



APPENDIX A
EXISTING AND FUTURE CONDITIONS TECHNICAL REPORT
DECEMBER 2022

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EXECUTIVE SUMMARY

This document details the existing conditions that will impact the planning of a transit option along the East–West Essex to Ellicott City) corridor. This corridor has long been considered an important connection for opportunities across Baltimore City, Baltimore County, and Howard County. Hundreds of community members and stakeholders have been invested in bringing additional fixed route transit to this corridor for many years. Today, this corridor still stands out as one that is ready for transit improvements. The data to support this and lead the planning effort is laid out in three sections:

- Corridor Market Analysis
- Transit and Travel Flow Analysis
- Land Use and Development

Demographics, travel patterns, and land use are divided along this corridor as it extends from urban core to suburban and rural landscapes. This diversity across the corridor does not detract from the need to establish a fixed transit connection; however, it does provide meaningful context for planning and implementation. The following describes the major takeaways from each of these areas of analysis.

Activity Generators

Jobs and population densities supportive of high-capacity transit are primarily located in Baltimore City. However, there are pockets of high activity in the suburban zones that are anchored by major employers like UMBC, CMS, Social Security Administration, the Howard County government, and Ellicott City businesses.

Within the city, activity generators are split east of the downtown core. Following north and east, Johns Hopkins Hospital main campus is a major generator. Following south and east, attractions close to the water like Fells Point Main Street, Canton Crossing, and Harbor Point/Harbor East are also major generators.

Trip Patterns

Trips within the corridor are not long; 80 percent of trips are less than five miles and 42 percent of the trips within the corridor are less than two miles in length. This indicates that residents along this corridor are traveling not only to their jobs but also to local services and attractions.

Regional Transit Connections

This study area is served by MTA Local, Express, and CityLink services, RTA Route 405, and MARC commuter rail. Furthermore, in the future, the US 29 Flash BRT from Montgomery County is planned to intersect this corridor and terminate in Mount Hebron. There is demand for major connections from Columbia and Howard County to Normandy, Ellicott City, and Catonsville as well as from Essex and Dundalk to downtown, Bayview, and Johns Hopkins Hospital.

Transit Use

In addition to downtown Baltimore City areas, where transit usage is higher, some additional corridors stand out in terms of existing transit ridership. Edmondson Avenue, in the western part of the corridor, and Fayette Street and Eastern Avenue, in the eastern part of the corridor, not only cluster ridership activity but are also highly traveled through corridors.

Land Use and Development

Today's major trip generators have zoning consistent with high employment, major shopping, higher education, and dense housing. Neighborhoods with the highest vacancy rates and lowest land values have the potential to be the focus of future investment. Concentrated west of Poppleton to Edmondson Village and the Uplands neighborhood and along parts of Baltimore National Pike in Baltimore County, development incentives coupled with a major transit investment could increase these areas' potential for new growth by linking them to some of the region's most popular

destinations, emerging projects and centers, and major north-south rail connections of MARC, Metro Subway and Light Rail.

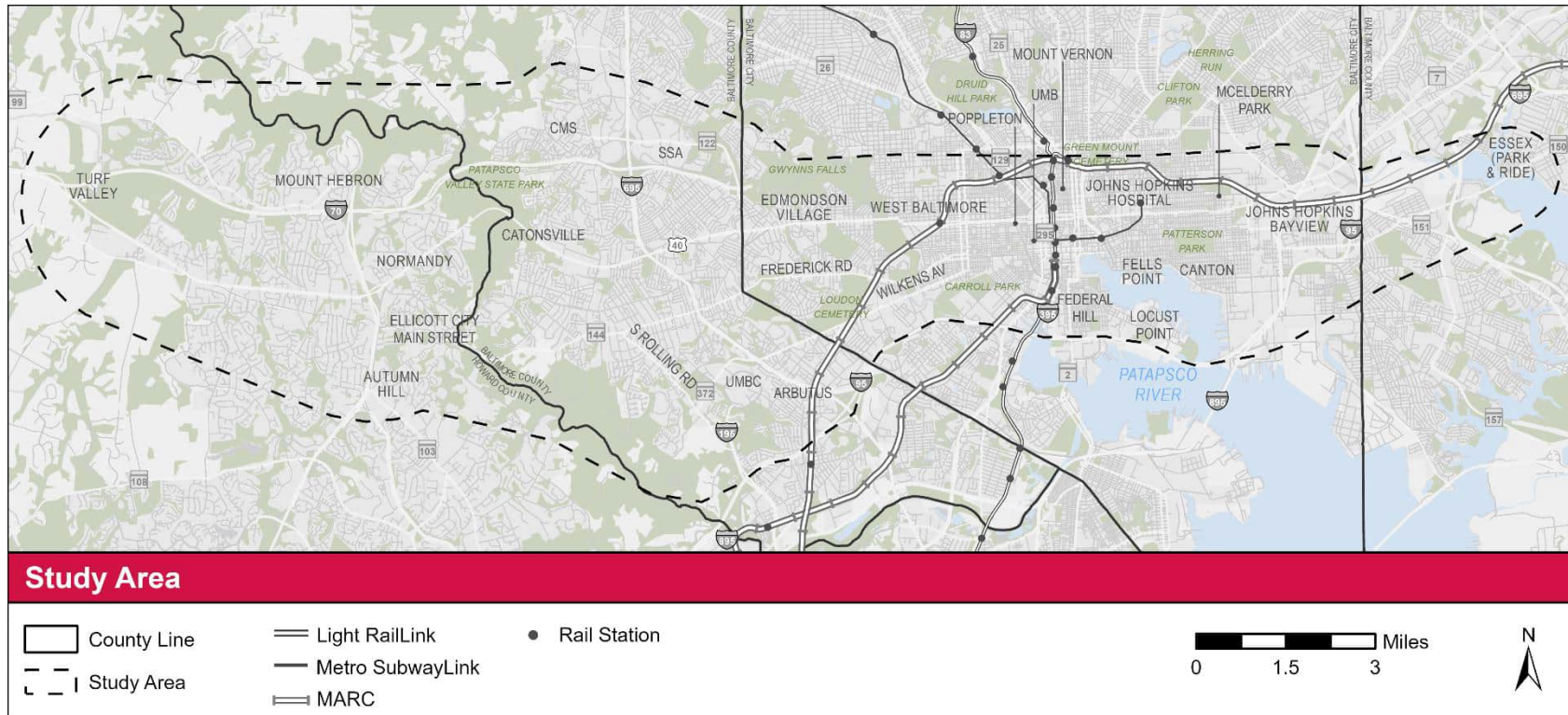
INTRODUCTION

The existing conditions analysis summarizes current and future demographic, travel patterns, and transit services information to create a baseline understanding of conditions along and around the Essex to Ellicott City Corridor. This study area extends from Turf Valley to Ellicott City, to West Baltimore, through downtown to Bayview, and ending at the Essex Park & Ride. It includes the University of Maryland, Baltimore County campus, CMS and Social

Security Administration offices, and other major employers within Howard and Baltimore counties. Overall, this analysis includes a:

- Corridor market analysis which includes demographics, transit propensity, and employment characteristics.
- Transit and travel flow analysis, which includes existing and future travel patterns, and existing transit use.
- Land use and development analysis which includes current land use, zoning, parcel values, and planning and development.

Figure 1: Study Area



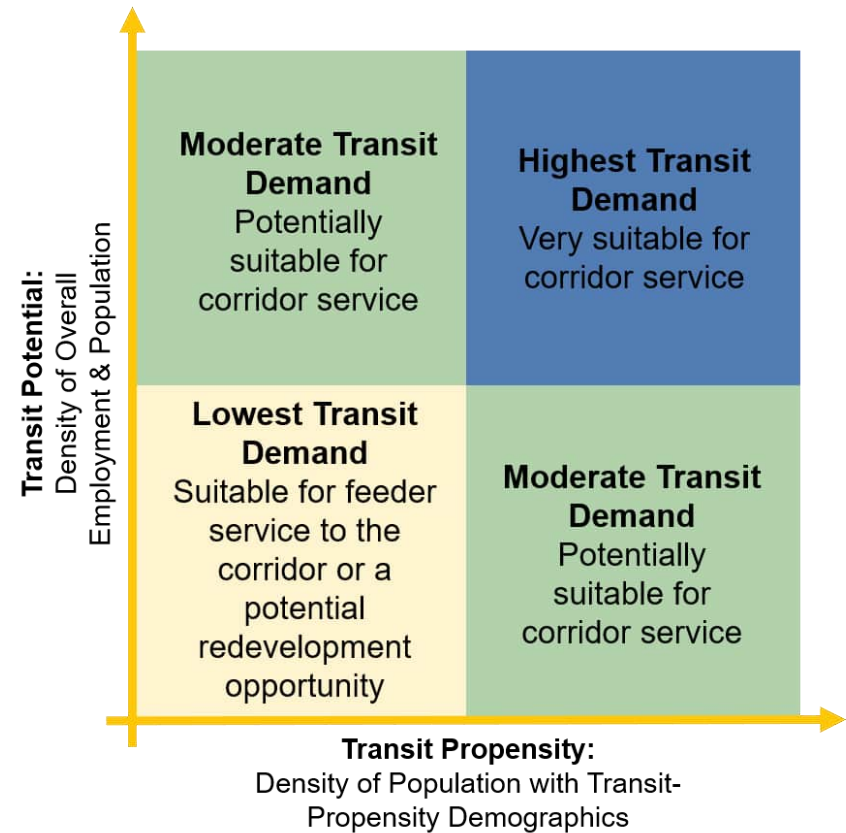
Corridor Market Analysis

A market analysis assesses the makeup of a region’s residents and workers and the distribution and density of locations at which they live, work, shop, or play. This analysis is useful in corridor planning as an indicator of where transit is supported as well as the frequency and type of transit.

The market analysis is conveyed through two parts: **Transit Potential**, which identifies areas with a density of jobs and population that meets the minimum threshold to support fixed-route transit, and **Transit Propensity**, which looks at the socioeconomic characteristics of population and jobs to pinpoint the highest demand for transit.

Areas with a high transit potential and a high transit propensity (represented in the blue, upper-right quadrant of Figure 2) have the highest transit demand and are very suitable for corridor service. The results of the market analysis help inform planners where the corridor’s alignment should be (i.e., the specific routing of the transit service) and where and how frequently stops or stations should be placed.

Figure 2: Market Analysis Results



Transit propensity combines different demographic, employment, and geographic characteristics into indices that identify where low, moderate, and high propensity for transit use is located within the study area. These measures are then weighted based on their relevance to transit ridership to generate a score for each census block group in the study area on each of the four primary propensity indices, shown in yellow in Figure 3.

Each of the primary indices comprises one or more “analysis factors” (Table 1). In accordance with MDOT MTA’s Title VI policies, the income threshold used for this analysis was an average household income of \$45,000 per year. This analysis used 2018 ACS data and 2017 LEHD/LODES data. For a full listing of the datasets that make up each index, see the Attachment at the end of this appendix.

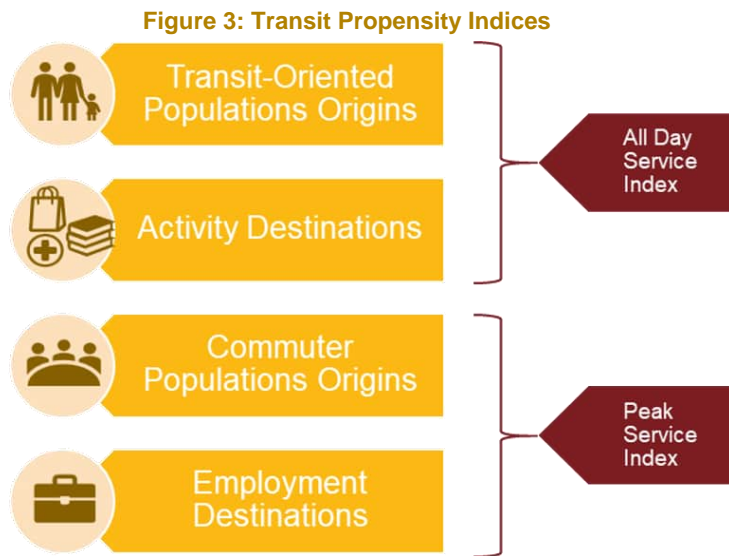


Table 1: Population and Datasets used for Primary Transit Indices

	INDEX	VARIABLE	DATASET
PRIMARY INDICES	Transit-Oriented Populations Origins	Population	Total Population
			Non-White or Hispanic Population
		Age	Seniors
			Youth
		Income	Population at or below \$45,000 Household Income
		Vehicle Ownership	Zero-Car Households
	One-Car Households		
	Disability Status	Population with a Disability	
	Commuter Population Origins	Labor Force	Labor Force Size
			Employed Persons
	Employment Destinations	Non-Single Occupancy Vehicle (SOV) Commute Mode	Commuters
			Non-SOV Commuters
	Employment Destinations	Employment	Jobs
	Activity Destinations	Retail & Restaurant	Retail Jobs
Restaurant Jobs			
Recreation		Entertainment / Recreation Jobs	
Healthcare & Social Assistance		Healthcare & Social Assistance Jobs	
Education		Education Jobs	
Government		Public Administration Jobs	

In addition to the four primary indices, there are two combined indices that incorporate the variables to identify where the highest propensity for transit use exists at specific times of the day. For example, an employment center with a high density of jobs may have a high employment destination index score, but this high level of demand may exist only at peak commuting times due to the lack of other activity generators in the area. Table 2 shows which variables and primary indices make up each of the two combined indices.

Table 2: Variables and Datasets used for Combined Transit Propensity Indices

	INDEX	VARIABLES / PRIMARY INDEX DATASETS
COMBINED INDICES	Peak Service	Higher number of Commuter Population Origins or higher Employment Destinations Scores
	All-Day Service	Higher number of Transit-Oriented Populations Origins or higher Activity Destinations Scores

Transit Potential

Transit Potential measures the density of jobs and population in the corridor. The denser an area, the more supportive of fixed-route and high-frequent transit.

Figure 4 shows the rural-to-urban Transect, depicting six zones of increasing density (plus a special district for uncategorizable specialty uses). The lines extending to the right next to the types of transit indicate what zones are suitable for that type of transit. For instance, fixed-route transit service is suitable in the suburban zone (T3) and denser, but not in the natural or rural zone.

The maps in this section visualize current and projected population and employment density in five breaks (Figure 5). The lowest density category, of one to five jobs and people per acre, is typically not supportive of transit. A density of more than five people and jobs per acre is supportive of transit, and densities of 30 or more people or jobs per acre is supportive of high-capacity and frequent transit.

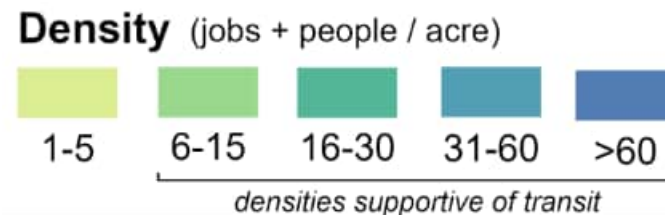
The transit potential analysis in this section uses population and employment projections from the Baltimore Metropolitan Council's (BMC) Round 9A Cooperative Forecasts, updated as of July 2020. Current and future year conditions are represented by 2020 and 2045 model data, respectively. The geographic divisions used for this analysis are Transportation Analysis Zones (TAZ).

Figure 4: Rural-to-Urban Transect



Reference: Congress for New Urbanism

Figure 5: Transit Potential Density Legend



Current and Projected Population and Employment Density

Figure 6 shows the population and employment density within the study area in 2020, represented as the total number of people and jobs per acre. The highest density areas are in Mount Vernon, Midtown, Downtown, the Inner Harbor, and at Johns Hopkins

Hospital. Most of the areas that are too sparsely populated with households and employment to support any transit are in the western half of the corridor, although there are some small pockets of low density throughout Baltimore City as well.

Figure 6: Current Population and Employment Density

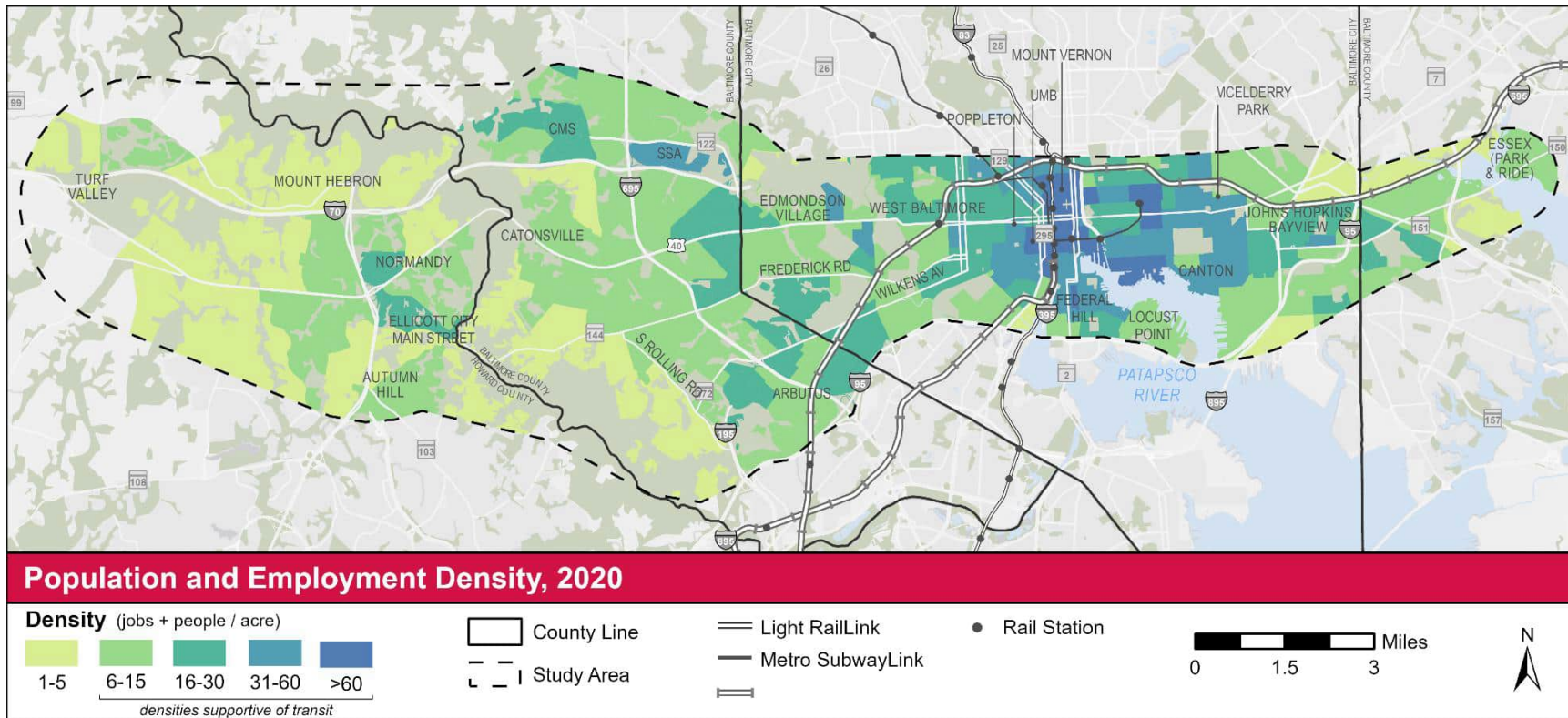
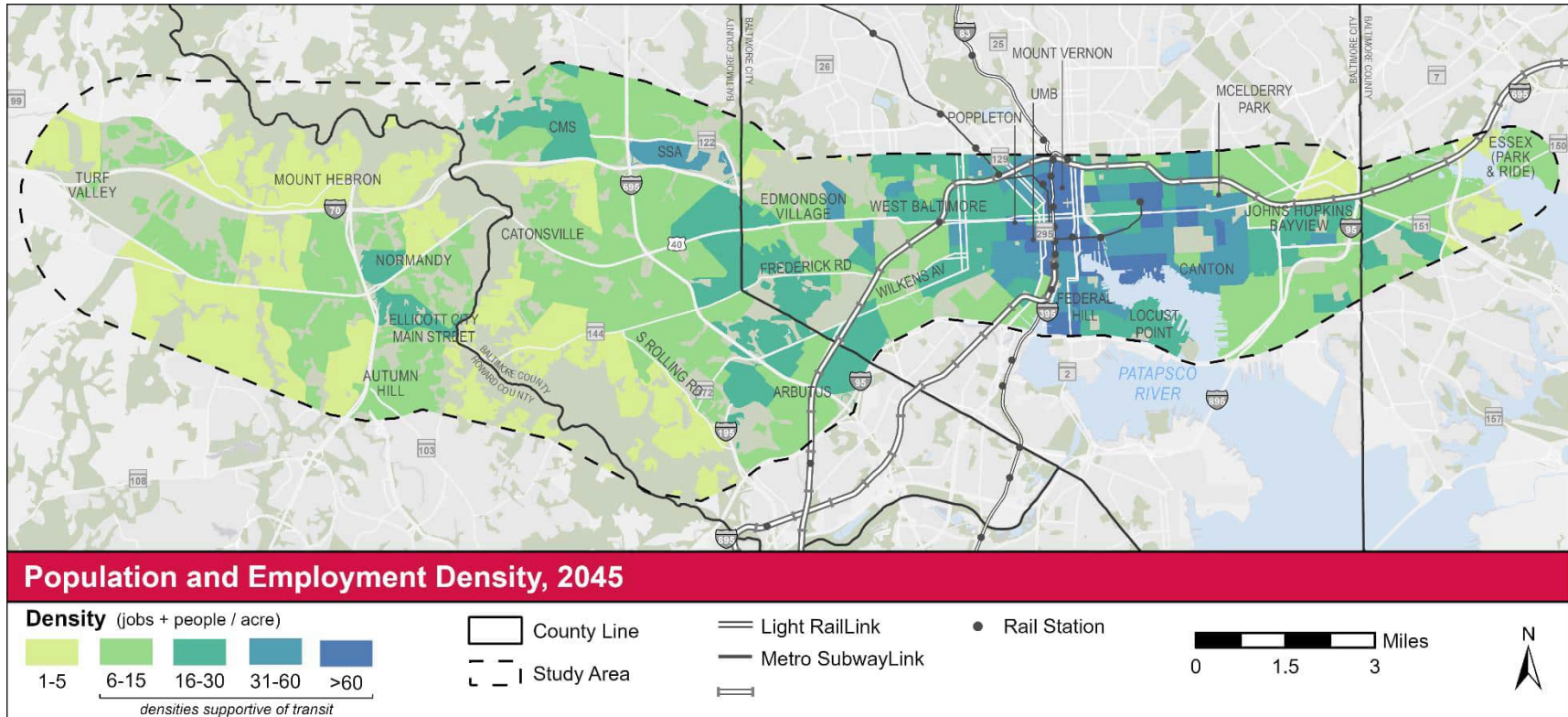


Figure 7 shows the projected population and employment density in 2045. Areas that are projected to enter the highest density tier by 2045 include Poppleton, the BGE Spring Gardens Facility, McElderry Park, and Highlandtown. Areas that were not dense enough to

support transit in 2020 but are projected to clear that threshold in 2045 include the industrial area east of Canton, Point Breeze, in Baltimore City, as well as several parts of Howard County: Turf Valley, Font Hill, Autumn Hill, and Normandy.

Figure 7: Projected Population and Employment Density



Transit Propensity

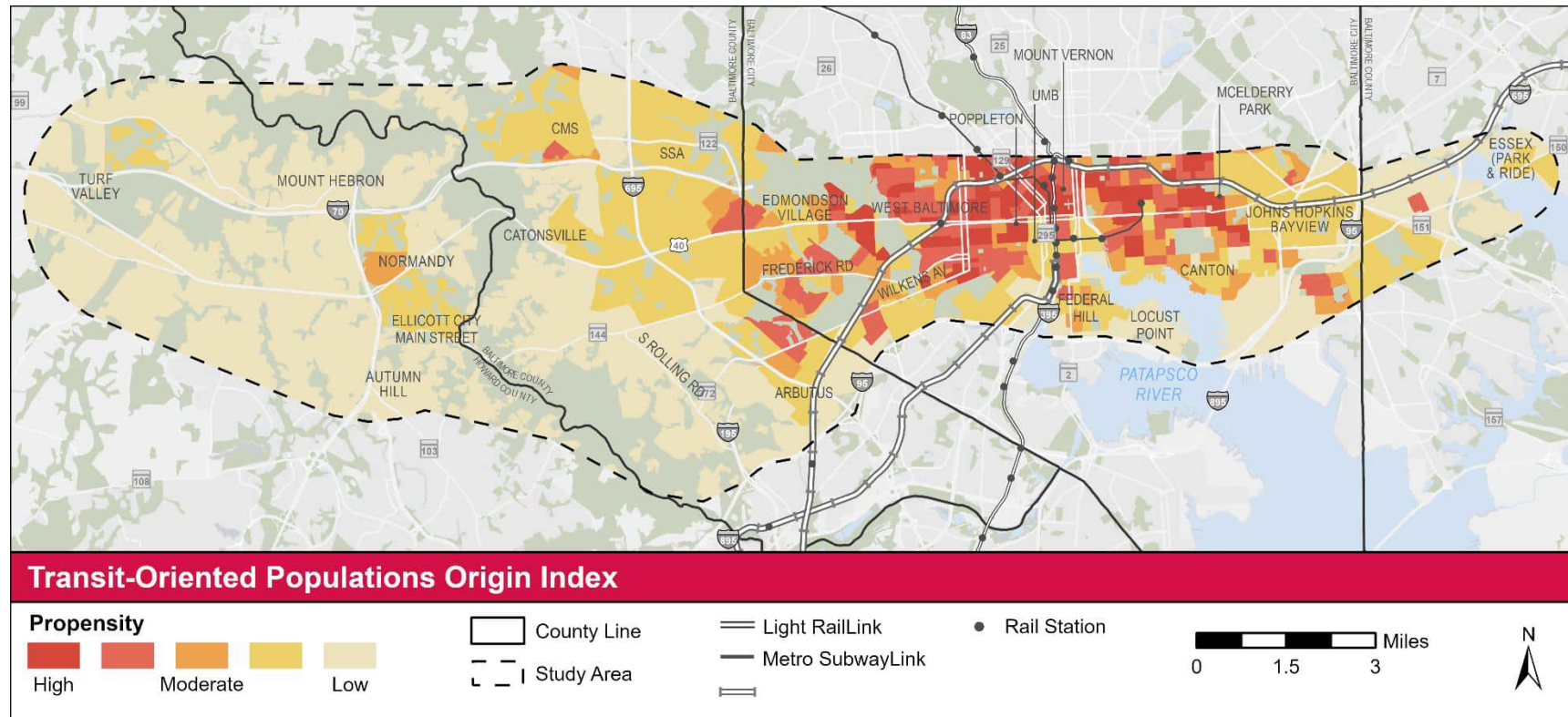
All-Day Transit Suitability

Transit-Oriented Populations Origin Index

The Transit-Oriented Populations Origin Index shows where residents who are likely to use transit live. This includes populations of young people and older adults, low-income residents, households with one or fewer cars, persons with disabilities, and minority households. Areas with high concentrations of these populations are more likely to need all-day, local transit services.

The transit-oriented populations origins with the highest propensity for transit include most parts of Baltimore City's core downtown and surrounding neighborhoods, in addition to neighborhoods on the western side like Edmondson Village and Yale Heights and the neighborhoods north and east of Patterson Park. The areas near the Centers for Medicare and Medicaid Services (CMS) and Eastpoint Center are also high in transit-oriented populations (Figure 8).

Figure 8: Transit-Oriented Populations Origin Index

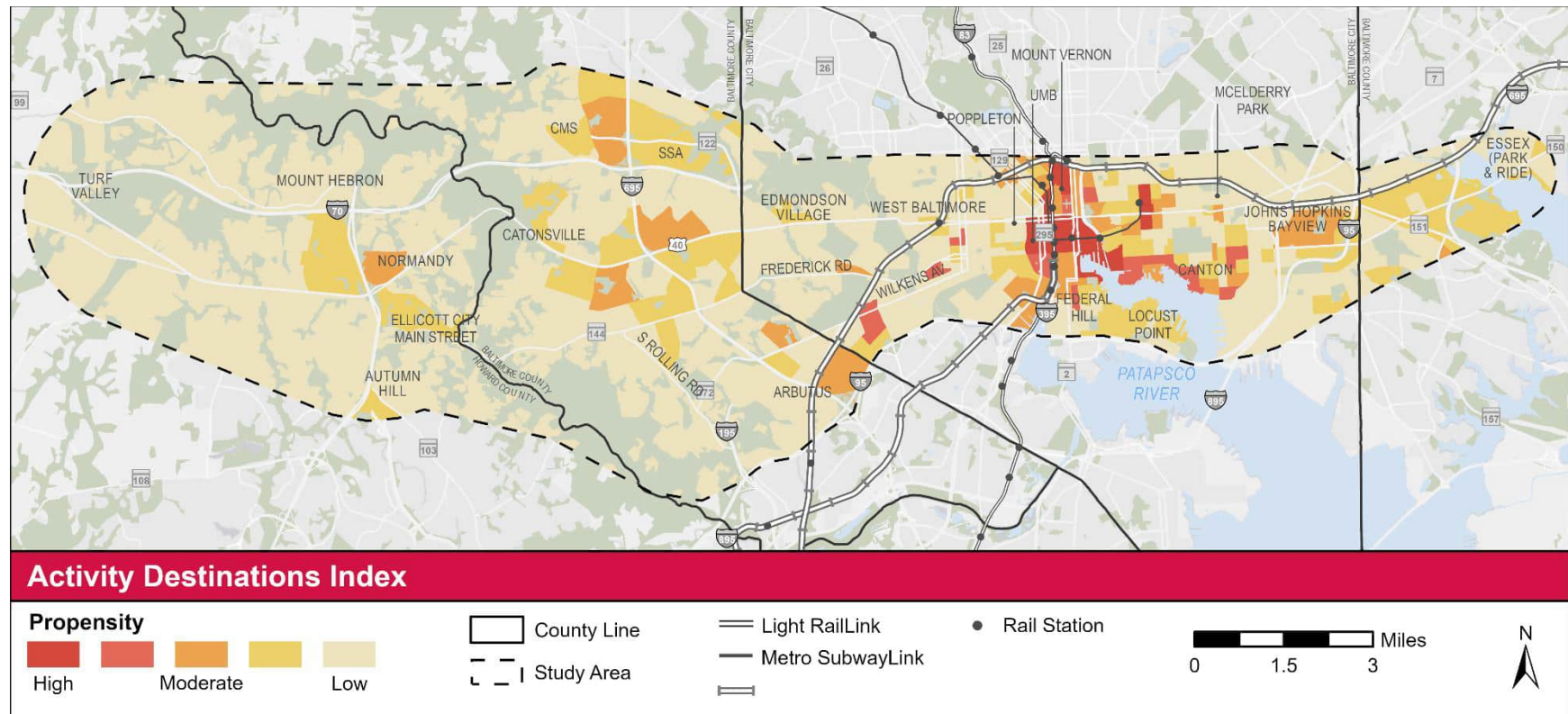


Activity Destinations Index

The Activity Destinations Index illustrates work destinations where residents might use transit to travel either for non-work trips or for lower-wage service jobs. These destinations include retail, restaurants, recreation, health care, social assistance, education, and government. Areas with high activity destination propensity benefit from both all-day local service and peak hour high frequency service.

The activity destinations with the highest propensity for transit include downtown Baltimore/Inner Harbor (overwhelmingly more than anywhere else in the study area), Johns Hopkins Hospital, Mount Vernon, Fells Point, and Violetville. There are no areas of high propensity outside of Baltimore City, but there is moderate propensity in Arbutus, Charlestown, Westview Park, Catonsville Main Street, the Security Square Mall, and in Normandy (Figure 9).

Figure 9: Activity Destination Index

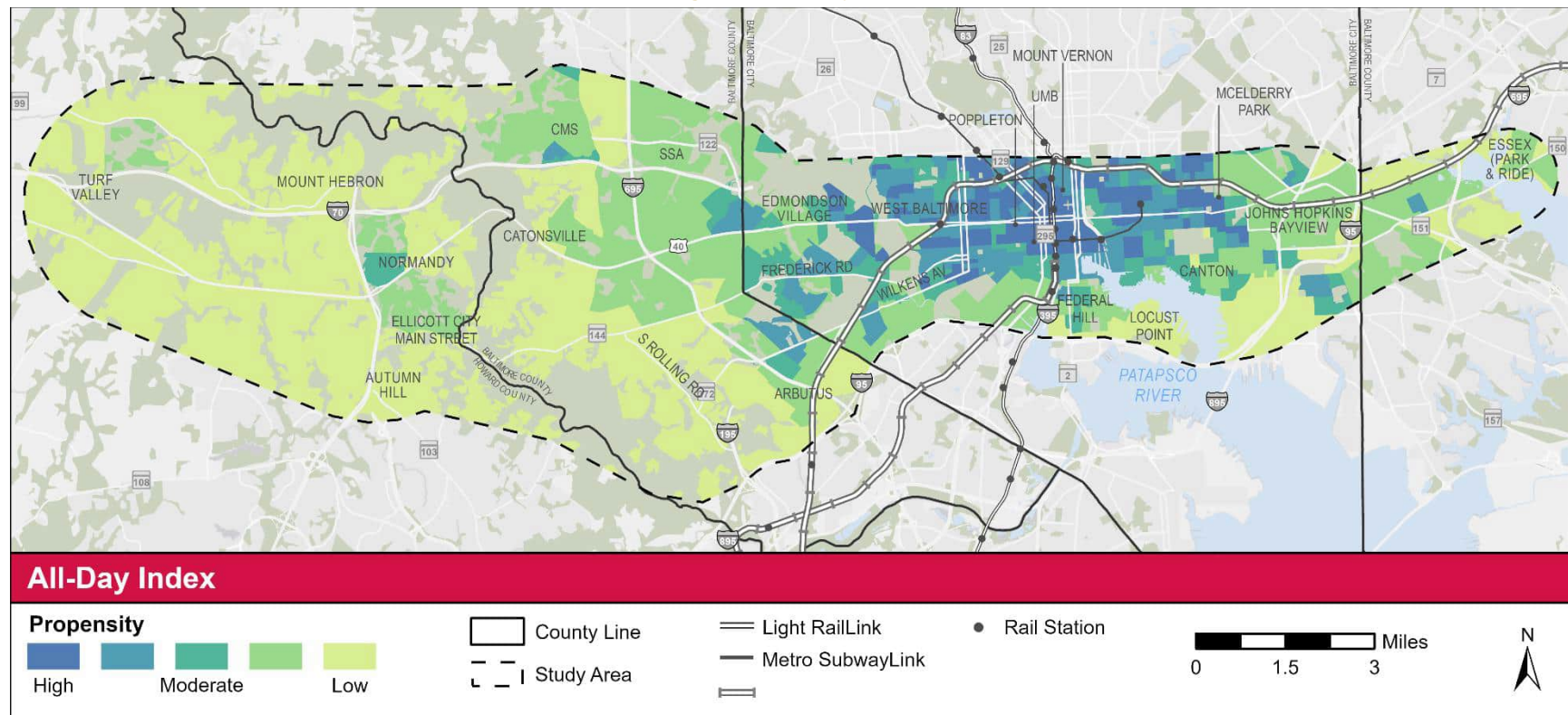


All-Day Index

The All-Day Index is a combination of the Transit-Oriented Populations Origin and Activity Destinations indices. Transit-Oriented Populations are likely to use transit to get to the everyday destinations represented in the Activity Destinations Index. By combining these measures, the All-Day Index represents areas that can serve as origins or destinations at all times of day and thus would benefit from service throughout the day.

The areas with the highest propensity for all-day service aligns almost identically with the Transit-Oriented Populations Origins Index map, including most parts of Baltimore City in the study area: Yale Heights, West Hills, and the area near the Centers for Medicare & Medicaid Services (CMS), Poppleton, Downtown, Mount Vernon, McElderry Park, Oldtown, and Eastpoint Center (a shopping center opposite Eastpoint Mall) (Figure 10).

Figure 10: All-Day Index

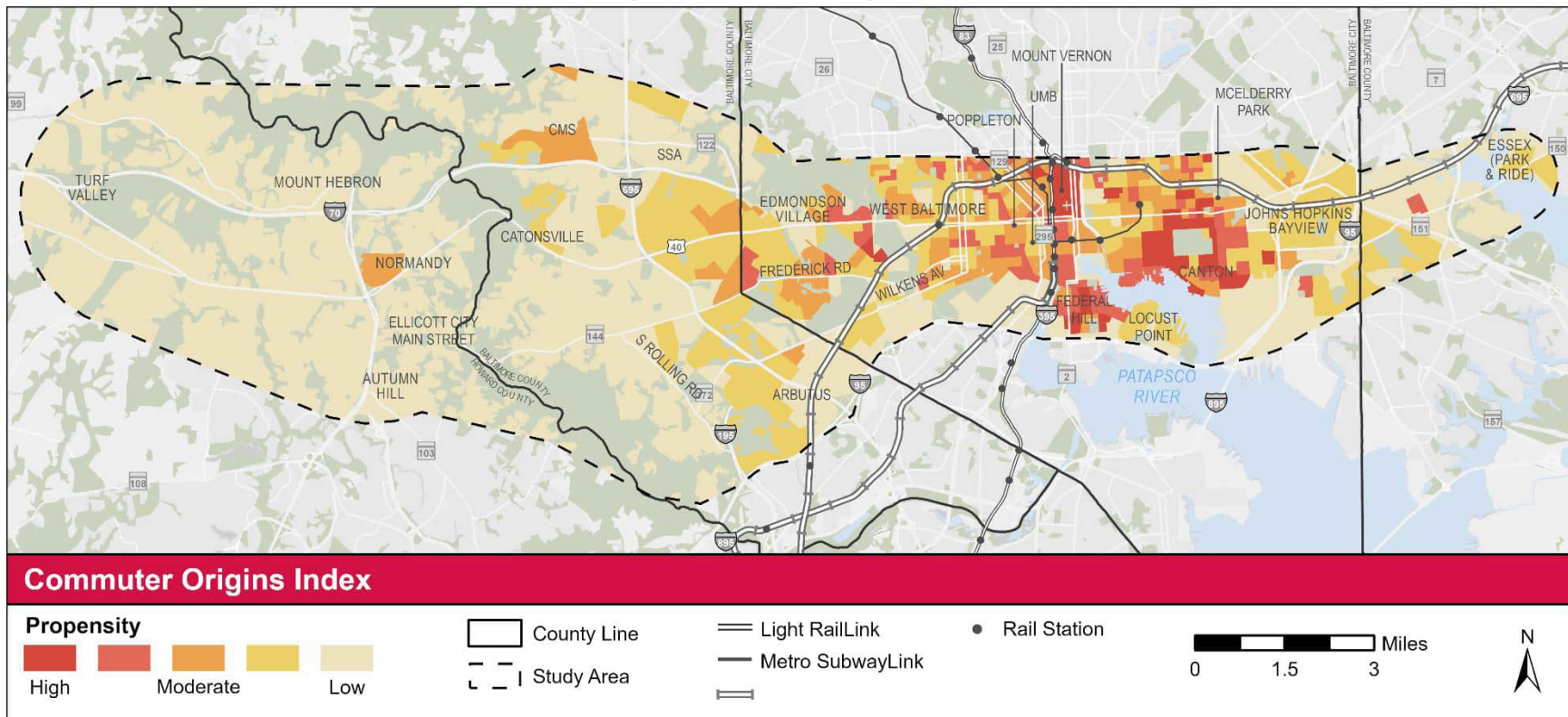


Peak Transit Suitability
Commuter Origins Index

The Commuter Origins Index represents areas that are likely to serve as the origin of a trip for transit commuters. This measure includes residents who are employed or in the labor force and above the age of 16, with a special emphasis on those who commute by transit or by means other than driving alone. Areas with high commuter origin propensity are most suitable for peak period, commuter or limited stop service, often directed towards downtown, but also serving high-density residential and employer locations not located in the downtown.

The commuter origins with the highest propensity for transit include Federal Hill, Mount Vernon, Canton/Patterson Park, Edmondson Village, Yale Heights, and the area near Eastpoint Center. Outside of Baltimore City, there is moderate propensity surrounding the Walmart in Ellicott City (Figure 11).

Figure 11: Commuter Origins Index

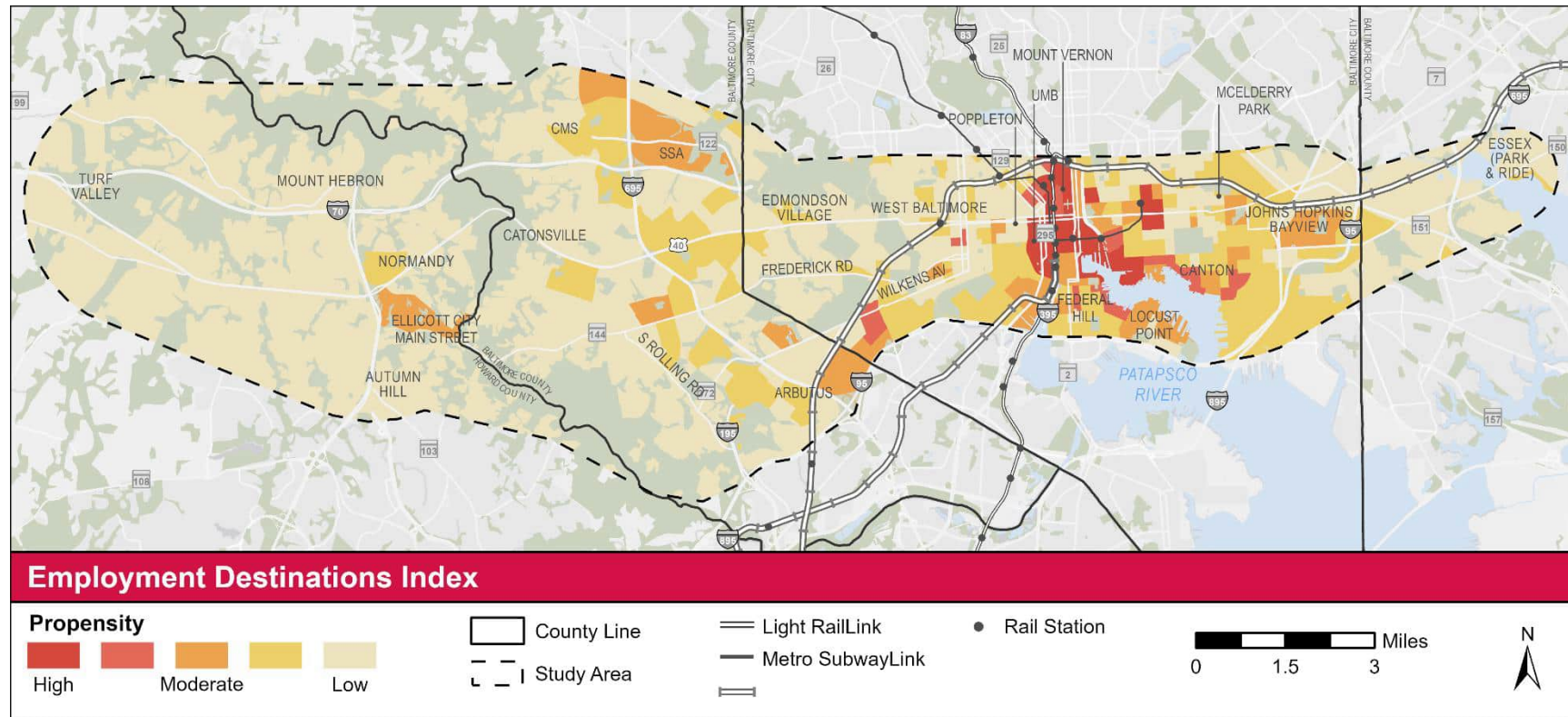


Employment Destination Index

The Employment Destinations Index shows where jobs in all sectors are heavily concentrated in the study area. Areas with high employment destination propensity are most suitable for peak period, commuter, or limited stop service, often directed towards downtown, but also serving high-density residential and employer locations not located in the downtown.

The employment destinations with the highest propensity for transit are almost exclusively in downtown Baltimore, especially Mount Vernon, Inner Harbor, and Johns Hopkins Hospital. There is moderate-high propensity at St. Agnes Hospital. Outside of Baltimore City, there is moderate propensity in Woodlawn, Catonsville, and Ellicott City (Figure 12).

Figure 12: Employment Destinations Index

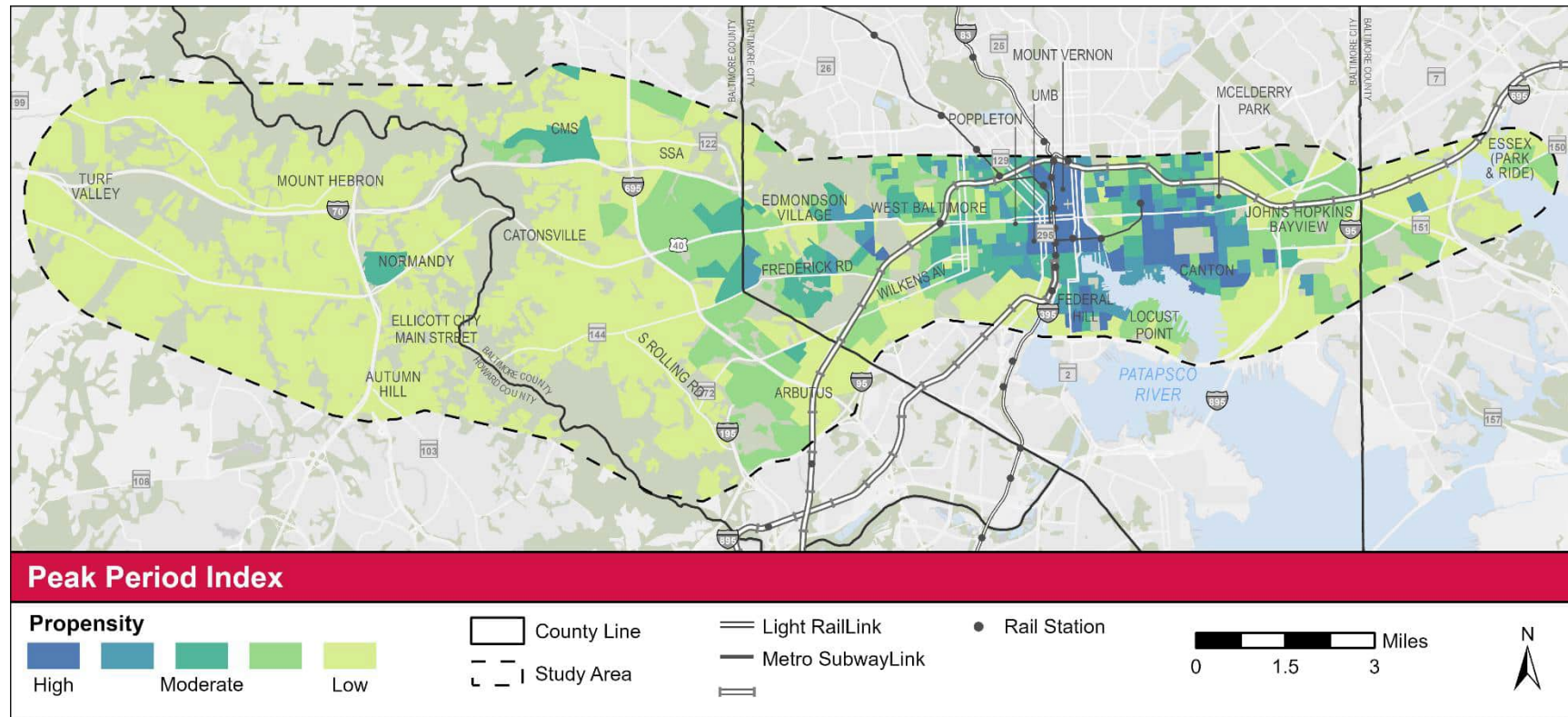


Peak Period Index

The Peak Period Index is a combination of the commuter origin and employment destination indices. This index identifies areas that serve as the origin or destination for home-to-work trips, which are concentrated during the peak morning and evening commute hours.

The areas with the highest propensity for transit in the peak period include Federal Hill, Mount Vernon, Johns Hopkins Hospital, Canton, the area immediately southwest of Leakin Park (surrounding Edmondson Village and Yale Heights), and the area near Eastpoint Center. Outside of Baltimore City, there is moderate propensity at the Walmart in Ellicott City, at CMS, and in Woodlawn (Figure 13).

Figure 13: Peak Period Index

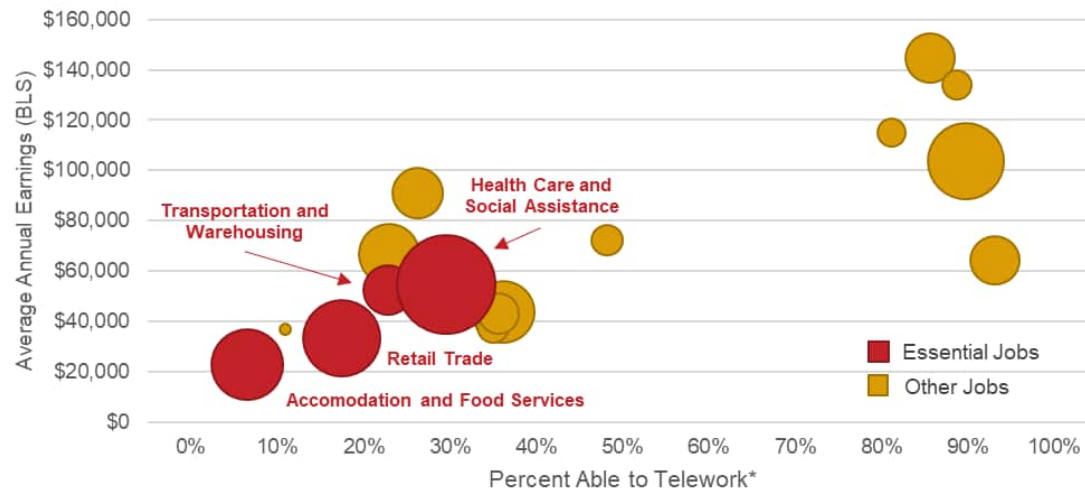


Essential Markets

The COVID-19 pandemic has changed public transportation in the last year and perhaps for years to come. In response to the pandemic, some activities of the economy have been suspended to slow the spread of the disease. While some workers have been teleworking, many jobs that have been deemed essential cannot be performed remotely. These workers continue to report in person to workplaces during shutdowns to support essential economic activity.

Figure 14 shows the workforce size, percentage of the workforce able to telework, and average annual earnings by job sectors as defined by the North American Industry Classification System (NAICS), and points to how workers in lower paying industries are generally less likely to be able to telework.

Figure 14: Baltimore Region Employment, Earnings, and Ability to Telework



In-person jobs in health care, supply chain, critical retail (grocery stores, hardware stores, mechanics), and restaurant industries emerged as essential jobs during a the COVID-19 pandemic (represented in red in Figure 14). These jobs are represented in four NAICS sectors:

- Health care and social assistance (NAICS sector 62)
- Retail trade (NAICS sectors 44 and 45)
- Transportation and warehousing (NAICS sectors 48 and 49)
- Accommodation and food services (NAICS sector 72)

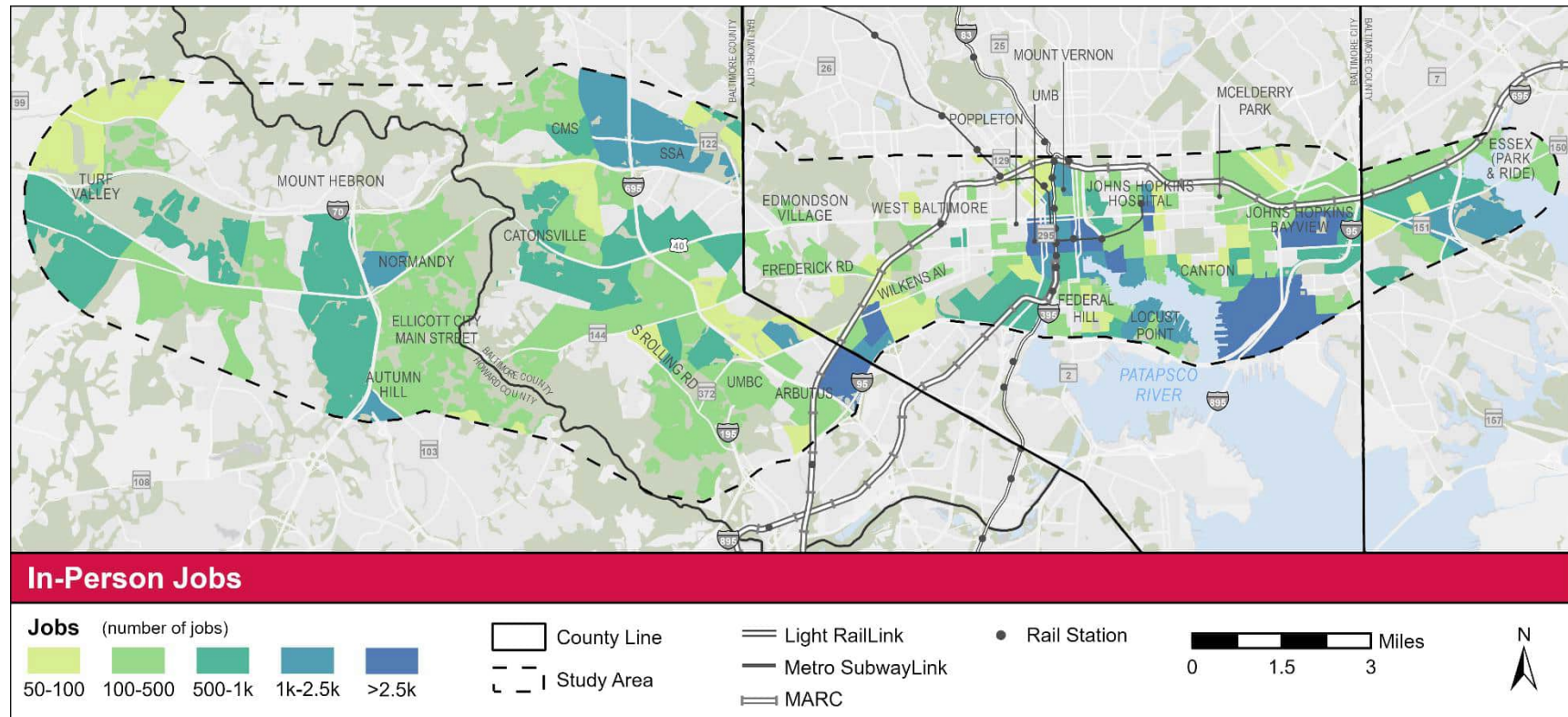
According to Census Longitudinal Employer-Household Dynamics (LEHD) data, jobs in those four sectors represent almost 40 percent of all jobs in the study area. Similar to the entire region, health care and social assistance is the largest job sector in the study area with over 65,000 jobs or 20 percent of all jobs in the Essex - Ellicott City Corridor study area. The retail trade, transportation and warehousing, and accommodation and food services account for almost 20 percent of the jobs in the study area and present the lowest percentage of workers able to telework.

**Estimates derived from Dingel and Meiman, How Many Jobs Can Be Done At Home?, NBER April 2020.*

Figure 15 shows where in-person job clusters emerge in the study area. Downtown Baltimore City, Johns Hopkins Hospital and Johns Hopkins Bayview, Fells Point, Canton Crossing, and Violetville concentrate a large number of essential jobs. Areas with a significant number of jobs also include Woodlawn, Normandy, and the

Eastpoint Mall. In Woodlawn alone, although there are about 5,300 in-person jobs, over 2,700 jobs there are telework-eligible. Census blocks with up to 1,000 jobs are spread over Baltimore County and along US 29 and Route 40 in Howard County.

Figure 15: In-Person Jobs Distribution



TRANSIT AND TRAVEL ANALYSIS

Travel Flow Analysis

Measuring and analyzing travel across the study area is an important piece for understanding current and future demand and capacity, travel patterns, and major generators of activity. This analysis leveraged travel model data from Baltimore Metropolitan Council (BMC). BMC has developed an Activity-Based Model to simulate daily activity patterns across the region. This type of model simulates individuals and predicts their travel choices and patterns today and in the future. In this section, current travel conditions are represented by 2020 travel model data, which do not reflect COVID-19 impacts to travel behavior.

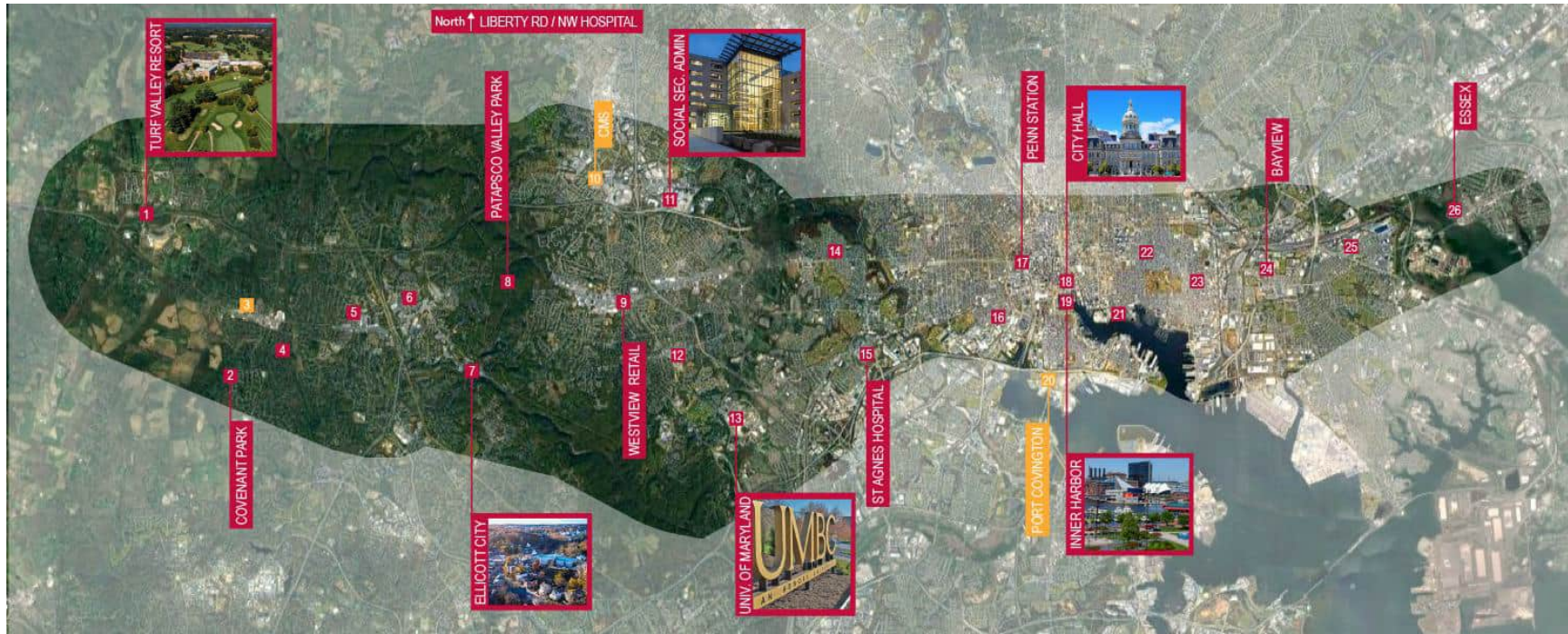
Major Generators & Points of Interest

Point-to-point flows from the regional activity-based model are aggregated to Travel Analysis Zones (TAZ). The top TAZ's by volume of trips are identified as major origin and destination areas, or *generators*. Within each of these top zones, major employers and destinations are identified as likely points of interest and shown in Figure 16. Future generators are identified by comparing 2020 travel flows with 2045 travel flows. Many of the generators that exist in 2020 will continue to be generators in the future. However, any zone projected to become a top origin or destination in 2045 is identified

as a future generator on the map. The map key (right) lists the points of interests identified from the top generating zones in order that they appear on the map from East to West. The future generators to note in this study area are located around the Centers for Medicare and Medicaid Services (CMS), Port Covington, and development along Rt 40 near Enchanted Forest. According to Round 9 Cooperative Forecasts, all these areas are likely to see significant employment growth and increased numbers of trips.

POI Map Key	
■	Current Generator
■	Future Generator
1	Turf Valley Resort
2	Covenant Park
3	Enchanted Forest
4	Howard Heights
5	Font Hill / Chatham
6	Town & Country West
7	Ellicott City
8	Patapsco Valley State Park
9	Westview / Cantonsville Retail off Rt 40
10	Medicare and Medicaid Services
11	Social Security Admin / Security Square
12	Cantonsville
13	University of Maryland Baltimore County
14	Uplands
15	Saint Agnes Hospital
16	Pigtown
17	Penn Station
18	City Hall
19	Inner Harbor
20	Port Covington
21	Harbor East / Fells Point Waterfront
22	Johns Hopkins Hospital
23	Highlands / Canton
24	Bayview
25	Eastpoint Mall
26	Essex Park & Ride
N	North - Liberty Rd Business Community / Northwest Hospital

Figure 16: Current and Future Major Points of Interest



Current Travel Flows Along the Corridor

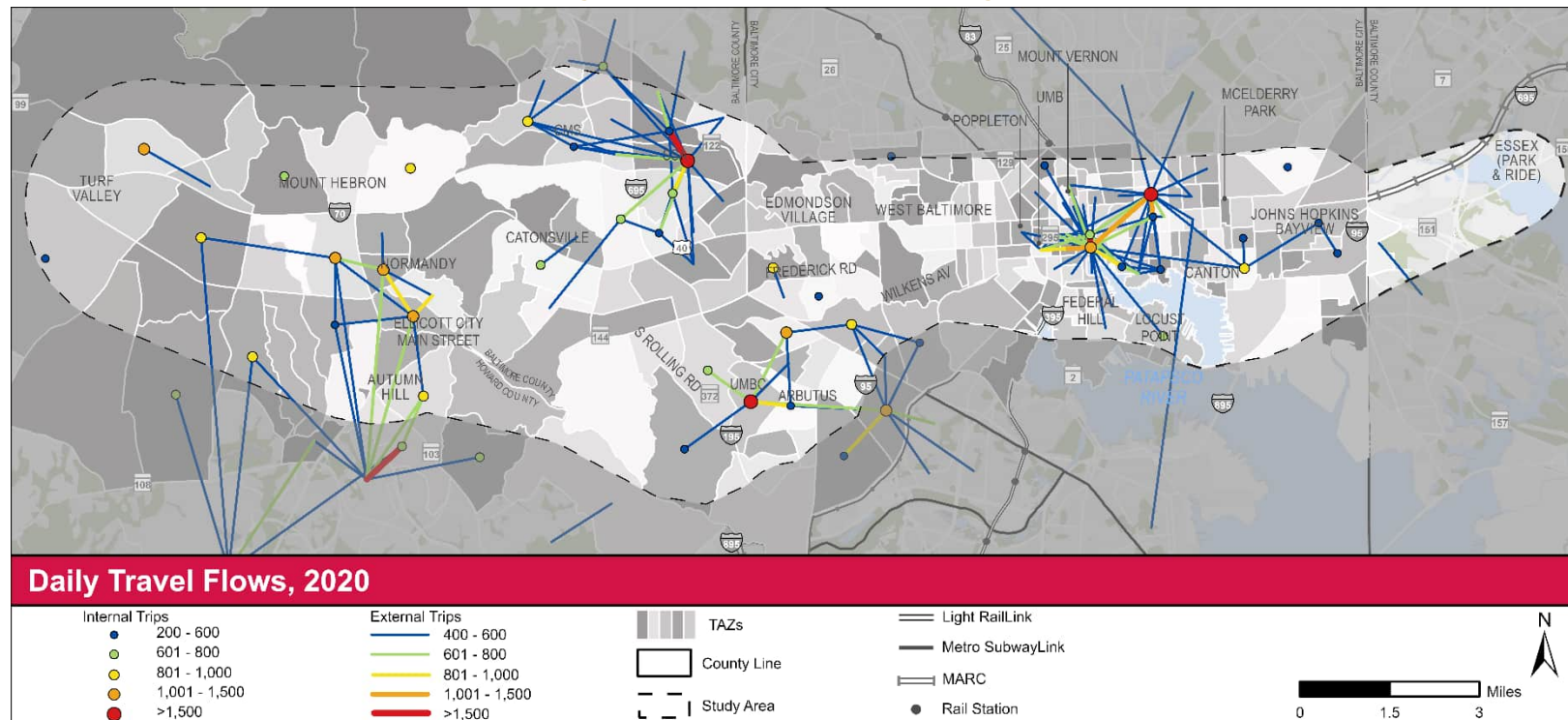
Current travel flows are shown in Figure 17. Trip volumes are measured at TAZ level. Trip patterns are aggregated to TAZs, which are represented in shades of gray on the map. Some trip patterns with low volumes are omitted from this map: those between two different TAZs with a volume of fewer than 400 daily trips and those that start and end within the same TAZ with fewer than 200 daily trips. Trip patterns between TAZs are shown with lines, and trips starting and ending in the same TAZ are shown as points within the zones.

and the western Baltimore County/Baltimore City line. West of Baltimore County, trips are concentrated around Ellicott City, with many trips coming to and from just outside the study area near the East Columbia Business District. East of the county lines, travel flows are concentrated near Woodlawn/SSA in the north and around UMBC in the south. Within Baltimore City, travel patterns are short, and concentrate near the University of Maryland/Downtown and Broadway East/Dunbar Broadway.

Based on these travel patterns, the study area can be broken into three areas, bisected by the Howard County/Baltimore County line,

An additional map showing travel flows to and from West Baltimore is located in the Attachment.

Figure 17: Current Travel Volume Along the Corridor



Current and Future Aggregated Travel Flows

To better understand how people move through the corridor study area on a more general level, TAZs were grouped into 10 sections across the corridor, and the trip volumes were summed. Travel flows in 2020 are shown in Figure 18 (on the next page) and flows in 2045 are shown in Figure 19 (on the following page). As in the previous map, flows between two different sections are shown with lines (“external trips”) and flows the start and end in the same section are shown with points (“internal trips”).

In 2020, when aggregated, major flows exist between downtown and CMS, Social Security Administration, and the Route 40 Corridor in

Catonsville and Edmondson, from Canton and Highlandtown to Bayview, Johns Hopkins Hospital, and Downtown. There are also major flows from Arbutus and UMBC to Route 40 and downtown.

In 2045, while traffic volumes are projected to increase for the flows that already have the highest volumes, there are no new patterns that emerge. The most notable change in travel flows from 2020 to 2045 at this scale is the increase in absolute number of trips between Downtown and surrounding neighborhoods of Poppleton, Johns Hopkins Hospital/Patterson Park/Harbor East/Fells Point, and Canton/Highlandtown, which had a net increase of approximately 20,000 trips originating or ending in Downtown.

Figure 18: Current Volume of Travel Between Areas of the Corridor

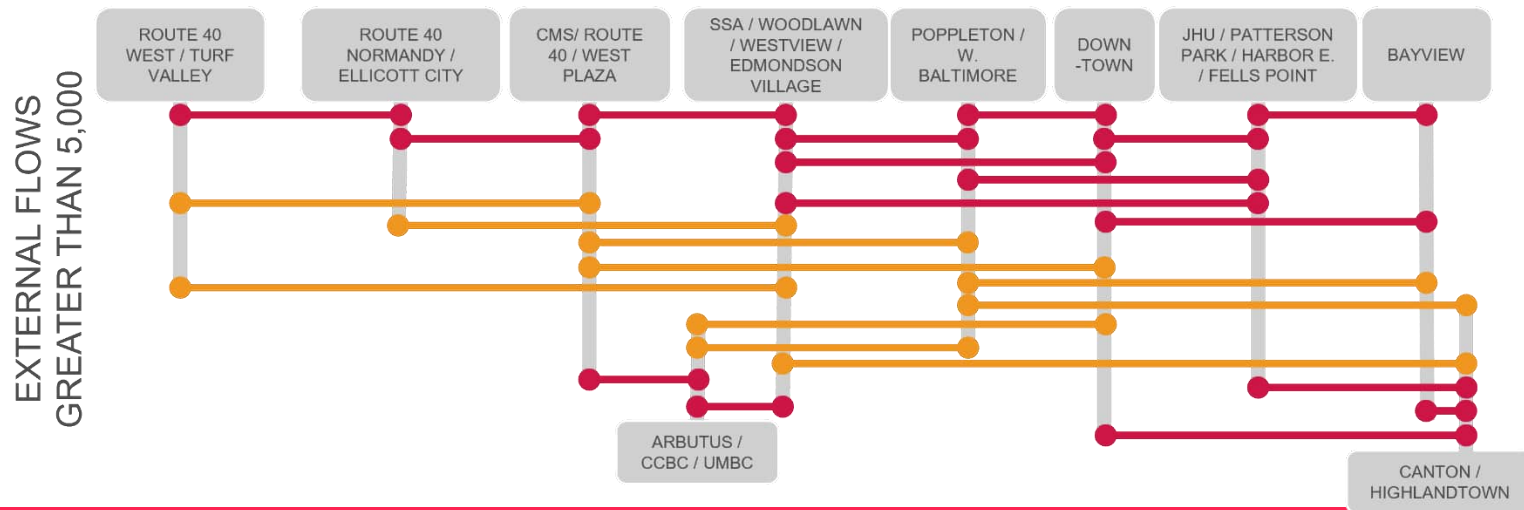
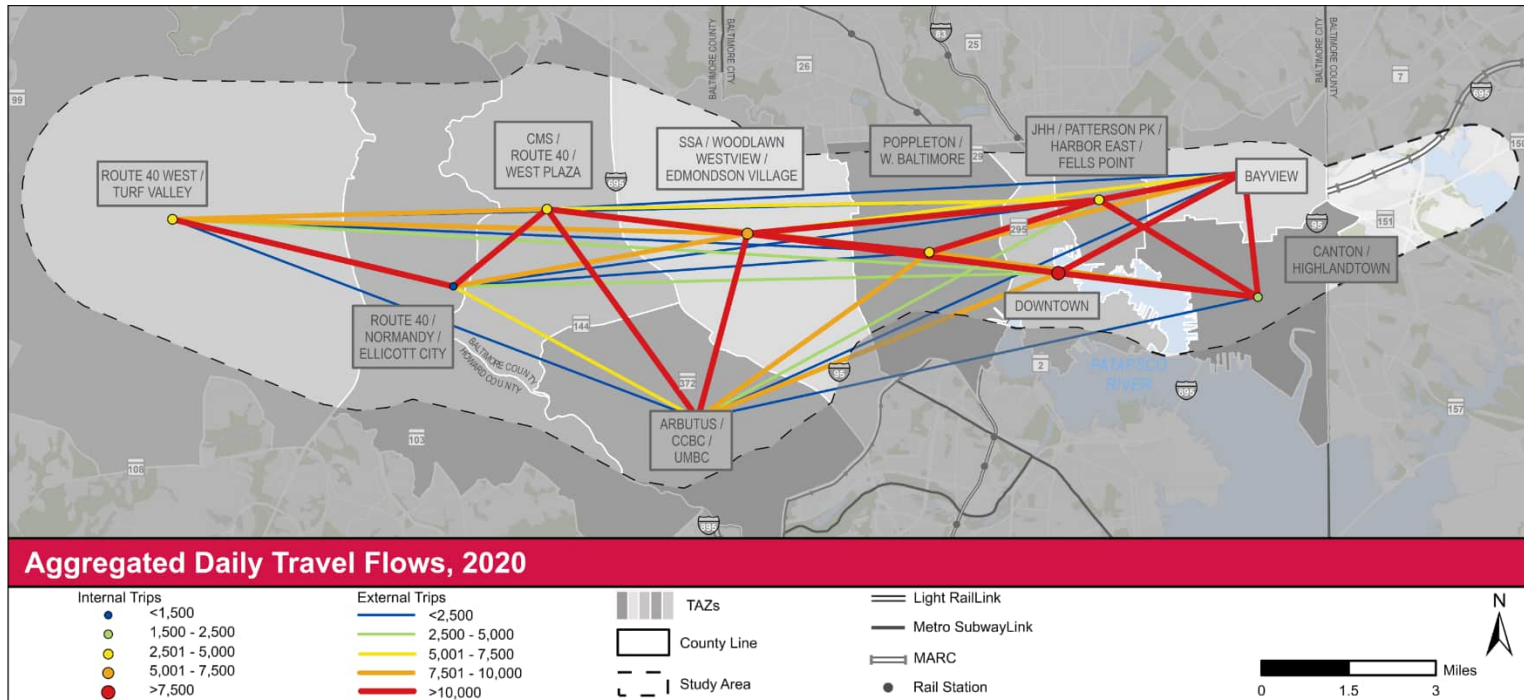
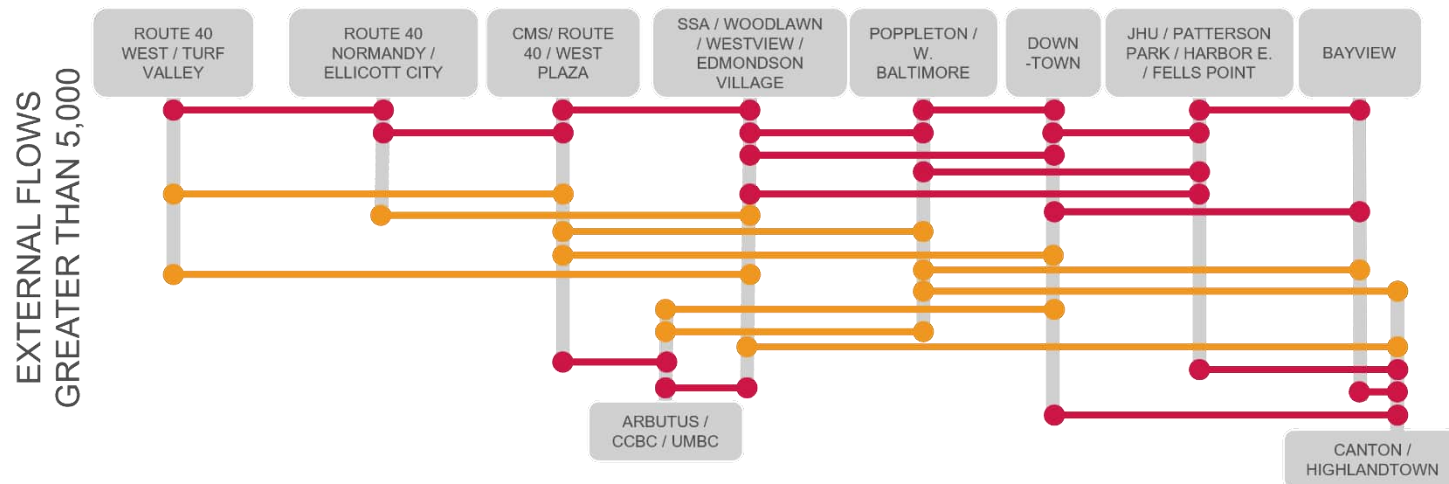
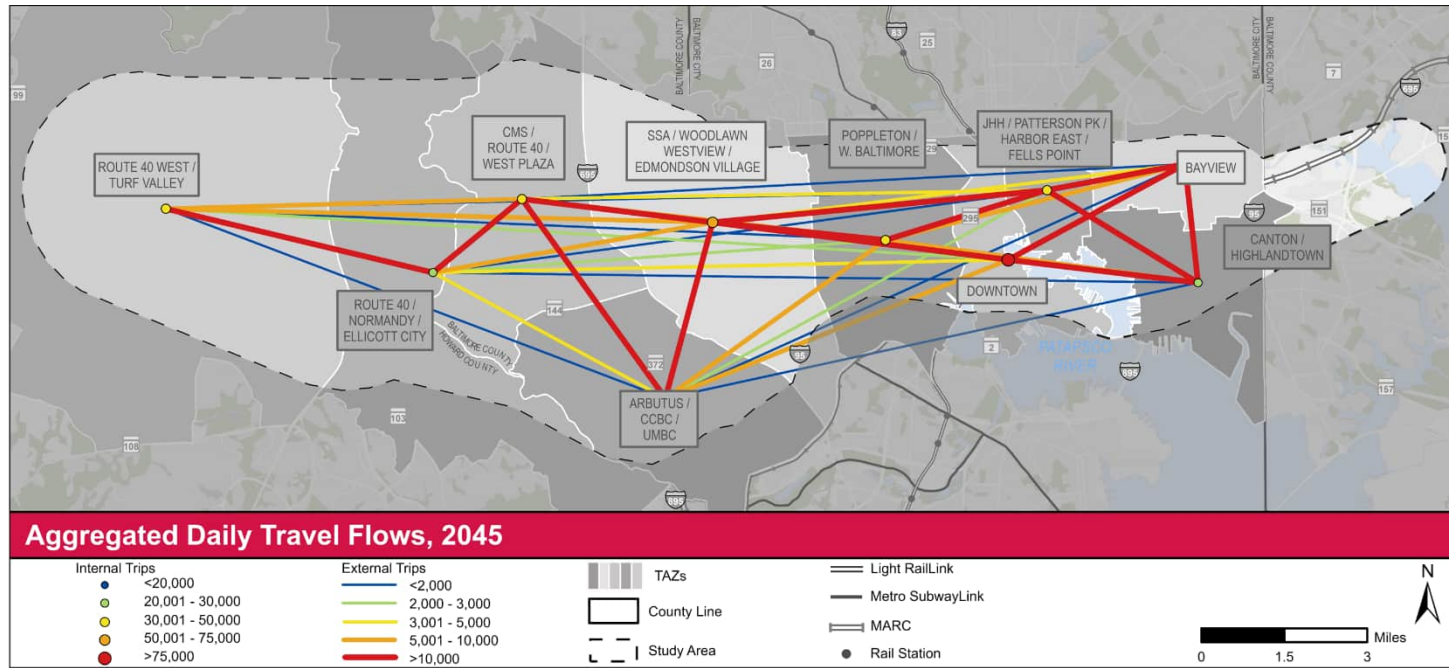


Figure 19: Future Travel Volume Along the Corridor

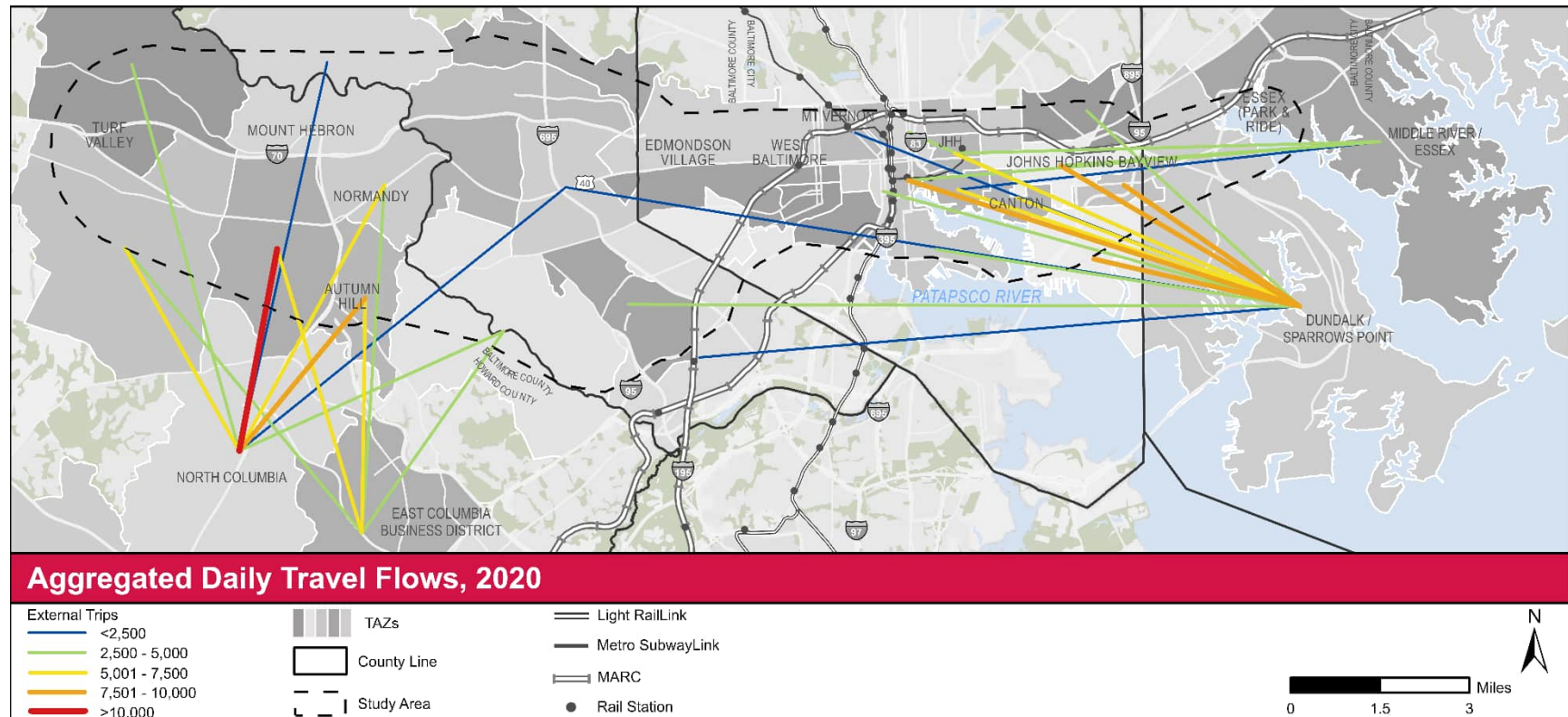


Travel Flows to and from the Study Area

To understand how travel from outside the study area into the study area may impact potential service, TAZ's were aggregated, and trip volumes summed (Figure 20). Considering aggregated flows from outside the study area, there are major connections between Sparrows Point and Dundalk to points north and south of Patterson Park, including to Bayview, Johns Hopkins Hospital, downtown, Canton, and Fells Point.

Middle River and Essex travel flows are more highly concentrated north of Patterson Park to Bayview, Johns Hopkins Hospital, and downtown. In the west, there is significant volume of flows from Columbia and Howard County to the western portions of the study area.

Figure 20: Current Outside Travel Flows to the Corridor



Travel Patterns

The volume of trips in the corridor varies by time of day, mode, traveler demographic, and length. The following sections analyze these trip characteristics separately for trips that remain within the study area and trips to and from the study area that start or finish elsewhere.¹ Examining travel patterns tells us what types of groups make trips in the corridor, how long those trips are, at what time they are made and for what purpose. This, in turn, can help determine the appropriate stop or station spacing and mode.

Time of Day

Hourly trip volumes by the time of day of the trip origin and destination are shown in Figure 21 and Figure 22, respectively. Volumes shown are the average number of trips per hour within each time period.²

Travel within the corridor is busiest during the PM peak period, with an average of 70,000 trips per hour. The next busiest time of day is the midday period followed by the AM peak period, which has only 70 percent of PM peak hourly volumes. For all times of day, hourly trip volumes to and from the study area are less than the number of trips internal to the corridor, often by more than half. Similar to internal trips, the PM peak is busier than the AM Peak and midday periods for trips to and from the corridor.

¹ In order to exclude north-south oriented trips to and from Downtown Baltimore, trips to and from the study area were limited to origins and destinations that lie to the east and west of the corridor.

However, it is important to note that this data reflects pre-COVID-19 travel behaviors. Based on more recent observations, travel in peaks and midday have smoothed.

Figure 21: Average Hourly Trip Volumes by Time Period of Origin

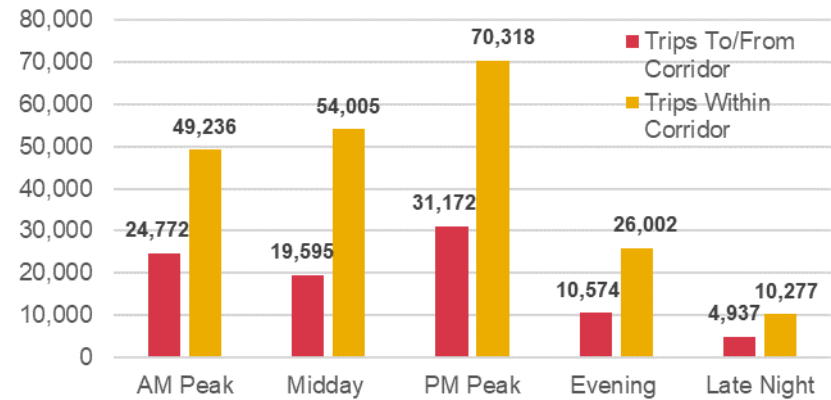
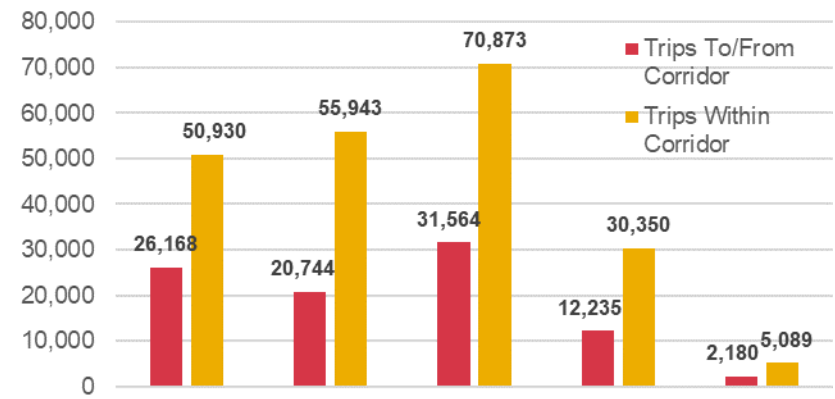


Figure 22: Average Hourly Trip Volumes by Time Period of Destination

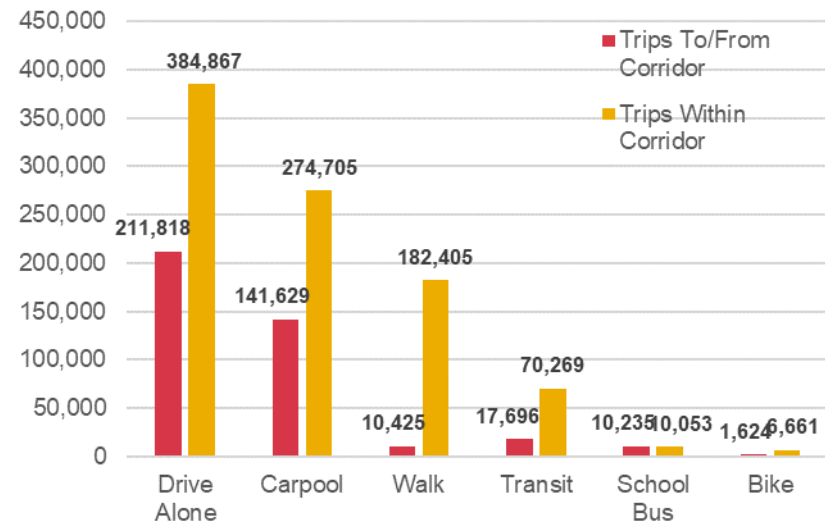


² Time periods were defined as AM Peak: 6:00-9:00 AM, Midday: 9:00 AM-3:00 PM, PM Peak: 3:00-7:00 PM, Evening: 7:00-11:00 PM, and Late Night: 11:00 PM-6:00 AM.

Mode

Figure 23 shows the breakdown of daily trips by mode of travel. For trips within the corridor and to and from the corridor, driving is the dominant mode. Carpooling and driving alone make up 90 percent of trips to and from the corridor, followed by transit, walking, school bus, and bike trips. Within the corridor, car trips are less dominant, with 71 percent of trips made in a car. For carpool trips to/from and within the corridor, about 60 percent are shared between two people with the other 40% between three or more people. Twenty percent of trips within the corridor are made on foot, a greater share of trips than transit trips.

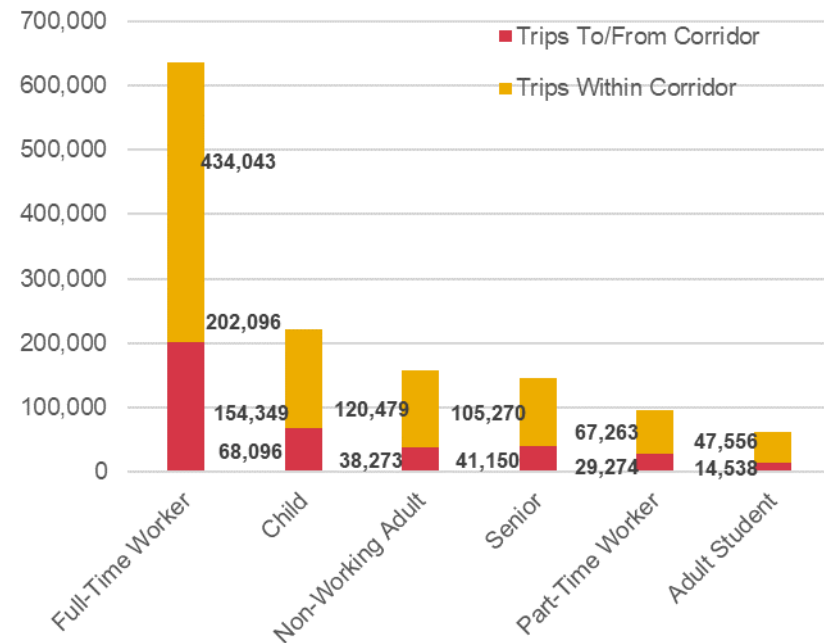
Figure 23: Daily Trip Volumes by Mode



Demographic

Persons making trips in the corridor were divided into six categories: full-time workers, part-time workers, non-working adults, adult students, children, and seniors. Figure 24 shows the daily trip volumes for each of these groups. Half of all trips are made by full-time workers, plus another seven percent by part-time workers. Children, non-working adults, and seniors have the next greatest trip volumes, while adult students make the least number of trips. All demographic groups make less trips to and from the corridor than within the corridor. Workers have the highest proportion of trips that start or end outside the study area, with part-time workers making a slightly larger share of trips within the corridor than full-time workers.

Figure 24: Daily Trip Volumes by Demographic Group



Trip Length

From Essex to Turf Valley, the corridor study area is approximately 24 miles long. The length of trips made within the corridor and to and from the corridor are shown by distance in Figure 25. Within the corridor, trip distances are well distributed from short trips of less than a mile to longer trips greater than of less than 5 miles; only about 20 percent of trips are greater than 5 miles. About 42 percent of internal corridor trips are less than 2 miles. In contrast, the length of trips to and from the study area are typically longer, with 89 percent of trips reaching 3 miles or longer.

Populations of Focus

Certain populations have a higher propensity for using transit. These populations are identified as low-car households (with one or less car), and low-income households. Figure 26 shows travel flows for these population groups to and from aggregated TAZs in the study area. These travel flows are similar for each population group. For example, there are large volumes of low-income household travel flows from Ellicott City to the areas south and southwest. This same travel pattern is seen among the low-car household group but in a lower volume. This illustrates that some low-car households could also be low-income—although the two are not mutually exclusive. Travel patterns that move across the corridor (east and west) for these population groups are focused around the Bayview area, Edmondson Village and Catonsville.

Figure 25: Daily Trip Volumes by Distance

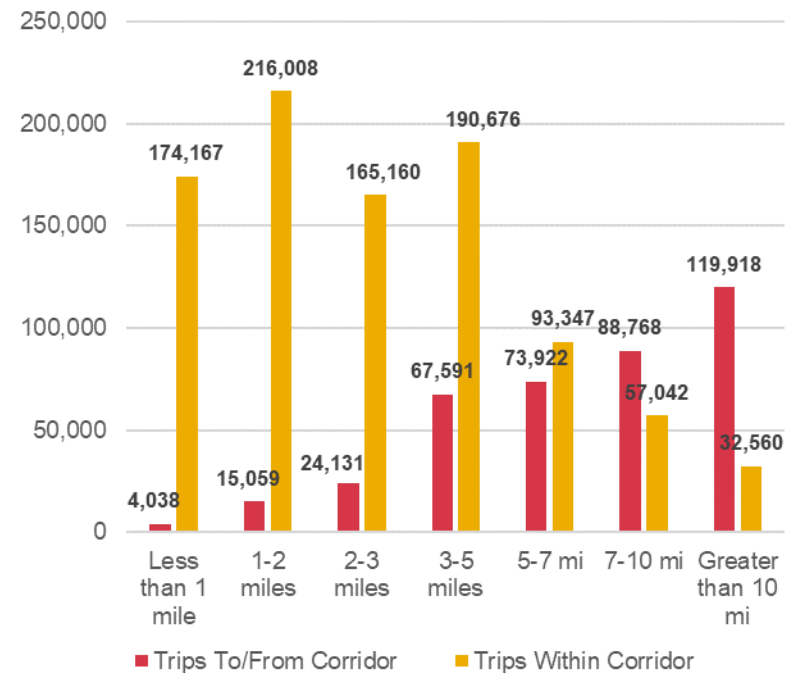
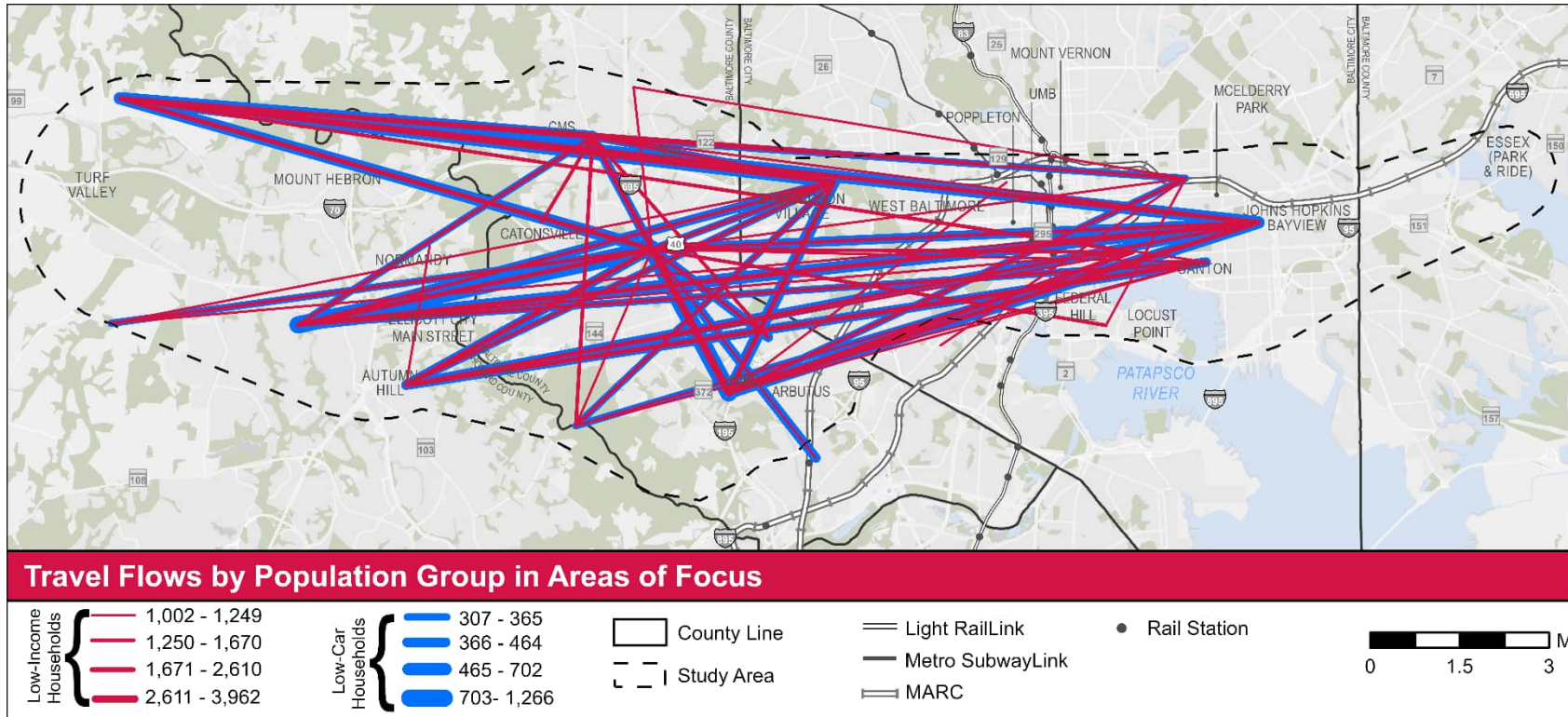


Figure 26: Top Travel Flows by Population Group



Transit Activity & Corridor Throughput

Existing and Planned Transit Services

MDOT MTA, Regional Transportation Agency of Central Maryland (RTA), and Charm City Circulator bus routes serve the study area (Figure 27). Including over 40 BaltimoreLink and several commuter routes, most MDOT MTA routes within the study area are in downtown Baltimore City. CityLink Blue, Navy, and Orange, LocalLink 63, 77, 78, and 80, and Express BusLink 150 are the only BaltimoreLink routes running along the corridor with most of the boarding and alighting activity taking place within the study area. Despite the majority of trips and ridership along CityLink Gold being outside of the study area limits, it is the only transit route on Boston Street within the study area, and is therefore also included in this analysis, as listed in Table 3. CityLink Purple and LocalLink 65 were not included as corridor routes because they would be covered under other corridor studies that more closely match their routes. Several other BaltimoreLink routes show significant ridership activity within the study area but run mostly off the corridor or as crosstown service (north-south) and intersect the corridor, so they were not included in most analysis. Similarly, MDOT MTA commuter routes in the study area operate on I-95 and serve downtown Baltimore City, except routes 315, Columbia and Silver Spring – DC, and 345, Columbia and Ellicott City – DC, which operates on US 29.

All Charm City Circulator routes serve study area, with three running entirely within it. The Charm City Orange route, which runs from Hollins Market to Harbor East, is the only east-west Charm City Circulator route on the corridor. Serving Ellicott City, RTA route 405 is the only RTA route within the study area. The route connects the Mall in Columbia and Ellicott City and overlaps sections of the Express BusLink 150.

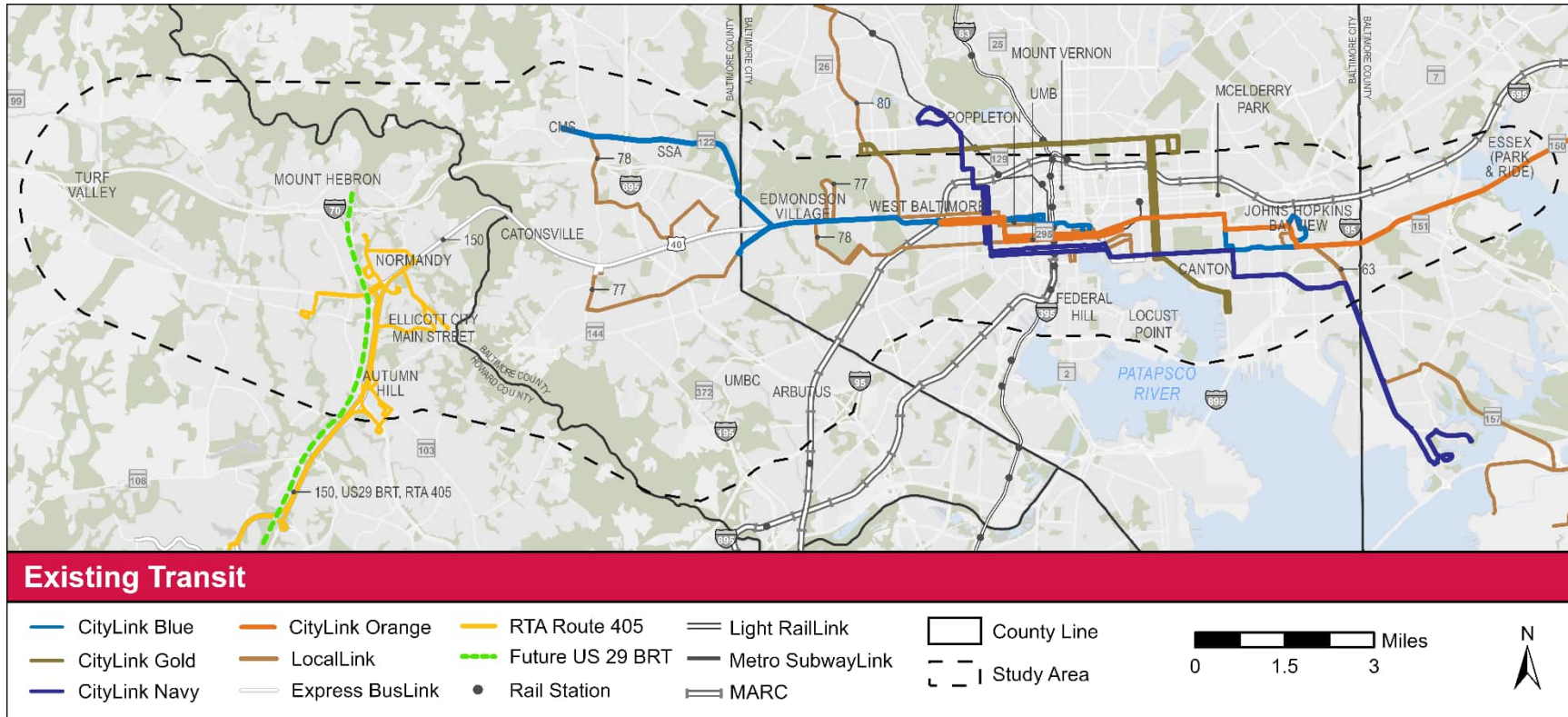
Regarding planned transit services in the study area, Howard County is evaluating the implementation of a Bus Rapid Transit (BRT) route on US 29. Originating within the study area near Mount Hebron at MD 99, US 29 connects Howard County with Montgomery County providing regional and local access to Ellicott City and Columbia. The BRT route would start in Mount Hebron near the interchange of

US 29 and I-70 and continue south on US 29 to the Silver Spring Metro station.

Table 3: Routes on the Corridor

Route	From	To	Service Type
CityLink Blue	Johns Hopkins Bayview	Westgate/CMS (Centers for Medicare and Medicaid Services)	Frequent Daily Service/ 24 hours
CityLink Gold	Walbrook Junction	Berea/Canton Crossing	Frequent Daily Service/ 24 hours
CityLink Navy	Mondawmin	Dundalk/Watersedge	Frequent Daily Service/ 24 hours
CityLink Orange	West Baltimore	Essex (Fox Ridge)	Frequent Daily Service/ 24 hours
LocalLink 63	Tradepoint Atlantic	Inner Harbor	Daily Service
LocalLink 77	West Baltimore	Cantonsville	Daily Service
LocalLink 78	Downtown	CMS (Centers for Medicare and Medicaid Services)	Daily Service
LocalLink 80	City Hall	Rogers Avenue	Frequent Daily Service/ 24 hours
Express BusLink 150	Harbor East	Columbia	Weekday Peak Service

Figure 27: Existing Transit



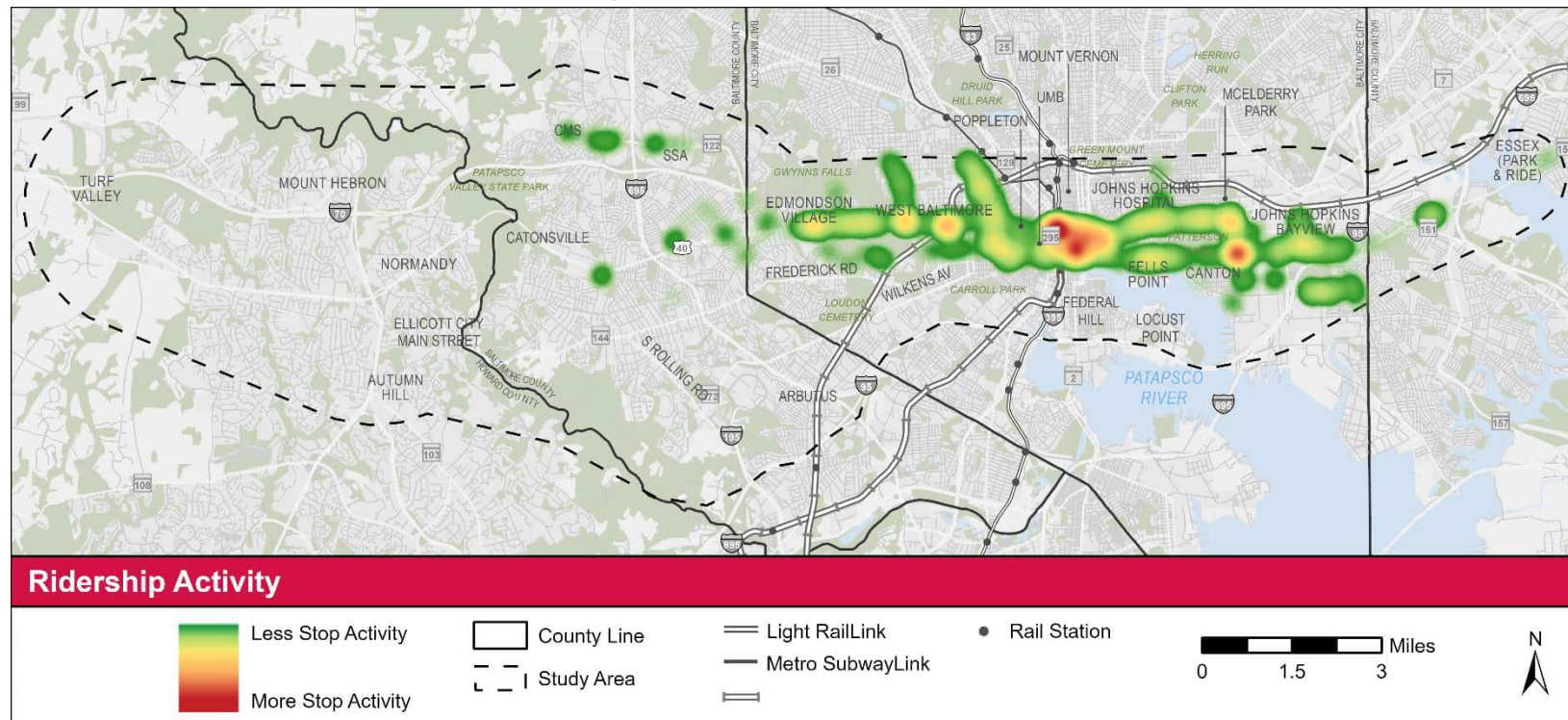
Existing Transit Use

Ridership activity reveals the busiest areas for transit, key destinations, and transfer points. This helps to confirm from the market analysis, where major generators and points of interest are in the study area. Ridership activity in Fall 2019 is shown in Figure 28.

On the west side of the study area, stop clusters with major activity are located along Edmondson Avenue: at retail centers in Edmondson Village, at the intersection of Franklin Street and Edmondson Avenue for transfers between LocalLink 77, CityLink

Blue, and LocalLink 80, and at West Baltimore MARC Station. Downtown stops at the Lexington Market Metro Subway Station, at the Convention Center and at Franklin Square all have high levels of stop activity because they are key transfer points for the core bus network. On the east side of the study area, commercial areas of Eastern Avenue and stop clusters for transfers between CityLink Blue, CityLink Orange, and LocalLink at Highland Avenue and Fayette Street have more stop activity.

Figure 28: Ridership Activity Heatmap



Transit vehicle loads, or transit passenger throughput, can help identify the highest ridership segments and how many people “travel through” an area versus board or alight the transit vehicle to reach a destination or to transfer. Ridership throughput for the east and westbound directions in the AM peak, midday, and PM peak periods are shown in Figure 29 through Figure 34.

Expressway, Saratoga Street, and Fayette Street. During peak periods, loads are also high on Eastern Avenue. The heaviest loads are seen in the AM peak eastbound and PM peak westbound, suggesting that corridor routes are used for peak commuting from the western sections of the study area and West Baltimore to points further east like Downtown and to Johns Hopkins and Bayview hospitals.

All day, and in both directions, loads are highest on Edmondson Avenue east of Baltimore National Pike, Franklin-Mulberry

Figure 29: Eastbound AM Peak Throughput

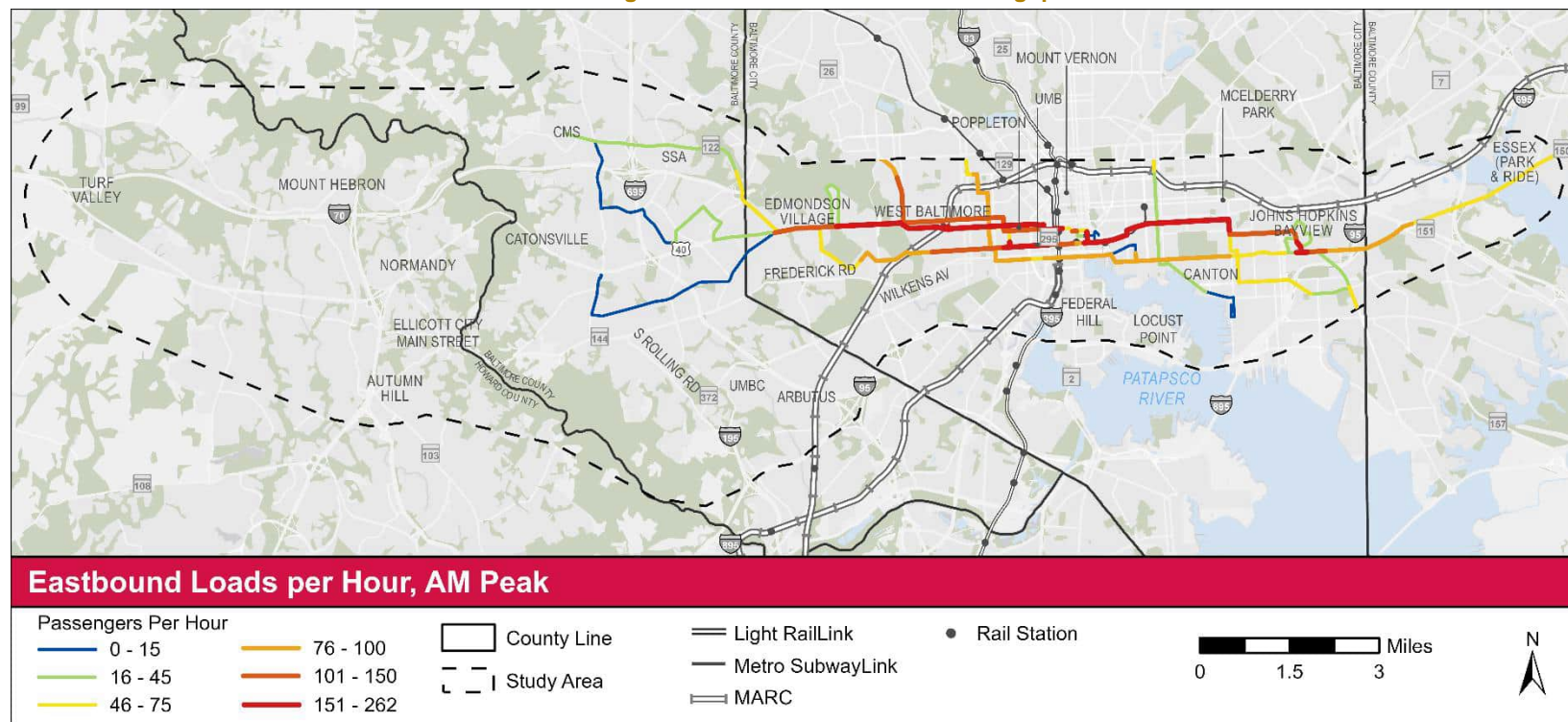


Figure 30: Westbound AM Peak Throughput

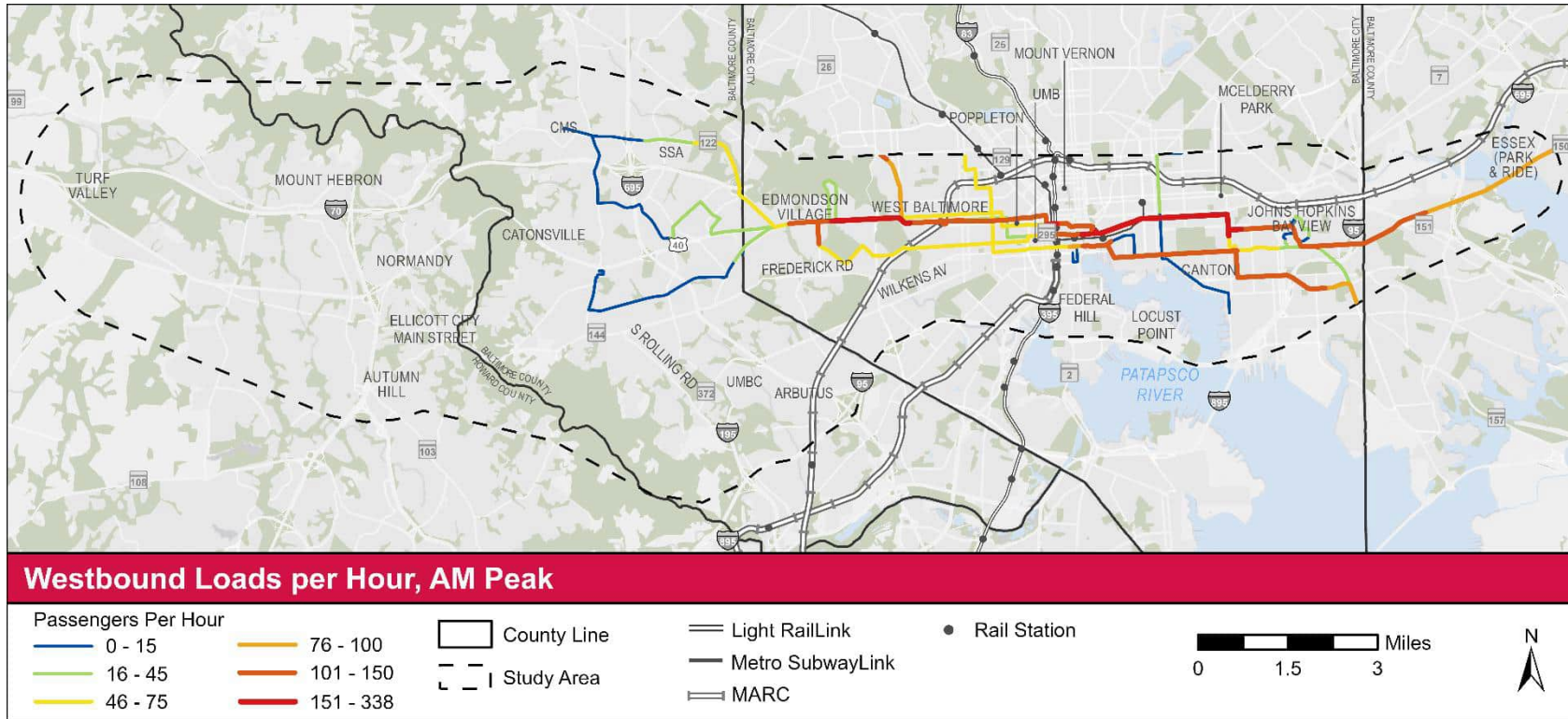


Figure 31: Eastbound Midday Throughput

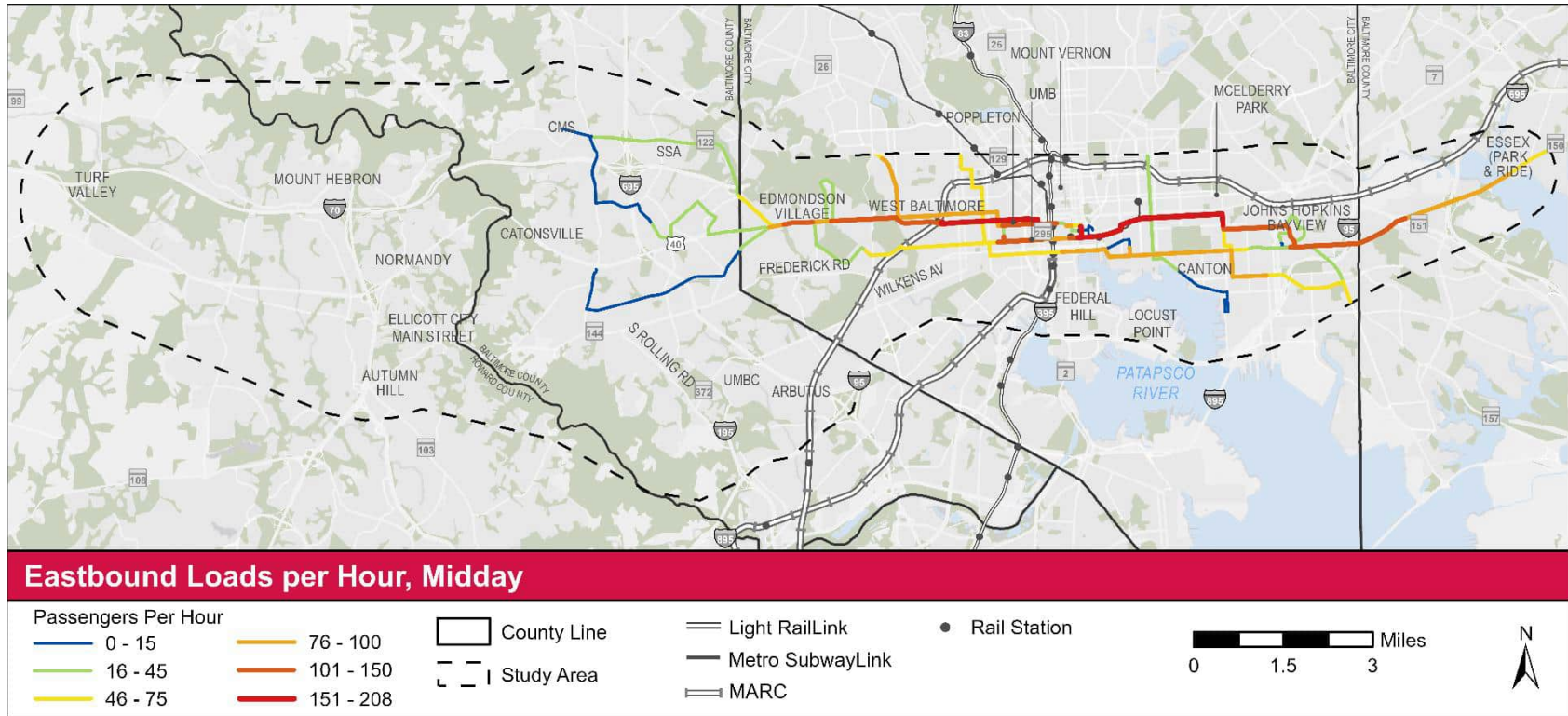


Figure 32: Westbound Midday Throughput

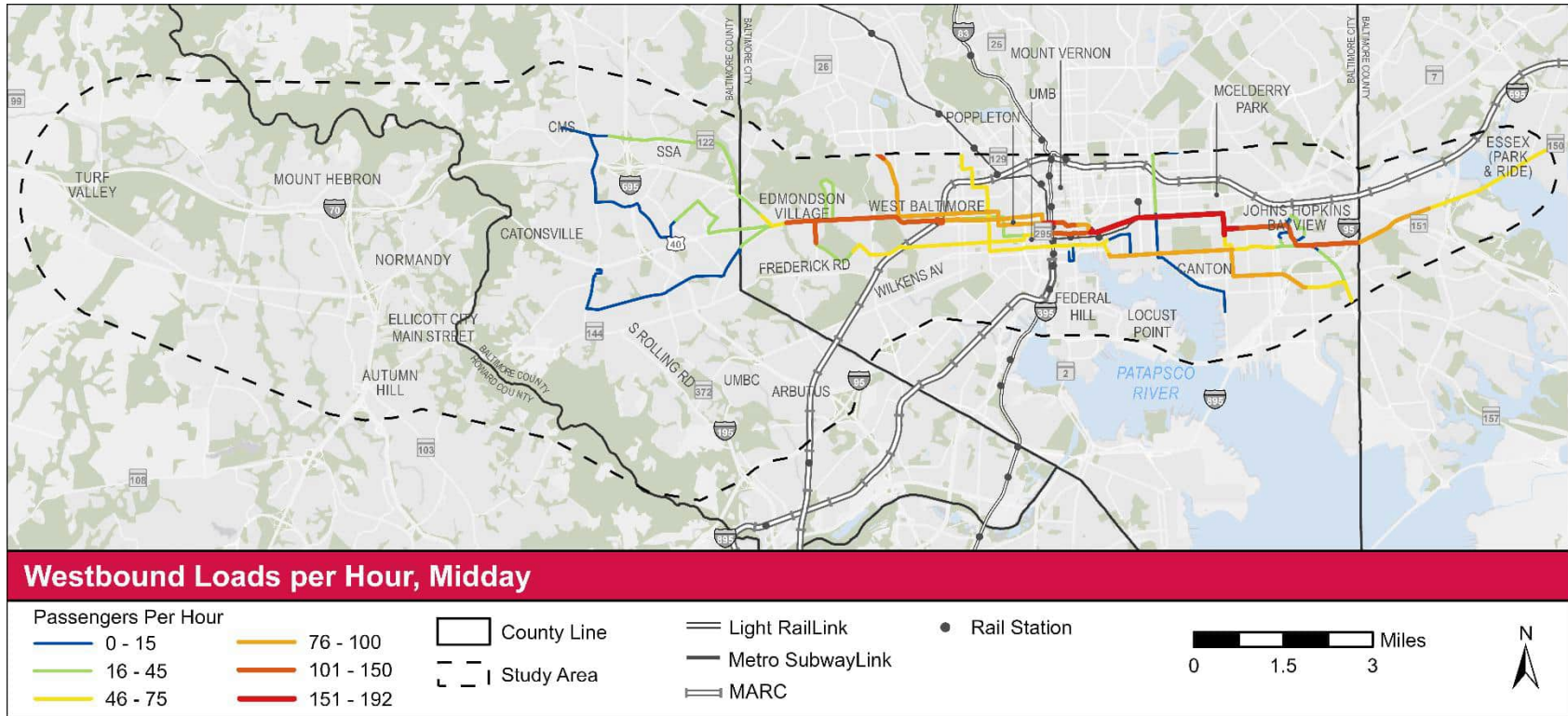


Figure 33: Eastbound PM Peak Throughput

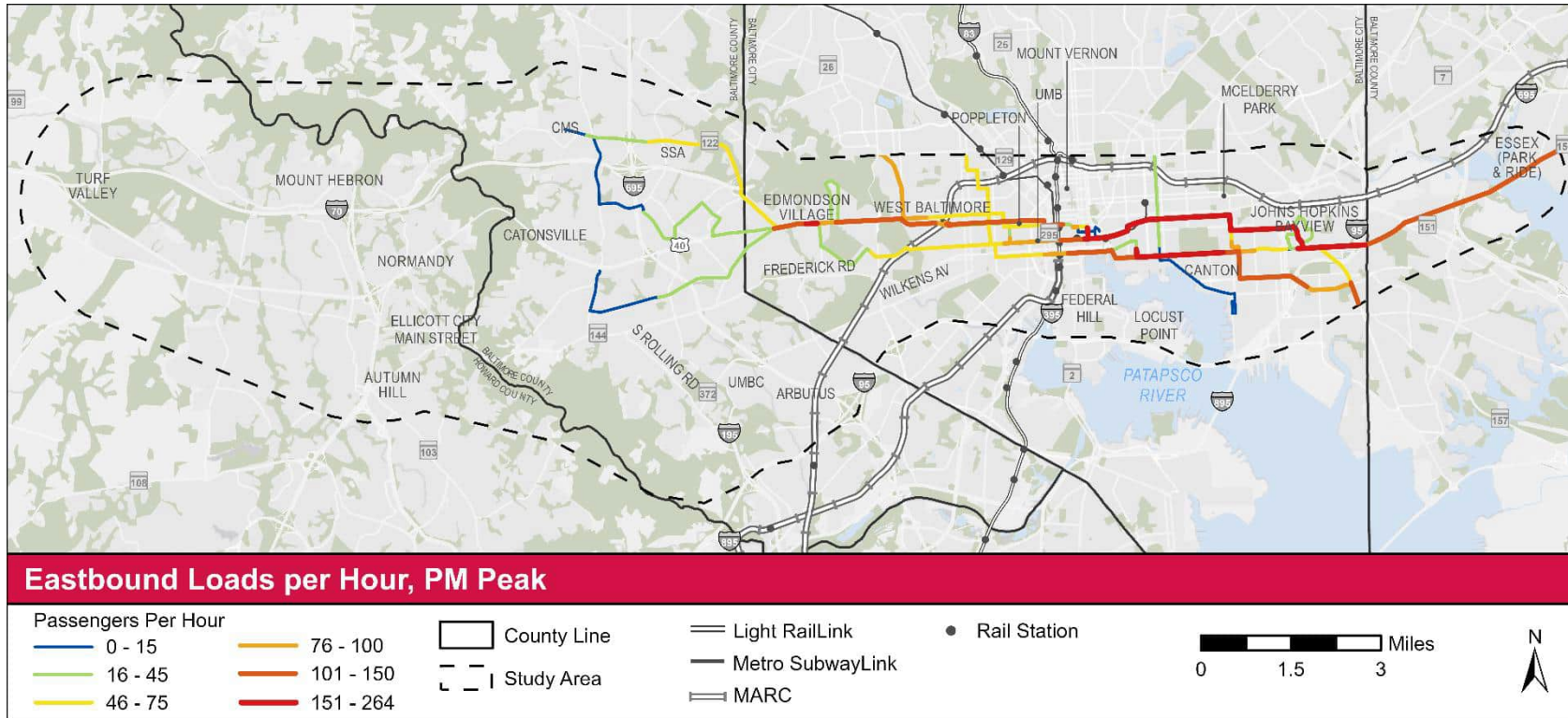
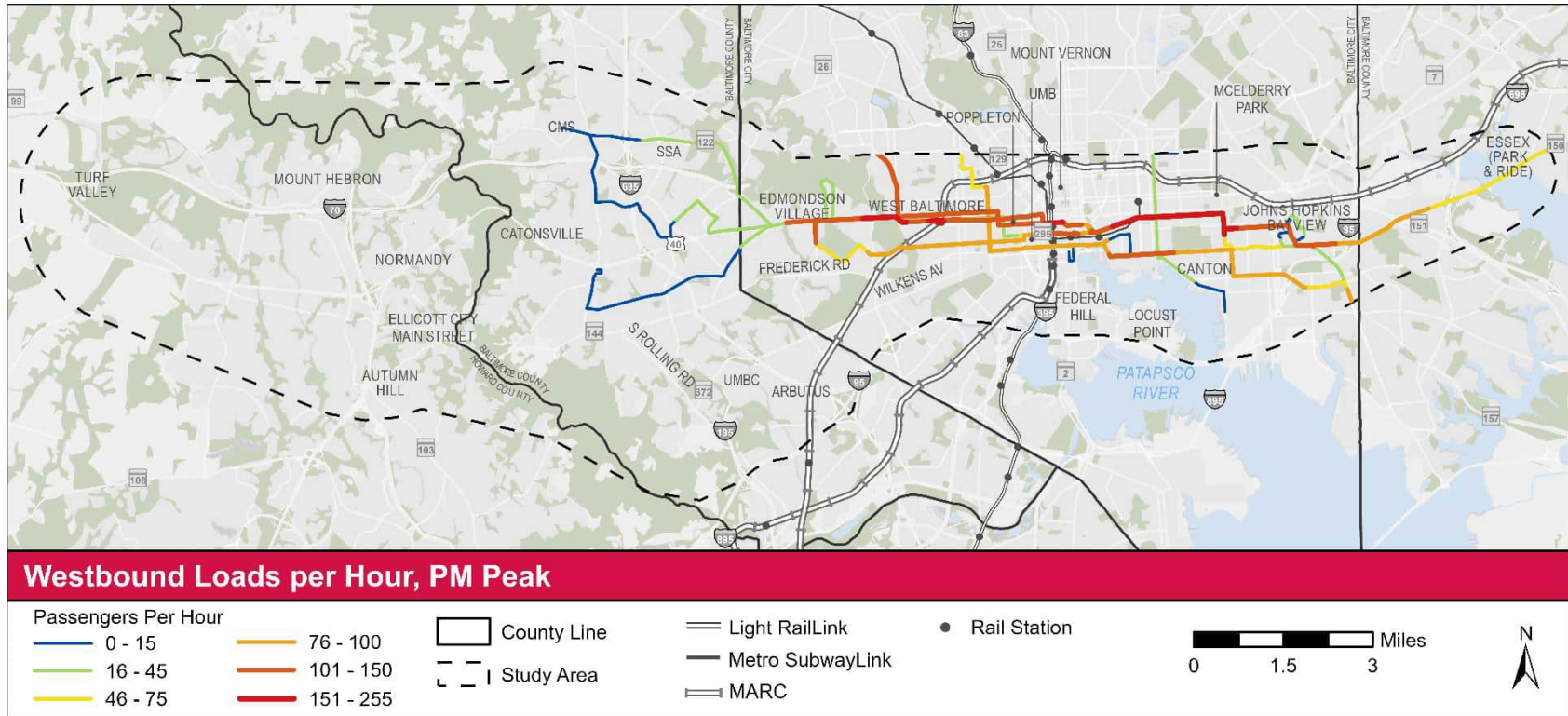


Figure 34: Westbound PM Peak Throughput

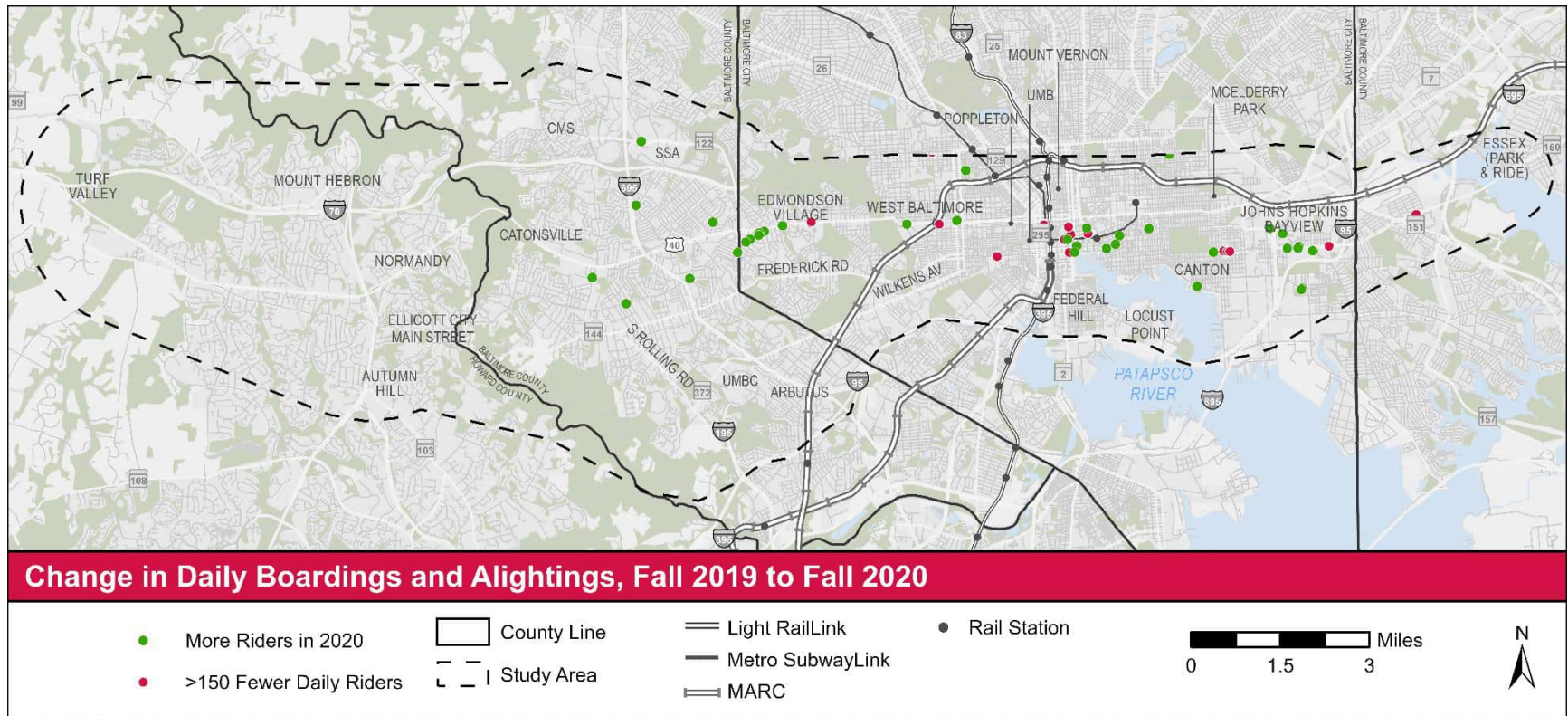


COVID Impacts on Transit Ridership

The COVID-19 pandemic impacted the way people travel in the study area. Between Fall 2019 and Fall 2020, most stops in the study area saw decreased daily ridership. Stops with more than 150 lost daily boardings and alightings are shown in Figure 35 as well as any stops with an increase in activity. Most of the stops with severe

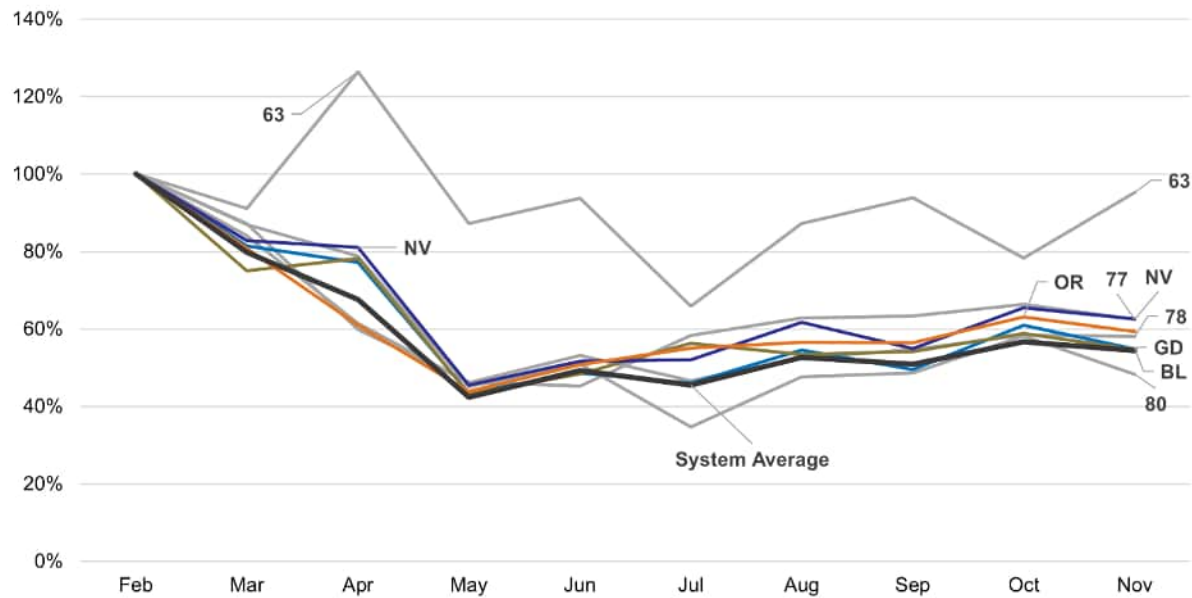
ridership loss are clustered in downtown and on Eastern Avenue, as well as at West Baltimore MARC. Stop clusters in Oldtown/Little Italy, Hopkins Bayview, and Ten Hills also gained daily riders between Fall 2019 and Fall 2020.

Figure 35: Change in Ridership (Pre-COVID to COVID Recovery)



During the initial stay-at-home order, all routes in the system lost significant ridership. As shown in Figure 36, starting in June, all routes began to recover. Most of the corridor routes recovered their ridership at a rate above or near the system average. LocalLink 63 is an outlier, as the route steadily retained nearly all its ridership throughout the stay-at-home orders into recovery.

Figure 36: Ridership Recovery (February – November 2020)



The time of day when people travel has also changed during the pandemic. Figure 37 and Figure 38 show boardings by hour for the weekday, Saturday, and Sunday, comparing pre-COVID ridership to COVID recovery ridership. On weekdays, there is considerably less activity during peak hours, and boardings are spread more evenly throughout the day for both the system and the corridor. This smoothing effect was less impactful for the corridor than the system, as the corridor routes were less peaked compared to the system pre-COVID. Ridership loss between Fall 2019 and Fall 2020 is less dramatic for weekends than weekdays. On Saturdays and Sundays, boarding patterns by hour are the same during COVID recovery and pre-COVID, though recovery ridership is lower.

Figure 37: Weekday Boardings by Hour, Fall 2019 and Fall 2020

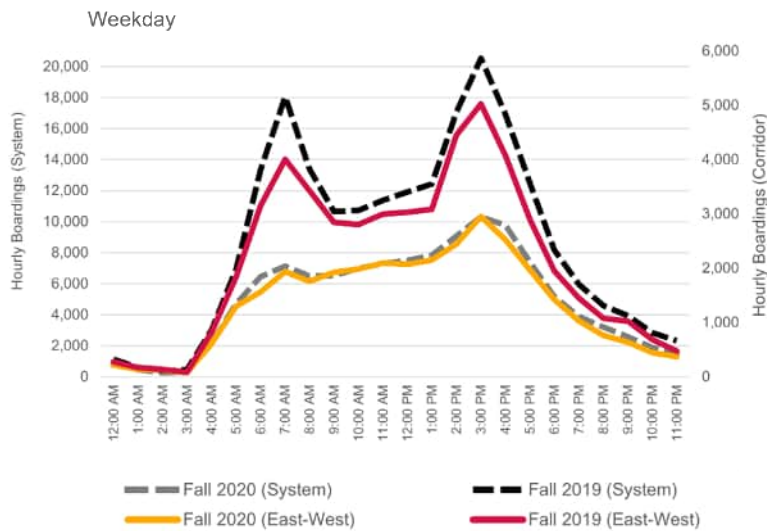
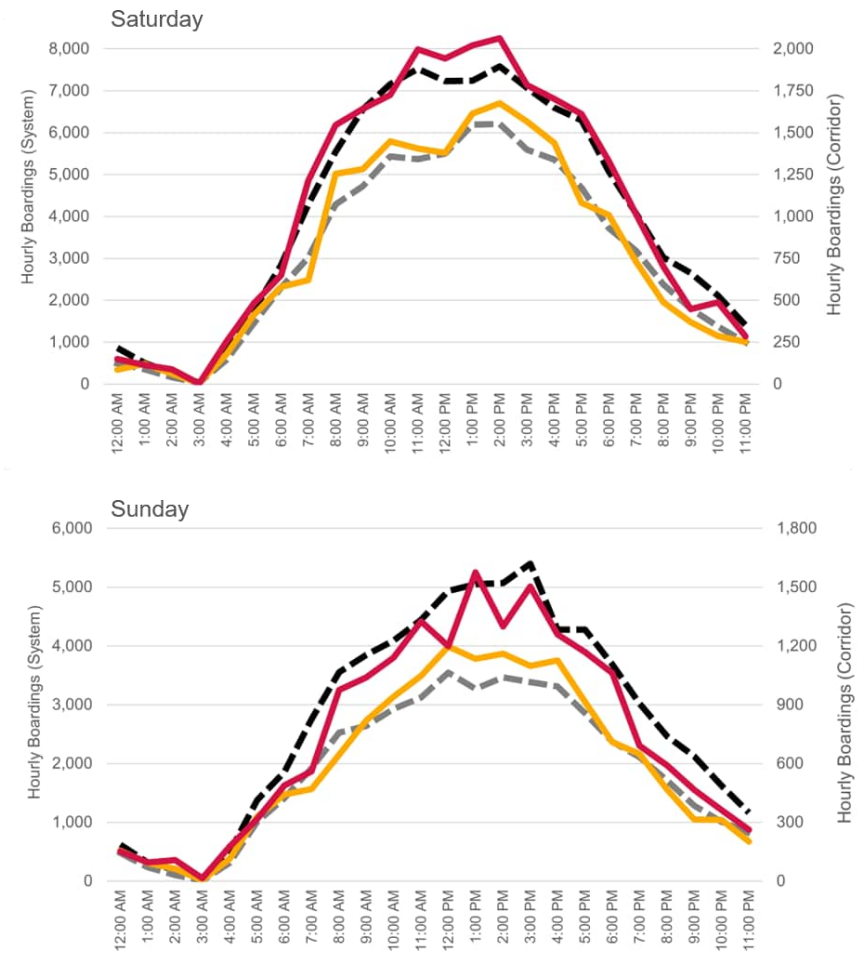


Figure 38: Saturday and Sunday Boardings by Hour, Fall 2019 and Fall 2020



Land Use and Development

The success of a frequent high-capacity transit investment depends on its ability to efficiently reach and connect places that concentrate activity typically within a comfortable walking distance of a stop. Efficient travel by fixed route transit also requires a balance of close proximity to the destination with as few stops as possible along the length of the trip requiring each alignment to balance stops frequent enough to pick up and discharge passengers with speed of destination access.

During the planning phase of this feasibility study, the details related to reaching origins and destinations will support the location of stops and the alignments able to connect these points given the geographic conditions and arterial road networks available to facilitate these connections. Stop locations will include the most important origins and destinations of today, those anticipated in growth plans, and those areas with the potential to accommodate new growth that might be unleashed through better transportation connections to major destinations.

This section begins to investigate with greater geographic precision the location of today's shopping and job centers, dense neighborhoods, major cultural and entertainment venues, educational institutions, and clusters combining these uses as the priority origins and destinations that make up the transit demand previously described. Parks, libraries, community centers and primary schools while more ubiquitous, are also important community assets and relevant for planning improved corridor-based transit service for the Baltimore region.

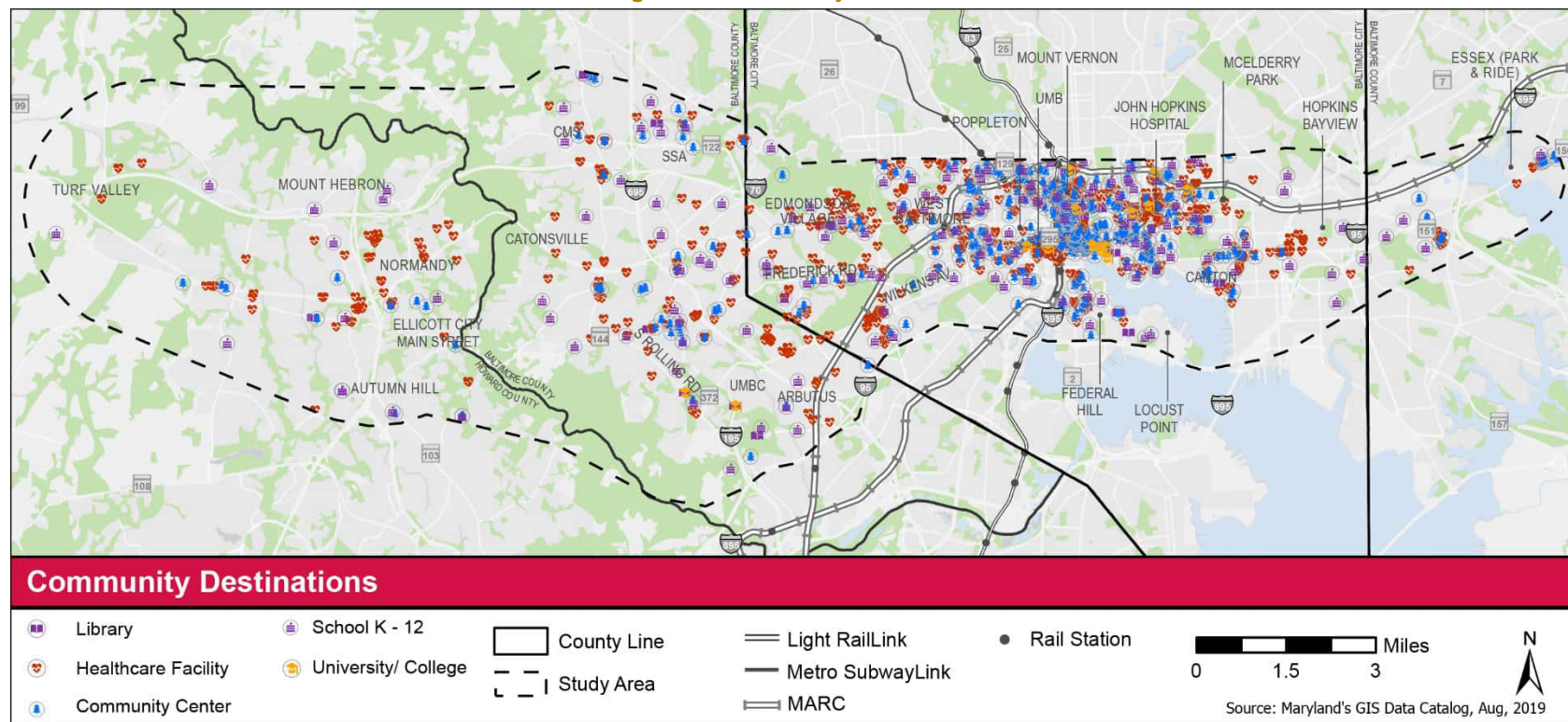
The following diagrams and maps also include local zoning and area plans prepared to guide growth and development in existing activity centers and show how change is anticipated to occur for areas projected to grow. Finally, this analysis includes vacant site mapping and shows comparative land values indicating areas where these values might be enhanced from a transformative transportation connection to more places both along the corridor and within the broader region.

Community Destinations

Roughly three quarters of trips are not related to commuting; destinations include trips to and from school, shopping, cultural and recreation locations, health care providers, houses of worship, sporting events and the homes of friends and family. Figure 39 shows some of these community destinations. They are scattered

throughout the study area and reflect the overall density patterns described in land use mapping. Schools and community centers are notably more densely clustered in Baltimore City neighborhoods. Healthcare facilities are clustered around existing hospitals and commercial centers.

Figure 39: Community Destinations

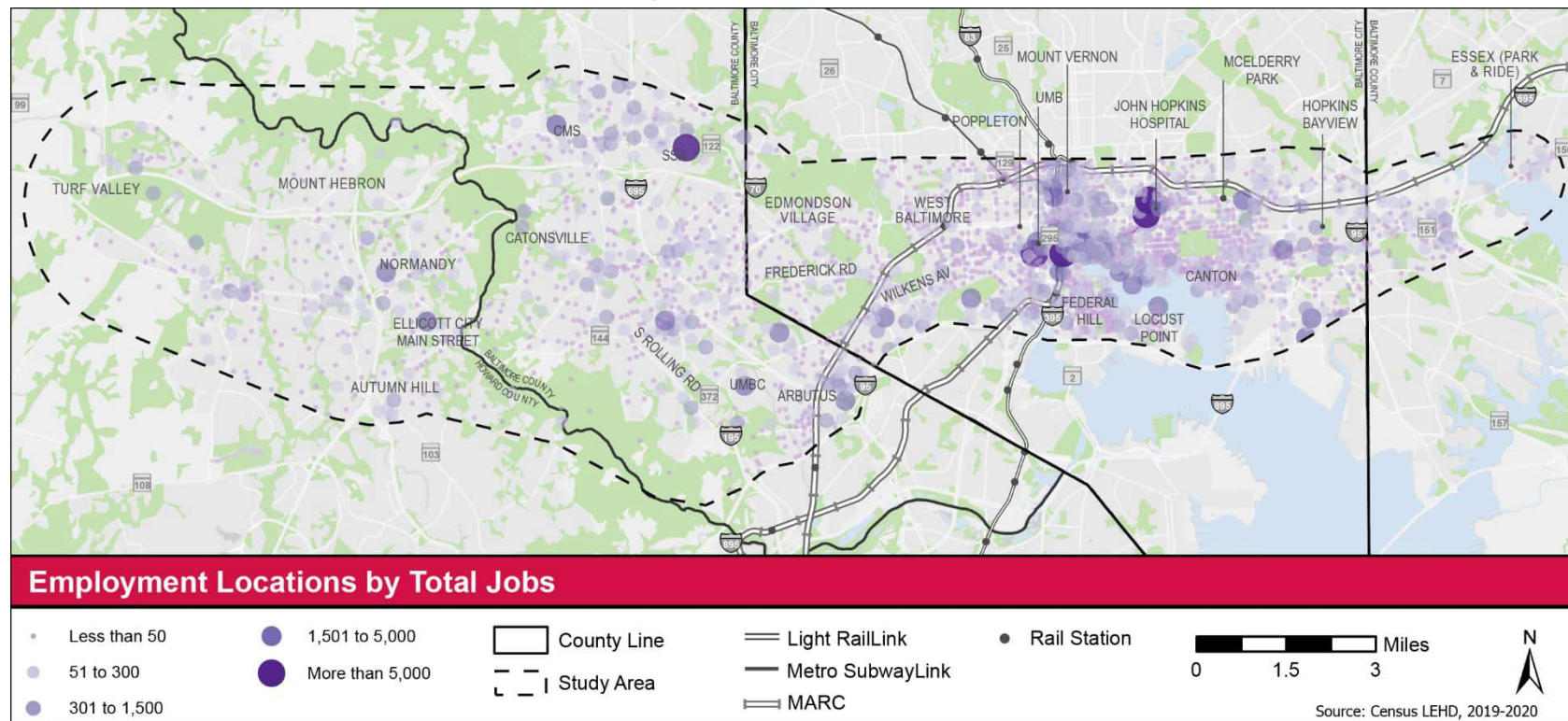


Employment Clusters

While only about one quarter of daily household trips are commute trips, it is one of the most important trip types for planning transit due to its value to family well-being, its regularity for planning service, and its ability to offer an alternative to driving during peak travel periods. Figure 40 maps dot clusters to show where jobs are concentrated within the study area. Combining these job clusters with the employment sector in the previously described transit

market analysis will inform where stops are needed for workers most likely to use transit for their commute. Important job clusters are in and near Downtown Baltimore, in Southwest Baltimore along Washington Boulevard, in the SSA/CMS and Security Square Mall area, Southeast Baltimore’s commercial and industrial corridors, along Columbia Pike and in Ellicott City, and at commercial centers along US 40.

Figure 40: Employment Clusters

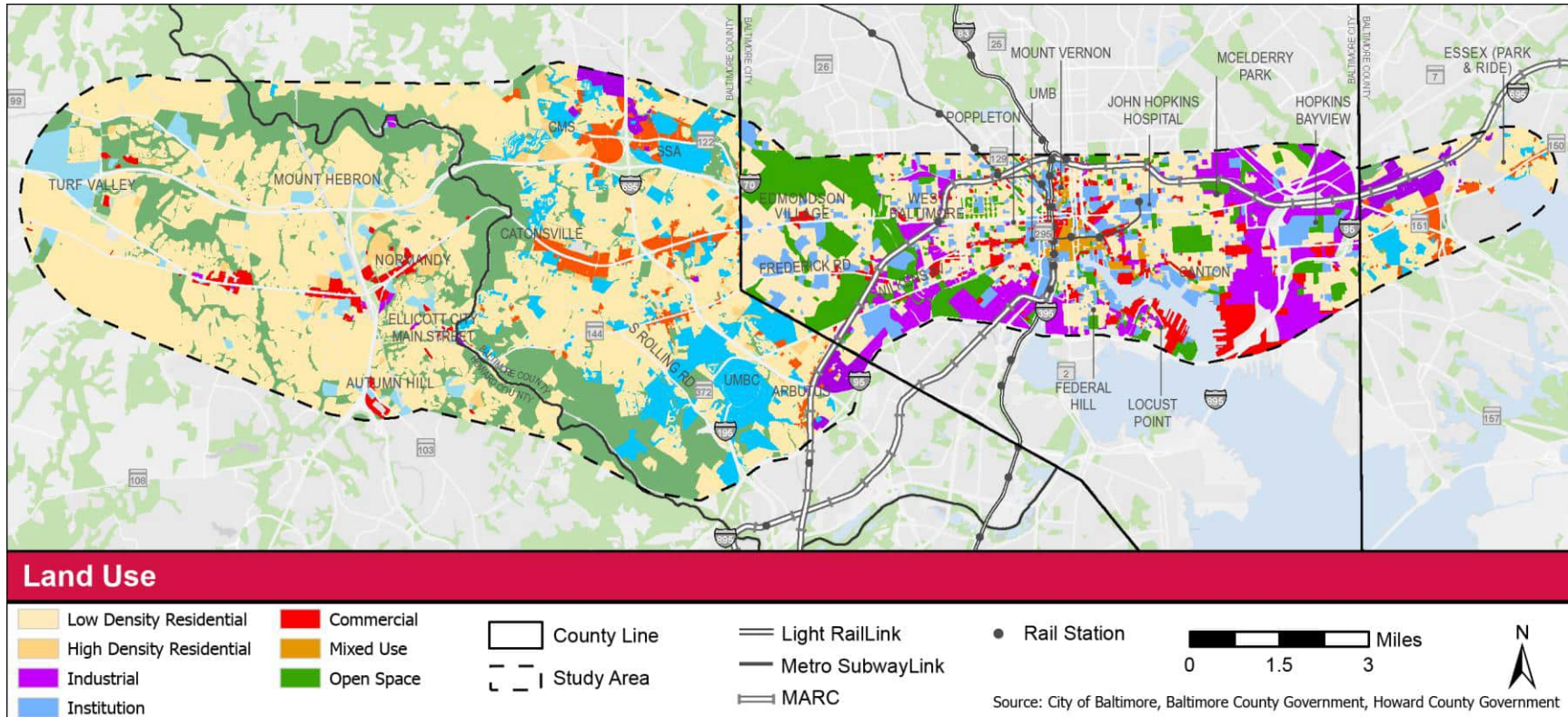


Existing Land Use

The existing land use map (Figure 41) shows where people live, work, and shop today, as well as the study area's open space and recreational amenities. The majority of the study area is characterized by residential land uses. Higher density residential and mixed land uses are concentrated in the City of Baltimore and along the Route 40 corridor. Major environmental areas and protected open space occur to the west in Howard County, along the Patapsco River separating Baltimore and Howard Counties, and in the Gwynns Falls and Leakin Park areas of Baltimore City. Retail and office commercial areas are concentrated along Route 40, at Security Square Mall in Baltimore County, and in

Edmondson Village, Downtown, and Southeast Baltimore, notably along Boston Street and Eastern Avenue. Major institutions and their concentrations of jobs and services are scattered throughout the study area, with notable centers at CMS/SSA, Spring Grove Hospital Center, UMBC, and the numerous hospitals and universities in Baltimore City, including UB, UMB, UMMC, JHMI, and Johns Hopkins Bayview. While typically lower in its concentration of jobs, the Port of Baltimore, the I-95 and I-895 corridors, and Amtrak's Northeast Corridor also show major industrial use land area.

Figure 41: Existing Land Use

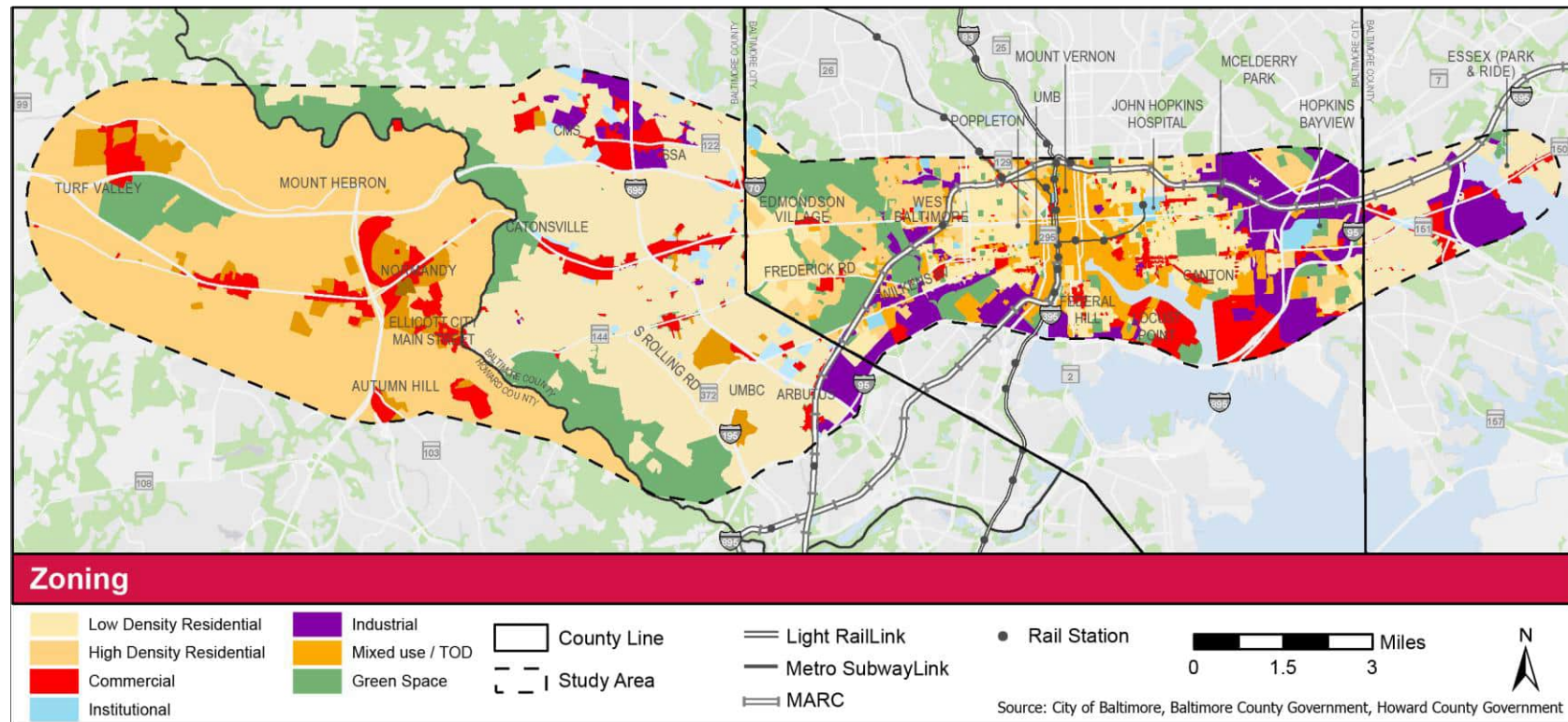


Existing Zoning

While the previous map shows how land is being used today, the zoning regulations (Figure 42) govern how land can be used in the future; Mixed Use/TOD and high-density residential zoning either are, or have the potential to become, places that are highly supportive of transit stations or stops. For commercial and residential zones to be transit supportive they must be designed to cluster and connect activity on and around sites with the highest arterial access. Places with low density residential zoning are

unlikely to be very attractive or convenient for people desiring or needing to use transit. Mixed Use/TOD zoning in the study area is concentrated in Baltimore City near downtown, around the Inner Harbor and along Martin Luther King Boulevard. The Spring Grove Hospital Center in Baltimore County is also zoned for mixed use. High residential densities are accommodated at sites along and just beyond Route 40 where Howard County has provided a Traditional Neighborhood Center zoning category.

Figure 42: Zoning

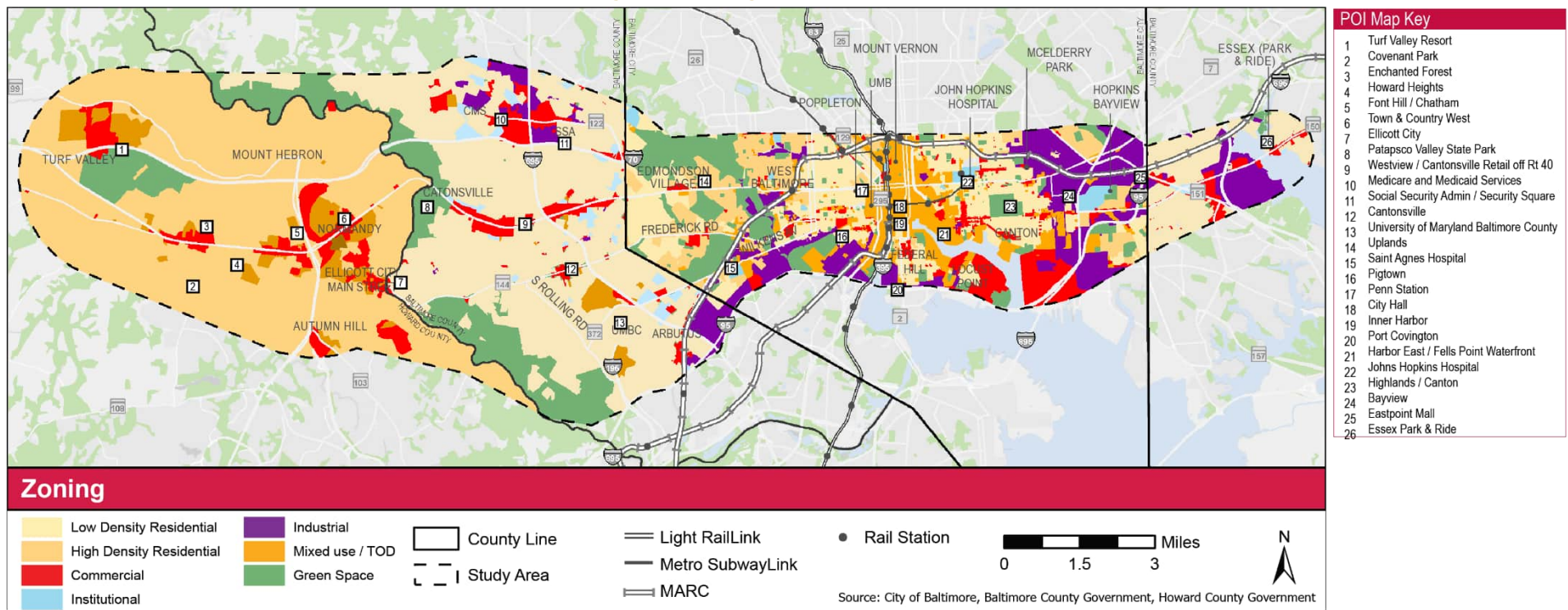


Existing Zoning and Major Points of Interest

Combining this study's Points of Interest identified in the travel flow analysis with the area's zoning (Figure 43) shows a strong correlation between the major trip generators and zoning categories that support shopping, jobs, anchor institutions for health care and education, places for recreation and entertainment and dense mixed-use neighborhoods.

This suggests that areas most likely to be transit supportive can continue to grow and attract investment as major stops or station areas. A notable gap on this map, however, is that the West Baltimore MARC station is neither a major destination nor a Point of Interest. This can be explained in part due to the surrounding land use, which is largely industrial and includes the Highway to Nowhere, the ditch that contains the abandoned I-70 roadway.

Figure 43: Zoning and Points of Interest

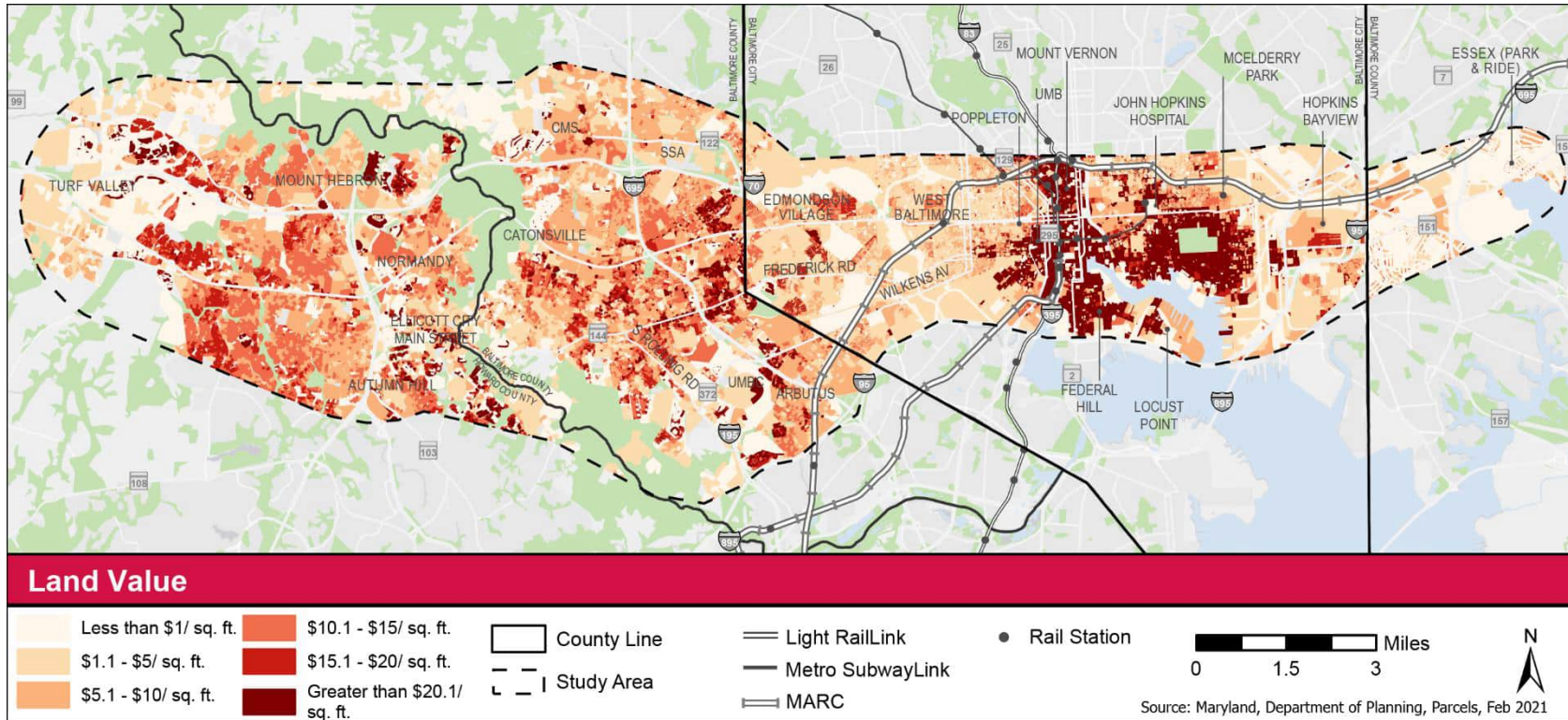


Land Values

Market forces play a vital role in land uses change over time. Commercial and industrial land with high value is less likely to change its use in the near term, as it is likely to be sufficiently profitable for its property owner. Parcel size is also a factor, as larger parcels are often more attractive to developers due to higher potential yield and flexibility in what can be built. Little change is expected in residential areas except where disinvestment is concentrated and reflected in low values. When housing values drop below the costs of rehabilitation, areas can become blighted as properties are neglected or abandoned. The many owners and varying conditions of these residential areas require targeted support from combinations of public, private, or non-profit investors.

Figure 44 maps parcel-level land values based on data reported by Maryland Department of Assessment and Taxation and published as part of the Maryland's GIS Data Catalog. There is considerable diversity in the range of land values, with the highest values concentrated around the Inner Harbor, Canton, Downtown, and the University of Maryland. Just beyond the City/County line the highest values are residential: south of Route 40 in Catonsville and west of US 29 in Howard County. West Baltimore around Route 40 (the Highway to Nowhere), areas east of Baltimore City, and East Baltimore in the vicinity of the Northeast Corridor and I-895 have the lowest values, even in the vicinity of the MARC Station, which should be more valuable given that it is a major transit asset.

Figure 44: Land Value



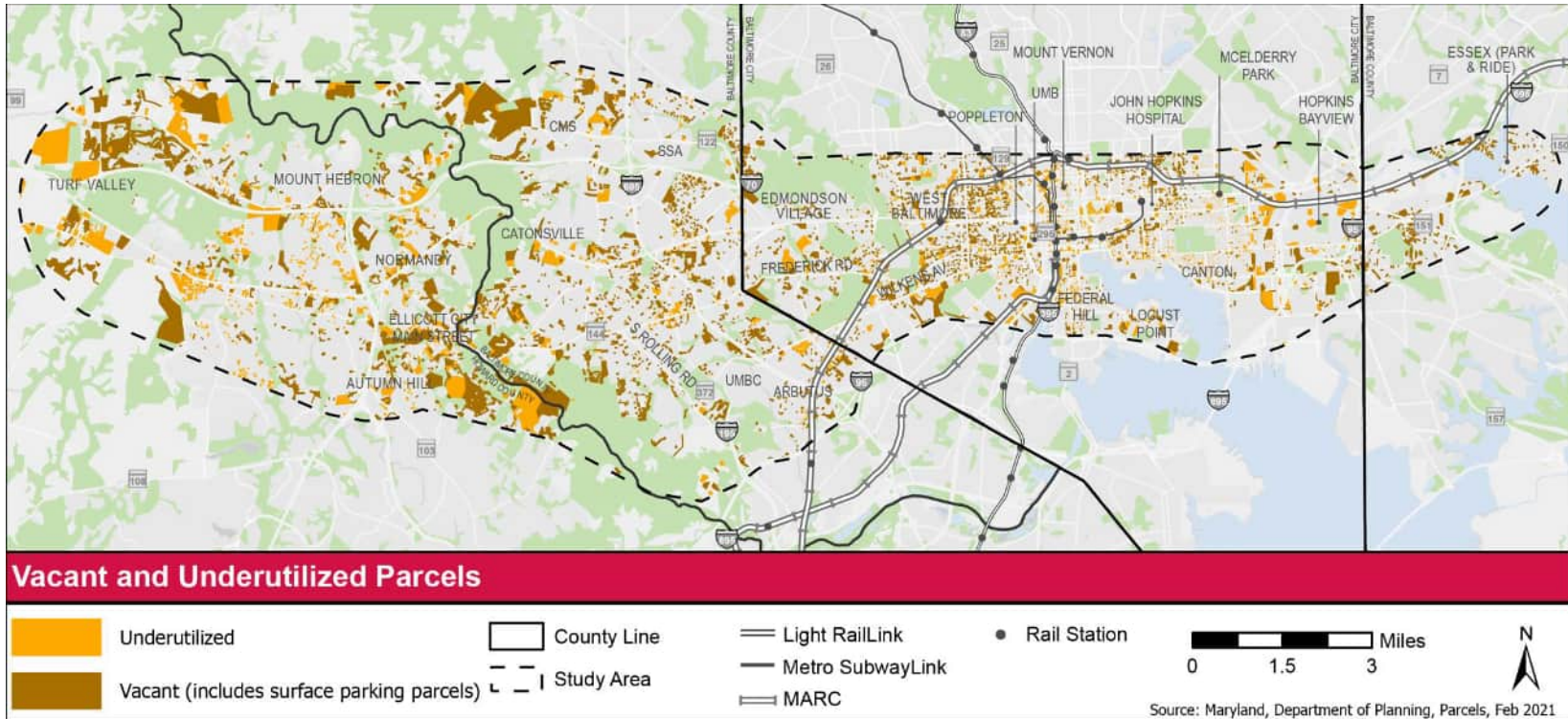
Vacant and Underutilized Land

Figure 45 shows properties that are classified as vacant or underutilized. Land and improvements values reported by Maryland Department of Assessment and Taxation and published as part of the parcels GIS shapefile in the Maryland's GIS Data Catalog were used for this analysis. Parcels that have no restrictions on development but have zero improvements value were classified as vacant. Parcels with improvements to total value (land value plus improvements value) of less than 40 percent were categorized as underutilized.

Most of the study area is highly developed with very few concentrations of vacant developable land. Vacant parcels also

include surface parking that is subdivided from the improved parcel it is serving. Large vacant and underutilized parcels clustered in the CMS/Security Square area, in Howard County near Turf Valley and Ellicott City, and along Amtrak's Northeast Corridor are examples of surface parking identified as vacant or underutilized. Baltimore City has significant concentrations of small vacant and underutilized parcels scattered throughout the city, notably in West Baltimore and east of Johns Hopkins Hospital north of Patterson Park. There is small-scale vacancy throughout Baltimore County, especially near the I-695 and I-95 corridors.

Figure 45: Vacant and Underutilized Land



Existing and Ongoing Plans for Land Use/Redevelopment

New projects are funded, and master plans are in place for new and re-development at locations throughout the study area. Figure 47 shows a selection of relevant plans within the study area. Notable additional insights from review of these plans and conversations with jurisdiction Planning staff included the following:

- Relatively recent residential development in Howard County is showing more density just beyond the Route 40 corridor, and a mixed-use zoning category only available on three major retail center sites may be more broadly applied along the newly designated Route 40 Korean Way in the ongoing Comprehensive Plan Update.
- The new Courthouse in the Route 108 industrial park and former Courthouse district in historic Ellicott City each have the potential to anchor future job and mixed-use centers.
- Baltimore County's west side is generally stable with little planned development activity west of the city except in and around the Catonsville and Arbutus Main Streets.
- Areas east of the City in Baltimore County are stable and an area of County focus influenced by emerging industrial and distribution warehouse investment occurring to the south (i.e. Trade Point Atlantic).

Development is ongoing within Baltimore City across the study area, with a few notable projects and considerations listed below:

- Along Edmondson Avenue, the Uplands Development will add to its single family community, rental units in the near term – a future phase to include additional single family detached units is about five years from implementation.
- The historic Ice House, the surplused Lockmund Bundy Elementary School, and parking at West Baltimore MARC are all potential redevelopment sites near important regional transit centers, but have no specific plans in the works.
- Additional projects active in the Poppleton area include Poe Homes and La Cite communities, the Mother Lange Catholic

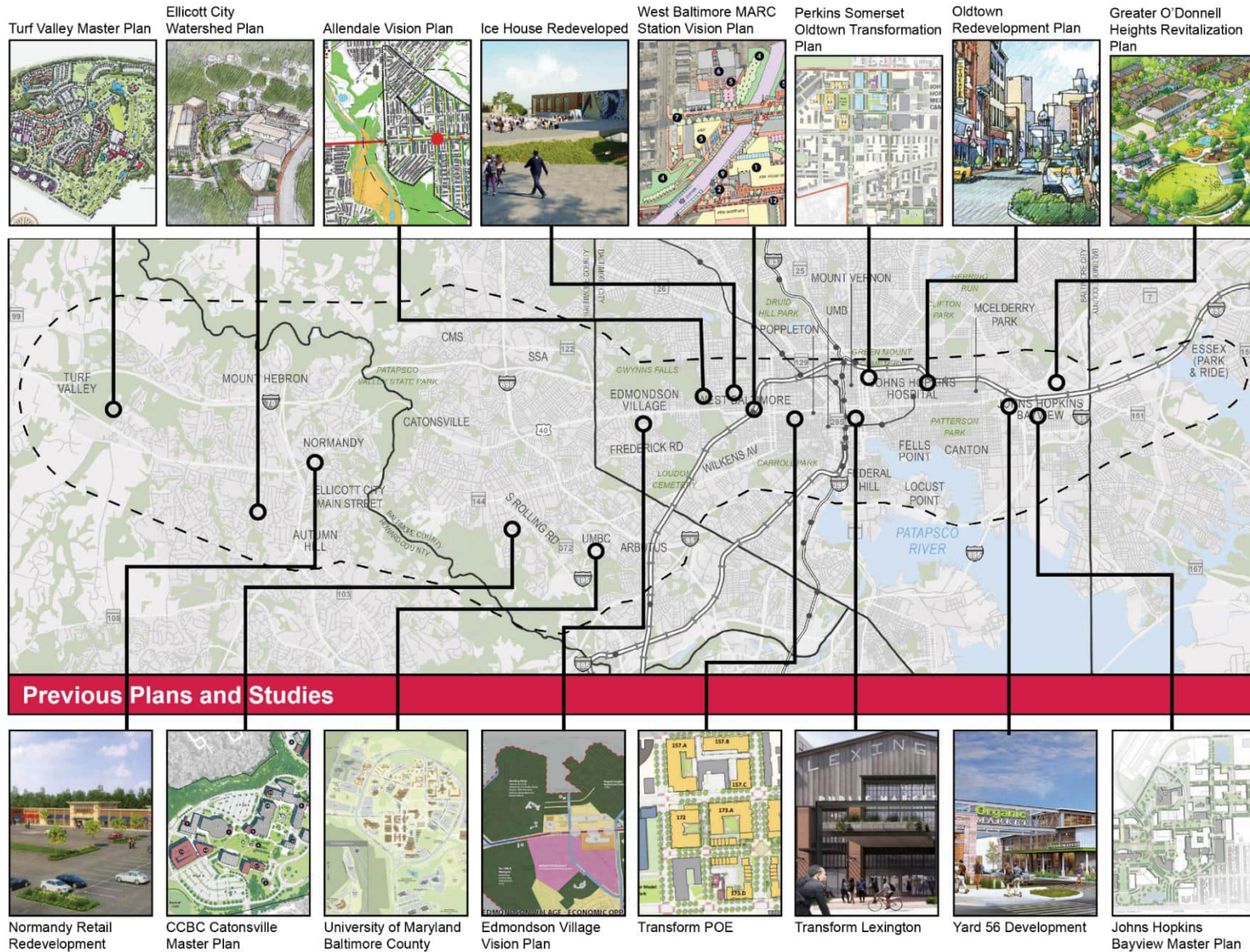
School, and a major phased BioPark expansion (including Wexford's MLK 4 project, shown in Figure 46).

Figure 46: UMB BioPark Development Plans



- Due to trends in office leasing exacerbated by COVID-19, Baltimore City planners are projecting Baltimore's traditional Downtown to become more residential over time. Harbor Point continues a major expansion of Downtown beyond Harbor East along the waterfront.
- Several transformative projects east of Downtown include Perkins Homes and O'Donnell Heights Choice Neighborhoods redevelopments, Yard 56 adjacent to Hopkins Bayview, and a Master Plan for Oldtown.
- Some parts of the Red Line Preferred Alternative are no longer available as envisioned, such as the Norfolk Southern segment, which is now imagined for a trail, and the parcel where the alignment turned east to Bayview has been developed into townhomes.

Figure 47: Existing Public and Private Master Plans Guiding Land Use and Redevelopment

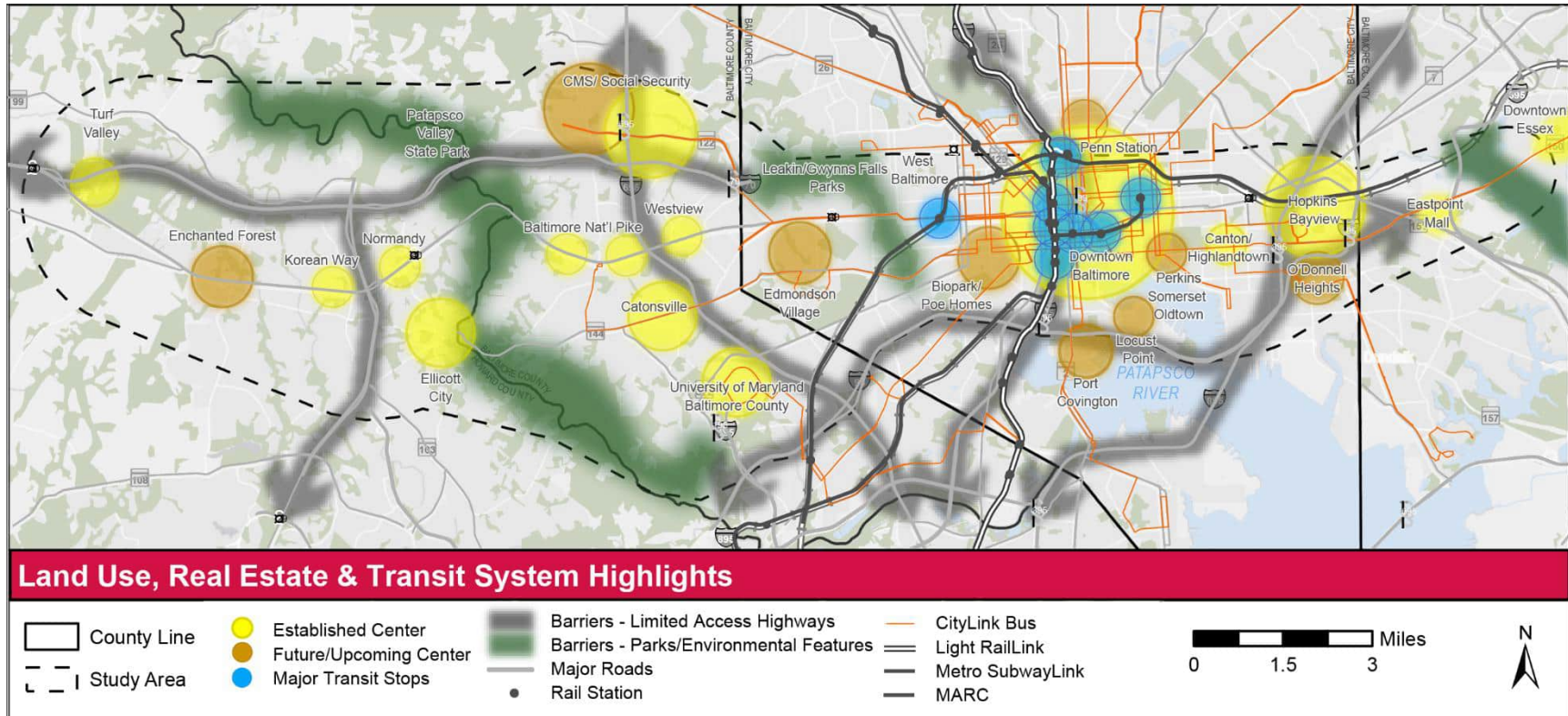


Land Use, Real Estate & Transit System Highlights

Figure 48 shows diagrammatically the physical relationships between today's major transit service, popular destinations, current activity centers, emerging development locations, and the natural and major infrastructure barriers that will direct most alignments onto a narrow set of highly connected roadways. Important takeaways include:

- Natural and highway barriers limit regional connectivity at crossings of Gwynns Falls Park, Patapsco Valley Park, and Back River, as well as US-29, I-95, and I-695 on both the east and west sides of the study area.
 - Metro Subway and Light Rail are concentrated at a few key points but are significant for both connection to city destinations and regional reach to and from Baltimore and Anne Arundel Counties. MARC service on the Camden and Penn Lines connects Howard County's Route 1 employment districts, BWI Business Park, Bowie State, College Park, New Carrollton, and Washington, DC's Union Station, each with transfers to lines in the Metrorail system and the future Purple Line at New Carrollton.
 - CityLink Bus Routes generally use the radial roads that extend from Downtown Baltimore and concentrate in and around Downtown on the City's busiest east-west streets then are more spaced out through Mount Vernon and on North Ave. There are no radial CityLink routes, and while service does not extend beyond Rolling Road in the west, CityLink service continues east beyond Bayview through Essex.
- The East-West Corridor study area is rich in diversity of strong attractors, emerging new neighborhoods, and districts that could benefit from clear connections to trigger revitalization and investment. In the Synthesis Diagram on the next page, they are roughly scaled to represent their physical footprint. They include the following:
 - Strong attractors: Johns Hopkins Bayview, Johns Hopkins Hospital/Medical Campus, Canton Crossing, Harbor East/Harbor Point, Downtown, UMB/UMMC/BioPark, UMBC, SSA/CMS, Route 40 Commercial Corridor, and Korean Way.
 - Emerging and growing neighborhoods: Catonsville Main Street, Uplands, along Eastern Ave through and beyond Highlandtown, Brewer's Hill, around Hopkins Bayview, and in housing project conversions including: Uplands, La Cite, Poe Homes and Perkins Homes, and O'Donnell Heights Choice Neighborhoods.
 - Districts that could benefit from connections to existing destinations for revitalization and investment: Security Square Mall, areas along Eastern Avenue, large commercial retail parking and car dealership sites along the Route 40 corridor that have mixed use potential in Baltimore and Howard Counties, Edmondson Village, West Baltimore Station Area, Oldtown, and Orleans Street Corridor in Baltimore City.

Figure 48: Synthesis Diagram



CONCLUSIONS

This corridor study area extends across a full transect of environments ranging from urban core to suburban, and rural (Figure 49). Demographic characteristics, travel patterns, transit use, and land use are similarly organized along these lines. Since this corridor is diverse in form, there is an opportunity to be diverse in application. There are many east-west corridor options with each of these transects that will also allow for different modes, stops spacing and priority treatments. Along with looking at planned land use and right of way opportunities, the unique activity generators, trip patterns, regional connections, and transit use in this study area will inform alignment alternatives.

Activity Generators

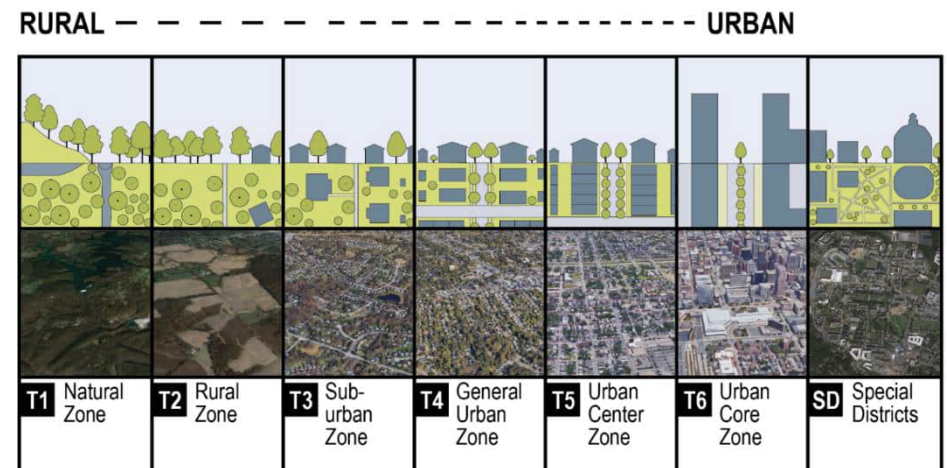
As noted, jobs and population densities follow the transect from Downtown Baltimore, west to Ellicott City and Turf Valley. However, there are pockets of high activity in the suburban zones which are anchored by major employers like, UMBC, CMS, Social Security Administration, Ellicott City, and Howard County Courts and Government. Travel patterns in the future follow current travel patterns apart from a significant increase in travel around CMS, Port Covington, and Enchanted Forest. These locations have growth in households and jobs based on the Round 9 Cooperative Forecasts; however, this could change as the region continues to recover from the COVID-19 pandemic. The nonlinear spacing of these activity generators will be challenging to connect with a single pattern or simple alignment.

Within the city, activity generators are split east of the downtown core. Following north and east, Johns Hopkins Hospital main campus is a major generator. Following south and east, Johns Hopkins Bayview and attractions close to the water like Fells Point Main Street, Canton Crossing, and Harbor Point/Harbor East are also major generators.

Trip Patterns

Trips within the corridor are not long; 80 percent of trips are less than five miles and 42 percent of the trips within the corridor are less than two miles in length. This indicates that residents along this corridor are traveling not only to their jobs but also to local services and attractions. Furthermore, 46 percent of trips that originate in the study area occur during either the AM or PM Peak period, and 46 percent of these same trips occur during the midday and evening time periods. This illustrates the importance of providing consistent all-day service.

Figure 49: Example of the Urban Transect



Regional Transit Connections

This study area is served by MTA Local, Express, and CityLink services, RTA Route 405, and MARC commuter rail. Furthermore, in the future, the BRT Route 29 from Montgomery County will intersect this corridor and terminate in Mount Hebron. This is an important chance to better connect to the regional services that are offered to these communities. Currently, nine percent of the trips that come to or from the study area use transit. From the external travel flows (Figure 20) there is demand for major connections from Columbia and Howard County to Normandy, Ellicott City, and Catonsville as well as from Essex and Dundalk to downtown, Bayview, and Johns Hopkins Hospital.

Transit Use

Currently, transit services are not provided much farther than the general urban zone (west of Catonsville). Therefore, anyone living beyond that zone who has needed transit has been unable to use it. Most of the riders that will come from these areas will be doing so by choice. Currently, the mode split within this study area is only 11 percent transit and 73 percent driving alone or ridesharing. Capturing these novice choice riders in the rural and suburban zones will require different resources and priorities than capturing transit-oriented and experienced riders near the urban core.

In addition to downtown Baltimore City areas, where transit usage is higher, some additional corridors stand out in terms of existing transit ridership. Edmondson Avenue, in the western part of the corridor, and Fayette Street and Eastern Avenue, in the eastern part of the corridor, not only cluster ridership activity but are also highly traveled through corridors.

Transit vehicle loads, or transit passenger throughput, tend to be high in both directions and throughout the day on Edmondson Avenue and Fayette Street. Along Eastern Avenue (neighborhoods south of Patterson Park) westbound loads are higher in the AM peak

and in the opposite direction in the PM peak. This indicates a more commuter focused need in places like Canton and Fells Point and a more all-day need in areas north of Patterson Park, like McElderry and around Johns Hopkins Hospital.

Most of the corridor routes recovered their ridership decline due to COVID-19 restrictions at a rate above or near the system average. Ridership in the corridor already presented smoother peaks compared to the BaltimoreLink system, and these peaks became even more smooth. This indicates that the East-West corridor is critical to essential jobs and workers.

Land Use and Development

Today's major trip in generators have zoning consistent with high employment, major shopping, higher education, and dense housing. Near term growth in Baltimore City is occurring through public and private mixed-income residential projects, and major private mixed use development activity south and west of downtown and around Bayview. Strongest growth in Baltimore County is focused around UMBC and historic Catonsville. Redevelopment envisioned around Howard County's historic courthouse and along US 40's Korean Way is market dependent and envisioned in current plans.

Neighborhoods with the highest vacancy rates and lowest land values have the potential to be the focus of future investment. Concentrated west of Poppleton to Edmondson Village and the Uplands neighborhood and along parts of US 40 Baltimore National Pike in Baltimore County, development incentives coupled with a major transit investment could provide new transit accessible growth area by linking them to some of the region's most popular destinations, emerging new neighborhoods, mixed-use centers, and major north-south rail connections of MARC, Metro Subway and Light Rail,

ATTACHMENT

Transit Propensity Methodology

Transit-Oriented Populations Index

The Transit-Oriented Populations Origin Index shows where residents who are likely to use transit live. This includes populations of young and senior citizens, low-income residents, households with one or fewer cars, persons with disabilities, and minority households (Table 4). The weights for each category are based on the projected impact of each in defining Transit-Oriented Populations.

Table 4: Transit-Oriented Populations Index

INDEX	VARIABLE	DATASET
TRANSIT-ORIENTED POPULATIONS	Population	Population Density
		Non-white and Hispanic Population Density
	Age	Senior (65+) Density
		Seniors as Percentage of Total Population
		Youth (<18) Density
	Households	Youths as Percentage of Total Population
		Total Households
	Income	Household Density
		Low-Income Households as Percentage of Total Number of Households
		Low-Income Household Density
	Vehicle Ownership	Percentage of Low-Income Households as Percentage of Total Number of Households
		Percentage of Zero-Car Households as Percentage of Total Number of Households
		Zero-Car Household Density
		Percentage One-Car Households as Percentage of Total Number of Households
	Disabled Person	One-Car Household Density
Disabled Population Density		

Activity Destination Index

The Activity Destination index illustrates other work destinations where residents might use transit to travel either for non-work trips or for lower-income service jobs. These destinations include retail, restaurants, recreation, health care, social assistance, education, and government (Table 5). These categories are weighted based on the typical trip purpose proportions for transit users. The primary datasets that make up these categories are employment in the each of the represented sectors (e.g., the recreation category contains datasets from the entertainment sector and the recreation sector). The employment-by-sector datasets serve as proxies for how much travel demand businesses that fall into these sectors would produce, making this index indicative of where people make non-work trips and also where jobs are located that may have non-traditional commute times (i.e. off-peak commutes).

Table 5: Activity Destination Index

INDEX	VARIABLE	DATASET
ACTIVITY	Retail/Restaurant	Retail Jobs Density Restaurant Jobs Density
	Recreation	Entertainment and Recreation Jobs Density
	Healthcare/Social Assistance	Healthcare & Social Assistance Jobs Density
	Education	Education Jobs Density
	Government	Public Administration Jobs Density

Commuter Origin Index

The commuter origin index represents areas that are likely to serve as the origin of a trip for transit commuters. This measure includes residents who are employed or in the labor force and above the age of 16, with a special emphasis on those who commute by transit or by means other than driving alone (Table 6).

Table 6: Commuter Index

INDEX	VARIABLE	DATASET
COMMUTERS	Labor Force	Labor Force Density
		Employed Person Density
		Employed Persons as Percentage of Total Population
	Commuter Density	Commuter Density
		Commuter Density
Commuter Density	Commuter Density	Transit Commuters as Percentage of Total Commuters
		Transit Commuter Density

Employment Destination Index

The employment destination propensity index shows where jobs in all sectors are heavily concentrated in the region. This measure

includes the total number of jobs and job density in each area (Table 7).

Table 7: Workplace Index

INDEX	VARIABLE	DATASET
EMPLOYMENT	Employment	Employment Density

This study area spans a downtown urban environment, inner ring suburbs, and outer ring suburbs. This far-reaching and diverse area requires careful consideration when applying indices that rank each census block group relative to other block groups in the study area. In order to account for the strong downtown Baltimore pull of the study area, all block groups that scored higher than 80 (out of 100) in a given index were rated as having a high transit propensity on that index. The remaining values were recalibrated to the low-moderate-high tiering system using Jenks natural breaks. This ensures that areas outside of downtown Baltimore that exhibit at least moderate transit propensity are not penalized when indexing simply because they cannot reach the naturally high transit propensity that exists in dense urban areas.

Transit-Oriented Populations

Maps shown in Figure 50 through Figure 55 show the density of various transit-oriented populations in the study area.

Figure 50: Density of Zero-Car Households

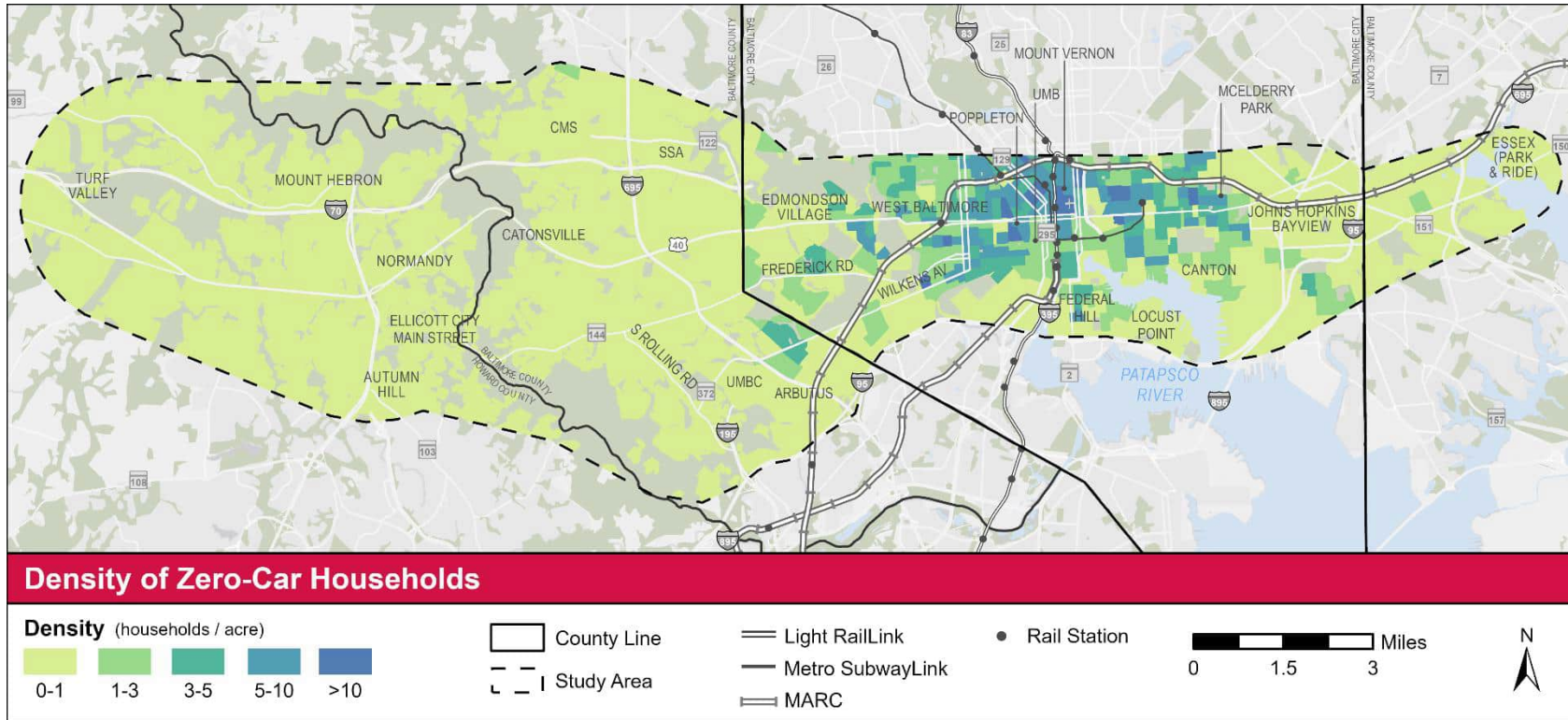


Figure 51: Density of Low-Income Households

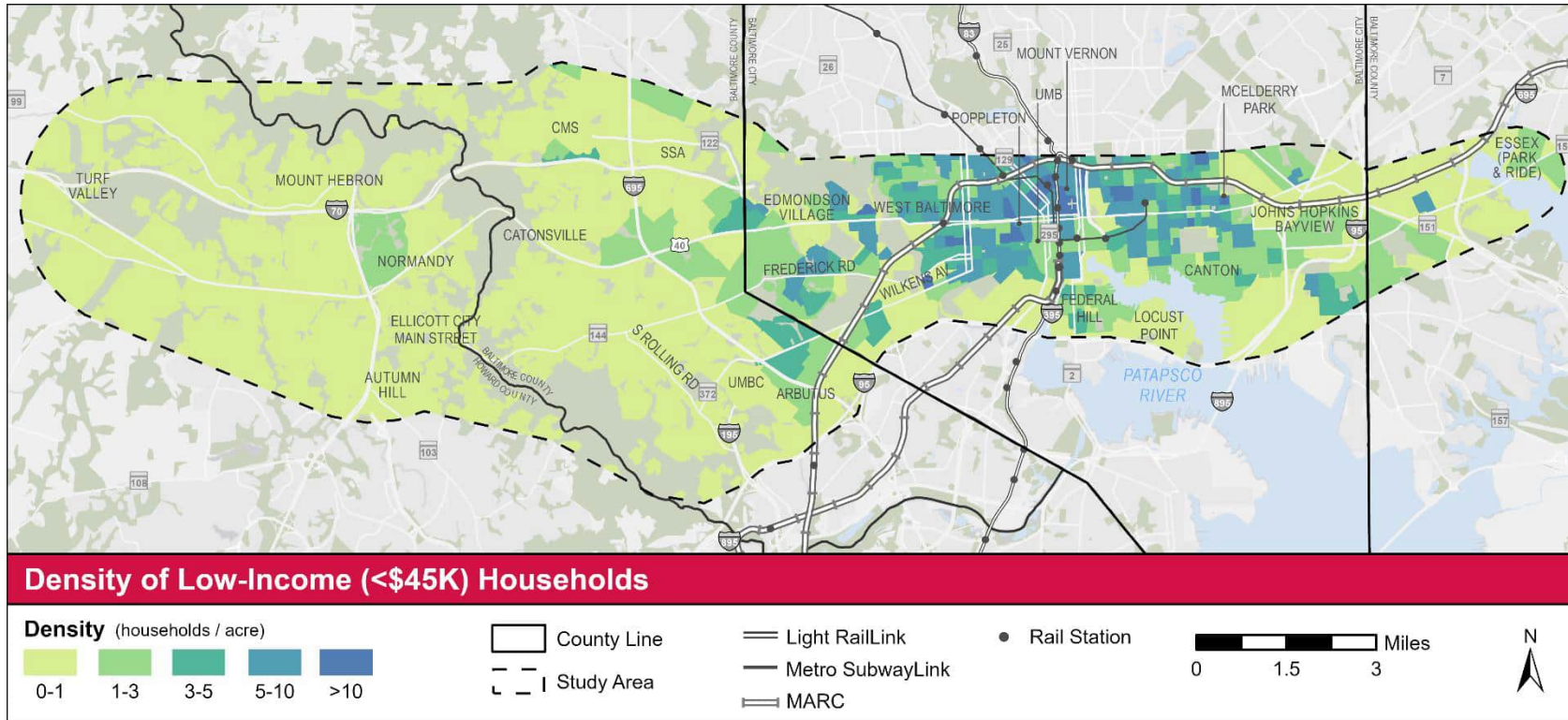


Figure 52: Density of Minority Populations

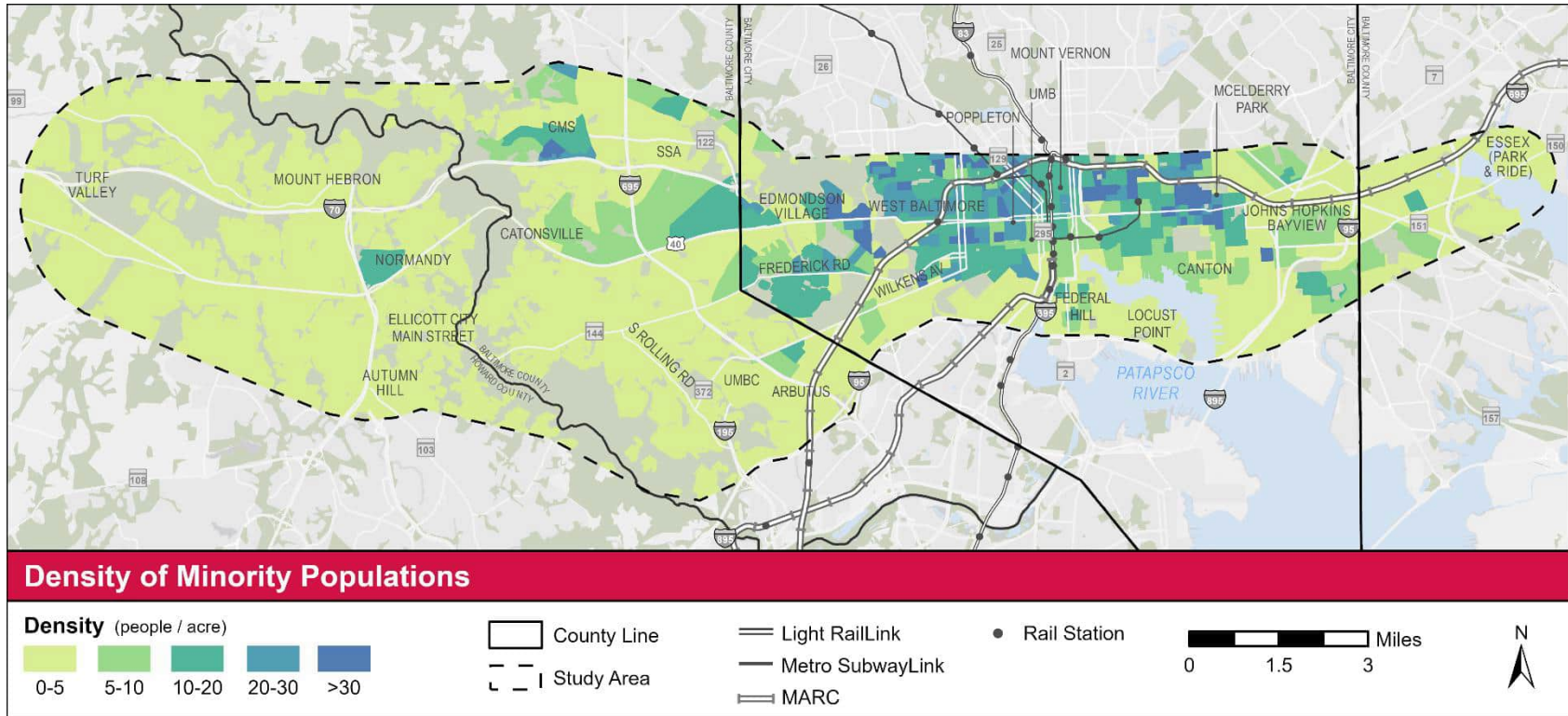


Figure 53: Density of Youth Population

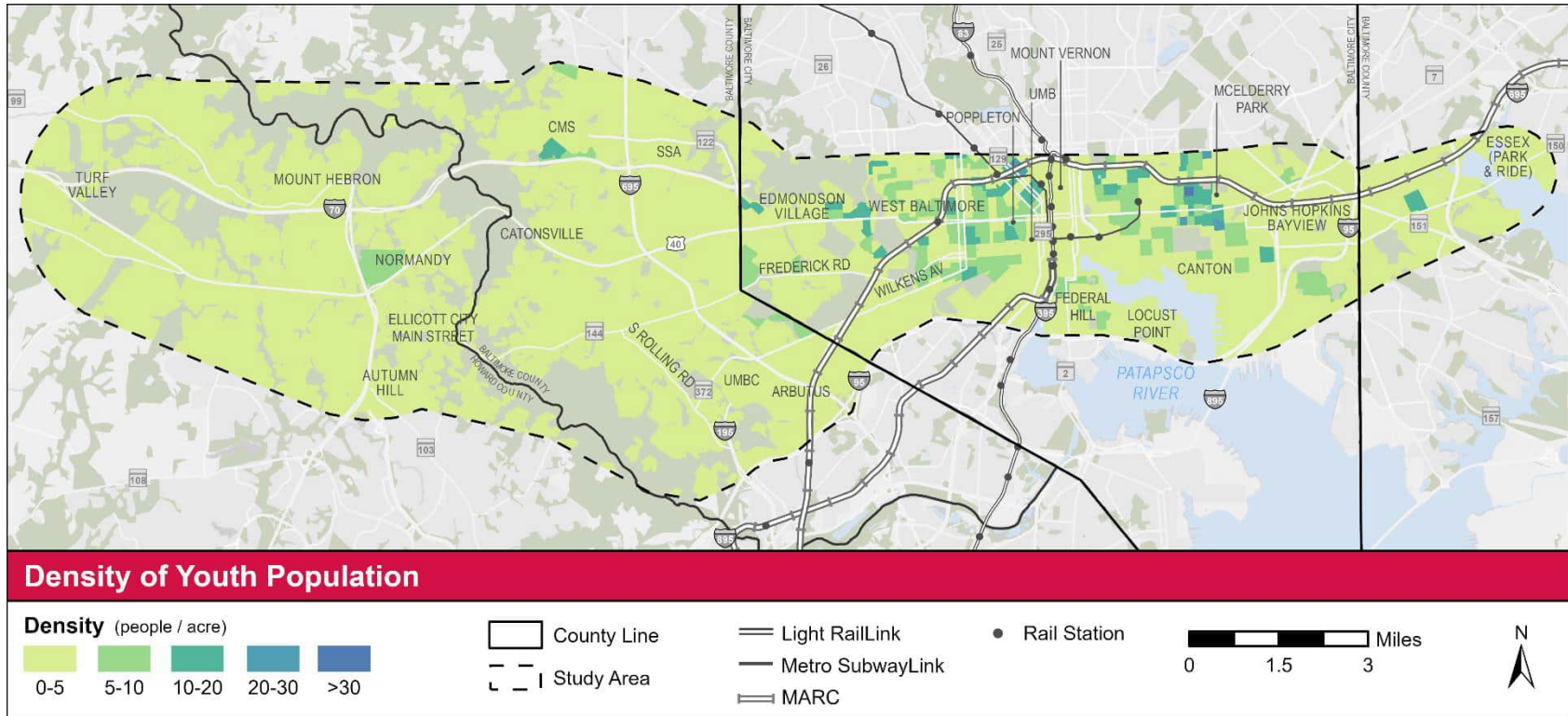


Figure 54: Density of Senior Population

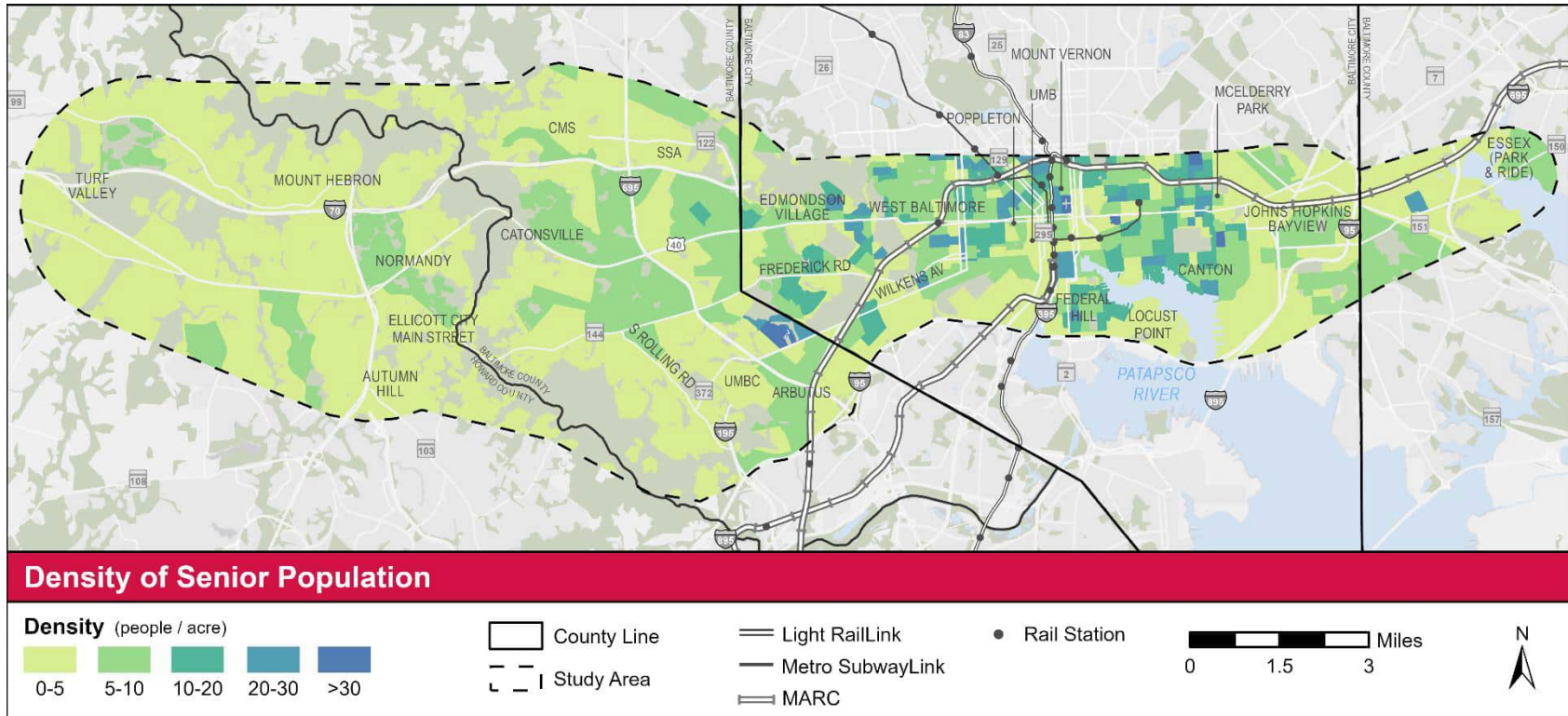
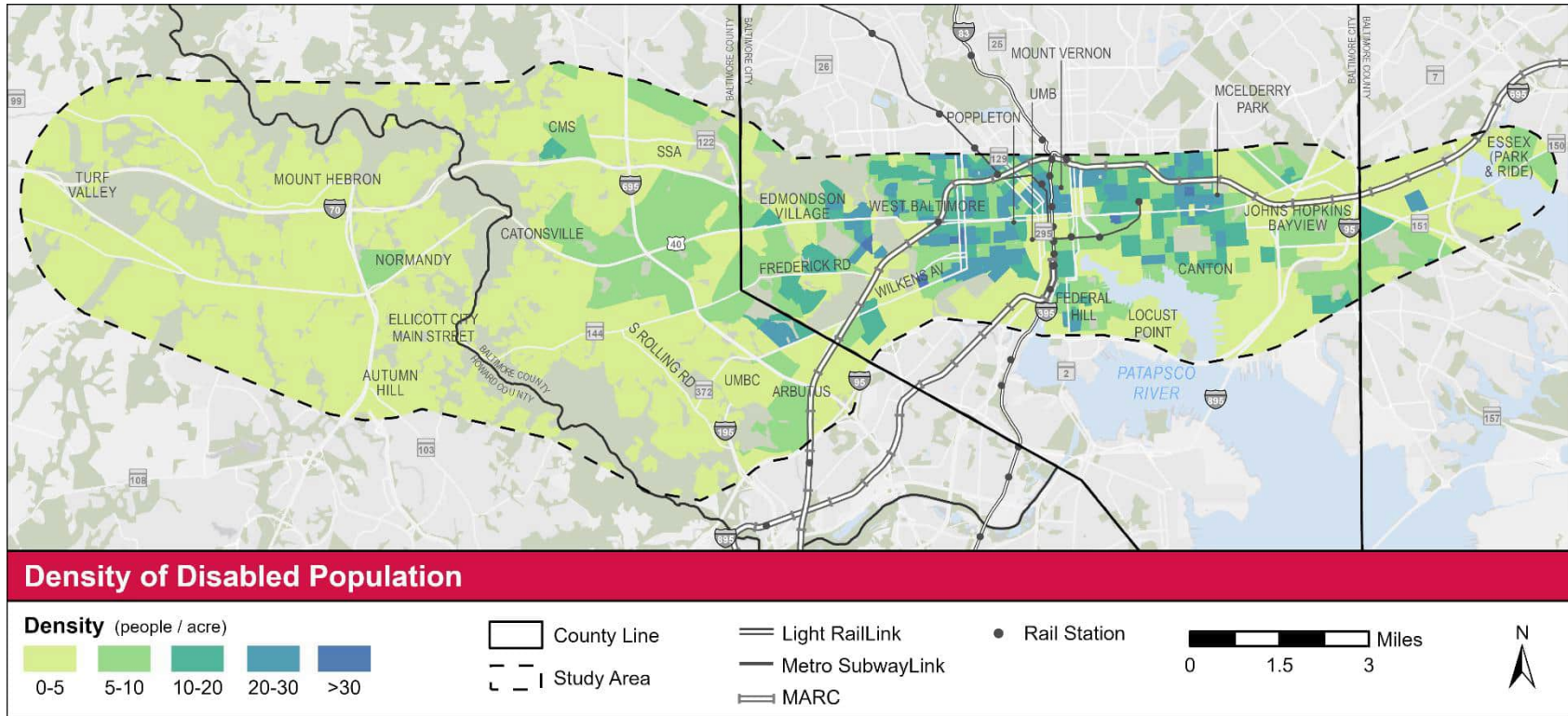


Figure 55: Density of Disabled Population



Travel Flows

Map shown in Figure 56 shows travel flows between 150 and 300 trips in West Baltimore.

Figure 56: Disaggregated Daily Travel Flows in West Baltimore, 2020

