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Introduction

The Maryland Transit Administration (MTA) and the Baltimore City Department of Transportation are proposing to construct a new Multi-modal Transportation Center (MTC) near the Johns Hopkins Bayview Medical Campus in East Baltimore. The Bayview MTC project (the Project) will help to serve transit customers of the existing Maryland Area Regional Commuter (MARC) commuter rail, MTA bus routes, the proposed Red Line light rail (a 14.1 mile east to west transit line), and local residents and employees and patrons of the nearby medical center. The Project includes the development of a new MARC station and platforms, Amtrak and Norfolk Southern track relocation, a new pedestrian bridge, and new commuter parking lot. Commuter services will be improved by creating an additional transit stop and developing a more walkable transit-oriented environment for pedestrians and commuters.

This study includes two components: the preparation of conceptual plans for the initial phases of the MTC, including the parking lot, bus, taxi, shuttle and private car pickup/dropoff areas, bicycle storage, and pedestrian amenities; and a planning study that examines the potential to accommodate transit-oriented development (TOD) uses at the proposed station site and the surrounding area.

In order to develop conceptual plans for the MTC and related TOD planning area, existing conditions were analyzed to understand the physical constraints of the site and its context.

This report is organized into the following Chapters:

- **Chapter 1 – Introduction** outlines the scope of the MTC/TOD Study, defines the study areas examined, and summarizes several planning studies that are relevant to the MTC project and/or contains information on the study areas examined for the purposes of the MTC project;
- **Chapter 2 – Existing Conditions** includes the inventory and analysis of:
 - *Urban Design and Landscape* features such as zoning, building typology, soil, slope, space use, development

potential, design opportunities, utilities, and site civil and geotechnical elements;

- *Transportation* conditions such as the road network, traffic conditions, bike lanes, bus routes;
- *Environmental Conditions* which includes a summary of the environmental research, analysis and documentation.
- **Chapter 3 – Market Analysis** includes an evaluation of the current market trends and future development potential for residential, office, industrial, retail, and hotel uses at the area of the proposed station;
- **Chapter 4 – Future Conditions** outlines opportunities for future development of the MTC and TOD uses and includes:
 - *Overview*
 - *Scenario 1: Parkway/Boulevard*
 - *Scenario 2: Urban Street*
 - *Transportation*
 - *Key Considerations*
 - *Traditional and Innovative Funding Options*
- **Chapter 5 – Next Steps** includes recommendations of next steps to be taken to carry out implementation of the Project.

Location

The Bayview study area (the study area) includes the proposed MTC site and related properties that could support TOD. The study area is located near the eastern border of the City of Baltimore, Maryland, approximately 3 miles from the Inner Harbor and Downtown Business District (Figure 1.1). Located between I-895 and I-95, with prominent east-west arterials like Eastern Avenue and Lombard Street connecting to the center of Baltimore, the study area is close to several residential communities, including Greektown, Brewers Hill, and Highlandtown. This area is also characterized by heavy and light industrial buildings, business parks, and large tracts of industrial land. Port and railroad-related transportation uses are also prominent in and around the study area. The Johns Hopkins Medical Center and the National Institute of Health (NIH) are large and prominent institutional anchors,

while the Bayview Joseph Lee neighborhood is the dominant residential community in the immediate vicinity.

The study area is divided into three planning areas (Figure 1.2): the MTC site (11 acres), the TOD Planning Area (±300 acres), and the General Impact Area (±1,600 acres). Various conditions were analyzed for each of these individual planning areas and specified in this report.

Existing Conditions

Based on the analysis of existing conditions at the site, various characteristics became important in the development of conceptual plans for the MTC and TOD planning. Four categories of existing conditions were analyzed, including: urban design and landscape, site civil and geotechnical engineering, transportation, and environmental conditions. The following are key points that were identified in the existing conditions analysis:

Urban Design and Landscape

- Existing zoning within the Bayview study area is primarily O-R-1 (office/residential). The area immediately adjacent to the railroad and I-895 is M-2-2 (industrial).
- Proposed zoning will replace the O-R-1 zone with the new H zone (hospital), the M-2-2 zone with the new OIP zone (office industrial park), and TOD-4 (Transit Oriented Design).
- The study area has clear physical boundaries to the north and west. Major intersections along Eastern Avenue and Lombard Street provide gateway opportunities.
- The MTC site and properties directly to its south contain low soil permeability and have the most severe soil and stormwater-related development constraints.
- Uses in the study area include medical buildings, residential communities, a fire station, community and regional retail, warehouses, vacant land and a vacant building.

- A large portion of land in the study area is used for parking and vehicle storage supporting both the Bayview campus, railroad uses, and other businesses.
- Existing retail, the Bayview (Joseph Lee) residential community, Patterson High School, Joseph Lee Park, and offices are located outside of a 15 minute walking distance from the proposed MTC.

Transportation

- I-895 and I-95 surround the study area and provide excellent regional highway system connections.
- Local access is provided through a series of arterials including Eastern Avenue, Lombard Street, Kane Street, Ponca Street, and Bayview Boulevard.
- Traffic analyses at eleven intersections showed that all of the intersections operated at an acceptable Level of Service (LOS) during AM peak hours, and one of the intersections (Kane Street/Northpoint Boulevard) operated at a poor LOS during PM peak hours.
- The majority of the TOD Planning Area has sufficient pedestrian facilities, although connections may be challenged by the topography of the study area.
- Approximately 2,000 linear feet of sidewalk on the south side of Lombard Street needs rehabilitation. There are also areas missing sidewalks on the north side of Lombard Street.
- There are no existing bike lanes within the TOD Planning Area.
- The study area is served by 5 MTA bus routes, and the TOD Planning Area contains 22 bus stops.

Site Civil and Geotechnical Engineering

- Utilities are present on-site, including: a sanitary sewer main below grade within the boundaries of the Station Site; electrical lines running parallel to Lombard Street; a sewer main and water main adjacent to the Station Site and running parallel to Lombard Street.
- Terrain in the TOD Planning Area slopes moderately to steeply downward from its center to its boundaries, with elevations ranging from 160 feet in the middle to 45 feet to the north of the MTC site.
- Existing fill materials near the MTC site are generally not suitable for support of structures on shallow footings.
- Minor cuts and fills needed to grade the site are anticipated.

- Groundwater is located at depths of 32 feet to 42 feet below grade.

MTC Site Environmental Conditions

- An un-named intermittent stream crosses the northeastern portion of the MTC site, from west to east, near the foot of a steep slope. The segment through the MTC site is approximately 790 feet long.
- No wetland areas are present at the MTC site. A wetland area is present along the south side of the stream channel near the northeast corner of the MTC site.
- The vegetative ecosystem was determined to be in poor health due to excessive invasive species cover in the understory and groundcover layers.
- Previous studies revealed potential subsurface soil concentrations of arsenic, thallium and lead. Groundwater contaminations with methyl tertiary butyl ether (MTBE) and beryllium has also been reported within the study area.
- The MTC site does not contain environmental justice (EJ) populations, but block groups within the TOD Planning Area and study area contain EJ populations.
- The MTC site is not within a mapped floodplain or a coastal zone. There are no large impervious surfaces, navigable waterways, federally listed or threatened species, or National Register-listed, eligible or potentially eligible buildings, parks, districts or landscapes on or adjacent to the MTC site.

Market Analysis

Current market trends of the City of Baltimore and future development potential at the MTC site were examined. The following are key points discovered in the market analysis:

- The MTC site contains 10 acres of developable land.
- The study area offers limited opportunity for expansion and infill of residential development.
- The study area could support up to 30,000 to 45,000 square feet of office space by 2020 if commuter rail service is available at the station. The Bayview campus could support an average annual absorption of 40,000 to 55,000 square feet spurred by expansion of the NIH and Bayview Medical Center.
- The Primary Market Area could absorb between 650,000 and 850,000 square feet of industrial space by 2021 based on an increase of 400 jobs in the distribution and warehouse operations industries.

- Extensive retail competition surrounding the MTC site will prevent successful large scale or regionally focused retail development at the site.
- The Bayview Medical Center Campus may be able to support future hotel development.

Future Conditions

Based upon the existing conditions and market analysis, two scenarios were developed to investigate what future development could be around the TOD area near the Bayview Redline Station. Scenario 1: Parkway/Boulevard creates a parkway setting along Lombard Street with generous green space and an integrated transit system. Most structures are 6-8 stories or 70'-100' heights. Development to the south might include expansion of parking facilities, adaption of an existing structure into a higher density office space, and the addition of office space at the southern most portion of the site.

Scenario 2: Urban Street takes on a more urban approach by containing a consistent street edge and separating buses and taxicabs from standard passenger drop-off. Structures are shorter at 4 stories or 50'-60' heights. Development to the south might include expansion of existing parking facilities, and the addition of more office/commercial complexes.

In both scenarios, parking is handled through a large structured garage. Structured parking, lined against the west side of the site, creates a buffer between the nearby highway and the development parcels. Use types consist primarily of office, suitable for health care, with commercial and some retail at street level.

Future transportation conditions in the TOD Planning Area, based on the market analysis, outlined that the planned densities can be accommodated with intersection-focused improvements. The planned redevelopment provides the opportunity to enhance mobility, and amenities should be incorporated into future plans to accommodate all users.

Next Steps

Next steps to bring the vision of the Bayview Multimodal Transit Center and related TOD planning are discussed, and include the following:

- Finalize the plans for the Red Line Alignment;
- Finalize phase one parking plan;
- Determine/confirm zoning;
- Study costs of Lombard Street improvements;
- Analyze operations for bus and taxis;
- Coordinate with Station design;
- Coordinate landscape design;
- Determine the business model for advancing the plan; and,
- Coordinate with Stakeholders.

These next steps are tasks that should be carried out to implement the Project.



Project Overview

The Maryland Transit Administration (MTA) and the Baltimore City Department of Transportation are proposing to construct a new Multi-modal Transportation Center (MTC) near the Johns Hopkins Bayview Medical Campus in East Baltimore. The Bayview MTC project (the Project) will help to serve transit customers of the existing Maryland Area Regional Commuter (MARC) commuter rail, MTA bus routes, the proposed Red Line light rail (a 14.1 mile east to west transit line), and local residents and employees and patrons of the nearby hospital. The Project includes the development of a new MARC station and platforms, Amtrak and Norfolk Southern track relocation, a new pedestrian bridge, and new commuter parking lot. Commuter services will be improved by creating an additional transit stop and developing a more walkable transit-oriented environment for pedestrians and commuters.

Report Overview

This study includes two components: the preparation of conceptual plans for the initial phases of the MTC, including the parking lot, bus, taxi, shuttle and private car pickup/dropoff areas, bicycle storage and pedestrian amenities; and a planning study that examines the potential to accommodate transit-oriented development (TOD) uses at the proposed station site and the surrounding area.

In order to develop conceptual plans for the MTC and related TOD planning area, existing conditions were analyzed to understand the physical constraints of the site and its context.

This report includes the existing conditions inventory and analysis of urban design and landscape elements, civil and geotechnical elements, transportation elements, and environmental conditions specific to the

MTC site. A market analysis of current market trends and future development potential was also conducted. Future conditions are then discussed, including the scenarios considered and funding options. The report closes with recommendations for next steps that should be taken in order to implement the Project.

Location

The Bayview study area (the study area) includes the proposed MTC site, and related properties that could support TOD. The study area is located near the eastern border of the City of Baltimore, Maryland, approximately 3 miles from the Inner Harbor and Downtown Business District (Figure 1.1). Located between I-895 and I-95, with prominent east-west arterials like Eastern Avenue and Lombard Street connecting to the center of Baltimore, the study area is close to several residential communities, including Greektown, Brewers Hill, and Highlandtown. This area is also characterized by heavy and light industrial buildings, business parks, and large tracts of industrial land. Port and railroad-related transportation uses are also prominent in and around the study area. The Johns Hopkins Medical Center and the National Institute of Health (NIH) are prominent institutional anchors, while the Bayview Joseph Lee neighborhood is the dominant residential community in the immediate vicinity.

Study Area Definitions

The Bayview study was divided into three planning areas: the MTC site, the TOD Planning Area, and the General Impact Area. As shown in Figure 1.2, the smallest is the MTC site, being approximately 11 acres and represents the future location for the MTC. The area is privately owned and will be redeveloped to accommodate a park and

ride facility, bus transfer station and layovers, and transit-supportive development.

The TOD Planning Area is approximately 300 acres total, and represents the secondary development area, whose potential is strongly influenced by the availability of the transportation facilities linked to the MTC site. The TOD Planning Area is characterized by heavy and light industrial buildings, business parks and large tracts of industrial land. The Johns Hopkins Medical Center and NIH prominent institutional anchors in the area, while the Bayview Joseph Lee neighborhood is the dominant residential area.



NIH Building, Bayview

The TOD Planning Area includes the MTC site and is bordered to the west by I-895, to the south by Eastern Avenue and the northern edges of the Bayview Joseph Lee residential community, and to the north by the north side of Lombard Street and the Station Area. The Johns Hopkins Medical Campus occupies a very large portion of the TOD Planning Area.

The General Impact Area is approximately 1,600 acres total and represents the boundaries of the area that will support real estate development within and may experience effects from the development of the MTC site and TOD Planning Area.

Related Planning Studies

Several planning studies related to the Bayview study area were reviewed, including:

- Red Line Corridor Transit Study;
- East Baltimore MARC Station Study;
- Southeastern Neighborhoods Development (SEND);
- Greektown Strategic Plan, Volume II;

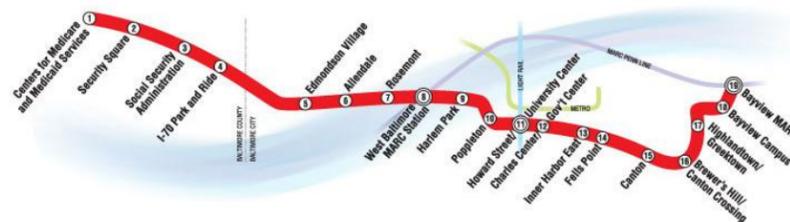
- Greektown Zoning Study; and,
- Highland Town-Greektown TOD, Charette Plan and Report.

Red Line Corridor Transit Study, MTA

The MTA has conducted the Red Line Alternatives Analysis/ Draft Environmental Impact Statement (AA/DEIS). The Red Line Corridor has been identified as the highest priority corridor within the Baltimore Region for potential transit improvements. The Red Line was first identified and prioritized in the 2002



Baltimore Region Rail System Plan. The Red Line is an integral part of the plan, with stations near major employment centers in downtown Baltimore, Inner Harbor East, the Social Security Administration complex, the University of Maryland-Baltimore, and the adjacent Bayview hospital and research complex. The Red Line would improve public transit for many Baltimore City and Baltimore County residential neighborhoods; provide connections to existing Metro, Light Rail and MARC stations; and increase proximity to leisure activity points of interest, such as Oriole Park at Camden Yards, M&T Bank Stadium and the Hippodrome Theater. The Red Line Corridor extends 14 miles from the Centers for Medicare & Medicaid Services (CMS) on the west in Woodlawn (Baltimore County) to the Johns Hopkins Bayview Medical Campus (Bayview) on the east (Baltimore City).



Red Line Station Map

Source: Red Line Corridor Transit Study

East Baltimore MARC Station Study, MTA

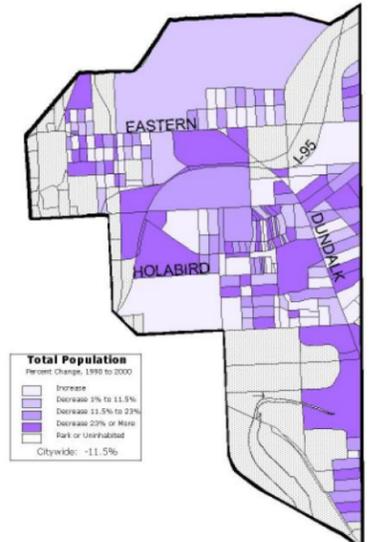
The MTA has conducted a feasibility study to plan for future commuter needs in the East Baltimore area and in conjunction with the Baltimore Regional Rail Plan. The purpose of the study was to respond to the future needs by developing several alternatives for the future MARC Station.

The study included a site selection task based on examination of 15 site locations. The site identified as the MTC site of this report was identified as the preferred location which met various criteria such as size, traffic accessibility, track configuration, site visibility, community impact, environmental features, and property ownership.

Preliminary platform location alternatives and rail configurations were also examined in the study, as well as preliminary site layouts and parking needs. A Phase II Environmental Site Assessment was also included in the scope of the East Baltimore MARC Study.

Southeastern Neighborhoods Development (SEND), City of Baltimore, 2002

In 2002, the City of Baltimore launched the Strategic Neighborhood Action Plan (SNAP) program to create comprehensive plans for select clusters of neighborhoods throughout the City. In January 2003, six clusters were selected citywide, one of which was the Southeastern Neighborhoods Development (SEND), which includes the Bayview study area. The following primary recommendations from the SEND include:



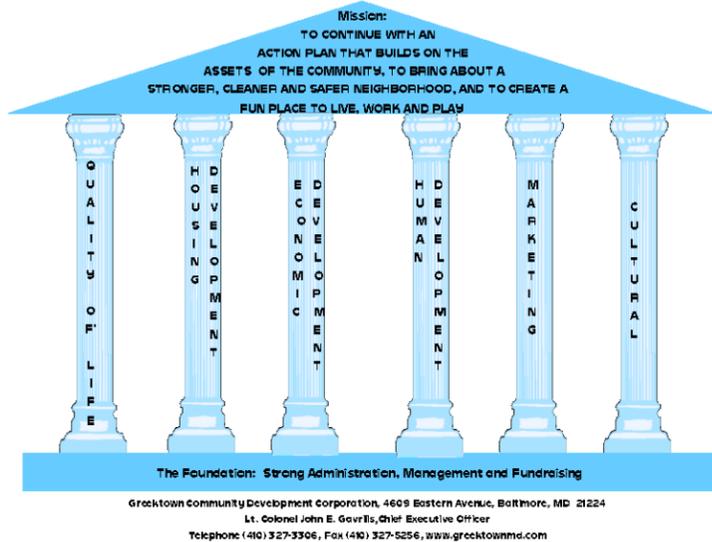
- Improving the housing market and property;
- Improve commercial viability in the cluster;
- Improve Mass Transit Practicability/ Viability;
- Enhance parks to provide increased utilization and provide a safer user-friendly environment;
- Ensure Pedestrian and Automobile Safety by enhancing minor arterials and residential streets to provide more attractive neighborhoods;
- Reduce Truck Traffic within the residential neighborhoods of SEND;
- Provide recreational opportunities and activities for youth; and,
- Improve the social and physical conditions in the neighborhoods to create safer spaces.

Greektown Strategic Plan Volume II, GCDC, 2004

The Greektown Community Development Corporation (GCDC) completed a Strategic Plan that established recommendations in six key components of community building: Quality of Life Issues, Housing Development, Human Development, Economic Development, Marketing, and Cultural (brand identity). Under Housing Development

and Economic Development, the goals include developing employment opportunities for residents through partnership with Johns Hopkins, and facilitating the development of new construction of single family homes by working with private developers and creating opportunities for new development. The Greektown neighborhood is located adjacent to the TOD Planning Area, to the south.

GREEKTOWN COMMUNITY DEVELOPMENT CORPORATION



Greektown Zoning Study, GCDC, 2006

The Greektown Zoning Study (2006) was precipitated by the *Greektown Strategic Plan, Volume II, 2004*. The study focused on the rezoning of areas within a study area adjacent to that of the Bayview study area. The Greektown Zoning Study Area is bounded by Lombard Street on the north, O'Donnell Street on the south, Haven Street on the west and Ponca Street on the east. Among the recommendations were rezoning several properties in the Greektown Zoning Study Area, improving access for business traffic, and creating buffers to separate industrial and rail use from residential properties.

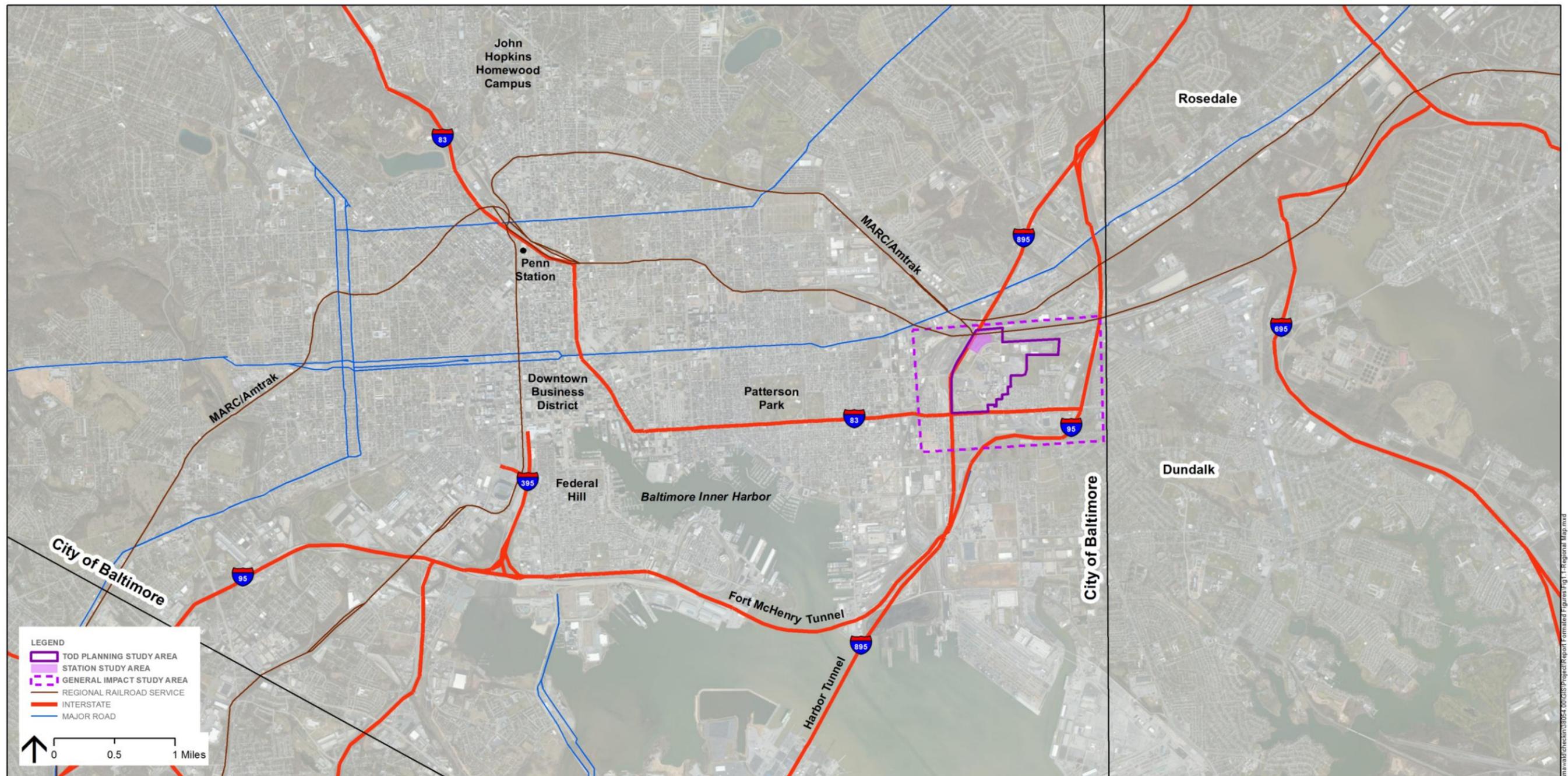
Highland Town- Greektown TOD, Charette Plan and Report, SECDC, 2009

The Southeast Community Development Corporation (SECDC), in cooperation with the Greektown Community Development Corporation (GCDC), conducted the *Highland Town-Greektown TOD, Charette Plan and Report* in 2009 to understand the potential community and economic benefits of the proposed Red Line transit station in the vicinity of the Eastern Avenue underpass. The Plan was aimed at guiding community and business organizations, property owners, the City Departments of Economic Development, Planning,

and Transportation and the MTA on the best way to enable new transit oriented development (TOD) in the vicinity of the proposed Red Line transit station. This includes recommendations on how to implement TOD in such a way that enhances the existing neighborhood and existing retail areas, as well as in leveraging the investment in the Red Line to create better connections between Highlandtown-Greektown and surrounding neighborhoods. Key concepts and findings include:

- Use the Red Line to create a vibrant transit-oriented destination;
- Revitalize Eastern Avenue "Main Street";
- Maximize opportunities for new residential and other infill development;
- Enhance the Connection Between Greektown and Hopkins-Bayview;
- Connect to the Waterfront; and,
- Enhance Multi-modal Travel Options.





Source: Bing Maps - Aerial; ESRI Boundaries

Figure 1.1 | Regional Map

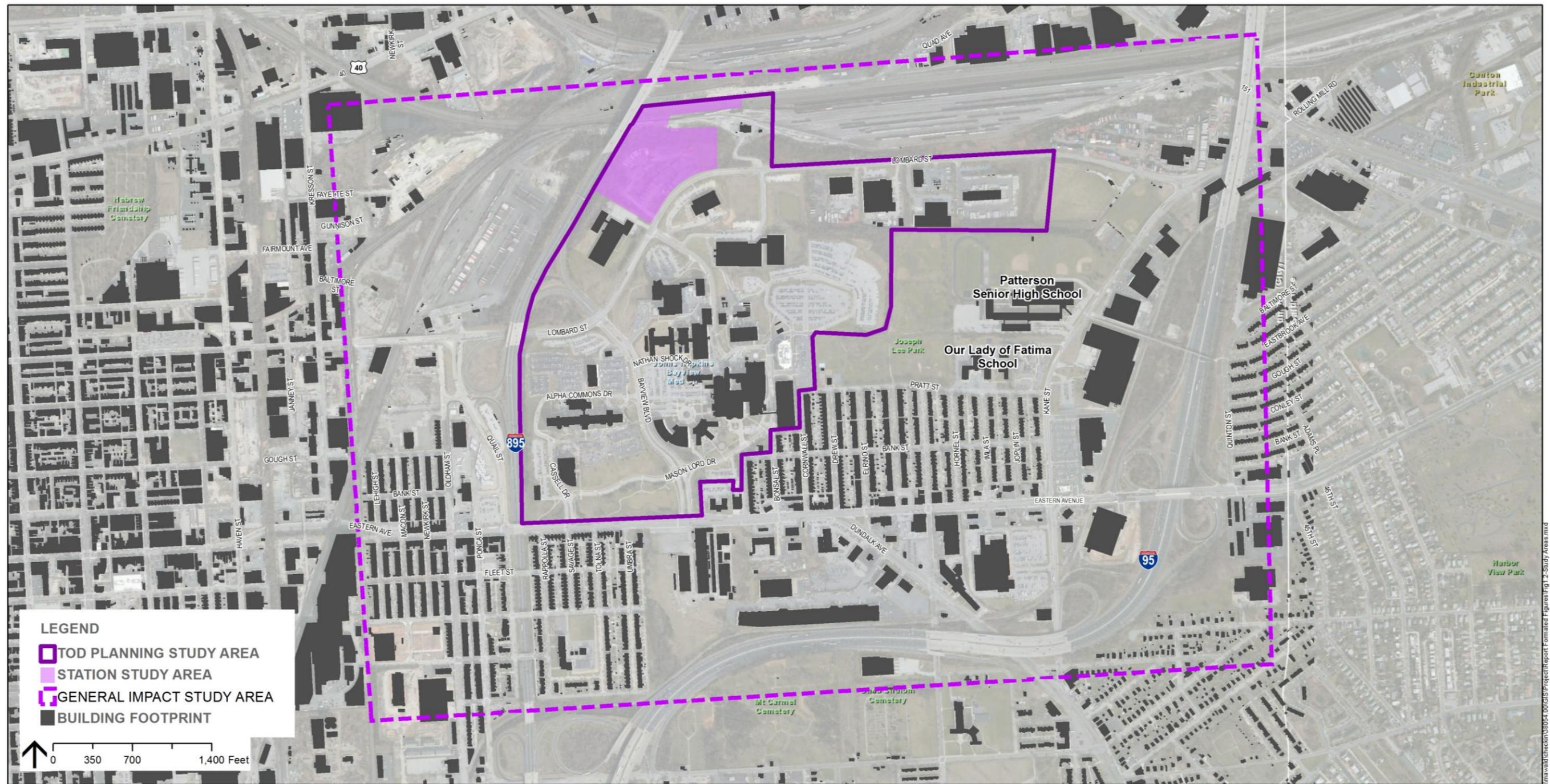


Figure 1.2 | Study Areas

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Existing Conditions

In order to propose recommendations for future development options of the Multi-modal Transportation Center (MTC) and related transit-oriented development (TOD) for the surrounding area, existing site conditions were analyzed to understand physical constraints of the study areas involved. This helps in creating a framework for exploring key considerations for future development.

Urban Design and Landscape

This section describes the preliminary findings of the urban design and landscape existing conditions and identifies key issues and opportunities related to future development. The urban design section outlines existing and proposed zoning, building typology, figure ground, transportation, site features, and local scale precedents. In addition, the urban design section includes figures that depict site features and building typology. It also includes four images that show how the Bayview study area relates to other “precedent” locations. The landscape section includes a summary of soil, elevation, slope, structure, space use, circulation analyses, development potential and design opportunities. Utilities and site geotechnical engineering features are also discussed. Further analysis and figures are located in Appendices A-C.

Urban Design

Existing Zoning

The existing zoning within the Bayview study area is primarily O-R-1 (office/residential), including the Johns Hopkins Bayview Campus and the National Institutes of Health properties. The area immediately adjacent to the railroad tracks and I-895 is currently zoned M-2-2 (industrial). See Figure 2.1.

Proposed Zoning

The proposed zoning under the Transform Baltimore zoning rewrite (set to be adopted in 2012) is a mixture of the new “H”, hospital zone, and the new “OIP,” office industrial park zone. The H zone replaces the O-R-1 zone and the OIP zone replaces the M-2-2 zone. Consideration should be given to making the area immediately adjacent to the proposed MTC site the new TOD-4 zone to allow for greater flexibility immediately around the MTC site, although height limits designated for the TOD-4 zone may be too limiting. It is anticipated that the City of Baltimore Planning Department will revise the proposed zoning map to reflect this change. See Figure 2.1.

Building Typology

Within the defined TOD Planning Area, there are primarily two building uses: institutional/campus and office/industrial park. To the east and south are commercial retail, single family housing, industrial/warehouse, open space, and office/industrial park. To the west (across I-895), is office/industrial park, industrial/warehouse, commercial retail, and single family housing. See Building Typology figure and related photographs in Appendix A: Urban Design.

Figure Ground

The figure ground within the TOD Planning Area depicts the variety in building footprints. Campus buildings are generally oriented orthogonally to the city grid with large expanses of space between buildings. The commercial/industrial buildings that surround the study area have large footprints, are substantially set back from the streets, and incorporate large amounts of surface parking. The single family housing south of the site are generally rowhouses that define a strong street edge. See Figure Ground figure in Appendix A: Urban Design.

Transportation

There is a clear delineation between the meandering campus streets within the TOD Planning Area, and the gridded, orthogonal streets of the adjacent residential areas. Steep topography and parking have shaped many of the roads within the study area. Pedestrian connections tend to be oriented to parking, not an overall network. See Transportation figure in Appendix A: Urban Design.

Site Features/Analysis

The study area has clear, physical boundaries to the north (railroad tracks) and west (I-895). To the south and east, it is bounded by residential neighborhoods and Eastern Avenue. Major intersections along Eastern Avenue and Lombard Street provide gateway opportunities into the study area and views that can frame the TOD study area. The undulating topography allows for significant views throughout the area. These features represent some of the most

important locations of interest and opportunity in the study area. See Figure 2.2 and Figure 2.3.

Local Scale Precedents

Comparing local scale precedents to the approximately 227 acres within the study area demonstrates the expansiveness of the study area and the opportunity for future development. These comparisons also allow for an understanding of the types of density and urban scale that already exist at similar campuses and urban regions in the Baltimore area. These extant campuses and regions demonstrate what kinds of development are possible within the area of this study. As shown, Bowie State University and Johns Hopkins University Homewood Campus easily fit within the study boundary. The area is comparable in size to the revitalized Silver Spring, Maryland TOD and the Baltimore City Central Business District. See Figure 2.4.

Landscape

Soil

The Soil Survey of Baltimore City, Maryland (1986) published by U.S. Department of Agriculture (USDA), Soil Conservation Service (SCS) maps the shallow soil profiles of the study area. Approximately 60 percent of the TOD Planning Area is identified as being underlain by Udorthents, 20 percent is underlain by the Urban Land-Sunnyside Complex or Urban Land-Beltsville Complex, and the remaining 20 percent is underlain by the Sunnyside-Urban Land Complex. All three of these soil complexes mostly consist of loamy fill material. The Urban Land Complexes include soils that have been cut or filled during urbanization and placed on natural soils of various drainage classes.

In accordance with USDA soil survey, the study area has nine soil types. (See the attached Soil Map and Soil Characteristics table in Appendix A). Each soil type was examined in terms of whether it is a hydric soil, which hydrological soil group it belongs to and other development constraints, such as the suitability for site preparation.

Based on the available information gathered, the designated MTC site and the properties directly to its south, have the most significant development constraints. They have partially hydric soil, belong to hydrological soil Group D, and have certain limitations for mechanical site preparation. The soil permeability is low and the apparent groundwater depths are variable due to the soil stratification, which can cause perched water conditions. According to the boring profiles provided, the groundwater elevation at the site ranges about 32 feet to 42 feet. Due to the existing fill, soils with a combined silt and clay content exceeding 40 percent and groundwater levels at the project site, the use of infiltration practices at the site will be limited. See

“Existing Conditions Assessment – Geotechnical Considerations” for additional soil and geological information in Appendix C.

A more detailed geotechnical exploration will be required to determine the construction method for the MTC site, suitable intensity of the development, and appropriate stormwater management (SWM) methods to meet the Maryland Department of Environment Environmental Site Design (MDE ESD) requirements.

Topography

Based on the U.S Geological Survey (USGS) topographic map of the site, the ground surface elevations range from a high of about 160 feet at the center of the TOD Planning Area to a low of about 45 feet at the north side in the vicinity of the rail lines. The ground surface elevations range from about 95 feet on the south side of the MTC site to about 45 feet at the north side. The ground surface elevation at the proposed MTC site is approximately 85 feet. Bayview campus is located on the highest ground of the study area. Generally speaking, the site slopes down from Bayview Campus toward the four bounding streets with low points at the bottom of two stormwater management ponds. The highest point on Bayview Campus is 151 feet. The Joseph Lee (or Bayview) community to the southeast and Patterson High School to the east are slightly lower; with a high point of 111 feet. To the north, the existing developed parcels located along the south side of Lombard Street are lower in elevation than the Bayview Campus. Lombard Street’s elevation changes from 59 feet at the lowest point to 92 feet at the highest point. To the south, Eastern Avenue ranges in elevation from 72 feet to 80 feet. Along the eastern border of the study area, Kane Street descends from 92 feet to 59 feet. For more detailed drainage patterns and site high points, see Elevation Analysis and Drainage Pattern Map in Appendix A: Landscape Streetscape.

Slopes equal to or greater than 15% are identified on the Slope Analysis Map in the Appendix. These slopes define the existing development areas within the study area. Construction of new roads or buildings and the creation of ADA compliant walkway/trail systems are constrained by steep slopes. See Figure 2.5.

Structure Use

Existing structures are indicated in the Existing Structure Use diagram in Appendix A. A group of medical buildings, the Bayview Campus, occupies the western portion of the study area. The residential community, known as Joseph Lee or Bayview community, is located to the southeast of the study area. A fire station is also located in this community. There is a strip of community-supportive and regional retail along Eastern Avenue. Patterson High School is located to the east of the study area.

To the north, along the south side of Lombard Street are two warehouses: one institutional use, and one commercial use. Also located along the Lombard Street corridor is a vacant parcel and a stormwater pond.

To the west of Lombard Street, there is a vacant building just south of the proposed MTC site. A vacant parcel is located to the south of this vacant building. Although this area is zoned for light industrial uses, not all existing uses are industrial uses. This area has redevelopment/development potential.

To the east of Kane Street are three warehouses: one institutional use, one vacant building and one retail structure.

Space Use

As shown on the Existing Space Use Diagram in Appendix A, the following observations are made regarding use of space:

- The majority of land in the study area is used for parking, which has re-development potential for additional medical offices and other associated uses as well as parking garages.
- Recreational space serves as a buffer between the existing high school and Bayview Medical Campus and should remain as a buffer.
- There are three vacant parcels within the study area. All three have development potential.
- Bayview Boulevard is a landscaped public street and can serve as a model for the Lombard Street’s future improvements.
- The visual quality of the northern stormwater pond grounds should be enhanced like the one in the south of the study area.
- There are two existing significant landscape treatments on Bayview Campus:
 - The intersection of Eastern Avenue and Bayview Boulevard (including the SWM pond and adjacent park area); and,
 - NIH Building landscape.

The connections between the parcels mentioned in the above list could be used to form a network of open spaces. These areas have the potential to serve a number of aesthetic or possibly recreational purposes. They could be used to enhance the development visually, but could also include pedestrian connections and amenities, and recreational elements, such as a fitness trail or a bicycle trail.

Circulation

There are highway, major arterials, collector and local streets within and around the TOD Planning Area. (See Circulation Diagram in Appendix A). Locations of existing sidewalk, MTA bus routes and bus stops, and shuttle bus stops on Bayview Campus were field identified. The MTA bus routes are connected to the campus shuttle bus routes. Although there are no existing designated bike routes within the study area and on the Bayview Campus, the Baltimore City Bicycle Master Plan shows a proposed City Bicycle Route from Eastern Avenue going through the southern portion of the study area and Cornwall Street in Bayview Community and then connecting to Dundalk Avenue. In addition, alternative alignments and stops of the Red Line are shown in this diagram.

As shown on the Circulation Diagram in Appendix A, the MTC site is primarily within walking distance of the Bayview Campus. The existing retail, the residential community, the high school, recreational uses and offices are all located outside of a 15 minute walking distance from the MTC site. This is farther than most transit users are willing to walk. It will be important to connect the MTC site to the community with bike routes and bus service. This circulation information will help identify the future needs and improvements for the pedestrian, bicycle, and bus connectivity within the study area and to the adjacent neighborhoods.

Development Potential and Design Opportunities

There are properties within the TOD Planning Area that have potential for development or redevelopment and expansion (see Development Potential and Design Opportunities Diagram and Existing Space Use Diagram in Appendix A). As previously mentioned, in addition to the MTC site, a total of three parcels totaling 10 acres are currently vacant and have potential for new development. Hotel, office space, housing, or retail are all possibilities for those sites.

Parcels along the south side of Lombard Street could be redeveloped with different uses, including those that support pedestrian amenities and transit-oriented uses. East Lombard Street is a designated truck route and transit-oriented redevelopment with freight movements can be achieved in this area.

Within the Bayview Campus, there are opportunities for redevelopment and expansion. The large amount of existing parking area could potentially be redeveloped to house additional medical offices and parking garages. Denser development would bring more people to the study area and encourage alternative modes of transportation.

Lombard Street has the potential to become a “boulevard” to the future transit station. Using “streetscape design” practices, many

features can be introduced to improve the spatial quality of the street, such as landscape median, street tree planting, ornamental street lights, decorative paving and other appropriate site furnishings. This approach can drastically transform the street space of Lombard Street and the image of the adjacent areas.

Gateway treatments at strategic locations where motorists approach the study area are important design features to signal that they have entered the Bayview Area. As Lombard Street is the primary approach to the study area, gateway treatments should be applied at both ends of this street. Another important gateway is Bayview Boulevard. Gateway features should also bookend this corridor. They would act as a defining element for the medical center property.

Within the study area, there are numerous small, leftover spaces between buildings. These areas could be used for landscaping and/or recreational uses. When these areas are combined with existing landscape and recreational features, an open space network can be created that would greatly enhance the spatial quality of the study area. These spaces are a great resource within the site and should be designed and utilized to the greatest extent practicable.

Utilities

Investigations confirmed that an 11' x 12'-3" sanitary sewer main, built in the early 1900s, lies approximately 20 feet below grade within the boundaries of the MTC site. The MTC site also has electrical lines running parallel to Lombard Street. Adjacent to the MTC site and running parallel to Lombard Street, there is an 8" sewer main, and a 16" water main that ties to a 36" water main just east of the site.

Utilities present on-site can be incorporated into the proposed development, depending on capacity and conditions during design and construction. Additionally, the development in this area should meet the stormwater management regulations.

See Figure 2.6 and Appendix B for more details on site civil findings, including pedestrian facilities.

Site Geotechnical Engineering

Topography and Geology

The TOD Planning Area lies within the Atlantic Coastal Plain physiographic province. According to the *Geologic Map of the Baltimore East Quadrangle, Maryland, 1979*, the majority of the study area is underlain by soils described as the Clay Facies of the Arundel Formation. The Clay Facies of the Arundel Formation consists of

gray, brown, black and red clay with locally interbedded quartz silt and sand lenses and pods.

Bedrock is expected to be more than 100 feet below surface, with the ground water table variations within a year ranging from 2 to 4 feet, between September and April, respectively.

Design Issues and Constraints

Existing fill materials found in the MTC site are generally not suitable for support of shallow footings, so it is best to remove the existing fill and replace with structural fill if the shallow foundations are considered for the MTC site development.

The natural soils underlying the existing fill are in most cases capable of supporting footings with a net bearing pressure of 3,000 pounds per square foot (psf), but this should only be used in preliminary design when sizing footings.

Earthwork

It is anticipated that the cuts and fills needed to grade the site for the proposed facilities will be minor.

Embankments and cut slopes should be constructed with permanent slopes not steeper than 2 (horizontal) to 1 (vertical) and that temporary stabilization and erosion control measures be provided until permanently stabilized with vegetation.

The depth/height of any new fill should be kept at a minimum to prevent any settlement that may damage foundations.

Earthwork construction should be scheduled during the drier months of the year, to the greatest extent practicable; and construction vehicle traffic may be limited to designated haul roads in order to protect subgrades. Mechanical manipulation or chemical treatment may be needed to dry and strengthen clayey soils.

Groundwater

Groundwater was encountered in borings conducted for the East Baltimore MARC Study at elevations of 32 feet to 42 feet below grade.

Appendix C includes the detailed geotechnical memorandum.

Transportation

This section discusses the existing transportation conditions in the study area. This inventory of existing transportation conditions primarily addresses the traffic and transportation infrastructure and

services within the TOD Planning Area. The existing vehicular, pedestrian, bicycle, and transit infrastructure is discussed, along with transit services. See Figure 2.7 for Transportation Photos.

Road Network

Interstates 895 (Harbor Tunnel Thruway) and I-95 together surround the Bayview study area, providing connectivity to the broader region. I-895 connects with I-95 south of the study area in Elkridge, Maryland and connects again with I-95 north of the study area after it passes through the Harbor Tunnel. I-895 is closest to the MTC site and can be accessed via Lombard Street. Access to I-95 is available from Eastern Avenue south of the MTC site less than three miles away. I-695, another regional connector, is also within five miles of the MTC site and can be accessed via Eastern Avenue.

Localized access to the site is possible through a series of arterial surface streets, including:

Eastern Avenue

Eastern Avenue is an undivided four-lane principal arterial within the General Impact Area. Eastern Avenue is a designated truck route within the City. The posted speed limit is 35 miles per hour (mph).

Running generally east-west, Eastern Avenue is a part of the Greektown Business District.



I-895 connection to Lombard Street

East Lombard Street

East Lombard Street is a minor arterial running generally east-west which varies in cross-section within the study area. East Lombard Street is a designated truck route within the City. Adjacent to the MTC site, Lombard Street is a three lane painted median roadway, but to the south and north of the MTC site it transitions to a four-lane roadway with a raised median at certain portions, while other segments are undivided. The posted speed limit is 40 mph.

Kane Street

Kane Street is a mostly three-lane (two southbound travel lanes and a single northbound lane) undivided minor arterial within the General Impact Area, generally running north-south. Kane Street is a designated truck route within the City. The posted speed limit is 25 mph. Kane Street transitions to a four-lane arterial near its intersection with Lombard Street.

South Ponca Street

South Ponca Street is a mostly four-lane median divided principal arterial closest to the MTC site. South Ponca Street between East Lombard Street and Eastern Avenue is a designated truck route within the City. The posted speed limit is 35 mph. Ponca Street connects Eastern Avenue to Lombard Street.

Traffic Conditions

Traffic analysis was conducted for eleven intersections in the General Impact Area (see Figure 2.8). These include:

1. Lombard Street at BioScience Boulevard;
2. Lombard Street at Bayview Boulevard;
3. Lombard Street at Ponca Street;
4. Ponca Street at Eastern Avenue;
5. Ponca Street/Quail Street at Eastern Avenue;
6. Bayview Boulevard at Mason Lord Drive;
7. Eastern Avenue at Bayview Boulevard;
8. Eastern Avenue at Dundalk Avenue;
9. Kane Street at Lombard Street;
10. Eastern Avenue at Kane Street; and,
11. Kane Street at North Point Boulevard.

The Highway Capacity Methodology (HCM) methodologies were utilized for the technical analysis using Synchro 7 software. The analysis showed that all eleven intersections operate at acceptable levels (Level of Service (LOS) A through LOS D) during the AM peak hour, with the Kane Street/Northpoint Boulevard operating at LOS E during the PM peak hour. Level of Service is used to categorize roadways according to their traffic flow, with LOS A representing free-flowing conditions, and LOS F being over-capacity where flow is forced. It should be noted that the analysis included traffic signal timings derived from the recent Eastern Avenue corridor study. Appendix D includes more information on the traffic analysis, including delay and volume-capacity measures.

Sidewalks and Crosswalks

The presence of the National Institutes of Health and Johns Hopkins medical center campus, as well as other recent developments have ensured that much of the TOD Planning Area has sufficient pedestrian facilities, including ADA compliant sidewalks and trails. Older sidewalk facilities have been retrofitted with ADA compliant ramps.

Although much of the area has sufficient pedestrian facilities, investigations reveal some prominent pedestrian paths without proper facilities. Approximately 2,000 linear feet of sidewalk on the south side of Lombard Street close to the MTC site is deteriorated and in need of rehabilitation. There are also areas lacking pedestrian sidewalks on the north side of Lombard close to the MTC site.

The Eastern Avenue/Bayview Boulevard intersection, which falls along a prominent pedestrian path, has no crosswalks on the eastern approach.

There are also several beaten, but unpaved, paths throughout the TOD Planning Area, which suggest the need to establish a stronger pedestrian network.

The Site/Civil memo included in Appendix B and the Transportation Report in Appendix D provide more details of current pedestrian facilities and deficiencies.

Bike Lanes

There are no bike lanes on the streets within the TOD Planning Area. Bicycle lanes do exist on Dundalk Avenue, south of the TOD Planning Area.

Bus Routes and Transit Facilities

The Bayview study area is currently served by five MTA bus routes, including a Quick Bus which offers limited stops. These bus routes provide relatively frequent service, with headways of approximately 15 minutes during peak hours, and 30-60 minutes for off-peak hours. At least two bus routes provide 24-hour bus service.

While three MTA commuter bus routes operate along I-95 in the Bayview area on weekdays, there are no stops within the TOD Planning Area.

There are 22 bus stops in the TOD Planning Area, but only 18 of these were clearly identified in site visits. Of the 18 that were identified, seven had shelters, nine were identified with sign posts,

and two were bus stop flags attached to other infrastructure elements.

Nearly 22 percent of commuters near the vicinity of the MTC site travel to and from work in less than 15 minutes and only 12 percent require travel time of 45 minutes or more (compared to nearly 20 percent for city commuters).¹ Only 4.8 percent of workers take public transportation to work, compared to almost 20 percent in the city at large.

Transportation Summary

The transportation assessment demonstrated that the Bayview study area is regionally connected, by being surrounded by I-895 and I-95, and proximate to I-695. Traffic analyses conducted at eleven intersections in the General Impact Area demonstrated that the intersections generally operate at acceptably, with one exception during one peak hour. Much of the TOD Planning Area has sufficient pedestrian facilities, with the exception of a few areas that are in need of rehabilitation. However, some areas are missing sidewalks and crosswalks altogether. Bicycle and transit facilities are much less complete within the TOD Planning Area, with no bike lanes and few bus shelters. Five MTA bus routes service the Bayview study area, but there are no commuter bus stops.

With this information in mind, TOD design and uses can address weaknesses in the transportation system within the study area. Deteriorated and missing pedestrian facilities can be remedied, along with the absence of bike lanes. Since the intersections examined operate at sufficient LOS, it is important to maintain this system to ensure acceptable roadway operations continue in the future, while improving mobility via other transportation modes.



MTA “Quick Bus” (Route 40)

¹ PES. 2011. *Bayview Multi-Modal Market Analysis*. Partners for Economic Solutions: Washington, DC.

Environmental Conditions

This section describes the existing environmental conditions within the MTC site area. This summary is based on the requirements of the Federal Transit Administration’s (FTA) guidelines for documentation of the environment that may affect or be affected by the Proposed Action, in accordance with the National Environmental Policy Act (NEPA).

In conformance with FTA and related Federal Highway Administration (FHWA) guidance² and regulations³ on the NEPA process, this description of existing conditions focuses on those resources listed in the FTA “Information Required for Probable Categorical Exclusion (Section 771.117(d))” checklist. The following sections describe the physical, biological, and human environment at the MTC site. Technical reports providing detailed information on certain resources are appended to the separate NEPA Categorical Exclusion document for the MTC.

Physical Environment

Air Quality

The City of Baltimore is in attainment with the current National Ambient Air Quality Standards (NAAQS) area for particulate matter (PM2.5 and PM10). The City of Baltimore was, however, in nonattainment for PM2.5 under the 1997 standard. The City of Baltimore is currently in an 8-hour nonattainment area for ozone (O3) and is classified as Severe.⁴ The Baltimore region is in compliance with the carbon monoxide (CO) NAAQS.

An air quality study including a local air quality analysis was prepared as part of the planning effort. The analysis results show that all the 1 hour and 8-hour CO concentrations are currently below the CO NAAQS of 35 and 9 parts per million (ppm), respectively. These values are consistent with the area’s designation as a maintenance CO attainment area. The study area demonstrates reduction in VMT and emissions associated with transit access and transit-oriented development within the station area.

² FHWA, 1987. *NEPA Implementation Guidance for Preparing and Processing Environmental and Section 4(f) Documents*. Available at: <http://environment.fhwa.dot.gov/projdev/impTA6640.asp#affect>. Accessed 28 March 2011.

³ FHWA and FTA, 2009. *Environmental Impact and Related Procedures*, 23 CFR 771. Federal Highway and Transit Administration. Effective April 23, 2009.

⁴ EPA. 2010. *Currently Designated Nonattainment Areas for All Criteria Pollutants*, as of December 17, 2010. US Environmental Protection Agency website <http://www.epa.gov/aqps001/greenbk/ancl.html>. Accessed 17 February 2011.

Surface Water

The floodplains, water quality, navigable waters, and coastal zones at the MTC site are described below. Wetland areas, a biological resource, are described separately in the Wetlands subsection of the Biological Environment section.

Floodplains

The MTC site is located within the Federal Emergency Management Agency (FEMA) City of Baltimore Flood Insurance Rate Map (FIRM) panel 2400870020E. The MTC site is not within a mapped floodplain.

Water Quality

There are no large impervious surfaces on the MTC site. Stormwater falling on the southern portion of the MTC site either infiltrates or sheet flows across a gravel parking area to the north to the un-named stream described below. Stormwater falling on the northern portion of the MTC site either infiltrates or sheet flows south or east to the un-named stream described below.

Navigable Waterways

A navigable waterway evaluation was conducted as part of the wetlands investigation described below.

There are no navigable waterways on the MTC site. An un-named intermittent stream crosses the northern-eastern portion of the MTC site, from west to east, near the foot of the steep slope. The segment through the MTC site is approximately 790 feet long. The stream enters the MTC site at the western boundary in a culvert, flows through a man-made channel, and continues offsite to the east alongside and then to the northeast under the railroad tracks (in channels or culverts). The stream is a tributary to Herring Run, which discharges to the Back River approximately 2 miles northeast of the MTC site. The stream may be a regulated water body under Section 404 of the Clean Water Act because it appears to be hydrologically connected to a navigable water. However, the stream itself is not navigable, as it is narrow and intermittent. There are no surface water bodies known to be used as drinking water resources at or near the MTC site.

Coastal Zones

The MTC site is not within a coastal zone.

Biological Environment

Wetlands

A wetland evaluation was conducted to determine the presence or absence of wetland areas regulated by federal or state agencies.

The *National Wetlands Inventory (NWI) Map for Baltimore City* (USFWS, 1981-2002) and *dnrwt - DNR_Wetlands* (DNR, 1993) do

not identify any wetlands or waterways at the MTC site. The SSURGO Database (USDA, NRCS, 2010) indicates that one of the two soil types located within the study area, Urban land-Beltsville complex, contain 5 percent hydric inclusions of Leonardtown on flats.

A wetland area is present along the south side of the stream channel near the northeast corner of the MTC site. Facultative and obligate wetland vegetation is present in this area, along with hydric soils and saturated conditions.⁵ Wetland vegetation includes *Phragmites australis*, an invasive plant. The wetland is a palustrine, emergent, persistent, temporarily flooded wetland, located just east of the existing container storage yard, approximately 750 feet northeast of the East Lombard/Bioscience Drive intersection. This area may also be a regulated wetland under Section 404 of the Clean Water Act because it appears to be hydrologically connected with the unnamed stream described above.

Ecologically Sensitive Areas

A Forest Stand Delineation was conducted to determine the presence or absence of forest areas regulated by city or state agencies, and is used here to identify ecologically sensitive areas.

The vegetation on the MTC site is restricted to the western boundary and across the central portion of the MTC site following the unnamed stream described above. This area is mapped by the Baltimore City Department of Planning as a heterogeneous combination of forest, trees and shrubs, and grass, meadow and groundcover,⁶ and current aerial photography and field observations confirm this characterization. Dominant plant species found within the ecosystem are listed in Table 2-1.

The ecosystem was determined to be in poor health due to excessive invasive species cover in the understory and groundcover layers, and the occurrence of several dead trees. The ecosystem contains an emergent wetland dominated by the invasive species, common reed (*Phragmites australis*), and one waterway which contains litter and debris. Surface soils on the MTC site consist mainly of gravel and fill material. No wildlife was observed.

Table 2-1 Dominant Plant Species

Canopy	Understory	Groundcover
American sycamore (<i>Platanus occidentalis</i>)	Boxelder (<i>Acer negundo</i>)	Common greenbrier (<i>Smilax rotundifolia</i>)
Black cherry (<i>Prunus serotina</i>)	Common greenbrier (<i>Smilax rotundifolia</i>)	Common reed (<i>Phragmites australis</i>)
Black locust (<i>Robinia pseudacacia</i>)	Eastern cottonwood (<i>Populus deltoids</i>)	Japanese honeysuckle (<i>Lonicera japonica</i>)
Black willow (<i>Salix nigra</i>)	Fox grape (<i>Vitis labrusca</i>)	Multiflora rose (<i>Rosa multiflora</i>)
Eastern cottonwood (<i>Populus deltoids</i>)	Multiflora rose (<i>Rosa multiflora</i>)	Raspberry species (<i>Rubus</i> spp.)
Sweetgum (<i>Liquidambar styraciflua</i>)	Poison ivy (<i>Toxicodendron radicans</i>)	
Tree of Heaven (<i>Ailanthus altissima</i>)	Redosier dogwood (<i>Cornus sericea</i>)	
	Sweetgum (<i>Liquidambar styraciflua</i>)	

The vegetated area is not considered an ecologically sensitive area.

Rare, Threatened, and Endangered Species

A rare, threatened, or endangered species habitat assessment was conducted to determine the presence or absence of suitable habitat for species that are federally listed or proposed for listing as endangered or threatened, as defined by the Endangered Species Act, within the vicinity of the MTC site.

The vegetation described above was classified in accordance with the habitat-based descriptions of the Key Wildlife Habitats listed in DNR's *Wildlife Diversity Conservation Plan* (2005). Early Successional Forest and Non-tidal Emergent Wetlands habitat types were found at the MTC site.

As part of the habitat assessment, the US Department of Interior, Fish and Wildlife Service, and the Maryland Department of Natural Resources, were contacted in regard to the presence of species which are listed or proposed for listing. Except for occasional transient individuals, no federally listed or proposed threatened species are known to exist in the study area.

Human Environment

Historic Resources

A cultural resources assessment of the MTC site was conducted to determine the presence or potential presence of buildings, parks, districts, or landscapes listed, eligible for listing, or potentially eligible for listing on the National Register of Historic Places. In accordance with Section 106 of the National Historic Preservation Act, the Maryland Historic Trust (MHT) was contacted in regard to the assessment findings.

The MTC site does not contain National Register-listed, eligible, or potentially eligible buildings, parks, districts, or landscapes.

Archaeological potential in the area is considered to be low. The MTC site has been severely disturbed by rail line, highway, and sewer construction, and the construction of the container storage yard that occupies the majority of the MTC site. However, geotechnical investigations completed in 2001 indicate the potential for natural soils to exist below the fill deposited during construction of the storage container yard. The fill layer is up to 8.5 feet thick. Any natural soils, assuming that they have not been graded, have moderate potential to contain prehistoric archaeological resources because this area was minimally disturbed by historic development prior to the construction of the container yard.

Public Parkland and Recreation Areas

The Joseph E. Lee Park is located approximately 1,800 feet east-southeast of the MTC site (Figure 1.2), adjacent to the east side of the Johns Hopkins Bayview Medical Center campus. The park includes sports fields such as baseball diamonds, soccer fields, and basketball courts. Sports fields accessible to the public are also present at the Patterson High School, immediately east of the Joseph E. Lee Park and about 2,500 feet east-southeast of the MTC site. A privately owned golf driving range abuts the Patterson High School sports fields, about 3,000 feet east of the MTC site. These facilities are all active recreation areas; no parklands for passive recreation activities such as picnicking or walking are nearby.

Noise and Vibration

A noise evaluation was conducted to measure ambient noise levels at the MTC site.

The ambient noise level at the MTC site is high due to the adjacent active railroad (five tracks and a rail yard) and busy interstate highway (I-895). Conversely, medical office buildings and hospital facilities such as at the nearby Johns Hopkins Bayview Medical Center are relatively quiet. There are no residential neighborhoods, schools, or public areas such as churches or parks where quietness is an important characteristic within ½ mile of the MTC site.

Ambient noise levels were measured at the following locations:

- Bioscience Drive at E. Lombard Street,
- Mid-Campus Lot (Hopkins Bayview Circle),
- Joseph Lee (E. Pratt) Street at Cornwall Street,
- Oldham Street, and
- Armistead Way at Alricks Way.

⁵ JMT. 1999. *Wetland Field Mapping, East Baltimore MARC. August 16, 1999. Memorandum to file from Harry Canfield. JMT Job No. 395116.00.09. Johnson, Mimiran & Thompson: Baltimore.*

⁶ Baltimore City. Undated. *Baltimore City Forest Cover and Vegetation*. City of Baltimore Department of Planning website <http://www.baltimorecity.gov/LinkClick.aspx?fileticket=OmTQDCtmQWw%3d&tabid=276&mid=653>. Accessed 17 February 2011.

Based on a noise monitoring program, existing noise exposure at the sensitive receptor locations in the vicinity of the Project ranges from 61 dB(A) to 67 dB(A) Ldn.

Ambient vibration levels at the MTC site may also be relatively high due to existing freight and passenger train operations, but were not measured for the MTC site.

Acquisitions and Relocations

The MTC would be constructed by the City on a site comprised of several privately owned parcels. The main portion of the MTC site is one parcel owned by Picorp and is currently used as a container storage yard. The City would acquire this parcel and relocate the current occupant in accordance with the Uniform Relocation Assistance and Real Property Acquisitions Policies Act of 1970.

The City may obtain an easement or acquire a small portion of the property east of the MTC site to align the existing signalized intersection with the entry driveway to the MTC site. Three other parcels include existing rail lines and service roads are owned by other operators. The MTA may obtain easements or special use agreements from the current owners.

Community Disruption and Environmental Justice

FTA does not provide criteria that define low income or minority neighborhoods for environmental justice evaluations. For the purposes of this study, environmental justice populations were defined as neighborhoods, comprised of block groups identified by the U.S. Bureau of the Census, which meet one or both of the following criteria:

- Census tracts or blocks where at least 20 percent of the residents are below the poverty level ⁷; and/or
- Minority residents ⁸ constitute 25 percent or more of the population.

The MTC site is not within a Block Group meeting either environmental justice criteria, and several of the Block Groups in the vicinity do not have residents. However, in 2009, seven of the nine Block Groups near the MTC site with residents met the low income criteria and six of the nine Block Groups with residents met the

minority criteria (minority percentage above 25 percent). The Block Groups across East Lombard Street to the south and across I-895 to the northwest meet both criteria. Low income and minority populations are present farther south and southwest of the MTC site.

Hazardous Materials

A Phase I Environmental Site Assessment was conducted at the MTC site to identify the potential presence of Recognized Environmental Conditions (RECs).

The MTC site encompasses portions of three parcels, Lots 008, 009, and 014, as shown on the Baltimore City Tax Map. The majority of the MTC site consists of Lot 014, which was undeveloped prior to 1971. Between 1971 and 1979, portions of Lot 014 were developed and were used to stockpile soil. Since 1986, Picorp has occupied Lot 014 for the storage of shipping containers and trailers, and now owns this parcel. Lots 008 and 009 are occupied by Norfolk Southern Railway Company. The railroad has occupied Lots 008 and 009 since 1899.

Previous investigations conducted at the storage container yard concluded that subsurface soils at the site contain concentrations of arsenic and thallium in excess of the MDE Non-Residential Clean-Up Standard. Subsurface soils also contain elevated levels of total lead, but available data does not indicate if the concentrations are hazardous. Groundwater at an adjacent site owned by Norfolk Southern is contaminated with methyl tertiary butyl ether (MTBE) and beryllium. To determine the nature and extent of impacts, the City will conduct subsurface soil and groundwater sampling and analysis when ownership or control of the parcels is obtained.

Environmental Conditions Summary

Environmental elements need to be examined in order to fully understand any possible environmental impacts and constraints. Based on the analysis, it is anticipated that there will not be a significant environmental impact from the development of the MTC and related TOD planning. No navigable waters are located on the MTC site and it is not within a coastal zone. However, there is an unnamed intermittent stream that crosses the north-eastern portion of the MTC site and a wetland area. The ecosystem on-site is considered to be in poor health due to excessive invasive species. There are no federally listed or proposed threatened species in the study area. The site does not contain any cultural or archaeological historic resources. Existing ambient noise and vibration levels are high due to the location of the MTC site and its uses. Environmental justice communities are not present within the MTC site, but are present south of the site. Preliminary and historic investigations discovered subsurface soils contaminated by arsenic, thallium, and lead. The

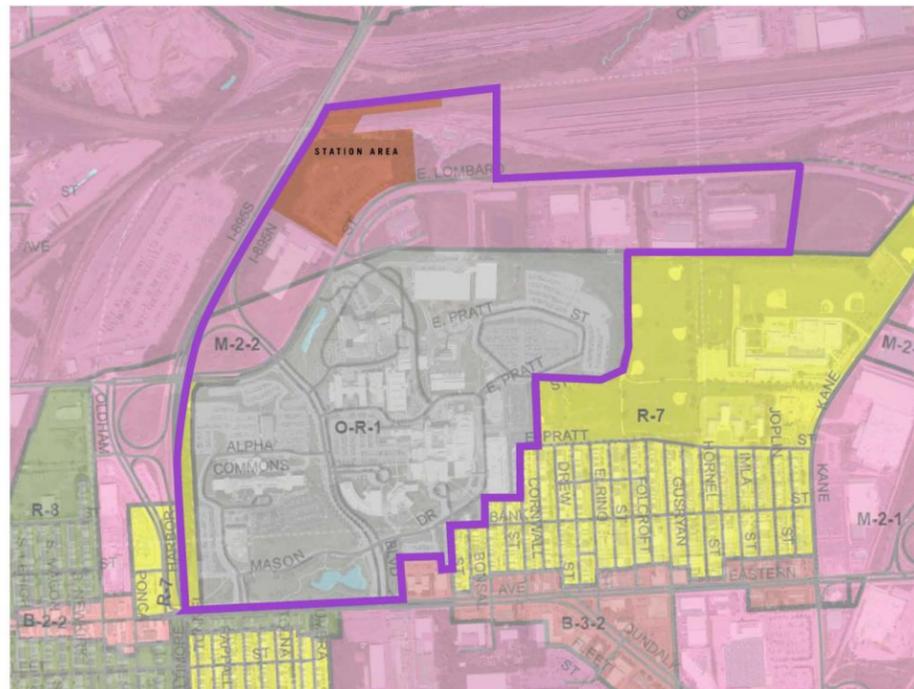
City will conduct subsurface soil and groundwater sampling and analysis when ownership or control of the parcels is obtained.

⁷ US Census Bureau. 2011. *Poverty Definitions*. Website: <http://www.census.gov/hhes/www/poverty/methods/definitions.html>. Accessed 25 April 2011. See also *How the Census Bureau Measures Poverty*. Website: <http://www.census.gov/hhes/www/poverty/methods/measure.html>. Accessed 25 April 2011.

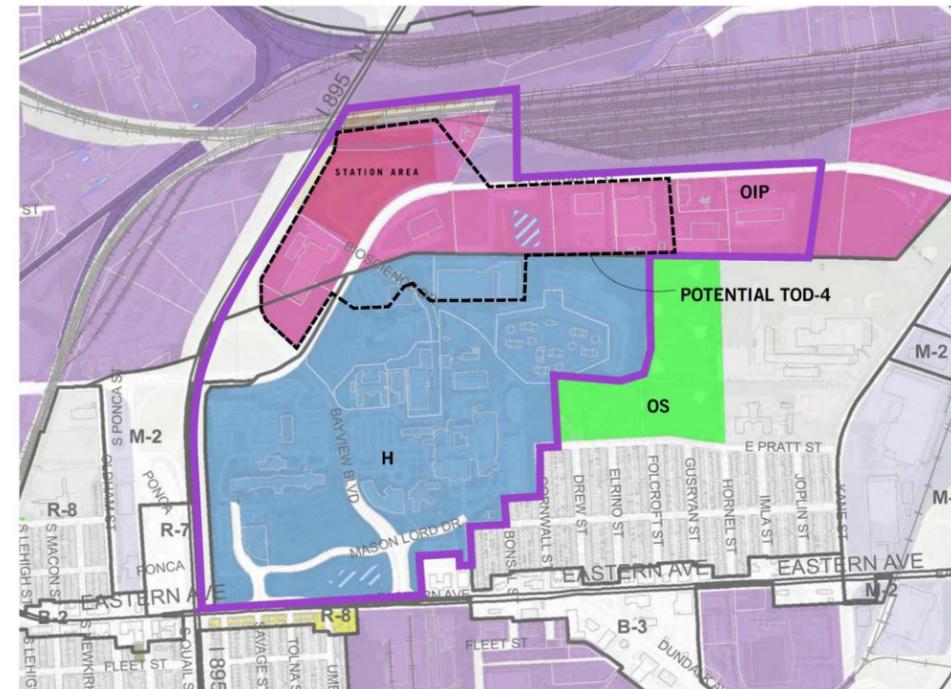
⁸ US Census Bureau. 2011. *Race Data*. Website: <http://www.census.gov/population/www/socdemo/race/racefactcb.html>. Accessed 25 April 2011.

	EXISTING O-R-1 (OFFICE RESIDENTIAL)	PROPOSED H (HOSPITAL)	EXISTING M-2-2 (INDUSTRIAL)	PROPOSED OIP (OFFICE INDUSTRIAL PARK)	PROPOSED TOD-4 (TRANSIT ORIENTED DEVELOPMENT)
MIN. LOT SIZE	for residential: 1,250 SF / RU; 1,675 SF / EFF; 2,500 SF / DU for elderly: 500 SF / EFF; 750 SF / DU	2 acres or 1 city block	NA	1 acre min. district size - no min. lot area.	none
FAR	1.0 (1.5 elderly)	NA	5.0	NA	NA
MIN. HT.	NA	NA	NA	NA	24' OR 2 stories
MAX HT.	40'	65'	NA	60'	100', Additional height permitted by conditional use
YARDS. Front Interior Side Corner Side Rear	20' min. none req'd or 10' min. 30' min 30' min.	none - front perimeter 10' none req'd or 10' abutting resid. none - corner side perimeter 10' none req'd or 15' abutting resid.	20' min. none req'd or 10' min. 10' min. 30' min.	none - front perimeter 10' none req'd or 10' abutting resid. none - corner side perimeter 10' none req'd of 15' abutting resid.	none - front perimeter 5' max none none 15'
RESTRICTED USES			dwelling, efficiency and rooming units other than guards' quarters	any residential, hospital, live entertainment industrial general, warehouse	
NOTES		base district regulations and general development plan (approval from city)	intended for general manufacturing and industry	intended for large office structures, r&d facilities, and/or light industry in a campus-like atmosphere	for areas around existing and anticipated transit stations by significant height and a full mix of uses

 TOD STUDY AREA
 POTENTIAL TOD-4



EXISTING ZONING



PROPOSED ZONING

OBSERVATIONS

- proposed OIP would replace M-2-2.
- TOD zoning may also be considered through differences are minor.
- height limits may be too restrictive.

0 100 200 400 800

Figure 2.1 | Existing/Proposed Zoning

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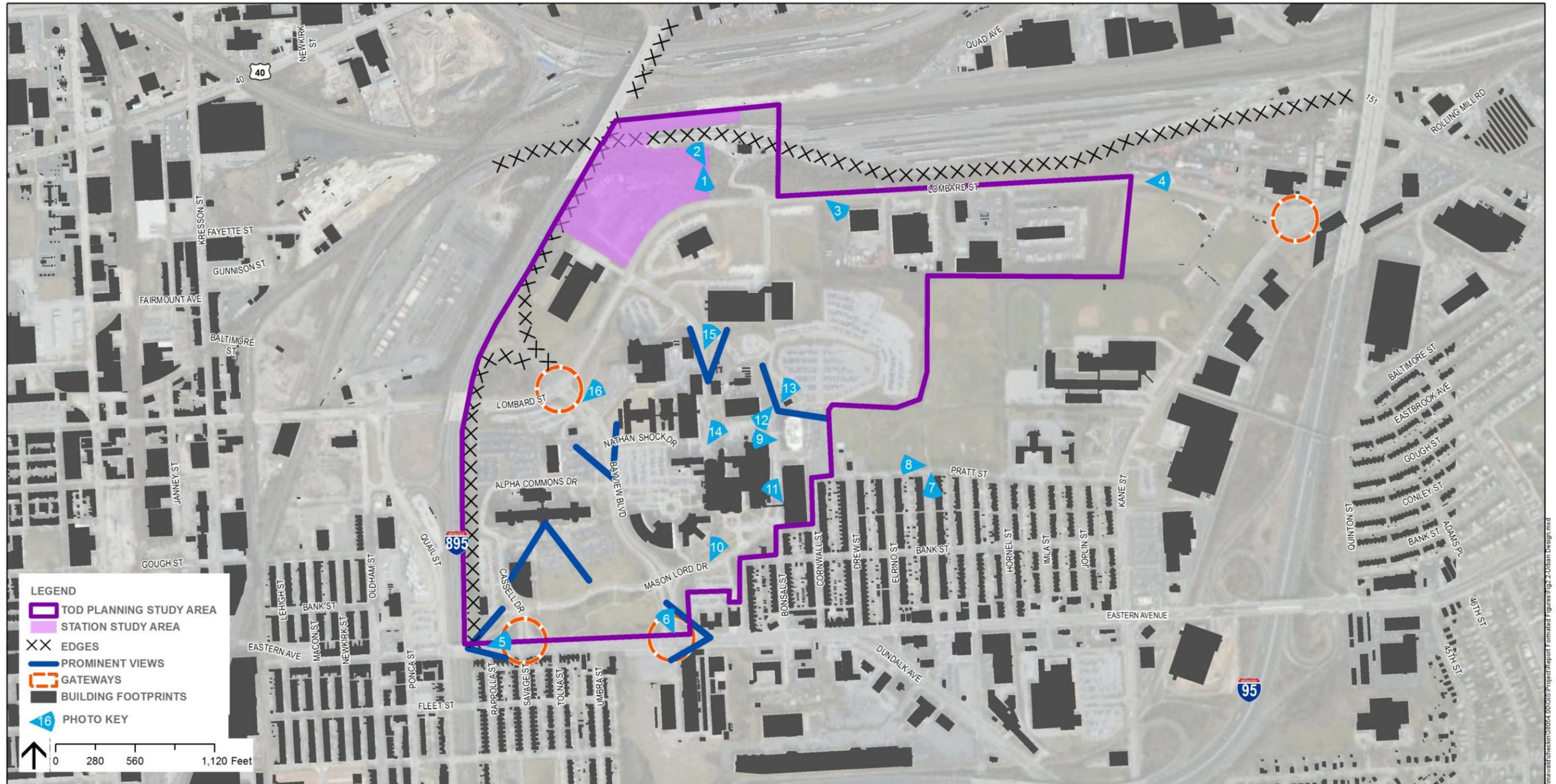


Figure 2.2 | Urban Design Issues & Opportunities

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1 station site looking south



2 station site looking north



3 lombard street



4



5 bayview campus entry along eastern ave.



6



7 joseph e. lee neighborhood and park



8



9 bayview campus



10



11



12 campus high point looking east



13 campus high point looking north



14 bioscience drive



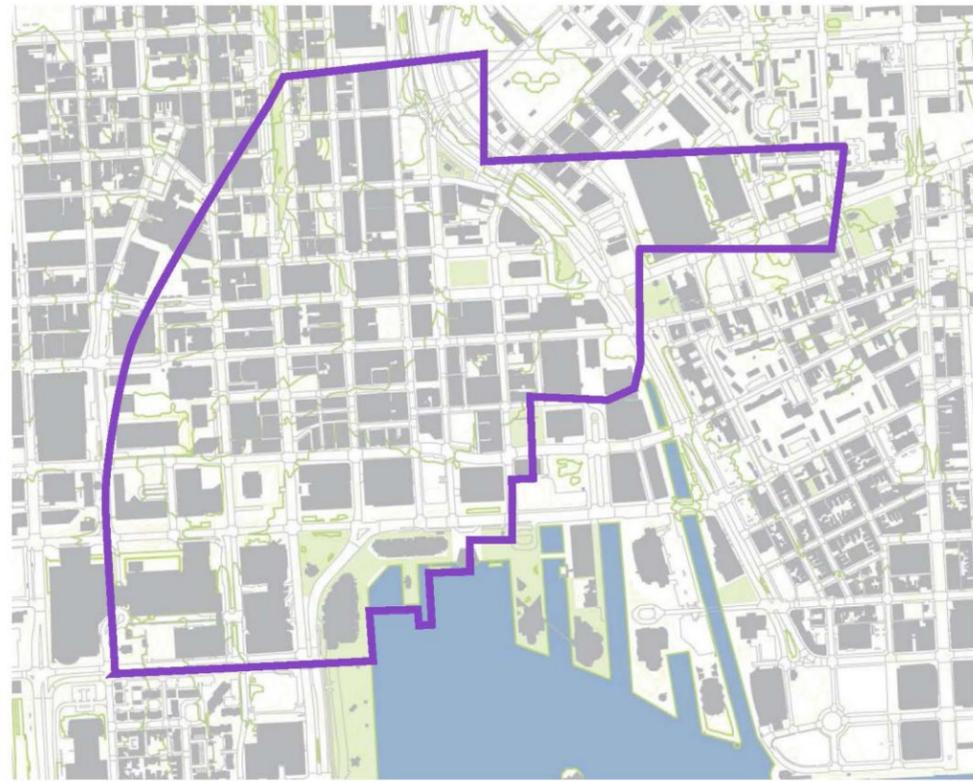
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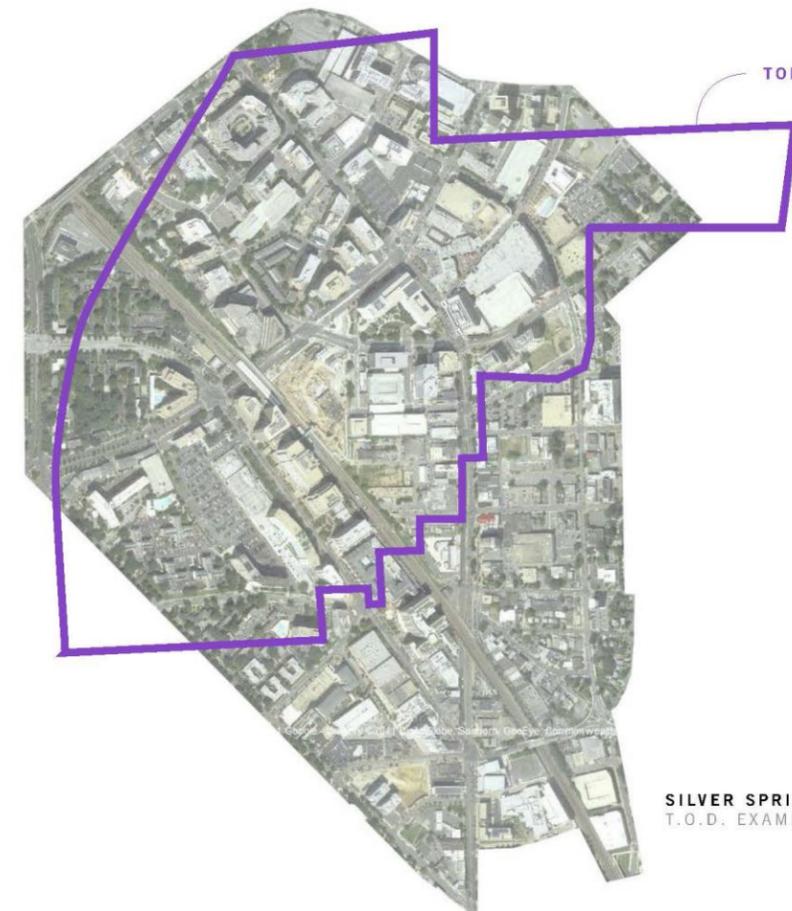
16 nih research center

Figure 2.3 | Study Area Photos

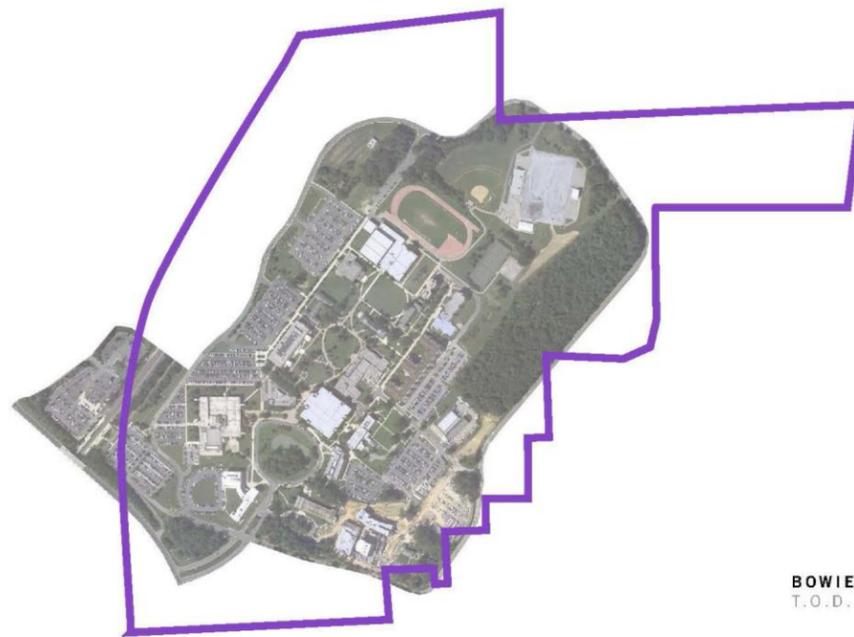
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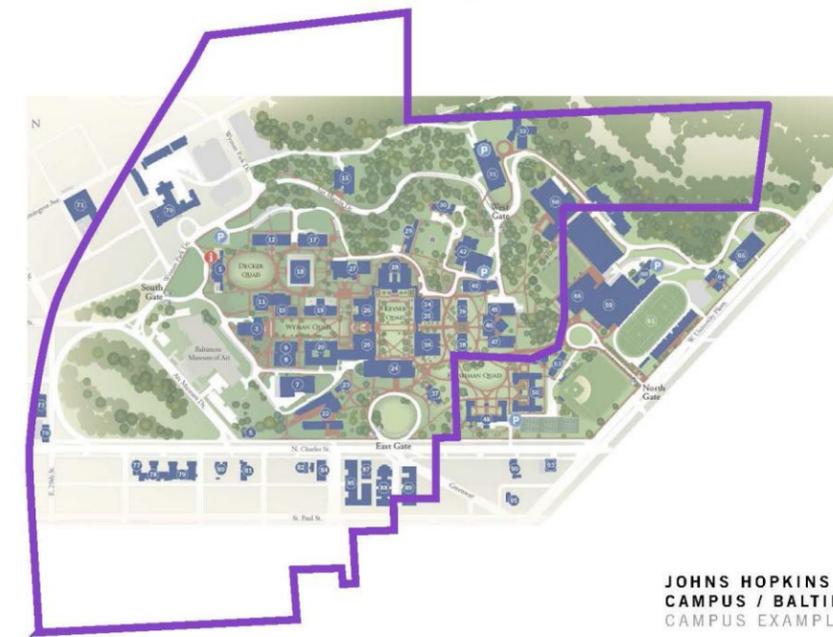
DOWNTOWN BALTIMORE
URBAN EXAMPLE



SILVER SPRING, MD
T.O.D. EXAMPLE



BOWIE STATE UNIVERSITY / BOWIE, MD
T.O.D. EXAMPLE



JOHNS HOPKINS UNIVERSITY / HOMEWOOD CAMPUS / BALTIMORE, MD
CAMPUS EXAMPLE

Figure 2.4 | Local Scale Precedents

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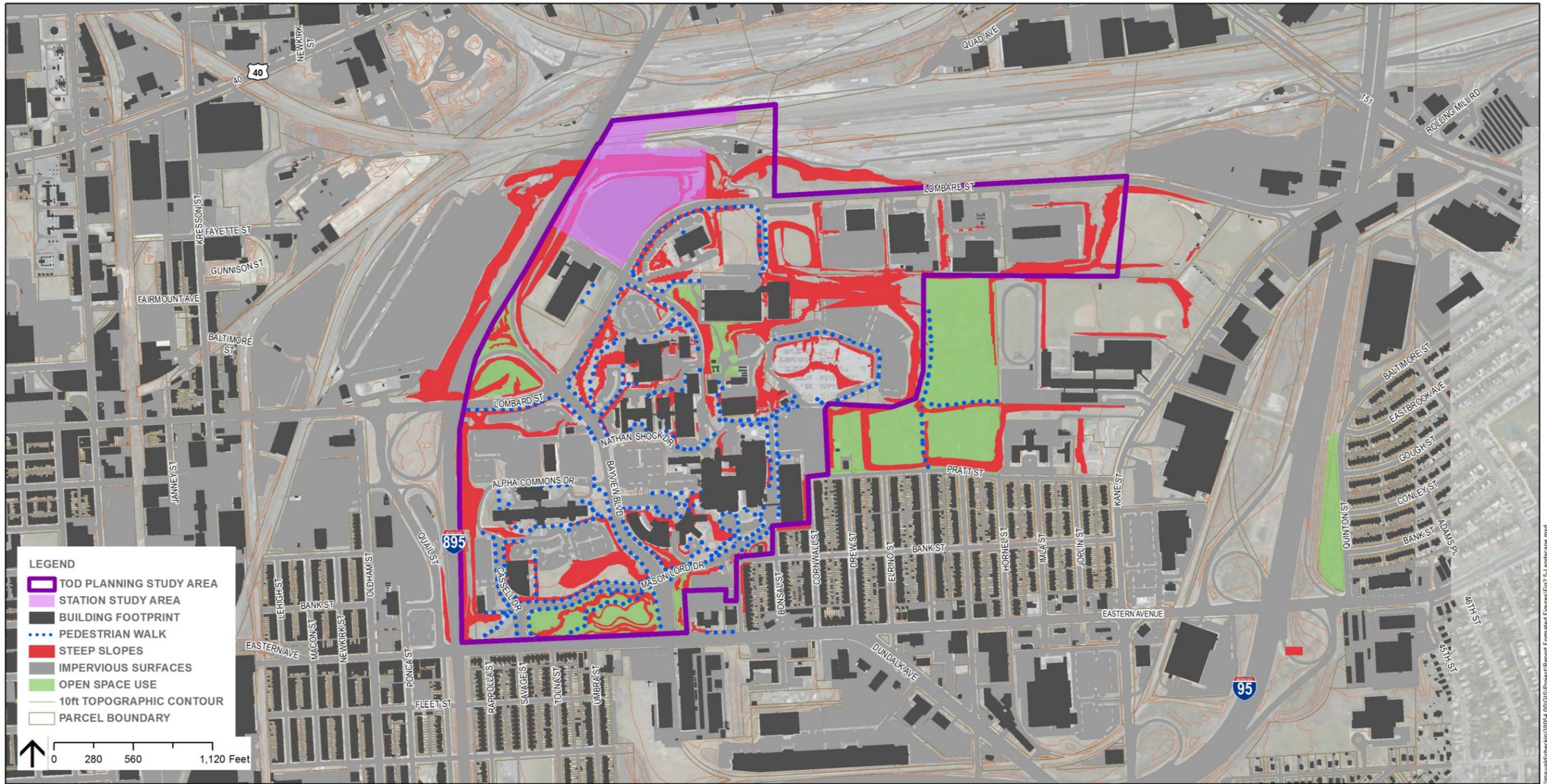


Figure 2.5 | Landscape

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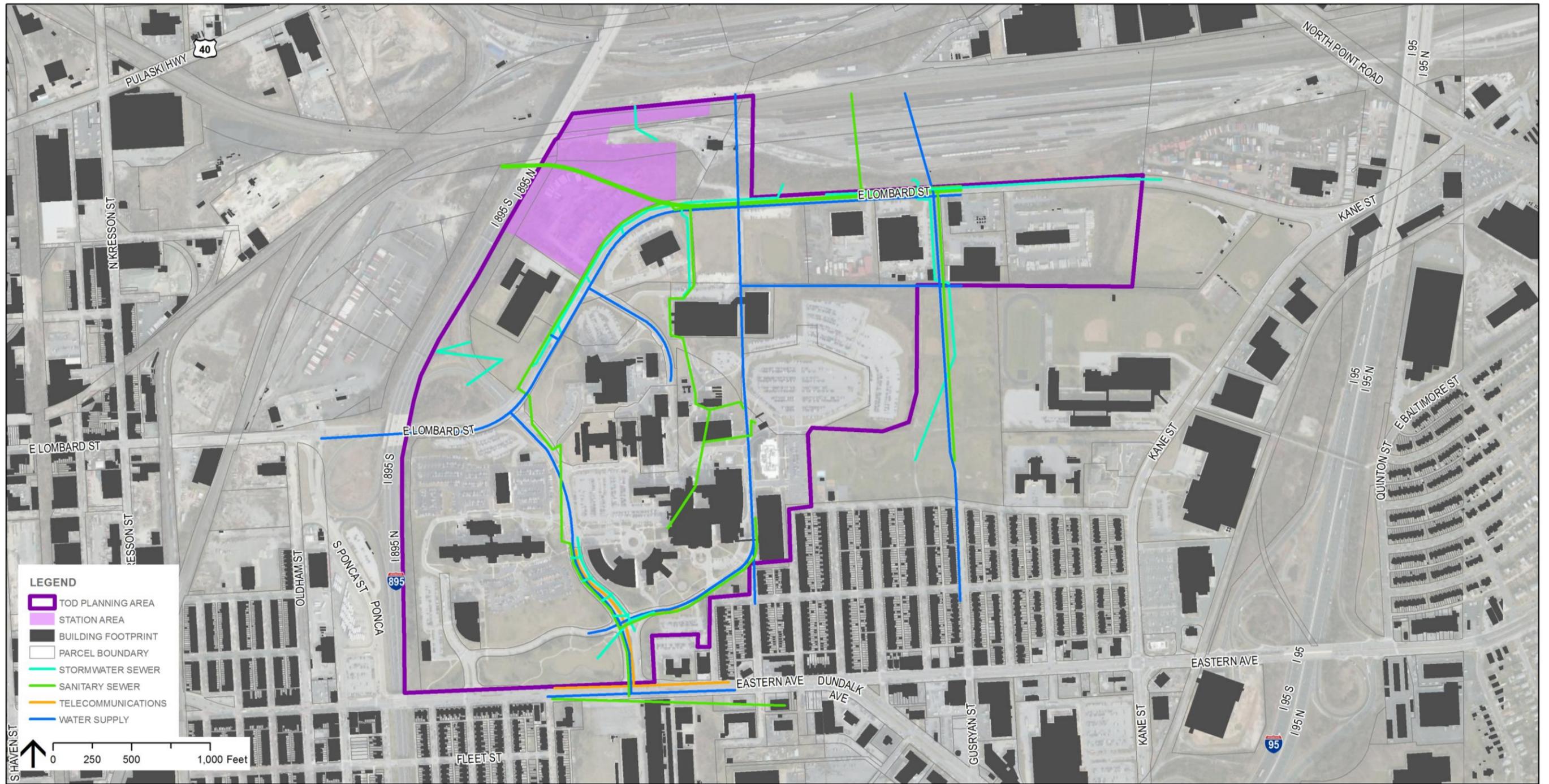


Figure 2.6 | Utilities

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Connectivity to I-95 and I-895



Pedestrian Facilities (Sidewalks, Crosswalks and ADA Ramps)



Vehicle and Pedestrian Facilities



Bus Stop Sign shared with Stop Sign and Light Pole



Some Bus Stops Lack Shelters



Existing Bus Stop with Shelter



Informal Pedestrian Connection



Pedestrian Path near Eastern Avenue

Figure 2.7 | Transportation Photos

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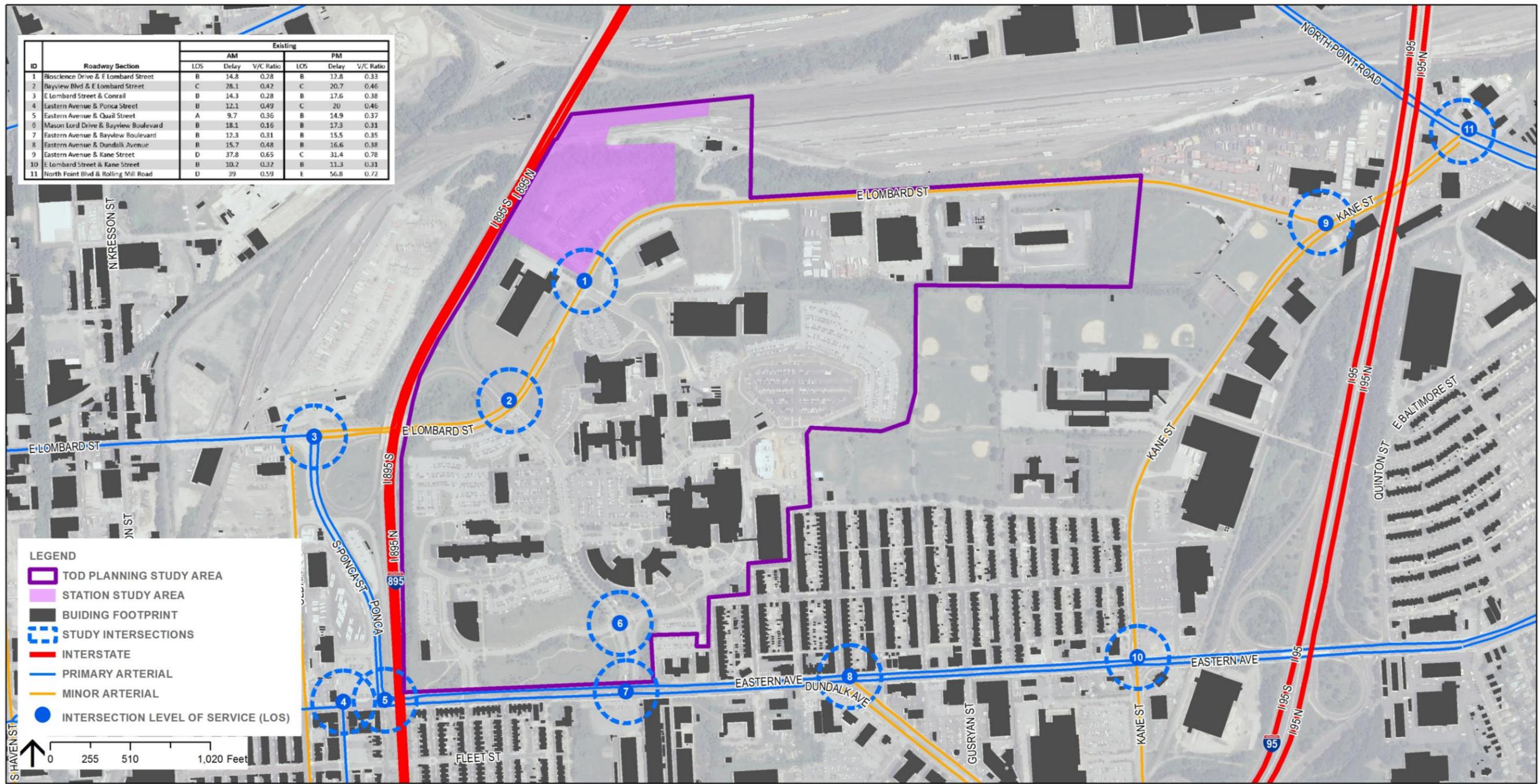


Figure 2.8 | Transportation & Study Intersections

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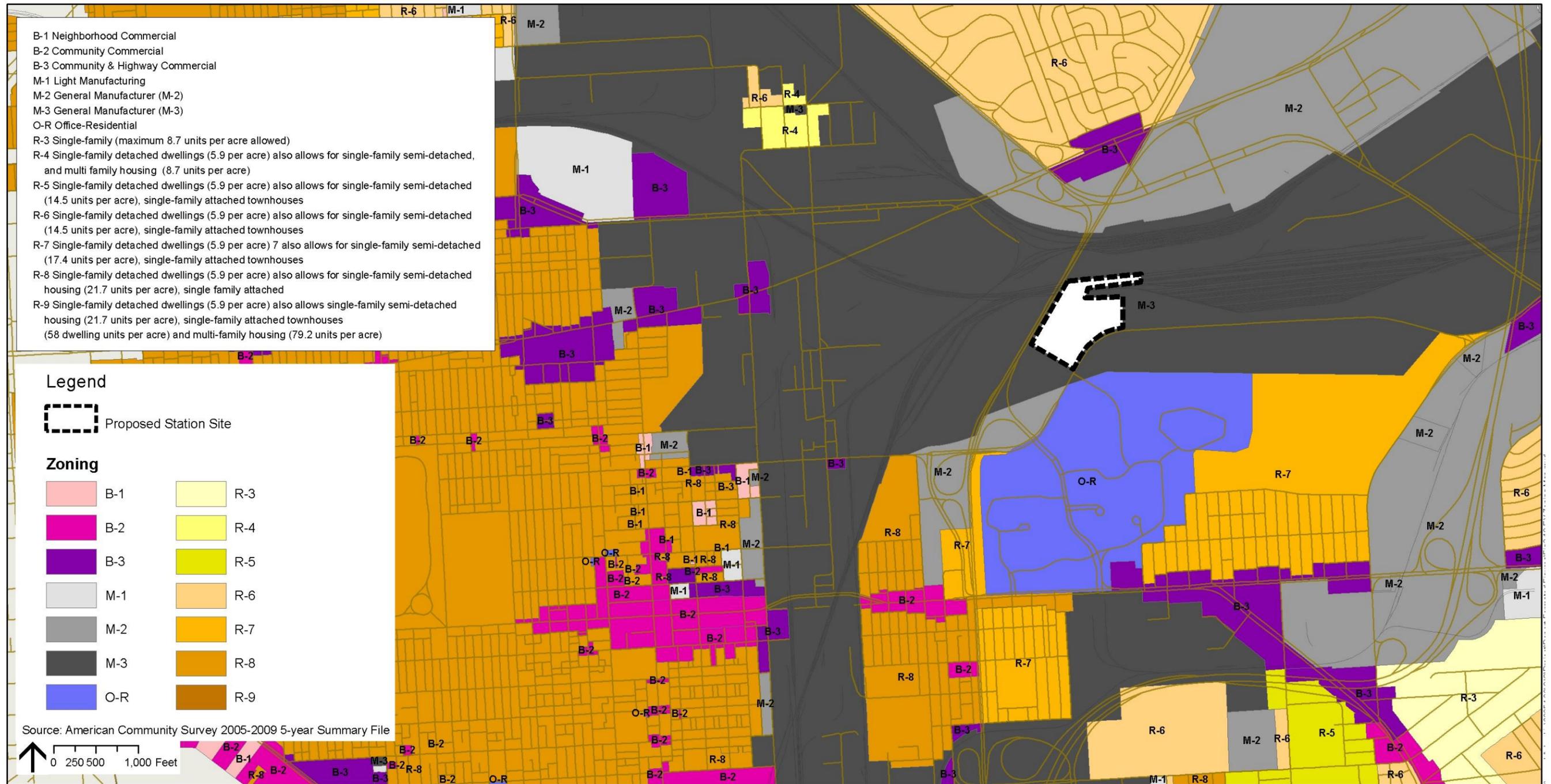
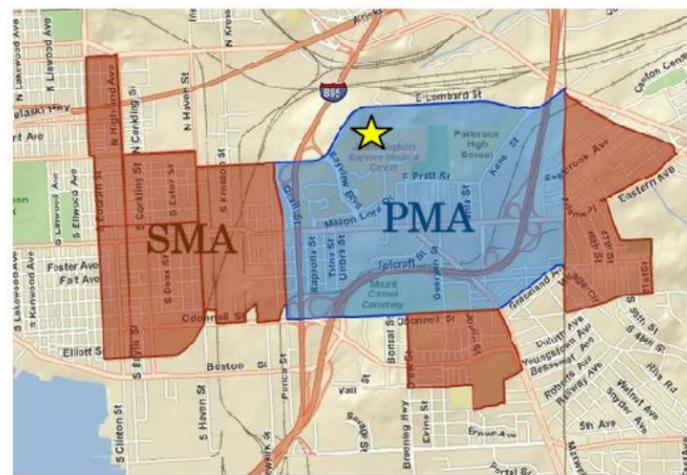


Figure 2.9 | Zoning

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The market analysis evaluated the City of Baltimore’s current market trends and future development potential at the proposed Multi-modal Transportation Center (MTC). The analysis focused on a Primary Market Area (PMA) and Secondary Market Area (SMA), which represent the bulk of the residentially-based demand for retail and services at the Bayview MARC station area.



Market Analysis Areas

Market Context

Although the City of Baltimore and the Baltimore region have faced economic downturn in the last decade, the Education and Health Services industries have gained almost 10,000 jobs in this period. These gains have been largely bolstered by the presence of the Johns Hopkins Institutions, including Johns Hopkins Hospital, the Johns Hopkins School of Medicine and the Bayview Medical Center, and the associated National Institute of Health (NIH) research campus. The following sections briefly describe the market potential for various uses. The Market Analysis report provided in Appendix E provides more detailed information.

Residential Potential

The Bayview study area with industrial properties, highway views, noise and limited residential amenities does not represent an ideal location for infill residential development. The PMA also offers limited opportunity to expand residential development. Any new residential development would first be attracted to the emerging neighborhoods nearby in both the City and county. Currently the dynamics of the land patterns within the area lend themselves first to commercial development for the majority of the available land.

Office Potential

The Bayview study area could support a small office building of up to 30,000 to 45,000 square feet (SF) of office space by 2020 with the assumption that commuter rail service is available at the station. The timing of office development likely will be affected by the entrance of MARC service and the potential Red Line as well as conditions in the financial market. These requirements could postpone new office development unless an effective partnership between State and City

officials brings necessary certainty about future MARC service to the market.

At the Bayview campus, the advent of commuter rail service increases the potential for federal expansion with a new agency. The Bayview campus could support an average annual absorption of 40,000 to 55,000 SF spurred by expansion of the existing NIH operations and/or the expansion plans for the Bayview Medical Center.

Industrial Potential

The PMA is projected to experience an increase of roughly 400 jobs in the distribution and warehouse operations industries by 2021. Based on the growth within these industry sectors, the PMA could absorb between 650,000 and 850,000 SF of industrial space by 2021. Roughly 250,000 to 340,000 SF of that demand is expected to be satisfied by flex buildings, accommodating users of 2,000 to 20,000 SF. Most of the rest will occur in warehouse/distribution facilities ranging in size from 50,000 to 250,000 SF.

Retail Potential

The extensive competition from North Point Boulevard and Eastpoint Mall, Greektown’s Eastern Avenue and Canton, White Marsh Mall and the Avenue at White Marsh, and assorted big box retailers will prevent successful development of destination retail at the MTC site. The sparsely populated market area surrounding the site militates against locally oriented retail development as well. Depending on the scale of office and hotel development, a small amount of new retail space (primarily restaurants and convenience retailers) could be supported elsewhere in the broader Bayview community, but potential at the rail station would be limited to a news and coffee stand to serve commuters.

Hotel Potential

In the future, there is no demonstrable need for additional hotels without the addition of new commercial office and retail activity. The overall occupancy rate of hotels in Baltimore City and the surrounding I-95 corridor suggest a stable lodging market. Over the longer term from 2021 to 2031, the Bayview Medical Center Campus and surrounding sites may be able to support one to two new hotels developed within a walkable town center environment with easy access to the I-95 and I-895 travel corridor.

Market Analysis Summary

This market analysis demonstrated that the Bayview study area may not be ideal for future residential development, due to the presence of industrial properties, limited amenities, and highway views, but the study area has potential for office and industrial uses. Retail development is expected to be minimal at the MTC site due to retail competition surrounding the site.

The following table summarizes the study area market potentials, distinguishing between those suitable for the MTC site and those more appropriate for locations elsewhere in the study area.

Table 3-1 Bayview Development Potential

	MTC Site	Elsewhere in Study Area		Total
	SF	SF	Units	SF
Residential				
Apartment – Rental		500,000	500	500,000
Single Family – For Sale		522,000	290	522,000
Townhouse – For Sale		1,204,000	860	1,204,000
Total Residential:		2,226,000	1,650	2,226,000
Commercial				
Neighborhood Office		260,000		260,000
R&D Medical Office	165,000	385,000		550,000
Industrial – Distribution/Warehouse		410,000		410,000
Industrial – Flex/Office		440,000		440,000
Retail – Neighborhood Goods & Service		43,000		43,000
Retail – Food & Beverage	5,000	22,000		27,000
Retail – General, Apparel, Furniture & Other Merchandise		11,000		11,000
Total Commercial:	170,000	1,571,000		1,741,000

Source: Partners For Economic Solution, 2011

Overview

The Bayview Multi-modal and TOD Plan emerged from the analysis of several scenarios. The process was guided by the City of Baltimore's directive to analyze land use mix and possible land use intensity by undertaking an existing conditions and market analysis. The plan represents a conceptual vision for future TOD at the new Multi-modal Transportation Center (MTC). It depicts the broad goals for the Bayview study area and functions as a resource to set parameters for urban design, including public spaces, pedestrian and vehicular access, parking, transit, and landscaped elements. Additionally, the plan will guide the City and developers when implementing the conceptual vision on a project-by-project basis.

Several key objectives were established during the development of the future scenarios. These include:

- Establishing a framework for TOD;
- Exploring preliminary goals for the Johns Hopkins campus;
- Testing parking requirements for commuter lots/structures;
- Defining options for Lombard Street;
- Testing densities within the MTC site and its immediate context; and,
- Exploring preliminary goals for landscape features (plaza, rain gardens, etc.)

Based upon the existing conditions and market analysis, two scenarios were developed to investigate what future development could be around the TOD area near the Bayview Redline Station. The scenarios are intended to be distinct, and express different approaches to development on-site. Both scenarios are presented as diagrams to guide potential growth. Specific elements from

either scenario could be substituted or combined to form additional options in the future.

In Figure 4.1, Bayview Multimodal Future Conditions Massing, a proposed massing, specifically pertaining to Scenario 2 discussed below, demonstrates potential development characteristics as the Bayview TOD area matures. These massings are speculative and flexible; depending on actual market need and interest, the outcomes may vary greatly.

Future development shown in gray in the Hopkins campus area is intended to suggest concept ideas, not specific parcel development. The concept is to provide better connections from the campus to the station and areas north. This can be achieved by providing a stronger connection to the campus heart via Bioscience Drive ending at signalized station at Lombard Street. Additionally, future development of JHU's former housing parcel to the east will make a connection down to Lombard between the industrial/commercial buildings of Parcel C desirable. Finally, an extension of the mall created for the redline station, before it turns north and crosses Lombard, into the core of the campus will help organize and simplify this confusing area. This added green space will also be an amenity and could connect to the station area by way of a series of rain gardens along the previously mentioned connections.

Also in this figure, there are three major Development Parcels shown. Specific configuration of Group A is discussed in greater detail in the following sections, but overall the parcel is designed to achieve the following conceptual goals: treat the southern portion of the parcel as a gateway to the campus and station, develop urban density and green-space throughout the parcel and finally, to develop a transit station that is signals itself as a destination and center of the TOD development. Group B is created to line the road with a commercial building that has structured parking in rear and to provide a bottom edge to the gateway formed by the off ramps from 895. Group C encourages development across from the

station; this will help to activate the area and make a more coherent sense of place around the station by adding depth across Lombard.

Assumptions

For planning purposes, numerous assumptions were made during the study. The two scenarios (outlined below) explore preliminary issues and opportunities associated with created transit oriented development at the station area and its immediate context. As such, the scenarios are conceptual only and are intended to identify key steps that will need to be undertaken to advance the concepts further. Specifically it is assumed that the scenarios will be defined beyond the efforts associated with this study once more information is available about the sites, and after the City and MTA have determined their preferences regarding the various approaches that are included in the two scenarios. In addition it is assumed that zoning will need to be modified to enable the conceptual uses, building forms, and other size and bulk requirements that are depicted.

TOD Planning Area Framework Plan

Following the evaluation of the existing conditions, a "framework" was established to set the broad urban design goals and objectives for the TOD Planning area. The elements identified in the framework became the "backbone" for developing and understanding the intended urban conditions, and subsequently, informed the development of the two scenarios. The following goals were identified during the existing conditions inventory.

1. *Lombard Street* – Given its current location and use, Lombard Street has the potential to become the primary street within the district. Further study will help to define the type of street, either a boulevard or urban street, that Lombard can transform into.

2. *Gateways, Portals, Entrance Points* - A hierarchy of gateways or entrance points should be created and celebrated along Lombard Street to clearly define the boundary of the district and give a sense of arrival.
3. *Street Edges and Setbacks* - The edges of Lombard Street need to be enhanced and strengthened to reinforce the urban character. Further study of setbacks and/or build-to lines will better define the street edge and give character to the area.
4. *Streetscape Character and Green Infrastructure* - The street edge can be reinforced and the street character defined by a clearly creating a landscape objective. A consistent rhythm of street trees along with the buildings can define a strong vertical edge while also providing over-story canopy shade. The use of urban rain gardens can bring storm water management to the public while softening the urban experience.
5. *Placemaking Opportunities* - The forecourt to the proposed train station is an excellent opportunity to define a sense of place and provide connectivity to the district. Its location adjacent to one of the entrance nodes and along Lombard Street creates great visibility for the public realm.
6. *Context Area Connections* - Providing connectivity of Lombard Street to the surrounding context is as important as redefining Lombard itself. Allowing the character to engage the local infrastructure will work to ground the redevelopment and engage the district as a whole.
7. *Eastern Avenue Redevelopment Opportunities* - The area immediately adjacent to the district along Eastern Avenue has a wealth of redevelopment potential. By improving the edges and engaging the streetscape, these potential redevelopment sites, i.e. the bus depot, the industrial site and the air rights above the highway become poised to strengthen the southern boundary of the district.

Scenario 1: Parkway/Boulevard

Concept

Scenario 1 creates a parkway along Lombard St., and establishes a plaza and building that can signify the red line terminus as a destination. Generous green-space, in the form of accessible rain gardens and lawn / dry ponds, is configured around the entrance to the station. Structured parking is lined along the west of the site,

creating a buffer between the nearby highway and the development parcels.

Transit Circulation

Buses, taxi cabs, and individual passenger drop-off are mingled in a one-way 3 lane approach avenue. The intention is to keep the plan simple by providing adequate space along the curb for varied drop-off lanes indicated with signage and pavement striping. Vehicles have two options to re-enter Lombard to the south, one of which is at a signal.

Massing, Heights, Composition of Uses

Use types in Scenario 1 are primarily office, suitable for health care, with commercial and some retail at street level. Parking for these uses, as well as for the commuter demand at the Red Line station, is provided by a large structured garage. Future development to the south in Scenario 1 might include expansion of parking facilities, adaption of an existing structure into a higher density office space, and the addition of further new office space to at the southern-most portion of the site. Overall total program space totals roughly 900,000 SF, with most structures at 6-8 stories or 70-100' heights. These massings and development footprints are speculative and flexible, and should be considered diagrammatic of future potential. The building located directly adjacent to the Red Line terminus provides an opportunity to create a higher and more noticeable building, using the architecture to signal the location as a destination visually from points nearby. Buildings are set back from Lombard St. to encourage green space along the parkway.

Figure 4.1 Scenario 1 Massing and Square Footages

Structure	Floors	Floor Area	Total Area	parking ratio (/1000GSF)	parking need	total structure capacity
Building 1	8					
Office	7	30,000	210,000	2.25	473	
Retail/Commercial	1	20,000	20,000	2	40	
Building 2	8					
Office	7	20,000	140,000	2.25	315	
Retail/Commercial	1	20,000	20,000	2	40	
GROUP A						
Building 3	6					
Office	5	60,000	300,000	2.25	675	
Retail/Commercial	1	60,000	60,000	2	120	
Building 4	2					
Office	2	65,000	130,000	2.25	293	
Building 5	2					
Office	2	50,000	100,000	2.25	225	
Parking Structure (P1)	7					1,900
Parking Structure (P2)	5					1,500
Station Parking					1,200	
totals			880,000	3,380	3,400	
				20		

See Figures 4.3 and 4.5 for a conceptual plan and cross-section of Scenario 1.

Scenario 2: Urban Street

Concept

Scenario 2 is organized to create an urban streetscape lining Lombard Street. Arrival at the Red Line station is signaled by a large plaza again providing generous green-space, in the form of accessible rain gardens and lawn / dry ponds. The Red Line plaza offers a high degree of flexibility; it can accommodate shifts in the train alignment as they occur.

Development parcels are configured to create a consistent street edge, with urban scale streets in-between parcels. Structured parking is again lined along the west of the site, creating a buffer between the nearby highway and the development parcels.

Transit Circulation

Scenario 2 separates buses and taxi-cabs from standard passenger drop-off, allowing for quick turnaround for transit vehicles, and a separation of passenger type. Commuters and individuals being dropped off access the Red Line from a turnaround to the west of the station, while buses and possibly taxis drop-off at a turnaround directly off of Lombard.

Massing, Heights, Composition of Uses

Use types in Scenario 2 are primarily office, suitable for health care, with commercial and some retail at street level. Parking for these uses, as well as for the commuter demand at the Red Line station, are provided by a large structured garage. Further development to the south might include an expansion of existing parking facilities, and the addition of more office/commercial complexes. Scenario 2 assumes demolition of an existing building on the southern portion of the site, which allows for extension of the north-south road. Overall total program space totals roughly 900,000 SF, with most structures at 4 stories or 50-60' heights. These massings and development footprints are speculative and flexible, and should be considered diagrammatic of future potential.

Figure 4.2 Scenario 2 Massing and Square Footages

Structure	Floors	Floor Area	Total Area	Parking ratio (/1000GSF)	Parking need	Total structure capacity
GROUP A						
Building 1	4					
Office	3	45,000	135,000	2.25	304	
Retail / Commercial	1	45,000	45,000	2	90	
Building 2	4					
Office	3	55,000	165,000	2.25	371	
Retail / Commercial	1	55,000	55,000	2	110	
Building 3	4					
Office	3	70,000	210,000	2.25	473	
Retail / Commercial	1	70,000	70,000	2	140	
Building 4	4					
Office	3	50,000	150,000	2.25	338	
Retail / Commercial	1	50,000	50,000	2	100	
Parking Structure (P1)	7					1,952
Parking Structure (P2)	5					1,273
Station Parking					1,200	
totals			880,000		3,125	3,224
GROUP B						
Building 5	3					
Office	3	30,000	90,000	3	270	
Parking Structure	3/Surface					270
totals			90,000		270	270
GROUP C						
Building 6	3					
Office	3	30,000	90,000	2.25	203	200
Surface Lot						
Building 7	4					
Office	4	20,000	80,000	2.25	180	200
Surface Lot						
Building 8	2					
Industrial Flex/Office	2	75,000	150,000	1.5	225	200
Surface Lot						
Building 9	1.5					
Industrial Flex/Office	1.5	35,000	52,500	1.5	79	100
Surface Lot						
totals			282,500		686	700
TOTAL OFFICE			920,000			
TOTAL FLEX OFFICE			202,500			
TOTAL RETAIL / COMMERCIAL			220,000			
TOTAL PROGRAM SF			1,342,500			
TOTAL PARKING				4,081	4,194	

See Figures 4.4 and 4.6 for a conceptual plan and cross-section of Scenario 2.

Transportation

This section outlines the future transportation conditions in the TOD Planning Area, including projections of future traffic demands, intersection operations and potential roadway improvements. Enhancements to mobility for other modes of travel that may be implemented with transit oriented development are also identified.

Future Traffic Projections

In order to evaluate traffic operations in the General Impact Area in the future with redevelopment of the TOD Planning Area, traffic projections were developed. These future traffic forecasts include existing traffic volumes, ambient traffic growth, the trips associated with the future development densities identified in the Bayview Multi-Modal Market Analysis, and vehicular traffic associated with the Red Line transit station.

Traffic growth trends from historic traffic counts provided by the City of Baltimore Department of Transportation were compared to counts conducted for this study. Comparison of the counts showed that traffic growth was relatively flat in some areas, while other areas demonstrated negative growth. To maintain a conservatively high estimate for future traffic conditions, a one percent (1%) annual rate was applied to the turning movement counts at the study intersections. This growth rate is consistent with rates used for areas throughout the City.

For planning purposes and in consultation with the City of Baltimore Departments of Transportation and Planning, it was determined that no other development, beyond that included in the Market Analysis, is planned for the General Impact Area prior to 2030. The Market Analysis focused on a Primary Market Area (PMA) which represents the bulk of the residentially-based demand for retail and services in the Bayview area. The following table summarizes the study area market potential in the PMA.

Table 4-3 Bayview Development Potential

	Square Feet	No. of Units
Residential		
Apartment - Rental	500,000	500
Single Family	522,000	290
Townhouse	1,204,000	860
Total Units	2,226,000	1,650
Commercial		
Neighborhood Office	550,000	
R&D Medical Office	410,000	
Industrial – Distribution/Warehouse	440,000	
Industrial – Flex Office	43,000	
Retail – Neighborhood Goods and Services	27,000	
Retail – GAFO	11,000	
Total Square Feet	1,687,000	

It should be noted that the PMA, as delineated in the Market Analysis, consists of a larger area than the General Impact Area identified by the intersections and roadways of the traffic study. However, to reflect the impacts of a concentration of these uses focused near the study intersections, the traffic analysis assumed the maximum development potential would be contained in the area immediately around the proposed Bayview multimodal transit center.

The number of vehicle-trips anticipated with the PMA development potential was estimated based on the industry-standard Institute of Transportation Engineer (ITE) Trip Generation, 8th Edition. These generalized trip estimates were augmented to reflect specific conditions in the area, such as internal trip interactions, pass-by trips (already on adjacent roadways) and transit use. Trips associated with the future station, but not with uses in the TOD Planning Area, were derived from the Red Line Corridor Transit Study data projections for transit passengers using the Bayview MTC.

Assumptions of the distribution of travel across the various available modes were derived from census commuting data from the Bayview study area, as well as mode split characteristics exhibited by several station areas within the Baltimore-Washington Metropolitan region comparable to the future Bayview site, as shown below.

Table 4.4 Mode Split Characteristics

Mode	Work-Bound Share	Home-Bound Share
SOV	60 %	40 %
Carpool	15 %	5 %
Public Transit	22 %	40 %
Walk	2 %	13 %
Bike	1 %	2 %

The geographic distribution of these trips was derived from a combination of existing travel patterns identified during data collection, knowledge of the study area, location of the central business district, and location of highways and interchanges. The trips associated with the TOD Planning Area redevelopment and the transit station were generally assigned to the network using the direction distributions summarized in the table below.

Table 4.5 Direction Distributions

Approach	Percentage
To and from north and south via I-895	47 %
To and from east on Eastern Avenue	13 %
To and from west on Eastern Avenue	8 %
To and from north via Kane Street	4 %
To and from west on Lombard Street	22 %
To and from south on Dundalk Street	6 %
Total	100 %

The resulting traffic assignments were combined with existing traffic volumes and ambient growth to yield the future traffic forecasts that also include the TOD Planning Area redevelopment potential and the trip associated with transit passengers using the Bayview MTC. These traffic forecasts are intended to illustrate the generalized traffic impacts of redevelopment in the area and are for illustrative purposes. It is anticipated that actual development proposals for future building construction will vary from the configurations and quantities included in this analysis.

Future peak hour levels of service for build-out conditions were calculated based on: (1) the future traffic volume projections; (2) existing roadway geometrics and traffic controls; and (3) the *Highway Capacity Manual 2000* (HCM) methodologies (using Synchro 7 software).

The future intersection capacity analysis showed that the intersections in the General Impact Area are generally expected to operate at acceptable levels, with the increase in traffic resulting in increased delays. Under the illustrative future traffic conditions, the following intersections would require improvements to maintain acceptable levels of service:

- **Bioscience Drive at Lombard Street** - would realize a significant increase in traffic volumes because the southbound approach serves as a driveway for the transit center. A second eastbound left turn lane on Lombard Street and the widening of the southbound approach to provide three exiting lanes from the transit center would be necessary to sustain acceptable levels of service.
- **Bayview Boulevard at Lombard Street** – would realize a considerable increase in traffic as a significant amount of the new traffic generated by the TOD and the Bayview MTC center would use the I-895 ramp as access to the area. A second southbound left turn lane and the conversion of the rightmost

lane on the ramp to an exclusive right turn lane would be required to maintain acceptable traffic operations.

- **Eastern Avenue at Bayview Boulevard** – would experience degradation in levels of service for the afternoon peak. However, signal timing adjustments would restore the operations to acceptable levels.
- **North Point Boulevard at Rolling Mill Road** – would continue experience increases in delays with the additional traffic through the intersection. The conversion of westbound North Point Boulevard, within the existing pavement width, to dual left turn lanes, and exclusive through lane, and a shared through and right-turn lane would maintain acceptable levels of service.

The improvements outlined above are illustrated graphically on Figure 2.7 and Figure 4.6, and are reflected in the level of service and delay values included on the prior listed figure.

Mobility Enhancements

The development densities and layout included in this analysis are conceptual and illustrative in nature. Specific recommendations for improvements to pedestrian, bicycle, and transit amenities are not appropriate at this level of planning. General bus observations and guidance are provided below.

As noted in the existing conditions chapter, the current network of sidewalks in the General Impact Area is reasonably complete. In addition to construction/reconstruction of missing and deteriorated segments, new and widened sidewalks should be incorporated in the redevelopment plans. Areas with informal walkways and new pedestrian corridors created by revised development patterns should be provided with appropriate walkways. Wider sidewalks, plazas, street trees, street furniture and other enhanced pedestrian amenities should be provided in areas of higher pedestrian use, such as in the vicinity of the transit station.

Marked crosswalks of appropriate materials (pavement markings, specialty pavers, raised crosswalks) should be included at all significant pedestrian crossings. Sidewalk ramps compliant with the Americans with Disabilities Act (ADA) must be provided in all crossing locations. At signalized intersections, push-button activated pedestrian indications with countdown timers enhance safety and should be incorporated. On-street parking with pedestrian “bulb outs” at intersections provide a physical barrier between moving vehicles and people, while retaining manageable crosswalk lengths and maintaining good sight lines.

Bicycle accommodations are relatively infrequent in the study area currently. Consistent with the City’s Bicycle Master Plan, provision of on-street bicycle lanes, or shared vehicular travel lanes indicated with pavement markings, would enhance motorist awareness and encourage biking in the area. New development should incorporate a mix of convenient short-term bicycle parking near entry doors and longer-term secure bicycle parking/storage within buildings. “End of trip” bicycle facilities for employment uses should include lockers, showers and changing rooms.

While nearly two dozen bus stops are provided in the area today, many are lacking in shelters and complete, standardized signage. Bus stops should be carefully planned with the redevelopment patterns to take advantage of new building forms and nodes of activity. Consistency within and between these facilities should be provided at each stop, including a shelter, seating, flag and schedule display. Real-time transit information should be provided in shelters and perhaps building lobbies to allow riders to make informed trip decisions. Depending upon the actual layout of development and distribution of uses, a circulator/shuttle bus may be appropriate to improve accessibility to all areas of the TOD Planning Area and incentivize the use of the Red Line station.

Transportation Summary

An illustrative analysis of future traffic conditions with the TOD Planning Area redevelopment and transit station was prepared based on the densities identified in the Bayview Multi-Modal Market Analysis. This analysis revealed that the planned densities, conservatively consolidated within the TOD Planning Area, can be accommodated with intersection-focused improvements at a few locations. The planned redevelopment provides the opportunity to enhance mobility for all travel modes, and amenities should be incorporated into future plans and designs to accommodate all user groups.

Key Considerations

Based upon the two scenarios that were considered for the future conditions of the MTC project, various key considerations are to be examined in order to determine which elements are most preferred by the City of Baltimore for the project. These considerations need to be vetted in order to advance future plans further. The various options can be combined to create a unique and customized plan for the Bayview MTC site and related TOD planning.

Lombard Street: Boulevard vs. Urban Street

Lombard Street can either serve as a boulevard or urban street in the area. Both options are different in their respect to the pedestrian experience, cost, right-of-way and other elements. The boulevard is more beneficial in terms of pedestrian experiences, with increased landscape elements, such as rain gardens, pocket parks within the spaces of existing buildings and additional green spaces. The urban street concept takes on the feel of a more urbanized space, with less of a focus on landscape and pedestrian elements, and more of a focus on building (office) space. Urban streets tend to have the building setbacks right along the street edge.

Internal development: Spine Road location

The location of the internal roadway, Spine Road, will foster different forms of development and flow in both present and future conditions. The Spine Road location defines development parcels within the area, and dictates whether the road can be extended to the south. For example, if the road were to take a right angle approach within the area, future development is constrained to a smaller section. On the other hand, if the road was extended throughout the area, and connected to the south, any possible future development would have a larger expanse of area.

Parking Structure

Commuter parking demand to address current and future commuter and development parking will need to be identified and considered in order to determine the scale/structure of parking. Two bay and three bay parking structures also need to be considered when identifying the amount of parking needed. The number of bays determine the width of the structure and dictate the number of stories that will be supported, the amount of efficiency of the overall structure, and the block layout and structure of the area. Expansion of parking facilities in the future may be possible through obtainment of additional parcels. Another consideration related to parking structure in the vicinity of the project area is the option of phasing parking or building all at once. Phased parking will increase the amount of available parking slowly over the long term while demand increases.

Bus loop/drop off

Two options exist for creating a bus loop/drop off area. While one option integrates the overall transportation system in the area, the other option segregates the system. For example, if the bus loop/drop off was its own separate area, bus drop off can be more efficient, but green space such as parks and other pedestrian amenities becomes more minimal. On the other hand, if the system

was integrated, bus drop off becomes less efficient but more green space is available.

Taxi and Passenger Kiss and Ride

Similar to the options for the bus loop/drop off system, the taxi and passenger kiss and ride can be either segregated from other transportation uses or integrated all together. Segregated uses increases the efficiency and flow of transit, but decreases pedestrian spaces. Integrated uses decreases the efficiency, but increases pedestrian uses.

Landscape Amenities

There are various landscape amenities and elements to be considered in the development. Different elements can be considered for the approach to Lombard Street, the approach to the internal courtyard of the area, and the approach to the Station Plaza. Each approach may have a different scale of landscape amenities and elements. Generally, two landscape concepts are considered. One of the concepts takes on more of an urban approach, while the other contains more landscape elements.

Long term phasing of adjacent sites

Long term phasing of the adjacent sites should be considered for the future in order to unlock the potential for future development. Future development that could work here includes additional office space, commercial space, and parking. This long term phasing of the adjacent sites assists in absorbing future demand for parking and other uses.

Traditional and Innovative Funding Options

As part of this plan, the City of Baltimore and the Maryland Transit Administration (MTA) seek to explore innovative financial approaches, assess feasibility of these funding sources, and identify and develop strategies to leverage private sector financial participation for the BMC.

A draft of the “White Paper”, prepared by Nexus Infrastructure (Appendix F), provides an overview of the traditional and innovative funding options available for the BMC. The document takes into consideration and discusses the status of transportation funding at the National and State Level, and highlights the financial constraints of recent transportation budgetary cuts by Congress and the State of Maryland.

Under the traditional funding options, the Multi-modal Transportation Center (MTC) is expected to meet the Federal Transit Administration (FTA) criteria for joint projects. FTA funding normally falls under two broad categories – Section 5307,

and Section 5309, also known as the “New Starts” program. The New Starts program is the federal government’s primary financial resource to support locally planned, implemented and operated major transportation capital investments. It is anticipated that the MTC could benefit from as much as 60 percent federal funding if the project was approved under New Starts. The remaining 40 percent would be a challenge for State and City funding, but could be achieved through private sector partnership.

Creative or “innovative finance” options are new approaches to completely fund projects or a supplementary mechanism for the shortfalls of traditional financing options. The White Paper describes several funding options that are directly related to the MTC. As the City and the MTA advance the development of the MTC, these innovative financial approaches should be explored further:

- The Transportation Infrastructure Finance and Innovation Act (TIFIA);
- Special Assessment District (SAD);
- Business Improvement District (BID);
- Tax Increment Financing (TIF);
- Public-Private Partnership (P3);
- Grant Anticipate Revenue/Grant Anticipation Notes; and,
- State Infrastructure Bank (SIB).

The Transportation Infrastructure Finance and Innovation Act (TIFIA)

The TIFIA program provides Federal credit assistance in the form of direct loans, loan guarantees, and standby lines of credit to finance surface transportation projects of national and regional significance. As it pertains to the BMC, TIFIA’s applicability includes:

- The provision of attractive financing terms despite project uncertainty (such as timing and cost of Red Line);
- Potential to attract private funding given its credit advantage; and,
- Funding to acquire real property that’s associated with the transportation project.

TIFIA funding requires that the project has a minimum capital cost of \$50 million, and that the project is consistent with the transportation plan of the state.

Special Assessment District (SAD)

Another innovative approach to funding the MTC is the Special Assessment District (SAD) approach. The SAD approach is one that allows the financing of public improvement projects, like the MTC, by distributing the cost of the project over those property owners who will reap a direct benefit. The City could designate a SAD around the MTC site, that encompasses all or part of the General Impact Area. The special assessment would be levied against real estate parcel to include residential homes, corporations, and institutions, even though one or more may be tax exempt.

The SAD approach was implemented in Baltimore County where locally administered tax increment financing revenue will be used to pay for parking garages at the planned Owing Mills transit oriented development.

Business Improvement District (BID)

An alternative to the SAD approach would be the Business Improvement District (BID) Approach. The BID approach allows for the delineation of an area around the MTC site within which businesses as well as property owners pay an additional tax or fee in order to fund improvements within the district's boundaries.

Although BIDs are not typically associated with transportation related projects, a rare and nearby example of a successful implementation of the BID approach demonstrates that it is possible. The New York Avenue Metro Station in the NoMa area of Northeast Washington, DC was developed through the BID process with business and community leaders recognizing the opportunity of an economic transformation as a result of building a transit station.

Tax Increment Financing (TIF)

Tax Increment Financing (TIF) is a financing mechanism used primarily in redevelopment and improvement projects. TIF allows municipalities to use future tax gains as a bargaining chip for current development. The State of Maryland has issued over fifteen TIF bonds with a value of over \$273 million.

As it relates to Bayview, the City could allocate future expected tax revenues to issue bonds that fund part of the project development. TIF could also be used as a repayment option; for example, for TIFIA loans.

Public-Private Partnership (P3)

Public-Private Partnership (P3) are becoming increasingly popular for major capital projects because its potential for accelerated project delivery, increased project financing and project risk sharing.

One form of P3 arrangement is a joint development, involving a real estate project with cooperative arrangement between public and private sector partners for a transit oriented development. These arrangements can take various forms, such as lease or sale of land, air rights, or air space to developers, as well as joint construction. Cost, revenues and risk can be shared by each party. If joint development includes federal funding, then it would follow their guidelines.

Since the MTC is not expected to generate significant operating revenues, a private operator would be unlikely. However, financial investment could be repaid through other value capture approaches.

Grant Anticipation Revenue Vehicles & Notes

Grant Anticipation Revenue Vehicles (GARVEEs) are security instruments issued to advance funding, which will be repaid using revenue expected from a specific source. These instruments allow the acceleration of construction and spread out the cost of the facility over its life. Grant Anticipation Notes (GANs) are normally used by transit agencies to borrow against future federal funds, which are anticipated in the short term (at most two years) because of annual congressional revues.

The MTC should be a good choice for GAN funding. The MTA and City would require funding over a one-year period through Full Funding Grant Agreement (FFGA) for New Starts.

State Infrastructure Bank (SIB)

A State Infrastructure Bank (SIB) is a revolving fund mechanism for financing a wide variety of highway and transit projects through loans and credit enhancement. SIBs are designed to complement traditional Federal-aid highway and transit grants through flexibility for financing infrastructure investments.

The State of Maryland does not have a SIB, but there are ongoing discussions to establish one. The City and the MTA could explore this option, which would allow funding at a lower overall cost.

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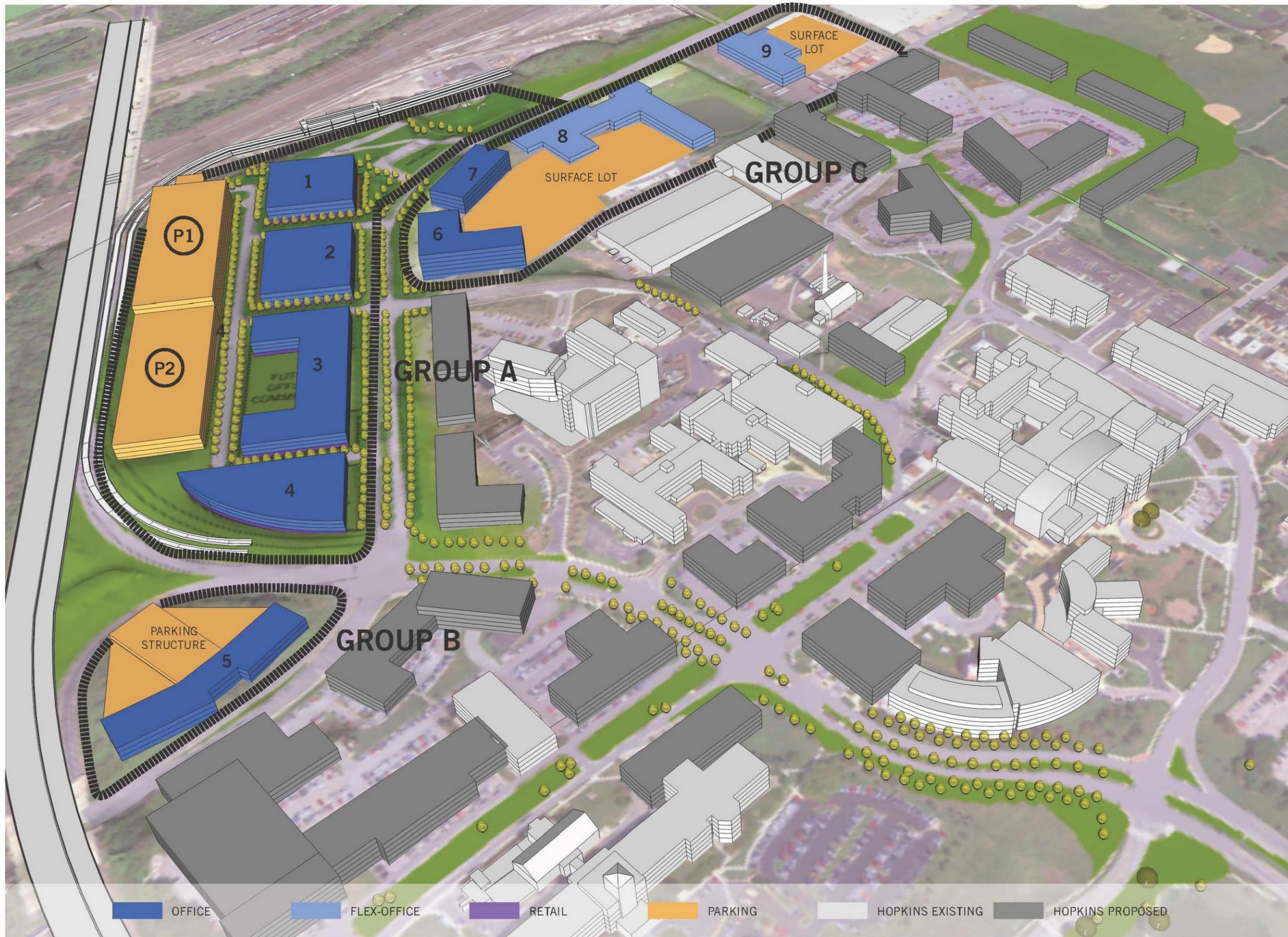


Figure 4.1 | Bayview Multi-modal Future Conditions Massing

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Source: Bing Maps - Aerial; ESRI Boundaries

Figure 4.2 | TOD Planning Area Framework

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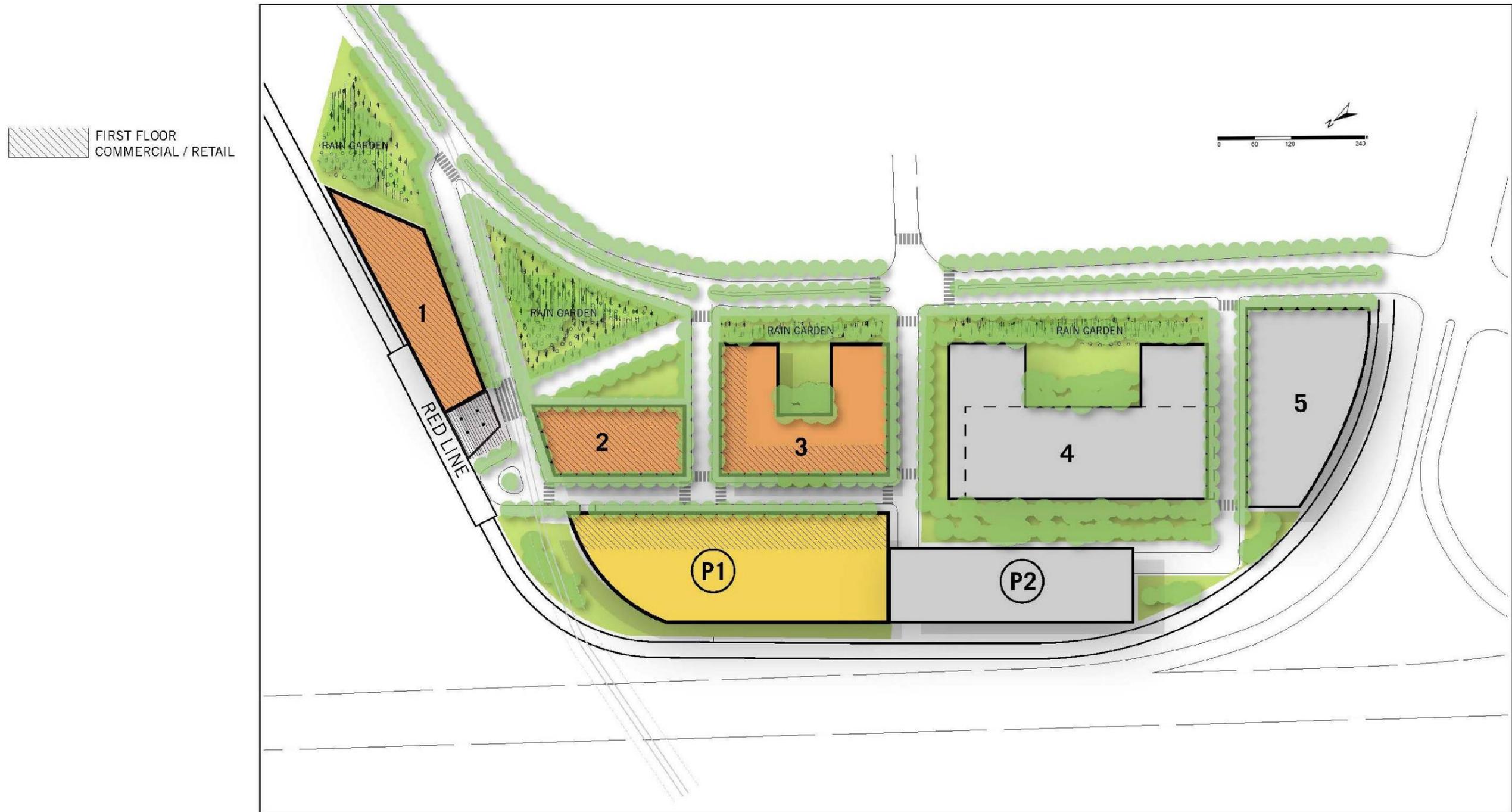


Figure 4.3 | Scenario 1: Parkway/Boulevard Conceptual Plan

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Figure 4.4 | Scenario 2: Urban Street Conceptual Plan

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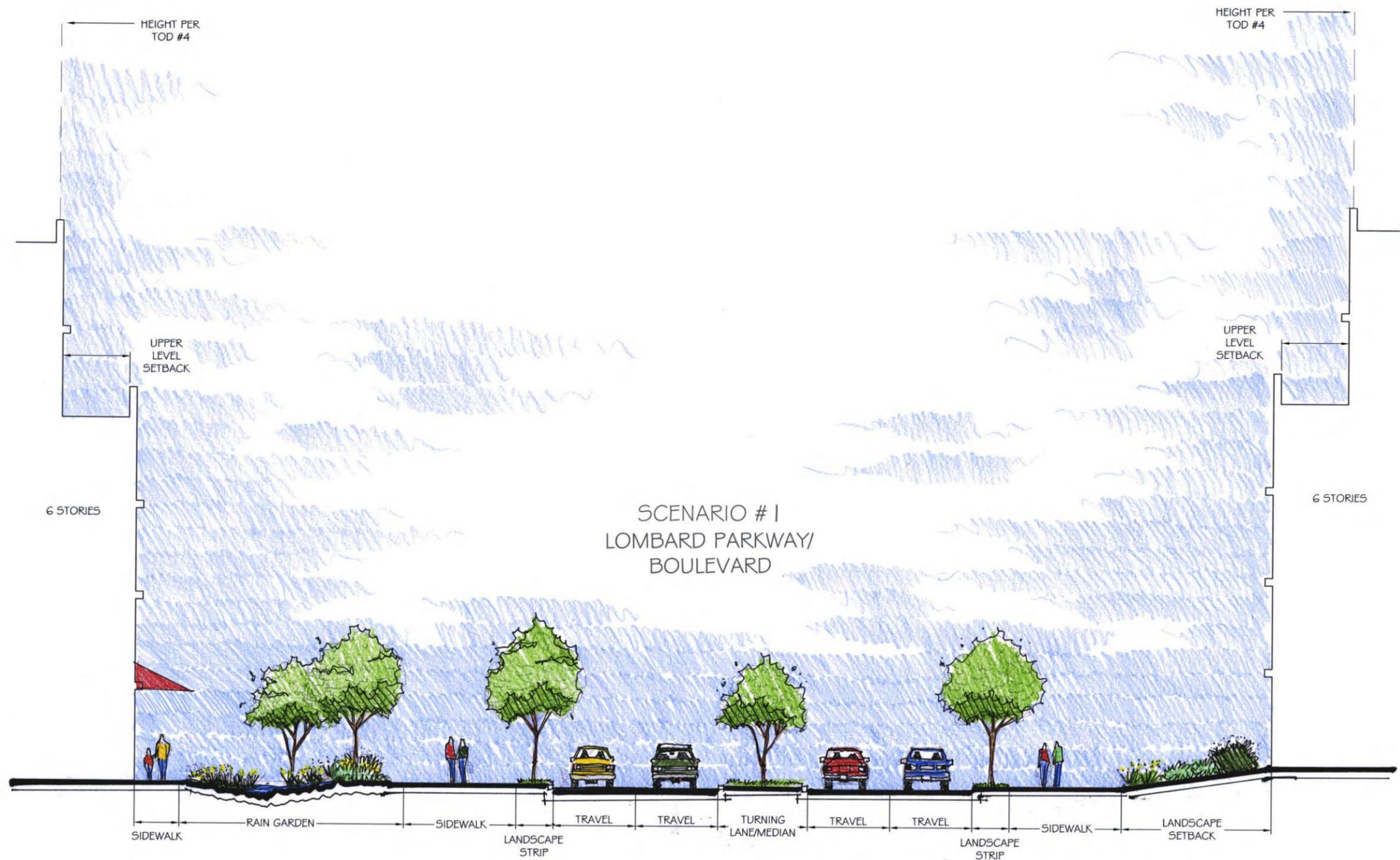


Figure 4.5 | Scenario 1: Parkway/Boulevard Cross-Section

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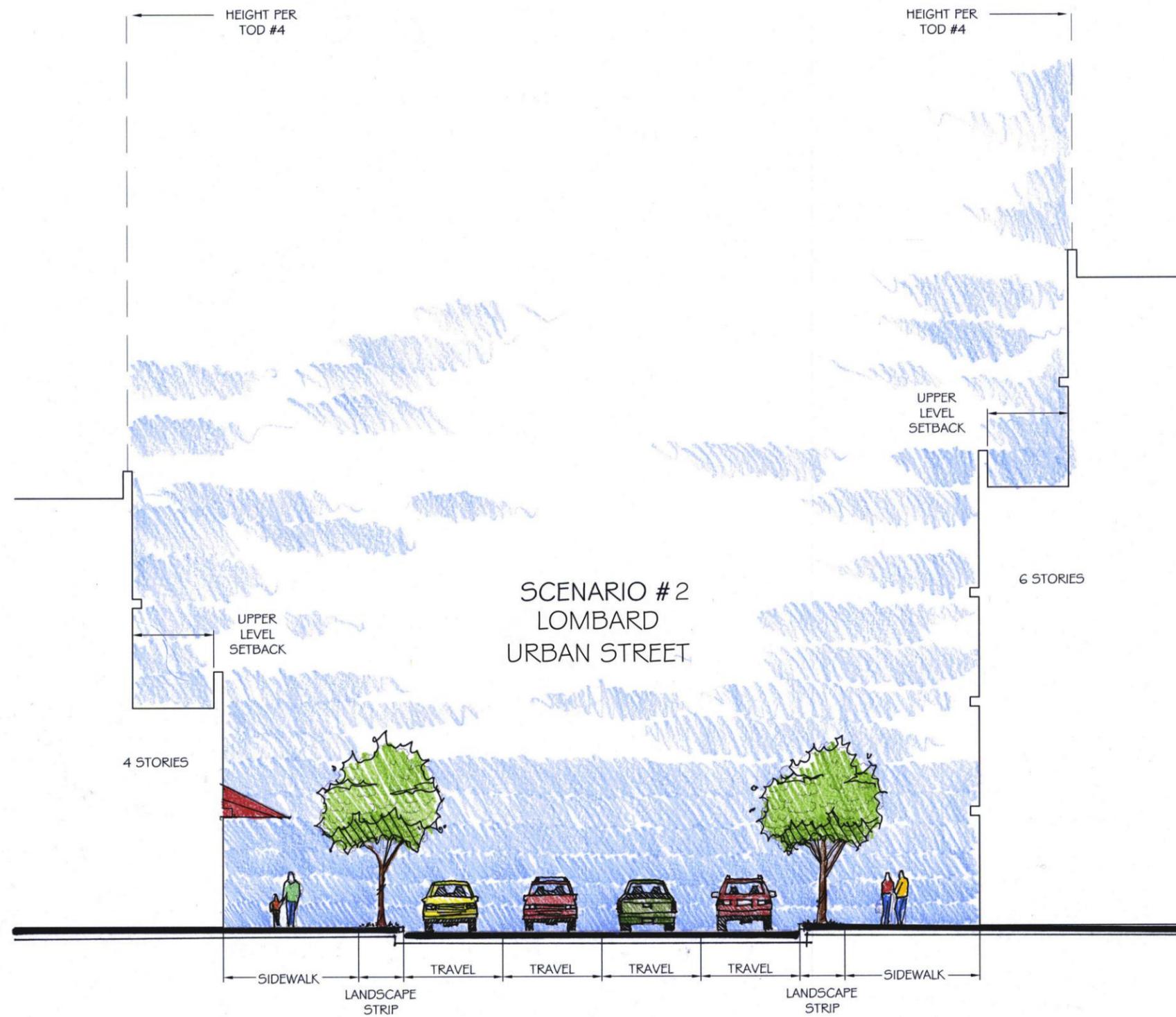


Figure 4.6 | Scenario 2: Urban Street Cross-Section

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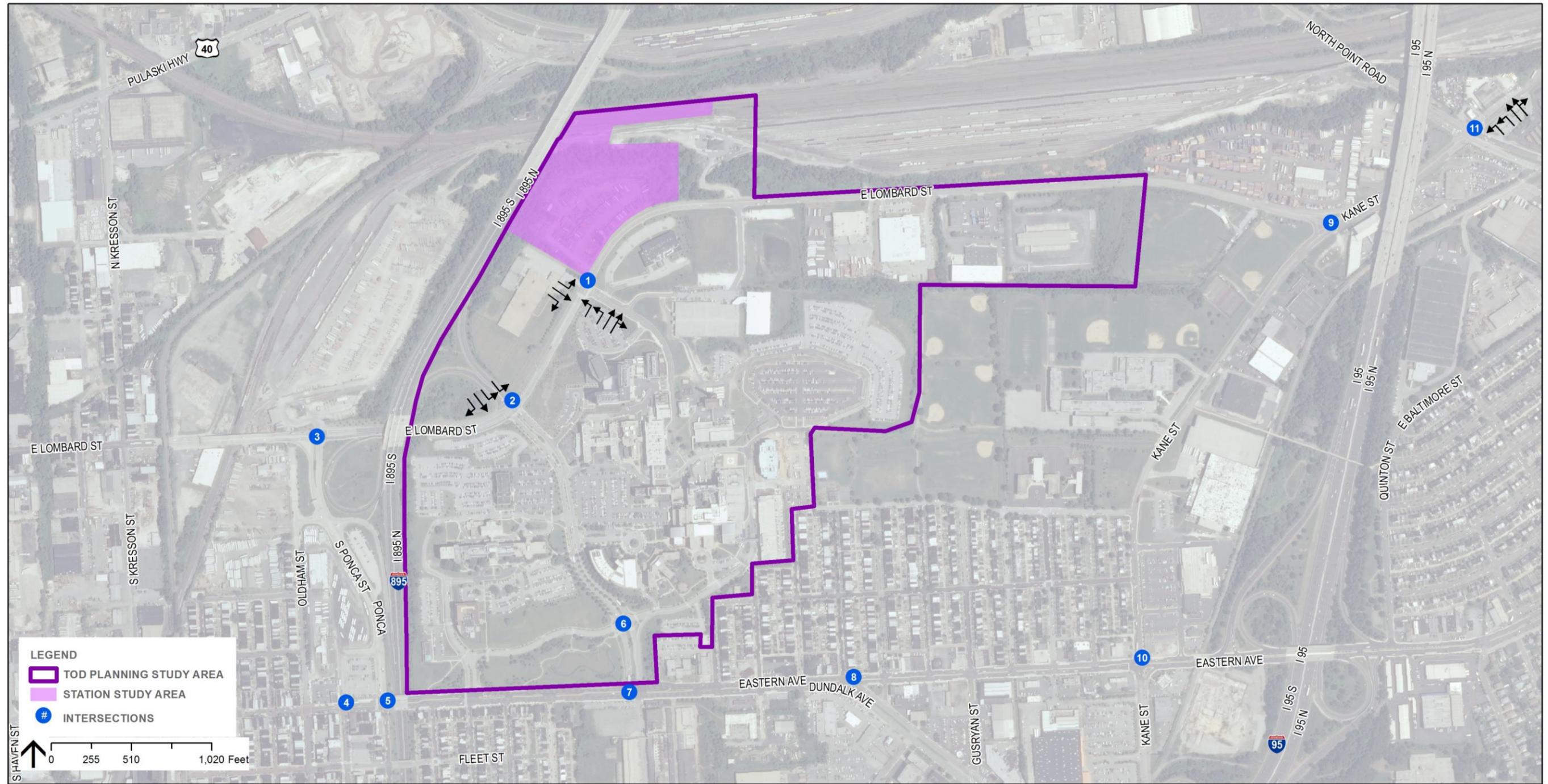


Figure 4.7 | Lane Improvements

Planning for the Bayview Multitodal Transit Center and associated development has illustrated the potential for the creation of an identifiable place at the intersection of healthcare, research, highways, and transit. The MTC will serve as a key interchange point between transportation modes that will benefit the City of Baltimore and the region. Also, the MTC can serve as an attractive location for mixed-use, transit-oriented and transit-supportive development. Drawing upon the strength of and integrating land use with the adjacent Johns Hopkins Bayview Campus, a high-quality, attractive development pattern can materialize over time.

This planning effort has identified a number of important considerations with respect to the existing conditions of the MTC planning area, has identified the potential for redevelopment in the station vicinity, and has provided illustrative visions of how this development could take place and integrate into the surrounding urban fabric. While the potential is compelling, a number of additional steps are required to bring this vision to reality. Some of the most critical activities include:

- **Finalize the plans for the Red Line alignment.** As the planning for the MTC and transit-oriented development have proceeded, the concurrent planning of the Red Line has evolved. Numerous alternative alignments, have been presented and have evolved over time. As the Red Line design continues, further refinements are likely. In order to understand the property availability and how the Red Line will integrate into this development area, the location of the Red Line will need to be finalized.
- **Finalize phase one parking plan.** As currently envisioned, the MTC will include a surface parking lot as the transit facility opens. The configuration of this parking lot is dependent upon access to adjacent property and is influenced by the location of the Red Line. Furthermore, it may be possible to construct a parking garage as part of the first phase to avoid the need for replacing surface parking over time.
- **Determine / confirm zoning.** While the planning for the MTC has progressed, the City of Baltimore has been proposing changes to the zoning requirements for the area. As the plan is finalized, the zoning for the area will need to be consistent with the intended vision.
- **Study costs of Lombard Street improvements.** The proposed plan envisions improvements to Lombard Street both to improve the aesthetic character of the roadway, but also to allow effective access to the MTC and to better integrate the station area with properties to the south and east of Lombard Street. It will be necessary to complete a more detailed conceptual design and cost estimate for the proposed improvements to this important thoroughfare.
- **Analyze operations for bus and taxis.** As the plan for the MTC is advanced, more detailed assessment of bus loading, unloading, circulation and queuing needs will be required. Additionally, the requirements for taxicabs and pickup/dropoff by shuttles and private cars will need to be assessed.
- **Coordinate with Station specific design.** The Maryland Transit Administration has also been designing the MARC commuter rail station concurrently with this planning process. During design, the elements of the station design will need to coordinate with the Red Line design, the bus station design, the commuter parking facilities, and the associated development in the MTC area.
- **Coordinate landscape design.** The planning area includes the transit stations, a core redevelopment site, and property owned by other parties. As the project moves forward, landscape can serve as a critical tool to integrate the MTC into the surrounding development and to tie together surrounding properties.
- **Determine the business model for advancing the plan.** The Bayview MTC and surrounding development is planned in an area that includes a variety of large-scale institutional land owners and owners of smaller individual parcels. Additionally there is the potential for long-term, self-supporting development enabled by the public investment in transportation facilities. The plan provides for a range of implementation options including public-private partnership, ground lease, or City of State development leadership. Through consideration of the business model options for the MTC, the City and MTA may be able to encourage a more rapid implementation of the plan.
- **Coordinate with Stakeholders.** Although there has been dialog concerning the Bayview MTC as part of the Red Line planning and environmental review process, the surrounding land owners, and the public at-large may have suggestions to improve the vision developed through this study. Coordination with these groups would strengthen the plan and potentially aid its implementation

