# FALL LINE TRAIL
# BRYAN PARK SEGMENT

## Alternate Routing Analysis


**Prepared For:**
City of Richmond Department of Public Works
Office of Equitable Transit and Mobility
Dironna Moore Clarke

**Prepared By:**
Timmons Group
Nick Soucie, PE


March 26, 2025

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

1001 Boulders Parkway
Suite 300
Richmond, VA 23225

P 804.200.6500
F 804.560.1016
www.timmons.com

# FALL LINE TRAIL - BRYAN PARK SEGMENT

**TO:** Dironna Moore Clarke

**FROM:** Nick Soucie, PE

**DATE:** March 26, 2025

**RE:** Fall Line Trail Bryan Park Segment – Alternate Routing Analysis

## Introduction

The Fall Line Trail (FLT) is a 43-mile regional shared-use path that was conceptualized in 2019. The Fall Line Trail will connect Petersburg to Ashland, through the heart of Richmond. The multi-jurisdictional trail system provides opportunities for active transportation, recreation, and economic development across the region. As a regional facility designated as a shared-use path, the FLT requires certain design criteria to be met for accessibility and mobility purposes.

With Henrico County's recent completion of the Fall Line Trail Spring Park segment, the City is presented with the starting point of its 13-mile portion of this regional facility. This northern terminus is situated at the intersection of Hermitage Road and Bryan Park Avenue, positioning Bryan Park as a gateway to the City for trail users.

Bryan Park offers a variety of facilities and activities including picnic shelters, a playground, soccer fields, tennis and pickleball courts, disc golf, annual bike racing events, the RVA Big Market and more. That said, there are very few dedicated facilities for cyclists or pedestrians within the park with accessible access being even further limited. Access to the park and between amenities once within the park is only feasible on foot or bike via vehicular access roads, over open grass/wooded areas, or otherwise by car to parking lots throughout the park. An accessible route does not exist from the northern side of the park at Bryan Park Avenue, to the southern side of the park at Bellevue Avenue.

As the City continues enhanced engagement with the community and project stakeholders, this analysis is provided to consider the feasibility of alternate routing through the park to achieve the project purpose and need.

## Purpose & Need

The purpose of the overall 43-mile Fall Line Trail project is to connect people and places within the counties of Chesterfield, Hanover and Henrico, cities of Colonial Heights, Petersburg and Richmond, and the Town of Ashland. In keeping with this regional goal, the City has established the following project objectives for the Bryan Park Segment:

A. **Connect Bryan Park to the Regional Fall Line Trail Network**
B. **Provide Accessible Connections to Park Amenities & Facilities**

## Alternatives Development

Through the City's early planning efforts with regional stakeholders and the Virginia Department of Transportation (VDOT), the 13-miles of FLT within the City of Richmond were split into multiple segments (14), with each segment currently advancing on a unique timeline. Current information for each of these segments within the City is available at the City's website:

https://www.rva.gov/public-works/fall-line-trail.

The City has been working since 2023 to develop engineering design plans for the FLT Bryan Park Segment (6B). Since beginning this task, a variety of alignment alternatives have been considered, discussed, or otherwise evaluated for Bryan Park. As part of the community engagement process, the City received feedback for further consideration of a potential alternate alignment which could utilize and repurpose the existing paved access roads within Bryan Park.

In receiving the aforementioned feedback, it was noted that goals for the alignments utilizing existing paved access roads are to reduce new impervious paths, reduce impact to trees, and separate the FLT from activity centers, such as the soccer fields and playground.

Based on this feedback, Timmons Group completed further evaluation of alternate alignments, to include options which would more fully utilize existing service roads.

Three alternative alignments were developed and are listed below:

- Option 1: Central Connection (Green)
- Option 2: Jordans Branch Loop (Red)
- Option 3: Azalea Garden Loop (Yellow)

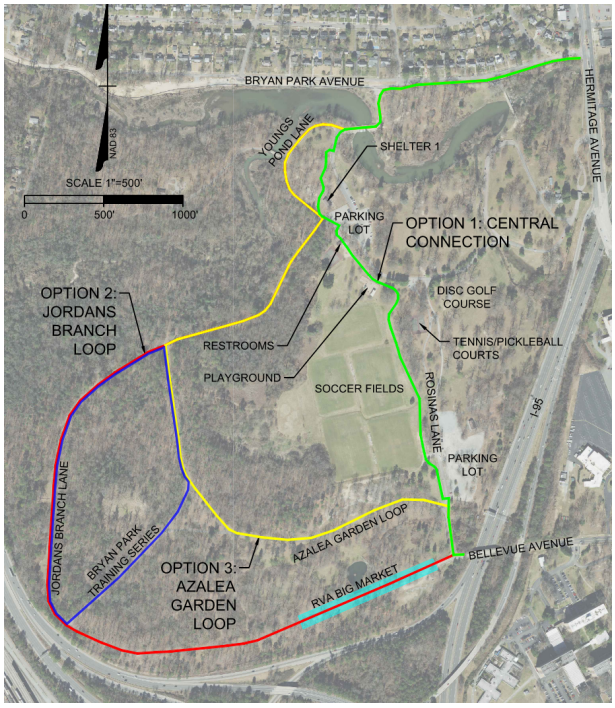



*Figure 1: Alternate Alignment Map*

## Alternatives Analysis

Based on review of the existing park roadway network and for the purposes of this analysis, three alignment options will be considered. A brief description and relative length for the three alternative alignment options are provided below:

- Option 1 Central Connection: Construction of a new central connection route generally separate from existing service roads, length = 0.94 mile
- Option 2 Jordans Branch Loop: Utilizes existing service roads along Jordans Branch Loop around the southwest perimeter of the park, length = 1.66 miles; this option would also include an accessible walking path along the Option 1 alignment to connect the noted amenities
- Option 3 Azalea Garden Loop: Utilizes existing service roads along Azalea Garden Loop, effectively the "middle" route situated between options 1 and 2 in the southern portion of the

park, length = 1.35 miles; this option would also include an accessible walking path along the Option 1 alignment to connect the noted amenities

The Fall Line Trail is proposed as a shared-use path, a designation which requires certain design criteria be provided/met. For the purposes of this evaluation, the following summarizes and briefly introduces key design considerations which are fundamental factors, as established by City, State, and Federal design guides.

*Design and construction criterion* used for this assessment is described below:

Criteria 1: Dedicated, separated facilities. Consideration of whether the path will exist independent of vehicular traffic, particularly public traffic. It is required that the proposed path be provided as a separate facility, however accommodation can be made for adjacent vehicular use as described further in the pavement width item.

Criteria 2: Pavement cross slope. Cross slopes that are steeper than ± 2.0% are non-compliant with ADA and PROWAG requirements and in practice tend to be the most sensitive to achieve. It was assumed that cross slopes that exceed ± 2.0% but were less than ± 5.0% could be corrected with minor pavement resurfacing or build-up. Cross slopes exceeding ± 5.0% were assumed to require a more significant and invasive road reconstruction to correct.

Criteria 3: Pavement longitudinal slope. It is permissible for paths and sidewalks along roads to match the longitudinal slope of the adjacent roadway (i.e. along Bryan Park Avenue). Since the FLT through Bryan Park is primarily proposed along an independent alignment and in keeping with the goal of accessibility for all users, consideration for steep longitudinal slopes was made in accordance with VDOT's Road Design Manual for off-road shared-use path design. It was therefore considered that longitudinal slopes less than ± 5.0%, the maximum grade without landings or waivers, were compliant. It was assumed that longitudinal slopes that exceed ± 5.0% but were within ± 8.0% could be corrected with minor pavement resurfacing or buildup. Longitudinal slopes steeper than ± 8.0% would require significant pavement reconstruction to provide more gradual grades and are therefore unfavorable.

Criteria 4: Pavement width. Where the path is fully independent of vehicular traffic, a 10' path with 2' minimum graded shoulder areas is required. For portions of the alternate alignment(s) which propose repurposing or "sharing" the existing service roads, a minimum pavement width of 23' is desired. 23' allows for the 10' path, a 3' buffer space, and a 10' vehicular drive aisle. It is expected that the 10' drive aisle would be adequate to support one-way use, limited to service vehicles and/or other special event traffic. The extent to which the existing service road(s) will require pavement widening to achieve the 23' minimum determines the degree to which that area is favorable for FLT construction. An all weather, uniform, stable surface free of obstructions and deficiencies (i.e. free of tripping hazards) is required.

Criteria 5: Disruption and/or Impact to Activities and Events. Bryan Park hosts a variety of activities and events year-round. These include the RVA Big Market, Bryan Park Training Series bike races, sports and other community events. The FLT should be completed in a manner which promotes and coexists with these events, rather than disrupting or otherwise negatively impacting them. Real impact to an activity or event, such as a physical disruption or taking of the space currently used for such events, would be considered detrimental to the purpose and need of the project.

*Figure 2: Typical Condition - Existing Service Road*

Criteria 6: Risk of Tree Impact and/or Removal. Preservation of healthy, native vegetation within Bryan Park is of paramount importance to park in general, and having shaded areas along the FLT is also an important consideration. Establishing a path / route which can achieve both aspects requires balance and planning. Along the central connection are of the park a detailed tree inventory and assessment has been completed, with an extensive tree preservation plan prepared in cooperation with the City Urban Forester. For the alignment options 2 and 3, a preliminary tree impact assessment has been completed to aid in evaluating this important criteria.

Criteria 7: Construction Cost. The City is currently developing this project using a $3,000,000 allocation of funds from the Central Virginia Transportation Authority (CVTA). This funding allows the project to be completed without direct contribution from the City. Each of the options considered has its own unique construction requirements that come at varying costs. The total cost of each option and the ability to complete the project within the allocated budget must be considered.

## *Methodology*

Our team has conducted additional field investigations and measurements to inform this assessment. A combination of visual inspection, vehicle-mounted digital level, GPS and 3-D imaging technologies were utilized to determine cross slopes, longitudinal slopes, pavement widths and tree characteristics along each of the alternate alignments.

With this information, each of the three alternate alignment options will be assessed for the degree to which the project ***purpose and need*** are met, with the seven ***design and construction criterion*** the basis of this assessment. A rating is assigned for each assessment criterion – either a yes / no rating for compliance, or a rating of good, fair, or poor for the degree to which a criteria is met. Mapping of several key assessment criteria is included in Appendix C for visual representation of this information as well, to include cross slope, longitudinal slope, and pavement width along the Option 2 and Option 3 service roads.

There was additional mapping performed for several key assessment criteria, which can be found in Appendix C. The visual representation of the information includes data on the

alternatives cross slope, longitudinal slope, and pavement width along the Option 2 and Option 3 service roads.

As previously acknowledged, Option 1 is primarily new construction on a new alignment designed to meet standards and therefore is evaluated as such. For Option 2 and Option 3, the assessment reflects the existing conditions relative to required criteria – i.e. is the existing road width adequate, just less than adequate, or significantly less than adequate, with the latter conditions requiring significantly more reconstruction efforts & cost than the prior.

Table 1 below summarizes the assessment criteria and associated rating conditions / ranges for each criterion.

| | Good | Fair | Poor |
|---|---|---|---|
| **Dedicated Facility** | **Yes** | **N/A** | **No** |
| **Cross Slope** | **-2% to +2%** | **-5% to -2% & +2% to +5%** | **< -5% & > +5%** |
| **Longitudinal Slope** | **-5% to +5%** | **-8% to -5% & +5% to +8%** | **< -8% & > +8%** |
| **Pavement Width** | **≥ 23'** | **18' to 23'** | **< 18'** |
| **Disruption to Activities/Events** | **No Direct Disruption** | **N/A** | **Direct Impact to Event(s)** |
| **Tree Impact Risk** (Native Tree Removal) | **Minimal Risk / Removal** | **Elevated Risk / Removal** | **Significant Risk / Removal** |
| **Construction Cost** | **Within Budget** | **Minor Budget Risk** | **Likely to Exceed Budget** |

Table 1 – Assessment Criteria / Rating

*Remainder of Page Intentionally Blank*

*Findings*

For this assessment it is assumed that each of the three options presented can be developed and constructed to achieve the purpose and need of this project.

What is challenging is determining the feasibility of construction if the project will require significantly more resources, construction impacts on events and the environment, and cost to do so for an option with unfavorable condition ratings.

With the assessment and rating criteria methodology established, each alternate alignment option is evaluated. Table 2 below summarizes the assessment of each option for each of the stated criteria.

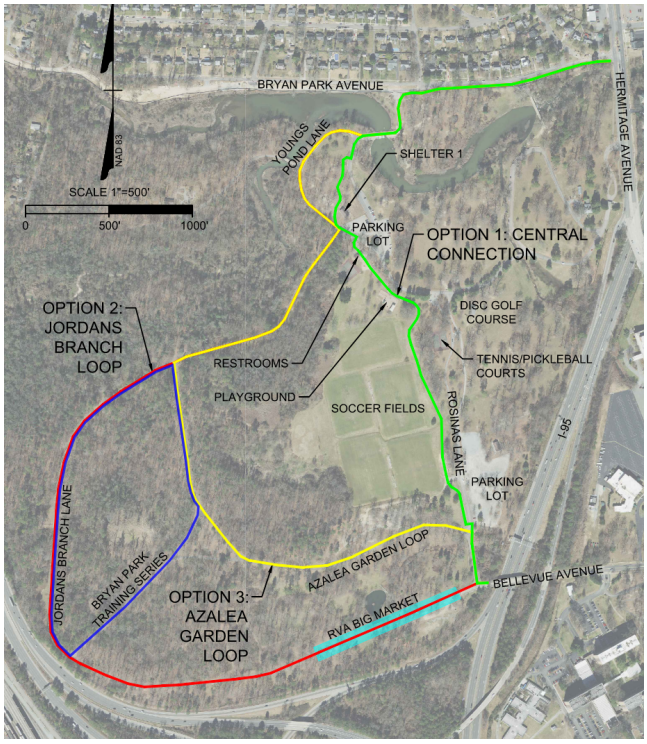



*Figure 3: Alternate Alignment Map*

| | **Option 1** Central Connection | **Option 2** Jordans Branch Loop | **Option 3** Azalea Garden Loop |
|---|---|---|---|
| **Dedicated Facility** | **Yes** | **Yes** | **Yes** |
| **Cross Slope** | **Good** | **Poor** | **Fair** |
| **Longitudinal Slope** | **Good** | **Fair** | **Poor** |
| **Pavement Width** | **Good*** | **Poor** | **Fair** |
| **Disruption to Activities/Events** | **Good**** | **Poor** | **Poor** |
| **Tree Impact Risk** (Native Tree Removal) | **Good** | **Poor** | **Fair** |
| **Construction Cost** | **Good** | **Poor** | **Poor** |
| | | | |
| **Overall** | **Good** | **Poor** | **Fair** |

Table 2 – Assessment Ratings/Results

## Summary of Findings

This assessment includes consideration of each alignment Option as related to the assessment criteria and the resulting rating for each, as previously prescribed.

Positive ratings ("yes" and "good", or green results) suggest an option is consistent with and/or meets the project purpose and need. Unfavorable ratings ("no" and "poor", or red results) suggest that an option requires significant resources, time, impact and/or construction cost in order to achieve the project purpose and need.

Based on the City's established project objectives for the Bryan Park Segment, the following information is provided to better understand how each of the Options meet the project purpose and need.

**Does the alternative option:**

***"Connect Bryan Park to the Regional Fall Line Trail Network"?***

Construction of Option 1, Option 2, or Option 3 will meet this objective. The purpose and need would not be met under a no-build scenario (i.e. if no construction takes place). A no-build option is therefore not discussed in detail in this evaluation for this reason.

**Does the alternative option:**

***"Provide Accessible Connections to Park Amenities & Facilities"?***

As previously stated, each of the three options being considered can be developed and constructed in a manner which achieves this objective. The difference between the options comes down to the construction scale, time, resources and cost of doing so.

Option 1 provides the most direct and cost-effective solution for achieving this objective, with the Fall Line Trail itself serving as the accessible connection between key amenities such as the playground, picnic shelters, parking areas, soccer fields and tennis courts. This option meets the objective within the project budget. Further, it is important to note that this option is not expected to interrupt or preclude continuation of the RVA Big Market or the Bryan Park Training Series bike races.

Option 2 and Option 3, without additional improvements, would not meet this objective. Therefore, it is planned and assumed here that a spur / connector path would also be required in addition to the primary Fall Line Trail route along Option 2 and/or Option 3. This spur / connector path would likely follow the approximate location of Option 1, however the path width could be reduced to 5' – 6' to minimize disruption through the central core of the park. To reiterate, this results in the FLT routing along either Option 2 or Option 3 alignment, with an additional path constructed along the Option 1 location to connect existing amenities. As a result of this redundant construction and the extensive rework of the existing service roads, both Option 2 and Option 3 are expected to exceed the allocated budget. Table 3 below includes preliminary estimated construction cost for each of the options.

## Executive Summary

The City has established two key elements of the project purpose and need, focused on making Bryan Park a major part of the regional Fall Line Trail network and aimed at ensuring accessibility to amenities within Bryan Park. Three alternative alignment options have been developed and considered in this memorandum. A variety of assessment criteria have been established to determine the suitability of each alignment option for providing a facility which meets the project purpose and need.

Option 1 received the highest rating, suggesting it is most likely to effectively and efficiently meet the project purpose and need, within the project budget.

Option 2 received the lowest rating, suggesting it is least likely to effectively and efficiently meet the project purpose and need, and likely to exceed the project budget to do so.

Option 3 received the middle rating, suggesting it is more feasible than Option 2 to effectively and efficiently meet the project purpose and need, but still is likely to exceed the project budget to do so.

Table 3 below provides a summary of findings as it relates to each of the alignment options considered. This table is also included in Appendix B with supporting construction cost estimate information.

**FALL LINE TRAIL - BRYAN PARK SEGMENT**
**ALTERNATIVES ANALYSIS SUMMARY TABLE - MARCH 2025**

| | Total Length (miles) | Tree Impact / Anticipated Removal | New Pavement Area (sf) | Disruption / Impact to Activities & Events | Construction Cost |
|---|---|---|---|---|---|
| **Option 1: Central Connection** | 0.94 | 6 | 26,000 | No | $ 2,299,000 |
| **Option 2: Jordans Branch Loop** | 1.66 [1] | 60 [2] | 32,000 | Yes [3] | $ 4,084,500 |
| **Option 3: Azalea Garden Loop** | 1.35 [1] | 42 [2] | 20,000 | Yes [4] | $ 3,475,000 |

*Notes:*

*1. Length shown does not include additional 0.40 mile accessible connector path*

*2. Estimated tree removal per March 2025 Preliminary Tree Impact Assessment, not based on detailed tree preservation plan*

*3. Likely to significantly effect / impede annual Bryan Park Training Series bike races, direct route through busiest areas of RVA Big Market*

*4. Likely to significantly effect / impede annual Bryan Park Training Series bike races, negligible impact to the RVA Big Market*

*Table 3: Alternatives Analysis Summary of Findings*

This memorandum is provided to detail the purpose and need of the project, establish critical design considerations for a potential shared-use path facility, present and evaluate three options for meeting the purpose and need, and to provide assessment of each. With this information, we expect the City will be well-equipped to determine its preferred path forward.

Beyond providing information to inform next steps, there are also some additional considerations identified through this effort which should be noted. We understand the City remains committed to working with the community and stakeholders to ensure a successful project. We recommend additional consideration be given to address various concerns raised through the City's ongoing and enhanced public engagement. As an example, we understand

the concern of path users commuting through the park who may not wish to slow down or stop at the various amenities, interacting with those who do. To enhance the experience of both those using the park and those using the Fall Line Trail, the City may consider additional measures such as wayfinding signs, to direct users more effectively through the park. Such signs would provide recommended direction of travel to various amenities within the park, and a "bypass" route for those otherwise wishing to continue through the park. This through / bypass route would be aimed at cyclists commuting through the park at higher rates of speed, with recommendations to avoid congested areas by taking the alternate route. It is acknowledged that the alternate route would not be an accessible or ADA/PROWAG compliant facility, and therefore accommodations should be made to ensure this is made clear to all users.

Additional signage requiring cyclists to slow, yield to pedestrians, or even dismount and walk when near the restrooms, playground, and soccer fields could also be considered to further encourage safe cyclist behavior and help protect pedestrians on the trail and patrons using park facilities. It is recommended that these additional measures be evaluated once the facilities are fully opened and observed during regular activities. Examples of similar signs in practice are included in Appendix E.

Finally, we support the City's ongoing efforts to work with stakeholders to identify modification and/or improvement to the options presented herein. A variety of hybrid solutions may exist which would satisfy the greater stakeholder community while also meeting the project purpose and need within the allocated funding. Our team is ready and available to support these additional considerations.

*Remainder of Page Intentionally Blank*

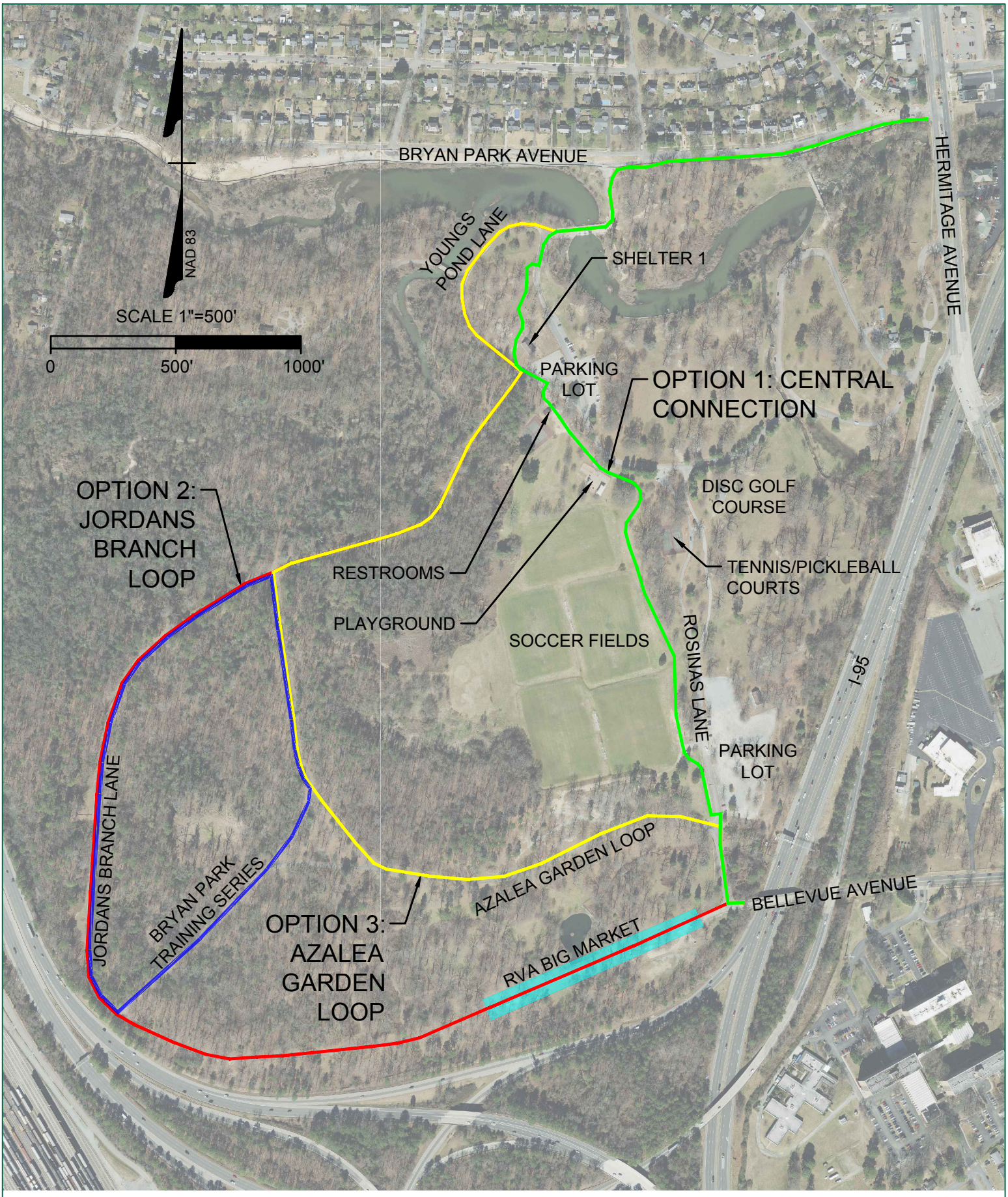
**List of Included Appendices:**

Appendix A: Alternatives Routing Maps
- Appendix A-1: Alternatives Routing Overall Map
- Appendix A-2: Option 1 – Central Connection
- Appendix A-3: Option 2 – Jordans Branch Loop
- Appendix A-4: Option 3 – Azalea Garden Loop

Appendix B: Alternatives Analysis Summary of Findings & Construction Cost Estimates
Appendix C: Alternate Routing Heat Maps and Summary Tables
Appendix D: Tree Impact Assessment (Option 2 and Option 3)
Appendix E: Cyclist Sign Examples

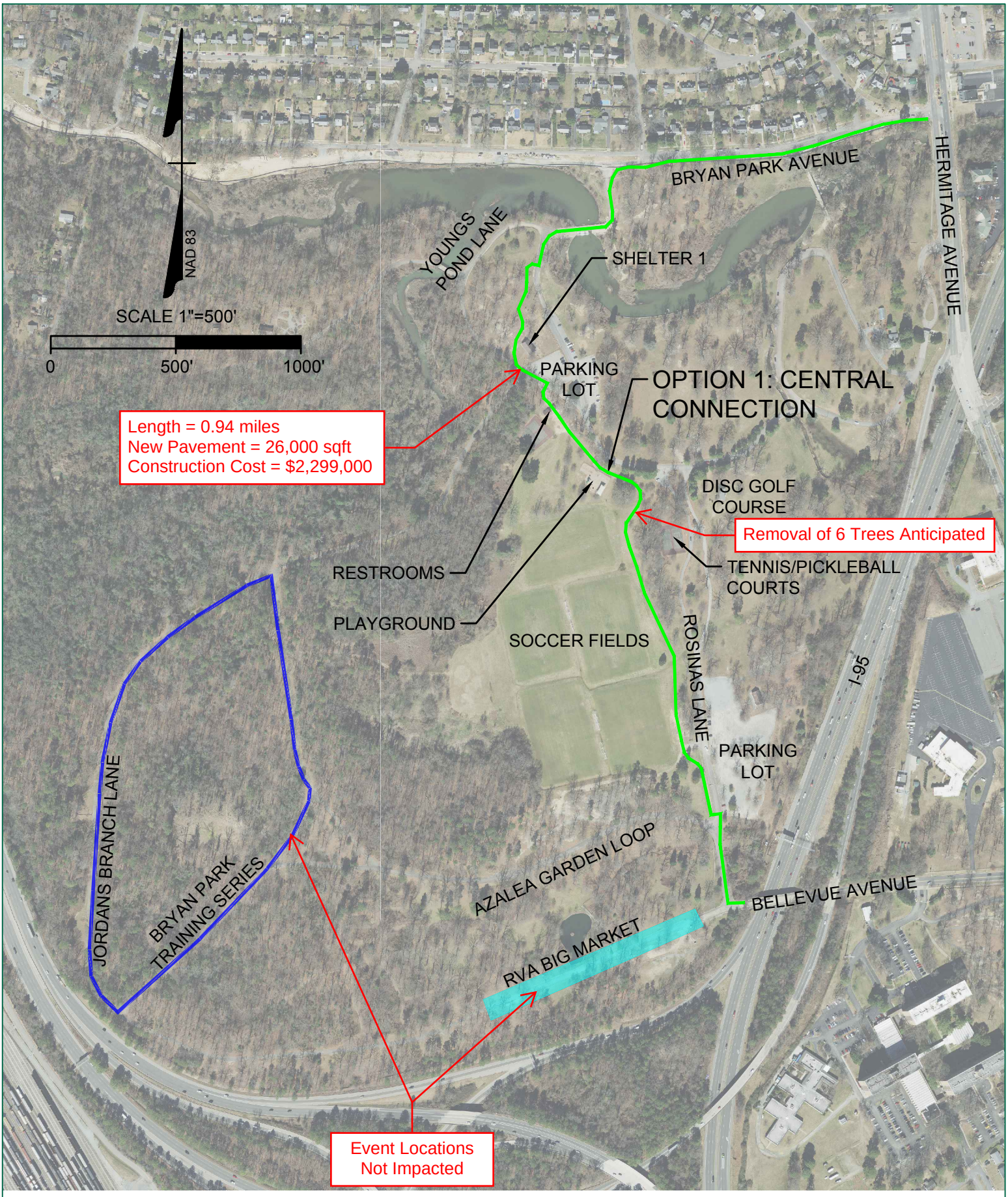
# APPENDIX A – Alternatives Routing Maps

*(Remainder of Page Intentionally Blank – See Next Page)*



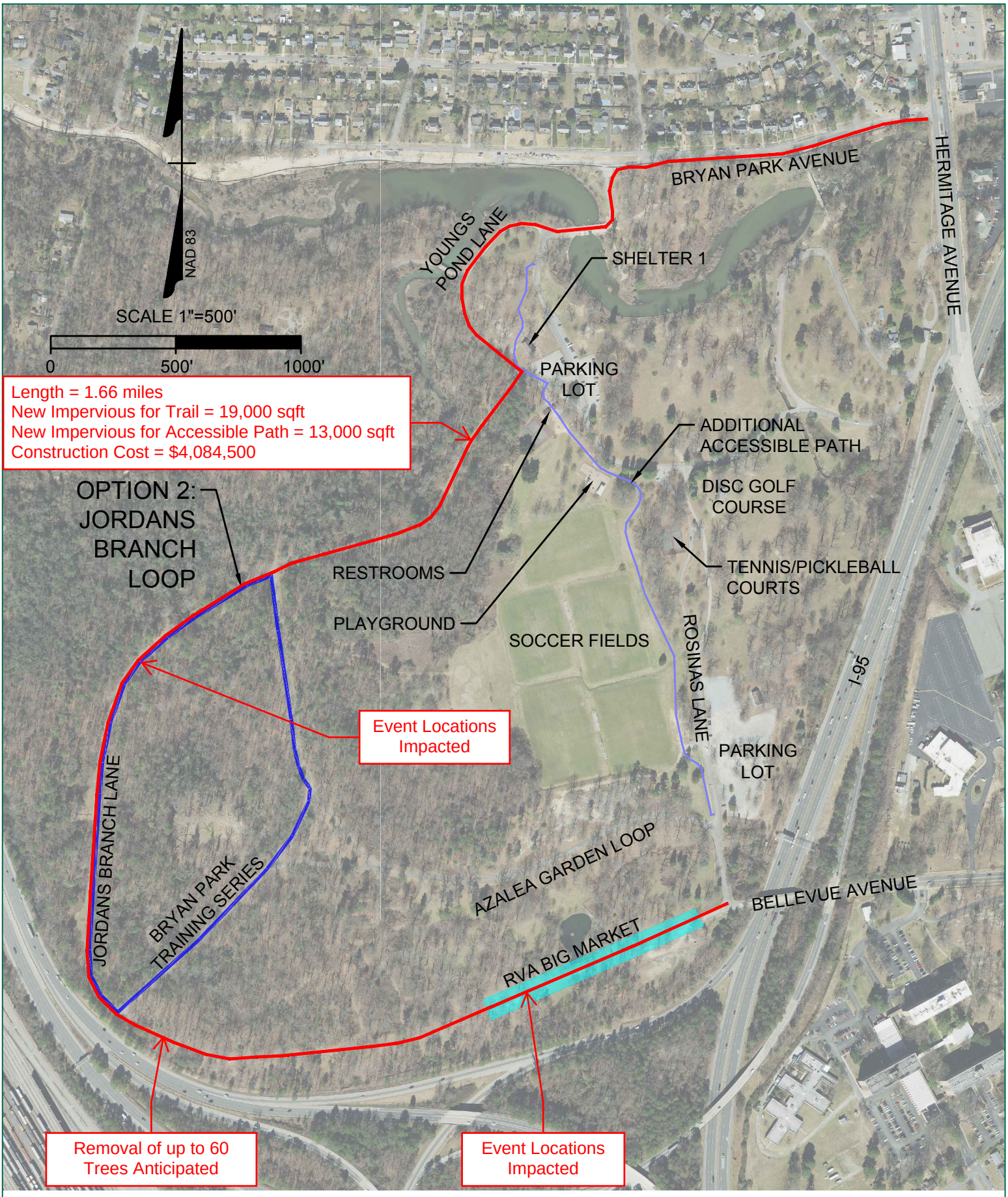

BRYAN PARK - FALL LINE TRAIL
ROUTING ANALYSIS
MARCH 2025

*Appendix A-1*



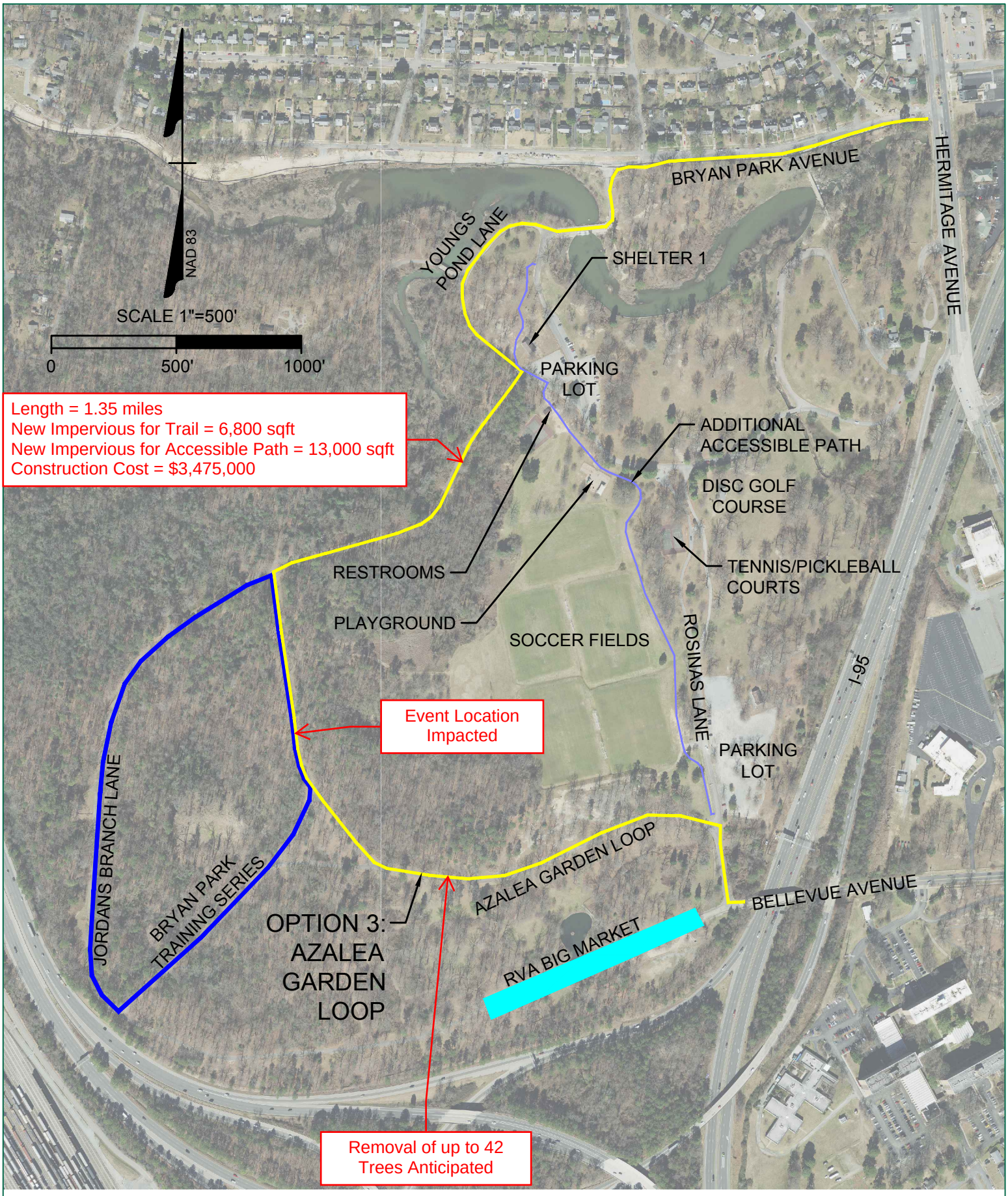

BRYAN PARK - FALL LINE TRAIL
ROUTING ANALYSIS - OPTION 1: CENTRAL CONNECTION
MARCH 2025

*Appendix A-2*




BRYAN PARK - FALL LINE TRAIL
ROUTING ANALYSIS - OPTION 2: JORDANS BRANCH LOOP
MARCH 2025

*Appendix A-3*




BRYAN PARK - FALL LINE TRAIL
ROUTING ANALYSIS - OPTION 3: AZALEA GARDEN LOOP
MARCH 2025

*Appendix A-4*

# APPENDIX B

Alternatives Analysis Summary of Findings & Supporting Construction Cost Estimates

*(Remainder of Page Intentionally Blank – See Next Page)*

## FALL LINE TRAIL - BRYAN PARK SEGMENT

### ALTERNATIVES ANALYSIS SUMMARY TABLE - MARCH 2025

| | Total Length (miles) | Tree Impact / Anticipated Removal | New Pavement Area (sf) | Disruption / Impact to Activities & Events | Construction Cost |
|---|---|---|---|---|---|
| **Option 1: Central Connection** | 0.94 | 6 | 26,000 | No | $ 2,299,000 |
| **Option 2: Jordans Branch Loop** | 1.66 [1] | 60 [2] | 32,000 | Yes [3] | $ 4,084,500 |
| **Option 3: Azalea Garden Loop** | 1.35 [1] | 42 [2] | 20,000 | Yes [4] | $ 3,475,000 |

*Notes:*

*1. Length shown does not include additional 0.40 mile accessible connector path*

*2. Estimated tree removal per March 2025 Preliminary Tree Impact Assessment, not based on detailed tree preservation plan*

*3. Likely to significantly effect / impede annual Bryan Park Training Series bike races, direct route through busiest areas of RVA Big Market*

*4. Likely to significantly effect / impede annual Bryan Park Training Series bike races, negligible impact to the RVA Big Market*

**CONSTRUCTION COST SUMMARY - ALTERNATIVES ANALYSIS**
**CITY OF RICHMOND - FALL LINE TRAIL - BRYAN PARK SEGMENT**
**3/25/2025**

| | Option 1: Central Connection | Option 2: Jordans Branch Loop | Option 3: Azalea Garden Loop |
|---|---|---|---|
| Pavement Demolition and Resurfacing, Saw Cut, and Earthwork | $ 688,525 | $ 737,311 | $ 609,843 |
| Storm Sewer, Hydraulics, and Stormwater Mgmt | $ 94,200 | $ 160,450 | $ 144,950 |
| Pavement and Stone | $ 207,125 | $ 363,458 | $ 268,247 |
| Curb, Sidewalk, Pavement Markings, Misc. | $ 251,350 | $ 423,950 | $ 418,190 |
| Erosion and Sediment Control / Seeding / Tree Protection | $ 1,057,525 | $ 2,399,000 | $ 2,033,500 |
| **TOTAL (Rounded)** | **$ 2,299,000** | **$ 4,084,500** | **$ 3,475,000** |

*NOTE: The intention of this estimate as shown is to represent major construction cost items only, additional construction costs for materials testing, mobilization, inspection services may be required. This summary does not include Preliminary Engineering (PE) or Right of Way (RW) phase costs which also factor into the total budget.*

**CONSTRUCTION COST ESTIMATE - OPTION 1 (CENTRAL CONNECTION)**
**Fall Line Trail - Bryan Park**
**3/25/2025**

| ENGINEER'S OPINION OF PROBABLE COSTS | | | | | | |
|---|---|---|---|---|---|---|
| **Item Code** | **Spec. No.** | **Description** | **Quantity** | **Unit** | **Unit Price** | **Total** |
| **Pavement Demolition and Resurfacing, Saw Cut, and Earthwork** | | | | | | |
| 10628 | 515 | FLEXIBLE PAVEMENT PLANING 0" - 2" | 0 | SY | $ 12.00 | $ - |
| 24420 | 508 | DEMOLITION OF PAVEMENT RIGID | 220 | SY | $ 50.00 | $ 11,000.00 |
| 24430 | 508 | DEMOLITION OF PAVEMENT FLEXIBLE | 2300 | SY | $ 20.00 | $ 46,000.00 |
| 120 | 303 | REGULAR EXCAVATION | 6225 | CY | $ 45.00 | $ 280,125.00 |
| 140 | 305 | BORROW EXCAVATION | 6300 | CY | $ 35.00 | $ 220,500.00 |
| | | NS EXCAVATION UNDERCUT | 200 | CY | $ 50.00 | $ 10,000.00 |
| | | NS SOIL UNDERCUT BACKFILL | 200 | CY | $ 50.00 | $ 10,000.00 |
| | | GEOTEXTILE FABRIC | 300 | SY | $ 5.00 | $ 1,500.00 |
| | | CLEARING AND GRUBBING | 2.97 | AC | $ 20,000.00 | $ 59,400.00 |
| | | TREE PROTECTION & PRESERVATION MEASURES** | 1 | LS | $ 50,000.00 | $ 50,000.00 |
| | | **Sub-Total for Pavement Demolition and Resurfacing, Saw Cut, and Earthwork:** | | | | **$ 688,525.00** |
| **Storm Sewer, Hydraulics, and Stormwater Mgmt** | | | | | | |
| 1156 | 302 | STORM SEWER PIPE 15" | 235 | LF | $ 200.00 | $ 47,000.00 |
| | 302 | ELLIPTICAL STORM SEWER PIPE 23"x14" | 35 | LF | $ 250.00 | $ 8,750.00 |
| | 302 | 23"x14" END SECTION ES-1A | 4 | EA | $ 2,000.00 | $ 8,000.00 |
| | 0 | DROP INLET DI-2B,L=8' | 1 | EA | $ 7,000.00 | $ 7,000.00 |
| | 302 | DROP INLET DI-2BB,L=8' | 1 | EA | $ 8,500.00 | $ 8,500.00 |
| 6835 | 302 | DROP INLET DI-3C,L=6' | 1 | EA | $ 7,000.00 | $ 7,000.00 |
| 9056 | 302 | MANHOLE MH-1 OR 2 | 5.2 | LF | $ 1,000.00 | $ 5,200.00 |
| 9057 | 302 | FRAME & COVER MH-1 | 1 | EA | $ 1,250.00 | $ 1,250.00 |
| 9148 | 414 | EROS.CTRL.STONE CL.A1 EC-1 | 12 | TON | $ 125.00 | $ 1,500.00 |
| | | **Sub-Total for Storm Sewer, Hydraulics, and Stormwater Mgmt:** | | | | **$ 94,200.00** |
| **Pavement and Stone** | | | | | | |
| 16335 | 315 | **Asphalt Concrete Type SM-12.5A** | **485** | **TON** | **$ 175.00** | **$ 84,875.00** |
| | | *New Pavement (2")* | *15* | *TON* | | |
| | | *Trail (2")* | *470* | *TON* | | |
| | | | | | | |
| 16365 | 315 | **Asphalt Concrete Type IM-19.0A** | **15** | **TON** | **$ 150.00** | **$ 2,250.00** |
| | | *New Pavement (2")* | *15* | *TON* | | |
| | | | | | | |
| 16390 | 315 | **Asphalt Concrete Type BM-25.0A** | **30** | **TON** | **$ 125.00** | **$ 3,750.00** |
| | | *New Pavement (4")* | *30* | *TON* | | |
| | | | | | | |
| 10128 | 308 | **Aggregate Base Material Type 1, No. 21B** | **2325** | **TON** | **$ 50.00** | **$ 116,250.00** |
| | | *New Pavement (8")* | 55 | *TON* | | |
| | | *Trail (8")* | 2200 | *TON* | | |
| | | *CG-3 Curb and Gutter* | 70 | *TON* | | |
| | | | | | **Sub-Total for Pavement and Stone:** | **$ 207,125.00** |
| **Curb, Sidewalk, Pavement Markings, Misc.** | | | | | | |
| N/A | N/A | CITY OF RICHMOND STANDARD CURB | 1340 | LF | $ 125.00 | $ 167,500.00 |
| 50108 | 701 | SIGN PANEL | 22 | SF | $ 50.00 | $ 1,100.00 |
| 50436 | 700 | SIGN POST STP-1, 2 1/2", 12 GAUGE | 52 | LF | $ 50.00 | $ 2,600.00 |
| 50490 | 700 | CONCRETE SIGN FOUNDATION STP-1, TYPE F | 6 | EA | $ 600.00 | $ 3,600.00 |
| 54032 | 704 | TYPE B CLASS I PAVE. LINE MARKING 4" | 6150 | LF | $ 2.00 | $ 12,300.00 |
| 54042 | 704 | TYPE B CLASS I PAVE. LINE MARKING 24" | 175 | LF | $ 10.00 | $ 1,750.00 |
| 13108 | 504 | CG-12 DETECTABLE WARNING SURFACE | 50 | SY | $ 750.00 | $ 37,500.00 |
| | | **Sub-Total for Curb, Sidewalk, Pavement Markings, Misc.:** | | | | **$ 226,350.00** |
| **Erosion and Sediment Control / Seeding / Tree Protection** | | | | | | |
| 27012 | 602 | TOPSOIL CLASS A 2" | 2.1 | ACRE | $ 10,000.00 | $ 20,500.00 |
| 27101 | 603 | TEMPORARY SEED | 210 | LB | $ 15.00 | $ 3,150.00 |
| 27102 | 603 | REGULAR SEED | 310 | LB | $ 15.00 | $ 4,650.00 |
| 27103 | 603 | OVERSEEDING | 250 | LB | $ 15.00 | $ 3,750.00 |
| 27104 | 603 | LEGUME SEED | 30 | LB | $ 45.00 | $ 1,350.00 |
| 27105 | 603 | LEGUME OVERSEEDING | 25 | LB | $ 45.00 | $ 1,125.00 |
| 27110 | 603 | HYDRAULIC EROSION CONTROL PRODUCT TYPE 1 | 5560 | SY | $ 1.00 | $ 5,560.00 |
| 27111 | 603 | HYDRAULIC EROSION CONTROL PRODUCT TYPE 2 | 5560 | SY | $ 1.50 | $ 8,340.00 |
| 27112 | 603 | HYDRAULIC EROSION CONTROL PRODUCT TYPE 3 | 11250 | SY | $ 2.00 | $ 22,500.00 |
| 27230 | 603 | FERTILIZER NITROGEN - N | 200 | LB | $ 5.00 | $ 1,000.00 |
| 27231 | 603 | FERTILIZER PHOSPHOROUS - P | 270 | LB | $ 5.00 | $ 1,350.00 |
| 27232 | 603 | FERTILIZER POTASSIUM - K | 140 | LB | $ 5.00 | $ 700.00 |
| 27250 | 603 | LIME | 10 | TON | $ 500.00 | $ 4,750.00 |
| 27430 | 303 | SILTATION CONTROL EXCAVATION | 1900 | CY | $ 5.00 | $ 9,500.00 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 27451 | 303 | INLET PROTECTION TYPE A | 1 | EA | $ 350.00 | $ 350.00 |
| 27461 | 303 | INLET PROTECTION TYPE B | 3 | EA | $ 250.00 | $ 750.00 |
| N/A | N/A | INLET PROTECTION TYPE C | 2 | EA | $ 500.00 | $ 1,000.00 |
| 27505 | 303 | TEMP. SILT FENCE TYPE A | 10900 | LF | $ 5.00 | $ 54,500.00 |
| N/A | N/A | TREE PROTECTION | 5720 | LF | $ 35.00 | $ 200,200.00 |
| N/A | N/A | AIR SPADING | 14,200 | SF | $ 50.00 | $ 710,000.00 |
| N/A | N/A | TREE REMOVAL | 5 | EA | $ 500.00 | $ 2,500.00 |
| | | | | | | |
| | | **Sub-Total for Erosion and Sediment Control / Seeding / Tree Protection:** | | | | **$ 1,057,525.00** |
| **Maintenance of Traffic** | | | | | | |
| 24265 | ATTD | MOT Lump Sum | 1 | LS | $ 25,000.00 | $ 25,000.00 |
| | | | | | **Sub-Total for Maintenance of Traffic:** | **$ 25,000.00** |

**PRELIMINARY CONSTRUCTION COST ESTIMATE - OPTION 2 (JORDANS BRANCH LOOP)**
**Fall Line Trail - Bryan Park**
**3/25/2025**

| ENGINEER'S OPINION OF PROBABLE COSTS | | | | | | |
|---|---|---|---|---|---|---|
| **Item Code** | **Spec. No.** | **Description** | **Quantity** | **Unit** | **Unit Price** | **Total** |
| **Pavement Demolition and Resurfacing, Saw Cut, and Earthwork** | | | | | | |
| 10628 | 515 | FLEXIBLE PAVEMENT PLANING 0" - 2" | 12089 | SY | $ 12.00 | $ 145,066.67 |
| 24430 | 508 | DEMOLITION OF PAVEMENT FLEXIBLE | 3711 | SY | $ 20.00 | $ 74,228.89 |
| 24420 | 508 | DEMOLITION OF PAVEMENT RIGID | 220 | SY | $ 50.00 | $ 11,000.00 |
| 120 | 303 | REGULAR EXCAVATION | 3215 | CY | $ 45.00 | $ 144,675.00 |
| 140 | 305 | BORROW EXCAVATION | 2380 | CY | $ 35.00 | $ 83,300.00 |
| | | NS EXCAVATION: UNDERCUT EXC. & BACKFILL | 200 | CY | $ 100.00 | $ 20,000.00 |
| | | CLEARING AND GRUBBING | 2.97 | AC | $ 20,000.00 | $ 59,400.00 |
| | | TREE PROTECTION & PRESERVATION MEASURES CONTING. | 1 | LS | $ 150,000.00 | $ 150,000.00 |
| | | NS SAWCUT | 6205 | LF | $ 8.00 | $ 49,640.00 |
| | | **Sub-Total for Pavement Demolition and Resurfacing, Saw Cut, and Earthwork:** | | | | **$ 737,310.56** |
| **Storm Sewer, Hydraulics, and Stormwater Mgmt** | | | | | | |
| 1156 | 302 | STORM SEWER PIPE 15" | 235 | LF | $ 200.00 | $ 47,000.00 |
| | 0 | DROP INLET DI-2B,L=8' | 1 | EA | $ 7,000.00 | $ 7,000.00 |
| | 302 | DROP INLET DI-2BB,L=8' | 1 | EA | $ 8,500.00 | $ 8,500.00 |
| 6835 | 302 | DROP INLET DI-3C,L=6' | 1 | EA | $ 7,000.00 | $ 7,000.00 |
| 9056 | 302 | MANHOLE MH-1 OR 2 | 5.2 | LF | $ 1,000.00 | $ 5,200.00 |
| 9057 | 302 | FRAME & COVER MH-1 | 1 | EA | $ 1,250.00 | $ 1,250.00 |
| 9148 | 414 | EROS.CTRL.STONE CL.A1 EC-1 | 12 | TON | $ 125.00 | $ 1,500.00 |
| | | CROSS DRAINAGE IMPROVEMENTS / DITCHES | 1 | LS | $ 83,000.00 | $ 83,000.00 |
| | | | | | | $ - |
| | | **Sub-Total for Storm Sewer, Hydraulics, and Stormwater Mgmt:** | | | | **$ 160,450.00** |
| **Pavement and Stone** | | | | | | |
| 16335 | 315 | **Asphalt Concrete Type SM-12.5A** | **811** | **TON** | **$ 175.00** | **$ 141,939.85** |
| | | *New Pavement (3")* | *338* | *TON* | | |
| | | *Buildup (VAR.)* | *141* | *TON* | | |
| | | *Mill and Overlay (2")* | *332* | *TON* | | |
| | | | | | | |
| 16365 | 315 | **Asphalt Concrete Type IM-19.0A** | **15** | **TON** | **$ 150.00** | **$ 2,250.00** |
| | | | | | | |
| 16390 | 315 | **Asphalt Concrete Type BM-25.0A** | **30** | **TON** | **$ 125.00** | **$ 3,750.00** |
| | | | | | | |
| 10128 | 308 | **Aggregate Base Material Type 1, No. 21B** | **4310** | **TON** | **$ 50.00** | **$ 215,518.20** |
| | | *New Pavement (8")* | *3835* | *TON* | | |
| | | *Sidewalk / Walking Path (4")* | *350* | *TON* | | |
| | | *New Pavement & C&G (Varies)* | *125* | *TON* | | |
| | | | | | **Sub-Total for Pavement and Stone:** | **$ 363,458.05** |
| **Curb, Sidewalk, Pavement Markings, Misc.** | | | | | | |
| N/A | N/A | CITY OF RICHMOND STANDARD CURB | 1340 | LF | $ 125.00 | $ 167,500.00 |
| 13220 | 504 | HYDRAULIC CEMENT CONC. SIDEWALK 4", 6' WIDTH | 1420 | SY | $ 120.00 | $ 170,400.00 |
| 54032 | 704 | TYPE B CLASS I PAVE. LINE MARKING 4" | 19750 | LF | $ 2.00 | $ 39,500.00 |
| 54042 | 704 | TYPE B CLASS I PAVE. LINE MARKING 24" | 175 | LF | $ 10.00 | $ 1,750.00 |
| | 701 | SIGN PANEL, POST, FOUNDATION | 1 | LS | $ 7,300.00 | $ 7,300.00 |
| 13108 | 504 | CG-12 DETECTABLE WARNING SURFACE | 50 | SY | $ 750.00 | $ 37,500.00 |
| | | **Sub-Total for Curb, Sidewalk, Pavement Markings, Misc.:** | | | | **$ 423,950.00** |
| **Erosion and Sediment Control / Seeding / Tree Protection** | | | | | | |
| | | E&SC, SEEDING LUMP SUM ($150,000 per mile) | 2.06 | MI | $ 150,000.00 | $ 309,000.00 |
| N/A | N/A | TREE PROTECTION, AIR SPADING | 1 | LS | $ 2,060,000.00 | $ 2,060,000.00 |
| N/A | N/A | TREE REMOVAL | 60 | EA | $ 500.00 | $ 30,000.00 |
| | | **Sub-Total for Erosion and Sediment Control / Seeding / Tree Protection:** | | | | **$ 2,399,000.00** |
| | | | | | | |
| | | | | | **Total** | **$ 4,084,500.00** |

*NOTE: This estimate is based on conceptual-level design only. The intention of this estimate as shown is to represent major construction cost items only, and the total shown here does not include all construction costs. Additional construction cost items (e.g. mobilization, survey, testing, etc.) are excluded from this summary.*

**PRELIMINARY CONSTRUCTION COST ESTIMATE - OPTION 3 (AZALEA GARDEN LOOP)**
**Fall Line Trail - Bryan Park**
**3/25/2025**

| ENGINEER'S OPINION OF PROBABLE COSTS | | | | | | |
|---|---|---|---|---|---|---|
| **Item Code** | **Spec. No.** | **Description** | **Quantity** | **Unit** | **Unit Price** | **Total** |
| **Pavement Demolition and Resurfacing, Saw Cut, and Earthwork** | | | | | | |
| 10628 | 515 | FLEXIBLE PAVEMENT PLANING 0" - 2" | 9778 | SY | $ 12.00 | $ 117,333.33 |
| 24430 | 508 | DEMOLITION OF PAVEMENT FLEXIBLE | 2532 | SY | $ 20.00 | $ 50,640.00 |
| 24420 | 508 | DEMOLITION OF PAVEMENT RIGID | 220 | SY | $ 50.00 | $ 11,000.00 |
| 120 | 303 | REGULAR EXCAVATION | 2800 | CY | $ 45.00 | $ 126,000.00 |
| 140 | 305 | BORROW EXCAVATION | 2050 | CY | $ 35.00 | $ 71,750.00 |
| | | NS EXCAVATION: UNDERCUT EXC. & BACKFILL | 200 | CY | $ 100.00 | $ 20,000.00 |
| | | CLEARING AND GRUBBING | 2.97 | AC | $ 20,000.00 | $ 59,400.00 |
| | | TREE PROTECTION & PRESERVATION MEASURES CONTING. | 1 | LS | $ 125,000.00 | $ 125,000.00 |
| | | NS SAWCUT | 3590 | LF | $ 8.00 | $ 28,720.00 |
| | | **Sub-Total for Pavement Demolition and Resurfacing, Saw Cut, and Earthwork:** | | | | **$ 609,843.33** |
| **Storm Sewer, Hydraulics, and Stormwater Mgmt** | | | | | | |
| 1156 | 302 | STORM SEWER PIPE 15" | 235 | LF | $ 200.00 | $ 47,000.00 |
| | 0 | DROP INLET DI-2B,L=8' | 1 | EA | $ 7,000.00 | $ 7,000.00 |
| | 302 | DROP INLET DI-2BB,L=8' | 1 | EA | $ 8,500.00 | $ 8,500.00 |
| 6835 | 302 | DROP INLET DI-3C,L=6' | 1 | EA | $ 7,000.00 | $ 7,000.00 |
| 9056 | 302 | MANHOLE MH-1 OR 2 | 5.2 | LF | $ 1,000.00 | $ 5,200.00 |
| 9057 | 302 | FRAME & COVER MH-1 | 1 | EA | $ 1,250.00 | $ 1,250.00 |
| 9148 | 414 | EROS.CTRL.STONE CL.A1 EC-1 | 12 | TON | $ 125.00 | $ 1,500.00 |
| | | CROSS DRAINAGE IMPROVEMENTS / DITCHES | 1 | LS | $ 67,500.00 | $ 67,500.00 |
| | | **Sub-Total for Storm Sewer, Hydraulics, and Stormwater Mgmt:** | | | | **$ 144,950.00** |
| **Pavement and Stone** | | | | | | |
| 16335 | 315 | **Asphalt Concrete Type SM-12.5A** | **654** | **TON** | **$ 175.00** | **$ 114,398.84** |
| | | *New Pavement (3")* | *219* | *TON* | | |
| | | *Buildup (VAR.)* | *166* | *TON* | | |
| | | *Mill and Overlay (2")* | *269* | *TON* | | |
| | | | | | | |
| 16365 | 315 | **Asphalt Concrete Type IM-19.0A** | **15** | **TON** | **$ 150.00** | **$ 2,250.00** |
| | | | | | | |
| 16390 | 315 | **Asphalt Concrete Type BM-25.0A** | **30** | **TON** | **$ 125.00** | **$ 3,750.00** |
| | | | | | | |
| 10128 | 308 | **Aggregate Base Material Type 1, No. 21B** | **2957** | **TON** | **$ 50.00** | **$ 147,848.00** |
| | | *New Pavement (8")* | *2482* | *TON* | | |
| | | *Sidewalk / Walking Path (4")* | *350* | *TON* | | |
| | | *New Pavement & C&G (Varies)* | *125* | *TON* | | |
| | | **Sub-Total for Pavement and Stone:** | | | | **$ 268,246.84** |
| **Curb, Sidewalk, Pavement Markings, Misc.** | | | | | | |
| N/A | N/A | CITY OF RICHMOND STANDARD CURB | 1340 | LF | $ 125.00 | $ 167,500.00 |
| 13220 | 504 | HYDRAULIC CEMENT CONC. SIDEWALK 4", 6' WIDTH | 1420 | SY | $ 120.00 | $ 170,400.00 |
| 54032 | 704 | TYPE B CLASS I PAVE. LINE MARKING 4" | 16870 | LF | $ 2.00 | $ 33,740.00 |
| 54042 | 704 | TYPE B CLASS I PAVE. LINE MARKING 24" | 175 | LF | $ 10.00 | $ 1,750.00 |
| | 701 | SIGN PANEL, POST, FOUNDATION | 1 | LS | $ 7,300.00 | $ 7,300.00 |
| 13108 | 504 | CG-12 DETECTABLE WARNING SURFACE | 50 | SY | $ 750.00 | $ 37,500.00 |
| | | **Sub-Total for Curb, Sidewalk, Pavement Markings, Misc.:** | | | | **$ 418,190.00** |
| **Erosion and Sediment Control / Seeding / Tree Protection** | | | | | | |
| | | E&SC, SEEDING LUMP SUM ($150,000 per mile) | 1.75 | MI | $ 150,000.00 | $ 262,500.00 |
| N/A | N/A | TREE PROTECTION, AIR SPADING | 1 | LS | $ 1,750,000.00 | $ 1,750,000.00 |
| N/A | N/A | TREE REMOVAL | 42 | EA | $ 500.00 | $ 21,000.00 |
| | | **Sub-Total for Erosion and Sediment Control / Seeding / Tree Protection:** | | | | **$ 2,033,500.00** |
| | | | | | | |
| | | | | | **Total** | **$ 3,475,000.00** |

*NOTE: This estimate is based on conceptual-level design only. The intention of this estimate as shown is to represent major construction cost items only, and the total shown here does not include all construction costs. Additional construction cost items (e.g. mobilization, survey, testing, etc.) are excluded from this summary.*

## APPENDIX C – Alternate Routing Heat Maps and Summary Tables

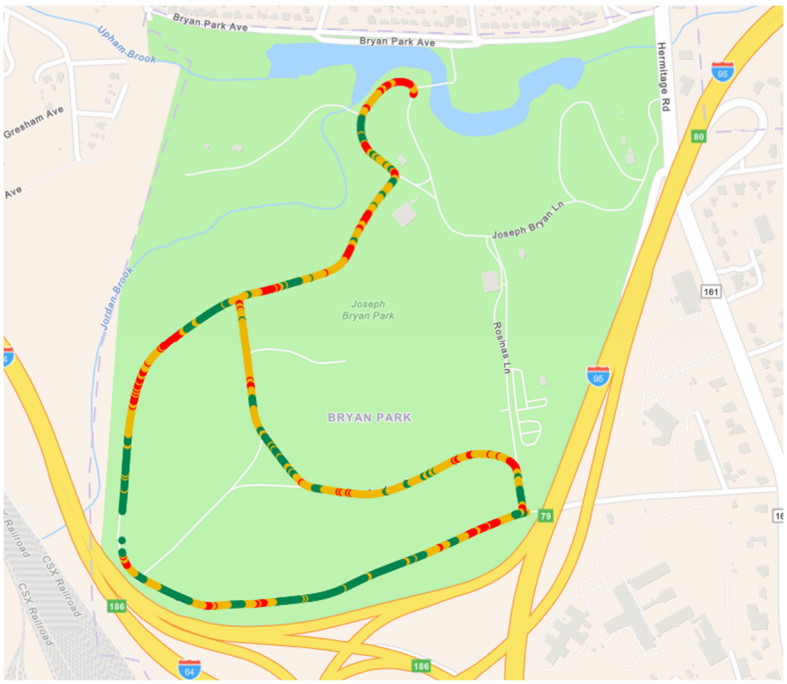



Figure – Maximum Cross Slopes Heat Map

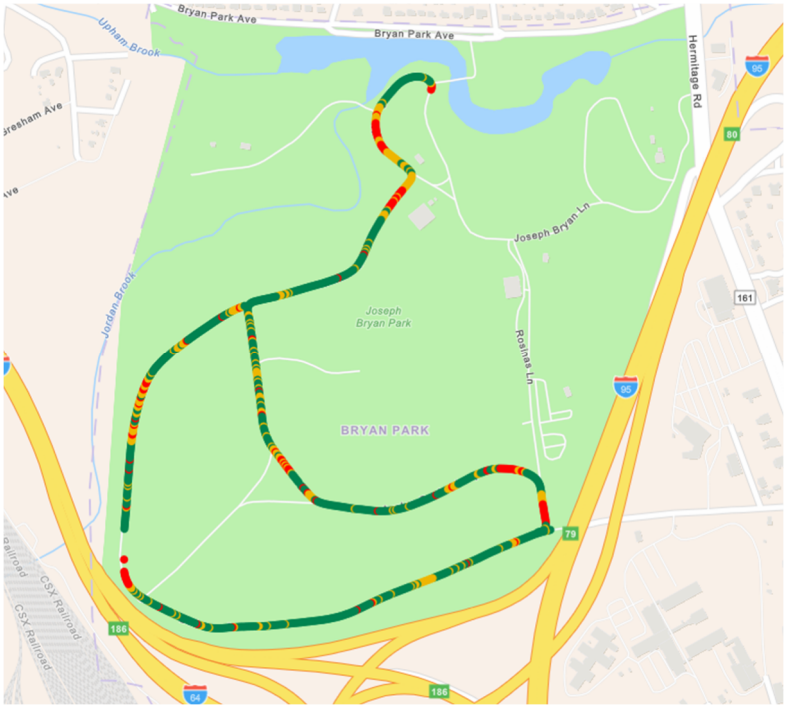



Figure – Maximum Longitudinal Slopes Heat Map

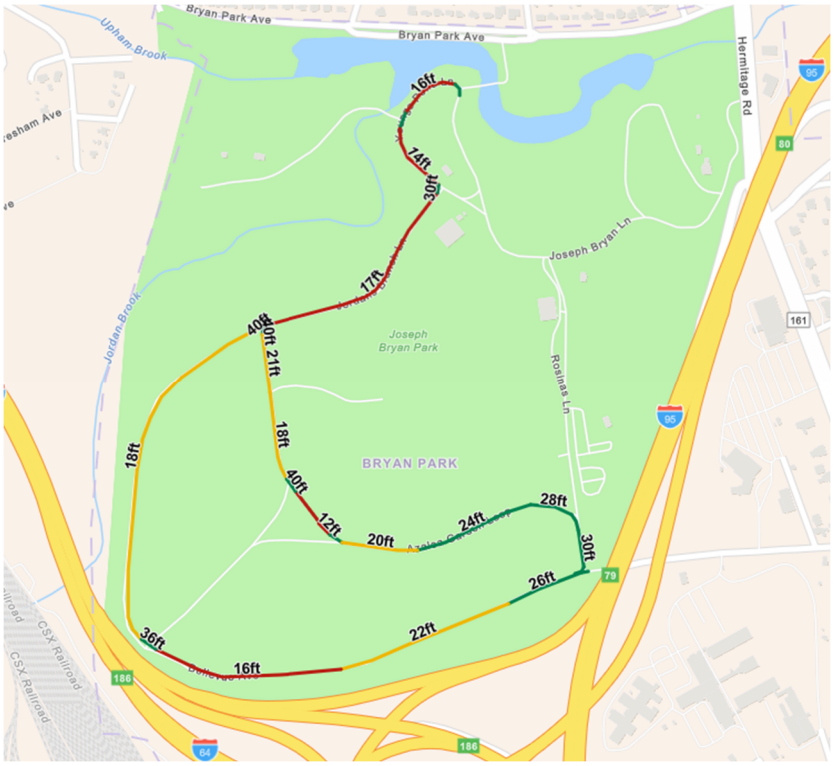



Figure – Pavement Widths Heat Map

**Bryan Park Measures: Cross-Slope Percent Max**

| | | | | Section 1 - Jordans Branch Ln | | | Section 2 - Azalea Garden Lp | | | Section 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | Total Count | Total Length (ft) | Total Percent | Count | Length (ft) | Percent | Count | Length (ft) | Percent | Count | Length (ft) | Percent |
| Low (-2% to +2%) | 336 | 3360 | 34% | 222 | 2220 | 49% | 68 | 680 | 22% | 46 | 460 | 20% |
| Mid (-5% to -2% & +2% to +5%) | 482 | 4820 | 49% | 156 | 1560 | 35% | 206 | 2060 | 67% | 120 | 1200 | 52% |
| High (<-5% & >+5%) | 168 | 1680 | 17% | 72 | 720 | 16% | 32 | 320 | 10% | 64 | 640 | 28% |
| | 986 | 9860 | 100% | 450 | 4500 | 100% | 306 | 3060 | 100% | 230 | 2300 | 100% |

**Bryan Park Measures: Running-Slope Percent Max**

| | | | | Section 1 | | | Section 2 | | | Section 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | Total Count | Total Length (ft) | Total Percent | Count | Length (ft) | Percent | Count | Length (ft) | Percent | Count | Length (ft) | Percent |
| Low (-5% to +5%) | 661 | 6610 | 67% | 330 | 3300 | 73% | 196 | 1960 | 64% | 135 | 1350 | 59% |
| Mid (-8% to -5% & +5% to +8%) | 209 | 2090 | 21% | 86 | 860 | 19% | 65 | 650 | 21% | 58 | 580 | 25% |
| High (<-8% & >+8%) | 116 | 1160 | 12% | 34 | 340 | 8% | 45 | 450 | 15% | 37 | 370 | 16% |
| | 986 | 9860 | 100% | 450 | 4500 | 100% | 306 | 3060 | 100% | 230 | 2300 | 100% |

**Bryan Park Measures: Pavement Widths**

| | | | | Section 1 | | | Section 2 | | | Section 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | Total Count | Total Length (ft) | Total Percent | Count | Length (ft) | Percent | Count | Length (ft) | Percent | Count | Length (ft) | Percent |
| Desirable (23'+) | 15 | 2335 | 23% | 3 | 583 | 12% | 9 | 1536 | 50% | 3 | 216 | 10% |
| Minimum (18' - 23') | 5 | 4344 | 43% | 2 | 3090 | 65% | 3 | 1254 | 41% | 0 | 0 | 0% |
| Requires Widening (<18') | 6 | 3407 | 34% | 1 | 1073 | 23% | 2 | 294 | 10% | 3 | 2040 | 90% |
| | 26 | 10086 | 100% | 6 | 4746 | 100% | 14 | 3084 | 100% | 6 | 2256 | 100% |

Table – Summary of Collected Information

## APPENDIX D – Alternate Alignment Tree Impact Assessment
## *(Alignment Option 2 & Option 3)*

*(Remainder of Page Intentionally Blank – See Next Page)*

TIMMONS GROUP

7053 Celebration Park Ave
Suite 300
Richmond, VA 23225

P 804.200.6500
F 804.560.1016
www.timmons.com

March 20, 2025

**Bryan Park: Fall Line Trail Alternative Route Study**
**Preliminary Tree Impact Assessment**

Intent:

This report details the findings of a tree impact analysis conducted by Timmons Group in February of 2025 regarding alternative corridors for the Fall Line Trail in Bryan Park in Richmond, Virginia. The alternative corridors deviate from the current proposed layout of the Fall Line Trail by following the path of Young's Pond Lane, Jordan's Branch Lane, and Azalea Garden Loop, which are existing service roads within the park. The asphalt roads, which wind through a mixed hardwood forest, are mainly used by pedestrians and service vehicles for park maintenance. The study was conducted at the request of the City of Richmond due to concerns regarding the impacts to existing trees along the current proposed layout of the Fall Line trail.

Methodology:

The following trees were documented:

- Trees with a diameter at breast height (DBH) of 4 inches or greater, present within a 20 feet offset from the edge of the existing pavement of the road or 30 feet from the centerline of the road, whichever was greater
- Trees with a DBH of 24 inches or greater present within a 20 feet offset from the edge of the existing pavement of the road, or within 30 feet of the centerline of the road, whichever was greater
- Tree removal projections are approximate. As described in the Alternatives Analysis by Timmons Group dated March 2025, a total of 23 feet of paved width is necessary to accommodate the Fall Line Trail and maintain access for occasional vehicles. The existing pavement width varies with 18 feet being typical for both routes discussed herein. To achieve the 23 foot width and allow for reconstruction operations, it is expected that modifications to the existing roads will require up to 18 inches of excavation within an 8 foot offset from the existing edge of pavement. For the purposes of this study, tree removal projections have been quantified based upon this 8 foot construction zone offset.

The intention of these parameters was to adequately capture all trees with critical root zones that would be impacted and/or removed due to construction and/or expansion of new hardscape required to meet VDOT standards for the construction of the Fall Line Trail. General tree species and their approximate locations were noted, as well as the presence of invasive species along the corridor. The assessment was conducted in 100 feet segments

along the alternate paths of the corridor. The accompanying exhibit was created to show the approximate locations with impacted trees, an approximate projection of tree removals, and areas where invasive species are present.

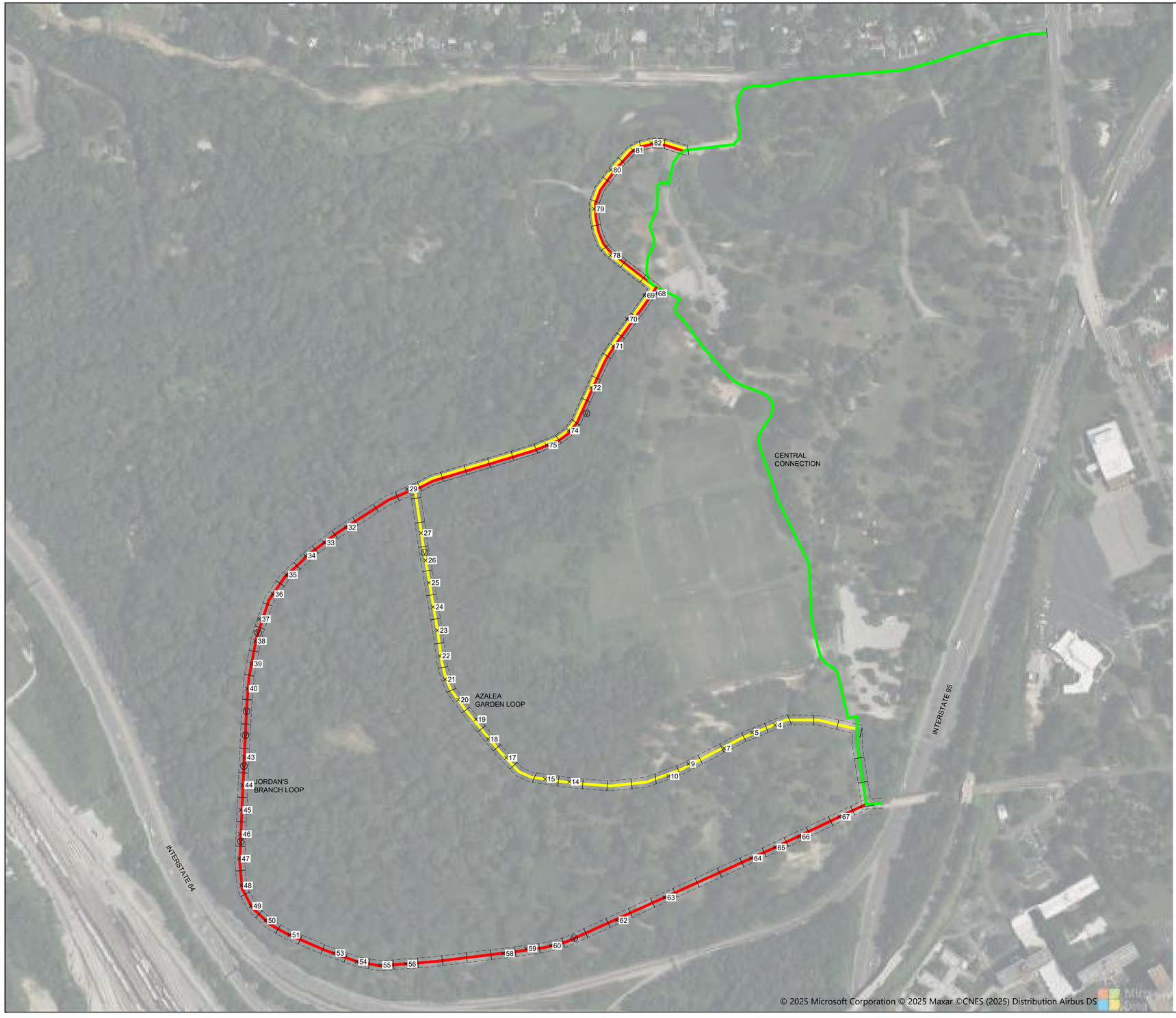
Findings:

60 trees on the Azalea Garden Loop alignment have critical root zones within the approximate limits of disturbance. Of those, approximately 42 are projected for removal. 91 trees on the Jordan's Branch Loop alignment have critical root zones within the approximate limits of disturbance. Of those, approximately 60 trees are projected for removal.

The documented trees range in size from 6-inch DBH to 44-inch DBH. All the species identified are species native to Virginia, including Carya, Fagus, Liriodendron, Liquidambar, Pinus, Platanus, Quercus, and Ulmus. Of the trees impacted, approximately 60% are oaks. Most of the trees assessed appear to be healthy, with a handful of exceptions. Some invasive species are present, specifically English Ivy and Honeysuckle. No invasive trees were noted.

Conclusion:

Along the Azalea Garden Loop alignment, 60 trees have critical root zones within the approximate limit of disturbance, with 42 projected for removal. Along the Jordan's Branch Loop alignment, 91 trees have critical root zones within the approximate limit of disturbance, with 60 trees projected for removal.




| ID | Azalea Garden Loop: Critical Root Zones Impacted |
|---|---|
| 4 | (1) 30" Quercus rubra |
| 5 | (1) 30" Quercus rubra |
| 7 | (1) 20" Quercus rubra |
| 9 | (1) 18" Quercus rubra |
| 10 | (1) 30"Quercus rubra |
| 14 | (1) 47" Quercus rubra |
| 15 | (1) 20" Pinus, (1) 18"Quercus rubra, (3) 12" Liriodendron |
| 17 | (1) 30"Quercus rubra |
| 18 | (1) 30" Quercus rubra |
| 19 | (1) 20" Quercus rubra |
| 20 | (1) 32" Quercus rubra |
| 21 | (1) 20" Quercus rubra, (3) 10" Liriodendron |
| 22 | (2) 20" Quercus rubra, (1) 6" Liriodendron |
| 23 | (1) 20" Quercus rubra (1) 6" Liriodendron |
| 24 | (2) 24" Quercus rubra, (1) 16" Quercus, (1) 20" Quercus |
| 25 | (1) Quercus rubra 20", (1) Quercus rubra 14" |
| 26 | (2) 20" Quercus rubra, (1) 8" Liriodendron |
| 27 | (3) 8" Liriodendron, (1) 8" Pinus |
| *68* | *(1) 21" Liquidambar* |
| *69* | *(1) 20" Pinus, (1) 20" Liriodendron, (1) 24" Quercus alba, (1) 16"Quercus alba* |
| *70* | *(2) 30" Quercus rubra* |
| *71* | *(1) 14"Liquidamber (1), 24" Liquidamber* |
| *72* | *(1) 24" Fagus* |
| *74* | *(1) 30" Liquidamber* |
| *75* | *(1) 30" Liquidamber, (1) 40" Liquidamber* |
| *77* | *(1) 20"Quercus rubra* |
| *78* | *(1) 24"Quercus alba, (1) 14"Quercus alba* |
| *79* | *(1) 24"Quercus alba, (2) 16" Quercus alba* |
| *80* | *(2) 10"Quercus rubra* |
| *81* | *(1) 24"Quercus rubra* |
| *82* | *(1) 36" Quercus rubra* |

TOTAL TREES IMPACTED: 60
PROJECTED TOTAL TREE REMOVALS: 42

| ID | Jordan's Branch Loop: Critical Root Zones Impacted |
|---|---|
| 29 | (1) 30" Fagus, (1) 24" Quercus rubra |
| 32 | (1) 24" Pinus, (1) 24" Quercus rubra, (1) 24" Quercus |
| 33 | (1) 18"Quercus rubra, (1) 24"Fagus |
| 34 | (1) 20"Quercus rubra |
| 35 | (2) 20" Quercus rubra |
| 36 | (1) 22"Quercus rubra |
| 37 | (1) 28" Quercus rubra |
| 38 | (1) 24" Quercus rubra, (1) 8"Pinus, (1) 24" Liriodendon |
| 39 | (1) 12"Liriodendron, (1) 20"Liquidambar, (1) 20"Quercus rubra |
| 40 | (1) 16" Ulmus |
| 43 | (1) 32" Quercus rubra |
| 44 | (1) 20"Liriodendron |
| 45 | (1) 34" Liriodendron |
| 46 | (1) 30" Liquidamber |
| 47 | (1) 36"Quercus rubra, (1) 16"Quercus rubra, (1) 16" Liquidamber, (1) 24" Pinus |
| 48 | (5) 8-10" Pinus,(1) 8" Quercus phellos, (1) 36" Quercus rubra |
| 49 | (3) 16" Pinus, (1) 36"Quercus rubra |
| 50 | (1) 20" Quercus rubra |
| 51 | (1) 24" Quercus alba, (1) 24" Quercus rubra, (3) 18" Pinus |
| 53 | (2) 28" Quercus rubra, (1) 14"Quercus rubra |
| 54 | (2) 24" Quercus alba |
| 55 | (2) 20" Quercus alba |
| 56 | (1) 26" Quercus alba, (1) 24" Quercus alba,(1) 20: Quercus rubra |
| 58 | (1) 36" Quercus alba |
| 59 | (1) 36" Quercus alba, (1) 30" Quercus rubra |
| 60 | (1) 20" Carya, (1) 46" Quercus alba |
| 62 | (2) 36" Quercus rubra, (1) 30" Quercus alba |
| 63 | (1) 42" Quercus rubra, (1) 24" Quercus alba |
| 64 | (1) 24" Quercus alba |
| 65 | (1) 44" Quercus alba |
| 66 | (1) 20" Quercus alba |
| 67 | (1) 30" Quercus alba |
| *68* | *(1) 21" Liquidambar* |
| *69* | *(1) 20" Pinus , (1) 20" Liriodendron, (1) 24" Quercus alba, (1) 16"Quercus alba* |
| *70* | *(2) 30" Quercus* |
| *71* | *(1) 14"Liquidamber (1) 24" Liquidamber* |
| *72* | *(1) 24" Fagus* |
| *74* | *(1) 30" Liquidamber* |
| *75* | *(1) 30" Liquidamber, (1) 40" Liquidamber* |
| *77* | *(1) 20"Quercus rubra* |
| *78* | *(1) 24"Quercus alba, (1) 14"Quercus alba* |
| *79* | *(1) 24"Quercus alba, (2) 16" Quercus alba* |
| *80* | *(2) 10"Quercus rubra* |
| *81* | *(1) 24"Quercus rubra* |
| *82* | *(1) 36" Quercus rubra* |

TOTAL TREES IMPACTED: 91
PROJECTED TOTAL TREE REMOVALS: 60

NOTES:

1. TREES INDICATED BY ITALICS DENOTE AREAS WHERE ROUTES OVERLAP
2. ASSESSMENT CONDUCTED BY TIMMONS GROUP FEBRUARY OF 2025

KEY:

(V) INDICATES PRESENCE OF INVASIVE SPECIES

# Tree Impact Assessment

Bryan Park Fall Line Trail - March 20, 2025

SCALE 1"=200'
0 200' 400'

TIMMONS GROUP
ENGINEERING | DESIGN | TECHNOLOGY

\\timmons.com\tgfs\200\203\63763-FLT_BryanPark\DWG\Sheet\Exhibit\2025 Tree Impact Assessment\63763-XPTREE-EXHIBIT.dwg | Plotted on 3/20/2025 10:03 AM | by MaryKate Weaver

## APPENDIX E – Cyclist Sign Examples


"SLOW – Congested Trail Area Ahead"
Caution Sign with Wood Post
Pocahontas State Park, Chesterfield, VA


"Cyclists Yield to Pedestrians/Hikers"
Posted on a Mile Marker/Guide Post
Pocahontas State Park, Chesterfield, VA


“PLEASE WALK YOUR BIKE THROUGH THE OLYMPIC SCULPTURE PARK. THANK YOU!”
Custom A-Frame Sign
Olympic Sculpture Park, Seattle, WA