DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL

K CAPITAL COSTS

D.C. TO RICHMOND SOUTHEAST HIGH SPEED RAIL

1 INTRODUCTION

1.1 INTRODUCTION

This report describes the methodology used to develop conceptual cost estimates for the Washington, D.C. to Richmond Southeast High Speed Rail (DC2RVA) project along the 123-mile DC2RVA corridor, based on the Concept Engineering Plans. The DC2RVA project is being led by the Virginia Department of Rail and Public Transportation (DRPT), in coordination with the Federal Railroad Administration (FRA) as the lead federal agency.

The Project is being evaluated in an Environmental Impact Statement (EIS) to satisfy the requirements of the National Environmental Policy Act (NEPA). DRPT developed conceptual cost estimates for the build alternatives being evaluated in the EIS, using the methodologies and assumptions documented herein based on the conceptual engineering-level designs for the build alternatives.

These conceptual costs were developed to support a general comparison of each build alternative's cost relative to one another only. The conceptual costs DO NOT represent the total Project cost, which will be highly dependent on schedules, construction phasing, and numerous other factors that have not been defined at this stage of Project development.

1.2 PURPOSE AND OBJECTIVE OF THIS REPORT

The purpose of this report is to support review of how the conceptual costs were developed for the concept alternatives being evaluated in the EIS by the governing agencies, Project stakeholders, and other interested parties.

The objective of this report is to document the conceptual cost estimates for each build alternative, including:

- Estimating methodologies used
- Major estimate assumptions
- Assumed Project schedule
- Major Project cost components
- Base year costs
- Year-of-implementation cost adjustments

- Cost risks reflected in the estimate
- Potential costs excluded from the estimate

This report is further structured to be consistent with the April 2016 draft of the Federal Railroad Administration's *Capital Cost Estimating for Project Sponsors* guidelines, currently under development.

2 PROJECT DESCRIPTION

2.1 PROJECT OVERVIEW

The DC2RVA project would include specific rail infrastructure improvements and service upgrades to deliver higher speed passenger rail, improve conventional speed passenger service, expand commuter rail, and accommodate growth of freight rail service in an efficient and reliable multimodal rail corridor. The increased capacity would improve passenger rail service frequency, reliability, and door-to-door competitive travel time in a corridor shared by growing volumes of passenger, commuter, and freight rail traffic. Specific improvements to the existing rail infrastructure between Arlington, VA, and Centralia, VA, include:

- Corridor-wide improvements to train operating capacity to accommodate efficient operation of passenger, commuter, and freight rail service with increased frequency, reliability, and speed, including an additional main track along most of the corridor, additional sidings, crossovers, yard bypasses and leads, and other capacity and reliability improvements at certain locations.
- Corridor-wide upgrades to existing track and signal systems to achieve higher operating speeds, including curve realignments, higher-speed crossovers between tracks, passing sidings, and grade crossing improvements.
- Station and platform improvements for Amtrak and Virginia Railway Express (VRE) stations to improve the efficiency of railroad operations, improve quality of service, and accommodate increased ridership.

The environmental impacts of these improvements and measures to avoid, minimize, or otherwise mitigate such impacts are described in Chapter 4 of the DC2RVA Draft EIS.

The Project would include locations for new or replacement passenger stations on the Project corridor. Additionally, the Project would include rail capacity improvements to address congestion in the Richmond area, including on the CSX Transportation (CSXT) Peninsula Subdivision from AM Junction in downtown Richmond east to Beulah Road in Henrico County, and on the Buckingham Branch Railroad from AM Junction north of Richmond to Doswell, VA.

Studies in support of the Project addressed passenger and freight rail operations and service between Union Station in Washington, D.C. and Richmond and beyond, but the Project would not include physical improvements to the Long Bridge across the Potomac River or to rail infrastructure within Washington, D.C. Other projects would address these improvements, as well as any improvements to the rail infrastructure north of Arlington and south of Centralia, VA.

As described in Chapter 2 of the DC2RVA Draft EIS, DRPT initially divided the Project corridor into three general areas based on common rail operation characteristics and environmental conditions: Northern Virginia, Central Virginia, and Richmond. DRPT collected and evaluated data for 22 functional segments within these three areas, which were then grouped into six build alternative areas that are more specific to the types of alternatives that would be developed as part of the DC2RVA project: Arlington (Long Bridge Approach), Northern Virginia, Fredericksburg (Dahlgren Spur to Crossroads), Central Virginia (Crossroads to Doswell), Ashland (Doswell to I-295), and Richmond (I-295 to Centralia). A full description of these areas and segments, the alternatives screening process, and the build alternatives evaluated in the Draft EIS, can be found in Chapter 2 of the DC2RVA Draft EIS.

2.2 SPONSORS

The Project is being led by the Virginia Department of Rail and Public Transportation (DRPT) in coordination with the Federal Railroad Administration (FRA) as the lead federal agency.

2.3 DEVELOPMENT TEAM

Overall Project management is being performed by DRPT, supported by a consultant team lead by HDR, Inc. HDR is further supported by two primary subconsultants, Parsons Corporation and Moffatt & Nichol.

The Project also includes a task force composed of representatives from FRA, DRPT, VRE, the Virginia Department of Transportation (VDOT), Amtrak, and CSX Transportation (CSXT).

2.4 SCHEDULE

DRPT commenced conceptual service planning, engineering development, environmental studies, and stakeholder outreach efforts in September 2014, with the Draft EIS scheduled to be published for public comment in late April 2017. The Final EIS and Record of Decision are anticipated to be complete in June 2018.

Preliminary engineering is being performed concurrently for all build alternatives documented in the Draft EIS to support rapid transition to final engineering and design following selection of a preferred alternative.

For purposes of estimating the Project costs only, construction is assumed to occur between 2017 and 2025. The actual schedule will be based on the final conclusions of the EIS, funding availability, more detailed development of construction procurement and phasing, and numerous other factors associated with a Project of this magnitude.

2.5 STATUS

The DC2RVA Draft EIS documents the environmental impacts of the build alternatives discussed in this report. Preliminary engineering (PE) is concurrently underway for these alternatives but is regarded as a separate effort from the conceptual engineering, including cost estimating, being performed in support of the EIS.

2.6 STATUS AND TIMING OF FUNDING SOURCES

The DC2RVA project, through development of the EIS and preliminary engineering, is funded by three sources:

- FRA High Speed Rail Grant (80 percent/$44,308,000)
- DRPT (15 percent/$8,101,000)
- CSXT (5 percent/$2,976,000)

Total funding for the DC2RVA project through the EIS and preliminary engineering is $55,385,000.

Funding for construction will be identified and scheduled upon selection and further development of a preferred alternative.

2.7 BASE YEAR

DRPT used 2015 dollars to develop the base costs prior to schedule-related cost escalations.

2.8 COST LIMITS

During conceptual engineering, DRPT screened alternatives based on preliminary assessments of technical feasibility and environmental impacts. Evaluation of alternatives based on formal cost estimates was excluded as a screening factor, and as such, no specific cost limits have been established for the Project at this stage.

3 TECHNICAL BASELINE

3.1 PROJECT DOCUMENTS

The DC2RVA project maintains a Project website at http://dc2rvarail.com. Final documents and public drafts are available under the Resources tab of the website.

3.2 ESTIMATING TEAM

The cost estimates for each of the build alternatives were prepared by the design teams developing each alternative using a common set of conceptual unit costs established by the overall Project team. Design teams were further allowed to adjust costs where site conditions or circumstances suggested higher costs were likely to be encountered. The individual design teams further estimated any additional costs for improvements unique to a specific segment where Project unit costs were undefined.

3.3 PROJECT DESIGN

The conceptual level designs reflect the DC2RVA engineering Basis of Design (BOD). The improvements to the existing track generally include the following:

- Addition of a third main track, designed to improve speed up to a maximum of 90 mph for passenger trains and 60 mph for freight trains.
- Re-alignment of curves in the existing tracks (maintaining tangents), designed to improve speed up to a maximum of 90 mph for passenger trains and 60 mph for freight trains, if practicable.
- All new track and re-aligned track are constrained within existing right-of-way.
- Existing rail bridges would continue to be used, and new parallel bridge structures would be constructed to carry the new track. The new bridge structures are to be capable of carrying two tracks, although only one track is being added.
- Track alignment at existing Amtrak and VRE stations would accommodate planned station improvements, including addition of center island platforms.

Details about the track improvements that served as the basis for the estimates are in Chapter 4.

4 ESTIMATING METHODOLOGY AND STANDARD COST CATEGORIES

4.1 METHODOLOGY

The estimating methodology utilizes the following assumptions to develop the fully burdened Project cost. The direct costs and indirect cost percentages are based on experience, current market conditions, and historical data. Major inputs and assumptions used for the estimates include:

- A combination of the HDR Constructors database, similar project costs, and historical data were used to establish direct costs. Marshall & Swift building cost data was also utilized to develop the line item costs that make up the unit costs for the vertical components.
- The estimate assumes a Project start in 2017, with completion in 2025. Unit costs for both the current year (2016) and 2017–2025 are included as well.
- Unit rates assumed to include prevailing wages rates for subcontractor labor.
- A 6 percent sales tax has been included based on the 2016 Virginia Department of Taxation Rates.
- Contractor Field General Conditions (GCs)—20 percent
  - Field general conditions include, but are not limited to the following:
    - Site office facilities adequate for staff required to manage Project site(s), includes owner and government field staff offices
    - Field office staff vehicles and equipment
    - Stormwater Pollution Prevention Plan (SWPPP) and minor maintenance of SWPPP measures
    - Project consumables
    - Temporary facilities
- Contractor Mobilization and Demobilization—8 percent
  - Mobilization and demobilization includes, but is not limited to the following:
    - Mobilization and demobilization of all necessary construction equipment
    - Set up and removal of all temporary facilities, including all contractor, subcontractor, and engineer field offices

- Contractor Bonds and Insurance—2.5 percent
  - Bonds and insurance includes the following (under normal conditions):
    - 0.75 percent—Bonds
    - 0.75 percent—General Liability
    - 0.50 percent—Rail
    - 0.50 percent—Environmental
- Contractor Field Overhead—16 percent
  - Field overhead includes, but is not limited to the following:
    - Field office project staff and standard burden
    - Procurement
    - Project controls/scheduling
    - Full time quality assurance/quality control (QA/QC), safety, and environmental staffing
- Contractor Profit—6 percent
  - Profit based on:
    - Size and scope of the Project
    - Market conditions
    - Assumes a joint venture, single prime contract
- Undefined Scope of Work contingency—0 percent
  - These unit costs ***do not*** include any contingency. AACE Guidelines state a range of 25 percent to 40 percent. Based on the complexity of the Project and the level of Project definition at the time these conceptual unit costs were derived, it is suggested that 35 percent should be used.

4.2 STANDARD COST CATEGORIES

Standard costs for the Project are described below and use the following units:

AC—Acre	BF—Bridge Foot	CY—Cubic Yards	MI—Track Mile
EA—Each	LF—Linear Foot	LS—Lump Sum	
SF—Square Feet	STALL—Parking Stall	SY—Square Yards	
TF—Track Feet	TON—Tons	%—Cost Percent	

4.2.1 Track Elements

There are ten separate items for track construction: proposed single track (Class IV or V), upgrade track (from Class III or IV to V), shift/realign track, track removal, turnout removal, turnouts (X 3), diamond crossings, and signals and communications. Each track construction item, including its appropriate unit price measurement, is described in detail in the remainder of this section.

Item 10.01 Single Track (TF)

It is assumed that concrete ties and (136# RE) rail in 80-foot lengths would be delivered to the construction site by truck. The concrete ties and rail would then be stacked per CSXT regulations. Further distribution of the materials would occur during the track installation process. Ballast for the new track construction would be delivered by truck and placed in piles at approved locations for distribution during track construction. The contractor would use equipment and manpower to construct the track (not a TLM). Concrete ties would be placed on 20-inch centers on the prepared sub-ballast. The 80-foot sticks of rail would be placed on the concrete ties using a speed swing or similar piece of lifting equipment after the tie pads have been placed on the concrete ties. Once the rail is in place, fasteners would then be installed. The 80-foot sticks of rail would then be welded together. Ballast would be loaded in on-rail dump trucks and distributed for tamping and surfacing. Production tampers are assumed to be used to raise and align the track as construction proceeds. Ballast distribution and production tampers would require several passes to raise the track to the required elevation and to place 12 inches of ballast underneath the concrete ties. A ballast regulator would be needed to distribute ballast and dress the track. The unit price for this item is based on CSXT Standard Specifications dated September 15, 2016. The unit price measurement for the item is Track Feet.

Item 10.02 Upgrade Track (Class III or IV to Class IV or V) (TF)

It is assumed that concrete ties and 80-foot rail (136RE#) sticks would be utilized for the track upgrade work. They would be delivered to the construction site by truck. Ballast to upgrade the track would be delivered by truck and placed in piles at approved locations for distribution during construction of the track upgrade.

After completion and acceptance of the new track, the existing track or one of the existing tracks would be taken out of service so construction can commence to renew the existing track structure.

All wood ties and existing rail would be removed from the current track structure, after the new double or triple track has been placed in service. The existing rail that has been removed would be placed in a location that would not affect train operations and would be picked up by CSXT for cascading on their system. The wood ties would be removed by the contractor and hauled to a landfill for disposal. Some ballast rework is assumed to be required before new concrete ties and 136# RE rail can be installed.

After the rail and wood ties have been removed as discussed in the paragraph above, concrete ties would be placed on 20-inch centers. Once the ties have been installed, the tie pads can be placed on the concrete ties and the 80-foot sticks of rail can be laid on the ties and pads. Once the rail is laid, the track fasteners would then be installed. The 80-foot sticks of rail would then be welded together. A 2-inch lift of ballast would be distributed using on-rail dump trucks to add needed ballast to fill the tie crib for tamping and track alignment. A ballast regulator would be needed to distribute ballast and dress the track. The unit price measurement for this item is Track Feet.

Item 10.03 Number 10 Turnout (EA)

For the Number 10 turnout, it is assumed that materials would transported to the work site by truck. Once delivered to the site, the turnout materials would be assembled prior to installation into the track structure. It is assumed that the Number 10 turnout is a non-power switch with wood switch ties. Before installation of the turnout into the track, a 6-hour work window is

estimated to allow the contractor adequate time to complete the work in CSXT's tracks. After the turnout has been slid into the track structure, ballast would added, and a tamper would be used to tamp the switch ties to provide support to the track structure. The unit price measurement for this item is Each.

Item 10.04 Number 15 Turnout (EA)

For the Number 15 turnout, it is assumed that the material for the turnout, including concrete switch ties, would be transported to the work site by truck. Once delivered to the site, the turnout material would be assembled prior to installation into the track structure. The Number 15 turnout is assumed to be operated by use of a power switch. Before installation of the turnout into the track, an 8-hour work window is estimated to allow the contractor adequate time to complete the work in CSXT's tracks. After the turnout has been placed in the track structure, ballast would be added, and a tamper would be used to tamp the switch ties to provide support to the track structure. The unit price measurement for this item is Each.

Item 10.05 Number 20 Turnout (EA)

It is assumed that the material for the Number 20 turnout, including concrete switch ties, would be transported to the work site by truck. Once transported to the site, the turnout materials would be assembled prior to installation into the track structure. Before installation of the turnout into the track, an 8-hour work window is estimated to allow the contractor adequate time to complete the work in CSXT's tracks. After the turnout has been placed in the track structure, ballast would be added, and a tamper would be used to tamp the switch ties to provide support for the track structure. The unit price measurement for this item is Each.

Item 10.06 Diamond Crossing (EA)

It is assumed that all material to construct the 45-degree diamond crossing would be trucked to the work site. In order to install the diamond crossing, a 12-hour work window is estimated to be established to allow the work to be completed in CSXT's tracks. Once an adequate work window has been established and all material to complete the work is at the site and the crossing diamond has been assembled, work can commence.

After the track structure has been removed, approximately 4 feet of material below the ties would then be removed. Once the ballast, sub-ballast, and earth material have been removed, a 1-foot base layer of asphalt would be placed underneath the crossing diamond. On top of the asphalt, 4-inch perforated pipes would be laid to drain the diamond crossing area. These pipes would be routed to a collection basin, which would be connected to a pipe to outfall the water from the track roadbed. The extent of the outfall drainage would be determined based on requirements at the specific site of the diamond crossing construction.

Once the perforated pipe has been laid, ballast would be placed on top of the asphalt to an elevation which is 2 inches below the bottom of the concrete ties. The assembled diamond would then be lifted into place on the ballast. Additional ballast would later be added to fill up the ties cribs and allow for a 2-inch track raise. A tamper would then be used to tamp the concrete ties and alignment the track. A ballast regulator would then dress the track prior to being placed back in service. The unit price measurement for this item is Each.

Item 10.07 Turnout Removal (EA)

It is assumed that all turnout material would be removed from the track structure. CSXT may require that the turnout material be transported to a specific location for storage. During removal

of the turnout material, rail and other track material along the main operating line is assumed to be installed so the track can be placed back in service. The unit price measurement for this item is Each.

Item 10.08 Track Shift/Realign (TF)

With the addition of another track, the existing track at some locations would have to be shifted several feet, but no more than 10 feet, to accommodate the new track construction. (Shifts of greater than 10 feet were counted as removed track and new track.) The track shift is assumed to be coordinated with CSXT to establish a work window to accomplish moving the track(s). When track with wood ties is shifted, a number of wood ties normally do not remain as part of the track structure and have to be replaced. The amount of ballast that would be added to the track structure would depend on how far the track is shifted. A tamper is assumed to be required to tamp the track and align the track at the new location. The wood ties that drop out of the track structure during the track shift would be picked up and removed from the site. The ties are assumed to be disposed of in a landfill. The unit price measurement for this item is Track Feet.

Item 10.09 Track Removal (TF)

All rail, ties, and other track material would be picked up and hauled off from the site. The rail and other track material may have to be hauled to a specific location for future use by the Owner, if required by the Owner. The ties would be hauled to a landfill that would accept the ties for disposal. It is assumed that ballast material can remain at the site once the track material is removed. The unit price measurement for this item is Track Feet.

Item 10.10 Signals & Communications (MI)

Signal and communication system installation will be performed by CSXT. Costs for this effort are anticipated to be substantial and include the removal of the existing equipment and the labor and materials required to install the new signal and communications system for all rail lines within the corridor. Until unit or system costs are provided by CSXT; an average of the signals and communications system cost from the Draft *2016 Business Plan for California High Speed Rail* was used. The unit price measurement for this item is Track Mile.

4.2.2 Structures

Structures to be constructed as part of the proposed improvements include rail bridges that carry the tracks over a highway or waterway; overhead structures that carry vehicle or pedestrian traffic over the tracks; box culverts or other drainage structures under the tracks that are 6 feet or greater in diameter or height; crash walls; and retaining walls.

Items 20.01/20.02 Rail Bridge (New Single/Double Parallel) (BF)

Minor rail bridges are those bridges that were not deemed to present significant structural or site challenges. Conceptual costs for these bridges reflect a single-track or double-track bridge structure parallel to an existing bridge.

This unit cost is for the addition of a new track bridge parallel and adjacent to an existing track (or tracks) as it passes over a variety of obstacles.

Generally, the work would include provision of new abutments or abutment extensions, necessary grading and earth retention system to control the embankment at the abutments, any

new piers or pier modification necessary, and the placement of a new superstructure and track on the substructure at these locations.

The typical bridge utilized to estimate this unit cost is a single span bridge with a total bridge length of 120 feet. It would be located with a minimum offset of 19′–6″ to be separated from the nearest existing track centerline. The proposed bridge is assumed to be designed with an equivalent or larger hydraulic opening than the existing bridge. The width of the proposed deck plate girder superstructure is assumed to be 22′–3″.

The typical double track bridge utilized to estimate the unit cost is a single span bridge with a total bridge length of 120 feet. It is assumed that the bridge would be located with a minimum offset of 19′–6″. The proposed bridge is assumed to be designed with an equivalent or larger hydraulic opening than the existing bridge. The width of the proposed deck plate girder superstructure is assumed to be 37′–3″, which includes walkways on both sides of the bridge. With limited structural and geotechnical information, the cost of the double track bridge substructure and superstructure is assumed to be 95 percent greater than the cost of the single-track bridge substructure and superstructure. The unit price measurement for this item is Bridge Foot.

Item 20.03 Rail Bridge (New)—Loop Bridge near North Boulevard (BF)

47 spans—total bridge length 2,588 feet, ballasted deck supporting double tracks

- Includes steel ballasted deck superstructure supported on eight steel plate girders.
- There is currently no bridge structure at this location, so no demolition of an existing bridge structure has been included.
- The abutments and intermediate piers are assumed to be standalone concrete structures supported on spread footings. The piers range from 10 feet to 24 feet high, with most of them at approximately 20 feet in height.
- The alignment carries the tracks over Leigh Street westbound, down the median and back across Leigh Street. Therefore, maintenance of traffic is more expensive than a typical bridge and has been included at $250,000.
- Construction of the bridge is assumed to be accomplished using on the ground construction. Equipment and material will be contained within the proposed track construction limits of disturbance.
- Construction duration is estimated to be two years, not including time required for permitting.

The unit price measurement for this item is Bridge Foot.

Item 20.04 Rail Bridge (New)—Walmsley Boulevard (BF)

3 spans—total bridge length 192 feet, ballasted deck supporting four tracks

- The superstructure is assumed to be a steel deck supported on a plate girder. The width of the proposed structure is 71′–3″ to accommodate the three existing tracks and one additional proposed track.

- This intersection is currently an at-grade crossing. There is no existing structure, so no demolition of an existing structure is assumed, but demolition of the existing at-grade crossing items is included.
- The abutments and piers will consist of standalone concrete structures. The piers are assumed to be approximately 16 to 18 feet high. The substructure units are supported on steel piles for this estimate.
- The top of rail profile is assumed to be similar to the existing top of rail profile. Walmsley Boulevard will be lowered to pass beneath the new bridge.
- Construction will be staged and trains will use an adjacent detour track during construction.
- Construction will be accomplished using on the ground construction. Equipment and materials will be contained within the proposed track construction limits of disturbance.
- Construction duration is estimated to be two years, not including time required for permitting.

The unit price measurement for this item is Bridge Foot.

Item 20.05 Neabsco Creek (BF)

13 spans—total bridge length 780 feet, ballasted deck, supporting double tracks

- The superstructure is assumed to be a steel deck with ballast supported on a steel plate girder.
- Proposed track center line offset is 34'–6" from the nearest existing track centerline.
- Substructure consists of concrete abutments, wingwalls, and piers supported on drilled shafts.
- The end spans are assumed to be 46 feet long to avoid interference with existing abutments.
- Construction of the bridge is assumed to be accomplished using barges.
- Construction equipment and material will be staged on causeways on the downstream side of the bridge. Additional construction equipment and material will be contained within the proposed track construction limits of disturbance.
- Construction staging and operation will be accomplished in a manner to maintain the navigability of the existing waterway.
- Construction duration is estimated to be two years, not including the time required for permitting.

The unit price measurement for this item is Bridge Foot.

Item 20.06 Occoquan River (BF)

8 spans—total bridge length 950 feet, ballasted deck, supporting double tracks

- The superstructure for the approach spans is assumed to be a steel deck with ballast supported on a steel plate girder. The main spans are steel deck with ballast supported on truss spans.
- Proposed track center line offset is 25'–0" from the nearest existing track centerline.
- Substructure will consist of concrete abutments, wingwalls, and piers supported on drilled shafts.
- The end spans are assumed to be 85 feet long to avoid interference with the existing abutments.
- Construction of the bridge is assumed to be accomplished using barges for the in-water piers and on the ground construction for the approach piers. Construction equipment and material will be staged on barges on the downstream side of the bridge. Additional equipment and material is assumed to be contained within the proposed track construction limits of disturbance.
- Construction staging and operation to be accomplished in a manner to maintain the navigability of the existing waterway.
- Construction duration is estimated to be two and a half years, not including the time required for permitting.

The unit price measurement for this item is Bridge Foot.

Item 20.07 Aquia Creek (BF)

21 spans—total bridge length 1,357 feet, ballasted deck, supporting double tracks

- The superstructure is assumed to be a steel deck with ballast supported on a steel plate girder.
- Proposed track center line offset is 25'–6" from the nearest existing track centerline.
- Substructure consists of concrete abutments, wingwalls, and piers supported on prestressed concrete piles.
- The end spans are 80 feet long to avoid interference with existing abutments.
- Construction of the bridge is assumed to be accomplished using barges for the in-water piers and on the ground construction for the approach piers. Construction equipment and material is to be staged on barges on the downstream side of the bridge. Additional equipment and material is assumed to be contained within the proposed track construction limits of disturbance.
- Construction staging and operation is assumed to be accomplished in a manner to maintain the navigability of the existing waterway.
- Construction duration is estimated to be two years, not including the time required for permitting.

The unit price measurement for this item is Bridge Foot.

Item 20.08 Powells Creek (BF)

9 spans—total bridge length 1,114 feet, ballasted deck, supporting double tracks

- The superstructure is assumed to be a steel deck with ballast supported on a steel plate girder.
- Proposed track center line offset is 25'–5" from the nearest existing track centerline.
- The substructure consists of concrete abutments, wingwalls and piers supported on prestressed concrete piles.
- The end spans are 130 feet long to avoid interference with the existing abutments.
- Construction of the bridge is assumed to be accomplished using barges.
- Construction equipment and material to be staged on causeways on the downstream side of the bridge. Additional construction equipment and material is estimated to be contained within the proposed track construction limits of disturbance.
- Construction duration is estimated to be two years, not including the time required for permitting.

The unit price measurement for this item is Bridge Foot.

Item 20.09 Potomac Creek (BF)

9 spans—total bridge length 400 feet, ballasted deck, supporting double tracks

- The superstructure is assumed to be a steel deck with ballast supported on a steel plate girder.
- Proposed track center line offset is 25'–0" from the nearest existing track centerline.
- Substructure consists of concrete abutments, wingwalls and approach piers founded on spread footings. The piers are made up of 60-foot tall concrete towers with steel bracing on a concrete spread footing.
- Construction of the bridge will be accomplished using ground construction.
- Construction equipment and material will be staged on land on the downstream side of the bridge. It is assumed to be contained within the proposed track construction limits of disturbance.
- Construction duration is estimated to be two and a half years, not including the time required for permitting.

The unit price measurement for this item is Bridge Foot.

Item 20.10 Lake near Old Grain Road (BF)

10 spans—total bridge length 550 feet, ballasted deck, supporting double tracks

- The superstructure is assumed to be a steel deck with ballast supported on a steel thru-plate girder.
- Substructure consists of concrete abutments, wingwalls, and piers supported on spread footing foundations.
- Construction of the bridge to be accomplished using causeways for the in-water piers and on the ground construction for the approach piers. Construction equipment and material to be staged on land. Additional equipment and material estimated as being contained within the proposed track construction limits of disturbance.

- Construction duration is estimated to be one year, not including the time required for permitting.

The unit price measurement for this item is Bridge Foot.

Item 20.11 Rappahannock River (BF)

9 spans—total bridge length 840 feet, ballasted deck, supporting double tracks

- The superstructure is assumed to be a steel deck with ballast supported on steel thru-plate girder with a non-structural arch in the front to mimic the existing arch structure.
- Proposed track center line offset is 34'–0" from the nearest existing track centerline.
- Substructure consists of concrete abutments and piers with spread footing foundations.
- Construction of the bridge is assumed to be accomplished using causeways for the in-water piers and on the ground construction for the approach piers. Construction equipment and material to be staged on the causeway on the downstream side of the bridge. Additional equipment and material estimated to be contained within the proposed track construction limits of disturbance.
- Construction staging and operation to be accomplished in a manner to maintain the navigability of the existing waterway.
- Construction duration is estimated to be two years, not including the time required for permitting.

The unit price measurement for this item is Bridge Foot.

Item 20.12 Rappahannock River Bridge (BF)

7 spans—total bridge length 674 feet, ballasted deck, supporting double tracks

- The superstructure is assumed to be a steel deck with ballast supported on steel thru-plate girder.
- The substructure consists of concrete abutments, wingwalls, and piers supported on spread footing foundations.
- Construction of the bridge is assumed to be accomplished using causeways for the in-water piers and on the ground construction for the approach piers. Construction equipment and material is estimated as being staged on the causeway on the downstream side of the bridge. Additional equipment and material will be contained within the proposed track construction limits of disturbance.
- Construction staging and operation is estimated to be accomplished in a manner to maintain the navigability of the existing waterway.
- Construction duration is estimated to be two years, not including the time required for permitting.

The unit price measurement for this item is Bridge Foot.

Item 20.13 North Anna River (BF)

5 spans—total bridge length 332 feet, ballasted deck, supporting double tracks

- Superstructure is assumed to be a steel deck with ballast supported on a steel plate girder
- Proposed track center line offset is 25′–0″ from the nearest existing track centerline
- Substructure abutments with wingwalls and piers are assumed to be standalone concrete structures founded on drilled shafts.
- The bridge is assumed to need demolition of the adjacent existing abutment wing wall to allow for construction of the new bridge.
- Construction of the bridge estimated to be accomplished using causeways for the in-water piers and on the ground construction for the approach piers.
- Construction equipment and material is estimated to be staged on causeways on the downstream side of the bridge. Additional construction equipment and material to be contained within the proposed track construction limits of disturbance.
- Construction staging and operation is assumed to be accomplished in a manner to maintain the navigability of the existing waterway.
- Construction duration is estimated to be two years, not including the time required for permitting.

The unit price measurement for this item is Bridge Foot.

Item 20.14 Little River (BF)

4 spans—total bridge length 251 feet, ballasted deck, supporting double tracks

- Superstructure is assumed to be a steel deck with ballast supported on a steel plate girder
- The proposed track center line offset is assumed to be 19′–6″ from the nearest existing track centerline.
- The substructure is assumed to have abutments with wingwalls and standalone concrete piers founded on drilled shafts.
- Existing structure is assumed to require demolition of adjacent abutment wing wall
- Construction of the bridge to be accomplished using causeways for the in-water piers and on the ground construction for the approach piers.
- Construction equipment and material is assumed to be staged on causeways on the downstream side of the bridge. Additional construction equipment and material will be contained within the proposed track construction limits of disturbance.
- Construction staging and operation is estimated to be accomplished in a manner to maintain the navigability of the existing waterway.
- Construction duration is estimated to be one and a half years, not including the time required for permitting.

The unit price measurement for this item is Bridge Foot.

Item 20.15 South Anna River (BF)

6 spans—total bridge length 499 feet, ballasted deck, supporting double tracks

- Superstructure is assumed to be a steel deck structure with ballast supported on steel plate girders.
- Proposed track center line offset is assumed to be 19'–6" from the nearest existing track centerline.
- For the substructure it was assumed that all the intermediate bents are 50-foot tall (or more) steel trestle type tower bents supported on drilled shafts foundations. Trestle type bents are needed to resist high longitudinal forces in this bridge because of the height of the bents. Abutments are assumed to be concrete structures with wingwalls, supported on drilled shafts.
- The estimate assumed the demolition of the adjacent existing abutment wing wall is required.
- Construction of the bridge estimated as being completed using causeways for the in-water piers and on the ground construction for the approach piers.
- Construction equipment and material to be staged on causeways on the downstream side of the bridge. Additional construction equipment and material to be contained within the proposed track construction limits of disturbance.
- Construction staging and operation assumed to be accomplished in a manner to maintain the navigability of the existing waterway.
- Construction duration is estimated to be two years, not including the time required for permitting.

The unit price measurement for this item is Bridge Foot.

Item 20.16 Mattaponi River (BF)

4 spans—total bridge length 207 feet, ballasted deck, supporting double tracks

- Superstructure is assumed to be steel deck with ballast supported on steel plate girders.
- The estimate assumed the proposed track center line offset is 25'–0" from the nearest existing track centerline.
- The substructure is assumed to consist of abutments with wingwalls. The piers are concrete structures founded on drilled shafts.
- The adjacent existing abutment wing wall is assumed to require demolition.
- Construction of the bridge is assumed to be completed using causeways for the in-water piers and on the ground construction for the approach piers.
- Construction equipment and material to be staged on causeways on the downstream side of the bridge. Additional construction equipment and material to be contained within the proposed track construction limits of disturbance.
- Construction staging and operation estimated assuming work is accomplished in a manner to maintain the navigability of the existing waterway.
- Construction duration is estimated to be one and a half years, not including the time required for permitting.

The unit price measurement for this item is Bridge Foot.

Item 20.17 Falling Creek (BF)

5 spans—total bridge length 325 feet ballasted deck supporting single track.

- Superstructure is assumed to be steel deck with ballast supported by steel deck plate girders. The width is 22'–3".
- The proposed track center line is assumed to be located 25 feet from the nearest existing track.
- The substructure is estimated to consist of abutments and intermediate piers. The piers are assumed to be of concrete construction and be wide enough to accommodate a future track. The proposed foundations are spread footings. The intermediate piers vary in height from approximately 25 feet to 60 feet.
- Construction of the bridge is assumed to be completed using on the ground construction from either side of the creek.
- Traffic on Cogbill Road will probably have to be maintained during construction of the bridge.
- Equipment and material is estimated as being required to be contained within the proposed track construction limits of disturbance.
- Construction duration is estimated to be one year, not including time required for permitting.

The unit price measurement for this item is Bridge Foot.

Item 20.18 James River (BF)

44 spans—total bridge length 2530 feet, primarily ballasted steel deck with some timber open deck and thru girder spans supporting one proposed track and one future track.

- The proposed construction will only cover a portion of the 5,213-foot existing structure.
- The superstructure is assumed to be steel deck plate girders for most of the spans and some will be thru plate girders. The span lengths vary from 24 feet to 76.5 feet. The superstructure width is 22'–3".
- The proposed track is estimated as being 40 feet from the existing track to accommodate a future track between the existing and proposed tracks.
- The abutment and intermediate piers are standalone concrete and wide enough to accommodate one future track. No abutment will be required on the north end of the bridge since the proposed structure merges with the existing structure at Dock Street.
- The proposed foundation type is spread footings with steel pile foundations.
- Construction of the bridge is estimated to be completed using causeways for the in-water piers and on the ground construction for the approach spans.
- From the Triple Crossing to just north of Dock Street, new beams and ties are assumed to be added to the existing substructure units. From the parking lot at Dock Street

north to Broad Street, another track is added to the existing structure but no new structure is required.

- The floodwall opening on the south side of the river will have to be widened to accommodate the proposed track, but this has been accounted for separately in the project cost estimate.
- Construction duration is estimated to be two and a half years, not including the time required for permitting.

The unit price measurement for this item is Bridge Foot.

Item 20.19 Restore Track on Downtown Richmond Viaduct (BF)

The restoration of the track on the downtown Richmond Viaduct included the following assumptions:

- Existing viaduct structure is more than 100 years old and supported on shallow foundations.
- Micropile underpinning is required at 75 percent of the foundation locations—three piles per foundation to depth of 60 feet based on previous HDR remedial design work
- 25 percent of substructure above foundation level would require rehabilitation/strengthening (similar to what HDR has done in spot locations along viaduct for previous projects)
- Superstructure is generally adequate for adding second track.
- Include cost for new ties and track for second track being added.
- Include cost for adding/repairing walkway for second track.

The unit price measurement for this item is Bridge Foot.

Items 20.20/20.21 Overhead Structures—New (SF)

Overhead Structures-New was assumed for roadway overpasses that are currently in use, where the proposed third track cannot be constructed beneath the overpass while meeting the required horizontal and vertical clearances. Cost includes removal of the existing overpass, replacement with a new overpass, and maintenance of traffic. Separate unit costs are provided for improvements in Northern Virginia and the Central Virginia/Richmond areas. This cost has been estimated based on a typical roadway bridge for the project with the following characteristics:

3 spans—total bridge length 340 feet

- Superstructure consists of 10 steel plate girders made composite with 8.5-inch concrete slab. The superstructure width is 83 feet.
- Existing bridge required demolition.
- Staged construction is required in order to maintain traffic on the existing road
- Substructure – Piers will be concrete frames founded on pile foundations. Abutments will be semi-integral concrete founded on piles
- Approach slabs are required at each abutment.

- Equipment and material are to be contained within the proposed track construction limits of disturbance and within the existing roadway right-of-way.
- Construction is estimated to be 18 months not including time required for permitting.

The unit price measurement for this item is Square Feet.

Item 20.22 James River Floodwall Penetrations (EA)

The north flood wall has an existing opening of 20-feet wide by 6'–5 5/8" tall with a sliding gate for a single track. The proposed opening will be 33' 11" wide by 6–5 5/8" tall and will have double leaf swing gates for two tracks. The existing span is a through-girder and will not accommodate a swing gate. Consequently, the existing span will have to be replaced when the new span is added.

The south flood wall has an existing opening of 20'–7 5/8" wide by 10'–0" tall with a single leaf swing gate for a single track. The proposed opening will be 61'–¼" and will require the addition of second swing gate to make it a double leaf swing gates for two tracks and a future CSXT track.

The swing gates will be made of horizontal girders top and bottom, vertical end diaphragms, vertical intercostals, a skin plate and diagonal braces. They will be supported one side by top and bottom hinges attached to a support structure.

The double leaf gates will require a removable center post to be used when they close. Water-tight seals between the gates, supporting walls and the bottom of the gate will be required.

The unit price measurement for this item is Each.

Item 20.23 Pedestrian Bridge—Trails (BF)

The pedestrian bridge for a shared use path over the railroad is assumed to have three spans, with a total bridge length of 228 feet. The bridge will be a steel plate girder superstructure, with fully integral abutments and multi column piers. Piers will not be designed for collisions. The bridge will have a total width of 18 feet and provide a 24'–3" vertical clearance and a 25-foot horizontal clearance for the railroad.

The estimated time for construction of this bridge is 12 months, using normal, routine construction methods. The proposed bridge will be constructed along the alignment of the roadway crossing. The existing roadway will be closed, a new pedestrian bridge built in one stage of construction in its place, and the existing pavement removed. Since the existing roadway will be permanently closed, substantial bridge construction operations, such as a temporary bridge for traffic and staged construction, are not anticipated in order to maintain traffic during the roadway and bridge construction. Access to both sides of the proposed bridge construction location will be achievable from the existing roadway and will be within the existing right-of-way.

The unit price measurement for this item is Bridge Foot.

20.24 Drainage Structures (EA)

Drainage Structures over 6 feet in diameter or height were cost as new. The measurement and price for such structure is each. VDOT unit prices for box culverts range from $1,800 to $3,000/LF. The largest culvert size found in VDOT bid tabs was a 10-foot x 10-foot double box in the Salem District. A 15 percent increase was included for work in DC2RVA geographies, with an additional

10 percent added for minor excavation and connection to the existing structure. Each culvert extension was assumed to be 40 feet in length. The unit price measurement for this item is Each.

Items 20.25/20.26 Retaining Walls—Soldier Pile (SF)

Retaining walls were assumed by DRPT in areas where the approximate cut/fill "daylight" lines are outside of the CSXT right-of-way. The daylight lines were created utilizing a conceptual design of the third track alignment that remains within the CSXT right-of-way against the existing digital terrain model. No geotechnical information, such as borings, was taken in the areas of proposed retaining walls. A standard wall was assumed and unit costs averaged for two different wall height categories. Retaining walls were measured and priced by square foot based on the concept profile and existing digital terrain model. Unit costs include the costs for access to construct the wall and any early grading needed for wall construction. Walls greater than 10 feet were anticipated to require tie-backs. The unit price measurement for this item is Square Feet of stem wall.

Items 20.27/20.28 Retaining Walls—Cast-in-Place (CIP) (SF)

Item 20.27 is for cast-in-place retaining walls that are 10 feet tall or less, and Item 20.28 is for cast-in-place retaining walls that are greater than 10 feet tall. The walls that are less than 10 feet tall were assumed to have cast-in-place footings and stem walls. The retaining walls that are 10 foot and taller are assumed to have deep foundations with cast-in-place footings and stem walls. Specific soils information was not available for this conceptual estimate and the foundation may change when specific geotechnical information is available. The unit price includes excavation, forms, reinforcing steel, concrete, labor, equipment and other costs associated with constructing the retaining walls. The unit price measurement for this item is Square Feet of stem wall.

Item 20.29 Retaining Walls—Mechanically Stabilized Earth (MSE) (SF)

MSE walls will be used to retain fill material used to construct embankments for roadways and overpasses. The unit price measurement for the item is square feet of MSE wall.

Item 20.30 Crash Walls (CY)

American Railway Engineering and Maintenance-of-Way Association (AREMA) Specifications, Chapter 8, Article 2.1.5 covers the requirements for crashwalls. Crashwalls are required when the face of the pier is closer than 25'–0" from centerline of the track, measured perpendicular to the track, except as noted below.

A. Crashwalls for single column piers shall be minimum 2'–6" thick and shall extend a minimum of 6'–0" above the top of high rail for piers located between 12'–0" and 25'–0" from the centerline of the nearest track. The wall shall extend minimum 6'–0" beyond the column on each side in the direction parallel to the track.

B. For multi-column piers, the columns shall be connected with a wall of the same thickness as the columns or 2'–6" whichever is greater. The wall shall extend a minimum of 2'–6" beyond the end of outside columns in a direction parallel to the track.

C. Reinforcing steel to adequately anchor the crashwalls to the column and footing shall be provided. For piers of heavy construction, crashwalls may be omitted. Solid piers with a minimum thickness of 2'–6" and length of 20'–0", single column piers of minimum 4'–0" by

12'–6" dimensions or any other solid pier sections with equivalent cross sections and minimum 2'–6" thickness are considered as heavy construction.

For the estimate, the crashwalls are assumed to be 3 feet (2'6" min.) wide by 12 feet above top of rail (for piers more than 12 feet, but less than 25 feet, from the centerline of track) and extend 4 feet below grade as recommended by the VDOT.

The concrete reinforced wall has a 21-foot high by 3-foot wide average section and the length has been established in the conceptual engineering layout. Units are measured in Cubic Yards.

4.2.3 Stations

Item 30.01 Station Building—Small (SF)

The station buildings are measured and priced on a square foot basis. An applicable unit price was compiled using a conceptual station building 1,500 square feet in size. Forty-nine scope line items were evaluated for both price and quantity and applied for a building of similar quality, durability, general use, finishes and systems. Unique scope items to note are included below:

- Elevator (two stops)
- Bird netting and mitigation
- Deep foundations (to account for various and unknown site conditions)
- Sprinkler system (given building occupancy and use)
- Full electrical, mechanical, plumbing, fire alarm, and low voltage systems
- Typical furnishings

Item 30.02 Station Building—Medium (SF)

The station buildings are measured and priced on a square foot basis. An applicable unit price was compiled using a conceptual station building 5,000 square feet in size. Forty-nine scope line items were evaluated for both price and quantity and applied for a building of similar quality, durability, general use, finishes, and systems. Unique scope items to note are included below:

- Elevator (two stops)
- Bird Netting and Mitigation
- Deep foundations (to account for various & unknown site conditions)
- Sprinkler System (given building occupancy and use)
- Full electrical, mechanical, plumbing, fire alarm, and low voltage systems
- Typical furnishings

Item 30.03 Station Building—Large (SF)

The station buildings are measured and priced on a square foot basis. An applicable unit price was compiled using a conceptual station building 10,000 square feet in size. Forty-nine scope line items were evaluated for both price and quantity and applied for a building of similar quality, durability, general use, finishes and systems. Unique scope items to note are included below:

- Elevator (two stops)

- Bird netting and mitigation
- Deep foundations (to account for various and unknown site conditions)
- Sprinkler system (given building occupancy and use)
- Full electrical, mechanical, plumbing, fire alarm, and low voltage systems
- Typical furnishings

Item 30.04 Main Street Station Upgrade—Medium (SF)

The Main Street Station upgrade work would be performed in a high profile, previously renovated building that is on the historical register. Work schedules, finishes, and layout would be severely constrained by the aesthetic of the existing building. They would also have to complete work to a higher quality standard than a general use station. Items included in the medium sized station include:

- Ticketing desk with baggage drop-off
- Station manager office
- Baggage handling area
- Baggage claim
- Station and circulation signage
- Vending area
- Upgrades to security and passenger information displays (PIDs)
- Expansion of rest room facilities and integration with access controls
- Architectural embellishments—not part of usual station programs, but there would likely be sculptures, historical displays, etc.

The unit price measurement for this item is Square Feet of building.

Item 30.05 Main Street Station Upgrade—Large (SF)

The Main Street Station upgrade work would be performed in a high profile, previously renovated building that is on the historical register. Work schedules, finishes and layout would be severely constrained by the aesthetic of the existing building. They would also have to complete work to a higher quality standard than a general use station. Items in the large size station include:

- Ticketing desk with baggage drop-off
- Station manager office
- Baggage handling area
- Baggage claim
- Station and circulation signage
- Vending area
- Upgrades to security and passenger information displays (PIDs)
- Expansion of rest room facilities and integration with access controls

- Architectural embellishments—not part of usual station programs, but there will likely be sculptures, historical displays, etc.
- Amtrak administrative services would be consolidated in the station
- Information desk

Apart from the square footage, the main differentiator between the medium and large program upgrades is more of the amenities such as ticketing and baggage handling.

The unit price measurement for this item is Square Feet of building.

Item 30.06 Platforms—New (Passenger Only) (SF)

Platforms are measured and priced per square foot. Passenger only platforms include such items as:

Platform

- Typical 6-inch thick reinforced concrete with reinforced turn down face
- Turndown at platform face adjacent to tracks is 12 inches thick, 12-inch embedment with perforated drain pipe
- ADA-compliant textured tiles along entire length of platform facing tracks
- Striping and marking for passenger loading zones along platform
- HS-20 rated approach ramps (support baggage handling equipment)
- Area drains (at the back face of side platforms or centered on island platforms)

Platform Amenities

- Canopy (assume 900 feet along 1,200-foot intercity platforms)
- Garbage receptacles
- Benches
- Public address system
- General circulation signage
- Security system: emergency phone, CCTV, gate indicators, connectivity to Amtrak system-wide communications
- Low elevation lighting
- Passenger information displays (PIDs), assume six along a 1,200-foot intercity platform, integrate to station and Amtrak system data
- Two wheelchair lifts and enclosures per platform

Item 30.07 Platforms—New (Maintenance Only) (SF)

Platforms are measured and priced per square foot. Maintenance only platforms include such items as:

Platform

- 6-inch thick reinforced concrete, 1 inch above top of rail. Overall geometry of the platform section is in the attached.
- NOTE: shared passenger/maintenance platforms will be higher (8 inches above top of rail)
- Turndown edge with perforated drainage pipe (similar to passenger platforms)
- Drip pans: assume field sides and inside gage sides of rail

Utilities and Equipment

- Sanitary sewer dumps and covers: 30 per platform (both sides, 80-foot spacing)
- Sanitary sewer connection for sanitary dumps
- Oil water separator (OWS) for drip pans and area drains on platform
- Drip pans and area drains are for locomotive servicing, refueling and overnight parking. Assume field and gauge drip pans at both ends for locomotive in either direction.
- Head End Power (HEP) unit: two per platform. Cars should overnight in cuts to go into service. Bad orders will not require HEP connection.
- 480V/400A power supply to HEP units, include vaults and conduit for under platform routing
- Hose reel cabinets: 15 per platform (80-foot spacing)
  - Stainless steel enclosure (similar to roadway signal cabinet)
  - Each cabinet support potable and non-potable water service
  - Retractable hose reels (two)
  - Hoses (two, 80-feet each)
  - Heater
  - Backflow preventer
- Electrical outlets: 15 per platform, 120V service each
- Compressed air (CA) system
  - CA stations: 15 per platform (80-foot spacing), stand with valves and two quick connects
  - High pressure compressor
- Lighting system
- All electrical, CA, water shall be encased with hand holes/vaults

Heavy duty vehicle circulation

- Heated/cooled storage: 5,000 SF—includes mechanical/electrical systems for HEP and CA
- Crew quarters: 2,400 SF
- Administrative Office: 2,400 SF

- Security fence, motorized with card scanner
- CCTV and PA system
- Integrated "blue light" system indicating open switches, track access, and movements
- Commercial/industrial utility connections
- Parking: 25 spaces

Item 30.08 Platforms—Expansion (SF)

Platforms are measured and priced per square foot. Platforms expansion include such items as:

Platform

- Typical 6" thick reinforced concrete with reinforced turn down face
- Turndown at platform face adjacent to tracks is 12-inches thick, 12-inch embedment with perforated drain pipe
- ADA compliant textured tiles along entire length of platform facing tracks
- Striping and marking for passenger loading zones along platform
- HS-20 rated approach ramps
- Area drains

Platform Amenities

- Canopy (assume 900 feet long)
- Garbage receptacles
- Benches
- Public address system
- General circulation signage
- Security system: emergency phone, CCTV, gate indicators, connectivity to Amtrak system wide communications
- Low elevation lighting
- Passenger information displays (PIDs), assume six along a 1,200-foot intercity platform, integrate to station and Amtrak system data
- Two wheelchair lifts and enclosures per platform

Item 30.09 Platforms—New Passenger with Service (SF)

Platforms are measured and priced per square foot. Platforms with both passenger service and train service would include the items from the passenger and maintenance service platforms, but would also include some additional features to handle both services at the same platform. These include:

- Architectural treatment for all enclosures and storage facilities (instead of typical industrial cabinets and warehouse type buildings)

- Additional cabinets/enclosures for service apparatuses that are not typically enclosed on a maintenance platform (compressed air stations, cabling and control covers on the HEP units)
- Locking systems on the sanitary sewer dumps. The dumps usually have simple lift covers, but they will need to be locked when the platform is open to the public. They will also require special odor control plumbing (the traps with water service to prevent evaporation of the standing water)
- All valve boxes, hand holes, manholes will require locking covers; again, to prevent tampering by the public. They also will have to get textured surfaces to prevent slipping.

Item 30.10 Vertical Access (EA)

The unit price measurement for this item is Each. The most common elevator used in commercial construction is the two stop hydraulic elevator. Pricing includes a standard hydraulic actuated unit with some non-standard features as seen below:

- Speed 200 fpm
- 3,000# Load
- Hall Lanterns
- Non-standard—durable finishes and sills
- Audio, video, and security access on traveling cable

Item 30.11 Pedestrian Bridge to Station (SF)

The pedestrian bridge would connect one platform to the island platform. It would be of steel construction with architecture similar to other existing VRE pedestrian bridges. The approximate dimensions of the bridge are 13'–0" wide by 16'–0" tall and a length of 62'–0". This estimate assumes the bridge would span across two tracks. The unit price measurement for this item is Square Feet of bridge.

Item 30.12 Pedestrian Tunnel (LS)

The pedestrian tunnel would provide access to the island platform. The internal clearance envelope of the tunnel is 7'–6" high by 12 feet wide. The length of the tunnel is assumed to be 100 feet. The tunnel would be constructed using either jack and bore or Sequential Excavation Method (SEM) tunneling method. The tunnel would be a cast in place concrete structure with lighting installed. The unit price measurement for this item is Lump Sum.

Item 30.13 Parking—Structure (Stall)

Parking structure pricing is performed on a per stall basis. Marshall and Swift was used to compile and extract the per stall pricing provided. An applicable unit price was compiled using a conceptual four story parking structure with a 40,000-square-foot floor plate (160,000 square feet total). Thirty-four scope line items were evaluated for both price and quantity and applied for a similar application, durability, general use, finishes, and systems. Unique scope items to note are included below:

- Precast structure
- Elevators

- Exterior wall screening
- Stair towers
- Topping slabs
- Fresh air requirements
- Access control

Item 30.14 Parking—Surface Lot (Stall)

Surface lot pricing is performed on a per stall basis. An applicable unit price was compiled using a conceptual surface lot. Seventeen scope line items were evaluated for both price and quantity and applied for a similar application, durability, general use, finish, and systems. Unique scope items to note are included below:

- Grading
- 6-inch paving section
- 6-inch aggregate base section
- Mast lighting
- Access control
- Communication to support access control and security

4.2.3 Earthwork—Rail

Item 40.01 Clearing and Grubbing (AC)

Clearing and grubbing was measured utilizing the approximate cut/fill "daylight" lines created utilizing a conceptual design of the third track alignment that remains within the CSXT right-of-way. Clearing and grubbing was measured and priced by acre.

Item 40.02 Excavation and Disposal (CY)

It is assumed that north of Lorton and south of Dahlgren Junction, there is approximately 25 percent of unsuitable material that will not be able to be reused as fill and must be hauled off site and disposed. Between Lorton and Dahlgren Junction, the likelihood of unsuitable material increases, and 75 percent of material is assumed to be hauled off site and disposed. Excavation quantities were calculated utilizing the conceptual design of the third track alignment against the existing digital terrain model. The suitable material assumptions are based on design team experience with other projects in these regions.

Excavation is the usable material that does not require disposal. Excavation was measured and priced by the cubic yard (CY).

Item 40.03 Over Excavation (CY)

Potential poor embankment and cut slope subgrade soils exist where track work is proposed primarily over natural or undeveloped ground conditions such as in mature forested, younger forested, cultivated, and wetland areas along the corridor. Also, problematic soils associated with certain geologic formations exist along the corridor that are known to exhibit low strength and shrink-swell characteristics that can negatively impact the performance of shallow embankments

and cut slopes. These problematic ground and subgrade conditions as well as the limits of these conditions are described in more detail in HDR's Draft Bridges, Walls, and Subgrades Geotechnical Engineering Report (GER) for each project segment dated October 5, 2016.

Where track work is proposed over problematic ground and subgrade conditions as identified in the Draft GER, an over-excavation or undercut and backfill treatment are recommended prior to track grading for preliminary engineering plan development. All over excavation/undercut material shall be hauled off site and disposed.

Where forested and cultivated ground conditions and where soils with low strength or high shrink/swell properties exist, the subgrade soils are over-excavated and treated as follows:

- Impacted embankments 5 feet or less in height and cuts of all heights are over excavated three feet below the track subgrade and five feet beyond the limits of the toe of the planned embankment limits and to the planned track bed prism limits (crest of fore slope) for cuts.
- Over-excavation is backfilled with No. 3 ballast stone with heavy stabilization fabric per Table 1-10-2 of AREMA placed on exposed subgrade and every foot vertically within the over-excavation. The exposed sides of over-excavation wrapped with filter fabric per Table 1-2-1 of AREMA.

Where wetland and floodplain ground conditions and soft compressible soils exist, the subgrade soils are over excavated and treated as follows:

- Impacted embankments and cuts of any height, the soil is over excavated three feet below the track subgrade and five feet beyond the limits of the toe of the planned embankment limits and to the planned track bed prism limits (crest of fore slope) for cuts.
- Over-excavation is backfilled with No. 3 ballast stone with heavy stabilization fabric per Table 1-10-2 of AREMA placed on exposed subgrade and every foot vertically within the over-excavation. The exposed sides of over-excavation wrapped with filter fabric per Table 1-2-1 of AREMA.

Additional details regarding the over-excavation limits and backfill treatment recommendations are provided in the Draft GER.

Over excavation is measured and priced in cubic yards, and the cost includes haul off site and disposal. Measurement and payment of over-excavation backfill treatment is covered under Item 40.05 Embankment (Engineer Fill/Select Borrow).

Item 40.04 Embankment (Common Borrow) (CY)

Embankment was measured and priced in cubic yards. The same assumptions regarding unsuitable material for excavation were used. Embankment quantities were calculated utilizing the conceptual design of the third track alignment against the existing digital terrain model.

Suitable material from excavation would be used to balance the embankment. Any additional embankment needed would be considered common borrow.

Item 40.05 Embankment (Engineer Fill/Select Borrow) (CY)

Engineer fill or select borrow would be used in the areas of over excavation. Over-excavation backfill shall consist of No. 3 ballast stone as described under Item 40.03. Engineer fill or select

borrow is measured and priced in cubic yards. Heavy stabilization fabric and filter fabric are incidental to engineer fill payment.

Item 40.06 Subballast (TON)

Subballast shall meet CSXT specifications for mainline track. The subballast quantity was measured using the conceptual design and standard typical sections. Subballast was assumed at a 6-inch depth and 105 pounds per cubic foot. Subballast was measured and priced in tons.

4.2.4 Roadway

Roadway elements reflect costs associated with improving roads and other adjacent sites impacted by expanding or otherwise modifying the rail corridor.

Item 50.01 Asphalt Concrete (SY)

- Uses Pavement Design Section 3 from the Preliminary Pavement Recommendations. This provides a level of conservatism over using Pavement Design Sections 1 and 2; Pavement Design Section 4 is only used at one location and is not representative of typical project conditions.
- Unit weights of asphalt concrete: 110 lbs./SY/inch of depth (VDOT IIM LD-158.12)
- Unit weight of subbase material: 145 lbs./CF
- VDOT unit costs: Surface $110/ton; Intermediate $95/ton; Base $87/ton; subbase $27/ton. These are based on averages in VDOT's Northern Virginia District and are what we have used recently for Fairfax County conceptual level estimating. Use of the Northern Virginia prices provides a level of conservatism. Differences in specific mixes/materials is beyond the level of detail/accuracy of the conceptual estimate.

Item 50.02 Curb & Gutter (LF)

Curb and gutter is measured and priced per linear foot. The quantity assumes 2016 VDOT Road and Bridge Standard Section 200.

Item 50.03 Concrete Median (LF)

Concrete median is measured and priced per linear foot. The quantity assumes 2016 VDOT Road and Bridge Standard Section 200.

Item 50.04 Concrete Sidewalk (SF)

Concrete sidewalk is measured and priced per square foot. The quantity assumes 2016 VDOT Road and Bridge Specifications Section 504.

Item 50.05 Clearing and Grubbing (AC)

Clearing and grubbing areas would have all vegetation removed from the designated area. Specific types of vegetation which are to be removed were unspecified. The effort to remove the vegetation may vary significant depending on the type of vegetation and density of the vegetation. The vegetation that is removed would be hauled from the site and disposed of in an acceptable manner. The unit price measurement for the item is per acre.

Item 50.06 Excavation and Disposal (CY)

Excavation and disposal includes material considered to be unusable as part of the embankment for the Project. The material is either unsuitable for construction or the haul distance was too far to include the material in the Project economically. The excavated material would be placed in trucks and hauled to a location where the material can be disposed of in an acceptable manner. Material that is suitable as fill for the project would be hauled to the work area, spread, and compacted to the required density. The unit price measurement for the item is Cubic Yards.

Item 50.07 Over Excavation/Undercut (CY)

Over excavated or undercut material was removed for construction of structures or other facilities for the Project. Material that is unsuitable would be undercut and removed from the Project. This material would be placed in trucks and hauled to a location where the material can be disposed of in an acceptable manner. The unit price measurement for the item is Cubic Yards.

Item 50.08 Embankment (Common Borrow) (CY)

Embankment was measured and priced in cubic yards. The same assumptions regarding unsuitable material for excavation were used. Embankment quantities were calculated utilizing the conceptual design of the third track alignment against the existing digital terrain model. Suitable material from excavation would be used to balance the embankment. Any additional embankment needed would be considered common borrow.

Item 50.09 Embankment (Engineer Fill/Select Borrow) (CY)

Engineered fill or select borrow would be used in the areas of over excavation or where material is needed with specific requirements to be placed around structures as backfill. The Unit of measurement for this item is cubic yards.

Item 50.10 Maintenance of Traffic (%)

Maintenance of traffic (MOT) is assumed to be 10 percent of the total cost of the roadway construction components. This is in line with VDOT roadway projects and is sufficient for the conceptual engineering level of detail.

Item 50.11 Stormwater Management (%)

Stormwater management is assumed to be 5 percent of the total cost of the roadway components. This is in line with other similar projects and is sufficient for the conceptual engineering level of detail.

Item 50.12 Grade Crossing—Concrete Panels (TF)

The cost includes concrete road crossing panels to match 136 # (RE) rail and installation of the panels. The installation of the crossing panels is assumed to be coordinated with CSXT and the local transportation authorities. For an existing roadway, barricades are assumed to be required during the installation of the crossing panels for traffic control. The unit price measurement for the item is Track Feet.

Item 50.13 Grade Crossing—Quad Gates (EA)

Grade crossing—quad gates are measured and priced as each per crossing location. The quantity and cost include furnish and installation of quad gates (four), advance warning signs, additional asphalt (wedge and level) for roadway, and pavement markings.

Item 50.14 Grade Crossing—Median Separator with Dual Gates (EA)

Grade crossing—median separator with dual gates is measured and priced as each per crossing location. The quantity and cost include furnish and installation of median separator (concrete), dual gates, asphalt widening, pavement markings, advance warning signs, and minor roadway excavation for asphalt widening.

Item 50.15 Grade Crossing—Locking Gate (Private Entrances) (EA)

Grade crossing—locking gate is measured and priced as each per crossing location. The quantity and cost include:

- Manual locking mechanisms, including padlocks
- Swing-style gates shall open a full 90 degrees and may swing in either direction, shall be adequately supported to prevent dragging, and shall be operable by one person.
- The gate assembly shall be fabricated with 8–5/8″ outside diameter by 0.322″ pipe per ASTM A 53, grade B. with a 48″ pipe section at the hinge post and a gate width of 20′.
- The hinge post will be 6–5/8″ outside diameter by 0.432″ 0.322″ pipe per ASTM A 53, grade B, with a ½″ by 18″ diameter steel anchor plate, with a concrete footing of 32″ diameter by 46″ tall.
- The locking post will be 8–5/8″ outside diameter by 0.322″ pipe per ASTM A 53, grade B, with a concrete footing of 24″ diameter by 36″ tall.

Item 50.16 Culvert Extension (EA)

Culvert extensions were based on a 40-foot-long 48-inch RCP pipe, which is capable of carrying E-80 Cooper Railroad Loads. The unit price includes connection to the existing pipe and end treatment requirements where the pipe outfalls. The unit price measurement for the item is Each.

Item 50.17 New Culvert (Jack and Bore) (EA)

Jack and bore costs were based on placing a new pipe completely across the right-of-way which was assumed to be 100 feet wide. The unit cost includes the bore pit and the cost of all material required to complete the jack and bore. The unit price measurement for the item is Each.

Items 60.01—60.20 Real Estate (LS)

VDOT has provided costs for permanent and temporary acquisition, as well as damages, condemnation, and costs to residential and business owners for each of the alternatives. These have been provided as lump sum costs.

Items 60.21—60.27 Utilities

CSXT has provided utility shapefiles to help determine the amount of utility relocations required. These costs assume all utilities within the limits of disturbance will be relocated. This is a conservative estimate, as some utilities may not require relocation.

Item 60.21 Fiber Optic Relocation (New Fiber Direct Bury) (LF)

All cable, phone, and fiber lines are included in this estimate. Cost is in Linear Feet.

Item 60.22 Water (LF)

Water line relocation cost include removal and backfill of the existing pipe. A replacement 24″ water line is assumed, buried 6′ deep. Cost includes the cost of the trench boxes for installation. Estimate is in Linear Feet.

Item 60.23 Sanitary Sewer (LF)

Sanitary sewer relocation cost includes removal and backfill of the existing pipe, with a 30″ concrete replacement pipe buried 8′ deep. Cost of the trench boxes is included. Estimate is in Linear Feet.

Item 60.24 Electric Distribution (LF)

Electric distribution line relocation cost include demolition of the existing with new underground electric distribution lines buried 6′ deep. Cost estimate is in Linear Feet.

Item 60.25 Electric Transmission (LF)

Electric transmission relocation assumes transmission towers require relocation. Estimate is measured in Linear Feet.

Item 60.26 Gas (LF)

An 8-inch gas line was assumed to be the typical gas line relocated on this project. Estimates include excavation, backfill and compaction and are measured in Linear Feet of pipe.

Item 60.27 Major Utility Facility Relocations (EA)

Major utility relocations include pump house relocations and other singular items that require relocation. Cost estimate is per Each.

5 ESTIMATE ASSUMPTIONS

5.1 GENERAL ASSUMPTIONS

Unit costs reflect the following general assumptions regarding Project construction:

- Single mobilization/demobilization for the general contractor(s) and their potential subcontractors and vendors.
- All regulatory approvals and federal, state, and local permits would be obtained prior to contractor mobilizing.
- All U.S. Department of Transportation (U.S. DOT)/FRA and DRPT requirements would be satisfied prior to contractor mobilizing.
- Acquisition of any new right-of-way and/or access or construction easements would be complete prior to contractor mobilizing.
- It is assumed that the general contractor(s) and its subcontractors and vendors would have reasonable (*i.e.*, typical for similar projects in the region) access to the project site(s).
- Project construction schedule is yet to be determined.
- Sufficient lay-down and staging areas would be available within rights-of-way.
- Standard subcontractor rates were used to develop unit costs. It is assumed that the subcontractor rates included standard subcontractor burdens.

5.2 INCLUSIONS

The estimates for the alternatives reflect material and labor costs to construct the improvements reflected in the concept engineering drawings, including track work, highway, station, and utility improvements. Contingencies are included to cover improvements that have not yet been identified but that will be necessary to complete the project.

Individual costs reflect mobilization and demobilization, which is not otherwise included as a specific line item for the alternatives.

5.3 EXCLUSIONS

The following potential Project costs are excluded from the conceptual cost estimates:

- **Rehabilitation of existing structures**: Existing rail bridges and highway structures capable of accommodating proposed improvements were assumed to remain in service and not require any project related-improvements. Cost estimates exclude improvements to these structures unless specifically identified.
- **Excessive work restrictions and phasing:** Unit costs reflect design team experience with similar projects in the region and reflect typical operational constraints. Specific operational constraint assumptions are excluded from the unit costs and as such, constructing certain work elements may incur higher than anticipated costs, particularly if construction windows and phasing requirements exceed typical projects.
- **Preliminary engineering and NEPA:** Professional service costs reflect the engineering and permitting efforts needed to take the selected alternative from a preliminary engineering level to final design. These costs exclude conceptual engineering, preparation of the EIS, and preliminary engineering.
- **Contaminated/hazardous materials:** The quantities of contaminated and hazardous materials that will be encountered by the project are assumed to be negligible compared to the total magnitude of earthwork and other construction activities. Costs associated with handling and properly disposing of contaminated and hazardous materials is excluded from the estimate. An initial screening of the Project area is being performed as part of developing the EIS; if findings indicate contaminated or hazardous material is likely to be encountered, the estimate will be updated.
- **Force majeure/weather delays**: The cost estimate excludes contingencies associated with force majeure or schedule delays based on weather-related events.
- **Third party inspections**: Costs for owner-hired inspection services are excluded from the cost estimate.
- **Miscellaneous fees**: Permit, regulatory, environmental, lease, and temporary easement costs are excluded from the cost estimate.

5.4 HISTORICAL INFLATION

Where historical costs were used to estimate project costs, an average annual inflation rate of 3.5 percent was used to escalate costs to 2015 values.

5.5 FUTURE ESCALATION

Escalation of unit costs to future years of expenditure uses data from the Bureau of Labor Statistics to calculate the Weighted Average Escalation Rates for future construction costs. The following four major components of the construction industry are the basis for the Weighted Average Escalation Rates:

- General Conditions
- Labor
- Construction Industry (Subcontractors)
- Materials

Future unit costs are calculated from unit costs based on calendar year 2016 dollars and the Weighted Average Escalation Rate for each year.

5.6 CONTINGENCIES

A single 35 percent contingency was applied to the combined construction and professional service costs of each alternative to capture unidentified improvement needs and other cost risks not otherwise captured in the standard cost items.

6 LIMITATIONS

6.1 DESIGN LEVEL

The conceptual cost estimates are based on concept-level designs intended to identify major Project impacts and improvement needs. Detailed design of improvements to address specific site constraints and opportunities has not been performed. Unit cost estimates are based on expected typical conditions; actual costs would vary from location to location based on site-specific conditions.

6.2 COST RISKS

The conceptual costs of the alternatives were developed to compare their relative magnitude of cost to one another only. Alternative-specific risk analyses have not been developed at this stage of development; all build alternatives are assumed to face the same magnitude of risks for purposes of comparing them.

Numerous risks are recognized to be present at the current stage of Project development that may ultimately impact overall project cost. Currently, these risks are predominantly related to how they impact timely and successful completion of the NEPA process. The existence of these risks and ongoing efforts to define and/or resolve them are being tracked by the project via a risk register, but cost impacts have not been estimated for these risks at this time.

The following risk descriptions will generally apply to any of the alternatives. As the Project is developed and coordinated with stakeholders, these risks will become better defined and potential cost impacts will be estimated for them.

6.2.1 Requirements Risk

The build alternatives have been developed to be conform to CSXT and other applicable design standards. However, the designs have not been formally reviewed and approved by CSXT, whose approval will be necessary to proceed to construction. The approval process could potentially identify additional improvements not specifically accounted for in the concept alternative estimates. The project is coordinating efforts with CSXT, FRA, VDOT, and other regulatory agencies to ensure the final design is acceptable and approved.

Highway and municipal improvements, while also designed to conform to applicable criteria, are likewise subject to acceptance by the owner. The owner may introduce additional requirements to further long term development strategies like increasing highway capacity or implementing

pedestrian, transit, or other quality-of-life improvements. Control of these cost impacts may require additional cost sharing agreements between sponsoring agencies.

Detailed geotechnical investigations have not been completed for the project alternatives; actual conditions may affect structure and site development costs. Assumptions are provided in the estimate with regard to the anticipated extent of poor soils, and concept structural costs reflect design team experience with structures in the region.

6.2.2 Design Risk

Professional service costs are currently estimated as a percentage of each build alternative's overall construction cost based on typical industry performance. Depending on the specific scope of follow-on design tasks, these costs may be higher or lower than the overall percentage on a project-by-project basis.

6.2.3 Market Risk

The conceptual cost estimate is based on an assumed schedule; an actual project schedule will not be established until a final Record of Decision has been issued. The actual schedule will be subject to funding availability and operational needs. Construction scheduled beyond the assumed schedule and market conditions at the time of construction will impact Project costs.

6.2.4 Construction Risk

Unit costs have been developed based on design team experience with similar projects in the area. Specific operational considerations such as constrained work windows and Project sequencing can have significant impacts to Project costs.

Market conditions, including labor costs and availability of materials, would also impact Project costs.

7 OPINIONS OF PROBABLE CONSTRUCTION COST

This section includes:

- A summary of the opinion of probable construction cost by build alternative.
- A table of the major system unit costs in 2016 dollars and 2025 dollars.
- A table for each alternative section identifying the quantities for each major system and the summation of the costs for the section.

Summary of the Opinion of Probable Construction Cost by Build Alternative						
DC2RVA DEIS ALTERNATIVES						
Full-Corridor No Build Alternative	Full-Corridor Build Alternative	Area Alternatives	Sections	Section Options	Section Costs (2016 $$)	Section Costs (2025 $$)
	Preferred Alternative = NOV-CEN Build Alternative With Selected Options + RIC Build Alternative	NOV-CEN Improved Speed (RO to Greendale)	Long Bridge Approach in Arlington (CFP 110 to CFP 109.3)	1A. RO East Alignment	$ 26,641,694	$ 35,613,737
				1B. RO West Alignment	$ 34,904,577	$ 46,657,304
				1C. RO East and West Alignment	$ 31,666,699	$ 42,329,763
			Northern Virginia (CFP 109.3 to CFP 62)	2A. Add Main Track ([1])	$ 1,236,004,765	$ 1,652,619,899
			Fredericksburg (CFP 62 to CFP 48)	3A. No Additional Track	$ 179,733,885	$ 240,241,030
				3B. Add Main Track	$ 379,203,328	$ 506,923,813
				3C. 2-Track Bypass (East)	$ 731,205,243	$ 977,514,217
			Central Virginia (CFP 48 to CFP 19)	4A. Add Main Track	$ 481,207,368	$ 643,222,454
			Ashland (CFP 19 to CFP 9)	5A. No Additional Track	$ 261,038,819	$ 349,494,087
				5A. No Additional Track - Ashcake	$ 261,634,084	$ 350,289,719
				5B. Add Main Track	$ 290,054,961	$ 388,290,177
				5B. Add Main Track - Ashcake	$ 290,418,637	$ 388,776,266
				5C. 2-Track Bypass (West)	$ 447,788,674	$ 599,186,063
				5C. 2-Track Bypass (West) - Ashcake	$ 448,383,940	$ 599,981,694
				5D. 3-Tracks Centered (*)	$ 297,943,446	$ 398,839,746
		RIC (Greendale to Centralia)	CFP 9 to A 11	6A. Staples Mill Only	$ 813,393,014	$ 1,087,693,644
				6B. Boulevard Station Only (A-Line)	$ 1,140,296,176	$ 1,524,101,957
				6B. Boulevard Station Only (S-Line) (*)	$ 1,085,174,245	$ 1,451,246,757
				6C. Broad Street Station Only	$ 1,113,351,370	$ 1,488,664,323
				6D. Main Street Station Only	$ 990,143,619	$ 1,323,488,160
				6E. Main Street / Staples Mill Split Service	$ 947,181,240	$ 1,266,468,369
				6F. Main Street / Staples Mill Full Service	$ 1,108,480,959	$ 1,482,863,232
				6G. Main Street / Staples Mill Shared Service	$ 1,195,278,982	$ 1,599,079,110

	2016 $$	2025 $$
Minimum Full-Build	$ 3,226,505,129	$ 4,314,363,724
Maximum Full- Build	$ 4,126,984,874	$ 5,519,074,679

ESTIMATE EXCLUDES: **Procurement of Rolling Stock (All Alternatives)**
Atlantic Gateway - Franconia to Occoquan (MP 99 to MP 90) ([1])
Acquisition of Right-of-way (*)

DC2RVA UNIT COSTS					
	ITEM DESCRIPTION	*UNIT*	*2016 UNIT COST*	*2025 UNIT COST*	*ASSUMPTIONS*
10	**Track Elements**				
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	$ 395	$ 529	To include track above the subballast. Subballast, clearing and grubbing, excavation to be quantified separately (under sitework)
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	$ 359	$ 479	
10.03	No. 10 Turnout	EA	$ 182,505	$ 243,936	
10.04	No. 15 Turnout	EA	$ 365,010	$ 487,873	
10.05	No. 20 Turnout	EA	$ 434,684	$ 581,012	
10.06	Diamond Crossing	EA	$ 470,056	$ 628,277	
10.07	Turnout Removal	EA	$ 33,228	$ 44,413	
10.08	Track shift/realign	TF	$ 139	$ 186	
10.09	Track removal	TF	$ 40	$ 53	
10.10	Signals & Communications (from CHSR)	MI	$ 2,740,000	$ 3,662,284	From CHSR draft 2016 Business Plan - Average of C&S costs along 520 mile corridor
20	**Structures**				
20.01	Rail Bridge (New Single Parallel)	BF	$ 17,425	$ 23,290	
20.02	Rail Bridge (New Double Parallel)	BF	$ 33,977	$ 45,414	
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF	$ 28,886	$ 38,609	
20.04	Rail Bridge (New) - Walmsley Blvd.	BF	$ 70,863	$ 94,716	
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF	$ 75,023	$ 100,275	
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF	$ 44,341	$ 59,266	
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF	$ 25,271	$ 33,777	
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF	$ 32,661	$ 43,654	
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF	$ 35,569	$ 47,541	
20.1	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF	$ 28,447	$ 38,022	
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	$ 37,159	$ 49,666	
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	$ 29,370	$ 39,257	
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF	$ 25,266	$ 33,771	
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF	$ 25,124	$ 33,580	
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	$ 35,927	$ 48,020	
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF	$ 22,611	$ 30,222	
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF	$ 24,845	$ 33,208	
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF	$ 37,661	$ 50,338	
20.19	Restore Track on Downtown Richmond Viaduct	BF	$ 7,986	$ 10,675	Assumes 75% of foundations are underpinned; 25% of substructure is rehabilitated/repaired
20.20	Overhead Structures - New (NOV)	SF	$ 721	$ 964	
20.21	Overhead Structures - New (CEN/RIC)	SF	$ 624	$ 834	
20.22	James River Floodwall Penetrations	EA	$ 103,737	$ 138,654	
20.23	Pedestrian bridges - Trails	BF	$ 18,959	$ 25,340	
20.24	Drainage Structures - over 6'	EA	$ 226,101	$ 302,207	Assume Typical Structure consists of Double 10' x 10' Box Culvert, say 40 LF with one Headwall and one culvert connection
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	$ 177	$ 237	
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	$ 222	$ 297	Assume tie backs; assume cost is 30% more than H<10'
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	$ 147	$ 196	
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	$ 279	$ 373	Assume deep foundations; assume cost is 30% more than H<10'
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	$ 73	$ 97	
20.30	Crashwalls	LF	$ 4,953	$ 6,620	
30	**Stations**				
30.01	Station Building- Small	SF	$ 305	$ 408	
30.02	Station Building - Medium	SF	$ 301	$ 403	
30.03	Station Building - Large	SF	$ 298	$ 398	
30.04	Main Street Station Upgrade - med	SF	$ 189	$ 253	
30.05	Main Street Station Upgrade - Large	SF	$ 186	$ 248	
30.06	Platforms - New (Passenger Only)	SF	$ 46	$ 62	
30.07	Platforms - New (Maintenance Only)	SF	$ 36	$ 48	
30.08	Platforms - Expansion	SF	$ 38	$ 51	
30.09	Platforms - New (Passenger With Service)	SF	$ 50	$ 66	
30.10	Vertical Access	EA	$ 150,000	$ 200,490	
30.11	Ped Bridge - For Stations	BF	$ 29,442	$ 39,794	
30.12	Ped Tunnel	LS	$ 332,254	$ 444,090	
30.13	Parking - Structure	Stall	$ 33,256	$ 44,449	
30.14	Parking - Surface lot	Stall	$ 2,783	$ 3,720	
40	**Sitework - Special Conditions**				
40.01	Clearing and Grubbing (Rail)	Acre	$ 19,909	$ 26,611	
40.02	Excavation (and Disposal)	CY	$ 49	$ 65	
40.03	Over Excavation/Undercut	CY	$ 55	$ 74	
40.04	Embankment (Common Borrow)	CY	$ 32	$ 42	
40.05	Embankment (Engineer Fill/Select Borrow)	CY	$ 38	$ 51	
40.06	Subballast	Ton	$ 44	$ 58	
40.07	Site Utilities, Utility Relocation - VDOT (Major Gas Pipelines, Electric, Fiber, Phone)	LS	$ -		
40.08	Site Utilities , Utility Relocation - Minor Gas Pipelines	LF	$ -		
40.09	Site Utilities , Utility Relocation - Water Pipelines	LF	$ -		
40.1	Site Utilities , Utility Relocation - Sanitary Sewer Pipelines	LF	$ -		
50	**Roadway**				
50.01	Asphalt Concrete	SY	$ 141	$ 189	This will include surface, intermediate, base and agreggate since pavement design is not known.
50.02	Curb & Gutter	LF	$ 56	$ 75	
50.03	Concrete Median	LF	$ 114	$ 152	
50.04	Concrete Sidewalk	SF	$ 12	$ 16	
50.05	Clearing and Grubbing	Acre	$ 20,905	$ 27,941	
50.06	Excavation (and Disposal)	CY	$ 51	$ 68	
50.07	Over Excavation/Undercut	CY	$ 58	$ 77	
50.08	Embankment (Common Borrow)	CY	$ 33	$ 44	
50.09	Embankment (Engineer Fill/Select Borrow)	CY	$ 40	$ 54	
50.1	Maintenance of Traffic	0.1			Percentage of summation of Items 50.01 to 50.09
50.11	Stormwater Management	0.05			Percentage of summation of Items 50.01 to 50.09
50.12	Grade Crossing - Concrete Panels	TF	1,297.47	1,734.20	
50.13	Grade Crossing - Quad Gates	EA	$ 542,996	$ 725,769	Per location, will note if only one side needs to be replaced
50.14	Grade Crossing - Median Separator with Dual Gates	EA	$ 282,034	$ 376,966	Per location, this will include the gates, concrete median, delineators and asphalt for additional width
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	$ 21,720	$ 29,031	Per location, includes 2 gates
50.16	Culvert Extension (less than 6-ft dia.)	EA	19,571.69	26,159.52	
50.17	New Culvert (Jack and Bore)	EA	150,000	200,490	$1,500 / LF for approximately 100LF
60	**Row, Land, Existing Improvements**				
60.01	Purchase or lease of real estate				
60.02	Permanent Acquisition	LS	$ -		
60.03	Temporary Acquisition	LS	$ -		
60.04	Damages	LS	$ -		
60.05	Condemnation	LS	$ -		
60.06	Admin Cost	LS	$ -		
60.07	Admin Settlement	LS	$ -		
60.08	Relocation of existing households and businesses				
60.09	Residential (Owners)	LS	$ -		
60.10	Residential (Tenants)	LS	$ -		
60.11	Business (Owners and Tenants)	LS	$ -		
60.12	Others (Personal Property Moves)	LS	$ -		
60.13	Unspecified	LS	$ -		
60.14	Services				
60.15	Property Management	LS	$ -		
60.16	Agency	LS	$ -		
60.17	Contractor R/W Services (Title/Appraisal, etc)	LS	$ -		
60.18	Legal Services	LS	$ -		
60.19	Unspecified	LS	$ -		
60.20	Other Real Estate Costs				
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	$ 47	$ 62.82	
60.22	Water	LF	$ 261	$ 348.85	
60.23	Sanitary Sewer	LF	$ 395	$ 527.96	
60.24	Electric Distribution	LF	$ 297	$ 396.97	
60.25	Electric Transmission	LF	$ 5,000	$ 6,683.00	
60.26	Gas	LF	$ 750	$ 1,002.45	
60.27	Major Utility Facility Relocations	EA	$ 250,000	$ 334,150.00	

DC2RVA - NOV 1A - RO East							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	*2025 UNIT COST*	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	4,958	$ 395	$ 529	$ 1,958,410	$ 2,620,896
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	-	$ 359	$ 479	$ -	$ -
10.03	No. 10 Turnout	EA	-	$ 182,505	$ 243,936	$ -	$ -
10.04	No. 15 Turnout	EA	1	$ 365,010	$ 487,873	$ 365,010	$ 487,873
10.05	No. 20 Turnout	EA	12	$ 434,684	$ 581,012	$ 5,216,208	$ 6,972,142
10.06	Diamond Crossing	EA	-	$ 470,056	$ 628,277	$ -	$ -
10.07	Turnout Removal	EA	6	$ 33,228	$ 44,413	$ 199,368	$ 266,476
10.08	Track shift/realign	TF	6,828	$ 139	$ 186	$ 949,092	$ 1,269,467
10.09	Track removal	TF	1,916	$ 40	$ 53	$ 76,640	$ 101,191
10.1	Signals & Communications (from CHSR)	MI	1	$ 2,740,000	$ 3,662,284	$ 1,918,000	$ 2,563,599
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	-	$ 17,425	$ 23,290	$ -	$ -
20.02	Rail Bridge (New Double Parallel)	BF	-	$ 33,977	$ 45,414	$ -	$ -
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF	-	$ 28,886	$ 38,609	$ -	$ -
20.04	Rail Bridge (New) - Walmsley Blvd.	BF	-	$ 70,863	$ 94,716	$ -	$ -
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF	-	$ 75,023	$ 100,275	$ -	$ -
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF	-	$ 44,341	$ 59,266	$ -	$ -
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF	-	$ 25,271	$ 33,777	$ -	$ -
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF	-	$ 32,661	$ 43,654	$ -	$ -
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF	-	$ 35,569	$ 47,541	$ -	$ -
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF	-	$ 28,447	$ 38,022	$ -	$ -
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$ -
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF		$ 29,370	$ 39,257	$ -	$ -
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF	-	$ 25,266	$ 33,771	$ -	$ -
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF	-	$ 25,124	$ 33,580	$ -	$ -
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	-	$ 35,927	$ 48,020	$ -	$ -
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF	-	$ 22,611	$ 30,222	$ -	$ -
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF	-	$ 24,845	$ 33,208	$ -	$ -
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF	-	$ 37,661	$ 50,338	$ -	$ -
20.19	Restore Track on Downtown Richmond Viaduct	BF	-	$ 7,986	$ 10,675	$ -	$ -
20.20	Overhead Structures - New (NOV)	SF	-	$ 721	$ 964	$ -	$ -
20.21	Overhead Structures - New (CEN/RIC)	SF	-	$ 624	$ 834	$ -	$ -
20.22	James River Floodwall Penetrations	EA	-	$ 103,737	$ 138,654	$ -	$ -
20.23	Pedestrian bridges - Trails	BF	-	$ 18,959	$ 25,340	$ -	$ -
20.24	Drainage Structures - over 6'	EA	-	$ 226,101	$ 302,207	$ -	$ -
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	3,690	$ 177	$ 237	$ 654,627	$ 874,975
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	-	$ 222	$ 297	$ -	$ -
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	-	$ 147	$ 196	$ -	$ -
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	-	$ 279	$ 373	$ -	$ -
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	-	$ 73	$ 97	$ -	$ -
20.30	Crashwalls	LF		$ 4,953	$ 6,620	$ -	$ -
30	**Stations**						
30.01	Station Building- Small	SF	-	$ 305	$ 408	$ -	$ -
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$ -
30.03	Station Building - Large	SF	-	$ 298	$ 398	$ -	$ -
30.04	Main Street Station Upgrade - med	SF	-	$ 189	$ 253	$ -	$ -
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$ -
30.06	Platforms - New (Passenger Only)	SF	-	$ 46	$ 62	$ -	$ -
30.07	Platforms - New (Maintenance Only)	SF	-	$ 36	$ 48	$ -	$ -
30.08	Platforms - Expansion	SF	-	$ 38	$ 51	$ -	$ -
30.09	Platforms - New (Passenger With Service)	SF	-	$ 50	$ 66	$ -	$ -
30.10	Vertical Access	EA	-	$ 150,000	$ 200,490	$ -	$ -
30.11	Ped Bridge - For Stations	BF	-	$ 29,442	$ 39,794	$ -	$ -
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$ -
30.13	Parking - Structure	Stall	-	$ 33,256	$ 44,449	$ -	$ -
30.14	Parking - Surface lot	Stall	-	$ 2,783	$ 3,720	$ -	$ -
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	5	$ 19,909	$ 26,611	$ 100,343	$ 134,118
40.02	Excavation (and Disposal)	CY	15,323	$ 49	$ 65	$ 745,104	$ 995,906
40.03	Over Excavation/Undercut	CY	23,234	$ 55	$ 74	$ 1,280,427	$ 1,711,419
40.04	Embankment (Common Borrow)	CY	-	$ 32	$ 42	$ -	$ -
40.05	Embankment (Engineer Fill/Select Borrow)	CY	23,234	$ 38	$ 51	$ 886,884	$ 1,185,409
40.06	Subballast	Ton	6,090	$ 44	$ 58	$ 266,522	$ 356,233
50	**Roadway**						
50.01	Asphalt Concrete	SY	-	$ 141	$ 189	$ -	$ -
50.02	Curb & Gutter	LF	-	$ 56	$ 75	$ -	$ -
50.03	Concrete Median	LF	-	$ 114	$ 152	$ -	$ -
50.04	Concrete Sidewalk	SF	-	$ 12	$ 16	$ -	$ -
50.05	Clearing and Grubbing	Acre	-	$ 20,905	$ 27,941	$ -	$ -
50.06	Excavation (and Disposal)	CY	-	$ 51	$ 68	$ -	$ -
50.07	Over Excavation/Undercut	CY	-	$ 58	$ 77	$ -	$ -
50.08	Embankment (Common Borrow)	CY	-	$ 33	$ 44	$ -	$ -
50.09	Embankment (Engineer Fill/Select Borrow)	CY	-	$ 40	$ 54	$ -	$ -
50.10	Maintenance of Traffic	10%	1	$ -	$ -	$ -	$ -
50.11	Stormwater Management	5%	1	$ -	$ -	$ -	$ -
50.12	Grade Crossing - Concrete Panels	TF	-	$ 1,297	$ 1,734	$ -	$ -
50.13	Grade Crossing - Quad Gates	EA	-	$ 542,996	$ 725,769	$ -	$ -
50.14	Grade Crossing - Median Separator with Dual Gates	EA	-	$ 282,034	$ 376,966	$ -	$ -
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	-	$ 21,720	$ 29,031	$ -	$ -
50.16	Culvert Extension (less than 6-ft dia.)	EA	-	$ 19,572	$ 26,160	$ -	$ -
50.17	New Culvert (Jack and Bore)	EA	-	$ 150,000	$ 200,490	$ -	$ -

DC2RVA - NOV 1A - RO East							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	*2025 UNIT COST*	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 3,749,000	$ 5,010,913	$ 3,749,000	$ 5,010,913
60.03	Temporary Acquisition	LS	1	$ 251,900	$ 336,690	$ 251,900	$ 336,690
60.04	Damages	LS	-	$ -	$ -	$ -	$ -
60.05	Condemnation	LS	-	$ -	$ -	$ -	$ -
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$ -
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$ -
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LS	-	$ -	$ -	$ -	$ -
60.10	Residential (Tenants)	LS	-	$ -	$ -	$ -	$ -
60.11	Business (Owners and Tenants)	LS	-	$ -	$ -	$ -	$ -
60.12	Others (Personal Property Moves)	LS	-	$ -	$ -	$ -	$ -
60.13	Unspecified	LS	-	$ -	$ -	$ -	$ -
60.14	Services						
60.15	Property Management	LS	-	$ -	$ -	$ -	$ -
60.16	Agency	LS	-	$ -	$ -	$ -	$ -
60.17	Contractor R/W Services (Title/Appraisal, etc)	LS	-	$ -	$ -	$ -	$ -
60.18	Legal Services	LS	-	$ -	$ -	$ -	$ -
60.19	Unspecified	LS	-	$ -	$ -	$ -	$ -
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	-	$ 47	$ 63	$ -	$ -
60.22	Water	LF	-	$ 261	$ 349	$ -	$ -
60.23	Sanitary Sewer	LF	-	$ 395	$ 528	$ -	$ -
60.24	Electric Distribution	LF	-	$ 297	$ 397	$ -	$ -
60.25	Electric Transmission	LF	-	$ 5,000	$ 6,683	$ -	$ -
60.26	Gas	LF	-	$ 750	$ 1,002	$ -	$ -
60.27	Major Utility Facility Relocations	EA	-	$ 250,000	$ 334,150	$ -	$ -
				Subtotal		$ 18,617,536	$ 24,887,307
				6% Professional services		$ 1,117,052	$ 1,493,238
				35% Contingency		$ 6,907,106	$ 9,233,191
				Project Total		**$ 26,641,694**	**$ 35,613,737**

DC2RVA - NOV 1B - RO West							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	*2025 UNIT COST*	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	4,273	$ 395	$ 529	$ 1,687,835	$ 2,258,792
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	-	$ 359	$ 479	$ -	$ -
10.03	No. 10 Turnout	EA	-	$ 182,505	$ 243,936	$ -	$ -
10.04	No. 15 Turnout	EA	1	$ 365,010	$ 487,873	$ 365,010	$ 487,873
10.05	No. 20 Turnout	EA	10	$ 434,684	$ 581,012	$ 4,346,840	$ 5,810,119
10.06	Diamond Crossing	EA	-	$ 470,056	$ 628,277	$ -	$ -
10.07	Turnout Removal	EA	4	$ 33,228	$ 44,413	$ 132,912	$ 177,651
10.08	Track shift/realign	TF	8,319	$ 139	$ 186	$ 1,156,341	$ 1,546,674
10.09	Track removal	TF	2,130	$ 40	$ 53	$ 85,200	$ 112,493
10.1	Signals & Communications (from CHSR)	MI	1	$ 2,740,000	$ 3,662,284	$ 1,918,000	$ 2,563,599
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	-	$ 17,425	$ 23,290	$ -	$ -
20.02	Rail Bridge (New Double Parallel)	BF	-	$ 33,977	$ 45,414	$ -	$ -
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF	-	$ 28,886	$ 38,609	$ -	$ -
20.04	Rail Bridge (New) - Walmsley Blvd.	BF	-	$ 70,863	$ 94,716	$ -	$ -
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF	-	$ 75,023	$ 100,275	$ -	$ -
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF	-	$ 44,341	$ 59,266	$ -	$ -
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF	-	$ 25,271	$ 33,777	$ -	$ -
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF	-	$ 32,661	$ 43,654	$ -	$ -
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF	-	$ 35,569	$ 47,541	$ -	$ -
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF	-	$ 28,447	$ 38,022	$ -	$ -
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$ -
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	-	$ 29,370	$ 39,257	$ -	$ -
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF	-	$ 25,266	$ 33,771	$ -	$ -
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF	-	$ 25,124	$ 33,580	$ -	$ -
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	-	$ 35,927	$ 48,020	$ -	$ -
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF	-	$ 22,611	$ 30,222	$ -	$ -
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF	-	$ 24,845	$ 33,208	$ -	$ -
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF	-	$ 37,661	$ 50,338	$ -	$ -
20.19	Restore Track on Downtown Richmond Viaduct	BF	-	$ 7,986	$ 10,675	$ -	$ -
20.20	Overhead Structures - New (NOV)	SF	-	$ 721	$ 964	$ -	$ -
20.21	Overhead Structures - New (CEN/RIC)	SF	-	$ 624	$ 834	$ -	$ -
20.22	James River Floodwall Penetrations	EA	-	$ 103,737	$ 138,654	$ -	$ -
20.23	Pedestrian bridges - Trails	BF	-	$ 18,959	$ 25,340	$ -	$ -
20.24	Drainage Structures - over 6'	EA	-	$ 226,101	$ 302,207	$ -	$ -
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	1,237	$ 177	$ 237	$ 219,451	$ 293,318
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	-	$ 222	$ 297	$ -	$ -
20.27	Retaining Walls - fill walls (CIP): H<10'	SF		$ 147	$ 196	$ -	$ -
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF		$ 279	$ 373	$ -	$ -
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	-	$ 73	$ 97	$ -	$ -
20.30	Crashwalls	LF	-	$ 4,953	$ 6,620	$ -	$ -
30	**Stations**						
30.01	Station Building- Small	SF	-	$ 305	$ 408	$ -	$ -
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$ -
30.03	Station Building - Large	SF	-	$ 298	$ 398	$ -	$ -
30.04	Main Street Station Upgrade - med	SF	-	$ 189	$ 253	$ -	$ -
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$ -
30.06	Platforms - New (Passenger Only)	SF	-	$ 46	$ 62	$ -	$ -
30.07	Platforms - New (Maintenance Only)	SF	-	$ 36	$ 48	$ -	$ -
30.08	Platforms - Expansion	SF	-	$ 38	$ 51	$ -	$ -
30.09	Platforms - New (Passenger With Service)	SF	-	$ 50	$ 66	$ -	$ -
30.10	Vertical Access	EA	-	$ 150,000	$ 200,490	$ -	$ -
30.11	Ped Bridge - For Stations	BF	-	$ 29,442	$ 39,794	$ -	$ -
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$ -
30.13	Parking - Structure	Stall	-	$ 33,256	$ 44,449	$ -	$ -
30.14	Parking - Surface lot	Stall	-	$ 2,783	$ 3,720	$ -	$ -
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	9	$ 19,909	$ 26,611	$ 175,600	$ 234,707
40.02	Excavation (and Disposal)	CY	15,523	$ 49	$ 65	$ 754,830	$ 1,008,905
40.03	Over Excavation/Undercut	CY	29,148	$ 55	$ 74	$ 1,606,348	$ 2,147,045
40.04	Embankment (Common Borrow)	CY	-	$ 32	$ 42	$ -	$ -
40.05	Embankment (Engineer Fill/Select Borrow)	CY	29,148	$ 38	$ 51	$ 1,112,632	$ 1,487,144
40.06	Subballast	Ton	6,408	$ 44	$ 58	$ 280,439	$ 374,835
50	**Roadway**						
50.01	Asphalt Concrete	SY	-	$ 141	$ 189	$ -	$ -
50.02	Curb & Gutter	LF	-	$ 56	$ 75	$ -	$ -
50.03	Concrete Median	LF	-	$ 114	$ 152	$ -	$ -
50.04	Concrete Sidewalk	SF	-	$ 12	$ 16	$ -	$ -
50.05	Clearing and Grubbing	Acre	-	$ 20,905	$ 27,941	$ -	$ -
50.06	Excavation (and Disposal)	CY	-	$ 51	$ 68	$ -	$ -
50.07	Over Excavation/Undercut	CY	-	$ 58	$ 77	$ -	$ -
50.08	Embankment (Common Borrow)	CY	-	$ 33	$ 44	$ -	$ -
50.09	Embankment (Engineer Fill/Select Borrow)	CY	-	$ 40	$ 54	$ -	$ -
50.10	Maintenance of Traffic	10%	1	$ -	$ -	$ -	$ -
50.11	Stormwater Management	5%	1	$ -	$ -	$ -	$ -
50.12	Grade Crossing - Concrete Panels	TF	-	$ 1,297	$ 1,734	$ -	$ -
50.13	Grade Crossing - Quad Gates	EA	-	$ 542,996	$ 725,769	$ -	$ -
50.14	Grade Crossing - Median Separator with Dual Gates	EA	-	$ 282,034	$ 376,966	$ -	$ -
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	-	$ 21,720	$ 29,031	$ -	$ -
50.16	Culvert Extension (less than 6-ft dia.)	EA	-	$ 19,572	$ 26,160	$ -	$ -
50.17	New Culvert (Jack and Bore)	EA	-	$ 150,000	$ 200,490	$ -	$ -

DC2RVA - NOV 1B - RO West								
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	*2025 UNIT COST*	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 9,620,000	$ 12,858,092	$ 9,620,000	$ 12,858,092
60.03	Temporary Acquisition	LS	1	$ 811,500	$ 1,084,651	$ 811,500	$ 1,084,651
60.04	Damages	LS	-	$ -	$ -	$ -	$ -
60.05	Condemnation	LS	-	$ -	$ -	$ -	$ -
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$ -
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$ -
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$ -
60.10	Residential (Tenants)	LF	-	$ -	$ -	$ -	$ -
60.11	Business (Owners and Tenants)	LF	-	$ -	$ -	$ -	$ -
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$ -
60.13	Unspecified	LF	-	$ -	$ -	$ -	$ -
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$ -
60.16	Agency	LF	-	$ -	$ -	$ -	$ -
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$ -
60.18	Legal Services	LF	-	$ -	$ -	$ -	$ -
60.19	Unspecified	LF	-	$ -	$ -	$ -	$ -
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	-	$ 47	$ 63	$ -	$ -
60.22	Water	LF	-	$ 261	$ 349	$ -	$ -
60.23	Sanitary Sewer	LF	-	$ 395	$ 528	$ -	$ -
60.24	Electric Distribution	LF	400	$ 297	$ 397	$ 118,800	$ 158,788
60.25	Electric Transmission	LF	-	$ 5,000	$ 6,683	$ -	$ -
60.26	Gas	LF	-	$ 750	$ 1,002	$ -	$ -
60.27	Major Utility Facility Relocations	LF	-	$ 250,000	$ 334,150	$ -	$ -
				Subtotal		$ 24,391,738	$ 32,604,685
				6% Professional services		$ 1,463,504	$ 1,956,281
				35% Contingency		$ 9,049,335	$ 12,096,338
				Project Total		**$ 34,904,577**	**$ 46,657,304**

DC2RVA - NOV 1C - RO East-West							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	*2025 UNIT COST*	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	3,315	$ 395	$ 529	$ 1,309,425	$ 1,752,374
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	-	$ 359	$ 479	$ -	$ -
10.03	No. 10 Turnout	EA	-	$ 182,505	$ 243,936	$ -	$ -
10.04	No. 15 Turnout	EA	1	$ 365,010	$ 487,873	$ 365,010	$ 487,873
10.05	No. 20 Turnout	EA	6	$ 434,684	$ 581,012	$ 2,608,104	$ 3,486,071
10.06	Diamond Crossing	EA	-	$ 470,056	$ 628,277	$ -	$ -
10.07	Turnout Removal	EA	-	$ 33,228	$ 44,413	$ -	$ -
10.08	Track shift/realign	TF	8,456	$ 139	$ 186	$ 1,175,384	$ 1,572,146
10.09	Track removal	TF	878	$ 40	$ 53	$ 35,120	$ 46,370
10.1	Signals & Communications (from CHSR)	MI	1	$ 2,740,000	$ 3,662,284	$ 1,918,000	$ 2,563,599
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	-	$ 17,425	$ 23,290	$ -	$ -
20.02	Rail Bridge (New Double Parallel)	BF	-	$ 33,977	$ 45,414	$ -	$ -
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF	-	$ 28,886	$ 38,609	$ -	$ -
20.04	Rail Bridge (New) - Walmsley Blvd.	BF	-	$ 70,863	$ 94,716	$ -	$ -
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF	-	$ 75,023	$ 100,275	$ -	$ -
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF	-	$ 44,341	$ 59,266	$ -	$ -
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF	-	$ 25,271	$ 33,777	$ -	$ -
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF	-	$ 32,661	$ 43,654	$ -	$ -
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF	-	$ 35,569	$ 47,541	$ -	$ -
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF	-	$ 28,447	$ 38,022	$ -	$ -
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$ -
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	-	$ 29,370	$ 39,257	$ -	$ -
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF	-	$ 25,266	$ 33,771	$ -	$ -
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF	-	$ 25,124	$ 33,580	$ -	$ -
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	-	$ 35,927	$ 48,020	$ -	$ -
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF	-	$ 22,611	$ 30,222	$ -	$ -
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF	-	$ 24,845	$ 33,208	$ -	$ -
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF	-	$ 37,661	$ 50,338	$ -	$ -
20.19	Restore Track on Downtown Richmond Viaduct	BF	-	$ 7,986	$ 10,675	$ -	$ -
20.20	Overhead Structures - New (NOV)	SF	-	$ 721	$ 964	$ -	$ -
20.21	Overhead Structures - New (CEN/RIC)	SF	-	$ 624	$ 834	$ -	$ -
20.22	James River Floodwall Penetrations	EA	-	$ 103,737	$ 138,654	$ -	$ -
20.23	Pedestrian bridges - Trails	BF	-	$ 18,959	$ 25,340	$ -	$ -
20.24	Drainage Structures - over 6'	EA	-	$ 226,101	$ 302,207	$ -	$ -
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	1,494	$ 177	$ 237	$ 265,044	$ 354,258
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	-	$ 222	$ 297	$ -	$ -
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	-	$ 147	$ 196	$ -	$ -
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	-	$ 279	$ 373	$ -	$ -
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	-	$ 73	$ 97	$ -	$ -
20.30	Crashwalls	LF	-	$ 4,953	$ 6,620	$ -	$ -
30	**Stations**						
30.01	Station Building- Small	SF	-	$ 305	$ 408	$ -	$ -
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$ -
30.03	Station Building - Large	SF	-	$ 298	$ 398	$ -	$ -
30.04	Main Street Station Upgrade - med	SF	-	$ 189	$ 253	$ -	$ -
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$ -
30.06	Platforms - New (Passenger Only)	SF	-	$ 46	$ 62	$ -	$ -
30.07	Platforms - New (Maintenance Only)	SF	-	$ 36	$ 48	$ -	$ -
30.08	Platforms - Expansion	SF	-	$ 38	$ 51	$ -	$ -
30.09	Platforms - New (Passenger With Service)	SF	-	$ 50	$ 66	$ -	$ -
30.10	Vertical Access	EA	-	$ 150,000	$ 200,490	$ -	$ -
30.11	Ped Bridge - For Stations	BF	-	$ 29,442	$ 39,794	$ -	$ -
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$ -
30.13	Parking - Structure	Stall	-	$ 33,256	$ 44,449	$ -	$ -
30.14	Parking - Surface lot	Stall	-	$ 2,783	$ 3,720	$ -	$ -
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	9	$ 19,909	$ 26,611	$ 179,383	$ 239,763
40.02	Excavation (and Disposal)	CY	15,423	$ 49	$ 65	$ 749,967	$ 1,002,406
40.03	Over Excavation/Undercut	CY	28,051	$ 55	$ 74	$ 1,545,892	$ 2,066,240
40.04	Embankment (Common Borrow)	CY	-	$ 32	$ 42	$ -	$ -
40.05	Embankment (Engineer Fill/Select Borrow)	CY	28,051	$ 38	$ 51	$ 1,070,758	$ 1,431,175
40.06	Subballast	Ton	5,952	$ 44	$ 58	$ 260,483	$ 348,161
50	**Roadway**						
50.01	Asphalt Concrete	SY	-	$ 141	$ 189	$ -	$ -
50.02	Curb & Gutter	LF	-	$ 56	$ 75	$ -	$ -
50.03	Concrete Median	LF	-	$ 114	$ 152	$ -	$ -
50.04	Concrete Sidewalk	SF	-	$ 12	$ 16	$ -	$ -
50.05	Clearing and Grubbing	Acre	-	$ 20,905	$ 27,941	$ -	$ -
50.06	Excavation (and Disposal)	CY	-	$ 51	$ 68	$ -	$ -
50.07	Over Excavation/Undercut	CY	-	$ 58	$ 77	$ -	$ -
50.08	Embankment (Common Borrow)	CY	-	$ 33	$ 44	$ -	$ -
50.09	Embankment (Engineer Fill/Select Borrow)	CY	-	$ 40	$ 54	$ -	$ -
50.10	Maintenance of Traffic	10%	1	$ -	$ -	$ -	$ -
50.11	Stormwater Management	5%	1	$ -	$ -	$ -	$ -
50.12	Grade Crossing - Concrete Panels	TF	-	$ 1,297	$ 1,734	$ -	$ -
50.13	Grade Crossing - Quad Gates	EA	-	$ 542,996	$ 725,769	$ -	$ -
50.14	Grade Crossing - Median Separator with Dual Gates	EA	-	$ 282,034	$ 376,966	$ -	$ -
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	-	$ 21,720	$ 29,031	$ -	$ -
50.16	Culvert Extension (less than 6-ft dia.)	EA	-	$ 19,572	$ 26,160	$ -	$ -
50.17	New Culvert (Jack and Bore)	EA	-	$ 150,000	$ 200,490	$ -	$ -

DC2RVA - NOV 1C - RO East-West								
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	*2025 UNIT COST*	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 9,715,000	$ 12,985,069	$ 9,715,000	$ 12,985,069
60.03	Temporary Acquisition	LS	1	$ 812,700	$ 1,086,255	$ 812,700	$ 1,086,255
60.04	Damages	LS	-	$ -	$ -	$ -	$ -
60.05	Condemnation	LS	-	$ -	$ -	$ -	$ -
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$ -
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$ -
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$ -
60.10	Residential (Tenants)	LF	-	$ -	$ -	$ -	$ -
60.11	Business (Owners and Tenants)	LF	-	$ -	$ -	$ -	$ -
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$ -
60.13	Unspecified	LF	-	$ -	$ -	$ -	$ -
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$ -
60.16	Agency	LF	-	$ -	$ -	$ -	$ -
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$ -
60.18	Legal Services	LF	-	$ -	$ -	$ -	$ -
60.19	Unspecified	LF	-	$ -	$ -	$ -	$ -
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	-	$ 47	$ 63	$ -	$ -
60.22	Water	LF	-	$ 261	$ 349	$ -	$ -
60.23	Sanitary Sewer	LF	-	$ 395	$ 528	$ -	$ -
60.24	Electric Distribution	LF	400	$ 297	$ 397	$ 118,800	$ 158,788
60.25	Electric Transmission	LF	-	$ 5,000	$ 6,683	$ -	$ -
60.26	Gas	LF	-	$ 750	$ 1,002	$ -	$ -
60.27	Major Utility Facility Relocations	LF	-	$ 250,000	$ 334,150	$ -	$ -
				Subtotal		$ 22,129,070	$ 29,580,547
				6% Professional services		$ 1,327,744	$ 1,774,833
				35% Contingency		$ 8,209,885	$ 10,974,383
				Project Total		**$ 31,666,699**	**$ 42,329,763**

DC2RVA - NOV 2A - Build (MP 109 to MP 62)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	182,640	$ 395	$ 529	$ 72,142,800	$96,547,084
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	154,056	$ 359	$ 479	$ 55,306,104	$73,866,796
10.03	No. 10 Turnout	EA	-	$ 182,505	$ 243,936	$ -	$0
10.04	No. 15 Turnout	EA	4	$ 365,010	$ 487,873	$ 1,460,040	$1,951,490
10.05	No. 20 Turnout	EA	46	$ 434,684	$ 581,012	$ 19,995,464	$26,726,546
10.06	Diamond Crossing	EA	-	$ 470,056	$ 628,277	$ -	$0
10.07	Turnout Removal	EA	13	$ 33,228	$ 44,413	$ 431,964	$577,365
10.08	Track shift/realign	TF	235,852	$ 139	$ 186	$ 32,783,428	$43,849,772
10.09	Track removal	TF	20,731	$ 40	$ 53	$ 829,240	$1,094,875
10.1	Signals & Communications (from CHSR)	MI	47	$ 2,740,000	$ 3,662,284	$ 128,780,000	$172,127,348
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	924	$ 17,425	$ 23,290	$ 16,100,242	$21,519,584
20.02	Rail Bridge (New Double Parallel)	BF		$ 33,977	$ 45,414	$ -	$0
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF		$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF	-	$ 70,863	$ 94,716	$ -	$0
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF	780	$ 75,023	$ 100,275	$ 58,517,646	$78,214,686
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF	950	$ 44,341	$ 59,266	$ 42,123,862	$56,302,754
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF	1,360	$ 25,271	$ 33,777	$ 34,368,839	$45,937,390
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF	1,115	$ 32,661	$ 43,654	$ 36,416,810	$48,674,708
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF	400	$ 35,569	$ 47,541	$ 14,227,473	$19,016,440
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF		$ 28,447	$ 38,022	$ -	$0
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF		$ 37,159	$ 49,666	$ -	$0
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF		$ 29,370	$ 39,257	$ -	$0
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF		$ 25,266	$ 33,771	$ -	$0
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF		$ 25,124	$ 33,580	$ -	$0
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF		$ 35,927	$ 48,020	$ -	$0
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF		$ 22,611	$ 30,222	$ -	$0
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF		$ 24,845	$ 33,208	$ -	$0
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF	-	$ 37,661	$ 50,338	$ -	$0
20.19	Restore Track on Downtown Richmond Viaduct	BF	250	$ 7,986	$ 10,675	$ 1,996,500	$2,668,750
20.20	Overhead Structures - New (NOV)	SF	94,537	$ 721	$ 964	$ 68,161,177	$91,133,668
20.21	Overhead Structures - New (CEN/RIC)	SF		$ 624	$ 834	$ -	$0
20.22	James River Floodwall Penetrations	EA		$ 103,737	$ 138,654	$ -	$0
20.23	Pedestrian bridges - Trails	BF	-	$ 18,959	$ 25,340	$ -	$0
20.24	Drainage Structures - over 6'	EA	24	$ 226,101	$ 302,207	$ 5,426,428	$7,252,964
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	66,904	$ 177	$ 237	$ 11,869,156	$15,864,314
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	3,604	$ 222	$ 297	$ 800,016	$1,069,302
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	34,523	$ 147	$ 196	$ 5,065,858	$6,771,026
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	18,316	$ 279	$ 373	$ 5,110,809	$6,831,107
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF		$ 73	$ 97	$ -	$0
20.30	Crashwalls	LF	160	$ 4,953	$ 6,620	$ 792,496	$1,059,250
30	**Stations**						
30.01	Station Building- Small	SF	-	$ 305	$ 408	$ -	$0
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$0
30.03	Station Building - Large	SF	-	$ 298	$ 398	$ -	$0
30.04	Main Street Station Upgrade - med	SF	-	$ 189	$ 253	$ -	$0
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$0
30.06	Platforms - New (Passenger Only)	SF	-	$ 46	$ 62	$ -	$0
30.07	Platforms - New (Maintenance Only)	SF	-	$ 36	$ 48	$ -	$0
30.08	Platforms - Expansion	SF	-	$ 38	$ 51	$ -	$0
30.09	Platforms - New (Passenger With Service)	SF	20,400	$ 50	$ 66	$ 1,010,610	$1,350,781
30.10	Vertical Access	EA	-	$ 150,000	$ 200,490	$ -	$0
30.11	Ped Bridge - For Stations	BF	812	$ 29,442	$ 39,794	$ 23,906,529	$32,312,459
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$0
30.13	Parking - Structure	Stall	-	$ 33,256	$ 44,449	$ -	$0
30.14	Parking - Surface lot	Stall	150	$ 2,783	$ 3,720	$ 417,460	$557,977
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	310	$ 19,909	$ 26,611	$ 6,173,880	$8,252,008
40.02	Excavation (and Disposal)	CY	910,933	$ 49	$ 65	$ 44,295,506	$59,205,373
40.03	Over Excavation/Undercut	CY	1,264,502	$ 55	$ 74	$ 69,686,783	$93,143,354
40.04	Embankment (Common Borrow)	CY	534,996	$ 32	$ 42	$ 16,866,389	$22,543,616
40.05	Embankment (Engineer Fill/Select Borrow)	CY	1,264,502	$ 38	$ 51	$ 48,268,345	$64,515,470
40.06	Subballast	Ton	228,050	$ 44	$ 58	$ 9,980,351	$13,339,737
50	**Roadway**						
50.01	Asphalt Concrete	SY	36,311	$ 141	$ 189	$ 5,129,294	$6,855,814
50.02	Curb & Gutter	LF	6,128	$ 56	$ 75	$ 344,171	$460,019
50.03	Concrete Median	LF	552	$ 114	$ 152	$ 62,944	$84,131
50.04	Concrete Sidewalk	SF	4,399	$ 12	$ 16	$ 52,407	$70,048
50.05	Clearing and Grubbing	Acre	22	$ 20,905	$ 27,941	$ 459,900	$614,702
50.06	Excavation (and Disposal)	CY	46,111	$ 51	$ 68	$ 2,354,329	$3,146,796
50.07	Over Excavation/Undercut	CY	92,837	$ 58	$ 77	$ 5,372,065	$7,180,303
50.08	Embankment (Common Borrow)	CY	86,072	$ 33	$ 44	$ 2,853,036	$3,813,367
50.09	Embankment (Engineer Fill/Select Borrow)	CY	92,837	$ 40	$ 54	$ 3,724,331	$4,977,941
50.10	Maintenance of Traffic	10%	1	$ 2,035,248	$ 2,720,313	$ 2,035,248	$2,720,313
50.11	Stormwater Management	5%	1	$ 1,017,624	$ 1,360,157	$ 1,017,624	$1,360,157
50.12	Grade Crossing - Concrete Panels	TF	250	$ 1,297	$ 1,734	$ 324,367	$433,549
50.13	Grade Crossing - Quad Gates	EA	6	$ 542,996	$ 725,769	$ 3,257,977	$4,354,612
50.14	Grade Crossing - Median Separator with Dual Gates	EA	-	$ 282,034	$ 376,966	$ -	$0
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	1	$ 21,720	$ 29,031	$ 21,720	$29,031
50.16	Culvert Extension (less than 6-ft dia.)	EA	166	$ 19,572	$ 26,160	$ 3,248,901	$4,342,480
50.17	New Culvert (Jack and Bore)	EA	48	$ 150,000	$ 200,490	$ 7,200,000	$9,623,520

DC2RVA - NOV 2A - Build (MP 109 to MP 62)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 87,944,800	$ 117,547,020	$ 87,944,800	$117,547,020
60.03	Temporary Acquisition	LS	1	$ 21,016,400	$ 28,090,520	$ 21,016,400	$28,090,520
60.04	Damages	LS	1	$ 200,000	$ 267,320	$ 200,000	$267,320
60.05	Condemnation	LS	1	$ 70,000	$ 93,562	$ 70,000	$93,562
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	1	$ 406,500	$ 543,328	$ 406,500	$543,328
60.10	Residential (Tenants)	LF	-	$ -	$ -	$ -	$0
60.11	Business (Owners and Tenants)	LF	-	$ -	$ -	$ -	$0
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	3,000	$ 47	$ 63	$ 141,000	$188,461
60.22	Water	LF	-	$ 261	$ 349	$ -	$0
60.23	Sanitary Sewer	LF	-	$ 395	$ 528	$ -	$0
60.24	Electric Distribution	LF	2,000	$ 297	$ 397	$ 594,000	$793,940
60.25	Electric Transmission	LF	-	$ 5,000	$ 6,683	$ -	$0
60.26	Gas	LF	45,000	$ 750	$ 1,002	$ 33,750,000	$45,110,250
60.27	Major Utility Facility Relocations	LF	-	$ 250,000	$ 334,150	$ -	$0
					Subtotal	$ 1,014,893,219	$ 1,356,979,177
					6% Professional services	$ 60,893,593	$ 81,418,751
					35% Contingency	$ 376,525,384	$ 503,439,275
	Remove Franconia to Occoquan (MP 99 to MP 90)					$ 216,307,431	$ 289,217,303
					Project Total	**$ 1,236,004,765**	**$ 1,652,619,899**

DC2RVA - NOV 3A - Minor (MP 62 to MP 48)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	22,014	$ 395	$ 529	$ 8,695,530	$11,637,032
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	15,692	$ 359	$ 479	$ 5,633,428	$7,524,003
10.03	No. 10 Turnout	EA	-	$ 182,505	$ 243,936	$ -	$0
10.04	No. 15 Turnout	EA	-	$ 365,010	$ 487,873	$ -	$0
10.05	No. 20 Turnout	EA	12	$ 434,684	$ 581,012	$ 5,216,208	$6,972,142
10.06	Diamond Crossing	EA	-	$ 470,056	$ 628,277	$ -	$0
10.07	Turnout Removal	EA	-	$ 33,228	$ 44,413	$ -	$0
10.08	Track shift/realign	TF	46,612	$ 139	$ 186	$ 6,479,068	$8,666,136
10.09	Track removal	TF	14,186	$ 40	$ 53	$ 567,440	$749,211
10.1	Signals & Communications (from CHSR)	MI	14	$ 2,740,000	$ 3,662,284	$ 38,360,000	$51,271,976
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	1,054	$ 17,425	$ 23,290	$ 18,365,428	$24,547,231
20.02	Rail Bridge (New Double Parallel)	BF	-	$ 33,977	$ 45,414	$ -	$0
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF	-	$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF		$ 70,863	$ 94,716	$ -	$0
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF		$ 75,023	$ 100,275	$ -	$0
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF		$ 44,341	$ 59,266	$ -	$0
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF		$ 25,271	$ 33,777	$ -	$0
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF		$ 32,661	$ 43,654	$ -	$0
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF	-	$ 35,569	$ 47,541	$ -	$0
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF	-	$ 28,447	$ 38,022	$ -	$0
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$0
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	-	$ 29,370	$ 39,257	$ -	$0
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF	-	$ 25,266	$ 33,771	$ -	$0
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF	-	$ 25,124	$ 33,580	$ -	$0
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	-	$ 35,927	$ 48,020	$ -	$0
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF	-	$ 22,611	$ 30,222	$ -	$0
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF	-	$ 24,845	$ 33,208	$ -	$0
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF	-	$ 37,661	$ 50,338	$ -	$0
20.19	Restore Track on Downtown Richmond Viaduct	BF		$ 7,986	$ 10,675	$ -	$0
20.20	Overhead Structures - New (NOV)	SF	-	$ 721	$ 964	$ -	$0
20.21	Overhead Structures - New (CEN/RIC)	SF	-	$ 624	$ 834	$ -	$0
20.22	James River Floodwall Penetrations	EA	-	$ 103,737	$ 138,654	$ -	$0
20.23	Pedestrian bridges - Trails	BF	-	$ 18,959	$ 25,340	$ -	$0
20.24	Drainage Structures - over 6'	EA	5	$ 226,101	$ 302,207	$ 1,130,506	$1,511,034
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	11,528	$ 177	$ 237	$ 2,045,134	$2,733,526
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	356	$ 222	$ 297	$ 79,025	$105,625
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	5,735	$ 147	$ 196	$ 841,546	$1,124,811
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	794	$ 279	$ 373	$ 221,554	$296,129
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	-	$ 73	$ 97	$ -	$0
20.30	Crashwalls	LF	90	$ 4,953	$ 6,620	$ 445,779	$595,828
30	**Stations**						
30.01	Station Building- Small	SF	-	$ 305	$ 408	$ -	$0
30.02	Station Building - Medium	SF	6,800	$ 301	$ 403	$ 2,049,489	$2,739,347
30.03	Station Building - Large	SF	-	$ 298	$ 398	$ -	$0
30.04	Main Street Station Upgrade - med	SF	-	$ 189	$ 253	$ -	$0
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$0
30.06	Platforms - New (Passenger Only)	SF	-	$ 46	$ 62	$ -	$0
30.07	Platforms - New (Maintenance Only)	SF	-	$ 36	$ 48	$ -	$0
30.08	Platforms - Expansion	SF	25,500.00	$ 38	$ 51	$ 971,024	$1,297,870
30.09	Platforms - New (Passenger With Service)	SF	-	$ 50	$ 66	$ -	$0
30.10	Vertical Access	EA	-	$ 150,000	$ 200,490	$ -	$0
30.11	Ped Bridge - For Stations	BF	-	$ 29,442	$ 39,794	$ -	$0
30.12	Ped Tunnel	LS	1	$ 332,254	$ 444,090	$ 332,254	$444,090
30.13	Parking - Structure	Stall	225	$ 33,256	$ 44,449	$ 7,482,488	$10,001,093
30.14	Parking - Surface lot	Stall	29	$ 2,783	$ 3,720	$ 80,709	$107,876
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	58	$ 19,909	$ 26,611	$ 1,153,546	$1,541,830
40.02	Excavation (and Disposal)	CY	241,329	$ 49	$ 65	$ 11,734,991	$15,684,988
40.03	Over Excavation/Undercut	CY	53,575	$ 55	$ 74	$ 2,952,522	$3,946,340
40.04	Embankment (Common Borrow)	CY	-	$ 32	$ 42	$ -	$0
40.05	Embankment (Engineer Fill/Select Borrow)	CY	53,575	$ 38	$ 51	$ 2,045,055	$2,733,421
40.06	Subballast	Ton	37,139	$ 44	$ 58	$ 1,625,346	$2,172,438
50	**Roadway**						
50.01	Asphalt Concrete	SY	-	$ 141	$ 189	$ -	$0
50.02	Curb & Gutter	LF	-	$ 56	$ 75	$ -	$0
50.03	Concrete Median	LF	-	$ 114	$ 152	$ -	$0
50.04	Concrete Sidewalk	SF	-	$ 12	$ 16	$ -	$0
50.05	Clearing and Grubbing	Acre	-	$ 20,905	$ 27,941	$ -	$0
50.06	Excavation (and Disposal)	CY	-	$ 51	$ 68	$ -	$0
50.07	Over Excavation/Undercut	CY	-	$ 58	$ 77	$ -	$0
50.08	Embankment (Common Borrow)	CY	-	$ 33	$ 44	$ -	$0
50.09	Embankment (Engineer Fill/Select Borrow)	CY	-	$ 40	$ 54	$ -	$0
50.10	Maintenance of Traffic	10%	1	$ -	$ -	$ -	$0
50.11	Stormwater Management	5%	1	$ -	$ -	$ -	$0
50.12	Grade Crossing - Concrete Panels	TF	40	$ 1,297	$ 1,734	$ 51,899	$69,368
50.13	Grade Crossing - Quad Gates	EA	1	$ 542,996	$ 725,769	$ 542,996	$725,769
50.14	Grade Crossing - Median Separator with Dual Gates	EA	-	$ 282,034	$ 376,966	$ -	$0
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	-	$ 21,720	$ 29,031	$ -	$0
50.16	Culvert Extension (less than 6-ft dia.)	EA	27	$ 19,572	$ 26,160	$ 528,436	$706,307
50.17	New Culvert (Jack and Bore)	EA	10	$ 150,000	$ 200,490	$ 1,500,000	$2,004,900

DC2RVA - NOV 3A - Minor (MP 62 to MP 48)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 1,587,000	$ 2,121,184	$ 1,587,000	$2,121,184
60.03	Temporary Acquisition	LS	1	$ 186,300	$ 249,009	$ 186,300	$249,009
60.04	Damages	LS	-	$ -	$ -	$ -	$0
60.05	Condemnation	LS	-	$ -	$ -	$ -	$0
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$0
60.10	Residential (Tenants)	LF	-	$ -	$ -	$ -	$0
60.11	Business (Owners and Tenants)	LF	-	$ -	$ -	$ -	$0
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	1,500	$ 47	$ 63	$ 70,500	$94,230
60.22	Water	LF	-	$ 261	$ 349	$ -	$0
60.23	Sanitary Sewer	LF	-	$ 395	$ 528	$ -	$0
60.24	Electric Distribution	LF	-	$ 297	$ 397	$ -	$0
60.25	Electric Transmission	LF	-	$ 5,000	$ 6,683	$ -	$0
60.26	Gas	LF	3,500	$ 750	$ 1,002	$ 2,625,000	$3,508,575
60.27	Major Utility Facility Relocations	LF	-	$ 250,000	$ 334,150	$ -	$0
					Subtotal	$ 125,600,199	$ 167,883,320
					6% Professional services	$ 7,536,012	$ 10,072,999
					35% Contingency	$ 46,597,674	$ 62,284,712
					Project Total	**$ 179,733,885**	**$ 240,241,030**

DC2RVA - NOV 3B - Add Main Track (MP 62 to MP 48)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	45,957	$ 395	$ 529	$ 18,153,015	$24,293,771
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	11,981	$ 359	$ 479	$ 4,301,179	$5,744,652
10.03	No. 10 Turnout	EA	-	$ 182,505	$ 243,936	$ -	$0
10.04	No. 15 Turnout	EA	-	$ 365,010	$ 487,873	$ -	$0
10.05	No. 20 Turnout	EA	13	$ 434,684	$ 581,012	$ 5,650,892	$7,553,154
10.06	Diamond Crossing	EA	-	$ 470,056	$ 628,277	$ -	$0
10.07	Turnout Removal	EA	4	$ 33,228	$ 44,413	$ 132,912	$177,651
10.08	Track shift/realign	TF	31,536	$ 139	$ 186	$ 4,383,504	$5,863,196
10.09	Track removal	TF	14,209	$ 40	$ 53	$ 568,360	$750,426
10.1	Signals & Communications (from CHSR)	MI	8	$ 2,740,000	$ 3,662,284	$ 21,920,000	$29,298,272
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	733	$ 17,425	$ 23,290	$ 12,772,162	$17,071,272
20.02	Rail Bridge (New Double Parallel)	BF	-	$ 33,977	$ 45,414	$ -	$0
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF	-	$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF	-	$ 70,863	$ 94,716	$ -	$0
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF	-	$ 75,023	$ 100,275	$ -	$0
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF	-	$ 44,341	$ 59,266	$ -	$0
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF	-	$ 25,271	$ 33,777	$ -	$0
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF	-	$ 32,661	$ 43,654	$ -	$0
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF	-	$ 35,569	$ 47,541	$ -	$0
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF		$ 28,447	$ 38,022	$ -	$0
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	840	$ 37,159	$ 49,666	$ 31,213,366	$41,719,785
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	-	$ 29,370	$ 39,257	$ -	$0
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF	-	$ 25,266	$ 33,771	$ -	$0
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF	-	$ 25,124	$ 33,580	$ -	$0
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	-	$ 35,927	$ 48,020	$ -	$0
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF	-	$ 22,611	$ 30,222	$ -	$0
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF	-	$ 24,845	$ 33,208	$ -	$0
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF	-	$ 37,661	$ 50,338	$ -	$0
20.19	Restore Track on Downtown Richmond Viaduct	BF	250	$ 7,986	$ 10,675	$ 1,996,500	$2,668,750
20.20	Overhead Structures - New (NOV)	SF	111,905	$ 721	$ 964	$ 80,683,505	$107,876,420
20.21	Overhead Structures - New (CEN/RIC)	SF	-	$ 624	$ 834	$ -	$0
20.22	James River Floodwall Penetrations	EA	-	$ 103,737	$ 138,654	$ -	$0
20.23	Pedestrian bridges - Trails	BF	-	$ 18,959	$ 25,340	$ -	$0
20.24	Drainage Structures - over 6'	EA	29	$ 226,101	$ 302,207	$ 6,556,934	$8,763,998
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	14,384	$ 177	$ 237	$ 2,551,805	$3,410,742
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	475	$ 222	$ 297	$ 105,441	$140,932
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	10,915	$ 147	$ 196	$ 1,601,652	$2,140,768
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	16,232	$ 279	$ 373	$ 4,529,299	$6,053,862
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	-	$ 73	$ 97	$ -	$0
20.30	Crashwalls	LF	90	$ 4,953	$ 6,620	$ 445,779	$595,828
30	**Stations**						
30.01	Station Building- Small	SF	-	$ 305	$ 408	$ -	$0
30.02	Station Building - Medium	SF	6,800	$ 301	$ 403	$ 2,049,489	$2,739,347
30.03	Station Building - Large	SF	-	$ 298	$ 398	$ -	$0
30.04	Main Street Station Upgrade - med	SF	-	$ 189	$ 253	$ -	$0
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$0
30.06	Platforms - New (Passenger Only)	SF	-	$ 46	$ 62	$ -	$0
30.07	Platforms - New (Maintenance Only)	SF	-	$ 36	$ 48	$ -	$0
30.08	Platforms - Expansion	SF	33,150	$ 38	$ 51	$ 1,262,331	$1,687,232
30.09	Platforms - New (Passenger With Service)	SF	-	$ 50	$ 66	$ -	$0
30.10	Vertical Access	EA	1	$ 150,000	$ 200,490	$ 150,000	$200,490
30.11	Ped Bridge - For Stations	BF	-	$ 29,442	$ 39,794	$ -	$0
30.12	Ped Tunnel	LS	1	$ 332,254	$ 444,090	$ 332,254	$444,090
30.13	Parking - Structure	Stall	225	$ 33,256	$ 44,449	$ 7,482,488	$10,001,093
30.14	Parking - Surface lot	Stall	29	$ 2,783	$ 3,720	$ 80,709	$107,876
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	66	$ 19,909	$ 26,611	$ 1,311,427	$1,752,853
40.02	Excavation (and Disposal)	CY	259,318	$ 49	$ 65	$ 12,609,733	$16,854,169
40.03	Over Excavation/Undercut	CY	175,366	$ 55	$ 74	$ 9,664,431	$12,917,479
40.04	Embankment (Common Borrow)	CY	15,838	$ 32	$ 42	$ 499,312	$667,380
40.05	Embankment (Engineer Fill/Select Borrow)	CY	175,366	$ 38	$ 51	$ 6,694,040	$8,947,254
40.06	Subballast	Ton	42,107	$ 44	$ 58	$ 1,842,765	$2,463,040
50	**Roadway**						
50.01	Asphalt Concrete	SY	28,715	$ 141	$ 189	$ 4,056,282	$5,421,627
50.02	Curb & Gutter	LF	4,268	$ 56	$ 75	$ 239,706	$320,392
50.03	Concrete Median	LF	592	$ 114	$ 152	$ 67,505	$90,228
50.04	Concrete Sidewalk	SF	1,694	$ 12	$ 16	$ 20,181	$26,975
50.05	Clearing and Grubbing	Acre	10	$ 20,905	$ 27,941	$ 209,045	$279,410
50.06	Excavation (and Disposal)	CY	6,154	$ 51	$ 68	$ 314,210	$419,973
50.07	Over Excavation/Undercut	CY	16,419	$ 58	$ 77	$ 950,095	$1,269,897
50.08	Embankment (Common Borrow)	CY	109,691	$ 33	$ 44	$ 3,635,936	$4,859,793
50.09	Embankment (Engineer Fill/Select Borrow)	CY	16,419	$ 40	$ 54	$ 658,679	$880,390
50.10	Maintenance of Traffic	10%	1	$ 1,015,165	$ 1,356,869	$ 1,015,165	$1,356,869
50.11	Stormwater Management	5%	1	$ 507,583	$ 678,435	$ 507,583	$678,435
50.12	Grade Crossing - Concrete Panels	TF	40	$ 1,297	$ 1,734	$ 51,899	$69,368
50.13	Grade Crossing - Quad Gates	EA	1	$ 542,996	$ 725,769	$ 542,996	$725,769
50.14	Grade Crossing - Median Separator with Dual Gates	EA	-	$ 282,034	$ 376,966	$ -	$0
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	-	$ 21,720	$ 29,031	$ -	$0
50.16	Culvert Extension (less than 6-ft dia.)	EA	181	$ 19,572	$ 26,160	$ 3,542,476	$4,734,873
50.17	New Culvert (Jack and Bore)	EA	10	$ 150,000	$ 200,490	$ 1,500,000	$2,004,900

DC2RVA - NOV 3B - Add Main Track (MP 62 to MP 48)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 2,642,600	$ 3,532,099	$ 2,642,600	$3,532,099
60.03	Temporary Acquisition	LS	1	$ 351,700	$ 470,082	$ 351,700	$470,082
60.04	Damages	LS	1	$ 445,000	$ 594,787	$ 445,000	$594,787
60.05	Condemnation	LS	-	$ -	$ -	$ -	$0
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$0
60.10	Residential (Tenants)	LF	-	$ -	$ -	$ -	$0
60.11	Business (Owners and Tenants)	LF	-	$ -	$ -	$ -	$0
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	1,500	$ 47	$ 63	$ 70,500	$94,230
60.22	Water	LF	-	$ 261	$ 349	$ -	$0
60.23	Sanitary Sewer	LF	-	$ 395	$ 528	$ -	$0
60.24	Electric Distribution	LF	-	$ 297	$ 397	$ -	$0
60.25	Electric Transmission	LF	-	$ 5,000	$ 6,683	$ -	$0
60.26	Gas	LF	3,500	$ 750	$ 1,002	$ 2,625,000	$3,508,575
60.27	Major Utility Facility Relocations	LF	-	$ 250,000	$ 334,150	$ -	$0
					Subtotal	$ 264,991,844	$ 354,244,453
					6% Professional services	$ 15,899,511	$ 21,254,667
					35% Contingency	$ 98,311,974	$ 131,424,692
					Project Total	**$ 379,203,328**	**$ 506,923,813**

DC2RVA - NOV 3C - Fredericksburg Bypass (MP 62 to MP 48)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	142,282	$ 395	$ 529	$ 56,201,390	$75,213,054
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	-	$ 359	$ 479	$ -	$0
10.03	No. 10 Turnout	EA	-	$ 182,505	$ 243,936	$ -	$0
10.04	No. 15 Turnout	EA	-	$ 365,010	$ 487,873	$ -	$0
10.05	No. 20 Turnout	EA	33	$ 434,684	$ 581,012	$ 14,344,572	$19,173,392
10.06	Diamond Crossing	EA	-	$ 470,056	$ 628,277	$ -	$0
10.07	Turnout Removal	EA	6	$ 33,228	$ 44,413	$ 199,368	$266,476
10.08	Track shift/realign	TF	15,127	$ 139	$ 186	$ 2,102,653	$2,812,423
10.09	Track removal	TF	19,535	$ 40	$ 53	$ 781,400	$1,031,710
10.1	Signals & Communications (from CHSR)	MI	18	$ 2,740,000	$ 3,662,284	$ 49,320,000	$65,921,112
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	974	$ 17,425	$ 23,290	$ 16,971,468	$22,684,064
20.02	Rail Bridge (New Double Parallel)	BF	100	$ 33,977	$ 45,414	$ 3,397,697	$4,541,362
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF	-	$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF	-	$ 70,863	$ 94,716	$ -	$0
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF	-	$ 75,023	$ 100,275	$ -	$0
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF	-	$ 44,341	$ 59,266	$ -	$0
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF	-	$ 25,271	$ 33,777	$ -	$0
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF	-	$ 32,661	$ 43,654	$ -	$0
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF	-	$ 35,569	$ 47,541	$ -	$0
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF	550	$ 28,447	$ 38,022	$ 15,645,584	$20,911,888
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$0
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	675	$ 29,370	$ 39,257	$ 19,825,034	$26,498,141
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF	-	$ 25,266	$ 33,771	$ -	$0
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF	-	$ 25,124	$ 33,580	$ -	$0
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	-	$ 35,927	$ 48,020	$ -	$0
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF	-	$ 22,611	$ 30,222	$ -	$0
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF		$ 24,845	$ 33,208	$ -	$0
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF		$ 37,661	$ 50,338	$ -	$0
20.19	Restore Track on Downtown Richmond Viaduct	BF	250	$ 7,986	$ 10,675	$ 1,996,500	$2,668,750
20.20	Overhead Structures - New (NOV)	SF	145,254	$ 721	$ 964	$ 104,728,134	$140,024,856
20.21	Overhead Structures - New (CEN/RIC)	SF	-	$ 624	$ 834	$ -	$0
20.22	James River Floodwall Penetrations	EA	-	$ 103,737	$ 138,654	$ -	$0
20.23	Pedestrian bridges - Trails	BF	-	$ 18,959	$ 25,340	$ -	$0
20.24	Drainage Structures - over 6'	EA	10	$ 226,101	$ 302,207	$ 2,261,012	$3,022,068
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	9,557	$ 177	$ 237	$ 1,695,467	$2,266,161
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	24,615	$ 222	$ 297	$ 5,464,040	$7,303,236
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	13,474	$ 147	$ 196	$ 1,977,156	$2,642,667
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	21,355	$ 279	$ 373	$ 5,958,797	$7,964,528
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	-	$ 73	$ 97	$ -	$0
20.30	Crashwalls	LF	90	$ 4,953	$ 6,620	$ 445,779	$595,828
30	**Stations**						
30.01	Station Building- Small	SF	-	$ 305	$ 408	$ -	$0
30.02	Station Building - Medium	SF	6,800	$ 301	$ 403	$ 2,049,489	$2,739,347
30.03	Station Building - Large	SF		$ 298	$ 398	$ -	$0
30.04	Main Street Station Upgrade - med	SF		$ 189	$ 253	$ -	$0
30.05	Main Street Station Upgrade - Large	SF		$ 186	$ 248	$ -	$0
30.06	Platforms - New (Passenger Only)	SF	-	$ 46	$ 62	$ -	$0
30.07	Platforms - New (Maintenance Only)	SF	-	$ 36	$ 48	$ -	$0
30.08	Platforms - Expansion	SF	25,500	$ 38	$ 51	$ 971,024	$1,297,870
30.09	Platforms - New (Passenger With Service)	SF	-	$ 50	$ 66	$ -	$0
30.10	Vertical Access	EA	1	$ 150,000	$ 200,490	$ 150,000	$200,490
30.11	Ped Bridge - For Stations	BF	-	$ 29,442	$ 39,794	$ -	$0
30.12	Ped Tunnel	LS	1	$ 332,254	$ 444,090	$ 332,254	$444,090
30.13	Parking - Structure	Stall	225	$ 33,256	$ 44,449	$ 7,482,488	$10,001,093
30.14	Parking - Surface lot	Stall	29	$ 2,783	$ 3,720	$ 80,709	$107,876
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	189	$ 19,909	$ 26,611	$ 3,756,092	$5,020,393
40.02	Excavation (and Disposal)	CY	2,477,179	$ 49	$ 65	$ 120,456,606	$161,002,300
40.03	Over Excavation/Undercut	CY	245,277	$ 55	$ 74	$ 13,517,231	$18,067,130
40.04	Embankment (Common Borrow)	CY	311,858	$ 32	$ 42	$ 9,831,697	$13,141,046
40.05	Embankment (Engineer Fill/Select Borrow)	CY	245,277	$ 38	$ 51	$ 9,362,670	$12,514,145
40.06	Subballast	Ton	96,729	$ 44	$ 58	$ 4,233,236	$5,658,143
50	**Roadway**						
50.01	Asphalt Concrete	SY	42,541	$ 141	$ 189	$ 6,009,344	$8,032,089
50.02	Curb & Gutter	LF	4,181	$ 56	$ 75	$ 234,820	$313,861
50.03	Concrete Median	LF	519	$ 114	$ 152	$ 59,181	$79,102
50.04	Concrete Sidewalk	SF	2,471	$ 12	$ 16	$ 29,438	$39,347
50.05	Clearing and Grubbing	Acre	17	$ 20,905	$ 27,941	$ 355,377	$474,997
50.06	Excavation (and Disposal)	CY	25,176	$ 51	$ 68	$ 1,285,432	$1,718,109
50.07	Over Excavation/Undercut	CY	35,696	$ 58	$ 77	$ 2,065,569	$2,760,840
50.08	Embankment (Common Borrow)	CY	143,793	$ 33	$ 44	$ 4,766,318	$6,370,661
50.09	Embankment (Engineer Fill/Select Borrow)	CY	35,696	$ 40	$ 54	$ 1,432,012	$1,914,028
50.10	Maintenance of Traffic	0.1	1	$ 1,623,750	$ 2,170,304	$ 1,623,750	$2,170,304
50.11	Stormwater Management	0.05	1	$ 811,875	$ 1,085,152	$ 811,875	$1,085,152
50.12	Grade Crossing - Concrete Panels	TF	400	$ 1,297	$ 1,734	$ 518,988	$693,679
50.13	Grade Crossing - Quad Gates	EA	3	$ 542,996	$ 725,769	$ 1,357,490	$1,814,422
50.14	Grade Crossing - Median Separator with Dual Gates	EA	3	$ 282,034	$ 376,966	$ 846,102	$1,130,899
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	4	$ 21,720	$ 29,031	$ 86,879	$116,123
50.16	Culvert Extension (less than 6-ft dia.)	EA	18	$ 19,572	$ 26,160	$ 352,290	$470,871
50.17	New Culvert (Jack and Bore)	EA	2	$ 150,000	$ 200,490	$ 300,000	$400,980

DC2RVA - NOV 3C - Fredericksburg Bypass (MP 62 to MP 48)								
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 951,200	$ 1,271,374	$ 951,200	$1,271,374
60.03	Temporary Acquisition	LS	1	$ 183,400	$ 245,132	$ 183,400	$245,132
60.04	Damages	LS	1	$ 5,412,600	$ 7,234,481	$ 5,412,600	$7,234,481
60.05	Condemnation	LS	1	$ 471,300	$ 629,940	$ 471,300	$629,940
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$0
60.10	Residential (Tenants)	LF	1	$ 2,711,600	$ 3,624,325	$ 2,711,600	$3,624,325
60.11	Business (Owners and Tenants)	LF	1	$ 500,000	$ 668,300	$ 500,000	$668,300
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	1,500	$ 47	$ 63	$ 70,500	$94,230
60.22	Water	LF	-	$ 261	$ 349	$ -	$0
60.23	Sanitary Sewer	LF	-	$ 395	$ 528	$ -	$0
60.24	Electric Distribution	LF	-	$ 297	$ 397	$ -	$0
60.25	Electric Transmission	LF	-	$ 5,000	$ 6,683	$ -	$0
60.26	Gas	LF	4,000	$ 750	$ 1,002	$ 3,000,000	$4,009,800
60.27	Major Utility Facility Relocations	LF	-	$ 250,000	$ 334,150	$ -	$0
					Subtotal	$ 510,975,013	$ 683,098,684
					6% Professional services	$ 30,658,501	$ 40,985,921
					35% Contingency	$ 189,571,730	$ 253,429,612
					Project Total	**$ 731,205,243**	**$ 977,514,217**

DC2RVA - CEN 4A - Add Main Track (MP 48 to MP 19)							
	ITEM DESCRIPTION	UNIT	QUANTITY	2016 UNIT COST	2025 UNIT COST	2016 TOTAL COST	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	153,150	$ 395	$ 529	$ 60,494,250	$80,958,092
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	230,750	$ 359	$ 479	$ 82,839,250	$110,640,047
10.03	No. 10 Turnout	EA		$ 182,505	$ 243,936	$ -	$0
10.04	No. 15 Turnout	EA		$ 365,010	$ 487,873	$ -	$0
10.05	No. 20 Turnout	EA	18	$ 434,684	$ 581,012	$ 7,824,312	$10,458,214
10.06	Diamond Crossing	EA	1	$ 470,056	$ 628,277	$ 470,056	$628,277
10.07	Turnout Removal	EA	2	$ 33,228	$ 44,413	$ 66,456	$88,825
10.08	Track shift/realign	TF	84,224	$ 139	$ 186	$ 11,707,136	$15,658,986
10.09	Track removal	TF	2,486	$ 40	$ 53	$ 99,440	$131,294
10.1	Signals & Communications (from CHSR)	MI	29	$ 2,740,000	$ 3,662,284	$ 79,460,000	$106,206,236
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	98	$ 17,425	$ 23,290	$ 1,707,601	$2,282,380
20.02	Rail Bridge (New Double Parallel)	BF		$ 33,977	$ 45,414	$ -	$0
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF		$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF		$ 70,863	$ 94,716	$ -	$0
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF		$ 75,023	$ 100,275	$ -	$0
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF		$ 44,341	$ 59,266	$ -	$0
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF		$ 25,271	$ 33,777	$ -	$0
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF		$ 32,661	$ 43,654	$ -	$0
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF		$ 35,569	$ 47,541	$ -	$0
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF		$ 28,447	$ 38,022	$ -	$0
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF		$ 37,159	$ 49,666	$ -	$0
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	-	$ 29,370	$ 39,257	$ -	$0
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF	315	$ 25,266	$ 33,771	$ 7,958,852	$10,637,801
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF	243	$ 25,124	$ 33,580	$ 6,105,060	$8,160,023
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	-	$ 35,927	$ 48,020	$ -	$0
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF	212	$ 22,611	$ 30,222	$ 4,793,603	$6,407,130
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF		$ 24,845	$ 33,208	$ -	$0
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF		$ 37,661	$ 50,338	$ -	$0
20.19	Restore Track on Downtown Richmond Viaduct	BF		$ 7,986	$ 10,675	$ -	$0
20.20	Overhead Structures - New (NOV)	SF		$ 721	$ 964	$ -	$0
20.21	Overhead Structures - New (CEN/RIC)	SF		$ 624	$ 834	$ -	$0
20.22	James River Floodwall Penetrations	EA	-	$ 103,737	$ 138,654	$ -	$0
20.23	Pedestrian bridges - Trails	BF		$ 18,959	$ 25,340	$ -	$0
20.24	Drainage Structures - over 6'	EA	8	$ 226,101	$ 302,207	$ 1,808,809	$2,417,655
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	-	$ 177	$ 237	$ -	$0
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	-	$ 222	$ 297	$ -	$0
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	12,750	$ 147	$ 196	$ 1,870,918	$2,500,669
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	51,037	$ 279	$ 373	$ 14,241,120	$19,034,681
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	-	$ 73	$ 97	$ -	$0
20.30	Crashwalls	LF	1,080	$ 4,953	$ 6,620	$ 5,349,346	$7,149,935
30	**Stations**						
30.01	Station Building- Small	SF	-	$ 305	$ 408	$ -	$0
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$0
30.03	Station Building - Large	SF	-	$ 298	$ 398	$ -	$0
30.04	Main Street Station Upgrade - med	SF	-	$ 189	$ 253	$ -	$0
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$0
30.06	Platforms - New (Passenger Only)	SF	-	$ 46	$ 62	$ -	$0
30.07	Platforms - New (Maintenance Only)	SF	-	$ 36	$ 48	$ -	$0
30.08	Platforms - Expansion	SF	-	$ 38	$ 51	$ -	$0
30.09	Platforms - New (Passenger With Service)	SF	-	$ 50	$ 66	$ -	$0
30.10	Vertical Access	EA	-	$ 150,000	$ 200,490	$ -	$0
30.11	Ped Bridge - For Stations	BF	-	$ 29,442	$ 39,794	$ -	$0
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$0
30.13	Parking - Structure	Stall	-	$ 33,256	$ 44,449	$ -	$0
30.14	Parking - Surface lot	Stall	-	$ 2,783	$ 3,720	$ -	$0
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	70	$ 19,909	$ 26,611	$ 1,393,652	$1,862,756
40.02	Excavation (and Disposal)	CY	56,075	$ 49	$ 65	$ 2,726,732	$3,644,550
40.03	Over Excavation/Undercut	CY	136,400	$ 55	$ 74	$ 7,517,012	$10,047,239
40.04	Embankment (Common Borrow)	CY	212,700	$ 32	$ 42	$ 6,705,622	$8,962,734
40.05	Embankment (Engineer Fill/Select Borrow)	CY	136,400	$ 38	$ 51	$ 5,206,637	$6,959,190
40.06	Subballast	Ton	86,060	$ 44	$ 58	$ 3,766,319	$5,034,062
50	**Roadway**						
50.01	Asphalt Concrete	SY	2,700	$ 141	$ 189	$ 381,402	$509,782
50.02	Curb & Gutter	LF	1,850	$ 56	$ 75	$ 103,903	$138,876
50.03	Concrete Median	LF		$ 114	$ 152	$ -	$0
50.04	Concrete Sidewalk	SF		$ 12	$ 16	$ -	$0
50.05	Clearing and Grubbing	Acre		$ 20,905	$ 27,941	$ -	$0
50.06	Excavation (and Disposal)	CY	6,250	$ 51	$ 68	$ 319,112	$426,525
50.07	Over Excavation/Undercut	CY		$ 58	$ 77	$ -	$0
50.08	Embankment (Common Borrow)	CY	2,500	$ 33	$ 44	$ 82,868	$110,761
50.09	Embankment (Engineer Fill/Select Borrow)	CY		$ 40	$ 54	$ -	$0
50.10	Maintenance of Traffic	0.1	1	$ 88,729	$ 118,595	$ 88,729	$118,595
50.11	Stormwater Management	0.05	1	$ 44,365	$ 59,298	$ 44,365	$59,298
50.12	Grade Crossing - Concrete Panels	TF	480	$ 1,297	$ 1,734	$ 622,785	$832,415
50.13	Grade Crossing - Quad Gates	EA	10	$ 542,996	$ 725,769	$ 5,429,962	$7,257,687
50.14	Grade Crossing - Median Separator with Dual Gates	EA	3	$ 282,034	$ 376,966	$ 846,102	$1,130,899
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	20	$ 21,720	$ 29,031	$ 434,397	$580,615
50.16	Culvert Extension (less than 6-ft dia.)	EA		$ 19,572	$ 26,160	$ -	$0
50.17	New Culvert (Jack and Bore)	EA		$ 150,000	$ 200,490	$ -	$0

DC2RVA - CEN 4A - Add Main Track (MP 48 to MP 19)							
	ITEM DESCRIPTION	UNIT	QUANTITY	2016 UNIT COST	2025 UNIT COST	2016 TOTAL COST	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 171,500	$ 229,227	$ 171,500	$229,227
60.03	Temporary Acquisition	LS	1	$ 129,300	$ 172,822	$ 129,300	$172,822
60.04	Damages	LS	-	$ -	$ -	$ -	$0
60.05	Condemnation	LS	-	$ -	$ -	$ -	$0
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$0
60.10	Residential (Tenants)	LF	-	$ -	$ -	$ -	$0
60.11	Business (Owners and Tenants)	LF	-	$ -	$ -	$ -	$0
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	153,000	$ 47	$ 63	$ 7,191,000	$9,611,491
60.22	Water	LF	1,160	$ 261	$ 349	$ 302,760	$404,669
60.23	Sanitary Sewer	LF	-	$ 395	$ 528	$ -	$0
60.24	Electric Distribution	LF	1,875	$ 297	$ 397	$ 556,875	$744,319
60.25	Electric Transmission	LF	-	$ 5,000	$ 6,683	$ -	$0
60.26	Gas	LF	7,275	$ 750	$ 1,002	$ 5,456,250	$7,292,824
60.27	Major Utility Facility Relocations	LF	-	$ 250,000	$ 334,150	$ -	$0
					Subtotal	$ 336,273,492	$ 449,491,582
					6% Professional services	$ 20,176,410	$ 26,969,495
					35% Contingency	$ 124,757,466	$ 166,761,377
					Project Total	**$ 481,207,368**	**$ 643,222,454**

DC2RVA - CEN 5A - Minor (MP 19 to MP 9)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	41,600	$ 395	$ 529	$ 16,432,000	$21,990,575
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	82,155	$ 359	$ 479	$ 29,493,645	$39,391,693
10.03	No. 10 Turnout	EA	1	$ 182,505	$ 243,936	$ 182,505	$243,936
10.04	No. 15 Turnout	EA	-	$ 365,010	$ 487,873	$ -	$0
10.05	No. 20 Turnout	EA	8	$ 434,684	$ 581,012	$ 3,477,472	$4,648,095
10.06	Diamond Crossing	EA	-	$ 470,056	$ 628,277	$ -	$0
10.07	Turnout Removal	EA	1	$ 33,228	$ 44,413	$ 33,228	$44,413
10.08	Track shift/realign	TF	1,385	$ 139	$ 186	$ 192,515	$257,500
10.09	Track removal	TF	1,731	$ 40	$ 53	$ 69,240	$91,420
10.1	Signals & Communications (from CHSR)	MI	10	$ 2,740,000	$ 3,662,284	$ 27,400,000	$36,622,840
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	106	$ 17,425	$ 23,290	$ 1,846,998	$2,468,697
20.02	Rail Bridge (New Double Parallel)	BF	-	$ 33,977	$ 45,414	$ -	$0
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF	-	$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF	-	$ 70,863	$ 94,716	$ -	$0
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF	-	$ 75,023	$ 100,275	$ -	$0
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF	-	$ 44,341	$ 59,266	$ -	$0
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF	-	$ 25,271	$ 33,777	$ -	$0
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF	-	$ 32,661	$ 43,654	$ -	$0
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF	-	$ 35,569	$ 47,541	$ -	$0
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF	-	$ 28,447	$ 38,022	$ -	$0
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$0
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	-	$ 29,370	$ 39,257	$ -	$0
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF	-	$ 25,266	$ 33,771	$ -	$0
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF	-	$ 25,124	$ 33,580	$ -	$0
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	499	$ 35,927	$ 48,020	$ 17,927,522	$23,961,926
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF	-	$ 22,611	$ 30,222	$ -	$0
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF	-	$ 24,845	$ 33,208	$ -	$0
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF	-	$ 37,661	$ 50,338	$ -	$0
20.19	Restore Track on Downtown Richmond Viaduct	BF	-	$ 7,986	$ 10,675	$ -	$0
20.20	Overhead Structures - New (NOV)	SF	-	$ 721	$ 964	$ -	$0
20.21	Overhead Structures - New (CEN/RIC)	SF	20,205	$ 624	$ 834	$ 12,607,920	$16,850,970
20.22	James River Floodwall Penetrations	EA	-	$ 103,737	$ 138,654	$ -	$0
20.23	Pedestrian bridges - Trails	BF	-	$ 18,959	$ 25,340	$ -	$0
20.24	Drainage Structures - over 6'	EA	4	$ 226,101	$ 302,207	$ 904,405	$1,208,827
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	-	$ 177	$ 237	$ -	$0
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	-	$ 222	$ 297	$ -	$0
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	-	$ 147	$ 196	$ -	$0
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	-	$ 279	$ 373	$ -	$0
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	50,150	$ 73	$ 97	$ 3,657,930	$4,889,190
20.30	Crashwalls	LF	480	$ 4,953	$ 6,620	$ 2,377,487	$3,177,749
30	**Stations**						
30.01	Station Building- Small	SF	2,300	$ 305	$ 408	$ 701,641	$937,813
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$0
30.03	Station Building - Large	SF	-	$ 298	$ 398	$ -	$0
30.04	Main Street Station Upgrade - med	SF	-	$ 189	$ 253	$ -	$0
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$0
30.06	Platforms - New (Passenger Only)	SF	-	$ 46	$ 62	$ -	$0
30.07	Platforms - New (Maintenance Only)	SF	-	$ 36	$ 48	$ -	$0
30.08	Platforms - Expansion	SF	25,500	$ 38	$ 51	$ 971,024	$1,297,870
30.09	Platforms - New (Passenger With Service)	SF	-	$ 50	$ 66	$ -	$0
30.10	Vertical Access	EA	3	$ 150,000	$ 200,490	$ 450,000	$601,470
30.11	Ped Bridge - For Stations	BF	940	$ 29,442	$ 39,794	$ 27,675,046	$37,406,048
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$0
30.13	Parking - Structure	Stall	-	$ 33,256	$ 44,449	$ -	$0
30.14	Parking - Surface lot	Stall	45	$ 2,783	$ 3,720	$ 125,238	$167,393
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	103	$ 19,909	$ 26,611	$ 2,052,265	$2,743,058
40.02	Excavation (and Disposal)	CY	14,105	$ 49	$ 65	$ 685,877	$916,743
40.03	Over Excavation/Undercut	CY	32,560	$ 55	$ 74	$ 1,794,384	$2,398,373
40.04	Embankment (Common Borrow)	CY	53,540	$ 32	$ 42	$ 1,687,913	$2,256,064
40.05	Embankment (Engineer Fill/Select Borrow)	CY		$ 38	$ 51	$ -	$0
40.06	Subballast	Ton	21,660	$ 44	$ 58	$ 947,925	$1,266,997
50	**Roadway**						
50.01	Asphalt Concrete	SY	45,521	$ 141	$ 189	$ 6,430,299	$8,594,738
50.02	Curb & Gutter	LF	4,465	$ 56	$ 75	$ 250,771	$335,180
50.03	Concrete Median	LF	-	$ 114	$ 152	$ -	$0
50.04	Concrete Sidewalk	SF	-	$ 12	$ 16	$ -	$0
50.05	Clearing and Grubbing	Acre	2	$ 20,905	$ 27,941	$ 41,809	$55,882
50.06	Excavation (and Disposal)	CY	15,640	$ 51	$ 68	$ 798,545	$1,067,335
50.07	Over Excavation/Undercut	CY	-	$ 58	$ 77	$ -	$0
50.08	Embankment (Common Borrow)	CY	126,000	$ 33	$ 44	$ 4,176,532	$5,582,353
50.09	Embankment (Engineer Fill/Select Borrow)	CY	-	$ 40	$ 54	$ -	$0
50.10	Maintenance of Traffic	0.1	1	$ 1,169,796	$ 1,563,549	$ 1,169,796	$1,563,549
50.11	Stormwater Management	0.05	1	$ 584,898	$ 781,775	$ 584,898	$781,775
50.12	Grade Crossing - Concrete Panels	TF	120	$ 1,297	$ 1,734	$ 155,696	$208,104
50.13	Grade Crossing - Quad Gates	EA	14	$ 542,996	$ 725,769	$ 7,601,947	$10,160,762
50.14	Grade Crossing - Median Separator with Dual Gates	EA	1	$ 282,034	$ 376,966	$ 282,034	$376,966
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	-	$ 21,720	$ 29,031	$ -	$0
50.16	Culvert Extension (less than 6-ft dia.)	EA	4	$ 19,572	$ 26,160	$ 78,287	$104,638
50.17	New Culvert (Jack and Bore)	EA	4	$ 150,000	$ 200,490	$ 600,000	$801,960

DC2RVA - CEN 5A - Minor (MP 19 to MP 9)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 1,829,200	$ 2,444,909	$ 1,829,200	$2,444,909
60.03	Temporary Acquisition	LS	1	$ 236,800	$ 316,507	$ 236,800	$316,507
60.04	Damages	LS	1	$ 884,000	$ 1,181,554	$ 884,000	$1,181,554
60.05	Condemnation	LS	1	$ 30,000	$ 40,098	$ 30,000	$40,098
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$0
60.10	Residential (Tenants)	LF	1	$ 20,000	$ 26,732	$ 20,000	$26,732
60.11	Business (Owners and Tenants)	LF	1	$ 80,000	$ 106,928	$ 80,000	$106,928
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	61,776	$ 47	$ 63	$ 2,903,472	$3,880,781
60.22	Water	LF	-	$ 261	$ 349	$ -	$0
60.23	Sanitary Sewer	LF	-	$ 395	$ 528	$ -	$0
60.24	Electric Distribution	LF	400	$ 297	$ 397	$ 118,800	$158,788
60.25	Electric Transmission	LF	-	$ 5,000	$ 6,683	$ -	$0
60.26	Gas	LF	600	$ 750	$ 1,002	$ 450,000	$601,470
60.27	Major Utility Facility Relocations	LF	-	$ 250,000	$ 334,150	$ -	$0
					Subtotal	$ 182,417,064	$ 244,230,669
					6% Professional services	$ 10,945,024	$ 14,653,840
					35% Contingency	$ 67,676,731	$ 90,609,578
					Project Total	**$ 261,038,819**	**$ 349,494,087**

DC2RVA - CEN 5A (Ashcake Station) - Minor (MP 19 to MP 9)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	41,600	$ 395	$ 529	$ 16,432,000	$21,990,575
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	82,155	$ 359	$ 479	$ 29,493,645	$39,391,693
10.03	No. 10 Turnout	EA	1	$ 182,505	$ 243,936	$ 182,505	$243,936
10.04	No. 15 Turnout	EA	-	$ 365,010	$ 487,873	$ -	$0
10.05	No. 20 Turnout	EA	8	$ 434,684	$ 581,012	$ 3,477,472	$4,648,095
10.06	Diamond Crossing	EA	-	$ 470,056	$ 628,277	$ -	$0
10.07	Turnout Removal	EA	1	$ 33,228	$ 44,413	$ 33,228	$44,413
10.08	Track shift/realign	TF	1,385	$ 139	$ 186	$ 192,515	$257,500
10.09	Track removal	TF	1,731	$ 40	$ 53	$ 69,240	$91,420
10.1	Signals & Communications (from CHSR)	MI	10	$ 2,740,000	$ 3,662,284	$ 27,400,000	$36,622,840
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	106	$ 17,425	$ 23,290	$ 1,846,998	$2,468,697
20.02	Rail Bridge (New Double Parallel)	BF	-	$ 33,977	$ 45,414	$ -	$0
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF	-	$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF	-	$ 70,863	$ 94,716	$ -	$0
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF	-	$ 75,023	$ 100,275	$ -	$0
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF	-	$ 44,341	$ 59,266	$ -	$0
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF	-	$ 25,271	$ 33,777	$ -	$0
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF	-	$ 32,661	$ 43,654	$ -	$0
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF	-	$ 35,569	$ 47,541	$ -	$0
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF	-	$ 28,447	$ 38,022	$ -	$0
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$0
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	-	$ 29,370	$ 39,257	$ -	$0
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF	-	$ 25,266	$ 33,771	$ -	$0
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF	-	$ 25,124	$ 33,580	$ -	$0
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	499	$ 35,927	$ 48,020	$ 17,927,522	$23,961,926
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF	-	$ 22,611	$ 30,222	$ -	$0
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF	-	$ 24,845	$ 33,208	$ -	$0
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF	-	$ 37,661	$ 50,338	$ -	$0
20.19	Restore Track on Downtown Richmond Viaduct	BF	-	$ 7,986	$ 10,675	$ -	$0
20.20	Overhead Structures - New (NOV)	SF	-	$ 721	$ 964	$ -	$0
20.21	Overhead Structures - New (CEN/RIC)	SF	20,205	$ 624	$ 834	$ 12,607,920	$16,850,970
20.22	James River Floodwall Penetrations	EA	-	$ 103,737	$ 138,654	$ -	$0
20.23	Pedestrian bridges - Trails	BF	-	$ 18,959	$ 25,340	$ -	$0
20.24	Drainage Structures - over 6'	EA	4	$ 226,101	$ 302,207	$ 904,405	$1,208,827
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	-	$ 177	$ 237	$ -	$0
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	-	$ 222	$ 297	$ -	$0
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	-	$ 147	$ 196	$ -	$0
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	-	$ 279	$ 373	$ -	$0
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	50,150	$ 73	$ 97	$ 3,657,930	$4,889,190
20.30	Crashwalls	LF	480	$ 4,953	$ 6,620	$ 2,377,487	$3,177,749
30	**Stations**						
30.01	Station Building- Small	SF	2,300	$ 305	$ 408	$ 701,641	$937,813
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$0
30.03	Station Building - Large	SF	-	$ 298	$ 398	$ -	$0
30.04	Main Street Station Upgrade - med	SF	-	$ 189	$ 253	$ -	$0
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$0
30.06	Platforms - New (Passenger Only)	SF	33,150	$ 46	$ 62	$ 1,537,002	$2,054,357
30.07	Platforms - New (Maintenance Only)	SF	-	$ 36	$ 48	$ -	$0
30.08	Platforms - Expansion	SF	-	$ 38	$ 51	$ -	$0
30.09	Platforms - New (Passenger With Service)	SF	-	$ 50	$ 66	$ -	$0
30.10	Vertical Access	EA	2	$ 150,000	$ 200,490	$ 300,000	$400,980
30.11	Ped Bridge - For Stations	BF	940	$ 29,442	$ 39,794	$ 27,675,046	$37,406,048
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$0
30.13	Parking - Structure	Stall	-	$ 33,256	$ 44,449	$ -	$0
30.14	Parking - Surface lot	Stall	45	$ 2,783	$ 3,720	$ 125,238	$167,393
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	103	$ 19,909	$ 26,611	$ 2,052,265	$2,743,058
40.02	Excavation (and Disposal)	CY	14,105	$ 49	$ 65	$ 685,877	$916,743
40.03	Over Excavation/Undercut	CY	32,560	$ 55	$ 74	$ 1,794,384	$2,398,373
40.04	Embankment (Common Borrow)	CY	53,540	$ 32	$ 42	$ 1,687,913	$2,256,064
40.05	Embankment (Engineer Fill/Select Borrow)	CY		$ 38	$ 51	$ -	$0
40.06	Subballast	Ton	21,660	$ 44	$ 58	$ 947,925	$1,266,997
50	**Roadway**						
50.01	Asphalt Concrete	SY	45,521	$ 141	$ 189	$ 6,430,299	$8,594,738
50.02	Curb & Gutter	LF	4,465	$ 56	$ 75	$ 250,771	$335,180
50.03	Concrete Median	LF	-	$ 114	$ 152	$ -	$0
50.04	Concrete Sidewalk	SF	-	$ 12	$ 16	$ -	$0
50.05	Clearing and Grubbing	Acre	2	$ 20,905	$ 27,941	$ 41,809	$55,882
50.06	Excavation (and Disposal)	CY	15,640	$ 51	$ 68	$ 798,545	$1,067,335
50.07	Over Excavation/Undercut	CY	-	$ 58	$ 77	$ -	$0
50.08	Embankment (Common Borrow)	CY	126,000	$ 33	$ 44	$ 4,176,532	$5,582,353
50.09	Embankment (Engineer Fill/Select Borrow)	CY	-	$ 40	$ 54	$ -	$0
50.10	Maintenance of Traffic	0.1	1	$ 1,169,796	$ 1,563,549	$ 1,169,796	$1,563,549
50.11	Stormwater Management	0.05	1	$ 584,898	$ 781,775	$ 584,898	$781,775
50.12	Grade Crossing - Concrete Panels	TF	120	$ 1,297	$ 1,734	$ 155,696	$208,104
50.13	Grade Crossing - Quad Gates	EA	14	$ 542,996	$ 725,769	$ 7,601,947	$10,160,762
50.14	Grade Crossing - Median Separator with Dual Gates	EA	1	$ 282,034	$ 376,966	$ 282,034	$376,966
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	-	$ 21,720	$ 29,031	$ -	$0
50.16	Culvert Extension (less than 6-ft dia.)	EA	4	$ 19,572	$ 26,160	$ 78,287	$104,638
50.17	New Culvert (Jack and Bore)	EA	4	$ 150,000	$ 200,490	$ 600,000	$801,960

DC2RVA - CEN 5A (Ashcake Station) - Minor (MP 19 to MP 9)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 1,829,200	$ 2,444,909	$ 1,829,200	$2,444,909
60.03	Temporary Acquisition	LS	1	$ 236,800	$ 316,507	$ 236,800	$316,507
60.04	Damages	LS	1	$ 884,000	$ 1,181,554	$ 884,000	$1,181,554
60.05	Condemnation	LS	1	$ 30,000	$ 40,098	$ 30,000	$40,098
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$0
60.10	Residential (Tenants)	LF	1	$ 20,000	$ 26,732	$ 20,000	$26,732
60.11	Business (Owners and Tenants)	LF	1	$ 80,000	$ 106,928	$ 80,000	$106,928
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	61,776	$ 47	$ 63	$ 2,903,472	$3,880,781
60.22	Water	LF	-	$ 261	$ 349	$ -	$0
60.23	Sanitary Sewer	LF	-	$ 395	$ 528	$ -	$0
60.24	Electric Distribution	LF	400	$ 297	$ 397	$ 118,800	$158,788
60.25	Electric Transmission	LF	-	$ 5,000	$ 6,683	$ -	$0
60.26	Gas	LF	600	$ 750	$ 1,002	$ 450,000	$601,470
60.27	Major Utility Facility Relocations	LF	-	$ 250,000	$ 334,150	$ -	$0
					Subtotal	$ 182,833,043	$ 244,786,666
					6% Professional services	$ 10,969,983	$ 14,687,200
					35% Contingency	$ 67,831,059	$ 90,815,853
					Project Total	**$ 261,634,084**	**$ 350,289,719**

DC2RVA - CEN 5B - Add Main Track (MP 19 to MP 9)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	56,910	$ 395	$ 529	$ 22,479,450	$30,083,741
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	84,595	$ 359	$ 479	$ 30,369,605	$40,561,624
10.03	No. 10 Turnout	EA	1	$ 182,505	$ 243,936	$ 182,505	$243,936
10.04	No. 15 Turnout	EA	-	$ 365,010	$ 487,873	$ -	$0
10.05	No. 20 Turnout	EA	12	$ 434,684	$ 581,012	$ 5,216,208	$6,972,142
10.06	Diamond Crossing	EA	-	$ 470,056	$ 628,277	$ -	$0
10.07	Turnout Removal	EA	1	$ 33,228	$ 44,413	$ 33,228	$44,413
10.08	Track shift/realign	TF	3,530	$ 139	$ 186	$ 490,670	$656,300
10.09	Track removal	TF	2,409	$ 40	$ 53	$ 96,360	$127,228
10.1	Signals & Communications (from CHSR)	MI	10	$ 2,740,000	$ 3,662,284	$ 27,400,000	$36,622,840
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	106	$ 17,425	$ 23,290	$ 1,846,998	$2,468,697
20.02	Rail Bridge (New Double Parallel)	BF		$ 33,977	$ 45,414	$ -	$0
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF		$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF		$ 70,863	$ 94,716	$ -	$0
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF		$ 75,023	$ 100,275	$ -	$0
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF		$ 44,341	$ 59,266	$ -	$0
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF		$ 25,271	$ 33,777	$ -	$0
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF		$ 32,661	$ 43,654	$ -	$0
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF		$ 35,569	$ 47,541	$ -	$0
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF		$ 28,447	$ 38,022	$ -	$0
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$0
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF		$ 29,370	$ 39,257	$ -	$0
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF		$ 25,266	$ 33,771	$ -	$0
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF		$ 25,124	$ 33,580	$ -	$0
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	499	$ 35,927	$ 48,020	$ 17,927,522	$23,961,926
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF		$ 22,611	$ 30,222	$ -	$0
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF		$ 24,845	$ 33,208	$ -	$0
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF		$ 37,661	$ 50,338	$ -	$0
20.19	Restore Track on Downtown Richmond Viaduct	BF	-	$ 7,986	$ 10,675	$ -	$0
20.20	Overhead Structures - New (NOV)	SF		$ 721	$ 964	$ -	$0
20.21	Overhead Structures - New (CEN/RIC)	SF	20,205	$ 624	$ 834	$ 12,607,920	$16,850,970
20.22	James River Floodwall Penetrations	EA	-	$ 103,737	$ 138,654	$ -	$0
20.23	Pedestrian bridges - Trails	BF		$ 18,959	$ 25,340	$ -	$0
20.24	Drainage Structures - over 6'	EA	4	$ 226,101	$ 302,207	$ 904,405	$1,208,827
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF		$ 177	$ 237	$ -	$0
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF		$ 222	$ 297	$ -	$0
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	-	$ 147	$ 196	$ -	$0
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	-	$ 279	$ 373	$ -	$0
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	50,150	$ 73	$ 97	$ 3,657,930	$4,889,190
20.30	Crashwalls	LF	480	$ 4,953	$ 6,620	$ 2,377,487	$3,177,749
30	**Stations**						
30.01	Station Building- Small	SF	2,300	$ 305	$ 408	$ 701,641	$937,813
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$0
30.03	Station Building - Large	SF	-	$ 298	$ 398	$ -	$0
30.04	Main Street Station Upgrade - med	SF	-	$ 189	$ 253	$ -	$0
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$0
30.06	Platforms - New (Passenger Only)	SF	-	$ 46	$ 62	$ -	$0
30.07	Platforms - New (Maintenance Only)	SF	-	$ 36	$ 48	$ -	$0
30.08	Platforms - Expansion	SF	29,750	$ 38	$ 51	$ 1,132,861	$1,514,182
30.09	Platforms - New (Passenger With Service)	SF	-	$ 50	$ 66	$ -	$0
30.10	Vertical Access	EA	3	$ 150,000	$ 200,490	$ 450,000	$601,470
30.11	Ped Bridge - For Stations	BF	940	$ 29,442	$ 39,794	$ 27,675,046	$37,406,048
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$0
30.13	Parking - Structure	Stall	-	$ 33,256	$ 44,449	$ -	$0
30.14	Parking - Surface lot	Stall	45	$ 2,783	$ 3,720	$ 125,238	$167,393
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	107	$ 19,909	$ 26,611	$ 2,120,343	$2,834,050
40.02	Excavation (and Disposal)	CY	48,105	$ 49	$ 65	$ 2,339,179	$3,126,547
40.03	Over Excavation/Undercut	CY	32,560	$ 55	$ 74	$ 1,794,384	$2,398,373
40.04	Embankment (Common Borrow)	CY	53,540	$ 32	$ 42	$ 1,687,913	$2,256,064
40.05	Embankment (Engineer Fill/Select Borrow)	CY		$ 38	$ 51	$ -	$0
40.06	Subballast	Ton	43,850	$ 44	$ 58	$ 1,919,046	$2,564,997
50	**Roadway**						
50.01	Asphalt Concrete	SY	58,640	$ 141	$ 189	$ 8,283,490	$11,071,712
50.02	Curb & Gutter	LF	12,823	$ 56	$ 75	$ 720,186	$962,601
50.03	Concrete Median	LF		$ 114	$ 152	$ -	$0
50.04	Concrete Sidewalk	SF	-	$ 12	$ 16	$ -	$0
50.05	Clearing and Grubbing	Acre	2	$ 20,905	$ 27,941	$ 41,809	$55,882
50.06	Excavation (and Disposal)	CY	20,813	$ 51	$ 68	$ 1,062,667	$1,420,361
50.07	Over Excavation/Undercut	CY		$ 58	$ 77	$ -	$0
50.08	Embankment (Common Borrow)	CY	126,000	$ 33	$ 44	$ 4,176,532	$5,582,353
50.09	Embankment (Engineer Fill/Select Borrow)	CY		$ 40	$ 54	$ -	$0
50.10	Maintenance of Traffic	0.1	1	$ 1,428,469	$ 1,909,291	$ 1,428,469	$1,909,291
50.11	Stormwater Management	0.05	1	$ 714,235	$ 954,646	$ 714,235	$954,646
50.12	Grade Crossing - Concrete Panels	TF	340	$ 1,297	$ 1,734	$ 441,140	$589,627
50.13	Grade Crossing - Quad Gates	EA	14	$ 542,996	$ 725,769	$ 7,601,947	$10,160,762
50.14	Grade Crossing - Median Separator with Dual Gates	EA	1	$ 282,034	$ 376,966	$ 282,034	$376,966
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA		$ 21,720	$ 29,031	$ -	$0
50.16	Culvert Extension (less than 6-ft dia.)	EA	4	$ 19,572	$ 26,160	$ 78,287	$104,638
50.17	New Culvert (Jack and Bore)	EA	4	$ 150,000	$ 200,490	$ 600,000	$801,960

DC2RVA - CEN 5B - Add Main Track (MP 19 to MP 9)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 2,407,400	$ 3,217,731	$ 2,407,400	$3,217,731
60.03	Temporary Acquisition	LS	1	$ 309,200	$ 413,277	$ 309,200	$413,277
60.04	Damages	LS	1	$ 156,000	$ 208,510	$ 156,000	$208,510
60.05	Condemnation	LS	1	$ 30,000	$ 40,098	$ 30,000	$40,098
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$0
60.10	Residential (Tenants)	LF	1	$ 20,000	$ 26,732	$ 20,000	$26,732
60.11	Business (Owners and Tenants)	LF	1	$ 80,000	$ 106,928	$ 80,000	$106,928
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	90,288	$ 47	$ 63	$ 4,243,536	$5,671,910
60.22	Water	LF	5,000	$ 261	$ 349	$ 1,305,000	$1,744,263
60.23	Sanitary Sewer	LF	600	$ 395	$ 528	$ 237,000	$316,774
60.24	Electric Distribution	LF	2,825	$ 297	$ 397	$ 839,025	$1,121,441
60.25	Electric Transmission	LF	-	$ 5,000	$ 6,683	$ -	$0
60.26	Gas	LF	2,800	$ 750	$ 1,002	$ 2,100,000	$2,806,860
60.27	Major Utility Facility Relocations	LF	-	$ 250,000	$ 334,150	$ -	$0
					Subtotal	$ 202,693,893	$ 271,341,843
					6% Professional services	$ 12,161,634	$ 16,280,511
					35% Contingency	$ 75,199,434	$ 100,667,824
					Project Total	**$ 290,054,961**	**$ 388,290,177**

DC2RVA - CEN 5B (Ashcake Station) - Add Main Track (MP 19 to MP 9)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	56,910	$ 395	$ 529	$ 22,479,450	$30,083,741
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	84,595	$ 359	$ 479	$ 30,369,605	$40,561,624
10.03	No. 10 Turnout	EA	1	$ 182,505	$ 243,936	$ 182,505	$243,936
10.04	No. 15 Turnout	EA	-	$ 365,010	$ 487,873	$ -	$0
10.05	No. 20 Turnout	EA	12	$ 434,684	$ 581,012	$ 5,216,208	$6,972,142
10.06	Diamond Crossing	EA	-	$ 470,056	$ 628,277	$ -	$0
10.07	Turnout Removal	EA	1	$ 33,228	$ 44,413	$ 33,228	$44,413
10.08	Track shift/realign	TF	3,530	$ 139	$ 186	$ 490,670	$656,300
10.09	Track removal	TF	2,409	$ 40	$ 53	$ 96,360	$127,228
10.1	Signals & Communications (from CHSR)	MI	10	$ 2,740,000	$ 3,662,284	$ 27,400,000	$36,622,840
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	106	$ 17,425	$ 23,290	$ 1,846,998	$2,468,697
20.02	Rail Bridge (New Double Parallel)	BF		$ 33,977	$ 45,414	$ -	$0
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF		$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF		$ 70,863	$ 94,716	$ -	$0
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF		$ 75,023	$ 100,275	$ -	$0
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF		$ 44,341	$ 59,266	$ -	$0
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF		$ 25,271	$ 33,777	$ -	$0
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF		$ 32,661	$ 43,654	$ -	$0
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF		$ 35,569	$ 47,541	$ -	$0
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF		$ 28,447	$ 38,022	$ -	$0
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$0
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF		$ 29,370	$ 39,257	$ -	$0
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF		$ 25,266	$ 33,771	$ -	$0
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF		$ 25,124	$ 33,580	$ -	$0
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	499	$ 35,927	$ 48,020	$ 17,927,522	$23,961,926
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF		$ 22,611	$ 30,222	$ -	$0
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF		$ 24,845	$ 33,208	$ -	$0
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF		$ 37,661	$ 50,338	$ -	$0
20.19	Restore Track on Downtown Richmond Viaduct	BF	-	$ 7,986	$ 10,675	$ -	$0
20.20	Overhead Structures - New (NOV)	SF		$ 721	$ 964	$ -	$0
20.21	Overhead Structures - New (CEN/RIC)	SF	20,205	$ 624	$ 834	$ 12,607,920	$16,850,970
20.22	James River Floodwall Penetrations	EA	-	$ 103,737	$ 138,654	$ -	$0
20.23	Pedestrian bridges - Trails	BF		$ 18,959	$ 25,340	$ -	$0
20.24	Drainage Structures - over 6'	EA	4	$ 226,101	$ 302,207	$ 904,405	$1,208,827
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF		$ 177	$ 237	$ -	$0
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF		$ 222	$ 297	$ -	$0
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	-	$ 147	$ 196	$ -	$0
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	-	$ 279	$ 373	$ -	$0
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	50,150	$ 73	$ 97	$ 3,657,930	$4,889,190
20.30	Crashwalls	LF	480	$ 4,953	$ 6,620	$ 2,377,487	$3,177,749
30	**Stations**						
30.01	Station Building- Small	SF	2,300	$ 305	$ 408	$ 701,641	$937,813
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$0
30.03	Station Building - Large	SF	-	$ 298	$ 398	$ -	$0
30.04	Main Street Station Upgrade - med	SF	-	$ 189	$ 253	$ -	$0
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$0
30.06	Platforms - New (Passenger Only)	SF	33,150	$ 46	$ 62	$ 1,537,002	$2,054,357
30.07	Platforms - New (Maintenance Only)	SF	-	$ 36	$ 48	$ -	$0
30.08	Platforms - Expansion	SF	-	$ 38	$ 51	$ -	$0
30.09	Platforms - New (Passenger With Service)	SF	-	$ 50	$ 66	$ -	$0
30.10	Vertical Access	EA	2	$ 150,000	$ 200,490	$ 300,000	$400,980
30.11	Ped Bridge - For Stations	BF	940	$ 29,442	$ 39,794	$ 27,675,046	$37,406,048
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$0
30.13	Parking - Structure	Stall	-	$ 33,256	$ 44,449	$ -	$0
30.14	Parking - Surface lot	Stall	45	$ 2,783	$ 3,720	$ 125,238	$167,393
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	107	$ 19,909	$ 26,611	$ 2,120,343	$2,834,050
40.02	Excavation (and Disposal)	CY	48,105	$ 49	$ 65	$ 2,339,179	$3,126,547
40.03	Over Excavation/Undercut	CY	32,560	$ 55	$ 74	$ 1,794,384	$2,398,373
40.04	Embankment (Common Borrow)	CY	53,540	$ 32	$ 42	$ 1,687,913	$2,256,064
40.05	Embankment (Engineer Fill/Select Borrow)	CY		$ 38	$ 51	$ -	$0
40.06	Subballast	Ton	43,850	$ 44	$ 58	$ 1,919,046	$2,564,997
50	**Roadway**						
50.01	Asphalt Concrete	SY	58,640	$ 141	$ 189	$ 8,283,490	$11,071,712
50.02	Curb & Gutter	LF	12,823	$ 56	$ 75	$ 720,186	$962,601
50.03	Concrete Median	LF		$ 114	$ 152	$ -	$0
50.04	Concrete Sidewalk	SF	-	$ 12	$ 16	$ -	$0
50.05	Clearing and Grubbing	Acre	2	$ 20,905	$ 27,941	$ 41,809	$55,882
50.06	Excavation (and Disposal)	CY	20,813	$ 51	$ 68	$ 1,062,667	$1,420,361
50.07	Over Excavation/Undercut	CY		$ 58	$ 77	$ -	$0
50.08	Embankment (Common Borrow)	CY	126,000	$ 33	$ 44	$ 4,176,532	$5,582,353
50.09	Embankment (Engineer Fill/Select Borrow)	CY		$ 40	$ 54	$ -	$0
50.10	Maintenance of Traffic	0.1	1	$ 1,428,469	$ 1,909,291	$ 1,428,469	$1,909,291
50.11	Stormwater Management	0.05	1	$ 714,235	$ 954,646	$ 714,235	$954,646
50.12	Grade Crossing - Concrete Panels	TF	340	$ 1,297	$ 1,734	$ 441,140	$589,627
50.13	Grade Crossing - Quad Gates	EA	14	$ 542,996	$ 725,769	$ 7,601,947	$10,160,762
50.14	Grade Crossing - Median Separator with Dual Gates	EA	1	$ 282,034	$ 376,966	$ 282,034	$376,966
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA		$ 21,720	$ 29,031	$ -	$0
50.16	Culvert Extension (less than 6-ft dia.)	EA	4	$ 19,572	$ 26,160	$ 78,287	$104,638
50.17	New Culvert (Jack and Bore)	EA	4	$ 150,000	$ 200,490	$ 600,000	$801,960

DC2RVA - CEN 5B (Ashcake Station) - Add Main Track (MP 19 to MP 9)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 2,407,400	$ 3,217,731	$ 2,407,400	$3,217,731
60.03	Temporary Acquisition	LS	1	$ 309,200	$ 413,277	$ 309,200	$413,277
60.04	Damages	LS	1	$ 156,000	$ 208,510	$ 156,000	$208,510
60.05	Condemnation	LS	1	$ 30,000	$ 40,098	$ 30,000	$40,098
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$0
60.10	Residential (Tenants)	LF	1	$ 20,000	$ 26,732	$ 20,000	$26,732
60.11	Business (Owners and Tenants)	LF	1	$ 80,000	$ 106,928	$ 80,000	$106,928
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	90,288	$ 47	$ 63	$ 4,243,536	$5,671,910
60.22	Water	LF	5,000	$ 261	$ 349	$ 1,305,000	$1,744,263
60.23	Sanitary Sewer	LF	600	$ 395	$ 528	$ 237,000	$316,774
60.24	Electric Distribution	LF	2,825	$ 297	$ 397	$ 839,025	$1,121,441
60.25	Electric Transmission	LF	-	$ 5,000	$ 6,683	$ -	$0
60.26	Gas	LF	2,800	$ 750	$ 1,002	$ 2,100,000	$2,806,860
60.27	Major Utility Facility Relocations	LF	-	$ 250,000	$ 334,150	$ -	$0
					Subtotal	$ 202,948,034	$ 271,681,528
					6% Professional services	$ 12,176,882	$ 16,300,892
					35% Contingency	$ 75,293,721	$ 100,793,847
					Project Total	**$ 290,418,637**	**$ 388,776,266**

DC2RVA - CEN 5C - Ashland Bypass (MP 19 to MP 9)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	103,165	$ 395	$ 529	$ 40,750,175	$54,535,041
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	29,525	$ 359	$ 479	$ 10,599,475	$14,156,652
10.03	No. 10 Turnout	EA		$ 182,505	$ 243,936	$ -	$0
10.04	No. 15 Turnout	EA		$ 365,010	$ 487,873	$ -	$0
10.05	No. 20 Turnout	EA	12	$ 434,684	$ 581,012	$ 5,216,208	$6,972,142
10.06	Diamond Crossing	EA	-	$ 470,056	$ 628,277	$ -	$0
10.07	Turnout Removal	EA	-	$ 33,228	$ 44,413	$ -	$0
10.08	Track shift/realign	TF	2,500	$ 139	$ 186	$ 347,500	$464,802
10.09	Track removal	TF	1,356	$ 40	$ 53	$ 54,240	$71,615
10.1	Signals & Communications (from CHSR)	MI	11	$ 2,740,000	$ 3,662,284	$ 30,140,000	$40,285,124
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	106	$ 17,425	$ 23,290	$ 1,846,998	$2,468,697
20.02	Rail Bridge (New Double Parallel)	BF		$ 33,977	$ 45,414	$ -	$0
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF		$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF		$ 70,863	$ 94,716	$ -	$0
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF		$ 75,023	$ 100,275	$ -	$0
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF		$ 44,341	$ 59,266	$ -	$0
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF		$ 25,271	$ 33,777	$ -	$0
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF		$ 32,661	$ 43,654	$ -	$0
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF		$ 35,569	$ 47,541	$ -	$0
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF		$ 28,447	$ 38,022	$ -	$0
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$0
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	-	$ 29,370	$ 39,257	$ -	$0
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF		$ 25,266	$ 33,771	$ -	$0
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF		$ 25,124	$ 33,580	$ -	$0
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	499	$ 35,927	$ 48,020	$ 17,927,522	$23,961,926
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF		$ 22,611	$ 30,222	$ -	$0
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF		$ 24,845	$ 33,208	$ -	$0
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF		$ 37,661	$ 50,338	$ -	$0
20.19	Restore Track on Downtown Richmond Viaduct	BF	-	$ 7,986	$ 10,675	$ -	$0
20.20	Overhead Structures - New (NOV)	SF		$ 721	$ 964	$ -	$0
20.21	Overhead Structures - New (CEN/RIC)	SF	92,068	$ 624	$ 834	$ 57,450,432	$76,784,712
20.22	James River Floodwall Penetrations	EA	-	$ 103,737	$ 138,654	$ -	$0
20.23	Pedestrian bridges - Trails	BF		$ 18,959	$ 25,340	$ -	$0
20.24	Drainage Structures - over 6'	EA	4	$ 226,101	$ 302,207	$ 904,405	$1,208,827
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	-	$ 177	$ 237	$ -	$0
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF		$ 222	$ 297	$ -	$0
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	41,650	$ 147	$ 196	$ 6,111,664	$8,168,851
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	-	$ 279	$ 373	$ -	$0
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	151,350	$ 73	$ 97	$ 11,039,437	$14,755,311
20.30	Crashwalls	LF	320	$ 4,953	$ 6,620	$ 1,584,991	$2,118,499
30	**Stations**						
30.01	Station Building- Small	SF	2,300.00	$ 305	$ 408	$ 701,641	$937,813
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$0
30.03	Station Building - Large	SF	-	$ 298	$ 398	$ -	$0
30.04	Main Street Station Upgrade - med	SF	-	$ 189	$ 253	$ -	$0
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$0
30.06	Platforms - New (Passenger Only)	SF	-	$ 46	$ 62	$ -	$0
30.07	Platforms - New (Maintenance Only)	SF	-	$ 36	$ 48	$ -	$0
30.08	Platforms - Expansion	SF	25,500.00	$ 38	$ 51	$ 971,024	$1,297,870
30.09	Platforms - New (Passenger With Service)	SF	-	$ 50	$ 66	$ -	$0
30.10	Vertical Access	EA	3.00	$ 150,000	$ 200,490	$ 450,000	$601,470
30.11	Ped Bridge - For Stations	BF	940.00	$ 29,442	$ 39,794	$ 27,675,046	$37,406,048
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$0
30.13	Parking - Structure	Stall	-	$ 33,256	$ 44,449	$ -	$0
30.14	Parking - Surface lot	Stall	45.00	$ 2,783	$ 3,720	$ 125,238	$167,393
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	172	$ 19,909	$ 26,611	$ 3,414,448	$4,563,752
40.02	Excavation (and Disposal)	CY	14,105	$ 49	$ 65	$ 685,877	$916,743
40.03	Over Excavation/Undercut	CY	85,307	$ 55	$ 74	$ 4,701,256	$6,283,698
40.04	Embankment (Common Borrow)	CY	53,540	$ 32	$ 42	$ 1,687,913	$2,256,064
40.05	Embankment (Engineer Fill/Select Borrow)	CY		$ 38	$ 51	$ -	$0
40.06	Subballast	Ton	55,250	$ 44	$ 58	$ 2,417,954	$3,231,837
50	**Roadway**						
50.01	Asphalt Concrete	SY	165,009	$ 141	$ 189	$ 23,309,180	$31,155,050
50.02	Curb & Gutter	LF	4,465	$ 56	$ 75	$ 250,771	$335,180
50.03	Concrete Median	LF		$ 114	$ 152	$ -	$0
50.04	Concrete Sidewalk	SF		$ 12	$ 16	$ -	$0
50.05	Clearing and Grubbing	Acre	2	$ 20,905	$ 27,941	$ 41,809	$55,882
50.06	Excavation (and Disposal)	CY	46,653	$ 51	$ 68	$ 2,382,002	$3,183,784
50.07	Over Excavation/Undercut	CY		$ 58	$ 77	$ -	$0
50.08	Embankment (Common Borrow)	CY	716,500	$ 33	$ 44	$ 23,749,884	$31,744,094
50.09	Embankment (Engineer Fill/Select Borrow)	CY		$ 40	$ 54	$ -	$0
50.10	Maintenance of Traffic	0.1	1	$ 4,973,365	$ 6,647,400	$ 4,973,365	$6,647,400
50.11	Stormwater Management	0.05	1	$ 2,486,683	$ 3,323,700	$ 2,486,683	$3,323,700
50.12	Grade Crossing - Concrete Panels	TF	120	$ 1,297	$ 1,734	$ 155,696	$208,104
50.13	Grade Crossing - Quad Gates	EA	18	$ 542,996	$ 725,769	$ 9,773,931	$13,063,837
50.14	Grade Crossing - Median Separator with Dual Gates	EA	1	$ 282,034	$ 376,966	$ 282,034	$376,966
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA		$ 21,720	$ 29,031	$ -	$0
50.16	Culvert Extension (less than 6-ft dia.)	EA	4	$ 19,572	$ 26,160	$ 78,287	$104,638
50.17	New Culvert (Jack and Bore)	EA	4	$ 150,000	$ 200,490	$ 600,000	$801,960

DC2RVA - CEN 5C - Ashland Bypass (MP 19 to MP 9)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 5,533,650	$ 7,396,277	$ 5,533,650	$7,396,277
60.03	Temporary Acquisition	LS	1	$ 333,550	$ 445,823	$ 333,550	$445,823
60.04	Damages	LS	1	$ 5,847,700	$ 7,816,036	$ 5,847,700	$7,816,036
60.05	Condemnation	LS	1	$ 790,000	$ 1,055,914	$ 790,000	$1,055,914
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$0
60.10	Residential (Tenants)	LF	1	$ 2,540,000	$ 3,394,964	$ 2,540,000	$3,394,964
60.11	Business (Owners and Tenants)	LF	1	$ 80,000	$ 106,928	$ 80,000	$106,928
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	30,096	$ 47	$ 63	$ 1,414,512	$1,890,637
60.22	Water	LF	1,667	$ 261	$ 349	$ 435,087	$581,537
60.23	Sanitary Sewer	LF	200	$ 395	$ 528	$ 79,000	$105,591
60.24	Electric Distribution	LF	942	$ 297	$ 397	$ 279,774	$373,946
60.25	Electric Transmission	LF	-	$ 5,000	$ 6,683	$ -	$0
60.26	Gas	LF	933	$ 750	$ 1,002	$ 699,750	$935,286
60.27	Major Utility Facility Relocations	LF	-	$ 250,000	$ 334,150	$ -	$0
					Subtotal	$ 312,920,108	$ 418,718,422
					6% Professional services	$ 18,775,206	$ 25,123,105
					35% Contingency	$ 116,093,360	$ 155,344,535
					Project Total	**$ 447,788,674**	**$ 599,186,063**

DC2RVA - CEN 5C (Ashcake Station) - Ashland Bypass (MP 19 to MP 9)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	103,165	$ 395	$ 529	$ 40,750,175	$54,535,041
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	29,525	$ 359	$ 479	$ 10,599,475	$14,156,652
10.03	No. 10 Turnout	EA		$ 182,505	$ 243,936	$ -	$0
10.04	No. 15 Turnout	EA		$ 365,010	$ 487,873	$ -	$0
10.05	No. 20 Turnout	EA	12	$ 434,684	$ 581,012	$ 5,216,208	$6,972,142
10.06	Diamond Crossing	EA	-	$ 470,056	$ 628,277	$ -	$0
10.07	Turnout Removal	EA	-	$ 33,228	$ 44,413	$ -	$0
10.08	Track shift/realign	TF	2,500	$ 139	$ 186	$ 347,500	$464,802
10.09	Track removal	TF	1,356	$ 40	$ 53	$ 54,240	$71,615
10.1	Signals & Communications (from CHSR)	MI	11	$ 2,740,000	$ 3,662,284	$ 30,140,000	$40,285,124
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	106	$ 17,425	$ 23,290	$ 1,846,998	$2,468,697
20.02	Rail Bridge (New Double Parallel)	BF		$ 33,977	$ 45,414	$ -	$0
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF		$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF		$ 70,863	$ 94,716	$ -	$0
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF		$ 75,023	$ 100,275	$ -	$0
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF		$ 44,341	$ 59,266	$ -	$0
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF		$ 25,271	$ 33,777	$ -	$0
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF		$ 32,661	$ 43,654	$ -	$0
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF		$ 35,569	$ 47,541	$ -	$0
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF		$ 28,447	$ 38,022	$ -	$0
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$0
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	-	$ 29,370	$ 39,257	$ -	$0
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF		$ 25,266	$ 33,771	$ -	$0
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF		$ 25,124	$ 33,580	$ -	$0
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	499	$ 35,927	$ 48,020	$ 17,927,522	$23,961,926
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF		$ 22,611	$ 30,222	$ -	$0
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF		$ 24,845	$ 33,208	$ -	$0
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF		$ 37,661	$ 50,338	$ -	$0
20.19	Restore Track on Downtown Richmond Viaduct	BF	-	$ 7,986	$ 10,675	$ -	$0
20.20	Overhead Structures - New (NOV)	SF		$ 721	$ 964	$ -	$0
20.21	Overhead Structures - New (CEN/RIC)	SF	92,068	$ 624	$ 834	$ 57,450,432	$76,784,712
20.22	James River Floodwall Penetrations	EA	-	$ 103,737	$ 138,654	$ -	$0
20.23	Pedestrian bridges - Trails	BF		$ 18,959	$ 25,340	$ -	$0
20.24	Drainage Structures - over 6'	EA	4	$ 226,101	$ 302,207	$ 904,405	$1,208,827
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	-	$ 177	$ 237	$ -	$0
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF		$ 222	$ 297	$ -	$0
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	41,650	$ 147	$ 196	$ 6,111,664	$8,168,851
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	-	$ 279	$ 373	$ -	$0
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	151,350	$ 73	$ 97	$ 11,039,437	$14,755,311
20.30	Crashwalls	LF	320	$ 4,953	$ 6,620	$ 1,584,991	$2,118,499
30	**Stations**						
30.01	Station Building- Small	SF	2,300	$ 305	$ 408	$ 701,641	$937,813
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$0
30.03	Station Building - Large	SF	-	$ 298	$ 398	$ -	$0
30.04	Main Street Station Upgrade - med	SF	-	$ 189	$ 253	$ -	$0
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$0
30.06	Platforms - New (Passenger Only)	SF	33,150	$ 46	$ 62	$ 1,537,002	$2,054,357
30.07	Platforms - New (Maintenance Only)	SF	-	$ 36	$ 48	$ -	$0
30.08	Platforms - Expansion	SF	-	$ 38	$ 51	$ -	$0
30.09	Platforms - New (Passenger With Service)	SF	-	$ 50	$ 66	$ -	$0
30.10	Vertical Access	EA	2	$ 150,000	$ 200,490	$ 300,000	$400,980
30.11	Ped Bridge - For Stations	BF	940	$ 29,442	$ 39,794	$ 27,675,046	$37,406,048
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$0
30.13	Parking - Structure	Stall	-	$ 33,256	$ 44,449	$ -	$0
30.14	Parking - Surface lot	Stall	45	$ 2,783	$ 3,720	$ 125,238	$167,393
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	172	$ 19,909	$ 26,611	$ 3,414,448	$4,563,752
40.02	Excavation (and Disposal)	CY	14,105	$ 49	$ 65	$ 685,877	$916,743
40.03	Over Excavation/Undercut	CY	85,307	$ 55	$ 74	$ 4,701,256	$6,283,698
40.04	Embankment (Common Borrow)	CY	53,540	$ 32	$ 42	$ 1,687,913	$2,256,064
40.05	Embankment (Engineer Fill/Select Borrow)	CY		$ 38	$ 51	$ -	$0
40.06	Subballast	Ton	55,250	$ 44	$ 58	$ 2,417,954	$3,231,837
50	**Roadway**						
50.01	Asphalt Concrete	SY	165,009	$ 141	$ 189	$ 23,309,180	$31,155,050
50.02	Curb & Gutter	LF	4,465	$ 56	$ 75	$ 250,771	$335,180
50.03	Concrete Median	LF		$ 114	$ 152	$ -	$0
50.04	Concrete Sidewalk	SF		$ 12	$ 16	$ -	$0
50.05	Clearing and Grubbing	Acre	2	$ 20,905	$ 27,941	$ 41,809	$55,882
50.06	Excavation (and Disposal)	CY	46,653	$ 51	$ 68	$ 2,382,002	$3,183,784
50.07	Over Excavation/Undercut	CY		$ 58	$ 77	$ -	$0
50.08	Embankment (Common Borrow)	CY	716,500	$ 33	$ 44	$ 23,749,884	$31,744,094
50.09	Embankment (Engineer Fill/Select Borrow)	CY		$ 40	$ 54	$ -	$0
50.10	Maintenance of Traffic	0.1	1	$ 4,973,365	$ 6,647,400	$ 4,973,365	$6,647,400
50.11	Stormwater Management	0.05	1	$ 2,486,683	$ 3,323,700	$ 2,486,683	$3,323,700
50.12	Grade Crossing - Concrete Panels	TF	120	$ 1,297	$ 1,734	$ 155,696	$208,104
50.13	Grade Crossing - Quad Gates	EA	18	$ 542,996	$ 725,769	$ 9,773,931	$13,063,837
50.14	Grade Crossing - Median Separator with Dual Gates	EA	1	$ 282,034	$ 376,966	$ 282,034	$376,966
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA		$ 21,720	$ 29,031	$ -	$0
50.16	Culvert Extension (less than 6-ft dia.)	EA	4	$ 19,572	$ 26,160	$ 78,287	$104,638
50.17	New Culvert (Jack and Bore)	EA	4	$ 150,000	$ 200,490	$ 600,000	$801,960

DC2RVA - CEN 5C (Ashcake Station) - Ashland Bypass (MP 19 to MP 9)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 5,533,650	$ 7,396,277	$ 5,533,650	$7,396,277
60.03	Temporary Acquisition	LS	1	$ 333,550	$ 445,823	$ 333,550	$445,823
60.04	Damages	LS	1	$ 5,847,700	$ 7,816,036	$ 5,847,700	$7,816,036
60.05	Condemnation	LS	1	$ 790,000	$ 1,055,914	$ 790,000	$1,055,914
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$0
60.10	Residential (Tenants)	LF	1	$ 2,540,000	$ 3,394,964	$ 2,540,000	$3,394,964
60.11	Business (Owners and Tenants)	LF	1	$ 80,000	$ 106,928	$ 80,000	$106,928
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	30,096	$ 47	$ 63	$ 1,414,512	$1,890,637
60.22	Water	LF	1,667	$ 261	$ 349	$ 435,087	$581,537
60.23	Sanitary Sewer	LF	200	$ 395	$ 528	$ 79,000	$105,591
60.24	Electric Distribution	LF	942	$ 297	$ 397	$ 279,774	$373,946
60.25	Electric Transmission	LF	-	$ 5,000	$ 6,683	$ -	$0
60.26	Gas	LF	933	$ 750	$ 1,002	$ 699,750	$935,286
60.27	Major Utility Facility Relocations	LF	-	$ 250,000	$ 334,150	$ -	$0
					Subtotal	$ 313,336,086	$ 419,274,419
					6% Professional services	$ 18,800,165	$ 25,156,465
					35% Contingency	$ 116,247,688	$ 155,550,810
					Project Total	**$ 448,383,940**	**$ 599,981,694**

DC2RVA - CEN 5D - 3-Tracks Centered (MP 19 to MP 9)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	56,910	$ 395	$ 529	$ 22,479,450	$30,083,741
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	84,595	$ 359	$ 479	$ 30,369,605	$40,561,624
10.03	No. 10 Turnout	EA	1	$ 182,505	$ 243,936	$ 182,505	$243,936
10.04	No. 15 Turnout	EA	-	$ 365,010	$ 487,873	$ -	$0
10.05	No. 20 Turnout	EA	4	$ 434,684	$ 581,012	$ 1,738,736	$2,324,047
10.06	Diamond Crossing	EA	-	$ 470,056	$ 628,277	$ -	$0
10.07	Turnout Removal	EA	6	$ 33,228	$ 44,413	$ 199,368	$266,476
10.08	Track shift/realign	TF	36,615	$ 139	$ 186	$ 5,089,485	$6,807,487
10.09	Track removal	TF	2,777	$ 40	$ 53	$ 111,080	$146,663
10.1	Signals & Communications (from CHSR)	MI	10	$ 2,740,000	$ 3,662,284	$ 27,400,000	$36,622,840
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	106	$ 17,425	$ 23,290	$ 1,846,998	$2,468,697
20.02	Rail Bridge (New Double Parallel)	BF	-	$ 33,977	$ 45,414	$ -	$0
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF	-	$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF	-	$ 70,863	$ 94,716	$ -	$0
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF	-	$ 75,023	$ 100,275	$ -	$0
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF	-	$ 44,341	$ 59,266	$ -	$0
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF	-	$ 25,271	$ 33,777	$ -	$0
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF	-	$ 32,661	$ 43,654	$ -	$0
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF	-	$ 35,569	$ 47,541	$ -	$0
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF	-	$ 28,447	$ 38,022	$ -	$0
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$0
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	-	$ 29,370	$ 39,257	$ -	$0
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF	-	$ 25,266	$ 33,771	$ -	$0
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF	-	$ 25,124	$ 33,580	$ -	$0
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	499	$ 35,927	$ 48,020	$ 17,927,522	$23,961,926
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF	-	$ 22,611	$ 30,222	$ -	$0
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF	-	$ 24,845	$ 33,208	$ -	$0
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF	-	$ 37,661	$ 50,338	$ -	$0
20.19	Restore Track on Downtown Richmond Viaduct	BF	-	$ 7,986	$ 10,675	$ -	$0
20.20	Overhead Structures - New (NOV)	SF	-	$ 721	$ 964	$ -	$0
20.21	Overhead Structures - New (CEN/RIC)	SF	20,205	$ 624	$ 834	$ 12,607,920	$16,850,970
20.22	James River Floodwall Penetrations	EA	-	$ 103,737	$ 138,654	$ -	$0
20.23	Pedestrian bridges - Trails	BF	-	$ 18,959	$ 25,340	$ -	$0
20.24	Drainage Structures - over 6'	EA	4	$ 226,101	$ 302,207	$ 904,405	$1,208,827
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	-	$ 177	$ 237	$ -	$0
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	-	$ 222	$ 297	$ -	$0
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	-	$ 147	$ 196	$ -	$0
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	-	$ 279	$ 373	$ -	$0
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	50,150	$ 73	$ 97	$ 3,657,930	$4,889,190
20.30	Crashwalls	LF	480	$ 4,953	$ 6,620	$ 2,377,487	$3,177,749
30	**Stations**						
30.01	Station Building- Small	SF	2,300	$ 305	$ 408	$ 701,641	$937,813
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$0
30.03	Station Building - Large	SF	-	$ 298	$ 398	$ -	$0
30.04	Main Street Station Upgrade - med	SF	-	$ 189	$ 253	$ -	$0
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$0
30.06	Platforms - New (Passenger Only)	SF	-	$ 46	$ 62	$ -	$0
30.07	Platforms - New (Maintenance Only)	SF	-	$ 36	$ 48	$ -	$0
30.08	Platforms - Expansion	SF	33,150	$ 38	$ 51	$ 1,262,331	$1,687,232
30.09	Platforms - New (Passenger With Service)	SF	-	$ 50	$ 66	$ -	$0
30.10	Vertical Access	EA	2	$ 150,000	$ 200,490	$ 300,000	$400,980
30.11	Ped Bridge - For Stations	BF	940	$ 29,442	$ 39,794	$ 27,675,046	$37,406,048
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$0
30.13	Parking - Structure	Stall	-	$ 33,256	$ 44,449	$ -	$0
30.14	Parking - Surface lot	Stall	45	$ 2,783	$ 3,720	$ 125,238	$167,393
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	107	$ 19,909	$ 26,611	$ 2,131,902	$2,849,501
40.02	Excavation (and Disposal)	CY	48,105.58	$ 49	$ 65	$ 2,339,207	$3,126,584
40.03	Over Excavation/Undercut	CY	32,560	$ 55	$ 74	$ 1,794,384	$2,398,373
40.04	Embankment (Common Borrow)	CY	53,540.58	$ 32	$ 42	$ 1,687,931	$2,256,088
40.05	Embankment (Engineer Fill/Select Borrow)	CY	-	$ 38	$ 51	$ -	$0
40.06	Subballast	Ton	43,850.58	$ 44	$ 58	$ 1,919,071	$2,565,031
50	**Roadway**						
50.01	Asphalt Concrete	SY	75,283	$ 141	$ 189	$ 10,634,481	$14,214,047
50.02	Curb & Gutter	LF	23,282	$ 56	$ 75	$ 1,307,602	$1,747,741
50.03	Concrete Median	LF	-	$ 114	$ 152	$ -	$0
50.04	Concrete Sidewalk	SF	59,950	$ 12	$ 16	$ 714,214	$954,619
50.05	Clearing and Grubbing	Acre	2	$ 20,905	$ 27,941	$ 41,809	$55,882
50.06	Excavation (and Disposal)	CY	26,361	$ 51	$ 68	$ 1,345,936	$1,798,978
50.07	Over Excavation/Undercut	CY	-	$ 58	$ 77	$ -	$0
50.08	Embankment (Common Borrow)	CY	126,000	$ 33	$ 44	$ 4,176,532	$5,582,353
50.09	Embankment (Engineer Fill/Select Borrow)	CY	-	$ 40	$ 54	$ -	$0
50.10	Maintenance of Traffic	0.1	1	$ 1,822,058	$ 2,435,362	$ 1,822,058	$2,435,362
50.11	Stormwater Management	0.05	1	$ 911,029	$ 1,217,681	$ 911,029	$1,217,681
50.12	Grade Crossing - Concrete Panels	TF	380	$ 1,297	$ 1,734	$ 493,038	$658,995
50.13	Grade Crossing - Quad Gates	EA	16	$ 542,996	$ 725,769	$ 8,687,939	$11,612,299
50.14	Grade Crossing - Median Separator with Dual Gates	EA	1	$ 282,034	$ 376,966	$ 282,034	$376,966
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	-	$ 21,720	$ 29,031	$ -	$0
50.16	Culvert Extension (less than 6-ft dia.)	EA	4	$ 19,572	$ 26,160	$ 78,287	$104,638
50.17	New Culvert (Jack and Bore)	EA	4	$ 150,000	$ 200,490	$ 600,000	$801,960

DC2RVA - CEN 5D - 3-Tracks Centered (MP 19 to MP 9)							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 1,274,300	$ 1,703,229	$ 1,274,300	$1,703,229
60.03	Temporary Acquisition	LS	1	$ 103,400	$ 138,204	$ 103,400	$138,204
60.04	Damages	LS	1	$ 180,000	$ 240,588	$ 180,000	$240,588
60.05	Condemnation	LS	-	$ -	$ -	$ -	$0
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$0
60.10	Residential (Tenants)	LF	-	$ -	$ -	$ -	$0
60.11	Business (Owners and Tenants)	LF	-	$ -	$ -	$ -	$0
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	90,288	$ 47	$ 63	$ 4,243,536	$5,671,910
60.22	Water	LF	5,000	$ 261	$ 349	$ 1,305,000	$1,744,263
60.23	Sanitary Sewer	LF	600	$ 395	$ 528	$ 237,000	$316,774
60.24	Electric Distribution	LF	2,825	$ 297	$ 397	$ 839,025	$1,121,441
60.25	Electric Transmission	LF	-	$ 5,000	$ 6,683	$ -	$0
60.26	Gas	LF	2,800	$ 750	$ 1,002	$ 2,100,000	$2,806,860
60.27	Major Utility Facility Relocations	LF	-	$ 250,000	$ 334,150	$ -	$0
					Subtotal	$ 208,206,461	$ 278,714,008
					6% Professional services	$ 12,492,388	$ 16,722,840
					35% Contingency	$ 77,244,597	$ 103,402,897
					Project Total	**$ 297,943,446**	**$ 398,839,746**

DC2RVA - RIC 6A - Staples Mill Road Station Only							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	89,531	$ 395	$ 529	$ 35,364,745	$47,327,841
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	259,284	$ 359	$ 479	$ 93,082,956	$124,321,534
10.03	No. 10 Turnout	EA	3	$ 182,505	$ 243,936	$ 547,515	$731,809
10.04	No. 15 Turnout	EA	18	$ 365,010	$ 487,873	$ 6,570,180	$8,781,706
10.05	No. 20 Turnout	EA	25	$ 434,684	$ 581,012	$ 10,867,100	$14,525,297
10.06	Diamond Crossing	EA	1	$ 470,056	$ 628,277	$ 470,056	$628,277
10.07	Turnout Removal	EA	6	$ 33,228	$ 44,413	$ 199,368	$266,476
10.08	Track shift/realign	TF	34,017	$ 139	$ 186	$ 4,728,363	$6,324,465
10.09	Track removal	TF	7,160	$ 40	$ 53	$ 286,400	$378,144
10.1	Signals & Communications (from CHSR)	MI	26	$ 2,740,000	$ 3,662,284	$ 71,240,000	$95,219,384
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	200	$ 17,425	$ 23,290	$ 3,484,901	$4,657,919
20.02	Rail Bridge (New Double Parallel)	BF	-	$ 33,977	$ 45,414	$ -	$0
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF	-	$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF	196	$ 70,863	$ 94,716	$ 13,889,154	$18,564,243
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF	-	$ 75,023	$ 100,275	$ -	$0
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF	-	$ 44,341	$ 59,266	$ -	$0
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF	-	$ 25,271	$ 33,777	$ -	$0
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF	-	$ 32,661	$ 43,654	$ -	$0
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF	-	$ 35,569	$ 47,541	$ -	$0
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF	-	$ 28,447	$ 38,022	$ -	$0
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$0
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	-	$ 29,370	$ 39,257	$ -	$0
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF	-	$ 25,266	$ 33,771	$ -	$0
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF	-	$ 25,124	$ 33,580	$ -	$0
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	-	$ 35,927	$ 48,020	$ -	$0
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF	-	$ 22,611	$ 30,222	$ -	$0
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF	325	$ 24,845	$ 33,208	$ 8,074,597	$10,792,506
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF	-	$ 37,661	$ 50,338	$ -	$0
20.19	Restore Track on Downtown Richmond Viaduct	BF	-	$ 7,986	$ 10,675	$ -	$0
20.20	Overhead Structures - New (NOV)	SF	-	$ 721	$ 964	$ -	$0
20.21	Overhead Structures - New (CEN/RIC)	SF	159,330	$ 624	$ 834	$ 99,421,920	$132,881,220
20.22	James River Floodwall Penetrations	EA	-	$ 103,737	$ 138,654	$ -	$0
20.23	Pedestrian bridges - Trails	BF	-	$ 18,959	$ 25,340	$ -	$0
20.24	Drainage Structures - over 6'	EA	8	$ 226,101	$ 302,207	$ 1,808,809	$2,417,655
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	37,576	$ 177	$ 237	$ 6,666,199	$8,910,042
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	10,800	$ 222	$ 297	$ 2,397,385	$3,204,345
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	50,232	$ 147	$ 196	$ 7,370,976	$9,852,046
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	8,400	$ 279	$ 373	$ 2,343,896	$3,132,851
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	166,461	$ 73	$ 97	$ 12,141,630	$16,228,503
20.30	Crashwalls	LF	1,478	$ 4,953	$ 6,620	$ 7,320,679	$9,784,819
30	**Stations**						
30.01	Station Building- Small	SF	-	$ 305	$ 408	$ -	$0
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$0
30.03	Station Building - Large	SF	30,964	$ 298	$ 398	$ 9,219,218	$12,322,407
30.04	Main Street Station Upgrade - med	SF	-	$ 189	$ 253	$ -	$0
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$0
30.06	Platforms - New (Passenger Only)	SF	-	$ 46	$ 62	$ -	$0
30.07	Platforms - New (Maintenance Only)	SF	-	$ 36	$ 48	$ -	$0
30.08	Platforms - Expansion	SF	-	$ 38	$ 51	$ -	$0
30.09	Platforms - New (Passenger With Service)	SF	47,872	$ 50	$ 66	$ 2,371,564	$3,169,832
30.10	Vertical Access	EA	2	$ 150,000	$ 200,490	$ 300,000	$400,980
30.11	Ped Bridge - For Stations	BF	900	$ 29,442	$ 39,794	$ 26,497,385	$35,814,301
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$0
30.13	Parking - Structure	Stall	300	$ 33,256	$ 44,449	$ 9,976,650	$13,334,791
30.14	Parking - Surface lot	Stall	340	$ 2,783	$ 3,720	$ 946,243	$1,264,748
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	141	$ 19,909	$ 26,611	$ 2,815,178	$3,762,767
40.02	Excavation (and Disposal)	CY	50,098	$ 49	$ 65	$ 2,436,092	$3,256,080
40.03	Over Excavation/Undercut	CY	160,172	$ 55	$ 74	$ 8,827,089	$11,798,287
40.04	Embankment (Common Borrow)	CY	55,981	$ 32	$ 42	$ 1,764,868	$2,358,923
40.05	Embankment (Engineer Fill/Select Borrow)	CY	139,052	$ 38	$ 51	$ 5,307,868	$7,094,497
40.06	Subballast	Ton	43,641	$ 44	$ 58	$ 1,909,899	$2,552,771
50	**Roadway**						
50.01	Asphalt Concrete	SY	91,423	$ 141	$ 189	$ 12,914,418	$17,261,411
50.02	Curb & Gutter	LF	16,258	$ 56	$ 75	$ 913,108	$1,220,461
50.03	Concrete Median	LF	1,134	$ 114	$ 152	$ 129,309	$172,835
50.04	Concrete Sidewalk	SF	30,522	$ 12	$ 16	$ 363,624	$486,020
50.05	Clearing and Grubbing	Acre	13	$ 20,905	$ 27,941	$ 271,759	$363,233
50.06	Excavation (and Disposal)	CY	55,162	$ 51	$ 68	$ 2,816,453	$3,764,471
50.07	Over Excavation/Undercut	CY	110,441	$ 58	$ 77	$ 6,390,731	$8,541,851
50.08	Embankment (Common Borrow)	CY	732,505	$ 33	$ 44	$ 24,280,403	$32,453,186
50.09	Embankment (Engineer Fill/Select Borrow)	CY	110,441	$ 40	$ 54	$ 4,430,549	$5,921,871
50.10	Maintenance of Traffic	10%	1	$ 5,251,036	$ 7,018,534	$ 5,251,036	$7,018,534
50.11	Stormwater Management	5%	1	$ 2,625,518	$ 3,509,267	$ 2,625,518	$3,509,267
50.12	Grade Crossing - Concrete Panels	TF	247	$ 1,297	$ 1,734	$ 320,475	$428,347
50.13	Grade Crossing - Quad Gates	EA	4	$ 542,996	$ 725,769	$ 2,171,985	$2,903,075
50.14	Grade Crossing - Median Separator with Dual Gates	EA	1	$ 282,034	$ 376,966	$ 282,034	$376,966
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	-	$ 21,720	$ 29,031	$ -	$0
50.16	Culvert Extension (less than 6-ft dia.)	EA	14	$ 19,572	$ 26,160	$ 274,004	$366,233
50.17	New Culvert (Jack and Bore)	EA	38	$ 150,000	$ 200,490	$ 5,700,000	$7,618,620

DC2RVA - RIC 6A - Staples Mill Road Station Only							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 6,245,600	$ 8,347,869	$ 6,245,600	$8,347,869
60.03	Temporary Acquisition	LS	1	$ 801,000	$ 1,070,617	$ 801,000	$1,070,617
60.04	Damages	LS	-	$ -	$ -	$ -	$0
60.05	Condemnation	LS	1	$ 690,000	$ 922,254	$ 690,000	$922,254
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$0
60.10	Residential (Tenants)	LF	1	$ 1,497,500	$ 2,001,559	$ 1,497,500	$2,001,559
60.11	Business (Owners and Tenants)	LF	1	$ 455,000	$ 608,153	$ 455,000	$608,153
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	24,345	$ 47	$ 63	$ 1,144,215	$1,529,358
60.22	Water	LF	2,170	$ 261	$ 349	$ 566,370	$757,010
60.23	Sanitary Sewer	LF	1,175	$ 395	$ 528	$ 464,125	$620,349
60.24	Electric Distribution	LF	9,510	$ 297	$ 397	$ 2,824,470	$3,775,187
60.25	Electric Transmission	LF	3,700	$ 5,000	$ 6,683	$ 18,500,000	$24,727,100
60.26	Gas	LF	6,915	$ 750	$ 1,002	$ 5,186,250	$6,931,942
60.27	Major Utility Facility Relocations	LF	1	$ 250,000	$ 334,150	$ 250,000	$334,150
					Subtotal	$ 568,408,815	$ 760,093,392
					6% Professional services	$ 34,104,529	$ 45,605,604
					35% Contingency	$ 210,879,670	$ 281,994,649
					Project Total	**$ 813,393,014**	**$ 1,087,693,644**

DC2RVA - RIC 6B (A-Line) - Boulevard Station Only							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	152,540	$ 395	$ 529	$ 60,253,300	$80,635,634
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	259,363	$ 359	$ 479	$ 93,111,317	$124,359,413
10.03	No. 10 Turnout	EA	8	$ 182,505	$ 243,936	$ 1,460,040	$1,951,490
10.04	No. 15 Turnout	EA	46	$ 365,010	$ 487,873	$ 16,790,460	$22,442,138
10.05	No. 20 Turnout	EA	41	$ 434,684	$ 581,012	$ 17,822,044	$23,821,487
10.06	Diamond Crossing	EA	1	$ 470,056	$ 628,277	$ 470,056	$628,277
10.07	Turnout Removal	EA	15	$ 33,228	$ 44,413	$ 498,420	$666,191
10.08	Track shift/realign	TF	41,688	$ 139	$ 186	$ 5,794,632	$7,750,663
10.09	Track removal	TF	26,484	$ 40	$ 53	$ 1,059,360	$1,398,711
10.1	Signals & Communications (from CHSR)	MI	27	$ 2,740,000	$ 3,662,284	$ 73,980,000	$98,881,668
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	200	$ 17,425	$ 23,290	$ 3,484,901	$4,657,919
20.02	Rail Bridge (New Double Parallel)	BF	2,577	$ 33,977	$ 45,414	$ 87,558,661	$117,030,907
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF	-	$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF	196	$ 70,863	$ 94,716	$ 13,889,154	$18,564,243
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF	-	$ 75,023	$ 100,275	$ -	$0
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF	-	$ 44,341	$ 59,266	$ -	$0
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF	-	$ 25,271	$ 33,777	$ -	$0
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF	-	$ 32,661	$ 43,654	$ -	$0
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF	-	$ 35,569	$ 47,541	$ -	$0
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF	-	$ 28,447	$ 38,022	$ -	$0
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$0
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	-	$ 29,370	$ 39,257	$ -	$0
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF	-	$ 25,266	$ 33,771	$ -	$0
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF	-	$ 25,124	$ 33,580	$ -	$0
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	-	$ 35,927	$ 48,020	$ -	$0
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF	-	$ 22,611	$ 30,222	$ -	$0
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF	325	$ 24,845	$ 33,208	$ 8,074,597	$10,792,506
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF	-	$ 37,661	$ 50,338	$ -	$0
20.19	Restore Track on Downtown Richmond Viaduct	BF	-	$ 7,986	$ 10,675	$ -	$0
20.20	Overhead Structures - New (NOV)	SF	-	$ 721	$ 964	$ -	$0
20.21	Overhead Structures - New (CEN/RIC)	SF	242,230	$ 624	$ 834	$ 151,151,520	$202,019,820
20.22	James River Floodwall Penetrations	EA	-	$ 103,737	$ 138,654	$ -	$0
20.23	Pedestrian bridges - Trails	BF	-	$ 18,959	$ 25,340	$ -	$0
20.24	Drainage Structures - over 6'	EA	10	$ 226,101	$ 302,207	$ 2,261,012	$3,022,068
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	59,597	$ 177	$ 237	$ 10,572,852	$14,131,674
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	3,200	$ 222	$ 297	$ 710,336	$949,435
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	57,618	$ 147	$ 196	$ 8,454,787	$11,300,668
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	8,400	$ 279	$ 373	$ 2,343,896	$3,132,851
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	194,488	$ 73	$ 97	$ 14,185,913	$18,960,892
20.30	Crashwalls	LF	2,883	$ 4,953	$ 6,620	$ 14,279,781	$19,086,355
30	**Stations**						
30.01	Station Building- Small	SF	-	$ 305	$ 408	$ -	$0
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$0
30.03	Station Building - Large	SF	30,964	$ 298	$ 398	$ 9,219,218	$12,322,407
30.04	Main Street Station Upgrade - med	SF	-	$ 189	$ 253	$ -	$0
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$0
30.06	Platforms - New (Passenger Only)	SF	-	$ 46	$ 62	$ -	$0
30.07	Platforms - New (Maintenance Only)	SF	-	$ 36	$ 48	$ -	$0
30.08	Platforms - Expansion	SF	-	$ 38	$ 51	$ -	$0
30.09	Platforms - New (Passenger With Service)	SF	63,600	$ 50	$ 66	$ 3,150,724	$4,211,258
30.10	Vertical Access	EA	2	$ 150,000	$ 200,490	$ 300,000	$400,980
30.11	Ped Bridge - For Stations	BF	-	$ 29,442	$ 39,794	$ -	$0
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$0
30.13	Parking - Structure	Stall	600	$ 33,256	$ 44,449	$ 19,953,300	$26,669,582
30.14	Parking - Surface lot	Stall	30	$ 2,783	$ 3,720	$ 83,492	$111,595
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	220	$ 19,909	$ 26,611	$ 4,388,014	$5,865,020
40.02	Excavation (and Disposal)	CY	70,268	$ 49	$ 65	$ 3,416,889	$4,567,013
40.03	Over Excavation/Undercut	CY	218,165	$ 55	$ 74	$ 12,023,087	$16,070,057
40.04	Embankment (Common Borrow)	CY	173,603	$ 32	$ 42	$ 5,473,042	$7,315,268
40.05	Embankment (Engineer Fill/Select Borrow)	CY	197,045	$ 38	$ 51	$ 7,521,567	$10,053,326
40.06	Subballast	Ton	57,726	$ 44	$ 58	$ 2,526,313	$3,376,670
50	**Roadway**						
50.01	Asphalt Concrete	SY	118,288	$ 141	$ 189	$ 16,709,369	$22,333,743
50.02	Curb & Gutter	LF	22,592	$ 56	$ 75	$ 1,268,849	$1,695,943
50.03	Concrete Median	LF	4,008	$ 114	$ 152	$ 457,029	$610,865
50.04	Concrete Sidewalk	SF	58,904	$ 12	$ 16	$ 701,753	$937,963
50.05	Clearing and Grubbing	Acre	14	$ 20,905	$ 27,941	$ 292,664	$391,174
50.06	Excavation (and Disposal)	CY	62,815	$ 51	$ 68	$ 3,207,199	$4,286,742
50.07	Over Excavation/Undercut	CY	121,921	$ 58	$ 77	$ 7,055,027	$9,429,750
50.08	Embankment (Common Borrow)	CY	778,721	$ 33	$ 44	$ 25,812,328	$34,500,758
50.09	Embankment (Engineer Fill/Select Borrow)	CY	121,921	$ 40	$ 54	$ 4,891,090	$6,537,432
50.10	Maintenance of Traffic	10%	1	$ 6,039,531	$ 8,072,437	$ 6,039,531	$8,072,437
50.11	Stormwater Management	5%	1	$ 3,019,766	$ 4,036,219	$ 3,019,766	$4,036,219
50.12	Grade Crossing - Concrete Panels	TF	247	$ 1,297	$ 1,734	$ 320,475	$428,347
50.13	Grade Crossing - Quad Gates	EA	4	$ 542,996	$ 725,769	$ 2,171,985	$2,903,075
50.14	Grade Crossing - Median Separator with Dual Gates	EA	1	$ 282,034	$ 376,966	$ 282,034	$376,966
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	-	$ 21,720	$ 29,031	$ -	$0
50.16	Culvert Extension (less than 6-ft dia.)	EA	18	$ 19,572	$ 26,160	$ 352,290	$470,871
50.17	New Culvert (Jack and Bore)	EA	41	$ 150,000	$ 200,490	$ 6,150,000	$8,220,090

DC2RVA - RIC 6B (A-Line) - Boulevard Station Only							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 10,210,100	$ 13,646,820	$ 10,210,100	$13,646,820
60.03	Temporary Acquisition	LS	1	$ 1,480,600	$ 1,978,970	$ 1,480,600	$1,978,970
60.04	Damages	LS	1	$ 280,000	$ 374,248	$ 280,000	$374,248
60.05	Condemnation	LS	1	$ 2,075,000	$ 2,773,445	$ 2,075,000	$2,773,445
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$0
60.10	Residential (Tenants)	LF	1	$ 3,192,500	$ 4,267,096	$ 3,192,500	$4,267,096
60.11	Business (Owners and Tenants)	LF	1	$ 675,000	$ 902,205	$ 675,000	$902,205
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	104,855	$ 47	$ 63	$ 4,928,185	$6,587,012
60.22	Water	LF	2,575	$ 261	$ 349	$ 672,075	$898,295
60.23	Sanitary Sewer	LF	1,220	$ 395	$ 528	$ 481,900	$644,108
60.24	Electric Distribution	LF	20,920	$ 297	$ 397	$ 6,213,240	$8,304,617
60.25	Electric Transmission	LF	5,200	$ 5,000	$ 6,683	$ 26,000,000	$34,751,600
60.26	Gas	LF	7,200	$ 750	$ 1,002	$ 5,400,000	$7,217,640
60.27	Major Utility Facility Relocations	LF	1	$ 250,000	$ 334,150	$ 250,000	$334,150
					Subtotal	$ 796,852,674	$ 1,065,060,766
					6% Professional services	$ 47,811,160	$ 63,903,646
					35% Contingency	$ 295,632,342	$ 395,137,544
					Project Total	**$ 1,140,296,176**	**$ 1,524,101,957**

DC2RVA - RIC 6B (S-Line) - Boulevard Station Only							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	165,501	$ 395	$ 529	$ 65,372,895	$87,487,072
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	160,984	$ 359	$ 479	$ 57,793,256	$77,188,634
10.03	No. 10 Turnout	EA	18	$ 182,505	$ 243,936	$ 3,285,090	$4,390,853
10.04	No. 15 Turnout	EA	48	$ 365,010	$ 487,873	$ 17,520,480	$23,417,883
10.05	No. 20 Turnout	EA	35	$ 434,684	$ 581,012	$ 15,213,940	$20,335,415
10.06	Diamond Crossing	EA	3	$ 470,056	$ 628,277	$ 1,410,168	$1,884,832
10.07	Turnout Removal	EA	29	$ 33,228	$ 44,413	$ 963,612	$1,287,969
10.08	Track shift/realign	TF	15,985	$ 139	$ 186	$ 2,221,915	$2,971,943
10.09	Track removal	TF	25,952	$ 40	$ 53	$ 1,038,080	$1,370,614
10.1	Signals & Communications (from CHSR)	MI	26	$ 2,740,000	$ 3,662,284	$ 71,240,000	$95,219,384
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	-	$ 17,425	$ 23,290	$ -	$0
20.02	Rail Bridge (New Double Parallel)	BF	-	$ 33,977	$ 45,414	$ -	$0
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF	-	$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF	-	$ 70,863	$ 94,716	$ -	$0
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF	-	$ 75,023	$ 100,275	$ -	$0
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF	-	$ 44,341	$ 59,266	$ -	$0
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF	-	$ 25,271	$ 33,777	$ -	$0
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF	-	$ 32,661	$ 43,654	$ -	$0
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF	-	$ 35,569	$ 47,541	$ -	$0
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF	-	$ 28,447	$ 38,022	$ -	$0
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$0
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	-	$ 29,370	$ 39,257	$ -	$0
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF	-	$ 25,266	$ 33,771	$ -	$0
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF	-	$ 25,124	$ 33,580	$ -	$0
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	-	$ 35,927	$ 48,020	$ -	$0
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF	-	$ 22,611	$ 30,222	$ -	$0
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF	-	$ 24,845	$ 33,208	$ -	$0
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF	2,242	$ 37,661	$ 50,338	$ 84,436,508	$112,857,836
20.19	Restore Track on Downtown Richmond Viaduct	BF	6,075	$ 7,986	$ 10,675	$ 48,514,950	$64,850,625
20.20	Overhead Structures - New (NOV)	SF	-	$ 721	$ 964	$ -	$0
20.21	Overhead Structures - New (CEN/RIC)	SF	94,430	$ 624	$ 834	$ 58,924,320	$78,754,620
20.22	James River Floodwall Penetrations	EA	2	$ 103,737	$ 138,654	$ 207,474	$277,308
20.23	Pedestrian bridges - Trails	BF	188	$ 18,959	$ 25,340	$ 3,564,292	$4,763,920
20.24	Drainage Structures - over 6'	EA	19	$ 226,101	$ 302,207	$ 4,295,922	$5,741,930
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	64,350	$ 177	$ 237	$ 11,416,061	$15,258,708
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	3,650	$ 222	$ 297	$ 810,227	$1,082,950
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	38,318	$ 147	$ 196	$ 5,622,731	$7,515,343
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	5,300	$ 279	$ 373	$ 1,478,887	$1,976,680
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	171,678	$ 73	$ 97	$ 12,522,157	$16,737,115
20.30	Crashwalls	LF	3,157	$ 4,953	$ 6,620	$ 15,636,930	$20,900,320
30	**Stations**						
30.01	Station Building- Small	SF	-	$ 305	$ 408	$ -	$0
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$0
30.03	Station Building - Large	SF	30,964	$ 298	$ 398	$ 9,219,218	$12,322,407
30.04	Main Street Station Upgrade - med	SF	-	$ 189	$ 253	$ -	$0
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$0
30.06	Platforms - New (Passenger Only)	SF	72,000	$ 46	$ 62	$ 3,338,286	$4,461,953
30.07	Platforms - New (Maintenance Only)	SF	57,593	$ 36	$ 48	$ 2,065,120	$2,760,240
30.08	Platforms - Expansion	SF	-	$ 38	$ 51	$ -	$0
30.09	Platforms - New (Passenger With Service)	SF	-	$ 50	$ 66	$ -	$0
30.10	Vertical Access	EA	2	$ 150,000	$ 200,490	$ 300,000	$400,980
30.11	Ped Bridge - For Stations	BF	1,180	$ 29,442	$ 39,794	$ 34,741,015	$46,956,528
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$0
30.13	Parking - Structure	Stall	600	$ 33,256	$ 44,449	$ 19,953,300	$26,669,582
30.14	Parking - Surface lot	Stall	30	$ 2,783	$ 3,720	$ 83,492	$111,595
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	213	$ 19,909	$ 26,611	$ 4,248,649	$5,678,744
40.02	Excavation (and Disposal)	CY	117,565	$ 49	$ 65	$ 5,716,777	$7,641,045
40.03	Over Excavation/Undercut	CY	432,850	$ 55	$ 74	$ 23,854,390	$31,883,778
40.04	Embankment (Common Borrow)	CY	22,005	$ 32	$ 42	$ 693,734	$927,245
40.05	Embankment (Engineer Fill/Select Borrow)	CY	411,730	$ 38	$ 51	$ 15,716,484	$21,006,653
40.06	Subballast	Ton	63,948	$ 44	$ 58	$ 2,798,612	$3,740,625
50	**Roadway**						
50.01	Asphalt Concrete	SY	69,733	$ 141	$ 189	$ 9,850,487	$13,166,161
50.02	Curb & Gutter	LF	15,533	$ 56	$ 75	$ 872,390	$1,166,036
50.03	Concrete Median	LF	1,447	$ 114	$ 152	$ 165,000	$220,539
50.04	Concrete Sidewalk	SF	29,837	$ 12	$ 16	$ 355,463	$475,112
50.05	Clearing and Grubbing	Acre	3	$ 20,905	$ 27,941	$ 62,714	$83,823
50.06	Excavation (and Disposal)	CY	10,482	$ 51	$ 68	$ 535,188	$715,333
50.07	Over Excavation/Undercut	CY	59,595	$ 58	$ 77	$ 3,448,498	$4,609,263
50.08	Embankment (Common Borrow)	CY	216,414	$ 33	$ 44	$ 7,173,492	$9,588,090
50.09	Embankment (Engineer Fill/Select Borrow)	CY	59,595	$ 40	$ 54	$ 2,390,766	$3,195,497
50.10	Maintenance of Traffic	10%	1	$ 2,485,400	$ 3,321,986	$ 2,485,400	$3,321,986
50.11	Stormwater Management	5%	1	$ 1,242,700	$ 1,660,993	$ 1,242,700	$1,660,993
50.12	Grade Crossing - Concrete Panels	TF	731	$ 1,297	$ 1,734	$ 948,450	$1,267,698
50.13	Grade Crossing - Quad Gates	EA	9	$ 542,996	$ 725,769	$ 4,886,966	$6,531,918
50.14	Grade Crossing - Median Separator with Dual Gates	EA	3	$ 282,034	$ 376,966	$ 846,102	$1,130,899
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	2	$ 21,720	$ 29,031	$ 43,440	$58,061
50.16	Culvert Extension (less than 6-ft dia.)	EA	26	$ 19,572	$ 26,160	$ 508,864	$680,148
50.17	New Culvert (Jack and Bore)	EA	37	$ 150,000	$ 200,490	$ 5,550,000	$7,418,130

DC2RVA - RIC 6B (S-Line) - Boulevard Station Only							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 6,106,600	$ 8,162,082	$ 6,106,600	$8,162,082
60.03	Temporary Acquisition	LS	1	$ 1,957,234	$ 2,616,039	$ 1,957,234	$2,616,039
60.04	Damages	LS	1	$ 3,985,000	$ 5,326,351	$ 3,985,000	$5,326,351
60.05	Condemnation	LS	1	$ 453,000	$ 605,480	$ 453,000	$605,480
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$0
60.10	Residential (Tenants)	LF	1	$ 1,295,000	$ 1,730,897	$ 1,295,000	$1,730,897
60.11	Business (Owners and Tenants)	LF	1	$ 487,500	$ 651,593	$ 487,500	$651,593
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	196,175	$ 47	$ 63	$ 9,220,225	$12,323,753
60.22	Water	LF	1,658	$ 261	$ 349	$ 432,738	$578,398
60.23	Sanitary Sewer	LF	1,215	$ 395	$ 528	$ 479,925	$641,468
60.24	Electric Distribution	LF	23,020	$ 297	$ 397	$ 6,836,940	$9,138,254
60.25	Electric Transmission	LF	14,700	$ 5,000	$ 6,683	$ 73,500,000	$98,240,100
60.26	Gas	LF	7,325	$ 750	$ 1,002	$ 5,493,750	$7,342,946
60.27	Major Utility Facility Relocations	LF	2	$ 250,000	$ 334,150	$ 500,000	$668,300
					Subtotal	$ 758,332,805	$ 1,014,148,677
					6% Professional services	$ 45,499,968	$ 60,848,921
					35% Contingency	$ 281,341,471	$ 376,249,159
					Project Total	**$ 1,085,174,245**	**$ 1,451,246,757**

DC2RVA - RIC 6C - Broad Street Station Only							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	148,292	$ 395	$ 529	$ 58,575,340	$78,390,058
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	256,262	$ 359	$ 479	$ 91,998,058	$122,872,545
10.03	No. 10 Turnout	EA	9	$ 182,505	$ 243,936	$ 1,642,545	$2,195,427
10.04	No. 15 Turnout	EA	46	$ 365,010	$ 487,873	$ 16,790,460	$22,442,138
10.05	No. 20 Turnout	EA	52	$ 434,684	$ 581,012	$ 22,603,568	$30,212,617
10.06	Diamond Crossing	EA	1	$ 470,056	$ 628,277	$ 470,056	$628,277
10.07	Turnout Removal	EA	28	$ 33,228	$ 44,413	$ 930,384	$1,243,556
10.08	Track shift/realign	TF	42,397	$ 139	$ 186	$ 5,893,183	$7,882,480
10.09	Track removal	TF	29,881	$ 40	$ 53	$ 1,195,240	$1,578,118
10.1	Signals & Communications (from CHSR)	MI	27	$ 2,740,000	$ 3,662,284	$ 73,980,000	$98,881,668
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	200	$ 17,425	$ 23,290	$ 3,484,901	$4,657,919
20.02	Rail Bridge (New Double Parallel)	BF	-	$ 33,977	$ 45,414	$ -	$0
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF	-	$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF	196	$ 70,863	$ 94,716	$ 13,889,154	$18,564,243
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF	-	$ 75,023	$ 100,275	$ -	$0
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF	-	$ 44,341	$ 59,266	$ -	$0
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF	-	$ 25,271	$ 33,777	$ -	$0
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF	-	$ 32,661	$ 43,654	$ -	$0
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF	-	$ 35,569	$ 47,541	$ -	$0
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF	-	$ 28,447	$ 38,022	$ -	$0
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$0
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	-	$ 29,370	$ 39,257	$ -	$0
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF	-	$ 25,266	$ 33,771	$ -	$0
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF	-	$ 25,124	$ 33,580	$ -	$0
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	-	$ 35,927	$ 48,020	$ -	$0
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF	-	$ 22,611	$ 30,222	$ -	$0
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF	325	$ 24,845	$ 33,208	$ 8,074,597	$10,792,506
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF	-	$ 37,661	$ 50,338	$ -	$0
20.19	Restore Track on Downtown Richmond Viaduct	BF	-	$ 7,986	$ 10,675	$ -	$0
20.20	Overhead Structures - New (NOV)	SF	-	$ 721	$ 964	$ -	$0
20.21	Overhead Structures - New (CEN/RIC)	SF	242,230	$ 624	$ 834	$ 151,151,520	$202,019,820
20.22	James River Floodwall Penetrations	EA	-	$ 103,737	$ 138,654	$ -	$0
20.23	Pedestrian bridges - Trails	BF	-	$ 18,959	$ 25,340	$ -	$0
20.24	Drainage Structures - over 6'	EA	10	$ 226,101	$ 302,207	$ 2,261,012	$3,022,068
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	80,764	$ 177	$ 237	$ 14,328,000	$19,150,804
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	15,423	$ 222	$ 297	$ 3,423,599	$4,575,982
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	59,516	$ 147	$ 196	$ 8,733,297	$11,672,925
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	8,400	$ 279	$ 373	$ 2,343,896	$3,132,851
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	194,488	$ 73	$ 97	$ 14,185,913	$18,960,892
20.30	Crashwalls	LF	2,714	$ 4,953	$ 6,620	$ 13,442,707	$17,967,523
30	**Stations**						
30.01	Station Building- Small	SF	-	$ 305	$ 408	$ -	$0
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$0
30.03	Station Building - Large	SF	30,964	$ 298	$ 398	$ 9,219,218	$12,322,407
30.04	Main Street Station Upgrade - med	SF	-	$ 189	$ 253	$ -	$0
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$0
30.06	Platforms - New (Passenger Only)	SF	-	$ 46	$ 62	$ -	$0
30.07	Platforms - New (Maintenance Only)	SF	-	$ 36	$ 48	$ -	$0
30.08	Platforms - Expansion	SF	-	$ 38	$ 51	$ -	$0
30.09	Platforms - New (Passenger With Service)	SF	48,000	$ 50	$ 66	$ 2,377,905	$3,178,308
30.10	Vertical Access	EA	2	$ 150,000	$ 200,490	$ 300,000	$400,980
30.11	Ped Bridge - For Stations	BF	920	$ 29,442	$ 39,794	$ 27,086,215	$36,610,175
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$0
30.13	Parking - Structure	Stall	300	$ 33,256	$ 44,449	$ 9,976,650	$13,334,791
30.14	Parking - Surface lot	Stall	300	$ 2,783	$ 3,720	$ 834,920	$1,115,954
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	230	$ 19,909	$ 26,611	$ 4,587,107	$6,131,128
40.02	Excavation (and Disposal)	CY	388,359	$ 49	$ 65	$ 18,884,549	$25,241,088
40.03	Over Excavation/Undercut	CY	275,803	$ 55	$ 74	$ 15,199,520	$20,315,679
40.04	Embankment (Common Borrow)	CY	22,005	$ 32	$ 42	$ 693,734	$927,245
40.05	Embankment (Engineer Fill/Select Borrow)	CY	254,683	$ 38	$ 51	$ 9,721,714	$12,994,043
40.06	Subballast	Ton	62,677	$ 44	$ 58	$ 2,742,988	$3,666,278
50	**Roadway**						
50.01	Asphalt Concrete	SY	134,018	$ 141	$ 189	$ 18,931,390	$25,303,696
50.02	Curb & Gutter	LF	25,400	$ 56	$ 75	$ 1,426,556	$1,906,735
50.03	Concrete Median	LF	4,296	$ 114	$ 152	$ 489,869	$654,760
50.04	Concrete Sidewalk	SF	80,068	$ 12	$ 16	$ 953,890	$1,274,969
50.05	Clearing and Grubbing	Acre	15	$ 20,905	$ 27,941	$ 313,568	$419,115
50.06	Excavation (and Disposal)	CY	141,587	$ 51	$ 68	$ 7,229,128	$9,662,452
50.07	Over Excavation/Undercut	CY	121,921	$ 58	$ 77	$ 7,055,027	$9,429,750
50.08	Embankment (Common Borrow)	CY	745,349	$ 33	$ 44	$ 24,706,144	$33,022,232
50.09	Embankment (Engineer Fill/Select Borrow)	CY	121,921	$ 40	$ 54	$ 4,891,090	$6,537,432
50.10	Maintenance of Traffic	10%	1	$ 6,599,667	$ 8,821,115	$ 6,599,667	$8,821,115
50.11	Stormwater Management	5%	1	$ 3,299,834	$ 4,410,558	$ 3,299,834	$4,410,558
50.12	Grade Crossing - Concrete Panels	TF	1,218	$ 1,297	$ 1,734	$ 1,580,317	$2,112,252
50.13	Grade Crossing - Quad Gates	EA	4	$ 542,996	$ 725,769	$ 2,171,985	$2,903,075
50.14	Grade Crossing - Median Separator with Dual Gates	EA	4	$ 282,034	$ 376,966	$ 1,128,135	$1,507,866
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	-	$ 21,720	$ 29,031	$ -	$0
50.16	Culvert Extension (less than 6-ft dia.)	EA	19	$ 19,572	$ 26,160	$ 371,862	$497,031
50.17	New Culvert (Jack and Bore)	EA	39	$ 150,000	$ 200,490	$ 5,850,000	$7,819,110

DC2RVA - RIC 6C - Broad Street Station Only							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 18,165,400	$ 24,279,874	$ 18,165,400	$24,279,874
60.03	Temporary Acquisition	LS	1	$ 1,431,500	$ 1,913,343	$ 1,431,500	$1,913,343
60.04	Damages	LS	1	$ 40,000	$ 53,464	$ 40,000	$53,464
60.05	Condemnation	LS	1	$ 3,660,000	$ 4,891,956	$ 3,660,000	$4,891,956
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$0
60.10	Residential (Tenants)	LF	1	$ 7,935,000	$ 10,605,921	$ 7,935,000	$10,605,921
60.11	Business (Owners and Tenants)	LF	1	$ 2,300,000	$ 3,074,180	$ 2,300,000	$3,074,180
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	104,900	$ 47	$ 63	$ 4,930,300	$6,589,839
60.22	Water	LF	2,665	$ 261	$ 349	$ 695,565	$929,692
60.23	Sanitary Sewer	LF	1,220	$ 395	$ 528	$ 481,900	$644,108
60.24	Electric Distribution	LF	20,920	$ 297	$ 397	$ 6,213,240	$8,304,617
60.25	Electric Transmission	LF	5,700	$ 5,000	$ 6,683	$ 28,500,000	$38,093,100
60.26	Gas	LF	7,200	$ 750	$ 1,002	$ 5,400,000	$7,217,640
60.27	Major Utility Facility Relocations	LF	1	$ 250,000	$ 334,150	$ 250,000	$334,150
					Subtotal	$ 778,023,319	$ 1,040,296,522
					6% Professional services	$ 46,681,399	$ 62,417,791
					35% Contingency	$ 288,646,651	$ 385,950,010
					Project Total	**$ 1,113,351,370**	**$ 1,488,664,323**

DC2RVA - RIC 6D - Main Street Station Only							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	166,496	$ 395	$ 529	$ 65,765,920	$88,013,049
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	154,209	$ 359	$ 479	$ 55,361,031	$73,940,156
10.03	No. 10 Turnout	EA	18	$ 182,505	$ 243,936	$ 3,285,090	$4,390,853
10.04	No. 15 Turnout	EA	46	$ 365,010	$ 487,873	$ 16,790,460	$22,442,138
10.05	No. 20 Turnout	EA	35	$ 434,684	$ 581,012	$ 15,213,940	$20,335,415
10.06	Diamond Crossing	EA	3	$ 470,056	$ 628,277	$ 1,410,168	$1,884,832
10.07	Turnout Removal	EA	29	$ 33,228	$ 44,413	$ 963,612	$1,287,969
10.08	Track shift/realign	TF	15,985	$ 139	$ 186	$ 2,221,915	$2,971,943
10.09	Track removal	TF	25,952	$ 40	$ 53	$ 1,038,080	$1,370,614
10.1	Signals & Communications (from CHSR)	MI	26	$ 2,740,000	$ 3,662,284	$ 71,240,000	$95,219,384
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	-	$ 17,425	$ 23,290	$ -	$0
20.02	Rail Bridge (New Double Parallel)	BF	-	$ 33,977	$ 45,414	$ -	$0
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF	-	$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF	-	$ 70,863	$ 94,716	$ -	$0
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF	-	$ 75,023	$ 100,275	$ -	$0
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF	-	$ 44,341	$ 59,266	$ -	$0
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF	-	$ 25,271	$ 33,777	$ -	$0
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF	-	$ 32,661	$ 43,654	$ -	$0
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF	-	$ 35,569	$ 47,541	$ -	$0
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF	-	$ 28,447	$ 38,022	$ -	$0
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$0
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	-	$ 29,370	$ 39,257	$ -	$0
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF	-	$ 25,266	$ 33,771	$ -	$0
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF	-	$ 25,124	$ 33,580	$ -	$0
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	-	$ 35,927	$ 48,020	$ -	$0
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF	-	$ 22,611	$ 30,222	$ -	$0
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF	-	$ 24,845	$ 33,208	$ -	$0
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF	2,242	$ 37,661	$ 50,338	$ 84,436,508	$112,857,836
20.19	Restore Track on Downtown Richmond Viaduct	BF	6,075	$ 7,986	$ 10,675	$ 48,514,950	$64,850,625
20.20	Overhead Structures - New (NOV)	SF	-	$ 721	$ 964	$ -	$0
20.21	Overhead Structures - New (CEN/RIC)	SF	68,130	$ 624	$ 834	$ 42,513,120	$56,820,420
20.22	James River Floodwall Penetrations	EA	2	$ 103,737	$ 138,654	$ 207,474	$277,308
20.23	Pedestrian bridges - Trails	BF	188	$ 18,959	$ 25,340	$ 3,564,292	$4,763,920
20.24	Drainage Structures - over 6'	EA	19	$ 226,101	$ 302,207	$ 4,295,922	$5,741,930
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	64,350	$ 177	$ 237	$ 11,416,061	$15,258,708
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	3,650	$ 222	$ 297	$ 810,227	$1,082,950
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	38,318	$ 147	$ 196	$ 5,622,731	$7,515,343
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	5,300	$ 279	$ 373	$ 1,478,887	$1,976,680
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	142,990	$ 73	$ 97	$ 10,429,660	$13,940,284
20.30	Crashwalls	LF	3,157	$ 4,953	$ 6,620	$ 15,636,930	$20,900,320
30	**Stations**						
30.01	Station Building- Small	SF	-	$ 305	$ 408	$ -	$0
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$0
30.03	Station Building - Large	SF	-	$ 298	$ 398	$ -	$0
30.04	Main Street Station Upgrade - med	SF	-	$ 189	$ 253	$ -	$0
30.05	Main Street Station Upgrade - Large	SF	6,800	$ 186	$ 248	$ 1,262,290	$1,687,177
30.06	Platforms - New (Passenger Only)	SF	60,000	$ 46	$ 62	$ 2,781,905	$3,718,294
30.07	Platforms - New (Maintenance Only)	SF	57,593	$ 36	$ 48	$ 2,065,120	$2,760,240
30.08	Platforms - Expansion	SF	-	$ 38	$ 51	$ -	$0
30.09	Platforms - New (Passenger With Service)	SF	-	$ 50	$ 66	$ -	$0
30.10	Vertical Access	EA	4	$ 150,000	$ 200,490	$ 600,000	$801,960
30.11	Ped Bridge - For Stations	BF	-	$ 29,442	$ 39,794	$ -	$0
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$0
30.13	Parking - Structure	Stall	600	$ 33,256	$ 44,449	$ 19,953,300	$26,669,582
30.14	Parking - Surface lot	Stall	52	$ 2,783	$ 3,720	$ 144,719	$193,432
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	209	$ 19,909	$ 26,611	$ 4,169,012	$5,572,301
40.02	Excavation (and Disposal)	CY	108,945	$ 49	$ 65	$ 5,297,617	$7,080,795
40.03	Over Excavation/Undercut	CY	432,850	$ 55	$ 74	$ 23,854,390	$31,883,778
40.04	Embankment (Common Borrow)	CY	22,005	$ 32	$ 42	$ 693,734	$927,245
40.05	Embankment (Engineer Fill/Select Borrow)	CY	411,730	$ 38	$ 51	$ 15,716,484	$21,006,653
40.06	Subballast	Ton	63,948	$ 44	$ 58	$ 2,798,612	$3,740,625
50	**Roadway**						
50.01	Asphalt Concrete	SY	64,323	$ 141	$ 189	$ 9,086,270	$12,144,709
50.02	Curb & Gutter	LF	14,378	$ 56	$ 75	$ 807,521	$1,079,332
50.03	Concrete Median	LF	829	$ 114	$ 152	$ 94,530	$126,349
50.04	Concrete Sidewalk	SF	22,567	$ 12	$ 16	$ 268,852	$359,347
50.05	Clearing and Grubbing	Acre	3	$ 20,905	$ 27,941	$ 62,714	$83,823
50.06	Excavation (and Disposal)	CY	10,675	$ 51	$ 68	$ 545,043	$728,504
50.07	Over Excavation/Undercut	CY	59,595	$ 58	$ 77	$ 3,448,498	$4,609,263
50.08	Embankment (Common Borrow)	CY	180,880	$ 33	$ 44	$ 5,995,644	$8,013,778
50.09	Embankment (Engineer Fill/Select Borrow)	CY	59,595	$ 40	$ 54	$ 2,390,766	$3,195,497
50.10	Maintenance of Traffic	10%	1	$ 2,269,984	$ 3,034,061	$ 2,269,984	$3,034,061
50.11	Stormwater Management	5%	1	$ 1,134,992	$ 1,517,031	$ 1,134,992	$1,517,031
50.12	Grade Crossing - Concrete Panels	TF	1,079	$ 1,297	$ 1,734	$ 1,399,969	$1,871,199
50.13	Grade Crossing - Quad Gates	EA	9	$ 542,996	$ 725,769	$ 4,886,966	$6,531,918
50.14	Grade Crossing - Median Separator with Dual Gates	EA	4	$ 282,034	$ 376,966	$ 1,128,135	$1,507,866
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	2	$ 21,720	$ 29,031	$ 43,440	$58,061
50.16	Culvert Extension (less than 6-ft dia.)	EA	26	$ 19,572	$ 26,160	$ 508,864	$680,148
50.17	New Culvert (Jack and Bore)	EA	37	$ 150,000	$ 200,490	$ 5,550,000	$7,418,130

DC2RVA - RIC 6D - Main Street Station Only							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 6,106,600	$ 8,162,082	$ 6,106,600	$8,162,082
60.03	Temporary Acquisition	LS	1	$ 1,957,234	$ 2,616,039	$ 1,957,234	$2,616,039
60.04	Damages	LS	1	$ 3,985,000	$ 5,326,351	$ 3,985,000	$5,326,351
60.05	Condemnation	LS	1	$ 453,000	$ 605,480	$ 453,000	$605,480
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$0
60.10	Residential (Tenants)	LF	1	$ 1,295,000	$ 1,730,897	$ 1,295,000	$1,730,897
60.11	Business (Owners and Tenants)	LF	1	$ 487,500	$ 651,593	$ 487,500	$651,593
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	196,175	$ 47	$ 63	$ 9,220,225	$12,323,753
60.22	Water	LF	1,658	$ 261	$ 349	$ 432,738	$578,398
60.23	Sanitary Sewer	LF	1,215	$ 395	$ 528	$ 479,925	$641,468
60.24	Electric Distribution	LF	23,020	$ 297	$ 397	$ 6,836,940	$9,138,254
60.25	Electric Transmission	LF	14,700	$ 5,000	$ 6,683	$ 73,500,000	$98,240,100
60.26	Gas	LF	7,325	$ 750	$ 1,002	$ 5,493,750	$7,342,946
60.27	Major Utility Facility Relocations	LF	2	$ 250,000	$ 334,150	$ 500,000	$668,300
					Subtotal	$ 691,924,262	$ 924,869,434
					6% Professional services	$ 41,515,456	$ 55,492,166
					35% Contingency	$ 256,703,901	$ 343,126,560
					Project Total	**$ 990,143,619**	**$ 1,323,488,160**

DC2RVA - RIC 6E - Main Street / Staples Mill Stations - Split Service							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	108,312	$ 395	$ 529	$ 42,783,240	$57,255,846
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	378,489	$ 359	$ 479	$ 135,877,551	$181,477,967
10.03	No. 10 Turnout	EA	9	$ 182,505	$ 243,936	$ 1,642,545	$2,195,427
10.04	No. 15 Turnout	EA	27	$ 365,010	$ 487,873	$ 9,855,270	$13,172,559
10.05	No. 20 Turnout	EA	25	$ 434,684	$ 581,012	$ 10,867,100	$14,525,297
10.06	Diamond Crossing	EA	1	$ 470,056	$ 628,277	$ 470,056	$628,277
10.07	Turnout Removal	EA	6	$ 33,228	$ 44,413	$ 199,368	$266,476
10.08	Track shift/realign	TF	38,070	$ 139	$ 186	$ 5,291,730	$7,078,002
10.09	Track removal	TF	11,025	$ 40	$ 53	$ 441,000	$582,268
10.1	Signals & Communications (from CHSR)	MI	29	$ 2,740,000	$ 3,662,284	$ 79,460,000	$106,206,236
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	200	$ 17,425	$ 23,290	$ 3,484,901	$4,657,919
20.02	Rail Bridge (New Double Parallel)	BF	-	$ 33,977	$ 45,414	$ -	$0
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF	-	$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF	196	$ 70,863	$ 94,716	$ 13,889,154	$18,564,243
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF	-	$ 75,023	$ 100,275	$ -	$0
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF	-	$ 44,341	$ 59,266	$ -	$0
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF	-	$ 25,271	$ 33,777	$ -	$0
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF	-	$ 32,661	$ 43,654	$ -	$0
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF	-	$ 35,569	$ 47,541	$ -	$0
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF	-	$ 28,447	$ 38,022	$ -	$0
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$0
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	-	$ 29,370	$ 39,257	$ -	$0
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF	-	$ 25,266	$ 33,771	$ -	$0
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF	-	$ 25,124	$ 33,580	$ -	$0
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	-	$ 35,927	$ 48,020	$ -	$0
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF	-	$ 22,611	$ 30,222	$ -	$0
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF	325	$ 24,845	$ 33,208	$ 8,074,597	$10,792,506
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF	-	$ 37,661	$ 50,338	$ -	$0
20.19	Restore Track on Downtown Richmond Viaduct	BF	-	$ 7,986	$ 10,675	$ -	$0
20.20	Overhead Structures - New (NOV)	SF	-	$ 721	$ 964	$ -	$0
20.21	Overhead Structures - New (CEN/RIC)	SF	165,230	$ 624	$ 834	$ 103,103,520	$137,801,820
20.22	James River Floodwall Penetrations	EA	-	$ 103,737	$ 138,654	$ -	$0
20.23	Pedestrian bridges - Trails	BF	-	$ 18,959	$ 25,340	$ -	$0
20.24	Drainage Structures - over 6'	EA	8	$ 226,101	$ 302,207	$ 1,808,809	$2,417,655
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	45,360	$ 177	$ 237	$ 8,047,126	$10,755,788
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	11,650	$ 222	$ 297	$ 2,586,068	$3,456,538
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	69,327	$ 147	$ 196	$ 10,172,950	$13,597,165
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	10,650	$ 279	$ 373	$ 2,971,725	$3,972,008
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	166,461	$ 73	$ 97	$ 12,141,630	$16,228,503
20.30	Crashwalls	LF	1,918	$ 4,953	$ 6,620	$ 9,500,042	$12,697,756
30	**Stations**						
30.01	Station Building- Small	SF	-	$ 305	$ 408	$ -	$0
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$0
30.03	Station Building - Large	SF	30,964	$ 298	$ 398	$ 9,219,218	$12,322,407
30.04	Main Street Station Upgrade - med	SF	6,800	$ 189	$ 253	$ 1,288,051	$1,721,609
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$0
30.06	Platforms - New (Passenger Only)	SF	96,000	$ 46	$ 62	$ 4,451,048	$5,949,270
30.07	Platforms - New (Maintenance Only)	SF	57,593	$ 36	$ 48	$ 2,065,120	$2,760,240
30.08	Platforms - Expansion	SF	-	$ 38	$ 51	$ -	$0
30.09	Platforms - New (Passenger With Service)	SF	-	$ 50	$ 66	$ -	$0
30.10	Vertical Access	EA	5	$ 150,000	$ 200,490	$ 750,000	$1,002,450
30.11	Ped Bridge - For Stations	BF	900	$ 29,442	$ 39,794	$ 26,497,385	$35,814,301
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$0
30.13	Parking - Structure	Stall	300	$ 33,256	$ 44,449	$ 9,976,650	$13,334,791
30.14	Parking - Surface lot	Stall	380	$ 2,783	$ 3,720	$ 1,057,565	$1,413,542
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	165	$ 19,909	$ 26,611	$ 3,293,002	$4,401,426
40.02	Excavation (and Disposal)	CY	60,742	$ 49	$ 65	$ 2,953,672	$3,947,878
40.03	Over Excavation/Undercut	CY	238,833	$ 55	$ 74	$ 13,162,101	$17,592,465
40.04	Embankment (Common Borrow)	CY	59,480	$ 32	$ 42	$ 1,875,178	$2,506,363
40.05	Embankment (Engineer Fill/Select Borrow)	CY	217,713	$ 38	$ 51	$ 8,310,502	$11,107,817
40.06	Subballast	Ton	53,948	$ 44	$ 58	$ 2,360,973	$3,155,677
50	**Roadway**						
50.01	Asphalt Concrete	SY	91,423	$ 141	$ 189	$ 12,914,418	$17,261,411
50.02	Curb & Gutter	LF	16,258	$ 56	$ 75	$ 913,108	$1,220,461
50.03	Concrete Median	LF	1,134	$ 114	$ 152	$ 129,309	$172,835
50.04	Concrete Sidewalk	SF	30,522	$ 12	$ 16	$ 363,624	$486,020
50.05	Clearing and Grubbing	Acre	13	$ 20,905	$ 27,941	$ 271,759	$363,233
50.06	Excavation (and Disposal)	CY	55,162	$ 51	$ 68	$ 2,816,453	$3,764,471
50.07	Over Excavation/Undercut	CY	110,441	$ 58	$ 77	$ 6,390,731	$8,541,851
50.08	Embankment (Common Borrow)	CY	732,505	$ 33	$ 44	$ 24,280,403	$32,453,186
50.09	Embankment (Engineer Fill/Select Borrow)	CY	110,441	$ 40	$ 54	$ 4,430,549	$5,921,871
50.10	Maintenance of Traffic	10%	1	$ 5,251,036	$ 7,018,534	$ 5,251,036	$7,018,534
50.11	Stormwater Management	5%	1	$ 2,625,518	$ 3,509,267	$ 2,625,518	$3,509,267
50.12	Grade Crossing - Concrete Panels	TF	247	$ 1,297	$ 1,734	$ 320,475	$428,347
50.13	Grade Crossing - Quad Gates	EA	4	$ 542,996	$ 725,769	$ 2,171,985	$2,903,075
50.14	Grade Crossing - Median Separator with Dual Gates	EA	1	$ 282,034	$ 376,966	$ 282,034	$376,966
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	-	$ 21,720	$ 29,031	$ -	$0
50.16	Culvert Extension (less than 6-ft dia.)	EA	16	$ 19,572	$ 26,160	$ 313,147	$418,552
50.17	New Culvert (Jack and Bore)	EA	40	$ 150,000	$ 200,490	$ 6,000,000	$8,019,600

DC2RVA - RIC 6E - Main Street / Staples Mill Stations - Split Service							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 5,108,400	$ 6,827,887	$ 5,108,400	$6,827,887
60.03	Temporary Acquisition	LS	1	$ 411,600	$ 550,145	$ 411,600	$550,145
60.04	Damages	LS	1	$ 1,335,000	$ 1,784,361	$ 1,335,000	$1,784,361
60.05	Condemnation	LS	1	$ 685,000	$ 915,571	$ 685,000	$915,571
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$0
60.10	Residential (Tenants)	LF	1	$ 1,467,500	$ 1,961,461	$ 1,467,500	$1,961,461
60.11	Business (Owners and Tenants)	LF	1	$ 455,000	$ 608,153	$ 455,000	$608,153
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	91,630	$ 47	$ 63	$ 4,306,610	$5,756,215
60.22	Water	LF	2,350	$ 261	$ 349	$ 613,350	$819,804
60.23	Sanitary Sewer	LF	1,220	$ 395	$ 528	$ 481,900	$644,108
60.24	Electric Distribution	LF	11,040	$ 297	$ 397	$ 3,278,880	$4,382,551
60.25	Electric Transmission	LF	3,700	$ 5,000	$ 6,683	$ 18,500,000	$24,727,100
60.26	Gas	LF	7,140	$ 750	$ 1,002	$ 5,355,000	$7,157,493
60.27	Major Utility Facility Relocations	LF	2	$ 250,000	$ 334,150	$ 500,000	$668,300
					Subtotal	$ 661,901,635	$ 885,023,319
					6% Professional services	$ 39,714,098	$ 53,101,399
					35% Contingency	$ 245,565,507	$ 328,343,651
					Project Total	**$ 947,181,240**	**$ 1,266,468,369**

DC2RVA - RIC 6F - Main Street / Staples Mill Stations - Full Service							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	170,404	$ 395	$ 529	$ 67,309,580	$90,078,894
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	150,434	$ 359	$ 479	$ 54,005,806	$72,130,119
10.03	No. 10 Turnout	EA	17	$ 182,505	$ 243,936	$ 3,102,585	$4,146,917
10.04	No. 15 Turnout	EA	52	$ 365,010	$ 487,873	$ 18,980,520	$25,369,373
10.05	No. 20 Turnout	EA	36	$ 434,684	$ 581,012	$ 15,648,624	$20,916,427
10.06	Diamond Crossing	EA	3	$ 470,056	$ 628,277	$ 1,410,168	$1,884,832
10.07	Turnout Removal	EA	29	$ 33,228	$ 44,413	$ 963,612	$1,287,969
10.08	Track shift/realign	TF	15,985	$ 139	$ 186	$ 2,221,915	$2,971,943
10.09	Track removal	TF	28,454	$ 40	$ 53	$ 1,138,160	$1,502,753
10.1	Signals & Communications (from CHSR)	MI	26	$ 2,740,000	$ 3,662,284	$ 71,240,000	$95,219,384
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	-	$ 17,425	$ 23,290	$ -	$0
20.02	Rail Bridge (New Double Parallel)	BF	-	$ 33,977	$ 45,414	$ -	$0
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF	-	$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF	-	$ 70,863	$ 94,716	$ -	$0
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF	-	$ 75,023	$ 100,275	$ -	$0
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF	-	$ 44,341	$ 59,266	$ -	$0
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF	-	$ 25,271	$ 33,777	$ -	$0
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF	-	$ 32,661	$ 43,654	$ -	$0
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF	-	$ 35,569	$ 47,541	$ -	$0
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF	-	$ 28,447	$ 38,022	$ -	$0
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$0
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	-	$ 29,370	$ 39,257	$ -	$0
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF	-	$ 25,266	$ 33,771	$ -	$0
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF	-	$ 25,124	$ 33,580	$ -	$0
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	-	$ 35,927	$ 48,020	$ -	$0
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF	-	$ 22,611	$ 30,222	$ -	$0
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF	-	$ 24,845	$ 33,208	$ -	$0
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF	2,242	$ 37,661	$ 50,338	$ 84,436,508	$112,857,836
20.19	Restore Track on Downtown Richmond Viaduct	BF	6,075	$ 7,986	$ 10,675	$ 48,514,950	$64,850,625
20.20	Overhead Structures - New (NOV)	SF	-	$ 721	$ 964	$ -	$0
20.21	Overhead Structures - New (CEN/RIC)	SF	68,130	$ 624	$ 834	$ 42,513,120	$56,820,420
20.22	James River Floodwall Penetrations	EA	2	$ 103,737	$ 138,654	$ 207,474	$277,308
20.23	Pedestrian bridges - Trails	BF	188	$ 18,959	$ 25,340	$ 3,564,292	$4,763,920
20.24	Drainage Structures - over 6'	EA	19	$ 226,101	$ 302,207	$ 4,295,922	$5,741,930
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	54,121	$ 177	$ 237	$ 9,601,378	$12,833,201
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	3,650	$ 222	$ 297	$ 810,227	$1,082,950
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	47,670	$ 147	$ 196	$ 6,995,031	$9,349,559
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	5,300	$ 279	$ 373	$ 1,478,887	$1,976,680
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	142,990	$ 73	$ 97	$ 10,429,660	$13,940,284
20.30	Crashwalls	LF	3,157	$ 4,953	$ 6,620	$ 15,636,930	$20,900,320
30	**Stations**						
30.01	Station Building- Small	SF	-	$ 305	$ 408	$ -	$0
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$0
30.03	Station Building - Large	SF	30,964	$ 298	$ 398	$ 9,219,218	$12,322,407
30.04	Main Street Station Upgrade - med	SF	6,800	$ 189	$ 253	$ 1,288,051	$1,721,609
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$0
30.06	Platforms - New (Passenger Only)	SF	117,600	$ 46	$ 62	$ 5,452,533	$7,287,856
30.07	Platforms - New (Maintenance Only)	SF	57,593	$ 36	$ 48	$ 2,065,120	$2,760,240
30.08	Platforms - Expansion	SF	-	$ 38	$ 51	$ -	$0
30.09	Platforms - New (Passenger With Service)	SF	-	$ 50	$ 66	$ -	$0
30.10	Vertical Access	EA	6	$ 150,000	$ 200,490	$ 900,000	$1,202,940
30.11	Ped Bridge - For Stations	BF	1,900	$ 29,442	$ 39,794	$ 55,938,923	$75,607,969
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$0
30.13	Parking - Structure	Stall	300	$ 33,256	$ 44,449	$ 9,976,650	$13,334,791
30.14	Parking - Surface lot	Stall	400	$ 2,783	$ 3,720	$ 1,113,227	$1,487,939
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	221	$ 19,909	$ 26,611	$ 4,407,923	$5,891,631
40.02	Excavation (and Disposal)	CY	143,336	$ 49	$ 65	$ 6,969,932	$9,316,011
40.03	Over Excavation/Undercut	CY	437,569	$ 55	$ 74	$ 24,114,454	$32,231,380
40.04	Embankment (Common Borrow)	CY	22,005	$ 32	$ 42	$ 693,734	$927,245
40.05	Embankment (Engineer Fill/Select Borrow)	CY	416,449	$ 38	$ 51	$ 15,896,617	$21,247,418
40.06	Subballast	Ton	66,644	$ 44	$ 58	$ 2,916,600	$3,898,327
50	**Roadway**						
50.01	Asphalt Concrete	SY	64,323	$ 141	$ 189	$ 9,086,270	$12,144,709
50.02	Curb & Gutter	LF	14,378	$ 56	$ 75	$ 807,521	$1,079,332
50.03	Concrete Median	LF	829	$ 114	$ 152	$ 94,530	$126,349
50.04	Concrete Sidewalk	SF	22,567	$ 12	$ 16	$ 268,852	$359,347
50.05	Clearing and Grubbing	Acre	3	$ 20,905	$ 27,941	$ 62,714	$83,823
50.06	Excavation (and Disposal)	CY	10,675	$ 51	$ 68	$ 545,043	$728,504
50.07	Over Excavation/Undercut	CY	59,595	$ 58	$ 77	$ 3,448,498	$4,609,263
50.08	Embankment (Common Borrow)	CY	180,880	$ 33	$ 44	$ 5,995,644	$8,013,778
50.09	Embankment (Engineer Fill/Select Borrow)	CY	59,595	$ 40	$ 54	$ 2,390,766	$3,195,497
50.10	Maintenance of Traffic	10%	1	$ 2,269,984	$ 3,034,061	$ 2,269,984	$3,034,061
50.11	Stormwater Management	5%	1	$ 1,134,992	$ 1,517,031	$ 1,134,992	$1,517,031
50.12	Grade Crossing - Concrete Panels	TF	1,079	$ 1,297	$ 1,734	$ 1,399,969	$1,871,199
50.13	Grade Crossing - Quad Gates	EA	9	$ 542,996	$ 725,769	$ 4,886,966	$6,531,918
50.14	Grade Crossing - Median Separator with Dual Gates	EA	4	$ 282,034	$ 376,966	$ 1,128,135	$1,507,866
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	2	$ 21,720	$ 29,031	$ 43,440	$58,061
50.16	Culvert Extension (less than 6-ft dia.)	EA	29	$ 19,572	$ 26,160	$ 567,579	$758,626
50.17	New Culvert (Jack and Bore)	EA	40	$ 150,000	$ 200,490	$ 6,000,000	$8,019,600

DC2RVA - RIC 6F - Main Street / Staples Mill Stations - Full Service							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 12,712,731	$ 16,991,836	$ 12,712,731	$16,991,836
60.03	Temporary Acquisition	LS	1	$ 4,342,074	$ 5,803,616	$ 4,342,074	$5,803,616
60.04	Damages	LS	1	$ 13,537,200	$ 18,093,822	$ 13,537,200	$18,093,822
60.05	Condemnation	LS	1	$ 430,000	$ 574,738	$ 430,000	$574,738
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$0
60.10	Residential (Tenants)	LF	1	$ 1,140,000	$ 1,523,724	$ 1,140,000	$1,523,724
60.11	Business (Owners and Tenants)	LF	1	$ 405,000	$ 541,323	$ 405,000	$541,323
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	196,175	$ 47	$ 63	$ 9,220,225	$12,323,753
60.22	Water	LF	1,658	$ 261	$ 349	$ 432,738	$578,398
60.23	Sanitary Sewer	LF	1,215	$ 395	$ 528	$ 479,925	$641,468
60.24	Electric Distribution	LF	23,020	$ 297	$ 397	$ 6,836,940	$9,138,254
60.25	Electric Transmission	LF	14,700	$ 5,000	$ 6,683	$ 73,500,000	$98,240,100
60.26	Gas	LF	7,325	$ 750	$ 1,002	$ 5,493,750	$7,342,946
60.27	Major Utility Facility Relocations	LF	2	$ 250,000	$ 334,150	$ 500,000	$668,300
					Subtotal	$ 774,619,817	$ 1,036,242,650
					6% Professional services	$ 46,477,189	$ 62,174,559
					35% Contingency	$ 287,383,952	$ 384,446,023
					Project Total	**$ 1,108,480,959**	**$ 1,482,863,232**

DC2RVA - RIC 6G - Main Street / Staples Mill Stations - Shared Service							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
10	**Track Elements**						
10.01	Single track - 136 lb CWR - Class IV or V (concrete ties, ballast, OTM)	TF	173,579	$ 395	$ 529	$ 68,563,705	$91,757,261
10.02	Upgrade Class III or IV to Class IV or V (New rail and Ties)	TF	303,757	$ 359	$ 479	$ 109,048,763	$145,645,455
10.03	No. 10 Turnout	EA	16	$ 182,505	$ 243,936	$ 2,920,080	$3,902,980
10.04	No. 15 Turnout	EA	53	$ 365,010	$ 487,873	$ 19,345,530	$25,857,246
10.05	No. 20 Turnout	EA	44	$ 434,684	$ 581,012	$ 19,126,096	$25,564,522
10.06	Diamond Crossing	EA	3	$ 470,056	$ 628,277	$ 1,410,168	$1,884,832
10.07	Turnout Removal	EA	32	$ 33,228	$ 44,413	$ 1,063,296	$1,421,207
10.08	Track shift/realign	TF	16,301	$ 139	$ 186	$ 2,265,839	$3,030,694
10.09	Track removal	TF	29,670	$ 40	$ 53	$ 1,186,800	$1,566,974
10.1	Signals & Communications (from CHSR)	MI	26	$ 2,740,000	$ 3,662,284	$ 71,240,000	$95,219,384
20	**Structures**						
20.01	Rail Bridge (New Single Parallel)	BF	-	$ 17,425	$ 23,290	$ -	$0
20.02	Rail Bridge (New Double Parallel)	BF	-	$ 33,977	$ 45,414	$ -	$0
20.03	Rail Bridge (New Double Parallel - Loop Bridge)	BF	-	$ 28,886	$ 38,609	$ -	$0
20.04	Rail Bridge (New) - Walmsley Blvd.	BF	-	$ 70,863	$ 94,716	$ -	$0
20.05	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Neabsco Creek	BF	-	$ 75,023	$ 100,275	$ -	$0
20.06	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Occocquan Creek	BF	-	$ 44,341	$ 59,266	$ -	$0
20.07	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Aquia Creek	BF	-	$ 25,271	$ 33,777	$ -	$0
20.08	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Powells Creek	BF	-	$ 32,661	$ 43,654	$ -	$0
20.09	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Potomac Creek	BF	-	$ 35,569	$ 47,541	$ -	$0
20.10	Rail Bridge (Major Span – New Double Super and Sub) Lake Near Old Grain Rd	BF	-	$ 28,447	$ 38,022	$ -	$0
20.11	Rail Bridge (Major Span – New Double Parallel) Rappahannock River	BF	-	$ 37,159	$ 49,666	$ -	$0
20.12	Rail Bridge (Major Span – New Double Super and Sub) Rappahannock River	BF	-	$ 29,370	$ 39,257	$ -	$0
20.13	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) North Anna River	BF	-	$ 25,266	$ 33,771	$ -	$0
20.14	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Little River	BF	-	$ 25,124	$ 33,580	$ -	$0
20.15	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) South Anna River	BF	-	$ 35,927	$ 48,020	$ -	$0
20.16	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) Mattaponi River	BF	-	$ 22,611	$ 30,222	$ -	$0
20.17	Rail Bridge (Minor Span – New Single Parallel Super with Double Sub) Falling Creek	BF	-	$ 24,845	$ 33,208	$ -	$0
20.18	Rail Bridge (Major Span – New Single Parallel Super with Double Sub) James River	BF	2,242	$ 37,661	$ 50,338	$ 84,436,508	$112,857,836
20.19	Restore Track on Downtown Richmond Viaduct	BF	6,075	$ 7,986	$ 10,675	$ 48,514,950	$64,850,625
20.20	Overhead Structures - New (NOV)	SF	-	$ 721	$ 964	$ -	$0
20.21	Overhead Structures - New (CEN/RIC)	SF	68,130	$ 624	$ 834	$ 42,513,120	$56,820,420
20.22	James River Floodwall Penetrations	EA	2	$ 103,737	$ 138,654	$ 207,474	$277,308
20.23	Pedestrian bridges - Trails	BF	188	$ 18,959	$ 25,340	$ 3,564,292	$4,763,920
20.24	Drainage Structures - over 6'	EA	20	$ 226,101	$ 302,207	$ 4,522,024	$6,044,137
20.25	Retaining Walls - cut walls (soldier pile with lagging): H<10'	SF	56,970	$ 177	$ 237	$ 10,106,807	$13,508,758
20.26	Retaining Walls - cut walls (soldier pile with lagging): H≥10'	SF	3,650	$ 222	$ 297	$ 810,227	$1,082,950
20.27	Retaining Walls - fill walls (CIP): H<10'	SF	40,394	$ 147	$ 196	$ 5,927,361	$7,922,510
20.28	Retaining Walls - fill walls (CIP): H≥10'	SF	8,300	$ 279	$ 373	$ 2,315,992	$3,095,555
20.29	Retaining Walls - MSE (roadways & overpass bridges)	SF	142,990	$ 73	$ 97	$ 10,429,660	$13,940,284
20.30	Crashwalls	LF	3,157	$ 4,953	$ 6,620	$ 15,636,930	$20,900,320
30	**Stations**						
30.01	Station Building- Small	SF	-	$ 305	$ 408	$ -	$0
30.02	Station Building - Medium	SF	-	$ 301	$ 403	$ -	$0
30.03	Station Building - Large	SF	30,804	$ 298	$ 398	$ 9,171,580	$12,258,734
30.04	Main Street Station Upgrade - med	SF	6,800	$ 189	$ 253	$ 1,288,051	$1,721,609
30.05	Main Street Station Upgrade - Large	SF	-	$ 186	$ 248	$ -	$0
30.06	Platforms - New (Passenger Only)	SF	156,000	$ 46	$ 62	$ 7,232,952	$9,667,565
30.07	Platforms - New (Maintenance Only)	SF	57,593	$ 36	$ 48	$ 2,065,120	$2,760,240
30.08	Platforms - Expansion	SF	-	$ 38	$ 51	$ -	$0
30.09	Platforms - New (Passenger With Service)	SF	-	$ 50	$ 66	$ -	$0
30.10	Vertical Access	EA	8	$ 150,000	$ 200,490	$ 1,200,000	$1,603,920
30.11	Ped Bridge - For Stations	BF	2,340	$ 29,442	$ 39,794	$ 68,893,200	$93,117,183
30.12	Ped Tunnel	LS	-	$ 332,254	$ 444,090	$ -	$0
30.13	Parking - Structure	Stall	200	$ 33,256	$ 44,449	$ 6,651,100	$8,889,861
30.14	Parking - Surface lot	Stall	450	$ 2,783	$ 3,720	$ 1,252,380	$1,673,931
40	**Sitework - Special Conditions**						
40.01	Clearing and Grubbing (Rail)	Acre	221	$ 19,909	$ 26,611	$ 4,407,923	$5,891,631
40.02	Excavation (and Disposal)	CY	185,840	$ 49	$ 65	$ 9,036,753	$12,078,525
40.03	Over Excavation/Undercut	CY	451,800	$ 55	$ 74	$ 24,898,726	$33,279,637
40.04	Embankment (Common Borrow)	CY	22,005	$ 32	$ 42	$ 693,734	$927,245
40.05	Embankment (Engineer Fill/Select Borrow)	CY	430,680	$ 38	$ 51	$ 16,439,840	$21,973,491
40.06	Subballast	Ton	71,588	$ 44	$ 58	$ 3,132,968	$4,187,525
50	**Roadway**						
50.01	Asphalt Concrete	SY	64,323	$ 141	$ 189	$ 9,086,270	$12,144,709
50.02	Curb & Gutter	LF	14,378	$ 56	$ 75	$ 807,521	$1,079,332
50.03	Concrete Median	LF	829	$ 114	$ 152	$ 94,530	$126,349
50.04	Concrete Sidewalk	SF	22,567	$ 12	$ 16	$ 268,852	$359,347
50.05	Clearing and Grubbing	Acre	3	$ 20,905	$ 27,941	$ 62,714	$83,823
50.06	Excavation (and Disposal)	CY	10,675	$ 51	$ 68	$ 545,043	$728,504
50.07	Over Excavation/Undercut	CY	59,595	$ 58	$ 77	$ 3,448,498	$4,609,263
50.08	Embankment (Common Borrow)	CY	180,880	$ 33	$ 44	$ 5,995,644	$8,013,778
50.09	Embankment (Engineer Fill/Select Borrow)	CY	59,595	$ 40	$ 54	$ 2,390,766	$3,195,497
50.10	Maintenance of Traffic	10%	1	$ 2,269,984	$ 3,034,061	$ 2,269,984	$3,034,061
50.11	Stormwater Management	5%	1	$ 1,134,992	$ 1,517,031	$ 1,134,992	$1,517,031
50.12	Grade Crossing - Concrete Panels	TF	1,079	$ 1,297	$ 1,734	$ 1,399,969	$1,871,199
50.13	Grade Crossing - Quad Gates	EA	9	$ 542,996	$ 725,769	$ 4,886,966	$6,531,918
50.14	Grade Crossing - Median Separator with Dual Gates	EA	4	$ 282,034	$ 376,966	$ 1,128,135	$1,507,866
50.15	Grade Crossing - Locking Gate (Private Entrances)	EA	2	$ 21,720	$ 29,031	$ 43,440	$58,061
50.16	Culvert Extension (less than 6-ft dia.)	EA	31	$ 19,572	$ 26,160	$ 606,722	$810,945
50.17	New Culvert (Jack and Bore)	EA	40	$ 150,000	$ 200,490	$ 6,000,000	$8,019,600

DC2RVA - RIC 6G - Main Street / Staples Mill Stations - Shared Service							
	ITEM DESCRIPTION	*UNIT*	*QUANTITY*	*2016 UNIT COST*	2025 UNIT COST	*2016 TOTAL COST*	*2025 TOTAL COST*
60	**Row, Land, Existing Improvements**						
60.01	Purchase or lease of real estate						
60.02	Permanent Acquisition	LS	1	$ 8,304,600	$ 11,099,928	$ 8,304,600	$11,099,928
60.03	Temporary Acquisition	LS	1	$ 651,200	$ 870,394	$ 651,200	$870,394
60.04	Damages	LS	1	$ 5,785,000	$ 7,732,231	$ 5,785,000	$7,732,231
60.05	Condemnation	LS	1	$ 440,000	$ 588,104	$ 440,000	$588,104
60.06	Admin Cost	LS	-	$ -	$ -	$ -	$0
60.07	Admin Settlement	LS	-	$ -	$ -	$ -	$0
60.08	Relocation of existing households and businesses						
60.09	Residential (Owners)	LF	-	$ -	$ -	$ -	$0
60.10	Residential (Tenants)	LF	1	$ 1,220,000	$ 1,630,652	$ 1,220,000	$1,630,652
60.11	Business (Owners and Tenants)	LF	1	$ 405,000	$ 541,323	$ 405,000	$541,323
60.12	Others (Personal Property Moves)	LF	-	$ -	$ -	$ -	$0
60.13	Unspecified	LF	-	$ -	$ -	$ -	$0
60.14	Services						
60.15	Property Management	LF	-	$ -	$ -	$ -	$0
60.16	Agency	LF	-	$ -	$ -	$ -	$0
60.17	Contractor R/W Services (Title/Appraisal, etc)	LF	-	$ -	$ -	$ -	$0
60.18	Legal Services	LF	-	$ -	$ -	$ -	$0
60.19	Unspecified	LF	-	$ -	$ -	$ -	$0
60.20	Other Real Estate Costs						
60.21	Fiber Optic Relocation (New Fiber Direct Bury)	LF	196,175	$ 47	$ 63	$ 9,220,225	$12,323,753
60.22	Water	LF	1,658	$ 261	$ 349	$ 432,738	$578,398
60.23	Sanitary Sewer	LF	1,215	$ 395	$ 528	$ 479,925	$641,468
60.24	Electric Distribution	LF	23,705	$ 297	$ 397	$ 7,040,385	$9,410,179
60.25	Electric Transmission	LF	14,700	$ 5,000	$ 6,683	$ 73,500,000	$98,240,100
60.26	Gas	LF	7,475	$ 750	$ 1,002	$ 5,606,250	$7,493,314
60.27	Major Utility Facility Relocations	LF	2	$ 250,000	$ 334,150	$ 500,000	$668,300
					Subtotal	$ 835,275,319	$ 1,117,455,703
					6% Professional services	$ 50,116,519	$ 67,047,342
					35% Contingency	$ 309,887,143	$ 414,576,066
					Project Total	**$ 1,195,278,982**	**$ 1,599,079,110**