

April 2025

Independence Avenue SW DESIGN STUDY

FINAL REPORT

National Capital Planning Commission

Smithsonian

Independence Avenue SW DESIGN STUDY

FINAL REPORT

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Document Structure

This document is organized into the following chapters:

Executive Summary

Overview of report contents, including key takeaways.

Chapter 1 Project Background

This chapter provides an overview of this project's history, purpose, and intent and outlines the contents of this Study.

Chapter 2 Planning Context

This chapter covers the history of Independence Avenue SW and includes a summary of previous plans and studies. This chapter also provides information about vehicular access and circulation to, from, and through the corridor.

Chapter 3 Urban Life Review

This chapter provides an overview of the Urban Life Review conducted, including background information, methodology, findings, and images from the field work.

Chapter 4 Design Framework

This chapter provides an overview of the project's design charrette, including the material presented, a summary of the discussion, key takeaways, and meeting outcomes. Additionally, this section outlines the considerations for concept design, including an overview of the Monumental Core Streetscape Design Guidelines as it relates to concept design along Independence Avenue SW.

Chapter 5 Design Vision

This chapter documents the three concept redesign alternatives for Independence Avenue SW and documents recommendations block by block

Chapter 6 Next Steps

This chapter summarizes recommendations for Independence Avenue SW and outlines the next steps to advance the concept designs.

Throughout this document, **project recommendations**, like the one below, are highlighted.

A complete list of recommendations, along with more information about each recommendation, is provided in the Next Steps and Recommendations section of this document.



Executive Summary

Reimagining Independence Avenue SW: A Bold Vision for the Future

The **Independence Avenue SW Design Study** is an ambitious effort to redefine one of Washington, D.C.'s most iconic corridors. Independence Avenue SW abuts the National Mall and is home to world renown institutions, including several Smithsonian Museums that draw millions of visitors annually, as well as federal buildings employing thousands. This effort, led by the National Capital Planning Commission (NCPC) and the Smithsonian Institution, sets forth a vision that honors the avenue's historic significance while embracing a future where safety, accessibility, and vibrant public spaces take center stage. The study explores how Independence Avenue SW can become a model of multimodal mobility, enhanced pedestrian experiences, and functional urban spaces that better serve residents, workers, and the millions of visitors who traverse the corridor each year.

This study represents an opportunity to reshape a corridor that, despite its importance, has long been dominated by vehicular traffic at the expense of pedestrians, cyclists, and public life. Through innovative design and strategic planning, Independence Avenue SW can evolve into an engaging public realm that balances movement, gathering spaces, and long-term resilience. The study identifies a path forward that ensures this transformation is both visionary and feasible, positioning Independence Avenue SW as a premier urban corridor that reflects the needs of the 21st century.



A reimagined Independence Avenue SW will:

- **Create a Pedestrian-Centered Experience:** Wide sidewalks, improved crossings, and better access to transit will make the corridor safer and more enjoyable for everyone.
- **Strengthen Multimodal Connections:** The avenue can become a model for integrating walking, biking, and public transportation into a cohesive, efficient system.
- **Celebrate Washington, D.C.'s Character:** Thoughtful urban design and streetscape enhancements will reinforce the historical and cultural significance of the corridor.
- **Promote Economic and Cultural Vitality:** By improving access and creating engaging public spaces, Independence Avenue SW can support local businesses, cultural institutions, and tourism.
- **Prepare for the Future:** Investments in durable infrastructure, flood management solutions, and heat mitigation strategies will ensure that the avenue remains functional and resilient in the face of evolving challenges.
- **Guide growth in Southwest D.C.:** As local federal developments are being considered for redevelopment and Southwest D.C. continues to grow and evolve, Independence Avenue SW can help guide the direction and use of the street.
- **Improve Connectivity:** The reimagined avenue should will improve connections between the National Mall and residential and mixed use areas to the south.



A Collaborative and Data-Driven Approach to Planning

Transforming Independence Avenue SW requires a deep understanding of its current function, challenges, and opportunities. The study was developed through a **highly collaborative, data-driven process** that brought together federal and local agencies, urban planners, business leaders, and transportation experts. This multi-disciplinary approach ensured that the recommendations reflect the operational needs of government agencies and the lived experiences of the people who use the corridor daily.

Stakeholder Contributions

The process of shaping this vision involved engaging with a broad spectrum of stakeholders, including:

- **Federal and District Agencies and Stakeholders:** Coordination with entities such as the National Park Service (NPS), the Architect of the Capitol (AOC), National Capital Planning Commission (NCPC), General Services Administration (GSA), District Homeland Security and Emergency Management Agency (HSEMA), United States Military District of Washington (MDW), Smithsonian Institution (SI), District Department of Transportation (DDOT), Washington Area Metropolitan Transit Authority (WMATA), District of Columbia Office of Planning (DCOP), Commission of Fine Arts (CFA), District of Columbia State Historic Preservation Office (SHPO), United States Department of Energy, (DOE) United States Department of Agriculture (USDA), United States Botanic Gardens (USBG) to ensure alignment with regulatory requirements and broader planning efforts.
- **Business and Institutional Leaders:** Engaging with property owners, the Southwest Business Improvement District (SWBID), and cultural institutions to understand economic and operational considerations.

The Role of the Southwest Area's Evolution

The study also considers the rapid changes occurring in the **Southwest area of Washington, D.C.**, where shifting federal office space demands, new developments, and planning initiatives like the Southwest Ecodistrict Plan are reshaping the urban landscape. The transformation of Independence Avenue SW presents an opportunity to align with these broader efforts and create a cohesive, forward-thinking approach to urban design and transportation.

The level of engagement and technical analysis that informed this study underscores its potential as a **road map for actio**n that not only proposes solutions but also lays the groundwork for coordinated next steps toward implementation.

Key Activities and Analytical Approach

This study builds on a foundation of extensive research, technical analysis, and precedent studies from comparable urban corridors. Major activities included:

- **Charrette Workshops:** The multi-day collaborative session brought together planners, designers, and transportation specialists to explore design alternatives, envision a reimagined Independence Avenue SW, and refine proposed improvements.
- **Traffic and Mobility Studies:** A comprehensive assessment of travel patterns, congestion points, and pedestrian and bicycle movement informed strategies for improving safety and efficiency.
- **Urban Life Review:** Observational studies provided insight into how the avenue currently functions and how design interventions can enhance public space utilization.
- **Comparative Analysis of Best Practices:** The study examined successful projects in cities across the U.S. to apply innovative, effective strategies to Independence Avenue SW.
- **Resiliency Considerations:** Evaluating tree canopy coverage, stormwater drainage challenges, and urban heat effects guided strategies to enhance comfort and infrastructure durability.

Challenges and Opportunities: Rethinking Independence Avenue SW for the Future

The study underscores the pressing need to address longstanding challenges along Independence Avenue SW while leveraging new opportunities to create a corridor that is safer, more accessible, and better integrated into the fabric of Washington, D.C. Although Independence Avenue SW is not on the District's High Injury Network, it has been identified as a bicycle priority corridor and freight priority corridor by the District's long range plan: moveDC. The corridor has served as a critical transportation route for decades, but its existing layout and infrastructure are no longer sufficient to meet the needs of a rapidly evolving city. The study identifies key challenges that must be addressed and opportunities that can be harnessed to transform the avenue into a world-class public space and multimodal corridor.



Existing Issues: Barriers to a Functional and Inviting Corridor

Independence Avenue SW plays a vital role in the city's transportation network but currently provides excess space for people driving and has insufficient space beyond the curb for people biking, walking, and rolling. Its existing conditions present significant barriers to mobility, public space activation, and multimodal efficiency. Through a combination of technical analysis and stakeholder engagement, the study has identified the following key challenges that must be addressed to unlock the corridor's full potential:

- **Pedestrian and Cyclist Safety:** The corridor's existing infrastructure prioritizes vehicle movement over pedestrian and bicycle access. Narrow sidewalks, high-speed traffic, and poorly designed crossings create a dangerous environment for non-motorized users.
- **Curbside Conflicts:** The absence of a clearly defined curbside management strategy has led to a chaotic mix of uses, including transit stops, deliveries, ride-share pickups, food trucks, and private vehicle parking. This congestion reduces efficiency for all users.
- **Lack of Public Space Activation:** Despite its location adjacent to cultural institutions and key destinations, Independence Avenue SW lacks inviting public spaces. The absence of seating, greenery, and gathering spaces makes the corridor feel unwelcoming and underutilized. Additionally, federal buildings along the corridor have unique security needs that must be addressed and fit in to the corridor's design.
- **Vehicular-Dominated Design:** The current street layout prioritizes vehicle throughput at the expense of a balanced multimodal approach. The lack of dedicated bicycle infrastructure, protected crossings, and pedestrian-friendly design elements has left non-motorized users at a disadvantage.
- **Stormwater Management Deficiencies:** The corridor faces stormwater runoff, flooding, and urban heat retention challenges due to limited tree canopy coverage and minimal permeable surfaces.

- **Wayfinding and Connectivity:** The existing corridor lacks a cohesive wayfinding system, making it difficult for visitors and daily commuters to navigate the area efficiently. Improved signage and navigation tools could enhance the experience for all users.

Opportunities for Change: Transforming the Corridor

Independence Avenue SW stands at a pivotal moment where shifting federal office space needs, evolving urban design priorities and increased attention to multimodal accessibility create an unprecedented opportunity for transformation.

The study outlines several key opportunities that can be leveraged to reimagine the corridor as a safer, more vibrant, and forward-thinking space:

- **Enhanced Multimodal Connectivity:** The corridor has the potential to become a flagship example of multimodal integration in Washington, D.C. By expanding pedestrian infrastructure, implementing bicycle facilities, and improving transit access, Independence Avenue SW can become a model for safe, efficient, and equitable transportation.
- **Public Space Activation:** Reallocating underutilized roadway space to create plazas, green spaces, and active streetscapes would encourage greater pedestrian engagement. Strategic landscaping, seating areas, and shaded spaces can transform the corridor into a welcoming environment for workers, visitors, and residents.
- **Infrastructure Enhancements:** Addressing stormwater management deficiencies, increasing tree canopy coverage, and introducing shading elements will help mitigate urban heat and improve air quality. These changes will contribute to a safer and more comfortable urban landscape.
- **Economic and Cultural Revitalization:** By improving accessibility and creating inviting public spaces, the corridor can better support adjacent businesses, cultural institutions, and tourism activities. Strengthening connections between federal office buildings, museums, and commercial areas will boost economic activity and increase foot traffic.
- **Flexible Use of Space:** The ability to adapt the corridor for seasonal events, outdoor markets, and temporary installations can enhance its functionality. Designing flexible-use spaces allows Independence Avenue SW to serve a variety of purposes throughout the year.
- **Improved Wayfinding and Signage:** A cohesive wayfinding system will help visitors, workers, and commuters easily navigate the area. Clear signage and multimodal route markers can enhance accessibility and user experience.
- **Right Sizing:** The traffic analysis supports the reconfiguration from eight-lanes to four-lanes with mitigation strategies on Independence Avenue. Reconfiguration to four lanes would help to effectively balance peak-hour traffic flow, minimize delays, and enhance multimodal functionality.

These opportunities represent a pathway to redefine Independence Avenue SW as a corridor that serves transportation needs and contributes to the broader civic, economic, and cultural life of Washington, D.C. The next steps outlined in the study provide a framework for turning this vision into reality.



Reimagining Independence Avenue SW

The study identifies several core principles that guide the reimagining of Independence Avenue SW:

- **Prioritizing Safety and Accessibility:** Enhancing pedestrian infrastructure, improving crosswalks, and integrating protected bicycle facilities to create a safer environment for all users.
- **Strengthening Multimodal Connectivity:** Expanding options for walking, biking, and transit use to create a corridor accommodating a broad range of transportation choices.
- **Enhancing Public Spaces:** Introducing elements such as plazas, seating areas, and tree-lined streetscapes to improve the overall experience of the avenue.
- **Balancing Transportation Needs:** Ensuring that vehicular operations, including transit and deliveries, continue to function efficiently while shifting the emphasis toward people-oriented mobility.
- **Aligning with Broader Planning Efforts:** Coordinating with the evolving needs of federal office space, institutional access, and adjacent developments to create a corridor that meets contemporary urban challenges.

By incorporating these principles, the study presents six distinct design concepts grouped into three themes: **monumental, multimodal, and public life.** Each concept offers a unique vision for how Independence Avenue SW can evolve into a corridor that better serves the diverse needs of those who live, work, and visit the area. Each concept provides a different vision for how the avenue can balance multimodal mobility, public space activation, and operational efficiency. These concepts explore varying degrees of intervention, from incremental improvements to transformative redesigns, ensuring flexibility in how the corridor evolves.

Each alternative reflects the priorities of enhancing pedestrian safety, improving multimodal connectivity, and creating a dynamic, people-friendly public space that serves local and national needs.

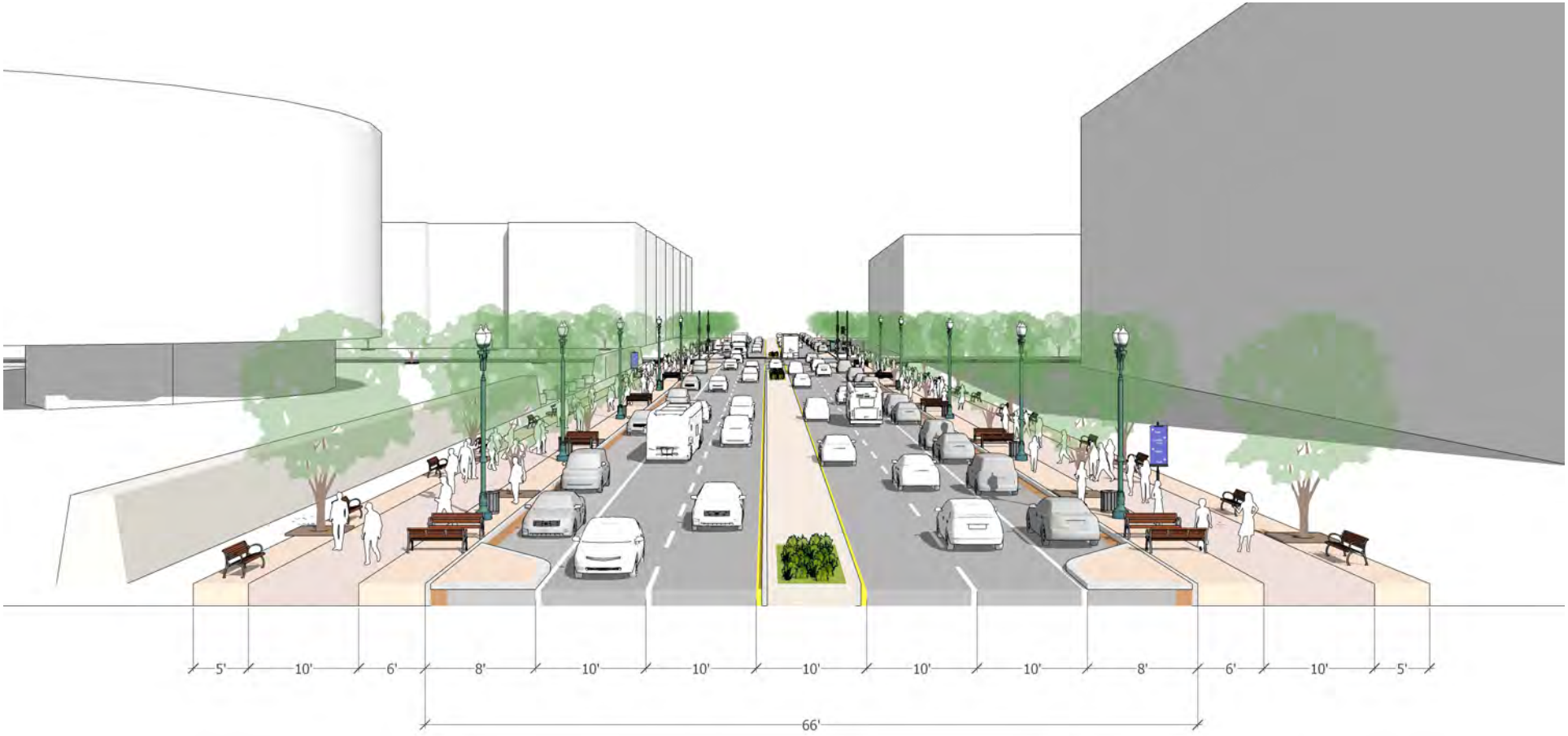
The study evaluates each of the six alternatives and scores them based on two distinct methodologies—Performance Measure-Based Evaluation and Design-Component Evaluation. While both assessments emphasize improvements in urban design, safety, and multimodality, their differing focus and ranking criteria reveal variations in performance across the concepts. The evaluation provides a qualitative assessment whether the design concept has a positive impact (positive score) or an adverse impact (negative score) compared to the current roadway. The table below shows that the **Multimodal: Full-Time Curbside Uses on North Curb** alternative scored highest on both evaluation methodologies.

Rank	Performance Measure-Based Evaluation	Design-Component Evaluation
1	Multimodal: Full-Time Curbside Uses on North Curb (+7.8)	Multimodal: Full-Time Curbside Uses on North Curb (+5.3)
2	Public Life: Full-Time Curbside Uses on North Curb (+7.5)	Public Life: Full-Time Curbside Uses on North Curb (+4.8)
3	Monumental: Full-Time Curbside Uses & Median (+7.1)	Monumental: Full-Time Curbside Uses & Median (+4.6)
4	Multimodal: Rush-Hour Curbside Lanes & Median (+6.4)	Multimodal: Rush-Hour Curbside Lanes & Median (+4.6)
5	Public Life: Rush-Hour Curbside Lanes & Median (+6.5)	Public Life: Rush-Hour Curbside Lanes & Median (+3.6)
6	Monumental: Rush-Hour Curbside Lanes (+5.3)	Monumental: Rush-Hour Curbside Lanes (+2.5)

1. Monumental: Full-Time Curbside Uses & Median

A formal option with less lane shifting, full-time curbside uses on both curbs and a center median alternating with left-turn lanes at some intersections.

- **Key Features:** Dedicated full-time curbside uses, expanded sidewalks, and median with partial landscaping (ten-foot landscaped area of low planting at intersections and permeable pavers along the rest of the median) and alternating with left-turn lanes.
- **Opportunities:** Creates a pedestrian-friendly environment by maintaining full-time curbside lanes, improving predictability for all users. The median enhances safety and aesthetics, while creating an opportunity to create mid-block crossing refuges for pedestrians.
- **Tradeoffs:** Limits available space outside the curbs for public life, reducing opportunities for expanded sidewalks or additional amenities. Alternative does not provide dedicated bicycle facilities. The median limits opportunities for additional pedestrian space.



2. Monumental: Rush-Hour Curbside Lanes

A formal option with less lane shifting and rush-hour restricted curbside lanes on both curbs.

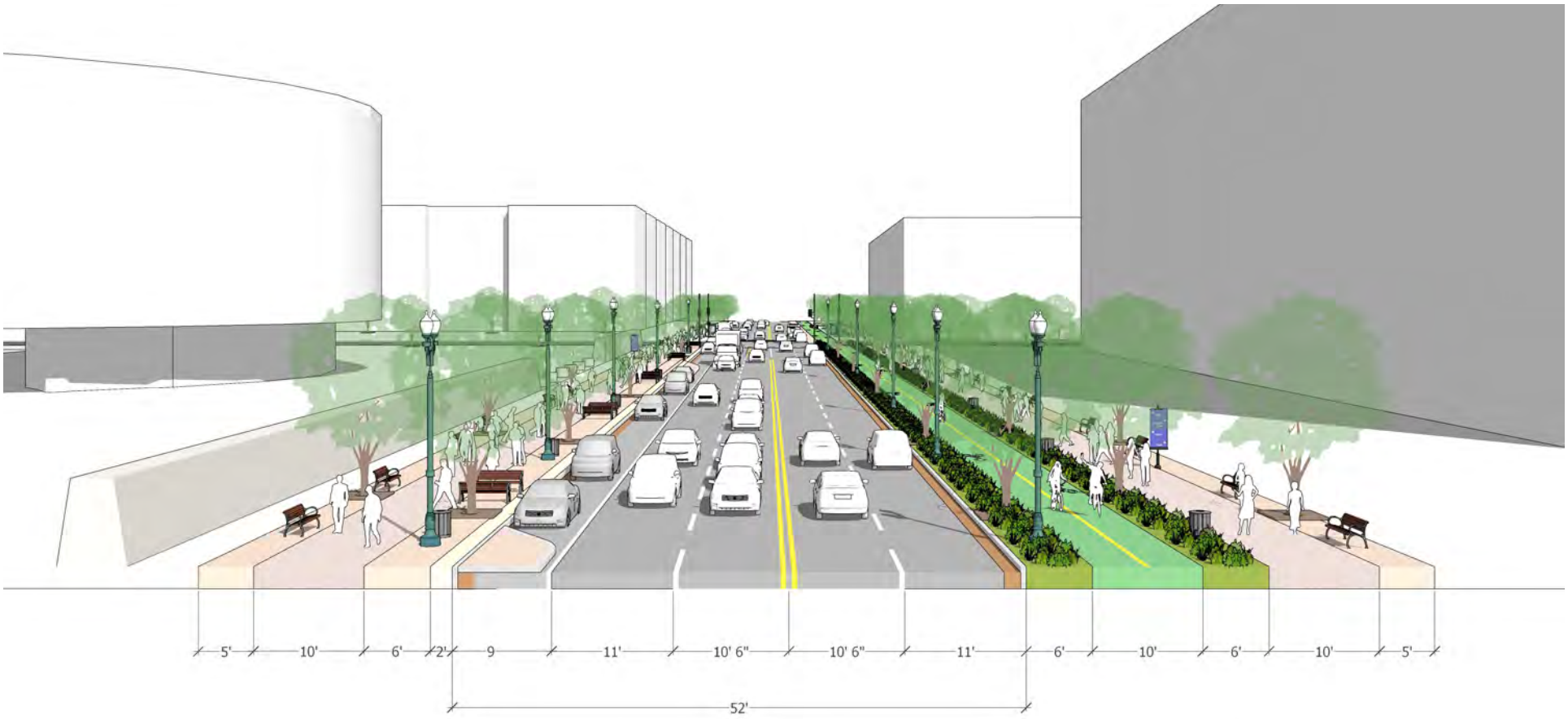
- **Key Features:** Rush-hour restricted curbside lanes, adaptable curb space, and enhanced pedestrian crossings.
- **Opportunities:** Helps manage peak-hour congestion while preserving a formal streetscape. The design supports vehicular flow and provides a structured traffic pattern.
- **Tradeoffs:** Left-turn "trap" lanes create turning-movement conflicts. Requires enforcement to ensure compliance with curbside restrictions. Limited space outside the curbs reduces opportunities for pedestrian enhancements. Alternative does not provide dedicated bicycle facilities.



3. Multimodal: Full-Time Curbside Uses on North Curb

Includes a two-way cycle track at sidewalk level for bicyclists on the south side, and full-time curbside uses are on the north curb, with no curb access to the south.

- **Key Features:** Separated two-way cycle track, enhanced pedestrian crossings, additional tree canopy, and dedicated curbside zones for transit and loading.
- **Opportunities:** Provides dedicated cycling infrastructure alongside expanded pedestrian space, improving active transportation options. Encourages a more connected corridor.
- **Tradeoffs:** Limits access to the south curb, which may pose challenges for deliveries and curbside activity. Less flexibility for future reconfigurations.



4. Multimodal: Rush-Hour Curbside Lanes & Median

Includes a two-way cycle track for bicyclists on the south side, rush-hour restricted curbside lanes on both curbs and a center median alternating with left-turn lanes at some intersections.

- **Key Features:** Two-way cycle track, rush-hour curbside lanes, a striped median alternating with left-turn lanes, and redesigned pedestrian crossings.
- **Opportunities:** Enhances multimodal accessibility by integrating bike lanes while maintaining traffic flow efficiency. The median contributes to better organization of roadway elements.
- **Tradeoffs:** Requires effective enforcement to regulate curbside lane use. Peak-hour lane restrictions may limit the consistent use of curb space.



5. Public Life: Full-Time Curbside Uses on North Curb

Provides wider sidewalks and more space for public life outside the curb, and full-time curbside uses are on the north curb, with no curb access to the south.

- **Key Features:** Widened pedestrian clear zones, improved landscaping, and active public spaces.
- **Opportunities:** Expanding sidewalks and green spaces creates a more engaging public realm for pedestrians. Supports flexible, mixed-use street functions.
- **Tradeoffs:** Eliminates curb access on the south, impacting loading and unloading activities. May require adjustments for businesses and service access. Alternative does not provide dedicated bicycle facilities.



6. Public Life: Rush-Hour Curbside Lanes & Median

Provides wider sidewalks and more space for public life outside the curb, rush-hour restricted curbside lanes on both curbs, and a center median alternating with left-turn lanes at some intersections.

- **Key Features:** Adaptive curbside lanes, widened pedestrian clear zones, a striped median alternating with left-turn lanes, and enhanced crossings.
- **Opportunities:** Prioritizes public space enhancements while maintaining dynamic traffic operations and integrates green spaces for a balanced urban environment.
- **Tradeoffs:** Relies on enforcement to manage curbside restrictions. Alternative does not provide dedicated bicycle facilities.



A Vision for a Better Independence Avenue SW

These six design concepts represent a different strategy for transforming Independence Avenue SW into a **safer, more accessible, and vibrant corridor**. Whether through multimodal integration, expanded public spaces, or dynamic curbside management, these alternatives provide a flexible framework for achieving a balanced and efficient transportation network.

The final selection of a preferred design will require continued collaboration among **District and federal agencies, urban designers, and transportation experts**, as well as additional feasibility assessments and public realm planning. Ultimately, the goal is to create a corridor that is **functional, iconic, and reflective of the evolving needs of Washington, D.C.**



Next Steps

With this study's completion, the project's next phase involves moving from concept to refined design and eventual implementation. Next steps will focus on identifying opportunities to make operational and safety improvements from curb to curb. The District Department of Transportation (DDOT) is expected to lead further safety improvements and operational analysis to ensure Independence Avenue SW is safely and comfortably serving the needs of all users. Next steps will ensure alignment with the District's safety initiatives, such as Vision Zero, and other Districtwide plans.

Next steps should be carried out with an **urban design lead** to ensure that the final design prioritizes and balances pedestrian experience, multimodal functionality, and the integration of public spaces. Additionally, this next phase requires a financial commitment from **District leadership, which requires funding** for detailed planning and eventual implementation. The next steps include further refinement of preferred concepts, environmental and cultural assessments, pilot projects, funding strategies, and ongoing coordination with local and federal planning efforts. Achieving this vision will require continued engagement, technical expertise, and a strong commitment from decision-makers to ensure that Independence Avenue SW evolves into a corridor that meets the needs of the 21st century.

The transformation of Independence Avenue SW represents more than just an infrastructure project—it is a **once-in-a-generation opportunity** to shape the heart of Washington, D.C. As cities across the country reimagine their streets to better serve people rather than just vehicles, Washington, D.C., has a unique opportunity to be a leader in creating a functional and inspiring avenue. This study provides a **comprehensive framework** for making meaningful changes to improve mobility, enhance public life, and reinforce the avenue's role as a world-class urban corridor.

A Call for Leadership and Action

Realizing this vision requires **bold leadership, strategic investment, and sustained collaboration** among District officials, federal agencies, and the public. The study outlines a clear path forward, but the next steps require commitment and coordination to bring this vision to life.

District leadership must prioritize funding for safety investments. Independence Avenue SW serves thousands of people daily, as they walk, bike, roll, take transit, and drive to destinations along the corridor. Federal partners must actively engage in the process to ensure that institutional needs are met while creating a space that safely serves the public good. Local stakeholders, advocacy groups, and residents must continue championing this transformation to maintain momentum and accountability.

The success of this effort will not be measured solely by traffic flow or infrastructure upgrades—it will be defined by the ability of Independence Avenue SW to serve as a safe and premier urban corridor that reflects the **values, history, and future aspirations** of Washington, D.C.

This is our opportunity to make a lasting impact. Today's decisions will determine whether Independence Avenue SW remains a traffic-dominated thoroughfare or evolves into a dynamic, people-centered space worthy of its place in the nation's capital.

Recommendations

Recommendations are provided throughout this document. This section provides an overview of each recommendation, including related objectives, estimated timing for implementation, and agency coordination.

Page Number

Each recommendation is included and detailed throughout this study and a respective page number is provided in **Table 1** for each recommendation.

Recommendation

Table 1 includes the title of each recommendation.

Related Objective

Each recommendation in **Table 1** is related to at least one study objective. For ease in displaying the objectives in the table, the objectives have been shortened as follows:

- **Character:** Emphasize the avenue's unique character
- **Streetscape:** High-quality streetscape
- **Resiliency:** Protect critical infrastructure and investments
- **Safety:** Improve multimodal safety
- **Comfort:** Improve multimodal comfort and access
- **Right-size:** Reevaluate the function of the avenue and 'right-size' the roadway

Timing

The generalized timeframe for each recommendation to be realized is provided. The timeframe considers the potential steps each recommendation may have to pass through to be implemented. The projects have been divided into "short-term" and "long-term" time frames.

Short-term projects follow a timeline of roughly less than five years. These projects are a mix of what are considered "quick-build" efforts and follow a relatively short implementation timeline, with limited additional analysis or coordination necessary. Some projects will require additional analysis, coordination, or design and construction.

Long-term projects follow a timeline of roughly five or more years. These projects are the most involved and require additional coordination, analysis, design, and construction. These projects tend to be larger scale and require more funding than short-term projects.

Table 1. Recommendation Summary

Page	Recommendation	Category	Implementation Timeframe
22	DDOT should advance the Independence Avenue SW corridor through historic preservation and environmental regulations by working with key agency partners.	Resiliency	Short-term
28	Design enhanced public spaces that reflect the avenue's character.	Character	Short-term
28	Incorporate contextual design to reflect the monumental core.	Character	Short-term
29	Create spaces for cultural programming.	Streetscape	Short-term
29	Create ceremonial spaces for gatherings and special events.	Streetscape	Long-term
29	Identify opportunities for landscaping and infrastructure improvements.	Resiliency	Short-term
31	Encourage multimodal travel.	Safety, Comfort	Short-term
31	Activate the public space with art, installations, wayfinding, and designated spaces for activities.	Streetscape	Short-term
33	Orient new developments along Independence Avenue SW.	Streetscape	Long-term
33	Incorporate human-scaled elements into the avenue's redesign.	Streetscape	Long-term
34	Restore the double rows of trees along Independence Avenue SW.	Resiliency	Long-term
34	Ensure consistent streetscape zones, including pedestrian circulation areas, street furniture, and security installations.	Streetscape, Safety, Comfort	Short-term
44	Use traffic management strategies to mitigate future traffic congestion.	Right-size	Long-term
45	Limit vehicle access to include vehicle pick up/drop off for museum/memorial visitors on Maryland Avenue SW between 3rd Street and Independence Avenue SW.	Right-size	Long-term
47	Use dedicated left-turn lanes only when necessary and avoid the use of right-turn only lanes.	Right-size, Safety	Long-term
47	Reduce the number of lanes on Independence Avenue SW and provide targeted mitigation strategies.	Right-size, Safety, Comfort	Long-term
74	Design continuity through lane transitions.	Streetscape	Long-term
74	Frame the avenue with streetscape elements and maintain views and sightlines.	Streetscape	Long-term

1 Project Background

1.1 Project Overview

Independence Avenue SW runs through the heart of Washington, D.C. (D.C. or the "District") and serves as an important edging street along the National Mall, providing access to the Smithsonian Institution and Southwest DC. The study corridor includes Independence Avenue SW from 15th Street SW to Washington Avenue. Independence Avenue SW refers to the study area in southwest D.C. and all streets are SW, unless noted otherwise.

The corridor transitions west of 15th Street SW into a parkway heading west. East of Washington Avenue, the corridor transitions to a smaller, local-serving neighborhood street. Independence Avenue SW serves as a connector to world-renowned destinations that draw millions of visitors annually. The corridor shares Smithsonian museums along its north side and a mix of federal buildings to the south, including the US Department of Agriculture, US Department of Energy, and Federal Aviation Administration, among others. Independence Avenue SW provides access to major destinations for locals, employees, vendors, and visitors.

The **Independence Avenue SW Design Study** (the Study) is a follow-up study to the 2023 Independence Avenue SW Corridor Study, completed as part of the Metropolitan Washington Council of Governments (MWCOG) Transportation-Land Use Connections (TLC) Program. The purpose of the Corridor Study was to reimagine the design and function of Independence Avenue SW and work with stakeholders to align on a vision for the future of the corridor. As a follow up to the Corridor Study, the purpose of this Study is to refine the design concepts and identify next steps to advance the Study's recommendations to better serve all users and reestablish Independence Avenue SW as a prominent, monumental corridor in the District.

The 2023 Corridor Study was a major step in considering a redesign of Independence Avenue SW. The Corridor Study included a review of the existing conditions, previous plans, challenges, and opportunities and presented three planning-level recommendations for future studies, public outreach, and the next steps for redesigning the avenue.

This Design Study is co-sponsored by the National Capital Planning Commission (NCPC) and the Smithsonian Institution (Smithsonian). It refines the findings and recommendations of the 2023 Corridor Study and provides a more in-depth analysis of the existing conditions and recommendations for reconfiguration. **Figure 1** summarizes the scope of the 2023 Corridor Study and the 2024 Design Study.

Figure 1. 2023 Corridor Study and 2024 Design Study

2023 Corridor Study

- Data collection and existing conditions review
- Goals and objectives identification
- Review of previous plans and studies
- Vehicular capacity analysis
- Stakeholder coordination
- Recommendation of three corridor concepts
- Development of multimodal ideas toolbox
- Planning-level alternatives evaluation

2024 Design Study

- Existing and future traffic operations analyses
- Future travel demand forecasting
- Urban Life Review and field evaluations
- Block-level existing conditions (curbside operations)
- Agency design charrettes
- Continued agency coordination and collaboration
- Refining the three 2023 concepts into six alternatives and developing block-level design concepts

Study Extents

Figure 2 shows the extent of the Design Study, which spans one mile from Washington Avenue SW on the eastern edge to 15th Street SW on the western edge. Smithsonian museums flank the north side along the Independence Avenue SW corridor, while federal headquarters front the south side. Both sides of the corridor feature a mix of open public space, federal facilities, and institutional uses with minimal ground-floor activity. Several parks and green spaces are linked along the avenue and just beyond the corridor, including the National Mall to the north of the corridor, the Washington Monument to the west, and the United States Capitol to the east.

Figure 2. Study Area Map

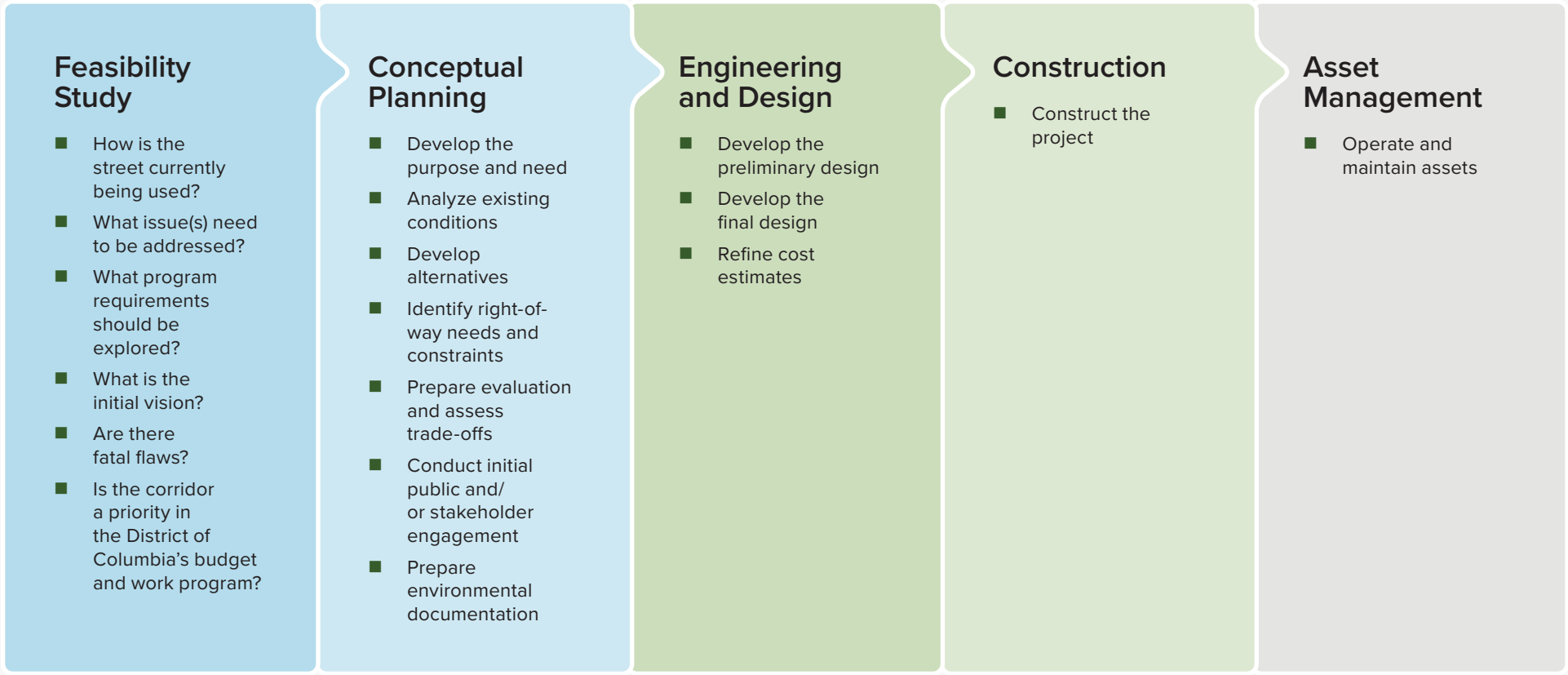


Independence Avenue SW Corridor Study

The 2023 corridor study served as an initial feasibility study of the Independence Avenue SW corridor and enabled early conversation and the exploration of needs. The result of the study was a set of ideas that began to form an initial cohesive vision for the corridor. Input from key stakeholders during the development of the corridor study, including the District Department of Transportation (DDOT), the Smithsonian, NCPC, and the National Park Service (NPS), helped document the cohesive vision (described in more detail in the subsequent section), identify recommendations, future study needs, and inform decision-making and budget priorities for moving efforts forward.

Figure 3 shows the general phases and activities associated with moving a project like the Independence Avenue SW corridor toward construction. While the graphic shows the project phases linearly, depending on the project, funding, and District of Columbia priorities, some of these phases can be combined, skipped, or occur out of order.

Figure 3. The District's Generalized Transportation Project Process



The 2023 corridor study generally supported the feasibility study stage of the generalized transportation project process, and this Design Study supports the initial conceptual planning.

To advance the concepts included in this document, future phases of study on Independence Avenue SW would consist of public outreach and the development of a preferred alternative(s) that meet Historic Preservation and Environmental regulations. Regulations may include environmental assessments and additional transportation studies. These future phases will also include identifying funding opportunities and, eventually, design and construction.

After the Design Study, DDOT would likely be the lead agency in advancing the regulatory requirements through compliance proceedings and engineering and design.

Because of Independence Avenue SW's unique operating environment, continued coordination between agencies and stakeholders, including DDOT, the Smithsonian, NPS, General Services Administration (GSA), and NCPC, will continue to be necessary to advance ideas on the corridor.

Recommendation:

DDOT should advance the Independence Avenue SW corridor through historic preservation and environmental regulations by working with key agency partners.



Initial Cohesive Vision

A key outcome of the 2023 corridor study was establishing a cohesive vision for future design efforts associated with Independence Avenue SW. **Figure 4** shows the cohesive vision established through conversations with NCPC, the Smithsonian, and DDOT and by collecting feedback from additional project stakeholders.

Figure 4. Initial Cohesive Vision from the 2023 Corridor Study



Less ceremonial but analogous to Constitution Avenue, Independence Avenue frames the National Mall, provides entry to the Capitol campus, and encourages the expansion of the historic core to the south and aims to establish a consistent treatment for existing and future buildings.



An attractive multimodal and pedestrian-friendly corridor with high-quality streetscape and enhanced pedestrian amenities linking beautiful public spaces and civic destinations.



A welcoming institutional presence, with active street-level programming, inviting building entrances, and open spaces, supported by a lively street activity zone that engages pedestrians and provides space for public celebration, parades, special events.



A key artery that serves both local and national needs, providing essential connections to transit and destinations for area workforce, residents, and visitors.

Independence Avenue SW Corridor Study (2023)

1.2 The Design Study

At this Design Study's onset, the team built off of the cohesive vision to establish project objectives. These project objectives, shown in **Table 2**, are grouped into three focus areas, each linked to individual objectives. The objectives are also linked to performance measures. Aligning with the preestablished vision ensures that the concepts advanced through the Design Study are congruent with the cohesive vision and provide an initial set of performance measures to evaluate alternatives.

Table 2. Project Objectives by Focus Areas

Focus Area	Objective	Performance Measures
1 Celebrated Boulevard	Emphasize the avenue's unique character	Alignment with guiding plans
	High-quality streetscape	Consistent and continuous streetscape elements and materials
	Resiliency	Reduce impervious surfaces
		Additional opportunities for trees and other plantings
2 Safety and Comfort	Improve multimodal safety	Pedestrian and bicycle crash risk
		Number of conflict points
		Vehicle queue lengths blocking pedestrian crossings
	Improve multimodal comfort and access	Pedestrian Level of Comfort (LOC)
		Bicycle Level of Traffic Stress (BLTS)
		Bus stop amenities
3 Multimodality	Reevaluate the function of the avenue and 'right-size' the roadway	Vehicle capacity
		Balance curbside access with demand.

1.3 The Design Study Process

The **Independence Avenue SW Design Study** involved a robust process that documented and analyzed existing conditions, forecasted expected future traffic, and engaged with key stakeholders. The design study process is summarized in **Figure 5** and includes:

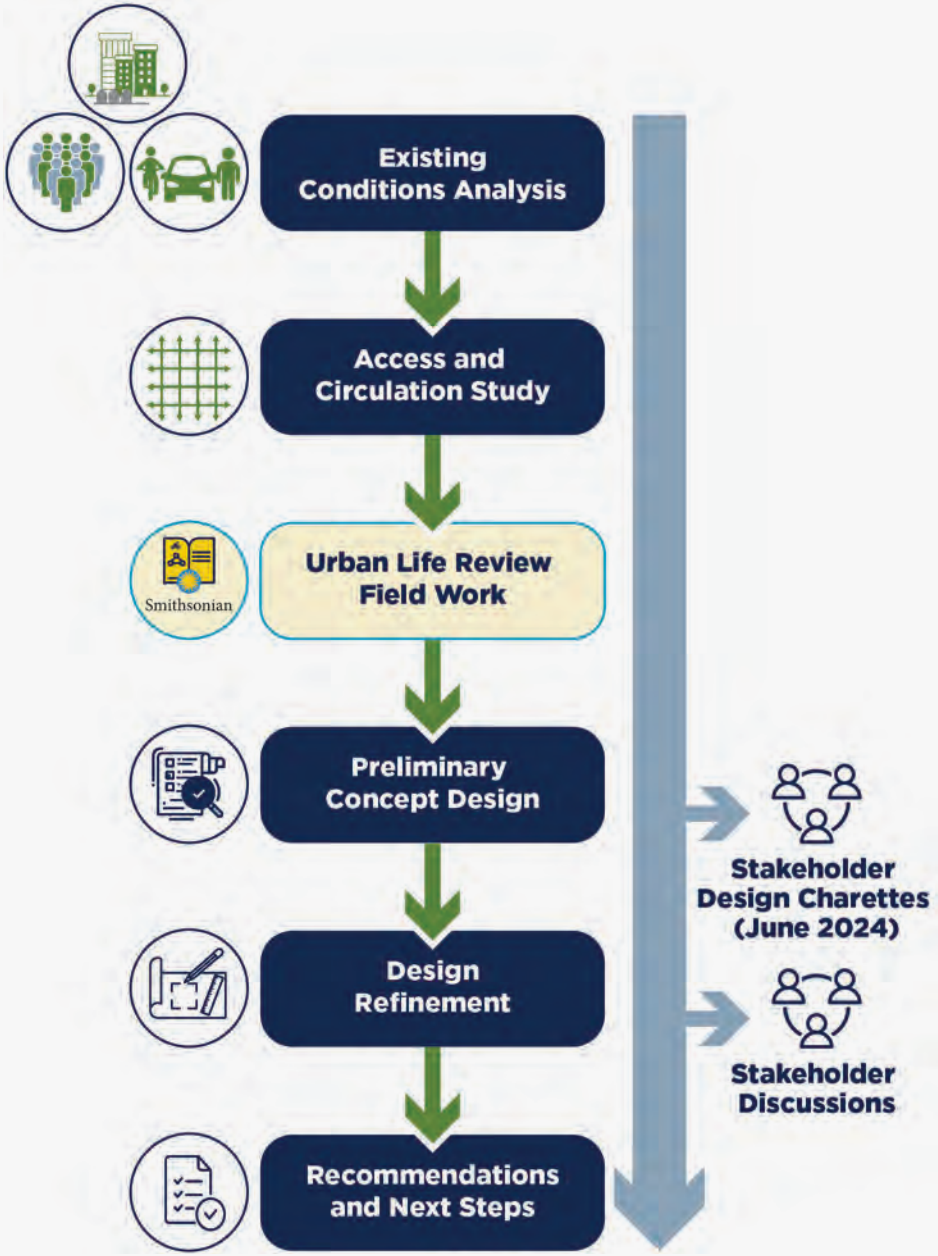
- A comprehensive **existing conditions analysis** and review of previous plans and studies, building on the 2023 Corridor Study
- An **access and circulation study** evaluating existing and projected traffic volumes and operations
- An **Urban Life Review**, funded by the Smithsonian Institution, to understand non-transportation-related behavior and use of the corridor
- **Preliminary concept design** for three corridor concepts, building on the 2023 Corridor Study
- **Design refinement** to incorporate feedback from stakeholders and the core team
- **Recommendations and next steps** packaged into a final report

The project team met bi-weekly during core team meetings throughout the design study process. In addition to these meetings, the core team hosted a design charrette and invited key stakeholders. Additionally, the core team hosted stakeholder meetings to collect additional data and refine the concept designs.

- **Design charrettes** with key stakeholders and the core team (NCPC and Smithsonian)
- **Stakeholder meetings** to work through concept details and address the various needs of users along the corridor

The following report chapters will detail each of these tasks and will discuss how they informed the development of corridor concepts.

Figure 5. Design Study Process



2 Planning Context

2.1 Corridor History

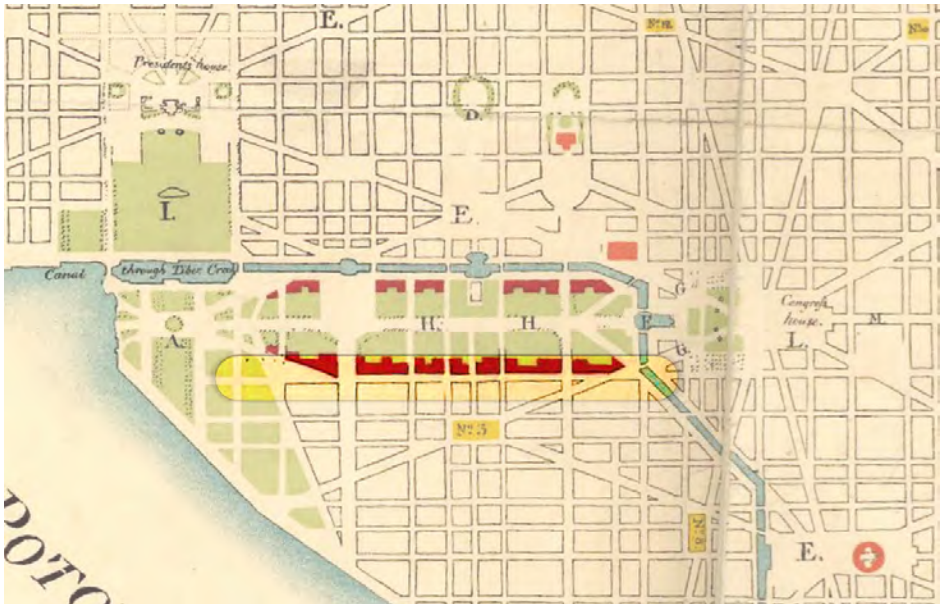
The current alignment of Independence Avenue SW was first identified in Pierre L'Enfant's 1790 "Plan of the City Intended for the Permanent Seat of the Government of the United States," as shown in **Figure 6**. In the "Plan of the City," the corridor that would become Independence Avenue SW, originally known as "South B Street," is shown on the edge of what would become the National Mall, connecting from the Potomac River to the west to what is now Kentucky Avenue SE to the east.

The "Plan of the City" also identified the "Breadth of the Streets" in the District. The "Breadth of the Street" for "every grand transverse Avenue" like Independence Avenue SW is today, was to include "80 feet in the middle for Carriageway," which matches Independence Avenue SW's current 80-feet curb-to-curb width, "30 feet of gravel walk; planted with trees on each side," and "10 feet of pavement on each side," for a total cross-section width of 160 feet. However, when the "Plan of the City" was released, South B Street would have been classified as an "other street" and, since it did not lead to a public building or market, would likely have been identified to have a 110 or 90-foot width.

Independence Avenue SW was constructed between 1791 and 1823 along the south edge of the Mall as South B Street. Maryland Avenue SW, the "Avenue" street, was the more prominent street at the time and the primary route from the Capitol to the Potomac River.

By 1858, South B Street extended from 15th Street to the west to 6th Street to the east, with a gap from 6th Street to 4th Street. The combination of Virginia Avenue and Maryland Avenue provided the east-west connectivity provided by Independence Avenue SW today.

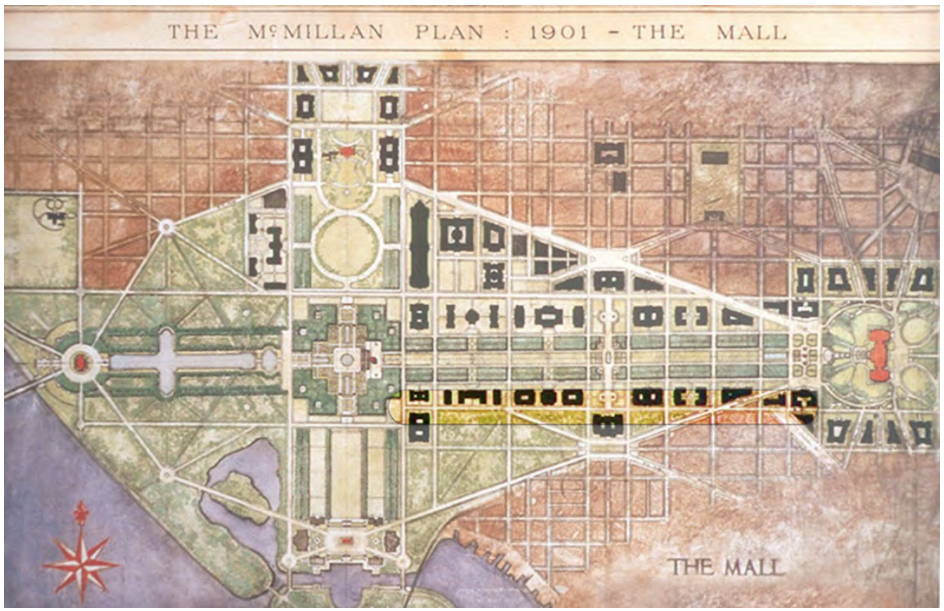
Figure 6. Independence Avenue SW, as shown in the original "Plan of the City"



Modified using an excerpt from: https://www.loc.gov/resource/g3850.ct000514/

Several plans for the Mall were developed around the beginning of the 20th century. These plans show Independence Avenue SW in a variety of roles, ranging from a tree-lined corridor between 15th Street and 6th Street in **Figure 7** to a less prominent street between 14th Street and 6th Street in **Figure 8**.

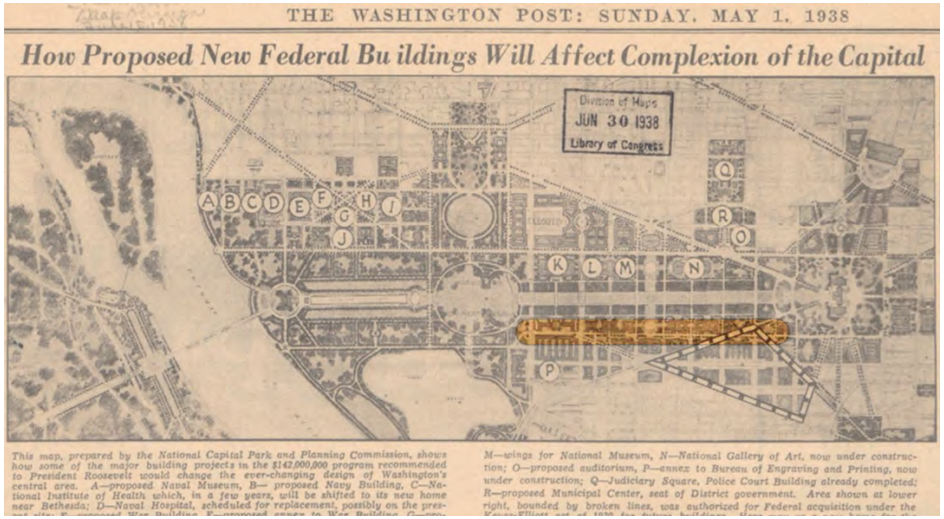
Figure 7. 1901 The McMillan Plan



Modified using an excerpt from: https://en.wikipedia.org/wiki/McMillan_Plan#/media/File:McMillan_Plan.jpg

In 1925, with the construction of the Arlington Memorial Bridge, NCPC approved the widening of North B Street (now Constitution Avenue) into a ceremonial avenue. In 1930, NCPC sought to turn South B Street into a widened ceremonial avenue as a counterpart to North B Street with connections to a bridge over the Tidal Basin. NCPC proposed widening South B Street to sixty feet between New Jersey Avenue SE and 12th Street SW and 80 feet between 12th Street and 14th Street to accommodate the piers of the planned pedestrian skyways linking the United States Department of Agriculture buildings. The north curb remained in place along the corridor, and the south curb was moved to provide the additional width of the roadway. In 1930, what is now the Longworth House Office Building was moved to the south to provide space for the widened street. South B Street was renamed Independence Avenue SW in 1934 after Congress passed legislation renaming the street.

Figure 8. 1938 Proposed New Federal Buildings


THE WASHINGTON POST: SUNDAY, MAY 1, 1938

How Proposed New Federal Bu ildings Will Affect Complexion of the Capital

Division of Maps
JUN 30 1938
Library of Congress

This map, prepared by the National Capital Park and Planning Commission, shows how some of the major building projects in the $142,000,000 program recommended to President Roosevelt would change the ever-changing design of Washington's central area. A—proposed Naval Museum, B— proposed Navy Building, C—National Institute of Health which, in a few years, will be shifted to its new home near Bethesda; D—Naval Hospital, scheduled for replacement, possibly on the pres-

M—wings for National Museum, N—National Gallery of Art, now under construction; O—proposed auditorium, P—annex to Bureau of Engraving and Printing, now under construction; Q—Judiciary Square, Police Court Building already completed; R—proposed Municipal Center, seat of District government. Area shown at lower right, bounded by broken lines, was authorized for Federal acquisition under the

Modified using an excerpt from: https://www.loc.gov/resource/g3852m.ct005010/

Today, Independence Avenue SW mirrors Constitution Avenue NW and serves as the southern edge of the National Mall. However, Independence Avenue SW plays a distinct role in the District's street network. Whereas Constitution Avenue serves as a major east-west connector, transporting vehicles from Maryland Avenue west to Virginia via I-66, Independence Avenue SW transitions into Ohio Drive near the Lincoln Monument to the west, and to the east, the roadway narrows significantly beyond Pennsylvania Avenue, and serves as a residential street through the Capitol Hill neighborhood. This Design Study focuses on developing recommendations considering Independence Avenue SW's more local and multimodal context.

As shown in the various plans and images of Independence Avenue SW over time, the role and use of Independence Avenue SW in the District's transportation network, the corridor's prominence, and its historical context have changed over time. This provides a foundation for considering changes to the corridor's look, feel, and operating environment to better match the corridor's surrounding land-use context and distinctive role in the transportation network.

Using History to Shape Urban Design Options

The history of Independence Avenue SW, from its origins in L'Enfant's Plan to its role as a cultural and civic artery, provides a rich foundation for shaping its future. By respecting its historical significance, maintaining clear sightlines to monuments, integrating modern amenities, and improving connectivity, design options can transform the avenue into a space that honors its past while catering to the needs of a 21st-century city. The challenge is to balance preservation with innovation, creating a vibrant corridor that continues to symbolize democracy and culture.

Honor the Vision of L'Enfant's Original Plan and Burnham's Plan for Washington

The original vision of wide, grand avenues with clear sightlines to important monuments and buildings remains central to Independence Avenue SW's identity. Any future design options should respect these sightlines to nationally important governmental and cultural institutions and civic spaces, including the U.S. Capitol, Washington Monument, and Smithsonian museums. This involves **preserving open vistas** by avoiding visual clutter along the corridor and obstructions that block views of iconic landmarks. It also ensures that the design complements rather than competes with the surrounding monumental architecture.

Integrate Historical Architecture with Modern Amenities

Independence Avenue SW's historical architecture, including federal buildings and museums, provides a sense of place and continuity. New design options should harmonize with these existing structures while incorporating modern amenities. Design options should focus on **Contextual Design** and use materials, colors, and styles that reflect the monumental core. The design should also include **Enhanced Public Spaces** that draw from the area's historical context, incorporating elements like classical styles and furnishings that reflect the avenue's monumental and civic character.

Recommendation:

- Design enhanced public spaces that reflect the avenue's character.
- Incorporate contextual design to reflect the monumental core

Reflect Cultural and Civic Uses

Independence Avenue SW's evolution into a cultural and civic space should be reinforced through the design of spaces that cater to both tourists and residents. This could be achieved by **Cultural Programming** and creating flexible outdoor spaces for art installations, performances, and temporary exhibitions that reflect the avenue's role as a cultural hub. Enhancing areas such as dedicated **Ceremonial Spaces** along the avenue to accommodate parades, public gatherings, and demonstrations with durable, multi-functional spaces can support a range of civic activities.

Recommendation:

- Create spaces for cultural programming
- Create ceremonial spaces for gatherings and special events

Stormwater Infrastructure

Stormwater infrastructure should be at the forefront of future design options for Independence Avenue SW. Drawing on the avenue's historical use as a monumental corridor, present-day interventions can include incorporating more street trees, rain gardens, and permeable pavements to manage stormwater and manage water capture, storage, and reuse. Future designs should also ensure that infrastructure can withstand flooding, heat waves, and other severe weather events.

Recommendation:

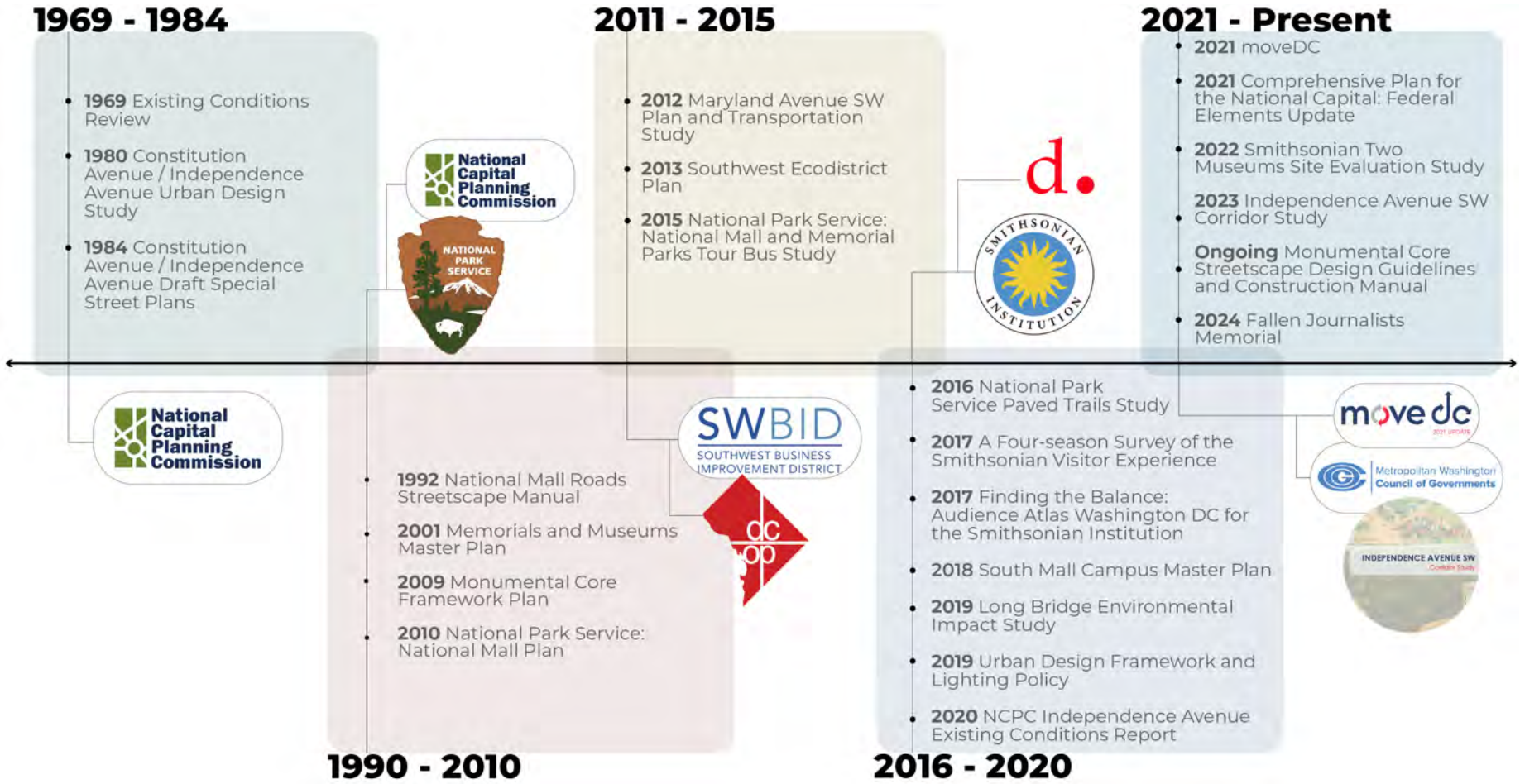
- Identify opportunities for landscaping and infrastructure improvements.



2.2 Other Plans and Studies

Independence Avenue SW has been the subject of numerous plans and studies over the decades shown in **Figure 9**, each contributing to the ongoing discussion about its future. These studies have shaped the current understanding of the corridor's challenges and opportunities, influencing design considerations for future development. These documents emphasize the importance of balancing the avenue's historical and monumental significance with the need for modern and multimodal urban design. Key considerations include enhancing pedestrian and cyclist infrastructure, restoring historic streetscape elements, integrating cultural institutions, and improving the public realm. By building on these insights, the current Design Study envisions a cohesive and vibrant corridor that meets the needs of both residents and visitors while respecting the avenue's rich history.

Figure 9. Previous Plans & Studies



Independence Avenue SW Corridor Study (2023)

The Independence Avenue SW Corridor Study is one of the most recent and comprehensive corridor evaluations, focusing on improving multimodal safety, enhancing pedestrian and cyclist infrastructure, and addressing transportation challenges. The study proposes three planning-level concepts for the avenue, aiming to balance the historical and monumental significance of the corridor with modern transportation needs. **Figure 10** summarizes the key takeaways from the Corridor Study. Additional recommendations from the Corridor Study include:

Enhanced Multimodal Connectivity: The Study emphasizes the need for a pedestrian-friendly and multimodal corridor, proposing integrating bike lanes, pedestrian crossings, and improved transit amenities. Additionally, designing for comfortable multimodal activity through a concept known as Complete Streets provides a design approach that balances the needs of cars, cyclists, pedestrians, and transit users.

Landscaping and Streetscape: The Study proposes the introduction of double rows of trees along the avenue, inspired by historic plans and other stormwater infrastructure to manage stormwater and provide shade.

Public Space Utilization: The Study recommends designing the public realm to be enjoyable and safe for all age groups through art, installations, and parklets. Additionally, the Study recommends program space for waiting, sitting, and eating and design wayfinding and signage to connect people to destinations.

Infrastructure Amenities: The Study recommends adding protection from the elements by adding more trees, streetscape elements, landscaped areas, and stormwater management. Streetscape elements should serve a range of users and needs.

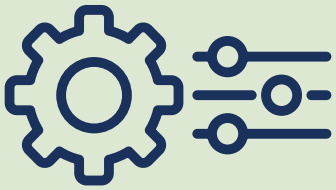
Traffic and Curbside: The Study recommends defining curbside uses based on priorities of adjacent institutions and clearing zones for walking, biking, and other curbside uses like pick-up/drop-off and parking.

Obstacles and Hazards: The Study recommends organizing streetscape elements and amenities on the sidewalk to improve circulation and avoid hazards. This includes designing for universal accessibility and compliance with accessibility standards.

Recommendation:

- Encourage multimodal travel.
- Activate the public space with art, installations, wayfinding, and designated spaces for activities.

Figure 10. Findings from the Independence Avenue SW Corridor Study (2023)



Configuration & Function

- Narrow sidewalk widths, wide curb-to-curb crossing distances, and physical obstructions limit the pedestrian experience and do not support the large volume of pedestrians accessing museums, employers, and destinations along Independence Avenue SW.
- The existing vehicle volumes on Independence Avenue SW fall under the capacity the avenue was intended to serve. The number of travel lanes on Independence Avenue SW and low vehicle volumes encourage speeding and create unsafe and uncomfortable conditions for all users.



Walking and Biking Experience and Quality

- Independence Avenue SW is a prominent corridor in the District and lacks cohesive streetscape elements, tree cover, and quality of amenities that emphasize its significance.
- The lack of bicycle infrastructure, wide street width, and high vehicular speeds create uncomfortable and uninviting conditions for people biking.



Environment

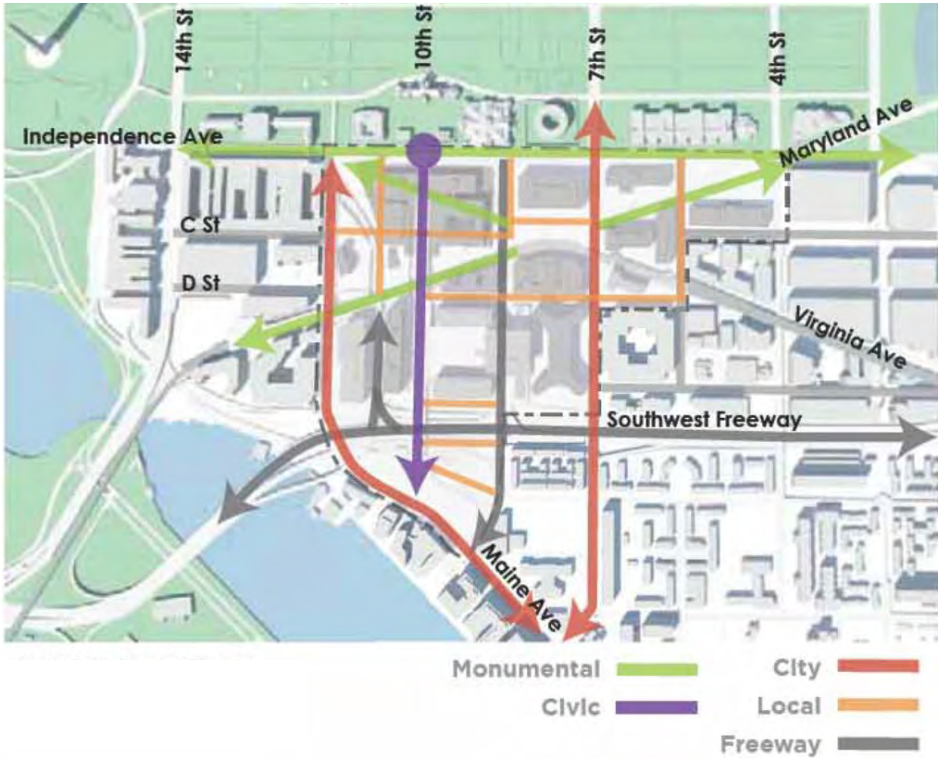
- Narrow sidewalks contribute to a lack of consistent tree cover, poor tree health, and reduced opportunities to support new tree growth. They also increase the heat island effect and impact of extreme temperatures.
- Lack of stormwater infrastructure and opportunities for trees and other plantings may impact stormwater management and result in drainage challenges.

Southwest Ecodistrict Plan (2013)

The Southwest Ecodistrict Plan outlines a vision for transforming the area south of the National Mall, including parts of Independence Avenue SW, into a vibrant, mixed-use community. The plan emphasizes the integration of cultural, federal, and residential uses, as shown in **Figure 11**. Key contributions to design considerations include:

Integration with Cultural and Federal Buildings: The plan highlights the importance of orienting new developments along Independence Avenue SW to enhance visibility and access to Smithsonian museums and other cultural institutions, as shown in **Figure 11**.

Figure 11. Independence Avenue SW Street Function and Character



SW EcoDistrict Plan

Urban Design: The Ecodistrict Plan's emphasis on stormwater infrastructure, public spaces, and pedestrian-friendly streets directly informs the current efforts to incorporate human-scaled elements into the avenue's redesign.

Recommendation:

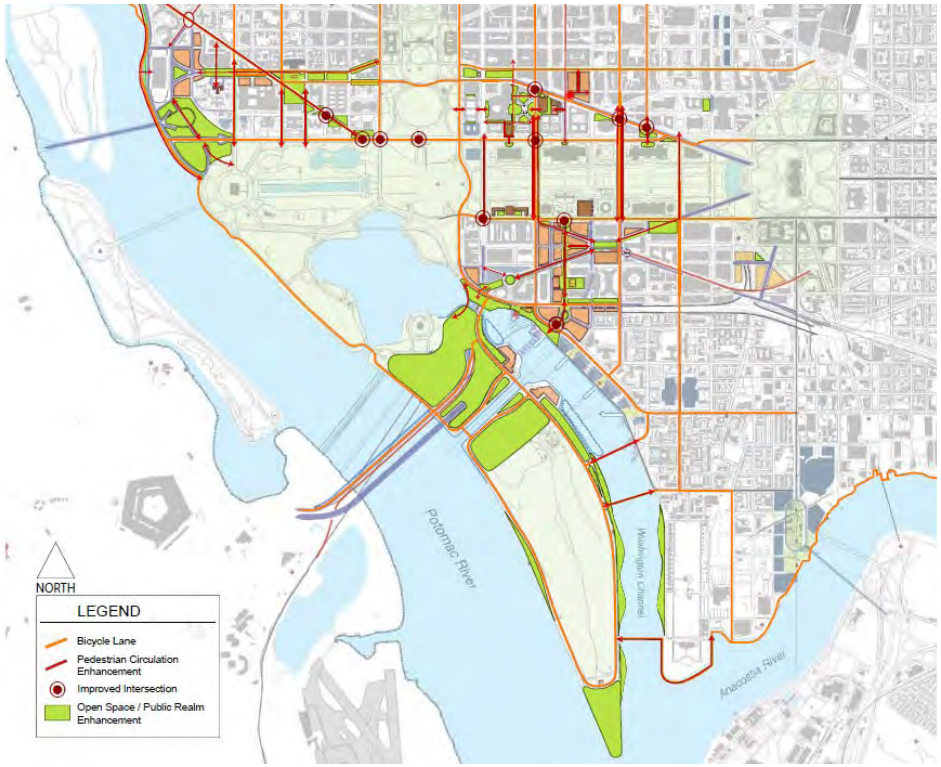
- Orient new developments along Independence Avenue SW.
- Incorporate human-scaled elements into the avenue's redesign.

Monumental Core Streetscape Design Guidelines (2023)

The Monumental Core Streetscape Design Guidelines (**Figure 12**) provide cohesive streetscape guidance for major federal avenues that shape the pedestrian experience and highlight the symbolic importance of historic streets. Key design details include:

Tree Canopy Restoration: The guidelines recommend restoring the double rows of trees along Independence Avenue SW, a feature that aligns with historical city plans and enhances the avenue's aesthetic and environmental quality.

Figure 12. Urban Framework Diagram



Monumental Core Framework Plan

Consistency in Streetscape Elements: The guidelines emphasize the need for consistent streetscape zones, including pedestrian circulation areas, street furniture, and security installations, to create a unified look and feel across the corridor.

Recommendation:

- Restore the double rows of trees along Independence Avenue SW.
- Ensure consistent streetscape zones, including pedestrian circulation areas, street furniture, and security installations.

Monumental Core Framework Plan (2009)

The Monumental Core Framework Plan provides a strategic vision for the federal core surrounding the National Mall, including Independence Avenue SW. The plan focuses on enhancing the avenue's role as a key connection between the Mall, downtown Washington, D.C., and the Southwest waterfront.

Public Realm Enhancements: The plan calls for creating more vibrant and accessible public spaces along Independence Avenue SW, improving connections between key federal and cultural sites.

Street Character and Functionality: The Framework Plan suggests that Independence Avenue SW should serve as an active pedestrian corridor and a gateway, balancing its historical significance with modern urban needs.

Smithsonian South Mall Campus Master Plan (2018)

The Smithsonian South Mall Campus Master Plan outlines a long-term vision for the South Mall campus, which includes several key Smithsonian museums located along Independence Avenue SW. The plan focuses on improving visitor services, accessibility, and the integration of the museums with the surrounding urban fabric. Key contributions to design considerations include:

Improved Accessibility and Wayfinding: The plan calls for better wayfinding and accessibility features along Independence Avenue SW to facilitate visitor movement between museums and the National Mall.

Active Frontages and Public Spaces: The plan promotes the activation of public spaces along the avenue with programming, seating, and landscaping that support the cultural institutions and the broader urban environment.

moveDC (2021)

The moveDC multimodal long-range transportation plan is Washington, D.C.'s multimodal long-range transportation plan (LRTP), which includes strategies for enhancing mobility and safety across the city, including along Independence Avenue SW. The plan identifies the avenue as a key corridor for multimodal transportation improvements, including pedestrian and bicycle infrastructure. Key strategies include:

Complete Streets Principles: The plan advocates applying complete streets principles to Independence Avenue SW, ensuring the corridor is safe and accessible for all users, including pedestrians, cyclists, and transit riders.

Bicycle and Pedestrian Infrastructure: moveDC highlights the need for protected bicycle lanes and improved pedestrian crossings along Independence Avenue SW to enhance safety and connectivity.

Fallen Journalists Memorial (2024)

The site for the planned Fallen Journalists Memorial has been approved to be the 0.3-acre triangular park along Independence Avenue SW, Maryland Avenue, and 3rd Street NW, under the National Park Service Jurisdiction. The monument intends to serve as a place of commemoration and inspiration for journalists and the public.

The site's location along Independence Avenue SW is thematic and represents the importance of an independent free press. The monument will feature a grove of trees interspersed among the monument to provide shade and help to distinguish the memorial.

2.3 Access and Circulation

Independence Avenue SW, one of Washington, D.C.'s most iconic corridors, plays a multifaceted role in the city's urban fabric. It connects the National Mall with the Southwest neighborhood, linking important cultural, governmental, and residential areas. Over time, the avenue has evolved from a primary transportation artery into a complex urban space that must accommodate a wide range of activities, from daily commutes to tourism, special events, and public gatherings. This chapter summarizes the transportation conditions discussed in the 2023 Independence Avenue SW Corridor Study and the traffic analysis completed as part of this study.

This section summarizes the traffic analysis focused on the corridor's current and future operational needs, emphasizing how traffic considerations should inform the design of a celebrated urban space rather than a traditional traffic artery. The analysis examines key intersections, the impact of seasonal traffic fluctuations, and the corridor's use during special events while incorporating a design approach that prioritizes safety, multimodal integration, and the public realm.

Independence Avenue SW's Network Function

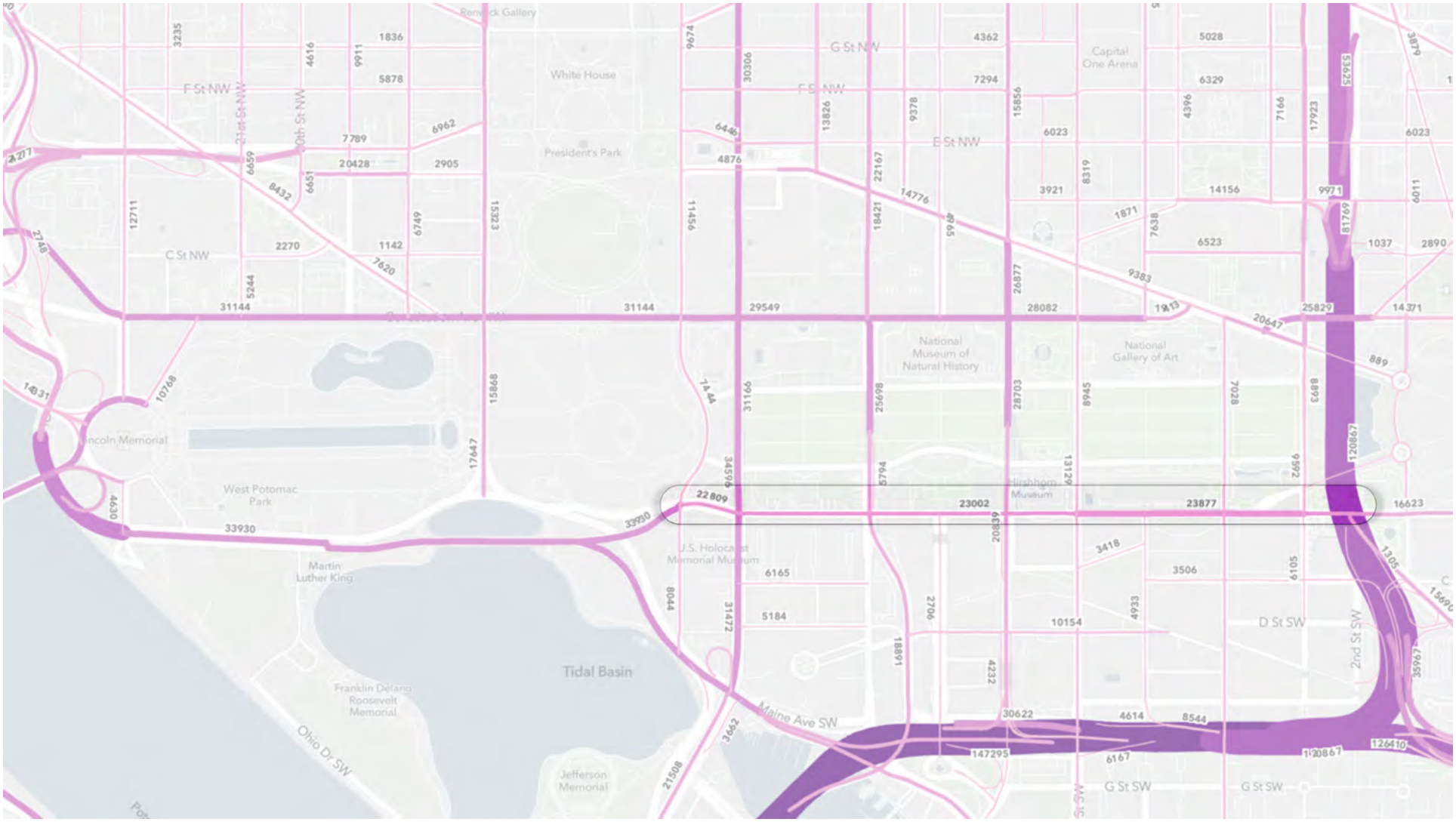
Independence Avenue SW serves many roles for a variety of users; from a transportation perspective, the configuration of Independence Avenue SW primarily functions to transport vehicles, trucks, buses, and other motorized modes of transportation. With the Southwest Freeway (I-395) opening in 1963, the roadway no longer functions as a primary route for vehicular traffic. The current eight-lane configuration provides excess roadway, which is not fully used to the current design capacity.

This creates an opportunity to consider repurposing existing travel lanes for other uses and reconfiguring the corridor's cross-section to prioritize non-motorized users, including people biking, walking, using micromobility, and riding and accessing transit.

Independence Avenue SW is designated as a principal arterial through the study area. Principal arterial roadways are the highest traffic volume corridors, connect activity centers in urban areas, and are designed to carry high volumes of vehicles. Independence Avenue SW also serves as a primary freight route from 15th Street SW to Washington Avenue SW and is served by various arterial, collector, and local streets adjacent to the study corridor.

As shown in **Figure 13**, the daily traffic volumes on Independence Avenue SW are dwarfed by the parallel Southwest Freeway (I-395), carrying about 90% less daily traffic than the freeway. As described in the Corridor History section, Independence Avenue SW was intended to become a counterpart to what is now Constitution Avenue. However, while Independence Avenue SW mirrors Constitution Avenue NW and serves as the southern edge of the National Mall, the corridor plays a distinct role in the District's street network, it serves as a major east-west connector, transporting vehicles from Maryland Avenue west to Virginia via I-66. Independence Avenue SW transitions from the west to east, functioning as a parkway from Ohio Drive to 15th Street SW, an urban corridor from 15th Street SW to Washington Avenue, and lastly a residential local street east of Washington Avenue through the Capitol Hill neighborhood.

Figure 13. 2023 Daily Traffic Volumes



DC Open Data

Current Transportation Conditions

The 2023 Independence Avenue SW Corridor Study included a robust evaluation of the corridor's current transportation conditions. The team collected multimodal traffic counts, conducted field reviews, and evaluated pedestrian, bicycle, transit, and vehicular conditions. This section provides a high-level summary of the findings from that evaluation. More detailed information can be found in the 2023 Corridor Study.

Pedestrian Conditions

The pedestrian network on Independence Avenue SW is not sized appropriately for the existing pedestrian demands (**Figure 14**). The existing pedestrian infrastructure is continuous along the length of the corridor on both sides of the roadway. Still, it lacks amenities to support the many pedestrians traveling along the corridor. While some sections are crowded, especially where tour buses load and unload or museum lines spill over onto the sidewalk, in other sections, the corridor has wide sidewalks with minimal public life or pedestrian activity. Major challenges include:

- **Crowded Sidewalks:** Narrow sidewalks in high-traffic zones near museum entrances cause bottlenecks, limiting pedestrian comfort and accessibility.
- **Long Crossing Distances:** At intersections, pedestrians are exposed to vehicular traffic for extended durations. Observations from the Corridor Study highlight intersections such as 14th Street SW and Independence Avenue SW as key areas where these risks are most prevalent. Interventions like curb extensions and pedestrian refuge islands could improve safety and reduce crossing times.
- **Lack of Mid-Block Crossings:** High-demand zones between Smithsonian museums and the National Mall lack sufficient crossings, leading to unsafe jaywalking. Strategic placement of mid-block crossings with clear signage and pedestrian refuge islands could alleviate these issues.
- **Inadequate Shade:** Sparse tree coverage, particularly in areas with heavy pedestrian flow, exacerbates heat discomfort during warmer months. Expanding the tree canopy, as suggested in the SW Ecodistrict Plan, would provide shade and contribute to a more inviting pedestrian environment.

Figure 14. A Student Group Using the Sidewalk Near the National Air and Space Museum



Kittelson & Associates, Inc.

Bicycle Conditions

Independence Avenue SW is identified in moveDC as a bicycle priority corridor; however, there is no existing bicycle infrastructure in the corridor study area. In the vicinity, there are parallel bicycle facilities along Pennsylvania Avenue NW. Nearby Jefferson Drive SW and Madison Drive NW within the National Mall also provide lower-stress, lower-volume options for bicyclists; however, they do not currently have dedicated bicycle facilities.

A Bicycle Level of Stress (LTS or BLTS) analysis objectively measures how comfortable bicycle facilities are for the range of bicycle riders. An LTS evaluation considers street characteristics, such as the number of lanes, vehicle speeds, vehicle volumes, and type of existing bicycle accommodations. The four levels are summarized in **Figure 15**. The entirety of the Independence Avenue SW corridor today is an LTS 4 facility, which represents uncomfortable conditions for most people biking and emphasizes the gap Independence Avenue SW creates in the District's bicycle network.

Figure 15. Bicycle Level of Traffic Stress Scores and the Corresponding Range of Bicycle Rider Types

Level of Traffic Stress Score	Bicycle Rider Type	Traffic Stress Tolerance - Description
LTS 1	**Interested but Concerned** 40% -60% of the Population	**Lowest Traffic Stress Tolerance:** Most children can feel safe and comfortable riding on these streets.
LTS 2	**Somewhat Confident** 15% -25% of the Population	**Lower Traffic Stress Tolerance:** The interested but concerned adult population will feel safe and comfortable riding on these streets.
LTS 3	**Confident** 5% -15% of the Population	**Higher Traffic Stress Tolerance:** Streets that are acceptable to enthused and somewhat confident riders Minimum acceptable bicycle infrastructure present.
LTS 4	**Highly Confident** 5% -10% of the Population	**Highest Traffic Stress Tolerance:** Only strong and fearless riders will ride on these streets. These are high-stress streets with high speed limits, multiple lanes, and limited or no dedicated bike facilities.

Adapted by Kittelson & Associates, Inc.

Transit Conditions

Independence Avenue SW has many transit options along the corridor, with a mix of local, regional, and private buses operating frequently throughout the day. Detailed maps of transit routes and stops are included in the 2023 Corridor Study. Transit service includes:

- **Washington Metropolitan Area Transit Authority (WMATA) Metrorail Service**
  - Smithsonian Metro Station (**Figure 16**)
  - L'Enfant Plaza Metro Station
  - WMATA Metrobus Service
  - 32 and 36 Metrobus routes
  - 52 Metrobus route services
  - WMATA's proposed Better Bus Network replaces the current 32 and 36 routes on the corridor with the D1X and D12 high-frequency routes and the 52 route with the D52 route
- **Other Bus Service**
  - The Potomac and Rappahannock Transportation Commission (PRTC) OmniRide, Maryland Transit Authority (MTA), and Loudoun County Transit (LCT)
  - The SW Neighborhood Shuttle operates on Independence Avenue SW
  - Several sightseeing tour services provide hop-on, hop-off service, including the Old Town Trolley Tours

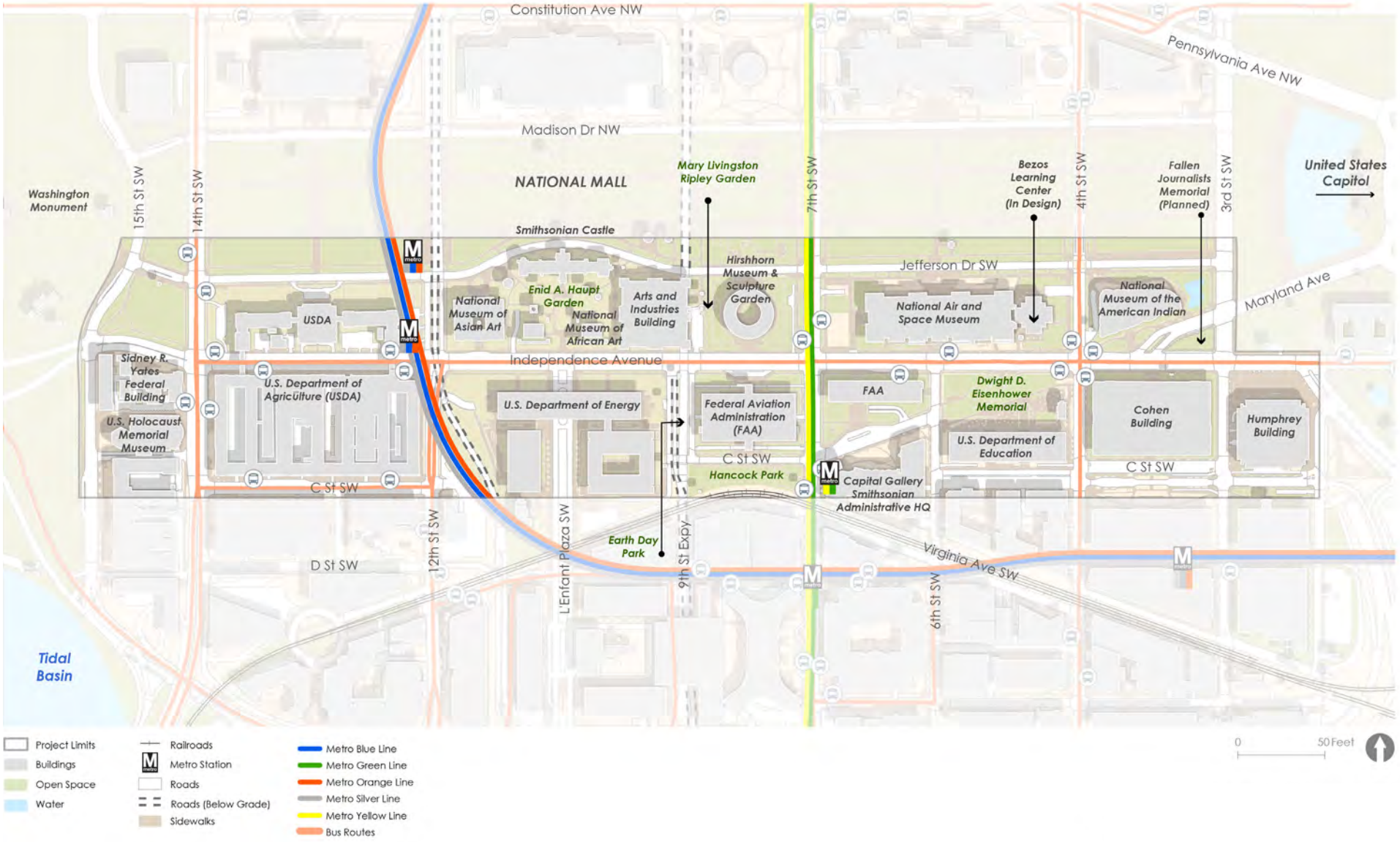
The corridor has eleven bus stop locations, eight providing WMATA Metrobus service as shown in **Figure 17**. Five of the bus stops have shelters with benches. Based on site observations during field visits and the Urban Life Review, bus stops are routinely blocked by parked vehicles, buses, and delivery trucks.

Figure 16. Smithsonian Metro Station entrance on Independence Avenue SW



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Figure 17. WMATA Transit Service

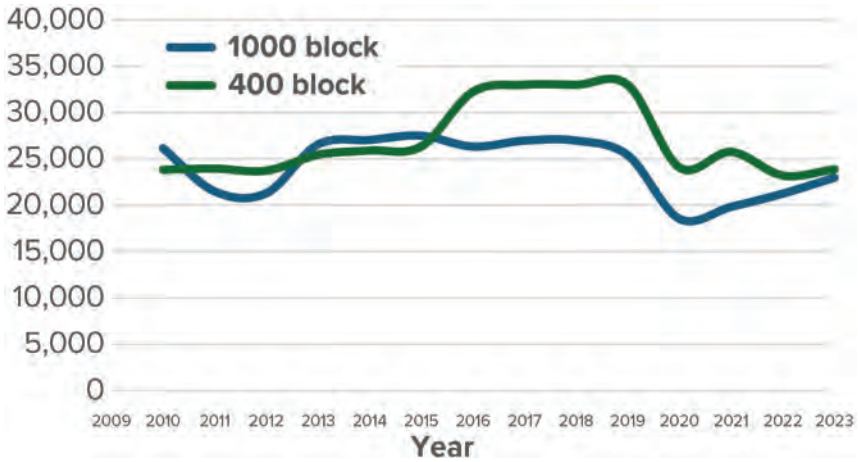


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Vehicular Conditions

Independence Avenue SW provides eight total travel lanes between 15th Street and 3rd Street SW. Daily traffic volumes on Independence Avenue SW have remained relatively stable since at least 2009, fluctuating between approximately 18,500 vehicles per day in 2020 near the onset of the COVID-19 pandemic and 33,000 during the three years from 2017 to 2019, as shown in **Figure 18**.

Figure 18. Average Annual Daily Traffic Volumes on Independence Avenue SW, 2009-2023



Data from DDOT via DC Open Data and DDOT GIS

Trucks are prohibited on Independence Avenue SW west of 14th Street SW and east of Washington Avenue SW. Between 14th Street and Washington Avenue SW, moveDC recognizes Independence Avenue SW as a freight priority corridor, and the same section of Independence Avenue SW is a designated truck route. While some trucks were observed using Independence Avenue SW, the restrictions on both ends of the corridor minimize freight activity to local trips.

Considering Level of Service

Automobile Level of Service (LOS) measures the convenience and efficiency with which people are able to drive motor vehicles along a roadway. Unlike the Bicyclist Level of Traffic Stress (BLTS) or Pedestrian Level of Comfort (PLOC) measures that evaluate the feelings of safety and comfort experienced by non-motorized users, LOS is typically reported as the amount of vehicle delay at intersections. Drivers tend to operate vehicles in a comfortable environment without the stress or discomfort felt by people walking and biking in certain environments, and lower levels of LOS rarely result in a person driving feeling unsafe, uncomfortable, or choosing not to make a trip.

For people biking and walking, the perceived and actual risk of sharing spaces with motor vehicles, the adequacy of dedicated paths, and environmental factors like noise and proximity to traffic significantly influence their experience. As a result, the measures of LOS, BLTS, and PLOC are not equal, and reflect fundamentally different experiences: the comfort and safety for non-motorized users versus convenience for drivers. Decision-makers prioritizing roadway investments should not weigh these measures equally. In a Vision Zero community like the District of Columbia, the prioritization of safety performance over the smooth flow of traffic is required. The ability to create a celebrated urban space as desired on Independence Avenue SW requires a high-quality urban space that belongs to the public realm and not operators of motor vehicles passing through the corridor.

The following section summarizes the results of the traffic analysis completed as part of this study.

Traffic Analysis

A traffic analysis focused on the corridor's current and future operational needs and examined key intersections, the impact of seasonal traffic fluctuations, and the corridor's use during special events. The detailed traffic study is included in Appendix C: Traffic Study, and is summarized here. The traffic study was conducted in compliance with DDOT traffic study procedures, and the project team met with DDOT several times to discuss and revise the study to ensure DDOT's acceptance of the study results. The traffic analysis evaluated the most conservative scenario, based on proposed corridor alternatives, which includes a four-lane street with turn pockets at select intersections.

The traffic analysis included signal phasing strategies designed to separate turning vehicles crossing a two-way cycletrack, which meets thresholds from DDOT's 2020 Bicycle Facility Design Guide and the third edition of NACTO's Urban Bikeway Design Guide.

Existing Traffic Patterns

Independence Avenue SW serves a variety of users, including commuters, tourists, pedestrians, cyclists, and service vehicles. The traffic patterns on the corridor vary significantly throughout the day and year, reflecting its dual role as both a transportation route and a public space. Weekend volumes tend to be lighter than weekday peak hours but can spike during special event days. Historically vehicle-centric, the current eight-lane Independence Avenue SW configuration presents significant challenges for multimodal users, such as pedestrians and cyclists, as described previously.

Independence Avenue SW experiences considerable seasonal traffic fluctuations, driven largely by tourism and special events. Spring and summer are peak tourist seasons in Washington, D.C., with significant pedestrian and vehicle traffic increases. During these months, the corridor experiences higher volumes of tour buses, increased pedestrian crossings, and more frequent traffic delays at intersections. Fall sees a slight decrease in tourism, but the corridor remains busy due to ongoing events, federal activities, and the start of the academic year. Traffic patterns are similar to those in spring and summer, though with reduced intensity. Winter significantly reduces tourist traffic, bringing lighter overall traffic volumes on Independence Avenue SW. However, the corridor still supports regular commuter traffic and occasional special events, particularly around the holiday season.

Data Collection and Methodology

Data collection for the traffic study was conducted in November and December 2022, capturing peak-hour traffic on weekdays and weekends. Historical data from DDOT supplemented this effort to create a comprehensive analysis framework. The study utilized the Metropolitan Washington Council of Government (MWCOG) regional Travel Demand Model (TDM) to forecast traffic growth, estimating a 0.58% annual increase from 2021 to 2045. The forecasted traffic growth considers funded transportation improvements, area growth, and development, including development suggested in the SW Ecodistrict Plan, and it also accounts for new museums and the conversion of office-centric buildings to mixed-uses.

Scenario Evaluations and Results

Three future-year scenarios for Independence Avenue SW were evaluated to assess their impacts on traffic flow and multimodal use. The Future Year Baseline scenario retains the existing eight-lane configuration, ensuring effective vehicle flow under 2045 conditions but limiting opportunities for pedestrian, cyclist, and multimodal improvements. While this scenario maintains vehicle capacity, it does not support urban transformation goals prioritizing efficient infrastructure. The Four-Lane Configuration reduces the corridor to two through lanes, significantly enhancing safety and accessibility for pedestrians and cyclists. However, it results in increased vehicle congestion during peak hours, highlighting the need for further mitigation measures.

The Four-Lane with Mitigation Strategies scenario incorporates measures like optimized signal timing and intersection reconfigurations, effectively balancing peak-hour traffic flow and non-vehicular improvements. These strategies, combined with the removal of Maryland Avenue SW, between 3rd Street and Independence Avenue SW, minimized delays while enhancing multimodal functionality. This scenario achieves a compromise between traffic efficiency and the promotion of active transportation modes.

Recommendation:

Use traffic management strategies to mitigate future traffic congestion.

Maryland Avenue SW

Maryland Avenue SW, between 3rd Street and Independence Avenue SW (**Figure 19**), is a minor connector for vehicular traffic, primarily facilitating southbound right-turn movements from Maryland Avenue SW to Independence Avenue SW and through movements on Maryland Avenue SW across 3rd Street SW. However, its strategic location adjacent to the National Museum of the American Indian and the forthcoming Fallen Journalists Memorial offers a unique opportunity to reconfigure this short segment to enhance the public life experience. Reimagining this segment to reduce or eliminate general vehicle traffic could significantly improve the area's public realm without adversely impacting the overall traffic network.

Figure 19. The Section of Maryland Avenue SW between 3rd Street and Independence Avenue SW



The third traffic study scenario included the closure of this Maryland Avenue SW section. As noted, if Maryland Avenue was closed to general traffic or reconfigured to serve only pick-up and drop-off activities for the museum, the surrounding street network could effectively absorb the displaced traffic. Southbound right-turn movements at the current Maryland Avenue SW & 3rd Street intersection would occur at the Independence Avenue SW & 3rd Street SW intersection, along with westbound left-turn movements from the current Independence Avenue SW & Maryland Avenue SW intersection.

Rather than a full roadway closure to all vehicles, the segment of Maryland Avenue SW could be limited to motorcoaches or vehicles picking up and dropping off museum or memorial visitors, as shown in **Figure 20**. If the segment were limited to "right-in" only movements from 3rd Street SW by restricting northbound left-turns and westbound through movements, along with "right-out" only movements from the segment to Independence Avenue SW, the restriction would be self-enforcing by not being an attractive alternative to Maryland Avenue or Independence Avenue SW.

Figure 20. Potential New Public Space Created by Converting Maryland Avenue SW to pick-up and drop-offs only



Either of these changes also allows the opportunity to provide a mid-block crosswalk across Independence Avenue SW aligned with the front entrance to the Voice of America building and creates space to further connect the public space between the Fallen Journalists Memorial and the National Museum of the American Indian.

Recommendation:

Limit vehicle access to include vehicle pick up/drop off for museum/memorial visitors on Maryland Avenue SW between 3rd Street and Independence Avenue SW.

24-Hour Capacity Framework

The 24-hour capacity framework provided a comprehensive analysis of traffic behavior on Independence Avenue SW, examining peak, off-peak, and transitional periods. Unlike traditional peak-hour studies, this approach evaluates hourly traffic variations and is rooted in the methodology of NCHRP Report 1036, Roadway Cross-Section Reallocation: A Guide, which emphasizes the importance of context and community priorities in roadway space allocation. The findings revealed that under projected 2045 conditions, the roadway operates significantly below capacity for most of the day, with intersections like 7th Street SW and 12th Street SW remaining under capacity for nearly all hours. This underscores substantial unused capacity, aside from brief peak congestion periods.

The results highlight the inefficiency of designing roadways solely for peak 15-minute traffic volumes, which underutilizes space during off-peak hours and misses opportunities to enhance pedestrian, cyclist, and public space usage. A 16-hour efficiency test showed that even with a reduced four-lane cross-section, excess capacity remains at critical intersections, ranging from 8.4 to 11.6 lane hours. This suggests that a more flexible design could repurpose space for public realm improvements and safety enhancements without compromising vehicle throughput during peak demand periods.

Dedicated Turn Lanes

The Independence Avenue SW corridor currently features a mix of exclusive and shared turn lanes. While left-turn-only lanes provide critical capacity and safety benefits, right-turn-only lanes are less effective and counterproductive to the vision of creating a celebrated urban corridor. With the exception of the eastbound right-turn-only lane at Independence Avenue SW & 14th Street SW, the concept design eliminates right-turn-only lanes due to their minimal traffic volume and the availability of alternative routes for right-turn movements. The removal of these lanes is not expected to impact traffic flow significantly.

Maintaining left-turn-only lanes, however, is essential for preserving capacity when reducing through lanes in the corridor. The proposed design retains the current left-turn configurations and signal timing, as detailed in **Table 3**. This includes protected left turns at several intersections and specific left-turn restrictions, such as westbound at Independence Avenue SW & 14th Street SW and eastbound at Independence Avenue SW & 3rd Street SW. These measures ensure that the corridor supports efficient traffic flow while aligning with urban design and multimodal goals.

Table 3. Left Turn Configurations on Independence Avenue SW

Intersection (SW)	Approach	Lane Configuration	Signal Phasing
15th Street	EB	Left turn only	Protected
	WB	Left turn only	Protected
14th Street	EB	Through left	Prohibited[1]
	WB	Through left	Prohibited[2]
12th Street	EB	Through left	Permissive
	WB	Left turn only	Protected + Permissive
L'Enfant Plaza (10th Street)	EB	n/a	n/a
	WB	Through left	Protected + Permissive
9th Street	EB	n/a	n/a
	WB	Through left	Protected + Permissive
7th Street	EB	Through left	Protected + Permissive
	WB	Through left	Permissive
6th Street	EB	n/a	n/a
	WB	Through left	Permissive
4th Street	EB	Through left	Permissive
	WB	Through left	Protected + Permissive
3rd Street	EB	Through left	Prohibited[2]
	WB	Through left	Permissive

[1] Left-turns are prohibited but are permissive for buses and taxi cabs.
[2] Left-turns are prohibited but are permissive for buses.

Recommendation:

- Use dedicated left-turn lanes only when necessary, and avoid the use of right-turn only lanes
- Reduce the number of lanes on Independence Avenue SW and provide targeted mitigation strategies.

Curbside Conditions

Given the mix of destinations along Independence Avenue SW, there is a high demand for curbside space along Independence Avenue SW. The most significant demand occurs near the Smithsonian museum entrances, particularly the National Air and Space Museum between 4th Street and 7th Street SW.

Both sides of the corridor are predominantly "rush-hour restricted" curbside zones allowing **off-peak**, **on-street parking** from 8:30 AM to 4:00 PM from Monday to Friday and 6:30 PM to 10:00 PM from Monday to Saturday, with a 3-hour limit.

Independence Avenue SW has significant bus activity (**Figure 21**), particularly tourist groups getting on and off motorcoaches or school buses, along with passenger pick-ups and drop-offs from ride-hail app service providers (**Figure 22**). Most of the corridor's curbside activity occurs at the designated "No Parking" zones, allowing vehicles to expeditiously load or unload passengers, packages, or merchandise at the curb. Other curbside uses along Independence Avenue SW include off-peak parking, food trucks and vendors, tour bus pick-ups and drop-offs, and motorcoach or school bus staging.

Figure 21. School Bus Staging on Independence Avenue SW adjacent to the Dwight D. Eisenhower Memorial across the street from the National Air and Space Museum



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Given the many attractions and destinations on Independence Avenue SW, the avenue experiences a high demand for **passenger pick-ups and drop-offs** from ride-hail app service providers like Uber and Lyft. Several locations along Independence Avenue SW have pull-in areas for pick-ups and drop-offs, including curbside adjacent to the National Museum of Asian Art and the Federal Aviation Administration. The entrance to the National Museum of Asian Art from Independence Avenue SW provides an accessible access point for museum goers.

Figure 22. The current Curbside Pick-Up/Drop-Off Zone near the National Museum of Asian Art



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The **delivery requirements** for Smithsonian museums along Independence Avenue SW include unique delivery needs specific to the museum collection and building needs that are summarized in detail in the 2023 Corridor Study.

Food trucks are regularly observed on the north side of Independence Avenue SW, particularly near the Smithsonian museum entrances. During field visits and the Urban Life Review, food trucks were regularly observed with flyers, banners, and merchandise impeding the sidewalk's clear path.

While there are not official **motorcoach** loading zones along Independence Avenue SW, tour bus loading often occurs adjacent to the study corridor on 14th Street, Jefferson Drive, and Maryland Avenue SW. Stakeholder feedback indicated a desire to increase capacity for motorcoach pick-ups and drop-offs on Independence Avenue SW.

3 Urban Life Review

This Urban Life Review aims to provide data, rather than assumptions, to inform concepts and recommendations for Independence Avenue SW that fit the unique context and specific user groups and stakeholders along the corridor. The Review was conducted in April 2024 through a series of field work along Independence Avenue SW, with observation locations shown in **Figure 23**. The findings of this Review focused primarily on non-transportation-related activities and their correlation with demographic characteristics and the physical design of the public realm. Key areas of observation include: qualitative aspects of the physical environment, stationary activities of individuals and groups, and user perceptions. This chapter outlines the findings from the Review. The detailed methodology and background information can be found in Appendix D.

There are several limitations of this Urban Life Review, including:

- Findings reflect current conditions only
- Limited data collection period: Each data collection is 10 to 15 minutes
- Weather conditions impacted weekday data collection
- Gathering feedback was challenging due to participants' reluctance to engage in person on-site

Figure 23. Urban Life Review Observation Locations



3.1 Purpose

The Review informed the Study's next steps by informing the development of policy and design recommendations for Independence Avenue SW that address the needs and concerns of all users and encourage an active, safe, comfortable, and vibrant corridor.

Public life concerns the daily activities that people participate in outside their homes, workplaces, and personal vehicles. **Figure 24** depicts the observation areas for the Urban Life Review. The observable areas include public space and the public realm, which comprise public life.

Public space contains the area under public ownership and often includes parks and streets. DDOT has jurisdiction over the public space along Independence Avenue SW between 15th Street and 3rd Street SW, NPS has jurisdiction over Independence Avenue SW west of 15th Street, and the Architect of the Capitol has jurisdiction over Independence Avenue SW east of 3rd Street.

The **Public realm** is the area under public and private ownership that is publicly accessible and can be experienced and interacted with by the public.

Along Independence Avenue SW, the public realm includes Smithsonian museum frontages and Smithsonian gardens along the north side of Independence Avenue SW and the General Services Administration (GSA) building frontages on the south side of Independence Avenue SW.

This Urban Life Review focused on understanding how to best reallocate space along Independence Avenue SW to address the variety of users and activities along the corridor by identifying who, how, and why people use Independence Avenue SW. The following questions frame the key questions this Urban Life Review sought to answer:

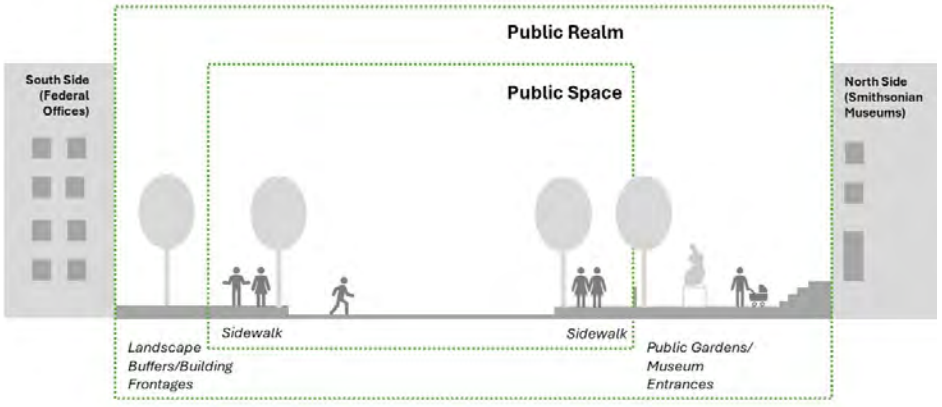
1/ **Who is using the public realm?**

2/ **What activities are people participating in within the public realm?**

3/ **Where are people engaged in activities along the study corridor?**

The Urban Life Review combined a mix of field observation and intercept surveys to document the conditions along Independence Avenue SW and answer the questions outlined above.

Figure 24. Public Realm and Public Space



3.2 Findings

The following sections provide an overview of the findings. Detailed findings from the Urban Life review are provided in Appendix D Urban Life Review.

Summary of Initial Assessments

The project team conducted initial assessments at each site along Independence Avenue SW. Appendix D Urban Life Review outlines the observed benefits and constraints at each of the four sites and includes the evaluation of the Twelve Urban Quality Criteria for each site.

The team identified **benefits** and **constraints** along Independence Avenue SW, as summarized below and in **Table 4**.

Table 4. Summary of Benefits and Constraints at Observation Points

Location	Benefit/ Constraint	Description
4th Street	Benefit	4th Street is narrow and serves as an important north-south bicycle connection
	Benefit	The area offers good views of surrounding amenities.
	Constraint	This area lacks pedestrian-scaled elements, which may disorient visitors.
	Constraint*	Excessive space for automobile movement in this area leads to traffic noise, pollution, and increased crash risk.
7th Street	Benefit	The fountain provides a well-defined place to linger, check directions, take pictures, etc.
	Benefit	The area offers good views of surrounding amenities.
	Constraint*	Excessive space for automobile movement in this area leads to traffic noise, pollution, and increased crash risk.
	Constraint*	No seating or shelter from the elements is provided in this area.
L'Enfant Plaza (10th Street)	Benefit*	The Haupt Garden gates provide a well-defined place to linger, check directions, take pictures, etc.
	Benefit	The crosswalk provides a direct connection to L'Enfant Plaza.
	Benefit*	Wide sidewalks provide enough space for groups of most sizes.
	Constraint*	Proximity to traffic on Independence Avenue SW diminishes the visitor experience.
	Constraint*	Cyclists and scooter riders lack dedicated space.
	Constraint	The space lacks shelter from the elements.
12th Street	Benefit*	The Metro station entrance provides visitors access to the National Mall across Independence Avenue SW.
	Constraint*	Excessive space for automobile movement in this area leads to traffic noise, pollution, and increased crash risk.
	Constraint*	No seating or shelter from the elements is provided in this area.
	Constraint	This intersection lacks a key crosswalk and any bicycle facilities.

** Represents a corridor-wide observation*

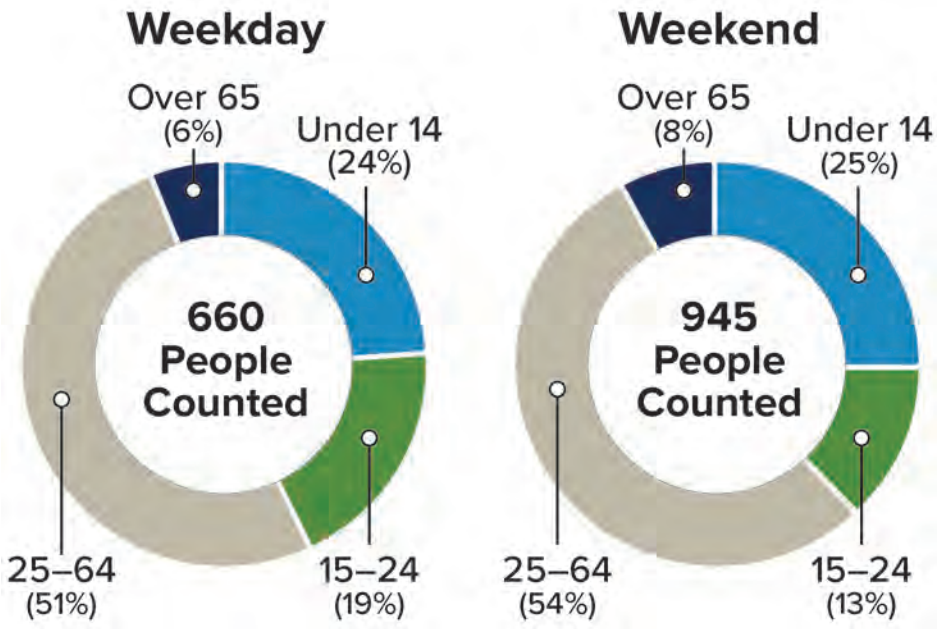
Counting Exercise Findings

During the counting exercise, the project team observed the perceived age and activity of each user passing along the avenue. The team reviewed many types of users along Independence Avenue SW, including:

- School and tour groups with young adults
- Families
- Bike tours
- Wedding and event photo shoots at the Smithsonian Castle
- Dog walkers

As shown in **Figure 25**, the majority of observed individuals along the corridor were between the ages of 25 to 64.

Figure 25. Perceived Age Groups Visiting on a Weekday and Weekend Day



When observing the **activities** of passersby, the project team found that most individuals were observed walking on Independence Avenue SW (88%), followed by biking (4%), pushing or carrying children in strollers (3%), and exercising (2%). When comparing the findings from the activity counting exercise by time of day, the team found a significant increase in walking, stroller use, and scooters/skateboards on the weekend. The team observed over 150% more people walking on the weekend than on the weekday observation day. Additionally, stroller use increased by five times on Saturday compared to Thursday.

Mapping Activity Findings

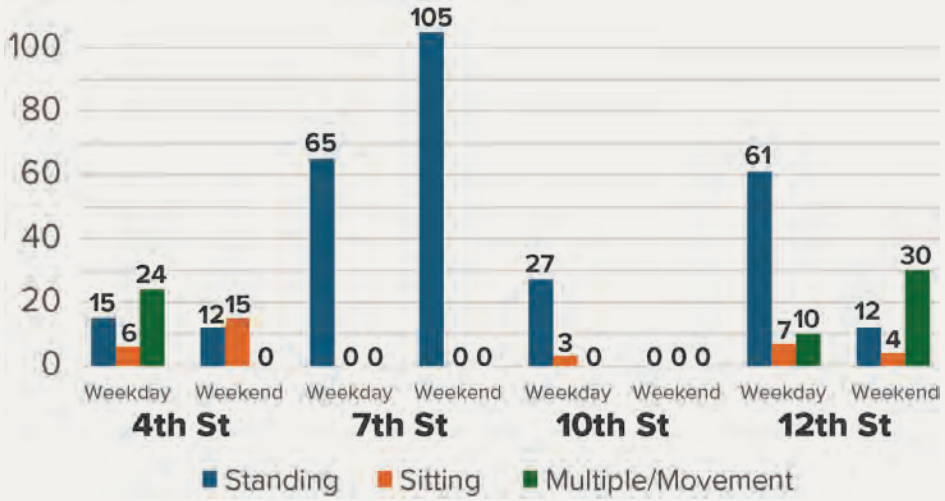
In addition to the counting exercise, the project team observed individuals and groups participating in stationary activities during the mapping activity. The team made the following key observations:

- Many people were waiting for transportation (Uber/Lyft, buses, tour buses),
- People were standing for food trucks,
- People were standing reading maps,
- Few people were sitting due to a lack of seating options, and
- People were sitting on grass, curbs, etc.

Furthermore, the team found that on weekdays, 7th, L'Enfant Plaza (10th), and 12th Streets were busier than 4th Street, as shown in **Figure 26**. The 4th Street intersection saw higher pedestrian movement through the intersection.

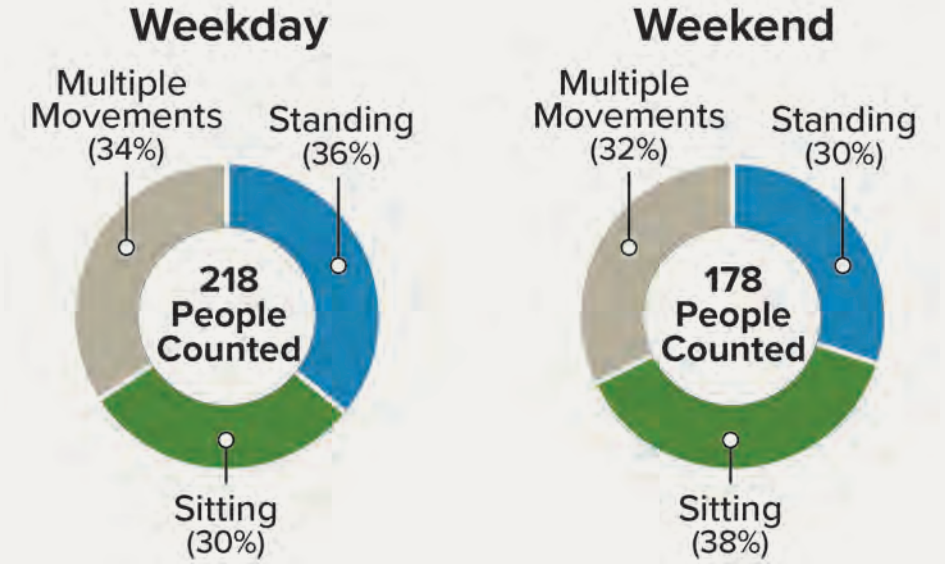
Furthermore, the team found that on weekends, there was an increase in stationary activities compared to the weekdays, including sitting, waiting for transit, standing and eating, taking photographs, and reading wayfinding signs and maps, as shown in **Figure 27**.

Figure 26. Observed Stationary Activities



*Data was not collected at L'Enfant Plaza (10th Street) on the weekend

Figure 27. Weekday and Weekend Day Stationary Activities



Survey Findings

During the Urban Life Review, the team sought to collect real-time feedback on user experiences, level of comfort and safety, and a wish list of recommendations for Independence Avenue SW.

The team collected in-field surveys at each location on Thursday, April 4th. Afterward, the team decided to create an online survey to provide people the option to complete the survey online. After Thursday, April 4th, we created an online survey.

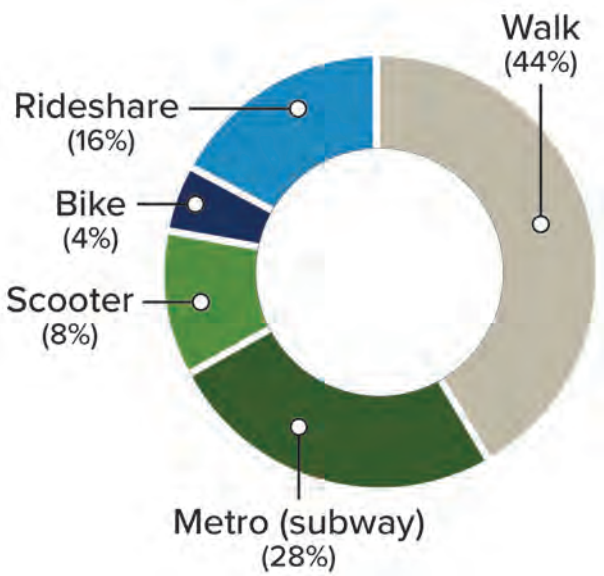
Despite efforts to engage with the public in the field, the number of survey participants was lower than anticipated. As a result, the limited responses may not fully represent all users along the corridor. Table 5 summarizes the surveys collected during the Urban Life Review on Thursday, April 4, 2024.

Table 5. Surveys Collected on Thursday, April 4, 2024

Survey Location	Number of Surveys
4th Street SW	6
7th Street SW	4
10th Street SW	12
12th Street SW	1
Total	**23**

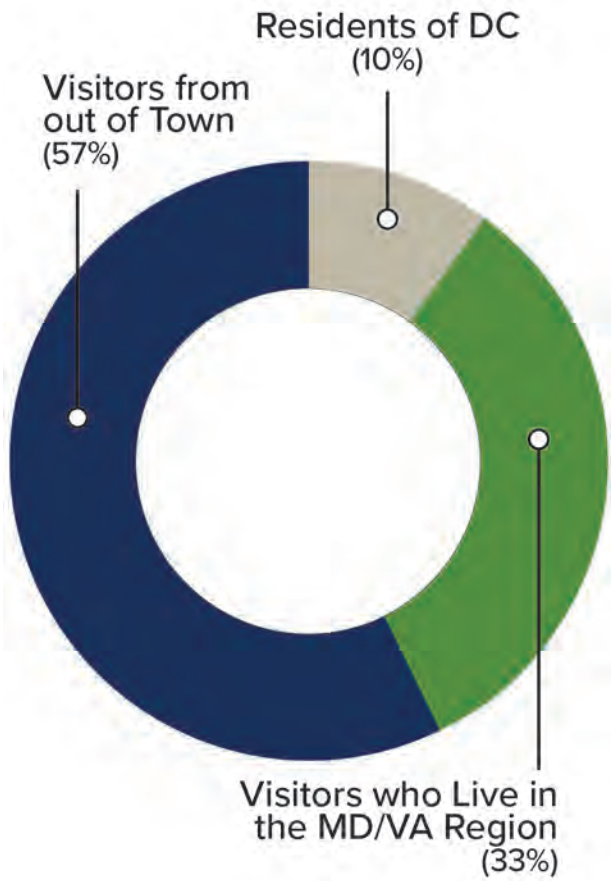
Survey responses demonstrated that most respondents walked to Independence Avenue SW. The top five modes of transportation to the study area included walking, Metro, rideshare, scooters, and bikes, as shown in **Figure 28**.

Figure 28. Mode of Travel



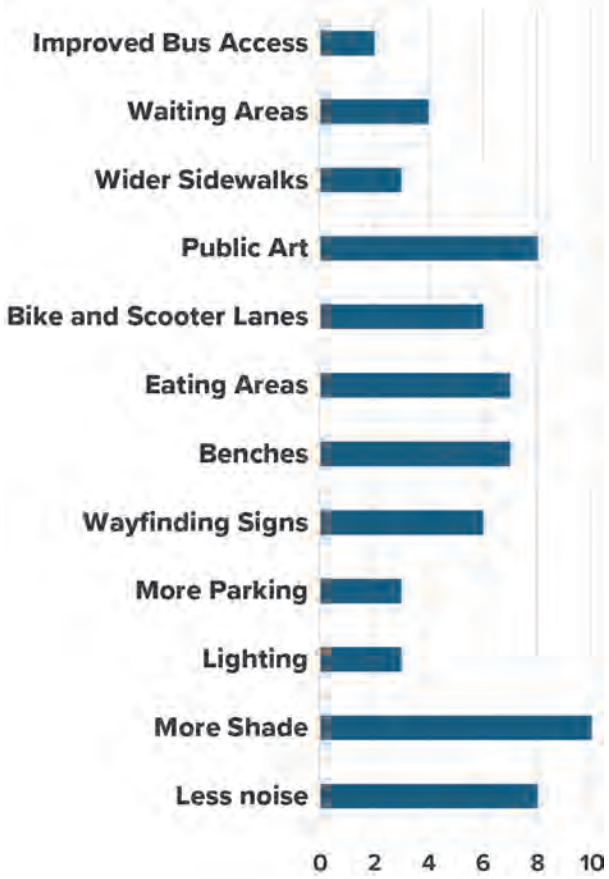
As shown in **Figure 29**, fifty-seven percent of survey respondents noted visiting from outside the region.

Figure 29. Relationship to Independence Avenue SW



Most survey respondents reported wanting more shade, less noise, and more public art on Independence Avenue SW. Other respondents reported wanting benches, sitting/eating areas, wayfinding signs, and dedicated bike lanes. **Figure 30** summarizes survey respondents' recommendations for the corridor, with the request for more shade scoring the highest.

Figure 30. Opportunities for Independence Avenue SW



Key Observations and Recommendations

In summary, the following observations capture the key findings from the Urban Life Review:

Public Space Utilization

- People routinely sit on grass, lawns, and curbs (**Figure 31**)
- Kids playing in grass and lawns
- People waiting for the bus
- Minimal street-level activity
- Families with kids in strollers
- Residents walking their dogs

Figure 31. Lack of Seating



Infrastructure Amenities

- Few places to wait in the shade
- Lack of public art
- Make-shift garbage cans (**Figure 32**)
- Users asking for directions to destinations

Figure 32. Make-shift Garbage Can



Traffic and Curbside

- Mix of people riding scooters and bikes on the sidewalk and on the street
- Tour buses parked along the curb where space is available (**Figure 33**)

Figure 33. Tour Buses on Independence Avenue SW



Obstacles and Hazards

- Cones and debris on the sidewalk (**Figure 34**)
- Construction near NASM is temporarily narrowing the sidewalk between 7th and 4th Street.

Figure 34. Cones and Debris



4 Design Framework

This section provides the framework for rethinking and redesigning Independence Avenue SW. The section is organized into three main sections: Design Charrette, Urban Design Framework, and Block-by-Block Curbside Considerations.

Several design aspects in this chapter have not been finalized and will require further study. Additionally, the design guidance outlined in this section adheres to the Monumental Core Streetscape Design Guidelines established by the National Capital Planning Commission.

4.1 Design Charrette

The Independence Avenue SW Urban Design Study Stakeholder Charrette was an opportunity for the Urban Design study team to meet with agency stakeholders for the following reasons:

- Verify the team's collective understanding of the corridor from the existing conditions and Urban Life reviews,
- Confirm the focus areas and objectives of the reenvisioned Independence Avenue SW,
- Engage collaboratively in discussions about reimagining and redesigning Independence Avenue SW,
- Review the proposed corridor design and confirm the inclusion of agency-specific requirements, and
- Share an updated corridor vision reflecting the feedback received from the agency stakeholders.

The project team hosted a series of meetings organized into focus areas. The focus areas included:

- Multimodal Transportation
- Urban Design and Streetscape
- Deliveries and Facility Requirements
- U.S. Capitol Grounds

During each meeting, the project team began with a presentation overview of the project and the 2023 Corridor Study. Charrette attendees included:

- National Capital Planning Commission
- General Services Administration
- National Park Service
- Smithsonian Institution
- District Department of Transportation
- Washington Area Metropolitan Transit Authority
- District of Columbia Office of Planning
- Commission of Fine Arts
- Southwest Business Improvement District
- District of Columbia State Historic Preservation Office
- United States Department of Energy
- United States Department of Agriculture
- Architect of the Capitol
- United States Botanic Gardens

Appendix E Stakeholder Charrette provides detailed charrette meeting agendas and materials.

Charrette Feedback

The feedback from the design charrette is organized into the following key takeaways and design objectives.

Emphasize Nodes

- Several intersections, including 15th Street, 12th Street, L'Enfant Plaza, 7th Street, and 4th Street, serve as gateways or transitions between the National Mall and the Southwest waterfront.
- These nodes should be emphasized in design and use, as well as other elements to improve public life through artwork and enhanced pedestrian and visitor experiences. The L'Enfant Plaza node should feel grand and monumental.

Promote Universal Accessibility

All designs should exceed federal accessibility criteria (PROWAG), including pedestrian crossings across roads and potential bicycle facilities.

- Improve corridor wayfinding and consider adopting a cohesive wayfinding system throughout the entire National Mall, the U.S. Capitol complex, and the Smithsonian campus.
- Incorporate state-of-the-practice design for people with visual impairments and hearing difficulties.
- Provide more places to sit and rest and improve the shaded environment, particularly along walkways.
- Plan to install elevators and other accessibility features in coordination with WMATA.
- Plan to install elevators and other accessibility features in coordination with WMATA.
- Consolidate signage along the corridor and ensure signage is visible to drivers of large vehicles and drivers with visual impairments.

Improve Public Space

- Reduce the curb-to-curb width as much as possible.
- Minimize the misalignment of travel lanes and consider increasing the curb-to-curb width to keep lanes aligned.
- The sidewalk, particularly on the north side of the street along the Smithsonian museums, should be designed as a high-quality public space, allowing for strolling and sightseeing.
- Make public spaces more inviting and tie the design and feel of the corridor to that of the National Mall and Smithsonian museums.
- Emphasize increasing the tree canopy and adding stormwater infrastructure.
- Maintain a consistent streetscape, particularly aligned sets of dual rows of trees on both sides of the street along the length of the corridor.
- Design public spaces with seating, shading, and landscaping to improve comfort by providing opportunities for lingering and social interaction.
- Develop a plan for temporary uses, such as farmers markets, to activate spaces during off-peak times.
- Install water fountains along the corridor for people and pets to help alleviate high heats during summer months. Consider including water misters in conjunction with water fountains to keep visitors cool.
- Gather feedback on proposed changes to ensure the final design meets the needs of all users.
- Consider installing wind sails for shade and weather protection along the corridor.

Provide a Comfortable Place to Walk and Stroll

- Improve sidewalk conditions, including widening the clear path, especially in areas with high pedestrian traffic. In particular, 7th Street and the L'Enfant Plaza crossings have high pedestrian traffic (**Figure 35**).
- Create more inviting entry points to museums and public buildings.
- Provide more comfortable pedestrian crossings, particularly at complex intersections like 12th Street and 9th Street, and consider more pedestrian crossings either at mid-block locations or at intersections with missing crossings.
- Implement measures to reduce vehicle speeds in pedestrian-heavy areas, such as raised crosswalks or pedestrian islands.

Figure 35. High Pedestrian Activity on Independence Avenue SW near the entrance to the National Air & Space Museum



Consider Bicyclists

- There is a need for low-stress east-west bicycle connections either on or parallel to Independence Avenue SW.
- A two-way cycle track on the south side of the corridor would minimize conflicts with people walking near the Smithsonian museums on the north side of the street while providing space for commuter cyclists that would not be fully accommodated by the proposed future bike lanes on Madison Drive and Jefferson Drive.
- Bicycle connections must integrate with 15th Street, 4th Street, and Pennsylvania Avenue SE facilities.

Prioritize Public Space and Access over Vehicle Parking

- Design for motorcoach pick-ups and drop-offs in key locations, but not for motorcoach idling in the same locations.
- Allow accessible pick-up and drop-off spaces, particularly in front of the Freer Gallery.
- Consider food vending options that work for visitors, vendors, and security needs.
- Work with DDOT to assess overnight restrictions and designated bus parking areas.
- Consider truck and service vehicle access.
- Account for Security Needs.
- Allow for security considerations, especially near government buildings like the Department of Energy and the Department of Agriculture.
- Consider the need for perimeter security plans, the possible geofencing of ride-hail app pick-ups and drop-offs, and shared vehicles like scooters.
- Engage with security agencies to ensure all plans meet security requirements without compromising public access.

Connectivity and Circulation

- Independence Avenue SW's role as a major thoroughfare requires a focus on connectivity and circulation. The urban design framework should enhance multimodal transportation, improve pedestrian access, and balance vehicular movement with the needs of other users.

Complete Streets

- Redesign Independence Avenue SW as a complete street that accommodates all users, including pedestrians, cyclists, transit riders, and drivers.
- Protected bike lanes, wider sidewalks, and transit priority features should be incorporated where possible.
- Improve Wayfinding and Accessibility
- Consistent and clear wayfinding elements should be placed along the corridor to guide visitors to key landmarks, Metro stations, and public amenities.
- All areas should be fully accessible to people with disabilities.

4.2 Urban Design Framework

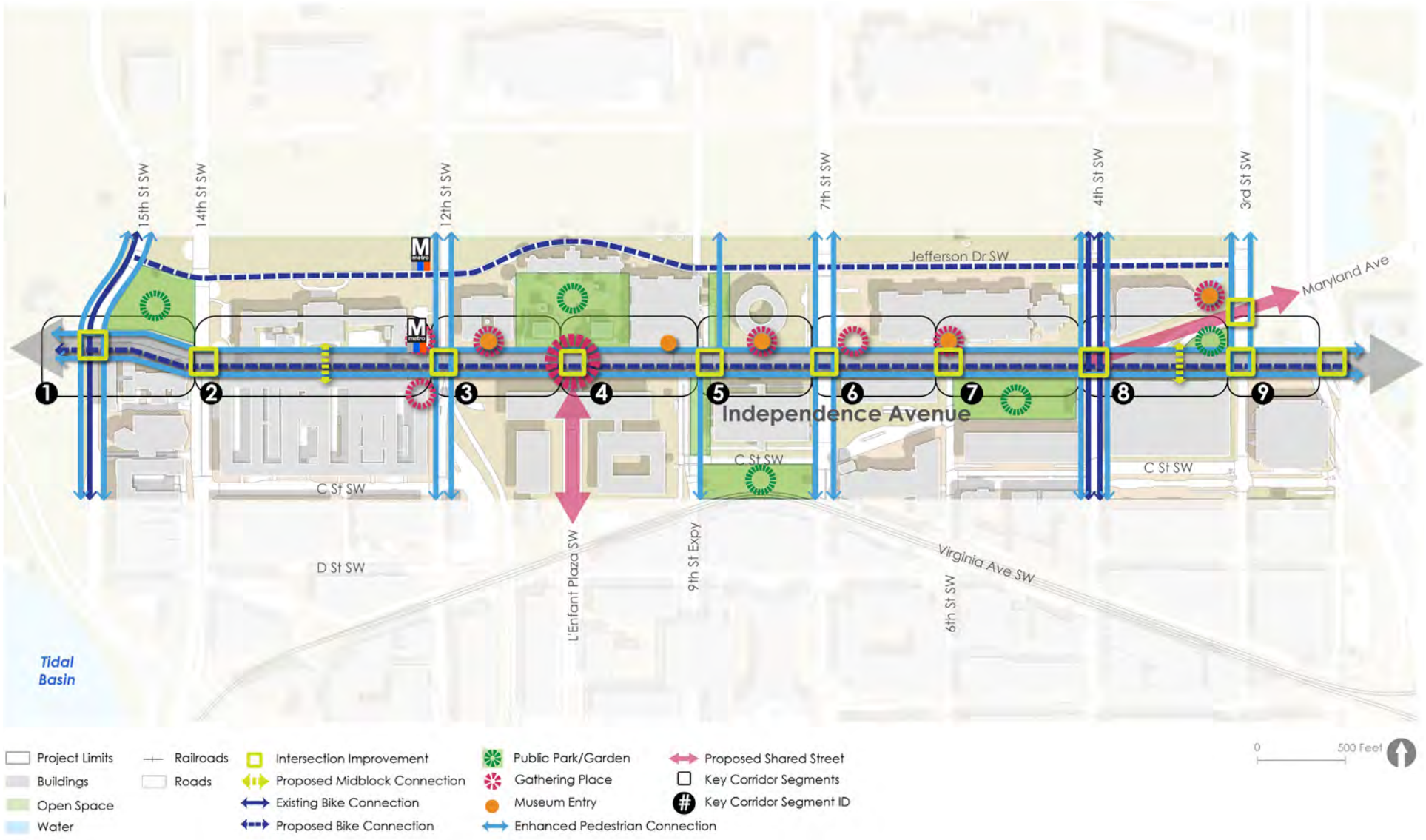
The urban design framework for Independence Avenue SW focuses on enhancing key nodes and special places, improving connectivity, and integrating creative design solutions. By elevating the public realm, fostering mobility, and balancing historic preservation needs with modern amenities, this framework will help transform Independence Avenue SW into a vibrant, accessible, and resilient corridor. The Urban Design Framework outlined in this section aligns with the Monumental Core Streetscape Design Guidelines established by the National Capital Planning Commission.

Significance of the Corridor and Key Nodes

Independence Avenue SW's strategic position as a connector between significant cultural and civic institutions establish it as an essential corridor in Washington, D.C. The uses and roadway network along and within the vicinity of Independence Avenue SW inform the role of the corridor and key intersection.

Figure 36 diagram depicts the blocks and key intersections that were identified as critical for reshaping the character and function of the street.

Figure 36. Design Framework



Building on the existing conditions analysis and input from the Charrette, a summary of the role and design priorities for these blocks and intersections are summarized in this section. These design priorities are generally organized by topic, including connectivity, safety, public space, and wayfinding. Additional topics are included when appropriate. The following intersections and blocks are detailed below:

1/ 15th Street Intersection/15th Street to 14th Street

2/ 14th Street Intersection/14th Street to 12th Street

3/ 12th Street Intersection/12th Street to L'Enfant Plaza

4/ L'Enfant Plaza SW (10th Street) Intersection/L'Enfant Plaza SW to 9th Street

5/ 9th Street Expressway Intersection/9th Street to 7th Street

6/ 7th Street Intersection/7th Street to 6th Street

7/ 6th Street Intersection/6th Street to 4th Street

8/ 4th Street Intersection/4th Street to 3rd Street

9/ 3rd Street Intersection/3rd Street to Washington Avenue SW

1. 15th Street Intersection/15th Street to 14th Street

Role: The 15th Street intersection is an important threshold and multi-modal connection between downtown, the National Museum of African American History, the National Mall, and the Tidal Basin. It supports high traffic volumes, is a key pedestrian connection between neighboring destinations, and connects to the protected north-south 15th Street cycle track, providing bicyclists an east-west connection to Independence Avenue SW.

Design Priorities include:

- **Threshold to the Corridor:** Enhance the entryway into Independence Avenue SW with improved public spaces, clear pedestrian zones, landscaping and wayfinding. Encourage public life activity by providing shade, benches, and resting places for people to linger and enjoy time between visiting museums and other destinations.
- **Bicycle Connectivity:** Enhance intersection treatments to improve comfort and safety for people biking from 15th Street SW onto Independence Avenue SW.
- **Wayfinding:** Implement clear and accessible wayfinding signs to guide visitors between the National Monument and key destinations along Independence Avenue SW, such as the National Air and Space Museum and the Eisenhower Memorial.

2. 14th Street Intersection/14th Street to 12th Street

Role: The 14th Street intersection is a key transit corridor, with several Metrobus routes running north and south. Additionally, 14th Street provides access across the 14th Street Bridge to Arlington. This block provides access to the United States Department of Agriculture buildings.

Design Priorities include:

- **Pedestrian Safety:** Improve intersection crosswalks to include pedestrian refuge islands and curb extensions to reduce pedestrian exposure and crossing distances.
- **Public Spaces:** Enhance public space amenities to include docking stations for micromobility devices and bicycles and enhanced transit stop infrastructure.
- **Wayfinding:** Implement clear and accessible wayfinding signs to guide visitors between the National Monument and key destinations along Independence Avenue SW.

3. 12th Street Intersection/12th Street to L'Enfant Plaza

Role: The 12th Street intersection serves as a key access point for people accessing the Smithsonian Metro station. This block provides access to the United States Department of Energy to the south and the National Museum of Asian Art and Enid A. Haupt Garden to the north. This block is the beginning of the continuous row of Smithsonian Museums that span from 12th Street to 3rd Street.

Design Priorities include:

- **Arrival Experience:** Improve the sense of arrival by enhancing the landing areas at the top of the Metro escalators with wayfinding, seating, and gathering spaces. The space should feel like a welcoming portal to the museums and monuments.
- **Cyclist & Pedestrian Integration:** Add a protected bike lane and add crosswalk on the east intersection leg to connect the Metro station with surrounding uses. Provide secure bike parking and scooter stations to encourage multimodal transportation. Figure 37 depicts the need for micromobility organization.
- **Stormwater Management:** Incorporate elements, such as rain gardens and permeable paving, to address frequent flooding at the intersection's pedestrian ramps.
- **Public Art and Exhibitions:** The row of Smithsonian museums offers an ideal location for outdoor exhibitions, art installations, and cultural programming, which can attract visitors and create a more vibrant public space.
- **Pedestrian Connectivity:** Improve pedestrian access between museums by enhancing the walkways with shaded corridors, comfortable seating, and wayfinding.
- **Food and Beverage Amenities:** Introduce pop-up food stands or small cafes to encourage visitors to stay longer and engage with the space. Seating and tables should be provided to accommodate eating and socializing.

Figure 37. Need for Bicycle and Scooter Organization



4. L'Enfant Plaza SW (10th Street) Intersection/L'Enfant Plaza SW to 9th Street

Role: L'Enfant Plaza SW to 9th Street serves as the primary access to the Smithsonian Institution's southern campus, L'Enfant Plaza, and the Wharf. The 10th Street intersection, on axis with the Smithsonian Castle and the Enid A. Haupt Garden, is the prominent threshold between southwest D.C., the Smithsonian Institutions, and the National Mall. It is a key tourist hub, providing access to multiple cultural landmarks.

Design Priorities include:

- **Celebrated Location:** Design of the 10th Street intersection should be elevated as the most prominent and special place along the corridor, an important threshold among the Smithsonian Institutions, National Mall, and southwest.
- **Stormwater Infrastructure:** Incorporate stormwater infrastructure elements, such as rain gardens, bioswales, and living roofs, to manage stormwater.
- **Public Art and Parklets:** Use public art, landscaped areas, and parklets to activate the streetscape and provide spaces for people to relax and enjoy the surrounding environment.

- **Public Spaces:** Provide gathering and shaded seating areas along the block with special emphasis at the 10th Street intersection and Smithsonian entry gates for both lingering and visitors waiting for tours or bus services. Consider locations for permanent or temporary public art, such as sculptures or interactive exhibits associated with nearby museums.
- **Mobility and Pedestrian Safety:** Improve pedestrian and cyclist connectivity by providing safe, dedicated paths from the National Mall to Independence Avenue SW. Consider raising crosswalks to promote slower vehicle speeds along Independence Avenue SW.
- **Wayfinding:** Improve visitor wayfinding between the National Mall, The Wharf, and downtown.
- **Transportation Integration:** Integrate pedestrian and cyclist pathways to seamlessly connect the Southwest EcoDistrict with both Independence Avenue SW and the waterfront, ensuring that this special place contributes to the broader mobility network.

5. 9th Street Expressway Intersection/9th Street to 7th Street

Role: The 9th Street intersection provides key vehicular access to 1-395 to the south, as well as providing important pedestrian connections to federal offices to the south and to the National Mall to the north.

This block serves as the southern entry to the Hirshhorn Museum and provides a connection to the National Mall via the Mary Livingston Ripley Garden. Additionally, this block provides access to the Federal Aviation Administration and Hancock Park via the Earth Day Park.

- **Curbside Use:** Close the drive-by lane in front of the Federal Aviation Administration to allow for more flexible curbside and maintain a consistent curb line along the avenue.
- **Public Art and Exhibitions:** The row of museums offers an ideal location for outdoor exhibitions, art installations, and cultural programming, which can attract visitors and create a more vibrant public space.
- **Pedestrian Connectivity:** Improve pedestrian access between museums by enhancing the walkways with shaded corridors, comfortable seating, and wayfinding.
- **Food and Beverage Amenities:** Provide signage and wayfinding to encourage visits to the food service in the Hirshhorn Museum and encourage visitors to stay longer and engage with the space. Seating and tables should be provided to accommodate eating and socializing.

6. 7th Street Intersection/7th Street to 6th Street

Role: The 7th Street Intersection is a significant multimodal node connecting pedestrians to the Hirshhorn Museum, the National Air and Space Museum, Fountain Plaza, L'Enfant Plaza Metro, the National Mall, the National Gallery of Art Sculpture Garden, and downtown. It serves as a cross-town thoroughfare between Silver Spring, Maryland, to the north and I-395 and the Wharf to the south.

This block provides access to the Federal Aviation Administration to the south and the Smithsonian Air and Space Museum to the north.

Design Priorities include:

- **Public Spaces:** Provide shaded seating areas along the block with special emphasis at the entry of the Hirshhorn Museum to provide pedestrian comfort and interest. Consider the relationship of streetscape design with the Hirshhorn Museum entry and the National Museum of Air and Space Fountain Plaza.
- **Public Art and Exhibitions:** The row of museums offers an ideal location for outdoor exhibitions, art installations, and cultural programming, which can attract visitors and create a more vibrant public space.

- **Pedestrian Connectivity:** Improve pedestrian access between museums by enhancing the walkways with shaded corridors, comfortable seating, and wayfinding.
- **Food and Beverage Amenities:** Introduce pop-up food stands or small cafes to encourage visitors to stay longer and engage with the space. Seating and tables should be provided to accommodate eating and socializing.

7. 6th Street Intersection/6th Street to 4th Street

Role: The 6th Street intersection provides connections to the US Department of Education, the L'Enfant Metro Station, and the L'Enfant Virginia Rail station to the south. This intersection is a key pedestrian connection to the Smithsonian Air and Space Museum. Additionally, this block provides access to the Dwight D. Eisenhower Memorial to the south, where tour buses and charter buses park on the south side of Independence Avenue SW.

Design Priorities include:

- **Pedestrian Safety:** Improve pedestrian crossings by narrowing street widths and incorporating raised crosswalks to reduce vehicle speeds and enhance safety; retain a mid-block crossing at 6th Street.
- **Public Spaces:** Provide shaded seating areas along the block; consider programming at the entry of the National Air and Space Museum, such as temporary art installations to draw in and provide pedestrian interests. Consider the relationship of streetscape design with the Eisenhower Memorial plaza area.
- **Wayfinding:** Implement clear and accessible wayfinding signs to guide visitors between key landmarks, such as the Museums, the Eisenhower Memorial, U.S. Botanical Garden, and downtown.
- **Public Gathering Spaces:** Introduce small-scale, semi-permanent installations or kiosks around the memorial to draw in visitors and activate the area. These could include temporary art, informational panels, or interactive exhibits celebrating Eisenhower's legacy.
- **Seating and Shading:** Increase seating options and shaded areas, making the space more comfortable for visitors to linger. Trees, trellises, or pergolas could provide shade while maintaining the memorial's sightlines.
- **Nighttime Activation:** Enhance lighting to improve nighttime safety and allow for evening programming, such as light shows or seasonal events.

8. 4th Street Intersection/4th Street to 3rd Street

Role: This intersection is a gateway between the National Mall, the Eisenhower Memorial, and the Smithsonian Museums. It is an important node for pedestrian movement, especially for visitors transitioning between the museums and monuments.

The 4th Street intersection is an important threshold between federal offices, the Eisenhower Memorial, and Smithsonian Museums with important views of the U.S. Capitol. It is an important node for the visitors traversing between the museums and monuments, and for cyclists between the southwest and National Mall. This block provides southern access to the National Museum of the American Indian Museum to the north and access to Voice of America to the south. Maryland Avenue SW bisects this block and provides vistas of the Capitol.

Design Priorities include:

- **Bicycle Connectivity:** Provide connections to and from the bicycle facilities on 4th Street to improve the bicycle network; provide bicycle amenities, such as bike racks, Capital Bikeshare stations, and micromobility corrals.
- **Public Spaces:** Activate the space with comfortable amenities, including seating and shade to invite lingering. Use temporary art installations and programming, leveraging the proximity to cultural institutions to draw in visitors.
- **Wayfinding:** Implement clear and accessible wayfinding signs to guide visitors between key landmarks, such as the National Air and Space Museum and the Eisenhower Memorial.

9. 3rd Street Intersection/3rd Street to Washington Avenue SW

The 3rd Street Intersection provides access to the Federal Center Metro station to the south and the National Mall and United States Capitol Building to the north. This block provides access to the United States Botanic Garden to the north and the United States Department of Health and Human Services to the south. Independence Avenue SW transitions to a four-lane road east of 3rd Street as it transitions into Capitol Hill. Washington Avenue SW (I-395) provides a bicycle route to Navy Yard.

Design Priorities include:

- **Threshold to the Corridor:** Enhance the entryway into Independence Avenue SW with improved public spaces, clear pedestrian zones, landscaping and wayfinding. Encourage public life activity by providing shade, benches, and resting places for people to linger and enjoy time between visiting museums and other destinations.
- **Bicycle Connectivity:** Enhance bicycle connectivity and fill gap in bicycle facilities between 4th Street and Washington Avenue SW. Add micromobility corrals.
- **Public Spaces:** Activate the space around the Humphrey Building with comfortable amenities, including seating and shade to invite lingering. Use temporary art installations and programming, leveraging the proximity to cultural institutions to draw in visitors.
- **Wayfinding:** Implement clear and accessible wayfinding signs to guide visitors to major destinations along Independence Avenue SW.
- **Transition:** Desig appropriate transition east of 3rd Street SW to align with the United States Botanical Gardens.

Design Parameters

As a key step in rethinking Independence Avenue SW, the project team reviewed, discussed, and identified design parameters to guide concept development. The following design parameters consider specific agency limitations, needs, and requests and incorporate guidance outlined in the Monumental Core Streetscape Design Guidelines.

- **Right-of-way:** The corridor concepts will include the DDOT-owned and maintained right-of-way in all concepts to ensure that the recommended changes will fit within the existing right-of-way.
- **Travel Lanes:** Based on the traffic analysis and conversations with DDOT, Independence Avenue SW can adequately accommodate existing and proposed vehicular traffic with two through lanes in each direction from 15th Street SW to 3rd Street SW. Intersections with high turning movement counts can be accommodated with dedicated left-turn lanes as needed. Except for the eastbound right-turn-only lane at the 14th Street & Independence Avenue SW intersection, shared right/through lanes will be used on all intersection approaches.
- **Pedestrian Clear Zone and Sidewalk Widths:** The minimum pedestrian clear zone should be 10 feet, with a minimum sidewalk width of 16 feet, as outlined in the Monumental Core Streetscape Design Guidelines. Wider sidewalks (**Figure 38)** should be provided near high-pedestrian activity areas like the Air and Space Museum. Tradeoffs with the double row of trees may give additional right-of-way for wider pedestrian clear zones.

Figure 38. Pedestrian Mobility Needs along Independence Avenue SW



- **Museum Entries:** Concepts will include a break in tree layout at museum entries.
- **Double row of trees:** All concepts will include a double row of trees lining the sidewalks on both sides of the street within the streetscape.
- **Tree Spacing:** Concepts will propose 35-45-ft spacing between trees to achieve an allée feel. On options with wider sidewalks, concepts will consider staggering the trees to add liveliness and ensure the sidewalk doesn't feel barren. The staggered rows will provide canopy coverage while allowing flexibility and space to add streetlights, utility boxes, site furnishings, etc., occupying the furnishings zone.
- **Tree Boxes:** Tree boxes along the corridor will have 6-foot tree boxes when possible. Step-out zones may be suspended over the tree box in constrained areas. Alternatively, permeable paving may be used in the tree box to adhere to the pedestrian clear zone and sidewalk zone.
- **Planting Strips:** The concepts will consider utilizing planting/landscape strips on streets with wider pedestrian clear zones to provide a buffer and ensure the organization of right-of-way for users.
- **Waste Receptacles:** Waste receptacles are provided for recycling, trash, and other waste and should be designed following Monumental Core Streetscape Design Guidelines to contribute aesthetically to the corridor's streetscape. Waste receptacles should be placed conveniently and visibly.

Streetscape Elements

Streetscape elements shown in the design concepts will follow guidance outlined in the Monumental Core Streetscape Design Guidelines and will address:

- Benches and Seating
- Lighting
- Wayfinding and Signage
- Bicycle Racks and Micromobility Corrals

Design Materials

When designing for Independence Avenue SW, materials and design details should align with the corridor's historical significance and Monumental Core Streetscape Design Guidelines while ensuring durability and functionality.

The goal is to enhance the avenue's visual appeal and usability while maintaining a sense of continuity with its existing character. Below is an overview of key materials and design details that should be incorporated into any new development or renovation of Independence Avenue SW.

- Tactile Elements for ADA accessibility
- Permeable Paving
- Recycled Materials
- High-Quality Stone Paving
- Infrastructure and Landscaping
- Tree Boxes
- Native and Adaptive Species

Resilience

Resiliency should be at the core of the urban design framework, ensuring that Independence Avenue SW can adapt while offering a healthy, comfortable environment for residents and visitors. The design concepts will incorporate:

- **Stormwater Infrastructure:** Implement rain gardens, permeable paving, and shade trees throughout the corridor to manage stormwater and mitigate the urban heat island effect.
- **Energy-Efficient Lighting:** Upgrade street lighting to energy-efficient LEDs with smart controls that adjust brightness based on time of day and activity, reducing energy consumption while enhancing nighttime safety. Consider installing lights that face downtown to reduce light pollution and improve corridor lighting conditions.

4.3 Block-by-Block Curbside Considerations

Building on the design materials and elements discussed in the previous sections, this section details the block-by-block considerations along Independence Avenue SW. This section represents a snapshot in time when this study was performed and may not necessarily reflect long-term needs. Given the unique character and land uses along the corridor, future design should include a detailed study of curb use space demands to understand the corridor's distinct needs.

These design details were compiled from a robust understanding of the purpose and function of the corridor. The details were documented after observing and evaluating the existing conditions and conversing with the project team and key stakeholders to understand and record the corridor needs. **Figure 39** depicts the sidewalk ownership and maintenance along Independence Avenue SW. As shown, the curb-to-curb right-of-way falls under the responsibility of DDOT, the Smithsonian, and the National Park Service. This section focuses primarily on design details for curbside uses and intersection treatments along Independence Avenue SW.

Figure 39. Street and Sidewalk Maintenance



The existing curbside uses on both the north and south sides of Independence Avenue SW, include:

- Off-peak parking (60%)
  Permitted on both sides of the street from 8:30 AM to 4 PM from Monday to Friday and 6:30 PM to 10 PM from Monday to Saturday, with a 3-hour limit.
- No parking (20%)
- Bus stop loading zones (17%)
- Vendor activity (3%)

While these curbside uses address some existing curbside needs, there are competing demands for curbside use. The 2023 Corridor Study identified the curbside space as having the potential to operate more efficiently, with the following observations:

- Curbside demand is diverse, encompassing food trucks, loading areas, and motorcoach access.
- Several pull-in curbside loading areas currently serve the corridor.
- Museums along Independence Avenue SW experience significant loading activity.
- Ride-hail services, such as app-based pick-ups and drop-offs, exhibit high demand in the area.
- The majority of curbside activity occurs in “No Parking” zones, likely because these areas are frequently unoccupied.
- The corridor’s north side curb demands primarily include building access needs of larger vehicles, including private bus loading and unloading and truck deliveries.
- Food trucks frequently operate along the north side of Independence Avenue SW near Smithsonian museums. Their setup, including banners and merchandise, often obstructs pedestrian pathways on the sidewalk.
- There are no designated unloading or loading zones for motorcoaches along Independence Avenue SW. Existing areas for tour bus operations are located on adjacent streets, such as 14th Street SW, Jefferson Drive, and Maryland Avenue.
- Accessibility to major museum entrances along Independence Avenue SW—such as those for the Hirshhorn Museum and Sculpture Garden, the National Museum of Asian Art, and the National Museum of African Art—is hindered by regulations prohibiting stopping during rush hours, conflicting with the need for accessible parking.

Figure 40 details the block-by-block curbside and intersection needs along Independence Avenue SW.

Additional design details depicted on **Figure 40** include loading needs, priority pick-up and drop-off locations, potential mid-block pedestrian crossing locations, and access to transit service, as outlined below:



1/ Childcare pick-up and drop-off

2/ Need for eastbound right-turn only lane

3/ Need to maintain dignitary drop-off ability

4/ USDA prefers limited to no on-street parking for security reasons

5/ Priority bus stop

6/ Need for westbound and eastbound left-turn-only lanes

7/ Close the current pull-in area but provide accessible pick-ups and drop-offs

8/ Close the lay-by that is currently used by parents during childcare pick-up and drop-off

9/ Need for an eastbound left-turn-only lane

10/ No median here. Need to accommodate large trucks' ability to load and unload

11/ Priority bus stop located in bus pull-in. Close the pull-in area to allow bus service to operate in lane

12/ Need for pick-up and drop offs. Consider alternative curbside uses (or widened sidewalks to limit the number of food trucks)

13/ Current official tour bus parking area

14/ High demand for pick-ups and drop-offs

15/ Priority bus stop

16/ Need for a westbound left-turn-only lane

17/ Current commuter bus pick-up priority bus stop

18/ Curb-to-curb width narrows east of 3rd Street SW

Figure 40. Block-by-block Curbside and Intersection Needs



The following sections outline design details block-by-block that aim to optimize curbside operations and meet the needs of all users safely, comfortably, and efficiently while maintaining acceptable travel flow and preserving the monumental nature of the corridor. The project team recognizes the tradeoffs that must be made to balance the needs of the limited curbside space. Tradeoffs will be discussed in the following sections. When considering curbside tradeoffs, the following will be prioritized:

- Adhering to the United States Access Board Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for the Public Right-of-Way (PROWAG) and DDOT curbside and parking restriction regulations
- Providing curbside space to accommodate local transit stops and consolidating commuter bus activity
- Minimizing pedestrian crossing distances, including pedestrian exposure to motor vehicle traffic, and reducing the risk of injuries

Providing adequate space to allow for oversized loading, deliveries, and driveway access

- Providing left turn lanes where vehicle operations require

Parking

As previously mentioned, most of the existing curbside uses along Independence Avenue SW function as off-peak parking on both the north and south sides of the street.

Several parking lots are located along Independence Avenue SW near the U.S. Department of Agriculture. These lots provide employees with parking and help offset the demand for on-street parking. The nearby Metro stations also encourage employees and visitors to travel to Independence Avenue SW by non-auto modes.

However, there is still a demand for parking along Independence Avenue SW. The following summarizes the parking needs identified along Independence Avenue SW and will be incorporated into the corridor concept designs:

- On-street parking for special events (Blocks 400 & 500)
- On-street parking with ADA access (Blocks 400 & 500)
- Demand for museum director and senior leadership parking (block 900)
- Follow the latest DCMR Title 18 requirements for ADA parking.

Parking Restrictions

DDOT has existing parking restrictions that apply Districtwide. These restrictions help to ensure visibility for people walking, biking, and rolling and promote safe curbside operations. Existing DDOT parking restrictions enforce:

- No parking within 40 feet of a signalized intersection
- No parking within 25 feet of a marked crosswalk
- No parking within 40 feet of an unmarked crosswalk at an intersection
- No parking within 10 feet of a fire hydrant
- No parking within 5 feet of a public or private driveway or alley
- No parking within 80 feet of a bus stop sign
- No parking within loading zones, bike lanes, or other restricted zones

DDOT uses design strategies, such as painted and permanent curb extensions to help enforce these no-parking restrictions near crosswalks and intersections.

Concept designs for Independence Avenue SW will consider recommending curb extensions at intersections and near crosswalks, following DDOT standards and where curbside demand allows.

Bus Zones

Independence Avenue SW is a busy transit corridor, with a mix of local, regional, and private buses operating frequently throughout the day. The following summarizes the curbside transit needs identified along Independence Avenue SW and will be incorporated into the corridor concept designs:

- Treat as a transit plaza (blocks 1200 & 1300)
- Busy Metro access point (blocks 1200 & 1300)
- Commuter bus loading (blocks 300, 700 & 800)
- Bus loading zone (blocks 400 & 500)
- Coach/tour bus loading zone (blocks 300-500)
- Remove bus pull-in stops and have buses stop in the travel lane for pick-ups and drop-offs.

Additional design considerations for motorcoach priority zones may improve existing conditions for tour buses and provide curbside access to accommodate pick-up and drop-off of passengers. Following WMATA's Guidelines for the Design and Placement of Transit Stops, a transit shelter typically requires eight feet of curbside space.

Concept designs for Independence Avenue SW will prioritize providing curbside use dedicated to local bus zones and offer flexible curbside zones to accommodate commuter and coach bus loading and offloading activity.

Loading Zones

Given the unique nature of Independence Avenue SW, which provides access to several Smithsonian Museums, the corridor experiences many loading demands. Loading needs for the museums require irregular, oversized, and generally challenging deliveries. The following summarizes the loading needs identified along Independence Avenue SW and will be incorporated into the corridor concept designs:

- Botanical Garden service yard (block 200)
- Frequent deliveries (block 600)
- Crane access is required on the north side (blocks 700 & 800)
- Equipment delivery on the north side (blocks 700 & 800)
- Loading dock access on the north side (blocks 700, 800, 1000, 1100)

Curbside flex zones can be allocated to meet Smithsonian loading needs on Independence Avenue SW's north side/museum side. This may include longer trucks that cannot pull into loading docks and other heavy equipment for unloading and loading gallery pieces and sculptures. Because these deliveries are scheduled, use of these zones can overlap metered parking and drop-offs for tour buses and rideshares.

Concept designs for Independence Avenue SW will consider loading needs for all buildings along the corridor.

Pick-up Drop-off

Designated pick-up and drop-off locations provide dedicated curbside space for passenger pick-up, drop-off, and commercial loading and unloading. Depending on the local context, the curbside flex zones in each concept could be designated as pick-up drop-off locations. The following summarizes the pick-up/drop-off existing and anticipated needs identified along Independence Avenue SW. These considerations will be incorporated into the corridor concept designs:

- Close the lay-by at FAA
- Close the pull-in area at the National Museum of Asian Art and provide accessible pick-up/drop-off.
- High demand for pick-ups and drop-offs outside of the Air and Space Museum
- VIP pick-up/drop-off (blocks 700, 800, 1200, 1300)
- Event pick-up/drop-off (blocks 700 & 800)
- Demand for pick-up/drop-off area (blocks 400, 500, 600)
- ADA drop-off access (blocks 1000, 1100)

Concept designs for Independence Avenue SW will provide curbside flex zones that can be used to address these pick-up/drop-off needs.

Rush-Hour Restricted Parking

Rush-hour restricted parking lanes offer a flexible approach to managing traffic flow in urban corridors like Independence Avenue SW. In the current traffic environment, where Independence Avenue SW serves as a major arterial route with multiple lanes in each direction, the use of rush-hour restricted parking lanes may not be as effective. The complexity of managing lane transitions, ensuring that parked vehicles are cleared in time, and maintaining smooth traffic flow during peak periods can present challenges, particularly in a corridor with high volumes of commuter and tourist traffic. Additionally, the current demand for curbside access for deliveries, ride-sharing, and other activities along the avenue might conflict with the need to keep these lanes clear during rush hours, potentially leading to enforcement difficulties and unintended congestion.

However, as urban design strategies evolve and the focus shifts toward reducing the dominance of vehicles on Independence Avenue SW, the concept of rush-hour restricted parking lanes could become more viable. If the corridor is reconfigured to have one through lane in each direction, these restricted lanes could provide a valuable solution to balance the needs of commuters during peak hours with the desire for more pedestrian-friendly streetscapes during off-peak times. Limiting the Avenue to a single through lane during off-peak periods would likely decrease the overall traffic volume, making it easier to manage the transitions between parking and travel lanes. This approach would also support the broader goal of transforming Independence Avenue SW into a more celebrated urban space, emphasizing pedestrian safety and multimodal transportation and enhancing the public realm while accommodating the necessary traffic flow during peak periods.

Concept designs for Independence Avenue SW will consider using rush hour restricted travel lanes to balance vehicle capacity demands with the demand for on-street parking.

Dedicated Turn Lanes

Dedicated turn lanes provide separation between turning vehicles and through traffic, improving safety and traffic flow. They allow for deceleration and vehicle storage near intersections, reducing conflicts with adjacent through traffic. Studies indicate left-turn-only lanes reduce crashes by 28–48% compared to shared lanes, while right-turn-only lanes achieve a 14–26% reduction. These lanes also enhance roadway capacity by minimizing disruptions caused by turning vehicles.

Exclusive left-turn lanes significantly improve safety by reducing rear-end collisions by 60–88%. These lanes also increase roadway capacity by 25% on average, compared to shared left/through lanes, enabling the efficient movement of traffic without requiring additional through lanes. This efficiency can create opportunities to allocate more space for sidewalks, bicycle lanes, and other pedestrian amenities.

Design Options for Left-Turn Lanes

Several designs address the specific needs of urban corridors like Independence Avenue SW, considering space constraints, traffic operations, and multimodal usage. Each design balances trade-offs between safety, capacity, and curbside space.

Trap Lanes

A trap lane (**Figure 41**) occurs when a through lane transitions into a left-turn-only lane without advance markings. This design often leads to sideswipe crashes as drivers abruptly change lanes near the intersection. Additionally, the receiving lane opposite the trap lane remains underutilized due to the lack of through traffic alignment. This option is generally avoided in favor of safer alternatives.

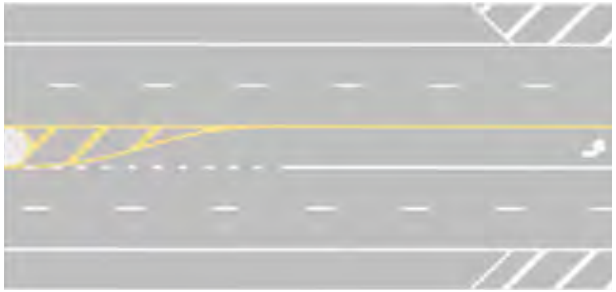
Figure 41. Left-Turn "Trap" Lane on Independence Avenue SW



No Lane Shifts

In a No Lane Shifts design (**Figure 42**), left-turning drivers must position their vehicles in the left-turn lane ahead of the intersection, maintaining the alignment of through lanes. This option ensures curbside uses on both sides of the street but requires a curb-to-curb width approximately 18 feet wider than the narrowest alternatives. While it prioritizes consistent alignment for through traffic, it reduces available sidewalk space, limiting pedestrian comfort.

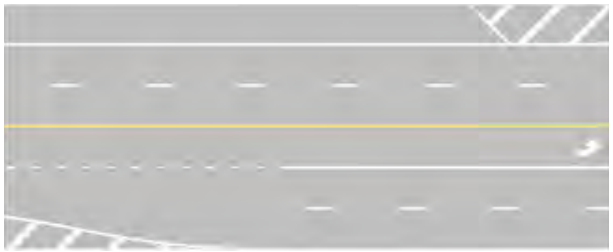
Figure 42. Left-turn lane with No Lane Shifts, Curbside Space on Both Sides of the Street, and Narrow Sidewalk Widths



Marked Lane Shifts

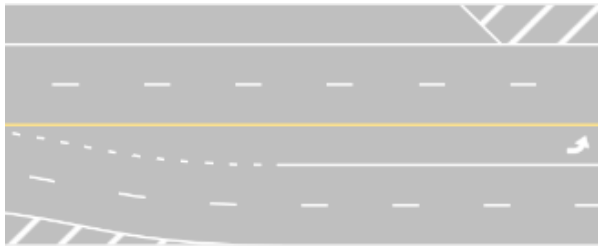
Unmarked Shift (Figure 43): Drivers are expected to transition into the left-turn lane without explicit guidance. This design resembles a trap lane, causing late lane changes, reduced lane utilization, and increased crash risk.

Figure 43. Left-turn lane with No Marked Lane Shifts, Moderate Curbside Space on Both Sides of the Street, and Moderate Sidewalk Widths



Marked Shift (Figure 44): Marked shifts guide drivers to align their vehicles in advance of the left-turn lane, improving lane utilization and reducing sideswipe crashes. However, the required lane changes may confuse some drivers and disrupt traffic flow, especially for unfamiliar road users.

Figure 44. Left-Turn Lane with Through Lane Shift, Moderate Curbside Space on Both Sides of the Street, and Moderate Sidewalk Widths



Opposing-Side Lane Shift

An Opposing-Side Lane Shift design (Figure 45) maintains alignment for through drivers approaching the intersection but requires drivers on the opposing side to shift lanes. Although this option minimizes driver confusion before intersections, it complicates traffic flow for vehicles exiting the intersection. It offers moderate curbside space on both sides of the street.

Figure 45. Left-turn lane with Lane Shift on the Opposing Side of Traffic, Moderate Curbside Space on Both Sides of the Street, and Moderate Sidewalk Widths



Curbside-Restricted Options

Aligned Through Lanes (Figure 46): Drivers move left in advance of the turn lane, maintaining consistent through-lane alignment. However, curbside uses are limited to one side of the street.

Figure 46. Left-turn lane with No Marked Lane Shifts, Curbside Space on One Side of the Street, and Moderate Sidewalk Widths



Opposing Lane Shift with Narrower Width (Figure 47): Similar to Figure 45, this design narrows the curb-to-curb width, reducing available curbside access to one side of the street. It maintains wide sidewalks, improving pedestrian conditions.

Figure 47. Left-turn lane with Lane Shift on the Opposing Side of Traffic, Moderate Curbside Space on One Side of the Street, and Wide Sidewalk Widths



Restricted Curbside Access (Figure 48): Through lanes remain aligned, but curbside uses are eliminated on both sides of the street. This design prioritizes vehicular movement at the expense of pedestrian and curbside activities.

Figure 48. Left-turn lane with No Marked Lane Shifts, Moderate Curbside Space on One Side of the Street, and Wide Sidewalk Widths



Integrated Lane Shifts

Drivers must shift lanes to align with through movements (Figure 49). While this design reduces curbside space to one side of the street, it ensures consistent sidewalks and through-lane alignment on both sides.

Figure 49. Left-Turn Lane with Through Lane Shift, Moderate Curbside Space on One Side of the Street, and Wide Sidewalk Widths



Integrating Lane Shifts into a Monumental Design

Shifting through lanes along Independence Avenue SW to accommodate exclusive turn lanes and on-street parking can be done while maintaining a monumental, aesthetically pleasing urban design through thoughtful alignment, consistent design elements, and strategic transitions. The key is to manage lane shifts in a way that enhances the avenue's visual and spatial continuity while celebrating its importance within the District's monumental core.

Lane shifts can be integrated smoothly by using landscaped medians or pavement treatments that guide the eye and subtly indicate the change in lane direction. Medians with consistent tree planting, shrubs, or decorative elements can visually buffer lane shifts, creating an appearance of continuity despite the realignment of lanes. The use of **differentiated paving materials** (such as brick or stone borders) can also indicate where lanes shift, making the change more intuitive for drivers while maintaining a cohesive aesthetic. This design approach helps balance vehicle flow needs with the avenue's monumental character.

Shifting lanes can also offer opportunities to break up the wide expanses of asphalt with **pedestrian islands**, **public art**, or **monumental lighting** at intersections. These elements can celebrate the avenue's importance using materials and forms reflecting nearby classical and civic architecture. Creating moments of pause, where pedestrians can interact with these elements, further enhances the experience of moving through a monumental space. Adding street furniture, monuments, and consistent wayfinding signage as lanes shift can evoke a grand but human-scaled atmosphere.

Recommendation:

- Design continuity through lane transitions.
- Frame the avenue with streetscape elements and maintain views and sightlines.

Vendors

Vendors currently occupy curbside space along Independence Avenue SW. Vendor activity is permitted and enforced through DDOT, as shown in **Figure 50**.

Vendors attract many patrons and require adequate trash receptacles and regulations to ensure the surrounding area remains free of debris and clutter.

Concept designs for Independence Avenue SW will consider vendor activity when determining appropriate curbside uses for the corridor and will balance the needs and interests of GSA, Smithsonian, and other corridor stakeholders.

Figure 50. Bollards at 6th Street and Independence Avenue SW by the Air and Space Museum



5 Design Vision

The proposed concept designs build on feedback from the design charrette and findings from the Urban Life Review, as well as guidance from the:

- Monumental Core Streetscape Design Guidelines,
- The District's Design and Engineering Manual
- NCHRP Report 1036: Guide for Roadway Cross Section Reallocation
- Design guidance from the National Association of City Transportation Officials (NACTO), including their Urban Street Design Guide, Global Street Design Guide, Urban Bikeway Design Guide, Transit Street Design Guide, and Urban Street Stormwater Guide.

The design elements are organized by streetscape zones, as defined by the Monumental Core Streetscape Design Guidelines and shown in Figure 51. These zones include:

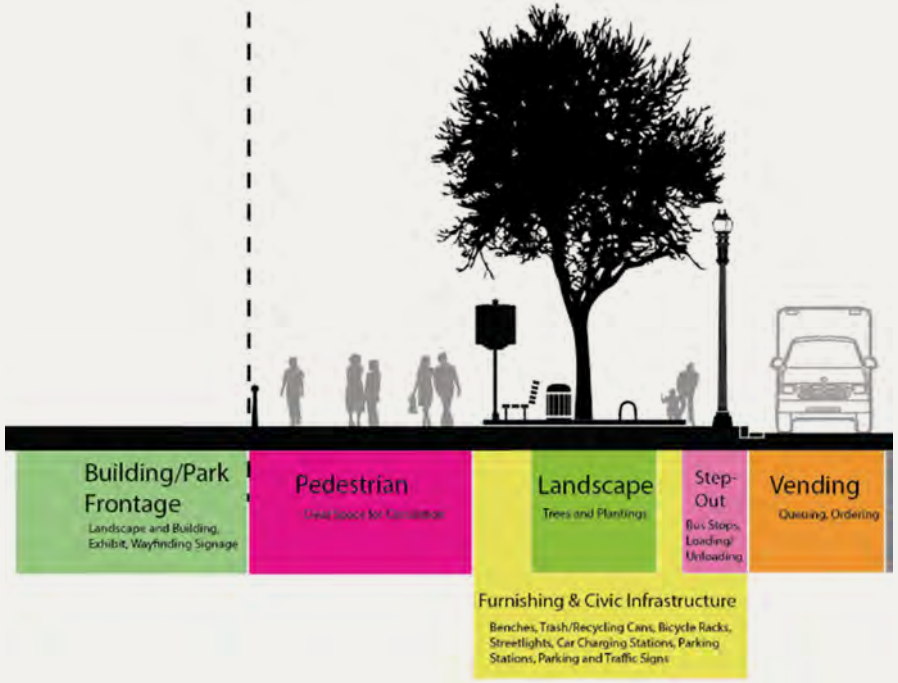
Beyond the existing right-of-way

- Building/Park Frontage

Within the existing right-of-way

- Pedestrian Clear Zone
- Furnishing & Civic Infrastructure Zone, including:
  - Landscape Zone, including trees and street furnishings
  - Step-Out Zone, including Bus Stops
  - Bicycle facilities
- Between the Curbs, including:
  - Curbside/Edge Lane Zone
  - Curb Extensions
  - Travel Lanes
  - Medians
  - Mid-block Crossings

Figure 51. Streetscape Zones



Monumental Core Streetscape Design Guidelines

5.1 Design Elements

The corridor concept design elements reflect varied priorities that align with the vision for Independence Avenue SW, including balancing multimodal infrastructure, pedestrian safety, public life, and operational needs to align with the corridor's long-term vision of serving as a celebrated corridor that safely and comfortably serves all users and modes of transportation.

Corridor Right-of-Way

Independence Avenue SW today has a consistent curb-to-curb width of 80 feet, with a varied 110 to 126 feet back-of-sidewalk to back-of-sidewalk width, as shown in **Figure 52** and **Figure 53**.

Figure 52. Current Independence Avenue SW Roadway

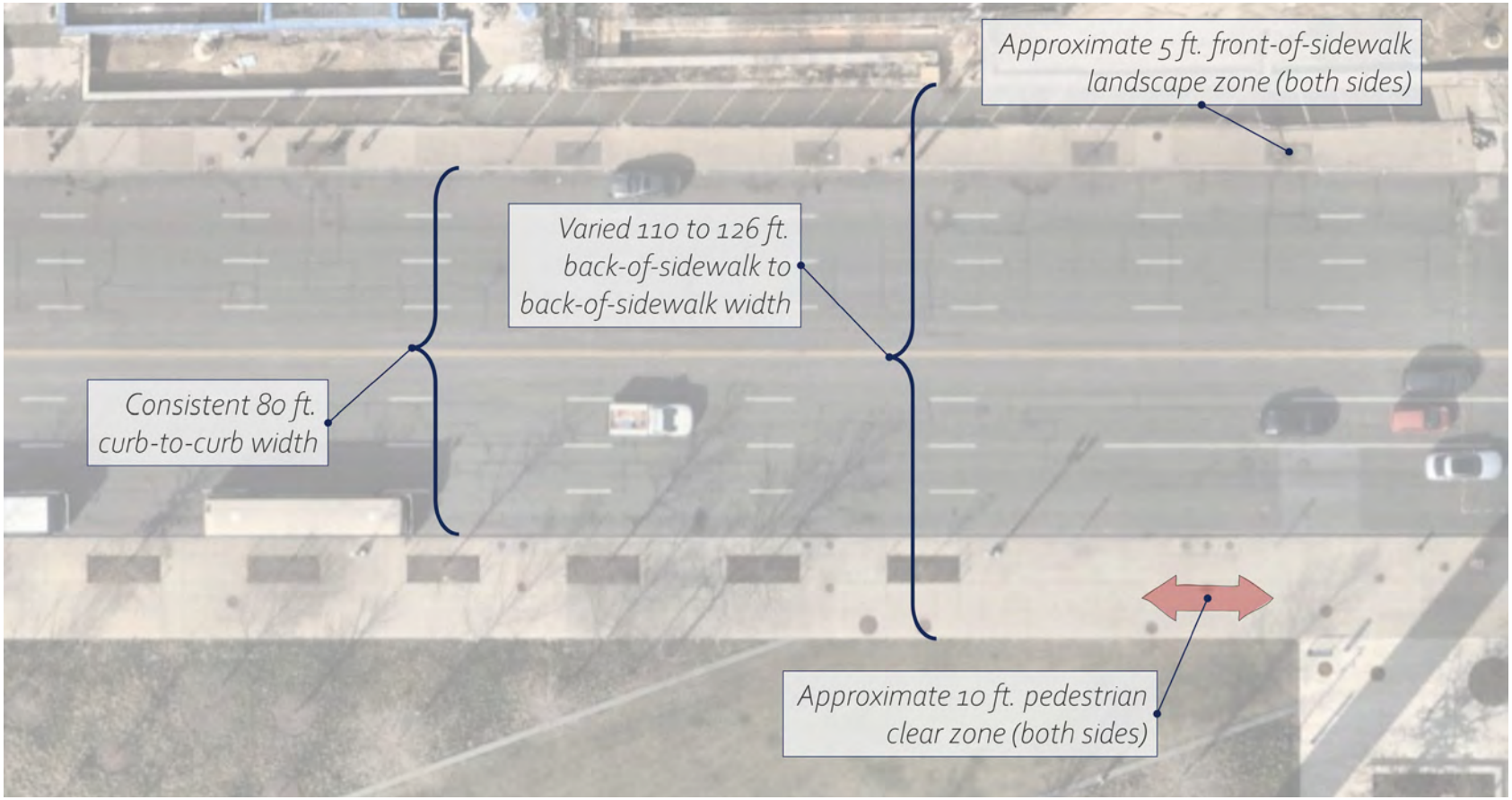
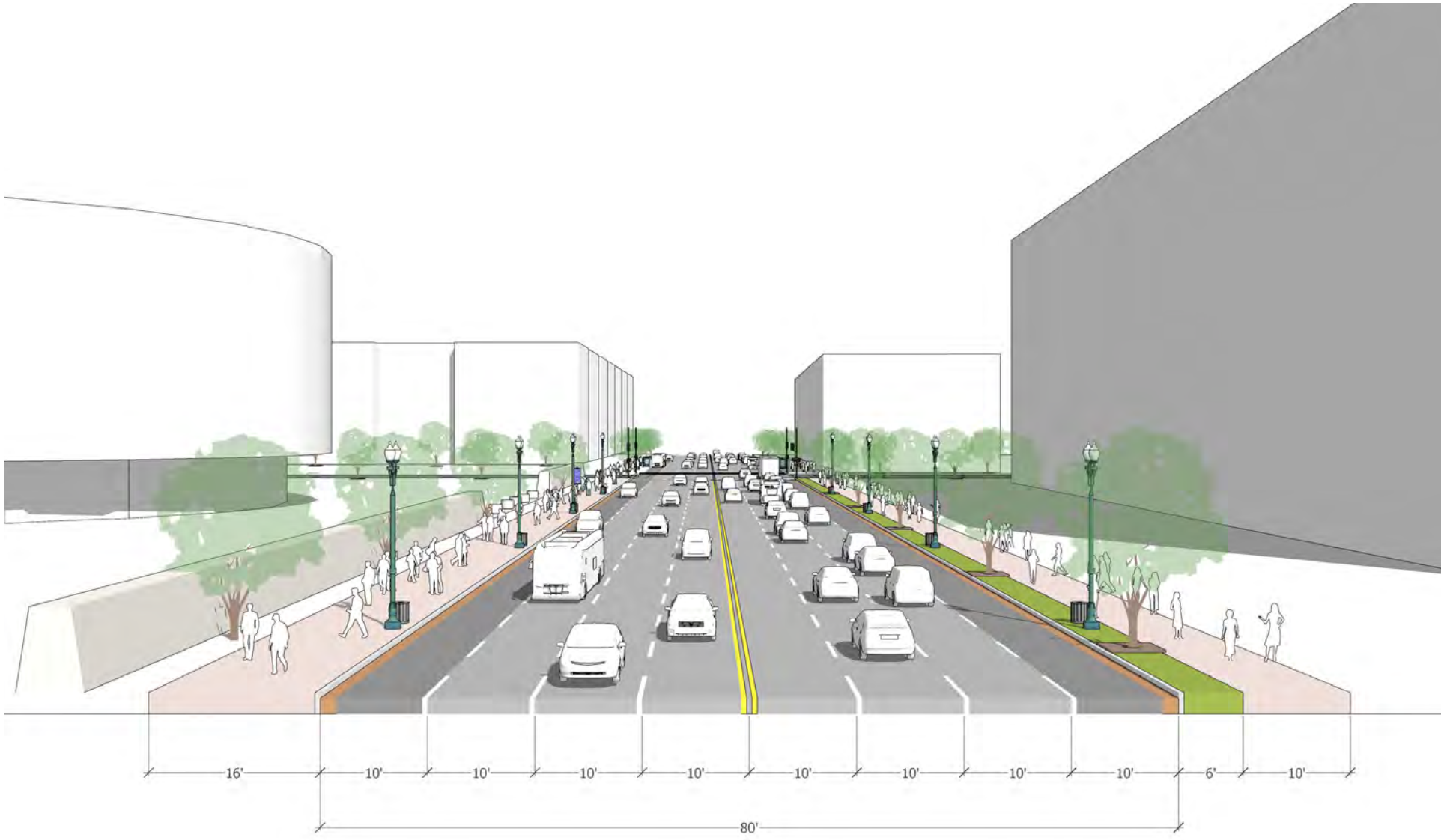


Figure 53. Existing Independence Avenue SW Cross Section

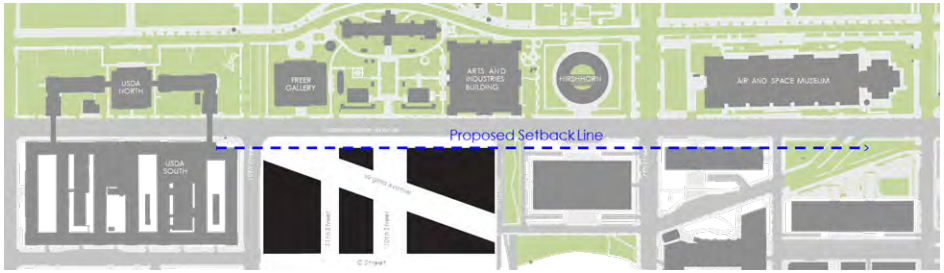


While the curb-to-curb width is consistent, the building setbacks and yards are inconsistent, particularly on the south side of Independence Avenue SW. Further, the current corridor right-of-way varies between 108 and 112 feet and is generally consistent with the back-of-sidewalk to back-of-sidewalk width. On the north side of Independence Avenue SW, the property lines largely include the entirety of the current sidewalk and extend to the edge of the curb. The property lines are generally near the back-of-sidewalk on the south side of Independence Avenue SW.

To provide a consistent future building setback on the south side of the corridor, maintain a similar setback as the Smithsonian buildings on the north side of the corridor, and provide more ample sidewalk space and sunlight than what currently exists in front of the USDA south building, the SW Ecodistrict Plan established a consistent 112-foot right-of-way along Independence Avenue SW.

The SW Ecodistrict also established a setback of approximately 34 feet from the southern right-of-way line to align with the corner of the USDA South Building that is inset at the intersection of 12th Street & Independence Avenue SW. **Figure 54** displays the proposed setback line from the SW Ecodistrict Plan and its alignment with the northeast reentrant corner of the USDA building at 12th Street & Independence Avenue SW.

Figure 54. SW Ecodistrict Plan Proposed Setback of 34 ft. from the Southern Right-of-Way Line

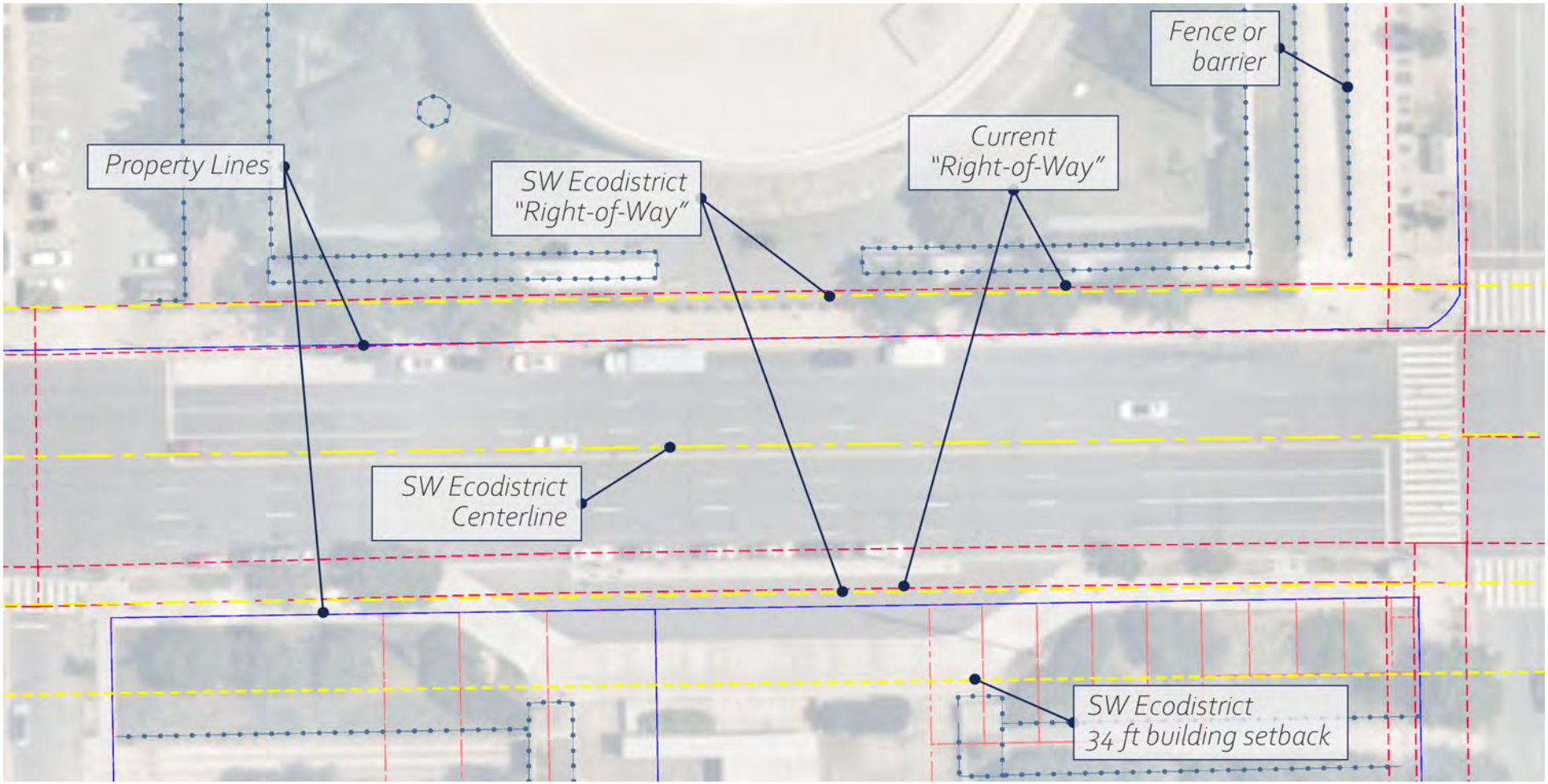


SW Ecodistrict Plan

Figure 55 displays the current Independence Avenue SW property lines and right-of-way lines from DC Open Data, along with the proposed SW Ecodistrict building setback and 110-112.5-foot right-of-way lines for the same 700 block of Independence Avenue SW. The 112-foot right-of-way lines in **Figure 55** are the lines used by the project team for all of the concept designs. All right-of-way and property lines should be further clarified and verified through survey efforts in future planning and design stages.



Figure 55. Current Independence Avenue SW Property Lines and Right-of-Way and Proposed Right-of-Way

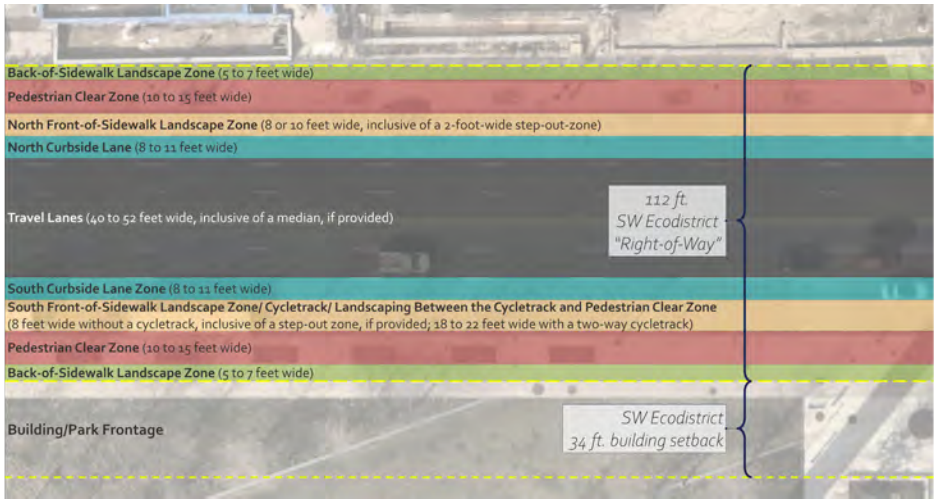


Property Lines and Current Right-of-Way from DC Open Data; SW Ecodistrict Right-of-Way Information from the SW Ecodistrict

The building face setbacks and right-of-way lines are portrayed using GIS information from DC Open Data. While the aerial imagery is scaled and georeferenced, the projection of buildings and other physical elements should be considered reasonable but not absolutely accurate in their portrayal.

Figure 56 shows the 112-foot right-of-way lines from **Figure 55** with the general location of the streetscape zones shown in **Figure 51**. The following sections provide more details on these zones.

Figure 56. Streetscape Zones Within the SW Ecodistrict Right-of-Way



Building/Park Frontage Zone

The building/park frontage zone is the area between the building face and the corridor's right-of-way. Also known as the "building yard," the building/park frontage zone contains landscaped areas, building, exhibit and wayfinding signage, and perimeter security. While the corridor today has landscaped areas and building, exhibit, and wayfinding signage at the back of the sidewalk in some locations, it is not within the current corridor right-of-way, nor is it consistent along the length of the corridor. The design concepts identify changes within the 112-foot right-of-way lines shown in **Figure 56** and do not propose changes to building/park frontage zones along the corridor.

Pedestrian Clear Zone

The pedestrian clear zone contains unobstructed space for pedestrian circulation. The pedestrian clear zone is free of amenities and street furnishings. As shown in **Figure 57**, the pedestrian clear zone is a particular section of the sidewalk, with the sidewalk being the entire width of the right-of-way outside the curb.

Figure 57. Pedestrian Clear Zone area of the sidewalk on Independence Avenue SW



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The minimum sidewalk width within the National Mall Streetscape Manual Boundary should be 16 feet, including a ten-foot minimum pedestrian clear zone. This is consistent with the DDOT Design and Engineering Manual, which specifies that sidewalks in Central DC and Commercial Areas should maintain a minimum unobstructed sidewalk width of ten feet. All Central Business District streets must have a total minimum sidewalk width of 16 feet, including a six-foot furnishing zone and ten feet of unobstructed sidewalk. An example of a ten-foot pedestrian clear zone with a six-foot furnishing zone is shown in **Figure 58** on Half Street SW. All design concepts exceed the minimum sidewalk width with widths between 23 and 30 feet wide.

Figure 58. Ten-foot pedestrian clear zone with a six-foot furnishing zone on Half Street SW



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As shown in **Figure 59**, the current pedestrian clear zone is not aligned along Independence Avenue SW and varies from less than five feet wide in some sections to over 20 feet wide in others.

Figure 59. Misaligned and varied pedestrian clear zone on Independence Avenue SW today



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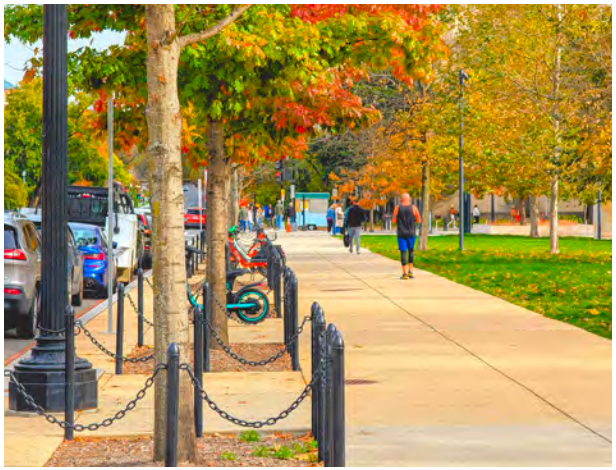
In all design concepts, the minimum width of the pedestrian clear zone is ten feet wide, and the pedestrian clear zone is aligned along the length of the corridor. Because of the significant pedestrian activity on Independence Avenue SW, pedestrian clear zone widths greater than the minimum ten-foot width are preferred. All proposed concept designs have pedestrian clear zone widths from 10 to 15 feet wide.

Furnishing & Civic Infrastructure Zone

The Furnishing and Civic Infrastructure zone contains streetlights, banners, benches, trash/recycling receptacles, bicycle racks, car charging and parking stations, and parking/traffic/regulatory signs. This area includes landscape zones, step-out zones, and bicycle facilities.

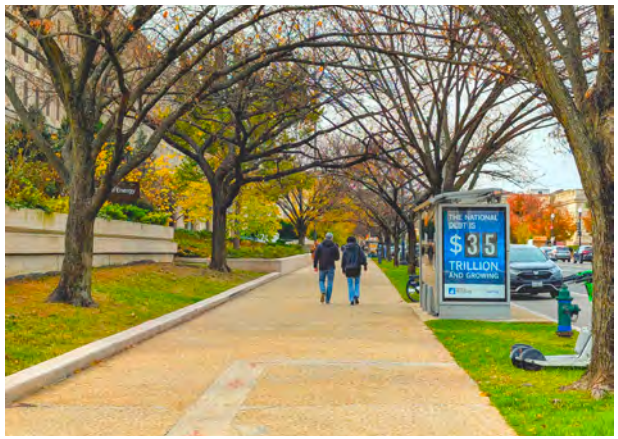
Today, the corridor does not have consistent landscape or step-out zones, as shown in **Figure 60**, **Figure 61**, and **Figure 62**. Landscape zones, step-out zones, and bicycle facilities are discussed in the following subsections.

Figure 60. Current pedestrian clear zone, landscape, and step-out zones near the Dwight D. Eisenhower Memorial on Independence Avenue SW



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Figure 61. Current pedestrian clear zone and landscape zone near the Department of Energy on Independence Avenue SW



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Figure 62. Current pedestrian clear zone and landscape zones near the Department of Agriculture on Independence Avenue SW



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Landscape Zone

All design concepts include two landscape zones on both sides of the corridor. The first landscape zone, identified as the "back-of-sidewalk landscape zone," is located between the back of the pedestrian clear zone and the building/park frontage zone. The second landscape zone, identified as the "front-of-sidewalk landscape zone," is located between the pedestrian clear zone and either the step-out zone, bicycle facilities, or curbs.

All design concepts provide a consistent and aligned back-of-sidewalk landscape zone along the length of the corridor. Two different types of landscaping were considered for the back of the sidewalk:

1/ Tree Boxes

2/ Landscape Strips with Trees

An example of tree boxes in the back-of-sidewalk landscape zone on Pennsylvania Avenue NW is shown in **Figure 63**, and an example of a landscape strip with trees is shown in **Figure 64**. As seen, the use of tree boxes provides additional sidewalk area, while the landscape strip provides an attractive extension of the building yard. In both cases, including trees in the back-of-sidewalk landscape zone provides a second row to allow dual rows of trees on both sides of the corridor.

While landscape strips with trees were considered for use in the corridor's design concepts, only tree boxes are proposed in the back-of-sidewalk landscape zone. This decision was made to maximize the available sidewalk space, particularly on the north side of the corridor near the Smithsonian museums. However, with potential redevelopment on the corridor's south side, the proposed 34-foot building setbacks from the edge of the right-of-way may provide additional landscape opportunities in the future. There are some exceptions to the lack of landscape strips, including the area in front of the Arts and Industries Building, where the building frontage abuts the edge of the proposed right-of-way and where tree boxes are not feasible. A landscape strip in this area provides visual continuity while guiding pedestrians away from the building edge.

In all design concepts, the minimum width of the back-of-sidewalk landscape zone with tree boxes is five feet, aligned along the corridor's length. To provide adequate soil volume for tree roots to grow and the tree to survive to maturity without pushing up the sidewalk, a back-of-sidewalk landscape zone width of six feet or greater is preferred. A wider width provides opportunities for amenities and furnishings, like benches, artwork, and exhibits. All proposed concept designs have a five- to seven-foot wide back-of-sidewalk landscape zone.

Further design refinement should explore the interface between the back-of-sidewalk landscape zone and the building/park frontage zone in the right-of-way. Design refinement should consider integrating and expanding

these landscaped areas for improved tree health and address potential conflicts such as adjacent canopy trees.

Figure 63. Dual row of trees with tree boxes in the back-of-sidewalk landscape zone on Pennsylvania Avenue NW



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Figure 64. Dual row of trees within a landscape strip in the back-of-sidewalk landscape zone on Pennsylvania Avenue NW



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The front-of-sidewalk landscape zone contains trees and plantings, including the second row, to allow dual rows of trees on both sides of the corridor.

In all design concepts, the front-of-sidewalk landscape zone on the north side of the corridor is six feet wide with tree boxes. In the design concepts without bicycle facilities, the front-of-sidewalk landscape zone on the south side of the corridor is also six feet wide with tree boxes. In the design concepts with bicycle facilities, a narrower landscape strip is provided between the bicycle facilities and the step-out zone, and a six-foot wide landscape strip with trees is provided between the pedestrian clear zone and bicycle facilities. Together with the landscape and furnishing zone, the dual rows of trees flanking the pedestrian clear zone on both sides of the corridor are symmetrical and aligned.

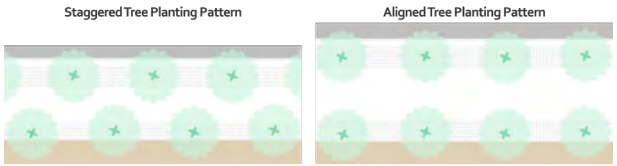
Trees

In all design concepts, dual rows of trees flanking the pedestrian clear zone on both sides of the corridor are symmetrical and aligned. Consistent with the Monumental Core Streetscape Design Guidelines, trees along Independence Avenue SW should be vase and spreading trees and be consistent in form and planting pattern for the length of the corridor.

For all concepts, the following provides information about specific design details related to trees:

- Trees are not located at museum or building entries.
- A second row of trees in the back-of-sidewalk landscape zone is not provided in locations where the right-of-way is adjacent to a building, such as the area next to the Smithsonian Arts and Industries Building.
- The dual rows of trees can be planted in either an aligned or staggered planting pattern, as shown in **Figure 65**. Generally, the aligned planting pattern is preferable when there is more space between the dual rows of trees. In the design concepts, an aligned tree pattern is used with design concepts that have wider pedestrian clear zones, while a staggered tree pattern is used with design concepts with pedestrian clear zones of 10 feet or close to 10 feet.

Figure 65. Dual Row of Trees Planting Patterns



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Street Furnishings

Street furnishings are small-scale elements placed within the public realm to enhance the functionality, aesthetics, and comfort of streetscapes, including seating, waste receptacles, lighting, bike racks, planters, and signage to create a user-friendly and cohesive urban environment.

- Pedestrian wayfinding signs coordinated with the National Park Service and Architect of the Capitol to provide consistent wayfinding across the National Mall and U.S. Capitol Complex are to be located in the front-of-sidewalk landscape zone on both sides of Independence Avenue SW in the area between the tree boxes.
- Twin-20 streetlights, which are 20 feet in height and oriented parallel to the curb, are used in all design concepts, as shown in **Figure 66**.

Figure 66. Twin-20 Streetlight



https://www.ncpc.gov/news/item/53/

- Benches are proposed in the landscape zones consistent with a key outcome of the Urban Life Review, which identified a lack of seating along the corridor as a major detriment to public life today. The Monumental Core Streetscape Design Guidelines identify appropriate bench types along Independence Avenue SW.
- Benches can be oriented either perpendicular to the curb in the front-of-sidewalk landscape zone closest to the curb under the tree canopy, particularly when adjacent to parking lanes, rather than moving traffic, facing the street in the back-of-sidewalk landscape zone under the tree canopy, or placed in pairs perpendicular to the street and facing each other, fostering varied interaction opportunities while maintaining consistency with the area's cohesive streetscape design. **Figure 67** shows C-12 benches on Constitution Avenue NW perpendicular to the street and facing each other.

Figure 67. C-12 Benches on Constitution Avenue NW are placed in pairs perpendicular to the street and facing each other.



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Step-Out Zone

The step-out zone provides two feet of space for locating curbside utilities, separating the sidewalk area from moving traffic, and additional space for bus stops and dedicated areas for loading and unloading. **Figure 60** shows an example of a two-foot step-out zone in front of the Dwight D. Eisenhower Memorial.

In all design concepts, the step-out zone on the north side of the corridor is two feet wide and adjacent to a six-foot-wide front-of-sidewalk landscape zone with tree boxes. In the design concepts with full-time or rush-hour restricted curbside uses provided adjacent to the curb on the south side of the corridor, the step-out zone is also two feet wide. In select design concepts with travel lanes adjacent to the curb on the south side of the corridor, no step-out zone is provided.

Bus Stops

Today, the Independence Avenue SW corridor has five bus stops on each side of the street, providing service to WMATA Metrobus, commuter buses, and tour buses. WMATA's proposed better bus network identified priority bus stops in both the eastbound and westbound directions in the 300 block (between 3rd and 4th Streets) and the 1200 block (located west of 12th Street SW), and a priority bus stop in the eastbound direction in the 600 block (between 6th and 7th Streets). The proposed design concepts add a westbound bus stop to the 600 block to pair with the stop in the eastbound direction, and it is recommended that the bus service be consolidated to these three locations along the corridor, as shown in **Figure 68**. Consolidating bus service to these three locations provides opportunities for simplifying transit connections between service providers and improving bus stop amenities, including multiple or larger shelters, trash and recycling receptacles, dynamic information displays, and route maps and schedules.

Figure 68. Proposed Bus Stops



Bicycle Facilities

The Independence Avenue SW corridor is a bicycle priority in the District's moveDC multimodal long-range transportation plan. Safe and comfortable (LTS 1) bicycle facilities are recommended on Independence Avenue SW, connecting with the protected bicycle facilities on Pennsylvania Avenue SE east of the corridor, the north-south bicycle facilities on 4th Street SW, and the two-way north-south cycletrack on 15th Street SW. While a "complete street" is generally preferred, moveDC also provides provisions for a "complete network" approach to multimodal design, where alternative parallel routes offer dedicated space designed for all users. This allows parallel streets in the urban network to prioritize transit service, bicycle facilities, or vehicular throughput as necessary.

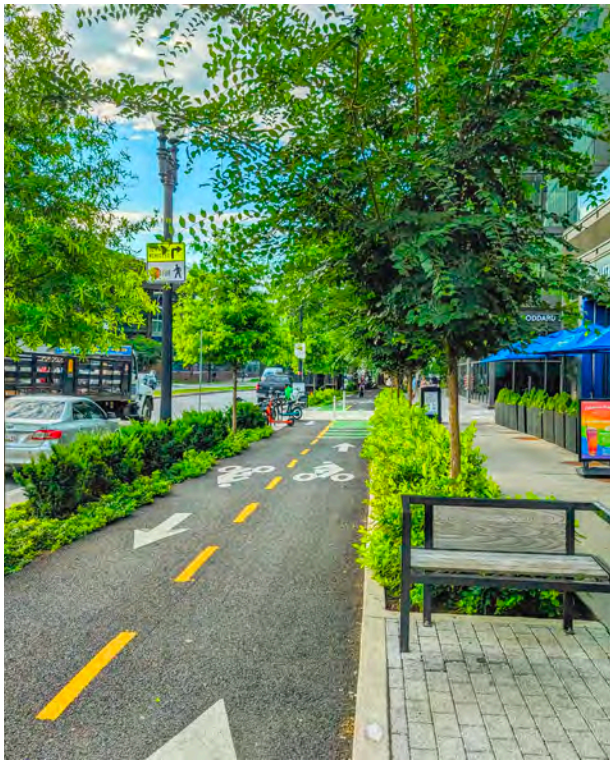
Today, safe and comfortable east-west bicycle facilities are provided on Pennsylvania Avenue NW, located about a half-mile north of Independence Avenue SW, and I Street SW, about a half-mile south of Independence Avenue SW. The National Park Service is exploring future buffered bike lanes on Madison Drive NW in the westbound direction and Jefferson Drive SW in the eastbound direction, located about 1,000 feet and 350 feet, respectively, north of Independence Avenue SW. Four of the design concepts do not provide a dedicated bicycle facility on Independence Avenue SW, and these options assume that cyclists would either continue to bike on Independence Avenue SW or use the future buffered bicycle facilities on Madison Drive NW and Jefferson Drive SW.

Based on the current bicycle ridership on Independence Avenue SW, despite the lack of safe and comfortable bicycle facilities, there is clear demand for bicycle facilities along the corridor. To meet this demand, two design concepts provide ten-foot wide, protected two-way cycletracks on the south side of the corridor. As designed, the cycletracks would provide a safe and comfortable (LTS 1) bicycle facility and likely attract a range of bicycle users, ranging from interested but concerned to confident cyclists. The decision to place a two-way cycletrack on the south side of the corridor stems from the different land uses on both sides of the avenue. The north side of the corridor near the National Mall and Smithsonian museums has more visitors and buildings that are unlikely to change, while the south side includes government offices with fewer visitors and generous building setbacks, along with buildings that are more likely to change.

The two designs with two-way cycletracks provide landscape zones between the cycletrack and pedestrian clear zone to comply with accessibility guidelines, encourage pedestrians to stay out of the cycletracks and maintain consistently spaced dual rows of trees on both sides of the corridor. Two-way cycletracks, both at sidewalk and street levels, are proposed. The cycletrack at sidewalk level provides an opportunity for a third row of trees, while the cycletrack at street level provides an additional indication to pedestrians to stay out of the cycletrack. **Figure 69** shows a two-way cycletrack on Maine Avenue in Washington, D.C. at sidewalk level.

Figure 70 shows an image of a two-way cycletrack at street level on 15th Street NW in Washington, D.C.

Figure 69. Two-Way Sidewalk-Level Cycletrack on Maine Avenue in Washington, D.C.



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Figure 70. Two-Way Cycletrack on 15th Street NW in Washington, D.C.



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Between the Curbs

Curbside/Edge Lane Zone

The curbside lane located outside the sidewalk area and within the curb-to-curb width provides access to the curb for transit vehicles, passenger pick-ups, drop-offs, loading and unloading, and temporary areas for commercial services and operations such as ordering and queuing.

All design concepts provide curbside access, either with full-time lanes or rush-hour restricted lanes on the north side of the corridor, and four of the design concepts provide curbside access on the south side of the corridor.

In the design concepts with a curbside lane providing full-time curbside access, the lane is eight or nine feet wide and has curb extensions at intersections, pedestrian crossings, and bus stops. The District's Design and Engineering Manual (DEM) specifies using an 11-foot lane width when the curbside lanes are either full-time or rush-hour restricted travel lanes. Curb extensions are not feasible with full-time or rush-hour restricted lanes.

Curb Extensions

Curb extensions, also known as bulb-outs, are a valuable streetscape feature that extends the sidewalk into the parking lane. They serve various purposes, including enhancing pedestrian safety by reducing crossing distances, improving sightlines between pedestrians and drivers, and acting as a traffic-calming measure by visually and physically narrowing the roadway. Curb extensions are also used as bus boarding areas, facilitating efficient and safer passenger loading and unloading. Furthermore, they contribute to environmental goals by creating opportunities for stormwater infrastructure elements, such as rain gardens, which manage stormwater runoff.

As discussed in the preceding section, curb extensions are proposed in design concepts with full-time curbside access.

Travel Lanes

Travel lane widths are proposed to be as narrow as possible to provide additional space for public life outside the curbs. Narrow lane widths of ten feet also improve the street's safety performance by reducing vehicle speeds without impacting traffic operations. Lane widths of ten feet, consistent with the DEM, are proposed for all travel lanes not adjacent to a curb. Lanes adjacent to a curb require 11-foot lanes following the DEM.

Medians

A roadway median is a strip of land or structure that separates opposing lanes of traffic on a roadway. Medians can vary in size and design, ranging from simple painted lines to raised structures with curbs, landscaped elements, or barriers. They serve several purposes, including improving safety by reducing head-on collisions, providing a refuge for pedestrians crossing wide roads, and enhancing roadway

aesthetics through landscaping. Medians can also help manage traffic flow by restricting certain turning movements and defining lane configurations. On Independence Avenue SW, medians provide space for left-turn-only lanes at intersections without lane shifts.

However, medians also remove space that could be available for public life outside the curbs and require maintenance and upkeep when landscaping is used. Further, all pedestrian crossings on Independence Avenue SW are currently at signalized intersections, or if mid-block crossings are added, as discussed in the following section, the crossings would also be signalized. Using medians as a pedestrian refuge is unnecessary since the signal timing would allow pedestrians to cross the roadway in a single crossing without trapping pedestrians in the middle of the avenue.

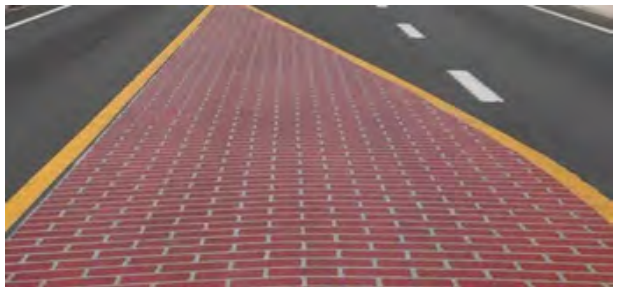
Three corridor design concepts use ten-foot medians to provide space for left-turn-only lanes at intersections without lane shifts. One of the design concepts provides a raised median with a small area of planting at intersections and permeable pavers along the rest of the median. The other two options show a striped median to minimize maintenance needs. Another option for flush medians is using attractive pavers or stamped asphalt or concrete. These options, as shown in **Figure 71** and **Figure 72**, differentiate the median area from travel lanes, require minimal maintenance, and allow for future roadway flexibility. These types of flush medians are not shown in the design concepts because they are currently not used in the District.

Figure 71. Stamped Asphalt Median



https://www.streetbond.com/product/stamped-asphalt-patterns

Figure 72. Flush Median with Color-Texture



https://safer4us.com/medians-flush-vs-raised/

Mid-Block Crossings

With the long block lengths and key destinations along Independence Avenue SW, people today routinely cross the roadway in mid-block locations. Mid-block crossings were considered in the 300 block (between 3rd and 4th Streets) and along the missing 5th Street, 8th Street, 11th Street, and 13th Street alignments to accommodate this demand. Based on stakeholder feedback and assessing the feasibility of the mid-block crossings, the design concepts show mid-block crossings in the 300 block (between 3rd and 4th Streets) and the missing 13th Street alignment. The pedestrian crossings at 9th Street are proposed to be adjusted to provide two crossings on both sides of the intersection rather than one crossing in the middle of the intersection, which satisfies the demand for a mid-block crossing on the missing 8th Street alignment, and the more prominent L'Enfant Plaza (10th Street) intersection is expected to fulfill the demand for a mid-block crossing on the missing 11th Street alignment.

5.2 Design Concepts

The corridor concepts include six design concepts, grouped into the following three themes:

1/ **Monumental:** Formal options with linear alignments and less lane shifting, prioritizing formal designs that reflect the avenue's historic character.

2/ **Multimodal:** Includes a two-way cycletrack for cyclists on the south side of the corridor.

3/ **Public Life:** Wide sidewalks and generous landscape and furnishing zones are provided.

Each theme includes two options for six total design concepts, varying based on full-time or rush-hour curbside uses and medians. **Table 6** provides a list of the six design concepts and a description of each concept.

Table 6. Description of Corridor Design Concepts

Design Option	Description	Opportunities	Tradeoffs
1. Monumental: Full-Time Curbside Uses & Median	A formal option with less lane shifting, full-time curbside uses on both curbs, and a center median alternating with left-turn lanes at some intersections.	Creates a pedestrian-friendly environment by maintaining full-time curbside lanes, improving predictability for all users. The median enhances safety and aesthetics while offering flexibility for potential future use of curbside space.	Limits available space outside the curbs for public life, reducing opportunities for expanded sidewalks or additional amenities.
2. Monumental: Rush-Hour Curbside Lanes	A formal option with less lane shifting, and rush-hour restricted curbside lanes on both curbs.	Helps manage peak-hour congestion while preserving a formal streetscape. The design supports vehicular flow and provides a structured traffic pattern.	Left-turn "trap" lanes create turning-movement conflicts. Requires enforcement to ensure compliance with curbside restrictions. Limited space outside the curbs reduces opportunities for pedestrian enhancements.
3. Multimodal: Full-Time Curbside Uses on North Curb	Includes a two-way cycle track at sidewalk level for bicyclists on the south side, and full-time curbside uses are on the north curb, with no curb access to the south.	Provides dedicated cycling infrastructure alongside expanded pedestrian space, improving active transportation options. Encourages a more connected corridor.	Limits access to the south curb, which may pose challenges for deliveries and curbside activity. Less flexibility for future reconfigurations.
4. Multimodal: Rush-Hour Curbside Lanes & Median	Includes a two-way cycle track for bicyclists on the south side, rush-hour restricted curbside lanes on both curbs, and a center median alternating with left-turn lanes at some intersections.	Enhances multimodal accessibility by integrating bike lanes while maintaining traffic flow efficiency. The median contributes to better organization of roadway elements.	Requires effective enforcement to regulate curbside lane use. Peak-hour lane restrictions may limit the consistent use of curb space.
5. Public Life: Full-Time Curbside Uses on North Curb	Provides wider sidewalks and more space for public life outside the curb, and full-time curbside uses are on the north curb, with no curb access to the south.	Expanding sidewalks and green spaces creates a more engaging public realm for pedestrians. Supports flexible, mixed-use street functions.	Eliminates curb access on the south, impacting loading and unloading activities. May require adjustments for businesses and service access.
6. Public Life: Rush-Hour Curbside Lanes & Median	Provides wider sidewalks and more space for public life outside the curb, rush-hour restricted curbside lanes on both curbs, and a center median alternating with left-turn lanes at some intersections.	Prioritizes public space enhancements while maintaining dynamic traffic operations and integrates green spaces for a balanced urban environment.	Relies on enforcement to manage curbside restrictions. Some curbside space may be underutilized outside of peak hours.

The following section provides an overview of each design concept. A summary of the design concepts, including their design elements described in the previous section, is provided in Table 7.

Table 7. Summary of Design Concepts

Name	Curb-to-curb width (ft.)	Back-of-Sidewalk Landscape Zone (Both Sides)	Pedestrian Clear Zone (ft.) (Each Side)	North Front-of-Sidewalk Landscape Zone	North Curbside Lane	North Curbside Lane at Intersections	Median	South Curbside Lane at Intersections	South Curbside Lane	South Front-of-Sidewalk Landscape Zone	Cycletrack	Landscaping Between the Cycletrack and Pedestrian Clear Zone on the South Side	Trees
Current	80	There is no current landscape and furnishing zone.	6	Generally, six-foot width, including tree boxes. No step-out zone.	Ten-foot rush-hour restricted curbside use.	Active travel lane during peak periods.		Active travel lane during peak periods.	Ten-foot rush-hour restricted curbside use.	Generally, six-foot width, including tree boxes. No step-out zone.	None		
Monumental: Full-Time Curbside Uses & Median	66	Five-foot width, including tree boxes and benches facing the street.	10	Six-foot width, including tree boxes and benches facing each other perpendicular to the curb alongside a two-foot width step-out zone.	Eight-foot full-time curbside use.	Curb extensions (bus bulbs in areas with transit).	Ten-foot small area of low planting at intersections and permeable pavers along the rest of the median.	Curb extensions (bus bulbs in areas with transit).	Eight-foot full-time curbside use.	Six-foot width, including tree boxes and benches facing each other perpendicular to the curb alongside a two-foot width step-out zone.	None		Staggered
Monumental: Rush-Hour Curbside Lanes	62	Six-foot width, including tree boxes and benches facing each other perpendicular to the curb.	11	Six-foot width, including tree boxes alongside a two-foot width step-out zone.	11-foot rush-hour restricted curbside use.	Active travel lane during peak periods.		Active travel lane during peak periods.	11-foot rush-hour restricted curbside use.	Six-foot width, including tree boxes alongside a two-foot width step-out zone.	None		Staggered

Name	Curb-to-curb width (ft.)	Back-of-Sidewalk Landscape Zone (Both Sides)	Pedestrian Clear Zone (ft.) (Each Side)	North Front-of-Sidewalk Landscape Zone	North Curbside Lane	North Curbside Lane at Intersections	Median	South Curbside Lane at Intersections	South Curbside Lane	South Front-of-Sidewalk Landscape Zone	Cycletrack	Landscaping Between the Cycletrack and Pedestrian Clear Zone on the South Side	Trees
Multimodal: Full-Time Curbside Uses on North Curb	52	Five-foot width, including tree boxes and benches facing the street.	10	Six-foot width, including tree boxes and benches facing each other perpendicular to the curb alongside a two-foot width step-out zone.	Nine-foot full-time curbside use.	Curb extensions (bus bulbs in areas with transit).		Active travel lane.	11-foot travel lane.	Six-foot width, including landscape strip with low-growth plantings. No step-out zone.	Ten-foot width sidewalk level.	Six-foot width, including landscape strip with low-growth planting and trees.	Staggered
Multimodal: Rush-Hour Curbside Lanes & Median	52	Six-foot width, including tree boxes and benches facing the street.	11	Six-foot width, including tree boxes alongside a two-foot width step-out zone.	11-foot rush-hour restricted curbside use.	Active travel lane during peak periods.	Ten-foot striped.	Active travel lane during peak periods.	11-foot rush-hour restricted curbside use.	Two-foot width step-out zone.	Ten-foot width street-level.	Six-foot width, including landscape strip with low-growth planting and trees.	Staggered

Name	Curb-to-curb width (ft.)	Back-of-Sidewalk Landscape Zone (Both Sides)	Pedestrian Clear Zone (ft.) (Each Side)	North Front-of-Sidewalk Landscape Zone	North Curbside Lane	North Curbside Lane at Intersections	Median	South Curbside Lane at Intersections	South Curbside Lane	South Front-of-Sidewalk Landscape Zone	Cycletrack	Landscaping Between the Cycletrack and Pedestrian Clear Zone on the South Side	Trees
Public Life: Full-Time Curbside Uses on North Curb	52	Six-foot width, including tree boxes and benches facing each other perpendicular to the curb.	15	Eight-foot width, including long tree boxes with low plantings and "garden feel," and benches facing each other perpendicular to the curb alongside a two-foot width step-out zone.	Nine-foot full-time curbside use.	Curb extensions (bus bulbs in areas with transit).		Active travel lane.	11-foot travel lane.	Eight-foot width, including long tree boxes with low plantings and a "garden feel." No step-out zone.	None		Aligned
Public Life: Rush-Hour Curbside Lanes & Median	52	Seven-foot width, including tree boxes and benches facing each other perpendicular to the curb.	15	Six-foot width, including tree boxes alongside a two-foot width step-out zone.	11-foot rush-hour restricted curbside use.	Active travel lane during peak periods.	Ten-foot striped.	Active travel lane during peak periods.	11-foot rush-hour restricted curbside use.	Six-foot width, including tree boxes alongside a two-foot width step-out zone.	None		Aligned

1. Monumental: Full-Time Curbside Uses & Median

The first monumental design provides a formal option with no lane shifting, as shown in **Figure 73** and **Figure 74**. This option provides a center median, which includes turn lanes at intersections, where needed. The design concept reduces the curb-to-curb width by 14 feet, from 80 feet to 66 feet, and adds four feet of pedestrian clear zone space on both sides of the corridor, along with five feet of landscape and furnishing zone with tree boxes and benches facing the street. However, the median limits opportunities for additional pedestrian space.

The landscape areas on both sides of the street add benches facing each other perpendicular to the street and a two-foot step-out zone adjacent to full-time curbside access. Curb extensions with bus boarding areas at transit stops are provided at intersections and mid-block crossings, and a center median includes low planting areas at intersections and crossings and permeable pavers along the rest of the median.

Design Elements for Monumental: Full-Time Curbside Uses & Median

Curb-to-curb width: . . . . . 66 feet

Back-of-Sidewalk Landscape Zone (Both Sides): . . . Five-foot width, including tree boxes and benches facing the street.

Pedestrian Clear Zone (Each Side): . . . . . 10 feet

North Front-of-Sidewalk Landscape Zone: . . . . . Six-foot width, including tree boxes and benches facing each other perpendicular to the curb alongside a two-foot width step-out zone.

North Curbside Lane: . . . . . Eight-foot full-time curbside use.

North Curbside Lane at Intersections: . . . . . Curb extensions (bus bulbs in areas with transit).

Median: . . . . . Ten-foot small area of low planting at intersections and permeable pavers along the rest of the median.

South Curbside Lane at Intersections: . . . . . Curb extensions (bus bulbs in areas with transit).

South Curbside Lane: . . . . . Eight-foot full-time curbside use.

South Front-of-Sidewalk Landscape Zone: . . . . . Six-foot width, including tree boxes and benches facing each other perpendicular to the curb alongside a two-foot width step-out zone.

Cycletrack: . . . . . None

Trees: . . . . . Staggered

Figure 73. Monumental: Full-Time Curbside Uses & Median Corridor Design Concept Rendering (View looking east from 9th Street SW)

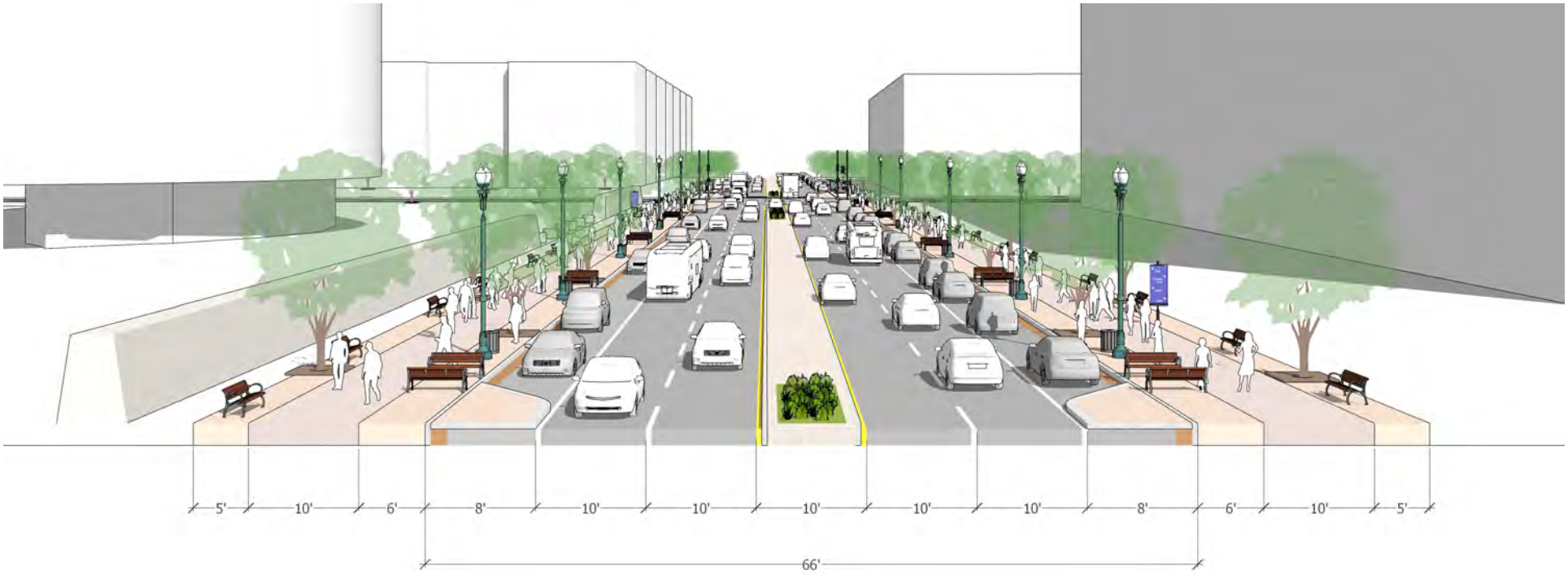
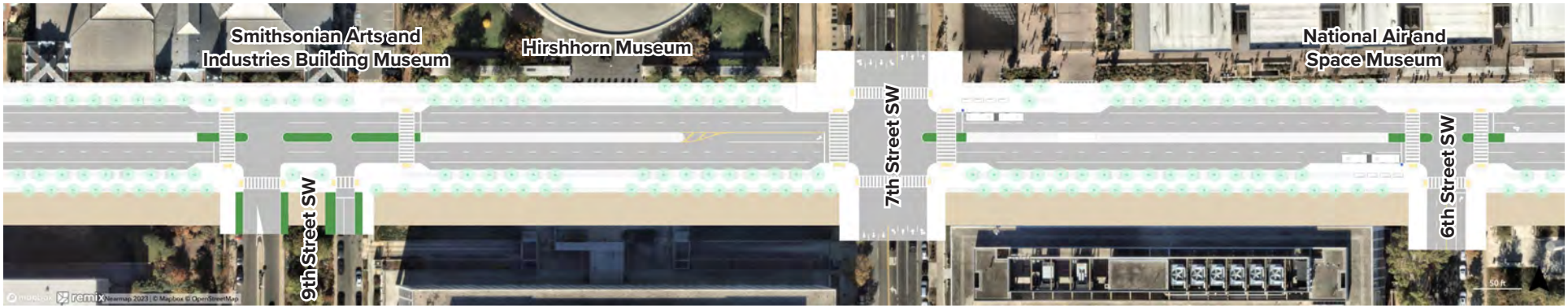


Figure 74. Monumental: Full-Time Curbside Uses & Median Corridor Plan View



Corridor view in the design concept rendering

2. Monumental: Rush-Hour Curbside Lanes

The second monumental design provides a formal option with aligned lanes requiring lane shifting due to through lanes becoming left-turn lanes at some intersections, as shown in **Figure 75** and **Figure 76**. The design concept reduces the curb-to-curb width by 18 feet, from 80 feet to 62 feet, and adds five feet of pedestrian clear zone space on both sides of the corridor, along with six feet of landscape and furnishing zone with tree boxes and benches facing each other perpendicular to the curb. The landscape areas on both sides of the street add a two-foot step-out zone adjacent to rush-hour restricted lanes, providing curbside access during off-peak hours and a travel lane during peak hours.

Design Elements for Monumental: Rush-Hour Curbside Lanes

Curb-to-curb width: . . . . . 62 feet

Back-of-Sidewalk Landscape Zone (Both Sides): . . . Six-foot width, including tree boxes and benches facing each other perpendicular to the curb.

Pedestrian Clear Zone (Each Side): . . . . . 11 feet

North Front-of-Sidewalk Landscape Zone: . . . . . Six-foot width, including tree boxes alongside a two-foot width step-out zone.

North Curbside Lane: . . . . . 11-foot rush-hour restricted curbside use.

North Curbside Lane at Intersections: . . . . . Active travel lane during peak periods.

South Curbside Lane at Intersections: . . . . . Active travel lane during peak periods.

South Curbside Lane: . . . . . 11-foot rush-hour restricted curbside use.

South Front-of-Sidewalk Landscape Zone: . . . . . Six-foot width, including tree boxes alongside a two-foot width step-out zone.

Cycletrack: . . . . . None

Trees: . . . . . Staggered

Figure 75. Monumental: Rush-Hour Curbside Lanes Corridor Design Concept Rendering (View looking east from 9th Street SW)

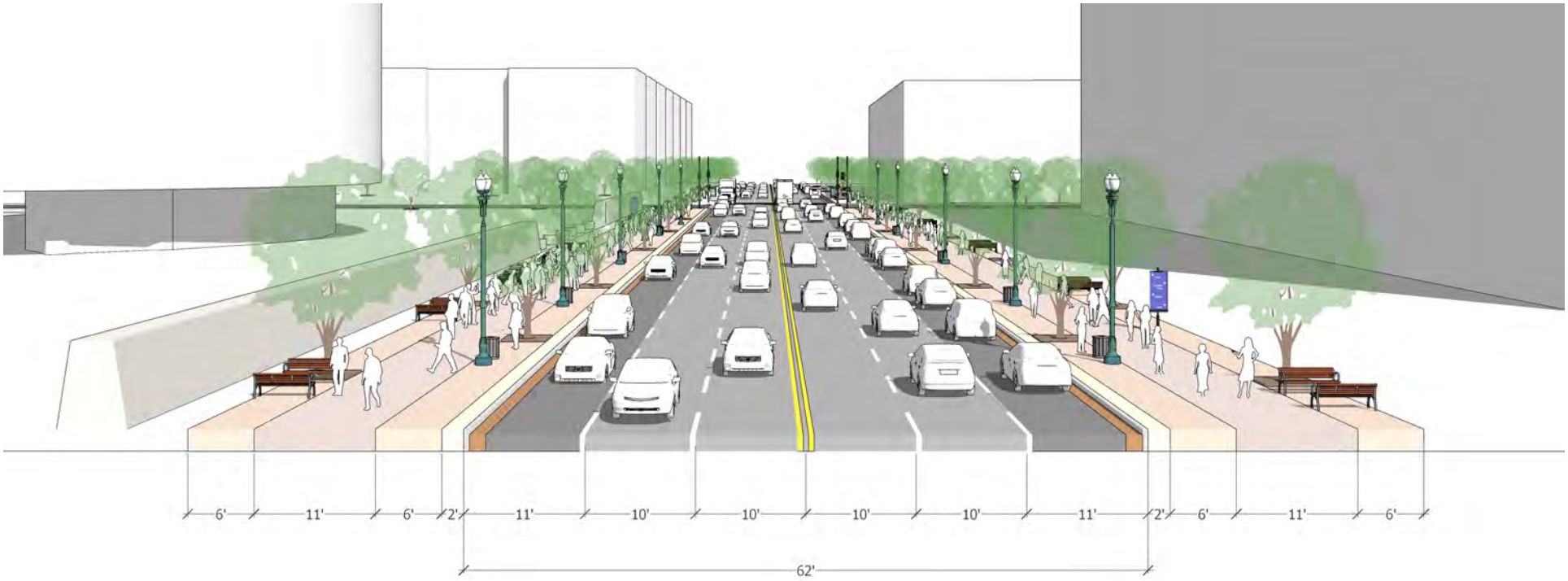
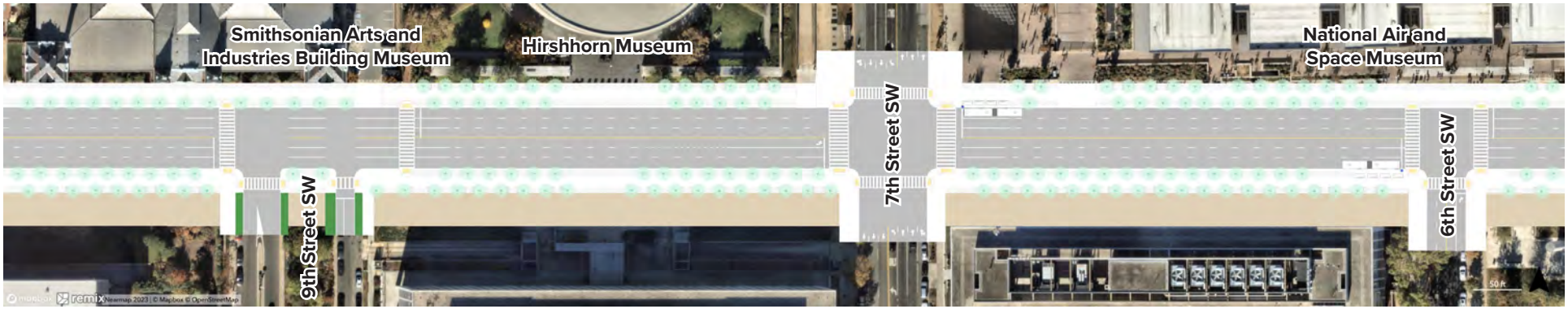


Figure 76. Monumental: Rush-Hour Curbside Lanes Corridor Plan View



Corridor view in the design concept rendering

3. Multimodal: Full-Time Curbside Uses on North Curb

The first multimodal design provides a two-way cycletrack at sidewalk level for bicyclists on the south side, as shown in **Figure 77** and **Figure 78**. The design concept reduces the curb-to-curb width by 28 feet, from 80 feet to 52 feet, and adds four feet of pedestrian clear zone space on both sides of the corridor, along with five feet of landscape and furnishing zone with tree boxes and benches facing the street. The landscape area on the north side of the street adds benches facing each other perpendicular to the street, along with a two-foot step-out zone adjacent to full-time curbside access. Curb extensions with bus boarding areas at transit stops are provided at intersections and mid-block crossings on the north side of the street as well. On the south side of the street, the two-way cycletrack is separated from the pedestrian clear zone by a six-foot landscape strip with low-growth planting and trees. Between the cycletrack and road is a six-foot landscape strip with low-growth plantings and no step-out zone adjacent to an active travel lane. The reduced curb-to-curb width and no median require some lane shifting due to the full-time curbside access width on the north side becoming left-turn lanes at some intersections.

Design Elements for Multimodal: Full-Time Curbside Uses on North Curb

Curb-to-curb width: . . . . . 52 feet

Back-of-Sidewalk Landscape Zone (Both Sides): . . . Five-foot width, including tree boxes and benches facing the street.

Pedestrian Clear Zone (Each Side): . . . . . 10 feet

North Front-of-Sidewalk Landscape Zone: . . . . . Six-foot width, including tree boxes and benches facing each other perpendicular to the curb alongside a two-foot width step-out zone.

North Curbside Lane: . . . . . Nine-foot full-time curbside use.

North Curbside Lane at Intersections: . . . . . Curb extensions (bus bulbs in areas with transit).

Median: . . . . . None

South Curbside Lane at Intersections: . . . . . Active travel lane.

South Curbside Lane: . . . . . 11-foot travel lane.

South Front-of-Sidewalk Landscape Zone: . . . . . Six-foot width, including landscape strip with low-growth plantings. No step-out zone.

Cycletrack: . . . . . Ten-foot width sidewalk level.

Landscaping Between the Cycletrack and Pedestrian Clear Zone on the South Side: Six-foot width, including landscape strip with low-growth planting and trees.

Trees: . . . . . Staggered

Figure 77. Multimodal: Full-Time Curbside Uses on North Curb Corridor Design Concept Rendering (View looking east from 9th Street SW)

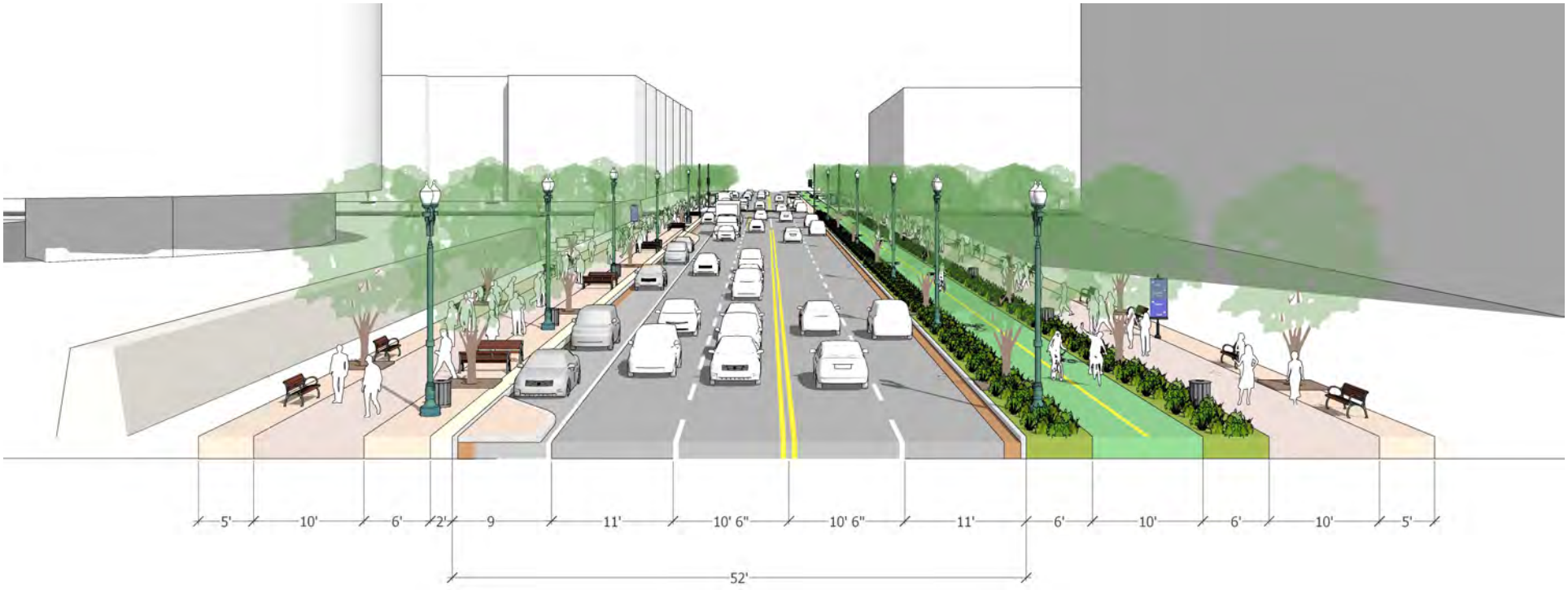
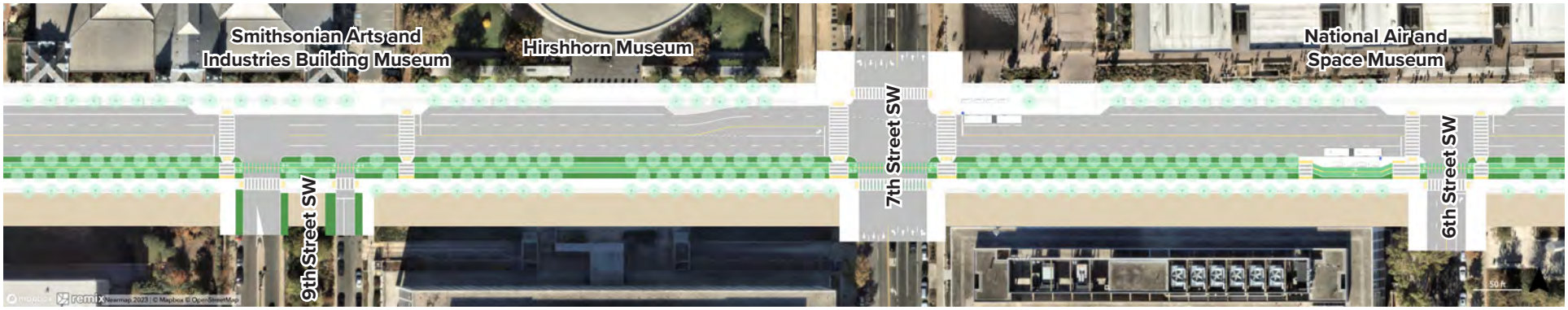


Figure 78. Multimodal: Full-Time Curbside Uses on North Curb Corridor Plan View



Corridor view in the design concept rendering

4. Multimodal: Rush-Hour Curbside Lanes & Median

The second multimodal design provides a two-way cycletrack at the street level for bicyclists on the south side, and there is no lane shifting due to a striped center median alternating with left-turn lanes at some intersections, as shown in **Figure 79** and **Figure 80**. The design concept reduces the curb-to-curb width by 28 feet, from 80 feet to 52 feet, and adds five feet of pedestrian clear zone space on both sides of the corridor, along with six feet of landscape and furnishing zones with tree boxes and benches facing the street. The landscape area on the north side of the street adds a two-foot step-out zone adjacent to rush-hour restricted lanes, providing curbside access during off-peak hours and a travel lane during peak hours. On the south side of the street, the two-way cycletrack is separated from the pedestrian clear zone by a six-foot landscape strip with low-growth planting and trees. Between the cycletrack and road is a two-foot step-out zone adjacent to rush-hour restricted lanes providing curbside access during off-peak hours and a travel lane during peak hours.

Design Elements for Multimodal: Rush-Hour Curbside Lanes & Median

Curb-to-curb width: . . . . . 52 feet

Back-of-Sidewalk Landscape Zone (Both Sides): . . . Six-foot width, including tree boxes and benches facing the street.

Pedestrian Clear Zone (Each Side): . . . . . 11 feet

North Front-of-Sidewalk Landscape Zone: . . . . . Six-foot width, including tree boxes alongside a two-foot width step-out zone.

North Curbside Lane: . . . . . 11-foot rush-hour restricted curbside use.

North Curbside Lane at Intersections: . . . . . Active travel lane during peak periods.

Median: . . . . . Ten-foot striped.

South Curbside Lane at Intersections: . . . . . Active travel lane during peak periods.

South Curbside Lane: . . . . . 11-foot rush-hour restricted curbside use.

South Front-of-Sidewalk Landscape Zone: . . . . . Two-foot width step-out zone.

Cycletrack: . . . . . Ten-foot width street-level.

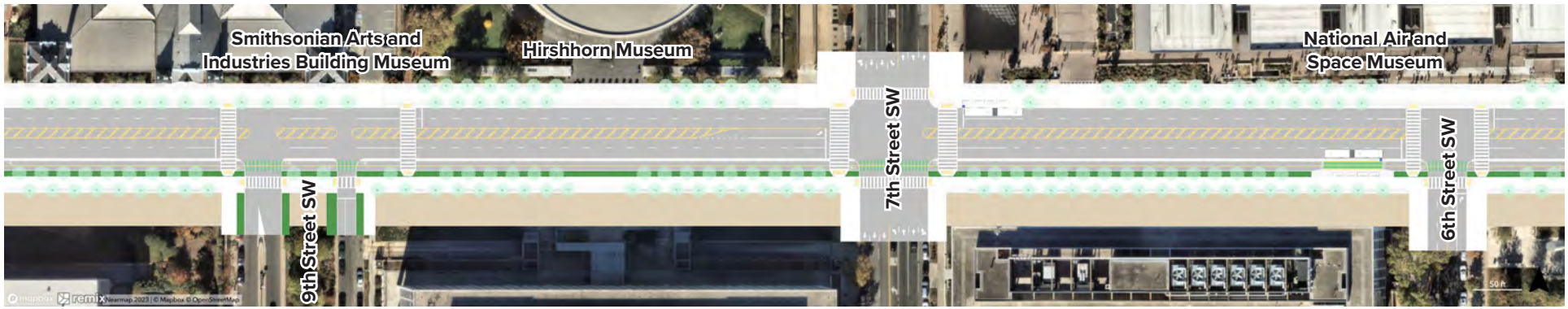
Landscaping Between the Cycletrack and Pedestrian Clear Zone on the South Side:
Six-foot width, including landscape strip with low-growth planting and trees.

Trees: . . . . . Staggered

Figure 79. Multimodal: Rush-Hour Curbside Lanes & Median Corridor Design Concept Rendering (View looking east from 9th Street SW)



Figure 80. Multimodal: Rush-Hour Curbside Lanes & Median Corridor Plan View



Corridor view in the design concept rendering

5. Public Life: Full-Time Curbside Uses on North Curb

The first public life design provides wider sidewalks and more space for public life outside of the curb, as shown in **Figure 81** and **Figure 82**. The design concept reduces the curb-to-curb width by 28 feet, from 80 feet to 52 feet, and adds nine feet of pedestrian clear zone space on both sides of the corridor, along with six feet of landscape and furnish zones with tree boxes and benches facing each other perpendicular to the curb. The landscape area on the north side of the street includes long tree boxes with low plantings to create a "garden feel," benches facing each other perpendicular to the street, and a two-foot step-out zone adjacent to full-time curbside access. Curb extensions with bus boarding areas at transit stops are provided at intersections and mid-block crossings on the north side of the street as well. On the street's south side, the eight-foot wide landscape area includes long tree boxes with low plantings to create a "garden feel" and no step-out zone adjacent to an active travel lane. The reduced curb-to-curb width and no median require some lane shifting due to the full-time curbside access width on the north side becoming left-turn lanes at some intersections.

Design Elements for Public Life: Full-Time Curbside Uses on North Curb

Curb-to-curb width: . . . . . 52 feet

Back-of-Sidewalk Landscape Zone (Both Sides): . . . Six-foot width, including tree boxes and benches facing each other perpendicular to the curb.

Pedestrian Clear Zone (Each Side): . . . . . 15 feet

North Front-of-Sidewalk Landscape Zone: . . . . . Eight-foot width, including long tree boxes with low plantings and "garden feel," and benches facing each other perpendicular to the curb alongside a two-foot width step-out zone.

North Curbside Lane: . . . . . Nine-foot full-time curbside use.

North Curbside Lane at Intersections: . . . . . Curb extensions (bus bulbs in areas with transit).

South Curbside Lane at Intersections: . . . . . Active travel lane.

South Curbside Lane: . . . . . 11-foot travel lane.

South Front-of-Sidewalk Landscape Zone: . . . . . Eight-foot width, including long tree boxes with low plantings and a "garden feel." No step-out zone.

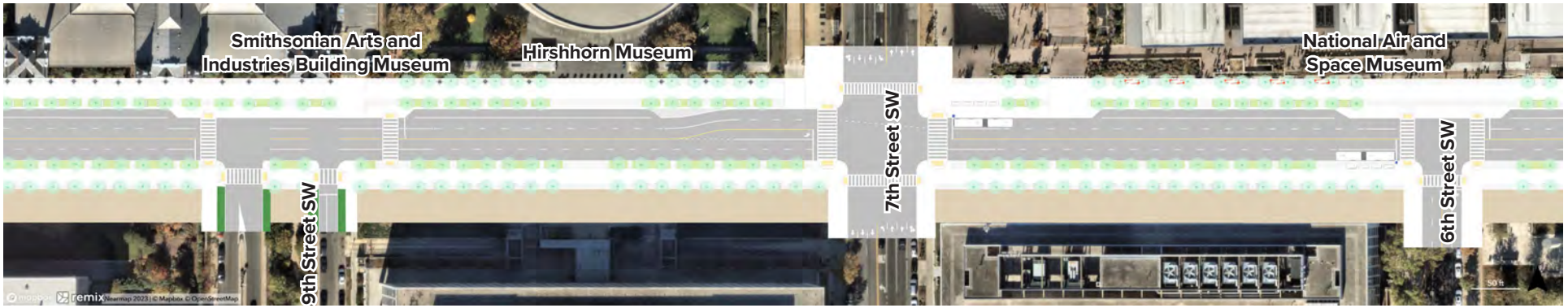
Cycletrack: . . . . . None

Trees: . . . . . Aligned

Figure 81. Public Life: Full-Time Curbside Uses on North Curb Corridor Design Concept Rendering (View looking east from 9th Street SW)



Figure 82. Public Life: Full-Time Curbside Uses on North Curb



Corridor view in the design concept rendering

6. Public Life: Rush-Hour Curbside Lanes & Median

The second public life design provides wider sidewalks and more space for public life outside of the curb, and there is no lane shifting due to a striped center median alternating with left-turn lanes at some intersections, as shown in **Figure 83** and **Figure 84**. The design concept reduces the curb-to-curb width by 28 feet, from 80 feet to 52 feet, and adds nine feet of pedestrian clear zone space on both sides of the corridor, along with seven feet of landscape and furnish zones with tree boxes and benches facing each other perpendicular to the curb. The landscape areas on both sides of the street add a two-foot step-out zone adjacent to rush-hour restricted lanes, providing curbside access during off-peak hours and a travel lane during peak hours.

This alternative proposes a more narrow cross section, with just one lane of traffic in each direction during off-peak hours, when on-street parking is permitted (similar to Alternative 4 Multimodal: Rush-Hour Curbside Lanes & Median). The striped median helps to facilitate left turns and mitigate traffic.

Design Elements for Public Life: Rush-Hour Curbside Lanes

Curb-to-curb width: . . . . . 52 feet

Back-of-Sidewalk Landscape Zone (Both Sides): . . . Seven-foot width, including tree boxes and benches facing each other perpendicular to the curb.

Pedestrian Clear Zone (Each Side): . . . . . 15 feet

North Front-of-Sidewalk Landscape Zone: . . . . . Six-foot width, including tree boxes alongside a two-foot width step-out zone.

North Curbside Lane: . . . . . 11-foot rush-hour restricted curbside use.

North Curbside Lane at Intersections: . . . . . Active travel lane during peak periods.

Median: . . . . . Ten-foot striped.

South Curbside Lane at Intersections: . . . . . Active travel lane during peak periods.

South Curbside Lane: . . . . . 11-foot rush-hour restricted curbside use.

South Front-of-Sidewalk Landscape Zone: . . . . . Six-foot width, including tree boxes alongside a two-foot width step-out zone.

Cycletrack: . . . . . None

Trees: . . . . . Aligned

Figure 83. Public Life: Rush-Hour Curbside Lanes Corridor Design Concept Rendering (View looking east from 9th Street SW)

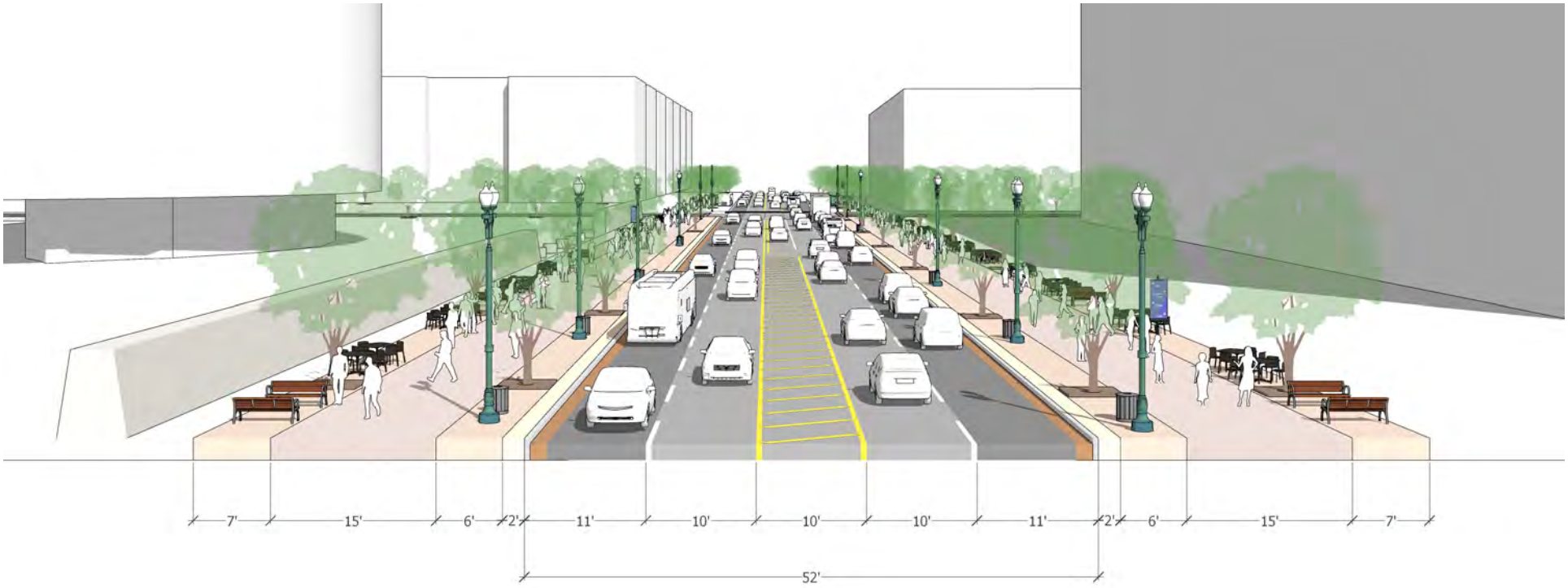
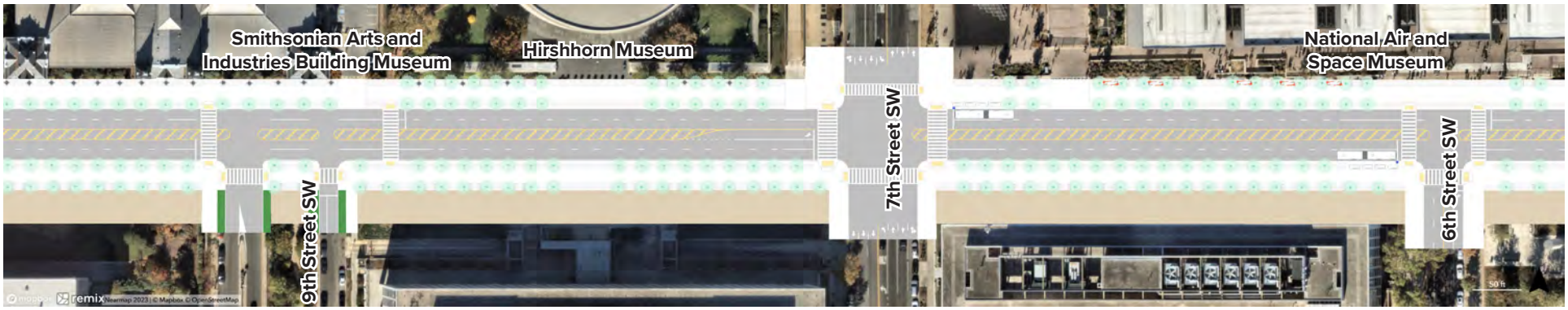


Figure 84. Public Life: Rush-Hour Curbside Lanes Corridor Plan View

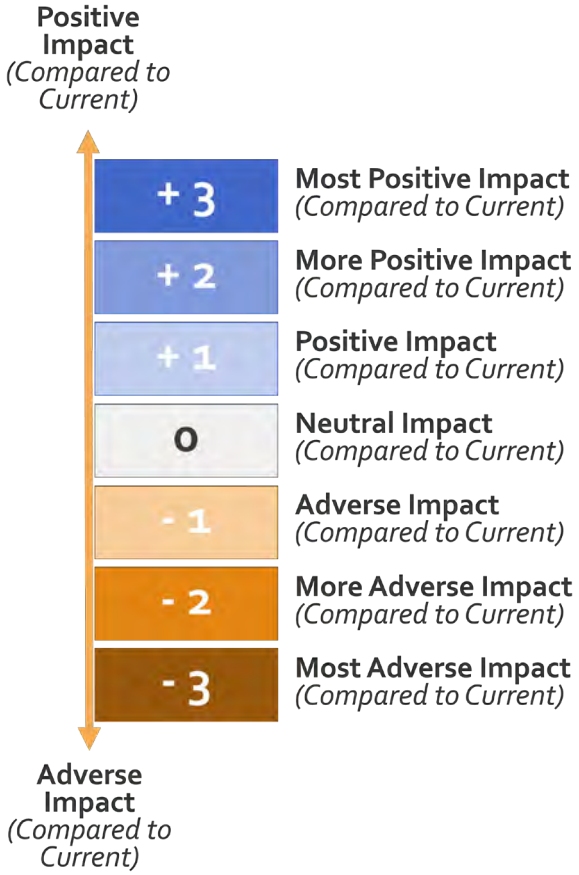


Corridor view in the design concept rendering

5.3 Alternatives Evaluation

The first method of evaluation uses the focus areas, objectives, and their associated performance measures to review each design concept and qualitatively assess whether the design concept has a positive impact (positive score) or an adverse impact (negative score) compared to the current roadway. Performance measures are scored from negative three to positive three, with the most adverse effects scored as negative three, and the most positive effects scored as plus three. A score of zero for a performance measure indicates no change from the current condition, and as a result, the current roadway would have a score of zero for all performance measures. Scores of positive one or two indicate a positive or more positive impact, respectively, compared to the current roadway, and scores of negative one or two indicate an adverse or more adverse impact. A chart showing the qualitative scoring rubric is shown in **Figure 85**.

Figure 85. Alternatives Evaluation Scoring



Performance Measure-Based Evaluation

The following tables repeat the focus areas, objectives, and performance measures established at the project's onset in the first three columns. The remaining columns summarize the qualitative review of the design concepts based on the project's performance measures. All design concepts represent a significant improvement compared to the current roadway when reviewed based on the project's established focus areas and objectives. The average performance measure rating is included for each focus area, and the totals of three focus area averages are provided at the bottom of the table to allow the design concepts to be compared with even weighting for each focus area. More information about the scores is provided in **Table 8**.

Table 8. Performance Measure-Based Evaluation

Focus Area	Objectives	Performance Measures	Monumental: Full-Time Curbside Uses & Median	Monumental: Rush-Hour Curbside Lanes	Multimodal: Full-Time Curbside Uses on North Curb	Multimodal: Rush-Hour Curbside Lanes & Median	Public Life: Full-Time Curbside Uses on North Curb	Public Life: Rush-Hour Curbside Lanes & Median
Celebrated Boulevard	Emphasize the avenue's unique character	Alignment with guiding plans	+3	+3	+3	+3	+3	+3
	High-quality streetscape	Consistent and continuous streetscape elements and materials	+3	+3	+3	+3	+3	+3
	Resiliency	Reduce impervious surfaces	+1	+2	+3	+3	+3	+3
		Additional opportunities for trees and other plantings	+2	+2	+3	+2	+3	+3
		Average	*+2.3*	*+2.5*	*+3.0*	*+2.8*	*+3.0*	*+3.0*
Safety and Comfort	Improve multimodal safety	Pedestrian and bicycle crash risk	+3	+3	+3	+3	+3	+3
		Number of conflict points	+3	+3	+3	+3	+3	+3
		Vehicle queue lengths blocking pedestrian crossings	0	0	0	0	0	0
	Improve multimodal comfort and access.	Pedestrian Level of Comfort (LOC)	+2	+2	+2	+2	+3	+3
		Bicycle Level of Traffic Stress (BLTS)	0	0	+3	+2	0	0
		Bus stop amenities	+3	+3	+3	+3	+3	+3
		Average	*+1.8*	*+1.8*	*+2.3*	*+2.2*	*+2.0*	*+2.0*
Multimodality	Reevaluate the function of the avenue and 'right-size' the roadway	Vehicle capacity	+3	+1	+3	+2	+3	+2
		Balance curbside access with demand.	+3	+1	+2	+1	+2	+1
		Average	*+3.0*	*+1.0*	*+2.5*	*+1.5*	*+2.5*	*+1.5*
		Total of Focus Area Averages	**+7.1**	**+5.3**	**+7.8**	**+6.4**	**+7.5**	**+6.5**

Celebrated Boulevard

All six design concepts represent a more "celebrated boulevard" with improvements to the avenue's unique character, streetscape, and resiliency. All six design concepts align with guiding plans and provide consistent and continuous streetscape elements and materials. While all six design concepts reduce impervious surfaces, the multimodal and public design concepts offer the greatest reductions in curb-to-curb width. Similarly, additional opportunities for trees and other plantings, including dual rows of trees, are provided in all six design concepts. The multimodal design with full-time curbside uses on the north curb and a sidewalk-level cycletrack offers a third row of trees on the south side of the roadway, while the two public life design concepts provide more generous landscaped areas. As a result, the public life and multimodal design concept with the third row of trees score the highest within the Celebrated Boulevard focus area.

Safety and Comfort

The six design concepts provide increased safety and comfort, including multimodal safety, comfort, and access improvements. The pedestrian and bicycle crash risk and the number of conflict points are reduced similarly for all six design concepts, representing a major improvement compared to the current roadway configuration. Each of the design concepts includes a reduced number of travel lanes and the same intersection lane configurations, which is reflected in the consistent scores for the six design concepts. Vehicle queues do not currently block pedestrian crossings, and the six design concepts do not introduce this challenge, so the design concepts do not provide a positive or adverse impact.

The pedestrian clear zones are wider for the public life design concepts, which is reflected in slightly better pedestrian level of comfort scores for those two concepts compared to the other four. The bicycle level of traffic stress is reduced most positively for the sidewalk-level cycletrack multimodal design concept and more positively for the street-level cycletrack multimodal design concept and is not changed for the other four concepts. All six design concepts provide improved bus stop locations with room for shelters and other amenities.

The two multimodal design concepts provide the greatest safety and comfort improvements due to the inclusion of two-way cycletracks, with the two public life design concepts following closely behind due to their wide pedestrian clear zones.

Multimodality

Multimodality, considered through a re-evaluation of the function of the avenue and right-sizing the roadway, is improved in all six design concepts. The corridor is "right-sized" for all six design concepts, with fewer travel lanes resulting in reduced curb-to-curb widths and more space for public life. The three design concepts with rush-hour restricted curbside lanes will likely not have the same capacity improvements as those with full-time uses on both curbside lanes, lowering their scores by one point. The monumental design concept with rush-hour curbside lanes and left-turn "trap" lanes is lowered another point due to reduced capacity associated with drivers making lane changes near the left-turn lanes. Considering the balance of curbside access with demand, the three design concepts with rush-hour restricted curbside lanes provide curbside access similar to the current roadway design; however, elements like closing lay-by zones and improved step-out zones have a positive impact. The two options with full-time curbside access on the north side of the corridor provide improved curbside access on one side of the street, but the lack of curbside access on the south side of the street leaves these design concepts with a more positive impact. The most positive impact design is the first design option with full-time curbside access on both sides of the street.

As a result, the design concepts with full-time access provide the greatest multimodality improvements, while the designs with rush-hour curbside restrictions represent less positive impacts.

Design-Component Evaluation

A second evaluation framework, based on the design components described in this section, provides an alternative evaluation methodology to understand and compare the design concepts. The design components have been divided into three categories, shown in the table below, including 1) furnishing and civic infrastructure, 2) multimodal comfort and safety, and 3) between the curbs. The furnishing and civic infrastructure category includes the back-of-sidewalk and front-of-sidewalk landscape zones and landscaping between the cycletrack and pedestrian clear zone. The multimodal comfort and safety category consists of the pedestrian clear zone and cycletrack, and the between the curbs category includes the curbside lanes, median, and travel lane design components. Similar to the performance measure-based evaluation, the design components are analyzed qualitatively with scores from negative three to positive three. The average design component rating is included for each design component category, and the totals of the three design component categories are provided at the bottom of the table to allow the design concepts to be compared with even weighting for each category. More information about the scores is provided in Table 9.

Table 9. Design-Component Evaluation

		Monumental:		Multimodal:		Public Life:	
Design Component Category	**Design Component**	**1. Full-Time Curbside Uses & Median**	**2. Rush-Hour Curbside Lanes**	**3. Full-Time Curbside Uses on North Curb**	**4. Rush-Hour Curbside Lanes & Median**	**5. Full-Time Curbside Uses on North Curb**	**6. Rush-Hour Curbside Lanes & Median**
Furnishing & Civic Infrastructure	Back-of-Sidewalk Landscape Zone (Both Sides)	+1	+2	+1	+2	+2	+3
	North Front-of-Sidewalk Landscape Zone	+2	+1	+2	+1	+3	+1
	South Front-of-Sidewalk Landscape Zone	+2	+1	+2	+1	+3	+1
	Landscaping Between the Cycletrack and Pedestrian Clear Zone on the South Side	0	0	+3	+3	0	0
	Average	*+1.3*	*+1.0*	*+2.0*	*+1.8*	*+2.0*	*+1.3*
Multimodal Comfort and Safety	Pedestrian Clear Zone (ft.) (Each Side)	+1	+2	+1	+2	+3	+3
	Cycletrack	0	0	+3	+2	0	0
	Average	*+0.5*	*+1.0*	*+2.0*	*+2.0*	*+1.5*	*+1.5*
Between the Curbs	North Curbside Lane	+2	+1	+3	+1	+3	+1
	North Curbside Lane at Intersections	+3	0	+3	0	+3	0
	Median	+3	0	0	+1	0	+1
	South Curbside Lane at Intersections	+3	0	0	0	0	0
	South Curbside Lane	+3	+1	0	+1	0	+1
	Travel Lanes	+3	+1	+2	+2	+2	+2
	Average	*+2.8*	*+0.5*	*+1.3*	*+0.8*	*+1.3*	*+0.8*
Total of Design Component Category Averages		**+4.6**	**+2.5**	**+5.3**	**+4.6**	**+4.8**	**+3.6**

Furnishing & Civic Infrastructure

All six design concepts significantly improve the furnishing and civic infrastructure along the corridor. The back-of-sidewalk zone is slightly wider at seven feet in the public life design concept with rush-hour curbside lanes, while the monumental and multimodal design concepts with full-time curbside use provide slightly more narrow five-foot landscape zones. The front-of-sidewalk landscape zones are the most generous in the public life design concept with full-time curbside uses, while the other design concepts with front-of-sidewalk landscape zones adjacent to full-time curbside use also provide more comfortable street furnishings compared to the front-of-sidewalk landscape zones adjacent to rush-hour restricted curbside uses. Landscaping is provided between the cycletrack and pedestrian clear zone in the two multimodal design concepts and is unavailable in the other design concepts. The two multimodal design concepts and the public life design concept with eight-foot-wide front-of-sidewalk landscape zones, including long tree boxes with low plantings and a "garden feel," are the highest-rated furnishing and civic infrastructure design concepts.

Multimodal Comfort and Safety

The pedestrian clear zones are widest for the public life design concepts at 15 feet, 10 feet wide for the full-time curbside use monumental and multimodal design concepts, and 11 feet wide for the rush-hour curbside use monumental and multimodal design concepts. The sidewalk-level cycletrack multimodal design concept is the most positive cycletrack improvement, and the street-level cycletrack multimodal design concept is more positive.

The two multimodal design concepts provide the greatest multimodal comfort and safety improvements due to the inclusion of two-way cycletracks, with the two public life design concepts following closely behind due to their wide pedestrian clear zones.

Between the Curbs

The design concepts with full-time curbside uses provide the most positive impacts, while rush-hour restricted curbside uses provide similar curbside access as the current roadway design; however, elements like closing lay-by zones and improved step-out zones offer a positive impact. Providing curb extensions at intersections has the most positive effect associated with full-time curbside access. The hardscaped median offers the most positive impact, while the striped median represents a positive effect. The three design concepts with rush-hour restricted curbside lanes will likely not have the same capacity improvements as those with full-time uses on both curbside lanes and require lane shifts, lowering their scores by one point. The monumental design concept with rush-hour curbside lanes and left-turn "trap" lanes is lowered another point due to reduced capacity associated with drivers making lane changes near the left-turn lanes.

As a result, the design concepts with full-time access provide the greatest improvements between the curbs, while the designs with rush-hour curbside restrictions represent less positive impacts.

Evaluation Results

The evaluation of design concepts for Independence Avenue SW uses two distinct methodologies—Performance Measure-Based Evaluation and Design-Component Evaluation—provided valuable insights into their effectiveness. While both assessments emphasize improvements in urban design, safety, and multimodality, their differing focus and ranking criteria reveal variations in performance across the concepts.

Key Commonalities Across Both Evaluations

Full-Time Curbside Use Yields the Strongest Results Designs with full-time curbside uses consistently receive the highest ratings in both evaluations due to their superior accommodations for pedestrians and cyclists, enhanced curbside access, and improved streetscape elements. These designs maximize public space, reduce impervious surfaces, and increase multimodal accessibility, making them the most transformative options for the corridor.

Rush-Hour Curbside Restrictions Offer a Balanced Approach Designs incorporating rush-hour curbside restrictions perform slightly lower in both evaluations, as they retain some existing roadway characteristics while introducing improvements in pedestrian safety, multimodal integration, and curbside access. Although they do not offer the same degree of transformation as full-time curbside designs, they still provide notable enhancements to the public realm.

Multimodal and Public Life Concepts Prioritize Safety and Comfort Multimodal concepts featuring cycletracks achieve higher ratings in bicycle safety and comfort, underscoring the importance of dedicated cycling infrastructure. Similarly, Public Life concepts score highly in pedestrian comfort due to their wider pedestrian clear zones and enhanced streetscape elements.

Key Differences Between the Evaluation Methods

The Performance Measure-Based Evaluation assesses how well the designs meet defined project objectives related to safety, multimodality, and corridor functionality, as shown in **Table 10**. The highest-scoring design concepts effectively "right-size" the roadway while balancing safety, comfort, and curbside access.

The Design-Component Evaluation focuses on the physical attributes of the streetscape, including furnishing and civic infrastructure, multimodal safety, and the design of roadway elements. This method highlights each concept's aesthetic and functional qualities rather than purely performance-driven outcomes.

Table 10. Summary Table: Comparison of Design Concept Rankings

Rank	Performance Measure-Based Evaluation	Design-Component Evaluation
1	Multimodal: Full-Time Curbside Uses on North Curb (+7.8)	Multimodal: Full-Time Curbside Uses on North Curb (+5.3)
2	Public Life: Full-Time Curbside Uses on North Curb (+7.5)	Public Life: Full-Time Curbside Uses on North Curb (+4.8)
3	Monumental: Full-Time Curbside Uses & Median (+7.1)	Monumental: Full-Time Curbside Uses & Median (+4.6)
4	Multimodal: Rush-Hour Curbside Lanes & Median (+6.4)	Multimodal: Rush-Hour Curbside Lanes & Median (+4.6)
5	Public Life: Rush-Hour Curbside Lanes & Median (+6.5)	Public Life: Rush-Hour Curbside Lanes & Median (+3.6)
6	Monumental: Rush-Hour Curbside Lanes (+5.3)	Monumental: Rush-Hour Curbside Lanes (+2.5)

Comparing the Rankings

The rankings from both evaluation methods align in broad trends but differ in their weighting priorities:

- Multimodal concepts with full-time curbside use consistently rank the highest, demonstrating strong functional and physical design performance.
- Public Life concepts excel in physical design evaluations due to wider pedestrian zones and a greater emphasis on public space enhancements.
- Monumental designs with rush-hour restrictions score lower in both evaluations, as they maintain a greater degree of the existing roadway layout while offering incremental improvements.

Conclusion and Implications for Design Selection

The findings confirm that all six design concepts represent a significant improvement over the current roadway, offering valuable enhancements in multimodal safety, pedestrian experience, and streetscape functionality. While full-time curbside access concepts, particularly Multimodal and Public Life approaches, demonstrate the strongest performance across both evaluations, all concepts contribute meaningfully to the avenue's transformation.

At the same time, designs incorporating rush-hour curbside restrictions preserve familiar roadway characteristics while introducing key improvements in multimodal access and public space use. Although they may not provide the same degree of transformation as full-time curbside designs, they offer practical enhancements to the corridor.

By considering insights from both evaluation methodologies, decision-makers can adopt a balanced approach that advances safety, multimodality, and high-quality streetscape elements, ensuring that Independence Avenue SW continues to evolve into a more vibrant, functional, and accessible corridor for all users.



6 Next Steps

With the completion of this study, the next phase of the project involves moving from concept to refined design and eventual implementation. DDOT is expected to take the lead in further refining the design concepts presented in this study. This refinement should be carried out with an urban design lead to ensure that the final design prioritizes pedestrian experience, multimodal functionality, and the integration of public spaces. Additionally, this next phase requires financial commitment from District leadership, which will need to allocate funding for detailed planning and eventual implementation.

6.1 Integration With Ongoing Southwest Area Planning Efforts

This effort aligns well with ongoing activity in the Southwest area, where several projects focused on urban revitalization, multimodal transportation, and infrastructure upgrades are underway. Coordination with these initiatives presents opportunities for a holistic approach that enhances connectivity and maximizes investment in public realm improvements. Key related efforts include:

- **Federal Office Space Realignment**: As federal agencies reconsider their real estate footprints, opportunities may arise to repurpose office spaces and enhance public space along the corridor.
- **Southwest Ecodistrict Plan Implementation**: Building upon previous urban design and infrastructure planning to improve the livability and environmental performance of Southwest Washington.
- **DDOT's Bus Priority Network Enhancements**: Exploring ways to integrate bus priority treatments where feasible along Independence Avenue SW to enhance transit reliability.

6.2 Key Next Steps

1 Pilot Projects and Temporary Installations

Identify opportunities to better coordinate and manage curbside uses along the corridor and develop tactical improvements within the curbs to test key aspects of the proposed designs. Explore pilot projects and temporary interventions to evaluate their effectiveness before full-scale implementation. These efforts could include:

- Installing temporary curb extensions and pedestrian refuge islands to test safety improvements,
- Setting up pop-up public spaces to gauge public reception to new seating and landscaping concepts, and
- Implementing temporary cycle tracks and monitoring usage data.

2 Refining Design Concepts

The design concepts outlined in this study represent a strong starting point but require further refinement based on additional analysis and stakeholder feedback. This includes:

- Conducting feasibility studies to determine the practical implementation of various elements,
- Testing different configurations for curbside uses and multimodal access, and
- Refining streetscape elements to better serve both pedestrians and transit users.

3 Environmental and Cultural Resource Assessments

Given the avenue's historical and cultural significance, further assessments are necessary to ensure that any changes comply with preservation guidelines and environmental standards. This will involve:

- Coordinating with the National Park Service (NPS) and other federal agencies,
- Conducting environmental impact studies on proposed infrastructure changes, and
- Evaluating stormwater management and tree canopy enhancement opportunities to improve long-term resilience.

4 Funding Strategies and Implementation Planning

A critical component of moving forward is securing funding to support project planning and execution. Funding sources may include:

- District capital improvement funds,
- Federal transportation and infrastructure grants, and
- Public-private partnerships that support public realm improvements.

A phased implementation strategy should be developed to ensure that improvements can be delivered in stages as funding becomes available.

5 Coordination with Ongoing Federal and Local Planning Efforts

To maximize investment and efficiency, the next steps must align with concurrent planning efforts, including:

- Coordination with federal agencies that have jurisdiction over portions of Independence Avenue SW,
- Coordination with the Smithsonian Institution building projects, including the Hirshhorn Revitalize Building and Plaza project,
- Consider implications to the changing building uses on the south side of Independence Avenue.
- Alignment with regional transportation initiatives and pedestrian-friendly infrastructure projects, and
- Ensuring that long-term planning supports broader District-wide mobility goals.

6 Stakeholder and Public Engagement to Build Consensus

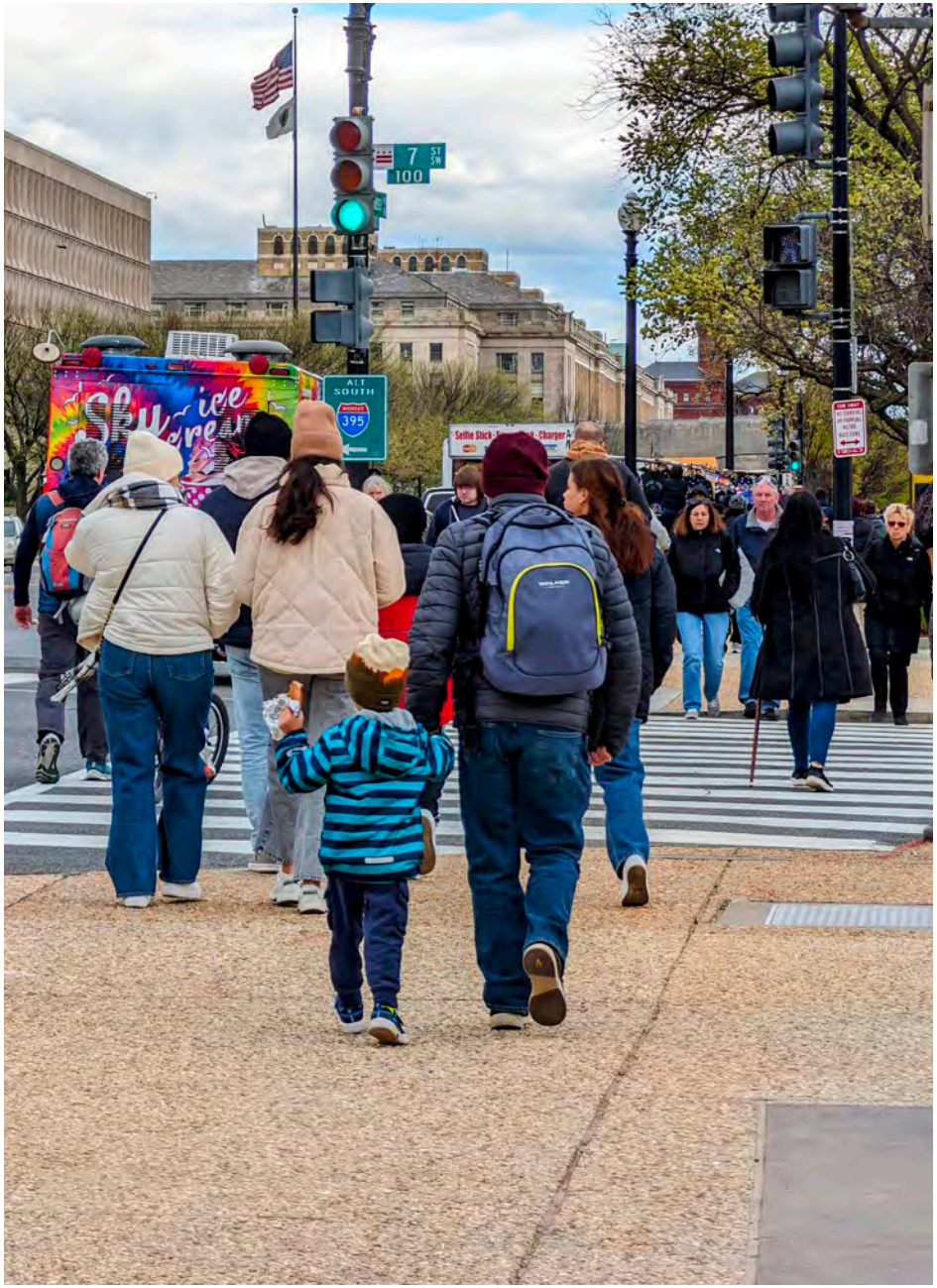
Achieving broad consensus on a preferred design will require continued engagement with stakeholders, residents, and advocacy groups. Steps include:

- Hosting public meetings and open houses to gather additional input,
- Conducting targeted outreach to ensure that the needs of local businesses, residents, and institutions are addressed, and
- Establishing working groups to guide design refinements based on community feedback.

6.3 Moving Toward Implementation

The transformation of Independence Avenue SW is a complex, multi-phase process that requires continued collaboration among government agencies, stakeholders, and the public. The successful implementation of this vision will not only enhance mobility and safety but will also contribute to a more engaging and resilient public space that reflects the evolving needs of Washington, D.C.

The next phase represents a unique opportunity to build upon the groundwork established by this study and take meaningful steps toward creating a reimagined Independence Avenue SW that serves residents, visitors, and institutions alike.



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Appendix A: Traffic Study

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MEMORANDUM

May 3, 2024 Project #: 29234

To: Laura Shipman, AICP
National Capital Planning Commission

CC: District Department of Transportation

From: Caitlin Mildner, AICP; Nemanja Dobrota, PhD; Alek Pochowski, PE

RE: Independence Avenue SW Urban Design – Traffic Operations Memorandum

Introduction

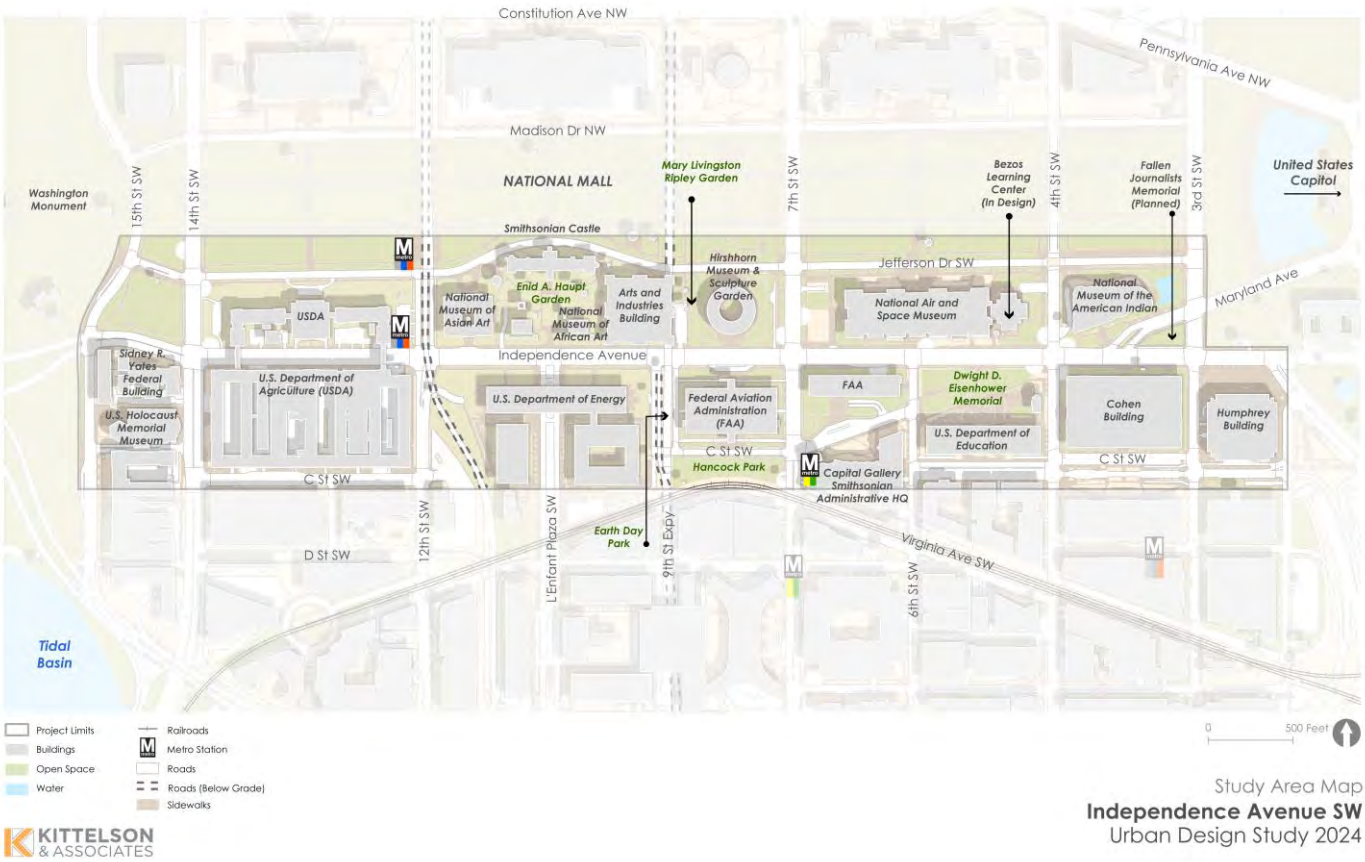
This memorandum documents the Traffic Operations Analysis (Task 1) for the Independence Avenue SW Urban Design Study (Study). This Study builds on a previous effort, the 2023 Independence Avenue SW Corridor Study (previous Corridor Study), which was initiated by the National Capital Planning Commission (NCPC), the Smithsonian Institution (Smithsonian), and the District Department of Transportation (DDOT) and funded through the Metropolitan Washington Council of Governments (MWCOG) Transportation-Land Use Connections (TLC) Program. The last Corridor Study looked at the eight-lane cross-section on Independence Avenue SW between Raoul Wallenberg Place/15th Street SW (hereby referred to as 15th Street SW) to 3rd Street SW, as shown in **Figure 1**. The previous Corridor Study examined the corridor's current state, reviewed previous plans, and identified challenges and opportunities along the corridor. The Corridor Study presented three planning-level concepts that improve multimodal safety and comfort for all users.

This Study uses the multimodal transportation volume data collected during the previous Corridor Study to calculate traffic volume growth rates consistent with Kittelson's understanding of DDOT procedures. Kittelson then applied the growth rates to the weekday morning (AM), weekday evening (PM), and weekend peak hours to develop future-year traffic volumes, as reported in the **Volume Balancing and Forecasting** section.

Using the future-year traffic volumes, Kittelson evaluated anticipated future traffic operations for the following scenarios during the AM, PM, and weekend time periods:

1. Scenario 1 – Future Year Baseline
2. Scenario 2 – Future Year Four-Lane
3. Scenario 3 – Future Year Four-Lane with Mitigation Strategies

Figure 1. Study Area



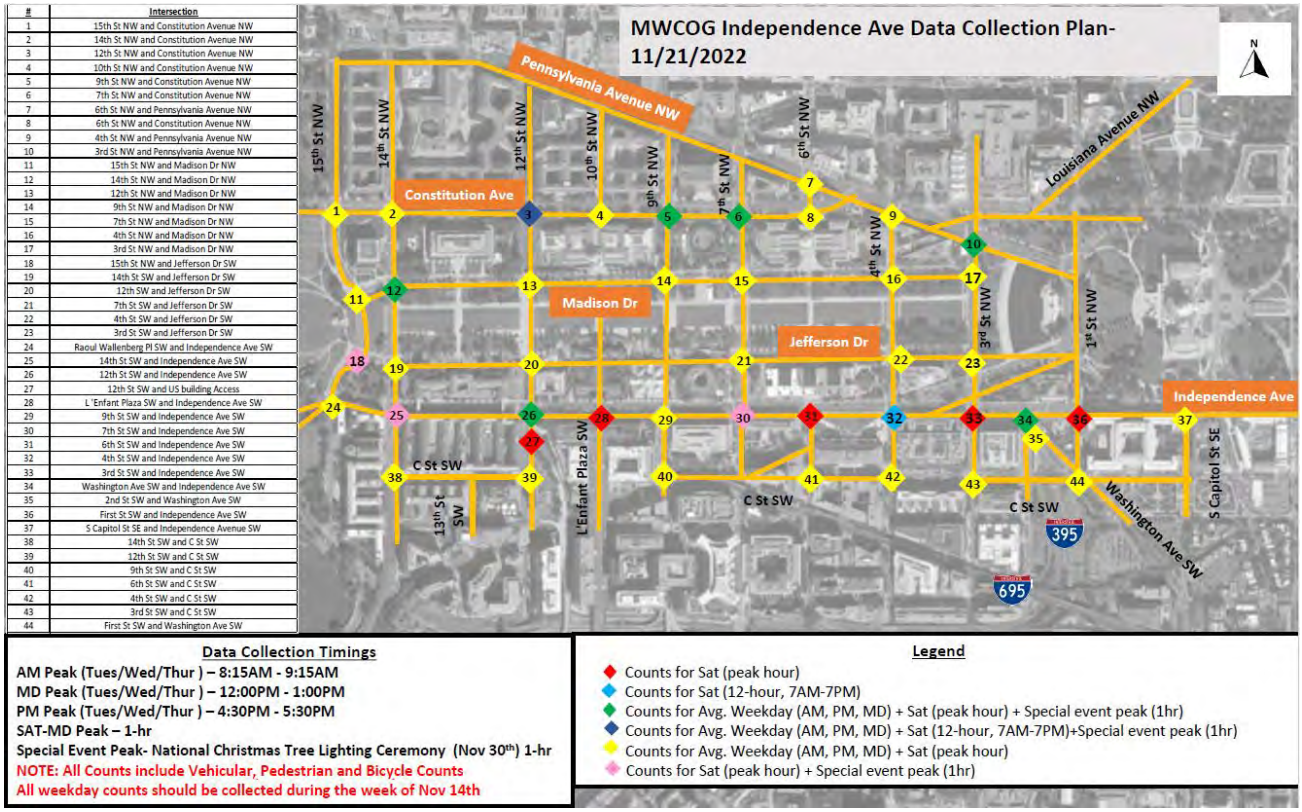
Data Collection

As part of the previous Corridor Study, the team collected peak-hour vehicular volume data in November and December 2022 to understand weekday (November 15, December 7), weekend (November 19, December 3, December 10), and special events (November 30) traffic and circulation patterns. In locations where DDOT had recently collected turning movement data, the previously collected data was utilized instead of collecting new data. No new traffic volume data was collected as part of this study.

Figure 2 shows the locations of the data collection from the previous Study. **Table 1** summarizes the hourly vehicle volumes along Independence Avenue during peak periods.

Appendix A *includes the compiled traffic volume information.*

Figure 2. Data Collection



#	Intersection
1	15th St NW and Constitution Avenue NW
2	14th St NW and Constitution Avenue NW
3	12th St NW and Constitution Avenue NW
4	10th St NW and Constitution Avenue NW
5	9th St NW and Constitution Avenue NW
6	7th St NW and Constitution Avenue NW
7	6th St NW and Pennsylvania Avenue NW
8	6th St NW and Constitution Avenue NW
9	4th St NW and Pennsylvania Avenue NW
10	3rd St NW and Pennsylvania Avenue NW
11	15th St NW and Madison Dr NW
12	14th St NW and Madison Dr NW
13	12th St NW and Madison Dr NW
14	9th St NW and Madison Dr NW
15	7th St NW and Madison Dr NW
16	4th St NW and Madison Dr NW
17	3rd St NW and Madison Dr NW
18	15th St NW and Jefferson Dr SW
19	14th St SW and Jefferson Dr SW
20	12th SW and Jefferson Dr SW
21	7th St SW and Jefferson Dr SW
22	4th St SW and Jefferson Dr SW
23	3rd St SW and Jefferson Dr SW
24	Raoul Wallenberg Pl SW and Independence Ave SW
25	14th St SW and Independence Ave SW
26	12th St SW and Independence Ave SW
27	12th St SW and US building Access
28	L'Enfant Plaza SW and Independence Ave SW
29	9th St SW and Independence Ave SW
30	7th St SW and Independence Ave SW
31	6th St SW and Independence Ave SW
32	4th St SW and Independence Ave SW
33	3rd St SW and Independence Ave SW
34	Washington Ave SW and Independence Ave SW
35	2nd St SW and Washington Ave SW
36	First St SW and Independence Ave SW
37	S Capitol St SE and Independence Avenue SW
38	14th St SW and C St SW
39	12th St SW and C St SW
40	9th St SW and C St SW
41	6th St SW and C St SW
42	4th St SW and C St SW
43	3rd St SW and C St SW
44	First St SW and Washington Ave SW

Table 1. Year 2022 Two-Way Peak One-Hour Vehicle Volumes along Independence Avenue

Peak Period	Two-Way Peak One-Hour Volume	Peak Intersection
AM Weekday Peak	2,703	Independence Avenue and 6th Street SW
Midday Weekday Peak	1,172	Independence Avenue and L'Enfant Plaza SW
PM Weekday Peak	2,685	Independence Avenue and 9th Street SW
Saturday Peak	1,668	Independence Avenue and 9th Street SW
Special Event	1,059	Independence Avenue and 12th Street SW

Volume Balancing and Forecasting

The team used a volume-balancing spreadsheet to organize and balance the collected volume data. The volume balancing procedures considered intersections on Independence Avenue and nearby intersections on adjoining north and south streets and corrected minor discrepancies between newly collected and historical data.

VOLUME BALANCING

The first step to balancing the traffic volumes between intersections consists of reviewing intersections with historical data (provided by DDOT) regarding adjacent intersections with field-collected data from the previous Corridor Study. The project team kept the ratios of turning movement counts from intersections with historical data constant and adjusted volumes proportionally to account for the difference between the subject intersection (with historical data) and the adjacent intersection with field-collected data. This step was performed for each intersection with historical data.

In the second step, the team examined volumes entering and exiting adjacent intersections and corrected discrepancies by increasing volumes at intersections with lower volumes. This ensured a more conservative approach when balancing volumes. While adjusting and increasing volumes, the team made certain that no more than 10% of volumes (compared to the initial volume value) were added for each movement in accordance with industry standards. In some cases, where the difference between entering and exiting volumes continued, volumes were added to intersections with field collection data since changes in volumes at intersections with historical data would further disbalance volumes. Usually, these differences were smaller in magnitude (i.e., several vehicles). The outlined process was used for all analyzed peak hours.

VOLUME FORECASTING

In the previous Corridor Study, the project team reviewed MWCOG's regional Travel Demand Model (TDM) portal to document existing (2021) and projected (2045) population and employment statistics from traffic analysis zones (TAZs) along Independence Avenue. Given the lack of current residential land uses within the study area, there is limited opportunity for population growth along this Study's corridor in the TDM. Employment growth is anticipated across several TAZs, totaling approximately 6,000 additional employees by 2045.

The Smithsonian Institution (SI) is identifying locations for two new museums, the National Museum of the American Latino and the Smithsonian American Women's History Museum. SI identified several potential sites along and adjacent to Independence Avenue. If selected, these new museums would result in increased multimodal demand for Independence Avenue and increased employees and visitors traveling to the new museums. Additionally, the revitalization of the Smithsonian Castle, the Hirshhorn Museum and Sculpture Garden, and the design of the Bezos Learning Center adjacent to the National Air and Space Museum will also contribute to an increase in visitors.

Given the scale of MWCOG's regional TDM and the use of annual adjusted percent growth rates from 2021 to 2045, as shown in **Table 2**, the project team believes these rates include the additional peak-hour multimodal demand resulting from the potential new museums and other proposed developments. According to SI data on museum visitors, museum visits are highest during weekday and weekend hours when traffic is lighter than during weekday peak times. As a result, the proposed developments are not expected to reduce peak-hour network performance.

The study area's current residential population is minimal, as is the expected increase in household population in the TDM. However, trends after the COVID-19 pandemic indicate a desire to rethink the commercial-oriented land uses of areas similar to the office-oriented land uses south of Independence Avenue and provide a mixture of land uses, including more housing and retail. An increase in the area's household population alongside a reduction in office use would likely reduce peak-hour traffic volumes since the peak-hour traffic demand today is predominantly due to area employees driving to work. More households would result in fewer people driving to and from work in the area, and trip generation studies in the District consistently show that new residential units in the District typically result in relatively few new car trips.

Table 2. Percent Growth from 2021 to 2045

Categories	2021	2045	Annual Adjusted Percent Growth
Households	285	610	4.75%
Household Population	492	1,014	4.42%
Total Population	492	1,014	4.42%
Total Employment	48,530	54,821	0.54%
Population + Employment	**49,022**	**55,835**	**0.58%**

The project team used the annual adjusted percent traffic growth rate of 0.58% from 2021 to 2045 to grow traffic volumes in the study area. As shown in the previous corridor study, traffic volumes on Independence Avenue SW have remained relatively stable since at least the early 2000s. In the 1000 block of Independence Avenue (near the 10th Street Promenade), in 2007, daily traffic volumes were 28,839 vehicles per day, which decreased to 25,405 by 2019, representing an annual growth rate of -1.05%. In the 400 block of Independence Avenue, in 2007, daily traffic volumes were 38,630 vehicles per day, which decreased to 32,974 by 2019, representing an annual growth rate of -1.31%. Between 2019 and 2020, daily traffic volumes at both locations on Independence Avenue decreased by 27%, likely due to the COVID-19 pandemic.

The traffic volumes used for the analysis build on historical (pre-pandemic) traffic count data, supplemented by data collected in November 2022. While the November 2022 data had peak-hour volumes that were generally lower than the pre-pandemic traffic count data, the discrepancy in volumes identified during the volume balancing process was within ranges that might be expected with day-to-day fluctuations in traffic volume data. Further, While the lasting effects of the COVID-19 pandemic are unknown, factors like continued

workplace flexibility, transportation costs (gas prices), transit usage, and changes in land use all factor into the lasting effects of the decrease in traffic volumes.

Peak Spreading

Using the peak-hour factor (PHF) helps account for the day-to-day, seasonal, and long-term fluctuations associated with collected traffic count data. The PHF is the ratio of the total peak-hour traffic volume and the peak 15-minute interval volume multiplied by four. The traffic volume during the peak 15-minute interval represents the "maximum rate of flow," which, when multiplied by four, provides the maximum rate of flow or peak traffic demand as an hourly volume, consistent with other evaluation procedures. This means that a roadway's analysis and resulting design are predicated on the worst-case 15 minutes of a typical weekday.

As traffic demand increases on a roadway, the PHF will also increase[1] until it reaches its theoretical maximum demand and experiences uniform traffic volumes throughout the entire hour, represented by a PHF of 1.0. This effect, known as "peak spreading," happens when travelers shift their departure time to the shoulder of the peak period as traffic congestion worsens, resulting in shorter and more consistent travel times. As a result, peaks in the daily distributions of traffic tend to flatten and spread over time, especially in crowded areas[2]. Accounting for peak spreading in the analysis of traffic volumes can be accounted for by using a consistent future-year PHF in the analysis as mandated by many agencies across the United States[3] or by manually "spreading" peak-hour traffic volumes to adjacent hours[4]. Other agencies simplify the analysis by using a PHF of 1.0 when 15-minute forecast demands are not available[5], for instance, when applying traffic volumes from a TDM. Another option that the team used for this analysis is to multiply the PHF by the same growth factor used to grow the traffic volumes (with a maximum PHF of 1.0). This technique accounts for the "peak spreading" effect while accounting for the local context and current and future congestion levels in a manner capable of extending the observed traffic data at a given location to some future year[6].

Traffic Evaporation

The idea of "traffic evaporation[7][8]" is not included in the volume forecasting effort described in this memorandum. Traffic evaporation is the decline in travel demand on a corridor after roadway space reallocation. Several studies have established the long-term impacts of lower traffic volumes, which occur when drivers pick other routes, travel at different times, change their method of transportation, or opt not to make the trip. While this analysis does not account for future changes in travel demand due to the traffic evaporation concept, the results described are likely to overstate the projected 2045 vehicular traffic demand on Independence Avenue, resulting in a "conservative" analysis of future roadway traffic conditions.

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[1] Loudon, W. R., E. R. Ruiter, and M. L. Schlappi. Predicting Peak Spreading Under Congested Conditions. Transportation Research Record 1203, TRB, National Research Council, Washington, D.C., 1988, pp. 1–9.
[2] Allen, W. G., and G. W. Schultz. Congestion-Based Peak Spreading Model. Transportation Research Record 1556, TRB, National Research Council, Washington, D.C., 1996, pp. 8–15.
[3] Barnes, J. Peak Spreading Analysis: Review of Relevant Issues and Synthesis of Current Practice, Phase I. Research Report No. WA-RD 459.1, Washington State Department of Transportation, Olympia, Wash., 1998
[4] Giaimo, G., Congestion Management & Air Quality Analysis [CMAQ] Program Documentation. Ohio Department of Transportation, Division of Transportation Systems Development, Office of Multi-Modal Planning, 2005, pp. 11–12.
[5] https://www.codot.gov/safety/traffic-safety/assets/traffic_analysis_forecasting_guidelines/traffic_analysis_forecasting_guidelines
[6] NCHRP Report 755: Analytical Travel Forecasting Approaches for Project-Level Planning and Design
7 Nello-Deakin, S. (2022). Exploring traffic evaporation: Findings from tactical urbanism interventions in Barcelona. Case studies on transport policy, 10(4), 2430-2442.
[8] Cairns, Sally & Atkins, Stephen & Goodwin, Phil. (2002). Disappearing traffic? The story so far. Municipal Engineer. 151. 13-22. 10.1680/muen.151.1.13.38856.

Model Development

To assess traffic conditions along the study corridor, the project team applied methodologies described in the most recent edition of the HCM (sixth edition) using the Synchro 11 software package. DDOT provided existing Synchro models of the area, and the project team verified and adjusted the roadway geometry and signal timing parameters. The project team evaluated two main measures of effectiveness (MOEs) at the study intersections, which are consistent with the evaluation of intersections in an urban context. These MOEs are:

1. Average delay per vehicle (seconds); and,
2. 95th percentile queue length (feet)

SCENARIO 1 – FUTURE YEAR BASELINE

Scenario 1 – Future Year Baseline includes the existing eight-lane configuration, and existing signal timing plans with future year traffic volumes for AM, PM, and Weekend time periods. The team evaluated average delay and 95th percentile queue lengths from the Synchro 11 analysis reports, as summarized in the following sections. **Table 3** shows results for signalized intersections on Independence Avenue SW.

Appendix B *includes the Analysis Reports.*

AM Peak Hour

The results indicate that most study intersections in Scenario 1 operate at average delays equivalent to a level of service (LOS) of D or better during the AM peak hour. However, some intersection approaches and movements are projected to operate at average delays per vehicle equivalent to LOS E or F, including:

- 14th St SW & Independence Ave SW
  - Southbound left movement (average delay per vehicle of 198.7 sec/veh)
- 12th St SW & Independence Ave SW
  - Westbound left movement (55.2 sec/veh)

PM Peak Hour

The results indicate that most study intersections operate at average delays equivalent to an LOS of C or better during the PM peak hour. One intersection approach and movements are operating at average delays per vehicle equivalent to LOS E:

- 12th St SW & Independence Ave SW
  - Westbound left movement (64.1 sec/veh)

Weekend Peak Hour

The results indicate that all the study intersections operate at average delays equivalent to a LOS of C or better during the Weekend peak hour.

Table 3 summarizes the average delay and 95th percentile queues. In the table, gold **bold** is equivalent to LOS E, red **bold** is equivalent to LOS F, and black **bold** indicates queue lengths longer than available storage.

Table 3. Scenario 1 – Average Delay, V/C, and 95th Percentile Queues by Intersection, reported from Synchro 11

Intersection Information				AM Peak			PM Peak			Weekend Peak		
Intersection (West to East)	Approach	Lane Group	Existing/ Proposed turn-lane lengths	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)
Raoul Wallenberg Pl SW (15th Street SW) & Independence Ave SW	EB	EBL		0.7	285	45.1	0.15	40	48.4	0.17	57	36.8
		EBTR		0.85	488	33.4	0.8	329	42.5	0.72	267	36.1
	EB Approach					35.7			42.7			36.1
	WB	WBL		0.23	m41	32.5	0.37	m49	16.5	0.28	61	22.8
		WBTR		0.7	274	21.2	0.77	24	8.2	0.61	51	16.7
	WB Approach					21.7			8.8			17.3
	NB	NBTR		0.39	174	30.2	0.08	44	17.8	0.19	83	19.5
	NB Approach					30.2			17.8			19.5
	SB	SBLT		0.27	105	26	0.68	381	21	0.39	162	15.2
		SBR		0.1	41	29.7	0.37	m57	50.9	0.34	87	37.2
	SB Approach					26.8			23.3			20.5
	Overall			0.72		31.2	0.8		24.1	0.6		25.8
14th St SW & Independence Ave SW	EB	EBTR	370	0.92	**#390**	22.5	0.62	#305	18.3	0.5	38	7.4
	EB Approach					22.5			18.3			7.4
	WB	WBT		0.47	171	42.4	0.68	245	29.4	0.36	146	31
		WBR	200	0.66	**220**	52.3	0.43	146	27.8	0.23	97	29.7
	WB Approach					45.1			29.2			30.8
	NB	NBT	450	0.83	426	31.6	0.66	274	31	0.66	247	28.6
		NBR	450	0.72	351	33.4	0.78	#339	44.5	0.59	234	30.5
	NB Approach					32			34.1			29
	SB	SBL	270	1.28	**#272**	**198.7**	0.57	112	24.1	0.51	53	26.3
		SBTR		0.22	50	9.8	0.62	70	7.7	0.49	57	7.7
	SB Approach					**59.8**			9.5			9.4
	Overall			1.16		35.8	0.72		22.1	0.61		19.1
12th St SW & Independence Ave SW	EB	EBLTR	960	1.02	m#426	33.2	0.95	m237	37.6	0.61	93	14.1
	EB Approach					33.2			37.6			14.1
	WB	WBL	450	0.54	121	**55.2**	0.87	#337	**64.1**	0.31	28	12
		WBTR	450	0.33	33	5.1	0.44	106	12.5	0.29	0	1.9
	WB Approach					11.7			25.5			2.8
	NB	NBL		0.41	125	34.8	0.34	110	33.2	0.21	55	26.8
		NBT		0.34	146	32	0.33	146	31.7	0.27	98	27
		NBR	140	0.24	101	33.5	0.36	95	15.6	0.14	64	38.4

Intersection Information				AM Peak			PM Peak			Weekend Peak		
Intersection (West to East)	Approach	Lane Group	Existing/ Proposed turn-lane lengths	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)
	NB Approach					33.3			23.5			31.1
	SB	SBLTR		0.07	42	29.2	0.05	33	28.3	0.04	26	25.7
	SB Approach					29.2			28.3			25.7
	Overall			0.8		26.9	0.77		29.9	0.51		12.7
L'Enfant Plaza SW & Independence Ave SW	EB	EBTR		0.63	m69	7	0.49	m72	7.9	0.39	22	2.7
	EB Approach					7			7.9			2.7
	WB	WBLT		0.34	196	15.9	0.45	124	11.3	0.29	95	11.7
	WB Approach					15.9			11.3			11.7
	NB	NBL		0.07	38	32.9	0.25	87	36.1	0.21	86	30.1
		NBR		0.07	33	25.2	0.05	28	24.8	0.14	46	24.3
	NB Approach					27.7			30.9			27.1
	Overall			0.43		10.7	0.41		10.6	0.32		8.2
9th St SW & Independence Ave SW	EB	EBLT		0.62	4	1.3	0.48	1	0.8	0.37	10	1.9
	EB Approach					1.3			0.8			1.9
	WB	WBTR		0.31	33	3	0.38	69	4.4	0.23	65	9
	WB Approach					3			4.4			9
	NB	NBLT		0.1	44	32.8	0.19	71	34.2	0.11	44	28.1
		NBR		0.01	0	45.7	0.04	0	45.3	0.01	0	41.6
	NB Approach					36.9			39.2			31.4
	SB	SBL		0	5	31.4	0	0	31.4	0	0	0
	SB Approach					31.4			31.4			0
	Overall			0.47		2.6	0.42		4.1	0.3		5.8
7th St SW & Independence Ave SW	EB	EBLTR	480	0.74	64	10.6	0.88	67	8.9	0.55	51	4.5
	EB Approach					10.6			8.9			4.3
	WB	WBLTR	450	0.85	246	14.8	0.58	161	26.9	0.47	100	5.4
	WB Approach					14.8			26.9			5.4
	NB	NBL	110	0.15	41	28.3	0.33	79	24.8	0.16	127	21.7
		NBTR		0.31	93	34.7	0.25	79	30.4	0.24		27.8
	NB Approach					33.9			28.9			26.5
	SB	SBL	310	0.54	136	31.4	0.83	#281	46.2	0.49		27.9
		SBTR		0.17	53	30.2	0.4	118	32.4	0.22		27.5
	SB Approach					30.7			37.3			28.2
	Overall			0.73		16.4	0.78		23.1	0.44		11.6
6th St SW & Independence Ave SW	EB	EBTR		0.49	136	12.1	0.46	176	6.7	0.4	75	5
	EB Approach					12.1			6.7			5
	WB	WBLT		0.61	28	4.7	0.33	91	12.9	0.3	89	12.6
	WB Approach					4.7			12.9			12.6
	NB	NBL		0.12	58	28.4	0.26	104	33	0.46	48	32.9
		NBR		0.1	50	28.3	0.33	112	34.7	0		
	NB Approach					28.4			33.9			32.9
	Overall			0.44		9.1	0.42		11	0.43		10
4th St SW & Independence Ave SW	EB	EBLTR	550	0.68	186	24.9	0.75	83	12.9	0.49	83	6.4
	EB Approach					24.9			12.9			7
	WB	WBLTR	180	0.67	35	4.1	0.45	94	10.7	0.3	94	14.3
	WB Approach					4.1			10.7			14.2
	NB	NBL	110	0.2	63	32.6	0.33	87	33.7	0.16	87	29.2
		NBT		0.09	46	30.3	0.1	48	28.2	0.12	48	28.3
		NBR	70	0.07	17	30.1	0.17	48	30	0	48	
	NB Approach					31			30.9			28.7
	SB	SBL	150	0.02	11	29.3	0.36	91	34.6	0.12	91	28.6
		SBT		0.04	22	29.6	0.1	50	28.3	0.21	50	29.8
		SBR	90	0.24	71	33.4	0.21	58	30.9	0	58	
	SB Approach					32.6			32			29.4
	Overall			0.52		15.6	0.56		14.6	0.36		11.9
3rd St SW & Independence Ave SW	EB	EBTR	555	0.5	219	25.6	0.77	#473	12.1	0.61	61	10.8
	EB Approach					25.6			12.1			10.8
	WB	WBLTR		0.84	429	21	0.6	145	21.6	0.39	76	19.1
	WB Approach					21			21.6			19.1
	NB	NBLTR		0.18	51	39.6	0.34	85	42.7	0.2	70	32.5
	NB Approach					39.6			42.7			32.5
	SB	SBL		0.25	62	19.3	0.52	18	10.2	0.08	19	8.2

Intersection Information				AM Peak			PM Peak			Weekend Peak		
Intersection (West to East)	Approach	Lane Group	Existing/ Proposed turn-lane lengths	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)
		SBTR		0.39	156	21.3	0.57	262	10	0.22	45	9.7
	SB Approach					20.3			10.1			9.1
	Overall			0.68		23.1	0.69		15.6	0.39		14
	EB	EBLT		0.4	45	2.6	0.79	95	6.6	0.29	8	1.1
	EB Approach					2.6			6.6			1.1
First St SW & Independence Ave SW	WB	WBTR		0.68	378	19.7	0.41	184	16.9	0.28	115	17.8
	WB Approach					19.7			16.9			17.8
	NB	NBLTR		0	0	31.3	0	0	0	0	0	0
	NB Approach					31.3			0			0
	Overall			0.47		12.7	0.61		9.6	0.21		7
	EB	EBL		0.25	m84	50.5	0.26	m48	18.1	0.15	15	6.9
		EBT		0.05	m30	47.8	0.06	m18	19.4	0.05	m10	7.3
	EB Approach					49.8			18.4			7.1
	WB	WBLTR		0.41	136	38.8	0.32	116	33.4	0.37	131	28.7
Maryland Ave & 3rd St SW	WB Approach					38.8			33.4			28.7
	NB	NBLTR		0.14	m62	23.8	0.1	38	19.9	0.09	m40	22.2
	NB Approach					23.8			19.9			22.2
	SB	SBTR		0.18	64	12.3	0.42	163	19.8	0.16	54	18.3
	SB Approach					12.3			19.8			18.3
	Overall			0.25		24.2	0.37		20.9	0.23		19.7

m - Volume for the 95th percentile queue is metered by upstream signal.
- The 95th percentile volume exceeds capacity, so the queue may be longer.
Gold **Bold** is equivalent to LOS E. Red **Bold** is equivalent to LOS F. Black **Bold** indicates queue lengths longer than available storage.

SCENARIO 2 – FUTURE YEAR FOUR-LANE

Scenario 2 – Future Year Four-Lane includes a proposed four-lane configuration with existing signal timing plans and future year traffic volumes for AM, PM, and Weekend time periods. **In this scenario, the cross-section of Independence Avenue changes from four lanes per direction to two lanes per direction without changes to existing left or right-turning movements.** Where exclusive left or right turn lanes exist in the existing conditions, Scenario 2 includes 200 ft pocket lanes. Where left-turns or right-turns are conducted from a shared through lane in the existing conditions, Scenario 2 maintains these shared turning lanes (i.e., only exclusive through lanes are "removed" from four-lane sections). In this proposed scenario, no changes in the geometry of the side streets were made.

In addition to the proposed geometric modification, several signal-timing-related modifications were made to mitigate traffic congestion, including:

- Adjusting signal timing splits within existing cycle lengths of 110 seconds for the AM and PM peak hours and 100 seconds for the Weekend peak hour.
- Modifying pedestrian clearance time for movements crossing Independence Avenue due to reduced crossing distances resulting from narrowing the travel lanes from four lanes to two lanes per direction.

When it comes to pedestrian clearance time, which consists of WALK and FLASHING DON'T WALK (FDW) intervals, a reduction of FDW provided time for people crossing the road (WALK + FDW) that is higher than the time needed to cross all traveling lanes with an assumed speed of 3.5 ft/s. **Table 4** shows some examples of changes in FDW intervals. No changes were made to existing Leading Pedestrian Interval (LPI) timings. Please note that not all intersections needed changes to FDW due to acceptable operational performance.

Table 4. Proposed modifications to FDW intervals

Intersection	Scenario 1				Scenario 2			
	# of lanes (width in feet)	WALK (sec.)	FDW (sec.)	Total PED time (sec.)	# of lanes (width in feet)	WALK (sec.)	FDW (sec.)	Total PED time (sec.)
12th St SW & Independence Ave SW	8 (80')	1	21	22	5 (50')	1	13	14
9th St SW & Independence Ave SW	8 (80')	5	20	25	4 (40')	5	10	15
7th St SW & Independence Ave SW	8 (80')	4	19	23	4 (40')	4	9	13
4th St SW & Independence Ave SW	8 (80')	0	19	19	4 (40')	0	12	12

It is important to note that in some instances, proposed signal timing changes bring operational benefits not only to movements along Independence Avenue but also to side street traffic.

The following sections summarize the results from the Synchro 11 analysis reports. **Table 5** shows results for signalized intersections on Independence Avenue SW.

Appendix C *includes the Analysis Reports.*

AM Peak Hour

The results indicate that most study intersections operate at average delays equivalent to a LOS of D or better during the AM peak hour. However, some intersections or intersection approaches and movements are operating at average delays per vehicle equivalent to LOS E or F:

- 12th St SW & Independence Ave SW (average delay per vehicle of 124.1 sec/veh)
  - Eastbound approach (198.8 sec/veh)
  - Westbound left (56.2 sec/veh)
- 7th St SW & Independence Ave SW (104.6 sec/veh)
  - Eastbound approach (196 sec/veh)
  - Southbound left movement (95.2 sec/veh)
- 14th St SW & Independence Ave SW (53.8 sec/veh)
  - Eastbound approach (74.8 sec/veh)
  - Northbound approach (61.5 sec/veh)
  - Southbound left movement (76.5 sec/veh)
- 4th St SW & Independence Ave SW (41.8 sec/veh)
  - Westbound approach (71.1 sec/veh)
  - Northbound left (55.7 sec/veh)
  - Southbound right (61.3 sec/veh)

These results indicate that the proposed lane reduction impacts traffic operations primarily at the intersections of Independence Avenue at 12th Street SW and 7th Street SW. For the intersection of 12th Street & Independence Avenue SW, although the reported average delays per vehicle are equivalent to a LOS of F, the 95th percentile queue lengths reported are within the available storage, as shown in **Table 5**. In other words, even though vehicles experience more waiting time, accumulated queues are not spilling back to upstream intersections. They are not blocking adjacent crosswalks or impacting the traffic operations at nearby intersections. At the 7th Street & Independence Avenue SW intersection, reported queues are beyond available storage. This indicates that the project team should take a closer look at this intersection in the development of Scenario 3 and during the development of potential corridor concepts.

Compared to the results from Scenario 1, the northbound approach at the 14th Street & Independence Avenue SW intersection is projected to experience queues longer than available storage. Additionally, westbound movements at the 4th Street & Independence Avenue SW intersection experience projected queues longer than available storage. Other locations along the corridor that operate at average delays equivalent to a LOS of E are not projected to experience queueing issues.

PM Peak Hour

The results indicate that most study intersections operate at average delays equivalent to a LOS of D or better during the AM peak hour. However, some intersections or intersection approaches/movements are operating at average delays per vehicle equivalent to LOS E or F, including:

- 12th St SW & Independence Ave SW (average delay per vehicle of 62.1 sec/veh)
  - Eastbound approach (72.9 sec/veh)
  - Westbound left (186.6 sec/veh)
- 7th St SW & Independence Ave SW (76.4 sec/veh)
  - Eastbound approach (72.1 sec/veh)
  - Westbound approach (68.2 sec/veh)
  - Southbound left movement (201.4 sec/veh)
- 4th St SW & Independence Ave SW (55.4 sec/veh)
  - Eastbound approach (76.3 sec/veh)
- 14th St SW & Independence Ave SW (30.5 sec/veh)
  - Westbound approach (69.5 sec/veh)
- 3rd St SW & Independence Ave SW (42.4 sec/veh)
  - Eastbound approach (63.3 sec/veh)

The eastbound movements at the 12th Street & Independence Avenue SW intersection are projected to have 95th percentile queue lengths within the available storage, as shown in **Table 5**. However, the 95th percentile queues are projected to exceed available storage for the westbound left-turn movement. The adjacent through movement in the westbound direction operates well below capacity, so these occasional queue spillbacks from the westbound left-turn pocket lane are not critical concerns. For the 7th Street & Independence Avenue SW intersection, although lower average delays per vehicle at the intersection level

were reported compared to the AM peak hour (from 104.6 sec/veh to 76.4 sec/veh), expected 95th percentile queues exceed available storage lengths. Lastly, for the intersection of 4th Street & Independence Avenue SW, queueing results indicate that reported expected 95th percentile queues exceed available storage lengths.

For movements at the intersections of Independence Avenue at 14th Street SW and 3rd Street SW, the average delay per vehicle is equivalent to an LOS of E. Still, the expected 95th percentile queues are within available storage lengths, indicating these movements are not likely to have operational challenges.

Weekend Peak Hour

The results indicate that most study intersections operate at average delays equivalent to a LOS of D or better during the Weekend peak hour. One intersection approach and movement operates at average delays per vehicle equivalent to LOS E:

- 12th St SW & Independence Ave SW (average delay per vehicle of 40.7 sec/veh)
  - Eastbound approach (66.6 sec/veh)

As shown, the average delay per vehicle is equivalent to an LOS of E. Still, the expected 95th percentile queues are within available storage lengths, indicating these movements are not likely to have operational challenges.

Table 5. Scenario 2 – Average Delay and 95th Percentile Queues by Intersection, reported from Synchro 11

Intersection Information				AM Peak			PM Peak			Weekend Peak		
Intersection (West to East)	Approach	Lane Group	Existing/ Proposed turn-lane lengths	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)
Raoul Wallenberg Pl SW (15th Street SW) & Independence Ave SW	EB	EBL		0.65	271	42.2	0.15	40	48.4	0.17	57	36.8
		EBTR		0.81	457	30.4	0.8	329	42.5	0.72	267	36.1
	EB Approach					32.7			42.7			36.1
	WB	WBL	200	0.22	m19	25.7	0.37	m32	16.3	0.28	m47	24.4
		WBTR		0.66	31	12.1	0.77	m34	6.6	0.61	61	18.5
	WB Approach					12.6			7.3			19.2
	NB	NBTR		0.4	174	31.8	0.08	44	17.8	0.19	83	19.5
	NB Approach					31.8			17.8			19.5
	SB	SBLT		0.27	105	27.5	0.68	381	21	0.39	162	15.2
		SBR		0.09	39	28.8	0.37	m57	50.9	0.34	87	37.2
	SB Approach					27.8			23.3			20.5
	Overall			0.7		27.4	0.8		23.5	0.6		26.5
14th St SW & Independence Ave SW	EB	EBTR	370	1.12	**#641**	**74.8**	0.83	#122	18.1	0.72	54	12.9
	EB Approach					**74.8**			18.1			12.9
	WB	WBT	950	0.61	194	24.5	0.96	#454	**73.6**	0.51	218	29.3
		WBR	200	0.56	167	27.2	0.43	174	47.2	0.23	97	24.5
	WB Approach					25.2			**69.5**			28.6
	NB	NBT	450	1.02	**#525**	**62.9**	0.66	274	31	0.66	247	28.6
		NBR	450	0.88	#435	**55.9**	0.78	#339	44.5	0.59	234	30.5
	NB Approach					**61.5**			34.1			29
	SB	SBL	270	0.91	#222	**76.5**	0.57	112	24.1	0.51	53	26.3
		SBTR			43	10.5		70	7.7		57	7.7
	SB Approach					27.9			9.5			9.4
	Overall			1.02		53.8	0.82		30.5	0.71		19.8
12th St SW & Independence Ave SW	EB	EBLTR	960	1.4	m#445	**198.8**	1.1	#657	**72.9**	1.08	#558	**66.6**
	EB Approach					**198.8**			**72.9**			**66.6**
	WB	WBL	200	0.73	m#108	**56.2**	1.3	**m#304**	**186.6**	0.33	28	15.6
		WBTR	450	0.41	138	14.5	0.55	m304	16.9	0.41	3	1.4
	WB Approach					20			**59.6**			2.8

Intersection Information				AM Peak			PM Peak			Weekend Peak		
Intersection (West to East)	Approach	Lane Group	Existing/ Proposed turn-lane lengths	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)
	NB	NBL		0.54	134	48.4	0.49	124	46.2	0.25	57	30.6
		NBT		0.49	159	43.6	0.46	162	42	0.32	103	30.7
		NBR	140	0.32	114	47.4	0.55	**226**	47.6	0.11	58	50.4
	NB Approach					46.3			45.7			37.9
	SB	SBLTR		0.1	47	37.4	0.07	37	35.3	0.05	27	28.7
	SB Approach					37.4			35.3			28.7
	Overall			1.16		**124.1**	1.16		**62.1**	0.86		40.7
L'Enfant Plaza SW & Independence Ave SW	EB	EBTR		1.09	m121	52.9	0.85	m468	18.5	0.7	m63	6.5
	EB Approach					52.9			18.5			6.5
	WB	WBLT		0.68	m108	17.2	0.86	521	34.2	0.4	34	4
	WB Approach					17.2			34.2			4
	NB	NBL		0.06	37	32.9	0.27	89	38.1	0.21	86	30.1
		NBR		0.07	32	25.1	0.05	29	26.2	0.14	46	24.3
	NB Approach					27.6			32.6			27.1
	Overall			0.75		39.9	0.72		26.5	0.51		7.6
9th St SW & Independence Ave SW	EB	EBLT		0.89	m6	3.9	0.87	m6	3.8	0.68	15	3
	EB Approach					3.9			3.8			3
	WB	WBTR		0.48	m36	1.8	0.69	367	15.2	0.42	136	10
	WB Approach					1.8			15.2			10
	NB	NBLT		0.16	48	42.2	0.19	71	34.2	0.11	44	28.1
		NBR		0.01	0	46.6	0.04	0	45.3	0.01	0	41.6
	NB Approach					43.6			39.2			31.4
	SB	SBL		0.01	6	39.4	0	0	0	0	0	0
	SB Approach					39.4			31.4			0
	Overall			0.77		3.8	0.71		10.8	0.51		6.8
7th St SW & Independence Ave SW	EB	EBLTR	480	1.37	**#898**	**196**	1.09	**#657**	**72.1**	0.95	#148	25.1
	EB Approach					**196**			**72.1**			25.1
	WB	WBLTR	450	1.03	m#210	25.1	1.03	**#542**	**68.2**	0.69	248	16.8
	WB Approach					25.1			**68.2**			16.8
	NB	NBL	110	0.22	51	39.1	0.52	100	42.4	0.17	46	21.8
		NBTR		0.54	105	48.1	0.5	94	45.2	0.16	49	26.7
	NB Approach					47			44.4			25.7
	SB	SBL	310	0.94	#230	**95.2**	1.3	**#351**	**201.4**	0.49	117	27.9
		SBTR		0.34	63	44.9	0.77	#157	53.5	0.22	52	27.4
	SB Approach					**67.5**			**106.7**			27.6
	Overall			1.31		**104.6**	1.18		**76.4**	0.59		23.2
6th St SW & Independence Ave SW	EB	EBTR		0.75	m171	11.9	0.84	529	21.3	0.59	286	8.9
	EB Approach					11.9			21.3			8.9
	WB	WBLT		1.02	m298	29.7	0.59	m116	9.8	0.44	143	13.2
	WB Approach					29.7			9.8			13.2
	NB	NBL		0.14	61	34.8	0.26	104	33	0.17	47	26
		NBR		0.13	53	34.7	0.33	112	34.7	0.22	0	27.5
	NB Approach					34.7			33.9			26.7
	Overall			0.78		21.1	0.68		18.1	0.46		11.9
4th St SW & Independence Ave SW	EB	EBLTR	550	0.87	43	10.4	1.12	#845	**76.3**	0.77	#362	12.6
	EB Approach					10.4			**76.3**			12.6
	WB	WBLTR	180	1.06	**#726**	**71.1**	0.89	**#264**	27.9	0.45	110	16.8
	WB Approach					**71.1**			27.9			16.8
	NB	NBL	110	0.44	72	**55.7**	0.42	96	42.6	0.16		29.1
		NBT		0.17	52	43.9	0.12	53	33.8	0.08	35	27.6
		NBR	70	0.07	16	42.6	0.19	58	36	0.03		27.1
	NB Approach					47.2			37.7			28.1
	SB	SBL	150	0.04	13	41.9	0.46	100	44.3	0.12	19	28.5
		SBT		0.07	24	42.2	0.13	55	33.9	0.07	45	27.6
		SBR	90	0.52	#87	**61.3**	0.27	63	38	0.14		28.8
	SB Approach					**57.2**			39.9			28.4
	Overall			0.95		41.8	0.9		**55.4**	0.51		15.8
3rd St SW & Independence Ave SW	EB	EBLTR	550	0.82	m535	36.7	1.11	m#337	63.3	0.87	m37	20.8
	EB Approach					36.7			**63.3**			20.8
	WB	WBLTR		0.79	389	19.5	0.74	210	20.3	0.56	3	21.3
	WB Approach					19.5			20.3			21.3

Intersection Information				AM Peak			PM Peak			Weekend Peak		
Intersection (West to East)	Approach	Lane Group	Existing/ Proposed turn-lane lengths	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)
	NB	NBLTR		0.16	48	39.5	0.32	84	41.6	0.1		30.7
	NB Approach					39.5			41.6			30.7
	SB	SBL		0.23	58	19.1	0.73	152	24.2	0.08		8.2
		SBTR		0.35	145	20.6	0.75	#332	25.9	0.22		9.7
	SB Approach					19.8			24.9			9.1
	Overall			0.65		26.6	0.99		42.4	0.51		19.6
First St SW & Independence Ave SW	EB	EBLT		0.37	115	9	0.79	86	5.8	0.41	m11	1.8
	EB Approach					9			5.8			1.8
	WB	WBTR		0.63	338	18.6	0.41	184	16.9	0.28	131	17.8
	WB Approach					18.6			16.9			17.8
	NB	NBLTR		0	0	31.3	0	0	0	0	m27	0
	NB Approach					31.3			0			0
	Overall			0.44		14.7	0.61		9	0.29		7.4
Maryland Ave & 3rd St SW	EB	EBL		0.23	m54	28.2	0.26	m35	20.6	0.15		11.2
		EBT		0.05	m18	23.9	0.06	m14	20.7	0.05	336	11.7
	EB Approach					27.2			20.6			11.4
	WB	WBLTR		0.37	125	37.8	0.32	116	33.4	0.37	270	28.7
	WB Approach					37.8			33.4			28.7
	NB	NBLTR		0.12	m65	25.2	0.1	m31	19.5	0.06		21.1
	NB Approach					25.2			19.5			21.1
	SB	SBTR		0.17	58	12.2	0.42	163	19.8	0.16		18.3
	SB Approach					12.2			19.8			18.3
	Overall			0.23		21.9	0.37		21.1	0.24		20.2

m - Volume for the 95th percentile queue is metered by upstream signal.
- The 95th percentile volume exceeds capacity, so the queue may be longer.
Gold **Bold** is equivalent to LOS E. Red **Bold** is equivalent to LOS F. Black **Bold** indicates queue lengths longer than available storage.

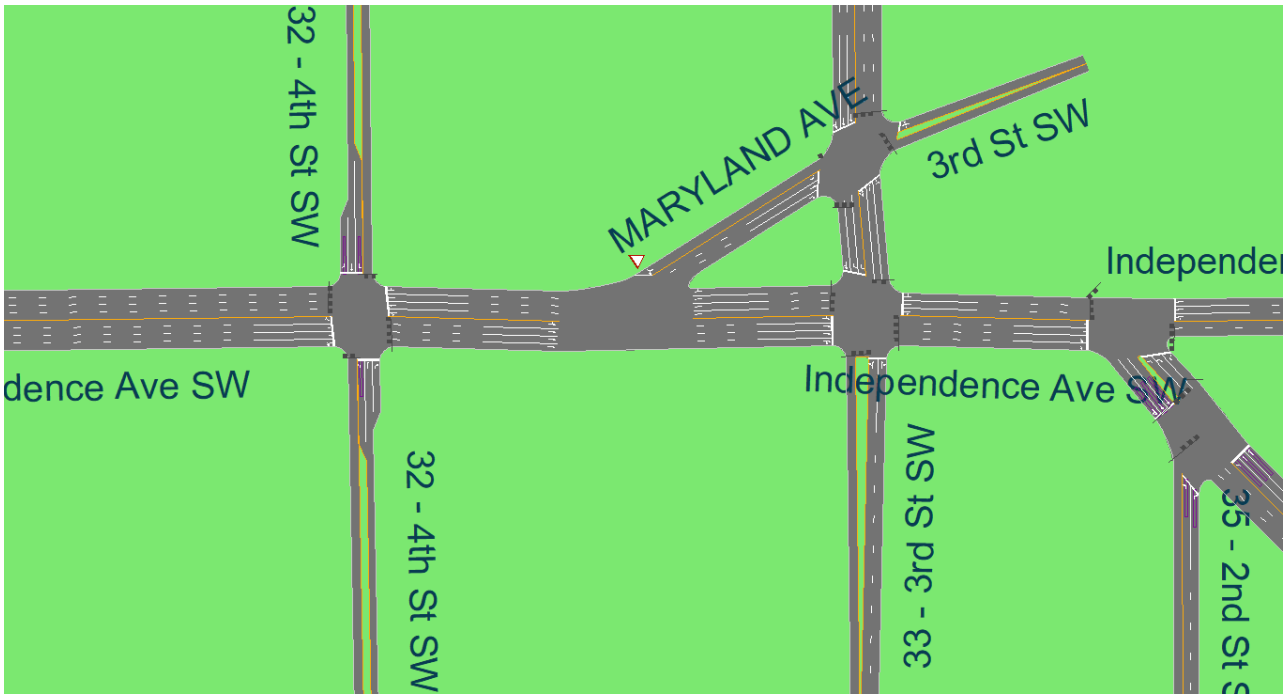
SCENARIO 3 – FUTURE YEAR FOUR-LANE WITH MITIGATION STRATEGIES

This scenario was developed to mitigate the operational challenges of the movements outlined in Scenario 2. Capacity improvements were explored to improve operations at intersections, with reported average delays per vehicle equivalent to LOS E and LOS F, along with the "soft" signal-timing-related modifications implemented in Scenario 2. The following lists the strategies used to improve traffic conditions:

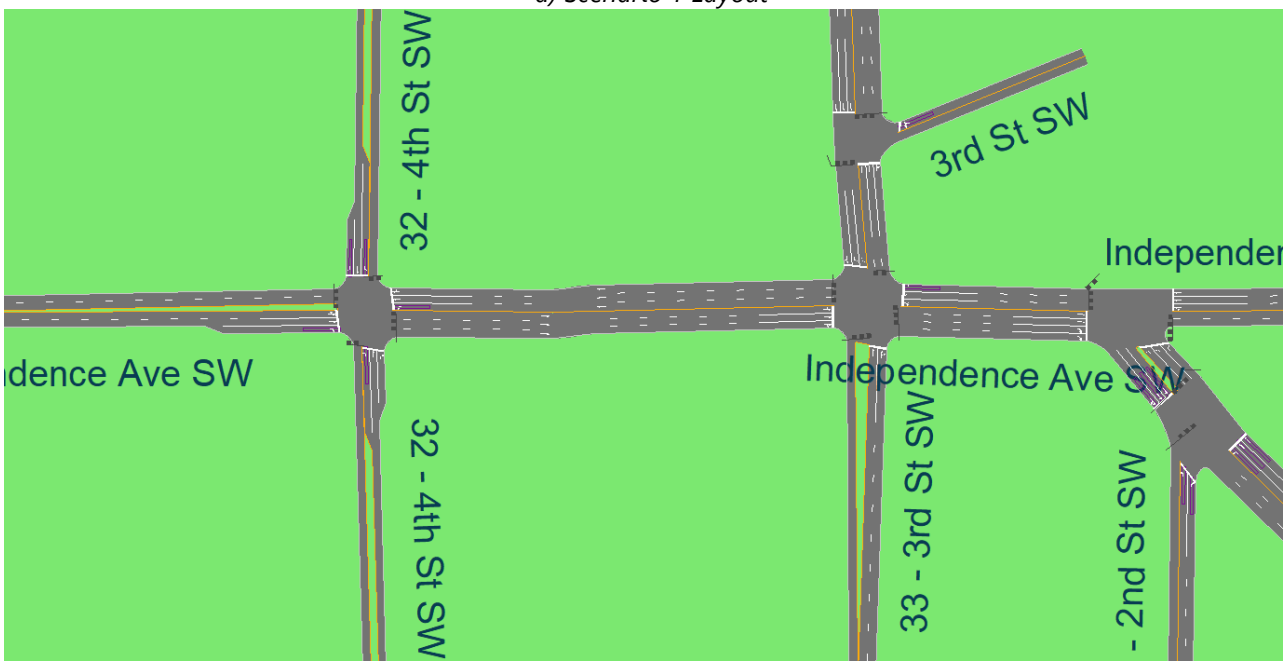
- At 14th St SW & Independence Ave SW:
  - For the Southbound direction, reconfigure the approach to include a double left turn lane.
  - Add an eastbound right-turn pocket lane with a 150-foot storage length.
- At 12th St SW & Independence Ave SW:
  - Add an eastbound left-turn pocket lane with a 150-foot storage length.
- At 7th St SW & Independence Ave SW:
  - Add an eastbound left-turn lane.
  - Reconfigure the southbound approach to include a double left-turn lane.
  - Add a westbound right-turn pocket lane with a 150-foot storage length.
- At 4th St SW & Independence Ave SW:

- Add an eastbound right turn pocket lane with a 150-foot storage length.

Remove the segment of Maryland Avenue from 3rd Street to Independence Avenue SW and redistribute vehicle volumes, as shown in **Figure 3**.



a) Scenario 1 Layout



b) Scenario 3 Layout

Figure 3. Proposed modifications to the intersection of Independence Avenue and Maryland Avenue SW

Additionally, the team adjusted signal timings (i.e., green splits) across most intersections. Scenario 3 ensures that the reduction in the Flashing Don't Walk (FDW) pedestrian interval was conducted properly and that No Turn On Red is not permitted throughout the network.

The proposed measures aim to mitigate traffic impacts resulting from the proposed lane narrowing from eight to four lanes. Results from the Scenario 3 operational analysis are summarized in **Table 6**.

AM Peak Hour

The results indicate that most study intersections operate at average delays equivalent to a LOS of D or better during the AM peak hour. However, some intersections or intersection approaches and movements are operating at average delays per vehicle equivalent to LOS E:

- 14th St SW & Independence Ave SW
  - Northbound approach (average delay per vehicle of 61.5 sec/veh)
- 12th St SW & Independence Ave SW
  - Westbound left movement (72.3 sec/veh)
- 4th St SW & Independence Ave SW
  - Northbound left movement (55.7 sec/veh)
  - Northbound right movement (60 sec/veh)
  - Southbound approach (57.2 sec/veh)

The northbound through movement at Independence Avenue SW & 14th Street SW is the only movement with a queue length longer than the available storage and a v/c ratio indicating conditions at capacity. Scenario 3 does not propose mitigation strategies as congestion and vehicular delay are expected due to the intersection's proximity to the 14th Street Bridge and access-controlled conditions.

PM Peak Hour

The results indicate that most study intersections operate at average delays equivalent to a LOS of D or better during the AM peak hour. However, some intersections or intersection approaches and movements are operating at average delays per vehicle equivalent to LOS E or F:

- 12th St SW & Independence Ave SW
  - Westbound left movement (68.2 sec/veh)
- 7th St SW & Independence Ave SW
  - Westbound right movement (133.1 sec/veh)
  - Southbound approach (57.2 sec/veh)
- 4th St SW & Independence Ave SW
  - Southbound left movement (55.5 sec/veh)
- 3rd St SW & Independence Ave SW
  - Southbound approach (88.6 sec/veh)

The only movement operating as critical (high delay, queue length longer than storage, and a v/c ratio >1.0) is the southbound approach at 3rd Street SW. This results from increased demand due to additional rerouted traffic from the removed segment of Maryland Avenue SW. However, this movement's demand is expected to normalize as drivers adjust routes due to the removal of the Maryland Avenue SW segment. Alternatively, adjusting the southbound approach lane configuration to provide a right-turn-only lane is possible. While this change addresses the operational issues, it is undesirable in a roadway environment that seeks to improve the comfort and safety of people walking and biking.

It is worth noting that the high delay reported for the westbound right movement at 7th Street SW can be attributed to Synchro's limitations (general HCM method)[9] to estimate delays for short turn pocket lanes accurately and considering reported values for queue lengths and the v/c ratio it is indicative that no operational challenges exist for this movement.

Weekend Peak Hour

The results indicate that all the study intersections operate at average delays equivalent to a LOS of C or better during the Weekend peak hour, as shown in Table 6.

Table 6. Scenario 3 – Average Delay, V/C, and 95th Percentile Queues by Intersection, reported from Synchro 11

Intersection Information				AM Peak			PM Peak			Weekend Peak		
Intersection (West to East)	Approach	Lane Group	Existing/ Proposed turn-lane lengths	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)
Raoul Wallenberg Pl SW & Independence Ave SW	EB	EBL		0.65	271	42.2	0.15	40	48.4	0.17	57	36.8
		EBTR		0.81	457	30.4	0.8	329	42.5	0.72	267	36.1
	EB Approach					32.7			42.7			36.1
	WB	WBL	200	0.22	m22	24.1	0.37	m39	16.6	0.28	m45	24
		WBTR		0.71	40	14.4	0.77	m35	6	0.61	61	18.2
	WB Approach					14.9			6.8			18.8
	NB	NBTR		0.41	179	32.1	0.08	44	17.8	0.19	83	19.5
	NB Approach					32.1			17.8			19.5
	SB	SBLT		0.27	105	27.5	0.68	381	21	0.39	162	15.2
		SBR		0.09	39	28.8	0.37	m57	50.9	0.34	87	37.2
	SB Approach					27.8			23.3			20.5
	Overall			0.71		27.9	0.80		23.3	0.6		26.4
14th St SW & Independence Ave SW	EB	EBT	370	1.04	**#586**	42	0.67	111	13.3	0.65	51	10.6
		EBR	150	0.12	m6	4.9	0.15	m19	12.8	0.17	m10	6.4
	EB Approach					40.6			13.2			10.2
	WB	WBT	950	0.56	228	30.2	0.86	#414	52.2	0.51	217	29.3
		WBR	200	0.55	207	33	0.38	170	38	0.23	97	24.5
	WB Approach					31			50			28.6
	NB	NBT	450	1.02	**#525**	**62.9**	0.66	274	31	0.66	247	28.6
		NBR	450	0.88	#435	**55.9**	0.78	#339	44.5	0.59	234	30.5
	NB Approach					**61.5**			34.1			29
	SB	SBL	270	0.5	56	34.4	0.38	23	16.9	0.26	15	14.6
		SBTR	270	0.35	65	11.5	0.98	**#693**	31.7	0.72	83	11.7
	SB Approach					17.5			30			11.9
	Overall			0.94		44.3	0.94		32.6	0.74		20
	EB	EBL	150	0.41	95	17.3	0.52	m72	28.9	0.6	m54	20.7

[9] Leidos and University of Florida. 2022. Highway Capacity Manual Reference Guide. FHWA-HOP-14-037

Intersection Information				AM Peak			PM Peak			Weekend Peak		
Intersection (West to East)	Approach	Lane Group	Existing/ Proposed turn-lane lengths	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)
12th St SW & Independence Ave SW		EBTR	960	1.01	#764	48	0.96	#554	41.1	0.69	151	14.5
	EB Approach					45.8			40.2			15.3
	WB	WBL	450	0.87	#148	**72.3**	0.92	m#261	**68.2**	0.28	15	7.5
		WBTR	450	0.42	145	9	0.56	113	5.1	0.41	3	1.4
	WB Approach					17.4			21			2
	NB	NBL		0.49	129	43.5	0.49	124	46.1	0.25	57	30.6
		NBT		0.44	155	40.1	0.46	163	41.9	0.32	103	30.7
		NBR	140	0.43	168	42.1	0.43	118	23.1	0.11	58	50.4
	NB Approach					41.7			32.8			37.9
	SB	SBLTR		0.11	51	35.4	0.07	37	35.3	0.05	27	28.7
	SB Approach					35.4			35.3			28.7
	Overall			0.89		36.9	0.89		30.6	0.6		14
L'Enfant Plaza SW & Independence Ave SW	EB	EBTR		0.9	631	25.2	0.79	m236	15.8	0.7	38	4.3
	EB Approach					25.2			15.8			4.3
	WB	WBLT		0.63	m340	15.4	0.85	120	14.1	0.4	34	4.1
	WB Approach					15.4			14.1			4.1
	NB	NBL		0.09	40	39.8	0.28	90	39.2	0.21	86	30.1
		NBR		0.09	38	34.2	0.05	32	29.8	0.14	46	24.3
	NB Approach					35.9			34.8			27.1
	Overall			0.71		22.2	0.72		16	0.51		6.4
9th St SW & Independence Ave SW	EB	EBLT		0.89	m6	3.8	0.87	m7	3.9	0.68	15	3
	EB Approach					3.8			3.9			3
	WB	WBTR		0.48	34	1.7	0.69	m500	13.4	0.42	111	9.3
	WB Approach					1.7			13.4			9.3
	NB	NBLT		0.16	48	42.2	0.19	71	34.2	0.11	44	28.1
		NBR		0.01	0	46.6	0.04	0	45.3	0.01	0	41.6
	NB Approach					43.6			39.2			31.4
	SB	SBL		0.01	6	39.4	0			0		
	SB Approach					39.4			31.4			0
	Overall			0.77		3.7	0.71		10	0.51		6.5
7th St SW & Independence Ave SW	EB	EBL	480	0.67	m82	31.2	0.63	m99	46.1	0.54	m28	11.1
		EBTR	480	0.67	m140	8.1	0.69	402	31.1	0.53	0	1
	EB Approach					11.6			32.7			2.7
	WB	WBLT	450	0.75	m137	7.6	0.77	424	31.7	0.56	122	12.9
		WBR	150	0.8	m114	11	0.15	m39	**133.1**	0.56	99	50
	WB Approach					8.5			40.3			18.5
	NB	NBL	110	0.2	50	36.9	0.5	96	42.2	0.17	46	21.9
		NBTR		0.54	105	48.1	0.52	97	47.1	0.16	49	26.7
	NB Approach					46.7			45.7			25.7
	SB	SBL	310	0.46	76	40.6	0.57	124	34.2	0.28	54	22.7
		SBTR		0.59	111	52	0.92	#270	**70.1**	0.32	81	29.1
	SB Approach					46.9			**57.2**			26.8
	Overall			0.72		17.3	0.78		42.2	0.46		14.4
6th St SW & Independence Ave SW	EB	EBTR	575	0.75	328	18.6	0.84	565	24.1	0.59	142	6.6
	EB Approach					18.6			24.1			6.6
	WB	WBLT	670	1.02	m#390	34	0.59	281	14.3	0.44	130	12.3
	WB Approach					34			14.3			12.3
	NB	NBL		0.14	61	34.8	0.26	104	33	0.17	47	26
		NBR		0.13	53	34.7	0.33	112	34.7	0.22	0	27.5
	NB Approach					34.7			33.9			26.7
	Overall			0.78		26.5	0.68		21.3	0.46		10.3
4th St SW & Independence Ave SW	EB	EBLT	550		46	7.4	0.96	**#750**	30.9	0.7	71	9.1
		EBR	150	0.76	m11	3.7	0.13	m0	48	0.08		14.9
	EB Approach					7			31.5			9.4
	WB	WBLTR	550	1.02	**m#642**	48.9	0.78	m138	16.8	0.36	97	14.5
	WB Approach					48.9			16.8			14.5
	NB	NBL	110	0.44	72	**55.7**	0.52	102	52.4	0.16	30	29.1
		NBT		0.17	52	43.9	0.15	56	38.2	0.08	35	27.6
		NBR	70	0.53	**#95**	**60**	0.3	78	43.7	0.03	45	27.1
	NB Approach					54.8			45.6			28.1

Intersection Information				AM Peak			PM Peak			Weekend Peak		
Intersection (West to East)	Approach	Lane Group	Existing/ Proposed turn-lane lengths	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)	V/C	Back of Queue (feet)	Avg. Delay Per Vehicle (sec)
	SB	SBL	150	0.04	13	41.9	0.56	#113	**55.5**	0.12	24	28.5
		SBT		0.07	24	42.2	0.16	59	38.4	0.07	222	27.6
		SBR	75	0.52	**#87**	**61.3**	0.33	67	44.7	0.14	50	28.8
	SB Approach					**57.2**			48.2			28.4
	Overall			0.92		30.2	0.85		28.7	0.46		13.3
3rd St SW & Independence Ave SW	EB	EBLTR	550	0.86	408	40.6	1.05	m#538	41.5	0.81	40	13.7
	EB Approach					40.6			41.5			13.7
	WB	WBLT	260	0.92	**#592**	29.9	0.55	233	11.7		10	20
		WBR	390	0.2	33	18.2	0.12	31	19.4	0.47	7	18.1
	WB Approach					28.1			12.7			19.8
	NB	NBLTR		0.17	48	39.5	0.52	91	52.4	0.1	2	30.7
	NB Approach					39.5			52.4			30.7
	SB	SBL	110	0.23	68	20.8	0.71	212	42.2	0.08	15	10.9
		SBTR	110	0.68	**242**	33.4	1.15	**#553**	**134.6**	0.42	4	20.1
	SB Approach					28.8			**88.6**			17.8
	Overall			0.84		33.2	1.12		45.8	0.61		16.8
First St SW & Independence Ave SW	EB	EBLT		0.37	115	9.2	0.79	83	6	0.41		1.8
	EB Approach					9.2			6			1.8
	WB	WBTR		0.63	338	18.6	0.41	184	16.9	0.28		17.8
	WB Approach					18.6			16.9			17.8
	NB	NBLTR		0	0	31.3	0		0	0	m52	0
	NB Approach					31.3			0			0
	Overall			0.44		14.7	0.61		9.2	0.29		7.4
Maryland Ave & 3rd St SW	WB	WBLR		0.33	123	36.6	0.28	114	32.6	0		27.7
	WB Approach					36.6			32.6			27.7
	NB	NBTR		0.17	m74	22.6	0.17	m42	19.4	0.11		30.1
	NB Approach					22.6			19.4			30.1
	SB	SBT		0.17	62	12.2	0.41	162	19.7	0.15		18.1
	SB Approach					12.2			19.7			18.1
	Overall			0.21		20	0.33		20.8	0		24.7

m - Volume for the 95th percentile queue is metered by upstream signal.
- The 95th percentile volume exceeds capacity, so the queue may be longer.
Gold **Bold** is equivalent to LOS E. Red **Bold** is equivalent to LOS F. Black **Bold** indicates queue lengths longer than available storage.

Summary

As demonstrated in the analysis, **the current eight-lane configuration on Independence Avenue has excess roadway capacity, and an Independence Avenue cross-section with two through lanes in each direction has sufficient capacity for both current and future vehicular traffic demand.**

Table 7 summarizes the intersection approach movements expected to have average delays per vehicle comparable to an LOS of E or F. As shown, more intersections in Scenario 2 operate with higher vehicle delays due to removing two travel lanes in each direction. Therefore, modifications to Scenario 2 are proposed in Scenario 3 to mitigate high queuing and high delays. The changes proposed in Scenario 3 improved operations for critical movements in Scenario 2. In some instances (e.g., northbound through movements in the AM Peak), Scenario 3 did not propose mitigation strategies as congestion and vehicular delay are expected due to the proximity to the 14th Street Bridge. The proposed mitigation strategies support efficient traffic operations along Independence Avenue for the proposed four-lane concept.

Table 7. Summary table of average delays per vehicle equivalent to LOS E or F

Intersection	Movement	Storage length	Peak Period	Scenario	Average Delay (sec)	95th Percentile Queue (ft)
14th St SW & Independence Ave SW	Southbound left	270'	AM Peak	1	**198.7**	**#272**
				2	**76.5**	#222
				3	34.4	56
	Eastbound approach	370'	AM Peak	1	22.5	**#390**
				2	**74.8**	**#641**
				3	42	**#586**
	Northbound through	450'	AM Peak	1	31.6	426
				2	**62.9**	**#525**
				3	**62.9**	**#525**
	Northbound right	450'	AM Peak	1	33.4	351
				2	**55.9**	#435
	Westbound through	950'	PM Peak	2	**73.6**	#454
12th St SW & Independence Ave SW	Westbound left	450'	AM Peak	1	**55.2**	121
				2	**56.2**	m#108
			PM Peak	1	**64.1**	#337
				2	**186.6**	m#304
				3	**68.2**	m#261
	Eastbound approach	950'	AM Peak	1	33.2	#426
				2	**198.8**	m#445
				3	48	#764
			PM Peak	2	**72.9**	#657
			Weekend Peak	2	**66.6**	#558
7th St SW & Independence Ave SW	Eastbound approach	480'	AM Peak	1	10.6	64
				2	**196**	**#898**
				3	8.1	m140
			PM Peak	1	8.9	67
				2	**72.1**	**#657**
				3	31.1	402
	Southbound left	310'	AM Peak	1	31.4	136
				2	**95.2**	#230

Intersection	Movement	Storage length	Peak Period	Scenario	Average Delay (sec)	95th Percentile Queue (ft)
				3	40.6	76
			PM Peak	1	46.2	#281
				2	**201.4**	**#351**
				3	34.2	124
	Westbound approach	450'	PM Peak	1	26.9	161
				2	**68.2**	**#542**
				3	31.7	424
	Westbound approach	550'	AM Peak	1	4.1	35
				2	**71.1**	**#726**
				3	48.9	**m#642**
4th St SW & Independence Ave SW	Northbound left	110'	AM Peak	2	**55.7**	72
	Southbound right	75'	AM Peak	2	**61.3**	**#87**
	Eastbound approach	550'	PM Peak	1	12.9	83
				2	**76.3**	**#845**
				3	30.9	**#750**
3rd Street SW & Independence Ave SW	Eastbound approach	550'	PM Peak	2	**63.3**	m#337

m – Volume for the 95th percentile queue is metered by upstream signal.
- The 95th percentile volume exceeds capacity, so the queue may be longer.
Gold **Bold** is equivalent to LOS E. Red **Bold** is equivalent to LOS F. Black **Bold** indicates queue lengths longer than available storage.

ALL-DAY CAPACITY ASSESSMENT

While the movements highlighted in Table 7 are expected to operate close to capacity in the year 2045, it is important to keep in mind that the results presented represent the reasonable worst-case 15 minutes of the day 21 years in the future. DDOT's **Vision Zero 2022 Update**[10] explicitly prioritizes the safety of people walking, wheeling, or using mobility assistive devices over passenger vehicles. In practice, this means that vehicular capacity and level of service are willing to be sacrificed to achieve safer conditions for vulnerable users, similar to the expected outcomes of any reallocation scenario along Independence Avenue. Strict adherence to using the peak 15 minutes of the day to measure demand means that a significant amount of roadway capacity goes unused during the rest of the day. As previously highlighted in this document, visitors to the museums and cultural attractions along Independence Avenue are highest during weekday and weekend hours when traffic is lighter than during weekday peak times.

As documented in National Cooperative Highway Research Program (NCHRP) Report 1036: *Roadway Cross-Section Reallocation: A Guide*[11], agencies like DDOT are encouraged to think beyond the peak-hour framework, as DDOT does when following their guidance in their Vision Zero 2022 Update. NCHRP Report 1036 presents the framework for an all-day capacity assessment with the explicit understanding that design decisions based on peak hour estimates tend to overcompensate in favor of drivers, creating barriers and

[10] https://visionzero.dc.gov/pages/2022-update
[11] National Academies of Sciences, Engineering, and Medicine. 2023. NCHRP Report 1036: Roadway Cross-Section Reallocation: A Guide. Washington, DC: The National Academies Press. https://doi.org/10.17226/26788.

unsafe situations for people walking and biking. The framework is intended to help practitioners make more equitable assessments of traffic operations for all modes.

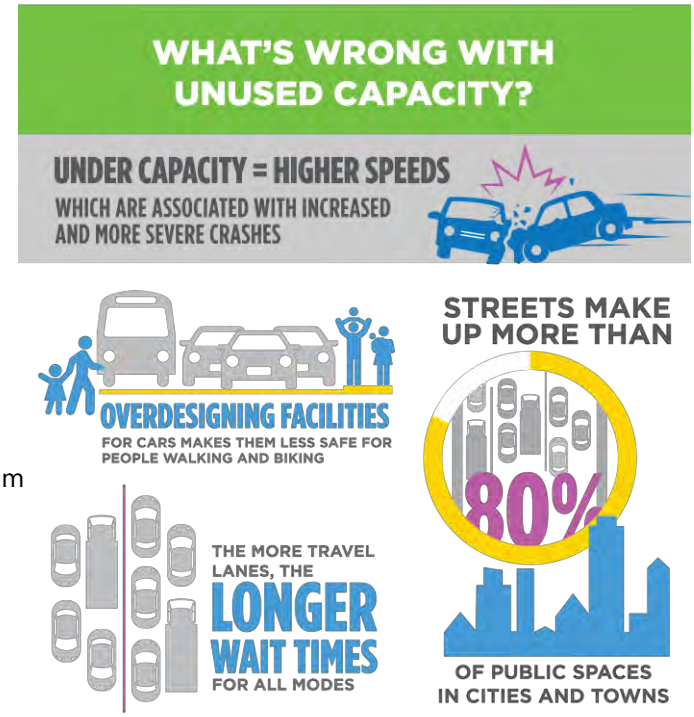


Figure 4 and **Figure 5** show the results of an all-day capacity assessment completed for Independence Avenue SW using the forecasted year 2045 traffic volumes and capacity results from Scenario 3 for the intersections at 7th Street SW and 12th Street SW, respectively.

The 24-hour traffic volume profile information is from MWCOG's open data portal from traffic counts on the 1400 block of Independence Avenue. As shown, in 2045, the roadway is expected to be under capacity for all 24 hours at the 7th Street SW intersection and 23 of 24 hours at the 12th Street SW intersection.

Applying the 16-hour efficiency test from NCHRP Report 1036 (the number of hours between 5:00 AM and 9:00 PM the roadway is at 60% capacity or greater), the modified four-lane cross-section is 70% efficient with approximately 8.4 lane hours of excess capacity (meaning that almost an entire lane is empty for 8.4 hours of the day, even after excluding nighttime hours), and 85% efficient with approximately 9.1 lane hours of excess capacity, for the eastbound and westbound approaches of the 7th Street SW intersection, respectively. For the 12th Street SW intersection, in the eastbound direction, the modified four-lane cross-section is 25% efficient with approximately 4.1 lane hours of excess capacity and 100% efficient in the westbound direction with 11.6 lane hours of excess capacity.

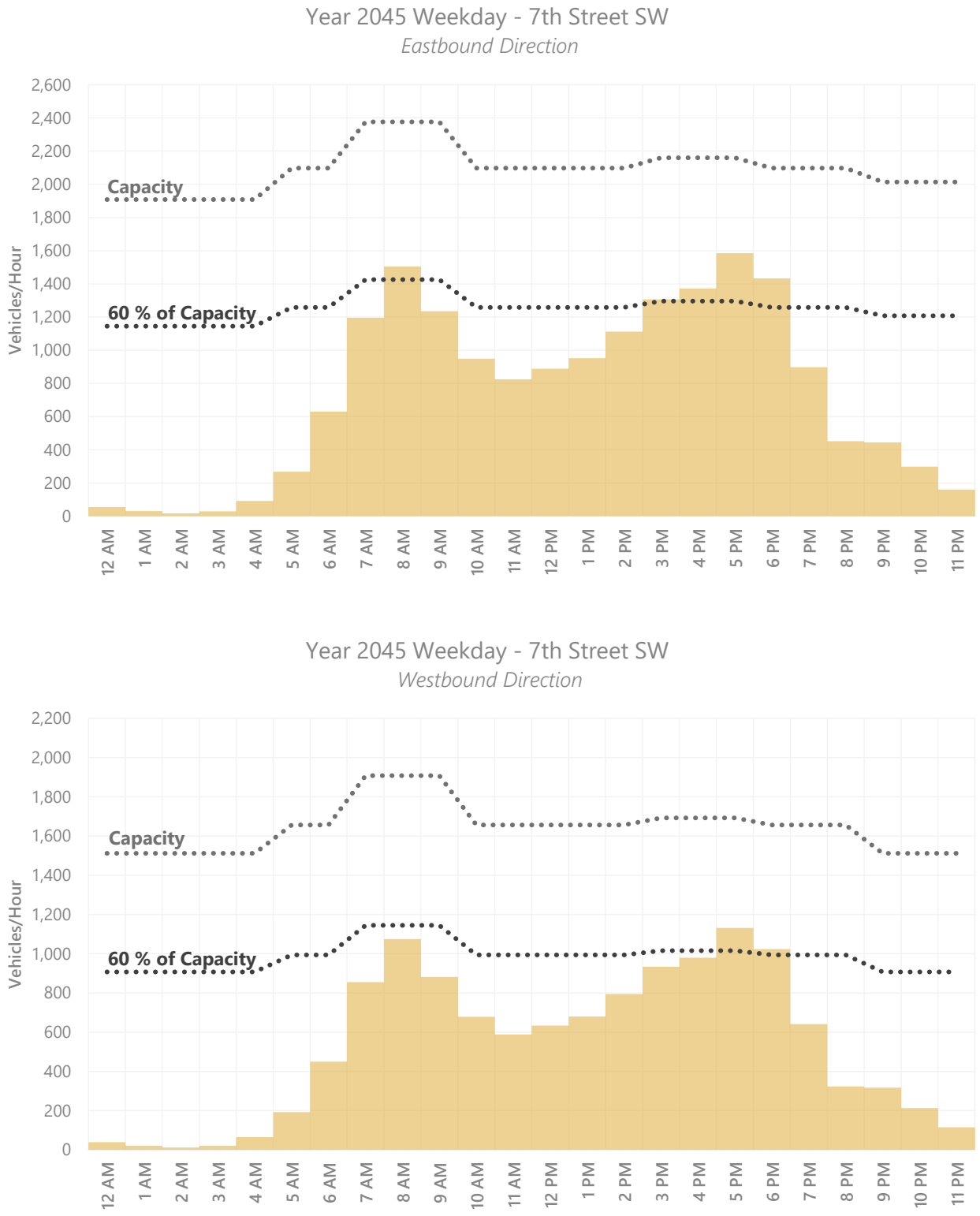


Figure 4. All-Day Capacity Assessment, Year 2045 Weekday – 7th Street SW

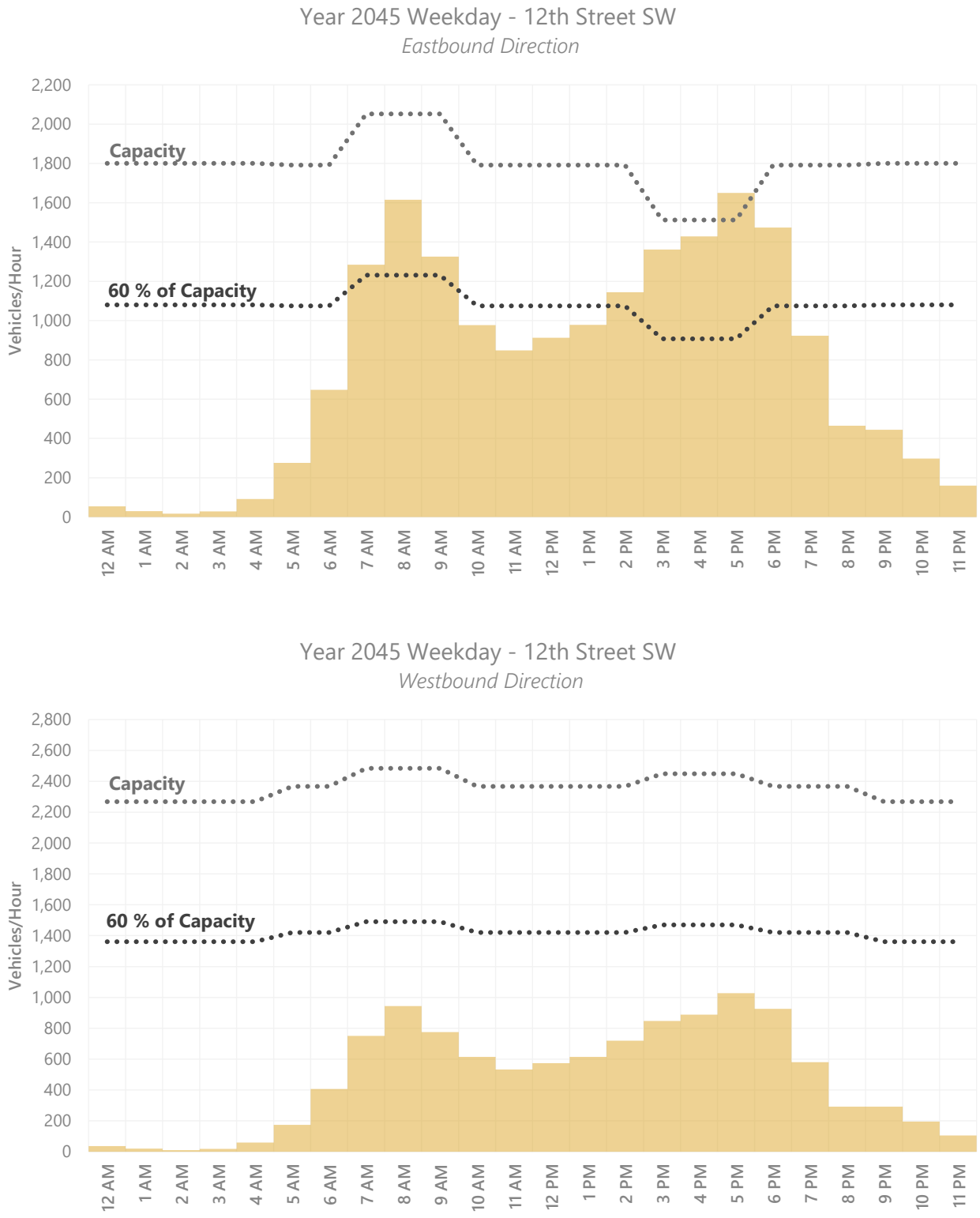


Figure 5. All-Day Capacity Assessment, Year 2045 Weekday – 12th Street SW

OPERATIONAL ANALYSIS RESULTS

Results from the operational analysis show that for Scenario 1, which includes future traffic conditions without any geometry or signal timing changes, most intersections along Independence Avenue operate at average delays per vehicle with acceptable levels of service. There are two intersections at which some movements operate at average delays per vehicle comparable to an LOS of E or F, including:

- 14th Street & Independence Avenue SW during the AM peak
- 12th Street & Independence Ave SW during the AM and PM peaks
- There were no movements with average delays per vehicle equivalent to LOS of E or F during the Weekend peak period

Scenario 2 proposes reducing the number of travel lanes from four to two lanes per direction without changing left or right-turning movements. In cases where the existing condition includes an exclusive left or right turn lane, the proposed scenario includes pocket lanes added to the proposed two-lane cross-section. Additionally, the team implemented the following signal-timing-related modifications to support traffic operations:

- Adjusting splits within existing cycle lengths of 110 seconds for the AM and PM peak hours and 100 seconds for the Weekend peak hour
- Modifying pedestrian clearance times for movements crossing Independence Avenue due to reduced crossing distances resulting from narrowing the travel lanes from four lanes to two lanes per direction

Results from the operational analysis show that for Scenario 2, which includes a four-lane configuration with existing-modified signal timing plans and future-year traffic volumes, most intersections along Independence Avenue operate at acceptable levels of service. From the intersection level perspective, two intersections operate at average delays per vehicle equivalent to a LOS of E or F, including:

- 12th Street & Independence Avenue SW during the AM and PM peaks
- 7th Street & Independence Ave SW during the AM and PM peaks
- 4th Street & Independence Ave SW during the PM peak

Also, from the movement/approach level perspective, four intersections operate with some movements and approaches with average delays per vehicle equivalent to a LOS of E, including:

- 14th Street & Independence Avenue SW during the AM and PM peaks
- 12th Street & Independence Avenue SW during the weekend peak
- 4th Street & Independence Ave SW during the AM peak
- 3rd Street & Independence Ave SW during the PM peak

Results from the operational analysis show that for Scenario 3, which includes a four-lane configuration with existing-modified signal timing plans and future-year traffic volumes, and modifications to some turning movement lanes, most intersections along Independence Avenue operate at acceptable levels of service. From the intersection level perspective, none of the intersections operate with unacceptable delays and v/c ratios that indicate oversaturation (i.e., lack of capacity). Few movements were outlined as operating with high delays, longer queues, and high v/c ratios. However, for these movements, either mitigating strategies were not proposed due to the proximity to the 14th Street Bridge or traffic demand is expected to adjust to removing the Maryland Avenue SW segment.

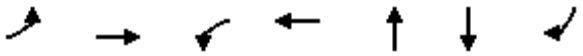
KITTELSON & ASSOCIATES

Appendix A
Compiled Traffic Volume Information

Scenario:	AM peak hour			Cars															Trucks												Pedestrians			
Project/ Path		Street Name		Intersection Orientation				Southbound Vehicles			Westbound Vehicles			Northbound Vehicles			Eastbound Vehicles			Southbound HV %			Westbound HV %			Northbound HV %			Eastbound HV%			Pedestrian Crossings			
	Intersection #	North-South	East-West	SB	WB	NB	EB	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	SB LT	SB TH	SB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	EB LT	EB TH	EB RT	South	West	North	East
AM Peak Balanced	2,185	2185 - Maryland Ave	3rd St SW	SB	WB	NB	EB	0	288	59	59	59	0	0	213	78	75	25	0	0	5	0	0	0	0	0	8	0	13	0	32	8	61	27	56
AM Peak Balanced	24	24 - Raoul Wallenberg Pl SW	Independence Ave SW	SB	WB	NB	EB	28	81	28	25	402	166	8	164	28	283	1,163	5	0	23	25	4	2	0	25	9	0	2	1	0	13	21	0	19
AM Peak Balanced	25	25 - 14th St SW	Independence Ave SW	SB	WB	NB	EB	179	486	13	1	580	224	0	1,567	386	0	1,171	48	7	1	1	25	0	8	0	1	1	0	1	8	123	78	75	39
AM Peak Balanced	26	26 - 12th St SW	Independence Ave SW	SB	WB	NB	EB	5	24	8	119	684	96	113	148	161	121	1501	114	20	0	0	3	4	3	10	4	5	0	2	6	176	70	22	4
AM Peak Balanced	28	28 - L'Enfant Plaza Sw	Independence Ave SW	SB	WB	NB	EB	0	0	0	44	874	0	25	0	54	0	1624	43	0	0	0	14	2	0	2	0	1	0	1	3	231	2	212	259
AM Peak Balanced	29	29 - 9th St SW	Independence Ave SW	SB	WB	NB	EB	1	0	0	129	887	0	31	0	15	2	1523	153	0	0	0	3	4	0	6	0	0	0	3	5	43	20	1	13
AM Peak Balanced	30	30 - 7th St Sw	Independence Ave SW	SB	WB	NB	EB	164	159	41	35	935	384	40	276	24	230	1225	84	5	8	6	10	2	2	6	3	0	0	0	2	166	200	207	226
AM Peak Balanced	31	31 - 6th St SW	Independence Ave SW	SB	WB	NB	EB	0	0	0	71	1,304	0	49	0	40	0	1,331	82	0	0	0	0	2	0	0	0	0	0	2	0	131	335	6	230
AM Peak Balanced	32	32 - 4th St SW	Independence Ave SW	SB	WB	NB	EB	4	11	56	99	1,271	42	48	34	63	26	1,214	131	0	17	0	0	2	0	2	10	0	0	2	0	123	121	502	132
AM Peak Balanced	33	33 - 3rd St SW	Independence Ave SW	SB	WB	NB	EB	180	102	65	42	1,228	231	1	52	26	8	1019	154	1	4	0	0	1	9	0	3	5	0	1	23	58	69	34	33
AM Peak Balanced	34	34 - Washington Ave SW	Independence Ave SW	SB	WB	NB	EB	0	0	0	71	1,043	0	457	0	107	0	660	565	0	0	0	1	2	0	7	0	0	0	2	1	45	0	45	21
AM Peak Balanced	36	36 - First St SW	Independence Ave SW	SB	WB	NB	EB	0	0	2	0	1,112	0	0	0	2	0	767	0	0	0	0	0	2	0	0	0	0	0	1	0	3	14	18	8
Scenario:	PM peak hour			Cars															Trucks												Pedestrians			
PM Peak Balanced	2,185	2185 - Maryland Ave	3rd St SW	SB	WB	NB	EB	0	657	53	53	53	0	0	128	101	101	34	0	0	5	0	0	0	0	0	8	0	13	0	32	8	61	27	56
PM Peak Balanced	24	24 - Raoul Wallenberg Pl SW	Independence Ave SW	SB	WB	NB	EB	34	399	35	63	714	32	2	36	29	20	681	4	6	3	0	3	1	0	0	8	7	0	1	0	5	10	1	8
PM Peak Balanced	25	25 - 14th St SW	Independence Ave SW	SB	WB	NB	EB	171	1,348	21	10	788	146	0	990	293	1	684	59	0	1	1	2	2	0	11	6	7	1	3	3	101	165	119	118
PM Peak Balanced	26	26 - 12th St SW	Independence Ave SW	SB	WB	NB	EB	8	11	7	323	840	121	97	144	268	81	1,023	44	0	0	0	1	3	1	8	3	2	0	3	11	165	83	43	1
PM Peak Balanced	28	28 - L'Enfant Plaza Sw	Independence Ave SW	SB	WB	NB	EB	0	0	0	49	1,210	0	74	0	64	0	1,264	35	0	0	0	20	4	1	31	4	6	0	2	26	42	28	42	50
PM Peak Balanced	29	29 - 9th St SW	Independence Ave SW	SB	WB	NB	EB	0	0	1	61	1,199	0	59	0	48	0	1,237	91	0	0	0	0	3	0	3	0	0	0	3	1	39	21	0	19
PM Peak Balanced	30	30 - 7th St Sw	Independence Ave SW	SB	WB	NB	EB	306	318	227	10	932	88	101	198	68	136	1,095	54	0	5	3	0	5	1	0	5	9	33	3	11	277	0	94	152
PM Peak Balanced	31	31 - 6th St SW	Independence Ave SW	SB	WB	NB	EB	0	0	0	16	930	0	99	0	104	0	1,425	44	0	3	0	11	2	2	7	3	2	0	2	15	106	108	81	75
PM Peak Balanced	32	32 - 4th St SW	Independence Ave SW	SB	WB	NB	EB	74	40	43	71	831	28	71	38	113	15	1,461	53	0	1	2	0	1	1	0	1	1	33	1	4	421	335	327	391
PM Peak Balanced	33	33 - 3rd St SW	Independence Ave SW	SB	WB	NB	EB	406	228	76	9	748	111	0	80	68	1	1,489	23	24	0	38	0	4	27	0	0	0	0	4	0	4	5	43	59
PM Peak Balanced	34	34 - Washington Ave SW	Independence Ave SW	SB	WB	NB	EB	0	0	0	46	555	0	313	0	71	1	1392	570	0	0	0	7	2	0	5	0	0	0	3	2	37	0	28	22
PM Peak Balanced	36	36 - First St SW	Independence Ave SW	SB	WB	NB	EB	2	0	1	0	600	1	0	0	0	0	1463	0	0	0	13	0	5	43	0	0	0	0	4	0	2	0	92	116
Scenario:	Saturday peak hour			Cars															Trucks												Pedestrians			
Saturday Peak Balanced	2,185	2185 - Maryland Ave	3rd St SW	SB	WB	NB	EB	0	164	66	66	66	0	0	97	63	63	21	0	0	5	0	0	0	0	0	8	0	13	0	32	8	61	27	56
Saturday Peak Balanced	24	24 - Raoul Wallenberg Pl SW	Independence Ave SW	SB	WB	NB	EB	56	154	67	59	444	44	10	73	46	42	615	21	1	4	1	2	0	0	0	1	2	0	0	0	27	113	64	43
Saturday Peak Balanced	25	25 - 14th St SW	Independence Ave SW	SB	WB	NB	EB	95	890	67	4	479	85	1	937	259	0	658	60	7	1	1	25	0	8	0	1	1	0	1	8	123	78	75	39
Saturday Peak Balanced	26	26 - 12th St SW	Independence Ave SW	SB	WB	NB	EB	4	8	12	61	503	97	53	117	98	124	856	32	0	12	0	4	0	0	4	0	0	0	1	12	99	150	134	9
Saturday Peak Balanced	28	28 - L'Enfant Plaza Sw	Independence Ave SW	SB	WB	NB	EB	0	0	0	21	581	0	81	0	85	0	929	29	0	0	0	14	2	0	2	0	1	0	1	3	231	2	212	259
Saturday Peak Balanced	29	29 - 9th St SW	Independence Ave SW	SB	WB	NB	EB	0	0	0	125	568	0	34	0	11	0	878	136	0	0	0	4	2	0	0	0	0	0	1	1	134	76	0	18
Saturday Peak Balanced	30	30 - 7th St Sw	Independence Ave SW	SB	WB	NB	EB	151	154	118	21	525	97	50	159	24	150	692	47	5	8	6	10	2	2	6	3	0	0	0	2	166	200	207	226
Saturday Peak Balanced	31	31 - 6th St SW	Independence Ave SW	SB	WB	NB	EB	0	0	0	18	575	0	68	0	54	0	806	61	0	0	0	0	2	0	0	0	0	0	2	0	131	335	6	230
Saturday Peak Balanced	32	32 - 4th St SW	Independence Ave SW	SB	WB	NB	EB	28	22	32	36	524	10	37	25	29	11	794	55	0	17	0	0	2	0	2	10	0	0	2	0	123	121	502	132
Saturday Peak Balanced	33	33 - 3rd St SW	Independence Ave SW	SB	WB	NB	EB	92	106	32	12	406	64	0	38	20	4	750	13	1	4	0	0	1	9	0	3	5	0	1	23	58	69	34	33
Saturday Peak Balanced	34	34 - Washington Ave SW	Independence Ave SW	SB	WB	NB	EB	0	0	0	17	344	0	138	0	20	0	651	211	0	0	0	0	2	0	2	0	0	0	1	1	11	0	27	10
Saturday Peak Balanced	36	36 - First St SW	Independence Ave SW	SB	WB	NB	EB	0	0	0	0	361	0	0	0	0	2	669	0	0	3	1	16	4	5	8	12	12	1	3	12	160	227	132	134

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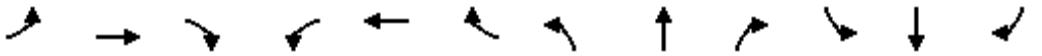
Appendix B
Scenario 1 Operation Analysis Results



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	292	1204	26	585	206	113	29
v/c Ratio	0.70	0.85	0.23	0.72	0.40	0.27	0.10
Control Delay	45.9	34.1	32.9	20.0	29.7	26.6	30.2
Queue Delay	0.0	0.0	0.0	2.3	0.0	0.0	0.0
Total Delay	45.9	34.1	32.9	22.2	29.7	26.6	30.2
Queue Length 50th (ft)	185	388	0	213	106	58	16
Queue Length 95th (ft)	285	488	m41	274	174	105	41
Internal Link Dist (ft)		172		412	453	306	
Turn Bay Length (ft)							
Base Capacity (vph)	420	1411	113	815	516	423	286
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	121	1	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.85	0.23	0.84	0.40	0.27	0.10

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	283	1163	5	25	402	166	8	164	28	28	81	28
Future Volume (vph)	283	1163	5	25	402	166	8	164	28	28	81	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	12	12	11	12	11	11
Total Lost time (s)	3.0	3.0		3.0	3.0			3.0			3.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.99			0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.96			0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	1.00
Satd. Flow (prot)	1540	3107		1562	3044			1532			1389	1124
Flt Permitted	0.95	1.00		0.95	1.00			0.99			0.90	1.00
Satd. Flow (perm)	1540	3107		1562	3044			1520			1259	1124
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	292	1199	5	26	414	171	8	169	29	29	84	29
RTOR Reduction (vph)	0	0	0	0	41	0	0	5	0	0	0	0
Lane Group Flow (vph)	292	1204	0	26	544	0	0	201	0	0	113	29
Confl. Peds. (#/hr)			13	13			21		19	19		21
Confl. Bikes (#/hr)						1			33			22
Heavy Vehicles (%)	2%	1%	0%	4%	2%	0%	25%	9%	0%	0%	23%	25%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Over
Protected Phases	7	4		3	8			2			2	7
Permitted Phases							2			2		
Actuated Green, G (s)	27.0	47.0		5.0	25.0			33.0			33.0	27.0
Effective Green, g (s)	30.0	50.0		8.0	28.0			37.0			37.0	28.0
Actuated g/C Ratio	0.27	0.45		0.07	0.25			0.34			0.34	0.25
Clearance Time (s)	6.0	6.0		6.0	6.0			7.0			7.0	6.0
Lane Grp Cap (vph)	420	1412		113	774			511			423	286
v/s Ratio Prot	c0.19	c0.39		0.02	c0.18							0.03
v/s Ratio Perm								c0.13			0.09	
v/c Ratio	0.70	0.85		0.23	0.70			0.39			0.27	0.10
Uniform Delay, d1	35.9	26.7		48.1	37.2			27.9			26.6	31.4
Progression Factor	1.00	1.00		0.59	0.44			1.00			0.92	0.92
Incremental Delay, d2	9.2	6.7		4.2	4.8			2.3			1.5	0.7
Delay (s)	45.1	33.4		32.5	21.2			30.2			26.0	29.7
Level of Service	D	C		C	C			C			C	C
Approach Delay (s)		35.7			21.7			30.2			26.8	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	72.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

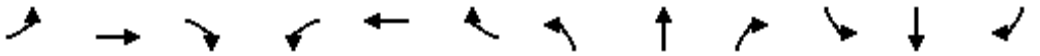


Lane Group	EBT	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	1256	599	231	1615	398	185	514
v/c Ratio	0.92	0.47	0.66	0.83	0.72	1.28	0.22
Control Delay	23.6	42.7	53.8	32.0	34.5	199.9	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.6	42.7	53.8	32.0	34.5	199.9	9.8
Queue Length 50th (ft)	152	132	141	360	226	~127	39
Queue Length 95th (ft)	#390	171	220	426	351	#272	50
Internal Link Dist (ft)	412	1035		259			307
Turn Bay Length (ft)			180		225		
Base Capacity (vph)	1361	1262	348	1949	552	144	2337
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.47	0.66	0.83	0.72	1.28	0.22

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1171	48	1	580	224	0	1567	386	179	486	13
Future Volume (vph)	0	1171	48	1	580	224	0	1567	386	179	486	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	11	11	11	10	10	10
Total Lost time (s)		5.0			5.0	5.0		5.0	5.0	5.0	5.0	
Lane Util. Factor		0.91			0.91	1.00		0.91	1.00	1.00	0.91	
Frpb, ped/bikes		0.99			1.00	0.91		1.00	0.94	1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.99			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		1.00			1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		4405			4355	1127		4468	1265	1417	4286	
Flt Permitted		1.00			0.94	1.00		1.00	1.00	0.08	1.00	
Satd. Flow (perm)		4405			4085	1127		4468	1265	113	4286	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	1207	49	1	598	231	0	1615	398	185	501	13
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1256	0	0	599	231	0	1615	398	185	514	0
Confl. Peds. (#/hr)	75		123	123		75	78		39	39		78
Confl. Bikes (#/hr)			10			1						
Heavy Vehicles (%)	0%	1%	8%	25%	0%	8%	0%	1%	1%	7%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	4	0	0	8	0	0	0
Turn Type		NA		Perm	NA	Perm		NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases				8		8			2	6		
Actuated Green, G (s)		32.0			32.0	32.0		46.0	46.0	58.0	58.0	
Effective Green, g (s)		34.0			34.0	34.0		48.0	48.0	60.0	60.0	
Actuated g/C Ratio		0.31			0.31	0.31		0.44	0.44	0.55	0.55	
Clearance Time (s)		7.0			7.0	7.0		7.0	7.0	7.0	7.0	
Lane Grp Cap (vph)		1361			1262	348		1949	552	144	2337	
v/s Ratio Prot		c0.29						0.36		c0.08	0.12	
v/s Ratio Perm					0.15	0.21			0.31	c0.62		
v/c Ratio		0.92			0.47	0.66		0.83	0.72	1.28	0.22	
Uniform Delay, d1		36.7			30.8	33.0		27.4	25.5	37.4	12.9	
Progression Factor		0.42			1.34	1.30		1.00	1.00	0.78	0.74	
Incremental Delay, d2		7.0			1.2	9.2		4.2	7.9	169.7	0.2	
Delay (s)		22.5			42.4	52.3		31.6	33.4	198.7	9.8	
Level of Service		C			D	D		C	C	F	A	
Approach Delay (s)		22.5			45.1			32.0			59.8	
Approach LOS		C			D			C			E	

Intersection Summary			
HCM 2000 Control Delay	35.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	83.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



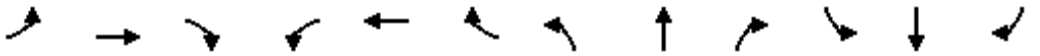
Lane Group	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	1809	124	813	118	154	168	38
v/c Ratio	1.02	0.54	0.33	0.41	0.34	0.28	0.08
Control Delay	35.5	57.0	4.4	35.8	32.5	19.9	24.9
Queue Delay	0.0	0.0	0.0	7.1	9.3	1.3	0.0
Total Delay	35.5	57.0	4.4	42.8	41.8	21.3	24.9
Queue Length 50th (ft)	~395	63	24	62	80	54	16
Queue Length 95th (ft)	m#426	121	33	125	146	101	42
Internal Link Dist (ft)	1035		511		84		359
Turn Bay Length (ft)						140	
Base Capacity (vph)	1766	230	2481	288	447	599	467
Starvation Cap Reductn	0	0	0	126	254	269	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.02	0.54	0.33	0.73	0.80	0.51	0.08

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	1501	114	119	684	96	113	148	161	5	24	8
Future Volume (vph)	121	1501	114	119	684	96	113	148	161	5	24	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	11	11	11	14	14	14
Total Lost time (s)		6.0		5.0	4.0		4.0	4.0	3.0		4.0	
Lane Util. Factor		0.86		1.00	0.91		1.00	1.00	1.00		1.00	
Frpb, ped/bikes		0.98		1.00	0.97		1.00	1.00	0.99		0.98	
Flpb, ped/bikes		0.99		1.00	1.00		0.93	1.00	1.00		1.00	
Frt		0.99		1.00	0.98		1.00	1.00	0.85		0.97	
Flt Protected		1.00		0.95	1.00		0.95	1.00	1.00		0.99	
Satd. Flow (prot)		5118		1472	3986		1327	1589	1323		1682	
Flt Permitted		0.78		0.08	1.00		0.73	1.00	1.00		0.97	
Satd. Flow (perm)		4029		117	3986		1023	1589	1323		1638	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	126	1564	119	124	712	100	118	154	168	5	25	8
RTOR Reduction (vph)	0	10	0	0	17	0	0	0	35	0	6	0
Lane Group Flow (vph)	0	1799	0	124	796	0	118	154	133	0	32	0
Confl. Peds. (#/hr)	22		176	176		22	70		4	4		70
Confl. Bikes (#/hr)			6			4			3			7
Heavy Vehicles (%)	0%	2%	6%	3%	4%	3%	10%	4%	5%	20%	0%	0%
Bus Blockages (#/hr)	0	8	8	0	0	0	0	0	0	0	0	0
Turn Type	Perm	NA		custom	NA		Perm	NA	pm+ov	Perm	NA	
Protected Phases		6		5	1 2			14	5		14	
Permitted Phases	6			2			14		14	14		
Actuated Green, G (s)		47.0		65.0	65.0		28.0	28.0	40.0		28.0	
Effective Green, g (s)		48.0		66.0	66.0		31.0	31.0	46.0		31.0	
Actuated g/C Ratio		0.44		0.60	0.60		0.28	0.28	0.42		0.28	
Clearance Time (s)		7.0		6.0			7.0	7.0	6.0		7.0	
Lane Grp Cap (vph)		1758		230	2391		288	447	553		461	
v/s Ratio Prot				c0.06	0.20			0.10	0.03			
v/s Ratio Perm		c0.45		0.26			c0.12		0.07		0.02	
v/c Ratio		1.02		0.54	0.33		0.41	0.34	0.24		0.07	
Uniform Delay, d1		31.0		17.2	11.0		32.1	31.4	20.7		28.9	
Progression Factor		0.42		2.71	0.43		0.95	0.95	1.57		1.00	
Incremental Delay, d2		20.1		8.4	0.4		4.3	2.1	1.0		0.3	
Delay (s)		33.2		55.2	5.1		34.8	32.0	33.5		29.2	
Level of Service		C		E	A		C	C	C		C	
Approach Delay (s)		33.2			11.7			33.3			29.2	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1737	956	26	56
v/c Ratio	0.63	0.34	0.07	0.13
Control Delay	7.0	15.3	33.3	10.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.0	15.3	33.3	10.6
Queue Length 50th (ft)	68	171	14	7
Queue Length 95th (ft)	m69	196	38	33
Internal Link Dist (ft)	511	529	390	
Turn Bay Length (ft)				
Base Capacity (vph)	2764	2832	389	423
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.63	0.34	0.07	0.13

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



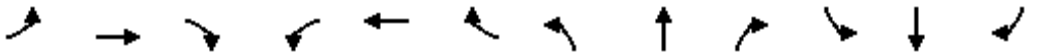
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1624	43	44	874	25	54
Future Volume (vph)	1624	43	44	874	25	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	13	13
Total Lost time (s)	5.0			5.0	4.0	3.0
Lane Util. Factor	0.86			0.86	1.00	1.00
Frpb, ped/bikes	0.98			1.00	1.00	0.78
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	5329			5339	1646	1153
Flt Permitted	1.00			0.79	0.95	1.00
Satd. Flow (perm)	5329			4251	1646	1153
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1692	45	46	910	26	56
RTOR Reduction (vph)	3	0	0	0	0	27
Lane Group Flow (vph)	1734	0	0	956	26	29
Confl. Peds. (#/hr)		231	231		2	259
Confl. Bikes (#/hr)		8				
Heavy Vehicles (%)	1%	3%	14%	2%	2%	1%
Turn Type	NA		pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	4	1
Permitted Phases			6			4
Actuated Green, G (s)	55.0			69.0	24.0	33.0
Effective Green, g (s)	57.0			71.0	26.0	37.0
Actuated g/C Ratio	0.52			0.65	0.24	0.34
Clearance Time (s)	7.0			7.0	6.0	5.0
Lane Grp Cap (vph)	2761			2852	389	387
v/s Ratio Prot	c0.33			c0.03	0.02	c0.01
v/s Ratio Perm				0.18		0.02
v/c Ratio	0.63			0.34	0.07	0.07
Uniform Delay, d1	18.9			8.8	32.6	24.8
Progression Factor	0.35			1.77	1.00	1.00
Incremental Delay, d2	0.4			0.3	0.3	0.4
Delay (s)	7.0			15.9	32.9	25.2
Level of Service	A			B	C	C
Approach Delay (s)	7.0			15.9	27.7	
Approach LOS	A			B	C	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBT	NBR	SBL
Lane Group Flow (vph)	1572	1047	32	15	1
v/c Ratio	0.62	0.31	0.10	0.06	0.00
Control Delay	1.3	3.0	33.4	0.5	31.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	1.3	3.0	33.4	0.5	31.0
Queue Length 50th (ft)	4	23	18	0	1
Queue Length 95th (ft)	4	33	44	0	5
Internal Link Dist (ft)	1	427	135		
Turn Bay Length (ft)					
Base Capacity (vph)	2526	3359	307	246	303
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	19	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.62	0.31	0.10	0.06	0.00

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	1523	0	0	1016	0	31	0	15	1	0	0
Future Volume (vph)	2	1523	0	0	1016	0	31	0	15	1	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0	4.0		
Lane Util. Factor		0.86			0.86			1.00	1.00	1.00		
Frpb, ped/bikes		1.00			1.00			1.00	1.00	1.00		
Flpb, ped/bikes		1.00			1.00			0.97	1.00	0.98		
Frt		1.00			1.00			1.00	0.85	1.00		
Flt Protected		1.00			1.00			0.95	1.00	0.95		
Satd. Flow (prot)		5330			5279			1253	1221	1598		
Flt Permitted		0.93			1.00			0.95	1.00	0.74		
Satd. Flow (perm)		4965			5279			1253	1221	1238		
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	2	1570	0	0	1047	0	32	0	15	1	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	14	0	0	0
Lane Group Flow (vph)	0	1572	0	0	1047	0	0	32	1	1	0	0
Confl. Peds. (#/hr)	1		43	43		1	20		13	13		20
Confl. Bikes (#/hr)			6			6			2			
Heavy Vehicles (%)	0%	3%	5%	3%	4%	0%	6%	0%	0%	0%	0%	0%
Parking (#/hr)							0	0	0			
Turn Type	Perm	NA			NA		Perm	NA	custom	D.Pm		Perm
Protected Phases		12			6			8	11			
Permitted Phases	12						8			8		8
Actuated Green, G (s)		54.0			68.0			25.0	8.0	25.0		
Effective Green, g (s)		56.0			70.0			27.0	10.0	27.0		
Actuated g/C Ratio		0.51			0.64			0.25	0.09	0.25		
Clearance Time (s)		6.0			6.0			6.0	6.0	6.0		
Lane Grp Cap (vph)		2527			3359			307	111	303		
v/s Ratio Prot					c0.20				0.00			
v/s Ratio Perm		c0.32						0.03		0.00		
v/c Ratio		0.62			0.31			0.10	0.01	0.00		
Uniform Delay, d1		19.4			9.1			32.1	45.5	31.3		
Progression Factor		0.02			0.31			1.00	1.00	1.00		
Incremental Delay, d2		0.9			0.1			0.7	0.2	0.0		
Delay (s)		1.3			3.0			32.8	45.7	31.4		
Level of Service		A			A			C	D	C		
Approach Delay (s)		1.3			3.0			36.9			31.4	
Approach LOS		A			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	2.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		

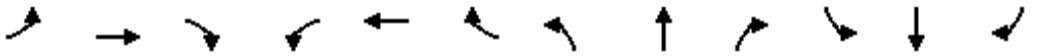
c Critical Lane Group



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	1587	1395	41	310	169	206
v/c Ratio	1.14dl	0.86	0.14	0.31	0.53	0.20
Control Delay	10.2	14.4	22.7	34.9	30.2	24.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.2	14.4	22.7	34.9	30.2	24.3
Queue Length 50th (ft)	58	115	18	65	81	31
Queue Length 95th (ft)	64	246	41	93	136	53
Internal Link Dist (ft)	427	493		361		348
Turn Bay Length (ft)			110			
Base Capacity (vph)	2195	1629	283	1002	317	1050
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.86	0.14	0.31	0.53	0.20

Intersection Summary

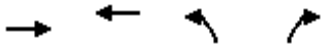
dl Defacto Left Lane. Recode with 1 though lane as a left lane.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	230	1225	84	35	935	383	40	276	24	164	159	41
Future Volume (vph)	230	1225	84	35	935	383	40	276	24	164	159	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			2%			0%			2%	
Total Lost time (s)		5.0			5.0		3.0	5.0		3.0	5.0	
Lane Util. Factor		0.86			0.86		1.00	0.91		1.00	0.91	
Frpb, ped/bikes		0.99			0.91		1.00	0.97		1.00	0.94	
Flpb, ped/bikes		1.00			1.00		0.87	1.00		0.92	1.00	
Frt		0.99			0.96		1.00	0.99		1.00	0.97	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		5317			4639		1246	4083		1309	3624	
Flt Permitted		0.72			0.82		0.62	1.00		0.49	1.00	
Satd. Flow (perm)		3855			3821		810	4083		674	3624	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	237	1263	87	36	964	395	41	285	25	169	164	42
RTOR Reduction (vph)	0	7	0	0	64	0	0	0	0	0	30	0
Lane Group Flow (vph)	0	1580	0	0	1331	0	41	310	0	169	176	0
Confl. Peds. (#/hr)	207		166	166		207	200		226	226		200
Confl. Bikes (#/hr)			2						6			3
Heavy Vehicles (%)	0%	0%	2%	10%	2%	2%	6%	3%	0%	5%	8%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	6	6
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		57.0			43.0		30.0	25.0		38.0	29.0	
Effective Green, g (s)		59.0			45.0		34.0	27.0		41.0	31.0	
Actuated g/C Ratio		0.54			0.41		0.31	0.25		0.37	0.28	
Clearance Time (s)		7.0			7.0		5.0	7.0		5.0	7.0	
Lane Grp Cap (vph)		2213			1563		278	1002		314	1021	
v/s Ratio Prot		c0.07					0.01	0.08		c0.05	0.05	
v/s Ratio Perm		0.31			c0.35		0.04			c0.15		
v/c Ratio		1.14dl			0.85		0.15	0.31		0.54	0.17	
Uniform Delay, d1		19.2			29.5		27.1	33.9		24.9	29.8	
Progression Factor		0.47			0.34		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.6			4.9		1.1	0.8		6.5	0.4	
Delay (s)		10.6			14.8		28.3	34.7		31.4	30.2	
Level of Service		B			B		C	C		C	C	
Approach Delay (s)		10.6			14.8			33.9			30.7	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	16.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	95.7%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.



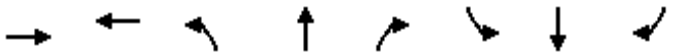
Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1519	1478	53	43
v/c Ratio	0.49	0.61	0.12	0.10
Control Delay	12.2	4.7	28.9	28.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.2	4.7	28.9	28.8
Queue Length 50th (ft)	124	25	27	22
Queue Length 95th (ft)	136	28	58	50
Internal Link Dist (ft)	493	589	158	
Turn Bay Length (ft)				
Base Capacity (vph)	3124	2406	459	411
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.49	0.61	0.12	0.10

Intersection Summary



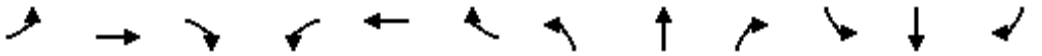
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1331	82	71	1304	49	40
Future Volume (vph)	1331	82	71	1304	49	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10
Grade (%)	-2%			1%	-2%	
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.86			0.86	1.00	1.00
Frpb, ped/bikes	0.97			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	5209			5262	1531	1370
Flt Permitted	1.00			0.76	0.95	1.00
Satd. Flow (perm)	5209			4011	1531	1370
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	1431	88	76	1402	53	43
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1519	0	0	1478	53	43
Confl. Peds. (#/hr)		131	131		335	230
Confl. Bikes (#/hr)		3				1
Heavy Vehicles (%)	2%	0%	0%	2%	0%	0%
Bus Blockages (#/hr)	8	8	0	14	0	0
Turn Type	NA		Perm	NA	Prot	Prot
Protected Phases	2			2	4	4
Permitted Phases			2			
Actuated Green, G (s)	64.0			64.0	31.0	31.0
Effective Green, g (s)	66.0			66.0	33.0	33.0
Actuated g/C Ratio	0.60			0.60	0.30	0.30
Clearance Time (s)	6.0			6.0	6.0	6.0
Lane Grp Cap (vph)	3125			2406	459	411
v/s Ratio Prot	0.29				c0.03	0.03
v/s Ratio Perm				c0.37		
v/c Ratio	0.49			0.61	0.12	0.10
Uniform Delay, d1	12.4			13.9	27.9	27.8
Progression Factor	0.94			0.27	1.00	1.00
Incremental Delay, d2	0.4			0.9	0.5	0.5
Delay (s)	12.1			4.7	28.4	28.3
Level of Service	B			A	C	C
Approach Delay (s)	12.1			4.7	28.4	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1474	1518	52	37	68	4	12	60
v/c Ratio	0.68	0.67	0.20	0.09	0.20	0.02	0.04	0.24
Control Delay	24.7	4.0	33.5	30.8	3.8	29.8	29.9	34.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.7	4.0	33.5	30.8	3.8	29.8	29.9	34.3
Queue Length 50th (ft)	178	31	28	20	0	2	6	33
Queue Length 95th (ft)	186	35	63	46	17	11	22	71
Internal Link Dist (ft)	589	201		452			368	
Turn Bay Length (ft)			110		70	150		75
Base Capacity (vph)	2158	2256	255	397	347	247	331	251
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.67	0.20	0.09	0.20	0.02	0.04	0.24

Intersection Summary



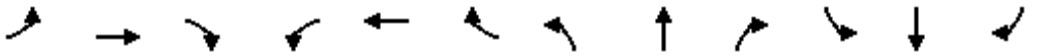
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	1214	131	99	1271	42	48	34	63	4	11	56
Future Volume (vph)	26	1214	131	99	1271	42	48	34	63	4	11	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			1%			-1%			2%	
Total Lost time (s)		4.0			4.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.86			0.86		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		0.96			0.98		1.00	1.00	0.75	1.00	1.00	0.77
Flpb, ped/bikes		1.00			1.00		0.79	1.00	1.00	0.78	1.00	1.00
Frt		0.99			1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00			1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		5073			5134		1185	1458	1011	1174	1215	923
Flt Permitted		0.86			0.73		0.75	1.00	1.00	0.73	1.00	1.00
Satd. Flow (perm)		4363			3738		935	1458	1011	906	1215	923
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	28	1305	141	106	1367	45	52	37	68	4	12	60
RTOR Reduction (vph)	0	16	0	0	4	0	0	0	49	0	0	0
Lane Group Flow (vph)	0	1458	0	0	1514	0	52	37	19	4	12	60
Confl. Peds. (#/hr)	502		123	123		502	121		132	132		121
Confl. Bikes (#/hr)			10			12			20			17
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	2%	10%	0%	0%	17%	0%
Bus Blockages (#/hr)	0	8	8	0	14	14	0	0	4	0	0	3
Parking (#/hr)											0	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		6		5	2			8			4	
Permitted Phases	6			2			8		8	4		4
Actuated Green, G (s)		52.0			62.0		28.0	28.0	28.0	28.0	28.0	28.0
Effective Green, g (s)		54.0			64.0		30.0	30.0	30.0	30.0	30.0	30.0
Actuated g/C Ratio		0.49			0.58		0.27	0.27	0.27	0.27	0.27	0.27
Clearance Time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Grp Cap (vph)		2141			2263		255	397	275	247	331	251
v/s Ratio Prot					c0.04			0.03			0.01	
v/s Ratio Perm		0.33			c0.35		0.06		0.02	0.00		c0.06
v/c Ratio		0.68			0.67		0.20	0.09	0.07	0.02	0.04	0.24
Uniform Delay, d1		21.4			15.7		30.8	29.8	29.6	29.2	29.4	31.1
Progression Factor		1.09			0.20		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.6			1.1		1.8	0.5	0.5	0.1	0.2	2.2
Delay (s)		24.9			4.1		32.6	30.3	30.1	29.3	29.6	33.4
Level of Service		C			A		C	C	C	C	C	C
Approach Delay (s)		24.9			4.1			31.0			32.6	
Approach LOS		C			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	72.9%	ICU Level of Service	C
Analysis Period (min)	15		



Lane Group	EBT	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	1271	1612	85	194	180
v/c Ratio	0.50	0.85	0.18	0.24	0.42
Control Delay	25.9	20.8	40.0	19.6	18.7
Queue Delay	0.0	0.4	0.0	0.8	2.1
Total Delay	25.9	21.2	40.0	20.4	20.9
Queue Length 50th (ft)	175	369	27	31	89
Queue Length 95th (ft)	219	429	51	62	156
Internal Link Dist (ft)	308	262	479		136
Turn Bay Length (ft)					
Base Capacity (vph)	2540	1906	479	793	433
Starvation Cap Reductn	0	57	0	361	144
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.50	0.87	0.18	0.45	0.62

Intersection Summary



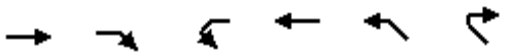
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	1019	154	41	1228	231	1	52	26	180	102	65
Future Volume (vph)	8	1019	154	41	1228	231	1	52	26	180	102	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	10	10	10
Grade (%)		-1%			0%			-1%			0%	
Total Lost time (s)		4.0			4.0			4.0		3.0	4.0	
Lane Util. Factor		0.86			0.91			0.95		0.97	1.00	
Frpb, ped/bikes		0.98			0.99			0.97		1.00	0.95	
Flpb, ped/bikes		1.00			1.00			1.00		0.96	1.00	
Frt		0.98			0.98			0.95		1.00	0.94	
Flt Protected		1.00			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		5095			4117			2914		2799	1259	
Flt Permitted		0.91			0.84			0.95		0.70	1.00	
Satd. Flow (perm)		4657			3450			2776		2059	1259	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	9	1096	166	44	1320	248	1	56	28	194	110	70
RTOR Reduction (vph)	0	0	0	0	24	0	0	0	0	0	21	0
Lane Group Flow (vph)	0	1271	0	0	1588	0	0	85	0	194	159	0
Confl. Peds. (#/hr)	34		58	58		34	69		33	33		69
Confl. Bikes (#/hr)			2			1			3			1
Heavy Vehicles (%)	0%	1%	23%	0%	1%	9%	0%	3%	5%	1%	4%	0%
Parking (#/hr)											0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		2			2			4		3	8	
Permitted Phases	2			2			4			8		
Actuated Green, G (s)		58.0			58.0			17.0		35.0	34.0	
Effective Green, g (s)		60.0			60.0			19.0		37.0	36.0	
Actuated g/C Ratio		0.55			0.55			0.17		0.34	0.33	
Clearance Time (s)		6.0			6.0			6.0		5.0	6.0	
Lane Grp Cap (vph)		2540			1881			479		786	412	
v/s Ratio Prot										0.03	c0.13	
v/s Ratio Perm		0.27			c0.46			0.03		0.05		
v/c Ratio		0.50			0.84			0.18		0.25	0.39	
Uniform Delay, d1		15.6			21.1			38.8		26.7	28.5	
Progression Factor		1.61			0.80			1.00		0.69	0.65	
Incremental Delay, d2		0.5			4.1			0.8		0.7	2.7	
Delay (s)		25.6			21.0			39.6		19.3	21.3	
Level of Service		C			C			D		B	C	
Approach Delay (s)		25.6			21.0			39.6			20.3	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	80.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	EBR	WBT	NWL	NWR
Lane Group Flow (vph)	710	608	1196	462	108
v/c Ratio	0.41	0.33	0.60	0.51	0.22
Control Delay	16.6	3.8	1.1	25.5	8.3
Queue Delay	0.1	0.2	0.4	8.6	2.6
Total Delay	16.8	4.1	1.5	34.1	11.0
Queue Length 50th (ft)	121	35	0	140	18
Queue Length 95th (ft)	133	38	0	191	62
Internal Link Dist (ft)	262		432	70	
Turn Bay Length (ft)					
Base Capacity (vph)	1729	1853	2009	909	494
Starvation Cap Reductn	278	243	0	404	290
Spillback Cap Reductn	0	561	338	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.49	0.47	0.72	0.91	0.53

Intersection Summary



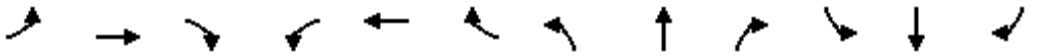
Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	660	565	69	1043	457	107
Future Volume (vph)	660	565	69	1043	457	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	11	11
Grade (%)	0%			0%	-1%	
Total Lost time (s)	5.0	5.0		5.0	4.0	4.0
Lane Util. Factor	0.95	0.88		0.91	0.97	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.85		1.00	1.00	0.85
Flt Protected	1.00	1.00		1.00	0.95	1.00
Satd. Flow (prot)	2973	2364		4153	2944	1358
Flt Permitted	1.00	1.00		0.83	0.95	1.00
Satd. Flow (perm)	2973	2364		3454	2944	1358
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.99	0.99
Adj. Flow (vph)	710	608	74	1122	462	108
RTOR Reduction (vph)	0	199	0	0	0	75
Lane Group Flow (vph)	710	409	0	1196	462	33
Confl. Peds. (#/hr)		45	45			
Confl. Bikes (#/hr)		3				
Heavy Vehicles (%)	2%	1%	1%	2%	4%	4%
Bus Blockages (#/hr)	0	0	0	18	0	0
Turn Type	NA	custom	Perm	NA	Prot	Perm
Protected Phases	2	2 8		6	4	
Permitted Phases			6			4
Actuated Green, G (s)	62.0	76.0		62.0	32.0	32.0
Effective Green, g (s)	64.0	74.0		64.0	34.0	34.0
Actuated g/C Ratio	0.58	0.67		0.58	0.31	0.31
Clearance Time (s)	7.0			7.0	6.0	6.0
Lane Grp Cap (vph)	1729	1590		2009	909	419
v/s Ratio Prot	0.24	0.17			c0.16	
v/s Ratio Perm				c0.35		0.02
v/c Ratio	0.41	0.26		0.60	0.51	0.08
Uniform Delay, d1	12.6	7.1		14.7	31.1	26.9
Progression Factor	1.25	7.98		0.01	0.75	1.34
Incremental Delay, d2	0.7	0.4		0.9	2.0	0.4
Delay (s)	16.4	57.2		1.1	25.2	36.4
Level of Service	B	E		A	C	D
Approach Delay (s)	35.2			1.1	27.4	
Approach LOS	D			A	C	

Intersection Summary			
HCM 2000 Control Delay	20.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBT
Lane Group Flow (vph)	825	1196	2
v/c Ratio	0.40	0.68	0.00
Control Delay	2.7	20.0	0.0
Queue Delay	0.0	0.0	0.0
Total Delay	2.7	20.0	0.0
Queue Length 50th (ft)	40	302	0
Queue Length 95th (ft)	45	378	0
Internal Link Dist (ft)	432	489	96
Turn Bay Length (ft)			
Base Capacity (vph)	2046	1758	848
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.40	0.68	0.00

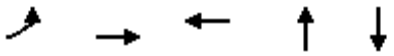
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	767	0	0	1112	0	0	0	2	0	0	0
Future Volume (vph)	0	767	0	0	1112	0	0	0	2	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	11	11	11	13	13	13	13	13	13
Grade (%)		0%			-6%			1%			-1%	
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		0.95			0.95			0.95				
Frpb, ped/bikes		1.00			1.00			0.98				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			1.00			0.85				
Flt Protected		1.00			1.00			1.00				
Satd. Flow (prot)		3002			3171			2776				
Flt Permitted		1.00			1.00			1.00				
Satd. Flow (perm)		3002			3171			2776				
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	825	0	0	1196	0	0	0	2	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	825	0	0	1196	0	0	0	0	0	0	0
Confl. Peds. (#/hr)	18		3	3		18	14		8	8		14
Confl. Bikes (#/hr)			1			4						2
Heavy Vehicles (%)	0%	1%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA			NA			NA				
Protected Phases	1	6			2			4				
Permitted Phases	6						4					
Actuated Green, G (s)		73.0			59.0			25.0				
Effective Green, g (s)		75.0			61.0			27.0				
Actuated g/C Ratio		0.68			0.55			0.25				
Clearance Time (s)		6.0			6.0			6.0				
Lane Grp Cap (vph)		2046			1758			681				
v/s Ratio Prot		c0.27			c0.38			c0.00				
v/s Ratio Perm												
v/c Ratio		0.40			0.68			0.00				
Uniform Delay, d1		7.7			17.5			31.3				
Progression Factor		0.27			1.00			1.00				
Incremental Delay, d2		0.6			2.1			0.0				
Delay (s)		2.6			19.7			31.3				
Level of Service		A			B			C				
Approach Delay (s)		2.6			19.7			31.3			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	12.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		

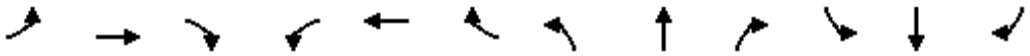
c Critical Lane Group



Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	82	27	130	320	381
v/c Ratio	0.24	0.05	0.41	0.15	0.18
Control Delay	48.0	48.4	39.6	17.4	12.4
Queue Delay	0.0	0.0	0.0	0.8	0.0
Total Delay	48.0	48.4	39.6	18.2	12.4
Queue Length 50th (ft)	56	19	77	53	46
Queue Length 95th (ft)	m84	m30	136	m62	64
Internal Link Dist (ft)		361	249	136	148
Turn Bay Length (ft)					
Base Capacity (vph)	338	536	316	2113	2094
Starvation Cap Reductn	0	0	0	1462	0
Spillback Cap Reductn	0	0	0	0	46
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.24	0.05	0.41	0.49	0.19

Intersection Summary

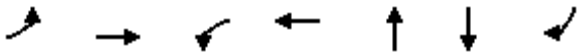
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	25	0	59	59	0	0	213	78	0	288	59
Future Volume (vph)	75	25	0	59	59	0	0	213	78	0	288	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	12	12	12	10	10	10	10	10	10
Grade (%)		0%			-1%			0%			1%	
Total Lost time (s)	3.0	5.0			5.0			4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00			0.91			0.91	
Frpb, ped/bikes	1.00	1.00			1.00			0.95			0.96	
Flpb, ped/bikes	0.98	1.00			0.99			1.00			1.00	
Frt	1.00	1.00			1.00			0.96			0.97	
Flt Protected	0.95	1.00			0.98			1.00			1.00	
Satd. Flow (prot)	1321	1596			1501			3741			3778	
Flt Permitted	0.63	1.00			0.84			1.00			1.00	
Satd. Flow (perm)	879	1596			1290			3741			3778	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	82	27	0	65	65	0	0	234	86	0	316	65
RTOR Reduction (vph)	0	0	0	0	0	0	0	38	0	0	0	0
Lane Group Flow (vph)	82	27	0	0	130	0	0	282	0	0	381	0
Confl. Peds. (#/hr)	27		8	8		27	61		56	56		61
Heavy Vehicles (%)	13%	0%	32%	0%	0%	0%	0%	8%	0%	0%	5%	0%
Parking (#/hr)				0	0	0					0	0
Turn Type	pm+pt	NA	Perm	Perm	NA			NA			NA	
Protected Phases	7	4			8			2			2	
Permitted Phases	4		4	8			2					
Actuated Green, G (s)	35.0	35.0			25.0			59.0			59.0	
Effective Green, g (s)	37.0	37.0			27.0			61.0			61.0	
Actuated g/C Ratio	0.34	0.34			0.25			0.55			0.55	
Clearance Time (s)	5.0	7.0			7.0			6.0			6.0	
Lane Grp Cap (vph)	323	536			316			2074			2095	
v/s Ratio Prot	c0.02	0.02						0.08			c0.10	
v/s Ratio Perm	0.07				c0.10							
v/c Ratio	0.25	0.05			0.41			0.14			0.18	
Uniform Delay, d1	26.2	24.6			34.8			11.8			12.1	
Progression Factor	1.87	1.93			1.00			2.01			1.00	
Incremental Delay, d2	1.5	0.1			3.9			0.1			0.2	
Delay (s)	50.5	47.8			38.8			23.8			12.3	
Level of Service	D	D			D			C			B	
Approach Delay (s)		49.8			38.8			23.8			12.3	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

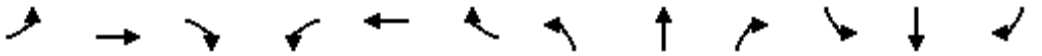
c Critical Lane Group



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	22	744	68	811	73	471	38
v/c Ratio	0.15	0.80	0.37	0.77	0.11	0.68	0.37
Control Delay	49.0	43.1	16.7	8.2	11.4	21.6	51.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.5	0.0
Total Delay	49.0	43.1	16.7	8.2	11.4	22.0	51.6
Queue Length 50th (ft)	15	253	38	28	16	258	26
Queue Length 95th (ft)	40	329	m49	24	44	381	m57
Internal Link Dist (ft)		171		412	453	306	
Turn Bay Length (ft)							
Base Capacity (vph)	142	931	186	1048	671	694	102
Starvation Cap Reductn	0	0	0	0	0	40	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.80	0.37	0.77	0.11	0.72	0.37

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	681	4	63	714	32	2	36	29	34	399	35
Future Volume (vph)	20	681	4	63	714	32	2	36	29	34	399	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	12	12	11	12	11	11
Total Lost time (s)	3.0	3.0		3.0	3.0			3.0			3.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.99			0.94			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	1.00
Satd. Flow (prot)	1570	3107		1577	3194			1479			1594	1405
Flt Permitted	0.95	1.00		0.95	1.00			0.99			0.97	1.00
Satd. Flow (perm)	1570	3107		1577	3194			1468			1559	1405
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	740	4	68	776	35	2	39	32	37	434	38
RTOR Reduction (vph)	0	0	0	0	3	0	0	18	0	0	0	0
Lane Group Flow (vph)	22	744	0	68	808	0	0	55	0	0	471	38
Confl. Peds. (#/hr)	1		5	5		1	10		8	8		10
Confl. Bikes (#/hr)									9			20
Heavy Vehicles (%)	0%	1%	0%	3%	1%	0%	0%	8%	7%	6%	3%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Over
Protected Phases	7	4		3	8			2			2	7
Permitted Phases							2			2		
Actuated Green, G (s)	7.0	30.0		10.0	33.0			45.0			45.0	7.0
Effective Green, g (s)	10.0	33.0		13.0	36.0			49.0			49.0	8.0
Actuated g/C Ratio	0.09	0.30		0.12	0.33			0.45			0.45	0.07
Clearance Time (s)	6.0	6.0		6.0	6.0			7.0			7.0	6.0
Lane Grp Cap (vph)	142	932		186	1045			653			694	102
v/s Ratio Prot	0.01	c0.24		0.04	c0.25							c0.03
v/s Ratio Perm								0.04			c0.30	
v/c Ratio	0.15	0.80		0.37	0.77			0.08			0.68	0.37
Uniform Delay, d1	46.1	35.4		44.7	33.3			17.6			24.2	48.6
Progression Factor	1.00	1.00		0.28	0.12			1.00			0.67	0.86
Incremental Delay, d2	2.3	7.1		4.1	4.2			0.3			4.7	9.1
Delay (s)	48.4	42.5		16.5	8.2			17.8			21.0	50.9
Level of Service	D	D		B	A			B			C	D
Approach Delay (s)		42.7			8.8			17.8			23.3	
Approach LOS		D			A			B			C	

Intersection Summary			
HCM 2000 Control Delay	24.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

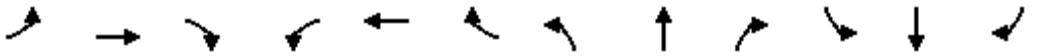


Lane Group	EBT	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	792	849	155	1053	312	182	1456
v/c Ratio	1.12	0.68	0.43	0.66	0.78	0.57	0.62
Control Delay	88.0	29.7	28.5	31.2	46.0	24.5	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	88.0	29.7	28.5	31.2	46.0	24.5	7.9
Queue Length 50th (ft)	~106	168	73	224	193	48	62
Queue Length 95th (ft)	#305	245	146	274	#339	112	70
Internal Link Dist (ft)	412	1035		259			307
Turn Bay Length (ft)			180		225		
Base Capacity (vph)	708	1253	364	1586	400	317	2340
Starvation Cap Reductn	0	0	0	0	0	0	182
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.12	0.68	0.43	0.66	0.78	0.57	0.67

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	684	59	10	788	146	0	990	293	171	1348	21
Future Volume (vph)	1	684	59	10	788	146	0	990	293	171	1348	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	11	11	11	10	10	10
Total Lost time (s)		5.0			5.0	5.0		4.0	4.0	4.0	4.0	
Lane Util. Factor		0.91			0.91	1.00		0.91	1.00	1.00	0.91	
Frpb, ped/bikes		0.99			1.00	0.86		1.00	0.82	1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.99			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		1.00			1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		4289			4267	1147		4257	1074	1511	4290	
Flt Permitted		0.94			0.92	1.00		1.00	1.00	0.17	1.00	
Satd. Flow (perm)		4028			3943	1147		4257	1074	277	4290	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1	728	63	11	838	155	0	1053	312	182	1434	22
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	792	0	0	849	155	0	1053	312	182	1456	0
Confl. Peds. (#/hr)	119		101	101		119	165		118	118		165
Confl. Bikes (#/hr)			4			9			37			3
Heavy Vehicles (%)	1%	3%	3%	2%	2%	0%	11%	6%	7%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	5	0	0	2	0	0	0
Turn Type		NA		Perm	NA	Perm		NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases				8		8			2	6		
Actuated Green, G (s)		33.0			33.0	33.0		39.0	39.0	58.0	58.0	
Effective Green, g (s)		35.0			35.0	35.0		41.0	41.0	60.0	60.0	
Actuated g/C Ratio		0.32			0.32	0.32		0.37	0.37	0.55	0.55	
Clearance Time (s)		7.0			7.0	7.0		6.0	6.0	6.0	6.0	
Lane Grp Cap (vph)		1281			1254	364		1586	400	319	2340	
v/s Ratio Prot								0.25		0.08	c0.34	
v/s Ratio Perm		0.20			c0.22	0.14			c0.29	0.23		
v/c Ratio		0.62			0.68	0.43		0.66	0.78	0.57	0.62	
Uniform Delay, d1		31.8			32.6	29.6		28.8	30.5	28.6	17.2	
Progression Factor		0.53			0.82	0.83		1.00	1.00	0.64	0.39	
Incremental Delay, d2		1.4			2.7	3.4		2.2	14.0	5.8	1.0	
Delay (s)		18.3			29.4	27.8		31.0	44.5	24.1	7.7	
Level of Service		B			C	C		C	D	C	A	
Approach Delay (s)		18.3			29.2			34.1			9.5	
Approach LOS		B			C			C			A	

Intersection Summary			
HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	86.7%	ICU Level of Service	E
Analysis Period (min)	15		

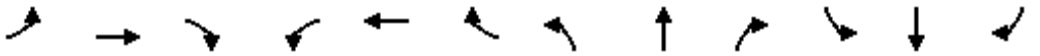
c Critical Lane Group



Lane Group	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	1221	344	1023	103	153	285	28
v/c Ratio	0.95	0.86	0.43	0.34	0.33	0.37	0.06
Control Delay	38.2	60.5	11.0	34.1	32.3	11.2	23.4
Queue Delay	0.0	0.0	0.0	6.2	10.2	1.3	0.0
Total Delay	38.2	60.5	11.0	40.3	42.5	12.5	23.4
Queue Length 50th (ft)	231	191	106	53	78	67	11
Queue Length 95th (ft)	m237	#337	106	110	146	95	33
Internal Link Dist (ft)	1035		511		84		359
Turn Bay Length (ft)						140	
Base Capacity (vph)	1287	398	2396	301	466	761	463
Starvation Cap Reductn	0	0	0	149	277	291	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.95	0.86	0.43	0.68	0.81	0.61	0.06

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	1023	44	323	840	121	97	144	268	8	11	7
Future Volume (vph)	81	1023	44	323	840	121	97	144	268	8	11	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	11	11	11	14	14	14
Total Lost time (s)		6.0		5.0	4.0		4.0	4.0	3.0		4.0	
Lane Util. Factor		0.86		1.00	0.91		1.00	1.00	1.00		1.00	
Frpb, ped/bikes		0.99		1.00	0.94		1.00	1.00	0.99		0.98	
Flpb, ped/bikes		0.99		1.00	1.00		0.92	1.00	1.00		1.00	
Frt		0.99		1.00	0.98		1.00	1.00	0.85		0.97	
Flt Protected		1.00		0.95	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (prot)		5121		1501	3907		1334	1605	1367		1693	
Flt Permitted		0.76		0.12	1.00		0.74	1.00	1.00		0.92	
Satd. Flow (perm)		3918		186	3907		1038	1605	1367		1576	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	86	1088	47	344	894	129	103	153	285	9	12	7
RTOR Reduction (vph)	0	5	0	0	18	0	0	0	28	0	5	0
Lane Group Flow (vph)	0	1216	0	344	1005	0	103	153	257	0	23	0
Confl. Peds. (#/hr)	43		165	165		43	83		1	1		83
Confl. Bikes (#/hr)									2			
Heavy Vehicles (%)	0%	3%	11%	1%	3%	1%	8%	3%	2%	0%	0%	0%
Bus Blockages (#/hr)	0	9	9	0	0	0	0	0	0	0	0	0
Turn Type	Perm	NA		custom	NA		Perm	NA	pm+ov	Perm	NA	
Protected Phases		6		5	1 2			14	5		14	
Permitted Phases	6			2			14		14	14		
Actuated Green, G (s)		35.0		64.0	64.0		29.0	29.0	52.0		29.0	
Effective Green, g (s)		36.0		65.0	65.0		32.0	32.0	58.0		32.0	
Actuated g/C Ratio		0.33		0.59	0.59		0.29	0.29	0.53		0.29	
Clearance Time (s)		7.0		6.0			7.0	7.0	6.0		7.0	
Lane Grp Cap (vph)		1282		396	2308		301	466	720		458	
v/s Ratio Prot				c0.19	0.26			0.10	c0.08			
v/s Ratio Perm		c0.31		0.32			0.10		0.10		0.01	
v/c Ratio		0.95		0.87	0.44		0.34	0.33	0.36		0.05	
Uniform Delay, d1		36.1		27.7	12.4		30.7	30.6	15.1		28.1	
Progression Factor		0.86		1.57	0.96		0.98	0.98	0.94		1.00	
Incremental Delay, d2		6.5		20.5	0.6		3.1	1.9	1.4		0.2	
Delay (s)		37.6		64.1	12.5		33.2	31.7	15.6		28.3	
Level of Service		D		E	B		C	C	B		C	
Approach Delay (s)		37.6			25.5			23.5			28.3	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1339	1298	76	66
v/c Ratio	0.49	0.46	0.25	0.13
Control Delay	7.9	10.8	36.8	6.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.9	10.8	36.8	6.3
Queue Length 50th (ft)	57	109	44	0
Queue Length 95th (ft)	m72	124	87	28
Internal Link Dist (ft)	511	529	390	
Turn Bay Length (ft)				
Base Capacity (vph)	2750	2846	302	502
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.49	0.46	0.25	0.13

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



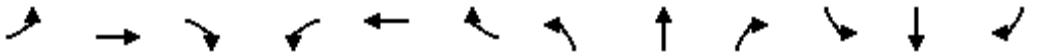
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1264	35	49	1210	74	64
Future Volume (vph)	1264	35	49	1210	74	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	13	13
Total Lost time (s)	5.0			5.0	4.0	3.0
Lane Util. Factor	0.86			0.86	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.94
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	5301			5235	1281	1329
Flt Permitted	1.00			0.82	0.95	1.00
Satd. Flow (perm)	5301			4291	1281	1329
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1303	36	51	1247	76	66
RTOR Reduction (vph)	3	0	0	0	0	44
Lane Group Flow (vph)	1336	0	0	1298	76	22
Confl. Peds. (#/hr)		42	42		28	50
Confl. Bikes (#/hr)		7				10
Heavy Vehicles (%)	2%	26%	20%	4%	31%	6%
Turn Type	NA		pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	4	1
Permitted Phases			6			4
Actuated Green, G (s)	55.0			69.0	24.0	33.0
Effective Green, g (s)	57.0			71.0	26.0	37.0
Actuated g/C Ratio	0.52			0.65	0.24	0.34
Clearance Time (s)	7.0			7.0	6.0	5.0
Lane Grp Cap (vph)	2746			2864	302	447
v/s Ratio Prot	c0.25			c0.05	c0.06	0.00
v/s Ratio Perm				0.25		0.01
v/c Ratio	0.49			0.45	0.25	0.05
Uniform Delay, d1	17.1			9.8	34.1	24.6
Progression Factor	0.44			1.10	1.00	1.00
Incremental Delay, d2	0.3			0.5	2.0	0.2
Delay (s)	7.9			11.3	36.1	24.8
Level of Service	A			B	D	C
Approach Delay (s)	7.9			11.3	30.9	
Approach LOS	A			B	C	

Intersection Summary			
HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBT	NBR	SBR
Lane Group Flow (vph)	1275	1299	61	49	1
v/c Ratio	0.48	0.38	0.19	0.19	0.00
Control Delay	0.8	4.4	34.9	1.7	31.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	0.8	4.4	34.9	1.7	31.0
Queue Length 50th (ft)	2	59	34	0	1
Queue Length 95th (ft)	1	69	71	0	5
Internal Link Dist (ft)	1	427	135		
Turn Bay Length (ft)					10
Base Capacity (vph)	2665	3391	316	256	342
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	279	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.48	0.42	0.19	0.19	0.00

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1237	0	0	1260	0	59	0	48	0	0	1
Future Volume (vph)	0	1237	0	0	1260	0	59	0	48	0	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		0.86			0.86			1.00	1.00			1.00
Frpb, ped/bikes		1.00			1.00			1.00	1.00			0.96
Flpb, ped/bikes		1.00			1.00			0.97	1.00			1.00
Frt		1.00			1.00			1.00	0.85			0.85
Flt Protected		1.00			1.00			0.95	1.00			1.00
Satd. Flow (prot)		5330			5330			1288	1221			1397
Flt Permitted		1.00			1.00			0.95	1.00			1.00
Satd. Flow (perm)		5330			5330			1288	1221			1397
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	1275	0	0	1299	0	61	0	49	0	0	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	44	0	0	0
Lane Group Flow (vph)	0	1275	0	0	1299	0	0	61	5	0	0	1
Confl. Peds. (#/hr)			39	39			21		19	19		21
Confl. Bikes (#/hr)			3			2			2			
Heavy Vehicles (%)	0%	3%	1%	0%	3%	0%	3%	0%	0%	0%	0%	0%
Parking (#/hr)							0	0	0			
Turn Type		NA			NA		Perm	NA	custom	D.Pm		Perm
Protected Phases		12			6			8	11			
Permitted Phases	12						8			8		8
Actuated Green, G (s)		53.0			68.0			25.0	9.0			25.0
Effective Green, g (s)		55.0			70.0			27.0	11.0			27.0
Actuated g/C Ratio		0.50			0.64			0.25	0.10			0.25
Clearance Time (s)		6.0			6.0			6.0	6.0			6.0
Lane Grp Cap (vph)		2665			3391			316	122			342
v/s Ratio Prot		c0.24			c0.24				0.00			
v/s Ratio Perm								0.05				0.00
v/c Ratio		0.48			0.38			0.19	0.04			0.00
Uniform Delay, d1		18.1			9.6			32.9	44.7			31.3
Progression Factor		0.02			0.43			1.00	1.00			1.00
Incremental Delay, d2		0.5			0.3			1.4	0.6			0.0
Delay (s)		0.8			4.4			34.2	45.3			31.4
Level of Service		A			A			C	D			C
Approach Delay (s)		0.8			4.4			39.2			31.4	
Approach LOS		A			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	4.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		

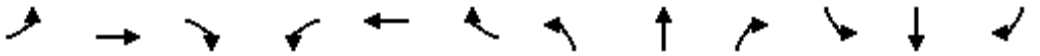
c Critical Lane Group



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	1325	1061	104	274	315	562
v/c Ratio	0.88dl	0.59	0.32	0.25	0.81	0.46
Control Delay	8.8	26.6	21.7	30.6	42.6	23.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.8	26.6	21.7	30.6	42.6	23.3
Queue Length 50th (ft)	71	119	43	54	155	82
Queue Length 95th (ft)	67	161	79	79	#281	118
Internal Link Dist (ft)	427	493		361		348
Turn Bay Length (ft)			110			
Base Capacity (vph)	1848	1811	330	1083	389	1230
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.59	0.32	0.25	0.81	0.46

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	136	1095	54	10	932	87	101	198	68	306	318	227
Future Volume (vph)	136	1095	54	10	932	87	101	198	68	306	318	227
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			2%			0%			2%	
Total Lost time (s)		5.0			5.0		3.0	5.0		3.0	5.0	
Lane Util. Factor		0.86			0.86		1.00	0.91		1.00	0.91	
Frpb, ped/bikes		0.99			0.99		1.00	0.94		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		0.92	1.00	
Frt		0.99			0.99		1.00	0.96		1.00	0.94	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		5018			5059		1516	3724		1377	3824	
Flt Permitted		0.71			0.91		0.36	1.00		0.58	1.00	
Satd. Flow (perm)		3599			4600		578	3724		836	3824	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	140	1129	56	10	961	90	104	204	70	315	328	234
RTOR Reduction (vph)	0	6	0	0	13	0	0	0	0	0	118	0
Lane Group Flow (vph)	0	1319	0	0	1048	0	104	274	0	315	444	0
Confl. Peds. (#/hr)	94		277	277		94			152	152		
Confl. Bikes (#/hr)						1						2
Heavy Vehicles (%)	33%	3%	11%	0%	5%	1%	0%	5%	9%	0%	5%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	7	7
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		52.0			41.0		39.0	30.0		39.0	30.0	
Effective Green, g (s)		54.0			43.0		43.0	32.0		43.0	32.0	
Actuated g/C Ratio		0.49			0.39		0.39	0.29		0.39	0.29	
Clearance Time (s)		7.0			7.0		5.0	7.0		5.0	7.0	
Lane Grp Cap (vph)		1869			1798		319	1083		380	1112	
v/s Ratio Prot		c0.05					0.03	0.07		c0.08	0.12	
v/s Ratio Perm		c0.30			0.23		0.09			c0.24		
v/c Ratio		0.88dl			0.58		0.33	0.25		0.83	0.40	
Uniform Delay, d1		21.8			26.4		22.0	29.9		27.7	31.3	
Progression Factor		0.31			0.97		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.0			1.3		2.7	0.6		18.5	1.1	
Delay (s)		8.9			26.9		24.8	30.4		46.2	32.4	
Level of Service		A			C		C	C		D	C	
Approach Delay (s)		8.9			26.9			28.9			37.3	
Approach LOS		A			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	93.5%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group



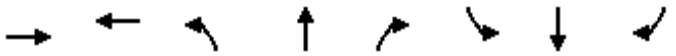
Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1514	974	102	107
v/c Ratio	0.46	0.33	0.26	0.33
Control Delay	6.7	13.0	33.6	35.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.7	13.0	33.6	35.5
Queue Length 50th (ft)	121	87	56	60
Queue Length 95th (ft)	176	91	104	112
Internal Link Dist (ft)	493	589	158	
Turn Bay Length (ft)				
Base Capacity (vph)	3298	2954	390	322
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.46	0.33	0.26	0.33

Intersection Summary



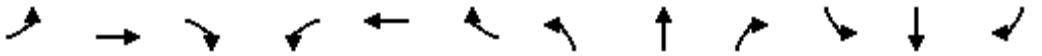
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1425	44	15	930	99	104
Future Volume (vph)	1425	44	15	930	99	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10
Grade (%)	-2%			1%	-2%	
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.86			0.86	1.00	1.00
Frpb, ped/bikes	0.99			1.00	1.00	0.88
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	5257			5294	1431	1183
Flt Permitted	1.00			0.89	0.95	1.00
Satd. Flow (perm)	5257			4712	1431	1183
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1469	45	15	959	102	107
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1514	0	0	974	102	107
Confl. Peds. (#/hr)		106	106		108	75
Confl. Bikes (#/hr)		3				3
Heavy Vehicles (%)	2%	15%	11%	2%	7%	2%
Bus Blockages (#/hr)	14	14	9	9	0	0
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			2	4	
Permitted Phases			2		4	4
Actuated Green, G (s)	67.0			67.0	28.0	28.0
Effective Green, g (s)	69.0			69.0	30.0	30.0
Actuated g/C Ratio	0.63			0.63	0.27	0.27
Clearance Time (s)	6.0			6.0	6.0	6.0
Lane Grp Cap (vph)	3297			2955	390	322
v/s Ratio Prot	c0.29				0.07	
v/s Ratio Perm				0.21		c0.09
v/c Ratio	0.46			0.33	0.26	0.33
Uniform Delay, d1	10.7			9.6	31.3	32.0
Progression Factor	0.59			1.31	1.00	1.00
Incremental Delay, d2	0.3			0.3	1.6	2.8
Delay (s)	6.7			12.9	33.0	34.7
Level of Service	A			B	C	C
Approach Delay (s)	6.7			12.9	33.9	
Approach LOS	A			B	C	

Intersection Summary			
HCM 2000 Control Delay	11.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1662	1010	77	41	123	80	43	47
v/c Ratio	0.75	0.45	0.33	0.10	0.40	0.36	0.10	0.21
Control Delay	12.9	10.2	34.8	28.7	9.4	35.9	28.8	32.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.9	10.2	34.8	28.7	9.4	35.9	28.8	32.0
Queue Length 50th (ft)	83	55	42	21	0	44	22	25
Queue Length 95th (ft)	83	94	87	48	48	91	50	58
Internal Link Dist (ft)	589	201		452			368	
Turn Bay Length (ft)			110		70	150		75
Base Capacity (vph)	2205	2222	233	428	308	223	422	223
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.45	0.33	0.10	0.40	0.36	0.10	0.21

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	1461	53	71	831	28	71	38	113	74	40	43
Future Volume (vph)	15	1461	53	71	831	28	71	38	113	74	40	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			1%			-1%			2%	
Total Lost time (s)		4.0			4.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.86			0.86		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		0.98			0.98		1.00	1.00	0.62	1.00	1.00	0.64
Flpb, ped/bikes		1.00			1.00		0.66	1.00	1.00	0.64	1.00	1.00
Frt		0.99			1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00			1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		5195			5225		1012	1429	740	968	1408	744
Flt Permitted		0.91			0.74		0.73	1.00	1.00	0.73	1.00	1.00
Satd. Flow (perm)		4748			3865		777	1429	740	744	1408	744
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	1588	58	77	903	30	77	41	123	80	43	47
RTOR Reduction (vph)	0	4	0	0	4	0	0	0	86	0	0	0
Lane Group Flow (vph)	0	1658	0	0	1006	0	77	41	37	80	43	47
Confl. Peds. (#/hr)	327		421	421		327	335		391	391		335
Confl. Bikes (#/hr)			2			8			2			3
Heavy Vehicles (%)	33%	1%	4%	0%	1%	1%	0%	1%	1%	0%	1%	2%
Bus Blockages (#/hr)	0	11	11	0	9	9	0	0	4	0	0	4
Parking (#/hr)								0	0		0	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		6		5	2			8			4	
Permitted Phases	6			2			8		8	4		4
Actuated Green, G (s)		49.0			59.0		31.0	31.0	31.0	31.0	31.0	31.0
Effective Green, g (s)		51.0			61.0		33.0	33.0	33.0	33.0	33.0	33.0
Actuated g/C Ratio		0.46			0.55		0.30	0.30	0.30	0.30	0.30	0.30
Clearance Time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Grp Cap (vph)		2201			2229		233	428	222	223	422	223
v/s Ratio Prot					c0.03			0.03			0.03	
v/s Ratio Perm		c0.35			0.22		0.10		0.05	c0.11		0.06
v/c Ratio		0.75			0.45		0.33	0.10	0.17	0.36	0.10	0.21
Uniform Delay, d1		24.3			14.6		29.9	27.7	28.4	30.2	27.8	28.8
Progression Factor		0.44			0.69		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		2.3			0.6		3.8	0.4	1.6	4.4	0.5	2.1
Delay (s)		12.9			10.7		33.7	28.2	30.0	34.6	28.3	30.9
Level of Service		B			B		C	C	C	C	C	C
Approach Delay (s)		12.9			10.7			30.9			32.0	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

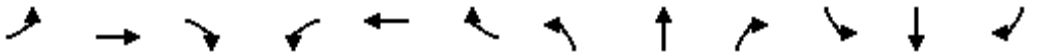


Lane Group	EBT	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	1627	933	158	437	327
v/c Ratio	1.22	0.60	0.34	0.50	0.57
Control Delay	118.7	21.1	43.1	10.4	9.9
Queue Delay	0.0	0.6	0.0	0.5	0.0
Total Delay	118.7	21.7	43.1	10.9	9.9
Queue Length 50th (ft)	~407	123	52	14	167
Queue Length 95th (ft)	#473	145	85	18	262
Internal Link Dist (ft)	308	262	479		136
Turn Bay Length (ft)					
Base Capacity (vph)	1339	1549	467	867	570
Starvation Cap Reductn	0	271	0	138	4
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.22	0.73	0.34	0.60	0.58

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	1489	23	9	748	111	0	80	67	406	228	76
Future Volume (vph)	1	1489	23	9	748	111	0	80	67	406	228	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	10	10	10
Grade (%)		-1%			0%			-1%			0%	
Total Lost time (s)		4.0			4.0			5.0		4.0	4.0	
Lane Util. Factor		0.86			0.91			0.95		0.97	1.00	
Frpb, ped/bikes		1.00			0.99			0.94		1.00	1.00	
Flpb, ped/bikes		1.00			1.00			1.00		0.94	1.00	
Frt		1.00			0.98			0.93		1.00	0.96	
Flt Protected		1.00			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		5294			3955			2857		2225	1256	
Flt Permitted		0.93			0.91			1.00		0.65	1.00	
Satd. Flow (perm)		4935			3585			2857		1527	1256	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	1	1601	25	10	804	119	0	86	72	437	245	82
RTOR Reduction (vph)	0	0	0	0	17	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	1627	0	0	916	0	0	158	0	437	316	0
Confl. Peds. (#/hr)	43		4	4		43	5		59	59		5
Confl. Bikes (#/hr)			2			10			2			2
Heavy Vehicles (%)	0%	4%	0%	0%	4%	27%	0%	0%	0%	24%	0%	38%
Parking (#/hr)											0	0
Turn Type		NA		Perm	NA			NA		pm+pt	NA	
Protected Phases		2			2			4		3	8	
Permitted Phases				2						8		
Actuated Green, G (s)		45.0			45.0			16.0		47.0	47.0	
Effective Green, g (s)		47.0			47.0			18.0		49.0	49.0	
Actuated g/C Ratio		0.43			0.43			0.16		0.45	0.45	
Clearance Time (s)		6.0			6.0			7.0		6.0	6.0	
Lane Grp Cap (vph)		2108			1531			467		845	559	
v/s Ratio Prot								0.06		0.12	c0.25	
v/s Ratio Perm		c0.33			0.26					0.11		
v/c Ratio		0.77			0.60			0.34		0.52	0.57	
Uniform Delay, d1		26.9			24.2			40.7		23.4	22.6	
Progression Factor		0.38			0.82			1.00		0.35	0.28	
Incremental Delay, d2		2.0			1.6			2.0		2.1	3.8	
Delay (s)		12.1			21.6			42.7		10.2	10.0	
Level of Service		B			C			D		B	B	
Approach Delay (s)		12.1			21.6			42.7			10.1	
Approach LOS		B			C			D			B	

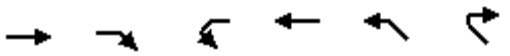
Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	EBR	WBT	NWL	NWR
Lane Group Flow (vph)	1497	613	645	340	77
v/c Ratio	0.80	0.34	0.32	0.45	0.20
Control Delay	7.3	2.0	1.5	29.0	9.8
Queue Delay	4.8	0.6	0.0	19.2	3.9
Total Delay	12.1	2.6	1.5	48.2	13.7
Queue Length 50th (ft)	138	36	4	106	23
Queue Length 95th (ft)	m122	m26	6	151	52
Internal Link Dist (ft)	262		432	70	
Turn Bay Length (ft)					
Base Capacity (vph)	1873	1808	1991	749	385
Starvation Cap Reductn	310	757	0	398	241
Spillback Cap Reductn	0	503	223	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.96	0.58	0.36	0.97	0.53

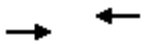
Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



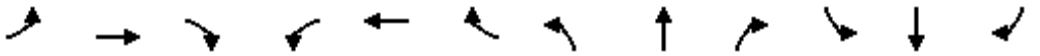
Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	1392	570	45	555	313	71
Future Volume (vph)	1392	570	45	555	313	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	11	11
Grade (%)	0%			0%	-1%	
Total Lost time (s)	5.0	5.0		5.0	4.0	4.0
Lane Util. Factor	0.95	0.88		0.91	0.97	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.85		1.00	1.00	0.85
Flt Protected	1.00	1.00		1.00	0.95	1.00
Satd. Flow (prot)	2944	2341		4189	2944	1358
Flt Permitted	1.00	1.00		0.74	0.95	1.00
Satd. Flow (perm)	2944	2341		3130	2944	1358
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.92	0.92
Adj. Flow (vph)	1497	613	48	597	340	77
RTOR Reduction (vph)	0	0	0	0	0	40
Lane Group Flow (vph)	1497	613	0	645	340	37
Confl. Peds. (#/hr)		37	37			
Confl. Bikes (#/hr)		3				
Heavy Vehicles (%)	3%	2%	7%	2%	4%	4%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	NA	custom	Perm	NA	Prot	Perm
Protected Phases	2	2 8		6	4	
Permitted Phases			6			4
Actuated Green, G (s)	68.0	83.0		68.0	26.0	26.0
Effective Green, g (s)	70.0	81.0		70.0	28.0	28.0
Actuated g/C Ratio	0.64	0.74		0.64	0.25	0.25
Clearance Time (s)	7.0			7.0	6.0	6.0
Lane Grp Cap (vph)	1873	1723		1991	749	345
v/s Ratio Prot	c0.51	0.26			c0.12	
v/s Ratio Perm				0.21		0.03
v/c Ratio	0.80	0.36		0.32	0.45	0.11
Uniform Delay, d1	14.8	5.2		9.2	34.6	31.4
Progression Factor	0.45	0.50		0.11	0.77	0.65
Incremental Delay, d2	0.3	0.1		0.4	2.0	0.6
Delay (s)	7.1	2.7		1.5	28.7	21.0
Level of Service	A	A		A	C	C
Approach Delay (s)	5.8			1.5	27.3	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	7.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT
Lane Group Flow (vph)	1573	646
v/c Ratio	0.79	0.41
Control Delay	6.8	17.1
Queue Delay	0.0	0.0
Total Delay	6.8	17.1
Queue Length 50th (ft)	89	140
Queue Length 95th (ft)	95	184
Internal Link Dist (ft)	432	489
Turn Bay Length (ft)		
Base Capacity (vph)	1988	1594
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.79	0.41

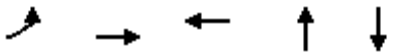
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1463	0	0	600	1	0	0	0	0	0	0
Future Volume (vph)	0	1463	0	0	600	1	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	11	11	11	13	13	13	13	13	13
Grade (%)		0%			-6%			1%			-1%	
Total Lost time (s)		4.0			4.0							
Lane Util. Factor		0.95			0.95							
Frpb, ped/bikes		1.00			1.00							
Flpb, ped/bikes		1.00			1.00							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		2916			3077							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		2916			3077							
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	1573	0	0	645	1	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1573	0	0	646	0	0	0	0	0	0	0
Confl. Peds. (#/hr)	92		2	2		92			116	116		
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	4%	0%	0%	5%	43%	0%	0%	0%	0%	0%	13%
Turn Type		NA			NA							
Protected Phases	1	6			2			4				
Permitted Phases	6						4					
Actuated Green, G (s)		73.0			55.0							
Effective Green, g (s)		75.0			57.0							
Actuated g/C Ratio		0.68			0.52							
Clearance Time (s)		6.0			6.0							
Lane Grp Cap (vph)		1988			1594							
v/s Ratio Prot		c0.54			0.21							
v/s Ratio Perm												
v/c Ratio		0.79			0.41							
Uniform Delay, d1		12.1			16.2							
Progression Factor		0.38			1.00							
Incremental Delay, d2		2.1			0.8							
Delay (s)		6.6			16.9							
Level of Service		A			B							
Approach Delay (s)		6.6			16.9			0.0			0.0	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

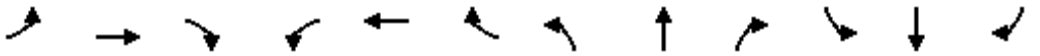
c Critical Lane Group



Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	111	37	116	211	780
v/c Ratio	0.25	0.06	0.32	0.12	0.42
Control Delay	17.1	19.7	34.1	11.0	20.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	17.1	19.7	34.1	11.0	20.0
Queue Length 50th (ft)	25	10	65	20	128
Queue Length 95th (ft)	m48	m18	116	38	163
Internal Link Dist (ft)		361	249	136	148
Turn Bay Length (ft)					
Base Capacity (vph)	440	600	365	1725	1842
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	74
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.25	0.06	0.32	0.12	0.44

Intersection Summary

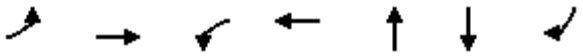
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	34	0	53	53	0	0	106	86	0	657	53
Future Volume (vph)	101	34	0	53	53	0	0	106	86	0	657	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	12	12	12	10	10	10	10	10	10
Grade (%)		0%			-1%			0%			1%	
Total Lost time (s)	3.0	5.0			5.0			4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00			0.91			0.91	
Frpb, ped/bikes	1.00	1.00			1.00			0.91			0.98	
Flpb, ped/bikes	0.98	1.00			0.99			1.00			1.00	
Frt	1.00	1.00			1.00			0.93			0.99	
Flt Protected	0.95	1.00			0.98			1.00			1.00	
Satd. Flow (prot)	1319	1436			1501			3546			3898	
Flt Permitted	0.65	1.00			0.84			1.00			1.00	
Satd. Flow (perm)	908	1436			1296			3546			3898	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	111	37	0	58	58	0	0	116	95	0	722	58
RTOR Reduction (vph)	0	0	0	0	0	0	0	50	0	0	0	0
Lane Group Flow (vph)	111	37	0	0	116	0	0	161	0	0	780	0
Confl. Peds. (#/hr)	27		8	8		27	61		56	56		61
Heavy Vehicles (%)	13%	0%	32%	0%	0%	0%	0%	8%	0%	0%	5%	0%
Parking (#/hr)		0	0	0	0	0					0	0
Turn Type	pm+pt	NA		Perm	NA			NA			NA	
Protected Phases	7	4			8			2			2	
Permitted Phases	4			8			2					
Actuated Green, G (s)	44.0	44.0			29.0			50.0			50.0	
Effective Green, g (s)	46.0	46.0			31.0			52.0			52.0	
Actuated g/C Ratio	0.42	0.42			0.28			0.47			0.47	
Clearance Time (s)	5.0	7.0			7.0			6.0			6.0	
Lane Grp Cap (vph)	424	600			365			1676			1842	
v/s Ratio Prot	c0.03	0.03						0.05			c0.20	
v/s Ratio Perm	0.08				c0.09							
v/c Ratio	0.26	0.06			0.32			0.10			0.42	
Uniform Delay, d1	20.6	19.1			31.2			16.0			19.1	
Progression Factor	0.83	1.01			1.00			1.24			1.00	
Incremental Delay, d2	1.1	0.1			2.3			0.1			0.7	
Delay (s)	18.1	19.4			33.4			19.9			19.8	
Level of Service	B	B			C			B			B	
Approach Delay (s)		18.4			33.4			19.9			19.8	
Approach LOS		B			C			B			B	

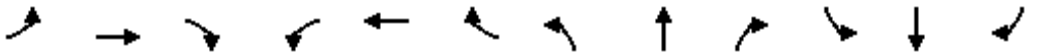
Intersection Summary			
HCM 2000 Control Delay	20.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	45	676	63	519	138	224	71
v/c Ratio	0.17	0.72	0.28	0.61	0.21	0.39	0.34
Control Delay	37.4	36.4	23.1	16.6	15.3	15.5	37.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.4	36.4	23.1	16.6	15.3	15.5	37.9
Queue Length 50th (ft)	25	201	30	44	41	98	42
Queue Length 95th (ft)	57	267	61	51	83	162	87
Internal Link Dist (ft)		172		412	319	306	
Turn Bay Length (ft)							
Base Capacity (vph)	266	936	223	852	642	579	208
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.72	0.28	0.61	0.21	0.39	0.34

Intersection Summary



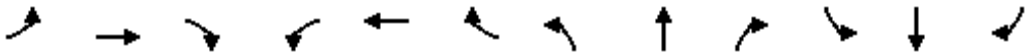
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	615	21	59	444	44	10	73	46	56	154	67
Future Volume (vph)	42	615	21	59	444	44	10	73	46	56	154	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	12	12	11	12	11	11
Total Lost time (s)	3.0	3.0		3.0	3.0			3.0			3.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.98			0.98			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			0.99	1.00
Frt	1.00	1.00		1.00	0.99			0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	1.00
Satd. Flow (prot)	1570	3114		1593	3133			1553			1565	1391
Flt Permitted	0.95	1.00		0.95	1.00			0.97			0.89	1.00
Satd. Flow (perm)	1570	3114		1593	3133			1518			1413	1391
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	45	654	22	63	472	47	11	78	49	60	164	71
RTOR Reduction (vph)	0	2	0	0	7	0	0	20	0	0	0	0
Lane Group Flow (vph)	45	674	0	63	512	0	0	118	0	0	224	71
Confl. Peds. (#/hr)	64		27	27		64	113		43	43		113
Confl. Bikes (#/hr)			1			5			17			29
Heavy Vehicles (%)	0%	0%	0%	2%	0%	0%	0%	1%	2%	1%	4%	1%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Over
Protected Phases	7	4		3	8			2			2	7
Permitted Phases							2			2		
Actuated Green, G (s)	14.0	27.0		11.0	24.0			37.0			37.0	14.0
Effective Green, g (s)	17.0	30.0		14.0	27.0			41.0			41.0	15.0
Actuated g/C Ratio	0.17	0.30		0.14	0.27			0.41			0.41	0.15
Clearance Time (s)	6.0	6.0		6.0	6.0			7.0			7.0	6.0
Lane Grp Cap (vph)	266	934		223	845			622			579	208
v/s Ratio Prot	0.03	c0.22		0.04	c0.16							c0.05
v/s Ratio Perm								0.08			c0.16	
v/c Ratio	0.17	0.72		0.28	0.61			0.19			0.39	0.34
Uniform Delay, d1	35.5	31.3		38.5	31.9			18.9			20.7	38.1
Progression Factor	1.00	1.00		0.51	0.43			1.00			0.64	0.87
Incremental Delay, d2	1.4	4.8		3.0	3.0			0.7			1.9	4.3
Delay (s)	36.8	36.1		22.8	16.7			19.5			15.2	37.2
Level of Service	D	D		C	B			B			B	D
Approach Delay (s)		36.1			17.3			19.5			20.5	
Approach LOS		D			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	788	530	93	1031	285	104	1052
v/c Ratio	0.50	0.36	0.23	0.66	0.59	0.52	0.49
Control Delay	7.5	31.2	30.5	28.9	31.4	24.7	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	7.5	31.2	30.5	28.9	31.4	24.7	7.9
Queue Length 50th (ft)	30	112	48	198	144	17	49
Queue Length 95th (ft)	38	146	97	247	234	53	57
Internal Link Dist (ft)	412	1036		403			307
Turn Bay Length (ft)			180		225		
Base Capacity (vph)	1563	1461	410	1552	485	201	2129
Starvation Cap Reductn	0	0	0	0	0	0	127
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.36	0.23	0.66	0.59	0.52	0.53

Intersection Summary



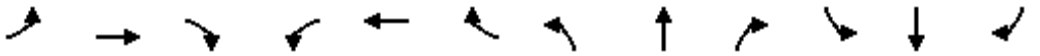
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	658	59	4	479	85	1	937	259	95	890	67
Future Volume (vph)	0	658	59	4	479	85	1	937	259	95	890	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	11	11	11	10	10	10
Total Lost time (s)		3.0			3.0	3.0		3.0	3.0	8.0	3.0	
Lane Util. Factor		0.91			0.91	1.00		0.91	1.00	1.00	0.91	
Frpb, ped/bikes		0.99			1.00	0.92		1.00	0.94	1.00	0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.99			1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected		1.00			1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		4341			4346	1140		4468	1313	1416	4097	
Flt Permitted		1.00			0.93	1.00		0.94	1.00	0.17	1.00	
Satd. Flow (perm)		4341			4060	1140		4196	1313	260	4097	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	723	65	4	526	93	1	1030	285	104	978	74
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	788	0	0	530	93	0	1031	285	104	1052	0
Confl. Peds. (#/hr)	75		123	123		75	78		39	39		78
Confl. Bikes (#/hr)			10			1						
Heavy Vehicles (%)	0%	1%	8%	25%	0%	8%	0%	1%	1%	7%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	3	0	0	0	0	0	0
Parking (#/hr)											0	0
Turn Type		NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases				8		8	2		2	6		
Actuated Green, G (s)		32.0			32.0	32.0		33.0	33.0	48.0	48.0	
Effective Green, g (s)		36.0			36.0	36.0		37.0	37.0	47.0	52.0	
Actuated g/C Ratio		0.36			0.36	0.36		0.37	0.37	0.47	0.52	
Clearance Time (s)		7.0			7.0	7.0		7.0	7.0	7.0	7.0	
Lane Grp Cap (vph)		1562			1461	410		1552	485	203	2130	
v/s Ratio Prot		c0.18								0.04	c0.26	
v/s Ratio Perm					0.13	0.08		c0.25	0.22	0.20		
v/c Ratio		0.50			0.36	0.23		0.66	0.59	0.51	0.49	
Uniform Delay, d1		25.0			23.6	22.3		26.3	25.4	30.2	15.5	
Progression Factor		0.26			1.29	1.28		1.00	1.00	0.60	0.45	
Incremental Delay, d2		0.9			0.7	1.3		2.3	5.1	8.1	0.7	
Delay (s)		7.4			31.0	29.7		28.6	30.5	26.3	7.7	
Level of Service		A			C	C		C	C	C	A	
Approach Delay (s)		7.4			30.8			29.0			9.4	
Approach LOS		A			C			C			A	

Intersection Summary			
HCM 2000 Control Delay	19.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	1137	69	675	60	131	110	26
v/c Ratio	0.61	0.31	0.29	0.21	0.27	0.19	0.06
Control Delay	14.2	10.3	1.6	27.5	27.5	16.9	17.3
Queue Delay	0.0	0.0	0.0	4.9	10.5	1.4	0.0
Total Delay	14.2	10.3	1.6	32.5	38.0	18.3	17.3
Queue Length 50th (ft)	80	5	0	27	60	27	6
Queue Length 95th (ft)	93	28	0	55	98	64	26
Internal Link Dist (ft)	1036		509		64		359
Turn Bay Length (ft)						140	
Base Capacity (vph)	1865	225	2299	290	479	565	427
Starvation Cap Reductn	0	0	0	178	313	312	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.31	0.29	0.54	0.79	0.43	0.06

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	124	856	32	61	503	98	53	117	98	4	8	12
Future Volume (vph)	124	856	32	61	503	98	53	117	98	4	8	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	11	11	11	14	14	14
Total Lost time (s)		6.0		5.0	4.0		4.0	4.0	3.0		4.0	
Lane Util. Factor		0.86		1.00	0.91		1.00	1.00	1.00		1.00	
Frpb, ped/bikes		0.99		1.00	0.89		1.00	1.00	0.98		0.92	
Flpb, ped/bikes		0.97		0.99	1.00		0.85	1.00	1.00		1.00	
Frt		1.00		1.00	0.98		1.00	1.00	0.85		0.93	
Flt Protected		0.99		0.95	1.00		0.95	1.00	1.00		0.99	
Satd. Flow (prot)		5114		1450	3783		1284	1653	1381		1485	
Flt Permitted		0.77		0.19	1.00		0.74	1.00	1.00		0.97	
Satd. Flow (perm)		3962		290	3783		1001	1653	1381		1445	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	139	962	36	69	565	110	60	131	110	4	9	13
RTOR Reduction (vph)	0	4	0	0	30	0	0	0	41	0	9	0
Lane Group Flow (vph)	0	1133	0	69	645	0	60	131	69	0	17	0
Confl. Peds. (#/hr)	134		99	99		134	150		9	9		150
Confl. Bikes (#/hr)			1			5			4			3
Heavy Vehicles (%)	0%	1%	12%	4%	0%	0%	4%	0%	0%	0%	12%	0%
Bus Blockages (#/hr)	0	8	8	0	0	0	0	0	0	0	0	0
Turn Type	Perm	NA		custom	NA		Perm	NA	pm+ov	Perm	NA	
Protected Phases		6		5	1 2			14	5		14	
Permitted Phases	6			2			14		14	14		
Actuated Green, G (s)		46.0		52.0	57.0		26.0	26.0	31.0		26.0	
Effective Green, g (s)		47.0		54.0	58.0		29.0	29.0	37.0		29.0	
Actuated g/C Ratio		0.47		0.54	0.58		0.29	0.29	0.37		0.29	
Clearance Time (s)		7.0		6.0			7.0	7.0	6.0		7.0	
Lane Grp Cap (vph)		1862		226	2194		290	479	510		419	
v/s Ratio Prot				0.02	c0.17			c0.08	0.01			
v/s Ratio Perm		c0.29		0.15			0.06		0.04		0.01	
v/c Ratio		0.61		0.31	0.29		0.21	0.27	0.14		0.04	
Uniform Delay, d1		19.7		11.4	10.6		26.8	27.4	20.9		25.5	
Progression Factor		0.65		0.76	0.14		0.94	0.93	1.81		1.00	
Incremental Delay, d2		1.3		3.4	0.3		1.6	1.4	0.6		0.2	
Delay (s)		14.1		12.0	1.9		26.8	27.0	38.4		25.7	
Level of Service		B		B	A		C	C	D		C	
Approach Delay (s)		14.1			2.8			31.1			25.7	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	12.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1053	661	89	93
v/c Ratio	0.39	0.29	0.21	0.22
Control Delay	2.7	11.6	30.6	10.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	2.7	11.6	30.6	10.4
Queue Length 50th (ft)	17	76	45	13
Queue Length 95th (ft)	22	95	86	46
Internal Link Dist (ft)	509	523	265	
Turn Bay Length (ft)				
Base Capacity (vph)	2713	2308	427	420
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.39	0.29	0.21	0.22

Intersection Summary



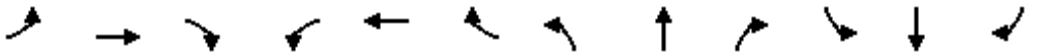
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	929	29	21	581	81	85
Future Volume (vph)	929	29	21	581	81	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	13	13
Total Lost time (s)	5.0			5.0	4.0	3.0
Lane Util. Factor	0.86			0.91	1.00	1.00
Frpb, ped/bikes	0.98			1.00	1.00	0.75
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	5313			4235	1646	1120
Flt Permitted	1.00			0.88	0.95	1.00
Satd. Flow (perm)	5313			3744	1646	1120
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	1021	32	23	638	89	93
RTOR Reduction (vph)	4	0	0	0	0	42
Lane Group Flow (vph)	1049	0	0	661	89	51
Confl. Peds. (#/hr)		231	231		2	259
Confl. Bikes (#/hr)		8				
Heavy Vehicles (%)	1%	3%	14%	2%	2%	1%
Turn Type	NA		pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	4	1
Permitted Phases			6			4
Actuated Green, G (s)	49.0			59.0	24.0	29.0
Effective Green, g (s)	51.0			61.0	26.0	33.0
Actuated g/C Ratio	0.51			0.61	0.26	0.33
Clearance Time (s)	7.0			7.0	6.0	5.0
Lane Grp Cap (vph)	2709			2318	427	369
v/s Ratio Prot	c0.20			c0.02	c0.05	0.01
v/s Ratio Perm				0.15		0.04
v/c Ratio	0.39			0.29	0.21	0.14
Uniform Delay, d1	15.0			9.2	28.9	23.5
Progression Factor	0.15			1.24	1.00	1.00
Incremental Delay, d2	0.3			0.3	1.1	0.8
Delay (s)	2.7			11.7	30.1	24.3
Level of Service	A			B	C	C
Approach Delay (s)	2.7			11.7	27.1	
Approach LOS	A			B	C	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBT	NBR
Lane Group Flow (vph)	954	753	37	12
v/c Ratio	0.37	0.23	0.11	0.05
Control Delay	1.9	9.0	28.7	0.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	1.9	9.1	28.7	0.5
Queue Length 50th (ft)	9	48	18	0
Queue Length 95th (ft)	10	65	44	0
Internal Link Dist (ft)	1	426	250	
Turn Bay Length (ft)				
Base Capacity (vph)	2554	3229	334	219
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	458	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.37	0.27	0.11	0.05

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	878	0	0	693	0	34	0	11	0	0	0
Future Volume (vph)	0	878	0	0	693	0	34	0	11	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			
Lane Util. Factor		0.86			0.86			1.00	1.00			
Frpb, ped/bikes		1.00			1.00			1.00	1.00			
Flpb, ped/bikes		1.00			1.00			0.91	1.00			
Frt		1.00			1.00			1.00	0.85			
Flt Protected		1.00			1.00			0.95	1.00			
Satd. Flow (prot)		5436			5383			1240	1221			
Flt Permitted		1.00			1.00			0.95	1.00			
Satd. Flow (perm)		5436			5383			1240	1221			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	954	0	0	753	0	37	0	12	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	11	0	0	0
Lane Group Flow (vph)	0	954	0	0	753	0	0	37	1	0	0	0
Confl. Peds. (#/hr)			134	134			76		18	18		76
Confl. Bikes (#/hr)			7			4						
Heavy Vehicles (%)	0%	1%	1%	4%	2%	0%	0%	0%	0%	0%	0%	0%
Parking (#/hr)							0	0	0			
Turn Type		NA			NA		Perm	NA	custom	D.Pm		Perm
Protected Phases		12			6			8	11			
Permitted Phases	12						8			8		8
Actuated Green, G (s)		45.0			58.0			25.0	7.0			
Effective Green, g (s)		47.0			60.0			27.0	9.0			
Actuated g/C Ratio		0.47			0.60			0.27	0.09			
Clearance Time (s)		6.0			6.0			6.0	6.0			
Lane Grp Cap (vph)		2554			3229			334	109			
v/s Ratio Prot		c0.18			c0.14				0.00			
v/s Ratio Perm								0.03				
v/c Ratio		0.37			0.23			0.11	0.01			
Uniform Delay, d1		17.0			9.3			27.5	41.4			
Progression Factor		0.09			0.95			1.00	1.00			
Incremental Delay, d2		0.4			0.2			0.7	0.2			
Delay (s)		1.9			9.0			28.1	41.6			
Level of Service		A			A			C	D			
Approach Delay (s)		1.9			9.0			31.4			0.0	
Approach LOS		A			A			C			A	

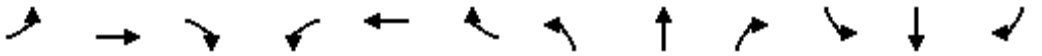
Intersection Summary			
HCM 2000 Control Delay	5.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBT	EBR	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	905	51	692	54	197	162	166	127
v/c Ratio	0.56	0.10	0.48	0.15	0.25	0.48	0.22	0.38
Control Delay	4.4	0.3	5.2	19.4	25.8	25.5	27.9	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.4	0.3	5.2	19.4	25.8	25.5	27.9	6.5
Queue Length 50th (ft)	1	0	19	21	45	67	42	0
Queue Length 95th (ft)	1	0	27	46	75	117	69	31
Internal Link Dist (ft)	426		493		418		342	
Turn Bay Length (ft)		75		110				30
Base Capacity (vph)	1613	531	1440	353	777	339	765	334
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.10	0.48	0.15	0.25	0.48	0.22	0.38

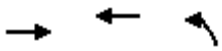
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	692	47	21	525	97	50	159	24	151	154	118
Future Volume (vph)	150	692	47	21	525	97	50	159	24	151	154	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			2%			0%			2%	
Total Lost time (s)		4.0	6.0		4.0		2.0	4.0		2.0	4.0	6.0
Lane Util. Factor		0.91	1.00		0.91		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.79		0.96		1.00	0.96		1.00	1.00	0.73
Flpb, ped/bikes		0.99	1.00		1.00		0.87	1.00		0.87	1.00	1.00
Frt		1.00	0.85		0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected		0.99	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		4130	948		3799		1244	2642		1238	2641	824
Flt Permitted		0.69	1.00		0.89		0.65	1.00		0.62	1.00	1.00
Satd. Flow (perm)		2887	948		3372		847	2642		809	2641	824
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	161	744	51	23	565	104	54	171	26	162	166	127
RTOR Reduction (vph)	0	0	25	0	25	0	0	12	0	0	0	93
Lane Group Flow (vph)	0	905	26	0	667	0	54	185	0	162	166	34
Confl. Peds. (#/hr)	207		166	166		207	200		226	226		200
Confl. Bikes (#/hr)			2						6			3
Heavy Vehicles (%)	0%	0%	2%	10%	2%	2%	6%	3%	0%	5%	8%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	3
Parking (#/hr)		0	0		0	0		0	0		0	0
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		8
Actuated Green, G (s)		50.0	50.0		39.0		31.0	26.0		31.0	26.0	26.0
Effective Green, g (s)		53.0	51.0		42.0		37.0	29.0		37.0	29.0	27.0
Actuated g/C Ratio		0.53	0.51		0.42		0.37	0.29		0.37	0.29	0.27
Clearance Time (s)		7.0	7.0		7.0		5.0	7.0		5.0	7.0	7.0
Lane Grp Cap (vph)		1641	483		1416		345	766		333	765	222
v/s Ratio Prot		c0.05					0.01	0.07		c0.04	0.06	
v/s Ratio Perm		0.24	0.03		c0.20		0.05			0.14		0.04
v/c Ratio		0.55	0.05		0.47		0.16	0.24		0.49	0.22	0.15
Uniform Delay, d1		15.6	12.3		21.0		20.7	27.1		22.9	26.9	27.8
Progression Factor		0.21	0.00		0.20		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		1.3	0.2		1.1		1.0	0.7		5.0	0.7	1.5
Delay (s)		4.5	0.2		5.4		21.7	27.8		27.9	27.5	29.3
Level of Service		A	A		A		C	C		C	C	C
Approach Delay (s)		4.3			5.4			26.5			28.2	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	81.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBT	WBT	NBL
Lane Group Flow (vph)	942	645	133
v/c Ratio	0.40	0.30	0.46
Control Delay	5.0	12.7	34.0
Queue Delay	0.0	0.0	0.0
Total Delay	5.0	12.7	34.0
Queue Length 50th (ft)	42	90	68
Queue Length 95th (ft)	51	100	127
Internal Link Dist (ft)	493	589	212
Turn Bay Length (ft)			
Base Capacity (vph)	2333	2128	290
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.40	0.30	0.46

Intersection Summary



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	806	61	18	575	68	54
Future Volume (vph)	806	61	18	575	68	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10
Grade (%)	-2%			1%	-2%	
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	0.91			0.91	1.00	
Frpb, ped/bikes	0.97			1.00	0.86	
Flpb, ped/bikes	1.00			1.00	0.82	
Frt	0.99			1.00	0.94	
Flt Protected	1.00			1.00	0.97	
Satd. Flow (prot)	4010			4093	938	
Flt Permitted	1.00			0.89	0.97	
Satd. Flow (perm)	4010			3667	938	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	876	66	20	625	74	59
RTOR Reduction (vph)	8	0	0	0	0	0
Lane Group Flow (vph)	934	0	0	645	133	0
Confl. Peds. (#/hr)		131	131		335	230
Confl. Bikes (#/hr)		3				1
Heavy Vehicles (%)	2%	0%	0%	2%	0%	0%
Parking (#/hr)	0	0		0	0	0
Turn Type	NA		Perm	NA	Perm	
Protected Phases	2			2		
Permitted Phases			2		4	
Actuated Green, G (s)	56.0			56.0	29.0	
Effective Green, g (s)	58.0			58.0	31.0	
Actuated g/C Ratio	0.58			0.58	0.31	
Clearance Time (s)	6.0			6.0	6.0	
Lane Grp Cap (vph)	2325			2126	290	
v/s Ratio Prot	c0.23					
v/s Ratio Perm				0.18	c0.14	
v/c Ratio	0.40			0.30	0.46	
Uniform Delay, d1	11.5			10.7	27.8	
Progression Factor	0.40			1.14	1.00	
Incremental Delay, d2	0.4			0.4	5.1	
Delay (s)	5.0			12.6	32.9	
Level of Service	A			B	C	
Approach Delay (s)	5.0			12.6	32.9	
Approach LOS	A			B	C	

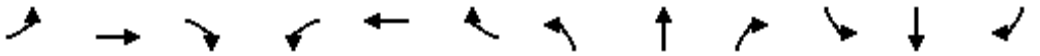
Intersection Summary			
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	875	60	609	7	40	59	30	59
v/c Ratio	0.49	0.14	0.30	0.03	0.16	0.18	0.12	0.21
Control Delay	6.5	1.4	14.1	0.3	30.0	17.3	29.2	30.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.5	1.4	14.1	0.3	30.0	17.3	29.2	30.6
Queue Length 50th (ft)	62	0	63	0	19	13	14	29
Queue Length 95th (ft)	75	1	89	m0	48	46	39	64
Internal Link Dist (ft)	589		201			407		351
Turn Bay Length (ft)		92		68	110		150	
Base Capacity (vph)	1796	431	2023	248	251	323	247	286
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.14	0.30	0.03	0.16	0.18	0.12	0.21

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	794	55	36	524	6	37	25	29	28	22	32
Future Volume (vph)	11	794	55	36	524	6	37	25	29	28	22	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			1%			-1%			2%	
Total Lost time (s)		4.0	4.0		4.0	4.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.91	1.00		0.91	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00	0.66		1.00	0.33	1.00	0.88		1.00	0.88	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	0.82	1.00		0.81	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	0.92		1.00	0.91	
Flt Protected		1.00	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4111	783		4085	387	1231	1112		1213	1062	
Flt Permitted		0.93	1.00		0.85	1.00	0.72	1.00		0.72	1.00	
Satd. Flow (perm)		3821	783		3486	387	931	1112		917	1062	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	863	60	39	570	7	40	27	32	30	24	35
RTOR Reduction (vph)	0	0	32	0	0	3	0	23	0	0	0	0
Lane Group Flow (vph)	0	875	28	0	609	4	40	36	0	30	59	0
Confl. Peds. (#/hr)	502		123	123		502	121		132	132		121
Confl. Bikes (#/hr)			10			12			20			17
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	2%	10%	0%	0%	17%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	2	0	0	1
Parking (#/hr)		0	0		0	0		0	0		0	0
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		6		5	2			4			4	
Permitted Phases	6		6	2		2	4			4		
Actuated Green, G (s)		45.0	45.0		55.0	55.0	25.0	25.0		25.0	25.0	
Effective Green, g (s)		47.0	47.0		57.0	57.0	27.0	27.0		27.0	27.0	
Actuated g/C Ratio		0.47	0.47		0.57	0.57	0.27	0.27		0.27	0.27	
Clearance Time (s)		6.0	6.0		6.0	6.0	7.0	7.0		7.0	7.0	
Lane Grp Cap (vph)		1795	368		2028	220	251	300		247	286	
v/s Ratio Prot					c0.02			0.03			c0.06	
v/s Ratio Perm		c0.23	0.04		0.15	0.01	0.04			0.03		
v/c Ratio		0.49	0.08		0.30	0.02	0.16	0.12		0.12	0.21	
Uniform Delay, d1		18.2	14.6		11.2	9.3	27.8	27.5		27.5	28.2	
Progression Factor		0.30	1.00		1.25	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.9	0.4		0.4	0.1	1.4	0.8		1.0	1.6	
Delay (s)		6.4	14.9		14.3	9.5	29.2	28.3		28.6	29.8	
Level of Service		A	B		B	A	C	C		C	C	
Approach Delay (s)		7.0			14.2			28.7			29.4	
Approach LOS		A			B			C			C	

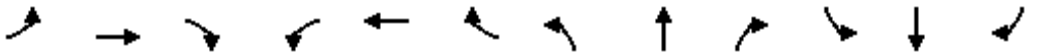
Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	59.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBT	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	851	535	64	102	154
v/c Ratio	0.61	0.39	0.20	0.08	0.23
Control Delay	10.9	19.2	33.1	8.3	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.9
Total Delay	10.9	19.2	33.1	8.3	9.5
Queue Length 50th (ft)	29	59	33	10	26
Queue Length 95th (ft)	61	76	70	19	45
Internal Link Dist (ft)	308	262	414		136
Turn Bay Length (ft)					
Base Capacity (vph)	1404	1360	320	1227	669
Starvation Cap Reductn	0	0	0	0	309
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.61	0.39	0.20	0.08	0.43

Intersection Summary



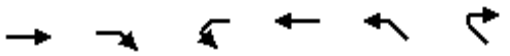
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	750	13	12	406	64	0	38	20	92	106	32
Future Volume (vph)	4	750	13	12	406	64	0	38	20	92	106	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	10	10	10
Grade (%)		-1%			0%			-1%			0%	
Total Lost time (s)		4.0			4.0			5.0		4.0	4.0	
Lane Util. Factor		0.91			0.91			1.00		0.97	1.00	
Frpb, ped/bikes		1.00			0.99			0.98		1.00	0.98	
Flpb, ped/bikes		1.00			1.00			1.00		0.97	1.00	
Frt		1.00			0.98			0.95		1.00	0.96	
Flt Protected		1.00			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		4155			4148			1393		2824	1315	
Flt Permitted		0.94			0.91			1.00		0.72	1.00	
Satd. Flow (perm)		3897			3780			1393		2127	1315	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	4	833	14	13	451	71	0	42	22	102	118	36
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	851	0	0	535	0	0	64	0	102	143	0
Confl. Peds. (#/hr)	34		58	58		34	69		33	33		69
Confl. Bikes (#/hr)			2			1			3			1
Heavy Vehicles (%)	0%	1%	23%	0%	1%	9%	0%	3%	5%	1%	4%	0%
Parking (#/hr)		0	0					0	0		0	0
Turn Type	Perm	NA		Perm	NA			NA		pm+pt	NA	
Protected Phases		2			2			4		3	8	
Permitted Phases	2			2						8		
Actuated Green, G (s)		34.0			34.0			21.0		48.0	48.0	
Effective Green, g (s)		36.0			36.0			23.0		50.0	50.0	
Actuated g/C Ratio		0.36			0.36			0.23		0.50	0.50	
Clearance Time (s)		6.0			6.0			7.0		6.0	6.0	
Lane Grp Cap (vph)		1402			1360			320		1216	657	
v/s Ratio Prot								0.05		0.02	c0.11	
v/s Ratio Perm		c0.22			0.14					0.02		
v/c Ratio		0.61			0.39			0.20		0.08	0.22	
Uniform Delay, d1		26.2			23.9			31.1		13.1	14.0	
Progression Factor		0.34			0.76			1.00		0.61	0.64	
Incremental Delay, d2		1.8			0.8			1.4		0.1	0.8	
Delay (s)		10.8			19.1			32.5		8.2	9.7	
Level of Service		B			B			C		A	A	
Approach Delay (s)		10.8			19.1			32.5			9.1	
Approach LOS		B			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	EBR	WBT	NWL	NWR
Lane Group Flow (vph)	715	232	397	168	24
v/c Ratio	0.45	0.16	0.20	0.16	0.05
Control Delay	5.2	3.2	1.4	21.0	15.2
Queue Delay	0.0	0.0	0.0	3.6	1.6
Total Delay	5.3	3.2	1.4	24.5	16.9
Queue Length 50th (ft)	32	10	2	43	7
Queue Length 95th (ft)	40	15	3	63	24
Internal Link Dist (ft)	262		432	70	
Turn Bay Length (ft)					
Base Capacity (vph)	1591	1489	2007	1050	500
Starvation Cap Reductn	72	0	0	789	399
Spillback Cap Reductn	0	13	7	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.47	0.16	0.20	0.64	0.24

Intersection Summary

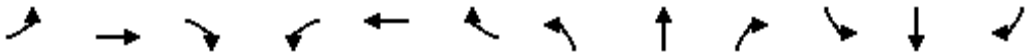


Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	651	211	17	344	138	20
Future Volume (vph)	651	211	17	344	138	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	11	11
Grade (%)	0%			0%	-1%	
Total Lost time (s)	5.0	5.0		5.0	4.0	4.0
Lane Util. Factor	0.95	0.88		0.91	0.97	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.85		1.00	1.00	0.85
Flt Protected	1.00	1.00		1.00	0.95	1.00
Satd. Flow (prot)	3002	2364		4230	3002	1384
Flt Permitted	1.00	1.00		0.89	0.95	1.00
Satd. Flow (perm)	3002	2364		3786	3002	1384
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.82	0.82
Adj. Flow (vph)	715	232	19	378	168	24
RTOR Reduction (vph)	0	0	0	0	0	16
Lane Group Flow (vph)	715	232	0	397	168	8
Confl. Peds. (#/hr)			11	11		
Confl. Bikes (#/hr)			6			
Heavy Vehicles (%)	1%	1%	0%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	6	0	0
Turn Type	NA	custom	Perm	NA	Prot	Perm
Protected Phases	2	2 8		6	4	
Permitted Phases			6			4
Actuated Green, G (s)	51.0	61.0		51.0	33.0	33.0
Effective Green, g (s)	53.0	59.0		53.0	35.0	35.0
Actuated g/C Ratio	0.53	0.59		0.53	0.35	0.35
Clearance Time (s)	7.0			7.0	6.0	6.0
Lane Grp Cap (vph)	1591	1394		2006	1050	484
v/s Ratio Prot	c0.24	0.10			c0.06	
v/s Ratio Perm				0.10		0.01
v/c Ratio	0.45	0.17		0.20	0.16	0.02
Uniform Delay, d1	14.5	9.3		12.3	22.4	21.3
Progression Factor	0.30	0.40		0.10	0.91	1.76
Incremental Delay, d2	0.8	0.2		0.2	0.3	0.1
Delay (s)	5.2	3.9		1.4	20.8	37.5
Level of Service	A	A		A	C	D
Approach Delay (s)	4.9			1.4	22.9	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	6.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	35.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT
Lane Group Flow (vph)	737	397
v/c Ratio	0.29	0.28
Control Delay	1.2	18.0
Queue Delay	0.0	0.0
Total Delay	1.2	18.0
Queue Length 50th (ft)	6	81
Queue Length 95th (ft)	8	115
Internal Link Dist (ft)	432	475
Turn Bay Length (ft)		
Base Capacity (vph)	2539	1399
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.29	0.28

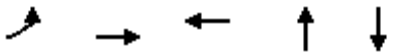
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	669	0	0	361	0	0	0	0	0	0	0
Future Volume (vph)	2	669	0	0	361	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	11	11	11	13	13	13	13	13	13
Grade (%)		0%			-6%			1%			-1%	
Total Lost time (s)		4.0			4.0							
Lane Util. Factor		0.91			0.95							
Frpb, ped/bikes		1.00			1.00							
Flpb, ped/bikes		1.00			1.00							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		4228			3111							
Flt Permitted		0.94			1.00							
Satd. Flow (perm)		3975			3111							
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	2	735	0	0	397	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	737	0	0	397	0	0	0	0	0	0	0
Confl. Peds. (#/hr)	132		160	160		132	227		134	134		227
Confl. Bikes (#/hr)			3			4			4			7
Heavy Vehicles (%)	1%	3%	12%	16%	4%	5%	8%	12%	12%	0%	3%	1%
Turn Type	pm+pt	NA			NA							
Protected Phases	1	6			2			4				
Permitted Phases	6						4					
Actuated Green, G (s)		61.0			43.0							
Effective Green, g (s)		63.0			45.0							
Actuated g/C Ratio		0.63			0.45							
Clearance Time (s)		6.0			6.0							
Lane Grp Cap (vph)		2539			1399							
v/s Ratio Prot		c0.04			0.13							
v/s Ratio Perm		c0.14										
v/c Ratio		0.29			0.28							
Uniform Delay, d1		8.4			17.3							
Progression Factor		0.11			1.00							
Incremental Delay, d2		0.3			0.5							
Delay (s)		1.1			17.8							
Level of Service		A			B							
Approach Delay (s)		1.1			17.8			0.0			0.0	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		

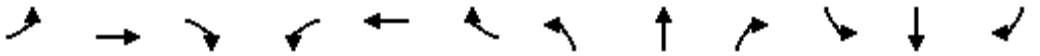
c Critical Lane Group



Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	69	34	152	117	253
v/c Ratio	0.15	0.05	0.37	0.11	0.16
Control Delay	6.4	7.4	29.4	13.2	18.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	6.4	7.4	29.4	13.2	18.4
Queue Length 50th (ft)	7	4	74	20	35
Queue Length 95th (ft)	15	m10	131	m40	54
Internal Link Dist (ft)		361	249	136	148
Turn Bay Length (ft)					
Base Capacity (vph)	468	660	416	1023	1571
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.15	0.05	0.37	0.11	0.16

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



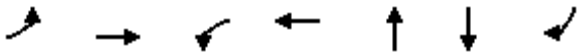
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	31	0	66	72	0	0	59	47	0	164	66
Future Volume (vph)	63	31	0	66	72	0	0	59	47	0	164	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	12	12	12	10	10	10	10	10	10
Grade (%)		0%			-1%			0%			1%	
Total Lost time (s)	3.0	5.0			5.0			4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00			0.95			0.91	
Frpb, ped/bikes	1.00	1.00			1.00			0.92			0.97	
Flpb, ped/bikes	0.99	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			1.00			0.93			0.96	
Flt Protected	0.95	1.00			0.98			1.00			1.00	
Satd. Flow (prot)	1323	1436			1504			2367			3740	
Flt Permitted	0.63	1.00			0.85			1.00			1.00	
Satd. Flow (perm)	876	1436			1301			2367			3740	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	69	34	0	73	79	0	0	65	52	0	180	73
RTOR Reduction (vph)	0	0	0	0	0	0	0	30	0	0	0	0
Lane Group Flow (vph)	69	34	0	0	152	0	0	87	0	0	253	0
Confl. Peds. (#/hr)	27		8	8		27	61		56	56		61
Heavy Vehicles (%)	13%	0%	32%	0%	0%	0%	0%	8%	0%	0%	5%	0%
Parking (#/hr)		0	0	0	0	0		0	0		0	0
Turn Type	pm+pt	NA	Perm	Perm	NA			NA			NA	
Protected Phases	7	4			8			2			2	
Permitted Phases	4		4	8			2					
Actuated Green, G (s)	44.0	44.0			30.0			40.0			40.0	
Effective Green, g (s)	46.0	46.0			32.0			42.0			42.0	
Actuated g/C Ratio	0.46	0.46			0.32			0.42			0.42	
Clearance Time (s)	5.0	7.0			7.0			6.0			6.0	
Lane Grp Cap (vph)	452	660			416			994			1570	
v/s Ratio Prot	c0.02	0.02						0.04			c0.07	
v/s Ratio Perm	0.05				c0.12							
v/c Ratio	0.15	0.05			0.37			0.09			0.16	
Uniform Delay, d1	15.7	14.9			26.2			17.5			18.0	
Progression Factor	0.40	0.48			1.00			1.26			1.00	
Incremental Delay, d2	0.6	0.1			2.5			0.2			0.2	
Delay (s)	6.9	7.3			28.7			22.2			18.3	
Level of Service	A	A			C			C			B	
Approach Delay (s)		7.1			28.7			22.2			18.3	
Approach LOS		A			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

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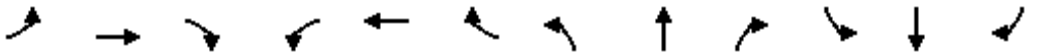
Appendix C
Scenario 2 Operation Analysis Results



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	283	1168	25	568	200	109	28
v/c Ratio	0.65	0.81	0.22	0.67	0.41	0.27	0.09
Control Delay	43.0	30.9	26.0	11.4	31.3	28.1	29.4
Queue Delay	0.0	46.2	0.0	1.3	0.0	0.0	0.0
Total Delay	43.0	77.2	26.0	12.7	31.3	28.1	29.4
Queue Length 50th (ft)	176	362	13	9	106	57	15
Queue Length 95th (ft)	271	457	m19	31	174	105	39
Internal Link Dist (ft)		172		412	453	306	
Turn Bay Length (ft)			200				
Base Capacity (vph)	434	1440	113	843	488	401	296
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	373	0	119	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	1.09	0.22	0.78	0.41	0.27	0.09

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	283	1163	5	25	402	166	8	164	28	28	81	28
Future Volume (vph)	283	1163	5	25	402	166	8	164	28	28	81	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	12	12	11	12	11	11
Total Lost time (s)	3.0	3.0		3.0	3.0			3.0			3.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.99			0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.96			0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	1.00
Satd. Flow (prot)	1540	3107		1562	3044			1531			1389	1124
Flt Permitted	0.95	1.00		0.95	1.00			0.99			0.90	1.00
Satd. Flow (perm)	1540	3107		1562	3044			1519			1261	1124
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	283	1163	5	25	402	166	8	164	28	28	81	28
RTOR Reduction (vph)	0	0	0	0	41	0	0	5	0	0	0	0
Lane Group Flow (vph)	283	1168	0	25	528	0	0	195	0	0	109	28
Confl. Peds. (#/hr)			13	13			21		19	19		21
Confl. Bikes (#/hr)						1			33			22
Heavy Vehicles (%)	2%	1%	0%	4%	2%	0%	25%	9%	0%	0%	23%	25%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Over
Protected Phases	7	4		3	8			2			2	7
Permitted Phases							2			2		
Actuated Green, G (s)	28.0	48.0		5.0	26.0			31.0			31.0	28.0
Effective Green, g (s)	31.0	51.0		8.0	29.0			35.0			35.0	29.0
Actuated g/C Ratio	0.28	0.46		0.07	0.26			0.32			0.32	0.26
Clearance Time (s)	6.0	6.0		6.0	6.0			7.0			7.0	6.0
Lane Grp Cap (vph)	434	1440		113	802			483			401	296
v/s Ratio Prot	c0.18	c0.38		0.02	c0.17							0.02
v/s Ratio Perm								c0.13			0.09	
v/c Ratio	0.65	0.81		0.22	0.66			0.40			0.27	0.09
Uniform Delay, d1	34.8	25.4		48.1	36.1			29.3			28.0	30.6
Progression Factor	1.00	1.00		0.46	0.24			1.00			0.92	0.92
Incremental Delay, d2	7.4	5.1		3.6	3.4			2.5			1.7	0.6
Delay (s)	42.2	30.4		25.7	12.1			31.8			27.5	28.8
Level of Service	D	C		C	B			C			C	C
Approach Delay (s)		32.7			12.6			31.8			27.8	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	72.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

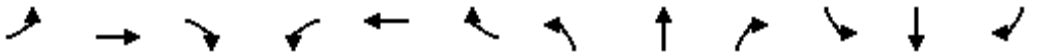


Lane Group	EBT	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	1219	581	224	1567	386	179	499
v/c Ratio	1.12	0.61	0.56	1.02	0.88	0.91	0.24
Control Delay	79.3	24.8	27.9	63.0	57.2	78.8	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.3	24.8	27.9	63.0	57.2	78.8	10.5
Queue Length 50th (ft)	~527	136	99	~415	255	85	34
Queue Length 95th (ft)	#641	194	167	#525	#435	#222	43
Internal Link Dist (ft)	412	1035		259			307
Turn Bay Length (ft)			200		225		
Base Capacity (vph)	1086	957	399	1543	437	196	2103
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.12	0.61	0.56	1.02	0.88	0.91	0.24

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1171	48	1	580	224	0	1567	386	179	486	13
Future Volume (vph)	0	1171	48	1	580	224	0	1567	386	179	486	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	11	11	11	10	10	10
Total Lost time (s)		5.0			5.0	5.0		5.0	5.0	5.0	5.0	
Lane Util. Factor		0.95			0.95	1.00		0.91	1.00	1.00	0.91	
Frpb, ped/bikes		0.99			1.00	0.91		1.00	0.94	1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.99			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		1.00			1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3066			3031	1127		4468	1265	1417	4285	
Flt Permitted		1.00			0.89	1.00		1.00	1.00	0.09	1.00	
Satd. Flow (perm)		3066			2702	1127		4468	1265	139	4285	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1171	48	1	580	224	0	1567	386	179	486	13
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1219	0	0	581	224	0	1567	386	179	499	0
Confl. Peds. (#/hr)	75		123	123		75	78		39	39		78
Confl. Bikes (#/hr)			10			1						
Heavy Vehicles (%)	0%	1%	8%	25%	0%	8%	0%	1%	1%	7%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	4	0	0	8	0	0	0
Turn Type		NA		Perm	NA	Perm		NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases				8		8			2	6		
Actuated Green, G (s)		37.0			37.0	37.0		36.0	36.0	52.0	52.0	
Effective Green, g (s)		39.0			39.0	39.0		38.0	38.0	54.0	54.0	
Actuated g/C Ratio		0.35			0.35	0.35		0.35	0.35	0.49	0.49	
Clearance Time (s)		7.0			7.0	7.0		7.0	7.0	7.0	7.0	
Lane Grp Cap (vph)		1087			957	399		1543	437	196	2103	
v/s Ratio Prot		c0.40						c0.35		c0.09	0.12	
v/s Ratio Perm					0.22	0.20			0.31	0.36		
v/c Ratio		1.12			0.61	0.56		1.02	0.88	0.91	0.24	
Uniform Delay, d1		35.5			29.2	28.6		36.0	33.9	41.0	16.1	
Progression Factor		0.35			0.75	0.77		1.00	1.00	0.79	0.63	
Incremental Delay, d2		62.5			2.7	5.2		26.9	22.0	44.3	0.3	
Delay (s)		74.8			24.5	27.2		62.9	55.9	76.5	10.5	
Level of Service		E			C	C		E	E	E	B	
Approach Delay (s)		74.8			25.2			61.5			27.9	
Approach LOS		E			C			E			C	

Intersection Summary			
HCM 2000 Control Delay	53.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	95.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



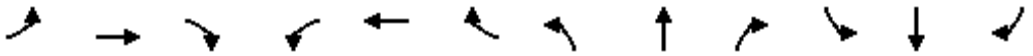
Lane Group	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	1736	119	780	113	148	161	37
v/c Ratio	1.39	0.73	0.40	0.54	0.49	0.38	0.12
Control Delay	200.6	46.9	12.5	49.5	44.3	28.8	31.8
Queue Delay	0.7	0.0	0.0	16.6	32.3	1.6	0.0
Total Delay	201.3	46.9	12.5	66.1	76.6	30.4	31.8
Queue Length 50th (ft)	~538	66	143	66	86	62	17
Queue Length 95th (ft)	m#445	m#108	138	134	159	114	47
Internal Link Dist (ft)	1035		511		84		359
Turn Bay Length (ft)		200				140	
Base Capacity (vph)	1245	164	1952	208	303	426	313
Starvation Cap Reductn	0	0	0	77	151	137	0
Spillback Cap Reductn	181	0	0	0	0	4	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.63	0.73	0.40	0.86	0.97	0.56	0.12

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	1501	114	119	684	96	113	148	161	5	24	8
Future Volume (vph)	121	1501	114	119	684	96	113	148	161	5	24	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	11	11	11	14	14	14
Total Lost time (s)		6.0		5.0	4.0		4.0	4.0	3.0		4.0	
Lane Util. Factor		0.95		1.00	0.95		1.00	1.00	1.00		1.00	
Frpb, ped/bikes		0.98		1.00	0.97		1.00	1.00	0.99		0.97	
Flpb, ped/bikes		0.99		1.00	1.00		0.90	1.00	1.00		1.00	
Frt		0.99		1.00	0.98		1.00	1.00	0.85		0.97	
Flt Protected		1.00		0.95	1.00		0.95	1.00	1.00		0.99	
Satd. Flow (prot)		2803		1472	2774		1280	1589	1321		1665	
Flt Permitted		0.78		0.06	1.00		0.81	1.00	1.00		0.96	
Satd. Flow (perm)		2202		95	2774		1092	1589	1321		1608	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	121	1501	114	119	684	96	113	148	161	5	24	8
RTOR Reduction (vph)	0	5	0	0	11	0	0	0	43	0	6	0
Lane Group Flow (vph)	0	1731	0	119	770	0	113	148	118	0	31	0
Confl. Peds. (#/hr)	22		176	176		22	70		4	4		70
Confl. Bikes (#/hr)			6			4			3			7
Heavy Vehicles (%)	0%	2%	6%	3%	4%	3%	10%	4%	5%	20%	0%	0%
Bus Blockages (#/hr)	0	8	8	0	0	0	0	0	0	0	0	0
Turn Type	Perm	NA		custom	NA		Perm	NA	pm+ov	Perm	NA	
Protected Phases		6		5	1 2			14	5		14	
Permitted Phases	6			2			14		14	14		
Actuated Green, G (s)		61.0		71.0	74.0		18.0	18.0	25.0		18.0	
Effective Green, g (s)		62.0		73.0	75.0		21.0	21.0	31.0		21.0	
Actuated g/C Ratio		0.56		0.66	0.68		0.19	0.19	0.28		0.19	
Clearance Time (s)		7.0		6.0			7.0	7.0	6.0		7.0	
Lane Grp Cap (vph)		1241		163	1891		208	303	372		306	
v/s Ratio Prot				c0.05	c0.28			0.09	0.03			
v/s Ratio Perm		c0.79		0.43			c0.10		0.06		0.02	
v/c Ratio		1.40		0.73	0.41		0.54	0.49	0.32		0.10	
Uniform Delay, d1		24.0		26.4	7.7		40.2	39.7	31.2		36.7	
Progression Factor		0.86		1.42	1.82		0.96	0.96	1.45		1.00	
Incremental Delay, d2		178.2		18.9	0.5		9.8	5.5	2.2		0.7	
Delay (s)		198.8		56.2	14.5		48.4	43.6	47.4		37.4	
Level of Service		F		E	B		D	D	D		D	
Approach Delay (s)		198.8			20.0			46.3			37.4	
Approach LOS		F			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	124.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	104.5%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1667	918	25	54
v/c Ratio	1.09	0.69	0.06	0.13
Control Delay	56.8	15.8	33.2	10.1
Queue Delay	4.1	0.0	0.0	0.0
Total Delay	60.9	15.8	33.2	10.1
Queue Length 50th (ft)	~687	137	14	5
Queue Length 95th (ft)	m121	m108	37	32
Internal Link Dist (ft)	511	529	390	
Turn Bay Length (ft)				
Base Capacity (vph)	1526	1327	389	424
Starvation Cap Reductn	73	0	0	0
Spillback Cap Reductn	321	0	0	6
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.38	0.69	0.06	0.13

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1624	43	44	874	25	54
Future Volume (vph)	1624	43	44	874	25	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	13	13
Total Lost time (s)	5.0			5.0	4.0	3.0
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	0.98			1.00	1.00	0.78
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2944			2949	1646	1153
Flt Permitted	1.00			0.65	0.95	1.00
Satd. Flow (perm)	2944			1928	1646	1153
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1624	43	44	874	25	54
RTOR Reduction (vph)	2	0	0	0	0	28
Lane Group Flow (vph)	1665	0	0	918	25	26
Confl. Peds. (#/hr)		231	231		2	259
Confl. Bikes (#/hr)		8				
Heavy Vehicles (%)	1%	3%	14%	2%	2%	1%
Turn Type	NA		pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	4	1
Permitted Phases			6			4
Actuated Green, G (s)	55.0			69.0	24.0	33.0
Effective Green, g (s)	57.0			71.0	26.0	37.0
Actuated g/C Ratio	0.52			0.65	0.24	0.34
Clearance Time (s)	7.0			7.0	6.0	5.0
Lane Grp Cap (vph)	1525			1346	389	387
v/s Ratio Prot	c0.57			c0.07	0.02	c0.01
v/s Ratio Perm				0.37		0.02
v/c Ratio	1.09			0.68	0.06	0.07
Uniform Delay, d1	26.5			12.4	32.6	24.8
Progression Factor	0.39			1.37	1.00	1.00
Incremental Delay, d2	42.6			0.3	0.3	0.3
Delay (s)	52.9			17.2	32.9	25.1
Level of Service	D			B	C	C
Approach Delay (s)	52.9			17.2	27.6	
Approach LOS	D			B	C	

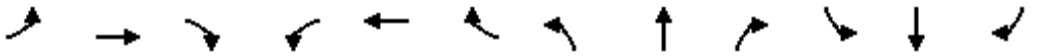
Intersection Summary			
HCM 2000 Control Delay	39.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBT	NBR	SBL
Lane Group Flow (vph)	1525	1016	31	15	1
v/c Ratio	0.89	0.48	0.16	0.08	0.01
Control Delay	4.7	1.9	42.9	0.7	40.0
Queue Delay	0.0	62.9	0.0	0.0	0.0
Total Delay	4.7	64.8	42.9	0.7	40.0
Queue Length 50th (ft)	5	36	19	0	1
Queue Length 95th (ft)	m6	m36	48	0	6
Internal Link Dist (ft)	1	427	135		
Turn Bay Length (ft)					
Base Capacity (vph)	1710	2120	190	199	189
Starvation Cap Reductn	0	498	0	0	0
Spillback Cap Reductn	0	1887	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.89	4.36	0.16	0.08	0.01

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	1523	0	0	1016	0	31	0	15	1	0	0
Future Volume (vph)	2	1523	0	0	1016	0	31	0	15	1	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0	4.0		
Lane Util. Factor		0.95			0.95			1.00	1.00	1.00		
Frpb, ped/bikes		1.00			1.00			1.00	1.00	1.00		
Flpb, ped/bikes		1.00			1.00			0.96	1.00	0.97		
Frt		1.00			1.00			1.00	0.85	1.00		
Flt Protected		1.00			1.00			0.95	1.00	0.95		
Satd. Flow (prot)		2944			2916			1231	1221	1580		
Flt Permitted		0.95			1.00			0.95	1.00	0.74		
Satd. Flow (perm)		2809			2916			1231	1221	1226		
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2	1523	0	0	1016	0	31	0	15	1	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	14	0	0	0
Lane Group Flow (vph)	0	1525	0	0	1016	0	0	31	1	1	0	0
Confl. Peds. (#/hr)	1		43	43		1	20		13	13		20
Confl. Bikes (#/hr)			6			6			2			
Heavy Vehicles (%)	0%	3%	5%	3%	4%	0%	6%	0%	0%	0%	0%	0%
Parking (#/hr)							0	0	0			
Turn Type	Perm	NA			NA		Perm	NA	custom	D.Pm		Perm
Protected Phases		12			6			8	11			
Permitted Phases	12						8			8		8
Actuated Green, G (s)		65.0			78.0			15.0	7.0	15.0		
Effective Green, g (s)		67.0			80.0			17.0	9.0	17.0		
Actuated g/C Ratio		0.61			0.73			0.15	0.08	0.15		
Clearance Time (s)		6.0			6.0			6.0	6.0	6.0		
Lane Grp Cap (vph)		1710			2120			190	99	189		
v/s Ratio Prot					c0.35				0.00			
v/s Ratio Perm		c0.54						0.03		0.00		
v/c Ratio		0.89			0.48			0.16	0.01	0.01		
Uniform Delay, d1		18.4			6.3			40.3	46.4	39.3		
Progression Factor		0.03			0.26			1.00	1.00	1.00		
Incremental Delay, d2		3.3			0.2			1.8	0.2	0.1		
Delay (s)		3.9			1.8			42.2	46.6	39.4		
Level of Service		A			A			D	D	D		
Approach Delay (s)		3.9			1.8			43.6			39.4	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	3.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



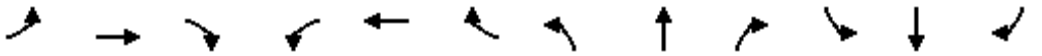
Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	1539	1353	40	300	164	200
v/c Ratio	1.41	1.02	0.20	0.54	0.89	0.38
Control Delay	208.2	27.4	35.1	48.4	82.7	36.6
Queue Delay	0.0	4.0	0.0	0.0	0.0	0.0
Total Delay	208.2	31.4	35.1	48.4	82.7	36.6
Queue Length 50th (ft)	~328	~348	22	73	99	37
Queue Length 95th (ft)	#898	m#210	51	105	#230	63
Internal Link Dist (ft)	427	493		361		348
Turn Bay Length (ft)			110			
Base Capacity (vph)	1095	1321	198	554	184	523
Starvation Cap Reductn	0	15	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.41	1.04	0.20	0.54	0.89	0.38

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

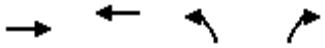
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	230	1225	84	35	935	383	40	276	24	164	159	41
Future Volume (vph)	230	1225	84	35	935	383	40	276	24	164	159	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			2%			0%			2%	
Total Lost time (s)		5.0			5.0		3.0	5.0		3.0	5.0	
Lane Util. Factor		0.95			0.95		1.00	0.91		1.00	0.91	
Frpb, ped/bikes		0.99			0.91		1.00	0.97		1.00	0.93	
Flpb, ped/bikes		1.00			1.00		0.84	1.00		0.89	1.00	
Frt		0.99			0.96		1.00	0.99		1.00	0.97	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2945			2563		1208	4067		1272	3579	
Flt Permitted		0.51			0.85		0.62	1.00		0.52	1.00	
Satd. Flow (perm)		1504			2171		790	4067		693	3579	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	230	1225	84	35	935	383	40	276	24	164	159	41
RTOR Reduction (vph)	0	4	0	0	38	0	0	0	0	0	35	0
Lane Group Flow (vph)	0	1535	0	0	1315	0	40	300	0	164	165	0
Confl. Peds. (#/hr)	207		166	166		207	200		226	226		200
Confl. Bikes (#/hr)			2						6			3
Heavy Vehicles (%)	0%	0%	2%	10%	2%	2%	6%	3%	0%	5%	8%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	6	6
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		73.0			63.0		18.0	13.0		18.0	13.0	
Effective Green, g (s)		75.0			65.0		22.0	15.0		22.0	15.0	
Actuated g/C Ratio		0.68			0.59		0.20	0.14		0.20	0.14	
Clearance Time (s)		7.0			7.0		5.0	7.0		5.0	7.0	
Lane Grp Cap (vph)		1117			1282		184	554		175	488	
v/s Ratio Prot		c0.09					0.01	0.07		c0.06	0.05	
v/s Ratio Perm		c0.85			0.61		0.03			c0.13		
v/c Ratio		1.37			1.03		0.22	0.54		0.94	0.34	
Uniform Delay, d1		17.5			22.5		36.4	44.3		42.0	43.0	
Progression Factor		1.43			0.24		1.00	1.00		1.00	1.00	
Incremental Delay, d2		171.1			19.7		2.7	3.8		53.2	1.9	
Delay (s)		196.0			25.1		39.1	48.1		95.2	44.9	
Level of Service		F			C		D	D		F	D	
Approach Delay (s)		196.0			25.1			47.0			67.5	
Approach LOS		F			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	104.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.31		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	130.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1413	1375	49	40
v/c Ratio	0.75	1.02	0.14	0.13
Control Delay	12.4	31.1	35.3	35.2
Queue Delay	3.5	30.1	0.0	0.0
Total Delay	15.8	61.2	35.3	35.2
Queue Length 50th (ft)	253	~462	28	23
Queue Length 95th (ft)	m171	m298	61	53
Internal Link Dist (ft)	493	589	158	
Turn Bay Length (ft)				
Base Capacity (vph)	1893	1346	347	311
Starvation Cap Reductn	377	0	0	0
Spillback Cap Reductn	11	111	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.93	1.11	0.14	0.13

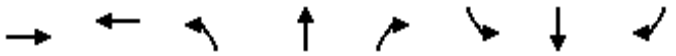
Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1331	82	71	1304	49	40
Future Volume (vph)	1331	82	71	1304	49	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10
Grade (%)	-2%			1%	-2%	
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	0.97			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2854			2871	1531	1370
Flt Permitted	1.00			0.70	0.95	1.00
Satd. Flow (perm)	2854			2028	1531	1370
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1331	82	71	1304	49	40
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1413	0	0	1375	49	40
Confl. Peds. (#/hr)		131	131		335	230
Confl. Bikes (#/hr)		3				1
Heavy Vehicles (%)	2%	0%	0%	2%	0%	0%
Bus Blockages (#/hr)	8	8	0	14	0	0
Turn Type	NA		Perm	NA	Prot	Prot
Protected Phases	2			2	4	4
Permitted Phases			2			
Actuated Green, G (s)	71.0			71.0	23.0	23.0
Effective Green, g (s)	73.0			73.0	25.0	25.0
Actuated g/C Ratio	0.66			0.66	0.23	0.23
Clearance Time (s)	6.0			6.0	6.0	6.0
Lane Grp Cap (vph)	1894			1345	347	311
v/s Ratio Prot	0.50				c0.03	0.03
v/s Ratio Perm				c0.68		
v/c Ratio	0.75			1.02	0.14	0.13
Uniform Delay, d1	12.3			18.5	33.9	33.8
Progression Factor	0.95			0.85	1.00	1.00
Incremental Delay, d2	0.3			14.0	0.9	0.9
Delay (s)	11.9			29.7	34.8	34.7
Level of Service	B			C	C	C
Approach Delay (s)	11.9			29.7	34.7	
Approach LOS	B			C	C	

Intersection Summary			
HCM 2000 Control Delay	21.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	115.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

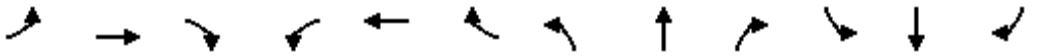


Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1371	1412	48	34	63	4	11	56
v/c Ratio	0.87	1.07	0.44	0.17	0.31	0.04	0.07	0.52
Control Delay	11.0	69.5	57.2	44.5	6.8	42.5	42.7	62.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.0	69.5	57.2	44.5	6.8	42.5	42.7	62.9
Queue Length 50th (ft)	37	~550	32	22	0	3	7	37
Queue Length 95th (ft)	43	#726	72	52	16	13	24	#87
Internal Link Dist (ft)	589	201		452			368	
Turn Bay Length (ft)			110		70	150		75
Base Capacity (vph)	1568	1324	110	198	204	108	165	107
Starvation Cap Reductn	2	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.88	1.07	0.44	0.17	0.31	0.04	0.07	0.52

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	1214	131	99	1271	42	48	34	63	4	11	56
Future Volume (vph)	26	1214	131	99	1271	42	48	34	63	4	11	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			1%			-1%			2%	
Total Lost time (s)		4.0			4.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.95			0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		0.96			0.98		1.00	1.00	0.65	1.00	1.00	0.66
Flpb, ped/bikes		1.00			1.00		0.68	1.00	1.00	0.69	1.00	1.00
Frt		0.99			1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00			1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		2780			2799		1023	1458	876	1033	1215	790
Flt Permitted		0.89			0.63		0.75	1.00	1.00	0.73	1.00	1.00
Satd. Flow (perm)		2487			1761		808	1458	876	799	1215	790
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	26	1214	131	99	1271	42	48	34	63	4	11	56
RTOR Reduction (vph)	0	7	0	0	2	0	0	0	54	0	0	0
Lane Group Flow (vph)	0	1364	0	0	1410	0	48	34	9	4	11	56
Confl. Peds. (#/hr)	502		123	123		502	121		132	132		121
Confl. Bikes (#/hr)			10			12			20			17
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	2%	10%	0%	0%	17%	0%
Bus Blockages (#/hr)	0	8	8	0	14	14	0	0	4	0	0	3
Parking (#/hr)											0	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		6		5	2			8			4	
Permitted Phases	6			2			8		8	4		4
Actuated Green, G (s)		67.0			77.0		13.0	13.0	13.0	13.0	13.0	13.0
Effective Green, g (s)		69.0			79.0		15.0	15.0	15.0	15.0	15.0	15.0
Actuated g/C Ratio		0.63			0.72		0.14	0.14	0.14	0.14	0.14	0.14
Clearance Time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Grp Cap (vph)		1560			1330		110	198	119	108	165	107
v/s Ratio Prot					c0.07			0.02			0.01	
v/s Ratio Perm		0.55			c0.69		0.06		0.01	0.01		c0.07
v/c Ratio		0.87			1.06		0.44	0.17	0.07	0.04	0.07	0.52
Uniform Delay, d1		16.9			15.5		43.6	42.0	41.4	41.2	41.4	44.2
Progression Factor		0.32			2.03		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		4.9			39.7		12.1	1.9	1.2	0.6	0.8	17.1
Delay (s)		10.4			71.1		55.7	43.9	42.6	41.9	42.2	61.3
Level of Service		B			E		E	D	D	D	D	E
Approach Delay (s)		10.4			71.1			47.2			57.2	
Approach LOS		B			E			D			E	

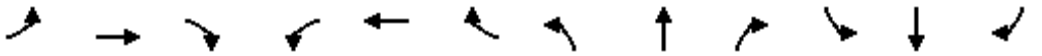
Intersection Summary			
HCM 2000 Control Delay	41.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	107.9%	ICU Level of Service	G
Analysis Period (min)	15		



Lane Group	EBT	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	1181	1500	79	180	167
v/c Ratio	0.82	0.79	0.16	0.23	0.39
Control Delay	37.7	19.2	39.8	19.4	17.8
Queue Delay	0.0	0.2	0.0	0.7	2.0
Total Delay	37.7	19.4	39.8	20.1	19.8
Queue Length 50th (ft)	462	335	25	27	80
Queue Length 95th (ft)	m535	389	48	58	145
Internal Link Dist (ft)	308	262	479		136
Turn Bay Length (ft)					
Base Capacity (vph)	1442	1904	479	795	433
Starvation Cap Reductn	0	56	0	370	152
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.82	0.81	0.16	0.42	0.59

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	1019	154	41	1228	231	1	52	26	180	102	65
Future Volume (vph)	8	1019	154	41	1228	231	1	52	26	180	102	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	10	10	10
Grade (%)		-1%			0%			-1%			0%	
Total Lost time (s)		4.0			4.0			4.0		3.0	4.0	
Lane Util. Factor		0.95			0.91			0.95		0.97	1.00	
Frpb, ped/bikes		0.98			0.99			0.97		1.00	0.95	
Flpb, ped/bikes		1.00			1.00			1.00		0.96	1.00	
Frt		0.98			0.98			0.95		1.00	0.94	
Flt Protected		1.00			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		2815			4119			2914		2797	1259	
Flt Permitted		0.94			0.84			0.95		0.70	1.00	
Satd. Flow (perm)		2645			3448			2776		2070	1259	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	8	1019	154	41	1228	231	1	52	26	180	102	65
RTOR Reduction (vph)	0	0	0	0	24	0	0	0	0	0	21	0
Lane Group Flow (vph)	0	1181	0	0	1476	0	0	79	0	180	146	0
Confl. Peds. (#/hr)	34		58	58		34	69		33	33		69
Confl. Bikes (#/hr)			2			1			3			1
Heavy Vehicles (%)	0%	1%	23%	0%	1%	9%	0%	3%	5%	1%	4%	0%
Parking (#/hr)											0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		2			2			4		3	8	
Permitted Phases	2			2			4			8		
Actuated Green, G (s)		58.0			58.0			17.0		35.0	34.0	
Effective Green, g (s)		60.0			60.0			19.0		37.0	36.0	
Actuated g/C Ratio		0.55			0.55			0.17		0.34	0.33	
Clearance Time (s)		6.0			6.0			6.0		5.0	6.0	
Lane Grp Cap (vph)		1442			1880			479		788	412	
v/s Ratio Prot										0.03	c0.12	
v/s Ratio Perm		c0.45			0.43			0.03		0.05		
v/c Ratio		0.82			0.79			0.16		0.23	0.35	
Uniform Delay, d1		20.5			19.9			38.7		26.5	28.2	
Progression Factor		1.62			0.83			1.00		0.69	0.65	
Incremental Delay, d2		3.4			2.9			0.7		0.7	2.4	
Delay (s)		36.7			19.5			39.5		19.1	20.6	
Level of Service		D			B			D		B	C	
Approach Delay (s)		36.7			19.5			39.5			19.8	
Approach LOS		D			B			D			B	

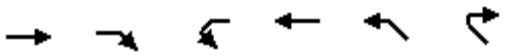
Intersection Summary			
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	EBR	WBT	NWL	NWR
Lane Group Flow (vph)	660	565	1112	457	107
v/c Ratio	0.38	0.31	0.55	0.50	0.22
Control Delay	7.5	1.2	1.0	25.8	8.6
Queue Delay	0.5	0.2	0.3	8.8	2.7
Total Delay	8.0	1.4	1.2	34.6	11.3
Queue Length 50th (ft)	47	7	0	138	15
Queue Length 95th (ft)	m105	m18	0	189	62
Internal Link Dist (ft)	262		432	70	
Turn Bay Length (ft)					
Base Capacity (vph)	1729	1840	2032	909	493
Starvation Cap Reductn	621	595	0	410	291
Spillback Cap Reductn	0	395	312	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.60	0.45	0.65	0.92	0.53

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



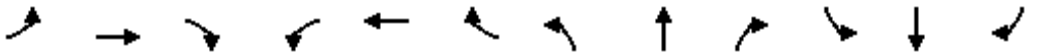
Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	660	565	69	1043	457	107
Future Volume (vph)	660	565	69	1043	457	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	11	11
Grade (%)	0%			0%	-1%	
Total Lost time (s)	5.0	5.0		5.0	4.0	4.0
Lane Util. Factor	0.95	0.88		0.91	0.97	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.85		1.00	1.00	0.85
Flt Protected	1.00	1.00		1.00	0.95	1.00
Satd. Flow (prot)	2973	2364		4152	2944	1358
Flt Permitted	1.00	1.00		0.84	0.95	1.00
Satd. Flow (perm)	2973	2364		3494	2944	1358
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	660	565	69	1043	457	107
RTOR Reduction (vph)	0	185	0	0	0	74
Lane Group Flow (vph)	660	380	0	1112	457	33
Confl. Peds. (#/hr)		45	45			
Confl. Bikes (#/hr)		3				
Heavy Vehicles (%)	2%	1%	1%	2%	4%	4%
Bus Blockages (#/hr)	0	0	0	18	0	0
Turn Type	NA	custom	Perm	NA	Prot	Perm
Protected Phases	2	2 8		6	4	
Permitted Phases			6			4
Actuated Green, G (s)	62.0	76.0		62.0	32.0	32.0
Effective Green, g (s)	64.0	74.0		64.0	34.0	34.0
Actuated g/C Ratio	0.58	0.67		0.58	0.31	0.31
Clearance Time (s)	7.0			7.0	6.0	6.0
Lane Grp Cap (vph)	1729	1590		2032	909	419
v/s Ratio Prot	0.22	0.16			c0.16	
v/s Ratio Perm				c0.32		0.02
v/c Ratio	0.38	0.24		0.55	0.50	0.08
Uniform Delay, d1	12.4	7.0		14.1	31.1	26.9
Progression Factor	0.56	2.07		0.01	0.76	1.38
Incremental Delay, d2	0.4	0.2		0.8	1.9	0.4
Delay (s)	7.4	14.8		1.0	25.5	37.4
Level of Service	A	B		A	C	D
Approach Delay (s)	10.8			1.0	27.8	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	10.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBT
Lane Group Flow (vph)	767	1112	2
v/c Ratio	0.37	0.63	0.00
Control Delay	9.1	18.9	0.0
Queue Delay	0.0	0.0	0.0
Total Delay	9.1	18.9	0.0
Queue Length 50th (ft)	110	269	0
Queue Length 95th (ft)	115	338	0
Internal Link Dist (ft)	432	489	96
Turn Bay Length (ft)			
Base Capacity (vph)	2046	1758	869
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.37	0.63	0.00

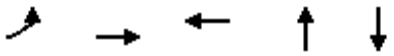
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	767	0	0	1112	0	0	0	2	0	0	0
Future Volume (vph)	0	767	0	0	1112	0	0	0	2	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	11	11	11	13	13	13	13	13	13
Grade (%)		0%			-6%			1%			-1%	
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		0.95			0.95			0.95				
Frpb, ped/bikes		1.00			1.00			0.98				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			1.00			0.85				
Flt Protected		1.00			1.00			1.00				
Satd. Flow (prot)		3002			3171			2776				
Flt Permitted		1.00			1.00			1.00				
Satd. Flow (perm)		3002			3171			2776				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	767	0	0	1112	0	0	0	2	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	767	0	0	1112	0	0	0	0	0	0	0
Confl. Peds. (#/hr)	18		3	3		18	14		8	8		14
Confl. Bikes (#/hr)			1			4						2
Heavy Vehicles (%)	0%	1%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA			NA			NA				
Protected Phases	1	6			2			4				
Permitted Phases	6						4					
Actuated Green, G (s)		73.0			59.0			25.0				
Effective Green, g (s)		75.0			61.0			27.0				
Actuated g/C Ratio		0.68			0.55			0.25				
Clearance Time (s)		6.0			6.0			6.0				
Lane Grp Cap (vph)		2046			1758			681				
v/s Ratio Prot		c0.26			c0.35			c0.00				
v/s Ratio Perm												
v/c Ratio		0.37			0.63			0.00				
Uniform Delay, d1		7.5			16.8			31.3				
Progression Factor		1.14			1.00			1.00				
Incremental Delay, d2		0.5			1.7			0.0				
Delay (s)		9.0			18.6			31.3				
Level of Service		A			B			C				
Approach Delay (s)		9.0			18.6			31.3			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		

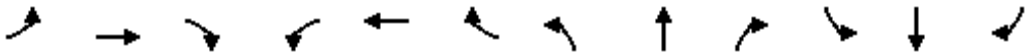
c Critical Lane Group



Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	75	25	118	291	347
v/c Ratio	0.22	0.05	0.37	0.14	0.17
Control Delay	26.9	24.2	38.6	18.5	12.3
Queue Delay	0.0	0.0	0.0	0.7	0.0
Total Delay	26.9	24.2	38.6	19.1	12.3
Queue Length 50th (ft)	46	15	69	49	41
Queue Length 95th (ft)	m54	m18	125	m65	58
Internal Link Dist (ft)		361	249	136	148
Turn Bay Length (ft)					
Base Capacity (vph)	343	536	318	2109	2094
Starvation Cap Reductn	0	0	0	1473	0
Spillback Cap Reductn	0	0	0	0	45
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.22	0.05	0.37	0.46	0.17

Intersection Summary

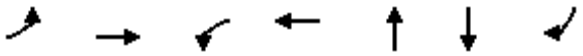
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	25	0	59	59	0	0	213	78	0	288	59
Future Volume (vph)	75	25	0	59	59	0	0	213	78	0	288	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	12	12	12	10	10	10	10	10	10
Grade (%)		0%			-1%			0%			1%	
Total Lost time (s)	3.0	5.0			5.0			4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00			0.91			0.91	
Frpb, ped/bikes	1.00	1.00			1.00			0.95			0.96	
Flpb, ped/bikes	0.98	1.00			0.99			1.00			1.00	
Frt	1.00	1.00			1.00			0.96			0.97	
Flt Protected	0.95	1.00			0.98			1.00			1.00	
Satd. Flow (prot)	1320	1596			1501			3741			3779	
Flt Permitted	0.64	1.00			0.84			1.00			1.00	
Satd. Flow (perm)	894	1596			1297			3741			3779	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	75	25	0	59	59	0	0	213	78	0	288	59
RTOR Reduction (vph)	0	0	0	0	0	0	0	35	0	0	0	0
Lane Group Flow (vph)	75	25	0	0	118	0	0	256	0	0	347	0
Confl. Peds. (#/hr)	27		8	8		27	61		56	56		61
Heavy Vehicles (%)	13%	0%	32%	0%	0%	0%	0%	8%	0%	0%	5%	0%
Parking (#/hr)				0	0	0					0	0
Turn Type	pm+pt	NA	Perm	Perm	NA			NA			NA	
Protected Phases	7	4			8			2			2	
Permitted Phases	4		4	8			2					
Actuated Green, G (s)	35.0	35.0			25.0			59.0			59.0	
Effective Green, g (s)	37.0	37.0			27.0			61.0			61.0	
Actuated g/C Ratio	0.34	0.34			0.25			0.55			0.55	
Clearance Time (s)	5.0	7.0			7.0			6.0			6.0	
Lane Grp Cap (vph)	327	536			318			2074			2095	
v/s Ratio Prot	c0.01	0.02						0.07			c0.09	
v/s Ratio Perm	0.06				c0.09							
v/c Ratio	0.23	0.05			0.37			0.12			0.17	
Uniform Delay, d1	26.0	24.6			34.5			11.7			12.0	
Progression Factor	1.05	0.97			1.00			2.14			1.00	
Incremental Delay, d2	1.0	0.1			3.3			0.1			0.2	
Delay (s)	28.2	23.9			37.8			25.2			12.2	
Level of Service	C	C			D			C			B	
Approach Delay (s)		27.2			37.8			25.2			12.2	
Approach LOS		C			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

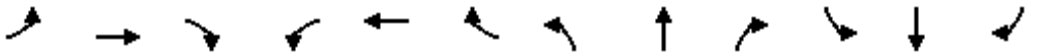
c Critical Lane Group



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	22	744	68	811	73	471	38
v/c Ratio	0.15	0.80	0.37	0.77	0.11	0.68	0.37
Control Delay	49.0	43.1	16.4	6.6	11.4	21.6	51.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.5	0.0
Total Delay	49.0	43.1	16.4	6.6	11.4	22.0	51.6
Queue Length 50th (ft)	15	253	27	22	16	258	26
Queue Length 95th (ft)	40	329	m31	m33	44	381	m57
Internal Link Dist (ft)		171		412	453	306	
Turn Bay Length (ft)			200				
Base Capacity (vph)	142	931	186	1048	671	694	102
Starvation Cap Reductn	0	0	0	0	0	40	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.80	0.37	0.77	0.11	0.72	0.37

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	681	4	63	714	32	2	36	29	34	399	35
Future Volume (vph)	20	681	4	63	714	32	2	36	29	34	399	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	12	12	11	12	11	11
Total Lost time (s)	3.0	3.0		3.0	3.0			3.0			3.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.99			0.94			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	1.00
Satd. Flow (prot)	1570	3107		1577	3194			1479			1594	1405
Flt Permitted	0.95	1.00		0.95	1.00			0.99			0.97	1.00
Satd. Flow (perm)	1570	3107		1577	3194			1468			1559	1405
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	740	4	68	776	35	2	39	32	37	434	38
RTOR Reduction (vph)	0	0	0	0	3	0	0	18	0	0	0	0
Lane Group Flow (vph)	22	744	0	68	808	0	0	55	0	0	471	38
Confl. Peds. (#/hr)	1		5	5		1	10		8	8		10
Confl. Bikes (#/hr)									9			20
Heavy Vehicles (%)	0%	1%	0%	3%	1%	0%	0%	8%	7%	6%	3%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Over
Protected Phases	7	4		3	8			2			2	7
Permitted Phases							2			2		
Actuated Green, G (s)	7.0	30.0		10.0	33.0			45.0			45.0	7.0
Effective Green, g (s)	10.0	33.0		13.0	36.0			49.0			49.0	8.0
Actuated g/C Ratio	0.09	0.30		0.12	0.33			0.45			0.45	0.07
Clearance Time (s)	6.0	6.0		6.0	6.0			7.0			7.0	6.0
Lane Grp Cap (vph)	142	932		186	1045			653			694	102
v/s Ratio Prot	0.01	c0.24		0.04	c0.25							c0.03
v/s Ratio Perm								0.04			c0.30	
v/c Ratio	0.15	0.80		0.37	0.77			0.08			0.68	0.37
Uniform Delay, d1	46.1	35.4		44.7	33.3			17.6			24.2	48.6
Progression Factor	1.00	1.00		0.32	0.13			1.00			0.67	0.86
Incremental Delay, d2	2.3	7.1		2.0	2.0			0.3			4.7	9.1
Delay (s)	48.4	42.5		16.2	6.5			17.8			21.0	50.9
Level of Service	D	D		B	A			B			C	D
Approach Delay (s)		42.7			7.3			17.8			23.3	
Approach LOS		D			A			B			C	

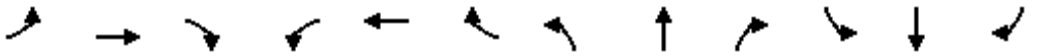
Intersection Summary			
HCM 2000 Control Delay	23.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	792	849	155	1053	312	182	1456
v/c Ratio	0.83	0.96	0.43	0.66	0.78	0.57	0.62
Control Delay	18.7	51.6	26.9	31.2	46.0	24.5	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	18.7	51.6	26.9	31.2	46.0	24.5	7.9
Queue Length 50th (ft)	48	338	84	224	193	48	62
Queue Length 95th (ft)	#122	#457	159	274	#339	112	70
Internal Link Dist (ft)	412	1035		259			307
Turn Bay Length (ft)			200		225		
Base Capacity (vph)	949	881	364	1586	400	317	2340
Starvation Cap Reductn	0	0	0	0	0	0	182
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.96	0.43	0.66	0.78	0.57	0.67

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	684	60	10	788	146	0	990	293	171	1348	21
Future Volume (vph)	0	684	60	10	788	146	0	990	293	171	1348	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	11	11	11	10	10	10
Total Lost time (s)		5.0			5.0	5.0		4.0	4.0	4.0	4.0	
Lane Util. Factor		0.95			0.95	1.00		0.91	1.00	1.00	0.91	
Frpb, ped/bikes		0.99			1.00	0.86		1.00	0.82	1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.99			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		1.00			1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		2984			2970	1147		4257	1074	1511	4290	
Flt Permitted		1.00			0.93	1.00		1.00	1.00	0.17	1.00	
Satd. Flow (perm)		2984			2769	1147		4257	1074	277	4290	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	728	64	11	838	155	0	1053	312	182	1434	22
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	792	0	0	849	155	0	1053	312	182	1456	0
Confl. Peds. (#/hr)	119		101	101		119	165		118	118		165
Confl. Bikes (#/hr)			4			9			37			3
Heavy Vehicles (%)	1%	3%	3%	2%	2%	0%	11%	6%	7%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	5	0	0	2	0	0	0
Turn Type		NA		Perm	NA	Perm		NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases				8		8			2	6		
Actuated Green, G (s)		33.0			33.0	33.0		39.0	39.0	58.0	58.0	
Effective Green, g (s)		35.0			35.0	35.0		41.0	41.0	60.0	60.0	
Actuated g/C Ratio		0.32			0.32	0.32		0.37	0.37	0.55	0.55	
Clearance Time (s)		7.0			7.0	7.0		6.0	6.0	6.0	6.0	
Lane Grp Cap (vph)		949			881	364		1586	400	319	2340	
v/s Ratio Prot		0.27						0.25		0.08	c0.34	
v/s Ratio Perm					c0.31	0.14			c0.29	0.23		
v/c Ratio		0.83			0.96	0.43		0.66	0.78	0.57	0.62	
Uniform Delay, d1		34.8			36.9	29.6		28.8	30.5	28.6	17.2	
Progression Factor		0.36			0.83	0.79		1.00	1.00	0.64	0.39	
Incremental Delay, d2		5.5			20.0	3.0		2.2	14.0	5.8	1.0	
Delay (s)		18.1			50.4	26.2		31.0	44.5	24.1	7.7	
Level of Service		B			D	C		C	D	C	A	
Approach Delay (s)		18.1			46.7			34.1			9.5	
Approach LOS		B			D			C			A	

Intersection Summary			
HCM 2000 Control Delay	25.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



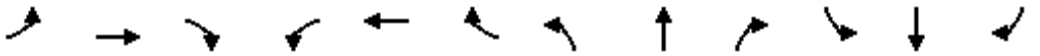
Lane Group	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	1221	344	1023	103	153	285	28
v/c Ratio	1.80	0.89	0.61	0.34	0.33	0.37	0.06
Control Delay	388.5	60.4	10.6	34.1	32.3	11.2	23.4
Queue Delay	0.0	0.0	0.2	6.2	10.2	1.3	0.0
Total Delay	388.5	60.4	10.8	40.3	42.5	12.5	23.4
Queue Length 50th (ft)	~699	197	115	53	78	67	11
Queue Length 95th (ft)	#833	m#253	m176	110	146	95	33
Internal Link Dist (ft)	1035		511		84		359
Turn Bay Length (ft)		200				140	
Base Capacity (vph)	678	386	1666	301	466	761	463
Starvation Cap Reductn	0	0	143	149	277	291	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.80	0.89	0.67	0.68	0.81	0.61	0.06

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	1023	44	323	840	121	97	144	268	8	11	7
Future Volume (vph)	81	1023	44	323	840	121	97	144	268	8	11	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	11	11	11	14	14	14
Total Lost time (s)		6.0		5.0	4.0		4.0	4.0	3.0		4.0	
Lane Util. Factor		0.95		1.00	0.95		1.00	1.00	1.00		1.00	
Frpb, ped/bikes		0.99		1.00	0.94		1.00	1.00	0.99		0.98	
Flpb, ped/bikes		0.99		1.00	1.00		0.92	1.00	1.00		1.00	
Frt		0.99		1.00	0.98		1.00	1.00	0.85		0.97	
Flt Protected		1.00		0.95	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (prot)		2803		1501	2719		1334	1605	1367		1693	
Flt Permitted		0.73		0.10	1.00		0.74	1.00	1.00		0.92	
Satd. Flow (perm)		2065		154	2719		1038	1605	1367		1576	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	86	1088	47	344	894	129	103	153	285	9	12	7
RTOR Reduction (vph)	0	3	0	0	11	0	0	0	28	0	5	0
Lane Group Flow (vph)	0	1218	0	344	1012	0	103	153	257	0	23	0
Confl. Peds. (#/hr)	43		165	165		43	83		1	1		83
Confl. Bikes (#/hr)									2			
Heavy Vehicles (%)	0%	3%	11%	1%	3%	1%	8%	3%	2%	0%	0%	0%
Bus Blockages (#/hr)	0	9	9	0	0	0	0	0	0	0	0	0
Turn Type	Perm	NA		custom	NA		Perm	NA	pm+ov	Perm	NA	
Protected Phases		6		5	1 2			14	5		14	
Permitted Phases	6			2			14		14	14		
Actuated Green, G (s)		35.0		64.0	64.0		29.0	29.0	52.0		29.0	
Effective Green, g (s)		36.0		65.0	65.0		32.0	32.0	58.0		32.0	
Actuated g/C Ratio		0.33		0.59	0.59		0.29	0.29	0.53		0.29	
Clearance Time (s)		7.0		6.0			7.0	7.0	6.0		7.0	
Lane Grp Cap (vph)		675		384	1606		301	466	720		458	
v/s Ratio Prot				c0.19	0.37			0.10	c0.08			
v/s Ratio Perm		c0.59		0.33			0.10		0.10		0.01	
v/c Ratio		1.80		0.90	0.63		0.34	0.33	0.36		0.05	
Uniform Delay, d1		37.0		31.9	14.7		30.7	30.6	15.1		28.1	
Progression Factor		0.85		1.57	0.73		0.98	0.98	0.94		1.00	
Incremental Delay, d2		365.8		16.6	1.1		3.1	1.9	1.4		0.2	
Delay (s)		397.4		66.7	11.7		33.2	31.7	15.6		28.3	
Level of Service		F		E	B		C	C	B		C	
Approach Delay (s)		397.4			25.5			23.5			28.3	
Approach LOS		F			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	169.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	90.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1339	1298	76	66
v/c Ratio	0.85	0.87	0.27	0.14
Control Delay	17.7	33.6	38.9	6.7
Queue Delay	1.4	34.6	0.0	0.0
Total Delay	19.1	68.1	38.9	6.7
Queue Length 50th (ft)	168	423	45	0
Queue Length 95th (ft)	m82	521	89	29
Internal Link Dist (ft)	511	529	390	
Turn Bay Length (ft)				
Base Capacity (vph)	1572	1488	279	479
Starvation Cap Reductn	97	274	0	0
Spillback Cap Reductn	53	0	0	1
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.91	1.07	0.27	0.14

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1264	35	49	1210	74	64
Future Volume (vph)	1264	35	49	1210	74	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	13	13
Total Lost time (s)	5.0			5.0	4.0	3.0
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.94
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2928			2893	1281	1331
Flt Permitted	1.00			0.74	0.95	1.00
Satd. Flow (perm)	2928			2152	1281	1331
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1303	36	51	1247	76	66
RTOR Reduction (vph)	2	0	0	0	0	45
Lane Group Flow (vph)	1337	0	0	1298	76	21
Confl. Peds. (#/hr)		42	42		28	50
Confl. Bikes (#/hr)		7				10
Heavy Vehicles (%)	2%	26%	20%	4%	31%	6%
Turn Type	NA		pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	4	1
Permitted Phases			6			4
Actuated Green, G (s)	57.0			71.0	22.0	31.0
Effective Green, g (s)	59.0			73.0	24.0	35.0
Actuated g/C Ratio	0.54			0.66	0.22	0.32
Clearance Time (s)	7.0			7.0	6.0	5.0
Lane Grp Cap (vph)	1570			1502	279	423
v/s Ratio Prot	0.46			c0.09	c0.06	0.00
v/s Ratio Perm				c0.49		0.01
v/c Ratio	0.85			0.86	0.27	0.05
Uniform Delay, d1	21.8			14.6	35.7	26.0
Progression Factor	0.76			2.04	1.00	1.00
Incremental Delay, d2	0.6			4.4	2.4	0.2
Delay (s)	17.2			34.2	38.1	26.2
Level of Service	B			C	D	C
Approach Delay (s)	17.2			34.2	32.6	
Approach LOS	B			C	C	

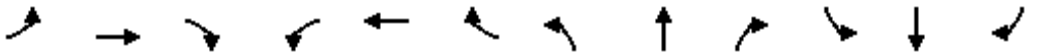
Intersection Summary			
HCM 2000 Control Delay	25.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	103.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBT	NBR	SBR
Lane Group Flow (vph)	1275	1299	61	49	1
v/c Ratio	0.87	0.69	0.19	0.19	0.00
Control Delay	4.5	15.5	34.9	1.7	31.0
Queue Delay	0.0	50.3	0.0	0.0	0.0
Total Delay	4.5	65.8	34.9	1.7	31.0
Queue Length 50th (ft)	5	288	34	0	1
Queue Length 95th (ft)	m6	367	71	0	5
Internal Link Dist (ft)	1	427	135		
Turn Bay Length (ft)					10
Base Capacity (vph)	1472	1873	316	256	342
Starvation Cap Reductn	0	402	0	0	0
Spillback Cap Reductn	0	986	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.87	1.46	0.19	0.19	0.00

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1237	0	0	1260	0	59	0	48	0	0	1
Future Volume (vph)	0	1237	0	0	1260	0	59	0	48	0	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		0.95			0.95			1.00	1.00			1.00
Frpb, ped/bikes		1.00			1.00			1.00	1.00			0.96
Flpb, ped/bikes		1.00			1.00			0.97	1.00			1.00
Frt		1.00			1.00			1.00	0.85			0.85
Flt Protected		1.00			1.00			0.95	1.00			1.00
Satd. Flow (prot)		2944			2944			1288	1221			1397
Flt Permitted		1.00			1.00			0.95	1.00			1.00
Satd. Flow (perm)		2944			2944			1288	1221			1397
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	1275	0	0	1299	0	61	0	49	0	0	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	44	0	0	0
Lane Group Flow (vph)	0	1275	0	0	1299	0	0	61	5	0	0	1
Confl. Peds. (#/hr)			39	39			21		19	19		21
Confl. Bikes (#/hr)			3			2			2			
Heavy Vehicles (%)	0%	3%	1%	0%	3%	0%	3%	0%	0%	0%	0%	0%
Parking (#/hr)							0	0	0			
Turn Type		NA			NA		Perm	NA	custom	D.Pm		Perm
Protected Phases		12			6			8	11			
Permitted Phases	12						8			8		8
Actuated Green, G (s)		53.0			68.0			25.0	9.0			25.0
Effective Green, g (s)		55.0			70.0			27.0	11.0			27.0
Actuated g/C Ratio		0.50			0.64			0.25	0.10			0.25
Clearance Time (s)		6.0			6.0			6.0	6.0			6.0
Lane Grp Cap (vph)		1472			1873			316	122			342
v/s Ratio Prot		c0.43			c0.44				0.00			
v/s Ratio Perm								0.05				0.00
v/c Ratio		0.87			0.69			0.19	0.04			0.00
Uniform Delay, d1		24.3			13.0			32.9	44.7			31.3
Progression Factor		0.04			1.00			1.00	1.00			1.00
Incremental Delay, d2		2.9			2.1			1.4	0.6			0.0
Delay (s)		3.9			15.2			34.2	45.3			31.4
Level of Service		A			B			C	D			C
Approach Delay (s)		3.9			15.2			39.2			31.4	
Approach LOS		A			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

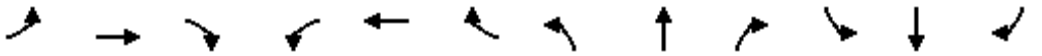


Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	1325	1061	104	274	315	562
v/c Ratio	1.11	1.03	0.50	0.50	1.22	0.81
Control Delay	78.3	68.3	38.0	45.5	162.2	43.2
Queue Delay	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay	78.4	68.3	38.0	45.5	162.2	43.2
Queue Length 50th (ft)	~399	~408	54	64	~243	104
Queue Length 95th (ft)	#657	#542	100	94	#351	#157
Internal Link Dist (ft)	427	493		361		348
Turn Bay Length (ft)			110			
Base Capacity (vph)	1196	1031	208	543	258	692
Starvation Cap Reductn	22	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.13	1.03	0.50	0.50	1.22	0.81

Intersection Summary

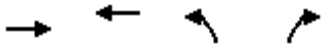
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	136	1095	54	10	932	87	101	198	68	306	318	227
Future Volume (vph)	136	1095	54	10	932	87	101	198	68	306	318	227
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			2%			0%			2%	
Total Lost time (s)		5.0			5.0		3.0	5.0		3.0	5.0	
Lane Util. Factor		0.95			0.95		1.00	0.91		1.00	0.91	
Frpb, ped/bikes		0.99			0.99		1.00	0.92		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		0.89	1.00	
Frt		0.99			0.99		1.00	0.96		1.00	0.94	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2777			2795		1516	3634		1332	3822	
Flt Permitted		0.53			0.93		0.25	1.00		0.56	1.00	
Satd. Flow (perm)		1476			2613		399	3634		789	3822	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	140	1129	56	10	961	90	104	204	70	315	328	234
RTOR Reduction (vph)	0	3	0	0	7	0	0	0	0	0	121	0
Lane Group Flow (vph)	0	1322	0	0	1054	0	104	274	0	315	441	0
Confl. Peds. (#/hr)	94		277	277		94			152	152		
Confl. Bikes (#/hr)						1						2
Heavy Vehicles (%)	33%	3%	11%	0%	5%	1%	0%	5%	9%	0%	5%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	7	7
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		66.0			40.0		22.0	14.0		22.0	14.0	
Effective Green, g (s)		68.0			42.0		26.0	16.0		26.0	16.0	
Actuated g/C Ratio		0.64			0.39		0.24	0.15		0.24	0.15	
Clearance Time (s)		7.0			7.0		5.0	7.0		5.0	7.0	
Lane Grp Cap (vph)		1217			1025		201	543		242	571	
v/s Ratio Prot		c0.23					0.05	0.08		c0.12	0.12	
v/s Ratio Perm		c0.46			0.40		0.08			c0.19		
v/c Ratio		1.09			1.03		0.52	0.50		1.30	0.77	
Uniform Delay, d1		19.5			32.5		33.2	41.9		38.9	43.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		52.6			35.7		9.2	3.3		162.5	9.8	
Delay (s)		72.1			68.2		42.4	45.2		201.4	53.5	
Level of Service		E			E		D	D		F	D	
Approach Delay (s)		72.1			68.2			44.4			106.7	
Approach LOS		E			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	76.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	107.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	119.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1514	974	102	107
v/c Ratio	0.84	0.59	0.26	0.33
Control Delay	21.9	10.0	33.6	35.5
Queue Delay	15.6	0.0	0.0	0.0
Total Delay	37.5	10.0	33.6	35.5
Queue Length 50th (ft)	411	110	56	60
Queue Length 95th (ft)	529	m116	104	112
Internal Link Dist (ft)	493	589	158	
Turn Bay Length (ft)				
Base Capacity (vph)	1795	1661	390	322
Starvation Cap Reductn	241	0	0	0
Spillback Cap Reductn	306	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.02	0.59	0.26	0.33

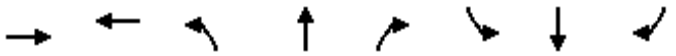
Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1425	44	15	930	99	104
Future Volume (vph)	1425	44	15	930	99	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10
Grade (%)	-2%			1%	-2%	
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	0.99			1.00	1.00	0.88
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2862			2899	1431	1183
Flt Permitted	1.00			0.91	0.95	1.00
Satd. Flow (perm)	2862			2650	1431	1183
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1469	45	15	959	102	107
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1514	0	0	974	102	107
Confl. Peds. (#/hr)		106	106		108	75
Confl. Bikes (#/hr)		3				3
Heavy Vehicles (%)	2%	15%	11%	2%	7%	2%
Bus Blockages (#/hr)	14	14	9	9	0	0
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			2	4	
Permitted Phases			2		4	4
Actuated Green, G (s)	67.0			67.0	28.0	28.0
Effective Green, g (s)	69.0			69.0	30.0	30.0
Actuated g/C Ratio	0.63			0.63	0.27	0.27
Clearance Time (s)	6.0			6.0	6.0	6.0
Lane Grp Cap (vph)	1795			1662	390	322
v/s Ratio Prot	c0.53				0.07	
v/s Ratio Perm				0.37		c0.09
v/c Ratio	0.84			0.59	0.26	0.33
Uniform Delay, d1	16.2			12.1	31.3	32.0
Progression Factor	1.00			0.74	1.00	1.00
Incremental Delay, d2	5.0			0.8	1.6	2.8
Delay (s)	21.3			9.8	33.0	34.7
Level of Service	C			A	C	C
Approach Delay (s)	21.3			9.8	33.9	
Approach LOS	C			A	C	

Intersection Summary			
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

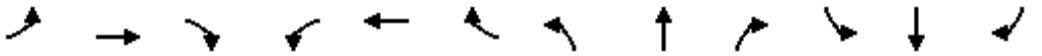


Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1662	1010	77	41	123	80	43	47
v/c Ratio	1.12	0.90	0.42	0.12	0.46	0.46	0.13	0.27
Control Delay	79.1	27.7	44.0	34.3	13.3	45.9	34.5	39.2
Queue Delay	0.7	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Total Delay	79.8	27.7	44.0	34.3	13.5	45.9	34.5	39.2
Queue Length 50th (ft)	~700	171	46	23	3	49	24	27
Queue Length 95th (ft)	#845	#264	96	53	58	100	55	63
Internal Link Dist (ft)	589	201		452			368	
Turn Bay Length (ft)			110		70	150		75
Base Capacity (vph)	1481	1127	183	337	265	175	332	175
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	248	0	0	0	10	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.35	0.90	0.42	0.12	0.48	0.46	0.13	0.27

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	1461	53	71	831	28	71	38	113	74	40	43
Future Volume (vph)	15	1461	53	71	831	28	71	38	113	74	40	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			1%			-1%			2%	
Total Lost time (s)		4.0			4.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.95			0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		0.98			0.98		1.00	1.00	0.62	1.00	1.00	0.64
Flpb, ped/bikes		1.00			1.00		0.66	1.00	1.00	0.64	1.00	1.00
Frt		0.99			1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00			1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		2838			2860		1012	1429	740	968	1408	744
Flt Permitted		0.94			0.57		0.73	1.00	1.00	0.73	1.00	1.00
Satd. Flow (perm)		2666			1640		777	1429	740	744	1408	744
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	1588	58	77	903	30	77	41	123	80	43	47
RTOR Reduction (vph)	0	2	0	0	2	0	0	0	90	0	0	0
Lane Group Flow (vph)	0	1660	0	0	1008	0	77	41	33	80	43	47
Confl. Peds. (#/hr)	327		421	421		327	335		391	391		335
Confl. Bikes (#/hr)			2			8			2			3
Heavy Vehicles (%)	33%	1%	4%	0%	1%	1%	0%	1%	1%	0%	1%	2%
Bus Blockages (#/hr)	0	11	11	0	9	9	0	0	4	0	0	4
Parking (#/hr)								0	0		0	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		6		5	2			8			4	
Permitted Phases	6			2			8		8	4		4
Actuated Green, G (s)		59.0			69.0		24.0	24.0	24.0	24.0	24.0	24.0
Effective Green, g (s)		61.0			71.0		26.0	26.0	26.0	26.0	26.0	26.0
Actuated g/C Ratio		0.55			0.65		0.24	0.24	0.24	0.24	0.24	0.24
Clearance Time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Grp Cap (vph)		1478			1136		183	337	174	175	332	175
v/s Ratio Prot					c0.06			0.03			0.03	
v/s Ratio Perm		c0.62			0.52		0.10		0.04	c0.11		0.06
v/c Ratio		1.12			0.89		0.42	0.12	0.19	0.46	0.13	0.27
Uniform Delay, d1		24.5			16.2		35.6	33.0	33.6	36.0	33.1	34.2
Progression Factor		0.60			1.21		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		61.5			8.3		7.0	0.7	2.4	8.4	0.8	3.7
Delay (s)		76.3			27.9		42.6	33.8	36.0	44.3	33.9	38.0
Level of Service		E			C		D	C	D	D	C	D
Approach Delay (s)		76.3			27.9			37.7			39.9	
Approach LOS		E			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	55.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	103.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group



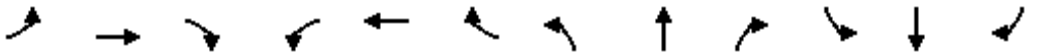
Lane Group	EBT	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	1627	933	158	437	327
v/c Ratio	1.11	0.74	0.32	0.73	0.76
Control Delay	66.2	20.4	41.9	25.2	26.2
Queue Delay	0.0	1.0	0.0	2.2	0.2
Total Delay	66.3	21.4	41.9	27.4	26.4
Queue Length 50th (ft)	~678	178	52	63	199
Queue Length 95th (ft)	m#337	210	84	152	#332
Internal Link Dist (ft)	308	262	479		136
Turn Bay Length (ft)					
Base Capacity (vph)	1472	1261	493	600	433
Starvation Cap Reductn	0	134	0	70	4
Spillback Cap Reductn	12	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.11	0.83	0.32	0.82	0.76

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	1489	23	9	748	111	0	80	67	406	228	76
Future Volume (vph)	1	1489	23	9	748	111	0	80	67	406	228	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	10	10	10
Grade (%)		-1%			0%			-1%			0%	
Total Lost time (s)		4.0			4.0			5.0		4.0	4.0	
Lane Util. Factor		0.95			0.95			0.95		0.97	1.00	
Frpb, ped/bikes		1.00			0.99			0.94		1.00	0.99	
Flpb, ped/bikes		1.00			1.00			1.00		0.94	1.00	
Frt		1.00			0.98			0.93		1.00	0.96	
Flt Protected		1.00			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		2924			2753			2857		2225	1256	
Flt Permitted		0.95			0.86			1.00		0.65	1.00	
Satd. Flow (perm)		2792			2373			2857		1527	1256	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	1	1601	25	10	804	119	0	86	72	437	245	82
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	1627	0	0	923	0	0	158	0	437	316	0
Confl. Peds. (#/hr)	43		4	4		43	5		59	59		5
Confl. Bikes (#/hr)			2			10			2			2
Heavy Vehicles (%)	0%	4%	0%	0%	4%	27%	0%	0%	0%	24%	0%	38%
Parking (#/hr)											0	0
Turn Type	Perm	NA		Perm	NA			NA		pm+pt	NA	
Protected Phases		2			2			4		3	8	
Permitted Phases	2			2						8		
Actuated Green, G (s)		56.0			56.0			17.0		35.0	35.0	
Effective Green, g (s)		58.0			58.0			19.0		37.0	37.0	
Actuated g/C Ratio		0.53			0.53			0.17		0.34	0.34	
Clearance Time (s)		6.0			6.0			7.0		6.0	6.0	
Lane Grp Cap (vph)		1472			1251			493		596	422	
v/s Ratio Prot								0.06		0.09	c0.25	
v/s Ratio Perm		c0.58			0.39					0.16		
v/c Ratio		1.11			0.74			0.32		0.73	0.75	
Uniform Delay, d1		26.0			20.1			39.8		32.5	32.4	
Progression Factor		0.57			0.83			1.00		0.52	0.47	
Incremental Delay, d2		48.5			3.7			1.7		7.3	10.7	
Delay (s)		63.3			20.3			41.6		24.2	25.9	
Level of Service		E			C			D		C	C	
Approach Delay (s)		63.3			20.3			41.6			24.9	
Approach LOS		E			C			D			C	

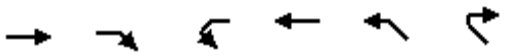
Intersection Summary			
HCM 2000 Control Delay	42.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	84.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	EBR	WBT	NWL	NWR
Lane Group Flow (vph)	1497	613	645	340	77
v/c Ratio	0.80	0.34	0.32	0.45	0.20
Control Delay	7.1	1.9	1.5	29.0	9.8
Queue Delay	17.9	0.5	0.1	19.2	3.9
Total Delay	25.0	2.4	1.5	48.2	13.7
Queue Length 50th (ft)	147	34	4	106	23
Queue Length 95th (ft)	m141	m26	6	151	52
Internal Link Dist (ft)	262		432	70	
Turn Bay Length (ft)					
Base Capacity (vph)	1873	1808	1991	749	385
Starvation Cap Reductn	409	747	0	398	241
Spillback Cap Reductn	0	655	292	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.02	0.58	0.38	0.97	0.53

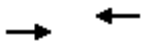
Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



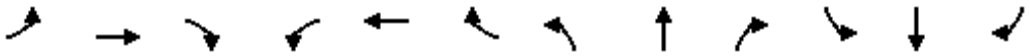
Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	1392	570	45	555	313	71
Future Volume (vph)	1392	570	45	555	313	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	11	11
Grade (%)	0%			0%	-1%	
Total Lost time (s)	5.0	5.0		5.0	4.0	4.0
Lane Util. Factor	0.95	0.88		0.91	0.97	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.85		1.00	1.00	0.85
Flt Protected	1.00	1.00		1.00	0.95	1.00
Satd. Flow (prot)	2944	2341		4189	2944	1358
Flt Permitted	1.00	1.00		0.74	0.95	1.00
Satd. Flow (perm)	2944	2341		3130	2944	1358
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.92	0.92
Adj. Flow (vph)	1497	613	48	597	340	77
RTOR Reduction (vph)	0	0	0	0	0	40
Lane Group Flow (vph)	1497	613	0	645	340	37
Confl. Peds. (#/hr)		37	37			
Confl. Bikes (#/hr)		3				
Heavy Vehicles (%)	3%	2%	7%	2%	4%	4%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	NA	custom	Perm	NA	Prot	Perm
Protected Phases	2	2 8		6	4	
Permitted Phases			6			4
Actuated Green, G (s)	68.0	83.0		68.0	26.0	26.0
Effective Green, g (s)	70.0	81.0		70.0	28.0	28.0
Actuated g/C Ratio	0.64	0.74		0.64	0.25	0.25
Clearance Time (s)	7.0			7.0	6.0	6.0
Lane Grp Cap (vph)	1873	1723		1991	749	345
v/s Ratio Prot	c0.51	0.26			c0.12	
v/s Ratio Perm				0.21		0.03
v/c Ratio	0.80	0.36		0.32	0.45	0.11
Uniform Delay, d1	14.8	5.2		9.2	34.6	31.4
Progression Factor	0.40	0.46		0.11	0.77	0.65
Incremental Delay, d2	0.8	0.1		0.4	2.0	0.6
Delay (s)	6.8	2.5		1.5	28.7	21.0
Level of Service	A	A		A	C	C
Approach Delay (s)	5.6			1.5	27.3	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	7.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT
Lane Group Flow (vph)	1573	646
v/c Ratio	0.79	0.41
Control Delay	5.9	17.1
Queue Delay	0.0	0.0
Total Delay	5.9	17.1
Queue Length 50th (ft)	75	140
Queue Length 95th (ft)	86	184
Internal Link Dist (ft)	432	489
Turn Bay Length (ft)		
Base Capacity (vph)	1988	1594
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.79	0.41

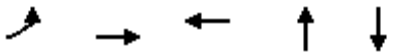
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1463	0	0	600	1	0	0	0	0	0	0
Future Volume (vph)	0	1463	0	0	600	1	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	11	11	11	13	13	13	13	13	13
Grade (%)		0%			-6%			1%			-1%	
Total Lost time (s)		4.0			4.0							
Lane Util. Factor		0.95			0.95							
Frpb, ped/bikes		1.00			1.00							
Flpb, ped/bikes		1.00			1.00							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		2916			3077							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		2916			3077							
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	1573	0	0	645	1	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1573	0	0	646	0	0	0	0	0	0	0
Confl. Peds. (#/hr)	92		2	2		92			116	116		
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	4%	0%	0%	5%	43%	0%	0%	0%	0%	0%	13%
Turn Type		NA			NA							
Protected Phases	1	6			2			4				
Permitted Phases	6						4					
Actuated Green, G (s)		73.0			55.0							
Effective Green, g (s)		75.0			57.0							
Actuated g/C Ratio		0.68			0.52							
Clearance Time (s)		6.0			6.0							
Lane Grp Cap (vph)		1988			1594							
v/s Ratio Prot		c0.54			0.21							
v/s Ratio Perm												
v/c Ratio		0.79			0.41							
Uniform Delay, d1		12.1			16.2							
Progression Factor		0.31			1.00							
Incremental Delay, d2		2.1			0.8							
Delay (s)		5.8			16.9							
Level of Service		A			B							
Approach Delay (s)		5.8			16.9			0.0			0.0	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

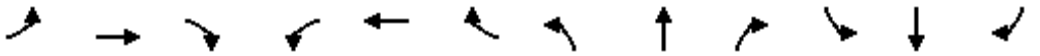
c Critical Lane Group



Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	111	37	116	211	780
v/c Ratio	0.25	0.06	0.32	0.12	0.42
Control Delay	19.5	21.0	34.1	10.8	20.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	19.5	21.0	34.1	10.8	20.1
Queue Length 50th (ft)	34	12	65	15	128
Queue Length 95th (ft)	m35	m14	116	m31	163
Internal Link Dist (ft)		361	249	136	148
Turn Bay Length (ft)					
Base Capacity (vph)	440	600	365	1725	1842
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	126
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.25	0.06	0.32	0.12	0.45

Intersection Summary

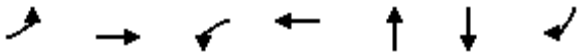
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	34	0	53	53	0	0	106	86	0	657	53
Future Volume (vph)	101	34	0	53	53	0	0	106	86	0	657	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	12	12	12	10	10	10	10	10	10
Grade (%)		0%			-1%			0%			1%	
Total Lost time (s)	3.0	5.0			5.0			4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00			0.91			0.91	
Frpb, ped/bikes	1.00	1.00			1.00			0.91			0.98	
Flpb, ped/bikes	0.98	1.00			0.99			1.00			1.00	
Frt	1.00	1.00			1.00			0.93			0.99	
Flt Protected	0.95	1.00			0.98			1.00			1.00	
Satd. Flow (prot)	1319	1436			1501			3546			3898	
Flt Permitted	0.65	1.00			0.84			1.00			1.00	
Satd. Flow (perm)	908	1436			1296			3546			3898	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	111	37	0	58	58	0	0	116	95	0	722	58
RTOR Reduction (vph)	0	0	0	0	0	0	0	50	0	0	0	0
Lane Group Flow (vph)	111	37	0	0	116	0	0	161	0	0	780	0
Confl. Peds. (#/hr)	27		8	8		27	61		56	56		61
Heavy Vehicles (%)	13%	0%	32%	0%	0%	0%	0%	8%	0%	0%	5%	0%
Parking (#/hr)		0	0	0	0	0					0	0
Turn Type	pm+pt	NA		Perm	NA			NA			NA	
Protected Phases	7	4			8			2			2	
Permitted Phases	4			8			2					
Actuated Green, G (s)	44.0	44.0			29.0			50.0			50.0	
Effective Green, g (s)	46.0	46.0			31.0			52.0			52.0	
Actuated g/C Ratio	0.42	0.42			0.28			0.47			0.47	
Clearance Time (s)	5.0	7.0			7.0			6.0			6.0	
Lane Grp Cap (vph)	424	600			365			1676			1842	
v/s Ratio Prot	c0.03	0.03						0.05			c0.20	
v/s Ratio Perm	0.08				c0.09							
v/c Ratio	0.26	0.06			0.32			0.10			0.42	
Uniform Delay, d1	20.6	19.1			31.2			16.0			19.1	
Progression Factor	1.00	1.08			1.00			1.21			1.00	
Incremental Delay, d2	0.1	0.0			2.3			0.1			0.7	
Delay (s)	20.6	20.7			33.4			19.5			19.8	
Level of Service	C	C			C			B			B	
Approach Delay (s)		20.6			33.4			19.5			19.8	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	21.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		

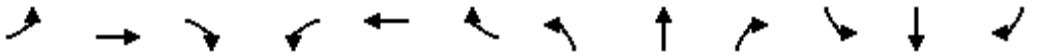
c Critical Lane Group



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	45	676	63	519	138	224	71
v/c Ratio	0.17	0.72	0.28	0.61	0.21	0.39	0.34
Control Delay	37.4	36.4	24.8	18.4	15.3	15.5	37.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.4	36.4	24.8	18.4	15.3	15.5	37.9
Queue Length 50th (ft)	25	201	26	54	41	98	42
Queue Length 95th (ft)	57	267	m47	61	83	162	87
Internal Link Dist (ft)		172		412	319	306	
Turn Bay Length (ft)			200				
Base Capacity (vph)	266	936	223	852	642	579	208
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.72	0.28	0.61	0.21	0.39	0.34

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



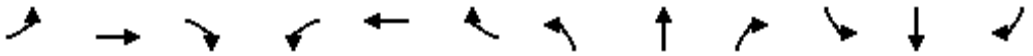
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	615	21	59	444	44	10	73	46	56	154	67
Future Volume (vph)	42	615	21	59	444	44	10	73	46	56	154	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	12	12	11	12	11	11
Total Lost time (s)	3.0	3.0		3.0	3.0			3.0			3.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.98			0.98			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			0.99	1.00
Frt	1.00	1.00		1.00	0.99			0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	1.00
Satd. Flow (prot)	1570	3114		1593	3133			1553			1565	1391
Flt Permitted	0.95	1.00		0.95	1.00			0.97			0.89	1.00
Satd. Flow (perm)	1570	3114		1593	3133			1518			1413	1391
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	45	654	22	63	472	47	11	78	49	60	164	71
RTOR Reduction (vph)	0	2	0	0	7	0	0	20	0	0	0	0
Lane Group Flow (vph)	45	674	0	63	512	0	0	118	0	0	224	71
Confl. Peds. (#/hr)	64		27	27		64	113		43	43		113
Confl. Bikes (#/hr)			1			5			17			29
Heavy Vehicles (%)	0%	0%	0%	2%	0%	0%	0%	1%	2%	1%	4%	1%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Over
Protected Phases	7	4		3	8			2			2	7
Permitted Phases							2			2		
Actuated Green, G (s)	14.0	27.0		11.0	24.0			37.0			37.0	14.0
Effective Green, g (s)	17.0	30.0		14.0	27.0			41.0			41.0	15.0
Actuated g/C Ratio	0.17	0.30		0.14	0.27			0.41			0.41	0.15
Clearance Time (s)	6.0	6.0		6.0	6.0			7.0			7.0	6.0
Lane Grp Cap (vph)	266	934		223	845			622			579	208
v/s Ratio Prot	0.03	c0.22		0.04	c0.16							c0.05
v/s Ratio Perm								0.08			c0.16	
v/c Ratio	0.17	0.72		0.28	0.61			0.19			0.39	0.34
Uniform Delay, d1	35.5	31.3		38.5	31.9			18.9			20.7	38.1
Progression Factor	1.00	1.00		0.56	0.49			1.00			0.64	0.87
Incremental Delay, d2	1.4	4.8		2.7	2.8			0.7			1.9	4.3
Delay (s)	36.8	36.1		24.4	18.5			19.5			15.2	37.2
Level of Service	D	D		C	B			B			B	D
Approach Delay (s)		36.1			19.2			19.5			20.5	
Approach LOS		D			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	26.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	788	530	93	1031	285	104	1052
v/c Ratio	0.72	0.51	0.23	0.66	0.59	0.52	0.49
Control Delay	13.1	29.7	25.2	28.9	31.4	24.7	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	13.1	29.7	25.2	28.9	31.4	24.7	7.9
Queue Length 50th (ft)	44	168	50	198	144	17	49
Queue Length 95th (ft)	54	218	97	247	234	53	57
Internal Link Dist (ft)	412	1036		403			307
Turn Bay Length (ft)			180		225		
Base Capacity (vph)	1087	1033	410	1552	485	201	2129
Starvation Cap Reductn	0	0	0	0	0	0	127
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.51	0.23	0.66	0.59	0.52	0.53

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	658	59	4	479	85	1	937	259	95	890	67
Future Volume (vph)	0	658	59	4	479	85	1	937	259	95	890	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	11	11	11	10	10	10
Total Lost time (s)		3.0			3.0	3.0		3.0	3.0	8.0	3.0	
Lane Util. Factor		0.95			0.95	1.00		0.91	1.00	1.00	0.91	
Frpb, ped/bikes		0.99			1.00	0.92		1.00	0.94	1.00	0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.99			1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected		1.00			1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3021			3025	1140		4468	1313	1416	4097	
Flt Permitted		1.00			0.95	1.00		0.94	1.00	0.17	1.00	
Satd. Flow (perm)		3021			2872	1140		4196	1313	260	4097	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	723	65	4	526	93	1	1030	285	104	978	74
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	788	0	0	530	93	0	1031	285	104	1052	0
Confl. Peds. (#/hr)	75		123	123		75	78		39	39		78
Confl. Bikes (#/hr)			10			1						
Heavy Vehicles (%)	0%	1%	8%	25%	0%	8%	0%	1%	1%	7%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	3	0	0	0	0	0	0
Parking (#/hr)											0	0
Turn Type		NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases				8		8	2		2	6		
Actuated Green, G (s)		32.0			32.0	32.0		33.0	33.0	48.0	48.0	
Effective Green, g (s)		36.0			36.0	36.0		37.0	37.0	47.0	52.0	
Actuated g/C Ratio		0.36			0.36	0.36		0.37	0.37	0.47	0.52	
Clearance Time (s)		7.0			7.0	7.0		7.0	7.0	7.0	7.0	
Lane Grp Cap (vph)		1087			1033	410		1552	485	203	2130	
v/s Ratio Prot		c0.26								0.04	c0.26	
v/s Ratio Perm					0.18	0.08		c0.25	0.22	0.20		
v/c Ratio		0.72			0.51	0.23		0.66	0.59	0.51	0.49	
Uniform Delay, d1		27.7			25.1	22.3		26.3	25.4	30.2	15.5	
Progression Factor		0.35			1.10	1.05		1.00	1.00	0.60	0.45	
Incremental Delay, d2		3.2			1.7	1.2		2.3	5.1	8.1	0.7	
Delay (s)		12.9			29.3	24.5		28.6	30.5	26.3	7.7	
Level of Service		B			C	C		C	C	C	A	
Approach Delay (s)		12.9			28.6			29.0			9.4	
Approach LOS		B			C			C			A	

Intersection Summary			
HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

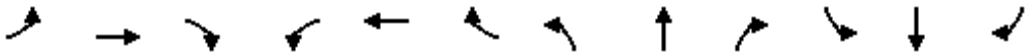


Lane Group	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	1137	69	675	60	131	110	26
v/c Ratio	1.08	0.33	0.40	0.25	0.32	0.21	0.07
Control Delay	69.0	11.5	1.3	31.5	31.2	15.5	19.4
Queue Delay	0.0	0.0	0.0	5.9	16.7	1.3	0.0
Total Delay	69.0	11.5	1.3	37.4	47.9	16.8	19.4
Queue Length 50th (ft)	~446	2	2	28	62	20	6
Queue Length 95th (ft)	#558	28	3	57	103	58	27
Internal Link Dist (ft)	1036		509		64		359
Turn Bay Length (ft)		200				140	
Base Capacity (vph)	1051	208	1675	243	413	528	364
Starvation Cap Reductn	0	0	0	138	261	273	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.08	0.33	0.40	0.57	0.86	0.43	0.07

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

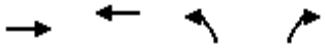
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	124	856	32	61	503	98	53	117	98	4	8	12
Future Volume (vph)	124	856	32	61	503	98	53	117	98	4	8	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	11	11	11	14	14	14
Total Lost time (s)		6.0		5.0	4.0		4.0	4.0	3.0		4.0	
Lane Util. Factor		0.95		1.00	0.95		1.00	1.00	1.00		1.00	
Frpb, ped/bikes		0.99		1.00	0.89		1.00	1.00	0.98		0.90	
Flpb, ped/bikes		0.97		1.00	1.00		0.83	1.00	1.00		1.00	
Frt		1.00		1.00	0.98		1.00	1.00	0.85		0.93	
Flt Protected		0.99		0.95	1.00		0.95	1.00	1.00		0.99	
Satd. Flow (prot)		2802		1458	2633		1248	1653	1381		1464	
Flt Permitted		0.74		0.15	1.00		0.74	1.00	1.00		0.96	
Satd. Flow (perm)		2096		234	2633		972	1653	1381		1421	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	139	962	36	69	565	110	60	131	110	4	9	13
RTOR Reduction (vph)	0	3	0	0	17	0	0	0	60	0	10	0
Lane Group Flow (vph)	0	1135	0	69	658	0	60	131	50	0	16	0
Confl. Peds. (#/hr)	134		99	99		134	150		9	9		150
Confl. Bikes (#/hr)			1			5			4			3
Heavy Vehicles (%)	0%	1%	12%	4%	0%	0%	4%	0%	0%	0%	12%	0%
Bus Blockages (#/hr)	0	8	8	0	0	0	0	0	0	0	0	0
Turn Type	Perm	NA		custom	NA		Perm	NA	pm+ov	Perm	NA	
Protected Phases		6		5	1 2			14	5		14	
Permitted Phases	6			2			14		14	14		
Actuated Green, G (s)		49.0		55.0	60.0		22.0	22.0	27.0		22.0	
Effective Green, g (s)		50.0		57.0	61.0		25.0	25.0	33.0		25.0	
Actuated g/C Ratio		0.50		0.57	0.61		0.25	0.25	0.33		0.25	
Clearance Time (s)		7.0		6.0			7.0	7.0	6.0		7.0	
Lane Grp Cap (vph)		1048		206	1606		243	413	455		355	
v/s Ratio Prot				0.02	c0.25			c0.08	0.01			
v/s Ratio Perm		c0.54		0.17			0.06		0.03		0.01	
v/c Ratio		1.08		0.33	0.41		0.25	0.32	0.11		0.05	
Uniform Delay, d1		25.0		12.1	10.1		30.0	30.5	23.3		28.5	
Progression Factor		0.67		0.95	0.07		0.94	0.94	2.14		1.00	
Incremental Delay, d2		49.8		4.1	0.7		2.4	2.0	0.5		0.2	
Delay (s)		66.6		15.6	1.4		30.6	30.7	50.4		28.7	
Level of Service		E		B	A		C	C	D		C	
Approach Delay (s)		66.6			2.8			37.9			28.7	
Approach LOS		E			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	40.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1053	661	89	93
v/c Ratio	0.70	0.40	0.21	0.22
Control Delay	6.6	4.1	30.6	10.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.6	4.1	30.6	10.4
Queue Length 50th (ft)	61	33	45	13
Queue Length 95th (ft)	m63	34	86	46
Internal Link Dist (ft)	509	523	265	
Turn Bay Length (ft)				
Base Capacity (vph)	1498	1640	427	420
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.70	0.40	0.21	0.22

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



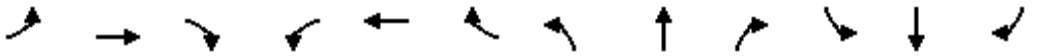
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	929	29	21	581	81	85
Future Volume (vph)	929	29	21	581	81	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	13	13
Total Lost time (s)	5.0			5.0	4.0	3.0
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	0.98			1.00	1.00	0.75
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2935			2956	1646	1120
Flt Permitted	1.00			0.90	0.95	1.00
Satd. Flow (perm)	2935			2666	1646	1120
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	1021	32	23	638	89	93
RTOR Reduction (vph)	2	0	0	0	0	42
Lane Group Flow (vph)	1051	0	0	661	89	51
Confl. Peds. (#/hr)		231	231		2	259
Confl. Bikes (#/hr)		8				
Heavy Vehicles (%)	1%	3%	14%	2%	2%	1%
Turn Type	NA		pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	4	1
Permitted Phases			6			4
Actuated Green, G (s)	49.0			59.0	24.0	29.0
Effective Green, g (s)	51.0			61.0	26.0	33.0
Actuated g/C Ratio	0.51			0.61	0.26	0.33
Clearance Time (s)	7.0			7.0	6.0	5.0
Lane Grp Cap (vph)	1496			1646	427	369
v/s Ratio Prot	c0.36			c0.03	c0.05	0.01
v/s Ratio Perm				0.22		0.04
v/c Ratio	0.70			0.40	0.21	0.14
Uniform Delay, d1	18.7			10.1	28.9	23.5
Progression Factor	0.31			0.34	1.00	1.00
Incremental Delay, d2	0.7			0.7	1.1	0.8
Delay (s)	6.5			4.0	30.1	24.3
Level of Service	A			A	C	C
Approach Delay (s)	6.5			4.0	27.1	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	7.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBT	NBR
Lane Group Flow (vph)	954	753	37	12
v/c Ratio	0.68	0.42	0.11	0.05
Control Delay	3.0	10.2	28.7	0.5
Queue Delay	0.0	1.0	0.0	0.0
Total Delay	3.0	11.2	28.7	0.5
Queue Length 50th (ft)	13	98	18	0
Queue Length 95th (ft)	15	136	44	0
Internal Link Dist (ft)	1	426	250	
Turn Bay Length (ft)				
Base Capacity (vph)	1410	1783	334	219
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	719	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.68	0.71	0.11	0.05

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	878	0	0	693	0	34	0	11	0	0	0
Future Volume (vph)	0	878	0	0	693	0	34	0	11	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			
Lane Util. Factor		0.95			0.95			1.00	1.00			
Frpb, ped/bikes		1.00			1.00			1.00	1.00			
Flpb, ped/bikes		1.00			1.00			0.91	1.00			
Frt		1.00			1.00			1.00	0.85			
Flt Protected		1.00			1.00			0.95	1.00			
Satd. Flow (prot)		3002			2973			1240	1221			
Flt Permitted		1.00			1.00			0.95	1.00			
Satd. Flow (perm)		3002			2973			1240	1221			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	954	0	0	753	0	37	0	12	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	11	0	0	0
Lane Group Flow (vph)	0	954	0	0	753	0	0	37	1	0	0	0
Confl. Peds. (#/hr)			134	134			76		18	18		76
Confl. Bikes (#/hr)			7			4						
Heavy Vehicles (%)	0%	1%	1%	4%	2%	0%	0%	0%	0%	0%	0%	0%
Parking (#/hr)							0	0	0			
Turn Type		NA			NA		Perm	NA	custom	D.Pm		Perm
Protected Phases		12			6			8	11			
Permitted Phases	12						8			8		8
Actuated Green, G (s)		45.0			58.0			25.0	7.0			
Effective Green, g (s)		47.0			60.0			27.0	9.0			
Actuated g/C Ratio		0.47			0.60			0.27	0.09			
Clearance Time (s)		6.0			6.0			6.0	6.0			
Lane Grp Cap (vph)		1410			1783			334	109			
v/s Ratio Prot		c0.32			c0.25				0.00			
v/s Ratio Perm								0.03				
v/c Ratio		0.68			0.42			0.11	0.01			
Uniform Delay, d1		20.6			10.7			27.5	41.4			
Progression Factor		0.06			0.88			1.00	1.00			
Incremental Delay, d2		1.9			0.6			0.7	0.2			
Delay (s)		3.0			10.0			28.1	41.6			
Level of Service		A			B			C	D			
Approach Delay (s)		3.0			10.0			31.4			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	6.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	73.0%	ICU Level of Service	C
Analysis Period (min)	15		

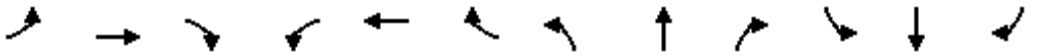
c Critical Lane Group



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	956	692	54	197	162	293
v/c Ratio	0.97	0.69	0.16	0.17	0.48	0.29
Control Delay	30.5	16.7	19.5	23.4	25.5	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.5	16.7	19.5	23.4	25.5	16.1
Queue Length 50th (ft)	134	50	21	29	67	28
Queue Length 95th (ft)	#149	248	46	49	117	52
Internal Link Dist (ft)	426	493		418		342
Turn Bay Length (ft)			110			
Base Capacity (vph)	987	996	329	1138	339	1022
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.97	0.69	0.16	0.17	0.48	0.29

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	692	47	21	525	97	50	159	24	151	154	118
Future Volume (vph)	150	692	47	21	525	97	50	159	24	151	154	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			2%			0%			2%	
Total Lost time (s)		4.0			4.0		2.0	4.0		2.0	4.0	
Lane Util. Factor		0.95			0.95		1.00	0.91		1.00	0.91	
Frpb, ped/bikes		0.99			0.96		1.00	0.96		1.00	0.88	
Flpb, ped/bikes		0.99			1.00		0.91	1.00		0.86	1.00	
Frt		0.99			0.98		1.00	0.98		1.00	0.93	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2778			2599		1300	3863		1236	3215	
Flt Permitted		0.61			0.90		0.56	1.00		0.62	1.00	
Satd. Flow (perm)		1720			2338		760	3863		810	3215	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	161	744	51	23	565	104	54	171	26	162	166	127
RTOR Reduction (vph)	0	4	0	0	15	0	0	18	0	0	90	0
Lane Group Flow (vph)	0	952	0	0	678	0	54	179	0	162	203	0
Confl. Peds. (#/hr)	207		166	166		207	200		226	226		200
Confl. Bikes (#/hr)			2						6			3
Heavy Vehicles (%)	0%	0%	2%	10%	2%	2%	6%	3%	0%	5%	8%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	3
Parking (#/hr)		0	0		0	0		0	0		0	0
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		50.0			39.0		31.0	26.0		31.0	26.0	
Effective Green, g (s)		53.0			42.0		37.0	29.0		37.0	29.0	
Actuated g/C Ratio		0.53			0.42		0.37	0.29		0.37	0.29	
Clearance Time (s)		7.0			7.0		5.0	7.0		5.0	7.0	
Lane Grp Cap (vph)		1006			981		324	1120		333	932	
v/s Ratio Prot		c0.09					0.01	0.05		c0.04	0.06	
v/s Ratio Perm		0.42			c0.29		0.05			0.14		
v/c Ratio		0.95			0.69		0.17	0.16		0.49	0.22	
Uniform Delay, d1		22.2			23.7		20.7	26.4		22.9	26.9	
Progression Factor		0.48			0.55		1.00	1.00		1.00	1.00	
Incremental Delay, d2		14.5			3.7		1.1	0.3		5.0	0.5	
Delay (s)		25.1			16.8		21.8	26.7		27.9	27.4	
Level of Service		C			B		C	C		C	C	
Approach Delay (s)		25.1			16.8			25.7			27.6	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	91.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	942	645	74	59
v/c Ratio	0.59	0.44	0.17	0.22
Control Delay	8.9	13.5	26.6	28.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	8.9	13.5	26.6	28.4
Queue Length 50th (ft)	94	127	34	28
Queue Length 95th (ft)	m100	143	70	62
Internal Link Dist (ft)	493	589	212	
Turn Bay Length (ft)				
Base Capacity (vph)	1595	1480	427	265
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.59	0.44	0.17	0.22

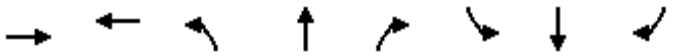
Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



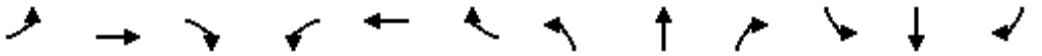
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	806	61	18	575	68	54
Future Volume (vph)	806	61	18	575	68	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10
Grade (%)	-2%			1%	-2%	
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	0.97			1.00	1.00	0.69
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2743			2801	1378	855
Flt Permitted	1.00			0.91	0.95	1.00
Satd. Flow (perm)	2743			2553	1378	855
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	876	66	20	625	74	59
RTOR Reduction (vph)	5	0	0	0	0	0
Lane Group Flow (vph)	937	0	0	645	74	59
Confl. Peds. (#/hr)		131	131		335	230
Confl. Bikes (#/hr)		3				1
Heavy Vehicles (%)	2%	0%	0%	2%	0%	0%
Parking (#/hr)	0	0		0	0	0
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			2	4	
Permitted Phases			2		4	4
Actuated Green, G (s)	56.0			56.0	29.0	29.0
Effective Green, g (s)	58.0			58.0	31.0	31.0
Actuated g/C Ratio	0.58			0.58	0.31	0.31
Clearance Time (s)	6.0			6.0	6.0	6.0
Lane Grp Cap (vph)	1590			1480	427	265
v/s Ratio Prot	c0.34				0.05	
v/s Ratio Perm				0.25		c0.07
v/c Ratio	0.59			0.44	0.17	0.22
Uniform Delay, d1	13.4			11.8	25.2	25.6
Progression Factor	0.60			1.05	1.00	1.00
Incremental Delay, d2	0.8			0.9	0.9	1.9
Delay (s)	8.9			13.2	26.0	27.5
Level of Service	A			B	C	C
Approach Delay (s)	8.9			13.2	26.7	
Approach LOS	A			B	C	

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	935	616	40	27	32	30	24	35
v/c Ratio	0.77	0.45	0.16	0.08	0.10	0.12	0.07	0.14
Control Delay	12.7	16.6	29.9	28.1	0.6	29.2	28.1	29.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.7	16.6	29.9	28.1	0.6	29.2	28.1	29.5
Queue Length 50th (ft)	189	97	19	13	0	14	11	17
Queue Length 95th (ft)	286	143	47	34	0	38	32	43
Internal Link Dist (ft)	589	201		407			351	
Turn Bay Length (ft)			110		70	150		75
Base Capacity (vph)	1216	1365	256	354	333	252	328	257
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.45	0.16	0.08	0.10	0.12	0.07	0.14

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	794	55	36	524	6	37	25	29	28	22	32
Future Volume (vph)	11	794	55	36	524	6	37	25	29	28	22	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			1%			-1%			2%	
Total Lost time (s)		4.0			4.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.95			0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		0.98			0.99		1.00	1.00	0.77	1.00	1.00	0.79
Flpb, ped/bikes		1.00			1.00		0.82	1.00	1.00	0.80	1.00	1.00
Frt		0.99			1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00			1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		2728			2773		1218	1312	941	1200	1215	953
Flt Permitted		0.94			0.85		0.74	1.00	1.00	0.74	1.00	1.00
Satd. Flow (perm)		2580			2352		951	1312	941	934	1215	953
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	863	60	39	570	7	40	27	32	30	24	35
RTOR Reduction (vph)	0	5	0	0	1	0	0	0	23	0	0	0
Lane Group Flow (vph)	0	930	0	0	615	0	40	27	9	30	24	35
Confl. Peds. (#/hr)	502		123	123		502	121		132	132		121
Confl. Bikes (#/hr)			10			12			20			17
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	2%	10%	0%	0%	17%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	2	0	0	1
Parking (#/hr)		0	0		0	0		0	0		0	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		6		5	2			4			4	
Permitted Phases	6			2			4		4	4		4
Actuated Green, G (s)		45.0			55.0		25.0	25.0	25.0	25.0	25.0	25.0
Effective Green, g (s)		47.0			57.0		27.0	27.0	27.0	27.0	27.0	27.0
Actuated g/C Ratio		0.47			0.57		0.27	0.27	0.27	0.27	0.27	0.27
Clearance Time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Grp Cap (vph)		1212			1370		256	354	254	252	328	257
v/s Ratio Prot					c0.03			0.02			0.02	
v/s Ratio Perm		c0.36			0.22		c0.04		0.01	0.03		0.04
v/c Ratio		0.77			0.45		0.16	0.08	0.03	0.12	0.07	0.14
Uniform Delay, d1		22.0			12.4		27.8	27.2	26.9	27.5	27.2	27.7
Progression Factor		0.39			1.27		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		3.9			1.0		1.3	0.4	0.2	1.0	0.4	1.1
Delay (s)		12.6			16.8		29.1	27.6	27.1	28.5	27.6	28.8
Level of Service		B			B		C	C	C	C	C	C
Approach Delay (s)		12.6			16.8			28.1			28.4	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		

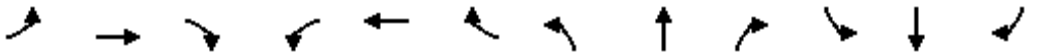
c Critical Lane Group



Lane Group	EBT	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	851	535	64	102	154
v/c Ratio	0.87	0.56	0.10	0.08	0.23
Control Delay	21.8	21.6	31.0	8.3	8.6
Queue Delay	0.0	0.4	0.0	0.0	0.9
Total Delay	21.8	22.0	31.0	8.3	9.5
Queue Length 50th (ft)	151	85	16	10	26
Queue Length 95th (ft)	#362	110	35	19	45
Internal Link Dist (ft)	308	262	414		136
Turn Bay Length (ft)					
Base Capacity (vph)	975	963	638	1226	669
Starvation Cap Reductn	0	117	0	0	309
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.87	0.63	0.10	0.08	0.43

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	750	13	12	406	64	0	38	20	92	106	32
Future Volume (vph)	4	750	13	12	406	64	0	38	20	92	106	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	10	10	10
Grade (%)		-1%			0%			-1%			0%	
Total Lost time (s)		4.0			4.0			5.0		4.0	4.0	
Lane Util. Factor		0.95			0.95			0.95		0.97	1.00	
Frpb, ped/bikes		1.00			0.99			0.98		1.00	0.98	
Flpb, ped/bikes		1.00			1.00			1.00		0.97	1.00	
Frt		1.00			0.98			0.95		1.00	0.96	
Flt Protected		1.00			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		2842			2887			2778		2825	1315	
Flt Permitted		0.95			0.93			1.00		0.71	1.00	
Satd. Flow (perm)		2708			2677			2778		2120	1315	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	4	833	14	13	451	71	0	42	22	102	118	36
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	851	0	0	535	0	0	64	0	102	143	0
Confl. Peds. (#/hr)	34		58	58		34	69		33	33		69
Confl. Bikes (#/hr)			2			1			3			1
Heavy Vehicles (%)	0%	1%	23%	0%	1%	9%	0%	3%	5%	1%	4%	0%
Parking (#/hr)		0	0					0	0		0	0
Turn Type	Perm	NA		Perm	NA			NA		pm+pt	NA	
Protected Phases		2			2			4		3	8	
Permitted Phases	2			2						8		
Actuated Green, G (s)		34.0			34.0			21.0		48.0	48.0	
Effective Green, g (s)		36.0			36.0			23.0		50.0	50.0	
Actuated g/C Ratio		0.36			0.36			0.23		0.50	0.50	
Clearance Time (s)		6.0			6.0			7.0		6.0	6.0	
Lane Grp Cap (vph)		974			963			638		1215	657	
v/s Ratio Prot								0.02		0.02	c0.11	
v/s Ratio Perm		c0.31			0.20					0.02		
v/c Ratio		0.87			0.56			0.10		0.08	0.22	
Uniform Delay, d1		29.9			25.6			30.3		13.1	14.0	
Progression Factor		0.43			0.74			1.00		0.61	0.64	
Incremental Delay, d2		7.9			2.3			0.3		0.1	0.8	
Delay (s)		20.8			21.3			30.7		8.2	9.7	
Level of Service		C			C			C		A	A	
Approach Delay (s)		20.8			21.3			30.7			9.1	
Approach LOS		C			C			C			A	

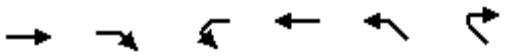
Intersection Summary			
HCM 2000 Control Delay	19.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	EBR	WBT	NWL	NWR
Lane Group Flow (vph)	715	232	397	168	24
v/c Ratio	0.45	0.16	0.20	0.16	0.05
Control Delay	4.8	3.1	1.4	21.0	15.2
Queue Delay	0.3	0.0	0.0	3.6	1.6
Total Delay	5.1	3.1	1.4	24.5	16.9
Queue Length 50th (ft)	32	10	2	43	7
Queue Length 95th (ft)	m37	m12	3	63	24
Internal Link Dist (ft)	262		432	70	
Turn Bay Length (ft)					
Base Capacity (vph)	1591	1489	2007	1050	500
Starvation Cap Reductn	316	0	0	789	399
Spillback Cap Reductn	0	1	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.56	0.16	0.20	0.64	0.24

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

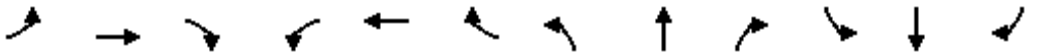


Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	651	211	17	344	138	20
Future Volume (vph)	651	211	17	344	138	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	11	11
Grade (%)	0%			0%	-1%	
Total Lost time (s)	5.0	5.0		5.0	4.0	4.0
Lane Util. Factor	0.95	0.88		0.91	0.97	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.85		1.00	1.00	0.85
Flt Protected	1.00	1.00		1.00	0.95	1.00
Satd. Flow (prot)	3002	2364		4230	3002	1384
Flt Permitted	1.00	1.00		0.89	0.95	1.00
Satd. Flow (perm)	3002	2364		3786	3002	1384
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.82	0.82
Adj. Flow (vph)	715	232	19	378	168	24
RTOR Reduction (vph)	0	0	0	0	0	16
Lane Group Flow (vph)	715	232	0	397	168	8
Confl. Peds. (#/hr)			11	11		
Confl. Bikes (#/hr)			6			
Heavy Vehicles (%)	1%	1%	0%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	6	0	0
Turn Type	NA	custom	Perm	NA	Prot	Perm
Protected Phases	2	2 8		6	4	
Permitted Phases			6			4
Actuated Green, G (s)	51.0	61.0		51.0	33.0	33.0
Effective Green, g (s)	53.0	59.0		53.0	35.0	35.0
Actuated g/C Ratio	0.53	0.59		0.53	0.35	0.35
Clearance Time (s)	7.0			7.0	6.0	6.0
Lane Grp Cap (vph)	1591	1394		2006	1050	484
v/s Ratio Prot	c0.24	0.10			c0.06	
v/s Ratio Perm				0.10		0.01
v/c Ratio	0.45	0.17		0.20	0.16	0.02
Uniform Delay, d1	14.5	9.3		12.3	22.4	21.3
Progression Factor	0.29	0.39		0.10	0.91	1.76
Incremental Delay, d2	0.6	0.2		0.2	0.3	0.1
Delay (s)	4.8	3.8		1.4	20.8	37.5
Level of Service	A	A		A	C	D
Approach Delay (s)	4.5			1.4	22.9	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	6.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	35.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT
Lane Group Flow (vph)	737	397
v/c Ratio	0.41	0.28
Control Delay	1.8	18.0
Queue Delay	0.0	0.0
Total Delay	1.8	18.0
Queue Length 50th (ft)	8	81
Queue Length 95th (ft)	20	115
Internal Link Dist (ft)	432	475
Turn Bay Length (ft)		
Base Capacity (vph)	1789	1399
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.41	0.28

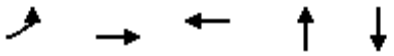
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	669	0	0	361	0	0	0	0	0	0	0
Future Volume (vph)	2	669	0	0	361	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	11	11	11	13	13	13	13	13	13
Grade (%)		0%			-6%			1%			-1%	
Total Lost time (s)		4.0			4.0							
Lane Util. Factor		0.95			0.95							
Frpb, ped/bikes		1.00			1.00							
Flpb, ped/bikes		1.00			1.00							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		2943			3111							
Flt Permitted		0.95			1.00							
Satd. Flow (perm)		2811			3111							
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	2	735	0	0	397	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	737	0	0	397	0	0	0	0	0	0	0
Confl. Peds. (#/hr)	132		160	160		132	227		134	134		227
Confl. Bikes (#/hr)			3			4			4			7
Heavy Vehicles (%)	1%	3%	12%	16%	4%	5%	8%	12%	12%	0%	3%	1%
Turn Type	pm+pt	NA			NA							
Protected Phases	1	6			2			4				
Permitted Phases	6						4					
Actuated Green, G (s)		61.0			43.0							
Effective Green, g (s)		63.0			45.0							
Actuated g/C Ratio		0.63			0.45							
Clearance Time (s)		6.0			6.0							
Lane Grp Cap (vph)		1789			1399							
v/s Ratio Prot		c0.06			0.13							
v/s Ratio Perm		c0.20										
v/c Ratio		0.41			0.28							
Uniform Delay, d1		9.2			17.3							
Progression Factor		0.12			1.00							
Incremental Delay, d2		0.6			0.5							
Delay (s)		1.8			17.8							
Level of Service		A			B							
Approach Delay (s)		1.8			17.8			0.0			0.0	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	49.6%	ICU Level of Service	A
Analysis Period (min)	15		

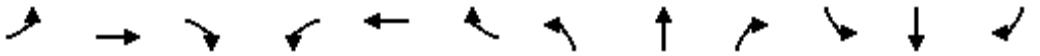
c Critical Lane Group



Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	69	34	152	117	253
v/c Ratio	0.15	0.05	0.37	0.08	0.16
Control Delay	10.4	11.9	29.4	12.5	18.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	10.4	11.9	29.4	12.5	18.5
Queue Length 50th (ft)	10	6	74	14	35
Queue Length 95th (ft)	m18	m11	131	m27	54
Internal Link Dist (ft)		361	249	136	148
Turn Bay Length (ft)					
Base Capacity (vph)	468	660	416	1482	1534
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.15	0.05	0.37	0.08	0.16

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



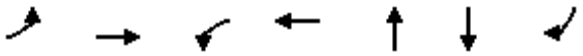
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	31	0	66	72	0	0	59	47	0	164	66
Future Volume (vph)	63	31	0	66	72	0	0	59	47	0	164	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	12	12	12	10	10	10	10	10	10
Grade (%)		0%			-1%			0%			1%	
Total Lost time (s)	3.0	5.0			5.0			4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00			0.91			0.91	
Frpb, ped/bikes	1.00	1.00			1.00			0.92			0.94	
Flpb, ped/bikes	0.99	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			1.00			0.93			0.96	
Flt Protected	0.95	1.00			0.98			1.00			1.00	
Satd. Flow (prot)	1323	1436			1504			3460			3653	
Flt Permitted	0.63	1.00			0.85			1.00			1.00	
Satd. Flow (perm)	876	1436			1301			3460			3653	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	69	34	0	73	79	0	0	65	52	0	180	73
RTOR Reduction (vph)	0	0	0	0	0	0	0	30	0	0	0	0
Lane Group Flow (vph)	69	34	0	0	152	0	0	87	0	0	253	0
Confl. Peds. (#/hr)	27		8	8		27	61		56	56		61
Heavy Vehicles (%)	13%	0%	32%	0%	0%	0%	0%	8%	0%	0%	5%	0%
Parking (#/hr)		0	0	0	0	0		0	0		0	0
Turn Type	pm+pt	NA	Perm	Perm	NA			NA			NA	
Protected Phases	7	4			8			2			2	
Permitted Phases	4		4	8			2					
Actuated Green, G (s)	44.0	44.0			30.0			40.0			40.0	
Effective Green, g (s)	46.0	46.0			32.0			42.0			42.0	
Actuated g/C Ratio	0.46	0.46			0.32			0.42			0.42	
Clearance Time (s)	5.0	7.0			7.0			6.0			6.0	
Lane Grp Cap (vph)	452	660			416			1453			1534	
v/s Ratio Prot	c0.02	0.02						0.03			c0.07	
v/s Ratio Perm	0.05				c0.12							
v/c Ratio	0.15	0.05			0.37			0.06			0.16	
Uniform Delay, d1	15.7	14.9			26.2			17.3			18.1	
Progression Factor	0.68	0.78			1.00			1.22			1.00	
Incremental Delay, d2	0.5	0.1			2.5			0.1			0.2	
Delay (s)	11.2	11.7			28.7			21.1			18.3	
Level of Service	B	B			C			C			B	
Approach Delay (s)		11.4			28.7			21.1			18.3	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	20.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

KITTELSON & ASSOCIATES

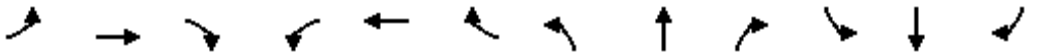
Appendix D
Scenario 3 Operation Analysis Results



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	283	1168	25	568	200	109	28
v/c Ratio	0.65	0.81	0.22	0.71	0.41	0.27	0.09
Control Delay	43.0	30.9	24.4	14.6	32.7	28.1	29.4
Queue Delay	0.0	13.9	0.0	1.1	0.0	0.0	0.0
Total Delay	43.0	44.9	24.4	15.7	32.7	28.1	29.4
Queue Length 50th (ft)	176	362	14	32	110	57	15
Queue Length 95th (ft)	271	457	m22	40	179	105	39
Internal Link Dist (ft)		172		412	453	306	
Turn Bay Length (ft)			200				
Base Capacity (vph)	434	1440	113	802	483	401	296
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	277	0	81	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	1.00	0.22	0.79	0.41	0.27	0.09

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	283	1163	5	25	402	166	8	164	28	28	81	28
Future Volume (vph)	283	1163	5	25	402	166	8	164	28	28	81	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	12	12	11	12	11	11
Total Lost time (s)	3.0	3.0		3.0	3.0			3.0			3.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.99			0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.96			0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	1.00
Satd. Flow (prot)	1540	3107		1562	3044			1531			1389	1124
Flt Permitted	0.95	1.00		0.95	1.00			0.99			0.90	1.00
Satd. Flow (perm)	1540	3107		1562	3044			1519			1261	1124
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	283	1163	5	25	402	166	8	164	28	28	81	28
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	283	1168	0	25	568	0	0	200	0	0	109	28
Confl. Peds. (#/hr)			13	13			21		19	19		21
Confl. Bikes (#/hr)						1			33			22
Heavy Vehicles (%)	2%	1%	0%	4%	2%	0%	25%	9%	0%	0%	23%	25%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Over
Protected Phases	7	4		3	8			2			2	7
Permitted Phases							2			2		
Actuated Green, G (s)	28.0	48.0		5.0	26.0			31.0			31.0	28.0
Effective Green, g (s)	31.0	51.0		8.0	29.0			35.0			35.0	29.0
Actuated g/C Ratio	0.28	0.46		0.07	0.26			0.32			0.32	0.26
Clearance Time (s)	6.0	6.0		6.0	6.0			7.0			7.0	6.0
Lane Grp Cap (vph)	434	1440		113	802			483			401	296
v/s Ratio Prot	c0.18	c0.38		0.02	c0.19							0.02
v/s Ratio Perm								c0.13			0.09	
v/c Ratio	0.65	0.81		0.22	0.71			0.41			0.27	0.09
Uniform Delay, d1	34.8	25.4		48.1	36.7			29.4			28.0	30.6
Progression Factor	1.00	1.00		0.42	0.27			1.00			0.92	0.92
Incremental Delay, d2	7.4	5.1		3.8	4.4			2.6			1.7	0.6
Delay (s)	42.2	30.4		24.1	14.4			32.1			27.5	28.8
Level of Service	D	C		C	B			C			C	C
Approach Delay (s)		32.7			14.9			32.1			27.8	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	72.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



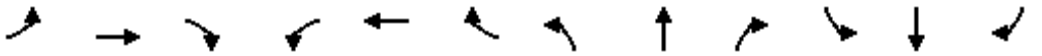
Lane Group	EBT	EBR	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	1171	48	581	224	1567	386	179	499
v/c Ratio	1.04	0.12	0.56	0.55	1.02	0.88	0.50	0.35
Control Delay	45.2	5.0	30.6	34.0	63.0	57.2	30.3	11.6
Queue Delay	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.2	5.0	30.6	34.0	63.0	57.2	30.3	11.6
Queue Length 50th (ft)	~471	5	171	124	~415	255	17	51
Queue Length 95th (ft)	#586	m6	228	207	#525	#435	56	65
Internal Link Dist (ft)	412		1035		259			307
Turn Bay Length (ft)		150		200		225		
Base Capacity (vph)	1130	406	1036	409	1543	437	355	1436
Starvation Cap Reductn	3	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.04	0.12	0.56	0.55	1.02	0.88	0.50	0.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

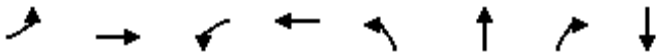
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1171	48	1	580	224	0	1567	386	179	486	13
Future Volume (vph)	0	1171	48	1	580	224	0	1567	386	179	486	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	11	11	11	10	10	10
Total Lost time (s)		5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	
Lane Util. Factor		0.95	1.00		0.95	1.00		0.91	1.00	0.97	0.95	
Frpb, ped/bikes		1.00	0.86		1.00	0.91		1.00	0.94	1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	
Frt		1.00	0.85		1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		1.00	1.00		1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3110	1117		3031	1127		4468	1265	2749	2982	
Flt Permitted		1.00	1.00		0.94	1.00		1.00	1.00	0.09	1.00	
Satd. Flow (perm)		3110	1117		2849	1127		4468	1265	269	2982	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1171	48	1	580	224	0	1567	386	179	486	13
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1171	48	0	581	224	0	1567	386	179	499	0
Confl. Peds. (#/hr)	75		123	123		75	78		39	39		78
Confl. Bikes (#/hr)			10			1						
Heavy Vehicles (%)	0%	1%	8%	25%	0%	8%	0%	1%	1%	7%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	4	0	0	8	0	0	0
Turn Type		NA	Perm	Perm	NA	Perm		NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases			4	8		8			2	6		
Actuated Green, G (s)		38.0	38.0		38.0	38.0		36.0	36.0	51.0	51.0	
Effective Green, g (s)		40.0	40.0		40.0	40.0		38.0	38.0	53.0	53.0	
Actuated g/C Ratio		0.36	0.36		0.36	0.36		0.35	0.35	0.48	0.48	
Clearance Time (s)		7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	
Lane Grp Cap (vph)		1130	406		1036	409		1543	437	355	1436	
v/s Ratio Prot		c0.38						c0.35		c0.05	0.17	
v/s Ratio Perm			0.04		0.20	0.20			0.31	0.20		
v/c Ratio		1.04	0.12		0.56	0.55		1.02	0.88	0.50	0.35	
Uniform Delay, d1		35.0	23.3		28.0	27.8		36.0	33.9	39.4	17.7	
Progression Factor		0.33	0.20		1.00	1.00		1.00	1.00	0.75	0.61	
Incremental Delay, d2		30.6	0.3		2.2	5.2		26.9	22.0	4.9	0.7	
Delay (s)		42.0	4.9		30.2	33.0		62.9	55.9	34.4	11.5	
Level of Service		D	A		C	C		E	E	C	B	
Approach Delay (s)		40.6			31.0			61.5			17.5	
Approach LOS		D			C			E			B	

Intersection Summary			
HCM 2000 Control Delay	44.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	87.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

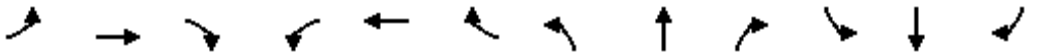


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	121	1615	119	780	113	148	161	37
v/c Ratio	0.41	1.01	0.86	0.41	0.49	0.44	0.42	0.11
Control Delay	18.4	48.7	67.8	8.1	44.5	40.8	38.9	35.8
Queue Delay	0.0	0.0	0.0	0.0	12.8	22.0	2.2	0.0
Total Delay	18.4	48.7	67.8	8.1	57.3	62.8	41.1	35.8
Queue Length 50th (ft)	45	~578	39	111	64	84	89	21
Queue Length 95th (ft)	95	#764	#148	145	129	155	168	51
Internal Link Dist (ft)		1035		511		84		359
Turn Bay Length (ft)	150		200				140	
Base Capacity (vph)	296	1602	139	1910	232	335	387	341
Starvation Cap Reductn	0	0	0	0	94	174	125	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	1.01	0.86	0.41	0.82	0.92	0.61	0.11

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	1501	114	119	684	96	113	148	161	5	24	8
Future Volume (vph)	121	1501	114	119	684	96	113	148	161	5	24	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	11	11	11	14	14	14
Total Lost time (s)	6.0	6.0		5.0	4.0		4.0	4.0	3.0		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	0.98		1.00	0.97		1.00	1.00	0.99		0.97	
Flpb, ped/bikes	0.92	1.00		1.00	1.00		0.91	1.00	1.00		1.00	
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00		0.99	
Satd. Flow (prot)	1393	2818		1472	2775		1293	1589	1320		1669	
Flt Permitted	0.36	1.00		0.06	1.00		0.81	1.00	1.00		0.96	
Satd. Flow (perm)	523	2818		98	2775		1100	1589	1320		1616	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	121	1501	114	119	684	96	113	148	161	5	24	8
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	121	1615	0	119	780	0	113	148	161	0	37	0
Confl. Peds. (#/hr)	22		176	176		22	70		4	4		70
Confl. Bikes (#/hr)			6			4			3			7
Heavy Vehicles (%)	0%	2%	6%	3%	4%	3%	10%	4%	5%	20%	0%	0%
Bus Blockages (#/hr)	0	8	8	0	0	0	0	0	0	0	0	0
Turn Type	Perm	NA		custom	NA		Perm	NA	pm+ov	Perm	NA	
Protected Phases		6		5	1 2			14	5		14	
Permitted Phases	6			2			14		14	14		
Actuated Green, G (s)	61.0	61.0		67.0	72.0		20.0	20.0	25.0		20.0	
Effective Green, g (s)	62.0	62.0		69.0	73.0		23.0	23.0	31.0		23.0	
Actuated g/C Ratio	0.57	0.57		0.63	0.67		0.21	0.21	0.28		0.21	
Clearance Time (s)	7.0	7.0		6.0			7.0	7.0	6.0		7.0	
Lane Grp Cap (vph)	297	1602		137	1858		232	335	375		340	
v/s Ratio Prot		c0.57		c0.05	c0.28			0.09	0.03			
v/s Ratio Perm	0.23			0.50			c0.10		0.09		0.02	
v/c Ratio	0.41	1.01		0.87	0.42		0.49	0.44	0.43		0.11	
Uniform Delay, d1	13.2	23.5		24.4	8.3		37.8	37.4	31.8		34.7	
Progression Factor	1.00	1.00		1.00	1.00		0.96	0.96	1.21		1.00	
Incremental Delay, d2	4.1	24.5		48.0	0.7		7.1	4.2	3.6		0.6	
Delay (s)	17.3	48.0		72.3	9.0		43.5	40.1	42.1		35.4	
Level of Service	B	D		E	A		D	D	D		D	
Approach Delay (s)		45.8			17.4			41.7			35.4	
Approach LOS		D			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	36.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	109.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1667	918	25	54
v/c Ratio	0.90	0.63	0.09	0.18
Control Delay	26.0	16.0	40.2	14.5
Queue Delay	15.3	0.0	0.0	0.0
Total Delay	41.3	16.0	40.2	14.5
Queue Length 50th (ft)	491	368	15	6
Queue Length 95th (ft)	631	m340	40	38
Internal Link Dist (ft)	511	529	390	
Turn Bay Length (ft)				
Base Capacity (vph)	1847	1465	269	293
Starvation Cap Reductn	214	0	0	0
Spillback Cap Reductn	43	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.02	0.63	0.09	0.18

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1624	43	44	874	25	54
Future Volume (vph)	1624	43	44	874	25	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	13	13
Total Lost time (s)	5.0			5.0	4.0	3.0
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	0.98			1.00	1.00	0.75
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2944			2949	1646	1110
Flt Permitted	1.00			0.69	0.95	1.00
Satd. Flow (perm)	2944			2039	1646	1110
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1624	43	44	874	25	54
RTOR Reduction (vph)	2	0	0	0	0	32
Lane Group Flow (vph)	1665	0	0	918	25	22
Confl. Peds. (#/hr)		231	231		2	259
Confl. Bikes (#/hr)		8				
Heavy Vehicles (%)	1%	3%	14%	2%	2%	1%
Turn Type	NA		D.Pm	NA	Prot	custom
Protected Phases	2			6	4	1
Permitted Phases			2			4
Actuated Green, G (s)	67.0			77.0	16.0	21.0
Effective Green, g (s)	69.0			79.0	18.0	25.0
Actuated g/C Ratio	0.63			0.72	0.16	0.23
Clearance Time (s)	7.0			7.0	6.0	5.0
Lane Grp Cap (vph)	1846			1464	269	252
v/s Ratio Prot	c0.57				c0.02	0.01
v/s Ratio Perm				c0.45		0.01
v/c Ratio	0.90			0.63	0.09	0.09
Uniform Delay, d1	17.6			7.9	39.1	33.5
Progression Factor	1.00			1.91	1.00	1.00
Incremental Delay, d2	7.6			0.2	0.7	0.7
Delay (s)	25.2			15.4	39.8	34.2
Level of Service	C			B	D	C
Approach Delay (s)	25.2			15.4	35.9	
Approach LOS	C			B	D	

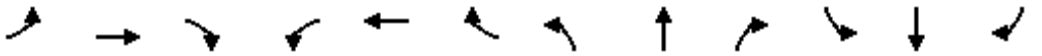
Intersection Summary			
HCM 2000 Control Delay	22.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	83.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBT	NBR	SBL
Lane Group Flow (vph)	1525	1016	31	15	1
v/c Ratio	0.89	0.48	0.16	0.08	0.01
Control Delay	4.6	1.8	42.9	0.7	40.0
Queue Delay	0.0	52.1	0.0	0.0	0.0
Total Delay	4.6	53.8	42.9	0.7	40.0
Queue Length 50th (ft)	2	31	19	0	1
Queue Length 95th (ft)	m6	34	48	0	6
Internal Link Dist (ft)	1	427	135		
Turn Bay Length (ft)					
Base Capacity (vph)	1710	2120	190	199	189
Starvation Cap Reductn	0	212	0	0	0
Spillback Cap Reductn	0	1421	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.89	1.45	0.16	0.08	0.01

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	1523	0	0	1016	0	31	0	15	1	0	0
Future Volume (vph)	2	1523	0	0	1016	0	31	0	15	1	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0	4.0		
Lane Util. Factor		0.95			0.95			1.00	1.00	1.00		
Frpb, ped/bikes		1.00			1.00			1.00	1.00	1.00		
Flpb, ped/bikes		1.00			1.00			0.96	1.00	0.97		
Frt		1.00			1.00			1.00	0.85	1.00		
Flt Protected		1.00			1.00			0.95	1.00	0.95		
Satd. Flow (prot)		2944			2916			1231	1221	1580		
Flt Permitted		0.95			1.00			0.95	1.00	0.74		
Satd. Flow (perm)		2809			2916			1231	1221	1226		
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2	1523	0	0	1016	0	31	0	15	1	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	14	0	0	0
Lane Group Flow (vph)	0	1525	0	0	1016	0	0	31	1	1	0	0
Confl. Peds. (#/hr)	1		43	43		1	20		13	13		20
Confl. Bikes (#/hr)			6			6			2			
Heavy Vehicles (%)	0%	3%	5%	3%	4%	0%	6%	0%	0%	0%	0%	0%
Parking (#/hr)							0	0	0			
Turn Type	Perm	NA			NA		Perm	NA	custom	D.Pm		Perm
Protected Phases		12			6			8	11			
Permitted Phases	12						8			8		8
Actuated Green, G (s)		65.0			78.0			15.0	7.0	15.0		
Effective Green, g (s)		67.0			80.0			17.0	9.0	17.0		
Actuated g/C Ratio		0.61			0.73			0.15	0.08	0.15		
Clearance Time (s)		6.0			6.0			6.0	6.0	6.0		
Lane Grp Cap (vph)		1710			2120			190	99	189		
v/s Ratio Prot					c0.35				0.00			
v/s Ratio Perm		c0.54						0.03		0.00		
v/c Ratio		0.89			0.48			0.16	0.01	0.01		
Uniform Delay, d1		18.4			6.3			40.3	46.4	39.3		
Progression Factor		0.03			0.19			1.00	1.00	1.00		
Incremental Delay, d2		3.3			0.5			1.8	0.2	0.1		
Delay (s)		3.8			1.7			42.2	46.6	39.4		
Level of Service		A			A			D	D	D		
Approach Delay (s)		3.8			1.7			43.6			39.4	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	3.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		

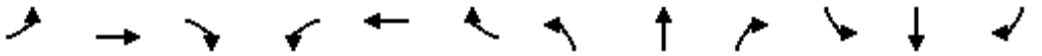
c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	230	1309	970	383	40	300	164	200
v/c Ratio	0.67	0.67	0.75	0.80	0.18	0.54	0.44	0.59
Control Delay	24.6	8.3	7.8	12.6	33.0	48.4	35.8	52.5
Queue Delay	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay	24.6	8.5	7.9	12.6	33.0	48.4	35.8	52.5
Queue Length 50th (ft)	63	127	141	117	21	73	46	71
Queue Length 95th (ft)	m82	m140	m137	m114	50	105	76	111
Internal Link Dist (ft)		427	493			361		348
Turn Bay Length (ft)				250	110			
Base Capacity (vph)	344	1961	1302	480	219	554	373	338
Starvation Cap Reductn	0	156	25	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.73	0.76	0.80	0.18	0.54	0.44	0.59

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	230	1225	84	35	935	383	40	276	24	164	159	41
Future Volume (vph)	230	1225	84	35	935	383	40	276	24	164	159	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			2%			0%			2%	
Total Lost time (s)	3.0	5.0			5.0	5.0	3.0	5.0		3.0	5.0	
Lane Util. Factor	1.00	0.95			0.95	1.00	1.00	0.91		0.97	0.95	
Frpb, ped/bikes	1.00	0.99			1.00	0.69	1.00	0.97		1.00	0.93	
Flpb, ped/bikes	0.99	1.00			1.00	1.00	0.86	1.00		0.82	1.00	
Frt	1.00	0.99			1.00	0.85	1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1505	2956			2926	911	1228	4067		2265	2481	
Flt Permitted	0.21	1.00			0.84	1.00	0.59	1.00		0.52	1.00	
Satd. Flow (perm)	325	2956			2470	911	761	4067		1234	2481	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	230	1225	84	35	935	383	40	276	24	164	159	41
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	230	1309	0	0	970	383	40	300	0	164	200	0
Confl. Peds. (#/hr)	207		166	166		207	200		226	226		200
Confl. Bikes (#/hr)			2						6			3
Heavy Vehicles (%)	0%	0%	2%	10%	2%	2%	6%	3%	0%	5%	8%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	6	6
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)	71.0	71.0			56.0	56.0	20.0	13.0		20.0	13.0	
Effective Green, g (s)	73.0	73.0			58.0	58.0	24.0	15.0		24.0	15.0	
Actuated g/C Ratio	0.66	0.66			0.53	0.53	0.22	0.14		0.22	0.14	
Clearance Time (s)	5.0	7.0			7.0	7.0	5.0	7.0		5.0	7.0	
Lane Grp Cap (vph)	344	1961			1302	480	204	554		353	338	
v/s Ratio Prot	0.07	c0.44					0.02	0.07		c0.04	c0.08	
v/s Ratio Perm	0.37				0.39	c0.42	0.03			0.06		
v/c Ratio	0.67	0.67			0.75	0.80	0.20	0.54		0.46	0.59	
Uniform Delay, d1	10.4	11.2			20.2	21.2	34.8	44.3		36.2	44.6	
Progression Factor	2.55	0.65			0.33	0.35	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.6	0.8			1.0	3.5	2.1	3.8		4.3	7.4	
Delay (s)	31.2	8.1			7.6	11.0	36.9	48.1		40.6	52.0	
Level of Service	C	A			A	B	D	D		D	D	
Approach Delay (s)		11.6			8.5			46.7			46.9	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	102.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1413	1375	49	40
v/c Ratio	0.75	1.02	0.14	0.13
Control Delay	19.2	35.5	35.3	35.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	19.3	35.5	35.3	35.2
Queue Length 50th (ft)	303	~458	28	23
Queue Length 95th (ft)	328	m#390	61	53
Internal Link Dist (ft)	493	589	158	
Turn Bay Length (ft)				
Base Capacity (vph)	1893	1346	347	311
Starvation Cap Reductn	22	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.76	1.02	0.14	0.13

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1331	82	71	1304	49	40
Future Volume (vph)	1331	82	71	1304	49	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10
Grade (%)	-2%			1%	-2%	
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	0.97			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2854			2871	1531	1370
Flt Permitted	1.00			0.70	0.95	1.00
Satd. Flow (perm)	2854			2028	1531	1370
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1331	82	71	1304	49	40
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1413	0	0	1375	49	40
Confl. Peds. (#/hr)		131	131		335	230
Confl. Bikes (#/hr)		3				1
Heavy Vehicles (%)	2%	0%	0%	2%	0%	0%
Bus Blockages (#/hr)	8	8	0	14	0	0
Turn Type	NA		Perm	NA	Prot	Prot
Protected Phases	2			2	4	4
Permitted Phases			2			
Actuated Green, G (s)	71.0			71.0	23.0	23.0
Effective Green, g (s)	73.0			73.0	25.0	25.0
Actuated g/C Ratio	0.66			0.66	0.23	0.23
Clearance Time (s)	6.0			6.0	6.0	6.0
Lane Grp Cap (vph)	1894			1345	347	311
v/s Ratio Prot	0.50				c0.03	0.03
v/s Ratio Perm				c0.68		
v/c Ratio	0.75			1.02	0.14	0.13
Uniform Delay, d1	12.3			18.5	33.9	33.8
Progression Factor	1.34			0.83	1.00	1.00
Incremental Delay, d2	2.1			18.6	0.9	0.9
Delay (s)	18.6			34.0	34.8	34.7
Level of Service	B			C	C	C
Approach Delay (s)	18.6			34.0	34.7	
Approach LOS	B			C	C	

Intersection Summary			
HCM 2000 Control Delay	26.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	115.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



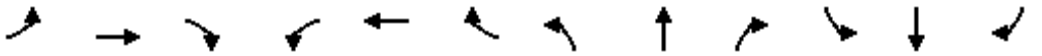
Lane Group	EBT	EBR	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1240	131	1412	48	34	63	4	11	56
v/c Ratio	0.76	0.25	1.02	0.44	0.17	0.53	0.04	0.07	0.52
Control Delay	7.5	3.8	47.8	57.2	44.5	61.5	42.5	42.7	62.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.6	3.8	47.8	57.2	44.5	61.5	42.5	42.7	62.9
Queue Length 50th (ft)	43	9	~519	32	22	42	3	7	37
Queue Length 95th (ft)	46	m11	m#642	72	52	#95	13	24	#87
Internal Link Dist (ft)	589		273		452			368	
Turn Bay Length (ft)		150		110		70	150		75
Base Capacity (vph)	1629	516	1379	110	198	119	108	165	107
Starvation Cap Reductn	7	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.25	1.02	0.44	0.17	0.53	0.04	0.07	0.52

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	1214	131	99	1271	42	48	34	63	4	11	56
Future Volume (vph)	26	1214	131	99	1271	42	48	34	63	4	11	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			1%			-1%			2%	
Total Lost time (s)		4.0	4.0		4.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.95	1.00		0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.63		0.98		1.00	1.00	0.65	1.00	1.00	0.66
Flpb, ped/bikes		1.00	1.00		1.00		0.68	1.00	1.00	0.69	1.00	1.00
Frt		1.00	0.85		1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		2919	824		2799		1023	1458	876	1033	1215	790
Flt Permitted		0.89	1.00		0.66		0.75	1.00	1.00	0.73	1.00	1.00
Satd. Flow (perm)		2596	824		1848		808	1458	876	799	1215	790
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	26	1214	131	99	1271	42	48	34	63	4	11	56
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1240	131	0	1412	0	48	34	63	4	11	56
Confl. Peds. (#/hr)	502		123	123		502	121		132	132		121
Confl. Bikes (#/hr)			10			12			20			17
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	2%	10%	0%	0%	17%	0%
Bus Blockages (#/hr)	0	8	8	0	14	14	0	0	4	0	0	3
Parking (#/hr)											0	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		6		5	2			8			4	
Permitted Phases	6		6	2			8		8	4		4
Actuated Green, G (s)		67.0	67.0		77.0		13.0	13.0	13.0	13.0	13.0	13.0
Effective Green, g (s)		69.0	69.0		79.0		15.0	15.0	15.0	15.0	15.0	15.0
Actuated g/C Ratio		0.63	0.63		0.72		0.14	0.14	0.14	0.14	0.14	0.14
Clearance Time (s)		6.0	6.0		6.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Grp Cap (vph)		1628	516		1387		110	198	119	108	165	107
v/s Ratio Prot					c0.06			0.02			0.01	
v/s Ratio Perm		0.48	0.16		c0.67		0.06		c0.07	0.01		0.07
v/c Ratio		0.76	0.25		1.02		0.44	0.17	0.53	0.04	0.07	0.52
Uniform Delay, d1		14.6	9.1		15.5		43.6	42.0	44.2	41.2	41.4	44.2
Progression Factor		0.35	0.32		1.83		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		2.3	0.8		20.5		12.1	1.9	15.8	0.6	0.8	17.1
Delay (s)		7.4	3.7		48.9		55.7	43.9	60.0	41.9	42.2	61.3
Level of Service		A	A		D		E	D	E	D	D	E
Approach Delay (s)		7.0			48.9			54.8			57.2	
Approach LOS		A			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	30.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	102.6%	ICU Level of Service	G
Analysis Period (min)	15		

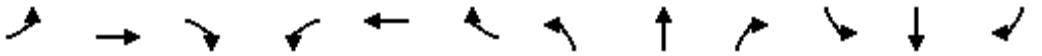
c Critical Lane Group



Lane Group	EBT	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	1281	1269	231	79	180	312
v/c Ratio	1.00dl	0.92	0.31	0.16	0.23	0.71
Control Delay	41.4	30.9	3.3	39.8	21.1	29.2
Queue Delay	0.0	0.0	0.4	0.0	0.8	5.4
Total Delay	41.4	30.9	3.7	39.8	21.8	34.6
Queue Length 50th (ft)	357	457	16	25	34	167
Queue Length 95th (ft)	408	#592	33	48	68	242
Internal Link Dist (ft)	236	262		479		136
Turn Bay Length (ft)						
Base Capacity (vph)	1487	1380	741	479	795	438
Starvation Cap Reductn	0	0	186	0	378	77
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.92	0.42	0.16	0.43	0.86

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	108	1019	154	41	1228	231	1	52	26	180	129	183
Future Volume (vph)	108	1019	154	41	1228	231	1	52	26	180	129	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	10	10	10
Grade (%)		-1%			0%			-1%			0%	
Total Lost time (s)		4.0			4.0	4.0		4.0		3.0	4.0	
Lane Util. Factor		0.91			0.95	1.00		0.95		0.97	1.00	
Frpb, ped/bikes		0.98			1.00	0.94		0.97		1.00	0.93	
Flpb, ped/bikes		1.00			1.00	1.00		1.00		0.96	1.00	
Frt		0.98			1.00	0.85		0.95		1.00	0.91	
Flt Protected		1.00			1.00	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		4053			2997	1167		2915		2797	1199	
Flt Permitted		0.67			0.84	1.00		0.95		0.70	1.00	
Satd. Flow (perm)		2726			2530	1167		2773		2070	1199	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	108	1019	154	41	1228	231	1	52	26	180	129	183
RTOR Reduction (vph)	0	0	0	0	0	105	0	0	0	0	46	0
Lane Group Flow (vph)	0	1281	0	0	1269	126	0	79	0	180	266	0
Confl. Peds. (#/hr)	34		58	58		34	69		33	33		69
Confl. Bikes (#/hr)			2			1			3			1
Heavy Vehicles (%)	0%	1%	23%	0%	1%	9%	0%	3%	5%	1%	4%	0%
Parking (#/hr)											0	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases		2			2			4		3	8	
Permitted Phases	2			2		2	4			8		
Actuated Green, G (s)		58.0			58.0	58.0		17.0		35.0	34.0	
Effective Green, g (s)		60.0			60.0	60.0		19.0		37.0	36.0	
Actuated g/C Ratio		0.55			0.55	0.55		0.17		0.34	0.33	
Clearance Time (s)		6.0			6.0	6.0		6.0		5.0	6.0	
Lane Grp Cap (vph)		1486			1380	636		478		788	392	
v/s Ratio Prot										0.03	c0.22	
v/s Ratio Perm		0.47			c0.50	0.11		0.03		0.05		
v/c Ratio		1.00dl			0.92	0.20		0.17		0.23	0.68	
Uniform Delay, d1		21.4			22.8	12.7		38.7		26.5	32.0	
Progression Factor		1.68			0.87	1.38		1.00		0.76	0.76	
Incremental Delay, d2		4.5			10.0	0.6		0.7		0.7	9.0	
Delay (s)		40.6			29.9	18.2		39.5		20.8	33.4	
Level of Service		D			C	B		D		C	C	
Approach Delay (s)		40.6			28.1			39.5			28.8	
Approach LOS		D			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	33.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	100.6%	ICU Level of Service	G
Analysis Period (min)	15		

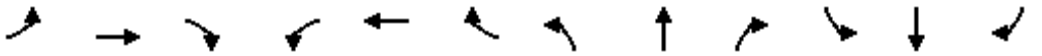
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group



Lane Group	EBT	WBT	NBT
Lane Group Flow (vph)	767	1112	2
v/c Ratio	0.37	0.63	0.00
Control Delay	9.3	18.9	0.0
Queue Delay	0.0	0.0	0.0
Total Delay	9.3	18.9	0.0
Queue Length 50th (ft)	105	269	0
Queue Length 95th (ft)	115	338	0
Internal Link Dist (ft)	432	489	96
Turn Bay Length (ft)			
Base Capacity (vph)	2046	1758	869
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.37	0.63	0.00

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	767	0	0	1112	0	0	0	2	0	0	0
Future Volume (vph)	0	767	0	0	1112	0	0	0	2	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	11	11	11	13	13	13	13	13	13
Grade (%)		0%			-6%			1%			-1%	
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		0.95			0.95			0.95				
Frpb, ped/bikes		1.00			1.00			0.98				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			1.00			0.85				
Flt Protected		1.00			1.00			1.00				
Satd. Flow (prot)		3002			3171			2776				
Flt Permitted		1.00			1.00			1.00				
Satd. Flow (perm)		3002			3171			2776				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	767	0	0	1112	0	0	0	2	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	767	0	0	1112	0	0	0	0	0	0	0
Confl. Peds. (#/hr)	18		3	3		18	14		8	8		14
Confl. Bikes (#/hr)			1			4						2
Heavy Vehicles (%)	0%	1%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA			NA			NA				
Protected Phases	1	6			2			4				
Permitted Phases	6						4					
Actuated Green, G (s)		73.0			59.0			25.0				
Effective Green, g (s)		75.0			61.0			27.0				
Actuated g/C Ratio		0.68			0.55			0.25				
Clearance Time (s)		6.0			6.0			6.0				
Lane Grp Cap (vph)		2046			1758			681				
v/s Ratio Prot		c0.26			c0.35			c0.00				
v/s Ratio Perm												
v/c Ratio		0.37			0.63			0.00				
Uniform Delay, d1		7.5			16.8			31.3				
Progression Factor		1.16			1.00			1.00				
Incremental Delay, d2		0.5			1.7			0.0				
Delay (s)		9.2			18.6			31.3				
Level of Service		A			B			C				
Approach Delay (s)		9.2			18.6			31.3			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	118	391	374
v/c Ratio	0.33	0.18	0.17
Control Delay	37.3	16.6	12.3
Queue Delay	0.0	0.9	0.0
Total Delay	37.3	17.5	12.3
Queue Length 50th (ft)	69	56	45
Queue Length 95th (ft)	123	m74	62
Internal Link Dist (ft)	249	136	148
Turn Bay Length (ft)			
Base Capacity (vph)	356	2122	2213
Starvation Cap Reductn	0	1415	0
Spillback Cap Reductn	0	0	144
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.33	0.55	0.18

Intersection Summary

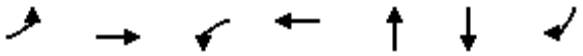
m Volume for 95th percentile queue is metered by upstream signal.



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	118	0	288	103	0	374
Future Volume (vph)	118	0	288	103	0	374
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	10	10	10	10
Grade (%)	-1%		0%			1%
Total Lost time (s)	5.0		4.0			4.0
Lane Util. Factor	1.00		0.91			0.91
Frpb, ped/bikes	1.00		0.95			1.00
Flpb, ped/bikes	0.99		1.00			1.00
Frt	1.00		0.96			1.00
Flt Protected	0.95		1.00			1.00
Satd. Flow (prot)	1453		3746			3991
Flt Permitted	0.95		1.00			1.00
Satd. Flow (perm)	1453		3746			3991
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	118	0	288	103	0	374
RTOR Reduction (vph)	0	0	46	0	0	0
Lane Group Flow (vph)	118	0	345	0	0	374
Confl. Peds. (#/hr)	8	27		56	56	
Heavy Vehicles (%)	0%	0%	8%	0%	0%	5%
Parking (#/hr)	0	0				0
Turn Type	Perm		NA			NA
Protected Phases			2			2
Permitted Phases	8					
Actuated Green, G (s)	25.0		59.0			59.0
Effective Green, g (s)	27.0		61.0			61.0
Actuated g/C Ratio	0.25		0.55			0.55
Clearance Time (s)	7.0		6.0			6.0
Lane Grp Cap (vph)	356		2077			2213
v/s Ratio Prot			0.09			c0.09
v/s Ratio Perm	c0.08					
v/c Ratio	0.33		0.17			0.17
Uniform Delay, d1	34.1		12.0			12.0
Progression Factor	1.00		1.86			1.00
Incremental Delay, d2	2.5		0.2			0.2
Delay (s)	36.6		22.6			12.2
Level of Service	D		C			B
Approach Delay (s)	36.6		22.6			12.2
Approach LOS	D		C			B

Intersection Summary			
HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

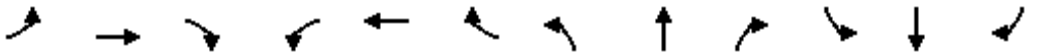
c Critical Lane Group



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	22	744	68	811	73	471	38
v/c Ratio	0.15	0.80	0.37	0.77	0.11	0.68	0.37
Control Delay	49.0	43.1	16.8	6.0	11.4	21.6	51.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.5	0.0
Total Delay	49.0	43.1	16.8	6.0	11.4	22.0	51.6
Queue Length 50th (ft)	15	253	33	12	16	258	26
Queue Length 95th (ft)	40	329	m39	m35	44	381	m57
Internal Link Dist (ft)		171		412	453	306	
Turn Bay Length (ft)			200				
Base Capacity (vph)	142	931	186	1048	671	694	102
Starvation Cap Reductn	0	0	0	0	0	40	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.80	0.37	0.77	0.11	0.72	0.37

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	681	4	63	714	32	2	36	29	34	399	35
Future Volume (vph)	20	681	4	63	714	32	2	36	29	34	399	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	12	12	11	12	11	11
Total Lost time (s)	3.0	3.0		3.0	3.0			3.0			3.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.99			0.94			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	1.00
Satd. Flow (prot)	1570	3107		1577	3194			1479			1594	1405
Flt Permitted	0.95	1.00		0.95	1.00			0.99			0.97	1.00
Satd. Flow (perm)	1570	3107		1577	3194			1468			1559	1405
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	740	4	68	776	35	2	39	32	37	434	38
RTOR Reduction (vph)	0	0	0	0	3	0	0	18	0	0	0	0
Lane Group Flow (vph)	22	744	0	68	808	0	0	55	0	0	471	38
Confl. Peds. (#/hr)	1		5	5		1	10		8	8		10
Confl. Bikes (#/hr)									9			20
Heavy Vehicles (%)	0%	1%	0%	3%	1%	0%	0%	8%	7%	6%	3%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Over
Protected Phases	7	4		3	8			2			2	7
Permitted Phases							2			2		
Actuated Green, G (s)	7.0	30.0		10.0	33.0			45.0			45.0	7.0
Effective Green, g (s)	10.0	33.0		13.0	36.0			49.0			49.0	8.0
Actuated g/C Ratio	0.09	0.30		0.12	0.33			0.45			0.45	0.07
Clearance Time (s)	6.0	6.0		6.0	6.0			7.0			7.0	6.0
Lane Grp Cap (vph)	142	932		186	1045			653			694	102
v/s Ratio Prot	0.01	c0.24		0.04	c0.25							c0.03
v/s Ratio Perm								0.04			c0.30	
v/c Ratio	0.15	0.80		0.37	0.77			0.08			0.68	0.37
Uniform Delay, d1	46.1	35.4		44.7	33.3			17.6			24.2	48.6
Progression Factor	1.00	1.00		0.31	0.09			1.00			0.67	0.86
Incremental Delay, d2	2.3	7.1		2.8	2.9			0.3			4.7	9.1
Delay (s)	48.4	42.5		16.6	6.0			17.8			21.0	50.9
Level of Service	D	D		B	A			B			C	D
Approach Delay (s)		42.7			6.8			17.8			23.3	
Approach LOS		D			A			B			C	

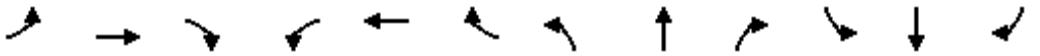
Intersection Summary			
HCM 2000 Control Delay	23.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	EBR	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	728	64	849	155	1053	312	182	1456
v/c Ratio	0.67	0.15	0.86	0.38	0.66	0.78	0.38	0.98
Control Delay	13.4	13.1	52.7	39.0	31.2	46.0	14.3	33.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.4	13.1	52.7	39.0	31.2	46.0	14.3	33.2
Queue Length 50th (ft)	41	7	337	105	224	193	13	523
Queue Length 95th (ft)	111	m19	#414	170	274	#339	23	#693
Internal Link Dist (ft)	412		1035		259			307
Turn Bay Length (ft)		150		200		225		
Base Capacity (vph)	1081	427	991	407	1586	400	478	1493
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.15	0.86	0.38	0.66	0.78	0.38	0.98

Intersection Summary

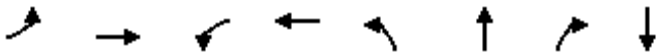
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	684	60	10	788	146	0	990	293	171	1348	21
Future Volume (vph)	0	684	60	10	788	146	0	990	293	171	1348	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	11	11	11	10	10	10
Total Lost time (s)		5.0	5.0		5.0	5.0		4.0	4.0	4.0	4.0	
Lane Util. Factor		0.95	1.00		0.95	1.00		0.91	1.00	0.97	0.95	
Frpb, ped/bikes		1.00	0.88		1.00	0.86		1.00	0.82	1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00	1.00		1.00	1.00	0.99	1.00	
Frt		1.00	0.85		1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		1.00	1.00		1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3049	1206		2970	1148		4257	1074	2926	2986	
Flt Permitted		1.00	1.00		0.94	1.00		1.00	1.00	0.17	1.00	
Satd. Flow (perm)		3049	1206		2797	1148		4257	1074	536	2986	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	728	64	11	838	155	0	1053	312	182	1434	22
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	728	64	0	849	155	0	1053	312	182	1456	0
Confl. Peds. (#/hr)	119		101	101		119	165		118	118		165
Confl. Bikes (#/hr)			4			9			37			3
Heavy Vehicles (%)	1%	3%	3%	2%	2%	0%	11%	6%	7%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	5	0	0	2	0	0	0
Turn Type		NA	Perm	Perm	NA	Perm		NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases			4	8		8			2	6		
Actuated Green, G (s)		37.0	37.0		37.0	37.0		39.0	39.0	53.0	53.0	
Effective Green, g (s)		39.0	39.0		39.0	39.0		41.0	41.0	55.0	55.0	
Actuated g/C Ratio		0.35	0.35		0.35	0.35		0.37	0.37	0.50	0.50	
Clearance Time (s)		7.0	7.0		7.0	7.0		6.0	6.0	6.0	6.0	
Lane Grp Cap (vph)		1081	427		991	407		1586	400	485	1493	
v/s Ratio Prot		0.24						0.25		0.03	c0.49	
v/s Ratio Perm			0.05		c0.30	0.14			0.29	0.15		
v/c Ratio		0.67	0.15		0.86	0.38		0.66	0.78	0.38	0.98	
Uniform Delay, d1		30.1	24.2		32.9	26.5		28.8	30.5	28.7	26.8	
Progression Factor		0.37	0.51		1.34	1.35		1.00	1.00	0.53	0.59	
Incremental Delay, d2		2.1	0.5		8.2	2.3		2.2	14.0	1.8	15.8	
Delay (s)		13.3	12.8		52.2	38.0		31.0	44.5	16.9	31.7	
Level of Service		B	B		D	D		C	D	B	C	
Approach Delay (s)		13.2			50.0			34.1			30.0	
Approach LOS		B			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	107.3%	ICU Level of Service	G
Analysis Period (min)	15		

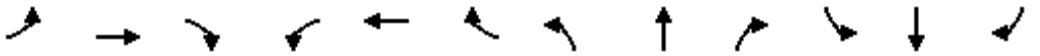
c Critical Lane Group



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	86	1135	344	1023	103	153	285	28
v/c Ratio	0.52	0.96	0.92	0.55	0.49	0.46	0.45	0.09
Control Delay	31.1	41.9	62.0	4.5	47.2	42.6	17.1	29.3
Queue Delay	0.0	0.0	0.0	0.2	11.8	30.8	2.4	0.0
Total Delay	31.1	41.9	62.0	4.7	59.1	73.4	19.5	29.3
Queue Length 50th (ft)	29	198	178	44	58	87	83	12
Queue Length 95th (ft)	m72	#554	m#261	113	124	163	118	37
Internal Link Dist (ft)		1035		511		84		359
Turn Bay Length (ft)	150						140	
Base Capacity (vph)	165	1184	373	1864	209	335	630	327
Starvation Cap Reductn	0	0	0	217	80	177	224	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.96	0.92	0.62	0.80	0.97	0.70	0.09

Intersection Summary

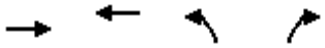
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	1023	44	323	840	121	97	144	268	8	11	7
Future Volume (vph)	81	1023	44	323	840	121	97	144	268	8	11	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	11	11	11	14	14	14
Total Lost time (s)	6.0	6.0		5.0	4.0		4.0	4.0	3.0		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.94		1.00	1.00	0.99		0.97	
Flpb, ped/bikes	0.89	1.00		1.00	1.00		0.89	1.00	1.00		1.00	
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1343	2825		1501	2719		1287	1605	1368		1678	
Flt Permitted	0.28	1.00		0.10	1.00		0.74	1.00	1.00		0.90	
Satd. Flow (perm)	396	2825		157	2719		1001	1605	1368		1541	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	86	1088	47	344	894	129	103	153	285	9	12	7
RTOR Reduction (vph)	0	3	0	0	11	0	0	0	34	0	6	0
Lane Group Flow (vph)	86	1132	0	344	1012	0	103	153	251	0	22	0
Confl. Peds. (#/hr)	43		165	165		43	83		1	1		83
Confl. Bikes (#/hr)									2			
Heavy Vehicles (%)	0%	3%	11%	1%	3%	1%	8%	3%	2%	0%	0%	0%
Bus Blockages (#/hr)	0	9	9	0	0	0	0	0	0	0	0	0
Turn Type	Perm	NA		custom	NA		Perm	NA	pm+ov	Perm	NA	
Protected Phases		6		5	1 2			14	5		14	
Permitted Phases	6			2			14		14	14		
Actuated Green, G (s)	45.0	45.0		72.0	72.0		20.0	20.0	41.0		20.0	
Effective Green, g (s)	46.0	46.0		73.0	73.0		23.0	23.0	47.0		23.0	
Actuated g/C Ratio	0.42	0.42		0.66	0.66		0.21	0.21	0.43		0.21	
Clearance Time (s)	7.0	7.0		6.0			7.0	7.0	6.0		7.0	
Lane Grp Cap (vph)	165	1181		372	1804		209	335	584		322	
v/s Ratio Prot		0.40		c0.18	0.37			0.10	0.09			
v/s Ratio Perm	0.22			c0.43			c0.10		0.09		0.01	
v/c Ratio	0.52	0.96		0.92	0.56		0.49	0.46	0.43		0.07	
Uniform Delay, d1	23.8	31.1		30.9	9.9		38.4	38.0	22.1		34.9	
Progression Factor	0.86	0.85		1.52	0.44		0.99	0.99	0.94		1.00	
Incremental Delay, d2	8.5	14.7		21.1	0.7		8.0	4.4	2.3		0.4	
Delay (s)	28.9	41.1		68.2	5.1		46.1	41.9	23.1		35.3	
Level of Service	C	D		E	A		D	D	C		D	
Approach Delay (s)		40.2			21.0			32.8			35.3	
Approach LOS		D			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	30.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1339	1298	76	66
v/c Ratio	0.79	0.86	0.28	0.16
Control Delay	16.2	14.7	40.0	7.8
Queue Delay	0.4	15.8	0.0	0.0
Total Delay	16.6	30.5	40.0	7.8
Queue Length 50th (ft)	207	122	45	0
Queue Length 95th (ft)	m236	120	90	32
Internal Link Dist (ft)	511	529	390	
Turn Bay Length (ft)				
Base Capacity (vph)	1705	1515	267	414
Starvation Cap Reductn	35	237	0	0
Spillback Cap Reductn	87	0	0	2
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.83	1.02	0.28	0.16

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1264	35	49	1210	74	64
Future Volume (vph)	1264	35	49	1210	74	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	13	13
Total Lost time (s)	5.0			5.0	4.0	3.0
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.92
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2928			2893	1281	1304
Flt Permitted	1.00			0.76	0.95	1.00
Satd. Flow (perm)	2928			2206	1281	1304
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1303	36	51	1247	76	66
RTOR Reduction (vph)	2	0	0	0	0	48
Lane Group Flow (vph)	1337	0	0	1298	76	18
Confl. Peds. (#/hr)		42	42		28	50
Confl. Bikes (#/hr)		7				10
Heavy Vehicles (%)	2%	26%	20%	4%	31%	6%
Turn Type	NA		pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	4	1
Permitted Phases			6			4
Actuated Green, G (s)	62.0			72.0	21.0	26.0
Effective Green, g (s)	64.0			74.0	23.0	30.0
Actuated g/C Ratio	0.58			0.67	0.21	0.27
Clearance Time (s)	7.0			7.0	6.0	5.0
Lane Grp Cap (vph)	1703			1527	267	355
v/s Ratio Prot	0.46			c0.05	c0.06	0.00
v/s Ratio Perm				c0.52		0.01
v/c Ratio	0.79			0.85	0.28	0.05
Uniform Delay, d1	17.7			13.8	36.6	29.5
Progression Factor	0.79			0.74	1.00	1.00
Incremental Delay, d2	1.9			3.9	2.7	0.3
Delay (s)	15.8			14.1	39.2	29.8
Level of Service	B			B	D	C
Approach Delay (s)	15.8			14.1	34.8	
Approach LOS	B			B	C	

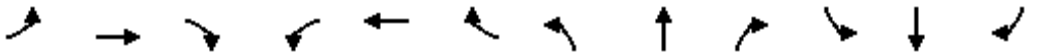
Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	100.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBT	NBR	SBR
Lane Group Flow (vph)	1275	1299	61	49	1
v/c Ratio	0.87	0.69	0.19	0.19	0.00
Control Delay	4.5	13.8	34.9	1.7	31.0
Queue Delay	0.0	49.9	0.0	0.0	0.0
Total Delay	4.5	63.6	34.9	1.7	31.0
Queue Length 50th (ft)	5	440	34	0	1
Queue Length 95th (ft)	m7	m500	71	0	5
Internal Link Dist (ft)	1	427	135		
Turn Bay Length (ft)					10
Base Capacity (vph)	1472	1873	316	256	342
Starvation Cap Reductn	0	508	0	0	0
Spillback Cap Reductn	0	911	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.87	1.35	0.19	0.19	0.00

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1237	0	0	1260	0	59	0	48	0	0	1
Future Volume (vph)	0	1237	0	0	1260	0	59	0	48	0	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		0.95			0.95			1.00	1.00			1.00
Frpb, ped/bikes		1.00			1.00			1.00	1.00			0.96
Flpb, ped/bikes		1.00			1.00			0.97	1.00			1.00
Frt		1.00			1.00			1.00	0.85			0.85
Flt Protected		1.00			1.00			0.95	1.00			1.00
Satd. Flow (prot)		2944			2944			1288	1221			1397
Flt Permitted		1.00			1.00			0.95	1.00			1.00
Satd. Flow (perm)		2944			2944			1288	1221			1397
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	1275	0	0	1299	0	61	0	49	0	0	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	44	0	0	0
Lane Group Flow (vph)	0	1275	0	0	1299	0	0	61	5	0	0	1
Confl. Peds. (#/hr)			39	39			21		19	19		21
Confl. Bikes (#/hr)			3			2			2			
Heavy Vehicles (%)	0%	3%	1%	0%	3%	0%	3%	0%	0%	0%	0%	0%
Parking (#/hr)							0	0	0			
Turn Type		NA			NA		Perm	NA	custom	D.Pm		Perm
Protected Phases		12			6			8	11			
Permitted Phases	12						8			8		8
Actuated Green, G (s)		53.0			68.0			25.0	9.0			25.0
Effective Green, g (s)		55.0			70.0			27.0	11.0			27.0
Actuated g/C Ratio		0.50			0.64			0.25	0.10			0.25
Clearance Time (s)		6.0			6.0			6.0	6.0			6.0
Lane Grp Cap (vph)		1472			1873			316	122			342
v/s Ratio Prot		c0.43			c0.44				0.00			
v/s Ratio Perm								0.05				0.00
v/c Ratio		0.87			0.69			0.19	0.04			0.00
Uniform Delay, d1		24.3			13.0			32.9	44.7			31.3
Progression Factor		0.04			0.93			1.00	1.00			1.00
Incremental Delay, d2		2.9			1.3			1.4	0.6			0.0
Delay (s)		3.9			13.4			34.2	45.3			31.4
Level of Service		A			B			C	D			C
Approach Delay (s)		3.9			13.4			39.2			31.4	
Approach LOS		A			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		

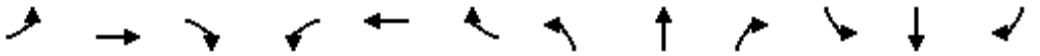
c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	140	1185	971	90	104	274	315	562
v/c Ratio	0.62	0.69	0.77	0.15	0.48	0.52	0.54	0.94
Control Delay	36.0	31.6	32.3	6.5	35.1	47.4	31.7	57.9
Queue Delay	0.0	0.8	0.8	0.0	0.0	0.3	1.0	0.4
Total Delay	36.0	32.5	33.1	6.5	35.1	47.7	32.7	58.3
Queue Length 50th (ft)	83	345	357	10	53	66	86	158
Queue Length 95th (ft)	m99	402	424	m39	96	97	124	#270
Internal Link Dist (ft)		427	493			361		348
Turn Bay Length (ft)				250	110			
Base Capacity (vph)	224	1724	1266	607	216	528	586	599
Starvation Cap Reductn	0	257	16	0	0	0	0	0
Spillback Cap Reductn	0	0	94	0	0	41	103	2
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.81	0.83	0.15	0.48	0.56	0.65	0.94

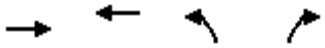
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	136	1095	54	10	932	87	101	198	68	306	318	227
Future Volume (vph)	136	1095	54	10	932	87	101	198	68	306	318	227
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			2%			0%			2%	
Total Lost time (s)	3.0	5.0			5.0	5.0	3.0	5.0		3.0	5.0	
Lane Util. Factor	1.00	0.95			0.95	1.00	1.00	0.91		0.97	0.95	
Frpb, ped/bikes	1.00	0.98			1.00	0.85	1.00	0.92		1.00	0.99	
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00		0.86	1.00	
Frt	1.00	0.99			1.00	0.85	1.00	0.96		1.00	0.94	
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1137	2869			2857	1130	1516	3632		2514	2648	
Flt Permitted	0.18	1.00			0.94	1.00	0.25	1.00		0.47	1.00	
Satd. Flow (perm)	218	2869			2679	1130	399	3632		1240	2648	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	140	1129	56	10	961	90	104	204	70	315	328	234
RTOR Reduction (vph)	0	3	0	0	0	47	0	0	0	0	118	0
Lane Group Flow (vph)	140	1182	0	0	971	43	104	274	0	315	444	0
Confl. Peds. (#/hr)	94		277	277		94			152	152		
Confl. Bikes (#/hr)						1						2
Heavy Vehicles (%)	33%	3%	11%	0%	5%	1%	0%	5%	9%	0%	5%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	7	7
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6		6	4			8		
Actuated Green, G (s)	64.0	64.0			50.0	50.0	23.0	14.0		31.0	18.0	
Effective Green, g (s)	66.0	66.0			52.0	52.0	27.0	16.0		34.0	20.0	
Actuated g/C Ratio	0.60	0.60			0.47	0.47	0.25	0.15		0.31	0.18	
Clearance Time (s)	5.0	7.0			7.0	7.0	5.0	7.0		5.0	7.0	
Lane Grp Cap (vph)	222	1721			1266	534	209	528		557	481	
v/s Ratio Prot	0.06	c0.41					0.05	0.08		c0.08	c0.17	
v/s Ratio Perm	0.31				c0.36	0.04	0.07			0.10		
v/c Ratio	0.63	0.69			0.77	0.08	0.50	0.52		0.57	0.92	
Uniform Delay, d1	13.4	15.0			24.0	15.9	34.0	43.4		30.1	44.2	
Progression Factor	2.94	2.00			1.16	8.36	1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.8	1.2			3.8	0.2	8.2	3.6		4.1	25.8	
Delay (s)	46.1	31.1			31.7	133.1	42.2	47.1		34.2	70.1	
Level of Service	D	C			C	F	D	D		C	E	
Approach Delay (s)		32.7			40.3			45.7			57.2	
Approach LOS		C			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	42.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	104.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1514	974	102	107
v/c Ratio	0.84	0.59	0.26	0.33
Control Delay	24.9	14.6	33.6	35.5
Queue Delay	2.5	0.0	0.0	0.8
Total Delay	27.5	14.6	33.6	36.4
Queue Length 50th (ft)	445	215	56	60
Queue Length 95th (ft)	565	281	104	112
Internal Link Dist (ft)	493	589	158	
Turn Bay Length (ft)				
Base Capacity (vph)	1795	1661	390	322
Starvation Cap Reductn	173	0	0	0
Spillback Cap Reductn	94	0	0	76
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.93	0.59	0.26	0.43

Intersection Summary



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1425	44	15	930	99	104
Future Volume (vph)	1425	44	15	930	99	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10
Grade (%)	-2%			1%	-2%	
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	0.99			1.00	1.00	0.88
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2862			2899	1431	1183
Flt Permitted	1.00			0.91	0.95	1.00
Satd. Flow (perm)	2862			2650	1431	1183
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1469	45	15	959	102	107
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1514	0	0	974	102	107
Confl. Peds. (#/hr)		106	106		108	75
Confl. Bikes (#/hr)		3				3
Heavy Vehicles (%)	2%	15%	11%	2%	7%	2%
Bus Blockages (#/hr)	14	14	9	9	0	0
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			2	4	
Permitted Phases			2		4	4
Actuated Green, G (s)	67.0			67.0	28.0	28.0
Effective Green, g (s)	69.0			69.0	30.0	30.0
Actuated g/C Ratio	0.63			0.63	0.27	0.27
Clearance Time (s)	6.0			6.0	6.0	6.0
Lane Grp Cap (vph)	1795			1662	390	322
v/s Ratio Prot	c0.53				0.07	
v/s Ratio Perm				0.37		c0.09
v/c Ratio	0.84			0.59	0.26	0.33
Uniform Delay, d1	16.2			12.1	31.3	32.0
Progression Factor	1.25			1.10	1.00	1.00
Incremental Delay, d2	3.9			1.0	1.6	2.8
Delay (s)	24.1			14.3	33.0	34.7
Level of Service	C			B	C	C
Approach Delay (s)	24.1			14.3	33.9	
Approach LOS	C			B	C	

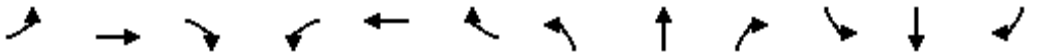
Intersection Summary			
HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	EBR	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1604	58	1010	77	41	123	80	43	47
v/c Ratio	0.96	0.19	0.79	0.52	0.15	0.56	0.56	0.16	0.33
Control Delay	31.7	1.6	16.1	54.0	38.9	22.2	57.3	39.0	46.1
Queue Delay	16.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.4	1.6	16.1	54.0	38.9	22.2	57.3	39.0	46.1
Queue Length 50th (ft)	615	0	136	49	24	14	52	26	29
Queue Length 95th (ft)	#750	m0	m138	102	56	78	#113	59	67
Internal Link Dist (ft)	589		249		452			368	
Turn Bay Length (ft)		150		110		70	150		75
Base Capacity (vph)	1671	307	1281	148	272	221	142	268	141
Starvation Cap Reductn	120	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.03	0.19	0.79	0.52	0.15	0.56	0.56	0.16	0.33

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	1461	53	71	831	28	71	38	113	74	40	43
Future Volume (vph)	15	1461	53	71	831	28	71	38	113	74	40	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			1%			-1%			2%	
Total Lost time (s)		4.0	4.0		4.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.95	1.00		0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.35		0.98		1.00	1.00	0.62	1.00	1.00	0.64
Flpb, ped/bikes		1.00	1.00		1.00		0.66	1.00	1.00	0.64	1.00	1.00
Frt		1.00	0.85		1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		2921	435		2860		1012	1429	740	968	1408	743
Flt Permitted		0.94	1.00		0.61		0.73	1.00	1.00	0.73	1.00	1.00
Satd. Flow (perm)		2744	435		1741		777	1429	740	744	1408	743
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	1588	58	77	903	30	77	41	123	80	43	47
RTOR Reduction (vph)	0	0	23	0	2	0	0	0	80	0	0	0
Lane Group Flow (vph)	0	1604	35	0	1008	0	77	41	43	80	43	47
Confl. Peds. (#/hr)	327		421	421		327	335		391	391		335
Confl. Bikes (#/hr)			2			8			2			3
Heavy Vehicles (%)	33%	1%	4%	0%	1%	1%	0%	1%	1%	0%	1%	2%
Bus Blockages (#/hr)	0	11	11	0	9	9	0	0	4	0	0	4
Parking (#/hr)								0	0		0	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		6		5	2			8			4	
Permitted Phases	6		6	2			8		8	4		4
Actuated Green, G (s)		65.0	65.0		75.0		19.0	19.0	19.0	19.0	19.0	19.0
Effective Green, g (s)		67.0	67.0		77.0		21.0	21.0	21.0	21.0	21.0	21.0
Actuated g/C Ratio		0.61	0.61		0.70		0.19	0.19	0.19	0.19	0.19	0.19
Clearance Time (s)		6.0	6.0		6.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Grp Cap (vph)		1671	264		1289		148	272	141	142	268	141
v/s Ratio Prot					c0.05			0.03			0.03	
v/s Ratio Perm		c0.58	0.08		0.50		0.10		0.06	c0.11		0.06
v/c Ratio		0.96	0.13		0.78		0.52	0.15	0.30	0.56	0.16	0.33
Uniform Delay, d1		20.2	9.2		10.9		40.0	37.1	38.2	40.3	37.1	38.5
Progression Factor		1.02	5.17		1.21		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		10.2	0.7		3.6		12.5	1.2	5.5	15.2	1.3	6.3
Delay (s)		30.9	48.0		16.8		52.4	38.2	43.7	55.5	38.4	44.7
Level of Service		C	D		B		D	D	D	E	D	D
Approach Delay (s)		31.5			16.8			45.6			48.2	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	28.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	101.1%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group



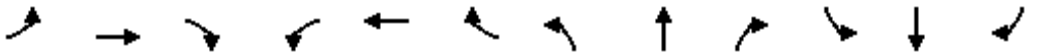
Lane Group	EBT	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	1772	814	119	158	437	441
v/c Ratio	1.05	0.55	0.20	0.52	0.70	1.14
Control Delay	43.8	11.9	3.0	52.9	45.2	123.5
Queue Delay	22.3	0.9	0.0	46.6	50.9	7.8
Total Delay	66.0	12.8	3.0	99.5	96.0	131.3
Queue Length 50th (ft)	~490	171	16	56	156	~339
Queue Length 95th (ft)	m#538	233	31	91	212	#553
Internal Link Dist (ft)	260	262		479		136
Turn Bay Length (ft)						
Base Capacity (vph)	1695	1481	607	305	623	387
Starvation Cap Reductn	0	367	0	0	222	180
Spillback Cap Reductn	98	0	0	152	119	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.11	0.73	0.20	1.03	1.09	2.13

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	136	1489	23	9	748	111	0	80	67	406	228	182
Future Volume (vph)	136	1489	23	9	748	111	0	80	67	406	228	182
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	10	10	10
Grade (%)		-1%			0%			-1%			0%	
Total Lost time (s)		4.0			4.0	4.0		5.0		4.0	4.0	
Lane Util. Factor		0.91			0.95	1.00		0.95		0.97	1.00	
Frpb, ped/bikes		1.00			1.00	0.92		0.92		1.00	0.99	
Flpb, ped/bikes		1.00			1.00	1.00		1.00		0.96	1.00	
Frt		1.00			1.00	0.85		0.93		1.00	0.93	
Flt Protected		1.00			1.00	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		4193			2915	984		2801		2274	1137	
Flt Permitted		0.73			0.92	1.00		1.00		0.65	1.00	
Satd. Flow (perm)		3058			2672	984		2801		1561	1137	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	146	1601	25	10	804	119	0	86	72	437	245	196
RTOR Reduction (vph)	0	0	0	0	0	53	0	0	0	0	26	0
Lane Group Flow (vph)	0	1772	0	0	814	66	0	158	0	437	415	0
Confl. Peds. (#/hr)	43		4	4		43	5		59	59		5
Confl. Bikes (#/hr)			2			10			2			2
Heavy Vehicles (%)	0%	4%	0%	0%	4%	27%	0%	0%	0%	24%	0%	38%
Parking (#/hr)											0	0
Turn Type	Perm	NA		Perm	NA	Perm		NA		pm+pt	NA	
Protected Phases		2			2			4		3	8	
Permitted Phases	2			2		2				8		
Actuated Green, G (s)		59.0			59.0	59.0		10.0		33.0	33.0	
Effective Green, g (s)		61.0			61.0	61.0		12.0		35.0	35.0	
Actuated g/C Ratio		0.55			0.55	0.55		0.11		0.32	0.32	
Clearance Time (s)		6.0			6.0	6.0		7.0		6.0	6.0	
Lane Grp Cap (vph)		1695			1481	545		305		613	361	
v/s Ratio Prot								0.06		0.12	c0.37	
v/s Ratio Perm		c0.58			0.30	0.07				0.11		
v/c Ratio		1.05			0.55	0.12		0.52		0.71	1.15	
Uniform Delay, d1		24.5			15.7	11.7		46.3		32.5	37.5	
Progression Factor		0.57			0.66	1.62		1.00		1.10	1.10	
Incremental Delay, d2		27.5			1.4	0.4		6.2		6.5	93.3	
Delay (s)		41.5			11.7	19.4		52.4		42.2	134.6	
Level of Service		D			B	B		D		D	F	
Approach Delay (s)		41.5			12.7			52.4			88.6	
Approach LOS		D			B			D			F	

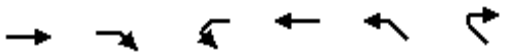
Intersection Summary			
HCM 2000 Control Delay	45.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	94.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	EBR	WBT	NWL	NWR
Lane Group Flow (vph)	1497	613	645	340	77
v/c Ratio	0.80	0.34	0.32	0.45	0.20
Control Delay	22.0	6.5	1.5	29.0	9.8
Queue Delay	48.1	1.0	0.1	19.2	3.9
Total Delay	70.1	7.5	1.6	48.2	13.7
Queue Length 50th (ft)	435	98	4	106	23
Queue Length 95th (ft)	m402	m102	6	151	52
Internal Link Dist (ft)	262		432	70	
Turn Bay Length (ft)					
Base Capacity (vph)	1873	1808	1991	749	385
Starvation Cap Reductn	585	841	0	398	241
Spillback Cap Reductn	0	889	395	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.16	0.67	0.40	0.97	0.53

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

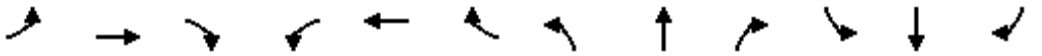


Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	1392	570	45	555	313	71
Future Volume (vph)	1392	570	45	555	313	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	11	11
Grade (%)	0%			0%	-1%	
Total Lost time (s)	5.0	5.0		5.0	4.0	4.0
Lane Util. Factor	0.95	0.88		0.91	0.97	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.85		1.00	1.00	0.85
Flt Protected	1.00	1.00		1.00	0.95	1.00
Satd. Flow (prot)	2944	2341		4189	2944	1358
Flt Permitted	1.00	1.00		0.74	0.95	1.00
Satd. Flow (perm)	2944	2341		3130	2944	1358
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.92	0.92
Adj. Flow (vph)	1497	613	48	597	340	77
RTOR Reduction (vph)	0	0	0	0	0	40
Lane Group Flow (vph)	1497	613	0	645	340	37
Confl. Peds. (#/hr)		37	37			
Confl. Bikes (#/hr)		3				
Heavy Vehicles (%)	3%	2%	7%	2%	4%	4%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	NA	custom	Perm	NA	Prot	Perm
Protected Phases	2	2 8		6	4	
Permitted Phases			6			4
Actuated Green, G (s)	68.0	83.0		68.0	26.0	26.0
Effective Green, g (s)	70.0	81.0		70.0	28.0	28.0
Actuated g/C Ratio	0.64	0.74		0.64	0.25	0.25
Clearance Time (s)	7.0			7.0	6.0	6.0
Lane Grp Cap (vph)	1873	1723		1991	749	345
v/s Ratio Prot	c0.51	0.26			c0.12	
v/s Ratio Perm				0.21		0.03
v/c Ratio	0.80	0.36		0.32	0.45	0.11
Uniform Delay, d1	14.8	5.2		9.2	34.6	31.4
Progression Factor	1.36	1.61		0.11	0.77	0.65
Incremental Delay, d2	1.2	0.2		0.4	2.0	0.6
Delay (s)	21.3	8.5		1.5	28.7	21.0
Level of Service	C	A		A	C	C
Approach Delay (s)	17.6			1.5	27.3	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT
Lane Group Flow (vph)	1573	646
v/c Ratio	0.79	0.41
Control Delay	6.1	17.1
Queue Delay	0.0	0.0
Total Delay	6.1	17.1
Queue Length 50th (ft)	73	140
Queue Length 95th (ft)	83	184
Internal Link Dist (ft)	432	489
Turn Bay Length (ft)		
Base Capacity (vph)	1988	1594
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.79	0.41

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1463	0	0	600	1	0	0	0	0	0	0
Future Volume (vph)	0	1463	0	0	600	1	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	11	11	11	13	13	13	13	13	13
Grade (%)		0%			-6%			1%			-1%	
Total Lost time (s)		4.0			4.0							
Lane Util. Factor		0.95			0.95							
Frpb, ped/bikes		1.00			1.00							
Flpb, ped/bikes		1.00			1.00							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		2916			3077							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		2916			3077							
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	1573	0	0	645	1	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1573	0	0	646	0	0	0	0	0	0	0
Confl. Peds. (#/hr)	92		2	2		92			116	116		
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	4%	0%	0%	5%	43%	0%	0%	0%	0%	0%	13%
Turn Type		NA			NA							
Protected Phases	1	6			2			4				
Permitted Phases	6						4					
Actuated Green, G (s)		73.0			55.0							
Effective Green, g (s)		75.0			57.0							
Actuated g/C Ratio		0.68			0.52							
Clearance Time (s)		6.0			6.0							
Lane Grp Cap (vph)		1988			1594							
v/s Ratio Prot		c0.54			0.21							
v/s Ratio Perm												
v/c Ratio		0.79			0.41							
Uniform Delay, d1		12.1			16.2							
Progression Factor		0.32			1.00							
Incremental Delay, d2		2.1			0.8							
Delay (s)		6.0			16.9							
Level of Service		A			B							
Approach Delay (s)		6.0			16.9			0.0			0.0	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	116	359	780
v/c Ratio	0.28	0.20	0.41
Control Delay	33.2	12.3	19.9
Queue Delay	0.0	0.6	0.5
Total Delay	33.2	12.9	20.3
Queue Length 50th (ft)	64	31	128
Queue Length 95th (ft)	114	m42	162
Internal Link Dist (ft)	249	136	148
Turn Bay Length (ft)			
Base Capacity (vph)	409	1785	1886
Starvation Cap Reductn	0	1056	0
Spillback Cap Reductn	0	0	626
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.28	0.49	0.62

Intersection Summary

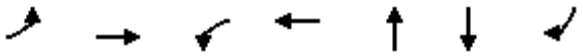
m Volume for 95th percentile queue is metered by upstream signal.



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	106	0	206	121	0	710
Future Volume (vph)	106	0	206	121	0	710
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	10	10	10	10
Grade (%)	-1%		0%			1%
Total Lost time (s)	5.0		4.0			4.0
Lane Util. Factor	1.00		0.91			0.91
Frpb, ped/bikes	1.00		0.93			1.00
Flpb, ped/bikes	0.99		1.00			1.00
Frt	1.00		0.94			1.00
Flt Protected	0.95		1.00			1.00
Satd. Flow (prot)	1453		3631			3991
Flt Permitted	0.95		1.00			1.00
Satd. Flow (perm)	1453		3631			3991
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	116	0	226	133	0	780
RTOR Reduction (vph)	0	0	70	0	0	0
Lane Group Flow (vph)	116	0	289	0	0	780
Confl. Peds. (#/hr)	8	27		56	56	
Heavy Vehicles (%)	0%	0%	8%	0%	0%	5%
Parking (#/hr)	0	0				0
Turn Type	Perm		NA			NA
Protected Phases			2			2
Permitted Phases	8					
Actuated Green, G (s)	29.0		50.0			50.0
Effective Green, g (s)	31.0		52.0			52.0
Actuated g/C Ratio	0.28		0.47			0.47
Clearance Time (s)	7.0		6.0			6.0
Lane Grp Cap (vph)	409		1716			1886
v/s Ratio Prot			0.08			c0.20
v/s Ratio Perm	c0.08					
v/c Ratio	0.28		0.17			0.41
Uniform Delay, d1	30.8		16.6			19.0
Progression Factor	1.00		1.16			1.00
Incremental Delay, d2	1.7		0.2			0.7
Delay (s)	32.6		19.4			19.7
Level of Service	C		B			B
Approach Delay (s)	32.6		19.4			19.7
Approach LOS	C		B			B

Intersection Summary			
HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

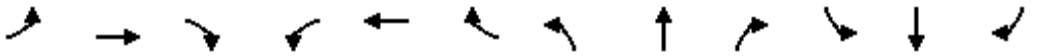
c Critical Lane Group



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	45	676	63	519	138	224	71
v/c Ratio	0.17	0.72	0.28	0.61	0.21	0.39	0.34
Control Delay	37.4	36.4	24.4	18.1	15.3	15.5	37.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.4	36.4	24.4	18.1	15.3	15.5	37.9
Queue Length 50th (ft)	25	201	26	54	41	98	42
Queue Length 95th (ft)	57	267	m45	61	83	162	87
Internal Link Dist (ft)		172		412	319	306	
Turn Bay Length (ft)			200				
Base Capacity (vph)	266	936	223	852	642	579	208
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.72	0.28	0.61	0.21	0.39	0.34

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	615	21	59	444	44	10	73	46	56	154	67
Future Volume (vph)	42	615	21	59	444	44	10	73	46	56	154	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	12	12	11	12	11	11
Total Lost time (s)	3.0	3.0		3.0	3.0			3.0			3.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.98			0.98			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			0.99	1.00
Frt	1.00	1.00		1.00	0.99			0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	1.00
Satd. Flow (prot)	1570	3114		1593	3133			1553			1565	1391
Flt Permitted	0.95	1.00		0.95	1.00			0.97			0.89	1.00
Satd. Flow (perm)	1570	3114		1593	3133			1518			1413	1391
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	45	654	22	63	472	47	11	78	49	60	164	71
RTOR Reduction (vph)	0	2	0	0	7	0	0	20	0	0	0	0
Lane Group Flow (vph)	45	674	0	63	512	0	0	118	0	0	224	71
Confl. Peds. (#/hr)	64		27	27		64	113		43	43		113
Confl. Bikes (#/hr)			1			5			17			29
Heavy Vehicles (%)	0%	0%	0%	2%	0%	0%	0%	1%	2%	1%	4%	1%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Over
Protected Phases	7	4		3	8			2			2	7
Permitted Phases							2			2		
Actuated Green, G (s)	14.0	27.0		11.0	24.0			37.0			37.0	14.0
Effective Green, g (s)	17.0	30.0		14.0	27.0			41.0			41.0	15.0
Actuated g/C Ratio	0.17	0.30		0.14	0.27			0.41			0.41	0.15
Clearance Time (s)	6.0	6.0		6.0	6.0			7.0			7.0	6.0
Lane Grp Cap (vph)	266	934		223	845			622			579	208
v/s Ratio Prot	0.03	c0.22		0.04	c0.16							c0.05
v/s Ratio Perm								0.08			c0.16	
v/c Ratio	0.17	0.72		0.28	0.61			0.19			0.39	0.34
Uniform Delay, d1	35.5	31.3		38.5	31.9			18.9			20.7	38.1
Progression Factor	1.00	1.00		0.55	0.49			1.00			0.64	0.87
Incremental Delay, d2	1.4	4.8		2.7	2.7			0.7			1.9	4.3
Delay (s)	36.8	36.1		24.0	18.2			19.5			15.2	37.2
Level of Service	D	D		C	B			B			B	D
Approach Delay (s)		36.1			18.8			19.5			20.5	
Approach LOS		D			B			B			C	

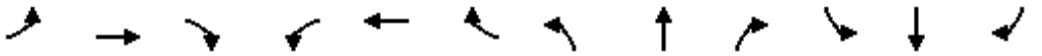
Intersection Summary			
HCM 2000 Control Delay	26.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	EBR	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	723	65	530	93	1031	285	104	1052
v/c Ratio	0.65	0.17	0.51	0.23	0.66	0.59	0.27	0.72
Control Delay	10.7	6.5	29.7	25.2	28.9	31.4	11.4	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.7	6.5	29.7	25.2	28.9	31.4	11.4	11.9
Queue Length 50th (ft)	41	7	168	50	198	144	8	70
Queue Length 95th (ft)	51	m10	217	97	247	234	15	83
Internal Link Dist (ft)	412		1036		403			307
Turn Bay Length (ft)		150		180		225		
Base Capacity (vph)	1119	373	1035	410	1552	485	391	1456
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.17	0.51	0.23	0.66	0.59	0.27	0.72

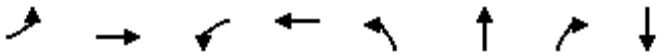
Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	658	59	4	479	85	1	937	259	95	890	67
Future Volume (vph)	0	658	59	4	479	85	1	937	259	95	890	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	11	11	11	10	10	10
Total Lost time (s)		3.0	6.0		3.0	3.0		3.0	3.0	8.0	3.0	
Lane Util. Factor		0.95	1.00		0.95	1.00		0.91	1.00	0.97	0.95	
Frpb, ped/bikes		1.00	0.87		1.00	0.92		1.00	0.94	1.00	0.99	
Flpb, ped/bikes		1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	
Frt		1.00	0.85		1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected		1.00	1.00		1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3110	1131		3025	1140		4468	1313	2744	2802	
Flt Permitted		1.00	1.00		0.95	1.00		0.94	1.00	0.17	1.00	
Satd. Flow (perm)		3110	1131		2874	1140		4196	1313	504	2802	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	723	65	4	526	93	1	1030	285	104	978	74
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	723	65	0	530	93	0	1031	285	104	1052	0
Confl. Peds. (#/hr)	75		123	123		75	78		39	39		78
Confl. Bikes (#/hr)			10			1						
Heavy Vehicles (%)	0%	1%	8%	25%	0%	8%	0%	1%	1%	7%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	3	0	0	0	0	0	0
Parking (#/hr)											0	0
Turn Type		NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases			4	8		8	2		2	6		
Actuated Green, G (s)		32.0	32.0		32.0	32.0		33.0	33.0	48.0	48.0	
Effective Green, g (s)		36.0	33.0		36.0	36.0		37.0	37.0	47.0	52.0	
Actuated g/C Ratio		0.36	0.33		0.36	0.36		0.37	0.37	0.47	0.52	
Clearance Time (s)		7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	
Lane Grp Cap (vph)		1119	373		1034	410		1552	485	393	1457	
v/s Ratio Prot		c0.23								0.02	c0.38	
v/s Ratio Perm			0.06		0.18	0.08		0.25	0.22	0.11		
v/c Ratio		0.65	0.17		0.51	0.23		0.66	0.59	0.26	0.72	
Uniform Delay, d1		26.7	23.8		25.1	22.3		26.3	25.4	25.8	18.4	
Progression Factor		0.31	0.24		1.10	1.05		1.00	1.00	0.51	0.48	
Incremental Delay, d2		2.2	0.8		1.7	1.2		2.3	5.1	1.5	2.8	
Delay (s)		10.6	6.4		29.3	24.5		28.6	30.5	14.6	11.7	
Level of Service		B	A		C	C		C	C	B	B	
Approach Delay (s)		10.2			28.6			29.0			11.9	
Approach LOS		B			C			C			B	

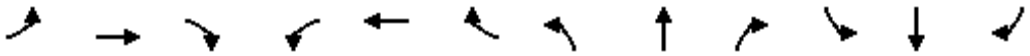
Intersection Summary			
HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	95.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	139	998	69	675	60	131	110	26
v/c Ratio	0.60	0.69	0.28	0.40	0.25	0.32	0.21	0.07
Control Delay	22.3	14.7	6.0	1.3	31.5	31.2	15.5	19.4
Queue Delay	0.0	0.0	0.0	0.0	5.9	16.7	1.3	0.0
Total Delay	22.3	14.7	6.0	1.3	37.4	47.9	16.8	19.4
Queue Length 50th (ft)	34	128	2	2	28	62	20	6
Queue Length 95th (ft)	m54	151	15	3	57	103	58	27
Internal Link Dist (ft)		1036		509		64		359
Turn Bay Length (ft)	150		200				140	
Base Capacity (vph)	233	1454	246	1675	243	413	528	364
Starvation Cap Reductn	0	0	0	0	138	261	273	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.69	0.28	0.40	0.57	0.86	0.43	0.07

Intersection Summary

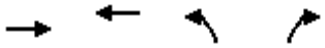
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	124	856	32	61	503	98	53	117	98	4	8	12
Future Volume (vph)	124	856	32	61	503	98	53	117	98	4	8	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	11	11	11	14	14	14
Total Lost time (s)	6.0	6.0		5.0	4.0		4.0	4.0	3.0		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.89		1.00	1.00	0.98		0.90	
Flpb, ped/bikes	0.74	1.00		1.00	1.00		0.83	1.00	1.00		1.00	
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85		0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00		0.99	
Satd. Flow (prot)	1120	2902		1458	2633		1248	1653	1381		1464	
Flt Permitted	0.40	1.00		0.20	1.00		0.74	1.00	1.00		0.96	
Satd. Flow (perm)	466	2902		306	2633		972	1653	1381		1421	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	139	962	36	69	565	110	60	131	110	4	9	13
RTOR Reduction (vph)	0	3	0	0	17	0	0	0	60	0	10	0
Lane Group Flow (vph)	139	996	0	69	658	0	60	131	50	0	16	0
Confl. Peds. (#/hr)	134		99	99		134	150		9	9		150
Confl. Bikes (#/hr)			1			5			4			3
Heavy Vehicles (%)	0%	1%	12%	4%	0%	0%	4%	0%	0%	0%	12%	0%
Bus Blockages (#/hr)	0	8	8	0	0	0	0	0	0	0	0	0
Turn Type	Perm	NA		custom	NA		Perm	NA	pm+ov	Perm	NA	
Protected Phases		6		5	1 2			14	5		14	
Permitted Phases	6			2			14		14	14		
Actuated Green, G (s)	49.0	49.0		55.0	60.0		22.0	22.0	27.0		22.0	
Effective Green, g (s)	50.0	50.0		57.0	61.0		25.0	25.0	33.0		25.0	
Actuated g/C Ratio	0.50	0.50		0.57	0.61		0.25	0.25	0.33		0.25	
Clearance Time (s)	7.0	7.0		6.0			7.0	7.0	6.0		7.0	
Lane Grp Cap (vph)	233	1451		243	1606		243	413	455		355	
v/s Ratio Prot		c0.34		0.02	c0.25			c0.08	0.01			
v/s Ratio Perm	0.30			0.14			0.06		0.03		0.01	
v/c Ratio	0.60	0.69		0.28	0.41		0.25	0.32	0.11		0.05	
Uniform Delay, d1	17.8	19.0		11.1	10.1		30.0	30.5	23.3		28.5	
Progression Factor	0.66	0.65		0.42	0.07		0.94	0.94	2.14		1.00	
Incremental Delay, d2	8.9	2.2		2.8	0.7		2.4	2.0	0.5		0.2	
Delay (s)	20.7	14.5		7.5	1.4		30.6	30.7	50.4		28.7	
Level of Service	C	B		A	A		C	C	D		C	
Approach Delay (s)		15.3			2.0			37.9			28.7	
Approach LOS		B			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1053	661	89	93
v/c Ratio	0.70	0.40	0.21	0.22
Control Delay	4.3	4.1	30.6	10.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	4.3	4.1	30.6	10.4
Queue Length 50th (ft)	27	33	45	13
Queue Length 95th (ft)	38	34	86	46
Internal Link Dist (ft)	509	523	265	
Turn Bay Length (ft)				
Base Capacity (vph)	1498	1640	427	420
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.70	0.40	0.21	0.22

Intersection Summary



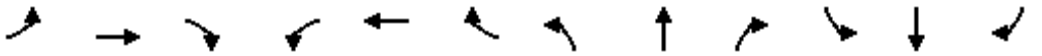
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	929	29	21	581	81	85
Future Volume (vph)	929	29	21	581	81	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	13	13
Total Lost time (s)	5.0			5.0	4.0	3.0
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	0.98			1.00	1.00	0.75
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2935			2956	1646	1120
Flt Permitted	1.00			0.90	0.95	1.00
Satd. Flow (perm)	2935			2666	1646	1120
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	1021	32	23	638	89	93
RTOR Reduction (vph)	2	0	0	0	0	42
Lane Group Flow (vph)	1051	0	0	661	89	51
Confl. Peds. (#/hr)		231	231		2	259
Confl. Bikes (#/hr)		8				
Heavy Vehicles (%)	1%	3%	14%	2%	2%	1%
Turn Type	NA		pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	4	1
Permitted Phases			6			4
Actuated Green, G (s)	49.0			59.0	24.0	29.0
Effective Green, g (s)	51.0			61.0	26.0	33.0
Actuated g/C Ratio	0.51			0.61	0.26	0.33
Clearance Time (s)	7.0			7.0	6.0	5.0
Lane Grp Cap (vph)	1496			1646	427	369
v/s Ratio Prot	c0.36			c0.03	c0.05	0.01
v/s Ratio Perm				0.22		0.04
v/c Ratio	0.70			0.40	0.21	0.14
Uniform Delay, d1	18.7			10.1	28.9	23.5
Progression Factor	0.11			0.34	1.00	1.00
Incremental Delay, d2	2.2			0.7	1.1	0.8
Delay (s)	4.3			4.1	30.1	24.3
Level of Service	A			A	C	C
Approach Delay (s)	4.3			4.1	27.1	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	6.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	WBT	NBT	NBR
Lane Group Flow (vph)	954	753	37	12
v/c Ratio	0.68	0.42	0.11	0.05
Control Delay	3.0	9.4	28.7	0.5
Queue Delay	0.0	0.9	0.0	0.0
Total Delay	3.0	10.3	28.7	0.5
Queue Length 50th (ft)	13	98	18	0
Queue Length 95th (ft)	15	111	44	0
Internal Link Dist (ft)	1	426	250	
Turn Bay Length (ft)				
Base Capacity (vph)	1410	1783	334	219
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	698	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.68	0.69	0.11	0.05

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	878	0	0	693	0	34	0	11	0	0	0
Future Volume (vph)	0	878	0	0	693	0	34	0	11	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			
Lane Util. Factor		0.95			0.95			1.00	1.00			
Frpb, ped/bikes		1.00			1.00			1.00	1.00			
Flpb, ped/bikes		1.00			1.00			0.91	1.00			
Frt		1.00			1.00			1.00	0.85			
Flt Protected		1.00			1.00			0.95	1.00			
Satd. Flow (prot)		3002			2973			1240	1221			
Flt Permitted		1.00			1.00			0.95	1.00			
Satd. Flow (perm)		3002			2973			1240	1221			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	954	0	0	753	0	37	0	12	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	11	0	0	0
Lane Group Flow (vph)	0	954	0	0	753	0	0	37	1	0	0	0
Confl. Peds. (#/hr)			134	134			76		18	18		76
Confl. Bikes (#/hr)			7			4						
Heavy Vehicles (%)	0%	1%	1%	4%	2%	0%	0%	0%	0%	0%	0%	0%
Parking (#/hr)							0	0	0			
Turn Type		NA			NA		Perm	NA	custom	D.Pm		Perm
Protected Phases		12			6			8	11			
Permitted Phases	12						8			8		8
Actuated Green, G (s)		45.0			58.0			25.0	7.0			
Effective Green, g (s)		47.0			60.0			27.0	9.0			
Actuated g/C Ratio		0.47			0.60			0.27	0.09			
Clearance Time (s)		6.0			6.0			6.0	6.0			
Lane Grp Cap (vph)		1410			1783			334	109			
v/s Ratio Prot		c0.32			c0.25				0.00			
v/s Ratio Perm								0.03				
v/c Ratio		0.68			0.42			0.11	0.01			
Uniform Delay, d1		20.6			10.7			27.5	41.4			
Progression Factor		0.06			0.81			1.00	1.00			
Incremental Delay, d2		1.9			0.6			0.7	0.2			
Delay (s)		3.0			9.3			28.1	41.6			
Level of Service		A			A			C	D			
Approach Delay (s)		3.0			9.3			31.4			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	6.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	73.0%	ICU Level of Service	C
Analysis Period (min)	15		

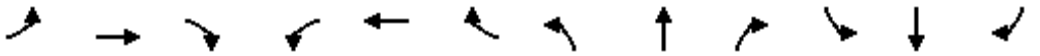
c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	161	795	588	104	54	197	162	293
v/c Ratio	0.55	0.53	0.56	0.45	0.17	0.17	0.28	0.40
Control Delay	10.7	1.0	13.1	12.2	19.6	23.4	19.9	17.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.7	1.0	13.1	12.2	19.6	23.4	19.9	17.6
Queue Length 50th (ft)	3	0	37	16	21	29	32	42
Queue Length 95th (ft)	m28	0	122	99	46	49	54	81
Internal Link Dist (ft)		426	493			418		342
Turn Bay Length (ft)				250	110			
Base Capacity (vph)	293	1494	1053	229	317	1138	574	727
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.53	0.56	0.45	0.17	0.17	0.28	0.40

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	692	47	21	525	97	50	159	24	151	154	118
Future Volume (vph)	150	692	47	21	525	97	50	159	24	151	154	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			2%			0%			2%	
Total Lost time (s)	5.0	4.0			4.0	3.0	2.0	4.0		2.0	4.0	
Lane Util. Factor	1.00	0.95			0.95	1.00	1.00	0.91		0.97	0.95	
Frpb, ped/bikes	1.00	0.99			1.00	1.00	1.00	0.96		1.00	0.88	
Flpb, ped/bikes	0.98	1.00			1.00	1.00	0.92	1.00		0.77	1.00	
Frt	1.00	0.99			1.00	0.85	1.00	0.98		1.00	0.93	
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1481	2811			2775	1185	1315	3863		2148	2199	
Flt Permitted	0.30	1.00			0.90	1.00	0.52	1.00		0.62	1.00	
Satd. Flow (perm)	472	2811			2509	1185	720	3863		1408	2199	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	161	744	51	23	565	104	54	171	26	162	166	127
RTOR Reduction (vph)	0	5	0	0	0	104	0	18	0	0	90	0
Lane Group Flow (vph)	161	790	0	0	588	0	54	179	0	162	203	0
Confl. Peds. (#/hr)	207		166	166		207	200		226	226		200
Confl. Bikes (#/hr)			2						6			3
Heavy Vehicles (%)	0%	0%	2%	10%	2%	2%	6%	3%	0%	5%	8%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	3
Parking (#/hr)		0	0		0	0		0	0		0	0
Turn Type	pm+pt	NA		Perm	NA	NA	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	50.0	50.0			39.0	0.0	31.0	26.0		31.0	26.0	
Effective Green, g (s)	50.0	53.0			42.0	0.0	37.0	29.0		37.0	29.0	
Actuated g/C Ratio	0.50	0.53			0.42	0.00	0.37	0.29		0.37	0.29	
Clearance Time (s)	5.0	7.0			7.0		5.0	7.0		5.0	7.0	
Lane Grp Cap (vph)	296	1489			1053	0	314	1120		580	637	
v/s Ratio Prot	0.03	c0.28					0.01	0.05		c0.02	c0.09	
v/s Ratio Perm	0.24				0.23		0.05			0.08		
v/c Ratio	0.54	0.53			0.56	0.00	0.17	0.16		0.28	0.32	
Uniform Delay, d1	15.3	15.4			22.0	50.0	20.7	26.4		21.5	27.8	
Progression Factor	0.38	0.00			0.50	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.2	1.0			2.0	0.0	1.2	0.3		1.2	1.3	
Delay (s)	11.1	1.0			12.9	50.0	21.9	26.7		22.7	29.1	
Level of Service	B	A			B	D	C	C		C	C	
Approach Delay (s)		2.7			18.5			25.7			26.8	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	942	645	74	59
v/c Ratio	0.59	0.44	0.17	0.22
Control Delay	6.6	12.5	26.6	28.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.6	12.5	26.6	28.4
Queue Length 50th (ft)	64	118	34	28
Queue Length 95th (ft)	78	139	70	62
Internal Link Dist (ft)	493	589	212	
Turn Bay Length (ft)				
Base Capacity (vph)	1595	1480	427	265
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.59	0.44	0.17	0.22

Intersection Summary



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	806	61	18	575	68	54
Future Volume (vph)	806	61	18	575	68	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10
Grade (%)	-2%			1%	-2%	
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	0.97			1.00	1.00	0.69
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2743			2801	1378	855
Flt Permitted	1.00			0.91	0.95	1.00
Satd. Flow (perm)	2743			2553	1378	855
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	876	66	20	625	74	59
RTOR Reduction (vph)	5	0	0	0	0	0
Lane Group Flow (vph)	937	0	0	645	74	59
Confl. Peds. (#/hr)		131	131		335	230
Confl. Bikes (#/hr)		3				1
Heavy Vehicles (%)	2%	0%	0%	2%	0%	0%
Parking (#/hr)	0	0		0	0	0
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			2	4	
Permitted Phases			2		4	4
Actuated Green, G (s)	56.0			56.0	29.0	29.0
Effective Green, g (s)	58.0			58.0	31.0	31.0
Actuated g/C Ratio	0.58			0.58	0.31	0.31
Clearance Time (s)	6.0			6.0	6.0	6.0
Lane Grp Cap (vph)	1590			1480	427	265
v/s Ratio Prot	c0.34				0.05	
v/s Ratio Perm				0.25		c0.07
v/c Ratio	0.59			0.44	0.17	0.22
Uniform Delay, d1	13.4			11.8	25.2	25.6
Progression Factor	0.38			0.96	1.00	1.00
Incremental Delay, d2	1.4			0.9	0.9	1.9
Delay (s)	6.6			12.3	26.0	27.5
Level of Service	A			B	C	C
Approach Delay (s)	6.6			12.3	26.7	
Approach LOS	A			B	C	

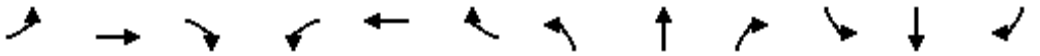
Intersection Summary			
HCM 2000 Control Delay	10.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	875	60	39	577	40	27	32	30	24	35
v/c Ratio	0.70	0.14	0.15	0.36	0.16	0.08	0.10	0.12	0.07	0.14
Control Delay	9.2	1.1	12.2	14.7	29.9	28.1	0.6	29.2	28.1	29.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.2	1.1	12.2	14.7	29.9	28.1	0.6	29.2	28.1	29.5
Queue Length 50th (ft)	91	1	10	104	19	13	0	14	11	17
Queue Length 95th (ft)	142	m3	m22	130	47	34	0	38	32	43
Internal Link Dist (ft)	589			201		407			351	
Turn Bay Length (ft)		150			110		70	150		75
Base Capacity (vph)	1249	431	268	1586	256	354	333	252	328	257
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.14	0.15	0.36	0.16	0.08	0.10	0.12	0.07	0.14

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	794	55	36	524	6	37	25	29	28	22	32
Future Volume (vph)	11	794	55	36	524	6	37	25	29	28	22	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			1%			-1%			2%	
Total Lost time (s)		4.0	4.0	3.0	4.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.66	1.00	0.99		1.00	1.00	0.77	1.00	1.00	0.79
Flpb, ped/bikes		1.00	1.00	0.99	1.00		0.82	1.00	1.00	0.80	1.00	1.00
Frt		1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		2812	783	1495	2783		1218	1312	941	1200	1215	953
Flt Permitted		0.94	1.00	0.21	1.00		0.74	1.00	1.00	0.74	1.00	1.00
Satd. Flow (perm)		2659	783	335	2783		951	1312	941	934	1215	953
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	863	60	39	570	7	40	27	32	30	24	35
RTOR Reduction (vph)	0	0	32	0	1	0	0	0	23	0	0	0
Lane Group Flow (vph)	0	875	28	39	576	0	40	27	9	30	24	35
Confl. Peds. (#/hr)	502		123	123		502	121		132	132		121
Confl. Bikes (#/hr)			10			12			20			17
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	2%	10%	0%	0%	17%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	2	0	0	1
Parking (#/hr)		0	0		0	0		0	0		0	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		6		5	2			4			4	
Permitted Phases	6		6	2			4		4	4		4
Actuated Green, G (s)		45.0	45.0	55.0	55.0		25.0	25.0	25.0	25.0	25.0	25.0
Effective Green, g (s)		47.0	47.0	57.0	57.0		27.0	27.0	27.0	27.0	27.0	27.0
Actuated g/C Ratio		0.47	0.47	0.57	0.57		0.27	0.27	0.27	0.27	0.27	0.27
Clearance Time (s)		6.0	6.0	5.0	6.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Grp Cap (vph)		1249	368	272	1586		256	354	254	252	328	257
v/s Ratio Prot				0.01	c0.21			0.02			0.02	
v/s Ratio Perm		c0.33	0.04	0.07			c0.04		0.01	0.03		0.04
v/c Ratio		0.70	0.08	0.14	0.36		0.16	0.08	0.03	0.12	0.07	0.14
Uniform Delay, d1		20.9	14.6	11.1	11.7		27.8	27.2	26.9	27.5	27.2	27.7
Progression Factor		0.30	1.00	1.21	1.19		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		2.7	0.3	1.0	0.6		1.3	0.4	0.2	1.0	0.4	1.1
Delay (s)		9.1	14.9	14.5	14.5		29.1	27.6	27.1	28.5	27.6	28.8
Level of Service		A	B	B	B		C	C	C	C	C	C
Approach Delay (s)		9.4			14.5			28.1			28.4	
Approach LOS		A			B			C			C	

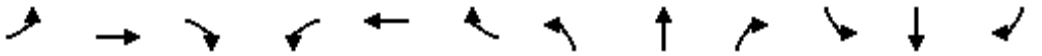
Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBT	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	945	464	71	64	102	307
v/c Ratio	0.81	0.47	0.17	0.10	0.08	0.47
Control Delay	14.0	20.3	18.6	31.0	11.0	14.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	1.1
Total Delay	14.0	20.3	18.6	31.0	11.0	15.9
Queue Length 50th (ft)	46	74	21	16	13	75
Queue Length 95th (ft)	71	97	41	35	24	222
Internal Link Dist (ft)	308	262		414		136
Turn Bay Length (ft)						
Base Capacity (vph)	1166	989	424	638	1226	659
Starvation Cap Reductn	0	0	0	0	0	166
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.47	0.17	0.10	0.08	0.62

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	98	750	3	12	406	64	0	38	20	92	116	160
Future Volume (vph)	98	750	3	12	406	64	0	38	20	92	116	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	10	10	10
Grade (%)		-1%			0%			-1%			0%	
Total Lost time (s)		4.0			4.0	4.0		5.0		4.0	4.0	
Lane Util. Factor		0.91			0.95	1.00		0.95		0.97	1.00	
Frpb, ped/bikes		1.00			1.00	0.95		0.98		1.00	0.95	
Flpb, ped/bikes		1.00			1.00	1.00		1.00		0.97	1.00	
Frt		1.00			1.00	0.85		0.95		1.00	0.91	
Flt Protected		0.99			1.00	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		4156			2997	1179		2778		2825	1220	
Flt Permitted		0.78			0.92	1.00		1.00		0.71	1.00	
Satd. Flow (perm)		3239			2749	1179		2778		2120	1220	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	109	833	3	13	451	71	0	42	22	102	129	178
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	50	0
Lane Group Flow (vph)	0	945	0	0	464	71	0	64	0	102	258	0
Confl. Peds. (#/hr)	34		58	58		34	69		33	33		69
Confl. Bikes (#/hr)			2			1			3			1
Heavy Vehicles (%)	0%	1%	23%	0%	1%	9%	0%	3%	5%	1%	4%	0%
Parking (#/hr)		0	0					0	0		0	0
Turn Type	Perm	NA		Perm	NA	Perm		NA		pm+pt	NA	
Protected Phases		2			2			4		3	8	
Permitted Phases	2			2		2				8		
Actuated Green, G (s)		34.0			34.0	34.0		21.0		48.0	48.0	
Effective Green, g (s)		36.0			36.0	36.0		23.0		50.0	50.0	
Actuated g/C Ratio		0.36			0.36	0.36		0.23		0.50	0.50	
Clearance Time (s)		6.0			6.0	6.0		7.0		6.0	6.0	
Lane Grp Cap (vph)		1166			989	424		638		1215	610	
v/s Ratio Prot								0.02		0.02	c0.21	
v/s Ratio Perm		c0.29			0.17	0.06				0.02		
v/c Ratio		0.81			0.47	0.17		0.10		0.08	0.42	
Uniform Delay, d1		28.9			24.6	21.8		30.3		13.1	15.8	
Progression Factor		0.31			0.75	0.79		1.00		0.82	1.14	
Incremental Delay, d2		4.7			1.6	0.8		0.3		0.1	2.1	
Delay (s)		13.7			20.0	18.1		30.7		10.9	20.1	
Level of Service		B			C	B		C		B	C	
Approach Delay (s)		13.7			19.8			30.7			17.8	
Approach LOS		B			B			C			B	

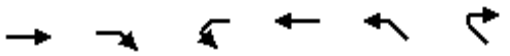
Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	EBR	WBT	NWL	NWR
Lane Group Flow (vph)	715	232	397	168	24
v/c Ratio	0.45	0.16	0.20	0.16	0.05
Control Delay	5.0	3.2	1.4	21.0	15.2
Queue Delay	0.2	0.0	0.0	3.6	1.6
Total Delay	5.2	3.2	1.4	24.5	16.9
Queue Length 50th (ft)	32	10	2	43	7
Queue Length 95th (ft)	40	m13	3	63	24
Internal Link Dist (ft)	262		432	70	
Turn Bay Length (ft)					
Base Capacity (vph)	1591	1489	2007	1050	500
Starvation Cap Reductn	271	0	0	789	399
Spillback Cap Reductn	0	1	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.54	0.16	0.20	0.64	0.24

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

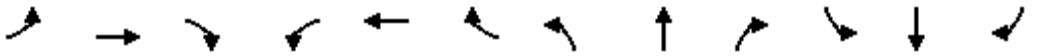


Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	651	211	17	344	138	20
Future Volume (vph)	651	211	17	344	138	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	11	11
Grade (%)	0%			0%	-1%	
Total Lost time (s)	5.0	5.0		5.0	4.0	4.0
Lane Util. Factor	0.95	0.88		0.91	0.97	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.85		1.00	1.00	0.85
Flt Protected	1.00	1.00		1.00	0.95	1.00
Satd. Flow (prot)	3002	2364		4230	3002	1384
Flt Permitted	1.00	1.00		0.89	0.95	1.00
Satd. Flow (perm)	3002	2364		3786	3002	1384
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.82	0.82
Adj. Flow (vph)	715	232	19	378	168	24
RTOR Reduction (vph)	0	0	0	0	0	16
Lane Group Flow (vph)	715	232	0	397	168	8
Confl. Peds. (#/hr)			11	11		
Confl. Bikes (#/hr)			6			
Heavy Vehicles (%)	1%	1%	0%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	6	0	0
Turn Type	NA	custom	Perm	NA	Prot	Perm
Protected Phases	2	2 8		6	4	
Permitted Phases			6			4
Actuated Green, G (s)	51.0	61.0		51.0	33.0	33.0
Effective Green, g (s)	53.0	59.0		53.0	35.0	35.0
Actuated g/C Ratio	0.53	0.59		0.53	0.35	0.35
Clearance Time (s)	7.0			7.0	6.0	6.0
Lane Grp Cap (vph)	1591	1394		2006	1050	484
v/s Ratio Prot	c0.24	0.10			c0.06	
v/s Ratio Perm				0.10		0.01
v/c Ratio	0.45	0.17		0.20	0.16	0.02
Uniform Delay, d1	14.5	9.3		12.3	22.4	21.3
Progression Factor	0.30	0.40		0.10	0.91	1.76
Incremental Delay, d2	0.6	0.2		0.2	0.3	0.1
Delay (s)	5.0	3.9		1.4	20.8	37.5
Level of Service	A	A		A	C	D
Approach Delay (s)	4.7			1.4	22.9	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	6.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	35.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT
Lane Group Flow (vph)	737	397
v/c Ratio	0.41	0.28
Control Delay	1.8	18.0
Queue Delay	0.0	0.0
Total Delay	1.8	18.0
Queue Length 50th (ft)	8	81
Queue Length 95th (ft)	20	115
Internal Link Dist (ft)	432	475
Turn Bay Length (ft)		
Base Capacity (vph)	1789	1399
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.41	0.28

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	669	0	0	361	0	0	0	0	0	0	0
Future Volume (vph)	2	669	0	0	361	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	11	11	11	13	13	13	13	13	13
Grade (%)		0%			-6%			1%			-1%	
Total Lost time (s)		4.0			4.0							
Lane Util. Factor		0.95			0.95							
Frpb, ped/bikes		1.00			1.00							
Flpb, ped/bikes		1.00			1.00							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		2943			3111							
Flt Permitted		0.95			1.00							
Satd. Flow (perm)		2811			3111							
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	2	735	0	0	397	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	737	0	0	397	0	0	0	0	0	0	0
Confl. Peds. (#/hr)	132		160	160		132	227		134	134		227
Confl. Bikes (#/hr)			3			4			4			7
Heavy Vehicles (%)	1%	3%	12%	16%	4%	5%	8%	12%	12%	0%	3%	1%
Turn Type	pm+pt	NA			NA							
Protected Phases	1	6			2			4				
Permitted Phases	6						4					
Actuated Green, G (s)		61.0			43.0							
Effective Green, g (s)		63.0			45.0							
Actuated g/C Ratio		0.63			0.45							
Clearance Time (s)		6.0			6.0							
Lane Grp Cap (vph)		1789			1399							
v/s Ratio Prot		c0.06			0.13							
v/s Ratio Perm		c0.20										
v/c Ratio		0.41			0.28							
Uniform Delay, d1		9.2			17.3							
Progression Factor		0.12			1.00							
Incremental Delay, d2		0.6			0.5							
Delay (s)		1.8			17.8							
Level of Service		A			B							
Approach Delay (s)		1.8			17.8			0.0			0.0	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	49.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	152	220	253
v/c Ratio	0.33	0.15	0.15
Control Delay	28.3	16.6	18.3
Queue Delay	0.0	0.0	0.0
Total Delay	28.3	16.6	18.3
Queue Length 50th (ft)	73	36	35
Queue Length 95th (ft)	128	m52	53
Internal Link Dist (ft)	249	136	148
Turn Bay Length (ft)			
Base Capacity (vph)	465	1507	1676
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	23
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.33	0.15	0.15

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	138	0	109	91	0	230
Future Volume (vph)	138	0	109	91	0	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	10	10	10	10
Grade (%)	-1%		0%			1%
Total Lost time (s)	5.0		4.0			4.0
Lane Util. Factor	1.00		0.91			0.91
Frpb, ped/bikes	1.00		0.92			1.00
Flpb, ped/bikes	0.99		1.00			1.00
Frt	1.00		0.93			1.00
Flt Protected	0.95		1.00			1.00
Satd. Flow (prot)	1455		3450			3991
Flt Permitted	0.95		1.00			1.00
Satd. Flow (perm)	1455		3450			3991
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	152	0	120	100	0	253
RTOR Reduction (vph)	0	0	58	0	0	0
Lane Group Flow (vph)	152	0	162	0	0	253
Confl. Peds. (#/hr)	8	27		56	56	
Heavy Vehicles (%)	0%	0%	8%	0%	0%	5%
Parking (#/hr)	0	0	0	0		0
Turn Type	Perm		NA			NA
Protected Phases			2			2
Permitted Phases	8					
Actuated Green, G (s)	30.0		40.0			40.0
Effective Green, g (s)	32.0		42.0			42.0
Actuated g/C Ratio	0.32		0.42			0.42
Clearance Time (s)	7.0		6.0			6.0
Lane Grp Cap (vph)	465		1449			1676
v/s Ratio Prot			0.05			c0.06
v/s Ratio Perm	c0.10					
v/c Ratio	0.33		0.11			0.15
Uniform Delay, d1	25.8		17.6			18.0
Progression Factor	1.00		1.70			1.00
Incremental Delay, d2	1.9		0.1			0.2
Delay (s)	27.7		30.1			18.1
Level of Service	C		C			B
Approach Delay (s)	27.7		30.1			18.1
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Appendix B: Urban Life Review

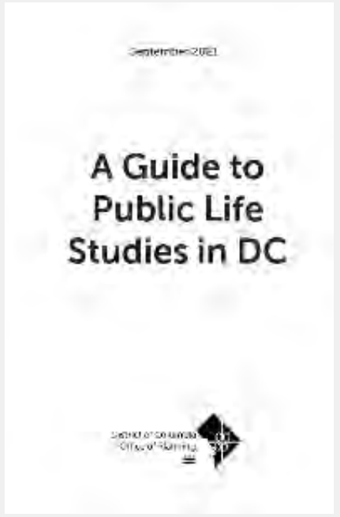
Urban Life Review



Background

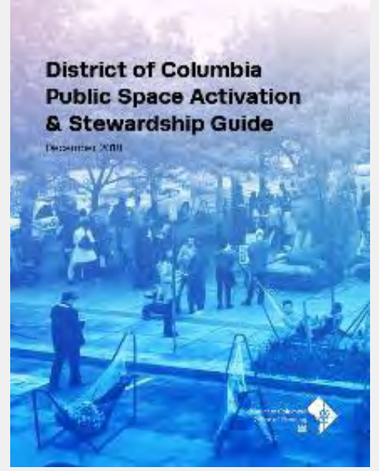
An *Urban Life Review* (Public Life Study) is a data-driven approach that applies observational, people-centric measures to understand the human experience of our shared public realm.

- The DC Office of Planning (OP) has completed eight Public Life Studies (PLS) between 2016-2021
- The methodology was developed by the Gehl Institute and adapted by OP
- Studies may include in person observations, in-person surveys, or online surveys
- **This study is an abbreviated version of OP's PLS and was completed in April 2024.**









Source: DC Office of Planning

Overview

What was observed?

- The findings of this study focused primarily on non-transportation-related activities and their correlation with demographic characteristics and the physical design of the public realm. Key areas of observation include:
- Qualitative aspects of the physical environment
- Stationary activities of individuals and groups
- User perceptions

Limitations

- Findings reflect current conditions only
- Limited data collection period: Each data collection is 10 to 15 minutes
- Weather conditions impacted weekday data collection
- Gathering feedback was challenging due to participants' reluctance to engage in person on-site

Data Collection Framework

I. Initial Assessments (Field Observations)

- Place Inventory
- Twelve Urban Quality Criteria

II. Counting (People in Motion; Field Observations)

- Mode (walking, running, biking, etc.)
- Age and gender of people in motion

III. Mapping (Stationary Activity; Field Observations)

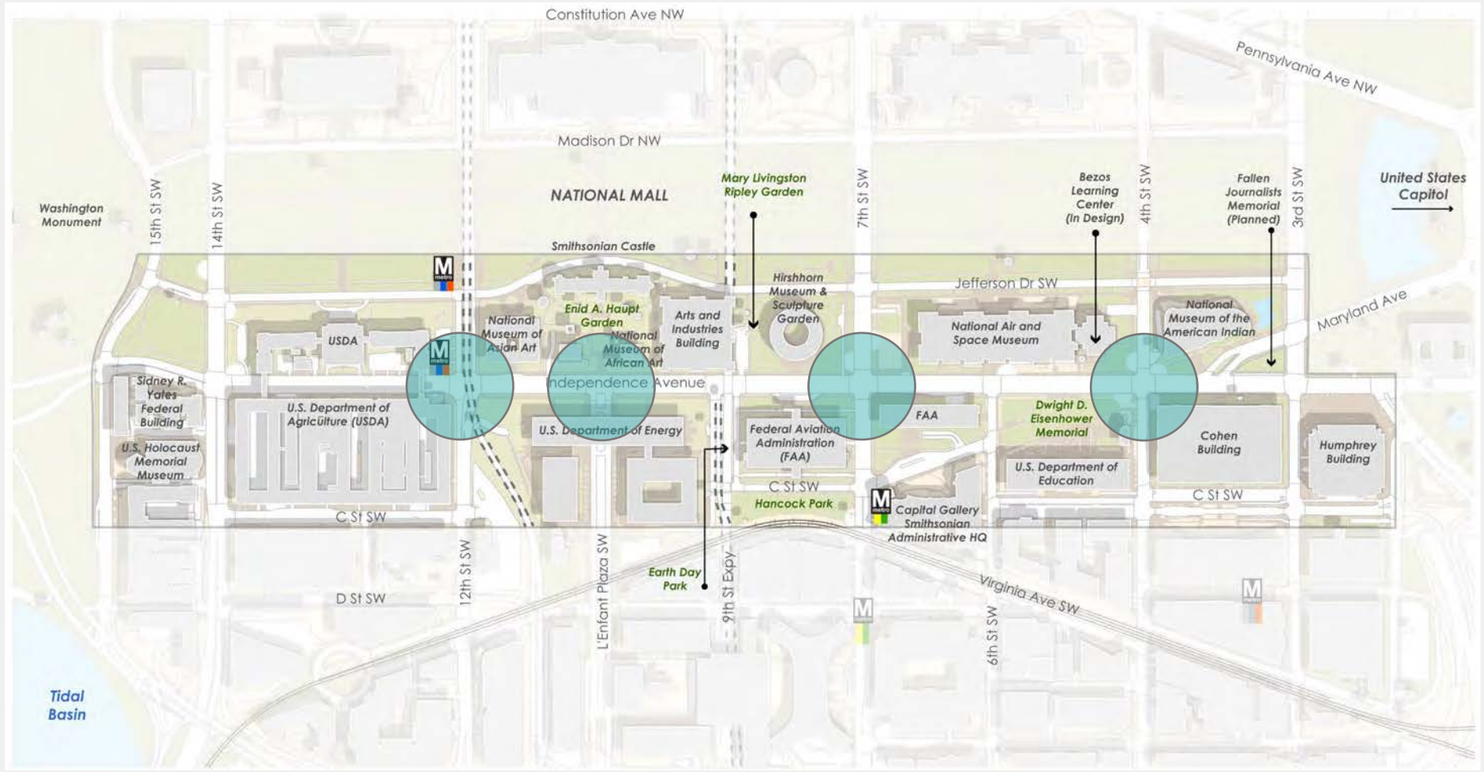
- Standing, sitting, other movement

IV. Surveys by Users on the Corridor

- Paper surveys were handed out to participants along the corridor

V. Observations & Recommendations

- The project team summarized observations and the data collection



Observations were documented within 100ft of these intersection locations

Initial Assessments

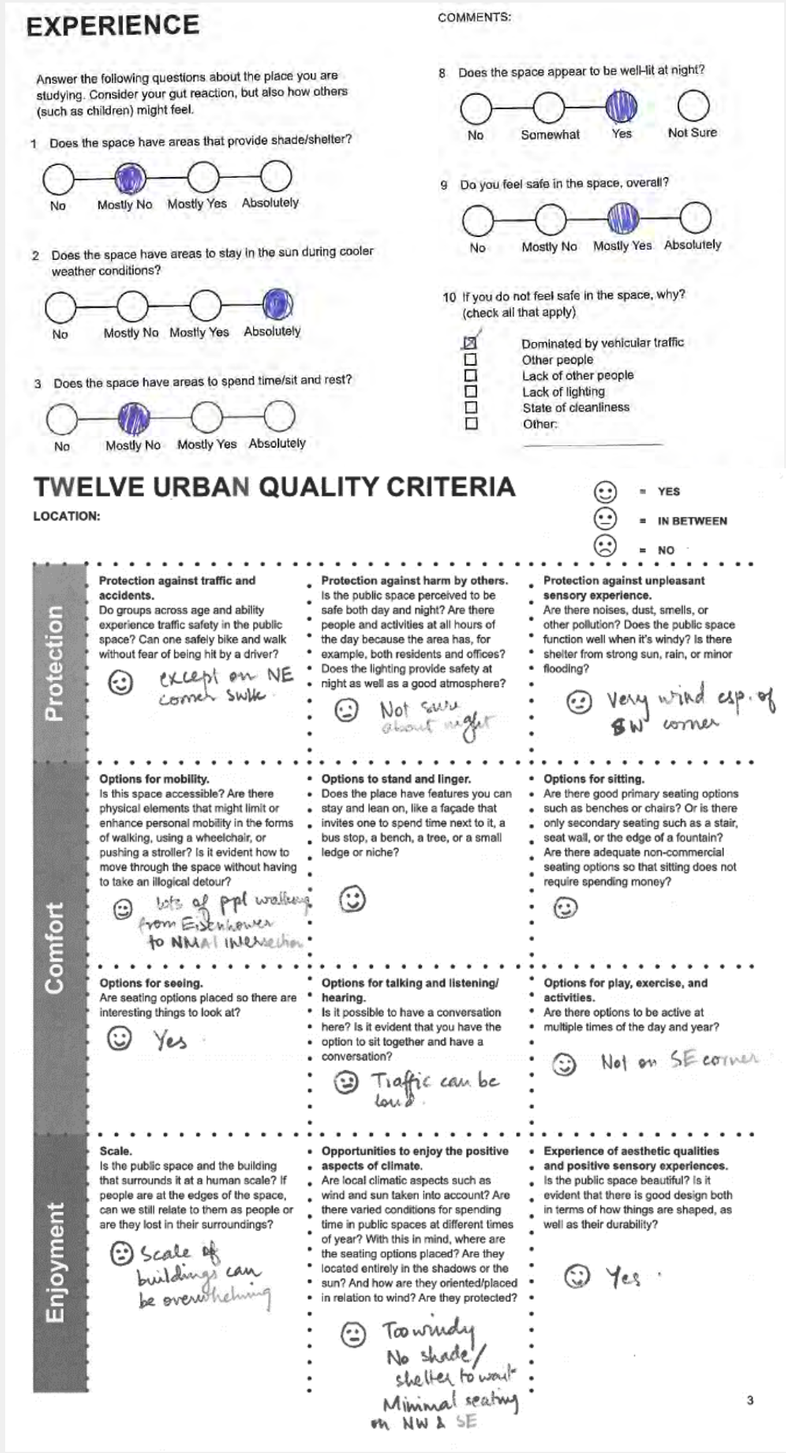
Place Inventory

Twelve Urban Quality Criteria

Initial Assessments

The project team evaluated the focus areas by following the framework below:

- Place Inventory Checklist
  - **Inventories characteristics of the physical environment**, noting amenities and their support for public realm experiences.
  - Experience questionnaire – documents **qualitative** aspects of how a space feels, looks, and is experienced by users. These questionnaires were filled by the project team.
- Twelve Urban Quality Criteria
  - Structured around **protection, comfort, and enjoyment** to understand user experiences in public spaces



EXPERIENCE

Answer the following questions about the place you are studying. Consider your gut reaction, but also how others (such as children) might feel.

1 Does the space have areas that provide shade/shelter?
No · Mostly No · Mostly Yes · Absolutely

2 Does the space have areas to stay in the sun during cooler weather conditions?
No · Mostly No · Mostly Yes · Absolutely

3 Does the space have areas to spend time/sit and rest?
No · Mostly No · Mostly Yes · Absolutely

COMMENTS:

8 Does the space appear to be well-lit at night?
No · Somewhat · Yes · Not Sure

9 Do you feel safe in the space, overall?
No · Mostly No · Mostly Yes · Absolutely

10 If you do not feel safe in the space, why? (check all that apply)
- ☒ Dominated by vehicular traffic
- ☐ Other people
- ☐ Lack of other people
- ☐ Lack of lighting
- ☐ State of cleanliness
- ☐ Other: _____

TWELVE URBAN QUALITY CRITERIA

LOCATION:

☺ = YES · 😐 = IN BETWEEN · ☹ = NO

Protection

Protection against traffic and accidents. Do groups across age and ability experience traffic safety in the public space? Can one safely bike and walk without fear of being hit by a driver? ☺ except on NE corner swale

Protection against harm by others. Is the public space perceived to be safe both day and night? Are there people and activities at all hours of the day because the area has, for example, both residents and offices? Does the lighting provide safety at night as well as a good atmosphere? 😐 Not sure about night

Protection against unpleasant sensory experience. Are there noises, dust, smells, or other pollution? Does the public space function well when it's windy? Is there shelter from strong sun, rain, or minor flooding? 😐 Very wind esp. of SW corner

Comfort

Options for mobility. Is this space accessible? Are there physical elements that might limit or enhance personal mobility in the forms of walking, using a wheelchair, or pushing a stroller? Is it evident how to move through the space without having to take an illogical detour? 😐 lots of ppl walking from Eisenhower to NMAI intersection

Options to stand and linger. Does the place have features you can stay and lean on, like a façade that invites one to spend time next to it, a bus stop, a bench, a tree, or a small ledge or niche? ☺

Options for sitting. Are there good primary seating options such as benches or chairs? Or is there only secondary seating such as a stair, seat wall, or the edge of a fountain? Are there adequate non-commercial seating options so that sitting does not require spending money? ☺

Options for seeing. Are seating options placed so there are interesting things to look at? ☺ Yes

Options for talking and listening/ hearing. Is it possible to have a conversation here? Is it evident that you have the option to sit together and have a conversation? 😐 Traffic can be loud

Options for play, exercise, and activities. Are there options to be active at multiple times of the day and year? ☺ Not on SE corner

Enjoyment

Scale. Is the public space and the building that surrounds it at a human scale? If people are at the edges of the space, can we still relate to them as people or are they lost in their surroundings? ☺ Scale of buildings can be overwhelming

Opportunities to enjoy the positive aspects of climate. Are local climatic aspects such as wind and sun taken into account? Are there varied conditions for spending time in public spaces at different times of year? With this in mind, where are the seating options placed? Are they located entirely in the shadows or the sun? And how are they oriented/placed in relation to wind? Are they protected? 😐 Too windy No shade/ shelter to wait Minimal seating on NW & SE

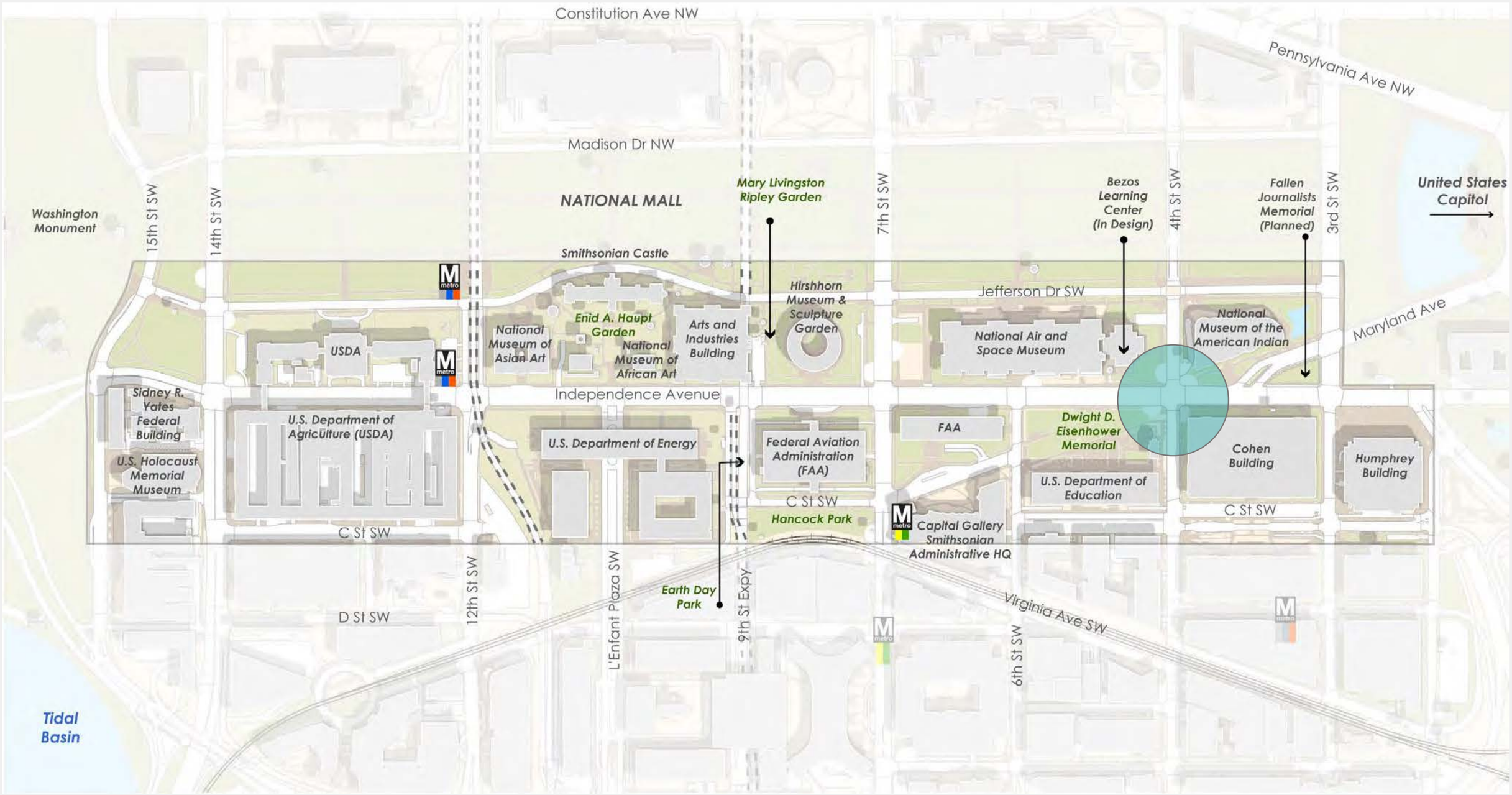
Experience of aesthetic qualities and positive sensory experiences. Is the public space beautiful? Is it evident that there is good design both in terms of how things are shaped, as well as their durability? ☺ Yes

3

Summary of the Twelve Urban Quality Criteria

Protection	**Protection against traffic and crashes** Do groups across age and ability experience traffic safety in the public space? Can one safely bike and walk without fear of being hit by a driver?	**Protection against harm by others** Is the public space perceived to be safe both day and night? Are there people and activities at all hours of the day because the area has, for example, both residents and offices? Does the lighting provide safety at night as well as a good atmosphere?	**Protection against unpleasant sensory experience** Are there noises, dust, smells, or other pollution? Does the public space function well when it's windy? Is there shelter from strong sun, rain, or minor flooding?
Comfort	**Options for mobility** Is this space accessible? Are there physical elements that might limit or enhance personal mobility in the forms of walking, using a wheelchair, or pushing a stroller? Is it evident how to move through the space without having to take an illogical detour?	**Options to stand and linger** Does the place have features you can stay and lean on, like a facade that invites one to spend time next to it, a bus stop, a bench, a tree, or a small ledge or niche?	**Options for sitting** Are there good primary seating options such as benches or chairs? Or is there only secondary seating such as a stair, seat wall, or the edge of a fountain? Are there adequate non-commercial seating options so that sitting does not require spending money?
	Options for seeing Are seating options placed so there are interesting things to look at?	**Options for talking and listening/hearing** Is it possible to have a conversation here? Is it evident that you have the option to sit together and have a conversation?	**Options for play, exercise, and activities** Are there options to be active at multiple times of the day and year?
Enjoyment	**Scale** Is the public space and the building that surrounds it at a human scale? If people are at the edges of the space, can we still relate to them as people or are they lost in their surroundings?	**Opportunities to enjoy the positive aspects of climate** Are local climate aspects such as wind and sun taken into account? Are there varied conditions for spending time in public spaces at different times of year? With this in mind, where are the seating options placed? Are they located entirely in the shadows or the sun? And how are they oriented/placed in relation to wind? Are they protected?	**Experience of aesthetic qualities and positive sensory experiences** Is the public space beautiful? Is it evident that there is good design both in terms of how things are shaped, as well as their durability?

4th Street & Independence Avenue



4th Street & Independence Avenue

Protection	Protection against traffic and accidents • 4th Street is relatively narrow, facilitating shorter pedestrian crossings • Parked vehicles often block sightlines for crossing pedestrians	Protection against harm by others • The reduced number of visitors at night when the museums are closed impacts the perception of safety	Protection against unpleasant sensory experience • Traffic noise, local pollution, and food truck music can contribute to discomfort • Shade-giving trees are present on two of the intersection corners
Comfort	Options for mobility • 4th Street provides an important north-south bicycle connection • Wide sidewalks and crosswalks allow most groups to walk abreast	Options to stand and linger • The Eisenhower Memorial and the National Museum of the American Indian provide open areas to stand and gather	Options for sitting • The Eisenhower Memorial provides many benches in partial shade
	Options for seeing • This area provides views of the Eisenhower Memorial, National Museum of the American Indian, National Air and Space Museum, and the National Mall	Options for talking and listening/hearing • Small areas, removed from the traffic noise, foster an environment conducive to conversation	Options for play, exercise, and activities • There is ample space at the Eisenhower Memorial for activities
Enjoyment	Scale • The architectural scale of the facades, along with the imposing Eisenhower Memorial structure, can make visitors feel diminished. It also significantly influences the street character in this segment	Opportunities to enjoy the positive aspects of climate • Gathering areas are not generally shaded or protected from the wind or traffic noise	Experience of aesthetic qualities and positive sensory experiences • This intersection provides memorable views, serving as a gateway to the National Mall from the south

Good *Fair* *Poor*

4th Street & Independence Avenue

Benefits

Mobility & Comfort

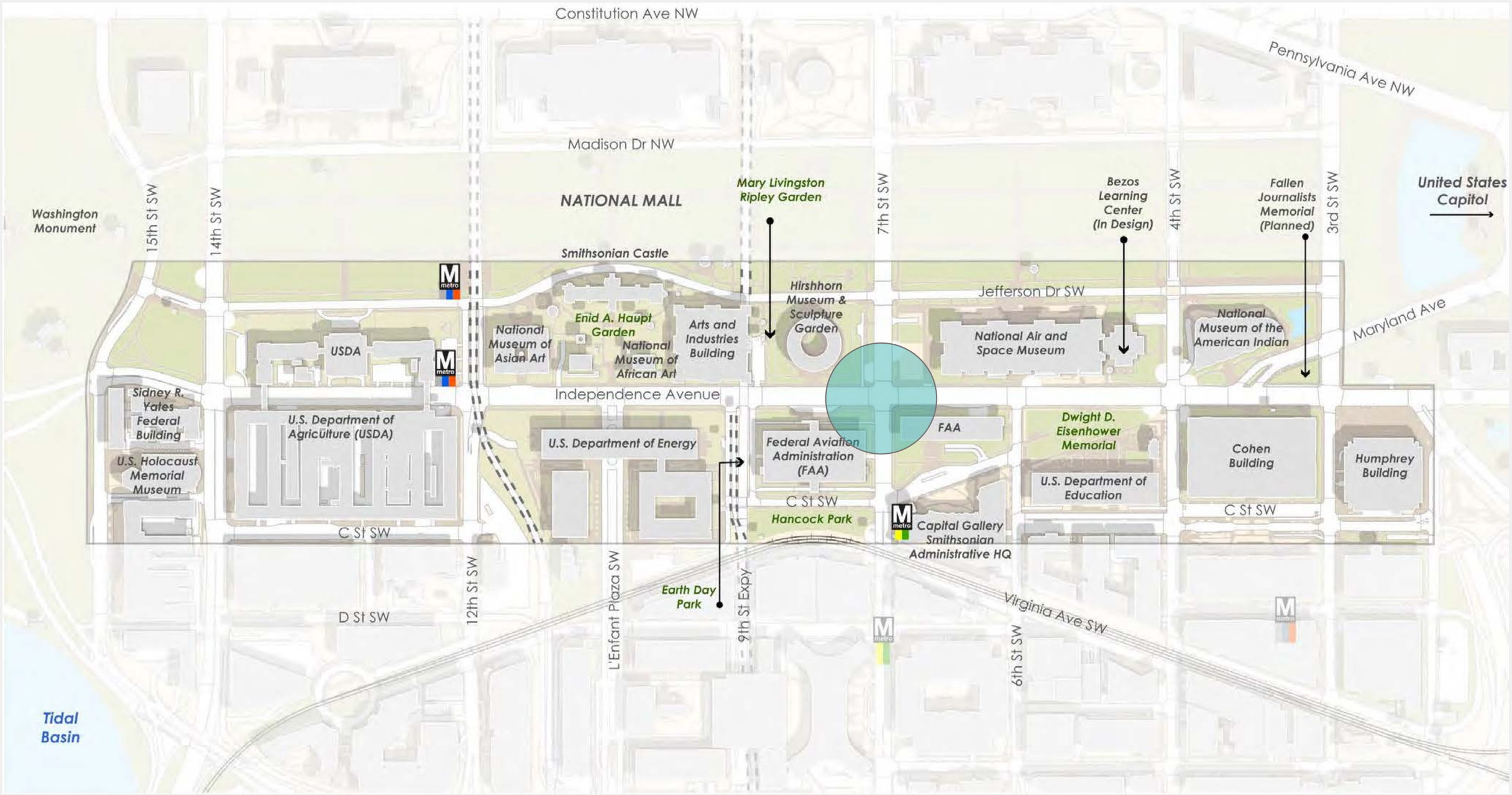
- 4th Street offers a key bicycle connection with wide sidewalks and crosswalks
- Open areas provide space for standing, gathering, and sitting with benches
- Intersection offers memorable views and a gateway to the National Mall

Constraints

Safety & Sensory Concerns

- Parked vehicles block sightlines, and fewer visitors affect night safety
- Traffic noise, pollution, and food truck music cause sensory discomfort
- Intimidating facades and Eisenhower Memorial can make visitors feel uncomfortable

7th Street & Independence Avenue



7th Street & Independence Avenue

Protection	Protection against traffic and accidents • Parked vehicles often block sightlines for crossing pedestrians • This intersection of wide roads can contribute to high vehicle turning speeds	Protection against harm by others • The reduced number of visitors at night when the museums are closed impacts the perception of safety	Protection against unpleasant sensory experience • Traffic noise, local pollution, and food truck music can contribute to discomfort • No shade is provided
Comfort	Options for mobility • There is plenty of space to maneuver on the wide sidewalks • Cyclists and scooter riders lack dedicated space	Options to stand and linger • The fountain feature at this intersection invites visitors to stop for pictures, allows children to touch the water, or check directions	Options for sitting • No options for sitting are provided
	Options for seeing • The space provides ample views of the National Mall, Hirshhorn Museum, and the National Air and Space Museum	Options for talking and listening/hearing • Traffic noise and food truck music can make conversation difficult and uncomfortable	Options for play, exercise, and activities • The area does not provide space for activities
Enjoyment	Scale • The tall featureless buildings on the south side of the area can make visitors feel diminished or disoriented	Opportunities to enjoy the positive aspects of climate • Visitors of this space are provided no shelter from the elements	Experience of aesthetic qualities and positive sensory experiences • The space provides good views of surrounding amenities, but can cause visitors to feel exposed

Good *Fair* *Poor*

7th Street & Independence Avenue

Benefits

Maneuverability & Views

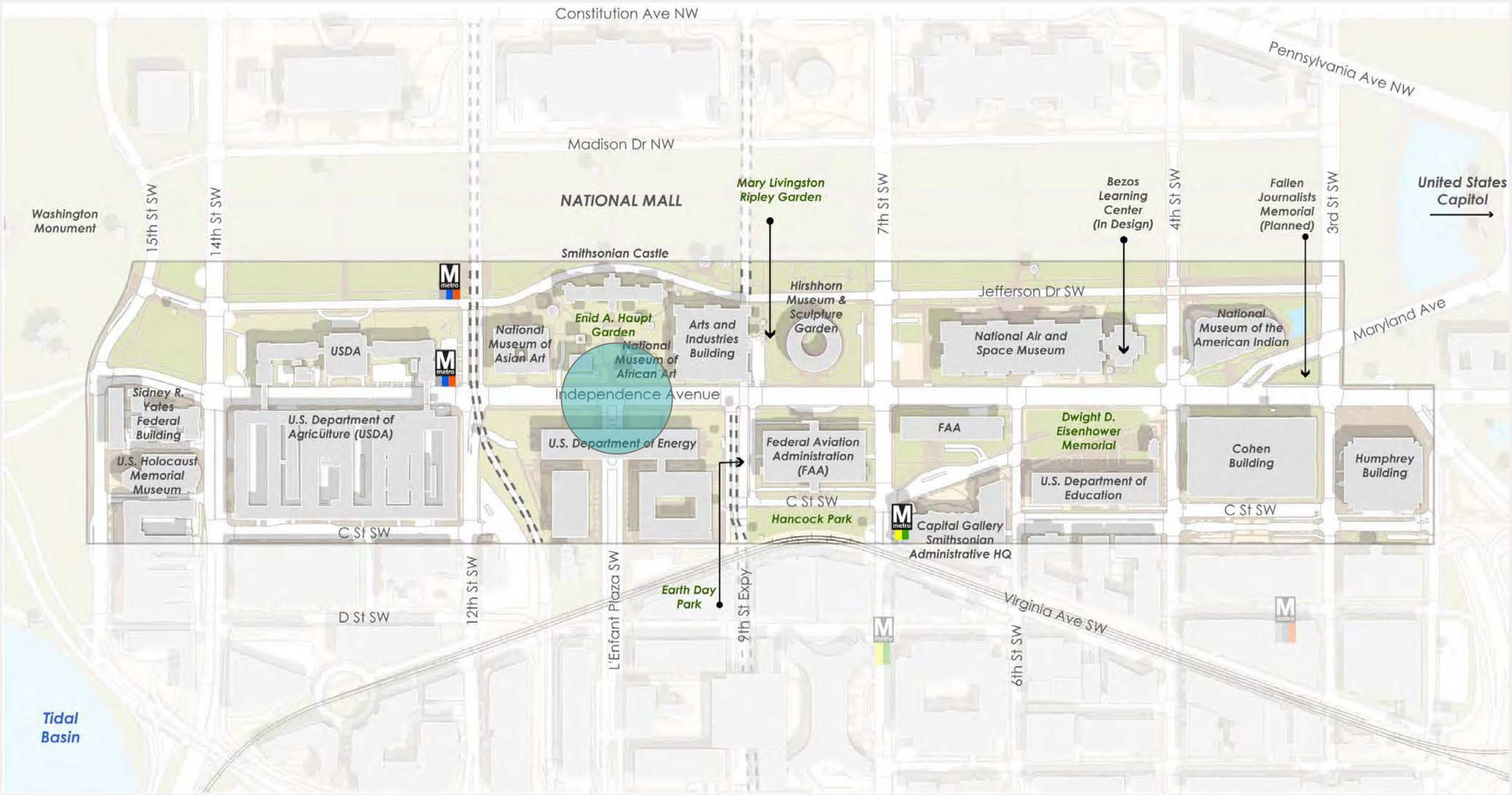
- The fountain provides a well-defined place to linger, check directions, or take a picture
- Wide sidewalks provide ample space for maneuvering safely and comfortably
- The area offers good views of surrounding amenities and attractions

Constraints

Safety & Seating Concerns

- Excess space for cars causes traffic noise, pollution, and crash risks
- Fewer visitors at night decrease the perceived safety of the area
- No seating options are available for visitors to rest or relax

10th Street & Independence Avenue



10th Street & Independence Avenue

Protection	Protection against traffic and accidents • Crossing pedestrians face long crossing distances • Cars occasionally block crosswalk • Cyclists and scooter riders have no dedicated, protected space to ride	Protection against harm by others • The reduced number of visitors at night when museums and garden gates are closed impacts perceived safety	Protection against unpleasant sensory experience • Traffic noise, local pollution, and food truck music can contribute to discomfort • Partial shade provided by street trees; no rain shelter is available
Comfort	Options for mobility • Wide sidewalks allow most groups to walk abreast • Scooters and bicycles observed mixing with pedestrians on the sidewalk	Options to stand and linger • The Haupt Garden gates represent a well-defined place to stop and linger or check directions	Options for sitting • The four benches in this area were usually occupied but never full • There are no other seating options along Independence Avenue
	Options for seeing • Many visitors stopped for photos in front of the picturesque Haupt Garden gates • L'Enfant Plaza rovides good sight lines	Options for talking and listening/hearing • Traffic noise and food truck music can make conversation difficult and uncomfortable	Options for play, exercise, and activities • Grassy areas under the trees are sloped enough to discourage use for any activity
Enjoyment	Scale • Garden walls/gates and the Smithsonian Castle are not tall enough to make visitors feel disoriented	Opportunities to enjoy the positive aspects of climate • The benches provided are partially shaded but lack other shelter from the elements	Experience of aesthetic qualities and positive sensory experiences • There are beautiful attractions nearby, but amenities are missing on Independence Avenue

Good *Fair* *Poor*

10th Street & Independence Avenue

Benefits

Defined Space & Views

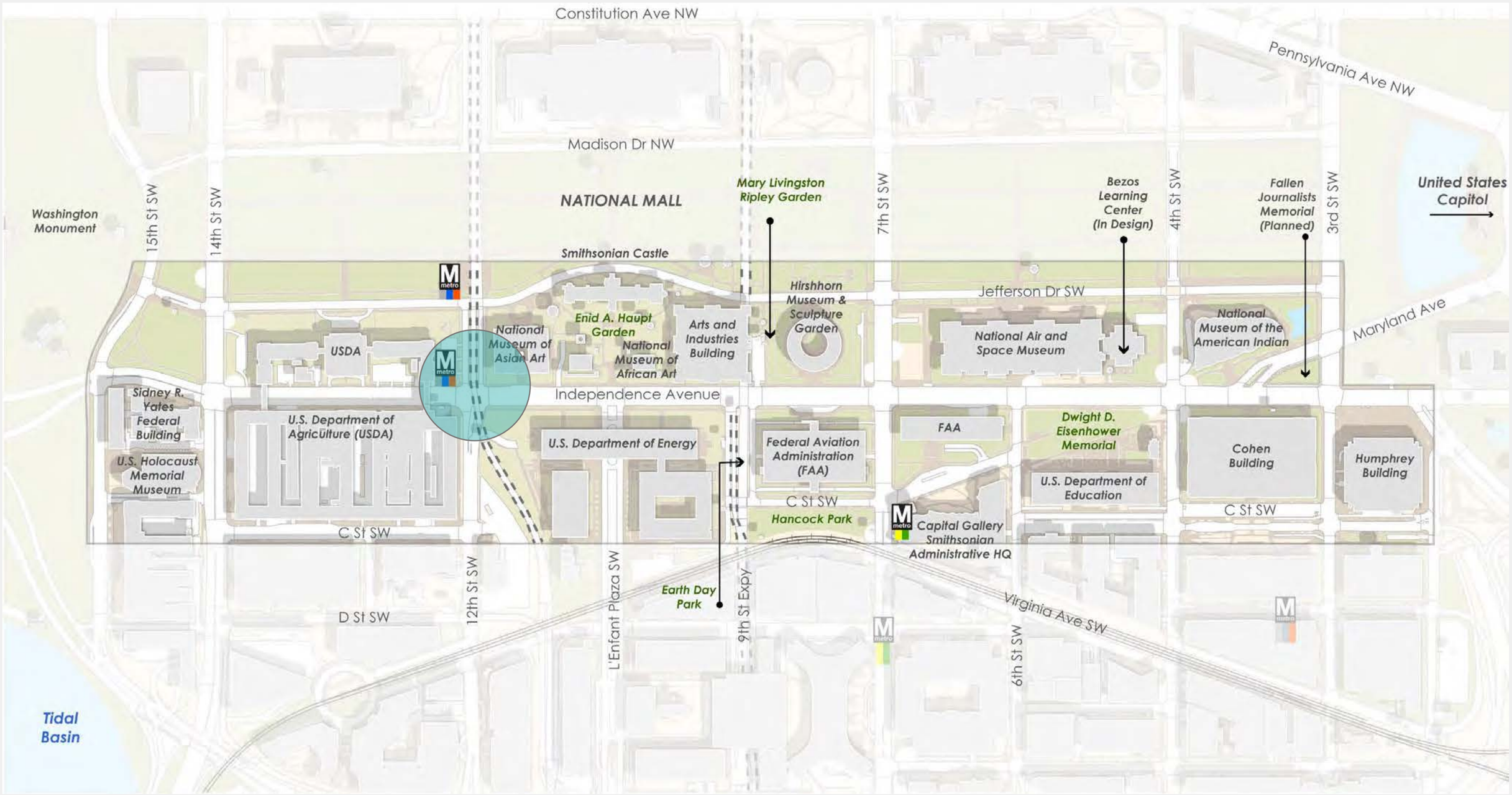
- The Haupt Garden gates provide a defined place to stop and check directions
- Visitors take photos at Haupt Garden gates; L'Enfant Plaza offers good sight lines
- Wide sidewalks provide sufficient space for groups of most sizes

Constraints

Crossing Issues & Sensory Discomfort

- Pedestrians face long crossing distances; no dedicated space for cyclists and scooters
- Traffic noise, pollution, and food truck music
- The space lacks shelter from the elements

12th Street & Independence Avenue



12th Street & Independence Avenue

Protection	Protection against traffic and accidents • This intersection of wide roads can contribute to high vehicle turning speeds • Many visitors cross Independence Avenue to reach the National Mall from the Metro station • Cyclists and scooter riders have no dedicated, protected space to ride	Protection against harm by others • The reduced number of visitors at night when museums are closed impacts perceived safety • Street lighting may not sufficiently illuminate this large intersection	Protection against unpleasant sensory experience • Traffic noise, local pollution, and food truck music can contribute to discomfort • Limited shade is provided
Comfort	Options for mobility • Wide sidewalks and crosswalks allow most groups to walk abreast • This intersection lacks a crosswalk on the eastern leg • After rain events, several pedestrian ramps flood, impeding use	Options to stand and linger • The landing at the end of the Metro station escalators provides space for visitors to stop and linger or check directions, although it is often crowded • There is insufficient wayfinding signs and visitors were often seen asking for directions here	Options for sitting • The steps at the entrance of the Department of Agriculture near the Metro station entrance provide seating
	Options for seeing • Other than the Knapp Memorial Arch, the views from this area lack notable sights or amenities	Options for talking and listening/hearing • Traffic noise and food truck music can make conversation difficult and uncomfortable	Options for play, exercise, and activities • Other than a small pocket of lawn on the southeast corner, this area does not provide space for activities
Enjoyment	Scale • This area contains smaller pedestrian-scaled elements and large ornate 5-storey buildings, but lacks any medium-sized elements in between	Opportunities to enjoy the positive aspects of climate • Visitors are provided very limited shelter from the elements	Experience of aesthetic qualities and positive sensory experiences • The space is primarily characterized by large granite building facades and fast-moving traffic

Good *Fair* *Poor*

12th Street & Independence Avenue

Benefits

Rest Stops

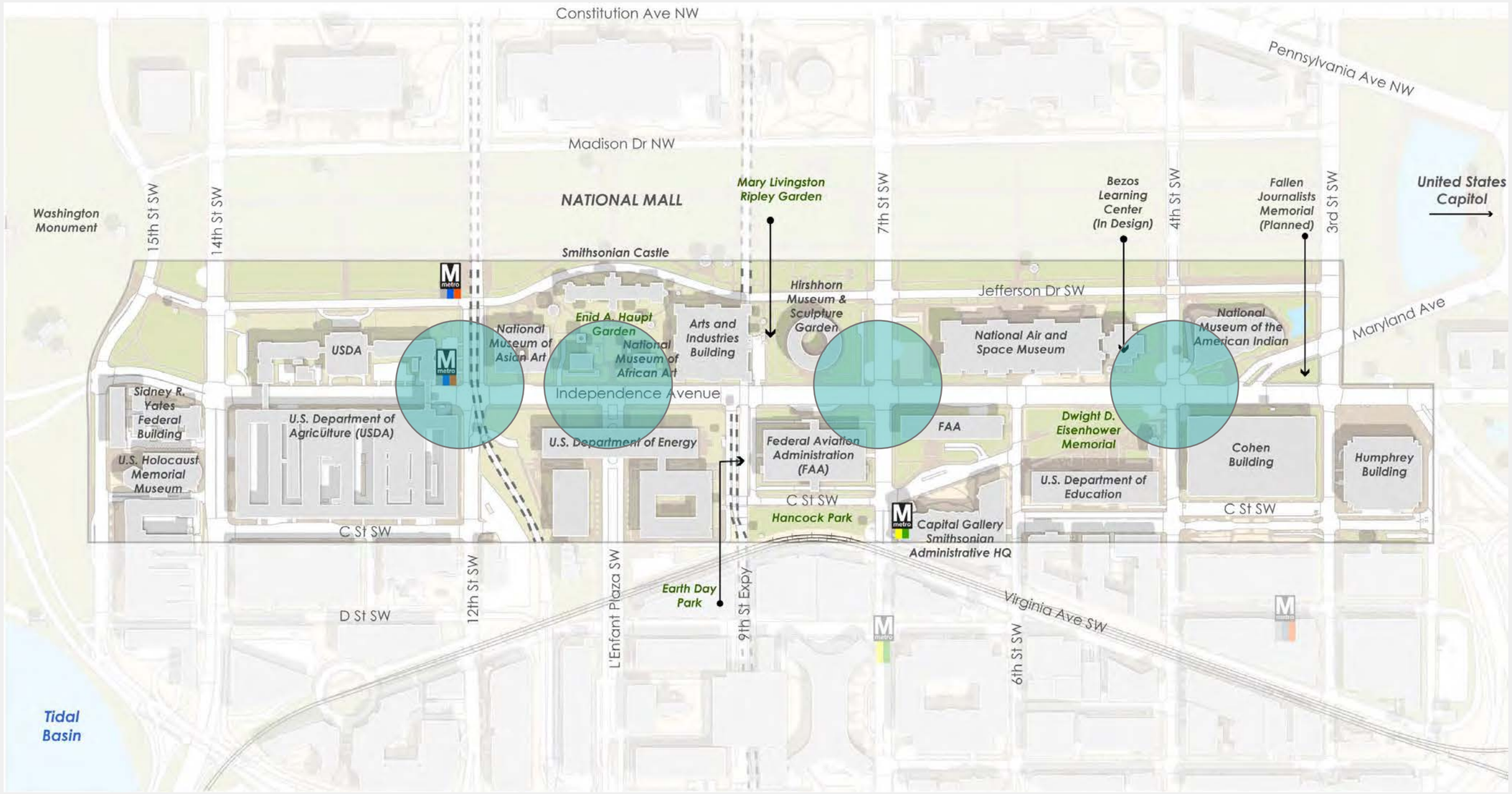
- Metro station landing offers space to stop and check directions
- Steps at Department of Agriculture provide some of the only seating

Constraints

Safety & Sensory Discomfort

- Excessive space dedicated to automobiles leads to traffic noise, pollution, and crash risk
- This intersection is missing a key crosswalk, along with any bicycle facility
- This area offers limited seating and shelter from the elements

Independence Avenue (Entire Corridor)



Independence Avenue (Entire Corridor)

Protection	Protection against traffic and accidents Do groups across age and ability experience traffic safety in the public space? Can one safely bike and walk without fear of being hit by a driver?	Protection against harm by others Is the public space perceived to be safe both day and night? Are there people and activities at all hours of the day because the area has, for example, both residents and offices? Does the lighting provide safety at night as well as a good atmosphere?	Protection against unpleasant sensory experience Are there noises, dust, smells, or other pollution? Does the public space function well when it's windy? Is there shelter from strong sun, rain, or minor flooding?
Comfort	Options for mobility Is this space accessible? Are there physical elements that might limit or enhance personal mobility in the forms of walking, using a wheelchair, or pushing a stroller? Is it evident how to move through the space without having to take an illogical detour?	Options to stand and linger Does the place have features you can stay and lean on, like a facade that invites one to spend time next to it, a bus stop, a bench, a tree, or a small ledge or niche?	Options for sitting Are there good primary seating options such as benches or chairs? Or is there only secondary seating such as a stair, seat wall, or the edge of a fountain? Are there adequate non-commercial seating options so that sitting does not require spending money?
	Options for seeing Are seating options placed so there are interesting things to look at?	Options for talking and listening/hearing Is it possible to have a conversation here? Is it evident that you have the option to sit together and have a conversation?	Options for play, exercise, and activities Are there options to be active at multiple times of the day and year?
Enjoyment	Scale Is the public space and the building that surrounds it at a human scale? If people are at the edges of the space, can we still relate to them as people or are they lost in their surroundings?	Opportunities to enjoy the positive aspects of climate Are local climate aspects such as wind and sun taken into account? Are there varied conditions for spending time in public spaces at different times of year? With this in mind, where are the seating options placed? Are they located entirely in the shadows or the sun? And how are they oriented/placed in relation to wind? Are they protected?	Experience of aesthetic qualities and positive sensory experiences Is the public space beautiful? Is it evident that there is good design both in terms of how things are shaped, as well as their durability?

Good *Fair* *Poor*

Twelve Urban Quality Criteria Summary

Location	Benefit/ Constraint	Description	Corridor Wide Observations
4th Street	Benefit	4th Street is narrow and serves as an important north-south bicycle connection	
	Benefit	The area offers good views of surrounding amenities	
	Constraint	This area lacks pedestrian-scaled elements, which may disorient visitors	
	Constraint	Excessive space for automobile movement in this area leads to traffic noise, pollution, and increased crash risk	x
7th Street	Benefit	The fountain provides a well-defined place to linger, check directions, take pictures, etc.	
	Benefit	The area offers good views of surrounding amenities	
	Constraint	Excessive space for automobile movement in this area leads to traffic noise, pollution, and increased crash risk	x
	Constraint	No seating or shelter from the elements are provided in this area	x

Twelve Urban Quality Criteria Summary Cont.

Location	Benefit/ Constraint	Description	Corridor Wide Observations
10th Street	Benefit	The Haupt Garden gates provide a well-defined place to linger, check directions, take pictures, etc.	x
	Benefit	The crosswalk provides a direct connection to L'Enfant Plaza	
	Benefit	Wide sidewalks provide enough space for groups of most sizes	x
	Constraint	Proximity to traffic on Independence Avenue diminishes the visitor experience	x
	Constraint	Cyclists and scooter riders lack dedicated space	x
	Constraint	The space lacks shelter from the elements	
12th Street	Benefit	The Metro station entrance provides visitors access to the National Mall across Independence Avenue	x
	Constraint	Excessive space for automobile movement in this area leads to traffic noise, pollution, and increased crash risk	x
	Constraint	No seating or shelter from the elements are provided in this area	x
	Constraint	This intersection lacks a key crosswalk and any bicycle facilities	

Independence Avenue (Entire Corridor)

The corridor's top benefits include well-defined areas for lingering, good visual access to significant landmarks, and fair mobility options. However, it faces significant challenges with sensory discomfort, difficulties in holding conversations due to noise, and safety concerns related to traffic.

Benefits

Options to Stand and Linger (Good)

- The corridor provides ample opportunities for visitors to stop, linger, and check directions. Areas like the Eisenhower Memorial and the Haupt Garden gates offer well-defined places to gather and rest.

Options for Seeing (Fair to Good)

- Many areas in the corridor provide good views of significant landmarks and attractions, such as the National Mall, the National Air and Space Museum, and the Eisenhower Memorial. These views enhance the aesthetic and scenic value of the corridor.

Options for Mobility (Fair)

- The corridor offers wide sidewalks and crosswalks that accommodate groups walking abreast and provide important connections for cyclists and pedestrians. However, some intersections lack crosswalks, and flooding can impede mobility.

Constraints

Protection against Unpleasant Sensory Experience (Poor)

- The corridor struggles with traffic noise, pollution, and limited shade, which contribute to discomfort and a poor sensory experience for visitors.

Options for Talking and Listening/Hearing (Poor)

- Traffic noise and food truck music in the corridor can make conversations difficult and uncomfortable, hindering social interactions.

Protection against Traffic and Accidents (Poor)

- Wide roads and high vehicle turning speeds at intersections pose safety risks for pedestrians and cyclists. Many areas lack dedicated, protected spaces for cyclists and scooter riders.

Counting

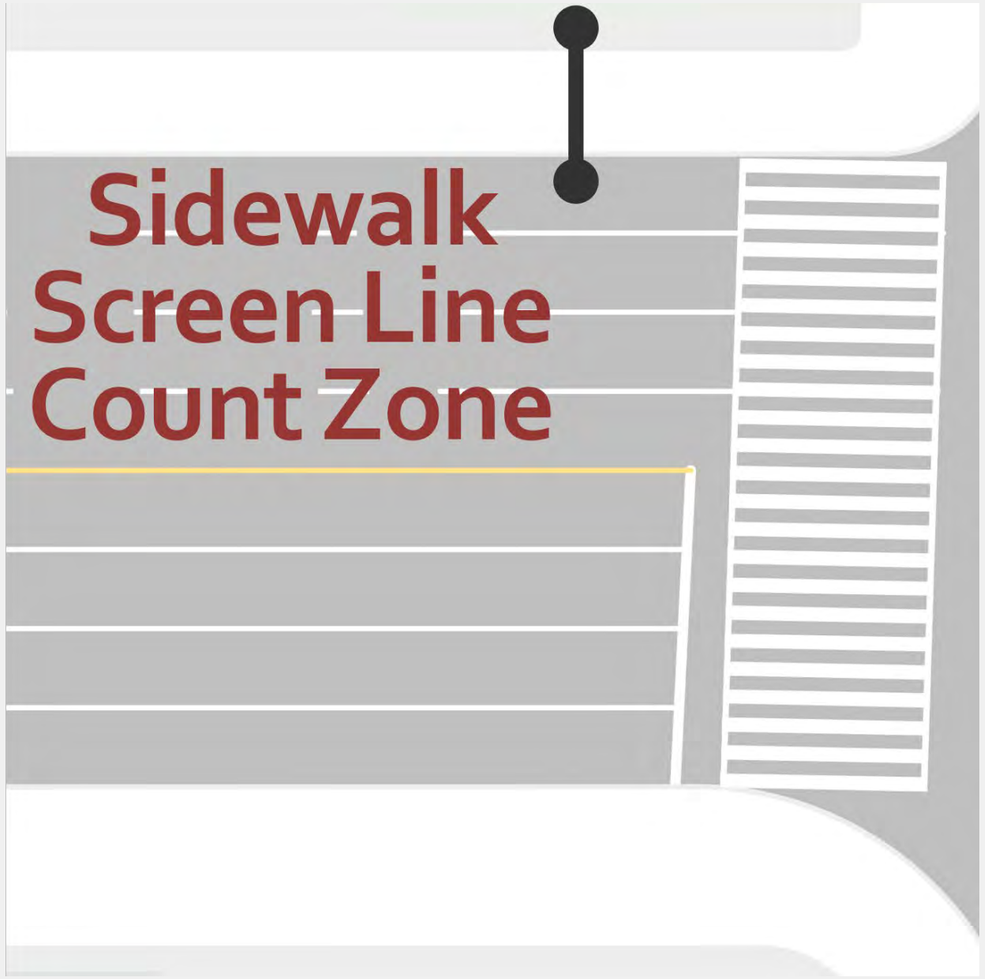
The project team observed people in motion for 10-minute periods during both weekday and weekend timeframes. Each 10-minute period focused on a different observation, including:

Mode (walking, running, biking, etc.)

(10-minute timeframe)

Perceived age and gender of people in motion

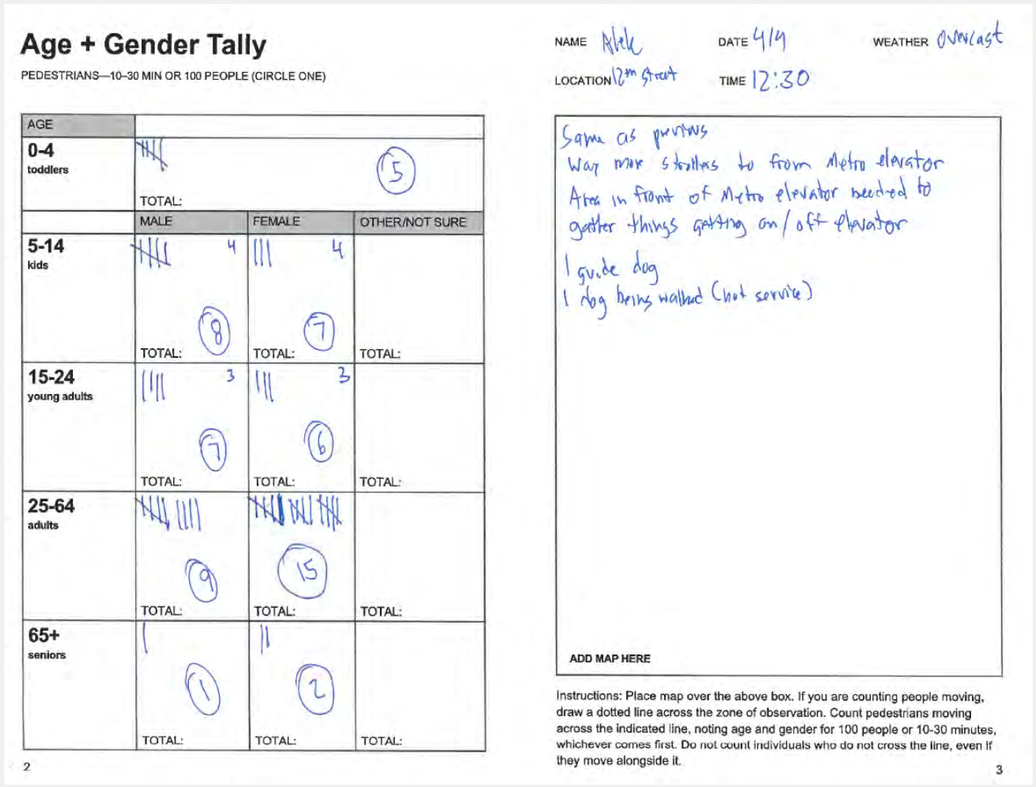
(10-30 minute timeframe)



Types of Users Observed

- School/tour groups with young adults
- Families
- Bike tours
- Wedding and event photo shoots at the castle
- Dog Walking





Age + Gender Tally

PEDESTRIANS—10–30 MIN OR 100 PEOPLE (CIRCLE ONE)

NAME Alek DATE 4/4 WEATHER Overcast

LOCATION 12th Street TIME 12:30

AGE			
0-4 toddlers	TOTAL: 5		
	MALE	FEMALE	OTHER/NOT SURE
5-14 kids	4 TOTAL: 8	4 TOTAL: 7	TOTAL:
15-24 young adults	3 TOTAL: 7	3 TOTAL: 6	TOTAL:
25-64 adults	TOTAL: 9	TOTAL: 15	TOTAL:
65+ seniors	1 TOTAL: 1	1 TOTAL: 2	TOTAL:

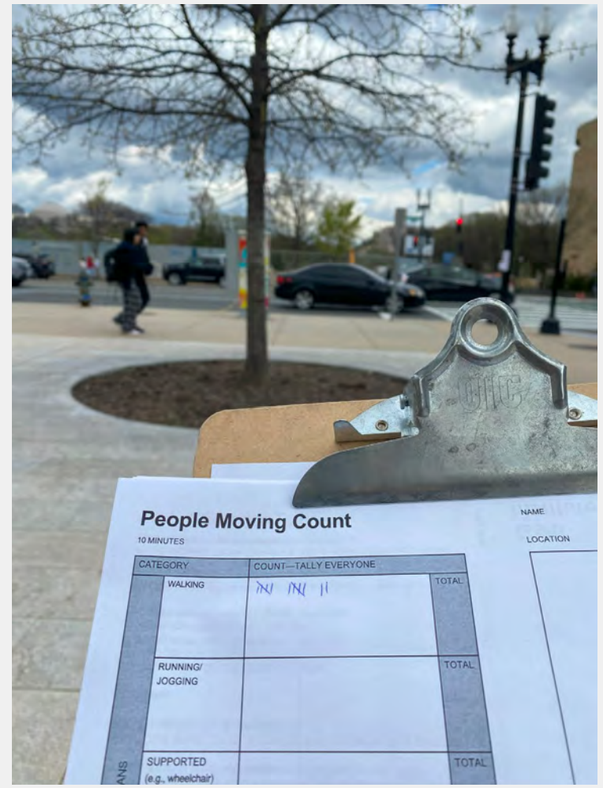
Same as previous
Way more strollers to from Metro elevator
Area in front of Metro elevator needed to gather things getting on/off elevator
1 guide dog
1 dog being walked (not service)

ADD MAP HERE

Instructions: Place map over the above box. If you are counting people moving, draw a dotted line across the zone of observation. Count pedestrians moving across the indicated line, noting age and gender for 100 people or 10-30 minutes, whichever comes first. Do not count individuals who do not cross the line, even if they move alongside it.

2

3

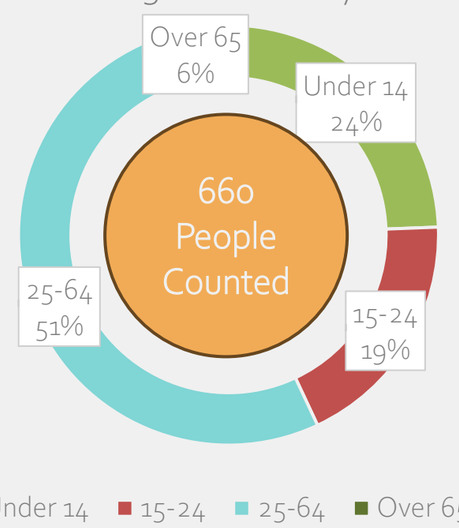


People Moving

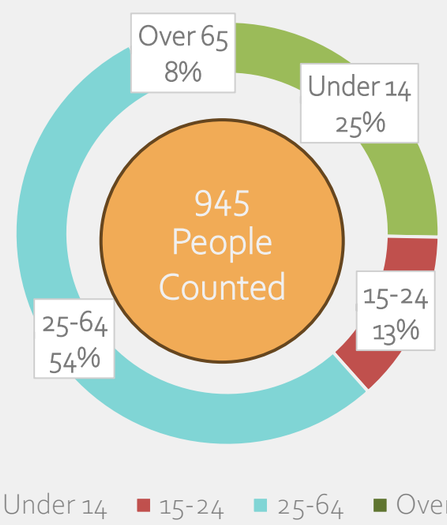
Total People Counted
1,605

WEEKDAY		WEEKENDS	
24%	Under 14	25%	Under 14
51%	Between 25 - 64 years	54%	Between 25 - 64 years

Perceived Age Group Visiting on Weekdays



Perceived Age Group Visiting on Weekends



Note: Total people counted reflects number of users on both the weekday and the weekend for Perceived Age Tally





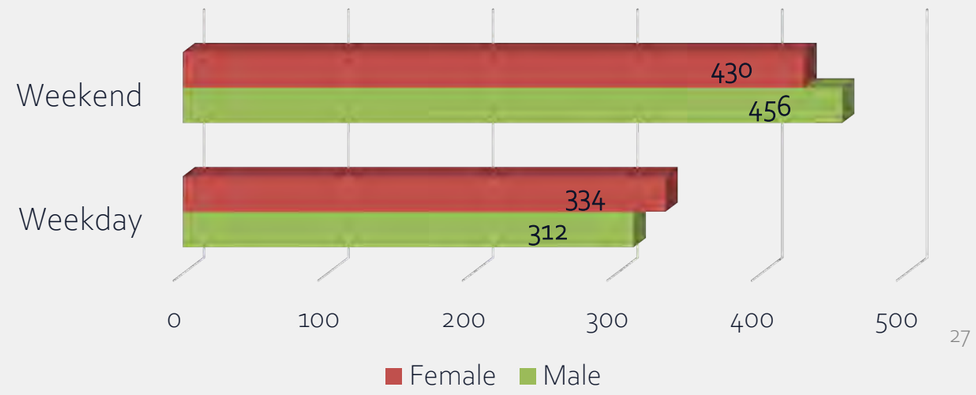




Total People Counted 1,532

Note: Total people counted reflects number of users on both the weekday and the weekend for Perceived Gender Tally

Perceived Gender



People Moving by Activity

- On average 88% of users walk on Independence Avenue
- 4% of users bike on Independence Avenue
- 3% of young visitors are pushed in strollers or carried
- 2% were observed exercising (e.g., jogging and running)
- >2% used scooters or skateboards mainly on sidewalks with some riding confidently in mixed traffic

Total People Counted

1,653

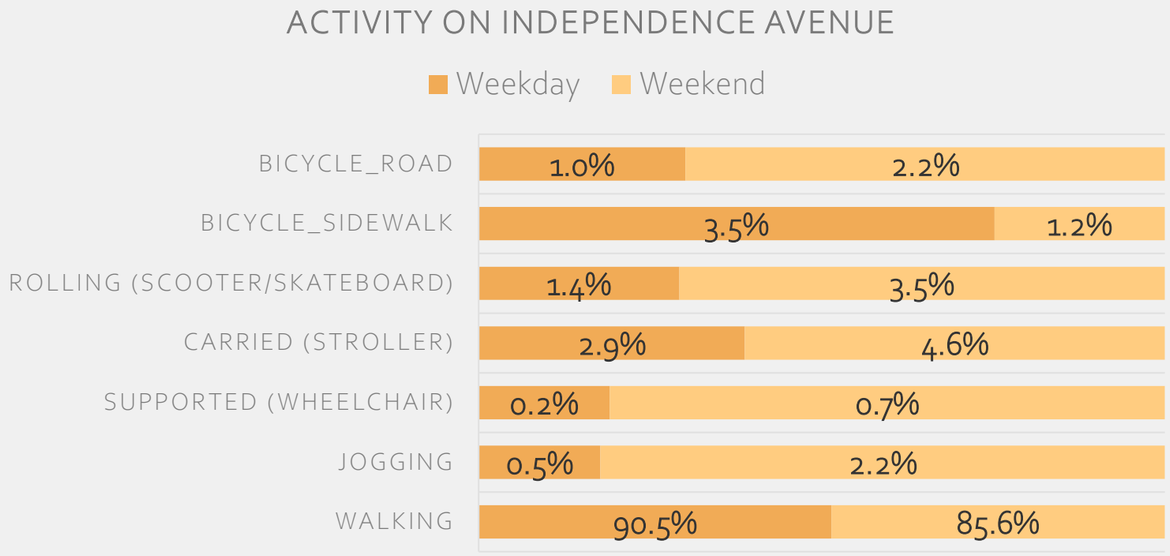
Note: Total people counted reflects number of users on both the weekday, and the weekend for People Moving Tally











People Moving by Time of Day

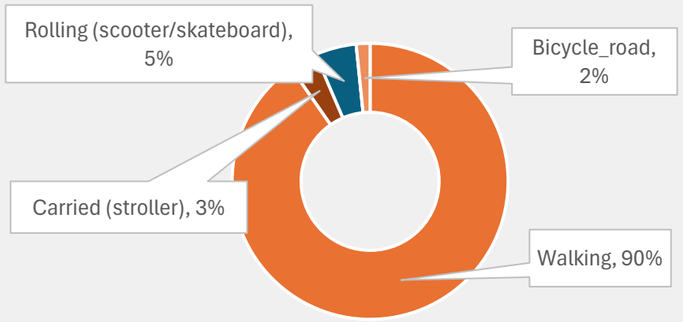
- Significant increase in walking, strollers, and scooters/skateboards on weekends
- Over 150% more people walking on weekends than weekdays
- Strollers increased by 5 times on Saturday compared to Thursday



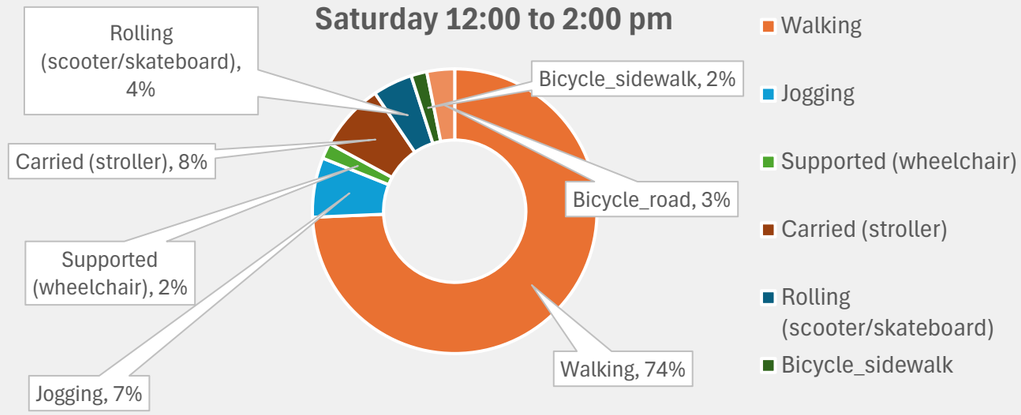




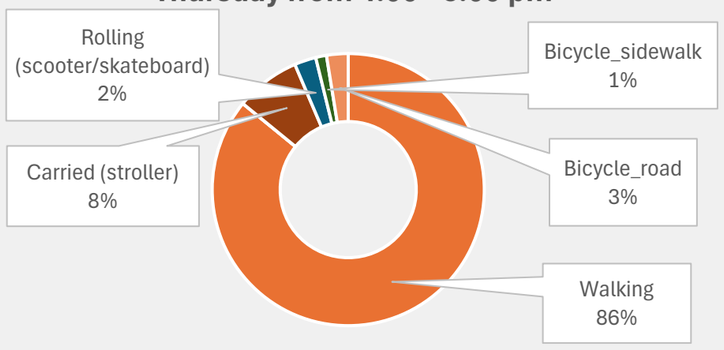
Thursday from 12:00 to 2:00 pm



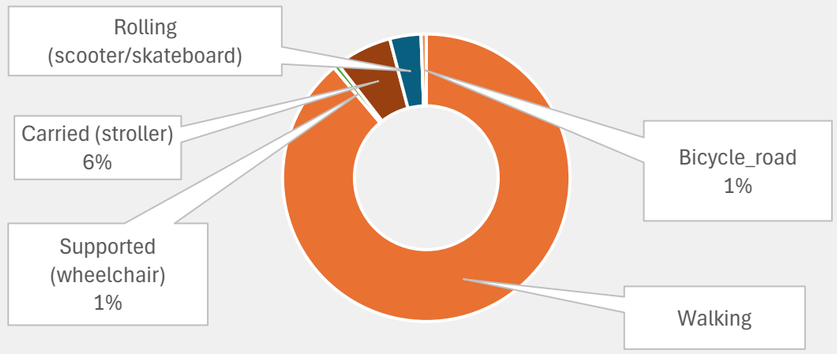
Saturday 12:00 to 2:00 pm



Thursday from 4:00 - 6:00 pm



Saturday from 2:30 to 4:00 pm

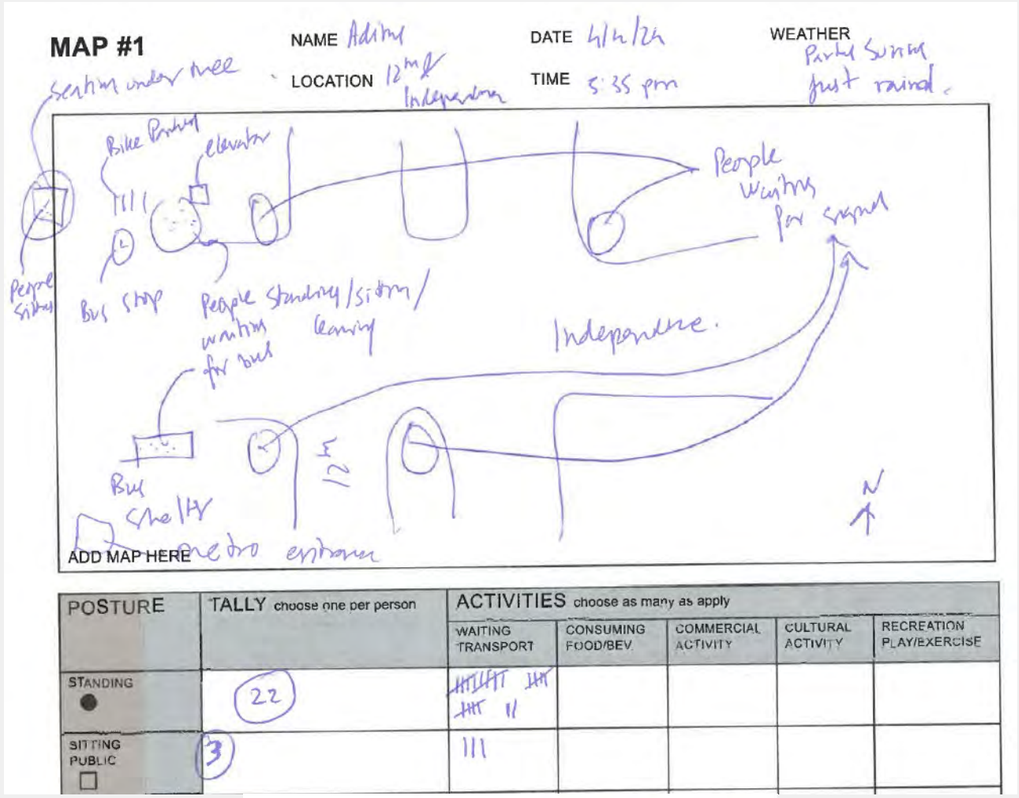


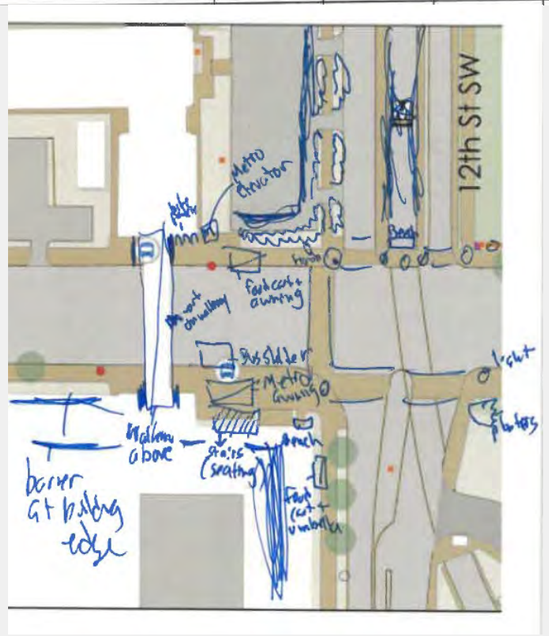
Mapping

Standing, sitting, other movement

Mapping

- Stationary activity mapping
- Key Observations:
  - Many people waiting for transportation (Uber/Lyft, buses, tour buses)
  - People standing for food trucks
  - People standing reading maps
  - Few people sitting due to a lack of seating options
    - Noted people sitting on grass, curbs, etc.



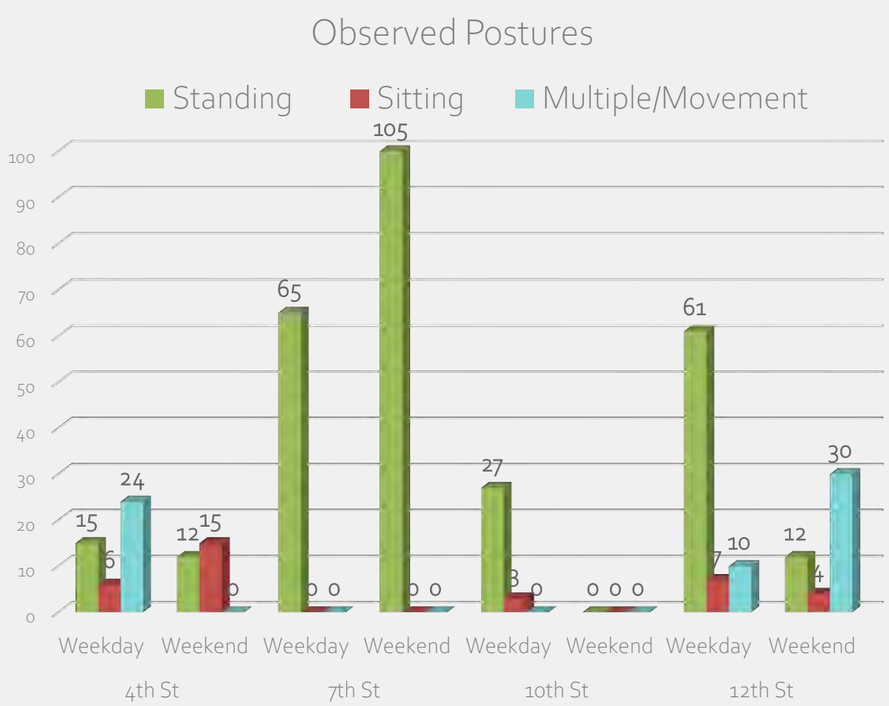


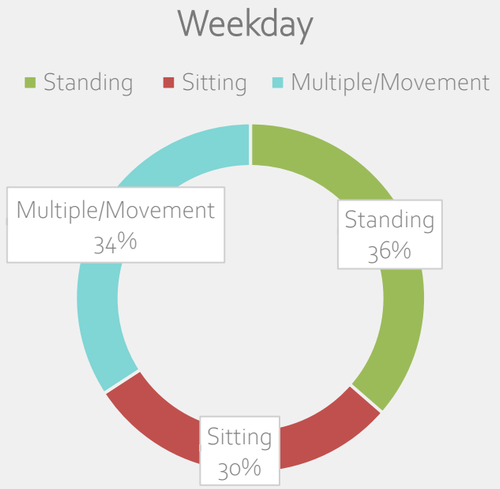
Stationary Activity Mapping

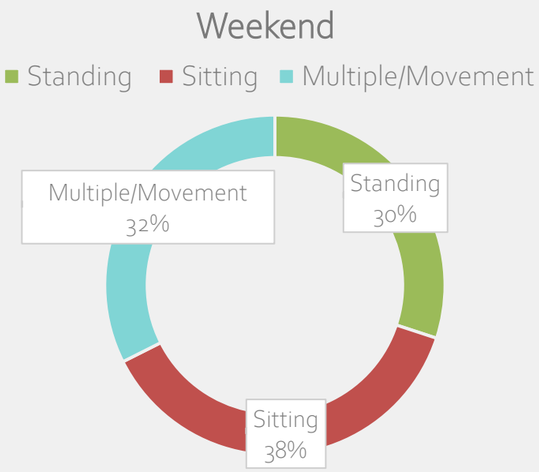
- On weekdays:
  - 7th, 10th, and 12th Streets were busier than 4th Street
  - The 4th Street intersection saw higher pedestrian movement through the intersection
- On weekends:
  - There was an increase in stationary activities compared to the weekdays, including sitting, waiting for transit, standing and eating, taking photographs, and reading wayfinding signs and maps











Total People Counted

396

**Data was not collected for 10th Street on the weekend*

Stationary Activity Mapping



















Surveys

Surveying

The goal was to get real time feedback on user experiences, level of comfort and safety, as well as collect a wish list of recommendations for Independence Avenue

- After Thursday, April 4th, we made an online survey

- In-field surveys received on Thursday, April 4th:
  - 4th Street: Six surveys
  - 7th Street: Four surveys
  - 10th Street: 12 surveys
  - 12th Street: One survey

- No surveys on Saturday, April 6; relied on online survey

Despite our efforts to engage with the public when we were out in the field, the number of participants was lower than anticipated. As a result, the limited responses may not fully represent all users along the corridor.



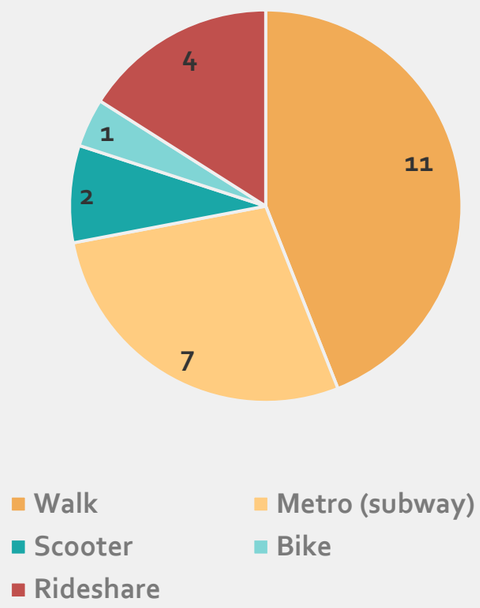
Survey Summary

- Most respondents walked to Independence Avenue
- The top five modes of transportation to the study area were walking, DC metro, rideshare, scooters, and bikes.
- 57% (12 respondents) were visiting from outside the region
- 1.4% used scooters and skateboards, mainly on sidewalks, with some riding in mixed traffic

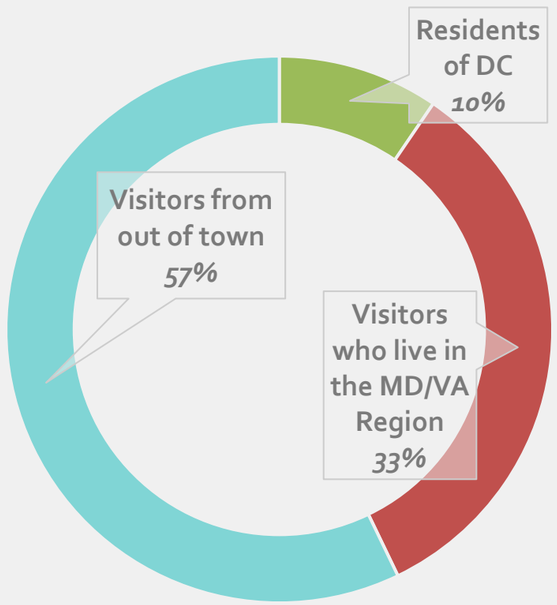
Total People Surveyed

23

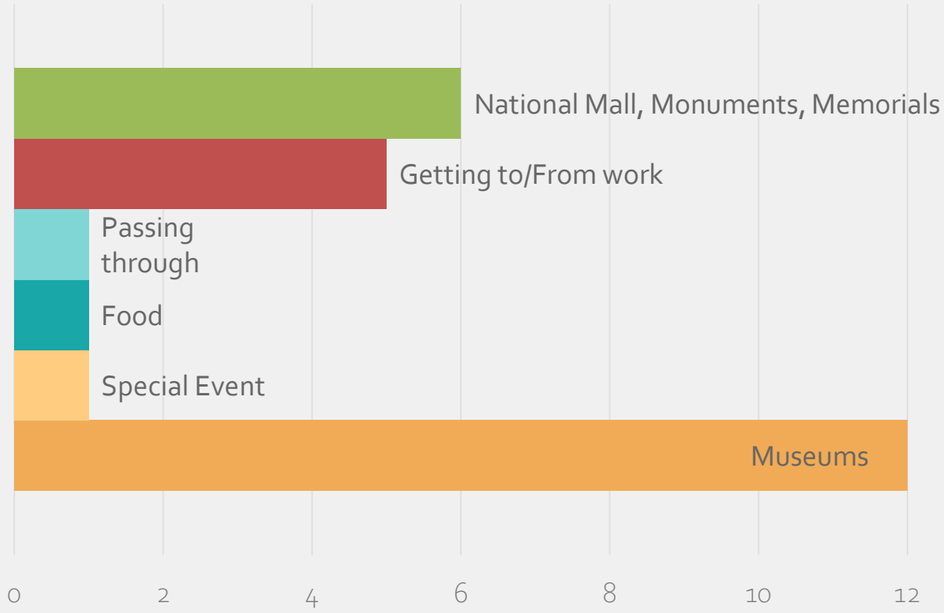
Mode of Travel to Independence Avenue



Relationship to the Corridor

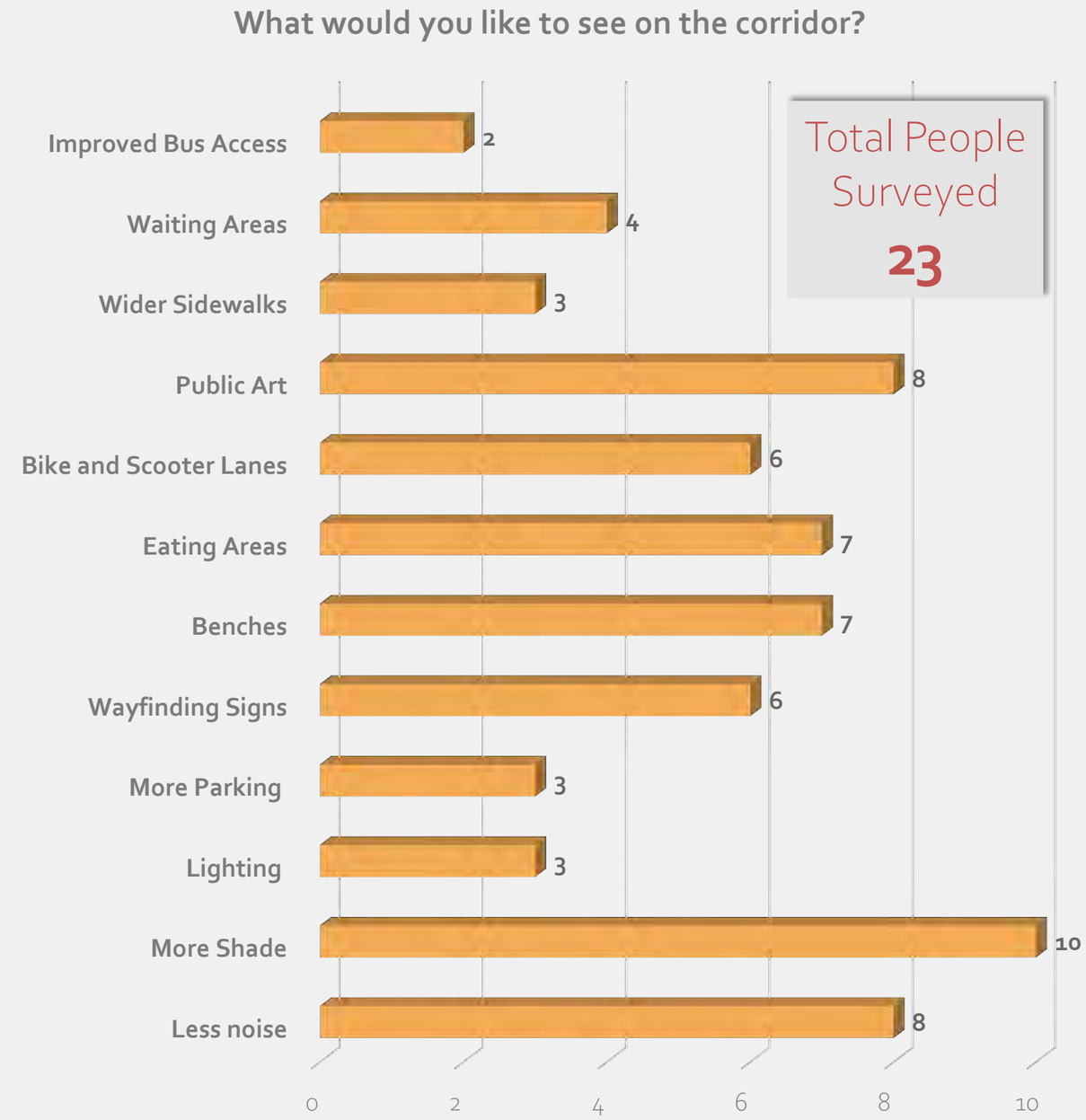


Top Reasons that Brought Visitors to Independence Avenue



Survey Summary

- Most respondents desired more shade, less noise, and more public art on Independence Avenue
- Others wanted benches, sitting/eating areas, wayfinding signs, and dedicated bike lanes
- The majority felt safe and comfortable on Independence Avenue



Observations & Recommendations

Observations

Public Space Utilization

- People routinely sitting on grass, lawns, curbs
- Kids playing in grass and lawns
- People waiting for the bus
- Minimal street-level activity
- Families with kids in strollers
- Residents walking their dogs

Traffic and Curbside

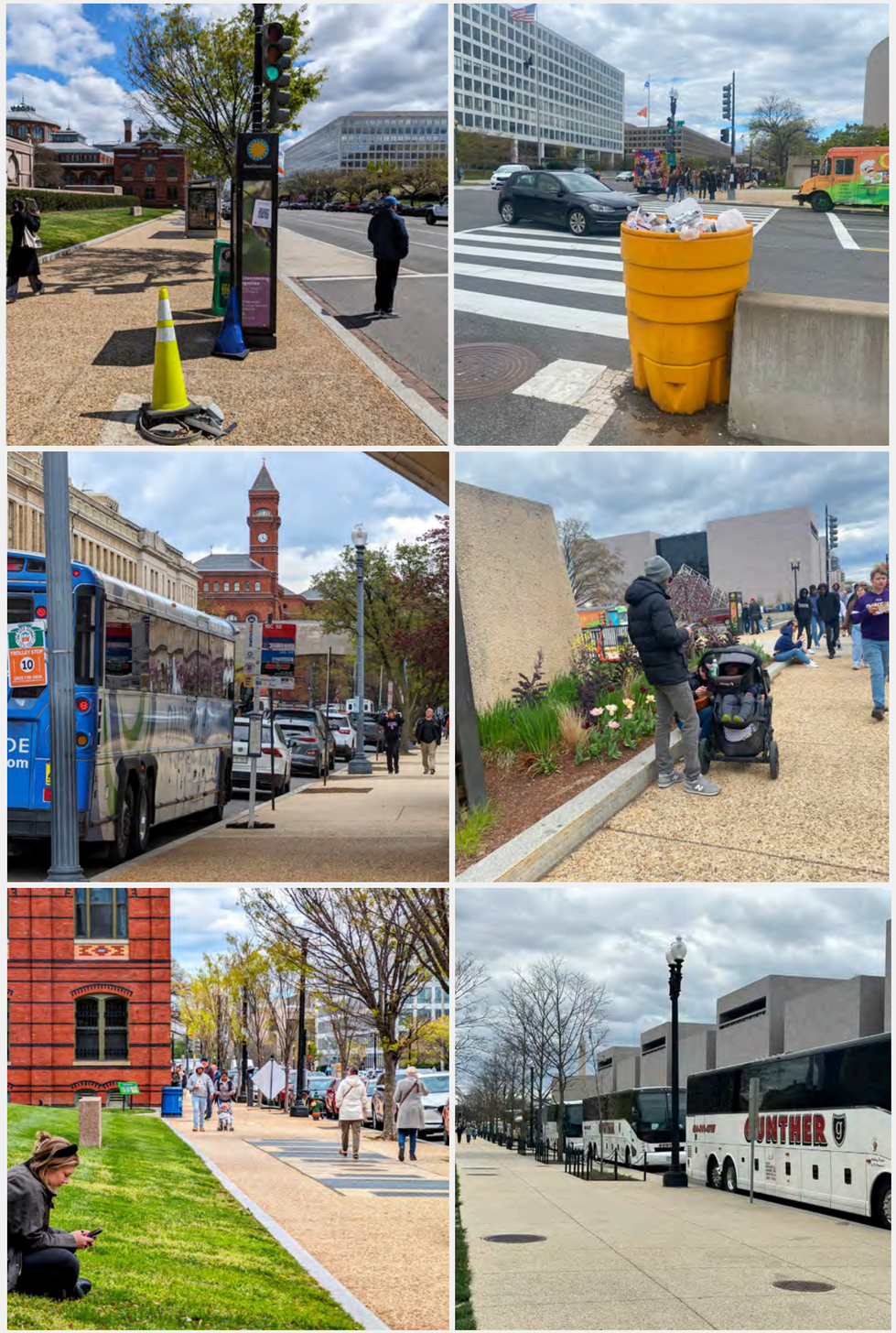
- Mix of people riding scooters and bikes on the sidewalk and on the street
- Tour buses parked along the curb where space is available

Infrastructure Amenities

- Few places to wait in the shade
- Lack of public art
- Make-shift garbage cans
- Users asking for directions to destinations

Obstacles and Hazards

- Cones and debris on the sidewalk
- Construction near NASM is temporarily narrowing the sidewalk between 7th and 4th Street



Recommendations

Public Space Utilization

- Design the public realm to be enjoyable and safe for all age groups through art, installations, and parklets
- Program space for waiting, sitting, and eating
- Design wayfinding and signage to connect people to destinations

Traffic and Curbside

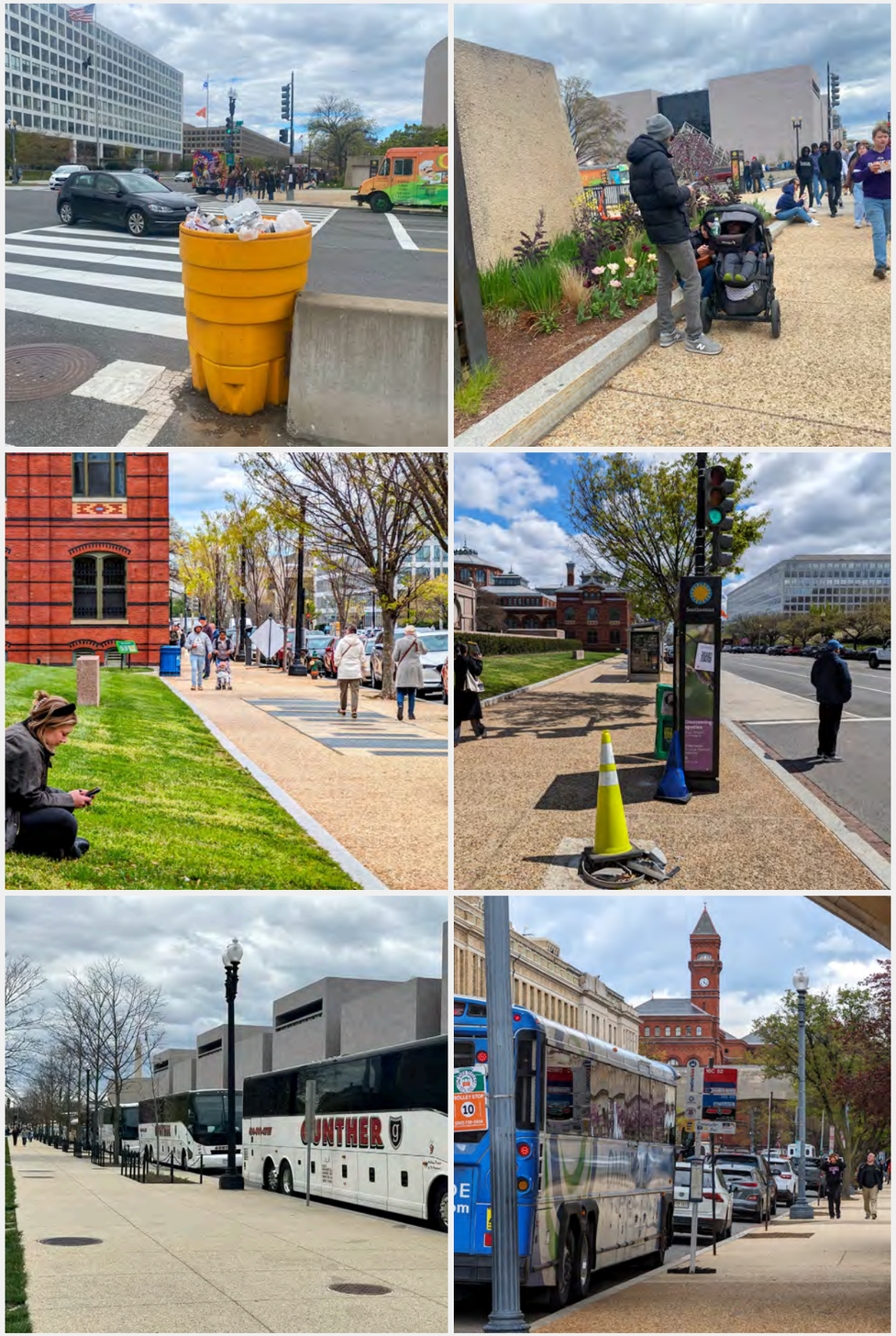
- Defining curbside uses based on priorities of adjacent institutions
- Clear zones for walking, biking, and other curbside uses like pick-up/drop-off and parking

Infrastructure Amenities

- Add protection from the elements by adding more trees
- Include streetscape elements and public art
- Incorporate landscaped areas and stormwater management
- Design streetscape elements that serve the range of activities observed

Obstacles and Hazards

- Ensure amenities on the sidewalk are organized to improve circulation and avoid hazards
- Design for universal accessibility and compliance with PROWAG and ADA standards



Appendix C: Stakeholder Charrette Materials

Independence Avenue SW
URBAN DESIGN STUDY
Stakeholder Charrette

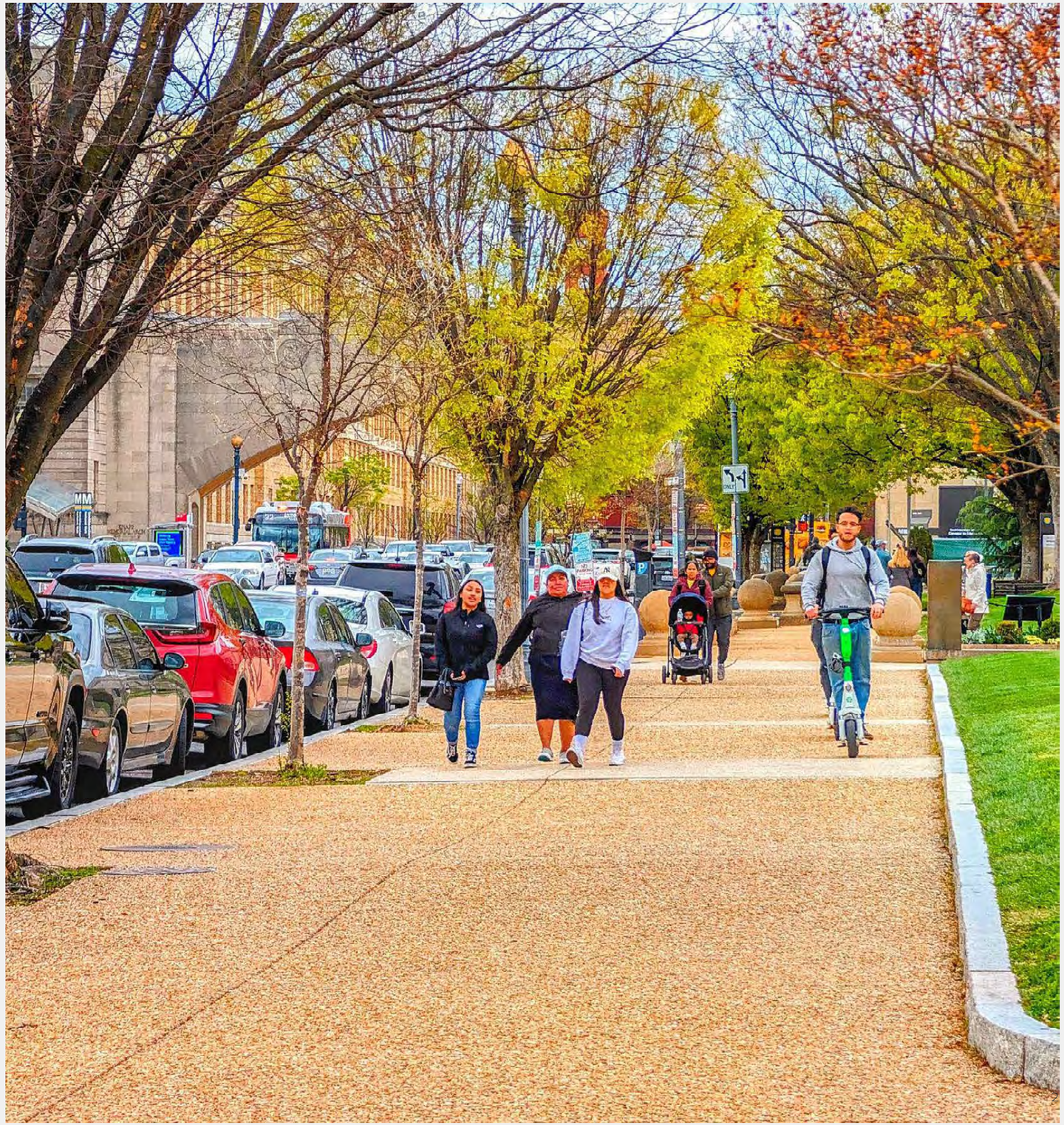
June 12 & 13, 2024

National Capital Planning Commission

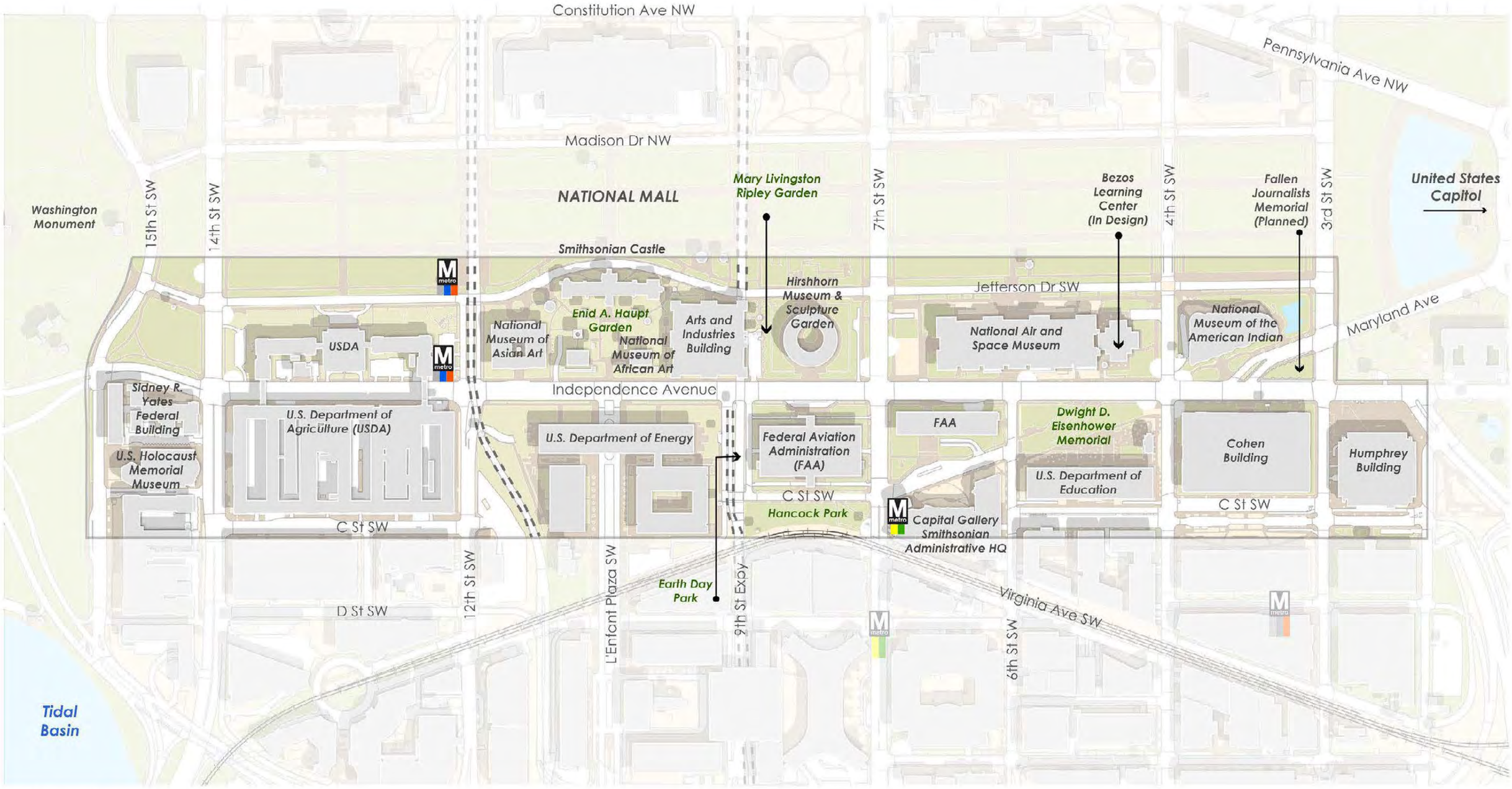
Smithsonian Institution

Contents

- Introduction
- The Urban Design Study
- Background Information
- Meeting Agendas
- Design Information



Introduction



KITTELSON & ASSOCIATES

Study Area Map

Independence Avenue SW
Urban Design Study 2024

Next Steps

The 2023 corridor study identified the need for additional study, including:

- A more detailed traffic study (completed)
- A public life review to measure and understand the current and potential future human experience of the street and public spaces (completed)
- Coordinating agency priorities and needs to identify a unified future vision (this charrette)
- Clarifying the purpose and need with stakeholders and decision-makers (ongoing)

Independence Avenue SW is not on the District's High Injury Network, and while it is partially on the Bus Priority Network, it has not been identified for a future Bus Priority Project.

- Independence Avenue SW is not currently a priority to fund future corridor improvements
- Moving forward requires a unified future vision, buy-in from stakeholders and decision-makers, and agency champions

Charrette Overview

Purpose

The Independence Avenue SW Urban Design Study Stakeholder Charrette is an opportunity for the Urban Design study team, including the study co-sponsors: the National Capital Planning Commission (**NCPC**) and the Smithsonian Institution (**Smithsonian**), and the consultant, Kittelson & Associates, Inc. (**Kittelson**), to meet with agency stakeholders for the following reasons:

Verify the team's collective understanding of the corridor from the existing conditions and Urban Life reviews.



Confirm the focus areas and objectives of the re-envisioned Independence Avenue SW.



Engage collaboratively in discussions about reimagining and redesigning Independence Avenue SW.



Review the proposed corridor design and confirm the inclusion of agency-specific requirements.



Share an updated corridor vision reflecting the feedback received from the agency stakeholders.

Charrette Logistics

Agenda

Meeting 1: Multimodal Transportation Network *Wednesday, June 12, 2024* *1:00 to 2:15 PM* • The role and purpose of Independence Avenue SW in the District and National Mall transportation network	**Meeting 3A: Deliveries and Facility Requirements** (Smithsonian Institution and National Mall) *Thursday, June 13, 2024* *9:00 to 10:30 AM* • Confirm deliveries and facility requirements on the north side of the corridor.	**Meeting 4: U.S. Capitol Grounds Coordination** *Thursday, June 13, 2024* *1:00 to 2:00 PM* • Transition from 3rd Street to 1st Street SW
Meeting 2: Urban Design & Streetscape *Wednesday, June 12, 2024* *2:30 to 5:00 PM* • Study area development • Public space activation • Security • Streetscape, including sidewalk and curbside space • The corridor's look and feel	**Meeting 3B: Deliveries and Facility Requirements** (Federal Buildings) *Thursday, June 13, 2024* *11:00 AM to Noon* • Confirm deliveries and facility requirements on the south side of the corridor.	**Meeting 5: Stakeholder Feedback and Updated Corridor Vision** *Tentatively planned for early Fall* • Incorporation of feedback and updated corridor vision

Location

- The meeting venue is the fifth-floor conference room of the Capital Gallery West Tower at 600 Maryland Avenue SW.
- You will need identification information to enter the building, and Smithsonian Planning staff will escort you from the lobby to the fifth floor.



The Urban Design Study

Independence Avenue SW Urban Design Study

- The Independence Avenue SW Urban Design Study (the Urban Design Study) is a follow-up study to the 2023 Independence Avenue SW Corridor Study, completed as part of the Metropolitan Washington Council of Governments (MWCOG) Transportation-Land Use Connections (TLC) Program.
- The Corridor Study included a review of the existing conditions, previous plans, challenges, and opportunities. It presented three planning-level recommendations for future studies, engineering design, public outreach, and the next steps for redesigning the avenue.
- The Urban Design Study is co-sponsored by the National Capital Planning Commission (NCPC) and the Smithsonian Institution (Smithsonian). It refines the findings and recommendations of the 2023 Corridor Study and provides a more in-depth analysis of the existing conditions and recommendations for reconfiguration.

2023 Corridor Study

- Data collection and existing conditions review
- Goals and objectives identification
- Review of previous plans and studies
- Vehicular capacity analysis
- Stakeholder coordination
- Recommendation of three corridor concepts
- Development of multimodal ideas toolbox
- Planning-level alternatives evaluation

2024 Urban Design Study

- Existing and future traffic operations analyses
- Future travel demand forecasting
- Urban Life Review and field evaluations
- Block-level existing conditions (curbside operations)
- Agency design charettes
- Continued agency coordination and collaboration
- Refining three 2023 Corridor Study concepts to block-level corridor redesign concepts

Independence Avenue SW Urban Design Study

Corridor Description

- The Urban Design Study spans one mile from Washington Avenue SW on the eastern edge to 15th Street SW on the western edge.
- Smithsonian museums flank the north side, while federal headquarters front the south side.
- Both sides of the corridor feature a mix of open public space, federal facilities, and institutional uses with minimal ground-floor activity.
- Several parks and green spaces are scattered along the avenue and just beyond the corridor, with the United States Botanic Garden and the Bartholdi Fountain and Gardens located on the east end of the corridor.

Proposed Focus Areas and Objectives of the Urban Design Study

Focus Area	Objective	Performance Measure
Celebrated Boulevard	Emphasize the avenue's unique character	• Alignment with guiding plans
	High-quality streetscape	• Consistent and continuous streetscape elements and materials
	Resiliency and sustainability	• Reduce impervious surfaces
		• Additional "green infrastructure" and opportunities for trees and other plantings
Safety and Comfort	Improve multimodal safety	• Pedestrian and bicycle crash risk
		• Number of conflict points
		• Vehicle queue lengths blocking pedestrian crossings
	Improve multimodal comfort and access	• Pedestrian Level of Comfort (LOC)
		• Bicycle Level of Traffic Stress (BLTS)
		• Bus stop amenities
Multimodality	Reevaluate the function of the avenue and 'right-size' the roadway	• Vehicle capacity • Balance curbside access with demand

2023 Corridor Study: Summary of Findings

Corridor Vision

A generous landscaped boulevard that celebrates its transitional role and unique character; less ceremonial but analogous to Constitution Avenue, framing the National Mall and providing entry to the Capitol campus.



An attractive multi-modal and pedestrian-friendly corridor with high-quality streetscape and enhanced pedestrian amenities linking beautiful public spaces and civic destinations.



A welcoming institutional presence, with active street-level programming, inviting building entrances, and open spaces, supported by a lively street activity zone that engages pedestrians.



A key artery that serves both local and national needs, providing essential connections to transit and destinations for area workforce, residents, and visitors.

Findings

Configuration & Function

- Narrow sidewalk widths, wide curb-to-curb crossing distances, and physical obstructions limit the pedestrian experience and do not support the large volume of pedestrians accessing museums, employers, and destinations along Independence Avenue.
- The existing vehicle volumes on Independence Avenue fall under the capacity the avenue was intended to serve. The number of travel lanes on Independence Avenue and low vehicle volumes encourage speeding and create unsafe and uncomfortable conditions for all users.

Walking and Biking Experience and Quality

- Independence Avenue is a prominent corridor in the District and lacks cohesive streetscape elements, tree cover, and quality of amenities that emphasize its significance.
- The lack of bicycle infrastructure, wide street width, and high vehicular speeds create uncomfortable and uninviting conditions for people biking.

Environment

- Narrow sidewalks contribute to a lack of consistent tree cover, poor tree health, and reduced opportunities to support new tree growth. They also increase the heat island effect and impact of extreme temperatures.
- Lack of "green infrastructure" and opportunities for trees and other plantings may impact stormwater management and result in drainage challenges.

2023 Corridor Study: Summary of Findings

Long distances between crosswalks

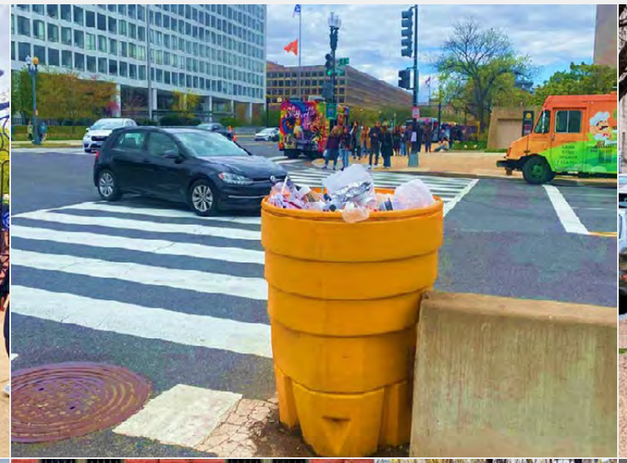


Inconsistent sidewalk widths

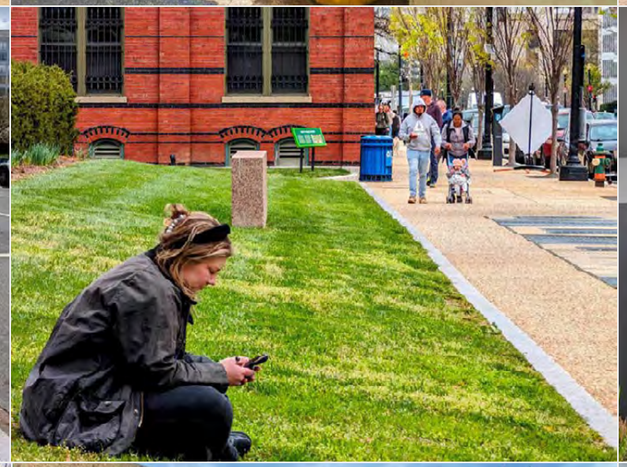


Corridor Activity







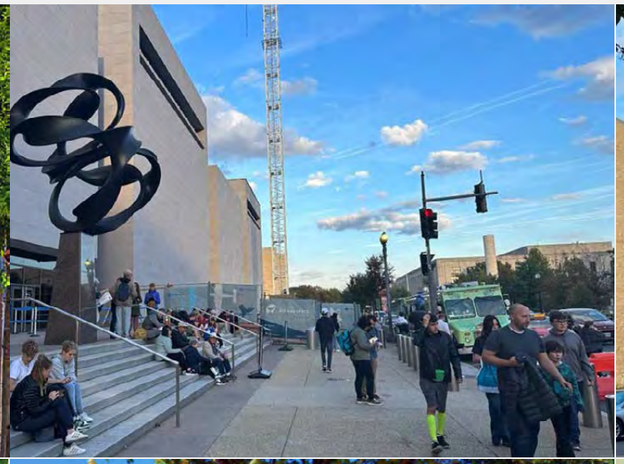









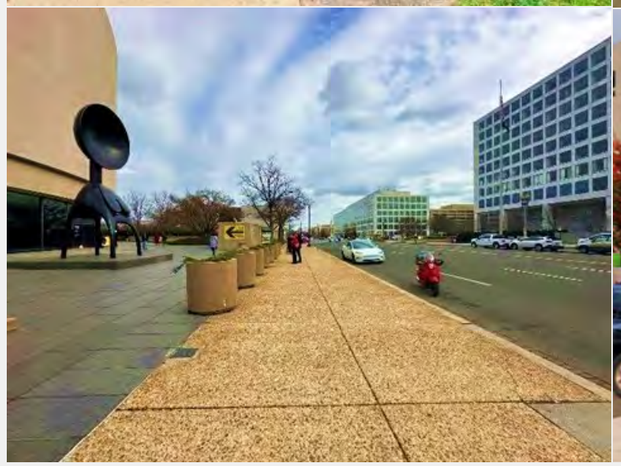
Corridor Environment







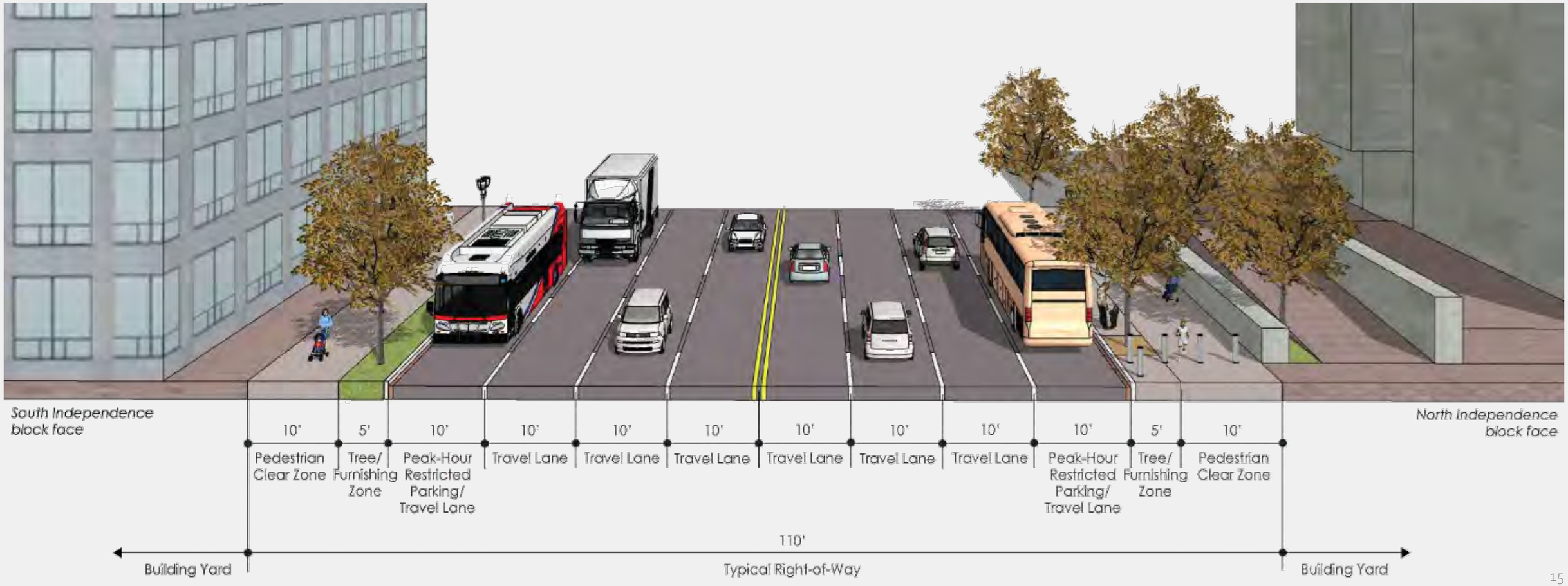





2023 Corridor Study: Summary of Findings

Existing Cross-Section

- Peak-hour restricted parking/travel lanes on both sides
- Approximate 10 ft. pedestrian clear zones on both sides of the street
- Single row of trees on both sides of the street

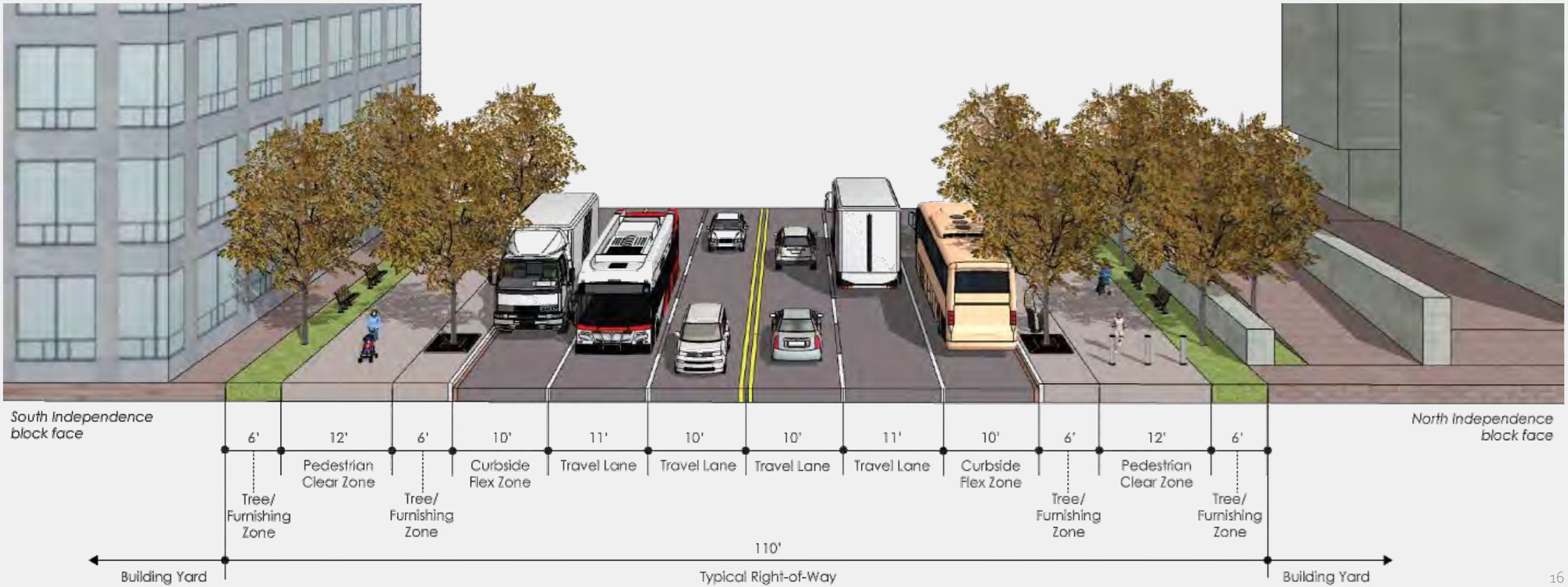


2023 Corridor Study: Summary of Findings

Corridor Concepts

- **Concept 1: Curbside Flex Zones**
- Concept 2: Landscaped Median
- Concept 3: Raised Cycle Track

- Curbside flex zones (10 ft.) that may be used for pick-up and drop-off activity, loading zones, motorcoach activity, bikeshare stations, etc.
- Pedestrian clear zones (12 ft.) on both sides of the street
- Double row of trees on both sides of the street
- Transit shelters alternate with street trees where bus stops are located

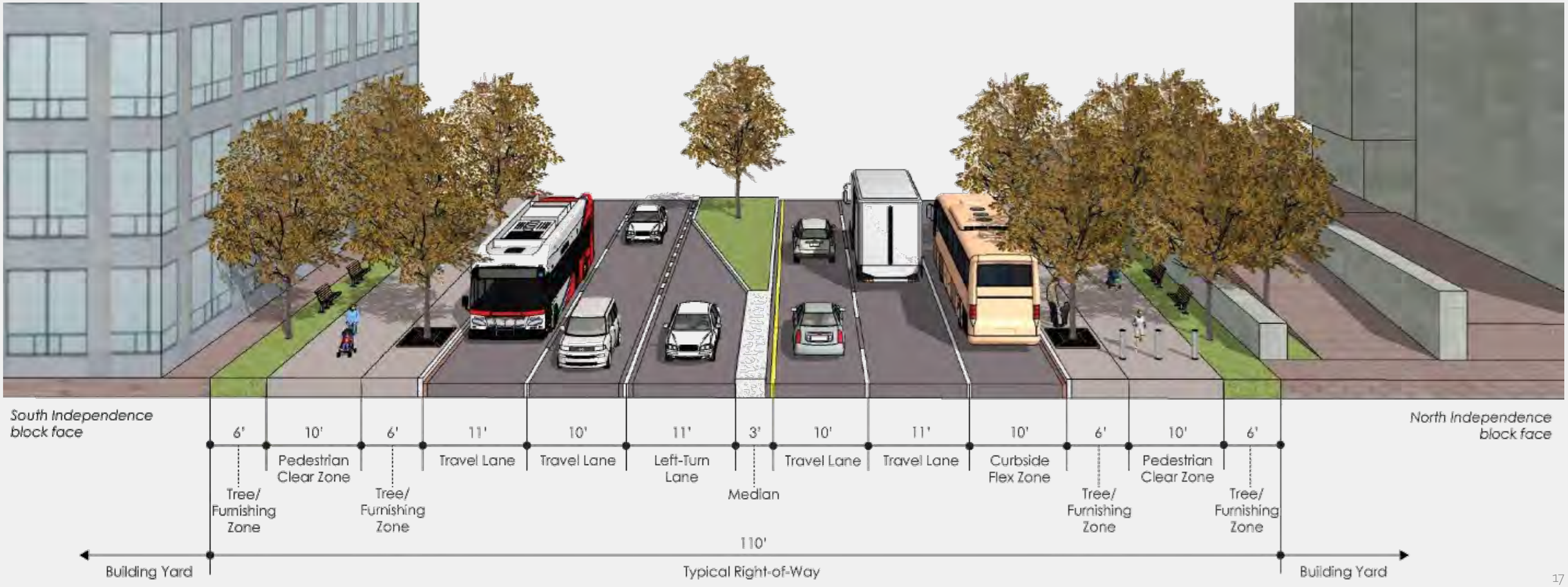


2023 Corridor Study: Summary of Findings

Corridor Concepts

- Concept 1: Curbside Flex Zones
- **Concept 2: Landscaped Median**
- Concept 3: Raised Cycle Track

- Landscaped median (14 ft.) with alternating left turn lanes
- Curbside flex zone (10 ft.) on the north side that may be used for pick-up and drop-off activity, loading zones, motorcoach activity, bikeshare stations, etc.
- Pedestrian clear zones (10 ft.) on both sides of the street
- Double row of trees on both sides of the street
- Transit shelters alternate with street trees where bus stops are located

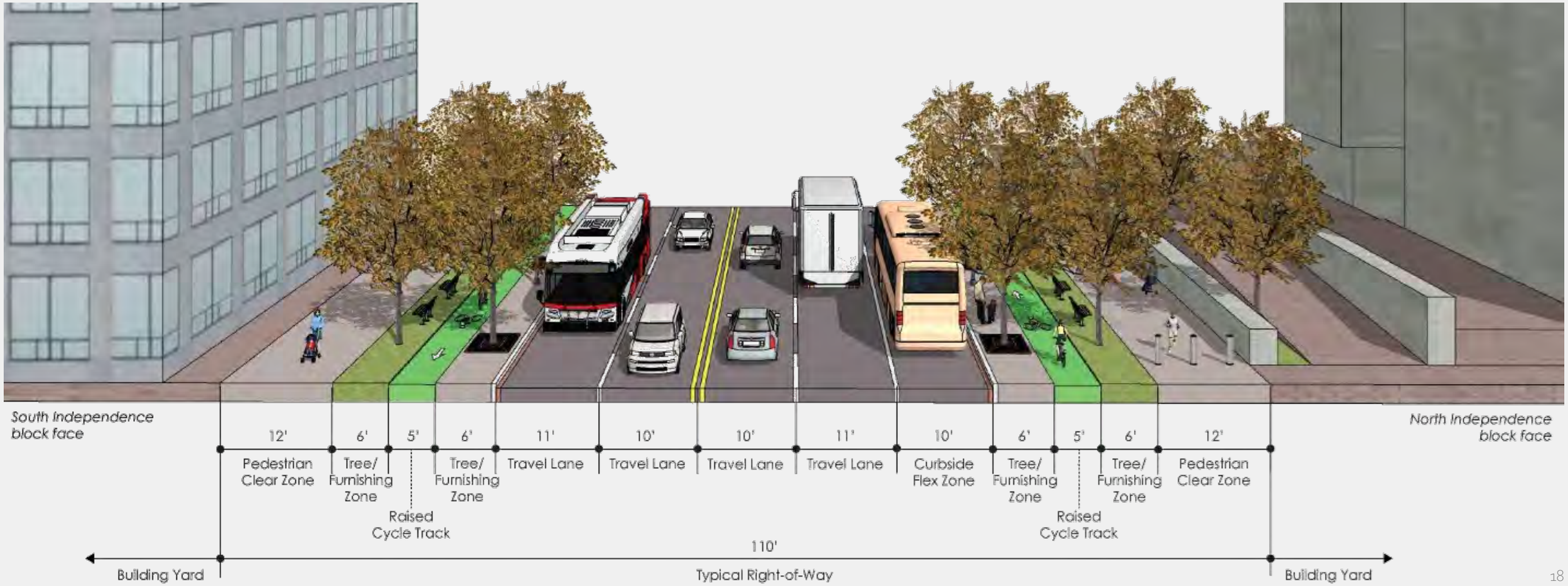


2023 Corridor Study: Summary of Findings

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- Concept 2: Landscaped Median
- **Concept 3: Raised Cycle Track**

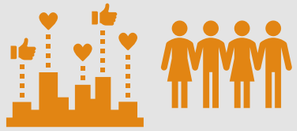
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Urban Design Study: *Draft Vision*

Celebrated Boulevard

Create a streetscape that celebrates the identity and functionality of Independence Avenue SW.



Safety and Comfort

Establish safe and comfortable multimodal access to institutions and destinations adjacent to the corridor.



Multimodality

Provide a distinguished public life experience that extends beyond the museum gardens and public space through space programming, active open spaces, and amenities that serve a range of activities.



Background Information

Other Previous Plans & Studies

1969 - 1984

- **1969** Existing Conditions Review
- **1980** Constitution Avenue / Independence Avenue Urban Design Study
- **1984** Constitution Avenue / Independence Avenue Draft Special Street Plans

1990 - 2010

- **1992** National Mall Roads Streetscape Manual
- **2001** Memorials and Museums Master Plan
- **2009** Monumental Core Framework Plan
- **2010** National Park Service: National Mall Plan

2011 - 2015

- **2012** Maryland Avenue SW Plan and Transportation Study
- **2013** Southwest Ecodistrict Plan
- **2015** National Park Service: National Mall and Memorial Parks Tour Bus Study

2016 - 2020

- **2016** National Park Service Paved Trails Study
- **2017** A Four-season Survey of the Smithsonian Visitor Experience
- **2017** Finding the Balance: Audience Atlas Washington DC for the Smithsonian Institution
- **2018** South Mall Campus Master Plan
- **2019** Long Bridge Environmental Impact Study
- **2019** Urban Design Framework and Lighting Policy
- **2020** NCPC Independence Avenue Existing Conditions Report

2021 - Present

- **2021** moveDC
- **2021** Comprehensive Plan for the National Capital: Federal Elements Update
- **2022** Smithsonian Two Museums Site Evaluation Study
- **2023** Independence Avenue SW Corridor Study
- **Ongoing** Monumental Core Streetscape Design Guidelines and Construction Manual
- **2024** Independence Avenue SW Urban Design Study



moveDC Bicycle and Freight Priority Networks

- Bicycle Priority Network (Future Planned Improvement)
  - The corridor is a gap between the 15th Street NW/SW cycle track, the protected bike lanes on 4th Street NW/SW, bike lanes on Washington Avenue SW, and protected bike lanes on Pennsylvania Avenue SE.



moveDC Bicycle Priority Network

- Freight Priority Network
  - Independence Avenue SW is on the Freight Priority Network between Washington Avenue SW and 15th Street SW.



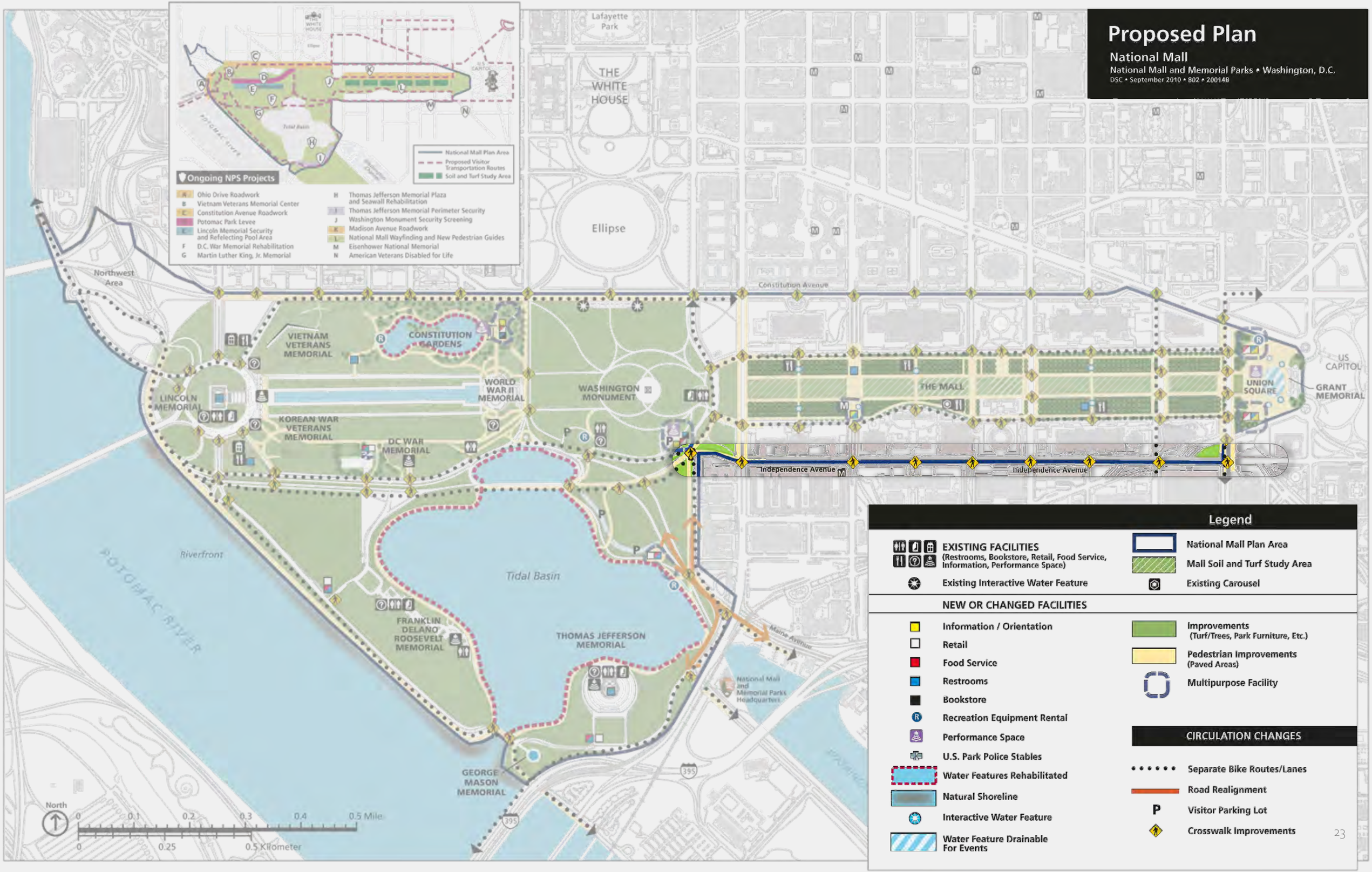
moveDC Freight Priority Network

Proposed Plan

National Mall

National Mall and Memorial Parks • Washington, D.C.

DSC • September 2010 • 802 • 20014B



Legend

EXISTING FACILITIES
(Restrooms, Bookstore, Retail, Food Service, Information, Performance Space)

Existing Interactive Water Feature

National Mall Plan Area

Mall Soil and Turf Study Area

Existing Carousel

NEW OR CHANGED FACILITIES

- Information / Orientation
- Retail
- Food Service
- Restrooms
- Bookstore
- Recreation Equipment Rental
- Performance Space
- U.S. Park Police Stables
- Water Features Rehabilitated
- Natural Shoreline
- Interactive Water Feature
- Water Feature Drainable For Events
- Improvements (Turf/Trees, Park Furniture, Etc.)
- Pedestrian Improvements (Paved Areas)
- Multipurpose Facility

CIRCULATION CHANGES

- Separate Bike Routes/Lanes
- Road Realignment
- P Visitor Parking Lot
- Crosswalk Improvements

Transit

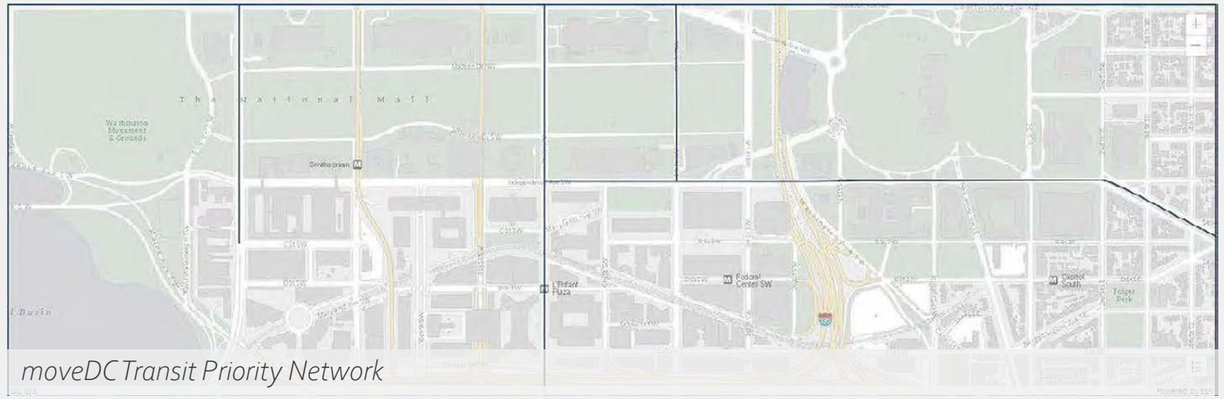
- moveDC Transit Priority Network from 7th Street SW to Pennsylvania Avenue SE

- D1X and D12 High-Frequency Routes on Independence Avenue
  - D1X: 7th Street SW to Pennsylvania Avenue SE (Peak 3X per hour)
  - D12: 4th Street SW to Pennsylvania Avenue SE (Peak 5x per hour)

- The Circulator (expected to stop operations in the Spring of 2025) does not provide service on Independence Avenue

- The Tourmobile formerly operated but did not stop on Independence Avenue SW

- The SW Neighborhood Shuttle operates on Independence Avenue SW between 7th Street SW and L'Enfant Plaza SW



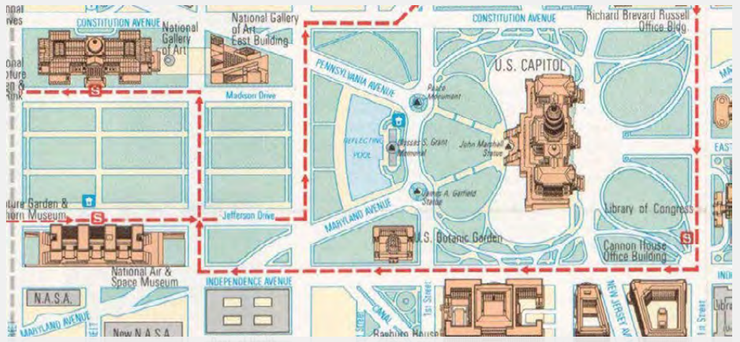
moveDC Transit Priority Network



Proposed 2025 Better Bus Network



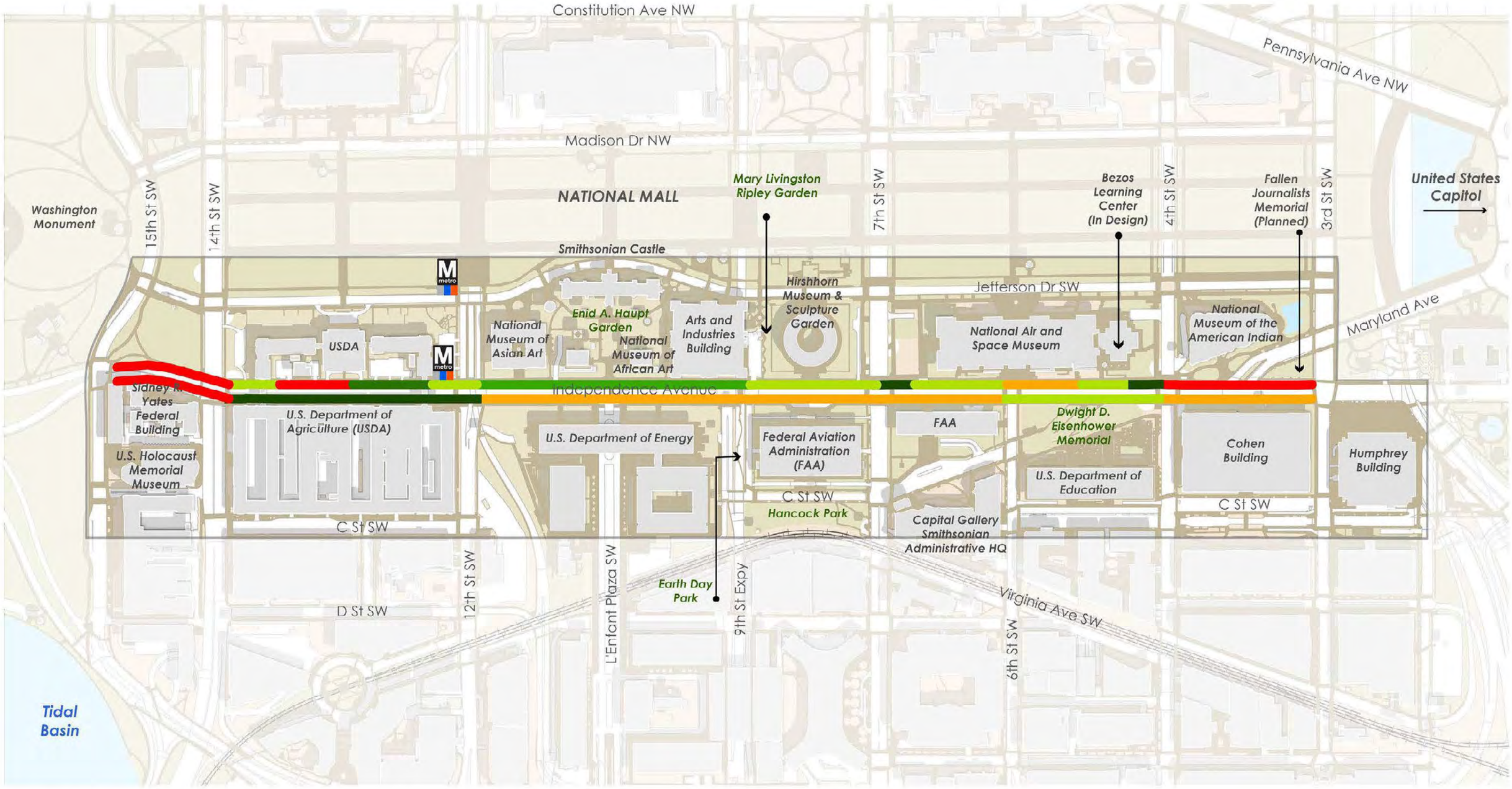
Circulator National Mall Route



Former Tourmobile Route



SW Neighborhood Shuttle



Project Limits
Buildings
Open Space
Water
Railroads
Roads
Sidewalks

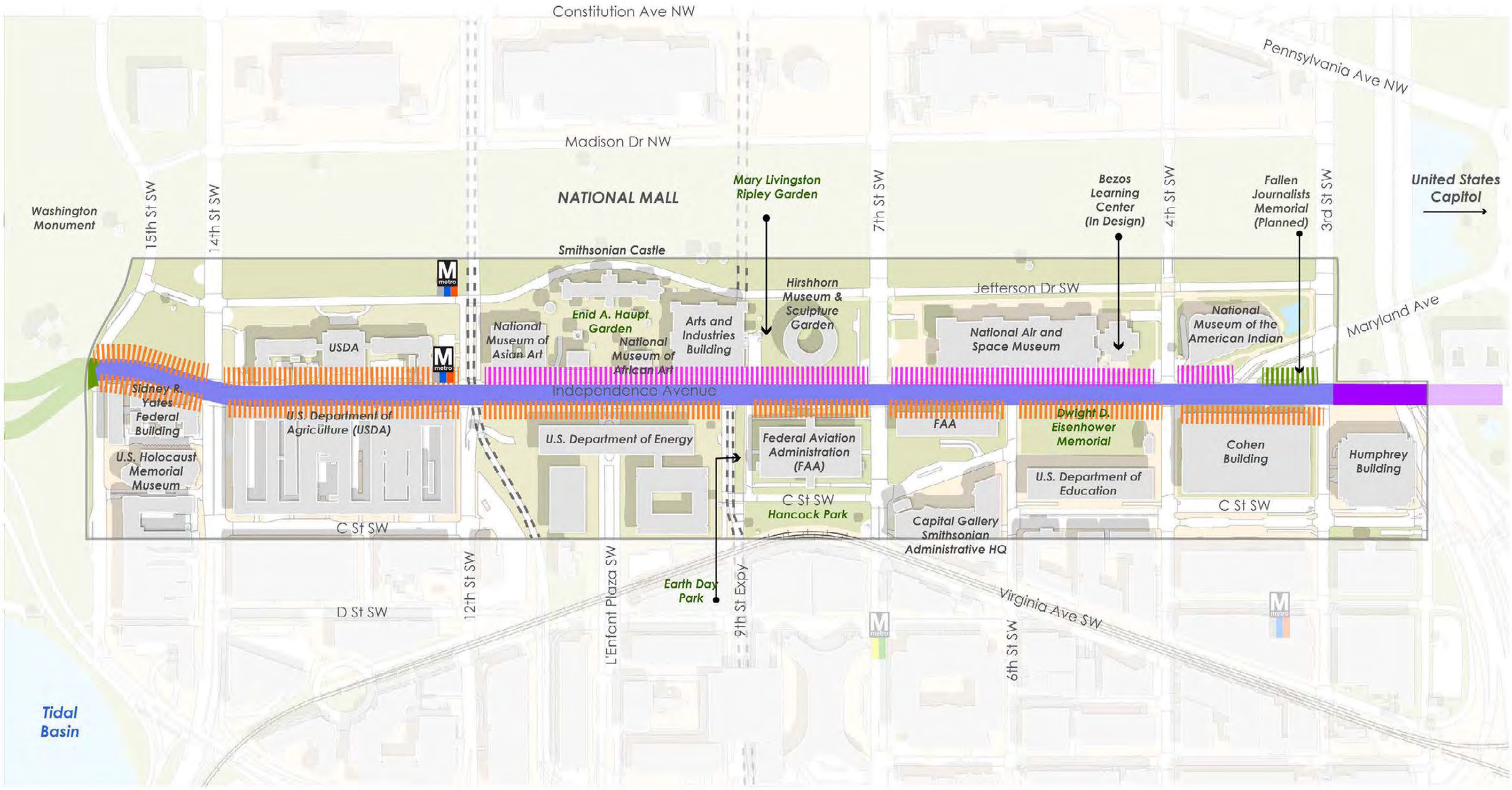
Sidewalk Widths
>20'
18'-20'
16'-18'
14'-16'
12'-14'
<10'

0 500 Feet

KITTELSON & ASSOCIATES

Sidewalk Widths

Independence Avenue SW
Urban Design Study 2024



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Street and Sidewalk Ownership and Maintenance

Independence Avenue SW
Urban Design Study 2024

Constitution Ave NW

Pennsylvania Ave NW

Madison Dr NW

*USDA Farmers Market
(Temporarily Location)

Washington Monument

15th St SW

14th St SW

NATIONAL MALL

Mary Livingston Ripley Garden

7th St SW

Bezos Learning Center (In Design)

4th St SW

Fallen Journalists Memorial (Planned)

3rd St SW

United States Capitol

Smithsonian Castle

Jefferson Dr SW

Maryland Ave

Hirshhorn Museum & Sculpture Garden

National Air and Space Museum

National Museum of the American Indian

USDA

National Museum of Asian Art

Enid A. Haupt Garden

National Museum of African Art

Arts and Industries Building

Independence Avenue

Sidney R. Yates Federal Building

U.S. Department of Agriculture (USDA)

U.S. Department of Energy

Federal Aviation Administration (FAA)

FAA

Dwight D. Eisenhower Memorial

Cohen Building

Humphrey Building

U.S. Holocaust Memorial Museum

U.S. Department of Education

C St SW

Hancock Park

Capital Gallery
Smithsonian Administrative HQ

C St SW

12th St SW

L'Enfant Plaza SW

Earth Day Park

9th St Expy

D St SW

Virginia Ave SW

6th St SW

Tidal Basin

60% Parking | **20% No Parking** | **17% Bus Zones** | **3% Vendors**

Project Limits
Buildings
Open Space

Water
Railroads
Roads
Bus Stop

Commuter Bus Stop (MTA, PRTC OmniRide, Loudoun County)

Parks, Plazas and Open Spaces

Vendors
Parking
No Parking
Metrobus/Private Buses/Trolley

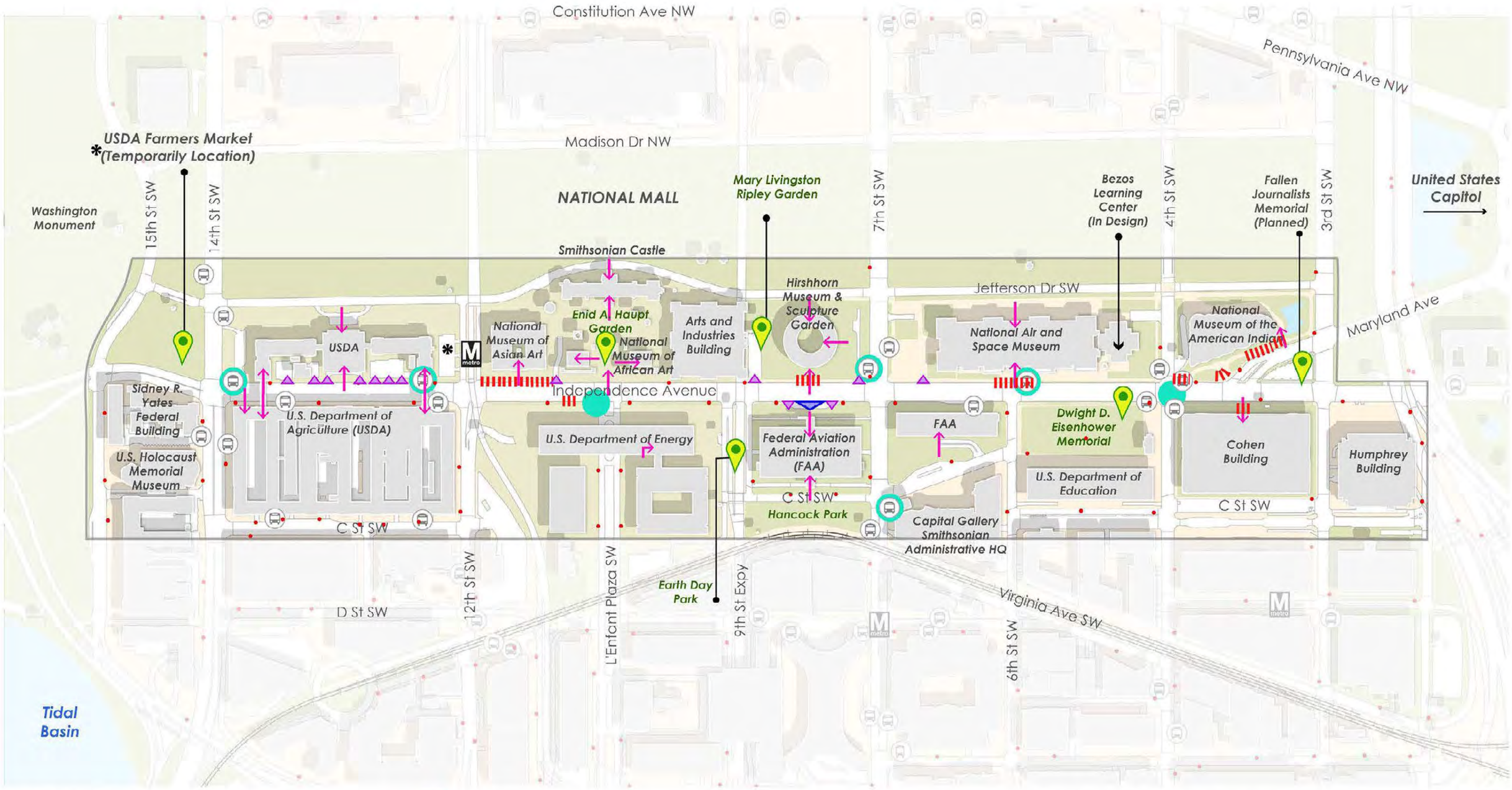
* *Farmers Market to be returned back to 12th Street in the long-term*

0 50 Feet

KITTELSON & ASSOCIATES

Curbside Inventory

Independence Avenue SW
Urban Design Study 2024



Project Limits
Buildings
Open Space

Water
Railroads
Roads
Bus Stop

Commuter Bus Stop (MTA, PRTC OmniRide, Loudoun County)

Parks, Plazas and Open Spaces

Fire Hydrants
Driveways
Pick Up/Drop Off
Security Bollards
Building Entrances

✱ *Farmers Market to be returned back to 12th Street in the long-term*

0 500 Feet

KITTELSON & ASSOCIATES

Building Entrances and Driveways

Independence Avenue SW
Urban Design Study 2024

Delivery Requirements

Building	Delivery Requirements	Vehicle Size/Other Notes
Art and Industries Building	• Loading and unloading at the curbside in front of the museum on Independence Avenue is facilitated by small box trucks. • Large trucks may park on the street, when necessary, though uncommon. • Service lot requirements will depend on the future building use.	• Small and large trucks are expected to use the service lot and park on the street. • There is an additional demand for museum director and senior leadership parking.
Hirshhorn Museum and Sculpture Garden	• Deliveries take place at Independence Avenue SW & 7th Street. • Large trucks require curbside access to the museum's plaza. The museum also requires crane access for sculpture installations and equipment deliveries for maintenance. • Large trucks require the full roadway width to back into the loading dock • Curbside delivery is sometimes needed for temporary installations/sculptures in museum gardens. Plants and trees may also be required to be delivered to adjacent gardens.	• 44' and 53' Trailers
Smithsonian Gardens	• The Smithsonian Gardens require snowplow access for all sidewalks on the north side of Independence Avenue, as well as access to sidewalks on 3rd Street, 4th Street, 7th Street, and 12th Street. Additional snow removal equipment access is required at the Arts and Industries Building and the Hirshhorn Plaza.	• A full-size pickup truck with an 8' plow
National Air and Space Museum (NASM)	• Trucks access the NASM West Terrace to bring large objects from the west-end entrance. • The Bezos Learning Center school group entry will face Independence Avenue, as will access to the Haas Observatory at the corner of 4th Street SW and Independence Avenue SW.	
The National Museum of Asian Art (NMAA) and the National Museum of African Art	• Truck access via the Quadrangle Building loading dock. Trucks that cannot fit in the loading zone curbside, typically in off-hours. Those deliveries are scheduled.	• 72' trucks • 48' to 53' trailers and turning for these trucks

















Tidal Basin

National Mall

Pennsylvania Avenue

Independence Avenue

Within 10-20 Min Walking Distance

1. World War II Memorial
2. Washington Monument
3. National Museum of African American History and Culture
4. National Museum of American History
5. National Museum of Natural History
6. National Gallery of Art-Sculpture Garden
7. National Gallery of Art
8. National Gallery of Art-East Building
9. United States Capitol
10. US Botanic Gardens
11. Humphreys Building
12. Dwight Eisenhower Memorial
13. Housing and Urban Development & Constitution Center
14. General Services Administration
15. L'Enfant Plaza
16. International SPY Museum
17. Maryland Avenue Planning Area
18. 10th St Promenade
19. Cotton Annex Redevelopment
20. Bureau of Engraving and Printing
21. US Forest Services
22. Holocaust Museum
23. Thomas Jefferson Memorial
24. Banneker Park
25. Potomac Riverboat Water Taxi
26. The Wharf Phase I
27. Jefferson School
28. Wharf Jitney Recreation Pier

SW Shuttle Loop

oogle Earth

KITTELSON & ASSOCIATES

Map information compiled from review of previous planning studies

Independence Avenue SW
Urban Design Study 2024



Project Limits
Buildings
Open Space

Water
Railroads
Roads
Bus Stop
Parks, Plazas and Open Spaces

Inadequate sidewalk clear width, quality, and continuity
Limited access to frontage and open space
Wide crossing distances

Driveways
Unmarked Crossing
Security Bollards

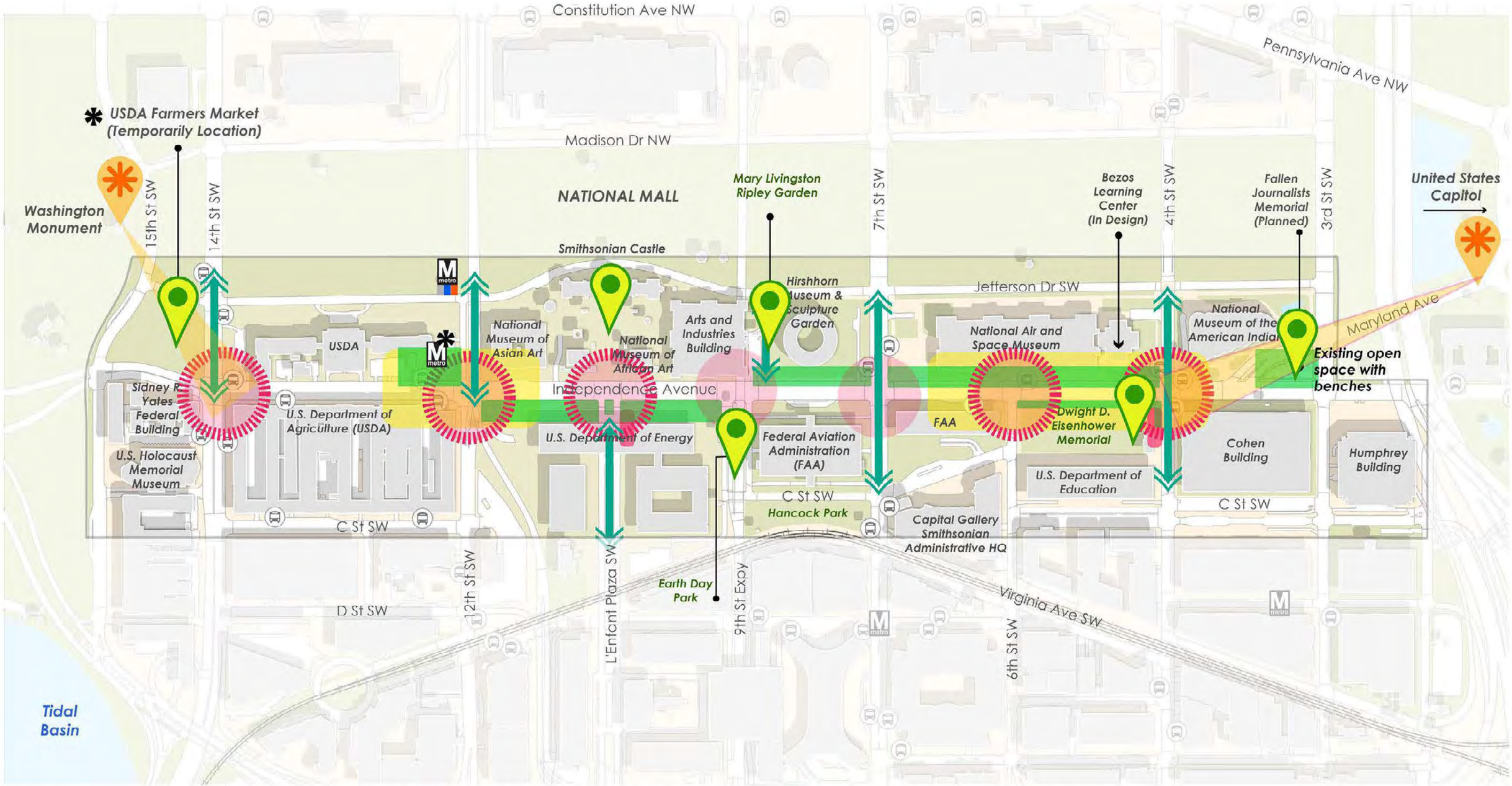
* Farmers Market to be returned back to 12th Street in the long-term

0 500 Feet

KITTELSON & ASSOCIATES

Study Area Challenges

Independence Avenue SW
Urban Design Study 2024

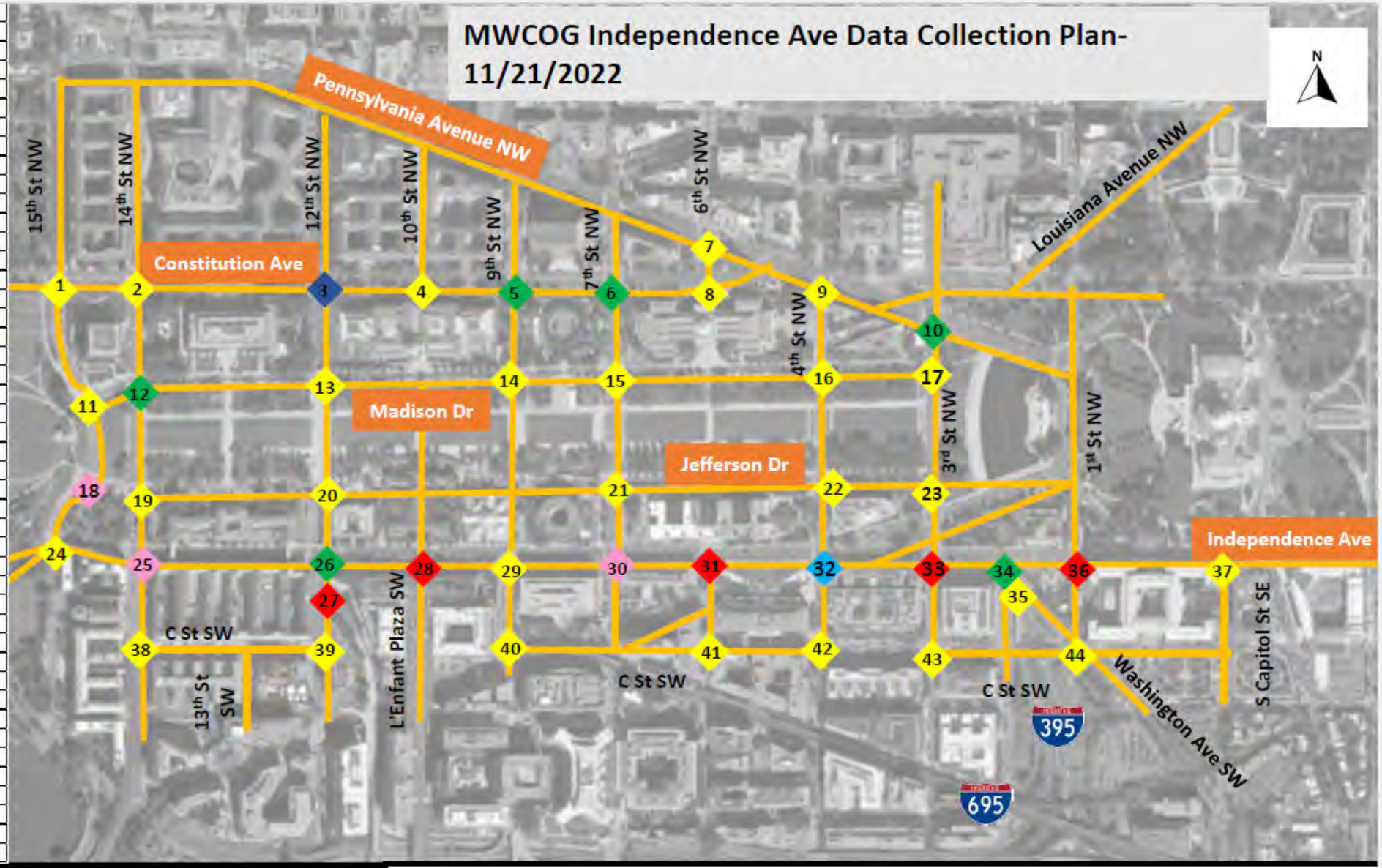


KITTELSON & ASSOCIATES

Study Area Opportunities

Independence Avenue SW
Urban Design Study 2024

#	Intersection
1	15th St NW and Constitution Avenue NW
2	14th St NW and Constitution Avenue NW
3	12th St NW and Constitution Avenue NW
4	10th St NW and Constitution Avenue NW
5	9th St NW and Constitution Avenue NW
6	7th St NW and Constitution Avenue NW
7	6th St NW and Pennsylvania Avenue NW
8	6th St NW and Constitution Avenue NW
9	4th St NW and Pennsylvania Avenue NW
10	3rd St NW and Pennsylvania Avenue NW
11	15th St NW and Madison Dr NW
12	14th St NW and Madison Dr NW
13	12th St NW and Madison Dr NW
14	9th St NW and Madison Dr NW
15	7th St NW and Madison Dr NW
16	4th St NW and Madison Dr NW
17	3rd St NW and Madison Dr NW
18	15th St NW and Jefferson Dr SW
19	14th St SW and Jefferson Dr SW
20	12th SW and Jefferson Dr SW
21	7th St SW and Jefferson Dr SW
22	4th St SW and Jefferson Dr SW
23	3rd St SW and Jefferson Dr SW
24	Raoul Wallenberg Pl SW and Independence Ave SW
25	14th St SW and Independence Ave SW
26	12th St SW and Independence Ave SW
27	12th St SW and US building Access
28	L 'Enfant Plaza SW and Independence Ave SW
29	9th St SW and Independence Ave SW
30	7th St SW and Independence Ave SW
31	6th St SW and Independence Ave SW
32	4th St SW and Independence Ave SW
33	3rd St SW and Independence Ave SW
34	Washington Ave SW and Independence Ave SW
35	2nd St SW and Washington Ave SW
36	First St SW and Independence Ave SW
37	S Capitol St SE and Independence Avenue SW
38	14th St SW and C St SW
39	12th St SW and C St SW
40	9th St SW and C St SW
41	6th St SW and C St SW
42	4th St SW and C St SW
43	3rd St SW and C St SW
44	First St SW and Washington Ave SW



Data Collection Timings

AM Peak (Tues/Wed/Thur) – 8:15AM - 9:15AM
MD Peak (Tues/Wed/Thur) – 12:00PM - 1:00PM
PM Peak (Tues/Wed/Thur) – 4:30PM - 5:30PM
SAT-MD Peak – 1-hr
Special Event Peak- National Christmas Tree Lighting Ceremony (Nov 30th) 1-hr
NOTE: All Counts include Vehicular, Pedestrian and Bicycle Counts
All weekday counts should be collected during the week of Nov 14th

Legend

- Counts for Sat (peak hour)
- Counts for Sat (12-hour, 7AM-7PM)
- Counts for Avg. Weekday (AM, PM, MD) + Sat (peak hour) + Special event peak (1hr)
- Counts for Avg. Weekday (AM, PM, MD) + Sat (12-hour, 7AM-7PM)+Special event peak (1hr)
- Counts for Avg. Weekday (AM, PM, MD) + Sat (peak hour)
- Counts for Sat (peak hour) + Special event peak (1hr)

Traffic Study – Changes to the Base Network

14th Street & Independence Avenue SW

- For the Southbound direction, reconfigure the approach to include a double left turn lane.
- Add an eastbound right-turn pocket lane.

12th Street & Independence Avenue SW

- Add an eastbound left-turn pocket lane.

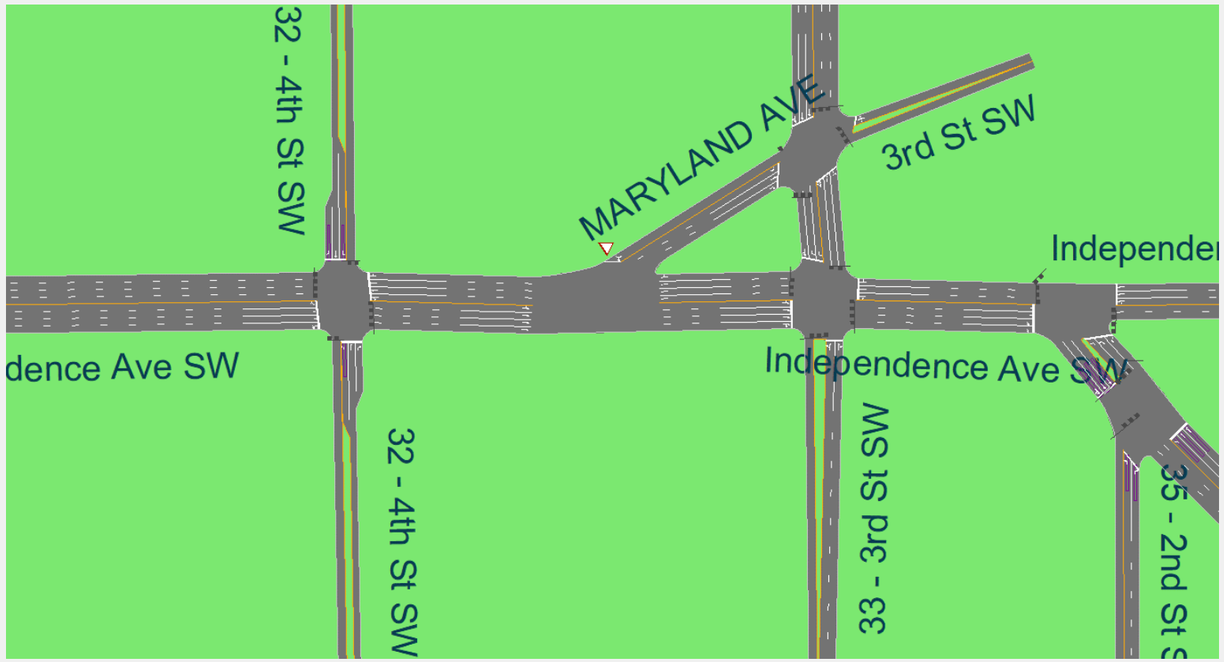
7th Street & Independence Avenue SW

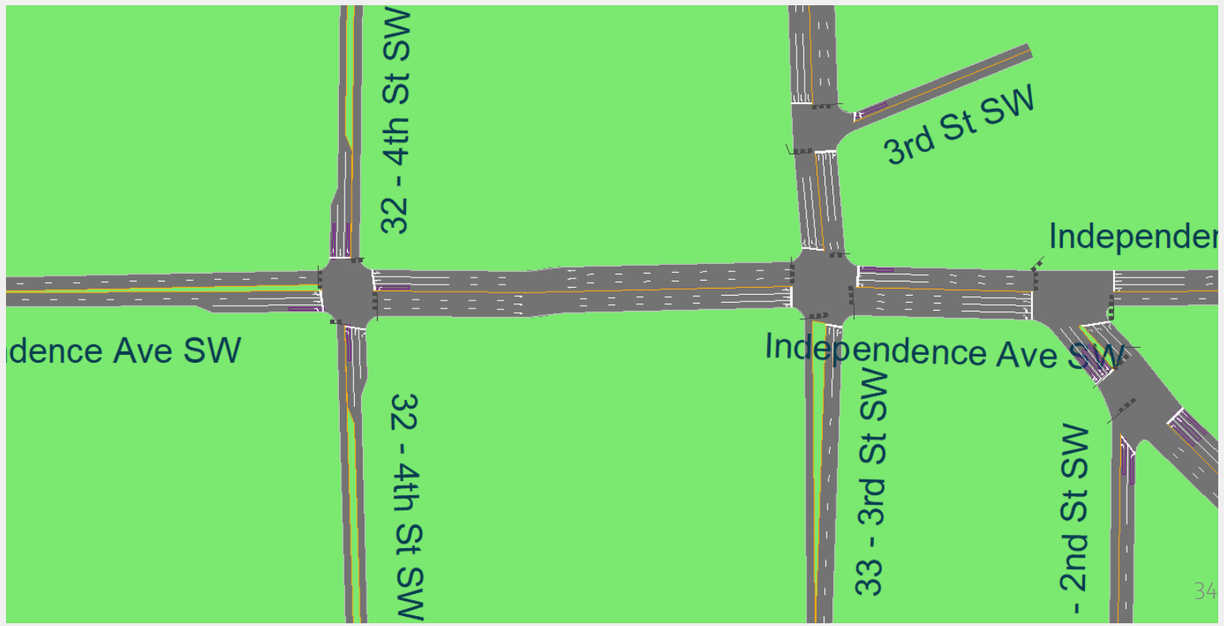
- Add an eastbound left-turn lane.
- Reconfigure the southbound approach to include a double left-turn lane.
- Add a westbound right-turn pocket lane.

4th Street & Independence Avenue SW

- Add an eastbound right turn pocket lane

Remove the segment of **Maryland Avenue from 3rd Street to Independence Avenue SW** and redistribute vehicle volumes





Traffic Study – Results

Intersection	Movement	Storage length	Peak Period	Scenario	Average Delay (sec)	95th Percentile Queue (ft)
14th St SW & Independence Ave SW	Southbound left	270'	AM Peak	1	198.7	#272
				2	76.5	#222
				3	34.4	56
	Eastbound approach	370'	AM Peak	1	22.5	#390
				2	74.8	#641
				3	42	#586
	Northbound through	450'	AM Peak	1	31.6	426
				2	62.9	#525
				3	62.9	#525
	Northbound right	450'	AM Peak	1	33.4	351
				2	55.9	#435
	Westbound through	950'	PM Peak	2	73.6	#454
12th St SW & Independence Ave SW	Westbound left	450'	AM Peak	1	55.2	121
				2	56.2	m#108
			PM Peak	1	64.1	#337
				2	186.6	m#304
				3	68.2	m#261
	Eastbound approach	950'	AM Peak	1	33.2	#426
				2	198.8	m#445
				3	48	#764
			PM Peak	2	72.9	#657
			Weekend Peak	2	66.6	#558

Intersection	Movement	Storage length	Peak Period	Scenario	Average Delay (sec)	95th Percentile Queue (ft)
7th St SW & Independence Ave SW	Eastbound approach	480'	AM Peak	1	10.6	64
				2	196	#898
				3	8.1	m140
			PM Peak	1	8.9	67
				2	72.1	#657
				3	31.1	402
	Southbound left	310'	AM Peak	1	31.4	136
				2	95.2	#230
				3	40.6	76
			PM Peak	1	46.2	#281
				2	201.4	#351
				3	34.2	124
	Westbound approach	450'	PM Peak	1	26.9	161
				2	68.2	#542
				3	31.7	424
4th St SW & Independence Ave SW	Westbound approach	550'	AM Peak	1	4.1	35
				2	71.1	#726
				3	48.9	m#642
	Northbound left	110'	AM Peak	2	55.7	72
	Southbound right	75'	AM Peak	2	61.3	#87
	Eastbound approach	550'	PM Peak	1	12.9	83
				2	76.3	#845
				3	30.9	#750
3rd Street SW & Independence Ave SW	Eastbound approach	550'	PM Peak	2	63.3	m#337

Traffic Study – Results

WHAT'S WRONG WITH UNUSED CAPACITY?

UNDER CAPACITY = HIGHER SPEEDS

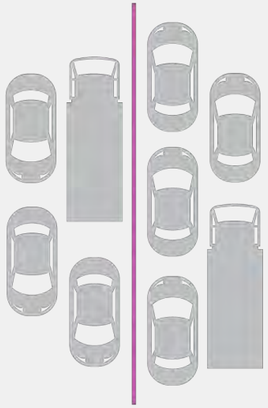
WHICH ARE ASSOCIATED WITH INCREASED AND MORE SEVERE CRASHES





OVERDESIGNING FACILITIES

FOR CARS MAKES THEM LESS SAFE FOR PEOPLE WALKING AND BIKING

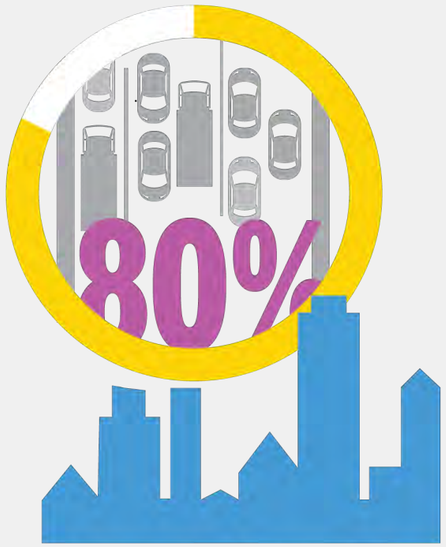


THE MORE TRAVEL LANES, THE

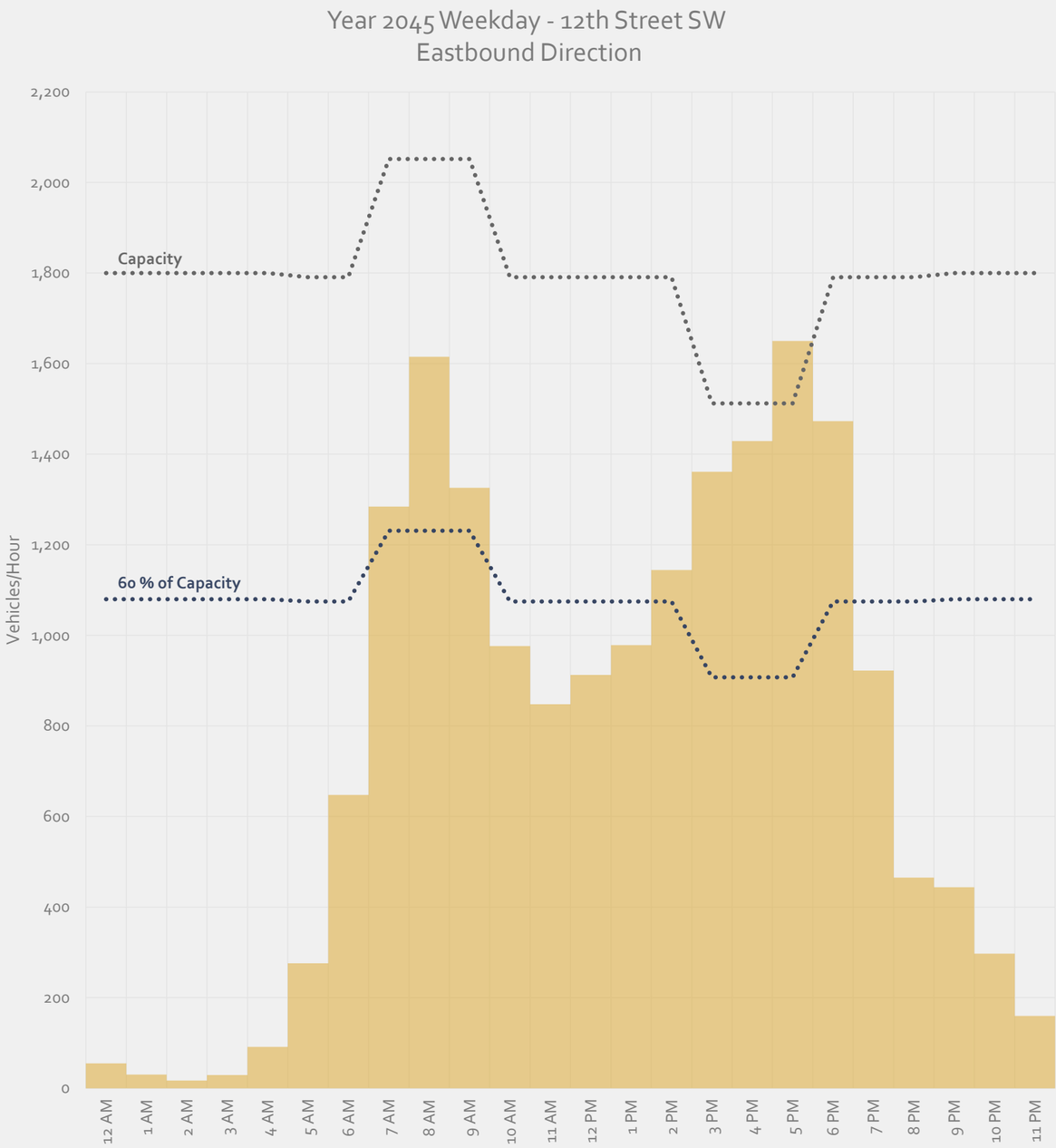
LONGER WAIT TIMES

FOR ALL MODES

STREETS MAKE UP MORE THAN

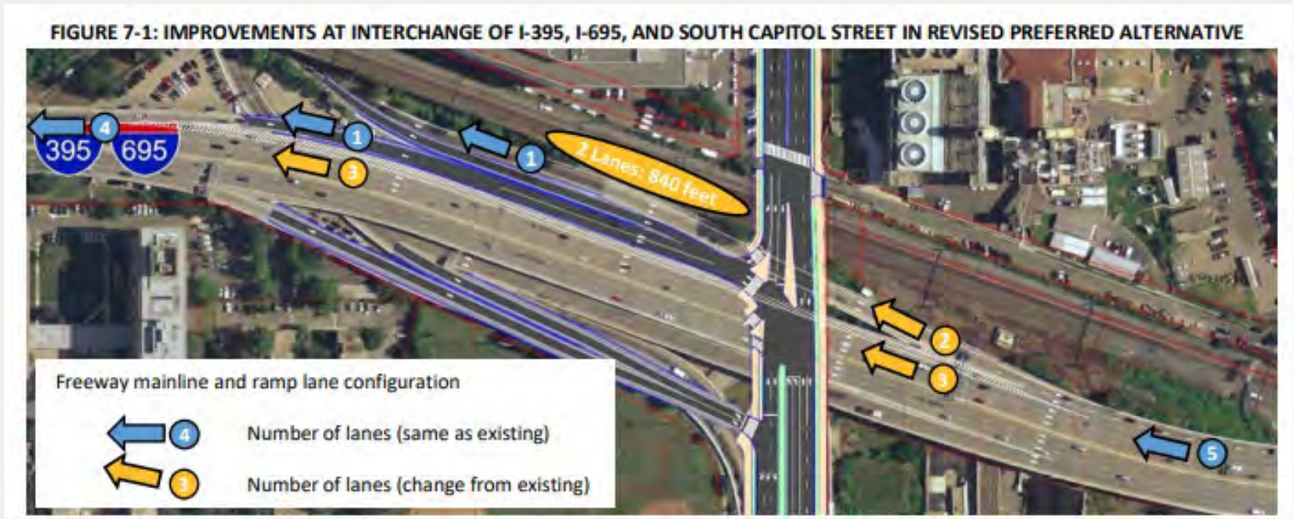


OF PUBLIC SPACES IN CITIES AND TOWNS



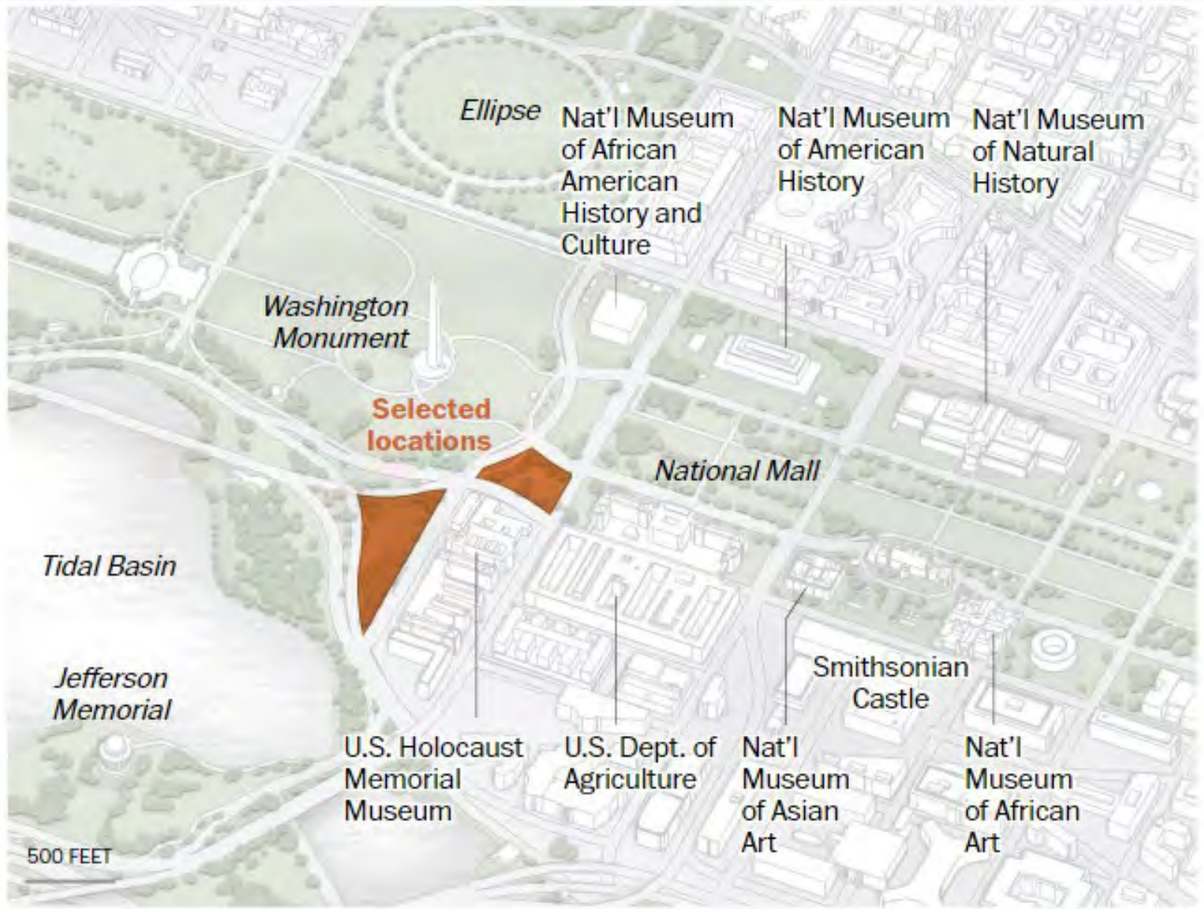
Washington Avenue & S. Capitol Street Interchange



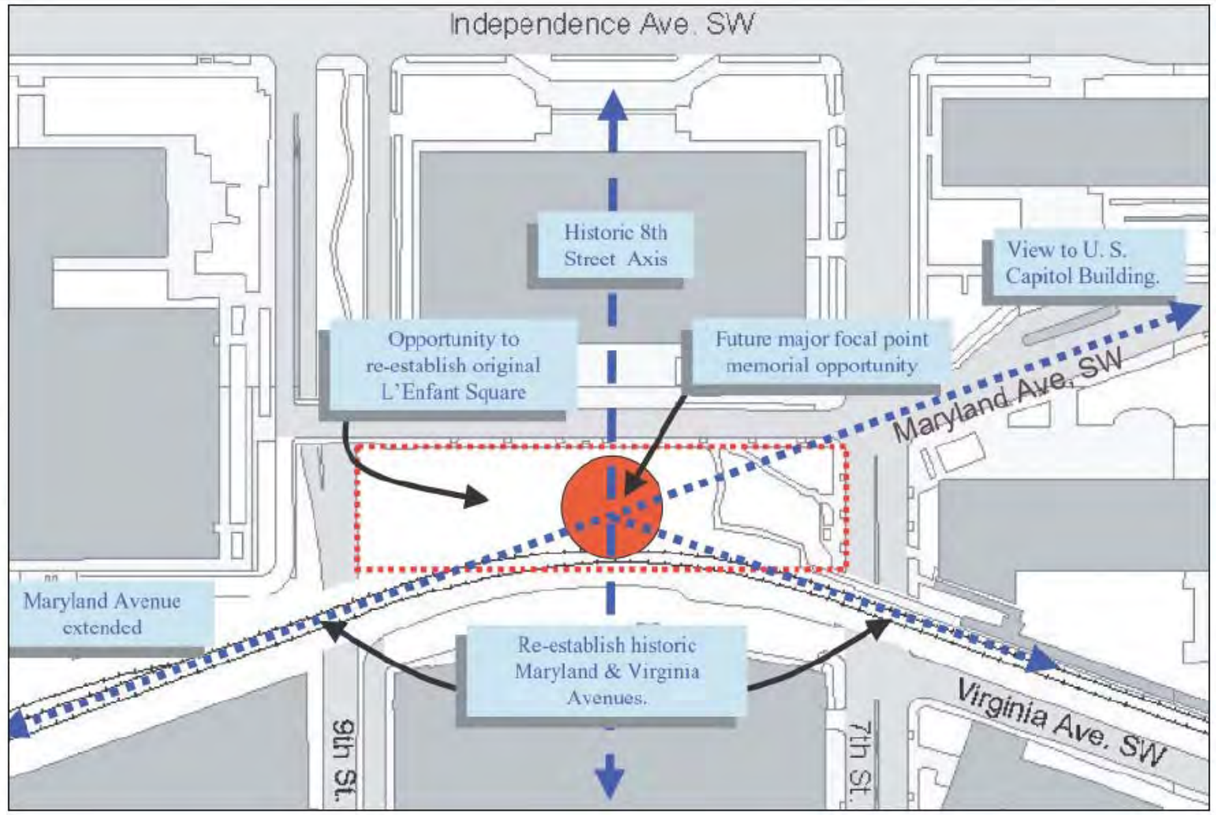


https://www.newfrederickdouglassbridge.com/_files/ugd/d5aa8e_4ec9086f61a342c880a9207da8bf1826.pdf

Potential Study Area Development Projects

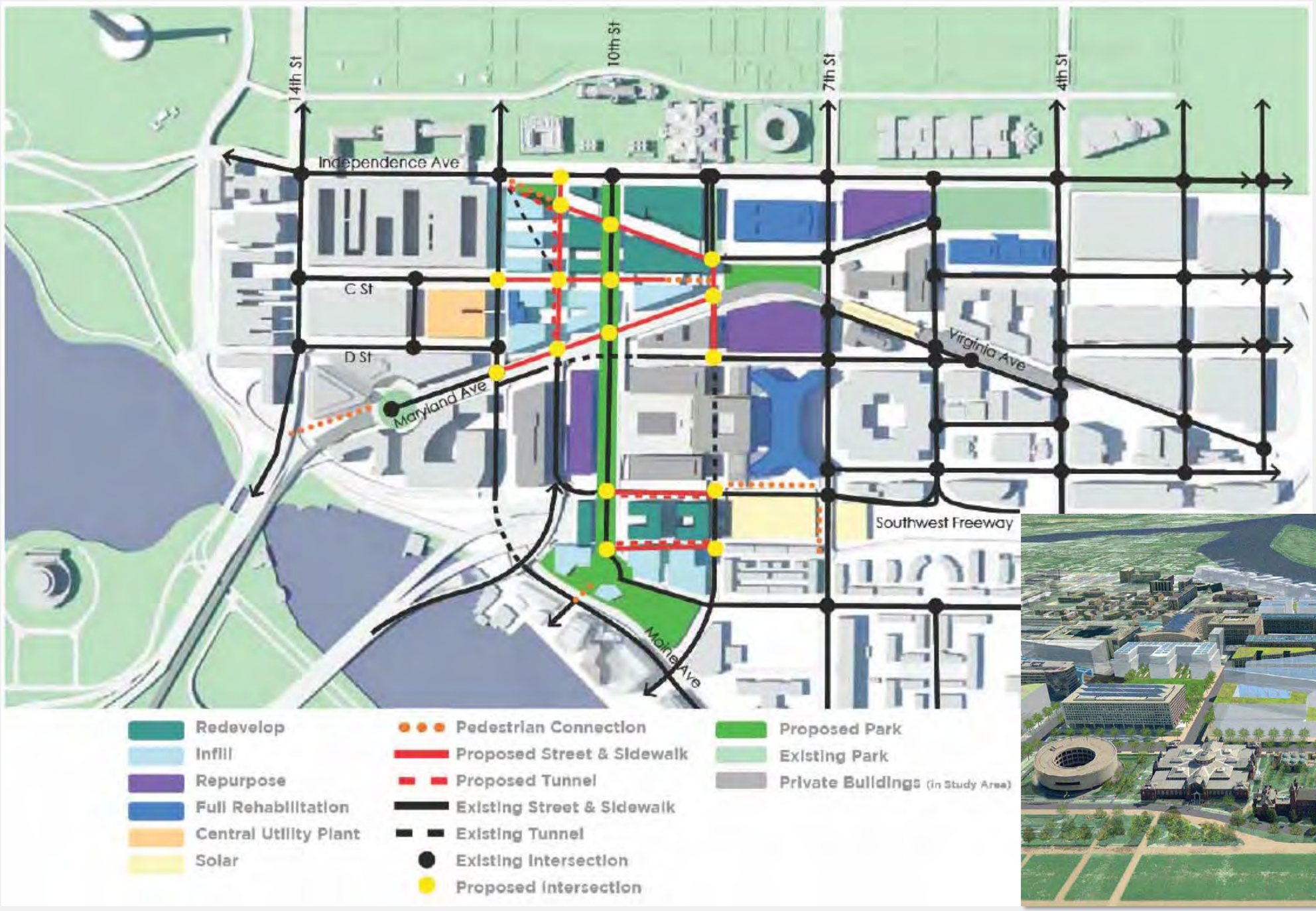


https://www.washingtonpost.com/arts-entertainment/2022/10/27/smithsonian-new-museums-latino-womens/



Memorials and Museums Master Plan

Potential Study Area Development Projects





SW Ecodistrict Plan

Meeting Agendas

Meeting 1: Multimodal Transportation Network

1:05 – 1:15	**Welcome and introductions**	**NCPC**
1:10 – 1:25	**Findings from the 2023 Corridor Study and the Traffic Study**	**Kittelson**
1:25 – 1:40	**Understanding of the surrounding transportation network** • Planned role of Independence Avenue SW, Jefferson Drive SW, and Madison Drive NW in the District's and National Mall's transportation network • Proposed connections to the Wharf, National Mall, and Downtown • Access to I-395 and regional connections • The transition of the corridor through the 15th Street intersection • The role of the corridor with potential changes to Washington Avenue SW and the S. Capitol Street interchange	**Kittelson**
1:40 – 1:50	**Transit Service on Independence Avenue SW** • The plans for the Circulator (or its replacement) • WMATA's Better Bus Network • Commuter bus service • SW Neighborhood Shuttle • Tourist-oriented services (Tours, Shuttles, Motorcoaches) • Metrorail entrance requirements • Connecting transit service at the Smithsonian Metrorail station	**Kittelson**
1:50 – 2:00	**Potential Mid-Block Crossings**	**Kittelson**
2:00 – 2:10	**Multimodal transportation utility of Maryland Avenue SW between 3rd Street and Independence Avenue SW**	**Kittelson**
2:10 – 2:15	**Recap and debrief**	**Kittelson**

Meeting 2: Urban Design & Streetscape

2:35 – 2:45	**Welcome and introductions**	**NCPC**
2:45 – 3:15	**Findings from the 2023 Corridor Study and Background Design Information**	**Kittelson**
3:15 – 3:30	**Other Study Area Efforts** S. Capitol Street interchange project | Washington Avenue SW | U.S. Department of Energy | Future Smithsonian Museums | National Mall U.S. Capitol Grounds | Future Monuments and Memorials	**Kittelson**
3:30 – 3:40	**Introduction to the Breakout Sessions**	**Kittelson**
3:40 – 3:50	**Break (and room reconfiguration)**	**All**
3:50 – 4:35	**Breakout sessions** **Three Sections:** 1. 3rd Street to 7th Street (including the 7th Street intersection) 2. 7th Street to L'Enfant Promenade (including the L'Enfant Promenade) 3. L'Enfant Promenade to 15th Street **Themes discussed during each breakout session:** **Streetscape** *Public space activation | Street furnishings | Corridor wayfinding and opportunities for a cohesive and coordinated wayfinding approach | Historic preservation requirements* *SW Ecodistrict Plan setback and build-to-line | Security requirements* **Green Infrastructure and Maintenance** *Landscaping | Green infrastructure | Stormwater management | Flooding and resilience | Maintenance requirements | Current and future maintenance of the corridor's landscape and sidewalks* **Multimodal Elements** *Walking environment | Cycle track need and design | Accessibility and Universal Design | Bus Stops | Metro Entrances | Bikeshare and Micromobility | Tourist-oriented bus services (Tours, Shuttles, Motorcoaches) | Street vending | Special Events with street closures on Independence Avenue SW or adjacent streets*	**Kittelson**
4:35 – 4:50	**Recap breakout sessions**	**Kittelson**
4:50 – 5:00	**Debrief**	**Kittelson**

Meeting 2 Breakout Sessions

Streetscape

1. What streetscape elements and furnishings can be introduced to activate the public space?
2. What opportunities are there to provide a coherent wayfinding system for the corridor?
3. How can streetscape elements fit within historic preservation requirements and the Southwest Ecodistrict Plan setback and build-to-lines?
4. What security requirements must be met, and how can streetscape elements be designed to meet these requirements?

Green Infrastructure and Maintenance

1. What landscaping elements should be consistently applied throughout the corridor?
2. How can green infrastructure be leveraged to manage stormwater requirements, mitigate flood risks, and complement landscaping elements?
3. How do maintenance requirements affect the types of landscaping and green infrastructure elements provided in the corridor?

Multimodal Elements

1. What design elements are necessary to provide a comfortable walking environment along the corridor?
2. How can the corridor design prioritize accessibility needs and universal design principles?
3. moveDC identified Independence Avenue as a key bicycle corridor. Where should bicycle facilities be placed? How should they be designed?
4. How should Independence Avenue be designed to facilitate access to Metro stations, bus stops, Capital Bikeshare stations, and micromobility vehicles?
5. How should tourist-oriented bus services (tours, shuttles, motorcoaches) be accommodated?
6. How should street vendors be accommodated?
7. How should the corridor be designed to accommodate special events and street closures on Independence Avenue and side streets?

1. 3rd Street to 7th Street (including 7th Street intersection)
2. 7th Street to L'Enfant Promenade (including the L'Enfant Promenade)
3. L'Enfant Promenade to 15th Street



Meeting 3: Deliveries and Facility Requirements

3A: Smithsonian Institution and National Mall

9:05 – 9:10	**Welcome and introductions**	**Smithsonian Planning & NCPC**
9:10 – 9:20	**Findings from the 2023 Corridor Study and Background Design Information**	**Kittelson**
9:20 – 10:15	**Verify specific Smithsonian Institution and National Park Service requirements for buildings on the north side of the corridor** • Deliveries • Security • Special events • Tourist-oriented bus services (Tours, Shuttles, Motorcoaches)	**Kittelson**
10:15 – 10:30	**Recap discussion and debrief**	**Kittelson**

3B: Federal Buildings

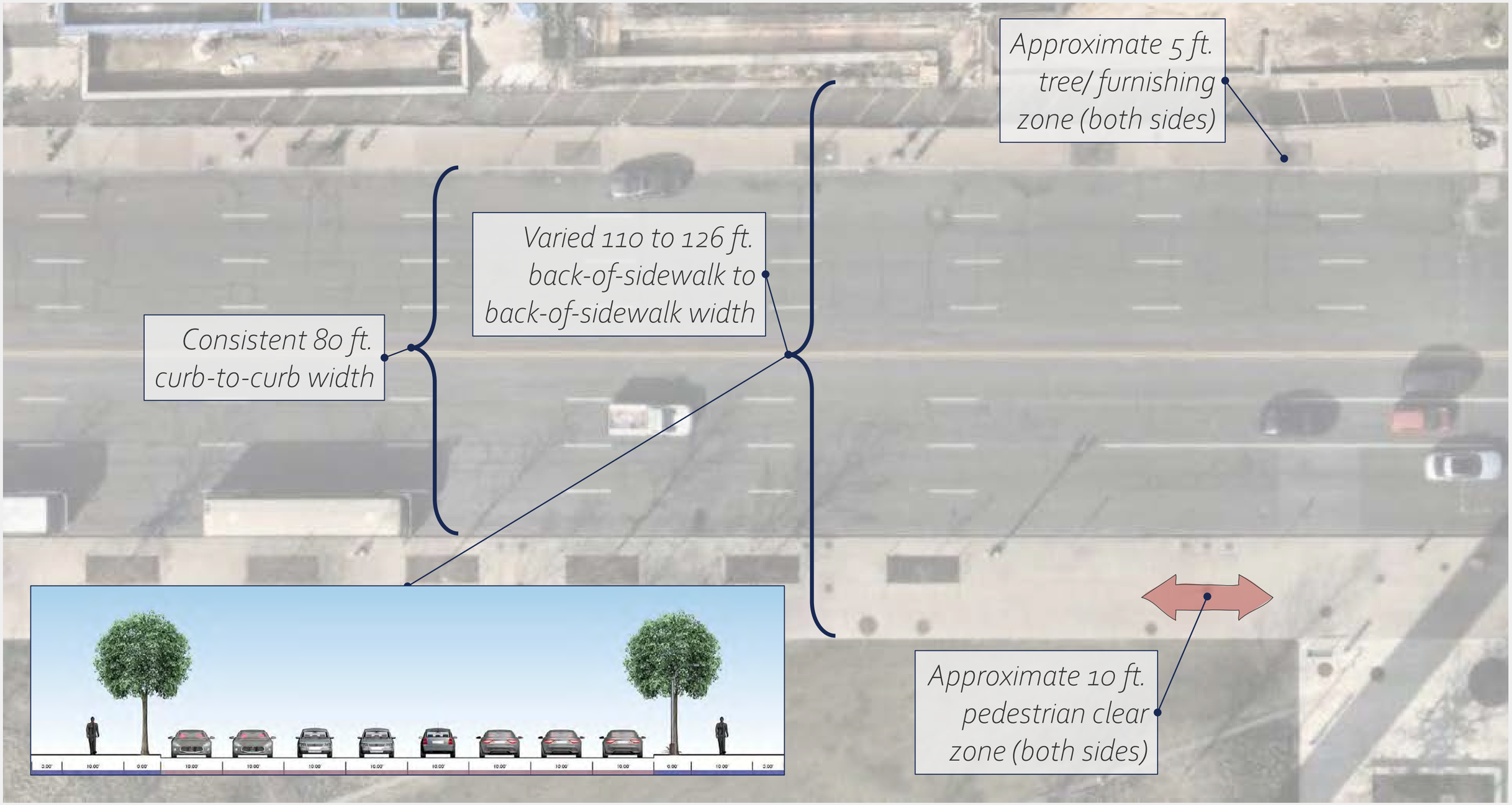
11:05 – 11:10	**Welcome and introductions**	**NCPC**
11:10 – 11:20	**Findings from the 2023 Corridor Study and Background Design Information**	**Kittelson**
11:20 – 11:50	**Verify specific Federal building requirements for the corridor** • Curbside access and the need for curb cuts, driveways, and pull-out pick-up/drop-off areas • Deliveries • Security • Special events	**Kittelson**
11:50 – Noon	**Recap discussion and debrief**	**Kittelson**

Meeting 4: U.S. Capitol Grounds Coordination

1:05 – 1:10	**Welcome and introductions**	**NCPC**
1:10 – 1:20	**Findings from the 2023 Corridor Study and Background Design Information**	**Kittelson**
1:20 – 1:50	**Transition of Independence Avenue SW from 3rd Street to 1st Street SW** • Transition blocks where the roadway reduces from eight lanes at 3rd Street to four lanes at 1st Street SW • Streetscape and sidewalk design • Future plans related to the U.S. Capitol Grounds and U.S. Botanic Gardens • Multimodal transportation connections through the U.S. Capitol Grounds • Security requirements and restrictions	**Kittelson**
1:50 – 2:00	**Recap discussion and debrief**	**Kittelson**

Design Information

Current Independence Ave SW Roadway



SW Ecodistrict Plan:
Existing and Proposed Setbacks

"*The* SW Ecodistrict Plan*/model assumed a setback of approximately 34 ft. from the southern right-of-way (ROW) line to align with the corner of the USDA South Building that is inset at the intersection of 12th Street and Independence Avenue to align with the northeast reentrant corner of the USDA building at 12th and Independence.*

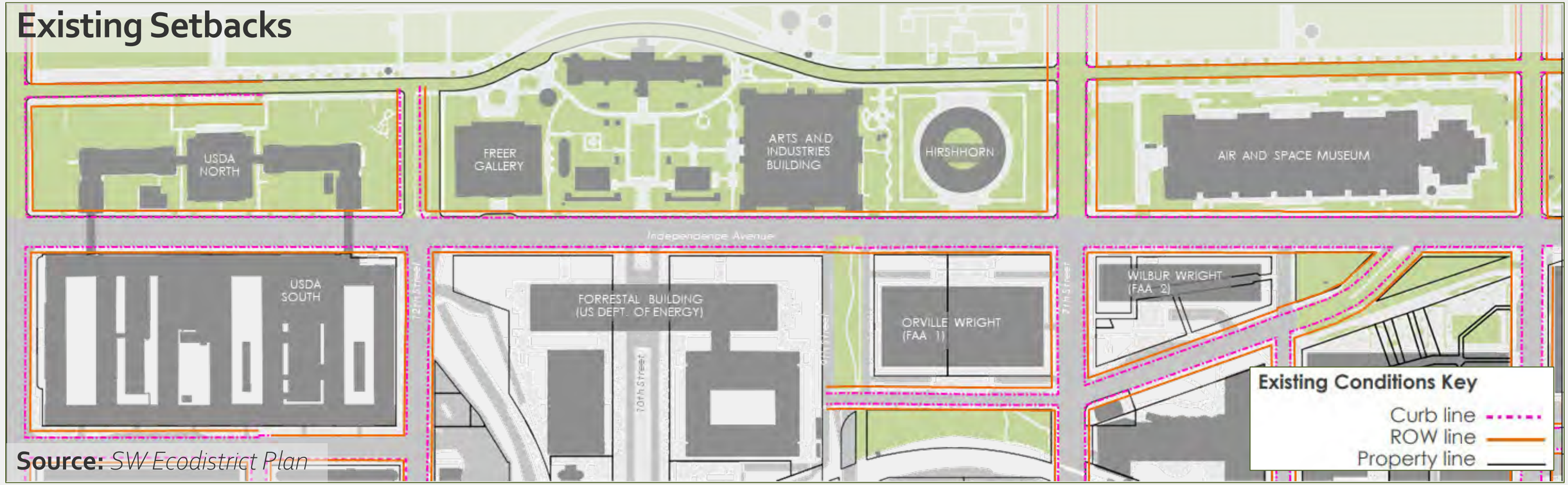
The purpose of this setback is to maintain a similar setback as the Smithsonian buildings, and provide more ample sidewalk space and sunlight than what currently exists in front of the USDA south building. As important, the 34ft. setback helps to mitigate the impact of the proposed height (130 ft. inclusive of penthouse and mechanical equipment) on Independence Avenue as viewed from the National Mall."



Model image of Independence Avenue looking east (top) and west (bottom) as proposed in the SW Ecodistrict Plan

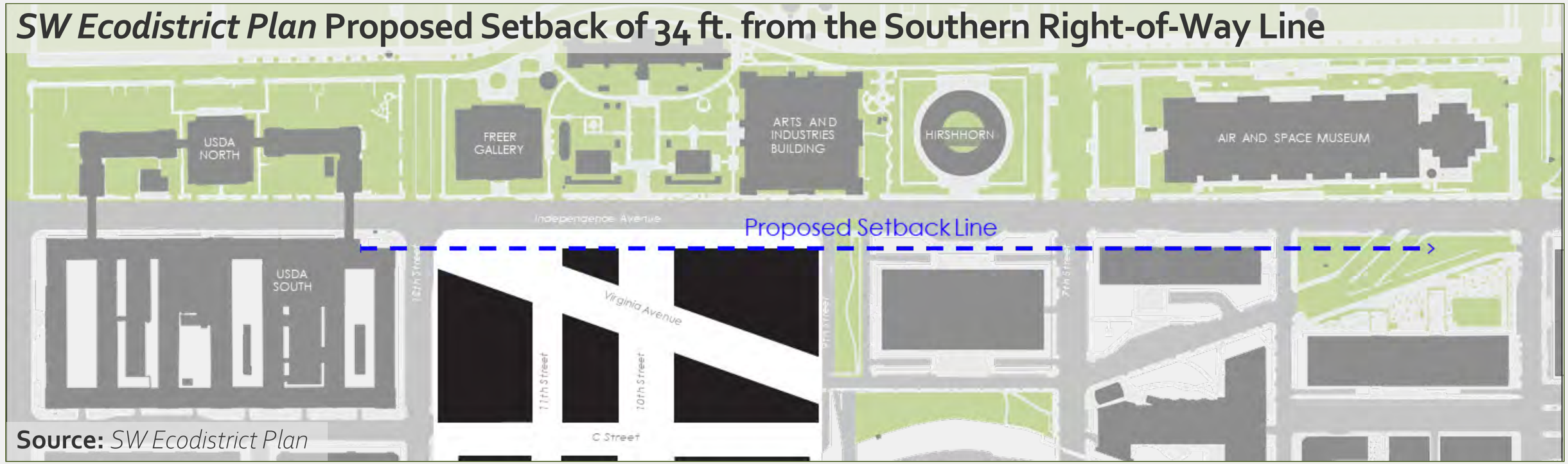


Existing Setbacks



Source: *SW Ecodistrict Plan*

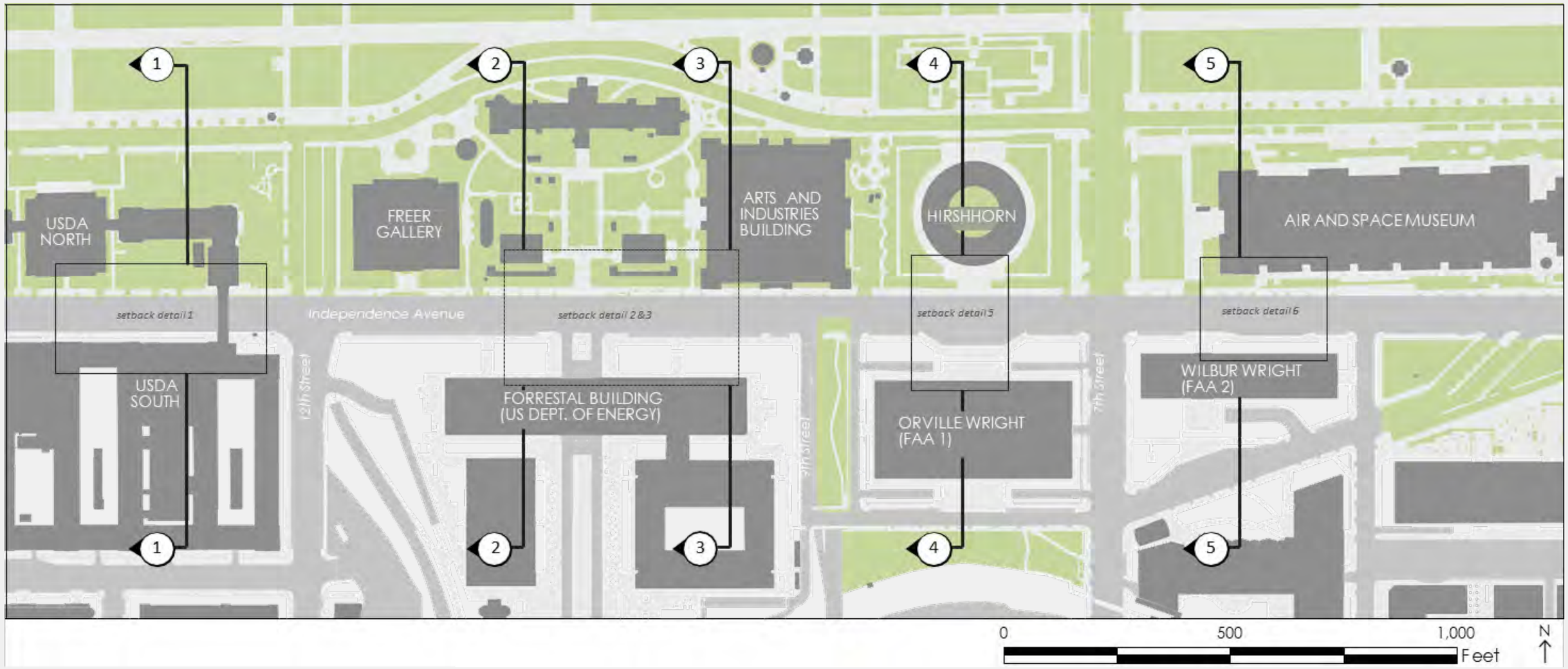
SW Ecodistrict Plan Proposed Setback of 34 ft. from the Southern Right-of-Way Line



Source: *SW Ecodistrict Plan*

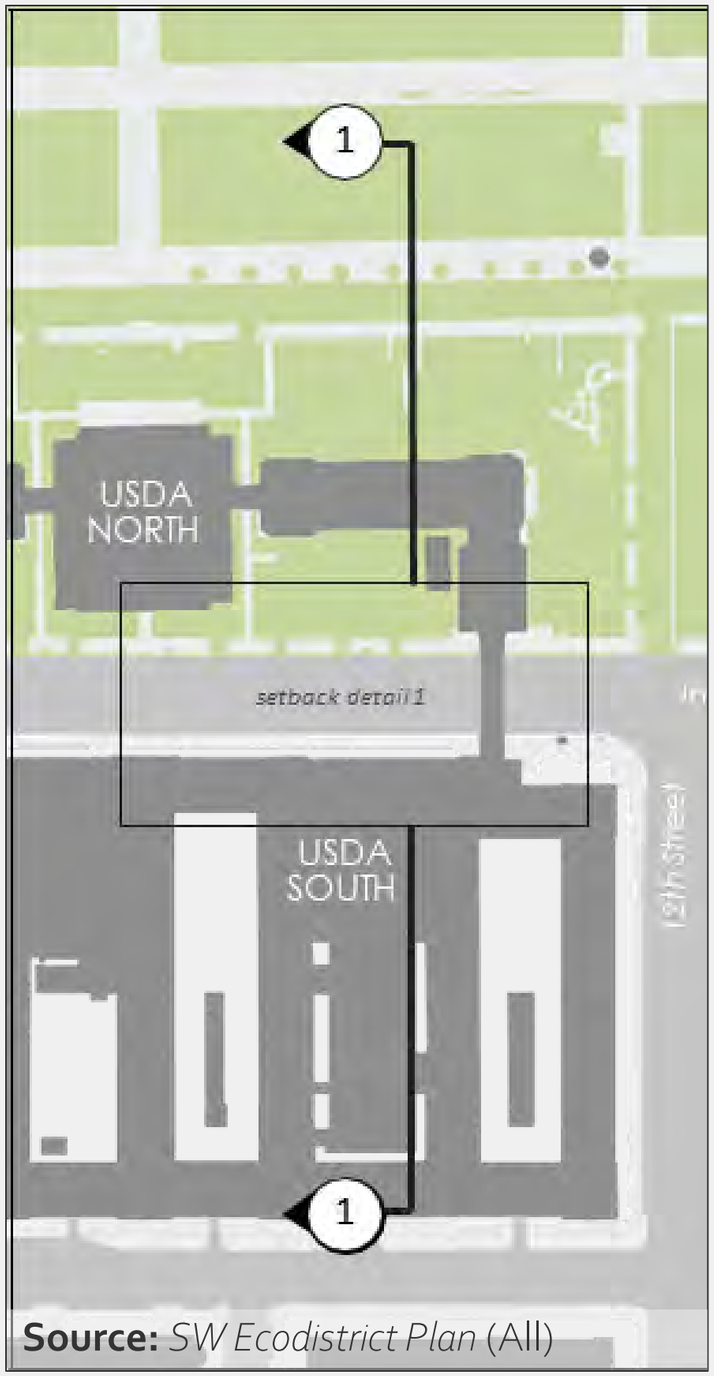
***SW Ecodistrict Plan*: Existing and Proposed Setbacks**

Independence Avenue SW Sections and Details

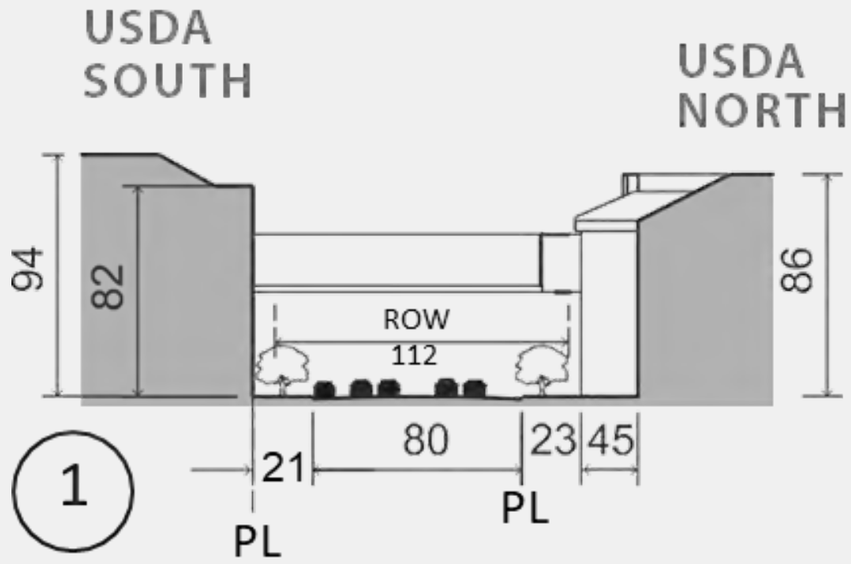


Source: *SW Ecodistrict Plan*

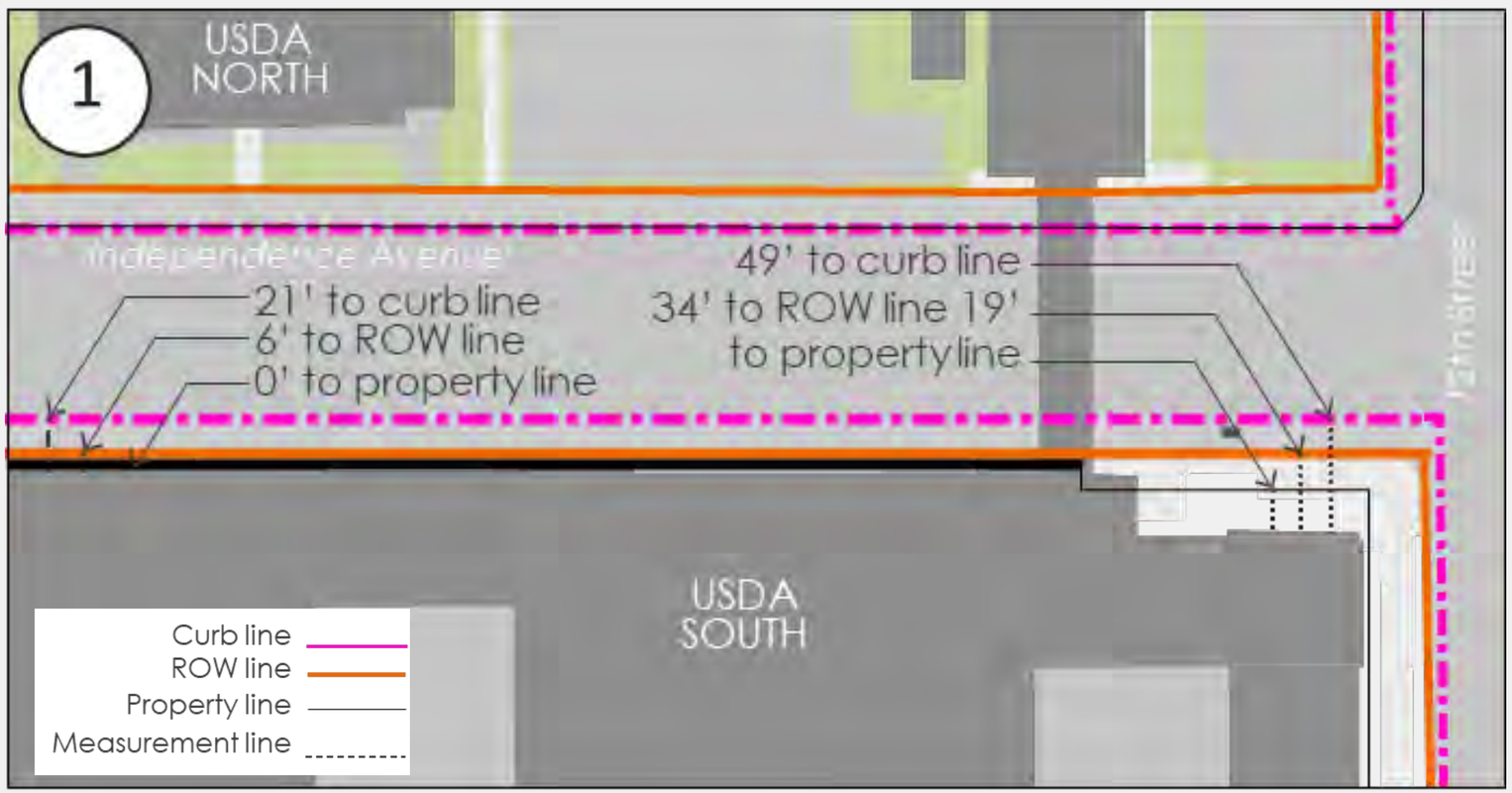
Independence Avenue SW Sections and Details



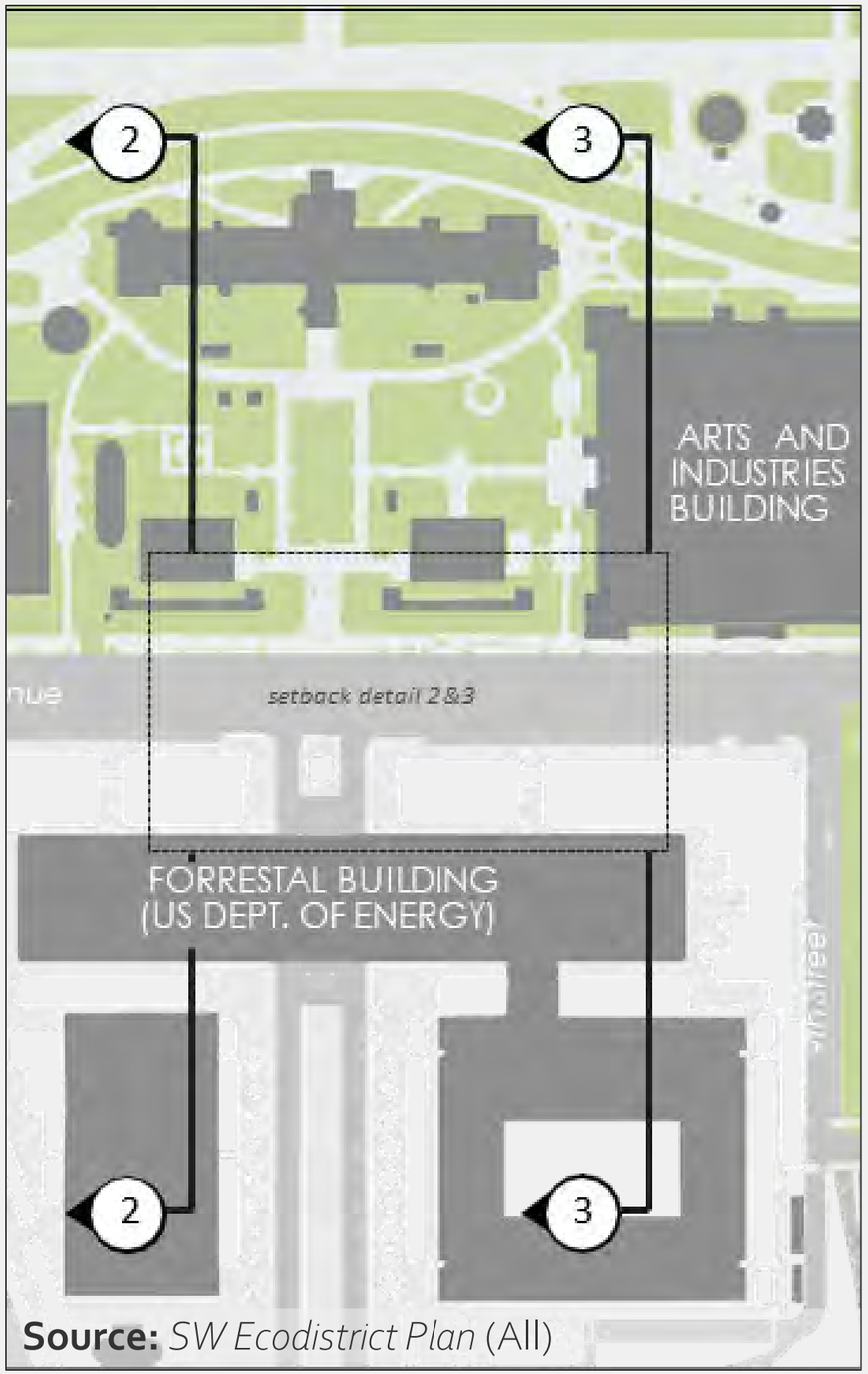
Source: *SW Ecodistrict Plan* (All)



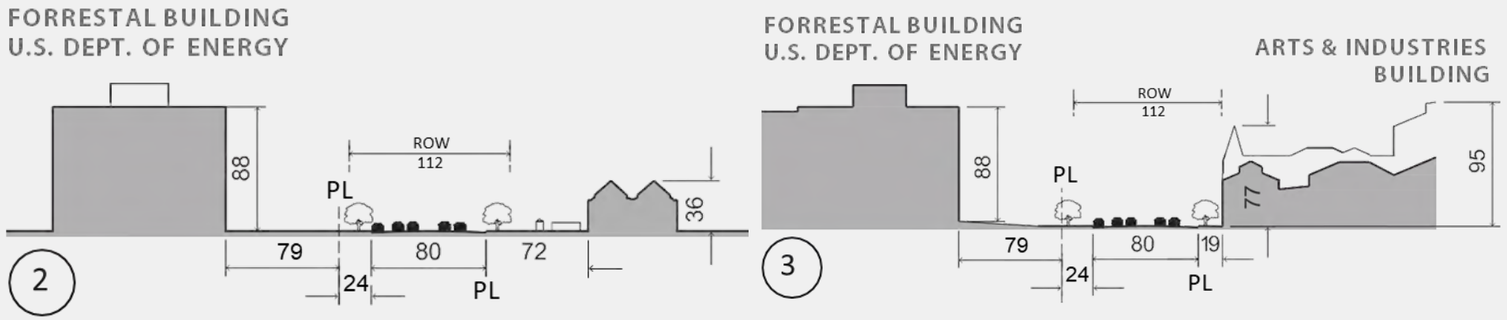
Existing height and setback of buildings on Independence Avenue SW



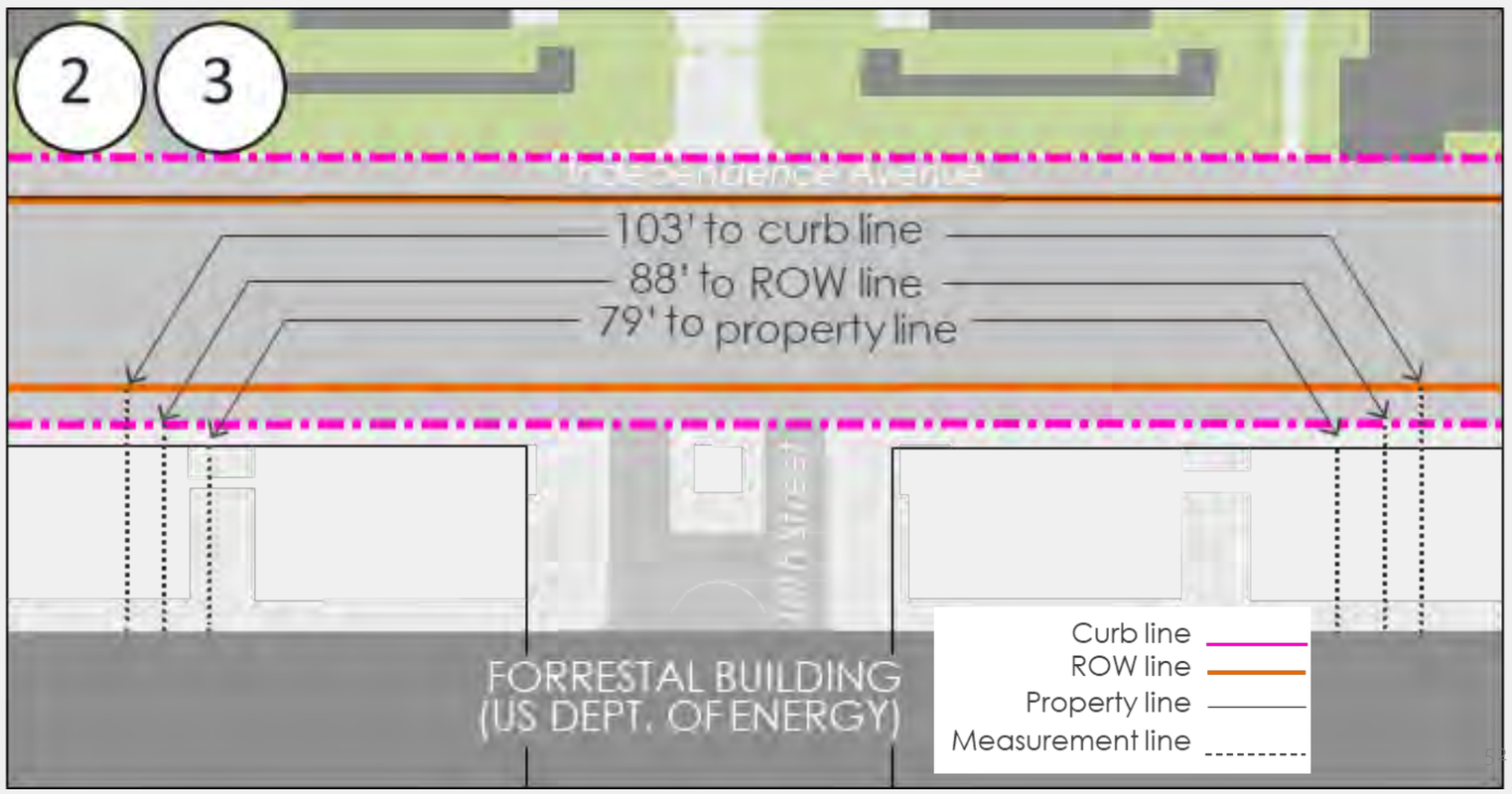
Independence Avenue SW Sections and Details



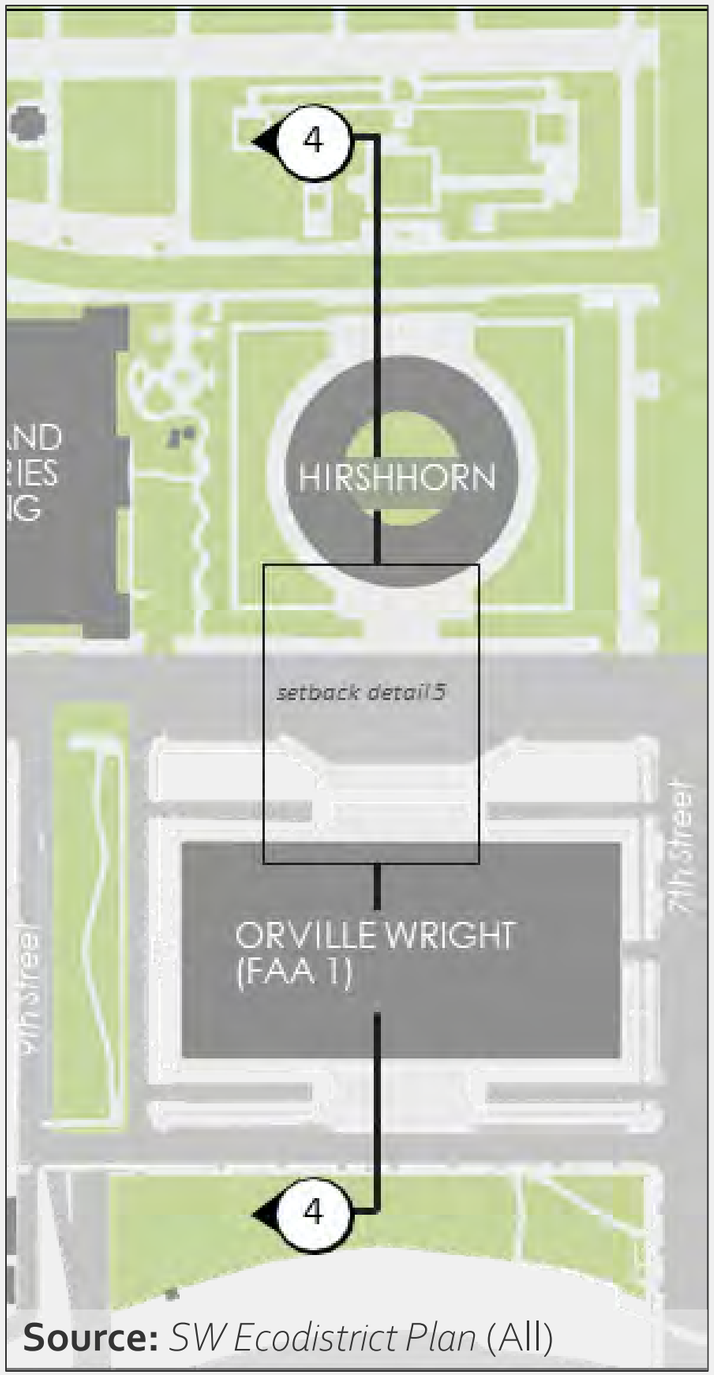
Source: *SW Ecodistrict Plan* (All)



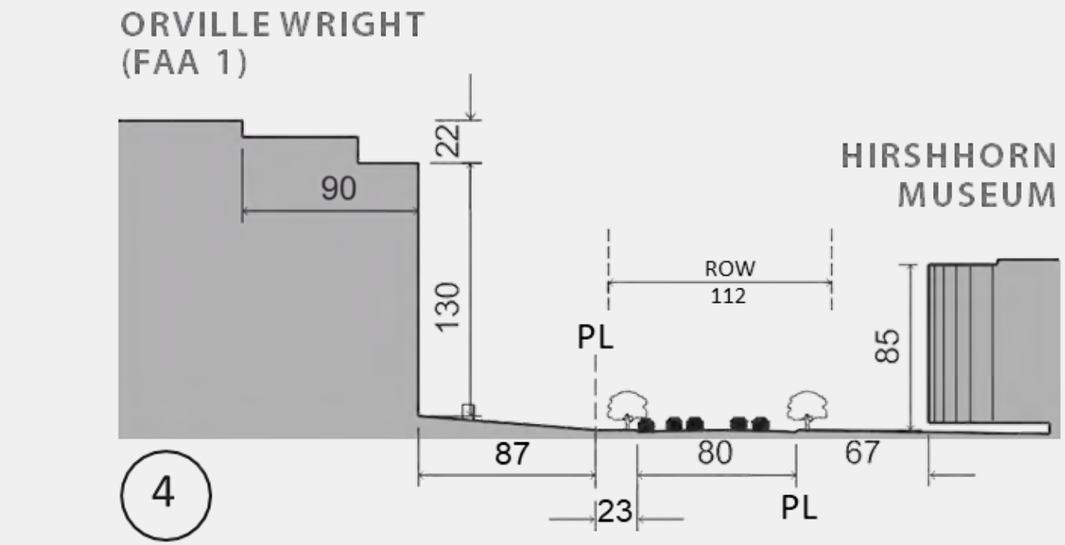
Existing height and setback of buildings on Independence Avenue SW



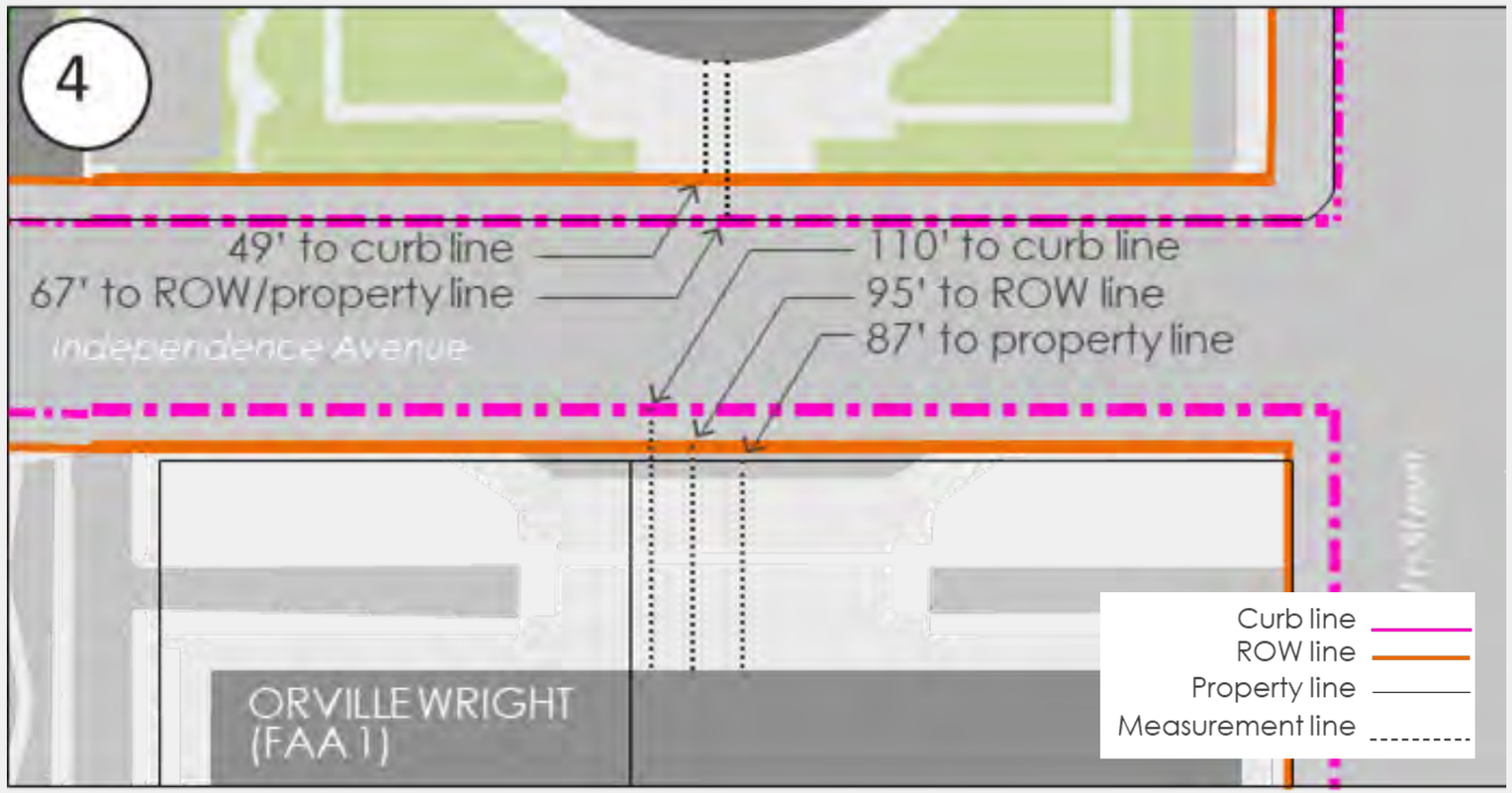
Independence Avenue SW Sections and Details



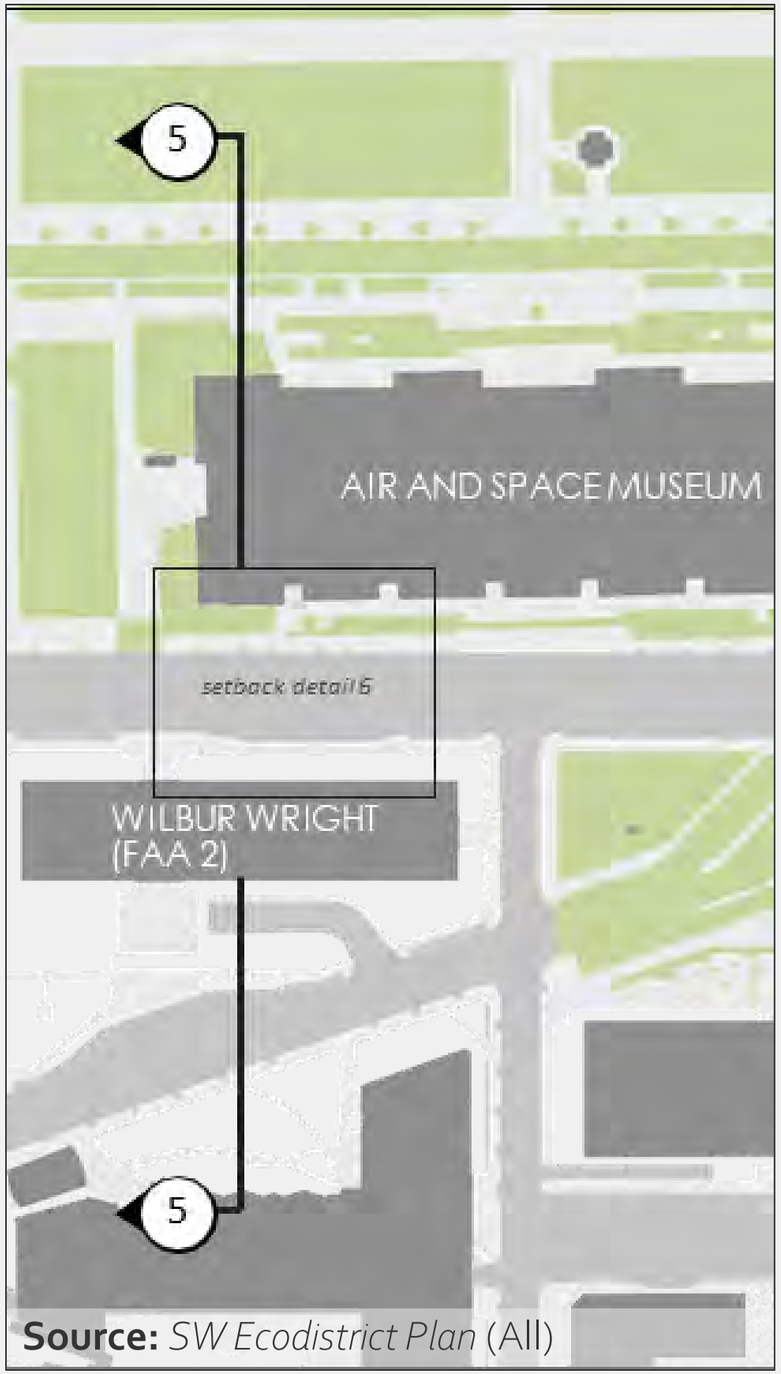
Source: *SW Ecodistrict Plan* (All)



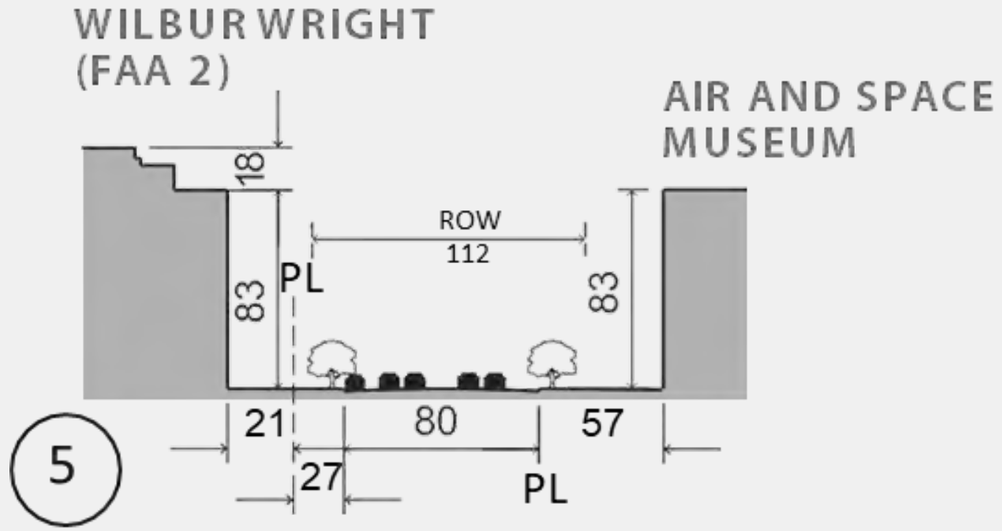
Existing height and setback of buildings on Independence Avenue SW



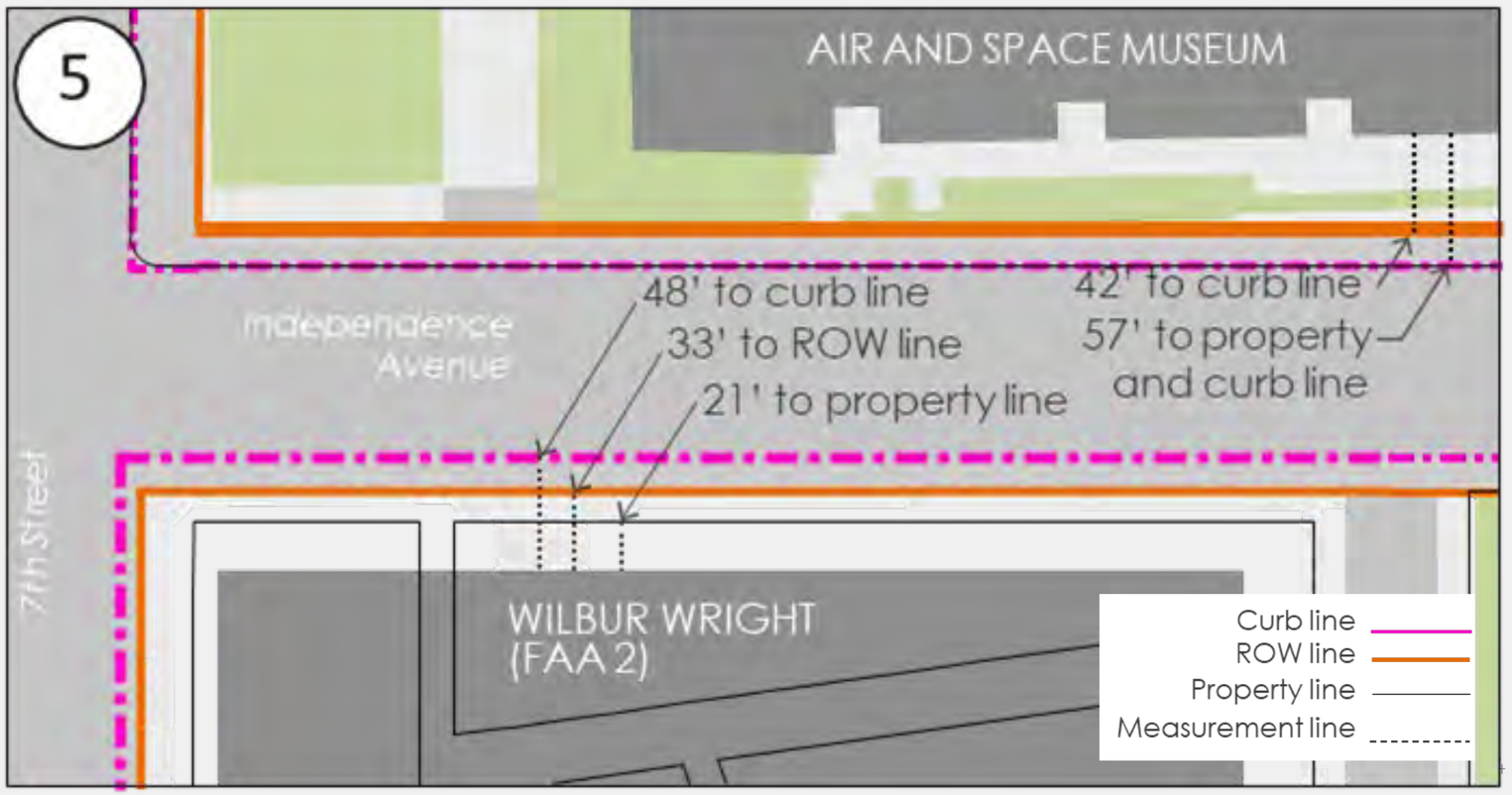
Independence Avenue SW Sections and Details



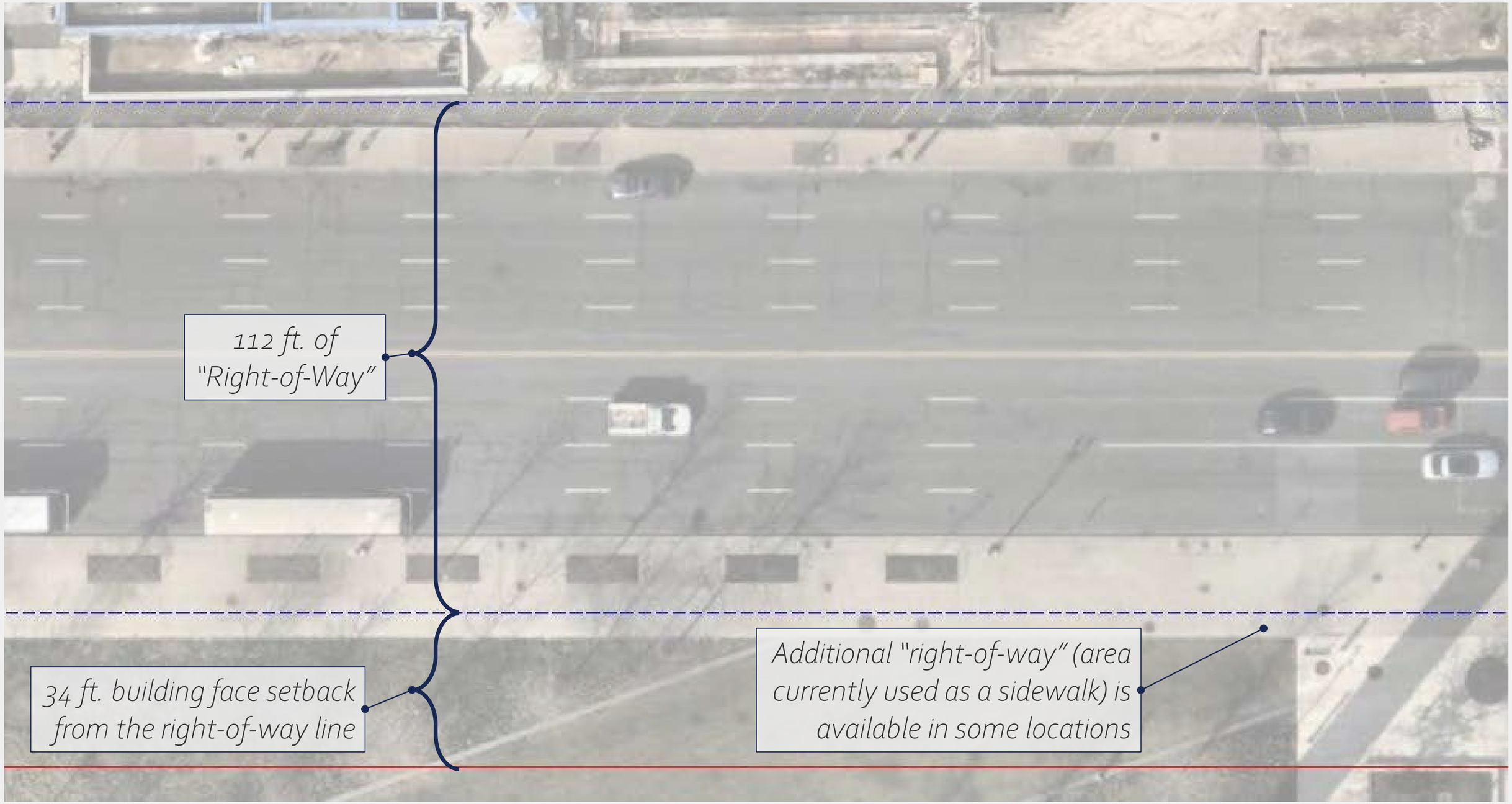
Source: *SW Ecodistrict Plan* (All)



Existing height and setback of buildings on Independence Avenue SW

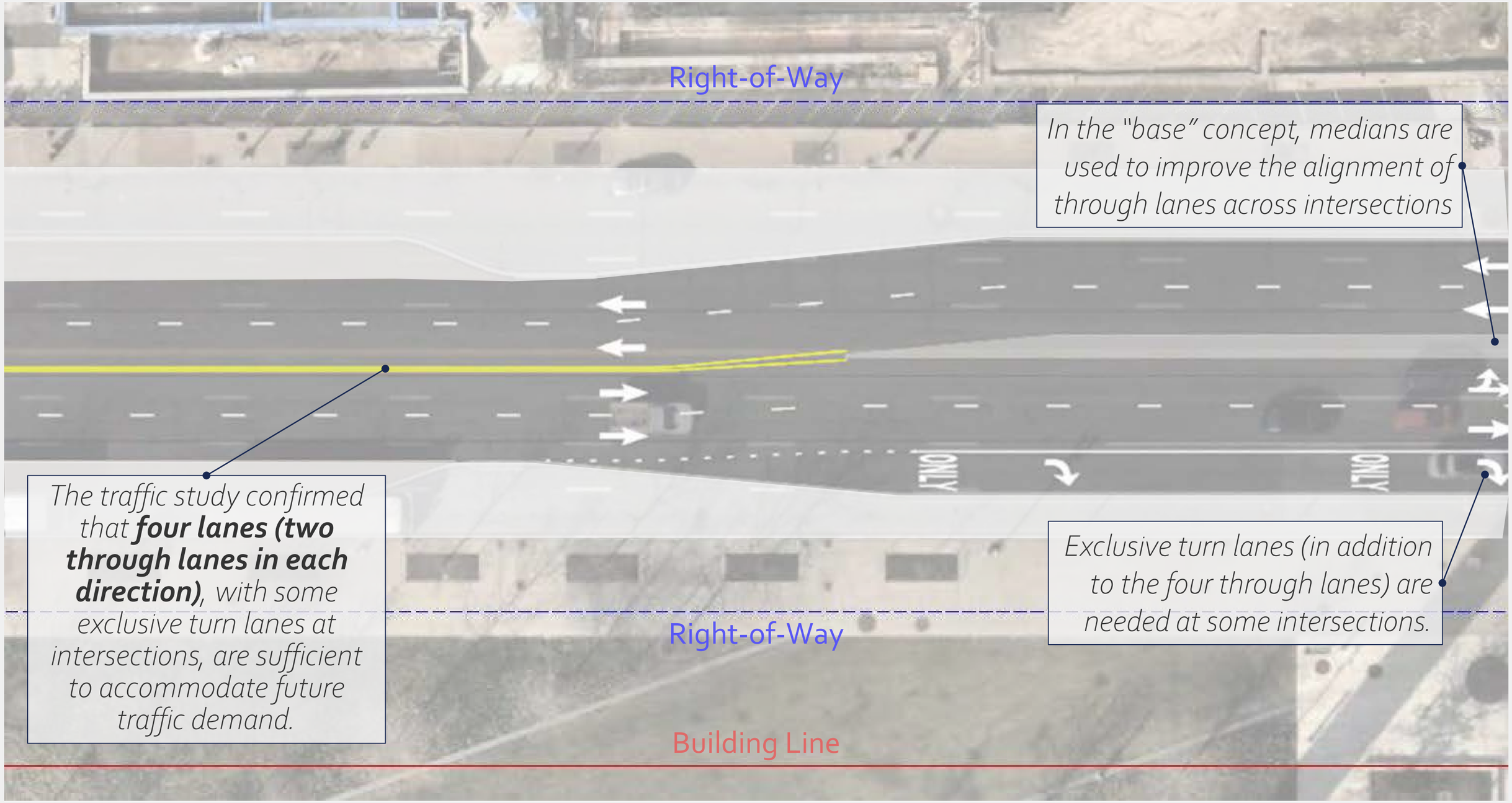


Corridor Right-of-Way (from the *SW Ecodistrict Plan*)



Note: *Kittelson set the building face setback and right-of-way lines using GIS information from DC Open Data. While the aerial imagery is scaled and georeferenced, the projection of buildings and other physical elements should be considered reasonably but not absolutely accurate in their portrayal.*

"Base" Concept Design



Note: *Kittelson set the building face setback and right-of-way lines using GIS information from DC Open Data. While the aerial imagery is scaled and georeferenced, the projection of buildings and other physical elements should be considered reasonably but not absolutely accurate in their portrayal.*

"Base" Concept Design

Consistent "edge lines" help us align visually important elements like tree lines, the pedestrian clear zone, and potential bicycle facilities.

Right-of-Way

30 ft. right-of-way to the edge line on the north side

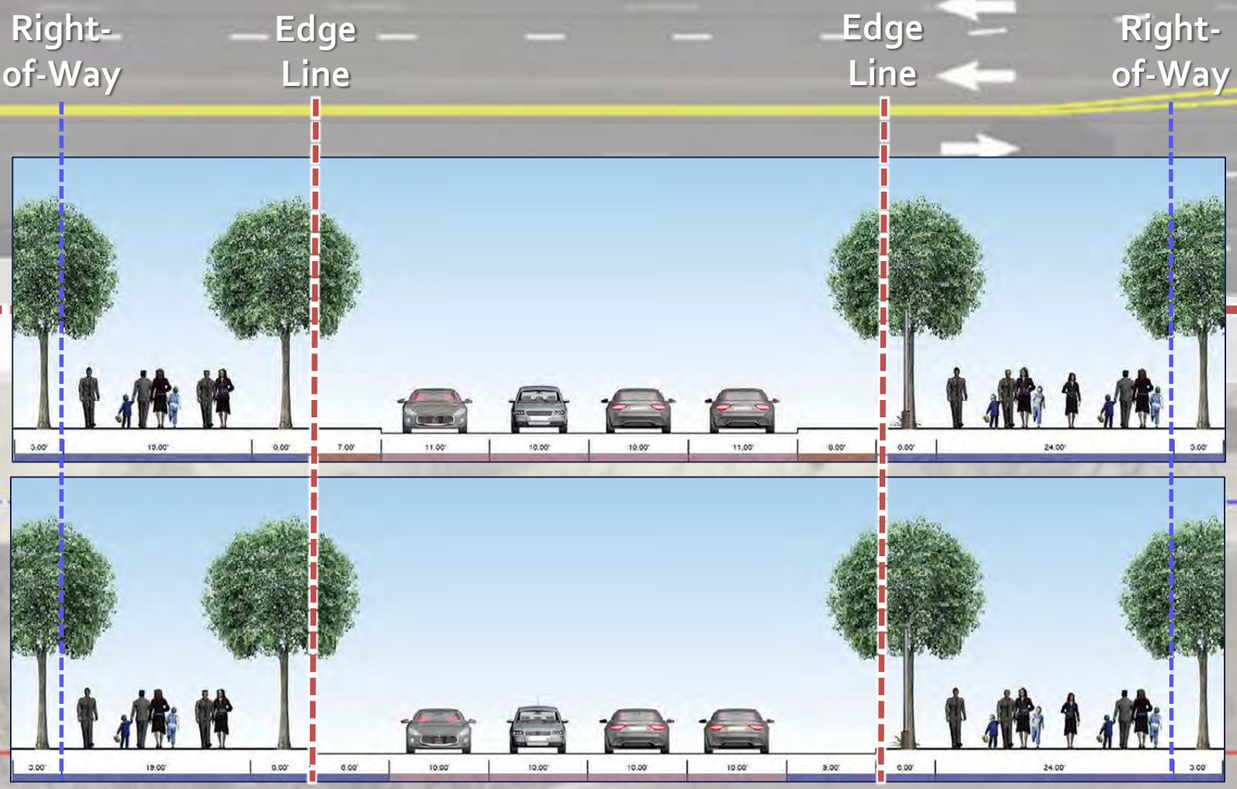
Consistent "Edge" Line

Right-of-Way

Edge Line

Edge Line

Right-of-Way



57 ft. (maximum) curb-to-curb width

Consistent "Edge" Line

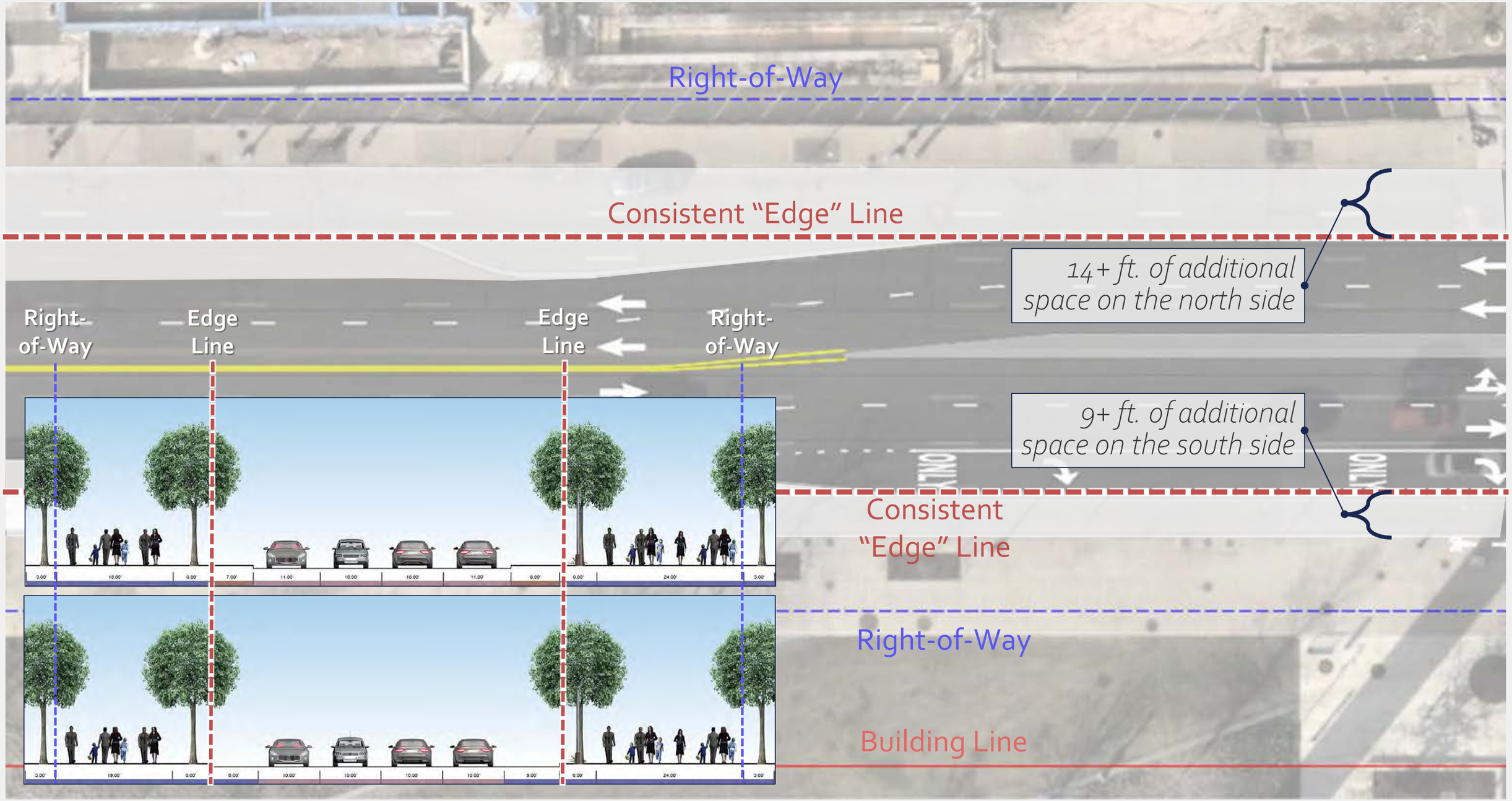
25 ft. right-of-way to the edge line on the south side

Right-of-Way

Building Line

Note: *Kittelson set the building face setback and right-of-way lines using GIS information from DC Open Data. While the aerial imagery is scaled and georeferenced, the projection of buildings and other physical elements should be considered reasonably but not absolutely accurate in their portrayal.*

"Base" Concept Design



Note: *Kittelson set the building face setback and right-of-way lines using GIS information from DC Open Data. While the aerial imagery is scaled and georeferenced, the projection of buildings and other physical elements should be considered reasonably but not absolutely accurate in their portrayal.*

Streetscape Zones

Within the 112 ft. right-of-way width, the corridor's cross-section is made of various components.

Building/Park Frontage Zone (width varies beyond the 112 ft. right-of-way)

Pedestrian Clear Zone (15 ft. width on the north side)

Furnishing, Civic Infrastructure & Bicycle Facility Zone (9 ft. includes 2 ft. buffers on both sides of a 5 ft. bike lane)

Landscape & Step-Out Zone (6 ft. minimum width to Edge Line; Actual width varies)

Edge Lane: Curbside Travel Lane (11 ft.), Flex/Curbside Access (9 ft.) or Additional Curb-Level Space (varies)

Travel Lanes (42 to 57 ft.)

Edge Lane: Curbside Travel Lane (11 ft.), Flex/Curbside Access (8 ft.) or Additional Curb-Level Space (varies)

Landscape & Step-Out Zone (6 ft. minimum width to Edge Line; Actual width varies)

Furnishing, Civic Infrastructure & Bicycle Facility Zone (9 ft.)

Pedestrian Clear Zone (10 ft. width on the south side)

Building/Park Frontage Zone (set at 34 ft. per the *SW Ecodistrict Plan*; Current width varies beyond the 112 ft. right-of-way)

Figure PC-1: Streetscape Zones



Definitions of Streetscape Zones

- **Pedestrian Circulation:** Containing unobstructed space for pedestrian circulation.
- **Furnishing and Civic Infrastructure:** Containing streetlights, banners, benches, trash/recycling receptacles, bicycle racks, car charging stations, parking stations, and parking/traffic/regulatory signs.
- **Step-Out:** Containing bus stops and dedicated areas for loading/unloading.
- **Building Yard and Park Frontage:** Containing landscaped areas and building, exhibit, and/or wayfinding signage, and perimeter security.
- **Vending:** Containing temporary areas for commercial services and operations such as ordering and queuing.
- **Bicycles and Micromobility Vehicles:** Containing dedicated space for bicycles and micromobility vehicles, where appropriate.

Principle: *Improve pedestrian circulation and enhance streetscape consistency by coordinating pedestrian circulation zones with other streetscape zones.*

Figure PC-1: Streetscape Zones



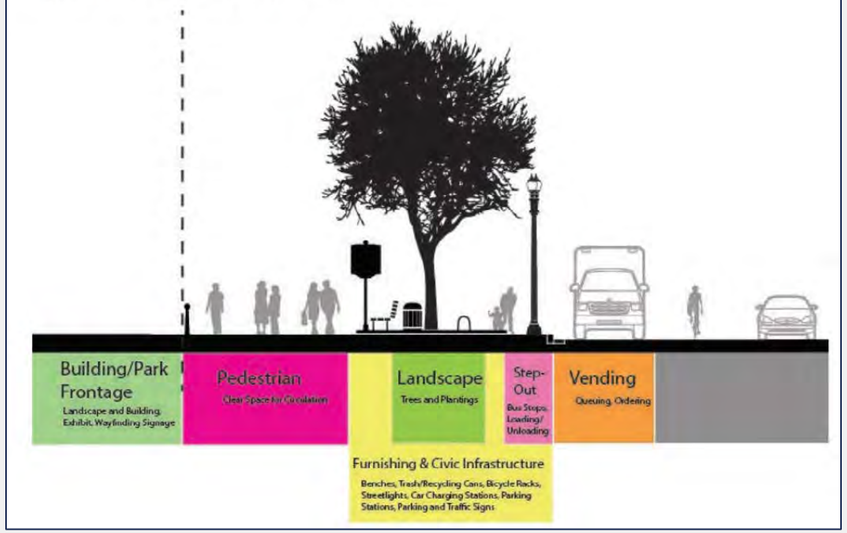
Source: *Monumental Core Streetscape Design Guidelines* (All)

Definitions of Streetscape Zones

- **Pedestrian Circulation:** Containing unobstructed space for pedestrian circulation.
  - **Principle:** Ensure pedestrian circulation spaces are consistently aligned and can accommodate pedestrian volumes, visitor populations, and movement patterns unique to the National Mall and surrounding areas.
    - **PC-12:** Prioritize universal accessibility when considering the space needed for pedestrian circulation, historic preservation goals, and security concerns
  - **PC-13:** Align pedestrian circulation zones between blocks
  - **PC-14,-15,-16,-17,-18:** Ensure circulation routes are adequately sized and meet minimum requirements
  - **PC-19:** Consider exceeding minimum widths where the number of pedestrians or types of users require doing so
  - **PC-20:** Exceptions for historic resources and WMATA infrastructure
  - **PC-21:** Consider pedestrian protection where appropriate

Principle: *Improve pedestrian circulation and enhance streetscape consistency by coordinating pedestrian circulation zones with other streetscape zones.*

Figure PC-1: Streetscape Zones



Source: *Monumental Core Streetscape Design Guidelines* (All)

Definitions of Streetscape Zones

- **Furnishing and Civic Infrastructure:** Streetlights, banners, benches, trash/recycling receptacles, bicycle racks, car charging stations, parking stations, and parking/traffic/regulatory signs.
  - **Principle:** Ensure pedestrian circulation space is unobstructed by furnishings and civic infrastructure.
    - **PC-23:** Consolidate and align furnishings and civic infrastructure between blocks
    - **PC-24:** Ensure that pedestrian-oriented wayfinding signs and elements are properly located
    - **PC-25:** Ensure that perimeter security elements do not obstruct pedestrian circulation
    - **PC-26:** Minimize the physical and visual impact of utilitarian measures within public space
    - **PC-27:** Consult and coordinate with the District's Design and Engineering Manual (DEM)

Principle: *Improve pedestrian circulation and enhance streetscape consistency by coordinating pedestrian circulation zones with other streetscape zones.*

Figure PC-1: Streetscape Zones



Source: *Monumental Core Streetscape Design Guidelines* (All)

Definitions of Streetscape Zones

- **Coordination with Other Travel Modes**
  - **Principle:** Ensure pedestrian circulation space is unobstructed, well-coordinated, and connected with other travel modes and related infrastructure.
    - **PC-31:** Prioritize pedestrian movement along sidewalks
    - **PC-32:** Create dedicated space for low-stress bicycle and micromobility vehicles within roadways and support NPS and DDOT efforts to develop separate facilities

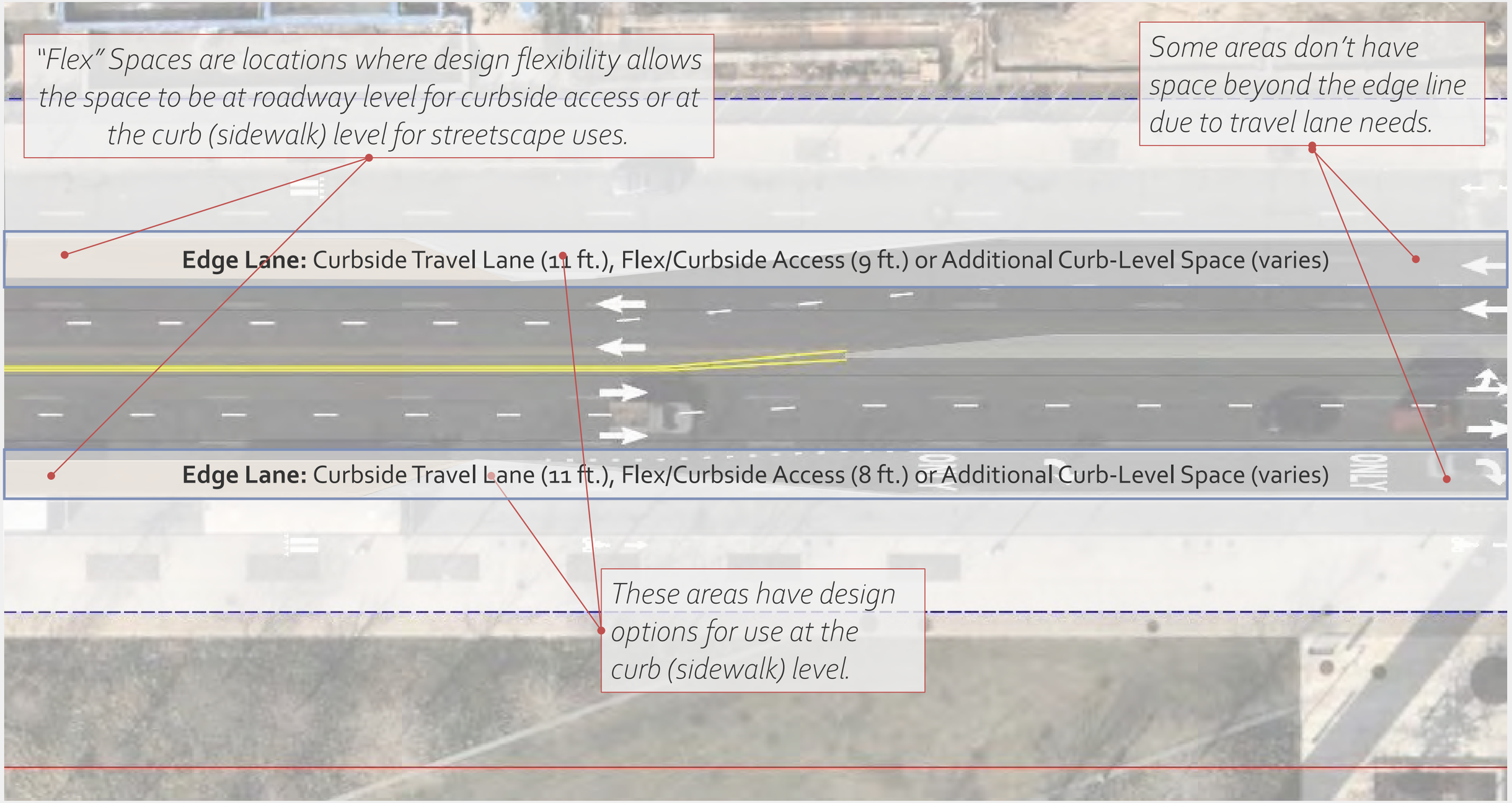
Principle: *Improve pedestrian circulation and enhance streetscape consistency by coordinating pedestrian circulation zones with other streetscape zones.*

Figure PC-1: Streetscape Zones

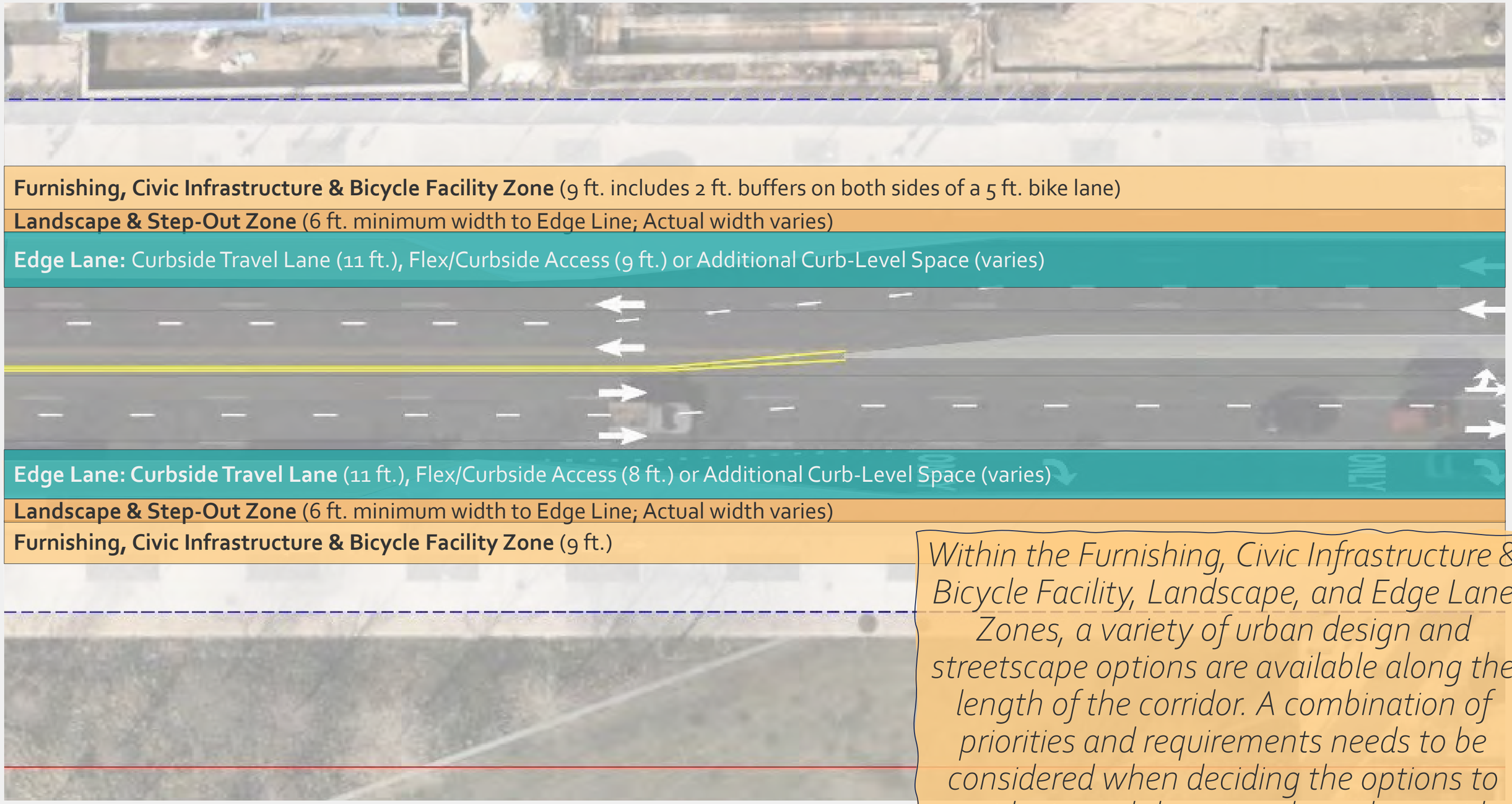


Source: *Monumental Core Streetscape Design Guidelines* (All)

Edge Lane


"Flex" Spaces are locations where design flexibility allows the space to be at roadway level for curbside access or at the curb (sidewalk) level for streetscape uses.
Some areas don't have space beyond the edge line due to travel lane needs.
Edge Lane: Curbside Travel Lane (11 ft.), Flex/Curbside Access (9 ft.) or Additional Curb-Level Space (varies)
Edge Lane: Curbside Travel Lane (11 ft.), Flex/Curbside Access (8 ft.) or Additional Curb-Level Space (varies)
These areas have design options for use at the curb (sidewalk) level.

Urban Design and Streetscape Options



Within the Furnishing, Civic Infrastructure & Bicycle Facility, Landscape, and Edge Lane Zones, a variety of urban design and streetscape options are available along the length of the corridor. A combination of priorities and requirements needs to be considered when deciding the options to consider in each location along the corridor.

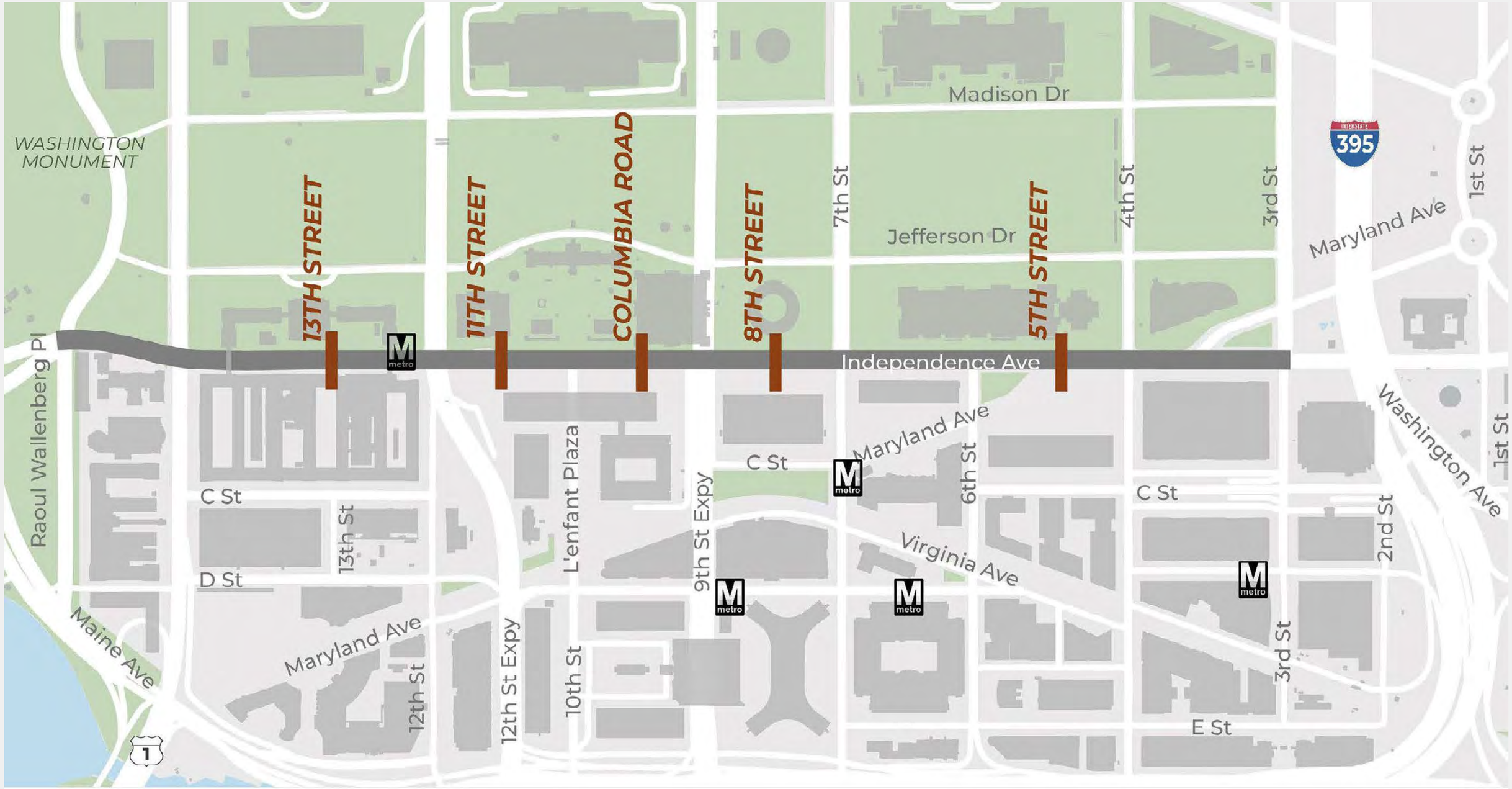
Urban Design and Streetscape Options

A variety of urban design and streetscape options are available along the corridor. A combination of priorities and requirements needs to be considered when deciding the options to consider in each location along the corridor.

Options include:

- Accessible curb ramps *(required at all pedestrian crossings – these can also be provided in mid-block locations to allow accessible curbside access)*
- Accessible parking
- Artwork
- Benches, chairs, and other seating
- Bicycle facilities (one-way; two-way)
- Bus stop boarding
- Curb extensions
- Driveways
- Fire hydrants and emergency access
- Landscaping and green infrastructure
- Loading and deliveries
- Medians (landscaped or paved)
- Motorcoach drop-offs and boarding; staging
- Other street furnishings
- Open spaces
- Playgrounds
- Pedestrian clear zones
- Retail and vending
- Ride-hail app pick-up/drop-off zones
- Sidewalk cafes
- Signalized mid-block crossings
- Security installations (bollards and other treatments)
- Special events
- Stormwater treatment
- Street programming
- Streetlights
- Tables
- Trash cans
- Trees
- Visitor entrances
- Wayfinding

Potential Mid-Block Crossing Locations



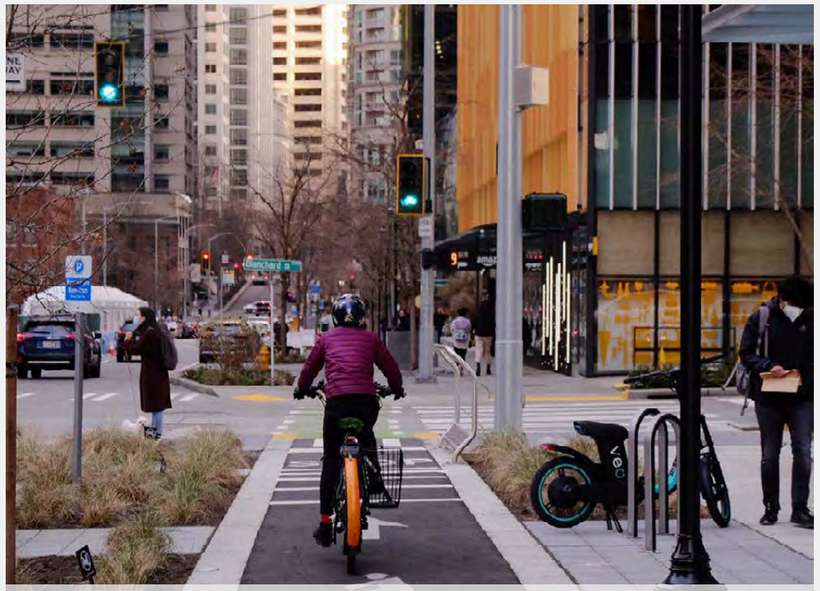
Sidewalk-Level Bicycle Facilities



Indianapolis Cultural Trail



Proposed Brickline Greenway in St. Louis, Missouri

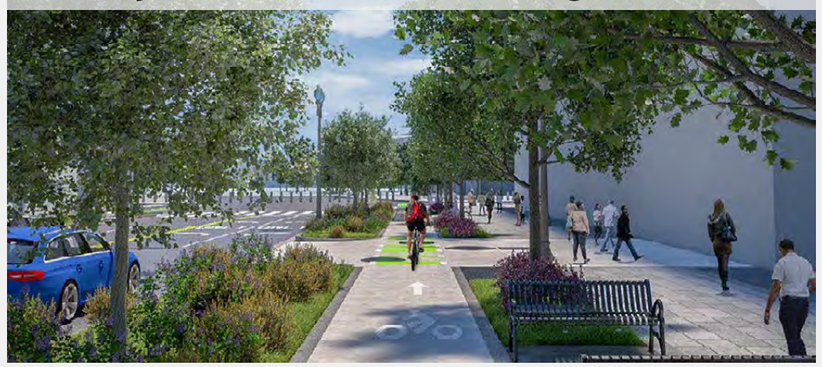


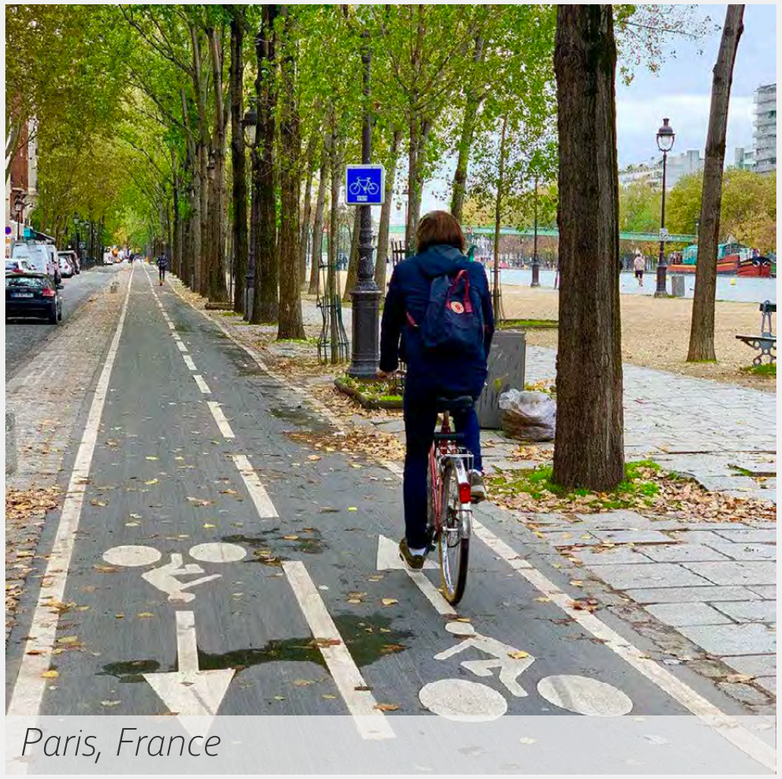
7th Avenue Cycletrack, Seattle, Washington



Proposed I-81 Viaduct, Syracuse, New York

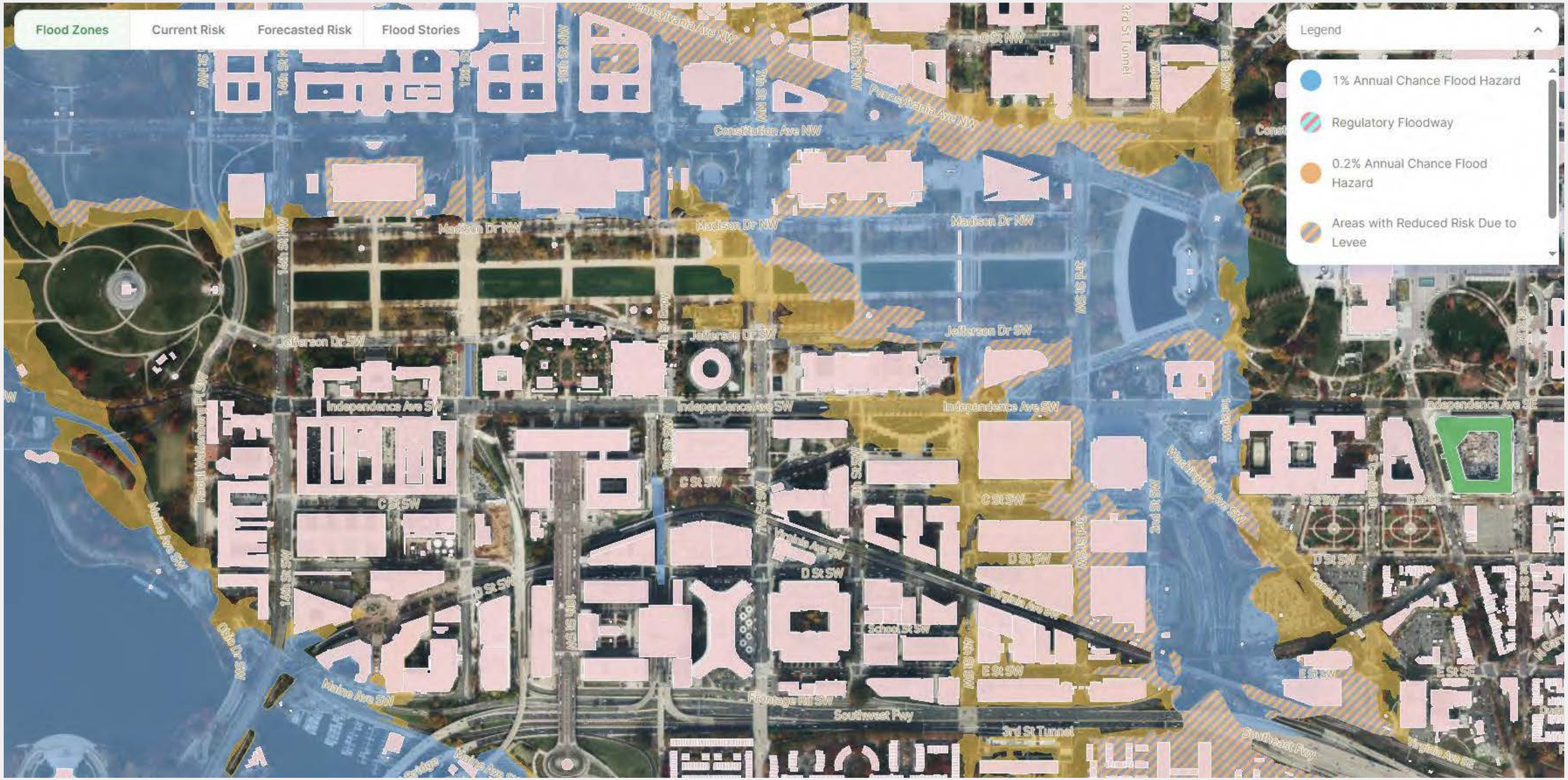
Proposed Pennsylvania Avenue NW (West of the White House), Washington, D.C.





Paris, France

Flood Risk



https://dcfloodrisk.org/

Lane Widths

30.11.Lane Widths

On freeways, the predominant lane width is 12 feet. Lane widths on arterials, collectors and local streets are typically between 10 and 11 feet, inclusive of the gutter, and are based on the following:

- **Design Speed.** Lanes 10 feet wide may be considered on streets with design speeds of 40 mph or less. Use the wider end of the range (11 to 12 feet) at design speeds greater than 40 mph.
- **Design Vehicle.** Vehicles such as transit buses and large tractor-trailers require wider lanes, particularly in combination with higher design speeds if they frequently use the thoroughfare. Consider wider lanes only if appropriate for the frequency of the design vehicle.
- **Right-of-Way.** Balance the provision of the required design elements of the thoroughfare with the available right-of-way. This balance can mean reducing the width of all elements or eliminating lower-priority elements.
- **Width of Adjacent Bicycle and Parking Lanes.** The width of adjacent bicycle and parking lanes influences the selection of lane width. If the adjacent bicycle or parking lane is narrower than recommended, first consider widening the bicycle lane. If a design vehicle or design speed justifies it, provide a wider travel lane to better separate lanes. Where bike lanes are provided on multi-lane streets, the outside lane width should be 1 foot wider than the adjacent through-lane width.
- All lane widths must be measured from the center of the pavement markings.

Table 30-13 | Collector and Arterial/Commercial Streets Cross Section Minimum Widths (feet)

	Roadway				Public Space					
Street Operation Type	Vehicular Travel Lanes	Bike Lanes	Parking Lane	Roadway Width (Curb to Curb)	Curb & Gutter	Curb Walk	Furnishing Zone/ Tree Space	Sidewalk	Public Parking	Total Right-of-Way
Two-Way, Parking Both Sides	10	0 or 5	8	36	1.67	1	4	8 or 10	Varies	90
Two-Way, Parking One Side	10		8	28						
Two-Way, No Parking	11		0	22						

Notes:

1) The above values are minimums for new streets; where existing conditions differ from these values, DDOT may allow the Designer to match existing conditions. Additionally, where average daily traffic is low, local street lane widths of 9' may be considered.
2) The roadway and lane widths listed are measured from curb to curb and include the gutter.
3) Maximum lane width is 12', except on roadways where bicycle accommodations are provided, where up to 13' with shared lane markings are allowable.
4) When buses are present in a curbside lane, an 11' minimum lane width should be used.
5) Additional through-lane minimum width should typically be 10'. (Total minimum width for two lanes is thus 20-21', and for three lanes 30-31'.)
6) Additional turning lane minimum width is 9' (10' preferred) for local/residential roadways and collector/arterial/commercial roadways.
7) Sidewalk widths are based on adjacent land use. See **Chapter 31** for more information on public space widths.

*If bike lanes are present, the minimum width is 5'. With no bike lanes, the minimum roadway widths are as shown. However, where bike lane(s) are present, travel lane widths 1' narrower than shown are acceptable.

** Total ROW width of 55' is limited to one-block-long streets only. Where streets extend farther, 75' of ROW is required.

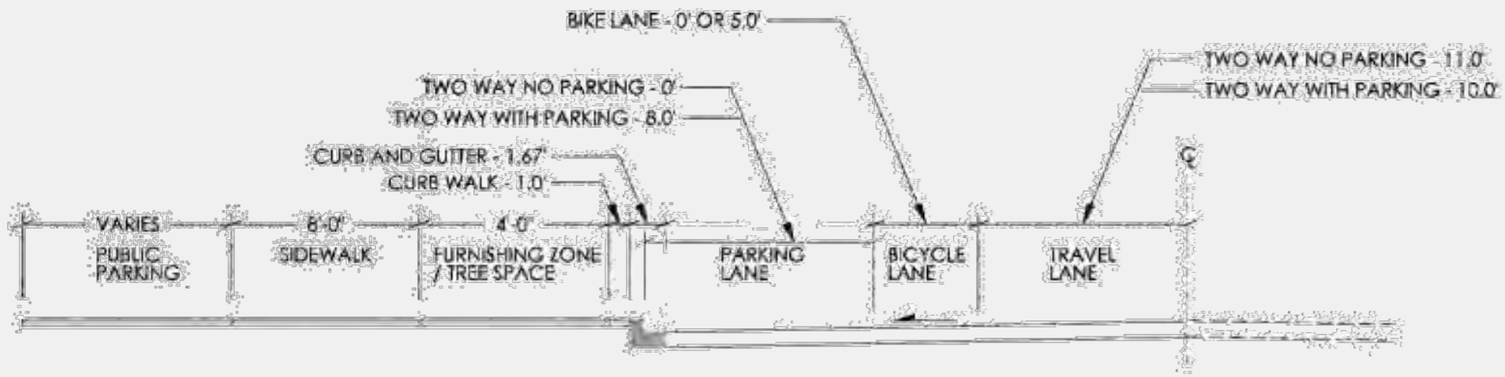
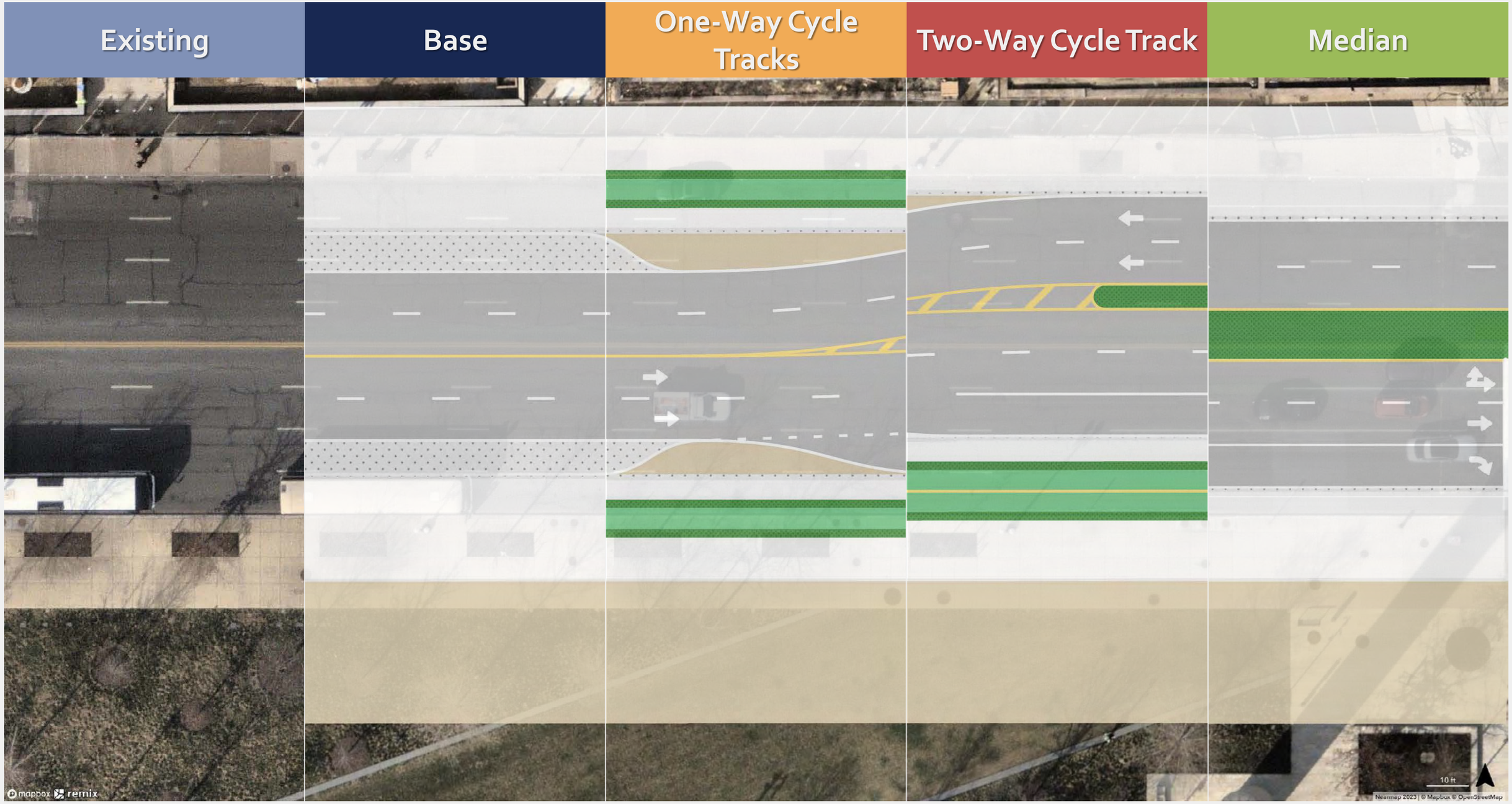
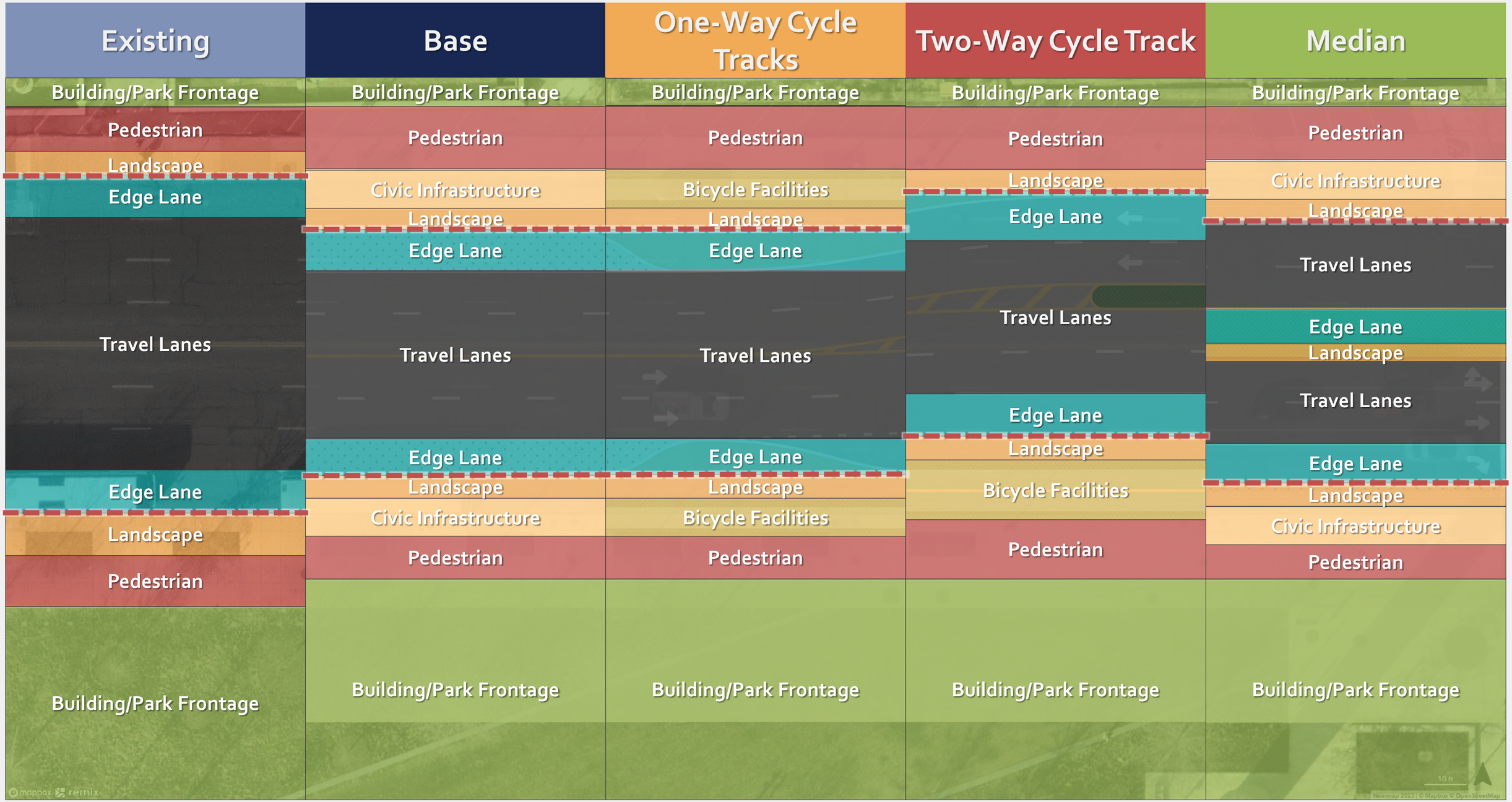


Figure 30-1 | Example Standard Roadway Element Width Typical Section for New Arterial Streets

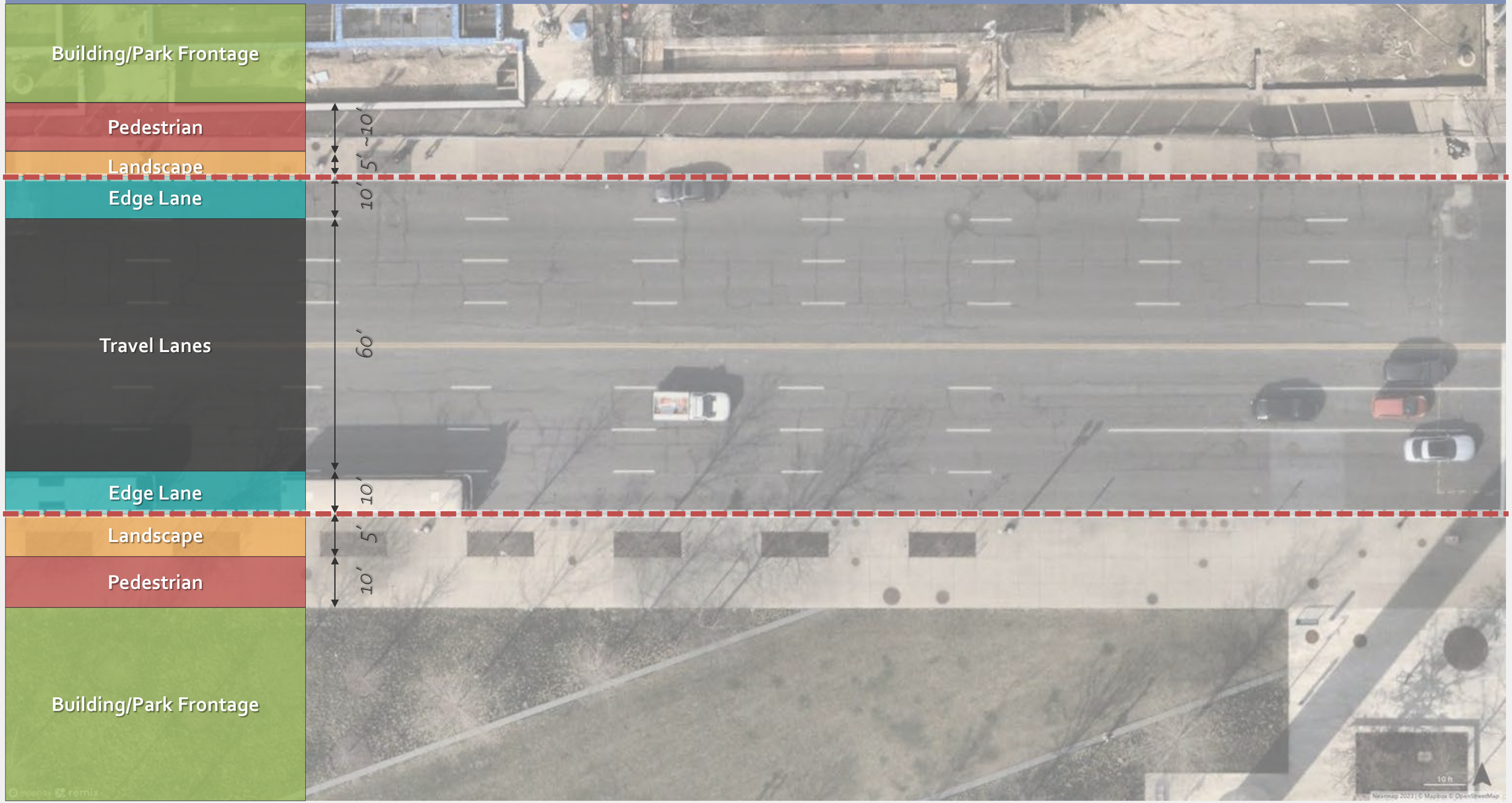
Corridor Options



Corridor Options



Existing


Building/Park Frontage
Pedestrian
Landscape
Edge Lane
Travel Lanes
Edge Lane
Landscape
Pedestrian
Building/Park Frontage
10'
5'
~10'
10'
60'
10'
5'
10'

Base

Building/Park Frontage

Pedestrian

Civic Infrastructure

Landscape

Edge Lane

Travel Lanes

Edge Lane

Landscape

Civic Infrastructure

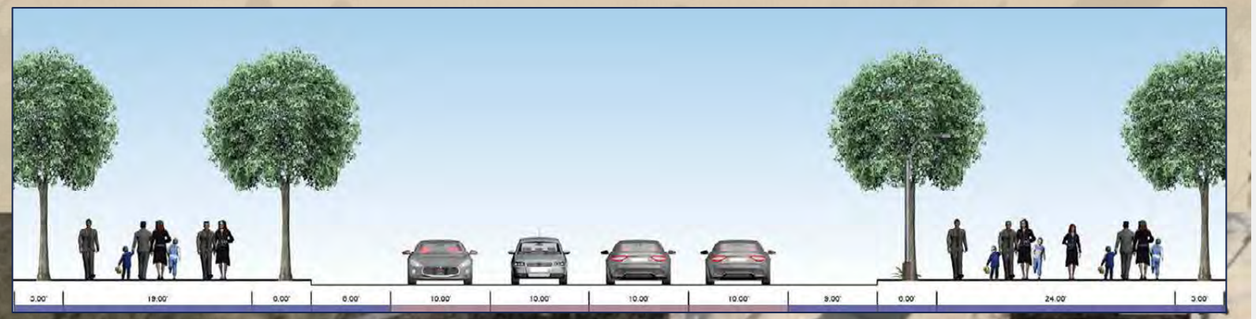
Pedestrian

Building/Park Frontage

15′ 9′ 6″ 9′ 24′

42′

8′ 6″ 9′ 10′ 19′



Base


Building/Park Frontage
Pedestrian
Landscape
Civic Infrastructure
Landscape
Edge Lane
Travel Lanes
Edge Lane
Landscape
Civic Infrastructure
Landscape
Pedestrian
Building/Park Frontage
15'
6'
3'
6'
9'
42'
8'
10'
6'
3'
6'
mapbox
remix
10 ft
Nearmap 2023 | © Mapbox © OpenStreetMap

Base


Building/Park Frontage
Landscape
Pedestrian
Civic Infrastructure
Landscape
Edge Lane
Travel Lanes
Edge Lane
Landscape
Civic Infrastructure
Pedestrian
Landscape
Building/Park Frontage
6'
15'
6'3'
9'
42'
8'
3'6"
10'
6'
10 ft
mapbox
remix

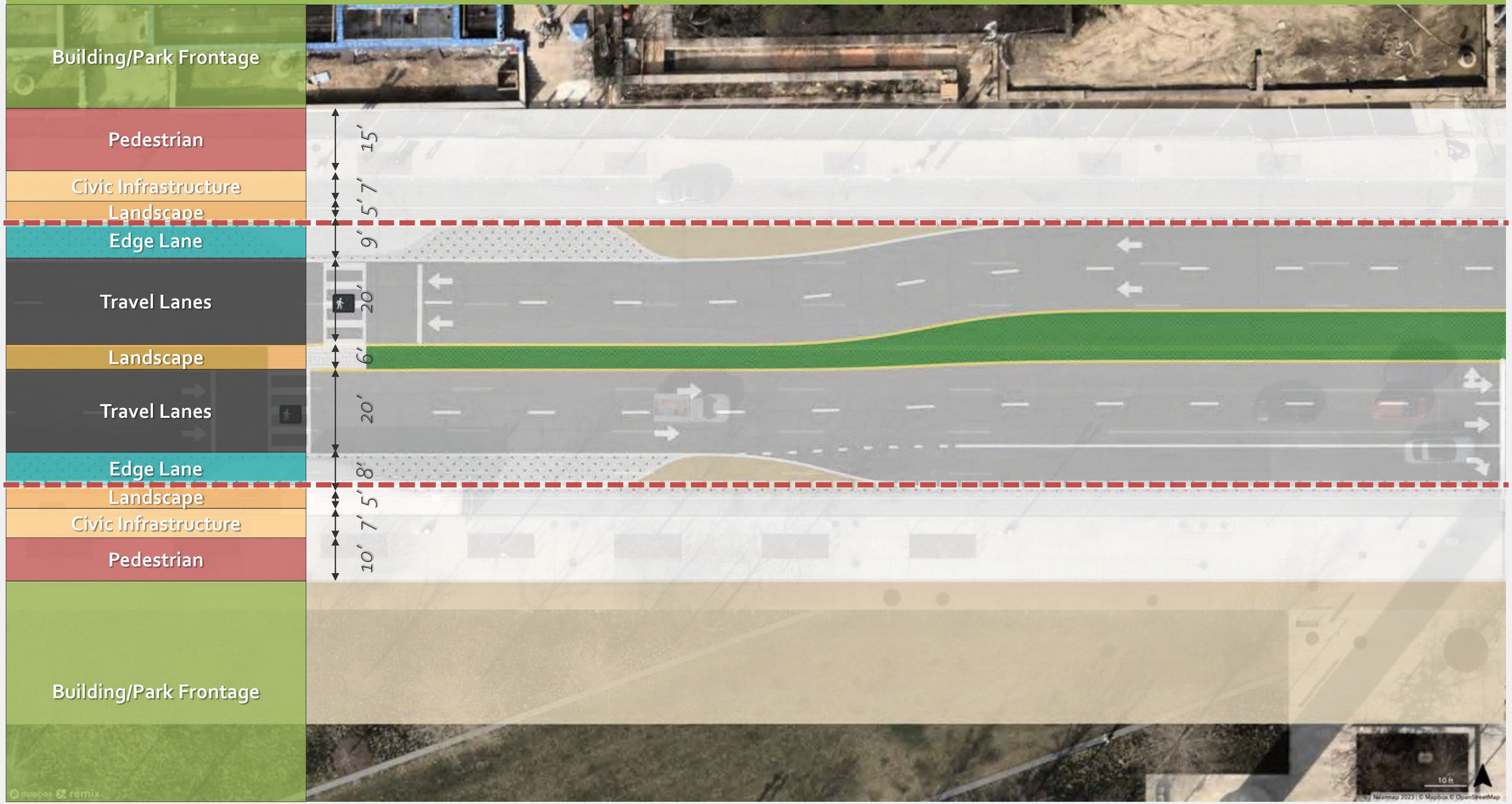
One-Way Cycle Tracks



Two-Way Cycle Track



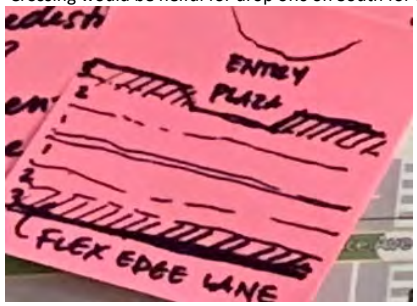
Median


Building/Park Frontage
Pedestrian
Civic Infrastructure
Landscape
Edge Lane
Travel Lanes
Landscape
Travel Lanes
Edge Lane
Landscape
Civic Infrastructure
Pedestrian
Building/Park Frontage
15'
7'
5'
9'
20'
6'
20'
8'
5'
7'
10'
mapbox
remix
10 ft
Nearmap 2023 | © Mapbox © OpenStreetMap

Appendix D: Stakeholder Feedback

Stakeholder Charrette Comments

Control Number	Block	From	To	Comment
1	General			Consider left-turn and right-turn lane pedestrian conflicts
2	General			Does road diet change the functional class of Independence Avenue? If so, does that disqualify it as an evacuation route?
3	General			Unpermitted vendors occupy a lane as-is; there will need to be clear control/enforcement mechanisms to service a 4-lane section.
3	1	15th	14th	
4	2	14th	12th	Temp farmers market location [at corner of 14th]
5	2	14th	12th	Lots 10A, 10B need service vehicle access
6	2	14th	12th	
7	3	12th	L'Enfant Plaza	
8	4	L'Enfant Plaza	9th	
9	5	9th	7th	
10	6	7th	6th	
11	7	6th	4th	
12	8	4th	3rd	
13	9	3rd	Washington Ave	
14	10	Washington Ave	1st	
15	11	1st	South Capitol	
16	2	14th	12th	Lot 8 ADA parking
17	2	14th	12th	Public Cafeteria, SW too narrow
18	2	14th	12th	VIP pick-up/drop-off
19	2	14th	12th	Confer impacts to approved perimeter security plan (Lot 9)
20	2	14th	12th	BL-OR-SV lines beneath
21	3	12th	L'Enfant Plaza	
22	5	9th	7th	DOJ: Be aware of underground bldg line w/ any improvements due to security concerns
23	5	9th	7th	improve intersection safety for pedestrians
24	5	9th	7th	2-level garage below
25	5	9th	7th	Drop-off used for parents for CDC & also for public & VIPs
26	5	9th	7th	Child development center
27	5	9th	7th	Visitors coming from North have difficulty finding way into Hirshorn. Value in 2 primary entrances
28	5	9th	7th	For Hirshorn - need other rideshare drop off or parking for evening events
29	6	7th	6th	Anticipate lots of ped activity @ plaza; no perm edge use
30	6	7th	6th	Median @ 7th - lots of deliveries - don't want a median
31	6	7th	6th	FAA - working entrances mostnly on south of bldgs
32	6	7th	6th	No real building use for current building by visitors enter from south
33	6	7th	6th	FAA - loading of 6th
34	7	6th	4th	Beneficial to have PUDO for rideshare
35	7	6th	4th	Need opportunities to sit, eat - people sitting + trash steps
36	7	6th	4th	Official tour bus parking (should be reconsidered)
37	7	6th	4th	Coach buses mostly drop off on Jefferson - queuing to west
38	7	6th	4th	bus drop off on jefferson - blocks sight lines, several buses block visual connection between mall and museums. Safety/ped/cycling concerns
39	7	6th	4th	primary student entrance; school bus drop off
40	6	7th	6th	Currently used as large scape art to signal hirshorn is art museum - now blocked by food trucks
41	8	4th	3rd	May be a need for Maryland for securty quick exit
42	8	4th	3rd	Essenial management space in flex lane
43	8	4th	3rd	Independence Ave. in front of Voice of America - commuter bus pickup
44	7	6th	4th	Antiscale fence - North side of Independence Ave. Jersey barriers couple blocks south of Independence - for the like inaugural (?)
45	7	6th	4th	On street parking? If all gone, will push to side streets
46	7	6th	4th	Parking for eventing events
47	7	6th	4th	Currently limited public parking South of Mall
48	7	6th	4th	Will never satisfy daytime parking - ADA parking - bonus
49	5	9th	7th	Hirshorn - Independence is main route for equipment (forklifts, etc.) to get onto plaza NOT accessible from Jefferson
50	5	9th	7th	"--" drive South down 7th, across Independence ave, then backing down loading (dock just West of 7th) - current practice
51	5	9th	7th	Need space for crane (70 to 100 tons) on Independence Ave. @ Hirshorn entrance. Need space for crane + 2-3 large adjacent trucks (2-3 times/hour)

52	7	6th	4th	Emergency Vehicles (ambulances) usually go to independence ave museum entrance
53	General			In inauguration - Independence Ave. is border - SS screening - fencing placed, jersey barriers etc -Inauguration counter protest could require more fencing, infrastructure
54	2	14th	12th	Newton apple tree at 12th and Independence intersection - adding bollards - Department of Energy
55	4	L'Enfant Plaza	9th	9th + 12th st parking garage acces - Department of Energy
56	5	9th	7th	Avoid drop-offs at entrances rather than pedestrian plazas? Improve pedestrian experience
57	5	9th	7th	Hirshorn Museum - wayfinding into museum (North vs South) is a challenge, 2 front doors
58	5	9th	7th	Twice per year crane + trucks to deliver large artwork
59	5	9th	7th	Trucks need to use most of street to back into loading dock
60	5	9th	7th	Crossing would be helful for drop offs on South for Hirshorn Museum
				
61	5	9th	7th	
62	6	7th	6th	Consider creating an entry point (wider ROW) in front of the entrances of the Museums to allow visitors to recognize the building
63	7	6th	4th	Need separate pedestrian phase
64	3	12th	L'Enfant Plaza	Drop off area is only ADA access to building (Don't need more space) (large loading sometimes happens here 8-5)
65	3	12th	L'Enfant Plaza	Added crosswalks are helpful - current desire line
66	3	12th	L'Enfant Plaza	Back into loading dock (may need to preserve 3rd lane for loading) mid block crossing may conflict
67	3	12th	L'Enfant Plaza	Need staging areas for future renovations
68	4	L'Enfant Plaza	9th	Security: May need to bring perimeter security out to curb (typically within frontage)
69	4	L'Enfant Plaza	9th	Can geofence pick-up/drop-off for rideshare
70	4	L'Enfant Plaza	9th	Could edge lane have a different texture? (would be for many functions)
71	4	L'Enfant Plaza	9th	Parking: short or long term? Flexibility to allow some off-peak parking -evening events
72	General			How to accommodate bus drop-off along avenue?
73	5	9th	7th	Consider species (of trees) along frontage that don't grow as tall to allow delivery - should there be a break at entries
74	General			Corridor funnel into national mall (change texture at these plazas) or size of space (?) of landscape
75	8	4th	3rd	Extend median
76	8	4th	3rd	(sketch of a crosswalk at east side of intersection at Independence Ave and Maryland Ave SW)
77	9	3rd	Washington Ave	Bus, truck, and dumpster access to driveway
78	General			Bike network + NBS plan
79				Area has wide variety of user classes, goal should be toencourage slow speeds
80				Windth challenges (and buses) on Jefferson & Madison for separated facilities
81				New museums reallocate exisitng traffice more than attract new
82				Bike lanes on Jefferson & Madison in alternatives eval and EA, expected CN in 2028. Separated facility under consideration, but unlikely
83	6	7th	6th	7th street crowded, adjacent to mid-block crossings could relieve pressure
84	General			Streetscape should dictate locations, not independece vehicular progressions
85	General			Several existing intersections have crosswalks only on one leg, affecting pedestrian behavior
86	8	4th	3rd	Indepence at Maryland should be midblock crossing
87				Museum mall entrances tend to be more heavily trafficked
88				Preference to remove buses from Jefferson & Madison, but no enforecement
89				Vendors are problem for all SHs, but important not to plan around vendors to the exclusion of other needs
90	8	4th	3rd	Memorial of Fallen Journalist anticipates being able to close Maryland Ave for events
91	5	9th	7th	Active area future after 2026 no queue
92	5	9th	7th	Green infrastructure close to street
93	5	9th	7th	Increase tree canopy

94	5	9th	7th	Simple lane configuration with flexibility and green space = simple to navigate	
95	7	6th	4th	Potential 5th street crosswalk	
96	7	6th	4th	Active area no major queue	
97	7	6th	4th	Coach loading at Air and Space Museum	
98	7	6th	4th	Holiday Inn - Big pedestriation generator on North side (C street)	
99	General			Streetscape - green infrastructure - multimodal	(Priority uses
100	General			Capitol hill bike connection?	(Priority uses
101	General			Traffic concerns - where do buses go?	(Priority uses
102	General			A la Smithsonian gardens, bring green clsoer to streets	(Priority uses
103	General			If one-way bikes, will be wrong-way users	(Priority uses
104	General			Need consistent edge curb lines - driver expectancy	(Priority uses
105	General			KISS	(Non-Starter
106	General			No Median	(Non-Starter
107	General			People read consistency off vertical elements [trees]	(Non-Starter
108	General			4th + 1oth key gateways	(Non-Starter
109	General			7th heaviest pedestrian traffic	(Non-Starter
110	General			Air and Space Museum bollards are current security constraint	(Non-Starter
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Stakeholder Comments on Draft Report #2

Action	Item	Discipline	Page	Section	Comment	Response	Author	Agency
No action	1	Planning	All documents	General	The cross-section color rendering(s) at the museums (i.e.- NASM, Hirshhorn) and the Wright Buildings provide a good visualization of the potential options for all to understand. Consider including renderings of other Independence Avenue locations (i.e.- 9th St Expy to 14th St SW) as the building-sidewalk-street relationships (i.e.- functions, sidewalk widths, roadways, etc) are somewhat different,	Will include plan view graphics for the entire corridor.	S Jones	GSA
No action	2	Planning	Study Report	42-43, General	The Section of Maryland Avenue SW between 3rd Street and Independence Avenue SW: With the forthcoming Fallen Journalists Memorial, the option of fully closure of this segment provides an expanded and foundational space for lots of activations/gathering opportunities associated with the memorial, museum(s), and/or in general for everyone to enjoy. As well as, it would completely eliminate pedestrian-vehicular safety conflicts. Additionally, there are a multitude of ways that the historic roadway could be articulated.	Noted.	S Jones	GSA
No action	3				Leaning more towards recommendation one. Would recommend removal of trees on the small area by the road and move them to the side closer to buildings allowing for the sidewalk to be larger. This will enable personnel to be able to get in and out of vehicles, drop off, easier delivery, easier maintenance and remove slip trip and fall hazards right next to parking and the road. This will also encourage pedestrians from standing in the middle of the sidewalk and hopefully get them to move further in towards the building to allow for pedestrian flow.	There is a desire for a double row of trees. Tree spacing will allow access to the curb in between trees.	J Cint	GSA
No action	4	Safety			No permanent median allows for more lane shift as well as easier time maintaining the roads for winter snow and ice removal, lane shift for large cranes, trucks, and events. Plus large trucks have a tendency in DC to take out the end of medians due to limited turn radius	Noted.	J Cint	GSA
No action	5				Ensure that the turn lane is visible with high vis paint (reflective) and do not make out of brick or stone pavers. There is never enough funding to maintain and they shift creating slip, trip, and fall hazards for pedestrians.	Turn lane will not use brick or stone pavers.	J Cint	GSA
No action	6				Recommend moving all benches to the tree line side closer to the buildings and away from the roadway. This allows for unobstructed access when personnel are getting in/out of vehicles. This also reduces the amount of personnel collapsing for sun and heat related injuries which is common around the mall and smithsonian areas. People do not dress for the sun and heat. Visitors are also not used to the amount of walking that is normal for DC. Moving the trees also gives more access for pedestrians to walk without falling into the tree boxes along the sidewalk. If you look throughout DC much of the sidewalk is reduced due to tree boxes that are more of a slip, trip, and fall hazard then access.	NCPC requested providing options for benches in this location. The report notes that benches may be provided in this space not adjacent to travel lanes.	J Cint	GSA
No action	7				Recommend all benches are made from material that has a long life span and is easy to maintain, does not fade in the sun and any metal that is used is powder coated for low maintenance. It's difficult to get funding to maintain.	Noted. Bench materials and design to be discussed in future project planning and design.	J Cint	GSA
No action	8				Recommend working with GSA and NPS arborists on types of trees that can withstand DC weather, are easy to maintain, as well as the amount of visitors that will destroy them.	Noted. Tree and plan selection to be discussed in future project planning and design.	J Cint	GSA

Complete	9		Recommend installing water fountains along these areas that are designed for water bottle filling and lower bowls for pets. The water fountain that NPS uses also comes with the pet bowl. For June to September and the high heat, recommend installing misters on the water fountains. There is a great one that the zoo uses to cool people down.	Will address.	J Cint	GSA
Complete	10		Consolidate signage along the street. Signage also needs to be high enough to see over vehicles and large enough font for those that have difficulty seeing	Will address.	J Cint	GSA
Complete	11		Recommend areas that permanent wind sails for shade and some protection from rain be installed. These can be put up in the summer months and removed after. This will help provide areas for pedestrians to get out of the heat and sun reducing heat/sun related injuries downtown. The wind sails will also hold up to the high velocity of wind that comes and goes in the downtown area.	Will address.	J Cint	GSA
Complete	12		Recommend changing the lighting along the roadway to down facing LED. These can be made to look historical. A lot of light during the evening is lost because it is focused up instead of down. That makes these areas dark and unsafe at night, discouraging visitors from walking down this area.	Will address.	J Cint	GSA
Complete	13	Separated Bicycle Infrastructure	The report makes a statement regarding “buffered bicycle facilities” on Jefferson Dr as an alternative to bicycle infrastructure on Independence (Pg. 85). It is unclear to us whether this is referencing the existing facilities along the mall, or plans for future on-road bicycle infrastructure.	Revised text to note that the NPS is exploring future bike lanes on Jefferson and Madison.		NPS
Complete	14	Separated Bicycle Infrastructure	On-road bicycle infrastructure on Jefferson Drive is anticipated to be one alternative considered as part of a future Environmental Assessment (based on the contents of the 2010 National Mall Plan and the 2022 NAMA Multimodal Strategic Implementation Plan), however there is not currently a preferred alternative for the corridor.	Revised text to note that the NPS is exploring future bike lanes on Jefferson and Madison.		NPS
No action	15	Separated Bicycle Infrastructure	Additionally, bicycle facilities on Independence Ave would largely serve a different user group than bicycle facilities on Jefferson Dr: 1) Jefferson Dr would only be able to accommodate eastbound bicyclists on-road due to space constraints, acting as a one-way pair with Madison Dr. 2) Jefferson Dr would also serve a more localized connection (with an eastern termination at 3rd St), while bicycle infrastructure on Independence Ave would have the potential to serve a longer east-west connection in the bicycle network. An Independence Ave connection would also facilitate access to the existing bicycle infrastructure on Pennsylvania Avenue.	Noted.		NPS
No action	16	Separated Bicycle Infrastructure	Protected bicycle infrastructure on Independence Avenue is critical in ensuring a safe and accessible future corridor.	Noted.		NPS
No action	17	Separated Bicycle Infrastructure	Although a two-way cycle track was presented in some options, it was unclear to us why a pair of one-way cycle tracks was not included as a consideration in at least one of the design options. One-way cycle tracks typically offer competing advantages, and the tradeoffs between a two-way cycle track or pair of one-way cycle tracks should be examined in a future phase.	After stakeholder discussions, two one-way cycle tracks were not noted as a desired option. There is a strong preference to maintain at least one curbside parking lane, making it difficult to accommodate one-way separated cycle tracks on both sides of the street.		NPS
No action	18	Separated Bicycle Infrastructure	The implementation of a pilot project (Pg. 112) that involved dedicated bicycle infrastructure would be a very useful tool in gathering data to inform the long-term concept, and we would advocate for this to be included in the next phase.	Noted.		NPS
No action	19	Curb Use Space	Curb use is one of the most complex and contentious issues in the corridor. Adjustments to its curb use will significantly impact Jefferson Drive, either positively or negatively, depending on the implementation.	Noted.		NPS

Complete	20	Curb Use Space		The needed curbside space for private bus loading and unloading (Pg. 66) on Independence Ave appears considerably underestimated.	The curbside use was estimated from observations and client discussions. Additional detailed information regarding prviate bus loading and unloading will be need to identify a more detailed representation.	NPS
Complete	21	Curb Use Space		Given the information above, next steps should emphasize a much more detailed study and exploration of curb use space ahead of the selection of a typical section.	Will update text to include this note.	NPS
Complete	22	Curb Use Space		The curb use on Independence Ave, particularly on the northern side, should emphasize the building access needs of larger vehicles (private bus loading and unloading, truck deliveries, etc) as opposed to personal vehicle storage.	Will update text to include this note.	NPS
No action	23	Traffic Modeling		The Study provides very limited information regarding the results of the traffic modeling, even though a traffic analysis was conducted. The traffic analysis was also not included in the Appendix, which prevented us from reviewing it.	We will include the traffic analysis appendix attachment in the final report. We did not conduct traffic modeling, but used traffic projection estimates approved by DDOT.	NPS
No action	24	Traffic Modeling		Without the accompanying traffic modeling data, we are unable to assess the variations in lane numbers and the presence or absence of left-turn lanes.	Data to be included in next submission, attached as an appendix.	NPS
No action	25	Traffic Modeling		We expect that traffic impacts will be an item of public interest as the project progresses into the next phases.	Noted.	NPS
No action	26	Evaluation Results		We generally concur with the Study's conclusion that Concept #3 ("Multimodal: Full-Time Curbside Uses on North Curb") presents the most benefits of the concepts presented based on the information presented. However, we'd like to see more information on the traffic modeling, bicycle infrastructure treatment, and curb use in the next phase, as discussed above.	Noted.	NPS
No action	27	Mid Block Crossings		Although mid-block crossings are mentioned generally throughout the document, they are not clearly shown in the corridor diagrams and discussed in the design elements. A basis of the NPS (and partner/NCPC) planning documents is the pedestrian connection between the National Mall and the city and the connection between the National Mall and the river; with a goal to support pedestrian access between these areas - especially due to the very wide, unrelenting Independence Ave blocks.	Mid-block crossings will be shown in the corridor-wide concepts that will be added to the final submission.	NPS
No action	28	Quality Related	General	AOC maintains its general need for intersection repairs at Washington Ave and Independence Ave for pedestrian safety and vehicular traffic safety improvements.	Noted.	AOC
No action	29	Quality Related	General	Does the study address potential future land-use changes along Independence Ave?	Yes, it does consider land use changes, potential future Smithsonian museum sites, and expected future traffic.	AOC
No action	30	Recommendation	General	Recommend consistency in rush-hour lane reconfiguration between AOC right-of-way (ROW) and DDOT ROW. AOC regonizes study compliance w/ DDOT ROW. The closer the number of DDOT lanes to AOC/USPC number of lanes and alignment with AOC/USPC High Occupancy Lane changes from 2&2 to 3&1 during certain hours could help reduce confusion and help traffic through AOC ROW.	Noted.	AOC
No action	31	Quality Related	General	AOC's transportation challenges: (1) ADA & PROWAG compliance (we have a long list of items we're working on to comply with current laws / best practices) (2) Wayfinding (for visitors and staff – need to find ways to make our system adaptable to accommodate street closures) (3) Connectivity (intra-campus and beyond to adjacent neighborhoods / Monumental Core – this also touches micromobility)	Noted	AOC

No action	32	Quality Related	General	Constitution and Independence Avenues identified as future complete streets within the Capitol Campus network. Need to Identify connection points for micromobility and pick-up/drop-off.	Noted	AOC
No action	33	Quality Related	General	Washington Avenue and 2nd Street SW intersection improvements to create more beautiful and safe intersection across the avenue. Identified in 2025 Capitol Complex Master Plan and 2022 Washington Avenue Traffic Study.	Noted	AOC
Complete	34	Recommendation	page 62, 3rd Street Intersection/3rd Street to Washington Avenue SW.	Recommend including micromobility corrals as part the Bicycle Connectivity Design Priority for 3rd Street Intersection/3rd Street to Washington Avenue SW.	Will add recommendations in the text.	AOC
No action	35	Recommendation	page 43	AOC requests to view a street section of the recommended realignment of Maryland Ave and 3rd street (page 42). AOC needs to understand the street realignment to understand the impact of the six scenarios at AOC's jurisdiction border at Independence and Maryland Avenues and 3rd Street.	This section does not recommend the reconfiguration of Maryland Avenue, but rather present an opportunity to consider this in the future. We do not have a realignment concept at this stage. Future decisions and analysis will be required to determine the feasibility of redesigning Maryland Avenue.	AOC
Complete	36	Recommendation	Chapter 4	Recommend including a diagram similar to Figure 36 but for Key Design Priorities by intersection. This would visualize design priorities for each block, specifically 3rd Street Intersection/3rd Street to Washington Avenue SW.	Added callouts to Fig 36 to show each block focus area. Additional design details block by block will be provided in the plan view corridor graphics for each alternative in an appendix.	AOC
No action	37	Recommendation	Chapters 5 and 6	Recommend scenario cross sections/renderings to include food trucks. It's realistic to anticiapte food trucks in all future scenaios	Food trucks are noted in the report, but will not be shown in the concepts. We're aiming to keep the concepts high-level to show generic curbside uses.	AOC
No action	38	Recommendation	page 62, 3rd Street Intersection/3rd Street to Washington Avenue SW.	AOC recommend eliminating the southern-most lane on Washington Ave and Independence Ave intersection which is outside of the study area. That said, do we need to add travel lanes as a design priority for the 3rd Street intersection to prepare for that lane reduction?	Transition at the beginning and end of the Independence Ave study will be determined upon selection of one preferred alternative and advancing that concept to final design.	AOC
Complete	39	Recommendation	Chapters 4,5,6	Recommend the 3rd Street and Independence Ave northside lane in all scenarios aligns with 3rd Street east side activities at USBG. This is an AOC safety priority for AOC staff and pedestrians.	Add section about transition zones beging further designed in next phase to transition at east and west ends of the corridor.	AOC
No action	40	Quality Related	Scenario 3 and 4	Scenario 4 is preferred since it provides traffic medians to support safer pedestrian crossings along with designated multi-modal infrastructure options. Scenario 3 has a protected cycle track with landscaping between micromobility users and vehiclular traffic. Is it possible to have protected landscape cycle track in a revised Scenario 4? Scenario 4 – food vendor space needs missing. What do bicycle connections look like at Independence Ave and 3rd street (north connection) for scenarios 3 and 4	Treatments from each design may be mixed/combined during further refinement. Our intent was to show distinct options for Scenario 3 (street-level cycle track) and 4 (raised cycle track).	AOC
No action	41	General		Was a survey done for Independence Ave? Ownership along the corridor can be mixed and misleading. If there is no survey, this should be part of the "next steps".	A survey was conducted as part of the Urban Life Review. Ownership conversations took place during the previous Corridor Study with DDOT, AOC, and NPS, among other stakeholders to discuss corridor ownership and maintenance.	DDOT
No action	42	General		A lot of these buildings will want perimeter security and having a wider sidewalk space will allow for a better design.	Noted.	DDOT

No action	43	General	Developing a coordinated curbside food vending approach is not contingent on larger physical changes to the roadway design and can be initiated now. A strategy can be developed in collaboration with SI, NPS, DDOT, DLCP, and other relevant stakeholders.	Noted, however, this is beyond the scope of this effort.	DDOT
Complete	44	Executive Summary (pp. 4-16)	The Recommendations section with numbered list and map noted on page 3 appears to be absent. With recommendations scattered throughout the document, how should they be considered? For example, recommendations in the Planning Context section seem out of place.	Will add recommendations section.	DDOT
Complete	45	Executive Summary (pp. 4-16)	Remove DDOT hand-off Recommendation on page 3 as this is addressed in the "Next Steps" narrative on page 15. Additionally, reframe Next Steps and Leadership narratives on pages 15-16 around and opportunities to make operational and safety improvements between the curbs.	Will address.	DDOT
Complete	46	Executive Summary (pp. 4-16)	The study needs a strong problem statement upfront (ie. purpose + need) to validate and justify an ambitious vision. The Exec Summary starting on page 4 should describe how the study's approach and findings explored and addressed this problem. For example, consider moving the "Why This Matters" section on page 16 to the beginning of the Exec Summary. While not directly addressed by the study, this is a good place to highlight recent proposals for disposing of local federal real estate holdings – how can the alternatives be considered in light of future changes to the land uses framing the corridor?	Will address.	DDOT
Complete	47	Executive Summary (pp. 4-16)	Consider succinctly describing how Independence Avenue is "iconic," "historically significant," and "important" (p.4). What "vital role" does Independence Ave play in the city's transportation network (p. 6)? Why does Independence Ave need to be transformed into "a model of multimodal mobility" (p. 4) or "a world-class public space and multimodal corridor?" (p. 6). For example, consider summarizing the road segment as: Principal Arterial with rush-hour restricted lanes Bicycle Priority in moveDC Freight Priority + truck route in moveDC Not on the High-Injury Network	Will address.	DDOT
Complete	48	Executive Summary (pp. 4-16)	Consider reframing Existing Issues (p. 6), seems like the main challenge for the corridor is insufficient space behind the curb, especially given the varied and inconsistent property/ROW line along the edges and paired with federal/SI perimeter security needs.	Updated text to emphasize this challenge	DDOT
Complete	49	Executive Summary (pp. 4-16)	It would be useful in the executive summary to present the 6 alternatives in the context of the evaluation they were subjected to in Section 5, highlighting the top two, or ability to achieve the main goals. For all alternatives, it would also be good to indicate how the designs address potential conflicts between people walking, on bikes, and loading/unloading from curbside motorcoaches, given the current and anticipated use. For example, while Independence is a moveDC bike priority corridor, only 2 alternatives provide a dedicated bike facility.	Will address.	DDOT
Complete	50	Executive Summary (pp. 4-16)	Monumental: Full-Time Curbside Uses & Median. A median here is not effectively allocating the ROW space needs as outlined in the background. If the goal is to provide more sidewalk and activation space, the median seems to create dead space (while providing no viewshed benefits).	Will add these limitations; however, this option was asked to be explored as one of the options.	DDOT
No action	51	Executive Summary (pp. 4-16)	Monumental: Rush-Hour Curbside Lanes. This doesn't seem to offer any safety measures.	Noted. Safety benefits for this option are more limited, but pedestrian crossing distances are reduced from narrowing the street from 8 to 6 lanes.	DDOT

No action	52	Executive Summary (pp. 4-16)	Multimodal: Full-Time Curbside Uses on North Curb. Restricting or conflicting with passenger loading (especially motorcoach) will create added pressure.	Noted. There are additional motorcoach and bus loading zone guidelines that should be considered and implemented if this alternative is selected to move forward, including considering parking on perpendicular side streets.	DDOT
No action	53	Executive Summary (pp. 4-16)	Multimodal: Rush-Hour Curbside Lanes & Median. Restricting or conflicting with passenger loading (especially motorcoach) will create added pressure.	Noted. There are additional motorcoach and bus loading zone guidelines that should be considered and implemented if this alternative is selected to move forward, including considering parking on perpendicular side streets.	DDOT
No action	54	Executive Summary (pp. 4-16)	Public Life: Full-Time Curbside Uses on North Curb. The double row of trees and widened ped space is nice. Restricting or conflicting with passenger loading (especially motorcoach) will create added pressure.	Noted. There are additional motorcoach and bus loading zone guidelines that should be considered and implemented if this alternative is selected to move forward, including considering parking on perpendicular side streets.	DDOT
Complete	55	Executive Summary (pp. 4-16)	Public Life: Rush-Hour Curbside Lanes & Median. The study may benefit from more distinction of the impacts between 5 and 6.	Noted. Will add discussion on the distinctions between alternatives 5 and 6 (with 6 having a larger impact to traffic operations, with just one single lane in each direction during off-peak hours and no curbside loading/drop-off, etc. during peak hours)	DDOT
No action	56	Planning Context (pp. 24-46)	DDOT supports the Recommendation on pg. 43 that would limit curbside access to PUDO for museum and memorial visitors on MD Ave.	Noted.	DDOT
No action	57	Urban Life Review (pp. 47-53)	Bus is not in the top 5 modes of travel identified by survey responses in Figure 28 on page 52. This seems surprising, does the team have an explanation, perhaps related to the low response rate?	Yes, we expect this was due to the low response rate (23 responses)	DDOT
Complete	58	Design Framework (pp.54-73)	Section 4.3 Block-by-Block Curbside Considerations should be framed as a snapshot in time when the study was performed and not necessarily long-term needs, as curbside uses are dynamic and subject to regular change.	Will update text to note this point.	DDOT
Complete	59	Design Framework (pp.54-73)	The detailed list of curbside uses on page 65 should be part of graphic (legend) on page 66 or designed as a two-page spread (66-67).	Will reconfigure this spread.	DDOT
Complete	60	Design Framework (pp.54-73)	For last Parking bullet on pg 67, and rewrite as "Follow latest DCMR Title 18 requirements for ADA parking" – This may be updated in the near future.	Will update.	DDOT
No action	61	Design Framework (pp.54-73)	Pg. 69 - DDOT supports prioritizing curbside passenger/visitor loading by all modes over curbside vehicle parking, with the exception of specific areas for commercial/museum-specific loading.	Noted.	DDOT
Complete	62	Design Vision (pp. 74-110)	Consider using DC examples for the two-way bike lane photos on pages 85-86.	Will update	DDOT
Complete	63	Design Vision (pp. 111-113)	Consider elevating the opportunity to better coordinate and manage curbside uses along the corridor and tactical improvements between the curbs as a more near-term next step.	Will add near-term step	DDOT
No action	64	Traffic Analysis Memo	There are concerns on the usage of counts collected in November 2022. Specifically, recent changes in workplace flexibility arrangements and staffing cuts made to federal departments may result in new baseline volumes in the Independence Avenue SW area. We acknowledge that uncertainties remain at this point and traffic has yet to be stabilized as a new normal.	We will note this as a limitation in the study and recommended update data collection and evaluation when advancing a preferred alternative.	DDOT
Complete	65	Traffic Analysis Memo	The traffic analysis memo appears to have only analyzed one general scenario which is four-lane with turn pockets added at select locations. However, the main body of the report outlined six options including a rush-hour restricted curbside lane option which was not analyzed. Clearly document whether only the preferred option was being analyzed or if the analysis picked a conservative option.	Will note that the analysis evaluated the most conservative option.	DDOT

Complete	66	Traffic Analysis Memo	In addition, DDOT has requirements for turning volume thresholds for crossing a two-way cycle track under permissive phasing, as specified in DDOT's 2020 Bicycle Facility Design Guide. The memo did not specify whether such thresholds were considered and whether the signal phasing was modified to meet the requirements.	We reviewed the requirements and adjusted signal timing for cycle track alternative. Will adjust text in report.	DDOT
Complete	67	Page 3	Should the bubbled recommendation examples be numbered (in the green circles), and summarized in a list somewhere in the report?	Will remove note about numbering (we removed numbering)	Scott SI
Complete	68	p 5	Fed and DC Agencies: delete one of references to DDOT (duplicative). Should all agencies have abbbreviations?	Will update text.	Passman SI
Complete	69	p 6	Include food trucks in Curbside Conflicts (as illustrated in the photo)	Will update text.	Passman SI
No action	70	p 9	The only graphic indication that the curb side lanes are mixed use functions is the raised curb right at the cross section. Perhaps the curb side lane surface could be a slightly darker grey tone lanes that are for rush hour traffic and curbside mixed use and hatched for those that are permanent non-traffic curbside mixed use. Suggest applying this graphic edit to all options throughout the report (section/perspectives an plans), where relevant.	This detail is noted in the text, we're hesitant to show different pavement in the curbside lanes, as they will be the same asphalt as the travel lanes. The solid lane striping helps to note that these are full-time curbside lanes.	Scott SI
Complete	71	p 9	Should median be colored green to indicate where landscape is intended? Opportunities: how do you mean that the median offers flexibility for future curbside use? Tradeoffs: since this option includes expanded sidewalks, should say that a tradeoff is that it reduces additional opportunities for expanded sidewalks?	Will review concepts to ensure landscaping/green areas are shown in green. Adjust Alternative 6 to fill green in the expanded tree boxees. Alternative 1 is a partially landscaped median that will include low profile landscaping near the intersections.	Passman SI
No action	72	p 11	Key features: Since no pedestrian crossings are illustrated, where are enhanced locations?	This will be shown in the plan view drawings of the corridor. The current view point does not show crossing locations.	Passman SI
Complete	73	p 12	Key features: is median landscaped (illustration shows striping)? Is non-rush hour parking permitted on south side?	Will update text, as the median is striped. Parking is permitted during non-rush hours on both sides of the street.	Passman SI
Complete	74	p 14	Key features: same as above, is median landscaped? Tradeoffs: what is meant by "Some curbside space may be underutilized? Wouldn't it be likely that people would park there?	Will update text, as the median is striped. Will review and update this text.	Passman SI
Complete	75	p 15	Paragraph 1, Consider editing the sentence that includes "ensure that the final design prioritizes pedestrian experience… "by adding the words "and balances" after the word prioritize. The study presents options that push functional, experiential and aesthetic changes to different degrees away from the existing but should be balanced with existing needs.	Will update text.	Scott SI
Complete	76	ExSum	Somewhere should indicate that the reimagined avenue should also improve connections between National Mall and residential and mixed use areas to the south. Perhaps include key take-aways and requirements such as that traffic analysis identified the need for a minimum of 4 lanes (described on p. 42)?	Will include.	Passman SI
Complete	77	p 17	Last bullet of 2024 Design Study: should say refining the three 2023 concepts into six options and developing block-level design concepts?	Will update this text	Passman SI
Complete	78	p. 20	Smithsonian is not an agency like the others listed. Perhaps say here "continued coordination between agencies and stakeholders including… "	Will update this text	Passman SI

Complete	79	p 21	Can figure 4, 1st narrative box, be edited to also convey how the study design options encourage the expansion of the historic core south, across independence avenue into the SW and waterfront. Also, that design options seek to establish consistent treatment relative to existing and future buildings on the south side?	Will update this text	Scott	SI
Complete	80	p 21	Should one of the Vision narratives identify the intention for Independence Avenue's continued or even improved use as location for public celebration, parades, special events?	Will include this vision narrative	Scott	SI
Complete	81	p 32	Is this illustration from the IWG Monumental Core streetscape guidelines?	Yes, we will update.	Passman	SI
Complete	82	p 43	Recommendation: Can this be revised to delete fully restricting vehicle access? Pick up/dropoff access is needed.	Will update text.	Passman	SI
No action	83	p. 46 & 65	There is motorcoach parking at Eisenhower Memorial(?)	Yes, bus parking was observed at this location.	Passman	SI
Complete	84	p 66	What is the difference between No Parking and Pick-up Drop Off zones? There is a need for Pick-up/drop off and delivery access in the areas marked for No Parking. At NMAI, what is the "need" for vendors? There are no assigned vendor locations there (2023 vendor handbook). I think there is a need there for pick-up/dropoff.	No Parking is no parking at any time (i.e. at bus stops, fire hydrants, near intersections, etc.) In some cases, there are very close overlaps between zones. Will add pick-up/drop off need at NMAI.	Passman	SI
Complete	85	p 92-103	Perhaps number the options consistent with how they are numbered in the Executive Summary, for ease of reference and clarity?	Will number options.	Passman	SI
Complete	86		The study for future phases should consider implications to the changing uses on the south side of Independence, such as disposition of Forrestal or the FAA vacating their buildings.	Will address this in text.	Bond	SI
No action	87		Option 3 creates a green space which competes with the National Mall greensward. Just a thought. I prefer Option 4 if there is desire to create the cycle track, which changes the character of Independence less (though it may be less safe for cyclists).	Noted.	Bond	SI
No action	88		Option 1 may offer the best pedestrian safety.	Noted.	Bond	SI
Complete	89		The Hirshhorn Revitalize Building and Plaza project is planning adjustments to the tree box locations and plantings on Independence Avenue. This project is moving into 35% dd and should be evaluated for alignment with the various options under consideration for the Independence Avenue Design Study.	Will note the need for coordination with this project.	Bond	SI
No action	90		The Arts & Industries Building and the Freer Gallery lack vehicular barriers on Independence Avenue. The appropriate location for bollards or hardened street furniture needs analysis and consideration under the various options.	Noted. This will likely take place in future design refinement	Bond	SI
Complete	91		Page 59 (and other spaces prior) reads: *"Add a protected bike lane and improve crosswalks to connect the Metro station with surrounding uses."* It is not clear whether that includes adding an additional crosswalk on the east side of the intersection. This would be a significant quality of life improvement for pedestrians. It would be helpful to see a map showing proposed added crosswalks.	Final report will include full corridor layouts for each of the six concepts and will show proposed crosswalks. Figure 36 also shows proposed midblock crosswalks.	Abrams	SI

No action	92		Page 69: " *Close the pull-in area at the National Museum of Asian Art and provide accessible pick-up/drop-off*" Would this proposed pick up/drop off area be large enough to accommodate a truck? NMAA uses the existing pull in area both for accessible visitors and some freight deliveries. Because of the low door thresholds in the historic building, some loads cannot come in through the 1150 loading dock and make it into the Freer Gallery of Art. Those oversized loads must enter the building through the Independence Ave side entrance.	Yes, the curbside lane will accommodate truck loading/unloading, as well as accessible parking access.	Abrams	SI
No action	93		Food trucks and vendors are cited in several sections of the report, but the resolution of the many challenges they create seems vague and unmanageable.	Noted, however, the management and guidance for food trucks and vendors was not included in this project's scope	Davies	SI
No action	94		Utilities under Independence Ave SW - including specifically the soon-to-be-decommissioned GSA chilled water and steam distribution systems - will require adaptive reuse or refurbishment or removal in the next ten years or so, and any such requirements should be ahead of or within the proposed reworking of the Avenue.	Noted.	Davies	SI
Complete	95	Table of Contents	As we discussed, it would be great to add the full corridor plans for each alternative to the appendix if you have them.	Will include.	Laura	NCPC
Complete	96	Table of Contents	Revise Appendix C title to "Stakeholder Charrette Materials" to distinguish from Appendix D.	Will update.	Laura	NCPC
Complete	97	Table of Contents	Could revise this appendix to "Stakeholder Feedback" so that it can include the charrette comments and comments on the draft report.	Will update.	Laura	NCPC
Complete	98	Document Structure	I don't think the ID number is included with the recommendation bubbles anymore, so this sentence could be removed.	Will update.	Laura	NCPC
Complete	99	Document Structure	Is there still a Recommendations section in the document?	Will add recommendations section, per DDOT's comment.	Laura	NCPC
No action	100	Executive Summary	Really great Exec Summary!	Thanks!	Laura	NCPC
Complete	101	Executive Summary	Should we change this phrase to just resilience?	Will update.	Meghan Hc	NCPC
Complete	102	Executive Summary	Kittelson please revise "environmental resilience" to just "resilience"	Will update.	Laura	NCPC
Complete	103	Executive Summary	add District Homeland Security and Emergency Management Agency (HSEMA) and United States Military District of Washington (MDW)	Will include.	Laura	NCPC
Complete	104	Executive Summary	Add "food trucks" to the list	Will include.	Laura	NCPC
Complete	105	Executive Summary	Can we remove Resilience here and change this to Infrastructure Enhancements?	Will update.	Meghan Hc	NCPC
Complete	106	Executive Summary	Kittelson please revise "Environmental Resilience Enhancements" to "Infrastructure Enhancements"	Will update.	Laura	NCPC
Complete	107	Executive Summary	revise to "These changes will contribute to a safer and more comfortable urban landscape."	Will update.	Laura	NCPC
Complete	108	Executive Summary	"...the study presents six distinct design concepts grouped into three themes: monumental, multimodal, and public life."	Will update.	Laura	NCPC
Complete	109	Executive Summary 3. Multimodal: Full-Time Curbside Uses on North Curb	add "additional tree canopy" to the Key Features (this is the only option with 5 rows of trees)	Will update.	Laura	NCPC

Complete	110	Executive Summary 4. Multimodal: Rush Hour Curbside Lanes & Median	revise to "striped median"	Will update.	Laura	NCPC
Complete	111	Executive Summary 4. Multimodal: Rush Hour Curbside Lanes & Median	This rendering has a slightly different view angle than the others. If it is possible to get the same angle that would be great so that when someone flips through they can easily pinpoint the differences between the alternatives.	Will update.	Laura	NCPC
Complete	112	Executive Summary 4. Multimodal: Rush Hour Curbside Lanes & Median	Show as raised 2' buffer	Will update.	Laura	NCPC
Complete	113	Exectutive Summary 5. Public Life: Full-Time Curbside Uses on North Curb	add low plantings to these large planters & make green	Will update.	Laura	NCPC
Complete	114	Project Background (pg 17)	Change 15th Street SW and Washington to, "to Washington"	Will update.	Laura	NCPC
Complete	115	Project Background (pg 17)	Change the purpose of this Study will be to, "is"	Will update.	Laura	NCPC
Complete	116	Planning Context (pg 25)	Strikethrough 'narrow street'	Will update.	Laura	NCPC
Complete	117	Planning Context (pg 27)	Remove double period	Will update.	Laura	NCPC
Complete	118	Planning Context (pg 27)	Remove recommendation, "Identify opportunities..."	Will update.	Laura	NCPC
Complete	119	Planning Context (pg 29)	Remove 'parklets' in recommendation	Will update.	Laura	NCPC
Complete	120	Planning Context (pg 22)	This figure is from the "Monumental Core Framework Plan" update source	Will update.	Laura	NCPC
Complete	121	Planning Context (pg 36)	Update text: More detail information can be found in the 2023 Corridor; to 'detailed'	Will update.	Laura	NCPC
Complete	122	Urban Life Review (pg 47)	change statistics to data	Will update.	Laura	NCPC
Complete	123	Urban Life Review (pg 48)	Change review will inform to 'informed'	Will update.	Laura	NCPC
Complete	124	Design Framework (pg 57)	I think the Figure name should be "Design Framework"; update graphic title	Will update.	Laura	NCPC
Complete	125	Design Framework (pg 57)	Consider showing the 9 segments of the avenue on this framework diagram that are described in the following pages.	Will update.	Laura	NCPC
Complete	126	Design Framework (pg 57)	add these viewshed arrows to the legend	Removed viewshed arrows, based on previous conversations	Laura	NCPC
Complete	127	Design Framework (pg 57)	Make sure that I captured where you are proposing midblock connections. I think I missed the one proposed at the Voice of America Building.	Will update.	Laura	NCPC
Complete	128	Design Framework (pg 57)	Sorry, I didnt include this arrow in the legend so it should be added. Could be called: "Proposed Pedestrian Priority Street" or "Proposed Shared Street" or another label you think appropriate.	Will update.	Laura	NCPC

Complete	129	Design Vision	Make edits to all sketchup renderings consistent with comments in the Exec Summary	Will update.	Laura	NCPC
Complete	130	Design Vision (ph 104)	method of evaluation... (change from the first method uses the focus areas,)	Will update.	Laura	NCPC
Complete			"landscaped median" revise text to indicate that this is at intersections (hard to see in concepts)			

Appendix E: Complete Corridor Design Concepts

Appendix E: Complete Corridor Design Concepts

1. Monumental: Full-Time Curbside Uses & Median

15th Street to 14th Street



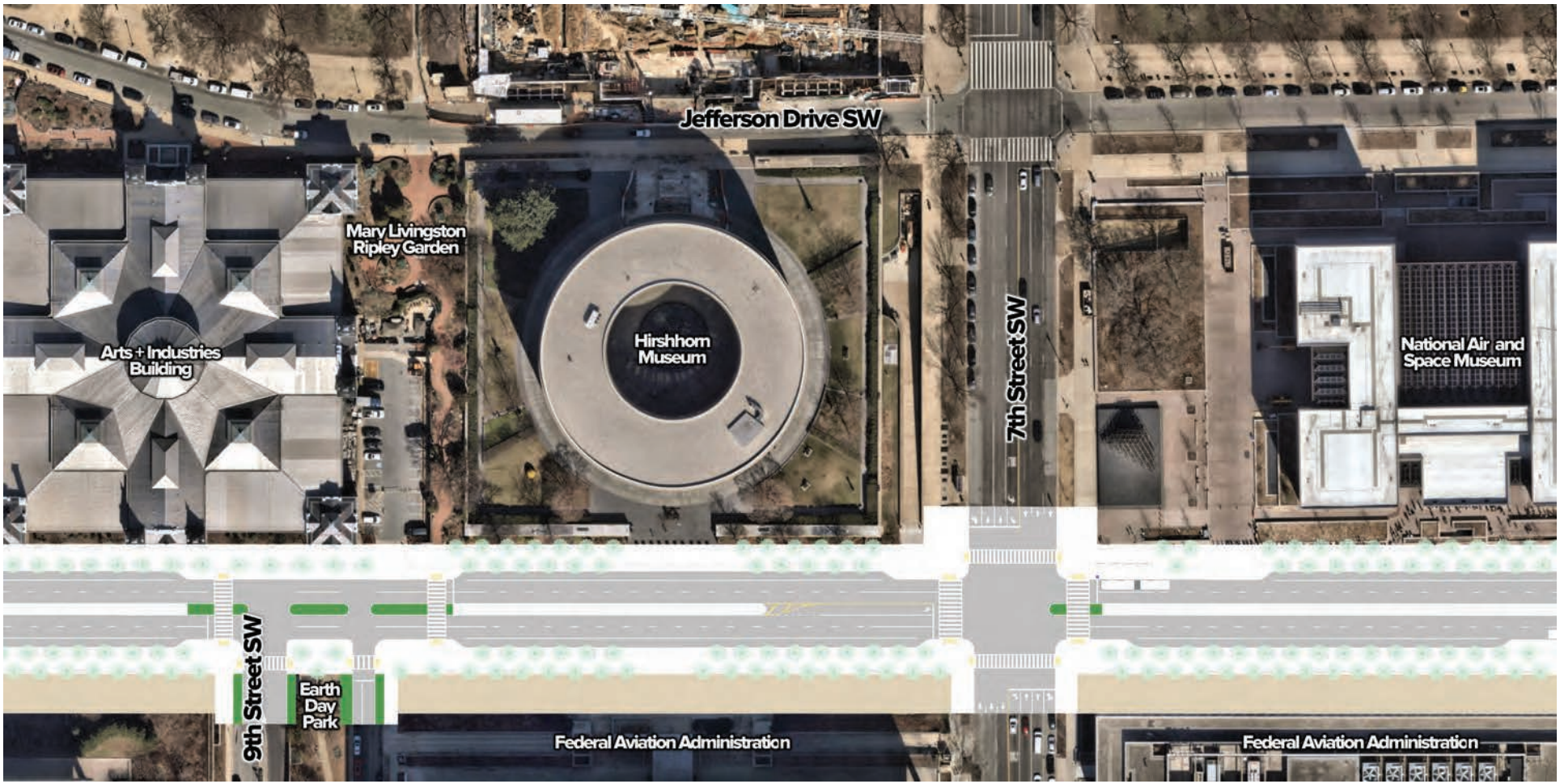
14th Street to 12th Street



12th Street to L'Enfant Plaza to 9th Street



9th Street to 7th Street



7th Street to 6th Street to 4th Street



4th Street to 3rd Street to Washington Avenue SW



2. Monumental: Rush-Hour Curbside Lanes

15th Street to 14th Street



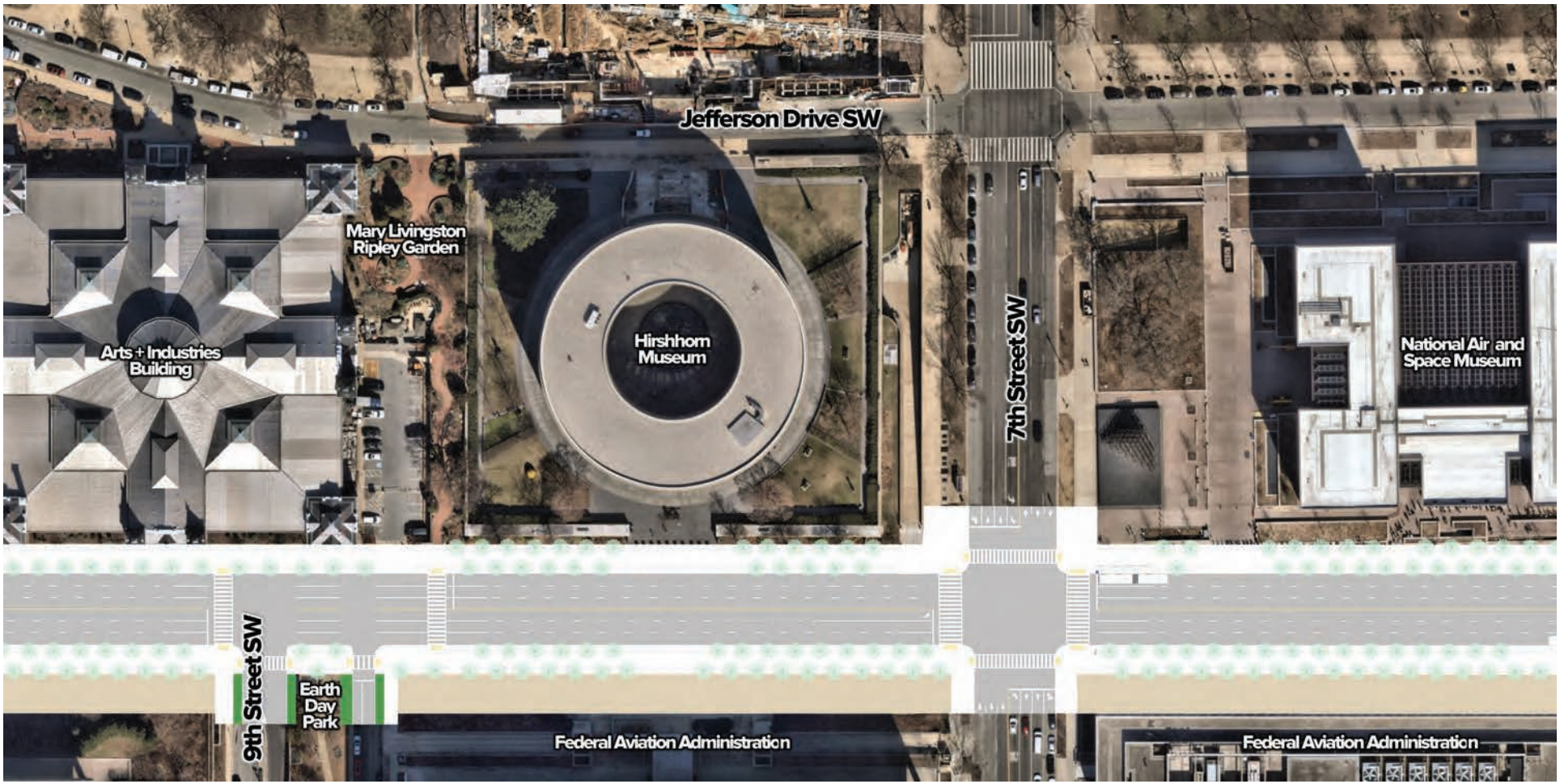
14th Street to 12th Street



12th Street to L'Enfant Plaza to 9th Street



9th Street to 7th Street



7th Street to 6th Street to 4th Street



4th Street to 3rd Street to Washington Avenue SW



3. Multimodal: Full-Time Curbside Uses on North Curb

15th Street to 14th Street



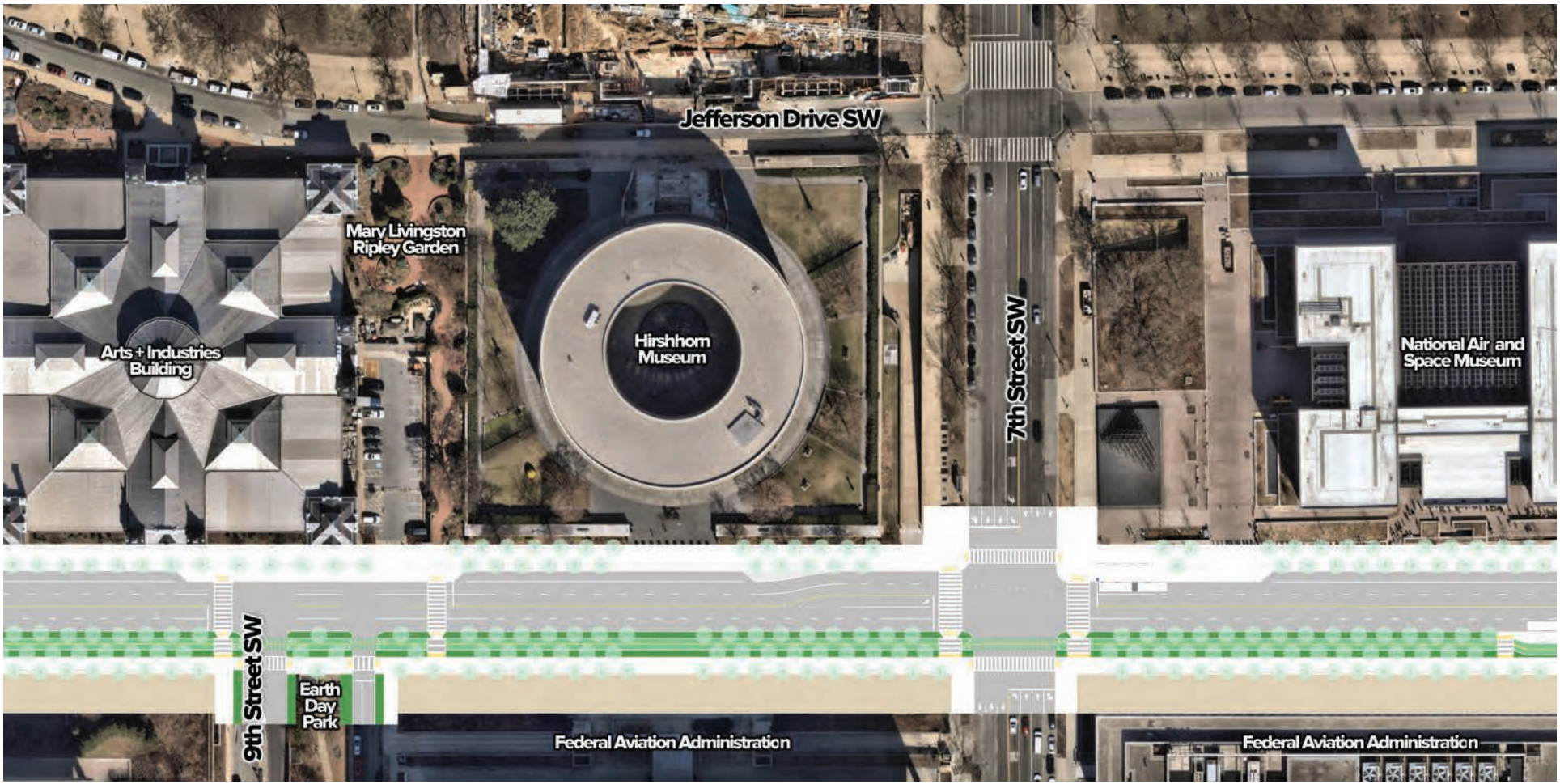
14th Street to 12th Street



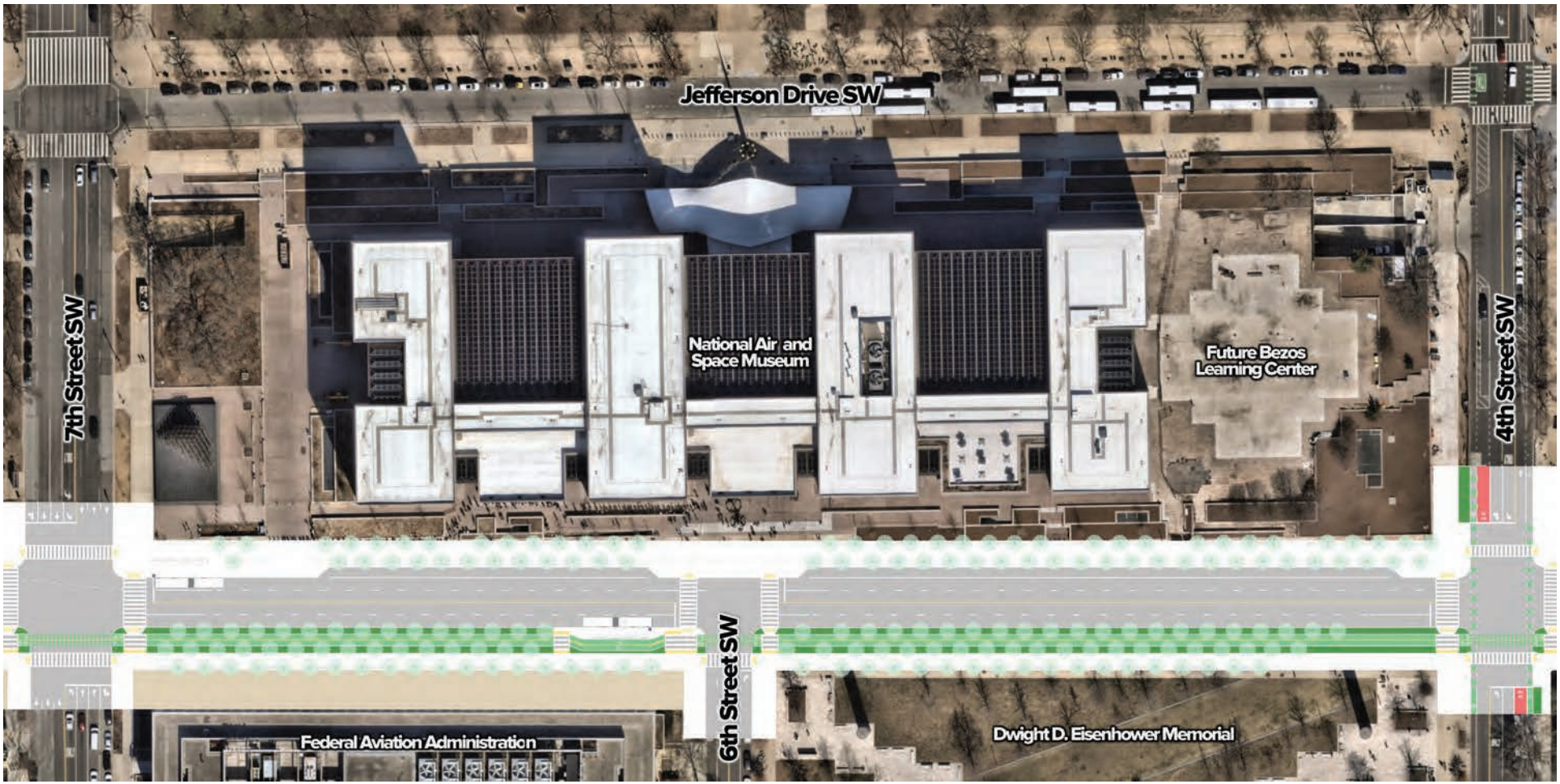
12th Street to L'Enfant Plaza to 9th Street



9th Street to 7th Street



7th Street to 6th Street to 4th Street



4th Street to 3rd Street to Washington Avenue SW



4. Multimodal: Rush-Hour Curbside Lanes & Median

15th Street to 14th Street



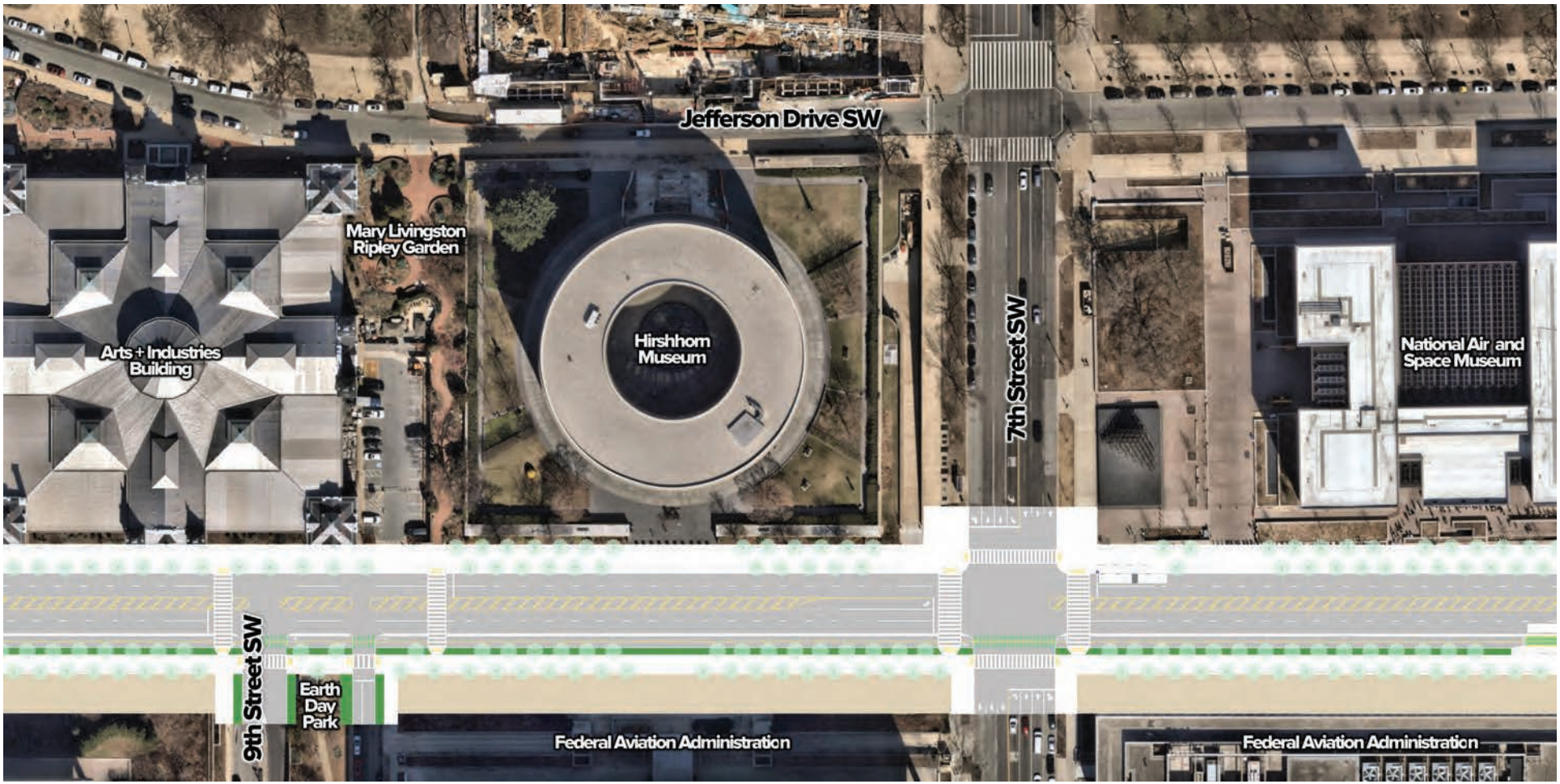
14th Street to 12th Street



12th Street to L'Enfant Plaza to 9th Street



9th Street to 7th Street



7th Street to 6th Street to 4th Street

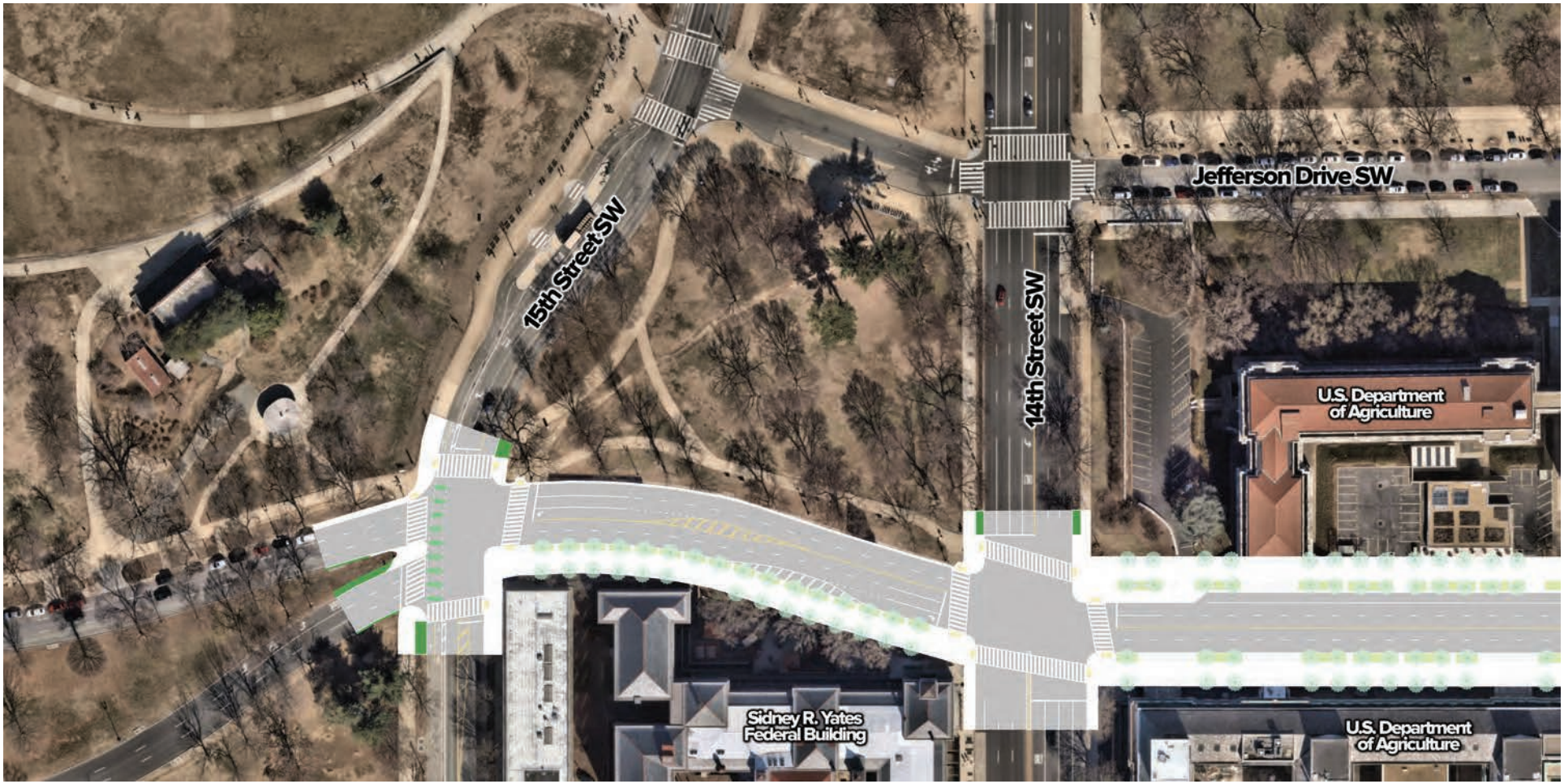


4th Street to 3rd Street to Washington Avenue SW



5. Public Life: Full-Time Curbside Uses on North Curb

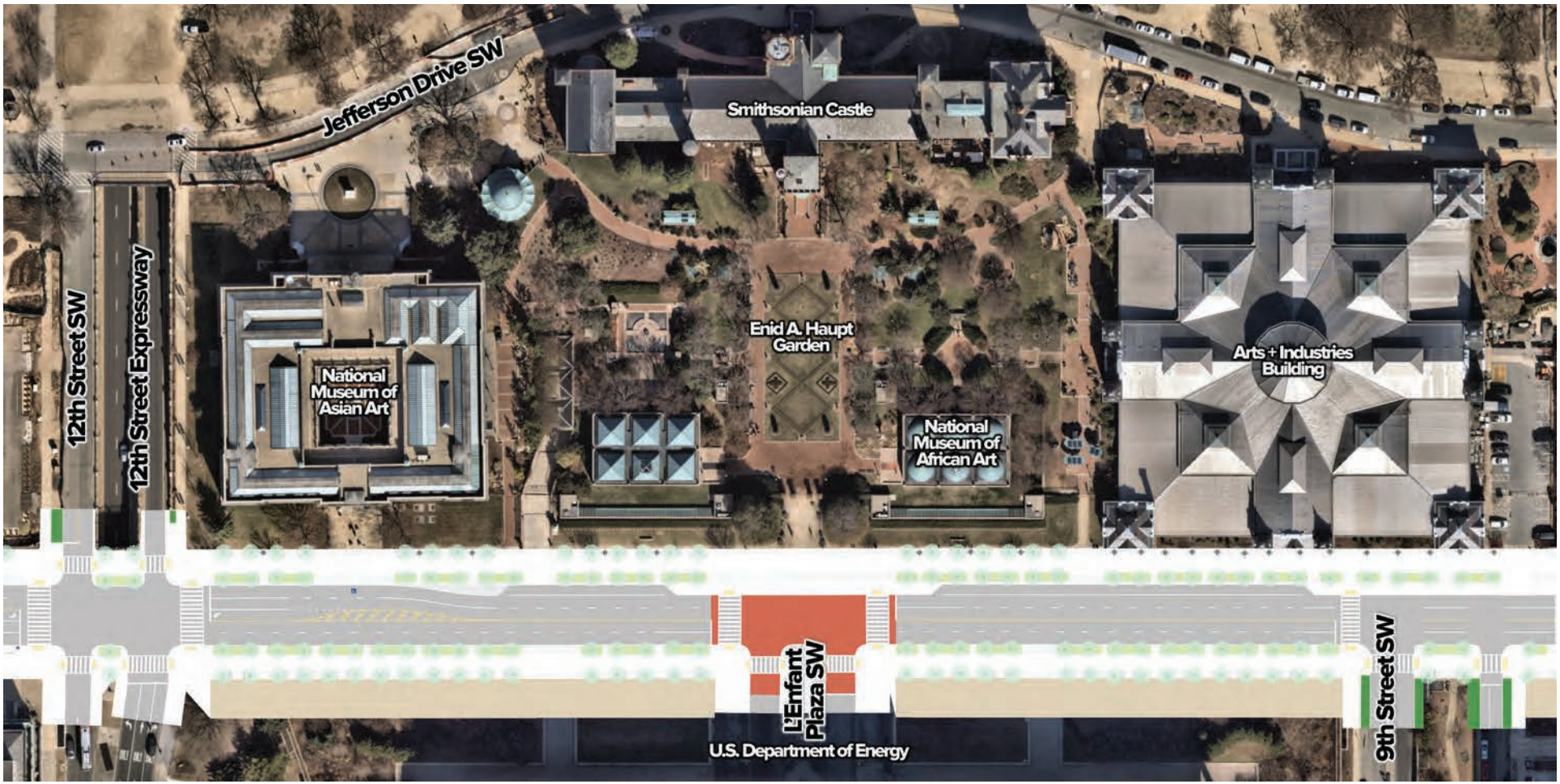
15th Street to 14th Street



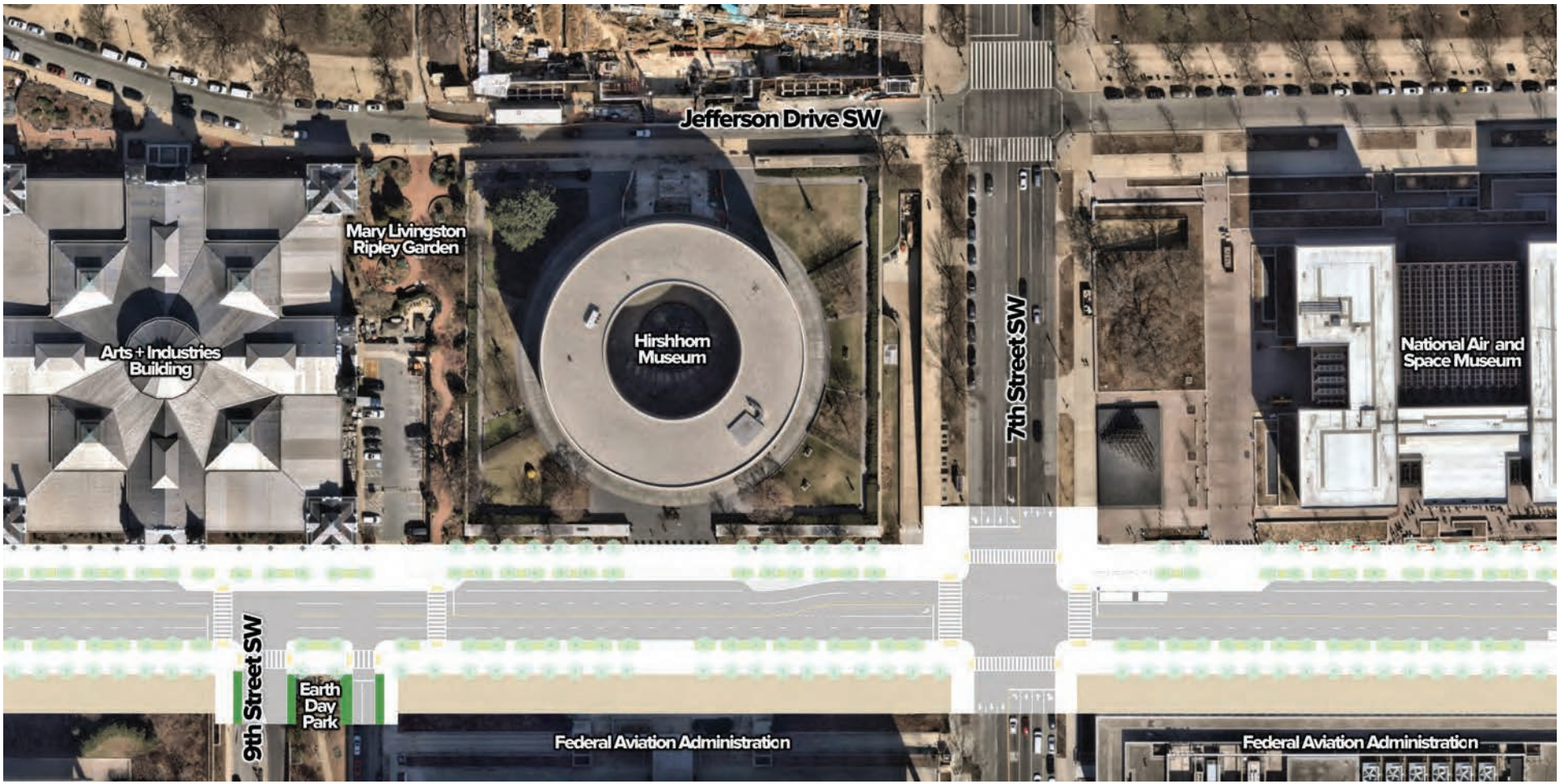
14th Street to 12th Street



12th Street to L'Enfant Plaza to 9th Street



9th Street to 7th Street



7th Street to 6th Street to 4th Street



4th Street to 3rd Street to Washington Avenue SW



6. Public Life: Rush-Hour Curbside Lanes & Median

15th Street to 14th Street



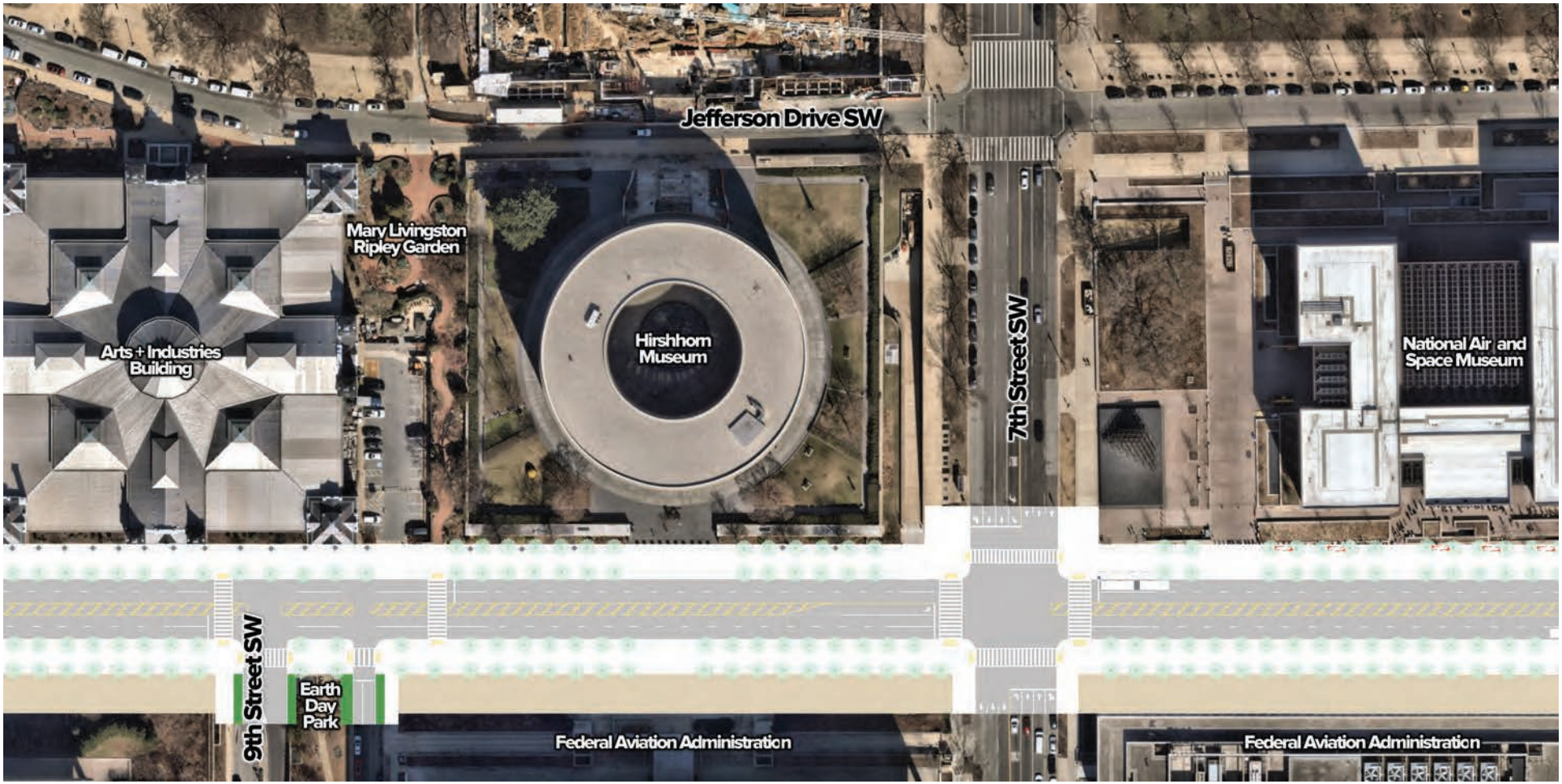
14th Street to 12th Street



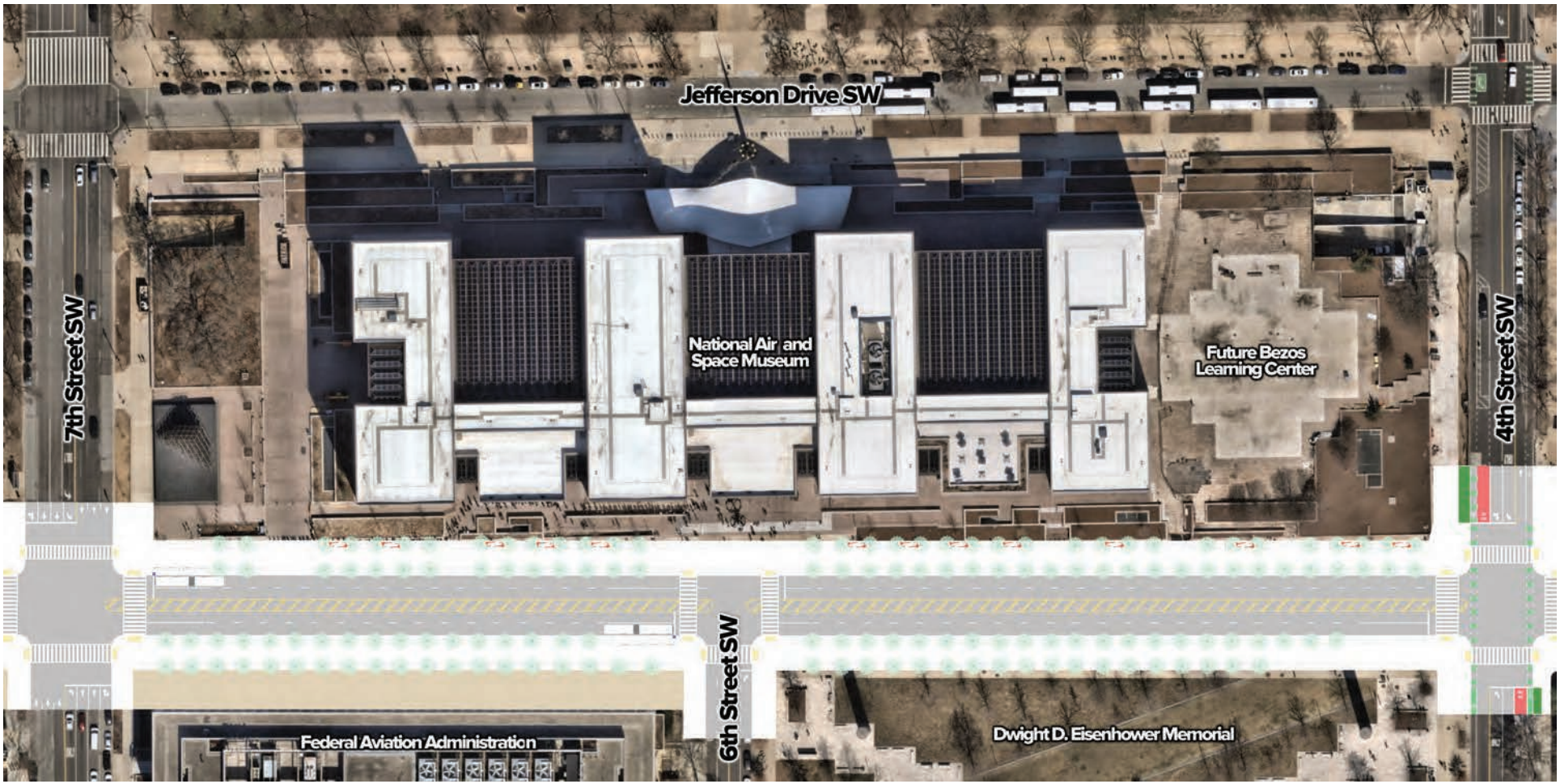
12th Street to L'Enfant Plaza to 9th Street



9th Street to 7th Street



7th Street to 6th Street to 4th Street



4th Street to 3rd Street to Washington Avenue SW

