HAM Wasson Way to Otto Armleder

PID 113603

Feasibility Study

November 1, 2024

Prepared for:

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1.0 INTRODUCTION

The City of Cincinnati, in cooperation with the Ohio Department of Transportation (ODOT), is proposing a new shared use path connection from the Wasson Way Trail to Otto Armleder Park. The proposed project is located in the Village of Fairfax and the City of Cincinnati in southeast Hamilton County (See **Figures 1 and 2**). This project is divided into three separate contiguous sections, starting with the northern section of the trail (Segment 1), which extends from the existing Wasson Way Trail at Ault Park and travels generally south to Wooster Pike. The middle section of the trail (Segment 2) crosses over the existing Norfolk Southern Railroad using the Wooster Road bridge near the intersection of Wooster Pike, Wooster Road and Red Bank Road. The southern section of the trail (Segment 3) extends from the Wooster Road bridge to the Otto Armleder Memorial Park and Recreation Complex at Armleder Road. This Feasibility Study was prepared as part of ODOT's Project Development Process to document the process used to recommend a preferred alternative for the Wasson Way to Otto Armleder Project (PID 113603). This report summarizes the results of the engineering and environmental studies conducted to date, as well as input received from project stakeholders and the public throughout the development of the project.

1.1 PROJECT HISTORY

Project Development

In 2017, ODOT prepared a *Transportation Needs Analysis* for Segments II and III (PID 86462) of the Eastern Corridor Program, a multi-modal transportation improvement program extending from downtown Cincinnati and communities through eastern Hamilton County and into western Clermont County, Ohio. The Eastern Corridor Program is a coordinated series of regional transportation improvement studies and projects in varying stages of planning, construction, and completion. Transportation needs in the Segments II and III study area were identified through technical studies and confirmed and refined through community and stakeholder input and, in August of 2019, were compiled into the *Conceptual Alternatives Implementation Plan* for Segments II and III. The project team conducted extensive public and stakeholder outreach to learn how communities prioritized transportation needs with respect to community goals, objectives, and ongoing planning. The need to address bicycle connectivity along designated US Bicycle Route 21 was identified as a primary need by this study. The need for pedestrian and bicycle connectivity from across railroad tracks to existing Armleder and Lunken bike paths was identified as a secondary need. When these initial studies were conducted, US Bicycle Route 21 and Ohio Bicycle Route 1 followed Wooster Road. However, when the Little Miami Scenic Trail (LMST) connector at Beechmont was completed, the designated bicycle routes were modified to stay on the LMST and connect directly to the Lunken Trail System. Although Wooster Road is no longer designated as a bicycle route, there is still a need to address pedestrian and bicycle connectivity in the study area. Excerpts from the 2017 Transportation Needs Analysis relevant to this project can be found in **Attachment A**.

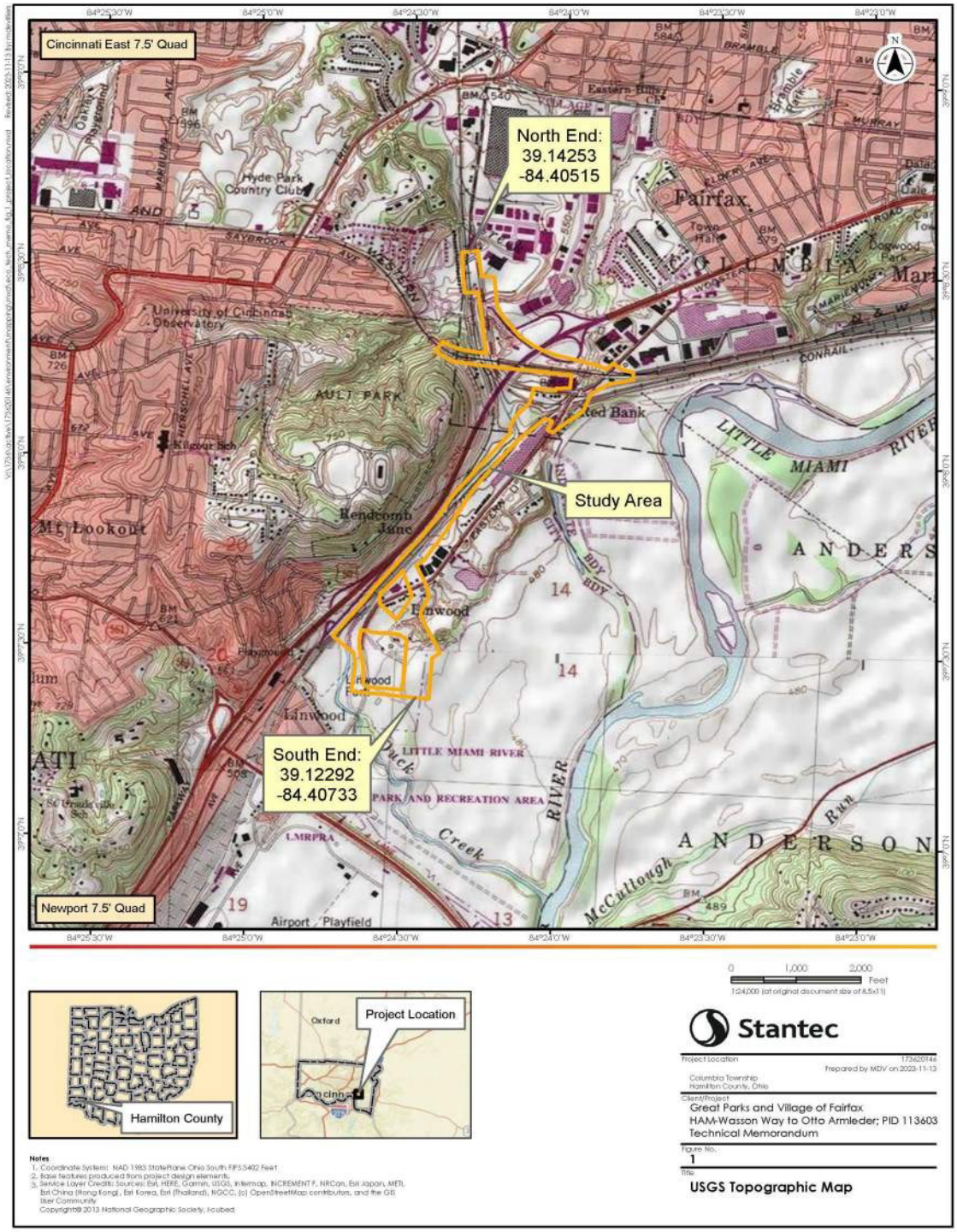

***Figure 1**: USGS Topographic Map*

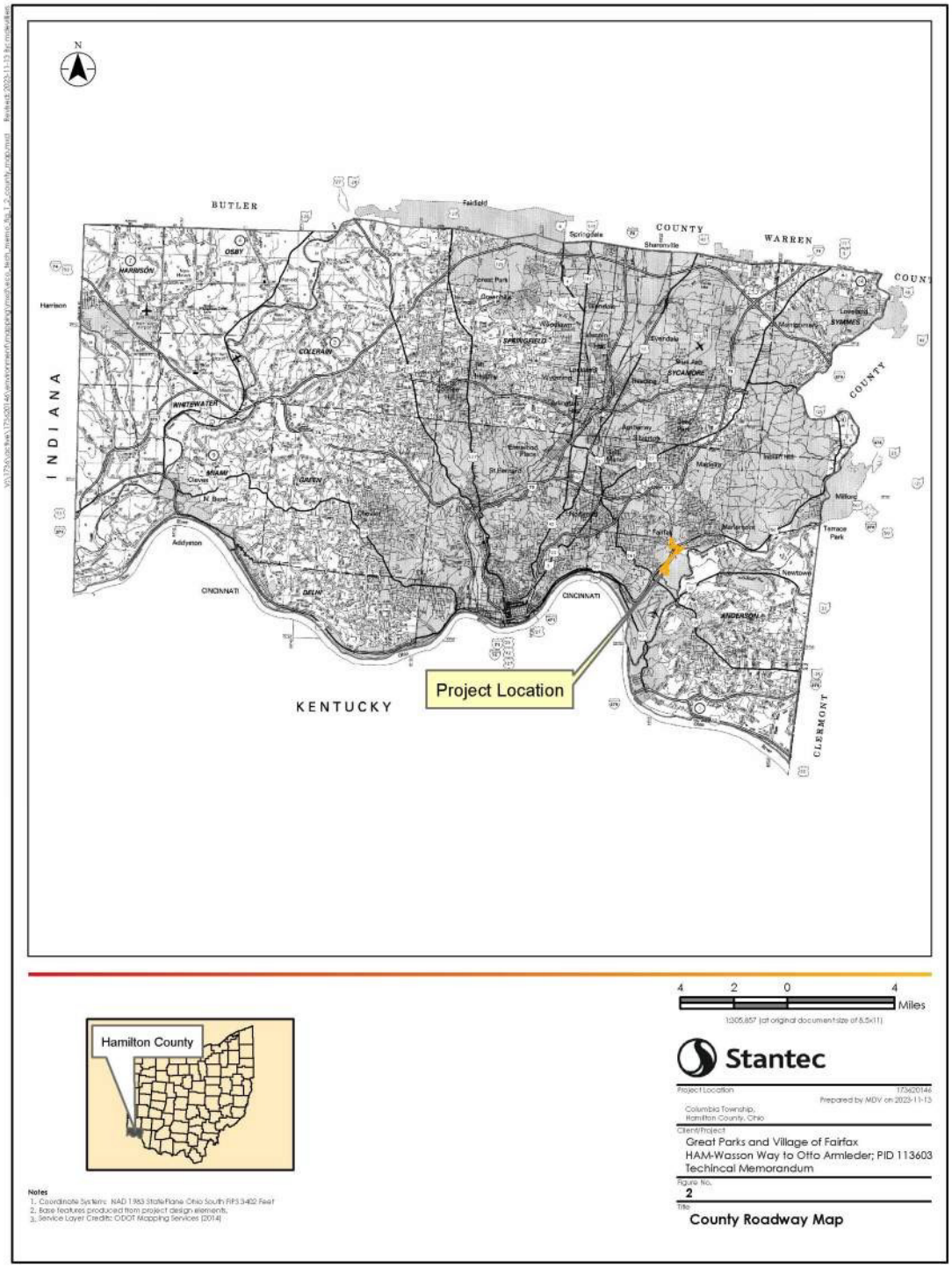

Figure 2: *County Roadway Map*

Based on the transportation needs identified in the 2017 Needs Analysis, ODOT began to develop project concepts which would address these needs. Concepts were developed through extensive input from five Advisory Committees comprised of stakeholders from six focus areas identified within the study area for Segments II and III. Advisory Committee members included elected officials, transportation planning professionals, and community and interest group representatives. Advisory Committee members assisted with identifying, evaluating, and prioritizing recommended solutions for transportation needs within their assigned focus area, as well as developing strategies for implementation.

Each Advisory Committee convened for four work sessions throughout this process for a combined total of 20 meetings. Two public meetings were also held throughout the development and refinement of the transportation concepts. Through this process, 68 transportation concepts were recommended for the Segments II and III study area and are identified in the *Conceptual Alternatives Implementation Plan* dated June 21, 2019. The Implementation Plan identified several concepts to improve pedestrian and bicycle connectivity in this area. These concepts would create a connection to Armleder Park from various starting points along Wooster Pike, Red Bank Road, or Ault Park meant to create a pedestrian/bicycle path that is separate from roadway traffic. Excerpts from the *Conceptual Implementation Plan* relevant to this project can be found in **Attachment B**. The purpose of this report is to complete a Feasibility Study (FS) to provide a recommended preferred alternative for this connection.

Consistency with Local and Regional Planning

This project is consistent with local and regional trail planning efforts underway by the City of Cincinnati and Great Parks of Hamilton County. The proposed trail extension will be part of the proposed CROWN (Cincinnati Riding or Walking Network), a planned 34-mile urban trail loop around Cincinnati. When it is complete, CROWN will connect regional trails currently in development including Wasson Way, Ohio River Trail East, Little Miami Scenic Trail (LMST), Ohio River Trail West, Mill Creek Greenway Trail, and Canal Bikeway and will provide a link to 54 communities (TriState Trails, 2023). The proposed trail is included in the Ohio-Kentucky-Indiana (OKI) 2050 Metropolitan Transportation Plan (approved June 11, 2020).

2.0 PURPOSE AND NEED

2.1 PROJECT PURPOSE

The purpose of the proposed project is to address pedestrian and bicycle connectivity from Wasson Way to the Otto Armleder Memorial Park Trail and subsequently the LMST.

2.2 NEED ELEMENTS

Pedestrian and Bicycle Connectivity

There is a need to improve pedestrian and bicycle connectivity between Wasson Way, Otto Armleder Memorial Park, and the LMST. This trail is a vital connection in the CROWN (Cincinnati Riding or Walking Network) which will connect Greater Cincinnati's regional trails to Downtown Cincinnati.

3.0 ALTERNATIVES

3.1 NO BUILD ALTERNATIVE

Under the No Build Alternative, there would be no improvement in pedestrian and bicycle connectivity along Wooster Pike between Wasson Way in Ault Park at the northern terminus and Otto Armleder Park at the southern terminus.

3.2 BUILD ALTERNATIVES

During the 2019 *Conceptual Alternatives Implementation Plan,* several concepts were developed to address pedestrian and bicycle connectivity between the Wasson Way Trail and Otto Armleder Park. Concept E7 was recommended for further study as a "Medium Priority" project in the *Conceptual Alternatives Implementation Plan*. This concept proposed various new shared use path alignments connecting to the gravel path in Ault Park, continuing west of Wooster Pike, then crossing the roadway to connect to the Wasson Way Trail and terminating at Otto Armleder Park. Using these concepts, several alternatives were developed and evaluated to improve bicycle and pedestrian connectivity in this area.

The Build Alternatives also help bridge the gap between two areas of high "Active Transportation Need". Active Transportation Need uses several indicators to determine the level of need for bicycle and pedestrian facilities in a particular area. These indicators include concentrations of minority groups, youth, older adults, poverty, adults with no high school diploma, people with limited English proficiency, and people with no access to a motor vehicle. Building bicycling and walking facilities in these high need areas can help provide multiple transportation options and decrease some of the economic and health burdens experienced by residents (ODOT, 2020).

Each Build Alternative also provides a facility to and from areas of moderate "Active Transportation Demand". Active Transportation Demand is determined by the following factors: employment density, population density, walk/bike commute mode share, park density, presence of college/university, retail employment density, and number of people 20% below poverty line. The areas within the project limits are both areas with relatively moderate Active Traffic Demand (ODOT, 2023). Therefore, each Build Alternative provides a safer facility that connects Ault Park to Otto Armleder Park.

As previously mentioned, this project is divided into three contiguous sections. Segment 1 extends from the existing Way Trail at Ault Park and travels generally south to Wooster Pike. Segment 2 crosses over the existing Norfolk Southern Railroad using the Wooster Road bridge near the intersection of Wooster Pike, Wooster Road and Red Bank Road. Segment 3 extends from the Wooster Road bridge to the Otto Armleder Memorial Park and Recreation Complex at Armleder Road. Alternatives for each of these three sections are described and evaluated separately in this Feasibility Study. The Build Alternatives are described below and shown on **Figures 3.1 and 3.2**, as well as in **Attachment C**.

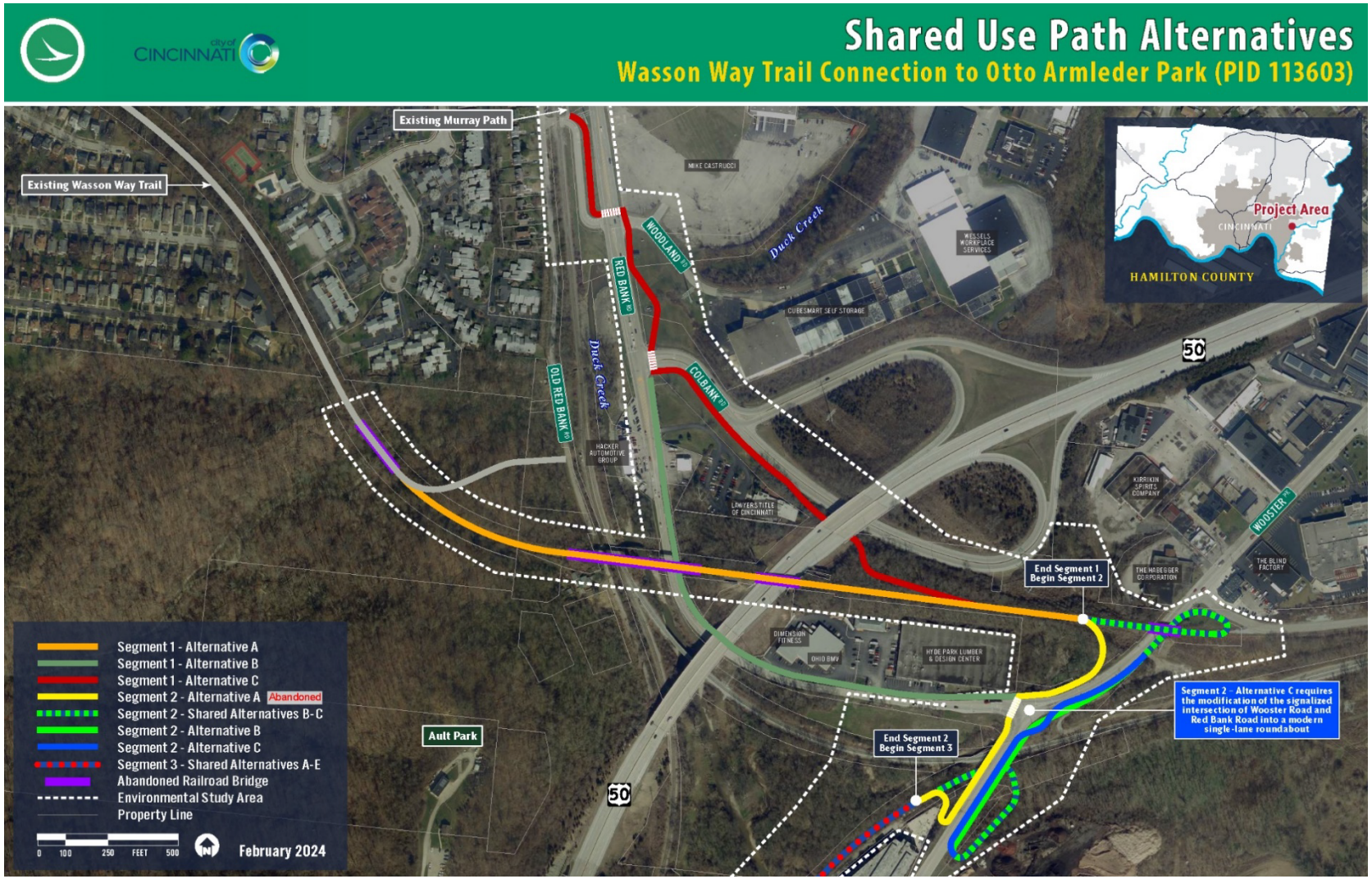

Figure 3.1: *Shared Use Path Alternatives Map*

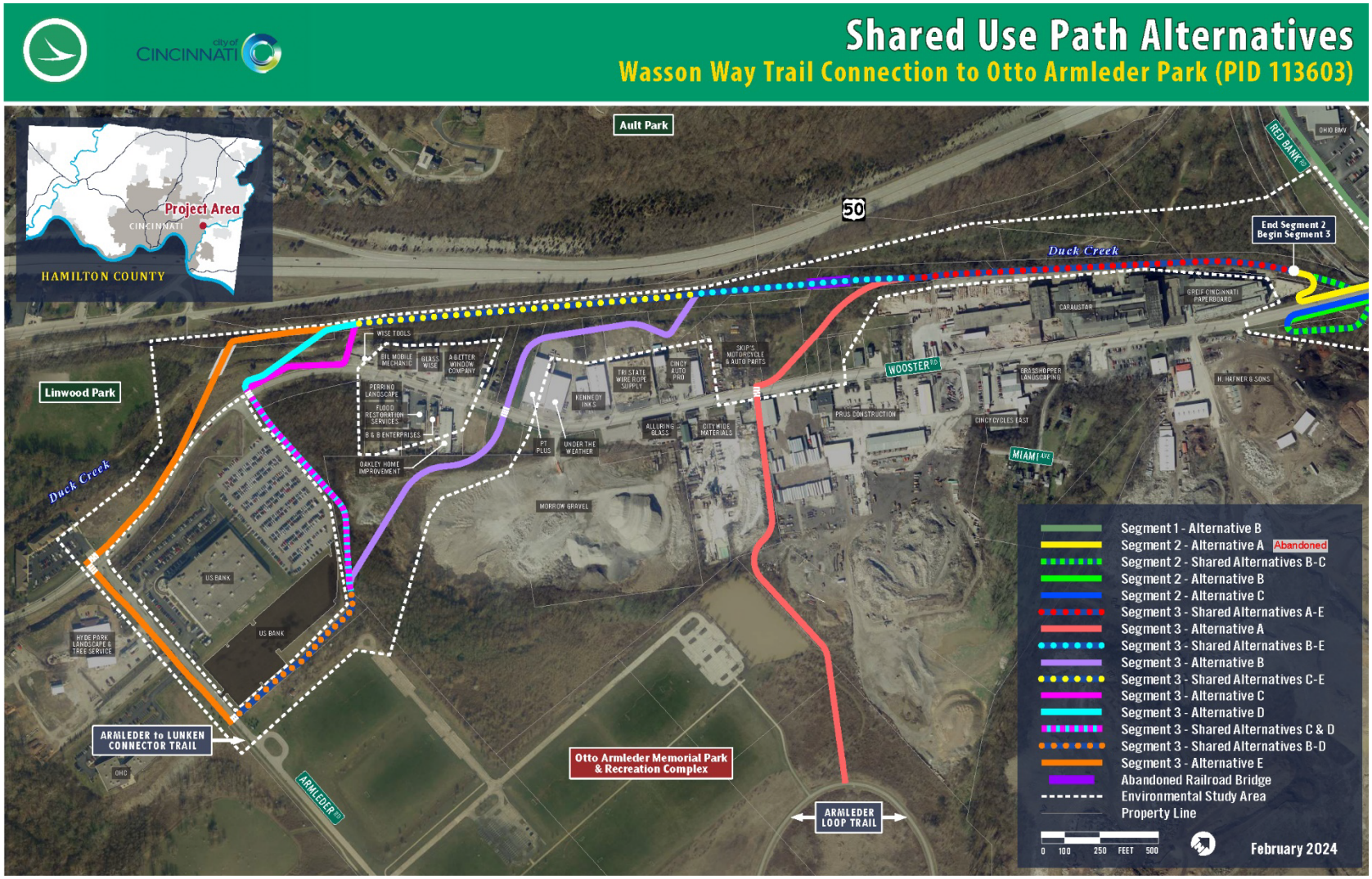

Figure 3.2: *Shared Use Path Alternatives Map*

Segment 1

Three build alternatives were developed for the Segment 1 portion of the project. These alternatives were:

Alternative A: This alternative starts at the existing Wasson Way Trail in Ault Park and continues southeast along the abandoned railroad line owned by the City of Cincinnati. The shared use path utilizes the existing railroad bridges to cross active rail lines, Red Bank Road, US 50, and Duck Creek. The trail crosses over Little Duck Creek by way of an existing culvert at the terminus point to Segment 2.

Alternative B: This alternative starts at the southern terminus of the Murray Path at the intersection of Woodland Road and Old Red Bank Road and follows along the east side of Red Bank Road to the intersection of Red Bank Road and Wooster Pike. The trail through this area would be a side path separated from the roadway by a five-foot-wide vegetated grass buffer. This alternative was advanced from the Implementation Plan and evaluated early in the feasibility study process but was dismissed from further consideration. One of the main issues with this alternative was the insufficient width between the existing railroad trestle and Red Bank Road as shown in **Figure 4**. The trestle creates an approximately 8-foot-wide pinch point which cannot accommodate the proposed 12-foot-wide shared use path on the east side of Red Bank Road. Additionally, the west side of Red Bank Road also has a railroad trestle as well as the floodwalls for Duck Creek and a guardrail which also creates a pinch point of approximately 5 feet, leaving neither side of Red Bank Road as a viable option. As such, **Alternative 1-B was excluded from resource specific evaluations and was not included in the evaluation matrix.**

Figure 4: *Pinch point between Railroad Bridge Trestles, the Duck Creek Floodwall, and Red Bank Road, facing south (Google Maps, 2022).*

Alternative C: This alternative starts at the southern terminus of the Murray Path at the intersection of Woodland Road and Old Red Bank Road. Alternative C then crosses Red Bank Road at the intersection with Woodland Road and continues down the east side of Red Bank Road to Colbank Road. At this intersection the trail crosses Colbank Road, then turns southeast to continue along the south side of Colbank Road, passing under US 50. East of US 50, the trail climbs the existing railroad embankment to connect to the existing abandoned railbed and follows the same alignment as Alternative 1-A to the Segment 2 connection. The shared use path will be separated from Woodland Road, Red Bank Road, and Colbank Road with a five-foot vegetated grass buffer.

Segment 2

Three build alternatives were developed for the Segment 2 portion of the project. These alternatives were:

Alternative A: From the connection with Segment 1, this alternative turns south and west along the north side of Wooster Pike and crosses Red Bank Road at the intersection with Wooster Pike. Alternative 2-A travels along the west side of the existing Wooster Pike Bridge over the Norfolk Southern railroad, then descends at a steep grade to a connection with Segment 3. This alternative was evaluated early in the process but dismissed from consideration for several reasons. The existing Wooster Road bridge cannot be widened to the west without adverse impacts to existing culverts, retaining walls, and other railroad infrastructure below the bridge. Additionally, a shared use path along the west side of the bridge would significantly exceed ADA compliant slopes in order to minimize impacts to adjacent properties. Finally, vehicular traffic moving westbound on Red Bank Road to southbound Wooster Road is the heaviest movement at this intersection. As such, it would be better to avoid placing a crosswalk on this approach. For these reasons, **Alternative 2-A was excluded from resource specific evaluations and was not included in the evaluation matrix.**

Alternative B: From the connection with Segment 1, this alternative continues east along the abandoned railroad over Wooster Pike, then turns north and west descending to meet Wooster Pike. The shared use path continues along the south side of Wooster Pike to the intersection with Red Bank Road. The shared use path would be separated from Wooster Pike by a five-foot vegetated grass buffer. The shared use path then continues south along the east side of Wooster Road. Widening of the Wooster Road Bridge over the railroad will be necessary to accommodate the trail. Once across the bridge and underlying active rail lines, the shared use path doubles back to descend the roadway embankment on the east side of Wooster Road, continues under Wooster Road, and terminates at the Segment 3 connection on the abandoned railroad.

Alternative C: This alternative follows the same general alignment as Alternative 2-B, however, instead of widening the Wooster Road bridge, it incorporates the construction of a single-lane roundabout at the Wooster and Red Bank Road intersection, thereby reducing the number of vehicular lanes required across the bridge from three to two and making room to accommodate the shared use path. In addition, the introduction of the roundabout requires an extension of the existing box culvert under the intersection. Most other aspects of this alternative are the same as Alternative 2-B.

Segment 3

Five build alternatives were developed for the Segment 3 portion of the project. All five alternatives utilize

the existing abandoned railroad from the connection at Segment 2 to travel southwest along Duck Creek, behind the existing businesses on Wooster Pike. These alternatives are described in further detail below:

Alternative A: This alternative turns south immediately before it crosses Duck Creek and crosses Wooster Pike, and travels along the Prus Construction property boundary to a connection with Armleder Loop Trail. This alternative was evaluated early in the process but was dismissed from more in-depth consideration for several reasons. The proximity and nature of the adjacent businesses would require long sections of this trail to be fenced in. Fencing on both sides creates security concerns for trail users. Another potential problem was the projected maintenance needs for a trail in this location, due to accumulation of construction debris from the adjacent properties. **Alternative 3-A was excluded from resource specific evaluations and was not included in the evaluation matrix.**

Alternative B: This alternative continues along the abandoned railroad and is carried across Duck Creek by the existing abandoned railroad bridge. The trail continues southwest for approximately 600 feet and then crosses Duck Creek a second time using a new bridge structure near the Cincy Auto Pro property. This alternative continues southwest along the left bank of Duck Creek, crosses Wooster Road at the Morrow Gravel property and continues through Morrow Gravel to the east side of the US Bank parking lot, reaching a terminus at Otto Armleder Memorial Park Trail.

Alternative C: Similar to Alternative 3-B, this alternative continues along the abandoned railroad and is carried across Duck Creek by the abandoned railroad bridge. Alternative C continues southwest for approximately 0.4 mile before crossing Duck Creek and following Wooster Road to the US Bank property. The route then crosses Wooster Pike and continues east and south along the US Bank property to a terminus at Otto Armleder Memorial Park Trail.

Alternative D: This alternative follows the same alignment as Alternative 3-C with one exception. Where Alternative 3-C turns sharply south to cross Duck Creek, Alternative 3-D continues generally straight (southwest) and crosses Duck Creek approximately 250 feet downstream from the proposed crossing for Alternative 3-C. It rejoins the Alternative 3-C alignment at the Wooster Road crossing and follows the same alignment described above to Otto Armleder Memorial Park Trail.

Alternative E: This alternative follows the same alignment as Alternative 3-C and Alternative 3-D but continues southwest and crosses Duck Creek adjacent to Linwood Park. Alternative E then continues southwest along the west side of Wooster Road and crosses the road at the existing signalized intersection with Armleder Road. The trail continues along the south side of Armleder Road and connects with the Otto Armleder Memorial Park Trail.

Design maps that display each alternative alignment, along with plan and profile sheets for each, can be found in **Attachment C**.

4.0 KEY ISSUES

This section summarizes the technical studies and information that were considered as part of the evaluation and selection of a preferred alternative.

The design user for this proposed shared use path project is the “interested but concerned” user as defined by ODOT’s Multimodal Design Guide (MDG). This user profile matches the user profile believed to be using the adjacent Little Miami Scenic Trail and includes users of all ages and skill levels. Based on Figure 3-1 of the MDG, “Bicyclist Design User Profiles”, 51% to 56% of the total population are interested in using bike facilities but are concerned for their safety and may not use less protected bike facilities, such as bike lanes, if these facilities don’t meet their perceived level of comfort (ODOT, 2024).

4.1 SAFETY ANALYSIS

4.1.1 No Build Alternative

Without construction of the proposed project, there would be no improvement in bicycle and pedestrian facilities between Wasson Way at Ault Park and the Otto Armleder Park Memorial Trail at Otto Armleder Park. Bicyclists traveling between these routes would continue to travel along Red Bank Road and Wooster Road, sharing lanes with vehicular traffic. There is an existing sidewalk which begins at Red Bank Road and continues along the west side of Wooster Road. Bicycle and pedestrian safety along Red Bank Road and Wooster Road within the study area was evaluated by reviewing five years of bicycle and pedestrian crash data from January 1, 2019, through December 31, 2023, using ODOT’s GIS Crash Analysis Tool (GCAT). No bicycle or pedestrian crashes were reported in the five-year period. However, this may be partially or wholly attributed to the lack of existing bicycle and pedestrian facilities and connectivity. The “interested but concerned” user described above is unlikely to use this corridor, which would require sharing the roadway with vehicular traffic.

In general, there are potential safety issues for bicyclists traveling along Red Bank Road and Wooster Road because bicyclists must share the road with automobiles and trucks. Red Bank Road has a posted speed limit of 35 mph and an average daily traffic (ADT) volume ranging from approximately 12,000 to 18,000 vehicles per day. Wooster Road also has a posted speed limit of 35 mph and an ADT of approximately 12,000 vehicles per day, making them both heavily trafficked corridors. Additionally, as part of the *Transportation Needs Analysis*, ODOT crash screening data identified the portion of Wooster Road starting just south of Red Bank Road and extending 0.7 mile south as a “high hazard area” (Stantec, 2017).

Pedestrians have a dedicated sidewalk on west side of Wooster Road; however, portions of the sidewalk are adjacent to the street without a tree lawn buffer. There are no sidewalks on Red Bank Road within the study area. This results in bicycles/pedestrians crossing or traveling next to vehicular traffic, which creates conflicts with vehicular traffic and puts bicycles and pedestrians at greater risk when compared to dedicated bicycle and pedestrian facilities that are physically separated from roadways.

Providing bicyclists and pedestrians with separated facilities also reduces the level of traffic stress of the facility. ODOT’s Bicycle Level of Traffic Stress (LTS) calculator was used to quantify the level of stress or discomfort one may feel when biking close to traffic. LTS is determined by the posted speed of the roadway, daily volume of the roadway (vehicles per day), the number of vehicular lanes and the type of separation between vehicular traffic and bicyclists. There are four (4) levels of traffic stress:

- LTS 1 – Very low stress, suitable for all ages and abilities
- LTS 2 – Low stress, comfortable for most adults
- LTS 3 – Medium stress, ridden by enthused/confident cyclists.
- LTS 4 – High stress, ridden by strong/fearless cyclists.

Currently, there is an LTS 4 rating within the project area (ODOT, 2021). The No Build Alternative will not address this area of high LTS.

4.1.2 Build Alternatives

Each of the Build Alternatives include the construction of a shared use path which is physically separated from vehicular traffic and would, therefore, be safer for bicyclists and pedestrians than the No Build Alternative and result in a lower LTS rating. All considered alternatives would be a shared use path that is completely separated from the roadway, which means that all alternatives would have an LTS rating of 1. Connecting the Wasson Way Trail to Otto Armleder Park with a low LTS facility would be a substantial improvement to regional connectivity.

The safety differences between the Build Alternatives for Segments 1, 2, and 3 are described below.

Segment 1:

Alternative A: Alternative 1-A runs along the abandoned railway line and has no crossings where there are potential bicycle/pedestrian conflicts with automobiles.

Alternative B: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative C: This alternative crosses a commercial property driveway, Red Bank Road, and the Colbank Road Interchange ramp to US 50, which creates three potential sites of pedestrian/bicycle conflict with automobiles. All crossings would be signalized at existing traffic signals.

Segment 2:

Alternative A: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative B: There are no potential sites of pedestrian/bicycle conflict with automobiles along Alternative 2-B.

Alternative C: There are no potential sites of pedestrian/bicycle conflict with automobiles for this alternative.

Segment 3:

Alternative A: As described in Section 3.2, this alternative was excluded from resource specific evaluations

and was not included in the evaluation matrix.

Alternative B: This alternative has one site of pedestrian/bicycle conflict with automobiles where the alternative crosses Wooster Road. This would be an unsignalized mid-block crossing which has sign distance issues. This alternative would require local businesses to remove parking and signage from their storefronts in order to achieve a clear sight distance for the crossing.

Alternative C: There is one pedestrian/bicycle conflict site with automobiles where the alternative crosses Wooster Road. This would be an unsignalized mid-block crossing and, due to the curvature of Wooster Road, would also result in sight distance concerns.

Alternative D: There is one pedestrian/bicycle conflict site with automobiles where the alternative crosses Wooster Road. This would be an unsignalized mid-block crossing and, due to the curvature of Wooster Road, would also result in sight distance concerns.

Alternative E: There four potential sites of pedestrian/bicycle conflict with automobiles with this alternative. These are where this alternative crosses Wooster Road, two driveway entrances for Hyde Park Landscape & Tree Service, and the driveway entrance for the OHC Corporate Office along Armleder Road. The Wooster Road crossing for this alternative would be signalized using existing traffic signals.

4.2 SHARED USE PATH DESIGN ISSUES

This section discusses design criteria and issues important in developing shared use path alternatives. The most demanding design challenge of this project was developing a trail through the project area which maintained horizontal and vertical alignments that would meet the requirements of the Americans with Disabilities Act (ADA) Accessibility Guidelines for Public Rights-of-Way (U.S. Access Board, 2024). The Plan and Profile sheet for each alignment can be found in **Attachment C**. More in depth information regarding Structure Type Studies can be found in **Attachment D**. Hydraulic Calculations can be found in **Attachment E**.

Segment 1

Alternative A: The length of Alternative 1-A is 2,350 feet from the connection between the existing Wasson Way Trail and the proposed connection with Segment 2. It is anticipated that the width of the shared use path will be 12 feet throughout the length of the path. Fencing is proposed at the bridge locations, totaling 350 feet. This shared use path has a design speed of 20 mph. No new bridges will be required for this alternative; however, alterations to the two existing railroad bridges will be necessary. The first railroad bridge is located over the Norfolk Southern Railroad, Duck Creek and Red Bank Road. The existing timber tie bridge deck would need to be replaced with a reinforced concrete bridge deck. Due to the height from the bridge to the ground below, tall railings will be required for the safety of cyclists and pedestrians. The second railroad bridge is over US 50. This bridge would be modified by maintaining the existing ballast and ties and overlaying the steel plate deck with asphalt. Due to the geometry of the existing structure, the trail would be narrower crossing the bridge. For additional discussion of the bridges, please see the Structure Type Study in **Attachment D**. The proposed horizontal and vertical alignments do not present any variance from the current ADA accessibility guidelines.

Alternative B: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative C: The length of this shared use path is 2,900 feet from the connection between the existing Murray Path and the proposed connection with Segment 2. This alternative would require an additional 2,400 feet of travel distance to connect with Wasson Way Trail via Old Red Bank Road. The width is proposed to be 12 feet along Red Bank Road. A minor transition in width from 12 feet to 10 feet between the roadway and the existing auto dealership sign is expected. It crosses Red Bank Road, the driveway for Fairfax Self Storage, and Colbank Road, which are all signalized. This path maintains a design speed of 20 mph and width of 12 feet, along Colbank Road. As it approaches and passes under US 50, a 350-foot retaining wall with an approximate height of 10 feet is required, as construction draws closer to the existing right-of-way. Alternative 1-C generally mirrors the vertical alignment of the adjacent roadways and is compliant with the current ADA accessibility guidelines throughout. Currently, there is an ongoing project coordinated by the Village of Fairfax and ODOT to improve the intersection of Red Bank Road and the intersection between Colbank Road and the US 50 westbound ramp (PID 113600). This project proposes installing dual westbound right turn lanes from Colbank Road to Red Bank Road, installing dual northbound through lanes on Red Bank Road, lengthening storage lanes, and improving signal timing. Once the Colbank Road project is completed, Alternative 1-C for the HAM-Wasson Way to Otto Armleder project will need to be revised as there will be a new pattern of traffic along this intersection. The number of lanes requiring a crossing will increase from two to four, but a small traffic island will be embedded in the middle of the intersection that can be utilized as part of the shared use path. Depending on which alternative is selected as the Segment 1 preferred alternative, changes to 1-C will be required due to this concurrent project.

Segment 2

Alternative A: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative B: The length of Alternative 2-B is approximately 2,650 feet, and it is anticipated that the width of the shared use path will be 12 feet. This path has a reduced design speed of 12 mph, due to two 27-foot radius horizontal curves. Otherwise, Alternative 2-B maintains a design speed of 20 mph and is within the current ADA accessibility guidelines. This alignment would require modifications to two existing bridges. The first is a 75-foot-long abandoned railroad bridge over Wooster Pike. The modifications would include removing the timber ties and replacing them with a reinforced concrete deck. 4.5-foot railings would be installed on each side of the trail. A retaining wall will also be required along the access road to the Norfolk Southern railroad yard and is expected to be approximately 100 foot long with an average 3-foot exposed height. This wall is provided to support the new fill required for the proposed shared use path with a 2:1 slope between the edge of the trail and the top of wall in lieu of encroaching on the roadway. A second retaining wall would be required from the end of the bridge widening to a point which protects the existing access road from Wooster Pike to the railroad active line. The wall is approximately 400 feet in length with an exposed height of 15 feet. As the path extends along Wooster Pike, it mirrors the vertical alignment of

the roadway and provides a 4.5-foot vegetated buffer (5 foot from the face of curb) between the proposed trail and the roadway. It continues across the Wooster Road bridge over the railroad, which is the second bridge to be modified to accommodate the shared use path, and then proceeds off and extends beneath the bridge to a point along the abandoned railroad alignment. This alternative would widen the Wooster Road bridge by 17 feet to the east and would include a bicycle railing. For additional discussion of the bridges, please see the Structure Type Study in **Attachment D**. This point ends Segment 2 and is the beginning of Segment 3.

Alternative C: The length of Alternative 2-C is 2,650 feet, and it is anticipated that the width of the shared use path will be 12 feet. This alternative begins at the same point as Alternative 2-B near the existing Wooster Road bridge over the railroad, and would involve the same process for the existing railroad bridge modification as described for 2-B. A retaining wall will also be required along the access road to the Norfolk Southern railroad yard and is expected to be approximately 100 foot long with an average 3-foot exposed height, similar to what was done for Alternative 2-B. For additional discussion of the bridges, please see the Structure Type Study in **Attachment D**. This alternative then extends onto the Wooster Road bridge, thus removing the need for widening. Instead, it reduces the number of lanes on the bridge and employs a proposed roundabout at the intersection, where the path follows adjacent to the roadway and ties to Alternative 2-B again along Wooster Pike. The introduction of the roundabout in this alternative requires a second retaining wall which is approximately 150 feet in length, with 15 feet exposed height. In addition, there is a proposed culvert extension on the north side of the proposed roundabout, totaling approximately 50 feet in length. The most significant challenge associated with this alternative is the inclusion of the roundabout and the culvert extension. This shared use path has a minimum design speed of 20 mph and is compliant with all the current ADA accessibility requirements. The path maintains a two-foot buffer from concrete barrier along the Wooster Road bridge, and a 4.5-foot vegetated buffer (5 foot from the face of curb) along Wooster Pike.

Segment 3

Alternative A: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative B: This alternative follows the abandoned railroad and is carried across Duck Creek by the abandoned railroad bridge. The trail crosses Duck Creek a second time near the Cincy Auto Pro property, which will require a new bridge structure. It then continues parallel to Duck Creek where it turns to cross Wooster Road at a mid-block crossing. As this alternative travels alongside Duck Creek, it will require two retaining walls. One of the retaining walls will be approximately 250 feet in length and approximately less than 8 feet in exposed height, while the other wall will be approximately 235 feet in length and approximately less than 8 feet in exposed height. The path continues along to Otto Armleder Park and crosses Armleder Road, terminating on the existing shared use path. Alternative 3-B complies with all current ADA accessibility requirements and is 5,581 linear feet long with a uniform width of 12 feet. The existing railroad bridge over Duck Creek will require some modifications which will include replacing the existing timber tie bridge deck with a reinforced concrete bridge deck, which is similar to the bridge modifications discussed for the Segment 1 alternatives. The most challenging aspect will be the new bridge crossing Duck Creek, as the bridge is located within the 100-year floodway and will be submerged during the flood. To minimize

impacts a bridge with a thin superstructure is required. A three-span reinforced concrete slab bridge is proposed. Alternative 3-B also transverses through an existing detention basin behind the US Bank building in order to stay out of the lower elevations prone to flooding. Additional coordination will be required to either avoid or mitigate anticipated impacts to the basin. For additional discussion, please see the Structure Type Study in **Attachment D** and Hydraulic Calculations found in **Attachment E**.

Alternative C: This shared use path alignment also follows the abandoned railroad alignment to a proposed new crossing of Duck Creek, which requires a new bridge structure. It continues to Wooster Road and then parallels the roadway to proceed to a mid-block crossing at the existing drive to Riverside Electric, Inc. Once on the other side of Wooster Road, this alternative follows the same alignment as Alternative 3-B until it terminates at the existing shared use path at Otto Armleder Park. Alternative 3-C complies with all current ADA accessibility requirements. The total length of this shared use path is 6,443 linear feet and maintains a 12-foot width. The existing railroad bridge over Duck Creek will require some modifications which will include replacing the existing timber tie bridge deck with a reinforced concrete bridge deck, which is similar to the bridge modifications discussed for the Segment 1 alternatives. The most challenging aspect will be the new bridge crossing Duck Creek, as the bridge is located within the 100-year floodway and will be submerged during the flood. To minimize impacts a bridge with a thin superstructure is required. A three-span reinforced concrete slab bridge is proposed. Alternative 3-C also transverses through an existing detention basin behind the US Bank building in order to stay out of the lower elevations prone to flooding. Additional coordination will be required to either avoid or mitigate anticipated impacts to the basin. For additional discussion, please see the Structure Type Study in **Attachment D** and Hydraulic Calculations found in **Attachment E**.

Alternative D: Alternative 3-D follows the same alignment along the abandoned railroad alignment to a new crossing of Duck Creek, which requires a new bridge. As it passes alongside Duck Creek, a 250-foot retaining wall with an approximately less than 8 feet in exposed height is required, It then proceeds to a mid-block crossing of Wooster Road, and continues along the drive to Riverside Electric, Inc. Alternative 3-D follows the same alignment as both Alternatives 3-B and 3-C until it reaches the existing shared use trail at Otto Armleder Park where it terminates. This shared use path is 6,420 linear feet in length and maintains a 12-foot width. It also complies with the ADA accessibility requirements. The existing railroad bridge over Duck Creek will require some modifications, including replacing the existing timber tie bridge deck with a reinforced concrete bridge deck, which is similar to the bridge modifications discussed for the Segment 1 alternatives. The most challenging aspect will be the new bridge crossing Duck Creek, as the bridge is located within the 100-year floodway and will be submerged during the flood. To minimize impacts a bridge with a thin superstructure is required. A three-span reinforced concrete slab bridge is proposed. Alternative 3-D also transverses through an existing detention basin behind the US Bank building in order to stay out of the lower elevations prone to flooding. Additional coordination will be required to either avoid or mitigate anticipated impacts to the basin. For additional discussion, please see the Structure Type Study in **Attachment D** and Hydraulic Calculations found in **Attachment E**.

Alternative E: Alternative 3-E follows the same alignment as Alternatives 3-C and 3-D on the abandoned railroad and crosses Duck Creek adjacent to Linwood Park. This crossing will require a new bridge. It continues along the west side of Wooster Road, providing a 5-foot vegetated buffer between the path and the road. This path continues across a commercial driveway at the signalized intersection with Wooster

Road and Armleder Road. The alignment then crosses Wooster Road and continues along the south side of Armleder Road, providing a 5-foot vegetated buffer. It also crosses four commercial driveways before terminating at Otto Armleder Park. Alternative 3-E provides a total length of 6,402 linear feet and maintains a 12-foot width. The existing railroad bridge over Duck Creek will require some modifications which will include replacing the existing timber tie bridge deck with a reinforced concrete bridge deck, which is similar to the bridge modifications discussed for the Segment 1 alternatives. This alternative will also require two retaining walls as it travels alongside Duck Creek. One of the retaining walls will be approximately 250 feet in length and approximately less than 8 feet in exposed height, while the other wall will be approximately 235 feet in length and approximately 10 feet in exposed height. The most challenging aspect will be the new bridge crossing Duck Creek, as the bridge is located within the 100-year floodway and will be submerged during the flood. To minimize impacts a bridge with a thin superstructure is required. A three-span reinforced concrete slab bridge is proposed. For additional discussion, please see the Structure Type Study in **Attachment D** and Hydraulic Calculations found in **Attachment E**.

4.3 POST-CONSTRUCTION STORM WATER BEST MANAGEMENT PRACTICES

This section discusses the preliminary post-construction stormwater best management practices (BMP). Post-Construction Storm Water Best Management Practices (BMPs) are provided for long-term management of storm water runoff quality and quantity so that a receiving stream's physical, chemical, and biological characteristics are protected, and stream functions are maintained. This analysis was performed to identify challenges associated with BMP installation and ensure that the construction limits for each alternative incorporate the BMP areas. The BMP analysis was conducted in accordance with the Ohio Department of Transportation, Location and Design Manual, Volume 2. Stantec also utilized several other ODOT BMP resources including the BMP calculation spreadsheet and the ODOT BMP tool. The BMP analysis is included in **Attachment F**. Each alternative was considered an individual project for the BMP analysis; however, final BMP analysis will need to match the construction phasing of the project.

4.3.1 No Build Alternative

No post-construction stormwater BMPs would be required under the No Build Alternative.

4.3.2 Build Alternatives

Segment 1

Post Construction Stormwater BMPs should not be a differentiator between the Segment 1 alternatives. BMPs will not be required for Alternative A; however, BMP credit will be relatively easy and inexpensive to obtain for Alternative C. See below and **Attachment F** for additional description and calculations.

Alternative A: The total project earth disturbed area for post-construction storm water BMP is 0.17 acre. Because the earth disturbed area is less than one-acre, permanent BMPs will not be required.

Alternative B: As described in Section 3.2, this alternative was excluded from resource specific evaluations

and was not included in the evaluation matrix.

Alternative C: The total project earth disturbed area for post construction storm water BMP is 1.99 acres. Because the earth disturbed area is larger than one-acre, permanent BMPs will be required. The overall treatment area required for Alternative C will be 0.46 acre. This alternative will utilize vegetated filter strips and enhanced bankfull width ditches (vegetated biofilters) to treat stormwater runoff, and it is anticipated that a combination of these can be used along Colbank Rd. Narrow vegetated filter strips can be used in some areas since all improvements are pedestrian related.

Segment 2

Post Construction Stormwater BMPs should not be a differentiator between the Segment 2 alternatives, as it will be challenging to achieve all BMP credits through vegetative options with either alternative. A manufactured system will most likely be required for both alternatives because of the steep slopes, anticipated walls, and proposed curb. See below and **Attachment F** for additional description and calculations.

Alternative A: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative B: The total project earth disturbed area for post-construction storm water BMP is 2.89 acres. Because the earth disturbed area is larger than one-acre, permanent BMPs will be required. The required area for overall treatment is 0.94 acre. This alternative will utilize vegetated filter strips, enhanced bankfull width ditches (vegetated biofilters), and a manufactured system to treat stormwater runoff. It is anticipated that vegetated filter strips can be used inside the loop between Sta. 325+00 and Sta. 329+00, and towards the Segment 3 termini on the abandoned rail line. Narrow vegetated filter strips can be used where all improvements are pedestrian related. Where filter strips cannot be used, vegetated biofilters can be used, such as potentially on the east side of Wooster Rd. Additional area can be treated with a manufactured system installed where the proposed curb is present, such as along Wooster Pike.

Alternative C: The total project earth disturbed area for post-construction storm water BMP is 2.89 acres. Because the earth disturbed area is larger than one-acre, permanent BMPs will be required. The required area for overall treatment is 0.94 acre. This alternative will utilize vegetated filter strips, enhanced bankfull width ditches (vegetated biofilters), and a manufactured system to treat stormwater runoff. It is anticipated that vegetated filter strips can be used inside the loop between Sta. 325+00 and Sta. 329+00, and towards the Segment 3 termini on the abandoned rail line. Narrow vegetated filter strips can be used where all improvements are pedestrian related. Where filter strips cannot be used, vegetated biofilters can be used, such as potentially on the east side of Wooster Rd. Additional area can be treated with a manufactured system installed where the proposed curb is present, such as along Wooster Pike.

Segment 3

Post Construction Stormwater BMPs should not be a differentiator between the Segment 3 alternatives. Providing the required BMPs will be challenging for all four alternatives since several acres of quantity treatment is required. It is possible that construction phasing of the project will provide opportunities for extra treatment in Segments 1 or 2 to be used for Segment 3. As the project develops, additional coordination

should be conducted with project stakeholders to find creative and efficient ways to obtain the required treatment credit. See below and **Attachment F** for additional description and calculations.

Alternative A: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative B: The total project earth disturbed area for post-construction storm water BMP is 3.86 acres and, because the earth disturbed area is larger than one-acre, permanent BMPs will be required. The required area for overall treatment is 3.86 acres. In addition to quality treatment, quantity treatment will be required because more than 1 acre of new impervious area is being added in new right of way. This alternative will need to use bioretention cells or detention basins to treat stormwater runoff. Permeable pavement was considered but was determined not to be feasible due to strict performance requirements. It is anticipated that bioretention cells should be used along the trail side wherever possible. As previously mentioned, Alternative 3-B transverses through an existing detention basin behind the US Bank building in order to stay out of the lower elevations prone to flooding.

Alternative C: The total project earth disturbed area for post-construction storm water BMP is 3.91 acres and, because the earth disturbed area is larger than one-acre, permanent BMPs will be required. The required area for overall treatment is 2.98 acres. In addition to quality treatment, quantity treatment will be required because more than 1 acre of new impervious area is being added in new right of way. This alternative will need to use bioretention cells or detention basins to treat stormwater runoff. Permeable pavement was considered but was determined not to be feasible due to strict performance requirements. As previously mentioned, Alternative 3-C transverses through an existing detention basin behind the US Bank building in order to stay out of the lower elevations prone to flooding.

Alternative D: The total project earth disturbed area for post-construction storm water BMP is 3.83 acres and, because the earth disturbed area is larger than one-acre, permanent BMPs will be required. The required area for overall treatment is 3.31 acres. In addition to quality treatment, quantity treatment will be required because more than 1 acre of new impervious area is being added in new right of way. This alternative will need to use bioretention cells or detention basins to treat stormwater runoff. Permeable pavement was considered but was determined not to be feasible due to strict performance requirements. As previously mentioned, Alternative 3-D transverses through an existing detention basin behind the US Bank building in order to stay out of the lower elevations prone to flooding.

Alternative E: The total project earth disturbed area for post-construction storm water BMP is 4.09 acres and, because the earth disturbed area is larger than one-acre, permanent BMPs will be required. The required area for overall treatment is 2.91 acres. In addition to quality treatment, quantity treatment will be required because more than 1 acre of new impervious area is being added in new right of way. This alternative will need to use bioretention cells or detention basins to treat stormwater runoff. Permeable pavement was considered but was determined not to be feasible due to strict performance requirements.

4.4 MAINTENANCE OF TRAFFIC (MOT)

This section discusses the temporary traffic impacts required to construct the various build alternatives.

4.4.1 No Build Alternative

There would be no Maintenance of Traffic (MOT) impacts under the No Build Alternative.

4.4.2 Build Alternatives

The following sections discuss MOT that would be required for the project alternatives.

Segment 1

Alternative A: The construction of Alternative 1-A will potentially cause temporary traffic impacts to the Wasson Way trail, Red Bank Road, US 50, and the Norfolk Southern Railroad. The existing Wasson Way trail will remain open, except for during work at the tie in point, when construction fencing and/or flaggers may be necessary to protect trail users from construction equipment. The remainder of temporary traffic impacts are the result of structures work over existing roads and railways. Structures work on the existing trestle may require short term closures, and/or lane closures of the underlying roadways and railways to add a new deck or replace structural members/repair abutments. Construction equipment will need to access the work from multiple access points; however, equipment access is not expected to be an issue with this alternative.

Alternative B: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative C: The construction of Alternative 1-C will potentially cause temporary traffic impacts to Red Bank Road, Woodland Road, and Colbank Road. While the majority of the alignment maintains a variable separation from the roadway and prevents the need to impact traffic, work near the intersections, which includes curb ramps and crosswalks, will require temporary lane closures. Curb cuts, drop curbs, and curb ramps will utilize drums to delineate the work zone during construction activities. This may require single lane closures on Red Bank Road, as well as shoulder closures and/or lane narrowing on Woodland Road and Colbank Road. No complete road closures will be necessary. Construction equipment access via Colbank Road would be recommended.

Segment 2

Alternative A: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative B: The construction of Alternative 2-B will cause temporary traffic impacts to Wooster Pike, Wooster Road, and the Norfolk Southern Railroad. Structure work on the existing bridge over Wooster Pike may require short term closures, and/or lane closures of the Wooster Pike to add a new deck, replace structural members, and repair abutments. Daily lane closures on Wooster Pike will also be required to construct the path on the south side of the road up to the intersection with Red Bank Road. The lane closure may be accomplished using drums to delineate the work area. Lane closures will also be required along Wooster Road to widen the bridge and build the shared use path south of the existing bridge. Impacts to rail service may also be required for bridge widening, which will require close coordination with the railroad to provide minimal interruption to rail traffic. These lane closures will provide for the construction of the path, grading, and equipment access. No full road closures are anticipated.

Alternative C: The construction of Alternative 2-C will cause temporary traffic impacts to Wooster Pike, Wooster Road, and the Norfolk Southern Railroad. Structures work on the existing bridge over Wooster Pike may require short term closures, and/or lane closures of the Wooster Pike to add a new deck, replace structural members, and repair abutments. Lanes closures on Wooster Pike will also be required to construct the path on the south side of the road up to the intersection with Red Bank Road. Alternative 2-C requires the construction of a roundabout at the intersection of Red Bank Road and Wooster Pike, and lane shifts and closures should be expected during roundabout construction; however, no full road closures are anticipated. Lane closures will also be required along Wooster Road to modify the bridge deck to accommodate the shared use path, and to construct the shared use path south of the existing Wooster Road bridge. It is not anticipated that there will be any impacts to rail service. It is anticipated that no full closures will be required to construct Alternative 2-C.

Segment 3

Alternative A: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative B: The construction of Alternative 3-B will include temporary traffic impacts to Wooster Road and Armleder Road. While most of the alignment maintains a large separation from roadways and prevents the need to impact traffic, work near the intersections, including curb ramps and crosswalks, will require temporary lane closures and/or shoulder closures. Curb cuts, drop curbs, and curb ramps will utilize drums to delineate the work zone during construction activities. No complete road closures will be necessary, no temporary rail traffic impacts are anticipated, and no existing pedestrian facilities will be impacted with this alternative. However, there is potential for the construction of this alternative to temporarily impact operations for some businesses along Wooster Road, as construction would occur in the backlots of several commercial properties.

Alternative C: The construction of Alternative 3-C will include temporary traffic impacts to Wooster Road and Armleder Road. While most of the alignment maintains a large separation from roadways and prevents the need to impact traffic, work near the intersections, including curb ramps and crosswalks will require temporary lane closures and/or shoulder closures. Curb cuts, drop curbs, and curb ramps will utilize drums to delineate the work zone during construction activities. No complete road closures will be necessary, however, given the proximity to an active rail line, some temporary impacts to rail traffic are anticipated. Railroad flaggers will likely be required on site during construction, and temporary railroad closures may be required when construction equipment is in the close vicinity. The existing sidewalk along the west side of Wooster Road is in direct conflict with the proposed shared use path and therefore pedestrian impacts are anticipated. A temporary pedestrian detour would be necessary for this alternative for where the shared use path overlaps the existing sidewalk along Wooster Road.

Alternative D: The construction of Alternative 3-D will include temporary traffic impacts to Wooster Road and Armleder Road. While most of the alignment maintains a large separation from roadways and prevents the need to impact traffic, work near the intersections, including curb ramps and crosswalks, will require temporary lane closures and/or shoulder closures. Curb cuts, drop curbs, and curb ramps will utilize drums to delineate the work zone during construction activities. Given the proximity to an active rail line, some temporary impacts to rail traffic are anticipated. Railroad flaggers will likely be required on site during construction, and temporary railroad closures may be required when construction equipment is in the close

vicinity. No complete road closures will be necessary, no and no existing pedestrian facilities will be impacted with this alternative.

Alternative E: The construction of Alternative 3-E will include temporary traffic impacts to Wooster Road and Armleder Road. While most of the alignment maintains a large separation from roadways and prevents the need to impact traffic, work near the intersections and crossings, as well as work along Wooster Road and Armleder Road may require temporary lane closures and/or shoulder closures. The four commercial property driveways along Armleder Road may require temporary part-width or full lane closures during construction. No complete road closures will be necessary, however, given the proximity to an active rail line, some temporary impacts to rail traffic are anticipated. Railroad flaggers will likely be required on site during construction, and temporary railroad closures may be required when construction equipment is in the close vicinity. The existing sidewalk along the west side of Wooster Road is in direct conflict with the proposed shared use path and therefore pedestrian impacts are anticipated. A temporary pedestrian detour would be necessary for this alternative for where the shared use path overlaps the existing sidewalk along Wooster Road.

Vehicular and pedestrian access to all properties will be maintained at all times. A portion of sidewalk will be closed for the construction of Alternatives 3-C and 3-E. No other full closures of any kind are anticipated.

4.5 RIGHT-OF-WAY REQUIREMENTS

This section discusses impacts to private property and provides an estimate of permanent property acquisition that would be required for the construction of each of the shared use path alternatives. The project sponsors have determined that no private property will be appropriated for this project. Therefore, the impacts shown below will need to be transferred willingly by each property owner. As the project continues to develop the project team will reach out to adjacent property owners to discuss the project.

4.5.1 No Build Alternative

There would be no right-of-way impacts under the No Build Alternative.

4.5.2 Build Alternatives

Segment 1

Alternative A: This alternative would potentially result in approximately 0.01 acre of temporary impact to private property owned by Hyde Park Lumber Company, which includes a small, wooded section of their lot. Much of this alternative utilizes the City of Cincinnati property along the abandoned rail line, which includes bridges that traverse active rail lines and roads.

Alternative B: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative C: This alternative would result in approximately 0.97 acre of temporary and permanent impacts to private property from four owners. These owners include Fairfax Self Storage, MCAS Cincinnati

LLC, Oliver Bardes, and Hyde Park Lumber Company. Impacts to private property would include strip takes from lawns and parking lots along Red Bank Road but would not include any impacts to other structures such as monument or advertising signs. Much of this alternative utilizes property already owned by the City of Cincinnati and the Village of Fairfax.

Segment 2

Alternative A: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative B: This alternative would result in approximately 0.9 acre of temporary and permanent impacts to private property from five owners. These owners include Southwest Ohio Regional Transit Authority, Consolidated Rail, Habegger Investment Group, Norfolk and Western Railway, and Norfolk and Southern Rail Company. Impacts to private property would include strip takes along Wooster Pike and Wooster Road to construct the shared use path. Retaining walls are utilized in this alternative to avoid impacts to existing structures on private property. A portion of this alternative utilizes the abandoned rail alignment owned by SORTA.

Alternative C: This alternative would result in approximately 1.66 acres of temporary and permanent impacts to private property from five owners. These owners include Southwest Ohio Regional Transit Authority, Consolidated Rail, Habegger Investment Group, Norfolk and Western Railway, Norfolk and Southern Railway Company, and Hyde Park Lumber Company. Impacts to private property would include strip takes along Wooster Pike and Wooster Road to construct the roundabout and shared-use path. Retaining walls are utilized in this alternative to avoid impacts to existing structures on private property. A portion of this alternative utilizes the abandoned rail alignment owned by SORTA.

Segment 3

All the alternative alignments for this segment utilize the abandoned railway that is owned by the Southwestern Ohio Regional Transit Authority (SORTA). They also occur within the vicinity of an active railroad, which would require a coordination with the rail companies as well as some form of fence or separation. **Figure 5** below provides a visual estimation of where a fence separating the railroad from the shared use path could be placed, as well as estimates on the buffer distances between the railroad, the fence, and the path.

Alternative A: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative B: This alternative would result in an estimated total of 5.41 acres of temporary and permanent impacts to private property from eleven owners. These owners include Southwest Ohio Regional Transit Authority, Consolidated Rail, GDS Real Estate Inc, Park Ridge Estates LLC, Norfolk and Western Railway, K INK Properties LLC, the Morrow Gravel Company, US Bank National, Amjon LLC, Jeffery M Kachelmeyer, and Caraustar Mill Group Inc. Impacts to private property would include impacts to forested areas and strip takes along backlots and grass medians. This alternative utilizes the abandoned rail alignment owned by SORTA.

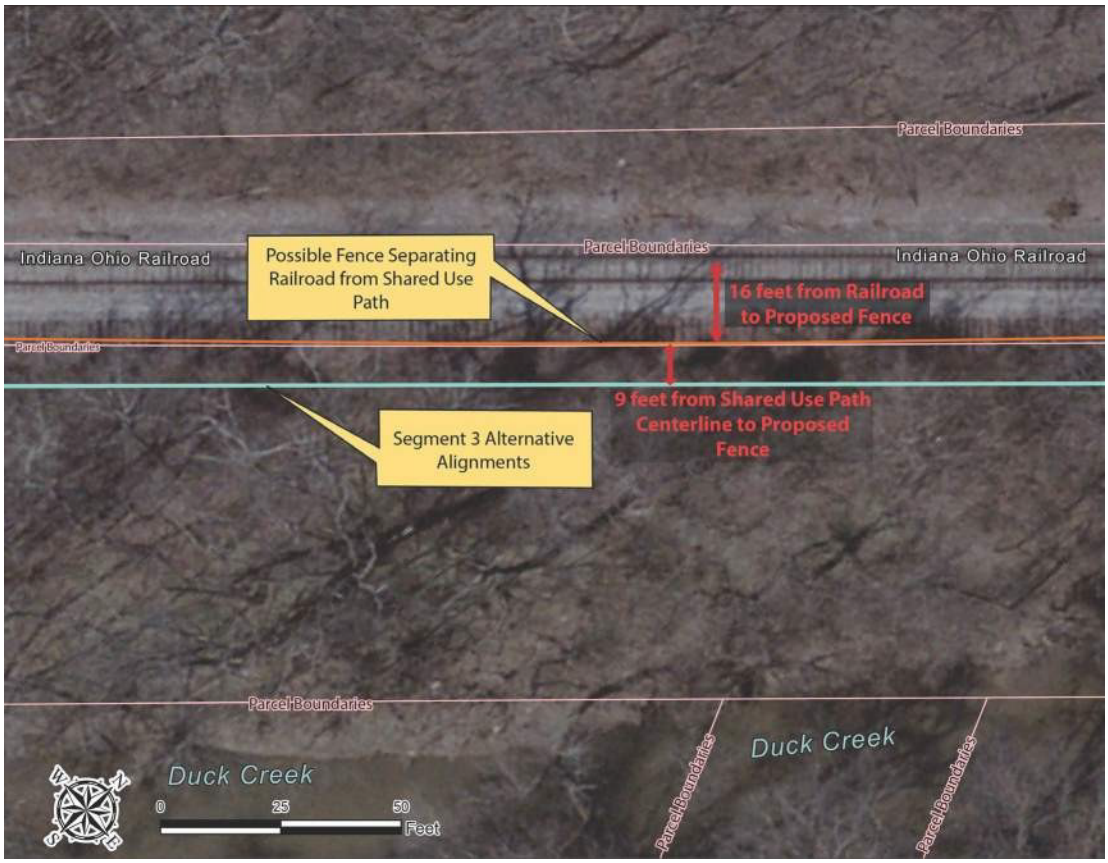

Figure 5: *Visual Representation of distance between railroad and shared use path.*

Alternative C: This alternative would result in a total of approximately 4.77 acres of temporary and permanent impacts to private property from seven owners. These owners include Southwest Ohio Regional Transit Authority, Consolidated Rail, Norfolk and Western Railway, the Morrow Gravel Company, US Bank National, Caraustar Mill Group Inc, and Johnny Box Manufacturing Co. Impacts to private property would include forested areas and strip takes of grass medians and gravel lots for the construction of the trail. The Johnny Box Manufacturing Co would lose a small amount of parking for their business with this alternative. A portion of this alternative utilizes city-owned right-of-way along Wooster Road. This alternative utilizes the abandoned rail alignment owned by SORTA.

Alternative D: This alternative would result in an approximate total of 5.05 acres of temporary and permanent impacts to private property from seven owners. These owners include Southwest Ohio Regional Transit Authority, Norfolk and Western Railway, the Morrow Gravel Company, US Bank National, Caraustar Mill Group Inc, and Garner, Charles R TRS, and James E TRS. Impacts to private property would include forested areas and strip takes of grass medians and gravel lots for the construction of the trail. A portion of this alternative utilizes city right-of-way along Wooster Road. This alternative utilizes the abandoned rail alignment owned by SORTA.

Alternative E: This alternative would result in an estimated total of 4.26 acres of temporary and permanent impacts to private property from six owners. These owners include Southwest Ohio Regional Transit

Authority, Consolidated Rail, Norfolk and Western Railway, Hyde Park Land LLC, Caraustar Mill Group Inc, Garner, Charles R TRS and James E TRS, and Mar Cinci LLC. Impacts to private property would include forested areas and strip takes of grass medians and gravel lots for the construction of the trail. A portion of this alternative utilizes City of Cincinnati right-of-way along Wooster Road. This alternative utilizes the abandoned rail alignment owned by SORTA.

4.6 UTILITY ISSUES

Preliminary utility coordination was conducted as a part of this Feasibility Study. This coordination included design coordination with OHIO811 for information on utilities in the project area. Based on information received through OHIO811, it was revealed that Duke Energy has aerial electric distribution and transmission lines and underground gas lines in the project area. There are also aerial communication lines in the project area owned by Cincinnati Bell, Charter Communications, and MCI Communications/Verizon. Greater Cincinnati Water Works owns water distribution lines in the area. The Metropolitan Sewer District (MSD) owns sanitary and combined sewer facilities in the project area. The Cincinnati Stormwater Management Utility owns storm sewers in the project area. ODOT owns storm sewers along with underground and overhead traffic signal equipment in the project area. A brief description of utility impacts for each alternative is described below. Further coordination with the utility providers will occur throughout project development.

4.6.1 No Build Alternative

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

4.6.2 Build Alternatives

Segment 1

Alternative A: There are no major utility impacts associated with Alternative A, which is located along the abandoned railroad right-of-way. Caution is warranted during construction due to existing overhead electric lines in the area.

Alternative B: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative C: Alternative C impacts multiple existing utilities. The alternative will be constructed along Red Bank Road within existing right-of-way where existing utilities are located. This alternative will impact the existing overhead electric lines, overhead communication lines, and water supply lines on the east side of Red Bank Rd. It is anticipated that traffic signal support poles, and utility poles will need to be relocated for the proposed shared use path. The proposed shared use path is currently drawn within 6’ of an electric transmission pole within a Duke owned utility easement. Coordination with Duke Energy will be required to determine the acceptability of this alignment.

Segment 2

Alternative A: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative B: It is anticipated that Alternative 2-B will have minor impacts on existing storm and sanitary sewers, particularly in areas where the existing curb line is to be relocated.

Alternative C: It is anticipated that the construction of Alternative 2-C will require the relocation of at least one electric distribution pole. Additional utility conflicts include possible relocation of underground waterlines and gas lines for roundabout construction. Also, minor impacts to existing storm and sanitary sewers are likely.

Segment 3

Alternative A: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative B: There are no utility impacts associated with Alternative B.

Alternative C: Alternative 3-C provides the potential for utility impacts to existing power lines.

Alternative D: It is likely that construction of the proposed bridge over Duck Creek will impact an existing gas line with this alternative. Potential utility conflicts are present at the non-signalized crossing of Wooster Road.

Alternative E: Alternative 3-E provides minimal utility impacts to traffic signal support poles at the signalized crossing at Wooster Road and Armleder Road.

4.7 ENVIRONMENTAL ANALYSIS

The following is a summary of the environmental resources and potential impacts associated with each of the alternatives. Information for environmental features in the study area was obtained from secondary sources as well as a field survey of the project area. Environmental maps referenced in this section are included in **Attachment G**. The Ecological Resources Technical Memorandum is included as **Attachment H**.

4.7.1 No Build Alternatives

There would be no impacts to ecological features (rivers, streams, wetlands, and habitat), Section 4(f)/6(f) resources, cultural resources, regulated materials, drinking water resources, or environmental justice populations as a result of the No Build Alternative.

4.7.2 Build Alternatives

The potential impacts of each Build Alternative are described below by resource category.

***Rivers, Streams, and Wetlands*:** The proposed project is located within the Duck Creek-Little Miami River watershed (HUC-12 050902021404) and within an Ohio Environmental Protection Agency (OEPA) Nationwide Permit "eligible" area. A 408 permit will be required for project construction due to work near the US Army Corps of Engineers (USACE) levee at Duck Creek. The project area contains two potentially jurisdictional streams, Stream 1 (Duck Creek) and Stream 2 (Little Duck Creek) (See **Attachment G, Exhibits 1.1, 1.2, and 1.3**). In addition, two forested wetlands and two emergent wetlands were delineated within the project area. The project area contains approximately 6,294 linear feet (lf) of streams and 1.01 acres of wetland. Additional information regarding the ecological features in the project area, as well as photographs of these features, are provided in the Ecological Resources Technical Memorandum included in **Attachment H** The potential impacts under each alternative are described below:

Segment 1

Alternative A: Impacts to approximately 26 linear feet of Duck Creek are anticipated to construct Alternative 1-A. There would be no wetland impacts.

Alternative B: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative C: Alternative 1-C is not expected to impact any streams or wetlands.

Segment 2

Alternative A: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative B: No stream impacts are anticipated for the construction of Alternative 2-B. Approximately 0.01 acre of impact is anticipated to Wetland A.

Alternative C: Alternative 2-C is anticipated to impact approximately 105 linear feet of Little Duck Creek. This alternative is also anticipated to impact approximately 0.01 acre of Wetland A.

Segment 3

Alternative A: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative B: Alternative 3-B is expected to impact approximately 110 linear feet of Duck Creek. This alternative is also expected to impact approximately 0.08 acre of Wetland B and 0.01 acre of Wetland D.

Alternative C: Alternative 3-C is expected to impact approximately 164 linear feet of Duck Creek. There would also be approximately 0.01 acre of Wetland C and 0.01 acre of Wetland D.

Alternative D: Alternative 3-D is expected to impact approximately 186 linear feet of Duck Creek. This alternative would also impact approximately 0.01 acre of Wetland C and 0.01 acre of Wetland D.

Alternative E: Alternative 3-E is expected to impact approximately 139 linear feet of Duck Creek. There would be no wetland impacts.

***Floodplains*:** Several portions of the alignments are located within the 1% and 0.2 % Annual Chance Flood Hazard Areas for Duck Creek, Little Duck Creek, and the Little Miami River, as well as the regulated floodways for both Duck Creek and Little Duck Creek (See **Attachment G, Exhibits 2.1, 2.2, and 2.3)**. A limited hydraulic analysis was completed to determine the effects the proposed structures will have on the regulatory flood water surface elevations. Due to the location of this project, floodway encroachment is unavoidable. In Segment 3, the project area is subject to backwater from the Little Miami / Ohio Rivers which control the water surface elevation in the vicinity of the structures. However, the effects on the regulatory water surface elevation from all of the alternatives extend past this backwater. A detailed hydraulic study will be performed during final design of the preferred alternative to determine the extent of the impact to the regulatory flood water surface elevation. A CLOMR/LOMR is anticipated for this project, however it is not anticipated that the construction of this project will place any new properties into a regulated flood hazard area. The potential impacts for each alternative are described below.

Segment 1

Alternative A: This alternative is not expected to impact the 1% Annual Chance Flood Hazard Area or the regulatory floodway of Duck Creek. This alternative crosses the Special Flood Hazard Area (SFHA) using existing bridge/culvert crossings that will not be modified for construction.

Alternative B: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative C: This alternative is not expected to impact the 1% Annual Chance Flood Hazard Area or the regulatory floodway of Duck Creek. This alternative crosses the SFHA using an existing culvert crossing that will not be modified for construction.

Segment 2

Alternative A: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative B: Construction of Alternative 2-B would result in 1.38 acres of encroachment to the combined 1% Annual Chance Flood Hazard Area of Duck Creek, Little Duck Creek, and the Little Miami River, and approximately 0.35 acre of encroachment in the 0.2% Annual Chance Flood Hazard Area. There would also be 0.11 acre of encroachment to the Duck Creek regulatory floodway.

Alternative C: This alternative would result in a total of 1.51 acres of encroachment to the 1% Annual Chance Flood Hazard Area of Duck Creek, Little Duck Creek, and the Little Miami River, and 0.35 acre of encroachment to the 0.2% Annual Chance Flood Hazard Area. There would also be 0.21 acre of encroachment to the Duck Creek regulatory floodway.

Segment 3

Alternative A: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative B: This alternative would result in a total of 2.95 acres of encroachment to the 1% Annual Chance Flood Hazard Area of Duck Creek, Little Duck Creek, and the Little Miami River, as well as a total of 0.8 acre of encroachment on the 0.2% Annual Chance Flood Hazard Area. There would also be approximately 1.38 acres of encroachment to the regulated floodway of Duck Creek. It is anticipated that there will be approximately 2.08 feet in water surface elevation rise with the implementation of this alternative. Bridge crossings were excluded from the total acreage as proposed bridges will be designed above the base flood elevation. The anticipated rise in water surface elevation for this alternative exceeds the FEMA back water surface elevation of 501 feet for 5,433 feet and is anticipated to impact 30 property owners. However, all the affected property owners already exist within the floodplain.

Alternative C: This alternative would result in a total of 1.91 acres of encroachment to the 1% Annual Chance Flood Hazard Area for Duck Creek, Little Duck Creek, and the Little Miami River. It would also result in 1.24 acres of encroachment to the regulated floodway of Duck Creek, and 1.04 acre of encroachment to the 0.2% Annual Chance Flood Hazard Area of Duck Creek. It is anticipated that there will be approximately 0.91 feet in water surface elevation rise with the implementation of this alternative. Bridge crossings were excluded from the total acreage as proposed bridges will be designed above the base flood elevation. The anticipated rise in water surface elevation for this alternative exceeds the FEMA back water surface elevation of 501 feet for 3,373 feet and is anticipated to impact 11 property owners. However, all the affected property owners already exist within the floodplain.

Alternative D: This alternative would result in a total of 1.91 acres of encroachment to the 1% Annual Chance Flood Hazard Area for Duck Creek, Little Duck Creek, and the Little Miami River. There would also be approximately 1.17 acres of encroachment on the regulated floodway for Duck Creek, as well as 1.08 acres of encroachment on the 0.2% Annual Chance Flood Hazard Area for Duck Creek. It is anticipated that there will be approximately 0.38 feet in water surface elevation rise with the implementation of this alternative. Bridge crossings were excluded from the total acreage as proposed bridges will be designed above the base flood elevation. The anticipated rise in water surface elevation for this alternative only exceeds the FEMA back water surface elevation of 501 feet for less than 300 feet and is anticipated to impact 6 property owners. However, all the affected property owners already exist within the floodplain.

Alternative E: This alternative would result in approximately 1.48 acres of encroachment to the 1% Annual Chance Flood Hazard Area for Duck Creek, Little Duck Creek, and the Little Miami River. There would also be approximately 1.27 acres of encroachment to the regulated floodway for Duck Creek, as well as 1.43 acres of encroachment to the 0.2% Annual Chance Flood Hazard Area of Duck Creek. It is anticipated that there will be approximately 0.9 feet in water surface elevation rise with the implementation of this alternative. Bridge crossings were excluded from the total acreage as proposed bridges will be designed above the base flood elevation. The anticipated rise in water surface elevation for this alternative only exceeds the FEMA back water surface elevation of 501 feet for less than 300 feet and is anticipated to impact 6 property owners. However, all the affected property owners already exist within the floodplain.

Threatened and Endangered Species: The project is located within Hamilton County, Ohio. Hamilton County is within the known habitat ranges of the following federally listed species:

- Northern long-eared bat (*Myotis septentrionalis*) – Threatened
- Indiana bat (*Myotis sodalis*)- Endangered

- Tricolored bat (*Perimyotis subflavus*) - Proposed Endangered
- Bald eagle (*Haliaeetus leucocephalus*) - Protected
- Fanshell (*Cyprogenia stegaria*) - Endangered
- Rayed bean (*Villosa fabalis*) - Endangered
- Sheepnose (*Plethobasus cyphyus*) - Endangered
- Snuffbox (*Epioblasma triquetra*) - Endangered
- Pink mucket pearly mussel (*Lampsilis orbiculata*) - Endangered

Suitable habitat for the federally listed mussel species was found within the project area in Duck Creek. A mussel reconnaissance survey conducted on September 8, 2022, found no mussel shells, including living and/or fresh dead mussel shells. Approximately 32 acres of suitable wooded habitat for the federally endangered Indiana bat (*Myotis sodalis*) and federally threatened northern long-eared bat (*Myotis septentrionalis*) are located within the project study area. Three potential maternity roost trees for bats were observed within the study area 100 feet past the edge of pavement. No portals, openings, cracks, or crevices in rock outcrops that may be an entrance to a cave or mine that would be considered suitable winter hibernacula for Indiana bat or northern long-eared bat were found within the study area. A USFWS records check found that the project area was not located within a known bat buffer. No bald eagle nests were observed within the project area (See **Attachment H**).

The ODNR-DOW NHDB records check found seven records of state-listed species within a one-mile radius of the project area (See **Attachment H**).

- Loggerhead shrike (*Lanius ludovicianus*) - Endangered
- Mountain madtom (*Noturus eleutherus*) - Threatened
- Blue sucker (*Cycleptus elongatus*) - Threatened
- Running buffalo clover (*Trifolium stoloniferum*) - Potentially Threatened
- Fawnsfoot mussel (*Truncilla donaciformis*) - Species of Concern
- Eastern ringtail dragonfly (*Erpetogomphus designatus*) - Species of Concern
- Black sandshell mussel (*Ligumia recta*) - Species of Concern

The three state-listed mussel species, blue sucker, and mountain madtom all occur in the Little Miami River, and no impacts to the Little Miami River are expected due to this project. Suitable habitat for the running buffalo clover, loggerhead shrike (in semi-open scrub/shrub habitat), fawnsfoot mussel, black sandshell mussel (Duck Creek), and the eastern ringtail dragonfly (Duck Creek) was observed within the study area. There is no suitable habitat for the mountain madtom and blue sucker within the study area.

Segment 1

Alternative A: The construction limits for Alternative 1-A are expected to impact approximately 0.25 acre of suitable wooded habitat for listed bats. No impacts to any PMRTs are anticipated.

Alternative B: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative C: The construction limits for Alternative 1-C are expected to impact approximately 0.9 acre of

suitable wooded habitat for listed bats. No impacts to any PMRTs are anticipated.

Segment 2

Alternative A: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix.

Alternative B: The construction limits for Alternative 2-B are expected to impact approximately 0.50 acre of suitable wooded habitat for listed bats. No impacts to any PMRTs are anticipated.

Alternative C: The construction limits for Alternative 2-C are expected to impact approximately 0.64 acre of suitable wooded habitat for listed bats. No impacts to any PMRTs are anticipated.

Segment 3

Alternative A: As described in Section 3.2, this alternative was excluded from resource specific evaluations and was not included in the evaluation matrix. No impacts to any PMRTs are anticipated.

Alternative B: The construction limits for Alternative 3-B are expected to impact approximately 2.62 acres of suitable wooded habitat for listed bats. No impacts to any PMRTs are anticipated.

Alternative C: The construction limits for Alternative 3-C are expected to impact approximately 2.79 acres of suitable wooded habitat for listed bats. No impacts to any PMRTs are anticipated.

Alternative D: The construction limits for Alternative 3-D are expected to impact approximately 2.95 acres of suitable wooded habitat for listed bats. No impacts to any PMRTs are anticipated.

Alternative E: The construction limits for Alternative 3-E are expected to impact approximately 2.85 acres of suitable wooded habitat for listed bats. No impacts to any PMRTs are anticipated.

Cultural Resources: Based on a review of the State Historic Preservation Office's online mapping, both of the Segment 2 alternatives are located within the National Register Boundary of the Village of Mariemont National Historic District (see **Attachment G, Exhibits 3.1, 3.2, and 3.3**). According to the Cultural

Resource PA (Agreement 38503) dated May 26, 2023, coordination with ODOT's Office of Environmental Service (OES) will be required for this portion of the project. Alternatives 3-B, 3-C, and 3-D would cross into a portion of the project area that is located within a previously completed Phase 1 cultural resources survey that covers the majority of Otto Armleder Park. A literature search also found that the abandoned Norfolk South Railroad bridge that Alternatives 1-A, 1-C, 2-B, and 2-C utilize is on the Ohio Historic Inventories list (OHI). No known Ohio Archeological Inventory sites (OAI) were found within the construction limits for any of the segments or alternatives.

Section 4(f)/6(f): Section 4(f)/6(f) properties include publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites. Given the nature and location of the project, there will be impacts to Ault Park and Otto Armleder Park (see **Attachment G- Exhibits 4.1, 4.2, and 4.3**). Tree clearing within Ault Park will require tree replacement. Another small park, the Linwood Hutton Recreational Area, is located adjacent to the southwest portion of the study area and would be very slightly impacted

depending on the alternative chosen. Minor impacts are anticipated to the existing Wasson Way shared use path to connect the new trail. There are no Section 6(f) properties within the project area. Given the anticipated impacts to Section 4(f) properties, coordination with Officials with Jurisdiction (OWJs) will be required for various alternatives and portions of the project. Due to the project type and minimal impacts anticipated, this work will likely be classified as *de minimis*. The potential 4(f) impacts are described below.

Segment 1

Alternative 1-A would connect to the existing Wasson Way Trail within Ault Park, and Alternative 1-C would connect with the existing Murray Path. Section 4(f) coordination would be required for these alternatives.

Segment 2

There are no Section 4(f)/6(f) properties that would be impacted by any of the Segment 2 alternatives.

Segment 3

Alternative 3-E will result in approximately 0.03 acre of encroachment in Linwood Hutton Recreational Area, and approximately 0.27 acre in Otto Armleder Park. Alternatives 3-B, 3-C, and 3-D would also require approximately 0.02 acre of encroachment to Otto Armleder Park. All the Segment 3 alternatives would connect with the existing Otto Armleder Memorial Park Trail. Section 4(f) coordination would be required for these alternatives.

Air and Noise Quality: There would be no adverse air and noise quality impacts associated with this project. The project would have an overall beneficial impact on air and noise quality because of individuals biking and walking instead of driving. Overall emissions would decrease, and traffic noise would be reduced.

Regulated Materials: Based on a review of the project area using the Ohio Regulated Properties Search (ORPS) Tool, a total of 15 regulated material (RM) records occur within the project area (See **Attachment G-Exhibits 5.1, 5.2, and 5.3**). These include five Resource Conservation and Recovery Act (RCRA) records, one Division of Environmental Response and Revitalization record (DERR), nine underground storage tanks (UST), eight leaking underground storage tanks (LUST) and two spill records. Alternative 1-C and Alternative 3-B would be the only considered alternatives to have any regulated material impacts. Any work within 300 feet of landfills in the project area requires a 513 permit. The H. Hafner and Sons Inc.

landfill buffer zone occurs within the construction limits for all of the Segment 2 and 3 alternatives, which means this project will require 513 coordination.

Drinking Water Resources: All the segments and alternatives are located within the boundaries of a designated sole source aquifer. Three ODNR water wells are also located within the HAM-Wasson Way to Otto Armleder Trail Extension project area, however, none of these wells are expected to be impacted by any of the proposed alternatives (See **Attachment G-Exhibits 6.1, 6.2 and 6.3**). The proximity of the project to a sole source aquifer requires that a plan note be included in the project's construction plans in accordance with ODOT's *Standard Operating Procedure for Drinking Water Resources* (ODOT, 2005). The plan note will require that contractors employ basic protective measures, such as avoiding refueling and maintenance activities in environmentally sensitive areas, to minimize the potential

for contamination.

Farmland: The project is located entirely within an urbanized area and would not require coordination under the Farmland Protection Policy Act.

Environmental Justice: ODOT's TIMS mapping was used to identify Environmental Justice (EJ) populations in the project area for the HAM-Wasson Way to Otto Armleder Trail Extension, which is summarized in **Table 1**. These populations include racial/ethnic minority groups and low-income households. The data collected shows that environmental justice populations are present within the census block groups within and adjacent to the project area (See **Attachment G, Exhibits 7.1 - 7.3 and 8.1 - 8.3**). Potential impacts to EJ populations will be evaluated during preliminary and detailed design; however, the proposed project would not result in residential or business displacements and there would be no adverse impacts to EJ populations. Therefore, it is anticipated that impacts to these populations would be beneficial, as the project would provide benefits for low-income residents by providing pedestrian and bicycle access from Ault Park to Otto Armleder Park.

Table 1. Environmental Justice Populations in the HAM-Wasson Way to Otto Armleder Trail Extension (PID 113603) Project Area

Block Group	Population	Minority (%)	Low-Income (%)
Block Group 390610247002	874	6.8	24.1
Block Group 390610048001	858	6.8	2.9
Block Group 390610248002	1,665	9.8	10.4
Block Group 390610047021	687	8.8	46.0

Source: ODOT Transportation Information Mapping System (TIMS), accessed November 6, 2023.

Public Involvement: As discussed in Section 1.1, the need to address pedestrian and bicycle connectivity along designated US Bicycle Route 21 was identified in the *Eastern Corridor Segments II and III (PID 86462) Transportation Needs Analysis*, which was prepared in July 2017. This study was followed by the *Conceptual Alternatives Implementation Plan for Eastern Corridor Segments II and III (PID 86462)* prepared in 2019, which identified the proposed shared use path along US 50 from Wasson Way Trail to Otto Armleder Park as one of 68 projects that should be prioritized for implementation. The public involvement process for each of these studies is detailed in the reports cited above and summarized as follows.

Transportation Needs Analysis: During the Needs Analysis study, stakeholder input was gathered through an Eastern Corridor Development Team (ECDT) meeting, which included Eastern Corridor Partners, community representatives, leadership of the Eastern Corridor communities, business associations, and

other stakeholder groups that have an interest in the Eastern Corridor Program. In addition, a series of Focus Area Workshops were held for smaller geographic areas within Segments II and II of the Eastern Corridor area to gather public input regarding community values and priorities along with the transportation needs of the focus areas. To reach all residents within the Eastern Corridor area, an online interactive survey was conducted which solicited information from residents and commuters about transportation issues in Segments II and III of the Eastern Corridor. ODOT also held a Public Open House to update the public on the Eastern Corridor Segments II and III Transportation Needs Analysis Study and provide an opportunity for the public to provide comments on the needs identified for the six focus areas.

Conceptual Alternatives Implementation Plan: As part of the development of the Implementation Plan, Advisory Committees were established for the six Focus Areas within Segments II and III. These committees included elected officials, transportation planning professionals, and community and interest group representatives, including representatives of the Sierra Club, Tri-State Trails/Green Umbrella, and the Ohio-Kentucky-Indiana (OKI) Regional Council of Governments. Each Focus Group held four meetings with ODOT over the course of the study to further refine transportation needs in the Focus Areas and assist with developing solution concepts. Two Public Open House Meetings also were held throughout the development and refinement of the transportation concepts to ensure that the public had an opportunity to provide input at key decision points.

Additional public involvement activities for the Build Alternative are planned as part of this project. The draft Feasibility Study will be presented in a virtual Public Open House and the Recommended Alternative will be identified to the public and to solicit public input on the project. The meeting will be advertised using various methods, which could include the project website, a news release, social media posts using ODOT District 8 social media platforms, paid newspaper advertisements, notification letters, and email e-blasts. According to TIMS, there are no linguistically isolated populations in the census block group for this project, and as such, no outreach specific to those communities is planned. During the meeting period, the public will have the opportunity to review updated project materials and leave comments. The results will be summarized, and comment responses will be issued in an open house summary report.

4.8 COST ESTIMATE

A preliminary construction cost estimate for each Build Alternative has been developed as a part of this study. The preliminary cost estimates are provided in **Attachment I** and shown in the evaluation matrices provided in **Tables 2, 3** and **4**. Detailed construction costs will be created during development of the Preferred Alternative.

5.0 COMPARISON OF ALTERNATIVES

Detailed evaluation matrices, which summarize purpose and need, environmental, engineering, safety, and public input evaluation criteria for the HAM Wasson Way to Otto Armleder (PID 113603) segment alternatives, are provided as **Tables 2, 3, and 4** on the following pages.

Table 2 – Evaluation Matrix for the Wasson Way to Otto Armleder (PID 113603) Project Alternatives – Segment 1

Evaluation Matrix: Wasson- Armleder Shared Use Path (PID 113603) Segment 1			
Feature Consideration	Preliminary Alternatives		
	No Build Alternative	Alternative A	Alternative C
Purpose and Need			
Improve bicycle and pedestrian connectivity between Wasson Way Trail and Otto Armleder Park	No	Yes	Yes
Safety Analysis			
Safety Issues	No bicycle facilities exist in this corridor. Traveling next to vehicular traffic is a safety concern.	No pedestrian/bicycle conflict points with vehicular traffic.	Three pedestrian/bicycle conflict points with vehicular traffic - at intersections and driveway entrance
Bicycle Level of Traffic Stress	LTS 4	LTS 1	LTS 1
Engineering Issues			
Length of Shared Use Path (ft)	N/A	2350	2900
Width of Shared Use Path (ft)	N/A	12	10 and 12
Design Speed (mph)	N/A	20	20
Trail Design Issues	N/A	None	None
Structures Required	None	2 existing rail bridges to be modified	1 retaining wall required
Utility Relocations/Issues	None	None	Electric relocations required; potential conflict with electric transmission easement
Right-of-Way Impacts			
Additional Right-of-Way Required (acres)	None	0.01	0.97
Ecological Resources			
Streams (lf)	No Impact	26 lf of impact	No Impact
Wetlands (acres)	No Impact	No Impact	No Impact
Threatened & Endangered Species	No Impact	Encroachment of 0.25 ac of suitable habitat for federally listed bats	Encroachment of 0.90 ac of suitable habitat for federally listed bats
Floodplain/Floodway Impacts			
100 Year Floodplain Encroachment (acres)	None	None	None
Floodway Encroachment (acres)	None	None	None
Cultural Resources			
NHRP-Listed Districts	None	None	None
NHRP-Listed Sites	None	None	None
Section 4(f)/6(f) Resources			
Section 4(f)/6(f) Impacts	None	Ault Park (minor)	None
Hazardous Materials			
Regulated Materials Review	None	None	3 UST sites, 2 LUST sites, 1 RCRA, 2 spill sites
Drinking Water			
Sole Source Aquifer	None	Within boundaries of sole source aquifer, plan note would be required	Within boundaries of sole source aquifer, plan note would be required
Community Impacts			
Environmental Justice (EJ) Populations	None	Improves pedestrian/bicycle connectivity for EJ populations	Improves pedestrian/bicycle connectivity for EJ populations
Preliminary Cost Estimates			
Estimated Construction Costs*	N/A	$7,050,000.00	$2,700,000.00
Estimated ROW Costs			
Conclusion			
Recommendation	Not recommended	Recommended as Preferred Alternative	Not recommended

Table 3 – Evaluation Matrix for the Wasson Way to Otto Armleder (PID 113603) Project Alternatives – Segment 2

Evaluation Matrix: Wasson- Armleder Shared Use Path (PID 113603) Segment 2			
Feature Consideration	Preliminary Alternatives		
	No Build Alternative	Alternative B	Alternative C
Purpose and Need			
Improve bicycle and pedestrian connectivity between Wasson Way Trail and Otto Armleder Park	No	Yes	Yes
Safety Analysis			
Safety Issues	No bicycle facilities exist in this corridor. Traveling next to vehicular traffic is a safety concern.	No pedestrian/bicycle conflict points with vehicular traffic.	No pedestrian/bicycle conflict points with vehicular traffic.
Bicycle Level of Traffic Stress	LTS 4	LTS 1	LTS 1
Engineering Issues			
Length of Shared Use Path (ft)	N/A	2650	2650
Width of Shared Use Path (ft)	N/A	12	12
Design Speed (mph)	N/A	12	12
Trail Design Issues	N/A	Tight curve requires slower speeds	Tight curve requires slower speeds
Structures Required	None	1 existing railroad bridge modified, 1 highway bridge widened, 2 retaining walls required	1 existing railroad bridge modified, 1 highway bridge modified (no widening required), 2 retaining walls required
Utility Relocations/Issues	None	Impacts to storm and sanitary sewers is anticipated	Impacts to storm and sanitary sewers is anticipated. Relocation of electric distribution pole, underground water and gas lines expected
Right-of-Way Impacts			
Additional Right-of-Way Required (acres)	None	0.9	1.66
Ecological Resources			
Streams (lf)	None	None	105 lf of impact
Wetlands (acres)	None	0.01 ac of impact	0.01 ac of impact
Threatened & Endangered Species	None	Encroachment of 0.50 ac of suitable habitat for federally listed bats	Encroachment of 0.64 ac of suitable habitat for federally listed bats
Floodplain/Floodway Impacts			
100 Year Floodplain Encroachment (acres)	None	1.38	1.51
100 Year Floodway Encroachment (acres)	None	0.11 (Additional hydraulic analysis required)	0.21 (Additional hydraulic analysis required)
Cultural Resources			
NHRP-Listed Districts	None	Village of Mariemont Historic District	Village of Mariemont Historic District
NHRP-Listed Sites	None	None	None
Section 4(f)/6(f) Resources			
Section 4(f)/6(f) Impacts	None	None	None
Hazardous Materials			
Regulated Materials Review	None	513 Landfill Permit may be required	513 Landfill Permit may be required
Drinking Water			
Sole Source Aquifer	None	Within boundaries of sole source aquifer, plan note would be required	Within boundaries of sole source aquifer, plan note would be required
Community Impacts			
Environmental Justice (EJ) Populations	None	Improves pedestrian/bicycle connectivity for EJ populations	Improves pedestrian/bicycle connectivity for EJ populations
Preliminary Cost Estimates			
Estimated Construction Costs	N/A	$6,400,000.00	$5,660,000.00
Estimated ROW Costs	N/A		
Conclusion			
Recommended as Preferred Alternative	Not recommended	Not recommended	Recommended as Preferred Alternative

Table 4 – Evaluation Matrix for the Wasson Way to Otto Armleder (PID 113603) Project Alternatives – Segment 3

Evaluation Matrix: Wasson- Armleder Shared Use Path (PID 113603) Segment 3					
Feature Consideration	Preliminary Alternatives				
	No Build Alternative	Alternative B	Alternative C	Alternative D	Alternative E
Purpose and Need					
Improve bicycle and pedestrian connectivity between Wasson Way Trail and Otto Armleder Park	No	Yes	Yes	Yes	Yes
Safety Analysis					
Safety Issues	No bicycle facilities exist in this corridor. Traveling next to vehicular traffic on Wooster Road is a safety concern.	One pedestrian/bicycle conflict points with vehicular traffic - at mid-block crossing	One pedestrian/bicycle conflict points with vehicular traffic - at mid-block crossing	One pedestrian/bicycle conflict points with vehicular traffic - at mid-block crossing	Five pedestrian/bicycle conflict points with vehicular traffic - at intersections and driveway entrances
Bicycle Level of Traffic Stress	LTS 4	LTS 1	LTS 1	LTS 1	LTS 1
Engineering Issues					
Length of Shared Use Path (lf)	N/A	5600	6450	6400	6400
Width of Shared Use Path (ft)	N/A	12	12	12	12
Design Speed (mph)	N/A	20	20	20	20
Trail Design Issues	None	None	None	None	None
Structures Required	None	1 existing railroad bridge modified, 1 new bridge structure required, 2 retaining walls required	1 existing railroad bridge modified, 1 new bridge structure required	1 existing railroad bridge modified, 1 new bridge structure required, 1 retaining wall required	1 existing railroad bridge modified, 1 new bridge structure required, 2 retaining walls required
Utility Relocations/Issues	None	None	Impacts to overhead electric lines likely	Minor impacts to gas line anticipated	None
Right-of-Way Impacts					
Additional Right-of-Way Required (acres)	None	5.41	4.77	5.05	4.26
Ecological Resources					
Streams (lf)	None	110 lf of impact	164 lf of impact	186 lf of impact	139 lf of impact
Wetlands (acres)	None	0.09 ac of impact	0.02 ac of impact	0.02 ac of impact	None
Threatened & Endangered Species	None	Encroachment of 2.62 ac of suitable habitat for federally listed bats	Encroachment of 2.79 ac of suitable habitat for federally listed bats	Encroachment of 2.95 ac of suitable habitat for federally listed bats	Encroachment of 2.85 ac of suitable habitat for federally listed bats
Floodplain/Floodway Impacts					
100 Year Floodplain Encroachment (acres)	None	2.95	1.91	1.91	1.48
Floodway Encroachment (acres)	None	1.38 (CLOMR Anticipated)	1.24 (CLOMR Anticipated)	1.17 (CLOMR Anticipated)	1.27 (CLOMR Anticipated)
Impact of New Bridge on FEMA Flood Hazard Area	None	Rise 2.08'; extends 5,400' upstream	Rise 0.90'; extends 4,900' upstream	Rise 0.38'; extends 2,000' upstream	Rise 0.90'; extends 2,200' upstream
Cultural Resources					
NHRP-Listed Districts	None	None	None	None	None
NHRP-Listed Sites	None	None	None	None	None
Section 4(f)/6(f) Resources					
Section 4(f)/6(f) Impacts	None	Otto Armleder Park (minor)	Otto Armleder Park (minor)	Otto Armleder Park (minor)	Otto Armleder Park (minor), Linwood Hutton Recreational Area (minor)
Hazardous Materials					
Regulated Materials Review	None	2 RCRA, 3 UST, 3 LUST, 513 Landfill Permit may be required	513 Landfill Permit may be required	513 Landfill Permit may be required	513 Landfill Permit may be required
Drinking Water					
Sole Source Aquifer	None	Within boundaries of sole source aquifer; plan note would be required	Within boundaries of sole source aquifer; plan note would be required	Within boundaries of sole source aquifer; plan note would be required	Within boundaries of sole source aquifer; plan note would be required
Community Impacts					
Environmental Justice (EJ) Populations	None	Improves pedestrian/bicycle connectivity for EJ populations	Improves pedestrian/bicycle connectivity for EJ populations	Improves pedestrian/bicycle connectivity for EJ populations	Improves pedestrian/bicycle connectivity for EJ populations
Preliminary Cost Estimates					
Estimated Construction Costs	N/A	$3,900,000.00	$4,050,000.00	$4,350,000.00	$5,850,000.00
Estimated ROW Costs	N/A				
Conclusion					
Recommended as Preferred Alternative	Not recommended	Not recommended	Not recommended	Not recommended	Recommended as Preferred Alternative

6.0 PREFERRED ALTERNATIVE/NEXT STEPS

The Preferred Alternatives for the HAM Wasson Way to Otto Armleder (PID 113603) were selected based on the results of the engineering and environmental studies summarized in this Feasibility Study, as well as the extensive public input received on this project. The Preferred Alternatives are summarized below in a segment-by-segment fashion.

6.1 SEGMENT 1

Alternative 1-A was selected as the Preferred Alternative for the Segment 1 portion. This alternative was chosen based on the utilization of the existing railroad bridges and how the use of the rail bridges helps to improve safety and eliminate/minimize impacts. By utilizing these bridges, all the sites of potential vehicle/ pedestrian conflict are eliminated. This alternative also utilizes existing city-owned right of way, resulting in lower anticipated costs to acquire new right of way as compared to Alternative 1-C. It should be noted that the overall cost of this alternative is higher due to some required maintenance of the existing railroad bridges, but those costs would eventually need to be addressed by the City prior to project award.

6.2 SEGMENT 2

Alternative 2-C was selected as the Preferred Alternative for the Segment 2 portion. This alternative was selected due to the benefits of being able to utilize the existing Wooster Road bridge width by creating a new roundabout at the intersection of Wooster Pike and Red Bank Road. The new roundabout is also predicted to help improve the safety and traffic flow of the intersection. Since this alternative doesn't require any widening of the existing Wooster Road bridge, the potential to impact railroad owned property is reduced, and the overall construction cost and amount of right of way needed is less compared to Alternative 2-B. Alternative 2-C will require the extension of the existing culvert through Little Duck Creek, resulting in slightly more utility, stream, and floodplain impacts.

6.3 SEGMENT 3

Alternative 3-E was selected as the Preferred Alternative for the Segment 3 portion. This alternative was selected for its safety benefits because it was the only alternative that crosses Wooster Road with a signalized crossing and it minimized the potential conflicts with existing industrial and construction related businesses along Wooster Road. When compared to the other Segment 3 alternatives, this alternative doesn't have any wetland impacts, avoids impacts to the detention basin located on the US Bank property, and requires the least amount of new permanent right-of-way. This alternative also has less floodway rise upstream when compared to most of the other Segment 3 alternatives and the rise that does occur is largely under the regulatory flood elevation, which is controlled by Ohio River backwater flooding. In addition, the anticipated rise in water surface elevation for this alternative exceeds the FEMA back water surface elevation of 501 feet for a much shorter distance when compared with the other alternatives for Segment 3. As mentioned in section 4.7.2, this alternative meets the Linwood Hutton Recreational Area, which provides opportunity in the future for a connecting trail to be built between the shared use path and the park. Furthermore, since this park is connected to Eastern Avenue via a pedestrian bridge over the active railroad, access to Alternative 3-E could also be made to the homes and businesses along Eastern

Avenue; further improving regional connectivity.

6.4 PHASING

This project can be constructed in two separate phases with logical termini. Phase 1 of the project would start at the beginning of Segment 1 and would terminate at Wooster Pike north of the abandoned railroad bridge near the access road to Norfolk/Southern rail yard. From this point, pedestrians can use the existing sidewalk and cyclists can travel within the roadway on Wooster Pike and Wooster Road to travel down towards Otto Armleder Memorial Park. The second construction phase would begin at the terminus of Phase 1 and build the shared use path to Otto Armleder Memorial Park.

7.0 REFERENCES

American Association of State Highway and Transportation Officials (AASHTO). 2012. *Guide for the Development of Bicycle Facilities, 4th Edition,* Washington, D.C.

ACS 2020 5-year Estimates from ODOT Transportation Information Mapping System (TIMS), accessed August 4, 2023, and U.S. Census Bureau.

Google (2022). *3399 Red Bank Road.* Available at: www.google.com/maps (Accessed February 21, 2024).

Ohio Department of Transportation (ODOT). 2005. *Standard Operating Procedure. Drinking Water Resources.* Columbus, Ohio.

Ohio Department of Transportation (ODOT). 2021. *Bicycle Level of Traffic Stress Calculator.* Columbus, Ohio

Ohio Department of Transportation (ODOT). 2020. *Walk. Bike. Ohio, Demand Analysis Summary.* Columbus, Ohio

Ohio Department of Transportation (ODOT). 2020. *Walk. Bike. Ohio, Needs Analysis.* Columbus, Ohio

Ohio Department of Transportation (ODOT). 2023. *Programmatic Agreement No. 38503.* Columbus, Ohio

Ohio Department of Transportation (ODOT). 2024a. *Location and Design Manual- Volume 1.* Columbus, Ohio.

Ohio Department of Transportation (ODOT). 2024b. *Location and Design Manual- Volume 2.* Columbus, Ohio.

Ohio Department of Transportation (ODOT). 2024. *Multimodal Design Guide.* Columbus, Ohio.

Stantec Consulting Services Inc., 2019. *Conceptual Alternatives Implementation Plan for Segment II/III of the Eastern Corridor Study (PID 86462)*. Lebanon, Ohio.

Stantec Consulting Services Inc. 2017. *Transportation Needs Analysis prepared for Eastern Corridor Segments II and III (PID 86462).* Lebanon, Ohio.

TriState Trails. 2023. “CROWN,” accessed April 23, 2023, CROWN – Tri-State Trails (tristatetrails.org).

U.S. Access Board. 2024. “Guide to the ADA Accessibility Standards,” accessed January 21, 2024, About the ADA Guides (access-board.gov)\