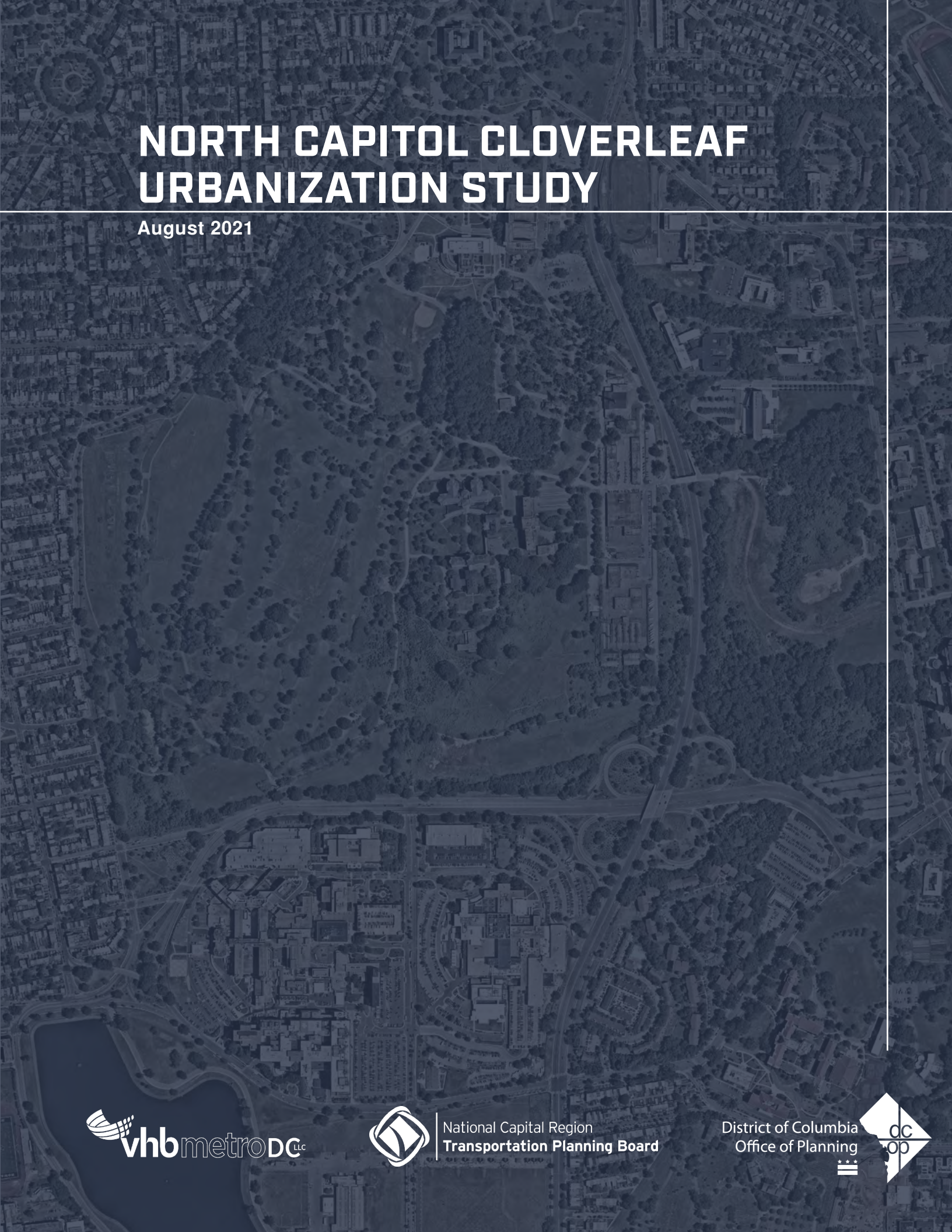
# NORTH CAPITOL CLOVERLEAF URBANIZATION STUDY

August 2021



vhb metroDC LLC

National Capital Region
Transportation Planning Board

District of Columbia
Office of Planning

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# EXECUTIVE SUMMARY

The District of Columbia Office of Planning (OP) and the District Department of Transportation (DDOT) have studied the challenges and opportunities related to urbanizing the North Capitol Crossroads Future Planning Analysis Area and improving pedestrian and bicycle connectivity throughout the area. This study focuses on the North Capitol Street and Irving Street NE/NW interchange and provides recommendations on how to transition the existing transportation infrastructure from its legacy highway orientation to a public right-of-way network that will facilitate multimodal connectivity and allow for neighboring parcels to develop and integrate into a more open and accessible urban form.

The North Capitol Cloverleaf Urbanization Study is a critical milestone in achieving numerous policy goals outlined in the District's Comprehensive Plan, which envisions transforming the area around North Capitol and Irving Streets into a connected, well-designed, and multi-modal neighborhood. The recommended alternative's removal of the free-flow ramps will fundamentally change the character of Irving Street NE/NW, encouraging buildings to face the urbanized roadway allowing for the development of a vibrant public realm. The Study builds on prior land use and transportation planning efforts to identify the new roadway connections that allow for the removal of the existing freeway-style interchange and achieve the project goals. The interchange and insular developments surrounding it currently limit connectivity between the residential neighborhoods of Columbia Heights to the west and Brookland to the east. Destinations within the Study area include the Washington Hospital Complex, Armed Forces Retirement Home (AFRH), and Catholic University of America (CUA), but direct connections to and between these places are limited. This study demonstrates that removing the interchange and associated ramps:

- Is feasible in terms of vehicular circulation;
- Highlights the improvements to multimodal access and safety that would be achieved through its implementation implementation, specifically for pedestrians and cyclists;
- Provides enhanced connectivity between the adjacent land uses; and
- Would reclaim significant inaccessible land for development and/or public use.

## Existing Conditions

The existing cloverleaf interchange at North Capitol Street and Irving Street NW/NE cuts off nearly 11 acres of open space within the ramps. The free-flowing vehicle traffic and uncontrolled intersections along Irving Street at the ends of the ramps create conflicts between vehicles and pedestrians, while a center-running, two-way cycle track protects cyclists from Michigan Avenue NE to Hobart Place NW. No direct pedestrian connections exist from Irving Street to North Capitol Street, and sidewalks along both sides of the North Capitol Street Bridge do not connect to pedestrian facilities north or south of the bridge. Sidewalks are only present on the south side of Irving Street and are not well buffered from vehicular traffic.

## Urbanized Alternative

The Urbanized Alternative presented in this report replaces the cloverleaf ramps with two new connector roads in the southwest and northeast quadrants of the North Capitol Street and Irving Street NW/NE intersection. The recommended alignments of the connector roads optimize the shape of parcels created by the new roadways and adds shared-use paths and sidewalks for direct pedestrian and bicycle connectivity between the two roads and accessibility to the new land parcels. This Alternative also includes new shared-use paths along both sides of North Capitol and Irving Streets and creates four new signalized intersections, eliminating all uncontrolled pedestrian crossings.


## Urbanized + Connected Alternative

The Urbanized + Connected Alternative builds on the Urbanized Alternative, providing additional connections to private developments to increase access to adjacent destinations and enable a future street grid. The southwest connector road is proposed to become part of a four-leg intersection, crossing Irving Street NW into AFRH, and the northeast connector road will provide direct access to AFRH from Irving Street NE and North Capitol Street as another four-leg intersection. The northeast connector road is designed with the potential to establish a four-leg intersection for future access or development on CUA West Campus property. The shared-use paths and sidewalks are carried through in this alternative.

# PROJECT OVERVIEW

## Study Purpose and Goals

The District of Columbia Office of Planning (OP) initiated the North Capitol Cloverleaf Urbanization Study (the study) to identify and evaluate transportation network alternatives at the North Capitol Street and Irving Street NW/NE interchange (the interchange) to better connect planned development around the corridor and enhance multimodal connectivity. The area currently lacks direct multimodal connections to nearby destinations, and the freeway cloverleaf infrastructure does not allow for future connection to planned urbanized development around the corridor. The study focused on creating a recommended alternative that would allow for the transformation of Irving Street into a urbanized corridor with safe pedestrian and bicycle facilities that would encourage buildings to front and engage Irving Street. These improvements would improve the area not just for the future developments, but for current residents and visitors of the area.

The study identified and evaluated an Urbanized alternative to improve multimodal connectivity and safety in the context of the planned adjacent land uses, and an Urbanized + Connected alternative to consider an improved street grid network to facilitate access to future development. The study included traffic analyses to confirm operational feasibility of the proposed alternatives and to understand the impacts to vehicular traffic. Field visits were conducted to assess bicycle and pedestrian conditions and comfort to inform improvements recommended in the study.

The goals of the study are to:

- Create a multimodal transportation network that facilitates connected development in the area
- Improve multimodal connectivity
- Enhance pedestrian and bicycle comfort and safety
- Maintain adequate vehicular traffic operations

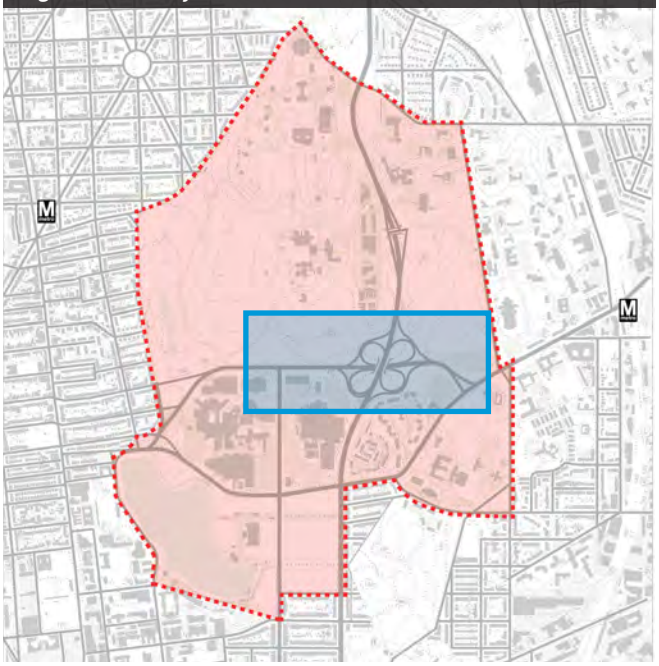
# Planning Context

The area surrounding the study area, identified in the DC Comprehensive Plan as the North Capitol Crossroads Future Planning Analysis Area, has multiple development, redevelopment, or modernization projects proposed on several large sites surrounding the interchange. The existing major destination in the study area is the Washington Hospital Complex, comprised of the Veterans Affairs Medical Center (VAMC), MedStar Washington Hospital Center, and Children's National Hospital. The dominant freeway-type infrastructure near the interchange limits the street grid, resulting in an inadequate pedestrian, bicycle, and transit network. The existing road network has also encouraged insular development within the study area which is disconnected from the adjacent vibrant neighborhoods including Petworth and Brookland.

The DC Comprehensive Plan, a high-level guiding document that sets a positive, long-term vision for the District, was recently adopted by Council. The Plan lays out five themes for the how the District should grow, all of which are relevant to the planning and goals of this study. These themes focus on economic recovery, equity, housing, resilience, and public resources. Realizing the goals of this study will allow for move inclusive development to the north and south of Irving Street; the ability to reclaim land from highway infrastructure to use for housing, commercial development, or public use; and would create a more sustainable transportation network for the area.

Two recent studies completed by the District Department of Transportation (DDOT) and OP have analyzed the study area. The area was looked at as the broader Crosstown Multimodal Transportation Study (2016) and in the North Capitol Crossroads Study (2019), which addressed street grid network opportunities within planned and future developments. The North Capitol Crossroads Urban Design and Connectivity Study specifically identified the limited transportation network as a barrier to development in this area (see **Figure 1**). This study builds on the recommendations identified in prior studies which identified needed improvements to facilitate crosstown multimodal connectivity and the potential for connected development in the surrounding area.

*Figure 1. Study Area*



*North Capitol Crossroads Future Planning Analysis Area*

*North Capitol Cloverleaf Urbanization Study Area*

# EXISTING CONDITIONS

## Land Use

The cloverleaf interchange at North Capitol Street and Irving Street NW/NE creates four distinct quadrants. The northwest quadrant is entirely occupied by the Armed Forces Retirement Home (AFRH) with no access via Irving Street NW. The northeast quadrant is owned by the Catholic University of America (CUA), and the intersection is proximate to the Basilica of the National Shrine of the Immaculate Conception. The southwest quadrant is home to the Washington Hospital Complex and is the major destination within the study area. The southwest quadrant is slated for redevelopment into a mixed-use development, called the Michigan and Irving Project (MIRV). Site plans indicate two entrances to the site from Irving Street NE, which informed the alignment of proposed alternatives. The current land uses in the four quadrants are neither connected nor create a sense of place that invites residents and visitors to safely and comfortably linger or recreate.

## Interchange Configuration

The intersection of North Capitol Street and Irving Street NW/NE is a cloverleaf interchange with North Capitol Street crossing Irving Street NW/NE above grade on a bridge that provides four-lanes in each direction. All ramps are uncontrolled, except the signalized southbound left-turn onto Irving Street NW from the ramp from southbound North Capitol Street NE, located in the northeast quadrant of the interchange (see **Figure 2**).

At the interchange, eastbound and westbound vehicular traffic on Irving Street NW/NE is separated by a raised median and a center-running, two-way cycle track, which is aligned along the southern edge of the median for most of Irving Street in the study area. Northbound and southbound traffic on North Capitol Street is median separated in the study area.

# Pedestrian and Bicycle Facilities

The primary pedestrian and bicycle facilities in the vicinity of the interchange and highlighted in **Figure 3** are:

- A continuous 6-foot wide sidewalk along the south side of Irving Street NW
- The Crosstown two-way cycle track in the center of Irving Street NW/NE

There are no pedestrian facilities provided along the north side of Irving Street NW. All pedestrian crossings at the interchange ramps are uncontrolled, shown in **Figures 4–5**, as is the right-turn slip lane at the east end of Irving Street NE onto Michigan Avenue NE. Underneath the North Capitol Street overpass, the sidewalks directly abut the roadway on the north side and are constrained by walls on the south side, forcing pedestrians close to the roadway. Sidewalk conditions are good along most of the corridor, particularly outside the Washington Hospital Complex, but sidewalks directly east and west of the North Capitol Street bridge are cracked and deteriorated (see **Figures 6–7**).

Pedestrian comfort was judged to be poorest where the sidewalks directly abut the roadway, particularly under the North Capitol Street bridge, with no buffer from traffic or lateral space next to the sidewalk, and at uncontrolled crossings. Pedestrian safety is a concern when walking on the south side of Irving Street NW/NE crossing each North Capitol Street slip ramps, where high-speed traffic approaches without any active control and pedestrians walking east must turn backward to look for oncoming traffic. The North Capitol Street bridge crossing Irving Street has sidewalks on the east and west sides, but there are no connecting pedestrian facilities on North Capitol Street to the north or south of the bridge.

The cycle track has dedicated bicycle signals at Michigan Avenue NE, First Street NW, and at the west end of the corridor where bicycle lanes divert onto Kenyon Street NW, shown in **Figure 8**. Access to the cycle track from the east end of the corridor is signalized when accessing the shared-use path (SUP) on Michigan Avenue NE, north of Irving Street NE. When approaching from the south on Michigan Avenue NE, bicyclists must use vehicular lanes or sidewalks and heed traffic signals.

*Figure 2. Interchange Movements*

*Figure 3. Existing Pedestrian and Bicycle Facilities*

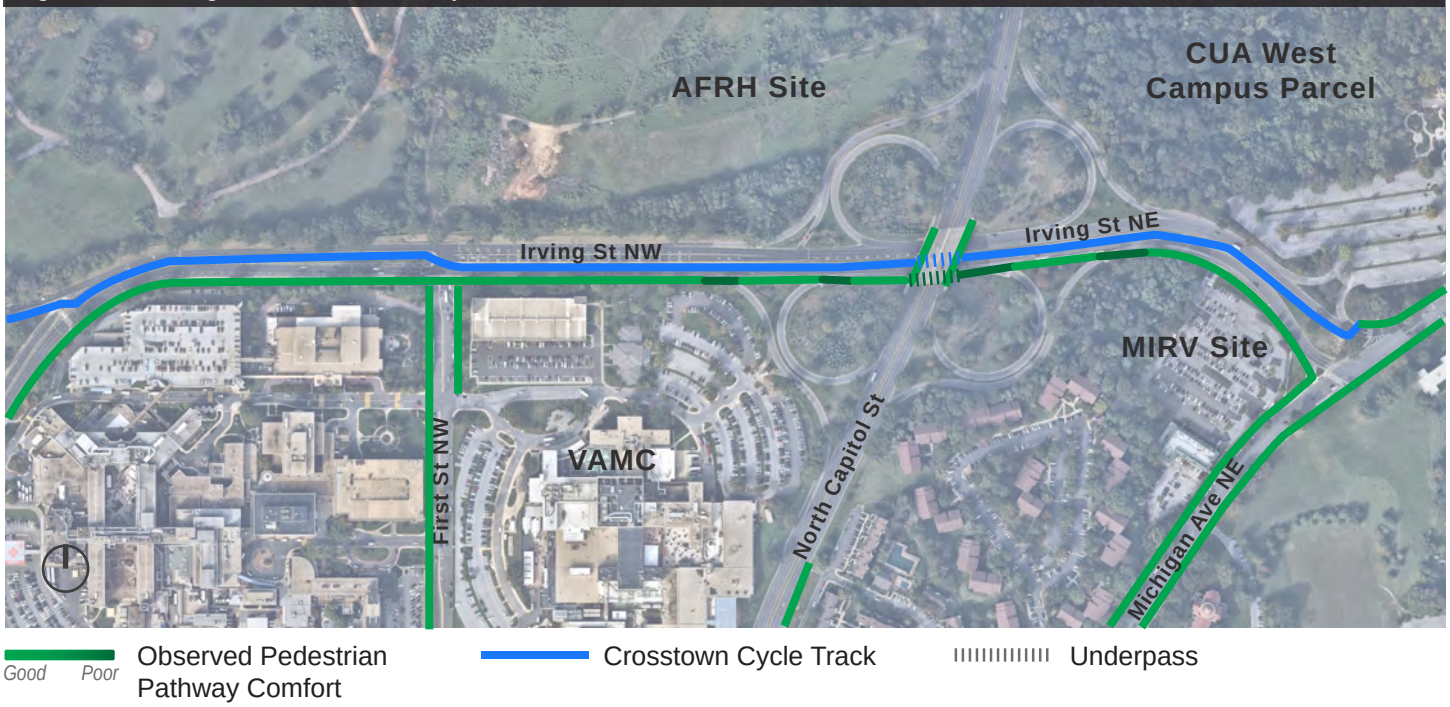



*Figure 4. Pedestrian Crossing at EB Irving Street NE and North Capitol Street NB Entrance Ramp*

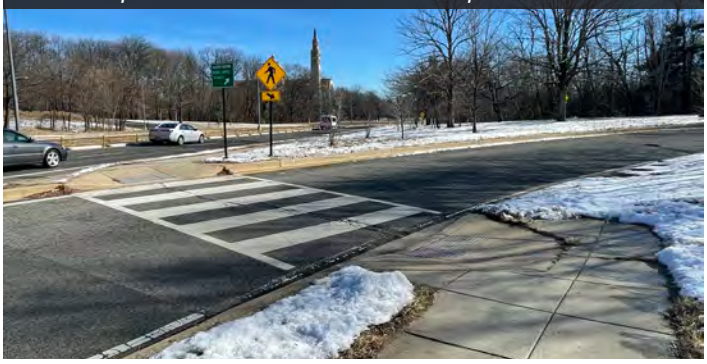


*Figure 5. Pedestrian Crossing at EB Irving Street NE and North Capitol Street NB Exit Ramp*

*Figure 6. Sidewalk Conditions West of Bridge*

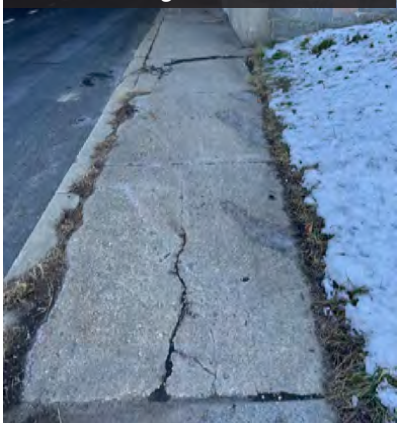


*Figure 7. Sidewalk Conditions East of Bridge*

*Figure 8. Dedicated Bicycle Signals*

# CONCEPT ALTERNATIVES

## Concept Development and Prior Planning

### Crosstown Multimodal Transportation Study Recommendations

The 2016 Crosstown Multimodal Transportation Study assessed multimodal connectivity from 16th Street NW to South Dakota Avenue NE, including the subject intersection of this study, North Capitol Street and Irving Street NW/NE. The findings resulted in more than a dozen project recommendations for bicycle, transit, and overarching multimodal improvements throughout the east-west network in the study area. The Irving Street two-way cycle track constructed in 2020 was recommended in the Crosstown Study, and the recommendations in this Cloverleaf Urbanization Study will also advance the implementation of the Crosstown Study recommendations. Crosstown recommendation MM.6B, shown in **Figure 9**, calls for the reconfiguration of the cloverleaf interchange and recommended an alignment for a connector roadway in the northeast quadrant, the Concept Alternatives presented in this section build off this recommend by adding a connection in the southwest quadrant in addition to the one recommended in the Crosstown Study.

### North Capitol Crossroads Urban Design and Connectivity Study Vision

The 2019 North Capitol Crossroads Study explored opportunities to guide interconnected, sustainable future growth of a study area that included all parcels abutting the North Capitol Street and Irving Street NW/NE intersection. The existing transportation facilities were cited as barriers to its development goals, as stated below.

> *"Large properties are bisected with fragments of highway infrastructure, giving the study area a suburban character, while being centrally located within the District. As a result, development in the study area over the past several decades has been insular, gated, and disconnected from adjacent vibrant neighborhoods and the dynamism of the city."*

North Capitol Crossroads Study goals included:

- Improved multimodal connectivity throughout the study area for pedestrians, bicycles, and transit, as well as the overall street grid network
- Enhanced urban form to enable a block structure, add open space, implement green infrastructure, and highlight landmark views
- Increased development potential and density, which also brings increased tax revenue to enhance District services for residents
- Shared transportation infrastructure costs by aligning public- and private-sector investments

The scenarios developed in the North Capitol Cloverleaf Urbanization Study advance all these goals through public roadway redesign that reclaims development potential within the existing cloverleaf ramps, allows for connections with future redevelopment, and provides more and safer multimodal connectivity options.

# Urbanized Alternative

## Concept Plan and Typical Sections

The Urbanized Alternative concept design would remove the freeway-style cloverleaf interchange and replace it with a pair of connector roadway segments in the northeast and southwest quadrants with new signalized intersections to control traffic circulation, as portrayed in **Figure 10**. This alignment reclaims the inaccessible public right-of-way within the existing cloverleaf ramps for future development or recreation and provides new pedestrian access between Irving Street NW/NE and North Capitol Street.

The redesigned intersection retains grade separation and the existing two-way cycle track and replaces all uncontrolled ramps with signalized intersections, providing controlled pedestrian crossings. The removal of these uncontrolled ramps creates a much safer pedestrian environment, furthering the District's commitment to Vision Zero. **Figure 11** portrays the typical sections for North Capitol Street, Irving Street NW/NE, and the new connector roads.

*Figure 9. Crosstown Multimodal Transportation Study Recommendation MM.6B*

*Figure 10. Urbanized Alternative Concept Diagram*

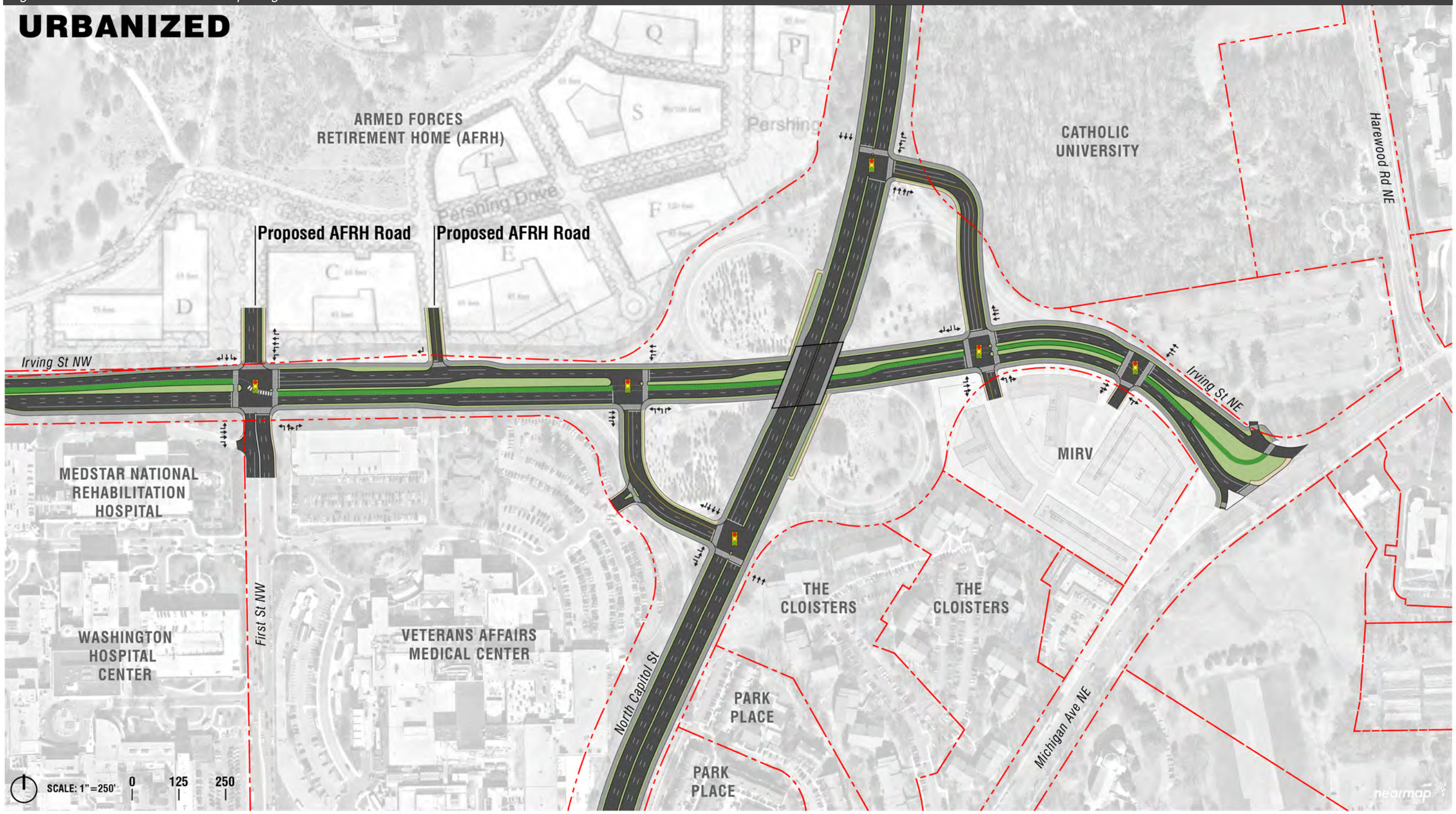


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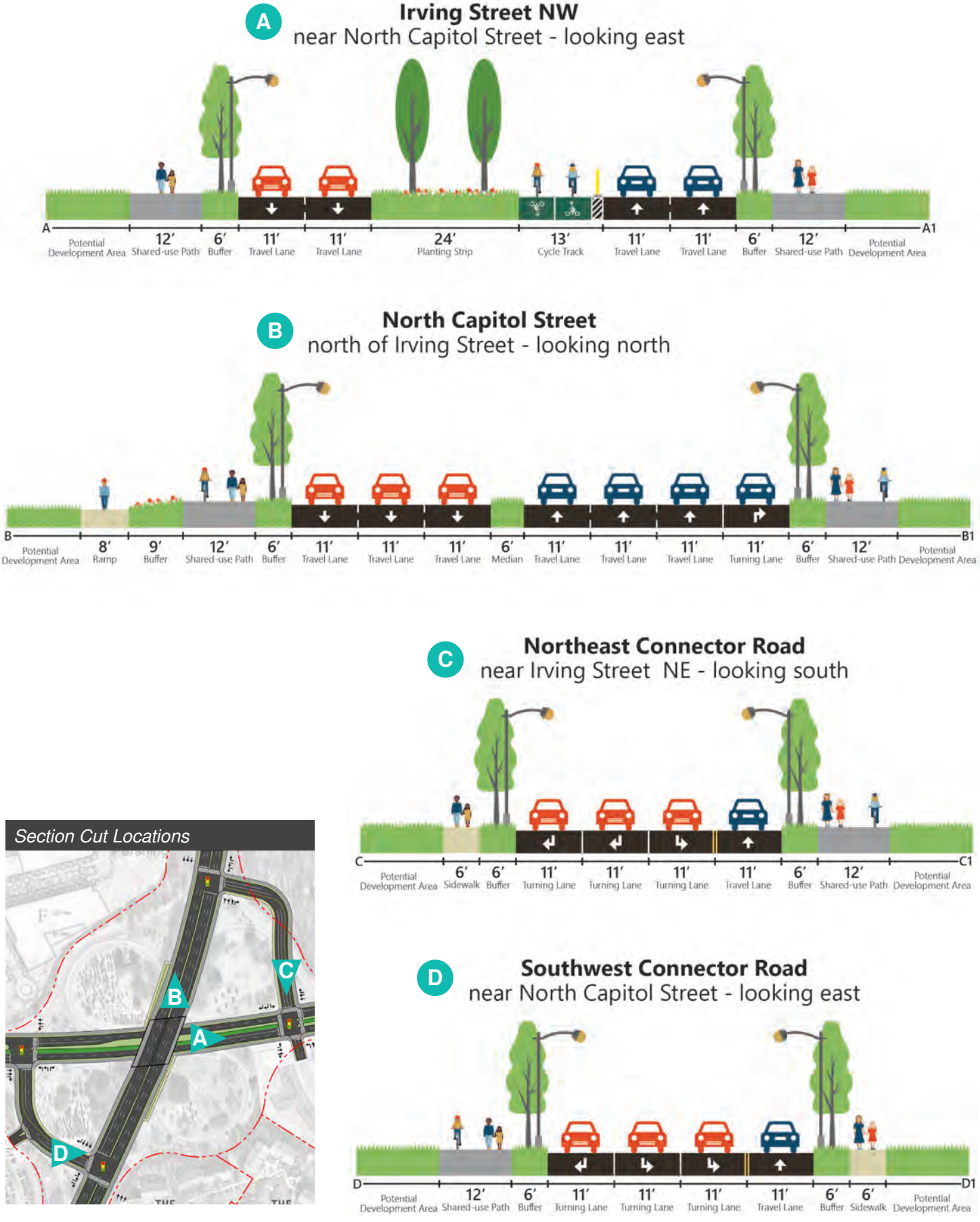
*Figure 11. Typical Sections*




*Section Cut Locations*

*Figure 12A. Irving Street NW/NE Westbound Access to North Capitol Street (Urbanized Alternative)*

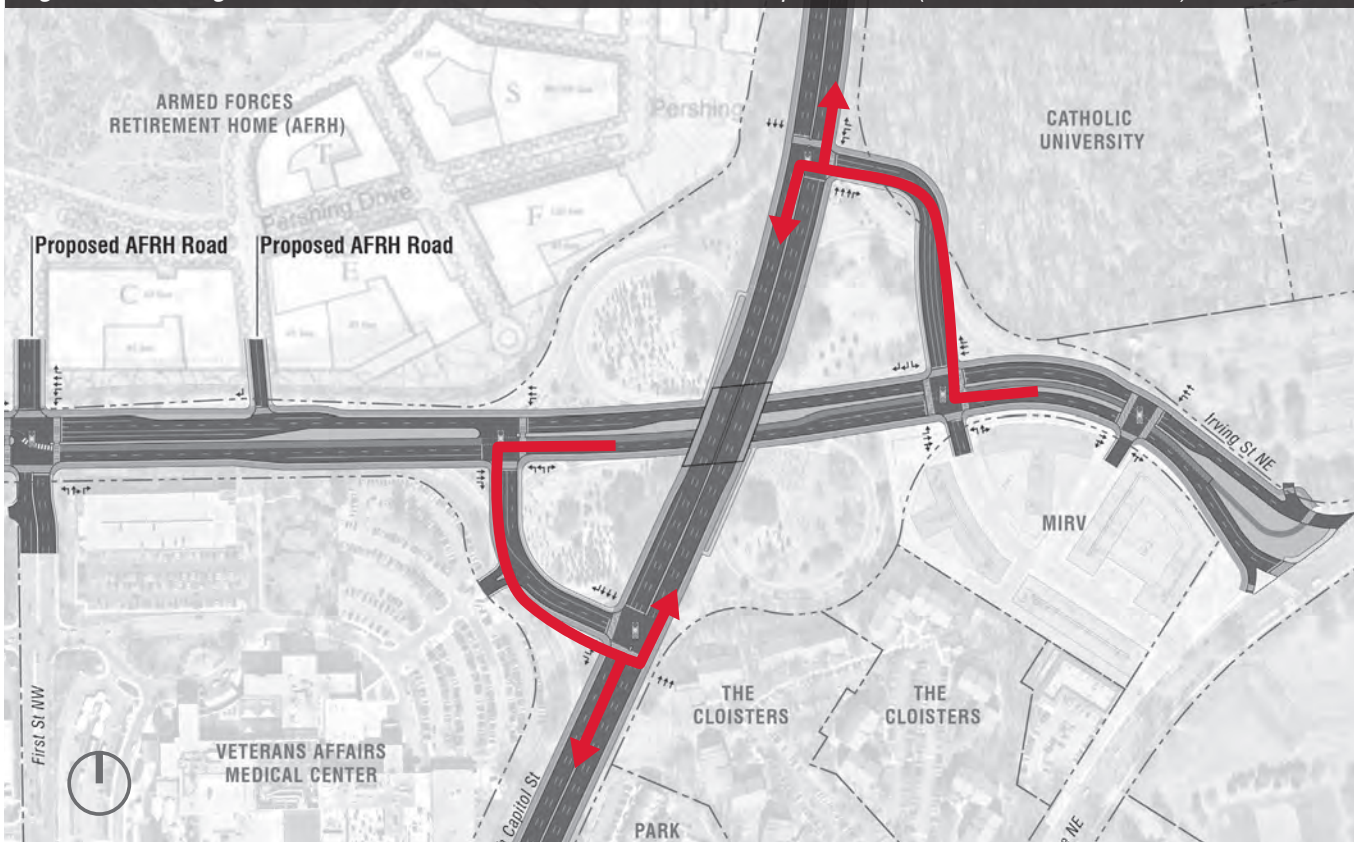



*Figure 12B. Irving Street NW/NE Eastbound Access to North Capitol Street (Urbanized Alternative)*

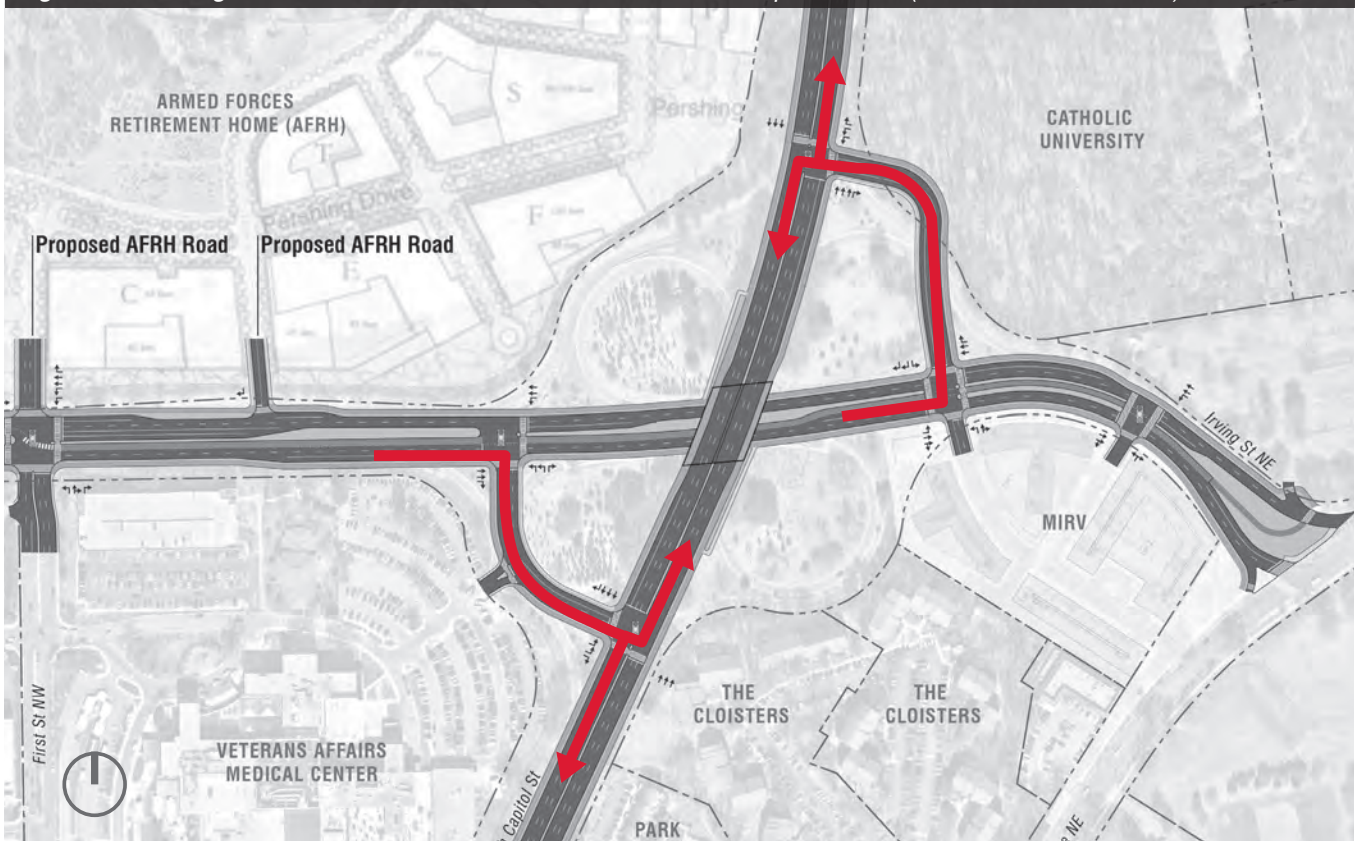


*Figure 12C. North Capitol Street Northbound Access to Irving Street NW/NE (Urbanized Alternative)*

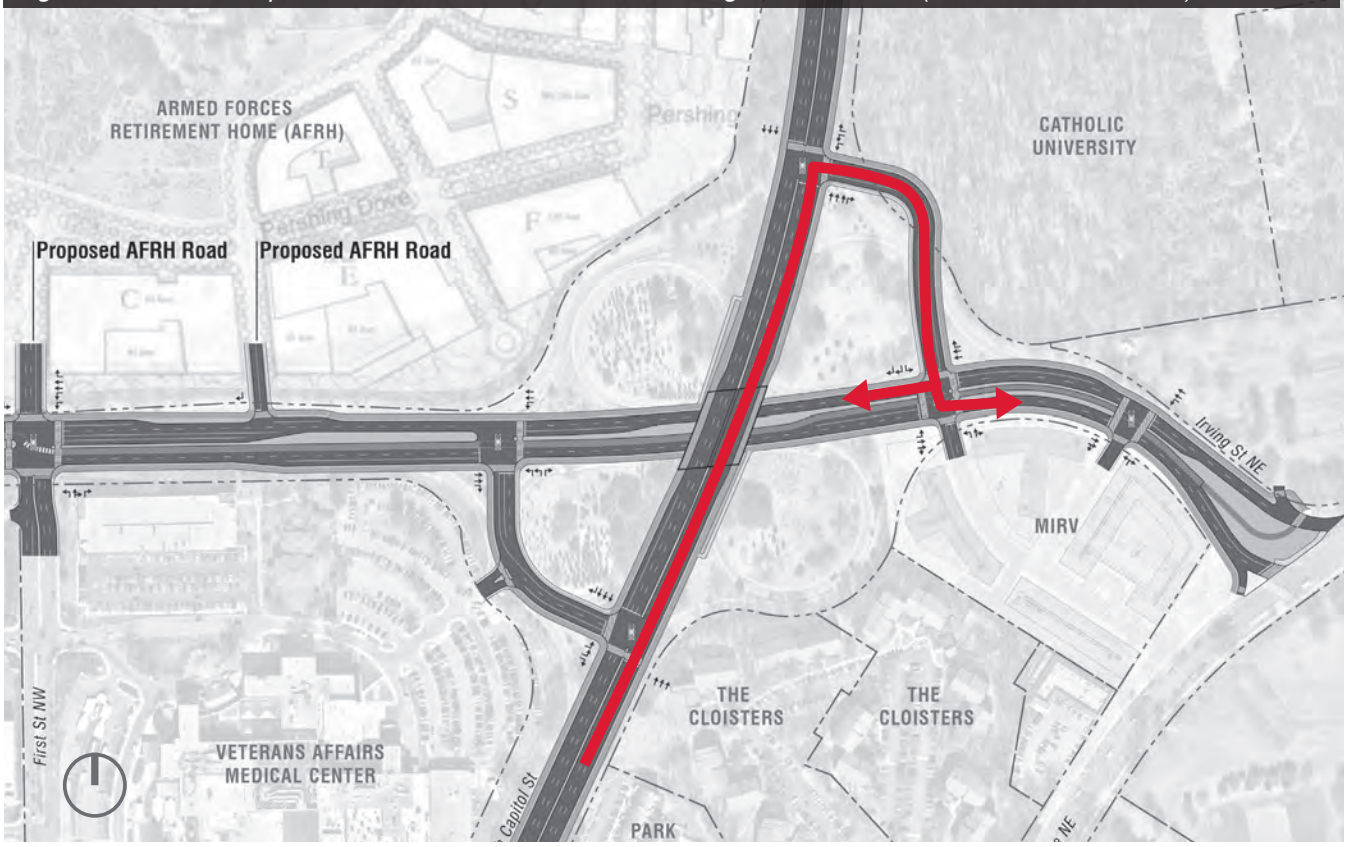
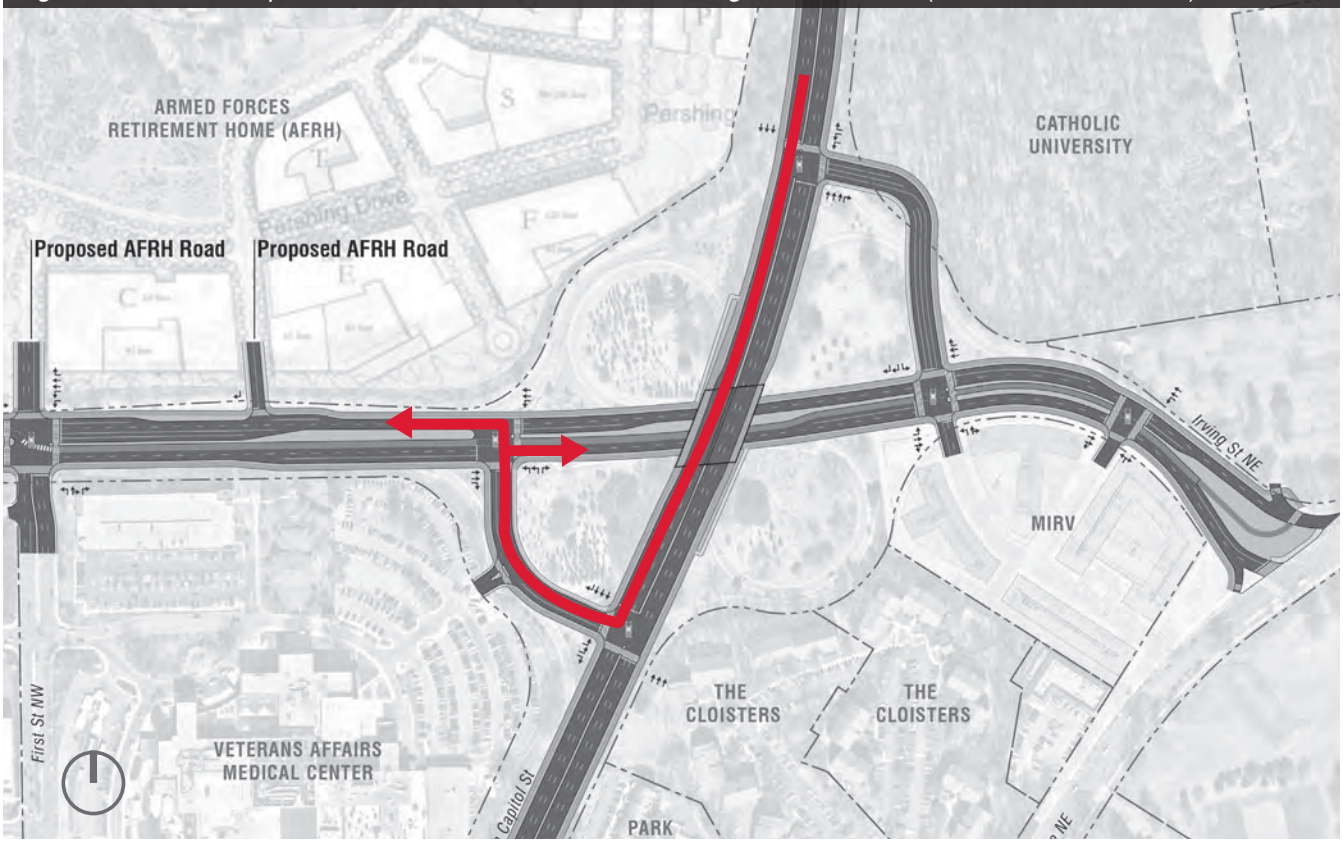



*Figure 12D. North Capitol Street Southbound Access to Irving Street NW/NE (Urbanized Alternative)*



## Transportation Facilities

### Roadway Network and Circulation

The primary purpose of the Urbanized Alternative roadway network is to remove the existing interstate highway style cloverleaf interchange of North Capitol Street and Irving Street and replace it with a more human scale network of urban intersections. This conversion is done by creating two new connections in the northeast and southwest quadrants of the intersection. This new network of connections will maintain and expand access by providing four new signalized intersections—one at the end of each new connector road.

The two intersections along Irving Street will be full access and allow all turning movements from any approach, as shown in **Figures 12A–12D**. This will allow vehicles to have multiple route options for connecting to North Capitol Street. For example, a vehicle traveling from eastbound Irving Street NW to northbound North Capitol Street will be able utilize either the northeast (left from Irving Street and right onto North Capitol Street) or the southwest (right from Irving Street and left onto North Capitol Street) connector roadways.

The two intersections along North Capitol Street will be limited access and left turns from North Capitol Street to the new connector roadways will be restricted. The primary reason for this is the high vehicle volume along North Capitol Street. While allowing lefts from North Capitol Street would increase vehicle dispersion, it would also require stopping the opposing North Capitol Street movement and widening the roadway cross section to provide significant left-turn bays. To limit overall roadway widening and traffic delays/queues on North Capitol Street, all turns from North Capitol Street will be limited to right turns onto the new connector roadways. Vehicles will be able to access either direction of Irving Street from both the connectors and the proposed signalized intersections.

In addition to the Urbanized Alternative's two new connectors, all adjacent proposed development project access points have also been incorporated. AFRH, located in the northwest quadrant, proposes two roadway connections, including a northern road at the Irving Street/First Street NW signalized intersection and a right-in/right-out access along Irving Street NW between First Street NW and North Capitol Street. VAMC, located in the southwest quadrant, has an existing access point and proposes a right-in/right-out driveway along the ramp from Irving St NW eastbound to North Capitol St NW southbound. This driveway has been maintained in the concept design for the southwest connector roadway. MIRV, located in the southeast quadrant, proposes two access points along Irving Street NE, including a right-in/right-out along the northern portion of the site and a full-access, signalized intersection along the eastern portion of the site.

### Pedestrian, Bicycle, and Transit Facilities

#### *Pedestrian*

The Urbanized Alternative provides additional, safer, and more comfortable pedestrian facilities, as depicted in **Figure 13**. Proposed pedestrian facilities along North Capitol Street and Irving Street NW/NE include 12-foot-wide SUPs on each side of both roadways, consistent with recommendations from the Crosstown Multimodal Transportation Study and sidewalk gaps identified in the moveDC 2021 update. Along the connectors, direct pedestrian access is provided between North Capitol Street and Irving Street NW/NE via SUPs on the inner side of each roadway and sidewalks on the outer sides. Additional sidewalk access is proposed from the east side of North Capitol Street to the south side of Irving Street NE and from the west side of North Capitol Street to the north side of Irving Street NW. All SUPs and sidewalks along public roadways are proposed to include 6-foot wide landscaped buffer between the walkway and the roadway. Operational improvements will also be added through the implementation of leading pedestrian intervals (LPIs) at each signalized crossing.

The North Capitol Street and Irving Street NW/NE intersection design reduces the number roadway crossing points on the south side of Irving Street NW/NE from four to two and provides pedestrian signal control

at both intersections. Another signalized crossing will be added at the approved MIRV access between the new signalized intersection and Michigan Avenue NE.

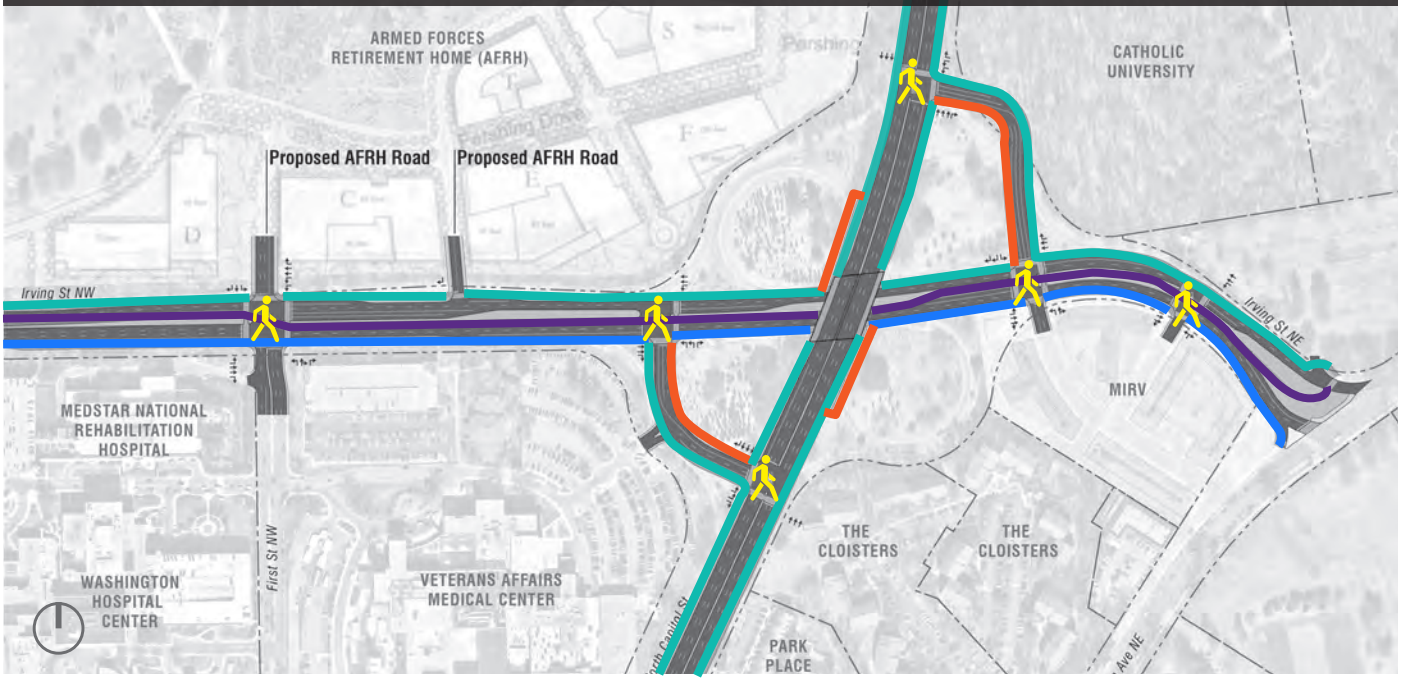
New pedestrian facilities are proposed on the north side of Irving Street NW/NE, where none currently exist. Only one signalized crossing is needed, at the intersection with the northeast connector North Capitol Street connector. On Irving Street NW, west of the North Capitol Street, two new roadways will provide direct access to the AFRH. The AFRH connection at First Street NW will be signal controlled, and the access farther east, which only allows right turns in and out of the site, will be unsignalized.

Along North Capitol Street, SUPs are proposed on the east and west sides of the roadway connecting to the existing pedestrian facilities on the bridge. Direct sidewalk or pathway connections will be provided from the North Capitol Street SUPs to the Irving Street SUPs adjacent to the bridge. These improvements will fundamentally change the pedestrian experience on Irving Street, specifically the removal of the free-flow ramps, addition of new and enhanced pedestrian facilities, and introduction of  blocks will make this a more comfortable and welcoming pedestrian experience as the area redevelops.

### *Bicycle*

The Irving Street two-way cycle track is retained in the Urbanized Alternative to maintain Crosstown mobility. The Urbanization Study considered a potential reconfiguration of the on-street bicycle facilities to replace the median cycle track with separated bicycle lanes along the Irving Street curbside in each direction. However, heavy projected right-turning traffic volumes at multiple intersections on Irving Street represent a significant vehicle-bicycle conflict and safety issue for the separated bike lanes. Additionally, the proposed traffic signal phasing is conducive to providing significantly more green time for bicycle signal phases for a median cycle track, which supports maintaining a median cycle track design, in line with the original Crosstown Multimodal Transportation Study recommendations.

*Figure 13. New Pedestrian and Bicycle Facilities*



The SUPs on Irving Street NW/NE will provide additional bicycle routes to access North Capitol Street along the connectors to minimize conflict points crossing from the center-running cycle track to connect to the proposed SUPs along North Capitol Street. At least one crosswalk is provided for the cycle track at each signalized intersection to expand bicycle facility access. The new SUPs along North Capitol Street create a new north-south bicycle route where none currently exists.

***Transit***

The study intersection does not have any adjacent Metrobus stops under existing conditions or the Urbanized Alternative. Metrobus lines D8, H2, and H4 serve the WashingtonHospital Complex, and MetroAccess, the Washington Metropolitan Area Transit Authority's (WMATA's) paratransit service, also makes frequent trips to the Complex. No transit stops are provided on Irving or North Capitol Streets and no improvements are proposed under the Urbanized Alternative, as Michigan Avenue NE is the primary transit corridor for this area. However, the proposed connections would allow for more direct access for transit if routes are expanded in the area to serve the new developments, as well as better pedestrian connectivity to access potential transit stops on existing roadways. North Capitol Street is also identified as a Future Transit Priority Corridor by DDOT's Bus Priority Program, which could serve future developments in the area.

## Local Access and Adjacent Development

A major goal of the Urbanized Alternative is to improve access to the sites around the North Capitol Street and Irving Street NW/NE and reclaim the under-utilized public property currently separated from surrounding development by the cloverleaf ramps. The new intersection design provides a new direct point of access to the Washington Hospital Complex from the southwest connector and would allow for two new points of access to AFRH from Irving Street NW. East of the intersection, the Urbanized Alternative includes two access points into the future MIRV development, including one that is part of four-leg intersection with Irving Street NE and the northeast connector.

The proposed configuration eliminates barriers to the land previously separated by the cloverleaf ramps (for more information see the Land Use section on page 24). In the northwest and southeast quadrants, the elimination of the ramps opens up the public right-of-way directly to the adjacent privately-owned parcels. The southwest and northeast quadrants remain separated by the new connectors but are improved for future redevelopment with controlled pedestrian access, adjacent SUPs, and controlled intersections slowing traffic moving around the site. The connectors are also designed to create a parcel shape more attractive to development than the existing curved ramps. To implement the proposed Northeast Connector alignment, right-of-way would need to be acquired from CUA, but all other improvements can be implemented within existing DDOT right-of-way.

# Urbanized + Connected Alternative

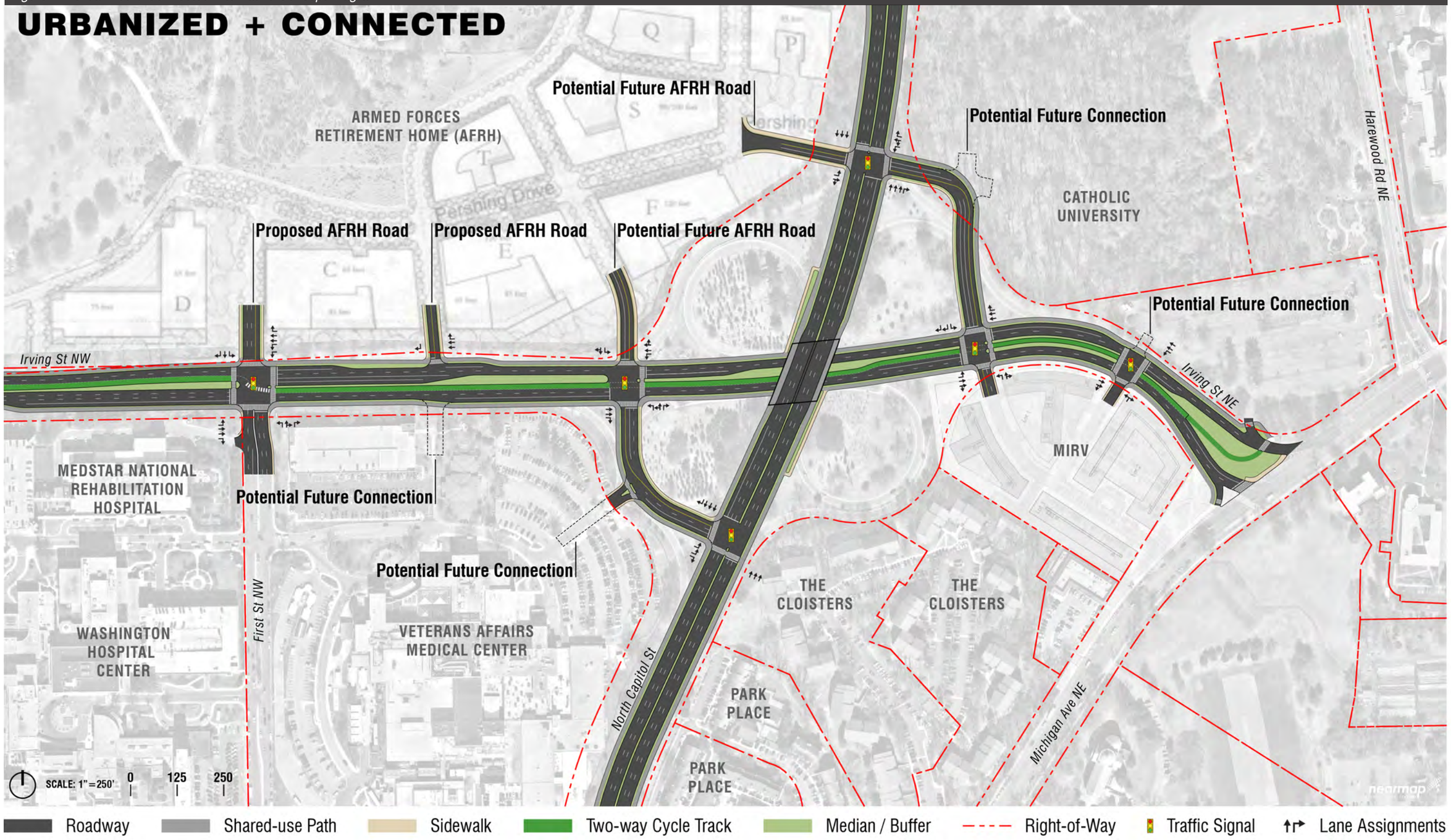
## Concept Plan and Typical Sections

The Urbanized + Connected Alternative shown in **Figure 14** builds on the Urbanized Alternative, assuming the Urbanized Alternative would be implemented first and the additional connections would be built out in coordination with future development on the adjacent parcels. The design enables up to four new four-leg intersections:

- A new AFRH entrance road across Irving Street NW from the southwest connector
- A second additional AFRH entrance road across North Capitol Street from the northeast connector
- A northern continuation of the eastern-most MIRV access toward CUA across Irving Street NE
- The conversion of the northeast connector corner into two roads extending to the north and to the east

The typical sections of North Capitol Street, Irving Street NW/NE, and the connector roads remain the same as the Urbanized Alternative (see **Figure 11**).

*Figure 14. Urbanized + Connected Alternative Concept Diagram*



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## Transportation Facilities

### Roadway Network and Circulation

The Urbanized + Connected Alternative roadway network goal is to expand and build upon the Urbanized Alternative to provide additional connections. These connections will better link the future development parcels along the corridor and provide for enhanced connectivity. The additional connections will also provide for increased dispersion of traffic and reduce the vehicle volume along Irving Street.

For the AFRH development, located in the northwest quadrant, two additional connections are proposed. These include a northern approach to the new Irving Street NW/Southwest connector signalized intersection and a western approach to the new North Capitol Street/ Northeast Southwest connector signalized intersection. This provides the significant benefit to the development of direct egress to North Capitol Street in this part of the site and removes vehicle traffic from Irving Street that will otherwise utilize the Irving Street NW/First Street NW intersection in the No Build and Urbanized Alternative conditions.

The parcel located in the northeast quadrant of the intersection is controlled by CUA. While there are no current plans to redevelop the site, the Urbanized + Connected Alternative offers an opportunity for that parcel to connect to the new roadway network. Potential future connections for redevelopment in this area are envisioned along the northeast connector roadway and at the new MIRV signalized access along Irving Street NE.

### Pedestrian, Bicycle, and Transit Facilities

The multimodal facilities included in the Urbanized + Connected Alternative are the same as the proposed facilities in the Urbanized Alternative. The additional access points to AFRH will include sidewalks connecting with planned development on the site.

## Local Access and Adjacent Land Use

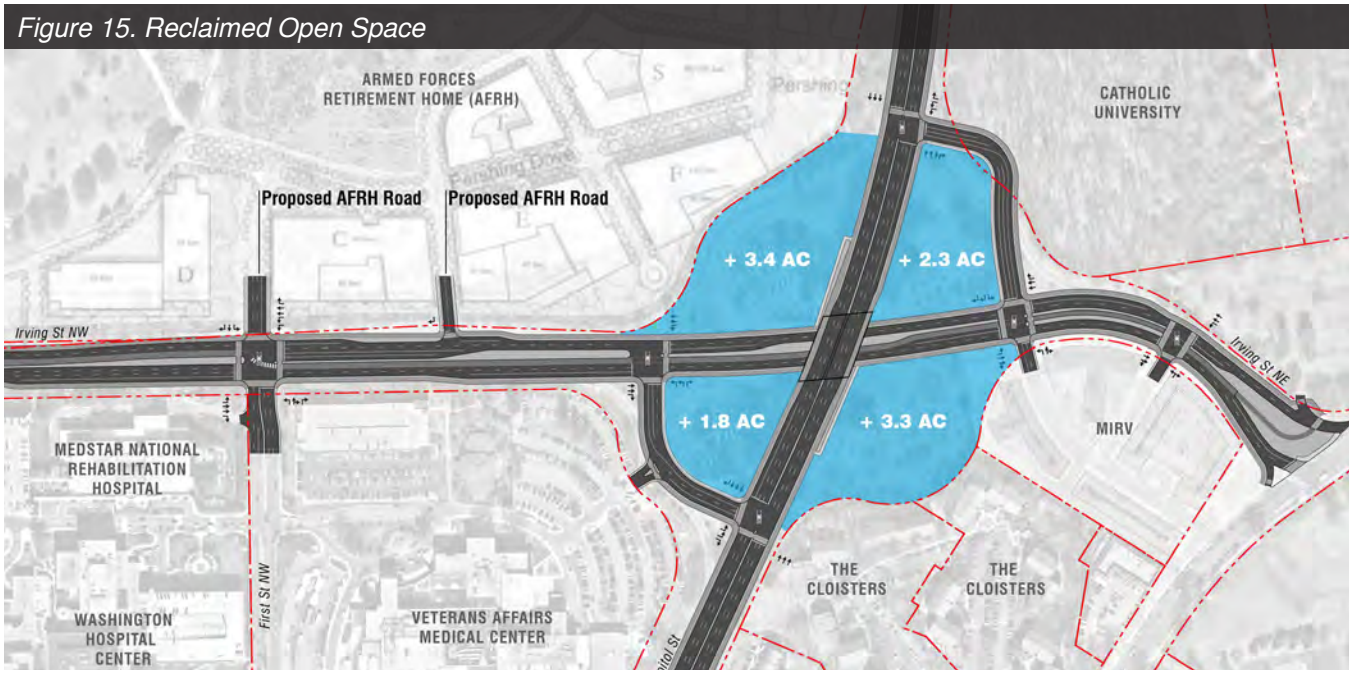
The Urbanized + Connected Alternative relies upon coordination with adjacent private developments that include internal roadway networks to enhance the overall urban form, aligning with the approach recommended in the 2019 North Capitol Crossroads Study. The new AFRH access roads provide additional access to the site itself, but also enable connections to areas northeast of the AFRH via the site. The potential future connections at the MIRV access and northeast connector will achieve similar goals of both increased access to the adjacent sites and routes through the sites to other destinations via an interconnected street grid network.

## Land Use

The area surrounding the study area, identified in the DC Comprehensive Plan as the North Capitol Crossroads Future Planning Analysis Area, has multiple development, redevelopment, or modernization projects proposed on several large sites surrounding the interchange. As mentioned in the Local Access and Adjacent Land Use section on page 20, a major goal of the Concept Alternatives is to improve access to parcels that will be redeveloping in the future. An outcome of these alternatives is the potential for additional land to be reclaimed from inside the four cloverleaf ramps. **Figure 15** shows the land area that could be repurposed for other uses that better integrate into these new neighborhoods as a result of implementing either Concept Alternative, totaling nearly 11 acres.

The success of the Urbanized + Connected Alternative depends on coordination with private developers implementing internal street grid networks to achieve a true interconnected urban street network. Both alternatives fundamentally change the character of Irving Street by removing the freeway style ramps to North Capitol Street, introducing multiple controlled intersections, and adding enhanced bicycle and pedestrian facilities. This change will allow developments along Irving Street to be designed to engage the streetscape with their building frontages. Irving Street would transition from an uninviting area to walk to an activated and engaging public realm for residents, workers, and visitors.

*Figure 15. Reclaimed Open Space*



# TRAFFIC OPERATIONS

## Existing Conditions

The existing cloverleaf operates as a highway interchange. There are few vehicle conflict points and where there are conflicts (i.e., merge at the end of a free-flow ramp), it operates under yield control. This type of control and intersection layout is designed to prioritize vehicle movements and allows for close to free flow vehicle operations while minimizing vehicular delay.

### Existing Traffic Volumes and Data

Existing Condition traffic volumes were developed from various sources. DDOT provided traffic count information at the signalized intersection within the study area. Interchange volumes were developed based on the latest available traffic counts presented in area development project's permitting documents. A summary of the traffic count sources for each intersection is provided:

- Irving St NW/First St NW: DDOT
- North Capitol St NW/Irving St NW: DDOT
- Interchange Northside: AFRH 2017 Draft Supplemental Environmental Impact Statement (DSEIS) and Comprehensive Transportation Review (CTR)
- Interchange Southside: MIRV 2018 Interchange Modification Report (IMR)
- Irving St NE/Michigan Ave NE: DDOT

Although not in place during the counts, this project has assumed that the Irving Street Crosstown protected cycle track is as an existing condition as it was in operation at the beginning of the study. DDOT provided area signal timings and a base traffic analysis model (Synchro) which included updates to the Irving Street corridor related to the bicycle facility's installation.

# No Build Conditions

The No Build Condition was developed to evaluate future transportation conditions within the traffic study area without consideration of the Cloverleaf Urbanization project. The selected future horizon year is 2045. This assumption aligns with the AFRH CTR full-build scenario and MWCOG's Visualize 2045 Constrained Long Range Plan.

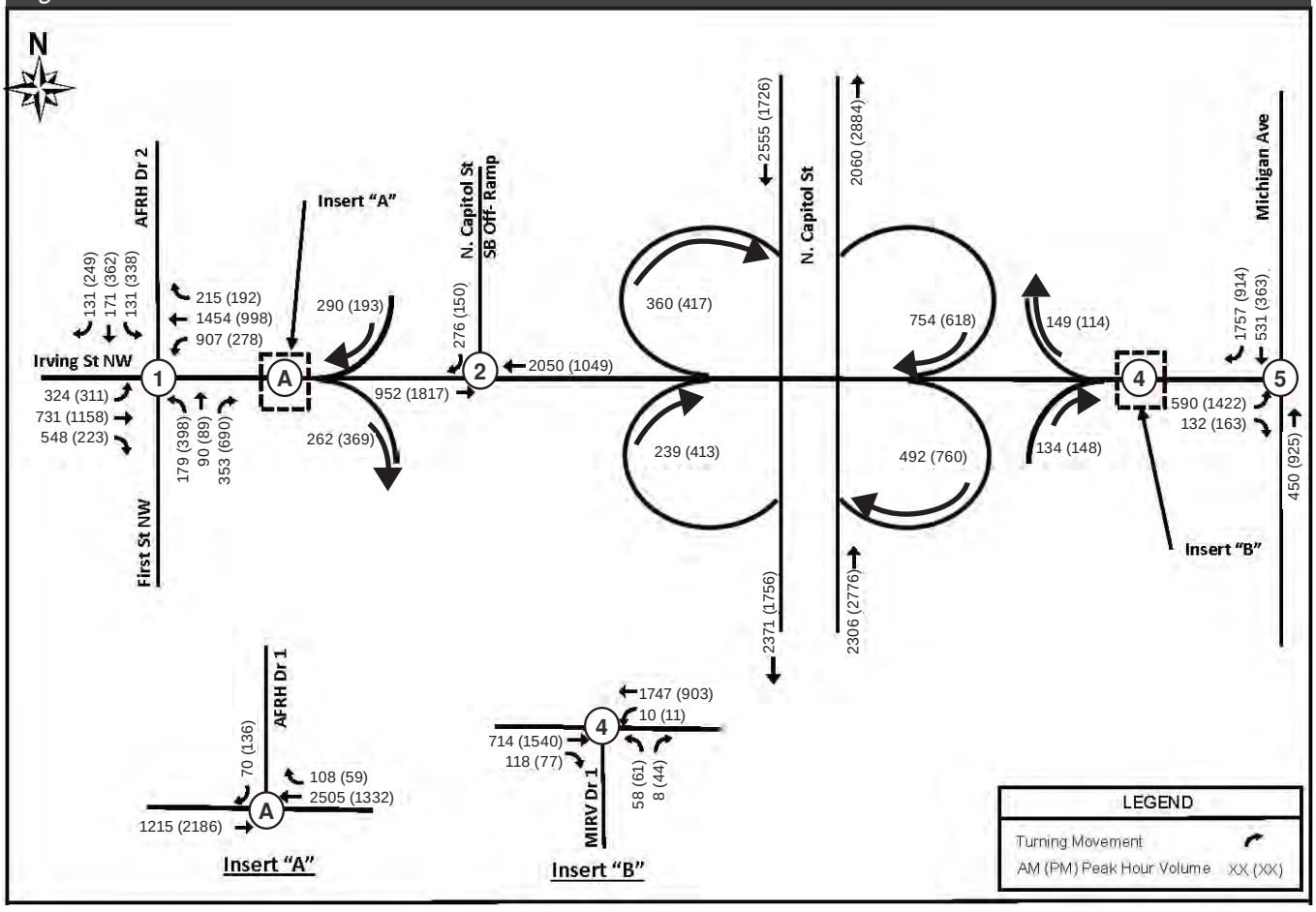
## No Build Traffic Forecasts

As mentioned previously, there is a significant amount of development that is planned in and around the Cloverleaf area. To account for this growth, background traffic was added to the network. Future additional vehicle trips are a result of one of two key elements: regional growth and traffic generated by specific planned projects that are expected to affect the local roadway network.

Regional traffic growth is usually accounted for using percentage growth rates. The growth rates used in this analysis were developed based on information from the AFRH Report and assume a general 0.3 percent annual growth rate. This rate is consistent with the MWCOG regional transportation model and the MIRV development assumptions.

While the regional growth provides a general area traffic increase, background developments typically represent local traffic changes. Through each development project's permitting process, a traffic study is prepared which outlines the site plan, access point, project generated trip and trip distribution/ assignment. Background project-generated trips for the following

*Figure 16. Future No Build Traffic Conditions*



projects are include within the future traffic network:

- AFRH Master Planned Redevelopment
- CUA Campus Master Plan
- McMillan Sand Filtration Site Redevelopment
- MIRV Mixed-Use Development
- VAMC Master Plan

The MIRV development proposes a signalized intersection along Irving Street NE. This intersection of Irving St NE/MIRV Site connection has been added to the study area. The future No Build condition traffic volumes for the morning and evening peak hours are summarized in **Figure 16**.

## Future Conditions

The Future Condition was developed to evaluate transportation conditions within the study area with the Cloverleaf Urbanization project in-place and operational. There are two scenarios included in the Future Condition analyses, which both build upon the No Build traffic volume forecasts. The Urbanized Alternative removes the cloverleaf interchange and replace it with a network of urban signalized intersections. The Urbanized + Connected Alternative continues to build upon the Urbanized condition and provides additional connections to better link the future development parcels along the corridor and provide for enhanced connectivity.

*Figure 17. North Capitol Street and NE Connector*

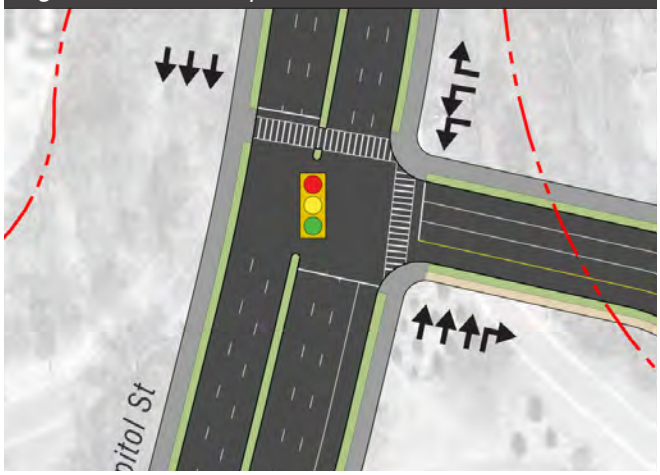


*Figure 18. North Capitol Street and SE Connector*

*Figure 19. Irving Street NE and NE Connector*

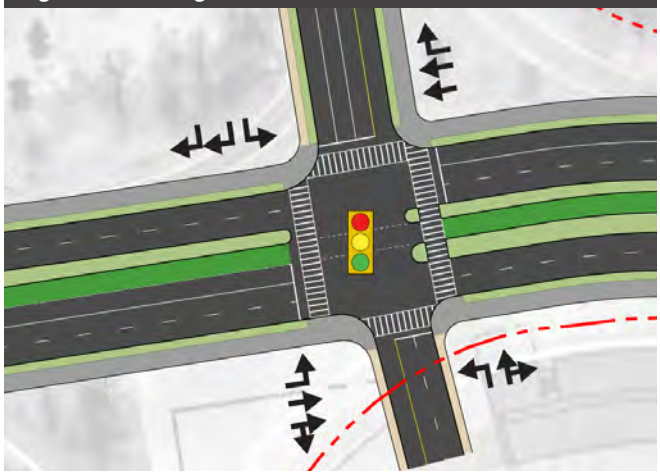
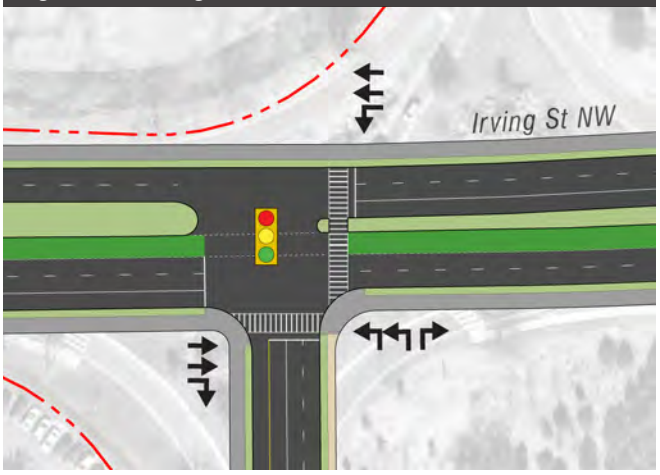


*Figure 20. Irving Street NW and SE Connector*



It should be noted that no new additional vehicle volume was added to the roadway network in either of these scenarios. Both alternatives modify roadway links and operations, but neither are expected to intrinsically produce any new vehicle trips to and through the study area.

## Urbanized Alternative

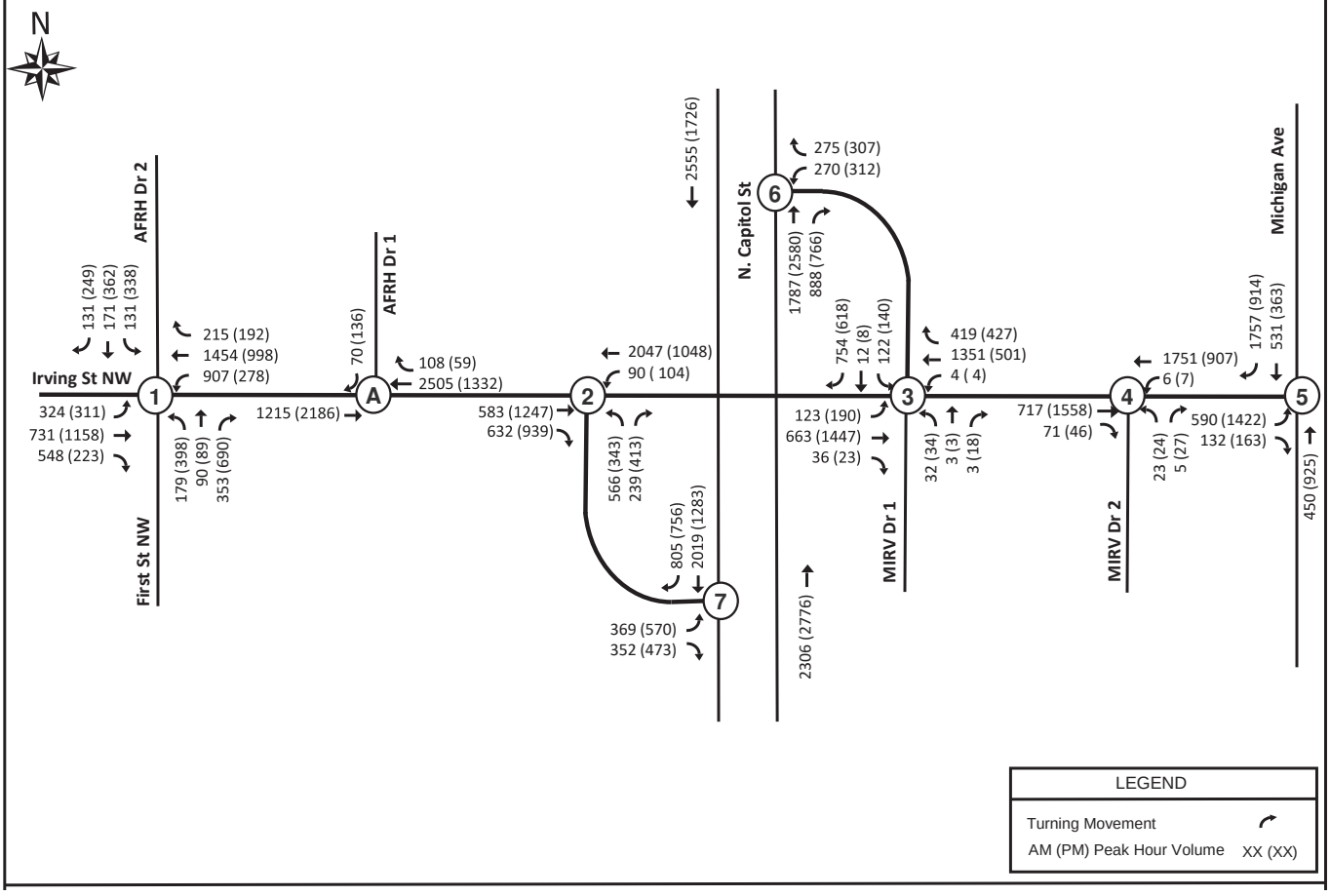
### Traffic Forecast

The four new signalized intersections of the Urbanized Alternative roadway network will significantly change traffic flows and operations through the area. Currently, vehicles traverse the area with little delay due to the ramp configuration. The new intersections will add delay to these movements, as the number of conflict points are increased, and all vehicles will now be processed by the planned traffic signals. However, this signal control will provide enhanced opportunities for pedestrian, bicycle, and future transit connections throughout the area.

The two planned signalized connector intersections on Irving Street will be full-access and allow all turning movements from any approach. This will allow vehicles to have multiple route options for connecting to North Capitol Street. To help determine the appropriate assignment for the multiple routes, a review of the expected traffic operation and delay for each path was explored and balanced.

The two intersections along North Capitol Street will be limited access and left turns, from North Capitol Street to the new connector roadways will be restricted. All turns from North Capitol Street will be right-turn movements onto the new connector roadways. Vehicles will then be able to travel in either direction along Irving Street from the new Irving Street intersections.

*Figure 21. Future Traffic Conditions – Urbanized Alternative*



**Figures 17–20** show the proposed intersection and lane geometries at the new signalized intersections. The future Urbanized condition traffic volumes for the morning and evening peak hours are summarized in **Figure 21**.

## Urbanized + Connected Alternative

### Traffic Forecast

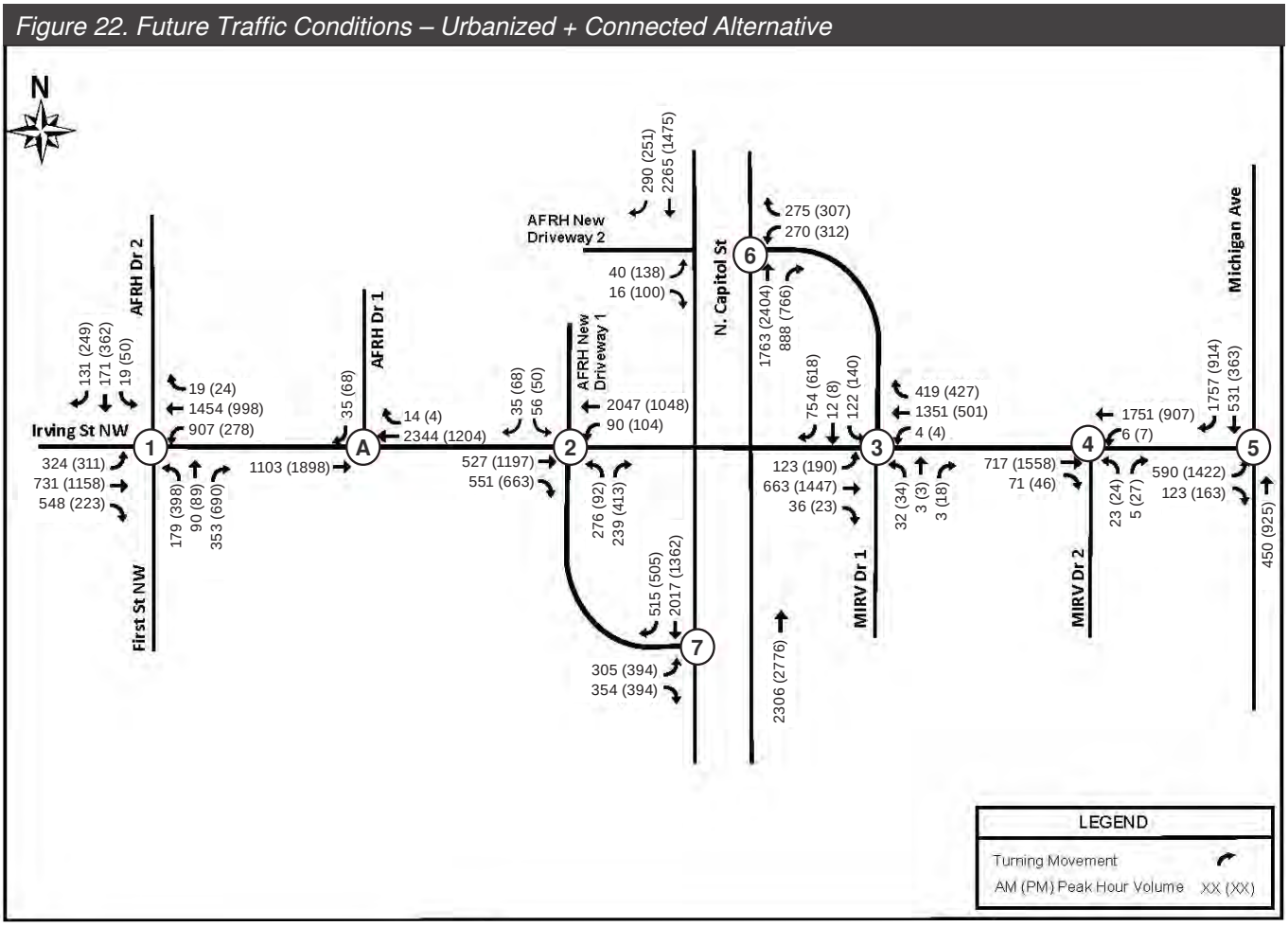
By expanding upon the previous scenario, the Urbanized + Connected Alternative roadway network provides additional connections to better link the future development parcels along the corridor and provide for enhanced connectivity.

The site that benefits the most from this alternative is the AFRH development. Located in the northwest quadrant of the intersection, the development plan does not currently propose a direct connection to North Capitol Street along its eastern boundary near Irving Street. Vehicles approaching the AFRH site North Capitol Street, particularly from the south, are expected to use Irving Street and the First Street NW access.

In this Alternative, a new western approach to the North Capitol Street/Northeast Connection signalized intersection is added. This will be a significant benefit to the development, as it will provide direct access to North Capitol Street (both northbound and southbound) in this portion of the site. By doing so, it will remove vehicle volume from Irving Street and should improve operations along that corridor.

The future Urbanized + Connected condition traffic volumes for the morning and evening peak hours are summarized in **Figure 22**.

*Figure 22. Future Traffic Conditions – Urbanized + Connected Alternative*



# Capacity Analysis

Intersection capacity analyses were performed at the intersections within the study area during the morning and afternoon peak hours for the Future Conditions. Due to the planned development in the area and the complete change in roadway geometry and control, the Existing Conditions analysis is not expected to be comparable to the Future Conditions.

Synchro software was used to analyze the study intersections based on Highway Capacity Manual (HCM 2000) methodologies. The results of the capacity analyses are expressed in level of service (LOS) and delay (seconds per vehicle) for each approach. A LOS grade is a letter grade based on the average delay (in seconds) experienced by motorists traveling through an intersection. LOS results range from "A" (<10 seconds) being the best to "F" (>80 seconds) being the worst. LOS D (35–55 seconds) is typically used as the acceptable LOS threshold in the District; although LOS E (55–80 seconds) or F is sometimes accepted in urbanized areas if vehicular improvements would be a detriment to safety or non-auto modes of transportation.

## Summary of Findings

A summary of the Future Conditions LOS analysis for the for the morning and evening peak hours are presented in **Tables 1 and 2**, respectively. Additional detailed operational information, including delay, capacity, and queue information, can be found in the appendix.

The study intersections generally operate at acceptable conditions during the morning and afternoon peak hours in the 2045 Future scenarios. The exception to this is the intersection of Irving Street NW/ First Street NW. This intersection is unmodified from AFRH's proposed redevelopment plans by the Urbanization project but will experience significant traffic increases due to the AFRH and VAMC background projects. The AFRH project adds a northern approach to the intersection and both of these sites will add hundreds of vehicles making turning movements at the intersection.

Additionally, the intersections at either end of the Northeast connector (Irving St NE/Northeast Connection and North Capitol St/Northeast Connection) operate at an overall intersection LOS E during both the morning and evening peak hours. Both of these intersections experience a high volume of turning movements as the connection provides for access from North Capitol Street northbound to Irving Street westbound and the adjacent medical area.

While there would be vehicle delay at these intersections, the intersection of Irving Street NW/First Street NW is not substantially affected by the Preferred Alternative. The new intersections with the Northeast Connector are anticipated to operate at LOS E, which is acceptable considering the urbanized contexts the Alternatives represent in the corridor, the prioritization of pedestrian and cyclist safety and comfort, and the goal to facilitate a major transformation of the land uses in the area. The additional vehicular roadway capacity necessary to improve the LOS at these intersections would involve roadway widening at significant cost and detriment to the multimodal improvements and overall goals of the project, while providing only modest improvements in traffic operations.

| Table 1 \| Morning Peak-Hour Intersection Capacity Analysis | | | | |
|---|---|---|---|---|
| | **Intersection/Approach** | **No Build Condition** | **Connected Alternative** | **Urbanized + Connected Alternative** |
| **1** | **Irving St NW/First St NW** | **F** | **F** | **F** |
| | *Eastbound* | E | F | F |
| | *Westbound* | F | F | F |
| | *Northbound* | F | E | E |
| | *Southbound* | F | F | F |
| **2*** | **Irving St NW/North Capitol St SB Off-Ramp** | **B** | -- | -- |
| | *Westbound* | B | -- | -- |
| | *Southbound* | D | -- | -- |
| **2** | **Irving St NW/Southwest Connector** | -- | **C** | **C** |
| | *Eastbound* | -- | C | C |
| | *Westbound* | -- | C | C |
| | *Northbound* | -- | D | D |
| | *Southbound* | -- | -- | D |
| **3** | **Irving St NE/Northeast Connector** | -- | **E** | **E** |
| | *Eastbound* | -- | C | D |
| | *Westbound* | -- | F | F |
| | *Northbound* | -- | F | F |
| | *Southbound* | -- | F | F |
| **4** | **Irving St NE/MIRV Connection** | **A** | **A** | **A** |
| | *Eastbound* | A | B | B |
| | *Westbound* | A | A | A |
| | *Northbound* | C | D | D |
| **5** | **Irving St NE/Michigan Ave NE** | **C** | **C** | **C** |
| | *Eastbound* | D | E | E |
| | *Northbound* | A | A | A |
| | *Southbound* | C | C | C |
| **6** | **North Capitol St/Northeast Connector** | -- | **C** | **E** |
| | *Eastbound* | -- | -- | D |
| | *Westbound* | -- | E | E |
| | *Northbound* | -- | B | D |
| | *Southbound* | -- | D | F |
| **7** | **North Capitol St/Southwest Connector** | -- | **C** | **B** |
| | *Eastbound* | -- | B | C |
| | *Northbound* | -- | D | C |
| | *Southbound* | -- | B | A |

***Note**: LOS results reported from A (best operations) to F (worst operations). Bold indicates overall intersection LOS.*

**Intersection to be replaced by signalized Southwest Connector road in future conditions.*

| Table 2 \| Evening Peak-Hour Intersection Capacity Analysis | | | | |
|---|---|---|---|---|
| | **Intersection/Approach** | **No Build Condition** | **Connected Alternative** | **Urbanized + Connected Alternative** |
| **1** | **Irving St NW/First St NW** | **F** | **F** | **F** |
| | *Eastbound* | F | F | F |
| | *Westbound* | F | F | F |
| | *Northbound* | F | F | F |
| | *Southbound* | F | F | F |
| | **Irving St NW/North Capitol St SB Off-Ramp** | **A** | -- | -- |
| | *Westbound* | B | -- | -- |
| | *Southbound* | C | -- | -- |
| **2** | **Irving St NW/Southwest Connector** | -- | **C** | **C** |
| | *Eastbound* | -- | D | C |
| | *Westbound* | -- | B | B |
| | *Northbound* | -- | C | D |
| | *Southbound* | -- | -- | C |
| **3** | **Irving St NE/Northeast Connector** | -- | **E** | **E** |
| | *Eastbound* | -- | C | C |
| | *Westbound* | -- | F | F |
| | *Northbound* | -- | F | F |
| | *Southbound* | -- | D | C |
| **4** | **Irving St NE/MIRV Connection** | **A** | **C** | **C** |
| | *Eastbound* | A | C | C |
| | *Westbound* | A | A | A |
| | *Northbound* | B | D | D |
| **5** | **Irving St NE/Michigan Ave NE** | **C** | **D** | **D** |
| | *Eastbound* | C | D | D |
| | *Northbound* | C | C | C |
| | *Southbound* | C | C | C |
| **6** | **North Capitol St/Northeast Connector** | -- | **C** | **E** |
| | *Eastbound* | -- | -- | F |
| | *Westbound* | -- | E | F |
| | *Northbound* | -- | B | E |
| | *Southbound* | -- | B | C |
| **7** | **North Capitol St/Southwest Connector** | -- | **D** | **C** |
| | *Eastbound* | -- | D | D |
| | *Northbound* | -- | E | D |
| | *Southbound* | -- | B | A |

***Note**: LOS results reported from A (best operations) to F (worst operations). Bold indicates overall intersection LOS. *Intersection to be replaced by signalized Southwest Connector road in future conditions.*

# CONCLUSIONS

The Concept Alternatives presented in this report—Urbanized and Urbanized + Connected—both advance the goals of the 2019 North Capitol Crossroads Study and improve multimodal safety and connectivity throughout the corridor without causing adverse impacts to existing traffic operations. The recommendation also furthers many of moveDC 2021's Goals including improving safety, enhancing mobility, creating enjoyable spaces, furthering equity, and creating a sustainable transportation network. The Urbanized Alternative relies on public investment in roadway redesign to leverage private investment on the reclaimed parcels of land currently separated by the cloverleaf ramps and the free-flowing traffic on those ramps. The Urbanized + Connected Alternative builds on the Urbanized Alternative design to guide the build-out of a larger street grid network throughout redeveloped parcels in the study area. The removal of the legacy highway infrastructure in both alternatives furthers DDOT's equity goals, by creating a safe, accessible and efficient transportation network in the study area that will provide improved access to economic opportunities, housing and services for District residents.

The Concept Alternatives provide significant improvements of multimodal facilities, particularly additional and improved pedestrian facilities and enhanced bicycle and pedestrian connectivity. Pedestrian safety is substantially improved by consolidating and signalizing existing uncontrolled ramp crossings, widening sidewalks to become SUPs, and separating them from the roadway. Bicycle facilities will be expanded to provide connectivity to destinations along the corridor, and the median cycle track will continue to provide strong crosstown multimodal mobility. These improvements further the District's Vision Zero commitment by removing the free-flow ramps, which are dangerous intersections for pedestrians and drivers.

Traffic operations analyses for the Concept Alternatives indicate that the planned connector intersections are generally expected to operate at or near acceptable LOS. The Irving and First Streets NW intersection is likely to operate at a failing condition but is not modified by the Cloverleaf Urbanization project. Projected traffic operation issues at that intersection are attributable to background traffic forecasts for proposed development at the Armed Forces Retirement Home and Washington Hospital Complex. While not analyzed as part of this

study, the Urbanized Alternatives will likely encourage residents and visitors to walk, bike or take transit in and to the study area, which in the future could reduce the pressure vehicle trips put on these intersections.

The Cloverleaf Urbanization project provides a significant opportunity to urbanize some of the largest underdeveloped land parcels in the District and create a more welcoming, interconnected corridor between Petworth and Brookland. Elimination of the freeway type infrastructure will help recognize the potential of the study area and achieve the development goals of the DC Comprehensive Plan for the North Capitol Crossroads Future Planning Analysis Area. The realization of the Urbanized Alternative facilitates ongoing and future planning for new neighborhoods in this part of the District by providing an urban design framework that encourages a more robust grid of streets and urban block pattern. Through the study area, Irving Street retains its important role as a crosstown connection between Park View and Brookland, completing its transformation into a multi-modal boulevard framed by new neighborhoods in the North Capitol Crossroads Area.

# Project Implementation Process

The next steps for the North Capitol Cloverleaf Urbanization project development involve maximizing the project's potential benefits through coordination between District agencies and additional facility planning, design, and stakeholder coordination. OP will need to communicate the goals of this project to other District agencies. A lead agency for the next planning phase of the project should be identified, and funding will need to be secured . The project entails two particularly significant elements that define its purpose and can be used to develop strong support:

- Planned pedestrian and bicycle facilities will help close critical gaps in the transportation network, as identified in the Crosstown Study, and will better connect adjacent land uses with activity centers to the east and west.
- Eliminating the existing interchange configuration allows the District to reclaim nearly 11 acres of currently inaccessible open space that will provide meaningful opportunities for development and/or public use.

Project implementation depends partly on the funding for additional facility planning and design, and the primary purpose(s) of the project may dictate which agencies will lead the next stages of the project. The following sections outline several steps that will likely be necessary to fully assess the project's potential benefits, design, costs, and impacts.

## Property Research

The ownership and necessary disposition of all property within the existing interchange footprint should be further researched to inform future steps in the implementation process. Historical property plats available from the DC Surveyor's Office indicate that land transfers from the Armed Forces Retirement Home property were made between 1951 and 1954 to the District of Columbia, indicating that the interchange property may be owned by the District; however, this transfer was a federal action prior to the DC Home Rule Act and legal research is needed to confirm the property status. Because the interchange was never incorporated in the National Interstate System, the scale of Federal agency review and property ownership require coordination with the Federal Highway Administration (FHWA). Should the Federal Interstate System (or Federal highway aid) considerations indicate additional land transfers are necessary to secure the District's property rights in the interchange, then DDOT should proceed with the formal Interchange Modification process with FHWA and prepare an Interchange Modification Report (IMR) before additional facility planning.

In assessing property within the interchange footprint, District agencies should explore property reclamation and disposition of public land for potential redevelopment. This study would include researching the property history, including its acquisition from the AFRH to serve as public right-of-way. The reclaimed property represents significant revenue potential, as

well as public space opportunities for recreation and transit access/support. A next step includes a focused assessment of the reclaimed land area and defining how to maximize future land use access and value. Ultimately, recommendations for land transfers or property sales will likely require approval by the DC Council and/or the Federal Government.

## Local Stakeholder Coordination

As the District advances the Urbanization plan and assessment of property disposition/impacts, local stakeholder coordination meetings will be necessary to engage adjacent property owners in understanding the plan and building support for it. At a minimum, this coordination will involve the following stakeholders:

- Continue coordination with AFRH Master Plan developer about potential access opportunities and influences on their master plan in coordination with the National Capital Planning Commission (NCPC)
- Engage CUA about West Campus plans and potential property impacts associated with the Northeast Connector Road and future access potential
- Coordinate with MIRV property developer about changes to the MIRV site plan, access upgrades, potential property impacts
- Coordinate with the VA on any future master planning efforts for their facility in partnership with NCPC
- Coordinate with DC Clean Rivers about an existing “demonstration” bioretention area within the limits of the southeast loop ramp that was one of the District’s first green infrastructure projects

## Facility Planning and Design Process

In conjunction with the reclaimed property and land use assessment, early actions may include DDOT advancement of facility planning and design for the following:

- SUPs along Irving Street and North Capitol Street that are feasible within the public right-of-way. This could include SUPs on both the north and south sides of Irving Street NW/NE outside of the existing interchange ramps.
- New Crosstown cycletrack/trail alignments along the southern edge and through the raised curb island to connect to the SUP on Michigan Avenue NE.

The DDOT Planning & Sustainability Division should be engaged to produce a feasibility study for the corridor and fulfill long-term project planning objectives. DDOT will need to define potential interchange concept alternatives; perform additional detailed transportation operations, multimodal, and safety analyses; and produce a conceptual design establishing geometric layouts and engineering requirements for new roadway and intersection configurations. This process should identify right-of-way and parcel impacts and produce National Environmental Policy Act (NEPA) documentation. DDOT should recommend a preferred alternative to advance to preliminary engineering and perform a project cost estimate.

The North Capitol cloverleaf interchange was originally designed as part of the Federal Interstate System and an Interchange Modification Report (IMR) is likely required for proposed modifications to the existing interchange. DDOT will lead the IMR process and coordinate with FHWA on review and approval. The IMR will summarize the purpose of the interchange modification, planned roadway geometric layout, traffic control modifications, and overall impacts on traffic operations for the preferred alternative.

After a DDOT corridor study and IMR process, the project will need to be identified and funded as a capital project in the District’s State Transportation Improvement Plan (STIP) and the Regional

Transportation Improvement Plan (TIP). The DDOT Infrastructure Project Management Division (IPMD) will need to advance the project through Preliminary Engineering (PE), including topographic, utility, and boundary surveys; geotechnical evaluations; and roadway and traffic control plans necessary to complete detailed design. Stormwater management design is an important consideration for the project, as the study area falls within the Bloomingdale/LeDroit Park watershed area, which has experienced severe flooding in recent years. Some reclaimed property in the interchange may need to be used for stormwater management purposes to help mitigate flooding in the downstream areas. Space for transit access and support facilities is also an important consideration for the project, as some portion(s) of the land in the cloverleaf could still be used for transportation purpose(s) supporting new crosstown or north-south transit service.

Documentation as required by NEPA is also typically included in the PE stage. After the PE stage, the project may be advanced to Final Engineering in line with DDOT's preferred construction delivery method.

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