Memorandum

To: Reed Johnson, Superintendent, Appomattox Court House NHP

CC:

From: David Spiller, MS. Trans. Eng., US DOT/RITA/Volpe Center; Robert Hallett, BS. Comp. Science/GIS Specialist, US DOT/RITA/Volpe Center

Date: 10/12/2007

Re: Feasibility Assessment, Bicycle or Bicycle/Pedestrian (Multi-User) Facility at Appomattox Court House NHP

This memorandum provides a preliminary feasibility assessment for a bicycle or combined bicycle/pedestrian (i.e., multi-user) facility at Appomattox Court House National Historical Park (NHP). This assessment is based on discussions with park staff, the VDOT Resident Engineer, and the Region 2000 Commission trail plan coordinator. It also is based on a site field reconnaissance, the collection of new data (i.e., the collection of the geo-coordinates and the lateral offset from the pavement edge of existing trees within the right-of-way (ROW) limits of the Rt. 24 corridor that bisects the park), and the review of the following maps, drawings, and reports:

- Appomattox Court House National Historical Monument, Plans for Relocation of State Highway No. 24, Project 4306-03, Sheets 1-5, 1954.
- Commonwealth of Virginia, Plan and Profile of Proposed State Highway, Appomattox County, including section B-602 – Rt. 24 Bridge over Rt.460 -, 1991.
- Appomattox Court House NHP, GIS Map produced by Brian Eick/Natural Resource Specialist at Appomattox Court House NHP, illustrating stream flows, cemeteries, historic structures, monuments, battlegrounds, elevation contours, wayside signage, historic trace roads, roads, and wetlands, August 2007.
- Appomattox Court House NHP, GIS Map produced by Robert Hallett/GIS Specialist, illustrating roads, park boundaries, and existing and proposed trails, August 2007.
- Joseph C. Mitchell, Ph. D **Inventory of Amphibians and Reptiles of Appomattox Court House National Historical Park,** Technical Report NPS/NER/NRTR--2006/056, September 2006.
- FHWA EFLHD and Brudis & Associates, Appomattox Court House National Historical Park *Transportation Planning Study*, September 2003.
- Lardner/Klein Landscape Architects, *Route 24 Traffic Calming and Pedestrian Safety Concepts*, June 2004.
- FHWA EFLHD *Safety Study*, March 2001.
- K. Ahn and H. Rakha *Study of Traffic Use on Virginia State Route 24 at Appomattox Court House National Historic Park*, December 2003.
- VDOT Highway Design Manual, *Section A-5 Bicycle Facility Guidelines*, A-76, Rev. 9/01.
- D. Harkey, D. Reinfurt, M. Knuiman, J. Stewart and A. Sorton **Development of the Bicycle Compatibility Index: A Level of Service Concept**, Final Report, FHWA-RD-98-072, December 1998.
- The Virginia's Region 2000- Local Government Council, *The Appomattox Heritage and Recreational Trail Plan: A Vision of Connectivity*, 2006.
- The Virginia's Region 2000- Local Government Council, Region 2000 *Greenways, Blueways, and Trail Plan*, 2003.
- H. W. Lochner, Inc., *Virginia State Route 24 Truck Traffic Study*, September 2004.
- VDOT, *Bike and Pedestrian Implementation Guide for Locality Involvement*, November 2006.
- VDOT, Letter to Local Government Officials, January 2007.

- VDOT, *Policy for Integrating Bicycle and Pedestrian Accommodations*, March 2004.
- VDOT, *Bicycle and Pedestrian Accommodation Decision Process for Construction Projects*, November 2006.

Termini of the Bicycle or Multi-User Facility

To be most useful and functional, the bicycle or multi-user facility needs to tie into the central part of the Town of Appomattox, preferably at a location where other trails converge and where there is adequate vehicular parking or the ability to share parking with other land uses (i.e., allowing modal transfer from vehicular access to the trail to bicycle use). The Carver – Price School may be a good starting terminus because of its central location, and the potential to share parking facilities at times when peak trail use (i.e., summers and weekends) is NOT coincident with peak parking demand for the offices that now reside within the school structure.

Discussion with local planners[1] indicates that VDOT is amenable to redesign of the RT. 24 Bridge over the Rt. 460 Bypass to accommodate both bicycles and pedestrians (e.g., narrowing of the travel lanes, widening of the shoulders, signage for shared use of the road, and narrowing the concrete median to permit sidewalks on the edge of the bridge). Discussion with both the local planners and the park staff indicate that preservation of the parcels that encompass the Battlefield of Appomattox Station (e.g., acquisition by the Civil War Trust) may be a strong possibility. This is highly desirable not only for historic preservation, but also to allow an off-road bicycle/pedestrian facility to connect to the Carver-Price School and to the downtown area. This possibility is illustrated conceptually on the Appomattox Greenway Master Plan. This would avoid routing the bicycle/pedestrian facility off the Rt. 24 Bridge along Rt. 24 and Confederate Boulevard, both of which could be problematic and discouraging to its use.

At Appomattox Court House NHP, the terminus needs to go at least as far as the turn-off to the Visitor's Center and the Village of Appomattox, but preferably the whole length of the park to the pull-off parking facilities for Lee's Headquarters, just beyond the junction with Rt. 656. Not only would this extension of the facility provide access to both Grant's headquarters and Lee's Headquarters (providing a more holistic interpretive experience of the meaning and significance of Appomattox), but it could potentially – depending on the actual alignment (see below) – tie in with the extensive pedestrian trail system on the southern edge of Rt.24 in the southern section of the park.

General Alignment of the Bicycle or Multi-User Facility

Appomattox Court House NHP is rich with natural, historic and cultural structures, markers, and artifacts. There are multiple historic trace roads, continuous and intermittent stream flows, historic structures, wetlands, sacred cemeteries, battlegrounds, and pedestrian trails that are widely spread across the landscape[2]. The figure below (Figure 1) illustrates capture locations for amphibians and reptiles at Appomattox Court House NHP, and is indicative of the sensitive habitat and nature of the landscape.

There are several reasons that argue against threading a bicycle or multi-user facility through park lands:

- It would be nearly impossible to route the alignment to avoid impact on these resources while still providing convenient access

[1] Kelly Hitchcock, Regional Development Specialist, Virginia's Region 2000 Local Government Council, and John Roark, Appomattox County Planner.

[2] See, e.g., reference to the map produced by Brian Eick, Natural Resource Specialist at Appomattox, August/September 2007.

- VDOT design standards for a shared path prefer a hard, all-weather pavement surface over those of crushed aggregate, sand, clay or stabilized earth since these materials provide a much lower level of service and require higher maintenance; yet a paved surface would violate the landscape and existing terrain – which still maintains its Civil War-era historical integrity - consisting of rolling open fields and forested lands
- Any alignment through park lands would require multiple stream crossings, both an expensive proposition and having adverse hydrological impacts

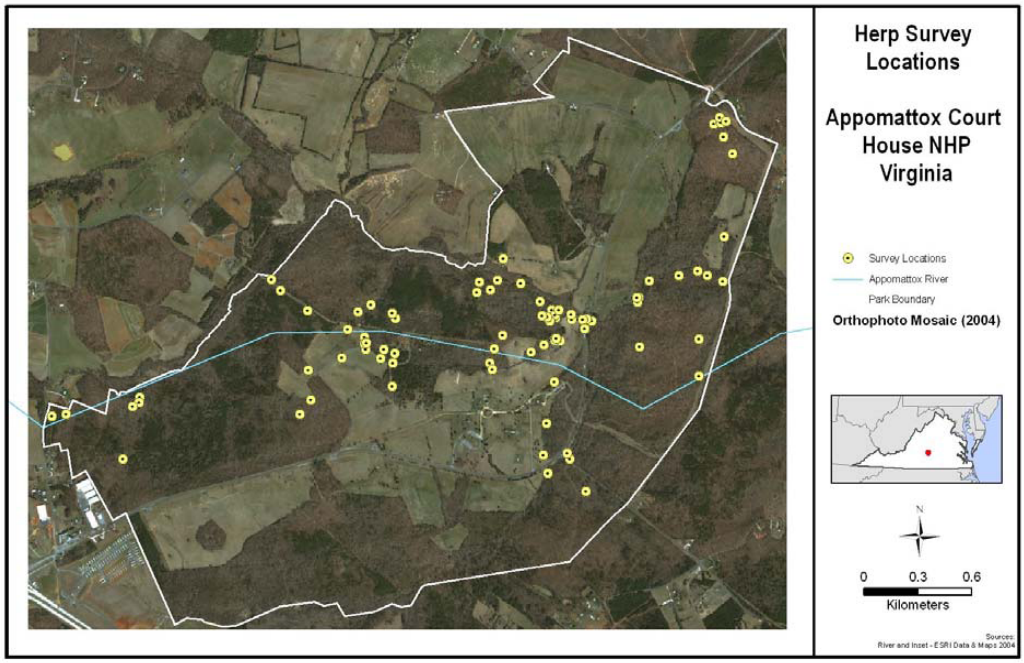

Figure 1. Map showing observation and capture locations for amphibians and reptiles in Appomattox Court House National Historical Park.
Source: Joseph C. Mitchell, Ph. D **Inventory of Amphibians and Reptiles of Appomattox Court House National Historical Park,** Technical Report NPS/NER/NRTR--2006/056, September 2006.

Our conclusion, therefore, is that the alignment for a bicycle or a multi-user facility must lie within the VDOT right-of-way limits of the Rt. 24 corridor that bisects the park. This is already "disturbed" land, and locating the facility within these limits would have the least adverse impact on park resources while providing convenient, alternative modal access to these resources. Review of the original engineering drawings of the Rt. 24 relocation (in 1954) – now the current alignment for Rt. 24 – establish that the VDOT right-of-way limits extend 55 feet from the centerline (i.e., 110 feet total ROW width). These ROW limits are uniform throughout the segment of Rt. 24 that traverses the park, i.e., between the western and eastern boundaries. Should a two-way shared use path be built within the VDOT ROW limits south of the existing roadway pavement edge (see Option 3 below), there could be at least three connection points where the shared –use path could 'tie-in' with the extensive pedestrian trail system in the southern segment of the park: (1) at the parking and pullout location just west of the park maintenance road; (2) just south of the junction of Rt. 671 with Rt. 24; and (3) at the pullout and parking facilities at the proposed terminus at Lee's Headquarters.

Design and Operational Characteristics of Rt. 24 within the Park

Route 24 is a 2-lane rural state highway owned and maintained by the Virginia Department of Transportation (VDOT). VDOT classifies the segment within the boundaries of the park as a Class One Arterial[3]. Functionally, and based on its design speed, it operates as a rural minor arterial that carries traffic from US Route 460 to and from US Route 60. Average Daily Traffic (ADT) volume approximates 4000 vehicles[4], operating speed limit is 55 mph but measured 85 percentile speeds approach 62 mph[5], the majority of traffic is through traffic[6], the percentage of truck/bus/RV traffic (i.e., other than cars) is approximately 22 percent[7], and speed variance between through traffic and visitor traffic – many unfamiliar with the route - (i.e., exiting and entering Rt. 24 at intersections and wayside pullouts) poses a safety hazard[8]. Interpretative sites lie on both sides of the Rt. 24 corridor, and the History Trail crosses the roadway but there are no signs, signals or markings for pedestrian crossings[9].

Lane width and shoulder width are substandard relative to both AASHTO and VDOT design standards for its classification. Rt. 24 has nominal 11 foot lanes[10] (although the FHWA EFLHD and Brudis & Associates study lists a variable width of 9 ½-10 1/2 foot lane width) and 2 foot paved shoulders (many areas having no shoulders) (the FHWA EFLHD and Brudis & Associates study indicates a grass shoulder of variable width 1 ½- 3 feet). AASHTO's *Policy of Geometric Design of Highways and Streets* and VDOT design standards prescribe a 12-foot travel lane and 8-foot graded shoulder on each side of the roadway for a rural minor arterial carrying the volume of traffic that Rt. 24 carries. Inadequate surface width (for the design and operating speed currently experienced on Rt. 24) causes vehicles to drive close to the edge of the travel way and onto the grass shoulders. Field observations indicate that larger type vehicles, particularly trucks, often drop their right wheels over the edge of the pavement, especially on horizontal curves[11].

Horizontal and vertical alignment for sight and stopping distance requirements at the posted speed limit is also deficient. FHWA's safety study concluded that the measured sight distances more closely match a 35-mph sight distance well over 50 percent of the length of the segment of Rt. 24 within the boundaries of the park. Restricted areas at intersections with Rt. 24 include[12]:

- Grant's headquarters parking area
- Park office side road
- Park maintenance roadway
- Virginia Rt. 710
- Virginia Rt. 656

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[3] See FHWA EFLHD and Brudis & Associates, Appomattox Court House National Historical Park *Transportation Planning Study*, September 2003.

[4] See Lardner/Klein Landscape Architects, *Route 24 Traffic Calming and Pedestrian Safety Concepts*, June 2004.

[5] See, e.g., FHWA EFLHD *Safety Study*, March 2001; FHWA EFLHD and Brudis & Associates, *Transportation Planning Study*, September 2003; and Lardner/Klein, *Route 24 Traffic Calming and Pedestrian Safety Concepts*, June 2004.

[6] See K. Ahn and H. Rakha *Study of Traffic Use on Virginia State Route 24 at Appomattox Court House National Historic Park*, December 2003.

[7] See FHWA EFLHD *Safety Study*, March 2001.

[8] See e.g., FHWA EFLHD *Safety Study*, March 2001; FHWA EFLHD and Brudis & Associates, *Transportation Planning Study*, September 2003; and Lardner/Klein, *Route 24 Traffic Calming and Pedestrian Safety Concepts*, June 2004.

[9] See e.g., FHWA EFLHD and Brudis & Associates, *Transportation Planning Study*, September 2003; and Lardner/Klein, *Route 24 Traffic Calming and Pedestrian Safety Concepts*, June 2004.

[10] See FHWA EFLHD *Safety Study*, March 2001.

[11] See FHWA EFLHD and Brudis & Associates, Appomattox Court House National Historical Park *Transportation Planning Study*, September 2003.

[12] See FHWA EFLHD *Safety Study*, March 2001.

Options for Inclusion of a Bicycle or Multi-User Facility within the Rt. 24 Corridor

VDOT recognizes three (3) types of bicycle users, consistent with FHWA and AASHTO practice. Group A are advanced bicyclists with experience who can operate under most traffic conditions. Group B are basic bicyclists who are casual or new adult and teenage riders with less confidence of their ability to operate in traffic without special provisions for bicycles. Group C, children, are pre-teen riders whose roadway use is initially monitored by parents.

VDOT has adopted FHWA's approach to selecting roadway design treatments to accommodate bicycles for on-road bicycle facilities. For a shared path on an independent alignment relative to the road's alignment (i.e., a multi-user facility), VDOT has developed modifications to the AASHTO design standards. Lardner/Klein in the *Route 24 Traffic Calming and Pedestrian Safety Concept Plan* have established that all adjustments to the roadway will need to take place on the south side of the roadway to avoid a waterline and potential archaeological and historic sites on the north side of Route 24[13]. Whether the traffic calming concept plan is implemented or not, we fully concur with this conclusion that changes to the road's cross section to accommodate bicycles, or developing a shared-use path on a separate alignment must occur within the VDOT ROW limits on the south side of the roadway's pavement edge – a buffer zone equal to 42 feet given the road's existing cross section consisting of an 11 foot travel lane and 2 foot shoulder. Even though VDOT also owns and controls a buffer zone of equivalent width to the north of the pavement edge, the thrust of our discussion in **General Alignment for a Bicycle or Multi-User Facility** indicates that the impacts on park resources are too severe.

Option 1 On-Road Facility, Traffic Calming plan NOT implemented

VDOT would require the following on-road facility for Rt. 24 within the park's boundary based on design and operational factors pertinent to Rt. 24[14]. This option assumes that the traffic calming concept plan is NOT implemented.

Group A Bicyclists, Rural Section
AADT volume – 2,000-10,000
Average operating speed – over 50 mph
Inadequate sight distance
High percentage and flow of trucks/buses/rvs
On-road bicycle facility: 6 foot paved shoulder on each side of roadway

Group B Bicyclists, Rural Section
AADT volume – 2,000-10,000
Average operating speed – over 50 mph
Inadequate sight distance
High percentage and flow of trucks/buses/rvs
On-road bicycle facility: 8 foot paved shoulder on each side of roadway

Conditions are not conducive to an on-road facility for Group C bicyclists.

Since all construction would take place south of the existing roadway edge, given the existing 1 ½ -2 feet of shoulder width, the pavement would have to be widened by 8-9 feet, with re-striping the centerline and edge lines to provide 11 foot travel lanes and 6 foot paved shoulders. Based on the data collected on site – i.e., the geo-coordinates of existing trees within the VDOT ROW limits south of the existing pavement edge (the 42 foot buffer), and the lateral offset in feet from the existing

[13] See Lardner/Klein, *Route 24 Traffic Calming and Pedestrian Safety Concepts*, June 2004.
[14] See VDOT Highway Design Manual, *Section A-5 Bicycle Facility Guidelines*, A-76, Rev. 9/01.

pavement edge – Table 5 documents which trees would have to be removed to accommodate this option. An auxiliary advantage of this option is that the paved shoulders would provide safer operation for vehicle use of the roadway, including emergency stops. A disadvantage is that the on-road facility is primarily a bicycle user facility (i.e., not pedestrian friendly). Also, an adverse impact on the park is that this option radically changes the character, "look and feel" of the road as it bisects the park.

Option 2 On-Road Facility, Traffic Calming plan IS implemented

The Traffic Calming concept plan envisions a series of gateway and splitter island treatments at strategic locations to create sufficient horizontal deflections to slow the pace of traffic substantially over the existing operating speeds. As part of the plan, there is no continuous median on the roadway the length of the park, so integration of a bicycle facility or multi-user facility (i.e., shared use path) within the splitter islands which are at discrete locations only is not feasible.

However, the design and operational characteristics of Rt. 24 within the park will change as a direct result of the traffic calming plan, and it is possible to determine the type and size of on-road bicycle facility with the traffic calming plan in place and if the plan achieves its objectives. The tool to make this determination is the *Bicycle Compatibility Index (BCI)* model.

Bicycle Compatibility Index (BCI) model

The *Bicycle Compatibility Index (BCI)* model[15] allows bicycle coordinators, transportation planners, traffic engineers and others to evaluate the capability of specific roadways to accommodate both motorists and bicyclists. The model – whose output yields a BCI index that then is translated to a level-of-service for bicyclists – incorporates geometric and operational variables considered by adult bicyclists to be important in terms of their comfort level when riding on streets in the presence of motor vehicle traffic. It does NOT apply to children bicyclists. Table 1 below summarizes the model and the variables. Table 2 below summarizes the level-of-service equivalent to the computed range for the BCI index, and compatibility level qualifiers.

[15] The model was developed by the University of North Carolina Highway Safety Research Center, and was validated in a pilot study. See D. Harkey, D. Reinfurt, M. Knuiman, J. Stewart and A. Sorton **Development of the Bicycle Compatibility Index: A Level of Service Concept**, Final Report, FHWA-RD-98-072, December 1998.

Table 1. *Bicycle Compatibility Index (BCI) Model and Variables*

BCI = 3.67 - 0.966**BL** - 0.410**BLW** - 0.498**CLW** + 0.002**CLV** + 0.0004**OLV** + 0.022**SPD** + 0.506**PKG** - 0.264**AREA** + **AF**

where:

BL = presence of a bicycle lane or paved shoulder ≥ 0.9 m
no = 0
yes = 1

BLW = bicycle lane (or paved shoulder) width
m (to the nearest tenth)

CLW = curb lane width
m (to the nearest tenth)

CLV = curb lane volume
vph in one direction

OLV = other lane(s) volume - same direction
vph

SPD = 85th percentile speed of traffic
km/h

PKG = presence of a parking lane with more than 30 percent occupancy
no = 0
yes = 1

AREA = type of roadside development
residential = 1
other type = 0

AF = $f_t + f_p + f_{rt}$

where:

f_t = adjustment factor for truck volumes *(see below)*

f_p = adjustment factor for parking turnover *(see below)*

f_{rt} = adjustment factor for right-turn volumes *(see below)*

Adjustment Factors			
Hourly Curb Lane Large Truck Volume[1]	f_t	Parking Time Limit (min)	f_p
≥ 120	0.5	≤ 15	0.6
60 - 119	0.4	16 - 30	0.5
30 - 59	0.3	31 - 60	0.4
20 - 29	0.2	61 - 120	0.3
10 - 19	0.1	121 - 240	0.2
< 10	0.0	241 - 480	0.1
		> 480	0.0
Hourly Right-Turn Volume[2]	**f_{rt}**		
≥ 270	0.1		
< 270	0.0		

[1] Large trucks are defined as all vehicles with six or more tires.
[2] Includes total number of right turns into driveways or minor intersections along a roadway segment.

Table 2. Bicycle Compatibility Index (BCI) ranges associated with level of service (LOS) designations and compatibility level qualifiers.

LOS	BCI Range	Compatibility Level[1]
A	≤ 1.50	Extremely High
B	1.51 - 2.30	Very High
C	2.31 - 3.40	Moderately High
D	3.41 - 4.40	Moderately Low
E	4.41 - 5.30	Very Low
F	> 5.30	Extremely Low

[1] Qualifiers for compatibility level pertain to the average adult bicyclist.

The model was applied to baseline conditions on Rt. 24 within the park, and to **Option 1 On-Road Facility, Traffic Calming plan NOT implemented** and to **Option 2 On-Road Facility, Traffic Calming plan IS implemented**. The data input for these three scenarios is presented in Table 3, and the model results are presented in Table 4.

Table 3. *Bicycle Compatibility Index (BCI) Model* Input Data

Scenario	**Geometric and Roadside Data**					**Traffic Operations Data**					**Parking Data**		
	Number of lanes (one direction)	**Curb lane width**	**Bicycle lane width**	**Paved shoulder width**	**Residential development (y/n)**	**Speed limit**	**85% tile speed**	**AADT**	**Large truck percentage**	**Right turn percentage**	**Parking lane (y/n)**	**Occupancy (%)**	**Time limit (minutes)**
Baseline Conditions	1	11	n/a	2	n	55	62	3910	22	0	n	n/a	n/a
Option 1 On-Road Facility, Traffic Calming plan NOT implemented	1	11	n/a	6	n	55	62	3910	22	0	n	n/a	n/a
Option 2 On-Road Facility, Traffic Calming plan IS implemented	1	10	n/a	3	n	35	45	3910	22	0	n	n/a	n/a

Table 4. *Bicycle Compatibility Index (BCI) Model* Results – Three Scenarios

Scenario	BCI	Level-of-service	Bicycle compatibility level
Baseline Conditions	3.88	D	Moderately low
Option 1 On-Road Facility, Traffic Calming plan NOT implemented	3.38	C	Moderately high
Option 2 On-Road Facility, Traffic Calming plan IS implemented	3.31	C	Moderately high

Table 5. (Note: There are no trees within 9 feet of the pavement edge.)

Extending the paved shoulder width to 8 feet to accommodate Group B bicycle riders does not change the level-of-service or bicycle compatibility level for Option 1. Likewise, for Option 2, the **minimum paved shoulder width** to achieve an equivalent level of service to Option 1 is 3 feet; conversely, though, extending the pavement width to 6 feet under Option 2 does not change the level-of-service or the bicycle compatibility level, although it does lower the BCI index value.

Option 3 Shared-Use Path, Independent alignment, within VDOT ROW limits south-side of roadway

On-site at Appomattox Court House NHP, new data were collected for the geo-coordinates of existing trees (as well as culvert openings, and signs) and their lateral offset from the pavement edge on the south-side VDOT ROW buffer (42 feet in width). The data were then mapped using GIS software. Using an iterative, intuitive or heuristic design process, a line proportional in scale to a 10-foot cross section for a shared-use two-directional path was overlaid on the map such that the centerline alignment was threaded between the trees within the VDOT ROW buffer to achieve the following:

- Place as many existing trees as possible between the roadway and the shared-use path
- Maximize canopy cover for the path
- Use the existing trees to frame views to the northern and southern segments of the park for the bicycle/pedestrian user
- Adjust the alignment to cross the existing contour elevations of the terrain to provide acceptable grades (but not explicitly cross checking that AASHTO/VDOT design standards for vertical and horizontal profile and length of grade are fully met)

The results are illustrated in Figure 2 (a)- (j) and conclusively demonstrate proof-of-concept for **Option 3 Shared-Use Path, Independent alignment, within VDOT ROW limits south-side of roadway** that goes beyond a conceptual design but falls just short of a preliminary engineering phase.

In contrast to Options 1 and 2, Option 3 expands usage of the facility to pedestrians, and provides a higher level-of service and 'visitor experience' for bicyclists and pedestrians, and a greater degree of safety. Unlike Option 1, Option 3 provides no concurrent safety benefit to motorists on the roadway. Option 3 is viable and feasible **with or without** implementation of the traffic calming concept plan.

However, its maximum benefit is achieved with implementation of the traffic calming plan. Implementation of the traffic calming plan would allow a "park once and explore" strategy. Visitors could drive to the Visitor's Center and park there. They could then safely cross the road (with the traffic calming plan in place to slow the traffic and provide signed and marked pedestrian crossings) to access the shared-use path and explore (via bicycle brought to the park or walking) that segment of the park in both directions.

Assuming that the traffic calming plan is implemented, the preferred alternative to accommodate both bicyclists and pedestrians at Appomattox Court House National Historical Park is to implement **Option 2 On-Road Facility, Traffic Calming plan IS implemented** to accommodate Group A bicyclists, and **Option 3 Shared-Use Path, Independent alignment, within VDOT ROW limits south-side of roadway** to accommodate Group B/C bicyclists and pedestrians. Options 2 and 3 are NOT mutually exclusive, so both could be built.

Figure 2A. Option 3: Shared-Use Path, Independent alignment, within VDOT ROW limits south-side of roadway

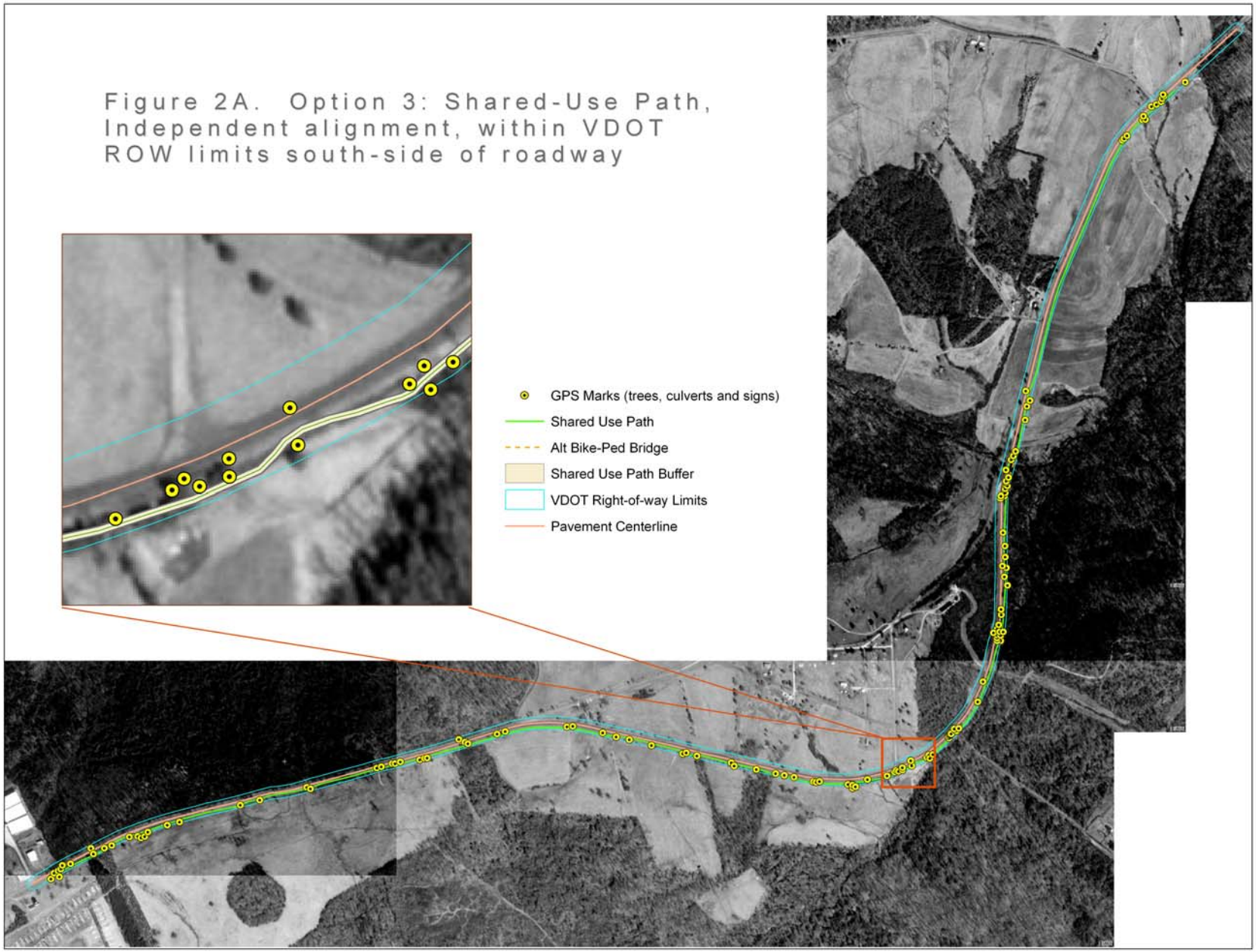



Figure 2B-2C Matchline
Figure 2B
GPS Marks (trees, culverts and signs)
Shared Use Path
Alt Bike-Ped Bridge
Shared Use Path Buffer
VDOT Right-of-way Limits
Pavement Centerline

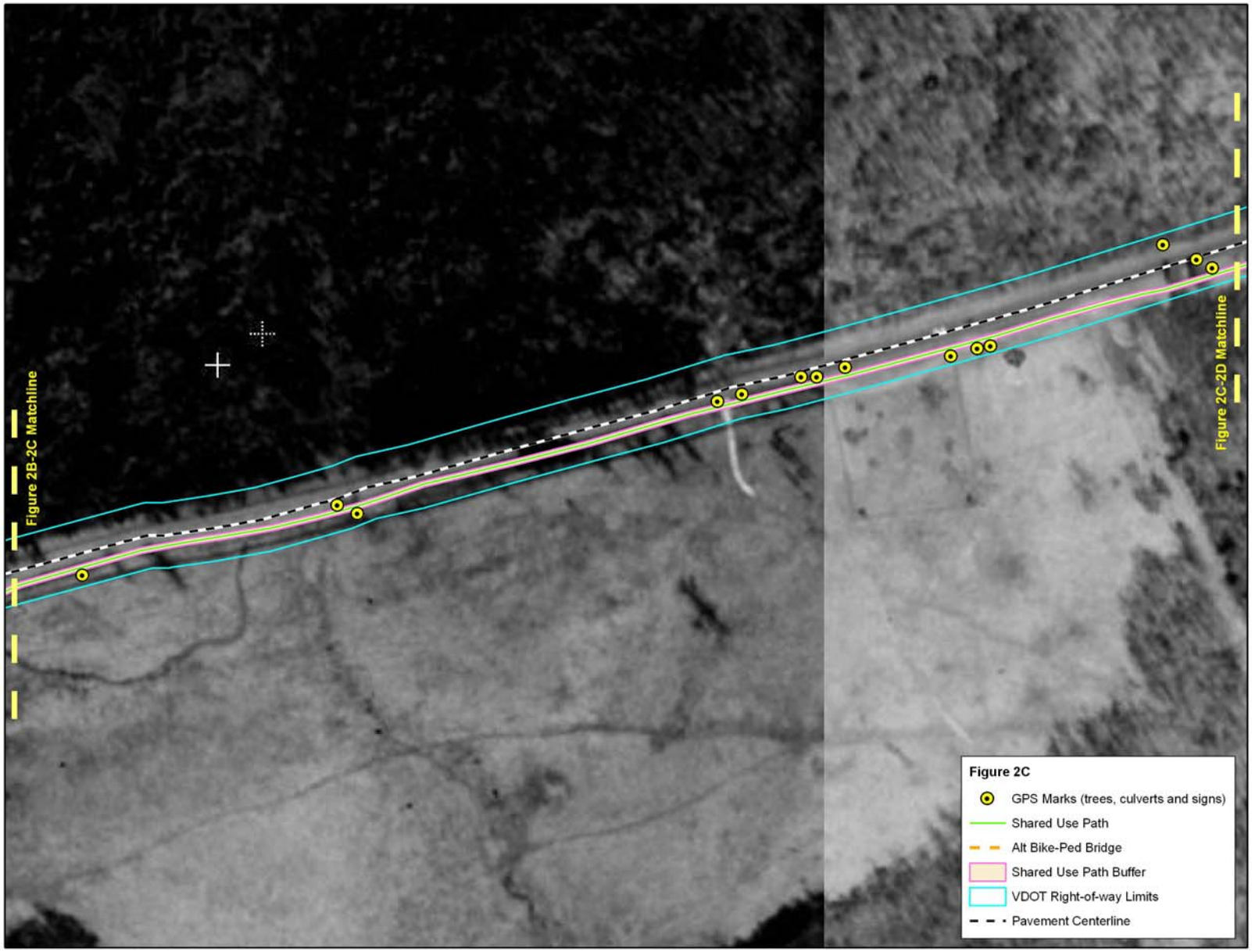
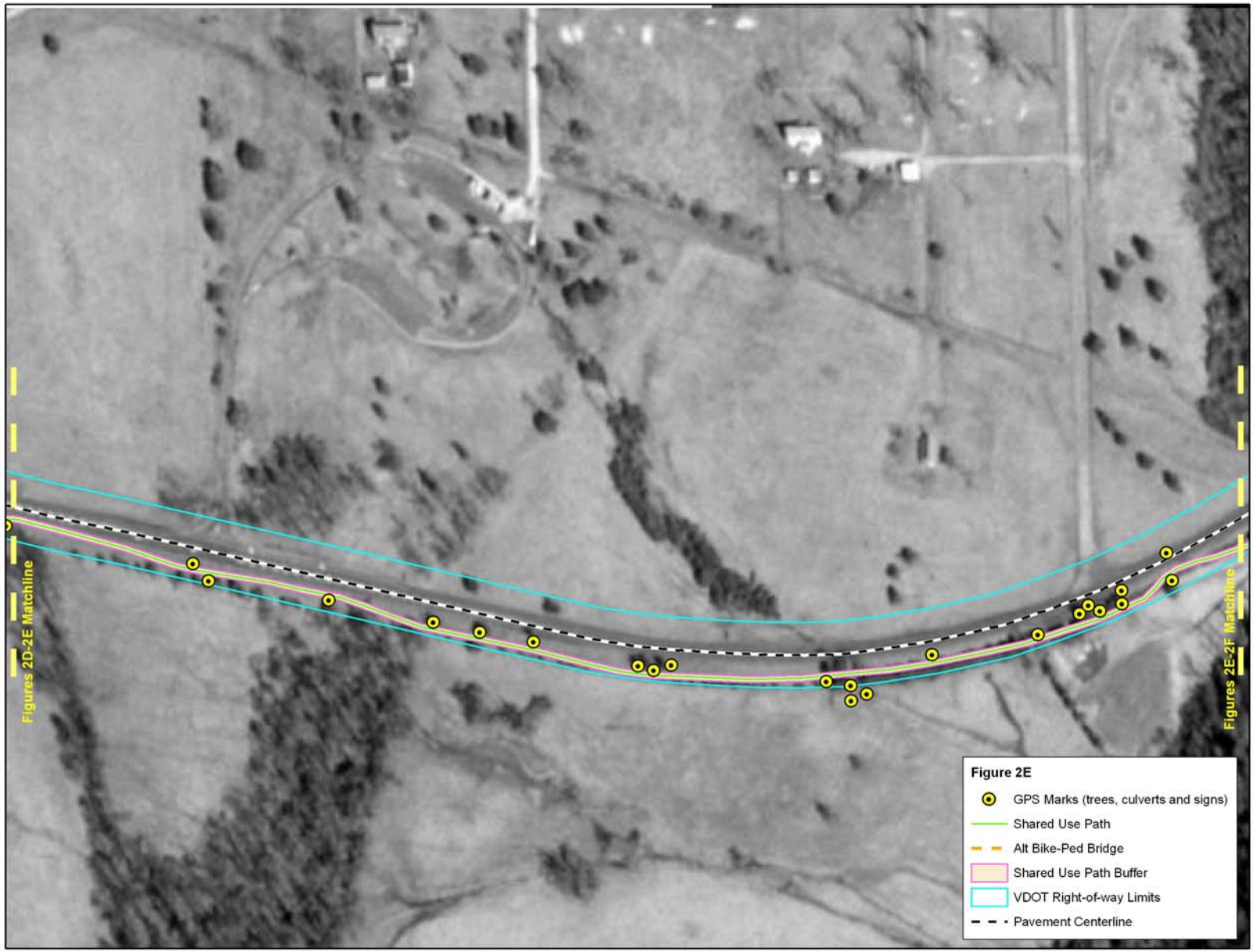


Figure 2B-2C Matchline
Figure 2C-2D Matchline
Figure 2C
GPS Marks (trees, culverts and signs)
Shared Use Path
Alt Bike-Ped Bridge
Shared Use Path Buffer
VDOT Right-of-way Limits
Pavement Centerline


Figure 2C-2D Matchline
Figures 2D-2E Matchline
Figure 2D
GPS Marks (trees, culverts and signs)
Shared Use Path
Alt Bike-Ped Bridge
Shared Use Path Buffer
VDOT Right-of-way Limits
Pavement Centerline


Figures 2D-2E Matchline
Figures 2E-2F Matchline
Figure 2E
GPS Marks (trees, culverts and signs)
Shared Use Path
Alt Bike-Ped Bridge
Shared Use Path Buffer
VDOT Right-of-way Limits
Pavement Centerline


Figures 2F-2G Matchline
Figures 2E-2F Matchline
Figure 2F
GPS Marks (trees, culverts and signs)
Shared Use Path
Alt Bike-Ped Bridge
Shared Use Path Buffer
VDOT Right-of-way Limits
Pavement Centerline


Figures 2G-2H Matchline
Figures 2F-2G Matchline
Figure 2G
GPS Marks (trees, culverts and signs)
Shared Use Path
Alt Bike-Ped Bridge
Shared Use Path Buffer
VDOT Right-of-way Limits
Pavement Centerline


Figures 2G-2H Matchline
Figures 2G-2H Matchline
Figure 2H
GPS Marks (trees, culverts and signs)
Shared Use Path
Alt Bike-Ped Bridge
Shared Use Path Buffer
VDOT Right-of-way Limits
Pavement Centerline


Figures 2H-2I Matchline
Figure 2I
GPS Marks (trees, culverts and signs)
Shared Use Path
Alt Bike-Ped Bridge
Shared Use Path Buffer
VDOT Right-of-way Limits
Pavement Centerline