Memorandum

To: Don Briggs, Superintendent, Potomac Heritage National Scenic Trail, National Park Service

From: Daniel Biggs, RLA (TDG)

CC: David Turner (BCHD)
Eileen Nivera (M-NCPPC),
Don Herring (M-NCPPC)

Date: July 6, 2011

Re: Feasibility Study for PHNST at Broad Creek, Prince George's County, Maryland
TDG Project No. 5292

Feasibility Study for the Proposed Segment of the Potomac Heritage National Scenic Trail at Broad Creek in Prince George's County, Maryland

Toole Design Group (TDG) was retained by the Potomac Heritage National Scenic Trail Office of the National Park Service to conduct a feasibility study for a segment of the Potomac Heritage National Scenic Trail (PHNST) through the Broad Creek Historic District in Fort Washington, Prince George's County, Maryland.

The scope of this feasibility study was to review existing site conditions, recommend potential trail design parameters, and propose a potential implementation strategy. A site visit was conducted on March 17th, 2011 by Daniel Biggs, RLA (TDG), David Turner (Broad Creek Historic District), and Eileen Nivera and Don Herring (Maryland-National Capital Park and Planning Commission (M-NCPPC) Park Planning and Development Division). The field visit consisted of a reviewing existing site conditions, potential alignment alternatives and discussing potential implementation strategies.

Study Area

The study corridor starts at the existing Henson Creek trailhead at the intersection of Oxon Hill Road and Fort Foote Road. The trail extends east along Oxon Hill Road to Broad Creek Church Road and Old St. Johns Way. The alignment then extends across Livingston Road entering an existing undeveloped parcel. Within the undeveloped parcel, the trail continues east and south through a forested area and across two tributaries of Broad Creek to Livingston Road just east of the existing WSSC pump station driveway. The trail extends across Livingston Road and south parallel to Livingston Road through the Harmony Hall Manor (National Park Service) property. The alignment terminates just south of the Harmony Hall Manor parcel at the Harmony Hall Arts/ Harmony Regional Center (M-NCPPC) parking lot. A more specific review of each trail segment is described below. A graphic illustrating the study area is included as Attachment A.

General Recommendations

A low impact trail within the Broad Creek Historic District is recommended for a variety of trail user groups. In general it is suggested that the alignment consider potential views and vistas and amenities which compliment the historic character of the community and consider minimal impacts to the natural, cultural, and historic environments. During future design development phases it is suggested that a more precise alignment analysis of opportunities and constraints be considered prior to implementation. It is suggested that design characteristics, specifications, and details as published by M-NCPPC, Department of Parks and Recreation, should be followed to the extent possible and appropriate to the characteristics of the proposed trail. Photos and graphics of potential trail features, design character and amenities are attached as Attachment C for consideration.

Trail Development Strategy
In order to successfully implement the proposed trail, it is recommended that a sound overall strategy be developed, including establishing a steering committee, and endorsement of local government officials. The following five general steps should be followed:

1. *Establish a Steering Committee*
   As with similar trail projects, a Broad Creek Historic District steering committee, including and endorsed by local government agency officials and staff, is important to successfully design, construct and manage the planned trail. Trail design standards are also important, particularly since several segments may and could be designed and developed by various agencies and/or property owners.

2. *Local Government Endorsement*
   While Local Government officials may have been involved in discussions about the project, it is recommended that the project be 'officially' endorsed by the M-NCPPC and the Broad Creek Historic District Advisory Committee. An endorsement could include a resolution endorsing the project or take the form of a broader agreement concerning the funding, development, and maintenance of the trail. The overall success of the trail project will be aided by developing strategic alliances and effective partnerships with local government officials.

3. *Develop Project Brief*
   It is suggested that a clear project brief be developed so that everyone involved in the project has a clear understanding of the proposed project. The brief should include the following:
   - Project history and background. Including developments and community outreach completed.
   - Description of project purpose, goals, and objectives.
   - Description of intended user groups (eg. walk, bike, equestrians).
   - Anticipated periods for community input, overall funding strategy, and timeframe of project.

4. *Community Consultation*
   As with any community project, it is best to involve the public and interested stakeholders in as many ways as possible. The investment of time and energy in community consultation is necessary to develop community support and ownership of the project.

5. *Project Design and Development*
   Once the first four steps are completed or underway it is necessary to begin the project design and development phases of the project. As a result, this memo provides an outline of the suggested steps to design and develop the trail corridor. Identifying initial design standards is important for the successful implementation of the trail, particularly since several segments may and could be designed and developed by various agencies or property owners. In addition, once funding has been identified for particular segments of the trail corridor, more specific permit requirements may be identified for compliance.

   Implementation of the project requires coordination with various local, county, state and federal agencies as the project is designed, permitted, and constructed. Staff members in various County departments and agencies include: watershed management, environmental services, historic preservation, park planning, transportation engineering and public works.

Anticipated Users
It is anticipated that users of the proposed trail connection will initially consist of pedestrians and equestrian riders utilizing the trail network for historical and environmental education, sightseeing, and recreational riding, walking or jogging. Visitors are expected to originate at the Harmony Hall (M-NCPPC) or the Henson Creek Trail. Once the connecting links to this trail segment are completed and signed for trail users, usage is expected to moderately increase, particularly for recreational bicyclists, hikers, and equestrian riders.

Trail Design Standards
It is recommended that the trail surface should primarily consist of a granular surface (stone dust or a comparable alternative) and a hard surface (asphalt or concrete) where necessary at approaches to bridges or roadways, and in other areas where erosion or severe degradation of the trail surface is expected. Throughout the trail corridor the trail should comply with the *AASHTO Guide for the Development of Bicycle Facilities* and be a minimum 10 feet wide with a 2 ft buffer on either side. Maximum trail grades should be no steeper than 1:12 for a maximum length of 200 feet. Along the trail corridor a minimum 12-foot vertical clearance should be maintained to provide adequate clearance for equestrian riders.

The preferred width for bridges should be a minimum of 14 feet wide (10' treadway with 2' buffer on either side) composed of slip resistant wood or composite material. The bridge loading capacity should meet AASHTO guidelines (~100 lb/sf) and be capable of handling a utility maintenance vehicle for maintenance and emergency access (John Deere Gator or equivalent: 60"W x 113"L and vehicle weight: 1,500 lbs.). Proposed design dimensions of the bridges should comply with local, state, and federal guidelines and include universal design elements to enhance the pedestrian experience for all users.

All trail segments and features should comply with all applicable federal, state, and local design standards. A list of the potential design standards and guidelines are identified within the M-NCPPC Trail Standards and Details.

Preliminary Opinion of Probable Cost
A preliminary opinion of probable cost for the construction of the proposed trail (Segments A to F) is approximately $1,430,000. A description of the segments is below with preliminary opinions of probable costs separated by segment. Overall costs for the proposed trail could be reduced fairly significantly by combining segments. The construction of consecutive trail segments should begin and end at logical points in order to provide a usable trail corridor in interim conditions.

A detailed preliminary opinion of probable cost is included in Attachment B.

Trail Segments
The proposed trail is separated into six segments particularly due to ownership of property and anticipated opportunities and constraints within each portion of the trail. Each of the segments are described below and illustrated in Attachment A.

Segment A (Along Oxon Hill Road from Fort Foote Road to Broad Creek Church Road) – This segment consists of a trail crossing at the intersection of Fort Foote Road and a side path along the southern side of Oxon Hill Road (1,500 lf). Within this segment it is recommended that the trail consist of a hard surface (asphalt) with a parallel pre-fabricated pedestrian bridge (14-ft width minimum) over Broad Creek. Two alternatives to a prefabricated covered bridge could consist of A.) Uncovered 14-ft width pedestrian bridge or B.) Widening of the existing vehicular bridge to 14-ft width. Segment A Preliminary Cost: $695,300.

Segment B (Along Broad Creek Church Road) – Currently Broad Creek Church Road between Oxon Hill Road and Old St. Johns Way is closed to through traffic (750-ft). It is suggested that this segment of roadway be converted to multi-use trail with a gateway trailhead at the Oxon Hill Road end as a part of the proposed Prince George's County capital-improvement stormwater management project. A small parking area could be included at the trailhead area for trail users. The trail segment would consist of a gateway feature with interpretative signage and information for trail users entering the Broad Creek Historic District. All trail amenities and vehicular barriers should be context sensitive and be coordinated with other trail amenities. Segment B Preliminary Cost: $96,700.

Segment C – (along Old St. John's Way) – This low volume (550-ft) road/driveway provides access to the St. John's Lutheran Church between Livingston Road and the Church. It is recommended along this roadway to provide shared-lane markings and signage identifying the roadway as shared-use for trail users, as well as an crosswalk across Livingston Road at the east end of the driveway. Segment C Preliminary Cost: $2,800.

Segment D – (within undeveloped parcel) – This 2,250-ft trail segment through an undeveloped forested area, extends from Livingston Road south across two unnamed tributaries to Broad Creek. It is recommended that the trail consist of a soft-surface (stone dust) and include one or two interpretative sites within the segment. The trail should be aligned to follow the contours of the land, and minimize trail grades to the greatest extent possible.

Bridge crossings should be located perpendicularly across the stream at a stable location to minimize environmental impacts. It is suggested that the bridges within this segment consist of prefabricated pedestrian bridges, similar to those presented in the attached graphics. Segment D Preliminary Cost: $352,600.

Segment E – (within undeveloped parcel) – This 1,050-ft trail segment through an undeveloped forested area extends from east to west, between Segment D and Livingston Road and consist of a soft-surface (stone dust) with an interpretative site within the segment. The trail alignment should be aligned to follow the contours of the land, and minimize trail grades to the greatest extent possible. Segment D Preliminary Cost: $59,900.

Segment F – (parallel to Livingston Road at Harmony Hall Manor) – This segment begins at the a trail/road crossing of Livingston Road at the WSSC pump station driveway and extends along the west side parallel to Livingston Road through the Harmony Hall Manor (National Park Service) property. The 1,650-ft soft-surface trail segment extends to the property limits of the Harmony Hall Arts/ Harmony Regional Center (M-NCPPC). Within this segment the trail is planned within the proposed sewer trunk line alignment. Within this segment, compliance with the National Environmental Policy Act (NEPA) within National Park Service Directors Order (DO-12) will be necessary. Segment E Preliminary Cost: $157,400.

Segment G – (at Harmony Hall Arts/ Regional Center) – The 30-ft trail segment includes a trail connection between the existing parking lot and Segment F, as well as a trailhead area. The trailhead area should include wayfinding signage within the Harmony Hall Arts Center facility, a trail wayside with benches, as well as a landscaped area. Segment G Preliminary Cost: $ 55,700.00.

Design & Planning
A typical scope of work for projects of similar scale has been included as Attachment D: Trail Planning and Design Scope of work. Reviews at the 15%, 50%, and 90% design stages, in addition to the standard review/approvals required for environmental and general coordination aspects of the project are recommended. However, if this entire project or segments of which are undertaken through a design-build process, the scope of work could be streamlined, and some tasks could be consolidated, especially since the Broad Creek Historic District steering committee includes County staff and other essential stakeholders.

Attachments

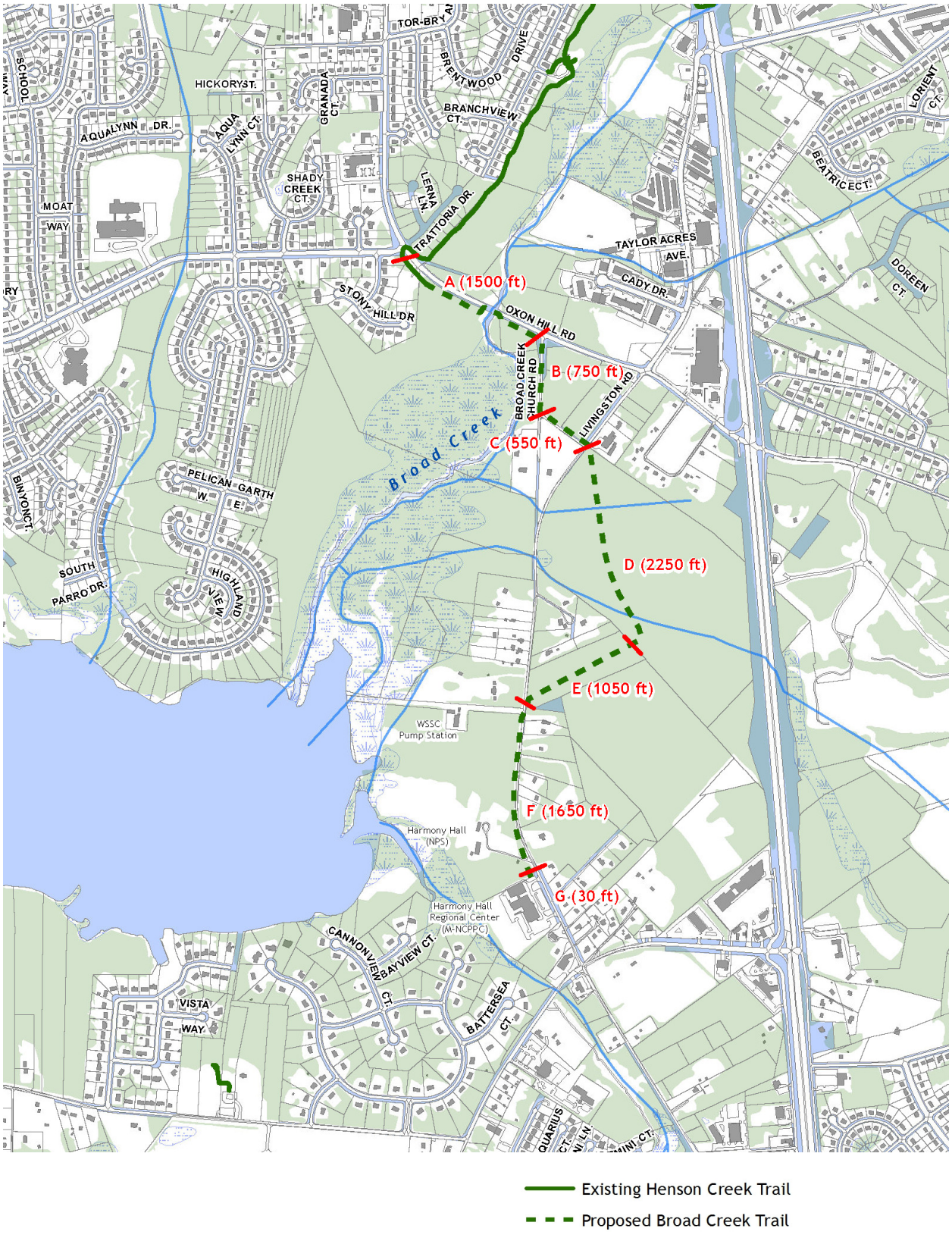
Attachment A: Alignment Map

Attachment B: Preliminary Opinion of Probable Cost

Attachment C: Trail Character

Attachment D: Trail Planning & Design Scope of Work

Attachment A: Alignment Map



Attachment B: Preliminary Opinion of Probable Cost

Broad Creek Trail Project
a segment of the Potomac Heritage National Scenic Trail
Prince George's County - Fort Washington, Maryland

Segment A (1,500 lf) - Asphalt Trail

Item No.	Item			Qty	Units		Unit Price	Subtotal Cost	Total Cost
1	Asphalt Surface Course [trail] [10' width]		2" thickness	200	Ton		$ 60.00	$ 12,000.00	
2	Asphalt Base Course [trail] (10' width)		2" thickness	100	Ton		$ 60.00	$ 6,000.00	
3	Aggregate Base Course [trail] (12' width)		6" thickness	400	Cubic Yard		$ 50.00	$ 20,000.00	
4	Excavation [trail] (12' width)		10" depth	600	Cubic Yard		$ 20.00	$ 12,000.00	
5	Slope Stabilization (grading, topsoil, geotextile, hydroseed)		6" depth	200	Cubic Yard		$ 20.00	$ 4,000.00	
6	Trail Signage (informational/warning)			4	Each		$ 200.00	$ 800.00	
7	Intersection Improvements (pedestrian signal, push buttons, signage, single leg of intersection)			1	Each		$ 5,000.00	$ 5,000.00	
8	Pedestrian Bridge - parallel to roadway [80' span covered] (14' width)[1]			1	Each		$ 300,000.00	$ 300,000.00	
	- Alternative A: Parallel Pedestrian Bridge 14' width (80' span uncovered) = $100,000[1]								
	- Alternative B: Bridge Widening 14' width = $180,000 to 300,000[2]								
								Subtotal	**$ 359,800.00**
9	Drainage and E&S (Moderate - 10%)			1	Lump Sum		$ 35,980.00		
10	Maintenance of Traffic (Low - 5%)			1	Lump Sum		$ 17,990.00		
11	Utility Modifications (Low - 5%)			1	Lump Sum		$ 17,990.00		
13	Mobilization (Moderate - 8%)			1	Lump Sum		$ 28,784.00		
12	Project Approvals & Permitting (Moderate - 10%)			1	Lump Sum		$ 35,980.00		
								Segment A Subtotal	**$ 496,600.00**
								Construction Contingency (25%)	$ 124,200.00
								Design & Planning Cost (15%)	$ 74,500.00
								Segment A Total	**$ 695,300.00**
								cost/lf	$ 463.53

[1] - Preliminary 12' wide Pedestrian Bridge Cost Data provided by Excel Bridge Manufacturing Company (80' span covered = $105,000, 80' span uncovered = $50,000) [delivered only

[2] - Preliminary Bridge Widening Cost Data provided from data from similar projects, however costs may vary significantly depending on superstructure and existing

Segment B (750 lf) - Stone Dust Trail

Item No.	Item			Qty	Units		Unit Price	Subtotal Cost	Total Cost
1	Stonedust Surface [trail] (10' width)		4" thickness	100	Cubic Yard		$ 20.00	$ 2,000.00	
2	Aggregate Base Course [trail] (12' width)		6" thickness	200	Cubic Yard		$ 50.00	$ 10,000.00	
3	Excavation [trail] (12' width)		10" depth	300	Cubic Yard		$ 20.00	$ 6,000.00	
4	Removal of Existing Roadway Asphalt (30' width)[3]		10" depth	700	Cubic Yard		$ 15.00	$ 10,500.00	
5	Removal of Existing Roadway Subbase (20' width)[3]		6" depth	300	Cubic Yard		$ 15.00	$ 4,500.00	
6	Topsoil & Hydroseed Areas of Removed Roadway[3]		6" depth	900	Cubic Yard		$ 15.00	$ 13,500.00	
7	Trail Signage (informational/warning)			2	Each		$ 200.00	$ 400.00	
8	Trail Gateway & Wayside Areas			1	Each		$ 7,000.00	$ 7,000.00	
								Subtotal	**$ 53,900.00**
9	Drainage and E&S (Low - 5%)			1	Lump Sum		$ 2,695.00		
10	Maintenance of Traffic (Low - 5%)			1	Lump Sum		$ 2,695.00		
11	Utility Modifications (Low - 5%)			1	Lump Sum		$ 2,695.00		
12	Mobilization (Moderate - 8%)			1	Lump Sum		$ 4,312.00		
13	Project Approvals & Permitting (Low - 5%)			1	Lump Sum		$ 2,695.00		
								Segment B Subtotal	**$ 69,000.00**
								Construction Contingency (25%)	$ 17,300.00
								Design & Planning Cost (15%)	$ 10,400.00
								Segment B Total	**$ 96,700.00**
								cost/lf	$ 128.93

[3] - Project assumes existing asphalt roadway and subbase will be removed and replaced with a stone dust trail/topsoil hydroseed. Existing subbase will only be retained where proposed stone dust trail is to be located.

Segment C (550 lf) - Shared Lane

Item No.	Item			Qty	Units		Unit Price	Subtotal Cost	Total Cost
1	Thermoplastic Pavement Symbols (Sharrow Symbol)		550 linear feet	4	Each		$ 250.00	$ 1,000.00	
2	Trail Signage (informational/warning)			3	Each		$ 200.00	$ 600.00	
								Subtotal	**$ 1,600.00**
3	Drainage and E&S (Low - 5%)			1	Lump Sum		$ 80.00		
4	Maintenance of Traffic (Low - 5%)			1	Lump Sum		$ 80.00		
5	Utility Modifications (Low - 2%)			1	Lump Sum		$ 32.00		
6	Mobilization (Low - 5%)			1	Lump Sum		$ 80.00		
7	Project Approvals & Permitting (Low - 5%)			1	Lump Sum		$ 80.00		
								Segment C Subtotal	**$ 2,000.00**
								Construction Contingency (25%)	$ 500.00
								Design & Planning Cost (15%)	$ 300.00
								Segment C Total	**$ 2,800.00**
								cost/lf	$ 5.09

Segment D (2,250 lf) - Stone Dust Trail

Item No.	Item			Qty	Units		Unit Price	Subtotal Cost	Total Cost
1	Stonedust Surface [trail] (10' width)		4" thickness	300	Cubic Yards		$ 20.00	$ 6,000.00	
	• Segment D Stonedust Surface		2250	278					
2	Aggregate Base Course [trail] (12' width)		6" thickness	500	Cubic Yards		$ 50.00	$ 25,000.00	
	• Segment D Aggregate Base		2,250	500					
3	Excavation [trail] (12' width)		10" depth	900	Cubic Yards		$ 20.00	$ 18,000.00	
	• Segment D Stonedust Surface		2250	833					
4	Trail Signage (informational/warning)			2	Each		$ 200.00	$ 400.00	
5	Trail Wayside Area			1	Each		$ 10,000.00	$ 10,000.00	
6	Intersection Improvements (20' asphalt approach, raised crossing, pavement markings, curb ramp, signage, drainage culvert)			1	Each		$ 3,000.00	$ 3,000.00	
7	Pedestrian Bridge [40' span covered] (14' width)[4]			1	Each		$ 60,000.00	$ 60,000.00	
8	Pedestrian Bridge [40' span covered] (14' width)[4]			1	Each		$ 60,000.00	$ 60,000.00	
								Subtotal	**$ 182,400.00**
9	Drainage and E&S (Moderate - 10%)			1	Lump Sum		$	18,240.00	
10	Maintenance of Traffic (Low - 5%)			1	Lump Sum		$	9,120.00	
11	Utility Modifications (Low - 5%)			1	Lump Sum		$	9,120.00	
12	Mobilization (Moderate - 8%)			1	Lump Sum		$	14,592.00	
13	Project Approvals & Permitting (Moderate - 10%)			1	Lump Sum		$	18,240.00	
								Segment D Subtotal	**$ 251,800.00**
								Construction Contingency (25%)	$ 63,000.00
								Design & Planning Cost (15%)	$ 37,800.00
								Segment D Total	**$ 352,600.00**
								cost/lf	$ 176.30

[4] - Preliminary 12' wide Pedestrian Bridge Cost Data provided by Excel Bridge Manufacturing Company (40' span uncovered = $30,000) [delivered only

Segment E (1,050 lf) - Stone Dust Trail

Item No.	Item			Qty	Units		Unit Price	Subtotal Cost	Total Cost
1	Stonedust Surface [trail] (10' width)		4" thickness	200	Cubic Yards		$ 20.00	$ 4,000.00	
2	Aggregate Base Course [trail] (12' width)		6" thickness	300	Cubic Yards		$ 50.00	$ 15,000.00	
3	Excavation [trail] (12' width)		10" depth	400	Cubic Yards		$ 20.00	$ 8,000.00	
4	Trail Signage (informational/warning)			2	Each		$ 200.00	$ 400.00	
5	Intersection Improvements (20' asphalt approach, raised crossing, pavement markings, curb ramps, signage, drainage culvert)			1	Each		$ 3,500.00	$ 3,500.00	
								Subtotal	**$ 30,900.00**
6	Drainage and E&S (Moderate - 10%)			1	Lump Sum		$	3,090.00	
7	Maintenance of Traffic (Low - 5%)			1	Lump Sum		$	1,545.00	
8	Utility Modifications (Low - 5%)			1	Lump Sum		$	1,545.00	
9	Mobilization (Moderate - 8%)			1	Lump Sum		$	2,472.00	
10	Project Approvals & Permitting (Moderate - 10%)			1	Lump Sum		$	3,090.00	
								Segment E Subtotal	**$ 42,700.00**
								Construction Contingency (25%)	$ 10,700.00
								Design & Planning Cost (15%)	$ 6,500.00
								Segment E Total	**$ 59,900.00**
								cost/lf	$ 57.05

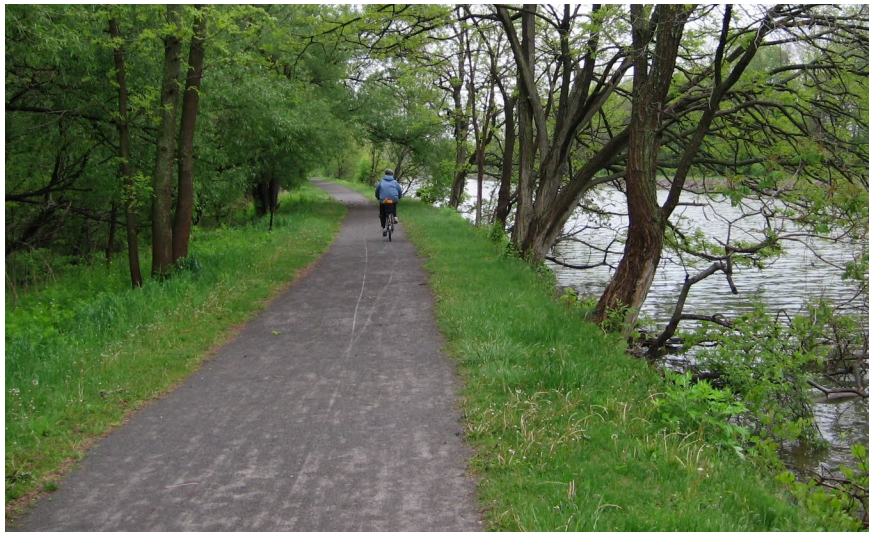
Segment F (1,650 lf) - Stone Dust Trail

Item No.	Item			Qty	Units		Unit Price	Subtotal Cost	Total Cost
1	Stonedust Surface [trail] (10' width)		4" thickness	300	Cubic Yards		$ 20.00	$ 6,000.00	
2	Aggregate Base Course [trail] (12' width)		6" thickness	400	Cubic Yards		$ 50.00	$ 20,000.00	
3	Excavation [trail] (12' width)		10" depth	700	Cubic Yards		$ 20.00	$ 14,000.00	
4	Supplemental Grading & Drainage Improvements (Culverts, Slope Stabilization & Grading)			1	Each		$ 6,000.00	$ 6,000.00	
5	Fencing (four board unfinished oak, locust posts with two 4 x 6 gates)[1920's]			80	Linear Feet		$ 35.00	$ 2,800.00	
6	Boardwalk Segment (8' width)			40	Linear Feet		$ 500.00	$ 20,000.00	
7	Driveway Crossing Improvements (20 ft Asphalt approaches, signage)			1	Lump Sum		$ 1,500.00	$ 1,500.00	
8	Trail Signage (informational/warning)			4	Each		$ 200.00	$ 800.00	
								Subtotal	**$ 71,100.00**
9	Drainage and E&S (Moderate - 10%)			1	Lump Sum		$	7,110.00	
10	Maintenance of Traffic (Low - 5%)			1	Lump Sum		$	3,555.00	
11	Utility Modifications (Low - 5%)			1	Lump Sum		$	3,555.00	
12	Mobilization (Moderate - 8%)			1	Lump Sum		$	5,688.00	
13	Project Approvals & Permitting (High - 30%)[5]			1	Lump Sum		$	21,330.00	
								Segment F Subtotal	**$ 112,400.00**
								Construction Contingency (25%)	$ 28,100.00
								Design & Planning Cost (15%)	$ 16,900.00
								Segment F Total	**$ 157,400.00**
								cost/lf	$ 95.39

[5] - Environmental Permitting assumes improvements on National Park Service Lands will require a high level of permitting and approvals, however any NEPA

Segment G (30 lf) - Gateway Area								
Item No.	**Item**		**Qty**	**Units**		**Unit Price**	**Subtotal Cost**	**Total Cost**
1	Asphalt Surface Course (proposed trail) [10' width]	2" thickness	100	Ton		$ 60.00	$ 6,000.00	
2	Asphalt Base Course [proposed trail] (10' width)	2" thickness	100	Ton		$ 60.00	$ 6,000.00	
3	Aggregate Base Course [proposed trail] (12' width)	6" thickness	100	Cubic Yards		$ 50.00	$ 5,000.00	
4	Excavation [proposed trail] (12' width)	10" depth	500	Cubic Yards		$ 20.00	$ 10,000.00	
5	Trail Signage (informational/warning)		2	Each		$ 250.00	$ 500.00	
6	Trail Gateway Area (Signage, gateway area, benches, informational kiosk)		1	Each		$ 5,000.00	$ 5,000.00	
							Subtotal	**$ 32,500.00**
7	Drainage and E&S (Low - 5%)		1	Lump Sum		$ 1,625.00		
8	Maintenance of Traffic (Low - 5%)		1	Lump Sum		$ 1,625.00		
9	Utility Modifications (Low - 2%)		1	Lump Sum		$ 650.00		
10	Mobilization (Low - 5%)		1	Lump Sum		$ 1,625.00		
11	Project Approvals & Permitting (Low - 5%)		1	Lump Sum		$ 1,625.00		
							Segment G Subtotal	**$ 39,700.00**
							Construction Contingency (25%)	$ 10,000.00
							Design & Planning Cost (15%)	$ 6,000.00
							Segment G Total	**$ 55,700.00**
							cost/lf	$ 1,856.67
							Construction Phase Subtotal	**$ 1,194,600.00**
							Design & Planning, Permitting Subtotal	**$ 235,400.00**
							Estimated Total Project Cost (Segments A - G)	**$ 1,430,000.00**
						Cost/lf =	$ 189.91	

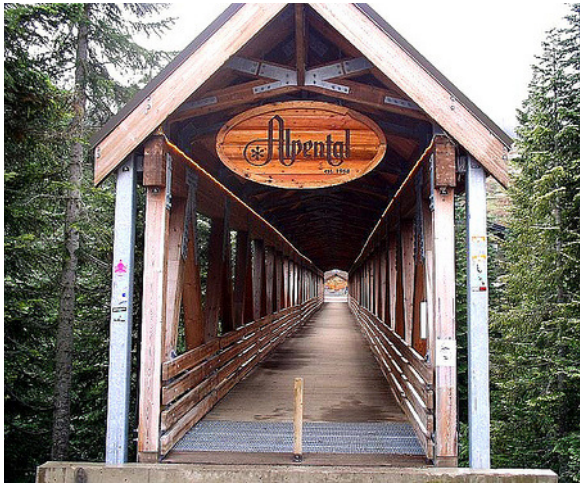
Trail Character 1



Stone Dust Trail Surface

Covered Bridge Concept

Steel Truss Bridge Concept



Covered Bridge Concept

Trail Character 2

Trail Cross Section

Trail Head Signage

Cape Cod, MA

Trail Character

Cape Cod, MA

Trail Character 3

Fencing – Three Rail Fence

Fencing – Two Rail Fence

Fencing – Trail Entrance Gate

Trail Head – Seating Area

Washington, D.C.

Attachment D: Trail Planning & Design Scope of Work

The following describes the possible scope of work to be completed as a part of the planning and design phase of the project. This process will need to be completed for all potential implementation phases. It is anticipated that this project will be completed as a design-bid-build process, and the scope of work assumes this format, however the scope of work could be streamlined to be more of a design-build process whereby tasks are consolidated. At a minimum, it is anticipated that three reviews at the 15%, 50%, and 90% design stages will be required. These reviews are in addition to the standard review/approvals required for environmental and general coordination aspects of the project.

It is recommended to the greatest extent possible, submissions to County and state agencies comply with their review process to minimize procedural confusion. Additional formal review meetings at kick-off and 15% design may provide clarity to the project, and help maintain an anticipated review schedule and procedure.

Task 1 – Kickoff and Project Management

A project kick-off meeting should be completed with the project team and the appropriate agency officials to review the scope and schedule for the project as well as clearly identify the project expectations. Coordination with the County, State and other agencies should be on-going.

Task 2 – Field Investigations/ Data Collection

Survey – A survey of the project area should be completed which meet County survey standards. Survey documentation should include limits of State Highway Administration (SHA), County Right-of-Way, National Park Service, M-NCPPC and private property limits, adjacent property owner information and any easements within the project area.

Subsurface Survey – Where necessary, a subsurface survey should be completed to determine the location of underground utilities within the project area and incorporated into the project survey.

Geotechnical Review – A subsurface geotechnical investigation should be completed to determine existing soil conditions for project design and construction. Test borings should be drilled in the area of trail alignment and bridge segments to perform laboratory tests on soil samples recovered from subsurface explorations as required to aid in soil classification and for determination of engineering properties required in foundation design, soil infiltration rates and site development studies. A summary of applicable design parameters for the structures horizontal and vertical movement tolerances and special features should be provided.

Task 3 – Environmental Documentation & Permitting

All phases of design and construction should comply with local, state and federal environmental, historic and cultural resource regulations. As a result, depending on the particular trail segment and funding source, additional environmental documentation and permitting may be required to comply with these requirements.

Natural Resources - A natural resources inventory and field reconnaissance of the project area should be completed. All natural resources including: limits of jurisdictional wetlands, streams, resource protection area's (RPA's), floodplains, forests, significant trees, steep slopes, geologic features, plant and animal habitat, threatened and endangered species, and other sensitive areas should be identified per local or federal standards (ie. delineation of wetlands and streams following the standards and procedures of the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual, Prince George's Site Development Checklist).

Cultural & Historic Resources – A cultural and historic resources reconnaissance should be completed In accordance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended through 1992 (NHPA).

In accordance with all local, state, and federal requirements, all natural, cultural, and historic resource permits should be acquired for each phase of design and construction. It may be necessary to complete the environmental permitting process during conceptual and/or preliminary design to

determine potential improvements, and avoidance and minimization measures. As noted previously, the degree of permitting necessary may be contingent upon property ownership and/or funding sources (ie. public vs. private funding) and funding requirements.

Task 4 – 15% Conceptual Design

Prior to initiating engineering design of the trail, it will first be necessary for the precise alignment to be identified and confirmed with all property owners and stakeholders. Therefore, a field review and reconnaissance should be conducted to gain a more thorough understanding of the project site. This review should examine potential specific locations of the trail within the recommended alignment, potential right-of-way and utility relocation needs, and possible challenges with sight distance, grades, and trail alignment. This field review should be conducted using topography mapping, and aerial photography provided by M-NCPPC/ County to record findings. A summary memorandum should be prepared with existing conditions observed in the field reconnaissance and the preparation of concept design drawings should be prepared. The concept drawings will be used as a basis for selecting design and alignment alternatives and recommend the optimum alignment.

A project review meeting should be completed with the project team to review the alternatives studied and facilitate an alternatives comparison and evaluation. Final decisions to be made/agreed upon at this meeting are as follows:

1. Trail alignment with respect to existing right-of-way, easements, trees, slopes, and utilities.
2. Trail design parameters, including:
    a. Trail cross-section
    b. Bridge cross-section
    c. Trail/Bridge materials
    d. Pavement and foundation design criteria to support maintenance vehicles.
    e. ADA criteria for trail design (desirable or required)
    f. Stormwater management requirements
3. Identification of the need for retaining walls or other design features.

It is advised that an initial public/stakeholder meeting be completed as necessary to identify project opportunities and constraints.

Meetings:

- 15% Design Review/ Coordination Meeting with Project Team
- 15% Design Public/ Stakeholder

Task 5 – 50% Preliminary Design

Following review of the 15% Conceptual Design Plans, an engineering design effort that will result in a 50% Preliminary Design package of the trail project should be completed. All geometrics will be checked for County, SHA, and AASHTO compliance. As determined during the prior design phase, complete compliance to all standards may not be able to be obtained due to the project site constraints and attempting to avoid adverse impacts to natural, historic and cultural resources. Therefore, design waivers or exceptions may be required. The plans within this drawing set will generally include the following:

Title Sheet, Index, Alignment Sheets and Right-of-Way Data Sheet - The Alignment sheets should show construction baseline data, survey control data and a proposed geometry layout. If needed, a Right-of-Way Data sheet should be developed to show property owner information and proposed right-of-way and easement takes.

General Notes, Details and Typical Detail Sheets – The General Notes Sheet should be developed and applicable typical detail sheets should be included in the plan set. Detail sheets depicting unique geometric or drainage situations may be developed as necessary.

Trail Plan and Profile Sheets – Plan sheets will be developed and will show the geometrics and geometric annotation at 1" = 50' scale. Incidental items such as curbing, sidewalks, and curb ramps, drainage items, structures, construction limits etc. are to be shown as appropriate. The profile sheets should show the vertical profile, vertical profile annotation and cross slope information.

Horizontal, Vertical & Edge Geometrics – Horizontal alignments should be established for the trail. A vertical alignment should also be established where needed to define proposed improvements. Edge geometrics are to be completed as necessary. All geometrics should be checked for County, SHA and AASHTO compliance.

Typical Sections - Typical sections should be developed showing trail, and bridge widths, surface design, side slopes, cross slopes, railing conditions, heights, and details at various locations along the corridor as appropriate.

Cross Sections – Cross sections every 50 feet should be developed with additional cross section locations to be added as necessary.

Bridge Design Plan Sheets – Plan sheets should be developed to show the geometrics and geometric annotation for the bridges within the project. A formal Type, Size & Location (TS&L) submission and review will most likely be required. Incidental items such as foundations, hydraulics, and decking materials are to be show in the plan sheets as appropriate.

Drainage Plan and Calculation Sheets – Existing and proposed drainage patterns should be evaluated to assess potential impacts and evaluate the stormwater management requirements. Major erosion sediment control measures and respective impacts should also be identified. Stormwater management facilities are to be sized and detailed if necessary. Where possible, innovative and viable Low Impact Development (LID) techniques should be considered. Drainage computations, stormwater management and other reports are to be prepared and submitted as necessary.

Signage and Marking Plans – Signage and marking plans should be included depicting all the signage and pavement markings required within the respective project limits. The plans will also include necessary details, notes and a quantity summary.

Landscaping & Forestry Plans – As necessary, landscaping and forest stand delineation/ conservation plans should be prepared depicting all the proposed landscaping within the project limits as well as necessary planting details, notes and a quantity summary.

Erosion and Sediment Control Plans – Erosion and sediment control plans are to be developed for each phase of construction as appropriate. Applicable erosion and sediment control insertable sheets and details are to be included as well.

Maintenance of Traffic - A Traffic Management Plan (TMP) should be developed with proper signage; markings, traffic controls, general notes, and details necessary to ensure a safe work zone and high level of mobility are maintained throughout project construction

Phasing Plan – A construction phasing plan should be developed to divide the project into segments for construction, while ensuring access, staging, and mobility are maintained throughout the project site.

Utility Coordination – Based on the 15% design and subsurface survey potential utility conflicts are to be identified and coordination with utility companies should be conducted as necessary.

50% Quantity and Cost Estimate & QA/QC Review - A preliminary quantities and cost estimate should be completed, followed by a quality control / quality assurance check for the 50% design submittal.

A project review meeting with the project team to review the design plans should be completed, as well as a second public meeting (if deemed necessary).

Meetings:

- 50% Design Coordination Meeting with Project Team
- 50% Design Review Meeting
- Second Public/Stakeholder Meeting

Task 6 – Final Design 90% and 100% Plans

Final Design (90%) – Construction plans are to be finalized including the title sheet, index of drawings, right-of-way data sheet, alignment data and layout sheets, typical sections, general notes, quantity summary sheets, detail sheets, plan and profile sheets, signing and marking plans, landscaping plans, bridge plans, and cross sections.

90% Quantity and Cost Estimate, QA/QC Review and Submittal – A 90% quantities and cost estimate should be completed, followed by a quality control/ quality assurance check for the 90% design submittal. Final design will also involve preparing permit information as needed, developing special provisions, and submitting design notes and tabulations. A nearly complete set of construction documents are to be submitted for final review.

A project review meeting with the project team to review the design plans should be completed prior to 100% design submission.

100% Final Quantity and Cost Estimate & QA/QC Review and Submittal – A final (100%) quality control / quality assurance check with an updated construction estimate and final special provisions should be completed. As necessary, utility relocation plans prepared by others should be coordinated, added to the plan index and inserted in the final construction plans.

Meetings:

- 90% Design Coordination Meeting with Project Team
- 90% Design Review Meeting
- 100% Design Coordination Meeting

Task 7 – Construction Phase Services

As needed, the project designer should assist to provide construction phase services through the construction process for formal plan revisions, design reviews and revisions to prevent change order claims, value engineering, constructability reviews, and shop drawing reviews.

Additional Tasks (As-needed)

As needed, several tasks may be required by local or state agencies or departments pending the final scope of work for the project. Some of the potential items may include:

- Additional meetings, presentations, and public involvement/input.
- Additional environmental reviews and investigations.
- Utility relocation design.
- Right-of-way, property, and easement acquisitions and platting.
- Wayfinding signage and design.