns south to cross Princeton Road, west of the existing Hampshire Drive intersection. The alignment would then tie into Hampshire Drive and SR 129.

Alternative EBE (See Attachment A-16): This hybrid of Alternatives B and E begins at Gordon Avenue, crosses the Great Miami River and the hydraulic dam at a skew, and connects with US 127 just north of the hydraulic dam. It then continues east, bridges over the CSX railroad and southwest corner of the Bonham Farm, then travels across the hydraulic canal. From this point the alignment follows the same alignment as Alternative ABE.

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Alternative AF1 (See Attachment A-17): This hybrid of Alternatives A and F uses the river crossing from Alternative A, includes a one lane roundabout at the intersection of W Elkton Road and Northwest Washington Boulevard on the west side of the Great Miami River to an at-grade T-type intersection at US 127 on the east side of the river. From this point, the alignment follows US 127 south to a new intersection just north of the existing US 127/Vine Street intersection. From the intersection, the alignment travels over the CSX railroad tracks and then follows Vine Street to the east, N. 8th Street to the south and Heaton Street to the east. The alignment then follows the Alternative E alignment as it crosses SR 4, N. Fair Avenue and Princeton Road before terminating at the intersection with SR 129 (High Street).

Alternative EF1 (See Attachment A-18): This hybrid of Alternatives E and F uses the Alternative E river crossing with the western terminus lining up with Gordon Avenue and includes dual roundabouts on North B Street and an at-grade T-type intersection at US 127 on the west side of the river. From this point, the alignment follows US 127 south to a new intersection just north of the existing US 127/Vine Street intersection at which point the alignment travels over the CSX railroad tracks and then follows Vine Street to the east, N. 8th Street to the south and Heaton Street to the east. The alignment follows the Alternative E alignment as it crosses SR 4, N. Fair Avenue and Princeton Road before terminating at the intersection with SR 129 (High Street).

4.0 KEY ISSUES

The preliminary alternatives have been evaluated based on the following: how well they address the Primary and Secondary Needs, how they impact traffic in the study area; roadway design issues which increase project complexity and cost; structural design considerations; utility impacts; environmental impacts; and public input. These issues are discussed in the following sections.

4.1 MEETS PROJECT NEEDS

4.1.1 Primary Needs

No Build Alternative: The No Build Alternative does not meet the Primary Transportation Needs identified for the NHX project which include: 1) improving east-west connectivity; 2) adding capacity to river crossings; 3) adding grade-separated railroad crossings; 4) improving mobility/congestion through the NHX study area; and 5) improving safety for motorists traveling through the NHX study area.

Build Alternatives: Each of the build alternatives would meet the primary needs identified for the NHX project.

4.1.2 Secondary Needs

No Build Alternative: This alternative would not meet the Secondary Transportation Needs of the NHX project which include: 1) Supports Economic Development; 2) Improves Bike/Pedestrian Connectivity; 3) Improves Multimodal Linkage.

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Build Alternatives: Not all build alternatives would meet the Secondary Transportation Needs of the NHX project as discussed below:

Supports Economic Development: The City of Hamilton has identified several prime development sites which are shown on **Figure 4**. These sites include developments which are recently opened, including Spooky Nook Champion Mill and Rossville Flats, as well as several that are planned. Of the eighteen build alternatives, only Alternatives B, ABE, EBE, and AF1 would support the City of Hamilton's ongoing development activities by providing direct access to these parcels. The other alternatives either do not provide direct access to these prime development parcels or would negatively impact development potential of these parcels by bisecting them. The impacts to economic development by the proposed alternatives are discussed in greater detail in Section 4.7.

Improves Multimodal Linkage: The ability of the build alternatives to improve multimodal linkage is undetermined at this point in the study. Further coordination with Butler County Regional Transit Authority (BCRTA) will be undertaken in the next phase of the project to identify opportunities to enhance transit use in the area for transit-dependent individuals in the NHX study area.

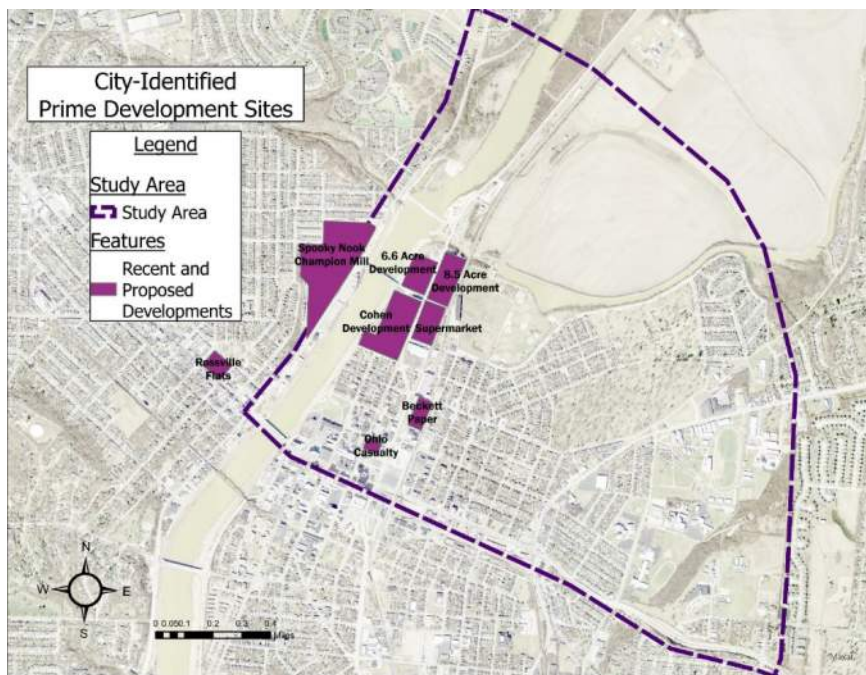


Figure 4: City-Identified Prime Economic Development Areas

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4.2 TRAFFIC ANALYSIS

No Build Traffic Analysis An operational analysis of 22 intersections along SR 129 (Main St./High St.), West Elkton Drive, North B Street, US 127 (Martin Luther King Jr. (MLK) Blvd.), and SR 4 (Erie Blvd.) was performed to establish the no build traffic conditions. Traffic data was collected in April 2019, November 2020, and December 2020. Since traffic volumes were collected in 2020, the impacts of the COVID pandemic were reviewed to see if any adjustments to traffic volumes were needed. The 2020 volumes were compared to historic ODOT traffic volumes. In most cases, the traffic volumes collected represented an increase in traffic compared to the most recent pre-COVID data collected by ODOT. Therefore, no COVID-19 adjustment factors were used to adjust traffic volumes.

The operational analysis was conducted using Trafficware's Synchro 11 Software (using the HCM 6th Edition methodology). The operational analysis identifies the Level of Service (LOS) of intersections in the study area. The Highway Capacity Manual 6th Edition (2016) defines LOS as a qualitative measure that describes operational conditions within a traffic stream, generally in terms of measures like speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. LOS ranges from LOS A, which indicates free-flow operations, and LOS F, which indicates severe congestion with the road in a state of constant traffic jam (Transportation Research Board, 2016). The results of this analysis, shown in **Table 1**, indicate that three intersections have an overall intersection LOS of E or F. These intersections are SR 129 & B Street, SR 129 & US 127 (MLK, Jr. Blvd.), and SR 129 & SR 4 (Erie Blvd.). Average delay times at these intersections range from 55.9 seconds to 98.3 seconds per vehicle. Furthermore, an additional 11 of the 22 intersections have two legs with LOS E or F, and four additional intersections have one leg with LOS E.

The existing congestion within the study area is contributing to safety issues. A Crash Analysis was conducted for the 22 intersections within the study area for the period between January 1, 2016, and October 31, 2020. Over the 5-year period there were 1,254 total crashes, four of which were fatal: two at the SR 129 & Fair Avenue intersection, one at the SR 129 & Hampshire Drive intersection, and one at the US 127 (MLK Jr. Blvd.) & Heaton Street intersection. Approximately 43% of the crashes were rear-end collisions, which are typically due to congestion related causes. Of the intersections within the study area, four are listed in ODOT's Highway Safety Improvement Program's 500 priority urban intersections. These intersections and their statewide ranking are:

- SR 129 & 7th Street - #24
- SR 129 & SR 4 (Erie Blvd) - #31
- SR 129 & US 127 (MLK Jr. Blvd) – #40
- SR 129 & B Street - #57

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Table 1. Existing Intersection Operations

Intersection	Intersection Control	Time Period	Overall Intersection		Max v/c Ratio	Approach LOS			
			Delay (sec/veh)	LOS		EB	WB	NB	SB
SR 129 (Main St) & B St	Signal	AM	98.3	F	1.23	F	A	E	F
		PM	23.8	C	0.67	B	B	D	D
SR 129 (Main St/High St) & Monument St	Signal	AM	2.1	A	0.63	A	A		D
		PM	2.7	A	0.70	A	A		C
SR 129 (High St) & Front St	Signal	AM	13.2	B	0.63	A	A	E	E
		PM	19.2	B	0.64	B	B	E	E
SR 129 (High St) & 2nd St	Signal	AM	9.0	A	0.53	A	A	E	E
		PM	16.5	B	0.48	B	B	E	E
SR 129 (High St) & 3rd St	Signal	AM	9.3	A	0.66	A	A	E	F
		PM	14.1	B	0.74	A	A	E	E
SR 129 (High St) & US 127 (MLK Jr Blvd)	Signal	AM	53.5	D	0.97	D	C	F	E
		PM	55.9	E	1.18	D	D	F	E
SR 129 (High St) & 7th St	Signal	AM	7.0	A	0.63	A	A	E	E
		PM	12.7	B	0.62	A	A	E	E
SR 129 (High St) & East Ave	Signal	AM	9.6	A	0.69	B	A	E	
		PM	12.3	B	0.65	A	B	E	
SR 129 (High St) & SR 4 (Erie Blvd)	Signal	AM	40.2	D	0.80	C	D	E	E
		PM	62.5	E	1.08	C	F	F	D
SR 129 (High St) & Fair Ave	Signal	AM	23.0	C	0.82	B	B	E	D
		PM	26.4	C	1.00	B	B	E	F
SR 129 (High St) & Hampshire Dr	Signal	AM	12.6	B	0.56	A	A	D	D
		PM	33.5	C	0.93	C	C	D	D
Elkton Rd & NW Washington Blvd	Stop	AM	n/a	n/a	0.69	C		A ¹	
		PM	n/a	n/a	0.52	C		A ¹	
Elkton Rd & N B St	Stop	AM	n/a	n/a	0.61		D		A ¹
		PM	n/a	n/a	0.60		D		A ¹
N B St & Rhea Ave	Signal	AM	23.4	C	0.90	E		A	B
		PM	20.1	C	0.89	D		B	C
N B St & Black St	Signal	AM	18.2	B	0.90		C	C	B
		PM	27.9	C	0.80		C	D	B
N B St & Park Ave	Signal	AM	28.3	C	0.88		C	C	D
		PM	31.2	C	0.88		C	C	D
US 127 (N 3rd St) & Black St	Signal	AM	23.9	C	0.76	C	C	B	C
		PM	20.2	C	0.92	C	D	B	B
US 127 (MLK Jr Blvd) & Heaton St	Signal	AM	9.6	A	0.79	E	E	A	A
		PM	18.1	B	0.88	D	E	B	A
US 127 (MLK Jr Blvd) & Dayton St	Signal	AM	23.3	C	0.81	B	B	B	C
		PM	15.2	B	0.78	C	D	A	B
US 127 (MLK Jr Blvd) & Maple Ave	Signal	AM	12.0	B	0.44	C	C	B	B
		PM	10.0	B	0.51	C	C	A	A
SR 4 (Erie Blvd) & Fair Ave	Signal	AM	16.8	B	0.48	A	A	D	D
		PM	20.2	C	0.70	B	B	D	E
SR 4 (Erie Blvd) & Dayton St	Signal	AM	18.4	B	0.80	E	E	A	A
		PM	18.8	B	0.81	E	E	A	A

1. Delay reported for left turn movement

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Traffic congestion in the study area is expected to get worse in the future as traffic demand increases due to ongoing residential development, redevelopment of the Main Street corridor, redevelopment of the Cohen property, and the Spooky Nook development. Future traffic volumes were developed for an Opening Year of 2030 and a Design Year of 2050. Future traffic volumes within the study area were estimated using a 2% linear annual growth rate from 2020 to the Opening Year of 2030 and a 1% linear annual growth rate from the Opening Year of 2030 to the Design Year of 2050. The future year no-build traffic forecasts were approved by ODOT's Office of Modeling & Forecasting.

The results of the 2030 Opening Year intersection analysis, shown on **Table 2**, indicate that seven intersections have an overall intersection LOS of E or F. Average delay times at these intersections range from 59.3 seconds to 227.7 seconds per vehicle. The results of the 2050 Design Year intersection analysis, shown on **Table 3**, indicate that 10 intersections have an overall intersection LOS of E or F. Average delay times at these intersections range from 57.9 seconds to 362.8 seconds per vehicle. The no build Synchro summary worksheets are provided in **Attachment B1**.

Build Traffic Analysis

A traffic simulation model was developed using Caliper's TransModeler (version 6) simulation package to evaluate the effectiveness of the various alternatives to divert traffic from SR 129 onto each build alternative. The initial model that was developed and calibrated included the roadway network generally east of the Great Miami River and includes major routes US 127, SR 4, and SR 129 in downtown Hamilton, the Dayton Lane Historic District, and the German Village Historic District east of the Great Miami River, and the Rossville Historic District west of the river. **Figure 5** shows the initial simulation model's roadway network.

The initial simulation model was used to analyze 13 alternatives to connect North B Street to SR 129 across the Great Miami River. Of the 13 alternatives, seven were also evaluated with only the first two phases of construction terminating at SR 4 instead of extending to SR 129. **Table 4** presents more detailed traffic operations information for each alternative for the AM peak and **Table 5** presents the PM peak.

Of the 13 alternatives evaluated in the initial model, Alternative E, Alternative F, and Alternative G are the most effective at reducing traffic volumes on SR 129 and Alternative AC, Alternative AD, and Alternative BD are the least effective.

As shown in **Figure 5**, the initial model network terminates just west of North B Street in the northwest portion of the study area. Due to the limits of the network, there was concern that the model was not able to properly capture travel patterns on NW Washington Boulevard for Alternative A, the northernmost river crossing. After the initial model analysis was completed, the simulation model network was expanded west of the river to include Main Street and NW Washington Boulevard to their intersection northwest of Hamilton. **Figure 6** shows the expanded simulation model's roadway network.

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Table 2. 2030 Opening Year Intersection Operations

Intersection	Intersection Control	Time Period	Overall Intersection		Max v/c Ratio	Approach LOS			
			Delay (sec/veh)	LOS		EB	WB	NB	SB
SR 129 (Main St) & B St	Signal	AM	227.7	F	1.78	F	B	E	F
		PM	30.0	C	0.90	C	B	D	C
SR 129 (Main St/High St) & Monument St	Signal	AM	2.3	A	0.63	A	A		D
		PM	3.0	A	0.70	A	A		B
SR 129 (High St) & Front St	Signal	AM	20.3	C	0.90	B	B	E	E
		PM	27.1	C	1.03	B	C	F	E
SR 129 (High St) & 2nd St	Signal	AM	10.7	B	0.54	A	A	E	E
		PM	20.4	C	0.81	B	B	E	E
SR 129 (High St) & 3rd St	Signal	AM	9.8	A	0.67	A	A	E	F
		PM	18.6	B	0.83	B	B	E	E
SR 129 (High St) & US 127 (MLK Jr Blvd)	Signal	AM	91.5	F	1.40	E	D	F	F
		PM	124.6	F	1.34	F	F	F	F
SR 129 (High St) & 7th St	Signal	AM	8.6	A	0.79	A	A	E	E
		PM	16.9	B	0.92	A	B	F	F
SR 129 (High St) & East Ave	Signal	AM	13.7	B	0.86	B	A	E	
		PM	13.4	B	0.91	A	B	E	
SR 129 (High St) & SR 4 (Erie Blvd)	Signal	AM	50.0	D	0.94	D	D	F	E
		PM	83.9	F	1.15	E	F	F	F
SR 129 (High St) & Fair Ave	Signal	AM	28.4	C	0.94	C	B	E	E
		PM	48.8	D	1.35	C	D	D	F
SR 129 (High St) & Hampshire Dr	Signal	AM	21.2	C	0.77	B	B	E	E
		PM	57.0	E	1.17	C	D	F	F
Elkton Rd & NW Washington Blvd	Stop	AM	n/a	n/a	0.97	E		A ¹	
		PM	n/a	n/a	0.70	C		A ¹	
Elkton Rd & N B St	Stop	AM	n/a	n/a	1.67		F		A ¹
		PM	n/a	n/a	1.40		F		A ¹
N B St & Rhea Ave	Signal	AM	59.3	E	1.10	F		D	E
		PM	60.3	E	1.15	F		D	E
N B St & Black St	Signal	AM	61.8	E	1.15		B	F	E
		PM	65.5	E	1.10		D	F	E
N B St & Park Ave	Signal	AM	39.3	D	0.94		D	C	E
		PM	70.4	E	1.14		E	E	F
US 127 (N 3rd St) & Black St	Signal	AM	43.5	D	1.10	E	C	C	C
		PM	23.1	C	0.97	C	D	B	B
US 127 (MLK Jr Blvd) & Heaton St	Signal	AM	10.5	B	0.82	E	E	A	A
		PM	23.1	C	0.91	D	E	C	B
US 127 (MLK Jr Blvd) & Dayton St	Signal	AM	40.3	D	1.02	B	B	B	D
		PM	18.6	B	0.89	C	D	A	B
US 127 (MLK Jr Blvd) & Maple Ave	Signal	AM	12.5	B	0.53	C	C	B	B
		PM	10.6	B	0.52	C	C	A	A
SR 4 (Erie Blvd) & Fair Ave	Signal	AM	17.7	B	0.50	A	A	D	D
		PM	23.3	C	0.77	B	B	D	E
SR 4 (Erie Blvd) & Dayton St	Signal	AM	19.3	B	0.83	E	E	A	B
		PM	20.2	C	0.83	E	E	A	B

Delay reported for left turn movement

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Table 3. 2050 Design Year Intersection Operations

Intersection	Intersection Control	Time Period	Overall Intersection		Max v/c Ratio	Approach LOS			
			Delay (sec/veh)	LOS		EB	WB	NB	SB
SR 129 (Main St) & B St	Signal	AM	362.8	F	2.34	F	C	E	F
		PM	57.9	E	1.17	F	C	D	C
SR 129 (Main St/High St) & Monument St	Signal	AM	2.5	A	0.63	A	A		D
		PM	3.4	A	0.78	A	A		B
SR 129 (High St) & Front St	Signal	AM	35.6	D	1.16	C	C	F	E
		PM	23.4	B	0.91	B	C	E	E
SR 129 (High St) & 2nd St	Signal	AM	14.4	B	0.85	B	B	E	E
		PM	26.4	C	0.98	B	C	E	E
SR 129 (High St) & 3rd St	Signal	AM	12.1	B	0.81	B	A	E	E
		PM	26.2	C	1.05	B	C	F	E
SR 129 (High St) & US 127 (MLK Jr Blvd)	Signal	AM	155.9	F	1.58	F	E	F	F
		PM	207.5	F	1.55	F	F	F	F
SR 129 (High St) & 7th St	Signal	AM	13.3	B	0.96	B	A	E	E
		PM	47.3	D	1.48	B	E	F	F
SR 129 (High St) & East Ave	Signal	AM	18.3	B	1.00	C	A	E	
		PM	39.2	D	1.09	B	E	F	
SR 129 (High St) & SR 4 (Erie Blvd)	Signal	AM	85.4	F	1.34	E	E	F	F
		PM	147.3	F	1.38	F	F	F	F
SR 129 (High St) & Fair Ave	Signal	AM	71.6	E	1.18	F	C	E	F
		PM	105.7	F	1.55	D	F	D	F
SR 129 (High St) & Hampshire Dr	Signal	AM	34.4	C	1.21	C	B	F	E
		PM	110.1	F	1.59	E	F	F	F
Elkton Rd & NW Washington Blvd	Stop	AM	n/a	n/a	1.24	F		A ¹	
		PM	n/a	n/a	1.67	F		A ¹	
Elkton Rd & N B St	Stop	AM	n/a	n/a	3.61		F		A ¹
		PM	n/a	n/a	4.30		F		A ¹
N B St & Rhea Ave	Signal	AM	114.8	F	1.42	F		F	F
		PM	121.3	F	1.23	F		F	F
N B St & Black St	Signal	AM	136.4	F	1.49		B	F	F
		PM	138.7	F	1.36		F	F	F
N B St & Park Ave	Signal	AM	74.2	E	1.17		E	E	F
		PM	147.5	F	1.46		F	F	F
US 127 (N 3rd St) & Black St	Signal	AM	92.6	F	1.39	F	D	C	C
		PM	44.8	D	1.14	C	D	D	D
US 127 (MLK Jr Blvd) & Heaton St	Signal	AM	12.9	B	0.85	D	E	A	A
		PM	45.8	D	1.09	D	F	D	C
US 127 (MLK Jr Blvd) & Dayton St	Signal	AM	82.6	F	1.21	B	B	B	F
		PM	27.6	C	1.07	C	F	B	C
US 127 (MLK Jr Blvd) & Maple Ave	Signal	AM	13.8	B	0.63	C	C	B	B
		PM	11.7	B	0.53	C	C	A	A
SR 4 (Erie Blvd) & Fair Ave	Signal	AM	20.2	C	0.56	B	B	D	D
		PM	30.1	C	0.87	C	C	D	E
SR 4 (Erie Blvd) & Dayton St	Signal	AM	21.2	C	0.82	E	E	A	A
		PM	23.9	C	0.84	D	E	B	C

Delay reported for left turn movement

FEASIBILITY STUDY

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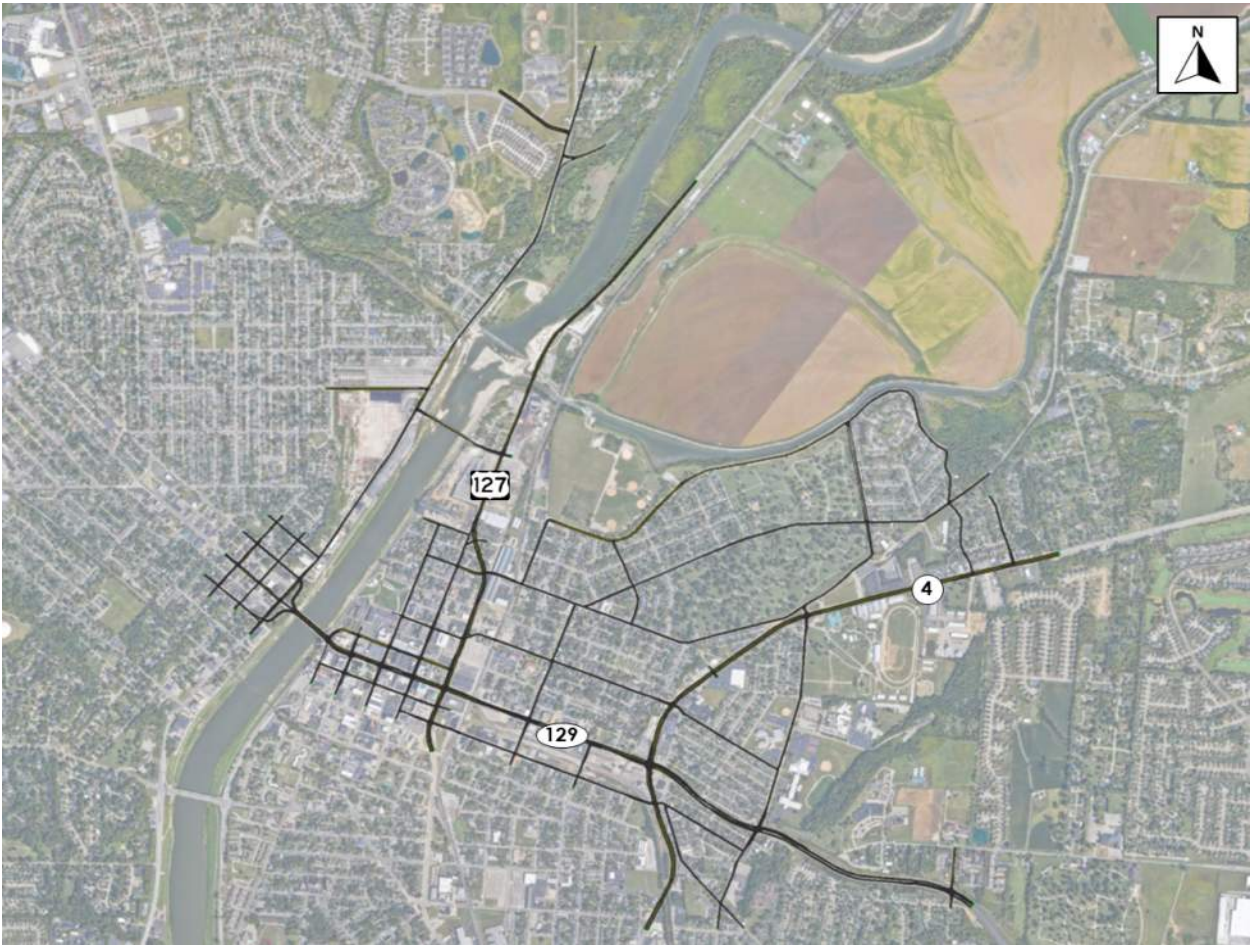


Figure 5: Initial Simulation Model Study Area

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North Hamilton Crossing (NHX)
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Table 4. Initial AM Peak-Hour Simulation Model Results

Alternative	Length (mi.)	AM Peak										
		Volume	NW Travel Time (min.)	SE Travel Time (min.)	B St. @ Main St. LOS	SR 127 @ SR 129 LOS	SR 4 @ SR 129 LOS	SR 129 VHT Savings per year	SR 129 % Reduction (Between B St. & MLK Jr.)	SR 129 % Reduction (Between MLK Jr. & SR 4)	SR 129 % Reduction (Between SR 4 & Hampshire)	SR 129 % Reduction in Volume
No-Build					D	E	D		1,500 - 2,700 vph	3,000 - 3,200 vph	2,600 - 2,900 vph	1,500 - 3,200 vph
Phases 1, 2 & 3												
A	2.47	1,241	4.58	5.74	E	E	D	1,200	-4%	5%	5%	2%
A (w/ Rhea traffic)	2.47	1,434	4.46	5.36	D	E	D	1,300	2%	6%	7%	5%
B	2.64	1,315	6.29	6.36	E	E	C	1,000	0%	8%	8%	5%
C	2.59	1,538	6.47	6.58	D	E	C	1,200	7%	9%	8%	8%
D	2.85	1,562	5.91	6.36	D	E	D	1,000	7%	4%	3%	5%
E	2.18	1,586	3.93	5.97	D	D	D	2,700	9%	21%	19%	16%
F	2.10	1,671	3.76	5.92	D	D	D	2,800	10%	22%	20%	17%
G	1.51	1,698	3.75	5.83	D	D	D	2,900	13%	26%	15%	18%
AC	3.28	1,895	6.38	6.94	F	E	C	N/A	-5%	3%	1%	0%
AD	3.55	1,869	7.17	7.56	F	E	C	N/A	-4%	2%	3%	0%
AE	2.86	1,880	4.62	5.21	F	D	D	1,000	-4%	15%	14%	8%
AE (w/ Rhea traffic)	2.86	2,030	4.61	5.22	D	E	D	1,000	2%	17%	16%	11%
BC	2.74	1,952	6.74	6.55	E	E	C	400	0%	2%	1%	1%
BD	3.03	1,652	8.73	8.85	D	E	C	200	0%	0%	2%	0%
BE	2.31	2,039	5.38	5.99	D	D	D	1,300	0%	11%	15%	8%
Phases 1 & 2 Only												
A	1.60	1,213	2.56	3.16	E	E	D	800	-5%	11%	0%	3%
A (w/ Rhea traffic)	1.60	1,441	2.59	3.28	D	F	D	800	1%	12%	1%	5%
B	1.77	1,301	4.04	4.34	E	E	D	N/A	-1%	2%	0%	1%
C	1.72	1,538	3.68	4.17	D	E	D	900	7%	0%	0%	2%
D	1.98	1,566	4.14	4.56	D	E	D	800	7%	1%	1%	3%
E	1.12	1,576	2.78	3.83	D	D	D	1,000	8%	16%	-1%	9%
AE	1.81	1,877	3.91	4.64	F	D	D	400	-5%	6%	-1%	1%
AE (w/ Rhea traffic)	1.81	2,070	3.85	4.57	D	E	D	400	2%	8%	0%	4%
BE	1.27	2,016	3.78	3.63	D	D	D	700	-1%	1%	-3%	-1%
Terminate at Fair Ave.												
E	1.40	1,563	2.77	3.49	D	D	D	1,000	7%	16%	-2%	8%

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Table 5. Initial PM Peak-Hour Simulation Model Results

Alternative	Length (mi.)	PM Peak										
		Volume	NW Travel Time (min.)	SE Travel Time (min.)	B St. @ Main St. LOS	SR 127 @ SR 129 LOS	SR 4 @ SR 129 LOS	SR 129 VHT Savings per year	SR 129 % Reduction (Between B St. & MLK Jr.)	SR 129 % Reduction (Between MLK Jr. & SR 4)	SR 129 % Reduction (Between SR 4 & Hampshire)	SR 129 % Reduction in Volume
No-Build					E	E	F		1,600 - 3,200 vph	3,700 - 4,000 vph	3,100 - 3,600 vph	1,600 - 4,000 vph
Phases 1, 2 & 3												
A	2.47	1,712	5.59	8.00	F	E	D	900	-9%	9%	8%	3%
A (w/ Rhea traffic)	2.47	2,042	2.71	3.89	E	E	D	1,000	-6%	13%	12%	6%
B	2.64	1,581	6.55	6.12	E	E	D	1,000	-4%	9%	9%	5%
C	2.59	1,897	7.06	6.34	E	E	D	2,000	5%	9%	7%	7%
D	2.85	1,916	5.79	6.57	E	E	E	2,500	6%	5%	4%	5%
E	2.18	1,974	4.07	4.40	D	D	D	6,100	5%	22%	19%	16%
F	2.10	2,107	3.91	4.44	D	D	D	6,300	7%	23%	20%	17%
G	1.51	2,144	3.89	4.32	D	D	D	6,400	8%	28%	14%	17%
AC	3.28	2,425	6.91	7.80	F	E	E	N/A	-7%	2%	3%	-1%
AD	3.55	2,216	7.29	8.31	E	E	E	N/A	-7%	2%	2%	-1%
AE	2.86	2,336	6.40	5.58	F	D	E	1,000	-5%	19%	15%	10%
AE (w/ Rhea traffic)	2.86	2,421	6.35	5.58	F	E	D	1,100	-3%	20%	17%	12%
BC	2.74	2,177	6.54	7.34	F	E	E	800	-2%	4%	3%	2%
BD	3.03	1,777	5.55	7.48	F	E	E	N/A	-2%	-1%	3%	0%
BE	2.31	2,418	5.97	5.85	F	D	D	2,300	-2%	9%	18%	8%
Phases 1 & 2 Only												
A	1.60	1,771	2.61	4.12	F	E	D	600	-9%	13%	0%	2%
A (w/ Rhea traffic)	1.60	2,045	2.69	4.12	E	E	E	400	-5%	15%	2%	5%
B	1.77	1,561	4.13	4.82	F	E	E	400	-2%	1%	0%	0%
C	1.72	1,897	4.44	4.51	E	E	E	1,400	7%	1%	-1%	2%
D	1.98	1,904	4.27	4.86	E	E	E	1,600	7%	3%	1%	3%
E	1.12	1,947	2.90	4.99	D	D	E	4,200	6%	19%	-2%	9%
AE	1.81	2,268	4.32	6.13	F	D	E	600	-6%	7%	-1%	0%
AE (w/ Rhea traffic)	1.81	2,420	4.27	6.24	E	E	E	800	-3%	7%	-2%	1%
BE	1.27	2,418	3.61	4.92	F	D	D	600	-2%	2%	-1%	0%
Terminate at Fair Ave.												
E	1.40	1,932	2.73	4.36	D	D	E	4,100	5%	19%	-1%	9%

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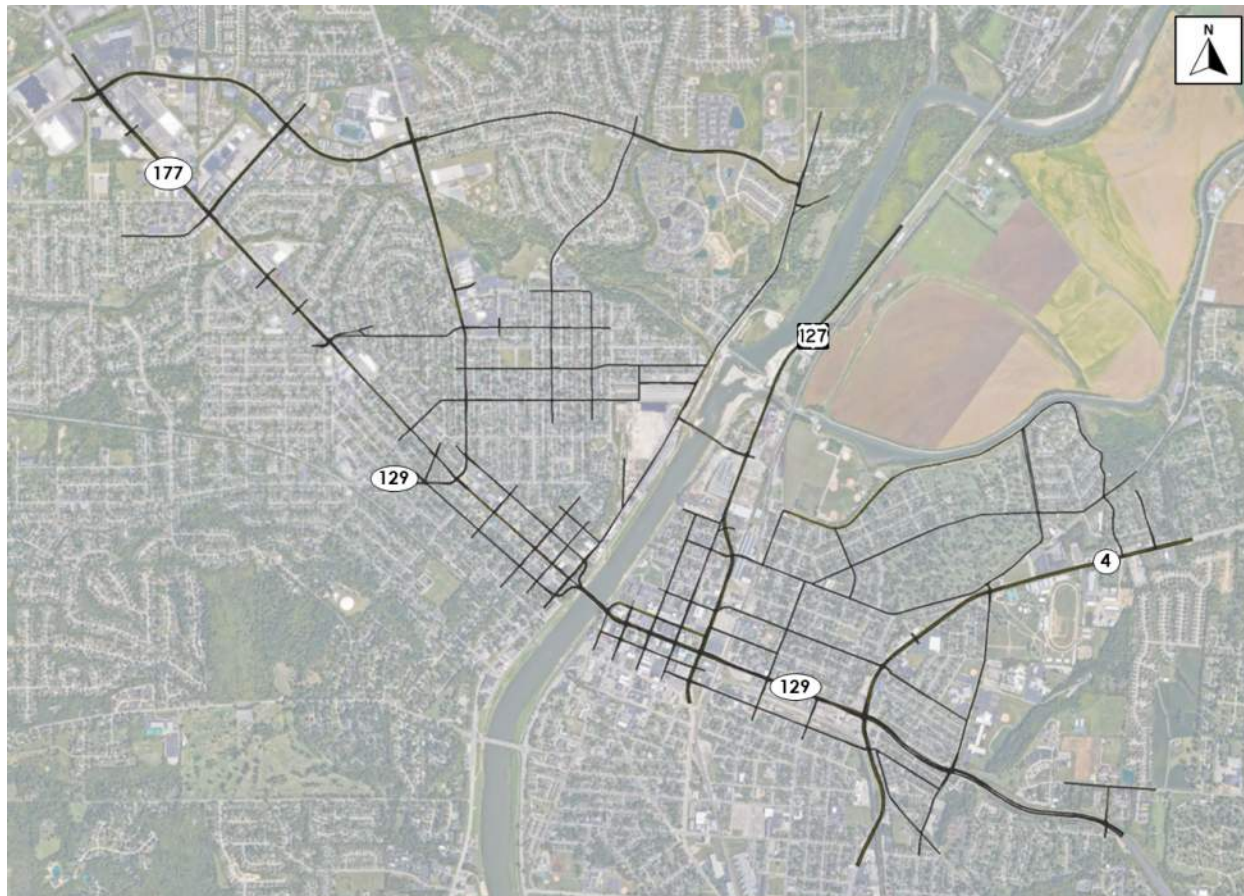


Figure 6: Expanded Simulation Model Study Area

Four build alternatives that were previously run in the initial model, Alternative A, Alternative B, Alternative BE, and Alternative E, were rerun with the expanded model. Alternative A was rerun to capture the diversion of traffic from Rhea Avenue to NW Washington Boulevard. Alternatives B and BE were rerun as the only alternatives that have a terminus point at Lagonda Avenue. Alternative E was rerun due to it being the most effective alternative for reducing traffic on SR 129 as well as the most effective alternative that had a terminus point at Gordon Ave. Two additional alternatives, Alternative ABE and Alternative EBE, that were not contemplated as part of the initial model runs were also analyzed. Comparisons of the expanded AM and PM models are shown in **Tables 6** and **7**, respectively. Of the six alternatives evaluated in the expanded model, Alternative E is the most effective at reducing traffic volumes on SR 129 and Alternative A and Alternative B are the least effective.

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Table 6. S.R. 129 Traffic Demand Reduction (AM Peak-Hour)

Concept	SR 129 AM Volume						SR 129 VHT Savings per year
	Eaton to B St.	B St. to US 127	US 127 to SR 4	SR 4 to Hampshire	Total	% Reduction	
No-Build	1,700	2,600	3,100	2,800	10,200		
Alt A	1,800	2,500	3,000	2,700	10,000	2%	1,900
Alt B	1,800	2,500	3,000	2,700	10,000	2%	1,900
Alt B-E	1,600	2,500	3,000	2,700	9,800	4%	3,600
Alt E	1,500	2,200	2,700	2,400	8,800	14%	10,000
Alt A-B-E	1,800	2,500	3,000	2,700	10,000	2%	2,100
Alt E-B-E	1,500	2,300	2,800	2,500	9,100	11%	7,500

Table 7. S.R. 129 Traffic Demand Reduction (PM Peak-Hour)

Concept	SR 129 PM Volume						SR 129 VHT Savings per year
	Eaton to B St.	B St. to US 127	US 127 to SR 4	SR 4 to Hampshire	Total	% Reduction	
No-Build	2,000	2,900	3,300	3,100	11,300		
Alt A	2,700	3,000	3,600	2,900	12,200	-8%	N/A
Alt B	2,800	3,000	3,500	2,800	12,100	-7%	N/A
Alt B-E	2,200	3,100	2,900	2,600	10,800	4%	9,900
Alt E	1,900	2,600	2,700	2,400	9,600	15%	22,600
Alt A-B-E	2,800	3,000	3,400	2,700	11,900	-5%	N/A
Alt E-B-E	1,900	3,000	2,800	2,600	10,300	9%	16,800

Alternatives closer to SR 129 and the Black Street bridge’s river crossing, which will be replaced as part of this project, generally performed better than alternatives that were further north. Based on results from both the initial and expanded models, Alternative E is the most effective alternative and provides the most traffic relief on congested routes in the study area such as SR 129.

A review of the expanded models indicated that several of the scenarios did not result in traffic pattern changes as expected. The congestion on SR 129 will only worsen with the introduction of Spooky Nook and other development traffic. Local drivers will have knowledge of the congested routes and make informed decisions based on previous experiences. Additionally, regional traffic patterns could also shift with the introduction of a new route. Regional “through” trips often use navigation tools to help determine the best route possible. To reflect the traffic pattern changes due to these informed drivers, dynamic traffic assignment (DTA) was implemented. DTA is a tool in TransModeler used to produce a set of time-period specific congested travel times and turning delays that reflect recurring congestion patterns. Whereas in a static assignment each set of drivers has a pre-defined shortest path based on travel time, drivers using DTA incorporate knowledge of the congested travel times and delays of alternative routes over a series of simulations (50 runs) and make incrementally informed route choices until they can no longer reduce travel time. The simulation runs conclude when a convergence rate of 1.5 percent is reached, meaning that travel times changed less than 1.5 percent from the previous run.

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The three most effective expanded model alternatives (Alternatives E, EBE, and ABE) were run with DTA to determine the impacts of regional traffic changes. Two additional alternatives were analyzed with DTA to determine the feasibility of two new alignments that had resulted from public comments: Alternative EF1 and Alternative AF1. Results from the Alternative E run with DTA did not reveal significant changes from the run without DTA. Comparisons of the expanded AM and PM models run with DTA are shown in **Table 8** and **Table 9**. Of the alternatives evaluated with DTA, Alternative E is the most effective at reducing traffic volumes on SR 129 followed by Alternative EF1.

Table 8. SR 129 Traffic Demand Reduction with DTA (AM Peak-Hour)

Concept	SR 129 AM Volume						SR 129 VHT Savings per year
	Eaton to B St.	B St. to US 127	US 127 to SR 4	SR 4 to Hampshire	Total	% Reduction	
No-Build	1,700	2,600	3,100	2,800	10,200		
Alt E	1,500	2,200	2,700	2,400	8,800	14%	10,000
Alt E-B-E	1,600	2,300	2,700	2,500	9,100	11%	8,100
Alt A-B-E	1,700	2,400	2,900	2,700	9,700	6%	5,700
Alt E-F1	1,600	2,300	2,700	2,500	9,100	12%	8,700
Alt A-F1	1,700	2,400	2,800	2,600	9,500	7%	6,200

Table 9. SR 129 Traffic Demand Reduction with DTA (PM Peak-Hour)

Concept	SR 129 PM Volume						SR 129 VHT Savings per year
	Eaton to B St.	B St. to US 127	US 127 to SR 4	SR 4 to Hampshire	Total	% Reduction	
No-Build	2,000	2,900	3,300	3,100	11,300		
Alt E	1,900	2,600	2,700	2,400	9,600	15%	22,600
Alt E-B-E	1,900	2,900	2,700	2,500	10,000	12%	17,900
Alt A-B-E	2,400	2,600	3,200	2,500	10,700	6%	13,600
Alt E-F1	1,900	2,900	2,600	2,400	9,800	13%	18,400
Alt A-F1	2,400	2,600	3,100	2,400	10,500	7%	14,800

Overall, Alternative E is the most effective alternative and provides the most traffic relief on congested routes in the study area such as SR 129. Alternative E is expected to carry the highest traffic volume of the alternatives, up to 2,100 vehicles per hour (VPH), and is expected to divert 14 to 15 percent of peak-hour traffic off of SR 129. Alternative EF1 is the second most effective alternative, carrying up to 1,900 VPH and diverting 12 to 13 percent of traffic from SR 129 during the peak hours. Alternative EBE was found to be the third most effective alternative, carrying up to 1,900 VPH and providing an 11 to 12 percent reduction in traffic on SR 129. Alternative AF1 was the next most effective alternative, with up to 2,100 VPH using the new route and seven percent diversion from SR 129. For a detailed discussion of the model development and traffic analysis results, please refer to **Attachment B2**.

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4.3 ROADWAY DESIGN ISSUES

Each of the build alternatives includes a boulevard-style road designed for a posted speed limit of 35 mph or less. The typical section of the roadway, shown in **Figure 7**, includes: four 11-foot-wide lanes (two each way), one 11-foot center turn lane, a 12-foot paved shared-use path along one side of the new roadway and a five-foot wide sidewalk on the other. A five-foot green space is included on each side of the roadway to provide a buffer between the roadway lanes and the bike lane and sidewalk. In addition, the decision to provide on-street parking along the new alignments will be based on the available right of way and will require further study.

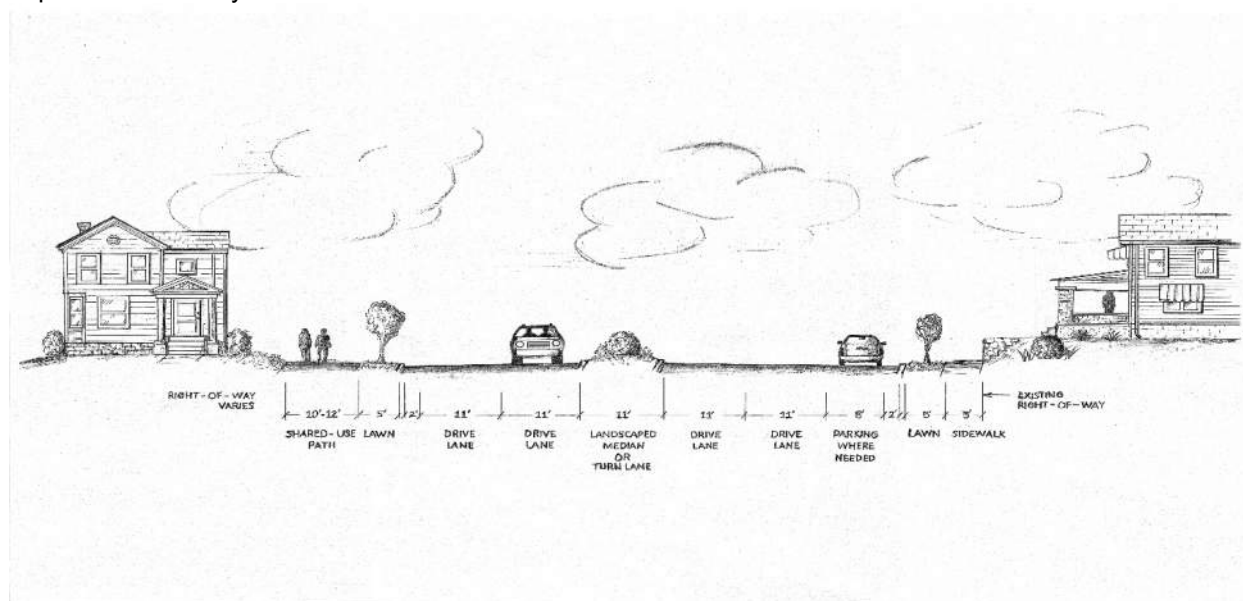


Figure 7: Typical Section of North Hamilton Crossing (NHX)

Each of the alternatives include a new crossing of the Great Mami River and a grade-separated crossing of the CSX railroad tracks, which will alleviate congestion and increase safety throughout the study area. Since the alternatives have different alignments, the location of the proposed river and rail crossings will vary.

Roadway design issues considered during the development and evaluation of the build alternatives are detailed in the following section. These issues impact right-of-way needed for the project and construction costs.

Build Alternatives

Each of the build alternatives, except for Alternatives F and G, follow the same alignment through the Princeton Road intersection to an eastern terminus at the intersection of SR 129 at Hampshire Drive. In order to avoid displacing the Transitional Living Facility located on Princeton Road, the existing Hampshire Road/Princeton Road intersection would need to be shifted to the southwest to accommodate the new

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alignment. This shift results in a slight skew of the new intersection and requires curves on the four approach legs of the intersection.



Figure 8: Reconfigured Hampshire Drive/Princeton Road Intersection



Figure 9: Roundabout at W Elkton Rd. and NW Washington Blvd.

The new intersection is shown in **Figure 8**. Design issues that are unique to each alternative are described in the following paragraphs.

Alternative A (See Attachment A-1): This alternative includes a one-lane roundabout at the intersection of W Elkton Road and NW Washington Boulevard shown on **Figure 9**. The proximity of the intersection of W Elkton Road and NW Washington Boulevard, coupled with the steep topography in this area, requires the removal of significant amounts of earth to accommodate the proposed roundabout and makes it infeasible to connect W Elkton Road directly to the roundabout. A separate T-intersection of W Elkton Road with NW Washington would be constructed just north of the roundabout.

As the alignment travels to the east from the roundabout, it crosses over the floodplain area on the west side of the Great Miami River. Since the elevation of the overpass of US 127 that the alignment is tying into on the east side of the river is much higher than the floodplain elevation, there is a significant amount of fill material required in the floodplain to raise the profile of the alignment in this area. In addition, as the alignment travels east of US 127, a significant amount of fill material is required in the floodplain located in the Bonham Farm property to raise the profile of the alignment to provide the necessary clearance for the US 127 overpass structure to the

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west and the Hydraulic Canal crossing structure to the east. The amount of fill material adds a significant cost to this alternative and impacts the floodplain.



Figure 10: J-Hook Connection at US 127

Due to the proximity of US 127 and the CSX railroad tracks, which are parallel to US 127, a grade-separated intersection is required. The grade-separated crossing would have a J-hook connection from to US 127. This connection would require traffic signals at the J-hook intersection with US 127 and the intersection with the new alignment. The configuration of this interchange is shown in **Figure 10**. The additional traffic signals would increase travel time and limit access to the new alignment. This alternative would also require

retaining walls in the vicinity of the Butler County Engineer's Office (BCEO) due to steep grades in this area and the proximity of several structures to the alignment. The configuration of these walls can be found in **Figure 11**.

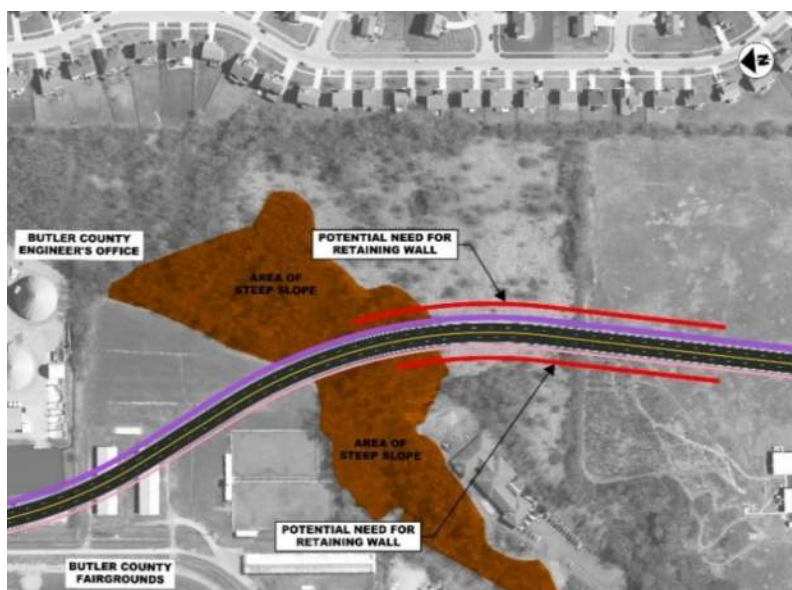


Figure 11: Retaining Walls Near BCEO's Building

Alternative B (See Attachment A-2): This alternative crosses the levy which parallels North B Street on the west bank of the Great Miami River, requiring a US Corps of Engineers (USACE) Section 408 permit for alteration to the levy. In order to meet the clearance requirements of the levy system and design criteria for intersecting streets, North B Street would have to be raised approximately five feet at the proposed intersection.

Another design challenge occurs at the proposed intersection of the new roadway and US 127. In order to meet design criteria for a new

intersection and enable the new roadway to cross the CSX railroad, located in proximity to US 127, US 127 would need to be raised approximately ten feet. The proposed intersection of the new roadway and US 127 is shown **Figure 12**.

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Figure 12: Alternative B Crossing US 127 and CSX Railroad

the vicinity of the Butler County Engineer's Office.

Modifications to the alignment would be required along Joe Nuxhall Boulevard between Pine Street and Neal Boulevard in order to avoid impacts to the Hydraulic Canal. In this section, the grass buffer would be removed and the shared-use path would be reduced in width from 12 to 10 feet and relocated to immediately adjacent to the north edge of the roadway.

Alternative B shares Alternative A's alignment from the intersection of Joe Nuxhall Boulevard and Neal Boulevard to the alignment's terminus at the intersection of Hampshire Drive and S.R. 129. Like Alternative A, this section of alignment requires retaining walls in

Alternative C (See Attachment A-3): The western terminus of Alternative C crosses the Great Miami River



Figure 13: Configuration of Alternative C, Power Plant, and US 127

and connects to Rhea Avenue, which was recently relocated as part of the work on the Spooky Nook development. Alignment C also crosses the Great Miami River levy, requiring that North B Street be raised approximately one to two feet in order to tie into the new roadway at the elevation required to clear the levy and meet design standards for the intersection. A USACE Section 408 permit would be required for alteration to the levy.

At the intersection of US 127 shown in **Figure 13**, there are several issues that affected the project design. First, US 127 is very close to the CSX railroad location where it is crossed by Alternative C. In order for the roadway to cross the railroad and tie into US 127, US 127 must be raised approximately 13 feet. The new alignment must also avoid the existing power plant located on the east side of US 127 by staying to the south end of the power plant, which creates a slightly skewed alignment through the intersection. Because the alignment must tie into Rhea Avenue on the west side of the river, the alignment is forced to stay as close to the power plant as possible. The configuration of the power plant, US 127, and the new roadway in this area creates a site distance concern on the eastern approach to the new intersection.

Alternative C follows the same alignment of Alternative B from LJ Smith Park through the end of the alignment at the intersection of Hampshire Drive and SR 129 and shares the same design issues discussed in the section for Alternative B: the need to reduce the width of the shared-use path to ten feet along Joe

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Nuxhall Boulevard to minimize the impacts to the Hydraulic Canal and the need for retaining walls near the Butler County Engineer's Office.



Figure 14: Configuration of Alternative D, Power Plant, and US 127

issues where it intersects US 127 due to the proximity of the CSX railroad. A skewed crossing over the railroad was used to meet the railroad's clearance requirements and eliminate the need to raise the intersection with US 127. This new approach



Figure 15: Configuration of Alternative E at Relocated Rhea Avenue, Power Plant, and and US 127

Hydraulic Canal and the need for retaining walls near the Butler County Engineer's Office.

Alternative E (See Attachment A-5): The western terminus of Alternative E ties into the relocated Rhea Avenue intersection at North B Street and, like Alternatives C and D, would require North B Street to be

Alternative D (See Attachment A-4): The western terminus of Alternative D ties into Gordon Avenue at North B Street. As with Alternatives B and C, Alternative D also crosses the Great Miami River levy, requiring that North B Street be raised approximately one to two feet in order to tie into the new roadway at the elevation required to clear the levy and to meet design standards for the intersection. A USACE Section 408 permit would be required for alteration to the levy. Also, because the Great Miami River crossing is skewed, the intersection of North B Street and the new alignment occurs in a curve. These design issues are shown in **Figure 14**.

Alignment D also presents some unique design issues where it intersects US 127 due to the proximity of the CSX railroad. A skewed crossing over the railroad was used to meet the railroad's clearance requirements and eliminate the need to raise the intersection with US 127. This new approach creates skewed east and west approaches to US 127, and results in the same limited sight distance on the west approach leg as Alternative C due to the sight line obstructions of the power plant which can be seen in **Figure 14**. Alternative D follows the same alignment as Alternatives B and C from LJ Smith Park to the end of the alignment at the intersection of Hampshire Drive and SR 129. Consequently, the same roadway design issues discussed for Alternatives B and C are found throughout this stretch of roadway. These issues include the need to reduce the width of the shared-use path from 12 feet to 10 feet along Joe Nuxhall Boulevard to minimize the impacts to the

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Figure 16: Narrowing of Shared-Use Path in Vicinity of Greenwood Cemetery for Alternative E

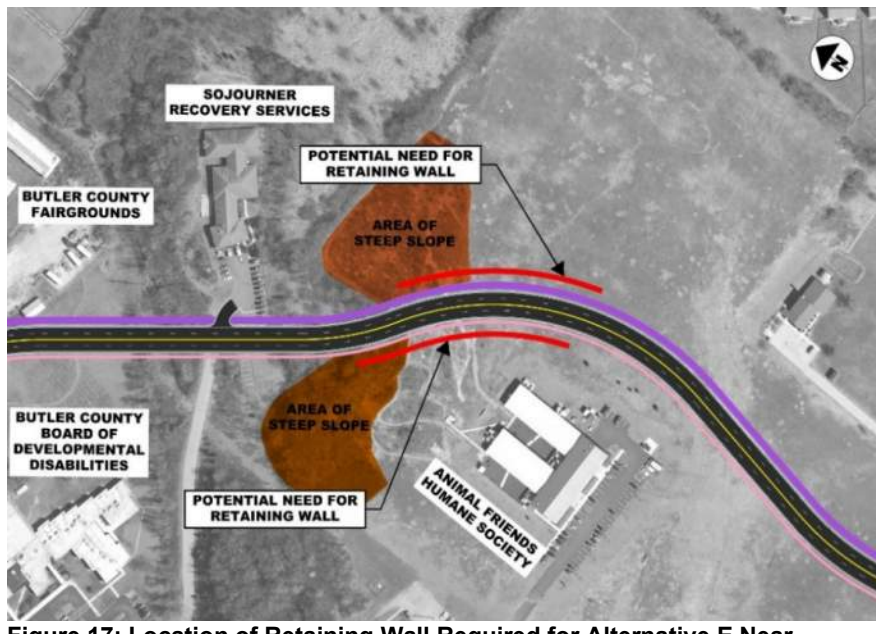


Figure 17: Location of Retaining Wall Required for Alternative E Near Humane Society Bldg.

travels up the steep grade behind the Humane Society, retaining walls may be required to mitigate impacts to the surrounding area. The location of these walls can be seen in **Figure 17**.

raised one to two feet to enable the new roadway to cross the existing Great Miami River levy located along the east side of North B Street. A USACE Section 408 permit would be required for alteration to the levy. See **Figure 15** for the location of the new intersection. Alternative E, like Alternative D, crosses the CSX railroad east of US 127 at a skew. Due to the distance between the point the alignment crosses the railroad and the intersection of US 127, US 127 does not need to be elevated. As with Alternative D, Alternative E has a sight distance issue at the intersection with US 127 due to the proximity of the power plant to the intersection and the skewed intersection at US 127. These issues are shown in **Figure 15**.

As Alternative E travels along Heaton Street near Miami Street, the width of the shared-use path was reduced from twelve to eight feet to avoid impacts to Greenwood Cemetery, as shown in **Figure 16**.

Additionally, as Alternative E

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Figure 18: Configuration of Alternative E1, CSX Railroad, and US 127

Alternative E1 follows a similar path as Alternative E and has the same design issues described under Alternative E, including the need to raise the profile of North B Street to accommodate the levy system and the need for retaining walls in the area of steep topography near the Humane Society. Because this alternative alters the levy, a USACE Section 408 permit would be required. From US 127 through SR 4, Alternative E1 deviates from Alternative E, by traveling through the former Chemdyne site and LJ Smith Park north of Joe Nuxhall Boulevard following Miami Street through the SR 4 Intersection. Alternative E1 shifts the proposed intersection with US 127 to the north, impacting the southern portion of the power plant in order to minimize impacts to potential economic development areas. The resulting alignment requires a steep grade to reach the skewed crossing of the CSX railroad. Consequently, US 127 needs to be raised one to two feet to meet design requirements for the intersection of the new roadway with US 127 as shown on **Figure 18**.



Figure 19: Alternative F River Crossing and Skewed Intersection at US 127

The alignment follows Village Street through the German Village and Heaton Street to SR 4. Even with alterations to the typical section along these two streets, the removal of elements like on street parking and buffer spaces, the proximity of the houses adjacent to the existing roadway did not result in a reduction in property impacts. This can be seen in **Figure 20**.

Alternative E1 (See Attachment A-6):

Alternative E1 follows a similar path as Alternative E and has the same design issues described under Alternative E, including the need to raise the profile of North B Street to accommodate the levy system and the need for retaining walls in the area of steep topography near the Humane Society. Because this alternative alters the levy, a USACE Section 408 permit would be required. From US 127 through SR 4, Alternative E1 deviates from Alternative E, by traveling through the former Chemdyne site and LJ Smith Park north of Joe Nuxhall Boulevard following Miami Street through the SR 4 Intersection. Alternative E1 shifts the proposed intersection with US 127 to the north, impacting the southern portion of the power plant in order to minimize impacts to potential economic development areas. The resulting alignment requires a steep grade to reach the skewed crossing of the CSX railroad. Consequently, US 127 needs to be raised one to two feet to meet design requirements for the intersection of the new roadway with US 127 as shown on **Figure 18**.

Alternative F:

This alternative creates an intersection with a relocated access drive on the south side of the Spooky Nook complex and a new crossing of the river that lines up with Village Street on the east side of the river. Due to the location of the levy along the west side of the Great Miami River and the new intersection of North B Street, the new river crossing will require the raising of the profile of North B Street. Because this alternative alters the levy, a Section 408 permit would be required from the USACE. In addition, the transition from following Village Street to Heaton Street on the east side of the river results in a

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Figure 20: Alternative F Reduced Roadway Typical Section Along Heaton Street



Figure 21: Displacement of Butler County Transitional Living Center Required Under Alternative F



Figure 22: Alternative G Reduced Roadway Typical Section Along Dayton Street to Reduce Property Impacts

alternative would not have the buffer space between the edge of pavement and the sidewalk and shared-use path on both sides of the road, or the center turn lane/island. This layout can be seen in **Figure 22**.

Like the other alternatives, the alignment follows Gilmore Avenue and travels along the southside of the Butler County Fairgrounds. Instead of turning to the south after passing the Butler County Board of Development Disabilities in front of the Sojourner and creating a new intersection at Princeton Road and Hampshire Drive to miss the Transitional Living Facility, this alternative continues to the east passing the Sojourner Recovery Services building to the north and traveling south along an alignment that aligns with the existing alignment of Hampshire Drive, traveling along the Fairfield Township boundary line, and displaces the Butler County Transitional Living Center. See **Figure 21**.

Alternative G: The river crossing for this alternative occurs further south on North B Street on the west side of the Great Miami River at Wayne Avenue and lines up with Buckeye Street on the east side of the river. This alternative also involves the levy and may require a USACE Section 408 permit. From there, it follows Buckeye Street to US 127 and shifts to the south to Dayton Street and follows Dayton Street to the east all the way to Fair Avenue where it terminates at SR 129.

The narrow width of the existing Dayton Street footprint and the proximity of the homes to the edge of pavement, required a narrow roadway design to avoid impacts to the adjacent homes along the Dayton Street corridor. Due to the constraints of the alignment along Dayton Street, this section of the

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Figure 23: River Crossing and Roundabout at W Elkton Rd and NW Washington Blvd. for Alts. AC, AD, AE, ABE and AF1

eliminates the need for an overpass and a J-hook connection at US 127. The river crossing can be seen in **Figure 23**.

These alternatives would then follow existing US 127 to connect the river crossing intersection with a second T-type intersection at Alternative C, D or E to the south, which in-turn relocates the CSX railroad crossing to an area with a greater separation between the railroad and US 127. This design eliminates the need to raise US 127 to accommodate the new roadway intersections with US 127, which also allows for a lower profile of the proposed alignment over the Great Miami River. Lowering the profile reduces the necessary fill material needed in this area compared to the fill required in Alternative A. However, there would still be a difference in elevation between the floodplain and US 127 on the east side of the river which would require a significant amount of fill material in the floodplain and increase the costs of these alternatives.

Alternative AC (See Attachment A-8): This alignment follows the Alternative C alignment from US 127 to the eastern terminus at Hampshire Drive and US 129. Like Alternative C, this alternative has the same design issues including limited sight distance at the intersection with US 127 due to the proximity of the power plant, the need to reduce the width of the shared-use path from 12 to 10 feet to minimize the impacts to the Hydraulic Canal, and the need for retaining walls in the vicinity of the Butler County Engineer's Office due to steep slopes.

Alternative AD (See Attachment A-9) : This alignment follows the Alternative D alignment to the eastern terminus at the intersection of Hampshire Drive and US 129 and has the same design concerns including: limited intersection sight distance at US 127 due to the proximity of the power plant; the need to reduce the width of the shared-use path from 12 to 10 feet along Joe Nuxhall Boulevard to minimize the impacts to the

Alternatives AC, AD, and AE:

These alternatives combine the river crossing of Alternative A with the alignments of Alternatives C, D, and E from their intersection with US 127 to the eastern terminus at Hampshire Drive and SR 129. Each of these alternatives replace the NW Washington Blvd and W Elkton Road intersection with a roundabout, which will have the same design issues discussed in Alternative A, and an at-grade T-type intersection at US 127 that

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Hydraulic Canal; and the need for retaining walls in the vicinity of the Butler County Engineer's Office due to steep slopes.

Alternative AE (See Attachment A-10): This alignment follows the Alternative E alignment to the eastern terminus at the intersection of Hampshire Drive and US 129 and has the same design issues including limited intersection sight distance at US 127 due to the proximity of the power plant, the need to reduce the width of the shared-use path from twelve to eight feet along Heaton Street to eliminate impacts to Greenwood Cemetery, and the need for retaining walls in the vicinity of the Humane Society due to steep slopes.

Alternatives BC, BD, BE: Each of these alternatives tie into Lagonda Avenue at their western terminus and include a new intersection with North B Street on the west side of the river. The location of the levy along the west side of the river requires that North B Street be raised, as discussed with Alternative B. A USACE Section 408 permit would be required due to alterations of the levy. These alternatives each utilize Alternative B's river crossing to US 127 where there would be a T-type intersection with US 127 as shown in **Figure 24**. Alternatives BC, BD, and BE would then follow existing US 127 south to the intersection with Alternatives C, D, or E. By having a T-type intersection with US 127 and shifting the crossing of the CSX railroad to a point further south, US 127 would not need to be raised. At US 127, the alternatives follow the alignments of Alternatives C, D, and E to the roadway's eastern terminus at the intersection of Hampshire Drive and SR 129.



Figure 24: Western Terminus of Alternatives BC, BD, and BE to US 127

Alternative BC (See Attachment A-11): Alternative BC follows the Alternative C alignment from US 127 to the eastern termini at Hampshire Drive and SR 129. Like Alternative C, Alternative BC has the following design issues: limited intersection sight distance at US 127 due to the proximity of the power plant to the intersection, the need to reduce the width of the shared-use path from 12 to 10 feet along Joe Nuxhall Boulevard to minimize the impacts to the

Hydraulic Canal, and the need for retaining walls in the vicinity of the Butler County Engineer's Office due to steep slopes.

Alternative BD (See Attachment A-12): This alignment follows the Alternative D alignment to the eastern terminus at the intersection of Hampshire Drive and SR 129. Like Alternative D, Alternative BD has the following design issues: limited intersection sight distance at US 127 due to the proximity of the power plant to the intersection, the need to reduce the width of the shared-use path from 12 to 10 feet along Joe Nuxhall

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Boulevard to minimize the impacts to the Hydraulic Canal, and the need for retaining walls in the vicinity of the Butler County Engineer's Office due to steep slopes.

Alternative BE (See Attachment A-13): This alignment follows the Alternative E alignment to the eastern terminus at the Hampshire Drive/SR 129 intersection. Like Alternative E, Alternative BE has the following design issues: limited intersection sight distance at US 127 due to the proximity of the power plant to the intersection, the need to reduce the width of the shared-use path from twelve to eight feet along Heaton Street to eliminate impacts to Greenwood Cemetery, and the need for retaining walls in the vicinity of the Humane Society due to steep slopes.



Figure 25: Steep Approach to Intersection of Alternative ABE and US 127

separation between US 127 and the railroad, making it possible to create the at-grade intersection with minimal raising of US 127. However, a steep grade to the western approach to the intersection would be required to provide the necessary clearance for the railroad overpass. **Figure 25** shows the layout of this area.



Figure 26: Alternative EBE from Western Terminus to US 127

intersection of Hampshire Drive and SR 129, Alternative E alignment is followed. A USACE Section 408

Alternative ABE (See Attachment A-14): This alternative combines the alignments of Alternatives A, B and E. Like Alternative A, this alternative would require a significant amount of excavation to construct the proposed roundabout at the NW Washington Boulevard/W Elkton Road intersection. This alternative follows the Alternative A alignment across the river to US 127, where there would be a T-type intersection, as shown in **Figure 23**. There would be a second T-type intersection further south on US 127 near the location of the Alternative B crossing of the CSX railroad. This design provides for greater

After the alignment crosses the Hydraulic Canal it follows Alternative E to the eastern terminus with SR 129. Details of the specific impacts this alignment between Joe Nuxhall Blvd. and SR 129 is described with Alternative E.

Alternative EBE (See Attachment A-15): The alignment for the EBE alternative combines sections of alignment from Alternatives E and B. As shown in **Figure 26**, the western terminus of this alternative aligns with Gordon Avenue at US 127 and crosses the Great Miami River, mirroring the Alternative B alignment between US 127 and Joe Nuxhall Boulevard. From Joe Nuxhall Boulevard to the eastern terminus at the

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permit would be required due to alterations to the levy. It should be noted that based on comments received from ODOT, the alignment of this crossing was modified to eliminate the skewed crossing to reduce the design complexity and costs of the bridge, as well as potential impacts to the hydraulic dam.

The intersection of US 127 is shifted slightly to the south of the Alternative B intersection which reduces the change in elevation and increases the distance between US 127 and the CSX railroad. These features help the new alignment tie into US 127 with minimal adjustments of the profile. In addition, the grade of the western approach to the US 127 intersection uses the maximum grade of seven percent to tie into US 127.

Details of the specific impacts of this alignment between Joe Nuxhall Blvd. and SR 129 are described with Alternative E.

Both Alternatives ABE and EBE could also utilize Alternative E1 from Joe Nuxhall Blvd. to the eastern terminus with SR 129. Further studies of right-of-way impacts, costs, and traffic operations of each alignment would be necessary to determine the best option for this section of Alternatives ABE and EBE.

ALTERNATIVES AF1 AND EF1: Both alternatives AF1 and EF1 intersect US 127 in the approximate location of the existing Vine Street intersection. By providing the distance between the railroad tracks and US 127 and maximizing the allowable slope of the profile, the new alignment can cross over the railroad and tie into the US 127 intersection without the need to raise the profile of US 127. As shown in **Figure 27** below, the proposed intersection is in a curve along the US 127 alignment and there are a several streets with access to US 127 in close proximity to the proposed intersection. Maintaining required spacing between each of the intersections with US 127 would be a design challenge if this alternative is advanced.

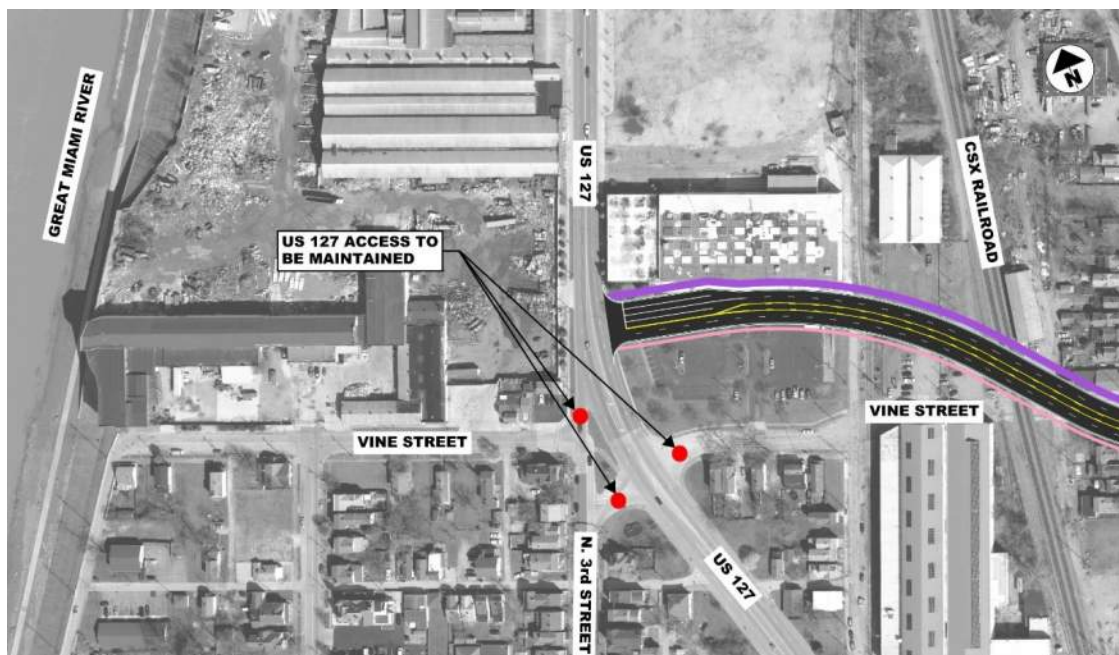


Figure 27: Location of the New Intersection Created by Alternative F1 on US 127 Curve

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As the alignment follows the existing Heaton Street alignment, the following design considerations were used to reduce the impacts to the properties along Heaton Street: the existing Heaton Street profile will require raising one to three feet, the width of the shared-use path width was reduced to eight feet, the buffer space between the edge of pavement and the edge of sidewalk and the edge of the shared-use path was reduced to two feet, and the on street parking along Heaton Street was removed as seen below in **Figure 28**.



Figure 28: Alternative F1 Reduced Property Impacts Along Heaton Street Due to Reduced Roadway Typical Section and Raised Profile

From SR 4 to the project's terminus at the intersection of SR 129 at Hampshire Drive, both of these alignments follow the Alternative E alignment traveling up the steep grade behind the Humane Society. As noted earlier, the steep grades in this location may require retaining walls to mitigate impacts to the surrounding area. The location of these walls can be seen in **Figure 17**.

Alternative AF1: This alternative uses Alternative A's river crossing which would require a significant amount of excavation to construct the proposed roundabout at the NW Washington Boulevard/W Elktion Road intersection. This alternative follows the Alternative A alignment across the river to US 127, where there would be a T-type intersection. The river crossing can be seen in **Figure 23**.

Alternative EF1: This alternative uses the Alternative EBE river crossing with the western terminus lining up with Gordon Avenue. Alternative EF1 includes dual roundabouts on North B Street and an at-grade T-type intersection at US 127 on the west side of the river. With the at-grade T-type intersection and using

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US 127 to travel south to the F1 alignment intersection at Vine Street, the railroad crossing would be shifted, eliminating the need to raise the US 127 profile. The river crossing can be seen in **Figure 29**. (Note: Since the development of this alternative, the river crossing has been realigned as discussed in Section 7.0 of this report). This alternative would alter the levy, requiring a USACE Section 408 permit.



Figure 29: Western Terminus of Alternative EF1 and Skewed Intersection Created at US 127

4.4 MAINTENANCE OF TRAFFIC (MOT)

No Build Alternative: There would be no impacts to traffic patterns under the No Build Alternative.

Build Alternatives: Maintenance of Traffic (MOT) plans would be developed as part of the next engineering phase of this project. At this level of engineering, several construction issues have been identified for the build alternatives that would require detours. These are described below:

Roundabout at Elkton and NW Washington Blvd: Alternatives A, AC, AD, AE, ABE and AF1 include a roundabout at W Elkton Road and NW Washington Blvd. which would require temporary closures of the North B Street and W Elkton Road intersection and a detour during construction of the roundabout.

Raising of North B Street: Due to the proximity of the levy along North B Street and the need to maintain the levy system, Alternatives C, D, E, E1, F, G, EBE, and EF1 would require a minimal raising of the North B Street profile (less than two feet) and Alternatives B, BC, BD, and BE would require raising the North B Street profile approximately five feet to maintain the elevation of the levy. The lack of space on either side of North B Street and the bridge over Two Mile Creek make a traffic shift impracticable. Therefore, a temporary closure and detour of North B Street would be required during the reconstruction of the North B

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Street intersection to accommodate the new alignment. Since there are no river crossings in the area, this detour would be lengthy and complex.

Raising of US 127: Under Alternatives C, B, E1, AB, AC, ABE, and EBE, US 127 would need to be raised to construct the new intersection with the proposed roadway. While Alternatives B, C, AB and AC require US 127 to be raised 10-13 feet, Alternatives E1, ABE, and EBE require the roadway to be raised only one to two feet, which would be less complex construction. The proximity of the US 127 bridge over the Hamilton Hydraulic Canal to the intersections makes lane shifts an impracticable method to maintain traffic, leaving a temporary closure and a detour of US 127 the only feasible way to maintain traffic. Since there are no river crossings in this area, the detour to upgrade the intersections to tie in the proposed alignments would be lengthy and complex.

Closure of Neal Blvd. at Joe Nuxhall Blvd.: In Alternative A, Neal Boulevard's profile at the intersection of Joe Nuxhall Boulevard would need to be raised to provide the necessary clearance for the bridge crossing of the Hydraulic Canal over the Great Miami River Recreational Trail (GMRRT). Due to the residences and Greenwood Cemetery in this area, a temporary diversion would not be possible, requiring a temporary closure and detour during the intersection construction.

Raising of Heaton Street from N. 8th Street to N. 11th Street: In a section of the AF1 and EF1 alignments, the profile of Heaton Street would need to be raised one to three feet to reduce property impacts on this street. Due to the structures along Heaton Street, it would not be possible to utilize a temporary diversion to maintain traffic during the intersection construction, therefore, a temporary closure and detour of Heaton Street would be required.

4.5 RIGHT-OF-WAY REQUIREMENTS

Each of the build alternatives share similar features, including four roadway lanes (two in each direction), a center turn lane where needed, and bridge crossings at the Great Miami River and the CSX railroad, with some also having a bridge crossing of the hydraulic canal. In addition, each alternative is designed for a speed of 35 miles per hour (mph). Each of the build alternatives includes a paved shared-use path along one side of the new roadway alignment which varies in width between eight and twelve feet depending on the constraints of the corridor. The other side of the roadway will have a five-foot wide sidewalk, bringing the total width of the proposed roadway with the sidewalk and shared-use path to 75 ft or 86 ft in areas with a center turn lane. Due to the urban nature of the project area and existing constraints within North Hamilton including the Great Miami River, the CSX railroad, existing neighborhoods, and other features, each of the build alternatives would impact commercial, residential, and agricultural properties between North B Street and SR 129. These impacts have been estimated based on the extent of the engineering completed for the conceptual alternatives. As the design of the build alternatives is refined through project development, relocations, and right-of-way impacts will be determined with a greater level of accuracy.

No Build Alternative: There would be no residential or commercial relocations or required right-of-way under the No Build Alternative.

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Build Alternatives: Table 10 on the following page identifies the required residential and commercial relocations for each build alternative, as well as the total acreage of land required. Residential relocations include houses and individual apartments. The alternatives with the least number of relocations are A, AD, and B with 41, 46, and 48, respectively. The alternatives with the greatest number of relocations include E1, EBE, and ABE with 94, 93, and 92 relocations, respectively. The right-of-way requirements of the alternatives vary from 5 to 15 acres for Alternatives G and AD to a high of 85 to 95 acres for Alternative A, of which 45 to 55 acres is undeveloped land that is part of the Bonham Family Farm.

4.6 UTILITY ISSUES

Utilities which occur within the NHX study area include electric transmission lines, the Hydraulic Canal and associated Hydroelectric Power Plant, the Power Plant on US 127, and the CSX railroad. Potential impacts of the alternatives on these features are described below:

No Build Alternative: There would be no impacts to utilities with the No Build Alternative.



Figure 30: Impacts to Electric Transmission Lines by Alternatives A, AC, AD, AE, ABE and AF1



Figure 31: Impacts to Electric Transmission Lines from Alternatives A, B, C and D

Alternative A: This alternative requires the relocation of electric transmission lines near the NW Washington and W. Elkton Rd. intersection due to construction and earthwork activities for the roundabout shown in Figure 30. In addition, this alignment crosses the Hydraulic Canal which will require revisions to the Federal Energy Regulatory Commission (FERC) permit. There would also be impacts to existing power poles at the intersection of SR 4, as shown on Figure 31.

Alternative B: This alternative follows the alignment of Alternative A through the intersection of SR 4 and requires the same relocations of the electric transmission lines in that area. These impacts are shown on Figure 31. In addition, this alignment crosses the Hydraulic Canal which will require revisions to the Federal Energy Regulatory Commission (FERC) permit.

Alternative C: This alignment also follows the Alternative A alignment through the intersection of SR 4 and would require the relocation of the electric transmission lines shown in Figure 31.

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Table 10. Anticipated Relocations and Right-of-Way																			
Alternatives	No Build	A	B	C	D	E	E1	F	G	AC	AD	AE	BC	BD	BE	ABE	EBE	AF1	EF1
Residential ¹ Relocations	0	38	45	50	44	86	90	65	55	45	42	83	48	45	87	90	91	76	76
Commercial Relocations	0	3	3	3	5	3	4	17	8	3	4	3	3	4	3	2	2	6	7
Total Relocations	0	41	48	53	49	89	94	82	63	48	46	86	51	49	90	92	93	82	83
Right of Way (acres)	0	85-95	50-60	25-35	10-20	25-35	20-30	25-35	5-15	25-35	5-15	25-35	20-30	10-20	20-30	50-60	45-55	25-35	20-30

¹Residential impacts include individual houses and apartments, where apartment buildings are impacted.

Red: Significant impacts expected to property; Yellow: Minimal impacts expected to property; Green: No impacts expected to property

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Figure 32: Proximity of Alternative C to Power Plant Property

Alternative C would also impact the operations of the power plant property since it would pass through the coal storage and processing area on the south side of the plant. This impact can be seen in **Figure 32**.



Figure 33: Alternative D Impacts to Electric Transmission Power Lines and Power Plant

Alternative D: Alternative D impacts the coal storage and processing area of the power plant located on US 127 with a slightly different alignment. This new alignment also impacts electric transmission lines south of the power plant as it passes over the rail lines as shown on **Figure 33**.

This alignment also follows the Alternative A alignment through the intersection of SR 4 and will require the relocation of the electric transmission lines in this area discussed in the section above Alternative A.

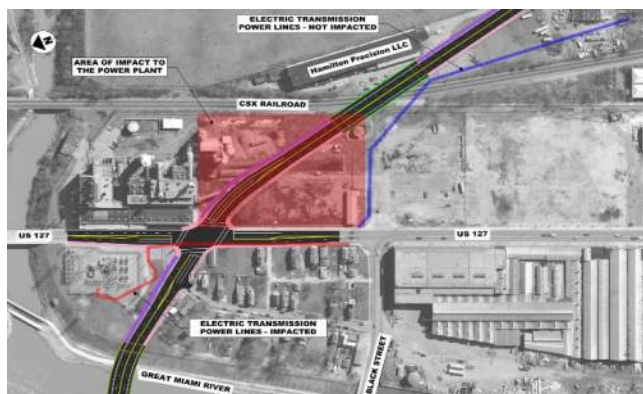


Figure 34: Alternative E in Vicinity of Power Plant and Electric Transmission Power Lines

Alternative E: Alternative E follows a similar path to Alternative D through power plant property located on US 127 and over the railroad. However, the variation in the Alternative E alignment would allow it to miss the electric transmission lines south of the power plant impacted in Alternative D shown as a blue line in **Figure 34**. However, this alternative would impact the coal storage and processing area, as well as the transmission lines on the west side of US 127 that originate from the substation located across the street from the power plant. These impacts can be seen in **Figure 34**.

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Figure 35: Alternative E1 Impacts to Power Plant and Electric Power Lines

Alternative E1: Like Alternative E, the major utility impacts in Alternative E1 occur in the area west of the power plant. This new alignment pushes the intersection of US 127 slightly further north, having a greater impact on the power plant and requiring demolition of the actual power plant building in addition to the coal storage and processing areas detailing in the earlier alternatives. This alignment would also impact the same electric transmission lines on the west side of US 127 as detailed in Alternative E. The details of these impacts can be viewed in **Figure 35**.

Alternative F: Unlike most of the alternatives, Alternative F goes under the railroad tracks, which will require excavation in areas where overhead and underground utilities are located. These utilities include electric transmission and distribution lines, water lines and sanitary sewer lines that will require relocations. In addition, the alignment that this alternative takes around the Sojourner Recovery Services building will require relocation of transmission and distribution lines at the back corner of the Butler County Fairgrounds property, **see Figure 36**.



Figure 36: Impact to Electric Transmission Lines Behind Butler County Fairgrounds in Alternative F

Alternative G: Like Alternative F, Alternative G would also go underneath the railroad tracks and would require excavation in areas with electric transmission and distribution lines, water lines and sewer lines that

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would require utility relocations. In addition, Substation 9 is located adjacent to the railroad tracks right next where the underpass will be located, which will impact the existing footprint of the substation, **see Figure 37.**

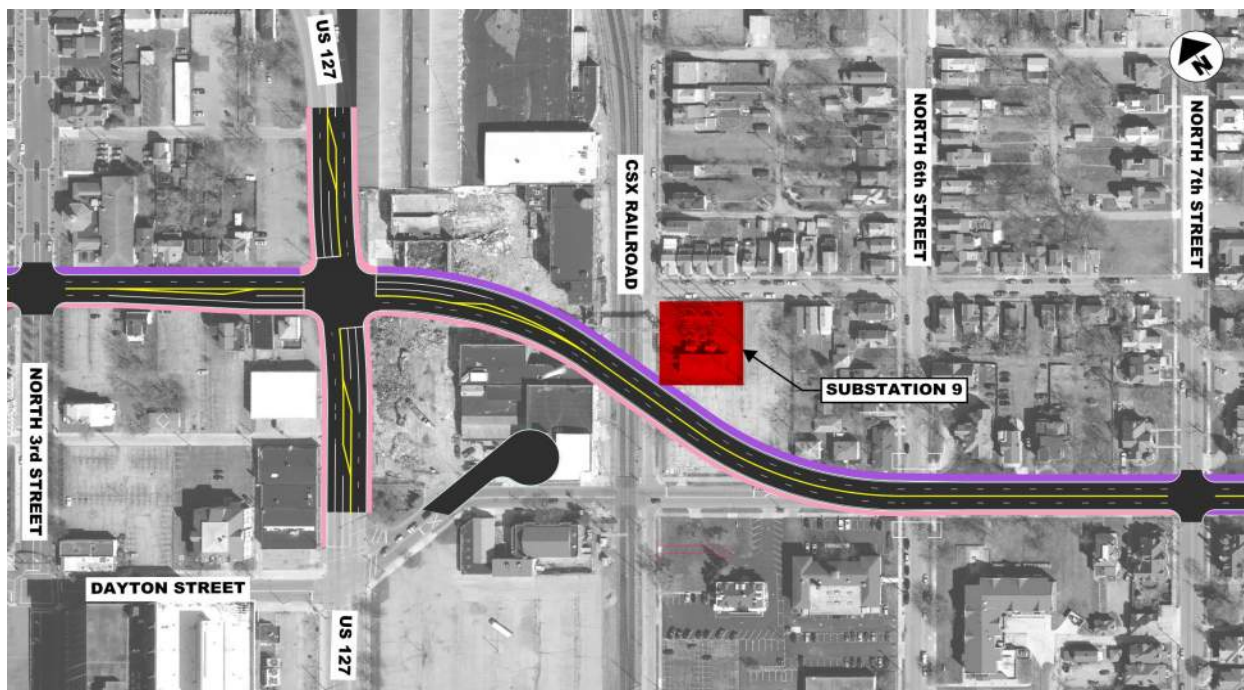


Figure 37: Impact to Substation 9 in Alternative G

Alternatives AC, AD and AE: These alternatives would follow the alignment of Alternative A from the western terminus at the intersection of NW Washington Boulevard and W Elkton Road to the intersection of US 127. At US 127, each alternative combines with Alternatives C, D, and E and follows these alignments to the eastern terminus at the intersection of Hampshire Drive and SR 129. Each of these alternatives would require the relocation of the electric transmission lines near the NW Washington Boulevard and W Elkton Road intersection. The impacts are detailed in the Alternative A utility impact section above.

Alternative AC: In addition to the relocation of the electric transmission lines at NW Washington Boulevard and W Elkton Road, this alternative has the same impacts as Alternative C which include the impacts to the power plant and the relocation of electric transmission lines at the intersection of SR 4. See the section for Alternative C for more details.

Alternative AD: In addition to the relocation of the electric transmission lines at NW Washington Boulevard and W Elkton Road, this alternative would have the same impacts as Alternative D which include the impacts to the power plant, the relocation of electric transmission lines impacted by the railroad overpass and the relocation of electric transmission lines at the intersection of SR 4. See the section for Alternative D for more details.

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Alternative AE: In addition to the relocation of the electric transmission lines at NW Washington Boulevard and W Elkton Road, this alternative would have the same impacts as Alternative E including impacts to the power plant and the relocation of electric transmission on the west side of US 127. See the section for Alternative E for more details.

Alternatives BC, BD and BE: These alternatives follow the alignment of Alternative B from the western terminus at the intersection of North B Street and Lagonda Avenue to the intersection of US 127 at which point they follow alignments C, D, or E from US 127 to the eastern terminus at Hampshire Drive and SR 129.

Alternative BC: This alternative would have the same impacts as Alternative C in the areas surrounding the power plant and the intersection of this alignment and SR 4. These include the impacts to the power plant and the relocation of electric transmission lines at the intersection of SR 4. See the section for Alternative C for more details.

Alternative BD: This alternative would have the same impacts as Alternative D in the areas surrounding the power plant and the intersection of this alignment and SR 4. These include the impacts to the power plant, the relocation of electric transmission lines impacted by the railroad overpass and the relocation of electric transmission lines at the intersection of SR 4. See the section for Alternative D for more details.

Alternative BE: This alternative would have the same impacts as Alternative E in the areas surrounding the power plant and near the intersection of SR 4. These include impacts to the power plant and the relocation of electric transmission on the west side of US 127. See the section for Alternative E for more details.



Figure 38: Location of the Electric Substation in the Vicinity of Alternative ABE

Alternative ABE: This alternative would follow the Alternative A alignment from the western terminus at the intersection of NW Washington Boulevard and W Elkton Road to the intersection of US 127. Like Alternative A, this alternative would also require relocation of electric transmission lines due to the construction of the roundabout at the western terminus. The alignment proceeds south on US 127 to a new intersection where it then follows the Alternative B alignment across the Hamilton Hydraulic Canal to the intersection of Joe Nuxhall Boulevard. At this point, the alternative follows Alignment

E. An electric substation is in the area of the new intersection with US 127 and could potentially be impacted by the new alignment. The location of the substation and the proposed alignment is shown on **Figure 38**. Since the alignment crosses over the Hydraulic Canal, an update of the canal's FERC permit would be required.

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The Alternative ABE alignment would follow the Alternative E or E1 alignment from the intersection of Joe Nuxhall Boulevard to the eastern terminus at the intersection of Hampshire Drive and SR 129. There are no known major utility impacts on this stretch of the alignment.



Alternative EBE: The EBE alternative uses a skewed version of the river crossing in Alternative E that would connect to North B Street at Gordon Avenue on the west side of the river and create a new intersection at the intersection of US 127 and the Alternative B alignment. (Note: Since the development of this alternative, the river crossing has been realigned as discussed in Section 7.0 of this report) This new river crossing impacts electric transmission lines that run along North B Street on the west side of the river and would require relocation. See **Figure 39** for the location of the transmission lines.

Figure 39: Location of Electric Transmission Power Lines in Vicinity of Alternative EBE

Alternative EBE would follow the same alignment as Alternative ABE from the intersection of US 127 to the eastern terminus

at the intersection of Hampshire Drive and SR 129. Like Alternative ABE, this alternative will impact the substation at the intersection of US 127 and require an update to the FERC permit since it will cross the Hamilton Hydraulic Canal.

Alternative AF1: The AF1 alternative uses the Alternative A river crossing for the western terminus from the intersection of NW Washington Boulevard and W Elkton Road to the intersection of US 127. This alternative will require the relocation of the electric transmission lines near the NW Washington Boulevard and W Elkton Road intersection. These impacts are detailed in **Figure 30** and in the Alternative A utility impact section above.

Alternative EF1: The EF1 alternative uses the EBE river crossing for the western terminus from the dual roundabouts at Gordon Avenue and the relocated Rhea Avenue on North B Street to the intersection of US 127. This alternative will require relocations of the electric transmission lines along North B Street, which are detailed in **Figure 36** and in the Alternative EBE utility impact section.

4.7 ENVIRONMENTAL ANALYSIS

The following is a summary of environmental resources within the project area and anticipated involvement with those resources under the No Build and build alternatives. Estimations of environmental impacts are very preliminary and will be refined throughout the project development process as further engineering detail is developed for the alternatives which are advanced. As part of the development of the alternatives,

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factors such as avoidance, minimization, and mitigation of environmental impacts will be incorporated into the design process. The impacts identified at this time are the worst case for the alternatives and are meant to provide a comparison between alternatives and their relative impacts. Graphics and maps for all Environmental Analysis factors can be found in **Attachment C**. **Attachment D** shows the environmental features in proximity to the individual build alternatives.

Streams, Wetlands, and Open Water: Based on the National Hydrography Dataset (NHD), there are four sections of perennial stream within the NHX project study area (See **Attachment C-1**). The NHX project is located primarily to the east of the Great Miami River (GMR), with the western end of the project crossing the river. A section of the Old Ford Canal (hydraulic canal), which diverges from the GMR further upstream of the project, empties back into the GMR in the NHX project area. Additionally, a short section of Two-Mile Creek can be found in the project area where it enters the GMR. There is also one unnamed stream found within the project study area to the east of Campbell Drive. Two-Mile Creek and the section of the GMR within the project area have been designated by the Ohio Environmental Protection Agency (OEPA) as warmwater habitats (WWH). Approximately 18,027 linear feet (lf) of stream is found within the project study area, 9,015 lf of which is the GMR. Based on National Wetland Inventory mapping, a total of eight wetlands are found within the project study area, not including riverine wetlands. These include three palustrine emergent wetlands (one PEM1A and two PEM1C), one palustrine forested wetland (PFO1C), and four ponds (two PUBGx, one PUBG, and one PUBGh) (See **Attachment C-1**). Approximately 25.36 ac of wetland and open water features are found within the project study area, 21.88 ac of which is emergent wetland, 0.89 ac of which is forested wetland, and 2.59 ac of which is ponds. The potential impacts are described below:

No Build Alternative: There would be no impacts to streams, wetlands, and open water features under the No Build Alternative.

Build Alternatives: All eighteen of the build alternatives are expected to impact the GMR since each alternative includes a new bridge being constructed over the river. Alternatives A, B, ABE, and EBE are expected to impact the Old Ford Canal (hydraulic canal), which these alternatives would cross. Alternatives B, C, D, AC, AD, BC, and BD could also affect the Old Ford Canal as these designs require widening along existing Joe Nuxhall Boulevard which runs adjacent to the canal. In addition, Alternatives A, B, ABE, and EBE are expected to impact an emergent wetland (PEM1A). Each of the build alternatives except G would impact one pond.

Floodplain: The project occurs in both the 100-year and 500-year floodplains of the GMR (**Attachment C-2**). Anticipated floodplain impacts for each Build Alternative are described below:

No Build Alternative: There would be no impacts to floodplains under the No Build Alternative.

Build Alternatives: Of the eighteen build alternatives, four are expected to significantly impact the 100-Year floodplain of the GMR. These include Alternatives A, ABE, EBE, and B. Each of these alternatives cross the 100-year floodplain and would require a significant amount of fill to elevate the roadway within the limits of the floodplain. Alternative A, which bifurcates the floodplain on Bonham Farm, is expected to impact 50-60 acres of floodplain. Alternatives ABE and EBE would each impact approximately 20-30 acres of floodplain, and Alternative B would impact 10-20 acres

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of floodplain. Alternatives AC, AD, AE, and AF1 would each impact approximately four acres of floodplain. Each of the other thirteen build alternatives are expected to impact the 100-year floodplain by less than one acre. Because floodplain impacts are anticipated to be a significant impact of this project, potential minimization and mitigation of these impacts will be considered throughout project development. Potential measures to mitigate floodplain impacts are discussed briefly below.

Mitigation of Floodplain Impacts:

In accordance with Butler County's "Special Purpose Flood Plan Damage Prevention Regulations," impacts to the floodplain would be minimized by using compensatory flood storage, which involves developing an artificially excavated, hydraulically equivalent volume of floodplain storage sufficient to offset a reduction in floodplain storage resulting from new embankment fills within the special flood hazard area. This floodplain storage compensation would be within the same watershed. This floodplain storage area could also be developed as a wetlands area to mitigate any wetlands impacted by the project and to enhance the natural area in close proximity to the project area.

Other engineering methods to minimize floodplain impacts have been considered in the development of the preliminary alternatives. For example, Alternative A, which has the greatest impact to the floodplain, includes a precast arch culvert installed in the embankment, which would allow flow of floodwaters between the portions of the floodplain on either side of the embankment, along with providing farm equipment access between fields.

Regulatory Considerations

Each of the alternatives include proposed bridge crossings of the Great Miami River with piers located in river, which is part of the Federal Emergency Management Agency (FEMA) designated floodway. Therefore, further each alternative would require compliance with Executive Order 11988 requirements to address floodplain impacts. In addition, further coordination with FEMA would be required to update the National Flood Insurance Program (NFIP) mapping via a Conditional Letter of Map Revision (CLOMR) and a Letter of Map Revision (LOMR) submission, as needed.

Threatened and Endangered Species: The project is located within Butler County, Ohio, which is within the known habitat ranges of the Indiana bat and northern long-eared bat, bald eagle, Eastern massasauga, and rayed bean mussel. In addition, Butler County has historically been within the known ranges of 18 additional state endangered or threatened species, 13 of which are wildlife and 5 of which are plant species. Information regarding state and federal listed known to occur within Butler County is provided in **Attachment C**. At this level of project development, a conclusion cannot be reached regarding the potential impacts of the project alternatives on threatened and endangered species. Further ecological studies and agency coordination would be undertaken during the next phase of the project to determine if there would be any impacts to habitat of federal and state listed species known to occur within Butler County.

Cultural Resources: The NHX project area contains several historic districts on the National Register of Historic Places (NRHP), including the German Village, Hamilton Downtown, and Dayton-Campbell Historic Districts. In addition, the project area includes a section of Greenwood Cemetery which is on the NRHP

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(see **Attachment C-3**). Other notable cultural resources found in the project study area include remnants of the Miami and Erie Canal, which occur in the northern section of the study area, as well as several archaeological sites on the Ohio Archaeological Inventory (OAI) including a Ft. Ancient Village site, a former mound, and remnants of Ft. Hamilton archaeological site. The Black Street Bridge is considered a Historic Bridge and is eligible for the NRHP. In addition to these resources, the project area contains over 200 historic structures identified on the Ohio Historic Inventory (OHI) but not on the NRHP (many of which are included in one of the NRHP historic districts). Further cultural resource investigations would be required to determine the eligibility of these resources for listing on the NRHP and to identify any other properties eligible for the NRHP. In addition to the known resources, the project area contains a significant floodplain area in the northern section of the project area, which has a high potential for archaeological resources. The expected impacts by each Build Alternative to cultural resources are shown in **Table 11**.

No Build Alternative: There would be no impacts to cultural resources under the No Build Alternative.

Build Alternatives: All build alternatives except G are expected to result in impacts to the section of Greenwood Cemetery which is an NHRP site. However, these impacts would be minor and would likely not result in any graves being displaced. Alternatives F and G are expected to have a significant impact on both the German Village and Dayton-Campbell Historic Districts, two NRHP-listed districts. There are also individual historic resources throughout the project area which are identified on the OHI but would require further cultural investigations to determine their eligibility for the NRHP. As shown in **Table 11**, Alternatives F and G impact the greatest number of OHI sites of the build alternatives, impacting nine and eight sites, respectively. Each of the other build alternatives impact less than 4 OHI sites and Build Alternatives A, B, ABE, and EBE do not impact any OHI sites.

Section 4(f)/6(f): Section 4(f) of the United States Department of Transportation (USDOT) Act protects publicly owned parks, recreation areas, wildlife and waterfowl refuges, and public or privately owned historic sites from adverse impacts resulting from the construction of transportation facilities funded by the USDOT. In addition to the cultural resources discussed above, which would be protected by Section 4(f), there are several parks and other recreational facilities within the NHX project area that are Section 4(f) resources. Public parks include LJ Smith Park, Combs Park, Marcum Park, Heaton Street Park, Rotary Park, Fordson Heights Playground, Howard F. "Hack" Wilson Park, Campbell Avenue Park, and Veteran's Park. Other recreational facilities include a section of the GMR Recreational Trail and the Beltline Trail. Both the Fairwood Elementary School and Garfield Middle School have recreational facilities onsite and may qualify as Section 4(f) properties. However, further coordination would be required with the Official with Jurisdiction (OWJ) for these schools to make this determination. This coordination would be undertaken in the next phase of the study if either school is impacted by the project alternatives advanced for further study. The Section 4(f) park and recreation resources within the project area are shown on mapping included as **Attachment C-4**. The expected impacts by each Build Alternative to the recreational Section 4(f) properties are shown in **Table 12**.

No Build Alternative: There would be no impacts to Section 4(f) properties under the No Build Alternative.

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Table 11. Impacts to Cultural Resources by Alternative

Cultural Resources	No Build Alternative	A	B	C	D	E	E1	F	G	AC	AD	AE	BC	BD	BE	ABE	EBE	AF1	EF1
Ohio Historic Inventory Sites	0	0	0	1	1	2	1	9	8	1	1	3	1	1	3	0	0	4	4
Historic Greenwood Cemetery (acres)	0 ac	0.87 ac	0.90 ac	0.90 ac	0.91 ac	0.04 ac	0.01 ac	0.04 ac	0 ac	0.90 ac	0.90 ac	0.04 ac	0.90 ac	0.91 ac	0.04 ac	0.01 ac	0.01 ac	0.04 ac	0.04 ac
NRHP Historic Districts (HD) and Properties (acres)	0 ac	0 ac	0 ac	0 ac	0 ac	0 ac	0 ac	2.8 ac to German Village HD	2.7 ac to German Village HD/ 4.04 ac to Dayton-Lane HD	0 ac	0 ac	0 ac	0 ac	0 ac	0 ac	0 ac	0 ac	Possible impact to German Village HD	Possible impact to German Village HD

Red: Significant impacts expected to property; Yellow: Minimal impacts expected to property; Green: No impacts expected to property

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Table 12. Impacts to Section 4(f)/6(f) Properties By Alternative																		
Facility Name	A	B	C	D	E	E1	F	G	AC	AD	AE	BC	BD	BE	ABE	EBE	AF1	EF1
L.J. Smith Park	Green	Red	Red	Yellow	Yellow	Red	Green	Green	Red	Yellow	Yellow	Red	Yellow	Yellow	Red	Red	Green	Green
Combs Park	Red	Red	Green	Green	Green	Green	Green	Green	Red	Red	Red	Red	Red	Red	Red	Green	Red	Green
Marcum Park	Green	Green	Green	Green	Green	Green	Green	Yellow	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Heaton Street Park	Green	Green	Green	Green	Green	Green	Yellow	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Rotary Park	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Fordson Heights Playground	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Howard F. Wilson Park	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Campbell Ave. Park	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Veteran's Park	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Great Miami River Recreational Trail	Red	Red	Red	Red	Red	Red	Red	Red	Green	Green	Green	Green	Green	Green	Red	Red	Red	Red
Beltline Trail	Green	Green	Red	Red	Red	Red	Red	Red	Green	Green	Green	Green	Green	Green	Green	Red	Green	Red
Fairwood Elementary School	Green	Green	Green	Green	Yellow	Yellow	Yellow	Yellow	Green	Green	Yellow	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow
Garfield Middle School	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green

Red: Significant impacts expected to property; Yellow: Minimal impacts expected to property; Green: No impacts expected to property

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Build Alternatives: Alternatives A, B, AC, AD, AE, BC, BD, BE, ABE, and AF1 are expected to bisect Combs Park, while Alternatives B, C, E1, AC, BC, ABE, and EBE are expected to bisect LJ Smith Park. Alternatives D, E, AD, AE, BD, and BE would require minor sliver takes from LJ Smith Park and Alternatives F and G would have minor impacts to Heaton Street Park and Marcum Park respectively. Alternatives C, D, E, F, G, E1, EBE, and EF1 would each cross the Beltline Trail and Alternatives A, B, C, D, E, F, G, E1, ABE, EBE, AF1, and EF1 would each cross the GMR Recreational Trail. Alternatives E, F, G, E1, F1, AE, BE, ABE, EBE, AF1, and EF1 would each impact Fairwood Elementary School in proximity to the school's ballfields. As noted earlier, further coordination would be required with the OWJs for Fairwood Elementary School and Garfield Middle School to determine if the school's recreational facilities meet the criteria for Section 4(f) protection.

Section 6(f): Based on a review the National Park Service's listing of properties that have received Land and Water Conservation Fund (LWCF) grants in Butler County and would be protected by Section 6(f) of the LWCF Act of 1965, there are no Section 6(f) properties within the study area. The list of LWCF grants in Butler County is provided in **Attachment C**.

Air Quality: Each of the build alternatives is expected to have similar impacts to air quality. The NHX project is in an area that is currently in attainment for all criteria air pollutants under the National Ambient Air Quality Standards (NAAQS). This project adds capacity but would have an average daily traffic (ADT) of less than 140,000 so would require a qualitative Mobile Source Air Toxics (MSAT) analysis. The project would also require an Emission's Burden Study since it moves traffic closer to schools and other sensitive receptors. The project is in Butler County, which is an ozone marginal nonattainment area, but the project is identified on OKI's FY 2021-2024 Transportation Improvement Program dated April 9, 2020, as well as on the ODOT's FY 2021-2024 Statewide Transportation Improvement Program (STIP) dated October 26, 2022, indicating that the project is included in the latest regional conformity analysis. Butler County is not a PM_{2.5} non-attainment area; therefore, a PM 2.5 analysis is not required. The State of Ohio is in attainment for Carbon Monoxide (CO) at this time and no coordination or analysis is required.

Noise Levels: The NHX project meets the description of a Type I project (Federal-aid highway project for construction of a new highway). The project area is primarily a mix of dense urban and suburban land use, with some agricultural land to the north, and noise sensitive areas (NSA), including residences, churches, and parks, are found within 500 feet of the project. As a result, a noise analysis would be required for all 18 of the Build Alternatives. There would be no noise impacts under the No Build Alternative.

Drinking Water Resources: The project is partially located within the boundaries of the designated Greater Miami sole source aquifer (See **Attachment C-5**). In addition, 129 ODNR water wells are found within the project area. Under each of the build alternatives, plan notes to protect groundwater resources would be included in the project plans. There would be no impact to Drinking Water Resources under the No Build Alternative.

Farmland: The NHX project area includes one active farm, the Bonham Family Farm, which is located at the northern end of the project area. Due to the inclusion of this farm in the study area and potential impacts to it, coordination with the Natural Resources Conservation Service (NRCS) would be required under the Farmland Protection Policy Act (See **Attachment C-6**).

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No Build Alternative: There would be no impacts to farmland under the No Build Alternative.

Build Alternatives: Only four of the build alternatives would affect the Bonham Family Farm. Of these four, Alternative B would have the least impact with only 10-20 acres being taken from the farm. Alternatives ABE and EBE would each impact between 20 and 30 acres of the farm. Alternative A would have the greatest impact to the Bonham Family Farm, with between 45 and 55 acres impacted.

Regulated Materials: The project area includes a total of 148 regulated material sites listed on the database of properties with regulated materials concerns accessed through ODOT's Ohio Regulated Properties Search (ORPS) Tool (See **Attachment C-7**). These sites were divided into several groups including: leaking underground storage tanks (LUST; 43 features), underground storage tanks (UST; 46 features), coal gas generators (one feature; Hamilton Gas Light & Coke Company), Division of Environmental Response & Revitalization (DERR; four features), Superfund Non-NPL (one feature; Clever Cleaners Site), Resource Conservation and Recovery Act (RCRA; 36 features), sites with institutional controls (three features), solid waste transfer facilities (one feature), spills (six features), and Voluntary Action Program sites (VAP; six features).

In addition, the Chem-Dyne site a Superfund site included on the National Priorities List (NPL) is located to the north of Joe Nuxhall Blvd. and adjacent to L.J. Smith Park. In 1985, a Record of Decision (ROD) was signed which required the remediation of the site. Also in 1985, a consent decree was entered into by USEPA, the State of Ohio, and approximately 174 potentially responsible parties to operate the site and maintain the remedial action systems. The Chem-Dyne Trust was established and continues to operate the site and maintain the remedial action systems. The Chem-Dyne site was purchased by the City of Hamilton in 2023. The potential regulated materials impacts are described below:

No Build Alternative: There would be no impacts to regulated material sites under the No Build Alternative.

Build Alternatives: All alternatives are expected to impact known regulated material sites. Alternative F would impact the least number of regulated material sites, with impacts to nine sites. Alternatives E, E1, F, G, ABE, EBE, AF1, and EF1 would impact between 9 and 20 regulatory materials sites and Alternatives A, B, C, D, AC, AD, AE, BC, BD, and BE would impact between 20 and 40 sites. Alternatives D, E, AD, AE, BD, and BE would require strip takes along the southern edge of the Chem-Dyne Superfund site and Alternatives B, C, E1, AC, and BC would go directly through the Chem-Dyne Superfund site. Further regulated materials assessments will be undertaken during the next phase of the project to determine the project impacts to regulated materials sites. Any impacts to the Chem-Dyne Superfund site would need to comply with the Environmental Covenant in place as part of the Consent Decree.

Neighborhoods: The proposed study area includes several neighborhoods, which are identified on **Attachment C-8**. Impacts to these neighborhoods are described below:

No Build Alternative: There would be no impacts to neighborhoods within the City of Hamilton under the No Build Alternative.

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Build Alternatives: Table 13 identifies the neighborhoods impacted by each build alternative. All build alternatives go through the North End and Prospect Hill neighborhoods and all build alternatives except Alternative G go through the East End neighborhood. Alternatives E, E1, F, G, AE, BE, ABE, EBE, AF1, and EF1 travel through the Dayton Lane neighborhood and Build Alternatives A, AC, AD, AE, ABE, and AF1 impact the Washington neighborhood. Only Alternatives F and G impact German Village.

Table 13. Impacts to Neighborhoods by Alternative						
Build Alternatives	Neighborhoods					
	East End	North End	Dayton Lane	German Village	Prospect Hill	Washington
A	X	X			X	X
B	X	X			X	
C	X	X			X	
D	X	X			X	
E	X	X	X		X	
E1	X	X	X		X	
F	X	X	X	X	X	
G		X	X	X	X	
AC	X	X			X	X
AD	X	X			X	X
AE	X	X	X		X	X
BC	X	X			X	
BD	X	X			X	
BE	X	X	X		X	
ABE	X	X	X		X	X
EBE	X	X	X		X	
AF1	X	X	X		X	X
EF1	X	X	X		X	

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Environmental Justice (EJ) Populations: Ohio Department of Transportation TIMS Mapping data was used to identify EJ populations in the project area as shown in **Table 14. Attachment C-9** identifies the location of the census block groups in the NHX project area. Detailed mapping of EJ populations in the project area are provided in **Attachment C (Attachments C-9.1 – C-9.2)**. Each of the identified census block groups within the project area have EJ populations that may be impacted by the preliminary build alternatives. **Table 15** shows which block groups are expected to have residential relocations.

Table 14. EJ Populations by Block Group			
Census Block Group	Neighborhood	Low Income %	Minority %
390170004001 (4.1)	<i>Jefferson</i>	93.93	8.52
390170005001 (5.1)	<i>East End</i>	30.35	18.18
390170005002 (5.2)	<i>East End</i>	52.83	14.03
390170010011 (10.11)	<i>Washington</i>	26.28	14.71
390170010013 (10.13)	<i>Prospect Hill</i>	25.87	1.03
390170011002 (11.2)	<i>Rossville</i>	73.21	12.27
390170146001 (146.1)	<i>North End</i>	79.18	22.03
390170146002 (146.2)	<i>German Village</i>	61.14	21.80
390170006001 (6.1)	<i>North End</i>	21.47	9.30
390170006002 (6.2)	<i>North End</i>	60.43	14.99
390170006003 (6.3)	<i>North End</i>	77.41	27.70
390170006004 (6.4)	<i>North End</i>	53.91	35.47
390170006005 (6.5)	<i>Dayton Lane</i>	55.16	32.74
390170006006 (6.6)	<i>Dayton Lane</i>	76.47	21.71
390170147001 (147.1)	<i>Prospect Hill</i>	49.64	31.36
390170147002 (147.2)	<i>Prospect Hill</i>	44.60	17.84
390170147003 (147.3)	<i>Prospect Hill</i>	30.95	15.05
390170105001 (105.1)	<i>Prospect Hill</i>	37.09	6.16
390170110021 (110.21)	<i>North End</i>	16.74	26.71
390170110022 (110.22)	<i>Fairfield Twp.</i>	4.28	4.38
390170110043 (110.43)	<i>East End</i>	18.66	26.28

Source: Demographic data provided through ODOT's TIMS Mapping

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Table 15. Residential Relocations by Alternative																		
Census Block Group	A	B	C	D	E	E1	F	G	AC	AD	AE	BC	BD	BE	ABE	EBE	AF1	EF1
390170004001 (4.1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
390170005001 (5.1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
390170005002 (5.2)	32	32	32	32	32	32	0	0	32	32	32	32	32	32	32	32	32	32
390170010011 (10.11)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
390170010013 (10.13)	0	6	0	1	0	0	0	0	0	0	0	3	3	3	0	0	0	0
390170011002 (11.2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
390170146001 (146.1)	0	0	9	2	2	1	15		6	2	2	5	2	4	0	0	4	4
390170146002 (146.2)	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0
390170006001 (6.1)	6	6	8	7	0	0	0	0	7	8	0	8	8	0	0	0	0	0
390170006002 (6.2)	0	1	1	1	0	4	0	0	0	0	0	0	0	0	4	4	0	0
390170006003 (6.3)	0	0	0	0	31	24	32	0	0	0	28	0	0	27	25	25	19	19
390170006004 (6.4)	0	0	0	0	15	14	10	20	0	0	15	0	0	15	15	15	15	15
390170006005 (6.5)	0	0	0	0	6	15	7	21	0	0	6	0	0	6	14	14	6	6
390170006006 (6.6)	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0
390170147001 (147.1)	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0
390170147002 (147.2)	0	0	0	1	0	0	0		0	0	0	0	0	0	0	1	0	0

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Table 15. Residential Relocations by Alternative																		
Census Block Group	A	B	C	D	E	E1	F	G	AC	AD	AE	BC	BD	BE	ABE	EBE	AF1	EF1
390170004001 (4.1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
390170147003 (147.3)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
390170105001 (105.1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
390170110021 (110.21)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
390170110022 (110.22)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
390170110043 (110.43)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	45	87	90	91	76	76	65	55	45	42	83	48	45	87	90	91	76	76

Red: >10 Anticipated Property Takes; Yellow: 1-10 Anticipated Property Takes; Green: No Anticipated Property Takes

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Impacts to EJ Populations for each alternative are as follows:

No Build Alternative: There would be no adverse impacts to EJ populations under the No Build Alternative. However, there would be no improvements in pedestrian and bicycle connectivity under the No Build Alternative which could provide needed travel options in low-income communities.

Build Alternatives: As shown in **Table 15**, Each of the build alternatives is expected to result in residential takes in census blocks with EJ populations. Neighborhoods with high levels of EJ populations which would have relocations under one or more build alternatives include the East End, North End, Dayton Lane, and Prospect Hill. Each of the build alternatives would improve pedestrian and bicycle access throughout the City of Hamilton which would benefit low-income communities.

The construction of the NHX project would be federally funded, therefore, the project would follow ODOT's policy and procedures for the relocation process, ODOT's procedures have integrated Federal and State laws so that displaced persons are treated fairly and consistently. As part of the Relocation Assistance Program, ODOT will assist persons and businesses that are displaced by the NHX project find comparable housing, and ensure that all replacement housing, moving, and other benefits are offered in compliance with established law, policy, and procedures.

Mitigation of Relocation Impacts

The City of Hamilton has been working with Neighborhood Housing Services of Hamilton, Inc. (NHS) to address relocation options for displacements of residents that may result from the NHX project. NHS is a private non-profit community development organization whose mission is stabilizing and revitalizing neighborhoods. NHS works closely with neighborhood residents, businesses, and city representatives to make homeownership accessible to low-and moderate-income families. NHS, in collaboration with the City of Hamilton, also runs an income-based rental program. Together, the City and NHS have identified several city-owned vacant lots within and adjacent to the North End neighborhood which may be candidates to build replacement housing for the North Hamilton Crossing project. (See **Attachment C-10**) NHS is proposing to build single family homes on these open lots which would be made available for displaced North End residents. In addition to new construction, the city is also exploring options for rehabilitation of existing vacant homes within the neighborhood. This would allow displaced residents to remain within their community. Additionally, the NHS Rental program may be utilized to assist relocation of residents who do not own a home or do not want to purchase a new home. Participants in this program must meet income requirements, pay utilities, and are subject to a background check. Multiple strategies are being considered to facilitate relocation of tenants, including monetary or time-based rent-relief programs.

Other Underserved Populations: **Table 16** identifies other underserved populations within the NHX project area, including those with limited English proficiency and older adults. (See **Attachments C-9.3** and **C-9.4**). As shown in **Table 16**, there are seven census blocks which include individuals with limited English proficiency. The areas with the highest percentages of non-English speaking residents include the communities of Downtown, North End, and Prospect Hill.

No Build Alternative: There would be no impacts to underserved populations under the No Build Alternative, However, without transportation improvements, there would be no improvements to pedestrian and bicycle facilities, which provide transportation options for these communities.

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Build Alternatives: Each of the build alternatives would travel through North End and Prospect Hill neighborhoods, which are shown to have with populations which have limited English proficiency. In addition, each build alternative would go through communities with older adults. By incorporating pedestrian and bicycle facilities, each build alternative will provide transportation options for these underserved populations.

Census Block Group	Neighborhood	Limited English Proficiency %	Older Adults (over Age 64) %
390170004001 (4.1)	Jefferson	0	14.59
390170005001 (5.1)	East End	0.7	12.17
390170005002 (5.2)	East End	0	14.27
390170010011 (10.11)	Washington	0	21.02
390170010013 (10.13)	Prospect Hill	0	40.59
390170011002 (11.2)	Rossville	0	14.94
390170146001 (146.1)	North End	0	7.50
390170146002 (146.2)	German Village	9.25	14.6
390170006001 (6.1)	North End	0	15.02
390170006002 (6.2)	North End	0	6.80
390170006003 (6.3)	North End	0	1.96
390170006004 (6.4)	North End	8.66	11.51
390170006005 (6.5)	Dayton Lane	1.18	5.86
390170006006 (6.6)	Dayton Lane	0	14.25
390170147001 (147.1)	Prospect Hill	0	4.50
390170147002 (147.2)	Prospect Hill	6.29	5.48
390170147003 (147.3)	Prospect Hill	4.16	12.31
390170105001 (105.1)	Prospect Hill	0	10.67
390170110021 (110.21)	North End	0	15.34
390170110022 (110.22)	Fairfield Twp.	0	13.96
390170110043 (110.43)	East End	2.94	16.82

Commercial Relocations: Table 17 shows the expected commercial relocations by alternative based on the level of engineering completed to date. These impacts would be refined and minimized, where possible, throughout the development of the project.

No Build Alternative: There would be no impacts to commercial properties within the study area under the No Build Alternative, However, without transportation improvements, traffic congestion

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Table 17. Commercial Relocations by Alternative																			
Alternative	No Build	A	B	C	D	E	E1	F	G	AC	AD	AE	BC	BD	BE	ABE	EBE	AF1	EF1
Number of Anticipated Relocations	0	3	3	3	5	3	4	17	7	3	4	3	3	4	3	2	2	6	7

Red: More than 10 relocations expected; Yellow: 1-10 relocations expected; Green: No relocations expected.

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in the study area would continue to worsen, which would adversely impact access to these facilities.

Build Alternatives: Each of the build alternatives will impact commercial properties within the NHX project area. Alternative F would result in the greatest number of commercial relocations, impacting 17 businesses, most of which are along Heaton and Village Streets. Similarly, Alternatives AF1 and EF1 which also impact commercial areas along Heaton Street, impact a total of six and seven commercial takes, respectively. Alternative G, which travels along commercial areas on Dayton and Buckeye Streets, would impact seven commercial buildings. Alternatives ABE and EBE result in the least amount of commercial property takes, impacting only two commercial buildings each.

Community Impacts: This measure considers how the proposed alignments impact the normal functions of a community or neighborhood and the impacts of the project on community resources or assets. Community resources include public buildings that provide services to the community including places of worship, healthcare facilities, educational facilities, libraries, government facilities, senior centers, recreational facilities and bike trails, and community centers. Community assets include buildings that are used for the well-being of the community and include restaurants and grocery stores. In low-income communities where residents often walk to facilities and stores, these features are vital to the well-being of the residents and the routes of the preliminary build alternatives were developed to avoid impacts to these facilities where possible. **Attachment C-11** identifies the community facilities and assets within the study area.

No Build Alternative: There would be no impacts to community facilities or resources within the study area under the No Build Alternative, However, without transportation improvements, traffic congestion in the study area would continue to worsen, which would adversely impact access to these facilities.

Build Alternatives: As shown on **Table 18**, Alternative F would have the greatest impact on community facilities and assets, requiring the displacement of the Transitional Living Center located on Princeton Road and the Food Town Marketplace on Heaton Street. Both Alternatives D and EBE would displace the Riverview Food Mart on N B Street. Alternatives F, AF1, and EF1 would displace Minnick's Drive-Thru. All build alternatives would impact the Butler County Fairgrounds: Alternatives A, B, C, D, AC, AD, BC, and BD would require taking two barns located along the eastern side of the fairgrounds; and Alternatives E, E1, F, G, AE, BE, ABE, EBE, AF1, and EF1 would require minor sliver takes from the southern edge of the property. **Table 18** identifies the community impacts resulting from build alternatives.

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Table 18. Impacts to Community Features By Alternative

Community Feature	No Build Alternative	A	B	C	D	E	E1	F	G	AC	AD	AE	BC	BD	BE	ABE	EBE	AF1	EF1
Butler County Educational Service Center (Main Building)																			
Transitional Living Center																			
Fairwood Elementary School																			
BCESC Grant Early Learning Center																			
Butler County Engineer's Office																			
Butler County Fairgrounds																			
Hamilton City School District																			
Hamilton Fire Station 25																			
Garfield Middle School																			
Juvenile Justice Center																			
Butler County Board of Developmental Disabilities																			
Hamilton Lane Library																			
Butler Metro Housing																			
Butler County Children Services																			
Dayton Lane Community Christian Center																			
True Free Christian Church of God																			

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Table 18. Impacts to Community Features By Alternative

Community Feature	No Build Alternative	A	B	C	D	E	E1	F	G	AC	AD	AE	BC	BD	BE	ABE	EBE	AF1	EF1
Kelly's House of Love	Green	Green	Green	Green	Green	Green	Green	Yellow	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Food Town Marketplace	Green	Green	Green	Green	Green	Green	Green	Red	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Minnick's Drive-Thru	Green	Green	Green	Green	Green	Green	Green	Red	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Red
Riverview Food Mart	Green	Green	Green	Green	Red	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Green	Green

Red: Relocations expected; Yellow: Impacts expected but no relocations; Green: No impacts expected.

Note: *This is not a comprehensive list of community features found with the NHX Study Area, but a list of all features expected to be impacted by one or more of the build alternatives.*

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Each of the build alternatives include bicycle/pedestrian shared-use paths and sidewalks as part of the “Complete Streets” design of the roadway described in Section 3.2. New shared-use path will connect to existing bike/pedestrian paths within the City of Hamilton, including the Great Miami Regional Trail and the proposed Beltline Trail, and will build connections to the broader regional and state trail system, including the Miami 2 Miami Regional Trail. New sidewalks will connect to the existing sidewalk system and improve pedestrian access to schools, residential areas, and planned development in the area. In addition, coordination will be undertaken with the Butler County Regional Transit Authority to identify opportunities to integrate bus stops in the project and to support the expansion of public transit in the project area. Through the expansion of shared-use path and sidewalk facilities and the addition of bus stops in the project area, access to community resources by pedestrians, bicyclists, and transit-dependent individuals would be improved as a result of each build alternative.

As the project continues to develop, further outreach to the impacted communities and neighborhoods will be undertaken to identify potential community impacts and possible approaches to avoid, minimize, mitigate and enhance the social impacts of the project.

Economic Development: The City of Hamilton has identified several areas of land as prime development areas. These areas are shown in **Attachment C-12** and include recent and ongoing development. Included in these areas is the Spooky Nook Sports Champion Mill, a multi-use development described in **Section 1.1**; a proposed supermarket; and the Rossville Flats, modern garden-style apartments located on Main Street. **Table 19** identifies each development by name, address, and a number that corresponds to its position on **Attachment C-12**. **Table 19** also indicates how each of these development sites would be impacted by the proposed alternatives.

No Build Alternative: There would be no adverse impacts to the areas of prime development shown on **Attachment C-11**. However, with the No Build Alternative there would be no traffic improvements and congestion would continue to increase in the NHX study area, which could negatively impact development in the area.

Build Alternatives: Of the eighteen build alternatives, thirteen would have a negative direct impact on the proposed economic development sites. Alternatives C, D, E, E1, F, G, AC, AD, AE, BC, BD, and BE would bisect one or more of the prime development sites that have been identified by the City of Hamilton. Alternative A would not bisect any business properties; however, it would also not provide any benefit to the planned development sites since it would not improve access to these sites. Alternatives B, ABE, EBE, AF1 and EF1 would support the planned development of the sites identified on **Attachment C-12** since they would improve traffic flow in the vicinity of these sites. **Table 19** shows the effect each alternative is expected to have on the prime development areas listed by the City of Hamilton.

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Red: Direct negative impacts/bisection of property expected

Proposed Development Name and Address	Table 19. Impacts to Prime Development Areas By Alternative																		
	No Build Alternative	A	B	C	D	E	E1	F	G	AC	AD	AE	BC	BD	BE	ABE	EBE	AF1	EF1
8.5 Acre Development (Corner of N 3 rd Street and Black Street)	Yellow	Yellow	Green	Red	Red	Red	Red	Green	Green	Red	Red	Red	Red	Red	Red	Green	Green	Green	Green
Cohen Development (Corner of N 3 rd Street and Black Street)	Yellow	Yellow	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Proposed Supermarket (Corner of N 3 rd Street and Black Street)	Yellow	Yellow	Yellow	Green	Red	Green	Green	Green	Green	Green	Red	Green	Green	Red	Green	Green	Green	Green	Green
Beckett Paper (Corner of N 3 rd Street and Black Street)	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Green	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Green
Ohio Casualty (Corner of N 3 rd Street and Magnolia Street)	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
6.6 Acre Development (Corner of N 3 rd Street and Black Street)	Yellow	Yellow	Green	Red	Red	Red	Red	Red	Yellow	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Rossville Flats (Corner of D Street North and Main Street)	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Spooky Nook Champion Mill (B Street North)	Yellow	Yellow	Yellow	Green	Green	Green	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Green

Yellow: No negative impact to property, no anticipated immediate improvement in traffic access to property

Green: Anticipated improvement in access to property resulting from alternative

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Aesthetics: Aesthetics considers the “visual appeal” of the components of the transportation system. These impacts consider the experience of the users of the transportation facility “view from the road” as well as the experience of individuals looking at the facility from adjacent sidewalks and buildings “view of the road”.

No Build Alternative: There would be no changes to the local transportation system or to the surroundings of the study area under the No Build Alternative. Therefore, there would be no impacts to the aesthetic appearance of the existing transportation system.

Build Alternatives: In general, each of the build alternatives include a boulevard-style roadway with a shared-use path, sidewalk, five-foot tree lawns on both sides of the roadway and either a landscaped median or a center turn lane. The new roadway will replace a narrow four-lane road with sidewalks on both sides of the road and limited tree lawns/landscaping with a design that incorporates more landscaping and green space. By incorporating aesthetic enhancements into the project design, the new roadway design has the potential to make the roadway more attractive and compatible with local surroundings. Aesthetic considerations of specific features of the build alternatives are discussed below.

Raising of North B Street: Under Alternative B, North B Street would need to be raised approximately five feet in order to provide the required clearance of the existing levy system. There are structures located near the right-of-way which would require the construction of retaining walls in close proximity to the buildings, which would result in a visual impact to users of the buildings. As part of the project design, aesthetic treatments of the wall facing, such as form liners, would be considered to mitigate the visual impacts of the retaining walls.

Bridge Crossings: Each of the build alternatives will require a new bridge which will be a prominent structural element of this project and will dominate the river view in the crossing location. Alternatives, A, B, ABE and EBE will also include a crossing of the hydraulic canal. Because the new structures will be significant features of Hamilton’s cityscape, aesthetic considerations will be part of the design of the structures. These considerations will include factors such as integration into the environment, choice of material, color, lighting, bridge type, etc.

Grade Separated Railroad Crossing: Each alternative includes a new grade separated crossing of the CSX railroad which would have visual impacts in the immediate area. The grade separated crossings for Alternatives, C, D, E, E1, AC, AD, AE, BC, BD, BE, ABE and EBE will occur in the area behind the power plant located on US 127. Due to the minimum clearance requirements for the railroad, these alignments will elevate more than thirty feet into the air using mostly retaining walls, which would have a visual impact on the surrounding area. Alternatives AF1 and EF1 will have to be elevated in a similar fashion, but the grade separated crossing will occur further south along the rail line. In addition, Alternative C would require that the profile of US 127 be raised thirteen feet to tie into the new alignment due to the proximity of the railroad crossing and US 127. In this section of US 127, the adjacent buildings are located right up against the existing right-of-way, requiring that retaining walls be placed right up against the existing structures. Alternatives A, B, ABE and EBE cross the railroad north of the hydraulic canal. Since this is a relatively undeveloped area with very few properties or pedestrian traffic the impacts of the proposed raised

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alignments in this area would be minimized. However, the profile of Alternative A crosses over the railroad and US 127 and would create a wall-like structure that would be perpendicular to the US 127 alignment. Motorists traveling on US 127 would drive through a tunnel-like structure through the new alignment with abutment wall on both sides of US 127. As part of the project design, aesthetic treatments of the wall facing, such as formliners, would be considered to mitigate the visual impacts of the retaining walls.

Retaining Walls: Each build alternative except Alternative G will travel through the area behind the Humane Society on Princeton Road where the existing grade is extremely steep. In order to minimize the grade of the roadway, retaining walls will be required on both sides of the roadway alignment. Although this treatment will hide the roadway from the surrounding buildings for a short stretch of the roadway, road users will be traveling into a trench and their view will be limited to the face of the retaining wall. The distance of the roadway along the retaining wall varies by alternative. For Build Alternatives A, B, C, D, and F motorists will be traveling in this trench for approximately 900 to 1000 feet. For the rest of the build alternatives (except Alternative G) the length of this section of roadway along the retaining wall is between 500 and 600 feet. As part of the project design, aesthetic treatments of the wall facing, such as formliners, would be considered to mitigate the visual impacts of the retaining walls.

4.8 PUBLIC INVOLVEMENT

Public involvement and input are important parts of the NHX project and will be used to guide project development and decision-making. Multiple public feedback opportunities will be conducted as this project continues. This section summarizes the public involvement activities that have been undertaken to date.

Project Website: A project website was developed to share information about the project. The website can be accessed at northhamiltoncrossing.org. A link to this website is also provided on the BCTID's website, which is accessed at [Current Projects | Butler County TID \(bctid.org\)](#).

Public Needs Survey: As part of the development of the Purpose and Need for the NHX project, a Public Needs Survey was conducted between August 30, 2021 and September 30, 2021. This survey had approximately 1,600 participants and received 4,188 comments. The survey provided feedback on the primary and secondary needs for the project.

Stakeholder Meetings: Stakeholder Meetings are being held throughout the NHX project to provide input to the Project Team, comprised of the consulting engineering staff, representatives of the City of Hamilton, ODOT, and the Butler County Transportation Improvement District (TID). The 65-person stakeholder committee includes representatives from businesses, community organizations, neighborhood groups, and public agencies. The role of the stakeholder committee members is to help facilitate the flow of information received at the Stakeholder Meetings to their organization/community. A list of stakeholders included on the Stakeholder Committee is provided in **Attachment E**. To date, there have been four stakeholder meetings held on the NHX project. These meetings are summarized as follows. Complete meeting minutes from these meetings are provided in **Attachment E**.

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Stakeholder Meeting 1: This meeting was held on November 9, 2021, between 5:30 PM and 7:30 PM at the Wilks Conference Center in Hamilton. There were 35 in-person participants and nine virtual participants. This meeting included an introduction of members of the Stakeholder Committee, an explanation of the role of the committee members, an overview of the Purpose and Need of the NHX project, and a review of seven conceptual alternatives that the Project Team had developed. Stakeholder committee members were asked to provide feedback to the Project Team on these alternatives from their organizations at the next Stakeholder Meeting.

Stakeholder Meeting 2: This meeting was held on February 2, 2022, between 5:30 PM and 7:30 PM at the Wilks Conference Center in Hamilton. There were 33 in-person participants and 20 virtual participants. Seven additional residents observed the meeting but did not participate. During this meeting the stakeholders were asked to share any feedback on Alternatives A through G from their organizations. In addition, the project team shared additional engineering and evaluation of the concepts. The stakeholders discussed if any of the concepts should be studied further or if there were any new concept alternatives that should be considered. Based on the materials presented by the Project Team, the stakeholder committee recommended the elimination of Alternatives A, F, and G from further consideration. Alternative A would have significant floodplain and farmlands impacts and both Alternatives F and G would impact the German Village Historic District and the Dayton-Campbell Historic District, which are listed on the National Register of Historic Places (NRHP). Cultural resources listed on the NRHP are afforded protection under Section 4(f) which states that no impacts can occur to these resources from federally funded projects unless it is determined that there are no “feasible and prudent” alternatives. At this stage of project development, several other alternatives have been identified that could avoid these resources, therefore these alternatives were recommended to be dropped from further consideration. Although the committee recommended the elimination of Alternatives A, F, and G, it was determined, based on consultation with ODOT, that these alternatives had not yet been defined at a level of detail that would allow them to be dismissed. It was also noted in the Stakeholder Committee meeting that elements of Alternative A could possibly be combined with elements of other alternatives to create a viable alternative. Therefore, further study was needed to better understand the potential impacts, costs, and benefits of these alternatives. Therefore, the Project Team decided to continue to evaluate Alternatives A, F, and G.

Stakeholder Meeting 3: This meeting occurred on May 4, 2022, between 5:30 PM and 7:30 PM at the Wilks Conference Center in Hamilton. 37 individuals attended in-person and 12 people attended virtually. Four residents observed the meeting but did not participate. During this meeting, the project team presented engineering and environmental information on the conceptual alternatives shown during Stakeholder Meeting 3 (Alternatives A through E and E1), as well as several hybrid alternatives (AC, AD, AE, BC, BD, and BE).

Stakeholder Meeting 4: This meeting took place on October 4, 2022, between 5:30 PM and 7:30 PM at the Butler County Engineer’s Office (BCEO). There were 36 in-person participants and nine virtual participants. Three additional residents observed the meeting but did not participate. The stakeholder committee reviewed each of the preliminary alternatives developed to date (A, B, C, D, E, E1, AC, AD, AE, BC, BD, and BE) Two additional hybrid options were presented, ABE and EBE. Both hybrids were recommended for further study since performed well in reducing travel time on the High and Main Street corridor. The stakeholder committee recommended that the following alternatives be dismissed from further

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study: A, B, CD, E, E1, AC, AD, AE, BC, BD, and BE because they were ineffective at reducing traffic from SR 129 during peak travel times, and/or they had negative impacts to neighborhoods, parks, Greenwood Cemetery, or underserved populations. Alternatives that do not support the City of Hamilton's planned economic development were also recommended for elimination.

The stakeholder committee recommended that alternatives ABE and EBE be advanced for further study in the next phase of the project. Both alternatives meet the project's purpose and need and reduce travel time on the High/Main/SR 129 corridor. Negatives for each alternative include their impact on farmland and both require business and residential relocations. EBE is the most expensive alternative studied and ABE is the second most expensive alternative of the preliminary alternatives.

While the stakeholder committee provided feedback on each of the proposed alignments that were developed, no permanent decisions could be made regarding the proposed options before all alternatives were presented to the public for their review and input, as required by the National Environmental Policy Act (NEPA).

Public Meetings: The following meetings were held with the public through the development of the Feasibility Study:

Neighborhood Meetings: Four meetings were held with neighborhood groups at their request. These meetings included the following:

- Meeting with North End neighbors at LJ Smith Park, October 27, 2022
- Meeting with North End neighborhood representatives at City Offices November 16, 2022
- Meeting with North End neighborhood representatives at City Offices January 18, 2023
- Meeting with North End RENEW at Dream Center, February 9, 2023.

In-person and Virtual Public Open Houses: A Summary of the In-Person and Virtual Open Houses is provided in **Appendix E**.

In January and February 2023, the City of Hamilton, BCTID, and ODOT hosted in-person and virtual open houses to:

- Provide an update on the NHX project
- Share the results of recently completed studies
- Discuss route alternatives evaluated
- Gather public input.

In-person Open House: The in-person public Open House was held on January 23, 2023 at Fairview Elementary School. The meeting was held in the cafeteria of the school between 5:30 p.m. and 7:30 p.m. More than 300 people attended the meeting, not including the project team, City, BCTID, and ODOT representatives. A total of 31 completed comment forms were turned into the project team. Four additional comment forms were provided to the city by the end of the March 12th comment period.

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Virtual Open House: The virtual Open House was conducted using the Public Input virtual public engagement platform. The online event took place between January 23, 2023 and March 12, 2023. During the public review period, the Open House webpage was viewed more than 9,100 times. A total of 880 participants answered at least one or more of the survey questions embedded throughout the website. Approximately 11,176 responses were submitted via the survey, 611 of which were written comments, questions, and suggestions.

Key Findings of the Public Open Houses: Below is a summary of key findings gathered based on all feedback received during the public review and input opportunity:

- The following concerns were raised: potential impacts to the North End neighborhood including losing homes; dividing the community; the inability to replace affordable housing in the current market; gentrification and economic development that wouldn't benefit the local community; impacts to the Butler County Fairgrounds and the historic Greenwood Cemetery; and impacts to the Joe Nuxhall ballfields.
- Most participants (61%) liked the proposed concept/typical section drawing for NHX or thought it was “ok”, whereas 21% did not particularly like it or didn't like it at all. Another 16% weren't sure yet.
- In general, alternatives that included components of Alternative E were liked by more people than the other alternatives. The following alternatives received the highest favorability ratings:
 - Alternative E (50%)
 - Alternative E1 (42%)
 - Alternative A (42%)
 - Alternative AE (40%)
 - Alternative EBE (39%)
- Conversely, the alternatives that were liked the least included Alternative BD (10%), Alternative AD (15%), Alternative BC (16%), Alternative AC (19%) and Alternative B (19%). **Table 20** summarizes the level of interest received for each of the initial and hybrid alternatives.

Table 20. Summary of Responses from the Virtual Public Open House

Alternative	I LIKE IT A LOT	IT'S OK	I'M NOT SURE YET	I DON'T PARTICULARLY LIKE IT	I DON'T LIKE IT AT ALL	I DON'T HAVE A PREFERENCE
A	31%	11%	8%	10%	39%	1%
B	8%	11%	8%	25%	47%	0%
C	9%	20%	9%	18%	43%	0%
D	9%	19%	9%	17%	47%	0%
E	25%	25%	9%	11%	28%	1%

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Table 20. Summary of Responses from the Virtual Public Open House

Alternative	I LIKE IT A LOT	IT'S OK	I'M NOT SURE YET	I DON'T PARTICULARLY LIKE IT	I DON'T LIKE IT AT ALL	I DON'T HAVE A PREFERENCE
E1	20%	22%	9%	17%	31%	1%
F	12%	9%	8%	16%	54%	1%
G	15%	13%	7%	12%	52%	1%
AC	6%	13%	9%	19%	52%	1%
AD	3%	12%	7%	18%	58%	1%
AE	13%	27%	12%	13%	34%	1%
BC	6%	10%	6%	18%	60%	1%
BD	4%	6%	4%	19%	66%	1%
BE	8%	17%	10%	22%	42%	1%
ABE	16%	18%	10%	18%	38%	1%
EBE	16%	23%	9%	15%	36%	1%

Note: Boxes around a cell highlight the highest percentage received for each response option.

5.0 COST ESTIMATES

A summary of the preliminary cost estimates developed for each of the build alternatives is provided in **Table 21**. The cost estimates are shown for three project phases: Phase 1, which includes the western terminus at North B Street, includes a new river crossing, and extends to US 127 on the east side of the river; Phase 2 extends from US 127 to SR 4 and includes an overpass of the CSX railroad; and Phase 3 extends from SR 4 to SR 129.

6.0 COMPARISON OF ALTERNATIVES

A detailed comparative evaluation matrix, which summarizes purpose and need, environmental, engineering, traffic, and public input evaluation criteria for the alternatives is provided in **Table 22**.

Table 21
North Hamilton Crossing (NHX) Feasibility Study (PID 115755)
Preliminary Cost Estimates

Alternative	Phase 1				Phase 2				Phase 3				Preliminary Construction Costs	Preliminary Right of Way Costs	Design and Management Costs	Preliminary Total Cost Range
	Construction Cost of Phase	Right of Way Cost of Phase	Total Phase Cost	Percent of Total Cost	Construction Cost of Phase	Right of Way Cost of Phase	Total Phase Cost	Percent of Total Cost	Construction Cost of Phase	Right of Way Cost of Phase	Total Phase Cost	Percent of Total Cost				
A	\$40,843,320	\$1,018,738	\$50,030,722	43%	\$34,971,300	\$5,051,914	\$47,017,474	41%	\$12,360,090	\$3,533,180	\$18,365,288	16%	\$88,174,710	\$9,603,832	\$17,634,942	\$97 - \$127 million
B	\$33,348,140	\$1,153,908	\$41,171,676	39%	\$34,539,250	\$4,237,632	\$45,684,732	43%	\$12,437,180	\$3,533,180	\$18,457,796	18%	\$80,324,570	\$8,924,720	\$16,064,914	\$96 - \$116 million
C	\$26,544,540	\$493,766	\$32,347,214	41%	\$20,034,660	\$3,358,992	\$27,400,584	35%	\$12,360,080	\$3,533,180	\$18,365,276	24%	\$58,939,280	\$7,385,938	\$11,787,856	\$69 - \$89 million
D	\$33,424,790	\$1,393,602	\$41,503,350	41%	\$30,410,510	\$5,236,196	\$41,728,808	41%	\$12,670,810	\$3,533,180	\$18,738,152	18%	\$76,506,110	\$10,162,978	\$15,301,222	\$88 - \$108 million
E	\$30,021,030	\$407,578	\$36,432,814	35%	\$26,767,030	\$10,107,378	\$42,227,814	40%	\$14,241,380	\$8,843,933	\$25,933,589	25%	\$71,029,440	\$19,358,889	\$14,205,888	\$93 - \$113 million
E1	\$30,063,840	\$58,618	\$36,135,226	37%	\$25,331,200	\$8,581,496	\$38,978,936	40%	\$14,283,650	\$5,733,098	\$22,873,478	23%	\$69,678,690	\$14,373,212	\$13,935,738	\$88 - \$108 million
F	\$25,343,981	\$3,064,440	\$33,477,217	33%	\$16,989,707	\$12,796,201	\$33,183,849	33%	\$14,324,094	\$16,323,722	\$33,512,635	33%	\$56,657,782	\$32,184,363	\$11,331,556	\$90 - \$100 million
G	\$28,564,356	\$2,681,212	\$36,958,440	47%	\$20,491,587	\$4,688,376	\$29,278,280	37%	\$6,575,615	\$4,835,478	\$12,726,216	16%	\$55,631,558	\$12,205,066	\$11,126,312	\$68 - \$88 million
A-E	\$38,567,650	\$860,720	\$47,141,900	41%	\$25,414,390	\$10,120,072	\$40,617,340	36%	\$14,241,370	\$8,843,933	\$25,933,577	23%	\$78,223,410	\$19,824,725	\$15,644,682	\$105 - \$125 million
B-C	\$33,484,690	\$416,682	\$40,598,310	47%	\$20,034,660	\$3,557,050	\$27,598,642	32%	\$12,360,080	\$3,533,180	\$18,365,276	21%	\$65,879,430	\$7,506,912	\$13,175,886	\$76 - \$96 million
B-D	\$33,484,690	\$416,682	\$40,598,310	41%	\$30,410,510	\$3,982,594	\$40,475,206	41%	\$12,670,810	\$2,935,128	\$18,140,100	18%	\$76,566,010	\$7,334,404	\$15,313,202	\$88 - \$108 million
B-E	\$33,480,565	\$416,682	\$40,593,360	38%	\$25,414,390	\$10,120,072	\$40,617,340	38%	\$14,241,370	\$8,843,933	\$25,933,577	24%	\$73,136,325	\$19,380,687	\$14,627,265	\$98 - \$118 million
ABE	\$38,567,650	\$1,391,525	\$47,672,705	37%	\$42,249,515	\$7,409,654	\$58,109,072	45%	\$14,283,644	\$5,731,326	\$22,871,699	18%	\$95,100,808	\$14,532,506	\$19,020,162	\$116 - \$141 million
EBE	\$60,951,670	\$795,157	\$73,937,161	45%	\$47,701,780	\$7,409,654	\$64,651,790	40%	\$14,283,644	\$7,254,038	\$24,394,411	15%	\$122,937,093	\$15,458,850	\$24,587,419	\$146 - \$171 million
AF1	\$38,614,375	\$860,720	\$47,197,970	46%	\$17,697,820	\$8,440,937	\$29,678,321	29%	\$14,130,119	\$8,843,933	\$25,800,076	25%	\$70,442,314	\$18,145,590	\$14,088,463	\$92 - \$117 million
EF1	\$60,698,020	\$795,157	\$73,632,781	57%	\$17,697,820	\$8,440,937	\$29,678,321	23%	\$14,130,119	\$8,843,933	\$25,800,076	20%	\$92,525,959	\$18,080,028	\$18,505,192	\$121 - \$146 million

Feature/Consideration	TABLE 22. NORTH HAMILTON CROSSING (NHX) CONCEPTUAL ALTERNATIVES EVALUATION MATRIX (PID 115755)						
	Preliminary Alternatives						
	No Build Alternative	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative E1
Purpose and Need - Primary Needs							
Improves East-West Connectivity	No	Yes (Ties to NW Washington Blvd, providing connectivity further west)	Yes (Ties to Lagonda Ave with no direct connectivity further west)	Yes (Ties to relocated Rhea Ave, providing connectivity further west)	Yes (Ties to Gordon Ave, providing connectivity further west)	Yes (Ties to relocated Rhea Ave, providing connectivity further west)	Yes (Ties to relocated Rhea Ave, providing connectivity further west)
Improves Lack of Sufficient River Crossings	No	Yes	Yes	Yes	Yes	Yes	Yes
Improves Lack of Grade-Separated Railroad Crossings	No	Yes	Yes	Yes	Yes	Yes	Yes
Improves Mobility/Congestion on Local Road Network	No	Minimal Improvement	Minimal Improvement	Yes	Yes	Yes	Yes
Improves Safety	No	Minimal Improvement	Minimal Improvement	Yes	Yes	Yes	Yes
Purpose and Need - Secondary Needs							
Supports Economic Development	No	Yes	Yes	No, impacts City-identified prime development parcels	No, impacts City-identified prime development parcels	No, impacts City-identified prime development parcels	No, impacts City-identified prime development parcels
Improves Bike/Pedestrian Connectivity	No	Yes	Yes	Yes	Yes	Yes	Yes
Improves Multimodal Linkage	No	Potentially	Potentially	Potentially	Potentially	Potentially	Potentially
Cultural Resources							
NRHP-Listed Sites	None	Greenwood Cemetery	Greenwood Cemetery	Greenwood Cemetery	Greenwood Cemetery	Greenwood Cemetery	Greenwood Cemetery
NRHP-Listed Historic Districts	None	None	None	None	None	None	None
NRHP-Eligible Sites	None	None	None	None	None	None	None
Ohio Historic Inventory (OHI) Sites	None	None	None	1	1	2	1
Section 4(f)/6(f) Sites							
Section 4(f)/6(f) Sites	None	Combs Park (bisects), GMR Recreational Trail (minor)	Combs Park (bisects), LJ Smith Park (bisects), GMR Recreational Trail (minor)	LJ Smith Park (bisects), Beltline Trail (minor), GMR Recreational Trail (minor)	LJ Smith Park (minor), Beltline Trail (minor), GMR Recreational Trail (minor)	LJ Smith Park (minor), Beltline Trail (minor), GMR Recreational Trail (minor), Fairwood Elementary School (minor)	LJ Smith Park (bisects), Beltline Trail (minor), GMR Recreational Trail (minor), Fairwood Elementary School (minor)
Ecological Resources							
Great Miami River / Hydraulic Canal	None	2 crossings	2 crossings	1 crossing	1 crossing	1 crossing	1 crossing
Other Large Streams	None	None	None	None	None	None	None
Wetlands (not including Open Water features)	None	1	1	None	None	None	None
Floodplains and Floodway							
100-Year Floodplain Encroachment (not including Floodway)	None	50 - 60 ac	10-20 ac	< 1 ac	< 1 ac	< 1 ac	< 1 ac
100-Year Floodway Encroachment	None	< 5 ac	< 5 ac	< 5 ac	< 5 ac	< 5 ac	< 5 ac
Hazardous Materials							
Regulated Materials Review	None	7 LUST, 10 UST, 3 RCRA	11 LUST, 11 UST, 6 RCRA, 1 DERR site, 1 site with Institutional Controls, 1 NPL site	9 LUST, 13 UST, 8 RCRA, 1 NPL site, 1 DERR site, 1 site with Institutional Controls, 1 spill	10 LUST, 14 UST, 8 RCRA, 2 DERR sites, 3 sites with Institutional Controls, 1 spill, 3 VAP2, 1 NPL site	5 LUST, 4 UST, 7 RCRA, 2 spills, 1 DERR site 1 site with Institutional Controls 1 NPL site	4 LUST, 1 UST, 7 RCRA, 1 DERR site, 1 site with Institutional Controls, 1 NPL site, 2 spills
Community and Land Use							
Farmland Impacts	None	45 - 55 acres	10 - 20 acres	None	None	None	None
Community Facilities	None	BCEO, Transitional Living Center, Grant Early Learning Center, Butler County Fairgrounds	BCEO, Transitional Living Center, Grant Early Learning Center, Butler County Fairgrounds	BCEO, Transitional Living Center, Grant Early Learning Center, Butler County Fairgrounds	BCEO, Transitional Living Center, Grant Early Learning Center, Butler County Fairgrounds, True Free Christian Church of God, Riverview Food Mart	BCESC Main Building, Transitional Living Center, Hamilton Fire Station 25, Butler County Fairgrounds, Fairwood Elementary School, Butler County Children Services, Juvenile Justice Center, Butler County Board of Developmental Disabilities	BCESC Main Building, Transitional Living Center, Hamilton Fire Station 25, Butler County Fairgrounds, Fairwood Elementary School, Butler County Children Services, Juvenile Justice Center, Butler County Board of Developmental Disabilities
Cemeteries (Non-Historic)	None	Greenwood Cemetery <.05	Greenwood Cemetery (>0.5 ac)	Greenwood Cemetery (>0.5 ac)	Greenwood Cemetery (>0.5 ac)	None	None
Environmental Justice (EJ) Populations	None	Displacements of EJ Populations	Displacements of EJ Populations	Displacements of EJ Populations	Displacements of EJ Populations	Displacements of EJ Populations	Displacements of EJ Populations
Aesthetic Concerns							
Aesthetic Impacts	None	In order to cross over the railroad and US 127, the roadway would be elevated on 30-40 ft. of earth embankment. Drivers on US 127 traveling under the new roadway would see abutment walls on both sides of the roadway. Tall retaining walls will be required on both sides of the new alignment in the steep section behind the Humane Society.	North B St. will be raised 5 feet to clear the existing levy and retaining walls will be required in close proximity to homes along North B St. and Lagonda Ave. Tall retaining walls will be required on both sides of the new alignment in the steep section behind the Humane Society.	In order to cross the railroad, the new roadway will be elevated 30 feet and will block sight lines in the surrounding area. In order to tie the new alignment into US 127, the profile of US 127 will have to be raised 13 feet, which will require the placement of retaining walls in close proximity to existing buildings and homes. Tall retaining walls will be required on both sides of the new alignment in the steep section behind the Humane Society.	In order to cross the railroad, the new roadway will be elevated 30 feet and will block sight lines in the surrounding area. Tall retaining walls will be required on both sides of the new alignment in the steep section behind the Humane Society.	In order to cross the railroad, the new roadway will be elevated 30 feet and will block sight lines in the surrounding area. Tall retaining walls will be required on both sides of the new alignment in the steep section behind the Humane Society.	In order to cross the railroad, the new roadway will be elevated 30 feet and will block sight lines in the surrounding area. Tall retaining walls will be required on both sides of the new alignment in the steep section behind the Humane Society.
Stakeholder/Public Involvement							
Public Concerns	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Stakeholder Concerns	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Right-of-Way							
Residential Relocations	None	38	45	50	44	86	90
Commercial Relocations	None	3	3	3	5	3	4
Right-of-Way (acres)	None	85 - 95 acres	50 - 60 acres	25 - 35 acres	10 - 20 acres	25 - 35 acres	20 - 30 acres
Engineering Considerations							
Alternative Length (mi)	N/A	2.70	2.64	2.59	2.86	2.26	2.29
Design Speed (mph)	N/A	35	35	35	35	35	35
Roadway Design Issues	N/A	Proximity of Elkton Road / NW Washington Blvd intersection to roundabout and steep existing grades near roundabout. Not directly connected to US 127 requiring connecting road and additional traffic signal. Significant fill required in floodplain. Steep grade on alignment near BCEO and requires retaining wall. Intersection of Princeton Road is skewed.	Requires North B Street to be raised roughly 5 feet at west terminus. Requires US 127 to be raised roughly 10 feet. Bikepath along the canal was reduced to a 10 foot width. Steep grade on alignment near BCEO and requires retaining wall. Intersection of Princeton Road is skewed.	North B Street may require profile adjustments at west terminus. Requires US 127 to be raised roughly 13 feet. Intersection at US 127 is skewed. Proximity of US 127 intersection to power plant reduces sight distance. Bikepath along the canal was reduced to a 10 foot width. Steep grade on alignment near BCEO and requires retaining wall. Intersection of Princeton Road is skewed.	North B Street may require profile adjustments at west terminus. North B Street intersection is in a curve. Intersection at US 127 is skewed. Proximity of US 127 intersection to power plant reduces sight distance. Bikepath along the canal was reduced to a 10 foot width. Steep grade on alignment near BCEO and requires retaining wall. Intersection of Princeton Road is skewed.	North B Street may require profile adjustments at west terminus. Intersection at US 127 is skewed. Proximity of US 127 intersection to power plant reduces sight distance. Width of bikepath on Heaton Street reduced to 8 foot width at cemetery. Steep grade on alignment near Humane Society and requires retaining wall. Intersection of Princeton Road is skewed.	North B Street may require profile adjustments at west terminus. Intersection at US 127 is skewed and may require US 127 to be raised 1 to 2 feet. Proximity of US 127 intersection to power plant reduces sight distance. Steep grade on alignment approaching 127 from crossing over railroad and near Humane Society and requires retaining wall. Intersection of Princeton Road is skewed.
Existing Flood Levy Design Issues	N/A	No existing flood levy at this location	Proximity of North B Street to the existing levy system will require the profile to be elevated to avoid the levy. This will require raising the west terminus roughly 5 feet.	The offset of North B Street to the existing levy system will allow a smooth transition of the proposed alignment over the levy to North B Street. This will limit raising at the west terminus to less than 2 feet.	The offset of North B Street to the existing levy system will allow a smooth transition of the proposed alignment over the levy to North B Street. This will limit raising at the west terminus to less than 2 feet.	The offset of North B Street to the existing levy system will allow a smooth transition of the proposed alignment over the levy to North B Street. This will limit raising at the west terminus to less than 2 feet.	The offset of North B Street to the existing levy system will allow a smooth transition of the proposed alignment over the levy to North B Street. This will limit raising at the west terminus to less than 2 feet.
Number of New Structures Requiring Long-Term Maintenance	N/A	5	3	2	2	2	2
Structural Design Issues	Black Street Bridge reaching end of serviceable life for vehicular traffic and cannot be widened. Replacement on same alignment would result in closure during construction.	No significant issues	River Bridge - tie into floodwall system required	No significant issues	River Bridge - Curve at NW end of bridge complicates design RR bridge - Severe skew complicates design	River Bridge - Curve at SE end of bridge & taper at NW end complicates design RR bridge - Severe skew complicates design	River Bridge - Curve at SE end of bridge & taper at NW end complicates design RR bridge - Severe skew complicates design
Major Utility Relocations and/or Issues	None	Electric Transmission Line relocations required at NW Washington Blvd and near SR 4. Coordination with hydroelectric plant.	Electric Transmission Line relocations required near SR 4. Coordination with hydroelectric plant.	Power plant located on US 127 impacted.	Electric Transmission Line relocations required for Railroad overpass and near SR 4. Power plant located on US 127 impacted.	Electric Transmission & Distribution Line relocations required near US 127. Power plant located on US 127 impacted.	Electric Transmission & Distribution Line relocations required near US 127. Power plant located on US 127 impacted.
Traffic/Maintenance of Traffic Considerations							
Anticipated Alternative Travel Time (MM:SS)	N/A	5:53	6:20	6:37	6:10	5:44	5:44
Anticipated High Street (SR 129) Annual VHT Savings	AM Peak-Hour - 00:00 PM Peak-Hour - 00:00	AM Peak-Hour - 1,900 PM Peak-Hour - 0	AM Peak-Hour - 1,900 PM Peak-Hour - 0	AM Peak-Hour - 1,200 PM Peak-Hour - 2,000	AM Peak-Hour - 1,000 PM Peak-Hour - 2,500	AM Peak-Hour - 10,000 PM Peak-Hour - 22,600	AM Peak-Hour - 10,000 PM Peak-Hour - 22,600
Anticipated % Reduction in High Street (SR 129) Traffic	AM Peak-Hour - 0% PM Peak-Hour - 0%	AM Peak-Hour - 2% PM Peak-Hour - 0%	AM Peak-Hour - 2% PM Peak-Hour - 0%	AM Peak-Hour - 8% PM Peak-Hour - 7%	AM Peak-Hour - 5% PM Peak-Hour - 5%	AM Peak-Hour - 14% PM Peak-Hour - 15%	AM Peak-Hour - 14% PM Peak-Hour - 15%
Maintenance of Traffic Concerns	None	Construction of roundabout at the intersection of W Elkton Rd and N B St will likely require a closure. Intersection of Neal Blvd and Joe Nuxhall Blvd will likely require short term closures.	Complicated construction staging at North B Street. North B Street & US 127 may require closures to raise the profiles. Complex detours would be required.	Complicated construction staging at North B Street. US 127 may require a closure to raise the profile. Complex detour would be required.	Complicated construction staging at North B Street.	Complicated construction staging at North B Street.	Complicated construction staging at North B Street. May require US 127 profile to be raised 1 to 2 feet requiring a complex MOT configuration.
Preliminary Cost Estimates							
Preliminary Construction Costs	N/A	\$85 - \$95 million	\$75 - \$85 million	\$55 - \$65 million	\$70 - \$80 million	\$65 - \$75 million	\$65 - \$75 million
Preliminary Right of Way Costs	N/A	\$7 - \$12 million	\$7 - \$12 million	\$5 - \$10 million	\$8 - \$13 million	\$16 - \$21 million	\$12 - \$17 million
Preliminary Design & Management	N/A	\$15 - \$20 million	\$14 - \$19 million	\$9 - \$14 million	\$13 - \$18 million	\$12 - \$17 million	\$11 - \$16 million
Preliminary Total Cost	N/A	\$97 - \$127 million	\$96 - \$116 million	\$69 - \$89 million	\$88 - \$108 million	\$93 - \$113 million	\$88 - \$108 million
Conclusion							
Recommended for Further Study?	Not Recommended for Further Study	Not Recommended for Further Study	Not Recommended for Further Study	Not Recommended for Further Study	Not Recommended for Further Study	Not Recommended for Further Study	Not Recommended for Further Study

Feature/Consideration	TABLE 22. NORTH HAMILTON CROSSING (NHX) CONCEPTUAL ALTERNATIVES EVALUATION MATRIX (PID 115755)					
	Preliminary Alternatives					
	Alternative F	Alternative G	Alternative AC	Alternative AD	Alternative AE	Alternative BC
Purpose and Need - Primary Needs						
Improves East-West Connectivity	Yes (Ties to relocated entrance of Spooky Nook, with no direct connectivity further west)	Yes (Ties to Wayne Ave, providing connectivity further west)	Yes (Ties to NW Washington Blvd, providing connectivity further west)	Yes (Ties to NW Washington Blvd, providing connectivity further west)	Yes (Ties to NW Washington Blvd, providing connectivity further west)	Yes (Ties to Lagonda Ave with no direct connectivity further west)
Improves Lack of Sufficient River Crossings	Yes	Yes	Yes	Yes	Yes	Yes
Improves Lack of Grade-Separated Railroad Crossings	Yes	Yes	Yes	Yes	Yes	Yes
Improves Mobility/Congestion on Local Road Network	Yes	Yes	Minimal Improvement	Minimal Improvement	Yes	Minimal Improvement
Improves Safety	Yes	Yes	Minimal Improvement	Minimal Improvement	Yes	Minimal Improvement
Purpose and Need - Secondary Needs						
Supports Economic Development	Yes	Yes	No, impacts City-identified prime development parcels	No, impacts City-identified prime development parcels	No, impacts City-identified prime development parcels	No, impacts City-identified prime development parcels
Improves Bike/Pedestrian Connectivity	Yes	Yes	Yes	Yes	Yes	Yes
Improves Multimodal Linkage	Potentially	Potentially	Potentially	Potentially	Potentially	Potentially
Cultural Resources						
NRHP-Listed Sites	Greenwood Cemetery	None	Greenwood Cemetery	Greenwood Cemetery	Greenwood Cemetery	Greenwood Cemetery
NRHP-Listed Historic Districts	German Village	German Village, Dayton-Campbell	None	None	None	None
NRHP-Eligible Sites	None	None	None	None	None	None
Ohio Historic Inventory (OHI) Sites	9	8	1	1	3	1
Section 4(f)(6)(f) Sites						
Section 4(f)(6)(f) Sites	Heaton Street Park (minor), Beltline Trail (minor), GMR Recreational Trail (minor), *Fairwood Elementary School (minor)	Marcum Park (minor), Beltline Trail (minor), GMR Recreational Trail (minor), *Fairwood Elementary School (minor)	Combs Park (bisects), LJ Smith Park (bisects)	Combs Park (bisects), LJ Smith Park (minor)	Combs Park (bisects), LJ Smith Park (minor), *Fairwood Elementary School (minor)	Combs Park (bisects), LJ Smith Park (bisects)
Ecological Resources						
Great Miami River / Hydraulic Canal	1 crossing	1 crossing	1 crossing	1 crossing	1 crossing	1 crossing
Other Large Streams	None	None	None	None	None	None
Wetlands (not including Open Water features)	None	None	None	None	None	None
Floodplains and Floodway						
100-Year Floodplain Encroachment (not including Floodway)	< 1 ac	<1 ac	4 ac	4 ac	4 ac	< 1 ac
100-Year Floodway Encroachment	<1 ac	<5 ac	< 5 ac	< 5 ac	< 5 ac	< 5 ac
Hazardous Materials						
Regulated Materials Review	3 LUST, 1 UST, 4 RCRA, 1 spill	7 LUST, 3 UST, 4 RCRA, 1 DERR site, 3 VAP2	9 LUST, 13 UST, 7 RCRA, 1 NPL site, 1 DERR site, 1 spill, 1 site with Institutional Controls	9 LUST, 11 UST, 7 RCRA, 2 DERR sites, 3 sites with Institutional Controls, 3 VAP2, 1 NPL site	5 LUST, 4 UST, 8 RCRA, 2 spills, 1 site with Institutional Controls, 1 DERR site, 1 NPL site	11 LUST, 13 UST, 7 RCRA, 1 NPL site, 1 DERR site, 1 site with Institutional Controls
Community and Land Use						
Farmland Impacts	None	None	None	None	None	None
Community Facilities	BCESC Main Building, Transitional Living Center, Hamilton Fire Station 25, Butler County Fairgrounds, Fairwood Elementary School, Butler County Children Services, Kelly's House of Love, Juvenile Justice Center, Butler County Board of Developmental Disabilities, Food Town Marketplace, Minnick's Drive Thru	Fairwood Elementary School, Garfield Middle School, Dayton Lane Community Christian Church, Butler Metro Housing, Hamilton City Board of Education Office, Hamilton Lane Library	BCEO, Transitional Living Center, Grant Early Learning Center, Butler County Fairgrounds	BCEO, Transitional Living Center, Grant Early Learning Center, Butler County Fairgrounds	BCESC Main Building, Transitional Living Center, Butler County Fairgrounds, Hamilton Fire Station 25, Fairwood Elementary School, Butler County Children Services, Juvenile Justice Center, Butler County Board of Developmental Disabilities	BCEO, Transitional Living Center, Grant Early Learning Center, Butler County Fairgrounds
Cemeteries (Non-Historic)	None	None	Greenwood Cemetery (>0.5 ac)	Greenwood Cemetery (>0.5 ac)	None	Greenwood Cemetery (>0.5 ac)
Environmental Justice (EJ) Populations	Displacements of EJ Populations	Displacements of EJ Populations	Displacements of EJ Populations	Displacements of EJ Populations	Displacements of EJ Populations	Displacements of EJ Populations
Aesthetic Concerns						
Aesthetic Impacts	The new alignment travels underneath the existing railroad tracks. Due to steep grades, there will be retaining walls along this section of roadway, which will create a trench-like roadway with restricted sight lines. Tall retaining walls will be required on both sides of the new alignment in the steep section behind the Humane Society.	The new alignment travels underneath the existing railroad tracks. Due to steep grades, there will be retaining walls along this section of roadway, which will create a trench-like roadway with restricted sight lines. In addition, the intersection of the new alignment and US 127 will be located on a curve which will limit intersection sight distances for approaching traffic.	In order to cross the railroad, the new roadway will be elevated 30 feet and will block sight lines in the surrounding area. In order to tie the new alignment into US 127, the profile of US 127 will have to be raised 13-feet. This will require the placement of retaining walls in close proximity to existing buildings and homes. Tall retaining walls will be required on both sides of the new alignment in the steep section behind the Humane Society.	In order to cross the railroad, the new roadway will be elevated 30 feet and will block sight lines in the surrounding area. Tall retaining walls will be required on both sides of the new alignment in the steep section behind the Humane Society.	In order to cross the railroad, the new roadway will be elevated 30 feet and will block sight lines in the surrounding area. Tall retaining walls will be required on both sides of the new alignment in the steep section behind the Humane Society.	In order to cross the railroad, the new roadway will be elevated 30 feet and will block sight lines in the surrounding area. In order to tie the new alignment into US 127, the profile of US 127 will have to be raised 13-feet. This will require the placement of retaining walls in close proximity to existing buildings and homes. Tall retaining walls will be required on both sides of the new alignment in the steep section behind the Humane Society.
Stakeholder/Public Involvement						
Public Concerns	TBD	TBD	TBD	TBD	TBD	TBD
Stakeholder Concerns	TBD	TBD	TBD	TBD	TBD	TBD
Right-of-Way						
Residential Relocations	65	55	45	42	83	48
Commercial Relocations	17	8	3	4	3	3
Right-of-Way (acres)	25-35 acres	5 - 15 acres	25 - 35 acres	5 - 15 acres	25 - 35 acres	20 -30 acres
Engineering Considerations						
Alternative Length (mi)	2.25	1.5	3.43	3.61	3.02	2.85
Design Speed (mph)	35	35	35	35	35	35
Roadway Design Issues	North B Street may require profile adjustments at west terminus. Intersection at US 127 is located in curves. 7% grade on alignment near Humane Society.	No median can be achieved in the Dayton Street corridor due to limited width.	Proximity of Elkton Road / NW Washington Blvd intersection to roundabout and steep existing grades near roundabout. Fill required in floodplain. Proximity of US 127 intersection to power plant reduces sight distance. Bikepath along the canal was reduced to a 10 foot width. Steep grade on alignment near Humane Society and requires retaining wall. Intersection of Princeton Road is skewed.	Proximity of Elkton Road / NW Washington Blvd intersection to roundabout and steep existing grades near roundabout. Fill required in floodplain. Proximity of US 127 intersection to power plant reduces sight distance. Bikepath along the canal was reduced to a 10 foot width. Steep grade on alignment near Humane Society and requires retaining wall. Intersection of Princeton Road is skewed.	Proximity of Elkton Road / NW Washington Blvd intersection to roundabout and steep existing grades near roundabout. Fill required in floodplain. Proximity of US 127 intersection to power plant reduces sight distance. Bikepath along the canal was reduced to a 10 foot width. Steep grade on alignment near Humane Society and requires retaining wall. Intersection of Princeton Road is skewed.	Requires North B Street to be raised roughly 5 feet at west terminus. Proximity of US 127 intersection to power plant reduces sight distance. Bikepath along the canal was reduced to a 10 foot width. Steep grade on alignment near Humane Society and requires retaining wall. Intersection of Princeton Road is skewed.
Existing Flood Levy Design Issues	The offset of North B Street to the existing levy system will allow a smooth transition of the proposed alignment over the levy to North B Street. This will limit raising at the west terminus to less than 2 feet.	The offset of North B Street to the existing levy system will allow a smooth transition of the proposed alignment over the levy to North B Street. This will limit raising at the west terminus to less than 2 feet.	No existing flood levy at this location	No existing flood levy at this location	No existing flood levy at this location	Proximity of North B Street to the existing levy system will require the profile to be elevated to avoid the levy. This will require raising the west terminus roughly 5 feet.
Number of New Structures Requiring Long-Term Maintenance	2	2	2	2	2	2
Structural Design Issues	2 bridges required Temporary RR runaround required for construction of new RR bridge over roadway	2 bridges required. Temporary RR runaround required for construction of new RR bridge over roadway	No significant issues	RR bridge - Severe skew complicates design	RR bridge - Severe skew complicates design	River Bridge - tie into floodwall system required
Major Utility Relocations and/or Issues	Electric Transmission & Distribution Line, Water Line and Sanitary Sewer Line relocations required for underpass. Electric Transmission & Distribution Line relocations required behind fairgrounds.	Electric Transmission & Distribution Line, Substation 9 Impacted, Water Line and Sanitary Sewer Line relocations required for underpass.	Electric Transmission Line relocations required at NW Washington Blvd. Power plant located on US 127 impacted.	Electric Transmission Line relocations required at NW Washington Blvd. Power plant located on US 127 impacted.	Electric Transmission Line relocations required at NW Washington Blvd. Power plant located on US 127 impacted.	Power plant located on US 127 impacted.
Traffic/Maintenance of Traffic Considerations						
Anticipated Alternative Travel Time (MM:SS)	05:45	05:19	7:00	7:35	6:26	6:48
Anticipated High Street (SR 129) Annual VHT Savings	AM Peak-Hour - 2,800 PM Peak-Hour - 6,300	AM Peak-Hour - 2,900 PM Peak-Hour - 6,400	AM Peak-Hour - 0 PM Peak-Hour - 0	AM Peak-Hour - 0 PM Peak-Hour - 0	AM Peak-Hour - 1,000 PM Peak-Hour - 1,000	AM Peak-Hour - 400 PM Peak-Hour - 800
Anticipated % Reduction in High Street (SR 129) Traffic	AM Peak-Hour - 17% PM Peak-Hour - 17%	AM Peak-Hour - 18% PM Peak-Hour - 17%	AM Peak-Hour - 0% PM Peak-Hour - 0%	AM Peak-Hour - 0% PM Peak-Hour - 0%	AM Peak-Hour - 8% PM Peak-Hour - 10%	AM Peak-Hour - 1% PM Peak-Hour - 2%
Maintenance of Traffic Concerns	Complicated construction staging at North B Street. Long term closure of Heaton St for the RR underpass.	Complicated construction staging at North B Street. Long term closure of Dayton St for the RR underpass.	Construction of roundabout at the intersection of W Elkton Rd and N B St will likely require a closure. US 127 may require a closure to raise the profile. Complex detour would be required.	Construction of roundabout at the intersection of W Elkton Rd and N B St will likely require a closure.	Construction of roundabout at the intersection of W Elkton Rd and N B St will likely require a closure.	Complicated construction staging at North B Street. North B Street may require a closure to raise the profile. US 127 may require closure to raise the profile. Complex detour would be required.
Preliminary Cost Estimates						
Preliminary Construction Costs	\$50 - \$60 million	\$50 - \$60 million	\$65 - \$75 million	\$75 - \$85 million	\$75 - \$85 million	\$60 - \$70 million
Preliminary Right of Way Costs	\$30 - \$35 million	\$9 - \$14 million	\$5 - \$10 million	\$5 - \$10 million	\$17 - \$22 million	\$5 - \$10 million
Preliminary Design & Management	\$10 - \$15 million	\$9 - \$14 million	\$12 - \$17 million	\$14 - \$19 million	\$13 - \$18 million	\$11 - \$16 million
Preliminary Total Cost	\$90 - \$100 million	\$68 - \$88 million	\$82 - \$104 million	\$94 - \$114 million	\$105 - \$125 million	\$76 - \$96 million
Conclusion						
Recommended for Further Study?	Not Recommended for Further Study	Not Recommended for Further Study	Not Recommended for Further Study	Not Recommended for Further Study	Not Recommended for Further Study	Not Recommended for Further Study

TABLE 22: NORTH HAMILTON CROSSING (NHX) CONCEPTUAL ALTERNATIVES EVALUATION MATRIX (PID 115755)						
Feature/Consideration	Preliminary Alternatives					
	Alternative BD	Alternative BE	Alternative ABE	Alternative EBE	Alternative AF1	Alternative EF1
Purpose and Need - Primary Needs						
Improves East-West Connectivity	Yes (Ties to Lagonda Ave with no direct connectivity further west)	Yes (Ties to Lagonda Ave with no direct connectivity further west)	Yes (Ties to NW Washington Blvd, providing connectivity further west)	Yes (Ties to Gordon Ave, providing connectivity further west)	Yes (Ties to NW Washington Ave, providing connectivity further west)	Yes (Ties to Gordon Ave, providing connectivity further west)
Improves Lack of Sufficient River Crossings	Yes	Yes	Yes	Yes	Yes	Yes
Improves Lack of Grade-Separated Railroad Crossings	Yes	Yes	Yes	Yes	Yes	Yes
Improves Mobility/Congestion on Local Road Network	Minimal Improvement	Yes	Yes	Yes	Yes	Yes
Improves Safety	Minimal Improvement	Yes	Yes	Yes	Yes	Yes
Purpose and Need - Secondary Needs						
Supports Economic Development	No, impacts City-identified prime development parcels	No, impacts City-identified prime development parcels	Yes	Yes	Yes	Yes
Improves Bike/Pedestrian Connectivity	Yes	Yes	Yes	Yes	Yes	Yes
Improves Multimodal Linkage	Potentially	Potentially	Potentially	Potentially	Potentially	Potentially
Cultural Resources						
NRHP-Listed Sites	Greenwood Cemetery	Greenwood Cemetery	Greenwood Cemetery	Greenwood Cemetery	Greenwood Cemetery	Greenwood Cemetery
NRHP-Listed Historic Districts	None	None	None	None	German Village	German Village
NRHP-Eligible Sites	None	None	None	None	None	None
Ohio Historic Inventory (OHI) Sites	1	3	None	None	4	4
Section 4(f)(6)(f) Sites						
Section 4(f)(6)(f) Sites	Combs Park (bisects), LJ Smith Park (minor), Butler County Fairgrounds (minor)	Combs Park (bisects), LJ Smith Park (minor), *Fairwood Elementary School (minor)	LJ Smith Park (bisects), Combs Park (bisects), GMR Recreational Trail (minor), *Fairwood Elementary School (minor)	LJ Smith Park (bisects), GMR Recreational Trail (minor), Bellline Trail (bisects), *Fairwood Elementary School (minor)	Combs Park (bisects), GMR Recreational Trail (minor), *Fairwood Elementary School (minor)	GMR Recreational Trail (minor), Bellline Trail (minor), *Fairwood Elementary School (minor)
Ecological Resources						
Great Miami River / Hydraulic Canal	1 crossing	1 crossing	2 crossings	2 crossings	1 crossing	1 crossing
Other Large Streams	None	None	None	None	None	None
Wetlands (not including Open Water features)	None	None	1	1	None	None
Floodplains and Floodway						
100-Year Floodplain Encroachment (not including Floodway)	< 1 ac	< 1 ac	20 - 30 ac	20-30 ac	4 ac	< 1 ac
100-Year Floodway Encroachment	< 5 ac	< 5 ac	< 5 ac	< 5 ac	< 5 ac	< 5 ac
Hazardous Materials						
Regulated Materials Review	11 LUST, 11 UST, 7 RCRA, 2 DERR sites, 3 sites with Institutional Controls, 3 VAP2, 1 spill, 1 NPL site	7 LUST, 4 UST, 7 RCRA, 2 spills, 1 site with Institutional Controls, 1 DERR site, 1 NPL site	7 LUST, 2 UST, 3 RCRA, 1 spill	7 LUST, 2 UST, 4 RCRA, 1 spill	5 LUST, 1 UST, 3 RCRA, 3 VAP, 1 spill, 1 DERR site, 2 sites with Institutional Controls	5 LUST, 1 UST, 4 RCRA, 3 VAP, 1 spill, 1 DERR site, 2 sites with Institutional Controls
Community and Land Use						
Farmland Impacts	None	None	15 - 25 acres	15 - 25 acres	None	None
Community Facilities	BCEO, Transitional Living Center, Grant Early Learning Center, Butler County Fairgrounds	BCESC Main Building, Transitional Living Center, Hamilton Fire Station 25, Fairwood Elementary School, Butler County Children Services, Butler County Fairgrounds, Juvenile Justice Center, Butler County Board of Developmental Disabilities	BCESC Main Building, Transitional Living Center, Fairwood Elementary School, Butler County Children Services, Juvenile Justice Center, Butler County Board of Developmental Disabilities, Butler County Fairgrounds	BCESC Main Building, Transitional Living Center, Fairwood Elementary School, Butler County Children Services, Juvenile Justice Center, Butler County Board of Developmental Disabilities, Butler County Fairgrounds, Riverview Food Mart	Butler County Fairgrounds, Butler County Children's Service, Butler County Board of Developmental Disabilities, Fairwood Elementary School, BCESC Main Building, Hamilton Fire Station 25, Transitional Living Center, Juvenile Justice Center, Minnick's Drive Thru	Butler County Fairgrounds, Butler County Children's Service, Butler County Board of Developmental Disabilities, Fairwood Elementary School, BCESC Main Building, Hamilton Fire Station 25, Transitional Living Center, Juvenile Justice Center, Minnick's Drive Thru, Riverview Food Mart
Cemeteries (Non-Historic)	Greenwood Cemetery (>0.5 ac)	None	None	None	Greenwood Cemetery <.05	Greenwood Cemetery <.05
Environmental Justice (EJ) Populations	Displacements of EJ Populations	Displacements of EJ Populations	Displacements of EJ Populations	Displacements of EJ Populations	Displacements of EJ Populations	Displacements of EJ Populations
Aesthetic Concerns						
Aesthetic Impacts	In order to cross the railroad, the new roadway will be elevated 30 feet and will block sight lines in the surrounding area. Tall retaining walls will be required on both sides of the new alignment in the steep section behind the Humane Society.	In order to cross the railroad, the new roadway will be elevated 30 feet and will block sight lines in the surrounding area. Tall retaining walls will be required on both sides of the new alignment in the steep section behind the Humane Society.	There will be a steep grade where the new alignment crosses the railroad, even after raising the profile of US 127 by 10 feet. The height of the new alignment will block sight lines in the surrounding area. Tall retaining walls will be required on both sides of the new alignment in the steep section behind the Humane Society.	There will be a steep grade where the new alignment crosses the railroad, even after raising the profile of US 127 by 10 feet. The height of the new alignment will block sight lines in the surrounding area. Tall retaining walls will be required on both sides of the new alignment in the steep section behind the Humane Society.	The road will be elevated 30-40 ft. with earth embankment where it bisects Combs Park. This will block sight lines in the park. There will be steep grades where the new alignment crosses the railroad and ties into US 127 and Vine Street. The height of the new alignment will block sight lines in the surrounding area and require retaining walls in close proximity to some properties. Tall retaining walls will be required on both sides of the new alignment in the steep section behind the Humane Society.	There will be steep grades where the new alignment crosses the railroad and ties into US 127 and Vine Street. The height of the new alignment will block sight lines in the surrounding area and require retaining walls in close proximity to some properties. Tall retaining walls will be required on both sides of the new alignment in the steep section behind the Humane Society.
Stakeholder/Public Involvement						
Public Concerns	TBD	TBD	TBD	TBD	TBD	TBD
Stakeholder Concerns	TBD	TBD	TBD	TBD	TBD	TBD
Right-of-Way						
Residential Relocations	45	87	90	91	76	76
Commercial Relocations	4	3	2	2	6	7
Right-of-Way (acres)	10 - 20 acres	20 -30 acres	50 - 60 acres	45 - 55 acres	25 - 35 acres	20 - 30 acres
Engineering Considerations						
Alternative Length (mi)	3.02	2.44	3.2	2.49	3.3	2.65
Design Speed (mph)	35	35	35	35	35	35
Roadway Design Issues	Requires North B Street to be raised roughly 5 feet at west terminus. Proximity of US 127 intersection to power plant reduces sight distance. Bikeway along the canal was reduced to a 10 foot width. Steep grade on alignment near Humane Society and requires retaining wall. Intersection of Princeton Road is skewed.	Requires North B Street to be raised roughly 5 feet at west terminus. Proximity of US 127 intersection to power plant reduces sight distance. Width of bikeway on Heaton Street reduced to 8 foot width at cemetery. Steep grade on alignment near Humane Society and requires retaining wall. Intersection of Princeton Road is skewed.	Proximity of Elkton Road / NW Washington Blvd intersection to roundabout and steep existing grades near roundabout. Steep grade approaching US 127 intersection from the west due to elevation of railroad crossing. Steep grade on alignment near Humane Society and requires retaining wall. Intersection of Princeton Road is skewed.	Steep grade approaching US 127 intersection from the west due to elevation of railroad crossing. Steep grade on alignment near Humane Society and requires retaining wall. Intersection of Princeton Road is skewed.	Proximity of Elkton Road / NW Washington Blvd intersection to roundabout and steep existing grades near roundabout. New intersection with US 127 located in a curve and will have to accommodate two additional streets in close proximity to intersection. Heaton Street profile may require raising 1 to 3 feet and the sidewalk along Heaton Street reduced to 8 foot width to minimize total property takes. Steep grade on alignment near Humane Society and requires retaining wall. Intersection of Princeton Road Skewed.	Steep grade approaching US 127 intersection from the west due to the elevation of the railroad crossing. New intersection with US 127 located in a curve and will have to accommodate two additional streets in close proximity to intersection. Heaton Street profile may require raising 1 to 3 feet and the sidewalk along Heaton Street reduced to 8 foot width to minimize total property takes. Steep grade on alignment near Humane Society and requires retaining wall. Intersection of Princeton Road is skewed.
Existing Flood Levy Design Issues	Proximity of North B Street to the existing levy system will require the profile to be elevated to avoid the levy. This will require raising the west terminus roughly 5 feet.	Proximity of North B Street to the existing levy system will require the profile to be elevated to avoid the levy. This will require raising the west terminus roughly 5 feet.	No existing flood levy at this location	The offset of North B Street to the existing levy system will allow a smooth transition of the proposed alignment over the levy to North B Street. This will limit raising at the west terminus to less than 2 feet.	No Existing flood levy at this location.	The offset of North B Street to the existing levy system will allow a smooth transition of the proposed alignment over the levy to North B Street. This will limit raising at the west terminus to less than 2 feet.
Number of New Structures Requiring Long-Term Maintenance	2	2	3	3	2	2
Structural Design Issues	River Bridge - tie into floodwall system required RR bridge - Severe skew complicates design	River Bridge - tie into floodwall system required RR bridge - Severe skew complicates design	No significant issues	River Bridge - Curve at the SE end of bridge, skewed alignment and location of dam complicates design. Potential scour concerns.	No significant issues	River Bridge - Curve at the SE end of bridge, skewed alignment and location of dam complicates design. Potential scour concerns.
Major Utility Relocations and/or Issues	Power plant located on US 127 impacted.	Power plant located on US 127 impacted.	Electric Transmission Line relocations required at NW Washington Blvd. Coordination with hydroelectric plant. Potential power substation impacts at US 127.	High voltage power-line tower relocations required along North B Street. Coordination with hydroelectric plant. Potential power substation impacts at US 127.	Electric Transmission Line relocations required at NW Washington Blvd.	High voltage power-line tower relocation required along North B Street
Traffic/Maintenance of Traffic Considerations						
Anticipated Alternative Travel Time (MM:SS)	7:39	5:48	5:53	5:50	05:51	05:48
Anticipated High Street (SR 129) Annual VHT Savings	AM Peak-Hour - 200 PM Peak-Hour - 0	AM Peak-Hour - 3,600 PM Peak-Hour - 9,900	AM Peak-Hour - 5,700 PM Peak-Hour - 13,600	AM Peak-Hour - 8,100 PM Peak-Hour - 17,900	AM Peak-Hour - 8,700 PM Peak-Hour - 18,400	AM Peak-Hour - 6,200 PM Peak-Hour - 14,800
Anticipated % Reduction in High Street (SR 129) Traffic	AM Peak-Hour - 0% PM Peak-Hour - 0%	AM Peak-Hour - 4% PM Peak-Hour - 4%	AM Peak-Hour - 6% PM Peak-Hour - 6%	AM Peak-Hour - 11% PM Peak-Hour - 12%	AM Peak-Hour - 7% PM Peak-Hour - 7%	AM Peak-Hour - 12% PM Peak-Hour - 13%
Maintenance of Traffic Concerns	Complicated construction staging at North B Street. North B Street may require a closure to raise the profile. Complex detour would be required.	Complicated construction staging at North B Street. North B Street may require a closure to raise the profile. Complex detour would be required.	Construction of roundabout at the intersection of W Elkton Rd and N B St will likely require a closure.	Construction of roundabouts on North B Street will likely require a closure.	Construction of roundabout at the intersection of W Elkton Rd and N B St will likely require a closure. Heaton Street may require a closure to raise the profile.	Construction of roundabouts on North B Street will likely require a closure. Heaton Street may require a closure to raise the profile.
Preliminary Cost Estimates						
Preliminary Construction Costs	\$70 - \$80 million	\$90 - \$100 million	\$90 - \$100 million	\$115 - \$125 million	\$65 - \$75 million	\$90 - \$100 million
Preliminary Right of Way Costs	\$5 - \$10 million	\$17 - \$22 million	\$10 - \$20 million	\$10 - \$20 million	\$15 - \$25 million	\$15 - \$25 million
Preliminary Design & Management	\$13 - \$18 million	\$12 - \$17 million	\$16 - \$21 million	\$21 - \$26 million	\$12 - \$17 million	\$16 - \$21 million
Preliminary Total Cost	\$88 - \$108 million	\$98 - \$118 million	\$116 - \$141 million	\$146 - \$171 million	\$92 - \$117 million	\$121 - \$146 million
Conclusion						
Recommended for Further Study?	Not Recommended for Further Study	Not Recommended for Further Study	Recommended for Further Study	Recommended for Further Study	Recommended for Further Study	Recommended for Further Study

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7.0 ALTERNATIVES RECOMMENDED FOR FURTHER STUDY

Based on the engineering and environmental information developed during the Feasibility Study and summarized in this report, as well as the public input received on the preliminary alternatives presented at the In-person and Virtual Public Open Houses, the City of Hamilton, Butler County TID, and ODOT selected several alternatives to evaluate further in an Alternatives Evaluation Report (AER), the next phase of project development. The alternatives which have been selected to advance for further development are ABE, EBE, AF1 and EF1. Due to funding considerations, it is anticipated that the project will be constructed in three phases: Phase 1 extends from the western terminus at North B Street, includes the new bridge over the Great Miami River and terminates at US 127; Phase 2 extends from US 127, includes a new overpass of the CSX railroad, and terminates at SR 4 and Phase 3 extends from SR 4 to the eastern terminus at SR 129. Therefore, recommendations for alternatives to advance for further study are presented for each phase.

Phase 1 – North B Street to US 127, including a new river crossing: Two alternative river crossings will be evaluated: a northern and southern crossing as discussed below.

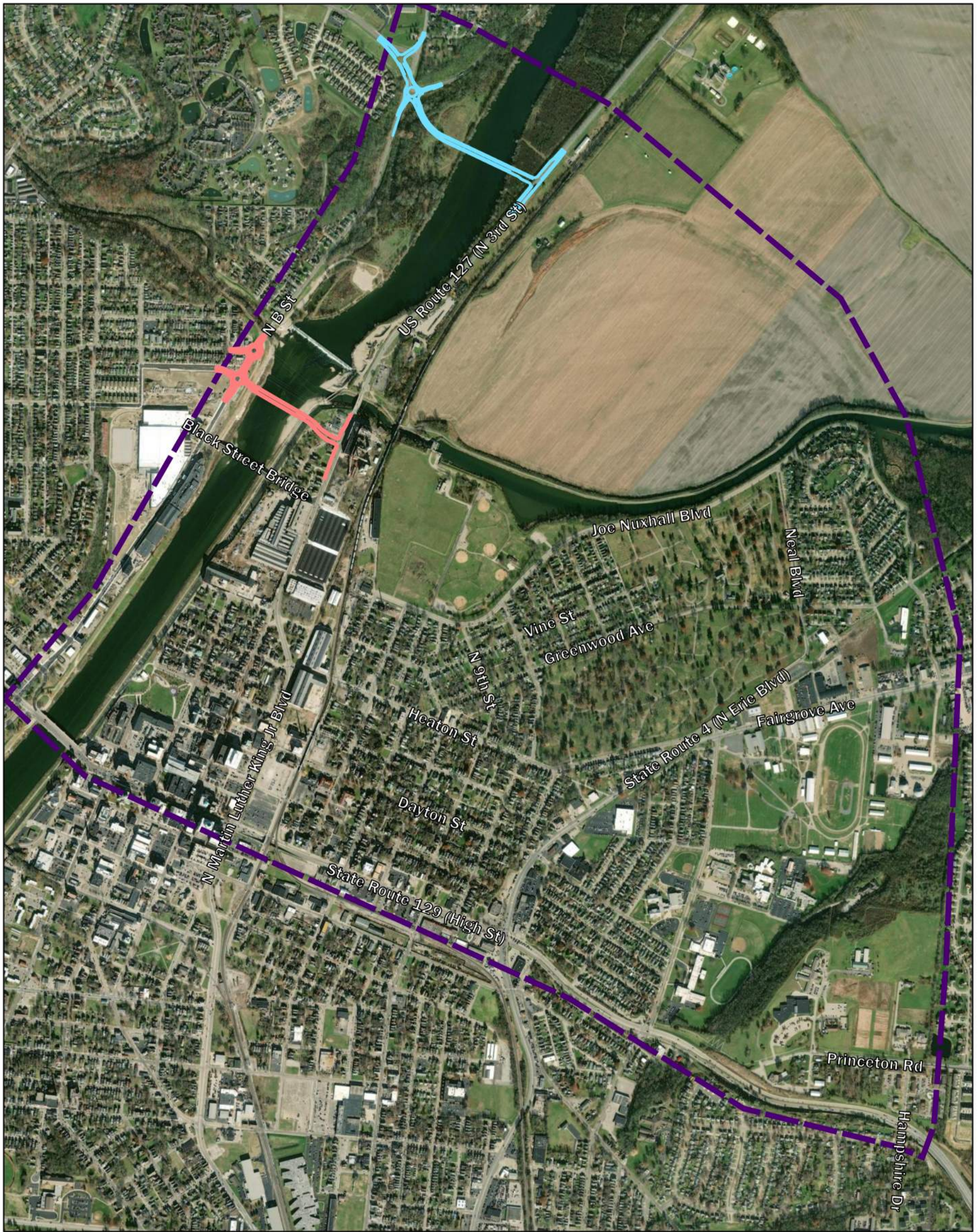
Northern River Crossing: The northern river crossing would tie-in to NW Washington Boulevard. This river crossing is included in Alternatives ABE and AF1. This alternative provides the following advantages over river crossings to the south:

- Does not add NHX traffic to congestion in vicinity of the Spooky Nook development;
- Provides regional connectivity to SR 177 and areas of western Butler County.

Southern River Crossing: A southern bridge crossing was included in Alternatives EBE and EF1 which crossed the river at a skew over the hydraulic dam and connected on the west bank in the vicinity of the Rhea Avenue/North B Street intersection. Based on comments received from ODOT, the alignment of this crossing was modified to eliminate the skewed crossing to reduce the design complexity and costs of the bridge, as well as potential impacts to the hydraulic dam. The southern crossing, which will be advanced to the AER, crosses the river south of the hydraulic dam, still connecting on the west bank in the vicinity of the Rhea Avenue/North B Street intersection. On the east bank, the alignment would run along the electric substation before connecting to US 127 with a T-intersection. This alternative provides the following advantages:

- Provides proximity to the existing Black Street Bridge and would, therefore, cause less disruption to current travel patterns;
- Provides direct access to the Spooky Nook development, as well as the prime development areas on the east bank of the river in the vicinity of North 3rd Street and Black Street.

Both river crossings, which are shown on **Figure 40**, provide connectivity to destinations west of the NHX study area. In



Notes
 1. Coordinate System: NAD 1983 StatePlane Ohio South FIPS 3402 Feet
 2. Base Features Produced from Project Map Designs
 3. Background: Light Gray Base: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA
 World Imagery: Maxar

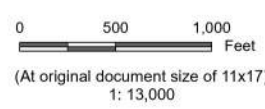
Legend

River Crossing Alternatives

- Northern River Crossing
- Southern River Crossing

Study Area

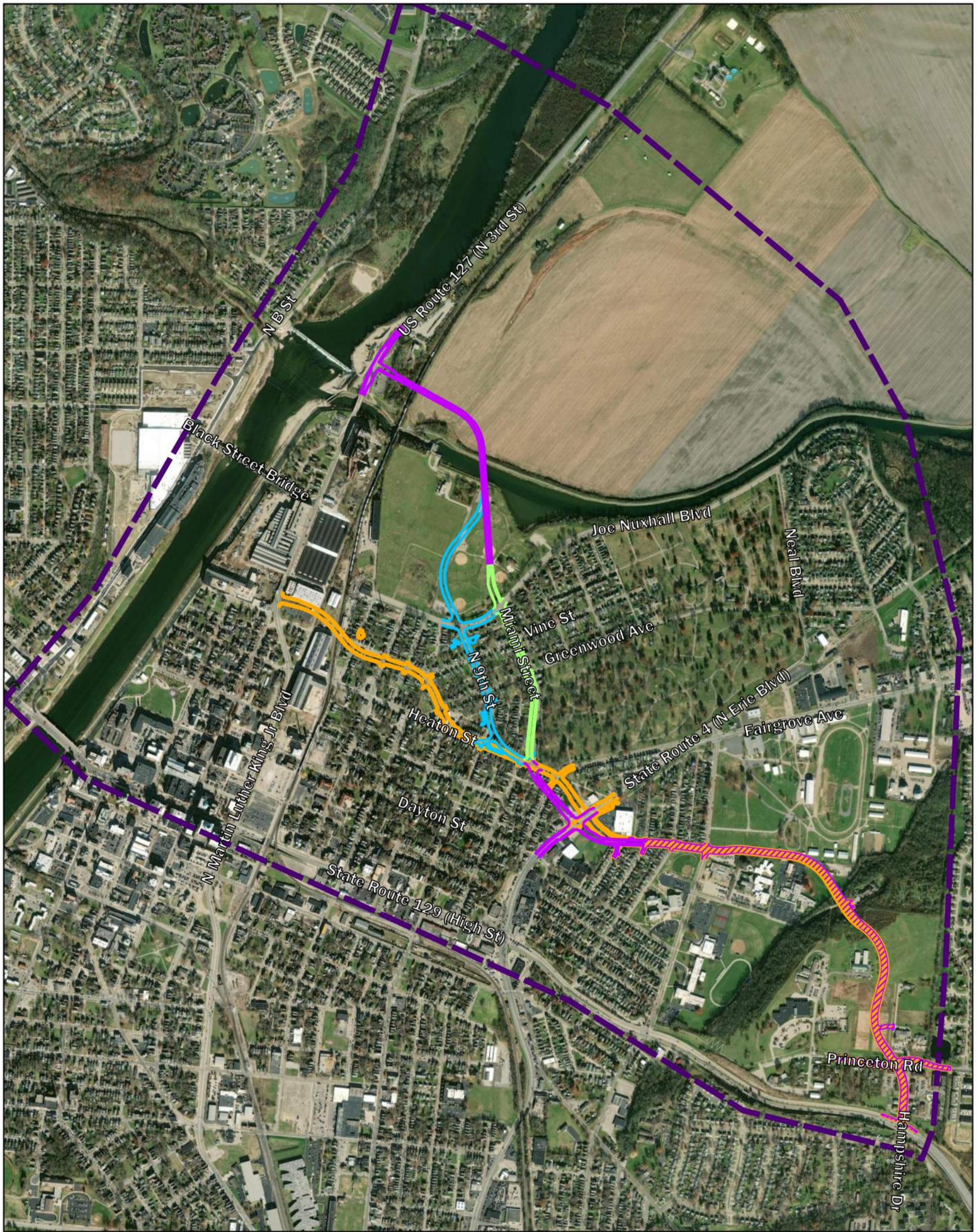
- Study Area



<i>Project Location</i> City of Hamilton Butler County, Ohio	Prepared by RG on 2023-01-06
<i>Client/Project</i> North Hamilton Crossing (NHX) PID 115755 Feasibility Study	173620130

Figure No.
40

Title
Recommended River Crossing Alternatives



Notes
 1. Coordinate System: NAD 1983 StatePlane Ohio South FIPS 3402 Feet
 2. Base Features Produced from Project Map Designs
 3. Background: Light Gray Base: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA
 World Imagery: Maxar

Legend

Roadway Alternatives

- Alternatives AF1/EF1
- Alternatives ABE/EBE
- Alternatives ABE/EBE 9th Street Variation
- Alternatives ABE/EBE Miami Street Variation

Study Area

- Study Area

(At original document size of 11x17)
1: 13,000

<i>Project Location</i> City of Hamilton Butler County, Ohio	Prepared by RG on 2023-01-06
<i>Client/Project</i> North Hamilton Crossing (NHX) PID 115755 Feasibility Study	173620130
<i>Figure No.</i> 41	
<i>Title</i> Recommended Alignments	

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- addition, both river crossings could connect with any of the recommended alignments from Phases 2 & 3 (US 127 to SR 129), which are described in the following section.

Phases 2 & 3 – US 127 to SR 129, including an overpass of the CSX Railroad: In Phases 2 and 3, the alignments for ABE and EBE are the same, since the only difference between these alternatives is the bridge crossing included in Phase 1. Similarly, the alignments for Alternatives AF1 and EF1 are the same in Phases 2 and 3. Phases 2 and 3 are as follows:

Phase 2 – Alternatives ABE and EBE: Alternatives ABE and EBE (now one alignment ABE/EBE) will connect with US 127 using a traditional T-type intersection just north of the hydraulic dam, then continue east, bridging over the CSX railroad and traveling across the southwest corner of the floodplain on the Bonham Farm then traveling across the hydraulic canal. From there, ABE/EBE travels south through LJ Smith Park and follows either North 9th Street or Miami Street to Heaton Street. ABE/EBE then continues east to an intersection with SR 4 in the vicinity of the fire station.

Phase 2 – Alternatives AF1 and EF1: In Phase 2, Alternatives AF1 and EF1 (now one alignment AF1/EF1) also begin at a T-type intersection with US 127, then follow US 127 to a new intersection just north of the existing US 127/Vine Street intersection. AF1/EF1 then cross the CSX railroad tracks and continue in a southeasterly direction, following Vine Street, North 8th Street, and Heaton Street until reaching SR 4.

Phase 3: In Phase 3, which extends from SR 4 to SR 129, Alternatives ABE, EBE, AF1, and EF1 follow the same alignment. At SR 4 the alternatives continue along Gilmore Avenue and south of the Butler County Fairgrounds before turning south to the intersection of SR 129 and Hampshire Drive.

The Phase 2 and 3 alignments for recommended Alternatives ABE, EBE, AF1, and EF1 are shown on **Figure 41**. Alternatives ABE, EBE, AF1 and EF1 were selected because they best balance the transportation benefits and impacts of the eighteen conceptual alternatives evaluated in the Feasibility Study. While each of the conceptual alternatives meet the project purpose to improve east-west connectivity north of SR 129 in the City of Hamilton in order to reduce congestion and improve mobility, the alternatives vary in their benefits, impacts, and costs. The Evaluation Matrix provided as **Table 21** compares each alternative based on these factors. The primary reasons that Alternatives ABE, EBE, AF1 and EF1 were selected for further study are as follows:

Each Support the City of Hamilton’s Economic Development Goals: A Secondary Goal of this project is to support Hamilton’s ongoing economic development. As discussed in Section 4.7, Hamilton has identified eight prime development areas in which significant development is planned or underway. Each of the recommended alternatives support the City’s economic development goals by improving access to many of these areas. In addition, none of the alternatives bifurcate any of the sites, which would reduce or eliminate their development potential. Each of the alternatives improve access to four large development sites located on the east bank of the Great Miami River between the river and the CSX tracks. These sites together total approximately 37 acres. Alternatives EBE and EF1 provide direct access to the Spooky Nook

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Sports Complex, since they include roundabouts on North B Street near the Spooky Nook development and Alternatives AF1 and EF1 improve access to the Beckett Paper site, located at the corner of 3rd Street and Black Street.

Each Avoid Significant Design Issues: As discussed in the Section 4.3, several of the preliminary alternatives require that North B Street be raised approximately five feet to meet intersection design criteria and/or require that US 127 be raised approximately ten feet to provide sufficient clearance of the CSX railroad. The impacts to North B Street and US 127 would likely require closure of both roads and the implementation of a complex detour for several months, exacerbating traffic issues. Beyond Maintenance of Traffic issues, the raising of the North B Street and US 127 would create undue impacts to surrounding properties, including the need for large retaining walls adjacent to existing buildings, cutting off direct access to properties, etc. Each of the recommended alternatives avoid this issue.

Each are Effective in Relieving Traffic Congestion: The recommended alternatives are among the most effective in relieving traffic congestion on routes in the NHX study area, including SR 129. Alternative EF1 is the second most effective alternative, carrying up to 1,900 vehicles per hour (VPH) and diverting 12 to 13 percent of traffic from SR 129 during the peak hours. Alternative EBE was found to be the third most effective alternative, carrying up to 1,900 VPH and providing an 11 to 12 percent reduction in traffic on SR 129. Alternative AF1 was the fourth most effective alternative, with up to 2,100 VPH using the new route and seven percent diversion from SR 129. It should be noted that while Alternative E is the most effective in relieving traffic congestion (carries up to 2100 VPH and diverts 14-15 percent of traffic from SR 129 during the peak hours), it was less desirable than the recommended alternatives because it would bifurcate two significant prime development sites on the west bank of the river and would, therefore, not support the City of Hamilton's economic development goals.

Each Avoid Direct Impacts to Chem-Dyne Site: Each of these alternatives avoid direct impacts to the Chem-Dyne Superfund site.

Other Considerations: Each of the recommended alternatives have environmental and social impacts that will require further engineering study to avoid, reduce, or mitigate. Of the eighteen preliminary alternatives, the recommended alternatives would require the greatest number of relocations. Alternatives ABE and EBE would require an estimated 91 relocations and AF1 and EF1 would require an estimated 76 relocations. In the next phase of the project, the Project Team will consider refinements to these alternatives to reduce the number of relocations. One such refinement which will be explored is modifying Alternatives ABE and EBE to utilize North 9th Street as an option to Miami Street, which would reduce relocations along Miami Street.

In addition, the City of Hamilton recognizes that relocation impacts from the recommended alternatives are significant and is actively developing mitigation strategies for these impacts. As discussed in Section 4.7, the City is working with Neighborhood Housing Services of Hamilton, Inc. (NHS) to address relocation options for displacements of residents that may result from the NHX project. The City and NHS have identified several city-owned vacant lots within and adjacent to the North End neighborhood which may be candidates to build replacement housing for the North Hamilton Crossing project. NHS is proposing to build single family homes on these open lots which would be made available for displaced North End residents. In addition to new construction, the city is exploring options for rehabilitation of existing vacant homes within

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the neighborhood. This would allow displaced residents to remain within their community. Additionally, the NHS Rental program may be utilized to assist relocation of residents who do not own a home or do not want to purchase a new home. Participants in this program must meet income requirements, pay utilities, and are subject to a background check. Multiple strategies are being considered to facilitate relocation of tenants, including monetary or time-based rent-relief programs. This initiative will be further developed as part of the NHX project.

In addition, Alternatives ABE and EBE bisect LJ Smith, a community park in the North End neighborhood which includes a sprayground, playground and Joe Nuxhall baseball fields. This is a significant community asset for the North End. Alternative AF1 would bisect Combs Park, an undeveloped park along the Great Miami River. In addition, Alternatives ABE and EBE would each impact 20 – 30 acres of floodplain. Each of these impacts are significant and will require additional engineering studies to determine if they can be minimized or mitigated.

8.0 NEXT STEPS

The next steps to be undertaken in the project development process include the preparation of the Alternatives Evaluation Report (AER) and the pursuit of project funding.

Alternative Evaluation Report (AER)

The AER includes many of the same elements as the Feasibility Study, however, the level of detail presented is much greater to enable the City of Hamilton, the BCTID and ODOT to make an informed decision on the preferred alternative. As previously discussed, Alternatives ABE, EBE, AF1, and EF1 are recommended for further evaluation in the AER along with the No Build Alternative. During the AER, the key features of the alternatives will be developed in greater detail and additional engineering and environmental studies will be undertaken, which will include field surveys. Coordination will be initiated with resource agencies, CSX railroad, and other agencies with interests in the NHX project area. In addition, public involvement will continue with the communities in the NHX study through the refinement of the project alternatives.

Funding

The project was awarded \$2 million from TRAC funding, with a \$2 million local match. These funds will be disbursed as follows: \$0.5 million for fiscal year (FY) 2023, \$1.5 million total for fiscal years 2023 - 2026. These funds will be used to develop the Alternatives Evaluation Report (AER). Additional federal and state funding is being pursued for to cover the costs of the project through construction. A more detailed funding plan will be developed for inclusion in the AER. It is anticipated that the project will be constructed in three Phases: Phase 1 includes extends from the western terminus at North B Street, includes the new bridge over the Great Miami River and terminates at US 127; Phase 2 extends from US 127, includes a new overpass of the CSX railroad, and terminates at SR 4 and Phase 3 extends from SR 4 to the eastern terminus at SR 129.

FEASIBILITY STUDY

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9.0 REFERENCES

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