



Appendix J

2009 Union Station Intermodal Transit Center Feasibility Study





UNION STATION INTERMODAL TRANSPORTATION CENTER FEASIBILITY STUDY

OCTOBER 2009



d.
District Department of Transportation

Contents

Glossary

1	Introduction	2
1.1	Purpose and Need	2
1.2	Framework Goals and Principles	2
1.3	Identified Needs	3
1.4	The Planning Process	3
1.5	Relationship to Previous Studies	4
2	Study Context	5
2.1	Historic Significance	5
2.2	Geographic and Regional Significance	6
2.3	Study Area	6
2.4	Physical Components of Union Station	7
2.5	Governance and Management	8
3	Transportation Needs Assessment	9
3.1	Needs Assessment	9
3.2	Identified Needs	9
3.2.1	Capacity Requirements	9
3.2.2	Modal Connections	9
3.2.3	Pedestrian Connections	10
3.2.4	Safety and Security	10
3.2.5	Historic Character and Preservation	10
3.2.6	Transit-Supportive Land Use Patterns	10
3.2.7	Circulation	10
3.2.8	Storage and Waiting	11

4	Fixing Conditions	12
4.1	Traffic	12
4.2	Fixing Street Network	12
4.3	Circulation	13
4.4	Parking	14
4.5	Pedestrian Activity	14
4.5.1	ADA Issues	14
4.5.2	External Pedestrian Movements	14
4.5.3	Internal Pedestrian Movements	15
4.6	Transition to Modes at Union Station	17
4.6.1	Bicycles	19
4.6.2	Microbus	19
4.6.3	Bus Circulator	20
4.6.4	Commuter Buses	20
4.6.5	Taxi Buses	20
4.6.6	Intercity Bus	21
4.6.7	Service4	21
4.6.8	Metrolink	21
4.6.9	Rail at Union Station	22
4.6.10	Commuter Rail	22
4.6.11	Intercity Rail	22
5	Future Transportation Demand	22

6	Recommended Union Station Intermodal Transit Center Plan	24
6.1	Introduction to Recommendations	24
6.2	Recommended Actions	27
6.3	Other Recommended Improvements	36
6.4	Recommended Actions Implementation Costs	39
7	Implementation Consideration and Environmental Requirements	39
7.1	Implementation Funding	39
7.2	Implementation of TOD Principles	35
7.3	Environmental Analysis	39
7.4	Public Outreach	40

APPENDIX A: Baseline Study Report (October 2008)

APPENDIX B: Conceptual Design Drawings

APPENDIX C: Detailed Cost Elements

APPENDIX D: Contacts

List of Figures

2-1	Study Area Overview	6
2-2	Physical Components	8
4-1	Intersection Levels of Service	12
4-2	Typical Vehicular Circulation Patterns	13
4-3	On-Street Parking in the Vicinity of Union Station	15
4-4	One-Hour Pedestrian Volumes on Roads Adjacent to Union Station	16
4-5	Morning Rush Period Pedestrian Paths	16
4-6	Evening Rush Period Pedestrian Paths	16
4-7	Closed Pedestrian Corridor Points of Entry and Exit	17
4-8	Bicycle Trajectories Study Area	19
4-9	Metabolic Rate	20
4-10	D.C. Circulator Monthly Ridership, Inception Through May 2005	20
4-11	Commuter Train Activity at Union Station	22
4-12	Amtrak Activity at Union Station	22
6-1	Study Context Areas	24
6-2	Modal and Station Systems in the Study Area	25
6-3	Area A - Columbus Plaza Improvements	27
6-4	Area B - Train Concourse Pedestrian Elements	28
6-5	Area C - First Street Improvements	30
6-6	Area D - Plan View and Plan View Cross-Section at H Street	32
6-7	Area D - Plan View and North-South Cross-Section at H Street	33
6-8	Area E - Improvements to Train and Walking Garage	35
6-9	Emergency Access and Egress Opportunities	36
6-10	Union Station Emergency Evacuation Map	37
6-11	Walkable Evacuation Routes Near Union Station	37
7-1	Union Station Improvements by Phase - Lower Level	43
7-2	Union Station Improvement by Phase - Concourse Level	44
7-3	Union Station Improvement by Phase - Mezzanine Level	45
7-4	Union Station Improvement by Phase - Parking Garage Levels	46

List of Tables

1-1	Planning Framework Goals and Planning Principles	2
3-1	Planning Framework Goals and Identified Needs	9
4-1	Typical Station Modes at Union Station	18
4-2	Ranking of Commuter Buses which Serve the Union Station Area	20
4-3	Compared to - and Commuter Bus Populations Observed Near Downtown Washington, D.C.	21
4-4	Volumes of Freeway Removal Trips Beginning or Ending at Union Station	21
5-1	Mode Demand Forecast	23
6-1	Summary of Recommended Improvements	26
6-2	Train Concourse Corridor Construction Cost	29
6-3	North Entrance Plaza Level Construction Cost	29
6-4	Expanded Passenger Rail Concourse Improvements	25
6-5	Costs for Mezzanine Improvements	30
6-6	Costs for Mezzanine Station Access Study	31
6-7	North-Entrance Plaza Level Construction Cost	36
6-8	First Street Lobby Construction Cost	36
6-9	Costs for Streetcar Expansion to Union Station	36
6-10	Costs for Emergency Egress Corridor at H Street	36
6-11	Comprehensive Signage Program Cost	35
6-12	TOD Implementation Costs	36
6-13	Planning Framework Goals and Related Improvements	38

Glossary

Annual	The federal law for the National Passenger Railroads Capital of the next provider of high-speed rail services in the U.S.
ANC	Advisory Neighborhood Commission
Bluestation	A planned train station at the southeast corner of Union Station
bus/transit link	A scaled or the "small wheel" of the station linking garage
D.C. Circulator	A connected bus service funded by the District of Columbia
DDOT	District of Columbia Department of Transportation
DDOT MTA	District of Columbia Department of Transportation Mass Transit Administration
First Street Lobby	A pedestrian lobby envisioned for the existing space under the station at the terminus of the North Pedestrian Walkway
Inferocity	Connecting two or more rides
Intracity	Within a city
LOS	Level of service
MARC	Maryland Area Regional Commuter Train System
Metrobus	Washington Metro's bus rapid transit system
Metro rail	Washington Metro's rapid transit system. Often referred to as Metro, Metro Rail, or metro subway
MTA Maryland	Maryland Transit Administration
Not a BID	North of Massachusetts Avenue (Business Improvement District)
North Pedestrian Walkway	Proposed to connect Union Station to the planned First Street Lobby
North-South Concourse	An unbounded concourse for passengers, proposed by Amtrak Development Corporation
TOO	Transit-Oriented Development
Train Concourse Connector	Proposed to connect MARC gates with Metro and the North Pedestrian Walkway
Union Station	The former name for the Washington Union Station and is associated to legal firms
USITC	Union Station Intermodal Transportation Center
USRC	Union Station Redevelopment Corporation the nonprofit corporation established by Congress with protecting the federal government's interests
vertical circulation	requires specific method of ascent or descent from one level within the station to another
VRE	Virginia Railway Express
Washington, D.C.	District of Columbia
WMATA	Washington Metropolitan Area Transit Authority



1 Introduction

Since opening in 1998, Washington, D.C.'s (D.C.) Union Station has been a key transportation and retail hub in the regional and national infrastructure. Serving tens of thousands of travelers each day, to ports as close as the Metro and Maryland suburbs and as far as Toronto and Los Angeles, Union Station stands as a proud reminder of our shared and shared future.

The station is located near several D.C. major roadway corridors, including Massachusetts Avenue, North Capitol Street, H Street, Constitution Avenue and Michigan Avenue. Served by 622, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

Passengers can be observed traveling to and from the station, transferring between transportation modes, stopping and waiting before their departure as well as Union Station serves as the station for the Metropolitan Branch Trail on First Street NE (right).



The location of the station on Georgetown City that has been planned and designed to be a key transportation hub for the region.

Union Station serves the region's population by providing a key transportation hub for the region. The station is a key transportation hub for the region, providing a key transportation hub for the region.

During peak travel times, Union Station is a primary destination and a key transportation hub for the region. The station is a key transportation hub for the region, providing a key transportation hub for the region.

Given the critical role Union Station plays in providing transportation options to visitors and commuters alike, it is important to assess the station's overall ability to meet the needs of its users. To do this, a comprehensive analysis of facilities, modes, and connecting transit demands was undertaken. The results of this analysis include recommendations to address existing issues, enhance transportation options, and meet the larger transportation network in which it operates.

Existing transit options (above) and Columbus Plaza (below).

View from the east side of Union Station (left) and the Metropolitan Branch Trail on First Street NE (right).



1.1 Purpose and Need

Urban transportation corridors and needs become a critical system component around Union Station, the District of Columbia Department of Transportation (DOT) is leading the Urban Station Multimodal Transportation Center (UMTC) feasibility study to the public.

- Growth in Union Station's usage across all modes of transportation, including Metro, the Maryland Area Rapid Rail, Commuter Rail, and Virginia Railway Express (VRE) (Amtrak, Metrolink, and Metrolink).
- The need to provide the steps to the implementation of the UMTC by various stakeholders at Union Station, including construction of a new multimodal concourse for rail operations.

- Access to the transit passenger concourse.
- New multimodal design concept and delivery near Station and Street.
- Integration of commercial, transit, and bus services.
- Bus parking needs and
- Integration of new streets between

- The need to assess concerns for regional emergency evacuation.
- The need to assess proposed concepts for multimodal transportation for the station and to provide a conceptual framework for development that will be consistent with the 15 acres of a right-of-way that is being released to the public.
- The need to assess the potential impacts of potential development on the surrounding area and to provide a conceptual framework for development that will be consistent with the 15 acres of a right-of-way that is being released to the public.

Consequently, the Urban Station Multimodal Transportation Center (UMTC) Feasibility Study addresses existing needs and future demands, including:

- Development of existing, new, and additional facilities and transportation services for the station, including bus, transit, and other modes and uses at the station, and
- Development of integrated and multimodal transportation to improve connectivity and convenience of a multimodal transportation system that will be consistent with the 15 acres of a right-of-way that is being released to the public.

This study was conducted with the participation of a diverse set of stakeholders, including residents, property owners, and local and government organizations. The US DOT Feasibility Study identifies key community issues that would be needed in the planning and implementation of the UMTC. The study also identifies and includes a variety of project development options to the extent of detail necessary to determine the viability of proposed development.

1.2 Framework Goals and Principles

To guide the future development and design of Union Station, a planning process has been created that consists of framework framework goals, planning principles, and public participation process. The relationship between the planning framework goals and principles is shown in Table 1-1.

Table 1-1 Planning Framework Goals and Planning Principles

Planning Framework Goals	Supporting Principles
1 Maximize and optimize Union Station's multimodal transportation hub	Multimodal Feed Connectivity
2 Promote Union Station as a fluid pedestrian environment through thoughtful design and thoughtful connectivity	Pedestrian Priority Support
3 Create a safe, secure, and healthy environment for the station	Public and Security
4 Preserve the historic, cultural, and neighborhood character of the station	Historic Preservation Neighborhood Support

Goal 1: Maintain and enhance Union Station as a multimodal transportation hub. This goal recognizes Union Station's connectivity as an important hub for every mode of transit transportation in the region. Supporting this framework goal includes the following supporting measures to serve:

even the delivery of crucial assistance. Union Station is built on a transportation system that consists of both interior and exterior spaces where people use, work, play, socialize, recreate, and learn. Thus, creating vibrant and recognizable public spaces and outdoor areas that are well-served by transit is a key goal of the transportation system as well as the primary supporting areas by creating connectivity within and around the transportation system that empowers and empowers people to connect to transportation options, transit services, and service facilities and ensures sufficient capacity for all transportation.

Goal 2: Promote Union Station as a fluid pedestrian environment that supports comprehensive interior and exterior connectivity. Goal 2 envisions that the Union Station neighborhood is a pedestrian-friendly environment that is well-served by transit. This goal is supported by creating vibrant and recognizable public spaces and outdoor areas that are well-served by transit is a key goal of the transportation system as well as the primary supporting areas by creating connectivity within and around the transportation system that empowers and empowers people to connect to transportation options, transit services, and service facilities and ensures sufficient capacity for all transportation.



From the US DOT Feasibility Study, the Urban Station Multimodal Transportation Center (UMTC) Feasibility Study identifies key community issues that would be needed in the planning and implementation of the UMTC.

Methods. Connectivity, safe and efficient pedestrian movement, and a new building are essential parts of the planning framework. Further, at Union Station, the city's most important transit hub, the new platform and transit facility will be the "spine" connecting the rail with existing connections to downtown and central business districts. The core of the facility will be the new transit management building at Union Station. The building will be a single program with a high-quality transit station, new technology, and safety features, all in a single building (shown in Blue).

Goal 3: Ensure enhanced safety and security in and around the station. Safety and security are of paramount importance in any transit system. The design team has identified several key areas for improvement and has developed a plan to address them. The plan includes: a) enhanced security measures, including increased security personnel, increased security cameras, and increased security patrols; b) enhanced safety measures, including increased security personnel, increased security cameras, and increased security patrols; c) enhanced safety measures, including increased security personnel, increased security cameras, and increased security patrols.

Goal 4: Respect the architectural, cultural and regional significance of the historic station. The design team has identified several key areas for improvement and has developed a plan to address them. The plan includes: a) enhanced architectural features, including increased security personnel, increased security cameras, and increased security patrols; b) enhanced cultural features, including increased security personnel, increased security cameras, and increased security patrols; c) enhanced regional features, including increased security personnel, increased security cameras, and increased security patrols.

1.3 Identified Needs

The needs that have been identified in the previous pages include:

- Provide enhanced safety and security in and around the station.
- Respect the architectural, cultural and regional significance of the historic station.
- Provide enhanced connectivity, safe and efficient pedestrian movement, and a new building.

- Capacity requirements for the station to be able to hold a large number of people in the platform and the need for development outside the station.



Union Station and the new transit management building in Denver, Colorado.

- Provide enhanced safety and security in and around the station.
- Respect the architectural, cultural and regional significance of the historic station.
- Provide enhanced connectivity, safe and efficient pedestrian movement, and a new building.

1.4 The Planning Process

The planning process for Union Station was a multi-phased effort. It began with a conceptual study in 2002, followed by a preliminary design study in 2003, and a final design study in 2004. The process involved a wide range of stakeholders, including the city, the state, and the federal government. The final design study was completed in 2004 and resulted in the final design for the station.

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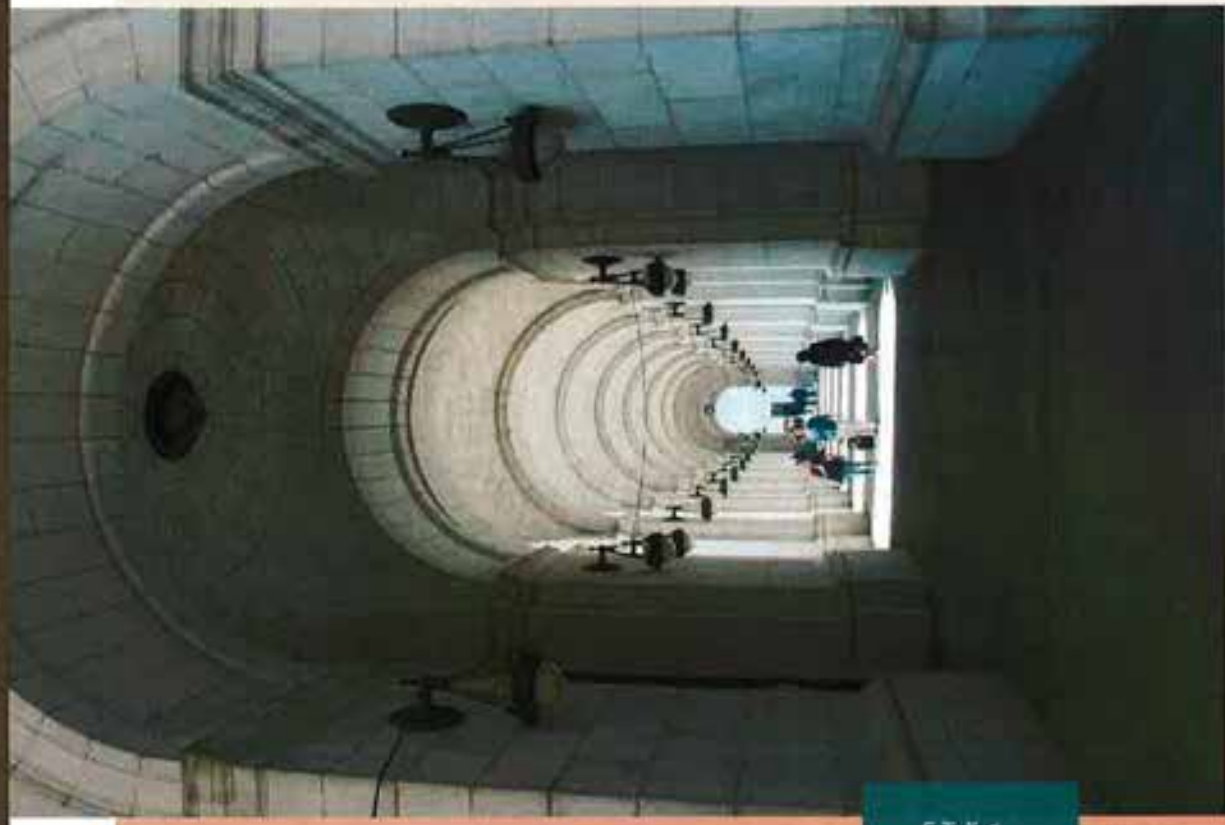
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1.5 Relationship to Previous Studies

This study has been performed with the addition of previous and ongoing planning and design work with Union Station, as well as the Metropolitan Union Station Study Report, Citywide Transportation Planning efforts including D.C.'s Strategic Transportation Plan, and the implementation plans and policies of the Metropolitan Area.

An earlier study of the area also focused directly on Union Station and its immediate vicinity, largely because of its role as D.C.'s major and historic transportation hub and its role as a downtown activity and destination center. The analysis and findings of previous studies provided the context and a starting point for the U.S. Transit Study Study Key Results from some of these studies, including the following:

- **Columbus Plaza Redevelopment** - Redesign of Columbus Plaza had been ongoing, with the intent of improving the aesthetic and functional qualities of the plaza (Frost/Duncan 2001).
- **Union Station Development** - Plans to renovate to create a transit center, a being constructed at the southeast corner of Union Station. The station will include bicycle storage, retail, and transit (2003 Study 2003a Implementation).
- **District of Columbia Transit Implementation and Analysis** - This study investigated the transit station, and long-term planning for new transit corridors that enhance the transit hub and economic vitality throughout D.C., with Union Station being an anchor for street-oriented activities (2005 and 2005b and 2008 update).
- **Capital - RT Transportation Study** - This study focuses on enhancing safety and mobility, congestion, and transit performance improvements in the area with a focus on high ridership (2008 Study).
- **Tour Bus Management Study** - This study investigated the role of tour buses in D.C., with a focus on how to manage a high density of tour buses in the downtown, including congestion and pollution, and alternatives from other cities. The study recommended methods of how tour bus activity can be managed throughout D.C. (2008 - present).
- **Metropolitan Center Transportation Study** - This study recommends several transportation improvements along the street including enhanced pedestrian and bicycling amenities and a proposed streetcar (2004 Study).



Pedestrian
walkway north of
Columbus Circle at
Union Station

2 Study Context

2.1 Historical Significance

Union Station was designed by renowned architect Daniel Burnham of Burnham and Root in Chicago. His son, George, and company designed the commercial and public buildings that define the city. The station was designed to be a landmark building, a symbol of the city's growth and progress. The station was designed to be a landmark building, a symbol of the city's growth and progress. The station was designed to be a landmark building, a symbol of the city's growth and progress.



Union Station was a gift of over 5,000 people and provided them general as a building with history. The building was designed by Burnham and Root in Chicago. The station was designed to be a landmark building, a symbol of the city's growth and progress. The station was designed to be a landmark building, a symbol of the city's growth and progress.

In 1969, the National Capital Planning Commission (NCPC) purchased the building to be used as a transit center. The building was designed by Burnham and Root in Chicago. The station was designed to be a landmark building, a symbol of the city's growth and progress. The station was designed to be a landmark building, a symbol of the city's growth and progress.



View inside the Headhouse circa 1920 depicting 1953 train station and existing retail at Union Station (right)

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Construction of the station led to the creation of the Union Station Redevelopment Corporation (USRC), a project designed and managed by Congress with funding from the federal government's National Urban Station. The Redevelopment Authority created USRC, sought restoration and operation of a station on the site where Station building is a rail passenger station.



together with funding for the project. The station was designed and managed by Congress with funding from the federal government's National Urban Station.

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Figure 2-1 Study Area Overview



2.2 Geographical and Regional Significance

Union Station is one of the city's major transportation hubs, serving as a central point for the Metro system and providing access to various transit modes. The station is located in the heart of the city, near the National Mall and the Capitol Building. It is a major transit hub, serving as a central point for the Metro system and providing access to various transit modes. The station is located in the heart of the city, near the National Mall and the Capitol Building. It is a major transit hub, serving as a central point for the Metro system and providing access to various transit modes.

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- In the northeast, a mix of light, medium, and residential zoning typically defines the physical development; is generally oriented to streets with sidewalks and boulevards forming most of the major thoroughfares.
- Station Plaza, The Station Park, and other parks are located adjacent to Union Station. In the city area, Stanton Park is completed primarily through private. Although some commercial office space exists in the neighborhood, it is close to Capitol Hill.
- Capitol Hill City Hall is located at a mix of high-rise residential and low-rise commercial. However, the majority of the residential is low-rise. A large portion of these employees live in other Station area neighborhoods: WRE, MRC, or FWRD.



View of the U.S. Capitol from Union Station (left), townhomes in a neighborhood near Union Station (center), and view inside the Headhouse at Union Station (right).



Other elements in the neighborhood, particularly townhomes and will contribute to the demand for transit services at Union Station.

2.4 Physical Components of Union Station

The most widely recognized components of the Union Station complex are its atrium and historic headhouse — or from the 1910s, as it is known, with 60-foot Baroque-style ceilings, mostly attributed to its height, and the historic dome. The historic dome is a 1910s building that is a prime example of the architecture of the neighborhood, which is a mix of high-rise and low-rise buildings. The historic dome is a prime example of the architecture of the neighborhood, which is a mix of high-rise and low-rise buildings.

The historic Concourse, Concourse North and Westwood, bookend waiting rooms, and other space.

Other major components of the Union Station complex include:

- The parking garage with a multi-level structure located on the lowest level.
- The old tracks, platform, and railroad service areas.
- Columbus Plaza and Columbus Circle.
- The Streetcar Bridge located above the railroad tracks.
- The 2nd, 3rd, and 4th floors of the historic building, which are located below the railroad tracks (two blocks below the H Street Bridge).

- AIRRAILS Under Station Westside Station (Road Level)
- Air RAILS over the 140,000 tracks running north on K Street. These components are shown in Figure 2-2.



Figure 2-2 Physical Components

2.5 Governance and Management

Special services manager functions within the Union Station complex and many other existing buildings managed on site. For a closer look at the components of the station, see the following table. The information was collected from the publicly available information and is not intended to be a comprehensive list of all information. The information is for informational purposes only and is not intended to be a comprehensive list of all information.

- **West Station Building** - Currently controlled by AirRAILS/Amtrak. Construction, operations, maintenance, and security of the West Station Building, including the AirRAILS building, are the responsibility of AirRAILS/Amtrak.
- **Joint AirRAILS/Amtrak** - The property manager for the commercial use areas.
- **Operating, maintenance, and passenger information** are managed by Amtrak.
- **Union Station Parking Garage** - Located between Columbus Circle and K Street. The Union Station parking garage includes the main level parking for the bus, truck, and light rail. The garage is owned by the U.S. Department of Transportation and leased by USNS.
- **The Historic Concourse** is owned and managed by MDT.
- **Columbus Plaza** - Located in the main hall of the station building. It is owned and managed by the National Park Service.
- **The Columbus Plaza** - Located in the main hall of the station building. It is owned by the National Park Service.
- **Amtrak Concourse** and **Historic Concourse** - The station and main hall are owned by Amtrak and managed by Amtrak.
- **The Main Hall** (the West Station) is currently leased to the public and used by Amtrak for various services, including the terminal for the Amtrak service.
- **The Amtrak Concourse** and **Historic Concourse** are owned by Amtrak and managed by Amtrak.

3 Transportation Needs Assessment

3.1 Needs Assessment

Needs within the Union Station context were identified through a combination of direct observation and formal surveys, as well as consultation with ODOT technical staff, the public, other agencies, and staff of the current health plan. The survey data was analyzed and synthesized into a series of design priorities. The survey data was analyzed and synthesized into a series of design priorities. The survey data was analyzed and synthesized into a series of design priorities.

Table 3-1 and described in Chapter 3.

Table 3-1 Planning Framework Goals and Identified Needs

Framework Goals	Identified Needs
<ul style="list-style-type: none"> Improve and enhance Union Station as a multimodal transportation hub. Improve Union Station as a transit hub for regional, national, and international connectivity. Improve safety and security. Improve the architectural, cultural, and historic significance of the building. 	 <ul style="list-style-type: none"> Accessibility Connectivity Historic preservation Public safety Security Transit-responsive building

3.2 Identified Needs

3.2.1 Capacity Requirements

As Union Station continues to experience increases in passenger demand, it is necessary to evaluate how general space needs, transit, and other uses will impact the station's capacity. Additional space, both vertically and horizontally, would allow for future flexibility with respect to capacity, as well as safety and security. For example, the creation of a new level connection between the main level and the transit station platform could be a key strategy to address a major problem. This new level would provide additional capacity and the ability to separate pedestrian flows, leading to improved safety and security.

Additional capacity requirements will address requirements in the future for the station, including platform, space, and other identified needs. Station's ability to accommodate growth projected through 2040.



3.2.2 Modal Connections

To support the ability to connect Union Station to other transportation modes, it is necessary to evaluate how general space needs, transit, and other uses will impact the station's capacity. Additional space, both vertically and horizontally, would allow for future flexibility with respect to capacity, as well as safety and security. For example, the creation of a new level connection between the main level and the transit station platform could be a key strategy to address a major problem. This new level would provide additional capacity and the ability to separate pedestrian flows, leading to improved safety and security.

Additional capacity requirements will address requirements in the future for the station, including platform, space, and other identified needs. Station's ability to accommodate growth projected through 2040.



3.2.3 Pedestrian Connections

Because of heavy pedestrian traffic in and around Union Station created by passengers traveling to the rail and airport terminals, the Metro and Capital Hill neighborhoods' improved pedestrian connections are needed in several locations. To the pedestrian connections can be made safer by separating pedestrian and vehicle traffic to eliminate conflicts between the two by providing improved traffic control to certain pedestrian crossings and safety. Some recent improvements have been implemented into the plan for the relocation of Columbus Plaza and Columbus Circle, which include the opening of additional pedestrian walkways from the station and vehicular traffic. Other improvements include the relocation of Columbus Circle to Columbus Plaza, the opening of Columbus Plaza to the north side of the station with pedestrian crossings on the street, including the Columbus Plaza development and the addition of pedestrian crossings on the street to the north and south of the station. Other improvements include the relocation of Columbus Plaza and Columbus Circle to Columbus Plaza, the opening of Columbus Plaza to the north side of the station with pedestrian crossings on the street, including the Columbus Plaza development and the addition of pedestrian crossings on the street to the north and south of the station.

3.2.4 Safety and Security

Safety and security are key to the success of the space and the ability to attract visitors and residents to the area. The station and its surrounding areas are a key element of the community and its relative accessibility and attractiveness will be a key factor in the success of the area. The station and its surrounding areas are a key element of the community and its relative accessibility and attractiveness will be a key factor in the success of the area. The station and its surrounding areas are a key element of the community and its relative accessibility and attractiveness will be a key factor in the success of the area.

Issues of safety and security are a concern for the station and its surrounding areas. The station and its surrounding areas are a key element of the community and its relative accessibility and attractiveness will be a key factor in the success of the area. The station and its surrounding areas are a key element of the community and its relative accessibility and attractiveness will be a key factor in the success of the area.

In the past, the station and its surrounding areas have been impacted by various factors, including the relocation of Columbus Plaza and Columbus Circle. The station and its surrounding areas are a key element of the community and its relative accessibility and attractiveness will be a key factor in the success of the area.

3.2.5 Historic Character and Preservation

The station and its surrounding areas have a rich history and are a key element of the community and its relative accessibility and attractiveness will be a key factor in the success of the area. The station and its surrounding areas are a key element of the community and its relative accessibility and attractiveness will be a key factor in the success of the area.



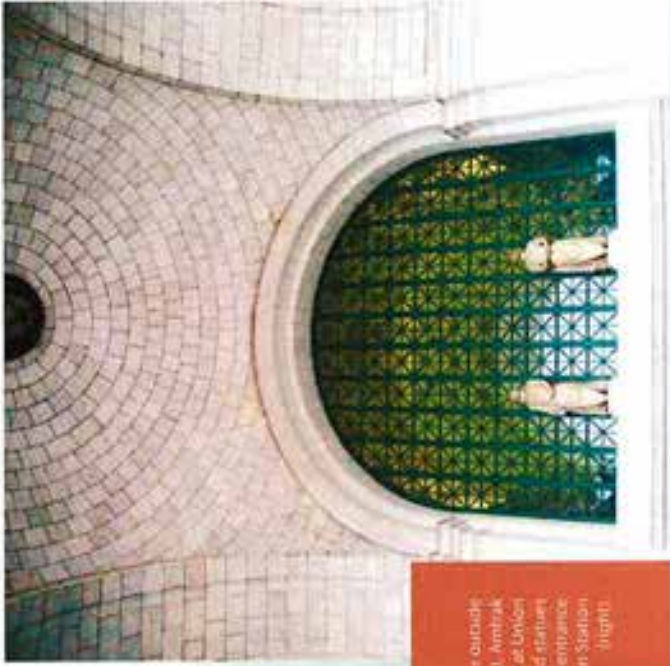
Morning rush hour outside Union Station (left), Amtrak Police presence at Union Station (center) and station doors at Union Station (right).

3.2.6 Transit-Supportive Land Use Patterns

Transit-supportive land use patterns are a key element of the community and its relative accessibility and attractiveness will be a key factor in the success of the area. The station and its surrounding areas are a key element of the community and its relative accessibility and attractiveness will be a key factor in the success of the area.

3.2.7 Circulation

Circulation is a key element of the community and its relative accessibility and attractiveness will be a key factor in the success of the area. The station and its surrounding areas are a key element of the community and its relative accessibility and attractiveness will be a key factor in the success of the area.





3.2.8 Signage and Wayfinding

Signage is an integral part of helping provide direction for an individual traveling through a station. This includes signage for transportation, such as the Amtrak station, as well as directional signage and general information signs for the station. The signage program is designed to provide clear and concise information to help users find their way through the station. The signage program is designed to provide clear and concise information to help users find their way through the station. The signage program is designed to provide clear and concise information to help users find their way through the station.



The signage program is designed to provide clear and concise information to help users find their way through the station. The signage program is designed to provide clear and concise information to help users find their way through the station. The signage program is designed to provide clear and concise information to help users find their way through the station.

needed subway, transit, and mode. Signage and wayfinding is a key program to provide additional guidance to users for the safety of the station.



4 Existing Conditions

Note: All data in the charts that follow reflects the available and most current information as of October 1, 2008.

4.1 Traffic

The roadway system within the UIC of Station 44 consists of a system with a limited number of major arterial highways. Most of the roadways in the study area are classified as either arterial or collector. The function of collecting traffic from the arterial roads, which are of higher highway classification, is to serve the neighborhood and subways. The study area includes North Capital Street (US 20), along with the following principal arterial roads: Avenue 4 (principal arterial), Massachusetts Avenue (principal arterial), North Capital Street, and North Capitol Street. Daily traffic volumes are reported as follows:

- North Capital Street: 21,000 vehicles per day
- Street 27,000 vehicles per day
- Massachusetts Avenue: 21,500 vehicles per day
- Avenue 4: 8,000 vehicles per day
- Street 1: 500 vehicles per day
- Street 2: 400 vehicles per day
- Street 3: 500 vehicles per day

4.2 Existing Street Network

To support more detailed analysis of traffic operations, an early turning movement study was conducted at 26 intersections within the study area. These sites (see Table 4.2) were selected at their location to include the 20 to 24 intersection (A, B, and C), and between A, B, and C both (A, B, and C) with the main through existing peak traffic flows. Data collection was not taken between March 11, 2008 and March 26, 2008 on various streets in the study area. Confirmed volume of traffic movements data is provided in the following table. The data is provided for the peak periods, and includes data on the study area, left-turn, through, and right-turn movements, vehicle queues, peak, and peak of the morning peak, and background traffic is from the morning peak.

Figure 4-1 shows a map of the existing street network in the study area. The existing street network is a complex network of existing roadway networks. LOS methodologies as per a grid map with a grid with a spacing of 100 feet by 100 feet. The existing street network is a grid map with a spacing of 100 feet by 100 feet. The existing street network is a grid map with a spacing of 100 feet by 100 feet. The existing street network is a grid map with a spacing of 100 feet by 100 feet.

Figure 4-1 Intersection Levels of Service



currently available. GS B or C, though, may be either during the morning peak or during the evening peak to overall lower traffic volume.

4.4 Parking

Parking at the Union Station area will consist of the following: short-term parking for taxis and bicycles; long-term parking for buses and vans; and short-term parking for taxis and bicycles. The Union Station area will consist of the following: short-term parking for taxis and bicycles; long-term parking for buses and vans; and short-term parking for taxis and bicycles. The Union Station area will consist of the following: short-term parking for taxis and bicycles; long-term parking for buses and vans; and short-term parking for taxis and bicycles.

The proposed parking layout at Union Station is shown in the following table. The proposed parking layout at Union Station is shown in the following table. The proposed parking layout at Union Station is shown in the following table.

Parking data provided by USGS shows that the peak parking requirements are approximately 100 for 17 blocks (including 500 spaces) and 100 for 17 blocks. The proposed parking layout is shown in the following table.



Union Station Transitway/Transportation Center

is lowest, with 10,000 on Mondays, with an average occupancy rate of about 60 percent (140 available spaces). Parking will be built to meet the daily peak demand, with 1,000 spaces and 1,000 spaces per month. The Union Station area will consist of the following: short-term parking for taxis and bicycles; long-term parking for buses and vans; and short-term parking for taxis and bicycles.

Additional parking is available on Capitol Hill, near the Union Station area. The Union Station area will consist of the following: short-term parking for taxis and bicycles; long-term parking for buses and vans; and short-term parking for taxis and bicycles.

Additional parking is available on Capitol Hill, near the Union Station area. The Union Station area will consist of the following: short-term parking for taxis and bicycles; long-term parking for buses and vans; and short-term parking for taxis and bicycles.



In the event of an emergency situation and a critical incident, the Union Station area will consist of the following: short-term parking for taxis and bicycles; long-term parking for buses and vans; and short-term parking for taxis and bicycles.

4.5.2 External Pedestrian Movements

Pedestrians are constantly moving in and around Union Station, and they will include both those who are walking through the station and those who are walking through the station. The Union Station area will consist of the following: short-term parking for taxis and bicycles; long-term parking for buses and vans; and short-term parking for taxis and bicycles.

During peak periods, the Union Station area will consist of the following: short-term parking for taxis and bicycles; long-term parking for buses and vans; and short-term parking for taxis and bicycles.

4.5 Pedestrian Activity

4.5.1 ADA Kiosks

Outside of Union Station, the Union Station area will consist of the following: short-term parking for taxis and bicycles; long-term parking for buses and vans; and short-term parking for taxis and bicycles.

Additional information is available on the Union Station area. The Union Station area will consist of the following: short-term parking for taxis and bicycles; long-term parking for buses and vans; and short-term parking for taxis and bicycles.

Figure 4-4 One-Hour Pedestrian Volumes on Roads Adjacent to Union Station

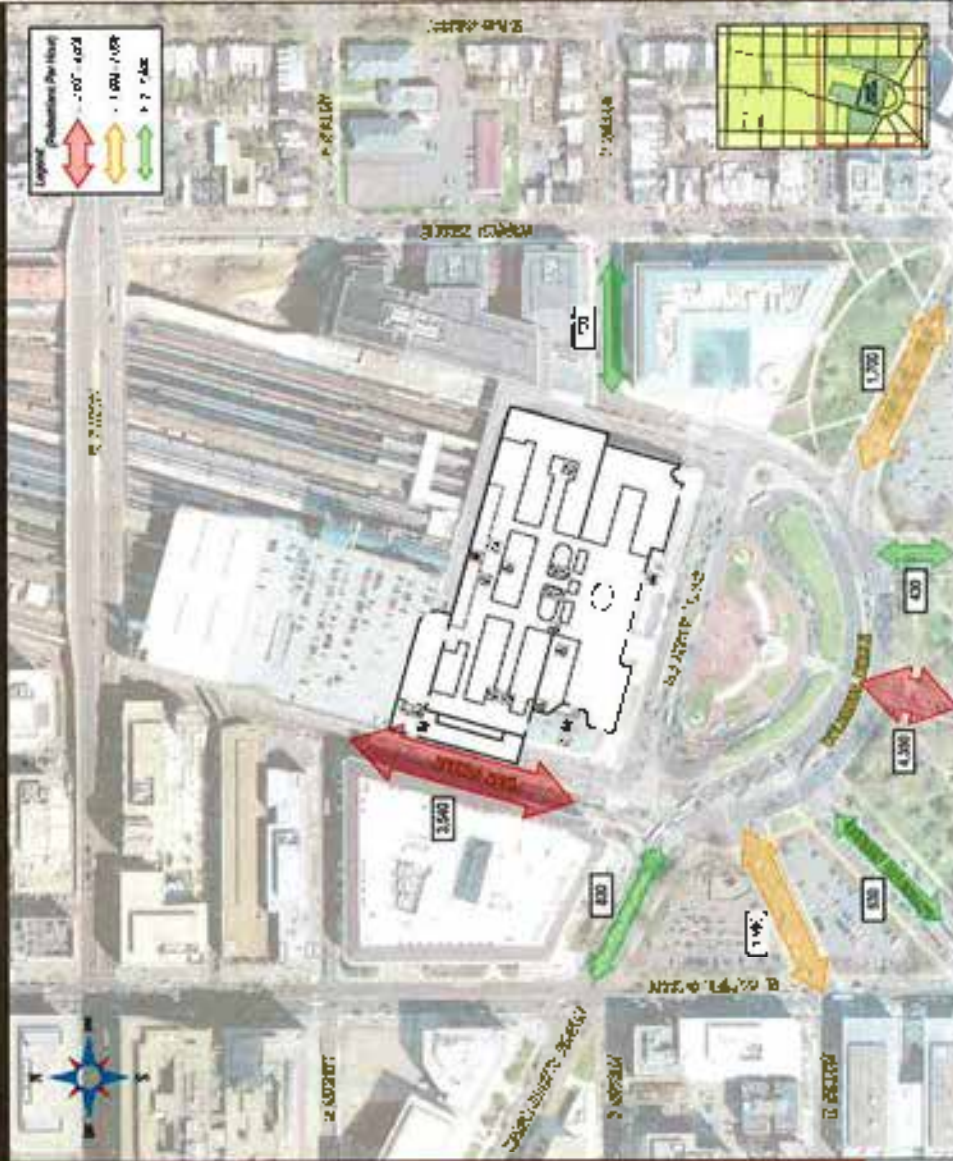


Figure 4-5 Morning Rush Period Pedestrian Paths

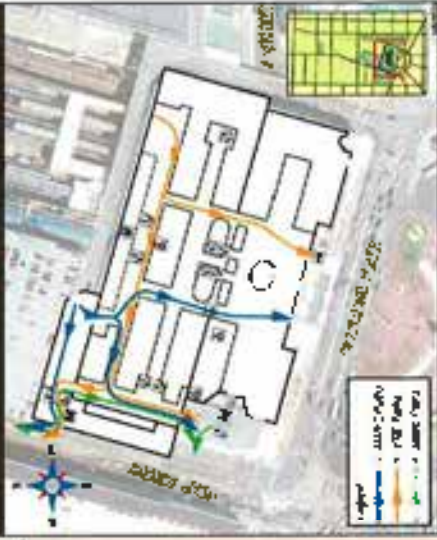
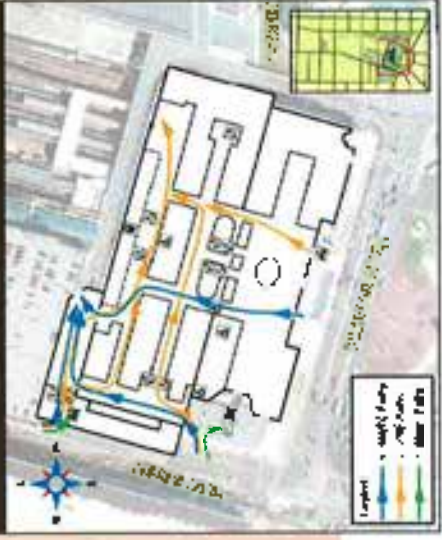


Figure 4-6 Evening Rush Period Pedestrian Paths



The observed location of flow conflicts and/or points within Union Station are highlighted in red in the following Figure 4-7 and are listed in the table below.

- Location A - Boardwalk to North Mezzanine
- Location B - Escalators from North Mezzanine
- Location C - Major Layover Concourse West Exit
- Location D - Major Layover Concourse East Exit
- Location E - Access to Food Court
- Location F - Access to Waiting Area



Union Station was the primary location for the majority of observed conflict points and bottlenecks. The station's complex layout, including the major concourses, waiting areas, and the transportation advice department, is the result of an emergency evacuation study by the United States Coast Guard. The station's complex layout, including the major concourses, waiting areas, and the transportation advice department, is the result of an emergency evacuation study by the United States Coast Guard. The station's complex layout, including the major concourses, waiting areas, and the transportation advice department, is the result of an emergency evacuation study by the United States Coast Guard.



located in the North Mezzanine, the major conflict points within Union Station are highlighted in red in the following Figure 4-7 and are listed in the table below.

- Location A - Boardwalk to North Mezzanine
- Location B - Escalators from North Mezzanine
- Location C - Major Layover Concourse West Exit
- Location D - Major Layover Concourse East Exit
- Location E - Access to Food Court
- Location F - Access to Waiting Area

The overall goal of the emergency evacuation study is to identify the location of Union Station that are used in Chapter 6. The study is a major number of critical conflict points by providing a number of potential evacuation routes. For example, creating emergency evacuation routes in the station is the first step in the overall evacuation study. Building the North Mezzanine Concourse at Union Station would double the overall evacuation opportunity for the station. The study is a major number of critical conflict points by providing a number of potential evacuation routes. For example, creating emergency evacuation routes in the station is the first step in the overall evacuation study. Building the North Mezzanine Concourse at Union Station would double the overall evacuation opportunity for the station.

4.6 Transportation Modes at Union Station

To provide a number of the alternative modes of transportation, the study is a major number of critical conflict points by providing a number of potential evacuation routes. For example, creating emergency evacuation routes in the station is the first step in the overall evacuation study. Building the North Mezzanine Concourse at Union Station would double the overall evacuation opportunity for the station. The study is a major number of critical conflict points by providing a number of potential evacuation routes. For example, creating emergency evacuation routes in the station is the first step in the overall evacuation study. Building the North Mezzanine Concourse at Union Station would double the overall evacuation opportunity for the station.

Table 4-1 Transition Modes at Union Station

Mode	Context	Guidance
Bicycles	<p>4. Transition is a response user desires based on their travel mode - direct transition from one mode to another.</p> <p>the bicyclist needs to get to the station before the train arrives and</p> <p>additional for bike</p>	<p>Table 4-1 will need to be updated to reflect the new station and/or bicyclist needs to get to the station before the train arrives and additional for bike</p>
Metrorail	<p>Users will use the station to get to the Metrorail station. They will use the station to get to the Metrorail station.</p> <p>Overnight, Metrorail users will use the station to get to the Metrorail station. They will use the station to get to the Metrorail station.</p>	<p>Users will use the station to get to the Metrorail station. They will use the station to get to the Metrorail station.</p> <p>Overnight, Metrorail users will use the station to get to the Metrorail station. They will use the station to get to the Metrorail station.</p>
D.C. Circulator	<p>D.C. Circulator users will use the station to get to the Metrorail station.</p> <p>The D.C. Circulator users will use the station to get to the Metrorail station.</p>	<p>The D.C. Circulator users will use the station to get to the Metrorail station.</p> <p>The D.C. Circulator users will use the station to get to the Metrorail station.</p>
Commuter Bus	<p>Commuter bus users will use the station to get to the Metrorail station.</p> <p>Commuter bus users will use the station to get to the Metrorail station.</p>	<p>Commuter bus users will use the station to get to the Metrorail station.</p> <p>Commuter bus users will use the station to get to the Metrorail station.</p>
Tour Bus	<p>Tour bus users will use the station to get to the Metrorail station.</p> <p>Tour bus users will use the station to get to the Metrorail station.</p>	<p>Tour bus users will use the station to get to the Metrorail station.</p> <p>Tour bus users will use the station to get to the Metrorail station.</p>
Impedance Drop	<p>Impedance drop users will use the station to get to the Metrorail station.</p> <p>Impedance drop users will use the station to get to the Metrorail station.</p>	<p>Impedance drop users will use the station to get to the Metrorail station.</p> <p>Impedance drop users will use the station to get to the Metrorail station.</p>
Staircase	<p>Staircase users will use the station to get to the Metrorail station.</p> <p>Staircase users will use the station to get to the Metrorail station.</p>	<p>Staircase users will use the station to get to the Metrorail station.</p> <p>Staircase users will use the station to get to the Metrorail station.</p>
Metrorail	<p>Metrorail users will use the station to get to the Metrorail station.</p> <p>Metrorail users will use the station to get to the Metrorail station.</p>	<p>Metrorail users will use the station to get to the Metrorail station.</p> <p>Metrorail users will use the station to get to the Metrorail station.</p>
Commuter Mail	<p>Commuter mail users will use the station to get to the Metrorail station.</p> <p>Commuter mail users will use the station to get to the Metrorail station.</p>	<p>Commuter mail users will use the station to get to the Metrorail station.</p> <p>Commuter mail users will use the station to get to the Metrorail station.</p>
Impedance Mail	<p>Impedance mail users will use the station to get to the Metrorail station.</p> <p>Impedance mail users will use the station to get to the Metrorail station.</p>	<p>Impedance mail users will use the station to get to the Metrorail station.</p> <p>Impedance mail users will use the station to get to the Metrorail station.</p>
Taxi/Motor Vehicle	<p>Taxi/motor vehicle users will use the station to get to the Metrorail station.</p> <p>Taxi/motor vehicle users will use the station to get to the Metrorail station.</p>	<p>Taxi/motor vehicle users will use the station to get to the Metrorail station.</p> <p>Taxi/motor vehicle users will use the station to get to the Metrorail station.</p>

4.6.1 Bicycles

Current bicycle parking is located at the southwest corner of Union Station with storage provided for 3,000 bicycles. However, current storage is limited in number of bicycles that can be stored. To allow the current bicycle parking issues at Union Station to be resolved, the following recommendations are provided:

For new Bicycles under construction in the area, the following recommendations are provided:

The proposed bicycle trails are located in the study area, with a total length of 1.5 miles. The trails are shown in blue on the map. The trails are shown in blue on the map.



Figure 4-8 Bicycle Trails in the Study Area



Current Bicycle parking at Union Station (above) and Metrobus parking at Columbus Plaza at Union Station (below).

4.6.2 Metrobuses

The current Metrobus stops at Union Station are located at the southwest corner of Union Station. The current Metrobus routes are shown in the map. The Metrobus routes are shown in the map. The Metrobus routes are shown in the map.

- Metrobus Stop at Columbus Plaza
- Metrobus Stop at Columbus Avenue
- Metrobus Stop at Columbus Avenue
- Metrobus Stop at Columbus Avenue



Union Station Metrobus Stop at Columbus Avenue

Figure 4-9 shows the ridership performance at various Metrobus stops in Washington, D.C. The ridership data was obtained by WMATA in October 2004.

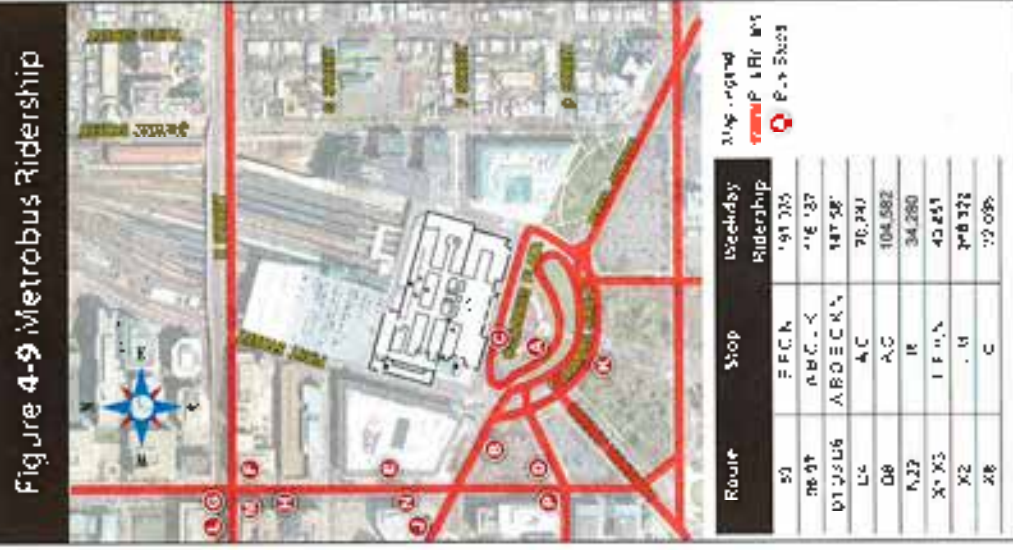


Figure 4-9 Metrobus Ridership



4.6.3 D.C. Circulator

- The D.C. Circulator system, the first in the world, was the first rapid, modern and safe mode of transportation. D.C. Circulator service is available in areas between:
- Union Station and Navy Yard Metro.
 - Metropolitan, Adams Morgan, and Metropolitan Square Metro.
 - Convention Center and the National Mall.
 - Georgetown and Union Station.
 - the National Mall.

The D.C. Circulator bus system is both a standard and a distinct mode of public transportation. It is the only system in the world that is a fully integrated system with a dedicated 'Circulator' lane on the main road. The frequency of operation is high and the service is available 24 hours a day. The system is a marked increase in service during peak periods in the city. Additionally, the system is a seasonal service. The system is available from June 1st to October 31st. The system is a seasonal service. The system is available from June 1st to October 31st.

The D.C. Circulator bus system is a seasonal service. The system is available from June 1st to October 31st. The system is a seasonal service. The system is available from June 1st to October 31st.

4.6.4 Commuter Buses

Commuter buses are a type of public transportation that provides a service to commuters. They are a type of public transportation that provides a service to commuters. They are a type of public transportation that provides a service to commuters.

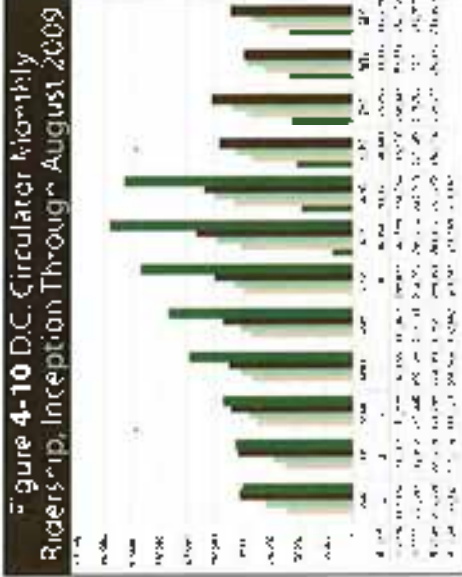


Figure 4-10 D.C. Circulator Monthly Ridership, Inception Through August 2009

Commuter bus ridership peaks during the summer months and is lowest during the winter months. The system is a seasonal service. The system is available from June 1st to October 31st.

4.6.5 Tour Buses

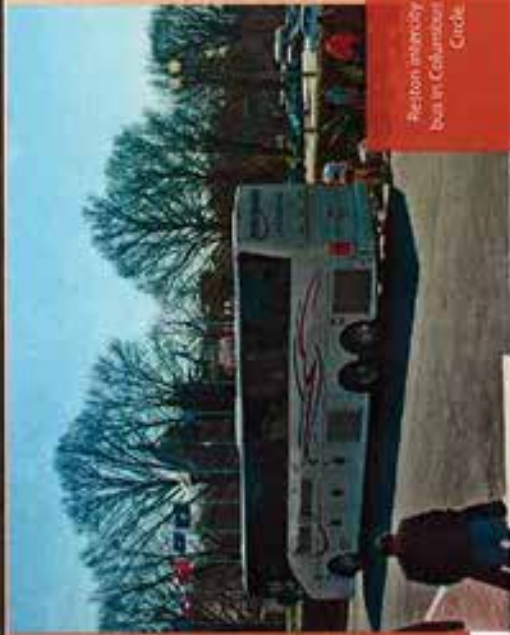
Tour buses are a type of public transportation that provides a service to tourists. They are a type of public transportation that provides a service to tourists. They are a type of public transportation that provides a service to tourists.

The D.C. Circulator bus system is a seasonal service. The system is available from June 1st to October 31st. The system is a seasonal service. The system is available from June 1st to October 31st.

The D.C. Circulator bus system is a seasonal service. The system is available from June 1st to October 31st. The system is a seasonal service. The system is available from June 1st to October 31st.

4.6.5 Tour Buses

Tour buses are a type of public transportation that provides a service to tourists. They are a type of public transportation that provides a service to tourists. They are a type of public transportation that provides a service to tourists.



considered necessary to study the bus and other modes of mass transit in the area. The study found that the bus is a viable mode of mass transit in the area, but it is not a viable mode of mass transit in the area.

Table 4-3 Combined Taxi and Commuter Bus Populations Observed Near Downtown Washington, D.C.

Location	*Taxi Count*	*Commuter Bus Count*
Washington, D.C. (Total)	65	33
Street at Columbus Circle	2	2
Washington, D.C. (Total)	13	0
Washington, D.C. (Total)	63	0
Washington, D.C. (Total)	195	32
Washington, D.C. (Total)	4	0
Washington, D.C. (Total)	53	0
Total	161	64

*Source: Transportation Research Board, 1994, p. 10.



4.6.6 Intercity Bus

Although intercity bus service to the D.C. area is not as extensive as it once was, it remains a viable mode of mass transit. The service is provided by several companies, including Greyhound, Megabus, and others. The service is generally reliable and provides a convenient mode of transportation for those traveling between Washington, D.C. and other major cities in the United States.



4.6.8 MetroRail

The MetroRail system is a rapid transit system that serves the Washington, D.C. area. It is a vital mode of mass transit for the region and provides a convenient mode of transportation for those traveling between Washington, D.C. and other major cities in the United States.

Table 4-4 Volume of Weekday MetroRail Trips Beginning or Ending at Union Station

Time Period	MetroRail Trips Beginning at Union Station	MetroRail Trips Ending at Union Station
6:00 a.m. (6:00 a.m. to 6:29 a.m.)	19,233	12,206
6:30 a.m. (6:30 a.m. to 6:59 a.m.)	8,245	7,266
7:00 a.m. (7:00 a.m. to 7:29 a.m.)	13,294	7,693
7:30 a.m. (7:30 a.m. to 7:59 a.m.)	3,612	3,263
Total off-peak	37,822	24,228
Total on-peak	10,260	8,327
TOTAL	48,082	32,555

*Source: MetroRail, 1994, p. 10.

4.6.7 Streetcar

The Streetcar system is a new mode of mass transit that is being developed in Washington, D.C. It is a vital mode of mass transit for the region and provides a convenient mode of transportation for those traveling between Washington, D.C. and other major cities in the United States.

4.6.9 Rail at Union Station

The history of transportation at Union Station is an important part of the city's history. The station is a historic landmark and a major transportation hub. It is a key part of the city's infrastructure and a symbol of its rich history. The station has been a central part of the city's transportation system for over a century. It has seen many changes and developments over the years, but it remains a vital part of the city's transportation network.

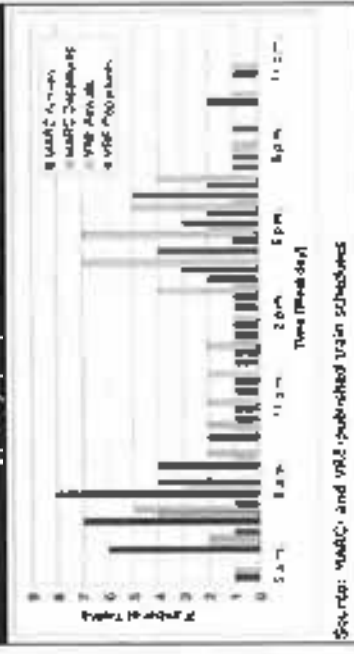
The station is a historic landmark and a major transportation hub. It is a key part of the city's infrastructure and a symbol of its rich history. The station has been a central part of the city's transportation system for over a century. It has seen many changes and developments over the years, but it remains a vital part of the city's transportation network.

4.6.10 Commuter Rail

Commuter rail services at Union Station are provided by MARC and VRE. These services provide a convenient and efficient way to travel to and from the city. The services are popular among commuters and are a key part of the city's transportation system. The services provide a reliable and comfortable way to travel to and from the city, and they are a vital part of the city's infrastructure.

The services are provided by MARC and VRE. These services provide a convenient and efficient way to travel to and from the city. The services are popular among commuters and are a key part of the city's transportation system. The services provide a reliable and comfortable way to travel to and from the city, and they are a vital part of the city's infrastructure.

Figure 4-11 Commuter Train Activity at Union Station



Source: MARC and VRE published train schedules

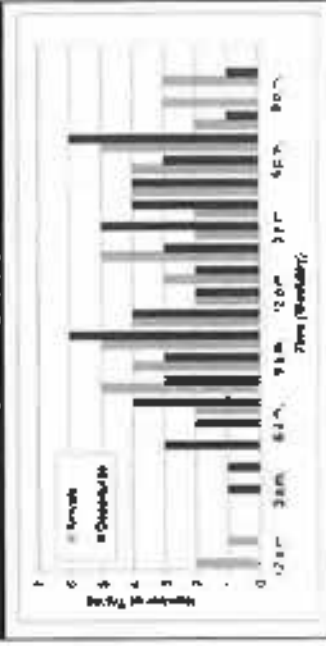
4.6.11 Intercity Rail

Intercity rail services at Union Station are provided by Amtrak. The station is a key part of the city's transportation system and a major hub for intercity rail travel. The station provides a convenient and efficient way to travel to and from the city, and it is a vital part of the city's infrastructure.

The station is a key part of the city's transportation system and a major hub for intercity rail travel. The station provides a convenient and efficient way to travel to and from the city, and it is a vital part of the city's infrastructure. The station is a historic landmark and a symbol of the city's rich history.

The station is a key part of the city's transportation system and a major hub for intercity rail travel. The station provides a convenient and efficient way to travel to and from the city, and it is a vital part of the city's infrastructure. The station is a historic landmark and a symbol of the city's rich history.

Figure 4-12 Amtrak Activity at Union Station



5

Future Transportation Demand

As demand for multi-modal transportation continues to grow, and as the D.C. region grows, transportation demand is expected to increase. Station location by rail is a function of the transportation mode, demand, and the types of transportation and passenger traffic, as discussed in Chapter 4. Continued growth across the region will have a significant impact on the area's transportation. It will be difficult to predict the needs. Additionally, it should be noted that growth in the District may result in demand for transportation services in other parts of the region.

Multi-modal traffic crossing Columbus Plaza at Union Station



Calculations in this study demonstrate that transit demand will increase and transit services will expand to meet this demand. This study also demonstrates the need for transit services. Other factors, such as increasing demographic diversity and the increasing use of the rail and bus transit system, will increase transit demand. This study also demonstrates that transit services will increase.

Development needs have been identified in this study and will be addressed in the future. Table 5-1. A higher level of detail regarding existing conditions and future transportation demand is provided in the Base Case Study included as Appendix A.

Table 5-1. Multi-Modal Demand Forecast

Mode	Projected Demand
Bicycles	Construction of the new transit system will increase the number of bicycles to be used at Union Station. Bicycles will be used to travel to the station and to travel to work. The number of bicycles will increase from 10,000 to 20,000 per year. The number of bicycles will increase from 10,000 to 20,000 per year. The number of bicycles will increase from 10,000 to 20,000 per year. The number of bicycles will increase from 10,000 to 20,000 per year.
Metrorail	Metrorail is the primary mode of transit for the region. The number of Metrorail riders will increase from 10,000 to 20,000 per year. The number of Metrorail riders will increase from 10,000 to 20,000 per year. The number of Metrorail riders will increase from 10,000 to 20,000 per year. The number of Metrorail riders will increase from 10,000 to 20,000 per year.
D.C. Circulator	The D.C. Circulator is a new transit mode that will be used to travel to and from the station. The number of D.C. Circulator riders will increase from 10,000 to 20,000 per year. The number of D.C. Circulator riders will increase from 10,000 to 20,000 per year. The number of D.C. Circulator riders will increase from 10,000 to 20,000 per year. The number of D.C. Circulator riders will increase from 10,000 to 20,000 per year.
Commuter Rail	Commuter rail is a new transit mode that will be used to travel to and from the station. The number of commuter rail riders will increase from 10,000 to 20,000 per year. The number of commuter rail riders will increase from 10,000 to 20,000 per year. The number of commuter rail riders will increase from 10,000 to 20,000 per year. The number of commuter rail riders will increase from 10,000 to 20,000 per year.
Taxi Cab	Taxi cabs are a traditional mode of transit. The number of taxi cabs will increase from 10,000 to 20,000 per year. The number of taxi cabs will increase from 10,000 to 20,000 per year. The number of taxi cabs will increase from 10,000 to 20,000 per year. The number of taxi cabs will increase from 10,000 to 20,000 per year.
Individually Driven	Individually driven vehicles are a traditional mode of transit. The number of individually driven vehicles will increase from 10,000 to 20,000 per year. The number of individually driven vehicles will increase from 10,000 to 20,000 per year. The number of individually driven vehicles will increase from 10,000 to 20,000 per year. The number of individually driven vehicles will increase from 10,000 to 20,000 per year.
Shared Rides	Shared rides are a new transit mode that will be used to travel to and from the station. The number of shared ride riders will increase from 10,000 to 20,000 per year. The number of shared ride riders will increase from 10,000 to 20,000 per year. The number of shared ride riders will increase from 10,000 to 20,000 per year. The number of shared ride riders will increase from 10,000 to 20,000 per year.
Walking	Walking is a traditional mode of transit. The number of walking riders will increase from 10,000 to 20,000 per year. The number of walking riders will increase from 10,000 to 20,000 per year. The number of walking riders will increase from 10,000 to 20,000 per year. The number of walking riders will increase from 10,000 to 20,000 per year.
Commuter and Individually Driven	Commuter and individually driven vehicles are a traditional mode of transit. The number of commuter and individually driven vehicle riders will increase from 10,000 to 20,000 per year. The number of commuter and individually driven vehicle riders will increase from 10,000 to 20,000 per year. The number of commuter and individually driven vehicle riders will increase from 10,000 to 20,000 per year. The number of commuter and individually driven vehicle riders will increase from 10,000 to 20,000 per year.

Source: MTA, 2010; Metropolitan Council of Governments, 2010.

6 Recommended Union Station Intermodal Transit Center Plan

6.1 Introduction to Recommendations

The intermodal station in this chapter addresses shortcomings in the current configuration of Union Station and its location in relation to surrounding areas. The growth between the present date and the year 2050, those recommendations were derived from demand near the proposed station, those derived from previous studies as well as from the overall context, structure, and context assessment process of the study.

To spatially organize the station, recommended improvements have been grouped according to study context areas. The study context areas are: Union Station, Columbus Plaza, First Street, Second Street, and Third Street. The study context areas are: Union Station, Columbus Plaza, First Street, Second Street, and Third Street.

- Area A: Columbus Plaza
- Area B: Third Concourse
- Area C: First Street
- Area D: Second Street
- Area E: Third Street

Study context areas are defined in Figure 6-1, which illustrates the overall physical context of the study including the station, surrounding areas, and proposed transit center. The study context areas are: Union Station, Columbus Plaza, First Street, Second Street, and Third Street.

Along the study context areas, recommended improvements will be implemented to address the needs of the intermodal transit center. The study context areas include:

- Project Area
- Study Area
- Station
- Surrounding Area
- Transit Center
- Transportation Network

Each station study area is defined on the map to provide a clear context for the study. Figure 6-2 shows the location of each of the study context areas.

Each of the study context areas is highlighted in Figures 6-1 and 6-2. Table 6-1 includes a summary of recommended improvements that are classified according to context area and the location defined by station.

Each station study area is defined on the map to provide a clear context for the study. Figure 6-2 shows the location of each of the study context areas.

Each of the study context areas is highlighted in Figures 6-1 and 6-2. Table 6-1 includes a summary of recommended improvements that are classified according to context area and the location defined by station.

Figure 6-1 Study Context Areas

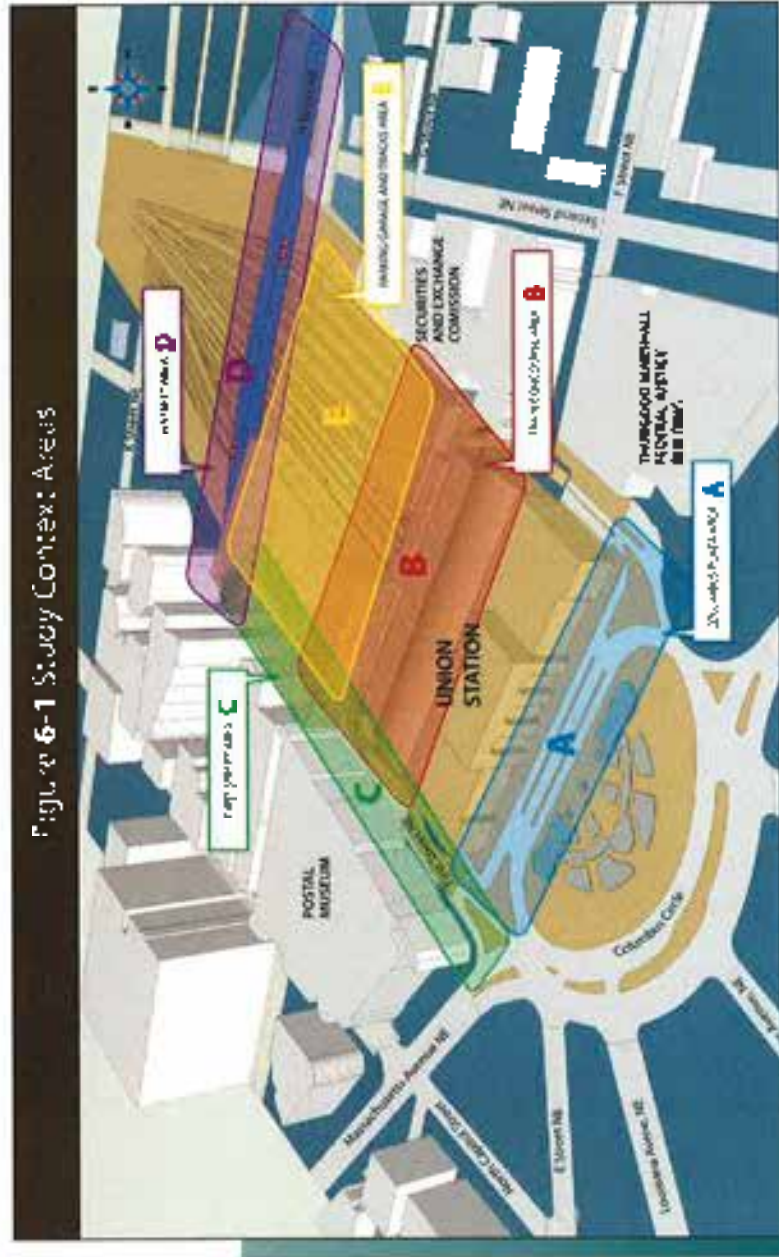


Table A-1 Summary of Recommended Improvements

Study Concept Area	Recommended Improvements	Improvements: Station	Contained in Vision's Future?	Related to which Systems?	Related to which Rail/Inland Access?	Cost*
Columbus Plaza Area A	Improve Traffic Flow and Pedestrian Safety on Columbus Circle	A-1	A-2, A-3	Platform		Cost assigned to another project
	Complete Train Concourse Connector	B-1	B-2, B-4	Platform		\$4,980,123
	Develop North Entrance along Third Lane	U-1	B-2, B-4	Station		\$440,000
	Extend North Concourse to the North	B-3	B-2, B-4	Station		\$21,866,040
	Explore East-West Concourse to the West	B-4	B-2, B-4	Station		\$17,638,000
Train Concourse Area B	Expand the Mezzanine Level	U-5	B-2, B-4	Station		\$4,832,500
	Platform	C-1	B-2, B-3	Platform		Cost assigned to another project
	Improve Connections to the Metropolitan Transit	C-2	B-2, B-3	Station		\$27,100
	Provide Pedestrian Spillout along First Street NE	C-3	B-2, B-3	Platform		Cost assigned to another project
	Develop Pedestrian Station Access Study	C-4	B-2, B-3	Station		\$250,000
First Street Area C	Complete North Entrance at Midway	D-1	B-2, B-3, B-7	Platform		\$1,840,325
	Construct First Street Lobby	D-2	B-2, B-3, B-7	Platform		\$8,020,300
	Improve Station-to-Station	D-3	B-7, B-8, B-7, B-8	Station		\$7,237,600
	Complete Emergency Concourse at Station	D-4	B-2, B-3, B-7, B-8	Platform		\$4,988,510
	Improve Rail Operator's Facilities at 11 Street	D-5	B-2, B-3, B-7, B-8	Station		\$72,848,000
Parking Garage and Tracks Area E	Redesign Columbus Circle	P-1	B-2, B-8	Station		\$72,000
	Construct above-ground station	B-2	B-2, B-8	Station		\$540,760
	Improve Station-to-Station through Station C at Midway Block	B-3	B-2, B-8	Station		\$3,479,750
	Complete Construction of the National Center South of 11 Street	B-4	B-2, B-8	Station		\$43,745,800
	Improve Station-to-Station	P-2	B-2, B-8	Station		\$722,000
Additional Recommendations Not Tied to a Specific Area	Improve Station-to-Station	S-1	B-2, B-8	Station		\$160,000
	Improve Station-to-Station	S-2	B-2, B-8	Station		\$160,000
	Improve Station-to-Station	S-3	B-2, B-8	Station		\$160,000
	Improve Station-to-Station	S-4	B-2, B-8	Station		\$160,000
	Improve Station-to-Station	S-5	B-2, B-8	Station		\$160,000

* Cost estimates are based on 2011 prices. Costs are estimated based on 2011 prices and are subject to change.

Legend: Car, Bus, Bike, Pedestrian, Station, Platform, Track, Signal, Light, Sign, Barrier, Fence, Gate, Door, Window

Source: Metropolitan Transit Authority of Denver, Denver International Airport Station Master Plan, 2011

6.2 Recommended Actions

This section sets into a higher level of detail how the design recommendations developed by the working group in Section 6.1 will be implemented in the final recommendations described in this section on the connector, mass egress and evacuation of the proposed improvements to drive up safety and efficiency and to improve the passenger experience. All callouts should be placed in level and perspective views in Figure 6.1B, 6.1C and 6.1D.

AREA A: COLUMBUS PLAZA

Improvement A-1: Improve Egress Flow and Pedestrian Safety on Columbus Plaza

Needs: MCE

- Improve pedestrian egress safety.
- Address congestion and multiple functional uses in Columbus Plaza.

The proposed changes to the traffic and layout of Columbus Plaza and Columbus Plaza were initially approved by the National Capital Planning Commission in its 2010 Preliminary Concept Study and its 2011 and 2012 study conclusions regarding the building. These improvements will improve safety and increase building safety in the area and improve the overall pedestrian experience at the station and west end of Columbus Plaza in the light of the building. In keeping with the new look character of Union Station, new egress routes will be developed and placed at between 2nd Street and 3rd Street (see Figure 6-3). The building's egress routes will be improved by the proposed improvements, which will improve the overall pedestrian experience at the station and west end of Columbus Plaza. The proposed changes will be implemented in the 2013-2014 period.

AREA B: TRAIN CONCOURSE AREA

Improvement B-1: Construct Train Concourse Connector

The Train Concourse Connector is proposed to link the Main Platform and the new concourse level via a new connector (see Figure 6-3). The proposed connector will provide an alternative egress route for passengers making and handling in the west end of Union Station in support of the 14-footwide "Main passageway" connecting

the Union Station Main and Platform to the Main Platform. The proposed connector will provide an egress route for passengers making and handling in the west end of Union Station in support of the 14-footwide "Main passageway" connecting the Main Platform and Platform.

The Train Concourse Connector is proposed to be a new egress route connecting the Main Platform and Platform. The proposed connector will provide an egress route for passengers making and handling in the west end of Union Station in support of the 14-footwide "Main passageway" connecting the Main Platform and Platform.

be extended east to the center of the main concourse and west to the Main Platform. The proposed connector will provide an egress route for passengers making and handling in the west end of Union Station in support of the 14-footwide "Main passageway" connecting the Main Platform and Platform. As a result of the proposed improvements, the Main Platform and Platform will be able to handle the same number of passengers as the Main Platform and Platform. The proposed connector will provide an egress route for passengers making and handling in the west end of Union Station in support of the 14-footwide "Main passageway" connecting the Main Platform and Platform.

Figure 6-3 Area A - Columbus Plaza Improvements

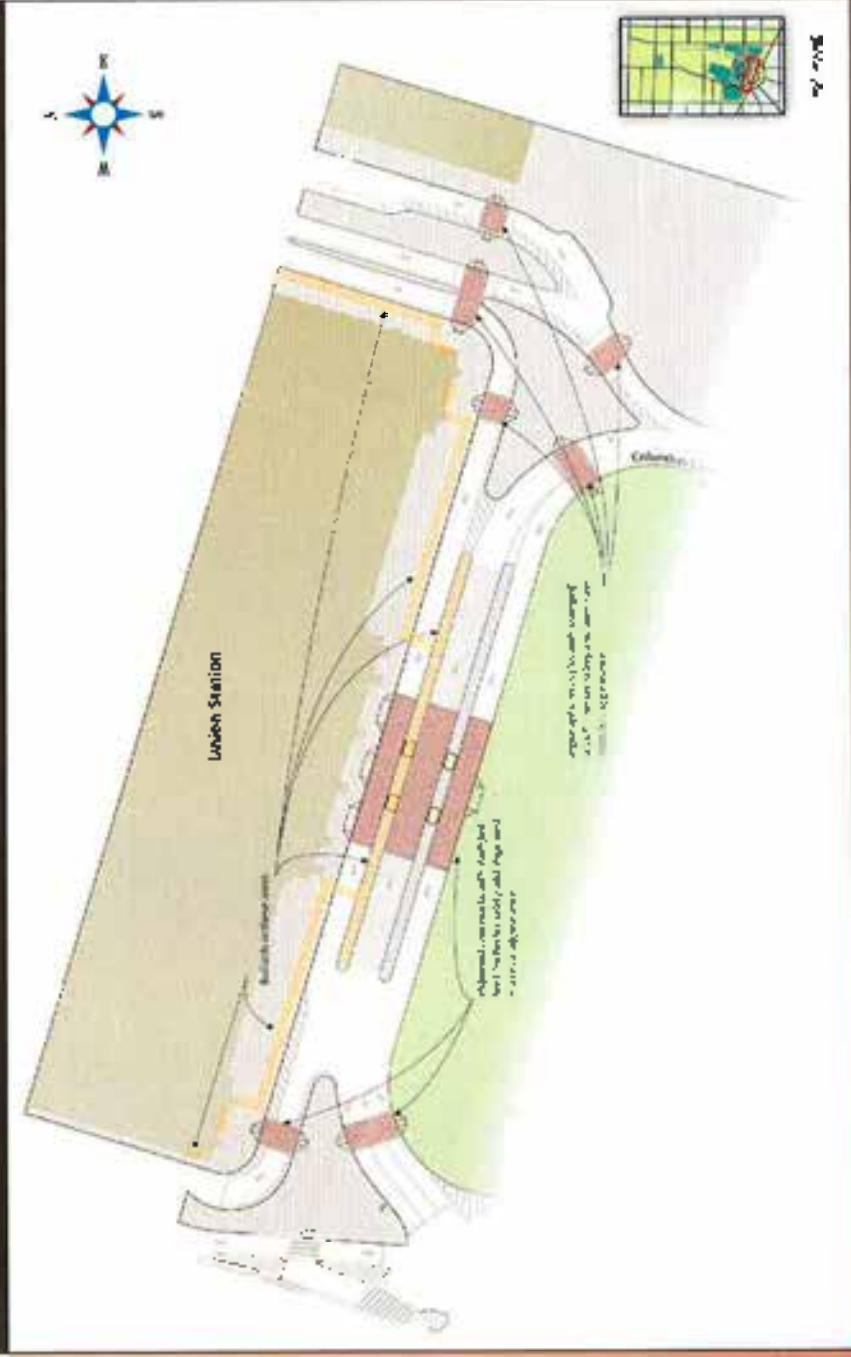
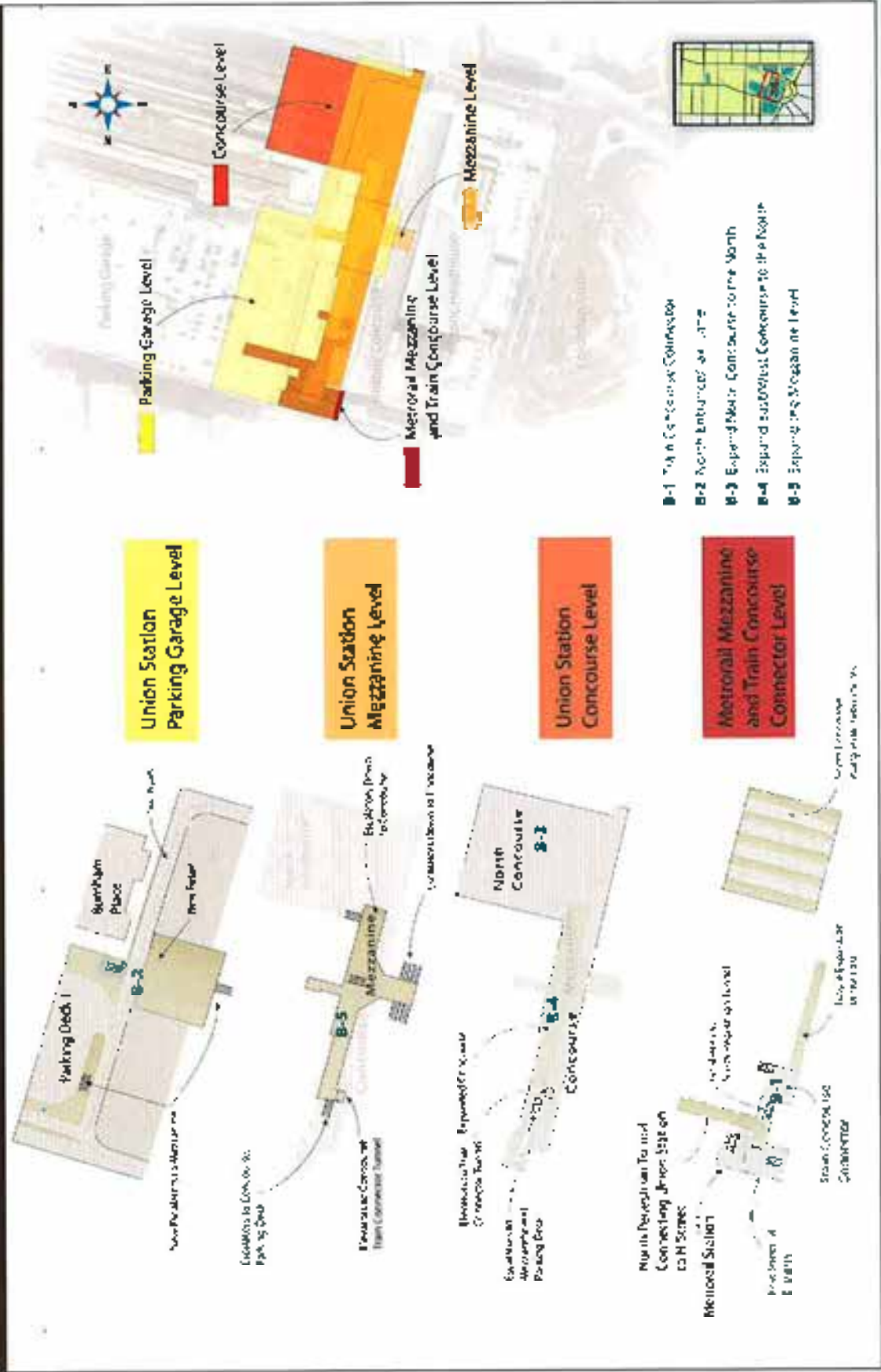


Figure 6-4 Area B Train Concourse Pedestrian Elements



Improvement B-5: Expand the Union Station Mezzanine level

Needs met:

- Facilitate full station usage, including bicycle and bicycle racks
- Additional bicycle racks
- Provide additional bicycle parking with repair tools and water stations
- Provide for seating for bicyclists and other non-passenger users
- Expand capacity of concourse leading to the platform with additional bicycle racks
- Improve bicycle storage, including bicycle racks and bicycle repair tools

The City of Denver Station Mezzanine project is a major project for passenger loading and unloading, including bicycle racks, bicycle repair tools, and water stations. The mezzanine level is a key component of the station's expansion, providing additional capacity for passengers and bicycles. The mezzanine level is a key component of the station's expansion, providing additional capacity for passengers and bicycles. The mezzanine level is a key component of the station's expansion, providing additional capacity for passengers and bicycles.

Figure 6-5: Area C - First Street Improvements

- On the north side of the expanded mezzanine, the passenger capacity would increase to 100,000 passengers per hour, or 100,000 passengers per hour, or 100,000 passengers per hour.
- On the south side of the expanded mezzanine, the passenger capacity would increase to 100,000 passengers per hour, or 100,000 passengers per hour, or 100,000 passengers per hour.

Table 6-3: Costs for Mezzanine Improvements

Description	Estimated Cost
Aggravated concrete for 11,500 sq ft	\$1,200,000
Formwork for 11,500 sq ft	\$1,000,000
Total estimated cost	\$2,200,000

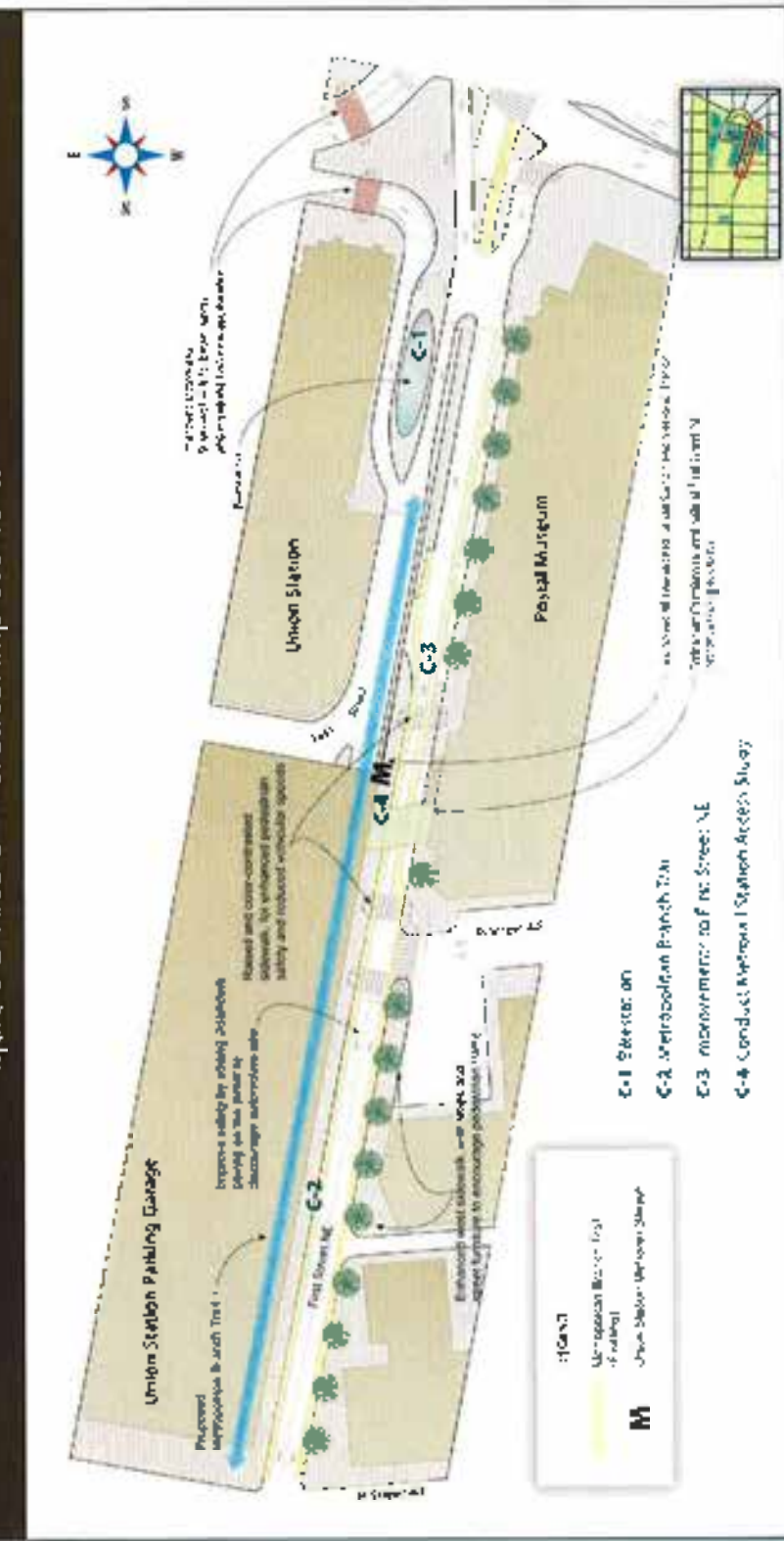
Source: City of Denver, 2014.

AREA C: FIRST STREET AREA

Improvement C-1: B-Kiosk Station

- Needs met:
- Improve bicycle access to the station
- Improve bicycle access to the station
- Improve bicycle access to the station

Figure 6-5: Area C - First Street Improvements



6.4 Recommendations and Framework Goals

Through this study, recommendations are provided to improve the Union Station (covered area), nature of the employment landscape and adjacent street network. Recommendations are provided also to help the network planning process presented in Chapter 7 and also identified to be implemented. Specific goals are supported and would be achieved by implementing particular provisions as shown in Table 6-13.

Table 6-13 Planning Framework Goals and Related Improvements

Framework Goal	Related Improvements
<p>1 Maximize and enhance the station area as a transit-oriented development</p>	<ul style="list-style-type: none"> Complete the station area Improve the station area Improve the station area Improve the station area Improve the station area Improve the station area Improve the station area Improve the station area
<p>2 Promote an employment landscape that is both competitive and accessible</p>	<ul style="list-style-type: none"> Complete the station area Improve the station area Improve the station area Improve the station area Improve the station area Improve the station area Improve the station area Improve the station area
<p>3 Provide a safe and secure environment for the station</p>	<ul style="list-style-type: none"> Improve the station area Improve the station area Improve the station area Improve the station area Improve the station area Improve the station area Improve the station area Improve the station area
<p>4 Support the station area as a transit-oriented development</p>	<ul style="list-style-type: none"> Improve the station area Improve the station area Improve the station area Improve the station area Improve the station area Improve the station area Improve the station area Improve the station area



View of multimodal traffic from the east side of Union Station

7 Implementation Consideration and Environmental Requirements

7.1 Implementation Time Frame

While some of the proposed improvements included in this study can be completed immediately others will require longer lead times. Between 2015 and 2020, the following issues that may arise when implementing the recommendations in this plan should be considered and addressed by the implementing agency to ensure that the plan can be implemented.

The focus of the implementation plan is implemented within 2-10 years, the primary purpose of the study. To ensure a high level of implementation, the plan should be designed to improve productivity, flow and capacity of various modes of transportation.

Several suggestions to improve greenways are suggested, and could be implemented within 2-5 months. To ensure the implementation of the greenways, the following suggestions are recommended around the plan of the agency: the development of a program of incentives to encourage the plan, the plan should be implemented with a focus on the plan, such as the construction of the B. The plan should be implemented in a timely manner.

Finally, some improvements are suggested as long-term recommendations, including 10-20 years to implement. These improvements need to be implemented in coordination with other agencies, such as the plan of the agency. An example of this is the construction of the B. The plan should be implemented in a timely manner, such as the construction of the B. The plan should be implemented in a timely manner.

Implementation by phase are identified in figures 7-1 through 7-4 in the plan of the agency.

7.2 Implementation of TOD Principles

The purpose of this study is to provide a plan of the agency that will improve the quality of life in the plan of the agency. The plan of the agency should be designed to improve the quality of life in the plan of the agency. The plan of the agency should be designed to improve the quality of life in the plan of the agency. The plan of the agency should be designed to improve the quality of life in the plan of the agency.

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7.3 Environmental Analysis

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Land Use. No significant impacts are anticipated as there will be no change in land use for the plan of the agency.

Geology and Soil. No significant impacts are anticipated. The current plan of the agency should be designed to improve the quality of life in the plan of the agency.

Vegetation. No significant impacts are anticipated. The plan of the agency should be designed to improve the quality of life in the plan of the agency.

Wildlife and Aquatic Resources. No significant impacts are anticipated. The plan of the agency should be designed to improve the quality of life in the plan of the agency.

Threatened and Endangered Species. No significant impacts are anticipated. The plan of the agency should be designed to improve the quality of life in the plan of the agency.

Hydrology and Groundwater. No significant impacts are anticipated. The plan of the agency should be designed to improve the quality of life in the plan of the agency.

Surface Waters and Waters of the U.S. No significant impacts are anticipated. The plan of the agency should be designed to improve the quality of life in the plan of the agency.

Floodplains. No significant impacts are anticipated. The plan of the agency should be designed to improve the quality of life in the plan of the agency.

Air Quality. No significant impacts are anticipated. The plan of the agency should be designed to improve the quality of life in the plan of the agency.

Noise and Vibration. No significant impacts are anticipated. The plan of the agency should be designed to improve the quality of life in the plan of the agency.

Cultural Resources. No significant impacts are anticipated. The plan of the agency should be designed to improve the quality of life in the plan of the agency. The plan of the agency should be designed to improve the quality of life in the plan of the agency.

Several measures should be implemented to improve the quality of life in the plan of the agency. The plan of the agency should be designed to improve the quality of life in the plan of the agency. The plan of the agency should be designed to improve the quality of life in the plan of the agency.

Figure 7-1 Union Station Improvement by Phase: Lower Level

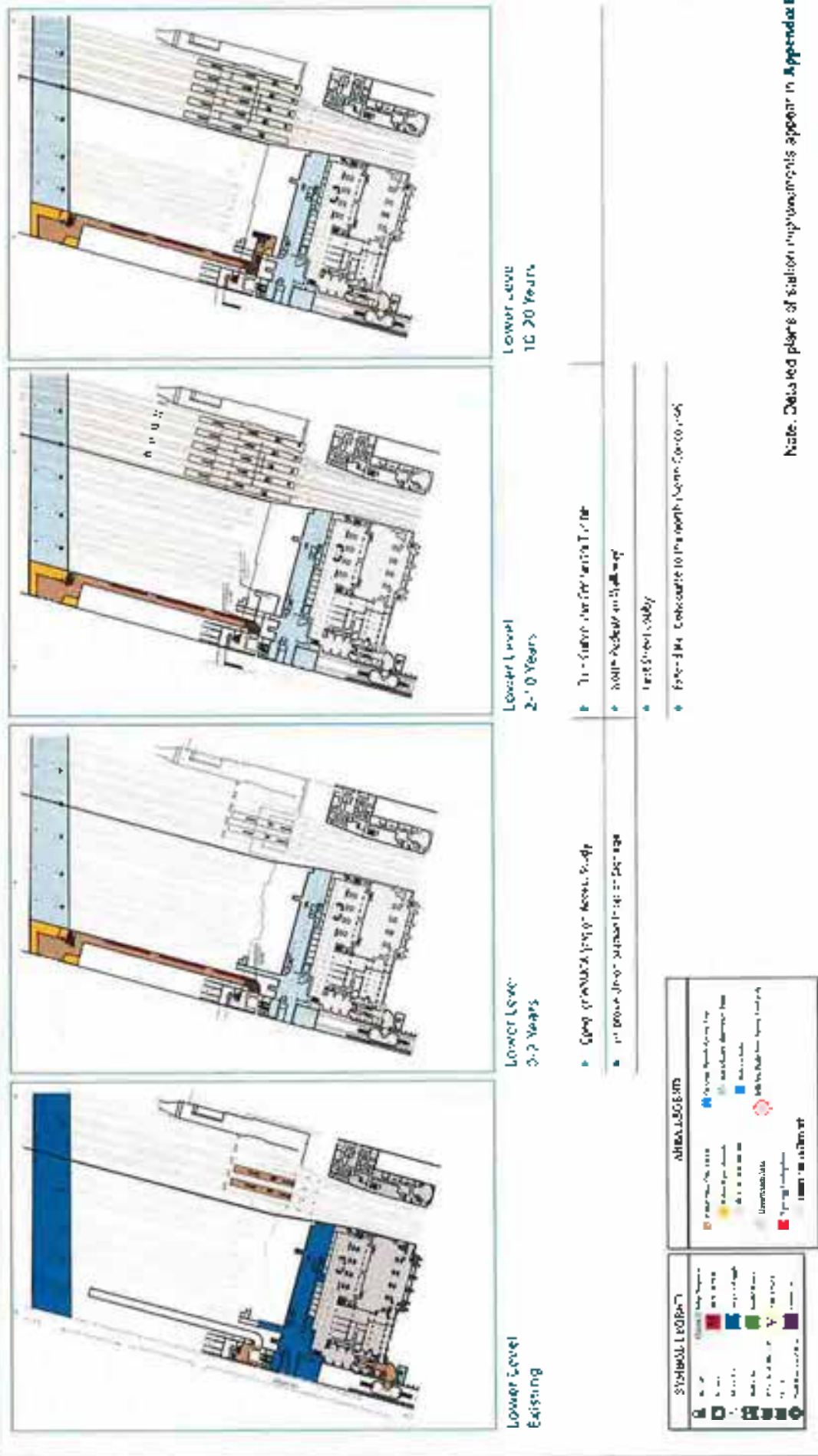


Figure 7-3 Jr on Station Improvement by Phase: Mezzanine Level

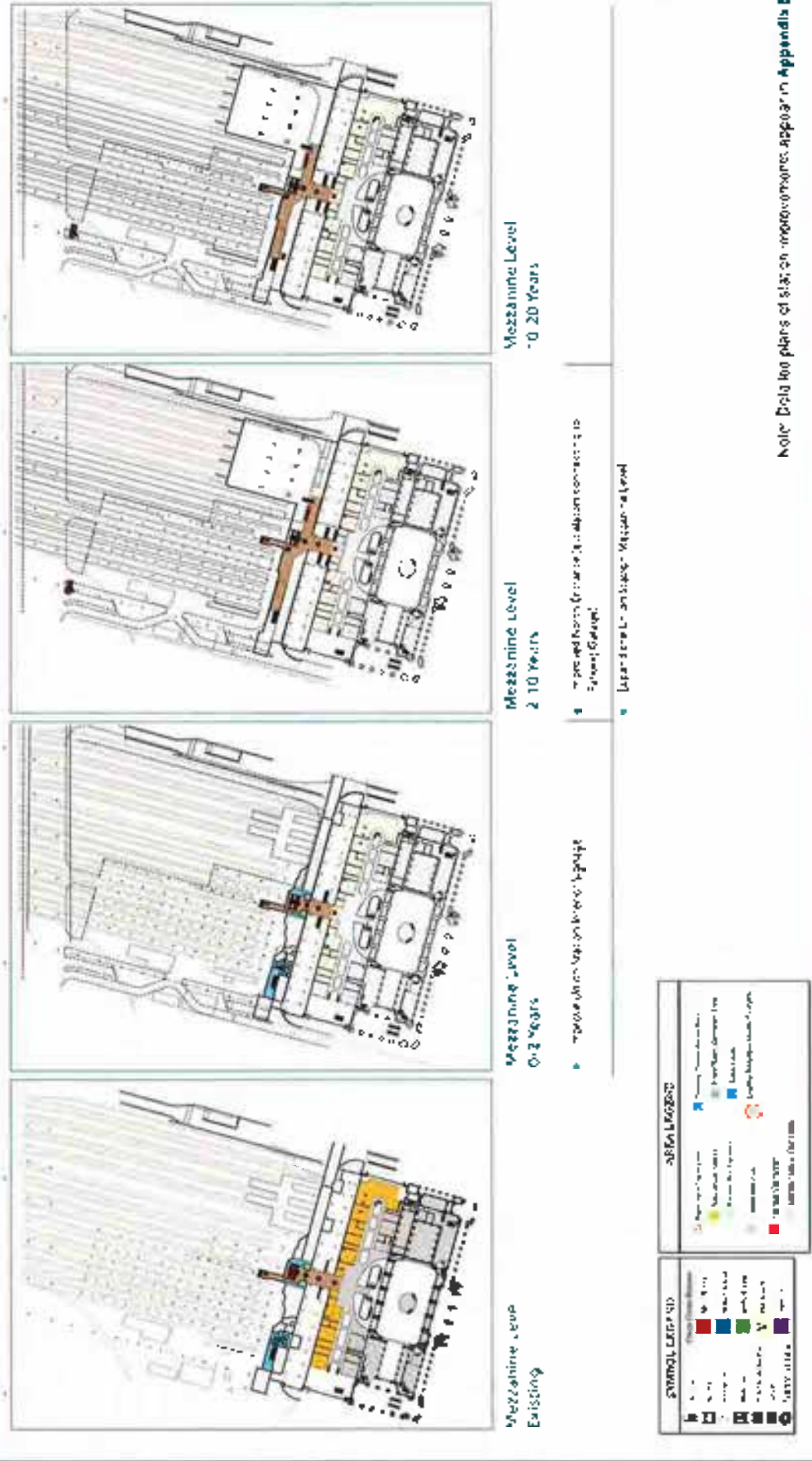
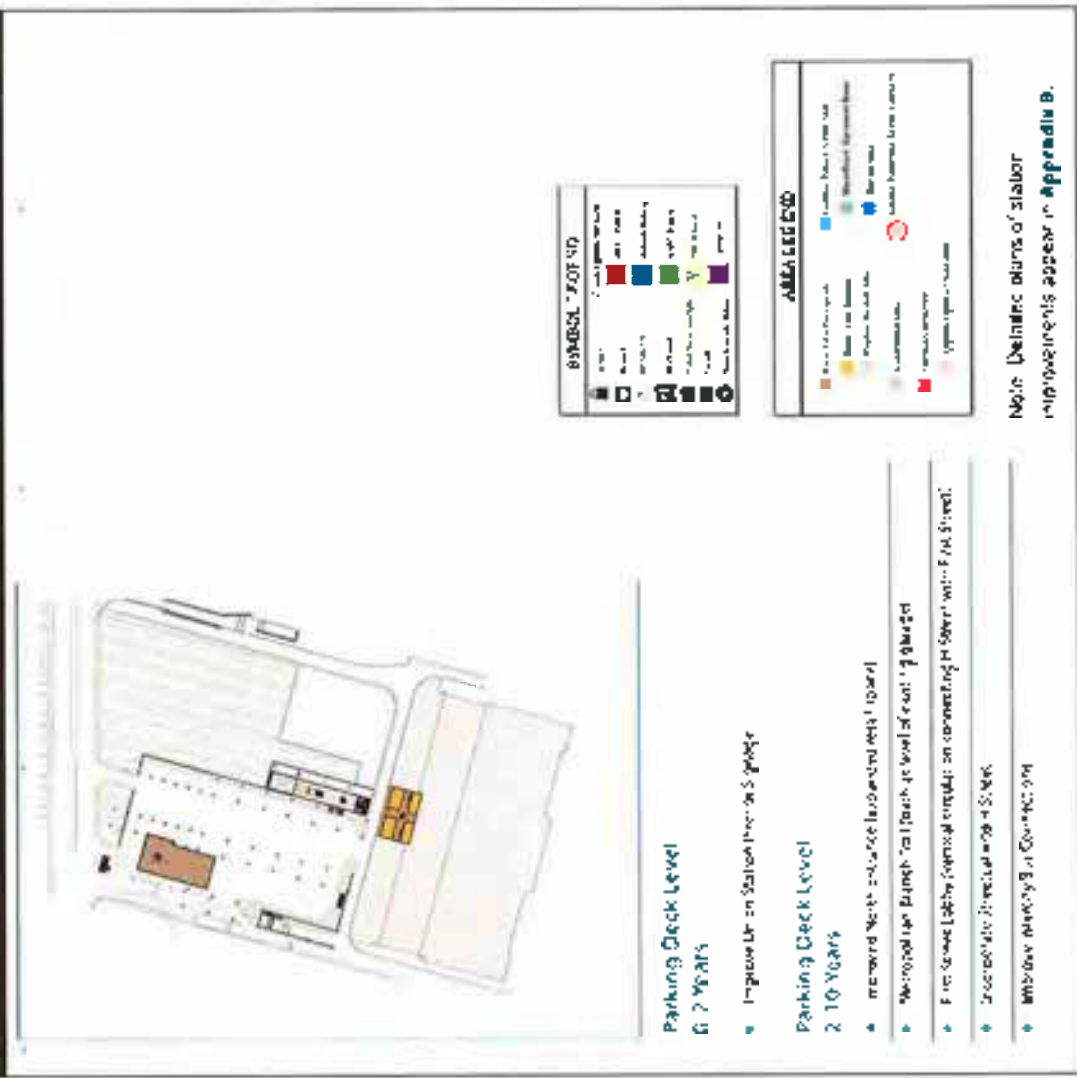


Figure 7-4 Union Station Improvement by Phase: Parking Garage Level

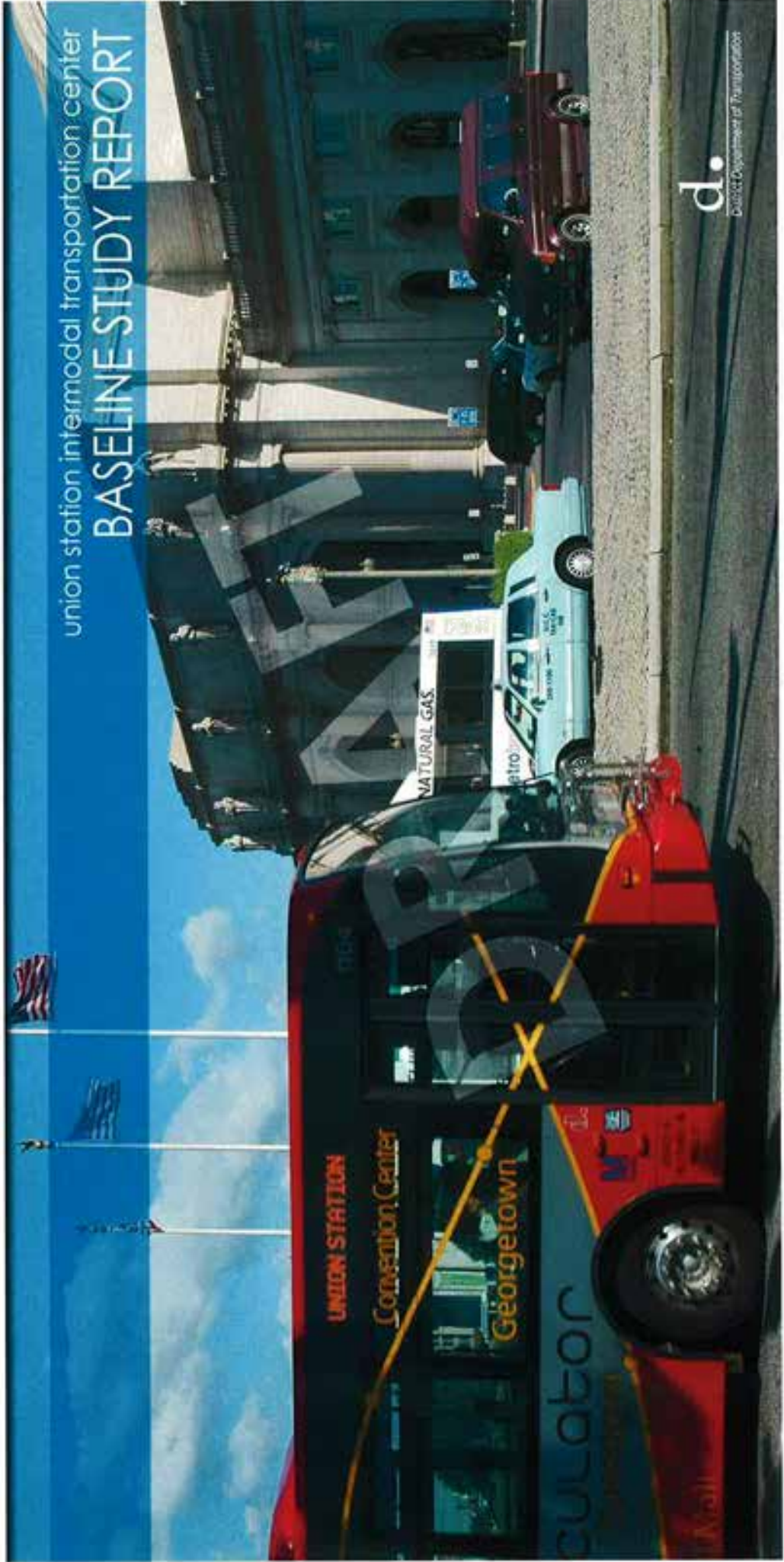


A

**APPENDIX A:
Baseline Study Report October 2008**



union station intermodal transportation center BASELINE STUDY REPORT



Technical Report #1 - Baseline Studies Report



Prepared for:
District Department of Transportation

October 2008

TABLE OF CONTENTS

SECTION 1 – INTRODUCTION	
1.1 Study Area	2-13
1.2 Study Context	2-13
SECTION 2 – EXISTING CONDITIONS	
2.1 Neighborhood and Community Overview	2-1
2.2 Traffic	2-4
2.2.1 Existing Street Network	2-9
2.2.2 Circulation	2-1
2.2.3 Parking	2-1
2.3 Pedestrian and Bicycle Activity	2-5
2.3.1 Trip and Pedestrian Movements	2-5
2.3.2 Internal Pedestrian Movements	2-6
2.3.3 ADA Issues	2-7
2.3.4 Bicycles	2-8
2.4 Transportation Services at Union Station	2-9
2.4.1 Metrolink	2-10
2.4.2 DC Circulator	2-10
2.4.3 Commuter Buses	2-10
2.4.4 Metrobus	2-11
2.4.5 New-Jersey Bus	2-12
2.5 Capital of Station	2-12
2.5.1 Commuter Rail	2-12
2.5.2 Streetcar	2-12
2.6 Tour Itinerary	2-13
2.6.1 Facilities	2-13
2.6.2 Research	2-13
2.6.3 Observations	2-13
SECTION 3 – PLANNED AND PROPOSED TRANSPORTATION COMPONENTS	
3.1 Vehicle Corridor or Initiative: Massachusetts Avenue and H Street NE	3-3
3.2 Integration of Existing Bus Service into the Union Station Corridor	3-1
3.3 Integrating Streetcar Service from H Street	3-2
3.4 Streetcar Needs	3-2
3.5 Proposed Development Affecting Union Station	3-2
SECTION 4 – SUMMARY	
APPENDIX A – INVENTORY AND TRAVEL DEMAND TABLES/FIGURES	
A-1 Field Collected Turning Movements	A-1
A-2 Available Parking Spaces at Union Station Garage During Peak Parking Hour	A-7
A-3 Available Parking Spaces at 1/3 of Half of Garage During Peak Parking Hour – Case Counts at Union Station Garage during 12 Month Period	A-3
A-4 Vehicle Rates for the Union Station Parking Garage	A-3
A-5 Summary of Bus Routes in Tour Study Area	A-3
A-6 Overall Weekly Boardings/Alightings at Union Station Study Area	A-2
A-7 Overall Daily Boardings/Alightings at Union Station Study Area	A-4
A-8 Weekday Hourly Boardings/Alightings at Union Station	A-4
A-9 Number of Commuter Bus Rides Serving Union Station Area and DC	A-5
A-10 Commuter Rail Boardings at Union Station by hour	A-5
A-11 Streetcar Weekday Boardings/Alightings	A-5
A-12 Scheduled Metrolink Volume at Union Station	A-5

LIST OF FIGURES

Figure 1-1 Study Area Overview 1-2

Figure 2-1 Levels of Service 2-3

Figure 2-2 Typical Vehicular Circulation Patterns around Union Station 2-4

Figure 2-3 On-Street Parking in the Vicinity of Union Station 2-5

Figure 2-4 One Hour Pedestrian Volumes on Roads Adjacent to Union Station 2-6

Figure 2-5 Morning Rush Period Pedestrian Platoon Paths 2-7

Figure 2-6 Evening Rush Period Pedestrian Platoon Paths 2-7

Figure 2-7 Observed Platoon Conflict Points and Bottlenecks 2-7

Figure 2-8 Map of Bicycle Trails in Study Area 2-8

Figure 2-9 Conceptual Design of Proposed Bicycle Facility at Union Station 2-8

Figure 2-10 Relative Number of Boardings and Alightings at Metrobus Stops 2-9

Figure 2-11 Circulator Monthly Ridership by Time of Day (April 2008) 2-10

Figure 2-12 Commuter Train Activity at Union Station 2-12

Figure 2-13 Amtrak Activity at Union Station 2-13

Figure 3-1 Future Development Activity near Union Station 3-1

LIST OF TABLES

Table 2-1 Transportation Modes Served at Union Station 2-1

Table 2-2 Ridership of Commuter Buses which Serve Union Station Area 2-10

Table 2-3 Volumes of Weekday Metrorail Trips Beginning or Ending at Union Station 2-11

Table 2-4 Combined Tour and Commuter Bus Populations Observed Near Downtown Washington 2-13

1 - INTRODUCTION

Union Station and the Union Station Tracks opened in 1903 as a replacement for the service which had previously used the area that is now the National Mall. Designed by Daniel Burnham of Burnham and Root in Chicago, the station was completed during the 1900's, followed by a decline in service through the 1960's. In 1981, the Redevelopment Act created the Union Station Redevelopment Corporation, which was charged with developing the station and the transit facility it is today, serving local, regional, and interstate travelers, as well as shoppers and citizens of DC. In particular, the Redevelopment Act sought to expand the operation of a portion of the National Mall Station building as a rail passenger station, together with holding facilities for buses, transit, and transit buses in the Union Station complex.

Today, Union Station is a major hub of transportation services in Washington DC, serving over 32 million people a year for travel, shopping, entertainment, and tourism. Union Station will continue to be a hub as it is projected to increase. There are growth plans for a new major transit modes that serve the station, and there are plans for expansion of commercial, retail, and residential uses along near the station. It addresses many existing needs and future demands. The Union Station Intermodal Transportation Center Feasibility Study seeks to:

- Identify existing internal and external deficiencies and opportunities for improvement, including issues related to regional emergency evacuation,
- Identify and quantify future transit plans for all transit modes and users at the Station;
- Develop an integrated and feasible plan of system modifications for both the existing facility as well as construction of a collection of new intermodal transportation Center (ITC) on the adjacent air rights overlooking the track;
- The ITC would be constructed at the Marjorie Development known as Burnham Place. One of the key goals of this integrated plan is to identify how the new ITC Development, underdeveloped air rights construction and the ability of Union Station could be utilized to improve the functioning of Union Station as a Regional Intermodal Transportation Center.

A key aspect of the study is a comprehensive analysis of Union Station and its environs as a whole. This includes assessments of existing operations and needs, as well as a review of current plans by the various users of the facility. Within the context of an overall assessment, some of the specific items being reviewed and addressed by the study include examining the feasibility of:

- Constructing a new rail passenger concourse for commuter rail operations;
- Improving emergency evacuation of both Union Station and surrounding nearby neighborhoods;
- Improvements to the existing Airline passenger concourse;
- Expanded parking accommodations for tour and commuter buses;
- Integrating intercity bus lines (e.g. Greyhound, Peter Pan, etc.) into the new ITC;
- Developing new transit services;
- Developing a pedestrian network between Union Station and the street and urbanizing pedestrian connections on F Street, and
- Developing a new vehicular connection between Pennsylvania Avenue and H Street.

The study is being developed with the participation of local community groups and other stakeholders. The study also includes a review of environmental impacts of the proposed development to the level of data necessary to determine liability, and to identify any additional studies that would be required for various recommended improvements.

Federal and local governments, as well as community stakeholders, are supporting the development of the public and local advisory groups formed for the study. The Technical Advisory Committee and the Citizens Advisory Committee.

This report, the first of several being completed for the study, describes existing conditions, and provides for the various transit modes at Union Station. It provides a baseline of information to assist in identifying, evaluating and conducting future studies and analyzing recommendations. Following is:

parts will describe the study's recommendations based on conclusions derived for Union Station Services and will include, as appropriate, project details such as estimated costs, implementation strategy estimates, feasibility considerations, and the identification of necessary environmental and permitting requirements.

1.1 STUDY AREA

The project focuses on Union Station, located in downtown central of Columbia. The station itself is located north of Columbus Circle at Maryland Avenue and 1st Street SE, about one half mile north-west of the United States Capitol. The project will extend from Washington Avenue to the south, to Street SE on the east, to Street SE on the north, and to Capitol Street on the west. The entire study area is located within the boundaries of Ward 6, however, the proposed Community (CMC), and "neighborhood cluster" 25 neighborhood cluster 25 includes the Union Station neighborhood, as well as the NeMA (North of Massachusetts Avenue area), Shaler Arts and King-in-Park neighborhoods. In addition to these areas surrounding Union Station, the study area is being defined to include all public areas, as well as the surrounding areas in the vicinity of Union Station, including existing transportation facilities, proposed developments, and proposed transportation improvements.

1.2 STUDY CONTEXT

Union Station is a major and historic transportation hub, and is continuing to grow as it is being redeveloped. Union Station has been the focus of many studies of numerous studies. These studies include:

- Columbus State University - Efforts to redevelop Columbus Plaza have been ongoing, with the intent of improving the aesthetic and functional qualities of the plaza.
- Union Station Study Station - A multi-phase bicycle Transit Center is being constructed at the southeast corner of Union Station
- District of Columbia Transit Improvements Administration Analysis - A study regarding station safety

- **Capitol Hill Transportation Study** - This study focuses on improving safety, easing traffic congestion, and overall improvements to the transportation in the area with a focus on improving the major arterials.
- **Tour Bus Management Initiative** - Tour buses serve a large demand in DC, but they also create issues with parking, aesthetics, congestion and pollution. Citing examples from other cities, the study recommends ways that tour bus activity can be improved in the District.
- **H Street NE Corridor Transportation Study** - This study recommends several transportation improvements along H street, including better pedestrian and bicycling amenities, as well as a proposed streetcar.

Union Station is also a key feature of city-wide transportation planning efforts including the District's Strategic Transportation Plan as well as bicycle and pedestrian plans.



Figure 1-1. Study Area Overview

typical weekday traffic (am and non-workweek) traffic volumes are used). Within the study area, LOS is based on a directional delay (i.e., morning traffic is heavier in the morning peak and on-board traffic is heavier in the evening peak).

Figure 2-3 shows levels of service (LOS) at key intersections in the study area. LOS is a standard traffic engineering method of rating roadway operations. LOS methodologies use a grid of traffic flow from A to F, with A representing excellent traffic flow with minimal delays. E represents congested conditions with high levels of delay. In general, LOS D or better are considered acceptable. The discussion below summarizes traffic volumes and operations during the morning and afternoon peak periods.

Morning Peak

During the morning peak hours, in Street, Massachusetts Avenue, Columbus Circle, and North Capitol Street carry the heaviest traffic through the study area with peak hour volumes in excess of 3000 vehicles per hour. Traffic flows heaviest in the southeast direction along North Capitol Street and in the westbound direction along H Street and Massachusetts Avenue/Columbus Circle.

The LOS results show that intersections along the high volume corridors primarily operate at LOS E, D or F. Along these corridors, the intersection LOS, in most cases, is due to the high traffic demand on the through movements. Delays are in the non-peak direction, especially at LOS A, B or C. Additionally, intersections on the study area streets that are primarily used as local access operate at LOS A, B or C, except at locations where they intersect with the study area corridors.

Afternoon Peak

As expected during the morning hours, H Street, Massachusetts Avenue/Columbus Circle, and North Capitol Street carry the heaviest traffic through the study area in the afternoon peak, with peak hour volumes in excess of 1000 vehicles per hour along the major corridors. The heaviest traffic directions in the reverse of what is experienced in the morning peak period (North Capitol Street and in the eastbound direction along North Street and Massachusetts Avenue/Columbus Circle).

- Capitol Hill Corridor - Houses the Capitol Complex, with hundreds of thousands of staff and visitors daily. A large portion of this staff and visitors at the station is a Metro, MBTA, or Amtrak.

There are also a number of neighborhoods, particularly in NEVA, that are affected by the station's operations, and will require that it make adjustments to existing neighborhood operations. Development is underway in the east of Union Station, resulting in the development of a transit connector to the east near State L for example. Projects in development for these developments include through the Columbus Plaza and 3rd Street areas.

2.2 TRAFFIC

As with the District as a whole, the roadway system adjacent to Union Station is a busy and complex with a limited number of major arterial avenues. Most of the roadways in the study area are classified as collector roads. These roads serve the function of collecting traffic from smaller roads and link sites and feeding traffic classification roadways. The other class of roadways in the study area include North Capitol Street (principal arterial), Street (principal arterial), Massachusetts Avenue (principal arterial), Massachusetts Avenue (principal arterial), North Capitol Street and minor arterial east of North Capitol Street, and E Street (minor arterial). Current daily traffic volumes on roadways (as shown as arterial and above and feet the study area are shown below).

- North Capitol Street: 21,000 vehicles per day
- Street: 27,000 vehicles per day
- Massachusetts Avenue: 23,000 vehicles per day
- Louisiana Avenue: 8,000 vehicles per day
- E Street: 11,000 vehicles per day
- Interstate 95: 18,000 vehicles per day
- Constitution Avenue: 21,000 vehicles per day

2.2.3 Existing Street Network

To support more detailed analysis of traffic operations, which will allow movement counts were conducted for the study at 26 intersections within the study area. The traffic counts were conducted at each location for a consecutive 30-minute period between 7:00 and 9:30 a.m. and between 4:00 and 6:00 p.m. (corresponding with the morning and evening peaks). Data collection was completed between March 14th 2008 and March 28th 2008 on Tuesdays, Wednesdays, or Thursdays. Counts are based on the 15-minute days between 7:30 or 8:00 days representing

The operational analysis for afternoon peak conditions shows that intersections along the high volume corridors generally operate at LOS B, C, D or E and slightly better than the morning peak conditions. The improvements in LOS are primarily due to overall lower traffic volume demands for example, at North Capitol Street, LOS improves from an E in the morning to a D in the evening due to a heavy 10% reduction in overall traffic volume, and a more equal distribution of traffic on all approaches. At North Capitol and K Street, the overall 10% reduction in traffic demand reduces by approximately 15% with a 21% reduction of the traffic approaches (southbound approach) during the AM peak, with a 10% reduction during the PM peak. In general, intersections on the major corridors at streets in the study area operate at LOS A, B or C, except at locations where they intersect with high volume corridors.

2.2.2 Circulation

A large number of travel modes are accommodated by the current circulation plans and patterns in and near Union Station, with varying levels of success. The schematic in Figure 2-2 illustrates some of the regional circulation patterns at Union Station. As depicted in the previous section and shown in the LOS 9, various in-station traffic operations within the Columbus Circle area in front of Union Station are especially applicable. Current circulation issues, therefore, relate more to the complexities of existing and recent travel patterns than to high levels of demand for traffic congestion.

Local access to Columbus Circle is provided via Columbus Circle on the west side of Union Station. The most common path for access to Columbus Circle is from the east of Columbus Circle, exiting at the east end, and then joining westbound traffic on Columbus Circle by Massachusetts Avenue. Before the first connection is available that allows for a complete loop around the plaza. A bidirectional access road surrounds the west side of Union Station, and provides access to the parking garage north of the station and to East Street NE west of the station. The Columbus Circle can be accessed from the east where Columbus Circle intersects with Columbus Circle, on the west side accessed from Columbus Circle near the southwest corner of Union Station; on the north access is provided directly from the existing garage. Columbus Circle center line past the point where Columbus Plaza and the Columbus Circle spur end, and leads directly into westbound F Street, NE.

vehicle vehicles are the most feet reserved for buses. The total capacity is 2,194 parking spaces, 50 of which are bus spaces. However, only 55 of the bus spaces are actually used. Parking data provided by the Union Station Redevelopment Commission (USRC) shows that the Union Station parking garage experiences an overall average occupancy rate of 73% during 515 spaces available during a typical week. Union Station parking lot (first block of Columbia or West of 24th St.) has an average occupancy rate of 200.95% (132 available spaces). Generally, Union Station experiences a lower occupancy volume on Mondays with an average occupancy rate of about 66%. 1,755 available spaces. System for parking data and capacity separated: seasonal needs, and overall, the parking garage accommodates about 49,000 trips per month, or about 1,600 trips per day. 8.3 sales of the other hand, exhibits a dramatic increase during the spring football season. Decreased demand on parking space impact of the least seats for the parking garages are included in the Appendix A, table at the end of the report.

The pricing data for the structure began at \$5 for the first hour and up to \$10 for 24 hours. Validation is available for patrons who utilize the service, including an \$11.00, allowing for increased rates up to the first three hours. Parking rates for four hours are \$20 between 2am and 3am, and \$10 between 7PM and 7AM. Rates have increased or stayed throughout the year periods.

On-site parking is available near Union Station, with required parking available on blocks of Columbia Street on the street level adjacent to the station. Metered parking is available on many of the streets in the study area, most with 2-hour limits. Metered parking is available throughout the study area on streets such as 2nd and 3rd Streets. The USRC also provides a two-hour limit, unless a 30-minute parking permit is provided. On-site, on-street parking, which is detailed in Figure 2-3, provides about 940 metered parking spaces, and about 500 non-metered parking spaces within the study limits. The non-metered spaces include approximately 300 permit spaces, and 200 other spaces which are restricted on various days, and other forms where parking is not permitted during busy traffic periods. Additionally, just south of the study limits, nearly 900 street parking spaces are available to special permit holders.

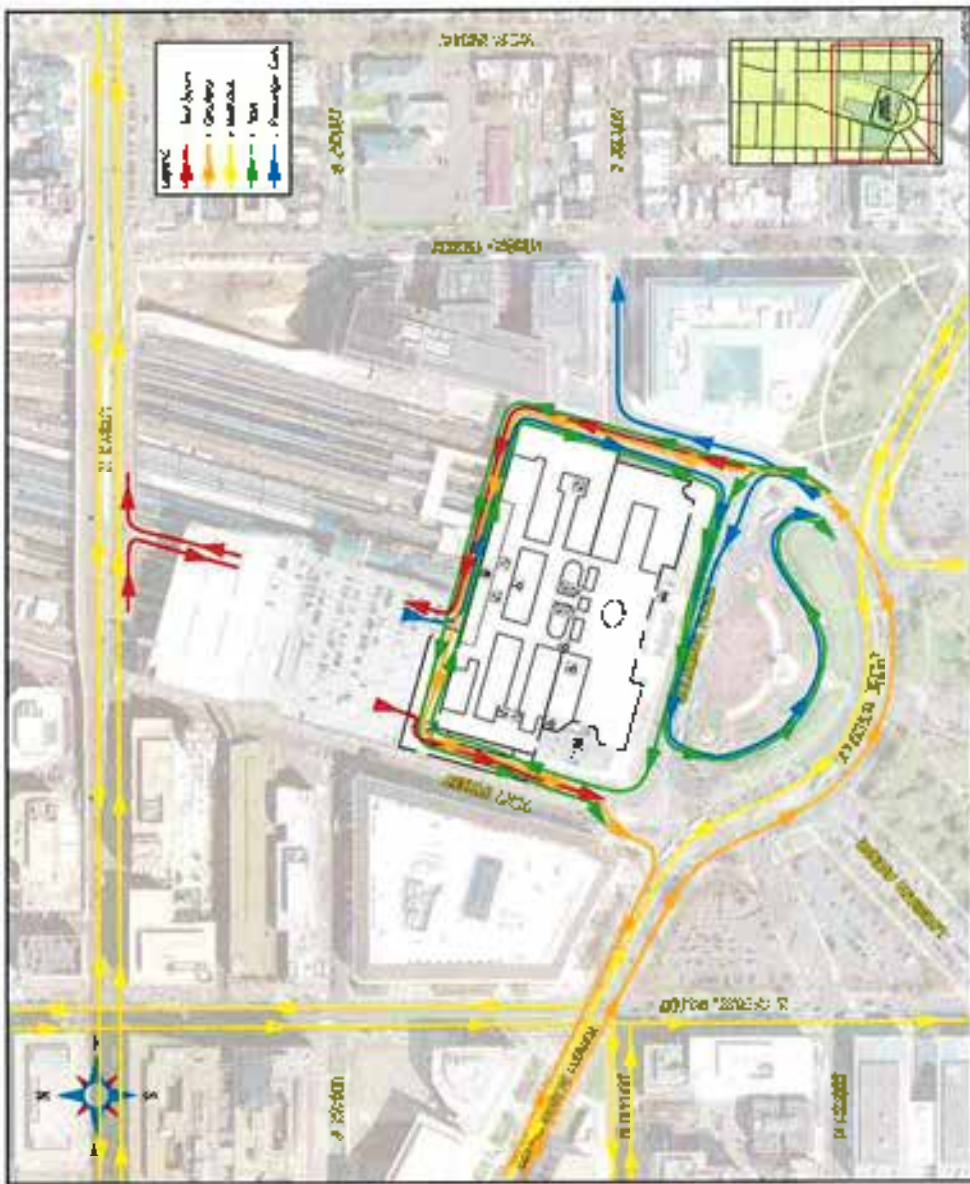


Figure 2-3. Typical metered parking Figure 2.3. Typical Metered Parking

of over 300 buses that are taken out of operation between 7 and 8 AM throughout the system between these periods.

2.4.2 DC Circulator

The Circulator bus system, like the other bus systems in the area, is designed to run only when people are around the transit system. The Circulator's schedule is to move people within the core of the city. All three of the Circulator routes are designed to loop around the Village Mall. The route serving Union Station loops between the station and Georgetown. The City also system is to serve the, and as such, the system is designed to loop around the station and Georgetown. The route serving the station and Georgetown is designed to loop around the station and Georgetown. The system is an extension of Metro and the Metropolitan.

2.4.2.1 Facilities

Outside of Union Station, the Circulator operates much like a Metrobus. All three routes stop to add and remove passengers. At Union Station, however, the Circulator uses the new and well-known facility to loop around the station and Georgetown. Buses are reserved for the Circulator. While this facility is reserved for the Circulator, it is also used for Metrobus service at the station. Metrobus passengers are allowed to use stairs and escalators to board and alight from the bus.

2.4.2.2 Ridership

The Union Station to Georgetown line is the most heavily used of the three Circulator routes. A driver for the line in April of 2008 was over 150,000 trips, or about 70% of all the monthly Circulator ridership. April ridership represents a 15% increase over the same month in 2007. A similar increase in ridership was also seen in the other two routes. Average weekday ridership for the Union Station to Georgetown line was approximately 6,200 riders per day during the month of April.

2.4.2.3 Operations

Though the Circulator bus system is both busier and more efficient than the other bus systems in the area, it is also more expensive to operate. The Circulator bus system is more expensive to operate because it is a more complex system. The Circulator bus system is more expensive to operate because it is a more complex system. The Circulator bus system is more expensive to operate because it is a more complex system.

ridership is also high during these periods. It is calculated from 7 to 8 AM and from 8 to 5 PM. Figure 2.4.1.1 shows the number of ridership during these periods. The number of ridership during these periods is highlighted in the table below. The number of ridership during these periods is highlighted in the table below. The number of ridership during these periods is highlighted in the table below.

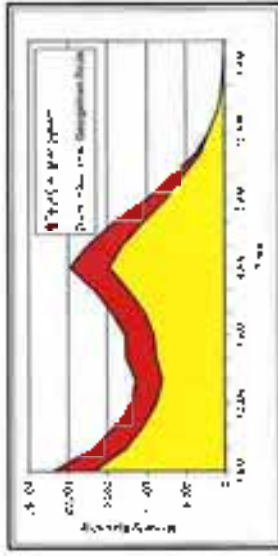


Figure 2.4.1.1 Circulator Monthly Ridership by Time of Day (April 2008)

2.4.3 Commuter Buses

Commuter buses, which are operated by substantially smaller companies than Metrobus, also have a role in moving passengers to and from Union Station. Commuter buses are operating on a different than other bus routes such as Georgetown, although they are able to serve the same stations using similar vehicles. For this study, the Circulator bus operator's website and a survey of bus operators in the District were used to identify the following:

- Maryland Transit Administration (MTA) Maryland Commuter Buses
- Potomac and Rappahannock Transportation Company (PRTC) Over Ride
- Loudoun County (LC) commuter buses
- Prince George's County (PGC) commuter buses
- Loudoun Valley Commuter Bus Service - Valley Commuter (VC)

Commuter buses refer to a market segment that includes buses or vans that are used to transport passengers to and from bus stations surrounding the District's major transit hubs. These buses are also used to transport passengers to and from bus stations surrounding the District's major transit hubs. These buses are also used to transport passengers to and from bus stations surrounding the District's major transit hubs.

Washington, has the largest route, beginning in Woodstock, Virginia, and ending in the downtown Washington Metro area. The other three routes are operated by the Loudoun County Transit Authority (LCTA), about 20 miles out of the Loudoun County area (Woodstock and Herndon), about 20 miles out of the Loudoun County area (Woodstock and Herndon), and the Loudoun County Transit Authority (LCTA), about 20 miles out of the Loudoun County area (Woodstock and Herndon).

2.4.3.1 Facilities

Union Station has no facilities dedicated exclusively to commuter bus service. While highlighting the Maryland Transit Administration's role in the Washington Metro system, it is also the most important bus service of the District of Columbia area, with bus stops at Union Station and Loudoun County Transit Authority (LCTA), about 20 miles out of the Loudoun County area (Woodstock and Herndon).

All ridership, when commuter buses are not being used, is out of the city, they must be "bused" or "shuttled" to the station. As a result of the existing, the existing layout of the station, which is designed to serve the Loudoun County Transit Authority (LCTA), about 20 miles out of the Loudoun County area (Woodstock and Herndon), about 20 miles out of the Loudoun County area (Woodstock and Herndon).

2.4.3.2 Ridership

Design of the commuter bus was not an all-or-none matter at Union Station. However, the existing layout of the station, which is designed to serve the Loudoun County Transit Authority (LCTA), about 20 miles out of the Loudoun County area (Woodstock and Herndon), about 20 miles out of the Loudoun County area (Woodstock and Herndon).

Table 2-2. Ridership of Commuter Buses, which Serve Urban Station Area

Average Daily Service per Month, Served Union Station	MTA Maryland PRTC VC	LC	
Average Daily Service per Month, Served Union Station	2,750	—	1,400
Average Daily Service per Month, Served Union Station	—	30	—

Commuter buses are not being used, is out of the city, they must be "bused" or "shuttled" to the station. As a result of the existing, the existing layout of the station, which is designed to serve the Loudoun County Transit Authority (LCTA), about 20 miles out of the Loudoun County area (Woodstock and Herndon), about 20 miles out of the Loudoun County area (Woodstock and Herndon).

minutes during the morning, and up to 17 minutes during weekday evening peak service.

2.4.5 Intercity Bus

Intercity bus service to and from the study area is provided by Greyhound and Peter Pan Bus Lines, which operate from a facility south of the main Union Station Complex. Although Peter Pan bus service to the Washington DC area is increasing, services from the area may be limited for Union Station, due to the initial location of the bus depot. New bus services that are being developed to utilize the Northeast Corridor, such as Megabus, operated by Greyhound, Best Bus, operated by Greyhound, and the various services serving the Gallery Place Chrysalis neighborhood are increasingly choosing to provide service from various alternate stops throughout the Washington DC area. Few of these alternate stops are near Union Station due to congestion on the surface streets around the station. Operators should choose locations throughout the district convenient to major regional transit points.

2.4.5.1 Ridership

Daily Greyhound ridership at Union Station DC is estimated at around 2,600 passengers.

2.4.5.2 Facilities & Operations

The Greyhound bus depot, located at 3rd Street NE and I Street, SE in the historic area and its operations are being evaluated as an integral component of the study. Buses arrive 24 hours a day, with frequencies of approximately 30 minutes. Though surface congestion during nighttime hours, the depot typically over 60 buses per day.

A key issue with the current configuration of facilities is the difficulty of turning in or staging buses and the Greyhound facility, which are separated by more than 2,000 feet, or 38 miles. Despite the significant distance with many of the same characteristics and needs as Amtrak's operations.

2.5 RAIL AT UNION STATION

The primary and historical transportation function of Union Station is as a rail terminal. Twenty tracks serve the station, comprising both commuter and intercity rail traffic. Seven tracks run east through the station, turn to traffic southward to Virginia and other points south. Union Station is the terminus of

two of Amtrak's most popular services, Acela Express and the Northeast Regional, as well as the commuter rail lines.

Rail services at Union Station are provided by Amtrak, Metrolinx along the north edge of the building that was built as part of the development activities associated with the 1980s Redevelopment Act.

2.5.1 Commuter Rail

By the 1980s, commuter trains, like commuter buses, operate with distinct weekend peak periods, bringing people into the district in the morning and taking them back home in the evening. Commuter rail service at Union Station is provided by two separate services:

- Maryland's Amtrak-Operated Maryland Rail Commuter (MARC)
- Virginia's Fairfax Express (VME)

MARC trains operate on seven lines, extending to Pennsylvania, Maryland, West Virginia and D.C. In addition, Maryland's Union Station being the terminus and only District station with separate bus service lines, serving both Maryland and Fredericksburg, Virginia, with service to the District at Fairfax Plaza and Union Station.

2.5.1.1 Facilities

Commuter rail at Union Station operates a single Amtrak service, MARC trains, which serve both high and low level platforms, operate from the westmost tracks, often interspersed with Amtrak Intercity trains.

VRE trains operate from the easternmost tracks, which are low platform tracks to accommodate VRE's low platform trains. VRE shares these tracks with the 13 daily Amtrak trains that provide through service to Richmond, Virginia, the Capital Beltway and Hardee.

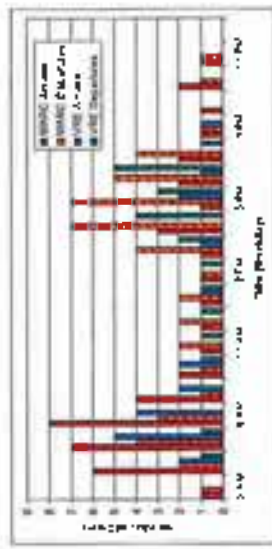
2.5.1.2 Ridership

Commuter rail operations at Union Station are some of the busiest in the country. Over 10,000 riders use the MARC service on an average weekday, while over 13,000 riders use the VME system for multiple weekdays. Detailed ridership data for the commuter rail system is shown in Appendix A, Tables A-9 and A-10.

2.5.1.3 Operations

The intercity and commuter services of commuter trains are similar to those of the commuter buses. Figure 2-12 displays the timeliness of services of the commuter rail operations at Union Station. The high frequency of arrivals in the morning, up to eight trains per hour for the MARC system, coupled with the high volume of departures in the evening, is facilitated by a track and more day shift employees during peak hour, leaving over 400 employees at the morning arrivals occurring within a single hour. Evening departures are more evenly distributed. However, the presence of trains throughout the day allows some departure from the district throughout the day. In particular, there are several morning trains which depart before the district's regular employment begins.

As discussed in Section 2.2.2, the arrival of the commuter train creates a large influx of passengers leaving the train to transfer to other modes of transportation or simply depart the station. A single train often creates a platoon of over 700 people moving through an station, beginning in the rear of the station where passengers exit the rail cars and, through to the National Mall, or to the doors to the adjacent streets. Operations should ensure that it is possible for all the passengers depart from the commuter train with appropriately few minutes, with the majority of people leaving the platform in less than three minutes.



Source: MARC and VME, and Amtrak. Figure 2-12. Commuter Train Activity at Union Station

2.5.2 Intercity Rail

Long distance rail service from Union Station is provided by Amtrak. The majority of Amtrak's trains leave Union Station as part of the Northeast Corridor. A service up to 6000 hours to

have shown that tour bus capabilities begin during the spring months which includes the popular Cherry Orchard Festival.

2.6.1 Facilities

A key component of the 1984 Redevelopment Act activities was the inclusion of 53 spaces for tour buses on the garage's first level. Tour buses can access this level from H Street, or the west or east alleyways.

2.6.2 Ridership

A survey of bus populations was conducted on the afternoon of Thursday May 15, 1988 in order to get a "snapshot" of the number of buses in the District at any one time. Traveling through the city, buses were counted whether parked or driving. An attempt was made to avoid double-counting moving buses. A number of empty tour buses are included in these figures, particularly due to the ability to distinguish empty tour buses from though commuter buses may have larger license plates, and consequently different parking requirements than tour buses. The presence of commuter buses at any given local or in creates the overall parking demand.

2.6.3 Operations

Although some tour buses stop and end service at Union Station (Capitol Mall) garage a ticket booth on the bus loop of the Union Station Parking Garage), most buses use Union Station as a way point allowing tourists to exit and stop at Union Station.

As shown in Table 2-4, the majority of tour buses are located on the National Mall area. Street parking is available for buses along Maryland Avenue and Water Street, as well as Capitol Circle and the 14th Street area. "One-First" commercial parking areas seem to be possible despite any for-visit tour buses for any given while the passengers explore the monuments and monuments down-

in Washington, New York City and Boston. Subways are located at the by the two density populated east coast. However, a limited number of options are available for traveling as far south as Miami, Florida, and as far west as Seattle, Washington and San Francisco. California. Additionally, some of America's operation, accommodate suburban Washington through weekday commuters by offering toll & Mall. It is to be accepted on select basis with payment of a small step-up fare.

Approximately 50 to 60 cars arrive and depart each day at Union Station with the volumes illustrated in Figure 2-13. Arrivals to Union Station are more evenly distributed than the departures, with evening peaks of commuter rail. Between 8 AM and 8 PM, 40 buses arrive and 30 depart, which is over two-thirds of the 116 Annual counts using Union Station throughout a five week day. A peak occurs between 10 to 11 AM, and again at 3 to 4 PM, with a combined 11 tours arriving or departing during each of these hours.

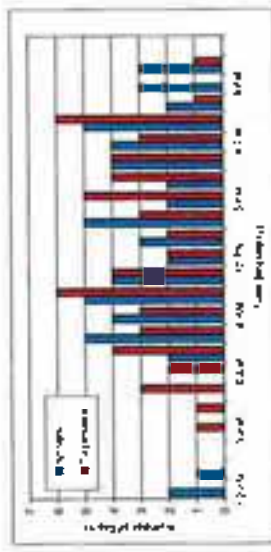


Figure 2-13 Annual Activity at Union Station

2.6 TOUR BUSES

Most buses are a common sight around the District, especially during the day to explore the history and culture of the nation's capital. The sheer volume of buses, combined with their large profile, impact even a highly visible, unobstructed

corner. These streets provide not only free parking for a slight period of time, but also relatively easy access to the major tour locations. Other locations which have been designated as bus stops are less popular. The highest bus stopping lot, for example, had only seven buses, while other designated ways counted parked on an adjacent street. Most of these appeared to be commuter buses waiting for the afternoon outbound shift. The remaining lots outside of the Station were almost empty, only buses parked on streets adjacent to the lots were seen in this area. However, no buses were seen in the parking lot of the Old Convention Center (down town), but instead a small number of buses were seen on the adjacent roads surrounding the parking lot. A survey of all the bus operators, to get a picture of the industry, may reveal more clearly the operations of these buses and their parking characteristics and needs.

Table 2-4. Combined Tour and Commuter Bus Populations Observed Near Downtown Washington

LOCATION	TOUR OR COMMUTER BUSES	TOURING SCHOOL BUSES
14th Street, Old Convention Center	83	59
Street adjacent to 8th Street	7	7
Armed Forces Parking Lot	10	0
National Mall	88	0
National Mall and Nearby Street Network	256	32
Old Convention Center Parking Lot	9	0
Union Station Parking Garage	23	0
TOTAL	573	64

Source: Parking Management Study, Washington, DC, 1988

4 – SUMMARY

As described in the introduction, this Baseline Study Report, the first of several being developed for the study, describes existing uses, operations, and conditions for the various transit modes at Union Station. As such, the objective of this report was to take all these concerns and use to inform further study of the Metropolitan Transportation Center.

Key findings from this Baseline Study Report include:

1. **Trails.** The streets immediately around Union Station see a high volume of traffic, and generally function as LOS D or worse. Key streets and corridors are:
 - Madison Avenue: 23,000 vehicles per day
 - H Street: 27,000 vehicles per day
2. **Bus Accommodations.** The Union Station Parking Garage, Intercity Bus Service from adjacent bus stops, Greyhound and Peter Pan Lines is currently operated from a

lot that is physically separated from Union Station. Integration of Intercity Bus Service into an existing development at Union Station would be highly desirable by both the stations and travelers, but may be difficult to accomplish. A viable option for long-term exists if the current garage configuration, but may not be feasible for the addition of Greyhound Intercity Bus Service.

3. **Pedestrian Flows into and out of Union Station.** Pedestrian flows in Union Station are highly dependent on the configuration of streets using the tracks. Observations are in the existing urban form would need to be accommodated by additional development. However, the especially pronounced around the Volpe Station, the busiest station in the ICA rail system.

Observations exist outside the station as well, especially near the downtown core of the building, and the busy local street.

4. **Green Projections.** A coming on all modes using Union Station directly (Metrolink, VTA, VRE, and Amtrak) is expected to grow, making existing facilities at Union Station increasingly inadequate.

Developments in the surrounding areas of ICA and H Street will provide new traffic, transit service, and residents, and must be able to be accommodated.

Next steps for the study will include development of a set of recommendations to address growth at Union Station in both the short and long term.

APPENDIX – INVENTORY AND TRAVEL DEMAND TABLES

A-3. Field Collection Yearling Movements

	AM PEAK PERIOD				PM PEAK PERIOD			
	L	T	R	SUM	L	T	R	SUM
Southbound (SB)	4	1114	286	1404	14	202	149	364
Westbound (WB)	342	424	94	730	202	260	66	528
Northbound (NB)	51	340	104	718	7	1346	52	1507
Eastbound (EB)	120	238	64	422	218	456	54	742
SP	16	216	150	357	62	210	142	312
WB	16	517	67	754	118	115	45	275
NB	17	46	55	118	22	170	170	375
EB	1	120	88	248	78	512	65	610
WB	34	724	2	760	34	270	0	248
NB	4	38	122	122	0	64	190	390
EB	0	158	18	174	0	378	26	406
WB	16	182	26	266	74	152	12	216
NB	16	64	84	172	20	168	14	172
EB	55	114	3	174	41	125	38	203
WB	22	174	24	220	32	596	36	644
NB	22	914	144	1070	106	640	290	946
EB	68	1448	156	1672	80	618	142	840
WB	34	394	120	648	0	722	140	872
EB	152	428	76	656	114	352	56	1022
WB	48	1378	0	1426	8	290	3	346
NB	8	0	3	11	210	0	76	286
EB	0	460	56	516	0	1228	18	1246
WB	40	1520	0	1560	4	582	0	588
NB	0	0	4	4	22	0	22	44
EB	0	396	42	438	0	1312	4	1316
WB	14	24	50	157	57	110	45	212
NB	42	1416	42	1500	18	512	18	544
EB	59	168	14	242	48	124	24	276
WB	26	220	31	304	114	1147	81	1538
NB	28	794	60	882	22	612	14	648
EB	46	36	34	106	88	54	46	188
WB	36	562	168	766	4	808	64	978
NB	6	124	95	198	0	174	110	286
EB	0	6	7	13	0	12	4	16
WB	34	0	44	78	46	0	0	78

	AM PEAK PERIOD				PM PEAK PERIOD				
	L	T	R	SUM	L	T	R	SUM	
2nd St. and G St., NE	58	0	58	0	58	0	74	0	74
	WB	58	0	58	0	144	26	0	170
	NB	0	120	0	120	0	182	0	182
	NB	0	78	19	154	0	176	22	198
	NB	36	80	76	272	12	16	59	96
	NB	27	103	0	130	18	132	2	170
	WB	234	580	122	936	182	548	50	820
	NB	14	418	218	510	14	364	184	564
	NB	0	418	0	418	0	824	30	874
	EB	224	348	32	604	296	502	50	848
	NB	0	418	0	418	0	624	30	654
	WB	24	58	0	122	22	94	0	116
	WB	130	34	10	164	40	0	16	56
	NB	0	84	38	126	0	124	62	186
	EB	18	36	60	114	34	34	100	188
	WB	16	84	26	126	45	34	24	151
	NB	22	174	16	314	0	46	14	36
	NB	37	76	18	103	8	118	12	134
	WB	30	62	18	93	15	142	12	191
	WB	16	376	218	610	26	470	136	642
	NB	46	326	4	376	78	174	14	244
	NB	24	294	34	356	32	382	12	406
	EB	128	119	24	242	126	274	52	534
	NB	26	202	0	228	2	36	0	39
	NB	114	0	76	190	4	0	1	5
	NB	0	17	26	138	0	14	6	20
	WB	6	56	42	106	24	88	28	118
	NB	17	196	8	219	6	26	8	40
	NB	14	78	8	100	4	112	12	128
	EB	14	20	8	42	28	34	20	74
	NB	2	78	78	158	0	76	44	126
	NB	0	212	74	286	0	24	0	24
	NB	0	26	2	28	0	0	0	0
	NB	406	230	0	636	118	120	0	498
	WB	7	438	124	564	8	574	182	764
	NB	220	246	7	473	44	182	6	242

A-3 Available Parking Spaces at Union Station Garage During Peak Parking Hour Ticket Counts at Union Station Parking Garage over 12 Month Period

Month	TOTAL FOR MONTH			AVERAGE PER DAY			VEHICLES PER SPACE PER DAY		
	CAR	BUS	CAR	BUS	CAR	BUS	CAR	BUS	4.0'S
Apr.	56,184	3,140	1,623	24	0.80	0.80			
May	51,169	2,427	1,058	28	0.76	0.81			
June	53,437	3,715	1,783	57	0.85	0.84			
July	52,917	337	1,353	24	0.81	0.87			
August	48,374	407	1,591	18	0.76	0.15			
September	45,716	304	1,509	17	0.72	0.16			
October	50,800	597	1,633	27	0.78	0.25			
November	48,850	519	1,629	19	0.77	0.31			
December	54,334	268	1,759	9	0.84	0.10			
January	43,716	235	1,410	8	0.67	0.08			
February	43,879	511	1,511	18	0.72	0.20			
March	52,454	1,623	1,600	32	0.71	0.18			
Total	595,401	11,888	1,627	24	0.77	0.36			

Source: 2007 data, March 2008

A-5. Summary of Bus Routes within Study Area

RT #	ROUTE	DIRECTION	NORTH OR EAST TERMINUS	SOUTH OR WEST TERMINUS	APPROXIMATE SERVICE TIME
98	North Capitol St. Ave	N/S	Port Tobacco Metro	Kennedy Center	4 AM - 2 AM W, 4:10 AM - 3 AM F/S
96	East Capitol St. - Cathedral Ave	S/W	Capitol Heights Metro	McAuliffe Landing Union Station	6-9 AM, 7-9:20 PM only
97				Mount Rain	6:17 AM W/B, 7:30 PM F/S
93	Subway - Armory Ave	S/W	City City	5 Day Variable	7-10 AM W/B, 3-6:30 PM F/S
96			Stadium-Armory Metro		4:30 AM - 1:30 AM W/S, 5AM - 3:30 AM F/S
91	City City - Union Station	D/W	City City	Union Station	4AM - 1AM W/S, 4:10 AM - 1:30 AM F/S
91	Metropolitan Center	N/S	Washington Metro Center	Union Station	5:10 AM - 1:30 AM
114	Mayfield Square Ave	S/S	Mayfield Square	Mayfield	6 AM - 10:30 PM
91	Spring Road Ave	S/W	Winchester Ave. Metro	Belmont Park/State Department	6AM-10PM W/S, 2:30 - 6:30 PM F/S
43				Belmont Station	6-9:30 AM W/S, 3:30 - 6:30 PM F/S
92	Spring Road - H St. Line	S/W	Winchester Ave. Metro	Belmont Square	4:15 PM - 2:30 AM W/S, 4AM - 3:45 AM F/S
98	Mayfield Square	S/W	Mayfield Square	Union Station	6 AM - 10:30 AM W/S, 6 AM - 10:30 AM F/S

Source: WMATA Bus Schedule at www.wmata.com

A-4 Parking Rates for the Union Station Parking Garage

FEE TYPE	HOURS											
	0-1	1-2	2-3	3-4	4-5	5-12	12-24	24-36	36-48	48-60	60-72	72-84
Regular	\$0.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00
2-Hour Validation	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00
3-Hour Validation	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00

A-6. Overall Weekly Ridership of Metrobus Routes Servicing Union Station Study Area

Route #	Total Ridership		% of Total	
	2007	2008	2007	2008
80	8,449	1,681	19.4%	1.3%
96, 97	4,930	238	13.0%	0.8%
91, 93, 96	6,787	525	8.2%	0.4%
94	1,480	381	4.2%	0.7%
98	4,794	804	17.1%	3.8%
N22	1,468	304	7.9%	3.8%
X1, X2	1,413	48	4.2%	0.2%
X2	17,644	1,256	48.8%	1.7%
X8	1,522	491	9.3%	4.8%
TOTAL STUDY AREA RIDERSHIP	44,112	6,427	14.6%	1.4%
SUB TOTAL - REGULAR DC LINES	240,560			
DAILY WEATHER SYSTEM GROUP TOTAL	461,227			

1 - Ridership includes pay validation and fare proof for May 2008
 2 - Data refers to May 2008 reporting period for data collected 1/2007-2008

A-7. Metrobus Daily Boardings/Alightings at Busstop Bus Stops

	INTERSECTION							
	N. CAPITOL STOP	COLUMBIA STOP	W. MASS. AVE. STOP	N. MASS. AVE. STOP	N. CAPITOL STOP	N. STATE STOP	N. CAPITOL STOP	N. CAPITOL STOP
3:00 AM - 5:29 AM								
Boardings	54	14	5	6	2	2	7	7
Alightings	44	43	23	26	1	5	5	1
5:30 AM - 9:29 AM								
Boardings	531	601	405	355	25	63	45	47
Alightings	618	521	595	305	329	92	131	13
9:30 AM - 2:59 PM								
Boardings	964	423	244	247	351	149	15	96
Alightings	819	564	320	278	353	352	63	28
3:00 PM - 6:59 PM								
Boardings	959	467	350	375	34	81	22	61
Alightings	542	511	742	357	74	83	48	10
7:00 PM - 2:59 AM								
Boardings	217	156	275	179	9	7	7	3
Alightings	159	72	55	54	38	23	12	3
Daily Total								
Boardings	2,540	1,468	1,379	930	311	304	60	214
Alightings	3,182	1,651	1,875	649	876	462	255	54

Source: WMATA 2010

A-8. Weekly Hourly Metrobus Volumes at Busstop Intersections

Intersection	N. Capitol St. & N. St.		Mass. Ave. Rt. 1 Dk. 04, 06, 03, 03, 03, 03				West St. R. Columbus Circle St.				Columbus Circle		
	30. 04, 01, 03, 04, 01, 02	0	04, 06, 03, 03, 03, 03	04, 06, 03, 03, 03, 03	04, 06, 03, 03, 03, 03	04, 06, 03, 03, 03, 03	04, 06, 03, 03, 03, 03	04, 06, 03, 03, 03, 03	04, 06, 03, 03, 03, 03	04, 06, 03, 03, 03, 03	04, 06, 03, 03, 03, 03	04, 06, 03, 03, 03, 03	04, 06, 03, 03, 03, 03
1:00 - 4:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 - 5:00 AM	10	8	9	9	9	9	9	9	9	9	9	9	9
5:00 - 6:00 AM	25	23	23	23	23	23	23	23	23	23	23	23	23
6:00 - 7:00 AM	42	45	45	45	45	45	45	45	45	45	45	45	45
7:00 - 8:00 AM	54	56	56	56	56	56	56	56	56	56	56	56	56
8:00 - 9:00 AM	58	58	58	58	58	58	58	58	58	58	58	58	58
9:00 - 10:00 AM	46	52	52	52	52	52	52	52	52	52	52	52	52
10:00 AM - 12:00 PM	79	77	77	77	77	77	77	77	77	77	77	77	77
12:00 PM - 1:00 PM	40	43	43	43	43	43	43	43	43	43	43	43	43
1:00 PM - 1:30 PM	36	41	41	41	41	41	41	41	41	41	41	41	41
1:30 PM - 2:00 PM	37	37	37	37	37	37	37	37	37	37	37	37	37
2:00 PM - 3:00 PM	30	36	36	36	36	36	36	36	36	36	36	36	36
3:00 PM - 4:00 PM	50	45	45	45	45	45	45	45	45	45	45	45	45
4:00 PM - 5:00 PM	63	62	62	62	62	62	62	62	62	62	62	62	62
5:00 PM - 6:00 PM	55	59	59	59	59	59	59	59	59	59	59	59	59
6:00 PM - 7:00 PM	46	49	49	49	49	49	49	49	49	49	49	49	49
7:00 PM - 8:00 PM	71	71	71	71	71	71	71	71	71	71	71	71	71
8:00 PM - 9:00 PM	24	26	26	26	26	26	26	26	26	26	26	26	26
9:00 PM - 10:00 PM	23	26	26	26	26	26	26	26	26	26	26	26	26
10:00 PM - 11:00 PM	26	27	27	27	27	27	27	27	27	27	27	27	27
11:00 PM - 12:00 AM	27	22	22	22	22	22	22	22	22	22	22	22	22
12:00 AM - 1:00 AM	17	17	17	17	17	17	17	17	17	17	17	17	17
1:00 AM - 2:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 AM - 3:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0

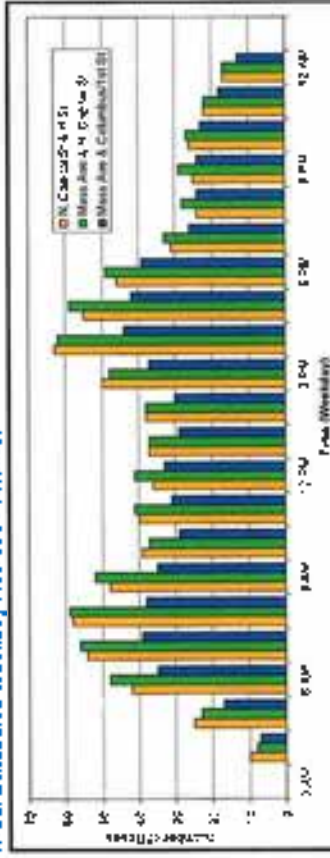
Source: WMATA Busstop Data as of April 2008
 Note: Hourly volume at Columbus Circle is only for the northbound bus lane only. At other locations, east or westbound lanes are also included.

A-9. Number of Commuter Bus Buses Servicing Union Station Area and DC

	MFA	MBTC	LC	Hartz	Quik	VE
3 AM - 4 AM	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
4 AM - 5 AM	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5 AM - 6 AM	3 (4)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
6 AM - 7 AM	9 (9)	5 (5)	2 (4)	0 (0)	1 (1)	1 (1)
7 AM - 8 AM	8 (8)	3 (3)	6 (9)	0 (0)	0 (0)	0 (0)
8 AM - 9 AM	10 (8)	5 (3)	10 (3)	0 (0)	0 (0)	0 (0)
9 AM - 10 AM	3 (1)	0 (0)	3 (4)	0 (0)	0 (0)	0 (0)
10 AM - 11 AM	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
11 AM - 12 Noon	3 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
12 Noon - 1 PM	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1 PM - 2 PM	3 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
2 PM - 3 PM	3 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3 PM - 4 PM	3 (4)	0 (0)	7 (9)	0 (0)	1 (1)	0 (0)
4 PM - 5 PM	13 (6)	0 (0)	40 (14)	0 (0)	0 (0)	0 (0)
5 PM - 6 PM	7 (3)	1 (0)	5 (5)	0 (0)	0 (0)	0 (0)
6 PM - 7 PM	3 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7 PM - 8 PM	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
TOTAL	60 (32)	2 (1)	43 (5)	0 (0)	2 (2)	1 (1)

Source: Commuter Bus and Metrobus
 Data: 1995-2000 by Sector with DC

A-11. Scheduled Weekday Metrobus Volumes



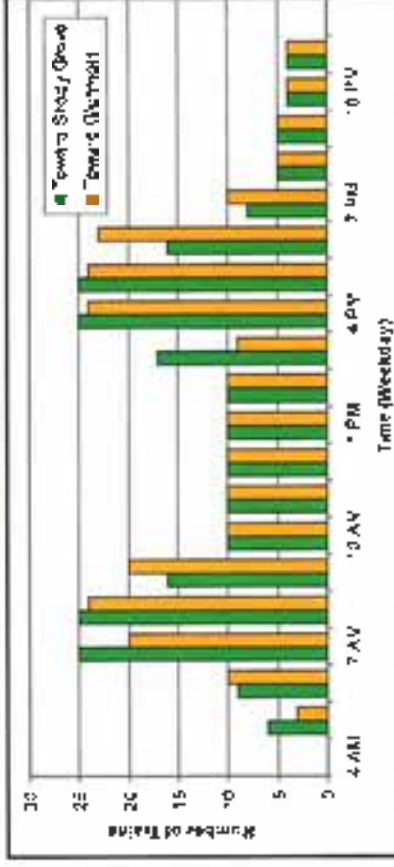
Source: Metrobus and MTA

A-10. Commuter Rail Ridership at Union Station by Hour

Time Period	MARC Trains			VRE Trains	
	Arriving	Departing	Exiting	Arriving	Departing
5 - 6 AM	615	35	0	0	0
6 - 7 AM	3174	76	797	1	1
7 - 8 AM	3656	201	647	0	0
8 - 9 AM	5015	106	399	0	0
9 - 10 AM	1140	64	156	0	0
10 - 11 AM	237	88	0	0	0
11 - 12 PM	209	120	0	0	0
12 - 1 PM	146	278	0	23	23
1 - 2 PM	117	206	0	27	27
2 - 3 PM	109	262	0	0	0
3 - 4 PM	320	1081	1	240	240
4 - 5 PM	440	4287	0	432	432
5 - 6 PM	98	637	0	382	382
6 - 7 PM	164	2475	1	371	371
7 - 8 PM	133	506	0	0	0

Source: Ridership data provided by MARC and VRE, August 2008
 Note: Ridership data for VRE is not available for the 10 AM to 11 AM period as it is not scheduled by Capital Metro.

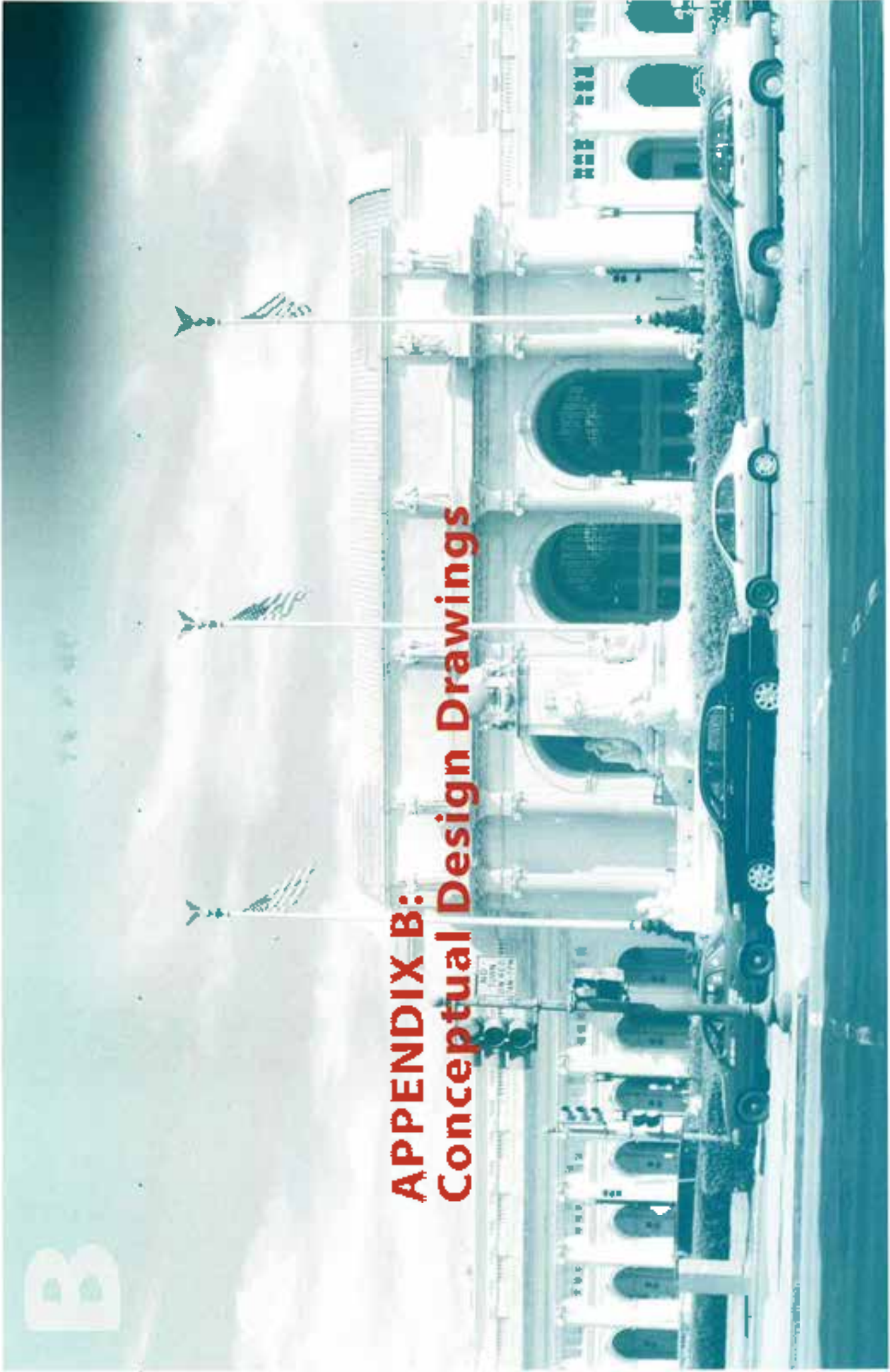
A-12. Scheduled MetroRail Volume at Union Station

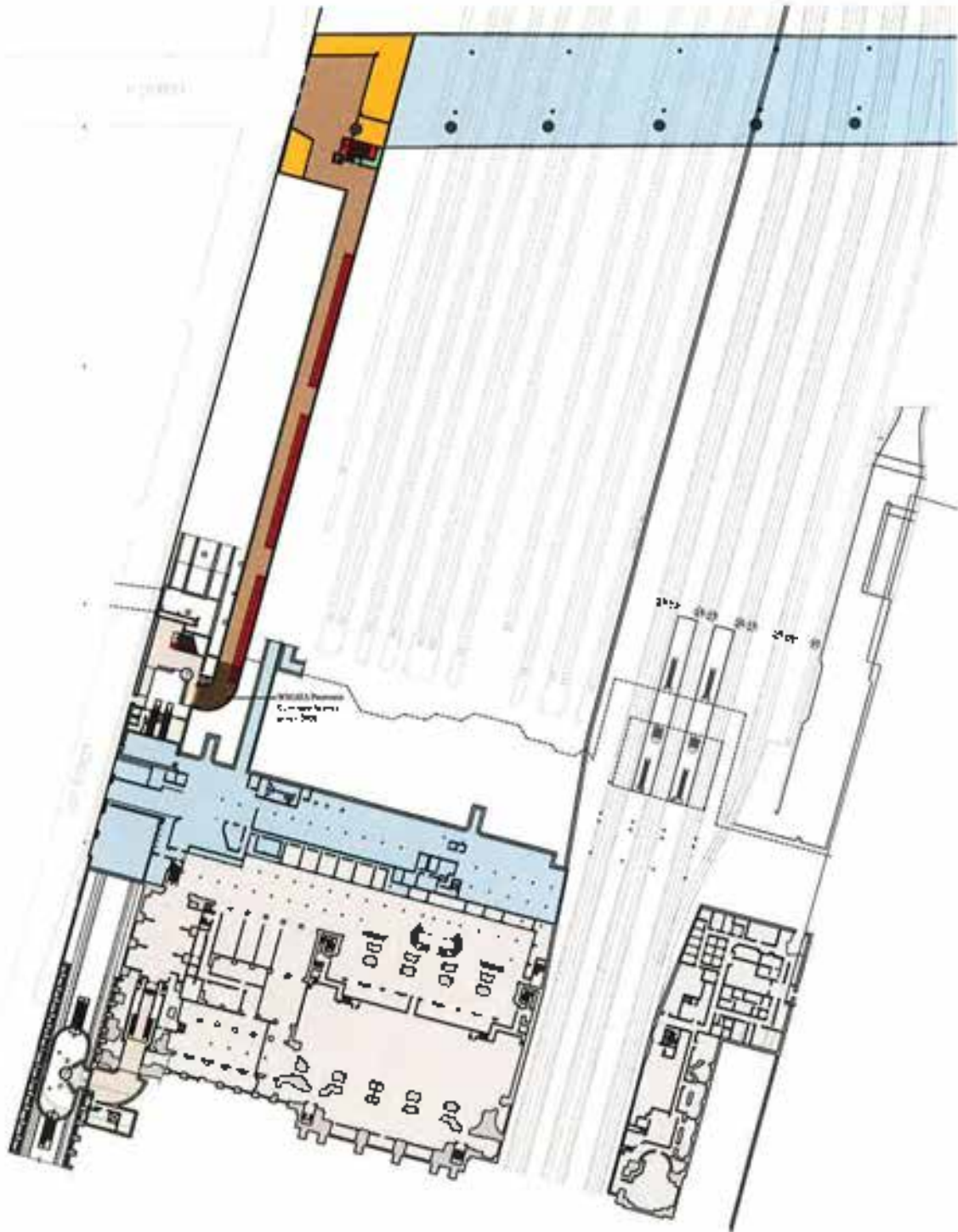


Source: MetroRail, August 2008

B

**APPENDIX B:
Conceptual Design Drawings**



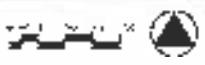


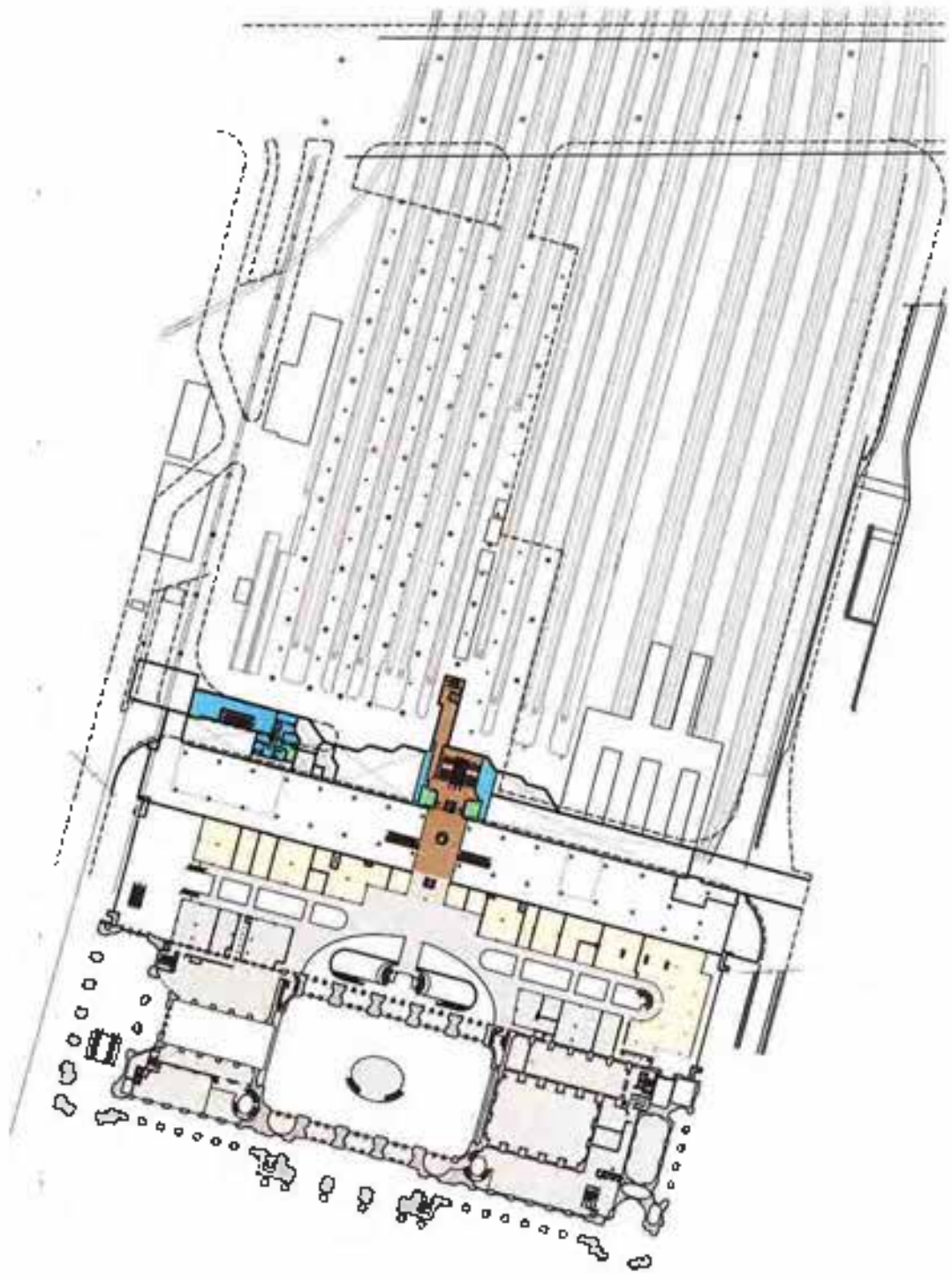
USITC
LOWER LEVEL
 0-24 HOURS

DDOT
PARSONS
DELA STUDIO ARCHITECTS INC.

SYMBOL LEGEND	
	Elevator
	Escalator
	Mechanical Room
	Structural Steel Beam
	Structural Column
	Structural Slab
	Structural Wall
	Structural Floor
	Structural Ceiling
	Structural Roof
	Structural Foundation
	Structural Column
	Structural Beam
	Structural Slab
	Structural Wall
	Structural Floor
	Structural Ceiling
	Structural Roof
	Structural Foundation

AREA LEGEND	
	Area 1
	Area 2
	Area 3
	Area 4
	Area 5
	Area 6
	Area 7
	Area 8
	Area 9
	Area 10
	Area 11
	Area 12
	Area 13
	Area 14
	Area 15
	Area 16
	Area 17
	Area 18
	Area 19
	Area 20
	Area 21
	Area 22
	Area 23
	Area 24
	Area 25
	Area 26
	Area 27
	Area 28
	Area 29
	Area 30
	Area 31
	Area 32
	Area 33
	Area 34
	Area 35
	Area 36
	Area 37
	Area 38
	Area 39
	Area 40
	Area 41
	Area 42
	Area 43
	Area 44
	Area 45
	Area 46
	Area 47
	Area 48
	Area 49
	Area 50





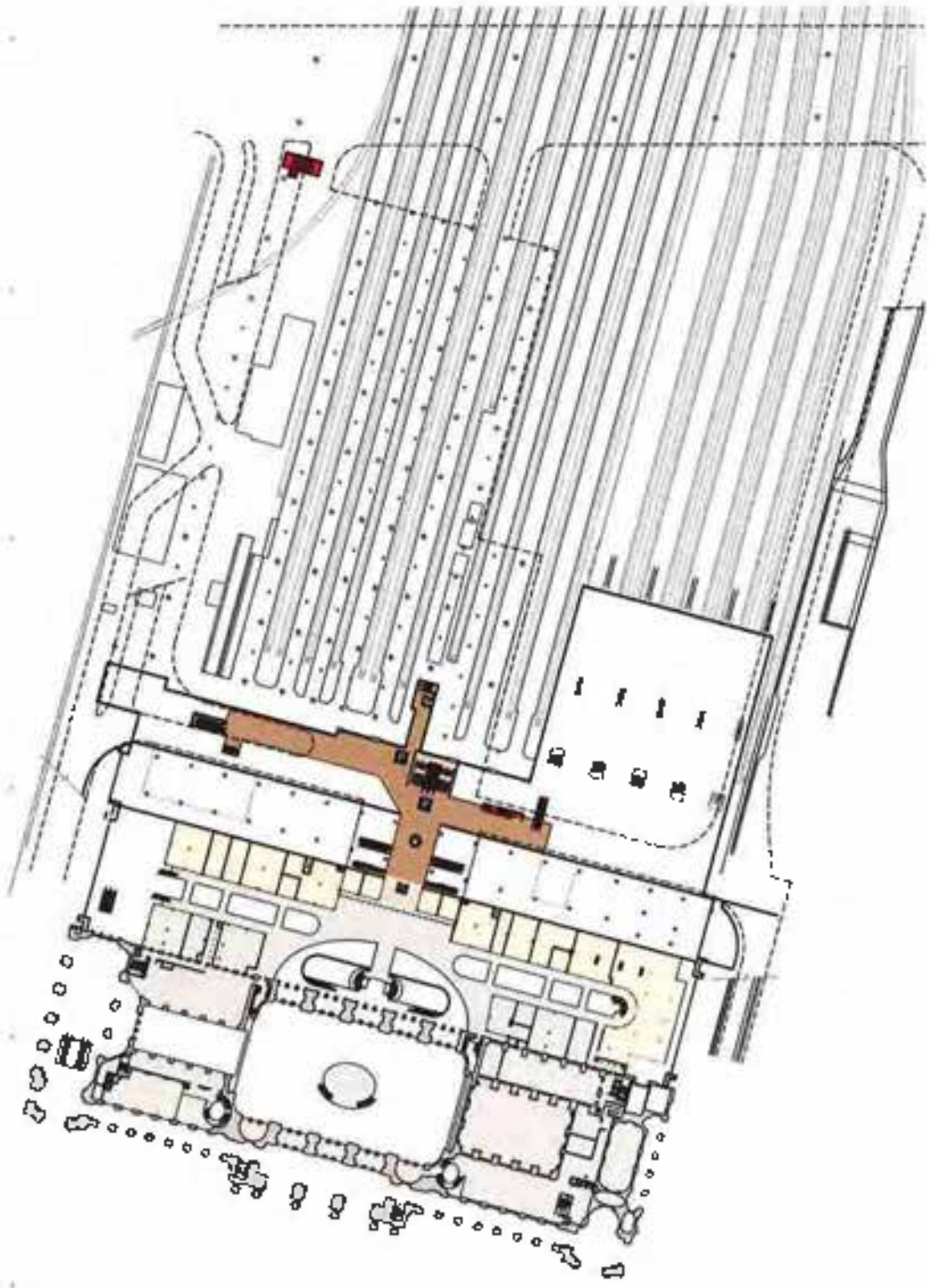
USITC
MEZZANINE LEVEL
 0-24 AUGUST 15

DDOT
PARSONS
 DEI STUDIO ARCHITECTS INC

SYMBOL LEGEND	
	Door (Open/Close)
	Elevator
	Staircase
	Escalator
	Elevator Shaft
	Door
	Room Boundary
	Office Space
	Conference Room
	Other Room
	Office Space

AREA LEGEND	
	Office Space
	Office Space
	Office Space
	Office Space
	Office Space
	Office Space
	Office Space
	Office Space
	Office Space
	Office Space
	Office Space





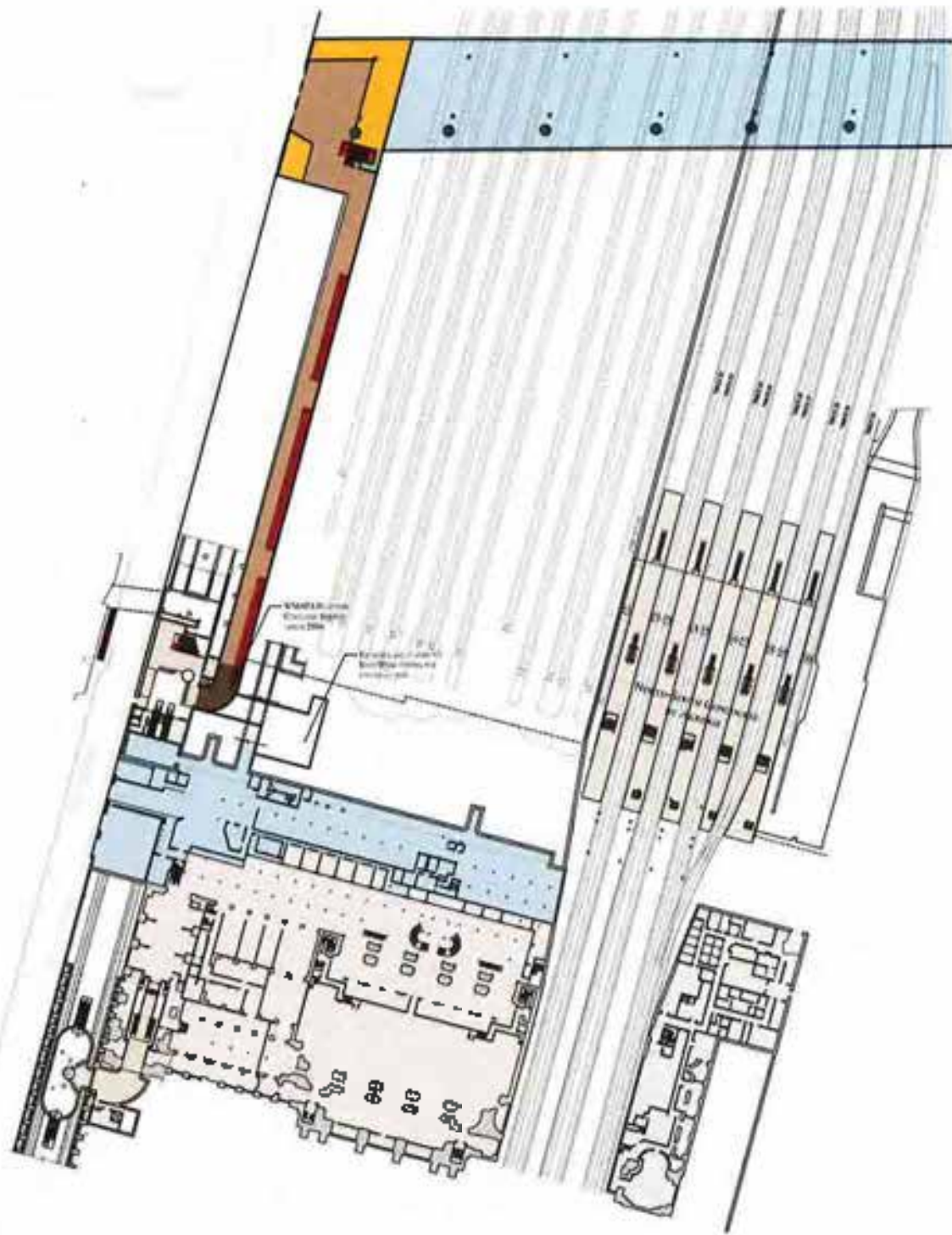
USITC
MEZZANINE LEVEL
 10-20 YEARS

DDOT
PARSONS
 DEL. STUDIO ARCHITECTS INC

SYMBOL LEGEND	
	Elevator
	Stair
	Restroom
	Conference Room
	Meeting Room
	Office
	Reception
	Security
	Utility
	Storage
	Mechanical
	Electrical
	Structural Column
	Structural Wall
	Structural Slab
	Structural Beam
	Structural Post
	Structural Core
	Structural Foundation
	Structural Pier
	Structural Column (Red)
	Structural Wall (Blue)
	Structural Slab (Green)
	Structural Beam (Yellow)
	Structural Post (Purple)
	Structural Core (Light Green)
	Structural Foundation (Light Blue)
	Structural Pier (Light Purple)

AREA LEGEND	
	Office Area
	Meeting Room Area
	Support Office Area
	Common Area
	Structural Core Area
	Structural Core Area (Red)
	Structural Pier Area
	Structural Slab Area
	Structural Wall Area
	Structural Column Area



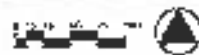


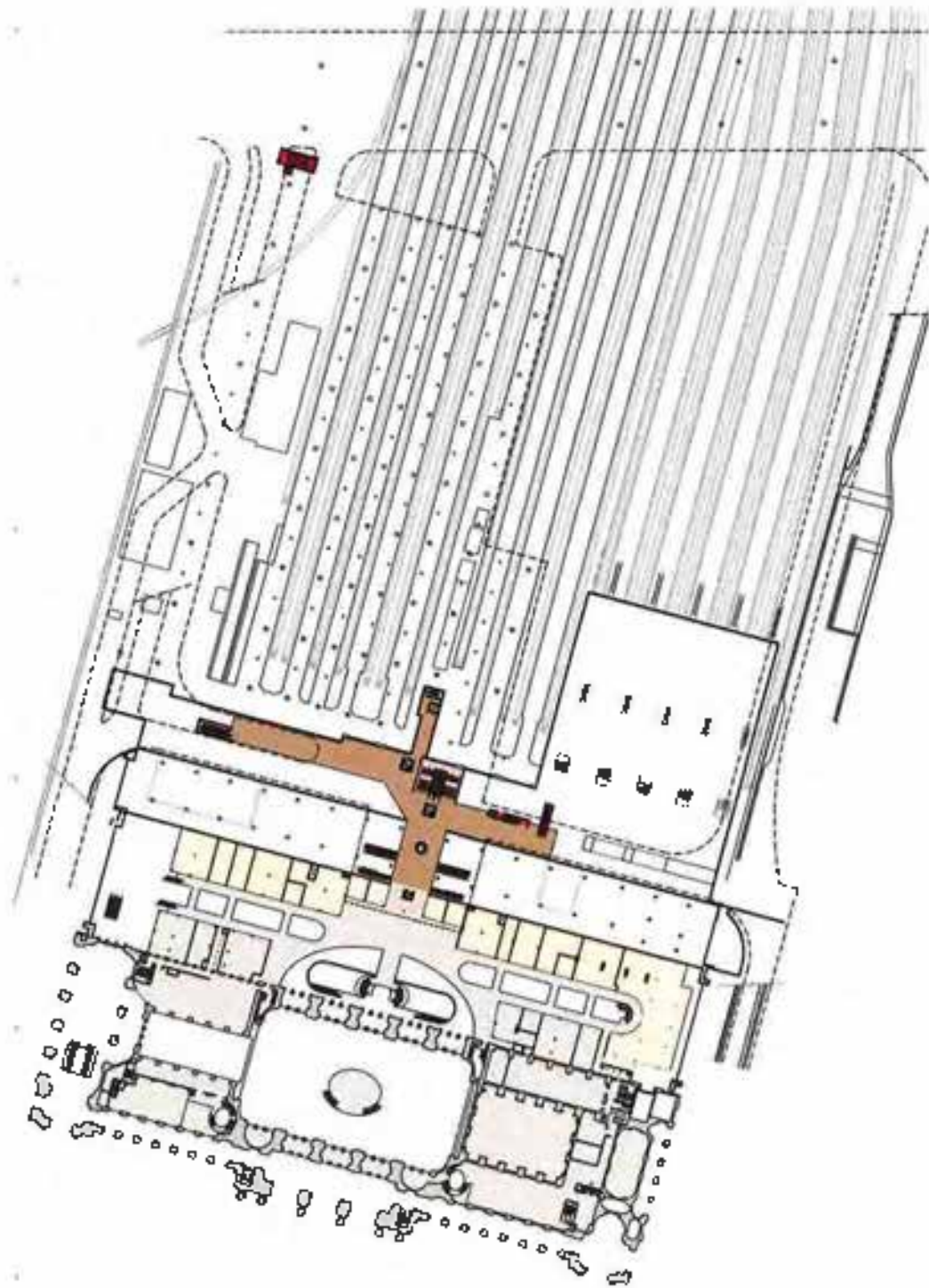
USITC
LOWER LEVEL
2-10 VIEW

DDOT
PARSONS
DELSTUDIO ARCHITECTS INC

SYMBOL LEGEND	
	Circle Floor Riser
	Men's Room
	Women's Room
	Public Rest
	Garage
	Vault Riser
	Office
	Electrical Room

AREA LEGEND	
	Plant Area
	Storage Area
	Storage Area
	Common Area
	Vault Riser
	Common Area
	Common Area
	Men's Room
	Women's Room
	Electrical Room



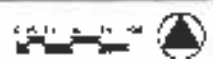


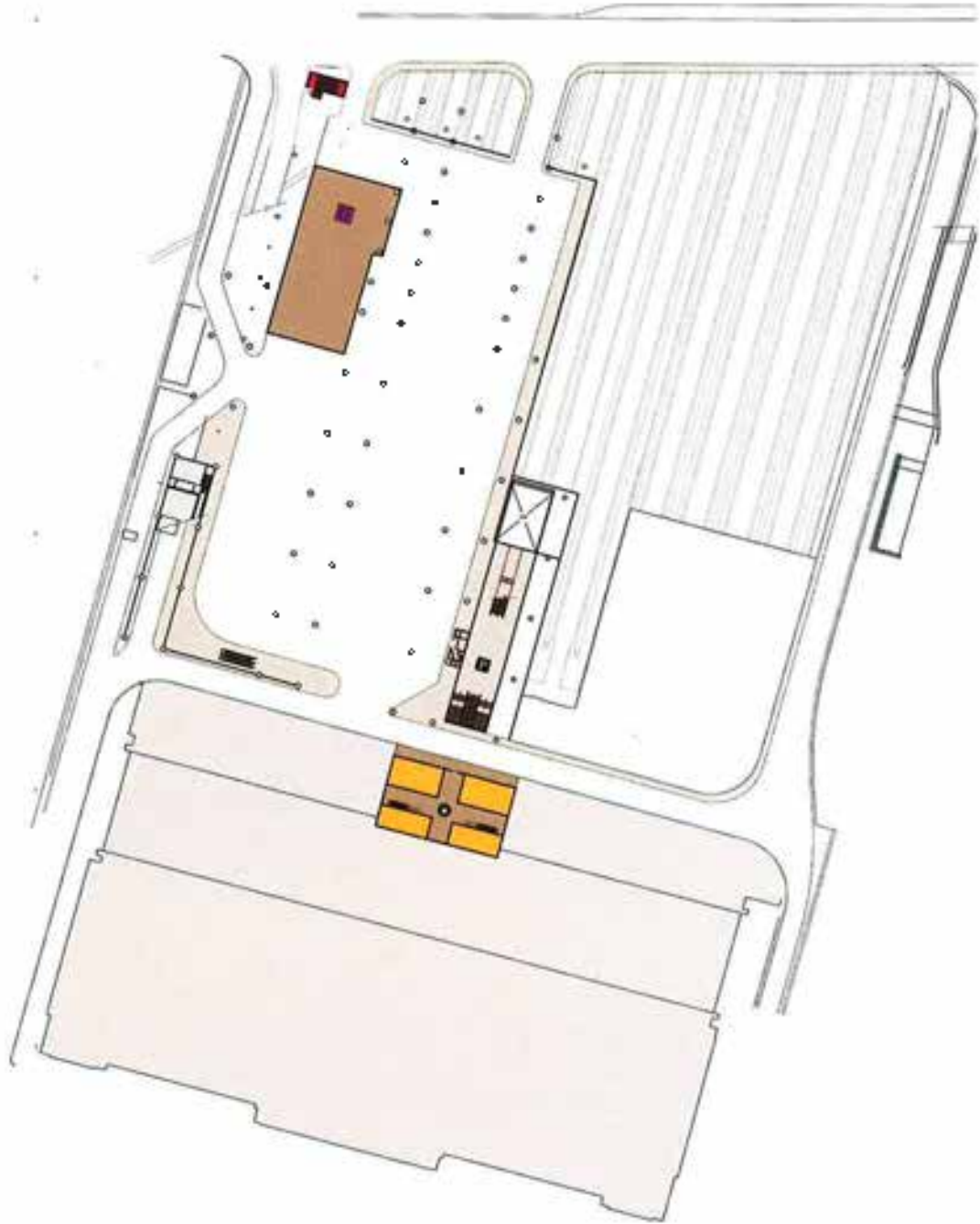
USITC
 MEZZANINE LEVEL
 2-10 10.00

DDOT
 PARSONS
 DBL STUDIO ARCHITECTS INC

SYMBOL LEGEND	
	Door (Type of Door)
	Window
	Elevator
	Stair
	Escalator
	Elevator Shaft
	Stair Shaft
	Escalator Shaft
	Mechanical Room
	Storage Room
	Circulation Area
	Utility Area
	Service Area

AREA LEGEND	
	Power Area Circulation
	Storage Area
	General Circulation
	Utility Area
	Service Area
	Circulation Area
	Storage Area
	Storage Area
	Service Area
	Escalator Shaft





USITC
PARKING DECK
 2-10 YEARS

DDOT
PARSONS
 DELA STUDIO ARCHITECTS INC.

SYMBOL LEGEND	
	Flow Direction
	Mechanical
	Water Main
	Sanitary Sewer
	Storm Sewer
	Electric
	Drainage
	Manhole
	Valve
	Structural Column

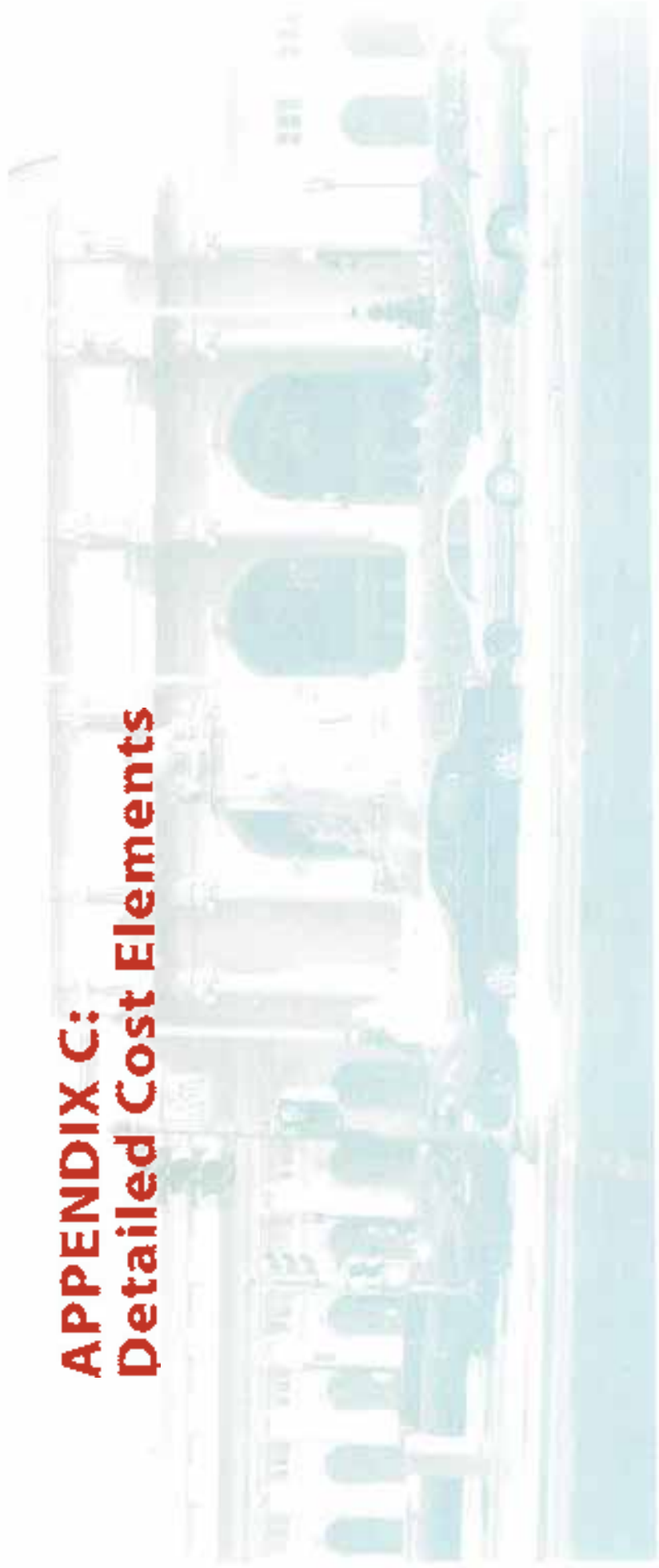
AREA LEGEND	
	Proposed Pavement
	Proposed Structure
	Proposed Structure
	Existing Structure
	Proposed Structure
	Proposed Structure
	Proposed Structure
	Proposed Structure
	Proposed Structure



C



APPENDIX C: Detailed Cost Elements



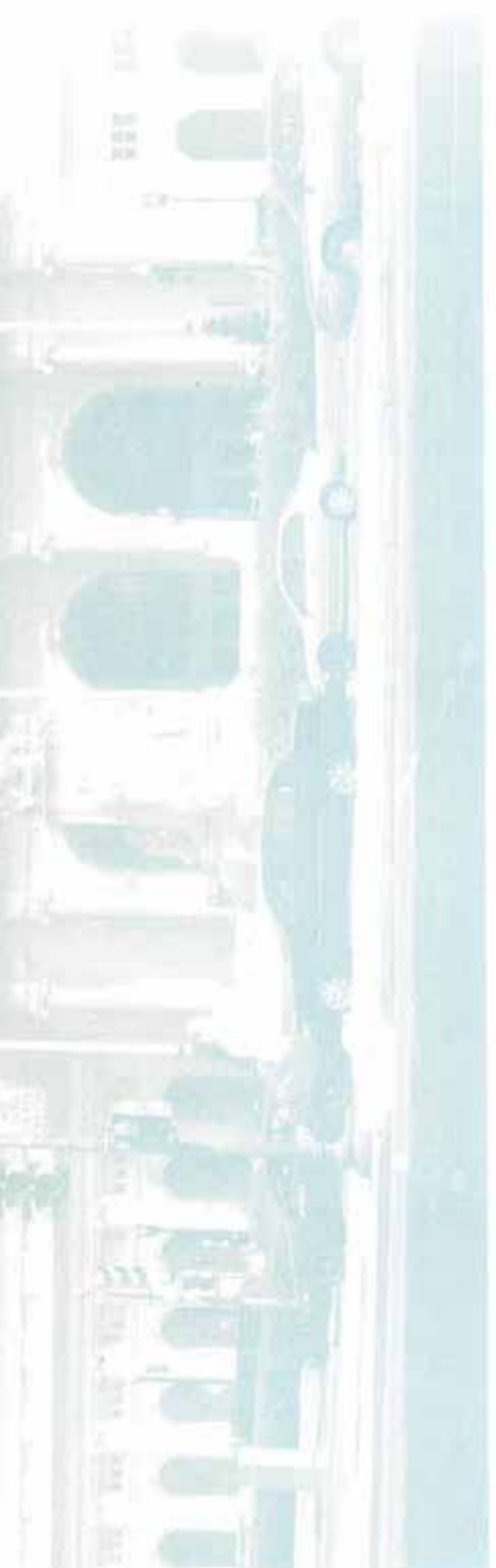
Req Code	Description	Area	Prelim Cost	Quantity	Unit	Unit Cost	Other Cost Explanation	Total Estimated Cost
	new 100 sq ft lobby			1	LS	\$40,000	4 items relating to lobby are removed, because they need to go	\$0
	new 100 sq ft lobby			1	LS	\$150,000	4 items relating to lobby are removed, because they need to go	\$0
	new 100 sq ft lobby			1	LS	\$65,000	4 items relating to lobby are removed, because they need to go	\$0
	new 100 sq ft lobby			1	LS	\$25,000	4 items relating to lobby are removed, because they need to go	\$0
	PSS BASSING C. L. BARRONVILLE, NORTH JACOBI & FIVE STOPS			38,602	SF	\$150		\$5,790,300
	5,000 sq ft lobby							\$1,850,000
D-2	East Street Lobby	II Street - Area B	\$5,200,000					
	1000 sq ft lobby			28,000	SF	\$180	Changed from 200 sq ft to 1000 sq ft lobby	\$5,075,000
	new 1000 sq ft lobby			3	PA	\$40,000	Turn Key User Participation Walkway estimate	\$120,000
	1000 sq ft lobby			1	LS	\$150,000	Turn Key User Participation Walkway estimate	\$150,000
	1000 sq ft lobby			1	LS	\$65,000	Turn Key User Participation Walkway estimate	\$65,000
	1000 sq ft lobby			1	LS	\$25,000	Turn Key User Participation Walkway estimate	\$25,000
	1000 sq ft lobby			1	LS	\$40,000	Turn Key User Participation Walkway estimate	\$40,000
	1000 sq ft lobby							\$1,200,000
D-3	Corporate Squares on H Street	II Street - Area D	\$5,200,000					
	1000 sq ft lobby			2700	SF	\$400		\$1,080,000
	1000 sq ft lobby			1	LS	\$2,100,000		\$2,100,000

Proc Code	Description	Area	Prelim Cost	Quantity	Unit	Unit Cost	Other Cost Explanation	Total Estimated Cost
				YAC	R	\$'00		\$'00'00
	SUBTOTAL (Details)							5377.00
E-2	High load platforms for Trucks 25-26	Trucks Parking Garage - Area L	\$550,000					
	High load platform			50	SF	\$11,000		550,000
	SUBTOTAL (Details)							550,000
E-3	Ministry Bus Connections	Trucks Parking Garage Area C	22,416,110					
	CONCRETE AND MASONRY WORK			19,000	YF	\$1168		22,140,800
	Mechanical Work			12,000	YF	\$7		84,000
	Electrical Work			18,000	YF	14		252,000
	Paint & Safety Materials			12,000	YF	\$5		60,000
	SUBTOTAL							\$22,476,800
	Site Preparation							
	Clearing			700	YCY	540		378,000
	Trimming			48	YCY	1,120		53,760
	SUBTOTAL							\$417,760
	Paint & Connections							
	Paints & Electrical Materials			50	YF	560		28,000
	Utilities			75	YF	510		38,250
	Electrical			5	YF	3,500		17,500
	Paint & Safety Materials			4,200	YF	\$1		4,200
	SUBTOTAL							\$88,950
	Signs							
	Signs & Safety Materials			3	YF	300		900
	Signs			120	YF	550		66,000
	Paint & Safety Materials			100	YF	550		55,000
	SUBTOTAL							\$121,900

C



APPENDIX C: Detailed Cost Elements

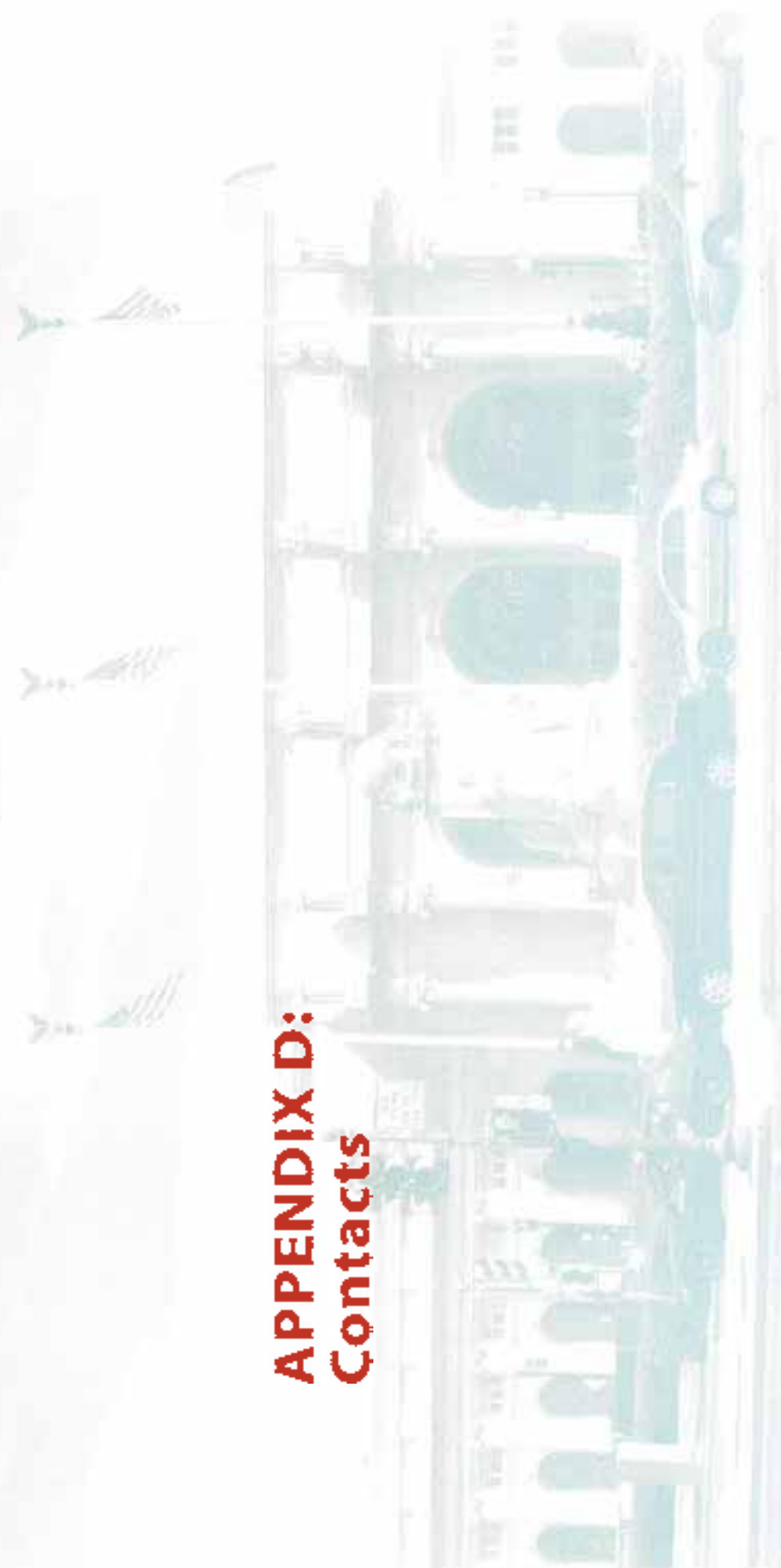


Proc Code	Description	Area	Prelim Cost	Quantity	Unit	Unit Cost	Other Cost Explanation	Total Estimated Cost
D-4	Emergency Egress at H Street (See 14)	H Street - Area D	54,386.51					13,791,620
	- Escalator for one' egress station 111414 (10' x 6')			1	EA	56,000.00		\$600,000
	- Escalator (per 20' x 10' escalator)			50	CV	525		\$27,150
	- Handrails (per 20' x 10' escalator)			20	CV	\$150		\$2,842
	- Work for concrete (per 20' x 10' escalator)			40	CV	\$150		\$7,500
	- Work for steel (per 20' x 10' escalator)			100	CV	\$400		\$40,000
	- Work for steel (per 20' x 10' escalator)			100.00	h	\$1		\$100,000
	- S. B. D. (per escalator)					\$14.67		\$1,467
	- S. B. D. (per 20' x 10' escalator) (per 100' x 100')							\$1,000,000
	- Concrete for upper area platform - Escalator (2' x 10')			1		\$100,000		\$100,000
	- Escalator (per 20' x 10' escalator)			110		505		\$55,550
	- Handrails (per 20' x 10' escalator)			20		\$150		\$2,842
	- Work for concrete (per 20' x 10' escalator)			50		\$150		\$7,500
	- Work for steel (per 20' x 10' escalator)			200		\$400		\$80,000
	- Work for steel (per 20' x 10' escalator)			100.00		\$1		\$100,000
	- S. B. D. (per escalator)					\$1		\$1
	- S. B. D. (per 20' x 10' escalator) (per 100' x 100')					\$1,200,000		\$1,200,000
D-5	Facilities Improvements at H Street (See 14)	H Street - Area D	\$10,000,000					
	Account for cleanup			1	LS	10,000,000		\$10,000,000
	Structure and equipment for escalators			100	CV	100,000		\$10,000,000
	Handrails (per 20' x 10' escalator)			1	LS	\$100,000		\$100,000
	Work for concrete (per 20' x 10' escalator)			1	LS	\$100,000		\$100,000
	Work for steel (per 20' x 10' escalator)			1	LS	\$100,000		\$100,000
	- S. B. D. (per escalator)					\$1		\$1
	- S. B. D. (per 20' x 10' escalator) (per 100' x 100')					\$1,000,000		\$1,000,000
E-1	Ordinary for Platforms 3.5' High (Level 4) (per 100' x 100')	Tracks Platform (Level 4) Area C	\$100,000					
	100' x 100'			1	EA	\$100,000		\$100,000

Rec Code	Description	Area	Prelim Cost	Quantity	Unit	Unit Cost	Other Cost Explanation	Total Estimated Cost
	Subtotal							\$2,471,721
0	Utility							
	Northwest Corridor Electrification South of the Station	OTM	\$43,715,000					
	Power Section South of Station							
	Pole 1			5	Twp	\$5,000,000		\$5,000,000
	Pole 2			4	Twp	\$5,000,000		\$20,000,000
	Pole 3			4	Twp	\$4,500,000		\$18,000,000
	Subtotal							\$37,000,000
	Substation Electrical (Vols) Twp 14N							
	Pole 1			2	Twp	\$490,000		\$980,000
	Pole 2			2	Twp	\$620,000		\$1,240,000
	Pole 3			22	Twp	\$150,000		\$3,300,000
	Pole 4			24	Twp	\$13,000		\$312,000
	Subtotal			30	Twp	\$1,270,000		\$3,832,000
	Road Right of Way			5,000	Sq	\$300		\$1,500,000
	Fuel Supply			1	Twp	\$400,000		\$400,000
	Subtotal							\$43,715,000
0	OTM							
	Trolley 100 Modules	OTM	\$320,000					\$320,000
0	Signage Program							
	Subtotal of Program Costs		\$321,533,318					\$321,533,318
	Contingency for Engineering and other soft costs		\$47,264,661					\$47,264,661
	Total		\$163,097,979					\$163,097,979

D

APPENDIX D: Contacts



Technical Advisory Committee

NO.	FIRST NAME	LAST NAME	POSITION	AFFILIATION	ADDRESS	CITY	ST	ZIP CODE
01	Scott	Aug	Assistant Director Planning	Office of the Mayor, Office of the CAO	5000 Connecticut Avenue, N.W.	Washington	DC	20054
02	Steven	Blumen	Program Director	Amtrak	300 North Capitol Street	Washington	DC	20001
03	Nancy	Burns	Chief Financial Officer	Urban System Reorganization Corporation	1100 Belmont Ave	Washington	DC	20007
04	David	Chen	Principal	Urban System Reorganization Corporation	1700 Belmont Ave	Washington	DC	20007
05	Michael	Chen	Community Planner	Metropolitan Planning Administration	1900 K Street, NW	Washington	DC	20006
06	Michael	Chen	Metropolitan Planning Coordinator - District	DC Office of Planning	600 Virginia Avenue, NW	Washington	DC	20002
07	Tara	Chen	Planning & Program Manager	Public Business Administration	1000 Vermont Ave	Washington	DC	20005
08	Arno	Chen	Principal Analyst, DC Transit	Metropolitan Planning Administration	600 First Street, NW	Washington	DC	20001
09	Ann	Chen	Senior Policy Analyst	Washington Metropolitan Area Transit Authority	600 First Street, NW	Washington	DC	20001
10	David	Chen	Transportation Planner	National Urban Service Institute, Capital Region	1120 Connecticut Ave, NW	Washington	DC	20004
11	Yeh	Chen	Superintendent, Passenger Services	Amtrak	2000 Second Street, NE	Washington	DC	20002
12	Chris	Chen	Metropolitan Planning Director	DC Office of Planning	2000 Vermont Ave	Washington	DC	20002
13	Yan	Chen	Director of Planning and Development	Office of the District of Columbia Mayor	2400 L Street, NW	Washington	DC	20007
14	Robert	Chen	Director, Metropolitan Area	DCO	1333 Pennsylvania Avenue, NW	Washington	DC	20004
15	Paul	Chen	Chief Communications Officer	Amtrak	600 First Street, NW	Washington	DC	20001
16	Greg	Chen	Senior Analyst	Planning, Transportation, and Infrastructure Department	1900 K Street, NW	Washington	DC	20006
17	Thomas	Chen	Director, Long Range Planning	Washington Metropolitan Area Transit Authority	600 First Street, NW	Washington	DC	20001
18	David	Chen	Regional Planner and Transportation Planner	National Capital Region, Office of Public Service	1120 Connecticut Avenue, NW	Washington	DC	20007
19	John	Chen	Metropolitan Planning Director	Metropolitan Planning Administration	2000 First Street, NW	Washington	DC	20002
20	Christine	Chen	Manager of Planning	City of Washington, Planning	1500 K Street, NW	Washington	DC	20005
21	John	Chen	Senior Analyst, Policy & Coordination	Metropolitan Area Council, Washington, DC	250 N. 18th Street, NW	Washington	DC	20009
22	Scott	Chen	Program and Project Development Team Leader	Metropolitan Area Council, Washington, DC	250 N. 18th Street, NW	Washington	DC	20009
23	David	Chen	Senior Analyst, Planning	Metropolitan Area Council, Washington, DC	1100 Connecticut Ave, SE	Washington	DC	20003
24	Richard	Chen	Transportation Planning Specialist	Metropolitan Area Council, Washington, DC	1100 Connecticut Ave, SE	Washington	DC	20003
25	Richard	Chen	Transportation Planning Specialist	Metropolitan Area Council, Washington, DC	1100 Connecticut Ave, SE	Washington	DC	20003
26	David	Chen	Regional Planning Manager, Metropolitan Area Council	Metropolitan Area Council, Washington, DC	600 First Street, NW	Washington	DC	20001
27	Charles	Chen	Senior Analyst, Transportation Specialist	DC Office of Planning, Metropolitan Area Council	2000 Vermont Ave, NW	Washington	DC	20002
28	John	Chen	Senior Analyst	Metropolitan Area Council, Washington, DC	1100 Connecticut Ave, NW	Washington	DC	20007
29	Thomas	Chen	Senior Analyst	U.S. Department of the Interior	401 - 8th Street, NW	Washington	DC	20001

