



MIDTOWN BUS TERMINAL

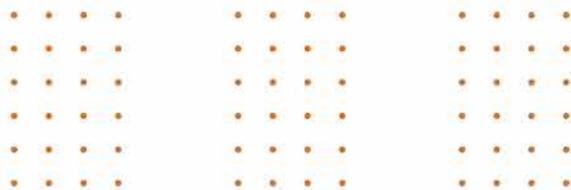
Temporary Bus Operations Study

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A Capstone Project presented to
The Port Authority of New York and New Jersey
and
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Master of Urban Planning





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Executive Summary

The Port Authority of New York and New Jersey operates critical transportation infrastructure across two states in the New York metropolitan area. Its Midtown Bus Terminal (MBT) is the busiest in the world, but future demands will outpace its capacity. Currently, over 100 bus routes terminate at the MBT, the majority of them being New Jersey Transit (NJ Transit) routes. During the PM peak hour (5-6pm), the period when capacity requirements are highest, 476 buses depart from the MBT on a typical weekday. Commuters using the MBT vary in terms of socioeconomic status and access to alternative transit services.

The MBT is slated to be replaced by a new terminal, with construction starting in 2024 and expected to end by 2034. Construction will temporarily reduce bus capacity in the terminal, requiring some buses to be rerouted to maintain the same level of trans-Hudson service. The Tunnels, Bridges, and Terminals (TB&T) department, which manages the MBT, has asked the Capstone Team to do the following:

- Identify alternative sites to which overflow buses (an estimated 88 buses between 5-6pm) can be rerouted
- Propose combinations of bus routes that can be rerouted to each site to minimize impact to passengers' travel experience

Methodology

The Capstone Team divided the project into two distinct phases: initial research and subsequent analysis and evaluation.

Initial Research

- **Existing Conditions Memo:** This memo provides an assessment of the Midtown Bus Terminal's current state, including geographical considerations, demographic profiles of the surrounding areas, and transportation connectivity.

• **Longlist of Potential Alternatives:** The Capstone Team identified and evaluated potential alternative terminal sites for buses during the reconstruction phase of the Midtown Bus Terminal. This process involved conducting site visits and collecting data about capacity, amenities, and current usage.

• **Literature Review:** The team reviewed academic research pertaining to bus stops, terminal design, and bus route planning. This review established a theoretical framework and practical basis for the team's evaluation phase.

• **Case Studies Analysis:** The team examined three cases of bus terminal reconstruction and bus rerouting to gather best practices and guidance for this study. Case studies included the Central Ohio Transit Authority Transit System Redesign, Staten Island Express Bus Network Redesign, and the Salesforce Transit Center.

Analysis and Evaluation

• **Shortlist of Most Feasible Alternatives:** The Capstone Team developed an evaluation criteria for scoring the alternative terminals and applied it to the longlist. The criteria included 3 fatal flaws and 10 site criteria which assessed existing conditions, bus and commuter capacity, and travel time and transfer costs. From this analysis, the team identified the 4 most promising alternative sites (a shortlist) as a recommendation for the Port Authority to consider further.

• **In-Depth Analysis and Evaluation of Bus Routes:** The Capstone Team then evaluated existing bus routes that use the MBT to propose several options for rerouting buses to each shortlisted site. To do this, the team developed an evaluation model that included general criteria and shortlisted site-specific criteria. The team developed three rerouting options guided by different priorities as well as a rerouting score per site for each individual bus route.

The Capstone Team encountered methodological limitations, including inconsistent bus trip data, limited survey data on traveler origins and destinations, and time constraints preventing the Team from conducting its own public outreach.

Findings

The Team identified 4 alternative bus terminals with the combined capacity to accommodate 118 rerouted buses during the Midtown Bus Terminal reconstruction.

Proposed Alternative Terminals

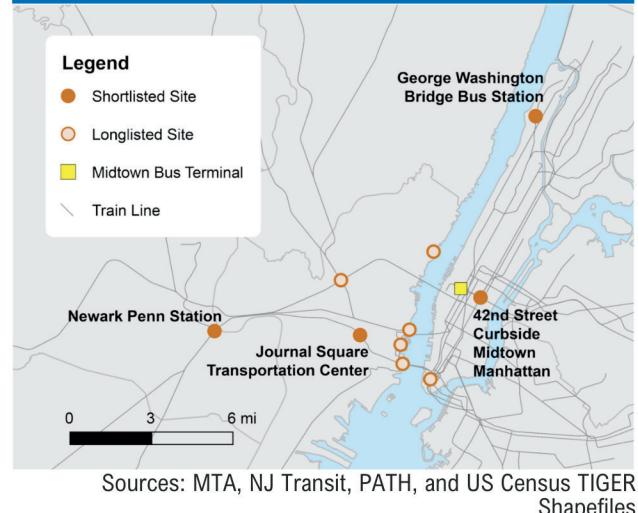
The four shortlisted sites can all accommodate additional buses during rush hour, require one or fewer transfers to reach Midtown, and have few capital needs required to take full advantage of the site.

The following 4 sites are the most suitable for receiving rerouted bus routes during construction at the MBT:

- 42nd Street - Curbside Midtown Manhattan
- Journal Square Transportation Center
- Newark Penn Station
- George Washington Bridge Bus Station

Each shortlisted site scored highly across most evaluation criteria, with the top-ranked

Figure ES.1: Map of Shortlist and Longlist of Alternative Terminals



site, 42nd Street - Curbside Midtown Manhattan, receiving the highest score of 41 out of 51 potential points.

The other selected sites scored similarly, ranging between 32 to 35 points. The longlist sites not shortlisted are described in detail in the Findings and Recommendations. The opportunities and challenges of each site are summarized in Table ES.1.



42nd Street in Midtown Manhattan is within the CBD and allows for quick intermodal transfers.

Credit: Capstone Team



As a multimodal hub, Journal Square offers direct service to both Midtown and the Financial District.

Credit: Capstone Team

Table ES.1: Opportunities and Challenges for Proposed Alternative Terminals

Opportunities	Challenges
42nd Street - Curbside Midtown Manhattan (Score: 41/51)	
This site presents opportunities for convenience due to its direct diversion of buses to the Midtown CBD, strong transit connectivity, and ample space for bus operations along 42nd Street. Future installation of a 42nd Street busway could enhance transit priority and efficiency, potentially mitigating congestion issues and improving travel times.	Current congestion on 42nd Street poses challenges, leading to significant added travel time for buses. Despite nearby private buildings and public plazas offering potential amenities for bus riders and drivers, there is a lack of amenities specifically for bus customers.
Journal Square Transportation Center (Score: 35/51)	
With one-seat access to multiple Manhattan locations via PATH routes, this site offers convenient transit options. Being owned and operated by the Port Authority simplifies coordination efforts for operational changes.	Despite being a major transit hub, this site is distant from the Midtown Manhattan CBD, resulting in longer travel times. Additionally, rerouting buses to this site may incur additional costs for passengers due to the need for an extra fare.
Newark Penn Station (Score: 34/51)	
High-frequency NJ Transit and PATH services offer efficient transit options to Manhattan. The station's amenities, including indoor shelter, seating, restrooms, and real-time information, enhance the passenger experience.	Despite providing fast access to Midtown via NJ Transit, this site is farther from the CBD and requires a cross-platform transfer for access. Additional costs for NJ Transit fares may pose challenges for commuters.
George Washington Bridge Bus Station (Score: 32/51)	
Affordable subway transfers mitigate additional travel costs for passengers. Fully ADA accessible facilities and recent renovations enhance passenger amenities, while Port Authority ownership facilitates decision-making for operational changes.	Being located out of the way from existing Midtown commuter bus routes adds travel time compared to other shortlisted sites. Despite this, direct subway access at 175th Street A train station provides quick transfers to the CBD.

The Capstone Team conducted site visits at each of the shortlisted sites to better understand the existing conditions and improvements needed in the future.

Figures ES.2 to ES.7 illustrate how each of the shortlist sites could accommodate temporary bus operations and showcase the strengths of each alternative terminal.

Newark Penn Station (right) has connections to NJ Transit commuter rail and PATH.

Credit: Capstone Team



Figure ES.2: Bus Capacity Along 42nd Street

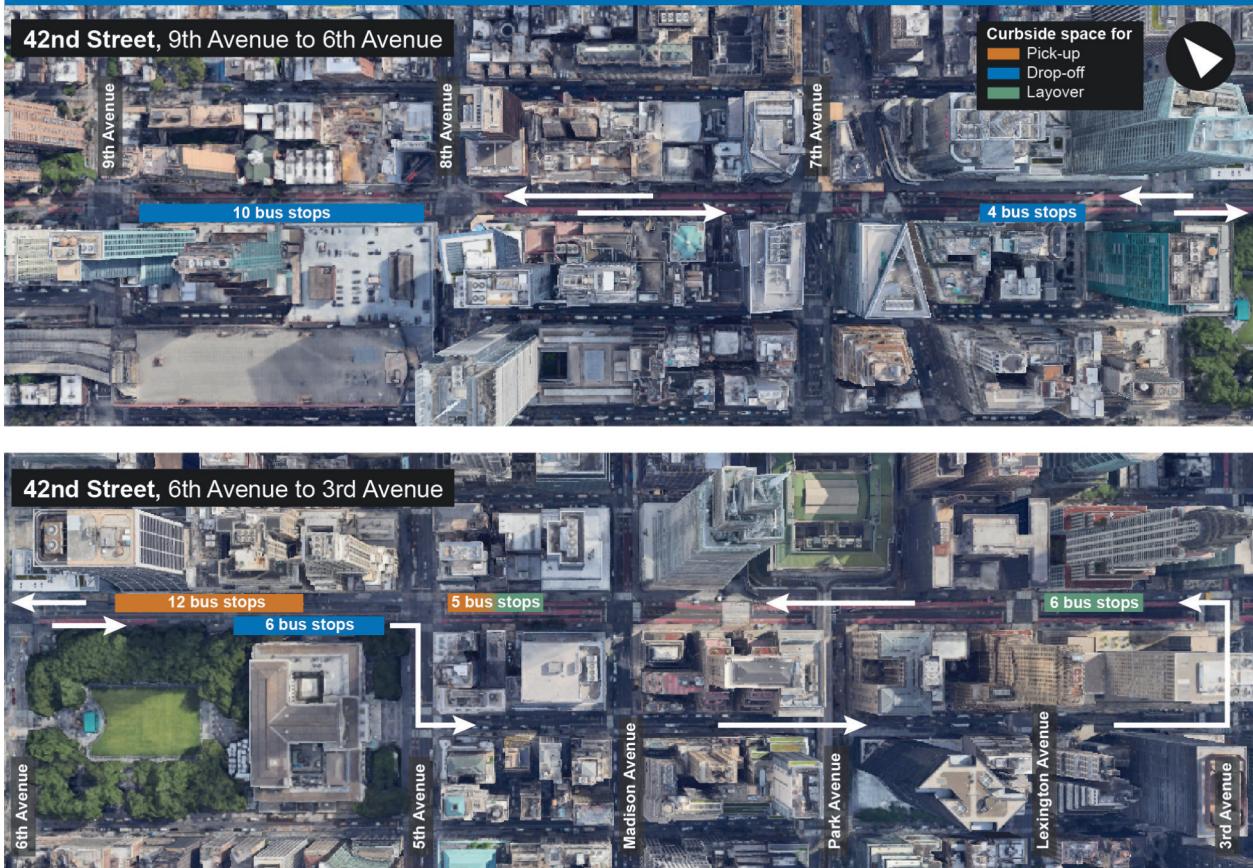


Figure ES.3: Bus Capacity and Amenities of 42nd Street Between 5th and 6th Avenues



Figure ES.4: Bus Capacity and Amenities of 42nd Street Between 6th and 7th Avenues



Figure ES.5: Station Characteristics of Journal Square Transportation Center



Figure ES.6: Station Characteristics of Newark Penn Station

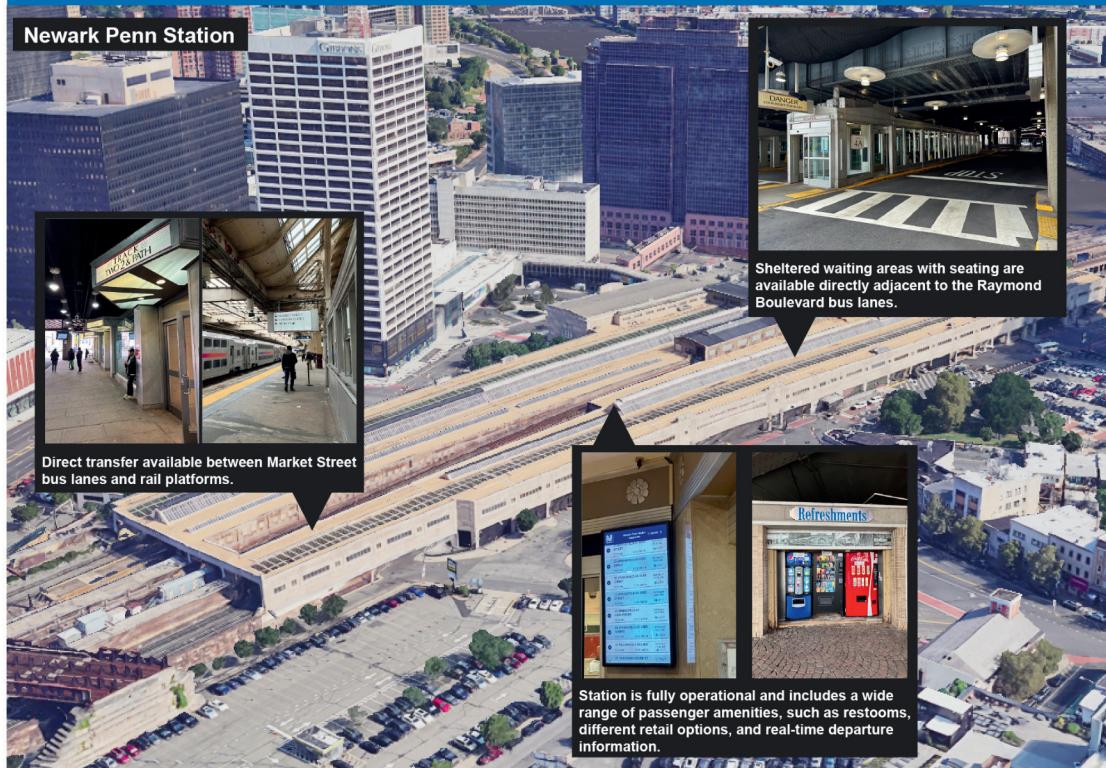


Figure ES.7: Station Characteristics of George Washington Bridge Bus Station





George Washington Bridge Bus Station is well-situated for northern New Jersey bus routes.

Credit: Capstone Team

Proposed Bus Reroutes

Taken together, the shortlisted sites have the capacity to accommodate an estimated 118 buses during the evening peak rush hour, exceeding the 72 departures and 16 arrivals unaccommodated by the temporary terminal, Dyer deckovers, 30th Street intercity stops, and planned curbside stops during the 5-6pm evening peak.

To determine which routes should be directed to which alternative terminal, the Capstone Team developed an evaluation criteria for bus rerouting and applied it to existing bus routes into and out of the MBT. The team then conducted an analysis of bus rerouting to determine combinations of routes that could be accommodated at each of the alternative terminals. The team developed three options of bus reroutes bundles, presented in Table ES.2. This menu of options provides PANYNJ with a starting point for discussions with bus carriers. The routes selected in these options are generally those that could be rerouted with relatively small travel time and equity impacts and that have more alternative transit options available for their riders.

Table ES.2: Number of Accommodated Peak Hour Buses by Option

	42 Street - Curbside Midtown	Journal Square	Newark Penn Station	GW Bridge Bus Station	Total
Option 1: Balanced Approach using Combined Scores	72	0	5	11	88
Option 2: Prioritizing Travel Time	72	0	16	0	88
Option 3: Rush Hour Rerouting	72	0	5	12	89

Notes: Peak hour refers to bus trips arriving and departing from the Midtown Bus Terminal between 5-6pm on a weekday. The Port Authority can select from one of the options or choose individually from the complete list of routes (available in the Proposed Bus Reroute Options section).

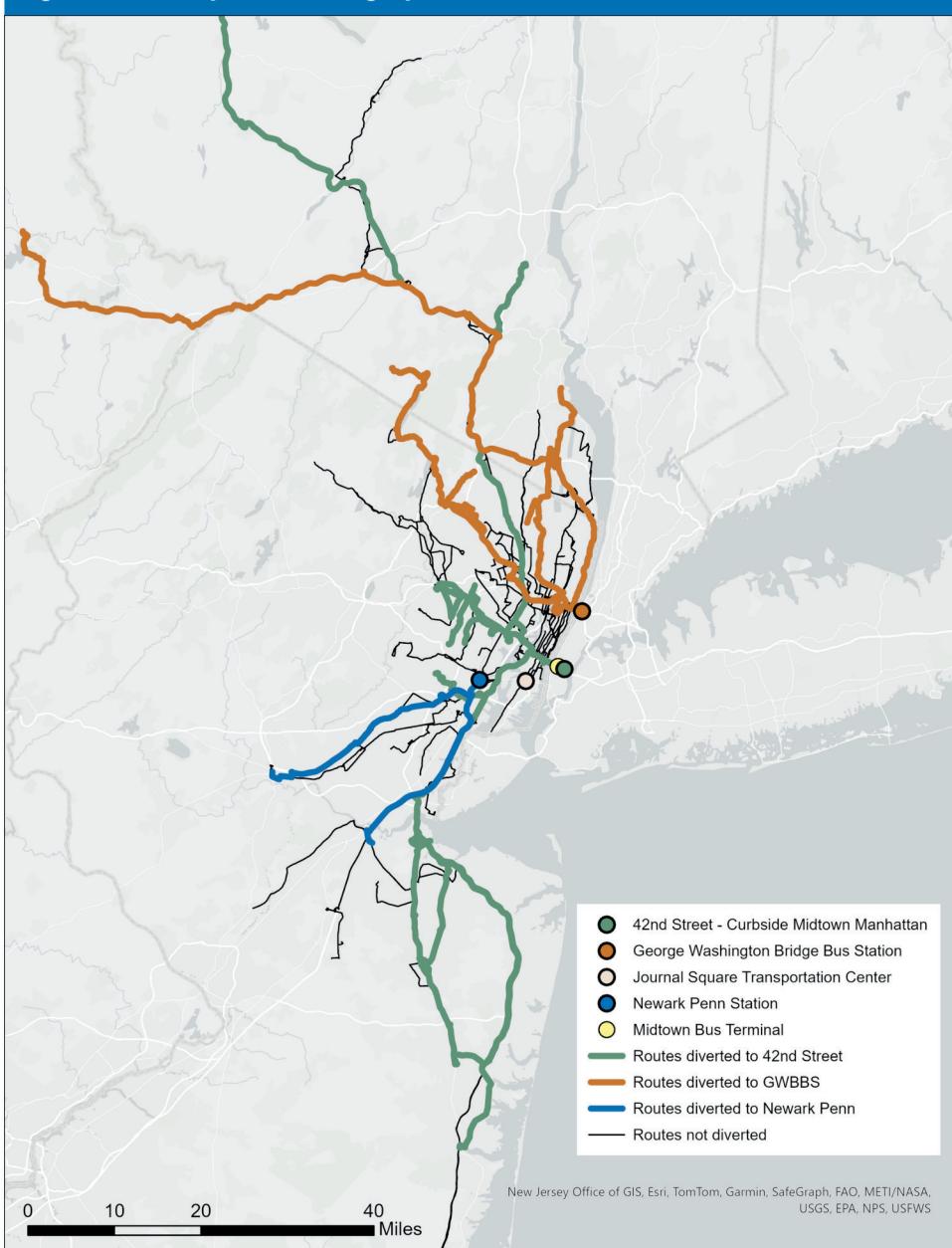
Option 1: Balanced Approach using Combined Scores

This option balances travel time, travel alternatives, equity impacts, and redundancy.

Seventy-eight departures and ten arrivals are accommodated. 42nd Street - Curbside Midtown Manhattan would accommodate 63 departures and nine arrivals.

George Washington Bridge Bus Station would accommodate ten departures and one arrival. Newark Penn Station would accommodate five departures. Journal Square would not be used for rerouted buses due to higher travel times compared to Newark Penn and other factors discussed in the Proposed Bus Reroute Options section.

Figure ES.8: Map of Rerouting Option 1



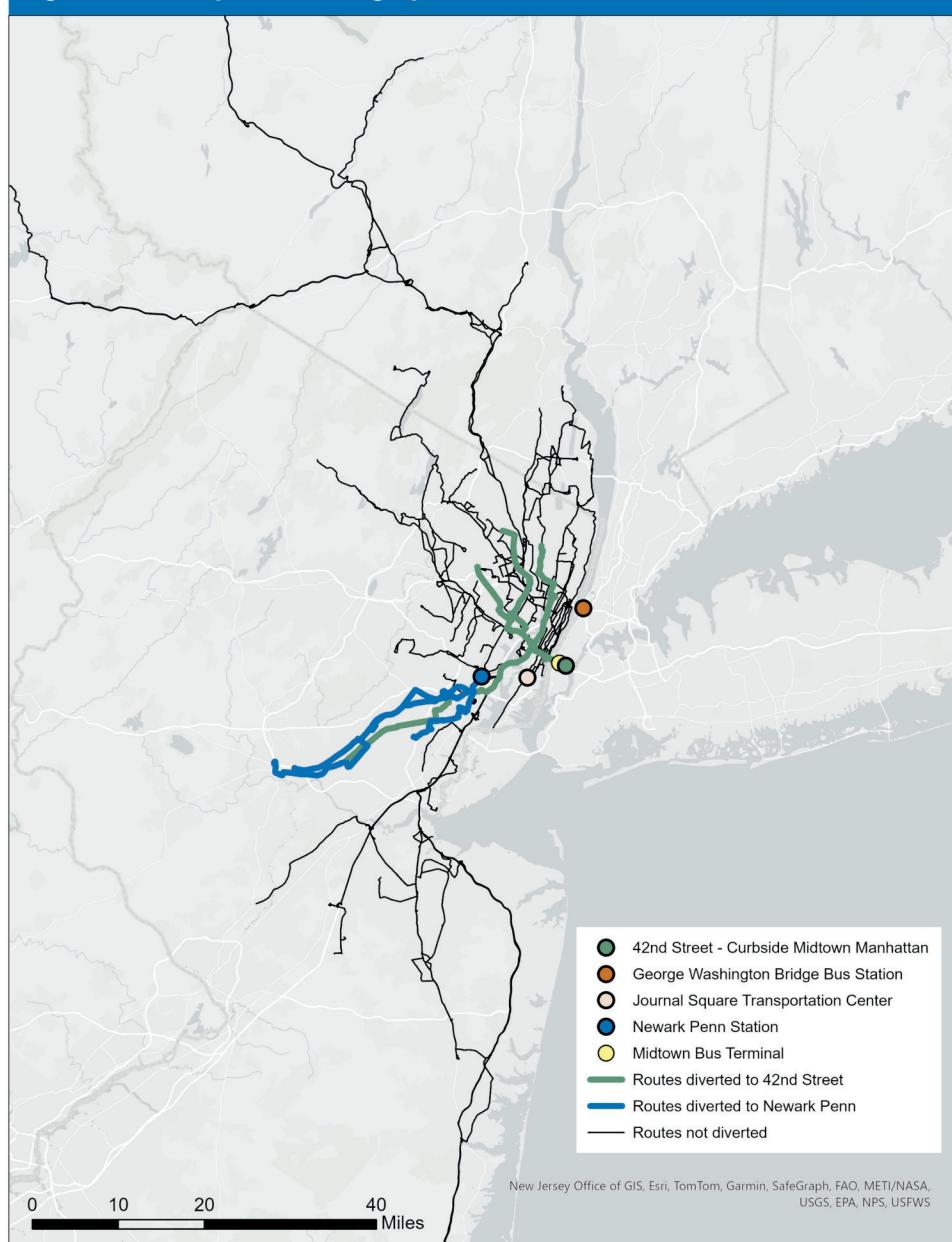
Option 2: Prioritizing Travel Time

This option prioritizes rerouting bus routes that would have the least impact in terms of added travel time.

Sixty-five departures and 23 arrivals are accommodated. 42nd St - Curbside Midtown Manhattan would

accommodate 52 departures and 20 arrivals. Newark Penn Station would accommodate 13 departures and three arrivals. Journal Square and the George Washington Bridge Bus Station would not be used for rerouted buses due to greater travel times.

Figure ES.9: Map of Rerouting Option 2



Option 3: Rush Hour Rerouting

This option prioritizes rerouting routes primarily operating during morning and evening rush hours, aligning with periods of peak demand at the temporary terminal. Routes were selected based on their rush hour trip proportions, with those exclusively running during rush hour rerouted first.

Eighty-two departures and seven arrivals are accommodated, with 42 St - Curbside Midtown Manhattan serving 65 departures and seven arrivals. Newark Penn Station would accommodate five departures. George Washington Bridge Bus Station would accommodate 12 departures. Journal Square would be unused for rerouted buses.

Figure ES.10: Map of Rerouting Option 3

