

Baltimore City

Dockless Vehicle Program

Annual Evaluation Report: Permit Year One



Appendix 3: COVID-19 Impact on Dockless Vehicles

Response and Analysis

This appendix explores the impacts of the COVID-19 pandemic on the Dockless Vehicle Program. The first cases of COVID-19 were confirmed in Baltimore City in March 2020, a time when ridership was expected to increase substantially due to warmer weather. Instead, daily ridership fell by approximately 75% in the week following the first confirmed case of COVID-19 in Baltimore City and then remained stable through March and April. The drop in ridership reflects citywide travel patterns, as residents were urged to stay at home and only travel for essential trips. This analysis provides additional detail about:

- Baltimore City DOT (BCDOT) and permit holder responses to COVID-19
- Changes in citywide deployment, ridership, and routing patterns
- Essential trip access to hospitals, grocery stores, and food distribution sites

COVID-19 Response

Timeline

- Thursday, March 5: First cases of COVID-19 confirmed in Maryland
- Thursday, March 12: First community transmission of COVID-19 in Maryland, school closures announced
- Friday, March 13: Deployment requirements lifted, response time for BCDOT requests extended to 6 hours
- Saturday, March 14: First case of COVID-19 confirmed in Baltimore City
- Thursday, March 19: Lime pauses operations
- Monday, March 16: Bars, restaurants, gyms, and movie theaters close in Maryland
- Monday, March 23: Non-essential businesses close in Maryland
- Saturday, May 2: Lime resumes operations
- Friday, May 8: Lime acquires JUMP operations

BCDOT Response

BCDOT began implementing policy changes to the dockless vehicle requirements upon the news of COVID-19 outbreaks in the United States. Prior to any local shutdowns or cases, BCDOT required permit holders to provide updates to their maintenance and cleaning protocols. When the closure of Maryland schools was announced on March 12, BCDOT adjusted permit requirements. BCDOT suspended deployment requirements and extended the mandated response time to BCDOT requests for vehicle relocation to six hours to aid permit holder compliance with social distancing protocols. In return, BCDOT asked permit holders to deploy vehicles at hospitals, grocery stores, and emergency food distribution sites and to support transit disruptions or reductions of transit service. BCDOT provided essential permit holder employees with letters to affirm that they could continue operations in case they were questioned by law enforcement.

Many of BCDOT's program support operations were interrupted due to COVID-19, including infrastructure projects (bike facility audit and corral installation), the Complete Streets Mobility Ambassador Program, the Dockless Vehicle PSA, and outreach to obtain more User Survey responses. Additionally, Governor Larry Hogan instituted an Executive Order on March 12, 2020, that extended all municipal permits 30 days past the end of the State of Emergency due to COVID-19. To accommodate for this extension and the changing state of the micro-mobility companies, on May 5, BCDOT released a proposal for public comment to amend permit Rules and Regulations in order to extend the permit for 90 days after the end of the State of Emergency. This extension of 90 days, rather than 30, will allow BCDOT to wait to release the full

Rules and Regulations for permit year two for public comment until after the State of Emergency is lifted. BCDOT seeks additional time to adjust the full Rules and Regulations to consider the changing dynamics of micro-mobility. The public comment period for the proposed extension is May 5 to June 5, 2020.

The Dockless Vehicle Committee has continued to meet via videoconference. The first digital meeting took place on April 8, 2020, and meetings are scheduled to continue via teleconference on the second Wednesday of each month.

Permit holder responses

All permit holders immediately implemented enhanced cleaning protocols in response to the COVID-19 crisis. When the State of Emergency became more acute, company operations and ownership shifted. These developments underscore the need to extend the permit for a longer time after the State of Emergency is lifted so that the program can adapt to the changing business environment. Additionally, all three of the permit holders in Baltimore City offered free 30-minute rides for certain groups of essential workers. These shifts and programs are summarized in **Table 1**.

Table 1: Summary of Permit holder Responses to COVID-19

	Spin	JUMP	Lime
Operational and ownership shifts	No changes to operations or ownership	Operational until May 7 when acquired by Lime; operations are approved for suspension through June 7	Suspended operations from March 19 to May 2; Acquired JUMP on May 7
Free 30-minute ride program and launch date	Everyday Heroes: March 27	Essential Service Workers Program: March 30	Lime Aid: May 2
Who is eligible for free 30-minute rides?	Healthcare workers	All essential workers	Healthcare, public safety, and law enforcement workers
Sign-up method	Individuals apply online, link provided to active users via e-mail	Organization HR rep applies online, shares code with employees	Individuals apply online, link provided to active users via e-mail

Ridership and Vehicle Distribution Data Analysis

Ridership and vehicle distribution varied greatly before and after the emergence of COVID-19 as well as throughout the period of transition. For the purposes of this analysis, the period of August 15, 2019 – February 29, 2020 is used to represent the period before COVID-19 (as is consistent with the data reporting in the Dockless Vehicle Program Annual Evaluation Report), and March 24 – April 27, 2020 represents the period after which changes due to COVID-19 have stabilized. However, smaller time windows are used when deemed more appropriate.

Overall Ridership

The number of daily rides and vehicles available between March 1 and April 27, 2020 are provided in **Figure 1**. Between March 14 and March 23, 2020, ridership declined on all days except one. Ridership fell by 76% between the 7 days before (March 7-13) and the 7 days immediately after (March 24-30) this period of decline. This is in line with other modes, such as transit, which fell 54% in ridership compared to the same time last year¹, and vehicle miles traveled, which fell by approximately 70% compared to January 2020 levels.² The average number of maximum daily vehicles deployed between these two periods declined by 41%, slightly less than ridership.

¹ <https://www.mta.maryland.gov/articles/285>

² <https://www.streetlightdata.com/vmt-monitor-by-county/#emergency-map-response>

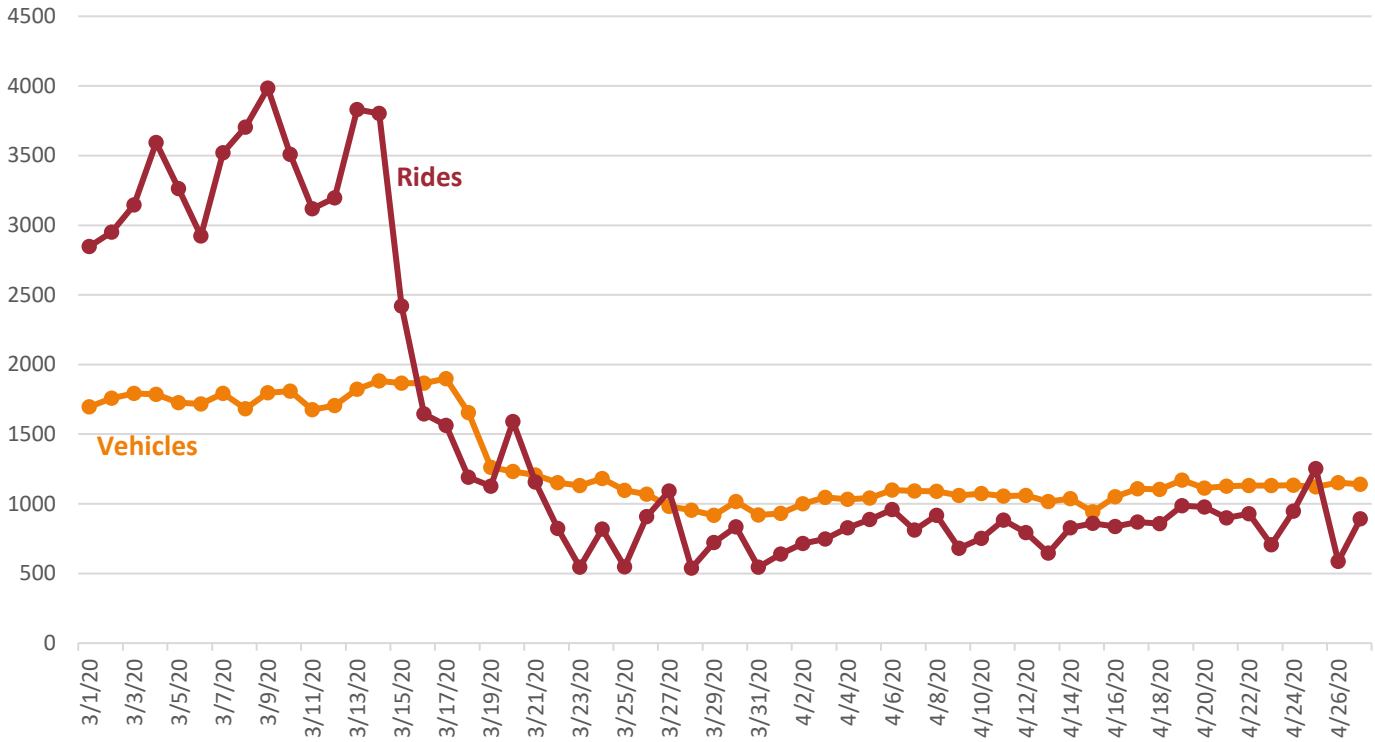


Figure 1: Daily Rides and Daily Maximum Available Vehicles, March 1 – April 27, 2020

Ridership level decreases are consistent throughout the week with losses particularly pronounced during weekday morning rush hours. Before COVID-19, there were 32% fewer trips during the morning peak hour than during the evening peak hour; however, after COVID-19, there were 67% fewer trips during the morning peak hour than during the evening peak hour. The comparable average hourly rides for each hour of the week before (August 15, 2019 – February 29, 2020) and after (March 24 – April 27, 2020) the arrival of COVID-19 are presented in **Figure 2**, and the March – April hourly averages are presented alone in **Figure 3**.

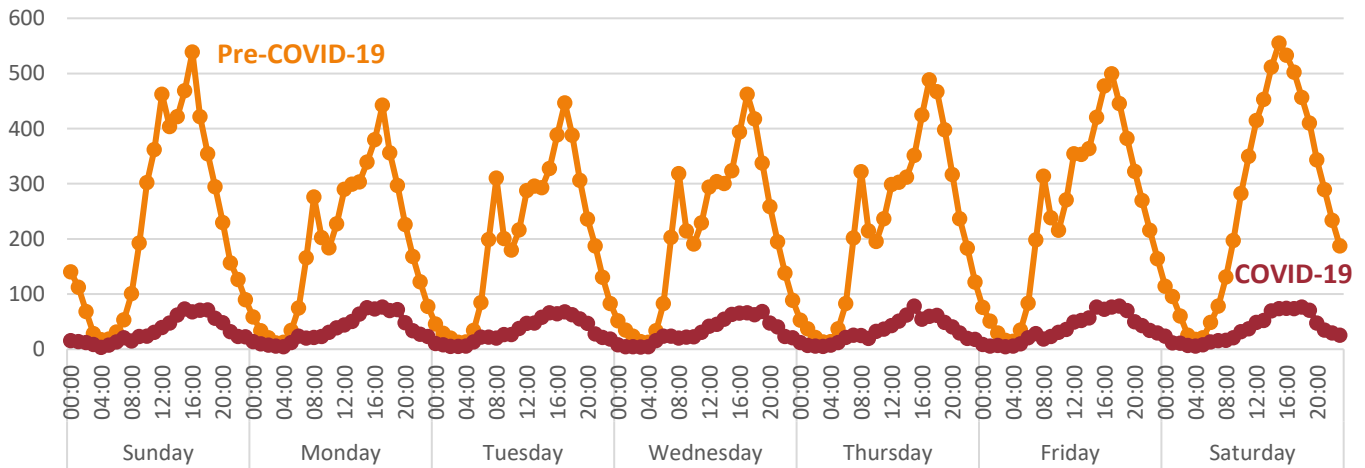


Figure 2: Average Hourly Rides Throughout Week Before (August 15, 2019 – February 29, 2020) and After (March 24 – April 27, 2020) Arrival of COVID-19

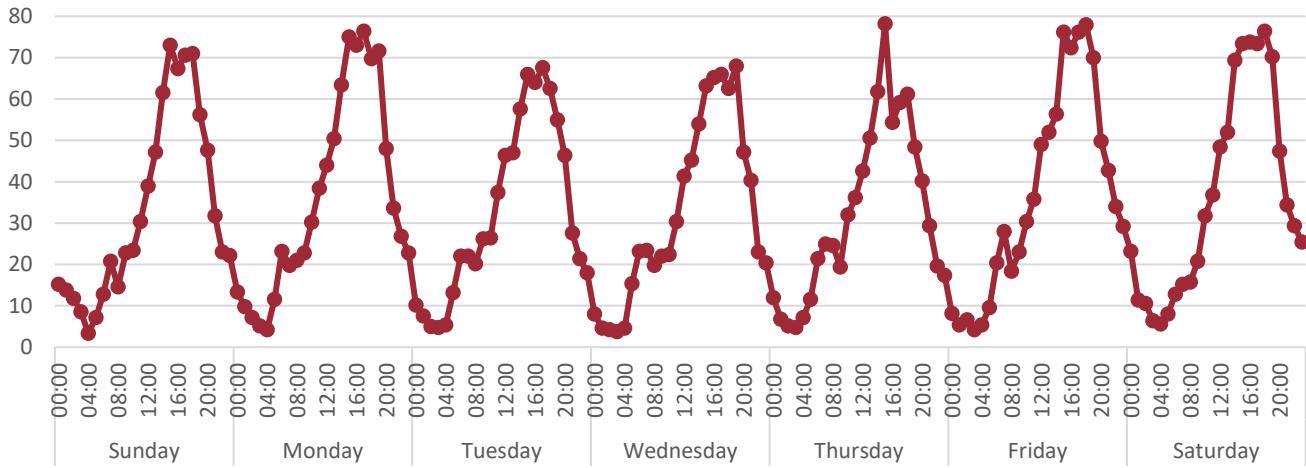


Figure 3: Average Hourly Rides Throughout Week, After Arrival of COVID-19 (March 24 – April 27, 2020)

Changes in Distribution of Vehicles

With equitable deployment requirements lifted, permit holders had more flexibility in distributing vehicles across the City’s planning districts to meet the changing demand. On average, permit holders deployed a greater proportion of vehicles in the Northwest, North, West, and East districts, and a smaller proportion of vehicles in the Southwest, South, Northeast, Southeast, and Central/Downtown districts. These changes are summarized below.

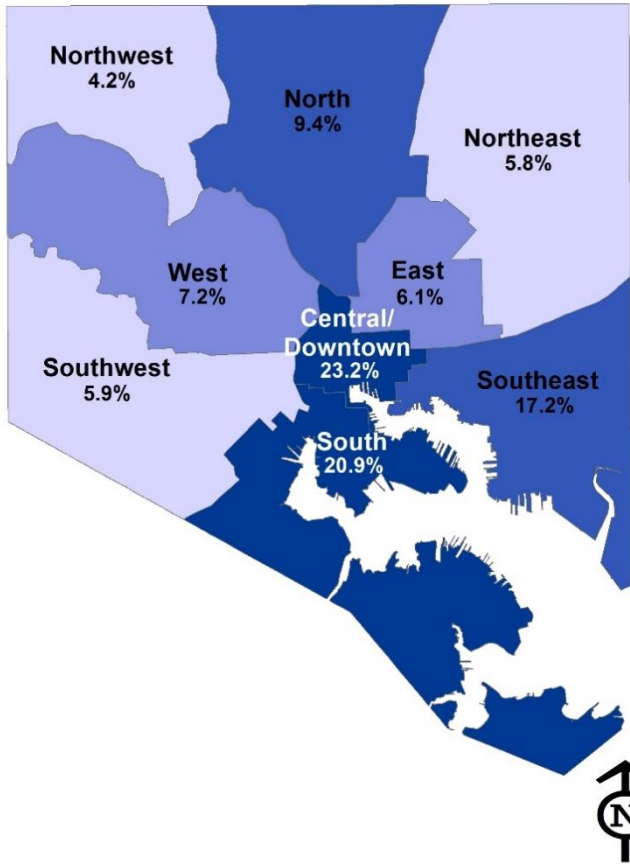


Figure 4: August 15, 2019 – February 29, 2020 Average 7am Vehicle Distribution

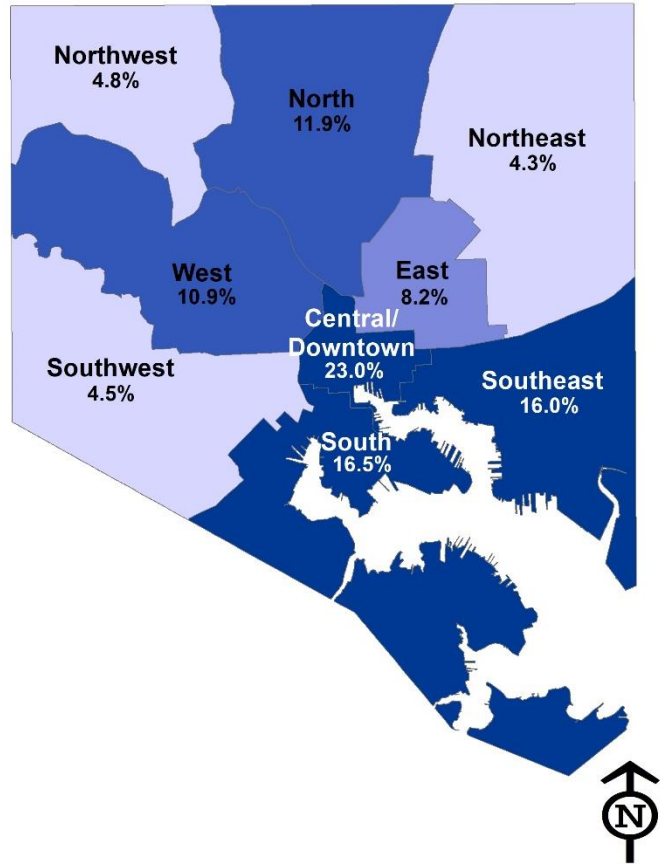


Figure 5: March 24 – April 27, 2020 Average 7am Vehicle Distribution

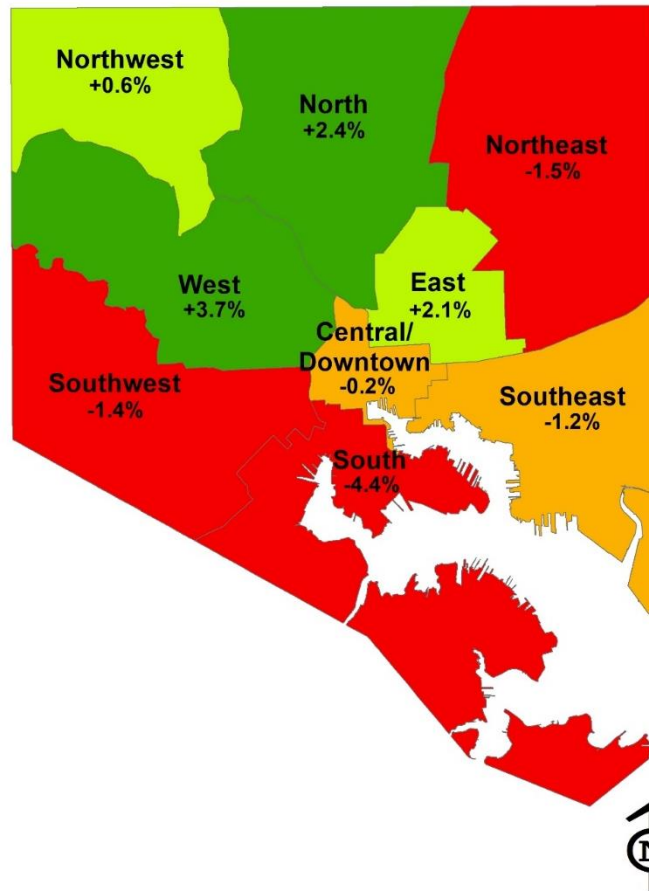


Figure 6: Changes in Proportional Vehicle Distribution after arrival of COVID-19 in Baltimore City

Changes in Ridership – Origins and Destinations

Origin-destination data suggest that a steep decline in commuting and non-essential rides, along with increased need for trips to essential services, were key factors in shifting ridership patterns. These changes are reflected in other datasets as well: Google's Community Mobility Report shows a 49% decrease in people present at workplaces and an 18% increase in people staying in residential areas of Baltimore City, presumably since many residents did not commute to work and only took essential trips.³

After the emergence of COVID-19, the distribution of trip origins in the Northwest, North, West, and East districts increased, and the share of trips decreased in the Southwest, South, Northeast, Southeast, and Central/Downtown districts. The same census tracts that saw increases in distribution of vehicles saw increases in the distribution of ride origins, and vice versa. The changes in ride origins were generally higher in magnitude than the changes in vehicle distribution. These changes are summarized below.

³ https://www.gstatic.com/covid19/mobility/2020-05-07_US_Maryland_Mobility_Report_en.pdf

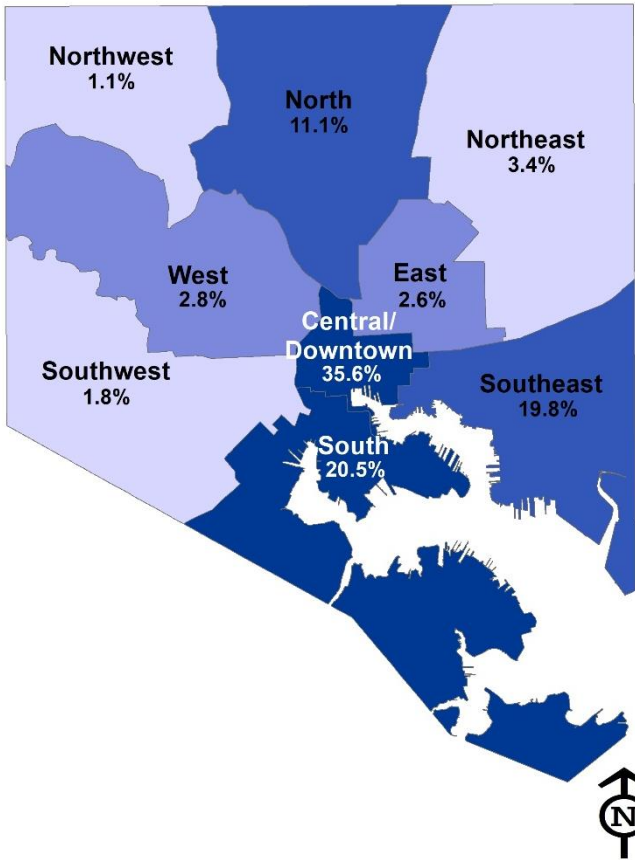


Figure 7: August 15, 2019 – February 29, 2020 Ride Origin Distribution

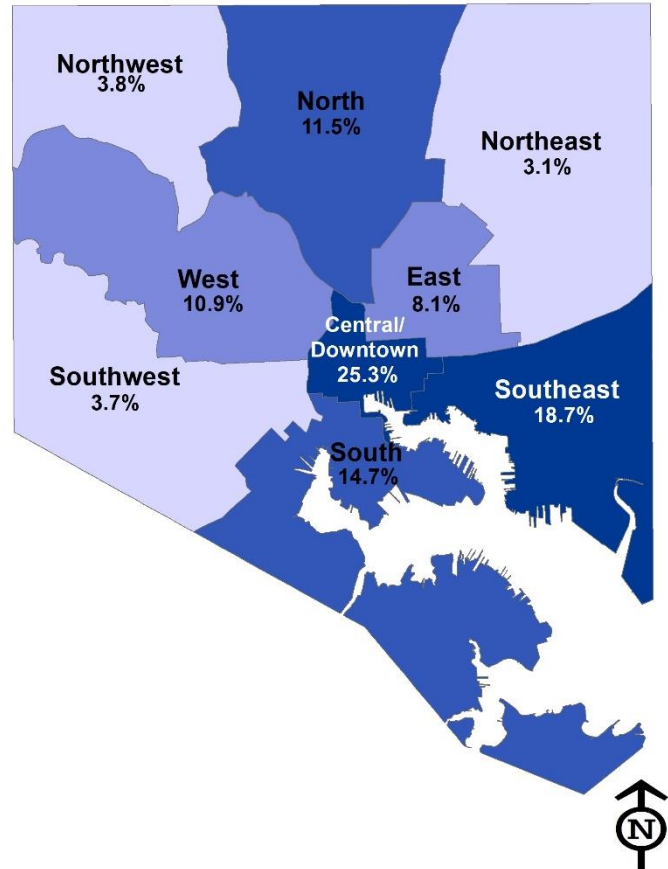


Figure 8: March 24 – April 27, 2020 Ride Origin Distribution

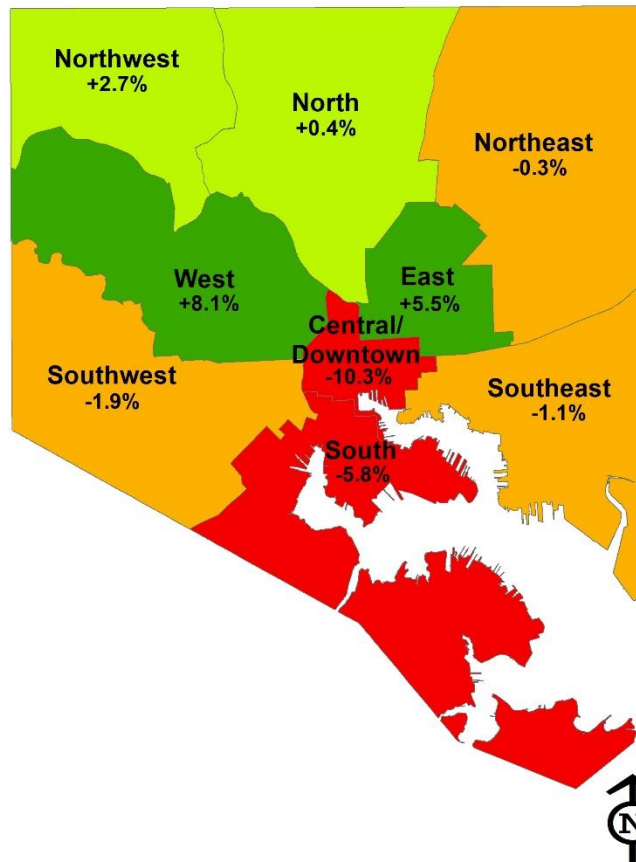


Figure 9: Changes in Proportional Ride Origin Distribution after arrival of COVID-19 in Baltimore City

Figure 10 shows the absolute changes in average daily rides by census block after the emergence of COVID-19 in Baltimore City. Where there were increases, they were modest, and they were found largely outside of areas with high existing ridership.

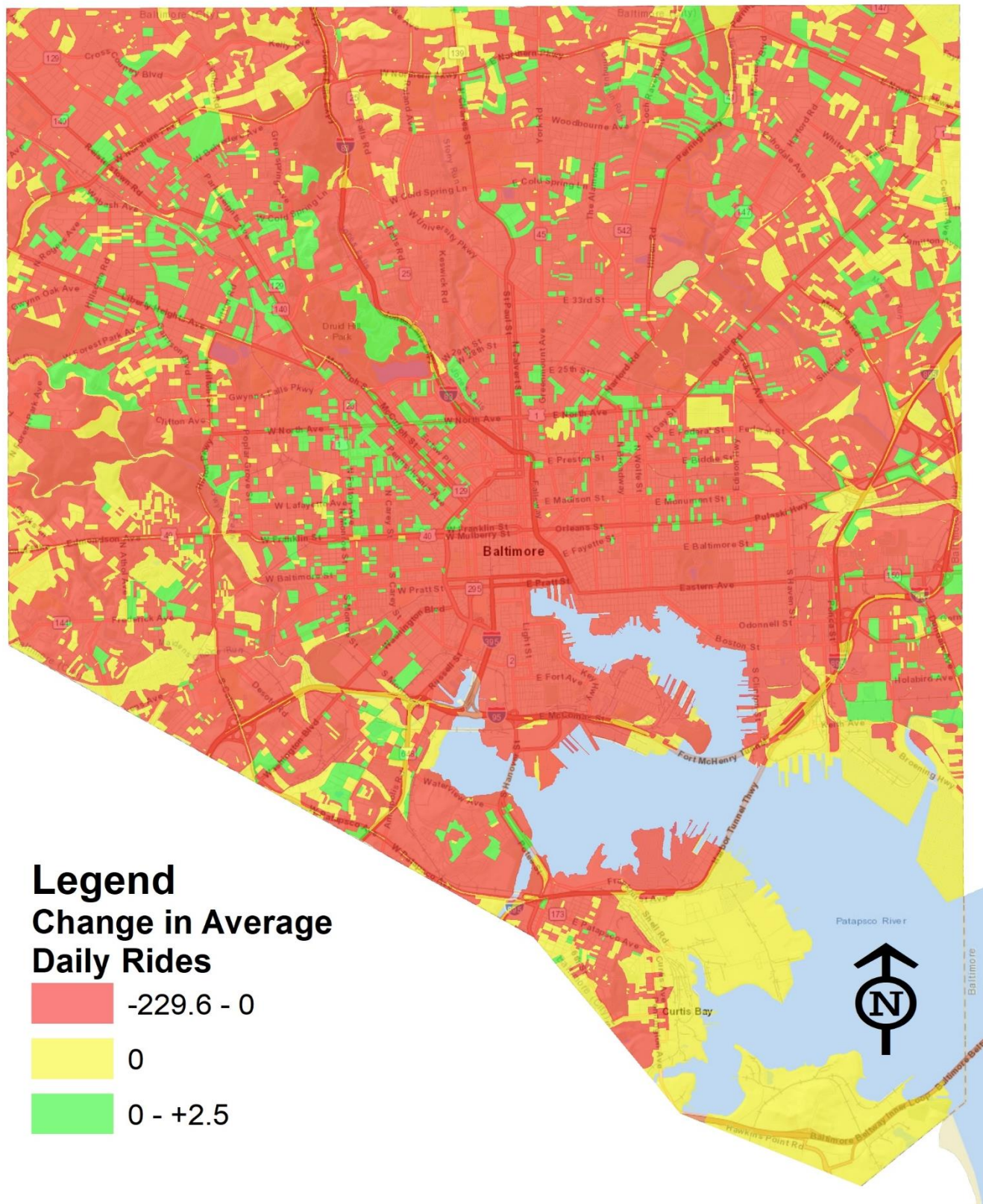


Figure 10: Changes in Average Daily Dockless Vehicle rides (combined origins and destinations) by Census Block after the emergence of COVID-19

While the absolute number of combined origins and destinations decreased or remained at zero in 92% of Baltimore City Census Blocks (12,434 out of 13,506 Census Blocks), the geographical distribution of trips has looked different after the arrival of COVID-19. Notable trends include substantial declines in the proportion of trips in the Inner Harbor and at colleges/universities and a substantial increase in the proportion of trips at hospitals, grocery stores, transit stations, and Patterson Park. These changes are summarized in **Figure 11**.

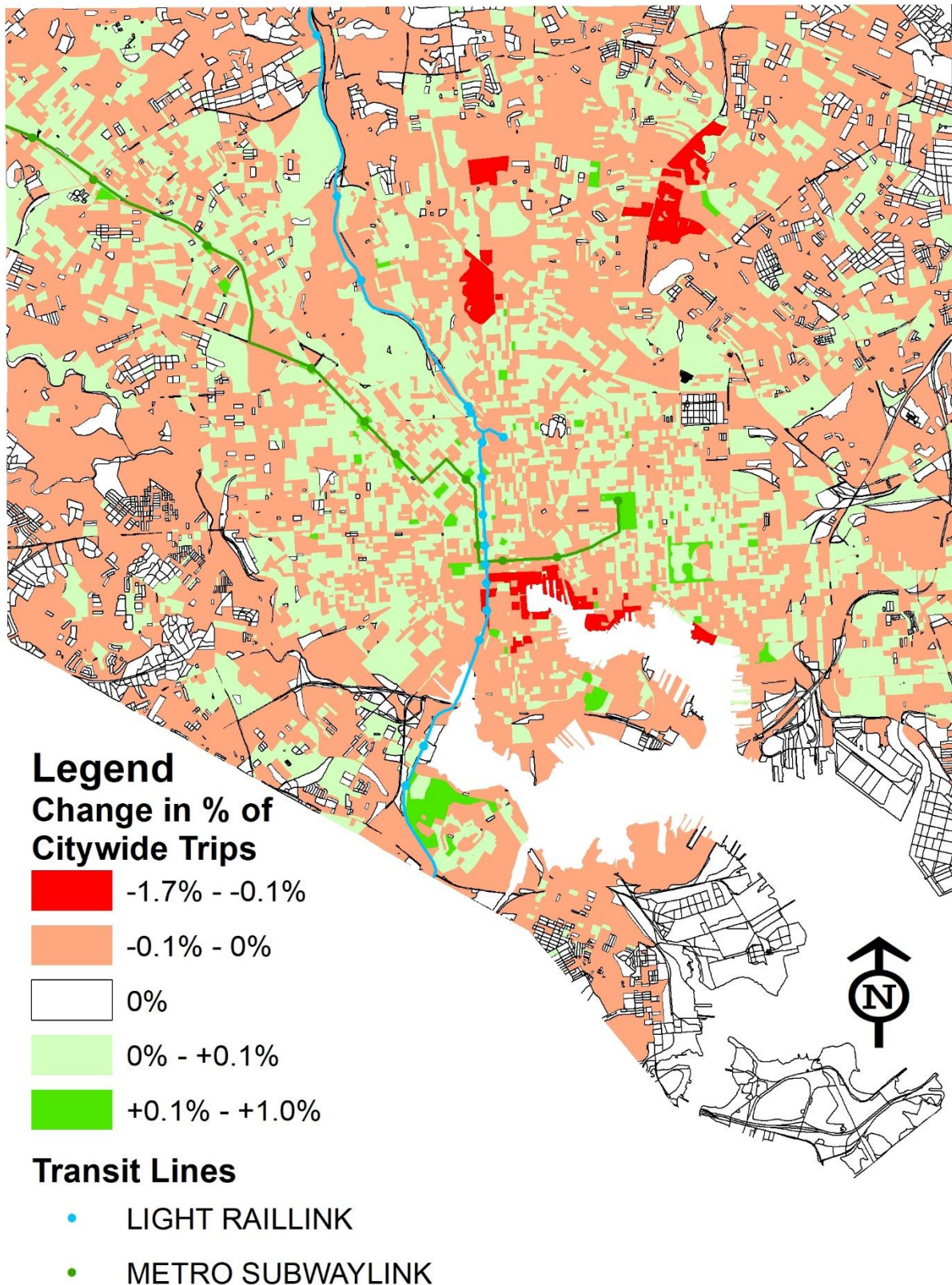


Figure 11: Changes in Proportional Dockless Vehicle Rides (combined origins and destinations) by Census Block after the emergence of COVID-19

These changes are also illustrated by the change in the top 20 Census Blocks, based on combined Dockless Vehicle ride origins and destinations, before and after the arrival of COVID-19 in Baltimore City. The top 20 Census Blocks before and after the arrival of COVID-19 are presented in **Table 2** and **Table 3**, respectively.

The Inner Harbor and Harbor East accounted for 13 of the top 20 Census Blocks before COVID-19, but only 6 of the top 20 after the arrival of COVID-19. The 2nd and 3rd most popular Census Blocks before COVID-19 make up the Johns Hopkins University Homewood campus, but neither of these Census Blocks were in the top 20 after the emergence of COVID-19. Furthermore, the top 20 Census Blocks after the arrival of COVID-19 include three grocery stores, three metro stations (all Equity Zones), and one hospital that were not included in the initial top 20. Two census blocks with grocery stores and one hospital rose two higher ranks after the arrival of COVID-19. These results are summarized in **Figure 12**.

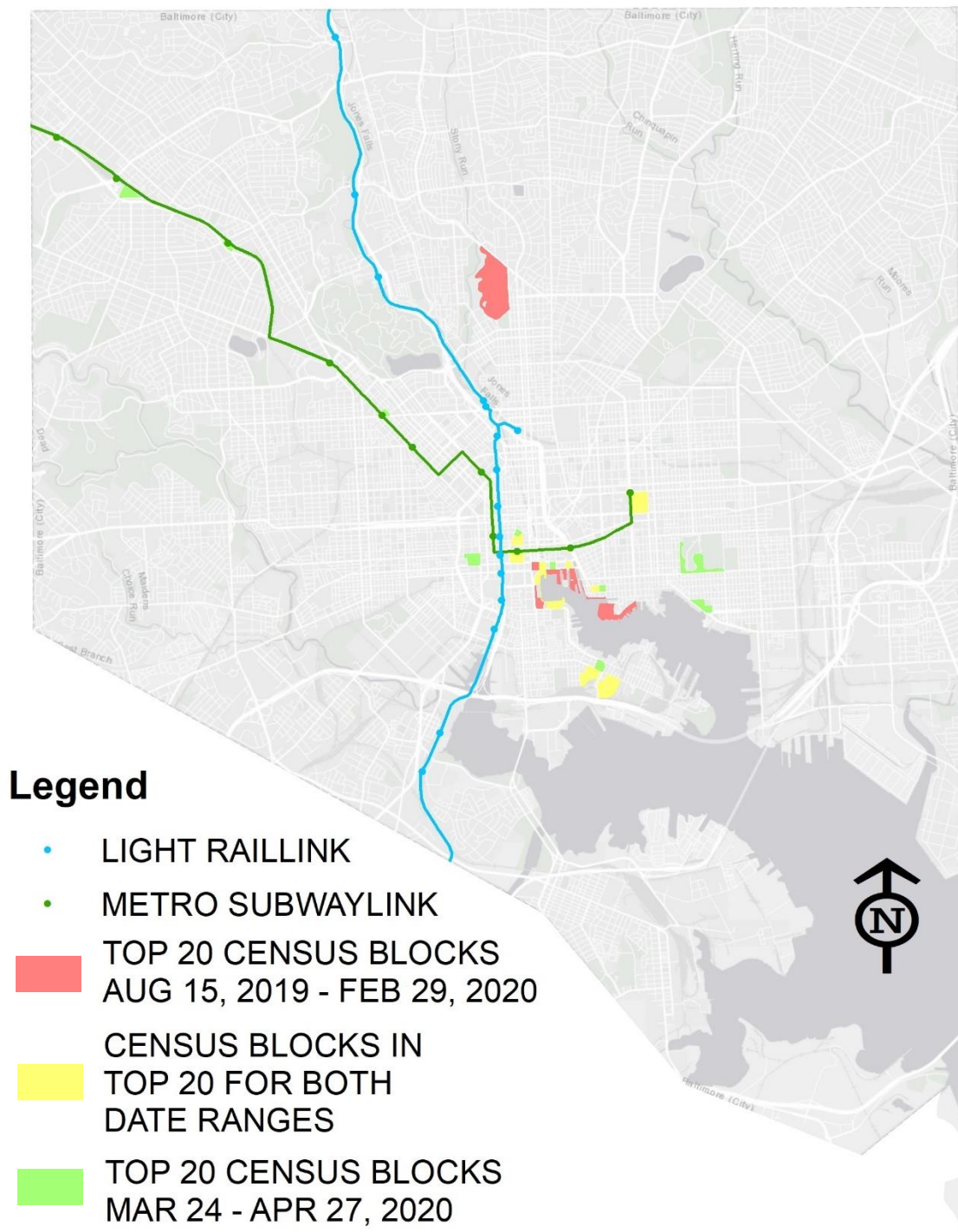


Figure 12: Top 20 Census Blocks (based on combined Dockless Vehicle ride origins and destinations) before and after the emergence of COVID-19

Table 2: Top 20 Census Blocks Ranked by Combined Origins and Destinations, August 15, 2019- February 29, 2020

Table 3: Top 20 Census Blocks Ranked by Combined Origins and Destinations, March 24 –April 27, 2020

Census blocks common to both lists are shaded in yellow.

Rank	Census Block	Description	Average Daily Trip Origins and Destinations
1	245102201003008	Inner Harbor - Promenade	238
2	245101202021008	Johns Hopkins University	121
3	245101202021001	Johns Hopkins University	115
4	245100302002013	Harbor East - Promenade	109
5	245102201003007	Inner Harbor - Promenade	100
6	245102201003006	Inner Harbor - Promenade	88
7	245102201003000	Inner Harbor - Promenade	78
8	245100401001089	Inner Harbor	74
9	245100203002031	Harbor East - Promenade	74
10	245100203002025	Fells Point - Promenade	71
11	245102201003011	Inner Harbor	67
12	245102401001030	McHenry Row	65
13	245102404002001	Riverside - Southside Marketplace	61
14	245100302002038	Harbor East	58
15	245100203002029	Harbor East - Promenade	58
16	245100604001000	Johns Hopkins Hospital	55
17	245100401001096	Inner Harbor	53
18	245100401001101	Inner Harbor	51
19	245100401001066	Downtown - Hopkins Plaza	49
20	245100401002036	Downtown - Charles Center	45

Rank	Census Block	Description	Average Daily Trip Origins and Destinations
1	245100604001000	Johns Hopkins Hospital	24
2	245102401001030	McHenry Row	16
3	245100103001006	Patterson Park	15
4	245102404002001	Riverside - Southside Marketplace	10
5	245100104001015	Canton - Safeway	8.7
6	245102201003008	Inner Harbor - Promenade	8.7
7	245100401002029	Downtown - Streets Market	8.5
8	245101511002002	West Cold Spring Metro	8.2
9	245100402001024	UM Medical Center	7.6
10	245100401002036	Downtown - Charles Center	7.5
11	245100401001066	Downtown - Hopkins Plaza	7.2
12	245100302002039	Harbor East - Whole Foods	6.9
13	245101303003012	Penn-North Metro	5.7
14	245100401001089	Inner Harbor	5.2
15	245102402001022	Riverside - Anthem House	5.1
16	245100401001101	Inner Harbor	5.0
17	245102801026001	Rogers Ave Metro	4.9
18	245100302002038	Harbor East	4.8
19	245100401001097	Inner Harbor	4.7
20	245100104001008	Canton	4.7

Equity Zones

After the emergence of COVID-19, the total trips originating from the Equity Zones decreased, but the percentage of trips originating from the Equity Zones compared to the total trips in the city increased, as seen in **Figure 13**. This is due to the fact that the decrease in ridership in Equity Zones (56%) was less severe than in the city as a whole (75%).

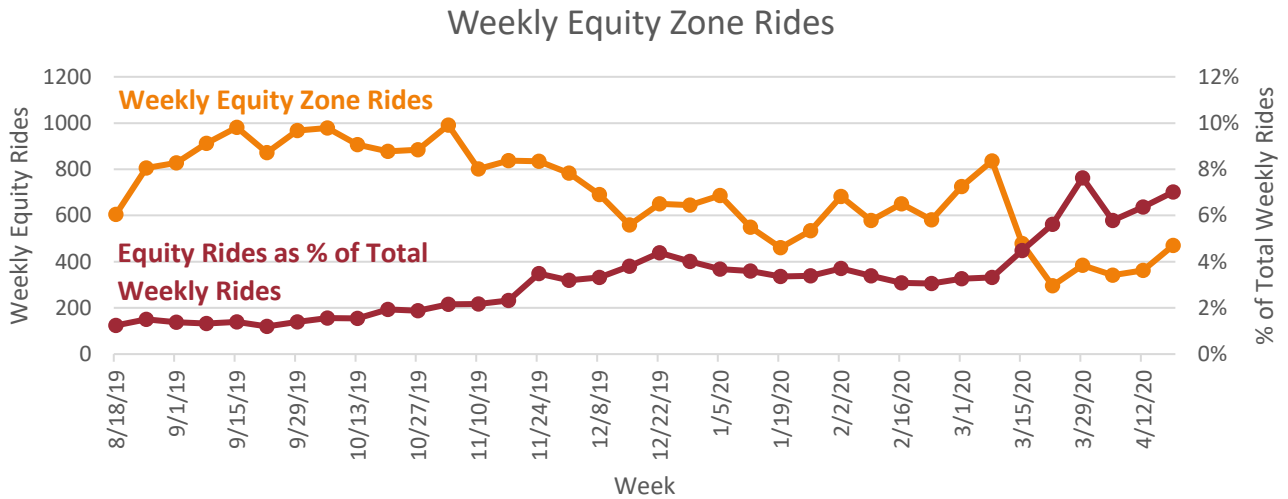


Figure 13: Percentage of Total Dockless Vehicle Trips Originating from the Equity Zones and Total Number of Trips Originating from Equity Zones

Before COVID-19 changed requirements and travel patterns, more scooters were being deployed in the Equity Zones than were being ridden. However, after COVID-19 emerged, the number of rides originating from the Equity Zones is almost equal to the number of scooters deployed, as shown in **Figure 14**. The comparative declines in rides and vehicles are also shown in **Table 4**. The data suggests that the number of trips originating from the Equity Zones has been constrained by the number of scooters deployed there.

Table 4: Changes in Daily Equity Rides and Deployments

Date Range	Average Daily Equity Rides	Average Daily Equity Deployments
March 1-14, 2020	111.5	203.5
March 20 - April 2, 2020	48.7	57.0
% Change	-56%	-72%

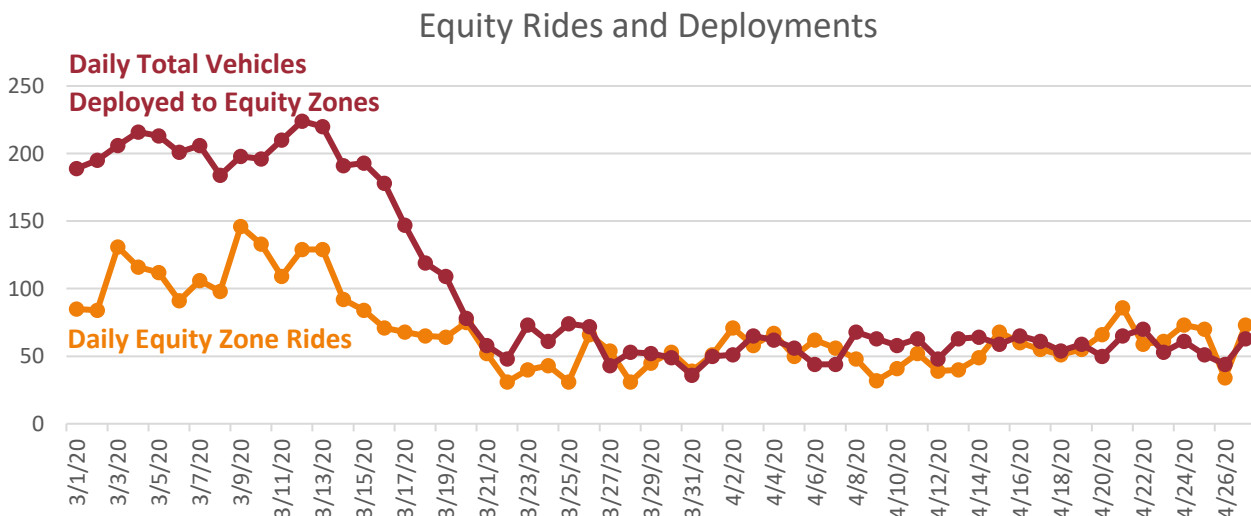


Figure 14: Equity Zone Trip Origins Compared to Number of Scooters Deployed

Changes in Routes Ridden

With changes to vehicle distribution and ridership, there were also shifts in routes travelled. These changes, illustrated in **Figure 15**, largely mirror the changes in origins and destinations discussed above. The greatest decreases were on the routes and in the neighborhoods surrounding the Inner Harbor, in Mount Vernon, along the Maryland Ave Cycle Track, and at Johns Hopkins and Morgan State Universities. Many routes with increased travel were near Metro stations and hospitals (i.e. Johns Hopkins Hospital and Johns Hopkins Bayview Medical Center). The Madison Park and Druid Heights Neighborhoods had the highest concentration of routes with increased travel.

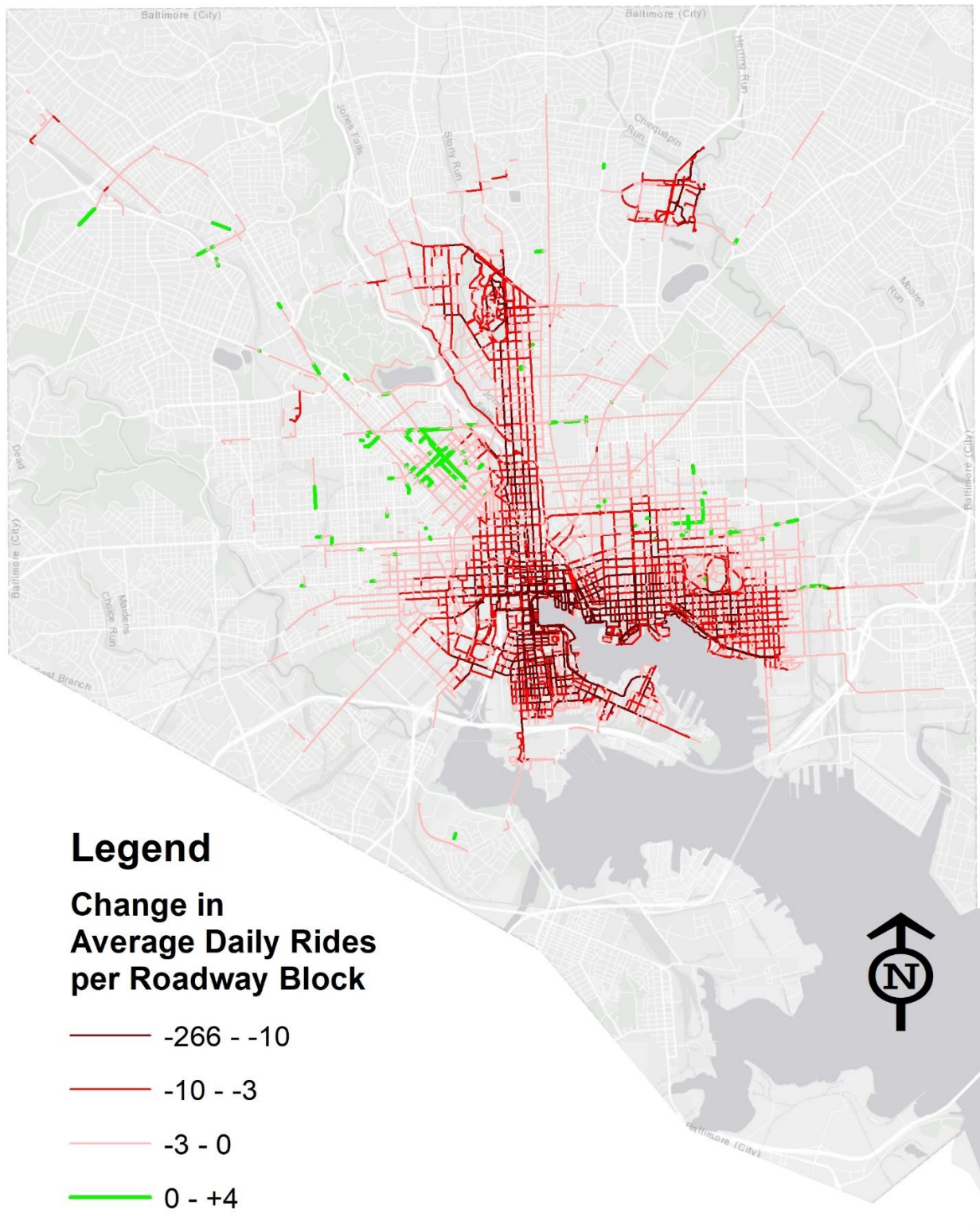


Figure 15: Changes in Ridership by Roadway Block between the periods of August 15, 2019 – February 29, 2020 and March 24 – April 27, 2020

Essential Services Analysis

BCDOT asked permit holders to deploy vehicles at hospitals, grocery stores, and emergency food distribution sites in mid-March, as the first cases of COVID-19 appeared in Baltimore City. This section evaluates the extent to which permit holders honored this request and analyzes changes in deployment and ridership.

Throughout this section, the number of rides is measured by the combined number of origins and destinations in the vicinity of each site. The number of deployments is measured by the number of times a permit holder dropped off a vehicle and put it online for rental; it does not include vehicles parked at the site by users.

Figure 16 illustrates the proportion of daily rides that began or ended at a hospital, food distribution site, or grocery store along with the total proportion of daily rides that began or ended at any of these essential services. The proportion of rides related to essential services increased from approximately 1/5 in early March to 1/3 after the emergence of COVID-19 in Baltimore City.⁴

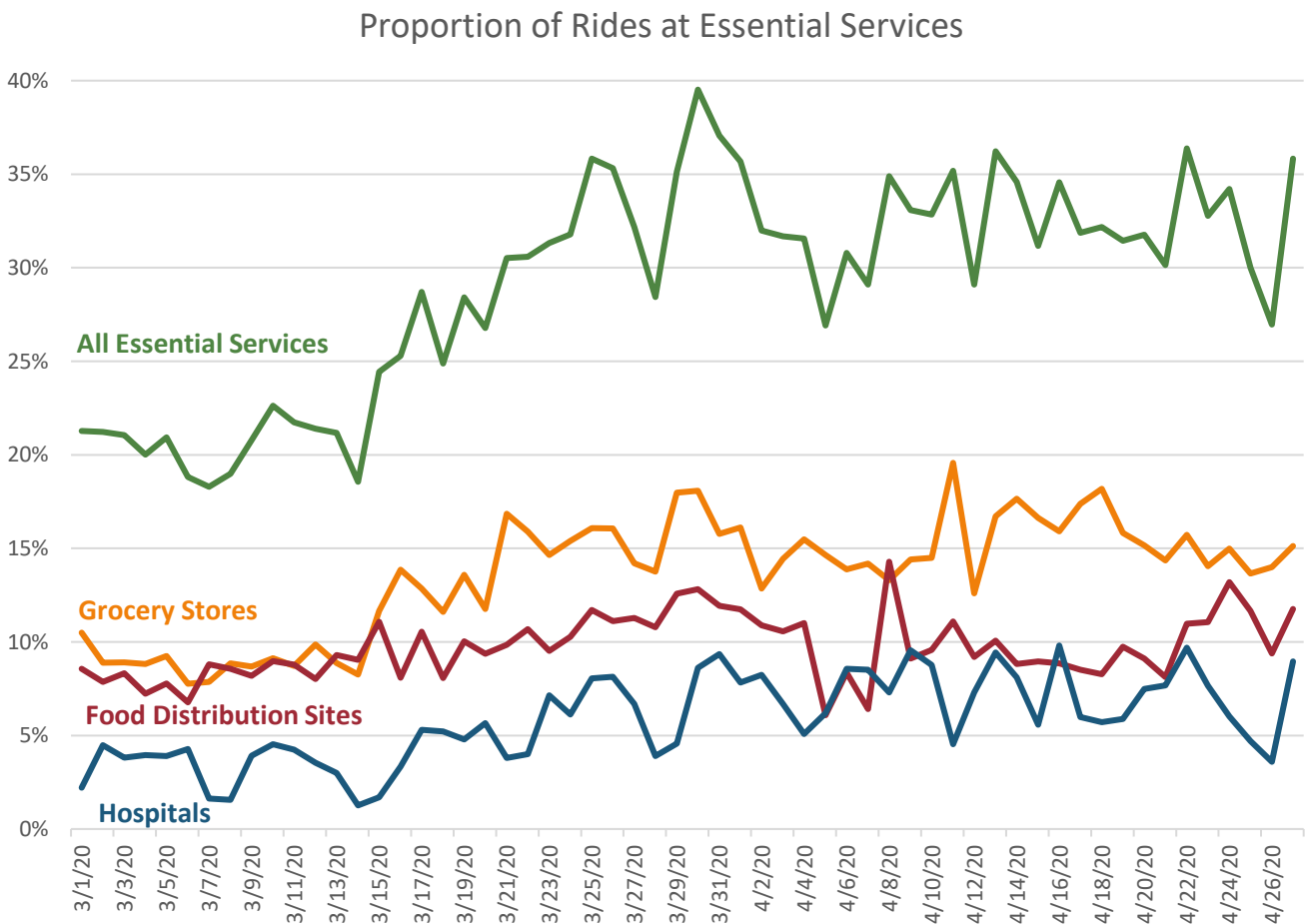


Figure 16: Rides Beginning or Ending at Essential Services as a Proportion of All Daily Trips

Hospitals

The hospitals included in this analysis, along with the number of average daily rides and deployments between March 24 and April 27, 2020 are listed in **Table 5**. The hospital analysis areas were drawn to encompass all buildings owned by the hospital and their surrounding streets.

⁴ Due to data privacy concerns, origins and destinations are not paired in the dataset available to BCDOT. Thus, rides that started and ended at essential services (e.g., start at hospital, end at grocery store) are double counted. This analysis assumes that such rides are a negligible proportion of total rides.

Table 5: Hospital Average Daily Rides and Deployments, March 24 – April 27, 2020

Hospital Name*	Average Daily Rides	Average Daily Deployments
Hopkins Hospital	38.2	22.8
University of Maryland Hospital	12.2	4.7
University of Maryland Midtown Hospital	2.2	1.5
Mercy Hospital	2.1	1.8
Hopkins Bayview Hospital	1.2	2.3
MedStar Union Memorial Hospital	0.9	0.4
MedStar Good Samaritan Hospital	0.6	1.8

*Hospitals with less than 0.5 rides per day are excluded from this table

Though the proportion of hospital rides has increased since the emergence of COVID-19 (Figure 16), the number of hospital rides has decreased since the emergence of COVID-19. The number of permit holder deployments to hospitals has increased. These trends are illustrated in Figure 17. It should be noted that Johns Hopkins Hospital is an outlier in both the number of rides and deployments that has driven the overall trends in hospital deployments and rides.

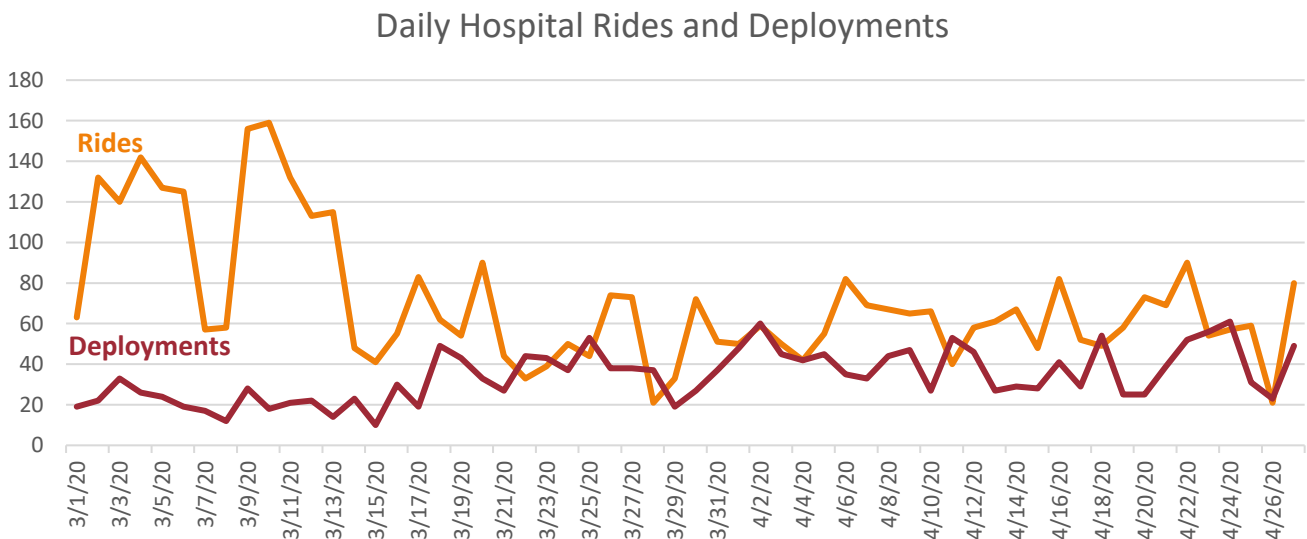


Figure 17: Daily Rides and Deployments at Baltimore City Hospitals

Grocery Stores

The grocery stores included in this analysis, along with the number of average daily rides and deployments between March 24 and April 27, 2020, are listed in **Table 6**. The list is based on Baltimore City's existing GIS Grocery Store layer. The grocery store analysis areas were designated as a 400-foot buffer from a central point on the site.

Table 6: Grocery Store Average Daily Rides and Deployments, March 24 – April 27, 2020

Name and Address*	Average Daily Rides	Average Daily Deployments
Streets Market 222 N Charles St	16.5	10.3
Safeway 2610 Boston St	14.7	2.3
Whole Foods Market 1001 Fleet St #A	14.7	5.8
Eddie's Market 3117 Saint Paul St	8.5	1.9
Harris Teeter 1801 Whetstone Way	8.5	1.3
Eddie's of Mt Vernon 7 West Eager St	7.1	1.7
SHOPPERS 857 E Fort Ave	6.2	1.3
Safeway 2401 N Charles St	5.9	2.5
Target 3559 Boston St	5.9	1.0
Save-A-Lot Food Stores 250 Mcmechen St	5.3	4.8
SHOPPERS 2000 Gwynns Falls Pkwy	3.5	2.1
Save-A-Lot Food Stores 2008 Maryland Ave	2.8	1.2
Save-A-Lot Food Stores 1101 Pennsylvania Ave	2.5	1.7
Giant Food 601 E 33rd St	2.5	3.6
Save-A-Lot Food Stores 2705 W Cold Spring Ln	2.0	1.9
Harris Teeter 3779 Boston St	2.0	0.4
Giant Food 1020 W 41st St	1.9	0.7
ALDI 3250 E Fayette St	1.5	0.7
Save-A-Lot Food Stores 2509 E Monument St	1.4	0.8
Mom's Organic Market 711 W 40th St	1.4	0.9
Safeway 4401 Harford Rd	1.3	0.5
Save-A-Lot Food Stores 929 N Caroline St	1.2	0.4
Price Rite 1205 W Pratt St	1.1	0.5
ALDI 3601 W Cold Spring Ln	1.1	0.3
<i>*Grocery Stores with less than 1 ride per day are excluded from this table</i>		

Though the proportion of grocery store rides has increased since the emergence of COVID-19 (**Figure 16**), the number of grocery store rides has decreased. The number of deployments remained largely constant, with a noticeable spike between March 21 and March 26 corresponding to the days immediately after BCDOT asked permit holders to deploy at grocery stores. These trends are illustrated in **Figure 18**.

Daily Grocery Store Rides and Deployments

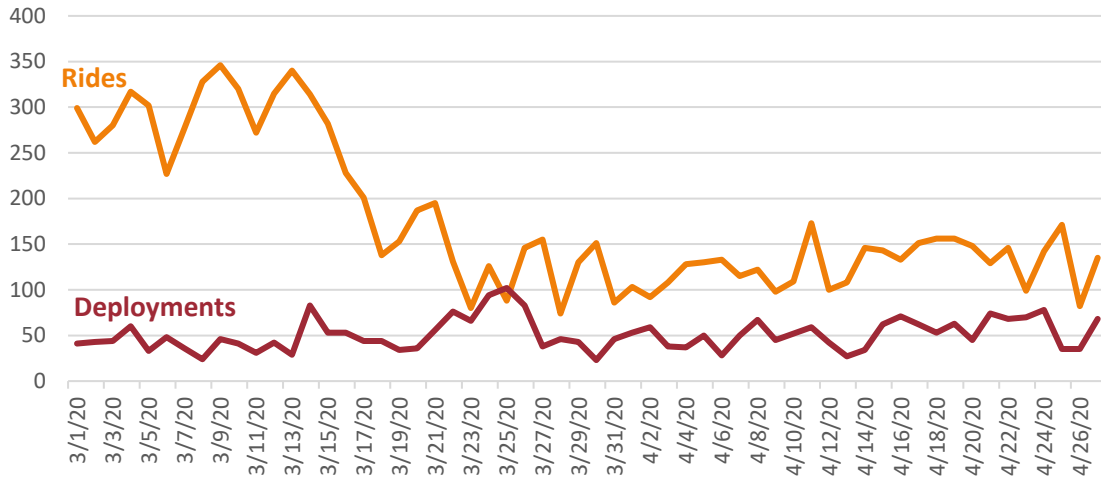


Figure 18: Daily Rides and Deployments at Baltimore City Grocery Stores

Unlike hospitals, grocery stores often primarily attract customers from nearby neighborhoods, and access to food in Baltimore is an ongoing priority—even before COVID -19. Thus, the following analysis compares grocery access trends geographically across Baltimore City. **Table 7** lists the number of grocery stores included in the analysis, the density of grocery stores, and average daily grocery store rides and deployments in each Planning District, from March 24 to April 27, 2020.

Table 7: Planning District-Level Grocery Store Access Statistics (March 24 – April 27, 2020)

Planning District	Planning District Area (sq. mi)	Number of Grocery Stores	Grocery Stores per Square Mile	Average Daily Grocery Rides	Average Daily Grocery Deployments
Central/Downtown	2.1	3	1.4	38.3	17.7
East	3.9	2	0.5	2.6	1.2
North	11.8	9	0.8	24.3	11.5
Northeast	14.2	7	0.5	3.8	2.7
Northwest	7.7	4	0.5	3.0	3.3
South	12.1	3	0.2	14.9	2.9
Southeast	8.5	5	0.6	24.1	4.3
Southwest	10.8	4	0.4	1.7	0.7
West	10.1	7	0.7	13.3	9.9

Average daily grocery deployments after the emergence of COVID-19, normalized by the number of grocery stores, are plotted against grocery store density for each district in **Figure 19**. The plot illustrates that permit holders were more likely to deploy more vehicles per store in districts with more grocery stores. Permit holders were not asked to consider equity in essential service deployments, and the graph is a reminder that without equity considerations, dockless vehicle service may reflect existing inequities in Baltimore City. A map of planning districts is provided for reference in **Figure 20**.

Deployments per Store vs Grocery Store Density, March 24 - April 27, 2020

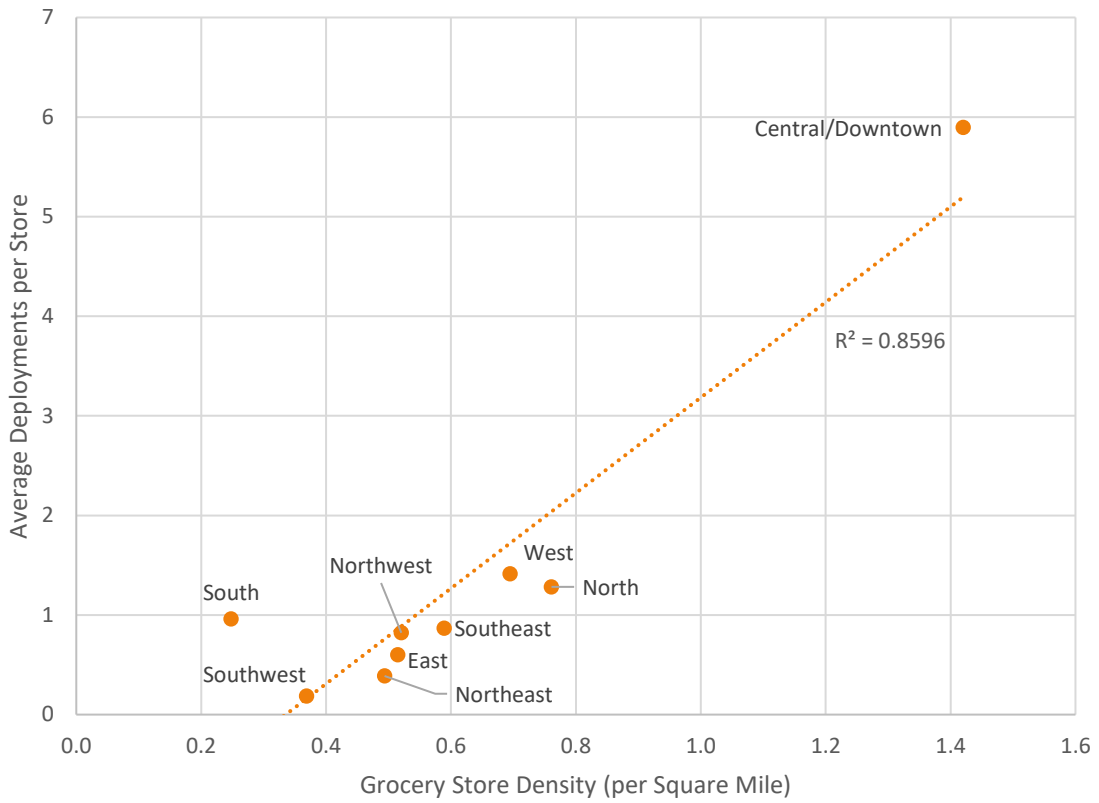


Figure 19: Average Daily Grocery Deployments (March 24-April 27, 2020), normalized by the number of grocery stores, plotted against grocery store density by Planning District

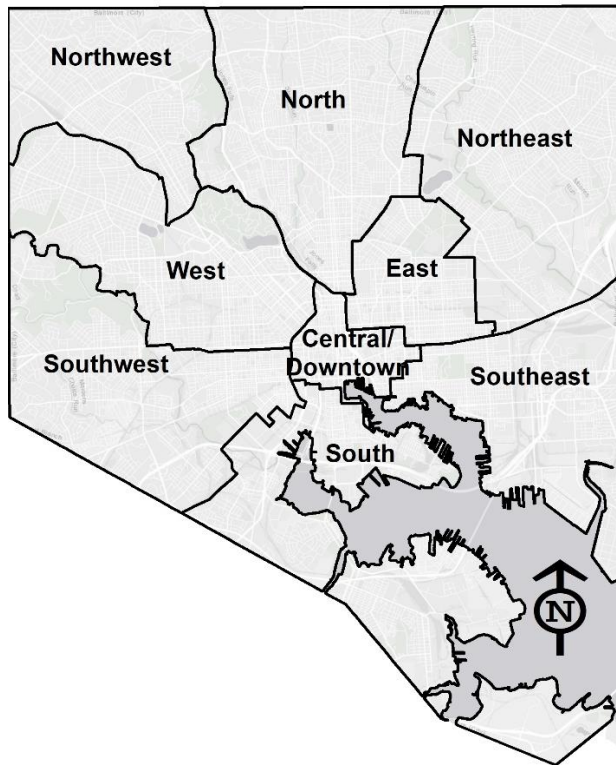


Figure 20: Baltimore City Planning Districts

Food Distribution Sites

The food distribution sites included in this analysis, along with the number of average daily rides and deployments between March 24 and April 27, 2020, are listed in **Table 8**. The list is based on Baltimore City's existing GIS Food Distribution layer, which was created for COVID-19 response and shared with Dockless Vehicle Permit Holders. The food distribution analysis areas were designated as a 400-foot buffer from a central point on the site.

The proportion of food distribution site rides has not noticeably changed since the emergence of COVID-19 (**Figure 16**). The absolute numbers of rides and deployments decreased since the emergence of COVID-19, and these trends are illustrated in **Figure 21**.

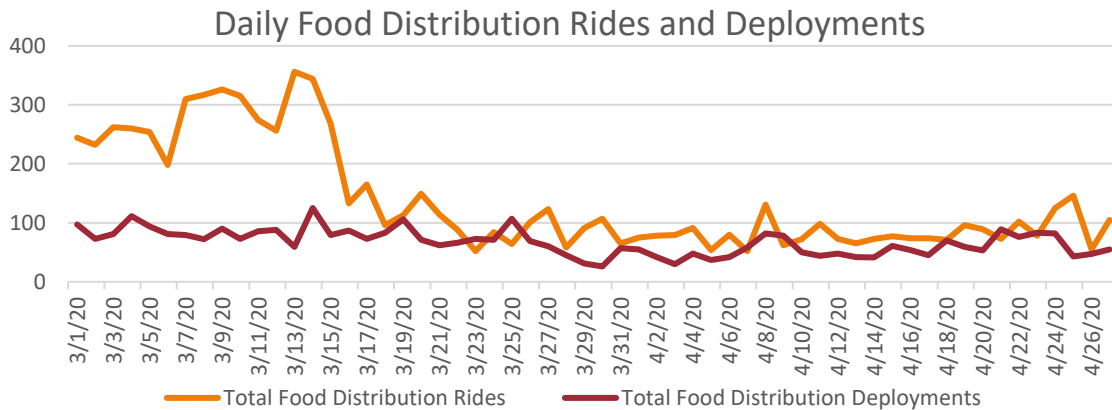


Figure 21: Daily Rides and Deployments at Baltimore City Food Distribution Sites

Table 8: Food Distribution Site Average Daily Rides and Deployments, March 24 – April 27, 2020

Food Distribution Site Name *	Average Daily Rides	Average Daily Deployments
Penn North Plaza	9.9	11.6
Ella Bailey	6.5	4.2
Harbor Apartments	5.3	2.4
Apostolic Towers	4.9	1.2
Waxter Center for Senior Citizens	4.3	0.9
Linden Park Apartments	3.8	3.7
Virginia S Baker	2.9	3.0
John Booth/Hooper Senior Center	2.9	3.0
Gilmor Homes	2.8	0.5
Westminster House	2.5	0.9
Robert C. Marshall	2.5	1.5
Hatton Senior Center	2.3	0.8
Baker/Patterson Park	1.8	2.3
Dorothy I. Height Elementary School	1.8	1.8
Locust Point	1.7	0.7
Crispus Attucks [Mount Royal]	1.6	0.9
Hanover Square Apartments	1.5	1.3
Poe Homes	1.3	0.4
Mi Espacio	1.3	1.1
Ashland Terrace	1.3	0.7
Sandtown-Winchester Senior Center	1.3	0.2
Smallwood Summit	1.2	0.4
Solo Gibbs [Ella Bailey]	1.0	0.4
Roosevelt	1.0	0.8

* Sites with less than 1 ride per day are excluded from this table

