



North Gulph Road Trail

FEASIBILITY STUDY

December 2018

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Acknowledgements



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Feasibility Study

December 2018



This report was prepared with funding support from the Delaware Valley Regional Planning Commission and the William Penn Foundation's Regional Trails Program.



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Introduction & Project Context

Introduction & Project Context

PROJECT OBJECTIVES

The North Gulph Road Trail Feasibility Study evaluates potential alignments for a multi-use trail connection between the Joseph Plumb Martin Trail in Valley Forge National Historical Park and the Chester Valley Trail via North Gulph Road in Upper Merion Township, Montgomery County. Additionally, the Feasibility Study outlines a trail connection along First Avenue between North Gulph Road and Moore Road, allowing for connection to Moore Park.

The objective of the Feasibility Study was to identify a multi-use trail alignment that could be constructed in next five years in conjunction with planned/programmed transportation projects. Programmed transportation projects included the relocation of PA 23/North Gulph Road in the vicinity of PA 23/US 422 interchange, replacement of the Pennsylvania Turnpike bridge over North Gulph Road, and the First Avenue linear park and road diet. Additionally, the Feasibility Study considered transportation projects that are planned -- but beyond the five-year implementation

window, including the widening of US 422 to six-lanes, replacement of the US 422 bridges over North Gulph Road, and SEPTA's King of Prussia rail with a proposed terminus station at First Avenue and North Gulph Road.

This Feasibility Study will serve as a coordination and implementation tool for the Valley Forge Park Alliance, Valley Forge National Historical Park, Upper Merion Township, Montgomery County, PennDOT, the Pennsylvania Turnpike, and SEPTA to develop a multi-use trail along North Gulph Road and First Avenue, while integrating



The Joseph Plumb Martin Trail approaching North Outer Line Drive and the entrance to Valley Forge National Historical Park from North Gulph Road/PA 23. (Source: Google Street View)

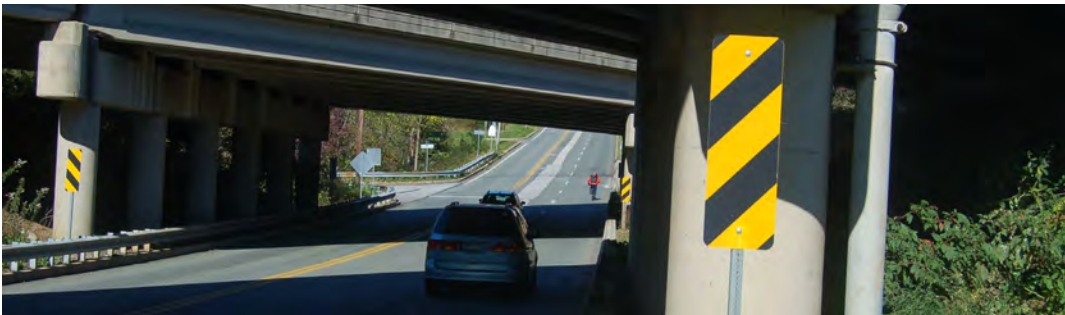


the trail design with these adjacent transportation projects as well as future land development proposals.

Overall, the North Gulph Road Trail has transformative potential that would provide:

1. Local bicycle and pedestrian access to Valley Forge National Historical Park
2. Non-motorized access to the First Avenue Linear Park, Moore Park, Valley Forge Casino, and Village at Valley Forge
3. Regional connectivity between the Schuylkill River Trail and Chester Valley Trail

From these perspectives, the North Gulph Road Trail would serve as a critical link to the trail systems of Upper Merion Township, Chester and Montgomery counties, and the Delaware Valley's Circuit trail network.



Source: <http://kingofprussia-towncenter.com>

REGIONAL TRAIL CONTEXT

The North Gulph Road Trail would provide a valuable trail link between the Schuylkill River and Chester Valley trails, two of the most used trails on the Circuit. Additionally, the trail would serve as a link between Perkiomen and Chester Valley trails.

Notably, the completion of the North Gulph Road Trail would create an 11.25-mile loop between Valley Forge, King of Prussia, Bridgeport, and Norristown via the North Gulph Road, Chester Valley, and Schuylkill River trails, as well as 27-mile loop between Valley Forge, Phoenixville, and Great Valley via the North Gulph Road, Schuylkill River, Devault (proposed), Cedar Hollow (proposed), and Chester Valley trails.

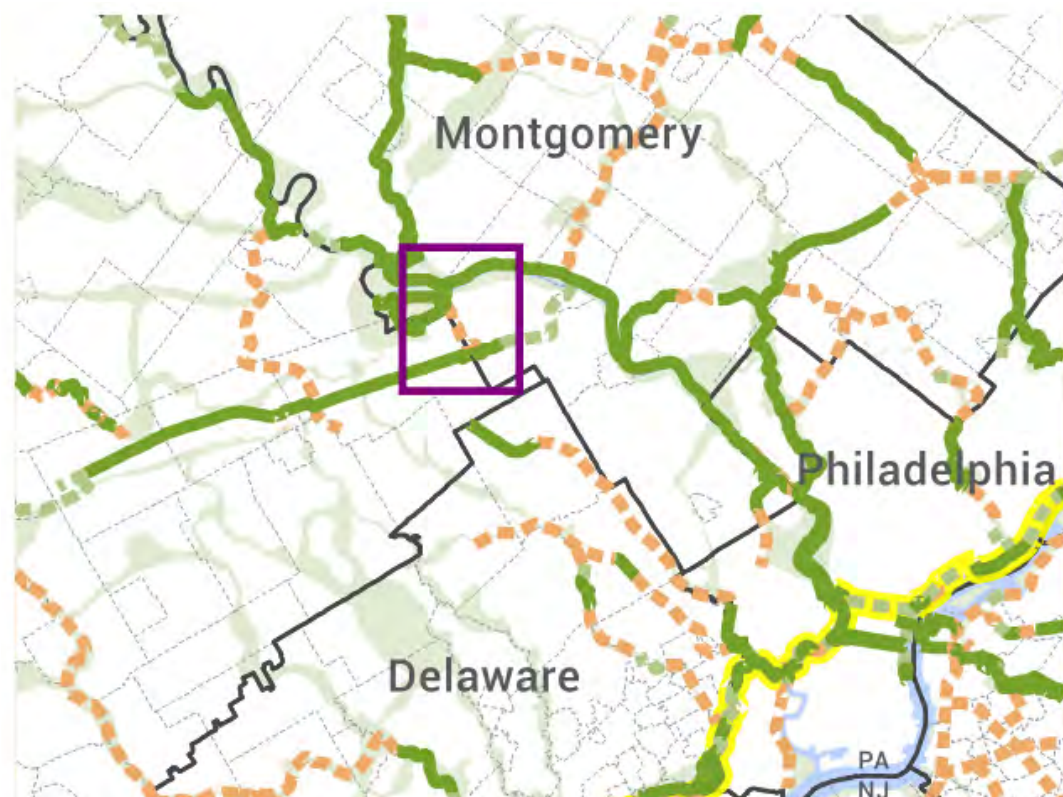
LOCAL PLANNING CONTEXT

Upper Merion Township

UPPER MERION 2020 VISION PLAN

Upper Merion Township Vision 2020 was officially accepted by the Upper Merion Township Board of Supervisors on February 3, 2005. Per Upper Merion Township's website,

"The plan pointed out that Upper Merion must not become complacent about its future. In order to enjoy a community rich in history, civic pride, cultural diversity, and economic prosperity, we must have a vision for the community and the framework necessary



The North Gulph Road Trail in the context of the Circuit. (Source: Connections 2045, DVRPC)

to achieve it. The need for economic and community development can only be met through successes won by thoughtful planning and diligent implementation. Without this vision, the township's future would be reactionary, with others determining its fate."

The North Gulph Road Trail is an example of a public-sector and non-profit led project

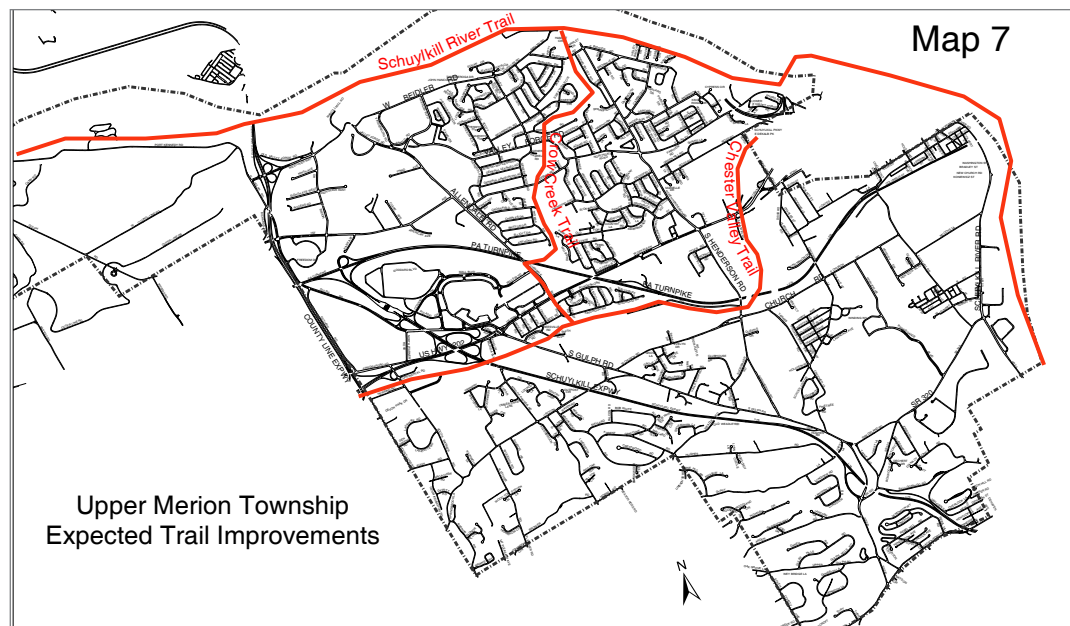
that could enhance the quality-of-life of Upper Merion Township. The Township is in the process of updating the Township Comprehensive Plan – Upper Merion 2040. This plan is slated for adoption in early 2019.

UPPER MERION OPEN SPACE PLAN (2005)

Upper Merion Township completed a township-wide open space plan in 2005. This Plan identified three trails for planned improvements:

1. Schuylkill River Trail "West"
2. Crow Creek Trail
3. Chester Valley Trail

While the North Gulph Trail wasn't identified within this 2005 Plan, the North Gulph Trail would serve an additional trail connection between these trail facilities and provide trail connections to shopping and recreational destinations on the western side of Upper Merion Township.



Trails identified in the Upper Merion Open Space Plan, 2005 (Source: Upper Merion Township)

SCHUYLKILL RIVER WEST TRAIL

In late 2014, Upper Merion Township broke ground on the Schuylkill River Trail "West". This trail is planned to connect several residential neighborhoods in the Township to Valley Forge National Historical Park, Bridgeport, and Lower Merion Township.



Ribbon-cutting for the Schuylkill River Trail West Trail (Source: <https://www.umtownship.org/departments/parks-recreation/parks-trails/schuylkill-river-west-trail/>)

COUNTY PLANNING CONTEXT

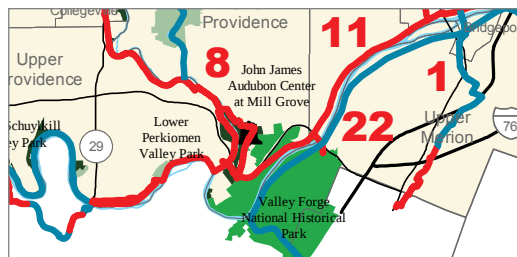
Montgomery County

MONTCO 2040: A SHARED VISION

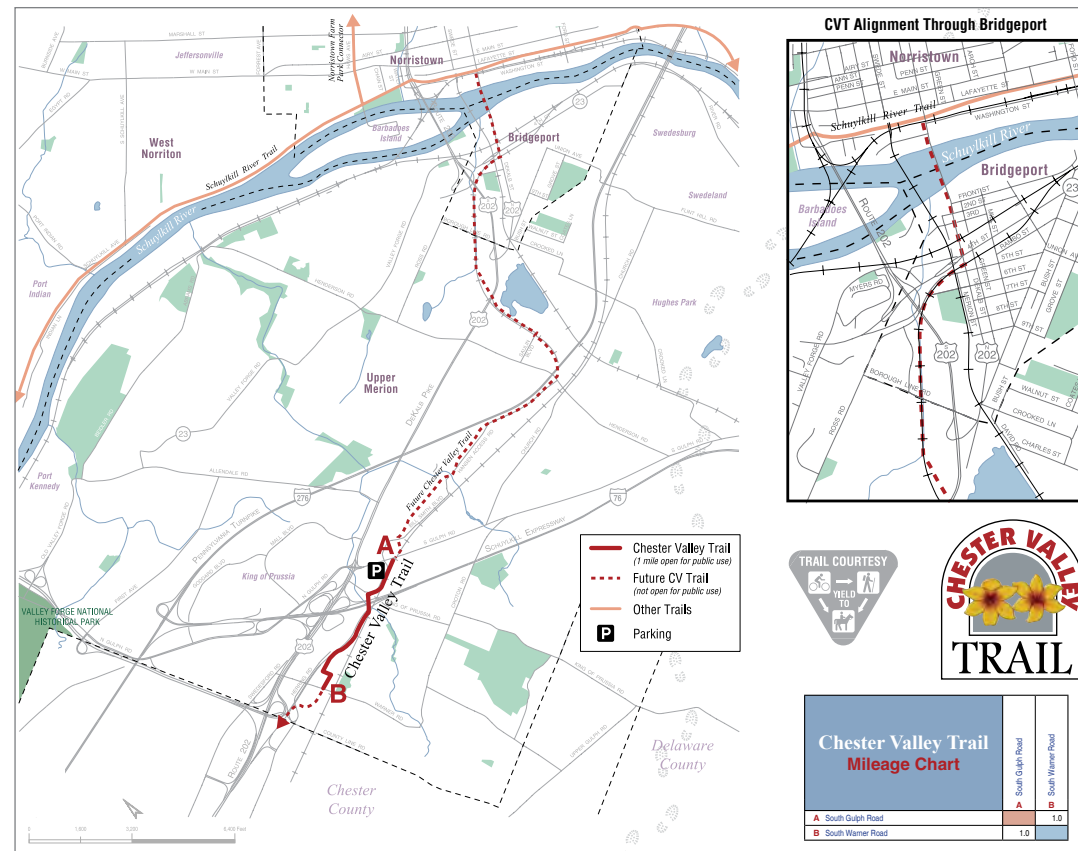
Montgomery County's comprehensive plan, Montco 2040: A Shared Vision, was adopted by the Montgomery County Commissioners in January 2015. Within the Montco 2040 plan, Montgomery County outlined their proposed trail system, including the Schuylkill River, Perkiomen, and Chester Valley trails.

CHESTER VALLEY TRAIL TO BRIDGEPORT/NORRISTOWN

As of December 2018, the Chester Valley Trail currently extends 15 miles from Exton to King of Prussia, with the eastern terminus of the Chester Valley Trail at South Gulph Road. Montgomery County is currently designing the extension of the Chester Valley Trail between South Gulph Road and Bridgeport, with a planned direction connection to the Schuylkill River Trail in Norristown. Construction of this section of trail is expected in late 2019.



The Valley Forge area of Montgomery County's Proposed County-wide Trail System (Source: Montco 2040: A Shared Vision)



Chester Valley Trail to Bridgeport/Norristown (Source: Montgomery County)

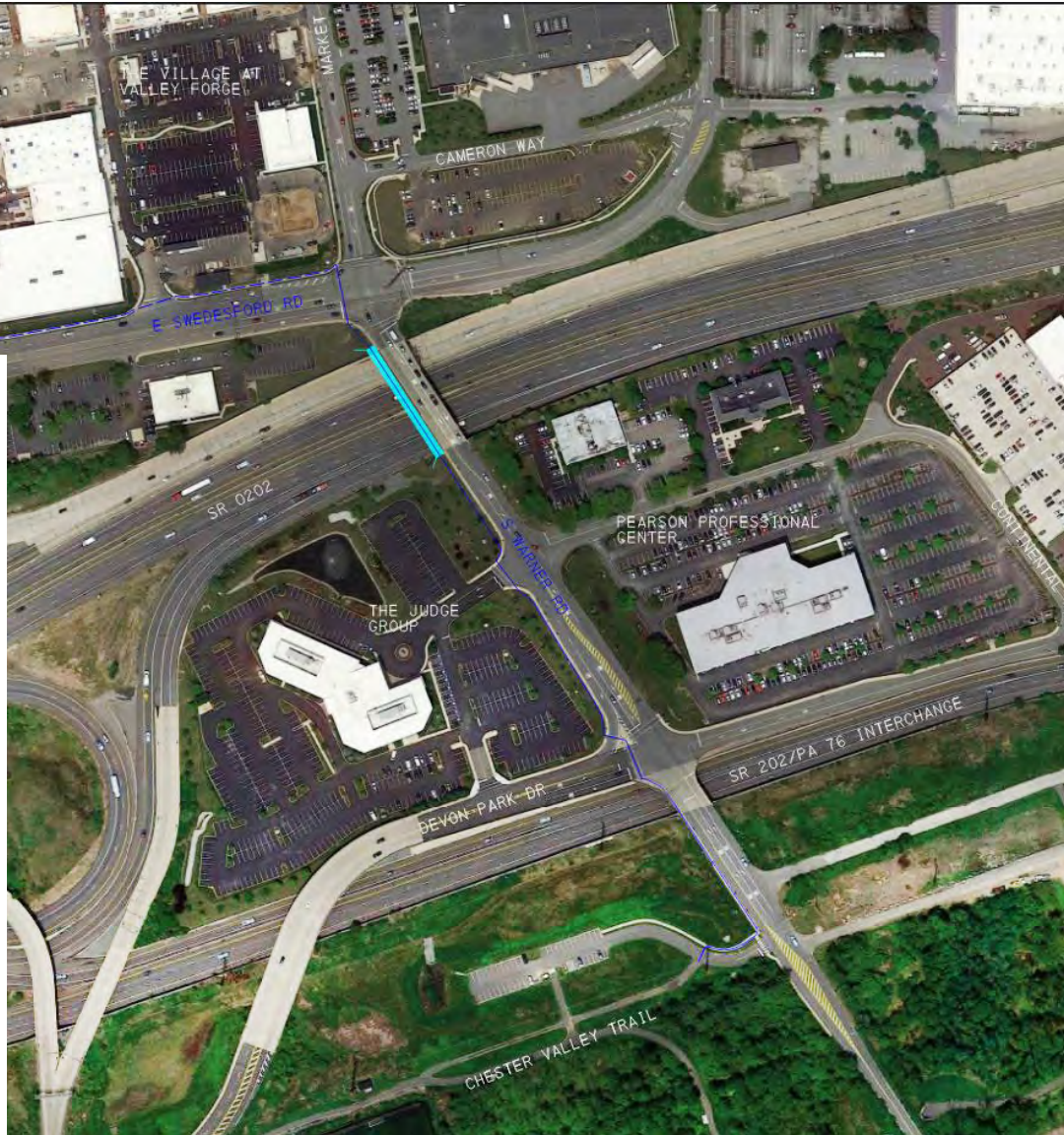


BIKE MONTCO 2040

In August 2018, the Montgomery County Commissioners adopted Bike Montco 2040, a county-wide bicycle plan. As part of the Plan, four case studies were developed to showcase how the Plan's policies could be applied in different contexts around Montgomery County. One of the case studies was Warner Road from Swedesford Road to the Chester Valley Trail, potentially providing trail access between the Village at Valley Forge and the Chester Valley Trail.

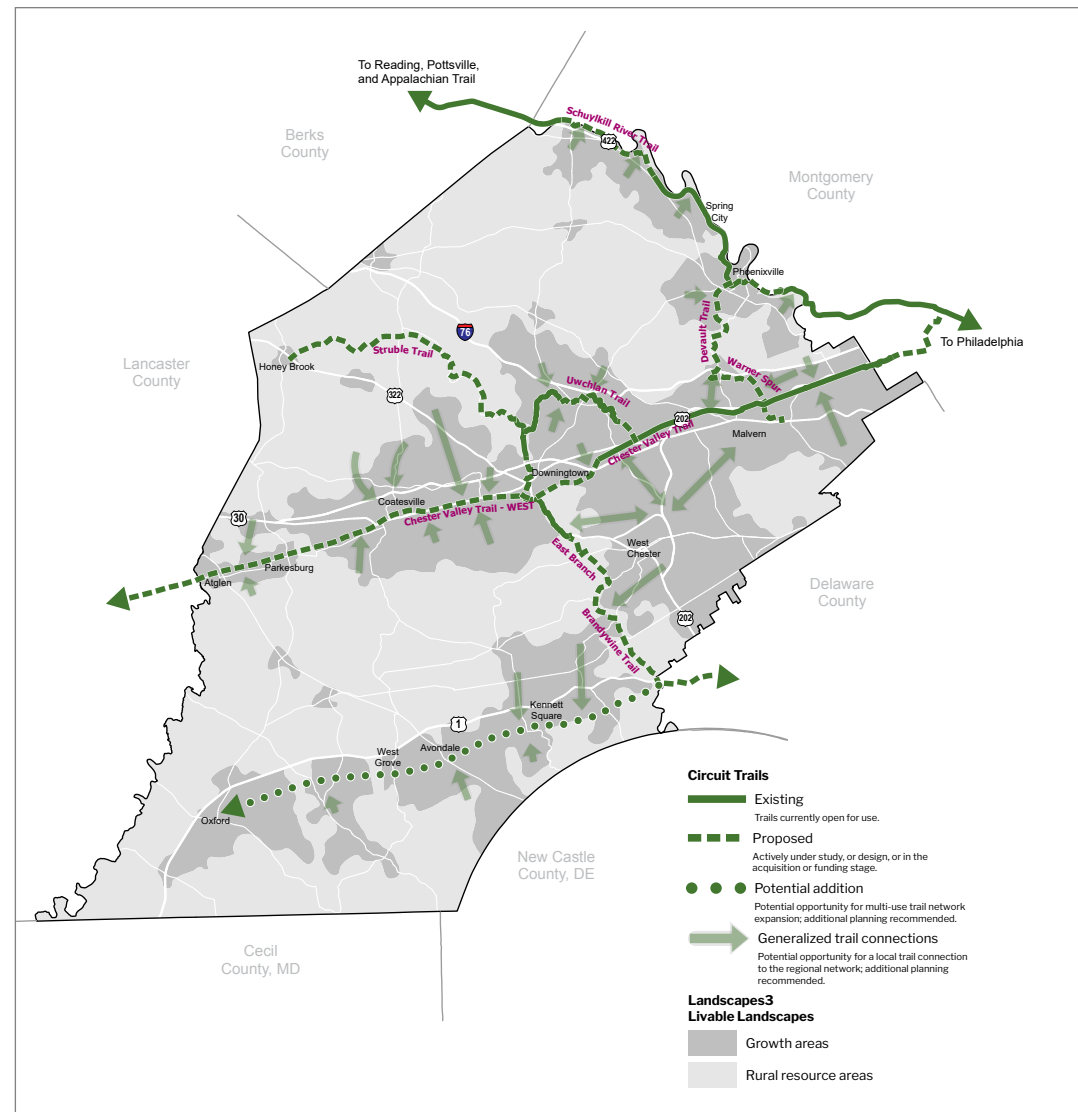
For the purposes of this Feasibility Study, the Project Team assumed this Bike Montco alignment to be valid and assumed the tie-in of this concept with the North Gulph Road Trail at the intersection of Swedesford Road and Warner Road/Market Street.

The estimated construction cost for this improvement (from the Swedesford Road/Market Street/Warner Road intersection to the CVT Trailhead) was estimated at \$1.77 million.



Chester County

In December 2018, the Chester County Commissioners adopted Landscapes3 as an update to Chester County's comprehensive plan. Within the Landscapes3 plan, Chester County outlined existing and proposed trails across the county. As noted previously, the North Gulph Road Trail could play a key role in developing a 27-mile loop between Valley Forge, Phoenixville, and Great Valley via the North Gulph Road, Schuylkill River, Devault (proposed), Cedar Hollow (proposed), and Chester Valley trails.



Chester County Circuit Trails (Source: Landscapes3, Chester County Planning Commission)

PROGRAMMED AND PLANNED PROJECTS IN PROJECT AREA

The Project Team coordinated extensively with agencies and consultant teams advancing transportation improvement projects within the Study Area, including:

PA 23/N. Gulph Road Relocation 23-2NG

The relocation of PA 23 and North Gulph Road (MPMS# 66952) is a \$14 million project currently under design. This project is one phase of the larger 422 River Crossing Complex, which included the PA 363 interchange (completed), Sullivan's bridge (completed), and widened US 422 bridge (construction underway). Construction for the 23-2NG project is anticipated to begin in Spring 2020.

Through coordination with the 23-2NG Consultant Team, VFNHP, and PennDOT, the Project Team discussed locating the North Gulph Road Trail on the existing roadbed of North Gulph Road (which will be abandoned when the 23-2NG relocates North Gulph Road to the east) between Richards Road and North Outer Line Drive.

PA Turnpike Widening: MP320-326

The Pennsylvania Turnpike (I-76) over North Gulph Road is one of the most constrained pinch-points in the Study Area; therefore, it was of great interest to the Project Team to understand the Turnpike's plans and timing for replacing the PTC bridge over North Gulph Road as part of their MP320-326 project. Based upon prior coordination with the Pennsylvania Turnpike staff dating back to 2011, the Pennsylvania Turnpike

Commission committed to lengthening the mainline bridges for I-76 over North Gulph Road to accommodate a multi-use trail on the east side of North Gulph Road

Unfortunately, as of December 2018, there is no set timetable for the construction of the MP320-326 project. The project had been delayed due to environmental permitting complexities. Additionally, the Pennsylvania Turnpike Commission has put major projects on hold due to funding uncertainties resulting from Act 44 and a pending lawsuit by the trucking industry.

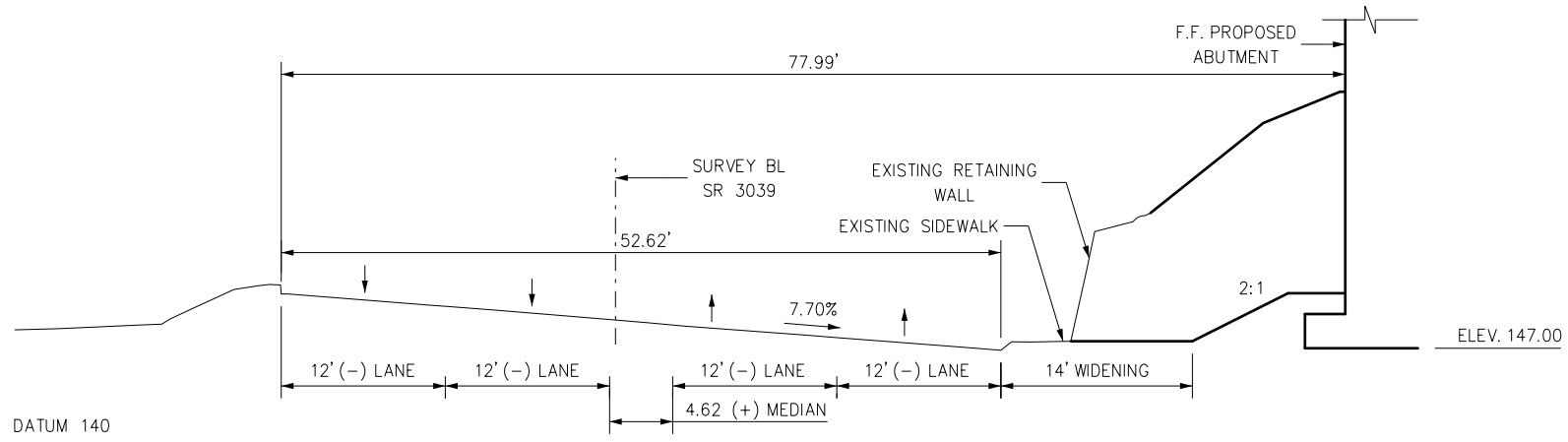
First Ave Linear Park and Road Diet

The King of Prussia Business Improvement District has spearheaded the transformation of First Avenue, with the goal of adding bicycle and pedestrian amenities along the



PA 23 / N. Gulph Road Relocation 23-2NG (Source: Ground Reconsidered)

POSSIBLE WIDENING: STA 20+77.92



Cross-section for the Pennsylvania Turnpike bridge over North Gulph Road, showing 14' of widening to accommodate the North Gulph Road Trail (Source: Pennsylvania Turnpike Commission)

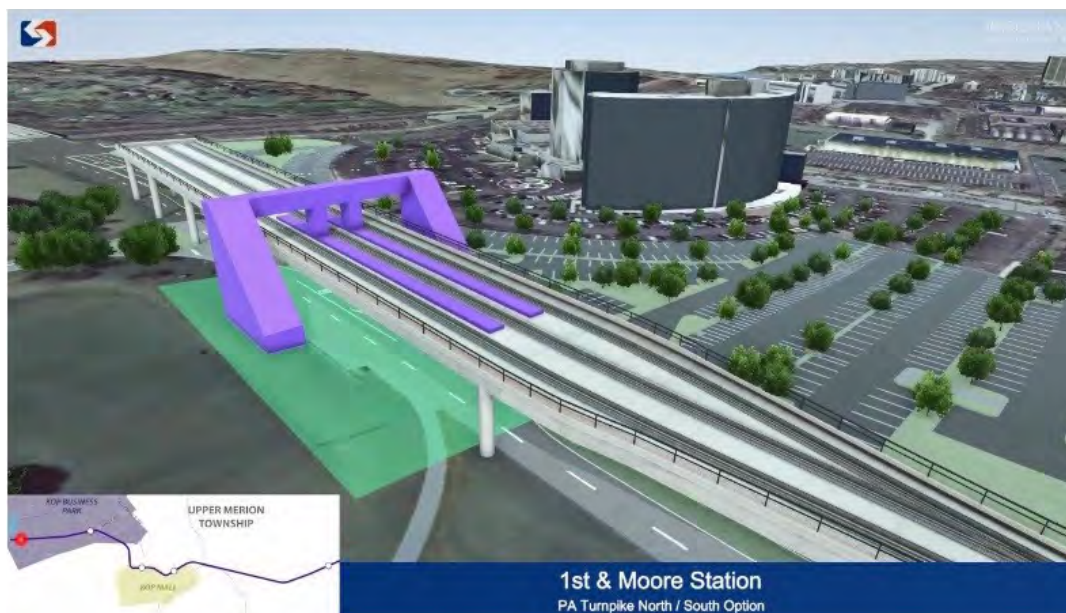


First Avenue Linear Park and Road Diet

corridor. In 2017, a demonstration section of the Linear Park was opened. In 2018, a second improvement project completed a "road diet" to First Avenue, reducing the roadway from two travel lanes in each direction to one travel lane per direction as well as designated bike lanes.

SEPTA's King of Prussia Rail

SEPTA has completed an Environmental Impact Statement and has begun design for developing a spur extension of the Norristown High Speed Line to King of Prussia. In 2018, SEPTA selected a Locally Preferred Alternative; notably for this Feasibility Study, the final section of the project is proposed to be elevated over First Avenue with a station located between North Gulph Road and Moore Road.



Rendering of the proposed First Avenue / Moore Station
(Source: SEPTA/Bergmann Associates)

AGENCY COORDINATION

A major aspect of the North Gulph Road Trail Feasibility Study was coordinating with local, county, and state agencies to review the design and timeline of the noted transportation project that were concurrently under design during the development of this Feasibility Study. Additionally, these agencies reviewed and provided feedback on the draft trail alignments. The project timeline included:

- » 3/02/18 – Kickoff Meeting
- » 4/03/18 – Coordination meeting with VFNHP, 23-2NG Team, and Upper Merion Township
- » 5/16/18 – Coordination meeting with KOPBID
- » 5/24/18 – Conference Call with Pennsylvania Turnpike
- » 8/08/18 – Coordination meeting with VFNHP and 23 NG Team
- » 10/19/18 – Coordination meeting with PennDOT 6-0 and Montgomery County Planning Commission
- » 11/16/18 – Coordination meeting with Village at Valley Forge properties

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Study Area Profile



North Gulph Road at Trout Creek (looking south)



Trout Creek culvert (looking north)



North Gulph Road at the Pennsylvania Turnpike (looking south)



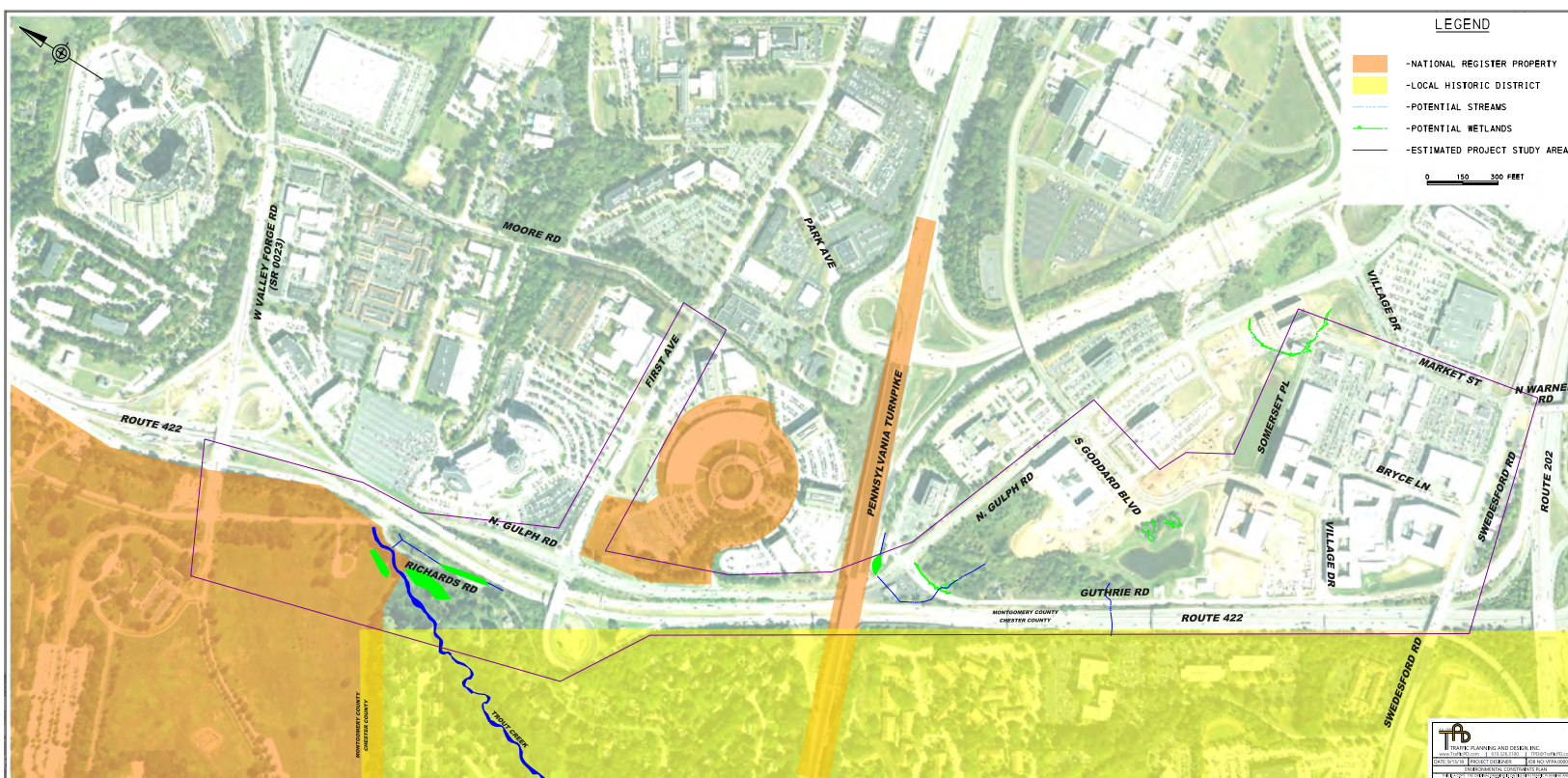
North Gulph Road at the Pennsylvania Turnpike (looking north)

ENVIRONMENTAL CONSTRAINTS

The project lies within the Trout Creek watershed, which is classified as a warm water/migratory fishery. Trout Creek is a detailed FEMA study area within the project study limits. Trout Creek is also listed as known to support wild trout by the PA Fish and Boat Commission (PAFBC), but is not

listed as stocked with trout. A preliminary PNDI completed for the project indicated one conflict with the PAFBC. This conflict is likely due to proximity of the Schuylkill River where the PA State threatened species, the Eastern Redbelly Turtle (*Pseudemys rubriventris*). Additional coordination with PAFBC will be required and mitigation measured implemented for any stream crossings.

Several potential wetlands are present within the project area based upon a preliminary field view. These potential wetland areas are shown on the environmental mapping. Due to the presence of naturally reproducing wild trout within the project area, all wetlands identified within the watershed are considered exceptional value. A number of roadside ditches or tributaries to Trout Creek



Environmental Constraints

are also present within the project area. The jurisdictional nature of these channels will need to be determined as part of a wetland delineation for the project.

Several sites within the project area currently or have historically maintained underground storage tanks. The Villages at Valley Forge are listed a Land Recycling Cleanup site. Based upon the nature of the project, these sites would not likely require investigation or affect the project.

No active agricultural land is located within the study area. Prime farmland soils and soils of statewide importance are located within the project area, however the entire area is classified as an urbanized area. The study area is also listed as an environmental justice area for minority (54%) and low income (9%) populations. As the project is considered a transportation enhancement project that will improve community cohesion, as well as promote multimodal transportation and will not disproportionately affect environmental justice populations.

The area is underlain by carbonate geology and numerous sinkhole repairs have occurred in the vicinity of the proposed alternatives. The Village at Valley Forge currently operates ground water injection wells to manage groundwater volume requirements. The entire study area is on public water supply.

The area has been extensively studied for historic resources and archaeology due to the nature of VNHP. The park is listed on the National Register of Historic Places and is a National Historic Landmark. The National Offices of the American Baptist Church along First Avenue is National Register eligible. The PA Turnpike Mainline is also National Register eligible and the Kennedy Mansion to the north of the VNHP main entrance is National Register listed. The Tredyfffin Historic District has been identified as a local resource. Several other properties within the vicinity of the study area have previously been evaluated and determined not National Register eligible including: Valley Forge Golf Course (now Villages at Valley Forge), 428 County Line Road (Guthrie Rd), Baron's Inne (now Creed's restaurant), Devon International Group, Dekalb's Headquarters and Port Kennedy Village. Due to the nature of the area, there is high historic archaeological potential near VFNHP and moderate prehistoric archeological within the Trout Creek floodplain.

VFNHP is anticipated to be exempt from the Section 6(f) process. One open space area (Richards Road Open Space) is located to the west of Richards Road, but impacts to this area are not anticipated. Section 4(f)/2002 coordination will be required for any park or historic resources to be impacted if federal or state funding is involved in the project.

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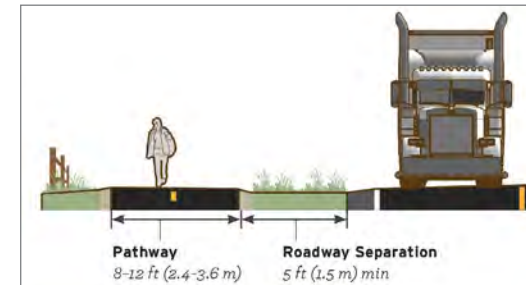
Trail Feasibility Analysis

Trail Feasibility Analysis

METHODOLOGY

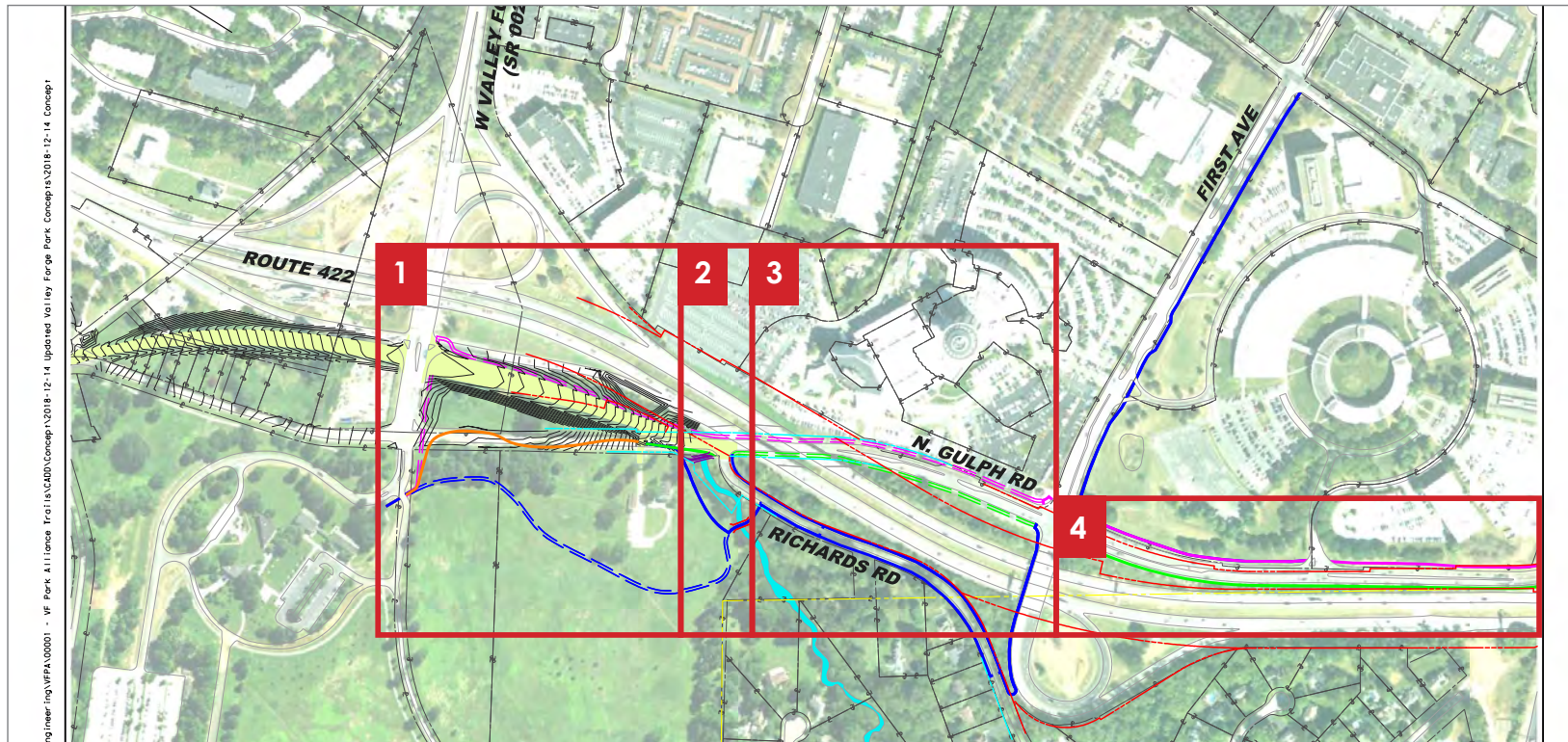
With the objective of connecting the Joseph Plumb Martin Trail to the Chester Valley Trail via North Warner Road, the Project Team identified all reasonably-feasible alignments for potentially constructing a multi-use

trail. The Project Team applied trail design guidelines based upon AASHTO's *Guide for the Development of Bicycle Facilities* (4th Edition, 2012). Each trail alignment was evaluated based on the physical feasibility, constructability, development cost, and environmental impact.



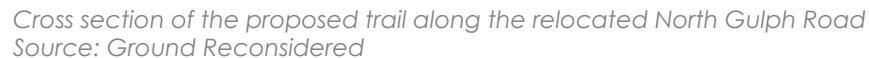
Source: Small Town and Rural Design Guide

OVERVIEW OF ALTERNATIVES





Starting from the Joseph Plumb Martin Trail, the Project Team identified three alignments for the North Gulph Road Trail. The first alignment (1A) follows the basic alignment of present-day North Gulph Road, with gradual curvatures to soften the trail grade as the trail climbs up from Trout Creek. Given that this alignment would be constructed on ground that is disturbed by the current alignment of North Gulph Road, this alignment would require the least amount of environmental review, justification, and permitting. VFNHP has requested federal funding for this portion of the trail. The funding could potentially be available in 2021.



and then parallel North Gulph Road as a sidepath.

VFNHP and the PA 23-2NG Consultant Team indicated that Alternative 1B would significantly disturb planned stormwater facilities and grading that is designed as part of the 23-2NG project. The timing of the permitting, approval, and construction of the 23-2NG project would not permit incorporation of this alternative. Therefore, advancement of the 1B Alternative would have to be done independently of the 23-2NG project and after the completion of the 23-2NG project. The cost estimate for this alternative has accounted for significant regrading and re-establishment of stormwater facilities.

The third alternative (1C) proposes the trail west of present-day North Gulph Road and west of the Park's Ranger Station through the meadow of Valley Forge National Historical Park. Being the furthest alignment from US 422 and North Gulph Road, this alignment would enjoy the serenity and calmness provided by Valley Forge National Historical Park; however, this alignment would require the most rigorous environmental review process including a formal Environmental Assessment per NEPA and Section 106 requirements. This alignment was dropped/not recommended due to these environmental considerations.



The alignment west of the Ranger Station would be most-separated from US 422 and North Gulph Road, but would require more extensive environmental evaluation than other alternatives. This alignment was dropped from further consideration.

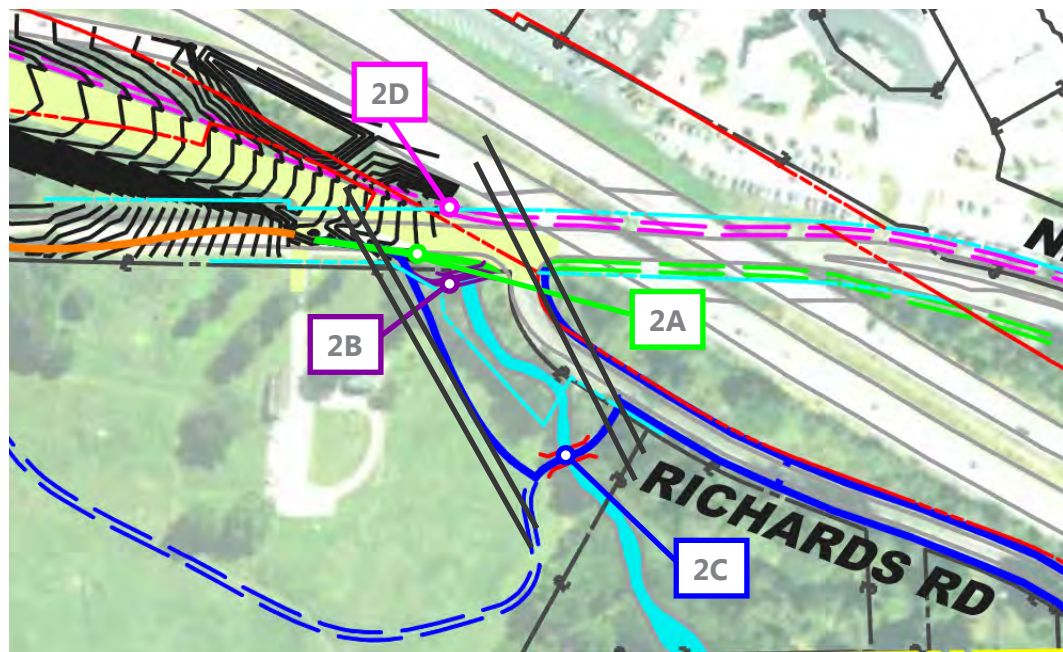
Section 2 – Crossing Trout Creek

Four trail alternatives were identified for the crossing of Trout Creek. Among the alignments on the western side of North Gulph Road, the first alignment (2A) would accommodate the shared use path at the same grade as North Gulph Road. This alternative would require the Trout Creek culvert to be extended to the west in order to support the trail and slope.

Given the limited width between North Gulph Road and Trout Creek, the Project Team identified a second alternative (2B) that would construct an independent pre-fabricated trail bridge to carry the trail over Trout Creek.

It should be noted that the land ownership at the North Gulph Road / Trout Creek crossing is unclear. Subsequent research beyond the scope of this Feasibility Study is required to determine land ownership in this vicinity.

Due to the height of the stream embankments relative to Trout Creek, Alternatives 2A and 2B would be expensive and challenging alignments. Therefore, the Project Team identified a third stream crossing location (2C) approximately 300 feet upstream/west of the existing North Gulph Road culvert. While this location would allow for a potentially smaller span bridge crossing, it is located with the VFNHP boundary and would require Section 4(f)/2002 coordination. Additionally, this alternative would require a more extensive



Section 2 - Crossing Trout Creek



North Gulph Road crossing Trout Creek



Trout Creek at North Gulph Road

hydrologic and hydraulic analysis to ensure that the trail approaches do not impact the floodplain of Trout Creek.

The eastern-most alignment (2D) would cross Trout Creek via the existing culvert that carries both North Gulph Road and US 422 over the stream.



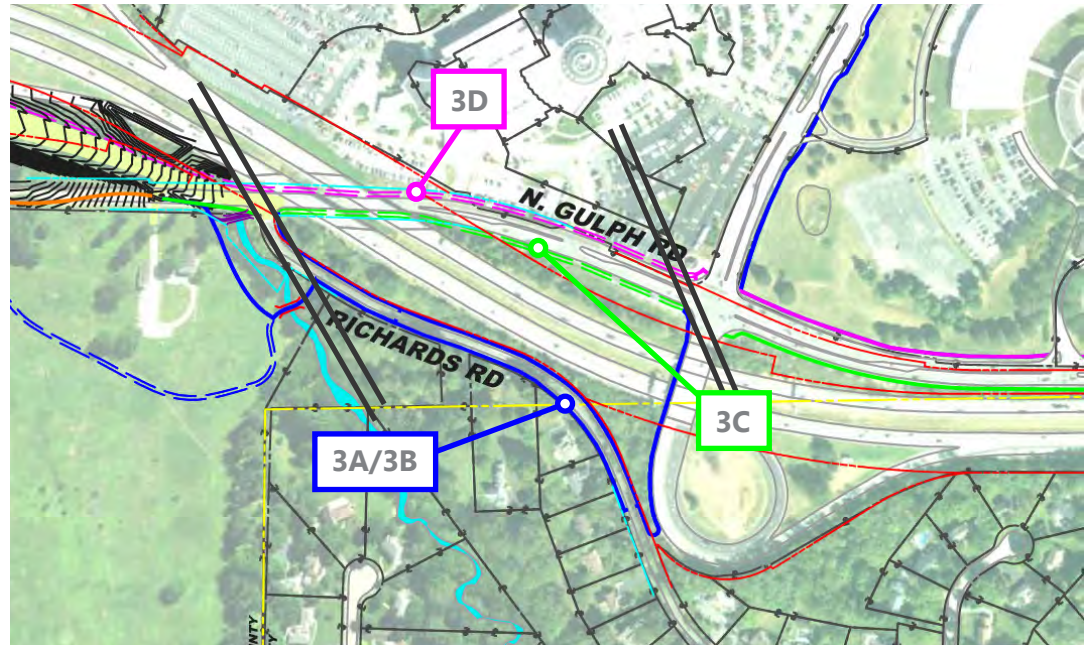
The potential location for a new bridge crossing of Trout Creek - west of North Gulph Road - Alternative 2C.



North Gulph Road over Trout Creek. Alternative 2A would extend this culvert to accommodate the trail; Alternative 2B would construct a separate bridge just west of the culvert.

Section 3 – Navigating under or over US 422

After crossing Trout Creek, the Project Team identified four alternatives for traversing US 422. The first two alternatives for this section of the North Gulph Road Trail avoid the US 422 bridges over North Gulph Road and rather locate the trail along Richards Road as a sidepath and then cross US 422 via the First Avenue on/off-ramp to US 422 (3A/3B). The First Avenue bridge over US 422 (which presently is 26' wide) would be modified to install a double-faced barrier to protect the shared use trail from the travel lane. This alternative would require design exception approval from PennDOT due to sub-standard shoulder width across the bridge span; however, this condition would be limited to 200' in length as the trail would turn away from the on-ramp immediately upon crossing the span.



Section 3 - Navigating under or over US 422



The US 422 bridges over North Gulph Road



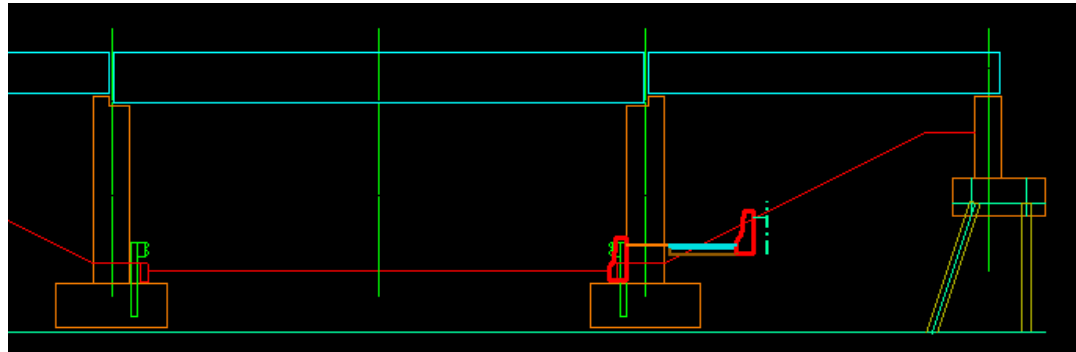
Richards Road - proposed



Proposed interim improvement under US 422, with trail running along east side of North Gulph Road



PA 412 - Hellertown



US 422 over North Gulph Road – depicting the proposed 5' sidewalk located behind the bridge pier



Proposed interim improvement under US 422, with trail running along west side of North Gulph Road

It should be noted that the 3A and 3B alternatives - if selected and advanced - would require property-owner coordination with residents along Richards Road.

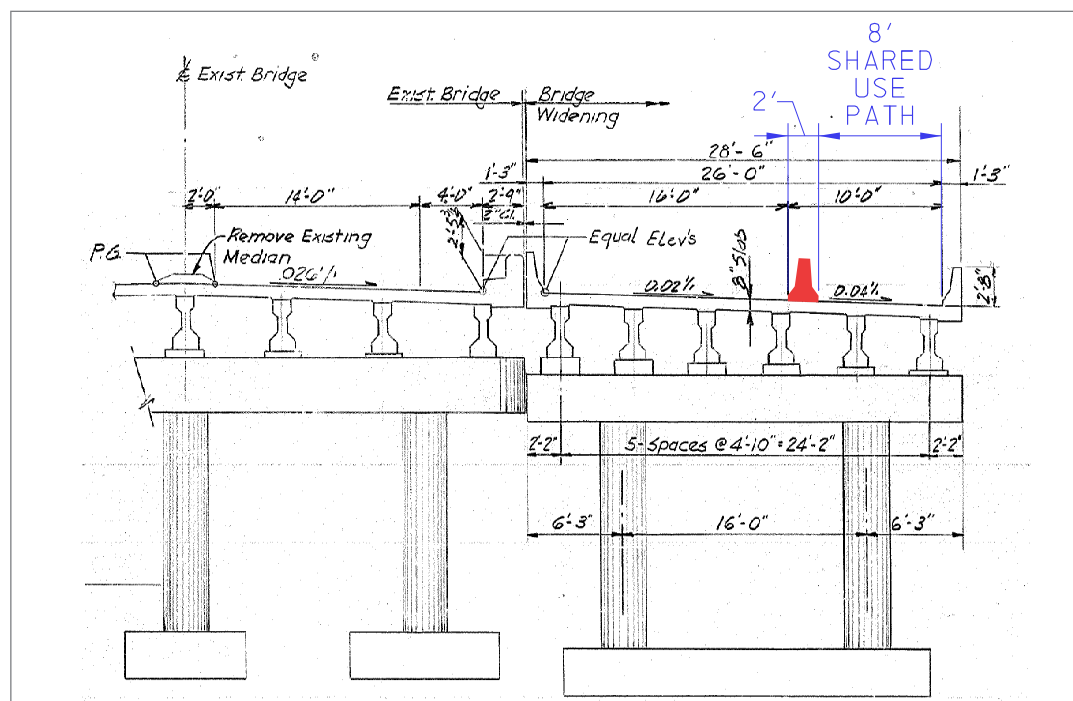
Two of the alternatives (3C/3D) propose to continue to the North Gulph Road Trail under the US 422 mainline bridges. The Project Team determined that the trail could not be located on the road-side of the bridge piers due to insufficient shoulder width. Locating

the trail in front of the bridge pier would have only been possible by removing a travel lane in one direction, which was determined infeasible due to the traffic volumes along North Gulph Road.

The Project Team evaluated the feasibility of locating a trail facility behind the bridge piers. Notably, the Project Team identified a similar project in PennDOT District 5-0 where a sidewalk was relocated behind a

bridge pier as part of a widening project to PA 412 in Hellertown, Northampton County. Similarly, the Project Team concluded that a five (5') foot sidewalk could be feasibly accommodated behind the US 422 bridge piers – but not an 8' or 10' multi-use trail. Therefore, as a safety measure, signage instructing bicyclists to dismount would be included if this alternative is selected and advanced.

It should be noted that the US 422 bridges over North Gulph Road (Bridge Key 27452 and 27453) are not programmed on the Delaware Valley Regional Planning Commission's four-year Transportation Improvement Program. However, PennDOT indicated that these structures may be programmed for rehabilitation or replacement as part of subsequent updates to the Transportation Improvement Program. (The next update to the Transportation Improvement Program begins in the Fall 2019, with adoption slated for Spring 2020.) In the event that PennDOT plans to rehabilitated or replace these bridge structures, the feasibility of providing a 10' shared use path should be discussed with PennDOT.



Proposed modifications to the First Avenue bridge over US 422

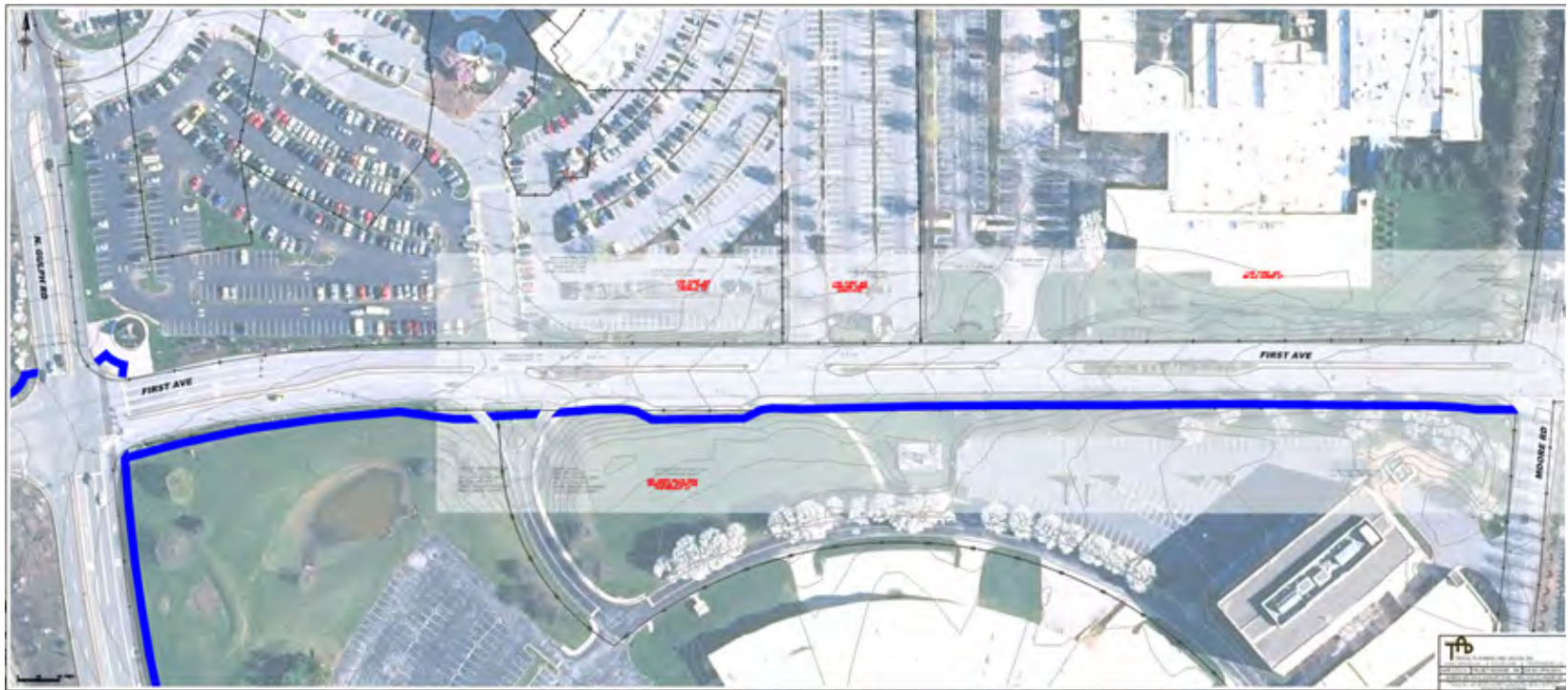
First Avenue – North Gulph Road to Moore Road

As a tie-in between the proposed North Gulph Road Trail and First Avenue linear park and road diet, the Project Team developed conceptual plans for extending a shared use facility along First Avenue from North Gulph Road to Moore Road. Despite the need for the significant regrading that would be required, the Project Team favored the south

side of First Avenue for a sidepath. The north side of First Avenue has considerably more access points and would require significant modification to the parking lot of the Valley Forge Casino. The development of the King of Prussia Rail station at this location may provide future opportunities to install a shared use facility on the north side of First Avenue as well.



First Avenue looking east



First Avenue concept - North Gulph Road to Moore Road, shown with planned Linear Park improvements. (Source: KOPBID)

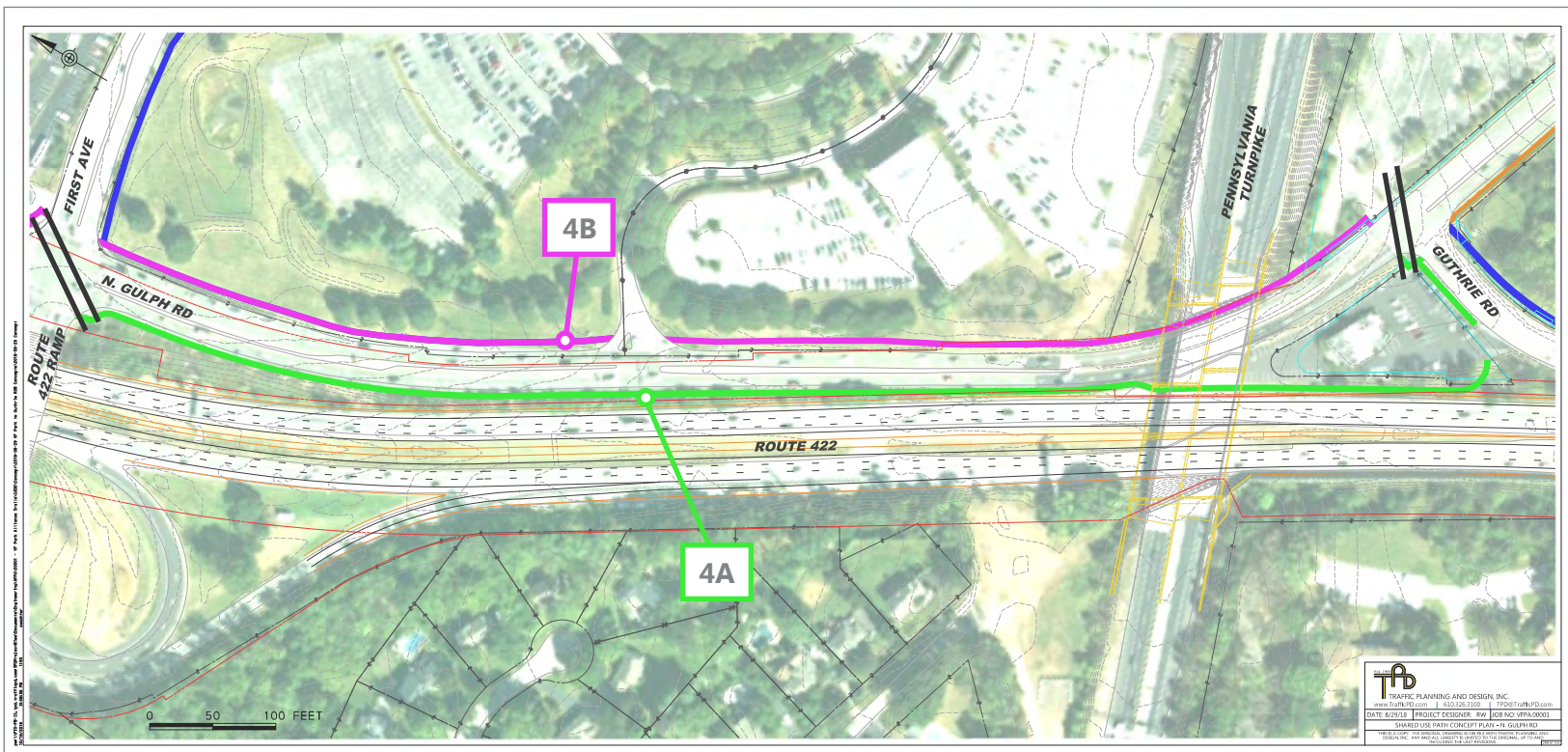
Section 4 – First Avenue to Guthrie Road

From the First Avenue/North Gulph Road intersection, two alternatives were identified by following either side of North Gulph Road to the Guthrie Road intersection.

In light of the timing uncertainties for replacing the Turnpike bridge, the Project Team explored the feasibility of constructing



North Gulph Road at the Pennsylvania Turnpike (looking south)

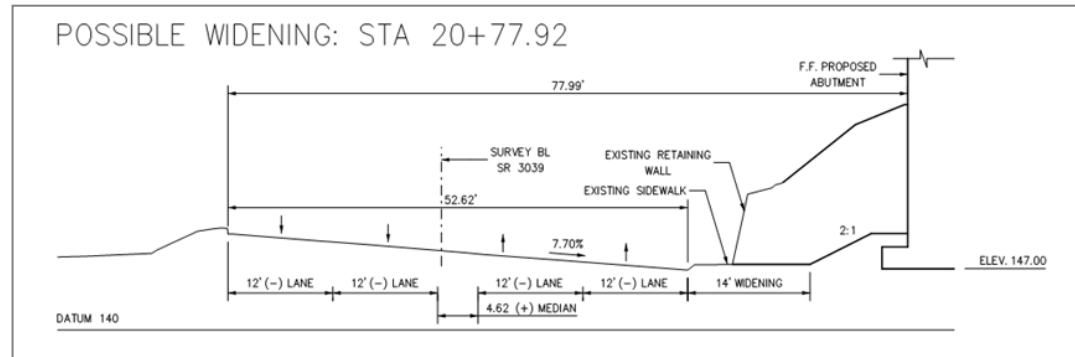


Section 4 – First Avenue to Guthrie Road

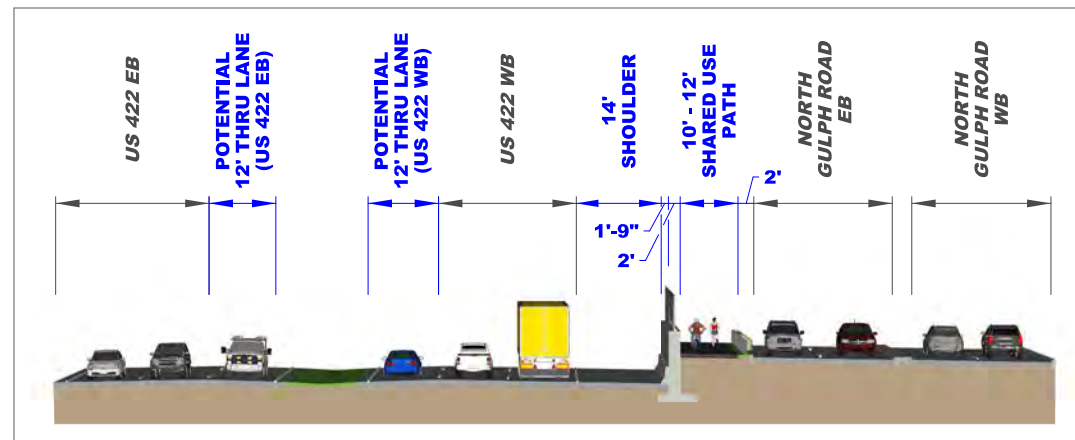
a sidepath along the western side of North Gulph Road, effectively between North Gulph Road and US 422 (Alt. 4A). The Project Team identified that it was feasible to accommodate a sidepath on the western side of North Gulph Road. This alternative would require an extensive wall to support the trail, while not encroaching upon the shoulder of US 422. Notably, this alignment is construct-able without the replacement of the Pennsylvania Turnpike bridge over North Gulph Road.

Additionally when developing the 4A alternative, the Project Team was mindful of future plans to widen US 422 in this section to six-lanes; this improvement is not on the Delaware Valley Regional Planning Commission's four-year Transportation Improvement Program, but the project is listed in DVRPC's 25-year long range plan, Connections 2045. Therefore, the Project Team developed a conceptual plan and cross-section to demonstrate that a trail along the western side of North Gulph Road could co-exist with US 422 when it is widened to six-lanes in the future – assuming the widening of US 422 is done into the existing median of US 422.

Along the east side of North Gulph Road, the crux of this trail alternative (4B) is the timing of the Pennsylvania Turnpike replacing its mainline bridge over North Gulph Road. As noted previously, unfortunately there is no definite timeline for this project due to the Pennsylvania Turnpike Commission's capital funding uncertainties.



Proposed cross-section of North Gulph Road under the Pennsylvania Turnpike (Alt. AB).
Source: Pennsylvania Turnpike Commission



Proposed North Gulph Road Trail along the west side of North Gulph Road, also depicting a six-lane widening of US 422 - Alt. 4A.

In the event the Turnpike's plans to replace the North Gulph Road bridge do not advance in a timely manner, an alternative may be to bore a separate trail tunnel under the Pennsylvania Turnpike on the eastern side of North Gulph

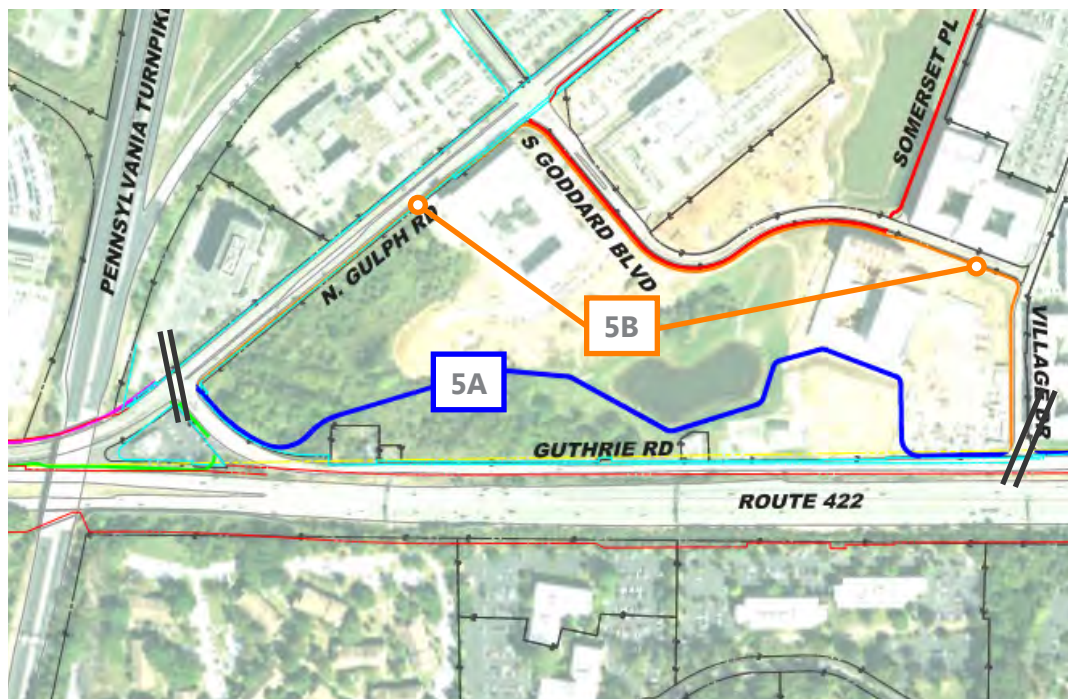
Road. However, the feasibility of this concept was not assessed nor discussed with the Pennsylvania Turnpike staff.

Section 5 – Guthrie Road to Village Drive

From the intersection of North Gulph Road and Guthrie Road, the Project Team identified two alternatives: navigating a shared use trail along Guthrie Road to Village Drive (5A) and second: continuing a sidepath along the western side of North Gulph Road to Goddard Boulevard (5B).

The trail alternative (5A) along Guthrie Road would navigate through the western side of the Village at Valley Forge development, which remains under development. This alignment would require extensive coordination with Upper Merion Township and property owners to accommodate the trail through pending and future land development projects. For this reason, alternative 5B along North Gulph Road is favored over the Guthrie Road alternative (5A); however, there is merit in considering developing both alignments to serve as a 1.25-mile recreational loop for the Village at Valley Forge properties, residents, and tenants.

The alternative along the western side of North Gulph Road (5B) would require the widening and reconfiguration of the existing and proposed sidewalk between Goddard Boulevard and Guthrie Road. Once the trail connects to Goddard Boulevard, the trail would continue along the existing shared use trail constructed within the Village at Valley



Section 5 – Guthrie Road to Village Drive

Forge to Somerset Place. Beyond Somerset Place, this alternative would similarly require existing sidewalk along Goddard Boulevard and Village Drive to be widened to a shared use trail width.

It should be noted that the existing shared use path of Goddard Boulevard continues along Somerset Place, terminating at Market Street. On Market Street, a bicycle lane is

provided from Somerset Place to Swedesford Road. However, the Project Team did not recommend using the Market Street bicycle lanes as part of the North Gulph Road Trail due to the unprotected nature of these bicycle lanes and the presence of several busy intersections along Market Street.



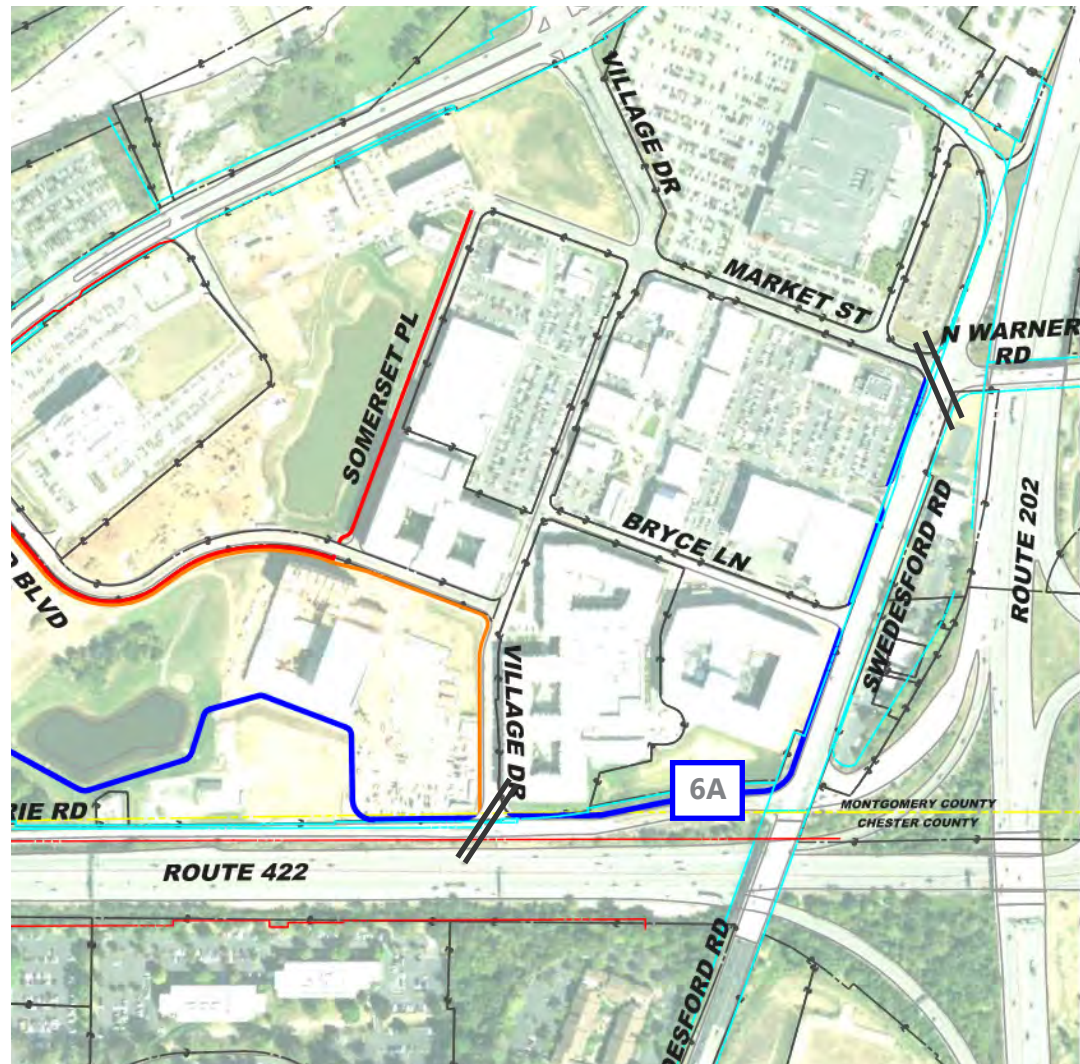
North Gulph Road at Goddard Boulevard - existing



North Gulph Road at Goddard Boulevard - proposed

Section 6 – Village Drive to Warner Road

From the Village Drive/Guthrie Road intersection, the Project Team recommends locating the trail adjacent to Guthrie Road and Swedesford Road as a sidepath (6A). This alignment will require installing of some wall features as well as minor utility and planting relocation. This alignment would connect the trail to the Swedesford Road/Warner Road/Market Street intersection, where the trail is proposed to continue south along South Warner Road per the concept plans developed for Montgomery County as part of the Bike Montco case study.



Section 6 – Village Drive to Warner Road



Guthrie Road - existing conditions



Guthrie Road - proposed



Swedesford Road - existing conditions



Swedesford Road - proposed

IMPLEMENTATION PLAN

Trail Ownership

With the basis of this Feasibility Study, a critical immediate step for advancing the North Gulph Road Trail should be to determine what agency will be assuming ownership and maintenance responsibilities for the North Gulph Road Trail. This agency would spearhead the selection of a preferred alternative, the pursuit of funding, and serve as the project sponsor for grant funding.

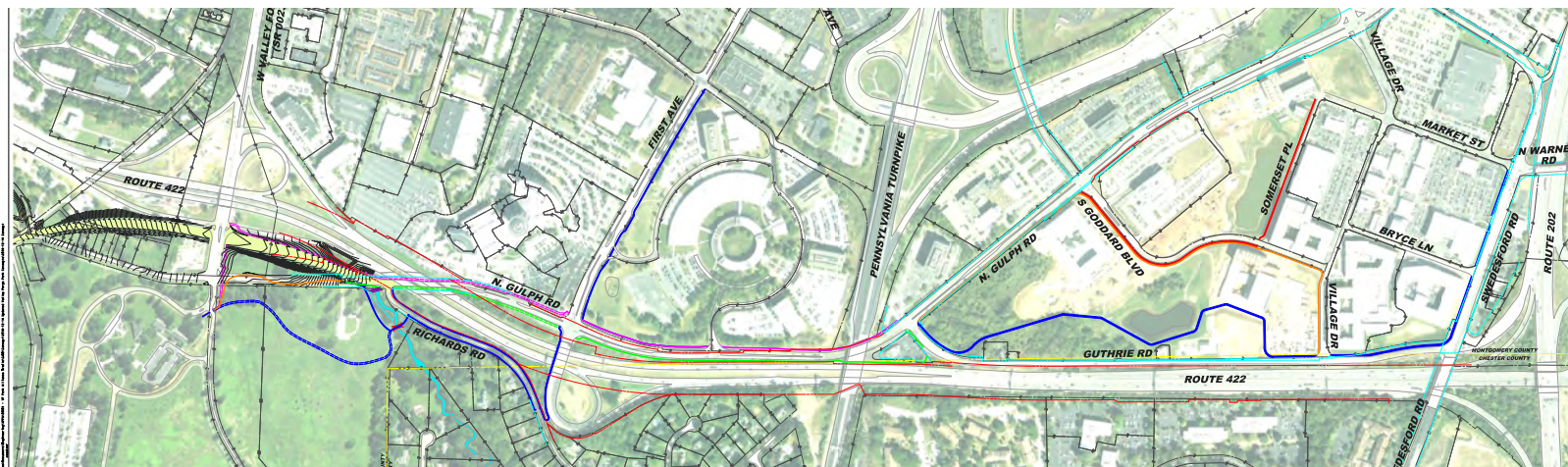
Through coordination with the Valley Forge National Historical Park, VFNHP staff confirmed that limits of the trail that run within National Park boundaries would be owned and maintained by VFNHP. To the south of the Park limits, is where no clear owner has been

identified. Montgomery County and Upper Merion Township should be approached to discuss their willingness and/or concerns regarding owning and maintaining the trail. From a Montgomery County perspective, the North Gulph Road is a Circuit-identified trail connection that will connect to two of Montgomery County's most well utilized trails – the Schuylkill River Trail and the Chester Valley Trail. From an Upper Merion Township perspective, the North Gulph Road Trail will provide trail access to the Township's rapidly-growing North Gulph Road corridor. The North Gulph Road Trail will, for instance, give residents and long-term guests living within the Village at Valley Forge a means for walking and bicycling to many destinations with Upper Merion and King of Prussia.

Implementation Scenarios

The Project Team determined that the majority of the draft alignments to be feasible; selection of the specific alignment depends on the desired timing/horizon for the implementation of the North Gulph Road trail and funding availability. All five scenarios use the same alignment south of the North Gulph Road/Guthrie Road intersection: Alternative 5B (North Gulph Road to Goddard Boulevard / Village Drive and Alternative 6A (Guthrie Road / Swedesford Road).

Note that the scenario construction costs do not include the estimated construction costs for First Avenue or the Bike Montco concept from Swedesford Road to the Chester Valley Trail.



Overview of Trail Alternatives

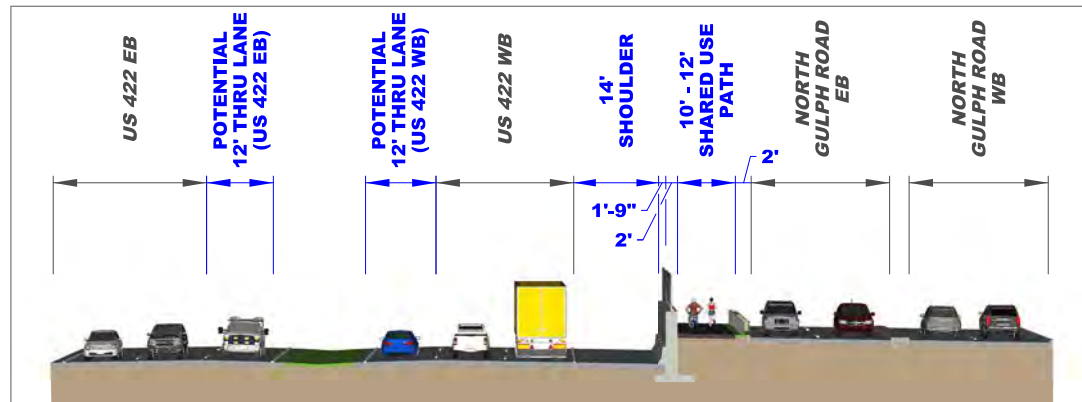


SCENARIO 1: WEST – 422 - WEST

SCENARIO 1: WEST – 422 - WEST

This scenario would construct the VFNHP section of the trail along the present-day North Gulph Road alignment (Alternative 1A), cross Trout Creek via a new trail bridge just west of the existing culvert (Alternative 2B), and then traverse under the US 422 bridges on the west side of North Gulph Road to the First Avenue intersection (Alternative 3C). The trail would then continue along the west side of North Gulph Road and around Creed's Seafood and Steaks (Alternative 4A). This scenario can be advanced without dependence on the Pennsylvania Turnpike's replacement of the I-76 bridge over North Gulph Road.

Estimated Construction Cost: \$5,500,000



Proposed North Gulph Road Trail along the west side of North Gulph Road, also depicting a six-lane widening of US 422

Advantages: keeps trail users on west side of North Gulph Road, most direct, not contingent on PTC bridge replacement

Challenges: traverses immediately adjacent to US 422, potential design complexities with Alternatives 3C and 4A

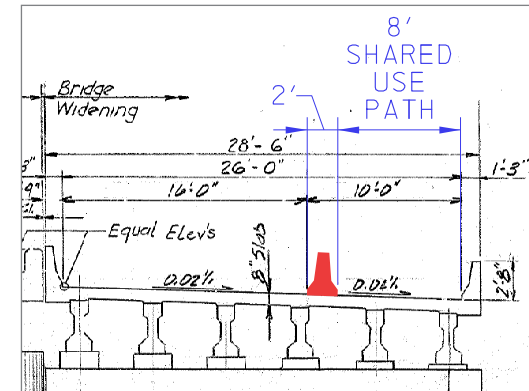
SCENARIO 2: WEST – RICHARDS/FIRST - WEST

This scenario would be the same as Scenario 1 to Richards Road via Alternative 1A and 2B. Then, this scenario would route the trail along Richards Road and across the First Avenue/422 bridge (Alternative 3B). Then, similar to Scenario 1, this scenario would use the Alternative 4A to traverse along the west side of North Gulph Road to navigate under the Pennsylvania Turnpike bridge; thus, this scenario can also be advanced without dependence on the Pennsylvania Turnpike's replacement of the I-76 bridge over North Gulph Road.

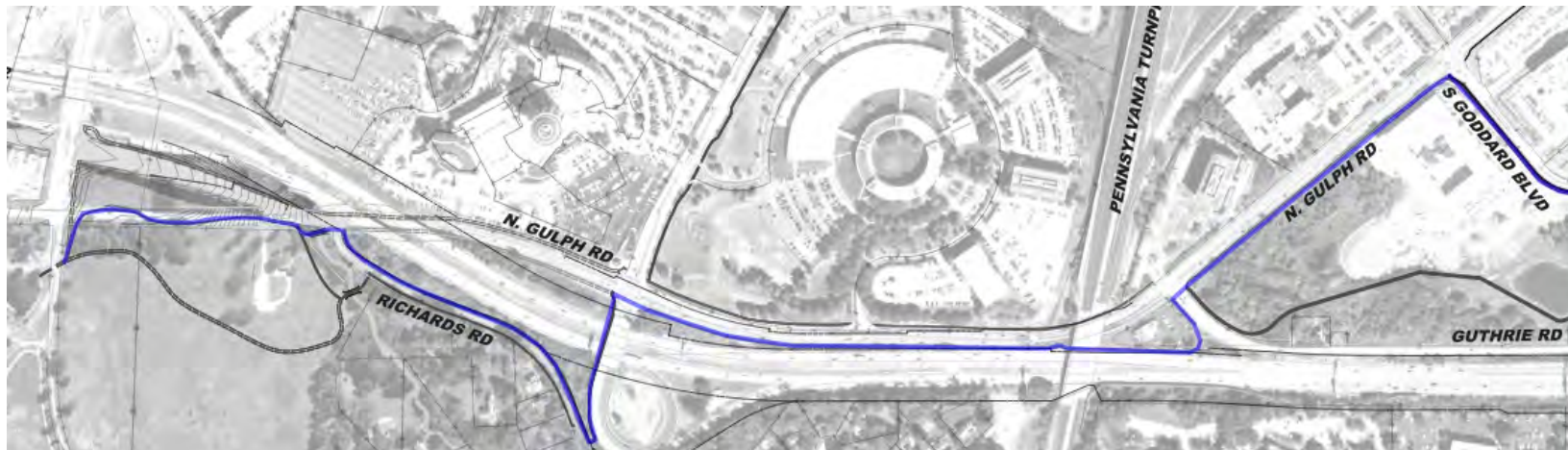
Estimated Construction Cost: \$5,810,000

Advantages: keeps trail users on west side of North Gulph Road; avoids potential design complexities with Alternative 3C/3D; not contingent on PTC bridge replacement

Challenges: less direct than Scenario 1; traverses immediately adjacent to US 422; requires property coordination along Richards Road (Alternative 3B); potential design complexities with 4A.



Proposed modifications to the First Avenue bridge over US 422



SCENARIO 2: WEST – RICHARDS/FIRST - WEST



SCENARIO 3: EAST – 422 – EAST/PTC

SCENARIO 3: EAST – 422 – EAST/PTC

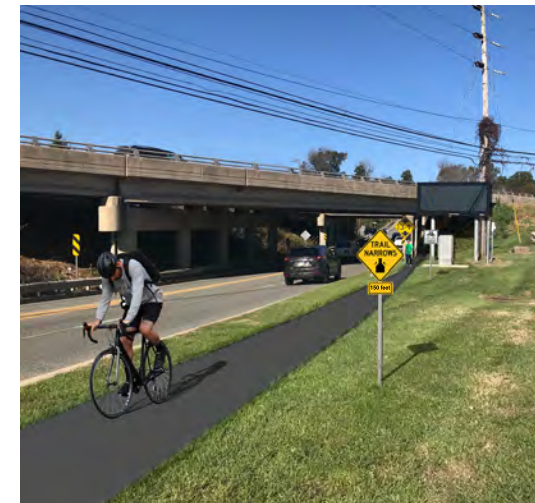
This scenario effectively traverses along the east side of North Gulph Road from PA 23 to Guthrie Road. As noted in the Feasibility Analysis, Alternative 1B would require extensive modification to the grading and proposed drainage facilities that are part of the PA 23-2NG project. Despite this coordination and design complexity, this scenario crosses Trout Creek in the most economical manner (Alternative 2D), as the trail would cross the existing North Gulph Road culvert over Trout Creek. Then, the trail would continue under US 422 on the east side of North Gulph Road (Alternative 3D). From the North Gulph Road/First Avenue intersection, this scenario continues the trail along the east side of North Gulph Road to the Pennsylvania Turnpike bridge

(Alternative 4B). This scenario is contingent on the Pennsylvania Turnpike's replacement of the mainline I-76 bridge over North Gulph Road. Once under the Pennsylvania Turnpike, the trail would cross North Gulph Road at the Guthrie Road traffic signal and continue along the west side of North Gulph Road.

Estimated Construction Cost: \$3,650,000

Advantages: utilizes existing North Gulph Road culvert to cross Trout Creek; avoids potential design complexities with 4A

Challenges: Significant coordination with PA 23-2NG for Alternative 1C; requires significant property coordination between US 422 and Guthrie Road (Alternatives 3D and 4B); contingent on PTC bridge replacement



Proposed interim improvement under US 422, with trail running along east side of North Gulph Road

SCENARIO 4: WEST – 422 – EAST/PTC

This scenario would be same as Scenario 1, running along the west side of North Gulph Road and under US 422 (Alternatives 1A, 2B, and 3C). At the First Avenue / North Gulph Road intersection, this scenario would then run the trail along the east side of North Gulph Road (4B) and under the Pennsylvania Turnpike, mimicking Scenario 3. Similarly, this scenario is contingent on the Pennsylvania Turnpike's replacement of the mainline I-76 bridge over North Gulph Road.

Estimated Construction Cost: \$3,910,000

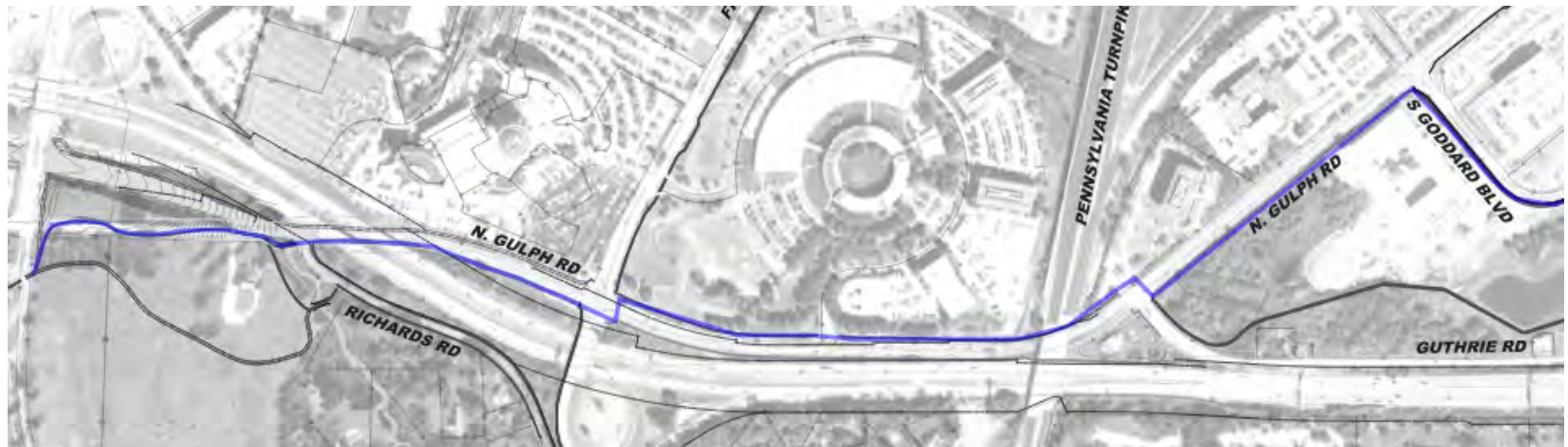
Advantages: More direct than Richards Road/First Avenue alternatives (but signalized crossings); avoids potential design complexities with 4A

Challenges: Requires trail users to cross North Gulph Road at First Avenue and Guthrie Road intersections; potential design complexities with Alternative 3C; requires significant

property coordination between US 422 and Guthrie Road (Alternatives 3C and 4B); contingent on PTC bridge replacement



Proposed interim improvement under US 422, with trail running along west side of North Gulph Road



SCENARIO 4: WEST – 422 – EAST/PTC



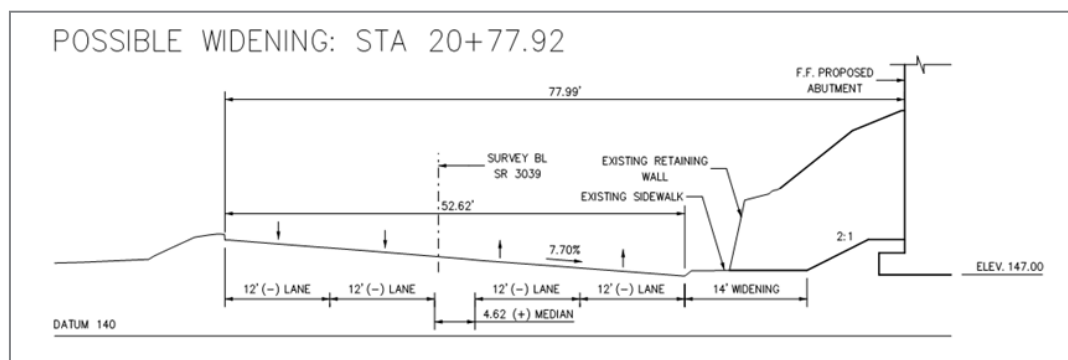
SCENARIO 5: WEST – RICHARDS/FIRST - EAST

SCENARIO 5: WEST – RICHARDS/FIRST - EAST

This scenario would be same as Scenario 2, running along the west side of North Gulph Road and then along Richards Road and over the First Avenue/US 422 bridge (Alternatives 1A, 2B, and 3B). Then, similar to Scenarios 3 and 4, this scenario would locate the trail along the east side of North Gulph Road and under the Pennsylvania Turnpike (4B). Like Scenarios 3 and 4, this scenario is contingent on the Pennsylvania Turnpike's replacement of the mainline I-76 bridge over North Gulph Road.

Estimated Construction Cost: \$4,070,000

Advantages: avoids potential design complexities with Alternatives 3C and 4A



Proposed cross-section of North Gulph Road under the Pennsylvania Turnpike
Source: PTC

Challenges: Least direct; requires trail users to cross North Gulph Road at First Avenue and Guthrie Road intersections; requires significant property coordination along

Richards Road (Alternative 3B) and along North Gulph Road from First Avenue and Guthrie Road (Alternatives 4B); contingent on PTC bridge replacement

Cost Estimates

The Project Team developed cost estimates for each identified alignment and scenario in the Alternatives Analysis. These cost estimates were prepared assuming the use of federal transportation grant sources and appropriate environmental review and permitting.

Segment	1A	1B	1C	2A	2B	2C	2D
Section	Valley Forge Rd (SR 0023) to Trout Creek	Valley Forge Rd (SR 0023) to Trout Creek	Valley Forge Rd (SR 0023) to Trout Creek	Trout Creek to Richards Rd	Trout Creek to Richards Rd	Trout Creek to Richards Rd	Trout Creek to Richards Rd
Option	A	B	C	A	B	C	D
Description	Along former North Gulph Road	West Side of Ranger Station	Along east side of North Gulph Road, crossing at signal	Along west side of N Gulph Road (Extend/Modify Culvert)	Pedestrian bridge 25' West of culvert	Pedestrian bridge 300' West of N Gulph Rd	Along east side of N Gulph Road
Segment Length (Linear Feet)	1,120	1,420	1,340	200	115	440	200
Preparation and Grading	\$26,000	\$33,000	\$85,000	\$5,000	\$3,000	\$10,000	\$25,000
Pavement Items ⁽¹⁾	\$81,000	\$103,000	\$97,000	\$14,000	\$8,000	\$32,000	\$14,000
Curbing Items			\$15,000				\$20,000
Landscaping Items	\$10,000	\$10,000	\$15,000				
ADA Ramps w/ DWS			\$10,000	\$5,000	\$5,000		\$5,000
Stormwater Management Items ⁽²⁾	\$12,000	\$15,000	\$80,000	\$2,000	\$2,000	\$4,000	\$6,000
Drainage and Miscellaneous Items ⁽³⁾	\$19,000	\$24,000	\$80,000	\$4,000	\$3,000	\$7,000	\$11,000
Structure Items			\$50,000	\$650,000	\$600,000	\$475,000	\$25,000
Signal Modifications/Pedestrian Signal			\$50,000				
Lighting Items ⁽⁴⁾							
Materials Sub Total	\$150,000	\$190,000	\$480,000	\$680,000	\$620,000	\$530,000	\$110,000
Contingency Item ⁽⁵⁾	\$37,500	\$47,500	\$120,000	\$170,000	\$155,000	\$132,500	\$27,500
Total Item Estimate	\$187,500	\$237,500	\$600,000	\$850,000	\$775,000	\$662,500	\$137,500
Construction Inspection ⁽⁶⁾	\$22,500	\$28,500	\$72,000	\$102,000	\$93,000	\$79,500	\$16,500
Mobilization, Bonds & Insurance, Cons. Surveying	\$9,000	\$11,400	\$28,800	\$40,800	\$37,200	\$31,800	\$6,600
Maintenance and Protection of Traffic ⁽⁷⁾	\$9,000	\$11,400	\$28,800	\$40,800	\$37,200	\$31,800	\$6,600
TOTAL SECTION COST	\$228,000	\$289,000	\$730,000	\$1,034,000	\$942,000	\$806,000	\$167,000
Scenarios							
Scenario 1 - West - 422 - West							
\$5,500,000	\$228,000				\$942,000		
Scenario 2 - West - Richards/First - West							
\$5,810,000	\$228,000				\$942,000		
Scenario 3 - East - 422 - East/PTC							
\$3,650,000			\$730,000				\$167,000
Scenario 4 - West - 422 - East/PTC							
\$3,910,000	\$228,000				\$942,000		
Scenario 5 - West - Richards/First - East/PTC							
\$4,070,000	\$228,000					\$806,000	

3A	3B	3C	3D	4A	4B	5A	5B	6A	7A
Richards Rd to N. Gulph Rd	Richards Rd to N. Gulph Rd	Richards Rd to N. Gulph Rd	Richards Rd to N. Gulph Rd	N. Gulph Rd to Guthrie Rd	N. Gulph Rd to Guthrie Rd	Guthrie Rd to Village Dr	Guthrie Rd to Village Dr	Village Dr to N. Warner Rd	First Ave
A	B	C	D	A	B	A	B	A	A
Along the west side of Richards road to mid-block crossing to 1st Ave Ramp	Crosses Richards Road @ N Gulph, then along east side of Richard to 1st Ave Ramp	along West side of N Gulph Road under SR 422	along East side of N Gulph Road under SR 422	Along West side of N. Gulph Rd and east side of WB SR 422	Along East side of N. Gulph Rd	Along East Side of Guthrie Road	Along N Gulph Rd & Goddard Boulevard & Village Dr	Along the east side of Guthrie Rd and North side of Swedesford Rd	Along the EB side of First Ave
1,780	2,000	1,100	1,280	2,480	2,010	3,200	3,700	1,900	1,660
\$41,000	\$46,000	\$25,000	\$30,000	\$57,000	\$47,000	\$74,000	\$86,000	\$44,000	\$50,000
\$129,000	\$144,000	\$79,000	\$92,000	\$179,000	\$145,000	\$231,000	\$267,000	\$137,000	\$120,000
\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000		\$5,000	\$6,000	\$25,000
			\$10,000	\$20,000	\$20,000	\$10,000	\$3,500	\$7,500	\$25,000
\$10,000	\$10,000		\$50,000	\$20,000	\$40,000	\$50,000	\$10,000	\$15,000	\$25,000
\$21,000	\$23,000	\$13,000	\$21,000	\$30,000	\$28,000	\$37,000	\$37,000	\$21,000	\$50,000
\$34,000	\$37,000	\$21,000	\$34,000	\$50,000	\$46,000	\$60,000	\$61,000	\$35,000	\$50,000
\$650,000	\$550,000	\$475,000	\$400,000	\$1,025,000		\$200,000			\$160,000
\$100,000	\$30,000	\$30,000	\$15,000	\$15,000	\$15,000			\$20,000	\$15,000
									\$70,000
\$1,010,000	\$870,000	\$670,000	\$680,000	\$1,420,000	\$370,000	\$660,000	\$470,000	\$290,000	\$520,000
\$3,600	\$217,500	\$167,500	\$170,000	\$355,000	\$92,500	\$165,000	\$117,500	\$72,500	\$130,000
\$1,013,600	\$1,087,500	\$837,500	\$850,000	\$1,775,000	\$462,500	\$825,000	\$587,500	\$362,500	\$650,000
\$121,632	\$130,500	\$100,500	\$102,000	\$213,000	\$55,500	\$99,000	\$70,500	\$43,500	\$78,000
\$60,600	\$52,200	\$40,200	\$40,800	\$85,200	\$22,200	\$39,600	\$28,200	\$17,400	\$31,200
\$60,600	\$52,200	\$40,200	\$40,800	\$85,200	\$22,200	\$39,600	\$28,200	\$17,400	\$31,200
\$1,256,000	\$1,322,000	\$1,018,000	\$1,034,000	\$2,158,000	\$562,000	\$1,003,000	\$714,000	\$441,000	\$790,000
		\$1,018,000		\$2,158,000			\$714,000	\$441,000	
	\$1,322,000			\$2,158,000			\$714,000	\$441,000	
			\$1,034,000		\$562,000		\$714,000	\$441,000	
		\$1,018,000			\$562,000		\$714,000	\$441,000	
	\$1,322,000				\$562,000		\$714,000	\$441,000	

Tables Notes:

- (1) Bituminous path is 10' wide and 10" in depth
- (2) Stormwater Management Items estimated to be 5% of known items
- (3) Miscellaneous Items are known items such as drainage not included or categorized in the estimate, and estimated at

15% of known items.

- (4) Trail assumed to be unlit, or utilize adjacent lighting as an adequate source.
- (5) Contingency cost for preliminary concepts is 25% of construction subtotal.
- (6) Construction Inspection Cost incorporates office trailer,

equipment package and schedule. Estimated at 12% Construction Items.

- (7) Maintenance and Protection of Traffic during Construction is estimated at 6% of construction items.
- (8) All work assumed to be within public right-of-way and/or acquired/transferred at no cost

Funding Opportunities

The following is a list a most-popular funding sources for planning and developing multi-use trails in the Delaware Valley. Once the trail ownership of the North Gulph Road trail has been determined, the agency-lead should pursue these funding sources as appropriate.

DVRPC Regional Trails Program

Primary Purpose: Circuit trails

Amount: \$50,000 - \$500,000; match requirements vary per planning/design phase

Application Window: Annually – window varies

More Information: *DVRPC Regional Trails Program*

Multimodal Transportation Fund (PennDOT)

Primary Purpose: bike, pedestrian, transit, aviation, port, freight improvements

Amount: \$100,000 - \$3,000,000; 30% match

Application Window: December – March (approximate; varies)

More Information: *Multimodal Transportation Fund*

Pennsylvania DCNR Community Conservation Partnerships Program (C2P2)

Primary Purpose: public parks, trails, & preserves

Amount: Up to \$500,000, 50% match

Application Window: April

More Information: *Community Conservation Partnerships Program Grants*

Congestion Mitigation and Air Quality Program (administered through DVRPC)

Primary Purpose: air quality improvements and traffic congestion reduction

Amount: \$250,000 minimum for construction; 20% match

Application Window: biennially (approximate; next expected round in 2019)

More Information: *DVRPC CMAQ Program*

Greenways, Trails and Recreation Program (Act 13)

Primary Purpose: parks, greenways, and trails

Amount: \$250,000 max, 15% match

Application Window: February - May

More Information: *Greenways, Trails and Recreation Program*

PennDOT - Automated Red Light Enforcement (ARLE)

Primary Purpose: signal upgrades

Amount: \$20,000 - \$400,000 (estimate)

Application Window: June

More Information: *Automated Red Light Enforcement Program*

Multimodal Transportation Fund (CFA/DCED)

Primary Purpose: bike, pedestrian, transit, aviation, port, freight improvements

Amount: \$100,000 - \$3,000,000; 30% match

Application Window: March - July

More Information: *Multimodal Transportation Fund*

Transportation Alternatives Set-Aside

Primary Purpose: bike, pedestrian improvements

Amount: \$100,000 - \$1,000,000; 20% match (cover engineering at 100%)

Application Window: biennially (approximate; next expected round in 2019)

More Information: *PennDOT TA Set-Aside*

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