



MEMORANDUM

TO: TPB Technical Committee
FROM: Eric Randall, TPB Transportation Engineer
SUBJECT: Bus Transit Service Equity Analysis and Webmap – 2022 Update
DATE: July 1, 2022

In Spring 2021, consultants were hired to conduct a white paper and technical analysis on inform regional decision makers about current bus service and equity considerations when restoring bus transit service and improving bus transit service equity in the longer-term post-pandemic.

This Spring, with most local bus service restored and with new data available, consultants were hired to update the analysis, producing a new webmap and an updated summary of analytical findings.

PURPOSE OF THE 2021 WHITE PAPER

In March 2020, bus transit agencies across the region drastically cut bus service in response to the coronavirus pandemic. In response to requests to identify bus service that should be a priority for restoration, the firms ICF Consulting and Foursquare Integrated Transportation Planning were contracted to produce a white paper to inform regional decision makers about equity considerations when restoring transit service and improving transit service equity in the longer-term post-pandemic.

Questions to be addressed with the analysis included:

- How does bus transit access for traditionally underserved groups compare to the region's overall population's transit access?
- How does bus transit access for COG's Equity Emphasis Areas (EEAs) work compare to the region's overall population's transit access?
- How does bus transit access to peak, high-frequency service (15 minutes or better) compare for traditionally underserved groups?
- How does bus transit access to jobs for low-wage work and essential jobs compare to the region's overall population's transit access to jobs?

The white paper analysis assessed bus service (route coverage, frequency, time of day, and span of service) as of March 15, 2021 for those living in COG's Equity Emphasis Areas (EEAs), historically disadvantaged populations, and essential workers. The analysis assessed whether service is distributed equitably and identified gaps in that service that could be filled to improve equity, both for service as of March 15 and for pre-pandemic service.

2022 UPDATE

With substantial restoration of local bus service in the region to near pre-pandemic levels, as well as a restructuring of Metrobus service on high-use routes and the new DASH (Alexandria) bus network implemented in 2021, it was thought opportune to produce a revised analysis to enable improved

focus on addressing equity issues for access to bus transit service. Accordingly, the same consulting firms were hired to conduct a revised analysis.

GEOGRAPHIC ANALYSIS AND WEBMAP TOOL

The bus transit service equity analysis examines the geographic distribution of transit service compared to various demographic and employment groups of interest. Select groups include:

- Total population density
- Total household density
- Persons of color population density
- Persons with disabilities density
- Low-income household density
- Zero/one-car household density
- Language other than English (LOTE) density
- Veteran population density
- All workers home location density
- Low-wage workers home location
- Total job density
- Density of essential service jobs
- Density of low-wage jobs

The 2022 updated dynamic webmap in ArcGIS Online format (AGOL) available at the following link.

<https://fitp.maps.arcgis.com/apps/webappviewer/index.html?id=9947fb0f78084a06aae2e747e093964b>

KEY FINDINGS – 2022 UPDATE

The white paper analysis had the following key findings:

Overall, transit service, major corridors, and population density are generally congruent.

- While 60 percent of the total population in the TPB region is within one quarter mile of fixed route bus service, only 35 percent of that group have access to 15-minute or better service in the AM peak period.
- There are select block groups across the region that are high in population density (both total and specific equity subgroups) that are not within one quarter mile of a bus stop. Areas with concentrations of these block groups include Prince George's County outside the Beltway (such as in Laurel and Bowie); Prince William County around Dale City and parts of Manassas; and portions of Loudoun County south of Leesburg.
- The low percentage of access to frequent service for all groups, even in the peak periods, remains a concern, particularly for quality of life and jobs access.

Regarding access to jobs

- A high density of low-wage jobs with no transit access can be seen primarily in Loudoun County around Dulles Airport and in and around Manassas and Manassas Park. Other significant areas include the edges of the City of Frederick and Prince George's County outside of the Beltway (such as Laurel and Bowie).

The complete technical memorandum summarizing the analysis is attached.

2022 TECHNICAL UPDATE: ASSESSING DISTRIBUTION OF BUS TRANSIT SERVICE FOR EQUITY DURING COVID-19 PANDEMIC - DRAFT

Technical Memorandum

June 2022



National Capital Region
Transportation Planning Board

ASSESSING DISTRIBUTION OF BUS TRANSIT SERVICE FOR EQUITY DURING COVID-19 PANDEMIC

June 2022

ABOUT THE TPB

The National Capital Region Transportation Planning Board (TPB) is the federally designated metropolitan planning organization (MPO) for metropolitan Washington. It is responsible for developing and carrying out a continuing, cooperative, and comprehensive transportation planning process in the metropolitan area. Members of the TPB include representatives of the transportation agencies of the states of Maryland and Virginia and the District of Columbia, 24 local governments, the Washington Metropolitan Area Transit Authority, the Maryland and Virginia General Assemblies, and nonvoting members from the Metropolitan Washington Airports Authority and federal agencies. The TPB is staffed by the Department of Transportation Planning at the Metropolitan Washington Council of Governments (COG).

CREDITS

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INTRODUCTION

In March 2020, transit service providers across the region drastically cut service in response to the coronavirus pandemic. As they began gradually restoring service, the *Assessing Distribution of Bus Transit Service for Equity During COVID-19 Pandemic* study was conducted in the Summer of 2021 to analyze and quantify the impacts of these service changes. The analysis assessed bus service (route coverage, frequency, time of day, and span of service) during the pandemic for those living in Equity Emphasis Areas (EEAs), historically disadvantaged populations, and low-wage and essential workers. The study produced a white paper and webmap documenting its findings.

Throughout the pandemic, the region has leaned on its essential workers, such as those in the food service and healthcare industries. Not only do many essential workers depend on transit to reach their jobs, but many are also from population groups and communities that face historical disadvantage and marginalization (such as people of color, low-income households, non-native English speakers). Inequities have been dramatically exacerbated by the pandemic's health and economic impacts; transit plays an important role in these communities social and economic mobility, so they are often disproportionately impacted by widespread service reductions like those seen during the beginning of the pandemic.

This technical memorandum, completed in the summer of 2022, is a refresher to this study, and provides updated data to account for the following developments:

1. Many transit service providers have almost (if not entirely) restored pre-pandemic service.
2. New 2020 American Community Survey (ACS) 5-year estimates for population and demographic data are now available.
3. New 2019 Longitudinal Employer-Household Dynamics (LEHD) employment data are now available.

[2021 Interactive Online Map](#)

This map contains all the data from the previous version of this report.

[2022 Interactive Online Map](#)

The [Interactive Online Map](#), available here, contains all the map layers shown in this report plus additional detailed data that can be used for other analyses.

UPDATED GTFS SOURCES

General Transit Feed Specification (GTFS) data from transit agencies across the region are the primary source of transit availability in the region. **Table 1** contains information about GTFS feeds that were pulled and used for the service analysis. Where available, two different time periods of service were pulled: one before the pandemic, and the most recently available data (as of May 2022). In the previous iteration of this study, feeds from Spring 2021 were compared to pre-pandemic service.

The “Notes” column describes any instance where there were any issues with the available data. Non-local bus routes, including commuter routes, airport shuttles, and local shuttles (i.e., routes connecting a Metrorail station with an employment campus) were removed from each feed.

Table 1: GTFS Data Sources

Agency	Pre-Pandemic GTFS	More Recent GTFS	Notes
ART	1/31/2020	3/27/2022	Latest feed available per agency.
Charles VanGo	8/27/2019	9/2021	Latest feed available per agency.
DASH	1/1/2020	2/27/2022	Latest feed available per agency.
DC Circulator	7/14/2019	4/3/2022	Latest feed available per agency.
Fairfax Connector	1/24/2020	7/10/2021	Latest feed available per agency.
Fairfax CUE	3/14/2019	1/26/2022	Latest feed available per agency.
Fauquier County	10/2/2020	3/1/2021	No earlier 2019 GTFS feed available. 2022 is latest feed available per agency.
Frederick Transit	3/27/2019	7/1/2021	Latest feed available per agency.
Loudoun County Transit	1/23/2021	12/15/2021	No earlier complete 2019 GTFS feed available. 12/15/2021 is latest feed available per agency.
PRTC Omniride	11/29/2019	2/28/2022	Latest feed available per agency.
RideOn	1/7/2020	3/13/2022	Latest feed available per agency.
TheBus	11/11/2019	10/25/2021	Latest feed available per agency (No GTFS available for May 30 service changes).
WMATA	1/31/2020	9/5/2021	WMATA returned to September 2021 service levels in late May of 2022, so recommended the September 2021 GTFS for this purpose.

At the time of this study, most transit agencies in the region had returned, or were close to returning, to full pre-pandemic service (compared to the 2021 version of this analysis). As a result, the final analysis of this technical memorandum update compares two sets of data that are more similar than was done in the 2021 study; the details of the service status by agency, as provided to the TPB via a survey of providers, or follow-up questions via email, are shown in **Table 2**.

Table 2: Agency Service Levels Status (as of May 2022)

Agency	Status of level of service as compared to pre-pandemic service
ART	Full return to pre-pandemic service
Charles VanGo	60% of pre-pandemic ridership on fixed route service; 100% on demand response service
DASH	Above pre-pandemic service levels (115%) due to funds received from I-395 Commuter Choice
DC Circulator	Full return to pre-pandemic service
Fairfax Connector	Full return to pre-pandemic service
Fairfax CUE	Full return to pre-pandemic service
Fauquier County	<i>Not Surveyed</i>
Frederick Transit	Full return to pre-pandemic service
Loudoun County Transit	Many routes yet to be restored, operating around 60% of pre-pandemic level of service
PRTC Omniride	Select trips still suspended
RideOn	89% of pre-pandemic service restored, all routes in operation.
TheBus	80% of pre-pandemic service restored; select routes still suspended
WMATA	99% of pre-pandemic service restored, but different distribution between service days and time periods

DISPARITIES IN ACCESS TO BUS TRANSIT

To understand differences in access to transit between groups, population and jobs were counted within a Euclidian one-quarter mile buffer around stops with weekday AM and PM peak period 15-minute or better service and around stops with Saturday midday 30-minute or better service.

These headways were calculated as the average time between arrivals at each stop during each time period. This analysis differs from the 2021 report, in which headways were measured as the minimum time between arrivals at each stop during a time period. Due to this methodology change¹, the calculated headway for many stops increased and fewer stops met the frequency thresholds used for this analysis. For this reason, the population and household access values were lower than in the 2021 report. Tabulations included²:

- Total population, percent of regional non-Hispanic white population, and percent of regional people of color population
- Population in low-income households
- People with disabilities
- People who speak languages other than English (LOTE) at home³
- Total households
- Zero/one-car households
- Two or more car households
- Total jobs, low-wage jobs, low-wage workers, and essential jobs (work location)

Full results for this analysis are in **Table 3** and **Table 4**. In both tables, the totals of each population group are calculated at the TPB region level and within a quarter-mile distance of all regional bus stops. For each service designation (e.g., a 15 minute or less headway or a 12 hour or less span), the total for that population group is displayed, as well as its percentage of 1) the regional population and 2) the regional population within a quarter mile of a bus stop.

¹ The headway calculation methodology was changed as the average time between arrivals was deemed a more accurate depiction of real-world conditions.

² Data was pulled from the 2020 ACS and 2019 LEHD data (Essential jobs are estimates, see footnote on page 15 for methodology)

³ Count of people who do not speak 'Only English' at home

Table 3: Transit Frequency Access Summary Statistics

	Total Population	White Population	People of Color Population	Disabled Population	Language other than English Population	Veteran Population	Population in Low-Income Households	Households	Zero Car Households	One Car Households	Two or More Car Households	Total Jobs	Low Wage Jobs	Essential Jobs (Work Location)	Total Workers	Low Wage Workers
TPB Region (A)	5,608,288	2,346,297	3,261,992	602,505	1,634,330	370,112	686,876	2,021,589	213,686	690,180	1,117,722	2,901,874	1,132,705	369,009	2,673,041	1,083,353
Within 1/4 Mile Buffer of Bus Stops (B)	3,370,104	1,258,752	2,111,351	351,143	1,072,277	228,131	507,962	3,307,516	188,402	521,844	574,350	2,106,539	782,420	273,076	1,578,517	650,752
<i>Percent of TPB Region (B/A)</i>	60%	54%	65%	58%	66%	62%	74%	60%	88%	76%	51%	73%	69%	74%	59%	60%
15 Minute Service - AM Peak Average Weekday (C)	1,169,253	439,831	729,422	123,832	320,560	77,929	215,766	1,139,793	124,183	230,431	135,683	1,115,273	355,461	131,852	541,696	209,486
<i>Percent of Pop. /Jobs Near Transit (C/B)</i>	35%	35%	35%	35%	30%	34%	42%	34%	66%	44%	24%	53%	45%	48%	34%	32%
<i>Percent of TPB Region (C/A)</i>	21%	19%	22%	21%	20%	21%	31%	21%	58%	33%	12%	38%	31%	36%	20%	19%
15 Minute Service - PM Peak Average Weekday (D)	1,178,225	436,471	741,754	124,848	331,718	77,859	217,088	1,151,571	124,692	232,573	137,917	1,068,774	343,914	125,584	547,384	213,752
<i>Percent of Pop. /Jobs Near Transit (D/B)</i>	35%	35%	35%	36%	31%	34%	43%	35%	66%	45%	24%	51%	44%	46%	35%	33%
<i>Percent of TPB Region (D/A)</i>	21%	19%	23%	21%	20%	21%	32%	21%	58%	34%	12%	37%	30%	34%	20%	20%
30 Minute Service - Saturday Midday (E)	1,779,677	625,005	1,154,672	188,547	525,357	124,675	315,668	1,737,480	151,496	328,335	240,566	1,349,197	462,204	167,281	820,994	332,712
<i>Percent of Pop. /Jobs Near Transit (E/B)</i>	53%	50%	55%	54%	49%	55%	62%	53%	80%	63%	42%	64%	59%	61%	52%	51%
<i>Percent of TPB Region (E/A)</i>	32%	27%	35%	31%	32%	34%	46%	32%	71%	48%	22%	46%	41%	45%	31%	31%

Table 4: Transit Span Access Summary Statistics

	Total Population	White Population	People of Color Population	Disabled Population	Language other than English Population	Veteran Population	Population in Low-Income Households	Households	Zero Car Households	One Car Households	Two or More Car Households	Total Jobs	Low Wage Jobs	Essential Jobs (Work Location)	Total Workers	Low Wage Workers
TPB Region (A)	5,608,288	2,346,297	3,261,992	602,505	1,634,330	370,112	686,876	2,021,589	213,686	690,180	1,117,722	2,901,874	1,132,705	369,009	2,673,041	1,083,353
Within 1/4 Mile Buffer of Bus Stops (B)	3,370,104	1,258,752	2,111,351	351,143	1,072,277	228,131	507,962	3,307,516	188,402	521,844	574,350	2,106,539	782,420	273,076	1,578,517	650,752
<i>Percent of TPB Region (B/A)</i>	60%	54%	65%	58%	66%	62%	74%	60%	88%	76%	51%	73%	69%	74%	59%	60%
<6 Hours - Average Weekday Span (C)	357,652	135,735	221,917	34,783	128,442	22,131	46,611	354,150	15,732	53,613	67,138	318,336	90,889	34,478	174,365	69,071
<i>Percent of Pop. /Jobs Near Transit (C/B)</i>	11%	11%	11%	10%	12%	10%	9%	11%	8%	10%	12%	15%	12%	13%	11%	11%
<i>Percent of TPB Region (C/A)</i>	6%	6%	7%	6%	8%	6%	7%	6%	7%	8%	6%	11%	8%	9%	7%	6%
<12 - Average Weekday Span (D)	714,233	255,362	458,872	72,708	237,465	45,815	97,277	706,600	30,677	107,069	133,524	503,525	173,279	60,941	350,886	146,367
<i>Percent of Pop. /Jobs Near Transit (D/B)</i>	21%	20%	22%	21%	22%	20%	19%	21%	16%	21%	23%	24%	22%	22%	22%	22%
<i>Percent of TPB Region (D/A)</i>	13%	11%	14%	12%	15%	12%	14%	13%	14%	16%	12%	17%	15%	17%	13%	14%
<18 Hours - Average Weekday Span (E)	2,679,701	1,024,572	1,655,129	274,664	863,459	179,253	384,471	2,630,725	134,312	410,087	478,224	1,785,194	653,914	226,265	1,256,266	515,523
<i>Percent of Pop. /Jobs Near Transit (E/B)</i>	80%	81%	78%	78%	81%	79%	76%	80%	71%	79%	83%	85%	84%	83%	80%	79%
<i>Percent of TPB Region (E/A)</i>	48%	44%	51%	46%	53%	48%	56%	48%	63%	59%	43%	62%	58%	61%	47%	48%
<21 Hours - Average Weekday Span (F)	3,296,811	1,237,198	2,059,614	342,442	1,053,422	223,250	494,716	3,235,647	183,476	510,343	563,765	2,071,139	768,199	268,361	1,544,814	635,792
<i>Percent of Pop. /Jobs Near Transit (F/B)</i>	98%	98%	98%	98%	98%	98%	97%	98%	97%	98%	98%	98%	98%	98%	98%	98%
<i>Percent of TPB Region (F/A)</i>	59%	53%	63%	57%	64%	60%	72%	59%	86%	74%	50%	71%	68%	73%	58%	59%
21+ Hours - Average Weekday Span (G)	3,367,636	1,257,735	2,109,901	350,828	1,071,845	227,976	507,775	3,305,215	188,387	521,670	573,772	2,105,832	781,955	272,915	1,577,274	650,277
<i>Percent of Pop. /Jobs Near Transit (G/B)</i>	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
<i>Percent of TPB Region (G/A)</i>	60%	54%	65%	58%	66%	62%	74%	60%	88%	76%	51%	73%	69%	74%	59%	60%

While 60 percent of the total population in the TPB region is within one-quarter mile of fixed route bus service, only 35 percent of that group have access to 15-minute or better service in the AM and PM Peak periods. Marginalized groups have more access to transit when compared to the region as a whole:

- 65 percent of people of color and 74 percent of low-income households are within a quarter mile of bus stops, compared to 60 percent of the region as a whole.
- 35 percent of people of color and 43 percent of low-income households have access to 15-minute or better service in the AM peak period, compared to 35 percent of the region as a whole.
- 88 percent of zero car households are within a quarter-mile of a bus stop and 66 percent have access to 15-minute or better service in the AM and PM peak periods, compared to 34 percent of the region as a whole.
- 69 percent of low-wage workers are within a quarter-mile of a bus stop, but only 45 percent have access to frequent service in the peak periods.

These data points illustrate that while marginalized population groups overall have more access to transit service compared to the general population, some specific sub-groups (such as veterans and LOTE speakers) have less access to high-frequency service (15 minutes or better than the AM Peak) compared to the 35 percent of the transit-accessible population overall, while others have reached parity with the overall population. This also applies to low-wage and essential jobs (45 to 48 percent having high-frequency access) compared to overall employment (53 percent).

Table 4 shows the results of an additional analysis that examines disparities between Equity Emphasis Areas and the region as a whole.

Table 5: Equity Emphasis Area Transit Access Summary Statistics

	Total Population	White Population	People of Color Population	Disabled Population	Language other than English Population	Veteran Population	Population in Low-Income Households	Households	Zero Car Households	One Car Households	Two or More Car Households	Total Jobs	Low Wage Jobs	Essential Jobs (Work Location)	Total Workers	Low Income Workers
Within All Equity Emphasis Areas (A)	1,551,167	320,794	1,230,373	165,209	567,352	119,602	349,483	1,502,429	104,625	223,332	218,854	690,535	291,937	98,682	696,281	353,641
Within EEAs within 1/4 Mile of Bus Stop (B)	1,288,593	251,277	1,037,316	136,848	466,330	99,021	303,852	1,250,478	98,337	196,133	168,582	584,183	240,944	84,586	572,045	290,379
Share of EEA Population/Jobs within 1/4 Mile of Bus Stop (B/A)	83%	78%	84%	83%	82%	83%	87%	83%	94%	88%	77%	85%	83%	86%	82%	82%
Regionwide Share of Population/Jobs within 1/4 Mile of Bus Stop	60%	54%	65%	58%	66%	62%	74%	60%	88%	76%	51%	73%	69%	74%	59%	60%

NETWORK JOB ACCESSIBILITY ANALYSIS

Disparities in access to jobs were analyzed on several dimensions:

- Jobs accessible for all workers compared to low-wage workers.
- Jobs accessible for people living within Equity Emphasis Areas (EEAs) compared to those living outside of EEAs.
- Access to essential jobs (12 percent of the region’s total) compared to all jobs.
- Comparisons between four main service periods: Weekday AM peak (6:00 AM - 9:00 AM); Weekday midday (9:00 AM - 3:00 PM); Weekday late night (12:00 AM - 4:00 AM); and Saturday core (9:00 AM - 3:00 PM).

The analysis was conducted using the Conveyal accessibility analysis platform, which calculates network-based travel patterns from many origins to many destinations. Using the platform, analysts can calculate not only the accessibility to jobs or other destinations from a single point but also aggregate the results of these accessibility measures over an entire region. The platform accepts custom inputs of demographic data (such as job counts), geographic aggregations (such as Equity Emphasis Areas), and GTFS feeds that describe transit systems. Parameters that affect accessibility calculations, such as the date and time ranges used, can also be modified. The platform's methodology is described in detail on its user help site.⁴

Table 3 and **Table 4** contain the results from the Conveyal accessibility analysis for jobs accessible within a 45-minute bus trip, which are summarized in the “Network Job Accessibility Analysis” section of the report.

Table 6: Network Job Accessibility Analysis Results – Total Workers

Time Period	Job Type (Total Jobs or Essential Jobs)	Living In EEA or not Living In EEA	Jobs Accessible (Weighted Average)
Weekday AM Peak 6:00 AM - 9:00 AM	Essential Jobs	In EEA	16,121
	Essential Jobs	Not in EEA	11,506
	Total Jobs	In EEA	168,538
	Total Jobs	Not in EEA	115,793
Weekday Midday 9:00 AM - 3:00 PM	Essential Jobs	In EEA	15,068
	Essential Jobs	Not in EEA	10,694
	Total Jobs	In EEA	157,633
	Total Jobs	Not in EEA	107,930
Weekday Late Night 12:00 AM – 4:00 AM	Essential Jobs	In EEA	5,075
	Essential Jobs	Not in EEA	2,968
	Total Jobs	In EEA	55,382
	Total Jobs	Not in EEA	29,640
Weekend Core 9:00 AM - 3:00 PM	Essential Jobs	In EEA	14,906
	Essential Jobs	Not in EEA	10,408
	Total Jobs	In EEA	155,937
	Total Jobs	Not in EEA	105,213

⁴ Conveyal. *Methodology*. <https://docs.analysis.conveyal.com/analysis/methodology>

Table 7: Network Job Accessibility Analysis Results – Low-Wage Workers

Time Period	Job Type (Total Jobs or Essential Jobs)	Living in EEA or not Living in EEA	Jobs Accessible (Weighted Average)
Weekday AM Peak 6:00 AM - 9:00 AM	Essential Jobs	In EEA	12,747
	Essential Jobs	Not in EEA	9,157
	Total Jobs	In EEA	128,159
	Total Jobs	Not in EEA	88,820
Weekday Midday 9:00 AM - 3:00 PM	Essential Jobs	In EEA	11,766
	Essential Jobs	Not in EEA	8,415
	Total Jobs	In EEA	118,843
	Total Jobs	Not in EEA	82,009
Weekday Late Night 12:00 AM – 4:00 AM	Essential Jobs	In EEA	3,740
	Essential Jobs	Not in EEA	2,209
	Total Jobs	In EEA	38,692
	Total Jobs	Not in EEA	21,097
Weekend Core 9:00 AM - 3:00 PM	Essential Jobs	In EEA	11,635
	Essential Jobs	Not in EEA	8,172
	Total Jobs	In EEA	117,531
	Total Jobs	Not in EEA	79,834

Figure 7 depicts the average jobs accessible via local bus for all workers, while **Figure 8** is limited to the average jobs accessible via local bus for low-wage workers only. Both analyses demonstrate that more jobs are accessible via local bus for people living in Equity Emphasis Areas (EEAs) compared to those not living in EEAs. The service period with the highest quantity of jobs accessible is the weekday peak period, followed by weekday midday, Saturday, and weekday late night. For all time periods, low-wage workers have access to fewer jobs compared to all workers. While the total quantities of jobs accessible increased in nearly all categories compared to the 2021 study, the trends between job types, worker incomes, periods, and EEA status all remain the same.

Across time periods and geographies, the average low-wage worker has access to fewer jobs than the average worker in similar conditions.

Trendlines in both figures show the percent change from the weekday peak period to the weekday midday period, and again from the weekday midday period to the weekday late period. There are similar rates of decrease between the weekday peak period and weekday midday period across all analysis categories in both figures, ranging from six to eight percent. There are sharper rates of decrease when comparing jobs accessible in the weekday midday period to the weekday late night period.

Figure 1: Average Jobs Available via Local Bus for All Workers

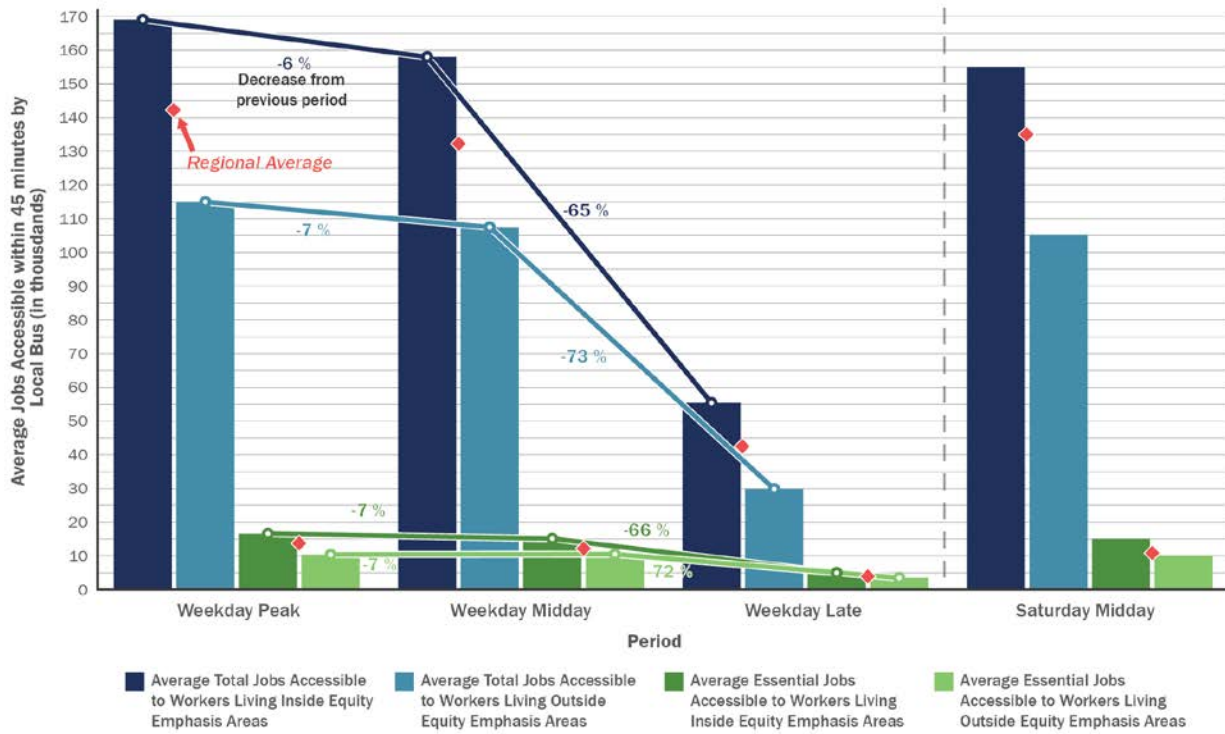
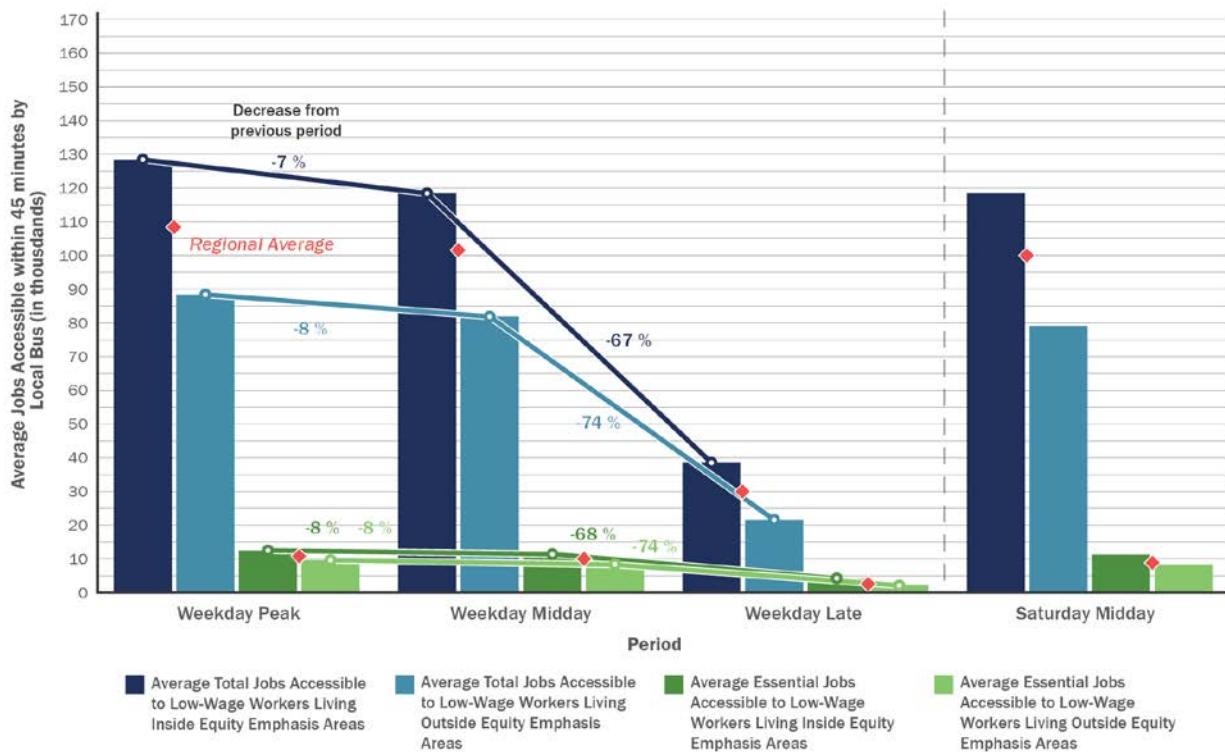


Figure 2: Average Jobs Accessible via Local Bus for Low-Wage Workers



A portion of the region’s total jobs are classified as essential service jobs for the purpose of this analysis: 12.7 percent of regional jobs are considered essential (2,901,874 total jobs and 369,009 essential jobs).⁵ In the late-night period, only 9.9 percent of jobs that are accessible via local bus are essential jobs, which is lower than what would be expected from the share of essential jobs regionwide.

Service restorations since 2021 have significantly increased the number of jobs available within a 45-minute bus ride in the weekday peak and midday periods, as well as the Saturday midday periods. The late-night period did not see growth compared to the other periods, increasing the job access disparity between it and the other periods. This indicates that late night period service did not see as much service restoration as the other periods. However, since the late-night period traditionally has less service even in normal (pre-pandemic) conditions, there was less service to be restored.

⁵ Essential jobs were identified using the Centers for Disease Control’s (CDC) *Interim List of Categories of Essential Workers Mapped to Standardized Industry Codes and Titles*. The level of geographic specificity of the NAICS codes used by CDC are identifiable at the ZIP code level. In order to assign essential jobs at the block group level, each block group was assigned a number of essential jobs based on its share of jobs compared to the ZIP code’s total. Centers for Disease Control. “Interim List of Categories of Essential Workers Mapped to Standardized Industry Codes and Titles.” <https://www.cdc.gov/vaccines/covid-19/categories-essential-workers.html>

KEY TAKEAWAYS

Because regional transit agencies have restored most of the service to pre-pandemic levels, the key takeaways of this study no longer easily describe a single change in conditions as they did in 2021. They are now divided into two themes: *Current Transit and Equity Conditions*, which are observations of current relationships between transit and equity in the current stage of the pandemic; and *Transit and Equity Conditions Compared to Pre-COVID 19*, which take note of structural changes in where transit is provided in the region.

Current Transit and Equity Conditions

GAPS IN SERVICE VS. POPULATION

- While 60 percent of the total population in the TPB region is within one quarter mile of fixed route bus service, only 35 percent of that group have access to 15-minute or better service in the AM peak period.
- Overall, transit service, major corridors, and population density are generally congruent.
- There are select block groups across the region that are high in population density (both total and specific equity subgroups) that are not within one quarter mile of a bus stop.
 - Areas with concentrations of these block groups include Prince George's County outside the Beltway (such as in Laurel and Bowie); Prince William County around Dale City and parts of Manassas; and portions of Loudoun County south of Leesburg.

GAPS IN SERVICE VS. EMPLOYMENT

- Overall, transit service, major corridors, and job density are generally congruent, particularly in the region's core.
- Overall, 73 percent of all jobs are within a quarter-mile of a bus stop, reflecting the fact that a significant amount of transit service is directed towards job centers and jobs access.
- A higher density of low-wage jobs with no transit access can be seen primarily in Loudoun County around Dulles Airport and in and around Manassas and Manassas Park.
 - Other significant areas include the edges of the City of Frederick and Prince George's County outside of the Beltway (such as Laurel and Bowie).
 - Essential jobs follow the same patterns, but with additional underserved essential job hotspots in Fairfax County and on the eastern boundary of Prince George's County.

DISPARITIES IN ACCESS TO BUS TRANSIT

- Overall, most people of color, people with low incomes, and zero and one-car households have higher access to bus stops than their parent populations (total population and total households).
- When looking at low-wage workers, only 60 percent are within one-quarter mile of a bus stop, and only 33 percent have access to frequent peak-period service.
- Marginalized population groups overall have more access to transit service compared to the general population and their access to frequent transit service in the peak periods is on par with the general population (around 35 percent).
- Zero car and one car households have a higher percentage of access to frequent peak period transit (42 to 66 percent) compared to all households (38 percent).
- The low percentage of access to frequent service for all groups, even in the peak periods, remains a concern, particularly for quality of life and jobs access.
- Equity Emphasis Areas (EEAs) have a higher percentage of residents within one-quarter mile of a bus stop for every analyzed sub-group, often by a factor of 20 percentage points.
 - However, this is compared to the entire TPB region, which is overall less dense than the EEAs.
- When looking at low-wage jobs within a quarter mile of transit compared to all jobs, the percentage of access drops four percentage points (73 percent to 69 percent), indicating that those in this higher need category have slightly less access to their employment location.
 - When looking at essential jobs, the figure rises slightly to 74 percent.
- When evaluating the peak periods access to all jobs drops significantly, with only 53 percent of jobs within a quarter mile of 15-minute or better service in the AM peak period (and 51 percent in the PM peak period).
 - For low-wage jobs, this drops to 45 percent in the AM peak and 44 percent in the PM peak.
 - Access to essential jobs in the AM peak period is five percentage points lower than access to all jobs (48 percent compared to 53 percent).

- Access rates for all demographic and job groups quadrupled between 12 hour or less of service span and 18 hours or less of service span, indicated that a service span between 12 and 18 hours is the most common.

NETWORK JOB ACCESSIBILITY ANALYSIS

- The service period with the highest quantity of jobs accessible is the weekday peak period, followed by weekday midday, Saturday, and weekday late night.
- For all time periods, low-wage workers have access to fewer jobs compared to all workers.
- Job access for all job types and all workers decrease consistently from the peak to the midday to the late periods.
- More jobs are accessible for people living within EEAs compared to those living outside of them.
- The highest levels of job access are found in the dense core of the District of Columbia and radiate out along major corridors. However, Montgomery County shows generally better access along its corridors compared to Prince George's County and Northern Virginia.

Transit and Equity Conditions Compared to Pre-COVID 19

TRANSIT LEVEL OF SERVICE CHANGE

- Areas with the greatest service reductions that were introduced during the pandemic include:
 - Burke and McLean (Fairfax County)
 - McLean (Fairfax County)
 - Fort Washington, Upper Marlboro, and Laurel (Prince George's County)
 - Germantown, Olney, and Burtonsville (Montgomery County)
 - Almost the entire District of Columbia during the AM peak (with the exception of select areas of SE and NE near the border with Maryland)

AREAS WITH LESS HIGH-FREQUENCY SERVICE

- The continuing absence of high-frequency service (service that comes every 15 minutes or better) was most prevalent:
 - Along M Street NW and North Capitol Street (District of Columbia)
 - Along Columbia Pike (Fairfax County)
- Other smaller pockets still missing high-frequency service can be found in:
 - Arlington County
 - Leesburg (Loudoun County)
 - Silver Spring (Montgomery County)

TRANSIT EQUITY NEED INDEX

- The Transit Need Equity Index measures demographic characteristics at the block group level that are known to indicate likelihood of transit use and/or transit dependency. These variables measure population and households at their home location and are therefore indicators for access on the origin side.
- There is a large degree of overlap between the areas which scored high on this index and Equity Emphasis Areas (EEAs):
 - The eastern and southwest portions of the District of Columbia
 - The inner beltway regions of Prince George's County and Montgomery County
 - Adjacent to major corridors in Northern Virginia
 - The densest areas of the region's satellite communities such as Rockville, Frederick, and Manassas.
- Clusters of high-need areas outside EEA boundaries can be found primarily in:
 - Prince George's County
 - Charles County

LEVEL OF SERVICE (LOS) CHANGE INDEX

- The Level of Service (LOS) Change Index measures how much service changed in each block group from before the pandemic until now (2022). The change in number of trips per period calculations were used to create the LOS Change Index.
- The highest scoring areas (those that are still seeing the lowest level of service compared to pre-pandemic levels) are in:
 - McLean and Burke (Northern Virginia)
 - Ashton and Burtonsville (Montgomery County)
 - Bowie and Laurel (Prince George's County)

GAP ANALYSIS INDEX

- The Gap Analysis Index determines the areas within the region that have high transit need and are still experiencing notable reductions in service from pre-pandemic levels (measured by the number of trips). This index is calculated by taking the Transit Equity Need Index and LOS Change Index and calculating the size of the gap between them. Block groups with higher Transit Need Equity scores that experienced a larger decrease in trips resulted in larger Gap Analysis Index scores, while block groups with lower Transit Need Equity scores with a similar service reduction would yield a smaller gap.
 - The District of Columbia had many block groups with moderate scores on this index, with higher scoring gaps east of the Anacostia River, and in the District's far north and northeast regions. Most of the largest gaps were found in Maryland and Virginia.
 - The largest gaps in Maryland can be found in Laurel, Burtonsville, Olney, and the National Harbor/Fort Washington area.
 - In Virginia, major gaps exist around Annandale, Burke, and Quantico.
 - High-scoring gaps can be found both within and outside of TPB's Equity Emphasis Areas.