



Planning Board Tour: Purple Line/Capital Crescent Trail (replacing the Georgetown Branch Trail)

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Description

This memo provides background information for a tour of segments of the Capital Crescent Trail in Bethesda and in Rock Creek Park on November 3, 2011. The tour is in advance of a Planning Board item scheduled for November 17, 2011, during which the Board will be asked to make recommendations to the County Council on several trail related items with major potential cost impacts. Staff from coordinating agencies will be in attendance, including the Planning Department, Parks Department, DOT, and MTA.

The tour will include about 1.5 miles of walking. Portions of the walking tour can be conducted in the event of rain, so please dress appropriately and bring an umbrella if rain is in the forecast. The itinerary for the tour is provided below, as are a summary of the major points from the white paper and a series of questions and responses to clarify what is presented in the white paper.

Summary

No Planning Board action is required at this time. This tour is being held to familiarize the Board with the issues and to determine what additional information the Board may need to make recommendations on this project at their November 17th meeting. Following the tour, staff will formulate recommendations for the 11/17 discussion.

Any substantive questions that arise during the tour will be summarized for the discussion on November 17th.

Discussion

The Maryland Transit Administration (MTA) is seeking guidance on whether to include several items in the design of the Capital Crescent Trail. The trail would be built in conjunction with the Purple Line but the construction would be County-funded.

MTA has prepared a white paper (Attachment A) outlining four of the items:

- landscaping/hardscaping
- lighting
- emergency call boxes, and
- whether to construct the trail in the tunnel beneath Wisconsin Ave as currently planned.

The first three items have not been factored into existing cost estimates for the trail.

The fourth item, the portion of the trail that runs in a tunnel under the Apex Building, Wisconsin Ave, and the Air Rights Building in Bethesda and above the Purple Line, represents about 43% of the total trail cost. Under this planned scenario, there are risks to the Apex Building because 35 existing columns supporting the building would need to be reconstructed or strengthened and 3 bracing grade beams would need to be relocated/reconfigured along Elm Street. Temporary supports for the Apex Building would need to be constructed. It is unclear how much of this risk would remain if only the Purple Line was constructed in the tunnel. This cost and concerns about risk associated with construction, have caused some stakeholders to question whether both the Purple Line and the trail should be built in the tunnel or whether the only the Purple Line should be built in the tunnel.

A fifth item – the connection between the Capital Crescent Trail and the Rock Creek Trail – is not included in the white paper, but MTA has asked for guidance on the type of connection to design. A switchback connection was envisioned in the Purple Line Functional Master Plan (2010) and the Facility Plan for the Capital Crescent and Metropolitan Branch Trails (2001), but just improving existing connections could be considered as a way to reduce costs if found to be acceptable, either as a temporary or permanent solution.

Background

The Capital Crescent Trail is part of a planned regional network of off-road multi-use trails that forms a crescent as it travels from Georgetown to Silver Spring via Bethesda in the Georgetown Branch right-of-way. Montgomery County purchased the right-of-way in 1988 from the DC Line to the CSX tracks just west of Silver Spring. M-NCPPC has jurisdiction over the portion between the DC Line and Bethesda and the Montgomery County Department of Transportation has jurisdiction over the portion between Bethesda and Silver Spring. In 1990, the National Park Service acquired the Georgetown Branch from Georgetown to the DC Line.

The Capital Crescent Trail is now paved from Georgetown to Bethesda. The right-of-way from Bethesda to Silver Spring is currently called the Interim Georgetown Branch Trail and has a gravel surface trail. It will be paved in conjunction with the Purple Line project, currently estimated to start in 2015 and end in 2020, at which time this segment will take the Capital Crescent Trail name as well. This segment will be 12 ft wide with 2 ft unpaved shoulders on each side. It will serve both a recreational and commuter function (see map below).

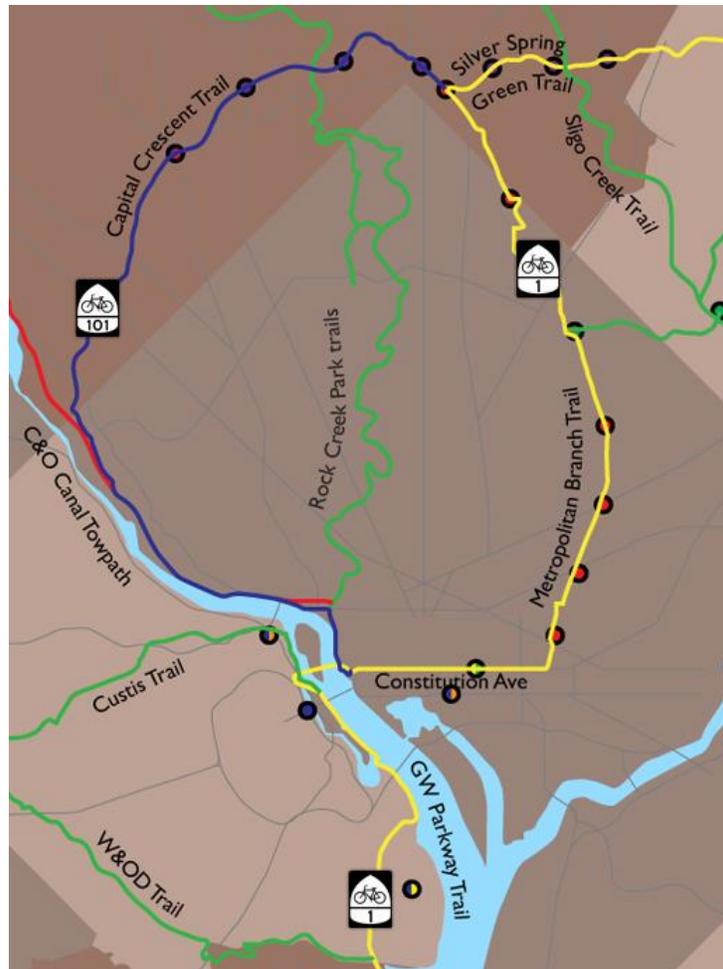


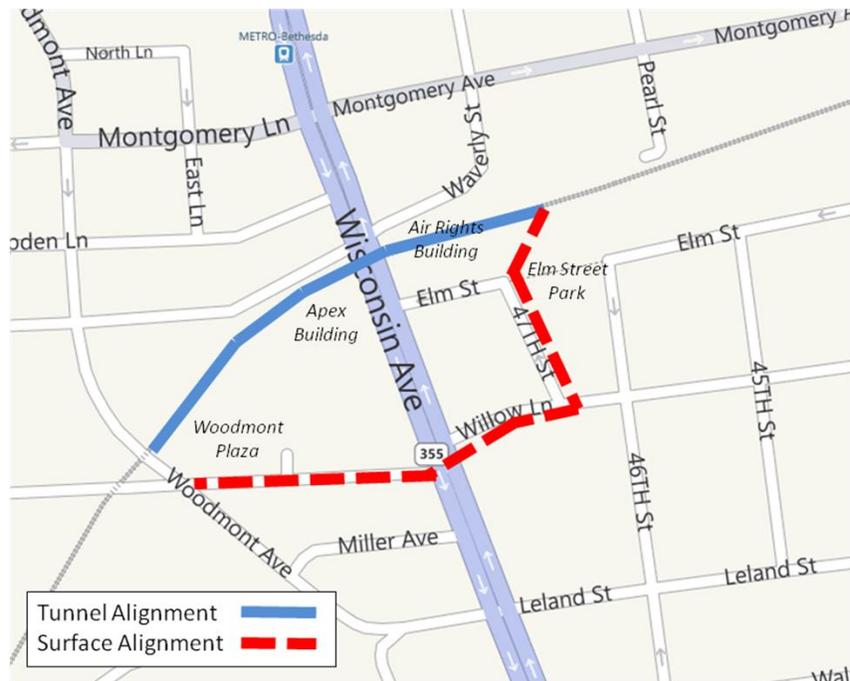
Illustration of Regional Trails

Both a train and a trail have been envisioned in the Georgetown Branch right-of-way between Bethesda and Silver Spring for over 20 years. The Georgetown Branch Master Plan Amendment (1990) recommended that this portion of the Georgetown Branch right-of-way include a predominately single track trolley route and a 10 ft hiker/biker path. The Purple Line Functional Master Plan (2010) extended the Purple Line to the Prince George’s County line and recommended a dual track light rail system with a 12 ft trail.

Between Woodmont Plaza and Elm Street Park in Bethesda, there are two approved master-planned alignments for the Capital Crescent Trail shown in the map below. Both would be permanent segments of the trail.

The “tunnel alignment,” shown as a solid blue line, starts at Woodmont Plaza and travels east beneath the Apex Building, Wisconsin Avenue, and the Air Rights Building before emerging at Elm Street Park. The tunnel alignment would be constructed in conjunction with the Purple Line. The tunnel alignment provides an efficient connection to downtown Bethesda and to the existing trail between Bethesda and Georgetown, as it avoids an at-grade crossing at Wisconsin Avenue.

The “surface alignment,” shown as a dashed red line, also starts at Woodmont Plaza, travels east on the north side of Bethesda Avenue, crosses Wisconsin Avenue at a signalized intersection, continues onto Willow Lane, and then heads north through Elm Street Park. Completion of the surface alignment is included in the County’s Capital Improvement Program as the Bethesda Bikeway and Pedestrian Facilities project (see Attachment B). The project is on hold for the construction of the Lot 31 joint development/mixed use project, but is scheduled to be constructed in FY 2013. The surface alignment is also advantageous, since it provides local access and will be the only connection to Woodmont Plaza and the Capital Crescent Trail west of Bethesda when the tunnel is temporarily closed during Purple Line construction.



*Location of Capital Crescent Trail
“Tunnel Alignment” and “Surface Alignment”*

The Capital Crescent Trail is an important part of the countywide trail and bikeway network and will connect to three other major trails, as shown in the map on page 3.

- The Silver Spring Green Trail is in various stages of completion and will run between Spring Street and Sligo Creek Parkway along Second Ave and Wayne Ave; some portions will also be constructed with the Purple Line.
- The Metropolitan Branch Trail is in various stages of completion and will run from the Silver Spring Transit Center to Union Station in DC.
- The Rock Creek Trail will also connect to the Capital Crescent Trail.

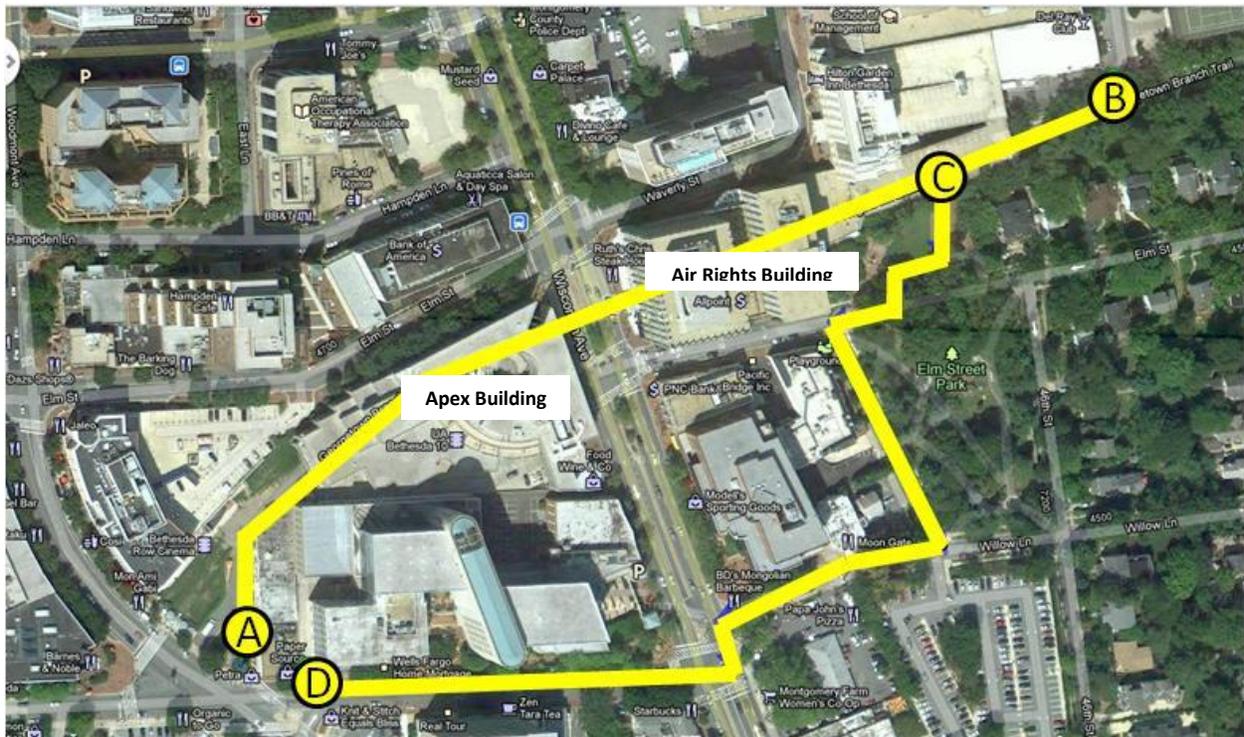
MTA recently received permission for the Purple Line to enter the Preliminary Engineering phase by the Federal Transit Administration. It is in this phase when more detailed engineering of the Purple Line and the trail will be developed. The current cost estimate for the trail is \$93.9 million in 2011 dollars.

Tour Itinerary

The tour will include two stops.

Stop #1: Woodmont Plaza in Bethesda

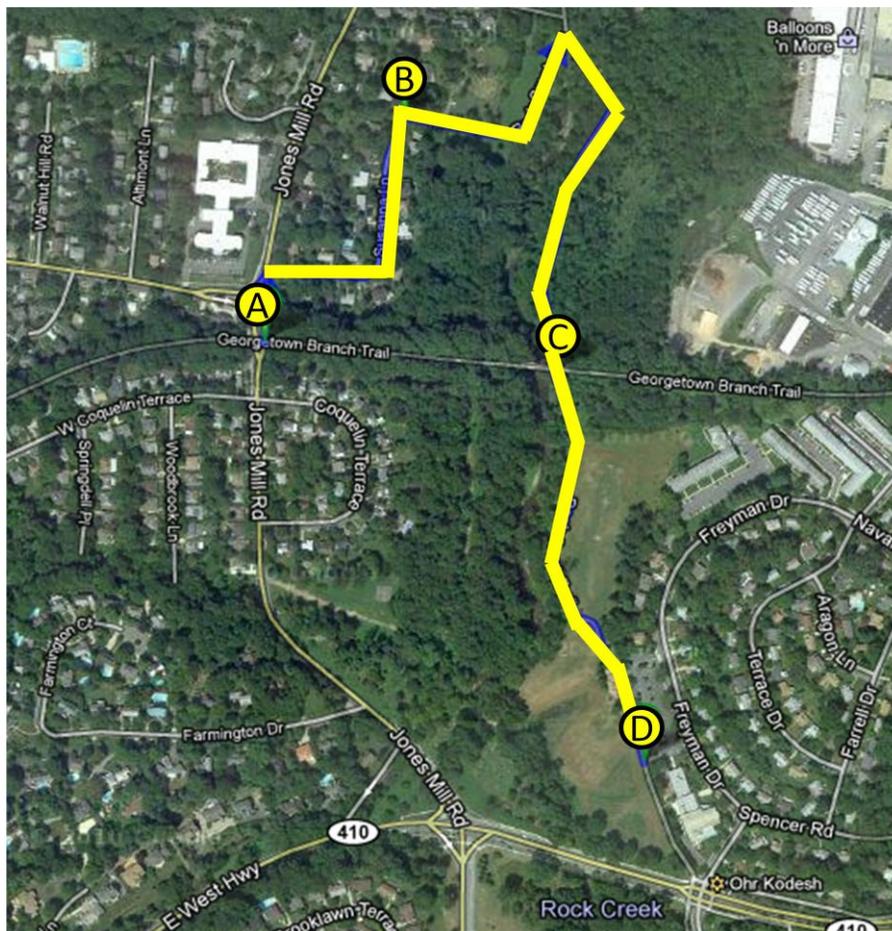
- The tour will start at Woodmont Plaza in Bethesda. This is across the street from the Barnes & Noble and identified as Point A in the map below.
- As the tour proceeds through the “tunnel alignment” of the Capital Crescent Trail, MTA will discuss the four issues presented in the white paper. The tour will proceed as far as Pearl Street, identified as Point B in the map below.
- The tour will return to Woodmont Plaza along the “surface alignment” of the Capital Crescent Trail, walking from Point B to Point C to Point D. Staff from DOT will provide an update on the status of the CIP project for the surface alignment.
- Total walking: 0.6 miles



Walking Tour in Bethesda

Stop #2: Rock Creek Park

- The second stop will view four potential connections between the Capital Crescent Trail and the Rock Creek Trail. These connections are illustrated on Attachment C and described in Attachment D. They are summarized on page 10 of this memo.
- The bus will stop at the intersection of Jones Mill Road and the Interim Georgetown Branch Trail, identified as Point A on the map below. The tour group will walk a short distance north on Jones Mill Road, turn onto Susanna Lane, and then continue onto a neighborhood connection to the Rock Creek Trail, that starts at Point B on the map below.
- The tour group will continue walking south along the Rock Creek Trail and stop at Point C to discuss the two potential switchback connections to the Capital Crescent Trail.
- The tour group will continue walking south along the Rock Creek Trail to the synagogue parking lot identified as Point D. The tour will continue onboard the bus at this location and view the planned connection to the Capital Crescent Trail on Freyman Drive and Terrace Drive.
- Walking distance: 0.9 miles



Walking Tour in Rock Creek Park

Summary of White Paper

The following bulleted list is intended to identify the major points in the white paper, included as Attachment A. Attachment E is an appendix to the white paper, and includes detailed cost estimates, typical sections, and renderings of the Bethesda station and trail. Note that all costs are in 2011 dollars.

Capital Crescent Trail

- The total cost to construct the Capital Crescent Trail is estimated to be \$93.9 million. This includes \$68.2 million in construction costs, \$21.8 million in engineering services, and \$3.8 million in unallocated contingencies, as shown in the table below.
- The cost does not include provisions for lighting, emergency call boxes, or supplemental landscaping and hardscaping. It includes a planned switchback connection between the Capital Crescent Trail and the Rock Creek Trail and the trail over the Purple Line in the tunnel beneath Wisconsin Avenue.

Item	Neat Construction	Engineering Services	Unallocated Contingency	Total	% Total
Apex Building	\$19.6	\$6.3	\$1.1	\$27.0	28.7%
Wisconsin and Air Rights Building	\$9.8	\$3.1	\$0.6	\$13.5	14.4%
Other Segments of Trail	\$38.8	\$12.4	\$2.2	\$53.5	56.9%
Total	\$68.2	\$21.8	\$3.8	\$93.9	100.0%

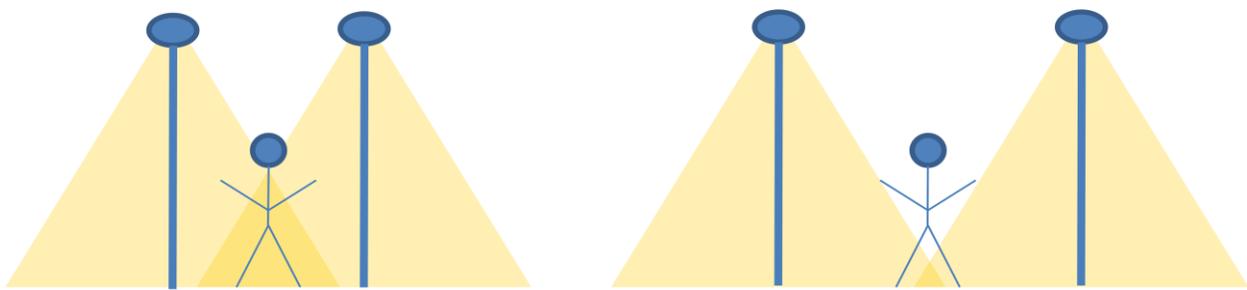
Tunnel Alignment

- MTA has the following concerns regarding the tunnel:
 - Cost: The cost to construct the trail in the tunnel is \$40.5 million, or about 43% of the total cost of the trail, even though it represents only about 4% of the length of the trail.
 - Risk: High due to construction directly impacting the Apex Building and possible claims as a result. Under this planned scenario, there are risks to the Apex Building because 35 existing columns supporting the building would need to be reconstructed or strengthened and 3 bracing grade beams would need to be relocated/reconfigured along Elm Street. Temporary supports for the Apex Building would need to be constructed. While MTA has not advanced the design of an option with only the Purple Line in the tunnel to a level where a firm determination of these impacts and risks can be made, it is likely that some columns or bracing grade beams would still be impacted.
 - Constructability / Engineering: Difficult and inefficient. The truss structure for the trail will have to be constructed outside of the tunnel (near the Air Rights Building) and moved into the tunnel.
 - User Experience: Constricted vertical clearance between 8 and 9 ft through tunnel. AASHTO recommends an 8 ft minimum, 10 ft preferable for passage of maintenance and emergency vehicles for shared use paths.
- Wisconsin Ave Bridge and Air Rights Building
 - Wisconsin Ave is carried over the Georgetown Branch right-of-way via a bridge.
 - The Air Rights Building is located above the Georgetown Branch right-of-way to the east of Wisconsin Ave.

- The physical constraints for installing the trail over the Purple Line are driven by the location of the Wisconsin Ave Bridge.
- The trail beneath Wisconsin Ave and the Air Rights Building costs \$13.5 million, or about 14% of the total cost of the Capital Crescent Trail.
- Apex Building
 - The Apex Building is located above the Georgetown Branch right-of-way to the west of Wisconsin Ave.
 - Ground level would need to be lowered by 8 to 10 ft to accommodate both the Purple Line and Capital Crescent Trail. As a result:
 - At least 35 existing columns supporting the building would need to be modified, strengthened, or reconstructed
 - Temporary supports would need to be constructed to support the building while the grade is lowered and the columns are modified, strengthened, or reconstructed.
 - 3 bracing grade beams would need to be relocated/reconfigured on Elm Street.
 - Challenges
 - The building will require constant monitoring throughout construction for settlement or rotation.
 - If building settlement or rotation occurs, construction would be halted and the building would be evacuated.
 - The costs of the modifications and the risks associated with the construction may exceed the cost to acquire the building.
 - The cost associated with accommodating the trail with respect to the Apex Building and making adjustments to the Apex Building is \$27.0 million, or about 28% of the total cost of the Capital Crescent Trail. This does not include any costs that could be incurred if building settlement or rotation occurs.

Trail Lighting

- Since the Capital Crescent Trail will be a commuter trail and will be used to access the Purple Line stations, it is expected that pedestrians and cyclists will be using it during hours of darkness.
- Current Montgomery County practice for a trail within the public right of way that expects significant use during darkness requires all portions of the trail to be lit for safety concerns.
- The pole spacing for lighting depends upon the vertical illuminance that is provided (see illustration below). MCDOT's lighting standard is less than the industry standard, which provides for facial recognition.



Industry Lighting Standard

Montgomery County Lighting Standard

- Montgomery County lighting standards require a pole spacing of 70 ft or about 450 light poles. The cost to provide lighting in line with Montgomery County standards is about \$3.1 million.
- Industry lighting standards require a pole spacing of about 50 ft, or about 600 light poles. The cost to provide lighting in line with industry standards is \$7.3 million.
- Operating costs were not provided.

Emergency Call Boxes

- It is Montgomery County’s practice to install call boxes as a way to create a safe environment.
- Call boxes – if installed – should be located every ¼ mile and at key points like stairwells and tunnels.
- Additional cost is approximately \$0.4.

Landscape and Hardscape Requirements

- The existing trail cost estimate includes landscaping and hardscaping in the area between the Purple Line and the Capital Crescent Trail.
- The type of landscaping and hardscaping that is envisioned with the current cost estimate is not as extensive as has been depicted in some of the renderings (see image below).
- Additional trail costs to include landscaping and hardscaping include:
 - \$1.2 million for landscaping along the outside edge of the Capital Crescent Trail adjacent to the community.
 - \$0.4 million for landscaping at key locations such as trail connections and in the vicinity of stations.
 - \$0.1 million for 40 six-foot benches.



Rendering of Capital Crescent Trail with Landscaping on Both Sides of Trail

Cost Summary

The total cost of including these additional items: industry standard lighting, emergency call boxes, and additional landscaping and hardscaping treatments, is about \$9.4 million. This is in addition to the \$93.9 million cost of the project.

Additional Guidance MTA is Seeking on the Connection to the Rock Creek Trail

MTA would like guidance on whether to continue to design the connection between the Capital Crescent Trail and the Rock Creek Trail. There are four options illustrated in Attachment C and evaluated in Attachment D. None of the options have been evaluated for environmental impacts.

- Currently, there are two connections between the Interim Georgetown Branch Trail and the Rock Creek Trail. Both require leaving the trail for about one-third of a mile, or about a six minute walk. Both connections would likely be enhanced if Connection #2 is not constructed.
 - Connection #1: Susanna Lane. A formal connection currently exists between the Interim Georgetown Branch Trail and the Rock Creek Trail via Susanna Lane, just off of Jones Mill Road.
 - Connection #3: Freyman/Terrace Drive. An existing connection between the Interim Georgetown Branch Trail and the Rock Creek Trail exists along Freyman Drive and Terrace Drive.
- Connection #2: Construct switchback. Since the Capital Crescent Trail is elevated above the Rock Creek Trail, this would require a switchback connection at the intersection of the two trails. It was recommended in the Purple Line Functional Plan (2010) and the Capital Crescent and Metropolitan Branch Trails Facility Plan (2001).
- Connection #4. Construct extension from Jones Mill Road switchback. This recently proposed connection starts at the Jones Mill Road switchback and extends east along the Georgetown Branch. It includes a new bridge across Rock Creek.

Clarifying Questions and Responses as Additional Background

This section presents a series of questions and responses to clarify the issues presented in the MTA white paper.

Question: If the Wisconsin Ave Bridge were to be reconstructed, can the depth of the bridge be reduced so that it would be possible to locate the trail over the Purple Line without having to lower ground level by 8 to 10 ft and thereby necessitating reconstruction or strengthening of the columns supporting the Apex Building?

Response: No, the Wisconsin Ave Bridge structure is only a few feet deep. Its depth could not be reduced by the 8 to 10 ft that would be needed to avoid reconstructing and strengthening the columns while keeping the trail over the Purple Line.

Question: If the trail is not built above the Purple Line in the tunnel, would there be changes to the Elm Street Park connection, the planned new entrance to the Metrorail Red Line (the Bethesda South Entrance project) on Elm Street, or the switchback connection in the approved Woodmont East building?

Response: This would have the following affect on adjacent projects:

- The Bethesda South Entrance project would not need to be modified substantially or at all.
- The Elm Street Park connection may need to be widened and the sidewalk along 47th Street may need to be widened to a 12 ft trail with impacts to the park, since the “surface alignment” of the Capital Crescent Trail would be the only connection to downtown Bethesda.
- The switchback in the approved Woodmont East building would no longer be needed.

Question: Would the Apex Building have to be torn down during the construction of the Purple Line and the Capital Crescent Trail to reduce associated cost and risk?

Response: Yes, the elevation of the tracks and the trail are fixed due to the elevation of the Wisconsin Ave Bridge. If the Apex Building remains in place during the construction of the Purple Line and Capital Crescent Trail, the ground level would still have to be excavated by 8 to 10 ft, which is the driver of the additional cost and risks.



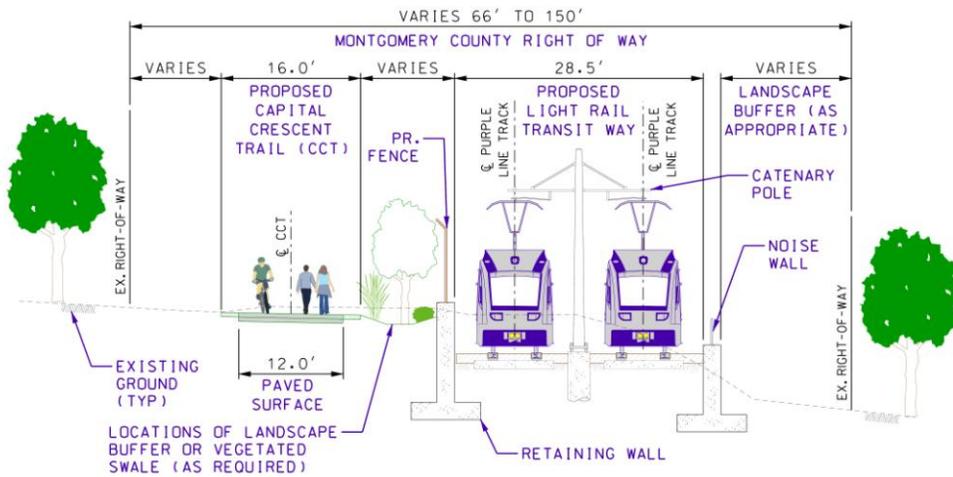
**Capital Crescent Trail
Considerations for Montgomery County**

October 2011

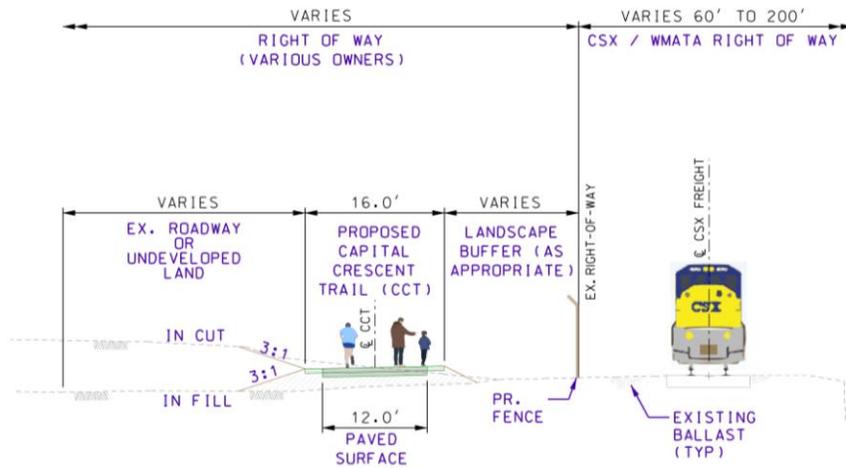


I. Introduction

The Capital Crescent Trail (CCT) is a mixed use trail that will be constructed from the Bethesda Station to the Silver Spring Transit Center where it will connect to the Metropolitan Branch Trail and the Silver Spring Green Trail (a Montgomery County Project that will likely be constructed at the same time as the CCT, but is not part of the project). The CCT is envisioned to be both a recreational trail and a commuter trail. As a commuter trail it will connect residential communities to proposed Purple Line stations at Bethesda, Connecticut Avenue/Chevy Chase Lakes, Lyttonsville, Woodside and Silver Spring Transit Center. The CCT is proposed to be adjacent to the Purple Line transitway along the north side from Bethesda to Lyttonsville. East of Lyttonsville the CCT and the Purple Line split and run on opposite sides of the CSX/WMATA corridor until it reaches the Silver Spring Transit Center. The trail will run along the north side of this corridor with the Purple Line running on the south side of the corridor. The trail will be paved, and will typically be 12' wide with 2-foot unpaved shoulders on each side. Refer to the typical sections below.



Typical Section Bethesda to Lyttonsville



Typical Section Lyttonsville to Silver Spring Transit Center

The current estimated total construction cost of the CCT is \$68.25 M (2011 dollars). The total trail cost of \$93.94 M (2011 dollars) includes engineering services (engineering through construction) and unallocated contingencies. Refer to Appendix 1 for the May 2011 trail cost breakdown that was presented in 2010 dollars and does not include updated costs covered in this paper. Appendix 1 also includes mapping that defines the components of the trail cost that are either costs assigned to the trail, costs shared between the trail and the Purple Line Transitway, or costs that are assigned fully to the Purple Line Transitway. This cost does not include provisions for trail lighting, emergency communications, and supplemental landscape and hardscape features. County decisions required on these topics are covered later in this white paper.

A significant component of the trail cost is related to both the CCT and the Purple Line occupying the space beneath the existing Apex Building, Wisconsin Avenue and the Air Rights Building. Refer to the table below that summarizes the costs related to the various components of the trail. This white paper outlines updated costs, some of the risks associated with constructing both the CCT and the Purple Line in this space and new issues that have come to light upon further investigation and design of the Bethesda Station.

Location	Neat Construction (Millions)	Engineering Services (Millions)	Unallocated Contingency (Millions)	Total (Millions)	% Total
Apex Building	\$19.60	\$6.27	\$1.11	\$26.98	28.7%
Wisconsin and Air Rights Building	\$9.80	\$3.14	\$0.55	\$13.49	14.4%
Other Segments of Trail	\$38.85	\$12.43	\$2.19	\$53.47	56.9%
Total	\$68.25	\$21.84	\$3.85	\$93.94	100.0%

The Capital Crescent Trail will be planned and built as part of the Purple Line, but construction will be funded by sources to be identified by Montgomery County and MTA. This white paper is being prepared to assist Montgomery County in defining their ultimate vision for the permanent Capital Crescent Trail. The decisions made by the County will be coordinated with the Maryland Transit Administration (MTA) to ensure that the Purple Line is designed to accommodate this ultimate vision. They are meant to help define a long-term vision for the trail and some elements may be implemented over time.

II. Trail at Bethesda Station

a. LPA Alignment Description

Several alternatives have been investigated for the Bethesda Terminal Station for the Maryland Transit Administration's (MTA) Purple Line in Montgomery County, Maryland. The Locally Preferred Alternative (LPA) layout includes a station with two (2) curved platforms beneath the Apex Building with tail or run out tracks and bumping posts extending into the Woodmont East development parcel, located to the west of the Apex Building. Side platforms would be provided under the Apex Building, with access from the street level via elevators and stairs at the corner of Elm Street and Wisconsin Avenue, as well as pedestrian access from Woodmont East. The station will be constructed around the existing columns and caisson foundations, which would protrude through the platforms. These columns will impede pedestrian flow and boardings and alightings. In order to provide adequate platform length and to meet the required vehicle clearances, the platform requires a slight horizontal curve. Patrons would have access to the proposed Washington Metropolitan Area Transit Authority (WMATA) Bethesda South Access entrance at the corner of Elm Street and Wisconsin Avenue from the station.

The Interim Capital Crescent Trail (CCT) currently runs along the former Georgetown Branch of the Baltimore & Ohio (B&O) Railroad corridor through Bethesda. As part of the LPA layout, the CCT would be on an aerial structure above the tracks that gained elevation through a switchback ramp in the Woodmont East plaza. The alignments then continue east, beneath the Maryland State Highway Administration bridge that carries MD 355 (Wisconsin Avenue) over the former Georgetown Branch corridor, on a proposed rigid box structure. Beneath the Air Rights Building, a bridge structure is included to carry the CCT out of the buildings and back down to grade. A connection between the CCT and Elm Street Park will be provided. Refer to the LPA roll map and typical sections that show the arrangement of the Purple Line at several key points of interest along the alignment.

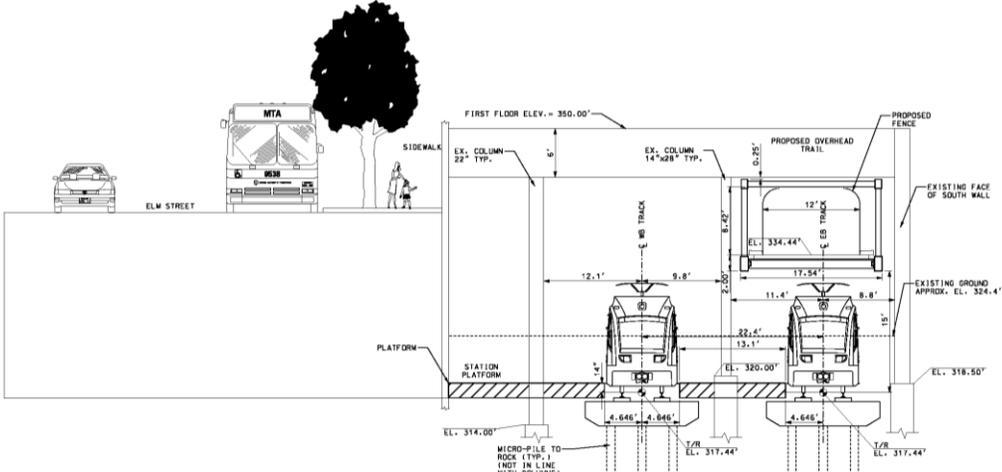
b. Goals & Challenges

The goals of the Bethesda Station are to present a welcoming station experience; to provide platforms of sufficient width for the expected ridership of 11,500 weekday boardings; to maximize the available space; to minimize the impacts to the existing structures, the risks associated with construction and re-development of properties surrounding the station/alignment, and the

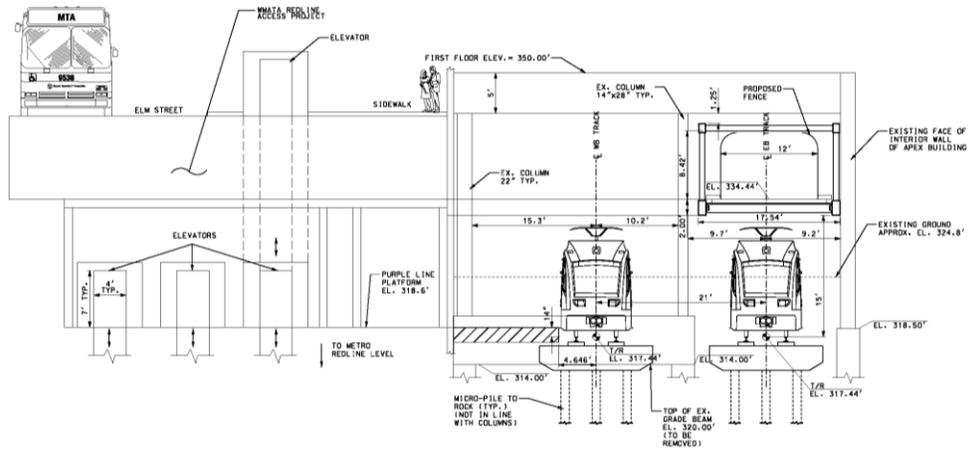
cost of the project; to include tail tracks or over run tracks beyond the platform for two (2) tracks to facilitate operational viability of the terminal station without sacrificing the efficiency of the station; and to accommodate the CCT. Accommodating the trail, while still meeting the other area project goals, is an extremely difficult task. Although technically feasible, the risks and costs associated with the proposed stacking of the CCT above the Purple Line are substantial, as demonstrated below.

- c. Investigation
 - i. Apex Building

A recent study was conducted to determine the viability of placing the station and the trail in the same footprint of the former Georgetown Branch right-of-way. In order to accommodate the construction of the trail above the Purple Line, but beneath the existing Apex Building, the reconstruction or strengthening of at least 35 existing columns would be required, as well as the relocation/reconfiguration of the 3 bracing grade beams along Elm Street to provide enough room for station platforms. The column foundations for the existing building are made up of unreinforced caissons that are founded on bedrock. The first floor of the Apex Building is a transfer slab to these columns, which means that the columns cannot be relocated in order to minimize impacts to the foundations/columns. In order to accommodate the CCT and the Purple Line, the ground surrounding the unreinforced caissons



Typical Section through Apex Building and Station Platforms



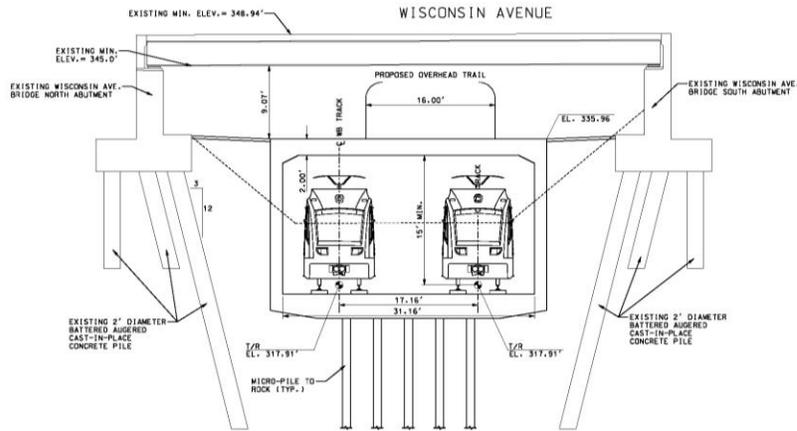
Typical Section through Apex Building at WMATA Access Point

would need to be lowered by approximately 8 to 10 feet, resulting in the need to modify and strengthen or replace the columns/caissons. The elevations of the tops of these caissons in the Apex Building are high enough such that the trail and the tracks cannot both be constructed without exposing the unreinforced caissons. These columns and caissons are near their intended structural capacities, which further complicates the process of lowering the grade while safely and effectively supporting the structure above it. Because the caissons are unreinforced, the surrounding ground is acting as the confining element that interacts with the structural element to provide the capacity. Removing this surrounding soil would compromise the caisson's structural integrity and require the construction of temporary foundations and support frames to transfer the loads off the columns and caissons while the grade is lowered and the columns/caissons are modified, strengthened, or reconstructed. Due to the type of construction, the caisson as constructed may be irregular in shape, orientation, and size, which may result in substantial structures/obstructions in the middle of the station platforms in order to make the necessary structural modifications. Rather than retrofitting the existing columns, another option is to replace the columns at the Apex Building and extend them to the existing caisson at a lower elevation than the track subgrade; this allows for smaller column sections coming through the platform compared to the retrofitting option, but larger columns than those that currently exist. Due to low overhead clearances, however, this is likely to be a very time-consuming, tedious, and expensive procedure that carries great risks. While all buildings within the vicinity will require some level of monitoring, the Apex building will need additional and more comprehensive monitoring for settlement and rotation throughout construction while daily building activities/operation takes place. Should settlement or rotation of the building occur, construction would be halted and the building evacuated. The

building would need to be inspected/stabilized/recertified for occupancy before construction could proceed. The costs of the modifications and the risks (structurally and due to the lost productivity/occupancy of the tenants) associated with the construction may exceed the appraisal of the existing building. Regardless of whether the columns and caissons are retrofitted or replaced, the exterior wall of the Apex Building along Elm Street needs to be underpinned for up to 20'+ vertically due to the fact that the bottom of wall elevation is as high as 339.25' at some locations at the east end. This elevation is significantly higher than the proposed platform elevation of 318.5' required in order to accommodate the CCT. There are existing grade beams that are above the proposed platform location that require removal and reconstruction. Additionally, the wall on the south side of the railroad corridor along the parking garage is not structurally adequate to act as a crash wall as required by current MTA LRT design criteria. Therefore, a wall would need to be constructed to protect the existing structure, or guardrails would need to be provided. Due to the risks and costs associated with constructing the trail within the existing constraints of the Apex Building, the idea of waiting until the Apex Building redevelops and then constructing the trail at that time has been considered. The developer would be given an envelope to redevelop around the Purple Line station and incorporate the trail at that time. However, even under redevelopment of the Apex Building, the constraints for installing the CCT above the Purple Line are driven by the Wisconsin Avenue Bridge, thereby setting the profile under the Apex Building. Refer to the roll map for the relationship between the LPA station platforms and the modified building columns.

ii. Wisconsin Avenue

As the Purple Line and CCT moves east, the tracks run inside of a concrete box structure that carries the trail above the tracks under the Wisconsin Avenue Bridge.

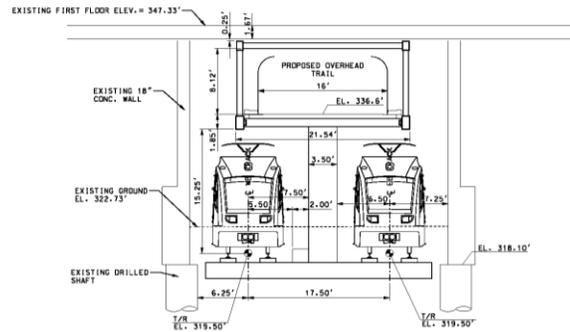


Typical Section through Wisconsin Avenue Bridge

The box structure would be supported on micropiles and would not compromise the structural integrity of the existing bridge. However, the existing Wisconsin Avenue Bridge was built around an older structure. The piers of the original bridge structure were to be cut off below grade during the construction of the existing structure, and they are likely in the vicinity of the proposed concrete box structure and its pile foundation. The presence of the previous foundations needs to be considered during design and construction. In addition, the clearances for installing the Purple Line and CCT in the same space beneath the bridge are very tight. The task of avoiding impact to the existing foundations while at the same time providing the absolute minimum operating clearances for the Purple Line and the catenary system, as well as the vertical clearance for the trail is extremely tedious. The construction will need to take place with low overhead equipment and will require significant structural reinforcement of the box due to span and foundation geometry to prevent loading effects from the proposed structure on to the existing foundations. Micropiles would be used to support the box to prevent these load effects by carrying the proposed loads directly to bedrock through a below ground pile cap.

iii. Air Rights Building

Inside the Air Rights Building, the track elevation is such that the top of rail is above the top of the existing caissons and the existing crash walls are acceptable for the proposed tracks, resulting in no modifications to the existing building.



Typical Section through Air Rights Building

iv. CCT Structure

The truss/bridge structures required to support the trail within the Apex and Air Rights buildings are significant structures. In order to support the CCT and minimize impacts on the Purple Line, the structures would need to span lengths of up to 240' in order to help minimize support locations on an already constrained platform and would require tighter engineering and construction controls to reduce deflections and camber due to tight construction clearances. The span lengths may possibly be reduced for the structures not over the platforms to optimize the costs of construction and the tighter tolerances required. Due to access requirements for construction, the CCT structures and their infrastructure beneath the Wisconsin Avenue Bridge and the Air Rights Building would need to be in place before the Purple Line could be built. The Apex and Air Rights Buildings and the Wisconsin Avenue Bridge surround the Purple Line, which make it impractical to construct these CCT structures once the Purple Line is in operation without taking the Bethesda Station out of service for an extended period of time. The structures would be expensive and inefficient because of the tight site constraints and limited clearances for deflection of the truss under load. The deflection limits are necessary in order to minimize the effect of the truss on the operations of the light rail vehicles as the pantograph travels along the catenary/trolley wire. The clearance between the truss and the top of rail is less than preferred by the MTA, making the deflection requirements even more pertinent. The box structure beneath the

Wisconsin Avenue Bridge will be heavily reinforced and require significant support of excavation and bracing during construction. All of these factors drive up the cost of the trail and Montgomery County's portion of the infrastructure costs to support the Purple Line beneath these buildings. The aforementioned items are unchangeable, whether the Apex Building is redeveloped or not.

d. Summary and Cost Analysis

In summary, below are the significant facts and costs for your consideration:

- i. The tight horizontal and vertical clearances within the Air Rights Building and underneath the Wisconsin Avenue Bridge, along with, more specifically, the control of the Wisconsin Avenue Bridge, drive the profile of the Purple Line for incorporating the CCT above.
- ii. The profile and existing building constraints require the use of inefficient, constrained and expensive temporary works in order to construct the project beneath the Apex Building and Wisconsin Avenue Bridge. This does not include the substantial and costly modifications required to the Apex Building columns/foundations, not to mention the associated risks.
- iii. In order to control the camber and deflections to maintain less-than-preferred minimum clearances for the catenary/trolley wires for the Purple Line, the truss structures will need to be built outside the Air Rights Building on temporary supports, the deck placed to control the camber, and then adjusted prior to moving the structures into position within the Air Rights Building and jacking them into place. This is specialized construction that results in additional costs. Once the structures are in place, the catenary/trolley wire can be installed and the remainder of the Purple Line built.
- iv. Moving a structure of this size and weight into place within the tight constraints of the Air Rights Building will require specialized construction techniques and skilled labor, resulting in additional costs.
- v. The cost impacts associated with accommodating the trail with respect to the Apex Building and making the necessary modifications to the Apex Building are approximately \$19.6 million (Net Construction Costs in 2011 Dollars with allocated construction contingencies). This amount is in addition to the costs associated with simply placing the Purple Line within the Georgetown Branch right-of-way.

- vi. The costs of accommodating the trail with respect to the Wisconsin Avenue Bridge and Air Rights Building are approximately \$9.8 million (Neat Construction Costs in 2011 Dollars with allocated construction contingencies). This amount is in addition to the costs associated with simply placing the Purple Line within the Georgetown Branch right-of-way.
- vii. The total costs of accommodating the trail along its current alignment and above the Purple Line are approximately \$29.4 million (Neat Construction Costs in 2011 Dollars with allocated construction contingencies). Escalating this cost out to Year 2020 (approximate average rate of 3% per year) and including Engineering Services (32% of neat construction cost) and unallocated contingencies (5% neat construction costs and 2% engineering services) the total cost is \$53.16 million.

Location	2011 Neat Construction Cost (with allocated Contingencies)	Neat Construction Cost, Year 2020 Escalated Rate	Engineering Services (32% of Neat Construction Cost, Escalated)	Unallocated Contingency (5% of Neat Construction Cost, Escalated)	Unallocated Contingency (2% of Engineering Services, Escalated)	Total (Millions)
Apex Building	\$19.6	\$25.75	\$8.24	\$1.29	\$0.16	\$35.44
Wisconsin and Air Rights Building	\$9.8	\$12.88	\$4.12	\$0.64	\$0.08	\$17.72
Total	\$29.4	\$38.63	\$12.36	\$1.93	\$0.24	\$53.16

- viii. The costs associated with constructing the CCT beneath the Wisconsin Avenue Bridge or the Air Rights Building do not change whether the Apex Building is redeveloped or not. If the Air Rights Building is redeveloped, other opportunities may become available.

e. Questions for Consideration

- i. Does the trail have to be under the Wisconsin Avenue Bridge and over the Purple Line, or can the trail be planned for and integrated as a parallel alignment adjacent to the Purple Line with a separate

underpass beneath Wisconsin Avenue as part of future redevelopment of the Air Rights and Apex Buildings?

- ii. Can any other redevelopment opportunities, other than the Apex Building, be considered?
- iii. In light of the above constraints, risks and costs, does it make sense to consider a surface alignment as the permanent alignment?

III. Trail Lighting

a. Background

It is anticipated that the Purple Line will operate 1 hour before and after the hours of operation of the WMATA Metro due to the connections between the two systems. It is also anticipated that the Capital Crescent Trail will connect residential communities to the proposed Purple Line stations. Given the commuter use of the Capital Crescent Trail it is expected that pedestrians may be using it during hours of darkness. Current Montgomery County practice for a trail within public right of way that expects significant use during darkness would require that all portions of the trail be lit for safety concerns. Other options for consideration could include providing no lighting or only lighting select portions of the trail, such as in the vicinity of stations, at entrances to the trail or portions where use is expected to be highest.

The Montgomery County Department of Transportation, Division of Traffic Engineering and Operations (DTEO) document *Streetlight Installation Guidelines Underground Distribution (Policy LTG-2)* indicates that the preferred light fixture for pathways in public maintained land is a post top fixture mounted from twelve to sixteen feet above ground. Three styles of post top fixtures are listed; colonial, contemporary and decorative Washington globe. The preferred lamp for use in each style of luminaire is a 70 watt high pressure sodium vapor lamp. All luminaires use an Illuminating Engineering Society of North America (IESNA) Type III distribution.

The IESNA publication *RP-8-00 Roadway Lighting* is the current standard that most state departments of transportation and other municipalities adopt in its entirety or portions for establishing their own lighting standards. The publication recommends that three criteria be satisfied when completing the lighting design for a shared walkway/bikeway. These criteria are:

- Average Horizontal Illuminance – An average of the light levels reaching all the points on the horizontal surface of the shared walkway/bikeway. Average horizontal illuminance criteria should be met or exceeded.
- Uniformity Ratio (Average Horizontal Illuminance to Minimum Horizontal Illuminance) – A ratio between the average horizontal illuminance and the light level of the point with the minimum

horizontal illuminance level. This ratio indicates how even or uniform the lighting is. Lower uniformity ratios indicate more uniform light which is preferable.

- Minimum Vertical Illuminance – The lowest light level of the set of points on a vertical plan set 4.9 feet above the surface of the shared walkway/bikeway. Minimum vertical illuminance criteria should be met or exceeded.

Horizontal illuminance is what enables a user of a shared walkway/bikeway to see the path itself and any objects that may be within it. The uniformity ratio is an indication of the variance of lighting levels in the area of concern and is used to minimize the occurrence of very bright spots and very dark spots. Vertical illuminance helps light vertical surfaces which contribute to the brightness of the environment and aides in facial recognition for security considerations.

Montgomery County’s current practice is to light pathways to an average horizontal illuminance of 1.0 foot-candles. Criteria for the uniformity ratio and minimum vertical illuminance are not specified by Montgomery County standards. When providing an average horizontal illuminance of 1.0 foot-candles per Montgomery County standards, additional guidance from *RP-8-00* for shared walkway/bikeway lighting suggests that a minimum vertical illuminance of 0.5 foot-candles at a height of 4.9 feet above the surface of the walkway/bikeway also be provided. Finally, a horizontal uniformity ratio (average illuminance: minimum illuminance) of 4.0:1 is recommended by *RP-8-00*.

In order to estimate a typical pole spacing that would be needed for continuous lighting along the trail, photometric calculations were completed for a twelve foot wide segment of the proposed trail representative of the typical section for several different options (light poles assumed on one side only).

- Using the luminaires described above from TEO *Policy LTG-2* with 70 watt high pressure sodium vapor luminaires a pole spacing of approximately 65-70 (all luminaire styles) feet provides an average illuminance of 1.0 foot-candles.
- In order to satisfy the minimum vertical illuminance criteria as recommended by *RP-8-00* a pole spacing ranging from 30 feet (colonial/contemporary style) to 50 feet (decorative Washington

globe style) is required and the horizontal illuminance is typically increased by 1.5-2.0 times the required 1.0 foot-candles.

- Under both scenarios the uniformity ratio is satisfied.

Rendering 1 below illustrates the amount of light reaching a person when only horizontal illuminance levels are considered using a light pole spacing of 70 feet. Rendering 2 illustrates the amount of light reaching a person when horizontal and vertical illuminance levels are considered using a light pole spacing of 50 feet, which results in higher average horizontal illuminance compared to Rendering 1. A graphical interpretation of the differences is shown in Figures 1 and 2 below. In these figures, cooler colors (blue to green - Figure 1) represent a lower light intensity shown on the vertical plane, warmer colors (yellow to red – Figure 2) represent higher light intensity.



Rendering 1 – Depiction of Average Horizontal Illuminance Only
(70 foot light pole spacing)



Rendering 2 – Depiction of Minimum Vertical Illuminance (50 foot light pole spacing)

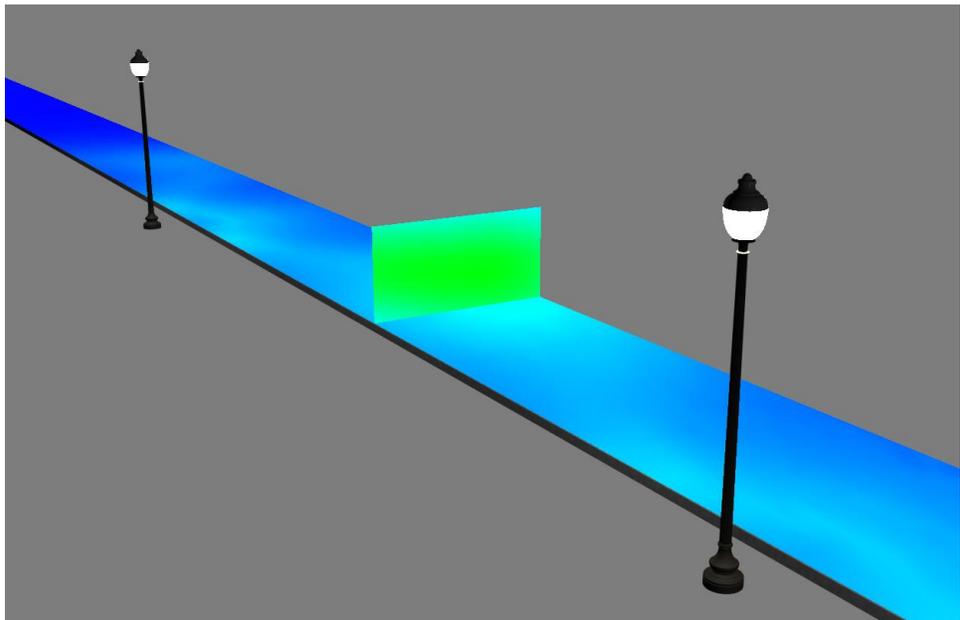


Figure 1 – Depiction of Average Horizontal Illuminance Only (70 foot light pole spacing)

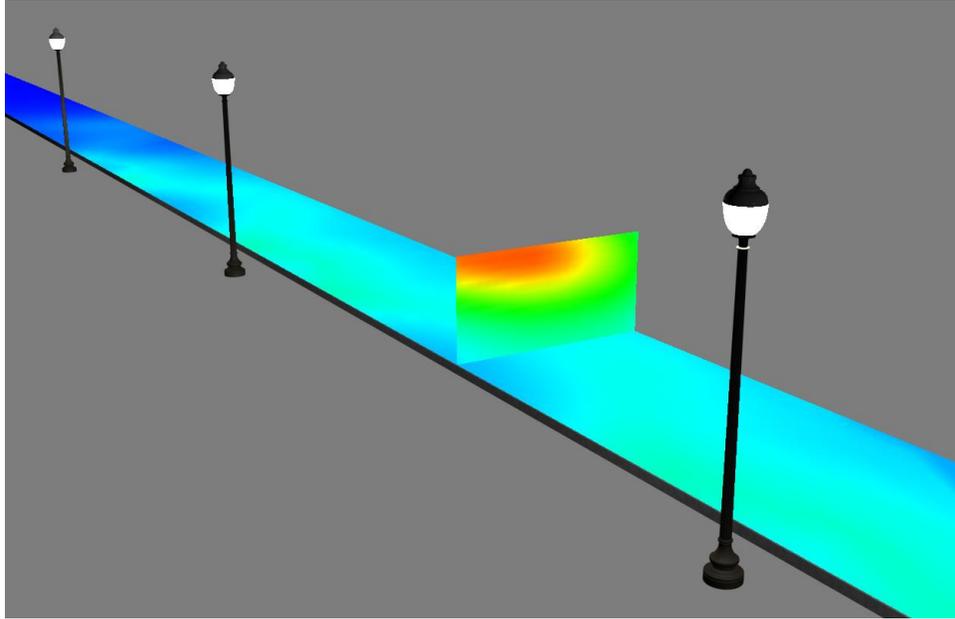


Figure 2 – Depiction of Minimum Vertical Illuminance (50 foot light pole spacing)

The proposed trail is approximately 4.5 miles long (23,760 feet). Additionally, there is approximately 4,500 feet of pathways that will be constructed to provide access/connections to the trail and Purple Line. In total, approximately 28,260 feet of trail is proposed. Using the pole spacings determined from the photometric calculation options above the following total number of poles would be required:

- For 70 watt high pressure sodium vapor lamps approximately 450 light poles (all luminaire styles) would be required to provide a horizontal illuminance of 1.0 foot-candles on all portions of the trail in accordance with current Montgomery County practice. This would add approximately \$3.1 million (2011 dollars) to the total cost of the trail including engineering services and unallocated contingencies.
- If the vertical illuminance criteria recommended by RP-8-00 is considered, approximately 600 light poles would be required along the trail, dependent on the luminaire style chosen for use. This would add approximately \$4.2 million (2011 dollars) to the total cost of the trail lighting noted above including engineering services and unallocated contingencies.

If only key areas were selected for lighting the total number of poles would be reduced significantly; however, this would leave segments of the trail unlit.

b. Considerations

- i. Should the Capital Crescent Trail and the connections be designed with continuous lighting? If so, should the lighting be designed to Montgomery County's current practice or the higher IESNA standard?
- ii. If not, should the Capital Crescent Trail and the connections be designed with lighting only select portions of the trail, such as in the vicinity of stations, at entrances to the trail or portions where use is expected to be highest? If so, should the lighting be designed to Montgomery County's current practice or the higher IESNA standard?
- iii. If not, should the Capital Crescent Trail be designed without lighting?

IV. Emergency Communications

a. Background

Emergency communication is vital to creating a safe environment along trails, and emergency call boxes are a successful way to create a safe environment. It is Montgomery County's current practice to install emergency call boxes along trails. It is likely that at the time of construction, the type of call box that could be used will have solar power, wireless, two-way audio and strobe lights on the call boxes. A two-way audio box will allow for a person to have a conversation with security. The strobe light will flash to support quick location of the emergency. Generally the spacing for emergency call boxes on a trail of this type would be every ¼ mile with additional boxes placed at key points like stairwells and tunnels. A call box system consisting of 25 emergency call boxes would add approximately \$400,000 (2011 dollars) to the total trail cost including engineering services and unallocated contingencies.

b. Considerations

Should the Capital Crescent Trail be designed with emergency call boxes?

V. Landscape and Hardscape Requirements

a. Background

The current trail cost estimate does not include extensive or specific landscaping along the outside of the trail adjacent to the community, but rather an allowance for general seeding and turf establishment. The landscaping between Purple Line and the CCT is accounted for in the trail cost.

The following additional landscape and hardscape features could be considered for the Capital Crescent Trail:

1. Longitudinal landscape treatments for the Capital Crescent Trail could help knit the new Purple Line Transitway and trail improvements into the existing landscape. Trail plantings could be focused along the outside edges of the trail adjacent to the community. Plants would be selected that are native or adapted to the region and could be implemented in a manner to minimize maintenance. Including 2.5” cal. shade trees, 8’ Ht. ornamental trees, 6’ Ht. evergreen trees and shrubs as appropriate would add approximately \$1.2M (2011dollars) to the total trail cost including engineering services and unallocated contingencies.
2. At key points along the alignment such as trail connections to the community and in the vicinity of stations, enhanced landscaping may be desired. In these areas a higher level of finish and detail may be utilized to highlight important connections and to provide for a variety of experiences along the length of the alignment. Including enhanced landscaping at 12 locations/connections would add approximately \$400,000 (2011dollars) to the total trail cost including engineering services and unallocated contingencies.
3. Site furnishings such as benches could be installed at regular intervals along the outside edge of trail for users to rest and for general enjoyment. Including forty (40) 6-foot long benches would add approximately \$100,000 (2011 dollars) to the total trail cost including engineering services and unallocated contingencies.

b. Considerations

- i. Should the Capital Crescent Trail be designed to include longitudinal landscape treatments along the outside edge of the trail adjacent to the community?
- ii. Should the Capital Crescent Trail be designed to include enhanced landscaping at key points such as connections and stations?
- iii. Should the Capital Crescent Trail be designed to include site furnishings adjacent to the trail?

Bethesda Bikeway and Pedestrian Facilities -- No. 500119

Category
Subcategory
Administering Agency
Planning Area

Transportation
Pedestrian Facilities/Bikeways
Transportation
Bethesda-Chevy Chase

Date Last Modified
Required Adequate Public Facility
Relocation Impact
Status

January 08, 2010
Yes
None.
On-going

EXPENDITURE SCHEDULE (\$000)

Cost Element	Total	Thru FY09	Est. FY10	Total 6 Years	FY11	FY12	FY13	FY14	FY15	FY16	Beyond 6 Years
Planning, Design, and Supervision	1,413	1,071	0	342	0	0	342	0	0	0	0
Land	0	0	0	0	0	0	0	0	0	0	0
Site Improvements and Utilities	200	80	0	120	0	0	120	0	0	0	0
Construction	1,806	1,256	0	550	0	0	550	0	0	0	0
Other	1	1	0	0	0	0	0	0	0	0	0
Total	3,420	2,408	0	1,012	0	0	1,012	0	0	0	0

FUNDING SCHEDULE (\$000)

G.O. Bonds	3,420	2,408	0	1,012	0	0	1,012	0	0	0	0
Total	3,420	2,408	0	1,012	0	0	1,012	0	0	0	0

DESCRIPTION

This project provides bikeway network improvements and pedestrian intersection improvements as specified in the Bethesda Central Business District (CBD) Sector Plan to complete the requirements of Stage I development.

ESTIMATED SCHEDULE

This project is on hold for the construction of the Bethesda Lot 31 Parking Garage (No. 500932). The construction costs and estimated schedule for the remaining projects (Bethesda Avenue bike facilities, 47th Street bike facilities, and Willow Lane bike facilities) will be updated upon completion of the parking garage.

JUSTIFICATION

The Bethesda CBD has little net remaining capacity for employment under the current Stage I development restrictions. It is desirable to get the Bethesda CBD into Stage II development to increase employment capacity. The Bethesda CBD Sector Plan of 1994 recommends that certain bikeway and pedestrian improvements be implemented (see Table 5.2 of the Sector Plan) to allow the area to go to Stage II development.

Bethesda Central Business District Sector Plan, July 1994.

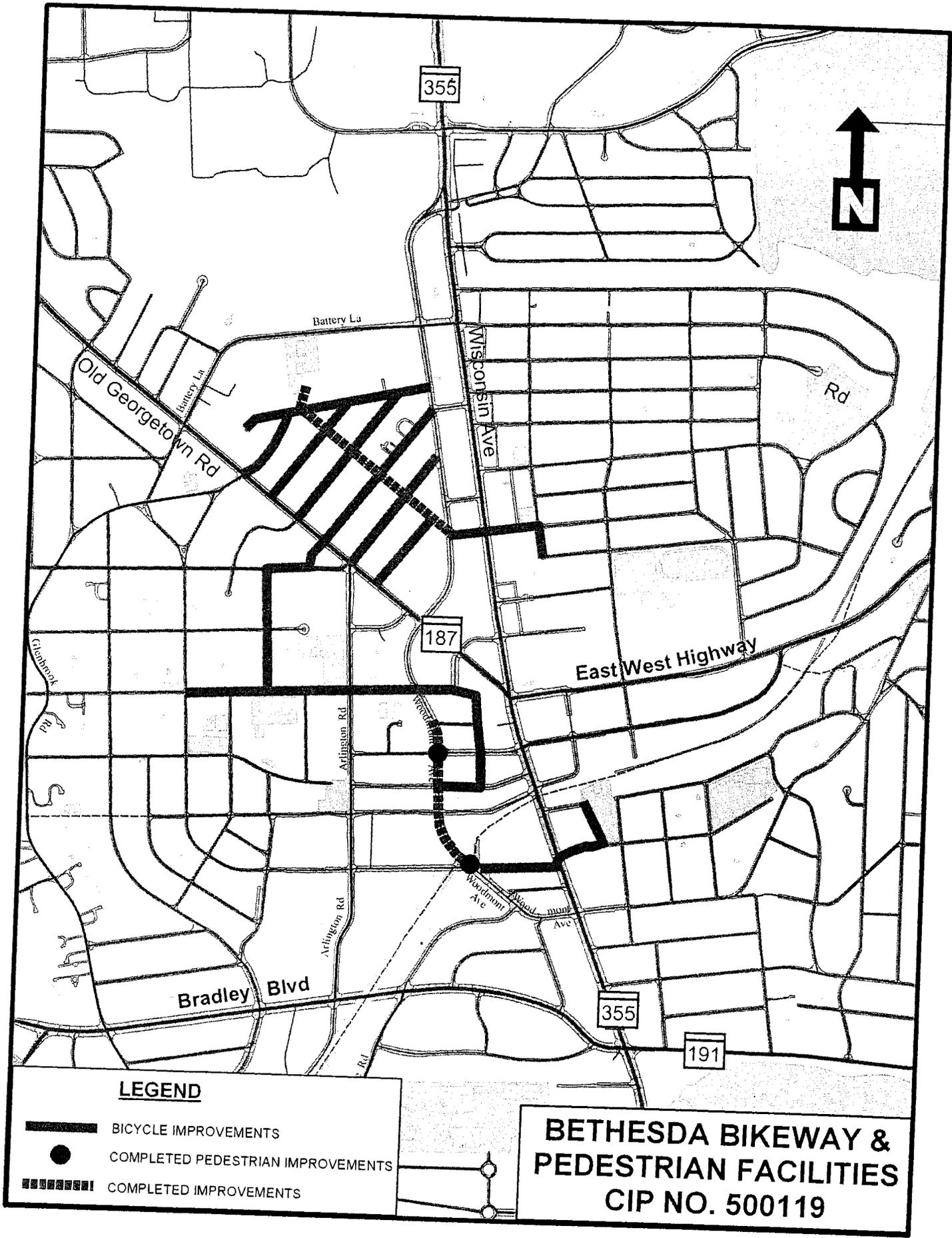
OTHER

The scope of work was planned and coordinated with local communities, property owners, and the Bethesda Urban Partnership before cost estimates for final design and construction were developed. Costs could be further refined and amended once feasibility is determined during the design process.

OTHER DISCLOSURES

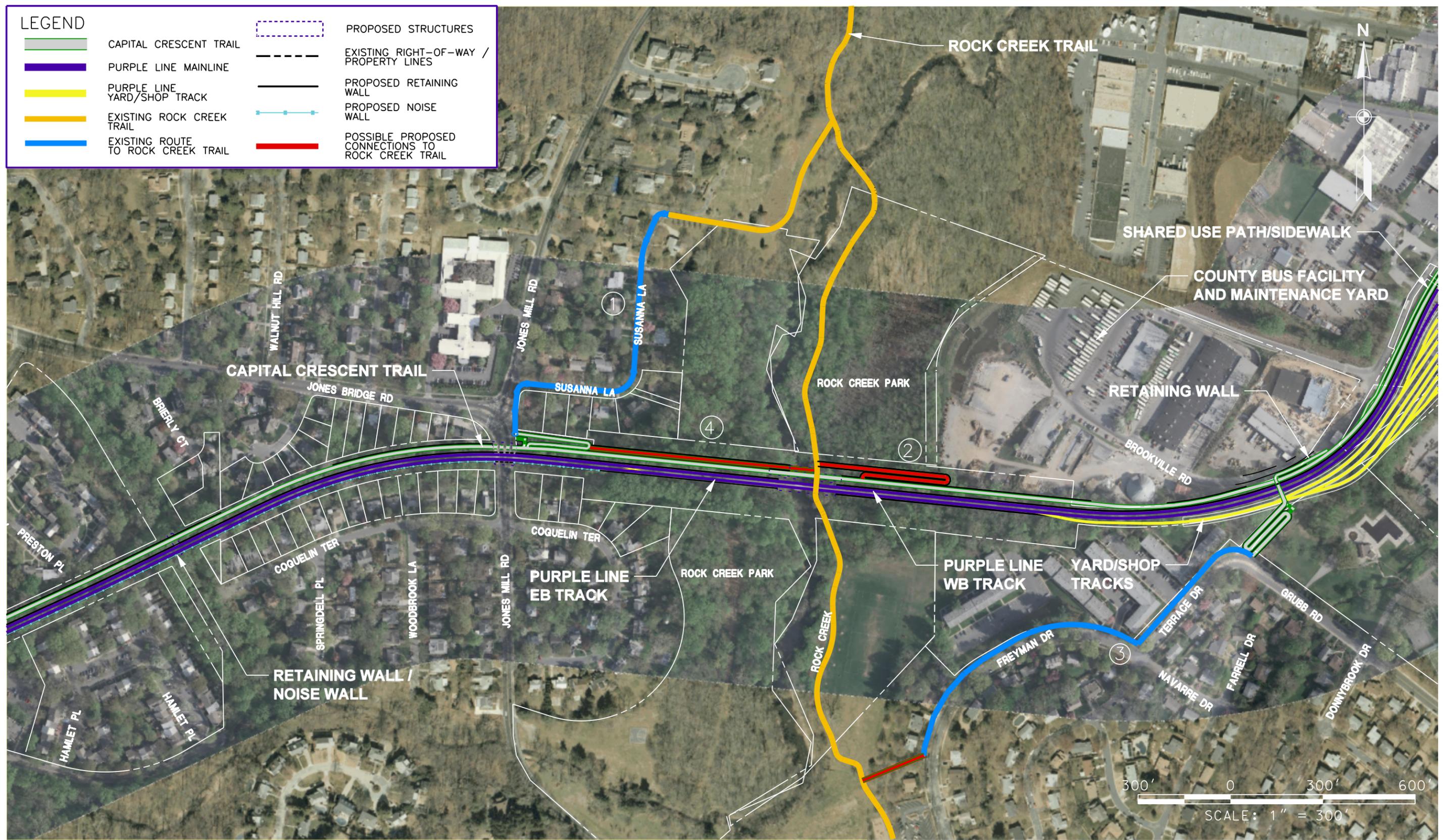
- A pedestrian impact analysis has been completed for this project.

APPROPRIATION AND EXPENDITURE DATA	COORDINATION	MAP
Date First Appropriation FY04 (\$000)	Bethesda Chevy Chase Regional Services Center (BCC)	See Map on Next Page
First Cost Estimate Current Scope FY01 3,366	Bethesda Urban Partnership	
Last FY's Cost Estimate 3,420	Montgomery Bicycle Action Group	
Appropriation Request FY11 0	Maryland-National Capital Park and Planning Commission	
Appropriation Request Est. FY12 0	Maryland State Highway Administration	
Supplemental Appropriation Request 0	Bethesda CBD Streetscaping	
Transfer 0	Hard Surface Trail Design and Construction	
Cumulative Appropriation 3,420	Resurfacing Park Roads - Bridges	
Expenditures / Encumbrances 2,465	Maryland Mass Transit Administration	
Unencumbered Balance 955	Washington Metropolitan Area Transit Authority	
Partial Closeout Thru FY08 0		
New Partial Closeout FY09 0		
Total Partial Closeout 0		



LEGEND

-  CAPITAL CRESCENT TRAIL
-  PURPLE LINE MAINLINE
-  PURPLE LINE YARD/SHOP TRACK
-  EXISTING ROCK CREEK TRAIL
-  EXISTING ROUTE TO ROCK CREEK TRAIL
-  PROPOSED STRUCTURES
-  EXISTING RIGHT-OF-WAY / PROPERTY LINES
-  PROPOSED RETAINING WALL
-  PROPOSED NOISE WALL
-  POSSIBLE PROPOSED CONNECTIONS TO ROCK CREEK TRAIL



MARYLAND DEPARTMENT OF TRANSPORTATION

MARYLAND TRANSIT ADMINISTRATION

Purple Line

 **Gannett Fleming**
 **WR&A**

DRAFT WORK-IN-PROGRESS
 STUDY INFORMATION SHOWN SHALL BE USED FOR GENERAL PLANNING / INFORMATION ONLY AND IS SUBJECT TO CHANGE DURING PRELIMINARY ENGINEERING

PURPLE LINE LIGHT RAIL
 ROCK CREEK TRAIL CONNECTION OPTIONS
 PLAN SHEET
 DATE: OCTOBER 2011 SCALE: AS SHOWN

CONTRACT NO. 1042
 DRAWING NO. RCP-01
 SHEET NO. 2 OF 2

FILES \$
 DATES \$



Capital Crescent Trail Rock Creek Connection Options

1. Susanna Lane Existing Connection

- a. Length - 1868' or 0.35 miles (6 min walk)
- b. Construction
 - i. Requires approximately 990' of sidewalk/shared use path construction along Susanna Lane
 - ii. Low Cost
- c. Facts
 - i. Utilizes existing connection through residential community
 - ii. No new park impact

2. Rock Creek Switch Back

- a. Length – 797' or 0.15 (2.5 min walk)
- b. Construction
 - i. Requires switchback construction
 - ii. High Cost
- c. Facts
 - i. Within Rock Creek viewshed – high level of visibility
 - ii. Moved to North side of transitway
 - iii. Potential to be smaller than LPA switch back due to lower trail bridge concept

3. Grubb Road Connection

- a. Length – 1634' or 0.31 miles (5.5 min walk)
- b. Construction
 - i. Requires approximately 1250' of sidewalk/shared use path along Terrace Drive and Freyman Drive as existing sidewalk does not meet current ADA guidelines.
 - ii. Low Cost
- c. Facts
 - i. Utilizes County ROW through residential community to connect to trail

4. Extension from Jones Mill Road Switchback

- a. Length – 950' or 0.18 miles from CCT (3 min walk)
- b. Construction
 - i. Requires approximately 740' of shared use path
 - ii. High Cost due to retaining walls and an additional new bridge over Rock Creek
- c. Facts
 - i. Within Rock Creek viewshed – high level of visibility

APPENDIX 1

**Capital Crescent Trail
Cost Estimate Breakdown**



**Capital Crescent Trail
Cost Estimate Breakdown
May 2011**

All costs shown are estimated in year 2010 dollars.

Trail Cost Includes: (On plan, these items are shown in **GREEN** unless noted)

- **Apex / Air Rights Buildings Structural Modifications, Wisconsin Avenue Tunnel and Trail Structure – \$27.7 M**
 - Trail Structure – 16’ to 24’ wide

Apex / Air Rights Buildings Structural Modifications and Trail Structure Cost Breakdown			
	Building Modifications and Tunnel (\$M)	Structures (\$M)	Total (\$M) (w/ allocated contingency)
Trail through Apex / Air Rights Buildings	\$22.8	\$4.9	\$ 27.7

- **Trail and Connections – Bethesda to Silver Spring – \$7.0 M**
 - Capital Crescent Mainline Trail – 12’ wide;
 - Bethesda / Chevy Chase – 11,063 ft. – Woodmont Avenue to Jones Mill Road
 - Chevy Chase / Silver Spring – 5,736 ft. – East of Jones Mill Road to just west of Michigan Avenue / Talbot Avenue
 - Silver Spring – 6,318 ft. – Just west of Michigan Avenue / Talbot Avenue to Silver Spring Transit Center / Ripifant Road
 - Trail Connections – 8’ to 10’ wide;
 - Elm Street
 - Elm Street Park
 - Pearl Street
 - Lynn Drive – at-grade crossing
 - East-West Highway
 - Sleaford Road
 - Kentbury Drive
 - Connecticut Avenue/ Newdale Road
 - Jones Mill Road
 - Rock Creek

- 16th Street
- Spring Street
- Minor connections (incidental to trail cost) – Elm Street, Grubb Road, Kansas Avenue, Michigan Avenue, Hanover Street
- Trail Connections – Stairs;
 - East-West Highway
 - Sleaford Road
 - Jones Mill Road
 - Apple Avenue
- Costs Include;
 - 4" Hot Mix Asphalt
 - 4" Graded Aggregate Base
 - Concrete Staircases
 - Excavation and fill material
 - Basic Landscaping

Trail and Connections Cost Breakdown				
Trail Section	Trail (\$M)	Stairs (\$M)	Trailscaping (\$M)	Total (\$M) (w/ allocated contingency)
Bethesda / Chevy Chase	\$2.2	\$0.01	\$1.1	\$3.4
Mainline	\$1.84	-	\$0.94	\$2.78
Elm Street Connection	\$0.03	-	\$0.01	\$0.04
Pearl Street Connection	\$0.01	-	\$0.01	\$0.02
Lynn Drive Connection	\$0.03	-	\$0.01	\$0.04
East-West Highway Connection	\$0.04	\$0.01	\$0.02	\$0.07
Sleaford Road	\$0.06	<\$0.01	\$0.03	\$0.09
Kentbury Drive Connection	\$0.03	-	\$0.01	\$0.04
Newdale Road Connection	\$0.08	-	\$0.04	\$0.12
Jones Mill Road Connection	\$0.10	<\$0.01	\$0.05	\$0.15
Chevy Chase / Silver Spring	\$1.2	\$0.00	\$0.6	\$1.9
Mainline	\$1.05	-	\$0.53	\$1.58
Rock Creek Connection	\$0.18	-	\$0.09	\$0.28
Silver Spring	\$1.2	<\$0.01	\$0.6	\$1.8
Mainline	\$1.03	-	\$0.52	\$1.55
16th Street Connection	\$0.10	-	\$0.05	\$0.15
Spring Street Connection	\$0.06	-	\$0.03	\$0.09
Apple Avenue Connection	-	<\$0.01	<\$0.01	<\$0.01
Total	\$4.6	\$0.02	\$2.4	\$7.0

- **Bridge / Aerial Structures – \$9.5 M**
 - Exiting Air Rights Building – 16’ wide
 - Connecticut Avenue – 16’ wide
 - Rock Creek – 16’ wide
 - Talbot Avenue / CSX Crossing – 14’ wide
 - Colesville Road / Silver Spring Transit Center (SSTC) – 14’ wide

Bridge / Aerial Structures Cost Breakdown	
Trail Section	Structure (\$M)
Bethesda / Chevy Chase	\$5.5
Bethesda - exiting Air Rights Building to Pearl Street	\$0.3
Connecticut Avenue	\$5.2
Chevy Chase / Silver Spring	\$1.1
Rock Creek	\$1.1
Silver Spring	\$2.9
Talbot Avenue	\$0.6
Colesville & Silver Spring Transit Center (SSTC)	\$2.3
Total	\$9.5

- **Retaining Walls with Fencing – \$17.9 M**
 - Wall and fence, where applicable, along Right of Way on outside edge of mainline trail
 - Wall and fence, where applicable, to reduce property impacts along trail connections
 - Half of wall and fence between trail and transitway. This is a shared cost with the transitway. (On plan, this item is shown as **YELLOW**)
 - Exceptions include; Sta. 11+90 to Sta. 15+50 and Sta. 170+60 to Sta. 174+82. Within these areas the wall and fence are included entirely as a trail cost. This is due to the trail vertical alignment deviating from typical to accommodate trail crossings over the transitway and CSX

Retaining Walls Cost Breakdown			
Trail Section	Retaining Walls (\$M)	Shared Retaining Walls (\$M)	Total (\$M) (w/ allocated contingency)
Bethesda / Chevy Chase	\$5.2	\$2.4	\$7.6
Mainline	\$3.51	\$2.39	\$5.90
Elm Street Connection	-	-	-
Pearl Street Connection	\$0.10	-	\$0.10
Lynn Street Connection	\$0.11	-	\$0.11
East-West Highway Connection	\$0.36	-	\$0.36
Sleaford Road Pedestrian Path	\$0.11	-	\$0.11
Kentbury Drive Connection	-	-	-
Newdale Road Connection	\$0.64	-	\$0.64
Jones Mill Road Connection	\$0.43	-	\$0.43
Chevy Chase / Silver Spring	\$3.8	\$1.4	\$5.2
Mainline	\$2.74	\$1.41	\$4.16
Rock Creek Connection	\$1.08	-	\$1.08
Silver Spring	\$4.9	\$0.1	\$5.1
Mainline	\$4.85	\$0.12	\$4.97
16th Street Connection	-	-	-
Spring Street Connection	\$0.10	-	\$0.10
Apple Avenue Connection	-	-	-
Total	\$14.0	\$3.9	\$17.9

- **Crash Walls – Silver Spring – \$3.5 M**
 - Between Trail and CSX from Talbot Avenue to Silver Spring Transit Center (SSTC)

Trail Cost Breakdown Summary									
Trail Section	Trail (\$M)	Stairs (\$M)	Trail-scaping (\$M)	Structure (\$M)	Retaining Wall (\$M)	Shared Retaining Wall (\$M)	Crash Wall (\$M)	Building Mods. (\$M)	Total (\$M) (w/ allocated contingency)
Air Rights / Apex Building	-	-	-	\$4.9	-	-	-	\$22.8	\$27.7
Bethesda / Chevy Chase	\$2.2	\$0.01	\$1.1	\$5.5	\$5.2	\$2.4	-	-	\$16.5
Mainline	\$1.84	-	\$0.94	-	\$3.51	\$2.39	-	-	\$8.7
Elm Street Connection	\$0.03	-	\$0.01	-	-	-	-	-	<\$0.1
Pearl Street Connection	\$0.01	-	\$0.01	-	\$0.10	-	-	-	\$0.1
Lynn Drive Connection	\$0.03	-	\$0.01	-	\$0.11	-	-	-	\$0.2
East-West Hwy Connection	\$0.04	\$0.01	\$0.02	-	\$0.36	-	-	-	\$0.4
Sleaford Road	\$0.06	<\$0.01	\$0.03	-	\$0.11	-	-	-	\$0.2
Kentbury Drive Connection	\$0.03	-	\$0.01	-	-	-	-	-	<\$0.1
Newdale Road Connection	\$0.08	-	\$0.04	-	\$0.64	-	-	-	\$0.8
Jones Mill Road Connection	\$0.10	<\$0.01	\$0.05	-	\$0.43	-	-	-	\$0.6
Chevy Chase / Silver Spring	\$1.2	-	\$0.6	\$1.1	\$3.8	\$1.4	-	-	\$8.2
Mainline	\$1.05	-	\$0.53	-	\$2.74	\$1.41	-	-	\$5.7
Rock Creek Connection	\$0.18	-	\$0.09	-	\$1.08	-	-	-	\$1.4
Silver Spring	\$1.2	<\$0.01	\$0.6	\$2.9	\$4.9	\$0.1	\$3.5	-	\$13.3
Mainline	\$1.03	-	\$0.52	-	\$4.85	\$0.12	-	-	\$6.5
16th Street Connection	\$0.10	-	\$0.05	-	-	-	-	-	\$0.1
Spring Street Connection	\$0.06	-	\$0.03	-	\$0.10	-	-	-	\$0.2
Apple Avenue Connection	-	<\$0.01	<\$0.01	-	-	-	-	-	<\$0.1
Total	\$4.6	\$0.02	\$2.4	\$14.3	\$14.0	\$3.9	\$3.5	\$22.8	\$65.6

In addition to Total Trail Construction Costs;

- **Engineering Services – \$21.0 M**
 - 32% of Total Construction Cost (including allocated contingencies);
 - Preliminary Engineering = 4%
 - Final Design = 6%
 - Project Management for Design and Construction = 5%
 - Construction Administration Management = 8%
 - Insurance = 2%
 - Legal, Permits, Review Fees, etc. = 3%
 - Surveys, Testing, Investigation, Inspection = 3%
 - Start up = 1%

- **Unallocated Contingencies – \$3.7 M**
 - 5% of Total Construction Costs (including allocated contingencies)
 - 2% of Engineering Services

Total Trail Cost = \$90.3 M

Trail Cost Does Not Include:

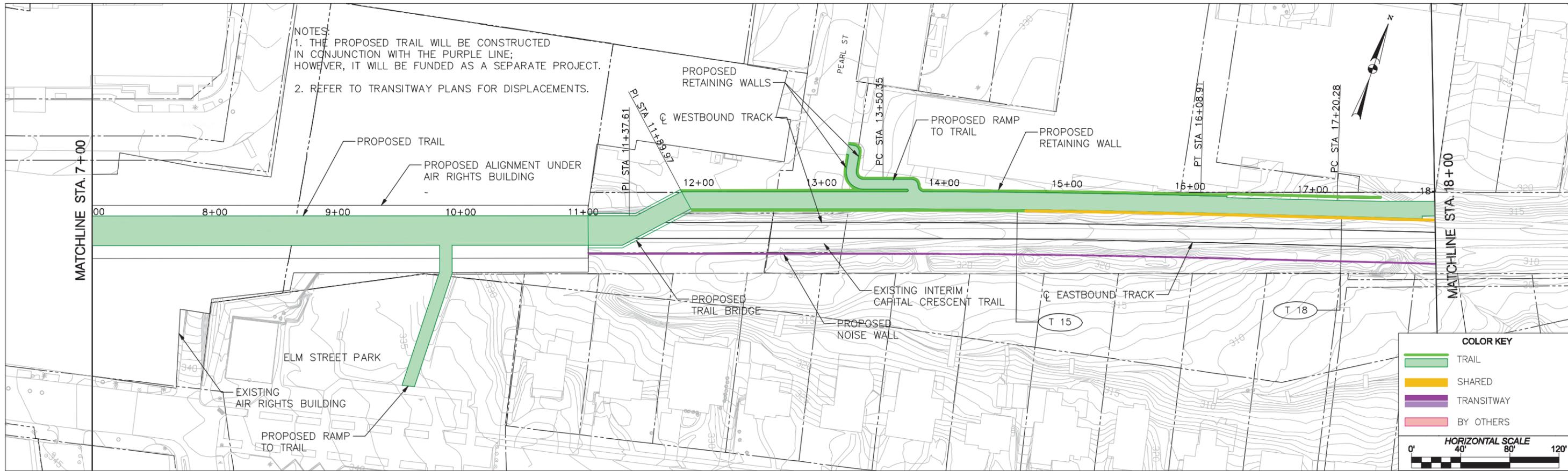
- Construction of Green Trail
- Trail connection to Woodmont East (On plan, shown in **PINK**)
- Extensive or Specific Landscaping / Hardscaping – trees, bushes, shrubs, benches, signs, etc.
- Lighting – cables, conduits, fixtures
- Emergency Communication – call boxes, lights
- Fencing beyond retaining walls
- Trail striping – lanes, hatched shoulders where paved
- Increased Pavement Section, if needed
- Grade separated crossing at Lynn Drive

Transitway Added Costs to Accommodate Trail Including: (On plan, these items are shown in **PURPLE** unless noted)

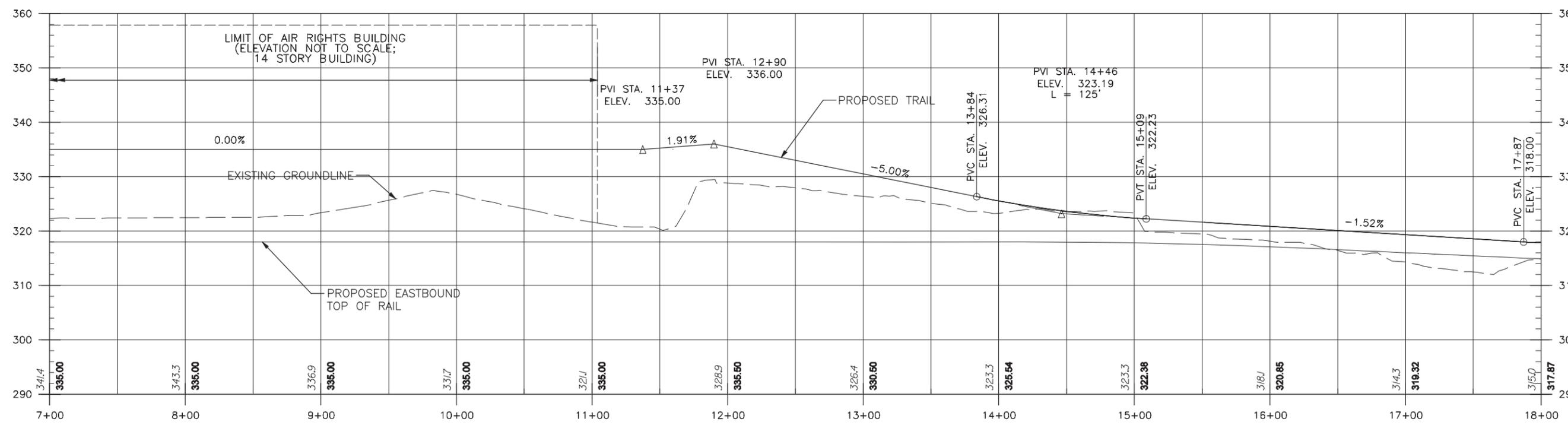
- Reconstructed Bridges (longer to accommodate trail)
 - Jones Mill Road
 - Lyttonsville Place
 - 16th Street
 - Spring Street

- Underpasses

- Sleaford Road – Pedestrian Underpass
 - Columbia County Club – Golf Cart Underpasses (2)
 - Coquelin Run – longer and wider underpass
 - Other culverts, pipes, etc.
- Stations – Platforms and Stairs
 - Bethesda
 - Connecticut Avenue
 - Lyttonsville Place
 - Woodside
- Retaining Walls with Fencing
 - Half of wall and fence between trail and transitway. This is a shared cost with the transitway. (On plan, this item is shown as **YELLOW**)
 - Exceptions include; Sta. 11+90 to Sta. 15+50 and Sta. 170+60 to Sta. 174+82. Within these areas the wall and fence are included entirely as a trail cost. This is due to the trail vertical alignment deviating from typical to accommodate trail crossings over the transitway and CSX
- Noise Walls – along Right of Way where retaining walls are not used
- Other Impacts
 - Talbot Avenue relocation – roadway and sidewalk
 - CSX siding track relocation
 - Utilities including ventilation in Bethesda, if needed
 - Drainage
 - Additional Right of Way
 - Gates and Signals – Lynn Drive at-grade crossing, if needed



PLAN



PROFILE



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PURPLE LINE
 NEW STARTS DEFINITION

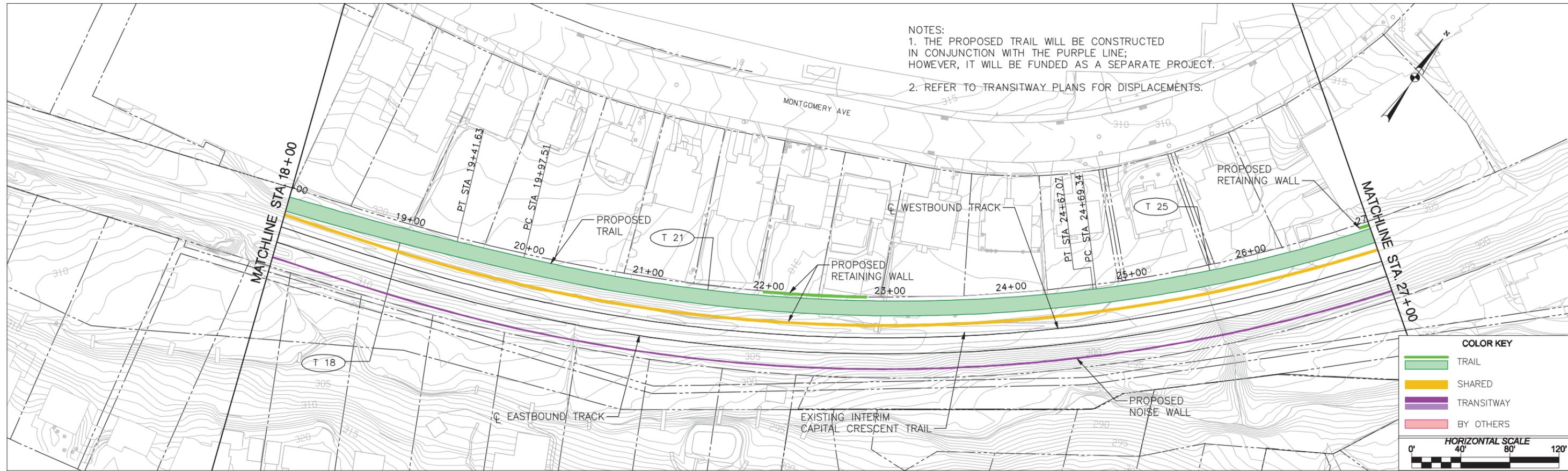
PLAN & PROFILE – TRAIL
 STA 7+00 TO STA 18+00

DATE: MARCH 2011 PLAN SCALE: AS SHOWN

CONTRACT NO. _____
 DRAWING NO. **NSD-T04**
6 OF **28**

Monday, February 26, 2011, AT 03:55 PM

NOTES:
 1. THE PROPOSED TRAIL WILL BE CONSTRUCTED IN CONJUNCTION WITH THE PURPLE LINE; HOWEVER, IT WILL BE FUNDED AS A SEPARATE PROJECT.
 2. REFER TO TRANSITWAY PLANS FOR DISPLACEMENTS.

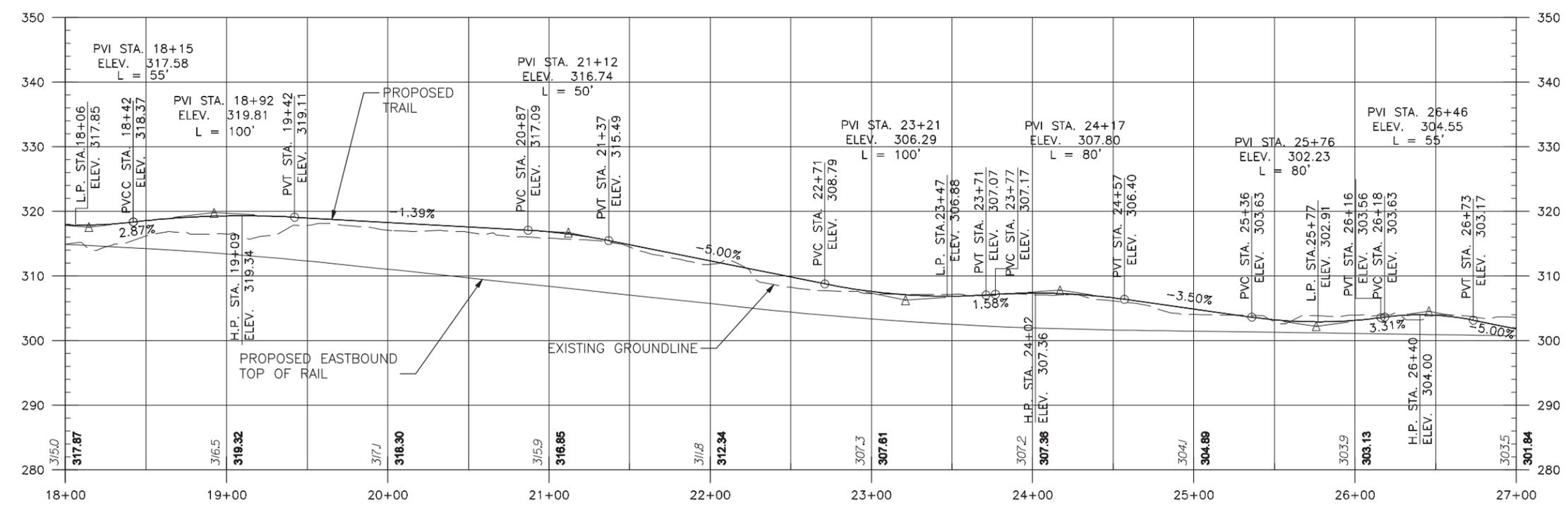


COLOR KEY

- TRAIL
- SHARED
- TRANSITWAY
- BY OTHERS

HORIZONTAL SCALE
 0' 40' 80' 120'

PLAN



PROFILE

VERTICAL SCALE
 0' 10' 20' 30'

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PURPLE LINE
 NEW STARTS DEFINITION

PLAN & PROFILE – TRAIL
 STA 18+00 TO STA 27+00

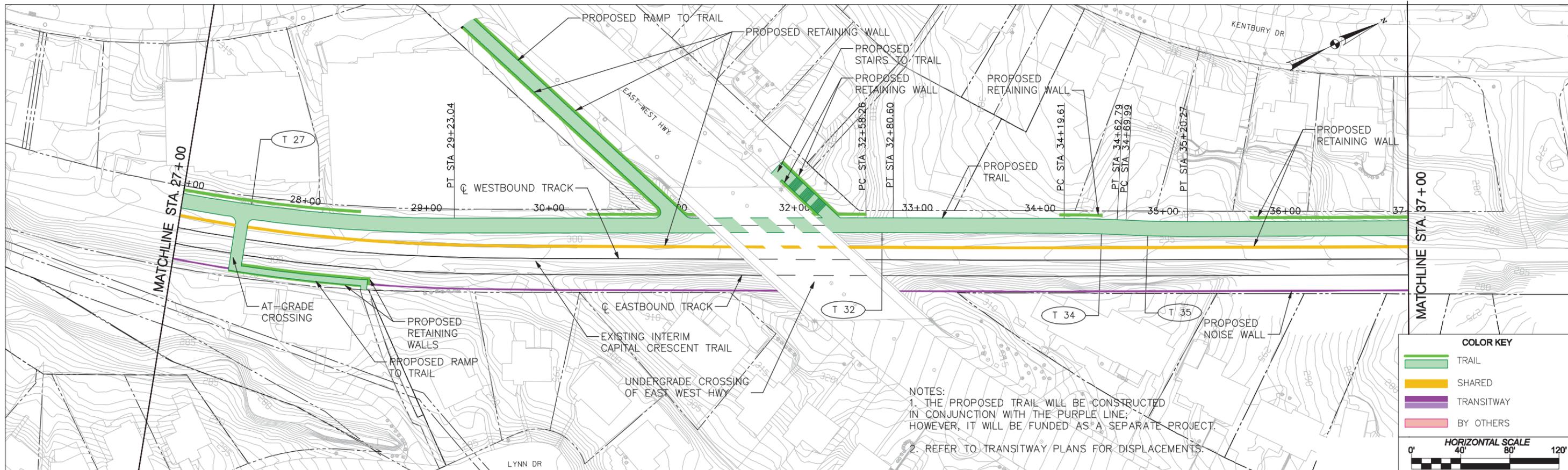
DATE: MARCH 2011 PLAN SCALE: AS SHOWN

CONTRACT NO. _____

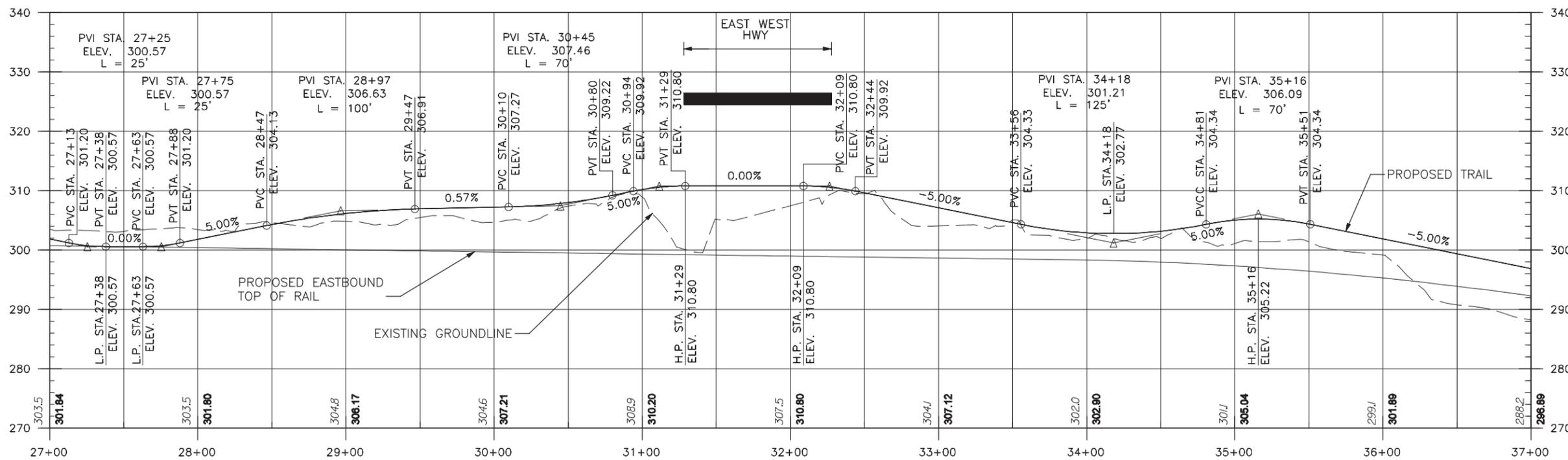
DRAWING NO.
NSD-T05

7 OF 28

Monday, February 28, 2011, AT 03:56 PM



PLAN



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PURPLE LINE
NEW STARTS DEFINITION

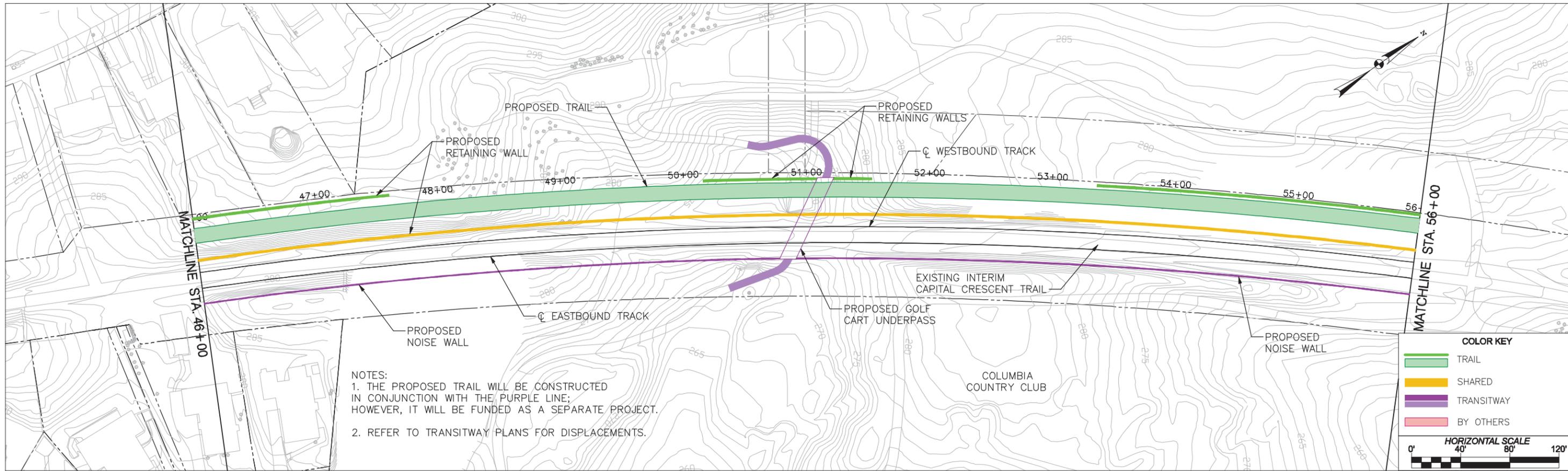
PLAN & PROFILE – TRAIL
STA 27+00 TO STA 37+00

DATE: MARCH 2011 PLAN SCALE: AS SHOWN

CONTRACT NO.

DRAWING NO.
NSD-T06

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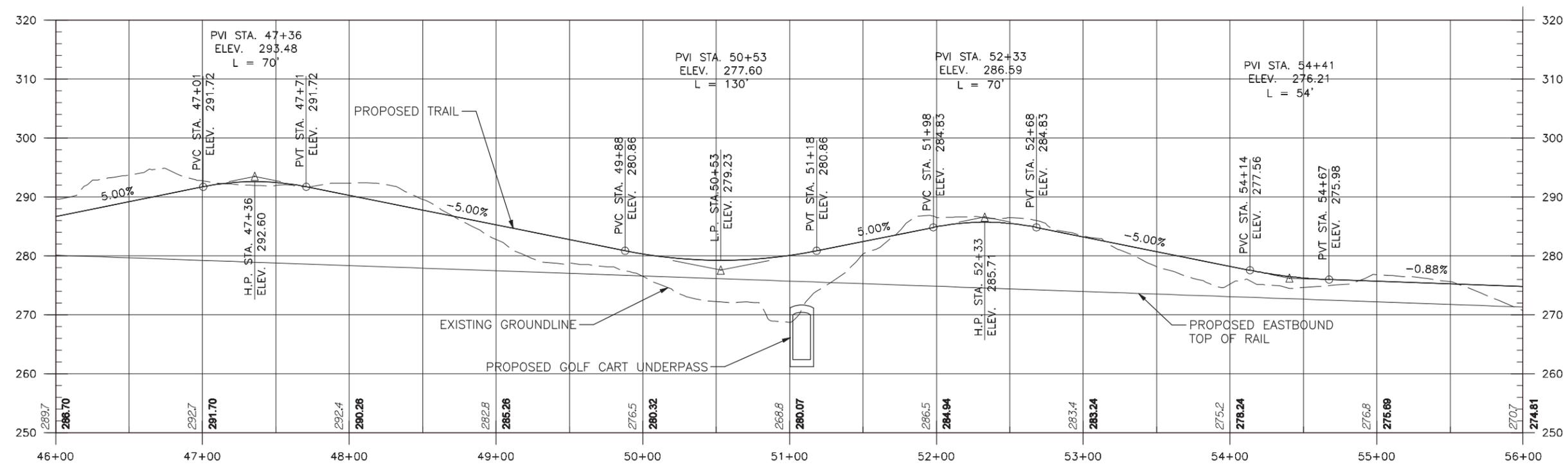
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COLOR KEY

- TRAIL
- SHARED
- TRANSITWAY
- BY OTHERS

HORIZONTAL SCALE
 0' 40' 80' 120'

PLAN



PROFILE

VERTICAL SCALE
 0' 10' 20' 30'

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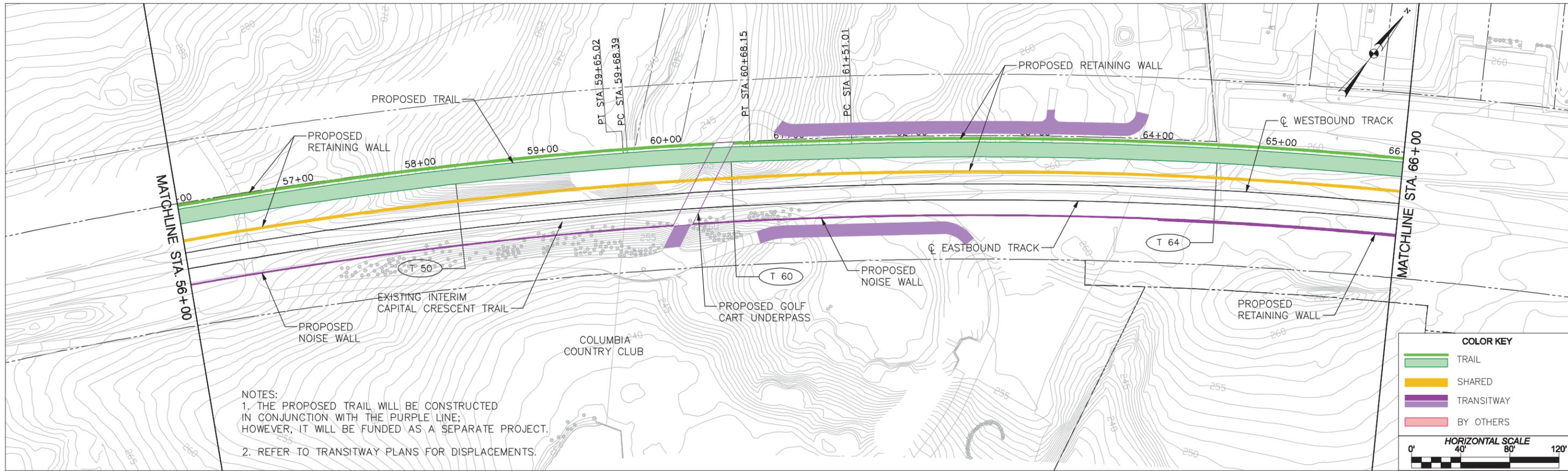
PURPLE LINE
 NEW STARTS DEFINITION

PLAN & PROFILE – TRAIL
 STA 46+00 TO STA 56+00

DATE: MARCH 2011 PLAN SCALE: AS SHOWN

CONTRACT NO. _____
 DRAWING NO. **NSD-T08**
 10 OF 28

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 PILES



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PLAN & PROFILE - TRAIL
STA 56+00 TO STA 66+00

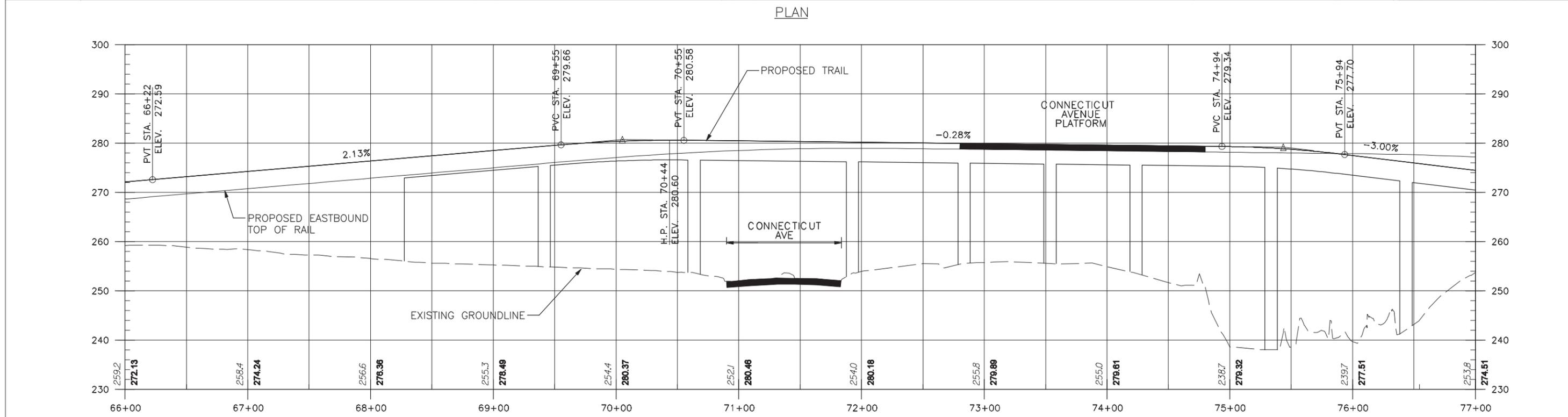
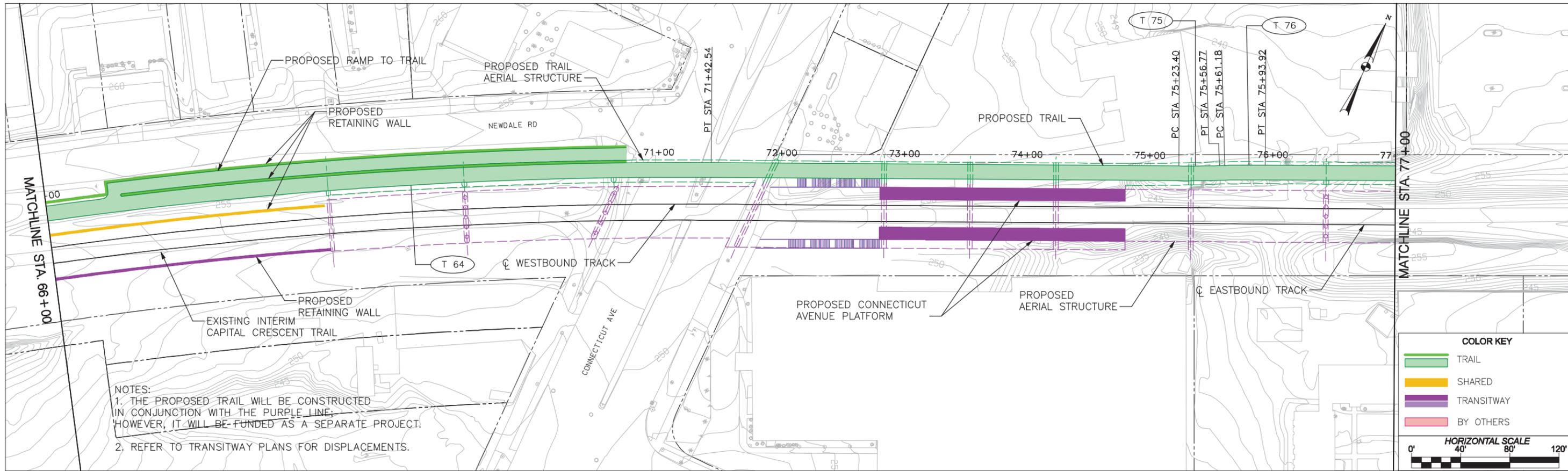
DATE: MARCH 2011 PLAN SCALE: AS SHOWN

CONTRACT NO. _____

DRAWING NO. **NSD-T09**

11 OF **28**

Monday, February 28, 2011, AT 03:59 PM



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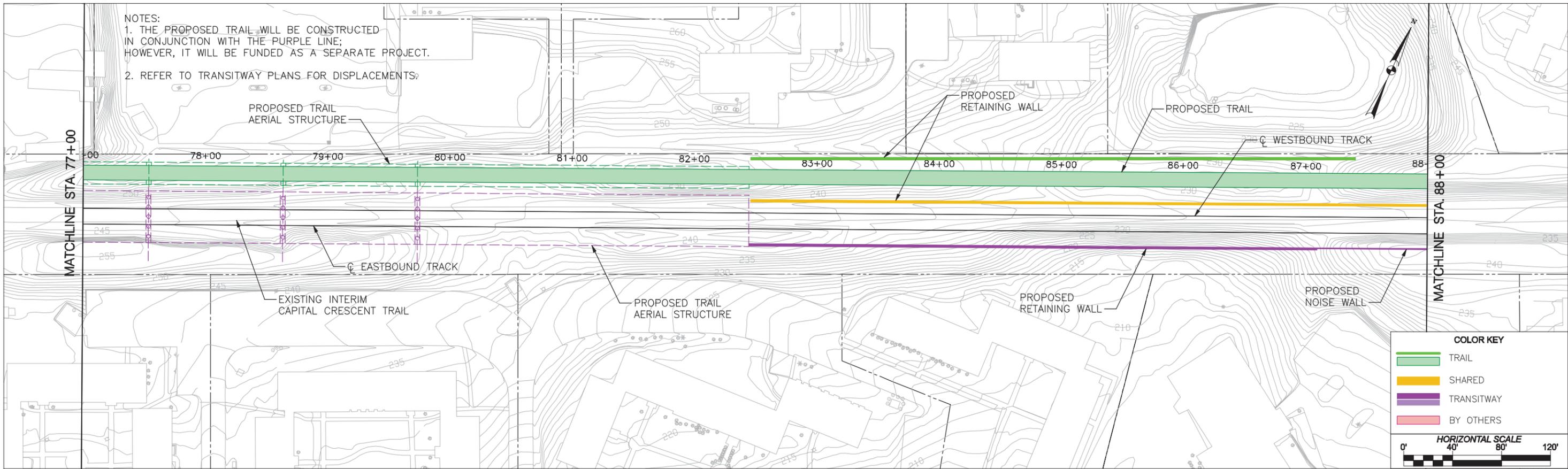
PLAN & PROFILE - TRAIL
 STA 66+00 TO STA 77+00

DATE: MARCH 2011
 PLAN SCALE: AS SHOWN

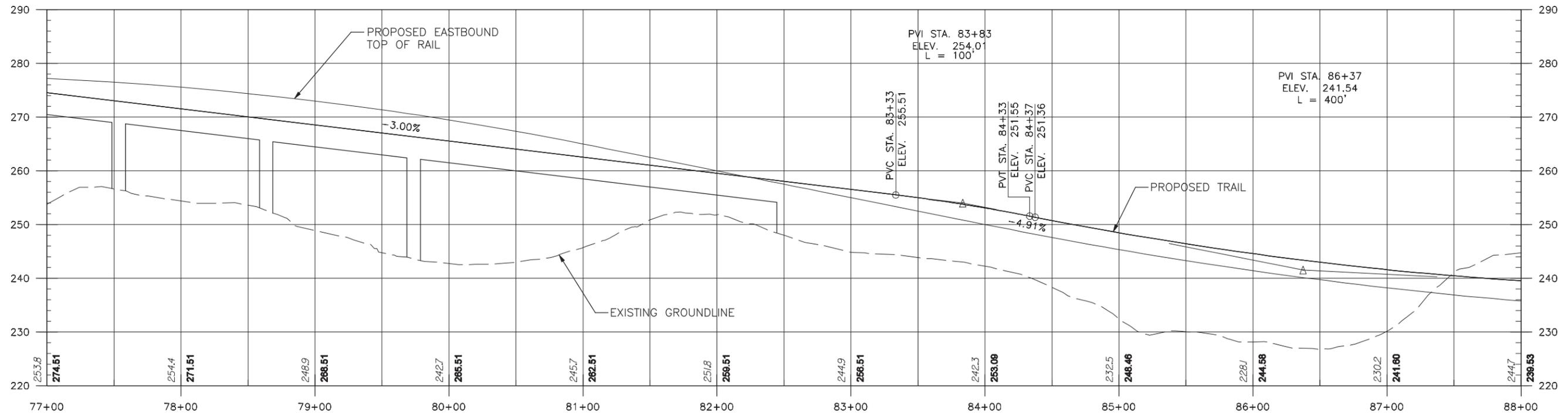
CONTRACT NO.
 DRAWING NO.
NSD-T10
 12 OF 28

Tuesday, March 01, 2011 AT 02:56 PM
 PRICE

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PLAN



PROFILE



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PLAN & PROFILE – TRAIL
 STA 77+00 TO STA 88+00

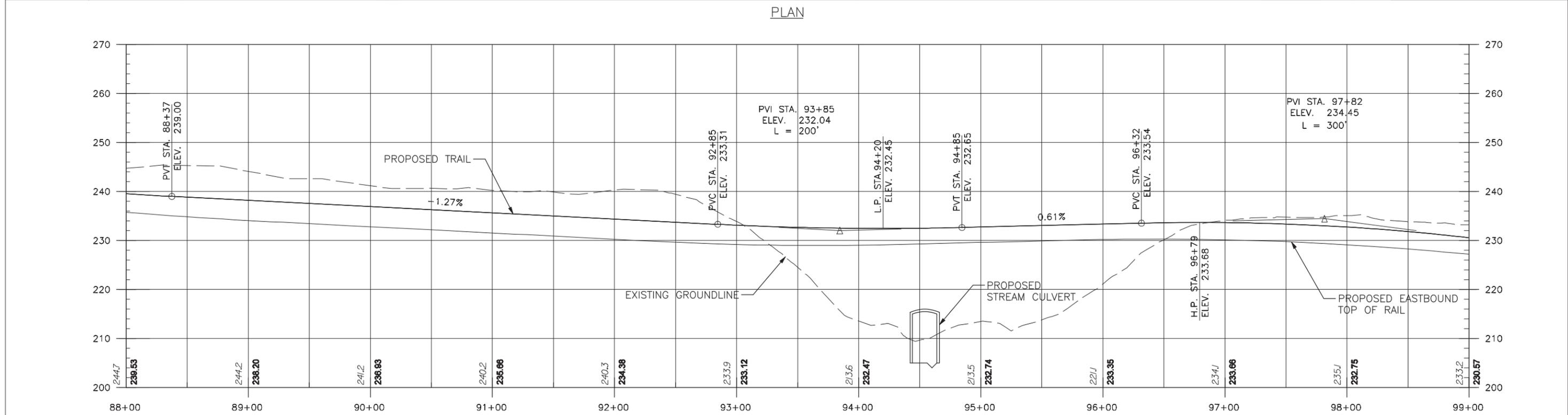
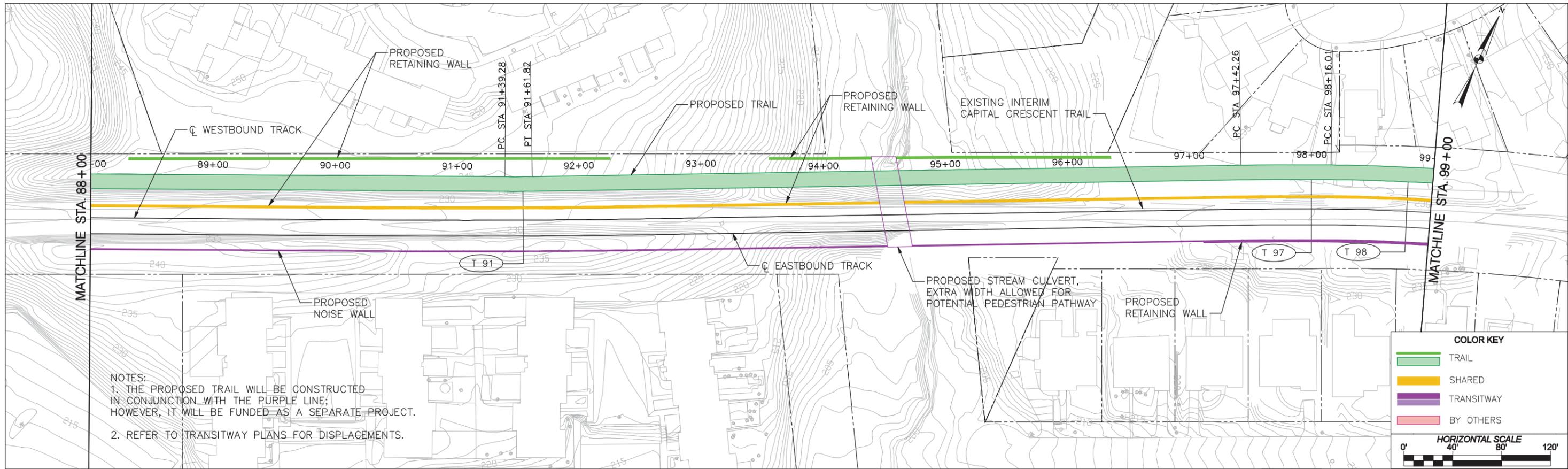
DATE: MARCH 2011 PLAN SCALE: AS SHOWN

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DRAWING NO.
NSD-T11

13 OF 28

Monday, February 28, 2011, AT 04:01 PM



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PURPLE LINE NEW STARTS DEFINITION

PLAN & PROFILE - TRAIL
STA 88+00 TO STA 99+00

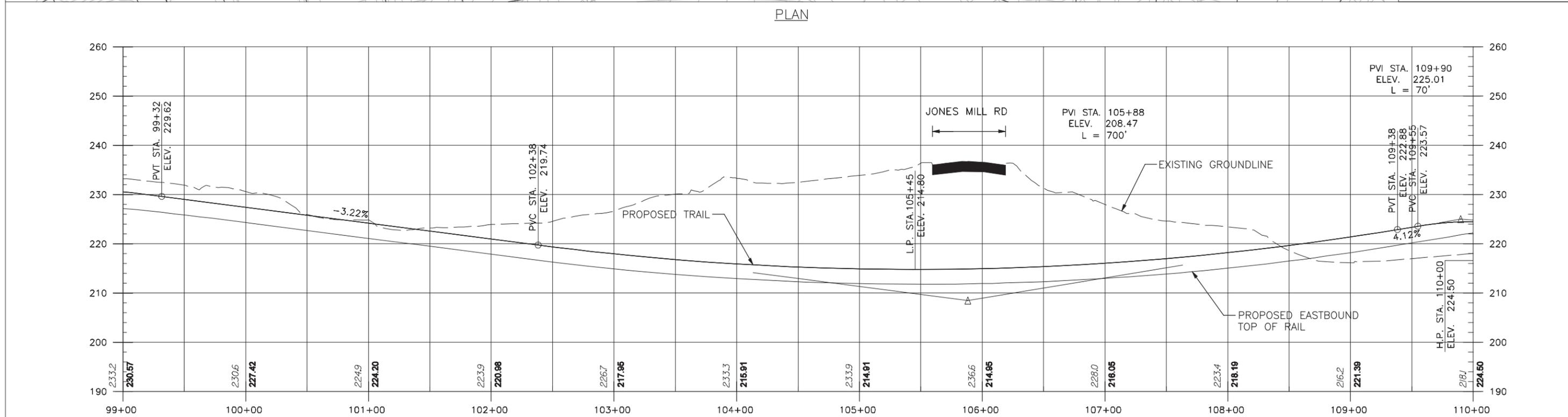
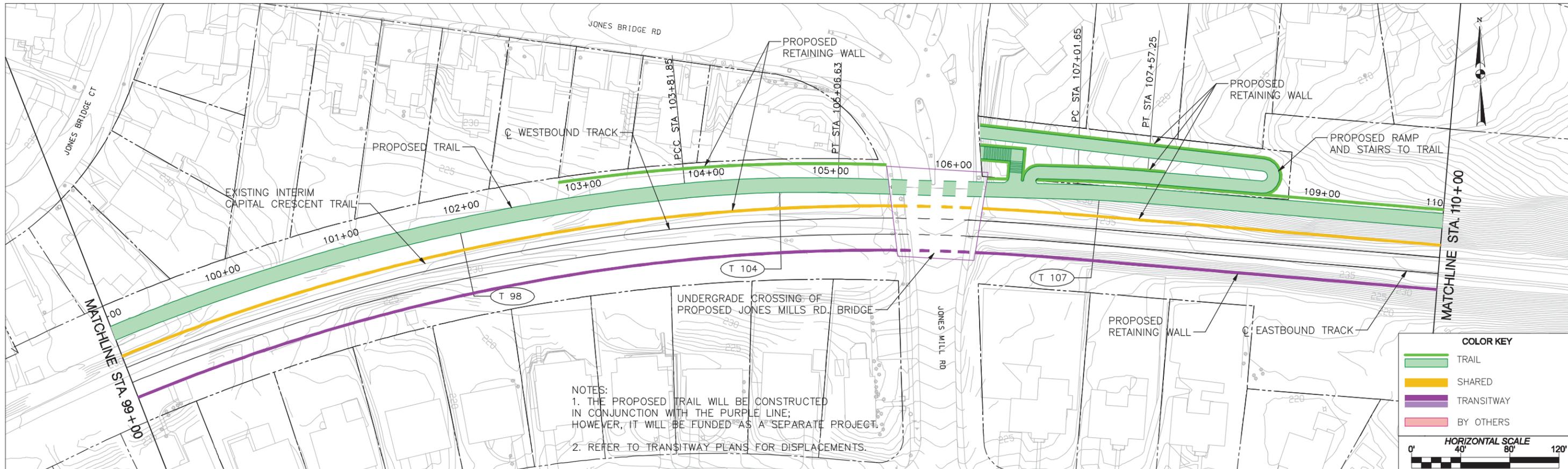
DATE: MARCH 2011
PLAN SCALE: AS SHOWN

CONTRACT NO.

DRAWING NO.
NSD-T12

14 OF 28

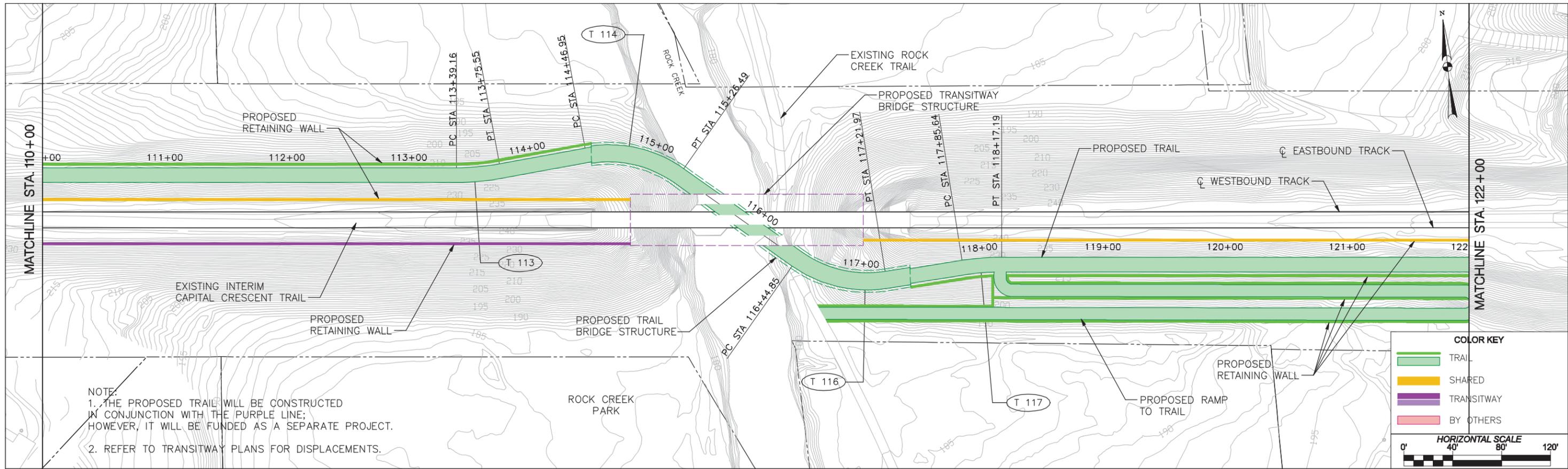
Monday, February 28, 2011, AT 04:01 PM



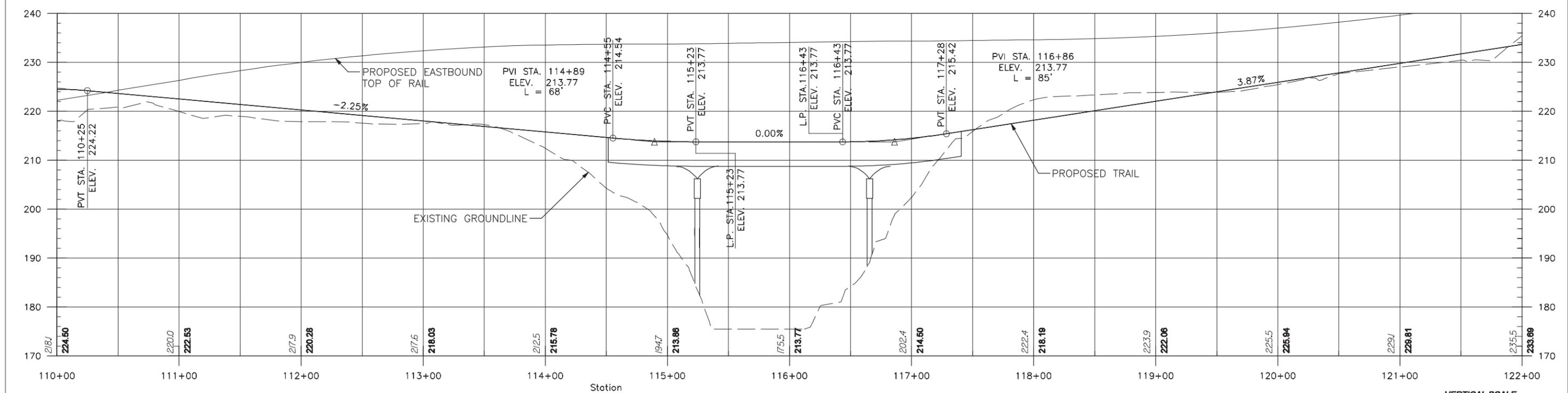
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						NO.	DESCRIPTION	BY	DATE						
<p>DATE: MARCH 2011</p>	<p>PLAN SCALE: AS SHOWN</p>	<p>DRAWING NO. NSD-T13</p>													

Tuesday, March 01, 2011 AT 03:51 PM



PLAN



PROFILE

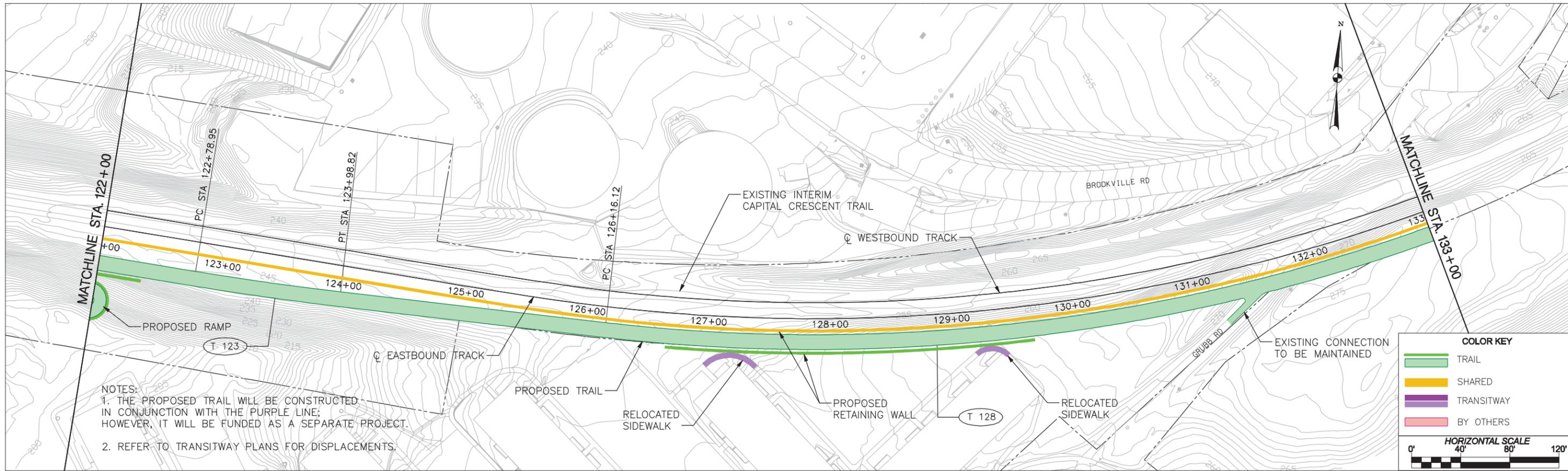


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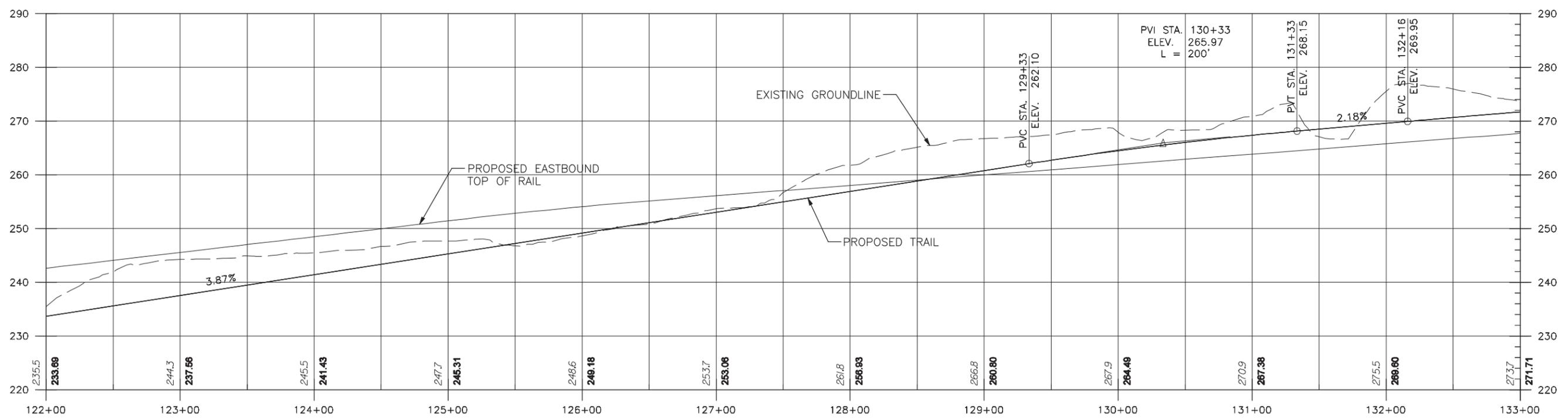
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PLAN



PROFILE

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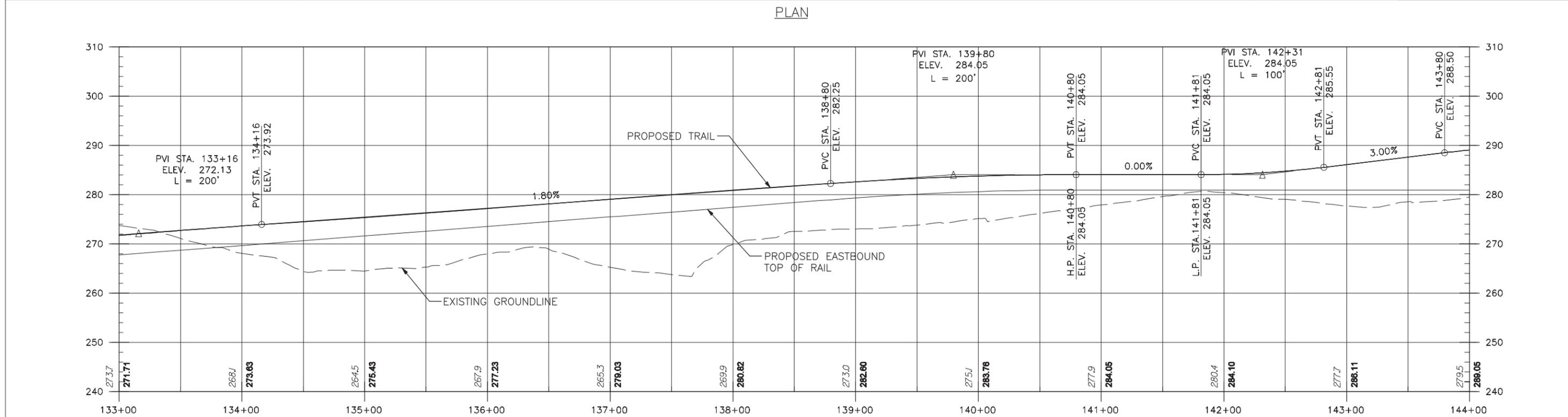
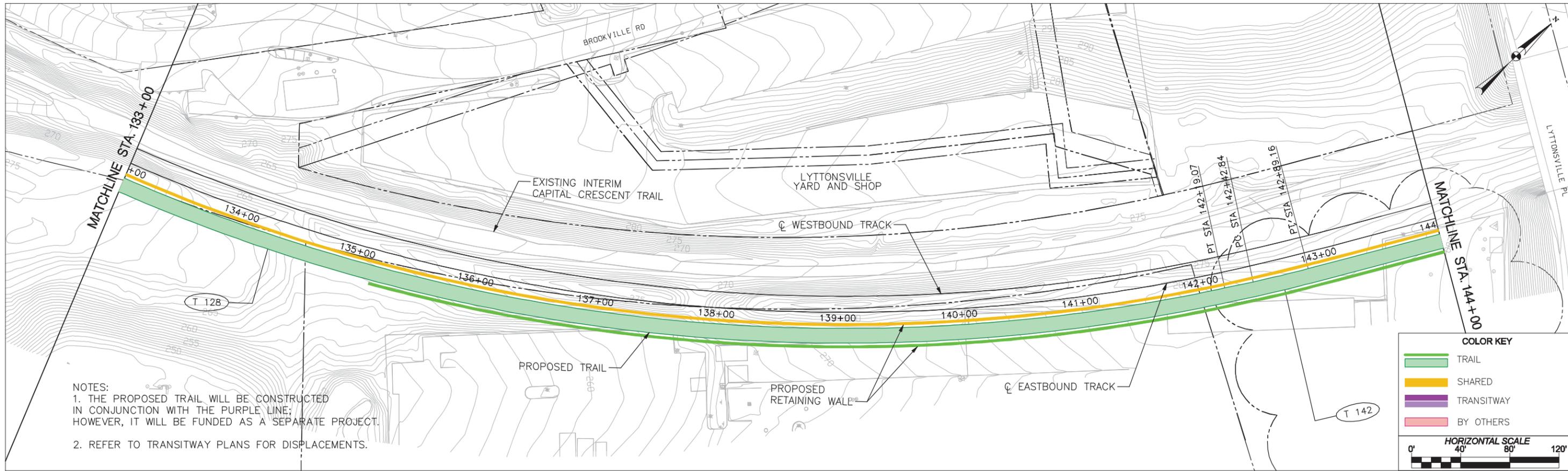
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PLAN & PROFILE – TRAIL
 STA 122+00 TO STA 133+00

DATE: MARCH 2011 PLAN SCALE: AS SHOWN

CONTRACT NO. DRAWING NO. NSD-T15 17 OF 28

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PLAN & PROFILE – TRAIL
STA 133+00 TO STA 144+00

DATE: MARCH 2011 PLAN SCALE: AS SHOWN

CONTRACT NO.

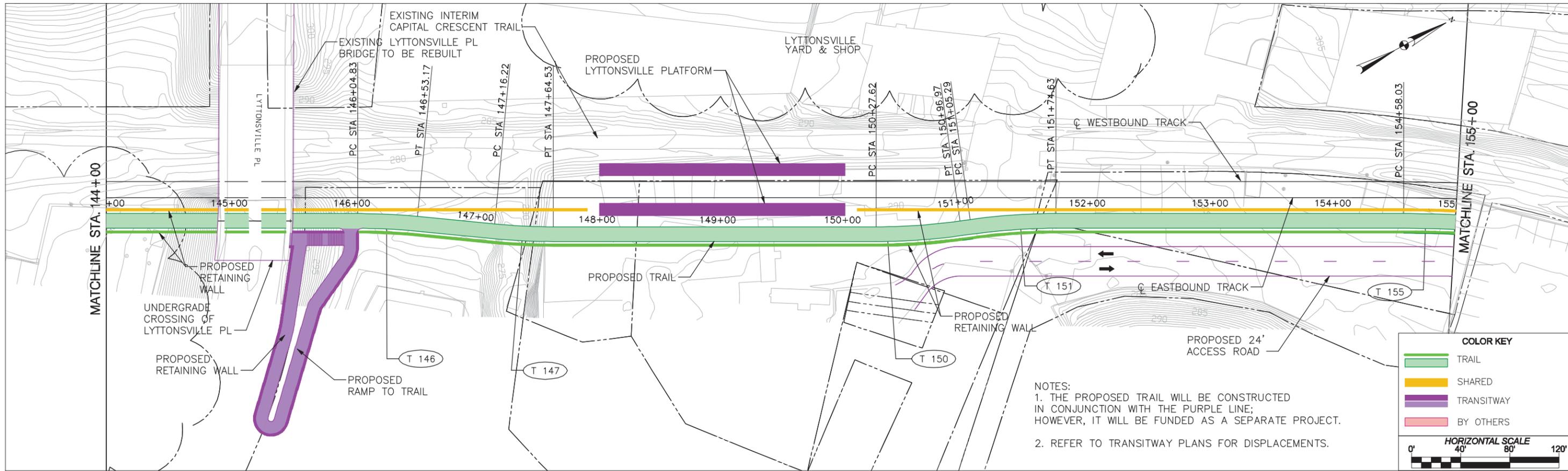
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NSD-T16

18 OF 28

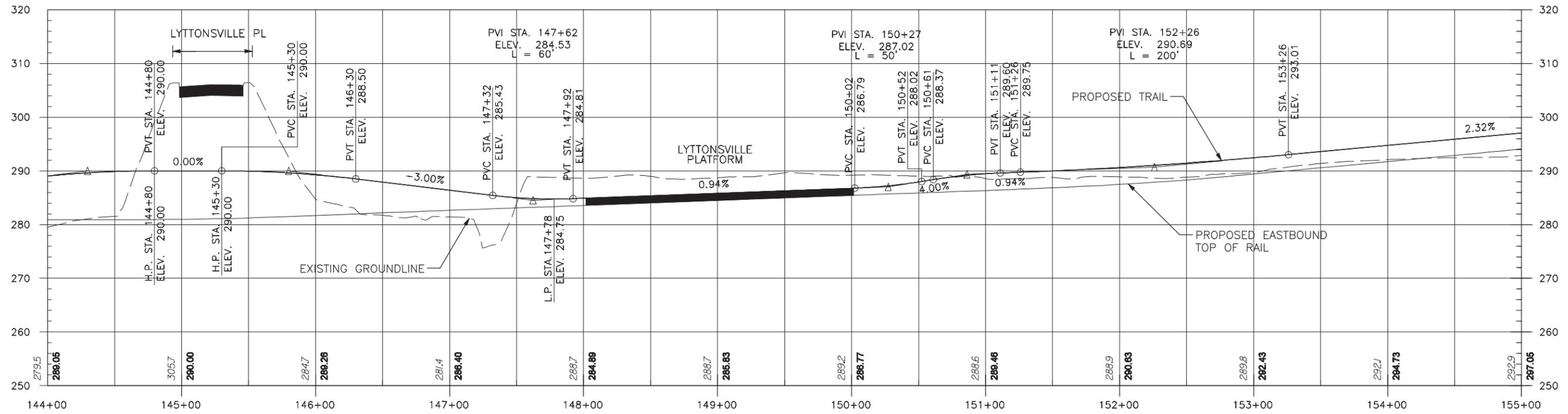
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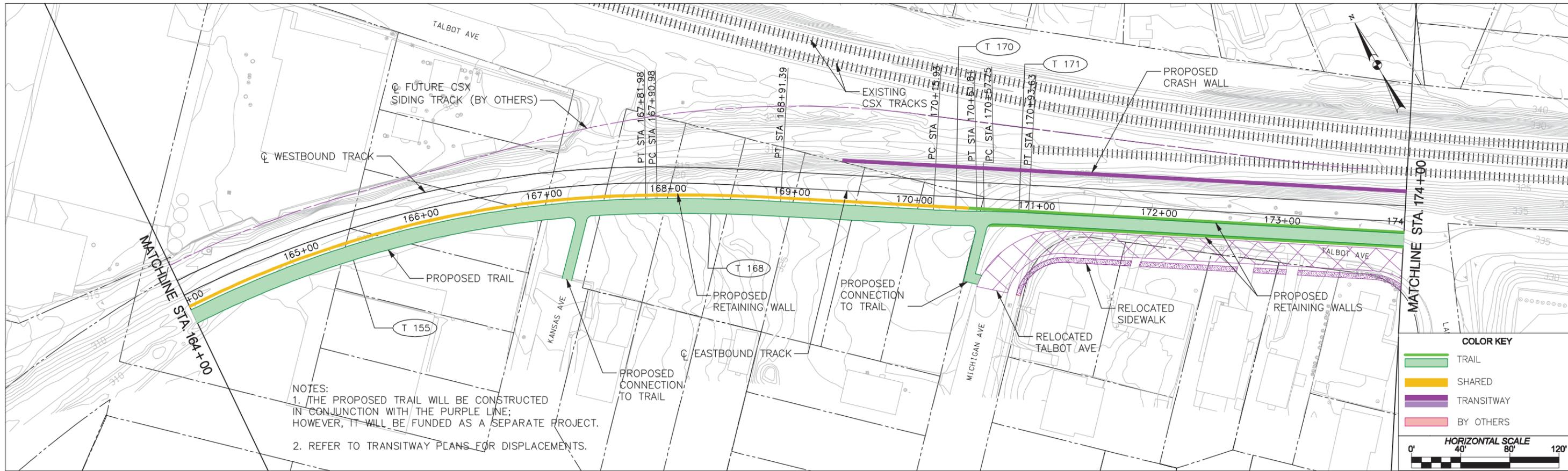
PURPLE LINE
NEW STARTS DEFINITION

PLAN & PROFILE – TRAIL
STA 144+00 TO STA 155+00

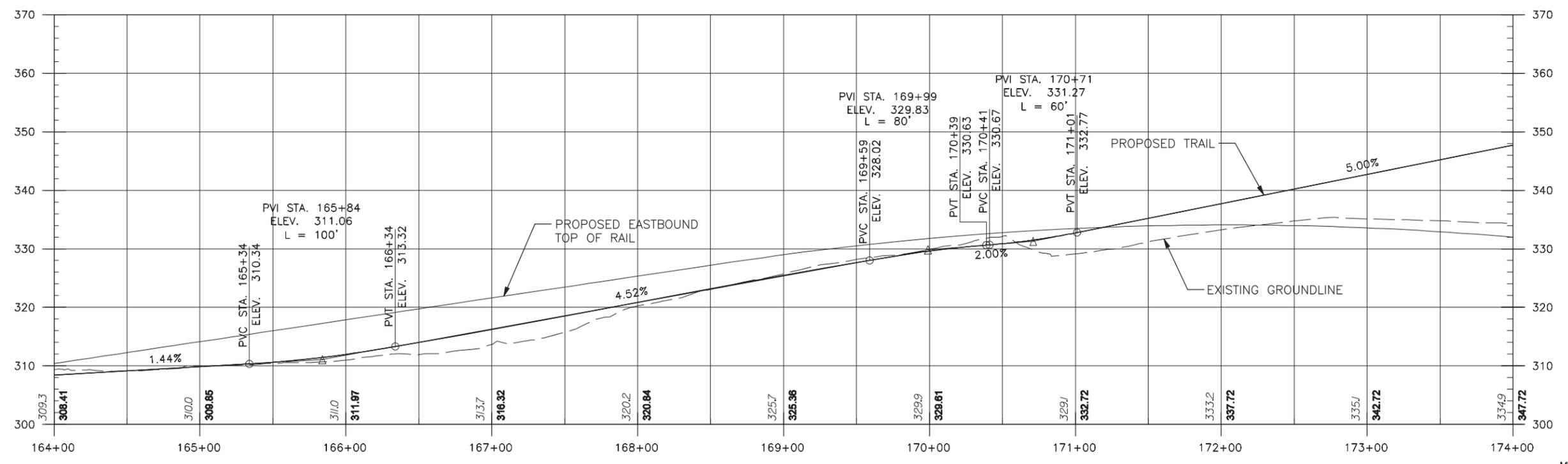
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CONTRACT NO. DRAWING NO. NSD-T17 19 OF 28

Monday, February 28, 2011, AT 04:15 PM



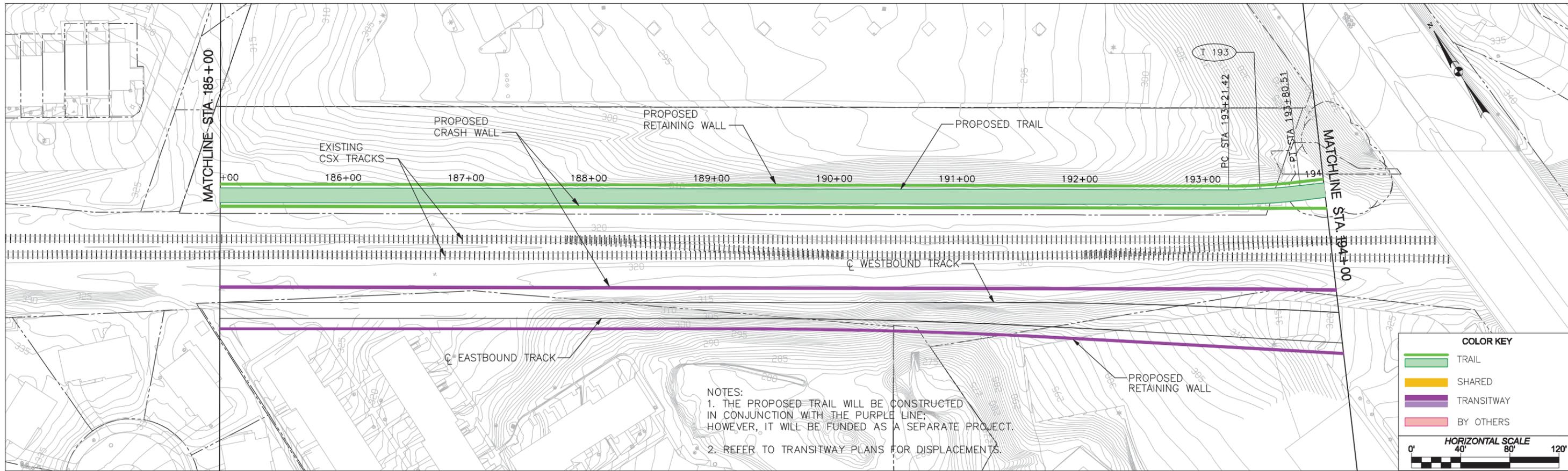
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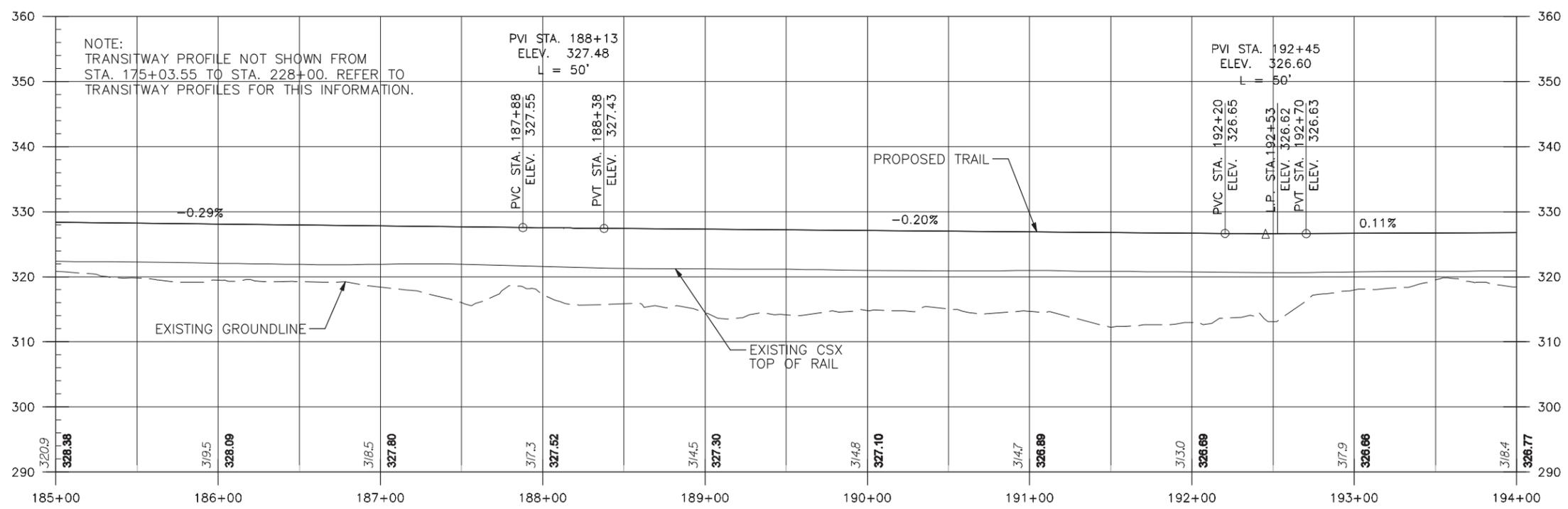
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					REVISIONS		DRAWING NO. NSD-T19
						21 OF 28	

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 PILES



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PLAN



PROFILE



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PURPLE LINE
 NEW STARTS DEFINITION

PLAN & PROFILE – TRAIL
 STA 185+00 TO STA 194+00

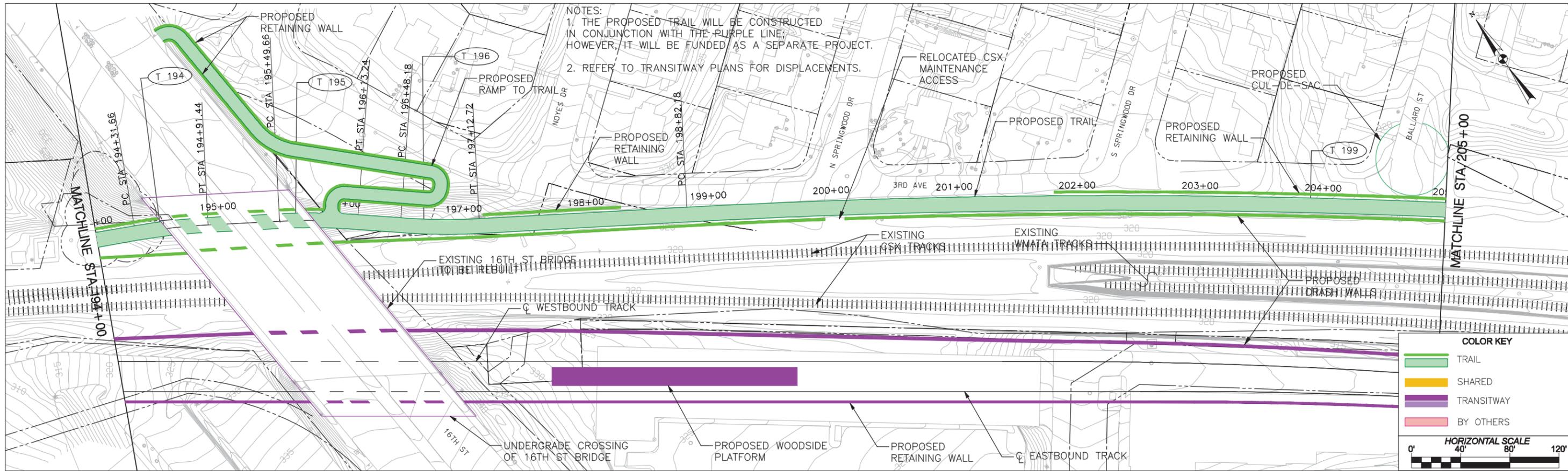
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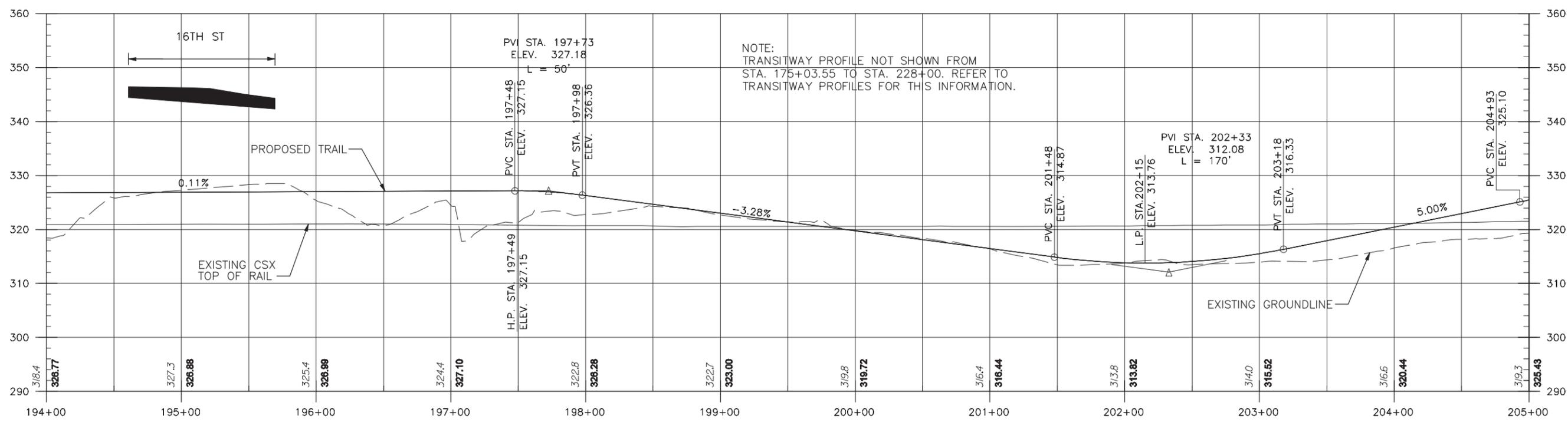
DRAWING NO.
NSD-T21

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Monday, February 28, 2011, AT 04:18 PM



PLAN



PROFILE



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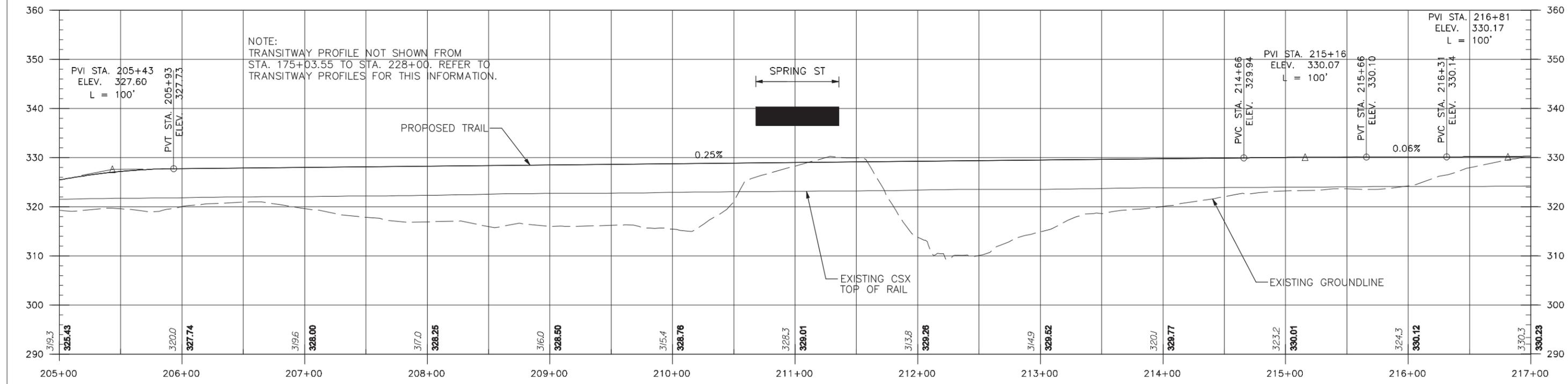
<p>MARYLAND DEPARTMENT OF TRANSPORTATION</p> <p>MARYLAND TRANSIT ADMINISTRATION</p>	<p>STV Incorporated</p> <p>7125 Ambassador Road, Suite 200 Baltimore, MD 21244 www.stvinc.com</p>	<p>JACOBS</p>	<p>Purple Line</p>	<p>NOT FOR CONSTRUCTION</p>	<table border="1"> <thead> <tr> <th>NO.</th> <th>DESCRIPTION</th> <th>BY</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	NO.	DESCRIPTION	BY	DATE													<p>PURPLE LINE NEW STARTS DEFINITION</p> <p>PLAN & PROFILE – TRAIL STA 194+00 TO STA 205+00</p>	<p>CONTRACT NO.</p>
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<p>DATE: MARCH 2011</p>	<p>PLAN SCALE: AS SHOWN</p>	<p>DRAWING NO. NSD-T22</p>																					
<p>24 OF 28</p>																							

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PROFILE

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 Baltimore, MD 21244
 www.stvinc.com

JACOBS

NOT FOR CONSTRUCTION

NO.	DESCRIPTION	BY	DATE
REVISIONS			

**PURPLE LINE
 NEW STARTS DEFINITION**

PLAN & PROFILE – TRAIL
 STA. 205+00 TO STA. 217+00

DATE: MARCH 2011 PLAN SCALE: AS SHOWN

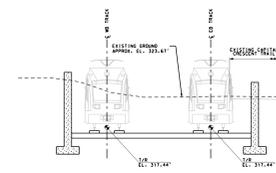
CONTRACT NO. _____
 DRAWING NO. **NSD-T23**
25 OF **28**

Monday, February 28, 2011, AT 04:19 PM

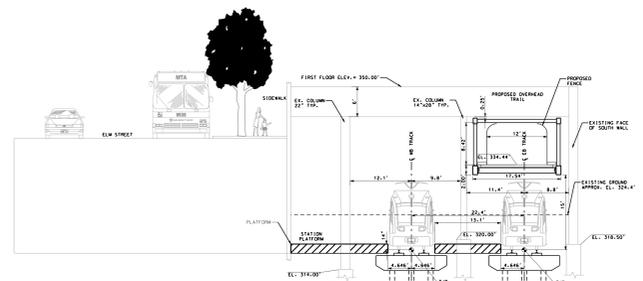
APPENDIX 2

Bethesda Station

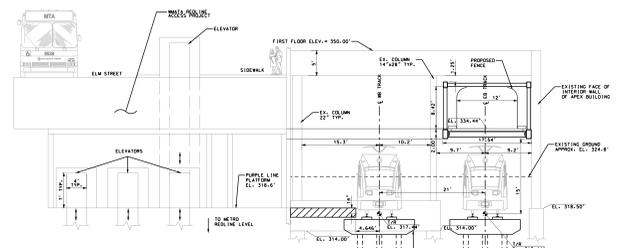
Plan and Profile Drawings



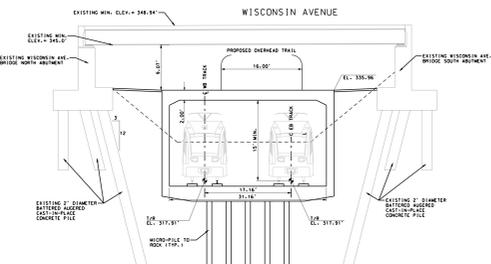
SECTION A-A
WOODMONT PLAZA



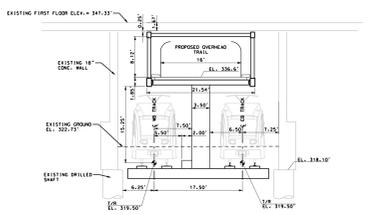
SECTION B-B
STATION PLATFORM
APEX BUILDING



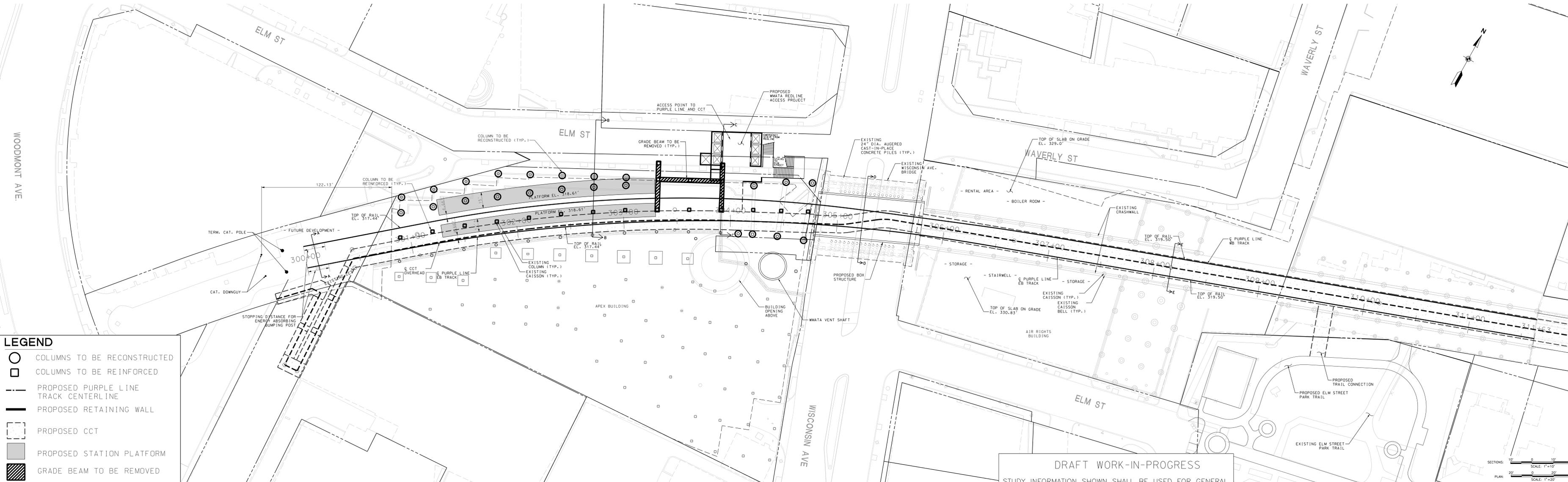
SECTION C-C
WMATA ACCESS
APEX BUILDING



SECTION D-D
WISCONSIN AVENUE



SECTION E-E
AIR RIGHTS BUILDING



LEGEND

- COLUMNS TO BE RECONSTRUCTED
- COLUMNS TO BE REINFORCED
- PROPOSED PURPLE LINE TRACK CENTERLINE
- PROPOSED RETAINING WALL
- PROPOSED CCT
- PROPOSED STATION PLATFORM
- GRADE BEAM TO BE REMOVED

DRAFT WORK-IN-PROGRESS
STUDY INFORMATION SHOWN SHALL BE USED FOR GENERAL PLANNING / INFORMATION ONLY AND IS SUBJECT TO CHANGE DURING PRELIMINARY ENGINEERING

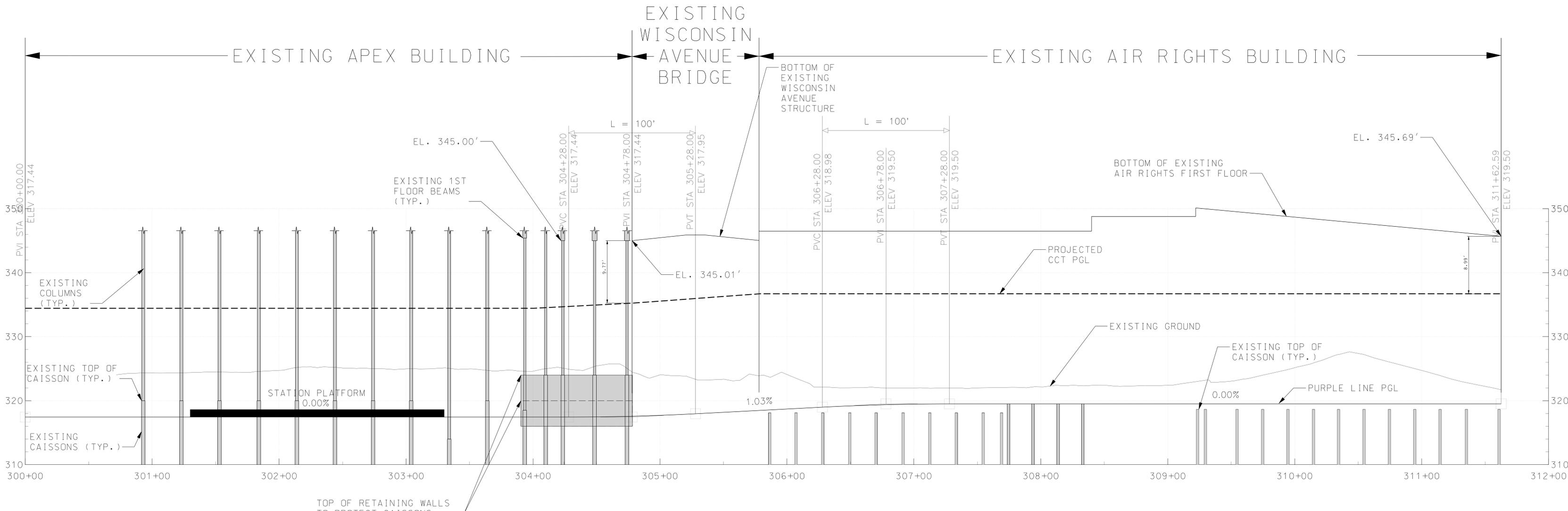
MARYLAND DEPARTMENT OF TRANSPORTATION

Purple Line
Gannett Fleming
WRSA
 PROFESSIONAL CERTIFICATION
 I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland.
 License No. Expiration Date

NO.	DESCRIPTION	REVISIONS	BY	DATE

DATE: OCT 2011
SCALE: AS SHOWN

BETHESDA TERMINAL STUDY
CONTRACT NO. 1042
DRAWING NO. SHEET NO. 1 OF 2
PLAN & SECTION LPA WITH TRAIL



LINE	SURFACE	OFFSET
BethesdaTunnel		0.0000
Scaled 5.0000 Times Ver.		
Scaled 1.0000 Times Hor.		

DRAFT WORK-IN-PROGRESS

STUDY INFORMATION SHOWN SHALL BE USED FOR GENERAL PLANNING / INFORMATION ONLY AND IS SUBJECT TO CHANGE DURING PRELIMINARY ENGINEERING



MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND TRANSIT ADMINISTRATION

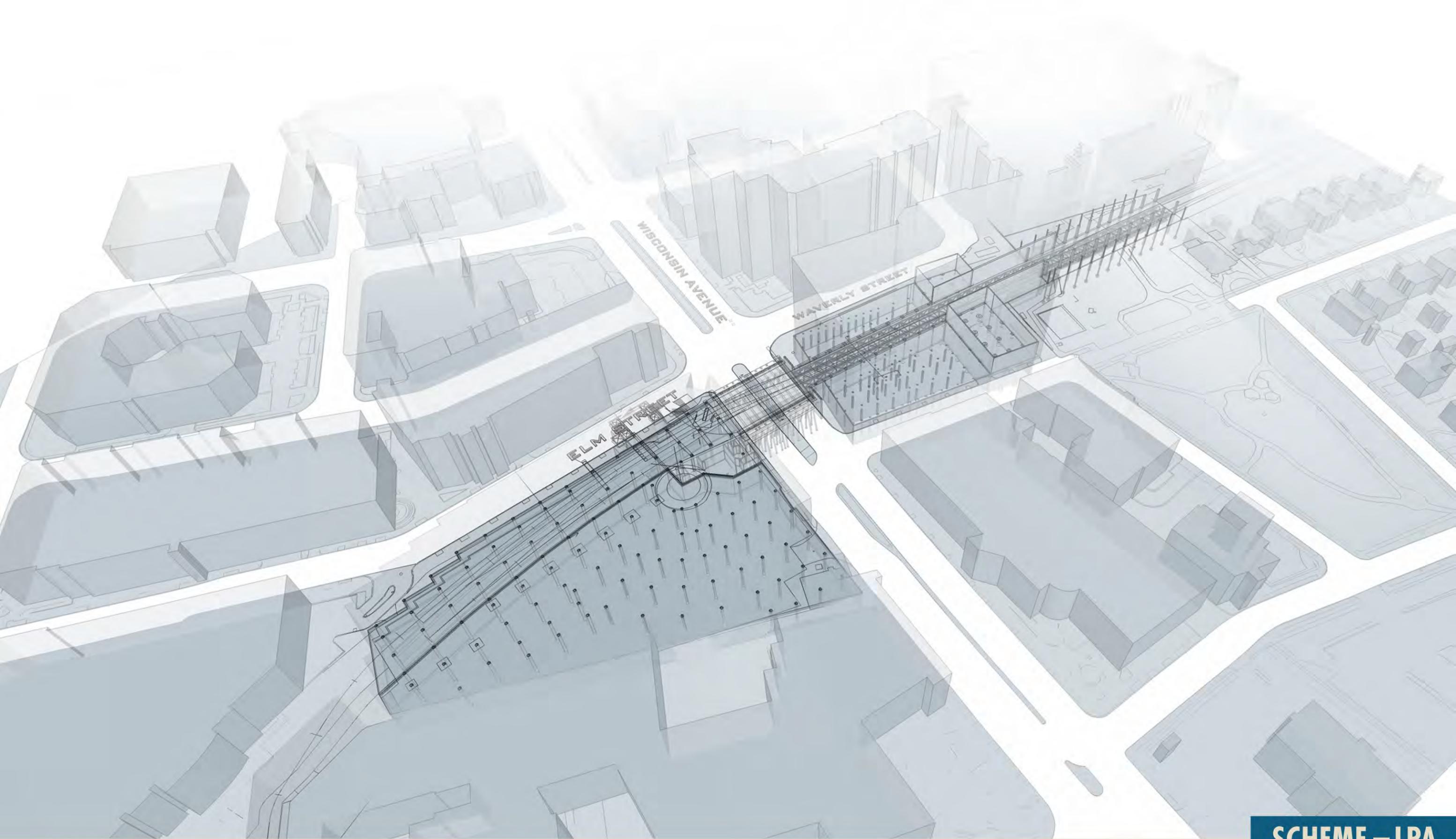
Gannett Fleming
WR&A

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland.

License No. _____ Expiration Date _____

			CONTRACT NO. 1042 DRAWING NO.
			SHEET NO. 2 OF 2
			BETHESDA TERMINAL STUDY PROFILE LPA WITH TRAIL DATE: OCT 2011 SCALE: AS SHOWN

APPENDIX 3
Bethesda Station
Renderings of
Station and Trail



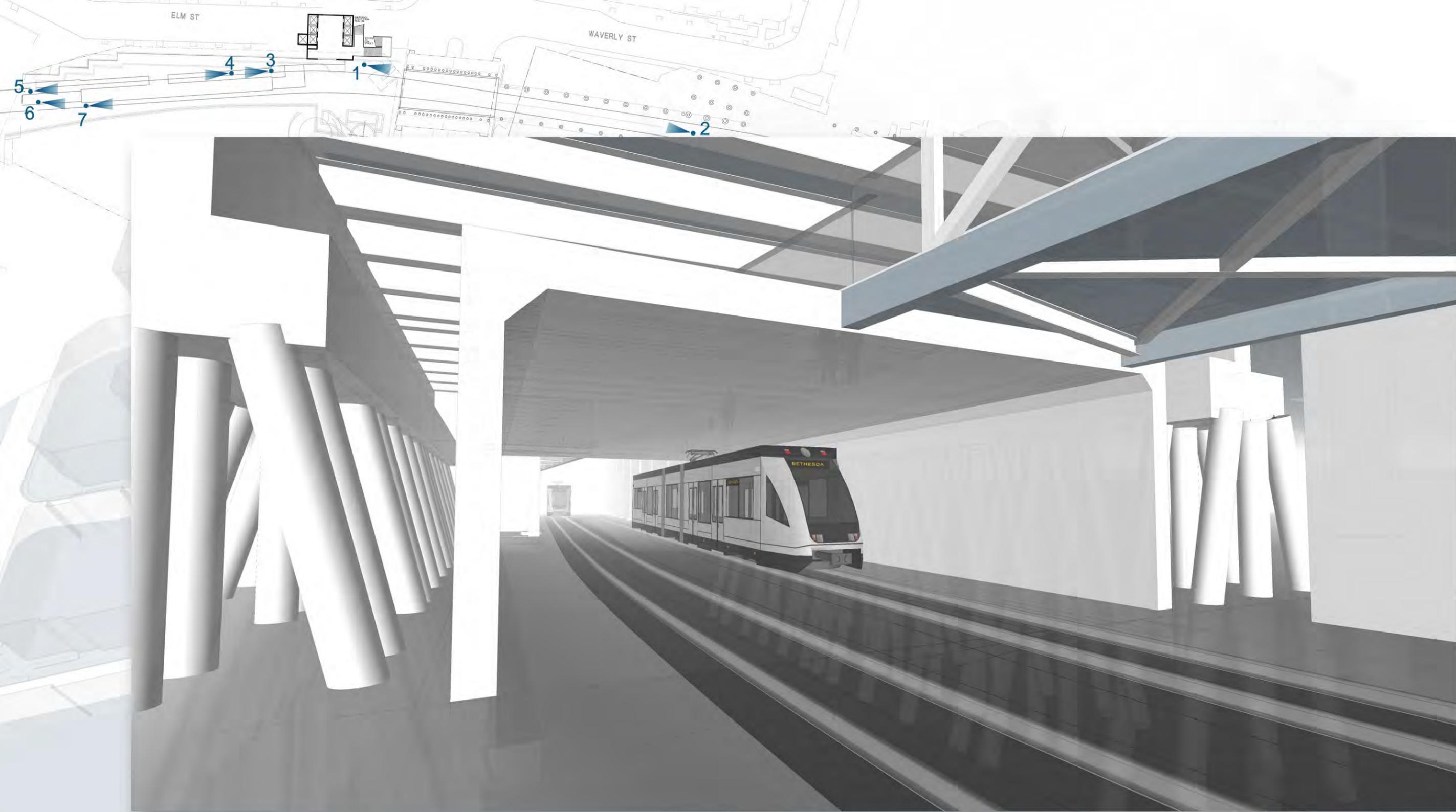
SCHEME – LPA



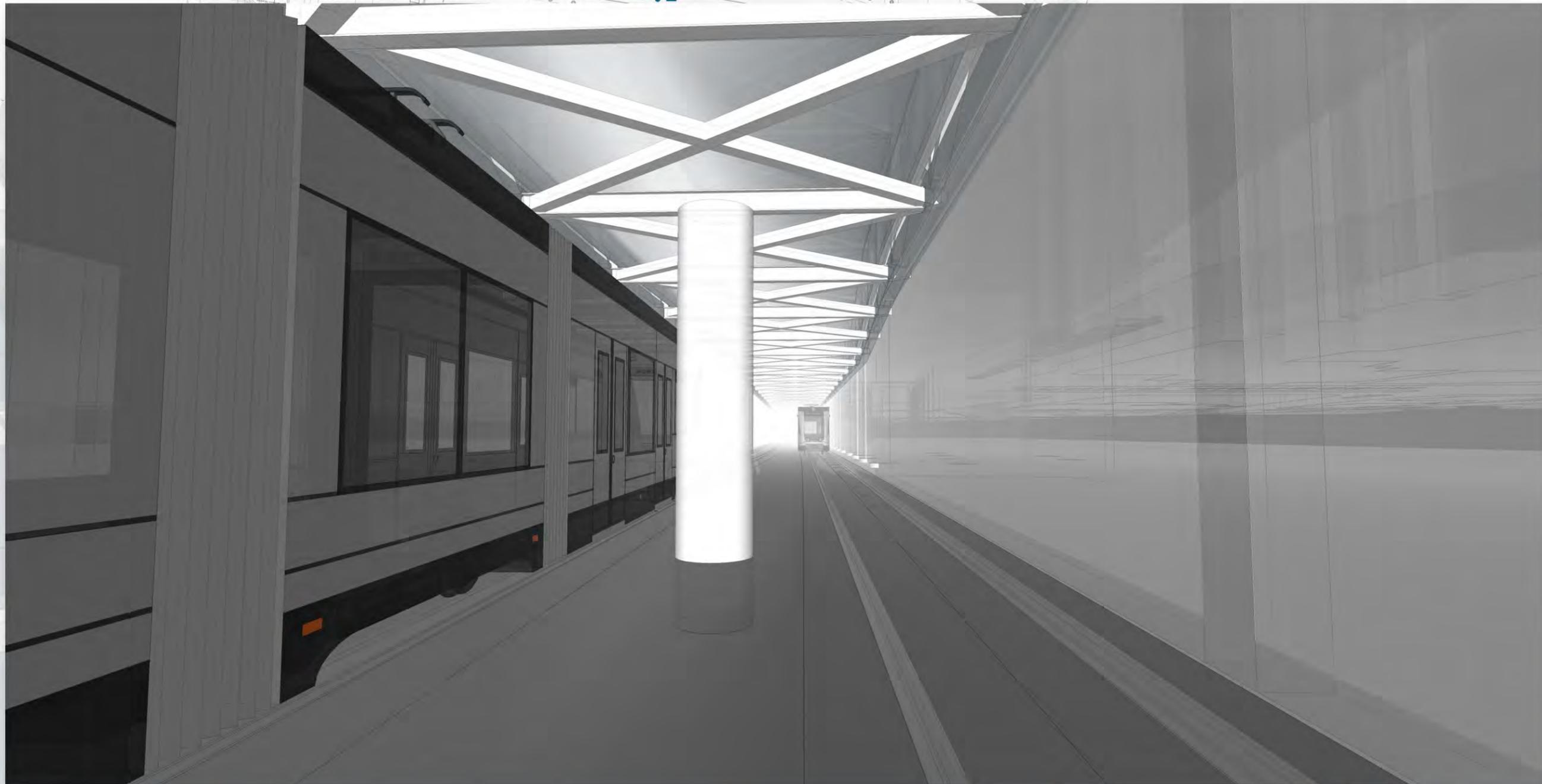
Purple Line - Bethesda Station



August 15, 2011



LPA – Perspective 1



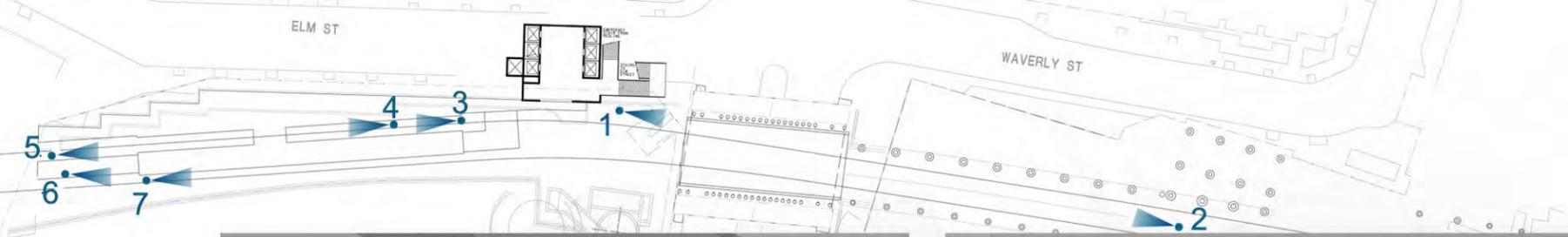
LPA – Perspective 2



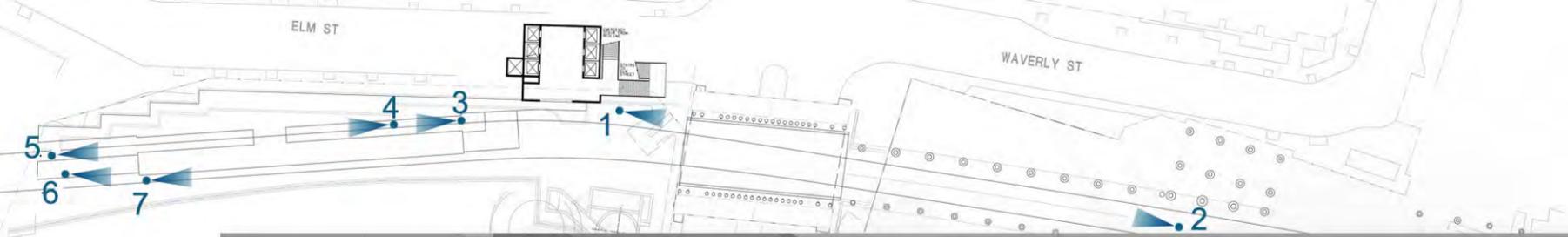
Purple Line - Bethesda Station



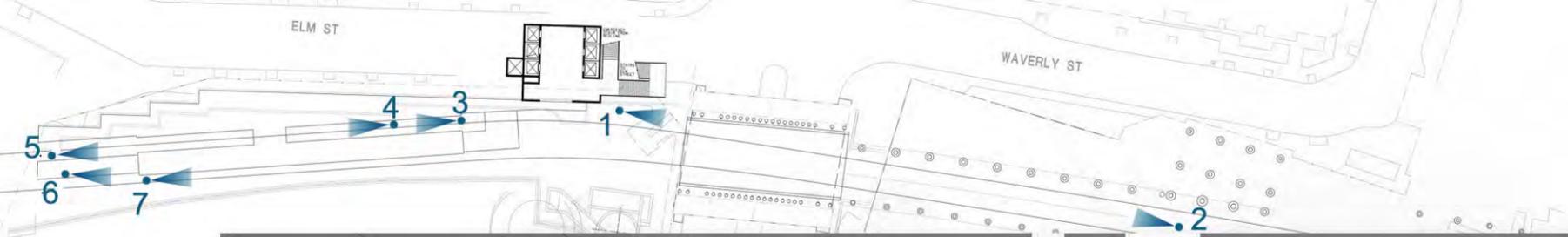
August 15, 2011



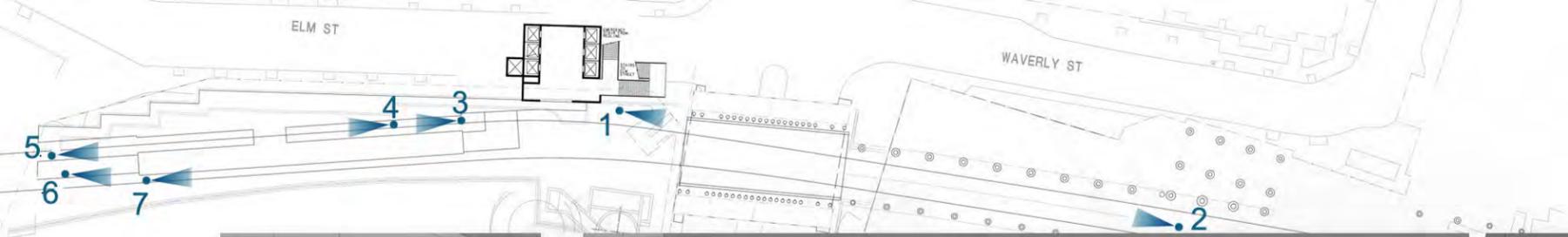
LPA – Perspective 3



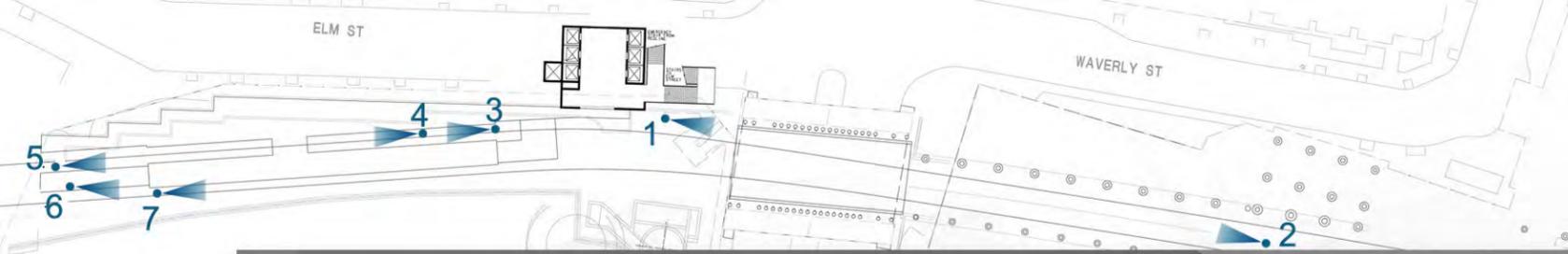
LPA – Perspective 4



LPA – Perspective 5



LPA – Perspective 6



LPA – Perspective 7