PRELIMINARY ALTERNATIVES ANALYSIS

Montgomery County Bridge #59
Whitemarsh Township, Montgomery County

West Valley Green Road
Over
Wissahickon Creek
MPMS #72355 & ER#2007-8046-091

Prepared For:

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October 2021

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I. LOCATION MAP
West Valley Green Road over Wissahickon Creek
(Montgomery County Bridge #59)
Whitemarsh Township, Montgomery County
II. INTRODUCTION

The purpose of this report is to outline the alternatives studied and provide recommendations for the West Valley Green Road over Wissahickon Creek bridge (Montgomery Bridge #59) in Whitemarsh Township, Montgomery County. A location map showing a portion of Montgomery County is included at the beginning of this report for reference. The existing bridge, constructed in 1884, is a 174’ long, three span, wrought iron, pin-connected Pratt pony truss. The bridge carries two lanes of traffic on a narrow 18'-8” curb-to-curb width. The bridge is supported on two stone abutments, one stone pier, and one concrete pier which was constructed in 1953 to replace the second original stone pier. The existing bridge is located on a 20’ wide local road with an ADT of 5,864 vehicles per day (2015). Because the bridge was built to cross the Wissahickon Creek at a 90 degree skew, West Valley Green Road curves sharply to meet the bridge at both ends. The curve on the east end is restricted by an existing home as well. West Valley Green Road serves as a short cut to bypass a congested area located north of the Philadelphia County line. It cuts through a residential area and connects Stenton Avenue with Bethlehem Pike and other urban minor arterials. As a result, West Valley Green Road has evolved into a busy thoroughfare classified as an urban collector.

The area immediately surrounding the bridge is largely residential with a mix of a few period homes and many large modern homes. The eastern end of West Valley Green Road, at the intersection with the Bethlehem Pike, is a mix of residential and commercial properties. Just southwest of the project site is the Philadelphia Cricket Club. At the bridge, the Wissahickon Creek and surrounding floodplains are part of Fort Washington State Park and Wissahickon Valley Park. The Wissahickon Green Ribbon Trail follows the creek through the parks and users of the trail currently cross West Valley Green Road in a designated crosswalk south of the bridge. All quadrants of the bridge are within publicly owned park land. The two other bridges that cross the Wissahickon Creek closest to the West Valley Green Road crossing are East Skippack Pike (SR 0073) to the north and Stenton Avenue (SR 3003) to the southwest. Neither of these bridges is currently posted for weight restriction.

Improvements to the Wissahickon Green Ribbon Trail at-grade crossing were looked at as a request from the Montgomery County Parks and Recreation Department. The practicality of relocating the trail under the bridge (new or existing) to eliminate the at-grade crossing was dismissed due to maintenance and safety concerns associated with flooding. There is no history of bicycle or pedestrian crashes at the current trail crossing location.

The existing bridge was determined eligible for the National Register of Historic Places (NRHP) under Criterion C for technological significance. The bridge is the oldest documented existing example of John Denithorne’s work, a local bridge builder from the last quarter of the 19th century. The character defining features include the truss form and method of truss member end connection (pinned Pratt pony truss) and floorbeam to truss connection details (U-shaped floorbeam hangers supporting the floorbeams and passing over the lower chord pins). The plaques on the bridge are also significant features.
The existing bridge has had numerous repairs and retrofits performed to strengthen the bridge. However, the lightweight design of the truss, along with ongoing deterioration, required the bridge be posted for a 3 Ton weight limit beginning in 1999. Since then, the bridge has been closed multiple times for repairs due to on-going deterioration and is now closed to traffic indefinitely. The bridge and its approaches are deficient in width, the alignment/profile and lateral offsets to obstructions (home on south side of east approach) do not provide adequate sight lines, and there is minor impact damage evident to non-structural items in several locations. The existing bridge does not meet current design and safety standards and is considered both structurally insufficient and geometrically inadequate.

**III. REVIEW OF PROJECT NEEDS**

The purpose of the project is to improve the safety of the crossing at Wissahickon Creek and provide access for vehicular traffic (including EMS vehicles and school buses).

The project needs include the following:

1. The existing bridge is structurally insufficient. The existing bridge deterioration must be addressed.
   a. The condition code ratings in BMS2 (2015) for the existing superstructure, deck, and substructure units are all a 4, “poor condition”. Deterioration is on-going and will lead to further reductions in condition ratings over time.
   b. The bridge has been closed multiple times for repairs due to on-going deterioration and is now closed to traffic. The existing bridge had been posted for a 3 Ton weight restriction beginning in 1999. Emergency vehicles and standard school buses have increased travel times circumnavigating around the existing stream crossing. The bridge must be able to accommodate vehicular traffic including EMS vehicles and school buses.
      - The Barren Hill and Flourtown fire trucks range in weight from approximately 21 Tons to 38 Tons.
      - The Whitemarsh ambulances weigh approximately 7 Tons.
      - The Colonial School District buses range in weight from 6 Tons to 17 Tons.
      - The detour route for trucks, EMS vehicles, and school buses utilizes congested roads, causing further delays.

2. The existing bridge is geometrically inadequate.
   a. The bridge and its approaches are deficient in width, vertical alignment (crest) and horizontal alignments, sight distances and lateral offset to obstruction (house on south side of east approach). Geometric improvements must be made to West Valley Green Road in the area of the bridge to meet current PennDOT design criteria with acceptable design exceptions in order to improve safety at the crossing.
WHITEMARSH TOWNSHIP, MONTGOMERY COUNTY
West Valley Green Road over Wissahickon Creek
(Montgomery County Bridge #59)
PRELIMINARY ALTERNATIVES ANALYSIS

- The existing bridge width is 18’-8” curb-to-curb. Current bridge width design criteria for an Urban Collector functional classification is 30’.
- The alignment does not provide adequate sight lines and motorists often stop prior to slowly crossing the bridge.
- Minor impact damage is evident to non-structural items such as the bridge railing, guiderail transitions, guiderail, and guiderail end treatments due to the existing sight lines and roadway geometry issues.

IV. DESCRIPTION OF PRELIMINARY ALTERNATIVES

Seven conceptual alternatives were considered for this study. Each alternative is briefly described below and is evaluated in Section VI. Conceptual plans are included in Appendix A.

A. Alternative 1 – No-Build or Do Nothing

The no-build or do nothing alternative involves leaving the existing bridge and approaches as they exist today. The bridge had been posted for a 3 Ton weight limit beginning in 1999 due to deterioration. Since then, the bridge has been closed multiple times for repairs due to on-going deterioration and is now closed to traffic. If nothing is done to maintain or improve the bridge, deterioration will continue over time and eventually lead to bridge failure.

B. Alternative 2 - Rehabilitation

TranSystems investigated the rehabilitation of the existing bridge and presented their findings in the Preservation Assessment Report of September 2016. The Preservation Assessment Report outlined the required rehabilitation necessary to bring the existing bridge up to a posted weight limit of 15 Tons. The Update to the Preservation Assessment Report Memo, prepared by Erdman Anthony in November 2017, recommended that the existing bridge not be rehabilitated. After rehabilitation, the bridge would only have a 15 Ton capacity, which does not meet the Project Needs in allowing for EMS vehicles and school buses to use the bridge. In addition, the bridge would remain geometrically inadequate. The geometric/safety concerns including the narrow bridge width (curb-to-curb width of 18’-8”), existing horizontal alignment, and sight distance issues would not be addressed and, therefore, would not meet the Project Needs. The Update to the Preservation Assessment Report (November 2017) and the Preservation Assessment Report (Sept 2016) were submitted to the Pennsylvania State Historic Preservation Office (PA SHPO) and the Section 106 Consulting Parties and also posted on Project PATH on March 13, 2018.

C. Alternative 3 – Replacement on Existing Alignment

Replacement on the existing alignment would involve removal of the existing structure and replacement with a new structure at the bridge’s current location. The proposed bridge would span the Wissahickon Creek and minimize the number of in-stream piers. The proposed horizontal alignment for this alternative would generally match the existing condition, but would provide
smoother curve to tangent transitions. The proposed vertical profile would raise the bridge and roadway approaches higher than the existing bridge and approaches. Limited sight distance with this alternative would remain. The bridge typical section would consist of two (2) 11’ lanes and two (2) 6’ shoulders for a total bridge width of 37’-4½”, including barriers. Two (2) 6’ shoulders would be provided for pedestrian and bicycle access due to the close proximity of the Wissahickon Green Ribbon Trail. Refer to Figure 1 in Appendix A for a plan depicting this alternative.

D. Alternative 4 – Replacement on New Alignment, Similar Location as Existing Bridge

This alternative would involve the construction of a new structure on a new alignment. The existing structure would be removed in order to construct the proposed bridge. The proposed bridge would span the Wissahickon Creek in a similar location as the existing bridge and would minimize the number of in-stream piers. The new alignment would tie into the existing roadway near the intersection with Creek Lane (southwest of the bridge) and near the existing homes adjacent to the bridge in the east approach. The proposed alignment includes three horizontal curves. The proposed vertical profile would raise the bridge and roadway approaches higher than the existing bridge and approaches. The proposed superelevation cross slopes and horizontal radii for the curves nearest the bridge would support a 25 mph design speed. The bridge typical section would consist of two (2) 11’ lanes and two (2) 6’ shoulders for a total bridge width of 37’-4½”, including barriers. Two (2) 6’ shoulders would be provided for pedestrian and bicycle access due to the close proximity of the Wissahickon Green Ribbon Trail. Refer to Figure 2 in Appendix A for a plan depicting this alternative.

E. Alternative 5 - Rehabilitation of Existing Bridge/Construction of New Adjacent Bridge (One-way Couplet)

This alternative would involve the rehabilitation of the existing bridge in its current location to carry one lane of traffic eastbound and the construction of a new bridge to the north of the existing bridge to carry one lane of traffic westbound. The existing truss bridge would be converted to one lane of traffic with a curb-to-curb width of approximately 15’. The horizontal alignment along the existing bridge would be maintained with the eastbound travel lane centered on the existing structure. The new bridge that would accommodate the westbound portion of the one-way couplet would span the Wissahickon Creek parallel to the existing bridge, approximately 40’ upstream (north) of the existing bridge. The piers would be located such that the piers of both bridges would be aligned and reduce the hydraulic impact of the new bridge. The new bridge typical section would consist of one (1) 11’ lane and two (2) 6’ shoulders for a total bridge width of 26’-4½”, including barriers. Two (2) 6’ shoulders would be provided for pedestrian and bicycle access due to the close proximity of the Wissahickon Green Ribbon Trail. Refer to Figure 3 in Appendix A for a plan depicting this alternative.

TranSystems investigated the rehabilitation of the existing bridge and presented their findings in the Preservation Assessment Report of September 2016. The Preservation Assessment Report outlined the required rehabilitation necessary to bring the existing bridge up to a posted weight
limit of 15 Tons. The Update to the Preservation Assessment Report Memo, prepared by Erdman Anthony in November 2017, recommended that the existing bridge not be rehabilitated. After rehabilitation, the bridge would have limited capacity even with only one lane of traffic proposed in this alternative, which does not meet the Project Needs in allowing for EMS vehicles to use the bridge. Both the rehabilitated bridge and the new bridge would be required to allow for the passage of EMS vehicles, as it is possible EMS vehicles would need to travel in both directions. In addition, the bridge would remain geometrically inadequate. The geometric/safety concerns including the existing horizontal alignment and sight distance issues would not be addressed and, therefore, would not meet the Project Needs. The Update to the Preservation Assessment Report (November 2017) and the Preservation Assessment Report (Sept 2016) were submitted to the Pennsylvania State Historic Preservation Office (PA SHPO) and the Section 106 Consulting Parties and also posted on Project PATH on March 13, 2018.

F. Alternative 6 - Replacement on New Alignment, North of Existing Bridge

This alternative would involve the construction of a new structure on a new alignment approximately 50’ upstream (north) of the existing bridge as shown in Figure 4 in Appendix A. The new bridge would span the Wissahickon Creek parallel to the existing bridge with the piers located such that the piers of both the existing bridge and proposed bridge would be aligned and reduce the hydraulic impact of the new bridge. The new alignment would tie into the existing roadway near the intersection with Creek Lane (southwest of the bridge) and near the existing homes adjacent to the bridge in the east approach. The proposed alignment includes three horizontal curves. The proposed vertical profile would raise the bridge and roadway approaches higher than the existing bridge and approaches. The proposed superelevation cross slopes and horizontal radii for the curves nearest the bridge would support a 25 mph design speed. The bridge typical section would consist of two (2) 11’ lanes and two (2) 6’ shoulders for a total bridge width of 37’-4½”, including barriers. Two (2) 6’ shoulders are provided for pedestrian and bicycle access due to the close proximity of the Wissahickon Green Ribbon Trail. The existing structure would not need to be removed in order to construct the proposed bridge. The existing structure could potentially be rehabilitated for recreational use, but that use is not considered in this report.

G. Alternative 7 - Replacement on New Alignment, South of Existing Bridge

This alternative would involve the construction of a new structure on a new alignment a minimum of 50’ downstream (south) of the existing bridge as shown in Figure 5 in Appendix A. The new bridge would span the Wissahickon Creek in a northeast-southwest direction (not parallel to the existing bridge) with the piers located such that the piers of both the existing bridge and proposed bridge would be aligned and reduce the hydraulic impact of the new bridge. The new alignment would tie into the existing roadway near the intersection with Creek Lane (southwest of the bridge) and near the existing homes adjacent to the bridge in the east approach. The proposed alignment includes two horizontal curves. The proposed vertical profile would raise the bridge and roadway approaches higher than the existing bridge and approaches. The proposed superelevation cross slopes and horizontal radii for the curves near the bridge would support a 25 mph design speed.
The bridge typical section would consist of two (2) 11’ lanes and two (2) 6’ shoulders for a total bridge width of 37’-4½”, including barriers. Two (2) 6’ shoulders are provided for pedestrian and bicycle access due to the close proximity of the Wissahickon Green Ribbon Trail. The existing structure would not need to be removed in order to construct the proposed bridge. The existing structure could potentially be rehabilitated for recreational use, but that use is not considered in this report.

H. West Valley Green Road Bridge Relocation Efforts

Montgomery County started to investigate relocation sites for the West Valley Green Road Bridge in August of 2019. Multiple locations were investigated. They were as follows:

- Norristown Farm Park
  - Lower Farm Road Bridge over Stony Creek (Hospital Bridge).
    - Montgomery County wanted to replace the Lower Farm Road Bridge over Stoney Creek with the West Valley Green Road Bridge. The Lower Farm Road Bridge over Stony Creek is a contributing resource to the Norristown Farm Park. This bridge replacement would result in an adverse effect. Therefore, this relocation option was dismissed.

- Display the West Valley Green Road Bridge in a County park
  - Due to safety and liability concerns this option was dismissed.

- Relocate the West Valley Green Road Bridge to a location along the Schuylkill River Trail (eight possible locations).
  - Relocation restrictions:
    - The character defining features underneath the bridge would not be visible due to the site conditions. The bridge would have to be installed at grade and stream crossings are not deep enough.
    - The trail is located within the flood plain at certain locations. The bridge could be inundated and damaged during flood events.
    - One location considered is within a PECO easement and the West Valley Green Bridge would have to accommodate all PECO vehicles for maintenance of their utilities along the trail.
    - Several potential locations for the West Valley Green Road Bridge have overall span lengths longer than the overall span length of the existing West Valley Green Road Bridge.

- Relocate the West Valley Green Road Bridge to the Cross County Trail over Plymouth Creek in Conshohocken Borough
  - Montgomery County considered replacing a county trail bridge with one span of the West Valley Green Road Bridge. The existing span of the trail bridge is 30’-6” and one span of the West Valley Green Road Bridge is 60’ long. With each span being 60 feet in length, one of the three spans exceeds the length available at this location
resulting in most of the bridge being placed along the existing ground elevation. Therefore, this option was dismissed.

- Relocate the West Valley Green Road Bridge to the Cross County and Wissahickon Connector Trail
  - Relocation of the West Valley Green Road Bridge to this location could increase flooding by adding two piers in the waterway. Therefore, this option was dismissed.

- Relocate the West Valley Green Road Bridge to Green Lane Park
  - Relocation restrictions:
    - Relocation of the bridge to Knight Lake – the West Valley Green Road Bridge was too short to span the lake at any location. The bridge could be inundated and damaged during large storm events. Therefore, this option was dismissed.
    - Relocation of the bridge as a fishing platform or pier on the lake – The character defining features underneath the bridge would not be visible and a platform of pier does not fit within the master plan for the park. The relocated bridge would distract from the setting that they are trying to create.

- Relocation of the West Valley Green Road Bridge to the Perkiomen Trail over Unami Creek
  - Relocation restrictions:
    - Montgomery County wanted to replace the Perkiomen Trail Bridge over Unami Creek with the West Valley Green Road Bridge. The Perkiomen Trail was historically the Philadelphia and Reading Railroad and the Perkiomen Railroad (Emmaus Junction to Perkiomen Junction). The Perkiomen Railroad is eligible for the National Register of Historic Places. Different sections of The Philadelphia and Reading Railroad have been determined eligible for the National Register of Historic Places.
    - This bridge replacement would result in an adverse effect to the Perkiomen Railroad (Emmaus Junction to Perkiomen Junction). Therefore, this relocation option was dismissed.

*PennDOT Bridge Marketing Website:* PennDOT and the PASHPO will advertise this bridge on the website.
V. ENVIRONMENTAL OVERVIEW

A. Natural Resources

Surface Waters
The project study area includes only one waterway, Wissahickon Creek, which is a tributary to the Schuylkill River. This perennial stream is within the Delaware Estuary section of the Delaware River watershed. The basin of Wissahickon Creek is classified as a Trout Stocked Fishery and Migratory Fishery (TSF, MF) according to Chapter 93 of the “Pennsylvania Code” (Drainage List F). In addition, Wissahickon Creek is listed on the Pennsylvania Fish and Boat Commissions (PFBC’s) Stocked Trout Waters Summary Book, “2018 Pennsylvania Fishing Laws and Regulations”. As such, in-stream construction restrictions from March 1 to June 15 will apply. Wissahickon Creek is not on the PFBC Class A Wild Trout Waters (October 17, 2016) or Pennsylvania Wild Trout Waters (Natural Reproduction) (October 2016) lists. Further, Wissahickon Creek is not designated as a wild or scenic river by either the National Wild and Scenic Rivers System or the Department of Conservation and Natural Resources (DCNR) Scenic Rivers Program of Pennsylvania.

Wissahickon Creek is not listed by the PFBC as a water trail, nor is it listed on the American Whitewater Association website. However, it is listed in Keystone Canoeing (Gertler 2004) as canoeable within 24 to 48 hours of a hard rain. An Aids to Navigation Plan (ATON) will be required by the PFBC to safely guide boaters through the project area during construction.

Floodplains
The project is located within Zone AE of the FEMA mapped 100-year floodplain, which has base flood elevations determined. As an area with detailed floodplain mapping, no increase of base flood elevations is permitted. The base flood elevation for the project area is 150 feet.

Wetlands
No wetlands were on National Wetland Inventory (NWI) mapping within the project study area. The project study area for the wetland and waterway investigations extended approximately 100 feet upstream and 150 feet downstream of the existing bridge crossing of Wissahickon Creek, and 150 feet along both approaches of West Valley Green Road. This project study area encompasses all alternatives investigated in this report. A field view of the project study area was conducted on November 9, 2016 which confirmed the absence of wetlands.

Threatened and Endangered Species
The project is located within the known range of the state-listed threatened eastern red-bellied turtle (Pseudemys rubriventris) and the federally-listed endangered bog turtle (Clemmys muhlenbergii). Additional coordination with PFBC will be required to determine if the project has impacts on the eastern red-bellied turtle based on the preferred alternative. It is anticipated that the project will not have any impact on bog turtles as no wetlands were identified within 300 feet of the proposed limits of disturbance of any alternative considered.
**Agricultural Resources**

Present across the project area is Ch-Codorus Silt Loam, which is defined as Prime Farmland Soil with a Soil Capability Class II. However, field views and aerial photographs indicated there are no active agricultural lands within the project area or its vicinity. Therefore, this bridge project is exempt from FPPA and ALLP compliance and no further assessment is necessary.

**B. Cultural Resources**

**Historic**

The West Valley Green Road Bridge (Key No. 136911) was determined individually eligible for listing in the National Register of Historic Places (National Register) on March 5, 2007. The bridge, which is owned by Montgomery County, is a three-span, pin connected Pratt pony truss bridge constructed in 1884 by J. Denithorne & Sons of Phoenixville. It is 174 feet long and 24 feet wide, and is supported on ashlar abutments with wingwalls, one stone pier, and one concrete pier that was added in 1953. It is considered significant under Criterion C for its “mature design [which] shows great understanding of economy of design and how trusses work on the part of a regional fabricator” (A.G. Lichtenstein & Associates 1999).

The Robert Waln Mill House/Creek House (Key No. 144033) is located in southeast quadrant of the bridge. The Robert Waln Mill House was documented and evaluated on a Pennsylvania Historic Resources Survey Form (HRSF) as part of the project and was determined not eligible for the National Register of Historic Places in September 2007.

There are no additional historic properties within the project area.

**Archaeology**

Research performed on the Pennsylvania State Historic Preservation Office’s Cultural Resources Geographic Information System (PA SHPO’s CRGIS) website indicates that no previously identified archaeological sites are located within or nearby the project study area. CRGIS also indicates that no previous archaeological surveys have been performed within the project study area. However, a Phase IA Preliminary Case Study was completed for the Montgomery County Department of Roads and Bridges in August of 2007 by A.D. Marble and Company (Kenworthy et al. 2007).

Previous Phase IA studies completed for the project in August of 2007 included background research and geomorphological investigations of the, then, three alternatives under consideration. Based on the background research and the geomorphological assessment of the project location, the study area was considered to have a moderate to high potential for archaeological resources. Those portions of the project area to the east of the Wissahickon Creek (northeast and southeast quadrants) were identified to have the potential to contain undocumented and potentially significant precontact (Native American) archaeological resources. The southwest quadrant of the project area was noted to have potential for historic archaeological deposits related to a former...
gristmill. The 1871 Hopkins and the 1877 Scott atlases of Montgomery County identified a former gristmill just downstream of the bridge. Although the former gristmill is no longer present, components of the mill’s operation, such as the mill race and possibly artifact deposits, are likely to be present. Historic artifact deposits may occur as late eighteenth through twentieth century artifacts associated with the gristmill and the Robert Waln Mill House (Kenworthy et al. 2007).

C. Section 4(f) Resources

Refer to Appendix C for a figure depicting the Section 4(f) resources described below.

- Fort Washington State Park is under the jurisdiction of the Pennsylvania Department of Conservation and Natural Resources. Fort Washington State Park consists of 493 acres in eastern Montgomery County.

- The Wissahickon Green Ribbon Trail is under the jurisdiction of the Wissahickon Valley Watershed Association. The 12.6 mile passive recreational trail begins in Upper Gwynedd Township and ends in Whitemarsh Township southwest of the project area.

- As a historic resource individually eligible for listing on the National Register of Historic Places, the West Valley Green Road Bridge (Key No. 136911) is a Section 4(f) resource under the jurisdiction of the Pennsylvania Historical & Museum Commission (PHMC).

D. Socioeconomic Resources

Environmental Justice Communities, Planned Development, and Displacements were determined not to be present within a project area that encompasses all alternatives considered for this project.

E. Noise

If the proposed bridge is to be replaced on the same or similar alignment as the existing structure with no additional travel lanes, it would be considered a Type III project (exempt from a noise analysis). No substantial increase in noise is anticipated based upon the nature of this project.

Alternatives where improvements to the West Valley Green Road and bridge may relocate the roadway and bring it closer to the areas of residential noise sensitive receptors could qualify this project as a Type I project. In that case an applicable noise analysis will be done.
F. Municipal, Industrial, and Hazardous Waste Facilities

According to the Department of Environmental Protection (DEP) and the United States Environmental Protection Agency (USEPA) websites, there are no regulated hazardous waste facilities within the project study area. Additionally, a field view of the project study area did not reveal any potential hazardous waste sites. Paint on the truss bridge has the potential to be lead based paint. A lead based paint survey will be required prior to any work on the existing structure for either rehabilitation or replacement.

G. Construction Impacts

Temporary construction impacts to communities along West Valley Green Road will likely occur regardless of which build alternative is selected. Temporary impacts to aquatic habitat and recreation will occur due to construction staging and cofferdam placement. Temporary impacts to the noise and air environment are expected during construction.

VI. EVALUATION METHODOLOGY AND RESULTS

The seven alternatives previously outlined were evaluated based upon their ability to meet the project needs, technical criteria, environmental impacts, and economic factors. Appendix B provides a summary of the seven alternatives based upon the criteria listed above.

A. Alternative 1 – No-Build or Do Nothing

The no-build or do nothing alternative involves leaving the existing bridge and approaches as they exist today. This alternative would leave the existing structure closed to traffic. Pedestrians and bicyclists would not be accommodated on the bridge. The Wissahickon Green Ribbon Trail would be unaltered. Current frequent flooding of the Wissahickon Creek over the existing low spot in the western approach to the bridge would not be eliminated with this alternative. No impacts on the surrounding resources and no construction activities would take place. The bridge would continue to deteriorate and eventually lead to failure. None of the project needs would be met by this alternative.

B. Alternative 2 - Rehabilitation

TranSystems investigated the rehabilitation of the existing bridge and presented their findings in the Preservation Assessment Report of September 2016. The Preservation Assessment Report outlined the required rehabilitation necessary to bring the existing bridge up to a posted weight limit of 15 Tons. The Update to the Preservation Assessment Report Memo, prepared by Erdman Anthony in November 2017, recommended that the existing bridge not be rehabilitated. After rehabilitation, the bridge would only have a 15 Ton capacity, which does not meet the Project Needs in allowing for EMS vehicles and school buses to use the bridge. In addition, the bridge would remain geometrically inadequate. The geometric/safety concerns including the narrow
bridge width (curb-to-curb width of 18’-8”), existing horizontal alignment, and sight distance issues would not be addressed and, therefore, would not meet the Project Needs. The Update to the Preservation Assessment Report (November 2017) and the Preservation Assessment Report (Sept 2016) were submitted to the Pennsylvania State Historic Preservation Office (PA SHPO) and the Section 106 Consulting Parties and also posted on Project PATH on March 13, 2018.

For this alternative, the vertical profile of West Valley Green Road would remain the same as the existing profile. Therefore, frequent flooding of the Wissahickon Creek over the western approach to the bridge would not be improved. Preliminary hydraulic analysis suggests the 10-year storm event overtops West Valley Green Road for this alternative. This alternative should not require a Conditional Letter of Map Revision (CLOMR) from FEMA or flowage easements along Wissahickon Creek because the proposed hydraulic condition generally matches the existing condition.

Pedestrians and bicyclists would not be accommodated on the bridge. The Wissahickon Green Ribbon Trail would be unaltered.

Assuming bridge rehabilitation was completed, the service life of the structure would be significantly less than that of a replacement structure. In addition, large future maintenance costs for the bridge owners (Montgomery County) would be anticipated. If the rehabilitated truss does not receive regular maintenance, it would continue to deteriorate.

Section 4(f) involvement is limited to one resource with the rehabilitation of the historic bridge. Section 106 determination of a No Adverse Effect is generally not subject to Section 4(f) use and requires coordination to confirm the no use. The no adverse effect requires that the scope of the rehabilitation does not impair the historic integrity of the bridge, as determined by procedures implementing the national Historic Preservation Act of 1966, as amended (FHWA). If construction can be completed without a temporary occupancy of the Wissahickon Green Ribbon Trail or Fort Washington State Park, no Section 4(f) involvement with these two additional resources would be necessary.

This alternative would likely result in a No Adverse Effect to the bridge if the rehabilitation meets the Secretary of the Interior’s Standards and does not alter the characteristics that qualify the bridge for listing in the National Register. Coordination with the Pennsylvania State Historic Preservation Office (PA SHPO) and Section 106 consulting parties would be required. Permanent stream impacts would total approximately 3200 square feet due to rip rap placement around the larger existing piers. No archaeological survey would be needed for this alternative provided that no new staging areas, drainage improvements, etc. are required outside of the current right-of-way within the eastern or southwest quadrants. Paint should be tested for lead based paint before rehabilitation work is completed.
While the rehabilitation of the bridge would minimize impacts to natural and cultural resources and adjacent properties, the rehabilitation of the bridge does not meet the project needs. The rehabilitation is not recommended.

C. Alternative 3 – Replacement on Existing Alignment

Replacement on the existing alignment would involve removal of the existing structure and replacement with a new structure at the current location of the bridge. The proposed bridge would span the Wissahickon Creek and minimize the number of in-stream piers. Refer to Figure 1 in Appendix A for a plan depicting this alternative. A new bridge would improve the structural capacity of the bridge and allow for all vehicles to cross, satisfying the Project Need to address the existing bridge deterioration and accommodate vehicular traffic including EMS vehicles and school buses.

The proposed horizontal alignment for this alternative would generally match the existing conditions, but would provide smoother curve to tangent transitions. The proposed horizontal curve radii and superelevation cross slopes would not meet the criteria for a design speed of 25 mph. Due to the re-use of the existing alignment, the sight lines and stopping sight distances around the curves would remain similar to the existing condition. The existing home and stone wall on the eastern end of the bridge act as obstructions to these sight lines and therefore the calculated stopping sight distances fall short of the required criteria. The sight distance from the driveway at the existing home on the eastern end of the bridge would remain the same as in the existing condition. Due to the close proximity of the existing home to the roadway alignment, the driveway sight distance falls well below the required distance. Limited sight distance with this alternative would remain.

The proposed vertical profile would raise the bridge and roadway approaches higher than the existing bridge and approaches. This would eliminate the low spot along West Valley Green Road in the western approach and improve sight distance across the bridge. Eliminating the low spot in the western approach would also improve the frequent flooding of the Wissahickon Creek over that portion of the roadway. In addition, the proposed bridge would minimize the number of in-stream piers. Preliminary hydraulic analysis of this alternative indicates both a 10-year storm event and a 25-year storm event pass beneath the bridge without overtopping West Valley Green Road as opposed to the existing condition which suggests the 10-year storm event does overtop West Valley Green Road. Analysis of the 100-year storm event indicates proposed flood elevations will not increase over existing flood elevations. As a result, this alternative would not require a Conditional Letter of Map Revision (CLOMR) from FEMA or flowage easements along Wissahickon Creek.

The bridge typical section would consist of two (2) 11’ lanes and two (2) 6’ shoulders, which is much wider than the existing bridge. The proposed bridge addresses the existing narrow bridge width problem and meets current design criteria. The 6’ shoulders are provided on both sides of
the proposed bridge for bike and pedestrian access to the Wissahickon Green Ribbon Trail on the western end of the bridge.

The replacement of the existing bridge would have an Adverse Effect on the bridge. This alternative would require a Memorandum of Agreement/Letter of Agreement that outlines the mitigation measures for the loss of the historic bridge in consultation with the Section 106 consulting parties.

A Phase IB archeological survey would be required in any areas needed for staging, drainage, etc. which are located outside of the current right-of-way within the northeastern, southeastern, and southwestern quadrants.

This alternative requires involvement with three Section 4(f) resources with the replacement of the historic bridge, 0.18 acres of impact within the limit of disturbance of Fort Washington State Park for temporary construction easements and required right-of-way, and the minor realignment of the Wissahickon Green Ribbon Trail. Impacts to the state park and trail are likely to be considered de minimis since the potential impacts would not adversely affect the activities, features, and attributes of the resource.

As a proposed replacement on the same or similar alignment as the existing structure with no additional travel lanes, it would be considered a Type III noise project. No substantial increase in noise is anticipated based upon the nature of this project. Paint should be tested for lead based paint before removal and disposal work on the structure.

Approximately five (5) properties are anticipated to be partially impacted by construction. Permanent stream impacts would total approximately 2200 square feet due to new pier and rip rap placement. Impacts to the creek and floodplain would be minimal. There would be no wetlands or agricultural land impacted by this alternative. This alternative would require a detour.

There are overhead electric, telephone, and cable television utility lines located along the downstream side of the existing bridge and in both approaches. At least two of the existing utility poles would be impacted by this alternative.

This alternative has a similar new bridge cost to Alternative #4 (Replacement on New Alignment, Similar Location as Existing Bridge). With the inclusion of roadway construction costs and existing bridge demolition costs, the overall cost of this alternative is estimated to be $2,316,000. The overall cost is only slightly lower than the cost of Alternative #4 due to less roadway construction anticipated for an on-alignment alternative. It also has a lower overall cost than all other alternatives, ranging from approximately 75% of the cost of Alternative #6 (Replacement on New Alignment, North of Existing Bridge) to approximately 35% of the cost of Alternative #5 (Rehabilitation of Existing Bridge/Construction of New Adjacent Bridge, One-Way Couplet). The service life of a replacement structure would be significantly more than that of a rehabilitated structure. Future maintenance costs would be less than anticipated for a rehabilitated bridge.
This alternative addresses the existing bridge deterioration, increases capacity to accommodate vehicular traffic including EMS vehicles and school buses, and improves the bridge width geometry over the existing condition. In addition, this alternative would improve the existing flooding conditions over West Valley Green Road, be able to accommodate future re-decking and replacement, and provide bike and pedestrian access across the bridge to the Wissahickon Green Ribbon Trail. Despite the structural and geometric improvements made with a new bridge, stopping sight distances and driveway sight distances would remain an issue, especially due to the close proximity of the house on the east end of the bridge. Safety would remain a concern in the bridge approaches due to the existing horizontal alignment and sight lines. Therefore, the Project Need requiring geometric improvements in the area of the bridge would not be met if the bridge was replaced on the existing alignment. Therefore, replacement on existing alignment is not recommended.

D. Alternative 4 – Replacement on New Alignment, Similar Location as Existing Bridge

This alternative would involve the construction of a new structure on a new alignment. The existing structure would be removed in order to construct the proposed bridge. The proposed bridge would span the Wissahickon Creek in a similar location as the existing bridge and would minimize the number of in-stream piers. Refer to Figure 2 in Appendix A for a plan depicting this alternative. A new bridge would improve the structural capacity of the bridge and allow for all vehicles to cross, satisfying the Project Need to address the existing bridge deterioration and accommodate vehicular traffic including EMS vehicles and school buses.

The proposed horizontal alignment for this alternative is slightly realigned from the existing alignment in order to improve the roadway and bridge geometry. The realignment of West Valley Green Road pulls the horizontal curve and the bridge farther away from the existing home on the eastern end of the existing bridge, which improves sight lines and stopping sight distances around the curve. The sight distance from the driveway at the existing home on the eastern end of the bridge is improved over the current condition. The proposed horizontal curve radii and superelevation cross slopes would meet the criteria for a design speed of 25 mph.

The proposed vertical profile would raise the bridge and roadway approaches higher than the existing bridge and approaches. This would eliminate the low spot along West Valley Green Road in the western approach and improve sight distance across the bridge. Eliminating the low spot in the western approach would also improve the frequent flooding of the Wissahickon Creek over that portion of the roadway. In addition, the proposed bridge would minimize the number of in-stream piers. Preliminary hydraulic analysis of this alternative indicates both a 10-year storm event and a 25-year storm event pass beneath the bridge without overtopping West Valley Green Road as opposed to the existing condition which suggests the 10-year storm event does overtop West Valley Green Road. Analysis of the 100-year storm event indicates proposed flood elevations will not increase over existing flood elevations. As a result, this alternative would not
require a Conditional Letter of Map Revision (CLOMR) from FEMA or flowage easements along Wissahickon Creek.

The bridge typical section would consist of two (2) 11’ lanes and two (2) 6’ shoulders, which is much wider than the existing bridge. The proposed bridge addresses the existing narrow bridge width problem and meets current design criteria. The 6’ shoulders are provided on both sides of the proposed bridge for bike and pedestrian access to the Wissahickon Green Ribbon Trail on the western end of the bridge.

The removal of the existing bridge would have an Adverse Effect on the bridge. This alternative would require a Memorandum of Agreement/Letter of Agreement that outlines the mitigation measures for the loss of the historic bridge in consultation with the Section 106 consulting parties.

A Phase IB archeological survey would be required in any areas needed for staging, drainage, etc. which are located outside of the current right-of-way within the northeastern and southwestern quadrants. Alternative 4 would require a larger limit of disturbance in the southwest and northeast quadrants in comparison to Alternative 3.

This alternative requires involvement with three Section 4(f) resources with the removal of the historic bridge, 0.26 acres of impact within the limit of disturbance of Fort Washington State Park for temporary construction easements and required right-of-way, and the minor realignment of the Wissahickon Green Ribbon Trail. Impacts to the state park and trail are likely to be considered de minimis since the potential impacts would not adversely affect the activities, features, and attributes of the resource.

Although this is a new alignment, this alternative would not qualify as a Type I noise project since the horizontal alignment change is minimal and doesn’t halve the distance to the nearest receptor. A noise screening analysis could be requested to confirm this, but due to the minor shift in alignment, noise impacts requiring mitigation in the form of a noise wall are not anticipated. Paint should be tested for lead based paint before removal and disposal work on the structure.

Approximately five (5) properties are anticipated to be partially impacted by construction. Permanent stream impacts would total approximately 2200 square feet due to new pier and rip rap placement. Impacts to the creek and floodplain would be minimal. There would be no wetlands or agricultural land impacted by this alternative. This alternative would require a detour.

There are overhead electric, telephone, and cable television utility lines located along the downstream side of the existing bridge and in both approaches. At least three of the existing utility poles would be impacted by this alternative.

This alternative has a similar new bridge cost to Alternative #3 (Replacement on Existing Alignment). With the inclusion of roadway construction costs and existing bridge demolition costs, the overall cost of this alternative is estimated to be $2,396,000. The overall cost is only
slightly higher than the cost of Alternative #3 due to the additional roadway construction costs anticipated for the new alignment work, but falls within 5% of the cost of Alternative #3. All other alternatives have higher overall costs than this alternative, with costs for this alternative ranging from approximately 75% of the cost of Alternative #6 (Replacement on New Alignment, North of Existing Bridge) to approximately 35% of the cost of Alternative #5 (Rehabilitation of Existing Bridge/Construction of New Adjacent Bridge, One-Way Couplet). The service life of a replacement structure would be significantly more than that of a rehabilitated structure. Future maintenance costs would be less than anticipated for a rehabilitated bridge.

This alternative addresses the existing bridge deterioration, increases capacity to accommodate vehicular traffic including EMS vehicles and school buses, and improves all aspects of the existing bridge and roadway geometry (improving safety) over the existing condition. Therefore, this alternative meets all of the Project Needs. In addition to meeting the Project Needs, this alternative would improve the existing flooding conditions over West Valley Green Road, be able to accommodate future re-decking and replacement, and provide bike and pedestrian access across the bridge to the Wissahickon Green Ribbon Trail. Therefore, replacement on a new alignment in a similar location as the existing bridge is recommended.

E. Alternative 5 – Rehabilitation of Existing Bridge/Construction of New Adjacent Bridge (One-way Couplet)

This alternative would involve the rehabilitation of the existing bridge in its current location to carry one lane of traffic eastbound and the construction of a new bridge to the north of the existing bridge to carry one lane of traffic westbound. Structure mounted guiderail or standard concrete safety shape barriers would be installed on the existing truss bridge to protect the truss members from vehicular impacts, resulting in a curb-to-curb width of approximately 15’ for eastbound vehicular traffic only. The horizontal alignment along the existing bridge would be maintained with the eastbound travel lane centered on the existing structure. Limited sight distance would remain for the eastbound bridge due to the existing home on the eastern end of the bridge. TranSystems investigated the rehabilitation of the existing bridge and presented their findings in the Preservation Assessment Report of September 2016. The Preservation Assessment Report outlined the required rehabilitation necessary to bring the existing bridge up to a posted weight limit of 15 Tons. The Update to the Preservation Assessment Report Memo, prepared by Erdman Anthony in November 2017, recommended that the existing bridge not be rehabilitated. After rehabilitation, the bridge would have limited capacity even with only one lane of traffic proposed in this alternative, which does not meet the Project Needs in allowing for EMS vehicles to use the bridge. Both the rehabilitated bridge and the new bridge would be required to allow for the passage of EMS vehicles, as it is possible EMS vehicles would need to travel in both directions. In addition, the bridge would remain geometrically inadequate. The geometric/safety concerns including existing horizontal alignment and sight distance issues would not be addressed and, therefore, would not meet the Project Needs. The Update to the Preservation Assessment Report (November 2017) and the Preservation Assessment Report (Sept 2016) were submitted to the
Pennsylvania State Historic Preservation Office (PA SHPO) and the Section 106 Consulting Parties and also posted on Project PATH on March 13, 2018.

The new bridge that would accommodate the westbound portion of the one-way couplet would span the Wissahickon Creek parallel to the existing bridge, approximately 40’ upstream (north) of the existing bridge. The piers would be located such that the piers of both bridges would be aligned and reduce the hydraulic impact of the new bridge. The horizontal alignment for the westbound bridge pulls the horizontal curve and the bridge farther away from the existing home on the eastern end of the existing bridge, which improves sight lines and stopping sight distances around the curve. The proposed westbound horizontal curve radii and superelevation cross slopes would meet the criteria for a design speed of 25 mph. The new westbound bridge typical section would consist of one (1) 11’ lane and two (2) 6’ shoulders for a total bridge width of 26’-4½”, including barriers. Two (2) 6’ shoulders would be provided for pedestrian and bicycle access due to the close proximity of the Wissahickon Green Ribbon Trail. A new westbound bridge would allow for all vehicles to cross and would satisfy the Project Need to address the existing bridge deterioration and accommodate vehicular traffic including EMS vehicles and school buses, but for westbound traffic only. Refer to Figure 3 in Appendix A for a plan depicting this alternative.

For this alternative, the vertical profile of the eastbound bridge on West Valley Green Road would remain similar to the existing, however, the approach roadways would be raised. The proposed vertical profile of westbound West Valley Green Road would raise the westbound bridge and roadway approaches higher than the existing bridge and approaches. This configuration would eliminate the low spot along West Valley Green Road in the western approaches and improve the sight distances across both the eastbound and westbound bridges. However, constructing another bridge with two additional piers in the floodway adjacent to the existing bridge creates more obstructions for flood waters and would increase water surface elevations during flood events. Preliminary hydraulic analysis of this alternative indicates a 10-year storm event passes beneath the bridges without overtopping West Valley Green Road as opposed to the existing condition which suggests the 10-year storm event overtops West Valley Green Road. This alternative would not allow the 25-year storm event to pass beneath the bridges without overtopping West Valley Green Road. Analysis of the 100-year storm event indicates proposed flood elevations will increase over existing flood elevations. Due to the flood impacts occurring in a detailed Federal Emergency Management Agency (FEMA) study area with a floodway, this alternative would require a Conditional Letter of Map Revision (CLOMR) from FEMA and flowage easements along Wissahickon Creek.

Pedestrians and bicyclists would not be accommodated on the eastbound bridge. The proposed westbound bridge includes two (2) 6’ shoulders for bike and pedestrian access to the Wissahickon Green Ribbon Trail. The new westbound structure would also be on a raised profile, however, the eastbound bridge profile would remain similar to the existing. Minor adjustments can be made to the alignment and profile at the western bridge approach to improve sight distance for the Wissahickon Green Ribbon Trail at-grade crossing but a 25 mph design speed cannot be achieved.
A Phase IB archaeological survey would be required in any areas needed for staging, drainage, etc., which are located outside of the current right-of-way within the northeastern, southeastern, and southwestern quadrants. This alternative would require a larger limit of disturbance in the northern quadrants in comparison to Alternatives #2, #3, or #4.

This alternative requires Section 4(f) involvement with three Section 4(f) resources with the rehabilitation of the historic bridge, approximately 0.05 acres of impact within the limit of disturbance of Fort Washington State Park for temporary construction easements and required right-of-way, and the major realignment of the Wissahickon Green Ribbon Trail. Impacts to the state park and trail are likely to be considered de minimis since the potential impacts would not adversely affect the activities, features, and attributes of the resource. This alternative is not likely to allow for the trail to be realigned under the structure and would remain as an at-grade crossing. Section 106 determination of a No Adverse Effect is generally not subject to Section 4(f) use and requires coordination to confirm the no use. This alternative would likely result in a No Adverse Effect to the bridge and minimal impacts to natural or cultural resources if the rehabilitation meets the Secretary of the Interior’s Standards and does not alter the characteristics that qualify the bridge for listing in the National Register. Coordination with the Pennsylvania State Historic Preservation Office (PA SHPO) and Section 106 consulting parties would be required.

Although this is a new alignment, this alternative would not qualify as a Type I noise project since the horizontal alignment is shifted minimally and doesn’t halve the distance to the nearest receptor. A noise screening analysis could be requested to confirm this, but due to the minor shift in alignment, noise impacts requiring mitigation in the form of a noise wall are not anticipated. Paint should be tested for lead based paint before rehabilitation work is completed.

This alternative would have considerably more right-of-way and environmental impacts than Alternatives #2, #3, or #4 due to the addition of the new bridge for westbound traffic. Approximately four (4) properties are anticipated to be partially impacted by construction. An additional property, the property on the southwest end of the new alignment, would be significantly impacted by this alternative due to the close proximity of the new alignment to the existing home. Permanent stream impacts would total approximately 6800 square feet, due to rip rap placement at the existing piers in addition to the proposed piers. There would be no wetlands or agricultural land impacted by this alternative. This alternative may not require a detour.

There are overhead electric, telephone, and cable television utility lines located along the downstream side of the existing bridge and in both approaches. At least one of the existing utility poles would be impacted by this alternative.

This alternative has a similar new bridge cost as Alternative #3 (Replacement on Existing Alignment) and Alternative #4 (Replacement on New Alignment, Similar Location as Existing Bridge). It also includes a similar rehabilitated bridge cost as Alternative #2 (Rehabilitation). With the inclusion of roadway construction costs, the overall cost of this alternative is estimated to be $6,793,000. The overall cost is significantly higher than all other alternatives due to the
construction of a new westbound bridge in addition to the full rehabilitation of the existing bridge for eastbound traffic. The service life of the new westbound structure would be significantly more than that of the rehabilitated eastbound structure. Large future maintenance costs for the bridge owners (Montgomery County) would be anticipated for the eastbound structure. If the rehabilitated truss does not receive regular maintenance, it would continue to deteriorate.

While the rehabilitation of the existing bridge for eastbound traffic would minimize impacts to natural and cultural resources and adjacent properties, the rehabilitation of the bridge does not meet the project needs. The construction of the new bridge would address the project needs for westbound traffic. However, impacts to natural and cultural resources, adjacent properties, and flood elevations would increase. The property on the west end of the new alignment would be significantly impacted by this alternative. Therefore, this alternative is not recommended.

F. Alternative 6 – Replacement on New Alignment, North of Existing Bridge

This alternative would involve the construction of a new structure on a new alignment approximately 50’ upstream (north) of the existing bridge. The existing structure would not need to be removed in order to construct the proposed bridge. The new bridge would span the Wissahickon Creek parallel to the existing bridge with the piers located such that the piers of both the existing bridge and proposed bridge would be aligned to reduce the hydraulic impact of the new bridge. Refer to Figure 4 in Appendix A for a plan depicting this alternative. A new bridge would allow for all vehicles to cross, satisfying the Project Need to address the existing bridge deterioration and accommodate vehicular traffic including EMS vehicles and school buses. The existing structure could also potentially be rehabilitated for recreational use, but that use is not considered in this report and would require a new owner to agree to maintain the existing bridge.

The proposed alignment would tie into the existing roadway near the intersection with Creek Lane (southwest of the bridge) and near the existing homes adjacent to the bridge in the east approach. The proposed alignment includes three horizontal curves. The realignment of West Valley Green Road pulls the horizontal curve and the bridge farther away from the existing home on the eastern end of the existing bridge, which improves sight lines and stopping sight distances around the curve. The sight distance from the driveway at the existing home on the eastern end of the bridge is improved over the current condition. The proposed horizontal curve radii and superelevation cross slopes would meet the criteria for a design speed of 25 mph.

The proposed vertical profile would raise the bridge and roadway approaches higher than the existing bridge and approaches. This would eliminate the low spot along West Valley Green Road in the western approach and improve sight distance across the bridge. However, constructing another bridge with two additional piers in the floodway adjacent to the existing bridge creates more obstructions for flood waters and would increase water surface elevations during some flood events. Preliminary hydraulic analysis of this alternative indicates all storm events (10-year, 25-year, and 100-year) overtop West Valley Green Road. Analysis of the 10-year and 25-year storm events indicate proposed flood elevations will increase over existing flood elevations. Analysis of
the 100-year storm event indicates proposed flood elevations may slightly decrease over existing flood elevations. Due to the possible flood impacts occurring in a detailed Federal Emergency Management Agency (FEMA) study area with a floodway, this alternative may require a Conditional Letter of Map Revision (CLOMR) from FEMA and flowage easements along Wissahickon Creek.

The bridge typical section would consist of two (2) 11’ lanes and two (2) 6’ shoulders, which is much wider than the existing bridge. The proposed bridge addresses the existing narrow bridge width problem and meets current design criteria. The 6’ shoulders are provided on both sides of the proposed bridge for pedestrian and bicycle access to the Wissahickon Green Ribbon Trail on the western end of the bridge. The trail realignment would require major regrading of the approach to the existing bridge.

A Phase IB archaeological survey would be required in any areas needed for staging, drainage etc. which are located outside of the current right-of-way within the northeastern quadrant only since no work is proposed in the southeast or southwest quadrants. This alternative would require a larger limit of disturbance in the northern quadrants in comparison to Alternatives #2, #3, or #4.

This alternative requires Section 4(f) involvement with two Section 4(f) resources with 0.06 acres of impact within the limit of disturbance of Fort Washington State Park for temporary construction easements and required right-of-way, and the major realignment of the Wissahickon Green Ribbon Trail. Impacts to the state park and trail are likely to be considered de minimis since the potential impacts would not adversely affect the activities, features, and attributes of the resource. The trail realignment would require major regrading of the approach to the existing bridge.

Although this is a new alignment, this alternative would not qualify as a Type I noise project since the horizontal alignment change is minimal and doesn’t halve the distance to the nearest receptor. A noise screening analysis could be requested to confirm this, but due to the minor shift in alignment, noise impacts requiring mitigation in the form of a noise wall are not anticipated. With no work anticipated on the existing bridge, there would be no concern with the paint on the bridge.

This alternative would have considerably more right-of-way and environmental impacts than Alternatives #2, #3, or #4 due to the new baseline being offset to the north 50’ from the existing baseline. Approximately four (4) properties are anticipated to be partially impacted by construction. An additional property, the property on the west end of the new alignment, would be significantly impacted by this alternative due to the close proximity of the new alignment to the existing home. Permanent stream impacts would total approximately 4400 square feet due to new pier and rip rap placement. There would be no wetlands or agricultural land impacted by this alternative. This alternative may not require a detour.

There are overhead electric, telephone, and cable television utility lines located along the downstream side of the existing bridge and in both approaches. At least three of the existing utility poles would be impacted by this alternative.
This alternative has a higher new bridge cost than Alternative #3 (Replacement on Existing Alignment) or Alternative #4 (Replacement on New Alignment, Similar Location as Existing Bridge) due to the construction of an additional pier. With the inclusion of roadway construction costs, the overall cost of this alternative is estimated to be $3,082,000. The overall cost is approximately 30% higher than the cost of Alternatives #3 or #4 due to the additional roadway construction costs anticipated for the new alignment work. However, the overall cost of this alternative is less than all remaining alternatives. The service life of a replacement structure would be significantly more than that of a rehabilitated structure. Future maintenance costs would be less than anticipated for a rehabilitated bridge.

This alternative addresses the existing bridge deterioration, increases capacity to accommodate vehicular traffic including EMS vehicles and school buses, and improves all aspects of the existing bridge and roadway geometry (improving safety) over the existing condition. Therefore, this alternative meets all of the Project Needs. In addition to meeting the Project Needs, this alternative would be able to accommodate future re-decking and replacement and provide bike and pedestrian access across the bridge to the Wissahickon Green Ribbon Trail. However, impacts to natural and cultural resources, adjacent properties, and flood elevations for the 10-year and 25-year storm events would increase. The property on the west end of the new alignment would be significantly impacted by this alternative. Therefore, this alternative is not recommended.

G. Alternative 7 – Replacement on New Alignment, South of Existing Bridge

This alternative would involve the construction of a new structure on a new alignment a minimum of 50’ downstream (south) of the existing bridge. The existing structure would not need to be removed in order to construct the proposed bridge. The new bridge would span the Wissahickon Creek in a northeast-southwest direction (not parallel to the existing bridge) with the piers located such that the piers of both the existing bridge and proposed bridge would be aligned to reduce the hydraulic impact of the new bridge. Refer to Figure 5 in Appendix A for a plan depicting this alternative. A new bridge would allow for all vehicles to cross, satisfying the Project Need to address the existing bridge deterioration and accommodate vehicular traffic including EMS vehicles and school buses. The existing structure could also potentially be rehabilitated for recreational use, but that use is not considered in this report and would require a new owner to agree to maintain the existing bridge.

The proposed alignment would tie into the existing roadway near the intersection with Creek Lane (southwest of the bridge) and near the existing homes adjacent to the bridge in the east approach. The proposed alignment includes two horizontal curves. The realignment of West Valley Green Road improves sight lines and stopping sight distances around the curves. The proposed horizontal curve radii and superelevation cross slopes for the curves near the bridge would meet the criteria for a design speed of 25 mph.
The proposed vertical profile would raise the bridge and roadway approaches higher than the existing bridge and approaches. This would eliminate the low spot along West Valley Green Road in the western approach and improve sight distance across the bridge. Eliminating the low spot in the western approach would also improve the frequent flooding of the Wissahickon Creek over that portion of the roadway. However, constructing another bridge with two additional piers in the floodway adjacent to the existing bridge creates more obstructions for flood waters and would increase water surface elevations during all flood events. Preliminary hydraulic analysis of this alternative indicates both a 10-year storm event and 25-year storm event pass beneath the proposed bridge without overtopping West Valley Green Road as opposed to the existing condition which suggests even the 10-year storm event overtops West Valley Green Road. Analysis of the 100-year storm event indicates proposed flood elevations will increase over existing flood elevations and a 100-year storm event will overtop West Valley Green Road. Due to the flood impacts occurring in a detailed Federal Emergency Management Agency (FEMA) study area with a floodway, this alternative would require a Conditional Letter of Map Revision (CLOMR) from FEMA and flowage easements along Wissahickon Creek.

The bridge typical section would consist of two (2) 11’ lanes and two (2) 6’ shoulders, which is much wider than the existing bridge. The proposed bridge addresses the existing narrow bridge width problem and meets current design criteria. The 6’ shoulders are provided on both sides of the proposed bridge for pedestrian and bicycle access to the Wissahickon Green Ribbon Trail on the western end of the bridge. The trail realignment would require major regrading of the approach to the existing bridge.

A Phase IB archaeological survey would be required in any areas needed for staging, drainage etc. which are located outside of the current right-of-way within the southeastern and southwestern quadrants only since no work is proposed in the northeast quadrant. This alternative would require a larger limit of disturbance in the southeast and southwest quadrants in comparison to Alternatives #2, #3, or #4.

This alternative requires Section 4(f) involvement with two Section 4(f) resources with 0.52 acres of impact within the limit of disturbance of Fort Washington State Park for temporary construction easements and required right-of-way, and the major realignment of the Wissahickon Green Ribbon Trail. Impacts to the state park and trail are likely to be considered de minimis since the potential impacts would not adversely affect the activities, features, and attributes of the resource. The trail realignment would require major regrading of the approach to the existing bridge.

This alternative could potentially qualify as a Type I noise project since the horizontal alignment change is shifted closer to the residential noise receptors in the southeast quadrant, but this alternative would require the acquisition of the closest residential structure that would be impacted by halving the distance. A noise screening analysis could be requested to confirm this, but due to the minor shift in alignment, noise impacts requiring mitigation in the form of a noise wall are not anticipated. With no work on the existing bridge, there would be no concern with the paint on the bridge.
This alternative would have considerably more right-of-way and environmental impacts than Alternatives #2, #3, or #4 due to the new baseline being offset to the south a minimum of 50’ from the existing baseline. Approximately three (3) properties are anticipated to be partially impacted by construction. An additional property on the southeast corner of the new alignment would be severely impacted and the dwelling on the property would be demolished due to the location of the new alignment. Permanent stream impacts would total approximately 4400 square feet due to new pier and rip rap placement. There would be no wetlands or agricultural land impacted by this alternative. This alternative may not require a detour.

There are overhead electric, telephone, and cable television utility lines located along the downstream side of the existing bridge and in both approaches. At least two of the existing utility poles would be impacted by this alternative.

This alternative has a higher new bridge cost than Alternative #3 (Replacement on Existing Alignment) or Alternative #4 (Replacement on New Alignment, Similar Location as Existing Bridge) due to the construction of an additional pier. With the inclusion of roadway construction costs, the overall cost of this alternative is estimated to be $3,142,000. The overall cost is approximately 32% higher than the cost of Alternatives #3 or #4 due to the additional roadway construction costs anticipated for the new alignment work. However, the overall cost is similar to Alternative #6 (Replacement on New Alignment, North of Existing Bridge) and less than Alternative #2 (Rehabilitation) or Alternative #5 (Rehabilitation of Existing Bridge/Construction of New Adjacent Bridge, One-Way Couplet). The service life of a replacement structure would be significantly more than that of a rehabilitated structure. Future maintenance costs would be less than anticipated for a rehabilitated bridge.

This alternative addresses the existing bridge deterioration, increases capacity to accommodate vehicular traffic including EMS vehicles and school buses, and improves all aspects of the existing bridge and roadway geometry (improving safety) over the existing condition. Therefore, this alternative meets all of the Project Needs. In addition to meeting the Project Needs, this alternative would improve the existing flooding conditions over West Valley Green Road, be able to accommodate future re-decking and replacement, and provide bike and pedestrian access across the bridge to the Wissahickon Green Ribbon Trail. However, impacts to natural and cultural resources, adjacent properties, and flood elevations would increase. The property on the southeast corner of the new alignment would be severely impacted and the dwelling on the property would be demolished due to this alternative. Therefore, this alternative is not recommended.
VII. CONCLUSIONS

Seven alternatives were investigated in detail: Alternative #1 (No-Build or Do Nothing); Alternative #2 (Rehabilitation); Alternative #3 (Replacement on Existing Alignment); Alternative #4 (Replacement on New Alignment, Similar Location as Existing Bridge); Alternative #5 (Rehabilitation of Existing Bridge/Construction of New Adjacent Bridge, One-Way Couplet); Alternative #6 (Replacement on New Alignment, North of Existing Bridge); and Alternative #7 (Replacement on New Alignment, South of Existing Bridge).

Of the seven alternatives investigated, only Alternatives #4, #6, and #7 met all of the project needs. Alternatives #1, #2, and #5 did not meet any of the outlined project needs and Alternative #3 only met some of the project needs. Therefore, Alternatives #1, #2, #3, and #5 were withdrawn from further consideration on the basis of not meeting project needs.

Impacts to natural and cultural resources, adjacent properties, and flooding were closely examined for each alternative. Alternatives #6 and #7 significantly impact adjacent properties, increase flood elevations for most flood events, and have greater permanent stream impacts than Alternative #4. Alternative #4 minimally impacts adjacent properties, decreases flood elevations, and minimizes permanent stream impacts. Therefore, of the remaining alternatives under consideration (Alternatives #4, #5, and #6), Alternative #4 is recommended as the preferred alternative on the basis of meeting all project needs and minimizing impacts.

In addition to meeting all project needs and minimizing impacts, Alternative #4 is economical, as it falls within 5% of the least cost alternative. In addition, the service life of the new structure would be maximized and future maintenance costs would be minimized. Alternative #4 would also improve the existing flooding conditions over West Valley Green Road, be able to accommodate future re-decking and replacement, and provide bike and pedestrian access across the bridge to the Wissahickon Green Ribbon Trail.
APPENDIX A

Plans
FIGURE 2

ALTERNATIVE 4:
REPLACEMENT ON NEW ALIGNMENT - SIMILAR LOCATION AS EXISTING BRIDGE

DATE: 2/8/2019
TIME:

FILE NAME: POB STA 9+01.98

RED 1/2 STY DWLG

PC STA 10+23.73

12' 12'

12'

4'

M

AC

PC STA 11+36.84

L

PI STA 16+91.55

MAC

111.19

G

406.80

PBR

SUPERELEVATE 3.0%

11' 11'

T = 71.90'

L = 135.14'

R = 160.00'

IE = 15.41'

RSUPELEVATE 3.0%

4763 B

14'

4'

101 40

5'

3'

2'

1'

4'

2'

6'

2':1

2':1

RIP-RAP

FOR TOWNSHIP ROAD

LEGAL R/W LINE

137'-4"

BRIDGE SECTION

SUPERELEVATED SECTION

TANGENT SECTION

LEGEND
- PROPOSED ROADWAY
- PROPOSED SHOULDER
- PROPOSED BRIDGE
FIGURE 3
ALTERNATIVE 5: REHABILITATION OF EXISTING BRIDGE/CONSTRUCTION OF NEW ADJACENT BRIDGE (ONE-WAY COUPLET)
FIGURE 4
ALTERNATIVE 6:
REPLACEMENT ON NEW ALIGNMENT - NORTH
OF EXISTING BRIDGE

SCALE

0  50 100

LEGEND

- PROPOSED ROADWAY
- PROPOSED SHOULDER
- PROPOSED BRIDGE
APPENDIX B

Alternatives Matrix
West Valley Green Road (Montgomery County Bridge #59) - Alternatives

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Description</th>
<th>Design Exceptions</th>
<th>Hydraulic Impacts (100-year floodplain impacts)</th>
<th>Rehabilitation (25-year floodplain impacts)</th>
<th>Hydraulic Impacts (50-year floodplain impacts)</th>
<th>Demolition Cost (Existing Bridge) **</th>
<th>Roadway Construction Costs *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative #1: No-Build or Do Nothing</td>
<td>No impact</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Alternative #2: Rehabilitation</td>
<td>1 total take</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>3,900,000$</td>
<td>3,900,000$</td>
</tr>
<tr>
<td>Alternative #3: Replacement on Existing Bridge, Similar Location as Existing Bridge</td>
<td>1 total take</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>3,900,000$</td>
<td>3,900,000$</td>
</tr>
<tr>
<td>Alternative #4: Rehabilitation of Existing Bridge/Construction of New Adjacent Bridge (One-way Complete)</td>
<td>1 total take</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>3,900,000$</td>
<td>3,900,000$</td>
</tr>
<tr>
<td>Alternative #5: Rehabilitation of Existing Bridge, North of Existing Bridge ****</td>
<td>1 total take</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>3,900,000$</td>
<td>3,900,000$</td>
</tr>
<tr>
<td>Alternative #6: Replacement on New Alignment, South of Existing Bridge ****</td>
<td>1 total take</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>3,900,000$</td>
<td>3,900,000$</td>
</tr>
</tbody>
</table>

- ** Includes estimate for mobilization, maintenance and protection of traffic, erosion control measures, construction inspection, etc.
- N/A: Not applicable
- * Includes 20% contingency. Trail reconstruction costs were not considered in the cost estimate.
- ** Includes costs for mobilization, maintenance and protection of traffic, erosion control measures, construction inspection, etc.
- *** The matrix does not include if the existing bridge were to be rehabilitated for other use, i.e. recreational use. Rehabilitating and maintaining existing truss bridge is NOT included, as the new owner would be responsible for all repairs.
- **** The matrix does not include if the existing bridge were to be rehabilitated for other use, i.e. recreational use. Rehabilitating and maintaining existing truss bridge is NOT included, as the new owner would be responsible for all repairs.
- A new owner would need to be found to maintain the existing bridge.

** Life Cycle Costs provided represent the present value of all repairs/maintenance through a 100-year life of the bridge(s). Costs do NOT include the initial rehabilitation cost required as part of this project. For Alternatives #3 & #4, the cost of maintaining the existing truss bridge is NOT included, as the new owner would be responsible for all repairs.

- Movable Property Needs

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Description</th>
<th>None</th>
<th>N/A</th>
<th>3,900,000$</th>
<th>N/A</th>
<th>N/A</th>
<th>N/A</th>
<th>N/A</th>
<th>N/A</th>
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<tbody>
<tr>
<td>Overall Estimated Construction Cost***</td>
<td>N/A</td>
<td>None</td>
<td>N/A</td>
<td>3,900,000$</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Construction Cost (New Bridge)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>3,900,000$</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Rehabilitation Cost (Existing Bridge)****</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>3,900,000$</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

- A new owner would need to be found to maintain the existing bridge.

- ** Includes 20% contingency. Trail reconstruction costs were not considered in the cost estimates.
West Valley Green Road

Wissahickon Creek

Fort Washington State Park

West Valley Green Road Bridge

Wissahickon Green Ribbon Trail

Project Study Area

Fort Washington State Park

Wissahickon Green Ribbon Trail

Section 4(f) Resources
Montgomery County Bridge No. 59
Whitemarsh Township, Montgomery County, Pennsylvania