

UDC Project Narrative

for

Lombardy over CSX Bridge replacement for Walking and Biking

VDOT UPC 104216

May 14, 2025

PURPOSE

PROJECT PURPOSE:

The project will replace the Lombardy Street over CSX bridge. The current bridge is structurally deficient. After analysis, it was determined that replacing the structure would be more cost-effective solution.

EXISTING BRIDGE DESCRIPTION:

The bridge structure carrying Lombardy Street over CSXT Railroad (Virginia Str. No. 127-8088) is located in the City of Richmond, 0.18 miles north of the intersection with West Leigh Street. The original bridge structure was constructed by agreement between the City and the new Seaboard Air Line Railway Company in 1903/04 to raise Lombardy St. over the Railway Lines to facilitate an at grade crossing and a passenger platform for Virginia Union University (VUU) and Hartshorn Memorial College (merged with VUU in 1932). Due to the bridge structure conditions, in approximately 1932/33, the superstructure was replaced. The bridge structure consists of four simply supported, riveted steel girder spans with span lengths of approximately 25'-6", 31'-0", 41'-4", 31'-0" and 25'-6" for an approximate total length of 154'-4" (end-of-slab to end-of-slab). The bridge is oriented in the northbound direction. When looking from Abutment A (south) towards Abutment B (north), the girders are numbered from left to right. A unique feature of the bridge is beyond Abutment A, Bacons Quarter Branch is located under an original 1903/04 culvert, and the widened 1930's culvert. Bacons Quarter Branch served as an original collector of water for the north side of Richmond and today, is a major storm sewer/creek that is completely buried in a culvert that extends towards Shockoe Bottom.

The superstructure is 50'-2" wide (out-to-out). The roadway width is 40'-0" curb-to-curb with a 2'-2" sidewalk on the east side and an 8'-0" sidewalk along the west side. The superstructure consists of nine (9) riveted steel beams with a reinforced concrete deck cast integral with the beams. The reinforced concrete deck has an asphalt overlay that was installed in 2006.

The bridge structure substructure units consist of four piers and the two abutments, which are parallel to each other and are on an approximate 13-degree skew to the baseline. The four (4) piers are each comprised of three steel columns with latticework bracing with a steel pier cap and are supported on individual spread foundations. The pier foundations appear to be original 1903 construction and the steel pier bents are a combination of original 1903 construction and 1930's improvements to support the wider superstructure. The original abutments, based on the 1903 plans, were steel or timber piles (material not identified) with a steel/timber mat for the abutment seat/cap; the approach roadway fill spilled through the piles. However, the 1930 widening plan seems to indicate that a tall wall gravity style abutment may have actually been constructed. Regardless, the current abutments consist of concrete supported by an unknown foundation (no-plans can be found).

Lombardy Street is classified as a Major Collector with a current AADT of 6700 vehicles based on VDOT's published traffic volume data for 2018. The structure is currently posted with R12-V1 signage denoting a 15-ton weight limit. **Figure 1** shows a vicinity map of the subject bridge structure with roadway classifications taken from the VDOT Approved Functional Classification map available on the VDOT website. The purple is identified as a "Major Collector" Roadway.

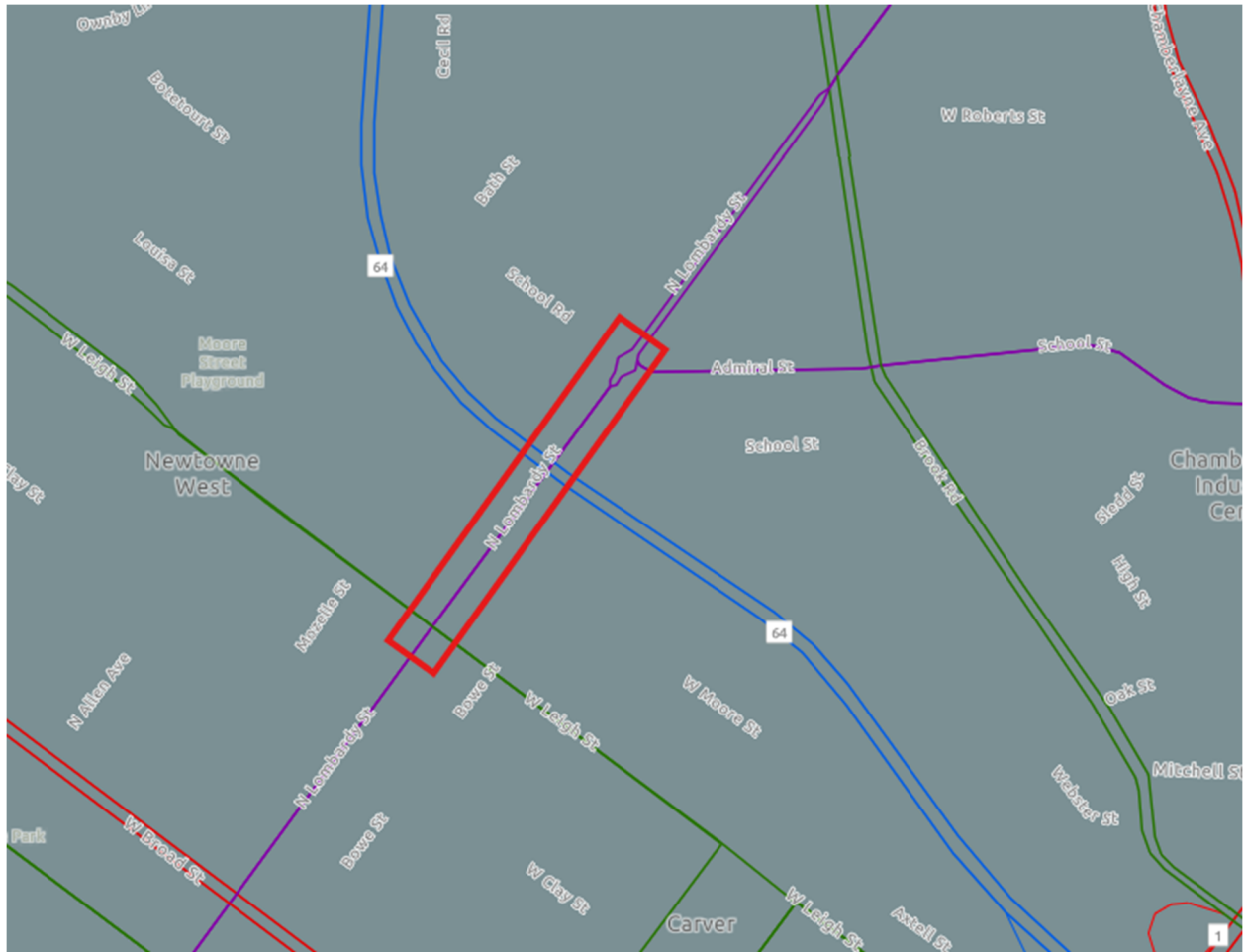


Figure 1- Roadway Classification Map

PROJECT CONSIDERATIONS

DESIGN OPTIONS

STRUCTURAL DESIGN CONSIDERATIONS:

As with any proposed bridge replacement project, there are some primary design criteria that WRA establishes; among which are constructing bridge structures that are:

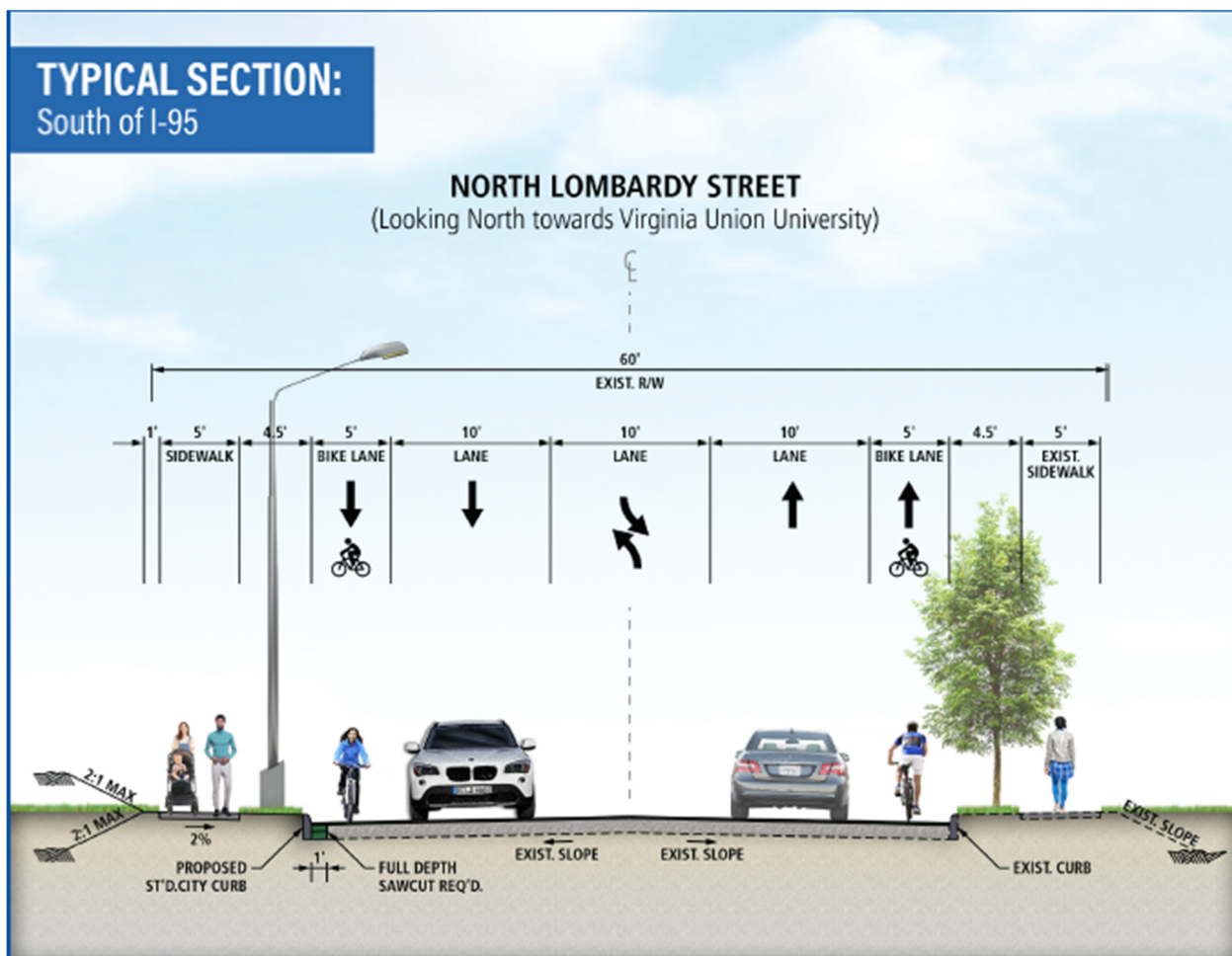
- Long-term low maintenance
- Structurally efficient with materials selected
- Providing for adequate clearances
- Cost effective

SUPERSTRUCTURE:

The superstructure for this option will utilize six (6) structural steel plate girders with a 32-inch deep web spaced at 9'-6" with variable flange thicknesses. The superstructure will consist of a single 100-foot long span and will make use of semi-integral abutments. The benefit of this layout is that the shallow steel girders provide the thinnest potential superstructure (which allows the design to maximize the vertical clearances). Additionally, the total deadload will be the lightest of the options investigated, which will in-turn will reduce the foundation requirements for the new abutments. The proposed 32-in web depth will not meet the AASHTO suggested composite section span-to-depth ratio (AASHTO Section 2.5.2.6.3); however, this is an optional design criterion and the proposed bridge superstructure does meet minimum deflection criteria.

Based on preliminary values and the roadway geometrics proposed, WRA anticipates that the proposed vertical clearances will provided about 21'-0" between the top of rail and bottom of bridge structure for this option. This is based upon the assumption that CSXT has not altered their track profiles since our survey was completed and based on no track modifications in the future.

Based on the preliminary information, WRA developed the proposed transverse section presented in **Figure 2**.



TYPICAL SECTION:
North of I-95

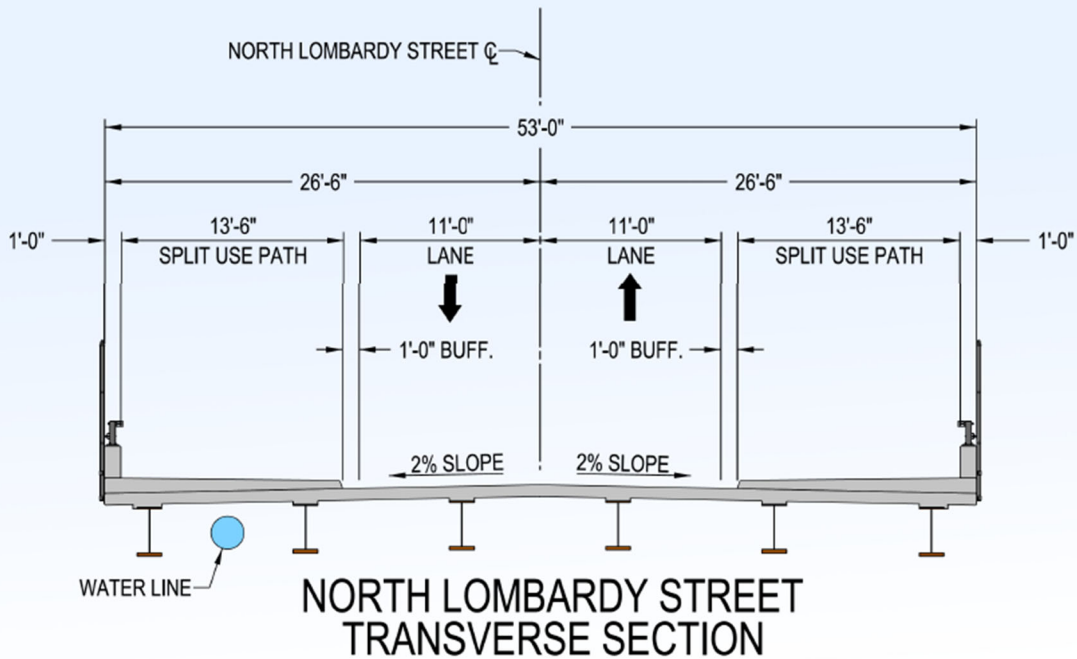
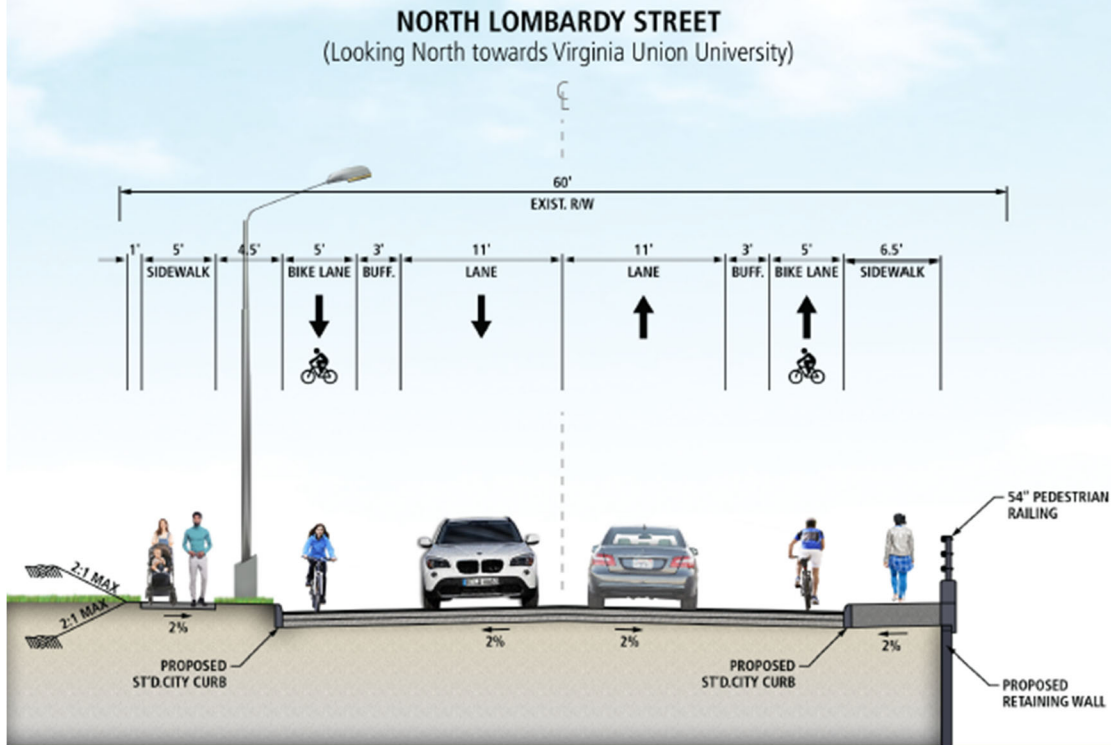


Figure 2-Proposed Typical Sections

SUBSTRUCTURE:

The proposed Abutment A will be a tall wall semi-integral stem type abutment supported by deep foundations that will be flanked by angled wingwalls that will taper down following the approach roadway fill. The backfill material between the proposed abutment and existing abutment will consist of a lightweight fill material (EPS, Geofoam, Lightweight Glass Aggregates) to minimize any lateral loading imparted on the existing culvert by the fill material. For Abutment A, the intent is to leave as much of the existing abutment in-place in order to reduce the risk of damaging the existing culvert system. The top portion of the abutment will be removed down to an elevation that allows for reconstruction of the approach roadway and the addition of the new water main. Along the existing approach roadway fill slopes, the top 5-8 ft of the existing slope will be removed and will be replaced with lightweight fill to reduce the dead load on the culverts below. This design approach will provide for stabilization of the approach roadway fill slopes and will rectify the current drainage issues present along the southern approach. After reviewing the geological borings, WRA is proposing the use of deep foundations. To reduce the impact to the existing culvert, a foundation construction methodology that involves pre-drilling holes and considering proximity to overhead obstructions will be required. As such, the recommended type of foundation is steel H-Piles. This foundation system along with pre-drilling will help to reduce vibrations and minimize the impacts to the over 100-year old culvert located nearby. With the location of the proposed abutment, the piles will be far enough north that they will not impact the overhead utility lines.

Abutment B will consist of a short stub abutment on deep foundations that will be supported by a full-height T-wall system that will wrap around the stem. This abutment, like Abutment A, will also make use of steel H-Piles eliminating the need to mobilize equipment for installing multiple foundation systems will help to minimize overall construction duration. This abutment type provides for the least amount of fill while also fulfilling the CSXT requirement that MSE walls cannot be constructed adjacent to railroads due to the induced vibrations.

This proposed bridge structure replacement option provides a solution that meets the major design criteria requests made by the City and CSXT. These requests primarily involve providing increased vertical clearance and space for four future tracks along the CSXT Railway.

RETAINING WALLS

South Roadway Approach – As previously presented, the top portion of the existing retaining wall on the south side of the bridge structure (east face) will be removed to allow for roadway reconstruction and the installation of a new water main. The remainder of the wall below this elevation will be encased in lightweight fill and will remain in place. No additional retaining wall structures are anticipated on the south approach

North Roadway Approach – the existing retaining wall on the north side of the structure will be replaced in its entirety with a modular block or T-wall system. The proposed wall will extend for the entire length of the existing retaining wall and will be set back such that it is fully within the City right-of-way rectifying the issue of the existing wall being located on the adjacent property owner. It will provide for stabilization of the approach roadway of the new structure and meets the railroad requirement that MSE walls not be located adjacent to the railroad.

CONSTRUCTABILITY: Due to complete reconfiguration of the bridge, it is the intent to make the construction as simple as possible to reduce the impacts to the traveling public. However, there will be special considerations for the piles (anticipate micro-piles) to reduce the impacts to the Bacon's Quarter Branch and the overhead electrical lines. In addition, the general

coordination with CSX will pose risks to the project and through the detailing, our plan is to make the construction as simple as possible.

ROADWAY:

The roadway, beginning at West Leigh Street, will have a 10' travel lane in each direction, a 10' center turn lane, and a 5' bike lane on each side of the road adjacent to the curb. The curb and concrete sidewalk on the west side of the road will be reconstructed. This section will be carried past the Maggie Walker school, where it will transition to an 11' travel lane in each direction and the 5' bike lanes on each side will continue adjacent to the curb. At the bridge, the bike lanes will transition by ramps onto a split use path that will combine with the sidewalk on the bridge. North of the bridge, the bikes will transition down from the split use paths on each side to a 5' bike lane, maintaining 11' travel lanes, a 5' sidewalk and 4' buffer space on the west side, and a 6' sidewalk on the east side. A new retaining wall will be constructed on the east side between the bridge and the intersection with Admiral St. Pedestrian scale lighting will be installed along the corridor and will match the existing VUU lighting.

RIGHT OF WAY AND EASEMENTS

Survey shows that there is adequate right-of-way along both the north and south approach to the east and west side of the existing bridge to accommodate the proposed structure. On the north side of the bridge, both the proposed retaining wall and the abutment itself remain in City right-of-way. However, as mentioned, the existing retaining wall along the north approach is outside of City right-of-way. To achieve the maximum vertical clearance over the railroad, the proposed southern abutment sits just inside a line that connects the CSXT right-of-way on either side of Lombardy St. CSXT does not have right-of-way over Lombardy St. thus, this proposed location, which is just behind existing Pier 1, should not pose any issues with CSXT. It is recommended that as part of this project, the City and CSXT re-establish property lines to record these limits correctly within the deed books for the City.

UTILITIES:

Lighting: The City of Richmond Department of Public Works (DPU) has specified that the proposed structure must incorporate both vehicular and pedestrian lighting.

Water: The Department of Public Utilities has specified that a new 12-inch waterline shall be included on the new bridge structure. There is on-going coordination with DPU as the waterline located on Belvidere St. need to active to eliminate the water feed currently on Lombardy St. The new waterline will be under the bridge superstructure.

Verizon: There are lines located on the bridge which due to the proposed method of Construction are anticipated to be temporarily removed and re-installed. In addition, there are FO lines running parallel to the track which are located near current Pier 1 (proposed Abutment A). It is not anticipated to impact these lines.

CSO – The City DPU has on on-going project to relocate the storm drainage which runs currently towards Abutment B and relocate such that it runs towards Admiral St.

Gas – While there is a gas line located on the bridge, it is TBD if it is still active. On-going coordination with DPU is occurring

MATERIALS/ARCHITECTURAL:

The new bridge will have concrete railings, concrete sidewalks, and concrete deck. The abutments and railing will use split face block as much as practicable emulating the stone at VUU.

The bridge railings will emulate the bridge railing like that on 1st Street and 5th St. over CSX.

MAINTENANCE OF TRAFFIC:

The bridge will be closed during construction of the project. The City evaluated phasing construction, but the anticipated increased costs and increased duration make this an unacceptable option.

ENVIRONMENTAL:

Due to the Federal Funding, the project is subject to the National Environmental Policy Act (NEPA) process. The project received a programmatic categorical exclusion on 7/25/24.

OFF BRIDGE FACILITIES

As required from the Smartscale application, the bicycle and pedestrian elements along N. Lombardy St will be evaluated and upgraded as required.

PUBLIC OUTREACH

Public Works held an in-person public hearing on December 18th, 2024. A few members of the public attended the hearing. No comments were made at the meeting, nor were additional comments received in the post-meeting comment period ending January 9th, 2025.