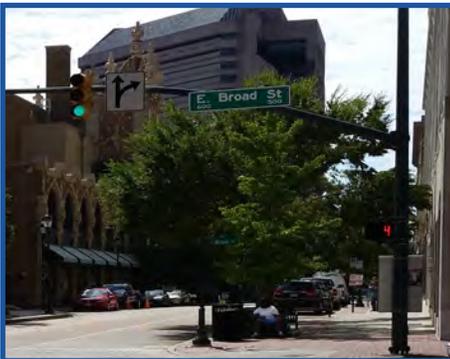


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Design-Build GRTC Bus Rapid Transit (BRT) Project City of Richmond and County of Henrico, Virginia

Contract ID Number C00108069DB87



VOLUME I TECHNICAL PROPOSAL

Submitted by



Submitted to



February 29, 2016



4.1 Letter of Submittal

February 29, 2016

Mr. Bryan Stevenson, PE
Alternate Project Delivery Office
Virginia Department of Transportation
1401 East Broad Street
Richmond, VA 23219

**RE: Letter of Submittal: Design Build | GRTC Bus Rapid Transit (BRT)
Contract ID Number: C00108069DB87**

Dear Mr. Stevenson:

4.1.1 Corman Construction, Inc. (Corman), 12001 Guilford Road, Annapolis Junction, MD 20701 is the legal entity who will execute the contract with VDOT and submits the following:

- Ten identical paper copies of the Technical Proposal, one of which bears an original signature on the Letter of Submittal
- One CD-ROM containing the entire proposal in a single cohesive Adobe PDF file, along with the Proposal Schedule and Narrative as required.

4.1.2 Corman declares our intent that if selected, we will enter into a contract with VDOT for this project per the RFP.

4.1.3 Pursuant to Part 1, Sec. 8.2, Corman declares that the offer represented by our Technical and Price Proposals will remain in full force and effect for 120 days after the date the Technical Proposal is actually submitted to VDOT (February 29, 2016).

4.1.4 Point of Contact	Secondary Point of Contact	4.1.5 Principal Officer for Corman
<p>Chris Rutkai, PE, Division Manager, Gorman South Corman Construction, Inc. 16500 Happy Hill Road Colonial Heights, VA 23834 804-520-9766 Telephone 804-520-9810 Fax crutkai@cormanconstruction.com</p>	<p>Lou Robbins, PE, DBIA Vice President Design-Build Corman Construction, Inc. 12001 Guilford Road Annapolis Junction, MD 20701 703-772-8566 Telephone 301-953-0384 Fax lrobbins@cormanconstruction.com</p>	<p>Arthur C. Cox, III, Vice President Corman Construction, Inc. 12001 Guilford Road Annapolis Junction, MD 20701 410-792-9400 Telephone ccox@cormanconstruction.com</p>

4.1.6 Interim Milestone Date: March 30, 2018 | Final Completion Date: June 30, 2018.

4.1.7 An executed **Proposal Payment Agreement (Attachment 9.3.1)** is in the Appendix.

4.1.8 Certification Regarding Debarment Forms (Attachments 11.8.6(a) and 11.8.6(b)) are in the Appendix.

We present to you a design-build team equipped with the experience, knowledge, and resources to partner with the Virginia Department of Transportation in successfully delivering the GRTC Bus Rapid Transit (BRT) Design-Build project.

Sincerely,

CORMAN CONSTRUCTION, INC.



Arthur C. Cox, III, Vice President



4.2 Qualifications

4.2 QUALIFICATIONS

4.2.1 The information and statements made in our SOQ remain true and accurate in accordance with Part 1, Section 11.4. The organizational chart and narrative as provided in our SOQ is wholly incorporated into this technical proposal by reference.

Per our response to your clarification email dated 11/16/15, we have clarified our organizational chart to reflect that the Design QC Manager reports to the Design Manager. In addition, Bryon Johnston from Parsons has replaced Steve Walter as Community Stakeholder Involvement, which was approved and will now be called the Public Information Officer, as required by the RFP (See his bio below). We added Michael Elliott from CES Consulting, LLC as the Lead QC Inspection who will report to Design and Construction QC Managers, Devin Robertson from MBP as QA Inspection, who will report to the QA Manager, Douglas Brazelton as ITS Devices/Systems and Stuart Tyler, PE as Environmental/Permitting from Parsons who will report to the Design Manager, a Utility Coordinator, and Virginia Commonwealth University (VCU) as a stakeholder.

We are in discussions with VCU and the University of Richmond to provide the required Archeological services, however neither is prepared to make a commitment at this time. If we cannot obtain the required Archeology services from either of these two local universities, we will contract with a local firm that meets the required Secretary of Interior's standards. The firm we would propose, should the Universities not be available, is James River Institute for Archaeology. They have considerable experience dealing with the Virginia Department of Historic Resources on similar monitoring projects. They also have experience conducting large-scale archaeological projects in the City of Richmond. From 2005 to 2010 they excavated the site of Lumpkin's Slave Jail, a large slave-trading facility located in the downtown Shockoe Bottom neighborhood, and over the past several months has been assisting the mayor's office with a large Public Outreach Program in anticipation of construction of a museum on the site.

It is clearly shown on the Organizational Chart that the Construction QC Manager reports to the Construction Manager, the Lead Utility Coordination Manager works with the design and construction teams, and that the Lead Utilities Designer and Utility Coordinator communicate with each other. We also revised the reporting line from the DBPM to the Quality Assurance box and eliminated the reporting line to the Lead Utility Coordination Manager and Design/ Construction Integrator.

DB **Public Information Officer (PIO) Bryon Johnston (Parsons)** has almost 20 years of strategic communication and public outreach experience with community and customer relations being a critical component of this work. He has spent the last 12 years developing and executing successful strategic communication and outreach efforts for high-profile, politically-sensitive transportation and infrastructure projects and initiatives in Virginia, Washington, DC, and Maryland. His project portfolio includes the Woodrow Wilson Bridge which spanned these jurisdictions, the 11th Street Bridge and other Anacostia Waterfront Initiatives in District and the Chesapeake Bay Bridge Deck Reconstruction in Maryland. Bryon will leverage his experience to serve as a liaison between stakeholders, staff from GRTC, DRPT, City of Richmond, Henrico County, VDOT, and our team to identify potential design and construction issues and proposed solutions or strategies to minimize them while adroitly managing responses to complaints and concerns as they arise.

The above changes are shown in red on the Organizational Chart (See **Figure 1**).

4.2.2 ORGANIZATIONAL CHART

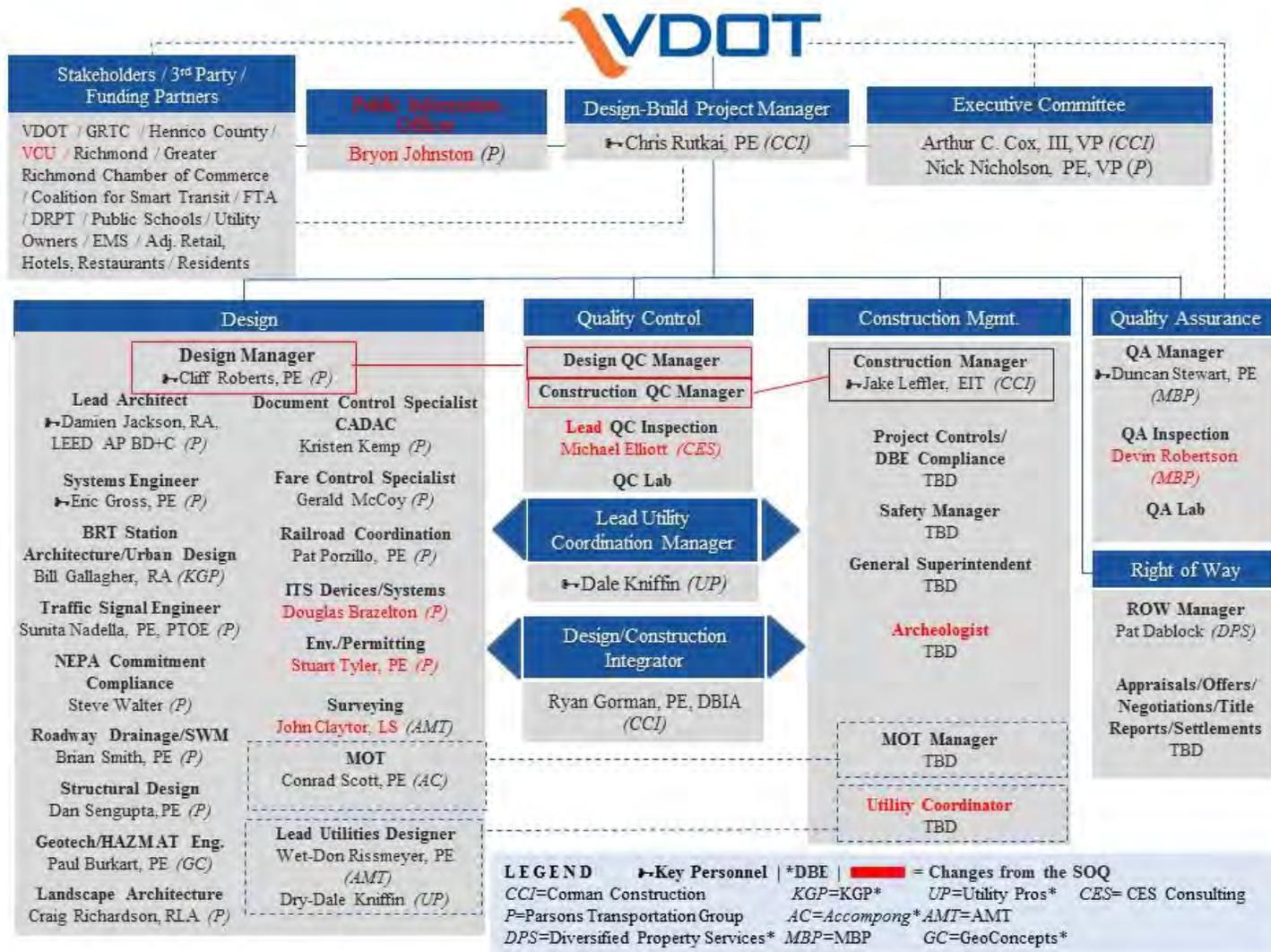


Figure 1: Organizational Chart



4.3 Design Concept

4.3 DESIGN CONCEPT

4.3.1 CONCEPTUAL ROADWAY PLANS

The GRTC Bus Rapid Transit (BRT) project is unique for a VDOT Design-Build procurement in that it is a transit project that will be delivered to a third-party transit operator (GRTC) as opposed to the upgrade or expansion of a VDOT owned-facility. Consequently, the roadway design is supplemental to the BRT scope and only includes items required to provide changes to the roadway to accommodate the new BRT operations. The roadway scope is, therefore, not intended to provide an upgrade of Broad Street and other streets on which the BRT operates – only to provide upgrades where specifically required due to the new BRT installations.

The project design has been subject of considerable study during the Alternatives Analysis and NEPA Phase prepared by Dept. of Rail and Public Transportation (DRPT) and the preliminary engineering phase prepared by GRTC. Consequently, the design features have been presented to third parties and have received formal approvals or general concurrence. Since the project schedule does not provide time to revisit these decisions, it is in the best interest of the project to progress the design in a manner consistent with the design shown in the Conceptual Plans.

With this background in mind, there are a considerable number of details to be evaluated and determined during final design.

ROADWAY: Roadway design will be consistent with the design shown in the Conceptual Plans. Consequently, the Corman/Parsons Team does not envision major changes to the roadway geometrics and overall roadway design concept. In addition, the limits of milling and overlay have been previously vented with the stakeholders and are as directed on the Conceptual Plans and the Byrd Street / Broad Street intersection will be upgraded to comply with CG-11 standards.

Geometrics: The horizontal and vertical geometrics are straightforward; the line and grade of Broad Street is unchanged. Roadwork consists mainly of milling and overlay. We will, therefore, not be providing a profile or cross sections for the full seven miles of Broad and Main Streets the BRT travels, but more as is typical for a site/civil project, show profiles or spot elevations at the key station control points. Intersection geometrics require more design effort. As discussed in RFP, Section 2.2.2 at intersections being modified, the new intersection elements will be designed to accommodate a City of Richmond firetruck. Intersections with cross streets classified as Minor Arterials, will also accommodate a WB-40; intersections with cross streets classified as Principle Arterials, will also accommodate a WB-62. This design will be determined using AutoTURN.

AutoTURN will also be used to ensure the BRT vehicles (GILLIG BRT PLUS) can maneuver to and from the station platforms without encroaching onto other traffic lanes, curbs, sidewalks, medians, and parking lanes.

Parking: Broad Street reconfiguration requires reducing on-street parking during construction and in the ultimate configuration. This is a sensitive issue for businesses. During construction, we will sequence construction operations to minimize removal of parking in accordance with Part 2 of the RFP. Ultimate parking and loading zone requirements are directed in RFP, Section 2.2.4. It is understood that no additional parking analysis is required by the Design-Builder and, therefore, no changes are proposed.

Pavement Marking and Signing: There are three special considerations for pavement markings and signing on this project: delineation of exclusive guideway for the BRT vehicles; warning and delineation of pedestrian

BENEFITS: Roadway design consistent with project planning & funding, including the TIGER Grant Application.

crossings; and wayfinding. Pavement markings will conform to the 2011 Virginia Supplement to the 2009 MUTCD requirements.

- **Exclusive BRT Guideway:** The specialized pavement markings to delineate the BRT guideway from public use travel lanes are shown on the RFP Conceptual Plans. These markings conform to the guidance of the 2011 Virginia Supplement to the 2009 MUTCD Chapter 3D - Markings for Preferential Lanes, including the use of “BUS ONLY” pavement messages.
- **Pedestrian and Bicycle Warning:** The BRT will increase pedestrian and bicycle activity along the BRT route due to additional transit riders and the economic benefits of BRT. Clearly-marked crosswalks will be provided as shown in the RFP, Part 2 and Conceptual Plans to warn motorists of the crosswalks and to make clear to pedestrians the location of legal and safe crossings to discourage jaywalking. Signs warning of increased pedestrian activity will be provided with the intention that these be in place during the 90-day operation testing period.
- **Wayfinding Signage:** In addition to signs needed for safe motor vehicle operations, wayfinding signage will be provided as an enhancement to the public. Because some on-street parking will be eliminated, wayfinding signs will guide motorists to off-street parking, surface lots, and garages. Wayfinding signs for pedestrians and bicyclists will guide them to the nearest BRT station and nearest pedestrian crossings. These signs could be combined with directional signs to public buildings and attractions.

***BENEFITS:**
Increased motor
vehicle/
pedestrian
safety.*

***BENEFITS:**
Improved
functionality &
urban place
making.*

Station Locations: Station locations have been selected by careful analysis during the previous Alternatives Analysis and Preliminary Engineering phases. They have also been vetted with many of the stakeholders and we will not be relocating any, except by the allowable 15-ft shift to avoid utilities or other in place obstructions. As noted in the RFP, a change in station location by more than 15-ft. will require re-review by third parties and could trigger a re-evaluation of the NEPA impacts. The project schedule does not allow for this level of review and re-evaluation.

In the Base Bid, the station length has been reduced by approximately 13-ft. from the full size station shown in the Concept Plans. This reduction coupled with the 15-ft. leeway in station location provides some flexibility to avoid utilities not shown on the Concept Plans which may be discovered during Subsurface Utility Engineering (SUE) performed prior to final design or for unknown conditions encountered during construction. For most stations, no change in station location is proposed. The following stations will be moved within the 15-ft. limit:

5th Street EB

Move 5-ft. east to avoid impact to street light.

9th Street EB

Move 5-ft. west to avoid placing level landing area of east ramp on top of inlet.

Main Street WB

Possible change in location due to adjacent Verizon manhole. Revised ramps for accessibility.

Pedestrian and Bicycle Facilities: The RFP Concept Plans show improvements to existing pedestrian crossings and new mid-block crossings. These improvements provide ADA compliant ramps and median refuge at mid-block crossings. The crosswalks will be signed and striped per the MUTCD, Virginia Supplement to the MUTD, and project special provisions as required by RFP, Section 2.10.3. No change is proposed.

ADA Ramps: Modifying intersections for exclusive BRT lanes requires reconstructing curb cut ramps. These ramps will be replaced with ADA compliant ramps. New crosswalks will be provided with new ADA complaint ramps. VDOT has identified, in the Curb Ramp Upgrades Requirement Matrix, the need to provide new ramps or upgrade existing ramps in locations not impacted by BRT construction. Some of these ramps would require relocating utility poles. To minimize utility relocations, we propose that a curb ramp “wing” be eliminated if it is in conflict with a utility pole. Eliminating a wing is not common, but is allowed by ADA. We are aware that on some projects construction of curb cut ramps has not resulted in ADA complaint ramps due to insufficient details provided in the plans. This is generally a result of over reliance of standard details without the necessary engineering to ensure the standard details address the site-specific conditions. We will ensure that the field forces have adequate information to construct the ramps in accordance with ADA the first time.

Crosswalks: The crosswalks will be signed and striped in accordance with the MUTCD, Virginia Supplement to the MUTD and project special provisions as required by RFP Section 2.10.3. No change to the RFP Concept Plans is proposed.

DRAINAGE / STORMWATER MANAGEMENT: As with any project in Virginia, this project must satisfy requirements of Virginia Department of Environmental Quality (DEQ) and Virginia Stormwater Management Program (VSMP) permitting by providing and implementing a stormwater management (SWM) design that meets current VDOT and DEQ methodology for water quality, downstream channel analysis, and erosion & sediment control (E&SC). A Richmond Stormwater Management Permit (RSMP) will be prepared for the areas of the project in the City of Richmond. This will include VSMP technical and administrative requirements. The project will conform to technical criteria contained in Part IIB of the VSMP Regulations which involves applying the Runoff Reduction Method for water quality and the Energy Balance Equation for erosion and flood control in the downstream receiving channel. Stormwater requirements are dependent on whether a station site discharges to a municipal separate storm sewer system (MS4) area or to a combined sanitary system (CSS). For MS4 locations, the project must reduce pollutant runoff by at least 10% relative to existing quality levels as calculated by the Runoff Reduction Method, and for CSS locations, the project must demonstrate there is no net increase in the pollutant load and quantity runoff. Some sections of the project are subject to consideration of the 100-year floodplain and the Chesapeake Bay Resource Management Area.

Because the project involves less than five acres of land disturbance, it qualifies for use of nutrient credits (See VDOT’s Nutrient Credit Use Flow Diagram, IIM-LD-251.2) to satisfy the water quality requirements. Nutrient credits are the preferred alternative (IIM-LD-251.2: “*The purchase of nutrient credits to address post-construction water quality reduction requirements for construction activities shall be considered the preferred alternative when available and economically feasible.*”

Nutrient credits are applied on a per drainage basin/tributary basis. The GRTC BRT project falls within two so-called “8-digit basins” within the James River Basin. There are eligible nutrient bank credit facilities for both of these sub basins within the proximity of this project.

Nutrient credits do not cover water quantity requirements, which must be addressed onsite. However, the GRTC BRT project has a nominal decrease in

BENEFITS: Using nutrient credits will eliminate a construction activity, thereby reducing project schedule and MOT impacts.

impervious area; therefore, no water quantity mitigation is necessary. The decrease in impervious area is a result of the substantial landscaping provided with the median stations and the small areas of landscaping provided at the curb stations. This landscaping replaces areas of existing paving. The GRC BRT project does add impervious area where Broad Street is slightly widening into the exiting median and at the Sauer Center Development, but this area is less than the pavement removed for the landscaping.

In addition to water quality and quantity considerations, the project must also implement satisfactory Erosion & Sediment Control as to minimize erosion and sedimentation impacts to receiving sewer systems. This consists of inlet protection and/or silt fence surrounding disturbed areas.

During construction, we will implement the approved Stormwater Pollution Prevention Plan (SWPPP) to control downstream flooding and erosion. We will carry a current VDOT Erosion and Sediment Control Contractor Certification (ESCCC) and have individuals with DEQ-certified Responsible Land Disturber (RLD) certification and DEQ-certified E&SC Inspector Certification on site to ensure compliance with project E&SC expectations. Diligent control of stormwater during construction will control delays due to permit infractions and sediment cleanup.

TRAFFIC SIGNAL DESIGN: There are 52 existing signals along the BRT route. Additionally, three new signals will be installed at the Broad Street / Tilden Street, Broad Street / Monroe Street and East Main Street / Orleans Road intersections. Three currently signalized intersections on Broad Street: Altamont Street, Robinson Street, and Davis Street, will be completely replaced with new signals as discussed in Part 2, Section 2.10.2. The remaining signals require modifications to accommodate the revised lane configuration, including changes to left turn lanes needed in the exclusive flow sections of Broad Street, and other various modifications depending upon intersection, including new controllers, video detection, changes to and additions of pedestrian push buttons and pedestrian signal heads, and modification of associated signs. All signals will be designed in accordance with the MUTCD and the 2011 Virginia Supplement to the MUTCD and include Transit Signal Priority (TSP), which is discussed as part of the Systems Design below.

TRANSIT SIGNAL PRIORITY (TSP) DESIGN: Our TSP approach includes signal control and timing (SCAT) analyses and upgrades, communications system engineering analyses and upgrades, as well as central TSP servers and software, and priority request server hardware installed in the signal control cabinets.

The BRT route includes 55 existing traffic signals: 54 within the City of Richmond and one in Henrico County which is operated by VDOT's Richmond District. The city signals have Econolite ASC/3 controllers; we will upgrade their software to be TSP compatible. A new controller is required for the signal in Henrico County; we will provide Siemens Eagle M50 controller. We will review the existing coordination timing plans to learn the green / yellow / red timing for each phase (northbound / southbound, eastbound / westbound, NB / SB left, EB / WB left), and determine where opportunities exist for TSP by providing extended green lights for the bus prior to the beginning or at the end of that phase. We will use the VISSIM model prepared by VDOT and, if available, will also use VDOT-provided traffic signal timing analysis data that was developed to obtain these current timing plans, such as Synchro analysis or traffic volume counts. This analysis can help determine the effect of traffic signal timing changes that TSP will have on the non-TSP movements.

We will develop new TSP timing parameters for each coordinated plan and free operation based on 10% reduction in BRT travel time under TSP as per the RFP. This travel time reduction shall be achieved by borrowing a maximum of 10% green time from other traffic signal movements and providing it in the direction the bus is travelling. If we determine more time can be "*borrowed*," we will make these recommendations to VDOT and the City; the RFP allows an absolute maximum of 15% of borrowed time. Additionally, we will look at any opportunities to make recommendations that might improve current operations.

Two locations: Broad Street / Thompson Street (westbound only) and Broad Street / Foushee Street (eastbound only) will require a queue jump operation where the traffic signal will allow the bus to override signal phases. Our team, with input from VDOT and the City, will determine the safest and most efficient way to provide the queue jumps for the busses and enable this operation as allowed by the traffic signal software.

We will perform timing analysis (before speed / delay analysis), while riding on the BRT vehicles during the operational testing period while systems elements not related to bus operations are being completed. We will perform a minimum of five runs in peak and off-peak hours. We will discuss with GRTC their schedules, how bus drivers react to being ahead of schedule, etc. Our engineers will evaluate the data collected and prepare a Results and Conclusions / Recommendations Report. The initial timing analysis will give us a baseline for the average BRT travel times before we implement any changes. After we implement TSP, more data will be collected with BRT travel times with TSP active and compare the resulting times vs. the baseline.

Our team will analyze and propose modifications to the existing or proposed application interface between Clever Devices AVL system and the proposed TSP central system. The current 30-second poll interval is deemed insufficient to perform TSP; as such – we will work with the GRTC to define the appropriate polling rate. We will provide the TSP central system software and servers, as well as the 55 Priority Request Servers (PRS) to be installed in the traffic signal cabinets.

It is assumed that the City's existing signal communication system can handle the TSP equipment. This will be confirmed during the Scope Validation Period. Once the initial implementation is analyzed, we will discuss the system performance with the City of Richmond and VDOT to determine how to further optimize timing as necessary.

BENEFITS: Transit Signal Priority

- ✓ Straightforward TSP implementation with experienced Signal Control and Timing (SCAT) engineers.
- ✓ Headway based TSP providing a nominal 10% reduction in travel times.

SYSTEM DESIGN: The RFP provides prescriptive systems element requirements and we do not propose any deviations. The approach to systems design and construction is provided in the Design Approach Section.

STATION DESIGN: We have reviewed the reference documents and technical requirements of the RFP to better understand the desires and motivations of the project stakeholders. GRTC developed two conceptual designs; one was advanced to preliminary engineering and is shown in the RFP.

We know the significance of the urban design elements and their importance to the city and the neighborhoods through which the BRT passes. The urban design treatment is most evident in the following project design elements:

- Hardscape / pavement treatments.
- Shelter area layout and design scheme.
- Landscape planting.
- Site furnishing and station amenities: benches, lean bars, bike racks, trash receptacles, seat walls / raised planters, lighting / illumination, ticket vending machines, CCTV cameras, wayfinding and bus arrival signs.
- Art in public spaces (by others).

The design that GRTC developed included consistent and recognizable configurations for all of the above elements, but also allows the station to be adapted to the three site configurations listed below:

- Median stations

- Curb stations
 - pedestrian circulation behind shelter
 - pedestrian circulation through shelter

It is imperative to create a quality image for the GRTC BRT project for easy recognition and familiarity which will assist in attracting new riders to the system. Accordingly, we will maintain one standard design for all stations. Nevertheless, we also recognize the desire to integrate the BRT alignment into the four distinct neighborhoods through which it traverses; West End, Museum / VC, Downtown, and East End. To achieve this, we propose to work with VDOT and stakeholder communities to implement one or several of the follow design options final design of the stations:

1. Changing the color of the brick, precast concrete elements and/or painted metal elements depending on which segment the station is located.
2. Having a unique pattern / color treatment on the glass windscreen panels of the station depending on which segment the station is located.
3. Having neighborhood specific plant selection for the landscaped areas.

Either option allows the system to have a distinct identity that complements the established urban environments throughout the BRT alignment.

To allow stakeholders to understand design development and allow VDOT project management to document acceptance of these details, a Basis of Design Report for Stations will be prepared. This will provide design details not defined in the plans presented to the Urban Design Committee. This report will be prepared and submitted early to obtain stakeholder concurrence and will be similar to the Urban Design and Landscaping Basis of Design Report prepared by GRTC during preliminary engineering. Prompt review and approval of the elements included in this report is critical to completing this project on schedule.

For each of the above configurations, we have adapted the station designs shown in the original RPF to conform to the reduced station shown in RFP Drawings AD-01 - AD-4 and discussed in RFP, Section 2.3.8.

We have also developed an alternative framing configuration for the reduced-size station which maintains the original design intent, but provides simplified construction and cleaner aesthetics (**See Figure 2**). We propose to use this change unless this element was significant to the Urban Design Committee approval in which case we will provide the framing shown in the Concept Plans. This will be included in the Basis of Design Report.

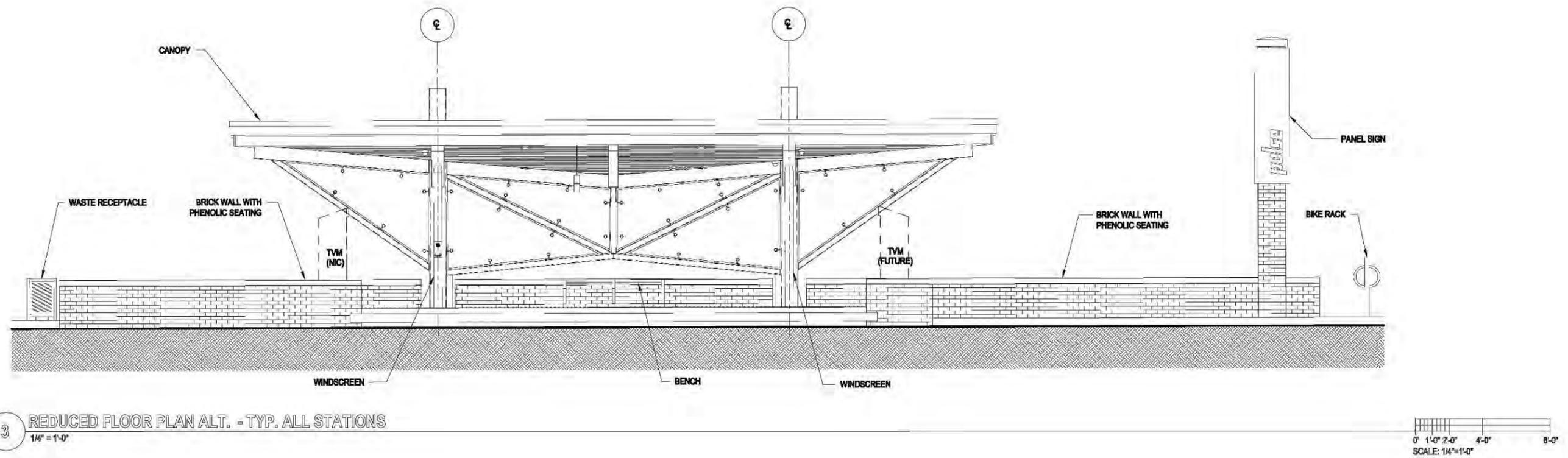


Figure 2: Alternative Framing Configuration

As shown in the Concept Plans (Pages 97-100), the current reduced-station configuration is approximately 15% shorter than the original station and 10 inches shorter. Length reduction is achieved by reducing the boarding platform edge to 33-ft., which provides adequate length to accommodate the 40-ft. long GILLIG BRT vehicle doors. However, the reduced-size station design maintains the original station design functional elements and allows the stations to provide equivalent urban design benefits to the community as the original station. For example, the station's materials remain as originally conceived by GRTC. Just like the original station, the reduced-size stations are composed of brick walls, a steel and glass canopy and windscreen, phenolic benches, and angled ramps surrounded by landscape areas. The hardscape and landscape treatments have remained nearly identical to the original design shown by GRTC. Although the size of the stations has been reduced, the aesthetics and critical functional elements are maintained. The iconic visual impact of the shelter and design scheme has also been maintained.

First, consider the truss windscreen and canopy structure. Although each truss bay is smaller than originally conceived, the composition, relative scale and proportion of the structure have not been impacted. Each windscreen is composed of four steel truss struts supporting glass panels held by spider clips.

Second, all functional station amenities have been maintained in the reduced-size stations. One ticket vending machine (TVM), instead of two, will initially be provided by GRTC, although all supporting infrastructure will be provided to easily install a second TVM at a later date. Knee walls along the sidewalk edge of the ramps were removed from the design, but a handrail barrier is provided to serve the same purpose. The reduced-size stations maintain two benches, similar to the original station design, to reduce the station footprint; one lean bar and one trash receptacle are provided, instead of two of each.

Note that our concept drawings include systems elements not shown on the RFP concept drawings, including communications and UPS cabinets, CCTV cameras, and bus arrival (RTIS) signs.

Parsons architects recognize the importance of the stations' urban design elements and of the project to the city and the four neighborhoods through which the BRT passes. It is imperative to support the quality image for this project that GRTC has already projected to the public. We understand the approval and stakeholder buy ins already taken place and the desire for a rapid construction schedule. Our design maintains the previously-approved design elements and will not trigger any additional third-party approvals. The renderings that follow (See **Figures 3a-b**) illustrate our interpretation. Note that they show both TVMs in order to display the stations in their ultimate configuration.

Station Foundations: Conceptual designs for drilled shaft and spread footing foundations are provided in the station plans included in this proposal. These are based on similar stations elsewhere, including the Columbia Pike Transit Stations in Arlington, which meet VSUBC requirements and were designed by Parsons' proposed Structural Engineer Dan Sengupta, PE. Either drilled shafts and/or spread footings will be used based on site constructability constraints. Station foundations will be designed not to exceed the maximum loading over exiting utilities as shown in the RFP.

Station Landscaping: The RFP Concept Plans show landscaping at each station. The curb stations provide limited opportunity for landscaping; however, the Concept Plans take full advantage of the available space. The median stations provide more landscaping opportunities by virtue of the transition zones to accommodate the stations. Landscaping enhances station aesthetics and BRT branding, comply with the City of Richmond Tree Ordinance and reduce impervious area.

BENEFITS: A station design that meets the conceptual design intent for functionality, historic context, place making & BRT branding.

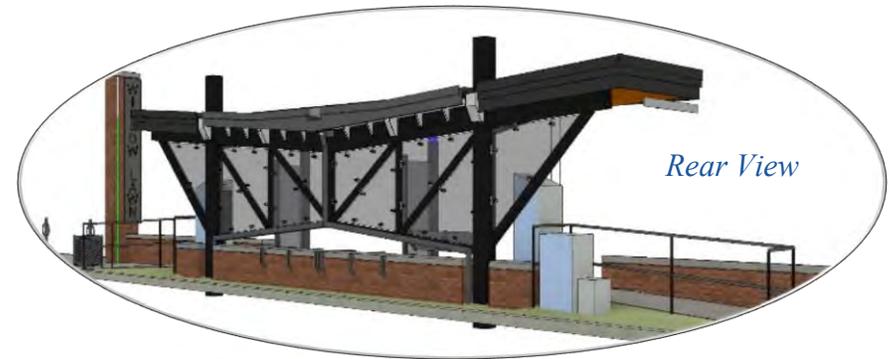


Figure 3a: BRT Curb Station Boarding Side

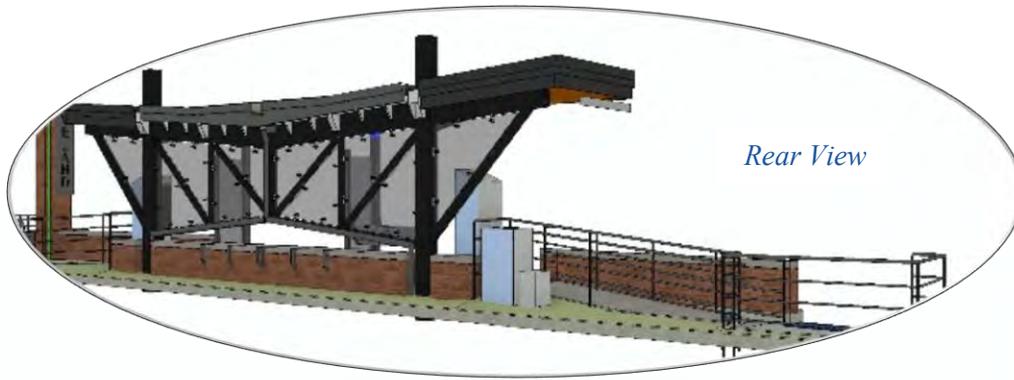


Figure 3b: BRT Median Station Boarding Side

GEOTECHNICAL: Similar to other aspects of the project, considerable geotechnical investigation has been performed during preliminary engineering and limits of roadway work vented with project stakeholders. We do not intend to violate these previous agreements and will hold the milling and overlay limits shown on the RFP Concept Plans. A Geotechnical Data Report (GDR) was performed by Schnabel Engineering dated January 16, 2016, and included the completion of 130 test borings. The length of roadway improvements is approximately 3.5 miles (18,500-ft.). For new pavement design, the Material Division's Manual of Instructions (MOI) requires borings at 200-ft spacing for each direction of travel which will be performed at the new Sauer Center Development widening. Since the median paving consists of a narrow strip between existing pavement, we propose to replace this narrow in-fill, utilizing either the RFP minimum pavement section or match the existing adjacent section, whichever is the stronger section. This will save precious resources and speed the project while minimizing the disruption of traffic along the busy corridor due to the placement of drill rigs in the roadway. The adjacent existing pavement section has already stood the test of time under the same high traffic needs as is proposed.

Additional borings will be performed for signal pole and station foundation design as required by the applicable VDOT manuals.

BENEFITS:
***Reduced cost and
schedule needs,
and no disruption
to existing traffic.***



4.4 Project Approach



4.4 PROJECT APPROACH

4.4.1 APPROACH TO THE SYSTEM

Approach for the design, construction, and integration, testing, and acceptance of the overall BRT system.

Typical of all transit projects, the BRT system incorporates many technical disciplines:

- **Roadway:** Street and intersection design, drainage, maintenance of traffic.
- **Traffic Engineering:** Signal design, pavement markings, signing.
- **Utilities:** Water, sewer, gas, power, communications (including fiber optic line).
- **Architecture & Landscape Architecture:** Transit station design, overall ADA compliance, and “GRTC Pulse” branding.
- **Structural:** Station canopy framing and foundation.
- **Systems:** Communications for Transit Signal Priority and for station equipment.

Individually, the involvement of each of these discipline is straightforward and routine. However, the project’s complexity lies in assuring that each discipline is compatible with the others and that the approval bodies and operating entities are satisfied with the overall BRT system design. These disciplines will be coordinated and integrated during design, construction, and testing to provide an operational BRT system.

Design Management: The design management approach has been successfully implemented by Lead Designer Parsons on more than \$10 billion in complex design-build transit roadway and infrastructure projects. The design team’s best practices and lessons learned are integrated into each design management package to take advantage of successful procedures and processes on similar projects. We will form task forces made up of designers and constructors to address key construction geographic area / design packages, disciplines / like activities, and critical path construction activities. The task force structure is described in the Task Force Narrative section below. The design management objective is to meet the package submittal deadlines for all deliverables of construction while achieving a high-quality product that includes meeting criteria and environmental commitments, responding to constructability input, and incorporating the VDOT’S and GRTC’S Operations and Maintenance (O&M) needs.

For any multi-discipline, multi-agency project, a strong design manager with multi-discipline experience is key. Project Design Manager Cliff Roberts, PE will lead our design team. He has held management roles in major transit and roadway and tunnel projects in Virginia, Maryland, and the District of Columbia. Cliff has experience in design-build delivery as members of the design-builder’s and the Owner’s teams. This experience gained an understanding of the complexities associated with large, multi-discipline, multi-stakeholder projects.

Cliff, reporting to the Design-Build Project Manager will:

- ✓ Be the design team contact with the VDOT Project Manager regarding design issues.
- ✓ Establish design policies / procedures.
- ✓ Allocate technical design resources.
- ✓ Coordinate design and review schedules with the Design/Construction Integrator.
- ✓ Manage engineering costs, schedule, and scope adherence.
- ✓ Develop / implement corrective measures, if needed.
- ✓ Coordinate with senior management.
- ✓ Oversee design sub-consultants.
- ✓ Oversee the Design Quality process by monitoring design quality control.
- ✓ Coordinate engineering services during construction.

- ✓ Ensure the design satisfies the contract requirements of:
 - Accuracy.
 - Adequacy.
 - Conformance to standards of practice.
 - Compliance with codes and standards.
 - Cost effectiveness.
 - Fitness for purpose and/or function as specified and/or implied in the contract.
 - Quality

A key to any design-build project is to ensure that the design and construction teams have constant and open lines of communication right from the beginning. Ryan Gorman, PE, DBIA of Corman will serve as the Design/Construction Integrator to facilitate that communication and lead design and construction team integration. With a project portfolio of six design-build projects and over 11 years’ design-build experience, Ryan knows the design and construction elements of complex projects, such as these, and is qualified to serve in this role.

Ryan, together with Design Manager Cliff Roberts, will also ensure the plans and specifications meet the required level of constructability. A methodical Design Management Plan will integrate the designer and contractor while managing the individual design, schedule, and stakeholder challenges for compatibility and integrity with the consolidated final design.

The design will be produced in the following seven independent construction packages to facilitate the design effort, design and constructability reviews and construction:

1. **Water/Sewer Relocations:** Includes applicable MOT and E&SC.
2. **Fiber Communication Backbone:** Includes applicable MOT and E&SC.
3. **Streetlights:** Includes applicable MOT and E&SC.
4. **Traffic Signals:** Includes applicable MOT and E&SC.
5. **Roadway:** Includes MOT and E&SC necessary for this work and for station and systems work.
6. **Stations:** Includes Landscape Architecture.
7. **Systems:** Communications, CCTV, RTIS, Fare Collection, Push buttons/Loudspeakers.

Stakeholder and Public Involvement: There are two aspects of stakeholder coordination; 1.) that with public agencies with funding approval, maintenance and/or operational responsibilities, and, 2.) with the general public. Because coordination with public agencies is integral to the design process, coordination with these agencies is discussed in this section. Public outreach is discussed in Section 4.4.4 below.

Agency Coordination: The list below shows the major stakeholders involved. All have varying degrees of project interest and responsibility:

STAKEHOLDER	ROLE	INTERESTS DURING CONSTRUCTION
VDOT	Contracting Agency	Conformance to GRTC / FTA requirements, work zone safety; coordination with adjacent projects; traffic backups or inadequate public outreach, impacts to adjacent historic or environmental resources, coordination with other stakeholders, and schedule adherence.

STAKEHOLDER	ROLE	INTERESTS DURING CONSTRUCTION
Greater Richmond Transit Company (GRTC)	Will own BRT & be responsible for operations/maintenance	Quality of construction, ease of future maintenance, training, seamless integration with existing TOC operations, MOT and public perception of the construction impacts, schedule adherence, conformance to FTA requirements.
Henrico County	Local Jurisdiction/Funding Partner	Coordination with adjacent projects traffic backups or inadequate public outreach, dust and noise, impacts to adjacent County property, adjacent historic or environmental resources.
City of Richmond	Local Jurisdiction/Funding Partner	Coordination with adjacent projects traffic backups or inadequate public outreach, seamless integration with existing traffic signalization and TOC operations, utility installation/relocation, dust and noise, impacts to adjacent City owned property, adjacent historic or environmental resources.
Federal Transit Administration (FTA)	Administering the TIGER Grant	Conformance to FTA rules, regulations, and procedures.
Dept. of Rail and Public Transportation (DRPT)	Funding partner that oversees State transit projects	Conformance to funding rules, regulations and procedures.
City of Richmond	Code Official (AHJ) for Stations in the City of Richmond	Code Compliance.
Dept. of General Services, Bureau of Capital Outlay Management (BCOM)	Station code official (AHJ) for station in Henrico County (Willow Lawn)	Code Compliance.
Virginia Dept. of Historic Resources	Station aesthetic design approvals	Conformance to NEPA commitments.
Virginia Commonwealth University (VCU)	Local University/Student Transport	Since the BRT passes the campus, many riders will be VCU students, and construction will impact the VCU shuttles. Accessibility to/from University through work zone and travel time through work zone impacted by reduced speeds and/or back-ups.
City School District and Private Schools	Student Transport	Bus routes impacted by construction.
17 Utility Companies (City of Richmond DPW, Dominion Power, Verizon and other communications companies)	Maintain / Operate Utilities Within or Across Corridor	Accessibility to facilities and relocations through work zones; impacts on response time to outages, conformance to their individual system requirements.
CSX & Norfolk Southern Railroads	Maintain / Operate Rail Lines Across Corridor	Project has several grade-separated crossings of major railroad facilities. Design/construction adjacent to and crossing railroad property will have to conform to railroad requirements.
City Fire, Rescue, & EMS	Emergency Responders	Emergency response routes impacted by construction or temporary lane closures.

STAKEHOLDER	ROLE	INTERESTS DURING CONSTRUCTION
State & Local Police	Emergency Responders, assist in MOT and TMP implementation	Emergency response routes impacted by construction or temporary lane closures, work hours and assistance required during lane closures and /or rolling slowdowns.
Other Contractors Working in the Area	Adjacent Contractors	Coordination of scheduling construction on other area projects.

Table 1: Stakeholders

Task Force Narrative: To meet the schedule, coordination and communication needs, Task Forces will be established. Task forces are part of our integrated team and are organized around design packages by critical path items, disciplines, and construction areas. This allows for independent teams and fast-track design, leading to timely completed RFC designs. It requires management and coordination of team resources, including interdisciplinary reviews and independent technical reviews for quality, constructability, and to meet VDOT, GRTC and other stakeholder interests. Task force meetings will include Public Information Officer Bryon Johnston participating in the Task Forces as necessary. The following Task Forces will be established:

- | | |
|---|---|
| <ul style="list-style-type: none"> ✓ Roadway ✓ Utilities ✓ Stations ✓ Systems | <ul style="list-style-type: none"> ✓ Maintenance of Traffic ✓ Public Outreach ✓ Right of Way |
|---|---|

Additional Task Forces will be assembled or the above merged as the need is identified during project execution.

The task force structure facilitates solutions at the lowest management level to achieve cost-effective and expeditious design solutions. These groups communicate openly and frequently to instill trust among parties and to collaboratively resolve issues at all levels, as members are empowered to make decisions and quickly identify issues requiring higher-level review and guidance.

Each task force will meet weekly or bi-weekly as necessary during the design stage. In the event attendee(s) need to call in, we will use web-based meeting technology (“WebEx” or “Go To Meetings”), with each meeting documented and archived, including minutes, and assigned action items with a due date. A disciplined, accountable, and candid Task Force Team culture will be essential to designing and building a quality project on schedule that maximizes value to the VDOT, GRTC, and stakeholders. Task Forces will include agency design management and reviewers, as well as well as appropriate stakeholders with review/approval authority. Task Force meetings will promote team collaboration and unify the design and construction approach. Active participation by the review individuals with the authority to make decisions with timely feedback from the review and approving agencies is critical to meet the aggressive schedule.

The Task Force matrix management approach requires coordination across discipline leads and Task Force groups to apply experience and lessons learned. Design/Construction Integrator Ryan Gorman and Design Manager Cliff Roberts will attend the Task Force Meetings and provide that coordination. Key features and objectives of the task force approach include:

- ✓ Inviting / encouraging VDOT, GRTC and key third parties to participate.
- ✓ Verifying quality and consistency of the design approach and products across all disciplines.
- ✓ Developing action items at each Task Force meeting with the individual responsible to follow

through on the action item identified with a deadline.

Document Control: Document control is important on any project. Because of third-party delivery, multiple stakeholders and funding partners, a robust document control system is essential for VDOT to manage the project and meet its reporting obligations to third parties. As stated in the Special Provision for Documents Control, Organice by CADAC (commonly referred to as CADAC) will be the document control system. CADAC will maintain consistency through the life span of the project and across entity lines.

Document Control Manager Kristen Kemp brings an abundant appreciation for the need to strictly follow the protocols of the Project’s Document Control Plan and exchanges with CADAC. She established the major Areas in Organice, known as *Design, Correspondence, Civil Rights* and the new *ATC* module. She has led and participated in the project setup and control of CADAC for the Elizabeth River Crossing, Military Highway CFI, and I-66 ATC Outside Beltway Projects and championed and facilitated creating the *Design* workflows for Comment Resolution that has been applied to all VDOT CADAC projects in Virginia. Kristen is a representative of the Department on the Monthly SiteVision/CADAC planning and progress calls and understands the necessity to submit and interact with CADAC and Documents Controls. As the Document Control Manager and single Point of Contact, she is fully prepared to work with VDOT on workflows, submittal routing, and comment resolution and will align the submittals and other documentation with CADAC’s naming and filing structure.

BRT OPERATIONS: The BRT system comprises three separate elements; stations, systems and vehicles: Operationally, the stations will facilitate rapid boarding of the BRT vehicles, which is a distinguishing characteristic of BRT compared to regular bus service. This will occur in two ways: First, the stations provide a boarding platform which is at the same level as the BRT vehicle entry; 1-ft. 2 inches above the roadway surface. Second, BRT fare collection occurs off vehicle as opposed to on vehicle for regular bus service. The stations provide fare collection equipment (TVM) to enable off vehicle fare collection.

Station elements and how the station will function while in operation.

The BRT stations provide multiple functions:

- ✓ A raised platform for level boarding of the BRT vehicles.
- ✓ Protected waiting area for passengers.
- ✓ Location of fare collection equipment.
- ✓ Location of BRT and other GRTC real-time transit information.
- ✓ BRT branding.
- ✓ Urban place making

The station design provided in the RFP incorporates all of these functions. Design elements are discussed in the Design Concepts Section.

System operations, including the functionality of the traffic control and ITS elements.

Systems Operations: The BRT system will need multiple communications systems to function and is divided between BRT vehicle operations and station operations:

- **BRT Vehicle Operations:** A key component of BRT operations is Transit Signal Priority (TSP). TSP is a traffic signal operational strategy that facilitates the movement of transit vehicles through traffic signal-controlled intersections. This is accomplished by allowing the traffic signal system to know the location of transit vehicles and adjust signal timings accordingly based on parameters established by GRTC and the City. Transit vehicles locations are determined via on board GPS. The TSP will be headway based; i.e., will function to maintain headways between BRT vehicles. For the GRTC BRT

system, this will require hardware and/or software modifications to the existing traffic signal controllers. The controllers will communicate to the City's Emergency Communications Center (CORECC) via an Ethernet network using fiber optic cables installed as part of this project.

- **Station Operations:** A number of operational elements are included in the BRT stations. These will communicate to the GRCT's Transit Operation Center via an Ethernet network using fiber optic cables and leased wireless lines and include:
 - ✓ **Fare Collection** – The GRTC BRT system will have an off-board fare collection system via Ticket Vending Machines (TVM). The TVMs will communicate credit / debit card information and type of fare to the GRTC's Transit Operation Center.
 - ✓ **Real-Time Transit Information System (RTIS)** –RTIS display signs will show the arrival time of the next two BRT vehicles. Additionally, the stations have Totem Bus Arrival Lighting in which a vertical lighted pole (Totem) will be shown the arrival of the next BRT vehicle graphically. The displays and Totem will receive the arrival information from the Transit Operations Center via the new fiber backbone or wireless for the stations at the West or East ends. As required by ADA, the RTIS visual displays will be supplemented by a loudspeaker for the visually impaired to receive arrival information. There will be a push button to request this information. The loudspeakers and push buttons will communicate to the GRTC TOC.
 - ✓ **Closed Circuit Television (CCTV) Cameras** - Cameras will be located in the station monitoring for safety, security, and operations. Cameras will monitor the station with coverage at station entrances / exits, the platform and platform edge, and the TVMs. The cameras will communicate to the GRTC TOC.

Approach to Systems Design and Construction: The systems consists of five elements: **Control Documents, Systems Design, Implementation, Testing and Commissioning.**

1.0 Control Documents: The GRTC BRT approach will begin after NTP by developing several documents which will serve as control documents throughout design, construction, integration, testing, and Commissioning and include:

1.1 Requirements Traceability Matrix (RTM): Will be developed listing the requirements identified in the RFP, as well as any requirements identified during initial field surveys by the Corman/Parsons Team. It will identify the method by which the requirement will be met. For example: Hardware, software, or systems integration. This document is similar to the Basis of Design Report developed concurrently for the brick and mortar infrastructure.

1.2 Integration Control Document (ICD): Identifies interfaces that must occur for the GRTC BRT to be a successful operation and contains three sections:

1.2.1 Construction Integration: Identifies integration that must occur during the construction, including utilities such as power.

1.2.2 External Integration: Identifies integration with existing GRTC and VDOT systems, such as Advanced Traffic Management System, Real-Time Transit Information System and others.

1.2.3 Systems Integration: Identifies integrations which must occur within the BRT Systems, such as within the existing GRTC TOC or City's Emergency Communications Center (CORECC)..

1.3 Testing Plan: BRT systems testing will occur in three phases. The Testing plan will identify the tests to be conducted during each phase.

1.3.1 Unit Testing: Each unit will be tested individually before and after installation. This plan will identify the individual units to be tested and establish methodology for testing.

1.3.2 System Testing: After each unit within a system is installed and individually tested, a System Test will be conducted to ensure each unit within a system function in unison to satisfy the system requirements as a whole.

1.3.3 Systems Integration Testing: Once all BRT systems are installed and tested, Systems Integration Testing will be conducted to ensure that the BRT systems will function as required. There will also be testing for the systems that must be integrated with external GRTC, City and VDOT systems.

2.0 System Design: The Corman/Parsons Team will prepare detailed designs for each system identified in the RFP. The design will be completed in three steps: 1.) 30% design, 2.) 60% design, and 3.) final design.

2.1 Transit Signal Prioritization (TSP): The TSP will be a centralized system integrated with GRTC CAD/AVL and City of Richmond's Advanced Traffic Management System (ATMS). The TSP equipment must also integrate with the existing controllers within the City of Richmond, as well as the VDOT controllers.

2.2 Communications: There will be two independent networks: One to service GRTC BRT and the other to service the City of Richmond's ATMS. Communication will also be established to the City of Richmond Emergency Communications Center (CORECC).

Install conduits and pull fiber optic cable to the stations which cannot be serviced with existing fiber. Leased wireline will service outlying stations as indicated in the RFP.

2.3 Real-Time Information System (RTIS): Comprised of two devices: 1.) Message Signs (under separate contract), and 2.) Push Button Loudspeaker. The RTIS will be integrated with the existing GRTC Clever Devices CAD/AVL system.

2.4 Closed Circuit Television Cameras (CCTV): CCTV cameras will be provided at each station platform to provide coverage to view pedestrian and vehicular entrances and exits to the station and Ticket Vending Machine Transactions.

Video Recorders will be placed at each station to record from the individual station for viewing in real time or playback and forensic purposes from the GRTC TOC. Ability will also be provided so that video can be viewed from the City of Richmond Emergency Communications Center.

2.5 Ticket Vending Machines (TVMs): Two TVM sites will be at each station: one for current use and one for future use. We will provide the concrete pad for mounting, power supply and communications for debit / credit card transaction for both TVMs. However, only one TVM (to be provided by the Owner) will be installed under this contract.

2.6 Systems Integration: The Corman/Parsons Team will prepare a systems integration design which will provide details of how the BRT systems will be integrated with 1.) Infrastructure, 2.) Utilities, 3.) Existing GRTC, VDOT, and other systems, and 4.) BRT Systems.

3.0 Implementation: During design and before submitting the 60% design plan, a Bill of Materials (BOM) will be prepared for each system. Upon approval of the 60% design plans, procurement will begin. Long-lead time items will be identified for early procurement. Commercially off the Shelf (COTS) software will also be procured at this time.

As soon as the equipment arrives at designated facilities, qualified personnel will start testing and installing. Any software requiring customization or configuration changes will be made at this time. This will specifically apply where the BRT software has to be integrated with existing GRTC systems.

4.0 Testing: As indicated earlier, testing will be conducted in three steps:

4.1 Unit Testing: As soon as the equipment is acquired and prior to installation, each unit will be tested and a test report issued.

4.2 System Testing: Once equipment and software is installed for each system, system testing will be conducted for each system.

4.3 Systems Integration Testing: When all systems are independently tested, all aspects of the integrated systems will be tested, including 1.) Integration testing with GRTC, City and VDOT systems, and, 2.) Integration testing of systems within the BRT. Test reports will be issued.

5.0 Commissioning: During this phase, the following will be collected for submission:

1. Design Documents
2. Test Reports
3. As-Built Documents
4. Software configuration Documents
5. User Operations and Maintenance Manuals

Describe the bus operations in relationship to the overall BRT system.

BRT systems are served by transit vehicle expressly designed and branded for BRT operations. These differ from busses used in regular transit bus service several ways:

- Designed to have level boarding to reduce dwell times at station stops.
- Do not have fare collection equipment as BRT systems use off board fare collection to reduce dwell times at station stops.
- Include communication equipment to interact with the Real-Time Information Systems and Transit Signal Priority (TSP) system.
- Have higher passenger capacity.
- Have a distinctive exterior design.

GRTC is purchasing the BRT vehicles. Vehicle specifications are provided in the RFP. The station, roadway, and Systems elements will be designed to accommodate the features of the vehicles being procured. This is common transit practice, although differs from typical roadway design practice.

Operationally, the BRT vehicles operate in two ways: on exclusive use lanes and in mixed traffic. In exclusive use lanes, BRT vehicle movements are controlled by operating policy and traffic signals. In mixed traffic, BRT vehicle movements are controlled by motor vehicle regulations and traffic signals. Throughout the corridor, for exclusive use and mixed traffic segments, Traffic Signal Priority will be installed in the signal system to allow BRT vehicles to avoid delays associated with traffic signals.

An uncommon operational feature will occur where the BRT vehicles transition from median exclusive use lanes to curb lanes. This will require specialized signing and pavement marking as shown in RFP Concept

Plans. Operationally, BRT vehicle drivers will be trained for these transitions and motorists will be made aware of this through GRTC public outreach and education efforts.

Our designer, Parsons, and our QAM, MBP, are both experienced in commissioning and will be present for all identified testing and develop hold points for these within the project schedule.

4.4.2 UTILITIES: Our Utility Team has longstanding relationships and frequently works with the utility companies anticipated on this project, including Verizon Virginia, Inc., Comcast, Dominion Virginia Power, City of Richmond (power, sewer, water, and gas), AT&T, Windstream, Level 3, Fiber Light, Zayo, and all other private fiber providers. Many of our utility team members are past employees of these organizations and know the policies, procedures, and personnel. Our team's experience includes many current and past Corman / VDOT projects. In addition, Corman has performed substantial work for the City of Richmond (including utilities) and knows their policies and personnel. This knowledge is invaluable in obtaining records, suggesting alternate designs, layout, and using approved means and methods. Our utility coordination approach is a well-defined and effective four-stage process based upon our experience with VDOT and the affected utilities. During proposal preparation, we contacted utilities / providers that currently have facilities within the work area. Not all agreed to meet with us stating the City or VDOT already had all the information required; for those that did, meetings generated discussions about their utilities, specific features, utility maps, as-built drawings, and relocation criteria, where applicable. Our team understands the importance of identifying these potential impacts early on and developing mitigation strategies for each.

Progress was made during the pre-bid phase by VDOT and GRTC in identifying potential utility conflicts and determining if they can be avoided, mitigated through design changes, or must be relocated. The results of these studies have been shared with VDOT. *We have reviewed the RFP Utility Relocation Plans (Addendum 2-CU-102 – CU-108, CU-110 - CU-126, Addendum 4 CU-109) and Utility Conflict Matrix (Addendum 4 –CU 127 – CU-129) in developing our proposal and pricing. In cases where there was differing information shown between the two, we relied on the Utility Relocation Plans. We also refer the reader to our Conceptual Plans in Volume II to obtain a list of the specific utilities we will be relocating / adjusting.*

Our proposed strategy and sequence of Utility Engineering is described below:

Utility Coordination, Adjustments, Relocation, and Mitigation

Stage 1 – Initial Coordination during Proposal Phase

- Reviewed RFP Utility Matrix listing known and potential utilities and utility providers within the project limits of disturbance (*noting there may be more than one provider for a particular utility in some cases*);
- Obtained utility facilities maps drawings of the facilities in the area of interest;
- Identified utility point of contact(s);
- Held Informational Meeting with critical utilities having facilities within the project limits;
- Obtained additional information e.g., as-built drawings with profiles, elevation data, materials, procedures for managing relocations from design through construction and acceptance.
- Identified current work being performed by the utilities within or near the project boundaries to identify potential conflicts with proposed road designs.
- Identified conflicts to VDOT between the Part 2 Specifications and the Utility Matrix in the RFP Concept Plans and the information obtained during this phase.

Stage 2 – After Notice to Proceed: Concept Development / Design Phase

- Convert the Utility Matrix in the RFP into a Utility Project Management Plan to prioritize, define, schedule, and manage the design and construction of each task;
- Immediately initiate Miss Utility services, utility designation services, and test pits (vacuum / excavate) supported by the Corman/Parsons Team's survey location documentation capability, to pinpoint the

exact location and material for each utility. Precise utility location data is maintained in a Master Utility Database and then transferred to the roadway and structural design plans;

- As roadway and station design plans are developed, coordinate with the Utility Design Team. It is expected that in some locations, multiple utility relocations may be in proximity to each other. The Corman/Parsons Team will manage scheduling, materials, traffic control, outages, and all other relocation elements to minimize public disruption in the work area;
- These designs are refined with the hard data from the utility database, defines conflicts and identifies potential conflicts;
- Within 45 days of Notice to Proceed, our Utility Team meets with VDOT's Regional Utilities Office to review what is required with each utility relocation submittal. Preparation includes reviewing relative concerns to be addressed;
- Within 120 days of Notice to Proceed, submit a Preliminary Utility Status Report identifying utilities within the project limits, conflicts and proposed resolutions, time impacts, cost responsibilities, and supporting documentation on preliminary UT-9s for each utility;
- Conduct UFI as appropriate for our sequence of construction to discuss the project with all utility owners for that phase. There will be a UT-9 Form for each utility owner to resolve any questions about relocations, including cost responsibilities;
- Submit utility relocation plans, certified by the Corman/Parsons Team, to VDOT for approval prior to starting any relocation.
- Coordinate with utilities identified in the RFP to have their utilities relocated prior to our construction, to avoid subsequent conflicts and rework and to agree upon scheduling.

Stage 3 – Accomplish Relocations / Conflict Resolutions

The Corman/Parsons Team will provide the utility easement corridor as designed and approved by the utility companies to facilitate a pathway for the relocated utilities. Upon completion of the utility easement corridor, the utilities will be released to complete their relocations. Utility companies will then be expected to expedite their relocations into this corridor, within the roadway ROW, or in the case of City ITS, traffic signals, water and sewer relocation and design, will be by Corman and its designers. Relocation timelines, schedules, and expectations for completion will be determined prior to commencement of this stage of the project and communicated to the project taskforce. Scheduled outages and service affecting events will also be determined and scheduled throughout the relocation process. Temporary road closures during the relocation phase will be managed and controlled by the Corman/Parsons Team in conjunction with the utilities and their contractors. We will coordinate resolving any relocation conflicts during the relocation process and draft as-built documents provided.

Stage 4–Final Completion: The Corman/Parsons Team certifies to VDOT that conflicts were resolved, relocations accomplished, and as-builts completed and submitted per VDOT and utility owner requirements. The Corman/Parsons Team will coordinate with the utility companies to provide CE-7 (remain in place permits) as required by VDOT.

Mitigation: The best plan of attack on unexpected utility delays is planning, documentation, communication and scheduling to mitigate potential construction schedule impacts. This means assigning a Corman/Parsons Team lead person responsible for the entire utility process. They will also be responsible to jump start physically identifying and precisely locating surface and subsurface utilities along the project limits after Notice to Proceed.

As per our Organization Chart, Don Rissmeyer, PE will lead wet utility efforts coordinating with our Lead Coordination Utility Manager Dale Kniffin for dry utilities. They will band together to mitigate utility impacts during design and construction and the team will use our Four-Stage Process to get the job done.

HANDS ON: The Corman/Parsons Team has already met with the utilities identified and contacted known utilities in the corridor that agreed to meet with us, integrating data into our Conceptual Plans and Schedule.

The next step is coordinating with the utility companies to resolve issues, eliminate uncertainty of possible conflicts, and develop relocation plans and schedules for confirmed conflicts. Relocation schedules are integrated into the Project Master Planning Program and CPM Schedule. Additional mitigation tactics include overtime and overlapping relocation work of several utility companies, as well as working on several phases simultaneously to maintain the completion schedule.

Discovering an unknown utility within the project limits can cause a major impact on schedule and cost. Our Utility Team will be on the hunt for unknown utilities through initial field walks searching for telltale signs, such as unmarked valves or pull boxes, or long narrow strips of replaced asphalt. If anything surfaces, additional research and exploration will be conducted prior to the plan submittal. “No Conflict” letters will be obtained from additional utility providers who may have facilities within the limits of construction to attempt to avoid unknown utility delays.

Our Construction Sequencing in Section 4.5.1 identifies possibilities for concurrent work and offers the advantage that unexpected utility conflicts discovered in one area will not affect progress in other priority areas.

If or when additional impacts are noted, we will re-sequence operations to continue progressing work where possible as a means to mitigate delays and take immediate action to integrate any additional relocation into the Master Scheduling Plan, using slack time and/or other accelerations to mitigate adverse schedule impacts.

Individual services will be relocated / renewed were required with special attention given to proper notification to those that will be impacted.

The project’s timely completion relies on rapidly agreeing on utility relocation schemes, acquisitions of the utility easements, where required, and utility relocations. Design/Construction Integrator Ryan Gorman will focus on proper and timely utility relocation through bi-weekly Utility Task Force meetings to get the job done.

4.4.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC): The Corman/Parsons Team’s QA/QC approach creates a partnership between the project’s designers, contractor’s field staff, QC inspectors/testers, and QA staff. Forming this partnering environment with a proactive QC testing *and* inspection program and an adequate QA is key to a robust QA/QC Plan. It is in every stakeholder’s interest that the QC is proactive and effective to: 1.) reduce contractor or designer rework; 2.) limit required QA efforts to perform the QC for the team; 3.) limit VDOT’s need to assign valuable resources; 4.) assure VDOT of a well-maintained, safe construction site with design criteria and construction and materials meeting specifications; and, 5.) assure VDOT of an integrated system that functions as designed, works seamlessly with pre-existing systems, and operates reliably within the expected life cycle with low maintenance costs. ***Our DBPM will instruct the QC staff early on that their job supersedes keeping records and testing materials, includes the traditional duties of a VDOT inspector, and being assertive if anything is non-compliant.*** Knowing if any work items are not performed properly early sparks immediate correction while minimizing cost and schedule impacts.

Intelligent Transportation Systems (ITS) infrastructure and technology has requirements that go beyond those typically encountered in roadway construction. Integration is key when implementing ITS. Local and/or ITS architecture must be considered in the design, as well as integrating with any existing ITS architecture (if not the same as the regional architecture). VDOT and DRPT special provisions for the ITS equipment and materials must be considered and specialized operational and system testing is also a consideration with ITS.

Commissioning, testing, and the specified observation period must be performed for this A-Typical VDOT project.

Our QA/QC program will be per *VDOT's Minimum Requirements for Quality Assurance and Quality Control on Design Build and P3 Projects, January 2012*.

During our initial Partnering meeting, VDOT, utilities, local jurisdictions, and other stakeholders discuss and resolve “*rocks in the road*” to achieve quality goals. Including quality in the agenda has proven successful on our past projects.

Design QA/QC: To kick-off QA/QC prior to design, the Design Manager, Lead Discipline Engineers, and Design QA/QC Manager establish and provide criteria and checklists for each design element to staff engineers. They perform an audit to ensure correct standards are followed, checklists are used, and the work is documented. This will include compliance with the Basis of Design Report. Regular “*All Hands*” meetings, stressing the importance of quality in the design, keep the required quality culture in check. It is also a forum for Lead Construction and Design firm principals to offer lessons learned on past DB projects and perspectives on the role quality plays in project success. Quality control is the process which is carried out throughout the DB process and includes Design, Procurement, Installation, and Testing. Quality control will be accomplished by peer reviews, of design documents, installation procedures and reports, witnessing testing and obtaining and documenting test results, witnessing commissioning phase and producing As-Built documentation.

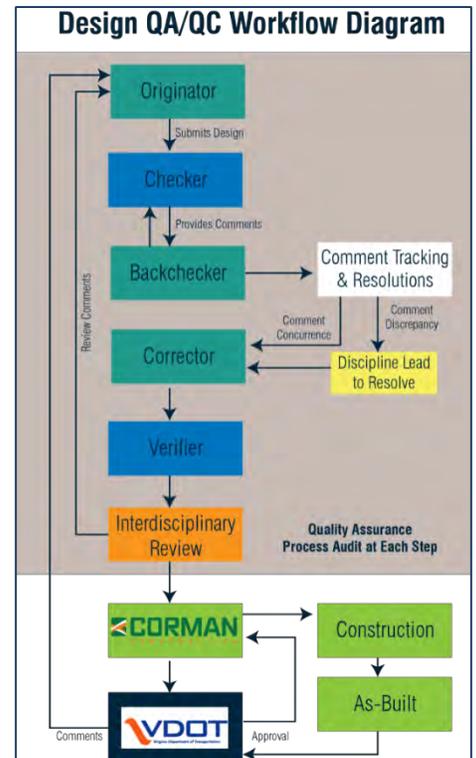


Figure 4: Design QA/QC Workflow Diagram

System operation and maintenance will be a focus during the design, as well as during construction. Reliability is key in the success of any ITS-related system and so the maintainability and constructability of the system must be a consideration of the design. ITS equipment selections with short life cycles; that have parts and spares that are difficult to locate or expensive to purchase; or that require technicians with knowledge, skills and abilities beyond the agencies’ staffing budget all impact the system’s reliability. To that end, Design QA/QC is not only about performing quality work, but is also about specifying quality equipment that is compatible AND sustainable as an integrated system. Beyond that, the operation and maintenance of the system, including any training and special software applications, must be taken into consideration in conjunction with the owner’s capacity to perform these activities with in-house resources vs. outsourcing. Quality will ultimately be defined, not only by the quality of the equipment and workmanship, but also by how easily and how well the system performs in relation to the owner’s needs and expectations.

The key to project success is an integrated QA/QC process that includes the QC staff, designers, contractors, and the design team’s quality control checkers. During design, plans are reviewed, not only by the design QC staff, but by the construction team and construction QC staff for constructability and ease and efficiency of resulting means and methods. This especially holds true for the impact the design will have on MOT. Items such as, material delivery / storage, workforce accessibility, field office, and crane and other equipment placement will be reviewed to minimize traffic impacts. Plan review checklists will be prepared during the constructability reviews and comment sheets will be rechecked for the action taken prior to the plans being issued for construction. VDOT Form LD-436 will be filled out and submitted along with the plans for each milestone design submittal. The LD-436 will be augmented to include BRT specific design elements, e.g.,

stations, including ADA compliance, communications, and transit signal priority. *Special attention will be given to the adequacy of temporary drainage, pedestrian, bicycle, and local bus service impacts resulting from temporary traffic controls during construction.*

The ability of the QA/QC team to form strong relationships with project stakeholders is significant. Solid relationships will be fostered that go beyond those typically associated with construction projects, and will include local utility, municipal public works and traffic maintenance workers. The QA/QC team will consider the concerns and needs of those living and working within the project area, including citizens, businesses and those providing public services.

The mission is to provide quality designs and plans in the fast-paced delivery of a design-build project. The key that drives success is effective communication among everyone involved with the design, including the construction team. QA/QC design procedure goals:

1. Design features that are safe and meet VDOT design guidelines and requirements;
2. Conform to the standards and reference documents in RFP, Part 2;
3. Consistency with previously-approved design features;
4. Meet the requirements of the permit agencies;
5. Design infrastructure that meets requirements, are constructible, durable, economical, and minimize maintenance;
6. Meet the design schedule, budget, and construction staging requirements;
7. Minimize design costs by working efficiently and avoiding rework;
8. Provide an organized and indexed set of design calculations, including design criteria and assumptions;
9. Provide Special Provisions which allow efficient procurement, construction, installation, testing and quantity control.
10. Minimize VDOT and other agency reviews.

Checking Design Deliverables: It is essential that design deliverables show complete and clear fabrication and construction requirements / details. The Design QA/QC Manager will develop and implement a QA/QC Plan. Processes and procedures will be enforced and documented to minimize VDOT reviews. Many of the disciplines required by this project are primarily specification driven (e.g. communications, TSP, architecture). Therefore, the project QA/QC plan will have a heavy emphasis on checking of specifications.

Design Preparation: Design deliverables will be prepared under the Lead Discipline (roadway, structural, drainage, geotechnical, system, etc.) Engineers. Weekly or bi-weekly Task Force meetings led by Design/Construction Integrator Ryan Gorman will be held throughout the design phase and include the Design Manager, Lead Discipline Engineers, QC staff, Construction Manager and key construction team member representatives, such as the fabricator and erector. VDOT, GRTC, or the City are welcome to participate. These meetings reduce design and VDOT review times by coordinating design and construction requirements during the design process, not just at scheduled milestones. On our Military Highway DB project, the VDOT Project Manager and Construction Manager attend these meetings bi-weekly and their presence is invaluable in maintaining schedule and keeping the entire team on track.

Checking design deliverables come in the form of drawings, specifications, and calculations. Review starts within the discipline before the deliverable is reviewed by the Design QA & QC Lead, Design Manager, etc.

Reviewing each deliverable follows the steps outlined below. At the end of each step, the checkprint stamp is signed. A stamp is required on each drawing to be issued for construction, each Special Provision to be issued for construction and on the cover sheet of each set of calculations.

- **Originator:** Prepares the deliverable to be checked and is accountable for its accuracy and adequacy per design code requirements. It is not intended that the Originator rely on the checking process to complete the deliverable.
- **Checker:** Independent of the Originator and checks the deliverable. Reviews every aspect, including input for design programs that are a part of the calculation set. Marks up the stamped deliverable set with comments and returns it to the Originator. This is a senior staff member with the experience to check the design of the discipline that they are reviewing.
- **Back-checker:** Reviews the checked deliverable, confirms the items marked for revision are justifiable, and that corrections noted are appropriate. The Back-checker is also the Originator. If the Back-checker disagrees with a Checker's correction, they must resolve it prior to the next step. If it cannot be resolved, the Lead Discipline Engineer or Design Manager resolves it.
- **Corrector:** Addresses comments marked on the checkprint (original deliverable). This can be either the Originator or a CAD Technician.
- **Verifier:** Reviews the corrected deliverable against the checkprint and verifies the corrections marked on the plan sheet or calculation sheet have been properly addressed. The Verifier is also the Checker.
- **Interdisciplinary Review:** Once the design deliverable is checked, the Design Manager organizes the Lead Discipline Engineers (roadway, drainage, relocated utilities, new power and communications utilities, signals, signing and pavement markings, communications systems, architecture, structural, landscaping, etc.) to review the submittal. Concurrently, the Construction Manager and QC group reviews the submittal for constructability. If there are comments from the Interdisciplinary Review, the checking procedure starts from the beginning for the affected portions of the deliverable.
- **Quality Assurance:** The Design QA/QC Manager audits and ensures the quality control checking process is being followed by the design team. In addition to the QA/QC design process outlined above, the Design QA/QC Manager and the Design Manager may direct a design peer review on a specific discipline by a senior technical team member. Comments from this peer review will also be addressed by following the quality control checking process.
- **Contractor Review:** As a final deliverable review prior to submitting to VDOT, Corman again reviews the plans for constructability, conformance to anticipated means and methods and completeness of comment responses.
- **Submit to VDOT:** The Lead Discipline Design Professional (Engineer, Architect or Landscape Architect) signs a form for each milestone deliverable that QC efforts are compliant and transmits it to the Design Manager who signs off on it with the QA/QC Manager. Final deliverables are now ready to be signed and sealed by the Lead Discipline Design Professional (a Virginia PE, RA, or LA) and the DBPM submits it to VDOT for review and/or approval. VDOT (or other reviewing agency) reviews the design and submits comments to the Corman/Parsons Team. The Team then responds by addressing comments by incorporating changes into the design for the next milestone submittal. This continues throughout the design phase until final plans are submitted to VDOT and approved for construction.

Design changes during construction will be reviewed using the same process as the original design. Changes, such as field-authorized design changes and nonconformance evaluations, will be maintained in a database or

marked up and dated on a set of “*Approved for Construction*” plans to track revisions and update the as-built documents.

Records: The Lead Design Professional verifies that quality control procedures were performed for the individual disciplines. The Design QA/QC Manager and the Design Manager are responsible for Quality Assurance. Copies of each submittal, including revisions, will be kept throughout the project. The Design Manager maintains final design records of the forms and checkprints in the project files.

The Design QC Manager’s role in evaluating design includes reviewing computations, technical accuracy, and conformance to contract documents, form, content and coordination with other disciplines, including roadway, traffic, geotechnical and construction. The Design QA process evaluates whether the designers assessed the design parameters appropriately, applied the correct analyses, and that the designs are by qualified personnel. Design QA will also ensure that the proposed solution meets contract requirements and required contract work is completed by applying skill and experience. The Design QA/QC Plan will include discipline-specific design checklists, in addition to VDOT Form LD-436, at all major milestone submissions. Constructability reviews will be led by the Construction Manager who will take into account how the phasing of construction activities affect maintenance of traffic. The Design QC Plan includes the contractor as an integral part of the design quality process.

TEAMWORK: The Design QC Plan includes the contractor as an integral part of the design quality process.

One Unique Design QA/QC Element: System Integration. The project contains communications systems for Transit Signal Priority (TSP), Real-Time Transit Information (RTTI), and Fare Collection which for most at VDOT are unique to this project. There are also camera, emergency telephone, transit message board, and loudspeaker installations at each BRT Station of which are similar, but still unique to other VDOT projects. QA/QC for these elements during design is addressed by Parsons’ Design QA/QC Procedures. Parsons is a multi-discipline firm and is routinely involved with transit projects that contain these elements; therefore, their Design QA/QC procedures already address the design and coordination of these elements.

In addition to the typical drawings and specifications, these systems require a robust System Integration Plan which will be prepared during design by the Lead Systems Engineer and his staff as is routinely done on transit projects. Referred to as an Integration, Testing and Acceptance Plan in the RFP, it will serve multiple functions:

- Ensure inter-disciplinary coordination during design.
- Provide procedures to Design-Build field staff.
- Provide VDOT with a tool for QA verification.
- Provide GRTC and the FTA visibility of how these systems were installed and tested.

This Integration, Testing and Acceptance Plan will include:

Requirements Traceability Matrix (RTM): Developed listing all the requirements identified in the RFP, as well as any requirements identified during initial field surveys by the team. The RTM will identify for each requirement the method by which the requirement will be met. For example, hardware, software, or systems integration.

Integration Control Document (ICD): Identifies interfaces that must occur for the GRTC BRT to be a successful operation and contains three sections:

1. **Construction Integration:** Identifies integration that must occur during construction, including utilities, such as power.

2. **External Integration:** Identifies integration with existing GRTC and VDOT systems, such as Advanced Traffic Management System, Real-Time Transit Information System and others.
3. **Systems Integration:** Identifies integrations which must occur within the BRT Systems.

Testing Plan: BRT systems testing will occur in three phases. The Testing Plan *will* identify the tests to be conducted during each phase.

1. **Unit Testing:** Each unit will be individually tested after installation. This plan will identify the individual units to be tested and establish methodology for testing. Unit testing will be conducted by supplier of equipment and witnessed by Parsons.
2. **System Testing:** After each unit within a system is installed and individually tested, a system test will be conducted to ensure each unit within a system function in unison to satisfy the system requirements as a whole. System Testing will be conducted by Parsons and can be witnessed by Contractor and/or GRTC/VDOT staff.
3. **Systems Integration Testing:** Once BRT systems are installed and tested, Systems Integration Testing will be conducted to ensure that the BRT systems that must be integrated function as in accordance with requirements. Testing will also be conducted for the systems that must be integrated with external GRTC, City of Richmond, and VDOT systems. System Integration Testing will be conducted by Parsons' systems staff and performed in a way to be witnessed by VDOT and/or third party staff at their discretion.

Construction QA/QC: No matter how accurate the design is, its implementation during construction determines success. Effective and aggressive Quality Control, supported by management, will drive the project toward success from VDOT and the community's perspectives, as well as the contractor's profit perspective. In addition to the traditional VDOT requirements for this project, FTA and DRPT requirements are included in Special Provisions for Station Technical Requirements: Section 014000 Quality Requirements and 017300 Project Execution. Meeting these requirements takes pre-planning and effective communication. Prior to construction, while design is still in progress, the Design-Build Project Manager, Construction Manager, Design/Construction Integrator, Construction QC Manager and Quality Assurance Manager will hold a lessons learned planning forum. ***Based upon their collective judgment, they will identify the 20% of work tasks that will cause 80% of the quality challenges.*** Inspection and Testing Plans (ITPs) will be developed for those critical items and distributed to the Foremen, QC Inspectors, and QA staff to use as a guide in performing and inspecting the work. Based upon past history and shared experiences, additional witness and hold points above those required by VDOT will be identified and then enforced in the field by the DBPM, CM and CQCM and their staff. Documents releasing work at each witness / hold point are identified on the ITPs and documented for review by the QAM or VDOT. Our goal is to perform work "right the first time" and if any issues, determine the root cause and then correct it.

One goal of the project-specific QA/QC Plan is to minimize the effort VDOT must expend performing QA or QC. For an item, such as maintenance of traffic, this can be accomplished through structured QA/QC procedures that include mandatory hold point preparatory, aka, activity pre-planning, meetings, routine inspections, checklists, thorough QA/QC documentation, and following a communications plan where roles and responsibilities are clearly laid out, including names, titles, and contact information, with procedures for stakeholder notifications, incident management, and emergency response. There will be

DEDICATION: Our DBPM will instruct the QC staff early on that their job supersedes keeping records and testing materials, includes the traditional duties of a VDOT inspector, and being assertive if anything is non-compliant.

no gaps regarding taking action to ensure timely communications and public safety in the face of any unforeseen event. Our Lead QC Inspector Michael Elliott was the lead inspector on the ITS systems on the Elizabeth River Crossing project on which Parsons' is VDOT's GEC. He is highly competent in the inspection of ITS and system anticipated to be encountered.

Our current Staffing Plan assigns an onsite Construction QC Manager supplemented by experienced QC inspector(s) to meet operation needs. For Example, during paving, VDOT specifications require a minimum of two qualified inspectors per paving operation. For this project, we envision two or three full-time QC inspectors onsite for the majority of the project. All will be VDOT certified for the work they are inspecting. If paving, MOT set ups, or multiple remote station locations are worked on concurrently the number of inspectors would be adjusted to meet actual field needs. Arrangements with a testing laboratory and back-up lab will be made should issues arise in performing field and laboratory testing. Each will hold certifications to perform material testing on VDOT projects. Other QC issues encountered on past design-build projects with Contractor-led QC follow. ***We will actively address these lessons learned on this project to limit additional VDOT involvement.***

WE WILL PAY SPECIAL ATTENTION TO ENSURE:

- ✓ Adequate/qualified inspection staff and QC staff management;
- ✓ Upper management support for QC or QA staff actions;
- ✓ QC staff concentrate on inspection of the actual work vs. solely focusing on material testing;
- ✓ Effective MOT (vehicle, pedestrian, bicycle) with allowable lane closure restrictions and continued involvement of the designers;
- ✓ A stellar Contractor Safety Program;
- ✓ Coordination between the field and office staff (including designers);
- ✓ Consistent and thorough coordination with the QA staff in scheduling oversight;
- ✓ Maintenance / protection of completed work (e.g. underdrains);
- ✓ Follow-up inspections and generation of punch lists, and;
- ✓ Complete and timely QA/QC ***documentation.***

Project Document Control and Maintenance: The QA and QC teams will follow VDOT's Design-Build QA/QC Guide, VDOT's Construction Manual and Materials Manual, among others for document control. The QAM monitors the QC team in preparing and submitting records daily, including daily work, inspection and material test reports. A master set of QA documents (hard and electronic) with submittal, RFI, and photo logs, is maintained by the QAM at the field office with preparatory meeting minutes, and completed QA and QC inspection checklists / test reports. For this project, specialized Commissioning and System Testing records will also be maintained. Materials Notebook entries and corresponding materials tests reports, invoices, and TL weigh sheets. A customized tracking log will monitor information. Additionally, a project SharePoint site can be established to facilitate secure access to this information by the appropriate project stakeholders if so desired.

One Unique Construction QA/QC Element: The Corman/Parsons Team evaluated the critical construction risks identifying the 20% of the tasks that represent 80% of the risk. The analysis identified System Integration and the associated commissioning as the construction element most likely to cause the majority of the risk. Integrating the multiple electronic systems for the proper operation of the system with the land side TSP, GRTC Operations Center, on board Bus GPS and TSP or City TOC present the biggest challenge to the "public trust" in the operational system. If the systems do not all work seamlessly together, public perception and ultimate financial success of the BRT system could be in jeopardy.

The brick and mortar construction has clear and predictable quality milestones and measurement. The required system integration and operational testing does not have clear and concise requirements with well-defined hold points and testing frequency. The focus of quality is on delivering the owner / operator GRTC a quality project in terms of systems and operation that performs as intended providing “*the outcomes that are promised at the performance levels expected.*” There is also a separate requirement for a Safety and Security certification by the FTA for the entire system (operational, as well as infrastructural). To assist the GRTC in obtaining that certification for our construction the application of commissioning to all systems construction integration is a logical step to ensuring this expectation is achieved consistently.

The commissioning process can differ significantly in terms of the scale and scope as defined by the project plan, but essentially a commissioning team and team leader are defined at the planning stage and are typically associated with the system project into the first year of its operation. For our project, the Commissioning Team will consist of the designers (Parsons) and the QAM firm (MBP).

Parsons routinely provides commissioning services as the Engineer of Record and as an Owner’s representative. This gives them a complete perspective of the level of effort, issues, and reporting involved. Currently, Parsons is VDOT’s Program Management Consultant for the Elizabeth River Crossing project in the Hampton Roads District, which includes commissioning roadway tunnel systems: emergency phones, surveillance cameras, reversible lane control devices, ITS, fire alarms, fire suppression systems, ventilation, pump stations and toll collection equipment.

Parsons knows FTA’s Safety and Security Certification requirements as we routinely assist The Washington Metropolitan Area Transit Authority (WMATA) with FTA Safety and Security Certifications for multiple modification to the existing Metro system.

MBP has built a reputation for effective and efficient construction management. However, MBP also has extensive experience in commissioning construction projects. The firm possesses extensive local staff with experience in both the construction management and the commissioning process, and will merge these two services for delivering this project. With that in mind, it is recognized the most successful commissioned projects initiate the process at the project planning/design stage which allows it to progress to the point where all planned outcomes are delivered by the system. MBP strongly believes that bringing this service and the benefits of their commissioning experience and expertise to the design and installation of GRTC’s ITS systems will pay significant dividends to GRTC, in the short and long terms.

ITS as applied to rapid transit systems can be improved with careful planning and organizing directed towards doing what is needed to accomplish the owner’s **operational** mission. Commissioning ensures that the system is performing as it was designed and intended to by the owner and that those who operate and maintain the system are well trained and can perform their system functions. Commissioning as implemented by MBP succeeds because it defines the desired *outcomes* of the system to be constructed and implemented. Commissioning is a process that oversees the design, construction, implementation, and operation keeping those original outcomes in consideration at all times making sure they are achieved.

In conventional construction inspection practice, typical inspection checklists generate a list of deficiencies from the original system design and specifications. This is not enough and simply “*righting*” these discrepancies will not ensure that the system will operate as it was designed or perform as expected. The commissioning process is a qualitative step above this basic inspection process. Our Team’s experienced commissioning team records and describes problems (potential and existing) and then makes recommendations for corrections or improvements based upon its analysis of the *entire system*. The commissioning team’s job is not to simply create a punch-list of deficiencies, but to recommend changes based upon the desired function and operation of the system; changes the commissioning team must see implemented, as well. The commissioning

process benefits stakeholders including the owner, GRTC, the operators, and the system users, who are also the ultimate “owners” of these systems. *This is especially true of this project as the FTA policies and procedures require a commissioning regime be implemented for the intended system operation, as well as a safety and security certification.*

Operationally, GRTC can expect decreased management, operational, and maintenance costs when handed a well-planned, well-documented, well-tested, and fully integrate system. They can also expect fewer complaints and can address any that might occur with a commissioned system. As Owners continue to place greater demands for accountability on its designers and contractors, the application of commissioning to project delivery is an essential cost effective and *cost beneficial* means of achieving that accountability. Simply put, Parsons’ and MBP’s solid track record in construction management and commissioning applicable to Owner-Agency project administration will ensure the successful delivery and operation of GRTC’s new BRT system.

Our designers’ and QA firms’ scopes will include Commissioning (Cx) QA Scope beyond conventional construction activities Quality Assurance - Ensuring all “*individual items*” are compatible as a system and performance meets the owner’s expectations.

Testing the components as a system only is problematic in that it lends itself to more time to diagnose where the actual problem lies, e.g., is it the cable company or the CCTV Performance testing each piece of equipment prior to full on system testing is the way to go. Using traffic signals as an example, ensure all of the intersection will run the pre-emption plan before connecting it to the entire system. Regarding the GRTC bus transit system:

1. The scope will include all of the acceptance testing starting at the Factory (FAT), and move into the Device Acceptance Testing (DAT), and Site Acceptance Testing (SAT) as equipment is installed. This assures the performance of the equipment works singularly (includes all of the test scripts for the sub systems). These activities will be listed in the CPM schedule.
2. There will be some integration testing that makes sense and should also be included within the CPM schedule (IAT). System specific Functional Performance Tests (FPT) scripts will need to be written for this.
3. Employ User Acceptance Testing, which is truly exercising all of the elements based on the scope or performance requirements in the specification, to include demonstrative failures and how the system responds to failures.
4. As part of this, we will ensure the Operation and Maintenance (O&M) Manuals and as-built drawings reflect all of the system’s features we provide and install.
5. Include training requirements as part of the system turn over and review to ensure owner’s personnel have the knowledge they need to operate the system efficiently and safely.
6. Although not specified in the RFP, recommend the system has spare parts / equipment to ensure system “*up time*” is within owner requirements.
7. Provide service during acceptance testing and the validation period.
8. Serve as a liaison between the sub-systems, City of Richmond, VDOT, GRTC, Public affairs, etc.

Operationally, an owner can expect decreased management, operational, and maintenance costs when handed a well-planned, well-documented, and well-tested system. They can also expect fewer complaints and can answer those that do occur with a system that has been commissioned. Agencies, such as VDOT, are placing greater demands for accountability on its designers and contractors, and the application of commissioning to projects with a heavy emphasis on system integration is a cost effective and *cost beneficial* means of achieving that accountability. Simply put, the Corman/Parsons Team’s solid track record in construction management and commissioning applicable to government project administration makes it uniquely qualified to bring the service

of commissioning to this construction project. By including system integration commissioning as part of the project's QA/QC plan, VDOT and the operator GRTC, will achieve the assurance the project will deliver the performance and outcomes expected. This includes achieving the required system integration for optimum performance and reliability, and BRT assets that perform as expected for years to come.

4.4.4 STAKEHOLDER COMMUNICATION: Communication and coordination with agencies who have operating, permit, and funding responsibilities is discussed under Project Approach.

Public Involvement/Public Relations: Conducting proactive and effective public involvement / public relations prior to and during construction will be critical to project success. Mindfulness of public involvement and public relations will not be limited only to certain aspects of this project, but instead will be an important consideration across disciplines and the team. There are three key components to our outreach program:

TEAMWORK, COLLABORATION, AND BEING HEARD.

We will prepare and execute a comprehensive Communications Strategy Plan which outlines a schedule and mix of meetings, public service announcements, print and broadcast advertising and other strategies and tactics that most effectively account for stakeholders, as well as the unique attributes of the project area and its proximity to residential areas, businesses, and job centers, tourist attractions, education facilities, and connections with other transportation modes, both in the heart of the project corridor and the Greater Richmond Area to be served by the project. The plan will be designed to build relationships with, set expectation by, and help mitigate construction impacts on them. Our plan will facilitate two-way communication by accounting for the concerns and informational needs of the stakeholder groups; maximizing methods for most-effectively engaging and sharing information with each group; soliciting and incorporating their feedback and suggestions whenever possible; and addressing their issues and concerns quickly.

Since potential traffic, parking, and delivery impacts are anticipated major risk factors having the most impact on VDOT and the public, the plan will focus on raising awareness and soliciting public input on proposed or planned multi-modal traffic pattern and access changes. Public outreach will also play important roles in our Team's development of the Traffic Management Plan (TMP) early in the design phase, as well as the subsequent Maintenance of Traffic (MOT) and Sequence of Construction (SOC) Plans, which will focus on the safe passage of vehicular, pedestrian, and bicycle traffic and maintaining access for residents and businesses during each construction phase.

Since we recognize that as our traffic and construction plans are implemented, stakeholder groups will continue to evolve over time, our communications plan and staff will continue to educate and inform the public about:

- What to expect;
- How best to navigate traffic patterns and changes,
- Travel times that may help them avoid congestion and delays;
- Tools available to access the latest project and travel information;
- Project progress and successes, and;
- How to most quickly and easily reach the project team with a question, concern or feedback.

In keeping with the project schedule and proposed milestones, this plan will include proposed advertising and marketing strategies. As noted in the RFP, each aspect of the public involvement effort will conform to the guideline requirements of and be approved by GRTC and VDOT.

Public Information Officer (PIO) Bryon Johnston has almost 20 years of strategic communication and public outreach experience with community and customer relations being a critical component of this work. He has spent the last 12 years developing and executing successful strategic communication and outreach efforts for

high-profile, politically-sensitive transportation and infrastructure projects and initiatives in Virginia, Washington, DC, and Maryland. His project portfolio includes the Woodrow Wilson Bridge which spanned these jurisdictions, the 11th Street Bridge and other Anacostia Waterfront Initiatives in District and the Chesapeake Bay Bridge Deck Reconstruction in Maryland. Bryon will leverage his experience to serve as a liaison between stakeholders, staff from GRTC, DRPT, City of Richmond, Henrico County, VDOT, and our team to identify potential design and construction issues and proposed solutions or strategies to minimize them while adroitly managing responses to complaints and concerns as they arise.

It is expected that three methods of receiving communication from the public will be established: the project hotline, emails, or mailed letters.

Project Hotline: Allows the public to readily communicate with the Project. Staffing will be provided an hour prior to through an hour after daily construction activities. A regularly updated and recorded message will give callers the option to leave a message that will be responded to within a day, listen to a recording about the week's construction work, or access additional information online.

Project Email Address: Will be routinely monitored and responses provided within a day of receipt.

Project Mailing Address for Public Queries: Gives the public an opportunity to mail concerns to the project, which will be responded to within one day of receipt.

All inquiries will be logged and reported weekly to VDOT. Complaints will be documented with proposed solutions or responses and forwarded to VDOT.

Upon Notice to Proceed, our team, in conjunction with GRTC and VDOT, will begin proposing and preparing for approval informational materials to inform key stakeholders about schedule, design elements, planned construction activities, mitigation of potential impacts and progress of the work. These materials will educate and inform the public about key design elements, temporary construction-related or permanent traffic pattern(s), parking and access changes, detour information, continuous and pertinent safety messages and the benefits of new the project work. These materials may include, Traffic and Construction alerts, website text, maps and graphics, Powerpoint presentations, an informational brochure, fact sheets, FAQs, project progress sheets, display boards, posters, advertising or other informational materials. Per the RFP, the informational brochure will be updated monthly regarding construction activities affecting parking, access, utilities, and other issues related to specific business and residential areas. This will be distributed to all businesses, residents, and community organizations and affected by the construction at least two weeks prior to any work in the area and provided on a continuous basis throughout construction.

As appropriate, materials will be tailored for relevant stakeholder groups, including motorists, pedestrians, bicyclists, businesses, current GRTC bus users, VCU students, faculty and visitors, and tourists.

To further build good will and public appreciation, we recognize the importance of drawing the public's attention to often overlooked signs of project progress that occur daily, weekly, and monthly in between more noticeable and publicized key project milestones. To share these signs of progress and bring the public along for the ride, we will identify potential human interest and feature story opportunities that put a face on the project work and our efforts to partner with community and minimize impacts. We also will furnish photos that are more public-friendly than typical progress photos and information about our work that can be used by GRTC, VDOT, the city and county to place on their websites and social media channels.

Working with the larger team, signs will also be developed and used at project locations to inform the public about the project, how to get more information, or communicate with us. These will include at least four project information signs along the project corridor as specified by VDOT.

As per the RFP and as appropriate based on project activities, print advertising will be placed in Richmond Times-Dispatch Insert (1/4 Page) Quarterly; Richmond Free Press (1/4 Page) Quarterly. We will also most cost-effectively place Traffic and Weather five-second sponsorship announcement and 15 second commercial three times a day Monday - Friday on Richmond radio stations. Ads will be rotated among the following radio stations:

WTBJ 106.5 FM
WRVA 1140 AM
WRVQ 94.5 FM

WRXL 102.1 FM
WURV 103.7 FM
WCVE 88.9 FM

Twice a month, 15-second public service announcements related to construction and driving the public to the project web page also will be provided and secured with the above radio stations.

To reach key stakeholder groups, we may also recommend supplementing these advertisements with strategically-placed internet advertisements. Please note that we recognize how critically important strategic timing, frequency, and placement is in the effectiveness of advanced notification advertisements and their ability to influence behavior and perceptions of the motorists, bicyclists, pedestrians, bus riders, residents, businesses, and visitors. This is particularly important during changes in traffic patterns, lane closures, bus service and other activities anticipated to impact the ability of people to travel through and adjacent to the area or to simply park. Because many of the impacted users are bus riders, we will work simultaneously with GRTC to update and maximize effective use of their website, social media channels and other informational materials to alert patrons aware of service changes.

Informational materials and advertising will keep with and incorporate established GRTC and VDOT branding and key messaging pertaining to this project. They will be approved by VDOT prior to distribution.

Our team will assist in holding up to 20 informal meetings with stakeholders as directed by VDOT. They will be geared for the specific stakeholder targeted – Fan District, Museum District, Rocketts Landing, etc. We will schedule these meetings based on our experience, anticipated construction activities and trends we may identify through daily and on-going basis interactions with these stakeholders and the public. A list of affected stakeholders, including community associations, religious houses of worship, business owners, police, fire and rescue, school bus transportation, and transit operators will be developed by the Corman/Parsons Team and submitted to GRTC and VDOT simultaneously for acceptance prior to holding any meetings. Stakeholders will be informed of meetings. GRTC staff will lead public meetings with the support from our team prior to, during, and after these meetings. Team members, including the Public Information Officer, will attend to share information and answer questions. We will assist with developing presentations and prepare collateral materials associated with public meetings; including project board, project plans and assist with brochure and handout production and printing. We know that preparing for these meetings will involve collaborative development of messaging and materials to make each meeting effective. Notes will be taken with follow up tasks or actions items identified based on questions, comments, and concerns that may be raised. Responses or follow up will be coordinated with GRTC and VDOT, provided timely with progress and response activities and outcomes tracked and logged.

As appropriate and approved, Bryon and other team members will operate as liaisons among VDOT, GRTC, the City of Richmond, the Department of Rail and Public Transportation and our Construction Manager for compliance with applicable local ordinances and providing required notification to affected property owners.

This information will also be included in a log or database of interactions with the public and include questions, complaints, and/or comments received from stakeholders and the public either via public outreach or direct

contact, along with dates received, responses generated, and how the issues or concerns are addressed. This list will be provided to GRTC, VDOT and /or the City to post on their websites and may be incorporated into other project informational materials and messaging. Any meeting or related activities will be conducted per VDOT Policy Manual for Public Participation in Transportation Projects, revised in 2011 modified by required elements of the GRTC Transit System Public Comment Procedures.

Concurrent with the first plan submittal and at intervals deemed necessary by the VDOT, the Corman/Parsons Team will provide to VDOT's Project Manager written information about the project to post on GRTC and/or VDOT websites, including any significant changes that affect the public. Information for Traffic and Construction Alerts will be submitted at least two weeks in advance of the impact. If the impact is major (changes or additional lane closures that are anticipated to cause traffic delays that exceed existing conditions or impacts to bus stops), VDOT and GRTC will be notified simultaneously three weeks in advance. We will assist VDOT and GRTC in sharing such information with the public via publication and broadcast earned media news briefs and stories.

As requested, we will provide VDOT's Project Manager and GRTC with an emergency contact list of Project personnel and response plan to respond to any onsite emergency, including any work zone incidents in accordance with I&IM-241.

In addition, in these and many other ways described throughout this proposal, the Corman/Parsons Team will minimize disruption to businesses and residents during construction. Any activity that affects parking, loading / delivery zones, access, utilities and other business impacts will be discussed with VDOT's Project Manager and prior approval will be obtained. We will provide and ensure access to businesses at all times. Utility disruptions will be limited to non-business hours and to a maximum of one hour with prior VDOT approval. Any damage to utilities affecting businesses will be repaired within one hour of disruption of the affected utility. Impacts to parking and loading zones shall be minimized. Overnight parking will be restored daily unless approved in advance by the City of Richmond, as instructed by VDOT's Project Manager. We will maintain access and adhere to ADA requirements during construction and adhere to the Transportation Management Plan (TMP) and approved Maintenance of Traffic Plans (MOT).



4.5 Construction of the Project

4.5 CONSTRUCTION OF THE PROJECT

4.5.1 SEQUENCE OF CONSTRUCTION: Construction is divided into two major categories: **ROADWORK AND STATION CONSTRUCTION**. To expedite the construction, the design will be performed and released for construction in seven individual packages.

One of the first packages to be “Released for Construction” is the **NEW FIBER / COMMUNICATIONS BACKBONE**. This backbone will include traffic signal communications to replace the under median City of Richmond multi-use duct. Until that element of the work has been totally installed, tested, and connected, for its entire length, the median removal and associated roadwork cannot start. Once selected, we will investigate the incremental directional boring / installation of the backbone in the existing median vs. under the sidewalk as specified in the RFP. By relocating the backbone under the existing backbone in the median, at an increased depth, the work can immediately be tested and connected to the elements it is intended to serve. This repositioning of the backbone will allow the median removal to proceed, prior to all the new backbone being installed, tested and all the new connections made. This change also removes the risk of the new backbone conflicting with the many other utilities under the sidewalk and eliminate potential pedestrian conflicts. *This minor change provides the opportunity to shave two months off this item potentially removing it from the critical path.* However, since this has not yet been approved, our Technical Proposal Schedule included in Volume II assumes the fiber under the sidewalk.

Another early package, available for construction only five months after NTP, will be the required **WATER AND SEWER RELOCATIONS**. Test holes and required geotechnical investigations will be accelerated for this effort and close coordination will be maintained with the City of Richmond to expedite their review and approvals. The immediate predecessor to this activity should be the approval of the drainage and SWM report which will need to be completed prior to laying out the new relocations to avoid any conflicts with potential new drainage piping. Since the new drainage is expected to be nominal, design of Water or Sewer relocations will be moved up and proceed based upon the approval of the Draft SWM report. Design approval of the 30% Station plans will also be required to ensure the relocations are either, in fact, actually required or located to avoid the approved new station locations.

Prepared concurrently with the above packages is the **ROADWAY PACKAGE**. The first phase of roadwork construction as discussed above is the new fiber backbone underneath the existing sidewalk along Broad Street using directional bores and dog house manholes to minimize disturbance to pedestrians and vehicular traffic at intersections. Once the new fiber backbone has been installed and tested, the operations of the existing traffic signals will be switched over and demolition of the existing median (including existing fiber) will commence. *Again, if the new backbone is allowed to be installed under the existing median, this work may also be removed from the critical path.* Roadway construction includes establishing MOT, demolition and backfill of the existing median; install new median, curb cuts, and sidewalk; mill and install new pavement, including striping; and install/modify signals, signage, and light poles. Median reconstruction will be done in manageable sections to minimize traffic impacts and maximize worker and public safety. Also included in this package will be the many new or upgraded ADA ramps or sidewalk improvements.

The **STATION PACKAGE** will commence upon NTP but not advance in earnest until after the utility test pits have been concluded to clearly establish the adjustments required to the RFP station locations to minimize impacts to adjacent infrastructure. This package will include the station civil, architectural, structural, and system infrastructure required. The package will include exclusive flow stations (Median) and mixed traffic stations (Curb). We acknowledge the RFP’s recommendation to approach the plan review process separately for the four neighborhoods along the BRT route. Should one of these station-type designs or a group of stations in

one neighborhood be delayed in the design or review process or an individual station require additional design or review time, the Station Package will be broken up as necessary to not delay RFC of any other stations. Stations that do not require ROW or utility relocations have been shown in the Technical Proposal Schedule starting in advance of those stations that do have those constraints. Each station will be constructed generally the same way: establish MOT and pedestrian protections; relocate / protect utilities; demolish necessary site features; install foundations and under slab utilities; construct the slab, walls, and ramps; install the canopy, glass, and railings; install conduit and wiring; install and test the station system elements (power / communication / lighting / cameras, fare machines, etc.); and install final amenity items, including trash receptacles, benches, and landscaping.

All of the stations require geotechnical, structural, and architectural design review and approval before starting construction. Some stations, however, have additional constraints that must be satisfied before starting construction; namely utility relocations and/or right of way acquisition. The stations will be constructed in groups with multiple crews and working on those stations with similar constraints at the same time with MOT, pedestrian access or lane closures coordinated. Geographic considerations will also be given to station construction phasing. For example, median stations in the Museum and VCU areas that do not require utility relocations may be constructed at the same time, while those that do require utility relocations will also be constructed together, albeit at a slightly later date. These “*groupings*” of station construction provides for the safest and most effective staging and storage areas, as the median work area between two stations can be used to stage and store materials and equipment as allowed.

Sequencing the station construction this way has the added advantage of schedule flexibility and the ability to adapt and mitigate potential delays by re-scheduling crews to other stations should unforeseen situations arise. If there is a delay in a utility relocation at one station, construction of a different station may begin so the project schedule is not detrimentally impacted.

The Street Lighting and Traffic Signal Packages are independent of the other main packages above with the exception street lighting cannot be removed to build a new station unless new or temporary lighting has been designed and installed to replace it. In addition, the traffic signal work at the 55 intersections that are impacted will need to be coordinated with the System Package. The Traffic Signal Package will lead the system package by several months. Should it be delayed or the System Package advance faster than expected they may be combined since they contain similar work to be performed by the same tradesmen. That decision can be made at the 30% or 60% stages. Also, if one specific location is held up in design or review for either the Street Lighting or Traffic Signal Packages, that specific element will be taken out of the full package and proceed on its own – so as to not delay construction at the other locations.

The last package to be “Released for Construction” is the **SYSTEM PACKAGE**. This will include all Communication, CCTV, RTIS, Pedestrian / Traffic Signal, Passenger Information Systems, Emergency Phone service connections integration and protocols so they work together seamlessly. It will also include the required infrastructure at the GRTC Operations Center, as well as the City of Richmond Emergency Communications Center.

A detailed Commissioning requirement list will be included, as well as the required testing regime for each unit to be included in the system. It will utilize many items specified or installed in the earlier packages, including the conduits / wiring previously installed in the stations, TPS or new Pedestrian heads included in the Traffic Signal Package, and, of course, the new fiber backbone included in the first package described above.

4.5.2 TRANSPORTATION MANAGEMENT PLAN: The project requires a Transportation Management Plan (TMP) Type C and will follow the Project Management Process (PMP). Our Team will work with VDOT to develop the TMP, including three major components: Temporary Traffic Control (TTC) Plans, Public Communications (PC) Plan, and Transportation Operations (TO) Plan. An important part of the TMP is a Public Information Program to inform the public of changes in traffic patterns and major impact activities as discussed above. This takes close coordination with VDOT, adjacent and overlapping construction projects, and other key stakeholders. The Public Information Plan is outlined in detail above in Section 4.4.4 Stakeholder Coordination. During design, the Corman/Parsons Team will establish an MOT Task Force that meets weekly to address traffic conditions and our construction sequence.

Maintenance of Traffic: MOT Typical Sections are shown below (See **Figure 5**). The RFP lists 19 other potential projects along the proposed BRT route. We will obtain construction schedules from these projects and to the extent practicable, will coordinate construction activities to allow lane closures in a particular area to be used for more than one project at a time. Our MOT and staging plans will address construction components, including stations, crosswalks, utility relocations, new communications backbone, and other new utilities, traffic signals, drainage facilities (temporary and permanent), and erosion and sediment control.

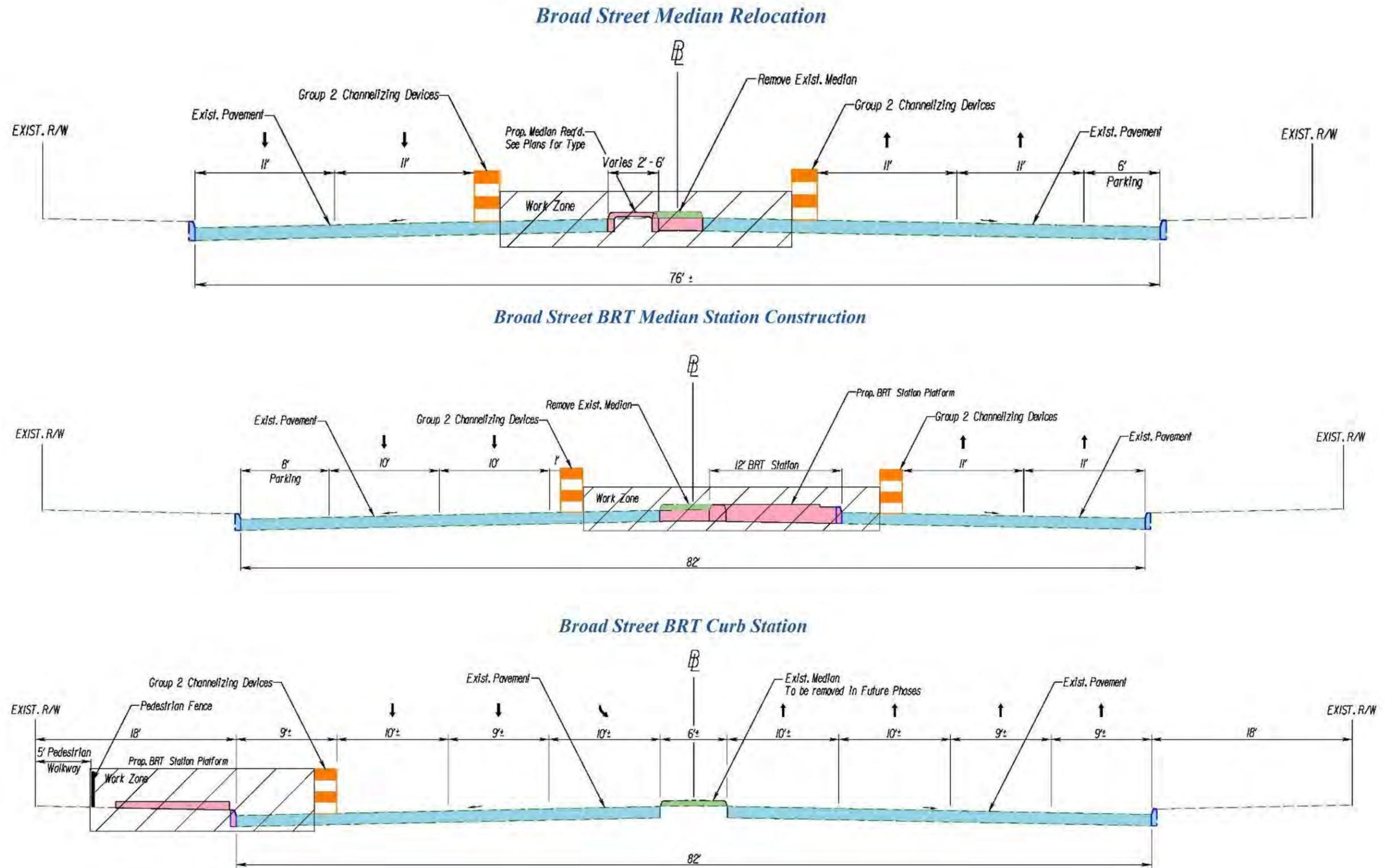


Figure 5: Preliminary MOT Typical Sections Broad Street Corridor

To minimize on street staging and storage, we will lease vacant land near the project (possibly at multiple locations) to serve the seven-mile plus corridor, minimize construction traffic on the busy roadways, and increase our time on site performing the work.

Traffic Management Plan: As part of the TMP, a Work Zone Impact Assessment will be developed to optimize traffic operations during construction and minimize motorist disruption and delays. Traffic analysis for MOT conditions will be performed in advance of the work and modified as conditions warrant. As necessary, we will perform an operational analysis and report for the different MOT concerns anticipated.

- Signal Timing Changes
- Existing Bus operations
- Short-Term Lane Closures
- Parking
- Access to business, including loading and delivery zones
- Incident Management

MOT Plan and work zone details and sequence will be per the *Virginia Work Area Protection Manual* and MUTCD. Typical MOT details will be developed to be utilized by the field crews. One typical may be for a parking lane closure mid-block or a utility crossing at an intersection, another may be for a typical two lane closure when permitted. We would expect the City to provide us, as the VDOT contractor, project-wide Work in Street Permits as it would not be practical, or assist with the tight schedule, to require individual permits for each utility test pit or boring.

Lane and Road Closure and Time-of-Day Restrictions: Lane and road closures will follow the restrictions in the RFP, Sec. 2.13.4.

Holiday Restrictions: Work will not be performed within the Project limits on holidays listed in RFP, Sec. 2.13.5.

Flagging: Flagging is anticipated when placing MOT devices, selected utility relocations, intersection construction, paving, and temporary lane closures.

Special Events: Work will not be performed during the special events listed in RFP, Sec. 2.13.7.

Incident Management: The Corman/Parsons Team will coordinate with VDOT, GRTC, the City and other stakeholders to develop protocols to implement Incident Management, not only within the project limits, but also within regional influence of the area. ***We will develop an Emergency Contact List and plans to address different incident scenarios.*** This includes strategically-placed VMS to assist motorists, alternative routes and procedures for emergency lane closures or hazard protection. This prepares our Project Team to react quickly to any incident affecting motorists traveling through the project.

Transportation Management Plan Deliverables: Our phased construction plans, including TMPs and MOT drawings, will be prepared in an integrated, multi-disciplinary manner, with significant construction team involvement. The TMP/MOT Design Team will receive critical input from construction professionals on access needs, material delivery routes, staging areas, and construction durations. They will also address pedestrian and bicycle access and safety.

The TMP will include the work hour and closure restrictions provided in the RFP. Of note, 96-hour notification of any MOT change is required.

Maintenance of On-Street Parking: Reconfiguring Broad Street to provide BRT lanes reduces on-street parking. Additional on-street parking reduction will occur during construction. We will stage the work to minimize on-street parking impacts. Mitigation during construction include signs directing motorists to the nearest available off-street, surface, and garage parking. Eliminating parking will be coordinated with adjacent retail establishments, other businesses, and VCU. As required by RFP, Sec. 2.2.4, parking will not be removed for more than 120 days unless otherwise approved by VDOT.

Maintenance of Existing Bus Operations: GRTC and VCU operate regularly scheduled bus service over most of the proposed BRT route. We will coordinate construction to minimize disruptions to existing bus stations and operations. We plan to engage the operating staff of GRTC and VCU Ram Ride so as to better understand their operations. Based on our experience, the most significant impacts to bus operations are not instinctive and dialogue is required to fully understand the needs of the bus operating agencies.

Transportation Management Plan Stakeholders: The Corman/Parsons Team know the importance of keeping stakeholders informed on progress and potential impacts. There are three key components to our outreach program:

1. **BEING HEARD:** Include stakeholders when preparing TMP and Traffic Control plans for input on important stakeholder issues, such as access to properties and hospital emergency response considerations.
2. **COLLABORATION:** Forming an MOT Task Force, which will include select stakeholders and VDOT, to collaborate on MOT issues, such as upcoming traffic switches, public notifications, and other items that have an impact on traffic flow and access.
3. **TEAMWORK:** A close working relationship between VDOT and the Corman/Parsons Team for a continuous and cooperative dissemination of information to stakeholders.

Major stakeholders, their role, and the key anticipated risks or impacts to them, are shown below:

STAKEHOLDER	ROLE	INTERESTS DURING CONSTRUCTION
VDOT	Contracting Agency	Conformance to GRTC / FTA requirements, work zone safety; coordination with adjacent projects; traffic backups or inadequate public outreach, impacts to adjacent historic or environmental resources, coordination with other stakeholders, and schedule adherence.
Greater Richmond Transit Company (GRTC)	Will own BRT & be responsible for operations/maintenance	Quality of construction, ease of future maintenance, training, seamless integration with existing TOC operations, MOT and public perception of the construction impacts, schedule adherence, conformance to FTA requirements.
Henrico County	Local Jurisdiction/Funding Partner	Coordination with adjacent projects traffic backups or inadequate public outreach, dust and noise, impacts to adjacent County property, adjacent historic or environmental resources.
City of Richmond	Local Jurisdiction/Funding Partner	Coordination with adjacent projects traffic backups or inadequate public outreach, seamless integration with existing traffic signalization and TOC operations, utility installation/relocation, dust and noise, impacts to adjacent City owned property, adjacent historic or environmental resources.

STAKEHOLDER	ROLE	INTERESTS DURING CONSTRUCTION
Virginia Commonwealth University (VCU)	Local University/Student Transport	Since the BRT passes the campus, many riders will be VCU students, and construction will impact the VCU shuttles. Accessibility to/from University through work zone and travel time through work zone impacted by reduced speeds and/or back-ups.
City School District and Private Schools	Student Transport	Bus routes impacted by construction.
17 Utility Companies (City of Richmond DPW, Dominion Power, Verizon and other communications companies)	Maintain / Operate Utilities Within or Across Corridor	Accessibility to facilities and relocations through work zones; impacts on response time to outages, conformance to their individual system requirements.
CSX & Norfolk Southern Railroads	Maintain / Operate Rail Lines Across Corridor	Project has several grade-separated crossings of major railroad facilities. Design/construction adjacent to and crossing railroad property will have to conform to railroad requirements.
City Fire, Rescue, & EMS	Emergency Responders	Emergency response routes impacted by construction or temporary lane closures.
State & Local Police	Emergency Responders, assist in MOT and TMP implementation	Emergency response routes impacted by construction or temporary lane closures, work hours and assistance required during lane closures and /or rolling slowdowns.
Other Contractors Working in the Area	Adjacent Contractors	Coordination of scheduling construction on other area project.
Traveling Public (Commuter & Local)	User of the Facility – Route Impacted	Bus routes impacted by construction or temporary lane closures; travel time through work zone impacted by reduced speeds and/or back-ups.
Local Homeowner Associations (e.g., Shockoe Bottom Neighborhood Assoc.)	Represent Local Communities	Routes impacted by temporary lane closures; travel time through work zone impacted by reduced speeds and/or back-ups; dust and noise.
Business Organizations (Anthem, Small business association representing corridor business owners in the Fan district, downtown and Rocketts Landing areas as examples).	Represent Local Business	Accessibility to facilities through work zone, parking, pedestrian access and travel time through work zone impacted by reduced speeds and/or back-ups.
Adjacent Retail, hotels, restaurants, and residents	Local Business / Residents	Accessibility to facilities through work zone, parking, pedestrian access and travel time through work zone impacted by reduced speeds and/or back-ups.

Table 2: Major Stakeholders



4.6 Elements of the Options in Relationship to Base Scope

4.6 ELEMENTS OF OPTIONS IN RELATIONSHIP TO THE BASE SCOPE

- **Base Scope:** Includes design and construction of all stations (reduced size) as shown on Sheets AD-01 - AD-04 of the RFP Concept Plans. It also includes the design and construction of all specified infrastructure for the BRT, as specified in Part 2 of the RFP and shown on the RFP Conceptual Plans required for the reduced stations. The above sections 4.2 - 4.5 supplemented by Section 4.8 describe our approach to perform this work.
- **Option 1:** Provides for installing clay face brick in lieu of the thin brick veneer included in the Base Scope on all the knee walls shown in the RFP Concept Plans. There are no major differences in project approach or change to the final completion schedule if this option is chosen.
- **Option 2:** Provides for replacing all ¼” milling and Thin Hot Mix Concrete Overlay (THMCO) shown on the RFP Conceptual Plans with a nominal 1.5” mill and 1.5” nominal SM 12.5E overlay. There are no major differences in project approach or changes to the final completion schedule if this option is chosen.
- **Option 3:** Provides for the design and construction of the full-size stations and additional infrastructure to support the larger stations. This option will increase the cost and take longer to construct, however, there are no major differences in project approach or changes to the final completion schedule if this option is chosen since it will not be a critical path item.

To complete the schedule as specified in Part 1, Section 2.3, we would require to be informed which options will be chosen, if any, as early as possible with the latest notice being provided with the NTP since they may impact the extent or length of the utilities to be relocated or require modifications to other infrastructure items.

Changes to the pricing will be shown in the Price Proposal as specified for the base scope and options.



4.7 DBE

4.7 DBE

4.7 DISADVANTAGED BUSINESS ENTERPRISES

The Corman/Parsons Team is committed to achieving a 10% DBE participation goal for the entire value of the contract.

Pages 47 – 56 are intentionally left blank.



4.8 Proposal Schedule

4.8 PROPOSAL SCHEDULE

4.8.1 PROPOSAL SCHEDULE

The Corman/Parsons Team has thoroughly evaluated the RFP documents, visited the site, attended pre-proposal meetings, participated in proprietary meeting discussions, and had working sessions among our construction and design teams. Through this progression, we developed a simplified solution to deliver the project through our Sequencing Plan. This narrative explains how we will deliver a positive experience to VDOT and stakeholders. The project completion date is as shown in the RFP: June 30, 2018. The Proposal Schedule is included in Volume II of this proposal.

Project Milestones

Notice of Intent to Award	March 21, 2016
Notice to Proceed	April 15, 2016
Substantial Completion of Advance Design Packages Fiber Backbone and Water and Sewer	August - September, 2016
Mobilization	August 29th, 2016
Start of Construction	September 28, 2016
Interim Milestone (Completion of construction, start of final observation period)	March 30, 2018
Final Completion	June 30, 2018

Work Breakdown Structure

The schedule integrates design and construction into a Work Breakdown Structure (WBS) as shown below:

Level 1: Project Milestones – Overall schedule review of progress.

Level 2: Public Relations – Includes preparing and executing a Public Outreach Plan.

Level 3: Permitting -Identifying and applying for required Environmental permits and approvals.

Level 4: Scope Validation – Validating the Scope with VDOT – Per the RFP there is a 60 day window to notify VDOT of any scope issues.

Level 5: Design–Includes the Basis of Design, Geotech and Drainage Reports, field investigations, preliminary, detailed, and final design cycles with time allocated for engineering services, plan development, QA/QC reviews, VDOT, and other regulatory agency 14 day reviews and approvals. This section includes a second level of WBS structure to group design by seven construction work packages (Water and Sewer Relocations, New Fiber/Communications Backbone Package; Street Light Package; Traffic Signal Package; Roadway Package; Station Packages; and System Package).

Level 6: Right of Way Acquisition-Includes title research, appraisals, offers and negotiations.

Level 7: Third-Party Utility Relocations–Includes activities for the UFI meetings, finalizing UT-9 Forms, preparing preliminary engineering estimates, utility relocation design by the our team and utility owners,

identifying utility easements, coordination with ROW acquisition, approval of P & E estimates, utility design approvals, and utility relocations.

Level 8: Construction—Includes all components of roadway and station construction, as well as MOT, temporary pavement for MOT, erosion & sediment controls, stormwater management, signals, systems / communication, drainage, lighting, and roadside improvements. The section has WBS second and third levels which segments the construction by tasks; Mobilization; Water and Sewer; Fiber Communications; Station Construction; Traffic Signal Improvements; Roadway Construction; System Integration / Commissioning and Close Out. Stations are separated between Median and Mixed Use (curb).

WORK BREAKDOWN STRUCTURE

LEVELS	WBS DESCRIPTION
Phase 1	Project Milestones
Phase 2	Public Relations
Phase 3	Permitting
Phase 4	Scope Validation
Phase 5	Design
Phase 6	ROW Acquisition
Phase 7	Third-Party Utility Relocations
Phase 8	Construction

Calendars

Four project calendars were used in the schedule and include:

1. **“5-Day Workweek with Basic Holidays”** – Based on five working days per week and is used for construction and design activities and includes holiday and special event restrictions and anticipated weather days.
2. **“6-Day Workweek with Basic Holidays”**-Based on six working days per work and is used for certain construction activities and includes holiday and special event restrictions and anticipated weather days.
3. **“Calendar Days”**—Based on seven days per week and is used for plan review periods and permitting activities.
4. **“Paving Calendar** – Excludes the months of November through mid-February

Design Phase

Includes preparing, QA/QC reviews, and submitting 30%, 60% and Final (Ready for Construction) design stages of the individual design packages. Included are 14-day review activities for VDOT / Agency review periods. Includes support of the plan preparation: survey coordination and mapping, geotechnical investigations, utility designations and test pitting.

The design phase begins immediately upon Notice of Intent to Award. In order to develop the initial site and utility packages, we need to be advised if Option Number 3 is to be selected at that time. The concept plans will be advanced to the 30% stage at this time. The Basis of Design will be submitted April 25, 2016 with approval expected June 8, 2016. As this is the key design submittal all other submittals are based upon, a speedy turn around within the 14 days specified is required. The Design Quality Control Plan will be submitted for review

at, or soon after, NTP. It is expected to have the Ready for Construction Plans for the different packages available as follows:

- Water and Sewer – August 2, 2016 (assumes City provides CAD files of 30% plans previously shared with the Design Builders.
- Fiber Backbone – September 28, 2016
- Street Lights – January 27, 2017
- Traffic Signal – October 20, 2016
- Roadway – October 24, 2016
- Stations
 - Mixed Traffic Stations (Curb) – December 14, 2016
 - Exclusive Flow Stations (Median) – December 30, 2016
- Systems Package – June 6, 2017

Key to the success of the project is prompt reviews and approvals by all agencies within the 14-day window defined in the RFP.

Permitting

Activities have been incorporated for the full project-wide concept SWM/E&SC Plan, Virginia Water Protection (VWP) Permit, and the VSMP Permit. Others include Henrico County Land Disturbance and the issuance of a “Project Wide” City of Richmond Work in the Streets permits.

Right-of-Way Acquisition

There are approximately 15 parcels that include permanent and temporary easements. The ROW process will advance during preparation of the 60% plans so that appraisals can be provided to VDOT for approval as soon as the 60% plans have been approved.

Utility Relocations

The utility relocations are sequenced to match the required work operations. A UFI meeting will be held as early as practical to advance this process. Due to the extent of the utility relocations, in each phase there will be some concurrent construction and utility relocation work within the same proximity.

Construction

Construction is scheduled to begin immediately once the appropriate package is approved, starting with setting out advance warning signs. Construction is anticipated to be in seven major packages (Water & Sewer Relocations, Fiber/Communication Backbone Package, Street Light Package, Traffic Signal Package, Roadway Package, Station Package, and System Package). Roadway work will be interrupted during the winter of '17 – '18 due to winter restrictions on paving.

Testing / Acceptance

Testing / Commissioning will be performed as the ITS and other communication elements are purchased and installed and connected. Commissioning will be performed as the individual systems are installed and brought

on line and continue until the end of the testing period. The Observation period will be between March 30, 2018 and June 30, 2018.

4.8.2 PROPOSAL SCHEDULE NARRATIVE

Plan to Execute the Work

We plan to complete each design package prior to commencing construction of that package, perform the construction in six phases and complete the project on or before the Final Completion Date of June 30, 2018.

Schedule Overview

Notice of Intent to Award:	March 21, 2016
Design Activities: Engineering which will be completed in June 2017.	March – December 2016, with the exception of System
Construction:	September 28, 2016 - March 30, 2018
Interim Milestone	March 30, 2018
Final Completion:	June 30, 2018

Construction

We divided the project into logical segments of work for efficient and effective utility relocation, roadway (includes pedestrian access) and station installation. Roadway work will be performed as the stations and ADA improvements are brought on line: We combined and sequenced the work to maximize resources, reduce schedule duration, and progress the work while maintaining constant traffic flow through the work zones. Stations without ROW needs or utility relocations are constructed first. Our work schedule/sequencing is shown on the attached schedule in Volume II.

Construction is scheduled to take place with multiple crews with much of the work constructed simultaneously. Weekly scheduling and supervisory meetings with the Construction Manager, Project Engineer, Construction QC Manager, QAM, superintendents, foreman, and engineers will be held to establish the three-week look ahead schedules. These schedules include detailed QC inspection and testing/commissioning needs. Subcontractors will be involved in weekly scheduling meetings.

Critical Path-For this project, *“Time will be of the Essence”* with the critical path being:

1. Obtaining a Project-Wide City of Richmond “Work in Street” Permit to allow subsurface investigations to proceed.
2. Subsurface Investigations - Utility Test Pits, Soil Borings and preparing the required Geotechnical Report. This report will control the follow-on 26 station foundation designs which can be broken out from the Station Architectural drawings and proceed early
3. The design of the Fiber Backbone will commence at NTP, but the subsequent submittals are constrained by the performance of the utility test pits. We have assumed a full VDOT submittal and review process for this submittal. Time can be saved if these utility plans can be developed to the same level as is typical for other third-party utilities.
4. The Fiber Backbone installation will follow the RFC drawing approvals of the Backbone.
5. Once the new Fiber is installed under the sidewalk, tested and connected to the existing facilities (Traffic Signals) we will start removing the median and the construction on the Median foundations.

6. The construction of the Median Stations is the next link on the critical path. Once these ten stations are finished the final roadway paving will be performed. This operation is constrained by weather.
7. Also on the critical path is the integration, commissioning and operational testing. The integration will begin in earnest once the items (CCTV, Message Board, etc.) are installed and connected.

The critical path is graphically on the attached schedule in Vol II.

Managing the Schedule and the Project

Open and honest communication leads to effective coordination. The construction schedule is the primary means for the Corman/Parsons Team to communicate the construction plan to the team and stakeholders. It includes planned means and methods, sequencing, resourcing and timing. The schedule provides the framework for planning and scheduling the day-to-day work. Established activity durations become the basis for setting production goals. The schedule also serves as the yardstick to monitor and measure progress and is a tool for identifying the impact of unexpected events or conditions and for revising the construction plan to mitigate delay impacts.

The schedule will be constantly reviewed and maintained to avoid slippage, as well as impacts discussed as part of the monthly partnering process, and finalize mitigation and recovery solutions should they be needed. Systems to manage the design and construction sequencing will be clear and concise and include:

- Weekly design/construction scheduling and coordination meetings during the design phase
- Weekly construction scheduling meeting during the construction phase
- Utility relocation tracking sheets during the design and construction phases
- ROW progress tracking spreadsheets (if needed) during the design and construction phases
- Review and approval tracking spreadsheets of design element submittals
- Shop drawings status tracking sheets
- Material submittals and delivery schedules
- Non-conformance logs by QC and QA for design and construction
- RFI logs
- Monthly internal project review meetings by the Corman/Parsons Team's Executive Review Committee
- Monthly progress/partnering meetings with the major stakeholders, including VDOT, the Corman/Parsons Team's designers, major subcontractors/vendors and local businesses. Affected utilities will also be invited for the current stage of work.

At the internal weekly meetings, issues/concerns will be identified using the above tracking aids and action items identified and assigned to someone who can resolve it. Three-week, 30-day and 60-day "look-ahead schedules" will be prepared and discussed to analyze schedule and quality impacts. Similar information will be discussed and action items assigned at the Monthly Progress/Partnering meetings with key stakeholders. Other stakeholders may be invited for anticipated issues during upcoming schedule activities.

The Executive Committee will meet monthly, typically one week prior to the Monthly Progress/Partnering meeting, to review actual progress and identify resources (manpower, equipment and materials) for upcoming scheduled items. Should issues be identified, resolutions and recovery strategies can be agreed upon prior to the monthly meeting so the Corman/Parsons Team can inform stakeholders of potential issues and solutions.

Tracking sheets, submittal logs, and meeting action item lists, along with all other tracking and correspondence, will be in Viewpoint (a project management database system) which allows integration with the schedule.

Managing the Design and Construction Schedule

Meeting design milestones is key to successful design-build projects. The Corman/Parsons Team will use performance evaluation tools, mainly the earned value method, to track progress of our design consultants and team members. This provides the design status to the management team as the job progresses.

Constructability reviews are crucial and will be performed by all parties to avoid schedule delays of field design changes. At the regularly scheduled project control meeting, the individual discipline manager (whether it be design or field) will report on his group's progress and how it fits into the overall CPM schedule.

Keeping the CPM as the “*big picture*” and using the three-week look ahead for the details has proven successful. The Construction Manager and Design Manager will review, maintain, and update the schedules as the work progresses. Three-week schedules (TWS) will be updated weekly at a scheduling/planning meeting. The overall CPM schedule will be updated weekly and used as the long-range planning tool. The “approved schedule” will be updated by the construction manager and project engineer, provided to VDOT monthly prior to the monthly progress/partnering meetings, and include a detailed narrative, performance evaluation charts, photos, etc.

The Corman/Parsons Team has proven management systems that keep the project on track:

- **Weekly** scheduling and supervisory meetings with the Construction Manager, Design Manager, Construction QC Manager, QAM, superintendents, foreman, and engineers to establish the two-week schedules, which include detailed QC testing needs.
- **Weekly** site meetings during construction include the design team, public relations, and utility coordination until design work is complete and as needed for the remainder of construction.
- **Bi-weekly** onsite progress meetings include all relevant parties to review schedule progress, design issues, QA/QC matters, unresolved construction issues, safety performance, administration issues, and general project management matters.
- **Monthly Progress/Partnering Meetings** are held by the DBPM, as well as all other project meetings. The DBPM will develop and review the schedule and work closely with the Public Relations Manager to implement the public outreach plan. When construction starts, the DBPM coordinates construction through the CM and holds monthly progress meetings to review progress, conflicts, safety, and quality. The Corman/Parsons Team will keep minutes of meetings and distribute to stakeholders within 48 hours.
- **During Construction**, design engineers will remain available to discuss and meet about field changes that may occur during construction.

This project will be administered using our Viewpoint Project Management System, which manages the project lifecycle, including design plans, contract management, RFI control, change orders, submittal/transmittal control, meetings, QA/QC documents, issue logs and lists, and more. It will help ensure that the project is administered timely to prevent schedule delays. Viewpoint offers secure remote access by all appropriate stakeholders via the web. It is designed to give Corman, designers, VDOT, subcontractors, utilities, and vendors access to the project data they need, when they need it, 24/7.

Schedule Recovery

The experience the Corman/Parsons Team gained in working on similar projects will be critical to the timeliness of resolving design and construction hurdles as they occur. The Corman/Parsons Team has successfully managed design on other jobs that enables critical activities, such as utility relocations and environmental permitting, to be prioritized and monitored with the overall design and construction progress

accordingly. We pride ourselves in solving construction and design issues rapidly without sacrificing quality. We will aggressively manage the project, allowing VDOT to minimize its management and inspection resources. Should any item on the CPM Schedule show unacceptable progress – *for any reason* – a schedule recovery strategy will be developed and implemented immediately with VDOT’s concurrence.

Subcontractor Scheduling

Subcontractors will be selected based on quality performance per schedule requirements and will be involved in schedule meetings to understand project expectations well in advance.

Resource Availability

In the event additional resources are needed to mitigate delays, Corman has a large pool of resources to draw from, including crews, equipment, subcontractors, suppliers, and professional expertise. The Construction Manager will have a direct relationship with Corman’s Operations Manager and Executive Team, who will intervene immediately on the project’s behalf to supply supplemental manpower and equipment to maintain schedules. Kevin Kern, Corman South’s Operations Manager, will be involved in oversight operations of the project. He has served in this capacity for over 20 years and has earned the respect of local agencies, including the City of Richmond and VDOT, for completing jobs on or ahead of schedule. Mr. Kern’s specialty is mitigating delays with alternate methods and adding shifts or providing additional resources as demands change.

Our team is committed to providing VDOT a completed project by June 30, 2018.



Appendix



ATTACHMENT 4.0.1.1
GRTC Bus Rapid Transit
TECHNICAL PROPOSAL CHECKLIST AND CONTENTS

Offerors shall furnish a copy of this Technical Proposal Checklist, with the page references added, with the Technical Proposal.

Technical Proposal Component	Form (if any)	RFP Part 1 Cross Reference	Included within page limit?	Technical Proposal Page Reference
Technical Proposal Checklist and Contents	Attachment 4.0.1.1	Section 4.0.1.1	no	Vol. I -101-103
Acknowledgement of RFP, Revisions, and/or Addenda	Attachment 3.6 (Form C-78-RFP)	Sections 3.6, 4.0.1.1	no	Vol. I 104
Letter of Submittal	NA	Sections 4.1		
Letter of Submittal on Offeror's letterhead	NA	Section 4.1.1	yes	Vol. I -1
Identify the full legal name and address of Offeror	NA	Section 4.1.1	yes	Vol. I -1
Authorized representative's original signature	NA	Section 4.1.1	yes	Vol. I -1
Declaration of intent	NA	Section 4.1.2	yes	Vol. I -1
120 day declaration	NA	Section 4.1.3	yes	Vol. I -1
Point of Contact information	NA	Section 4.1.4	yes	Vol. I -1
Principal Officer information	NA	Section 4.1.5	yes	Vol. I -1
Interim Milestone and Final Completion Date(s)	NA	Section 4.1.6	yes	Vol. I -1
Proposal Payment Agreement or Waiver of Proposal Payment	Attachment 9.3.1 or 9.3.2	Section 4.1.7	no	Vol. I 105-108
Certification Regarding Debarment Forms	Attachment 11.8.6(a) Attachment 11.8.6(b)	Section 4.1.8	no	Vol. I 109-118
Offeror's Qualifications	NA	Section 4.2		

ATTACHMENT 4.0.1.1
GRTC Bus Rapid Transit
TECHNICAL PROPOSAL CHECKLIST AND CONTENTS

Technical Proposal Component	Form (if any)	RFP Part 1 Cross Reference	Included within page limit?	Technical Proposal Page Reference
Confirmation that the information provided in the SOQ submittal remains true and accurate or indicates that any requested changes were previously approved by VDOT	NA	Section 4.2.1	yes	Vol. I 2
Organizational chart with any updates since the SOQ submittal clearly identified	NA	Section 4.2.2	yes	Vol. I 3
Revised narrative when organizational chart includes updates since the SOQ submittal	NA	Section 4.2.2	yes	Vol. I 2
Design Concept	NA	Section 4.3		
Conceptual Roadway Plans and description	NA	Section 4.3.1.1	yes	Descriptions Vol. I 4 – 14
Conceptual Structural Plans and description	NA	Section 4.3.1.2	yes	Plans Vol. II 57-100
Project Approach	NA	Section 4.4		
Environmental Management Approach to the System	NA	Section 4.4.1	yes	Vol. I -15-23
Utilities	NA	Section 4.4.2	yes	Vol. I -23-25
Geotechnical Quality Assurance/ Quality Control (QA/QC)	NA	Section 4.4.3	yes	Vol. I 25-34
Quality Assurance/ Quality Control (QA/QC) Stakeholder Communication	NA	Section 4.4.4	yes	Vol. I 34-37
Construction of Project	NA	Section 4.5		
Sequence of Construction	NA	Section 4.5.1	yes	Vol. I 38-39

ATTACHMENT 4.0.1.1
GRTC Bus Rapid Transit
TECHNICAL PROPOSAL CHECKLIST AND CONTENTS

Technical Proposal Component	Form (if any)	RFP Part 1 Cross Reference	Included within page limit?	Technical Proposal Page Reference
Transportation Management Plan	NA	Section 4.5.2	yes	Vol I 40-44
Narrative Addressing Elements of the Options in Relationship to the Base Scope	NA	Section 4.6		Vol. I 45
— Narrative that addresses elements of Option 1	NA	Section 4.6.1	yes	
Narrative that addresses elements of Option 2	NA	Section 4.6.2	yes	
Disadvantaged Business Enterprises (DBE)	NA	Section 4.7		
Written statement of percent DBE participation	NA	Section 4.7	yes	Vol. I -46
Proposal Schedule	NA	Section 4.8		
Proposal Schedule	NA	Section 4.8	no	Vol. II -S1-S7
Proposal Schedule Narrative	NA	Section 4.8	no	Vol. I S8-S14
Proposal Schedule in electronic format (CD-ROM)	NA	Section 4.8	no	CD-ROM

ATTACHMENT 3.6

**COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION**

RFP NO. C00108069DB87

ACKNOWLEDGEMENT OF RFP, REVISION AND/OR ADDENDA

Acknowledgement shall be made of receipt of the Request for Proposals (RFP) and/or any and all revisions and/or addenda pertaining to the above designated project which are issued by the Department prior to the Letter of Submittal submission date shown herein. Failure to include this acknowledgement in the Letter of Submittal may result in the rejection of your proposal.

By signing this Attachment 3.6, the Offeror acknowledges receipt of the RFP and/or following revisions and/or addenda to the RFP for the above designated project which were issued under cover letter(s) of the date(s) shown hereon:

- 1. Cover letter of RFP – November 24, 2015
(Date)
- 2. Cover letter of Addendum #1- December 30, 2015
(Date)
- 3. Cover letter of Addendum #2- January 14, 2016
(Date)
- 4. Cover letter of Addendum #3- January 29, 2016
(Date)
- 5. Cover letter of Addendum #4- February 17, 2016
(Date)

 2/29/16
SIGNATURE DATE

Arthur C. Cox, III Vice President
PRINTED NAME TITLE

ATTACHMENT 9.3.1
PROPOSAL PAYMENT AGREEMENT

THIS PROPOSAL PAYMENT AGREEMENT (this “Agreement”) is made and entered into as of this 29 day of Feb., 2016, by and between the Virginia Department of Transportation (“VDOT”), and Corman Construction, Inc. (“Offeror”).

WITNESSETH:

WHEREAS, Offeror is one of the entities who submitted Statements of Qualifications (“SOQs”) pursuant to VDOT’s November 24, 2015 Request for Qualifications (“RFQ”) and was invited to submit proposals in response to a Request for Proposals (“RFP”) for the **GRTC Bus Rapid Transit** (“Project”), under a design-build contract with VDOT (“Design-Build Contract”); and

WHEREAS, as part of the procurement process for the Project, Offeror has already provided and/or furnished to VDOT, and may continue to provide and/or furnish to VDOT, certain intellectual property, materials, information and ideas, including, but not limited to, such matters that are: (a) conveyed verbally and in writing during proprietary meetings or interviews; and (b) contained in, related to or associated with Offeror’s proposal, including, but not limited to, written correspondence, designs, drawings, plans, exhibits, photographs, reports, printed material, tapes, electronic disks, or other graphic and visual aids (collectively “Offeror’s Intellectual Property”); and

WHEREAS, VDOT is willing to provide a payment to Offeror, subject to the express conditions stated in this Agreement, to obtain certain rights in Offeror’s Intellectual Property, provided that Offeror submits a proposal that VDOT determines to be responsive to the RFP (“Offeror’s Proposal”), and either (a) Offeror is not awarded the Design-Build Contract; or (b) VDOT cancels the procurement or decides not to award the Design-Build Contract to any Offeror; and

WHEREAS, Offeror wishes to receive the payment offered by VDOT, in exchange for granting VDOT the rights set forth in this Agreement.

NOW, THEREFORE, in consideration of the mutual covenants and agreements set forth in this Agreement and other good and valuable consideration, the receipt and adequacy of which are acknowledged by the parties, the parties agree as follows:

1. **VDOT's Rights in Offeror's Intellectual Property.** Offeror hereby conveys to VDOT all rights, title and interest, free and clear of all liens, claims and encumbrances, in Offeror's Intellectual Property, which includes, without restriction or limitation, the right of VDOT, and anyone contracting with VDOT, to incorporate any ideas or information from Offeror's Intellectual Property into: (a) the Design-Build Contract and the Project; (b) any other contract awarded in reference to the Project; or (c) any subsequent procurement by VDOT. In receiving all rights, title and interest in Offeror's Intellectual Property, VDOT is deemed to own all intellectual property rights, copyrights, patents, trade secrets, trademarks, and service marks in Offeror's Intellectual Property, and Offeror agrees that it shall, at the request of VDOT, execute all papers and perform all other acts that may be necessary to ensure that VDOT's rights, title and interest in Offeror's Intellectual Property are protected. The rights conferred herein to VDOT include, without limitation, VDOT's ability to use Offeror's Intellectual Property without the obligation to notify or seek permission from Offeror.

2. **Exclusions from Offeror's Intellectual Property.** Notwithstanding Section 1 above, it is understood and agreed that Offeror's Intellectual Property is not intended to include, and Offeror does not convey any rights to, the Escrow Proposal Documents submitted by Offeror in accordance with the RFP.

3. **Proposal Payment.** VDOT agrees to pay Offeror the lump sum amount of twenty thousand and 00/100 Dollars (\$20,000.00) ("Proposal Payment"), which payment constitutes payment in full to Offeror for the conveyance of Offeror's Intellectual Property to VDOT in accordance with this Agreement. Payment of the Proposal Payment is conditioned upon: (a) Offeror's Proposal being, in the sole discretion of VDOT, responsive to the RFP; (b) Offeror complying with all other terms and conditions of this Agreement; and (c) either (i) Offeror is not awarded the Design-Build Contract, or (ii) VDOT cancels the procurement or decides not to award the Design-Build Contract to any Offeror.

4. **Payment Due Date.** Subject to the conditions set forth in this Agreement, VDOT will make payment of the Proposal Payment to the Offeror within forty-five (45) days after the later of: (a) notice from VDOT that it has awarded the Design-Build Contract to another Offeror; or (b) notice from VDOT that the procurement for the Project has been cancelled and that there will be no Contract Award.

5. **Effective Date of this Agreement.** The rights and obligations of VDOT and Offeror under this Agreement, including VDOT's ownership rights in Offeror's Intellectual Property, vests upon the date that Offeror's Proposal is submitted to VDOT. Notwithstanding the above, if Offeror's Proposal is determined by VDOT, in its sole discretion, to be nonresponsive to the RFP, then Offeror is deemed to have waived its right to obtain the Proposal Payment, and VDOT shall have no obligations under this Agreement.

6. **Indemnity.** Subject to the limitation contained below, Offeror shall, at its own expense, indemnify, protect and hold harmless VDOT and its agents, directors, officers, employees, representatives and contractors from all claims, costs, expenses, liabilities, demands, or suits at law or equity (“Claims”) of, by or in favor of or awarded to any third party arising in whole or in part from: (a) the negligence or wilful misconduct of Offeror or any of its agents, officers, employees, representatives or subcontractors; or (b) breach of any of Offeror’s obligations under this Agreement, including its representation and warranty under Section 8 hereof. This indemnity shall not apply with respect to any Claims caused by or resulting from the sole negligence or wilful misconduct of VDOT, or its agents, directors, officers, employees, representatives or contractors.

7. **Assignment.** Offeror shall not assign this Agreement, without VDOT’s prior written consent, which consent may be given or withheld in VDOT’s sole discretion. Any assignment of this Agreement without such consent shall be null and void.

8. **Authority to Enter into this Agreement.** By executing this Agreement, Offeror specifically represents and warrants that it has the authority to convey to VDOT all rights, title, and interest in Offeror’s Intellectual Property, including, but not limited to, those any rights that might have been vested in team members, subcontractors, consultants or anyone else who may have contributed to the development of Offeror’s Intellectual Property, free and clear of all liens, claims and encumbrances.

9. **Miscellaneous.**

a. Offeror and VDOT agree that Offeror, its team members, and their respective employees are not agents of VDOT as a result of this Agreement.

b. Any capitalized term used herein but not otherwise defined shall have the meanings set forth in the RFP.

c. This Agreement, together with the RFP, embodies the entire agreement of the parties with respect to the subject matter hereof. There are no promises, terms, conditions, or obligations other than those contained herein or in the RFP, and this Agreement shall supersede all previous communications, representations, or agreements, either verbal or written, between the parties hereto.

d. It is understood and agreed by the parties hereto that if any part, term, or provision of this Agreement is by the courts held to be illegal or in conflict with any law of the Commonwealth of Virginia, validity of the remaining portions or provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the Agreement did not contain the particular part, term, or provisions to be invalid.

e. This Agreement shall be governed by and construed in accordance with the laws of the Commonwealth of Virginia.

IN WITNESS WHEREOF, this Agreement has been executed and delivered as of the day and year first above written.

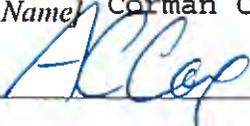
VIRGINIA DEPARTMENT OF TRANSPORTATION

By: _____

Name: _____

Title: _____

[Insert Offeror's Name] Corman Construction, Inc.

By:  _____

Name: Arthur C. Cox, III

Title: Vice President

ATTACHMENT 11.8.6(a)
CERTIFICATION REGARDING DEBARMENT
PRIMARY COVERED TRANSACTIONS

Project Name: GRTC Bus Rapid Transit
Contract ID No.: C00108069DB87

1) The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency.

b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; and have not been convicted of any violations of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification, or destruction of records, making false statements, or receiving stolen property;

c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph 1) b) of this certification; and

d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

The undersigned makes the foregoing statements to be filed with the proposal submitted on behalf of the Offeror for contracts to be let by the Commonwealth Transportation Board.

	2.12.16	Vice President
Signature	Date	Title

Corman Construction, Inc.
Name of Firm

ATTACHMENT 11.8.6(b)
CERTIFICATION REGARDING DEBARMENT
LOWER TIER COVERED TRANSACTIONS

Project Name: GRTC Bus Rapid Transit
Contract ID No.: C00108069DB87

- 1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

- 2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

The undersigned makes the foregoing statements to be filed with the proposal submitted on behalf of the Offeror for contracts to be let by the Commonwealth Transportation Board.

<u>Stephen Wavtur</u>	<u>1/20/2016</u>	<u>Vice President</u>
Signature	Date	Title

Parsons Transportation Group
Name of Firm

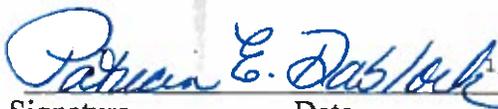
ATTACHMENT 11.8.6(b)
CERTIFICATION REGARDING DEBARMENT
LOWER TIER COVERED TRANSACTIONS

Project Name: GRTC Bus Rapid Transit
Contract ID No.: C00108069DB87

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- 2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

The undersigned makes the foregoing statements to be filed with the proposal submitted on behalf of the Offeror for contracts to be let by the Commonwealth Transportation Board.

	1/26/2016	President
Signature	Date	Title

Diversified Property Services, Inc.

Name of Firm

ATTACHMENT 11.8.6(b)
CERTIFICATION REGARDING DEBARMENT
LOWER TIER COVERED TRANSACTIONS

Project Name: GRTC Bus Rapid Transit
Contract ID No.: C00108069DB87

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 _____
Signature Date Title

2/1/2016

Managing Principal

KGP Design Studio
Name of Firm

ATTACHMENT 11.8.6(b)
CERTIFICATION REGARDING DEBARMENT
LOWER TIER COVERED TRANSACTIONS

Project Name: GRTC Bus Rapid Transit
Contract ID No.: C00108069DB87

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 Signature	<u>1/27/16</u> Date	<u>President</u> Title
<u>Accompany Engineering Group LLC</u> Name of Firm		

ATTACHMENT 11.8.6(b)
CERTIFICATION REGARDING DEBARMENT
LOWER TIER COVERED TRANSACTIONS

Project Name: GRTC Bus Rapid Transit
Contract ID No.: C00108069DB87

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The undersigned makes the foregoing statements to be filed with the proposal submitted on behalf of the Offeror for contracts to be let by the Commonwealth Transportation Board.

	<u>1/21/2016</u>	<u>Senior Vice President/Regional Manager</u>
Signature	Date	Title

MBP
Name of Firm

ATTACHMENT 11.8.6(b)
CERTIFICATION REGARDING DEBARMENT
LOWER TIER COVERED TRANSACTIONS

Project Name: GRTC Bus Rapid Transit
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The undersigned makes the foregoing statements to be filed with the proposal submitted on behalf of the Offeror for contracts to be let by the Commonwealth Transportation Board.

George A. Howe 1/21/16 President
Signature Date Title

Utility Professional Services, Inc.
Name of Firm

ATTACHMENT 11.8.6(b)
CERTIFICATION REGARDING DEBARMENT
LOWER TIER COVERED TRANSACTIONS

Project Name: GRTC Bus Rapid Transit
Contract ID No.: C00108069DB87

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The undersigned makes the foregoing statements to be filed with the proposal submitted on behalf of the Offeror for contracts to be let by the Commonwealth Transportation Board.

Arnel Wilhite 11/21/16 PRINCIPAL
Signature Date Title

A. MORTON THOMAS ! ASSOCIATES, INC.
Name of Firm

ATTACHMENT 11.8.6(b)
CERTIFICATION REGARDING DEBARMENT
LOWER TIER COVERED TRANSACTIONS

Project Name: GRTC Bus Rapid Transit
Contract ID No.: C00108069DB87

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The undersigned makes the foregoing statements to be filed with the proposal submitted on behalf of the Offeror for contracts to be let by the Commonwealth Transportation Board.

	1/21/2016	President
Signature	Date	Title

GeoConcepts Engineering, Inc.
Name of Firm

ATTACHMENT 11.8.6(b)
CERTIFICATION REGARDING DEBARMENT
LOWER TIER COVERED TRANSACTIONS

Project Name: GRTC Bus Rapid Transit
Contract ID No.: C00108069DB87

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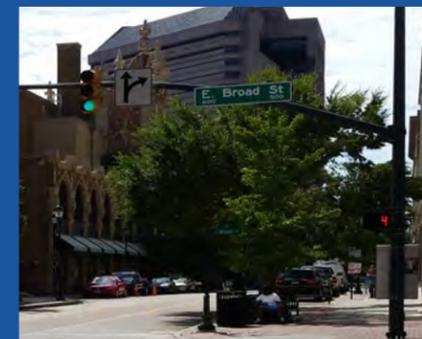
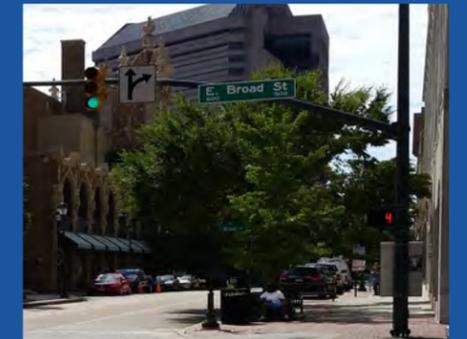
The undersigned makes the foregoing statements to be filed with the proposal submitted on behalf of the Offeror for contracts to be let by the Commonwealth Transportation Board.

<u>ga shw...</u>	<u>01/29/16</u>	<u>PRINCIPAL</u>
Signature	Date	Title
<u>CES CONSULTING LLC</u>		
Name of Firm		

Design-Build GRTC Bus Rapid Transit (BRT) Project

City of Richmond and County of Henrico, Virginia

Contract ID Number C00108069DB87



VOLUME II TECHNICAL PROPOSAL

Submitted by



Submitted to



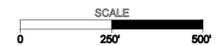
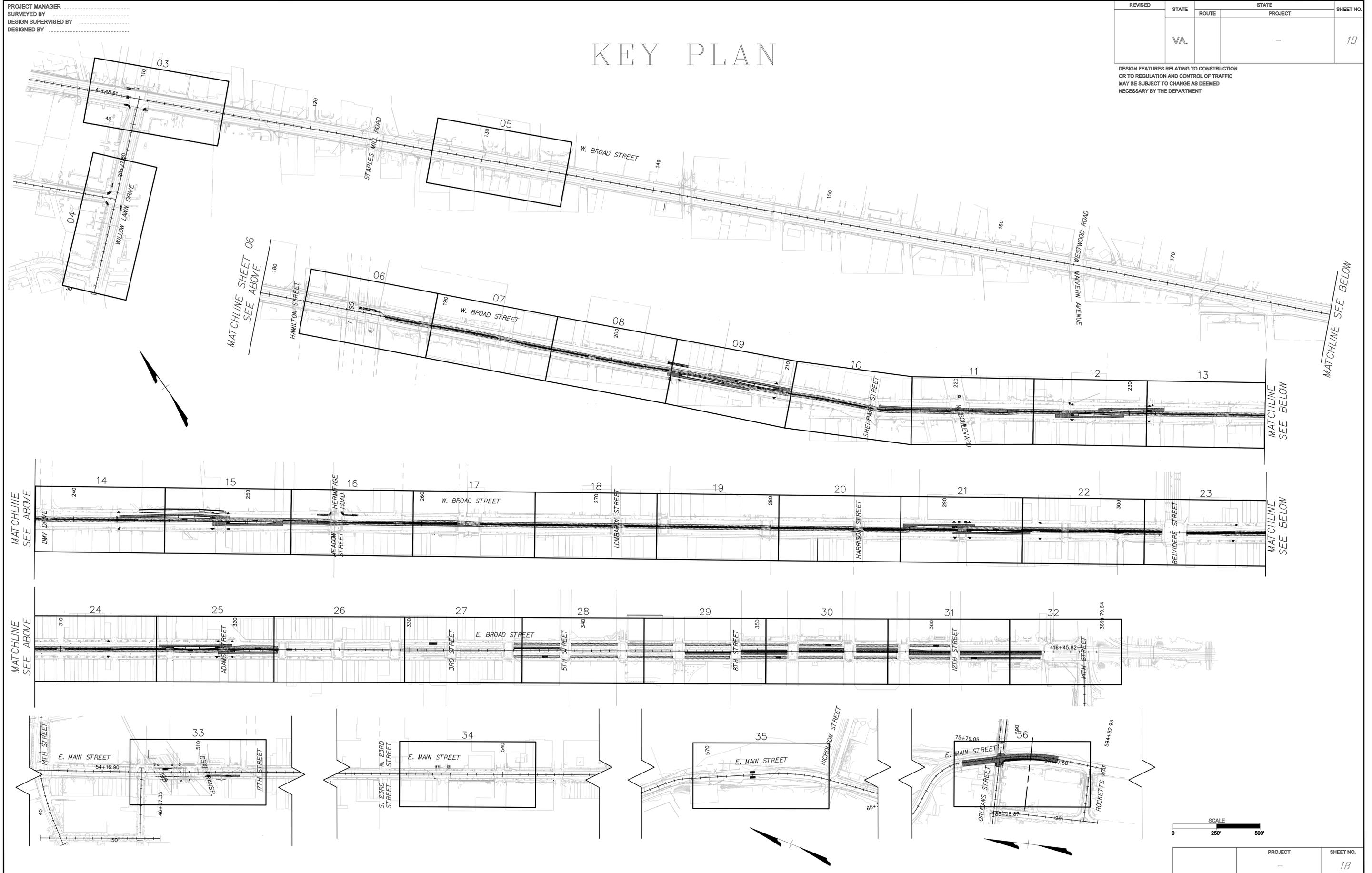
February 29, 2016

PROJECT MANAGER _____
SURVEYED BY _____
DESIGN SUPERVISED BY _____
DESIGNED BY _____

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.		-	1B

KEY PLAN

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PROJECT	SHEET NO.
-	1B

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

REVISED	STATE		PROJECT	SHEET NO.
	STATE	ROUTE		
	VA.		-	1C

DESIGN FEATURES RELATING TO CONSTRUCTION
OR TO REGULATION AND CONTROL OF TRAFFIC
MAY BE SUBJECT TO CHANGE AS DEEMED
NECESSARY BY THE DEPARTMENT

NOTE:
MODIFICATIONS TO CURB RAMPS AT THE FOLLOWING INTERSECTIONS
ARE INCLUDED WITHIN THE SCOPE OF THIS PROJECT, BUT ARE NOT
SHOWN ON THE PLAN SHEETS. CURB RAMP IMPROVEMENTS INCLUDE
ADDITION OF DETECTABLE WARNING SURFACE TO EXISTING RAMPS,
RECONSTRUCTION OF EXISTING RAMPS, OR ADDING NEW RAMPS. NO
OTHER ROADWAY WORK IS PROPOSED AT THESE INTERSECTIONS:

- BROAD ST & STAPLES MILL RD (4 RAMPS)
- BROAD ST & WESTMORELAND ST (4 RAMPS)
- BROAD ST & COMMONWEALTH AVE (3 RAMPS)
- BROAD ST & HAMILTON ST (4 RAMPS)
- FRANKLIN ST & 14TH ST (1 RAMP)
- MAIN ST & 14TH ST (4 RAMPS)
- MAIN ST & 18TH ST (2 RAMPS)
- MAIN ST & 19TH ST (3 RAMPS)
- MAIN ST & 21TH ST (3 RAMPS)
- MAIN ST & WILLIAMSBURG AVE (6 RAMPS)

ADDITIONALLY, VDOT STANDARD CG-11 WILL BE ADDED TO FORMALIZE
THE SOUTHWEST CORNER OF THE INTERSECTION OF BROAD ST &
BYRD AVE.

UTILITY NOTES:
NEW FIBER COMMUNICATION BACKBONE WILL BE INSTALLED AS
FOLLOWS:

- ALONG BROAD STREET BETWEEN CLEVELAND STREET
(APPROXIMATELY STA. 204+00) AND SHAFER STREET
(APPROXIMATELY STA. 293+00)
- ALONG MAIN STREET BETWEEN 14TH STREET (APPROXIMATELY
STA. 500+00) AND 17TH STREET (APPROXIMATELY STA. 512+00)
- ALONG THE NORTH AND SOUTH SIDES OF LORDLEY LANE
BETWEEN BELT BOULEVARD AND THE GRTC TRANSIT OPERATIONS
CENTER

THE EXISTING CITY OF RICHMOND MULTI-USE DUCT LOCATED IN THE
BROAD STREET MEDIAN WILL BE RELOCATED FROM ALTAMONT STREET
(APPROXIMATELY STA. 210+00) TO LAUREL STREET (APPROXIMATELY
STA. 298+00)

SHEET INDEX

1B	KEY PLAN
1C	SHEET INDEX & NOTES
2	TYPICAL SECTIONS
2A	TYPICAL SECTIONS
2B	TYPICAL SECTIONS
2C	TYPICAL SECTIONS
3	PROPOSED ROADWAY PLAN
4	PROPOSED ROADWAY PLAN
5	PROPOSED ROADWAY PLAN
6	PROPOSED ROADWAY PLAN
7	PROPOSED ROADWAY PLAN
8	PROPOSED ROADWAY PLAN
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26	PROPOSED ROADWAY PLAN
27	PROPOSED ROADWAY PLAN
28	PROPOSED ROADWAY PLAN
29	PROPOSED ROADWAY PLAN
30	PROPOSED ROADWAY PLAN
31	PROPOSED ROADWAY PLAN
32	PROPOSED ROADWAY PLAN
33	PROPOSED ROADWAY PLAN
34	PROPOSED ROADWAY PLAN
35	PROPOSED ROADWAY PLAN
36	PROPOSED ROADWAY PLAN
37	NOT USED
38	NOT USED
39	CURB STATION PLAN & ELEVATIONS
40	CURB STATION ELEVATIONS
41	MEDIAN STATION PLAN & ELEVATIONS
42	MEDIAN STATION ELEVATIONS

	PROJECT	SHEET NO.
	-	1C

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

TYPICAL SECTIONS

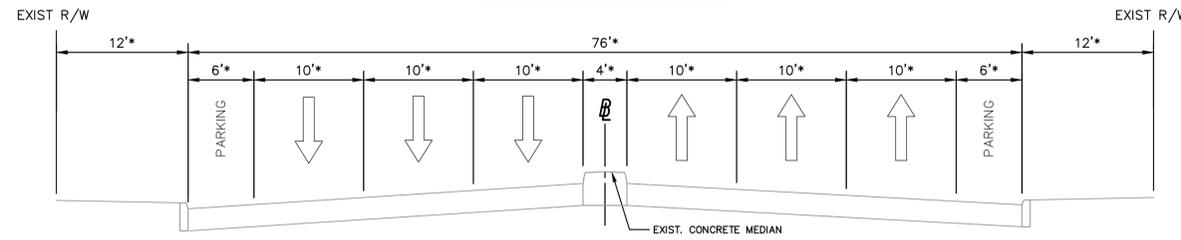
NOT TO SCALE
2:1 VERTICAL EXAGGERATION

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	2

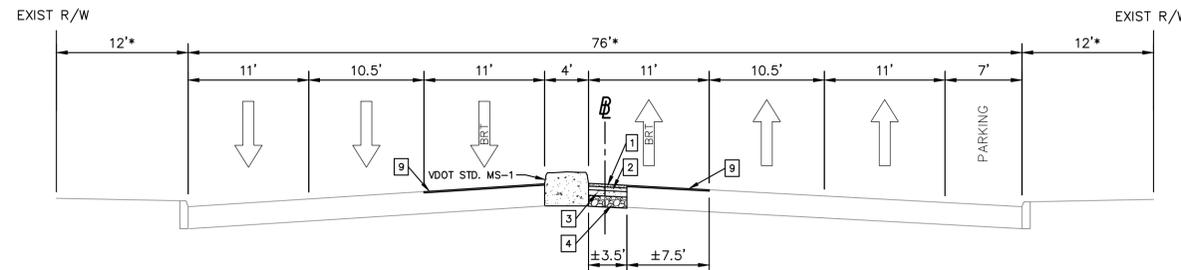
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

BROAD STREET

|-195 TO SHEPPARD STREET

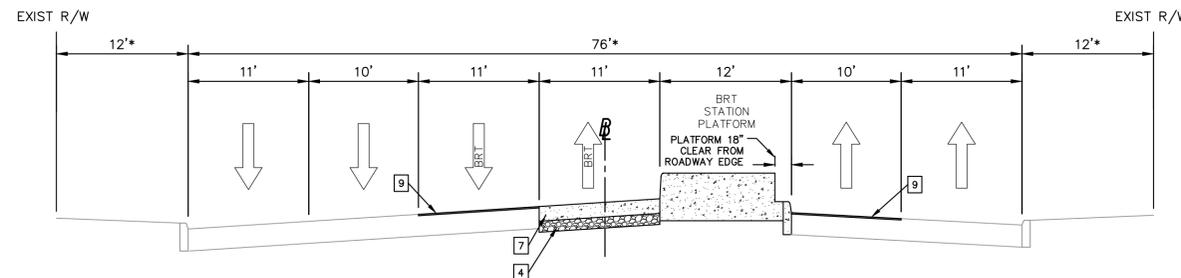


EXISTING SECTION

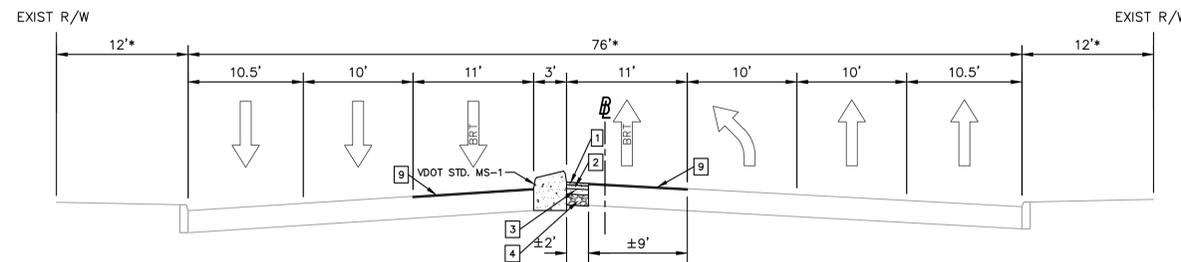


PROPOSED TYPICAL SECTION

NOTE: LANES ARE SHIFTED AT SOME LOCATIONS TO PROVIDE PARKING ON OPPOSITE SIDE.



PROPOSED TYPICAL SECTION: STATION LOCATIONS



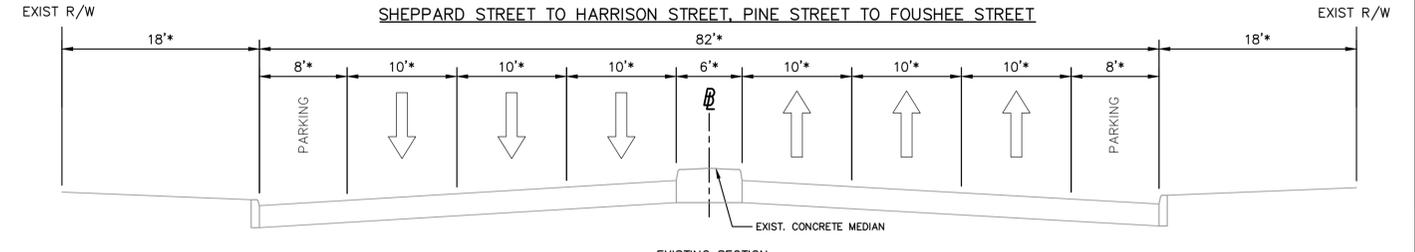
PROPOSED TYPICAL SECTION: LEFT TURNS

LEGEND:

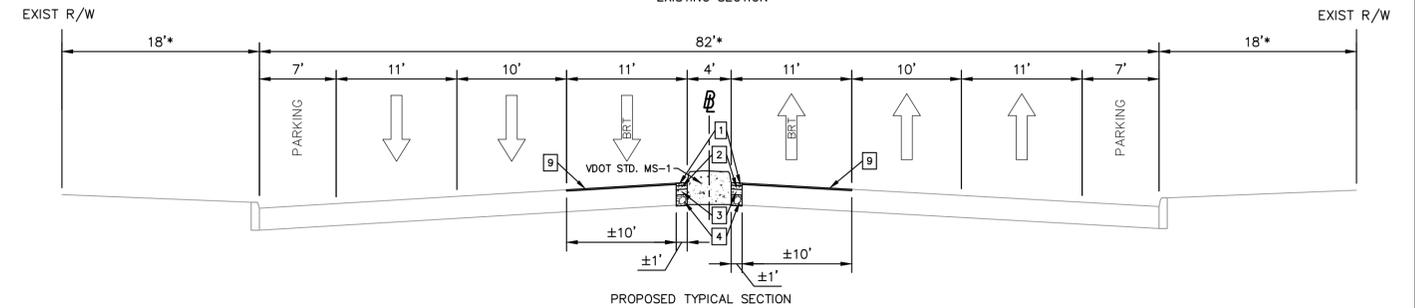
- 1 1.5" ASPHALT CONCRETE SM-12.5E @ 165 LB/SY
- 2 2.0" ASPHALT CONCRETE IM-19.0A @ 220 LB/SY
- 3 3.0" ASPHALT CONCRETE BM-25.0A @ 330 LB/SY
- 4 6.0" AGGREGATE BASE MATERIAL, TYPE 1 NO. 21B
- 5 4.0" ASPHALT CONCRETE BM-25.0A @ 440 LB/SY
- 6 7.0" AGGREGATE BASE MATERIAL, TYPE 1 NO. 21B
- 7 8.0" JOINTED REINFORCED CONCRETE PAVEMENT
- 8 2.0" ASPHALT CONCRETE SM-12.5E @ 220 LB/SY
- 9 0.75" MILL & THIN HOT MIXED CONCRETE OVERLAY (THMACO) @ 85 LB/SY
- 10 2.0" DEPTH MILL
- 11 4.0" DEPTH MILL

BROAD STREET

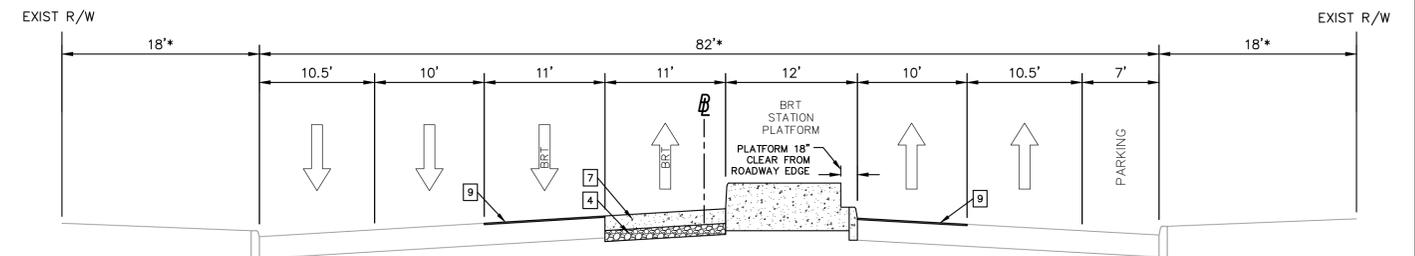
SHEPPARD STREET TO HARRISON STREET, PINE STREET TO FOUSHEE STREET



EXISTING SECTION

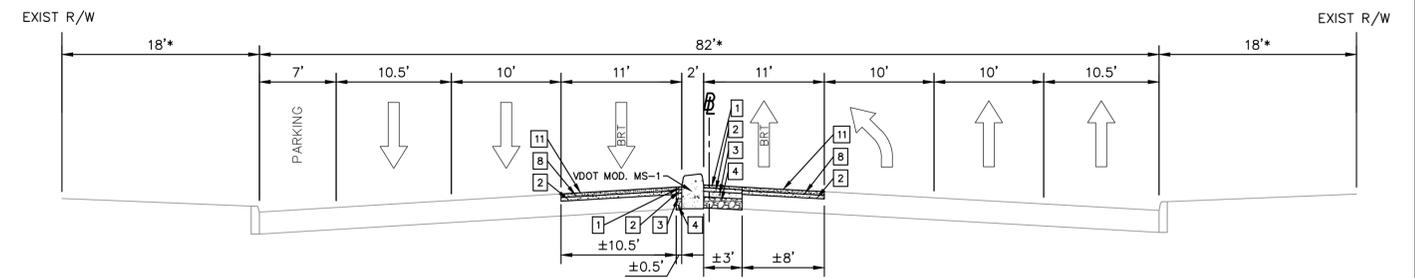


PROPOSED TYPICAL SECTION



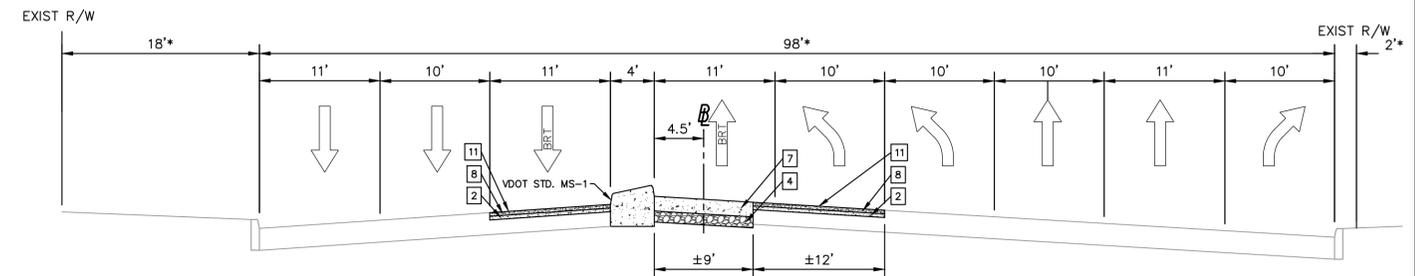
PROPOSED TYPICAL SECTION: STATION LOCATIONS

NOTE: LANES ARE SHIFTED AT SOME LOCATIONS TO PROVIDE PARKING ON OPPOSITE SIDE.



PROPOSED TYPICAL SECTION: LEFT TURNS

NOTE: SECTION MAY BE REVERSED TO PROVIDE LEFT TURN LANE IN OPPOSITE DIRECTION.
NOTE: LANES ARE SHIFTED AT SOME LOCATIONS TO PROVIDE PARKING ON OPPOSITE SIDE.



PROPOSED TYPICAL SECTION: WESTERN APPROACH TO BELVIDERE STREET INTERSECTION

PROJECT	SHEET NO.
-	2

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

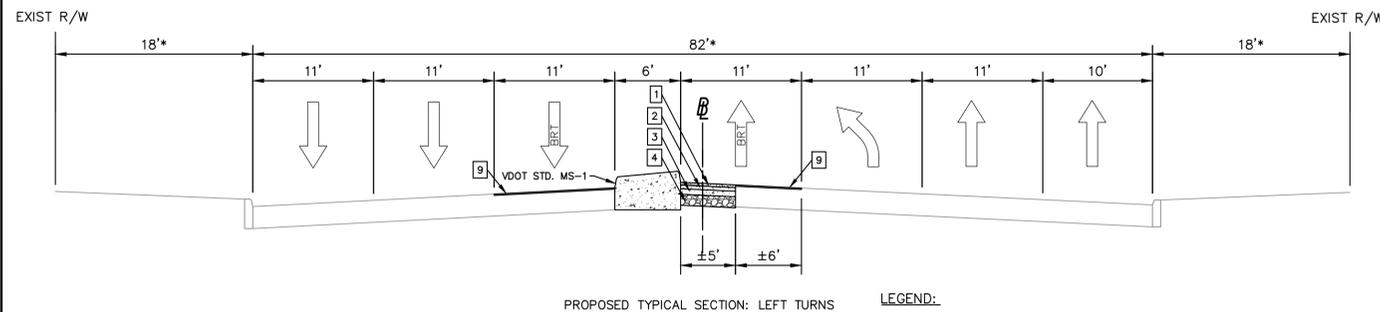
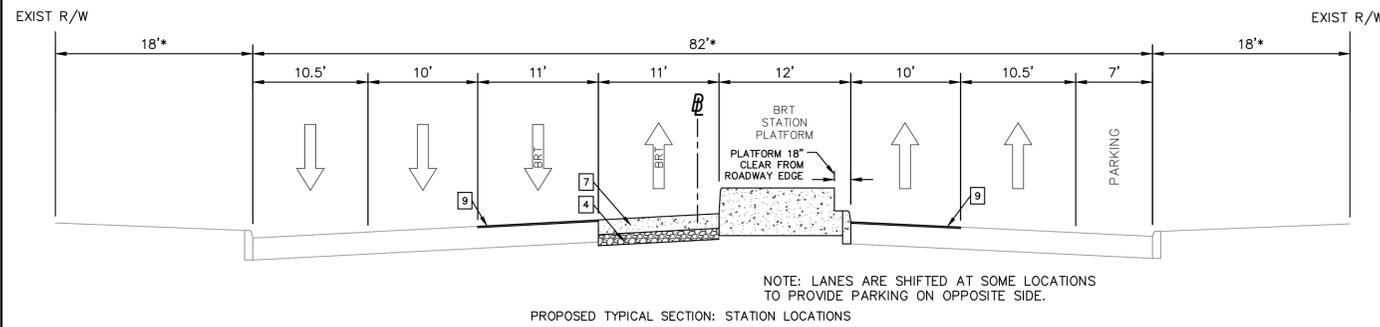
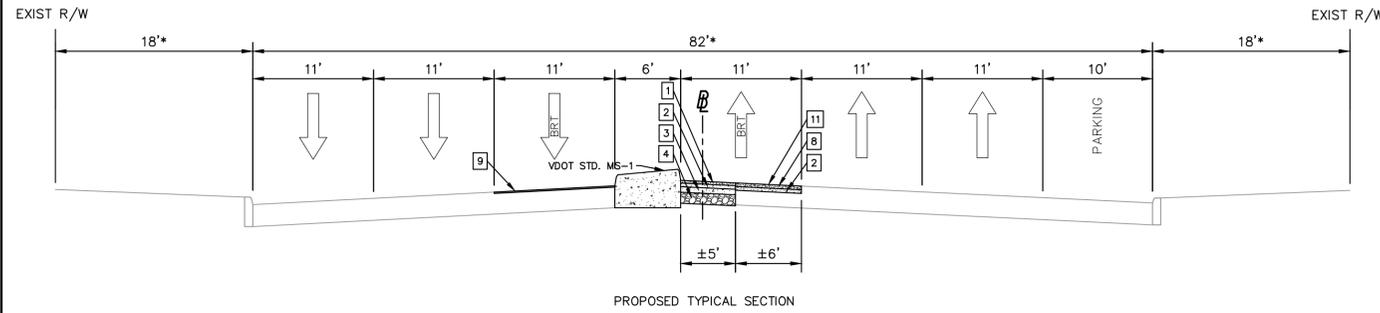
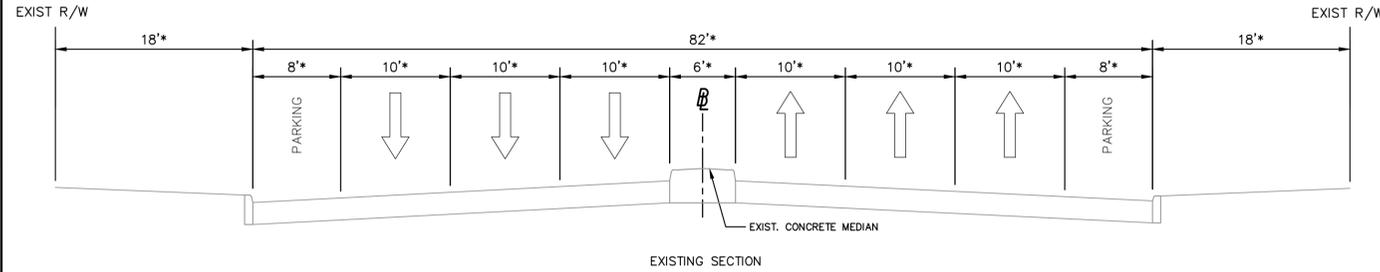
TYPICAL SECTIONS NOT TO SCALE 2:1 VERTICAL EXAGGERATION

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	24

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

BROAD STREET

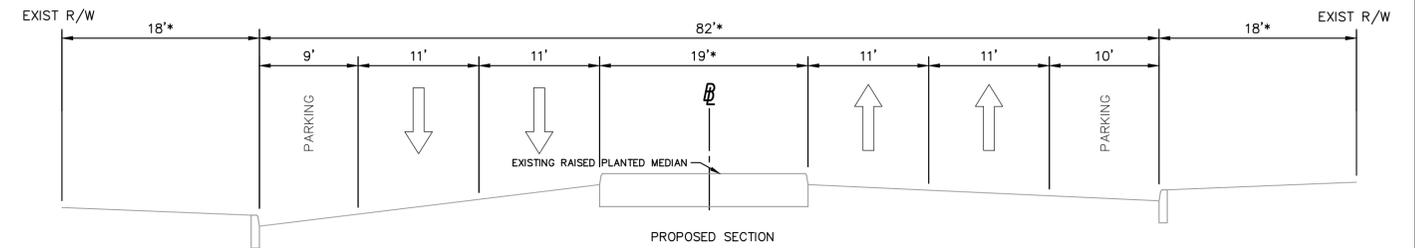
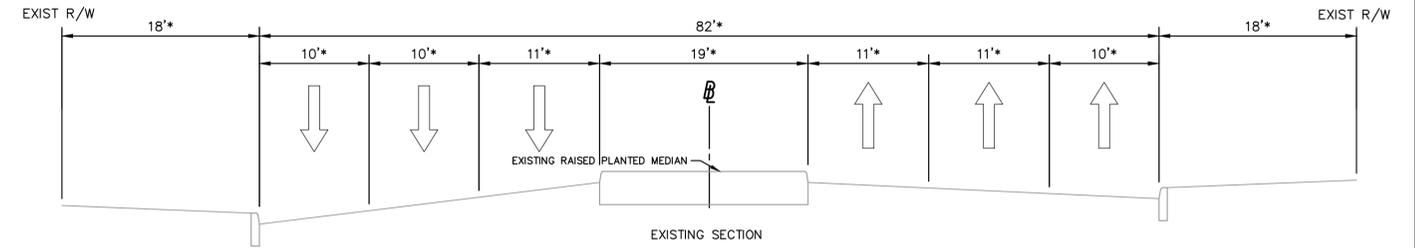
HARRISON STREET TO PINE STREET



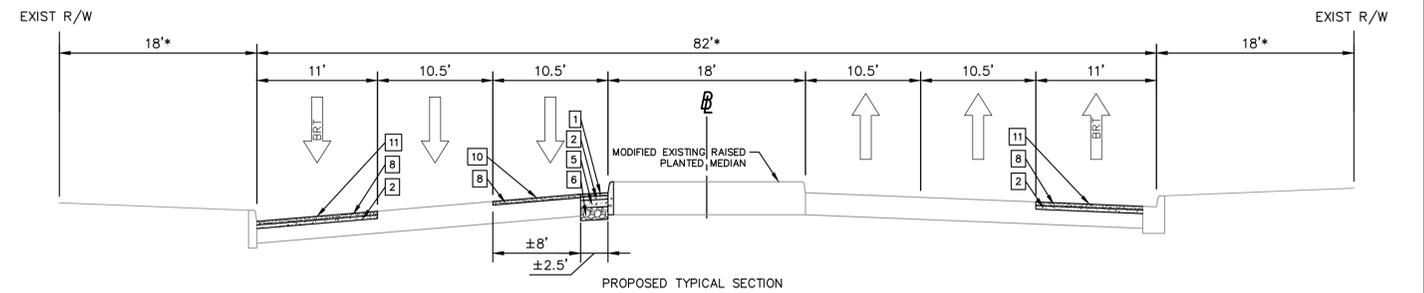
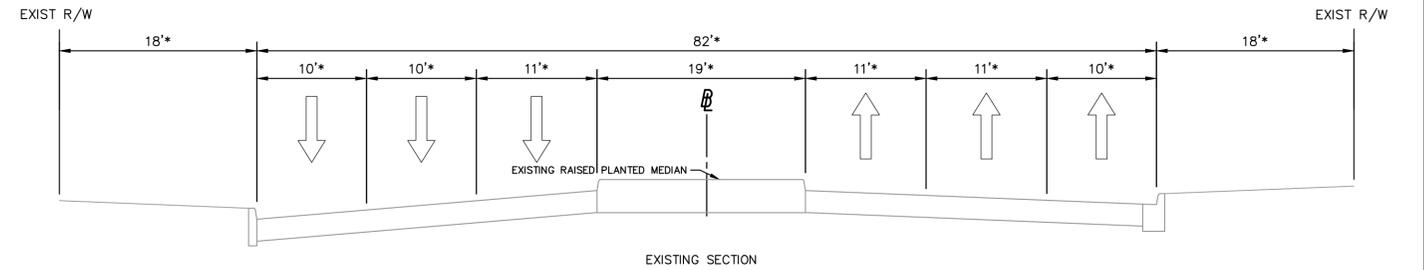
- LEGEND:**
- 1 1.5" ASPHALT CONCRETE SM-12.5E @ 165 LB/SY
 - 2 2.0" ASPHALT CONCRETE IM-19.0A @ 220 LB/SY
 - 3 3.0" ASPHALT CONCRETE BM-25.0A @ 330 LB/SY
 - 4 6.0" AGGREGATE BASE MATERIAL, TYPE 1 NO. 21B
 - 5 4.0" ASPHALT CONCRETE BM-25.0A @ 440 LB/SY
 - 6 7.0" AGGREGATE BASE MATERIAL, TYPE 1 NO. 21B
 - 7 8.0" JOINTED REINFORCED CONCRETE PAVEMENT
 - 8 2.0" ASPHALT CONCRETE SM-12.5E @ 220 LB/SY
 - 9 0.75" MILL & THIN HOT MIXED CONCRETE OVERLAY (THMACO) @ 85 LB/SY
 - 10 2.0" DEPTH MILL
 - 11 4.0" DEPTH MILL

BROAD STREET

2ND STREET TO 4TH STREET



4TH STREET TO 5TH STREET



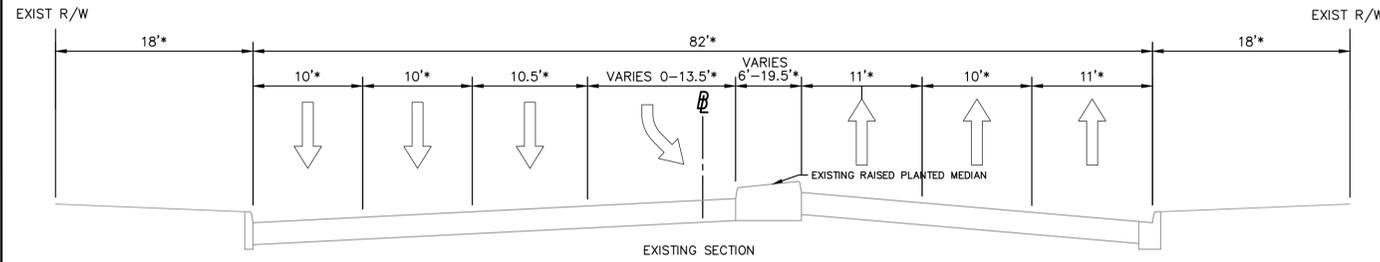
PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

TYPICAL SECTIONS NOT TO SCALE 2:1 VERTICAL EXAGGERATION

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	2B

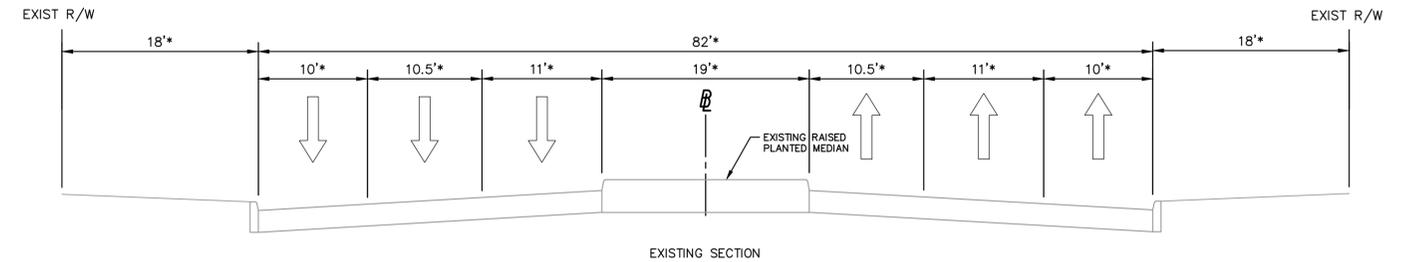
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

BROAD STREET 5TH STREET TO 6TH STREET

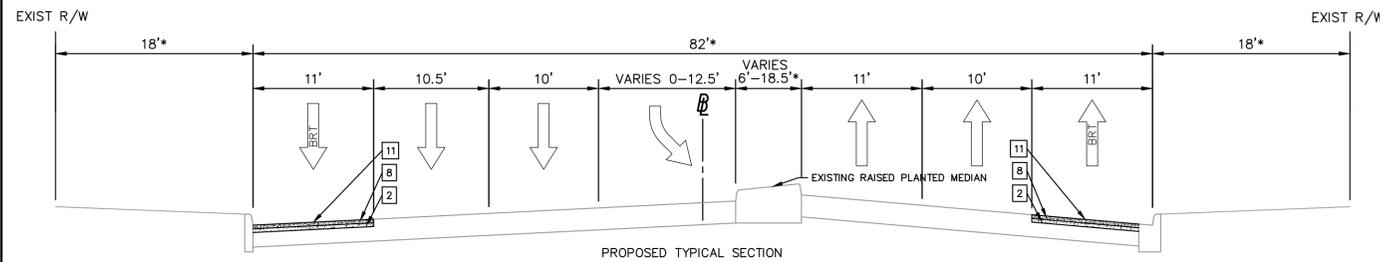


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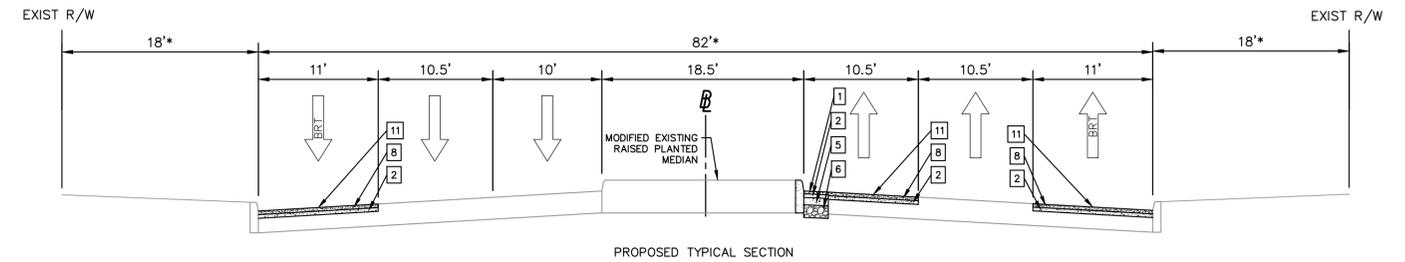
BROAD STREET 7TH STREET TO 8TH STREET



EXISTING SECTION

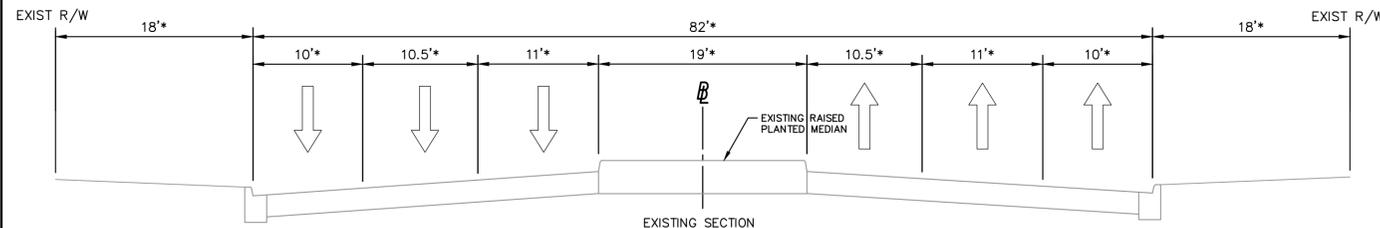


PROPOSED TYPICAL SECTION

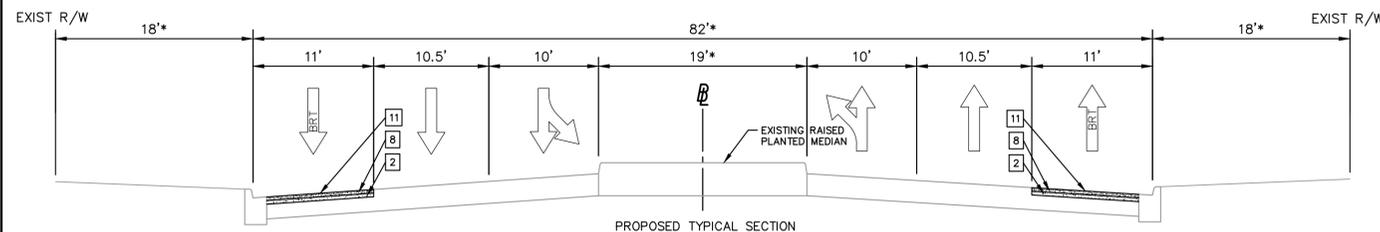


PROPOSED TYPICAL SECTION

6TH STREET TO 7TH STREET



EXISTING SECTION



PROPOSED TYPICAL SECTION

LEGEND:

- 1 1.5" ASPHALT CONCRETE SM-12.5E @ 165 LB/SY
- 2 2.0" ASPHALT CONCRETE IM-19.0A @ 220 LB/SY
- 3 3.0" ASPHALT CONCRETE BM-25.0A @ 330 LB/SY
- 4 6.0" AGGREGATE BASE MATERIAL, TYPE 1 NO. 21B
- 5 4.0" ASPHALT CONCRETE BM-25.0A @ 440 LB/SY
- 6 7.0" AGGREGATE BASE MATERIAL, TYPE 1 NO. 21B
- 7 8.0" JOINTED REINFORCED CONCRETE PAVEMENT
- 8 2.0" ASPHALT CONCRETE SM-12.5E @ 220 LB/SY
- 9 0.75" MILL & THIN HOT MIXED CONCRETE OVERLAY (THMACO) @ 85 LB/SY
- 10 2.0" DEPTH MILL
- 11 4.0" DEPTH MILL

PROJECT	SHEET NO.
-	2B

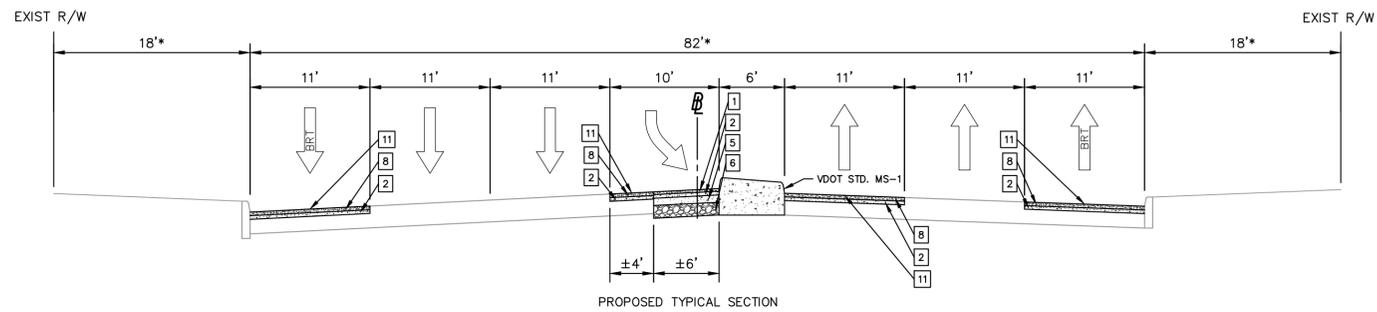
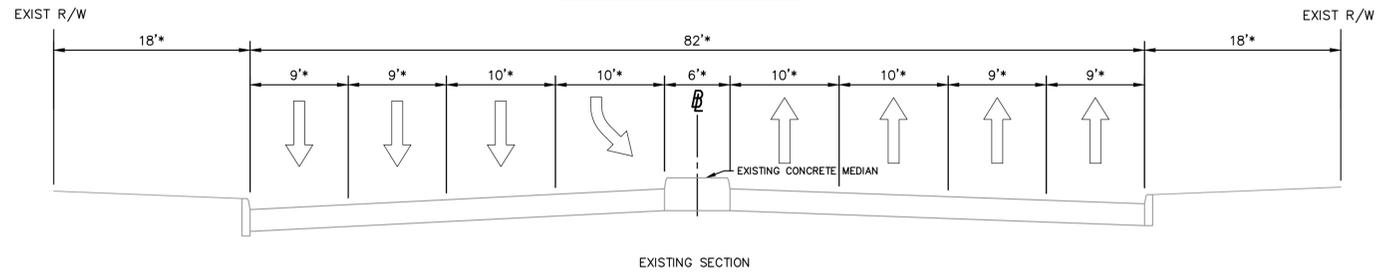
PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

TYPICAL SECTIONS NOT TO SCALE 2:1 VERTICAL EXAGGERATION

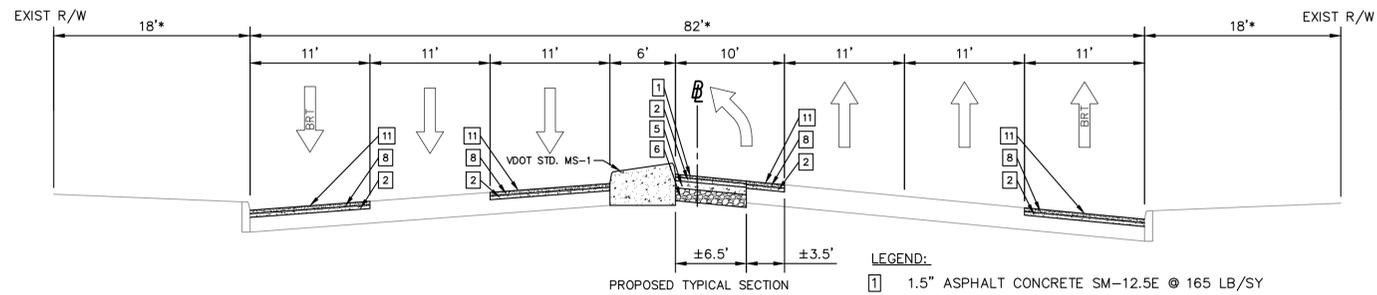
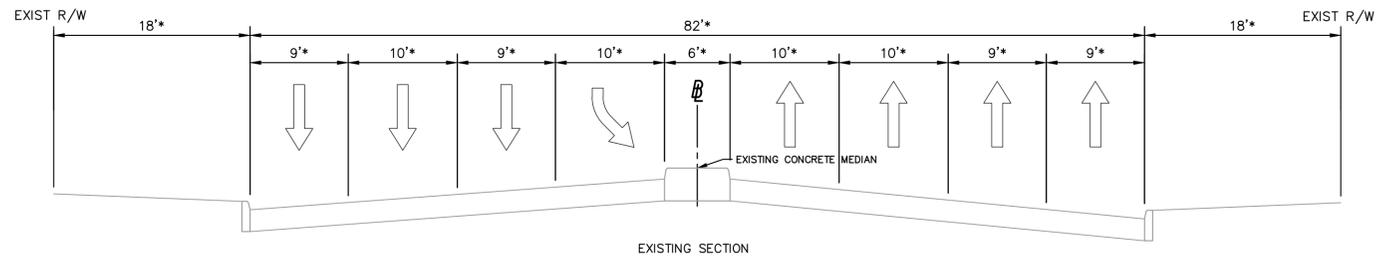
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	2C

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

BROAD STREET 8TH STREET TO 9TH STREET

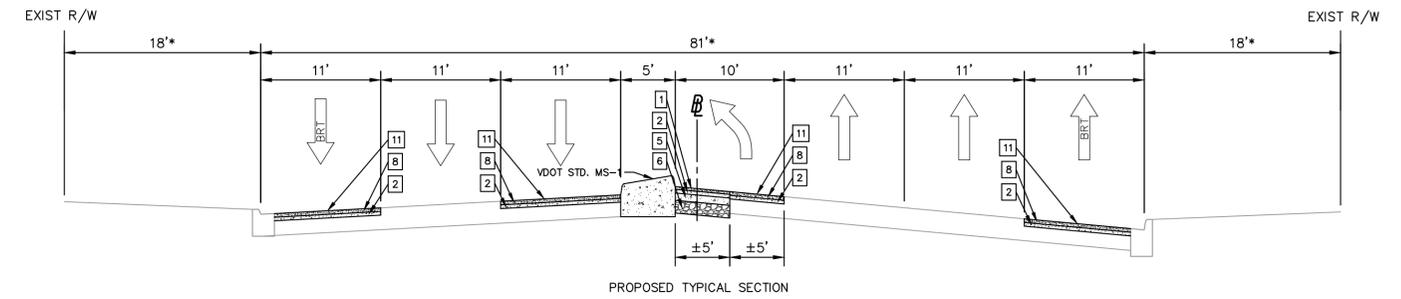
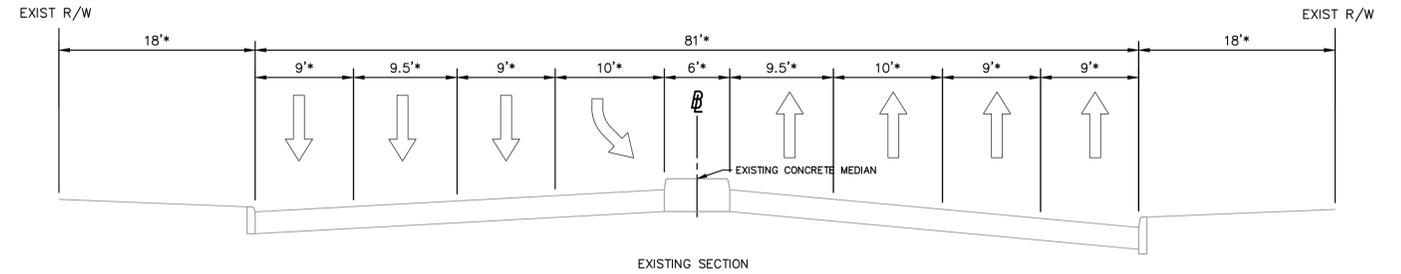


BROAD STREET 9TH STREET TO 10TH STREET

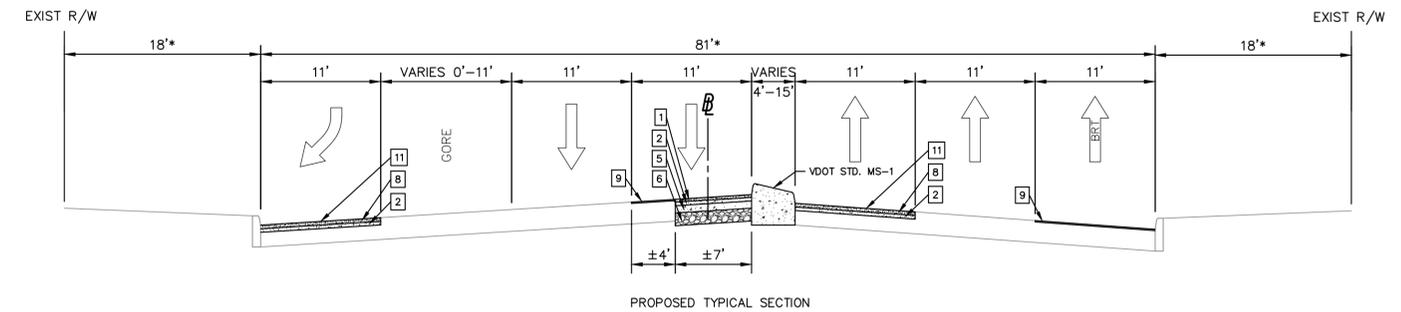
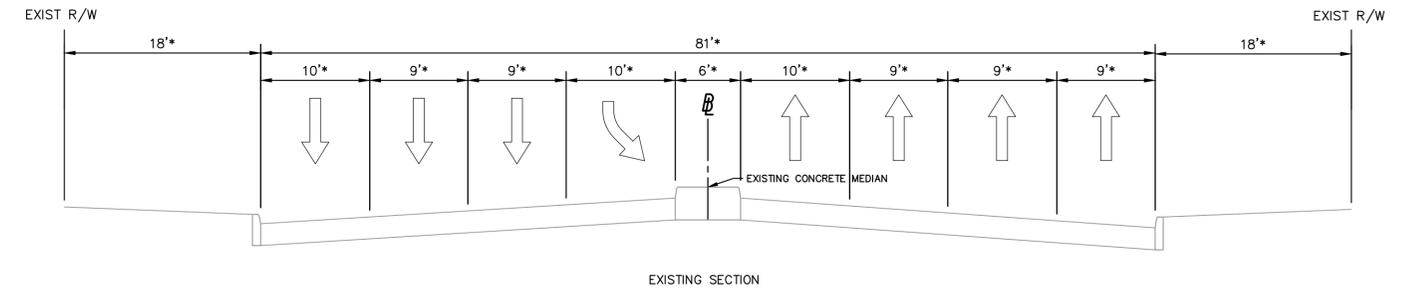


- LEGEND:
- 1 1.5" ASPHALT CONCRETE SM-12.5E @ 165 LB/SY
 - 2 2.0" ASPHALT CONCRETE IM-19.0A @ 220 LB/SY
 - 3 3.0" ASPHALT CONCRETE BM-25.0A @ 330 LB/SY
 - 4 6.0" AGGREGATE BASE MATERIAL, TYPE 1 NO. 21B
 - 5 4.0" ASPHALT CONCRETE BM-25.0A @ 440 LB/SY
 - 6 7.0" AGGREGATE BASE MATERIAL, TYPE 1 NO. 21B
 - 7 8.0" JOINTED REINFORCED CONCRETE PAVEMENT
 - 8 2.0" ASPHALT CONCRETE SM-12.5E @ 220 LB/SY
 - 9 0.75" MILL & THIN HOT MIXED CONCRETE OVERLAY (THMACO) @ 85 LB/SY
 - 10 2.0" DEPTH MILL
 - 11 4.0" DEPTH MILL

BROAD STREET 10TH STREET TO 11TH STREET



BROAD STREET 11TH STREET TO OLD 14TH STREET

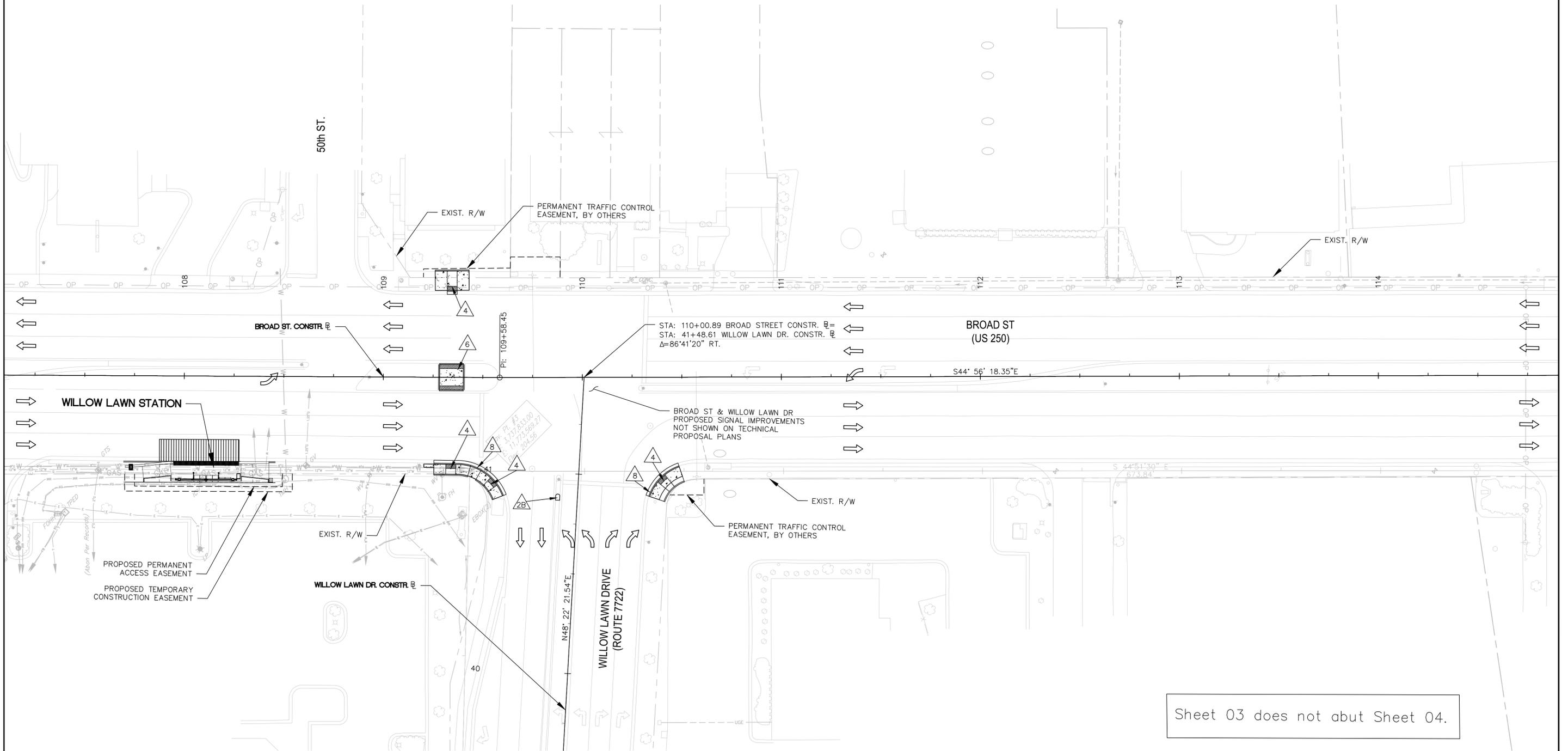


PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

UTILITY RELOCATIONS:
THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE WILLOW LAWN STATION:
STA. 107+25-109+00: RELOCATE/ABANDON COR GAS LINE (BY OTHERS)
STA. 107+25-108+50: RELOCATE VERIZON DUCT BANK
STA. 107+47-108+55: RELOCATE 12" WATER MAIN
STA. 107+60-108+60: RELOCATE IRRIGATION SYSTEM (BY OTHERS)
STA. 108+40: CONNECT 6" CIC WATER MAIN TO NEWLY RELOCATED 12" WATER MAIN

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	03

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



Sheet 03 does not abut Sheet 04.

LEGEND

- | | | | | | | | |
|--|---|--|------------------------------------|--|---|--|--|
| | PROPOSED CONC. ITEMS | | PROPOSED REINFORCED CONC. PAVEMENT | | VDOT STD. CG-12, TYPE B REQ'D. | | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| | PROPOSED ASPHALT PAVE. | | STD. CITY OF RICHMOND CURB REQ'D. | | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | | VDOT STD. CG-12, TYPE M2 REQ'D. |
| | 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT STD. MS-1 REQ'D. | | VDOT STD. MS-2 REQ'D. | | HENRICO STD. CURB & GUTTER REQ'D. |
| | 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT MOD. MS-1 REQ'D. | | VDOT STD. CG-12, TYPE A REQ'D. | | |
| | 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | | | | | | |

BRT LANE USE:
BRT MIXED TRAFFIC, CURB LANE

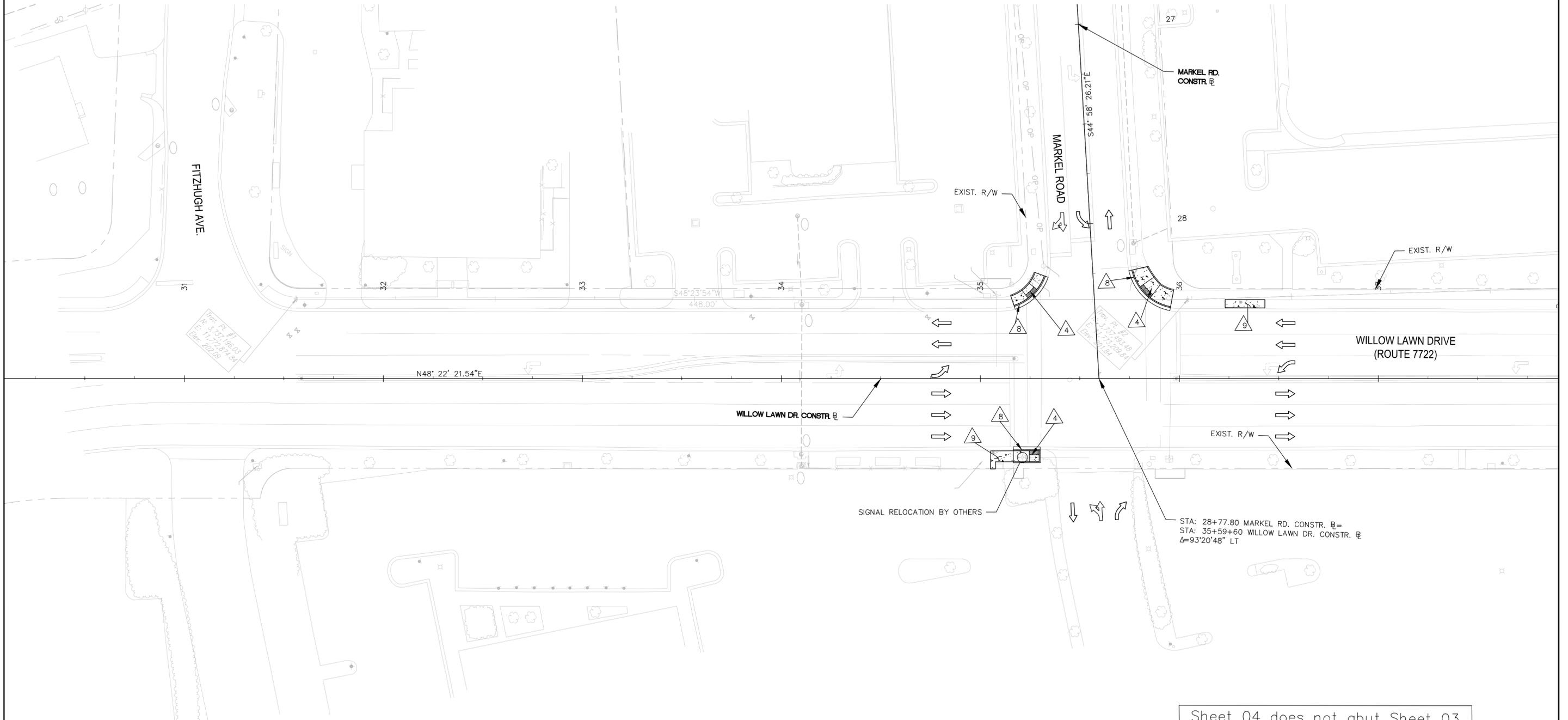


PROJECT	SHEET NO.
-	03

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

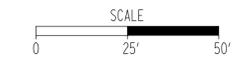
REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.		-	04

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

- | | | | | | | | |
|--|---|--|------------------------------------|--|-----------------------------------|--|---|
| | PROPOSED CONC. ITEMS | | PROPOSED REINFORCED CONC. PAVEMENT | | VDOT STD. CG-12, TYPE B REQ'D. | | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| | PROPOSED ASPHALT PAVE. | | STD. CITY OF RICHMOND CURB REQ'D. | | VDOT STD. MS-1 REQ'D. | | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE |
| | 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT MOD. MS-1 REQ'D. | | VDOT STD. CG-12, TYPE M2 REQ'D. | | VDOT STD. MS-2 REQ'D. |
| | 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT STD. CG-12, TYPE A REQ'D. | | HENRICO STD. CURB & GUTTER REQ'D. | | |
| | 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | | | | | | |



PROJECT	SHEET NO.
-	04

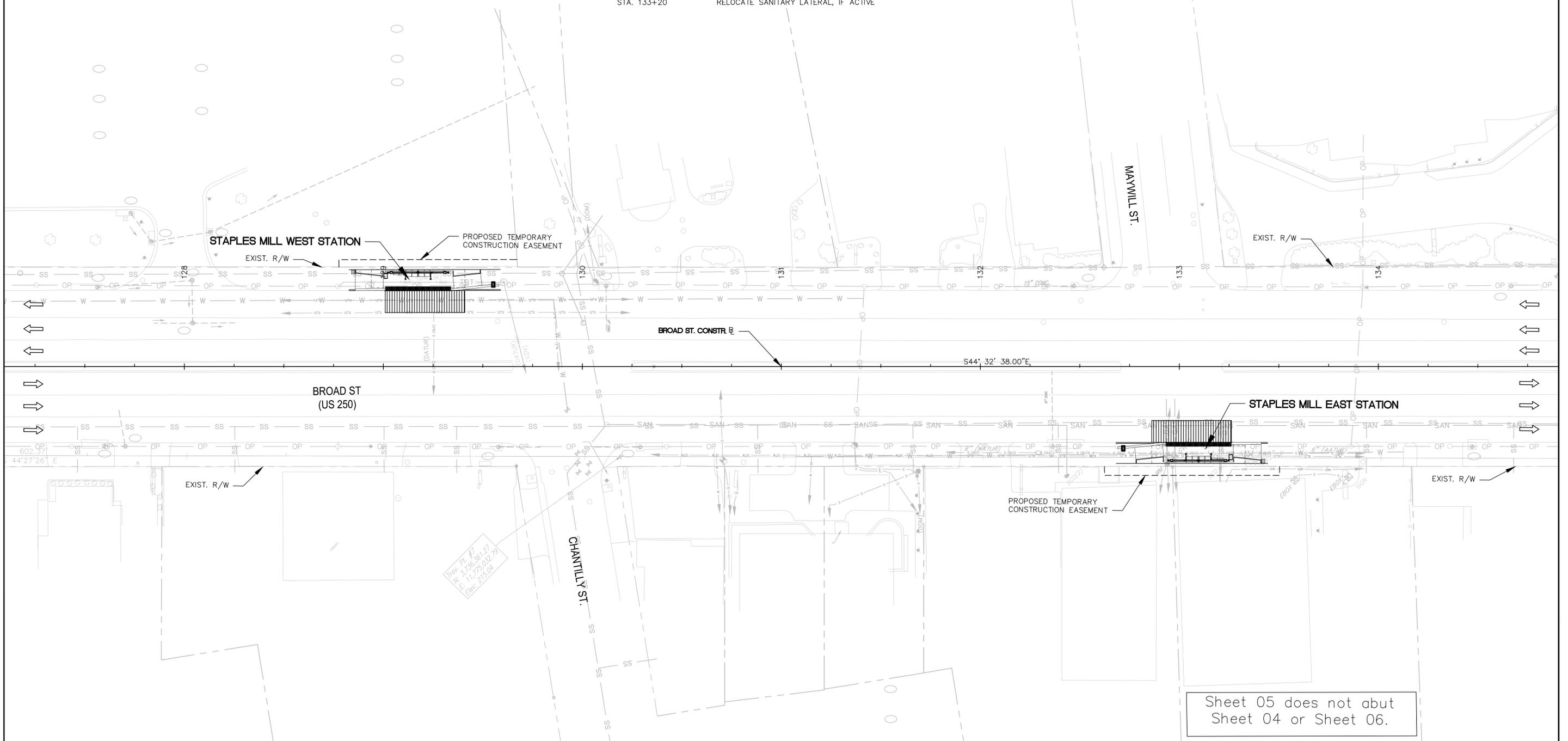
PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

UTILITY RELOCATIONS:
THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE STAPLES MILL WEST STATION:
STA. 128+75-129+40: ABANDON VERIZON (4) 3.5" TRANSITE CONDUITS (EMPTY)
STA. 128+75-129+75: CONSTRUCT STATION OVER EXISTING 12" PC SANITARY SEWER
STA. 129+60: ADJUST COLLAR OF VERIZON MANHOLE 1222
STA. 128+75-130+10: ADJUST HEIGHT OF VERIZON ATTACHED TO DVP POLES
STA. 128+75-130+10: ADJUST HEIGHT OF LUMOS FO AERIAL SPAN
STA. 128+75-130+10: ISOLATE (2) DOMINION 3 PHASE CIRCUIT SPANS DURING CONSTRUCTION
STA. 128+75-130+10: ADJUST HEIGHT OF COR FO AERIAL SPAN

THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE STAPLES MILL EAST STATION:
STA. 132+05-133+55: RELOCATE COR 12" WATER MAIN INTO EB TRAVEL LANES
STA. 132+70: REMOVE/RELOCATE DOMINION POLE EM83
STA. 132+70-133+85: RELOCATE/CONVERT STREETLIGHT SPAN BETWEEN POLE EM83 & FM01
STA. 132+90: CONVERT/ABANDON COR GAS SERVICE (BY OTHERS)
STA. 132+95: CONVERT/ABANDON COR GAS SERVICE (BY OTHERS)
STA. 132+95: INSTALL NEW WATER SERVICE, METER & METER BOX.
REMOVE EXISTING WATER METER & ABANDON SERVICE.
STA. 132+70-133+85: ADJUST HEIGHT OF COR FO AERIAL SPAN
STA. 133+20: RELOCATE SANITARY LATERAL, IF ACTIVE

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	05

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



Sheet 05 does not abut Sheet 04 or Sheet 06.

LEGEND

- | | | | | | | | |
|--|---|--|------------------------------------|--|---|--|--|
| | PROPOSED CONC. ITEMS | | PROPOSED REINFORCED CONC. PAVEMENT | | VDOT STD. CG-12, TYPE B REQ'D. | | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| | PROPOSED ASPHALT PAVE. | | STD. CITY OF RICHMOND CURB REQ'D. | | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | | VDOT STD. CG-12, TYPE M2 REQ'D. |
| | 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT STD. MS-1 REQ'D. | | VDOT STD. MS-2 REQ'D. | | HENRICO STD. CURB & GUTTER REQ'D. |
| | 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT MOD. MS-1 REQ'D. | | VDOT STD. CG-12, TYPE A REQ'D. | | |
| | 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | | | | | | |

BRT LANE USE:
BRT MIXED TRAFFIC, CURB LANE

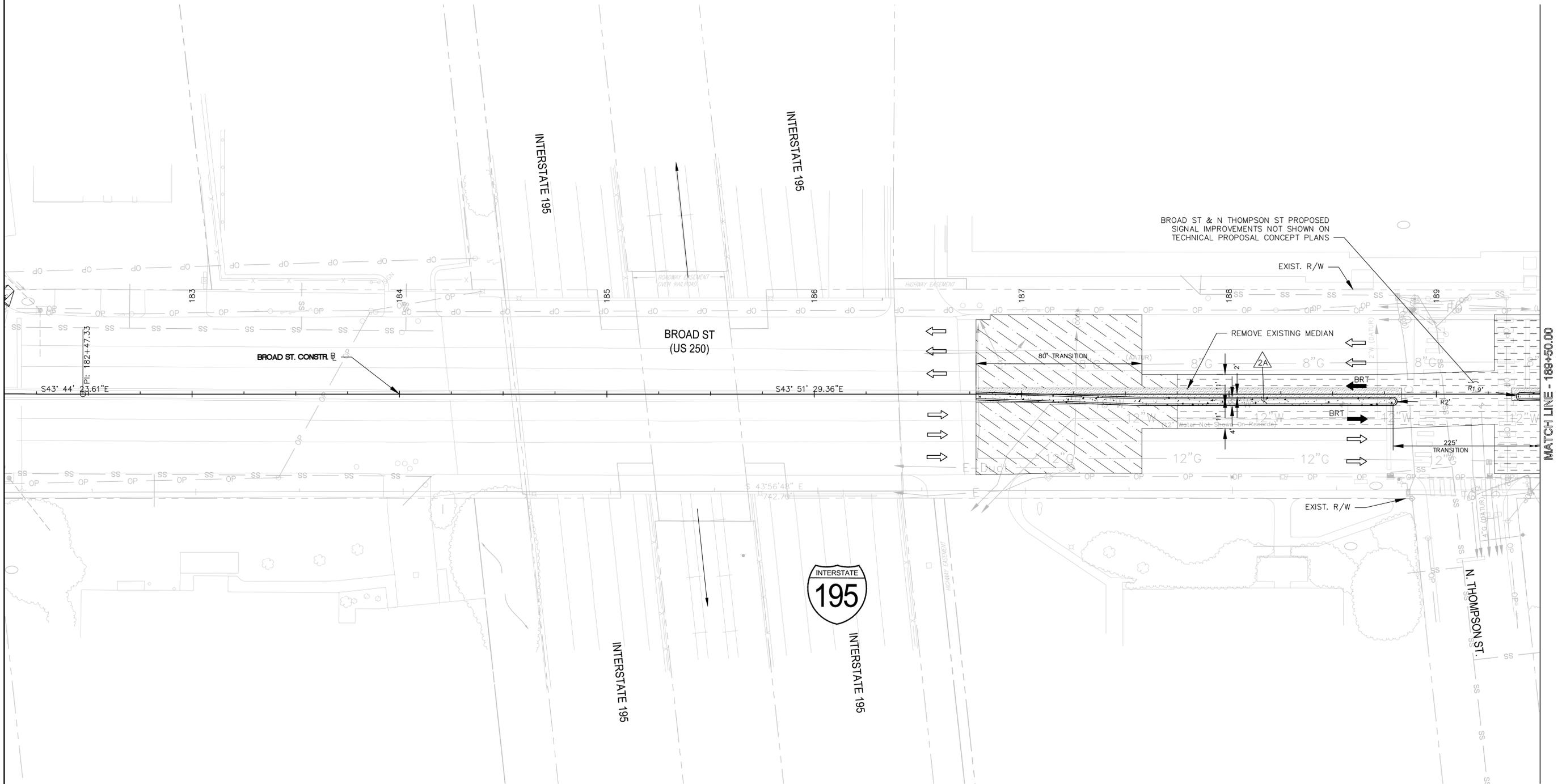


PROJECT	SHEET NO.
-	05

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	06

DESIGN FEATURES RELATING TO CONSTRUCTION
OR TO REGULATION AND CONTROL OF TRAFFIC
MAY BE SUBJECT TO CHANGE AS DEEMED
NECESSARY BY THE DEPARTMENT



MATCH LINE - 189+50.00

LEGEND

- | | | | |
|---|------------------------------------|---|--|
| PROPOSED CONC. ITEMS | PROPOSED REINFORCED CONC. PAVEMENT | VDOT STD. CG-12, TYPE B REQ'D. | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| PROPOSED ASPHALT PAVE. | STD. CITY OF RICHMOND CURB REQ'D. | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | |
| 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT STD. MS-1 REQ'D. | VDOT STD. CG-12, TYPE M2 REQ'D. | |
| 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT MOD. MS-1 REQ'D. | VDOT STD. MS-2 REQ'D. | |
| 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | VDOT STD. CG-12, TYPE A REQ'D. | HENRICO STD. CURB & GUTTER REQ'D. | |

BRT LANE USE:
TRANSITION FROM BRT MIXED TRAFFIC, CURB LANE TO BRT EXCLUSIVE LANE, MEDIAN LANE

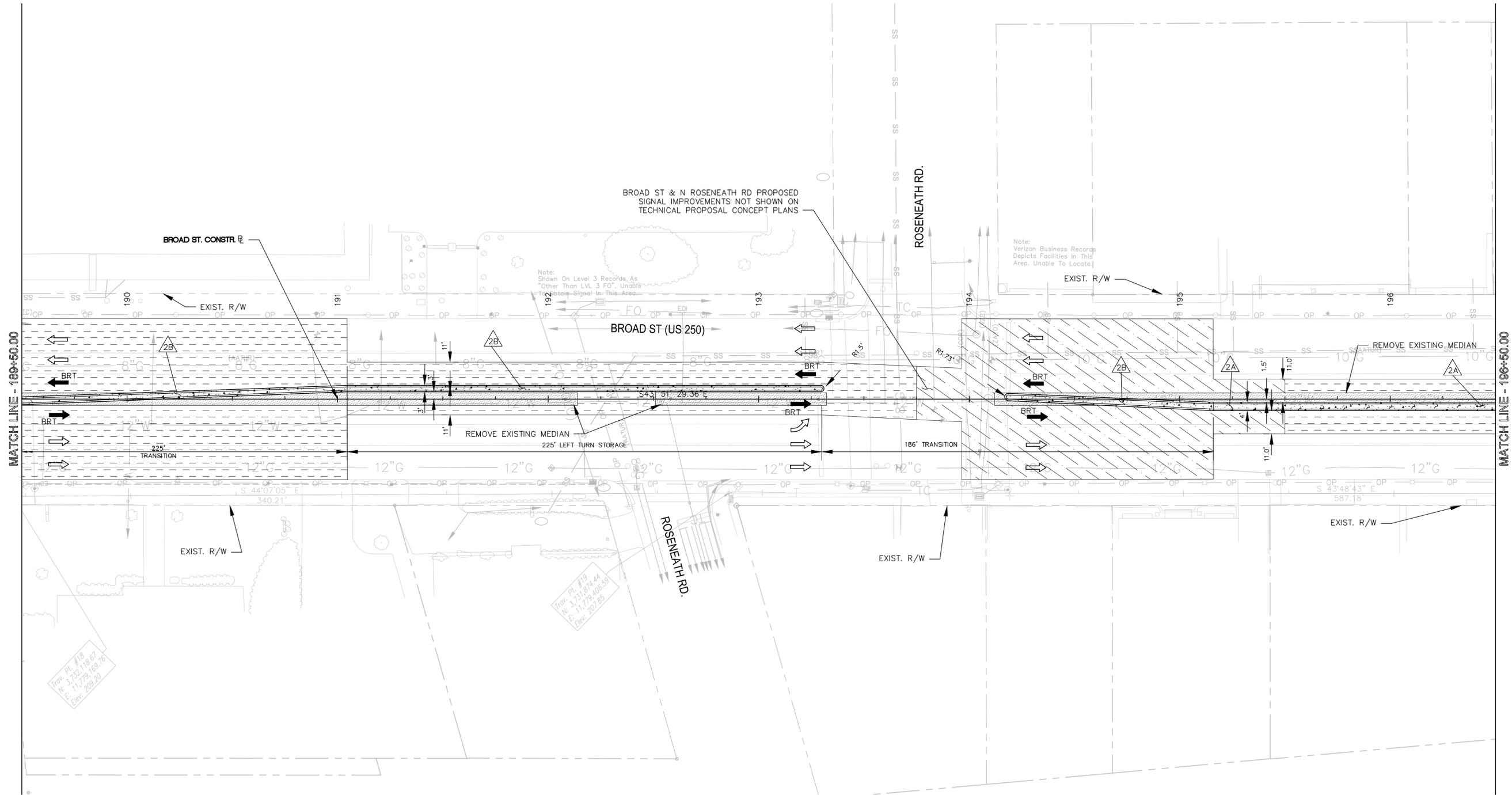


PROJECT	SHEET NO.
-	06

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.		-	07

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

- | | | | |
|---|------------------------------------|---|--|
| PROPOSED CONC. ITEMS | PROPOSED REINFORCED CONC. PAVEMENT | VDOT STD. CG-12, TYPE B REQ'D. | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| PROPOSED ASPHALT PAVE. | STD. CITY OF RICHMOND CURB REQ'D. | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | |
| 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT STD. MS-1 REQ'D. | VDOT STD. CG-12, TYPE M2 REQ'D. | |
| 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT MOD. MS-1 REQ'D. | VDOT STD. MS-2 REQ'D. | |
| 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | VDOT STD. CG-12, TYPE A REQ'D. | HENRICO STD. CURB & GUTTER REQ'D. | |

BRT LANE USE:
BRT EXCLUSIVE LANE, MEDIAN LANE

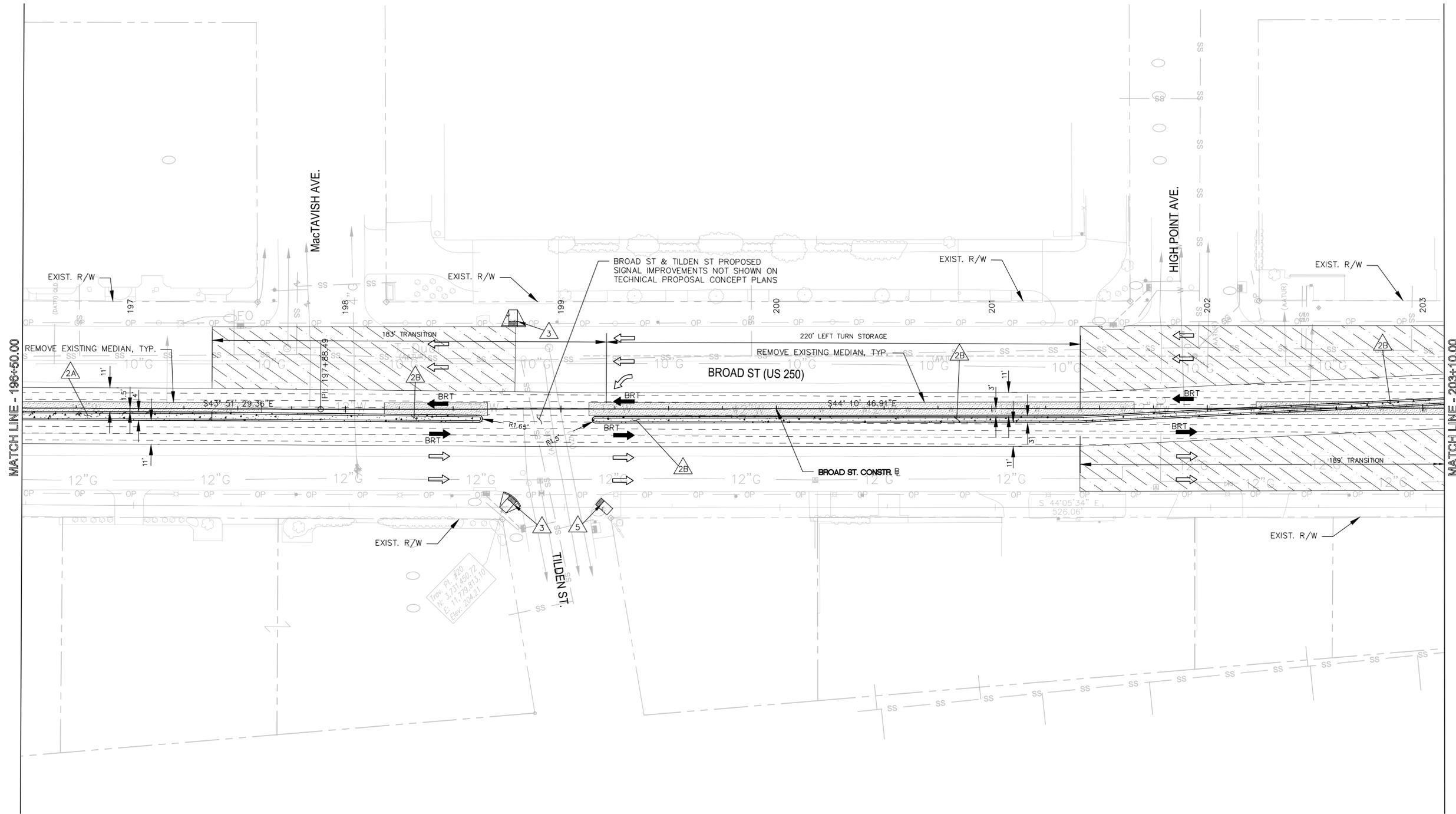


PROJECT	SHEET NO.
-	07

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

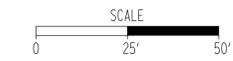
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	08

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



- LEGEND**
- | | | | | | | | |
|--|---|--|------------------------------------|--|---|--|--|
| | PROPOSED CONC. ITEMS | | PROPOSED REINFORCED CONC. PAVEMENT | | VDOT STD. CG-12, TYPE B REQ'D. | | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| | PROPOSED ASPHALT PAVE. | | STD. CITY OF RICHMOND CURB REQ'D. | | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | | VDOT STD. CG-12, TYPE M2 REQ'D. |
| | 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT STD. MS-1 REQ'D. | | VDOT STD. CG-12, TYPE M2 REQ'D. | | VDOT STD. MS-2 REQ'D. |
| | 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT MOD. MS-1 REQ'D. | | VDOT STD. MS-2 REQ'D. | | HENRICO STD. CURB & GUTTER REQ'D. |
| | 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | | VDOT STD. CG-12, TYPE A REQ'D. | | | | |

BRT LANE USE:
BRT EXCLUSIVE LANE, MEDIAN LANE



PROJECT	SHEET NO.
-	08

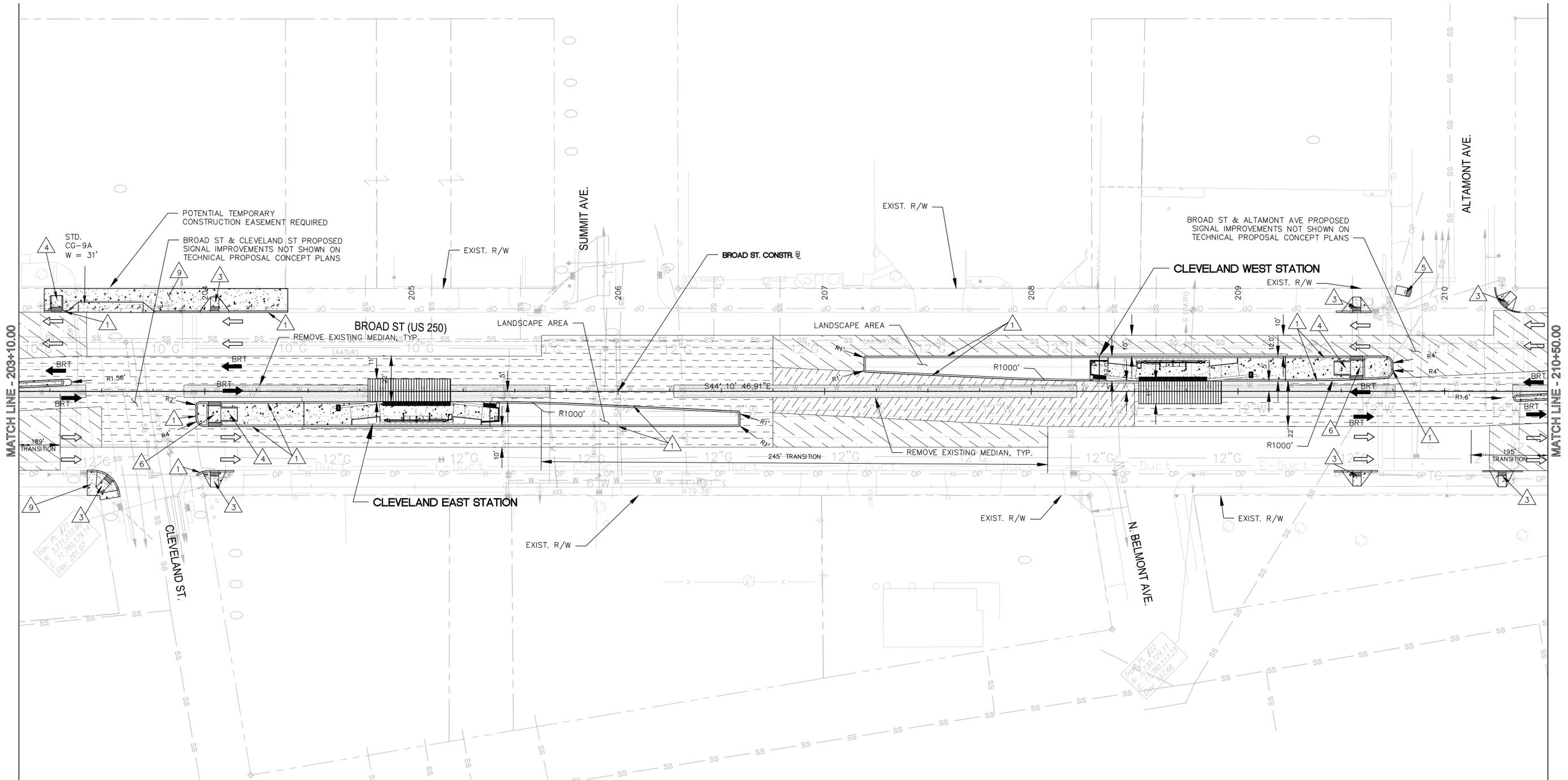
PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

UTILITY RELOCATIONS:
THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE CLEVELAND EAST STATION:
STA. 205+45: REMOVE/RIP COR GAS LINE (BY OTHERS)

THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE CLEVELAND WEST STATION:
STA. 208+35: SLEEVE/REPLACE WATER SERVICE
STA. 208+75: RELOCATE/ABANDON COR GAS SERVICE (BY OTHERS)
STA. 208+75: SLEEVE/REPLACE WATER SERVICE

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	09

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

	PROPOSED CONC. ITEMS		PROPOSED REINFORCED CONC. PAVEMENT		VDOT STD. CG-12, TYPE B REQ'D.		STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES
	PROPOSED ASPHALT PAVE.		STD. CITY OF RICHMOND CURB REQ'D.		REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE		VDOT STD. CG-12, TYPE M2 REQ'D.
	2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE.		VDOT STD. MS-1 REQ'D.		VDOT STD. CG-12, TYPE M2 REQ'D.		VDOT STD. MS-2 REQ'D.
	4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE.		VDOT MOD. MS-1 REQ'D.		HENRICO STD. CURB & GUTTER REQ'D.		
	3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY		VDOT STD. CG-12, TYPE A REQ'D.				

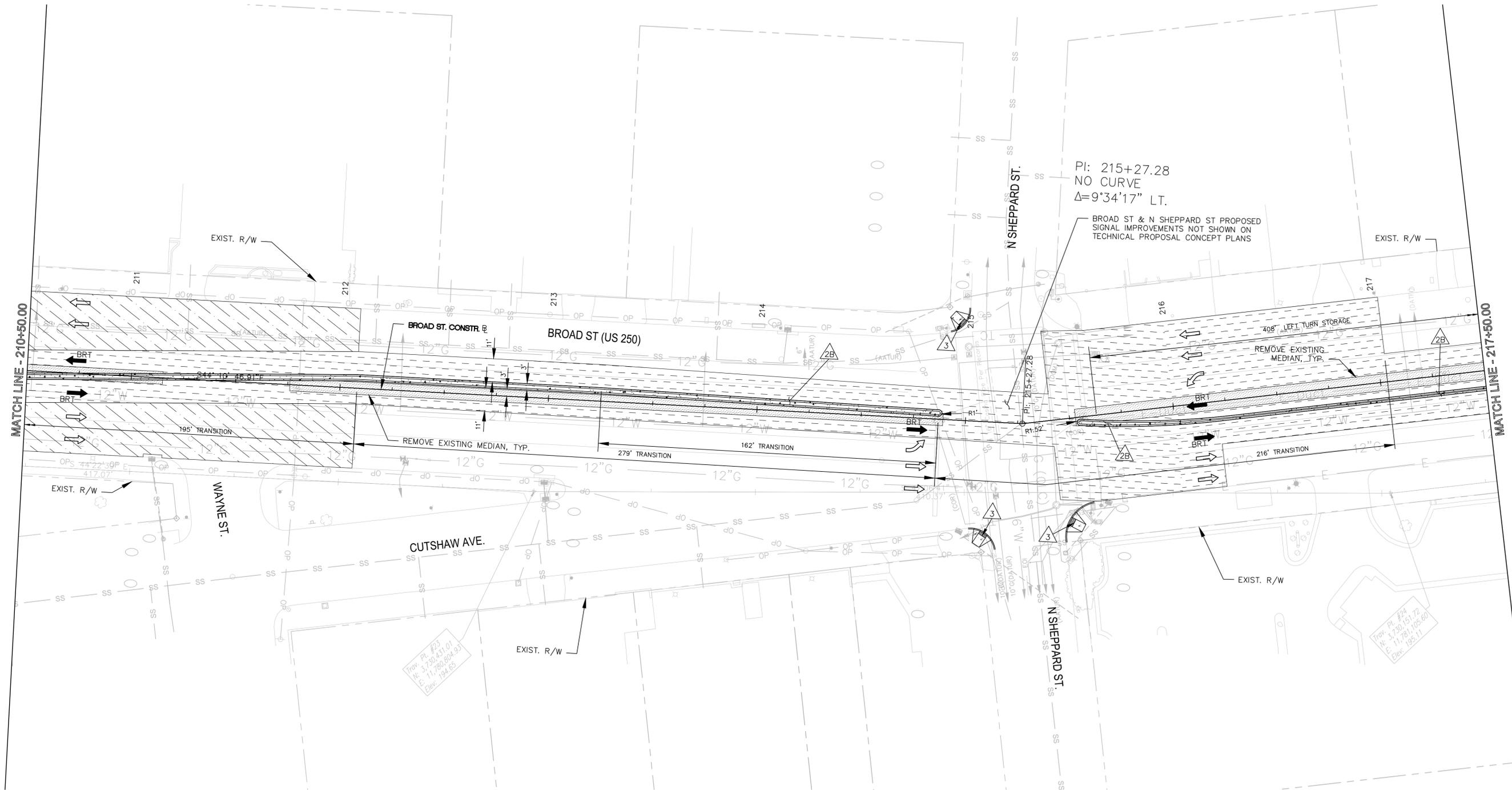
BRT LANE USE:
BRT EXCLUSIVE LANE, MEDIAN LANE

SCALE: 0 25' 50'

PROJECT MANAGER _____
SURVEYED BY _____
DESIGN SUPERVISED BY _____
DESIGNED BY _____

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.		-	10

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

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|--|---|--|------------------------------------|--|---|--|--|
| | PROPOSED CONC. ITEMS | | PROPOSED REINFORCED CONC. PAVEMENT | | VDOT STD. CG-12, TYPE B REQ'D. | | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| | PROPOSED ASPHALT PAVE. | | STD. CITY OF RICHMOND CURB REQ'D. | | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | | VDOT STD. CG-12, TYPE M2 REQ'D. |
| | 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT STD. MS-1 REQ'D. | | VDOT STD. MS-2 REQ'D. | | HENRICO STD. CURB & GUTTER REQ'D. |
| | 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT MOD. MS-1 REQ'D. | | | | |
| | 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | | VDOT STD. CG-12, TYPE A REQ'D. | | | | |

BRT LANE USE:
BRT EXCLUSIVE LANE, MEDIAN LANE

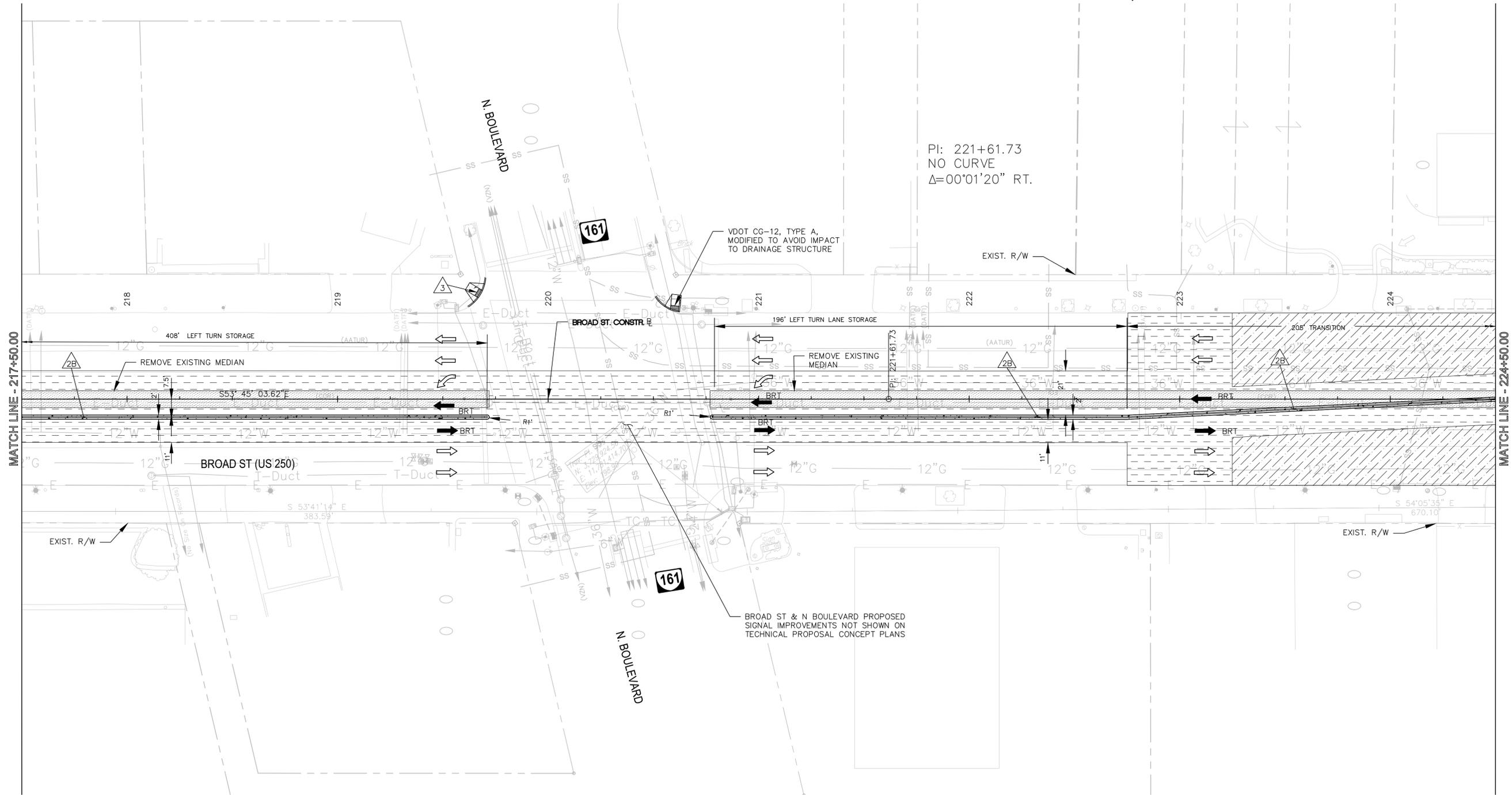


PROJECT	SHEET NO.
-	10

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

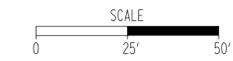
REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.		-	11

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



- LEGEND**
- | | | | |
|---|------------------------------------|---|--|
| PROPOSED CONC. ITEMS | PROPOSED REINFORCED CONC. PAVEMENT | VDOT STD. CG-12, TYPE B REQ'D. | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| PROPOSED ASPHALT PAVE. | STD. CITY OF RICHMOND CURB REQ'D. | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | |
| 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT STD. MS-1 REQ'D. | VDOT STD. CG-12, TYPE M2 REQ'D. | |
| 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT MOD. MS-1 REQ'D. | VDOT STD. MS-2 REQ'D. | |
| 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | VDOT STD. CG-12, TYPE A REQ'D. | HENRICO STD. CURB & GUTTER REQ'D. | |

BRT LANE USE:
BRT EXCLUSIVE LANE, MEDIAN LANE



PROJECT	SHEET NO.
-	11

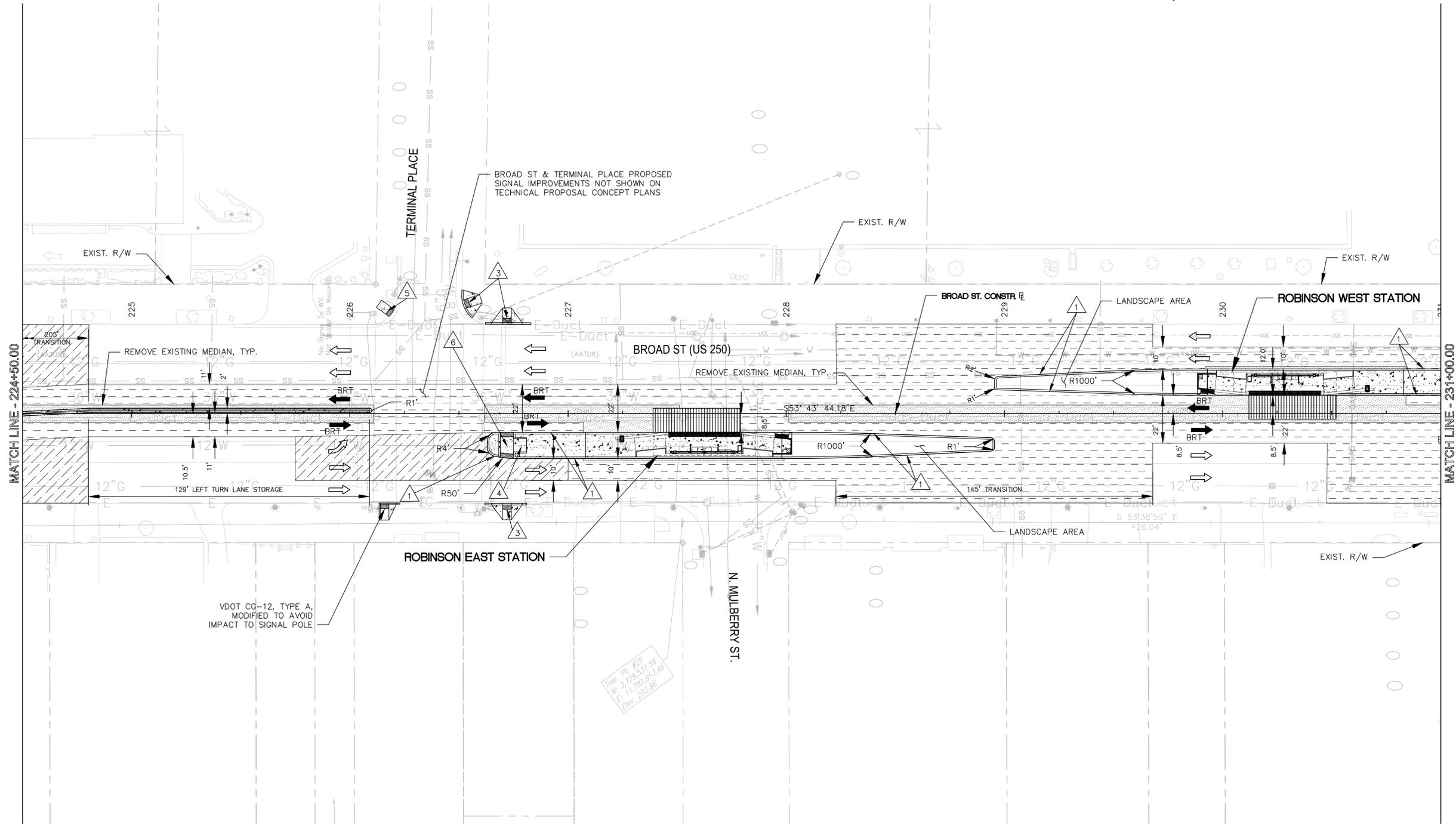
PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

UTILITY RELOCATIONS:
THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE ROBINSON EAST STATION:
STA. 226+45-227+75: NEW 8" COR WATER MAIN (BY OTHERS)
STA. 226+45-227+75: REPLACE 12" COR WATER MAIN (BY OTHERS)
STA. 227+75: PROTECT IN PLACE 36" COR WATER MAIN
STA. 227+75: PROTECT IN PLACE 16" COR WATER MAIN

THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE ROBINSON WEST STATION:
STA. 230+60: RELOCATE/ABANDON COR GAS SERVICE (BY OTHERS)
STA. 229+85-230+85: 16"x24" CSO SEWER TO REMAIN. MINIMIZE LOADING AND IMPACTS

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	12

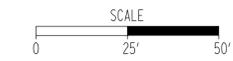
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

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|--|---|--|------------------------------------|--|---|--|--|
| | PROPOSED CONC. ITEMS | | PROPOSED REINFORCED CONC. PAVEMENT | | VDOT STD. CG-12, TYPE B REQ'D. | | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| | PROPOSED ASPHALT PAVE. | | STD. CITY OF RICHMOND CURB REQ'D. | | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | | VDOT STD. CG-12, TYPE M2 REQ'D. |
| | 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT STD. MS-1 REQ'D. | | VDOT STD. CG-12, TYPE M2 REQ'D. | | VDOT STD. MS-2 REQ'D. |
| | 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT MOD. MS-1 REQ'D. | | VDOT STD. CG-12, TYPE A REQ'D. | | HENRICO STD. CURB & GUTTER REQ'D. |
| | 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | | VDOT STD. CG-12, TYPE A REQ'D. | | | | |

BRT LANE USE:
BRT EXCLUSIVE LANE, MEDIAN LANE

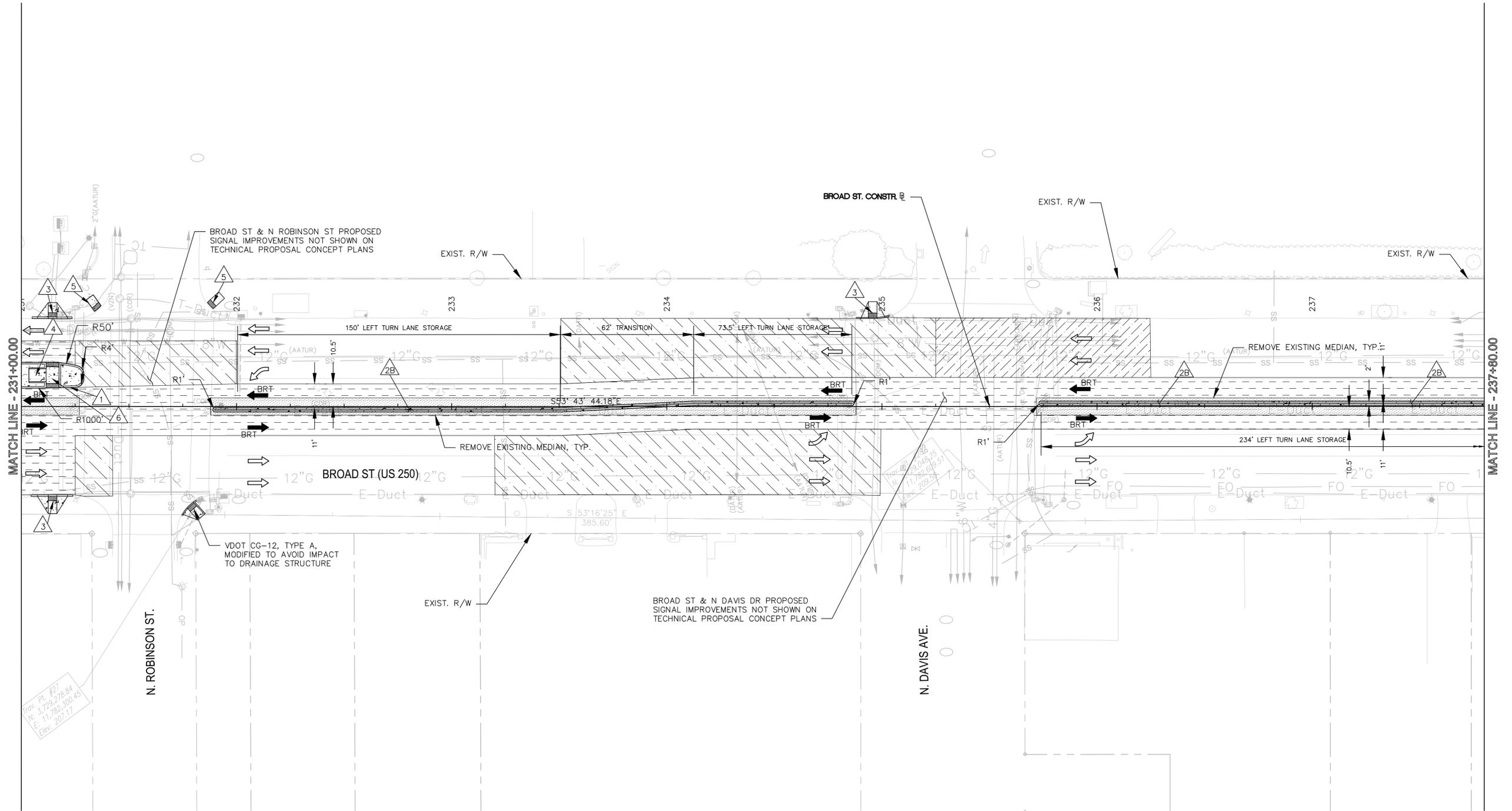


PROJECT	SHEET NO.
-	12

PROJECT MANAGER _____
SURVEYED BY _____
DESIGN SUPERVISED BY _____
DESIGNED BY _____

REVISED	STATE		STATE	PROJECT	SHEET NO.
	VA.				
					13

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

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|--|---|--|------------------------------------|--|---|--|--|
| | PROPOSED CONC. ITEMS | | PROPOSED REINFORCED CONC. PAVEMENT | | VDOT STD. CG-12, TYPE B REQ'D. | | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| | PROPOSED ASPHALT PAVE. | | STD. CITY OF RICHMOND CURB REQ'D. | | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | | VDOT STD. CG-12, TYPE M2 REQ'D. |
| | 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT STD. MS-1 REQ'D. | | VDOT STD. CG-12, TYPE M2 REQ'D. | | VDOT STD. MS-2 REQ'D. |
| | 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT MOD. MS-1 REQ'D. | | VDOT STD. MS-2 REQ'D. | | HENRICO STD. CURB & GUTTER REQ'D. |
| | 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | | VDOT STD. CG-12, TYPE A REQ'D. | | | | |

BRT LANE USE:
BRT EXCLUSIVE LANE, MEDIAN LANE



PROJECT	SHEET NO.
-	13

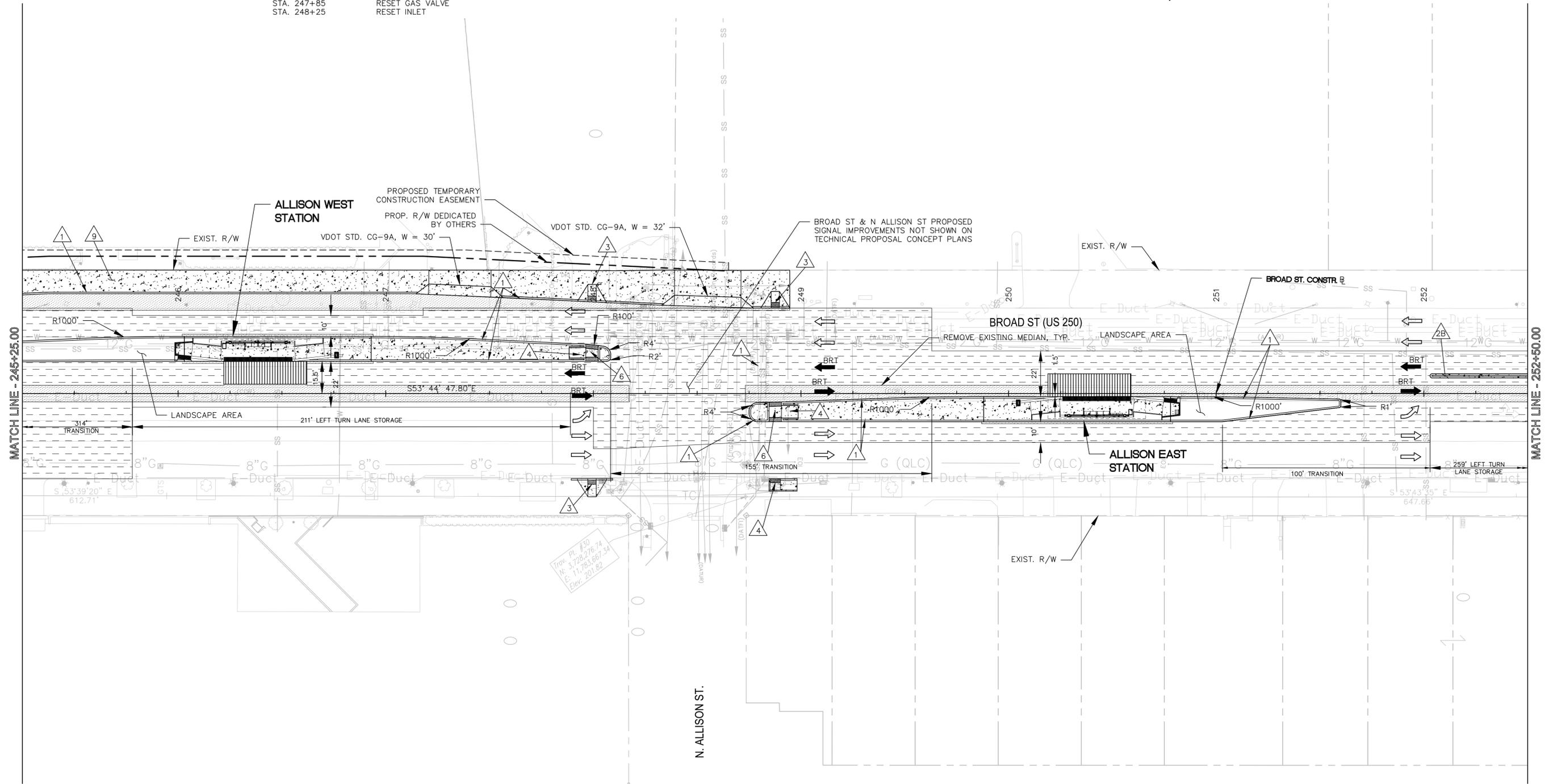
PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

UTILITY RELOCATIONS:
THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE ALLISON WEST STATION:
STA. 244+50 RELOCATE LIGHT POLE (SEE SHEET 14)
STA. 245+45 RELOCATE LIGHT POLE
STA. 245+75-247+55: ABANDON 8" CI WATER MAIN. INSTALL 8" DI WATER MAIN
STA. 246+00-247+00: 30"x45" CSO SEWER TO REMAIN. MINIMIZE LOADING AND IMPACTS
STA. 246+30 RELOCATE LIGHT POLE
STA. 247+15 RELOCATE LIGHT POLE
STA. 247+60 RESET HANDHOLE
STA. 247+85 RESET GAS VALVE
STA. 248+25 RESET INLET

THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE ALLISON EAST STATION:
STA. 248+85: RELOCATE TRAFFIC CONTROL HAND HOLE

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	15

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

PROPOSED CONC. ITEMS	PROPOSED REINFORCED CONC. PAVEMENT	VDOT STD. CG-12, TYPE B REQ'D.	STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES
PROPOSED ASPHALT PAVE.	STD. CITY OF RICHMOND CURB REQ'D.	REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE	
2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE.	VDOT STD. MS-1 REQ'D.	VDOT STD. CG-12, TYPE M2 REQ'D.	
4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE.	VDOT MOD. MS-1 REQ'D.	VDOT STD. MS-2 REQ'D.	
3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY	VDOT STD. CG-12, TYPE A REQ'D.	HENRICO STD. CURB & GUTTER REQ'D.	

BRT LANE USE:
BRT EXCLUSIVE LANE, MEDIAN LANE

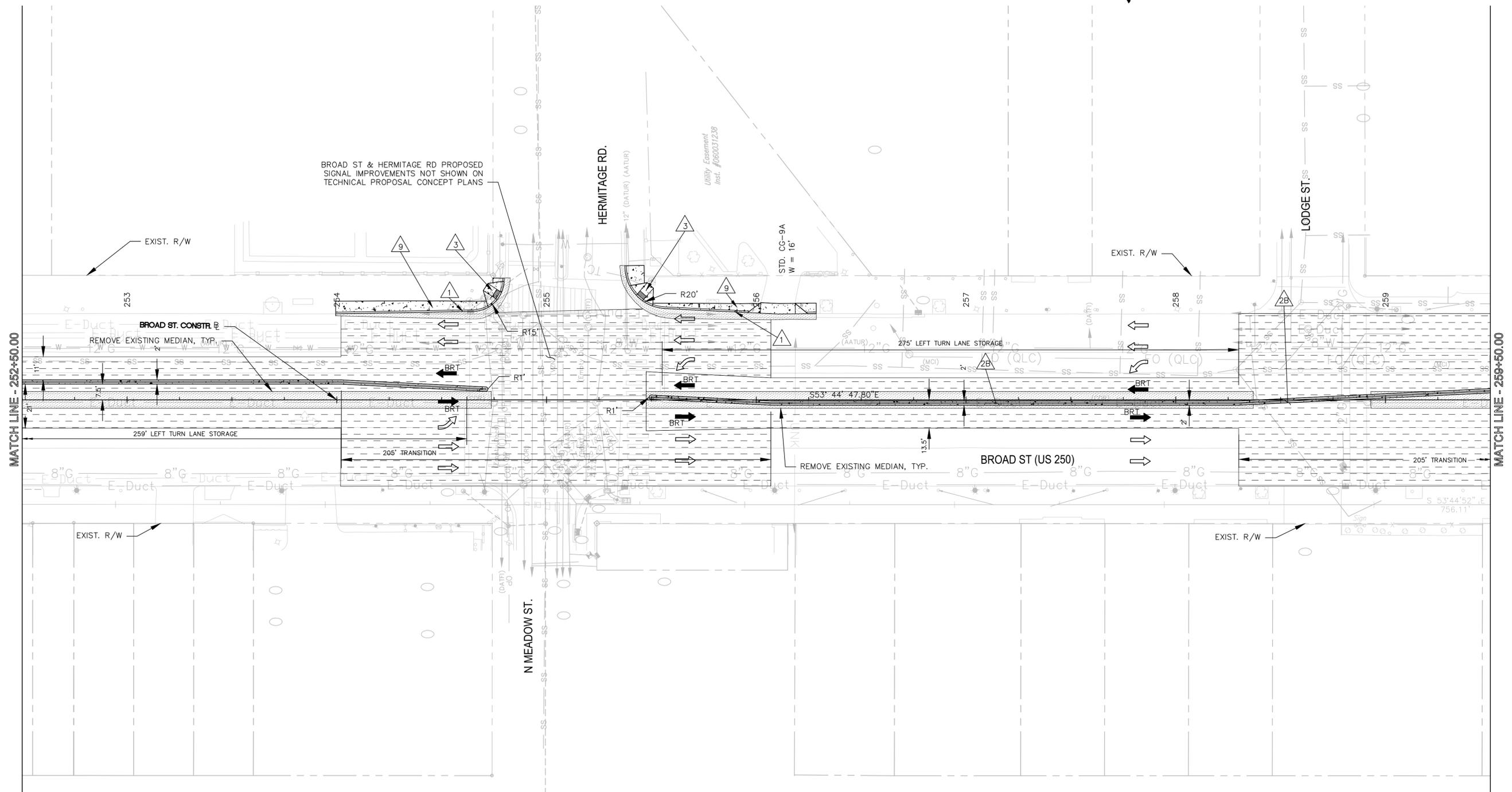
SCALE: 0 25' 50'

PROJECT	SHEET NO.
-	15

PROJECT MANAGER _____
SURVEYED BY _____
DESIGN SUPERVISED BY _____
DESIGNED BY _____

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.		-	16

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

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|---|------------------------------------|---|--|
| PROPOSED CONC. ITEMS | PROPOSED REINFORCED CONC. PAVEMENT | VDOT STD. CG-12, TYPE B REQ'D. | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| PROPOSED ASPHALT PAVE. | STD. CITY OF RICHMOND CURB REQ'D. | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | |
| 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT STD. MS-1 REQ'D. | VDOT STD. CG-12, TYPE M2 REQ'D. | |
| 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT MOD. MS-1 REQ'D. | VDOT STD. MS-2 REQ'D. | |
| 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | VDOT STD. CG-12, TYPE A REQ'D. | HENRICO STD. CURB & GUTTER REQ'D. | |

BRT LANE USE:
BRT EXCLUSIVE LANE, MEDIAN LANE

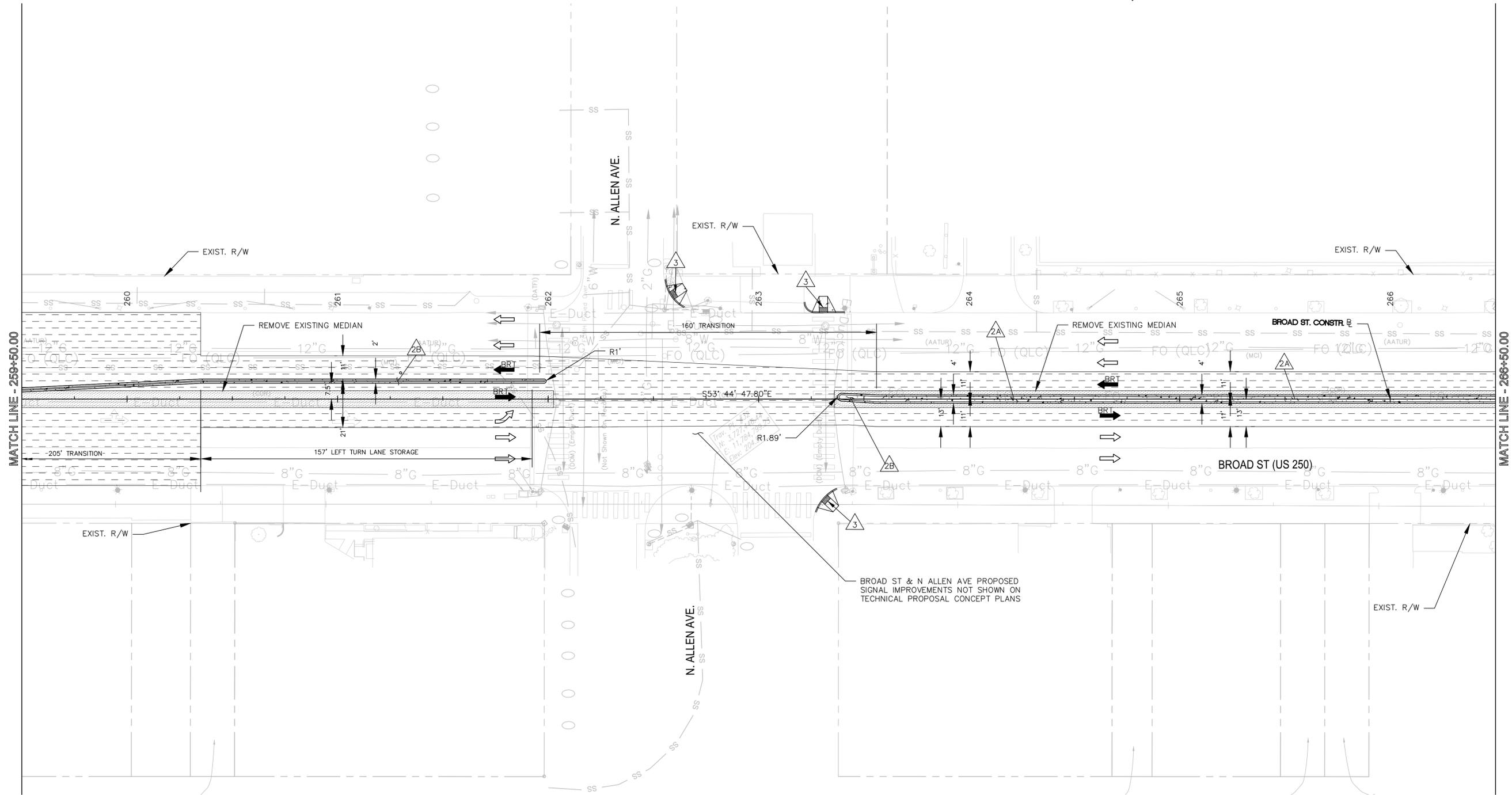


PROJECT	SHEET NO.
-	16

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

REVISED	STATE		STATE	PROJECT	SHEET NO.
	VA.				
				-	17

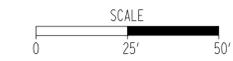
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

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|---|------------------------------------|---|--|
| PROPOSED CONC. ITEMS | PROPOSED REINFORCED CONC. PAVEMENT | VDOT STD. CG-12, TYPE B REQ'D. | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| PROPOSED ASPHALT PAVE. | STD. CITY OF RICHMOND CURB REQ'D. | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | |
| 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT STD. MS-1 REQ'D. | VDOT STD. CG-12, TYPE M2 REQ'D. | |
| 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT MOD. MS-1 REQ'D. | VDOT STD. MS-2 REQ'D. | |
| 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | VDOT STD. CG-12, TYPE A REQ'D. | HENRICO STD. CURB & GUTTER REQ'D. | |

BRT LANE USE:
BRT EXCLUSIVE LANE, MEDIAN LANE

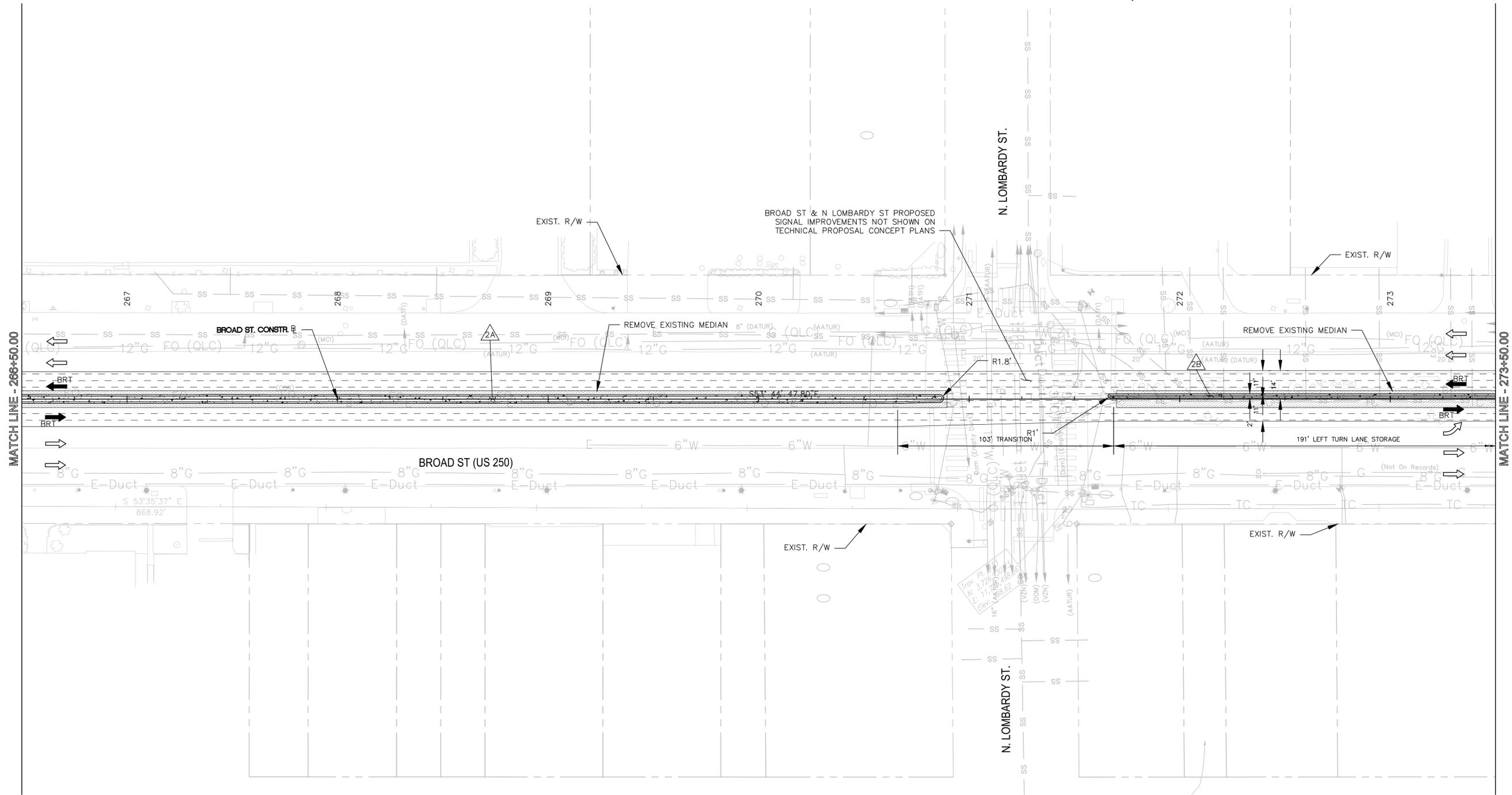


PROJECT	SHEET NO.
-	17

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.		-	18

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

- | | | | |
|---|------------------------------------|---|--|
| PROPOSED CONC. ITEMS | PROPOSED REINFORCED CONC. PAVEMENT | VDOT STD. CG-12, TYPE B REQ'D. | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| PROPOSED ASPHALT PAVE. | STD. CITY OF RICHMOND CURB REQ'D. | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | |
| 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT STD. MS-1 REQ'D. | VDOT STD. CG-12, TYPE M2 REQ'D. | |
| 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT MOD. MS-1 REQ'D. | VDOT STD. MS-2 REQ'D. | |
| 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | VDOT STD. CG-12, TYPE A REQ'D. | HENRICO STD. CURB & GUTTER REQ'D. | |

BRT LANE USE:
BRT EXCLUSIVE LANE, MEDIAN LANE

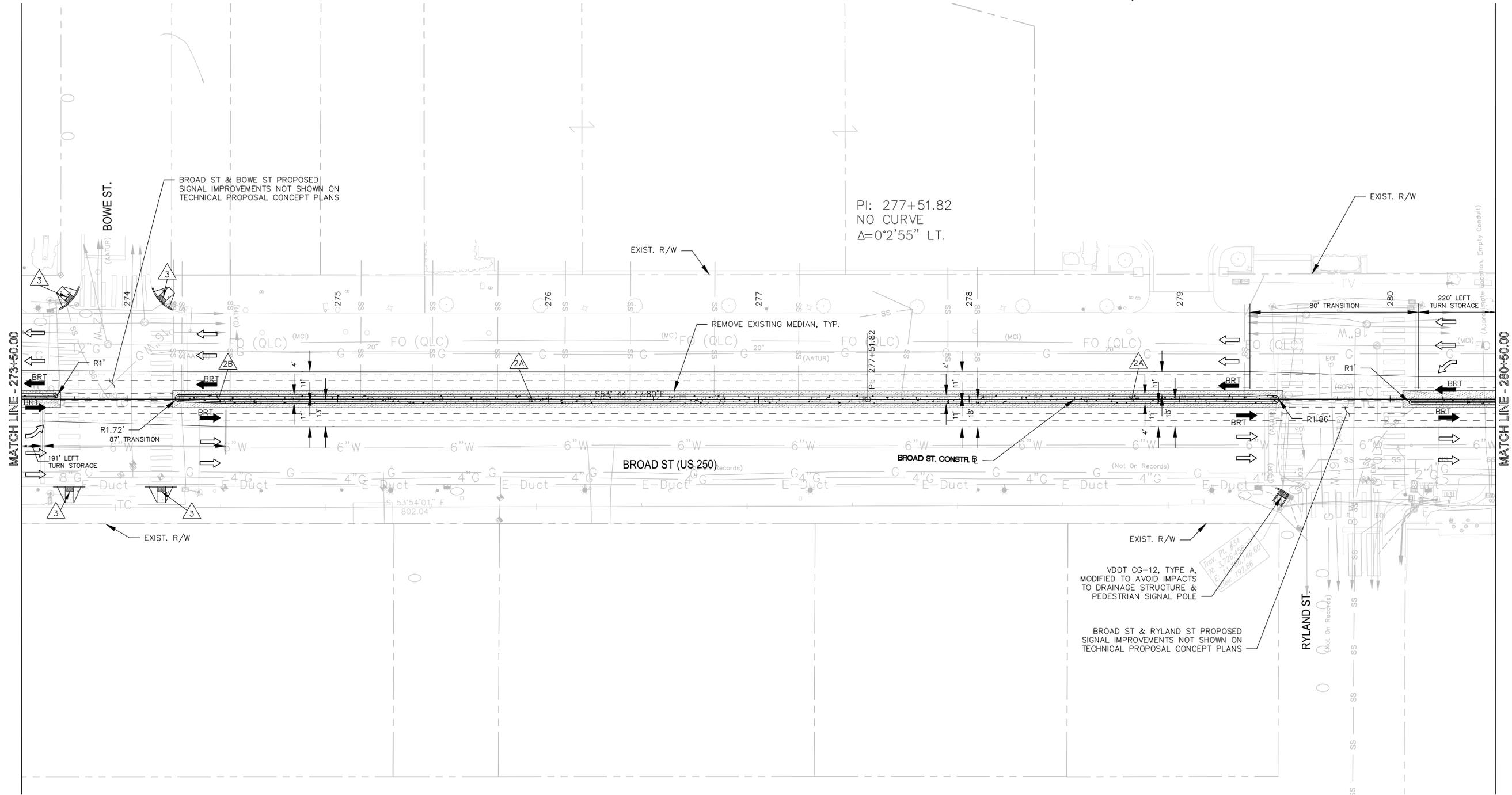


PROJECT	SHEET NO.
-	18

PROJECT MANAGER _____
SURVEYED BY _____
DESIGN SUPERVISED BY _____
DESIGNED BY _____

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.		-	19

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



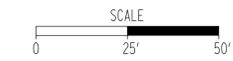
VDOT CG-12, TYPE A, MODIFIED TO AVOID IMPACTS TO DRAINAGE STRUCTURE & PEDESTRIAN SIGNAL POLE

BROAD ST & RYLAND ST PROPOSED SIGNAL IMPROVEMENTS NOT SHOWN ON TECHNICAL PROPOSAL CONCEPT PLANS

LEGEND

- | | | | |
|---|------------------------------------|---|--|
| PROPOSED CONC. ITEMS | PROPOSED REINFORCED CONC. PAVEMENT | VDOT STD. CG-12, TYPE B REQ'D. | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| PROPOSED ASPHALT PAVE. | STD. CITY OF RICHMOND CURB REQ'D. | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | VDOT STD. CG-12, TYPE M2 REQ'D. |
| 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT STD. MS-1 REQ'D. | VDOT STD. CG-12, TYPE M2 REQ'D. | VDOT STD. MS-2 REQ'D. |
| 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT MOD. MS-1 REQ'D. | VDOT STD. MS-2 REQ'D. | HENRICO STD. CURB & GUTTER REQ'D. |
| 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | VDOT STD. CG-12, TYPE A REQ'D. | | |

BRT LANE USE:
BRT EXCLUSIVE LANE, MEDIAN LANE

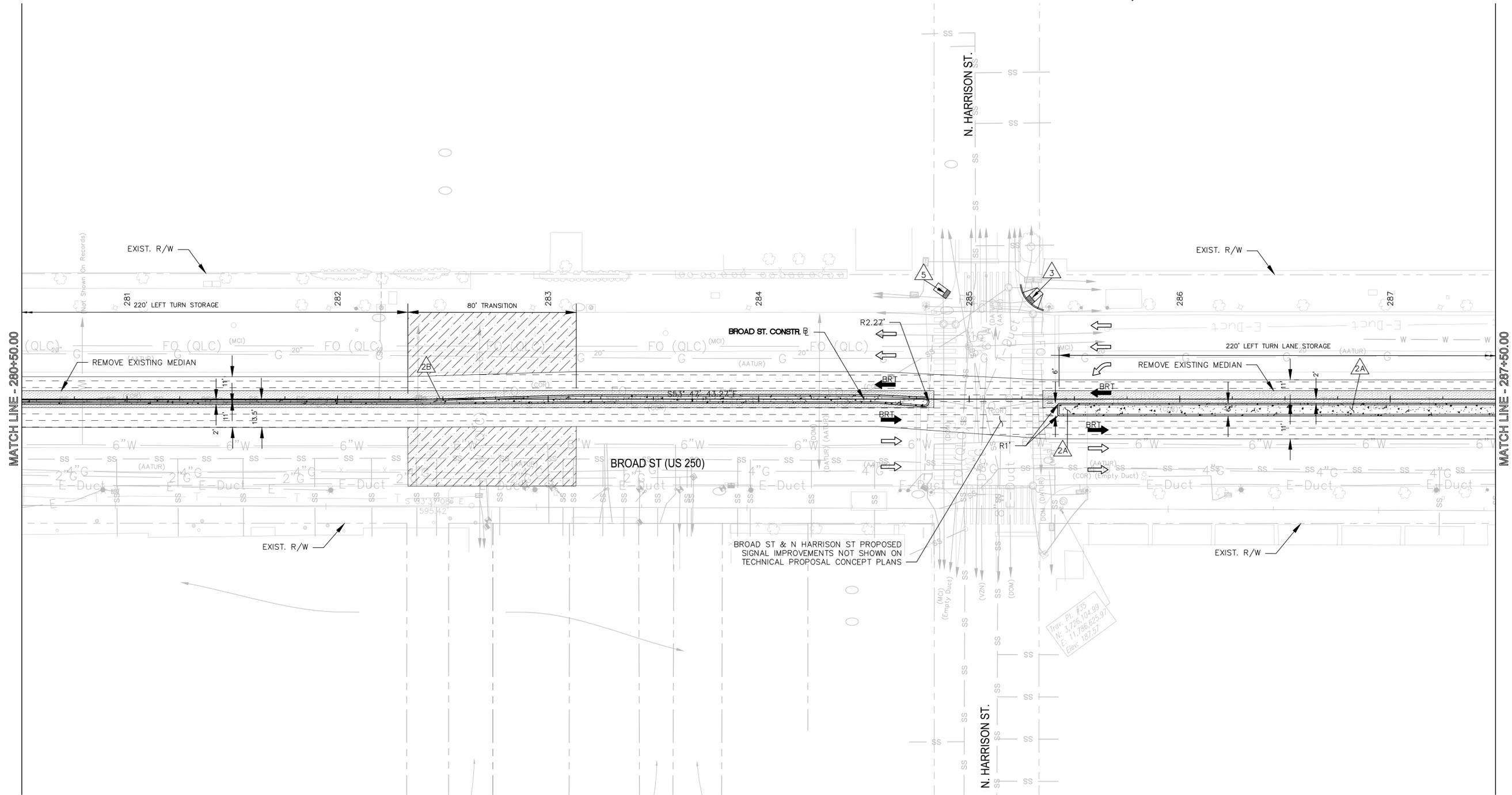


PROJECT	SHEET NO.
-	19

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.		-	20

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

PROPOSED CONC. ITEMS	PROPOSED REINFORCED CONC. PAVEMENT	VDOT STD. CG-12, TYPE B REQ'D.	STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES
PROPOSED ASPHALT PAVE.	STD. CITY OF RICHMOND CURB REQ'D.	REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE	
2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE.	VDOT STD. MS-1 REQ'D.	VDOT STD. CG-12, TYPE M2 REQ'D.	
4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE.	VDOT MOD. MS-1 REQ'D.	VDOT STD. MS-2 REQ'D.	
3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY	VDOT STD. CG-12, TYPE A REQ'D.	HENRICO STD. CURB & GUTTER REQ'D.	

BRT LANE USE:
BRT EXCLUSIVE LANE, MEDIAN LANE

SCALE: 0 25' 50'

PROJECT	SHEET NO.
-	20

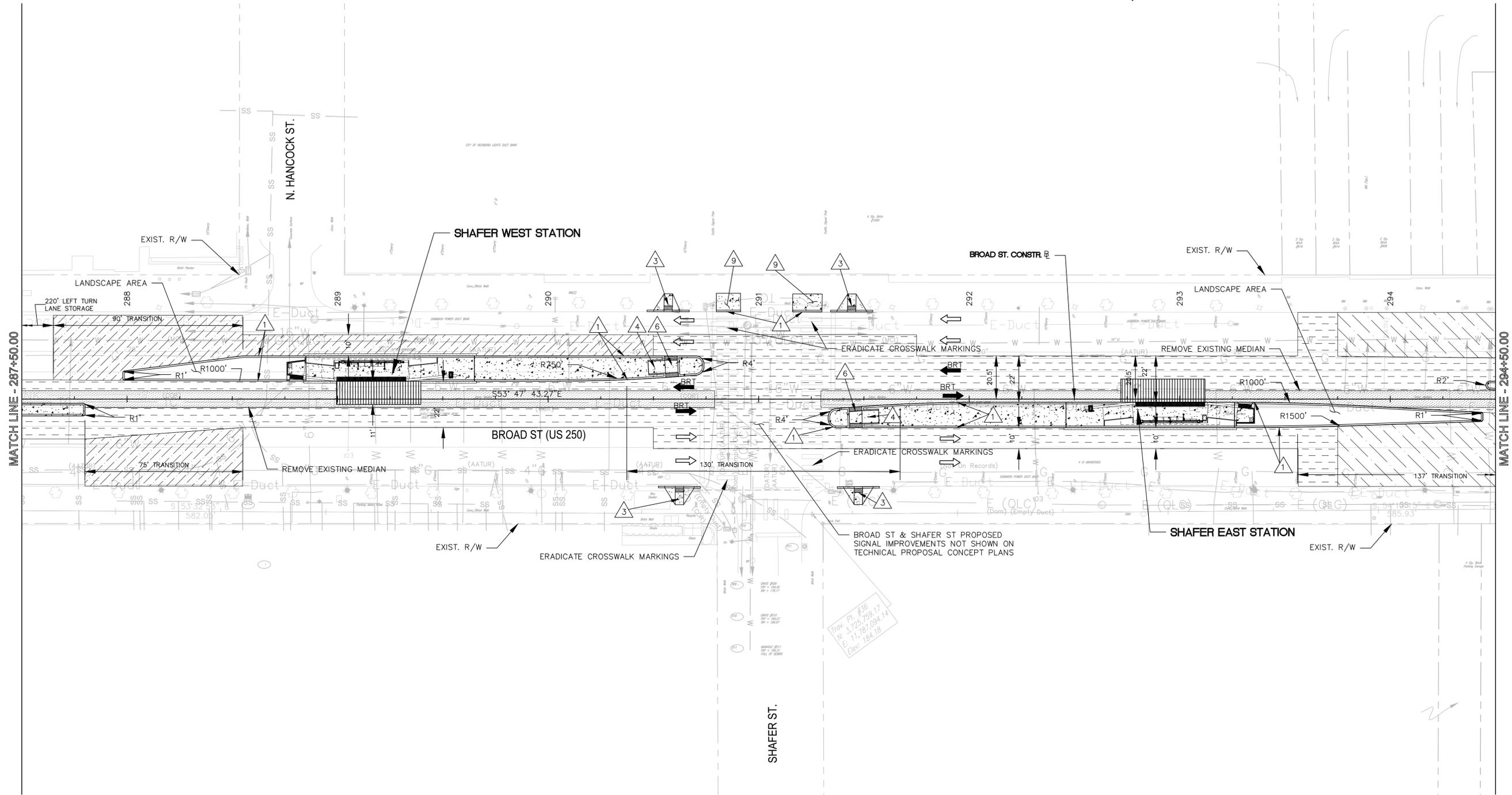
PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

UTILITY RELOCATIONS:
THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE SHAFER WEST STATION:
STA. 289+05: ABANDON/RELOCATE COR 6" CI WATER MAIN, IF ACTIVE
STA. 290+25-290+75: RIP/RELOCATE COR 20" GAS MAIN

THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE SHAFER EAST STATION:
STA. 293+15: SLEEVE/REPLACE WATER SERVICE

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	21

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

- | | | | |
|---|------------------------------------|---|--|
| PROPOSED CONC. ITEMS | PROPOSED REINFORCED CONC. PAVEMENT | VDOT STD. CG-12, TYPE B REQ'D. | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| PROPOSED ASPHALT PAVE. | STD. CITY OF RICHMOND CURB REQ'D. | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | |
| 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT STD. MS-1 REQ'D. | VDOT STD. CG-12, TYPE M2 REQ'D. | |
| 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT MOD. MS-1 REQ'D. | VDOT STD. MS-2 REQ'D. | |
| 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | VDOT STD. CG-12, TYPE A REQ'D. | HENRICO STD. CURB & GUTTER REQ'D. | |

BRT LANE USE:
BRT EXCLUSIVE LANE, MEDIAN LANE

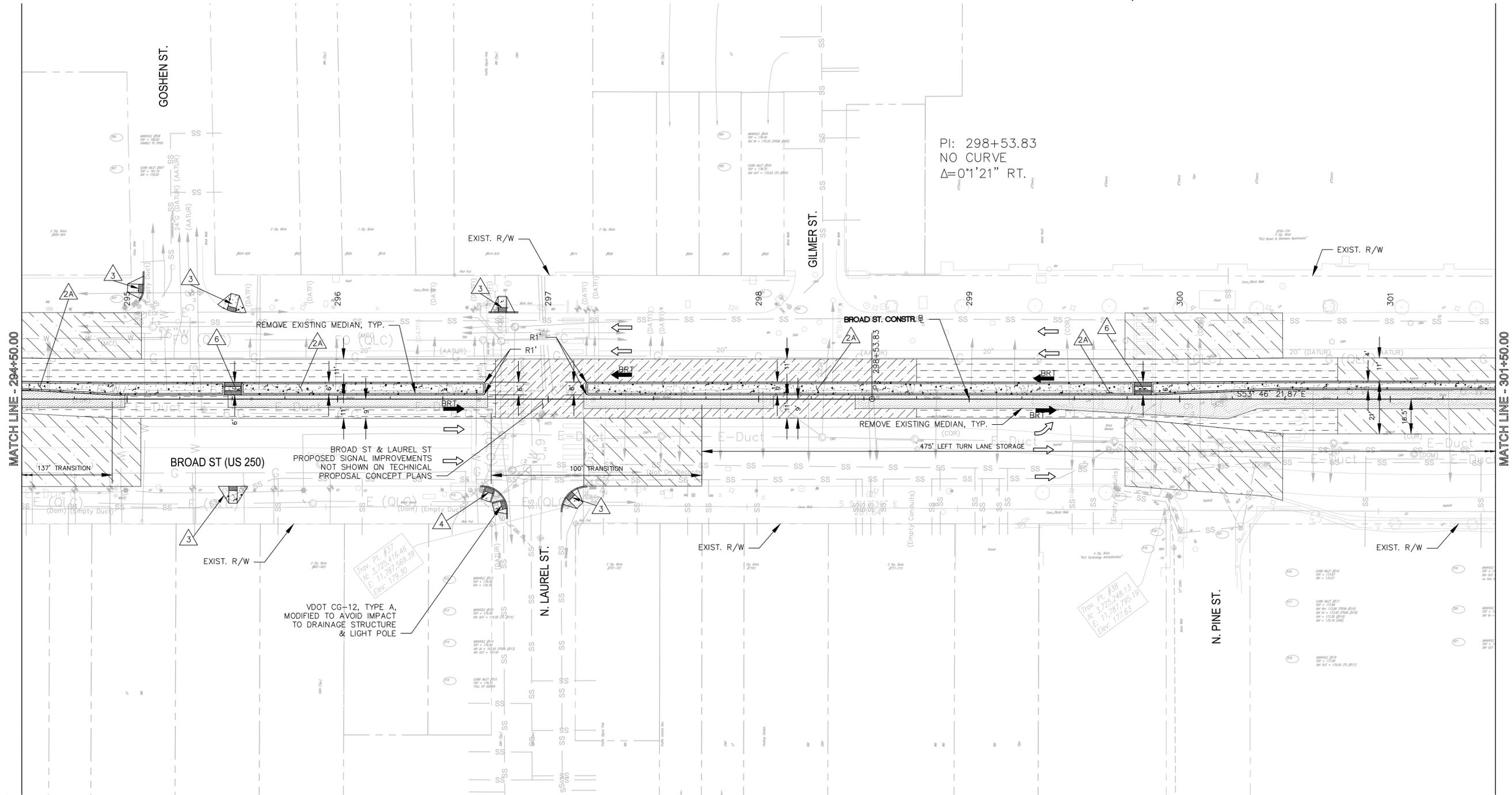


PROJECT	SHEET NO.
-	21

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.		-	22

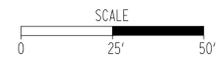
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

- | | | | | | | | |
|--|---|--|------------------------------------|--|---|--|--|
| | PROPOSED CONC. ITEMS | | PROPOSED REINFORCED CONC. PAVEMENT | | VDOT STD. CG-12, TYPE B REQ'D. | | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| | PROPOSED ASPHALT PAVE. | | STD. CITY OF RICHMOND CURB REQ'D. | | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | | VDOT STD. CG-12, TYPE M2 REQ'D. |
| | 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT STD. MS-1 REQ'D. | | VDOT STD. CG-12, TYPE A REQ'D. | | VDOT STD. MS-2 REQ'D. |
| | 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT MOD. MS-1 REQ'D. | | HENRICO STD. CURB & GUTTER REQ'D. | | |
| | 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | | VDOT STD. CG-12, TYPE A REQ'D. | | | | |

BRT LANE USE:
BRT EXCLUSIVE LANE, MEDIAN LANE

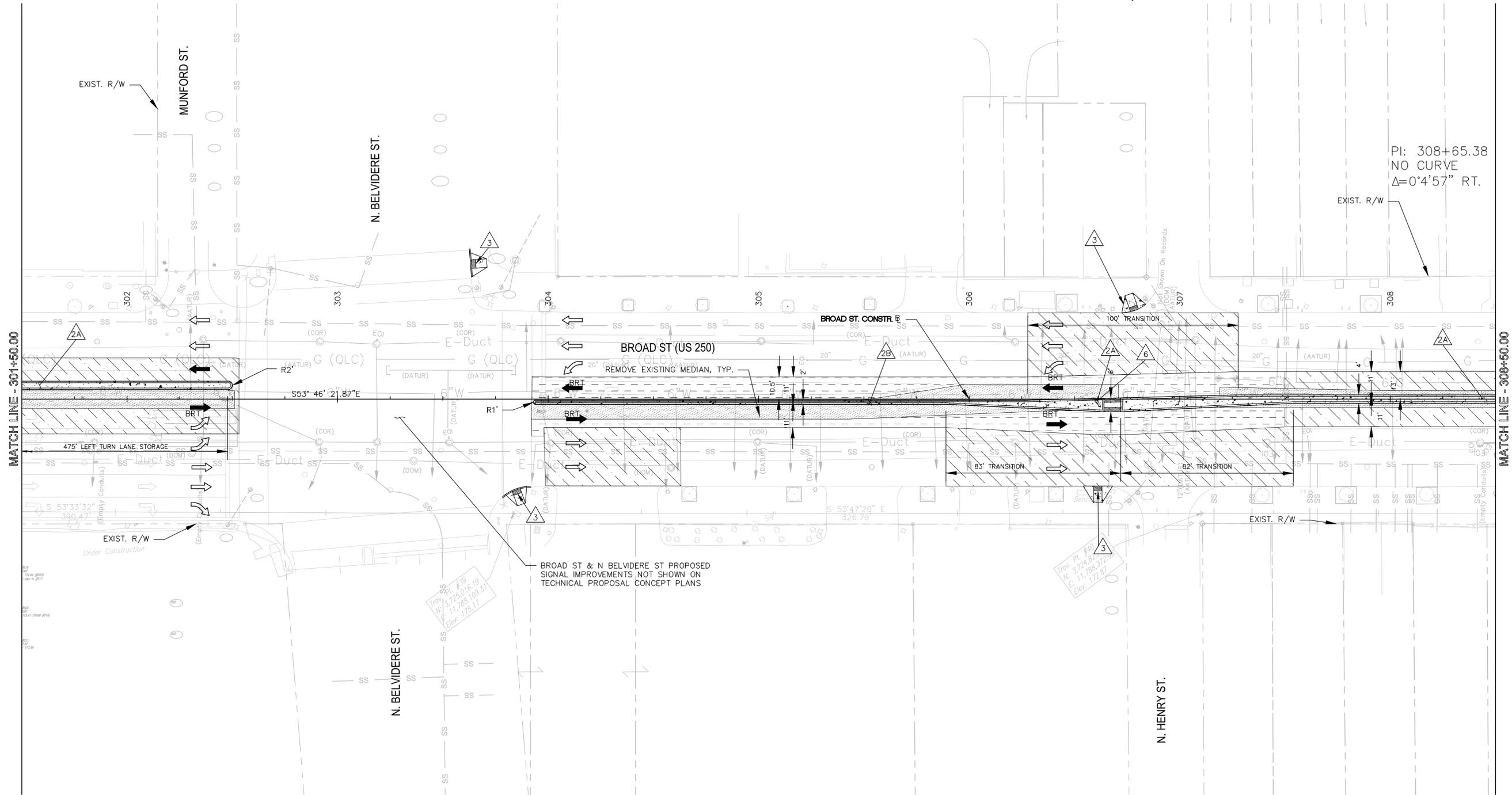


PROJECT	SHEET NO.
-	22

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.		-	23

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PI: 308+65.38
NO CURVE
 $\Delta=0^{\circ}4'57''$ RT.

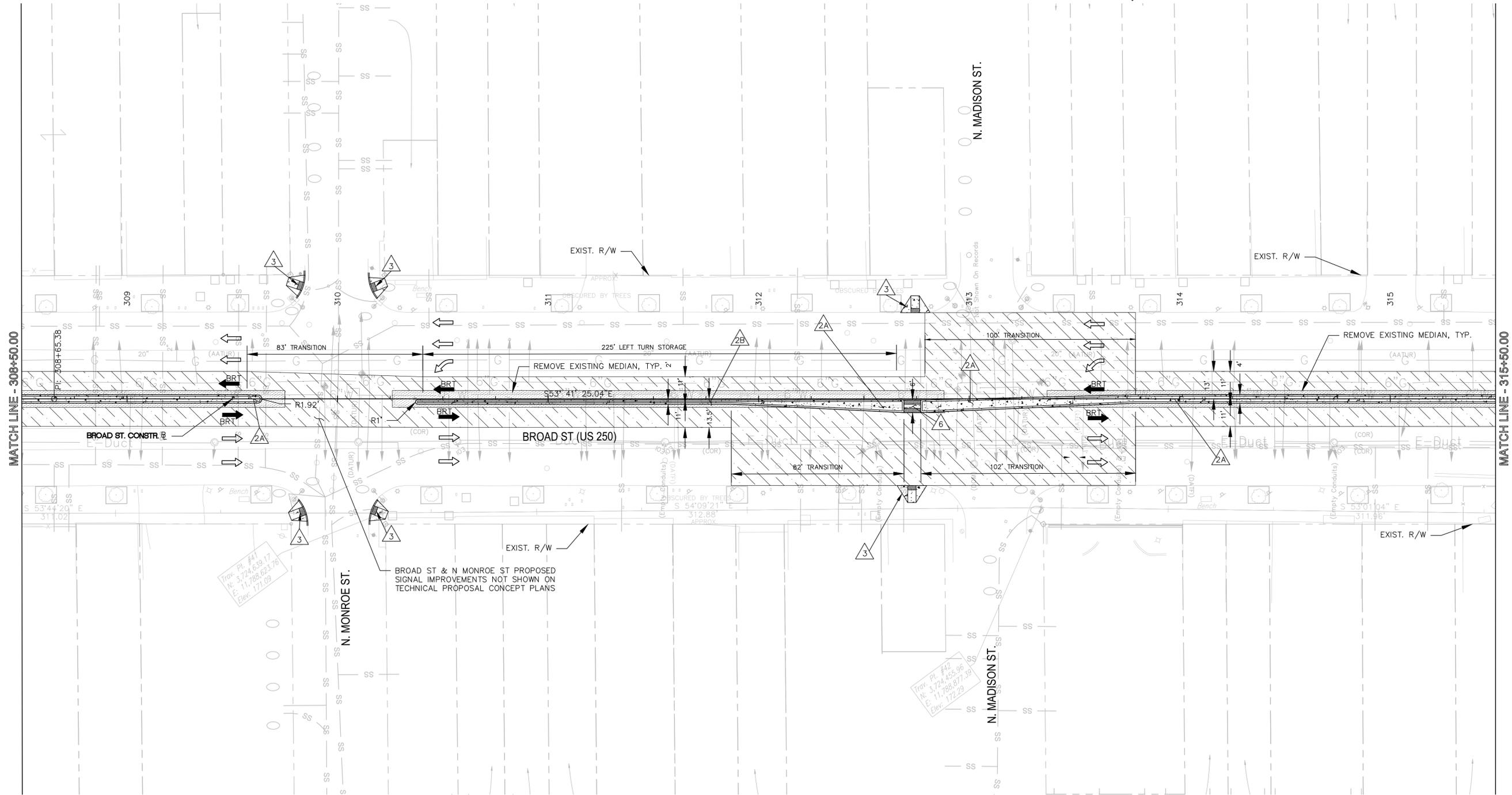
BROAD ST & N BELVIDERE ST PROPOSED SIGNAL IMPROVEMENTS NOT SHOWN ON TECHNICAL PROPOSAL CONCEPT PLANS

<p>LEGEND</p> <ul style="list-style-type: none"> PROPOSED CONC. ITEMS PROPOSED ASPHALT PAVE. 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY 		<ul style="list-style-type: none"> PROPOSED REINFORCED CONC. PAVEMENT STD. CITY OF RICHMOND CURB REQ'D. VDOT STD. MS-1 REQ'D. VDOT MOD. MS-1 REQ'D. VDOT STD. CG-12, TYPE A REQ'D. 		<ul style="list-style-type: none"> VDOT STD. CG-12, TYPE B REQ'D. REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE VDOT STD. CG-12, TYPE M2 REQ'D. VDOT STD. MS-2 REQ'D. HENRICO STD. CURB & GUTTER REQ'D. 		<ul style="list-style-type: none"> STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES 		<p>BRT LANE USE: BRT EXCLUSIVE LANE, MEDIAN LANE</p>
<p>SCALE: 0 25' 50'</p>			<p>PROJECT: -</p>		<p>SHEET NO.: 23</p>			

PROJECT MANAGER _____
SURVEYED BY _____
DESIGN SUPERVISED BY _____
DESIGNED BY _____

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	24

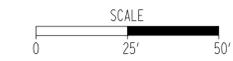
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

- | | | | |
|---|------------------------------------|---|--|
| PROPOSED CONC. ITEMS | PROPOSED REINFORCED CONC. PAVEMENT | VDOT STD. CG-12, TYPE B REQ'D. | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| PROPOSED ASPHALT PAVE. | STD. CITY OF RICHMOND CURB REQ'D. | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | |
| 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT STD. MS-1 REQ'D. | VDOT STD. CG-12, TYPE M2 REQ'D. | |
| 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT MOD. MS-1 REQ'D. | VDOT STD. MS-2 REQ'D. | |
| 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | VDOT STD. CG-12, TYPE A REQ'D. | HENRICO STD. CURB & GUTTER REQ'D. | |

BRT LANE USE:
BRT EXCLUSIVE LANE, MEDIAN LANE

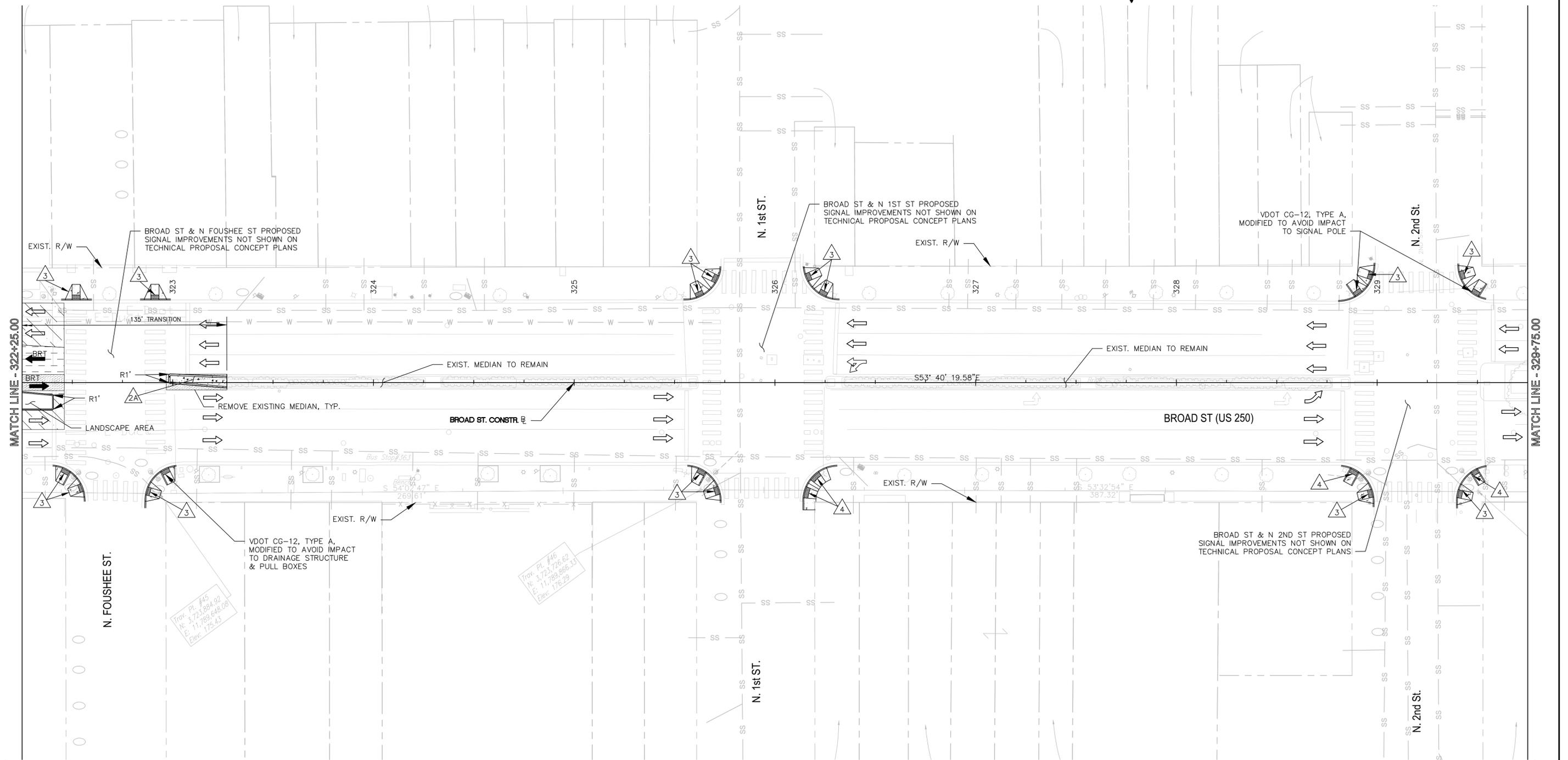


PROJECT	SHEET NO.
-	24

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.		-	26

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

- | | | | |
|---|------------------------------------|---|--|
| PROPOSED CONC. ITEMS | PROPOSED REINFORCED CONC. PAVEMENT | VDOT STD. CG-12, TYPE B REQ'D. | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| PROPOSED ASPHALT PAVE. | STD. CITY OF RICHMOND CURB REQ'D. | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | |
| 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT STD. MS-1 REQ'D. | VDOT STD. CG-12, TYPE M2 REQ'D. | |
| 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT MOD. MS-1 REQ'D. | VDOT STD. MS-2 REQ'D. | |
| 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | VDOT STD. CG-12, TYPE A REQ'D. | HENRICO STD. CURB & GUTTER REQ'D. | |

BRT LANE USE:
TRANSITION FROM BRT EXCLUSIVE LANE, MEDIAN LANE TO BRT MIXED TRAFFIC, CURB LANE



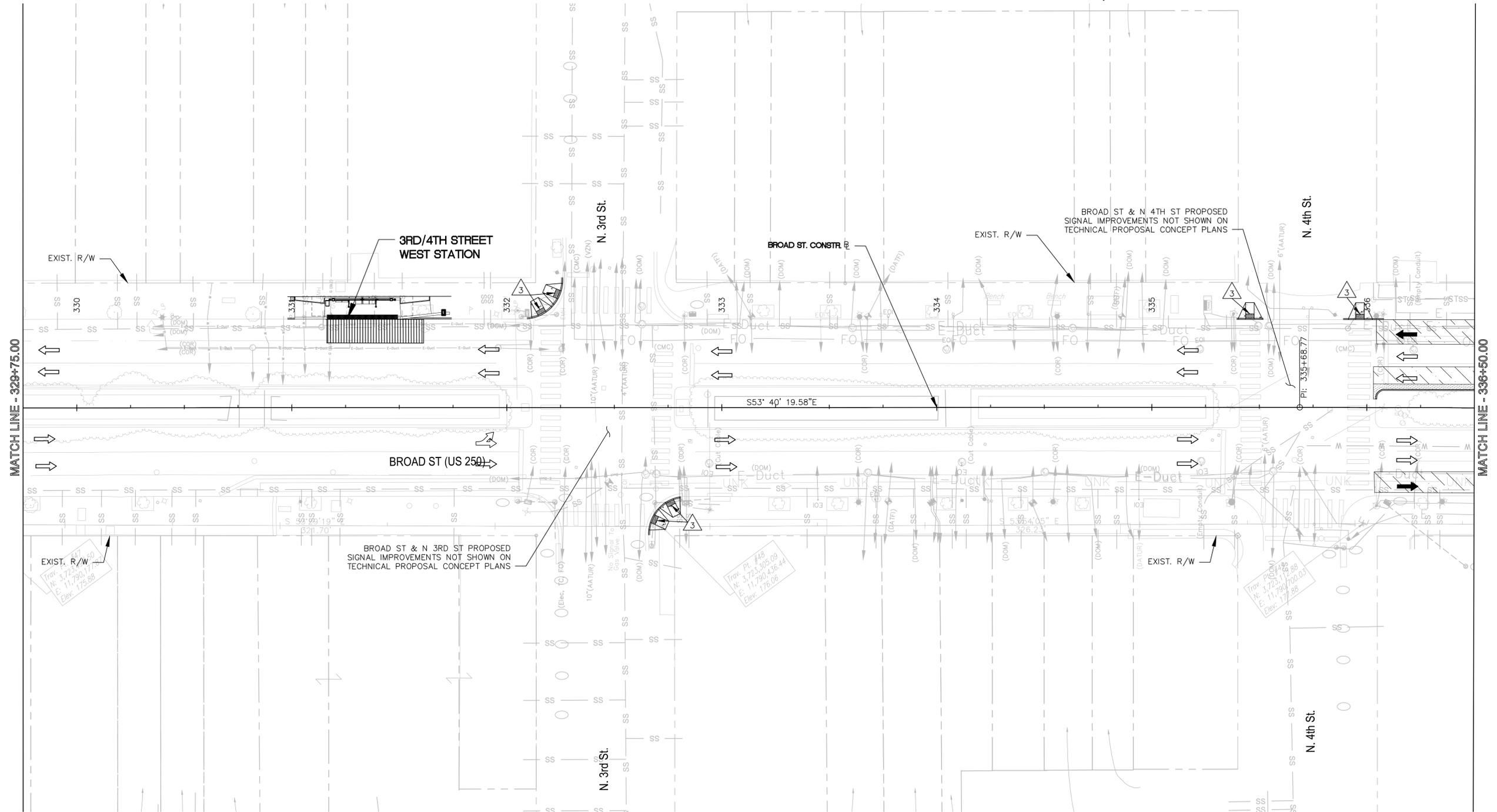
PROJECT	SHEET NO.
-	26

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

UTILITY RELOCATIONS:
THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE 3RD/4TH STREET WEST STATION:
STA. 330+95: RELOCATE FIRE HYDRANT AND ISOLATION VALVE
STA. 331+05: RELOCATE WATER METER
STA. 331+20: RELOCATE (IF ACTIVE) COR GAS SERVICE (BY OTHERS)
STA. 331+25: REMOVE/RELOCATE COR ORNAMENTAL STREETLIGHT

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	27

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



MATCH LINE - 329+75.00

MATCH LINE - 336+50.00

LEGEND

- | | | | | | | | |
|--|---|--|------------------------------------|--|---|--|--|
| | PROPOSED CONC. ITEMS | | PROPOSED REINFORCED CONC. PAVEMENT | | VDOT STD. CG-12, TYPE B REQ'D. | | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| | PROPOSED ASPHALT PAVE. | | STD. CITY OF RICHMOND CURB REQ'D. | | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | | VDOT STD. CG-12, TYPE M2 REQ'D. |
| | 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT STD. MS-1 REQ'D. | | VDOT STD. CG-12, TYPE M2 REQ'D. | | VDOT STD. MS-2 REQ'D. |
| | 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT MOD. MS-1 REQ'D. | | VDOT STD. MS-2 REQ'D. | | HENRICO STD. CURB & GUTTER REQ'D. |
| | 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | | VDOT STD. CG-12, TYPE A REQ'D. | | | | |

BRT LANE USE:
TRANSITION FROM BRT EXCLUSIVE LANE, CURB LANE TO BRT MIXED TRAFFIC, CURB LANE



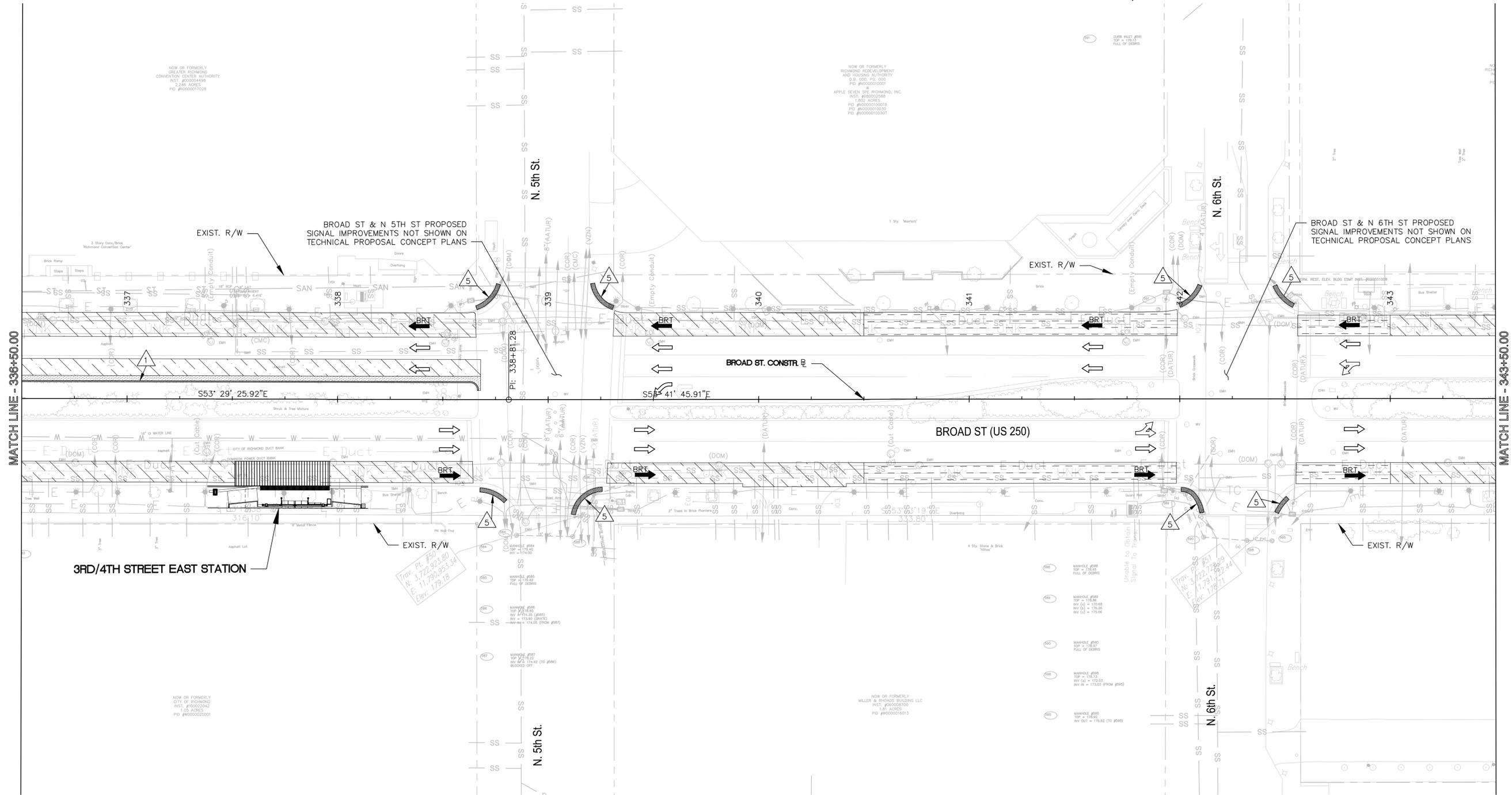
PROJECT	SHEET NO.
-	27

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

UTILITY RELOCATIONS:
THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE 3RD/4TH STREET EAST STATION:
STA. 336+95-338+37: ABANDON/RELOCATE COR ELECTRICAL DUCT TO STREETLIGHTS
STA. 337+20: RELOCATE 6" WATER MAIN & FIRE HYDRANT
STA. 337+37: REMOVE/RELOCATE COR ORNAMENTAL STREETLIGHT
STA. 337+75: REMOVE/RELOCATE COR COBRA HEAD STREETLIGHT
STA. 337+95: REMOVE/RELOCATE COR ORNAMENTAL STREETLIGHT

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	28

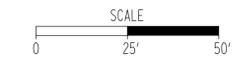
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

- | | | | | | | | |
|--|---|--|------------------------------------|--|---|--|--|
| | PROPOSED CONC. ITEMS | | PROPOSED REINFORCED CONC. PAVEMENT | | VDOT STD. CG-12, TYPE B REQ'D. | | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| | PROPOSED ASPHALT PAVE. | | STD. CITY OF RICHMOND CURB REQ'D. | | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | | VDOT STD. CG-12, TYPE M2 REQ'D. |
| | 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT STD. MS-1 REQ'D. | | VDOT STD. CG-12, TYPE M2 REQ'D. | | VDOT STD. MS-2 REQ'D. |
| | 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT MOD. MS-1 REQ'D. | | VDOT STD. MS-2 REQ'D. | | HENRICO STD. CURB & GUTTER REQ'D. |
| | 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | | VDOT STD. CG-12, TYPE A REQ'D. | | | | |

BRT LANE USE:
BRT EXCLUSIVE LANE, CURB LANE

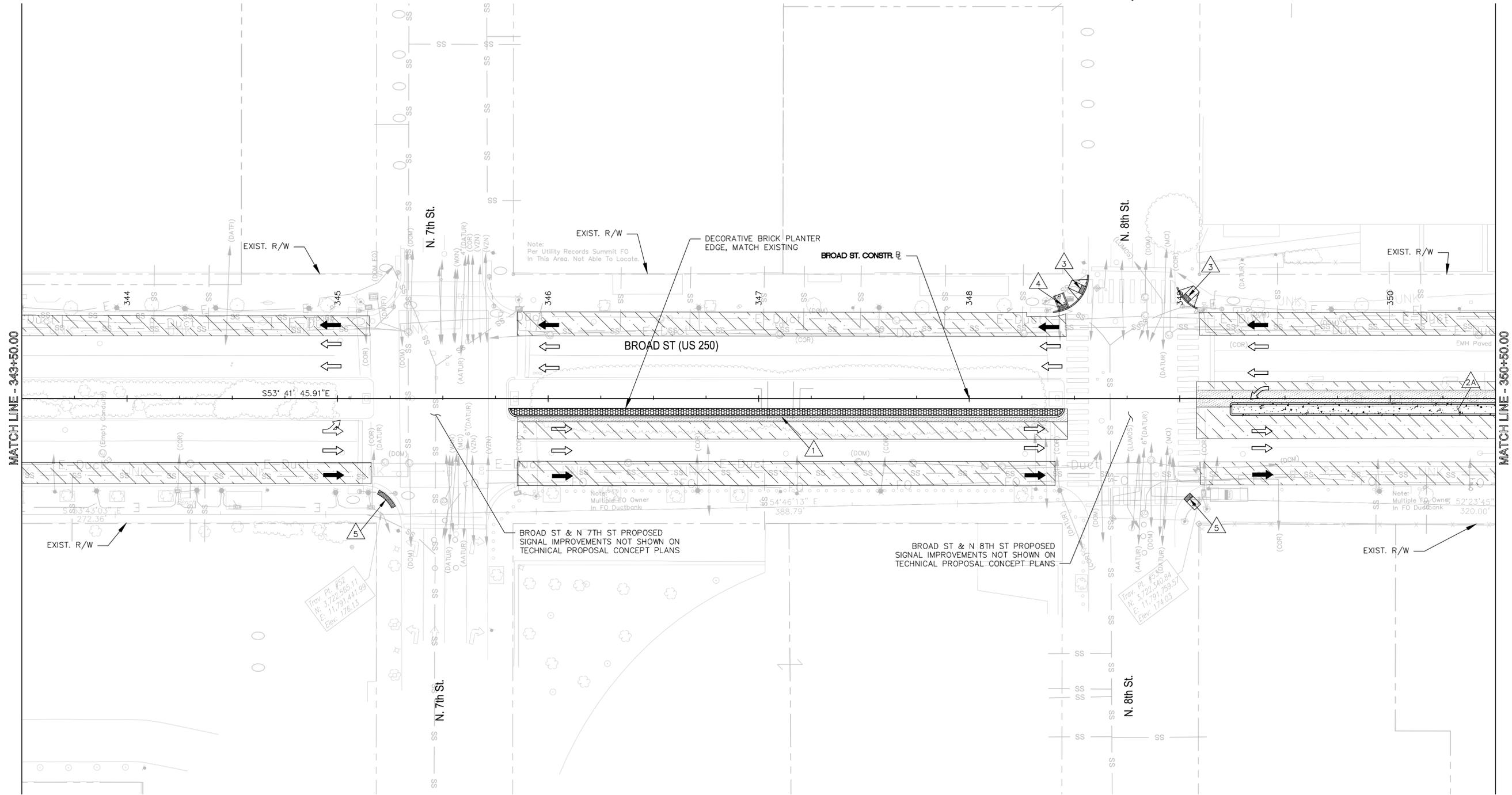


PROJECT	SHEET NO.
-	28

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	29

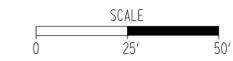
DESIGN FEATURES RELATING TO CONSTRUCTION
OR TO REGULATION AND CONTROL OF TRAFFIC
MAY BE SUBJECT TO CHANGE AS DEEMED
NECESSARY BY THE DEPARTMENT



LEGEND

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|--|---|--|------------------------------------|--|---|--|--|
| | PROPOSED CONC. ITEMS | | PROPOSED REINFORCED CONC. PAVEMENT | | VDOT STD. CG-12, TYPE B REQ'D. | | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| | PROPOSED ASPHALT PAVE. | | STD. CITY OF RICHMOND CURB REQ'D. | | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | | VDOT STD. CG-12, TYPE M2 REQ'D. |
| | 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT STD. MS-1 REQ'D. | | VDOT STD. CG-12, TYPE M2 REQ'D. | | VDOT STD. MS-2 REQ'D. |
| | 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT MOD. MS-1 REQ'D. | | VDOT STD. MS-2 REQ'D. | | HENRICO STD. CURB & GUTTER REQ'D. |
| | 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | | VDOT STD. CG-12, TYPE A REQ'D. | | | | |

BRT LANE USE:
BRT EXCLUSIVE LANE, CURB LANE



PROJECT	SHEET NO.
-	29

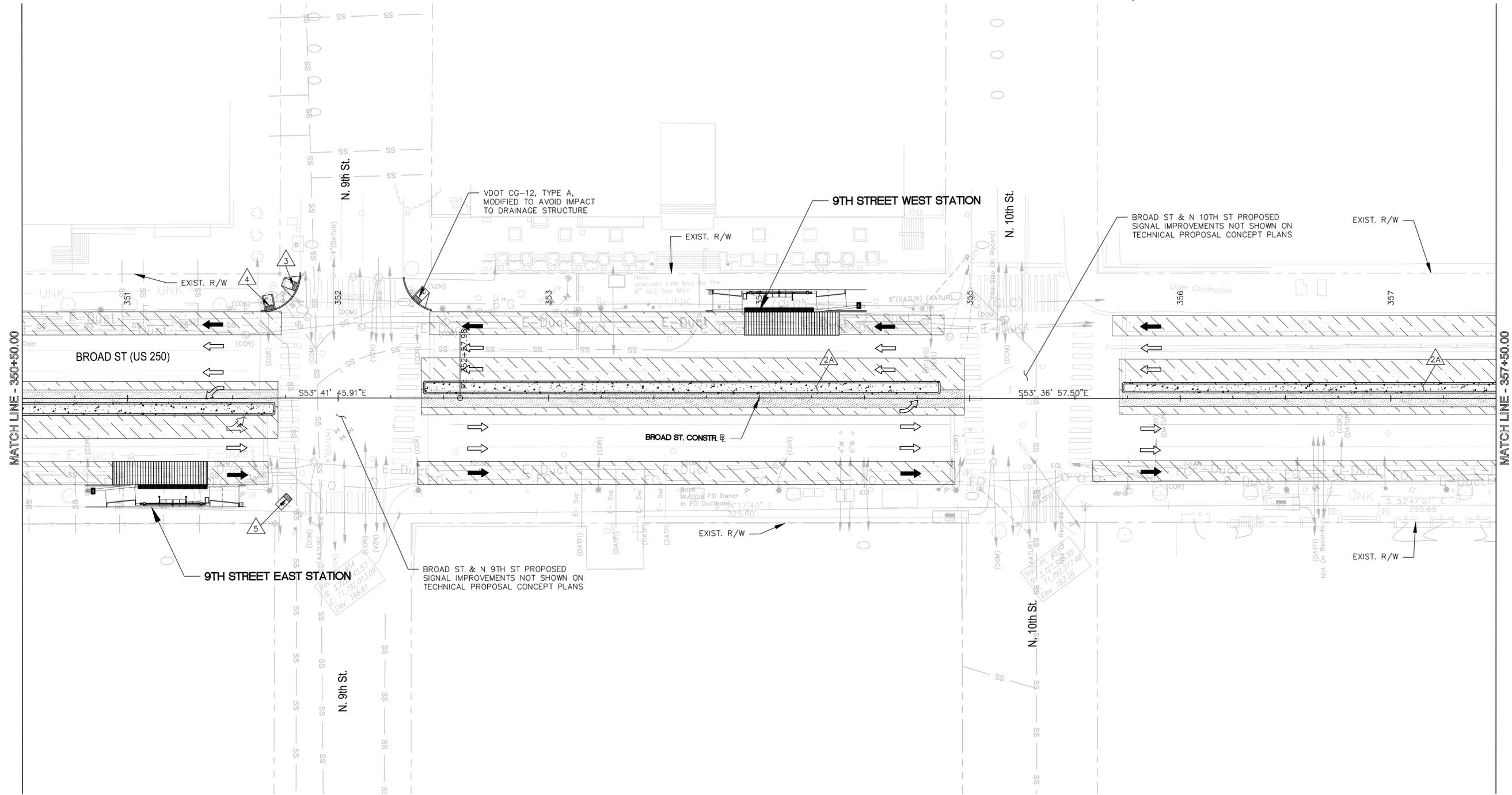
PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

UTILITY RELOCATIONS:
THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE 9TH STREET EAST STATION:
STA. 350+50-352+00: RELOCATE/EXPOSE & ADJUST AT&T FO DUCT BANK
STA. 350+80: REMOVE/RELOCATE COR STREETLIGHT & FEED FROM ACROSS BROAD STREET
STA. 351+35: SS LATERAL TO REMAIN. MINIMIZE LOADING AND IMPACTS.

THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE 9TH STREET WEST STATION:
STA. 353+50-355+00: REMOVE COR GAS
STA. 353+65-354+65: RELOCATE STREETLIGHT FEED
STA. 354+10: REMOVE/RELOCATE COR STREETLIGHT

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.		-	30

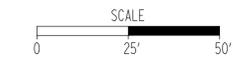
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

- | | | | |
|---|------------------------------------|---|--|
| PROPOSED CONC. ITEMS | PROPOSED REINFORCED CONC. PAVEMENT | VDOT STD. CG-12, TYPE B REQ'D. | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| PROPOSED ASPHALT PAVE. | STD. CITY OF RICHMOND CURB REQ'D. | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | |
| 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT STD. MS-1 REQ'D. | VDOT STD. CG-12, TYPE M2 REQ'D. | |
| 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT MOD. MS-1 REQ'D. | VDOT STD. MS-2 REQ'D. | |
| 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | VDOT STD. CG-12, TYPE A REQ'D. | HENRICO STD. CURB & GUTTER REQ'D. | |

BRT LANE USE:
BRT EXCLUSIVE LANE, CURB LANE



PROJECT	SHEET NO.
-	30

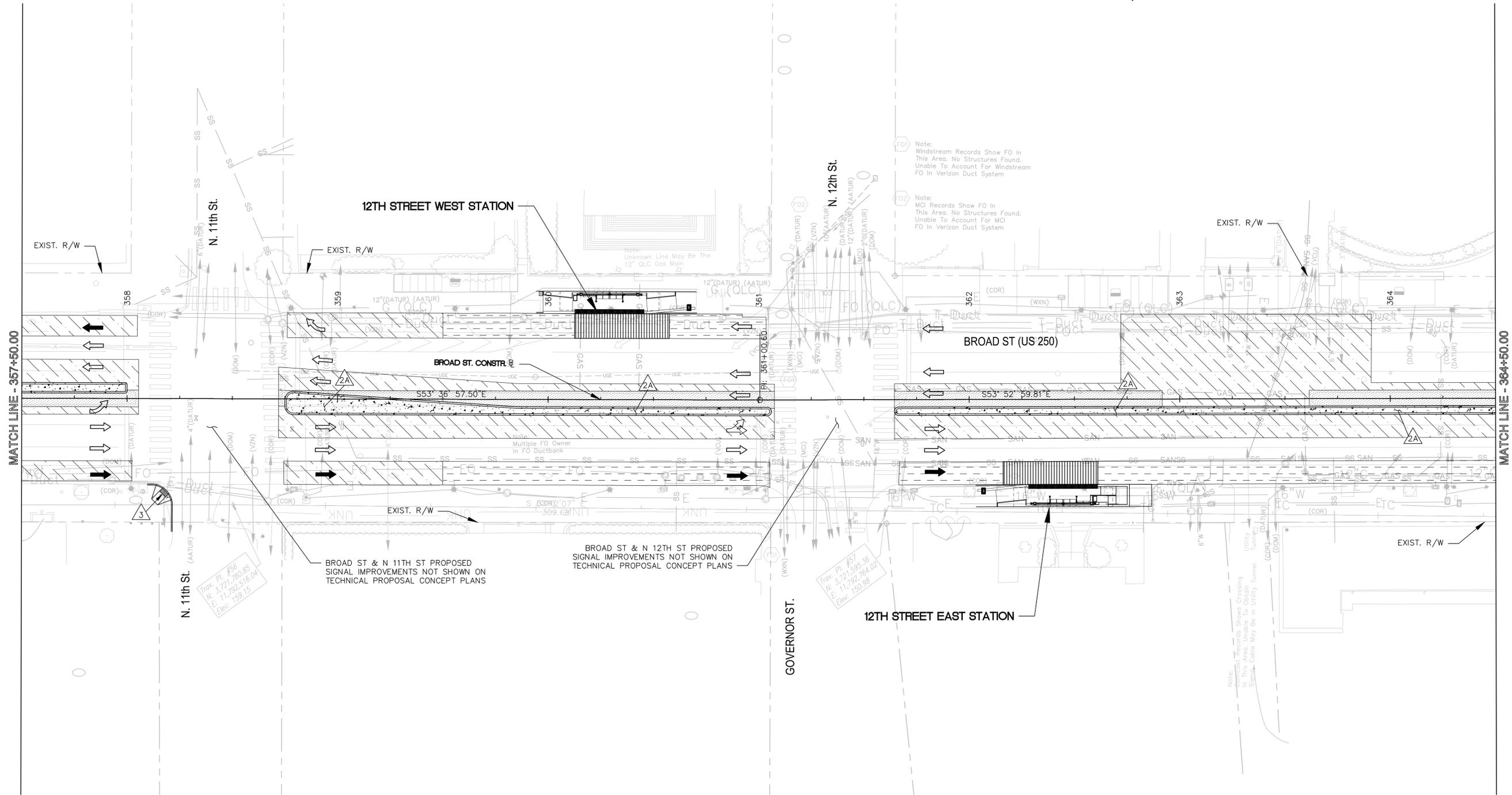
PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

UTILITY RELOCATIONS:
THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE 12TH STREET WEST STATION:
STA. 359+75-361+25: RIP/RELOCATE COR GAS (BY OTHERS)
STA. 359+90-360+80: RELOCATE COR ELECTRICAL DUCT
STA. 360+15: RELOCATE COR GAS SERVICE (BY OTHERS)
STA. 360+30: REMOVE/RELOCATE COR STREETLIGHT
STA. 360+65: RELOCATE COR GAS SERVICE (BY OTHERS)

THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE 12TH STREET EAST STATION:
STA. 361+55-364+00: ABANDON 16" CI WATER MAIN. INSTALL 16" DIC WATER MAIN. TIE-OVER 6" CI WATER SERVICE.
STA. 361+75-363+15: RIP/RELOCATE COR ELECTRICAL DUCT (FRONT)
STA. 361+75-363+15: RIP/RELOCATE COR ELECTRICAL DUCT (BACK)
STA. 362+55: REMOVE/RELOCATE COR STREETLIGHT

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	31

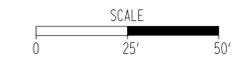
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

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|--|---|--|------------------------------------|--|---|--|--|
| | PROPOSED CONC. ITEMS | | PROPOSED REINFORCED CONC. PAVEMENT | | VDOT STD. CG-12, TYPE B REQ'D. | | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| | PROPOSED ASPHALT PAVE. | | STD. CITY OF RICHMOND CURB REQ'D. | | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | | VDOT STD. CG-12, TYPE M2 REQ'D. |
| | 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT STD. MS-1 REQ'D. | | VDOT STD. CG-12, TYPE M2 REQ'D. | | VDOT STD. MS-2 REQ'D. |
| | 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT MOD. MS-1 REQ'D. | | VDOT STD. MS-2 REQ'D. | | HENRICO STD. CURB & GUTTER REQ'D. |
| | 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | | VDOT STD. CG-12, TYPE A REQ'D. | | | | |

BRT LANE USE:
BRT EXCLUSIVE LANE, CURB LANE

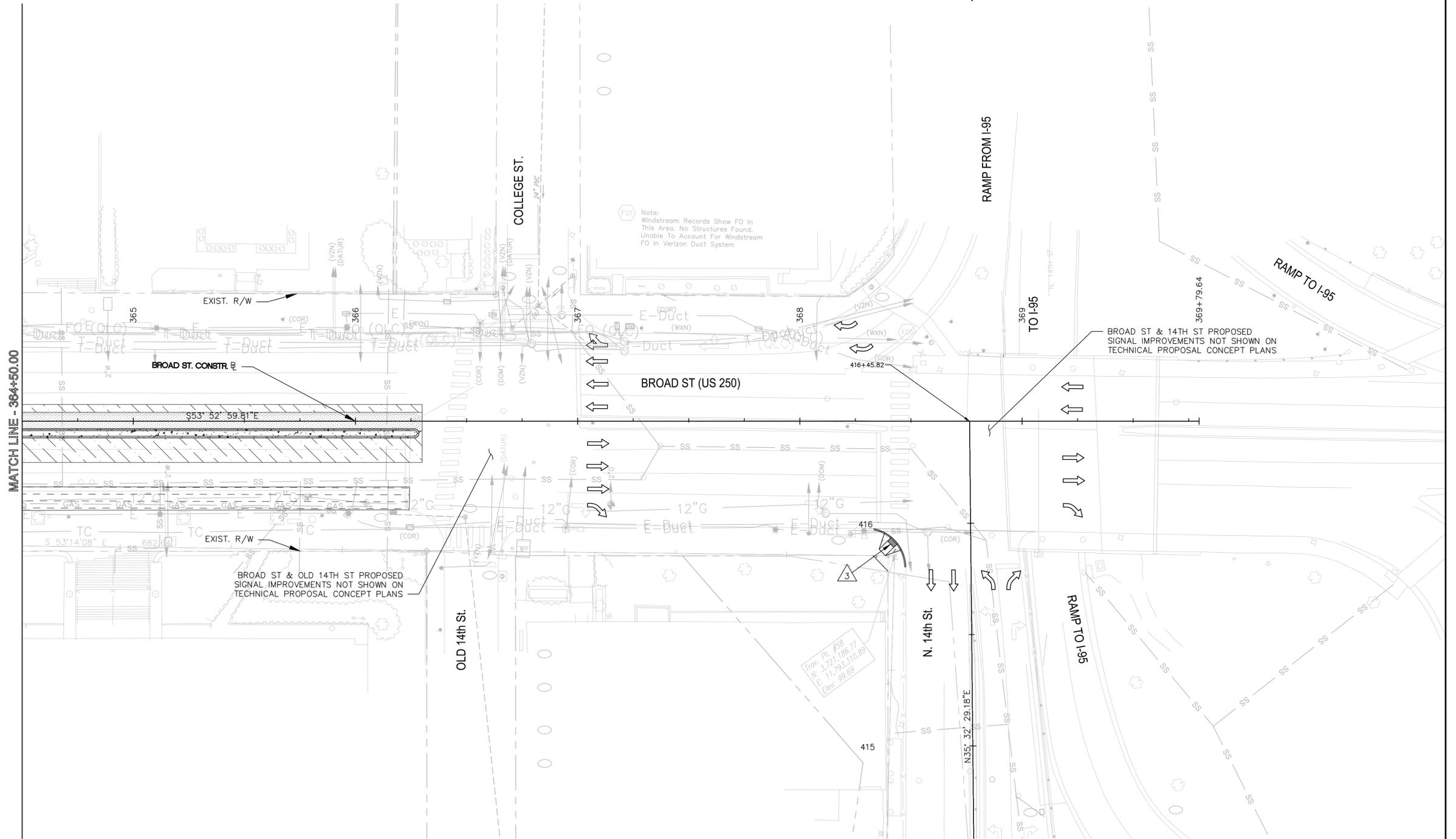


PROJECT	SHEET NO.
-	31

PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

REVISED	STATE		STATE	PROJECT	SHEET NO.
	VA.				
					32

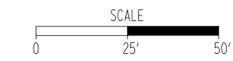
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

- | | | | | | | | |
|--|---|--|------------------------------------|--|---|--|--|
| | PROPOSED CONC. ITEMS | | PROPOSED REINFORCED CONC. PAVEMENT | | VDOT STD. CG-12, TYPE B REQ'D. | | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| | PROPOSED ASPHALT PAVE. | | STD. CITY OF RICHMOND CURB REQ'D. | | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | | VDOT STD. CG-12, TYPE M2 REQ'D. |
| | 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT STD. MS-1 REQ'D. | | VDOT STD. CG-12, TYPE M2 REQ'D. | | VDOT STD. MS-2 REQ'D. |
| | 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | | VDOT MOD. MS-1 REQ'D. | | VDOT STD. MS-2 REQ'D. | | HENRICO STD. CURB & GUTTER REQ'D. |
| | 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | | VDOT STD. CG-12, TYPE A REQ'D. | | | | |

BRT LANE USE:
TRANSITION FROM BRT EXCLUSIVE LANE, CURB LANE TO BRT MIXED TRAFFIC, CURB LANE



PROJECT	SHEET NO.
-	32

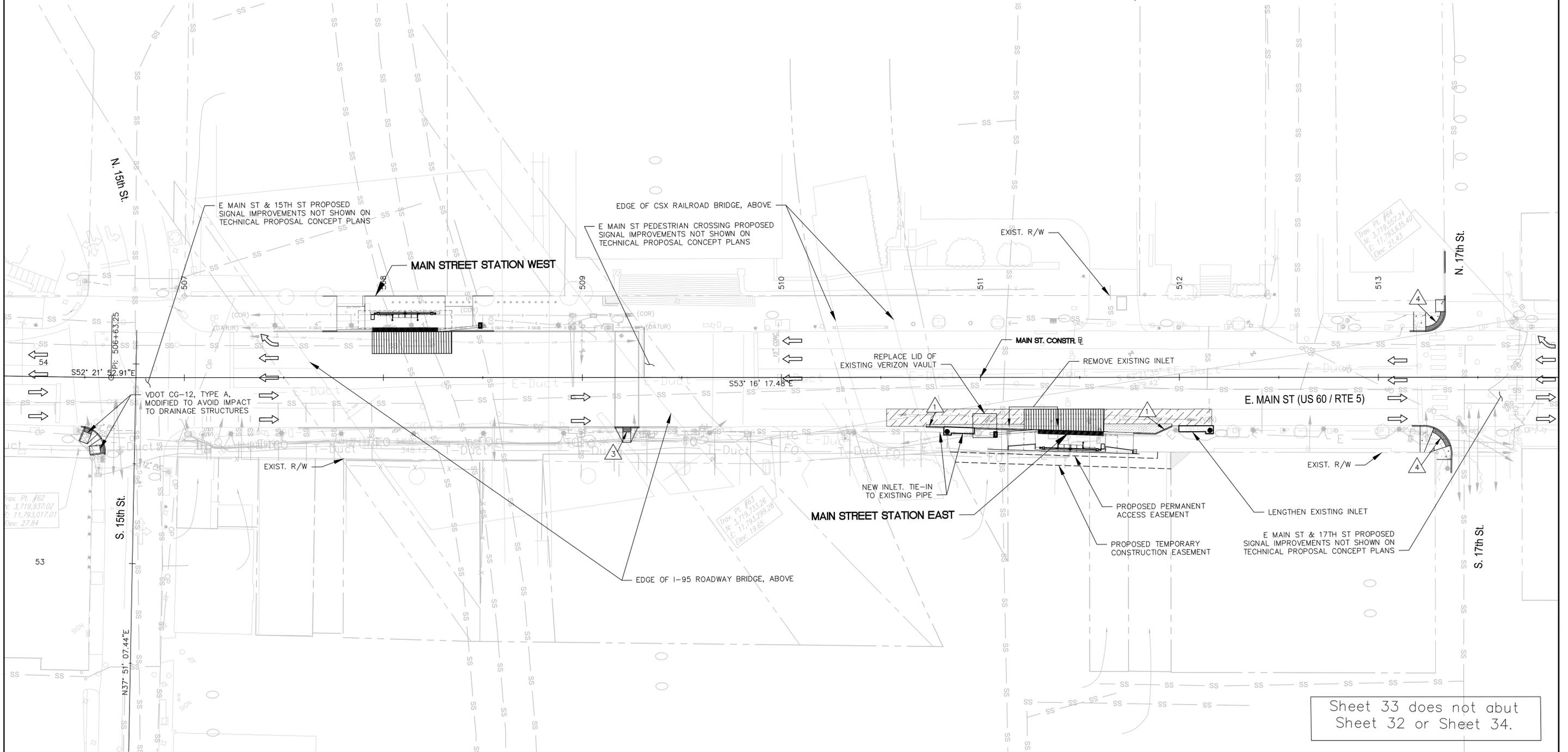
PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

UTILITY RELOCATIONS:
THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE MAIN STREET WEST STATION:
STA. 507+00-508+50: RELOCATE/ABANDON COR ELECTRICAL DUCT
STA. 507+35: REMOVE/RELOCATE DOMINION POLE QJ29
STA. 507+45: REMOVE/RELOCATE COR STREETLIGHT
STA. 507+85: REMOVE/RELOCATE COR STREETLIGHT
STA. 508+15: REMOVE/RELOCATE COR STREETLIGHT

THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE MAIN STREET EAST STATION:
STA. 510+40-513+00: REMOVE/CONVERT DOMINION OVERHEAD ELECTRIC LINE
STA. 510+50-511+50: REMOVE/RELOCATE VERIZON FO DUCT BANK
STA. 510+50-512+00: RELOCATE COR ELECTRICAL DUCT
STA. 511+00: RIP/RELOCATE VERIZON MANHOLE
STA. 511+15: REMOVE/RELOCATE COR COLONIAL STREETLIGHT
STA. 511+40: REMOVE/RELOCATE DOMINION POLE, STREETLIGHT AND OVERHEAD LINES
STA. 511+55: REMOVE/RELOCATE COR COLONIAL STREETLIGHT

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.				33

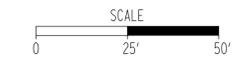
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



LEGEND

	PROPOSED CONC. ITEMS		PROPOSED REINFORCED CONC. PAVEMENT		VDOT STD. CG-12, TYPE B REQ'D.		STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES
	PROPOSED ASPHALT PAVE.		STD. CITY OF RICHMOND CURB REQ'D.		REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE		VDOT STD. CG-12, TYPE M2 REQ'D.
	2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE.		VDOT STD. MS-1 REQ'D.		VDOT STD. CG-12, TYPE M2 REQ'D.		VDOT STD. MS-2 REQ'D.
	4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE.		VDOT MOD. MS-1 REQ'D.		VDOT STD. MS-2 REQ'D.		HENRICO STD. CURB & GUTTER REQ'D.
	3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY		VDOT STD. CG-12, TYPE A REQ'D.				

Sheet 33 does not abut Sheet 32 or Sheet 34.



PROJECT	SHEET NO.
-	33

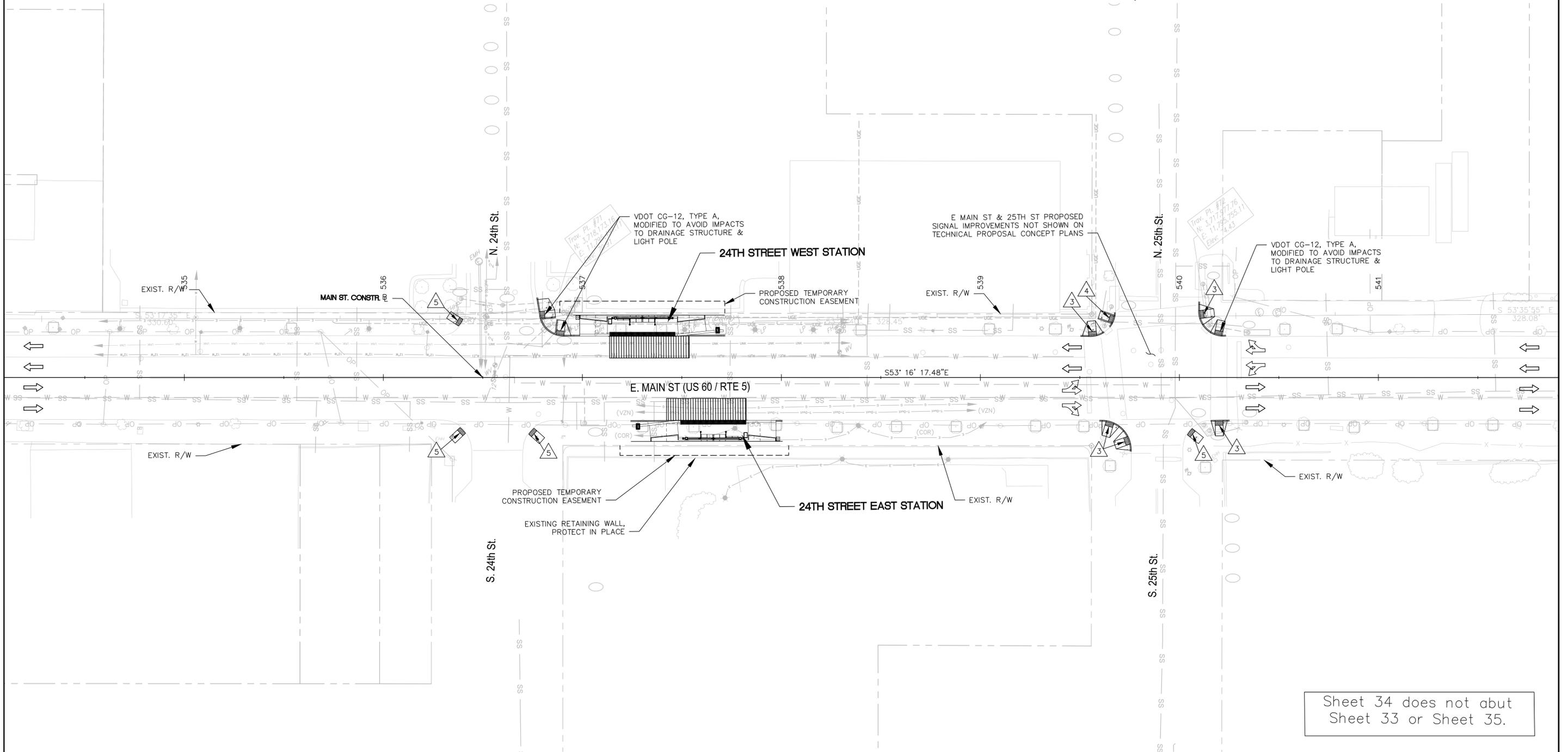
PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

UTILITY RELOCATIONS:
THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE 24TH STREET WEST STATION:
STA. 536+75-538+00: RIP/RELOCATE DOMINION UNDERGROUND ELECTRIC LINE
STA. 536+90-538+15: RELOCATE COR UNDERGROUND ELECTRIC LINE
STA. 536+90: REMOVE/RELOCATE COR ORNAMENTAL STREETLIGHT
STA. 537+10: ADJUST DOMINION MANHOLE/LID
STA. 537+50: REMOVE COR ORNAMENTAL STREETLIGHT
STA. 537+87: RIP/REMOVE/RELOCATE COR COBRA HEAD STREETLIGHT

THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE MAIN STREET EAST STATION:
STA. 536+90-538+40: RELOCATE COR ELECTRIC LINE
STA. 536+90-539+00: RIP/RELOCATE/CONVERT COR OVERHEAD ELECTRIC LINE
STA. 537+20: REMOVE/RELOCATE COR ORNAMENTAL STREETLIGHT
STA. 537+75: REMOVE/RELOCATE COR ORNAMENTAL STREETLIGHT

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	34

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



Sheet 34 does not abut Sheet 33 or Sheet 35.

LEGEND

- PROPOSED CONC. ITEMS

PROPOSED ASPHALT PAVE.

2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE.

4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE.

3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY
- PROPOSED REINFORCED CONC. PAVEMENT

1 STD. CITY OF RICHMOND CURB REQ'D.

2A VDOT STD. MS-1 REQ'D.

2B VDOT MOD. MS-1 REQ'D.

3 VDOT STD. CG-12, TYPE A REQ'D.
- 4 VDOT STD. CG-12, TYPE B REQ'D.

5 REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE

6 VDOT STD. CG-12, TYPE M2 REQ'D.

7 VDOT STD. MS-2 REQ'D.

8 HENRICO STD. CURB & GUTTER REQ'D.
- 9 STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES

BRT LANE USE:
BRT MIXED TRAFFIC, CURB LANE



PROJECT	SHEET NO.
-	34

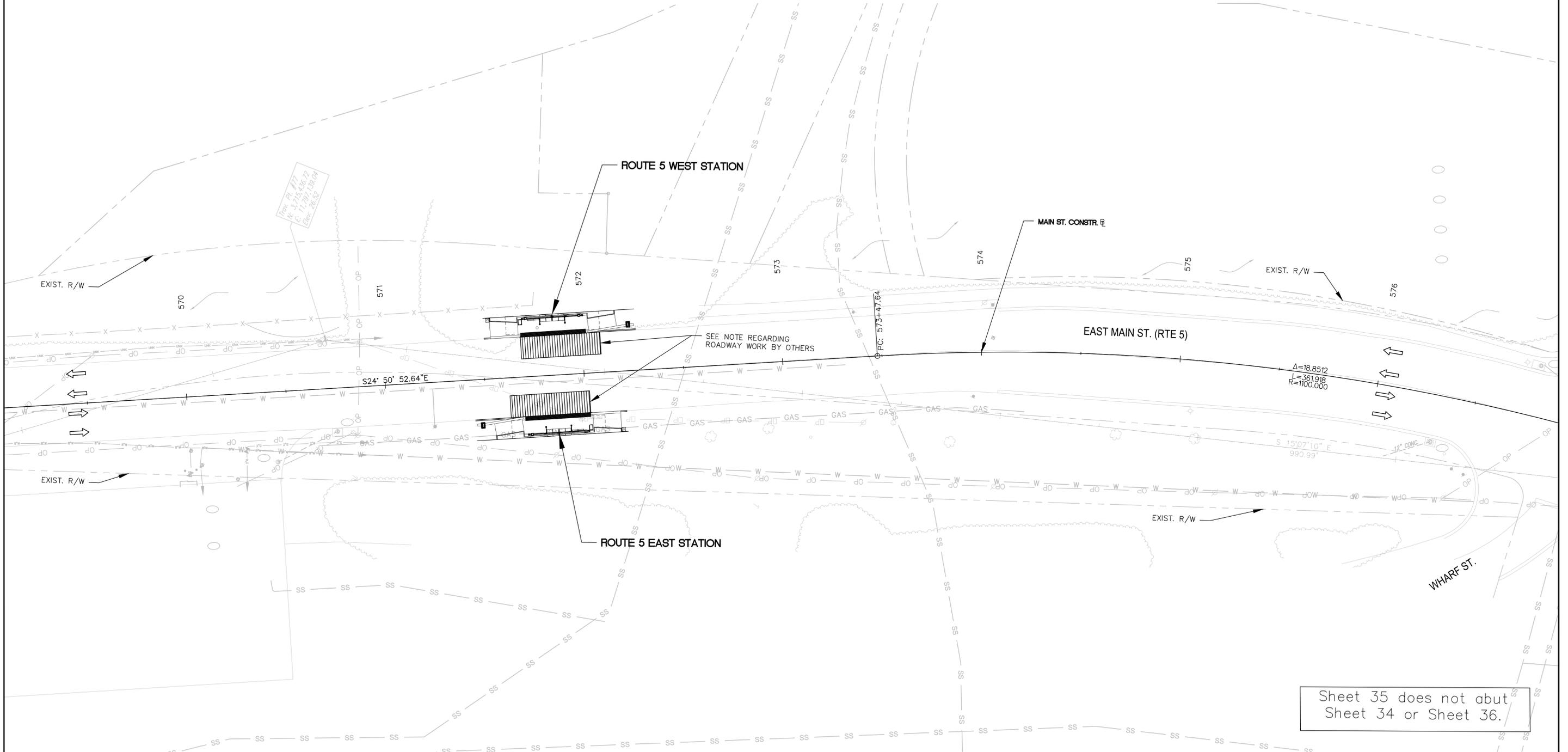
PROJECT MANAGER
SURVEYED BY
DESIGN SUPERVISED BY
DESIGNED BY

UTILITY RELOCATIONS:
THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE ROUTE 5 EAST STATION:
STA. 571+25-572+25: RELOCATE 2" PE GAS MAIN (BY OTHERS)
STA. 572+00: RELOCATE DVP LIGHT POLE

NO UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE ROUTE 5 WEST STATION.

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	35

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



Sheet 35 does not abut Sheet 34 or Sheet 36.

LEGEND

- | | | | |
|---|------------------------------------|---|--|
| PROPOSED CONC. ITEMS | PROPOSED REINFORCED CONC. PAVEMENT | VDOT STD. CG-12, TYPE B REQ'D. | STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES |
| PROPOSED ASPHALT PAVE. | STD. CITY OF RICHMOND CURB REQ'D. | REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE | |
| 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT STD. MS-1 REQ'D. | VDOT STD. CG-12, TYPE M2 REQ'D. | |
| 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE. | VDOT MOD. MS-1 REQ'D. | VDOT STD. MS-2 REQ'D. | |
| 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY | VDOT STD. CG-12, TYPE A REQ'D. | HENRICO STD. CURB & GUTTER REQ'D. | |

NOTE:
APPROXIMATE LOCATION OF ROUTE 5 STATION SHOWN IN TECHNICAL PROPOSAL CONCEPT PLANS. PER RFP SECTION 2.3.7, THE LOCATION OF THE ROUTE 5 STATION IS TO BE COORDINATED WITH EAST RIVERFRONT TRANSPORTATION IMPROVEMENT PROJECT. ROADWAY WORK, INCLUDING CONCRETE BUS PAD, BY OTHERS.

BRT LANE USE:
BRT MIXED TRAFFIC, CURB LANE



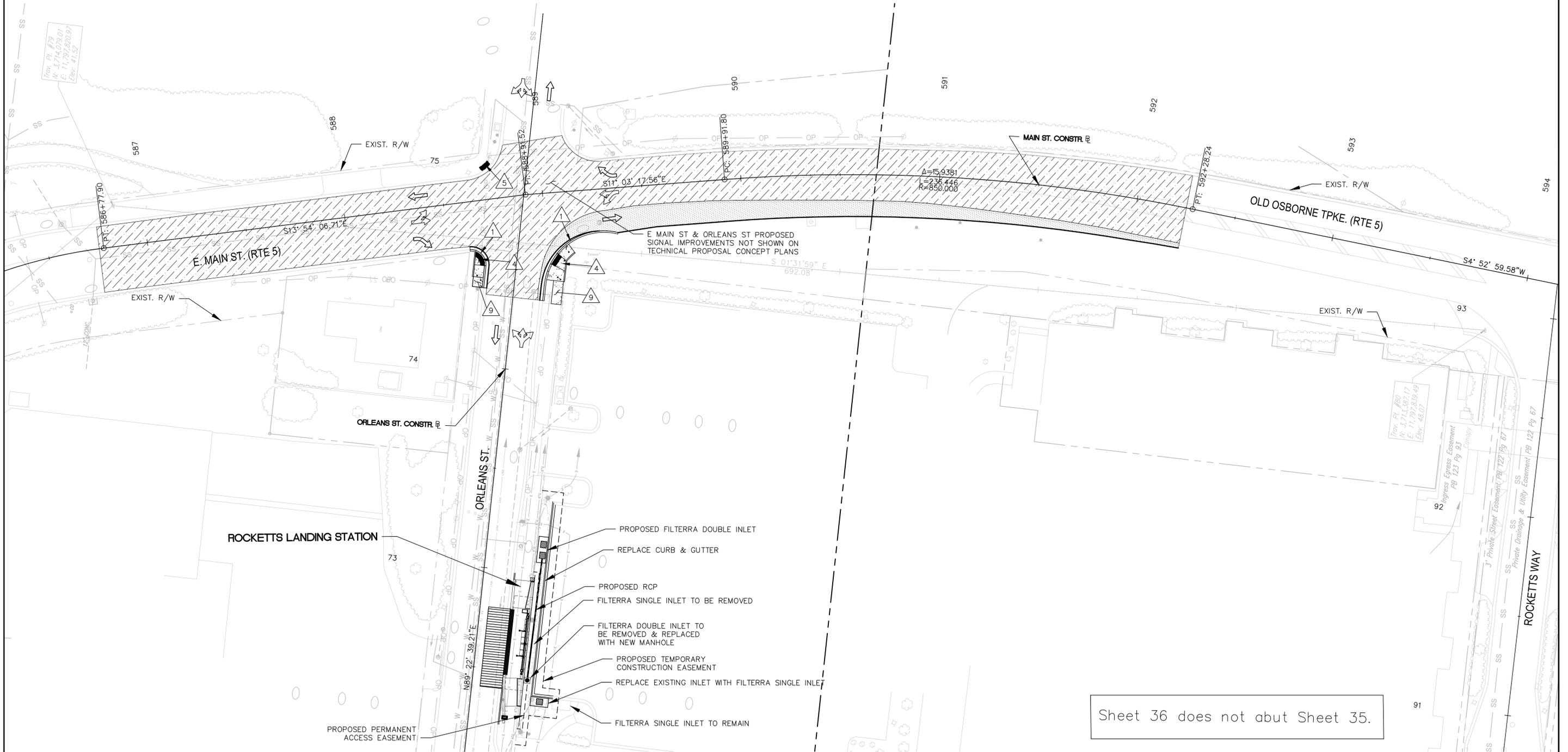
PROJECT	SHEET NO.
-	35

PROJECT MANAGER _____
SURVEYED BY _____
DESIGN SUPERVISED BY _____
DESIGNED BY _____

UTILITY RELOCATIONS:
THE FOLLOWING UTILITY RELOCATIONS ARE ANTICIPATED IN ASSOCIATION WITH THE CONSTRUCTION OF THE ROCKETTS LANDING STATION:
STA. 72+00-73+25: RIP/RELOCATE DOMINION UNDERGROUND ELECTRIC LINE
STA. 72+00-73+25: RELOCATE/ABANDON KINDER MORGAN GAS LINE (BY OTHERS)
STA. 72+20-73+35: RELOCATE/ABANDON COR UNDERGROUND STREETLIGHT FEED
STA. 72+20: REMOVE/RELOCATE PRIVATE STREETLIGHT
STA. 72+25: REMOVE/RELOCATE PRIVATE STREETLIGHT

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.				36

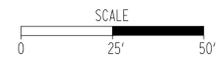
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



Sheet 36 does not abut Sheet 35.

- LEGEND**
- PROPOSED CONC. ITEMS
 - PROPOSED ASPHALT PAVE.
 - 2" MILL & OVERLAY/BUILD-UP ASPHALT PAVE.
 - 4" MILL & OVERLAY/BUILD-UP ASPHALT PAVE.
 - 3/4" MILL & THIN HOT-MIX ASPHALT CONCRETE OVERLAY
 - PROPOSED REINFORCED CONC. PAVEMENT
 - STD. CITY OF RICHMOND CURB REQ'D.
 - VDOT STD. MS-1 REQ'D.
 - VDOT MOD. MS-1 REQ'D.
 - VDOT STD. CG-12, TYPE A REQ'D.
 - VDOT STD. CG-12, TYPE B REQ'D.
 - REPLACE RAMP SURFACE AND DETECTABLE WARNING SURFACE
 - VDOT STD. CG-12, TYPE M2 REQ'D.
 - VDOT STD. MS-2 REQ'D.
 - HENRICO STD. CURB & GUTTER REQ'D.
 - STD. HYD. CONCR. SIDEWALK REQ'D., W=VARIES

BRT LANE USE:
BRT MIXED TRAFFIC, CURB LANE

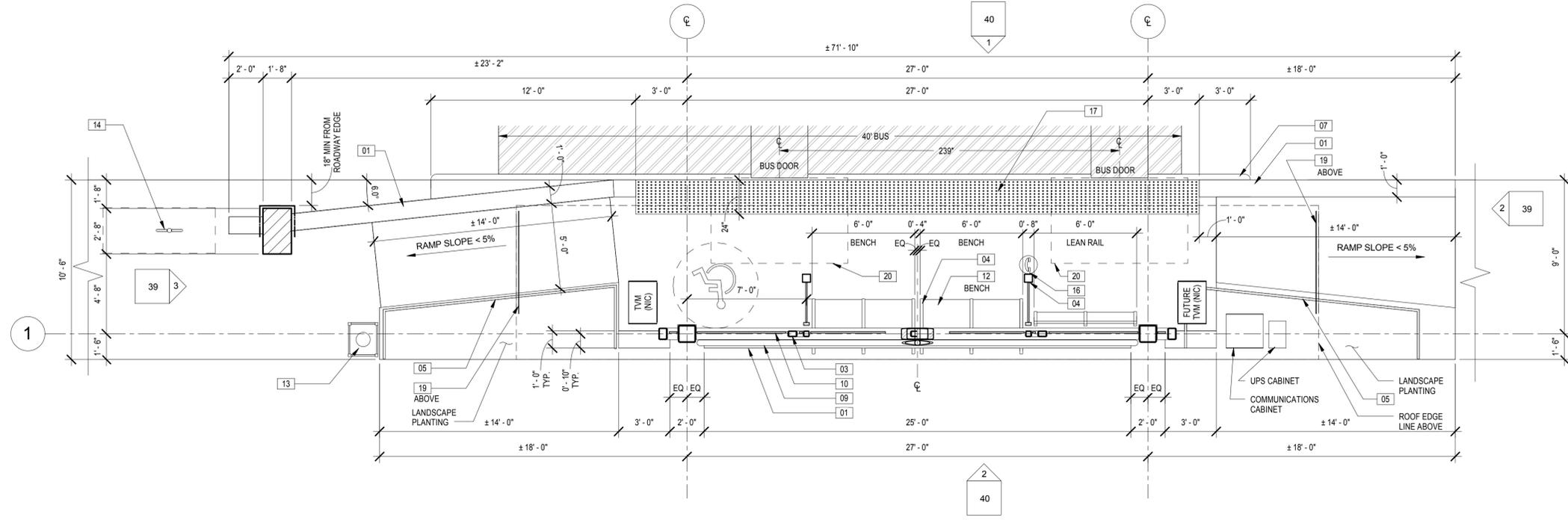


PROJECT	SHEET NO.
-	36

PROJECT MANAGER _____ Approver
 SURVEYED BY _____ Author
 DESIGN SUPERVISED BY _____ Checker
 DESIGNED BY _____ Designer

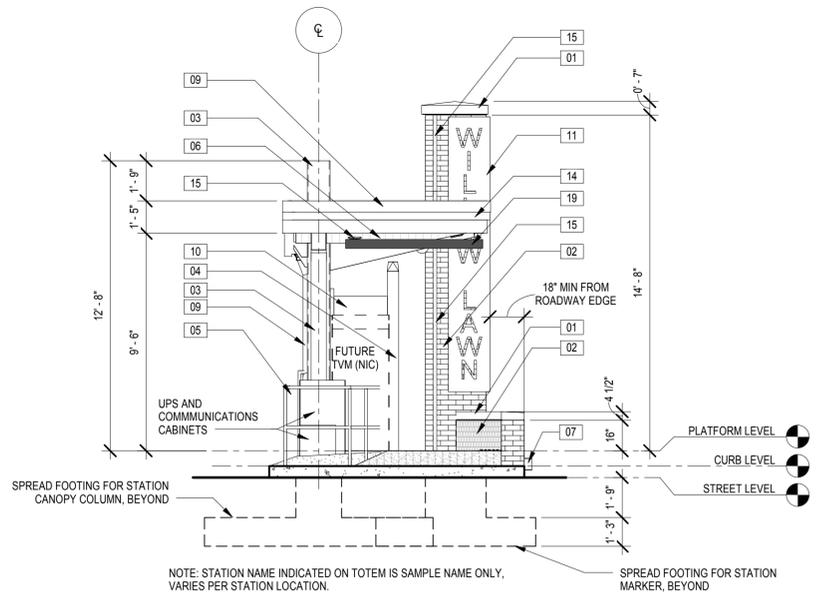
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	39

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

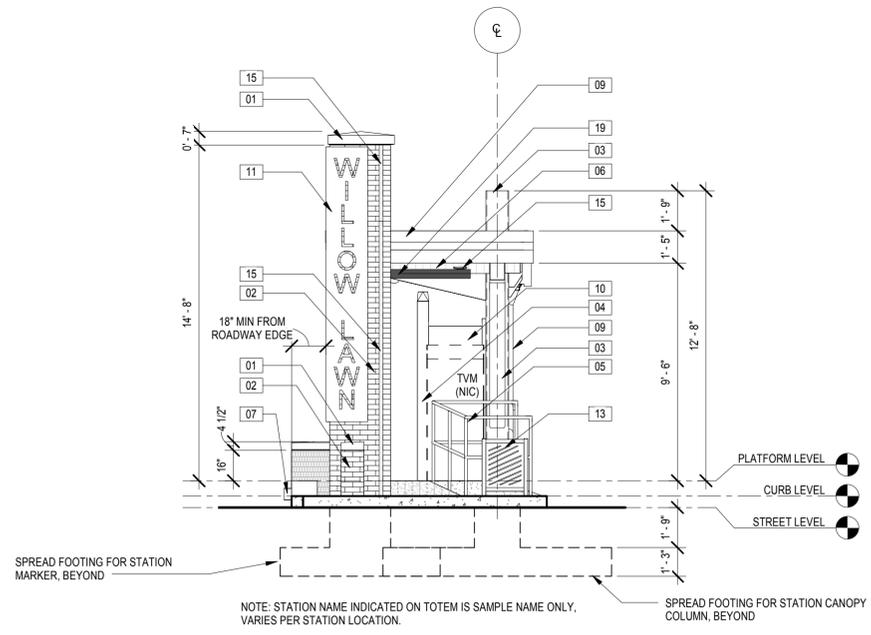


1 TYP. CURB PLAN - REDUCED SIZE
 1/4" = 1'-0"

Keynote Schedule	
Key Value	Keynote Text
01	PRECAST ARCHITECTURAL CONCRETE
02	UNIT MASONRY - BRICK
03	ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING W/ HIGH PERFORMANCE COATING
04	METAL FABRICATIONS W/ HIGH PERFORMANCE COATING
05	PIPE AND TUBE RAILINGS W/ HIGH PERFORMANCE COATING
06	NATURAL WESTERN RED CEDAR CEILING WITH STAIN
07	POLYETHYLENE PLATFORM EDGE STRIPS (BUS RUB RAIL)
08	STANDING-SEAM METAL ROOF PANELS
09	SHEET METAL FLASHING AND TRIM
10	DECORATIVE GLASS GLAZING
11	BRICK TOTEM WITH LASER CUT STEEL SIGN STATION IDENTIFICATION
12	BENCH
13	TRASH
14	BIKE RACK (TYPE A)
15	LED EXTERIOR LIGHTING
16	EMERGENCY PHONE SYSTEM
17	TACTILE WARNING SURFACE
18	DOMES CCTV
19	WAYFINDING SIGNAGE
20	5'X 8' CLEAR LOADING ZONE



2 TYP. CURB ELEVATION - REDUCED SIZE
 1/4" = 1'-0"



3 TYP. CURB ELEVATION - REDUCED SIZE
 1/4" = 1'-0"

- GENERAL NOTES:**
- ± DIMENSIONS ARE INDICATED AT RAMPS AND RELATED FEATURES WHERE THE LENGTH MAY VARY SLIGHTLY DEPENDING ON INDIVIDUAL SITE CONDITIONS.
 - SPREAD FOOTINGS SHOWN FOR CURB STATION; DRILLED SHAFTS SHOWN FOR MEDIAN STATION; HOWEVER, DRILLED SHAFTS OR SPREAD FOOTINGS WILL BE USED WITH EITHER STATION TYPE AS DETERMINED IN FINAL DESIGN.

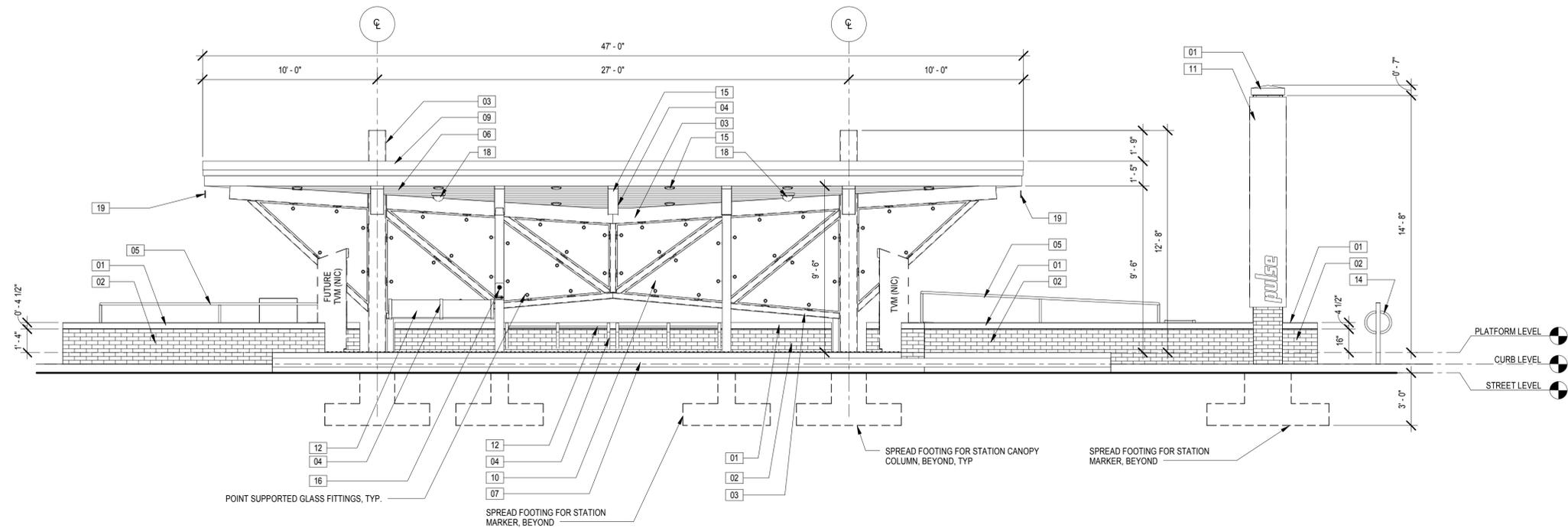
TYPICAL REDUCED SIZE CURB STATION

PROJECT	SHEET NO.
-	39

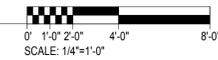
PROJECT MANAGER _____ Approver
 SURVEYED BY _____ Author
 DESIGN SUPERVISED BY _____ Checker
 DESIGNED BY _____ Designer

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	40

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



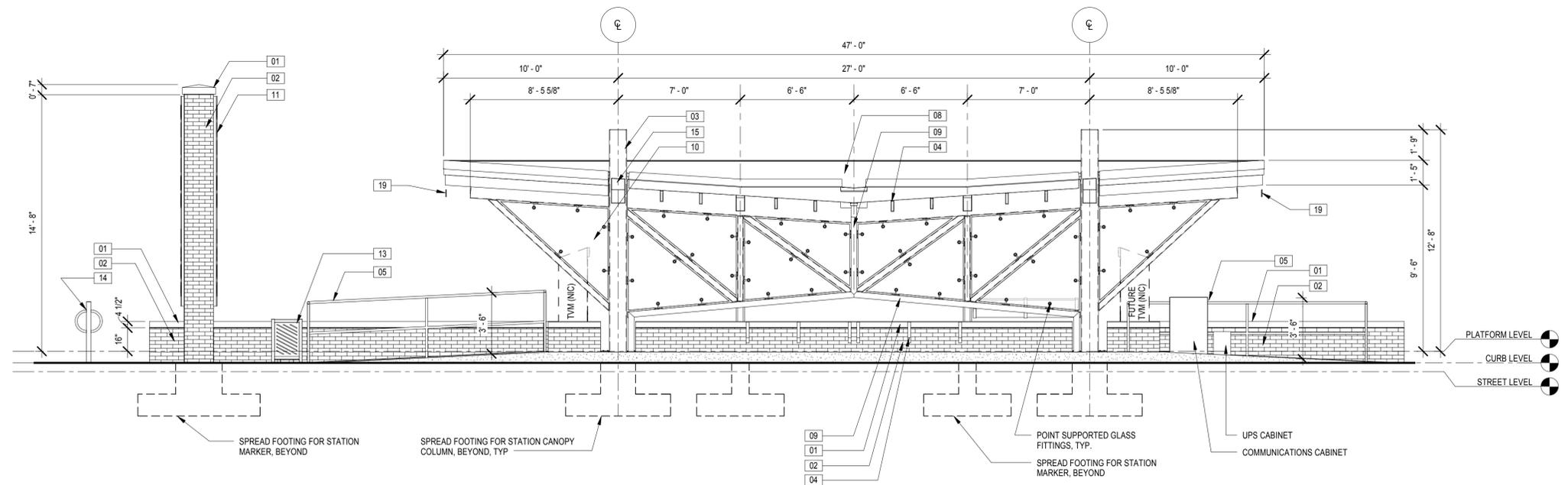
1 TYP. CURB ELEVATION - REDUCED SIZE
 1/4" = 1'-0"



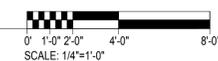
Keynote Schedule	
Key Value	Keynote Text
01	PRECAST ARCHITECTURAL CONCRETE
02	UNIT MASONRY - BRICK
03	ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING W/ HIGH PERFORMANCE COATING
04	METAL FABRICATIONS W/ HIGH PERFORMANCE COATING
05	PIPE AND TUBE RAILINGS W/ HIGH PERFORMANCE COATING
06	NATURAL WESTERN RED CEDAR CEILING WITH STAIN
07	POLYETHYLENE PLATFORM EDGE STRIPS (BUS RUB RAIL)
08	STANDING-SEAM METAL ROOF PANELS
09	SHEET METAL FLASHING AND TRIM
10	DECORATIVE GLASS GLAZING
11	BRICK TOTEM WITH LASER CUT STEEL SIGN STATION IDENTIFICATION
12	BENCH
13	TRASH
14	BIKE RACK (TYPE A)
15	LED EXTERIOR LIGHTING
16	EMERGENCY PHONE SYSTEM
17	TACTILE WARNING SURFACE
18	DOMED CCTV
19	WAYFINDING SIGNAGE
20	5'X 8' CLEAR LOADING ZONE

GENERAL NOTES:

- ± DIMENSIONS ARE INDICATED AT RAMPS AND RELATED FEATURES WHERE THE LENGTH MAY VARY SLIGHTLY DEPENDING ON INDIVIDUAL SITE CONDITIONS.
- SPREAD FOOTINGS SHOWN FOR CURB STATION; DRILLED SHAFTS SHOWN FOR MEDIAN STATION; HOWEVER, DRILLED SHAFTS OR SPREAD FOOTINGS WILL BE USED WITH EITHER STATION TYPE AS DETERMINED IN FINAL DESIGN.



2 TYP. CURB ELEVATION - REDUCED SIZE
 1/4" = 1'-0"



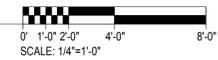
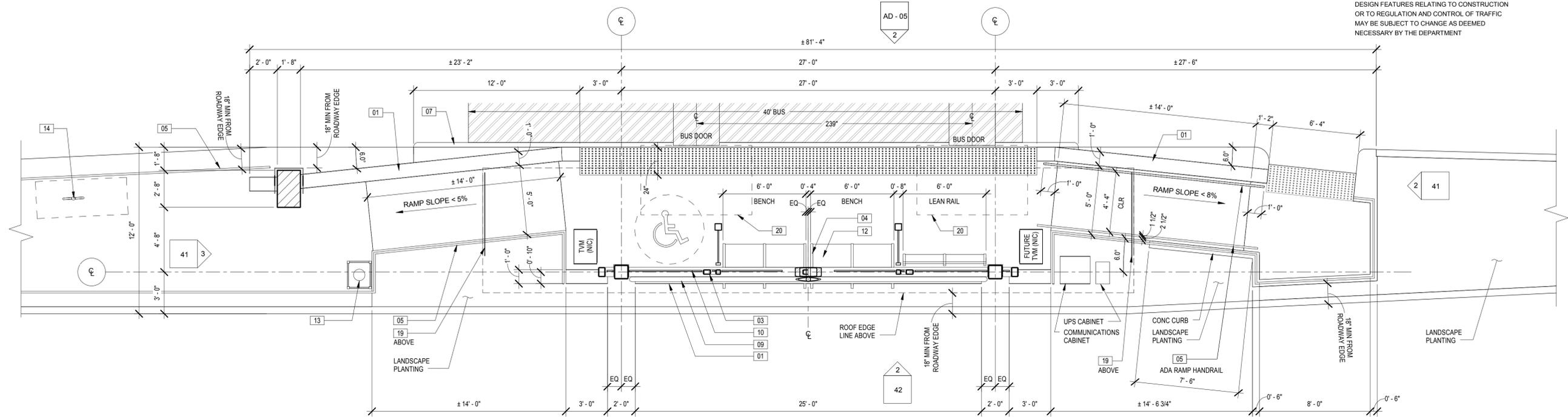
TYPICAL REDUCED SIZE CURB STATION

PROJECT	SHEET NO.
-	40

PROJECT MANAGER _____ Approver
 SURVEYED BY _____ Author
 DESIGN SUPERVISED BY _____ Checker
 DESIGNED BY _____ Designer

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	41

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

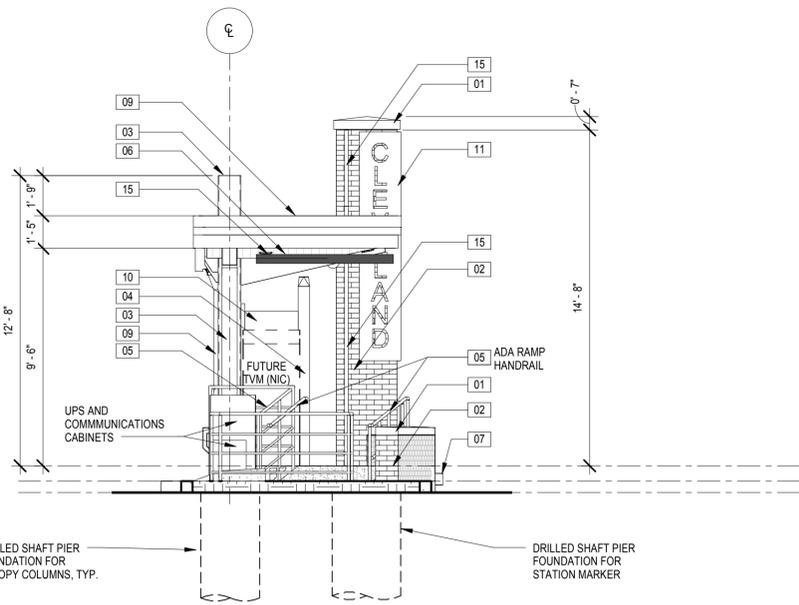


1 TYP. MEDIAN PLAN - REDUCED SIZE
 1/4" = 1'-0"

Keystone Schedule	
Key Value	Keystone Text
01	PRECAST ARCHITECTURAL CONCRETE
02	UNIT MASONRY - BRICK
03	ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING W/ HIGH PERFORMANCE COATING
04	METAL FABRICATIONS W/ HIGH PERFORMANCE COATING
05	PIPE AND TUBE RAILINGS W/ HIGH PERFORMANCE COATING
06	NATURAL WESTERN RED CEDAR CEILING WITH STAIN
07	POLYETHYLENE PLATFORM EDGE STRIPS (BUS RUB RAIL)
08	STANDING-SEAM METAL ROOF PANELS
09	SHEET METAL FLASHING AND TRIM
10	DECORATIVE GLASS GLAZING
11	BRICK TOTEM WITH LASER CUT STEEL SIGN STATION IDENTIFICATION
12	BENCH
13	TRASH
14	BIKE RACK (TYPE A)
15	LED EXTERIOR LIGHTING
16	EMERGENCY PHONE SYSTEM
17	TACTILE WARNING SURFACE
18	HOME CCTV
19	WAYFINDING SIGNAGE
20	5'X 8' CLEAR LOADING ZONE

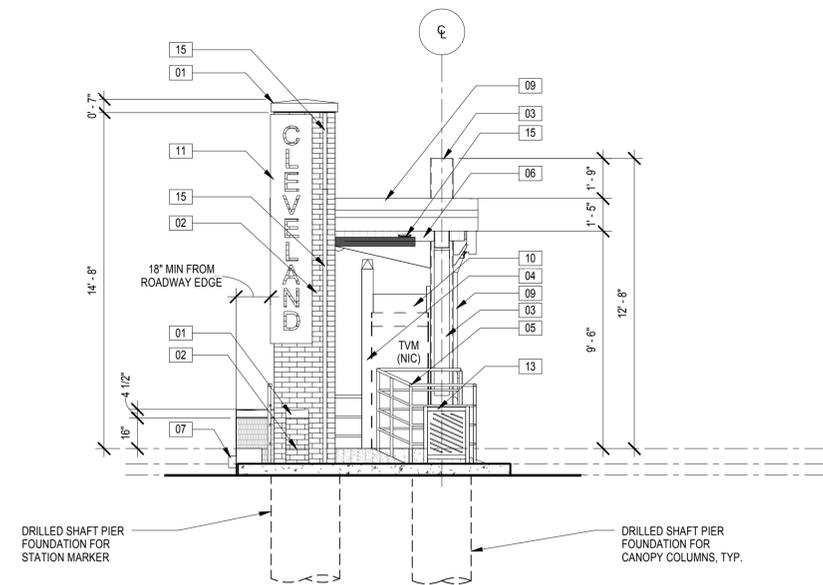
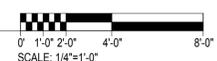
GENERAL NOTES:

- ± DIMENSIONS ARE INDICATED AT RAMPS AND RELATED FEATURES WHERE THE LENGTH MAY VARY SLIGHTLY DEPENDING ON INDIVIDUAL SITE CONDITIONS.
- SPREAD FOOTINGS SHOWN FOR CURB STATION; DRILLED SHAFTS SHOWN FOR MEDIAN STATION; HOWEVER, DRILLED SHAFTS OR SPREAD FOOTINGS WILL BE USED WITH EITHER STATION TYPE AS DETERMINED IN FINAL DESIGN.



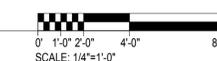
NOTE: STATION NAME INDICATED ON TOTEM IS SAMPLE NAME ONLY, VARIES PER STATION LOCATION.

2 TYP. MEDIAN ELEVATION - REDUCED SIZE
 1/4" = 1'-0"



NOTE: STATION NAME INDICATED ON TOTEM IS SAMPLE NAME ONLY, VARIES PER STATION LOCATION.

3 TYP. MEDIAN ELEVATION - REDUCED SIZE
 1/4" = 1'-0"



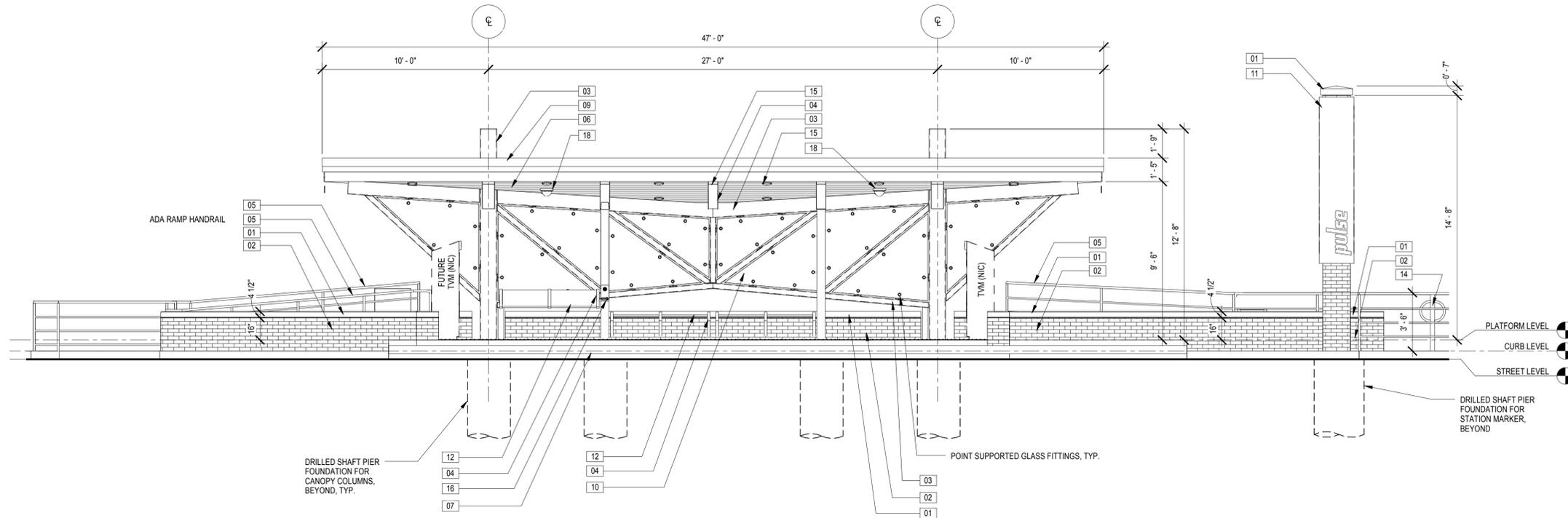
TYPICAL REDUCED SIZE MEDIAN STATION

PROJECT	SHEET NO.
-	41

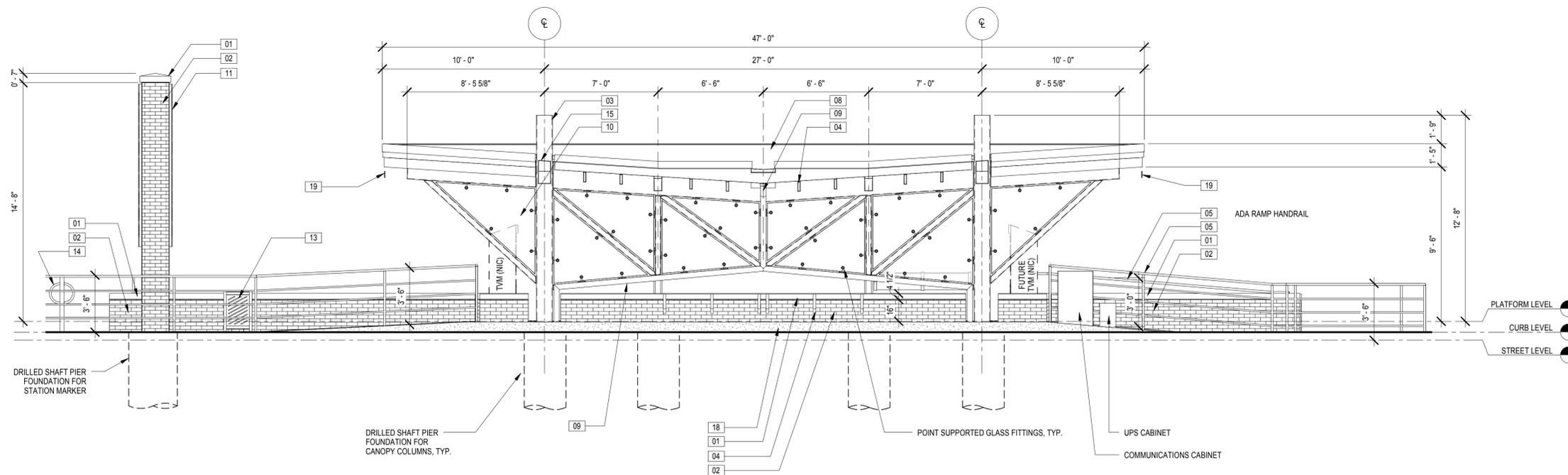
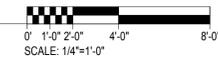
PROJECT MANAGER _____ Approver
 SURVEYED BY _____ Author
 DESIGN SUPERVISED BY _____ Checker
 DESIGNED BY _____ Designer

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.			-	42

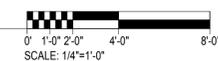
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



1 TYP. MEDIAN ELEVATION - REDUCED SIZE
 1/4" = 1'-0"



2 TYP. MEDIAN ELEVATION - REDUCED SIZE
 1/4" = 1'-0"



Keynote Schedule	
Key Value	Keynote Text
01	PRECAST ARCHITECTURAL CONCRETE
02	UNIT MASONRY - BRICK
03	ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING W/ HIGH PERFORMANCE COATING
04	METAL FABRICATIONS W/ HIGH PERFORMANCE COATING
05	PIPE AND TUBE RAILINGS W/ HIGH PERFORMANCE COATING
06	NATURAL WESTERN RED CEDAR CEILING WITH STAIN
07	POLYETHYLENE PLATFORM EDGE STRIPS (BUS RUB RAIL)
08	STANDING-SEAM METAL ROOF PANELS
09	SHEET METAL FLASHING AND TRIM
10	DECORATIVE GLASS GLAZING
11	BRICK TOTEM WITH LASER CUT STEEL SIGN STATION IDENTIFICATION
12	BENCH
13	TRASH
14	BIKE RACK (TYPE A)
15	LED EXTERIOR LIGHTING
16	EMERGENCY PHONE SYSTEM
17	TACTILE WARNING SURFACE
18	DOMA CCTV
19	WAYFINDING SIGNAGE
20	5'X 8' CLEAR LOADING ZONE

GENERAL NOTES:

- ± DIMENSIONS ARE INDICATED AT RAMPS AND RELATED FEATURES WHERE THE LENGTH MAY VARY SLIGHTLY DEPENDING ON INDIVIDUAL SITE CONDITIONS.
- SPREAD FOOTINGS SHOWN FOR CURB STATION; DRILLED SHAFTS SHOWN FOR MEDIAN STATION; HOWEVER, DRILLED SHAFTS OR SPREAD FOOTINGS WILL BE USED WITH EITHER STATION TYPE AS DETERMINED IN FINAL DESIGN.

TYPICAL REDUCED SIZE MEDIAN STATION

PROJECT	SHEET NO.
-	42

Activity ID	Activity Name	Rem	Start	Finish	2016												2017												2018											
					Jan	Apr	M	Jun	Jul	A	Sep	Oct	N	Dec	Jan	F	M	Apr	M	Jun	Jul	Aug	Sep	Oct	N	Dec	Jan	F	M	Apr	M	Jun	Jul							
GRTC Bus Rapid Transit		466	03-14-16	06-30-18																																				
Level 1 - Project Milestones		838	03-14-16	06-30-18																																				
MI100	Price Proposal Due	0	03-14-16*		Price Proposal Due																																			
MI120	Notice of Intent to Award & Selection of Bid Options	0	03-21-16*		Notice of Intent to Award & Selection of Bid Options																																			
MI130	Design Initiated	0	03-21-16*		Design Initiated																																			
MI140	Notice to Proceed	0	04-15-16*		Notice to Proceed																																			
MI150	Submit Design QC Plan	0	04-15-16*		Submit Design QC Plan																																			
MI145	Gas Relocation Completed by Others	0		05-31-16*	Gas Relocation Completed by Others																																			
MI170	Interim Milestone Construction Complete	0		03-30-18*	Interim Milestone Construction Complete																																			
MI180	Project Complete	0		06-30-18*	Project Complete																																			
Level 2 - Public Relations		800	04-15-16	06-23-18																																				
PR1000	Conduct Continuous Public Relations	800	04-15-16	06-23-18	Conduct Continuous Public Relations																																			
Level 3 - Permitting		105	04-15-16	10-17-16																																				
VPDES Permit		46	07-28-16	10-17-16																																				
D1082	Prepare Project Wide VPDES Permit Application	10	07-28-16	08-12-16	Prepare Project Wide VPDES Permit Application																																			
D1083	Submit Permit	1	08-12-16	08-15-16	Submit Permit																																			
D1110	Permit Review	60	08-15-16	10-14-16	Permit Review																																			
D1120	Permit Issued	1	10-14-16	10-17-16	Permit Issued																																			
City of Richmond Work in Streets Permit		16	04-15-16	05-12-16																																				
D1102	Prepare Project Wide "Work in Streets" Permit Appli	5	04-15-16*	04-22-16	Prepare Project Wide "Work in Streets" Permit Application																																			
D1103	Submit Permit	1	04-25-16	04-25-16	Submit Permit																																			
D1150	Permit Review	15	04-26-16	05-10-16	Permit Review																																			
D1160	Permit Issued	1	05-11-16	05-12-16	Permit Issued																																			
Henrico County Land Disturbance Permit		15	07-28-16	08-23-16																																				
D1092	Prepare Land Disturbance Permit Application	5	07-28-16	08-04-16	Prepare Land Disturbance Permit Application																																			
D1093	Submit Permit	1	08-04-16	08-05-16	Submit Permit																																			
D1130	Permit Review	15	08-05-16	08-20-16	Permit Review																																			
D1140	Permit Issued	1	08-22-16	08-23-16	Permit Issued																																			
Level 4 - Scope Validation		79	04-15-16	08-29-16																																				
SV1000	Scope Validation Investigations	60	04-15-16	06-13-16	Scope Validation Investigations																																			
SV1010	Scope Validation Submission	1	06-14-16	06-15-16	Scope Validation Submission																																			
SV1020	Scope Validation Discussions	45	06-15-16	08-29-16	Scope Validation Discussions																																			
Level 5 - Design		246	03-21-16	06-06-17																																				
Basis of Design		45	03-21-16	06-08-16																																				
BOD1000	Prepare & Submit Basis of Design Report	20	03-21-16	04-25-16	Prepare & Submit Basis of Design Report																																			
BOD1010	VDOT & Third Party Review	14	04-25-16	05-09-16	VDOT & Third Party Review																																			
BOD1020	Comment Resolution	15	05-09-16	06-07-16	Comment Resolution																																			
BOD1030	Submit Final Report	1	06-07-16	06-08-16	Submit Final Report																																			
Field Investigation		48	04-15-16	06-28-16																																				
FINV1000	Survey	30	04-15-16	05-30-16	Survey																																			
FINV1010	Subsurface Utility Markout	20	04-15-16	05-16-16	Subsurface Utility Markout																																			

█ Remaining Level of Effort
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Activity ID	Activity Name	Rem	Start	Finish	2016												2017												2018											
					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul					
FINV1020	Utility Test Holes	30	05-12-16	06-28-16	Utility Test Holes																																			
TMP		73	03-21-16	07-26-16	07-26-16, TMP																																			
TMP1000	Prepare Plans	20	03-21-16	04-19-16	Prepare Plans																																			
TMP1005	Submit Plans	1	04-19-16	04-20-16	Submit Plans																																			
TMP1010	VDOT & Third Party Review	14	04-20-16	05-04-16	VDOT & Third Party Review																																			
TMP1020	Comment Resolution	10	05-04-16	05-18-16	Comment Resolution																																			
TMP1025	Prepare Final Report	5	05-19-16	05-26-16	Prepare Final Report																																			
TMP1030	Submit Final Report	1	06-24-16*	06-24-16	Submit Final Report																																			
TMP1040	VDOT & Third Party Review	14	06-25-16	07-08-16	VDOT & Third Party Review																																			
TMP1050	Comment Resolution	10	07-11-16	07-25-16	Comment Resolution																																			
TMP1060	Design Approval	1	07-25-16	07-26-16	Design Approval																																			
Geotechnical Analysis and Geotech Reports		67	05-12-16	09-07-16	09-07-16, Geotechnical Analysis and Geotech Reports																																			
GEO1000	Perform Soil Borings and Start Analysis	30	05-12-16*	06-27-16	Perform Soil Borings and Start Analysis																																			
GEO1005	Prepare Geotechnical Report	40	05-12-16	07-13-16	Prepare Geotechnical Report																																			
GEO1010	Submit Plans	1	06-30-16*	07-01-16	Submit Plans																																			
GEO1020	VDOT & Third Party Review	14	07-01-16	07-15-16	VDOT & Third Party Review																																			
GEO1030	Comment Resolution	10	07-15-16	07-29-16	Comment Resolution																																			
GEO1040	Prepare & Submit Final Report	10	07-29-16*	08-12-16	Prepare & Submit Final Report																																			
GEO1050	VDOT & Third Party Review	14	08-12-16*	08-26-16	VDOT & Third Party Review																																			
GEO1060	Comment Resolution	5	08-26-16*	09-02-16	Comment Resolution																																			
GEO1070	Report Approval	1	09-06-16*	09-07-16	Report Approval																																			
Drainage and SWM Reports Package		52	04-15-16	07-14-16	07-14-16, Drainage and SWM Reports Package																																			
WS5000	Prepare & Submit Draft Drainage & SWM Report	20	04-15-16	05-16-16	Prepare & Submit Draft Drainage & SWM Report																																			
WS5010	VDOT & Third Party Review	14	05-16-16	05-30-16	VDOT & Third Party Review																																			
WS5020	Comment Resolution	5	05-30-16	06-07-16	Comment Resolution																																			
WS5030	Prepare & Submit Final	10	06-07-16	06-22-16	Prepare & Submit Final																																			
WS5040	VDOT & Third Party Review	14	06-22-16	07-06-16	VDOT & Third Party Review																																			
WS5050	Comment Resolution	5	07-06-16	07-13-16	Comment Resolution																																			
WS5060	Report Approval & VSMP	1	07-13-16	07-14-16	Report Approval & VSMP																																			
Water/Sewer Relocation		63	04-15-16	08-02-16	08-02-16, Water/Sewer Relocation																																			
60% Water/Sewer Plans		32	04-15-16	06-08-16	06-08-16, 60% Water/Sewer Plans																																			
WS1005	Prepare & Submit 60% Plans	15	04-15-16	05-06-16	Prepare & Submit 60% Plans																																			
WS1010	VDOT & Third Party Review	14	05-07-16	05-20-16	VDOT & Third Party Review																																			
WS1020	Comment Resolution	10	05-23-16	06-07-16	Comment Resolution																																			
WS1030	Design Approval	1	06-07-16	06-08-16	Design Approval																																			
Final Design Water/Sewer Plans		31	06-08-16	08-02-16	08-02-16, Final Design Water/Sewer Plans																																			
WS1100	Prepare & Submit Final Plans	15	06-08-16	06-30-16	Prepare & Submit Final Plans																																			
WS1110	VDOT & Third Party Review	14	06-30-16	07-14-16	VDOT & Third Party Review																																			
WS2040	Comment Resolution	5	07-14-16	07-22-16	Comment Resolution																																			
WS2050	Design Approval	1	07-22-16	07-22-16	Design Approval																																			
WS2060	Prepare RFC Plans	5	07-22-16*	08-01-16	Prepare RFC Plans																																			

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					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul		
Station Construction		238	01-13-17	12-26-17																																	
Median Stations		215	02-16-17	12-26-17																																	
SC100	Demo Median	20	02-16-17	03-17-17																																	
SC110	Install Median Foundations	40	03-17-17	05-12-17																																	
SC120	Install Kneewalls and Platforms	50	05-12-17	07-25-17																																	
SC130	Set Canopy Framing	20	07-25-17	08-22-17																																	
SC140	Install Canopy Finishes	20	08-22-17	09-20-17																																	
SC150	Install Equipment	25	08-22-17	09-27-17																																	
SC160	Install new sidewalks, curbs landscaping	60	09-27-17	12-26-17																																	
Mixed Use Stations		130	01-13-17	07-20-17																																	
SC170	Relocate Utilities and Street Lights	30	01-13-17	02-28-17																																	
SC180	Install Mixed Use Foundations	65	01-23-17	04-25-17																																	
SC190	Install Kneewalls and Platforms	15	04-25-17	05-16-17																																	
SC200	Set Canopy Framing	15	05-16-17	06-07-17																																	
SC210	Install Canopy Finishes	10	06-07-17	06-21-17																																	
SC220	Install Equipment	5	06-21-17	06-28-17																																	
SC230	Install new sidewalks, curbs landscaping	15	06-28-17	07-20-17																																	
Traffic Signal Improvement		160	01-13-17	08-31-17																																	
TS100	Install New Traffic Signals	75	01-13-17	05-02-17																																	
TS110	Upgrade/Install TSP	75	05-16-17	08-31-17																																	
Roadway Construction		140	07-20-17	03-30-18																																	
RC100	Install Pedestrian ADA Facilities	50	07-20-17	09-29-17																																	
RC110	Road Widening at Sauer Center	50	09-29-17	03-24-18																																	
RC120	Full Depth Reconstruction	30	02-15-18	03-20-18																																	
RC130	Milling	40	02-15-18	03-30-18*																																	
RC140	Overlay & Striping	40	02-15-18	03-30-18*																																	
System Integration/Commissioning		150	09-27-17	06-28-18																																	
SI100	Integration and Testing	125	09-27-17	03-30-18																																	
SI110	Commissioning	125	09-27-17	03-30-18																																	
SI120	Operational Testing	90	03-30-18*	06-28-18																																	
Close Out		52	03-30-18	06-30-18																																	
CO100	Close Out Submittals/Training/O&M Manuals	40	03-30-18	05-25-18																																	
CO110	Punch List Work	20	03-30-18	04-27-18																																	
CO120	Project Complete	0		06-30-18*																																	



