Utilizing Automatically Collected Data to Infer Travel Behavior: A Case Study of the East London Line Extension

by

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Abstract

Utilizing automatically collected data sources, this research strengthens the understanding of changes in user travel behavior caused by the introduction of the extended East London Line (ELL) into London's public transportation network. A recently developed method for inferring all Oyster users' origins and destinations on the public transportation system, and linking trip segments into full journeys, enables analysts to study the influence of a major capital investment on the larger public transportation network in great detail over a span of time and geography not available with traditional survey methods.

Expanding an Oyster-based origin-destination matrix to represent all users provides estimates of overall ridership and passengers' travel patterns. Careful analysis of the usage of the rail line and other public transportation services in its vicinity provides a new method to infer the passenger demand generated by the new service. Through the creation of a large user panel (made up of over 54,000 Oyster users with active cards in April 2010 and who travelled on the ELL in October 2011), this thesis studies changes in journey frequency, travel time, journey distance, public transportation mode share, and access distance by comparing journeys made before and after the introduction of the extended ELL.

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Contents

Figures

Tables

1

Introduction

The past decade has seen an explosion in the amount of data available to many public transportation properties. Automatic fare collection (AFC) systems, automatic vehicle location (AVL) systems, and automatic passenger counters (APC), have become vital technologies for many agencies around the world. Collectively referred to as automated data collection (ADC) systems, their increased prevalence provides an opportunity to improve understanding of passenger travel behavior and system performance. A recently developed method uses automatic vehicle location data from buses combined with automatic fare collection data from bus and rail services to infer passenger origins and destinations, and link trips to build all full public transportation journeys for a system on a daily basis using ADC transactions. These full journeys can be used to study how public transportation systems perform and are used, including analyzing travel time, mode shift, journey frequency, and path choice, and how these aspects of travel behavior change in response to new, expanded, or disrupted service.

The travel behavior of customers is of great interest to public transportation providers, as a deeper understanding of user behavior enables better strategic and operational planning. The influence of a change in service on usage of other modes, users' travel paths, the number of journeys each user makes, the amount of time a user spends in the public transportation network, and access distance to the network, are vital to a more thorough understanding of the impacts of a particular investment or disruption. This thesis focuses on using automatically collected data to assess the impact of a major capital investment on travel behavior using Transport for London's extended East London Line (ELL) as a case study.

Transport for London (TfL), the government agency responsible for the transportation network in Greater London, has invested in a number of ADC systems, providing a rich data set for studying how their customers use London's public transport network. The recent expansion of the London Overground provides a good opportunity to learn more about how passengers respond to a major change in public transport service in their area, and therefore is used as the case study for this thesis. This research develops and demonstrates techniques that take advantage of information provided by automated data collection systems to study travel behavior changes following the opening of the ELL in late April 2010.

1.1 Research Motivation

Given the construction of the East London Line Extension (ELLX), TfL's extensive ADC systems, and the development of a new methodology to infer full passenger journeys, this thesis demonstrates a variety of analysis methods that use automatically collected data to improve public transportation capital and operations planning.

1.1.1 Automated Inference of Intermodal Passenger Journeys

Many of the analyses presented in this thesis are enabled by the research described in Gordon (2012), specifically the development of algorithms that infer trip origins and destinations, link trip segments into full (in-system) journeys, and expand the resulting origin-destination matrix to characterize all journeys on a public transportation system. Utilizing AFC transaction records and bus AVL data, Gordon infers the origin of a bus user by matching the time stamp of the fare transaction record with time stamps of events in the AVL data. The alighting location of a bus user is inferred by looking at the next trip of a user, and assigning the alighting location to the stop on the bus route nearest to the next boarding stop or station entry. The origins and destinations of users of the rail network are already included in AFC records in London[1], due to the rail system's zonal fare system and the associated requirement to "tap-in" and "tap-out" at fare gates.

1 If Gordon's methodology is applied to a network that does not require smartcard users to validate their cards when exiting, the same inference process described for buses could be used to infer rail destinations.

Following the inference of origins and destinations, consecutive journey segments are linked using a set of interchange parameters to infer full journeys for smartcard users. In London's case, this results in full journeys for more than 70% of users of TfL's transit network. The results of the linking process are then expanded using station gateline counts and bus farebox transaction totals to represent all users of the public transportation network. The methodology just described is implemented as a Java program, which processes a service day's worth of AFC and AVL data, to produce an expanded, all-user origin-destination matrix for that day. The power of this methodology is demonstrated in this thesis, enabling most of the analyses reported in Chapters 3 and 4. More detail on this algorithm, including the parameters that determine inference of origins, destinations, and trip linking, can be found in Chapter 2 of this thesis, as well as Gordon (2012).

1.1.2 Passenger Surveys

This thesis is further motivated by the cost and limitations of existing surveying techniques, and will result in methods that will reduce the need for passenger surveys. As numerous authors have previously described, manual surveys come at a high marginal cost relative to utilizing already implemented ADC systems (Ng, 2011) and (Fijalkowski, 2010). A comprehensive analysis of various surveying methods by Ng (2011) indicates unit costs of $3 to $148 per completed survey, depending on the chosen method. By comparison, utilizing automatically collected data costs virtually nothing on an ongoing basis, given that the only expense - after the one-time capital and programming investments are made in ADC systems - is the salary of the analyst. If an agency has already invested significant capital in implementing a smartcard-based AFC system and an AVL system, it is in the property's interest to take full advantage of the resulting data to reduce planning expense and improve data quality.

In addition to a survey's higher cost there are many occasions where information about passenger journeys can be provided in more detail, accuracy, and breadth, with automatically collected data than with a passenger survey. Surveys often have a small sample size relative to overall ridership, have difficulty gathering information on infrequent users, and are usually limited to a one day (or one week) period. The individual being surveyed may interpret a question incorrectly, or may provide an answer that reflects what they perceive as the 'correct' answer. In a specific example related to this research, users are often a poor judge of their own travel time, and also typically round their answer to the nearest five (or ten) minutes. When only slight changes in travel time are being measured, this can lead to significant errors in estimating overall changes in travel time (Ng, 2011) and (Fijalkowski, 2010).

Obviously, there is some information that cannot be gathered simply from using ADC system records to observe passengers' actions. These pieces of information, and the survey questions that seek them, generally involve the unobservable; the purpose of a passenger's journey, any alternative modes that they considered for their journey, awareness of various services provided by the transit agency, etc. (Transport for London, 2011). It should be noted that although a significant portion of some surveys is used to determine the demographics of the user, these questions could be answered as part of the process of receiving, updating, or "reloading" a smartcard. Currently, however, these important demographic characteristics of passengers that are obtained from surveys cannot be replaced with information from ADC sources.

1.1.3 The Case Study

A former London Underground service running from Whitechapel to New Cross Gate, the nine kilometer ELL was closed in December 2007 to make way for an extended, upgraded service from Dalston Junction (in the north) to West Croydon (in the south), which opened in late April 2010. A further northern extension to Highbury & Islington in late February 2011 extended the new railway to 26 kilometers in length, and provided passengers with new interchange opportunities to avoid congested Central London. A western extension through South London will open in late 2012, completing the London Overground orbital network. This £1+ billion investment is used as a case study for the methodologies developed in this research.

Previous research by Ng (2011) presented a preliminary impact analyses of the extension of the ELL, using data from 6 months after the opening of the initial segment. The extensive coverage of the current state of impact analyses in the public transportation industry found in Ng's research provides direction for the research in Chapter's 3 and 4 of this thesis. The case study of Ng's thesis focuses on measuring ridership growth on the new rail line, calculating changes in journey frequency based on the results of survey data, and studying aggregate changes in mode share caused by the ELLX. This thesis will expand on Ng's work by utilizing the automated inference of intermodal passenger journeys to provide greater detail on changes in travel behavior in the 18 months following the start of service on the initial extension.

1.2 Research Objectives

This research seeks to develop applications that take advantage of the wealth of information from ADC systems to deliver a comprehensive picture of changes in travel behavior caused by a significant service change in a complex transport network. It is hoped that these applications – and the methodologies behind them – will assist public transport agencies in further utilizing the potential of automatically collected data; specifically in providing a larger and more accurate characterization of passenger behavior to enable improved capital and operations planning, and in improving subsequent impact analyses in London and other cities. The methods introduced are intended to be applicable for any public transportation agency with similar ADC systems. Finally, this research is intended to provide TfL with a detailed and thorough analysis of the short-term results of their investment in the ELL, focusing on the resulting changes in passenger usage throughout the London transportation network.

1.3 Research Approach

This thesis focuses heavily on the ELL, interweaving the methodology of each application with the analysis of its results when applied to the case study.

The research relies on the process outlined in Section 1.1.1 (and discussed at a greater length in Chapter 2), using the power of a (nearly) complete network-wide origin-destination matrix and full journey patterns for individual passengers to develop methods measuring the effect of the ELL investment on public transportation usage along the corridor, including nearby bus routes and other rail lines. Studying changes in ridership and passenger flow on the various public transport routes and lines in the corridor provides insight into passengers' response to the new service. The corridor is analyzed at key dates, using a full week in April 2010 to provide a picture of the "before" state of East London's public transport usage, a full week in February 2011 just before the extension to Highbury & Islington began service, and a full week in October 2011 to represent the "after" condition of the corridor eighteen months after the start of service.

Using these dates, a comparison of all public transportation activity within certain distances of the extended ELL provides information on the magnitude and extent of the changes in travel behavior. This includes an estimate of new users attracted by the capital investment, changes in the number of journeys made by previous users, and how passenger travel has been redistributed amongst the public transportation modes within the area surrounding the rail line.

To make a detailed assessment of changes in passenger travel behavior, a group of ELL passengers whose Oyster cards remained in use for the entire eighteen month analysis are studied to determine how their travel behavior changed in response to the new rail service. This group has been titled the 'user panel', and will be referred to as such for the remainder of this document. This research employs the user panel to study changes in journey frequency, travel time, travel distance, mode share amongst public transportation services, and access distance triggered by the ELL. These changes are analyzed by station and corridor-wide.

1.4 Thesis Organization

The remainder of this thesis is organized into four additional chapters. Chapter 2 provides further background on London's transportation system, the ELL, and describes the use of automated data collection systems in this research. Chapter 3 details the changes in ridership on the ELL and the alternative public transport services in the vicinity. Chapter 4 focuses on changes in travel behavior by specific users, measuring the changes in journey frequency, travel time, journey distance, public transportation mode choice, and access distance from just before the reopening of the ELL to 18 months after the start of service. Chapter 5 summarizes the thesis research and its results, compares these results to the business case developed before the construction of the rail line, and suggests avenues for future research.

2

Background

This chapter provides an introduction to London's public transportation network. ADC systems utilized in this research are described, specifically attributes that are unique to London. As was previously noted, the work by Gordon (2012) on inferring origins and destinations, linking trips into journeys, and scaling those journeys to estimate daily passenger travel on a public transportation network is central to the analyses presented in this thesis. Therefore, this chapter will summarize that research. Finally, the chapter will describe the East London Line (ELL) in greater detail, as it serves as the case study for the analyses discussed in Chapters 3 and 4.

2.1 Public Transportation in Greater London

The London region is governed by the Greater London Authority (GLA), which provides services to approximately 7.8 million residents (Office for National Statistics, 2011). The GLA's jurisdiction spans 610 square miles (1,579 square kilometers), and is lead by the popularly elected Mayor of London. The Mayor of London provides strategic direction to the city's transportation agency, Transport for London (TfL), as well as appointing board members and setting budget levels (Transport for London, 2010).

TfL and it's 31,000 employees manage many elements of the region's transportation network, including major roadways, the congestion charging scheme, and much of the public transportation network (Transport for London, 2010). London's public transportation network is extensive, and includes regional rail (National Rail and

London Overground), metro service (London Underground), light rail (London Tramlink and Docklands Light Railway (DLR)), bus service (London Buses), and ferries (The River Bus). Only the Underground is directly operated by TfL employees, with the remaining services operated through concession contracts tendered by TfL (Overground, Tramlink, DLR, Buses, and The River Bus) or franchise agreements tendered by the national Department for Transportation (National Rail).

All of the various public transportation modes in London, excluding The River Bus, have direct interchanges with the ELL.

- National Rail is a network of inter-city and regional rail services that are operated by Train Operating Companies (TOCs) that win competitively bid franchise agreements with the Department for Transportation. Three TOCs operate lines that interchange with the ELL, and these lines serve the London terminals of Moorgate, Cannon Street, London Bridge, Waterloo, and Victoria.
- London Overground is a largely above-ground inner suburban rail service operated by London Overground Rail Operations Limited (LOROL), a TOC that won the concession contract from TfL. In addition to being an Overground service, the ELL provides an interchange opportunity with the North London Line at Highbury & Islington. Following the completion of the ELL's extension to Clapham Junction, the Overground will provide London's second orbital rail service.
- London Underground is the backbone of the region's public transportation network, providing frequent metro service for more than 3.5 million journeys a day (Transport for London, 2010). Four of the Underground's 11 lines intersect the ELL, providing significant interchange opportunities.
- London Tramlink serves the borough of Croydon, operating east-west in both mixed and reserved right-of-way. All three of its routes service West Croydon station, the southern terminus of the ELL.
- The Docklands Light Railway is an automated light rail system serving the Docklands area east of central London, and is operated through a concession, similar to London Overground. The DLR has a Shadwell station across the road from the ELL station of the same name, and passengers are permitted an out-of-station-interchange (OSI) to transfer between the two.
- The London Bus network is expansive, with 8,500 buses serving some 19,500 stops across the region (Transport for London, 2012a). Approximately 120 bus routes pass within one kilometer of an ELL station, providing ample interchange opportunities (Ng, 2011).

Fares on the public transportation rail network are zone-based, with the zone of entry and zone of exit determining how a user is charged. There are nine concentric fare zones, numbered 1 - 9, with the highest being the furthest from central London. Journeys that travel into, from, or through congested Zone 1 pay the highest fare, which amounts to an incentive to avoid central London if you are traveling across the region. All London Bus and London Tramlink services have a flat fare and therefore are not part of the zonal fare system.

2.2 Data Sources

The following data sources, or a proxy, are required to do the analyses detailed in the remaining chapters of this thesis. The rich data sets provided by TfL's investments in its fare system and bus automatic vehicle location system enable this study of travel behavior, and it would not be possible to undertake it in both an in-depth and representative manner without the ADC sources described below.

2.2.1 Automatic Fare Collection Records

Many transit agencies have implemented or are in the process of implementing smartcard-based Automatic Fare Collection (AFC) systems. These systems allow properties to monitor fare collection and revenue electronically, while retaining records of an individual card's fare transactions. The AFC readers are typically installed at the boarding doors of a vehicle, or at gatelines in systems that have "paid" passenger areas. Although this is often not the impetus for their installation, smartcard AFC systems provide a significant amount of data that can be a useful resource for the planning staff of any agency that has the requisite system in place. The analyses in the succeeding chapters of this thesis require AFC information to include date, time, and location of each interaction with the system, as well as a unique, permanent identifying number for each card. Furth et al (2006) and Mistretta et al (2009) contain more detailed information regarding AFC systems.

Introduced in 2003, the Oyster Card is TfL's fare payment smartcard (Transport for London, 2010). All the transportation services within TfL's service area, excluding the ferries, accept the Oyster Card, and over 80% of public transportation journeys in London are made using an Oyster Card. Due to London's zone-based fare policy on its rail networks, Oyster Cards record both entries and exits at each gated rail station. Depending on ticket type[1], ungated rail stations require some passengers to tap their Oyster Card on a card reader located on the platform. Records that result from boarding a bus include the time, vehicle number, and route served by the vehicle.

2.2.2 Automatic Vehicle Location Records

Although the primary purposes of Automatic Vehicle Location (AVL) systems are to provide the location of a transit vehicle in real time to improve operations, increase passenger safety and security, and enable auditory and visual automated stop announcements, this research will utilize the byproduct of that effort; the event records that indicate the vehicle's location as it traveled a route. London's iBus AVL system uses Global Positioning Satellite (GPS) devices to provide event records that contain a vehicle's route, direction of travel, trip number, time of event, stop code, and stop sequence number. For the purposes of this thesis, the events of interest are the vehicle arriving at a stop and the vehicle departing a stop. Significantly more information on AVL systems can be found in Furth et al (2006).

2.2.3 Train Loadweigh System Estimates

These systems estimate train payloads based on measurements of air pressure in each vehicle's suspension system (Interfleet Technology, 2004). The measurement of the mass of each vehicle can be used to generate the weight of the contents. In London, this system is currently in use by some National Rail Train Operating Companies, and is in place on all London Overground trains. The system records the additional weight beyond the weight of the vehicle itself while traveling between each pair of stations. This is processed to produce an estimate of the number of passengers onboard each train set as it travels along the rail line. Because an average passenger weight (an average weight of 75 kilograms per passenger, or 165 pounds, is assumed by Overground staff) is used when processing these data, the resulting number is only an estimate of passenger load. More information on the sensitivity and accuracy of these loadweigh systems can be found in Frumin (2010).

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1 Oyster Cards have the capacity to be "loaded" with multiple ticket types. The ticket types generally fall into two categories: period tickets/passes and pay-as-you-go (PAYG). Passes vary in length: 1 week, 1 month, and 1 year; include special discounted passes for groups such as the elderly and students; and are purchased for specific zones of travel. PAYG requires the cardholder to load money onto the card before entering the network. The fare system then subtracts the fare for the journey upon the user's exit from the network. Many users simultaneously have both a pass for select zones (say a Zone 1-3 pass) and PAYG funds loaded onto their card (for travel into Zone 4, for instance). At ungated stations, only Oyster Card users who do not have a pass for the zones of their planned travel are expected to tap their card on the card reader.

2.2.4 Station Gateline Counts

For agencies that include gated barriers to access their stations, gatelines provide transaction information for all users who interact with the gate to gain access to the platform. Due to TfL's zonal fare policy, the gatelines in London provide records of both entries and exits for a station. These data are summarized by hour per group of gates, and simply provide a total count of users entering and exiting at that location. Large stations with multiple gatelines generally have their totals presented separately for each gateline. Gateline totals may not reflect true passenger movements, as individual gates and/or full gatelines are occasionally opened when stations experience overcrowding due to large events, and therefore no data are recorded during that time period. In addition, station employees often need to tap to get from one side of the gateline to the other in the course of their duties, inflating totals slightly.

2.2.5 Bus Farebox Counts

Farebox records provide transaction information for all users who interact with the farebox upon boarding a bus. In TfL's case their on-board Electronic Ticketing Machines (ETM) provide a record of each transaction, including time, trip number of the vehicle, route identification number, and ticket type. For this research these data were provided in a format that displayed total transactions on each route per hour. There is some error inherent in this data as not all passengers interact with the farebox upon boarding a vehicle.

2.3 Automated Inference of Intermodal Passenger Journeys

This thesis uses outputs from the research described in this section, which is being conducted simultaneously by another MIT Masters degree student. With the development of a methodology (and the accompanying Java program) to infer bus trip origins and destinations, and link the separate trips by an Oyster Card into full, multi-modal journeys, comes the ability to analyze passenger flow on specific bus routes, create origin-destination matrices for any route or line, study changes in journey frequency over time, compare travel time changes experienced by specific users, and a whole host of other potential avenues of analysis. The research outlined in the remaining chapters of this thesis takes advantage of the algorithm developed by Gordon (2012) to demonstrate methodologies that provide a great depth and breadth of information concerning the changes in travel behavior influenced by a significant capital investment.

Four of the five data sources mentioned in Section 2.2 are central to the algorithm developed to infer origins and destinations, link trips into full journeys, and expand the resulting origin-destination flows to represent all users of the public transport system. Due to the current limited implementation of the proprietary loadweigh system (it is only in place on Overground vehicles and some National Rail vehicles), that data source is not used by Gordon (2012) in his research, from which more extensive detail and descriptions can be found.

2.3.1 Inferring Origins

Most rail stations in London's public transport network are gated, and therefore the Oyster records for each card include the time and location of the user's entrance into the rail system. Ungated rail stations (such as DLR stations) have Oyster Card readers on their platforms, which require passengers without a pass to "tap" (place their Oyster Card within the validator's sensory field) their card in order for the proper fare to be charged. This algorithm is unable to infer the origin of a user with a pass who did not tap a card reader, as no record of the station entry exists in the fare system.

London's bus system uses onboard fare payment, and the current card reader that records an Oyster user's entrance onto the bus does not have access to the vehicle's exact location. Gordon's (2012) program infers the location of a bus rider's origin by matching the time stamp and vehicle trip number from the AFC (Oyster) record to the time stamp and vehicle trip number from a set of AVL (iBus) records, which contain the location of the bus at that time. In order for a match to be made, the time stamp for the tap must occur within five minutes of an iBus record indicating an arrival or departure from a bus stop. When applied to London's bus network, over 95% of bus trips have their origin inferred using this method.

2.3.2 Inferring Destinations

As with origins, destinations on the rail network in London are generally recorded in the Oyster system, given that the zonal fare policy mandates tapping the card reader to exit a gated station. Again, only the journeys of those passengers who tap their Oyster Card on a validator at ungated stations are included in these results. Public transportation networks that do not require users to interact with a gate to exit a station could have destinations on their rail network inferred using the same methodology outlined for London's bus network in the remainder of this section.

The flat fare of London's bus network leads to a more complex process for inferring the alighting times and locations of bus users. A user's alighting location is assumed to be the stop closest to the rider's next bus boarding or station entry, with the inherent assumption that passengers do not walk long distances or take another non-public-transportation motorized mode between public transportation journey stages on the same day. The algorithm includes a set of parameters that seek to prevent a false-positive identification of an alighting time and location. A destination is not inferred if:

- The boarding stop is the closest stop on that route to the boarding stop or station entry of the Oyster Card's next transaction.
- The next Oyster transaction's boarding stop or station entry is more than 1 kilometer from any of the stops that follow the boarding stop.
- The passenger's boarding stop indicates that she was traveling away from the boarding stop or station entry of her next Oyster transaction.
- The passenger did not have enough time to reach the stop closest to her next boarding stop or station entry.

If a tap onto a bus is the last Oyster record of the day for a particular card, it is assumed that the alighting location of that passenger is the stop closest to the location of their first Oyster transaction of that same day. This assumption is made only if it results in a trip that does not violate any of the circuity or geographic buffer rules just discussed. For obvious reasons, a destination cannot be inferred if the boarding tap is the only Oyster record for that day. Over 75% of all London bus[1] trips made each day have their destinations inferred by Gordon's (2012) program.

2.3.3 Linking Trips into Journeys

Once the origins and destinations of trips are inferred, the algorithm seeks to link these trips into journeys, creating a multi-modal record of each Oyster user's travel throughout the day. Similar to inferring the destinations of bus riders, this trip-linking is guided by a set of logical parameters. Trips are not linked into journeys if:

- The next trip is on the same bus route as the previous trip.

1 Alightings are not inferred for London Tramlink journeys, as AVL data is not available for tram vehicles. However, the farebox for Tramlink is located at each station, rather than on the vehicle, so Tramlink boardings are used to determine bus alightings for bus trips that precede a trip on Tramlink.

- The entry station of the next trip is the same as the exit station for the previous trip.
- The interchange distance between the exit station or alighting stop of the previous trip and the entry station or boarding stop of the next trip is greater than 750 meters.
- The walking speed between the exit station or alighting stop of the previous trip and the entry station or boarding stop of the next trip is slower than three kilometers per hour.
- The customer did not board the first bus that passed after the time required to travel between the previous trip's exit station or alighting stop and the next trip's boarding stop (given the slowest allowable walking speed of three kilometers per hour).
- The customer did not board a bus within 45 minutes of reaching their next boarding stop. (Individual linking decisions, however, are made based on "custom" waiting times for each bus route equal to a full headway for that route.)
- The linked journey would cause the travel distance from the origin to the interchange location to the destination to be two or more times the most direct travel path between the origin and destination.

The specific distances, times, and speeds, outlined in the preceding list of parameters can be easily modified via the Graphical User Interface (GUI) for the program. The numbers chosen for the analyses in this thesis reflect an understanding of the specific operations and geographic layout of the London transit network, and should be fine-tuned to reflect the particulars of each agency's services. On a typical weekday in London, about 22% of journey segments are linked to become part of larger journeys using this method.

2.3.4 Expansion to Represent All Passengers

Although this is not necessary to study many aspects of travel behavior, it is useful to have an accurate estimate of the origin-destination flows of all passengers in the public transportation system for analyses that are more aggregate in nature. Using gateline counts and records from London's ETM boxes, the full journeys created by linking trips together are expanded to estimate the journeys of all transit users in London. This expansion results in a complete origin-destination matrix for the network, with all passenger flows estimated for the time period selected.

2.4 The East London Line Extension

Initially constructed in 1869 and operated as part of the Underground network from 1922 to 2007, the ELL (see Figure 2-1) reopened as a significantly extended service on April 27, 2010 (British Broadcasting Company, 2010). Before closure for the construction associated with the extension the line operated from Whitechapel

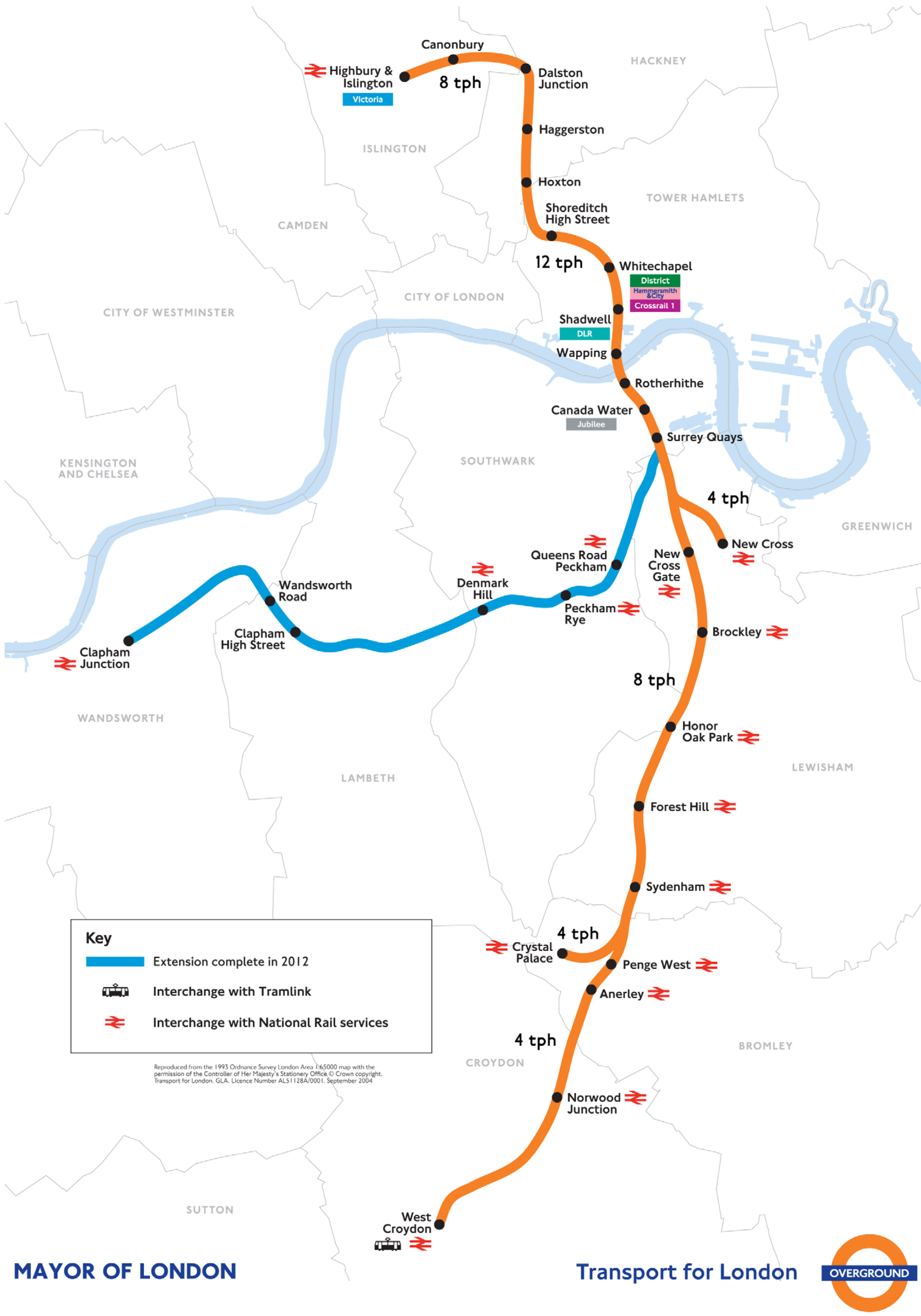


Figure 2-1: The East London Line Extension

to New Cross and New Cross Gate. The extended service includes four new stations to the north: Shoreditch High Street, Hoxton, Haggerston, and Dalston Junction. It also required constructing a flyover near New Cross Gate to connect to the National Rail line serving that station, adding the already existing stations between there and West Croydon to the southern end of the line. The new service approximately doubled the frequency of the ELL's former incarnation, with six to seven trains per hour becoming 12 trains per hour, increasing the utilization of the vital River Thames crossing. All trains serve Dalston Junction to Surrey Quays, after which four trains per hour divert to serve New Cross. Eight trains per hour serve New Cross Gate to Sydenham, after which four trains per hour serve the spur to Crystal Palace, and the remaining four travel further south to West Croydon. Interchanges with Underground service are possible at Whitechapel (District and Hammersmith & City Lines) and Canada Water (Jubilee Line), with the DLR at Shadwell, with Tramlink at West Croydon, and with National Rail services at most stations south of the Thames.

The ELL was further extended to Highbury & Islington on February 28, 2011. This two station extension provides interchange opportunities with the North London Line at Canonbury and Highbury & Islington, as well as the Victoria Line and National Rail services at the latter station. An additional extension is planned to open in December 2012, providing an additional 4 trains per hour through the core of the line (bringing the total to 16 trains per hour) and then traveling on to Clapham Junction (Transport for London, 2012b). At Clapham Junction, passengers can interchange with the West London Line and National Rail Services, while a station at Clapham High Street will provide a connection to the Northern Line.

Providing this increased connectivity in eastern and southern London, including new access to the rail network at the four new stations in Hackney, was a key goal of the extension project (Transport for London, 2006). This connectivity allows passengers to avoid crowded tube lines in central London as well as the similarly crowded interchange at London Bridge station. Depending on their origin and destination, it may also save a passenger the higher fare for traveling through Zone 1. When complete, the full ELL (connected to the North and West London Lines at either end) will provide London's second orbital rail service, improving circumferential travel outside of Zone 1.

The analyses described in the following chapters take advantage of this £1.2 billion capital investment to study how use of the public transportation network has changed in response to the introduction of the ELL, both the original extension and the short extension to Highbury & Islington. Full weeks of system-wide data, chosen in three key time periods, were used for the succeeding analyses. Given the opening dates of April 27, 2010, and February 28, 2011, the weeks of April 19 - 25, 2010, February 14 - 20, 2011, and October 17 - 23, 2011, were selected. The week in April 2010 is seen as the baseline data, and the February 2011 and October 2011 data are compared against April 2010 (and each other) to determine what changes the ELL brought to users of London's public transportation system.

3

Corridor Analyses

Analyzing any changes in travel patterns and behavior caused by a major capital investment like the East London Line Extension (ELLX) requires studying not only the new service, but any changes in other public transportation services in the corridor. To the extent possible, this study should further extend to any influences of the investment on all travel within its expected catchment area. This chapter attempts to do exactly that, first by studying changes in all public transportation services in the vicinity of the East London Line (ELL), then presenting the overall passenger usage and flows for the rail line itself, and finally with detailed analysis of the influence of the ELL on select nearby bus routes.

3.1 The Corridor

It is expected that a major capital investment such as the ELL will have some influence on travel demand and characteristics on other nearby modes, especially other public transportation modes. Quantifying and analyzing the changes in travel behavior caused by the extension of the ELL in the public transportation network requires studying travel on these nearby lines and modes. This section begins that process by comparing the travel patterns of all Oyster journeys that start near or on the ELL in October 2011 to those in April 2010 that enter the system near where the line would eventually run. The results that come out of studying the influence of the rail line include an estimate of new users drawn to the public transportation system, a comparison of changes in journey frequency amongst users in the vicinity of the ELL, and the overall change in distribution of the public transportation mode of entry for journeys within the area. Further analyses of these and other characteristics of user travel behavior are presented in Chapter 4.

In order to analyze the influence of the ELL on travel in the area surrounding the line, journeys that started within a certain distance of the ELL are studied by selecting all boarding or entry taps close to the ELL, during the analysis weeks in April 2010 and October 2011. Two "buffers" of 500 meters and 1500 meters from the railway are used to study any changes in travel behavior caused by the ELL and how those changes dissipate further from the rail line. Only journeys with origins within these buffers were used for the following analyses to simplify the analysis process.

3.1.1 New Users

Attracting new users is often one goal of a major capital investment in a city's public transportation system. In London, this has previously been measured through user surveys, but the corridor buffer analysis offers the opportunity to utilize the extensive data set described in Chapter 2 to estimate the number of new Oyster users to London's public transportation system generated by the extension of the ELL.

Because the corridor analysis compares all activity by Oyster users who start their journeys near the ELL before and after its construction, the number of new users generated by the introduction of the ELL can be estimated by comparing the overall system[1] change in active Oyster cards with the change in active cards in the corridor. Table 3-1 shows this comparison, indicating that growth in Oyster cards was greater within both corridors than in the rest of the system. The additional 13.6% growth in Oyster users in the 500 meter corridor suggests the influence of the ELL, and implies perhaps 65,000 new users to the public transportation system because of the new service. Some other changes within the corridor may be inflating this number including any remaining growth in Oyster users related to the introduction of Oyster on National Rail services in January 2010 and high levels of population growth along the corridor. On the other hand, this number may be an underestimation, assuming non-Oyster users grew at the same pace as Oyster users, and due to the dilution of the growth percentage because the corridor buffer area includes users who did not travel on the ELL.

1 The numbers displayed in Table 3-1 labeled 'System-Wide' are the total number of active Oyster cards during the analysis week, excluding the cards used in the 500 meter buffer corridor. This isolates the change in the number of Oyster cards within the corridor for a better estimate of the number of new users.

Table 3-1: Unique Oyster Users Active During Each Analysis Week

Selection of Users	April 2010	October 2011	Change
500 Meter Corridor	484,320	611,316	26.2%
1500 Meter Corridor	1,473,601	1,715,165	16.4%
System-Wide	4,028,792	4,538,328	12.6%

The estimate of 13.6% growth comes from the smallest corridor, the 500 meter buffer, and as expected, the effect dissipates as the corridor is expanded. All seven days of each analysis week are included in this analysis.

3.1.2 New Journeys

An increase in the number of journeys made by the average user is another indication of either new demand generated by the construction of the ELL or journeys shifted to public transportation from other modes. In this analysis, all journeys (where a journey is a group of linked journey segments, as described in Section 2.3.3) that started within the two corridor buffers during the analysis weeks were included. An obvious increase in both users and journeys per week is shown in Table 3-2. The higher increase in journey frequency within the 500 meter buffer (compared with the 1500 meter buffer) noted in Table 3-2 implies that the ELL is encouraging users to make more trips on London's public transportation system and that the influence of the ELL appears to be much stronger near the rail line. An estimate of the overall increase in journeys amongst Oyster users on the ELL is made in Chapter 4. The table also indicates that journey frequency is higher within the larger buffer than the smaller one, which is expected given the inclusion of a large portion of the City within the 1500 meter buffer, including Liverpool Street and Bank stations.

Table 3-2: Change in Average Journeys per User in Each Corridor

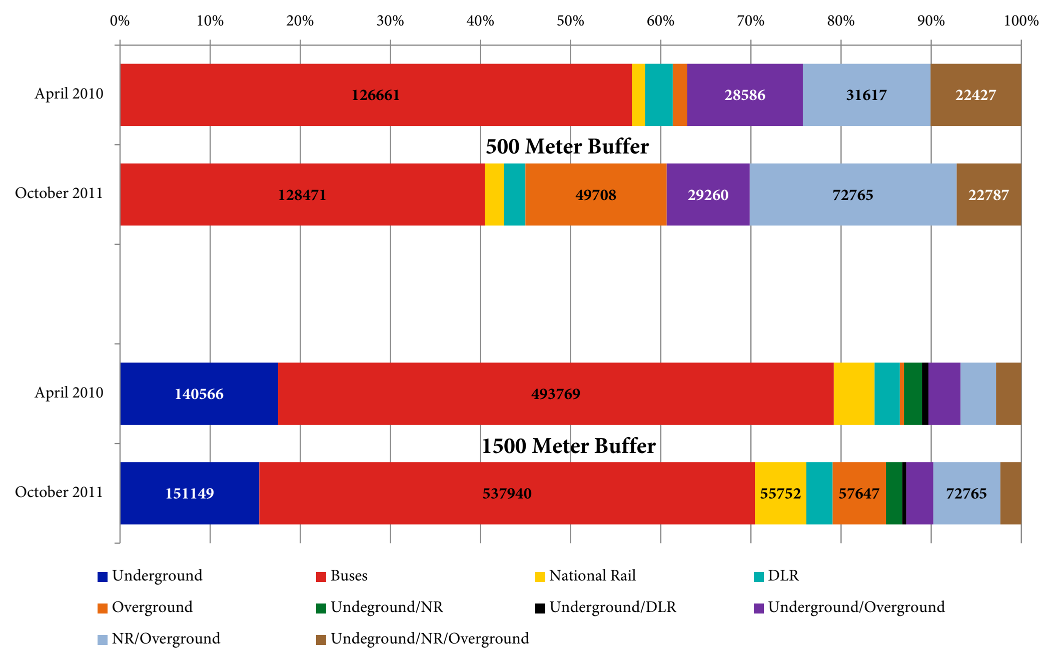
Corridor	500 Meter Buffer		1500 Meter Buffer	
Analysis Period	Apr 2010	Oct 2011	Apr 2010	Oct 2011
Journeys per Week	1,153,130	1,580,620	5,008,975	5,926,827
Users	484,320	611,316	1,473,601	1,715,165
Journey Frequency	2.38	2.59	3.40	3.46
Change in Journey Frequency	8.6%		1.7%	

3.1.3 The Distribution of Mode Share

Comparing the change in the distribution of the mode of the station (or stop) of entry between April 2010 and October 2011 can give some insight into how travel behavior has changed due to the introduction of the ELL. To simplify this analysis only the first journey of each weekday taken during the AM peak commuting time (7 AM - 10 AM) is included in the results in Figure 3-1. The figure indicates that essentially all of the previously demonstrated (in Table 3-2) increase in journeys occurs at Overground stations and stations that provide both Overground and National Rail service. Therefore, the mode share of other public transportation modes such as bus and other rail services decreases following the opening of the ELL (although the actual passenger numbers stay relatively constant). More analysis of the effect of the ELL on nearby bus services can be found in Section 3.3.

The figure further shows that the effect of the new journeys on mode share decreases as the corridor is widened, with Overground and National Rail/Overground stations now making up a smaller portion of the total journeys. In Figure 3-1 stations such as Canada Water and Whitechapel are within the "Underground/ Overground" category for the sake of consistency, despite those stations providing only Underground service in April 2010. The same definition is used for the National Rail/Overground stations south of Surrey Quays.

Figure 3-1: Distribution of the Mode Share in the Buffer Corridors - April 2010 vs. October 2011



3.2 The East London Line

The buffer corridor analyses imply significant growth in public transportation utilization due to the ELLX, but further study of the ridership and passenger flows on the rail line is necessary to create a more complete picture. Full estimates of ridership have been developed from the Oyster transaction records using two different scaling methods. The first relies on the overall Oyster penetration rate for the ELL of 84% calculated by Ng (2011) and utilizes this penetration rate to scale the Oyster seed matrix using an Iterative Proportional Fitting (IPF) process, expanding the seed data to fit boarding and alighting totals that were increased based on the assumption that the Oyster boarding and alighting totals for each station were 84% of the total boardings and alightings at each station. The second method utilizes the scaling methodology developed by Gordon (2012), outlined in Chapter 2, which relies on scaling the entire rail network simultaneously using gateline entry and exit counts as control totals. Where control totals were unavailable for a particular origin-destination pair, the seed data are scaled by the average scaling factor for the system on that day.

3.2.1 Passenger Flows

Figures 3-2 and 3-3 compare the resulting passenger flows from the two scaling methods (averaged from the five weekdays in the analysis week in October 2011) with the estimated flows from the loadweigh system installed on all ELL trains. Both the scaling methods result in similar estimates of the passenger flow on each link, but both indicate less passenger flow than the loadweigh data on many links. Assuming the loadweigh data is accurate (Frumin (2010) calculates an error of ±21.2 passenger per train with a 95% confidence interval), the gaps between the flows indicated by the loadweigh data and the flows from two scaling methods provide an opportunity to calculate the number of riders making behind-the-gate transfers on a typical day in October 2011.

Both figures indicate very few missing trips on the link between Highbury & Islington and Canonbury (only an additional 140 passengers would be necessary to raise the southbound passenger flows to match the loadweigh data). However, between Canonbury and Whitechapel, at least 500-1000 additional passengers would be needed to bridge the gap in passenger flows between data sources in the northbound direction). Table 3-3 provides estimates of the additional passengers that are making various trips to increase the passenger flows of the first two scaling methods to match the flows indicated by the loadweigh data. Due to the approximate nature of these estimates (which are an attempt to calculate boardings not captured by the Oyster data using only the differences in passenger flows), Table 3-4 displays ridership estimates that both do and do not include these additional passengers. The estimates in Table 3-3 approximate the number of additional passengers making behind-the-gate transfers to board and alight the ELL, therefore going unregistered

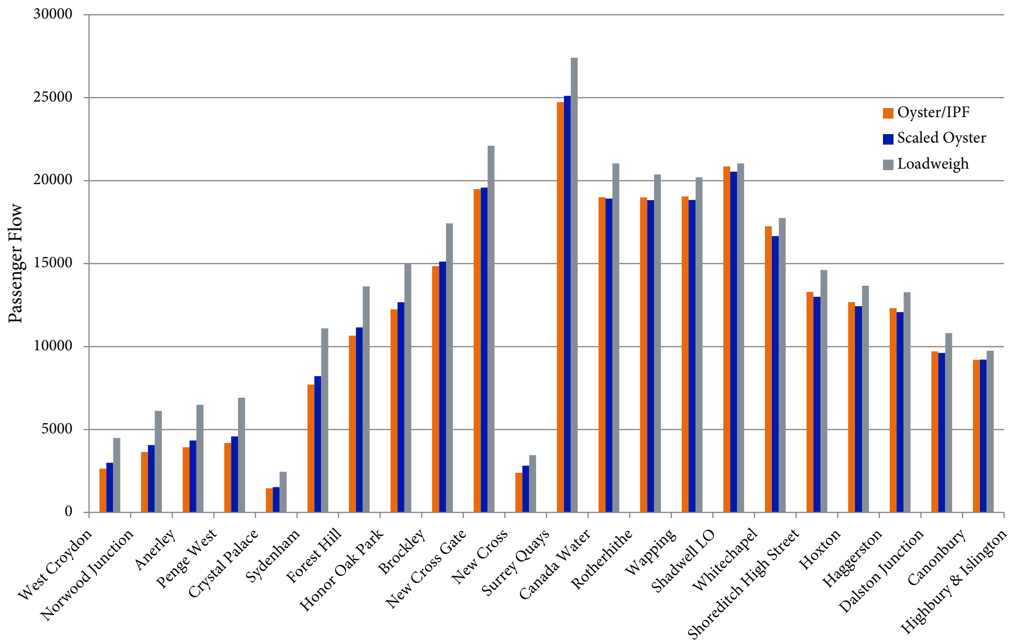


Figure 3-2: Northbound Passenger Flows in October 2011

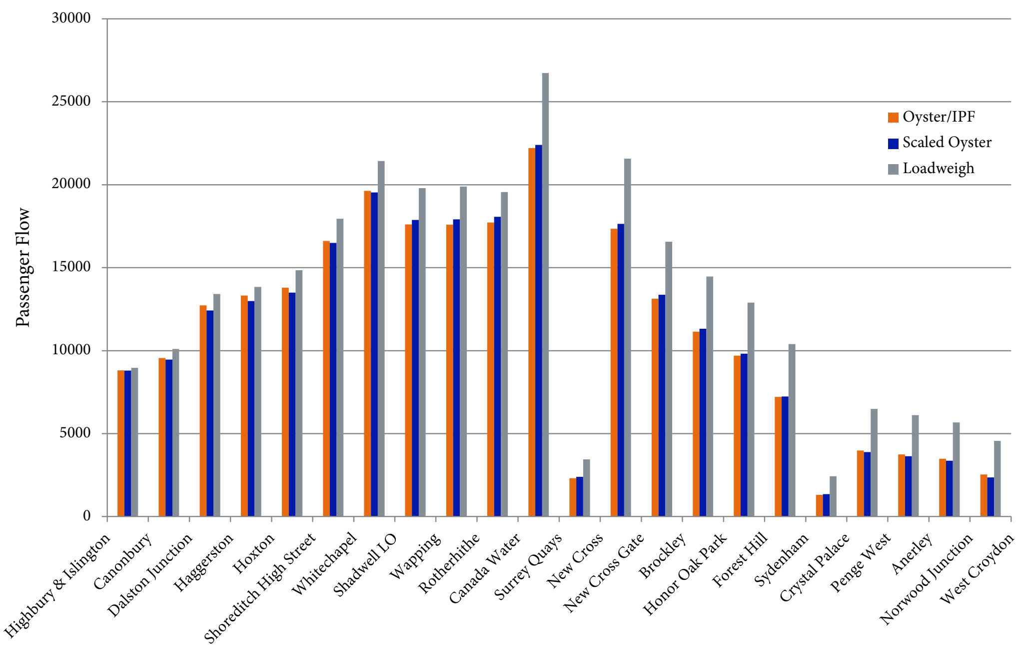


Figure 3-3: Southbound Passenger Flows in October 2011

in the Oyster system database used to calculate ridership and travel patterns in Sections 3.2.2 and 3.2.3.

Table 3-3: Travel Patterns and Estimates of Additional Ridership Based on Loadweigh Data

Direction of Travel	Travel Pattern	Additional Riders
Northbound	Cross-platform transfer onto ELL from NR at West Croydon, Behind-the-gate transfer at Canada Water to the Jubilee Line	900
	Cross-platform transfer onto ELL from NR at Norwood Junction, Behind-the-gate transfer at Canada Water to the Jubilee Line	700
	Cross-platform transfer onto ELL from NR at Crystal Palace, Behind-the-gate transfer at Canada Water to the Jubilee Line	600
	Cross-platform transfer onto ELL from NR at New Cross, Behind-the-gate transfer at Canada Water to the Jubilee Line	300
	Behind-the-gate transfer onto ELL from the Jubilee Line at Canada Water, Behind-the gate transfer at Whitechapel to the District Line	300
	Behind-the-gate transfer onto ELL from the District Line at Whitechapel, Behind-the-gate transfer at Canonbury to the NLL	500
	Behind-the-gate transfer onto ELL from the District Line at Whitechapel, Behind-the-gate transfer at Highbury & Islington to the NLL or Victoria Line	500
Southbound	Behind-the-gate transfer onto ELL from the NLL or Victoria Line at Highbury & Islington, Behind-the-gate transfer at Whitechapel to the District Line	100
	Behind-the-gate tranfer onto ELL from the NLL at Canonbury, Behind-the-gate transfer at Whitechapel to the District Line	500
	Behind-the-gate transfer onto ELL from the District Line at Whitechapel, Behind-the-gate transfer at Canada Water to the Jubilee Line	1500
	Behind-the-gate transfer onto ELL from the Jubilee Line at Canada Water, Cross-platform transfer onto National Rail at New Cross	1000
	Behind-the-gate transfer onto ELL from the Jubilee Line at Canada Water, Cross-platform transfer onto National Rail at Crystal Palace	1000
	Behind-the-gate transfer onto ELL from the Jubilee Line at Canada Water, Cross-platform transfer onto National Rail at Norwood Junction	200
	Behind-the-gate transfer onto ELL from the Jubilee Line at Canada Water, Cross-platform transfer onto National Rail at West Croydon	800

3.2.2 Ridership

Utilizing the scaling methods previously discussed, Table 3-4 displays estimated ridership for the ELL on the average weekday in October 2011. As stated previously, the first two totals do not include any additional riders estimated from the differences in passenger flow between the two Oyster-based scaling methods and the loadweigh data, while the third includes these estimates. The results indicate similar estimates of ridership from each scaling method.

Table 3-4: Ridership for the East London Line on an Average Weekday in October 2011

Scaling Method	Northbound	Southbound	Total
Oyster / IPF	51,628	48,185	99,813
Expanded Oyster	51,452	47,992	99,445
Expanded Oyster & Loadweigh	55,252	53,092	108,345

3.2.3 Travel Patterns

Figures 3-4 and 3-5 display the travel patterns of all users based on the second scaling method. The second scaling method, based on work by Gordon, is used in the figures to further the discussion of the travel patterns of ELL users. Given the very slight differences in the results of the two scaling methods, this method is used as it is thought to be more robust.

Most notable in Figure 3-4 is how few northbound passengers leave the line south of Canada Water. Those passengers that board in the southern section of the line are heading into London, not using the line to travel within that southern area. Similarly, Figure 3-5 indicates very few southbound boardings on the line south of Canada Water. In contrast, boardings and alightings north of Whitechapel are more equal in both directions of travel, indicating that passengers boarding in Hackney are heading both north and south from their station of origin.

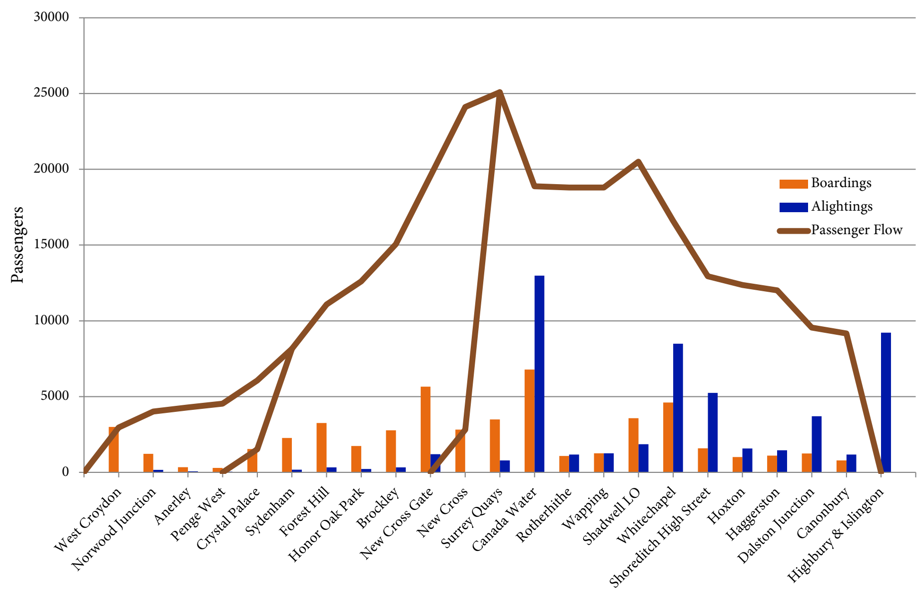


Figure 3-4: Northbound Travel Patterns on the East London Line in October 2011

3.3 Nearby Bus Routes

At the time of the planning and construction of the ELL, it was expected to have an effect on other parts of London's existing transport system, including nearby bus services. This section presents the results of analyses that estimate the impact of the initial ELL to Dalston Junction and its later extension to Highbury & Islington on nearby bus services, furthering the understanding of the ELL's influence on other public transportation services in the corridor.

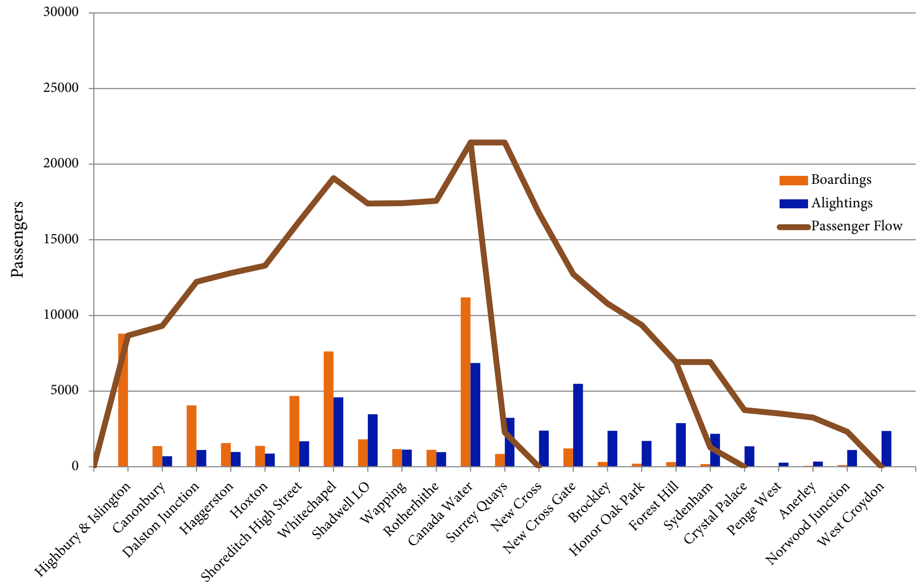


Figure 3-5: Southbound Travel Patterns on the East London Line in October 2011

These analyses study ten bus routes of interest; organized into three different categories, with some differences in the analysis approach within each grouping. Section 3.3.1 studies routes 67, 149, 242, and 243, which collectively are titled the Kingsland Road Corridor and form the major north-south bus service through Borough of Hackney, closely paralleling the ELL for this segment of their routes. Section 3.3.2 analyzes two routes – the P12 and 225 – that serve communities south of the River Thames. Section 3.3.3 contains analyses of routes 30, 38, 56, and 277, all of which run east-west along Balls Pond Road and Dalston Lane, intersecting with the ELL at Dalston Junction station.

The four routes that make up the Kingsland Road Corridor run parallel to the ELL from Shoreditch High Street station to Dalston Junction station. These routes are relatively interchangeable from the user's perspective for certain origins and destinations and therefore are analyzed as one high-frequency route in the segments of their routes that lie directly adjacent to the ELL. For this analysis, route usage is analyzed over three separate periods: from April 2010 to September 2010, from November 2010 to October 2011, and from April 2010 to October 2011. These periods were chosen to try to capture the effects of the initial line – which opened April 27, 2010 – separately from the effects of its extension to Highbury & Islington – which opened February 28, 2011. A service change on route 149 necessitated using September and November for the intermediate analysis period. The attempt to isolate the October service change is further explained in Section 3.3.1 of this document.

The two routes south of the River Thames were studied independently of each other. Both are low ridership routes, with less than 15,000 passengers a day combined. Because routes P12 and 225 interact with the ELL in its southern segments, only one period was used for these analyses, the full 18 month study period.

Similar to the four routes that make up the Kingsland Road Corridor, the analysis of the four routes that travel east-west across Hackney and intersect the ELL at Dalston Junction was split into three separate periods: April 2010 versus February 2011, February 2011 versus October 2011, and April 2010 versus October 2011. These divisions make sense for analyzing any influence the ELL and the extension to Highbury & Islington have on these routes, but the analysis was cluttered by two significant events on the North London Line (NLL), which runs parallel to two of the four routes for a short segment. In June 2010 the NLL was reopened after being closed for station and systems refurbishment to accept the new 4-car Capitalstar trains; then service frequency on the NLL was increased from 4 to 8 trains per hour in the peak periods on May 22, 2011.

In addition to the same analysis weeks in April 2010, February 2011, and October 2011, used throughout this thesis, the analyses described in this section use data from September 13-17, 2010, and November 15-19, 2010.

3.3.1 Kingsland Road Corridor

With the opening of the ELLX in late April 2010, Hackney received a significant improvement in its rail service, tying the borough's residents and businesses into the greater Underground/Overground network. The further expansion of the line to Canonbury and Highbury & Islington stations at the end of February 2011 gave the borough even greater connectivity to nearby Islington and the network beyond.

For much of its journey through Hackney, the ELL parallels a heavily served bus corridor along Kingsland Road (see Figure 3-6). Route 67 runs from Wood Green station to Aldgate station with minimum frequencies of five buses per hour in the peak. The 149 stays on the A10 nearly its entire route, running from Edmonton Green station to London Bridge station with 12 buses per hour in the peak. The only east-west route, the 242, runs west from Homerton station until meeting Kingsland Road, turns south along the corridor where it parallels the ELL, and then turns west again south of Shoreditch High Street station to head to Tottenham Court Road station. It has frequencies of about eight to ten buses per hour for much of the day. Route 243 also starts at Wood Green station, takes a slightly different route than the

67 to meet up with the A10, and then heads south, leaving the corridor between Hoxton station and Shoreditch High Street station to travel to Waterloo station. Peak frequencies are 15 buses per hour. Figure 3-6 provides a visual of how these routes integrate to form the corridor that is discussed for much of the remainder of this document.

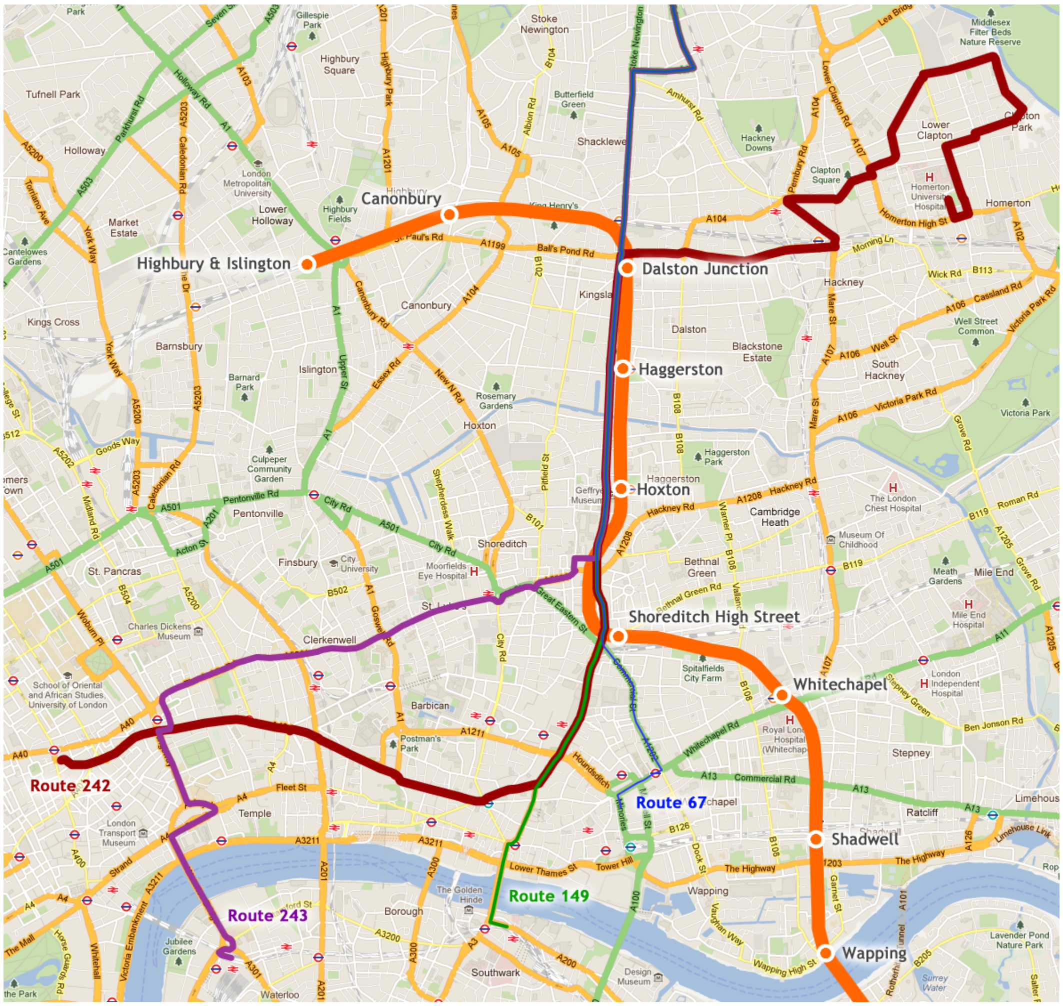


Figure 3-6: Map of the Bus Routes Serving the Kingsland Road Corridor

Route 149 Service Change

On October 16, 2010, route 149 was changed from articulated to double-decker bus operation, with an accompanying increase in frequency from 10 buses per hour to 12 buses per hour in the peak. In an attempt to measure and isolate the effect of this service change a few analyses were run to compare ridership on the 149 and other Kingsland Road bus routes before and after the change in service. The results of a comparison of ETM data between September and November 2010 (one month on either side of the service change) indicate an approximately 80% increase in passengers was seen on the Route 149 (see Table 3-5), as opposed to an only 0.5% increase in ridership system-wide.

Table 3-5: Route 149 Passenger Counts - September 2010 vs. November 2010

Direction	Period	September 2010	November 2010	Percent Change
Southbound	All Day	12,690	22,549	77.7%
	AM Peak	2,889	5,075	75.7%
	PM Peak	2,625	4,917	87.3%
Northbound	All Day	12,384	22,638	82.8%
	AM Peak	2,294	4,269	86.1%
	PM Peak	2,810	5,452	94.0%
Both	All Day	25,074	45,187	80.2%
System - Wide	All Day	6,474,783	6,511,109	0.5%

This increase in passengers has two obvious sources: passengers that previously used other routes that also serve many of the same stops as the route 149 and were responding to the increased frequency of service, and passengers who were previously boarding in the rear doors of the articulated vehicle (either with passes or to avoid payment). There is also the possibility of new passengers to the service due to the decreased headways, but the small difference between six minute and five minute headways makes this seem unlikely. The three other Kingsland Road routes collectively experienced a decrease in ridership due to the service changes made to route 149, with an overall decrease 4.4% in ridership according to the ETM data (see Table 3-6).

Table 3-6: Routes 67, 242, & 243 Passenger Counts - September 2010 vs. November 2010

Direction	Period	September 2010	November 2010	Percent Change
Southbound	All Day	40,657	38,943	-4.2%
	AM Peak	8,085	7,133	-11.8%
	PM Peak	10,269	9,366	-8.8%
Northbound	All Day	41,234	39,343	-4.6%
	AM Peak	8,797	7,676	-12.7%
	PM Peak	9,742	8,988	-7.7%
Both	All Day	81,890	78,287	-4.4%
System - Wide	All Day	6,476,783	6,511,109	0.5%

Routes 242 and 243 both experienced ridership drops, with the 242 measuring an approximately 12% decrease and the 243 around a 3% decrease. The 67 experienced an overall gain of 2% in ridership from September 2010 to November 2010. Although it is difficult to determine exactly why there is great variation in the effect of the route 149 service change, on each parallel route there are some logical but unsubstantiated explanations. Route 242, despite not sharing as much of the northern corridor as routes 67 and 243, serves the same high volume City area as the 149. Route 67 has headways two to three times longer than any of the other services (and has the accompanying lower ridership), implying that it serves very specific origins and destinations outside the corridor. Perhaps it is therefore less affected by any change in parallel routes.

The second potential source of the 20,000 additional riders – as recorded in the ETM data – is riders that were already using the 149 but were boarding using the rear two doors of the articulated vehicles. It is hoped that the majority of these customers would have had passes or period tickets and simply did not want to navigate through the typical crowding that occurs around the entrance of a bus vehicle. Table 3-7 displays the results of a comparison of the ticket types of Oyster users on route 149 before and after the service change. This data indicates that nearly three-fourths of new riders to the route are pass holders, making it likely that many of these "new" riders were indeed previously using the route. It is important to note that Table 3-7 is populated solely with Oyster users, with no scaling using ETM data.

Table 3-7: Route 149 Ticket Types

Ticket Type	Sept '10 Ridership	Nov '10 Ridership	Change in Ridership	Proportion of Growth	Sept Ratio between Ticket Types	Nov Ratio between Ticket Types
PAYG	8,518	13,058	4,540	26%	34%	31%
Pass	16,474	29,284	12,810	74%	66%	69%
Total	24,992	42,342	17,350			

Isolating the effects of the service change on October 16, 2010, is necessary to compare the changes in ridership experienced by the four bus routes that operate parallel to the ELL from Shoreditch High Street station to Dalston Junction station. In order to study the cumulative effects of the first two phases of the ELLX over the 18 months used in this analysis the shifts in ridership due to the change from articulated vehicles to double-deckers were applied to the results of the average service days for route 149 representing April 2010 and September 2010. In the case of the route 149's April 2010 to October 2011 comparison, the difference between the November 2010 and September 2010 ETM counts for that time period was added to the ETM counts of April 2010. This addition results in a change in the scaling factor used to expand the Oyster data to represent all users and removes the influence of the route 149 service change from the 18 month comparison. This same technique was used to scale the ETM counts for both months in the April 2010 to September 2010 comparison. Because of the timing of route 149's service change, analyses of the effect of the ELLX to Dalston Junction compare data from April 2010 to September 2010. For the same reason, the analyses of the effect of the extension to Highbury & Islington compare data from November 2010 to October 2011.

Corridor Results

Following the isolation of the effect of the route 149 service change, a series of graphs were produced for the corridor (and each individual route) to analyze changes in boardings, alightings, and passenger flow. Graphs were created for three time periods (All Day, AM Peak, and PM Peak), for both directions of service (Southbound and Northbound), and for each analysis period (April 2010 vs. September 2010, November 2010 vs. October 2011, and April 2010 vs. October 2011). For the remainder of this chapter, the graphs displayed and analyzed are the southbound AM peak and northbound PM peak charts for each analysis period, when they contain results of interest. The graphs for all time periods, directions, and analysis periods can be found in the Appendix.

From April 2010 to September 2010 there is a definite decrease in passenger flow in the southbound direction during the AM peak across the entire corridor. Figure 3-7 shows this decrease beginning with more alightings and reduced boardings at Dalston Junction station. From there, the difference between the two flows grows with each successive stop in the corridor.

Figure 3-8 provides a contrast to that previous scenario with very little difference between November 2010 and October 2011. As will be discussed in the individual route analyses, many of the effects of the ELL extension to Highbury & Islington are shown to be outside of the corridor directly parallel to the rail line. Many of the stops during this analysis period experience proportional changes in boardings and alightings, keeping the passenger flow the same. This trend reverses towards the southern end of the corridor, resulting in a slight gap in the two passenger flows.

The comparison in Figure 3-9 between April 2010 and October 2011 gives results that look much like the comparison between April 2010 and September 2010. Given the lack of significant impacts from November 2010 to October 2011, this is not much of a surprise. There are a few differences – such as the increase in passenger flow around Dalston Junction station – that are likely the result of the differences in passenger activity between September 2010 and November 2010.

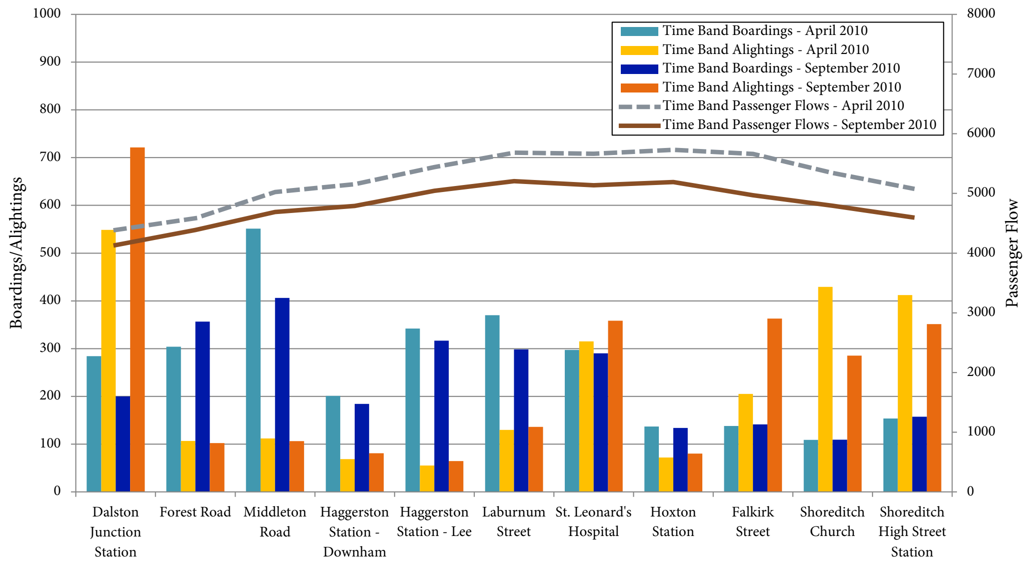


Figure 3-7: Kingsland Road Corridor - Southbound, AM Peak - April 2010 vs. September 2010

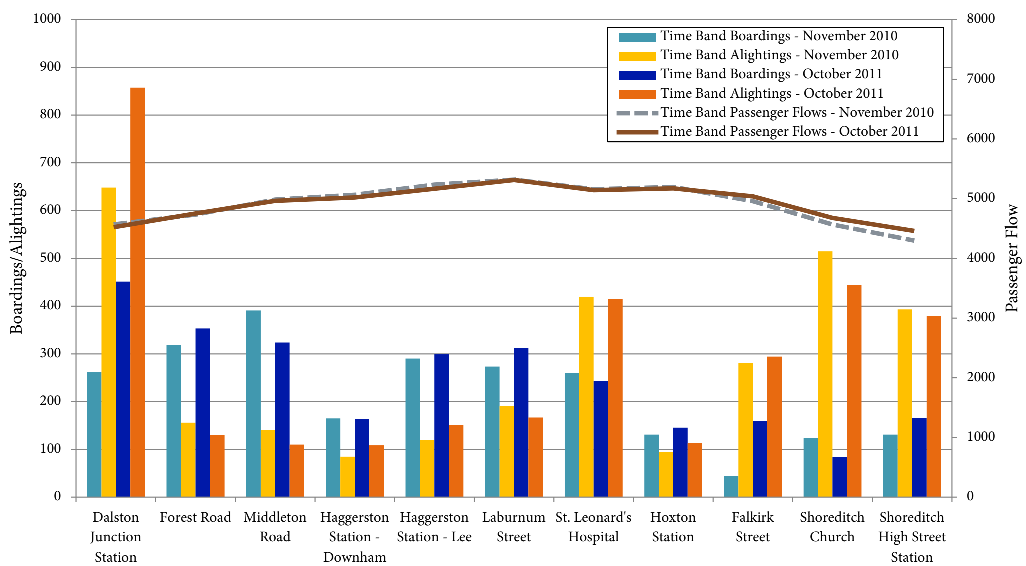


Figure 3-8: Kingsland Road Corridor - Southbound, AM Peak - November 2010 vs. October 2011

Figures 3-10 to 3-12 indicate only minor changes in passenger flow over the 18 months in the northbound direction during the PM peak. The April 2010 to September 2010 comparison begins with a slight decrease in passenger flow, then becoming a slight increase following growth in boardings near Hoxton station. The changes during the period from November 2010 to October 2011 are minimal. In this case, Figure 3-12 does not show any large changes, in contrast to the impacts seen in the opposite direction. The sudden rise in passenger flows at Waterson Street in all three figures is due to route 243 joining the corridor in between Shoreditch Church and that stop. In the northbound direction, the 243 joins between the second and third stop, while in the southbound direction it leaves the corridor between the Shoreditch Church and Shoreditch High Street station.

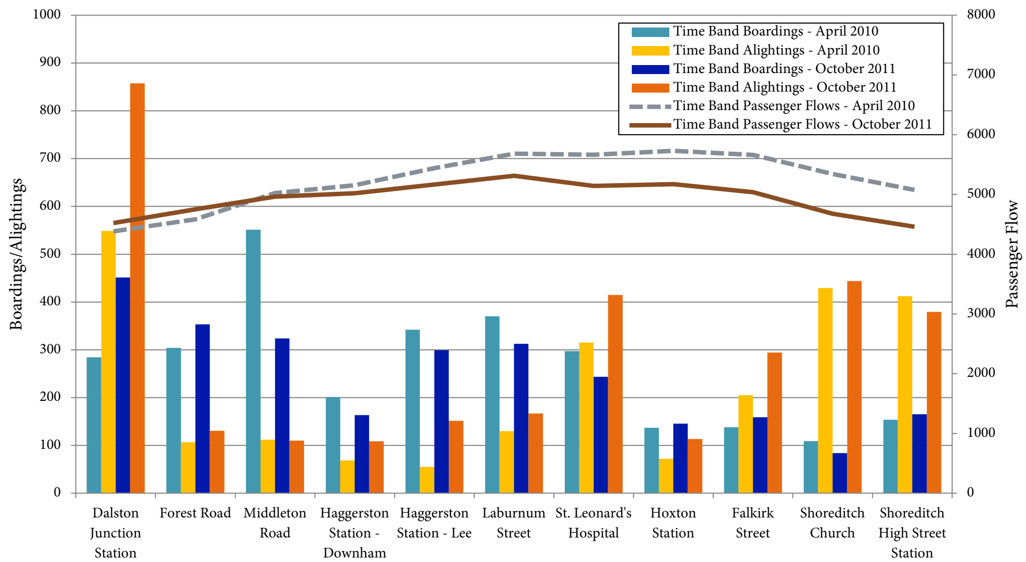


Figure 3-9: Kingsland Road Corridor - Southbound, AM Peak - April 2010 vs. October 2011

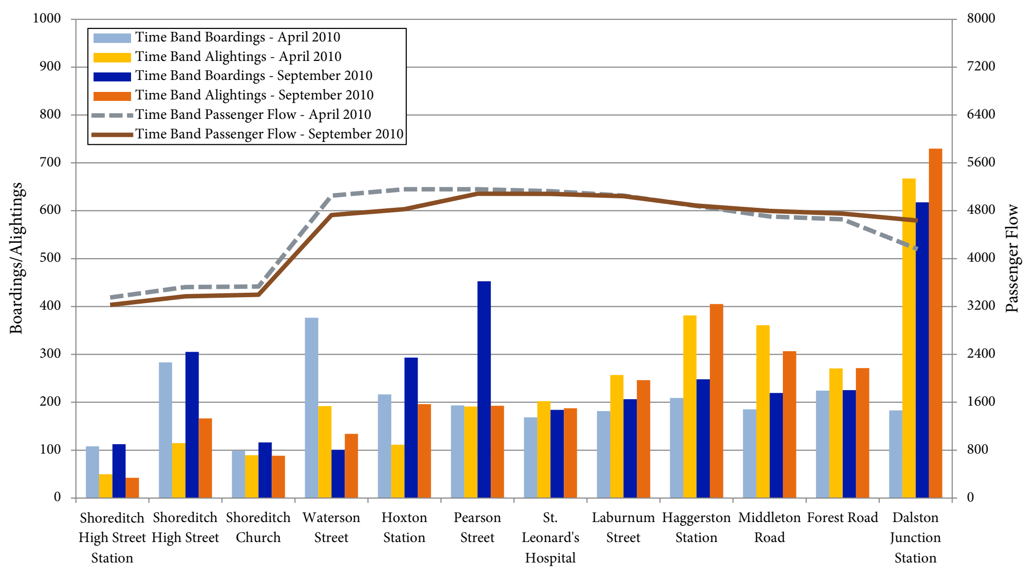


Figure 3-10: Kingsland Road Corridor - Northbound, PM Peak - April 2010 vs. September 2010

Tables 3-8 to 3-13 display what are essentially summarized origin-destination matrices for the four Kingsland Road Corridor bus routes. Stops have been grouped into three categories: those on the route before the corridor, those within the corridor, and those following (after) the corridor. The changes in the number of passengers boarding and alighting in each group are noted and the cells are colored according to the percentage change in each category. From April 2010 to September

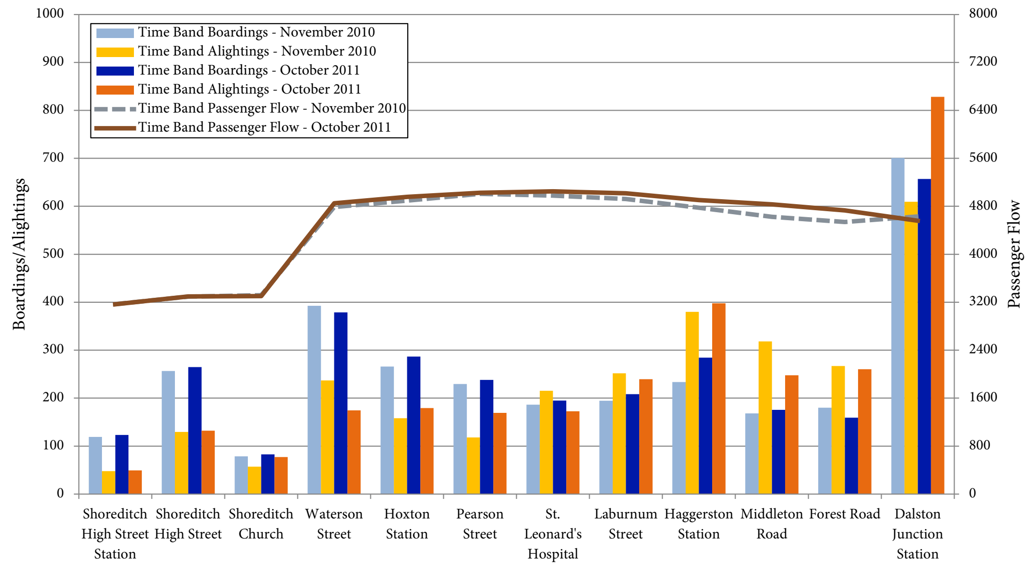


Figure 3-11: Kingsland Road Corridor - Northbound, PM Peak - November 2010 vs. October 2011

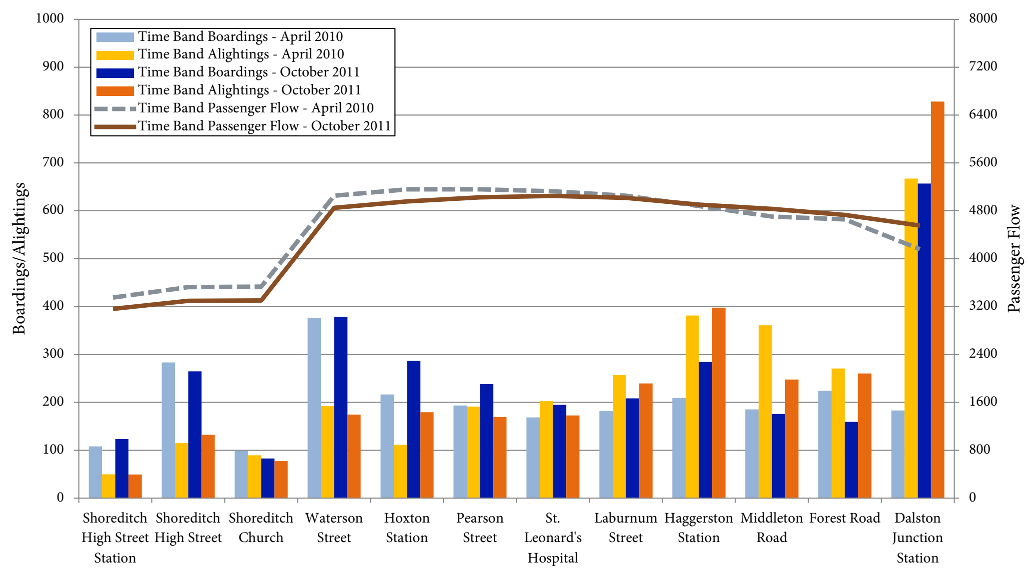


Figure 3-12: Kingsland Road Corridor - Northbound, PM Peak - April 2010 vs. October 2011

2010 (Table 3-8), decreases can be seen in the number of trips that end within and after the corridor in the southbound AM peak. Table 3-9 shows decreases in a few categories with the largest decrease in the number of passengers beginning their journeys before the corridor and ending them within the corridor. Given the wide swath of territory that these four routes cover outside of the Kingsland Road Corridor it is difficult to pinpoint the cause of this decrease. However, this could be due to the interchange provided by the extension of the line to Highbury & Islington station as a number of the bus routes serve areas near Victoria and Piccadilly Line stations north of Highbury & Islington.

Table 3-8: Kingsland Road Corridor - Southbound, AM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	5175	6057	1600	1433	2786	2501	9561	9991
		882	17%	-167	-10%	-284	-10%	430	5%
	Corridor			641	497	1947	1913	2588	2410
				-144	-23%	-34	-2%	-178	-7%
	After					1354	1388	1354	1388
						35	3%	35	3%
	Total	5175	6057	2242	1930	6087	5803	13504	13790
		882	17%	-312	-14%	-283	-5%	287	2%

Table 3-9: Kingsland Road Corridor - Southbound, AM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	5973	6697	1793	1628	2519	2460	10285	10786
		724	12%	-164	-9%	-59	-2%	501	5%
	Corridor			602	690	1622	1828	2224	2518
				88	15%	206	13%	294	13%
	After					1281	1320	1281	1320
						39	3%	39	3%
	Total	5973	6697	2395	2318	5422	5609	13790	14624
		724	12%	-76	-3%	186	3%	834	6%

Table 3-10 shows the change over the 18 month analysis period. In general, this table displays the combination of the trends from Tables 3-8 and 3-9.

Table 3-10: Kingsland Road Corridor - Southbound, AM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	5175	6697	1600	1628	2786	2460	9561	10786
		1522	29%	28	2%	-325	-12%	1225	13%
	Corridor			641	690	1947	1828	2588	2518
				49	8%	-119	-6%	-70	-3%
	After					1354	1320	1354	1320
						-34	-3%	-34	-3%
	Total	5175	6697	2242	2318	6087	5609	13504	14624
		1522	29%	77	3%	-478	-8%	1121	8%

Consistent with the previous figures, Tables 3-11 to 3-13 do not indicate significant changes in passenger counts for the northbound direction in most of the categories. Somewhat surprisingly, the category that experiences the largest percentage increase in passengers is within-corridor journeys. Likely unrelated to the ELL, the category containing journeys which begin after the corridor experiences the largest passenger increase.

Table 3-11: Kingsland Road Corridor - Northbound, PM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1567	1710	2051	2124	2397	2269	6014	6104
		144	9%	73	4%	-128	-5%	89	1%
	Corridor			690	747	1604	1765	2294	2511
				57	8%	161	10%	217	9%
	After					6552	6835	6552	6835
						283	4%	283	4%
	Total	1567	1710	2741	2870	10553	10869	14860	15450
		144	9%	130	5%	316	3%	590	4%

Table 3-12: Kingsland Road Corridor - Northbound, PM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1402	1612	1966	2014	2267	2256	5635	5882
		210	15%	48	2%	-11	-1%	247	4%
	Corridor			681	790	1662	1659	2343	2450
				109	16%	-3	0%	106	5%
	After					7055	7520	7055	7520
						464	7%	464	7%
	Total	1402	1612	2647	2805	10984	11434	15034	15852
		210	15%	157	6%	450	4%	817	5%

Table 3-13: Kingsland Road Corridor - Northbound, PM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1567	1612	2051	2014	2397	2256	6014	5882
		46	3%	-36	-2%	-141	-6%	-132	-2%
	Corridor			690	790	1604	1659	2294	2450
				100	15%	55	3%	156	7%
	After					6552	7520	6552	7520
						967	15%	967	15%
	Total	1567	1612	2741	2805	10553	11434	14860	15852
		46	3%	64	2%	881	8%	991	7%

The following tables quantify the results from the figures above and also show the results for all three time periods in each direction. Consistent with Figures 3-8 to 3-13, Table 3-14 and 3-15 demonstrate that much of the change in the corridor occurred relatively quickly after the ELL initially opened with generally minimal changes afterwards. This implies that the bus corridor is unlikely to see further changes in its passenger levels due to the ELL. Overall, bus service in the corridor immediately adjacent to the rail line saw a decrease of approximately 3,000 passengers (6%) on an average weekday about 18 months after the opening of the ELL.

Table 3-14: Kingsland Road Corridor - April 2010 vs. September 2010

For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Sep-10	Percent Change
Southbound	All Day	17332	16184	-6.6%
	AM Peak	5255	4815	-8.4%
	PM Peak	3185	2855	-10.3%
Northbound	All Day	16365	15943	-2.6%
	AM Peak	1868	1706	-8.7%
	PM Peak	4863	4824	-0.8%
Passenger Counts		Apr-10	Sep-10	Percent Change
Southbound	All Day	24445	23345	-4.5%
	AM Peak	6974	6345	-9.0%
	PM Peak	4677	4396	-6.0%
Northbound	All Day	25050	24417	-2.5%
	AM Peak	3036	2935	-3.3%
	PM Peak	6742	6904	2.4%
System-Wide	All Day	6481026	6476783	-0.1%

Table 3-15: Kingsland Road Corridor - November 2010 vs. October 2011

For Route Segments in the ELL Service Area				
Average Passenger Flow		Nov-10	Oct-11	Percent Change
Southbound	All Day	16547	15624	-5.6%
	AM Peak	4911	4937	0.5%
	PM Peak	2830	2777	-1.9%
Northbound	All Day	16154	15857	-1.8%
	AM Peak	1742	1754	0.7%
	PM Peak	4735	4812	1.6%
Passenger Counts		Nov-10	Oct-11	Percent Change
Southbound	All Day	23484	22705	-3.3%
	AM Peak	6535	6607	1.1%
	PM Peak	4380	4345	-0.8%
Northbound	All Day	24176	23665	-2.1%
	AM Peak	2934	2967	1.2%
	PM Peak	6576	6720	2.2%
System-Wide	All Day	6511109	6765182	3.9%

Table 3-16: Kingsland Road Corridor - April 2010 vs. October 2011

For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Oct-11	Percent Change
Southbound	All Day	17332	15624	-9.9%
	AM Peak	5255	4937	-6.0%
	PM Peak	3185	2777	-12.8%
Northbound	All Day	16365	15857	-3.1%
	AM Peak	1868	1754	-6.1%
	PM Peak	4863	4812	-1.0%
Passenger Counts		Apr-10	Oct-11	Percent Change
Southbound	All Day	24445	22705	-7.1%
	AM Peak	6974	6607	-5.3%
	PM Peak	4677	4345	-7.1%
Northbound	All Day	25050	23665	-5.5%
	AM Peak	3036	2967	-2.3%
	PM Peak	6742	6720	-0.3%
System-Wide	All Day	6481026	6765182	4.4%

As established previously, the ELL essentially parallels the Kingsland Road Corridor. When combined with the nearby service of the ELL this service corridor provides a major conduit for north-south travel in Hackney. To measure the total growth of public transportation usage in the corridor, the scaled Oyster data from Section 3.2 was quantified for ELL trains traveling from Shoreditch High Street station to Dalston Junction. Table 3-17 displays the results of this analysis of ELL passenger levels.

In October 2011 the four bus routes had approximately 20,500 passengers board, 20,400 passengers alight, and average passenger flow of 33,000 in the corridor during the typical weekday. On the parallel segment of the ELL about 16,700 passengers boarded, 16,900 passengers alighted, and the average passenger flow was 25,800. Combining the two public transport modes along this segment of Kingsland Road from April 2010 to October 2011:

- Growth in boardings was approximately 88%, increasing from around 19,800 to 37,200.
- Growth in alightings was approximately 77%, increasing from around 21,100 to 37,300.
- Growth in passenger flow was approximately 75%, increasing from around 33,700 to 58,800.

Table 3-17: Boardings, Alightings, and Passenger Flows on the ELL in the Kingsland Road Corridor

Direction	Station	Boardings	Alightings
Northbound	Shoreditch High Street	1585	5250
		Flow	*12999*
	Hoxton	1052	1668
		Flow	*12434*
	Haggerston	1154	1520
		Flow	*12073*
	Dalston Junction	1249	3851
	Total	**5040**	**12288**
		Avg Flow	***12502***
Southbound	Dalston Junction	4052	1100
		Flow	*12728*
	Haggerston	1560	981
		Flow	*13323*
	Hoxton	1371	870
		Flow	*13799*
	Shoreditch High Street	4684	1681
	Total	**11666**	**4633**
		Avg Flow	***13284***

Individual Route Results

The following sections take a look at the four routes that make up the Kingsland Road Corridor and the potential influences of each of the phases of the ELLX on each route.

Route 67

Traveling from Wood Green station (the same northern terminus as route 243) to Aldgate station, route 67 has the smallest ridership of the four routes on Kingsland Road (see Figure 3-13). Its 18,000 daily riders in October 2011 are served by ten minute headways in the peak, giving the route the lowest frequency of those same four routes.

The results from the before/after comparisons indicate that from April 2010 to September 2010 there was a defined decrease in passenger flow for both peak directions in the segment of the line paralleling the ELL (see Figures 3-14 and 3-15). For the southbound AM peak this drop in passenger flow began with sharp increases in passenger alightings near the Dalston stations and continues a bit further south than Shoreditch High Street. The decrease in boardings at Aldgate East in the northbound PM peak implies that there are a set of passengers who are no longer exiting the rail system at that station, presumably because the ELL provides them with better connections to their final destination.

Given the fact that the southbound AM peak comparison between November

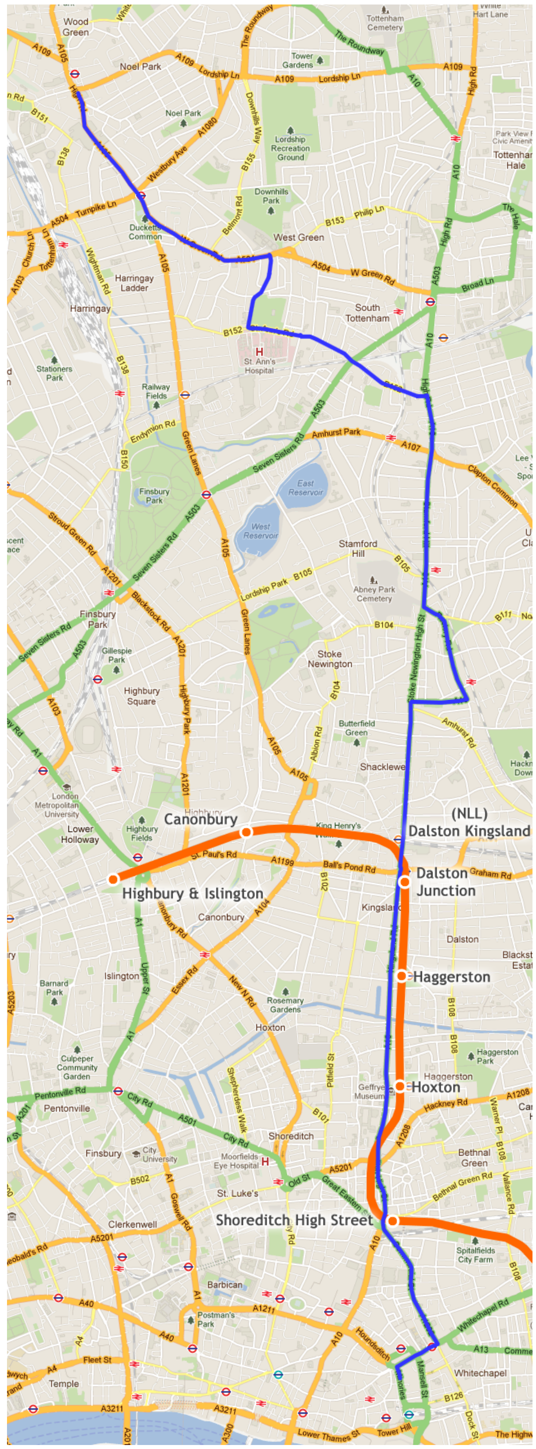


Figure 3-13: Map of Route 67

2010 and October 2011 for all four routes in the corridor (Figure 3-8) showed essentially no change in passenger flow over that time period, the increase shown by route 67 in Figure 3-16 is likely immaterial. The passengers gained appear to have simply switched from a different bus route. Similarly, an increase in the northbound PM peak passenger flow from November 2010 to October 2011 is probably unimportant, as Figure 3-11 shows only a very slight increase in passenger flow for all four routes combined.

Despite the near non-influence of the initial ELLX from November 2010 to October 2011, there is some evidence of the effect of the extension to Highbury & Islington. A couple of stops (at Turnpike Lane station and Seven Sisters station) show a decrease in boardings and an increase in alightings following the extension of the ELL to Highbury & Islington, implying that some passengers are taking advantage of that new interchange to make more of their journey on the rail network.

There is one additional stop of interest in Figure 3-16. The stop near Dalston Kingsland station has a significant decrease in boardings and increase in alightings in the southbound AM peak between November 2010 and October 2011. This may be due to an increase in service on the NLL (implemented in May 2011) which could be drawing passengers who were previously using route 67. However, there is no accompanying increase in boardings and decrease in alightings in the northbound PM peak, so perhaps the change in the southbound direction is simply related to a shift between bus routes.

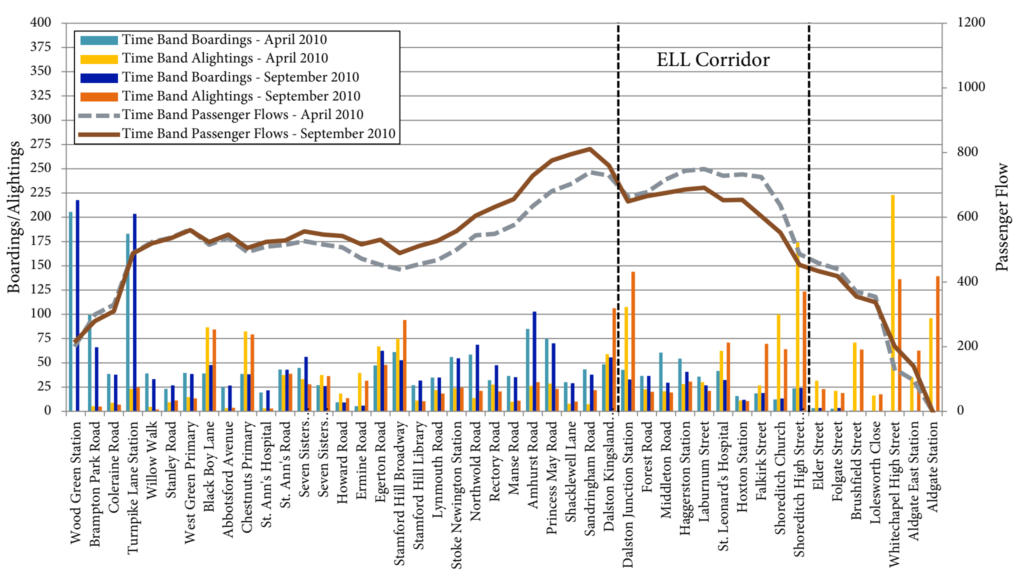


Figure 3-14: Route 67 - Southbound, AM Peak - April 2010 vs. September 2010

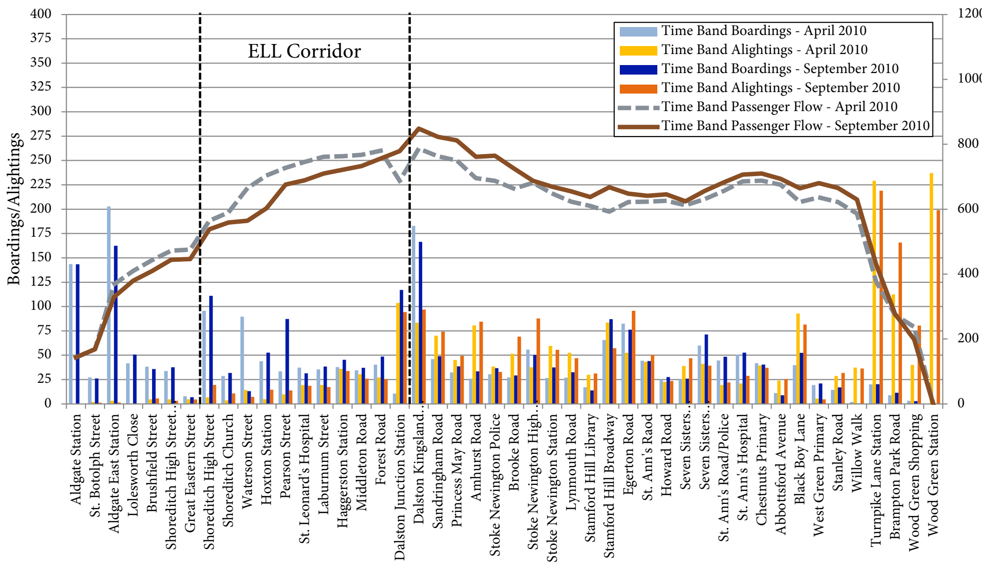


Figure 3-15: Route 67 - Northbound, PM Peak - April 2010 vs. September 2010

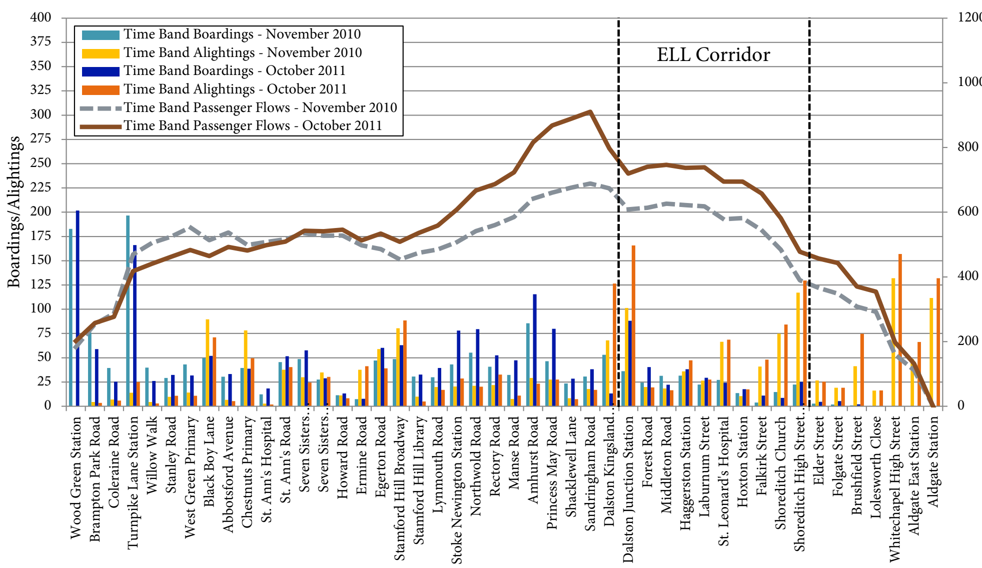


Figure 3-16: Route 67 - Southbound, AM Peak - November 2010 vs. October 2011

From April 2010 to September 2010 decreases in the number of southbound AM peak trips starting in the corridor as well as decreases in the number of trips ending after the corridor can be seen in Table 3-18. However, Table 3-19 shows these trends essentially reversing, making the effect of the ELL almost temporary. It is important to remember that all trips that both start and end in the corridor are almost certainly interchangeable between the four routes on Kingsland Road, so any increase or decrease seen in a specific route should be measured against the overall picture presented previously.

In the opposite direction, trips originating south of the corridor experience a similar change in the PM peak (Table 3-20) from April 2010 to September 2010. However, Table 3-21 indicates that the route did not experience the same recovery in the northbound direction that was seen in Table 3-19. In addition, there was a slight decrease in passenger levels from November 2010 to October 2011 for trips that began and ended after the route. This may have been caused by the August 2011 riots, which heavily affected the area north of the ELL. Overall, the 67 saw strong passenger growth over the 18 month analysis period in the dominant peak direction.

Table 3-18: Passenger Counts for Route 67 - Southbound, AM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	852	965	299	309	347	307	1498	1581
		114	13%	9	3%	-39	-11%	84	6%
	Corridor			151	121	185	122	336	243
				-30	-20%	-64	-34%	-93	-28%
	After					31	32	31	32
						1	4%	1	4%
	Total	852	965	451	430	563	461	1865	1856
		114	13%	-21	-5%	-102	-18%	-9	0%

Table 3-19: Passenger Counts for Route 67 - Southbound, AM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	874	940	308	316	264	315	1446	1572
		67	8%	8	3%	51	19%	125	9%
	Corridor			102	142	103	137	205	280
				40	40%	34	33%	75	36%
	After					28	38	28	38
						10	35%	10	35%
	Total	874	940	410	459	395	490	1680	1890
		67	8%	49	12%	95	24%	210	13%

Table 3-20: Passenger Counts for Route 67 - Northbound, PM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	55	12	99	146	308	265	462	423
		-42	-77%	47	47%	-43	-14%	-38	-8%
	Corridor			132	143	350	409	482	552
				12	9%	59	17%	70	15%
	After					1069	1209	1069	1209
						140	13%	140	13%
	Total	55	12	231	289	1727	1883	2012	2185
		-42	-77%	59	25%	156	9%	172	9%

Table 3-21: Passenger Counts for Route 67 - Northbound, PM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	8	7	128	145	270	273	406	425
		-1	-11%	17	13%	2	1%	19	5%
	Corridor			131	156	309	347	439	503
				25	19%	38	12%	64	14%
	After					1150	1099	1150	1099
						-51	-4%	-51	-4%
	Total	8	7	259	301	1729	1718	1995	2027
		-1	-11%	43	16%	-10	-1%	31	2%

Tables 3-22 to 3-24 display the changes in passenger counts and average passenger flow over the segment of the route parallel to the ELL and the ETM passenger counts for the entire route 67 for all time periods in each direction. It is important to note that the decreases in passenger counts on the route level mostly occur between November 2010 and October 2011 (Table 3-23). This is likely caused by a combination of the influence of the extension to Highbury & Islington and the August 2011 riots. The overall increase in ridership of 4.0% (Table 3-24) should be compared to a 4.4% growth in system-wide ridership during the same period.

Table 3-22: Route 67 - April 2010 vs. September 2010

For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Sep-10	Percent Change
Southbound	All Day	2214	2219	0.2%
	AM Peak	686	628	-8.4%
	PM Peak	386	419	8.6%
Northbound	All Day	2143	2021	-5.7%
	AM Peak	267	218	-18.4%
	PM Peak	669	632	-5.6%
Passenger Counts		Apr-10	Sep-10	Percent Change
Southbound	All Day	3485	3347	-4.0%
	AM Peak	982	859	-12.6%
	PM Peak	623	658	5.5%
Northbound	All Day	2991	3365	12.5%
	AM Peak	385	409	6.4%
	PM Peak	889	963	8.4%
Entire Route				
Passenger Counts		Apr-10	Sep-10	Percent Change
Southbound	All Day	9118	9391	3.0%
	AM Peak	1865	1856	-0.5%
	PM Peak	1982	2159	8.9%
Northbound	All Day	8371	8931	6.7%
	AM Peak	1401	1416	1.1%
	PM Peak	2012	2172	7.9%
Both	All Day	17490	18322	4.8%
System-Wide	All Day	6481026	6476783	-0.1%

Table 3-23: Route 67 - November 2010 vs. October 2011

For Route Segments in the ELL Service Area				
Average Passenger Flow		Nov-10	Oct-11	Percent Change
Southbound	All Day	2244	2295	2.3%
	AM Peak	567	679	19.8%
	PM Peak	385	359	-6.9%
Northbound	All Day	2051	2044	-0.3%
	AM Peak	219	237	7.9%
	PM Peak	589	641	8.8%
Passenger Counts		Nov-10	Oct-11	Percent Change
Southbound	All Day	3456	3451	-0.1%
	AM Peak	778	911	17.2%
	PM Peak	634	574	-9.5%
Northbound	All Day	3326	3295	-0.9%
	AM Peak	435	452	3.8%
	PM Peak	837	920	9.9%
Entire Route				
Passenger Counts		Nov-10	Oct-11	Percent Change
Southbound	All Day	9782	9622	-1.6%
	AM Peak	1680	1890	12.5%
	PM Peak	2201	2055	-6.7%
Northbound	All Day	8929	8573	-4.0%
	AM Peak	1420	1439	1.3%
	PM Peak	1995	2027	1.6%
Both	All Day	18711	18195	-2.8%
System-Wide	All Day	6511109	6765182	3.9%

Table 3-24: Route 67 - April 2010 vs. October 2011

For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Oct-11	Percent Change
Southbound	All Day	2214	2295	3.7%
	AM Peak	686	679	-1.1%
	PM Peak	386	359	-7.0%
Northbound	All Day	2143	2044	-4.6%
	AM Peak	267	237	-11.4%
	PM Peak	669	641	-4.2%
Passenger Counts		Apr-10	Oct-11	Percent Change
Southbound	All Day	3485	3451	-1.0%
	AM Peak	982	911	-7.2%
	PM Peak	623	574	-7.9%
Northbound	All Day	2991	3295	10.1%
	AM Peak	385	452	17.4%
	PM Peak	889	920	3.6%
Entire Route				
Passenger Counts		Apr-10	Oct-11	Percent Change
Southbound	All Day	9118	9622	5.5%
	AM Peak	1865	1890	1.3%
	PM Peak	1982	2055	3.7%
Northbound	All Day	8371	8573	2.4%
	AM Peak	1401	1439	2.7%
	PM Peak	2012	2027	0.7%
Both	All Day	17490	18195	4.0%
System-Wide	All Day	6481026	6765182	4.4%

Route 149

Route 149 carried approximately 45,000 passengers on an average day in October 2011, making it the busiest route in the corridor. Stretching along the A10/A1010 from Edmonton Green station in the north to London Bridge station in the south, the 149 serves customers with 12 buses per hour in the peak (see Figure 3-17).

The before/after comparisons from April 2010 to September 2010 show the influence of the ELL (see Figures 3-18 & 3-19). The southbound AM peak shows decreased passenger flow through the segment paralleling the ELL, while the northbound PM peak indicates decreased flow until around Hoxton station, where a jump in boardings causes a growth in passenger flow.

Figure 3-20 shows areas of sharp change between November 2010 and October 2011 in the southbound AM peak. Passenger flow in October 2011 drops sharply around Seven Sisters station. Combined, the stops near Seven Sisters have a large increase in alightings, likely due to the new interchange with the Victoria line at Highbury & Islington. Like route 67, the stop near Dalston Kingsland station has a significant decrease in boardings and increase in alightings in the southbound AM peak between November 2010 and October 2011. This may be due to an increase in service on the NLL (implemented in May 2011) which could be drawing passengers

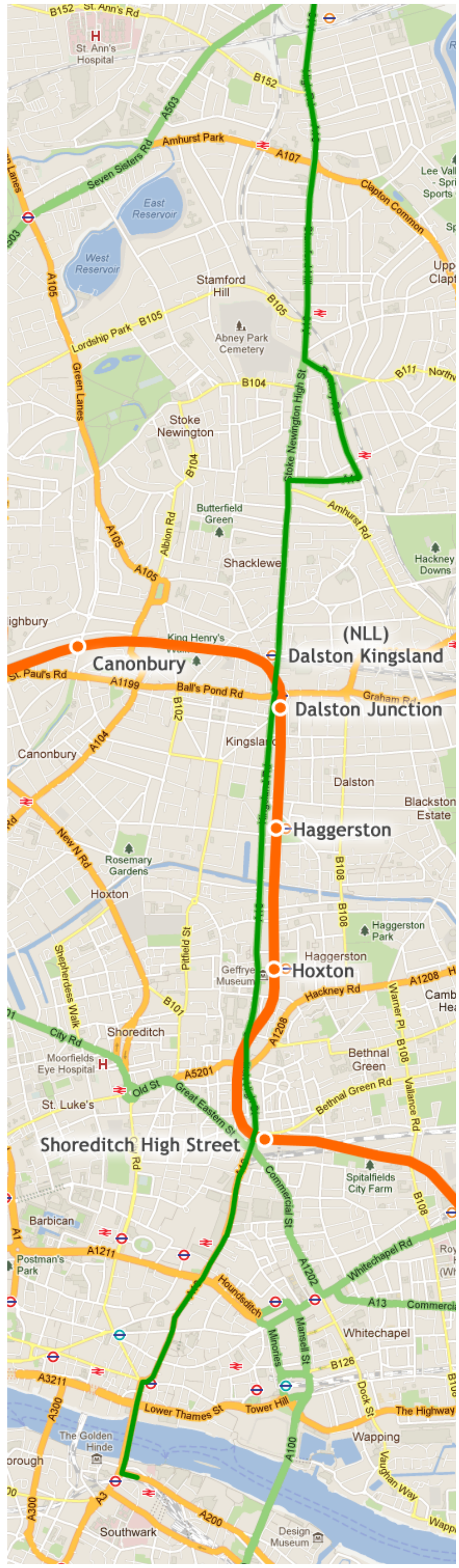


Figure 3-17: Map of Route 149

to that rail service from route 149. Finally, Figure 3-20 shows a significant increase in alightings at Liverpool Street station. This may be due to road works caused by Crossrail construction in the area around Liverpool Street. These works, starting in summer of 2011, caused congestion and rearranged bus routes in the area and the decrease in passenger flow seen for the remainder of the route could be caused by passengers seeking to avoid this area by switching to the rail system at Liverpool Street.

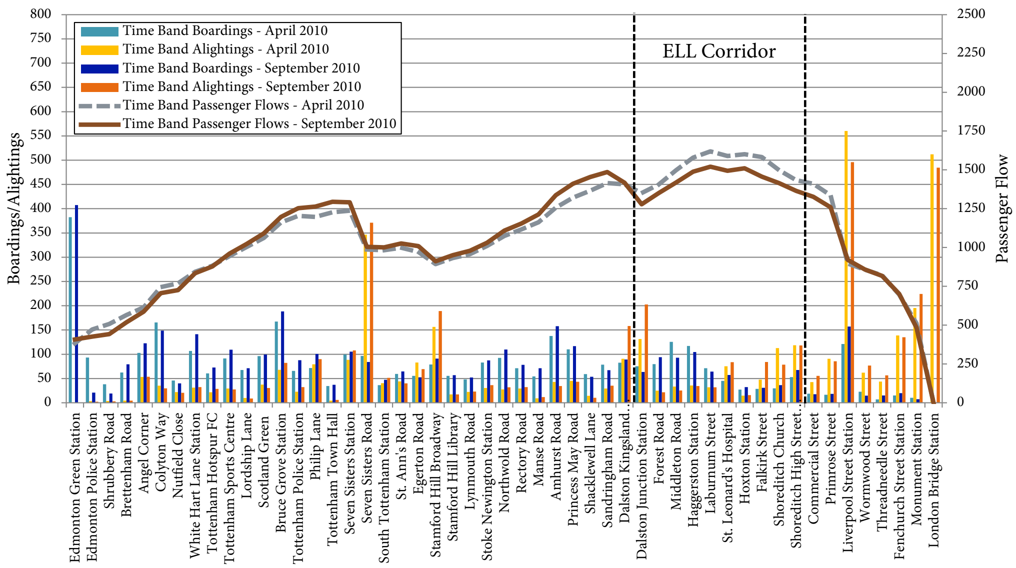


Figure 3-18: Route 149 - Southbound, AM Peak - April 2010 vs. September 2010

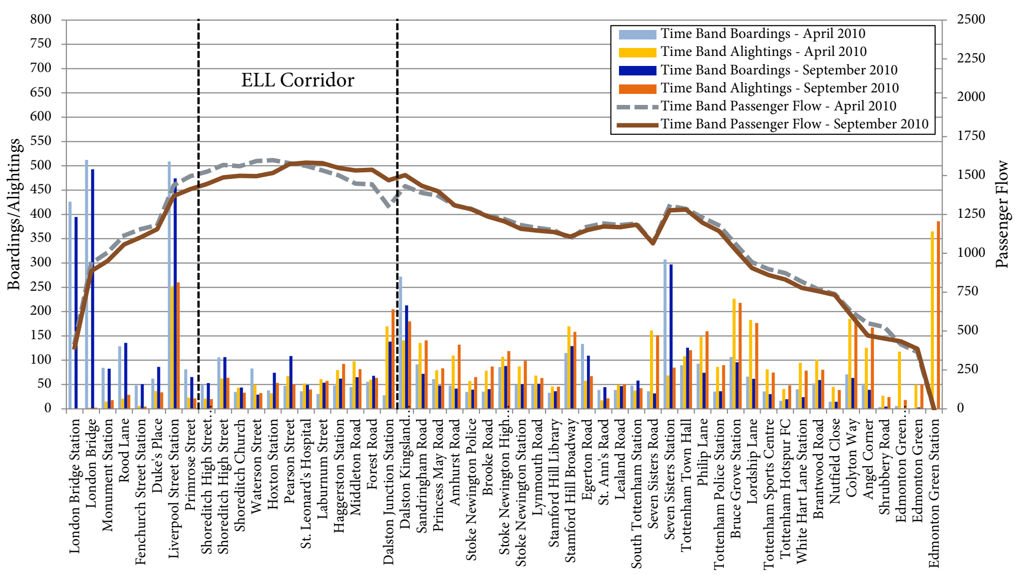


Figure 3-19: Route 149 - Northbound, PM Peak - April 2010 vs. September 2010

The northbound PM peak displayed in Figure 3-21 shows a nearly uniform slight increase in passenger flow, with almost none of the changes seen in its matching morning peak. Similar to Figure 3-20, the comparison between November 2010 and October 2011 shows a decrease in passenger flow south of Liverpool Street station, with a large increase in boardings at Liverpool Street.

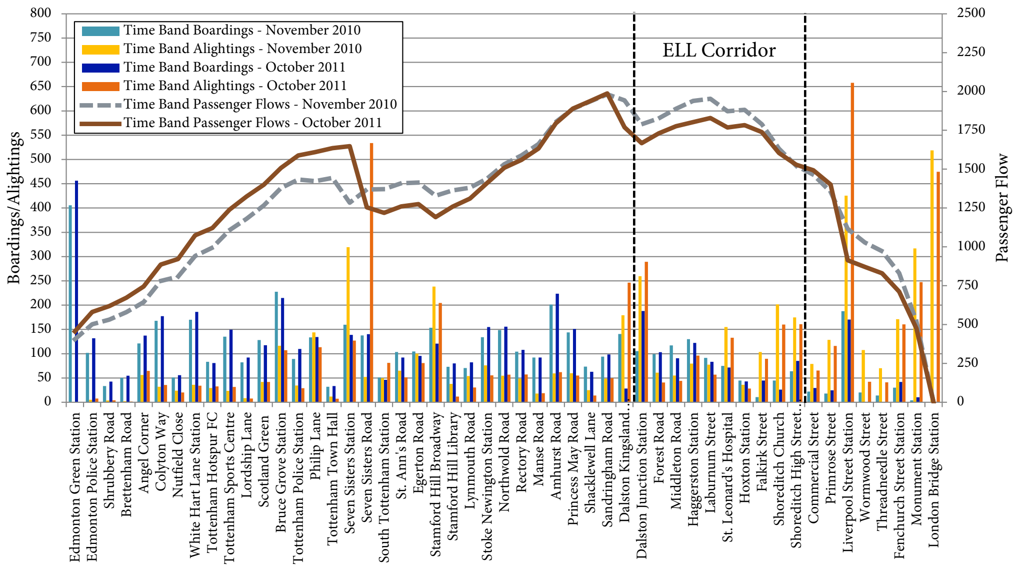


Figure 3-20: Route 149 - Southbound, AM Peak - November 2010 vs. October 2011

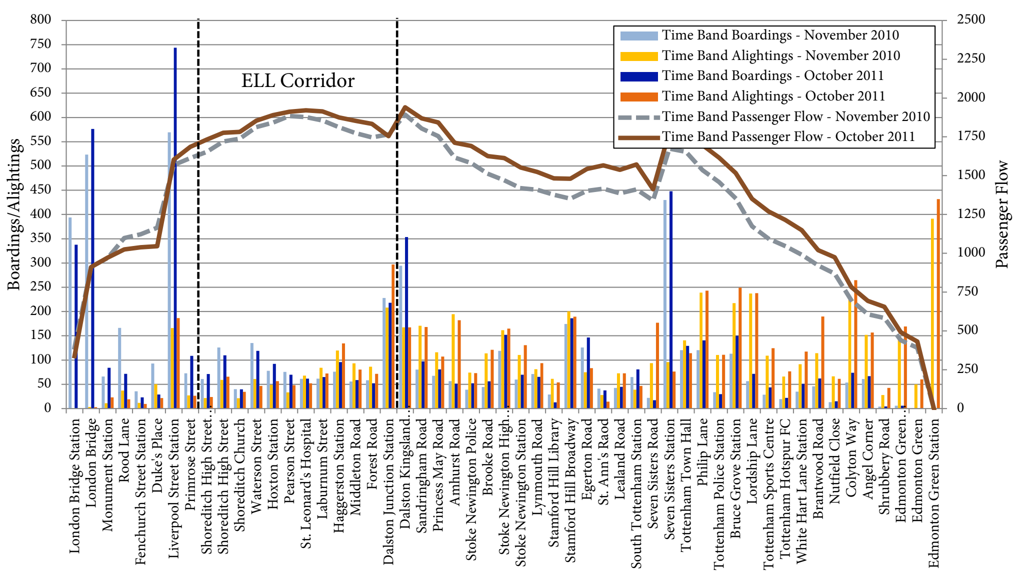


Figure 3-21: Route 149 - Northbound, PM Peak - November 2010 vs. October 2011

Tables 3-25 to 3-28 largely reflect the trends noted in the above graphs. Most notable is the sharp decrease in passengers making trips from north of the corridor into the corridor in the southbound AM peak (Tables 3-24 & 3-25). This is attributed to both the initial ELLX and the Highbury & Islington extension, again showing the attractiveness of the new interchange opportunity. Table 3-27 does not show the same drop because of a the large increase in passengers from other bus routes due to the increased service frequency in October 2010. The reverse movement during the northbound PM peak is dominated by the increase in passengers from other bus routes in the corridor, as can be seen in Table 3-28.

Table 3-25: Passenger Counts for Route 149 - Southbound, AM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1658	1917	566	381	773	834	2997	3131
		259	16%	-186	-33%	61	8%	135	4%
	Corridor			168	113	400	463	569	576
				-55	-33%	62	16%	7	1%
	After					250	317	250	317
						68	27%	68	27%
	Total	1658	1917	734	494	1423	1614	3815	4025
		259	16%	-240	-33%	191	13%	210	5%

Table 3-26: Passenger Counts for Route 149 - Southbound, AM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	2314	2565	722	568	962	912	3997	4044
		251	11%	-154	-21%	-50	-5%	47	1%
	Corridor			222	241	496	532	717	773
				19	9%	36	7%	55	8%
	After					360	362	360	362
						1	0%	1	0%
	Total	2314	2565	944	809	1818	1805	5075	5179
		251	11%	-135	-14%	-13	-1%	103	2%

Table 3-27: Passenger Counts for Route 149 - Southbound, AM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1658	2565	566	568	773	912	2997	4044
		907	55%	2	0%	139	18%	1048	35%
	Corridor			168	241	400	532	569	773
				73	43%	131	33%	204	36%
	After					250	362	250	362
						112	45%	112	45%
	Total	1658	2565	734	809	1423	1805	3815	5179
		907	55%	75	10%	382	27%	1364	36%

Tables 3-29 to 3-31 quantify the changes in average passenger flow, corridor passenger counts, and ETM passenger counts for the route 149 for all time periods by direction. Table 3-31 shows a significant increase in ridership over 18 months, which is not matched Tables 3-29 & 3-30. This indicates that much of this growth comes from the increase in service frequency in October 2010.

Table 3-28: Passenger Counts for Route 149 - Northbound, PM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	272	313	584	703	814	959	1671	1975
		41	15%	118	20%	145	18%	304	18%
	Corridor			168	257	467	577	635	835
				89	53%	110	24%	199	31%
	After					2303	3036	2303	3036
						732	32%	732	32%
	Total	272	313	753	960	3584	4572	4610	5845
		41	15%	207	27%	988	28%	1235	27%

Table 3-29: Route 149 - April 2010 vs. September 2010

For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Sep-10	Percent Change
Southbound	All Day	6269	5842	-6.8%
	AM Peak	1516	1429	-5.7%
	PM Peak	1172	1008	-14.0%
Northbound	All Day	5699	5592	-1.9%
	AM Peak	684	651	-4.9%
	PM Peak	1518	1522	0.3%
Passenger Counts		Apr-10	Sep-10	Percent Change
Southbound	All Day	8362	8003	-4.3%
	AM Peak	1907	1790	-6.1%
	PM Peak	1607	1484	-7.6%
Northbound	All Day	8844	8342	-5.7%
	AM Peak	997	1081	8.4%
	PM Peak	2034	2105	3.5%
Entire Route				
Passenger Counts		Apr-10	Sep-10	Percent Change
Southbound	All Day	20934	21149	1.0%
	AM Peak	3815	4025	5.5%
	PM Peak	4389	4434	1.0%
Northbound	All Day	20066	20435	1.8%
	AM Peak	3148	3246	3.1%
	PM Peak	4610	4681	1.5%
Both	All Day	41000	41584	1.4%
System-Wide	All Day	6481026	6476783	-0.1%

Table 3-30: Route 149 - November 2010 vs. October 2011

For Route Segments in the ELL Service Area				
Average Passenger Flow		Nov-10	Oct-11	Percent Change
Southbound	All Day	6236	6077	-2.5%
	AM Peak	1809	1723	-4.8%
	PM Peak	1135	1191	4.9%
Northbound	All Day	6233	6142	-1.5%
	AM Peak	814	800	-1.7%
	PM Peak	1790	1841	2.9%
Passenger Counts		Nov-10	Oct-11	Percent Change
Southbound	All Day	8714	8406	-3.5%
	AM Peak	2401	2252	-6.2%
	PM Peak	1691	1759	4.0%
Northbound	All Day	9008	8855	-1.7%
	AM Peak	1314	1324	0.8%
	PM Peak	2421	2496	3.1%
Entire Route				
Passenger Counts		Nov-10	Oct-11	Percent Change
Southbound	All Day	22549	22677	0.6%
	AM Peak	5075	5179	2.0%
	PM Peak	4917	5346	8.7%
Northbound	All Day	22638	22619	-0.1%
	AM Peak	4269	4378	2.6%
	PM Peak	5452	5845	7.2%
Both	All Day	45187	45296	0.2%
System-Wide	All Day	6511109	6765182	3.9%

Table 3-31: Route 149 - April 2010 vs. October 2011

For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Oct-11	Percent Change
Southbound	All Day	6269	6077	-3.1%
	AM Peak	1516	1723	13.7%
	PM Peak	1172	1191	1.6%
Northbound	All Day	5699	6142	7.8%
	AM Peak	684	800	16.9%
	PM Peak	1518	1841	21.3%
Passenger Counts		Apr-10	Oct-11	Percent Change
Southbound	All Day	8362	8406	0.5%
	AM Peak	1907	2252	18.1%
	PM Peak	1607	1759	9.4%
Northbound	All Day	8844	8855	0.1%
	AM Peak	997	1324	32.9%
	PM Peak	2034	2496	22.7%
Entire Route				
Passenger Counts		Apr-10	Oct-11	Percent Change
Southbound	All Day	20934	22677	8.3%
	AM Peak	3815	5179	35.7%
	PM Peak	4389	5346	21.8%
Northbound	All Day	20066	22619	12.7%
	AM Peak	3148	4378	39.1%
	PM Peak	4610	5845	26.8%
Both	All Day	41000	45296	10.5%
System-Wide	All Day	6481026	6765182	4.4%

Route 242

Route 242 is unique among the corridor routes because it is mostly an east-west route that spends some time as a rather circuitous neighborhood-serving collector before joining the Kingsland Road corridor. The route connects Homerton station in the northeast to Tottenham Court Road station in central London with peak frequencies of ten buses per hour.

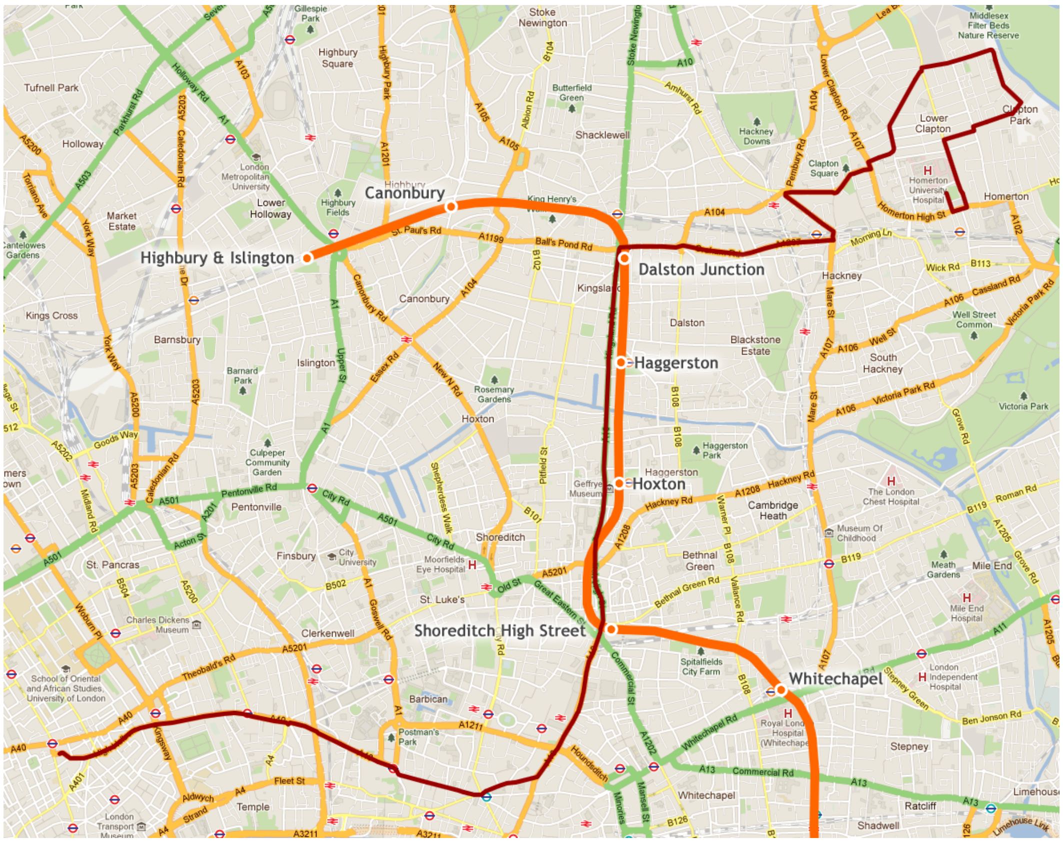


Figure 3-22: Map of Route 242

The westbound AM peak comparison between April 2010 and September 2010 shown in Figure 3-23 indicates a significant decrease in ridership along the ELL corridor that ends at Liverpool Street station. Based on the decrease in boarding at most stops along the corridor, it seems likely that this decrease is due to riders who formerly boarded the bus and then alighted at Liverpool Street using the ELL to access the rail system. Although the difference in passenger flows is not as large, Figure 3-24 shows a similar trend in the eastbound PM peak, with fewer riders boarding the line at Liverpool Street and a matching decrease in alightings along the corridor parallel to the ELL.

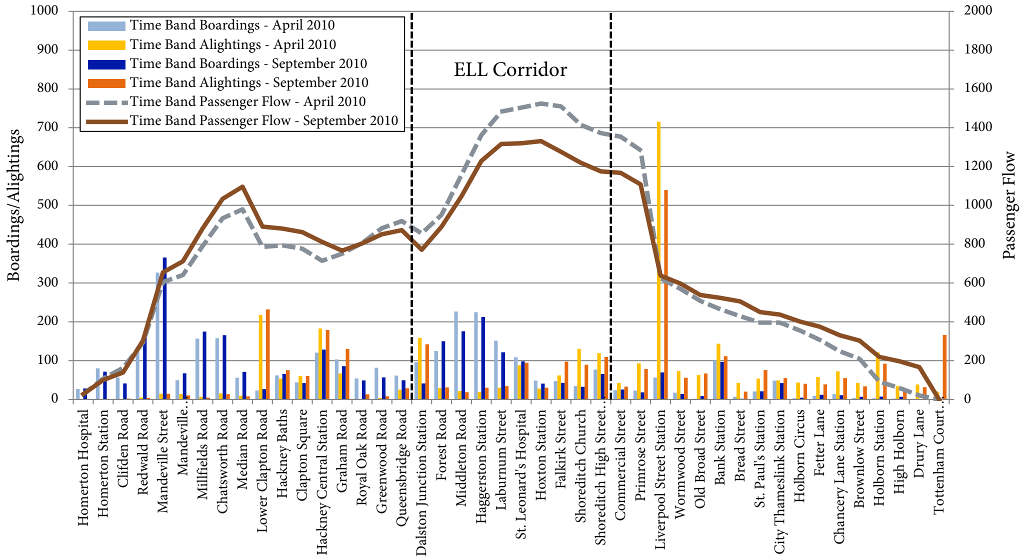


Figure 3-23: Route 242 - Westbound, AM Peak - April 2010 vs. September 2010

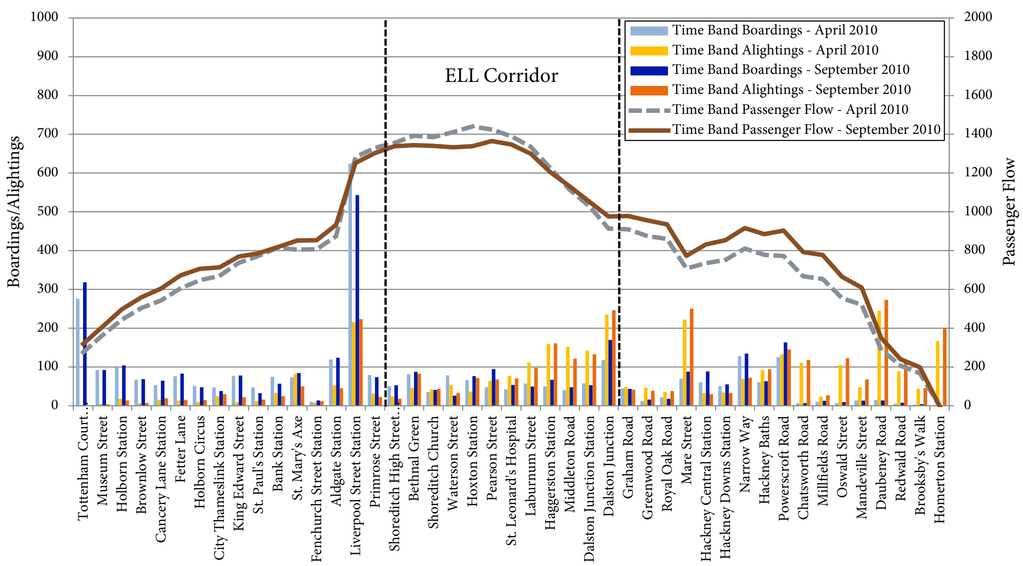


Figure 3-24: Route 242 - Eastbound, PM Peak - April 2010 vs. September 2010

Although Figure 3-25 shows growth in passenger flow between November 2010 and October 2011 in the westbound AM peak on the ELL corridor, this growth is less than that seen in the segment east of the corridor. This does not appear to be caused by a decrease in boardings along the segment of the 242 parallel to the ELL; rather it appears to be due to increased alightings or transfers to the ELL at Dalston Junction station from route 242. The eastbound PM peak comparison (Figure 3-26) between November 2010 and October 2011 shows a general decrease in passenger flow across the corridor and essentially no change in flow further east. This contrasts with the sharp growth in that part of the route shown in Figure 3-25.

The dramatic increase in Liverpool Street station alightings (in Figure 3-25) is a bit of a mystery, but may be due to the significant road works related to Crossrail referred to earlier. These works, and the related traffic congestion, may have encouraged riders to exit the route at Liverpool Street station and use another means to complete their journey. The remainder of the route shows decreased alightings, implying that the users who formerly got off at these stops likely alighted at Liverpool Street station. The matching eastbound PM peak (Figure 3-26) shows a similar trend, with decreased boardings at Tottenham Court Road and then an increase in boardings at Liverpool Street.

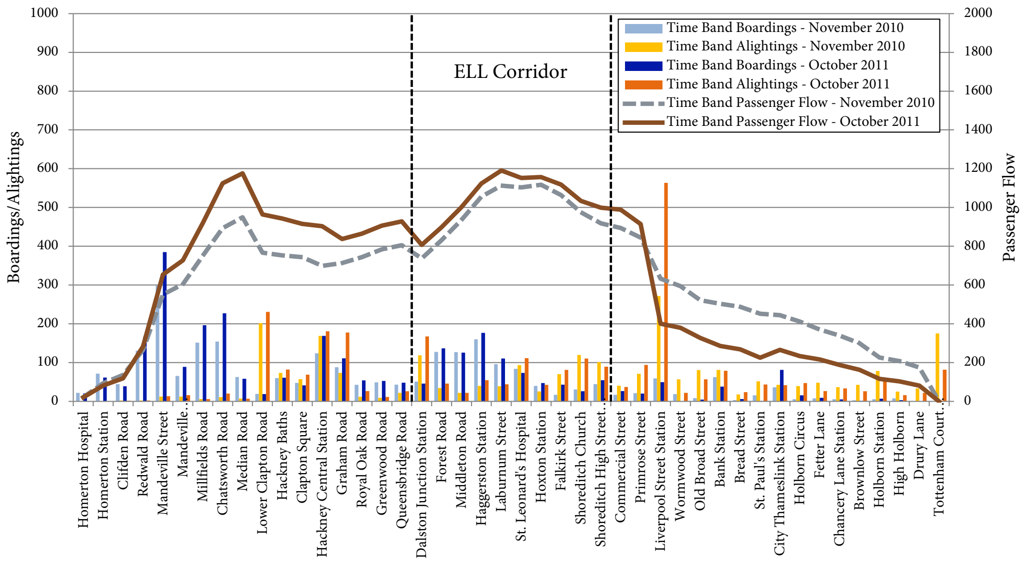


Figure 3-25: Route 242 - Westbound, AM Peak - November 2010 vs. October 2011

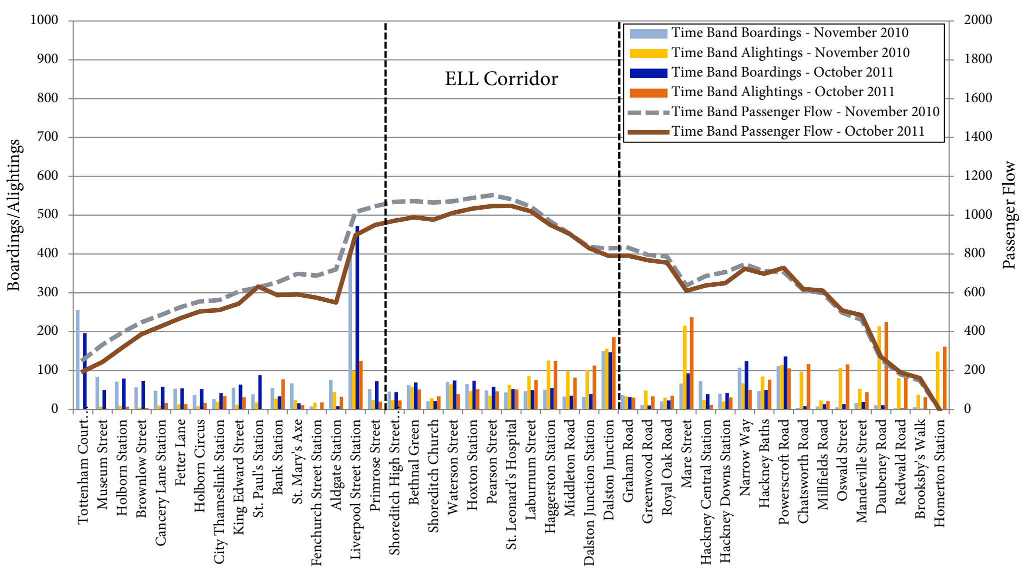


Figure 3-26: Route 242 - Eastbound, PM Peak - November 2010 vs. October 2011

The 18 month comparisons between April 2010 and October 2011 show expected results given Figures 3-23 to 3-26 and can be found in the Appendix.

From April 2010 to September 2010 the results of the ELL opening are evident on the passenger counts in Table 3-32. As expected (given the route of the 242) the further extension of the rail service to Highbury & Islington seems to have had little influence on the number of passengers in Table 3-33. The decrease seen in trips originating west of the corridor and ending east of the corridor in the eastbound PM peak direction may be related to the Liverpool Street station peculiarity noted in Figure 3-26 (see Table 3-34). The comparison of the entire 18 month analysis period is overwhelmed by the loss of passengers to the route 149, and therefore is not useful for this analysis.

Table 3-32: Passenger Counts for Route 242 - Westbound, AM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	804	929	351	354	471	376	1626	1658
		124	15%	2	1%	-95	-20%	32	2%
	Corridor			232	182	781	733	1013	916
				-50	-21%	-47	-6%	-97	-10%
	After					434	414	434	414
						-20	-5%	-20	-5%
	Total	804	929	583	536	1685	1523	3073	2988
		124	15%	-47	-8%	-162	-10%	-85	-3%

Table 3-33: Passenger Counts for Route 242 - Westbound, AM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	790	1038	362	409	325	351	1477	1799
		249	31%	47	13%	27	8%	322	22%
	Corridor			184	192	549	593	733	786
				8	4%	44	8%	52	7%
	After					320	324	320	324
						4	1%	4	1%
	Total	790	1038	546	602	1194	1269	2530	2909
		249	31%	56	10%	74	6%	378	15%

Table 3-34: Passenger Counts for Route 242 - Eastbound, PM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	360	434	667	641	356	286	1382	1361
		74	21%	-26	-4%	-70	-20%	-21	-2%
	Corridor			197	215	323	358	520	573
				19	9%	35	11%	53	10%
	After					719	765	719	765
						46	6%	46	6%
	Total	360	434	863	856	1398	1409	2621	2699
		74	21%	-7	-1%	11	1%	78	3%

Based on the previously discussed results in Figures 3-23 to 3-26, the quantified results shown in Tables 3-35 to 3-37 show the expected results. Route 242 saw the most dramatic decreases of any of the four routes serving the Kingsland Road Corridor. It is difficult to tell how much of this can be attributed to the ELL and how much is due to the increased service frequency on route 149.

Table 3-35: Route 242 - April 2010 vs. September 2010

For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Sep-10	Percent Change
Westbound	All Day	3993	3649	-8.6%
	AM Peak	1314	1157	-11.9%
	PM Peak	748	649	-13.2%
Eastbound	All Day	4181	3961	-5.2%
	AM Peak	420	381	-9.4%
	PM Peak	1285	1256	-2.3%
Passenger Counts		Apr-10	Sep-10	Percent Change
Westbound	All Day	5897	5757	-2.4%
	AM Peak	1835	1645	-10.3%
	PM Peak	1123	1087	-3.2%
Eastbound	All Day	7071	6480	-8.4%
	AM Peak	821	703	-14.3%
	PM Peak	2022	1935	-4.3%
Entire Route				
Passenger Counts		Apr-10	Sep-10	Percent Change
Westbound	All Day	11479	11645	1.4%
	AM Peak	3073	2988	-2.8%
	PM Peak	2398	2369	-1.2%
Eastbound	All Day	11214	11454	2.1%
	AM Peak	1313	1307	-0.5%
	PM Peak	3228	3383	4.8%
Both	All Day	22693	23099	1.8%
System-Wide	All Day	6481026	6476783	-0.1%

Table 3-36: Route 242 - November 2010 vs. October 2011

For Route Segments in the ELL Service Area				
Average Passenger Flow		Nov-10	Oct-11	Percent Change
Westbound	All Day	3210	3081	-4.0%
	AM Peak	985	1048	6.4%
	PM Peak	539	543	0.7%
Eastbound	All Day	3532	3449	-2.3%
	AM Peak	287	299	4.2%
	PM Peak	1011	964	-4.6%
Passenger Counts		Nov-10	Oct-11	Percent Change
Westbound	All Day	5114	5033	-1.6%
	AM Peak	1420	1546	8.9%
	PM Peak	908	971	7.0%
Eastbound	All Day	5774	5632	-2.5%
	AM Peak	528	538	1.9%
	PM Peak	1542	1500	-2.7%
Entire Route				
Passenger Counts		Nov-10	Oct-11	Percent Change
Westbound	All Day	10337	10576	2.3%
	AM Peak	2530	2909	15.0%
	PM Peak	2027	2215	9.3%
Eastbound	All Day	9833	9875	0.4%
	AM Peak	948	1017	7.3%
	PM Peak	2621	2699	3.0%
Both	All Day	20169	20451	1.4%
System-Wide	All Day	6511109	6765182	3.9%

Table 3-37: Route 242 - April 2010 vs. October 2011

For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Oct-11	Percent Change
Westbound	All Day	3993	3081	-22.8%
	AM Peak	1314	1048	-20.2%
	PM Peak	748	543	-27.4%
Eastbound	All Day	4181	3449	-17.5%
	AM Peak	420	299	-28.9%
	PM Peak	1285	964	-25.0%
Passenger Counts		Apr-10	Oct-11	Percent Change
Westbound	All Day	5897	5033	-14.7%
	AM Peak	1835	1546	-15.7%
	PM Peak	1123	971	-13.5%
Eastbound	All Day	7071	5632	-20.3%
	AM Peak	821	538	-34.4%
	PM Peak	2022	1500	-25.8%
Entire Route				
Passenger Counts		Apr-10	Oct-11	Percent Change
Westbound	All Day	11479	10576	-7.9%
	AM Peak	3073	2909	-5.3%
	PM Peak	2398	2215	-7.6%
Eastbound	All Day	11214	9875	-11.9%
	AM Peak	1313	1017	-22.6%
	PM Peak	3228	2699	-16.4%
Both	All Day	22693	20451	-9.9%
System-Wide	All Day	6481026	6765182	4.4%

Route 243

Route 243 is the second route in the Kingsland Road Corridor to begin its journey at Wood Green station (the other is route 67). From there it travels east to the A10, leaving the corridor in between Hoxton station and Shoreditch High Street station to head southwest to Waterloo station (see Figure 3-27). This route has the highest frequencies of any in the corridor, with up to 15 buses per hour.

Figure 3-28 displays the comparison between April 2010 and September 2010 for the southbound AM peak. A decrease in passenger flow can be seen starting at Dalston Junction station. This decrease is attributable to a slight decrease in boardings in the ELL corridor as well as the increase in alightings at Dalston Junction station. Passengers appear to be alighting at Dalston Junction to enter the rail system rather than further along the corridor (most notably at Old Street station, which sees a decrease in alightings). The opposing

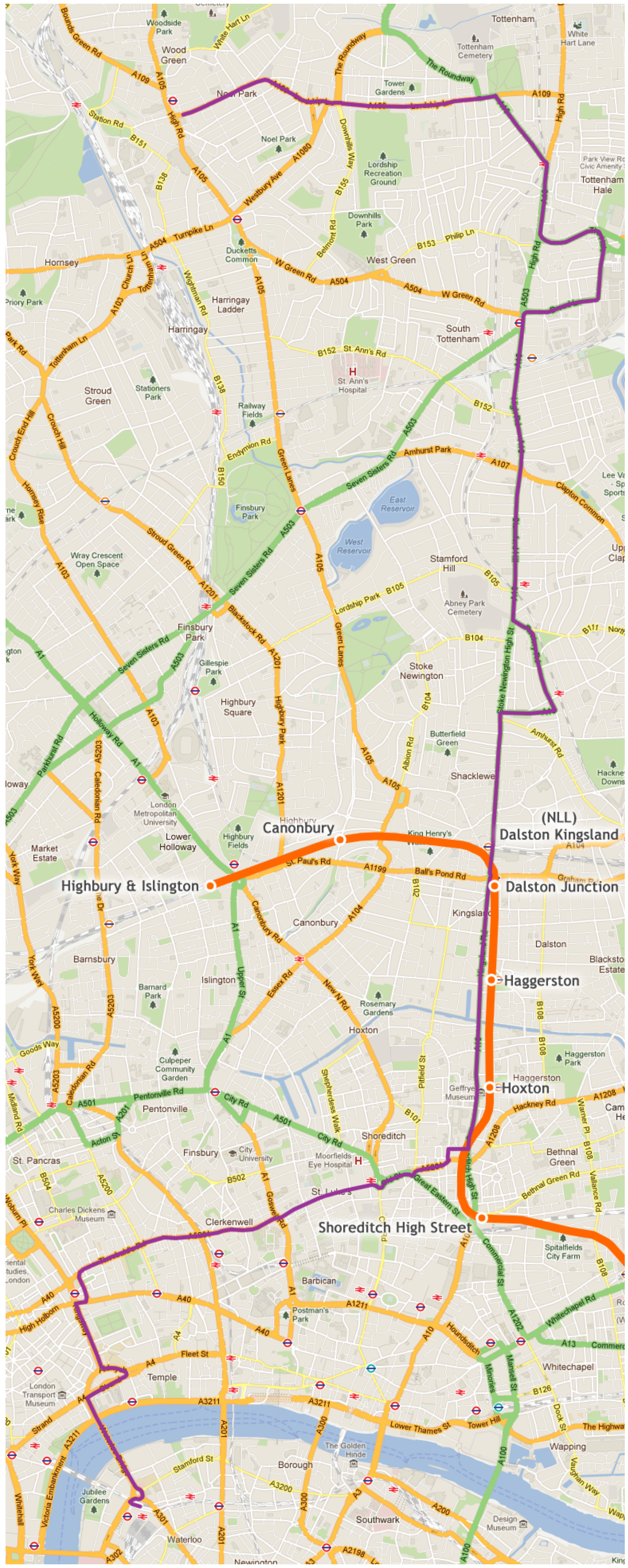


Figure 3-27: Map of Route 243

direction for the same analysis period has slight or no changes across the entire route.

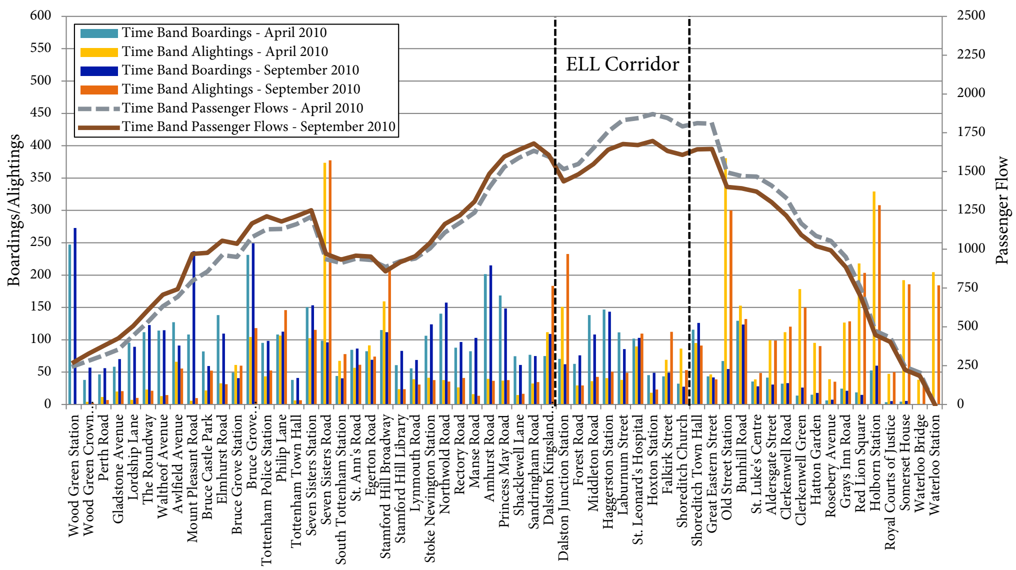


Figure 3-28: Route 243 - Southbound, AM Peak - April 2010 vs. September 2010

Comparing November 2010 to October 2011 results in many changes in passenger flow in the southbound AM peak. Figure 3-29 indicates large increases in alightings near Seven Sisters station, likely due to the new interchange at Highbury & Islington between the Victoria Line and the ELL. The sharp decrease in boardings at Dalston Kingsland may be related to the increase in service on the NLL in May 2011. These changes play out in decreased passenger flows for much of the route. The northbound PM peak in the same analysis period shows minimal growth in passenger flow along the ELL corridor, seemingly from smaller increases in boardings along stations in the corridor compared to the part of the route preceding the corridor. Figure 3-30 also shows a jump in passenger flow near Seven Sisters station, as boardings from the Victoria Line increase.

Given the previously described changes in the two separate analysis periods, the peak periods for the combined 18 month analysis period are as expected. These figures can be found in the Appendix.

A comparison of passenger travel patterns between April 2010 and September 2010 indicates similar changes in passenger levels as other routes in the corridor experienced during that time period. The period from November 2010 to October 2011 saw decreases in the number passengers due to the extension to Highbury & Islington, as can be noted in Tables 3-38 and 3-39.

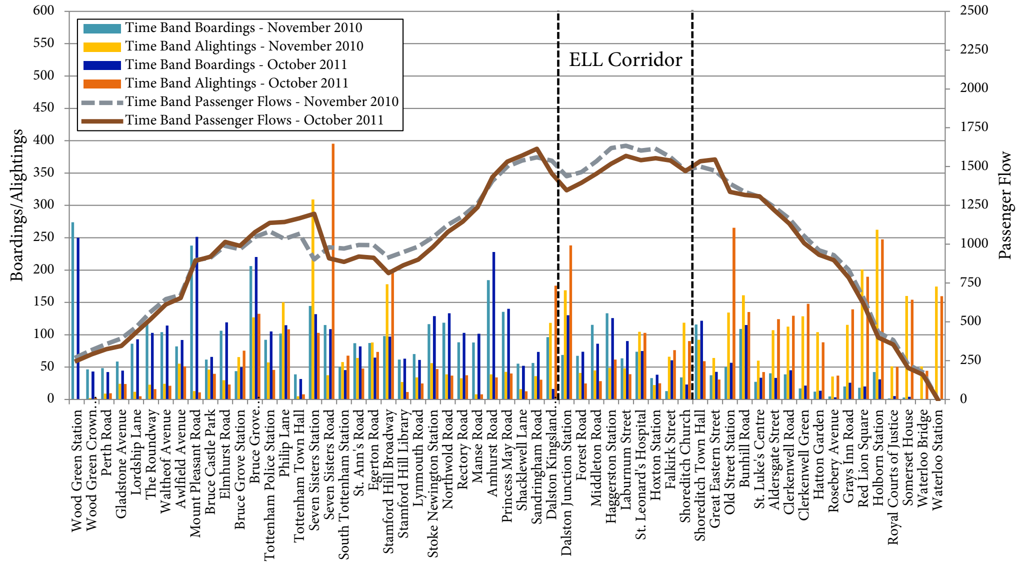


Figure 3-29: Route 243 - Southbound, AM Peak - November 2010 vs. October 2011

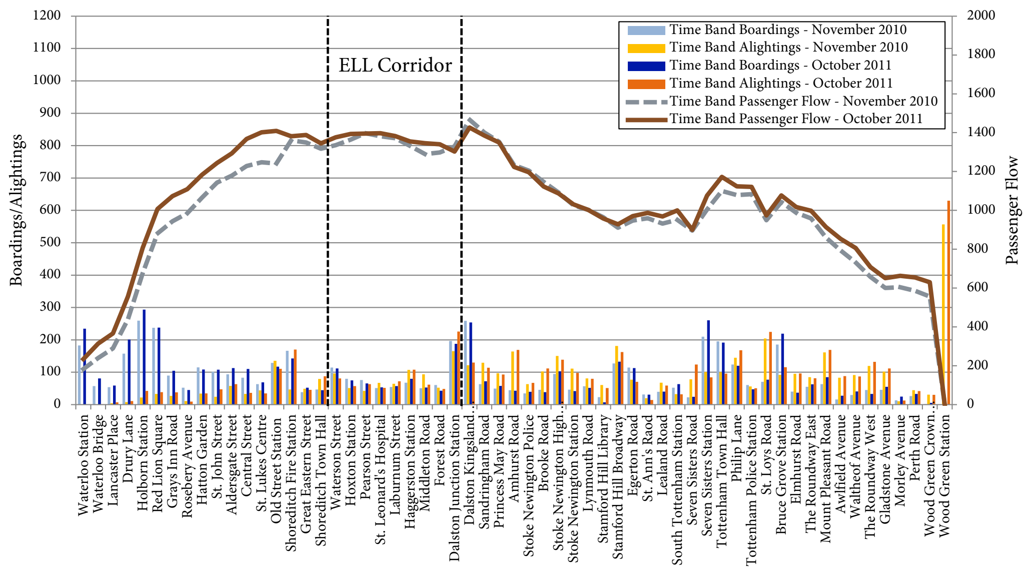


Figure 3-30: Route 243 - Northbound, PM Peak - November 2010 vs. October 2011

In contrast to the other routes, Tables 3-40 and 3-41 show that route 243 experienced similar changes in passenger flow in the ELL service area in each of the analysis periods. However, the decline in passengers in Table 3-41 is likely not a true decline. Table 3-15 does not show much of a decline in any of the time periods in the November 2010 vs. October 2011 analysis period, indicating that these passengers likely switched to another route in the corridor rather than leaving bus service entirely. Table 3-42 shows a modest growth rate for the route, even with the slight loss of passengers to route 149 during the 18 month analysis period.

Table 3-38: Passenger Counts for Route 243 - Southbound, AM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1996	2154	400	334	968	882	3365	3371
		158	8%	-66	-17%	-86	-9%	6	0%
	Corridor			94	114	474	566	568	680
				20	22%	92	19%	112	20%
	After					573	596	573	596
						24	4%	24	4%
	Total	1996	2154	494	449	2015	2045	4505	4647
		158	8%	-46	-9%	30	1%	142	3%

Table 3-39: Passenger Counts for Route 243 - Northbound, PM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	707	858	508	526	713	738	1927	2122
		151	21%	18	4%	26	4%	195	10%
	Corridor			135	162	420	377	555	539
				26	20%	-43	-10%	-17	-3%
	After					2483	2620	2483	2620
						136	5%	136	5%
	Total	707	858	643	688	3616	3735	4966	5281
		151	21%	45	7%	119	3%	315	6%

Table 3-40: Route 243 - April 2010 vs. September 2010

For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Sep-10	Percent Change
Southbound	All Day	4857	4474	-7.9%
	AM Peak	1740	1600	-8.1%
	PM Peak	880	779	-11.4%
Northbound	All Day	4342	4368	0.6%
	AM Peak	496	456	-8.1%
	PM Peak	1390	1413	1.6%
Passenger Counts		Apr-10	Sep-10	Percent Change
Southbound	All Day	6701	6239	-6.9%
	AM Peak	2250	2050	-8.9%
	PM Peak	1324	1167	-11.9%
Northbound	All Day	6144	6230	1.4%
	AM Peak	834	742	-11.0%
	PM Peak	1797	1901	5.8%
Entire Route				
Passenger Counts		Apr-10	Sep-10	Percent Change
Southbound	All Day	19155	19811	3.4%
	AM Peak	4751	4922	3.6%
	PM Peak	4618	4727	2.4%
Northbound	All Day	20307	20658	1.7%
	AM Peak	4330	4393	1.5%
	PM Peak	5011	5201	3.8%
Both	All Day	39462	40470	2.6%
System-Wide	All Day	6481026	6476783	-0.1%

Table 3-41: Route 243 - November 2010 vs. October 2011

For Route Segments in the ELL Service Area				
Average Passenger Flow		Nov-10	Oct-11	Percent Change
Southbound	All Day	4857	4171	-14.1%
	AM Peak	1549	1488	-4.0%
	PM Peak	771	684	-11.3%
Northbound	All Day	4338	4221	-2.7%
	AM Peak	422	419	-0.8%
	PM Peak	1344	1365	1.6%
Passenger Counts		Nov-10	Oct-11	Percent Change
Southbound	All Day	6200	5816	-6.2%
	AM Peak	1937	1897	-2.1%
	PM Peak	1147	1041	-9.2%
Northbound	All Day	6068	5883	-3.0%
	AM Peak	657	653	-0.5%
	PM Peak	1776	1803	1.5%
Entire Route				
Passenger Counts		Nov-10	Oct-11	Percent Change
Southbound	All Day	19328	19589	1.3%
	AM Peak	4505	4647	3.2%
	PM Peak	4543	4850	6.7%
Northbound	All Day	20078	21052	4.9%
	AM Peak	3725	4310	15.7%
	PM Peak	4966	5281	6.3%
Both	All Day	39406	40640	3.1%
System-Wide	All Day	6511109	6765182	3.9%

Table 3-42: Route 243 - April 2010 vs. October 2011

For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Oct-11	Percent Change
Southbound	All Day	4857	4171	-14.1%
	AM Peak	1740	1488	-14.5%
	PM Peak	880	684	-22.2%
Northbound	All Day	4342	4221	-2.8%
	AM Peak	496	419	-15.7%
	PM Peak	1390	1365	-1.8%
Passenger Counts		Apr-10	Oct-11	Percent Change
Southbound	All Day	6701	5816	-13.2%
	AM Peak	2250	1897	-15.7%
	PM Peak	1324	1041	-21.4%
Northbound	All Day	6144	5883	-4.2%
	AM Peak	834	653	-21.6%
	PM Peak	1797	1803	0.3%
Entire Route				
Passenger Counts		Apr-10	Oct-11	Percent Change
Southbound	All Day	19155	19589	2.3%
	AM Peak	4751	4647	-2.2%
	PM Peak	4618	4850	5.0%
Northbound	All Day	20307	21052	3.7%
	AM Peak	4330	4310	-0.5%
	PM Peak	5011	5281	5.4%
Both	All Day	39462	40640	3.0%
System-Wide	All Day	6481026	6765182	4.4%

3.3.2 Bus Routes South of the River Thames

Two routes were analyzed that provide service to areas near the ELL in South London. Both routes are generally north-south lines and could potentially serve as feeders/distributors during certain route sections and as competitor services in other segments. These routes were analyzed only over the entire 18 month period because it seems unlikely that the later extension to Highbury & Islington would have influenced them noticeably. In addition, route P12 had many stop closures and reroutes from October 2010 to March 2011, making it difficult to find a week to use for any intermediate analysis.

Route P12

The P12 starts near Honor Oak Park station in the south, and takes a rather circuitous route to Surrey Quays station, passing a few National Rail stations and Canada Water station on the way (see Figure 3-31). Service frequency in the peak is about five buses per hour,and ridership is less than 9,000 passengers a day.

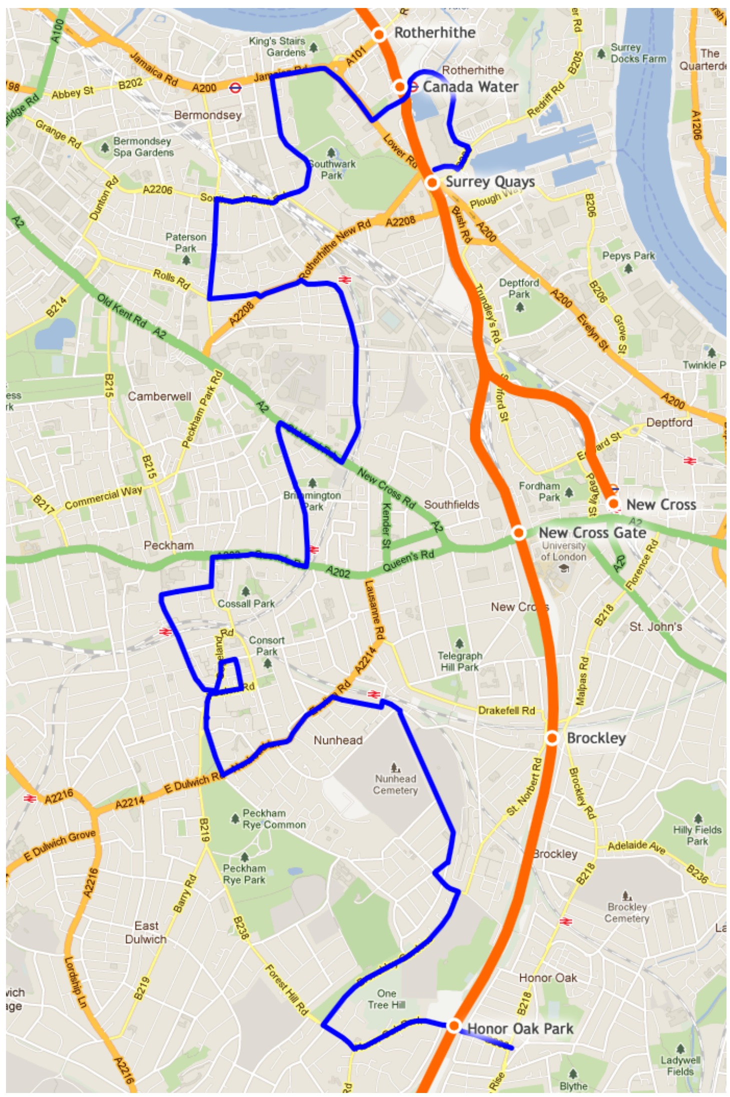


Figure 3-31: Map of Route P12

Figure 3-32 displays changes in AM peak northbound boardings, alightings, and passenger flow between April 2010 and October 2011. Northbound flow decreased from April 2010 to October 2011 preceding the stop near Peckham Rye station. From there northward a significant increase in flow is observed for the remainder of the route. There is a sharp decrease in alightings at Peckham Rye, perhaps indicating that riders heading towards the Docklands are now remaining on the route to use the stop at Canada Water. This change in route structure is unrelated to the opening of the ELL and appears to have been the main cause of the change in rider behavior reflected in the jump in passenger flow.

Changes in the southbound PM peak direction are displayed in Figure 3-33 and indicate a decrease in passenger flow along the entire route. This begins with a decrease in boardings at Surrey Quays station, somewhat unexpected given that the rail station itself was closed in April 2010. Considering Figures 3-32 and 3-33, it is difficult to argue that the opening of the East LLL had any measurable effect on the P12.

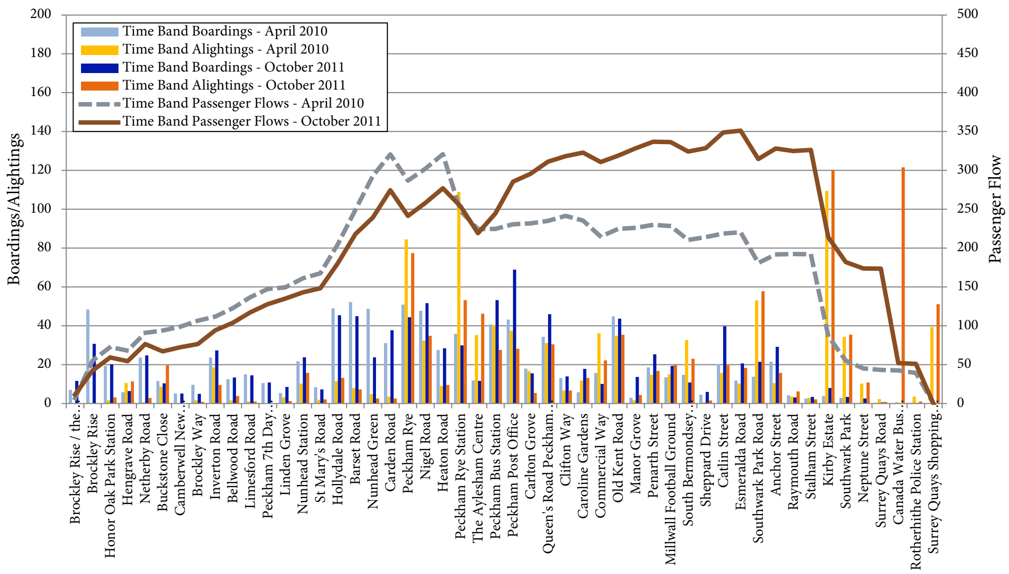


Figure 3-32: Route P12 - Northbound, AM Peak - April 2010 vs. October 2011

In general, Table 3-43 indicates slow growth in ridership on the P12 from April 2010 to October 2011, albeit at a slower rate than system-wide growth. The peaks became more balanced during that period, with the northbound AM peak gaining riders while the southbound PM peak lost riders.

Table 3-43: Route P12 - April 2010 vs. October 2011

Passenger Counts		Apr-10	Oct-11	Percent Change
Southbound	All Day	4427	4444	0.4%
	AM Peak	783	872	11.3%
	PM Peak	1180	1102	-6.6%
Northbound	All Day	4267	4487	5.1%
	AM Peak	934	1014	8.6%
	PM Peak	998	1092	9.4%
Both	All Day	8694	8931	2.7%
System-Wide	All Day	6481026	6765182	4.4%

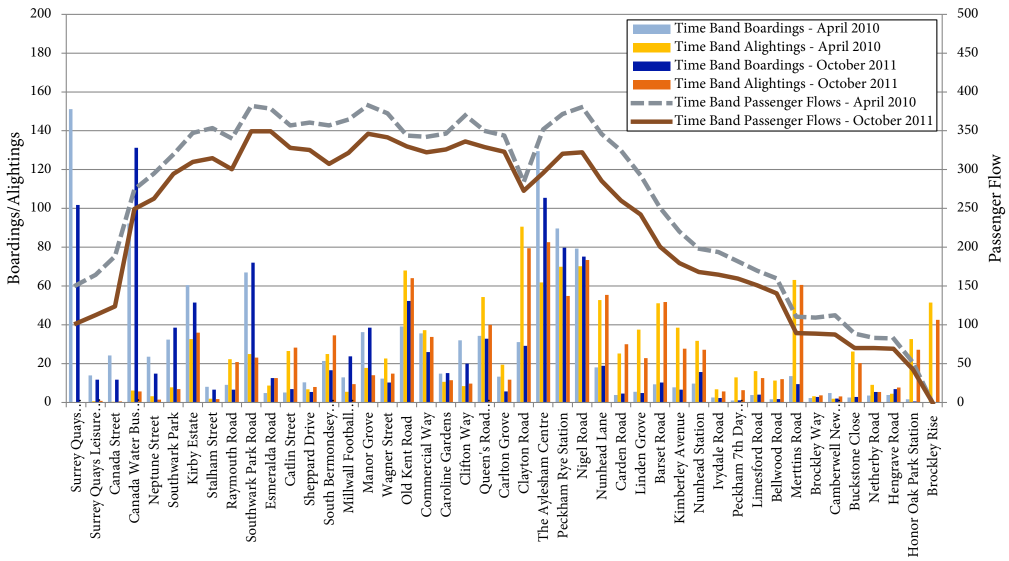


Figure 3-33: Route P12 - Southbound, PM Peak - April 2010 vs. October 2011

Route 225

Traveling from Hither Green station in the south to Canada Water station in the north, route 225 provides four buses per hour service in the peak (and for much of the day). Along the way it serves stops near Lewisham station, New Cross station, and Surrey Quays station (see Figure 3-34). About 5,300 passengers ride the 225 on the average weekday.

In contrast to the P12, route 225 has noticeable changes over the 18 month analysis period that can be attributed to the new ELL service. Figure 3-35 shows an initial increase in flow in the northbound AM peak until New Cross where

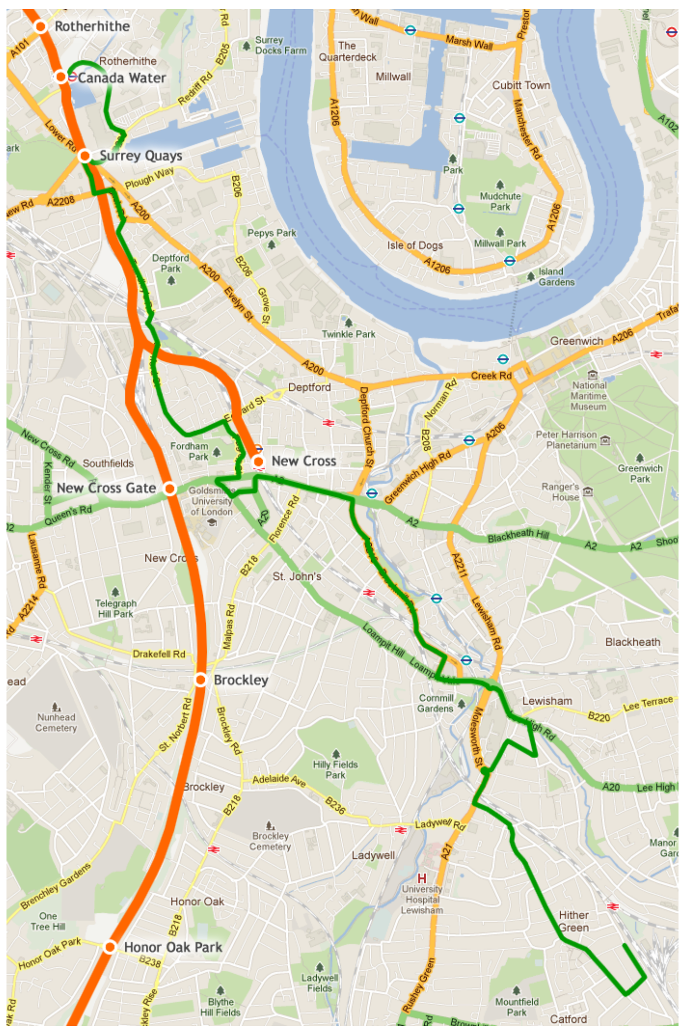


Figure 3-34: Map of Route 225

boardings drop significantly and alightings increase from April 2010 to October 2011. This decreased flow plays out over the remainder of the route, most markedly in decreased alightings at Surrey Quays and Canada Water. This implies that the new connections provided by the ELL are driving more feeder traffic to New Cross and then a decrease in traffic as people traveling to Surrey Quays, Canada Water, and beyond switch to the rail system earlier than they had previously.

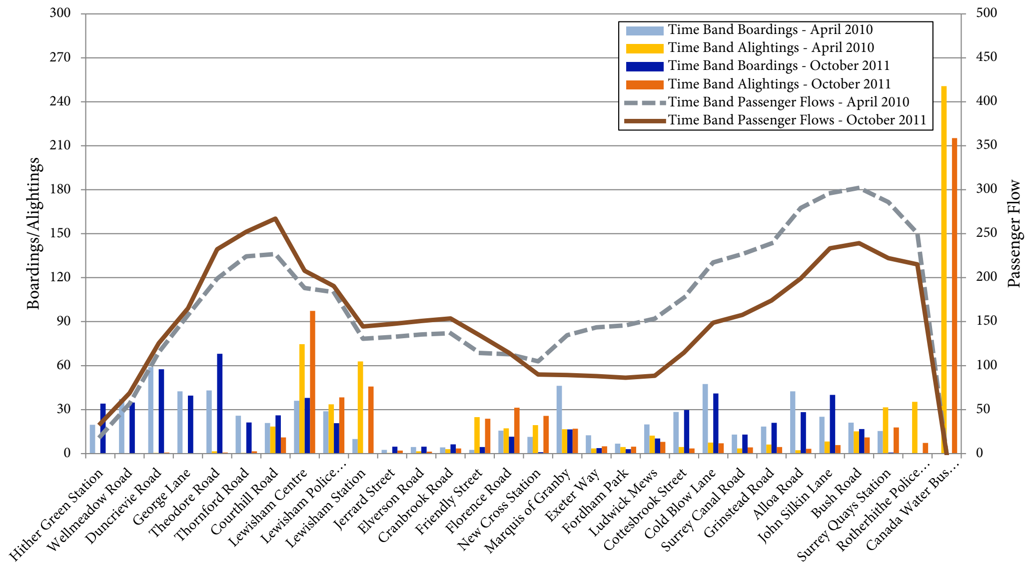


Figure 3-35: Route 225 - Northbound, AM Peak - April 2010 vs. October 2011

The opposing peak direction, shown in Figure 3-36, also experiences changes, but with less definable causation. In general, passenger flow is less until approximately New Cross. However, the jump in flow after New Cross is caused by a decrease in alightings rather than the expected jump in boardings. The increase in boardings at Canada Water could be attributed to the increased number of passengers delivered to that station by the ELL.

Table 3-44 shows nearly no growth in the 225 between April 2010 and October 2011. Significant decreases in ridership were seen in the northbound direction, while increases of the same magnitude were experienced in the southbound direction.

Table 3-44: Route 225 - April 2010 vs. October 2011

Passenger Counts		Apr-10	Oct-11	Percent Change
Southbound	All Day	2567	2791	8.7%
	AM Peak	439	414	-5.8%
	PM Peak	656	727	10.9%
Northbound	All Day	2776	2561	-7.7%
	AM Peak	660	597	-9.6%
	PM Peak	595	547	-8.2%
Both	All Day	5343	5352	0.2%
System-Wide	All Day	6481026	6765182	4.4%

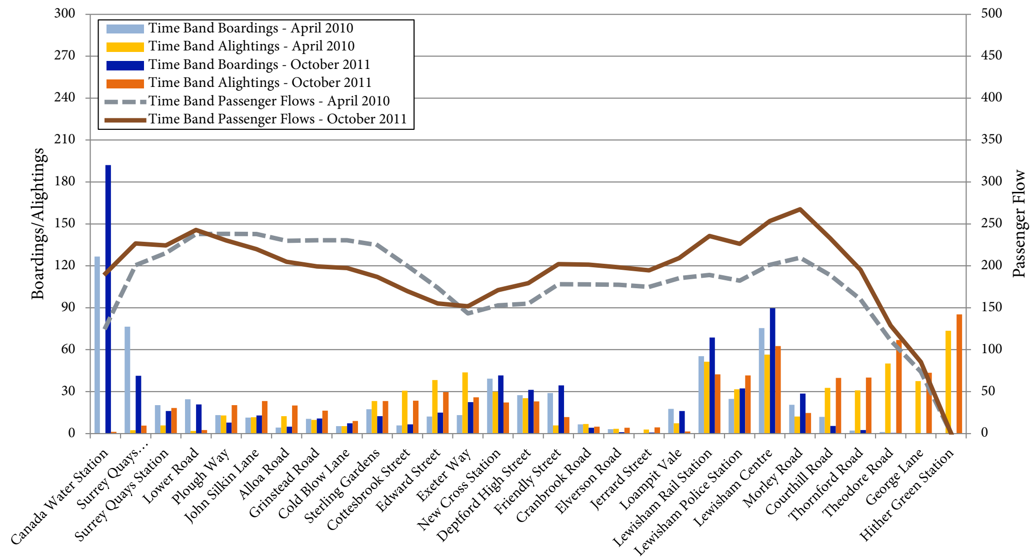


Figure 3-36: Route 225 - Southbound, PM Peak - April 2010 vs. October 2011

3.3.3 Hackney East-West Bus Routes

Just as the Kingsland Road Corridor is the major north-south bus corridor through Hackney, the major east-west bus corridor in the borough runs on Dalston Lane and Balls Pond Road. Routes 30, 38, 56, and 277 run on the corridor, closely paralleling the NLL and crossing the ELL at Dalston Junction station. Despite all four routes crossing at Dalston Junction, they do not have enough consecutive shared stops to create a true interchangeable service similar to the Kingsland Road Corridor analyzed earlier in this document. For this reason, they are considered individually.

All four routes have the potential to act as feeder/distributor services for the ELL because they serve the ELL at its initial northern terminus Dalston Junction. The further expansion of the ELL to Highbury & Islington at the end of February 2011, combined with the increased service frequency of the NLL that started on May 22, 2011, suggest separating the analysis into two distinct time periods: April 2010 versus February 2011, and February 2011 versus October 2011, as well as the combined April 2010 versus October 2011 period.

Route 30

Traveling from just west of Hackney Wick station to Oxford Street, route 30 parallels the NLL from Hackney Central station to Highbury & Islington station and then dives south towards Oxford Street and Marble Arch (see Figure 3-37). Buses arrive every six minutes in the peak and approximately 20,000 riders use the route each day.

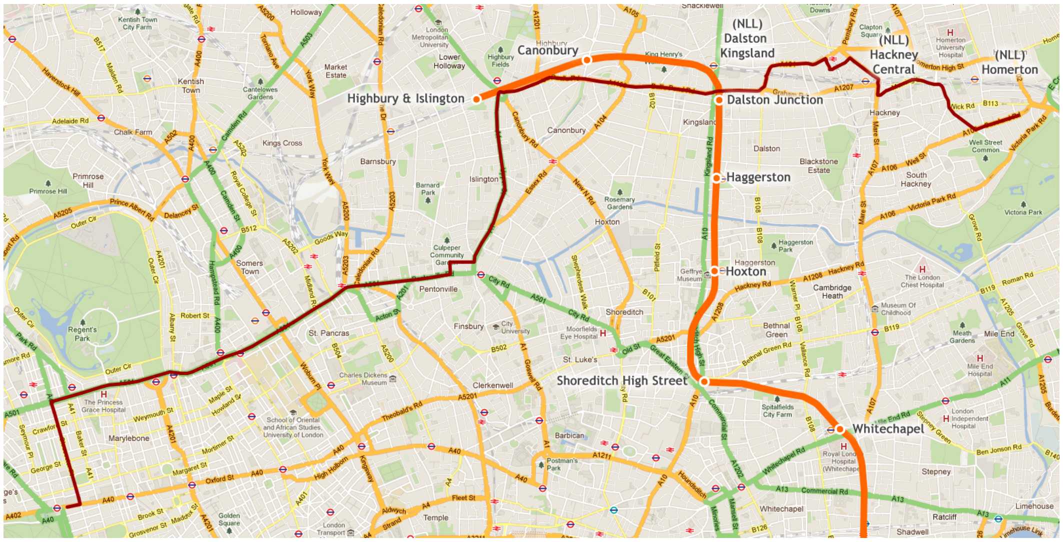


Figure 3-37: Map of Route 30

Route 30 shows little indication that it plays a major feeder role to the ELL, as can be seen in Figure 3-38. Between April 2010 and February 2011 the westbound AM peak experiences a significant drop in passenger alightings at Highbury & Islington (and an accompanying drop in passenger flow before this stop). Some decrease in boardings and increase in alightings is seen around Dalston Junction, implying the local influence of the opening of the ELL. However, it is important to remember that the NLL was closed for refurbishment until June 2010 and it is likely that the large drop seen in passenger flow is a result of users transferring to the NLL once it reopened with larger trains and better service. From February 2011 to October 2011 the opening of the ELL extension and increased service on the NLL seems to have caused a slight decrease in passenger flow from the beginning of the route until Highbury & Islington (Figure 3-39).

The case for route 30 acting as a distributor from the ELL is stronger in the eastbound PM peak (Figure 3-40), with a general decrease in passenger flow across the route until Dalston Junction where a significant jump in boardings causes flow in February to match flow in April. Figure 3-41 shows an increase in flow from February 2011 to October 2011 until Highbury & Islington where an increase in alightings and decrease in boardings indicate the influence of the service expansion on the NLL and the extension of the ELL to that station.

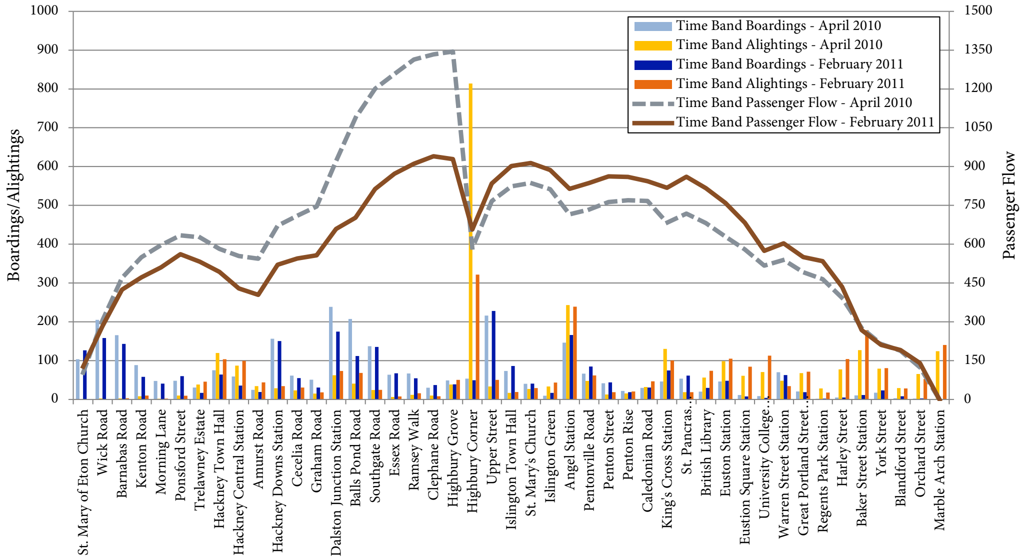


Figure 3-38: Route 30 - Westbound, AM Peak - April 2010 vs. February 2011

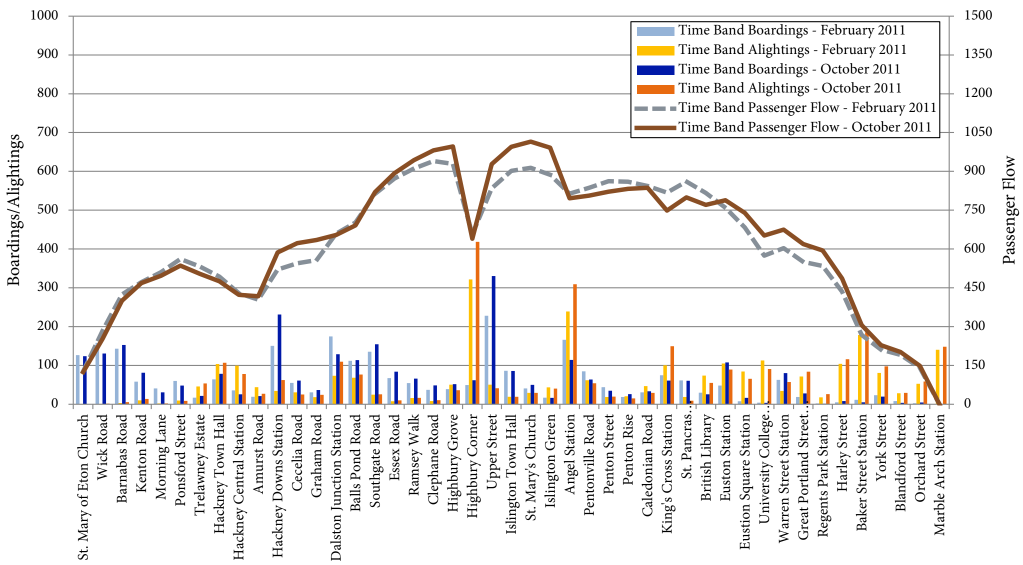


Figure 3-39: Route 30 - Westbound, AM Peak - February 2011 vs. October 2011

Tables 3-45 to 3-47 show the changes in passenger counts during the analysis period. A general decrease in passengers is shown, but it is important to remember that it is difficult to tell how much of the decrease is due to the reopening of the NLL in June 2010 rather than the introduction of the ELL.

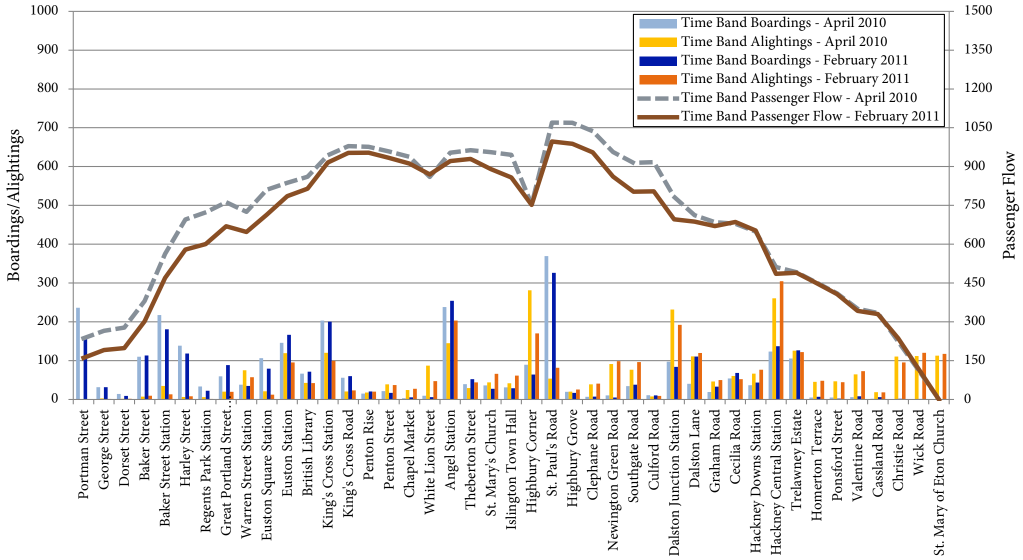


Figure 3-40: Route 30 - Eastbound, PM Peak - April 2010 vs. February 2011

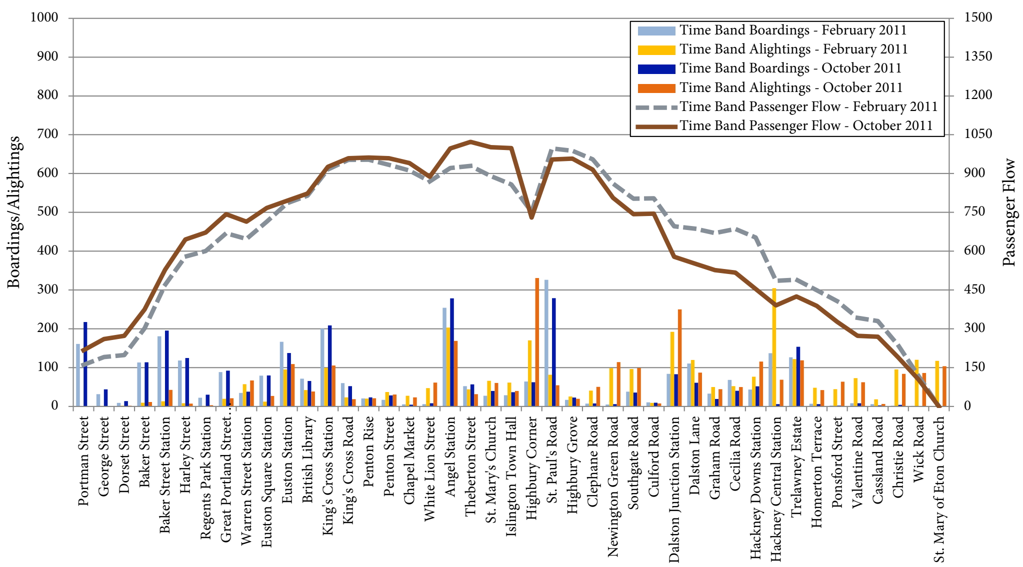


Figure 3-41: Route 30 - Eastbound, PM Peak - February 2011 vs. October 2011

Table 3-45: Route 30 - April 2010 vs. February 2011

Entire Route				
Passenger Counts		Apr-10	Feb-11	Percent Change
Westbound	All Day	10285	9617	-6.5%
	AM Peak	2928	2707	-7.5%
	PM Peak	2002	1874	-6.4%
Eastbound	All Day	10160	10129	-0.3%
	AM Peak	1454	1439	-1.1%
	PM Peak	2891	2850	-1.4%
Both	All Day	20445	19747	-3.4%
System-Wide	All Day	6481026	6627919	2.3%

Table 3-46: Route 30 - February 2011 vs. October 2011

Entire Route				
Passenger Counts		Feb-11	Oct-11	Percent Change
Westbound	All Day	9617	10180	5.8%
	AM Peak	2707	2935	8.4%
	PM Peak	1874	2068	10.4%
Eastbound	All Day	10129	9812	-3.1%
	AM Peak	1439	1348	-6.3%
	PM Peak	2850	2754	-3.4%
Both	All Day	19747	19992	1.2%
System-Wide	All Day	6627919	6765182	2.1%

Table 3-47: Route 30 - April 2010 vs. October 2011

Entire Route				
Passenger Counts		Apr-10	Oct-11	Percent Change
Westbound	All Day	10285	10180	-1.0%
	AM Peak	2928	2935	0.2%
	PM Peak	2002	2068	3.3%
Eastbound	All Day	10160	9812	-3.4%
	AM Peak	1454	1348	-7.3%
	PM Peak	2891	2754	-4.7%
Both	All Day	20445	19992	-2.2%
System-Wide	All Day	6481026	6765182	4.4%

Route 38

Route 38 connects Clapham Pond to Victoria station (see Figure 3-42), providing its more than 45,000 daily riders with a service frequency of approximately 20 buses per hour. It does not parallel the NLL in the same fashion as route 30, putting it mostly outside the influence of the service changes on the NLL.

Figures 3-43 to 3-45 display the westbound AM peak for the three time periods analyzed. From April 2010 to February 2011 the 38 experienced an increase in passenger flow across the route, with the greatest difference seen in the middle portion of Figure 3-43. This appears to be caused by a jump in boardings at Dalston Junction, likely due to the new ELL station there. A bit more peculiar is the 300 passenger drop in alightings at Angel station. This drop is balanced by an increase in alightings over the next few stations from Angel to Museum Street. Figure 3-44 shows a near-reversal of the changes in Figure 3-43, with an increase in alightings at Angel and a decrease in alightings over the successive stops. In addition, a slight increase in alightings at Dalston Junction is present between February 2011 and October 2011. The full 18 month comparison (Figure 3-45) shows how localized any effect of the ELL service is on route 38, showing only a slight increase in both boardings and alightings at Dalston Junction, but no real change in passenger flow that could be attributed to the new rail service.

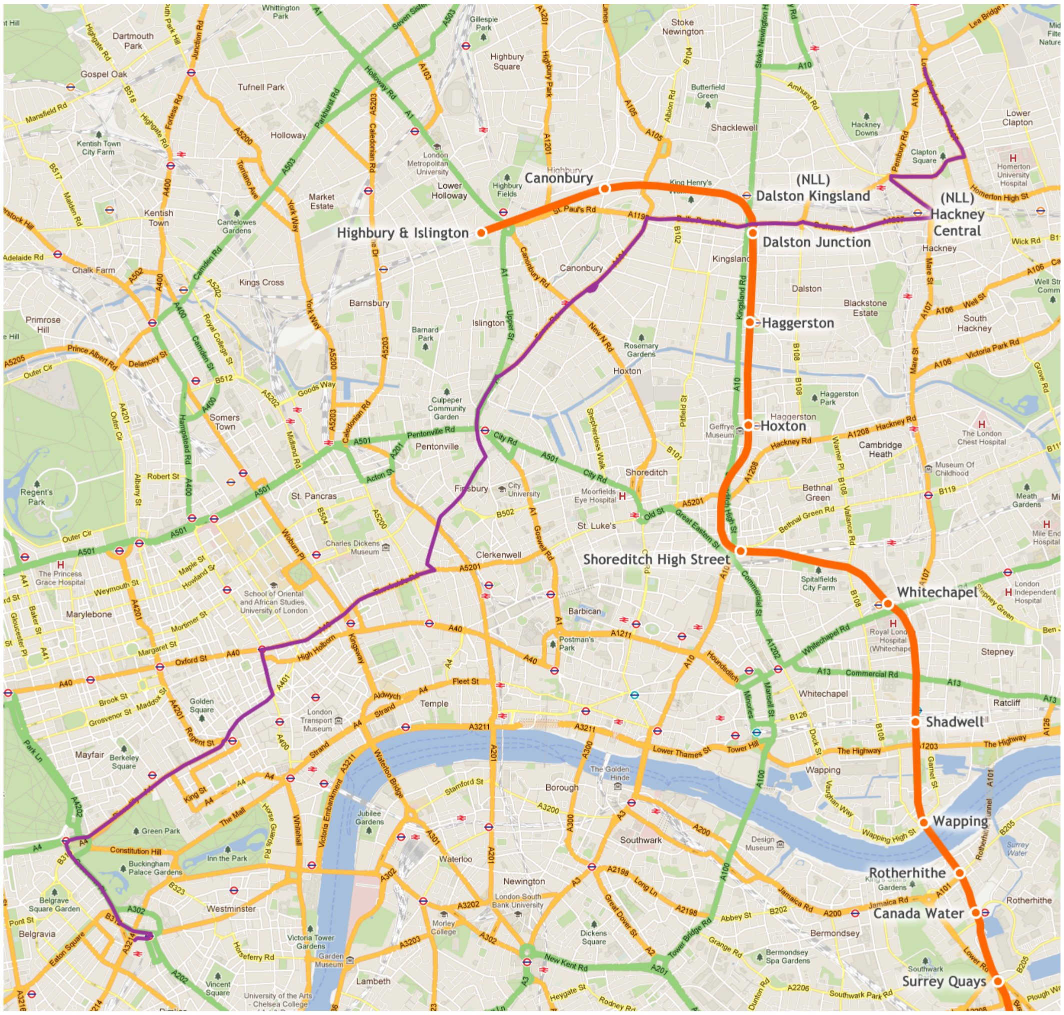


Figure 3-42: Map of Route 38

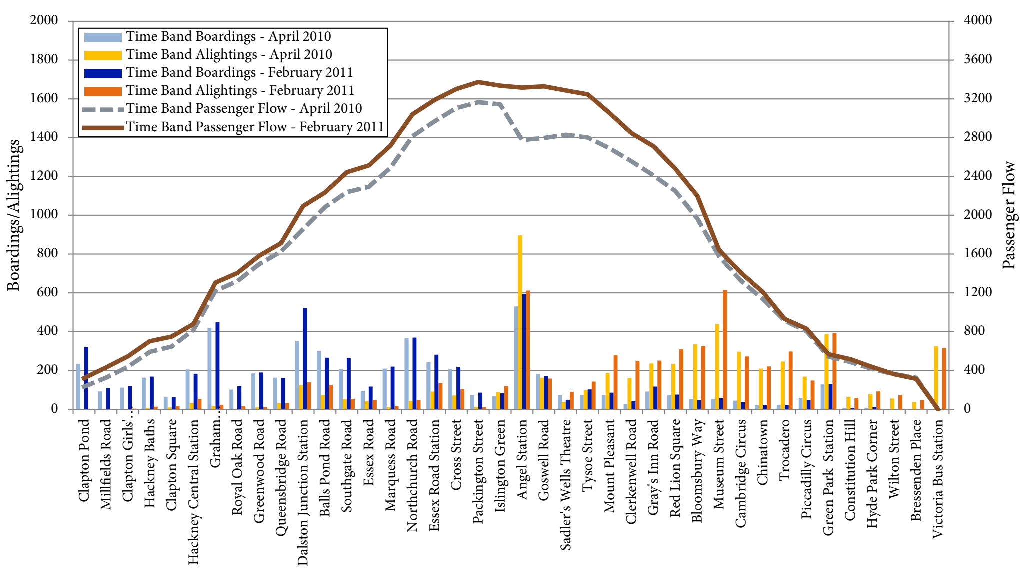


Figure 3-43: Route 38 - Westbound, AM Peak - April 2010 vs. February 2011

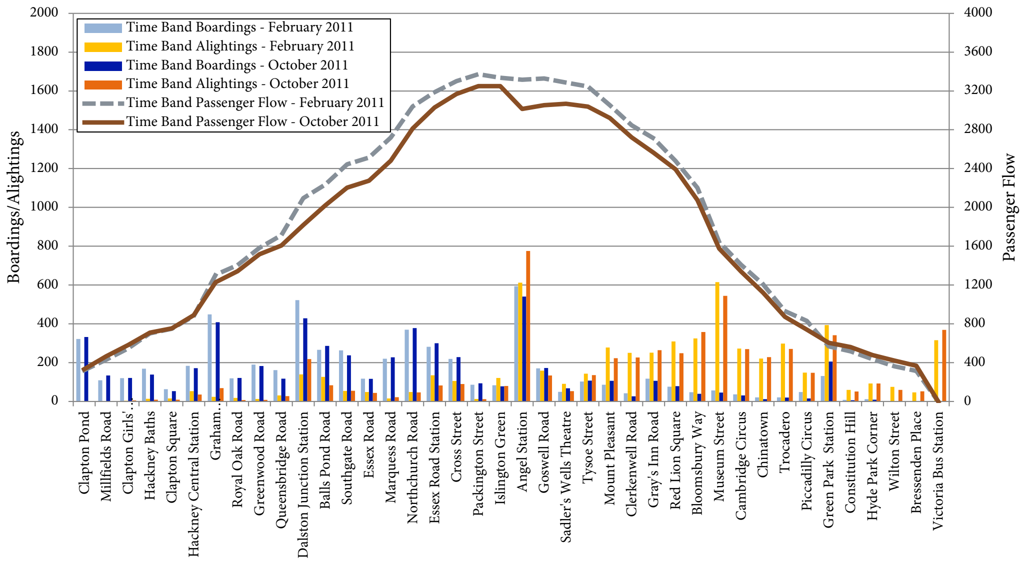


Figure 3-44: Route 38 - Westbound, AM Peak - February 2011 vs. October 2011

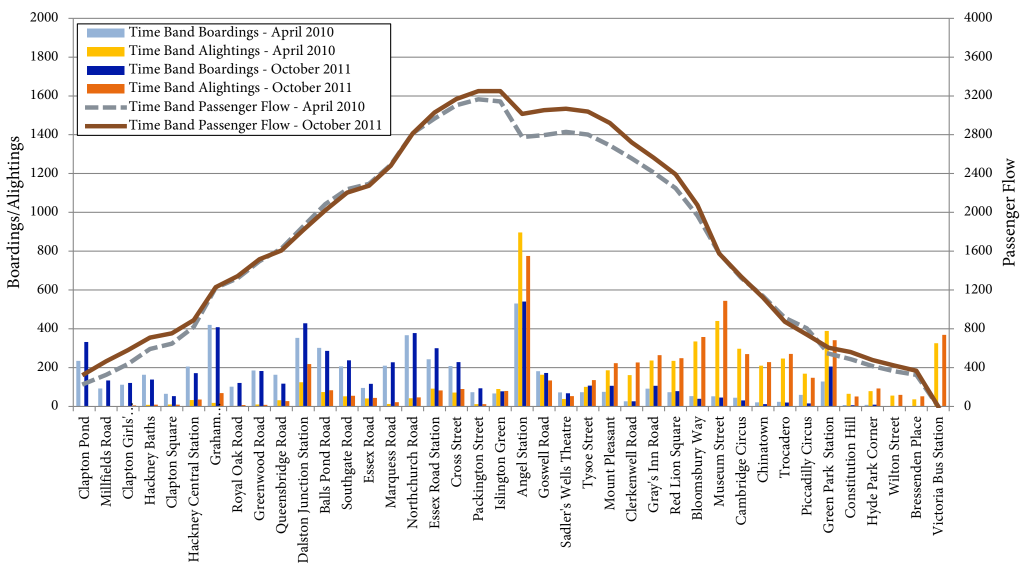


Figure 3-45: Route 38 - Westbound, AM Peak - April 2010 vs. October 2011

The eastbound PM peak experiences nearly identical changes, with very localized shifts in passenger flow noted around Dalston Junction when comparing April 2010 to October 2011.

Changes in passenger counts for the route during the three analysis periods are shown in Tables 3-48 to 3-50. An overall slight decrease in passenger levels is noted and compared to a 4.4% increase in system-wide ridership.

Table 3-48: Route 38 - April 2010 vs. February 2011

Route 38 - April 2010 vs. February 2011				
Entire Route				
Passenger Counts		Apr-10	Feb-11	Percent Change
Westbound	All Day	20736	22272	7.4%
	AM Peak	5400	5940	10.0%
	PM Peak	4941	5372	8.7%
Eastbound	All Day	25173	25742	2.3%
	AM Peak	4310	4479	3.9%
	PM Peak	6834	7359	7.7%
Both	All Day	45909	48013	4.6%
System-Wide	All Day	6481026	6627919	2.3%

Table 3-49: Route 38 - February 2011 vs. October 2011

Route 38 - February 2011 vs. October 2011				
Entire Route				
Passenger Counts		Feb-11	Oct-11	Percent Change
Westbound	All Day	22272	20859	-6.3%
	AM Peak	5940	5752	-3.2%
	PM Peak	5372	4646	-13.5%
Eastbound	All Day	25742	25017	-2.8%
	AM Peak	4479	4389	-2.0%
	PM Peak	7359	7009	-4.8%
Both	All Day	48013	45876	-4.5%
System-Wide	All Day	6627919	6765182	2.1%

Table 3-50: Route 38 - April 2010 vs. October 2011

Route 38 - April 2010 vs. October 2011				
Entire Route				
Passenger Counts		Apr-10	Oct-11	Percent Change
Westbound	All Day	20736	20859	0.6%
	AM Peak	5400	5752	6.5%
	PM Peak	4941	4646	-6.0%
Eastbound	All Day	25173	25017	-0.6%
	AM Peak	4310	4389	1.8%
	PM Peak	6834	7009	2.6%
Both	All Day	45909	45876	-0.1%
System-Wide	All Day	6481026	6765182	4.4%

Route 56

Beginning at Whipps Cross University Hospital in the northeast and traveling to St. Paul's in the City in the southwest, route 56 is the longest route of the four studied here (see Figure 3-46). Similar to the 38, it does not parallel the NLL for very long, limiting much of the following discussion to the 56's interaction with the ELL. Service frequency is eight to ten buses per hour for the majority of the day, with a little over 19,000 passengers carried on a typical weekday.

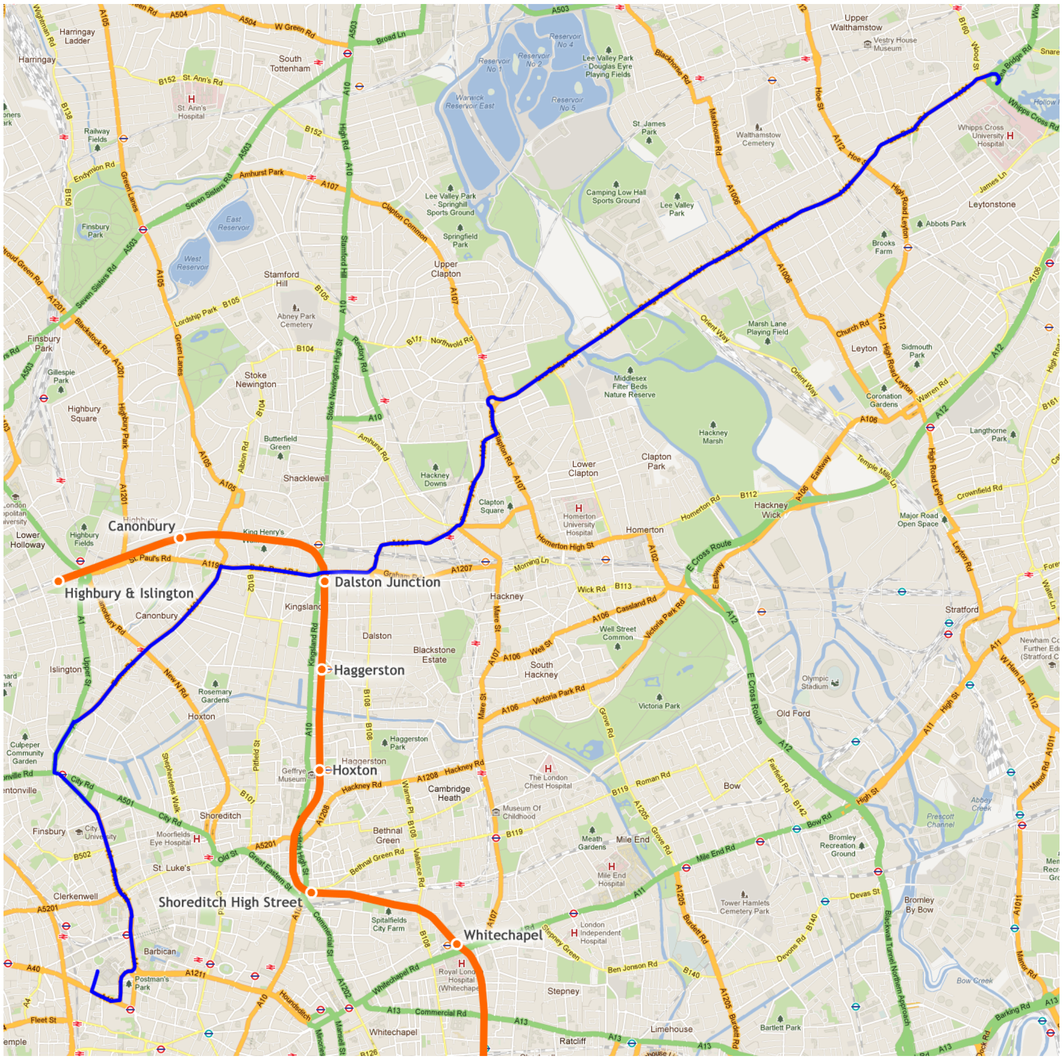


Figure 3-46: Map of Route 56

Similar to the results seen for route 38, Figure 3-47 shows route 56 experiencing a large jump in passenger flow in the middle of the route during the westbound AM peak. Within this surge in passengers an increase in boardings and alightings can be seen at Dalston Junction. However, this increase in activity is not out of scale with changes seen at other stops along the route and it's fairly obvious that route 56 is being influenced by whatever also caused a similar increase in passenger levels on the 38. From February 2011 to October 2011 a familiar pattern occurs, echoing route 38; a slight increase in alightings at Dalston Junction amongst an overall decrease in passenger flow. Figure 3-48 shows the overall changes on the route, with a noticeable increase in alightings at Dalston Junction due to the ELL service. An increase in passenger flow characterizes much of the route in this direction until Angel station where a large increase in passenger alightings leads to decreased flow for the remainder of the route. Roadworks projects between Angel station and the

City are one potential explanation for passengers leaving the route earlier in October 2011 than they did in April 2010 or February 2011.

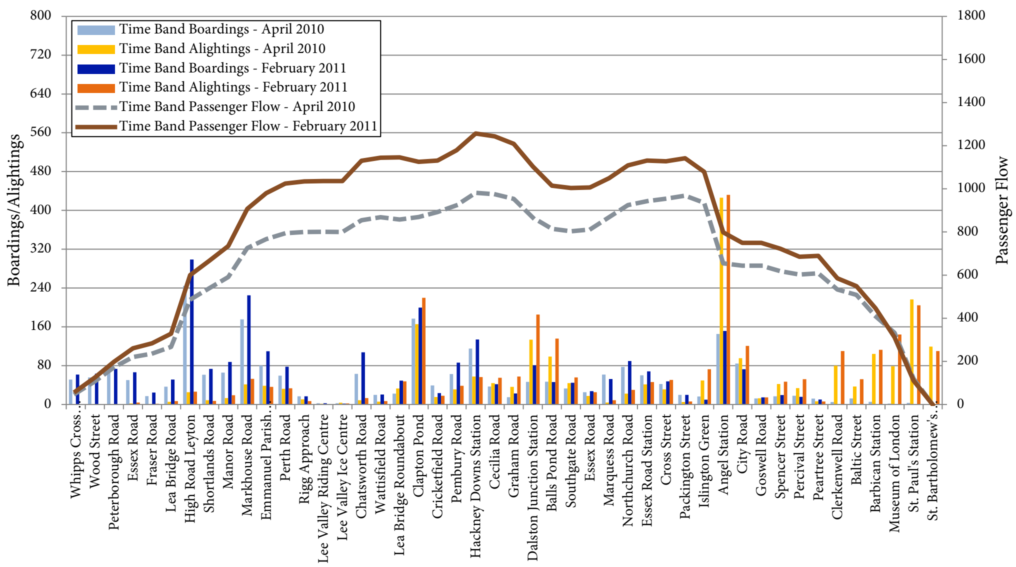


Figure 3-47: Route 56 - Westbound, AM Peak - April 2010 vs. February 2011

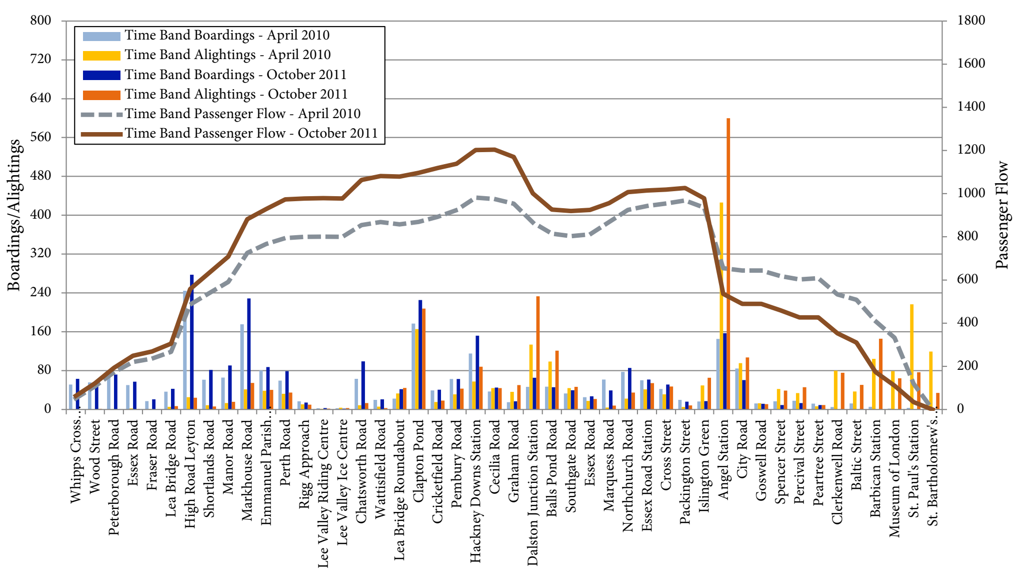


Figure 3-48: Route 56 - Westbound, AM Peak - April 2010 vs. October 2011

The eastbound PM peak follows the same overall trends as the westbound AM peak. However, the results from the three comparisons do not indicate any changes at Dalston Junction, implying that - in this direction - the ELL had essentially no influence on this route. Over the 18 months from April 2010 to October 2011 a slight decrease in passenger flow occurs across much of the route.

Tables 3-51 to 3-53 reflect what is seen in the previous figures with across-the-board increases in passengers from April 2010 to February 2011 essentially matched by decreases in passenger levels from February 2011 to October 2011. The overall result is a slight decrease in passenger counts over the course of the 18 months.

Table 3-51: Route 56 - April 2010 vs. February 2011

Entire Route				
Passenger Counts		Apr-10	Feb-11	Percent Change
Westbound	All Day	9420	10477	11.2%
	AM Peak	2285	2737	19.8%
	PM Peak	1835	2067	12.6%
Eastbound	All Day	10121	11196	10.6%
	AM Peak	1593	1782	11.9%
	PM Peak	2624	3109	18.5%
Both	All Day	19541	21674	10.9%
System-Wide	All Day	6481026	6627919	2.3%

Table 3-52: Route 56 - February 2011 vs. October 2011

Entire Route				
Passenger Counts		Feb-11	Oct-11	Percent Change
Westbound	All Day	10477	9728	-7.2%
	AM Peak	2737	2614	-4.5%
	PM Peak	2067	1907	-7.7%
Eastbound	All Day	11196	9683	-13.5%
	AM Peak	1782	1654	-7.2%
	PM Peak	3109	2484	-20.1%
Both	All Day	21674	19411	-10.4%
System-Wide	All Day	6627919	6765182	2.1%

Table 3-53: Route 56 - April 2010 vs. October 2011

Entire Route				
Passenger Counts		Apr-10	Oct-11	Percent Change
Westbound	All Day	9420	9728	3.3%
	AM Peak	2285	2614	14.4%
	PM Peak	1835	1907	3.9%
Eastbound	All Day	10121	9683	-4.3%
	AM Peak	1593	1654	3.8%
	PM Peak	2624	2484	-5.3%
Both	All Day	19541	19411	-0.7%
System-Wide	All Day	6481026	6765182	4.4%

Route 277

The 277 is different from the other three routes that travel east-west past Dalston Junction in that it does not serve the City of London. It begins at Highbury & Islington and travels east, parallel to the NLL until Hackney Central, and then heads south to the Docklands ending at Tower Hamlets' town hall, near East India DLR station (see Figure 3-49). Eight to ten buses per hour for much of the day provide service to over 20,000 passengers.

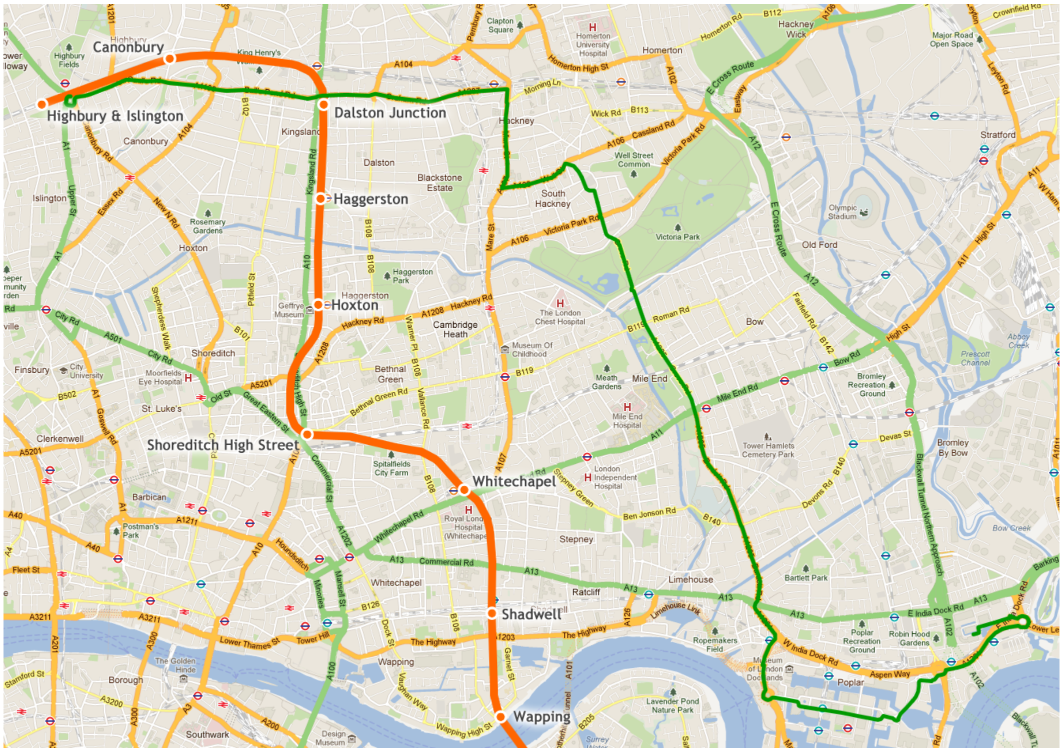


Figure 3-49: Map of Route 277

The eastbound AM peak (Figure 3-50) certainly shows the effect on the route of the reopening of the NLL in June 2010. The drop in passenger flow is largest before Mare Street, which is the stop near Hackney Central and the point at which the route travels away from the NLL. There is no real change around Dalston Junction, with the drop in boardings at Dalston Junction being made up with an increase at the Dalston Lane stop. The bounce in passenger flow at Mile End should likely be ignored given that the drop in alightings in the first stop is nearly matched by an increase in alightings at the second. It seems probable that the sharp drop in alightings in the Docklands is due to the passengers that are now making their journeys in the rail system starting with the reopened NLL. Figure 3-51 shows a further drop in passenger flow across the route, perhaps due to a combination of the ELLX to Highbury & Islington and the increased service on the NLL. The combination of these two time periods (Figure 3-52) demonstrates how large the drop in passenger flow is over these 18 months, most noticeably due to a large decrease in boardings at Highbury & Islington.

Figures 3-53 and 3-54 display the westbound PM peak. From April 2010 to February 2011 (Figure 3-53) a decrease in boardings in the Docklands leads to decreased passenger flow until a decrease in alightings at Mile End. Passenger flow again drops off around Hackney Central, likely reflecting the reopened NLL. The gap between flow in April and flow in February widens further around Dalston Junction, with increased alightings implying that the opening of the ELL siphoned some riders off the end of this route and the Victoria Line into Central London. Figure 3-54 shows a drop in passenger flow on the western half of the route, due to a large increase in alightings at Mile End. It is difficult to say for certain, but this could be due to the new connection provided to Highbury & Islington and beyond by the extended ELL. Like in Figure 3-52, a large overall drop in passenger flow occurs between April 2010 and October 2011 in the westbound PM peak.

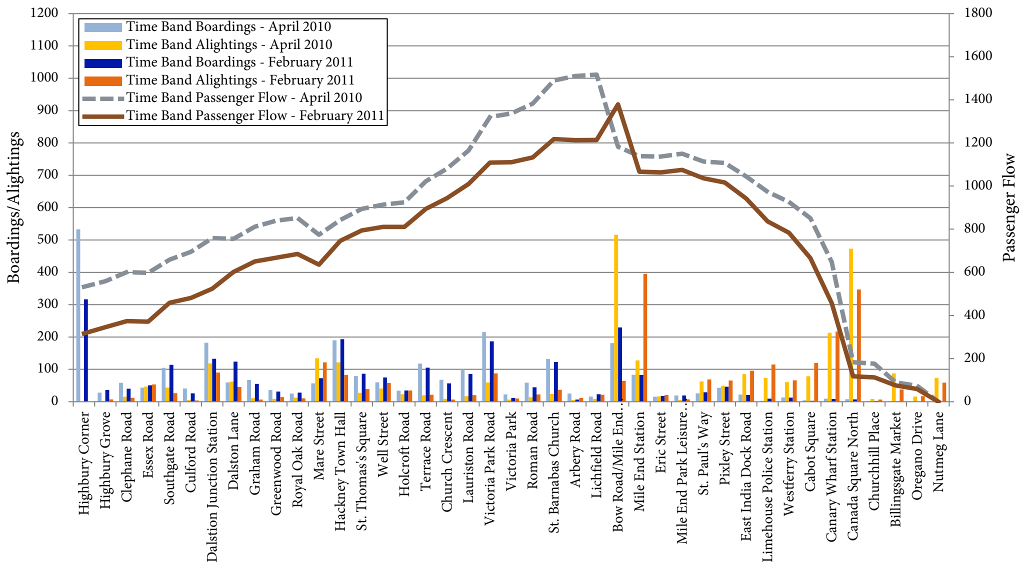


Figure 3-50: Route 277 - Eastbound, AM Peak - April 2010 vs. February 2011

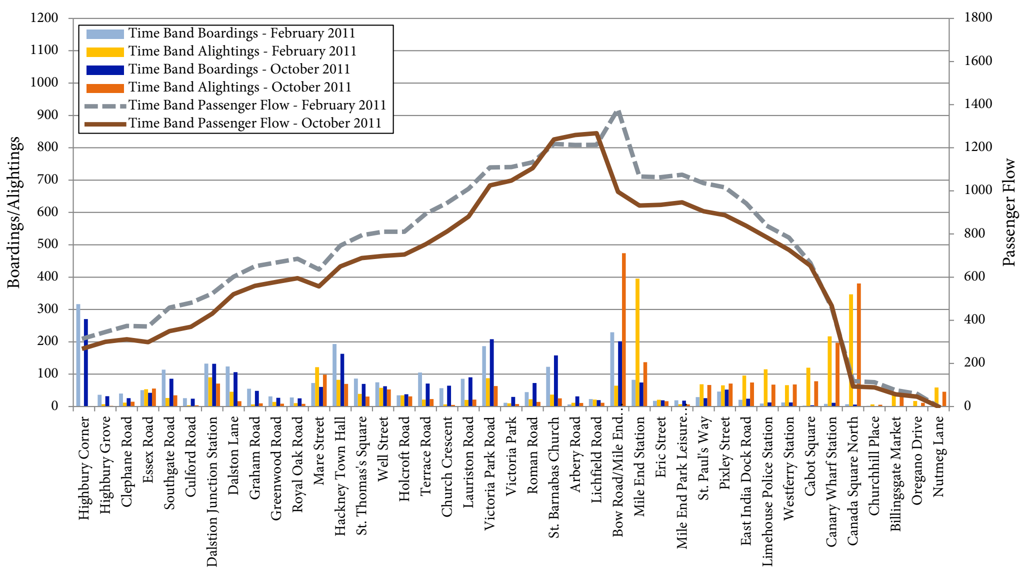


Figure 3-51: Route 277 - Eastbound, AM Peak - February 2011 vs. October 2011

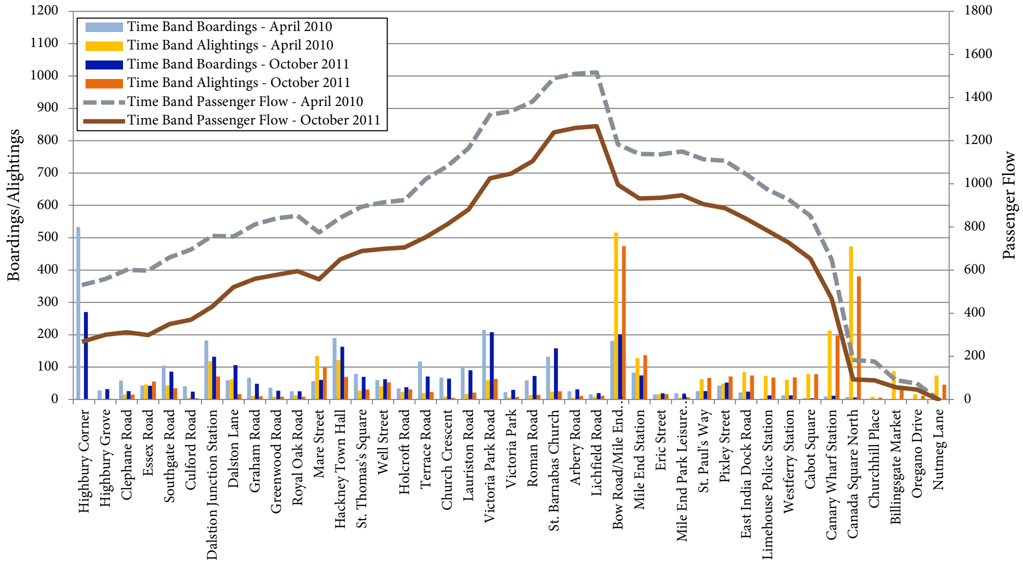


Figure 3-52: Route 277 - Eastbound, AM Peak - April 2010 vs. October 2011

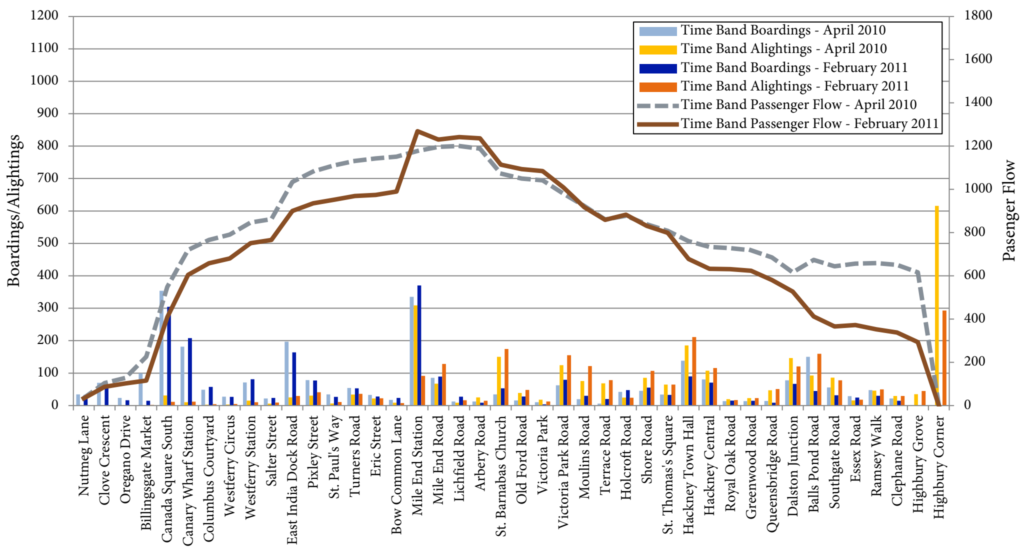


Figure 3-53: Route 277 - Westbound, PM Peak - April 2010 vs. February 2011

Tables 3-54 to 3-56 display the passenger counts for the three analysis periods, showing the drop in passenger counts experienced over the 18 months of the analysis period.

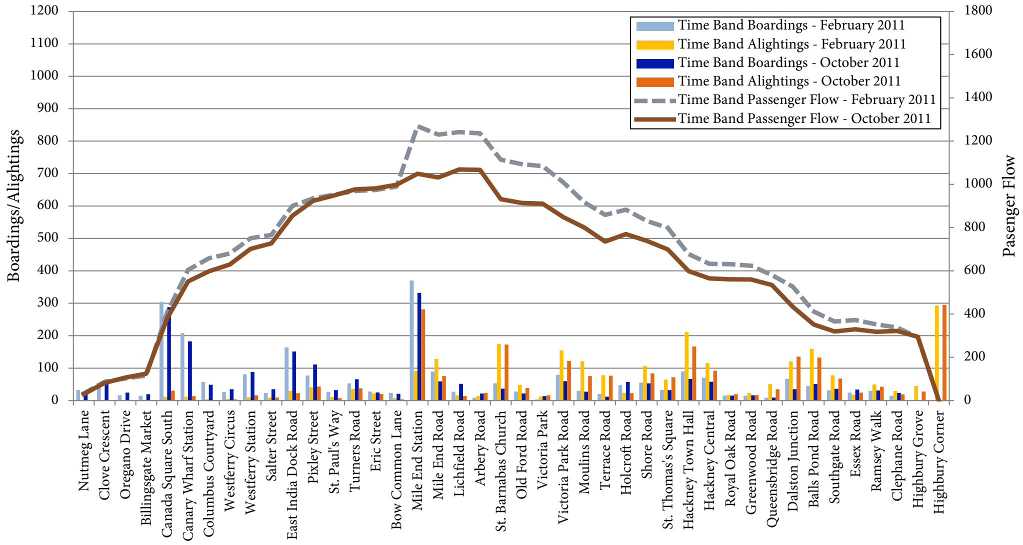


Figure 3-54: Route 277 - Westbound, PM Peak - February 2011 vs. October 2011

Table 3-54: Route 277 - April 2010 vs. February 2011

Entire Route				
Passenger Counts		Apr-10	Feb-11	Percent Change
Westbound	All Day	11134	10447	-6.2%
	AM Peak	2669	2290	-14.2%
	PM Peak	2704	2449	-9.4%
Eastbound	All Day	11665	10916	-6.4%
	AM Peak	2786	2548	-8.5%
	PM Peak	2574	2396	-6.9%
Both	All Day	22799	21363	-6.3%
System-Wide	All Day	6481026	6627919	2.3%

Table 3-55: Route 277 - February 2011 vs. October 2011

Entire Route				
Passenger Counts		Feb-11	Oct-11	Percent Change
Westbound	All Day	10447	9945	-4.8%
	AM Peak	2290	2121	-7.4%
	PM Peak	2449	2363	-3.5%
Eastbound	All Day	10916	10435	-4.4%
	AM Peak	2548	2425	-4.8%
	PM Peak	2396	2220	-7.3%
Both	All Day	21363	20380	-4.6%
System-Wide	All Day	6627919	6765182	2.1%

Table 3-56: Route 277 - April 2010 vs. October 2011

Entire Route				
Passenger Counts		Apr-10	Oct-11	Percent Change
Westbound	All Day	11134	9945	-10.7%
	AM Peak	2669	2121	-20.5%
	PM Peak	2704	2363	-12.6%
Eastbound	All Day	11665	10435	-10.5%
	AM Peak	2786	2425	-12.9%
	PM Peak	2574	2220	-13.7%
Both	All Day	22799	20380	-10.6%
System-Wide	All Day	6481026	6765182	4.4%

3.4 Summary

Studying the ELL as one part of the larger public transportation network in London enables greater understanding regarding changes in travel behavior caused by the new service. The buffer corridors create the opportunity to estimate that the extension of the rail line generated perhaps 65,000 new users to the public transportation system, that journey frequency amongst users near the ELL increased 7% over the 18 month analysis period, and that the distribution of mode share changed dramatically in the corridor as journeys that started at stations with Overground service took the lead amongst all other public transportation modes in the buffer corridor.

Comparing three different methods for calculating passenger flows gives rough estimates of the number of users making path choices that are not captured by the Oyster fare system. System-wide scaling of all Oyster journeys to match control totals results in information on the number of boardings and alightings and passenger flow on the rail line showing the importance of access to the Docklands and the City of London to users from the southern half of the railway. Ridership on the ELL is estimated as 99,400 to 108,300 passengers on a typical weekday in October 2011.

Studying key bus routes in the buffer corridor gives more detail on the effect of the ELLX on the public transportation network in London. The results indicate that the Kingsland Road Corridor (made up of routes 67, 141, 242, and 243) served 3,000 fewer bus passengers (a decrease of 6%) from Shoreditch High Street to Dalston Junction in October 2011 than in April 2010 as a result of the ELL. However, the same four routes collectively gained 3,900 riders over their entire lengths during the same period. A portion of this 3.8% increase in ridership can be attributed to these routes serving as feeder services to the ELL. In comparison, the entire bus system's ridership grew slightly more (4.4%) over those 18 months.

Analyzing changes in bus ridership in the Kingsland Road Corridor provides only part of the picture of the overall increase in mobility throughout the corridor. Integrating the results from Gordon's (2012) system-wide journey scaling method indicates that the average passenger flow on the ELL between Shoreditch High Street and Dalston Junction is about 25,800 on an average weekday in October 2011. When combined with the four bus routes, average passenger flow on public transportation in the Kingsland Road Corridor has risen 75%, from around 33,700 to 58,800. Combining the rail line with the four bus routes, passenger boardings on or near Kingsland Road increased 88% (from 19,800 to 37,200) and passenger alightings on or near Kingsland Road increased 77% (from 21,100 to 37,300).

The two routes south of the River Thames were studied independently of each other. Both are low ridership routes with less than 15,000 passengers a day combined. Because the routes interact with the ELL in its southern segments only one period was used for these analyses, the full 18 month study period. From April 2010 to October 2011, the P12 – which meanderingly connects Honor Oak Park to Surrey Quays – experienced a small growth in passengers, on the order of 2.7% (230 riders). However, based on the changes in passenger flow, boardings, and alightings over that period it is difficult to conclude that any of the route ridership changes were related to the opening of the ELL.

In contrast, route 225, traveling from Hither Green station to Canada Water via New Cross, shows increases in passenger flow south of New Cross and then decreases in flow between New Cross and Canada Water. This makes a strong case that the route is now acting as a feeder/distributor for the ELL until New Cross and then as a partially competitive service from that point north. Overall, the 225 experiences essentially no change in overall ridership when comparing October 2011 to April 2010.

There is some evidence that the four routes that travel east-west across Hackney and intersect the ELL at Dalston Junction serve significant roles as feeder/distributor bus routes. Because routes 30 and 277 parallel the improved NLL from Highbury & Islington to Hackney Central they both experience significant drops in ridership between April 2010 and February 2011, unrelated to the opening of the ELL. Both routes show localized changes around Dalston Junction and appear to lose passengers due to the extension to Highbury & Islington. Overall, both routes saw a decrease in ridership from April 2010 to October 2011 with route 30 down 2% (500 passengers) and route 277 down 11% (2,500 passengers).

Routes 38 and 56 do not follow the NLL, and therefore did not experience significant changes in ridership that can be traced to improvements in the NLL's level of service. Route 38 experienced very localized changes in passenger flow near Dalston Junction that can be traced to the ELL. Overall, the 45,000 passengers per day route saw essentially no change in its ridership from April 2010 to October 2011. In the same fashion, route 56 displayed localized changes around Dalston Junction, but nothing further. With a total decrease of 130 riders (just less than 1%) from April 2010 to October 2011 the 56 also saw essentially no change in overall ridership.

The construction of the ELL certainly had an influence on the ridership levels of routes in its service area, but the magnitude and types of changes experienced vary widely depending on the routing of each bus line. The four north-south bus lines and route 225 saw decreases in ridership in sections of their routes that parallel the East London Line and increases in ridership feeding into the rail line's stations. The P12 and east-west routes experienced only localized changes near ELL stations, making it difficult to argue that they serve any significant role as feeder/distributor routes for the rail line. Similar to the north-south routes and their reaction to the introduction of the ELL, the east-west routes 30 and 277 experienced decreases in ridership where their routes parallel the improved NLL.

4

User Panel Analyses

This chapter introduces the concept of a longitudinal "user panel" to study the influence of the East London Line Extension (ELLX) on travel behavior in London. Five important travel behavior characteristics are analyzed in this chapter to see whether and how they changed following the construction of the ELLX: travel time, journey frequency, mode choice, travel distance, and access distance. Analyzing these characteristics creates a detailed picture of changes in travel behavior following a significant change in the East London public transportation network.

4.1 The User Panel

For the analyses described in the remainder of this chapter a particular group of unique Oyster card numbers was selected to study the changes in travel behavior exhibited by East London Line (ELL) users over time. Referred to as the user panel, this group of Oyster cards are active in both weeks used for analysis (October 2011 and April 2010[1]), tap a gateline or validator at an ELL station in October 2011, and travel on the ELL for part of their journey. Of the 174,496 unique Oyster ID's that utilized the ELL from October 17 - 23, 2011, 54,326 also used the public

1 Due to an error made while gathering the data from February 2011, the Oyster card identification numbers were not encrypted using the same method as the April 2010 and October 2011 analysis periods. The different encryption method of the February 2011 data makes it impossible to identify user panel members in February 2011, so this analysis period is not part of the disaggregate analyses presented in this chapter, and specifically, impacts of the extension to Highbury & Islington cannot be separated from the impact of the introduction of the initial, larger segment of the ELL.

transportation network from April 19 - 25, 2010, and therefore are included in the user panel.

While almost all of the members of the user panel either began or ended their trip on the ELL in October 2011 and either tapped in or tapped out at a station's gateline, the panel does include some users (less than 1%) who traveled on the ELL during the middle segment of their journey and tapped a card validator during a behind-the-gate transfer. Some members (about 4%) who began or ended the rail portion of their journeys on the ELL also happened to tap a platform card validator at the interchange station where they transferred into or out of the rest of the rail system. Card validators are located at specific transfer stations to allow users that tap their Oyster card to demonstrate that they took a route that avoided Zone 1, reducing their fare. To the advantage of this research, many users appear to tap the validators as they pass them, even when it does not save them money. Much of the ELL is located along the border of Zones 1 and 2 so all major interchange locations have card validators, giving insight into users' path choice and indicating whether or not they traveled on the ELL to complete their journey.

It is important to note that the user panel does not include any individuals who may have traveled on the ELL and did not tap any validator or gateline, which could occur at such interchanges as the Victoria Line to the ELL at Highbury & Islington, combined with an interchange at Canada Water to the Jubilee Line. Without the use of a validator at an interchange location it is difficult to predict a user's path choice in this type of situation and therefore whether or not they traveled on the ELL in the course of their journey. Section 3.2.1 uses a comparison between Oyster data scaled to represent all network passenger flows and loadweigh data from ELL trains to estimate that about 8% (8,900 passengers) of all ELL ridership on a typical weekday in October 2011 are transferring behind the gate and therefore are not recorded in the Oyster records or included in the user panel .

4.1.1 Validating the User Panel

Chapter 3 addresses the expansion of Oyster data to represent users who are traveling on a paper ticket or pass. In a similar fashion, the results discussed in this chapter are intended to represent all users of the ELL. As the user panel only includes card numbers that are active in the analysis weeks in April 2010 and October 2011, this section will compare the October 2011 journeys of panel members to the journeys of all Oyster users who boarded the ELL in October 2011. The attributes chosen for this comparison closely relate to the travel behavior characteristics studied in the remainder of this chapter, verifying the representativeness of the user panel.

Journey Frequency per User

An attribute of interest is the number of journeys per week made per user, as it demonstrates whether or not any change in journey frequency experienced by the user panel is indicative of the experience of the larger group of ELL Oyster users. A comparison of journeys per week produces an average that is essentially the same for both groups, but there is some small variation in the distribution of the journey frequency for the two groups (see Figure 4-1). This variation (slightly fewer infrequent users and slightly more frequent users in the user panel) is not significant enough to detract from the results in Section 4.2.1, but nonetheless is interesting to note.

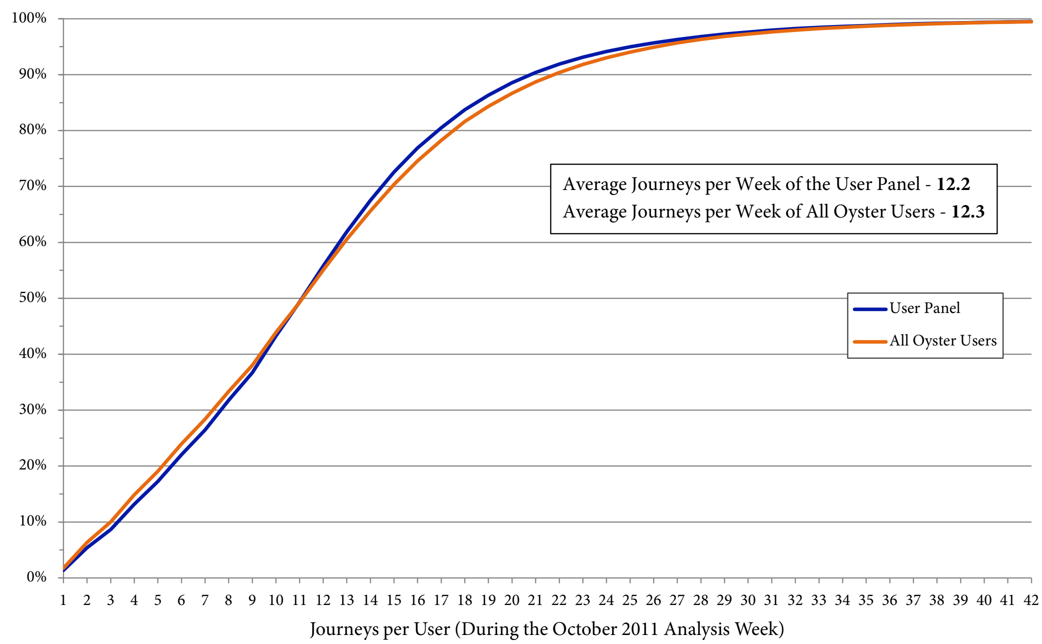


Figure 4-1: Journeys per Week - User Panel vs. All ELL Oyster Users

Journey Time

It is expected that the length of time a user spends in the system while traveling from an origin to a destination has been influenced by the construction of the ELL. Section 4.2.2 addresses this hypothesis utilizing the travel of user panel members, making it desirable to determine if these results can be assumed to be representative of ELL users who are not members of the user panel. Comparing the October 2011 journey times of members of the user panel to all ELL Oyster users indicates a consistent half-minute difference between the two groups (see Figure 4-2). This difference does not appear to indicate any significant bias in the user panel as it represents only about a 1% difference in travel time.

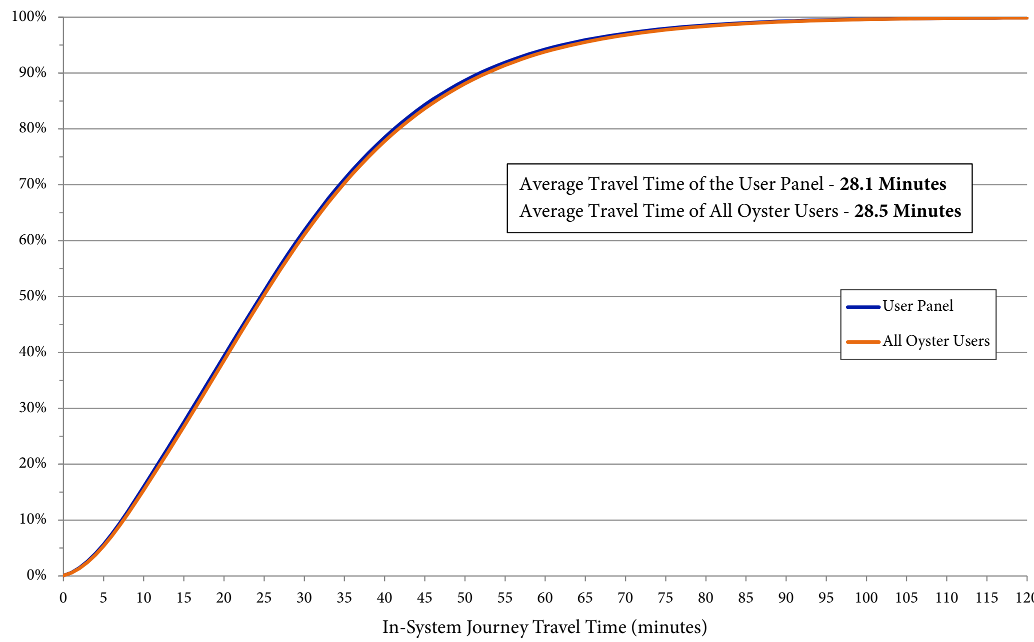


Figure 4-2: Journey Time - User Panel vs. All ELL Oyster Users

Public Transportation Mode Split

Changes in public transportation mode choice following the opening of the ELL are studied in Section 4.2.4 and in order to judge the applicability of the results discussed in that section, the distribution of the mode of the first tap of each Oyster journey segment for members of the user panel was compared to the distribution of the mode of the first tap of each Oyster journey segment of all Oyster users riding the ELL during the analysis week in October 2011. The results of that comparison can be seen in Table 4-1. The table indicates that although some modes see slight differences in utilization levels by each group, none of these differences appear to indicate that the user panel is significantly different from all ELL-riding Oyster users.

4.2 Changes in Travel Behavior by the User Panel

The analyses in this section take two basic approaches. For each attribute of travel behavior all travel by user panel members is compared between the two travel periods, with any changes noted and discussed. The second methodology is a bit more complicated, centering around directly comparing the characteristics

Table 4-1: Starting Mode Distribution between Two Populations during the October 2011 Analysis Week.

Mode	User Panel	All Oyster Users
Underground	25.1%	26.6%
Bus	43.1%	42.5%
National Rail	4.5%	4.2%
Tramlink	0.2%	0.2%
DLR	2.0%	2.2%
Overground	10.3%	9.7%
Underground / NR	1.8%	1.8%
Underground / DLR	0.4%	0.4%
Underground / NR / DLR	0.1%	0.1%
Underground / Overground	3.1%	3.1%
NR / Overground	6.8%	6.6%
Underground / NR / Overground	2.6%	2.6%

of geographically and temporally matched journeys from April 2010 to October 2011 to discover any changes in travel behavior.

As a result of inferring origins and destinations and linking trips (using the method outlined in Chapter 2), the journeys made by each member of the user panel can be used to study travel behavior changes between April 2010 and October 2011. This full set of journeys is used in the first method mentioned in the previous paragraph and includes all 54,362 users in the user panel.

In October 2011 the full set of journeys includes those that use the ELL and those journeys that do not, as the analysis includes all travel by members who used the ELL at least once during a full week. In order to gain a more detailed understanding of any changes in travel behavior, the second method isolates journeys that include travel on the ELL from the larger group of journeys by panel members. This selection of journeys from October 2011 is then "matched" with journeys from April 2010. Journeys are considered matched if all four of the following statements hold:

- The Oyster identification number for the journey in April 2010 is the same as the Oyster identification number for the journey in October 2011.

- The point of entry into the public transportation system in April 2010 is within 1000 meters[1] of the point of entry into the public transportation system in October 2011 (bus stop or station gateline).
- The exiting location from the public transportation network in April 2010 is also within 1000 meters of the exiting location in October 2011.
- In the interest of ensuring consistent service levels between the matched journeys, the first tap of the journey in April 2010 began within 60 minutes of the first tap of the journey in October 2011.
- Again to keep service levels consistent between a matched journey pair, weekend journeys are matched only if the day of the week for each journey is the same in both April 2010 and October 2011. Because holidays were avoided in the analysis weeks, it is assumed that the system's level of service is uniform across all weekdays, and therefore any weekday journey in April 2010 can be matched to any weekday journey in October 2011.

Matching the journeys in this way enables direct comparisons between a user's travel behavior in April 2010 and October 2011, as these matched journeys are considered to be the same journey made 18 months apart. This group of journeys is then used in the second methodology, providing a detailed look at changes in travel behavior for the approximately 14,600 "same journeys" that occurred in both April 2010 and October 2011. The limited number of matched journeys implies a high amount of change in journeys over the 18 month period, as only around 14% of panel members have a matched journey. This could also be due to the chosen 1000 meter matching distance[1] and future data analyses based on this research should perform a sensitivity analysis to determine the correct matching parameters.

This select group of same journeys is well distributed by time band (see Table 4-2) throughout the travel day and across the days of the week (see Table 4-3), providing a representative cross section of travel on the ELL. In some of the analyses presented in the remainder of this chapter, weekday journeys that were made repeatedly during the analysis week by the same user are averaged in order to represent each individual matched journey just once in the results of the analysis. This leads to a reduction in matched journeys from 14,632 to 7,152 and also removes any bias in

1 Based on an assumption of 500 meters as the maximum reasonable access distance to transit, 1000 meters was selected to ensure that matched journeys are, in fact, journeys with the same initial origin and final destination across the 18 month analysis period. Results in Section 4.2.5 imply that this number could be larger, and perhaps should be revised in future research to create a larger selection of matched journeys.

the sample caused by including a journey that occurs at the same time of day with the same origin and destination repeatedly in the results.

Table 4-2: Time Band Distribution of Matched Journeys

Time Band	Distribution	Journey Count
4:00 - 7:00	1%	196
AM Peak	44%	6378
10:00 - 16:00	12%	1700
PM Peak	31%	4562
19:00 - 2:00	12%	1788
Total	100%	14623

Table 4-3: Day of Week Distribution of Matched Journeys in April 2010

Day	Distribution	Journey Count
Monday	19%	2809
Tuesday	20%	2919
Wednesday	19%	2832
Thursday	18%	2682
Friday	17%	2557
Saturday	4%	519
Sunday	2%	305
Total	100%	14623

4.2.1 Journey Frequency

An increase in journey frequency is one change in travel behavior that may result from a significant capital investment in any transportation system. This can be measured a number of ways, including through passenger surveys, but utilizing automatically collected data provides the most expansive sample of users possible to provide a more complete picture of this travel behavior characteristic.

All User Panel Journeys

By simply summing the number of public transportation journeys made by user panel members in the analysis weeks and comparing the totals from October 2011 against the before-ELL totals in April 2010, any increase in overall journey frequency can be immediately noted. In order to ensure that any change in journey frequency is most likely caused by the ELLX, the user panel journey numbers are compared to a similar sized "control" panel of random Oyster users. The results of this comparison (shown in Table 4-4) strongly indicate increased journey frequency due to the opening of the expanded ELL. Given the slight decrease in journey frequency seen by members of the randomly-selected 54,000 Oyster card control panel, the user panel saw an adjusted increase of 14.4% in the number of journeys made, or approximately 85,000 new journeys each week (or about 1.6 journeys per week per user) by members of the user panel. Given the close alignment of the distribution of journey frequency between panel members and all Oyster users of the ELL indicated previously in Figure 4-2, it seems reasonable to apply this growth in journeys to all ELL Oyster journeys. If further expanded to encompass the 174,500 Oyster users of the ELL during the analysis week in October 2011, an estimated 270,000 new journeys per week were generated by the opening of the ELL.

Table 4-4: Changes in Journey Frequency by User Panel Members as Compared to a Control Panel

	April 2010	October 2011	Change
User Panel	591,473	673,666	13.90%
Control Panel	514,772	512,150	-0.50%

Geographically and Temporally Matched Journeys

No change in journey frequency can be calculated from the comparison of journeys due to the nature of the matching process which involves a one-to-one matched comparison.

4.2.2 Travel Time

Saving users travel time is a common justification for making a large capital investment in any type of transportation project and was included in the cost-benefit analysis section of the East London Line Business Case (Transport for London, 2006). Faster travel improves both mobility and accessibility, allowing users to reach more destinations in a reasonable time frame, and reducing the amount of time necessary to accomplish their current daily travel. Questions regarding travel time saved are often included in *ex post facto* surveys of users, but can be inaccurate due to respondents giving rounded answers or poorly approximating their change in travel time.

All User Panel Journeys

Comparing all journeys made by panel members in April 2010 to those made in October 2011, after the opening of the railway, a slight *increase* in in-system travel time is indicated by Figure 4-3. This is somewhat unexpected, but may be related to an increase in average journey distance described in Section 4.2.3, which could indicate (along with the increase in journeys in Section 4.2.1) increased accessibility offered to system users by the construction of the ELLX. Combining these results with the increase in journey frequency per user also implies an increase in the total time users spend traveling after the implementation of the new service, further evidence of improved accessibility and mobility for users as they make more journeys to further destinations than before the line was constructed.

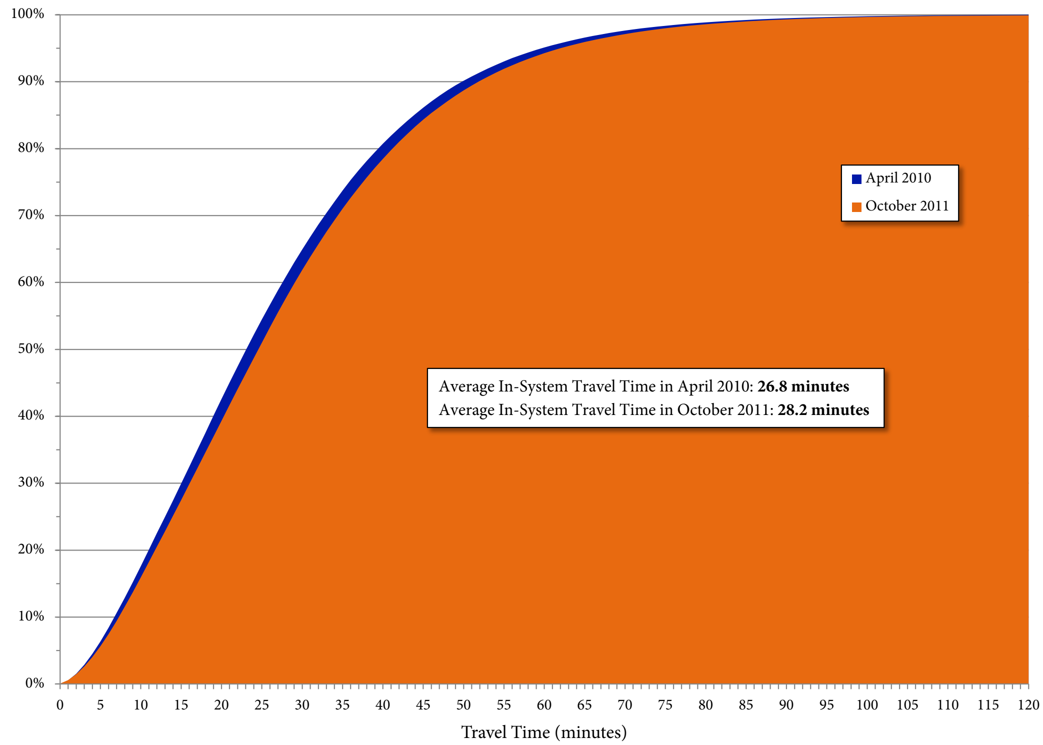


Figure 4-3: In-System Travel Time Distribution of User Panel Journeys

Geographically and Temporally Matched Journeys

In an attempt to measure the changes in travel time experienced by users on journeys that now include the ELL, user panel journeys in April 2010 and October 2011 are matched using the procedure outlined at the beginning of Section 4.2.

Figure 4-4 shows the distribution of the change in travel time between 7,152 pairs of matched journeys, which were selected using the previously discussed method to remove bias caused by including the same journey repeatedly in the distribution. The results indicate that the average journey using the ELL in October 2011 took 4.1 minutes less than the same journey in April 2010 before the opening of the ELL.

Many of the members of this sub-selection of the user panel have more than one matched journey. Figure 4-5 displays the distribution of average travel time saved per trip (averaged over all of their unique matched journeys) by each user with at least one matched journey. The 4,820 users (9% of the entire user panel) saved an average of 3.9 minutes on each journey they made, with a similar distribution to

Figure 4-4. When users replaced at least part of their journey in April 2010 with travel on the ELL, 2,945 (61%) of the users saw decreased journey times.

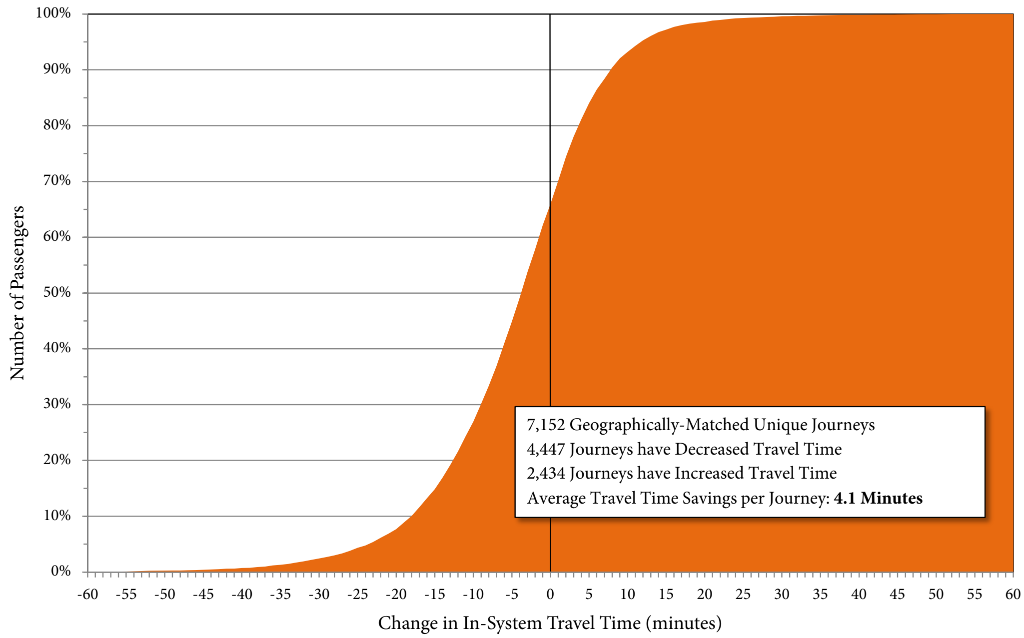


Figure 4-4: Distribution of Changes in Travel Time Experienced for the Same Journey

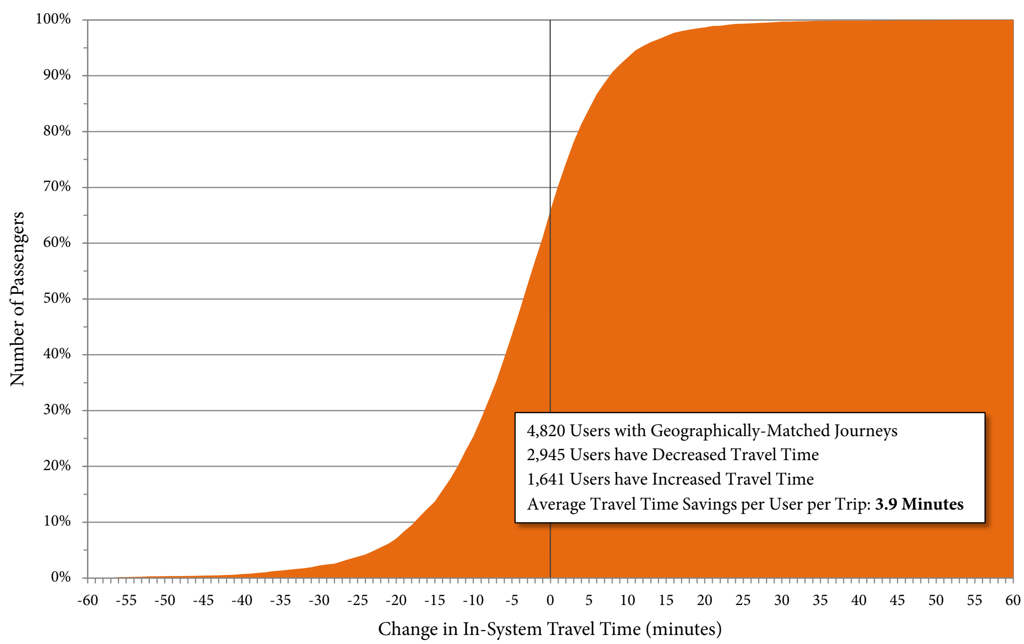


Figure 4-5: Distribution of Changes in Travel Time Experienced per User

Figure 4-6 shows the results of organizing the changes in travel time by the number of times a matched journey was repeated during the analysis weeks. The numbers inside the orange bars indicate the number of unique matched journeys made by users at that frequency during the analysis week. This analysis implies that the more

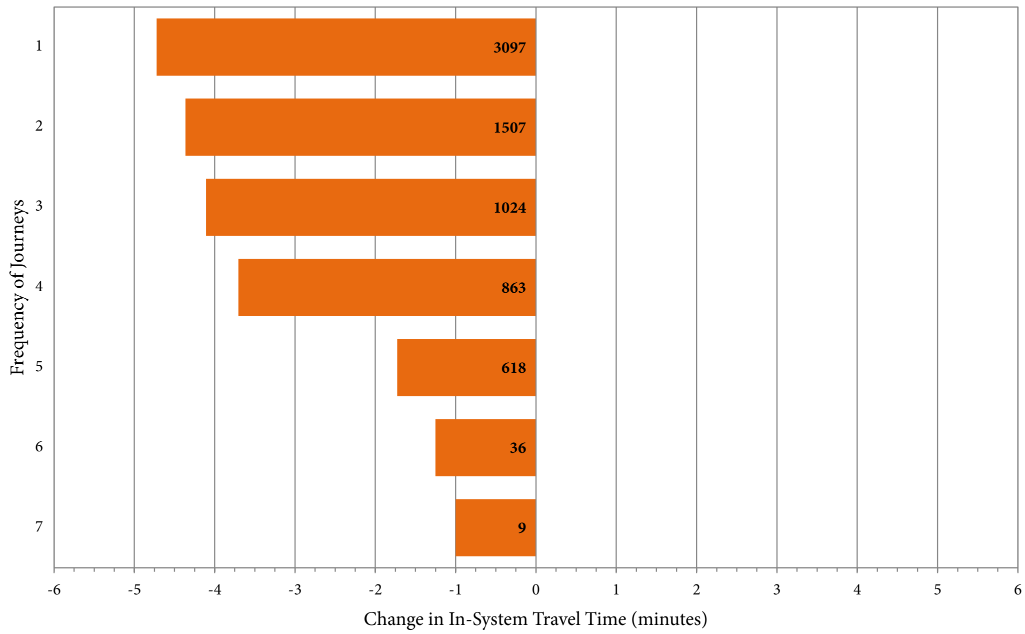


Figure 4-6: Change in Travel Time by Weekly Frequency of Journey

frequently a journey occurred, the less average travel time savings experienced by the user each time that passenger made that particular journey.

Comparing changes in travel time by the public transportation mode of the station or stop of entry for the April 2010 journey of the matched pair gives insight into any differences caused by the access method. In particular, Figure 4-7 indicates that when travel by bus is replaced by the ELL travel time savings are about two and a half times greater than with other modes. The travel time savings may be even larger (perhaps an additional two to three minutes) considering that in-system travel time as recorded by Oyster cards does not include wait time for bus service, unlike all the rail services listed here. All rail services appear to have about the same amount of travel time savings, perhaps reflecting that the ELLX provides a more direct route for the user, but not a speed advantage in the way that vehicles with a dedicated right-of-way have over mixed-traffic buses. The small sample size for matched journeys in April 2010 that started at an Overground, Underground/DLR, and Underground/NR/DLR make it likely that the changes in travel time indicated can not be reliably applied to other journeys made from stations served by those modes.

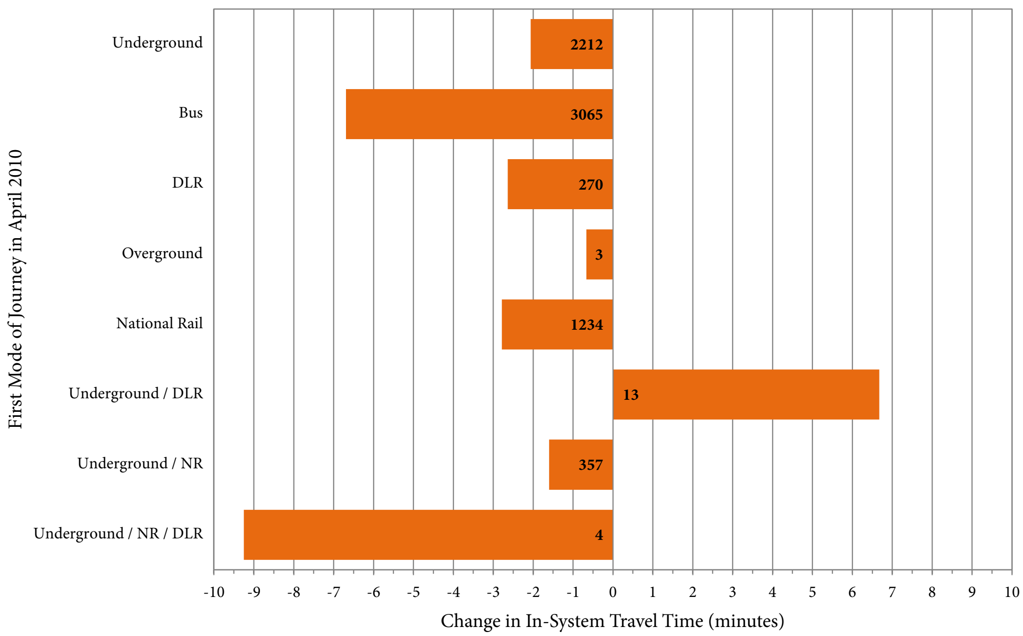


Figure 4-7: Change in Travel Time by Prior Mode

The final analysis of travel time savings for matched journeys studies any geographic differences in travel time savings by the station of access or egress[1] in October 2011 for the ELL portion of the user's journey. The results of this method of isolating travel time changes are displayed in Figure 4-8 and show some interesting trends. It appears that the four new stations north of the river and the stations between New Cross Gate and Crystal Palace south of the river provide users with the greatest level of travel time savings. This is not a surprise, as the lack of rail service at the four stations north of the river before the opening of the ELL would have left those riders dependent on mixed-traffic bus services. South of the river the riders in this sample are making journeys that heavily favor heading to or from the north and east and the new interchange opportunities at Canada Water, Whitechapel, and Highbury & Islington save them significant travel time over interchanges in Central London at stations such as London Bridge. The stations (Shadwell, Wapping, Rotherhithe, and Surrey Quays) that are near a station that was already open in April 2010 see less travel time savings. This is probably due to users who previously walked to Whitechapel or Canada Water in April 2010 experiencing larger in-system travel times by taking the ELL closer to their origin or destination being balanced by those users who previously interchanged to or from a bus at Whitechapel or Canada Water

1 If a user taps in and out on the ELL, the change in travel time is included for both the station of access and the station of egress. Journeys which do not tap at a station gateline on the ELL are not included in this analysis, perhaps causing the low number of journeys in the sample at the three major interchange stations (Highbury & Islington, Whitechapel, and Canada Water).

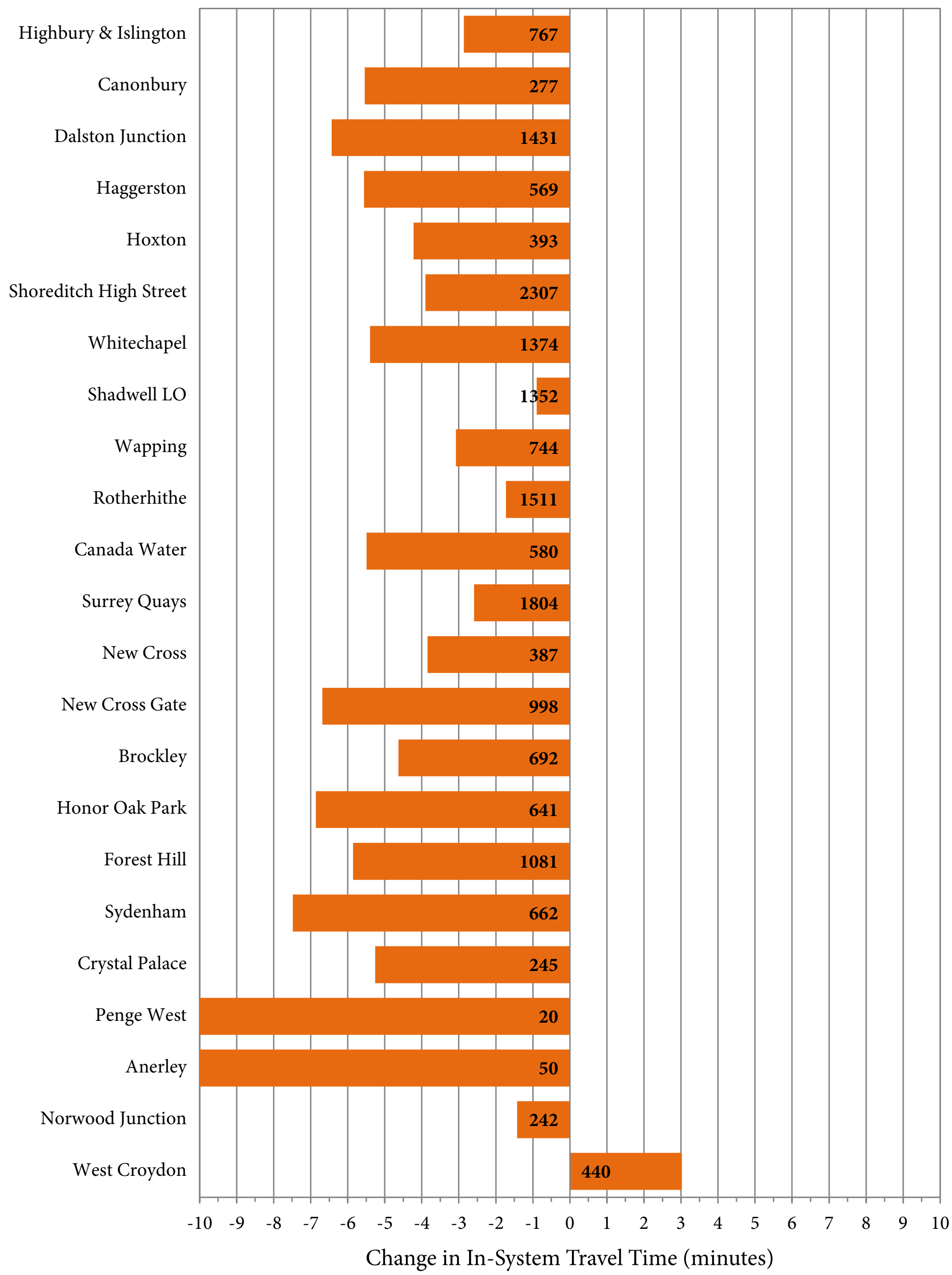


Figure 4-8: Change in Travel Time by Station

and therefore experienced decreased in-system travel times. The changes in travel time seen at Norwood Junction and West Croydon are likely due to an interesting path/mode choice by users. Previously, users would enter the rail system at East Croydon rail station (approximately 600 meters southeast of West Croydon) either by walking there or boarding a bus from the area around Norwood Junction and taking it to East Croydon. East Croydon is served by the First Capital Connect Thameslink service which provides non-stop service from East Croydon to London Bridge. The users who have chosen to switch to the ELL are apparently finding the slightly slower ELL service a worthwhile trade-off for avoiding central London as they make their journeys to and from places like the Docklands. The small number of matched journeys using the ungated stations of Penge West and Anerley make it difficult to conclude anything from their observed changes in travel time.

These various methods of displaying and analyzing the changes in travel time experienced by the users making the matched journeys lead to one central point; the ELL is saving the average user approximately four minutes on each journey, but there is significant variation in how much time is being saved (or lost) depending on origin, destination, and the other modes available to the user before the opening of the extended ELL.

4.2.3 Journey Distance

Increasing journey distance is typically not the goal of a major capital investment like the ELLX. However, it can be a reflection of the reduced travel times outlined in Section 4.2.2 and can demonstrate increased accessibility to destinations not previously frequented by travelers.

All User Panel Journeys

Because Oyster card data does not always contain enough information to determine a user's path through the public transportation network, actual traveled distances cannot be compared. However, even studying differences in as-the-crow-flies distance can provide insight into any increase in accessibility provided by the ELL. Figure 4-9 shows the results of a comparison of straight-line distances between journey origins and destinations in April 2010 and October 2011, indicating a slight increase in the distance traveled by the user panel from an average journey length of 6.1 kilometers in April 2010 to 6.5 kilometers in October 2011. When combined with the results in Figure 4-3, a calculation of average speed shows a small increase (13.6 km/hr to 13.9 km/hr) providing further evidence that the ELL is shortening journey time for members of the user panel.

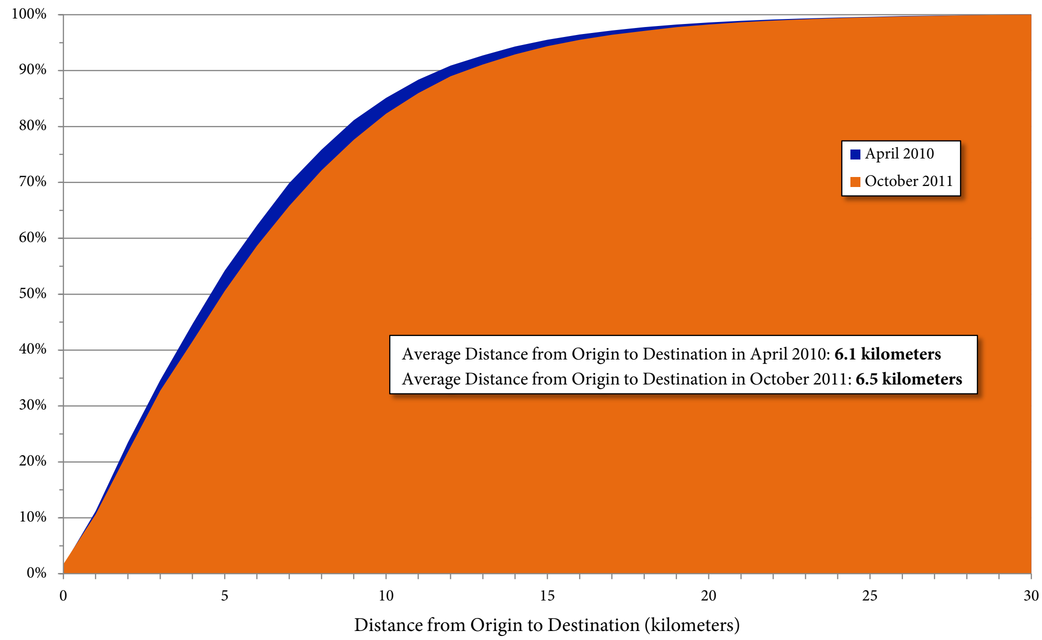


Figure 4-9: Distribution of Journey Distance of User Panel Journeys

Geographically and Temporally Matched Journeys

Given that the journeys are matched between April 2010 and October 2011 based on having similar origins and destinations, by definition no change in journey distance is seen in this sub-set of the user panel journeys.

4.2.4 Public Transportation Mode Shift

Any change in mode share triggered by the investment in the ELL would be an important indication of its benefits. Automatically collected data are limited in this realm as the ADC sources from a public transportation agency cannot provide detailed information on any mode shift from modes outside the agency's fare card system. In London's case, that means manual surveys must still be relied on to determine market capture from private vehicles, taxis, walking, and bicycling. However, within the public transportation system, automatically collected data can be used to determine how mode choice has changed between metro, regional and light rail, and bus service.

All User Panel Journeys

Given the complexity of London's public transportation network, it is difficult to assign journeys to modes without studying each one individually. Therefore, Figure 4-10 displays the distribution of the mode of the initial station or stop of each journey during each analysis week. Despite the limitations of this method, a significant

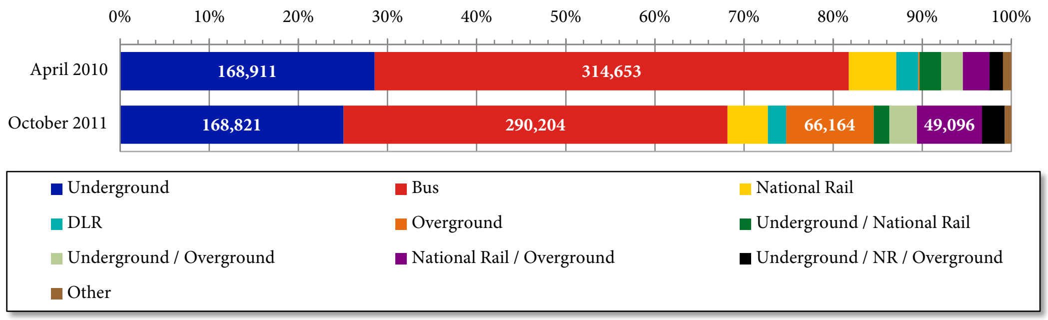


Figure 4-10: Distribution of Mode Shift - All User Panel Journeys - April 2010 vs. October 2011

decrease in mode share for Bus is immediately identifiable, as journeys that start at Overground stations grow significantly. Additional growth is seen at National Rail/Overground stations (such as those south of Surrey Quays), Underground/Overground stations (such as Whitechapel and Canada Water), and Underground/NR/Overground stations (such as Highbury & Islington). The mode share of Underground and National Rail stations falls, but in both cases it is actually a nearly constant number of entries and the decrease in mode share reflects the increase in journey frequency amongst panel members. However, a deeper understanding of changes in path and mode choice by panel members requires assigning modes to each journey, something that was done for the matched journey group.

Geographically and Temporally Matched Journeys

Utilizing the matching process outlined at the beginning of Section 4.2, the portion of a user's journey on the ELL in October 2011 was matched to the same portion of the journey in April 2010, determining the mode that a user replaced with the Overground. Of the 14,660 matched journeys, 273 were too difficult to determine which portion of the journey the ELL replaced, and therefore are not included in the results in the remainder of this section.

Amongst all matched journeys, ELL users came from every mode in the public transportation system, with 61% of journeys previously on other rail modes and 39% of journeys previously served by London Buses (see Figure 4-11).

Figure 4-12 shows the distribution of mode shift at the station level. These observations are categorized by the station of access from the ELL portion of the October 2011 journey. A similar analysis performed by station of egress indicated nearly identical results and is not displayed here. Figure 4-12 indicates that the four new stations north of the river are largely gaining market share from nearby bus service, an expected development given that there was no nearby rail service before

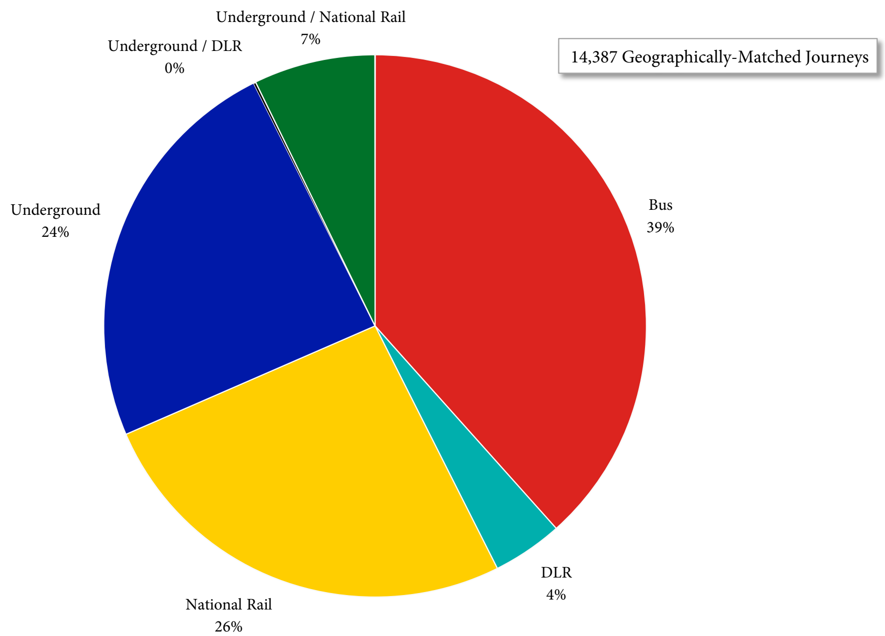


Figure 4-11: Distribution of Mode Shift to the ELL - Matched Journeys- April 2010 vs. October 2011

the ELL. Shoreditch High Street does show a significant percentage of its journeys previously used Underground and/or National Rail. This is due to its proximity to Old Street and Liverpool Street stations, both of which are served by Underground and National Rail. Whitechapel and Wapping show the influence of users who previously exited the DLR at Shadwell and walked to their final destination closer to those two stations. Rotherhithe and Surrey Quays show the exact same phenomena for Underground riders who previously walked to or from Canada Water. The remaining southern stations are dominated by users who are traveling to or from the north and east, with those riders previously taking National Rail into London Bridge Station. Again, note that Penge West and Anerley have small sample sizes, and therefore these results should not be used to provide reliable insight into traveler mode choices at those two stations.

4.2.5 Access Distance to Stations and Stops

The final travel behavior characteristic studied using the user panel was access distance from a user's place of residence to the station or stop where the user started a journey. It was expected that there would be an increase in access distance for many users between the two analysis weeks if they live near the ELL as some users would be willing to walk further for the faster service offered by the rail line. This is not expected to be universal, as some users may now live much closer to a station

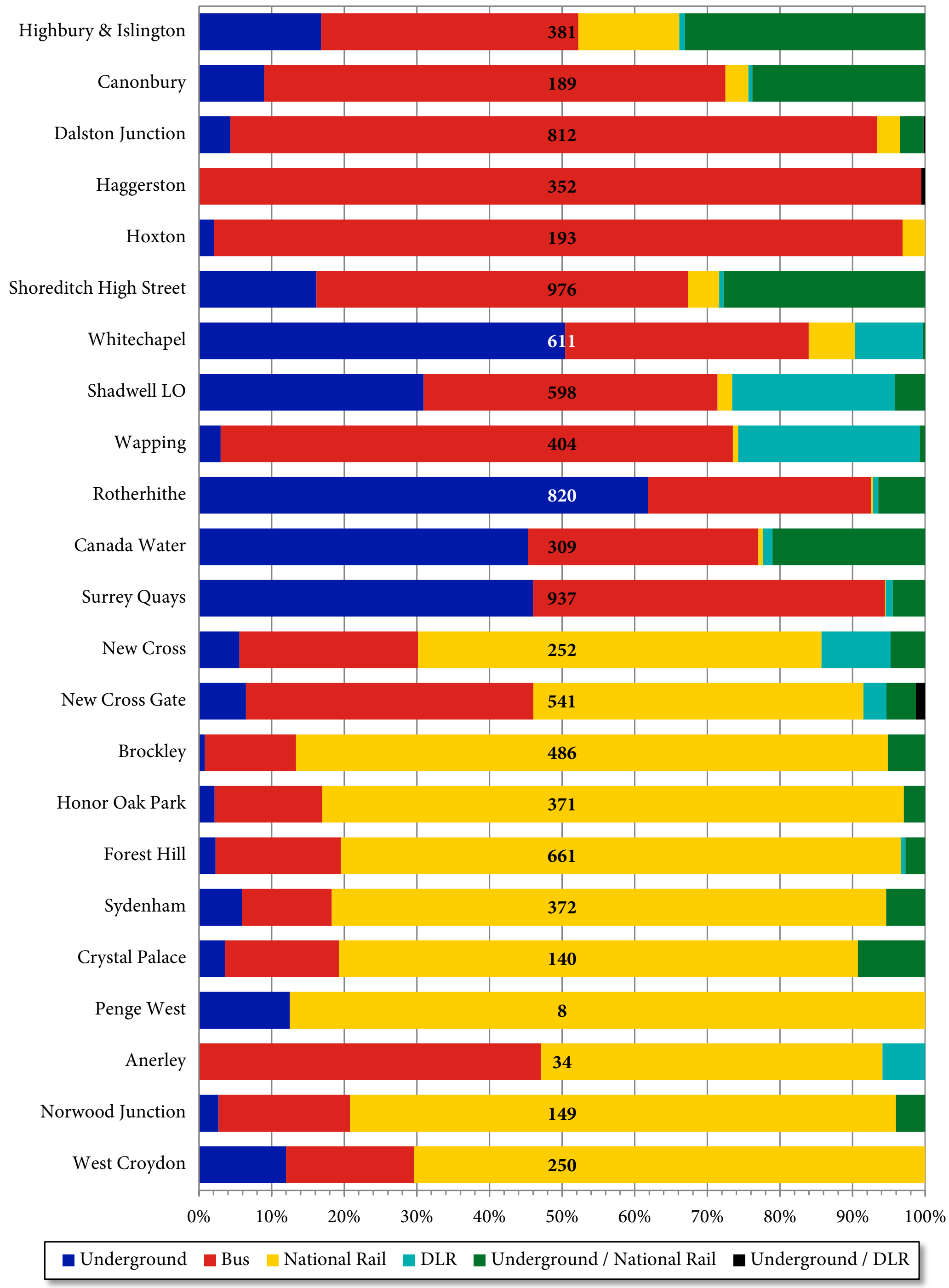


Figure 4-12: Distribution of Mode Shift by ELL Access Station - April 2010 vs. October 2011

than they did previously, decreasing their access distance (particularly for those users living near Surrey Quays, Rotherhithe and Wapping).

All User Panel Journeys

Approximately half (26,000) of all user panel members provided a postcode when registering their Oyster card (typically to load a monthly pass on to it). Of these 26,000 Oyster cards with postcode information on file with TfL, about 15,700 users began their first journey of the day on at least one day of both analysis weeks at a station or stop within 1,200 meters[1] of their registered postcode. Because the selected users made their first tap of the day near this postcode, it is assumed that this postcode is their place of residence.

Figure 4-13 indicates a slight increase in average access distance for users of a little over 25 meters. When combined with the information on average access distance by mode from the user panel members in October 2011 (see Table 4-5), this seems to be consistent with results in Section 4.2.4, which indicate that journeys starting at a bus stop make up about 20% less of the journeys in October 2011 than in April 2010. As more journeys begin at a rail station, the average access distance increases slightly.

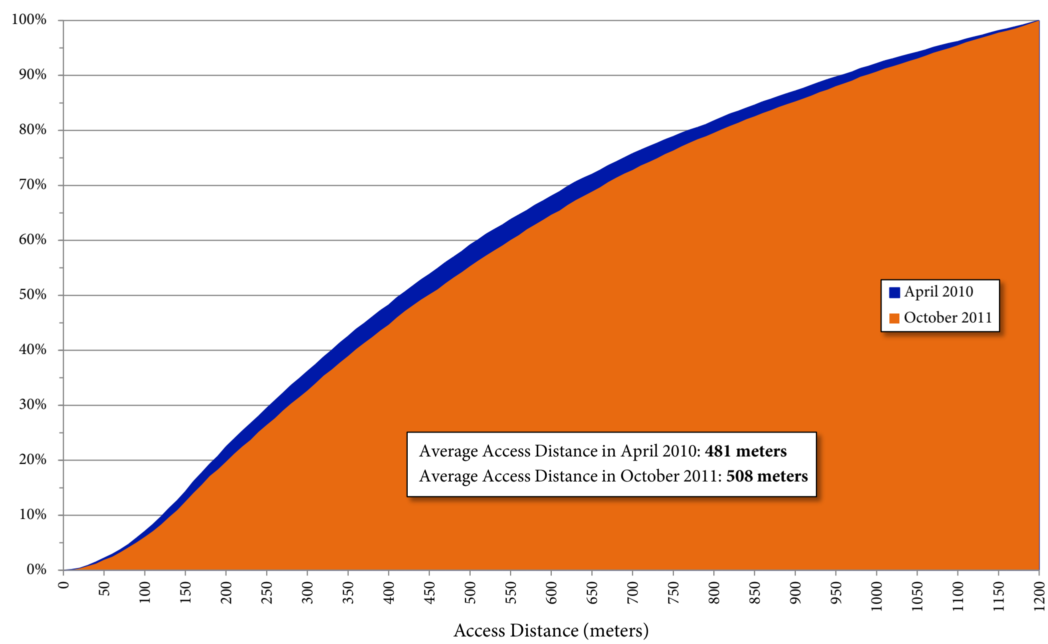


Figure 4-13: Distribution of Changes in Access Distance - All User Panel Journeys

1 1,200 meters was selected as the outer limit of expected access distance by creating a probability distribution function of the distance between the location of the first tap of the day and the registered postcode for all 26,000 panel members from all days of each analysis week. 1,200 meters is approximately the location where the slope of the number of users per meter of access distance "flattened".

Table 4-5: Access Distance by Initial Mode in October 2011

Mode	Count	Average (meters)
Underground	12018	693
Bus	34698	556
National Rail/Overground	28572	634
DLR	1803	540

Geographically and Temporally Matched Journeys

Of the 14,660 matched journey-pairs, only 3,905 journey-pairs could be used in this analysis (beginning within 1,200 meters of the travelers registered postcode in both April 2010 and October 2011). The changes in access distance experienced by the passengers making this smaller sample of matched journeys are described below.

Similar to the process followed for Figure 4-4, the calculation of the distribution of change in access distance per journey uses each unique origin-destination pair only once per user, averaging the change so that those journeys are not double-counted in the distribution. Figure 4-14 displays the results of this analysis, indicating a slight increase in the average access distance per journey. In the same fashion, Figure 4-15 indicates a slight increase in the average access distance made by a user each time they travel on the ELL.

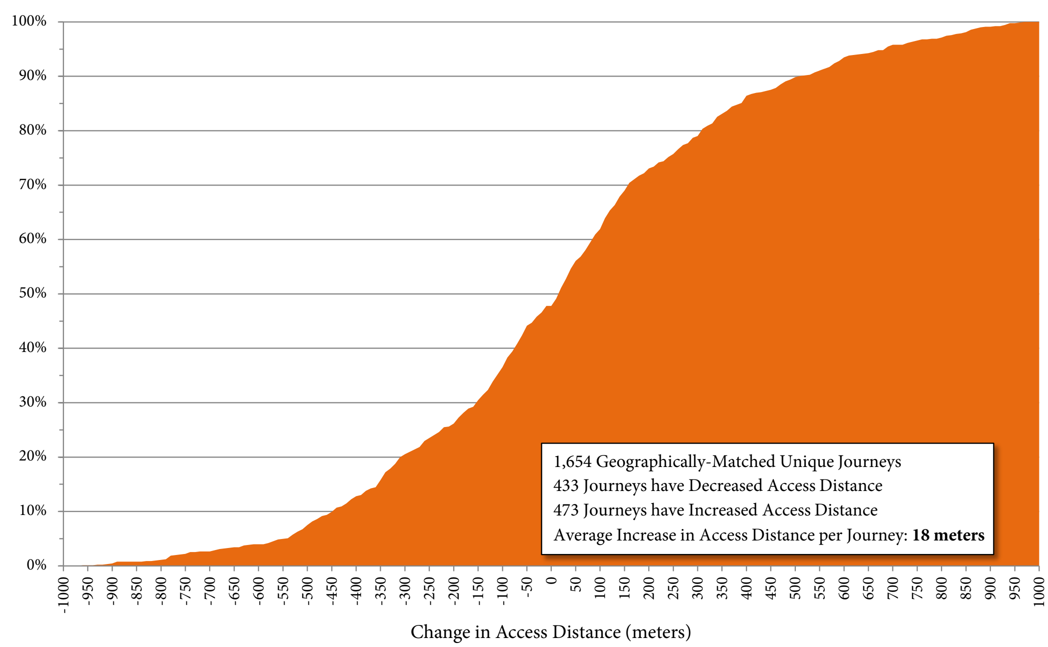


Figure 4-14: Distribution of Changes in Access Distance Experienced for the Same Journey

Comparing the changes in access distance of the matched journeys by the mode of travel used previous to the ELL's introduction yields more interesting results. Table

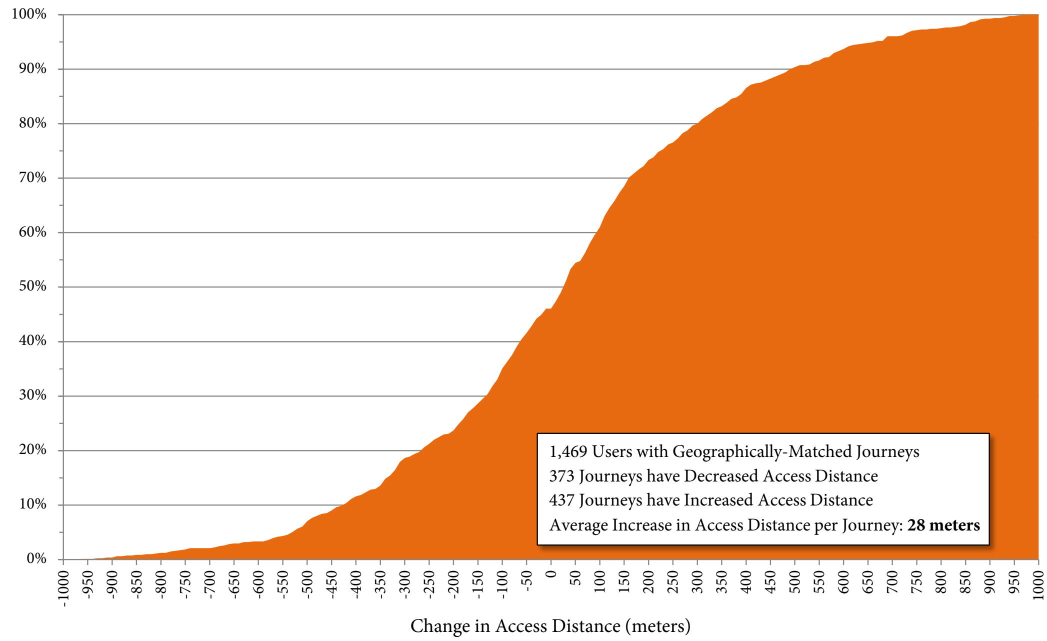


Figure 4-15: Distribution of Changes in Access Distance Experienced per User

4-6 indicates that users who previously used all other rail modes have experienced a decrease in access distance between April 2010 and October 2011. The largest decrease is experienced by users who previously entered the system at a station that now serves both the Underground and Overground. This is another indication that users who had to walk longer distances to Whitechapel and Canada Water are saving walking distance now that the Shadwell Overground, Wapping, Rotherhithe, and Surrey Quays stations are open. As expected, the group of users experiencing an increase in their access distance previously used bus services for their journey as they are now walking further to board the ELL.

Table 4-6: Changes in Access Distance by Initial Mode in April 2010

Change in Access Distance by Mode in April 2010		
Mode of Entry Station / Stop	Average (meters)	Number of Users
Underground	-36	146
Bus	100	800
National Rail	-12	69
DLR	-50	66
Underground / NR	-46	25
Underground / Overground	-171	178
NR / Overground	-14	441
Underground / NR / Overground	-137	23

Figure 4-16 supports the findings of Table 4-6. Users who entered the stations on either side of Canada Water experienced significant decreases in access distance, while those just north of the River Thames had little change. The southern stations all experienced slight increases in access distance, while the three new stations in Hackney experienced the greatest increase. This is expected considering that area was previously only served by buses. It is difficult to determine what might have

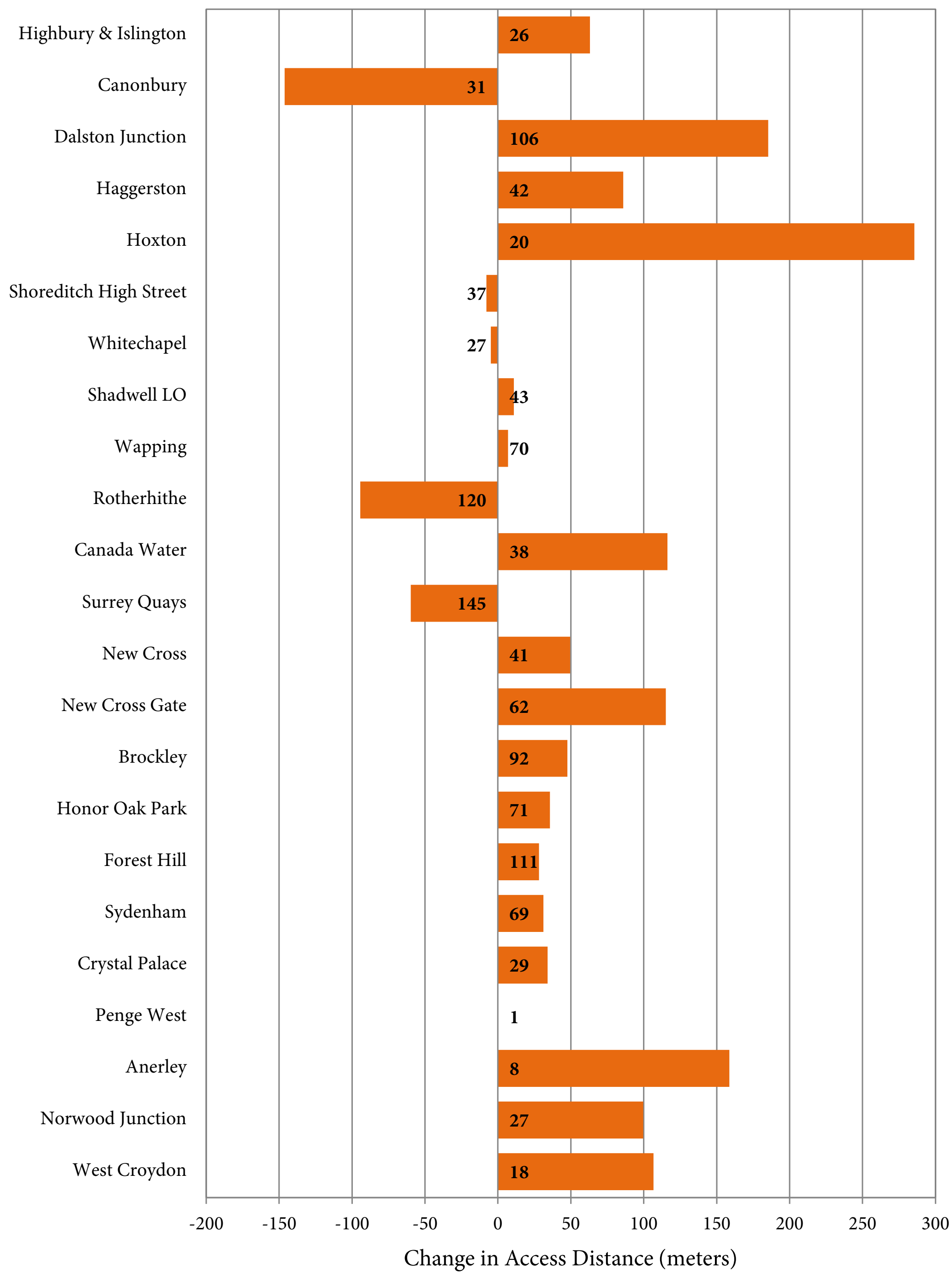


Figure 4-16: Change in Access Distance by Entry Station

caused the decrease at Canonbury, as it was expected that station would be similar to the National Rail/Overground stations south of the river.

4.3 Summary of User Panel Analyses

The creation of a user panel enabled careful study of changes in travel behavior experienced by users of the ELL. Geographically and temporally matching journeys from April 2010 to October 2011 gave detailed results where applicable, allowing further insight. It is estimated that each ELL user now makes 1.6 more journeys per week than they did previous to the opening of the new line and that each journey they make on the ELL takes an average of 4.1 minutes less than it would have previously. Increased accessibility is indicated by users traveling further and faster than they did before the railway opened and the rail line helped ease congestion on Underground, National Rail, and Bus services throughout East London by providing a new path for travel. On average, users starting their journey on the bus in April 2010 experienced an increase in access distance between April 2010 and October 2011, while those previously using other rail modes experienced a decrease. The final chapter of this thesis will compare some of these results (and the results from Chapter 3) with the forecasts in the East London Line Business Case published in February 2006.

5

Conclusions and Recommendations

5.1 Summary and Findings

This research sought to strengthen the understanding of changes in user travel behavior caused by the introduction of the extended East London Line (ELL) into London's public transportation network. The use of automated fare collection data, and more specifically, smart card transaction data, enabled a detailed analysis of the East London Line Extension (ELLX) as one part of the larger public transportation network over a span of time and geography not available with traditional survey methods.

Taking advantage of the ability to estimate overall ridership by expanding Oyster Card fare transaction records, ridership on the new line was estimated to be 99,400 to 108,300 passengers on an average weekday in October 2011, 18 months after the initial extension opened. By comparing growth in unique Oyster Card users system-wide to user card growth near the ELL, it was estimated that perhaps as many as 65,000 new Oyster users were brought into the public transportation system by the addition of the ELL, including any new population growth in the same area. Linking trip segments into full journeys and constructing a panel of Oyster users for longitudinal study resulted in an estimate that approximately 270,000 new journeys occur each week due to the extended ELL.

Analyzing changes in journey frequency, travel time, journey distance, access distance, and public transportation mode share using automatically collected data was performed by studying a group of Oyster users that traveled on the ELL during the analysis week in October 2011 and who also traveled using the same Oyster Card during the "before" analysis week in April 2010. Referred to as the user panel, comparing the journeys of this group of 54,326 Oyster users over the 18 month analysis period provided insights into these characteristics of travel behavior. Geographically and temporally matching user panel journeys between April 2010 and October 2011 enabled direct comparisons of specific journeys, providing more detail of changes in travel behavior caused by the ELL.

The user panel analysis calculated an average savings of 4 minutes per journey for users who are making the same journey in October 2011 that they made previous to the opening of the ELL in April 2010. On average, passengers are traveling longer (about a 5% increase in average in-system travel time), further (about 7% increase in the average as-the-crow-flies journey distance), and more frequently (growth of 14%, or an increase of 1.6 journeys per week per user) as the increased accessibility and mobility offered by the ELL improves their travel options. Including home postcode data where available indicates slightly longer access distances among user panel members after the construction of the ELL, and when this information is combined with a calculation of average access distance by mode, demonstrates that former bus riders are now walking further to use the service provided by the ELL.

Multiple analyses indicated mode shifts caused by the new rail service. Forty percent of those journeys that occurred in both April 2010 and October 2011 originally used bus services, while 60% previously used other rail services. In the area surrounding the ELL, the mode share of all other public transportation modes decreased, as the Overground's share grew from almost nothing to approximately 20%.

Studying key bus routes in the corridor gave more detail on the effect of the ELLX on the public transportation network in London. The results indicate that the Kingsland Road Corridor (made up of routes 67, 141, 242, and 243) saw 3,000 fewer bus passengers (a decrease of 6%) from Shoreditch High Street to Dalston Junction in October 2011 than in April 2010 as a result of the ELL. However, all four routes collectively gained 3,900 riders over their entire lengths during the same period. A portion of this 3.8% increase in ridership can be attributed to these routes serving as feeders to the ELL. Integrating the growth in ridership in the corridor due to the ELL with the changes experienced by the four bus routes, average passenger flow on public transportation in the Kingsland Road Corridor rose 75%, from around 33,700 to 58,800, while passenger boardings on or near Kingsland Road increased

88% (from 19,800 to 37,200) and passenger alightings on or near Kingsland Road increased 77% (from 21,100 to 37,300) over the 18 month analysis period.

Two routes south of the River Thames were also studied, both being low ridership routes, with less than 15,000 passengers a day combined. From April 2010 to October 2011 the P12 experienced minor growth in passengers, on the order of 2.7% (230 riders). Based on the changes in passenger flow, boardings, and alightings over that period, it is difficult to say that any of the ridership changes the route experienced were related to the opening of the ELL. In contrast, route 225 shows increased passenger flow south of New Cross, and decreased flow between New Cross and Canada Water. This makes a strong case that the route is now acting as a feeder/distributor for the ELL until New Cross and as a partially competitive service from that point north.

The east-west routes along Dalston Lane and Balls Pond Road experienced mostly local changes in passenger boardings, alightings, and flow around Dalston Junction station. Routes 30, 38, 56, and 277 all see fluctuations in passenger activity at the stops nearest that station, while only routes 30 (2% decrease) and 277 (11% decrease) show any decrease in overall ridership due to opening of the ELL.

The construction of the ELL certainly had an influence on the ridership levels of bus routes in its service area, but the magnitude and types of changes experienced vary widely depending on the routing of each bus line.

5.2 Comparison to the East London Line Business Case

Like any other major capital project considered by Transport for London (TfL), a benefit-cost analysis was developed for the ELL. Originally developed in October 2004 and revised in February 2006, this business case projects and quantifies the costs and benefits of constructing and operating the ELL's first phase from Dalston Junction to West Croydon. Although it addresses capital costs, operating costs, and revenue impacts, this summary will focus on the chapters on passenger demand and social benefits, which align with this thesis' focus on changes in travel behavior.

Due to increased service, new stations, and new interchange opportunities, the business case projects 33.2 million passengers will ride in 2011 (Transport for London, 2006). Without improvements, the original London Underground Limited operated ELL was projected to carry 11.1 million passengers in 2011, for an additional 22.1 million passengers on the rail system due to the capital investment by TfL. These projections were created using TfL's Railplan model, which is an AM peak travel model that takes journey time, service frequency, and journey opportunities into account when predicting passenger volumes across the London public transportation network. Using an annualization factor of 305 (developed by comparing annual ridership to daily ridership on the Underground in 2011), the ridership calculated in Chapter 3 of this thesis for the analysis week in October 2011 estimates annual ELL ridership to be 30.3 to 33.0 million.

Railplan was also used to predict changes in bus routes that interact with the ELL. Of particular note is the expected decrease in AM Peak passenger volumes along Kingsland Road. The business case assumed the discontinuation of route 67 south of Dalston Junction and projected an accompanying decrease in passengers on the bus routes on Kingsland Road, with the largest decrease (2,800 passengers) around Shoreditch High Street. Railplan predicted increases in passenger volume on the routes leading to and from Dalston Junction, with the largest increase being 800 more passengers just east of Dalston Junction on Dalston Lane. The model predicted slight decreases in passenger volumes for many of the routes south of the river, with increases on routes that lead to terminal stations such as New Cross. These predictions are difficult to compare to actual results, as route 67 is still in service. However, the Kingsland Road Corridor routes (67, 149, 242 and 243) have experienced a decrease of 3,000 passengers strictly within the Kingsland Road Corridor (but an increase in passengers over the full length of all four routes) over the 18 month analysis period, route 225 saw increased passenger flow into New Cross, and Hackney's east-west routes exhibit some evidence of being feeder/distributor lines into Dalston Junction.

The chapter on social benefits considers the value of the capital investment not measured through changes in revenue. This includes benefits due to user time savings, reductions in crowding on the public transport network, reductions in road congestion, reductions in accidents, improvements in rolling stock, and aesthetic and functional improvements at existing stations, as well as costs in travel time associated with the replacement bus service provided during construction. The business case predicts £60.6 million in travel time savings due to ELL service in 2011. Similar to the situation with the bus routes, it is difficult to make direct comparisons between the estimate of travel time savings in this thesis and the results of the business case, partly because the business case estimates are from an AM peak model, and partly because the model includes full journey time, as opposed to just in-system travel time. However, assuming the same journey purpose split and time values as the business case, the average travel time savings of 4.1 minutes per journey for 30.3 -

33.0 million annual journeys calculated in this thesis implies £21.1 - 23.2 million in travel time savings in 2011. This result is difficult to compare to the £60.6 million projection in the business case, as it is unlikely that the projected travel time savings were greater than 4.1 minutes.

5.3 Recommendations

As Transport for London continues to plan investment in its public transportation network, it is hoped that the types of analyses discussed in this thesis will be applied as part of the planning process to better understand current usage of the system, and to assist with testing planning scenarios related to potential service changes. The methods presented in this research rely on and result in information at a network level, less limited by geography and time than survey data. Therefore, they should allow more comprehensive study of user travel behavior and what service changes do and do not benefit users.

In order to allow closer integration of the results from survey data, models, and automatically collected data, a robust and standardized method of recording and storing data so that they are easily accessible by all the planners within TfL is necessary. This would assist with better integration of planning across modes, enable faster innovation in planning and analysis methods, and increase the reliability of data used by TfL for planning. This integration of survey results, predictions from models, and automatically collected data will lead to a fuller picture of all the effects of any change in service on the public transportation network, including predicting and measuring the effects of disturbances and closures on the travel behavior of users.

Oyster Card user panels should be used to study changes in travel behavior, including general user panels to study changes in travel behavior perhaps influenced by exogenous factors and user panels created specifically in response to service changes. A general panel will require selecting a representative group of Oyster users both geographically diverse and varied in their frequency of use of the system. This panel will need to have new users added to it each period or quarter so that it grows at pace with the growth of Oyster users in the system and to replace users lost to normal card attrition. The creation of such a panel would give TfL multimodal insight into system-wide changes in travel behavior, and should allow studying how factors (such as the economy, large events like the Olympics, or the introduction of High Speed 2) influence travel on public transportation across the region.

This research is slightly less robust due to the lack of passenger gateline totals at ELL stations. If possible, this should be remedied to strengthen the results here, as well as the full origin-destination daily matrix created as an output of the Java program created by Gordon (2012). Once this data is received by TfL, the process for origin-destination matrix estimation for the Overground developed by Frumin (2010) can also be utilized, providing more information about passenger movements to TfL.

5.4 Future Research

The following is a list of future opportunities based on the methods and results discussed in this research and are recommended to improve the understanding of travel behavior on London's public transportation network.

- The final extension of the ELL to Clapham Junction will create another orbital rail service for London. Numerous new interchange opportunities will be created, as well as a less expensive route around the capital. It will also increase service within the core segment of the line, with 16 tph (up from 12 tph) being provided from Dalston Junction to Surrey Quays. The analyses performed in this thesis should be updated when new data become available following the opening of the extension, to observe further changes in travel behavior caused by the additional service.
- Similar to the analysis found in Section 3.3 of changes in passenger activity on the ten bus routes, the Victoria Line and nearby National Rail services should be studied to understand the influences of all three phases of the ELLX on other rail lines. Because individual rail lines are not closed systems like individual bus routes, this requires some careful assignment of Oyster users' travel paths. If users can be correctly assigned to a rail line, this type of analysis would be another important facet of a full study of the impacts of the ELLX.
- Strengthening the voluntary gathering of home postcodes for as many Oyster Cards as possible would enable geographic study of changes experienced by passengers. This could be used to measure how certain parts of TfL's service area are or could be affected by a change in service, such as the low-income areas that are the focus of some of the Greater London Authority's investment programs.
- The analyses described in this research could be directly applied to study the impact of planned and unplanned closures and network unreliability on user travel behavior. Hopefully, the results of such analyses would enable TfL to prioritize investments in reducing unreliability and unplanned service

disruptions, as well as more carefully plan maintenance and construction closures to reduce their effect on customers.

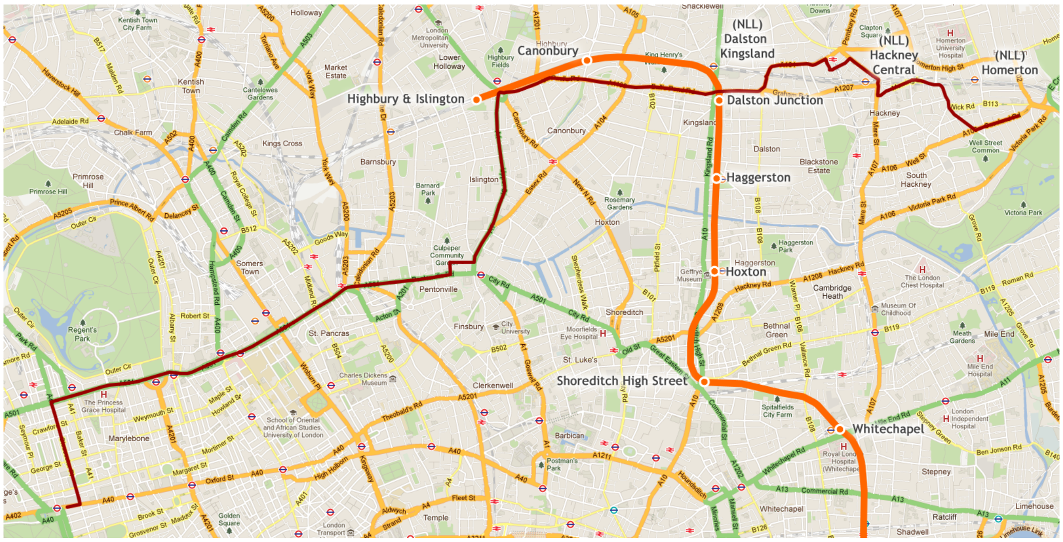
- If gateline data from more Overground stations is received, the origin-destination matrix estimation process developed by Frumin (2010) could be implemented, combining gateline passenger totals with loadweigh data to create a full picture of passenger movements on Overground services.

A

Appendix

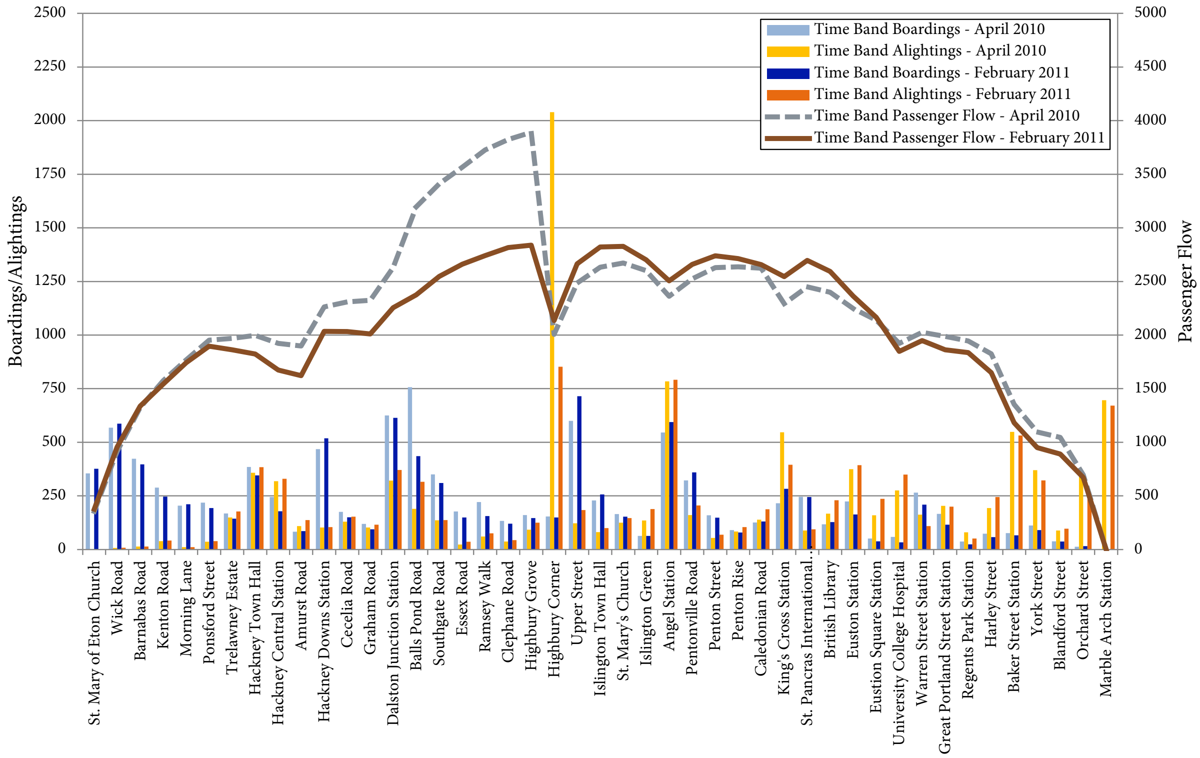
A.1 Route 30

Traveling from just west of Hackney Wick station to Oxford Street, route 30 parallels the North London Line from Hackney Central station to Highbury & Islington station, and then dives south towards Oxford Street and Marble Arch. Buses arrive every six minutes in the peak and approximately 20,000 riders use the route each day.

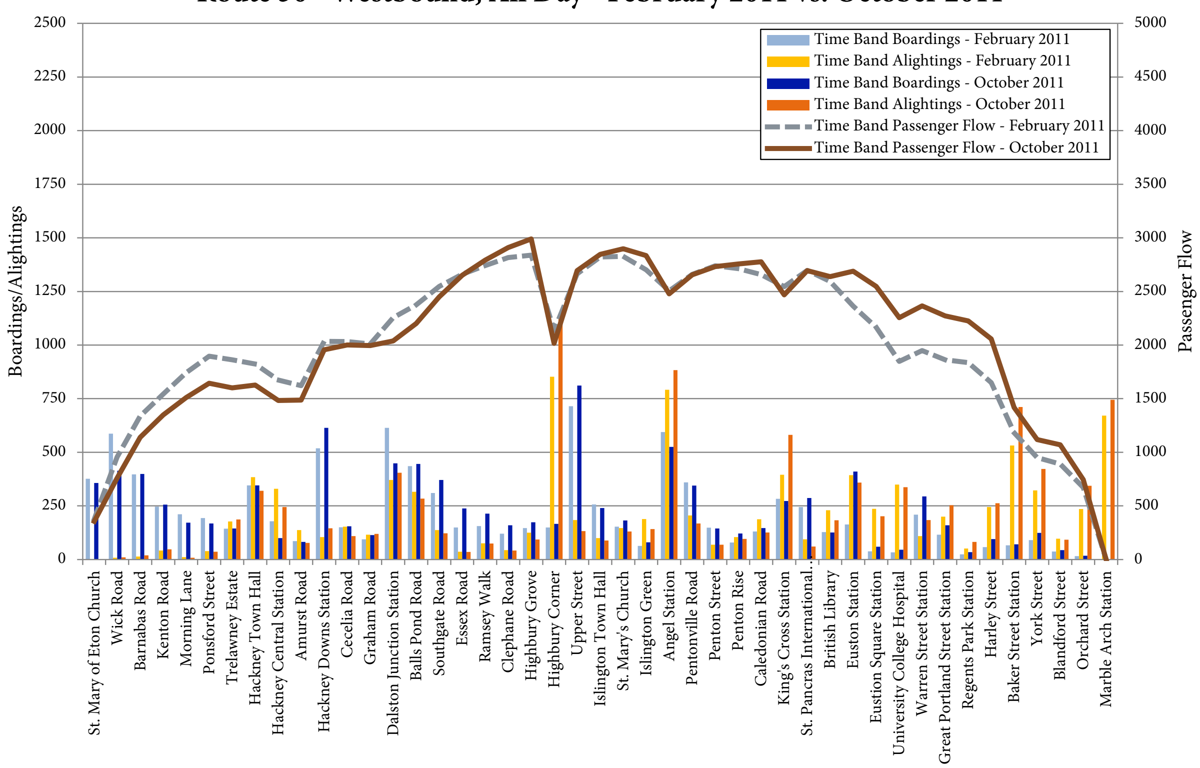


Map of Route 30

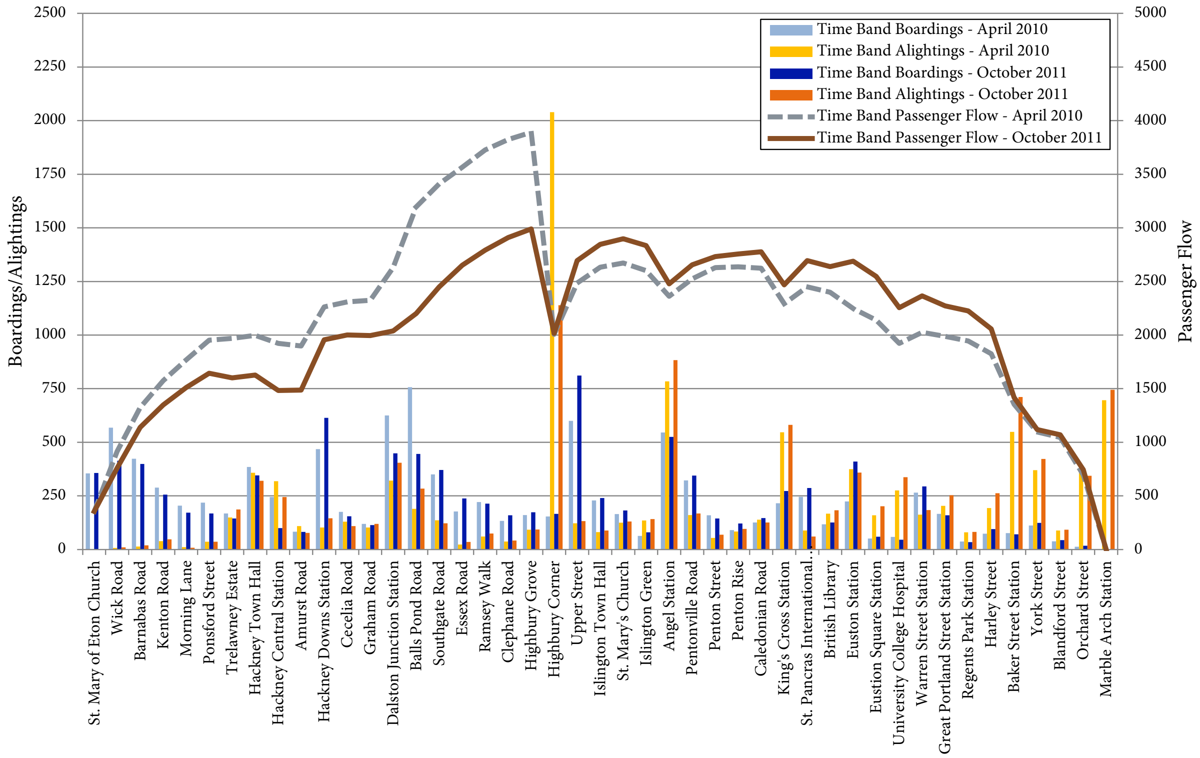
Route 30 - Westbound, All Day - April 2010 vs. February 2011



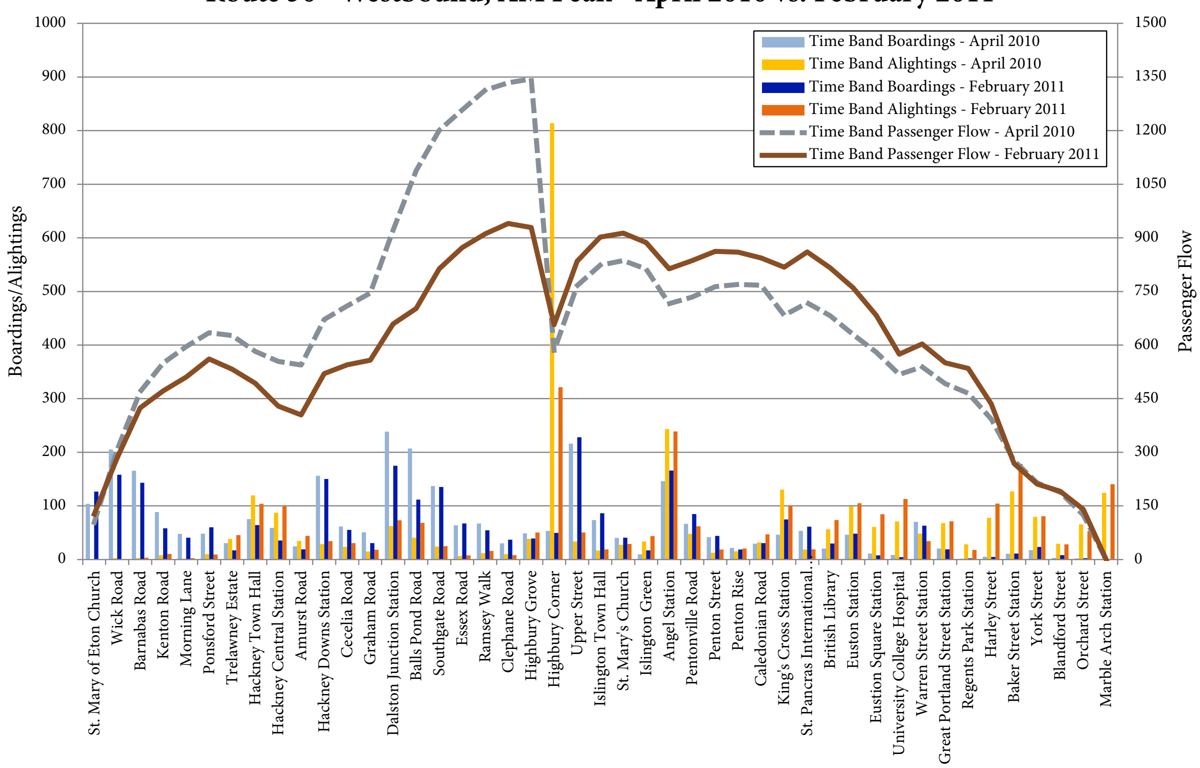
Route 30 - Westbound, All Day - February 2011 vs. October 2011

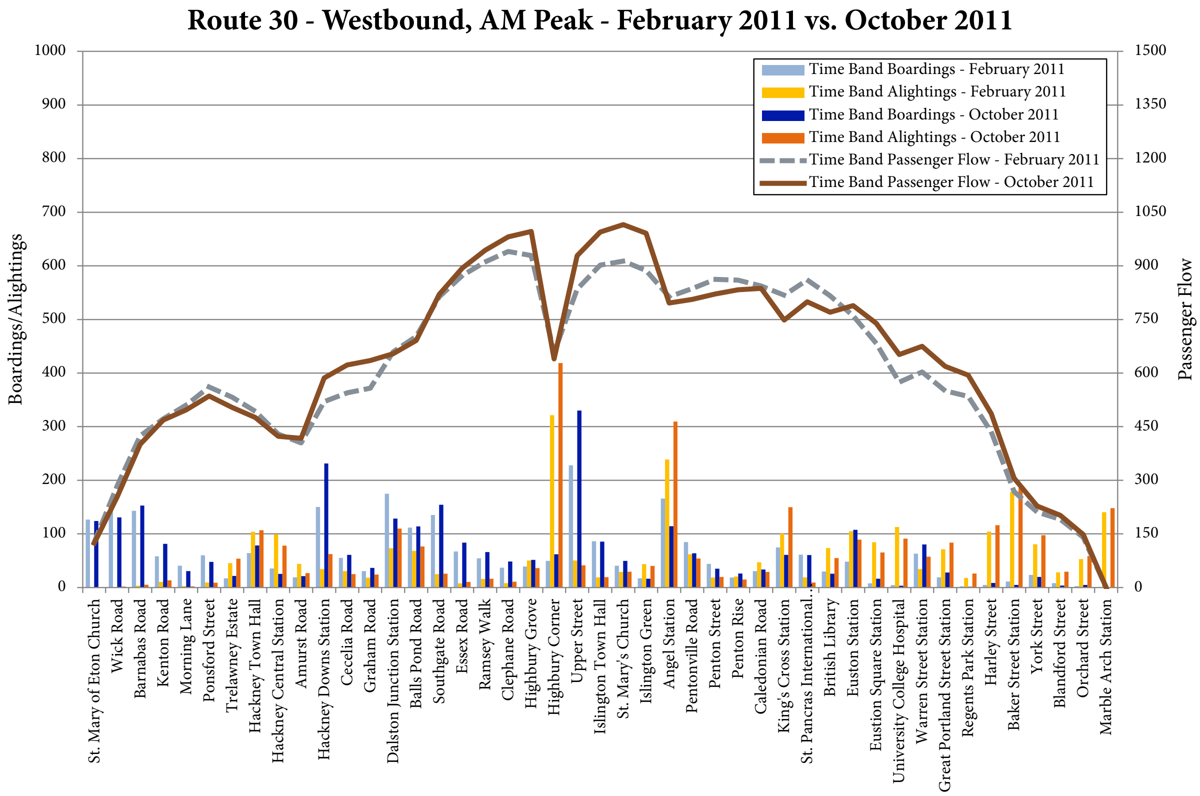


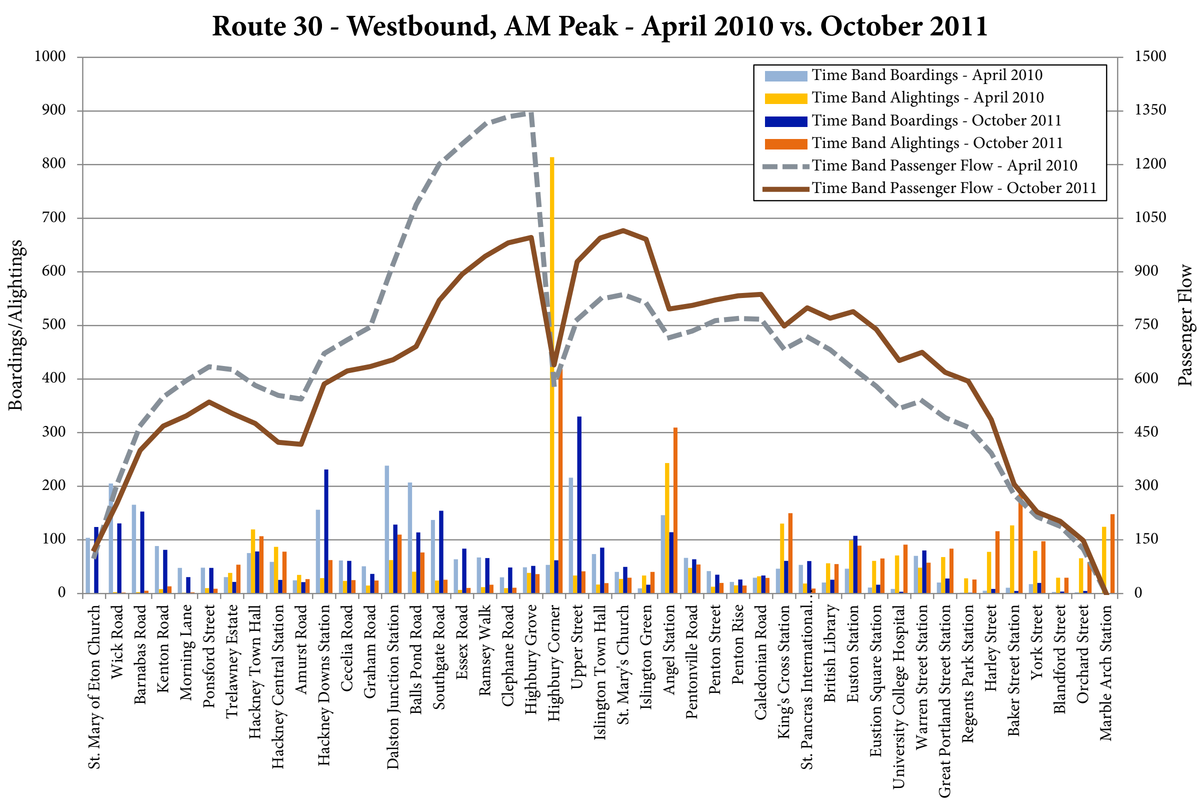
Route 30 - Westbound, All Day - April 2010 vs. October 2011



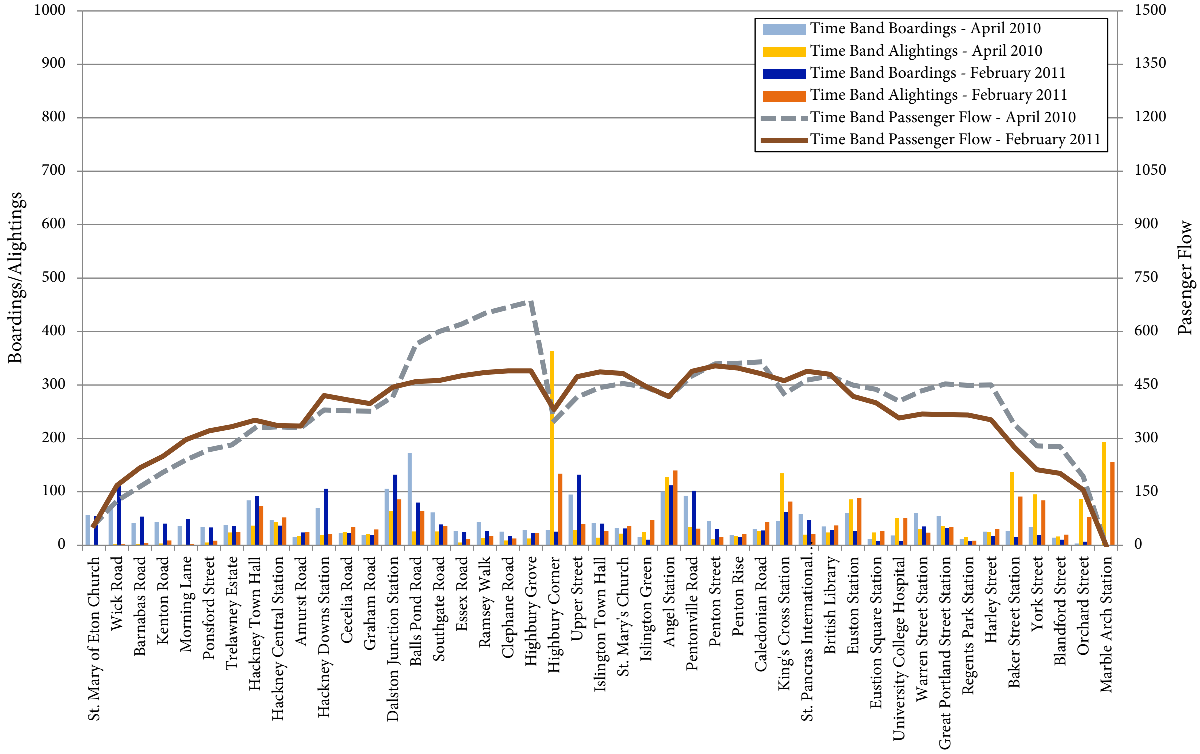
Route 30 - Westbound, AM Peak - April 2010 vs. February 2011



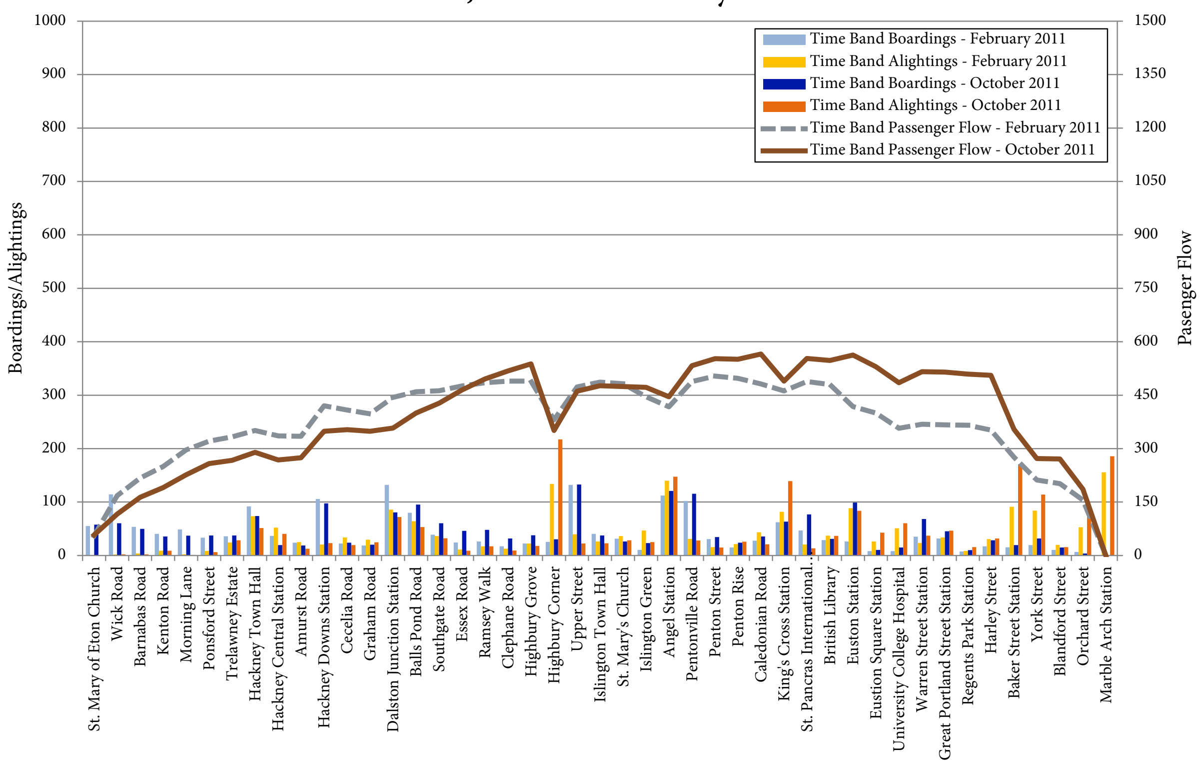

Route 30 - Westbound, AM Peak - February 2011 vs. October 2011
Time Band Boardings - February 2011
Time Band Alightings - February 2011
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - February 2011
Time Band Passenger Flow - October 2011
Boardings/Alightings
Passenger Flow
St. Mary of Eton Church
Wick Road
Barnabas Road
Kenton Road
Morning Lane
Ponsford Street
Trelawney Estate
Hackney Town Hall
Hackney Central Station
Amurst Road
Hackney Downs Station
Cecelia Road
Graham Road
Dalston Junction Station
Balls Pond Road
Southgate Road
Essex Road
Ramsey Walk
Clephane Road
Highbury Grove
Highbury Corner
Upper Street
Islington Town Hall
St. Mary's Church
Islington Green
Angel Station
Pentonville Road
Penton Street
Penton Rise
Caledonian Road
King's Cross Station
St. Pancras International...
British Library
Euston Station
Eustion Square Station
University College Hospital
Warren Street Station
Great Portland Street Station
Regents Park Station
Harley Street
Baker Street Station
York Street
Blandford Street
Orchard Street
Marble Arch Station

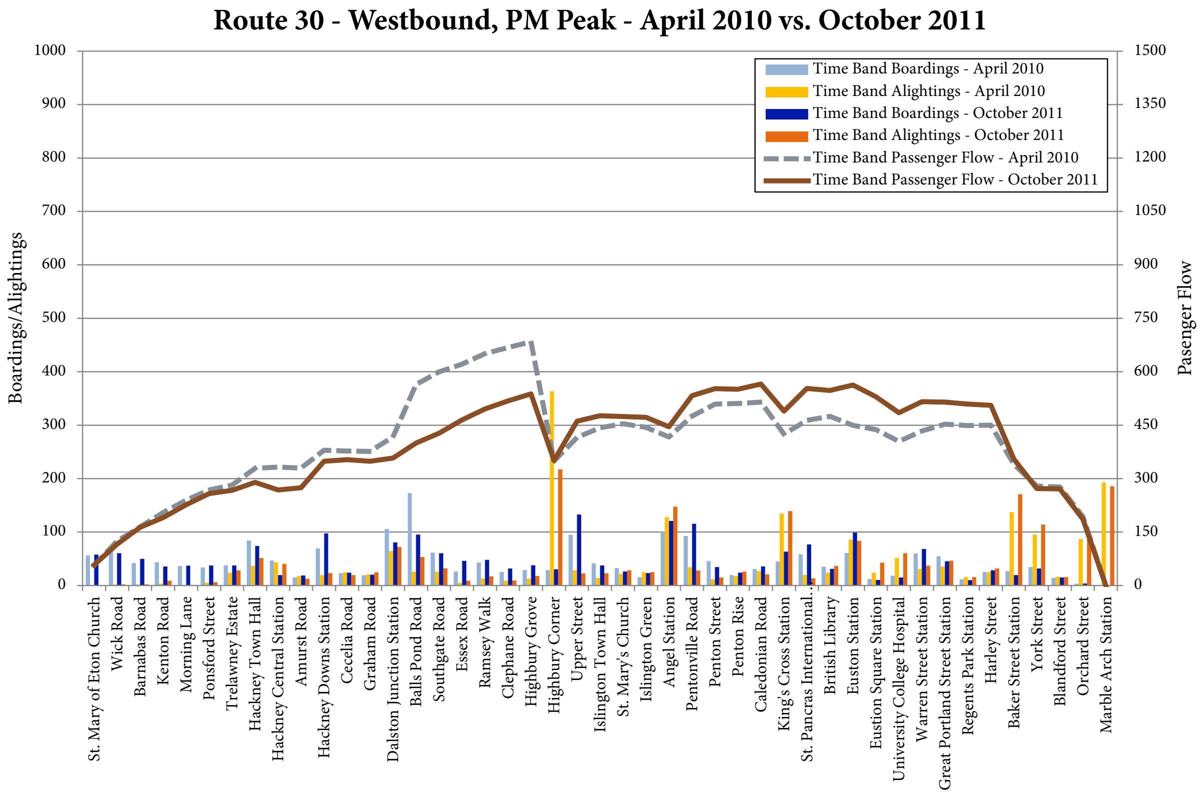

Route 30 - Westbound, AM Peak - April 2010 vs. October 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - October 2011
Boardings/Alightings
Passenger Flow

Route 30 - Westbound, PM Peak - April 2010 vs. February 2011



Route 30 - Westbound, PM Peak - February 2011 vs. October 2011




Route 30 - Westbound, PM Peak - April 2010 vs. October 2011
Boardings/Alightings
Pasenger Flow
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - October 2011
St. Mary of Eton Church
Wick Road
Barnabas Road
Kenton Road
Morning Lane
Ponsford Street
Trelawney Estate
Hackney Town Hall
Hackney Central Station
Amurst Road
Hackney Downs Station
Cecelia Road
Graham Road
Dalston Junction Station
Balls Pond Road
Southgate Road
Essex Road
Ramsey Walk
Clephane Road
Highbury Grove
Highbury Corner
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Islington Town Hall
St. Mary's Church
Islington Green
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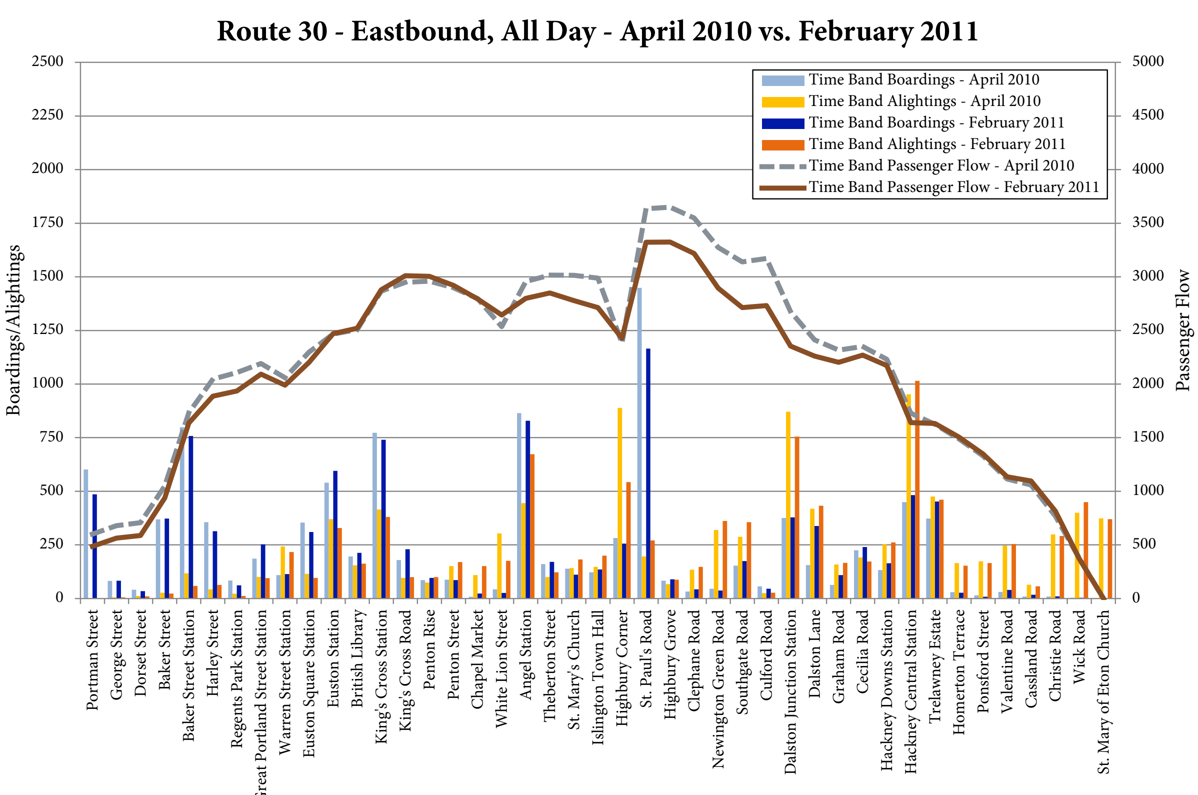
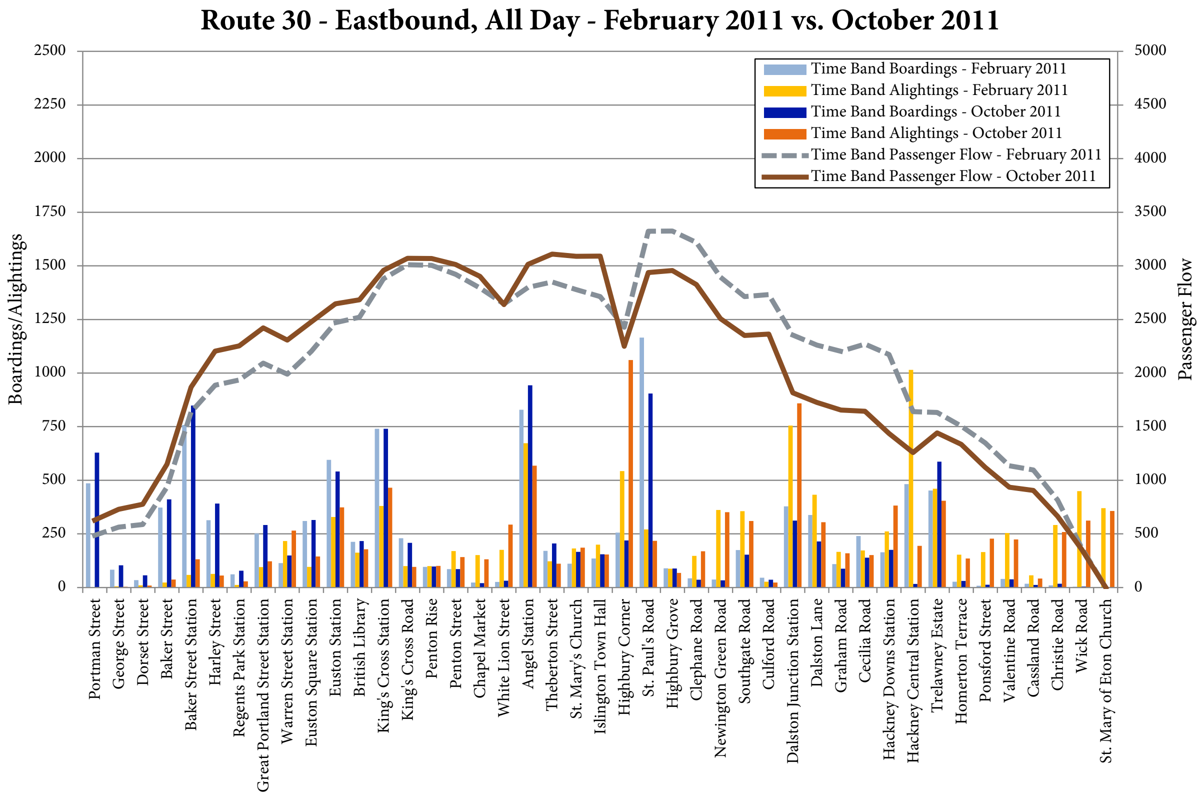
Baker Street Station
York Street
Blandford Street
Orchard Street
Marble Arch Station


Route 30 - Eastbound, All Day - April 2010 vs. February 2011
Boardings/Alightings
Passenger Flow
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - February 2011
Time Band Alightings - February 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - February 2011
Portman Street
George Street
Dorset Street
Baker Street
Baker Street Station
Harley Street
Regents Park Station
Great Portland Street Station
Warren Street Station
Euston Square Station
Euston Station
British Library
King's Cross Station
King's Cross Road
Penton Rise
Penton Street
Chapel Market
White Lion Street
Angel Station
Theberton Street
St. Mary's Church
Islington Town Hall
Highbury Corner
St. Paul's Road
Highbury Grove
Clephane Road
Newington Green Road
Southgate Road
Culford Road
Dalston Junction Station
Dalston Lane
Graham Road
Cecilia Road
Hackney Downs Station
Hackney Central Station
Trelawney Estate
Homerton Terrace
Ponsford Street
Valentine Road
Cassland Road
Christie Road
Wick Road
St. Mary of Eton Church


Route 30 - Eastbound, All Day - February 2011 vs. October 2011
Time Band Boardings - February 2011
Time Band Alightings - February 2011
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - February 2011
Time Band Passenger Flow - October 2011
Boardings/Alightings
Passenger Flow
Portman Street
George Street
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Baker Street
Baker Street Station
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Regents Park Station
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British Library
King's Cross Station
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Penton Rise
Penton Street
Chapel Market
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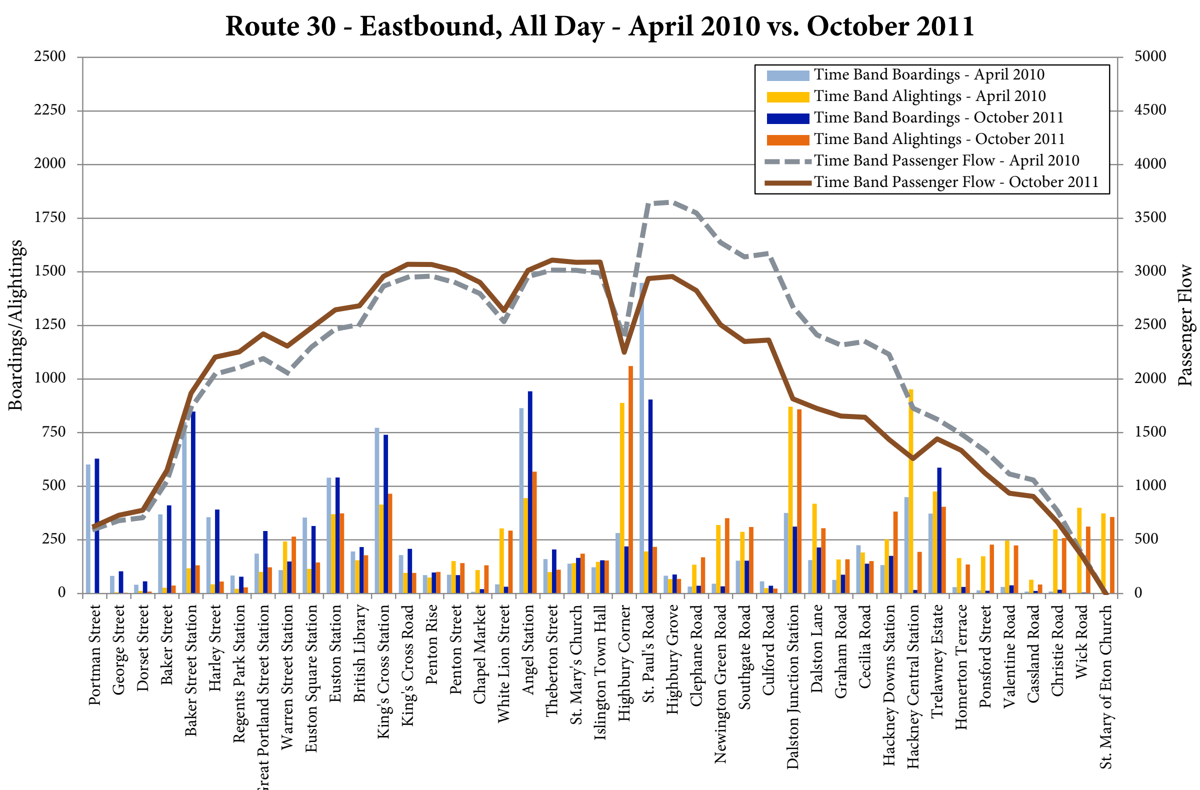
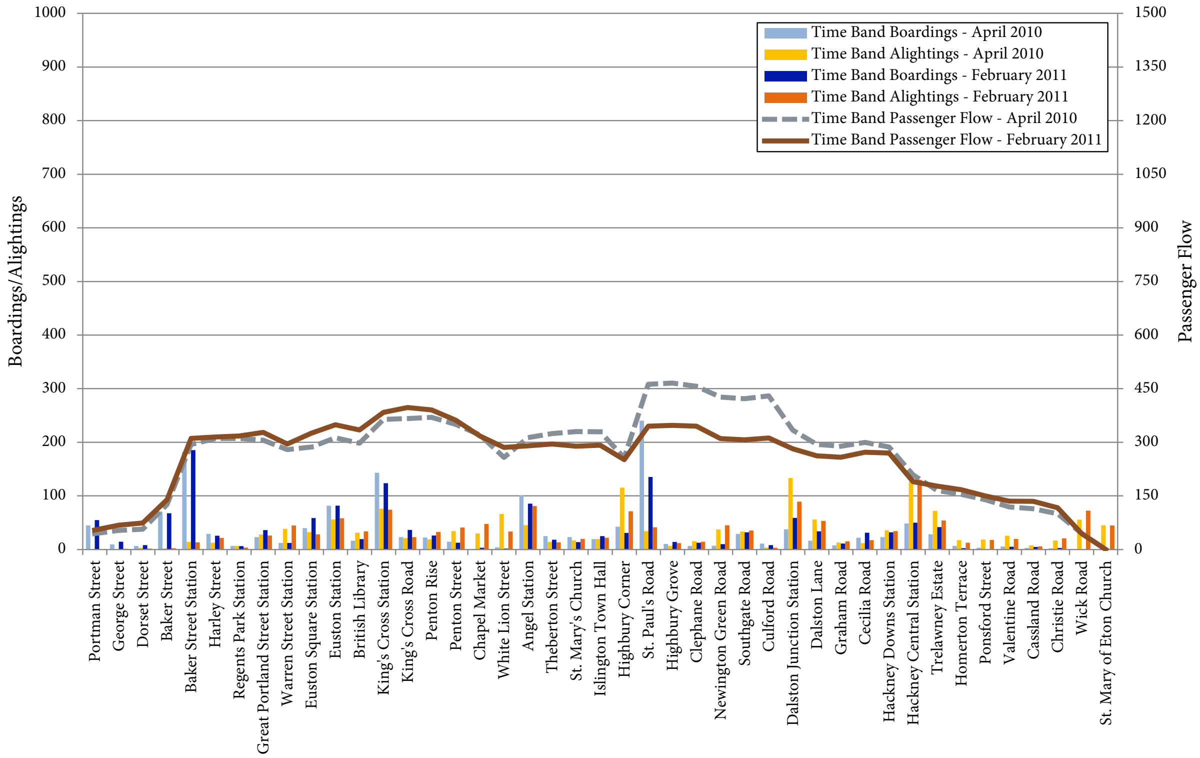
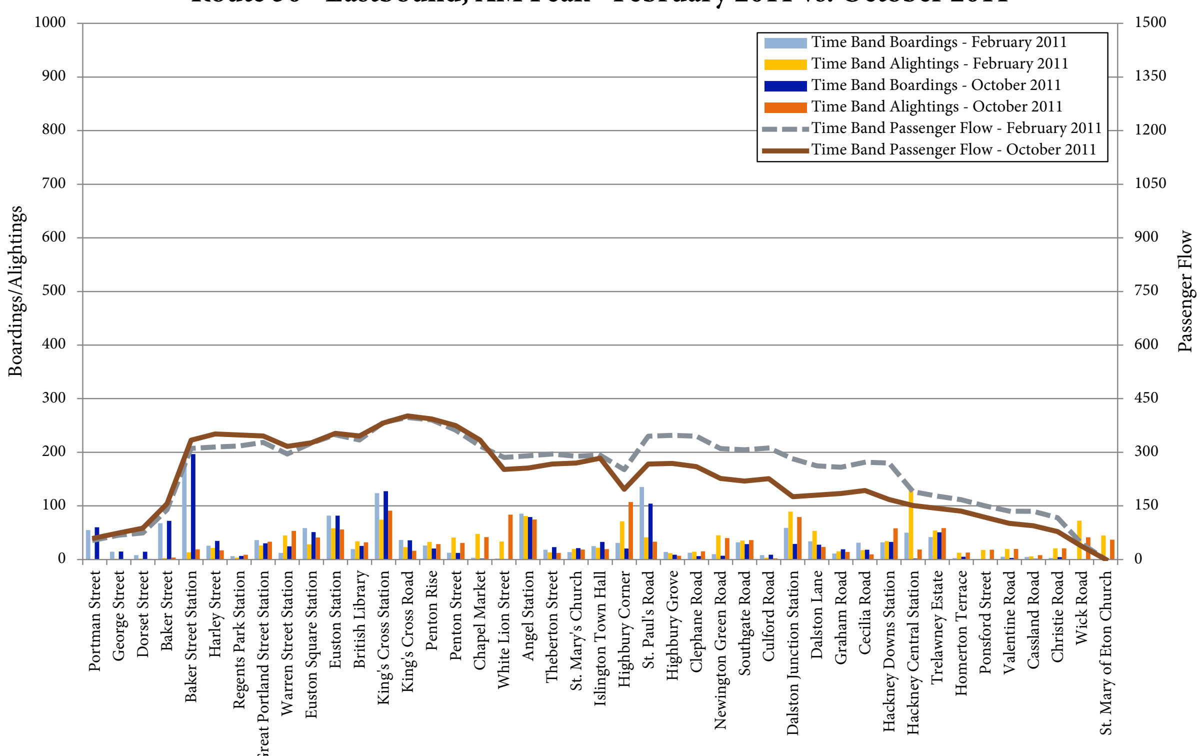
St. Mary's Church
Islington Town Hall
Highbury Corner
St. Paul's Road
Highbury Grove
Clephane Road
Newington Green Road
Southgate Road
Culford Road
Dalston Junction Station
Dalston Lane
Graham Road
Cecilia Road
Hackney Downs Station
Hackney Central Station
Trelawney Estate
Homerton Terrace
Ponsford Street
Valentine Road
Cassland Road
Christie Road
Wick Road
St. Mary of Eton Church


Route 30 - Eastbound, All Day - April 2010 vs. October 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - October 2011
Boardings/Alightings
Passenger Flow

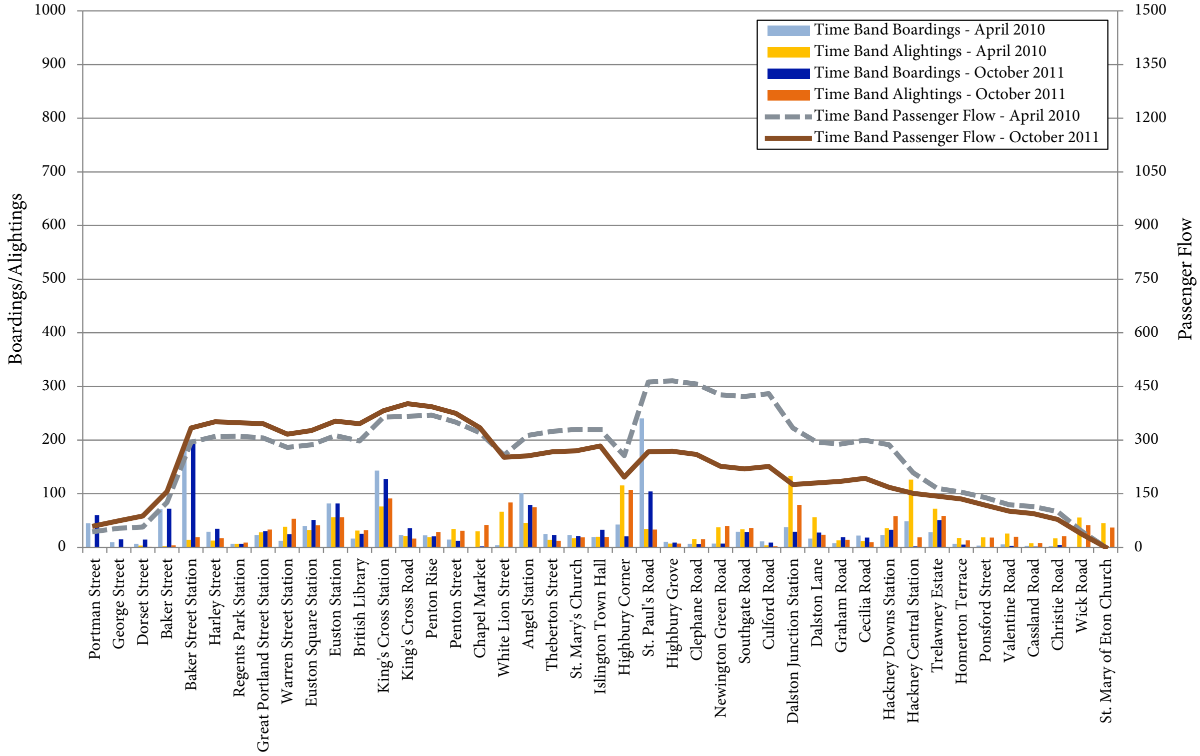
Route 30 - Eastbound, AM Peak - April 2010 vs. February 2011



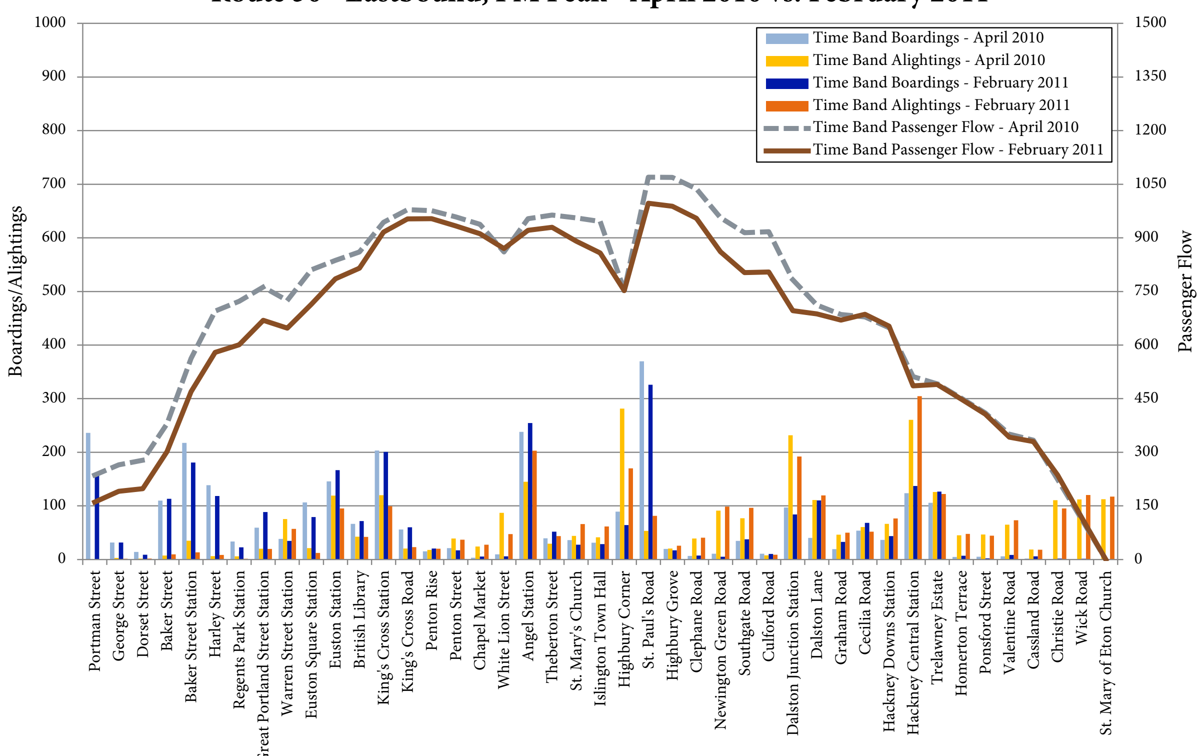
Route 30 - Eastbound, AM Peak - February 2011 vs. October 2011

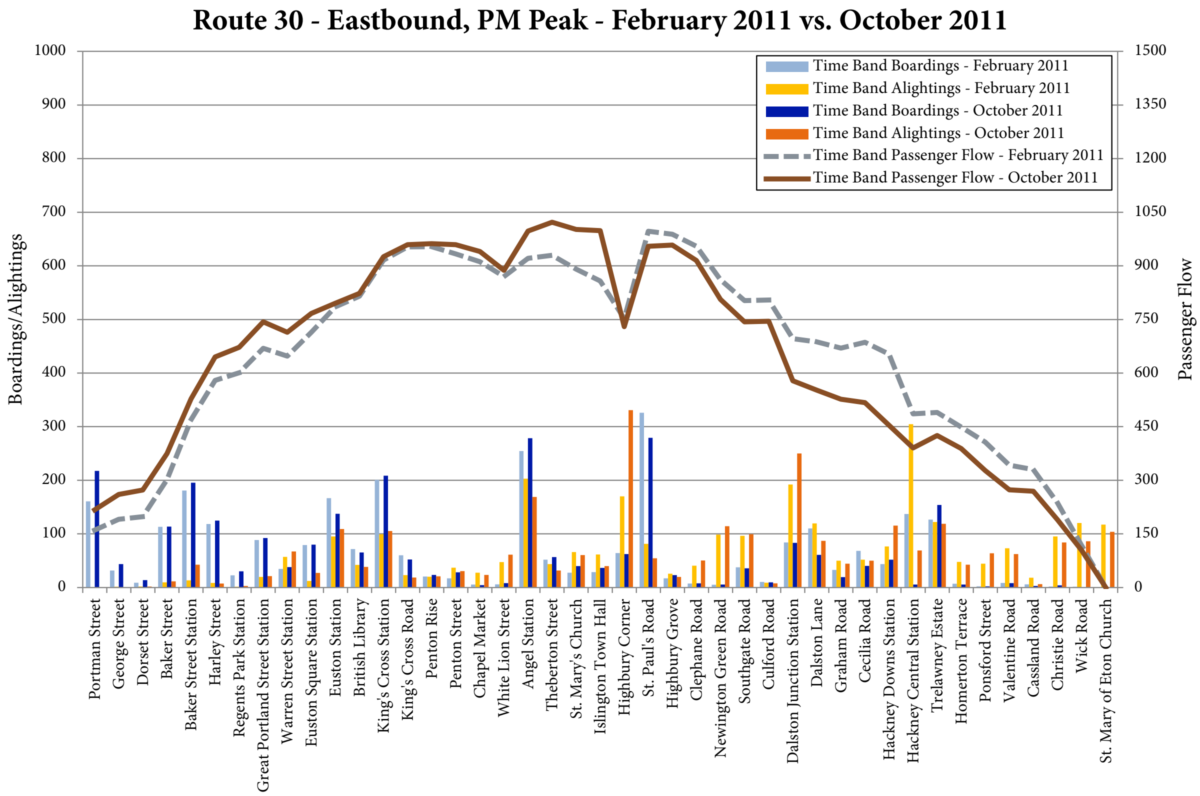


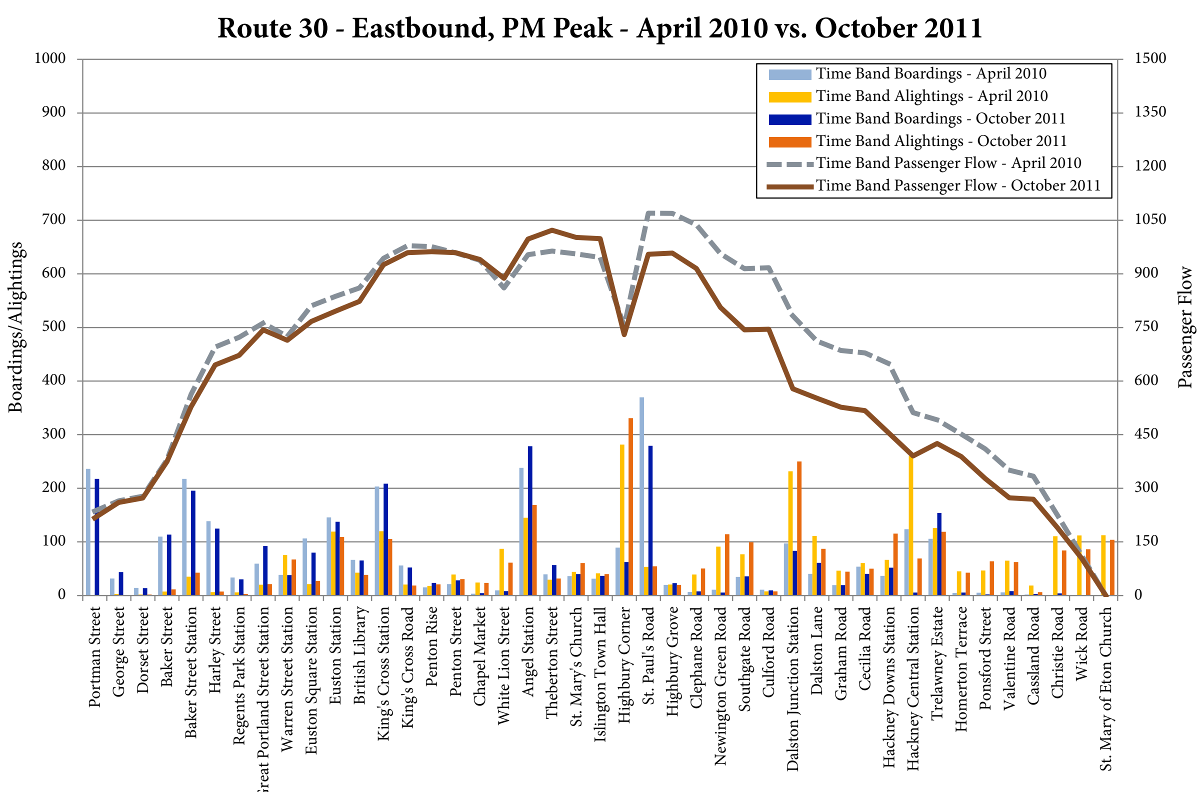
Route 30 - Eastbound, AM Peak - April 2010 vs. October 2011



Route 30 - Eastbound, PM Peak - April 2010 vs. February 2011




Route 30 - Eastbound, PM Peak - February 2011 vs. October 2011
Time Band Boardings - February 2011
Time Band Alightings - February 2011
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - February 2011
Time Band Passenger Flow - October 2011
Boardings/Alightings
Passenger Flow
0
100
200
300
400
500
600
700
800
900
1000
150
300
450
600
750
900
1050
1200
1350
1500
Portman Street
George Street
Dorset Street
Baker Street
Baker Street Station
Harley Street
Regents Park Station
Great Portland Street Station
Warren Street Station
Euston Square Station
Euston Station
British Library
King's Cross Station
King's Cross Road
Penton Rise
Penton Street
Chapel Market
White Lion Street
Angel Station
Theberton Street
St. Mary's Church
Islington Town Hall
Highbury Corner
St. Paul's Road
Highbury Grove
Clephane Road
Newington Green Road
Southgate Road
Culford Road
Dalston Junction Station
Dalston Lane
Graham Road
Cecilia Road
Hackney Downs Station
Hackney Central Station
Trelawney Estate
Homerton Terrace
Ponsford Street
Valentine Road
Cassland Road
Christie Road
Wick Road
St. Mary of Eton Church


Route 30 - Eastbound, PM Peak - April 2010 vs. October 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - October 2011
Boardings/Alightings
Passenger Flow
0
100
200
300
400
500
600
700
800
900
1000
150
300
450
600
750
900
1050
1200
1350
1500
Portman Street
George Street
Dorset Street
Baker Street
Baker Street Station
Harley Street
Regents Park Station
Great Portland Street Station
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King's Cross Station
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Trelawney Estate
Homerton Terrace
Ponsford Street
Valentine Road
Cassland Road
Christie Road
Wick Road
St. Mary of Eton Church

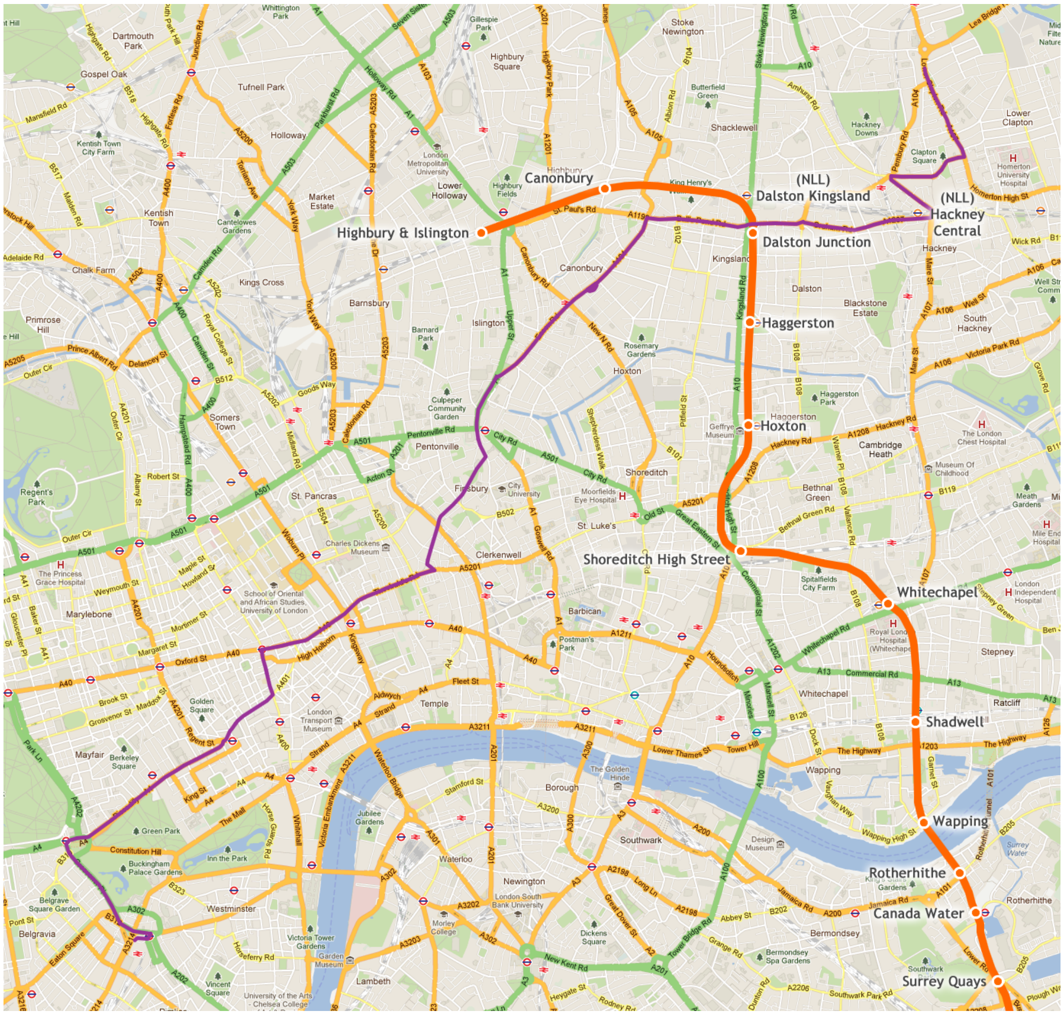
Route 30 - April 2010 vs. February 2011				
Entire Route				
Passenger Counts		Apr-10	Feb-11	Percent Change
Westbound	All Day	10285	9617	-6.5%
	AM Peak	2928	2707	-7.5%
	PM Peak	2002	1874	-6.4%
Eastbound	All Day	10160	10129	-0.3%
	AM Peak	1454	1439	-1.1%
	PM Peak	2891	2850	-1.4%
Both	All Day	20445	19747	-3.4%
System-Wide	All Day	6481026	6627919	2.3%

Route 30 - February 2011 vs. October 2011				
Entire Route				
Passenger Counts		Feb-11	Oct-11	Percent Change
Westbound	All Day	9617	10180	5.8%
	AM Peak	2707	2935	8.4%
	PM Peak	1874	2068	10.4%
Eastbound	All Day	10129	9812	-3.1%
	AM Peak	1439	1348	-6.3%
	PM Peak	2850	2754	-3.4%
Both	All Day	19747	19992	1.2%
System-Wide	All Day	6627919	6765182	2.1%

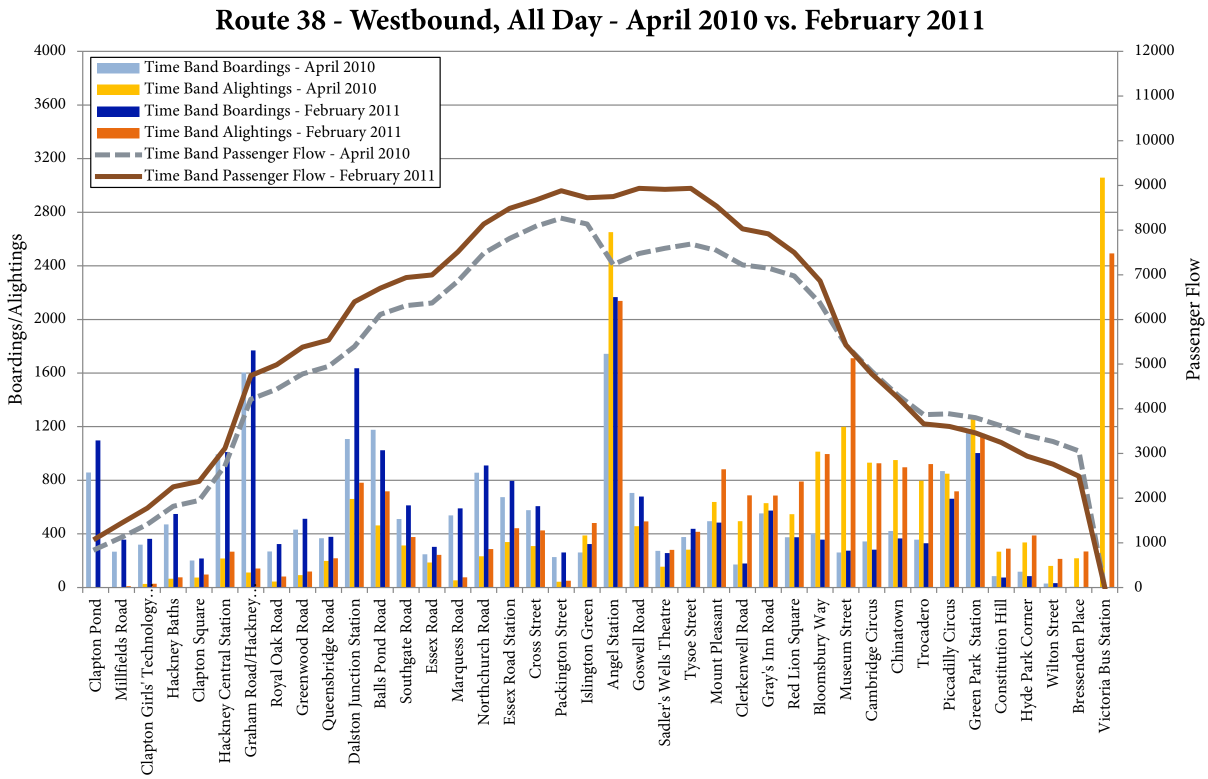
Route 30 - April 2010 vs. October 2011				
Entire Route				
Passenger Counts		Apr-10	Oct-11	Percent Change
Westbound	All Day	10285	10180	-1.0%
	AM Peak	2928	2935	0.2%
	PM Peak	2002	2068	3.3%
Eastbound	All Day	10160	9812	-3.4%
	AM Peak	1454	1348	-7.3%
	PM Peak	2891	2754	-4.7%
Both	All Day	20445	19992	-2.2%
System-Wide	All Day	6481026	6765182	4.4%

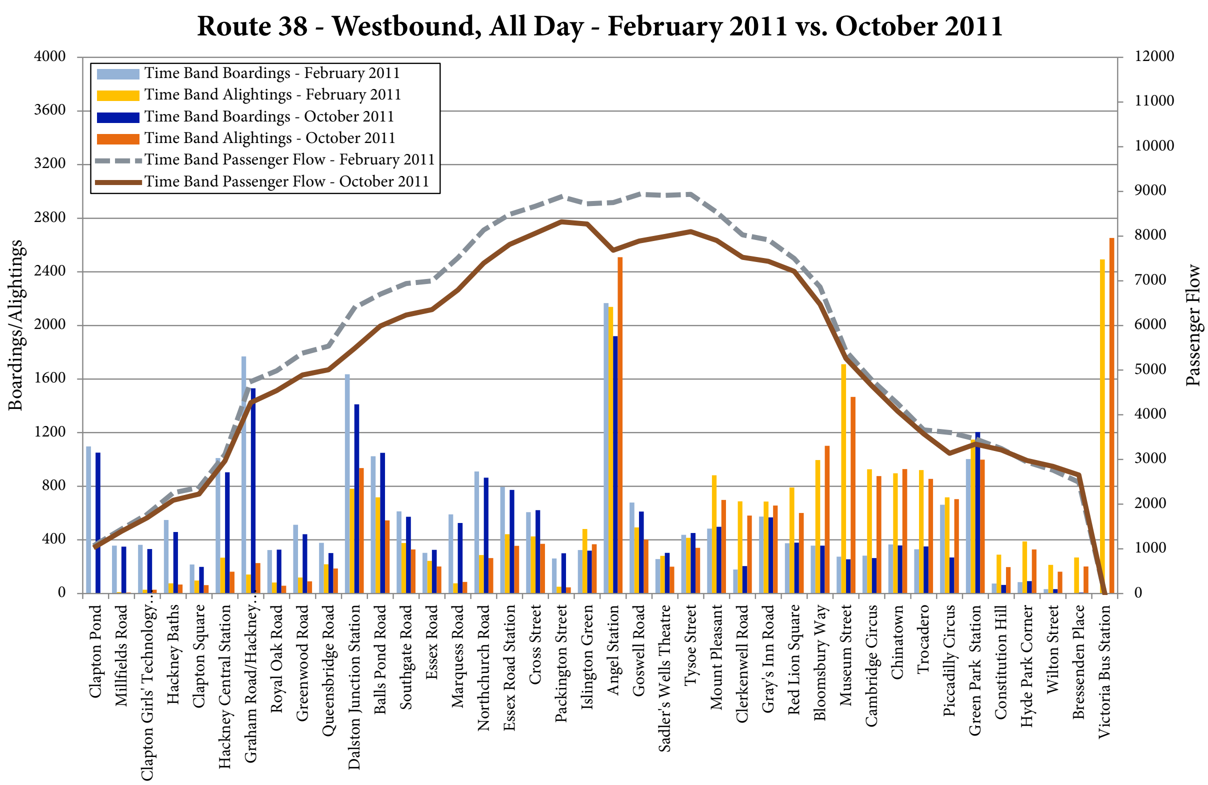
A.2 Route 38

Route 38 connects Clapham Pond to Victoria station, providing its more than 45,000 daily riders with a service frequency of approximately 20 buses per hour.



Map of Route 38


Route 38 - Westbound, All Day - April 2010 vs. February 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - February 2011
Time Band Alightings - February 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - February 2011
Boardings/Alightings
Passenger Flow
Clapton Pond
Millfields Road
Clapton Girls' Technology…
Hackney Baths
Clapton Square
Hackney Central Station
Graham Road/Hackney…
Royal Oak Road
Greenwood Road
Queensbridge Road
Dalston Junction Station
Balls Pond Road
Southgate Road
Essex Road
Marquess Road
Northchurch Road
Essex Road Station
Cross Street
Packington Street
Islington Green
Angel Station
Goswell Road
Sadler's Wells Theatre
Tysoe Street
Mount Pleasant
Clerkenwell Road
Gray's Inn Road
Red Lion Square
Bloomsbury Way
Museum Street
Cambridge Circus
Chinatown
Trocadero
Piccadilly Circus
Green Park Station
Constitution Hill
Hyde Park Corner
Wilton Street
Bressenden Place
Victoria Bus Station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Time Band Alightings - February 2011
Time Band Boardings - October 2011
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Time Band Passenger Flow - October 2011
Boardings/Alightings
Passenger Flow
Clapton Pond
Millfields Road
Clapton Girls' Technology…
Hackney Baths
Clapton Square
Hackney Central Station
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Southgate Road
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Northchurch Road
Essex Road Station
Cross Street
Packington Street
Islington Green
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Sadler's Wells Theatre
Tysoe Street
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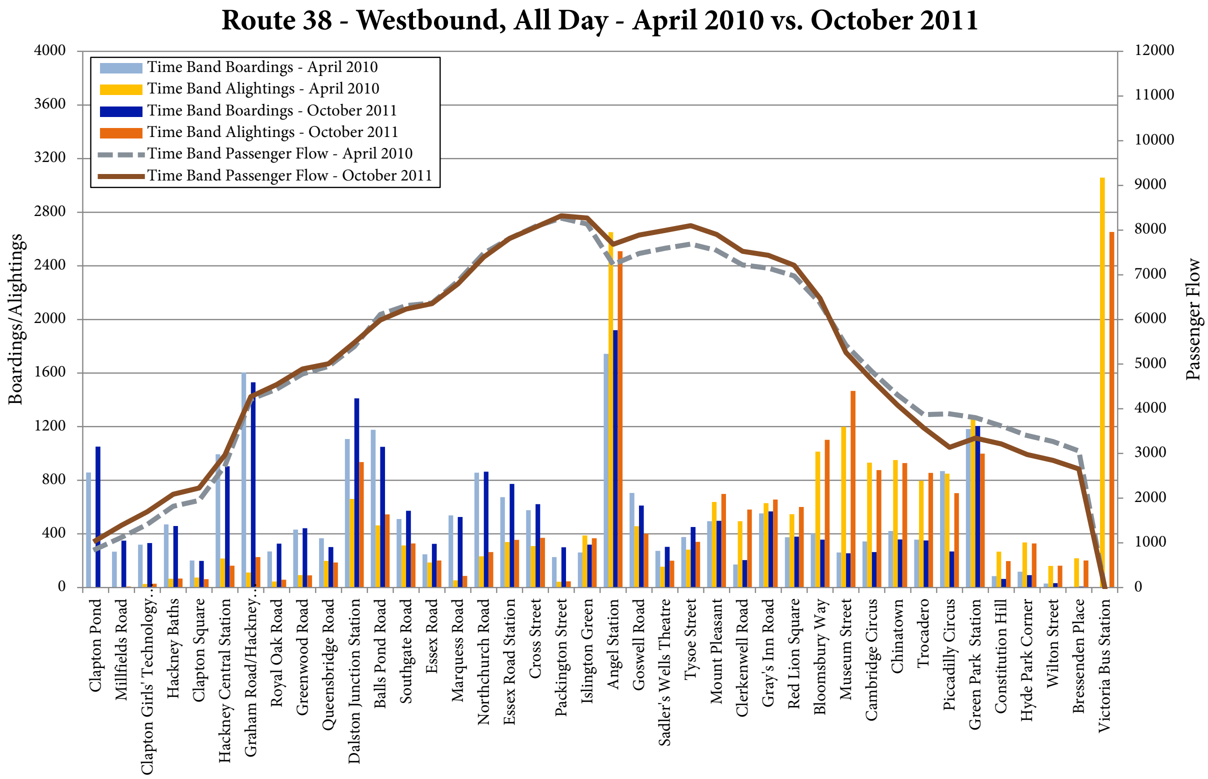
Wilton Street
Bressenden Place
Victoria Bus Station



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Time Band Alightings - April 2010
Time Band Boardings - October 2011
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Time Band Passenger Flow - April 2010
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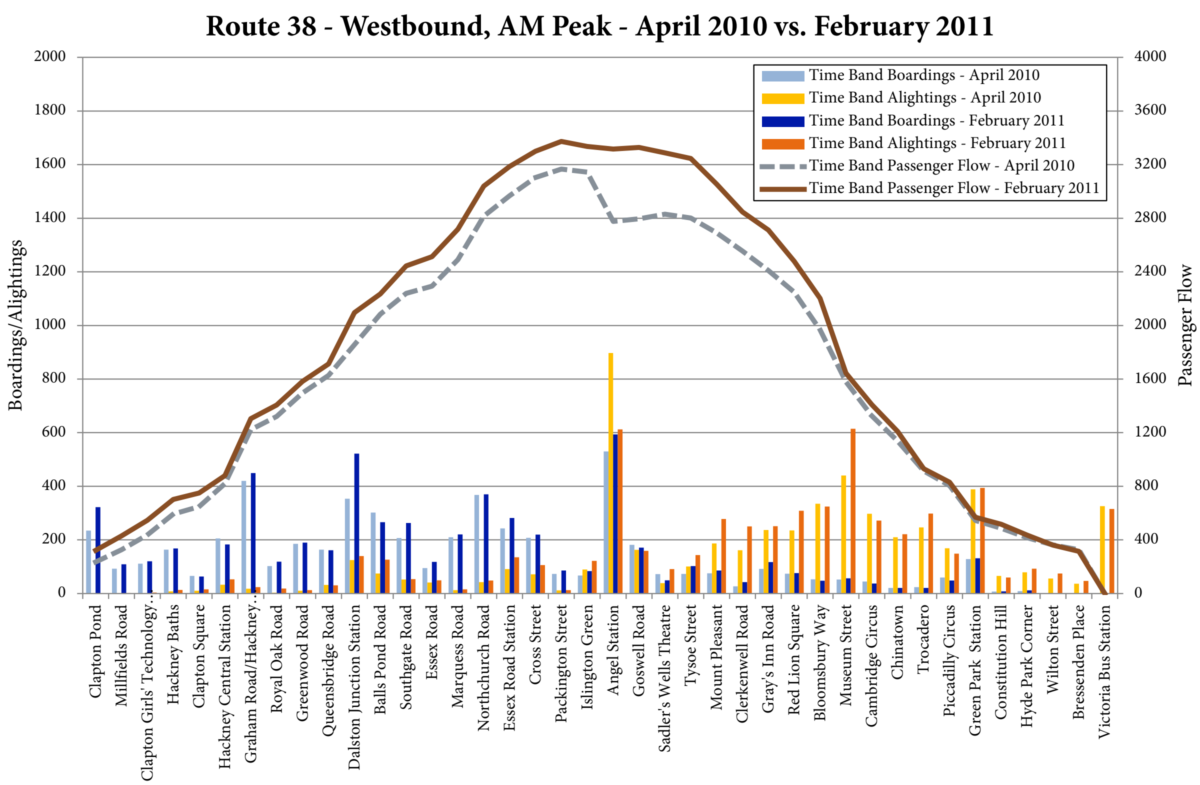
Boardings/Alightings
Passenger Flow
Clapton Pond
Millfields Road
Clapton Girls' Technology...
Hackney Baths
Clapton Square
Hackney Central Station
Graham Road/Hackney...
Royal Oak Road
Greenwood Road
Queensbridge Road
Dalston Junction Station
Balls Pond Road
Southgate Road
Essex Road
Marquess Road
Northchurch Road
Essex Road Station
Cross Street
Packington Street
Islington Green
Angel Station
Goswell Road
Sadler's Wells Theatre
Tysoe Street
Mount Pleasant
Clerkenwell Road
Gray's Inn Road
Red Lion Square
Bloomsbury Way
Museum Street
Cambridge Circus
Chinatown
Trocadero
Piccadilly Circus
Green Park Station
Constitution Hill
Hyde Park Corner
Wilton Street
Bressenden Place
Victoria Bus Station



Route 38 - Westbound, AM Peak - April 2010 vs. February 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - February 2011
Time Band Alightings - February 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - February 2011
Boardings/Alightings
Passenger Flow
Clapton Pond
Millfields Road
Clapton Girls' Technology...
Hackney Baths
Clapton Square
Hackney Central Station
Graham Road/Hackney...
Royal Oak Road
Greenwood Road
Queensbridge Road
Dalston Junction Station
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Southgate Road
Essex Road
Marquess Road
Northchurch Road
Essex Road Station
Cross Street
Packington Street
Islington Green
Angel Station
Goswell Road
Sadler's Wells Theatre
Tysoe Street
Mount Pleasant
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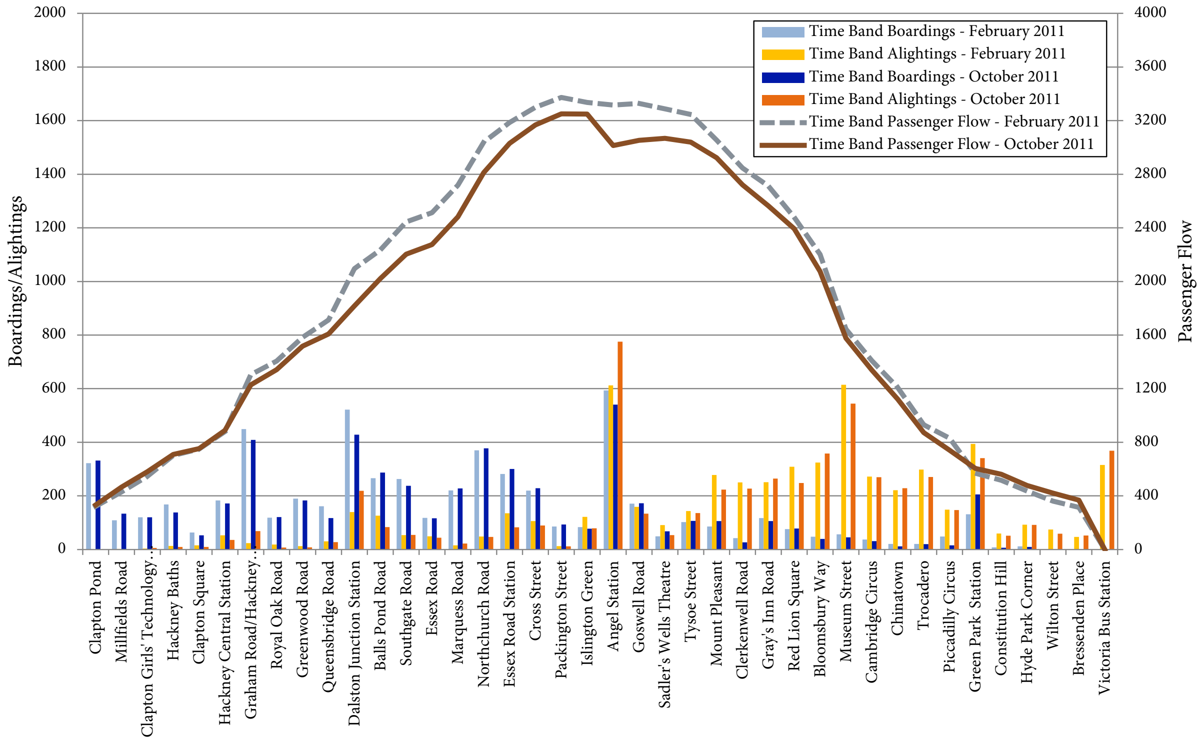
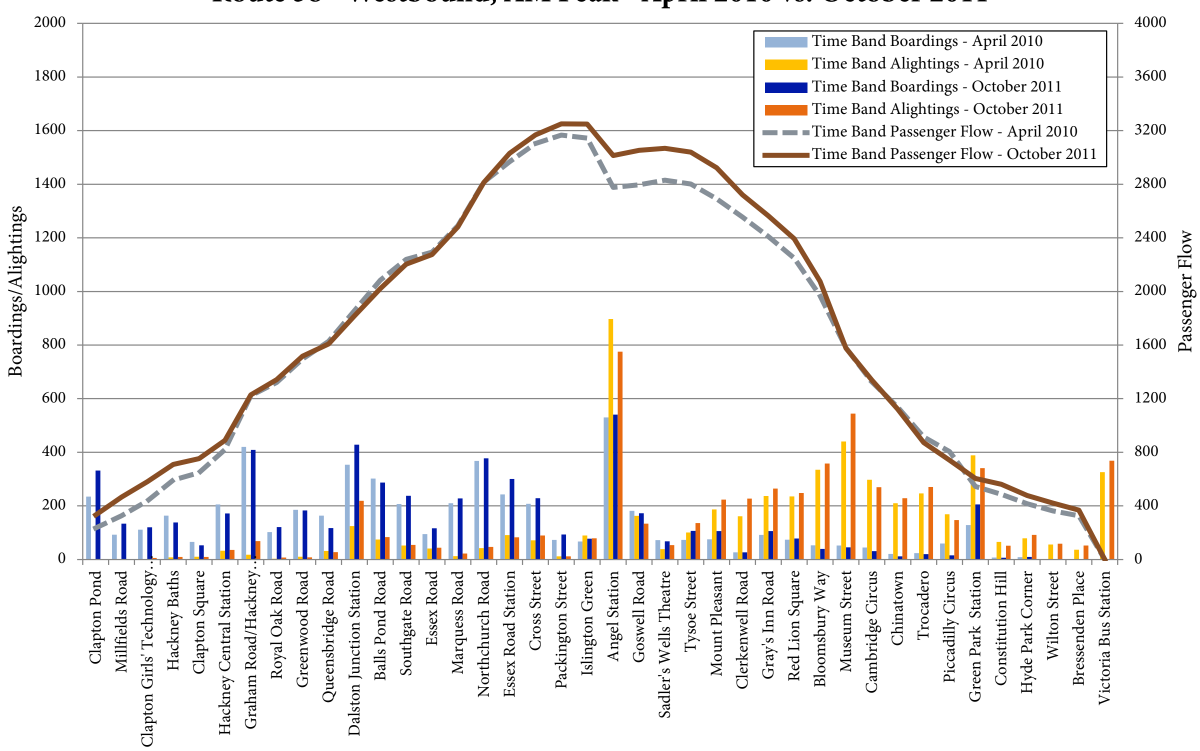
Wilton Street
Bressenden Place
Victoria Bus Station

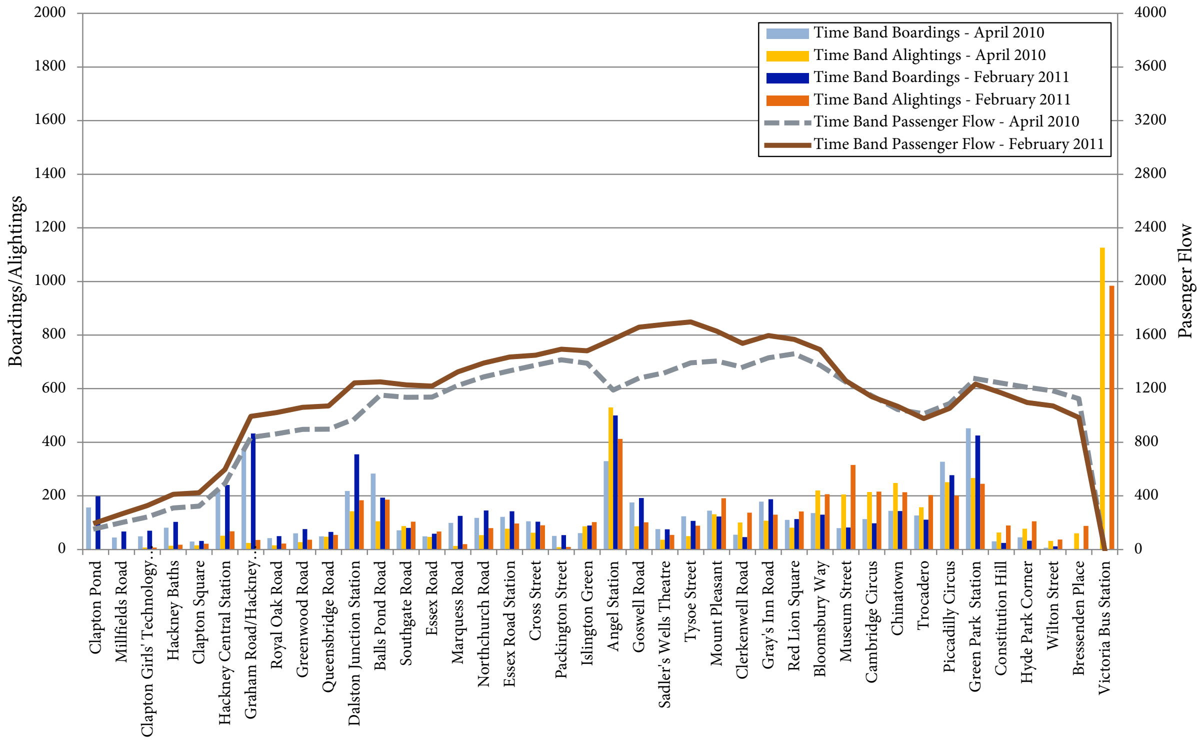
Route 38 - Westbound, AM Peak - February 2011 vs. October 2011



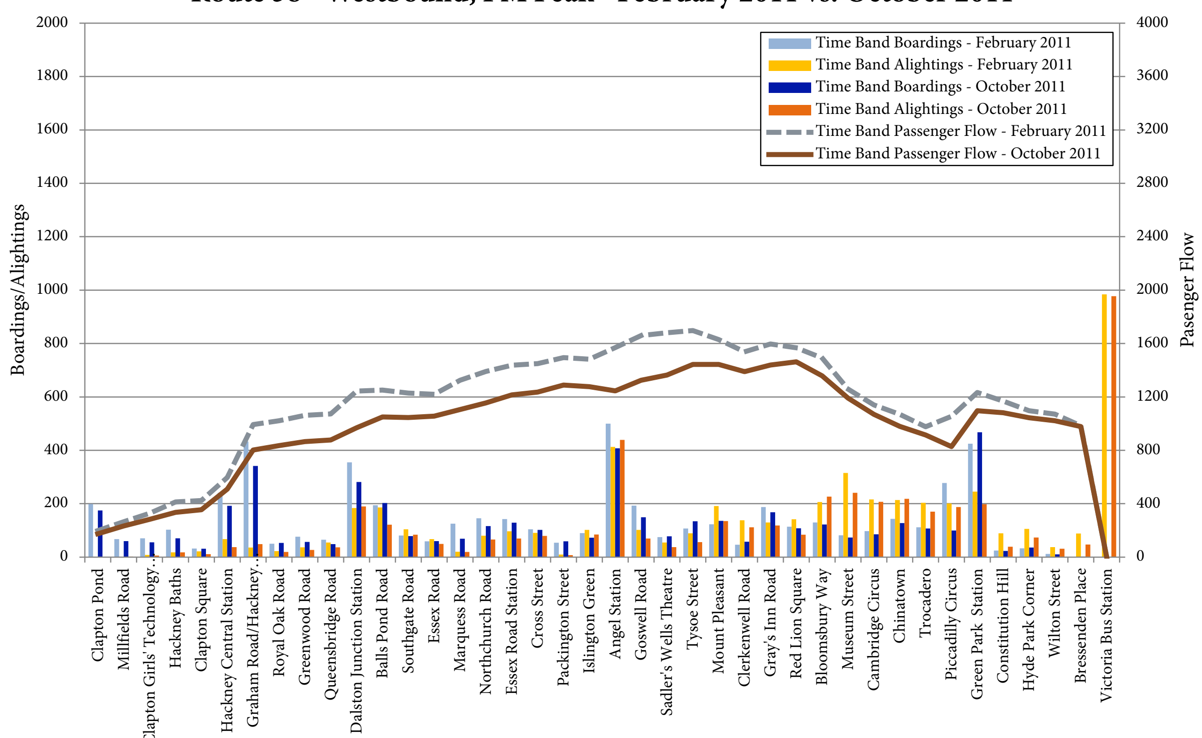
Route 38 - Westbound, AM Peak - April 2010 vs. October 2011



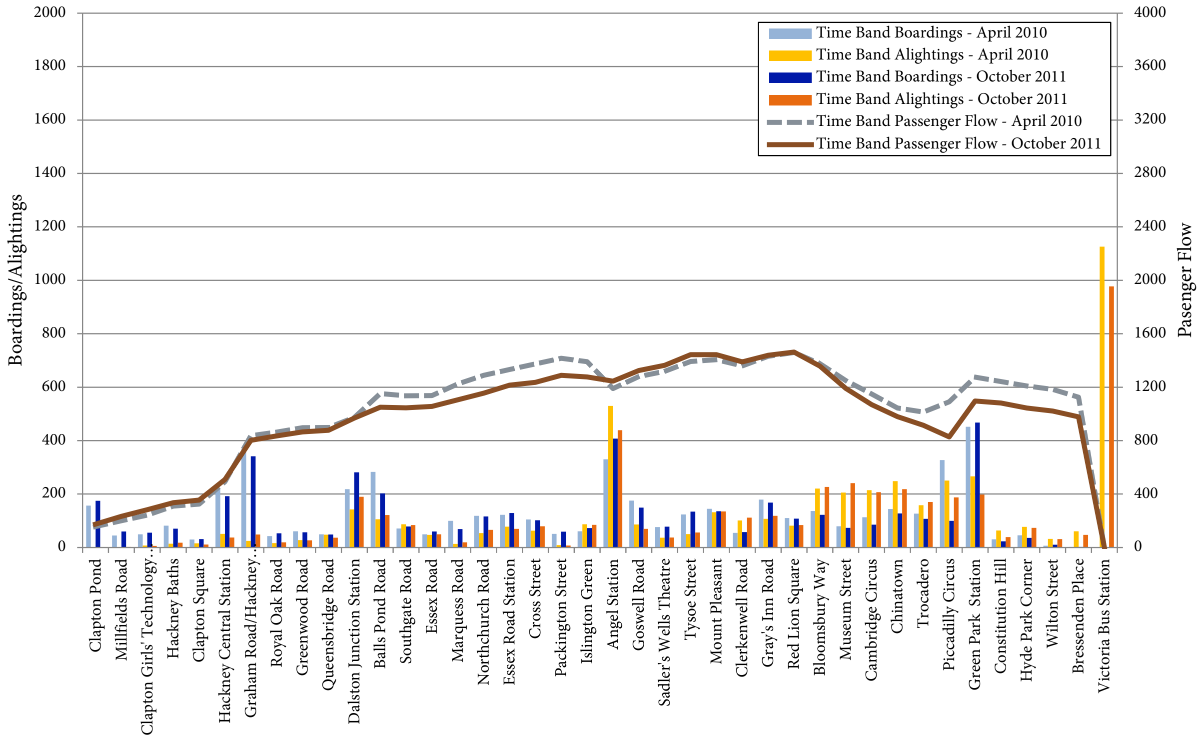
Route 38 - Westbound, PM Peak - April 2010 vs. February 2011



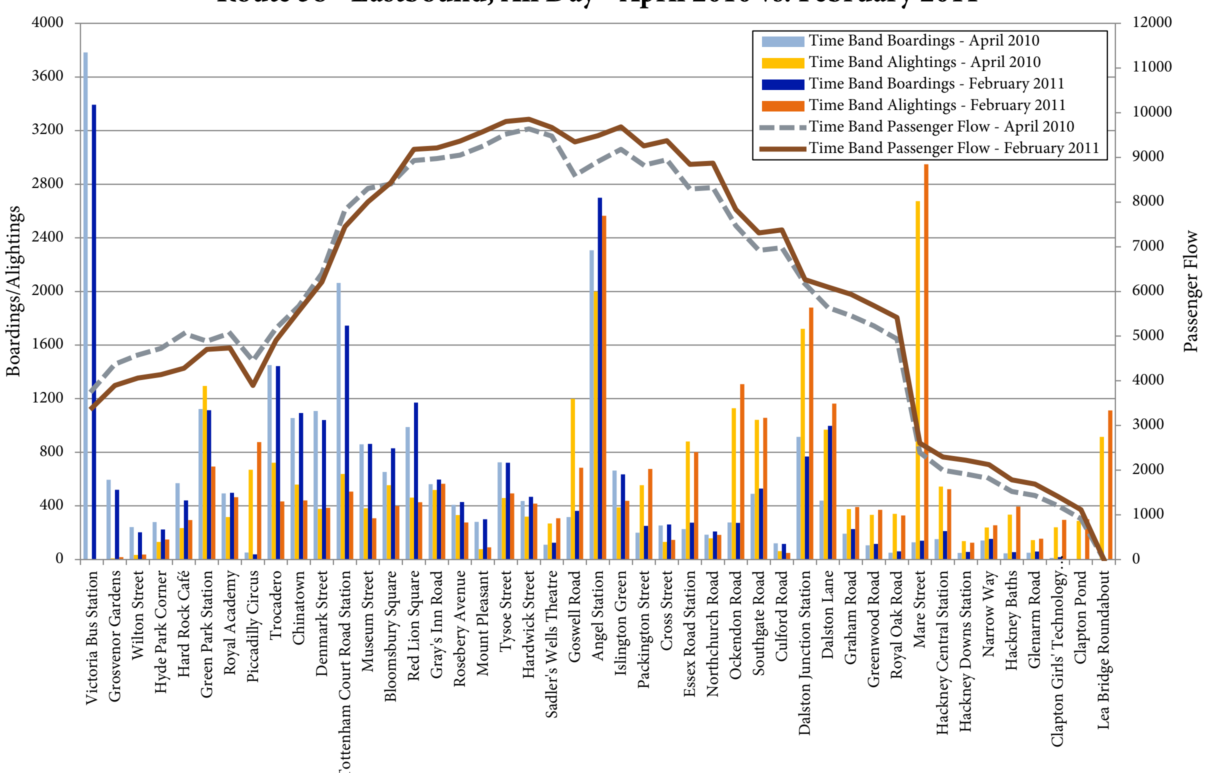
Route 38 - Westbound, PM Peak - February 2011 vs. October 2011



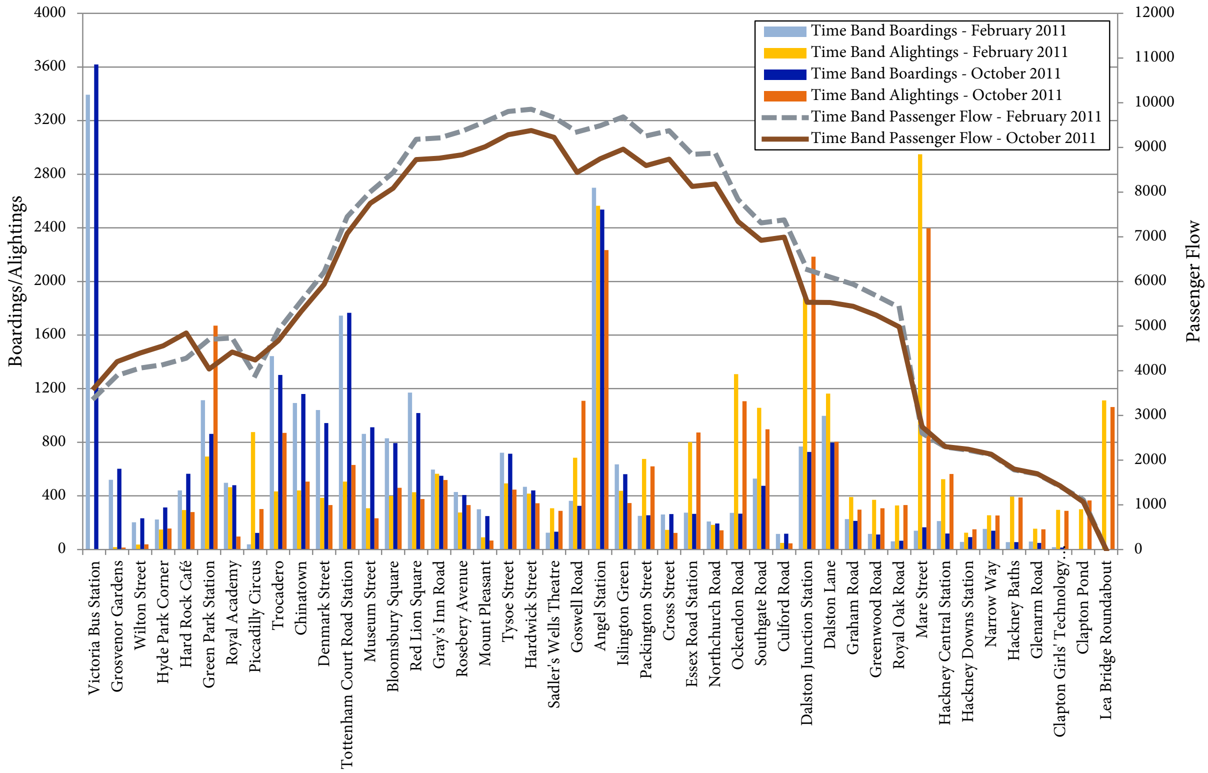
Route 38 - Westbound, PM Peak - April 2010 vs. October 2011



Route 38 - Eastbound, All Day - April 2010 vs. February 2011



Route 38 - Eastbound, All Day - February 2011 vs. October 2011



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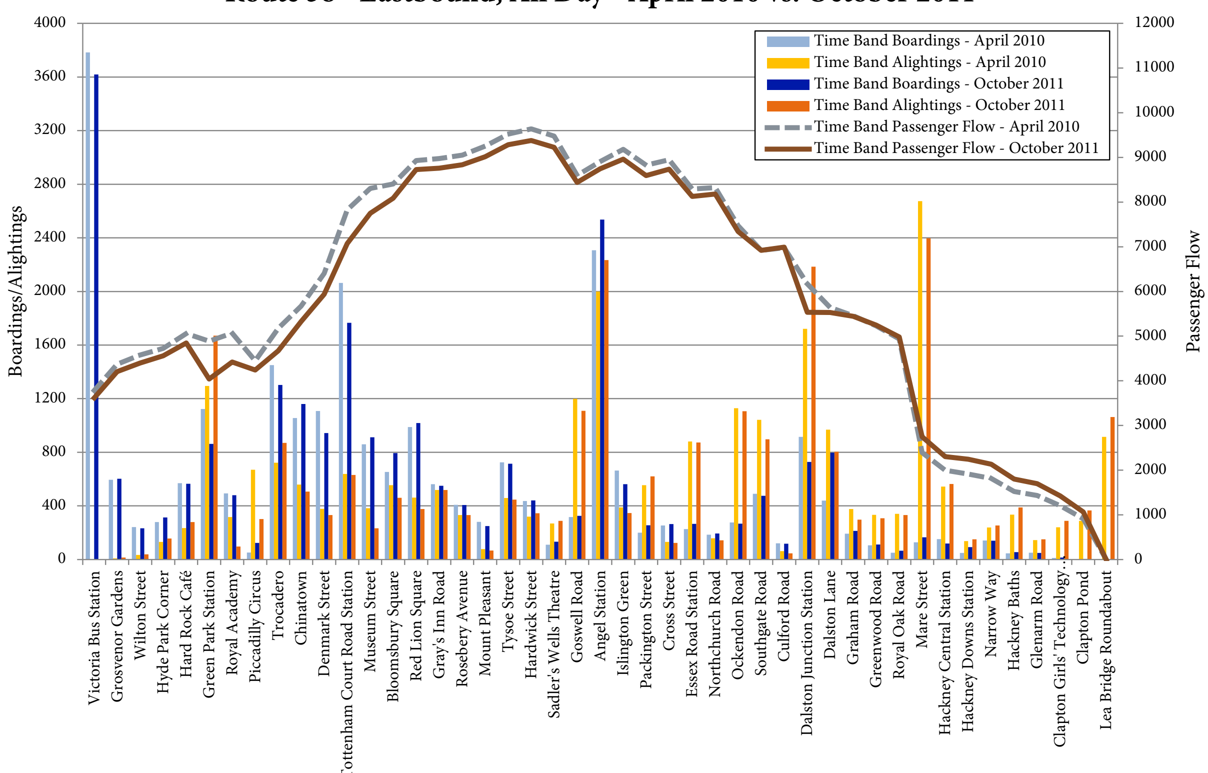

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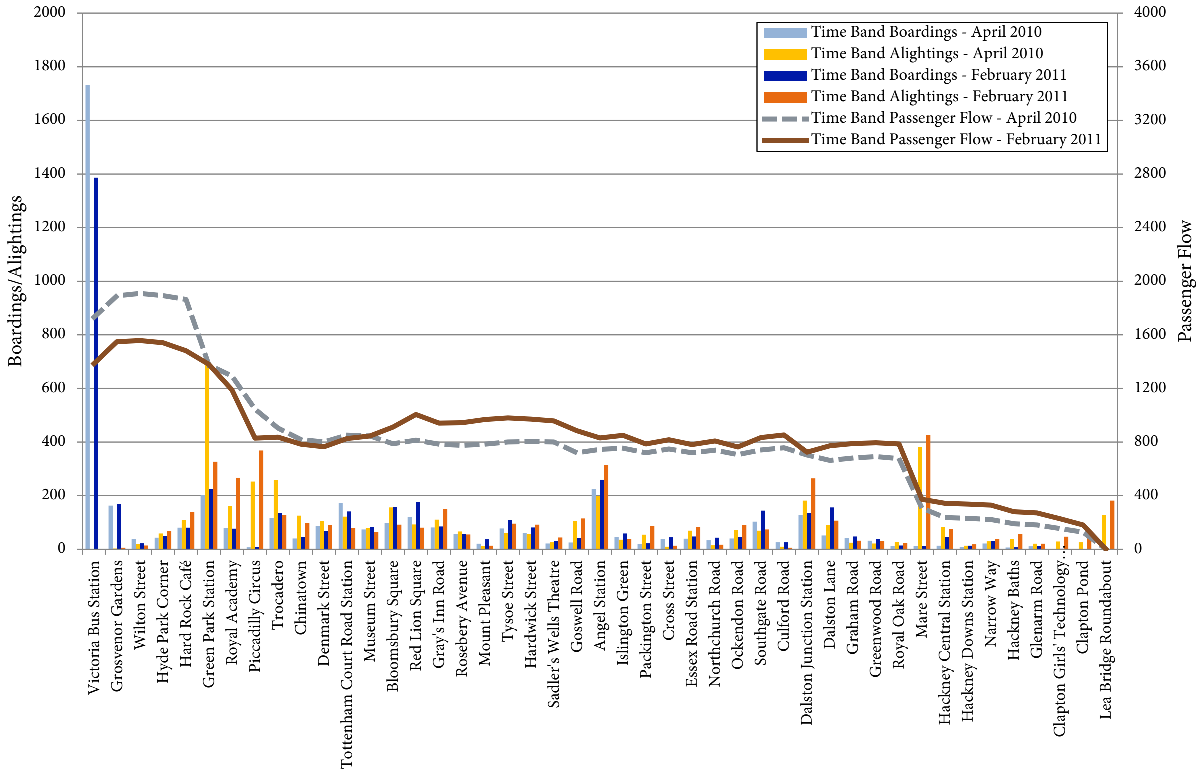

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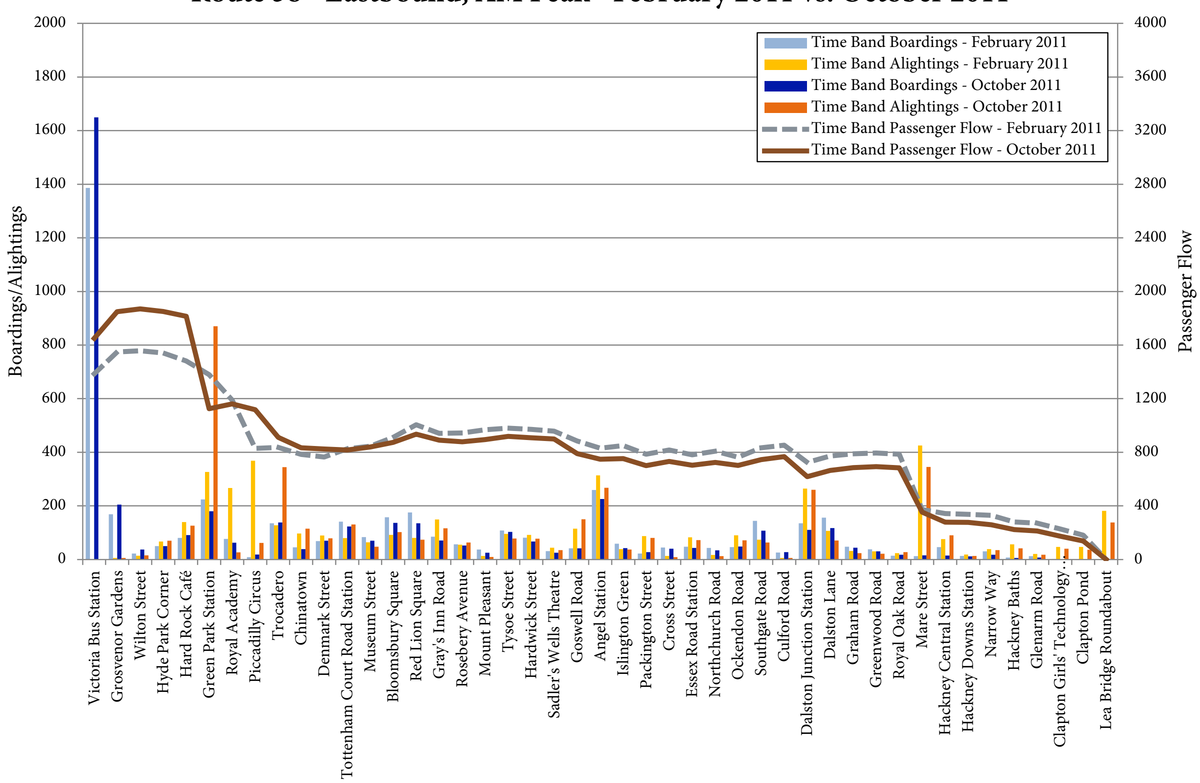

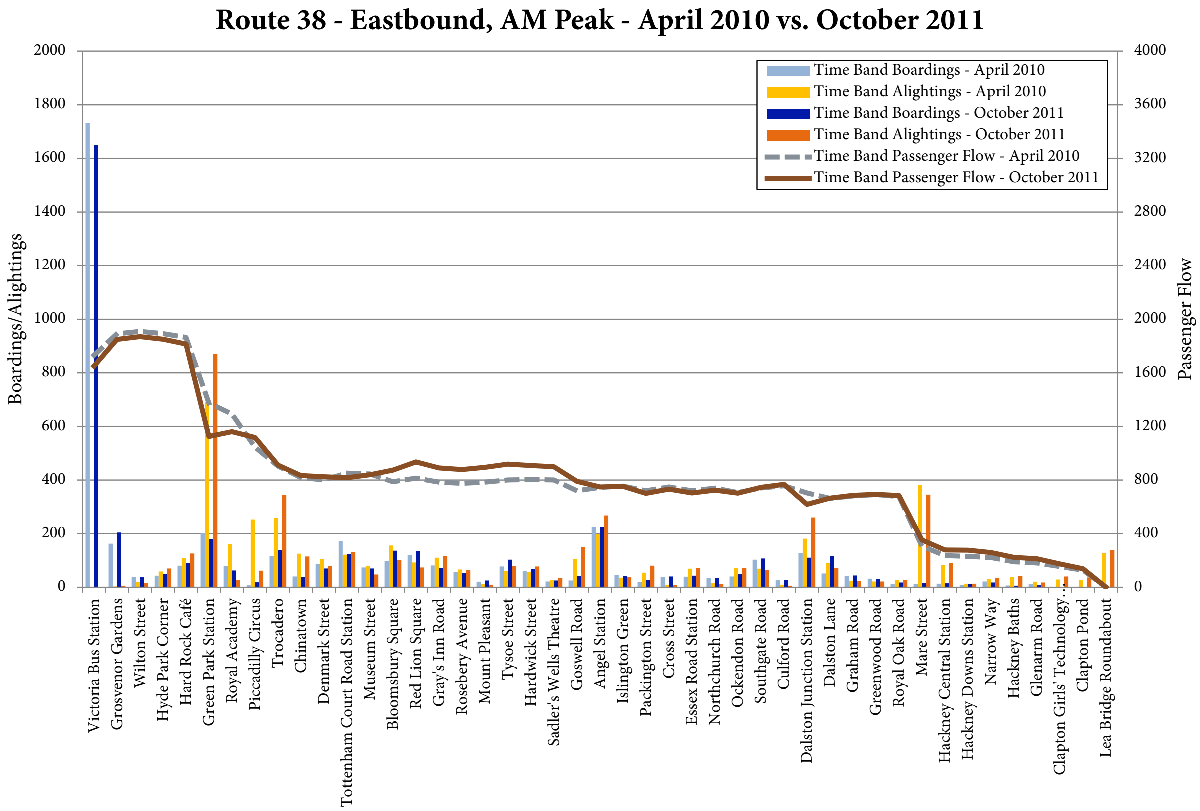
Route 38 - Eastbound, AM Peak - April 2010 vs. October 2011
Boardings/Alightings
Passenger Flow
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - October 2011
Victoria Bus Station
Grosvenor Gardens
Wilton Street
Hyde Park Corner
Hard Rock Café
Green Park Station
Royal Academy
Piccadilly Circus
Trocadero
Chinatown
Denmark Street
Tottenham Court Road Station
Museum Street
Bloomsbury Square
Red Lion Square
Gray's Inn Road
Rosebery Avenue
Mount Pleasant
Tysoe Street
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Packington Street
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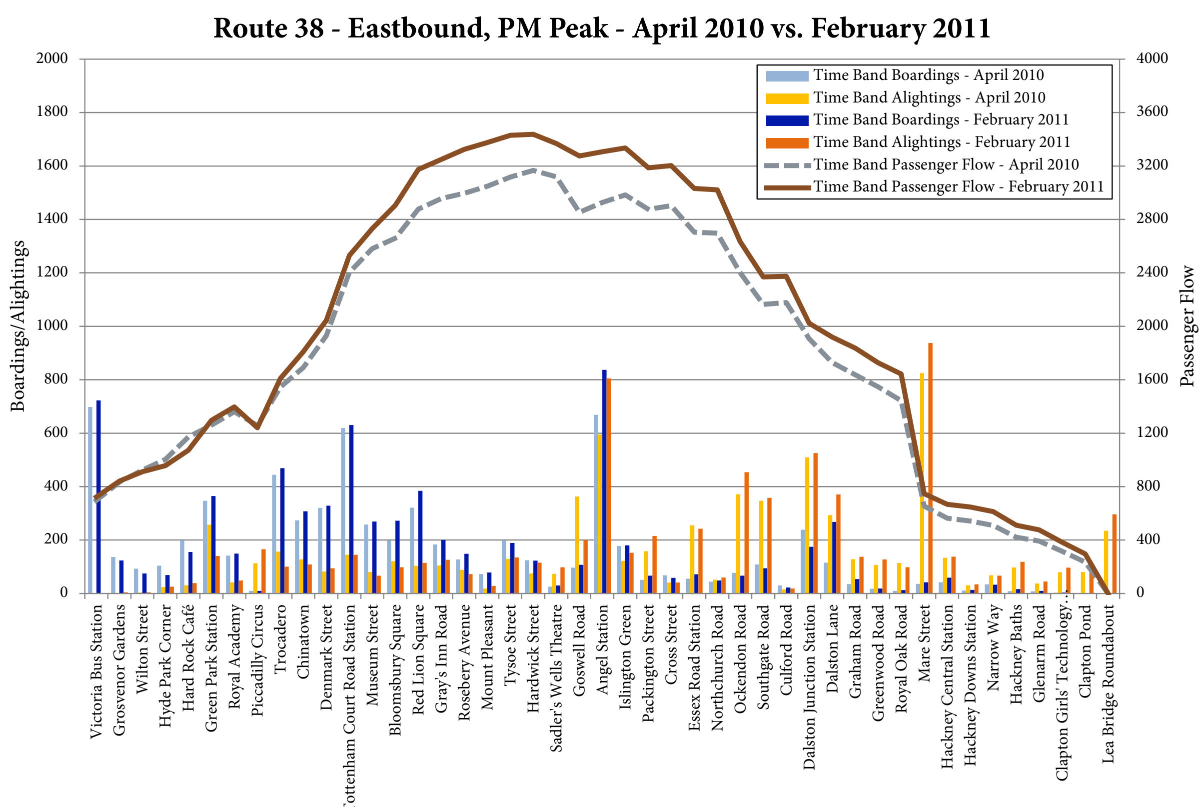
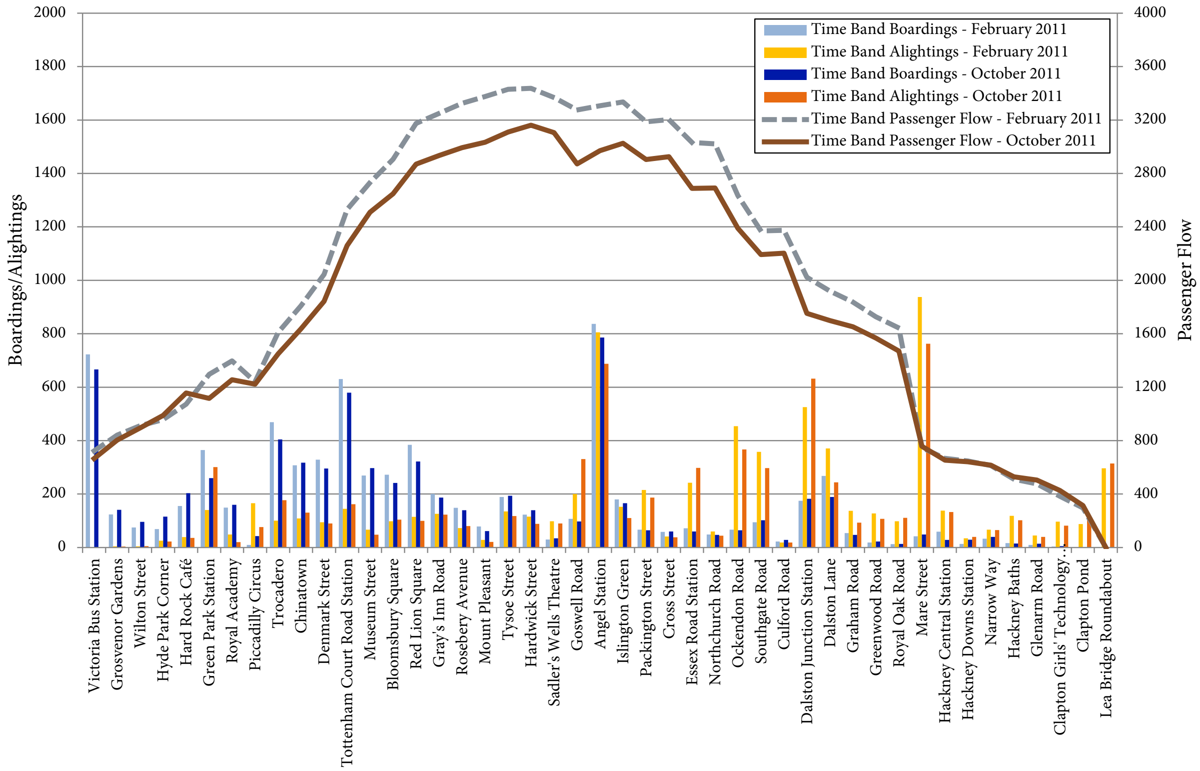
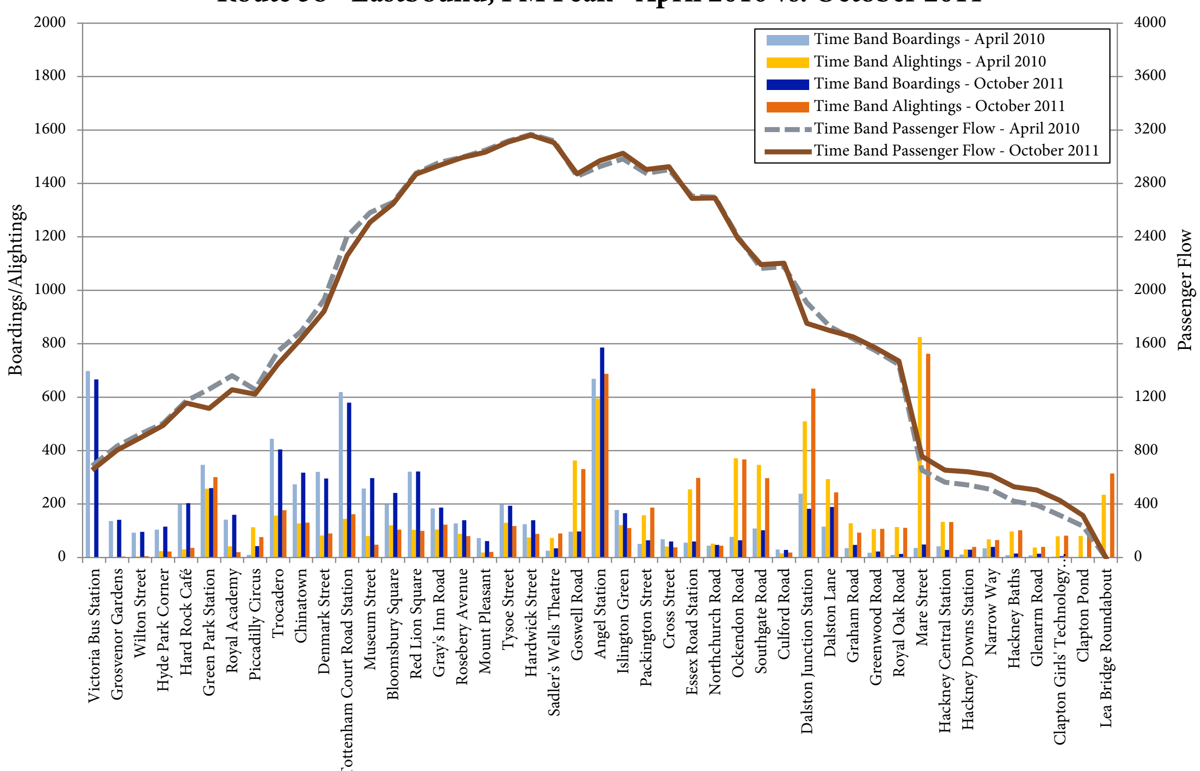
Dalston Lane
Graham Road
Greenwood Road
Royal Oak Road
Mare Street
Hackney Central Station
Hackney Downs Station
Narrow Way
Hackney Baths
Glenarm Road
Clapton Girls' Technology…
Clapton Pond
Lea Bridge Roundabout


Route 38 - Eastbound, PM Peak - April 2010 vs. February 2011
Boardings/Alightings
Passenger Flow
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - February 2011
Time Band Alightings - February 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - February 2011

Route 38 - Eastbound, PM Peak - February 2011 vs. October 2011



Route 38 - Eastbound, PM Peak - April 2010 vs. October 2011



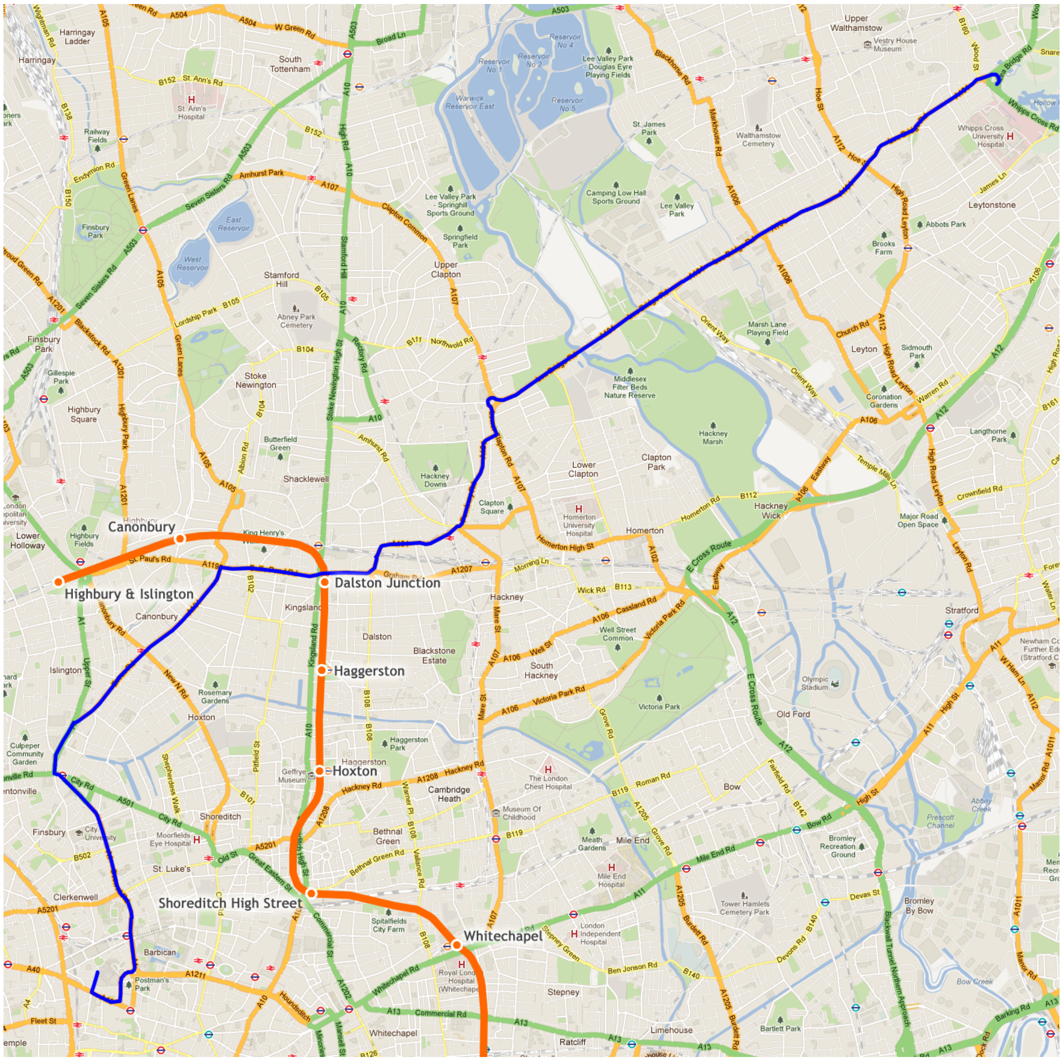
Route 38 - April 2010 vs. February 2011				
Entire Route				
Passenger Counts		Apr-10	Feb-11	Percent Change
Westbound	All Day	20736	22272	7.4%
	AM Peak	5400	5940	10.0%
	PM Peak	4941	5372	8.7%
Eastbound	All Day	25173	25742	2.3%
	AM Peak	4310	4479	3.9%
	PM Peak	6834	7359	7.7%
Both	All Day	45909	48013	4.6%
System-Wide	All Day	6481026	6627919	2.3%

Route 38 - February 2011 vs. October 2011				
Entire Route				
Passenger Counts		Feb-11	Oct-11	Percent Change
Westbound	All Day	22272	20859	-6.3%
	AM Peak	5940	5752	-3.2%
	PM Peak	5372	4646	-13.5%
Eastbound	All Day	25742	25017	-2.8%
	AM Peak	4479	4389	-2.0%
	PM Peak	7359	7009	-4.8%
Both	All Day	48013	45876	-4.5%
System-Wide	All Day	6627919	6765182	2.1%

Route 38 - April 2010 vs. October 2011				
Entire Route				
Passenger Counts		Apr-10	Oct-11	Percent Change
Westbound	All Day	20736	20859	0.6%
	AM Peak	5400	5752	6.5%
	PM Peak	4941	4646	-6.0%
Eastbound	All Day	25173	25017	-0.6%
	AM Peak	4310	4389	1.8%
	PM Peak	6834	7009	2.6%
Both	All Day	45909	45876	-0.1%
System-Wide	All Day	6481026	6765182	4.4%

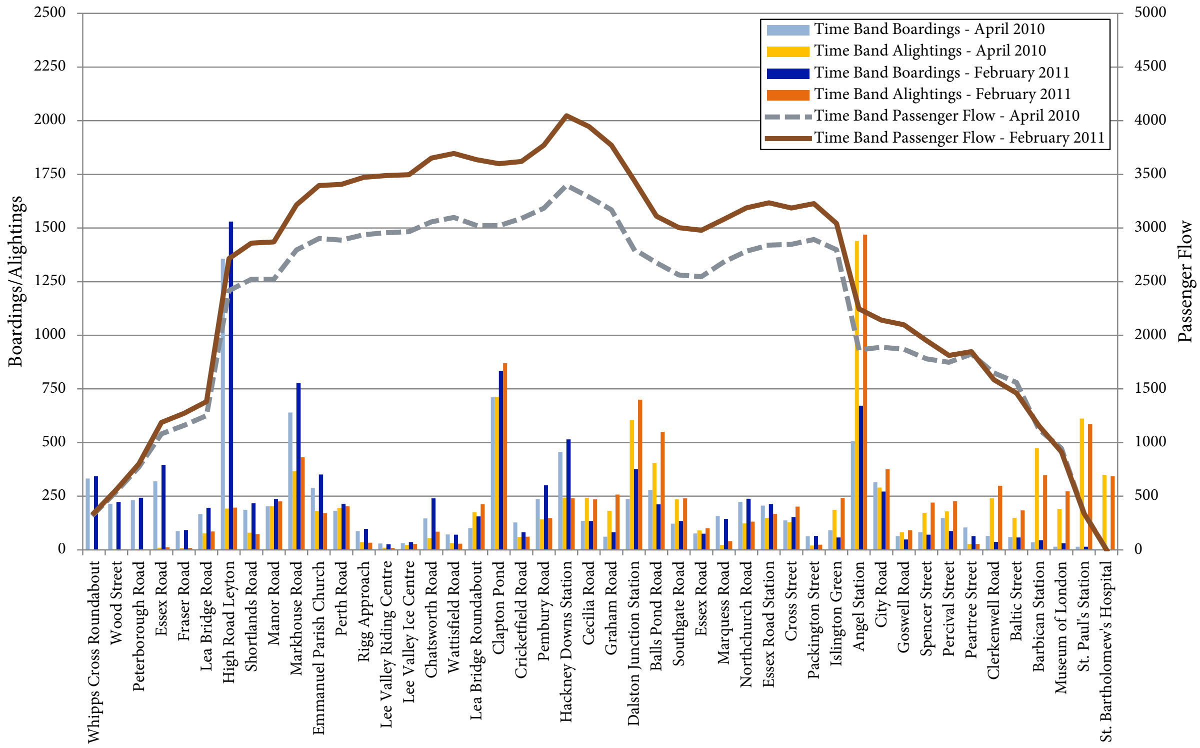
A.3 Route 56

Beginning at Whipps Cross University Hospital in the northeast and traveling to St. Paul's in the City to the southwest, route 56 is the longest route of the four east-west routes. Service frequency is eight to ten buses per hour for the majority of the day, with a little over 19,000 passengers on the typical weekday.

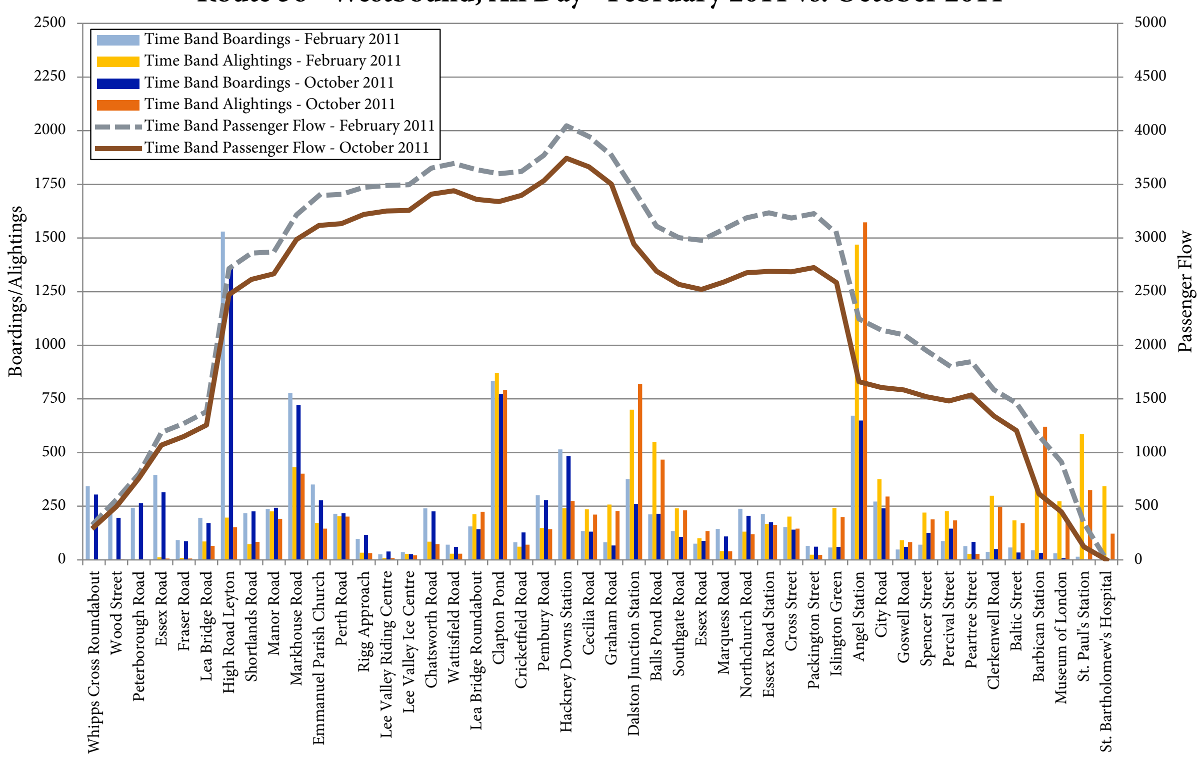


Map of Route 56

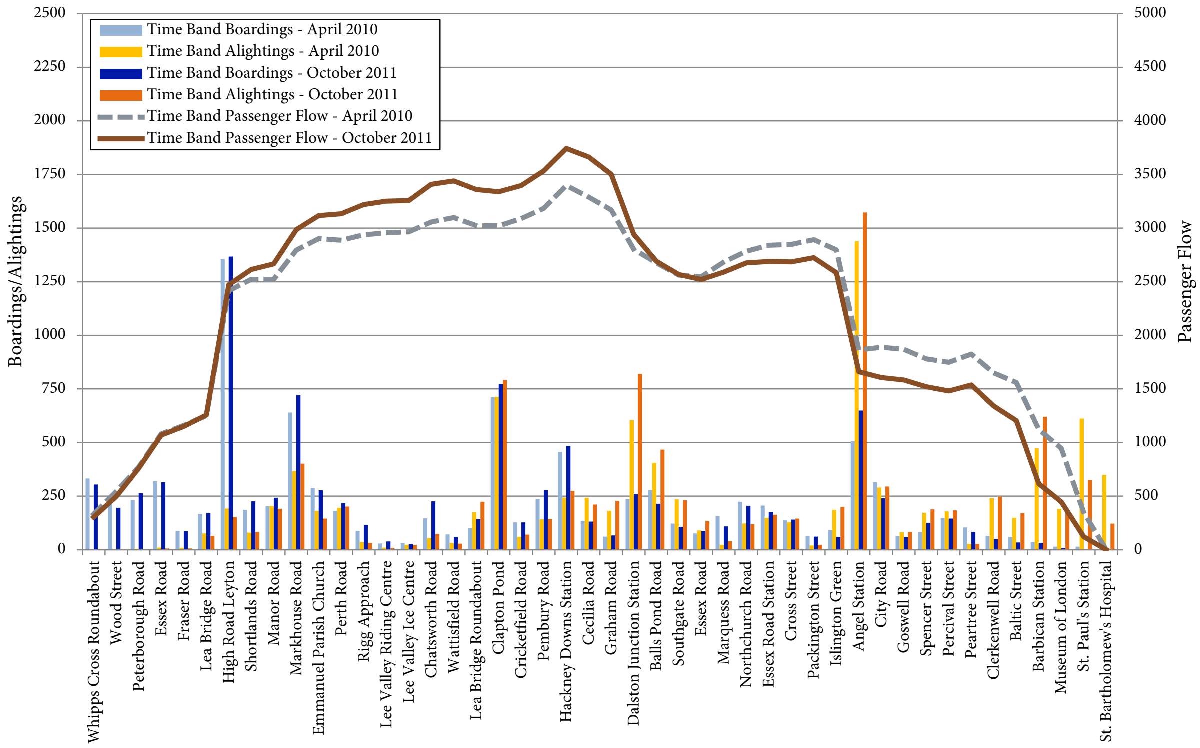
Route 56 - Westbound, All Day - April 2010 vs. February 2011



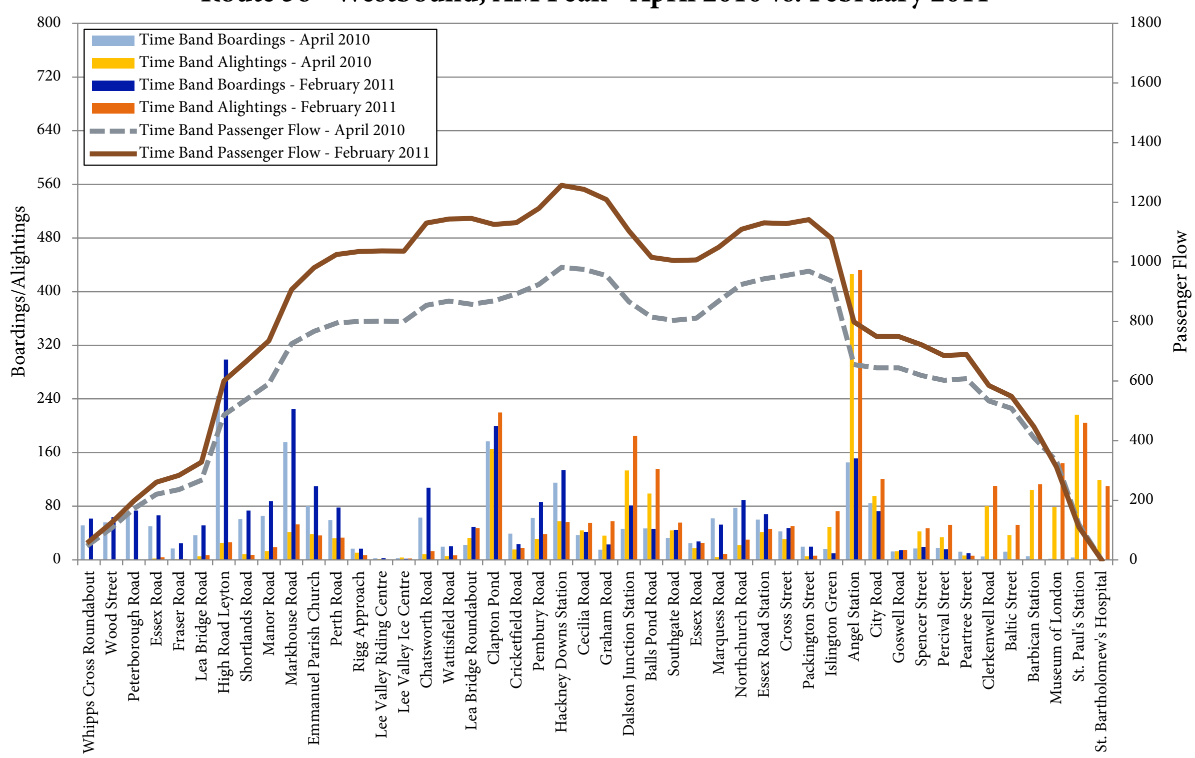
Route 56 - Westbound, All Day - February 2011 vs. October 2011



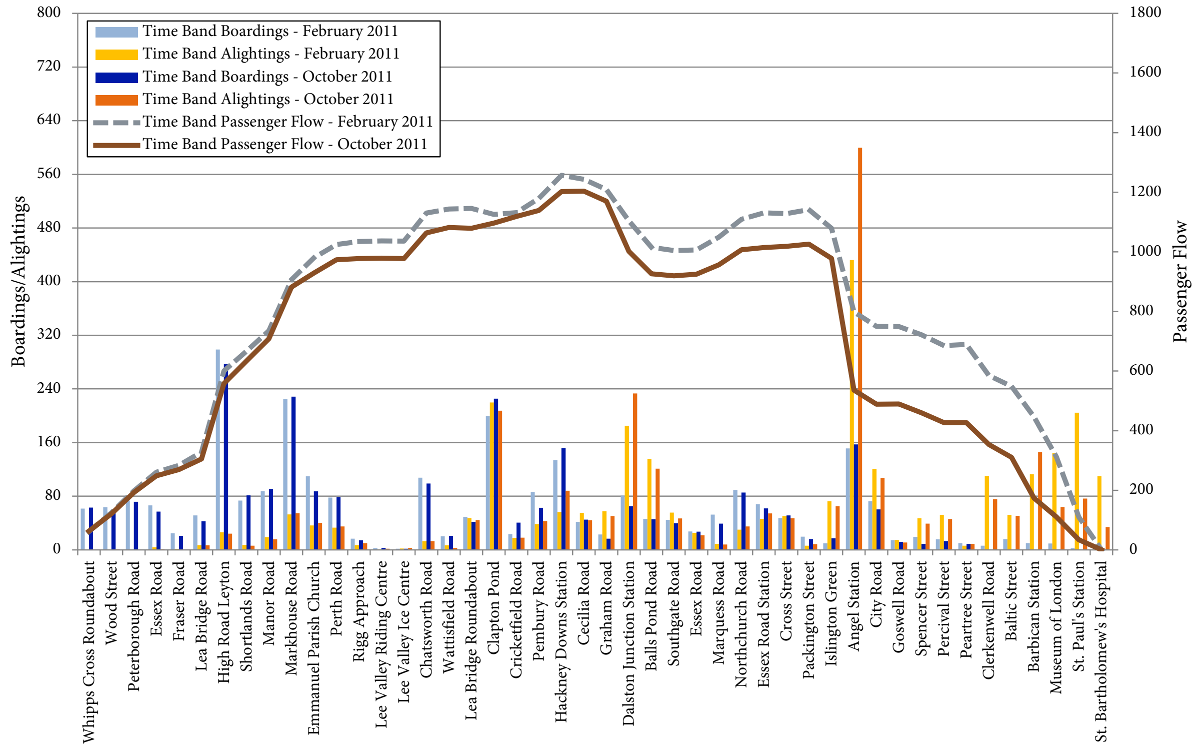
Route 56 - Westbound, All Day - April 2010 vs. October 2011



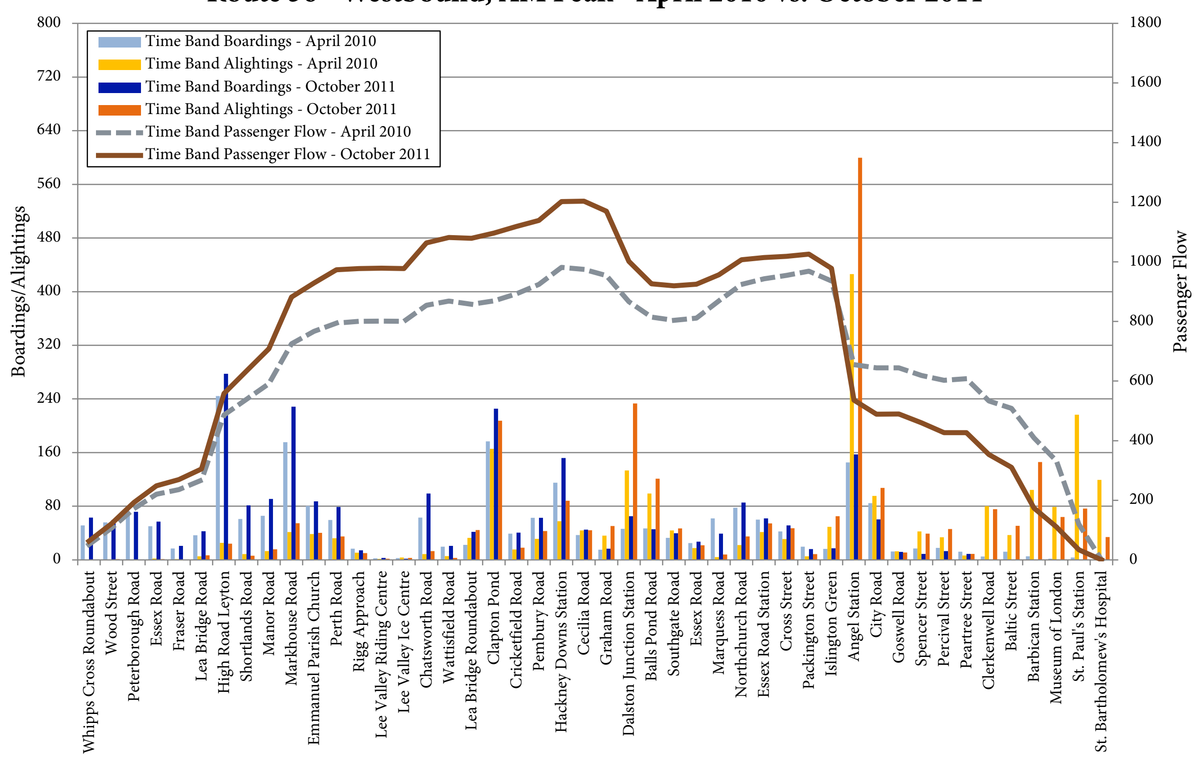
Route 56 - Westbound, AM Peak - April 2010 vs. February 2011



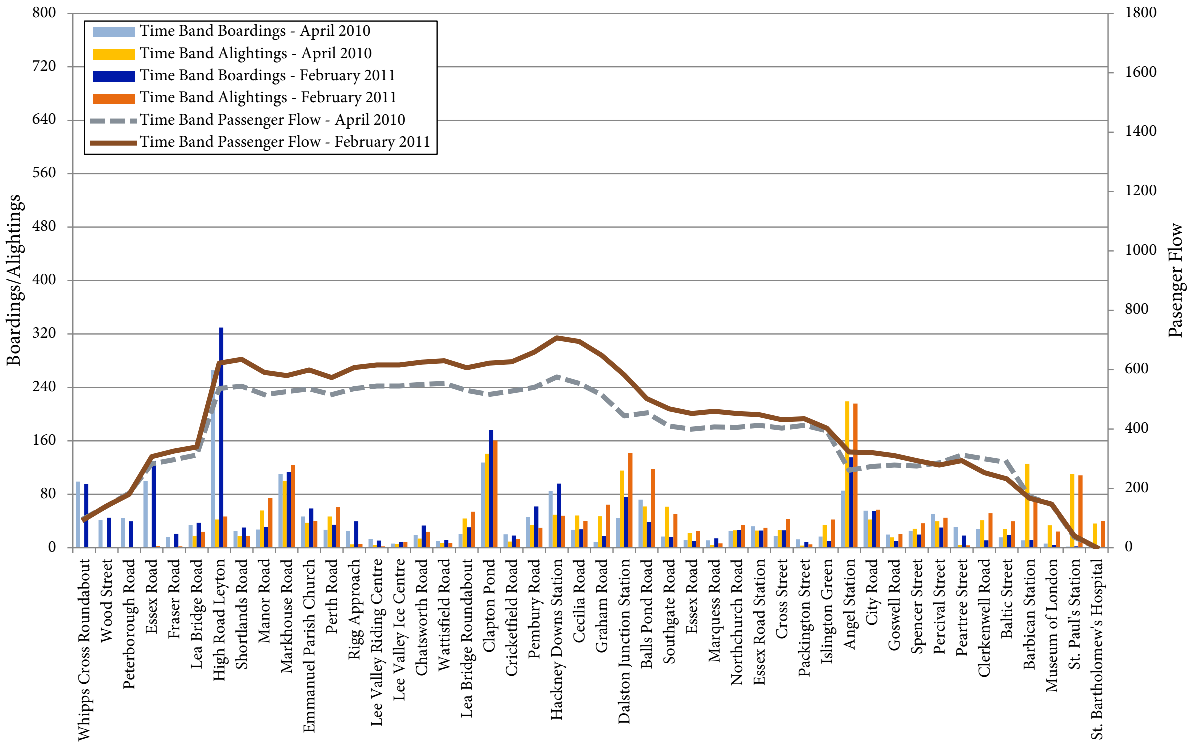
Route 56 - Westbound, AM Peak - February 2011 vs. October 2011



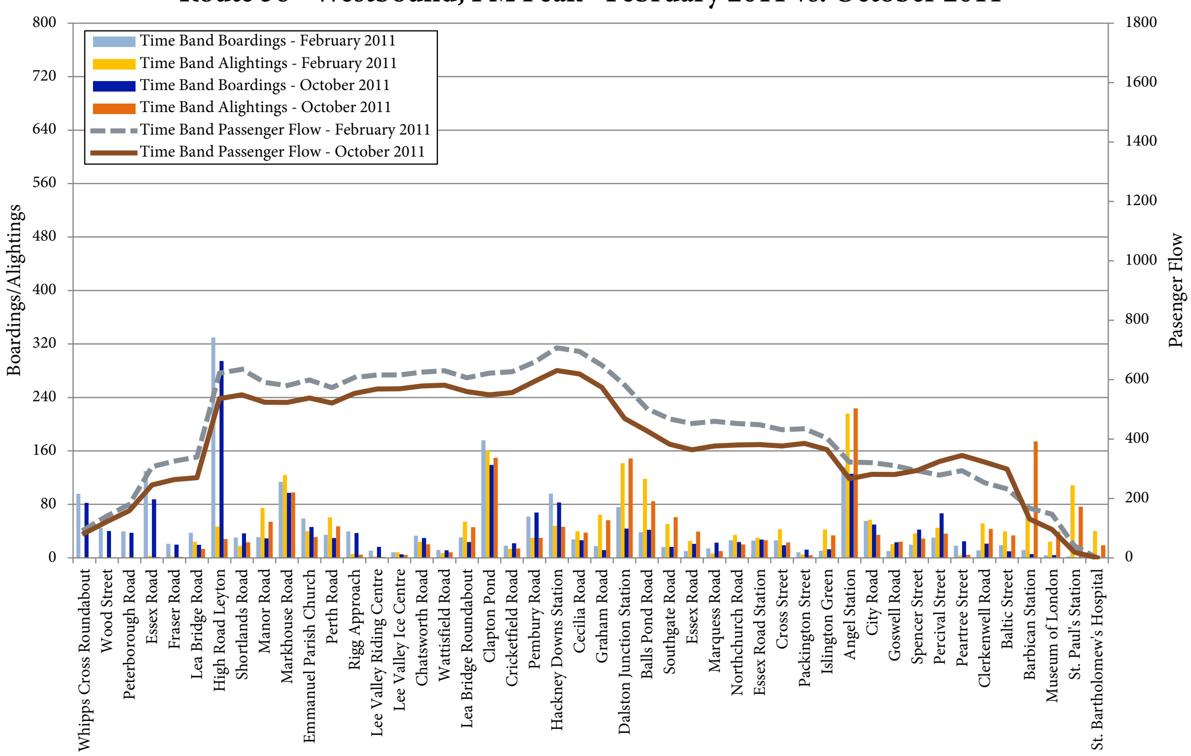
Route 56 - Westbound, AM Peak - April 2010 vs. October 2011

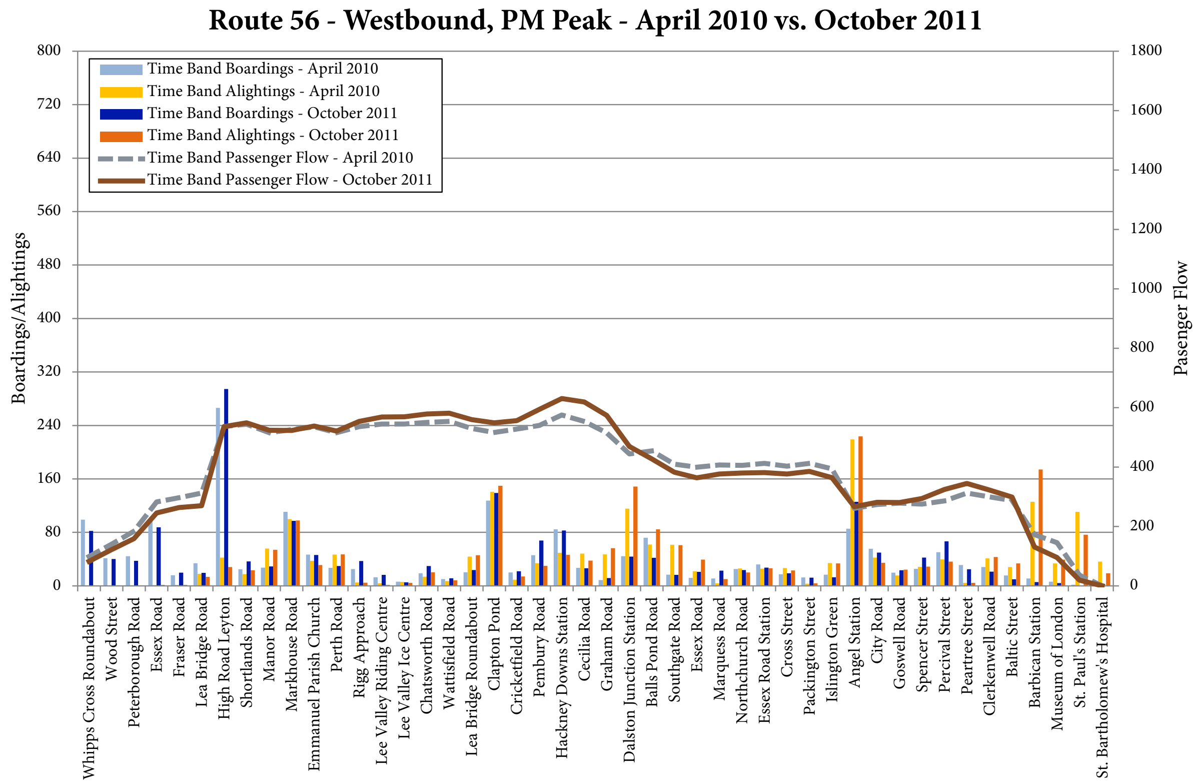


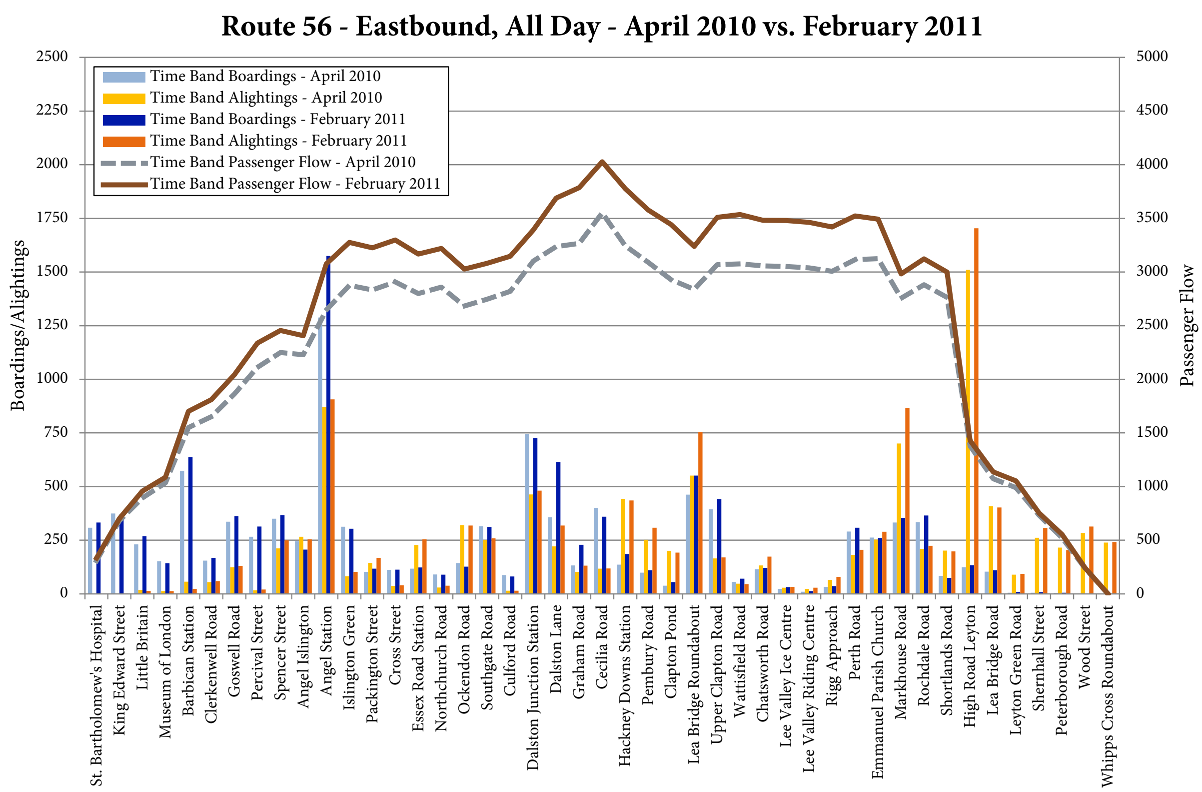
Route 56 - Westbound, PM Peak - April 2010 vs. February 2011



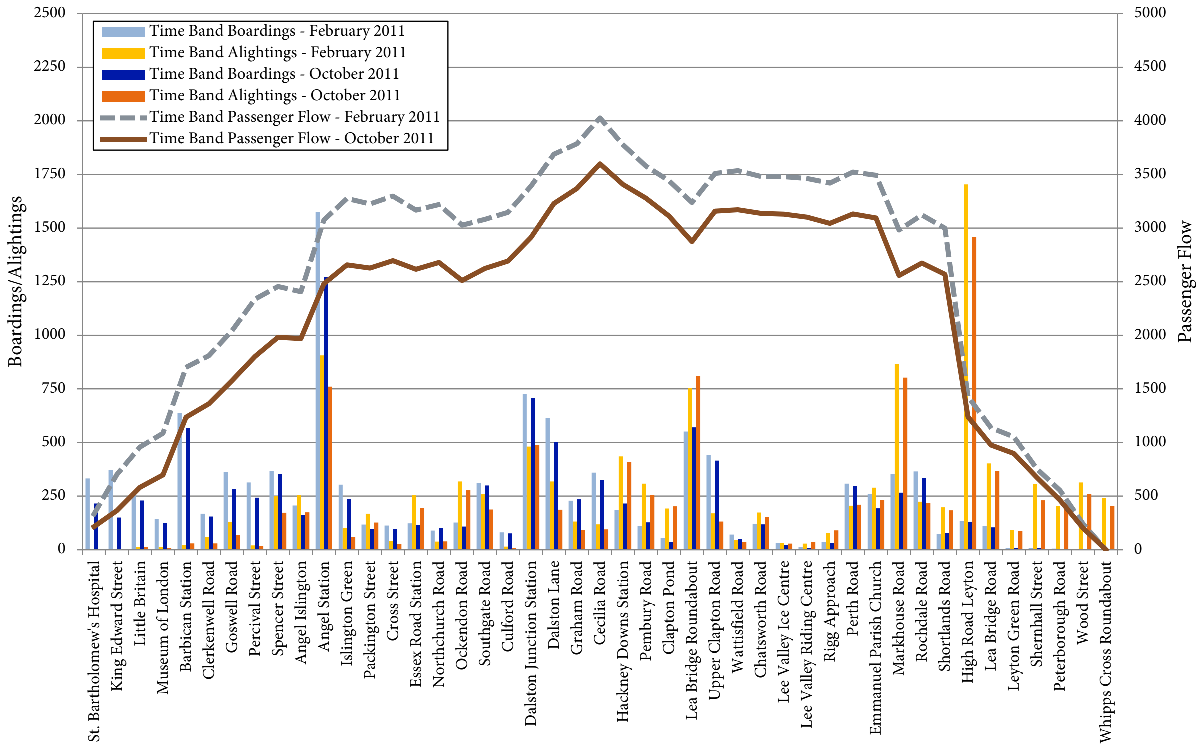
Route 56 - Westbound, PM Peak - February 2011 vs. October 2011



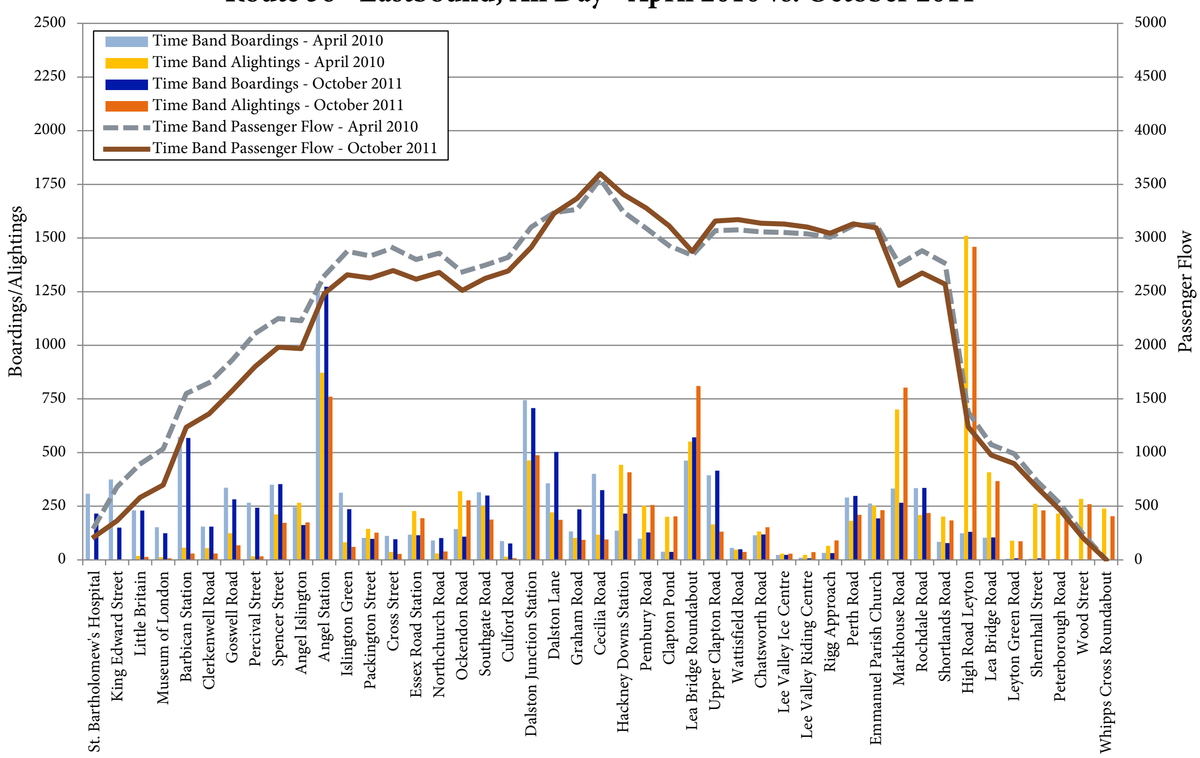

Route 56 - Westbound, PM Peak - April 2010 vs. October 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - October 2011
Boardings/Alightings
Pasenger Flow
Whipps Cross Roundabout
Wood Street
Peterborough Road
Essex Road
Fraser Road
Lea Bridge Road
High Road Leyton
Shortlands Road
Manor Road
Markhouse Road
Emmanuel Parish Church
Perth Road
Rigg Approach
Lee Valley Riding Centre
Lee Valley Ice Centre
Chatsworth Road
Wattisfield Road
Lea Bridge Roundabout
Clapton Pond
Cricketfield Road
Pembury Road
Hackney Downs Station
Cecilia Road
Graham Road
Dalston Junction Station
Balls Pond Road
Southgate Road
Essex Road
Marquess Road
Northchurch Road
Essex Road Station
Cross Street
Packington Street
Islington Green
Angel Station
City Road
Goswell Road
Spencer Street
Percival Street
Peartree Street
Clerkenwell Road
Baltic Street
Barbican Station
Museum of London
St. Paul's Station
St. Bartholomew's Hospital


Route 56 - Eastbound, All Day - April 2010 vs. February 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - February 2011
Time Band Alightings - February 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - February 2011
Boardings/Alightings
Passenger Flow
St. Bartholomew's Hospital
King Edward Street
Little Britain
Museum of London
Barbican Station
Clerkenwell Road
Goswell Road
Percival Street
Spencer Street
Angel Islington
Angel Station
Islington Green
Packington Street
Cross Street
Essex Road Station
Northchurch Road
Ockendon Road
Southgate Road
Culford Road
Dalston Junction Station
Dalston Lane
Graham Road
Cecilia Road
Hackney Downs Station
Pembury Road
Clapton Pond
Lea Bridge Roundabout
Upper Clapton Road
Wattisfield Road
Chatsworth Road
Lee Valley Ice Centre
Lee Valley Riding Centre
Rigg Approach
Perth Road
Emmanuel Parish Church
Markhouse Road
Rochdale Road
Shortlands Road
High Road Leyton
Lea Bridge Road
Leyton Green Road
Shernhall Street
Peterborough Road
Wood Street
Whipps Cross Roundabout

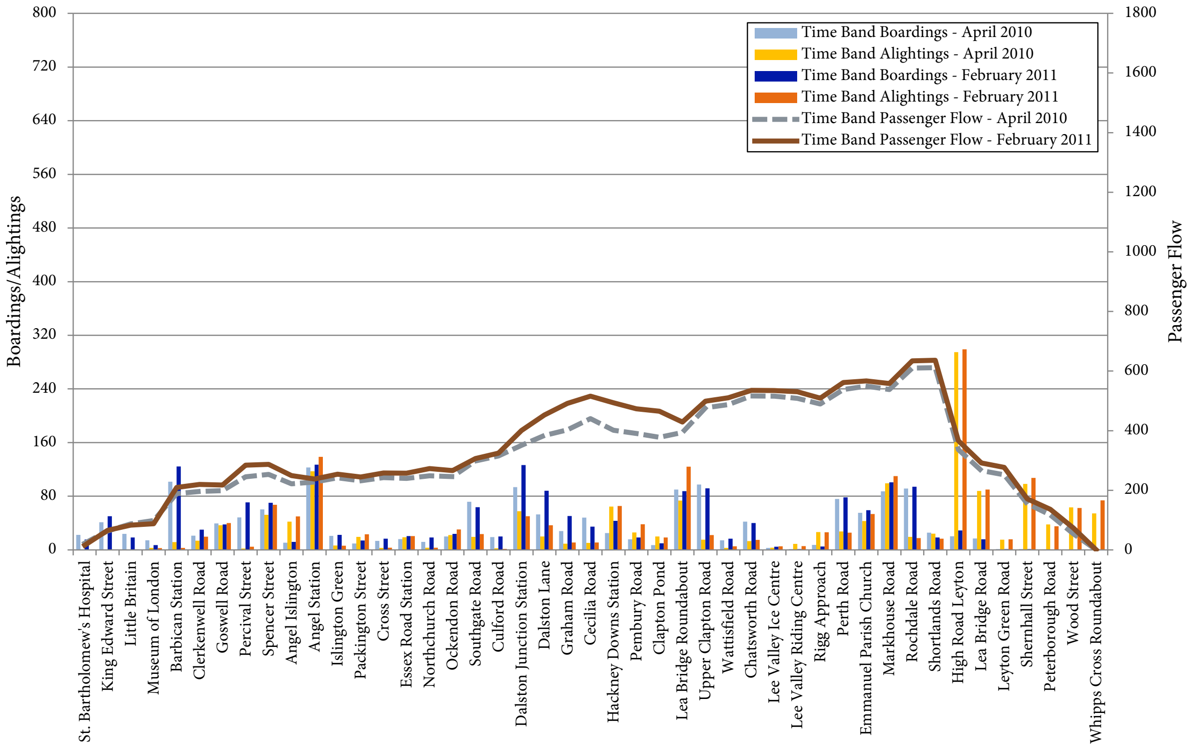
Route 56 - Eastbound, All Day - February 2011 vs. October 2011



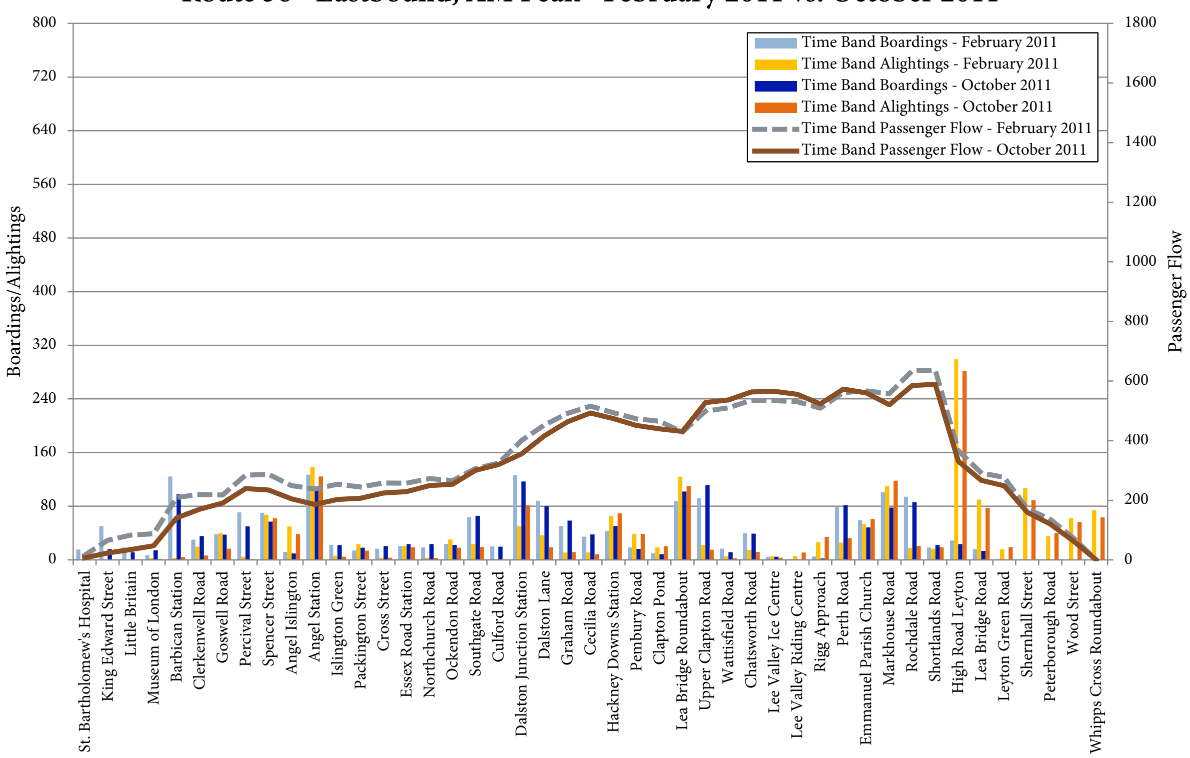
Route 56 - Eastbound, All Day - April 2010 vs. October 2011

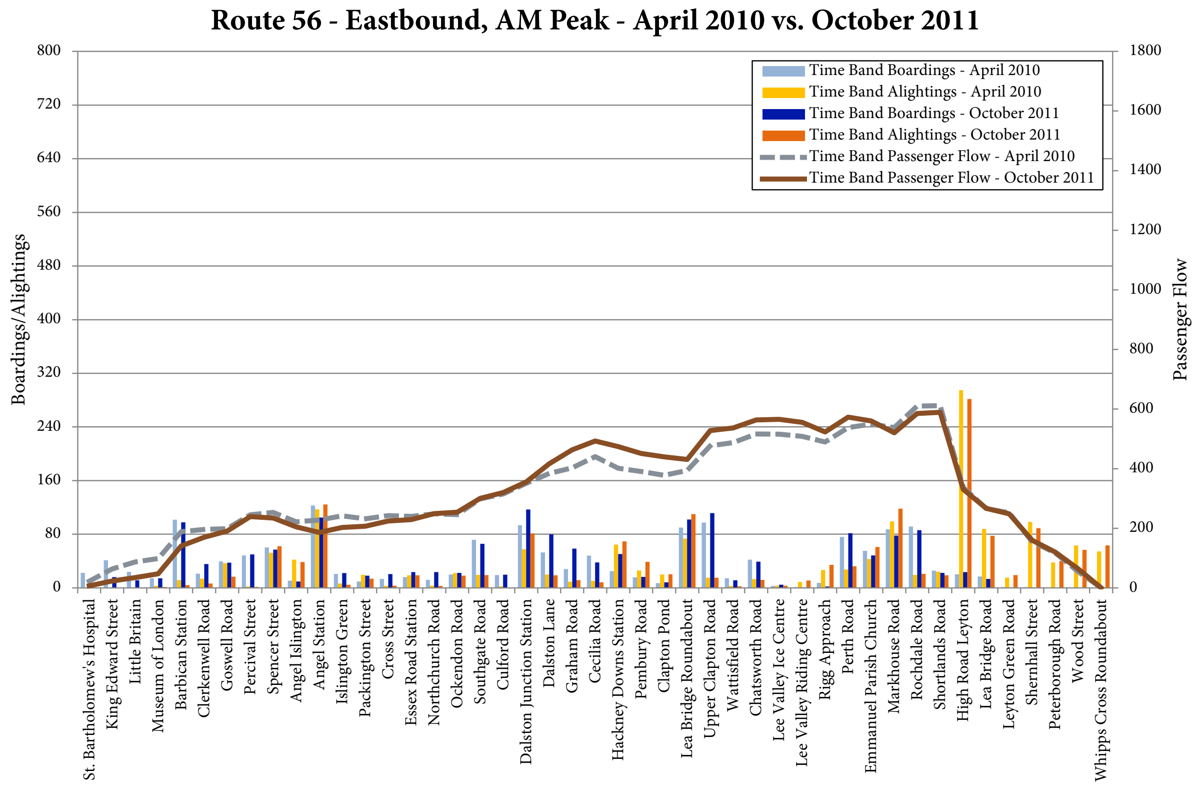


Route 56 - Eastbound, AM Peak - April 2010 vs. February 2011

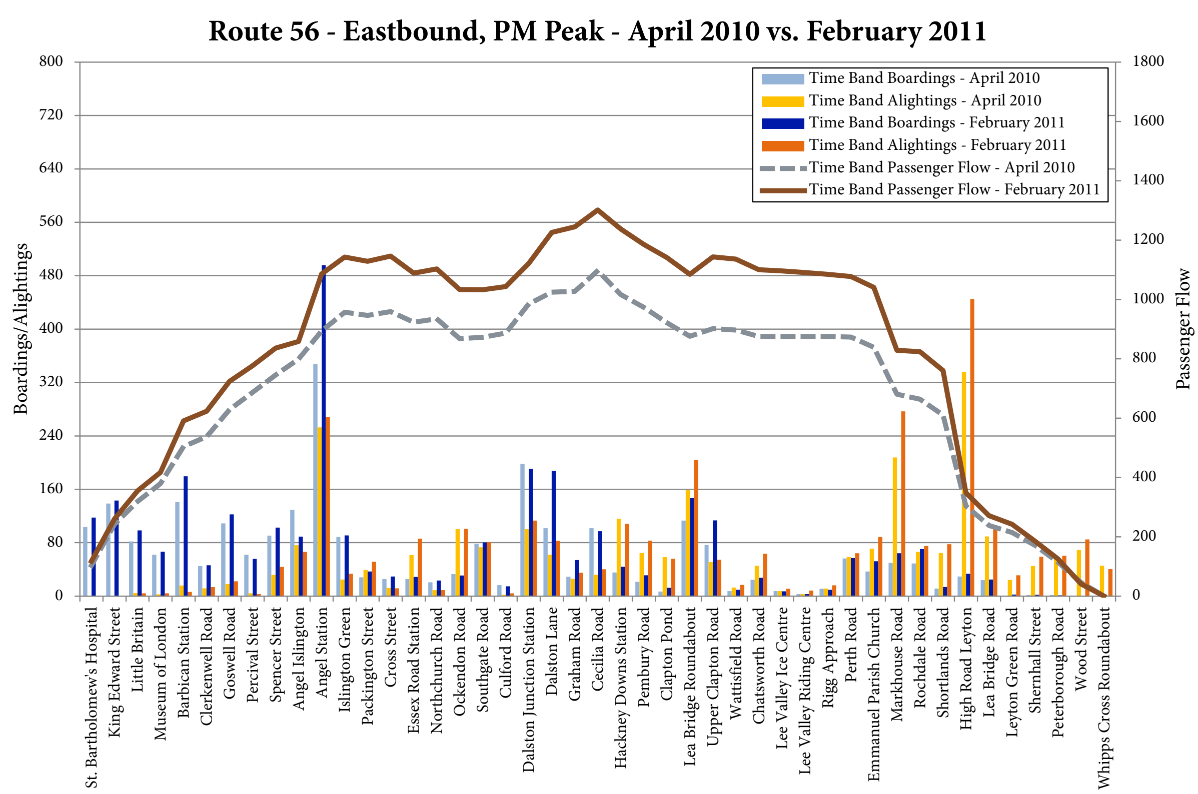


Route 56 - Eastbound, AM Peak - February 2011 vs. October 2011



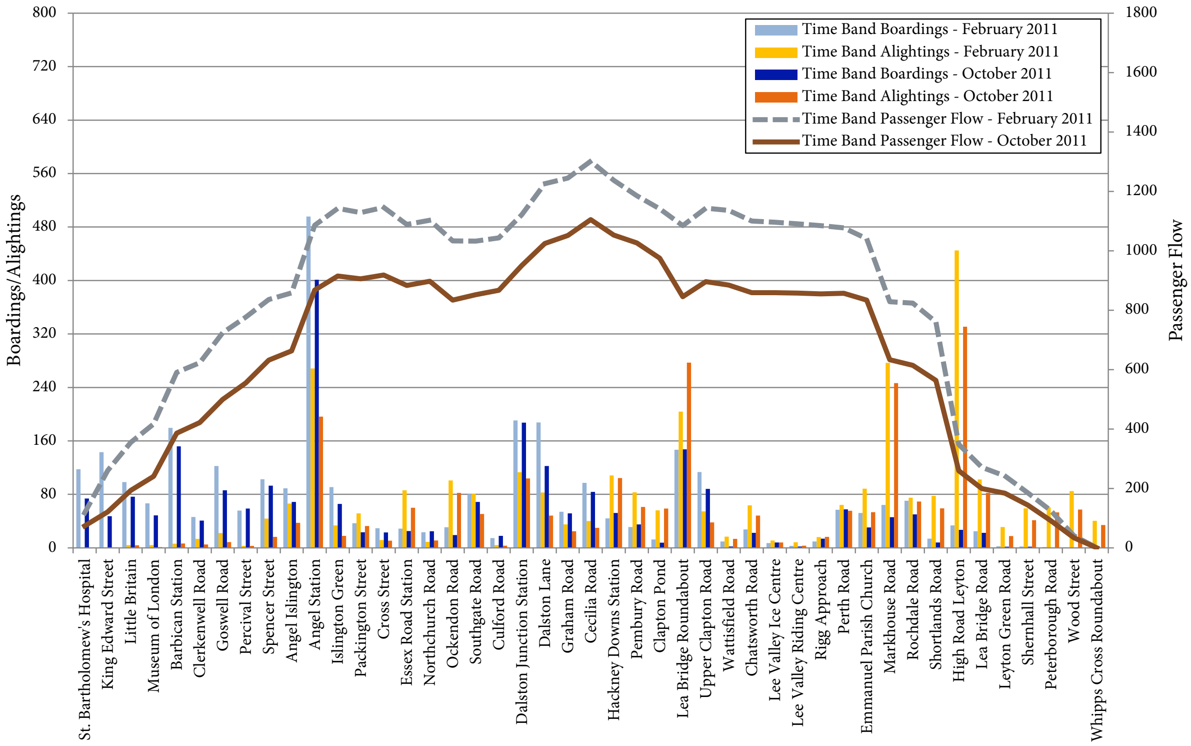


Route 56 - Eastbound, AM Peak - April 2010 vs. October 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - October 2011
Boardings/Alightings
Passenger Flow
St. Bartholomew's Hospital
King Edward Street
Little Britain
Museum of London
Barbican Station
Clerkenwell Road
Goswell Road
Percival Street
Spencer Street
Angel Islington
Angel Station
Islington Green
Packington Street
Cross Street
Essex Road Station
Northchurch Road
Ockendon Road
Southgate Road
Culford Road
Dalston Junction Station
Dalston Lane
Graham Road
Cecilia Road
Hackney Downs Station
Pembury Road
Clapton Pond
Lea Bridge Roundabout
Upper Clapton Road
Wattisfield Road
Chatsworth Road
Lee Valley Ice Centre
Lee Valley Riding Centre
Rigg Approach
Perth Road
Emmanuel Parish Church
Markhouse Road
Rochdale Road
Shortlands Road
High Road Leyton
Lea Bridge Road
Leyton Green Road
Shernhall Street
Peterborough Road
Wood Street
Whipps Cross Roundabout

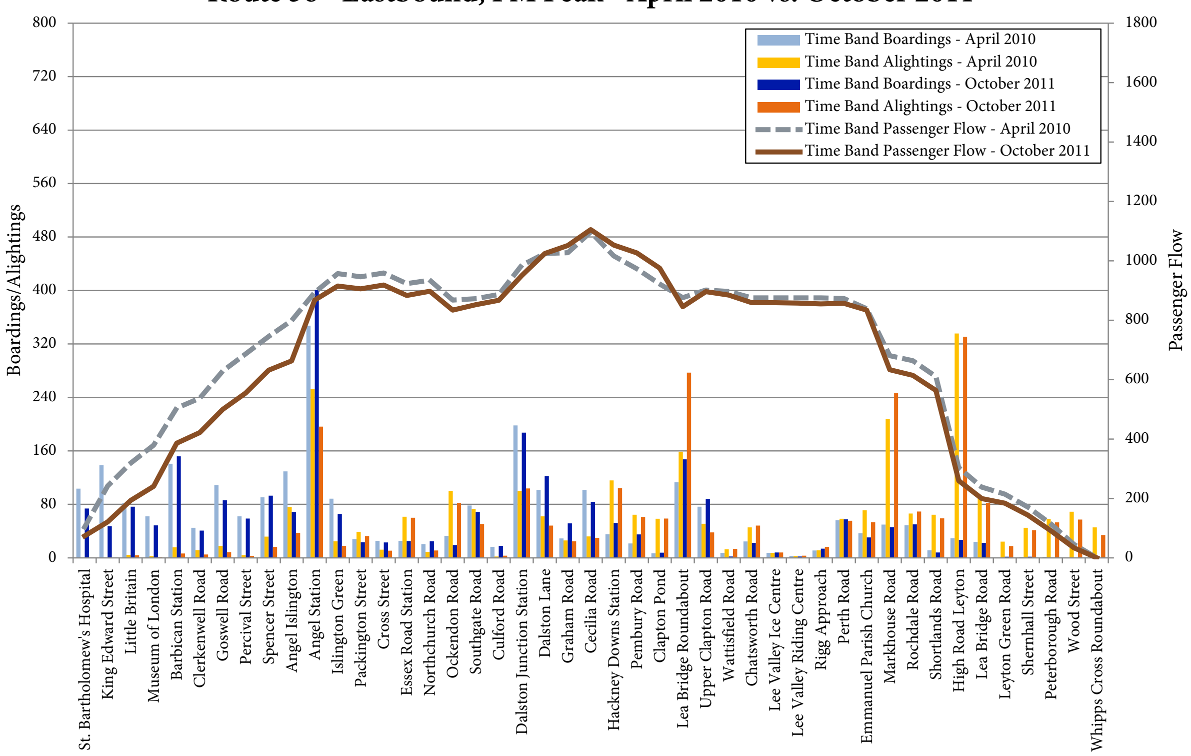


Route 56 - Eastbound, PM Peak - April 2010 vs. February 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - February 2011
Time Band Alightings - February 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - February 2011
Boardings/Alightings
Passenger Flow

Route 56 - Eastbound, PM Peak - February 2011 vs. October 2011



Route 56 - Eastbound, PM Peak - April 2010 vs. October 2011



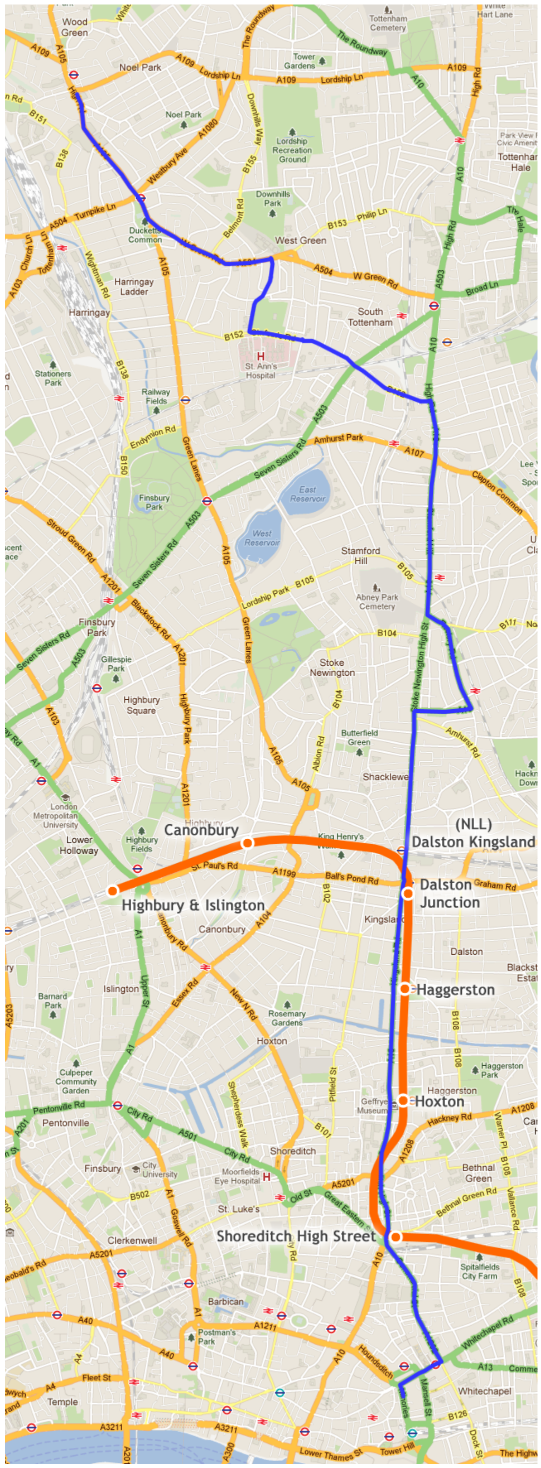
Route 56 - April 2010 vs. February 2011				
Entire Route				
Passenger Counts		Apr-10	Feb-11	Percent Change
Westbound	All Day	9420	10477	11.2%
	AM Peak	2285	2737	19.8%
	PM Peak	1835	2067	12.6%
Eastbound	All Day	10121	11196	10.6%
	AM Peak	1593	1782	11.9%
	PM Peak	2624	3109	18.5%
Both	All Day	19541	21674	10.9%
System-Wide	All Day	6481026	6627919	2.3%

Route 56 - February 2011 vs. October 2011				
Entire Route				
Passenger Counts		Feb-11	Oct-11	Percent Change
Westbound	All Day	10477	9728	-7.2%
	AM Peak	2737	2614	-4.5%
	PM Peak	2067	1907	-7.7%
Eastbound	All Day	11196	9683	-13.5%
	AM Peak	1782	1654	-7.2%
	PM Peak	3109	2484	-20.1%
Both	All Day	21674	19411	-10.4%
System-Wide	All Day	6627919	6765182	2.1%

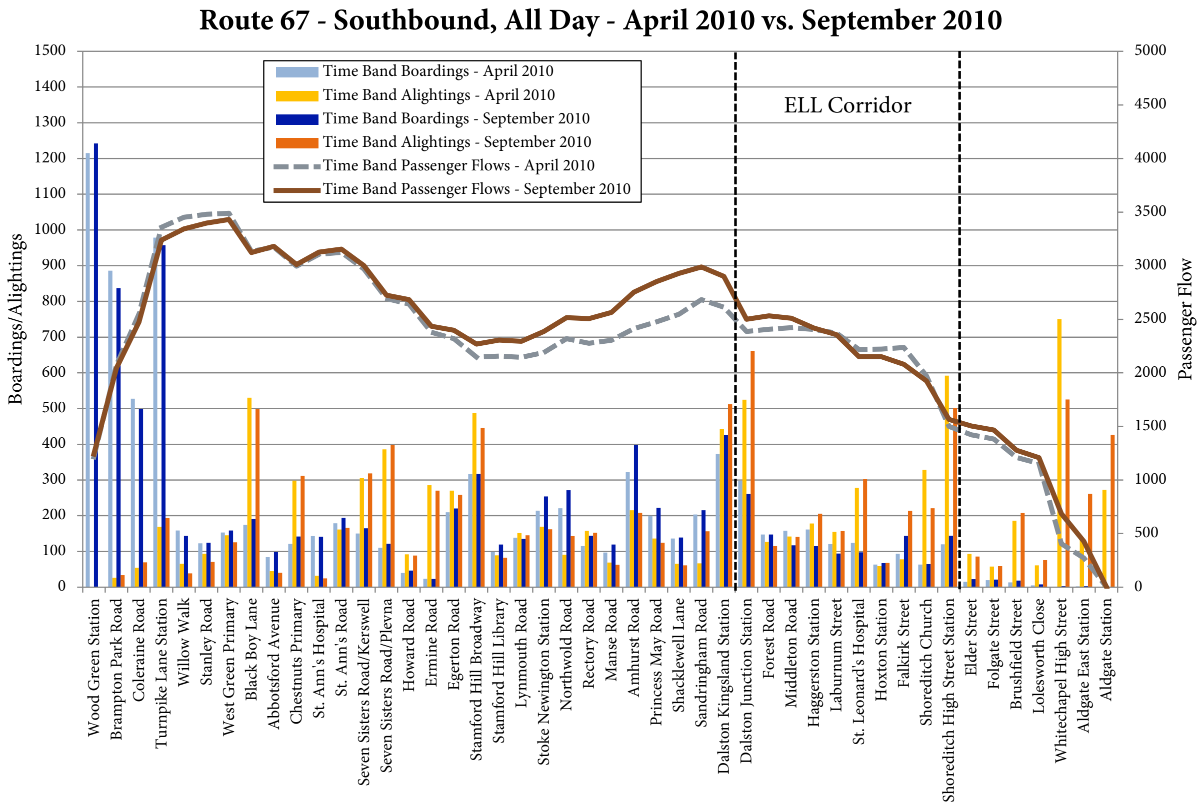
Route 56 - April 2010 vs. October 2011				
Entire Route				
Passenger Counts		Apr-10	Oct-11	Percent Change
Westbound	All Day	9420	9728	3.3%
	AM Peak	2285	2614	14.4%
	PM Peak	1835	1907	3.9%
Eastbound	All Day	10121	9683	-4.3%
	AM Peak	1593	1654	3.8%
	PM Peak	2624	2484	-5.3%
Both	All Day	19541	19411	-0.7%
System-Wide	All Day	6481026	6765182	4.4%

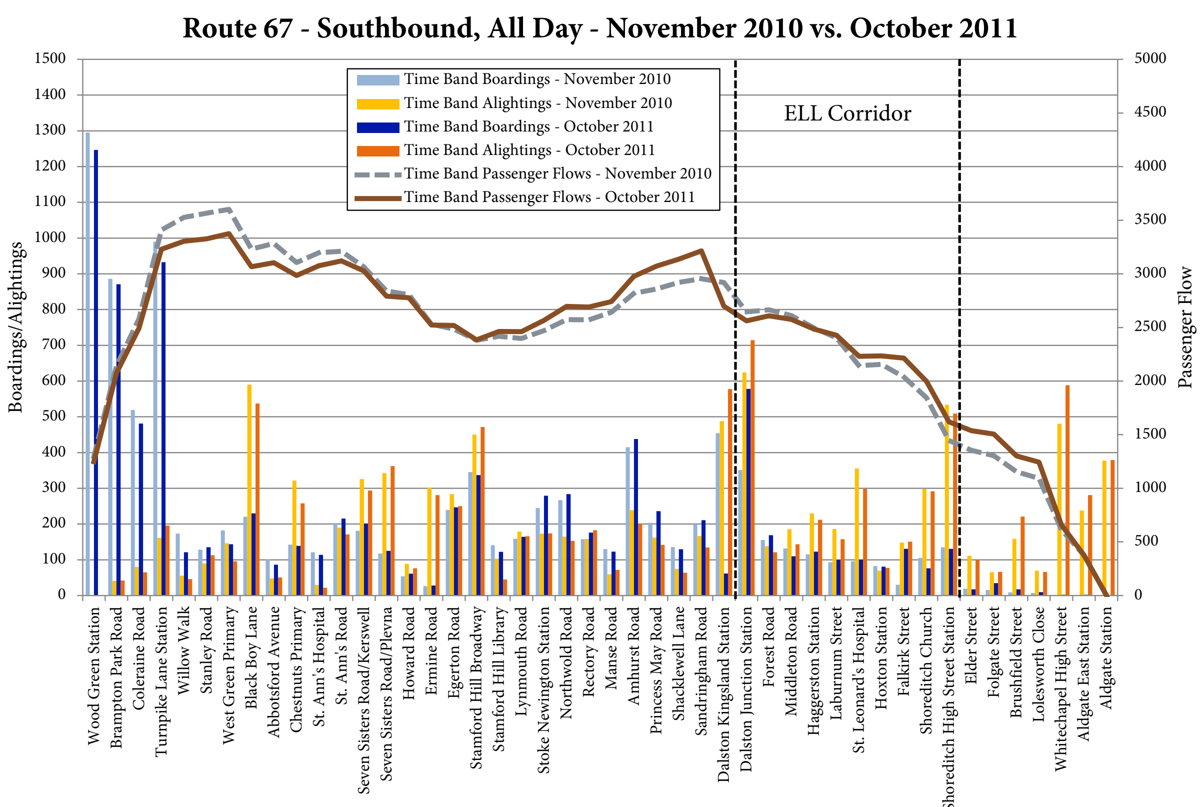
A.4 Route 67

Traveling from Wood Green station to Aldgate station, route 67 has the smallest ridership of the four routes on Kingsland Road. Its 18,000 daily riders in October 2011 are served by ten minute headways in the peak.

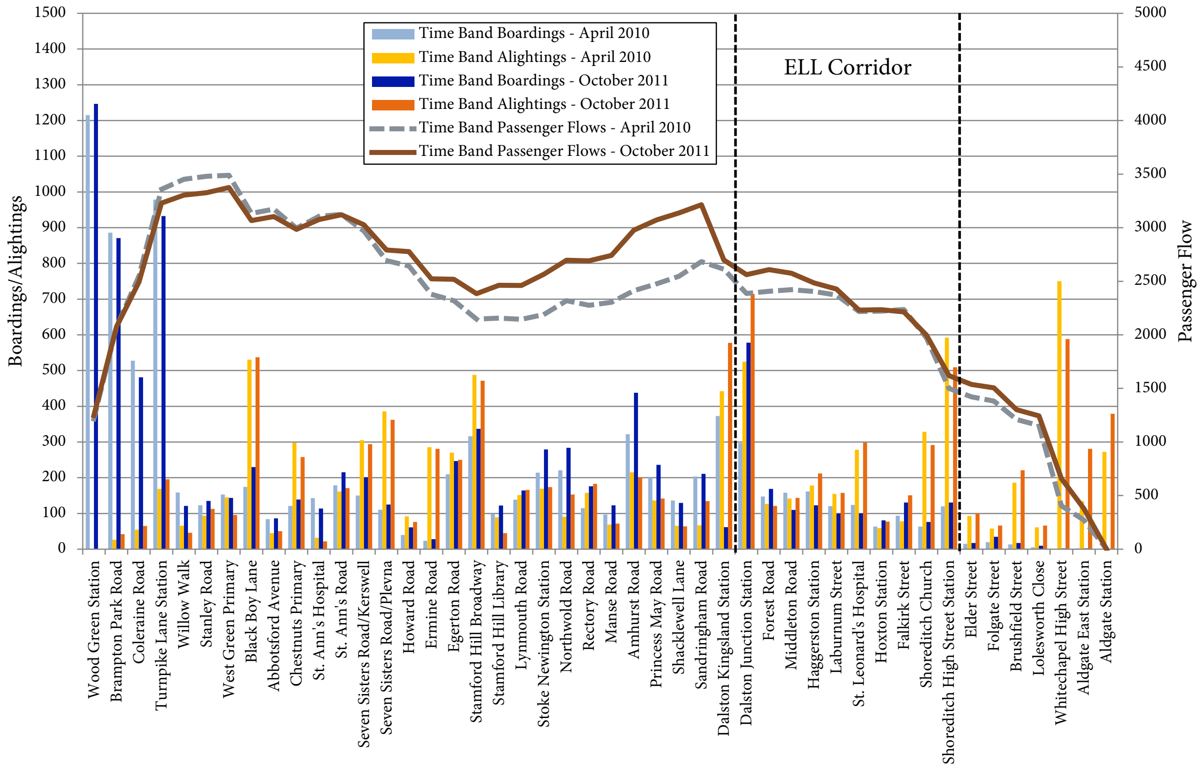


Map of Route 67

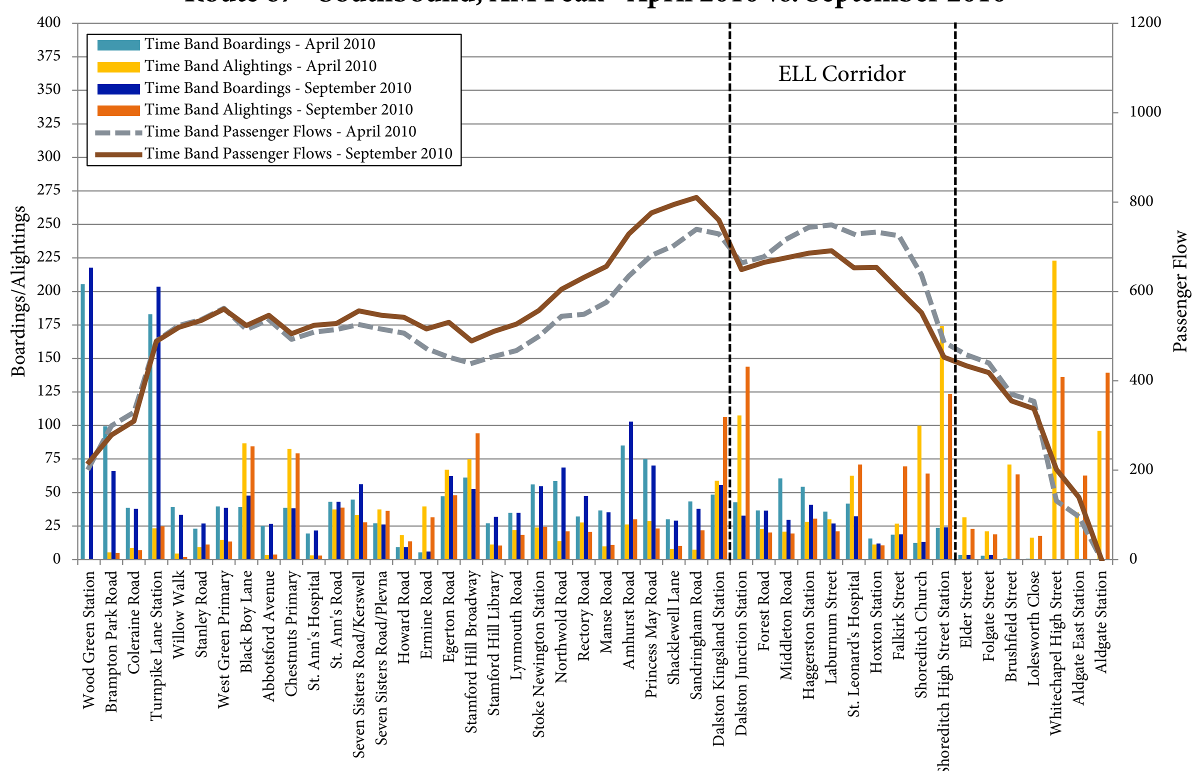

Route 67 - Southbound, All Day - April 2010 vs. September 2010
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - September 2010
Time Band Alightings - September 2010
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - September 2010
ELL Corridor
Boardings/Alightings
Passenger Flow
Wood Green Station
Brampton Park Road
Coleraine Road
Turnpike Lane Station
Willow Walk
Stanley Road
West Green Primary
Black Boy Lane
Abbotsford Avenue
Chestnuts Primary
St. Ann's Hospital
St. Ann's Road
Seven Sisters Road/Kerswell
Seven Sisters Road/Plevna
Howard Road
Ermine Road
Egerton Road
Stamford Hill Broadway
Stamford Hill Library
Lynmouth Road
Stoke Newington Station
Northwold Road
Rectory Road
Manse Road
Amhurst Road
Princess May Road
Shacklewell Lane
Sandringham Road
Dalston Kingsland Station
Dalston Junction Station
Forest Road
Middleton Road
Haggerston Station
Laburnum Street
St. Leonard's Hospital
Hoxton Station
Falkirk Street
Shoreditch Church
Shoreditch High Street Station
Elder Street
Folgate Street
Brushfield Street
Lolesworth Close
Whitechapel High Street
Aldgate East Station
Aldgate Station


Route 67 - Southbound, All Day - November 2010 vs. October 2011
Time Band Boardings - November 2010
Time Band Alightings - November 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flows - November 2010
Time Band Passenger Flows - October 2011
ELL Corridor
Boardings/Alightings
Passenger Flow

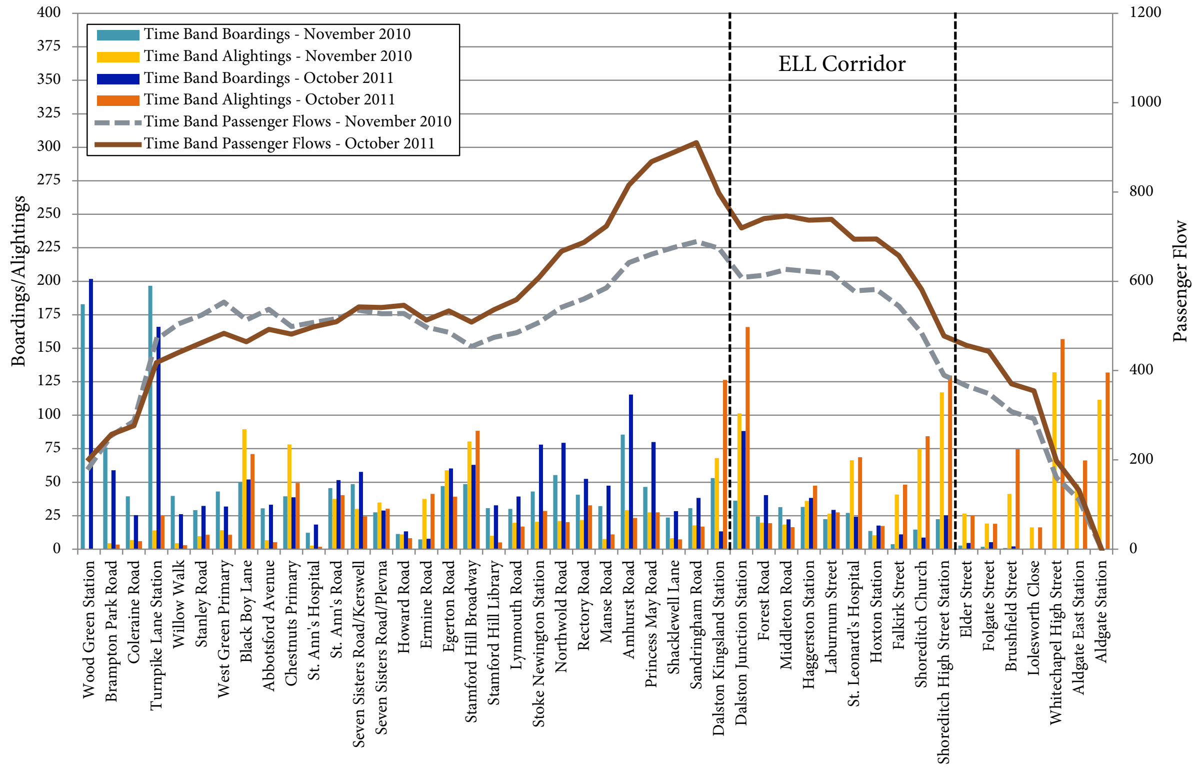
Route 67 - Southbound, All Day - April 2010 vs. October 2011



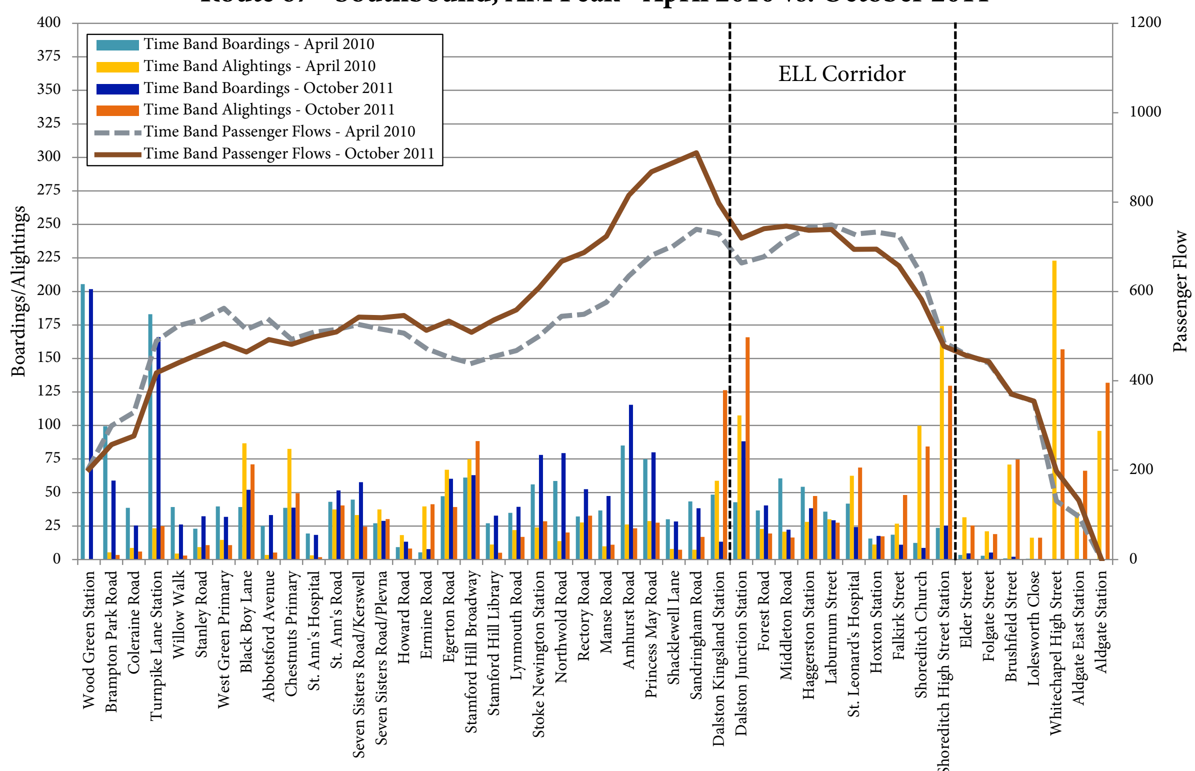
Route 67 - Southbound, AM Peak - April 2010 vs. September 2010



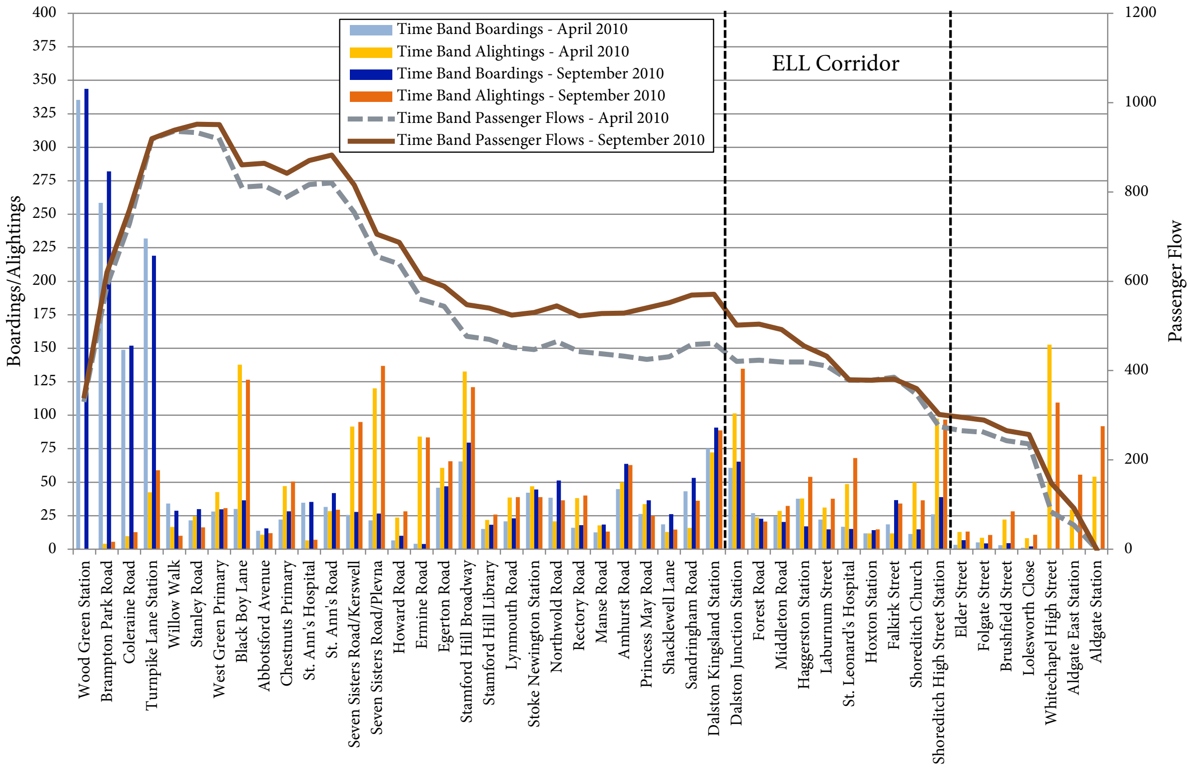
Route 67 - Southbound, AM Peak - November 2010 vs. October 2011



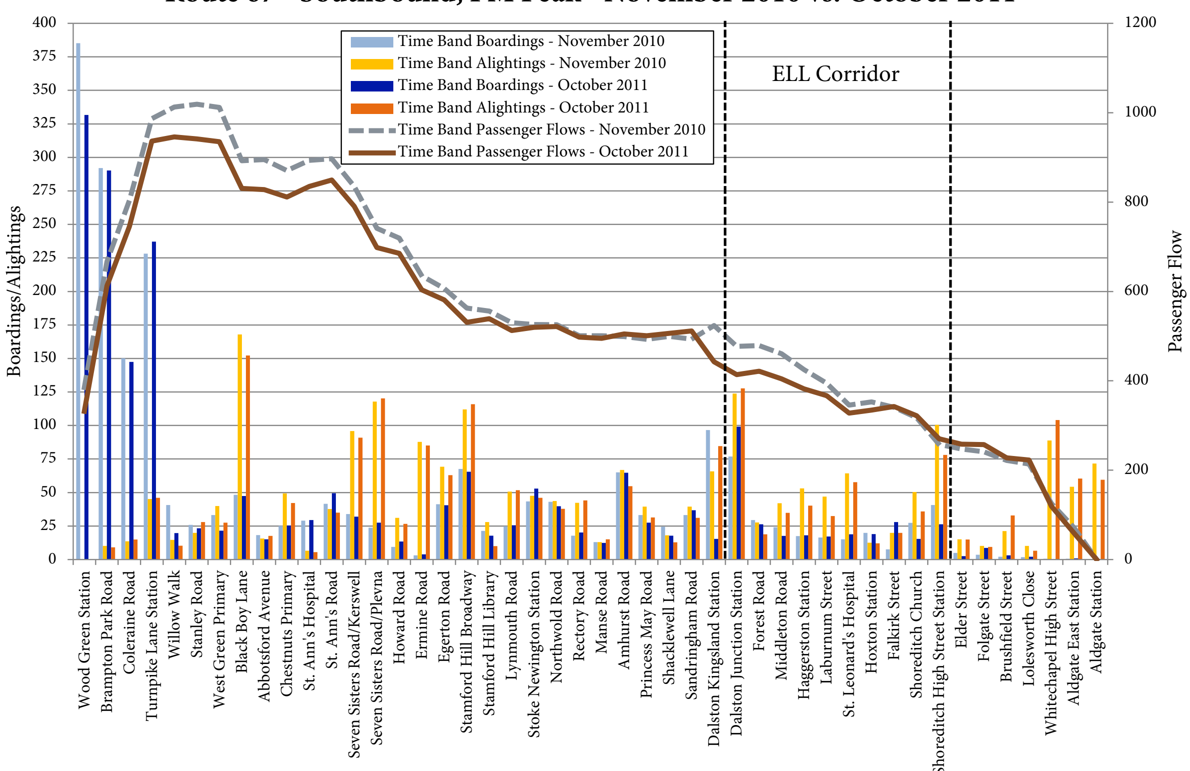
Route 67 - Southbound, AM Peak - April 2010 vs. October 2011

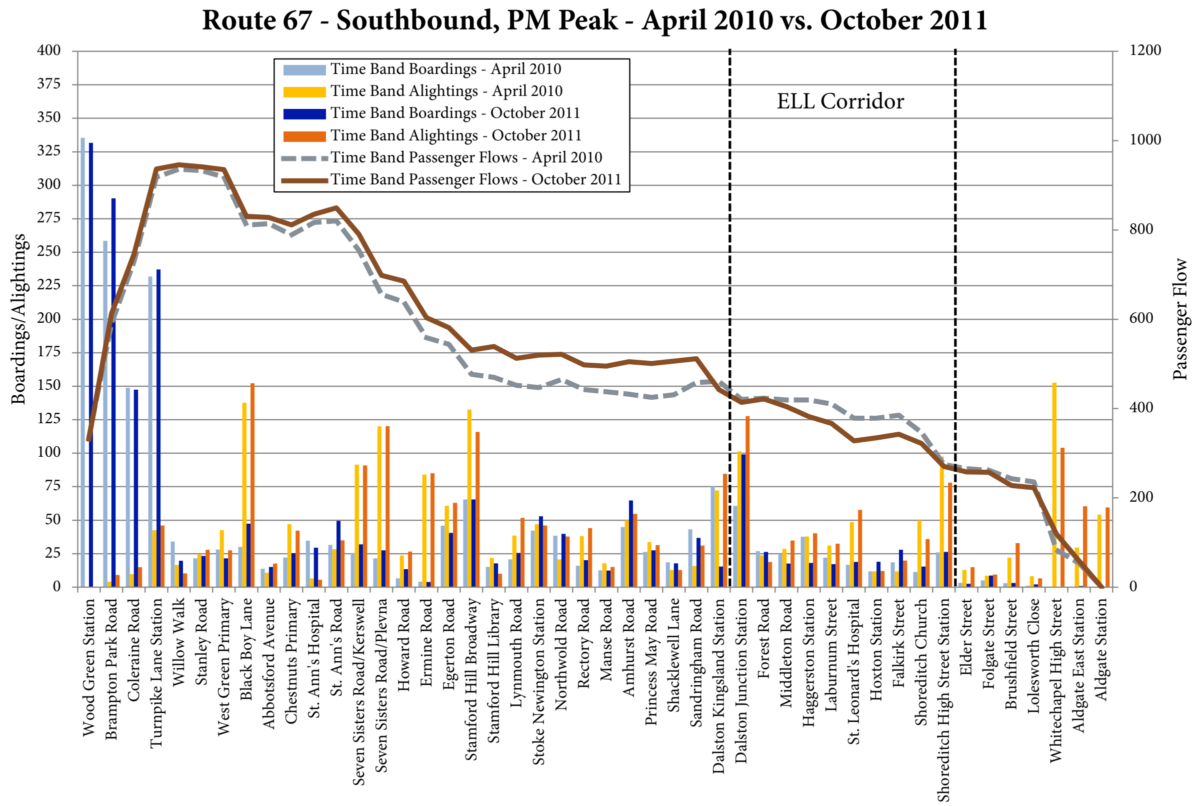


Route 67 - Southbound, PM Peak - April 2010 vs. September 2010

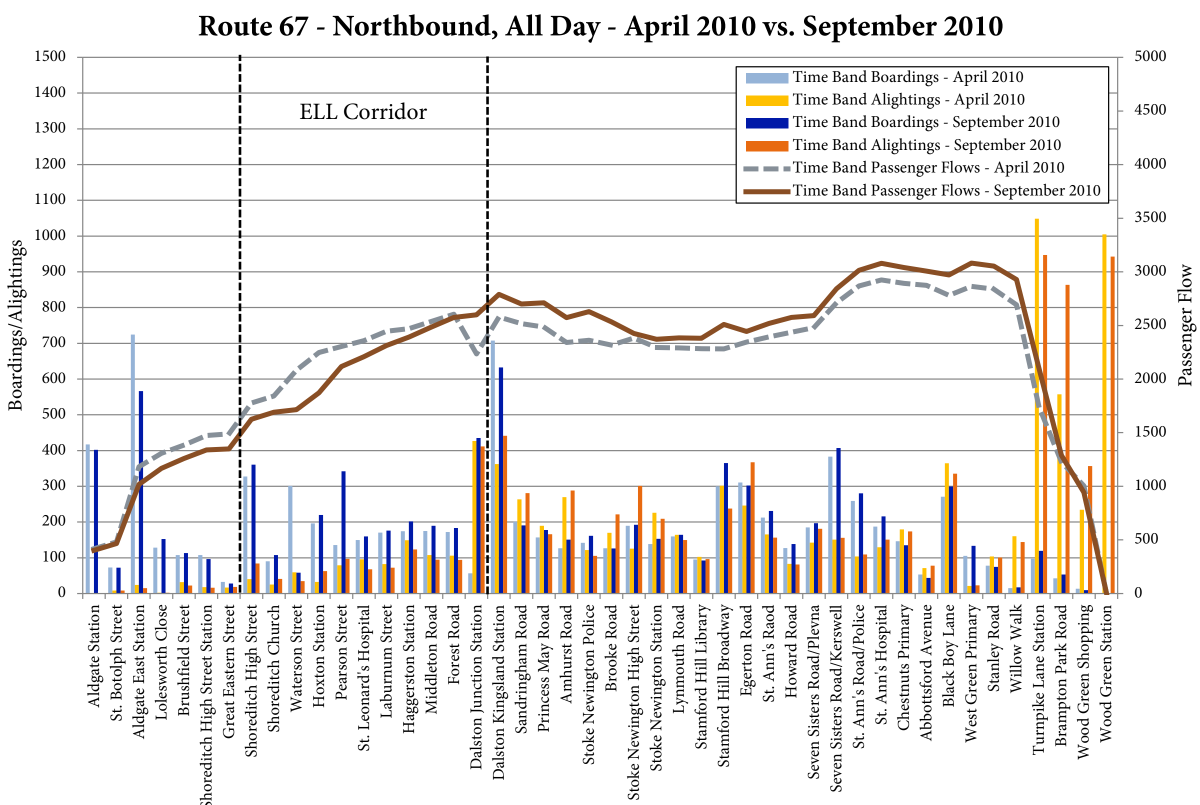


Route 67 - Southbound, PM Peak - November 2010 vs. October 2011



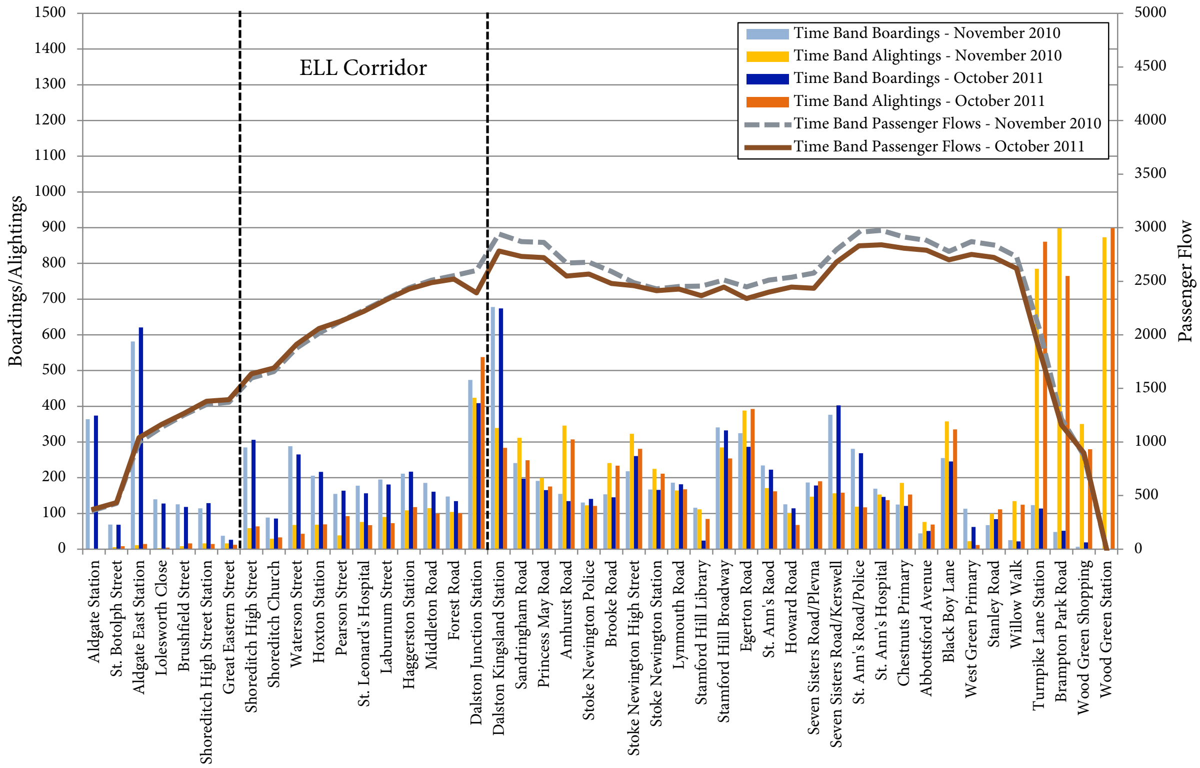


Route 67 - Southbound, PM Peak - April 2010 vs. October 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - October 2011
ELL Corridor
Boardings/Alightings
Passenger Flow
Wood Green Station
Brampton Park Road
Coleraine Road
Turnpike Lane Station
Willow Walk
Stanley Road
West Green Primary
Black Boy Lane
Abbotsford Avenue
Chestnuts Primary
St. Ann's Hospital
St. Ann's Road
Seven Sisters Road/Kerswell
Seven Sisters Road/Plevna
Howard Road
Ermine Road
Egerton Road
Stamford Hill Broadway
Stamford Hill Library
Lynmouth Road
Stoke Newington Station
Northwold Road
Rectory Road
Manse Road
Amhurst Road
Princess May Road
Shacklewell Lane
Sandringham Road
Dalston Kingsland Station
Dalston Junction Station
Forest Road
Middleton Road
Haggerston Station
Laburnum Street
St. Leonard's Hospital
Hoxton Station
Falkirk Street
Shoreditch Church
Shoreditch High Street Station
Elder Street
Folgate Street
Brushfield Street
Lolesworth Close
Whitechapel High Street
Aldgate East Station
Aldgate Station

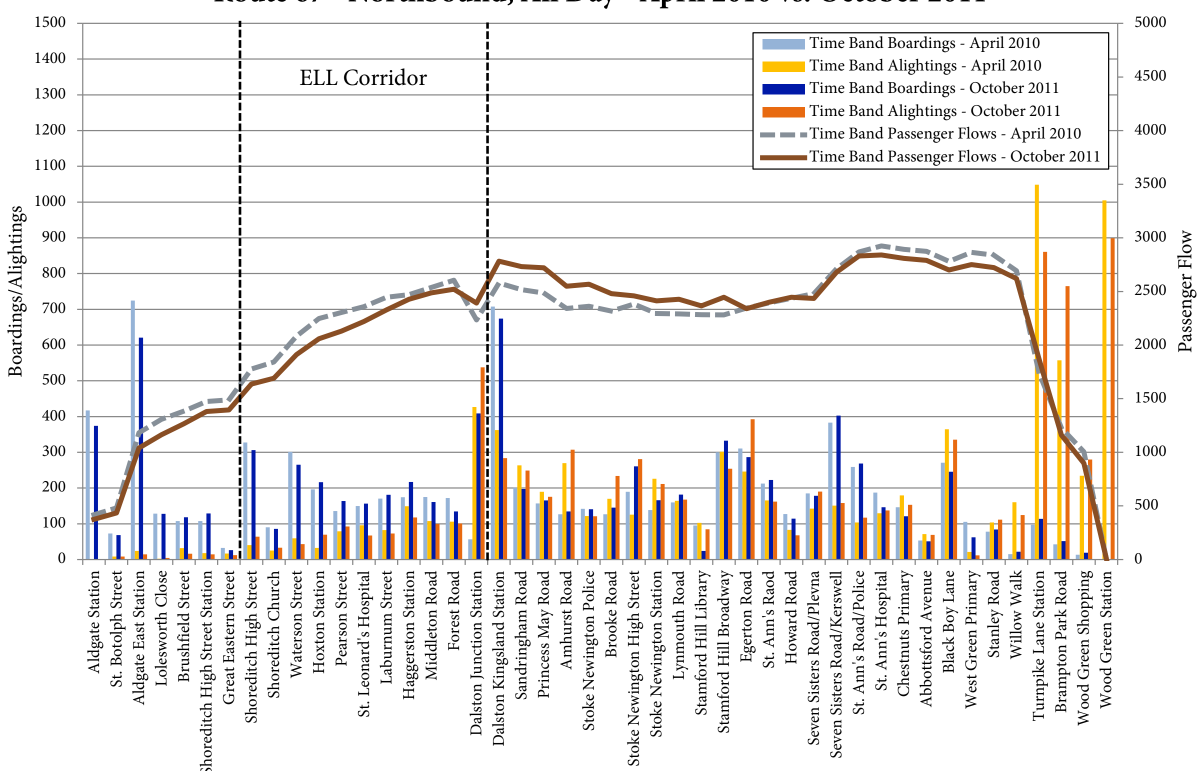


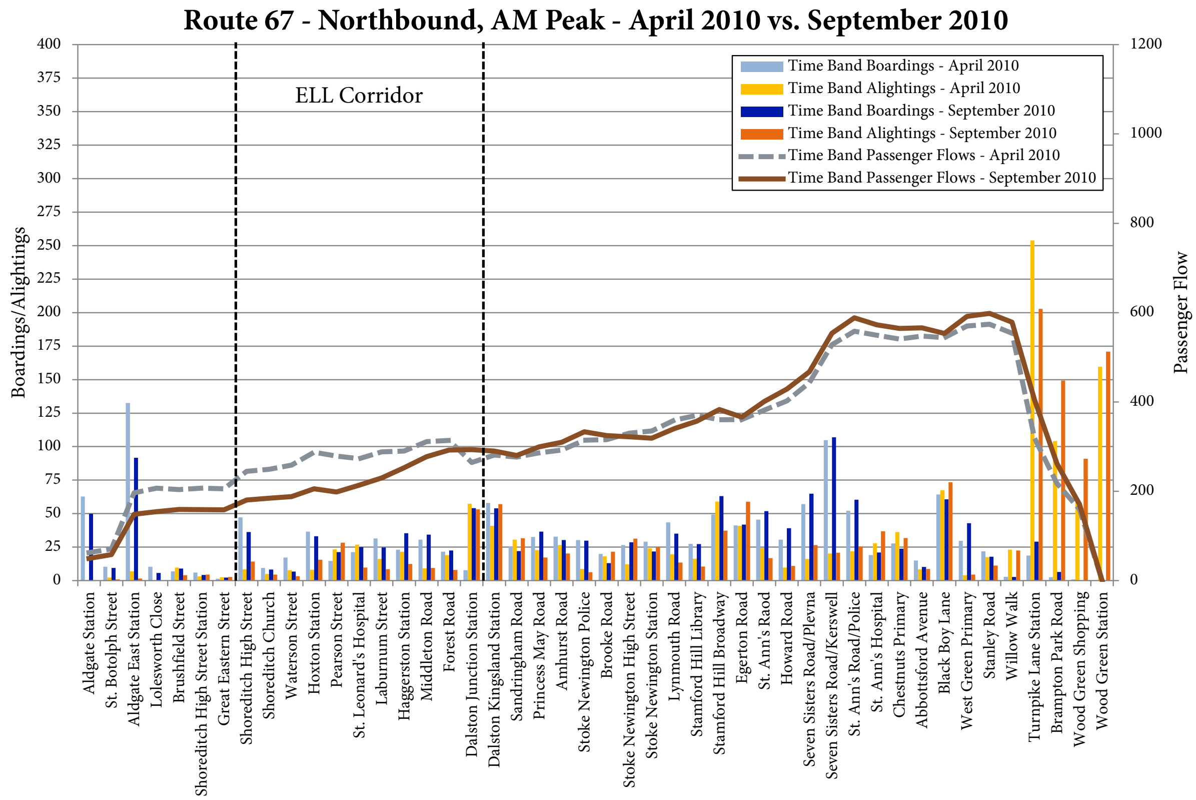
Route 67 - Northbound, All Day - April 2010 vs. September 2010
ELL Corridor
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - September 2010
Time Band Alightings - September 2010
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - September 2010
Boardings/Alightings
Passenger Flow
Aldgate Station
St. Botolph Street
Aldgate East Station
Lolesworth Close
Brushfield Street
Shoreditch High Street Station
Great Eastern Street
Shoreditch High Street
Shoreditch Church
Waterson Street
Hoxton Station
Pearson Street
St. Leonard's Hospital
Laburnum Street
Haggerston Station
Middleton Road
Forest Road
Dalston Junction Station
Dalston Kingsland Station
Sandringham Road
Princess May Road
Amhurst Road
Stoke Newington Police
Brooke Road
Stoke Newington High Street
Stoke Newington Station
Lynmouth Road
Stamford Hill Library
Stamford Hill Broadway
Egerton Road
St. Ann's Raod
Howard Road
Seven Sisters Road/Plevna
Seven Sisters Road/Kerswell
St. Ann's Road/Police
St. Ann's Hospital
Chestnuts Primary
Abbotsford Avenue
Black Boy Lane
West Green Primary
Stanley Road
Willow Walk
Turnpike Lane Station
Brampton Park Road
Wood Green Shopping
Wood Green Station

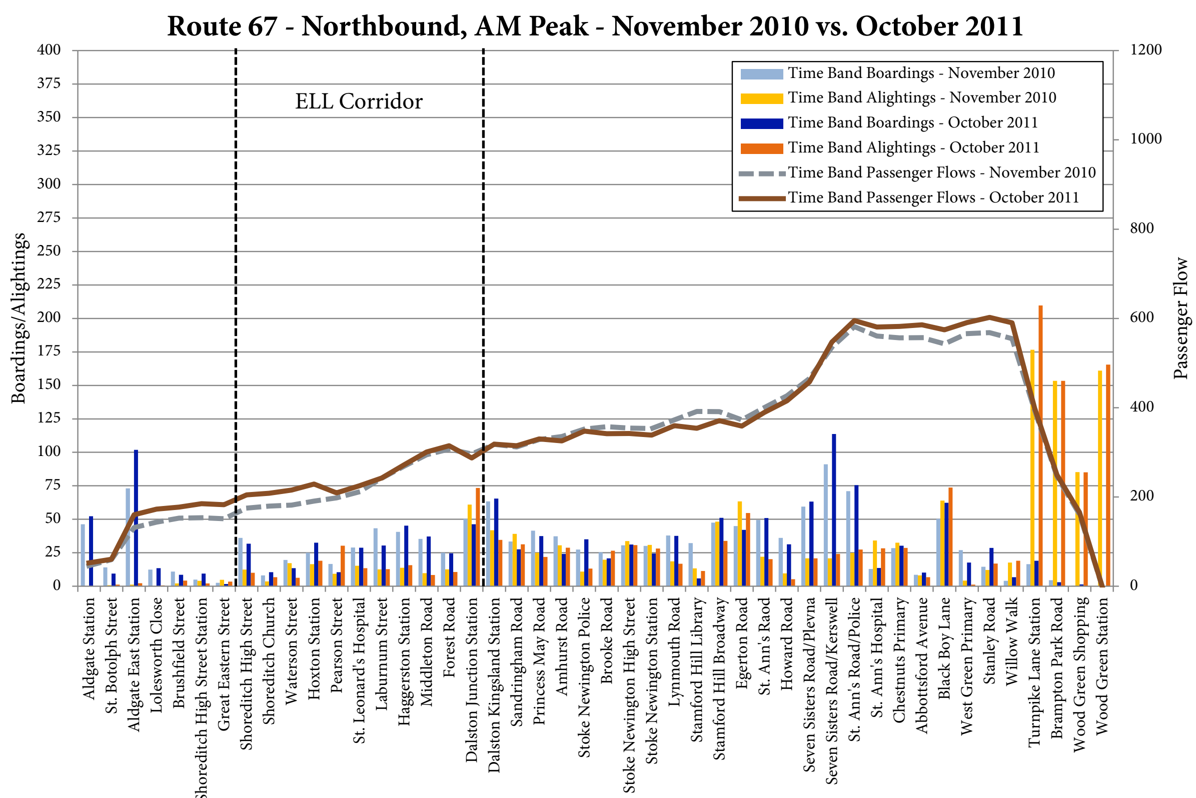
Route 67 - Northbound, All Day - November 2010 vs. October 2011

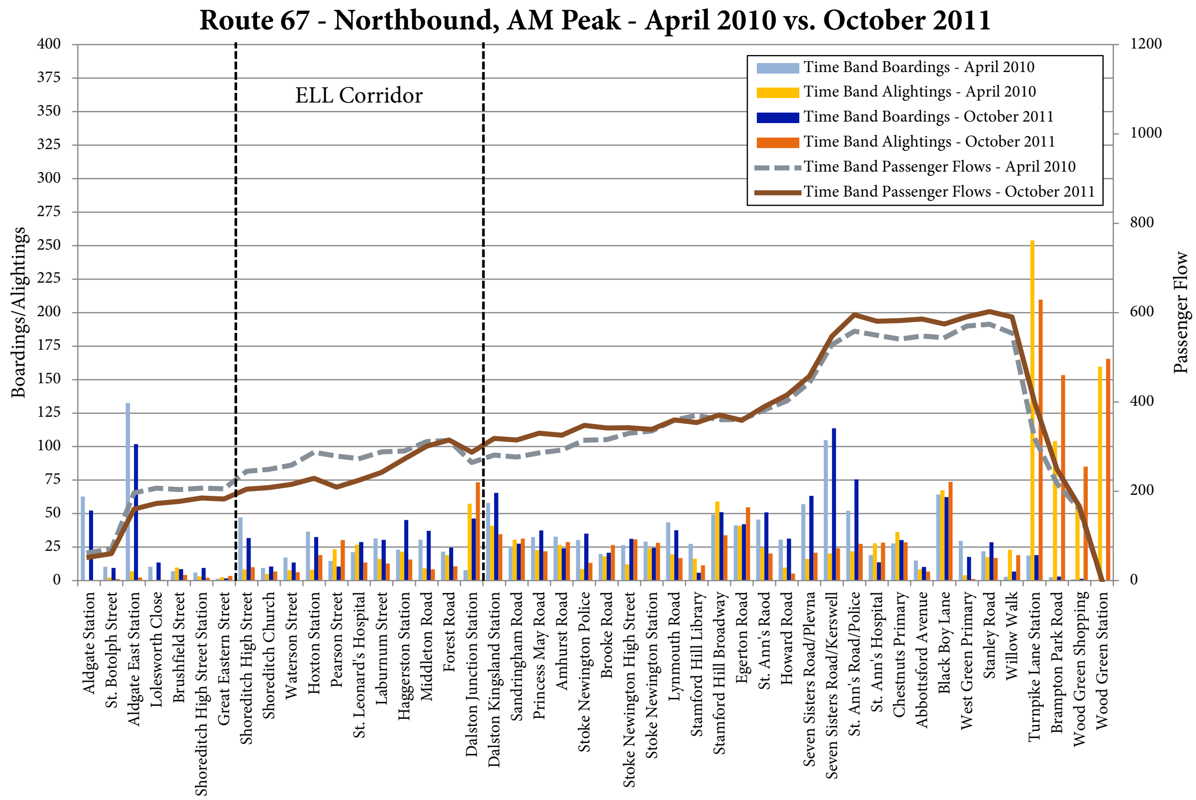


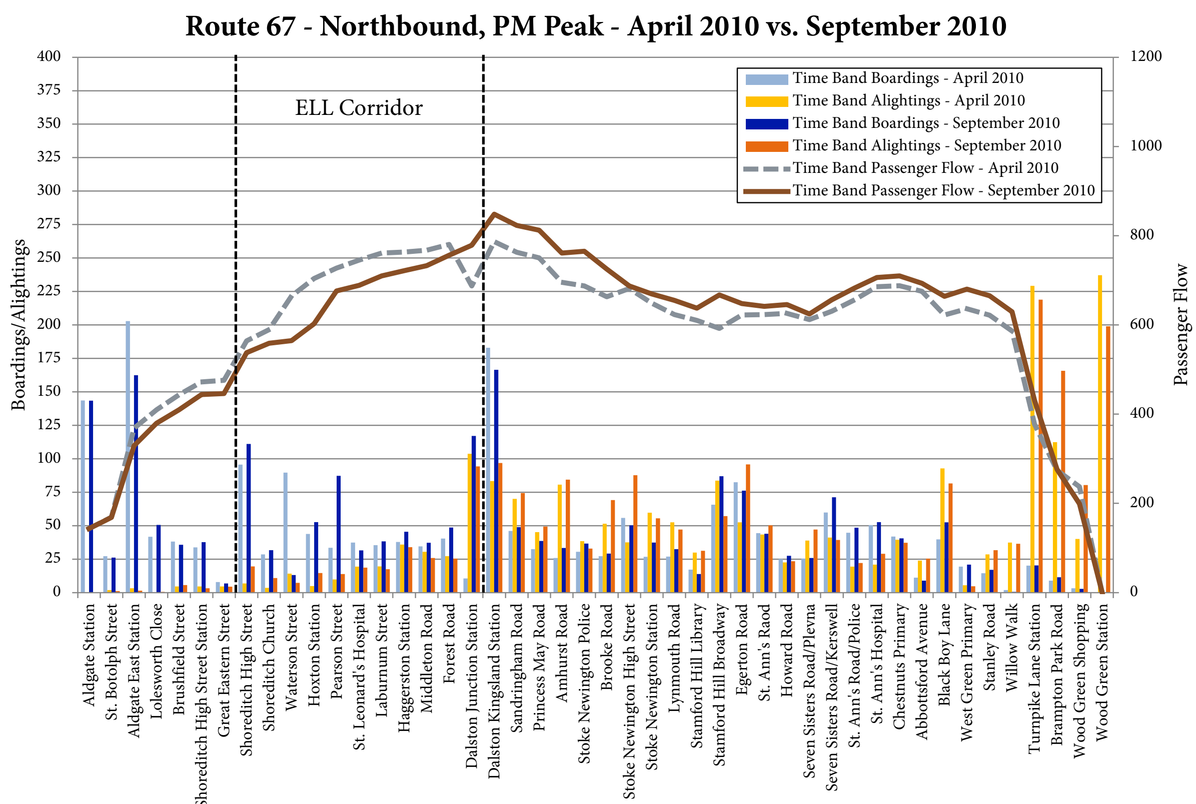
Route 67 - Northbound, All Day - April 2010 vs. October 2011



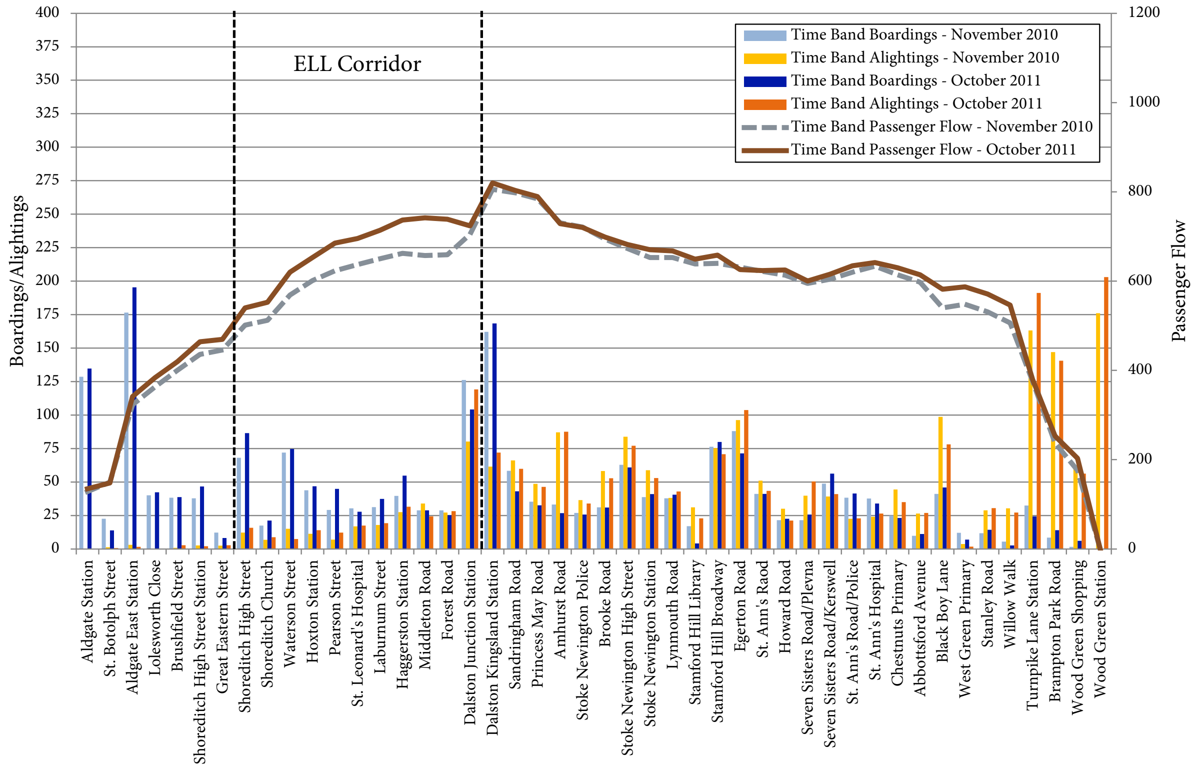

Route 67 - Northbound, AM Peak - April 2010 vs. September 2010
ELL Corridor
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - September 2010
Time Band Alightings - September 2010
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - September 2010
Boardings/Alightings
Passenger Flow
Aldgate Station
St. Botolph Street
Aldgate East Station
Lolesworth Close
Brushfield Street
Shoreditch High Street Station
Great Eastern Street
Shoreditch High Street
Shoreditch Church
Waterson Street
Hoxton Station
Pearson Street
St. Leonard's Hospital
Laburnum Street
Haggerston Station
Middleton Road
Forest Road
Dalston Junction Station
Dalston Kingsland Station
Sandringham Road
Princess May Road
Amhurst Road
Stoke Newington Police
Brooke Road
Stoke Newington High Street
Stoke Newington Station
Lynmouth Road
Stamford Hill Library
Stamford Hill Broadway
Egerton Road
St. Ann's Raod
Howard Road
Seven Sisters Road/Plevna
Seven Sisters Road/Kerswell
St. Ann's Road/Police
St. Ann's Hospital
Chestnuts Primary
Abbottsford Avenue
Black Boy Lane
West Green Primary
Stanley Road
Willow Walk
Turnpike Lane Station
Brampton Park Road
Wood Green Shopping
Wood Green Station


Route 67 - Northbound, AM Peak - November 2010 vs. October 2011
ELL Corridor
Time Band Boardings - November 2010
Time Band Alightings - November 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flows - November 2010
Time Band Passenger Flows - October 2011
Boardings/Alightings
Passenger Flow

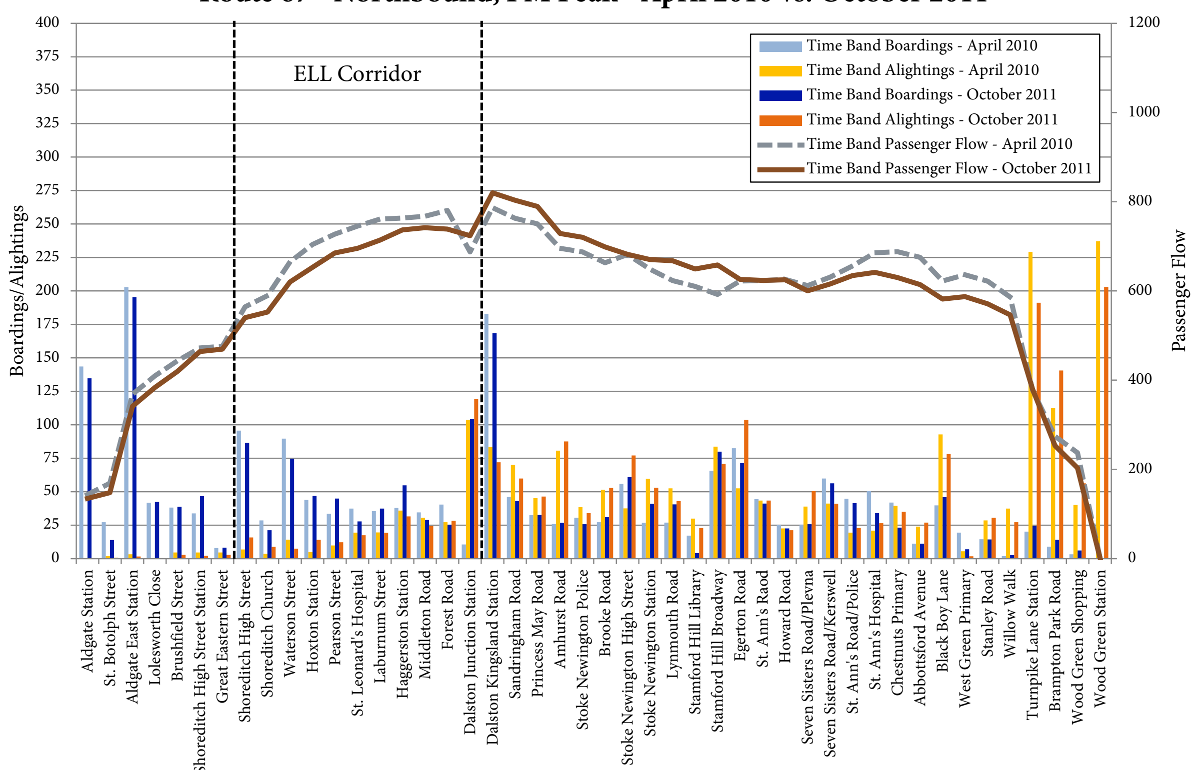

Route 67 - Northbound, AM Peak - April 2010 vs. October 2011
ELL Corridor
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - October 2011
Boardings/Alightings
Passenger Flow
Aldgate Station
St. Botolph Street
Aldgate East Station
Lolesworth Close
Brushfield Street
Shoreditch High Street Station
Great Eastern Street
Shoreditch High Street
Shoreditch Church
Waterson Street
Hoxton Station
Pearson Street
St. Leonard's Hospital
Laburnum Street
Haggerston Station
Middleton Road
Forest Road
Dalston Junction Station
Dalston Kingsland Station
Sandringham Road
Princess May Road
Amhurst Road
Stoke Newington Police
Brooke Road
Stoke Newington High Street
Stoke Newington Station
Lynmouth Road
Stamford Hill Library
Stamford Hill Broadway
Egerton Road
St. Ann's Raod
Howard Road
Seven Sisters Road/Plevna
Seven Sisters Road/Kerswell
St. Ann's Road/Police
St. Ann's Hospital
Chestnuts Primary
Abbottsford Avenue
Black Boy Lane
West Green Primary
Stanley Road
Willow Walk
Turnpike Lane Station
Brampton Park Road
Wood Green Shopping
Wood Green Station


Route 67 - Northbound, PM Peak - April 2010 vs. September 2010
ELL Corridor
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - September 2010
Time Band Alightings - September 2010
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - September 2010
Boardings/Alightings
Passenger Flow

Route 67 - Northbound, PM Peak - November 2010 vs. October 2011



Route 67 - Northbound, PM Peak - April 2010 vs. October 2011



Passenger Counts for Route 67 - Southbound - All Day

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	5455	5825	1227	1349	951	890	7633	8064
		370	7%	122	10%	-61	-6%	431	6%
	Corridor			627	576	680	532	1307	1108
				-51	-8%	-148	-22%	-199	-15%
	After					179	220	179	220
						41	23%	41	23%
	Total	5455	5825	1854	1925	1810	1642	9119	9391
		370	7%	71	4%	-168	-9%	272	3%

Passenger Counts for Route 67 - Southbound - All Day

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	6137	5957	1471	1137	824	846	8432	7940
		-180	-3%	-334	-23%	22	3%	-492	-6%
	Corridor			674	825	486	643	1160	1468
				151	22%	156	32%	308	27%
	After					190	214	190	214
						24	13%	24	13%
	Total	6137	5957	2145	1962	1501	1703	9782	9622
		-180	-3%	-183	-9%	202	13%	-161	-2%

Passenger Counts for Route 67 - Southbound - All Day

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	5455	5957	1227	1137	951	846	7633	7940
		502	9%	-90	-7%	-105	-11%	307	4%
	Corridor			627	825	680	643	1307	1468
				198	32%	-37	-5%	161	12%
	After					179	214	179	214
						35	19%	35	19%
	Total	5455	5957	1854	1962	1810	1703	9119	9622
		502	9%	108	6%	-107	-6%	503	6%

Passenger Counts for Route 67 - Southbound - AM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	852	965	299	309	347	307	1498	1581
		114	13%	9	3%	-39	-11%	84	6%
	Corridor			151	121	185	122	336	243
				-30	-20%	-64	-34%	-93	-28%
	After					31	32	31	32
						1	4%	1	4%
	Total	852	965	451	430	563	461	1865	1856
		114	13%	-21	-5%	-102	-18%	-9	0%

Passenger Counts for Route 67 - Southbound - AM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	874	940	308	316	264	315	1446	1572
		67	8%	8	3%	51	19%	125	9%
	Corridor			102	142	103	137	205	280
				40	40%	34	33%	75	36%
	After					28	38	28	38
						10	35%	10	35%
	Total	874	940	410	459	395	490	1680	1890
		67	8%	49	12%	95	24%	210	13%

Passenger Counts for Route 67 - Southbound - AM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	852	940	299	316	347	315	1498	1572
		89	10%	17	6%	-32	-9%	74	5%
	Corridor			151	142	185	137	336	280
				-9	-6%	-48	-26%	-56	-17%
	After					31	38	31	38
						7	22%	7	22%
	Total	852	940	451	459	563	490	1865	1890
		89	10%	8	2%	-73	-13%	25	1%

Passenger Counts for Route 67 - Southbound - PM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1320	1445	214	283	159	154	1693	1881
		125	9%	69	32%	-6	-4%	188	11%
	Corridor			113	112	138	109	250	221
				0	0%	-29	-21%	-29	-12%
	After					39	57	39	57
						18	45%	18	45%
	Total	1320	1445	326	395	336	320	1982	2159
		125	9%	69	21%	-17	-5%	177	9%

Passenger Counts for Route 67 - Southbound - PM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1513	1437	278	192	122	122	1913	1752
		-76	-5%	-85	-31%	0	0%	-161	-8%
	Corridor			139	138	95	122	234	259
				-2	-1%	27	28%	25	11%
	After					54	44	54	44
						-10	-19%	-10	-19%
	Total	1513	1437	417	330	271	288	2201	2055
		-76	-5%	-87	-21%	17	6%	-146	-7%

Passenger Counts for Route 67 - Southbound - PM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1320	1437	214	192	159	122	1693	1752
		117	9%	-21	-10%	-37	-23%	59	3%
	Corridor			113	138	138	122	250	259
				25	22%	-16	-12%	9	4%
	After					39	44	39	44
						5	12%	5	12%
	Total	1320	1437	326	330	336	288	1982	2055
		117	9%	4	1%	-48	-14%	73	4%

Passenger Counts for Route 67 - Northbound - All Day

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	272	64	400	566	796	676	1469	1306
		-208	-76%	166	41%	-120	-15%	-163	-11%
	Corridor			598	636	1197	1488	1795	2124
				38	6%	290	24%	328	18%
	After					5108	5501	5108	5501
						393	8%	393	8%
	Total	272	64	998	1202	7101	7665	8371	8931
		-208	-76%	204	20%	563	8%	559	7%

Passenger Counts for Route 67 - Northbound - All Day

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	44	58	510	566	726	686	1280	1309
		14	32%	55	11%	-40	-5%	29	2%
	Corridor			688	745	1402	1298	2090	2043
				57	8%	-104	-7%	-47	-2%
	After					5559	5221	5559	5221
						-338	-6%	-338	-6%
	Total	44	58	1198	1311	7687	7204	8929	8573
		14	32%	113	9%	-482	-6%	-356	-4%

Passenger Counts for Route 67 - Northbound - All Day

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	272	58	400	566	796	686	1469	1309
		-215	-79%	165	41%	-110	-14%	-160	-11%
	Corridor			598	745	1197	1298	1795	2043
				148	25%	100	8%	248	14%
	After					5108	5221	5108	5221
						113	2%	113	2%
	Total	272	58	998	1311	7101	7204	8371	8573
		-215	-79%	313	31%	103	1%	202	2%

Passenger Counts for Route 67 - Northbound - AM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	53	11	88	97	86	58	226	166
		-41	-79%	9	10%	-28	-32%	-60	-27%
	Corridor			87	73	124	181	211	254
				-13	-15%	57	46%	43	21%
	After					964	996	964	996
						32	3%	32	3%
	Total	53	11	175	170	1174	1235	1401	1416
		-41	-79%	-5	-3%	61	5%	15	1%

Passenger Counts for Route 67 - Northbound - AM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	8	10	92	112	57	63	157	186
		2	25%	21	23%	6	10%	29	18%
	Corridor			97	98	189	179	286	276
				1	1%	-11	-6%	-10	-4%
	After					977	977	977	977
						0	0%	0	0%
	Total	8	10	189	210	1223	1218	1420	1439
		2	25%	21	11%	-4	0%	19	1%

Passenger Counts for Route 67 - Northbound - AM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	53	10	88	112	86	63	226	186
		-42	-80%	24	28%	-23	-27%	-40	-18%
	Corridor			87	98	124	179	211	276
				11	13%	54	43%	65	31%
	After					964	977	964	977
						13	1%	13	1%
	Total	53	10	175	210	1174	1218	1401	1439
		-42	-80%	36	20%	45	4%	38	3%

Passenger Counts for Route 67 - Northbound - PM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	55	12	99	146	308	265	462	423
		-42	-77%	47	47%	-43	-14%	-38	-8%
	Corridor			132	143	350	409	482	552
				12	9%	59	17%	70	15%
	After					1069	1209	1069	1209
						140	13%	140	13%
	Total	55	12	231	289	1727	1883	2012	2185
		-42	-77%	59	25%	156	9%	172	9%

Passenger Counts for Route 67 - Northbound - PM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	8	7	128	145	270	273	406	425
		-1	-11%	17	13%	2	1%	19	5%
	Corridor			131	156	309	347	439	503
				25	19%	38	12%	64	14%
	After					1150	1099	1150	1099
						-51	-4%	-51	-4%
	Total	8	7	259	301	1729	1718	1995	2027
		-1	-11%	43	16%	-10	-1%	31	2%

Passenger Counts for Route 67 - Northbound - PM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	55	7	99	145	308	273	462	425
		-47	-87%	46	46%	-35	-11%	-37	-8%
	Corridor			132	156	350	347	482	503
				25	19%	-3	-1%	21	4%
	After					1069	1099	1069	1099
						30	3%	30	3%
	Total	55	7	231	301	1727	1718	2012	2027
		-47	-87%	70	30%	-9	-1%	14	1%

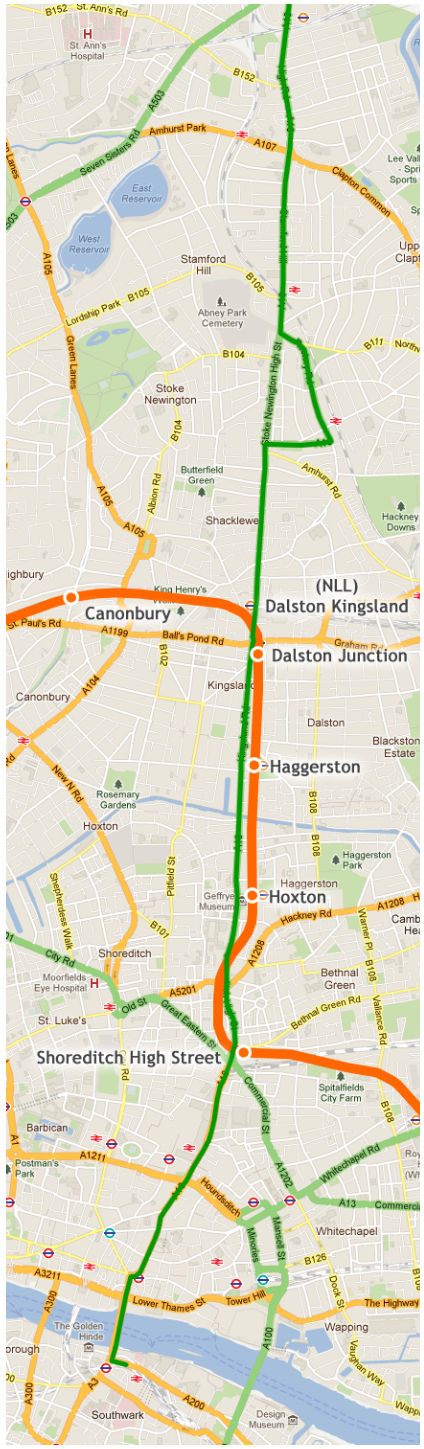
Route 67 - April 2010 vs. September 2010				
For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Sep-10	Percent Change
Southbound	All Day	2214	2219	0.2%
	AM Peak	686	628	-8.4%
	PM Peak	386	419	8.6%
Northbound	All Day	2143	2021	-5.7%
	AM Peak	267	218	-18.4%
	PM Peak	669	632	-5.6%
Passenger Counts		Apr-10	Sep-10	Percent Change
Southbound	All Day	3485	3347	-4.0%
	AM Peak	982	859	-12.6%
	PM Peak	623	658	5.5%
Northbound	All Day	2991	3365	12.5%
	AM Peak	385	409	6.4%
	PM Peak	889	963	8.4%
Entire Route				
Passenger Counts		Apr-10	Sep-10	Percent Change
Southbound	All Day	9118	9391	3.0%
	AM Peak	1865	1856	-0.5%
	PM Peak	1982	2159	8.9%
Northbound	All Day	8371	8931	6.7%
	AM Peak	1401	1416	1.1%
	PM Peak	2012	2172	7.9%
Both	All Day	17490	18322	4.8%
System-Wide	All Day	6481026	6476783	-0.1%

Route 67 - November 2010 vs. October 2011				
For Route Segments in the ELL Service Area				
Average Passenger Flow		Nov-10	Oct-11	Percent Change
Southbound	All Day	2244	2295	2.3%
	AM Peak	567	679	19.8%
	PM Peak	385	359	-6.9%
Northbound	All Day	2051	2044	-0.3%
	AM Peak	219	237	7.9%
	PM Peak	589	641	8.8%
Passenger Counts		Nov-10	Oct-11	Percent Change
Southbound	All Day	3456	3451	-0.1%
	AM Peak	778	911	17.2%
	PM Peak	634	574	-9.5%
Northbound	All Day	3326	3295	-0.9%
	AM Peak	435	452	3.8%
	PM Peak	837	920	9.9%
Entire Route				
Passenger Counts		Nov-10	Oct-11	Percent Change
Southbound	All Day	9782	9622	-1.6%
	AM Peak	1680	1890	12.5%
	PM Peak	2201	2055	-6.7%
Northbound	All Day	8929	8573	-4.0%
	AM Peak	1420	1439	1.3%
	PM Peak	1995	2027	1.6%
Both	All Day	18711	18195	-2.8%
System-Wide	All Day	6511109	6765182	3.9%

Route 67 - April 2010 vs. October 2011				
For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Oct-11	Percent Change
Southbound	All Day	2214	2295	3.7%
	AM Peak	686	679	-1.1%
	PM Peak	386	359	-7.0%
Northbound	All Day	2143	2044	-4.6%
	AM Peak	267	237	-11.4%
	PM Peak	669	641	-4.2%
Passenger Counts		Apr-10	Oct-11	Percent Change
Southbound	All Day	3485	3451	-1.0%
	AM Peak	982	911	-7.2%
	PM Peak	623	574	-7.9%
Northbound	All Day	2991	3295	10.1%
	AM Peak	385	452	17.4%
	PM Peak	889	920	3.6%
Entire Route				
Passenger Counts		Apr-10	Oct-11	Percent Change
Southbound	All Day	9118	9622	5.5%
	AM Peak	1865	1890	1.3%
	PM Peak	1982	2055	3.7%
Northbound	All Day	8371	8573	2.4%
	AM Peak	1401	1439	2.7%
	PM Peak	2012	2027	0.7%
Both	All Day	17490	18195	4.0%
System-Wide	All Day	6481026	6765182	4.4%

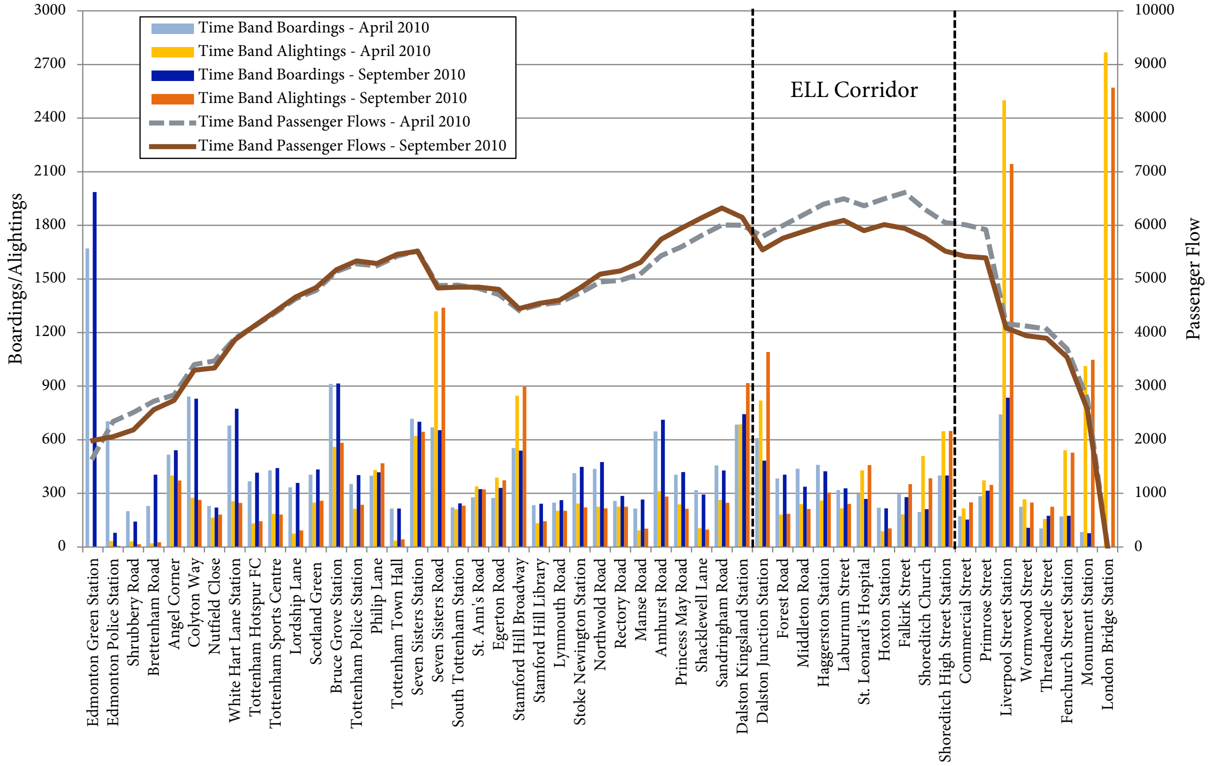
A.5 Route 149

Route 149 carried approximately 45,000 passengers on an average day in October 2011. Stretching along the A10/A1010 from Edmonton Green station in the north to London Bridge station in the south, the 149 is serves customers with 12 buses per hour in the peak.

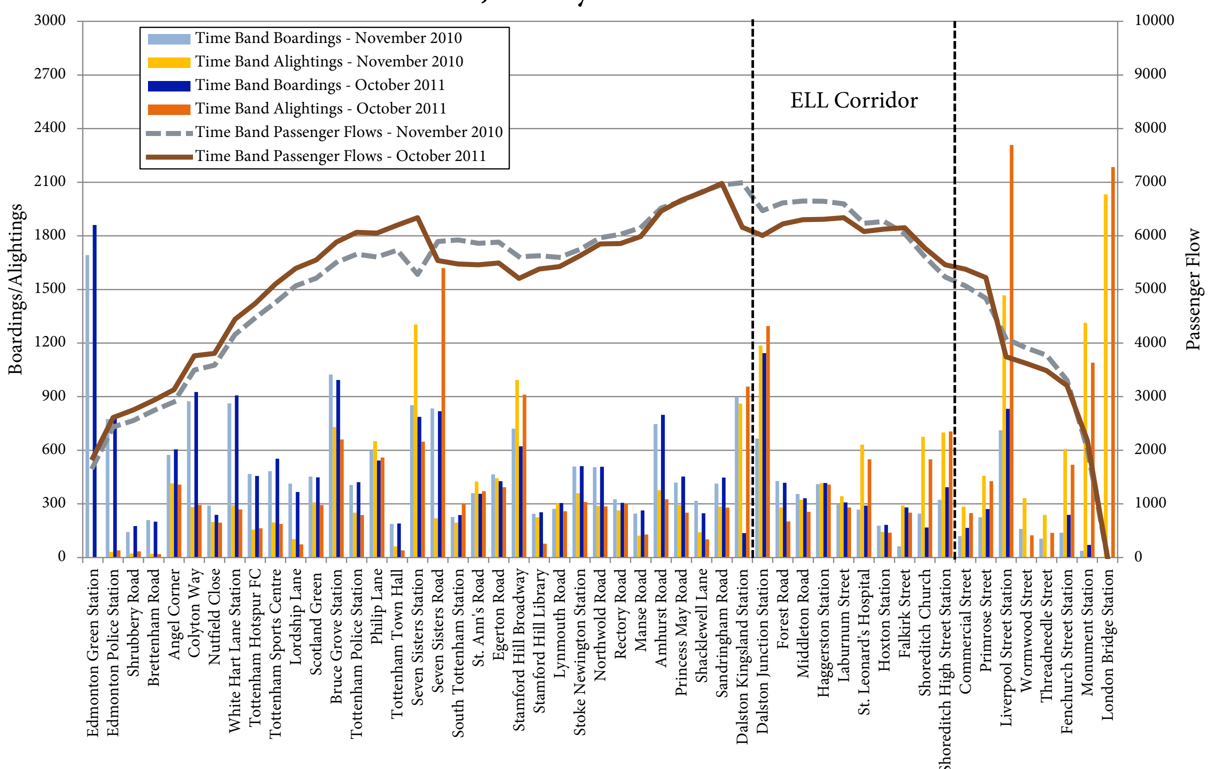


Map of Route 149

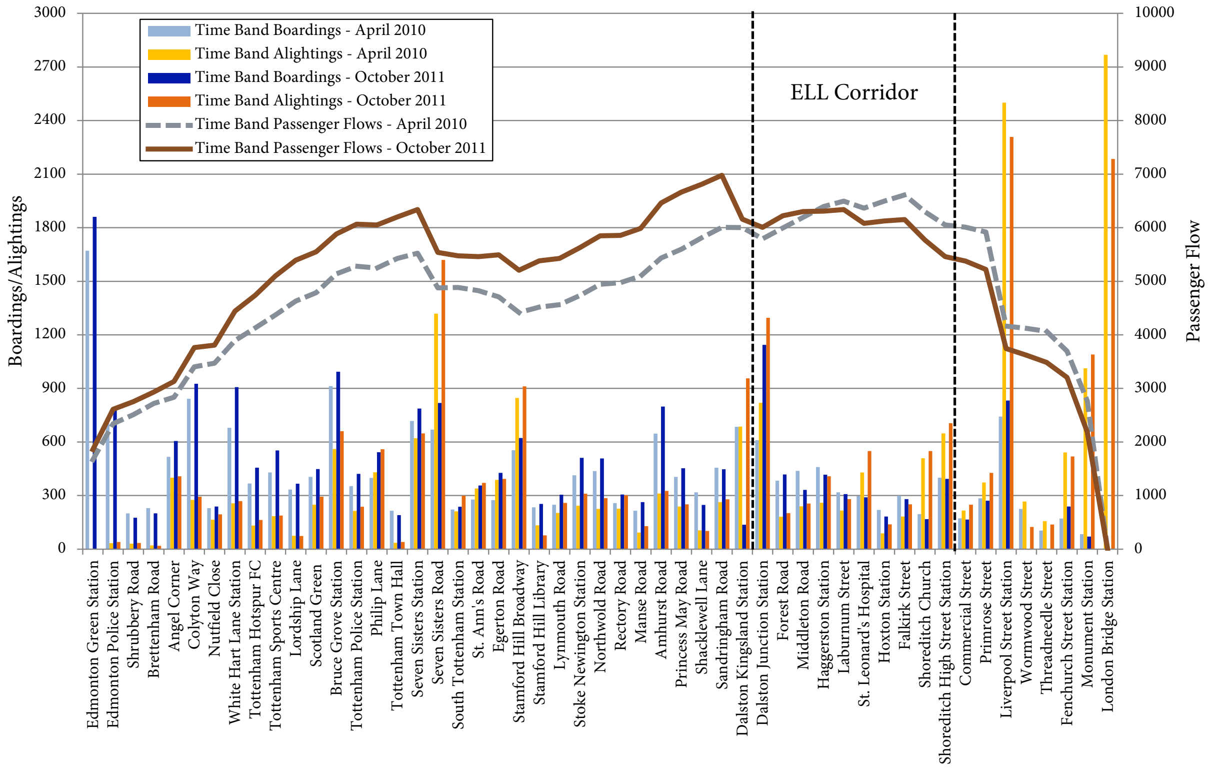
Route 149 - Southbound, All Day - April 2010 vs. September 2010



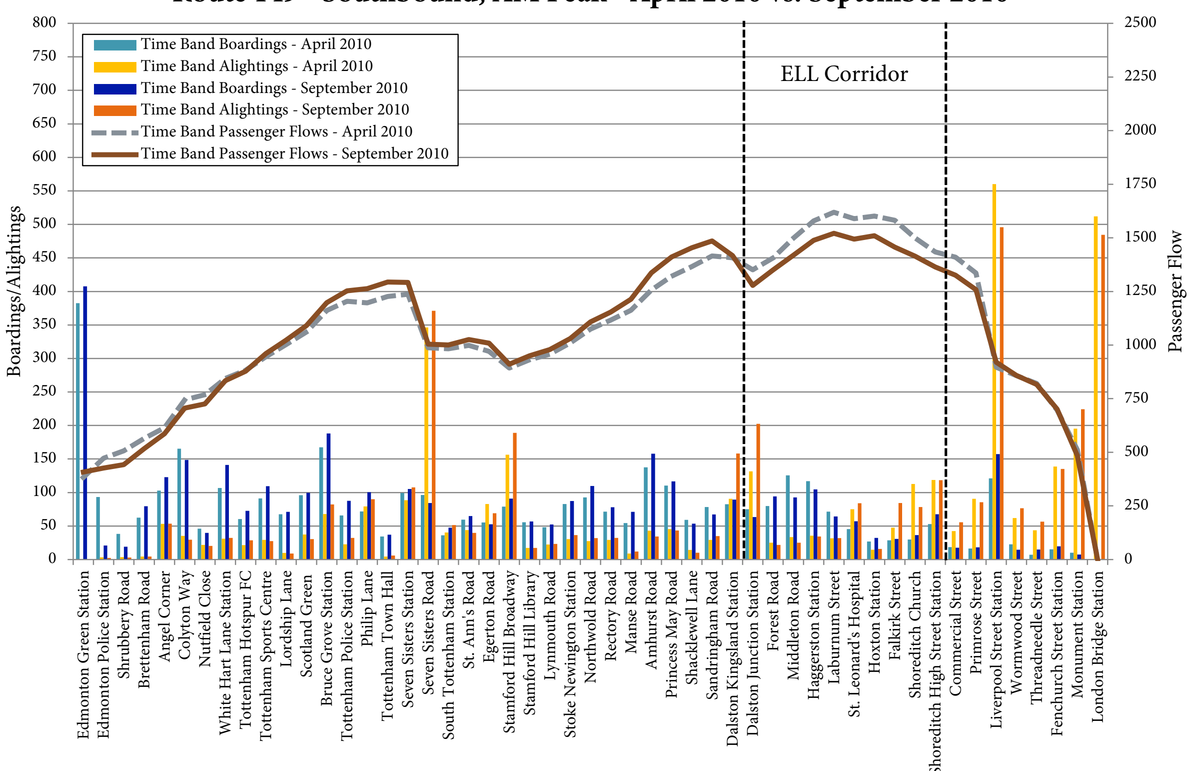
Route 149 - Southbound, All Day - November 2010 vs. October 2011



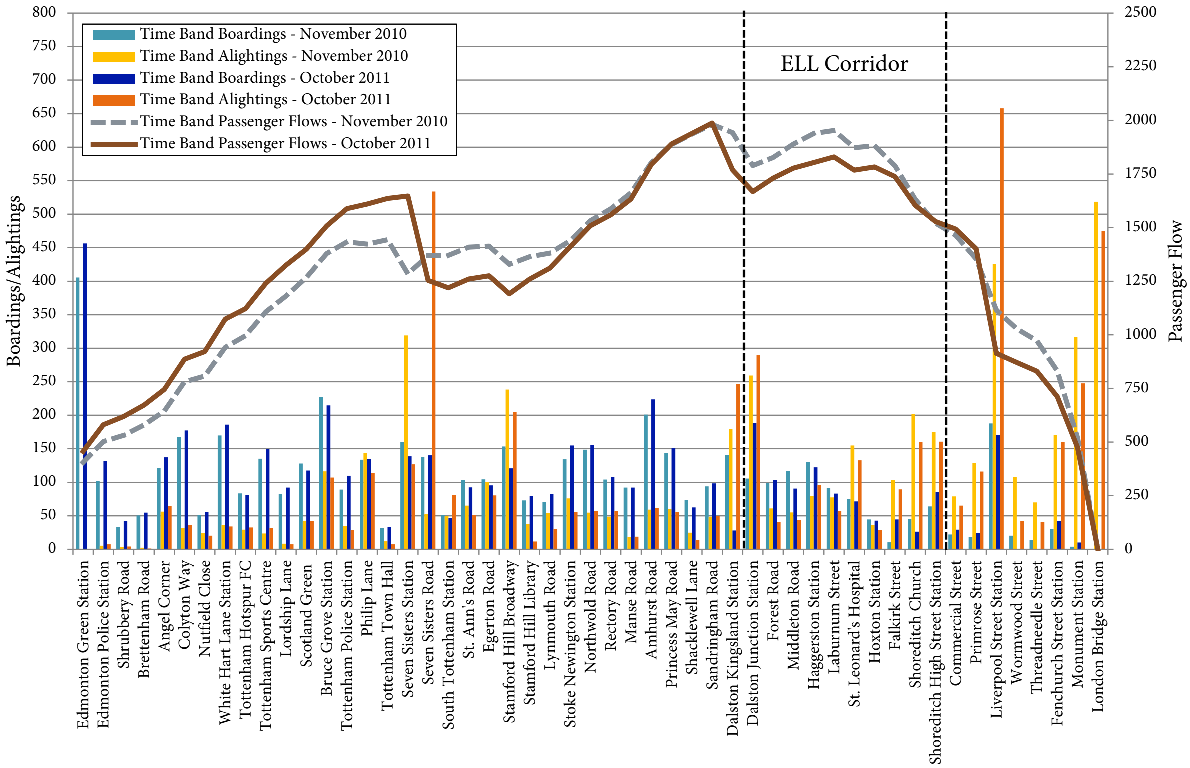
Route 149 - Southbound, All Day - April 2010 vs. October 2011



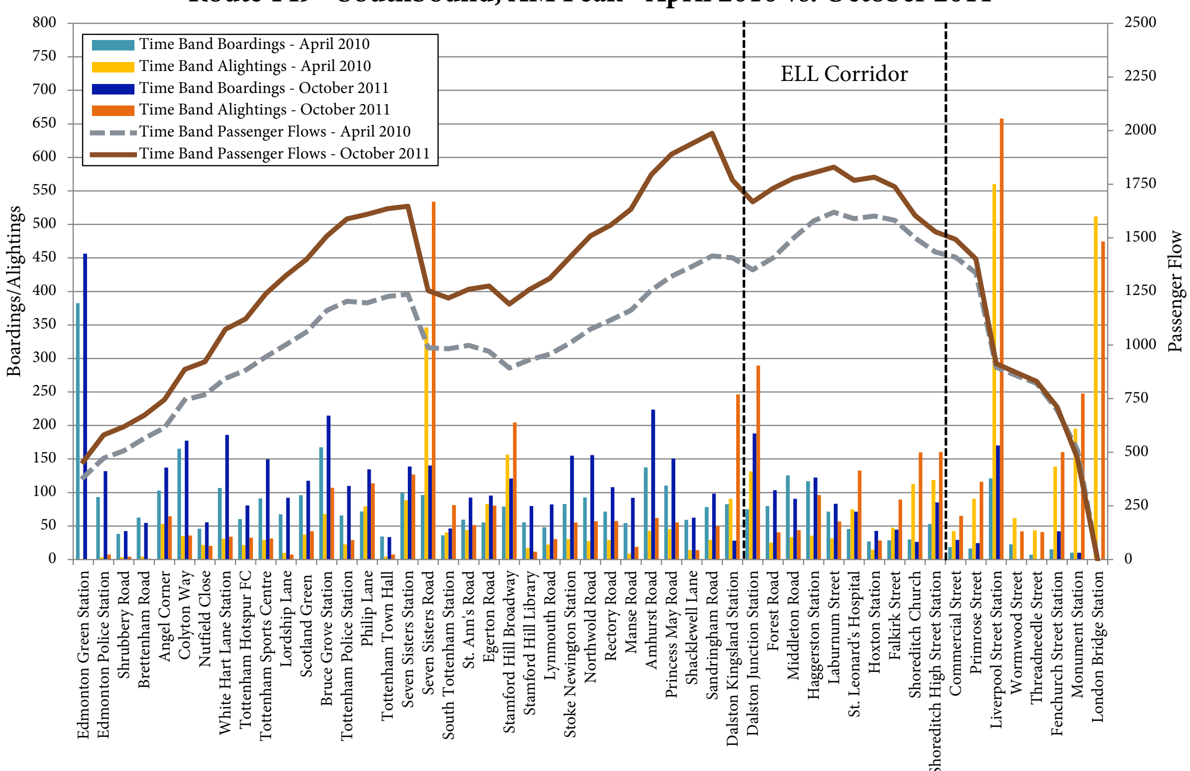
Route 149 - Southbound, AM Peak - April 2010 vs. September 2010



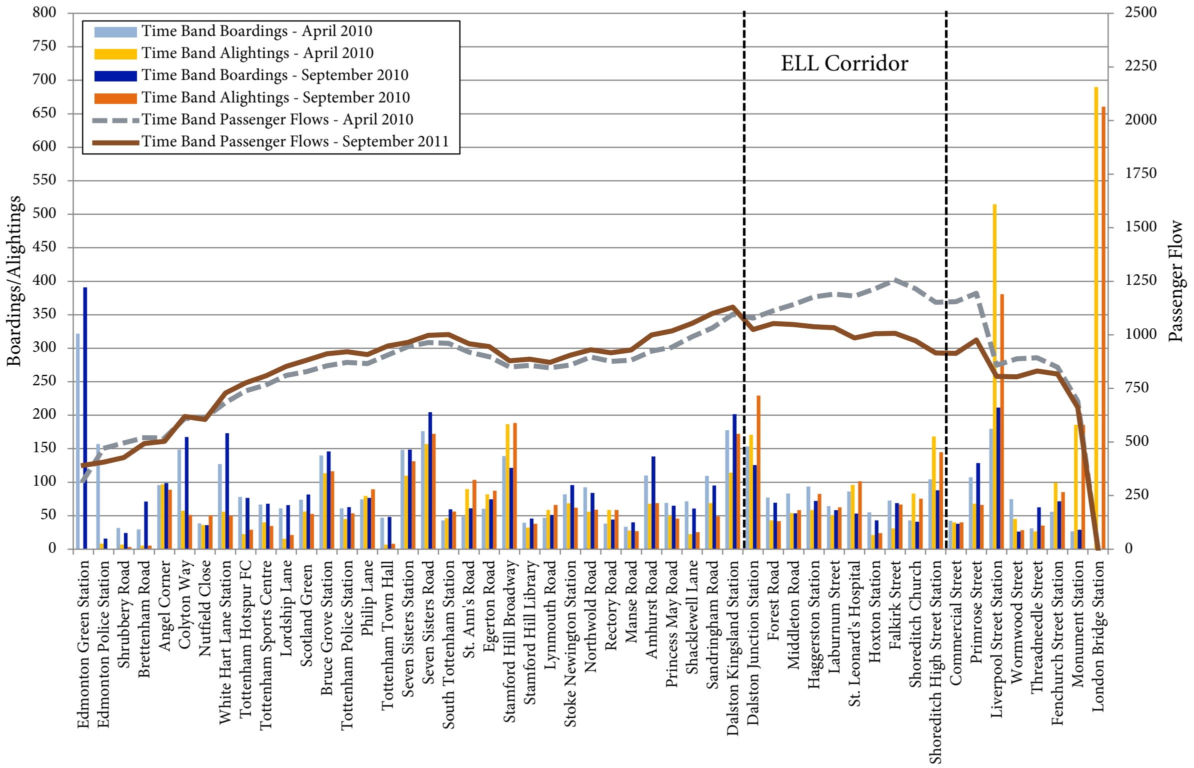
Route 149 - Southbound, AM Peak - November 2010 vs. October 2011



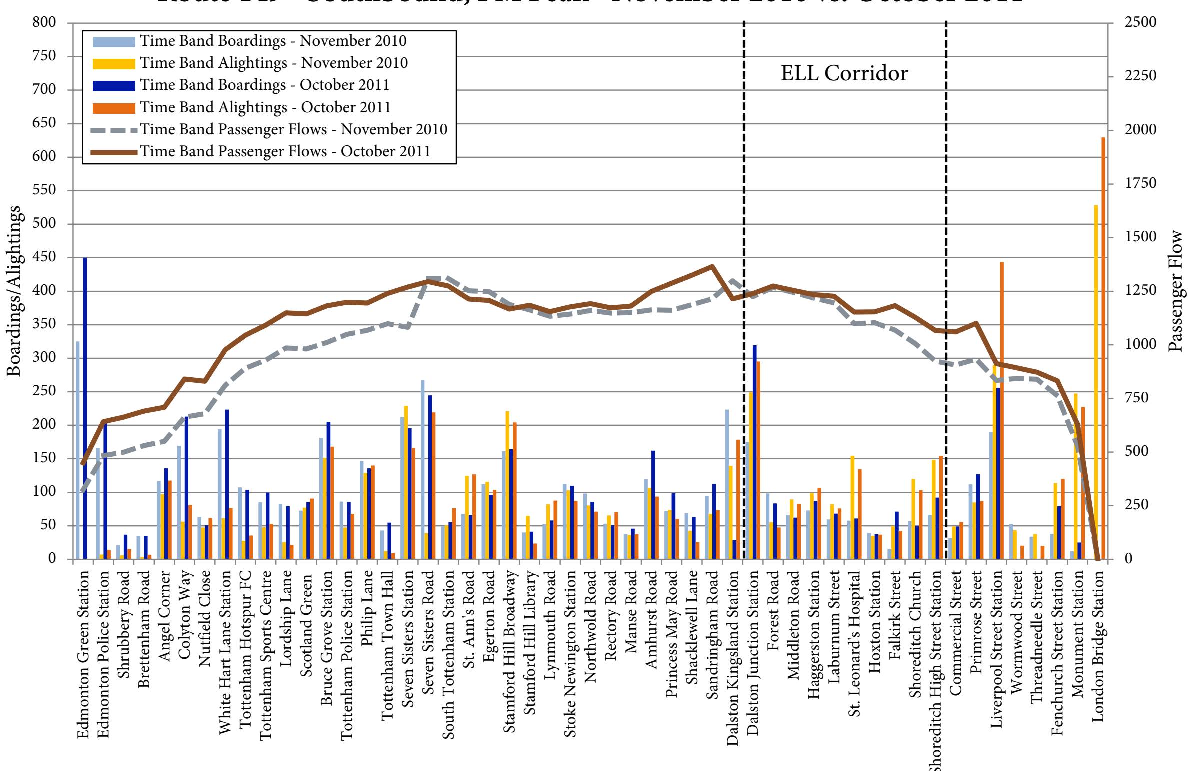
Route 149 - Southbound, AM Peak - April 2010 vs. October 2011



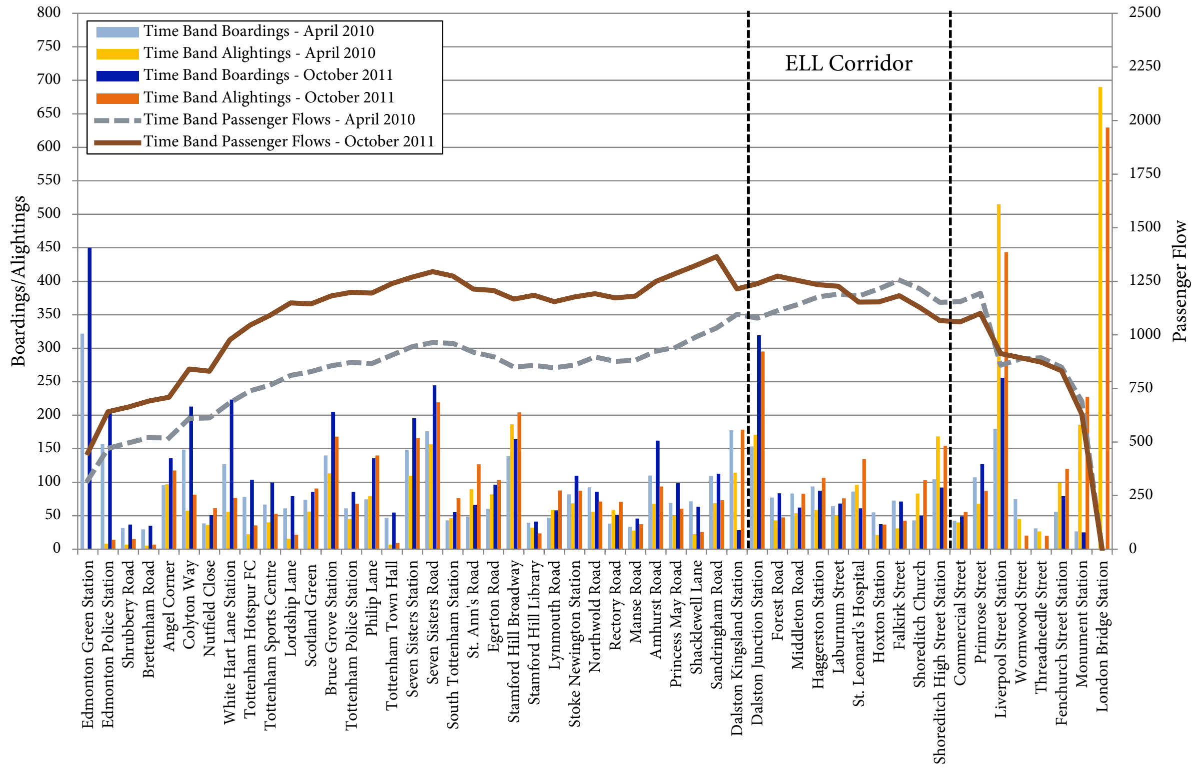
Route 149 - Southbound, PM Peak - April 2010 vs. September 2010



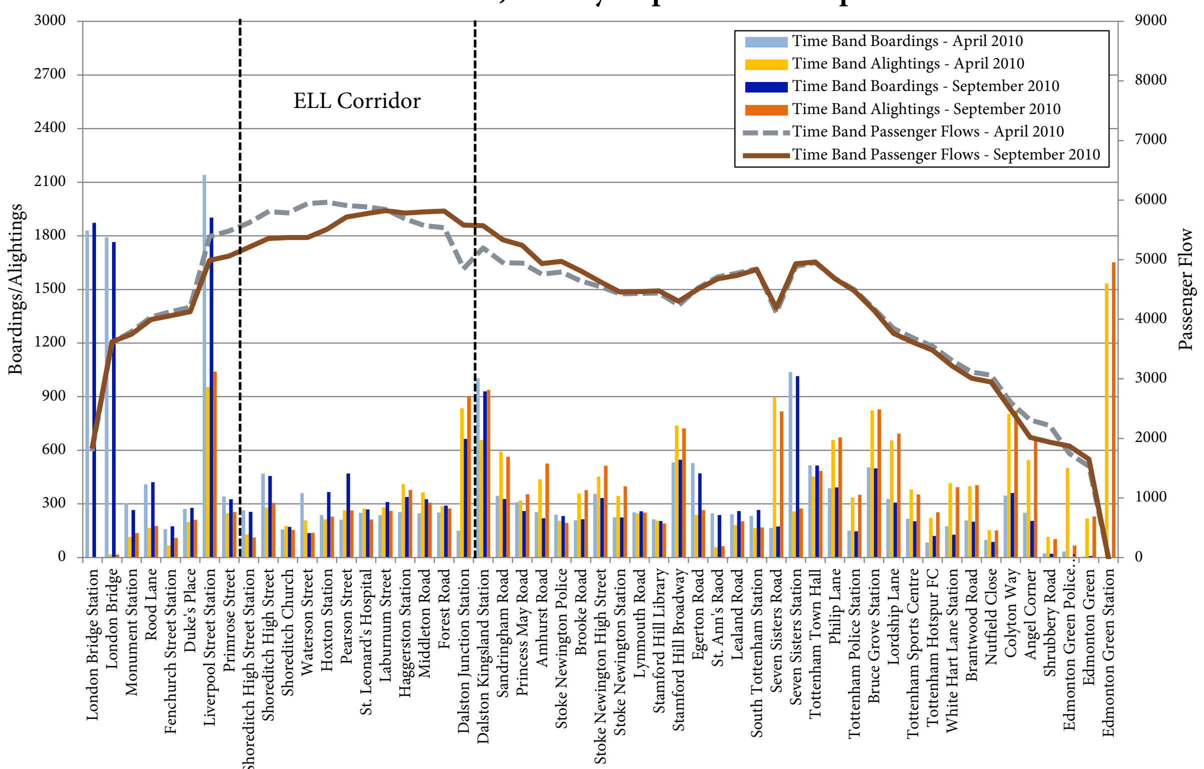
Route 149 - Southbound, PM Peak - November 2010 vs. October 2011



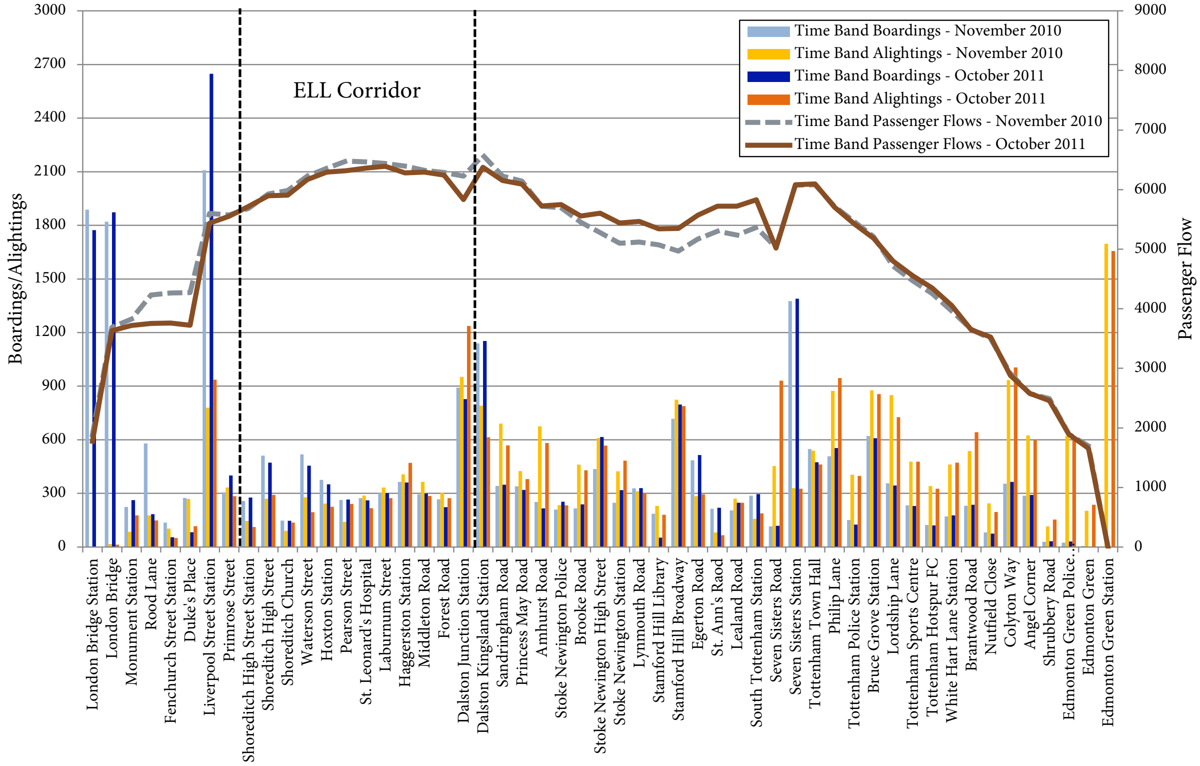
Route 149 - Southbound, PM Peak - April 2010 vs. October 2011



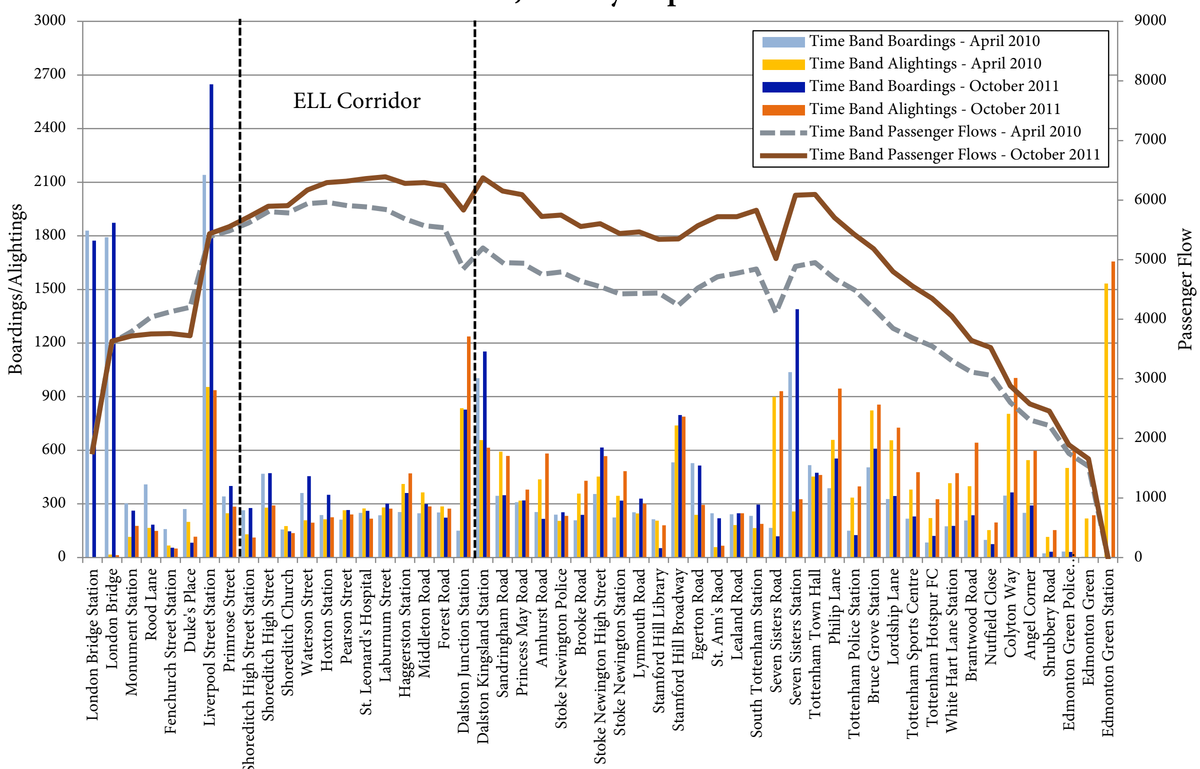
Route 149 - Northbound, All Day - April 2010 vs. September 2010

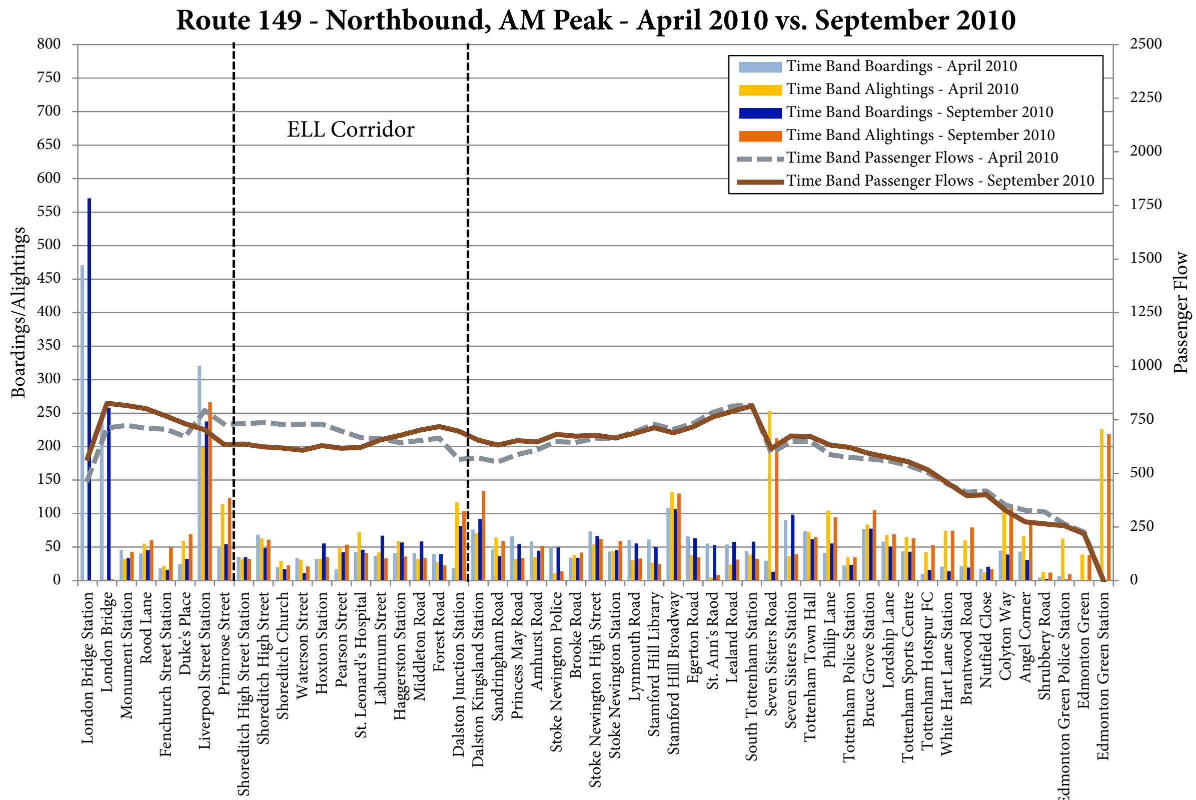


Route 149 - Northbound, All Day - November 2010 vs. October 2011

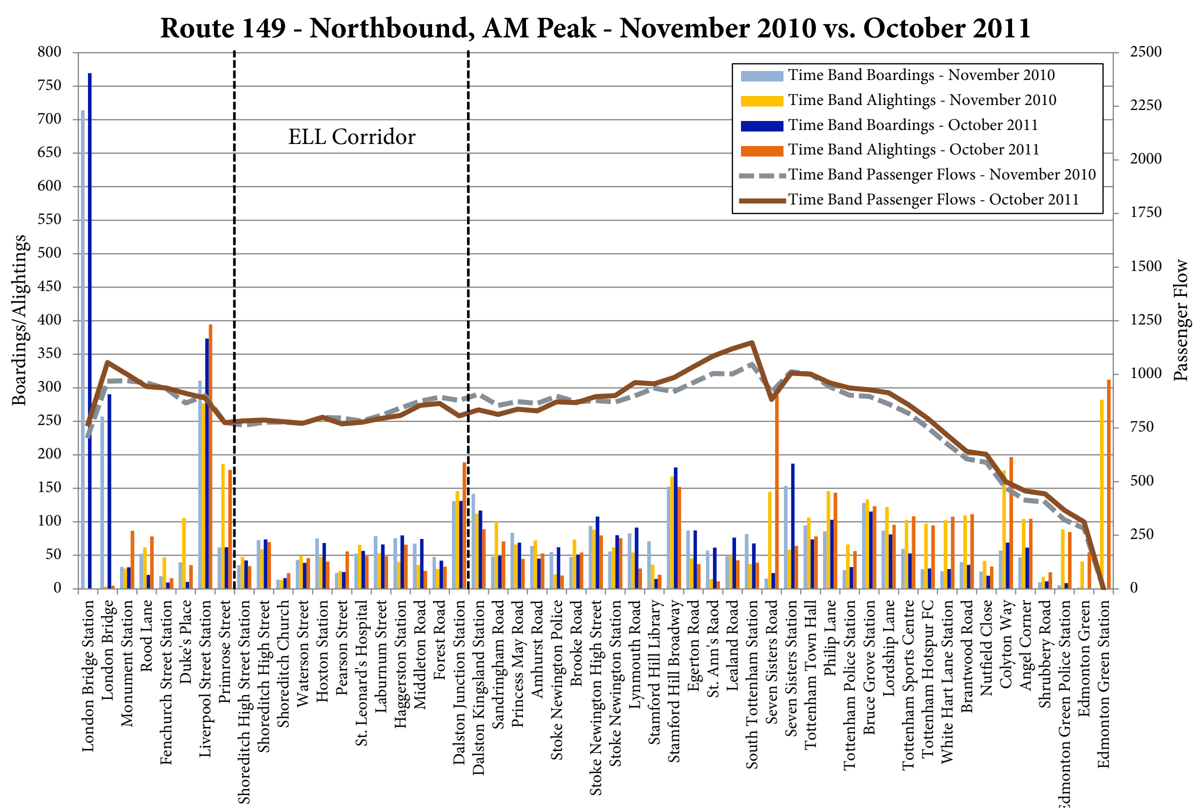


Route 149 - Northbound, All Day - April 2010 vs. October 2011



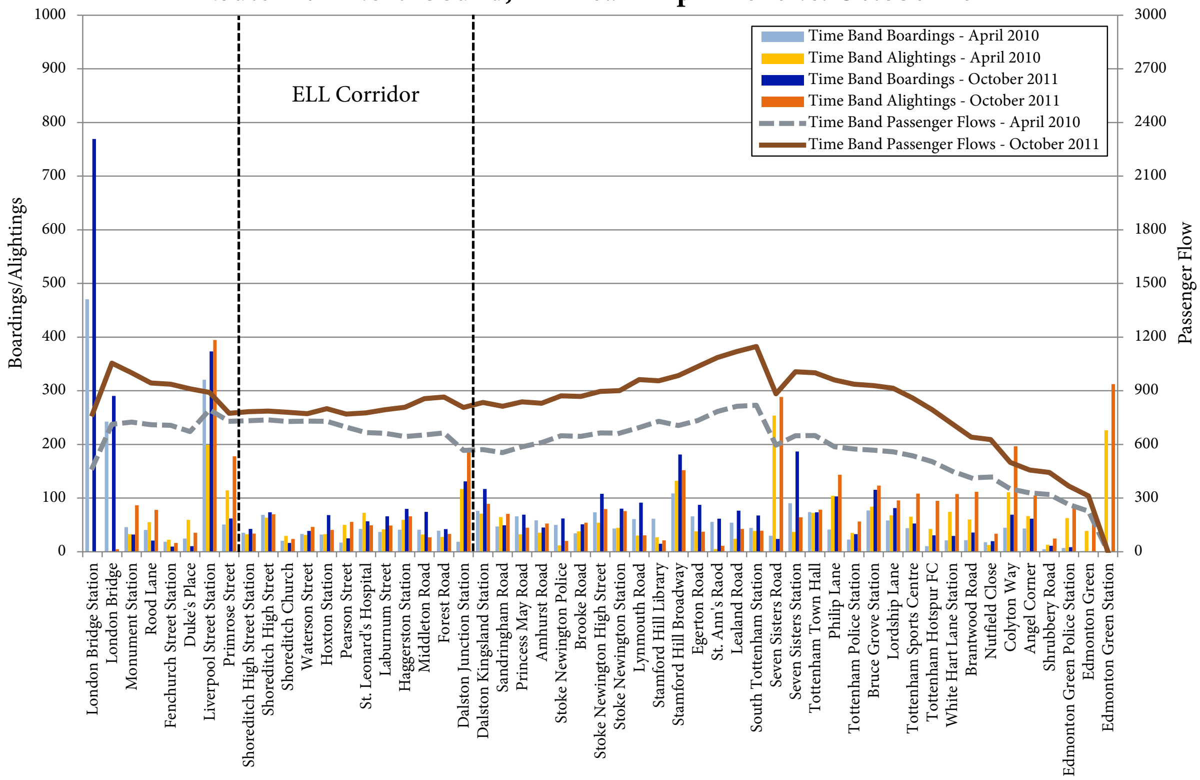


Route 149 - Northbound, AM Peak - April 2010 vs. September 2010
ELL Corridor
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - September 2010
Time Band Alightings - September 2010
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - September 2010
Boardings/Alightings
Passenger Flow
London Bridge Station
London Bridge
Monument Station
Rood Lane
Fenchurch Street Station
Duke's Place
Liverpool Street Station
Primrose Street
Shoreditch High Street Station
Shoreditch High Street
Shoreditch Church
Waterson Street
Hoxton Station
Pearson Street
St. Leonard's Hospital
Laburnum Street
Haggerston Station
Middleton Road
Forest Road
Dalston Junction Station
Dalston Kingsland Station
Sandringham Road
Princess May Road
Amhurst Road
Stoke Newington Police
Brooke Road
Stoke Newington High Street
Stoke Newington Station
Lynmouth Road
Stamford Hill Library
Stamford Hill Broadway
Egerton Road
St. Ann's Raod
Lealand Road
South Tottenham Station
Seven Sisters Road
Seven Sisters Station
Tottenham Town Hall
Philip Lane
Tottenham Police Station
Bruce Grove Station
Lordship Lane
Tottenham Sports Centre
Tottenham Hotspur FC
White Hart Lane Station
Brantwood Road
Nutfield Close
Colyton Way
Angel Corner
Shrubbery Road
Edmonton Green Police Station
Edmonton Green
Edmonton Green Station

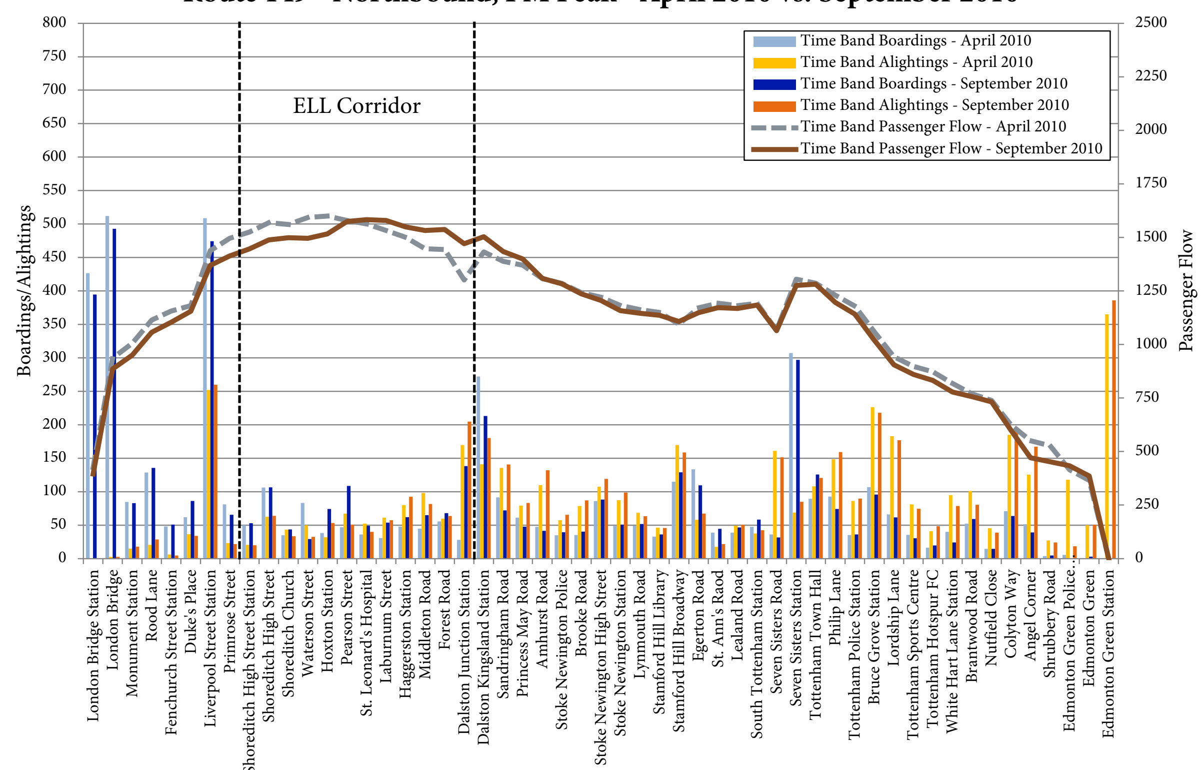


Route 149 - Northbound, AM Peak - November 2010 vs. October 2011
ELL Corridor
Time Band Boardings - November 2010
Time Band Alightings - November 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flows - November 2010
Time Band Passenger Flows - October 2011
Boardings/Alightings
Passenger Flow

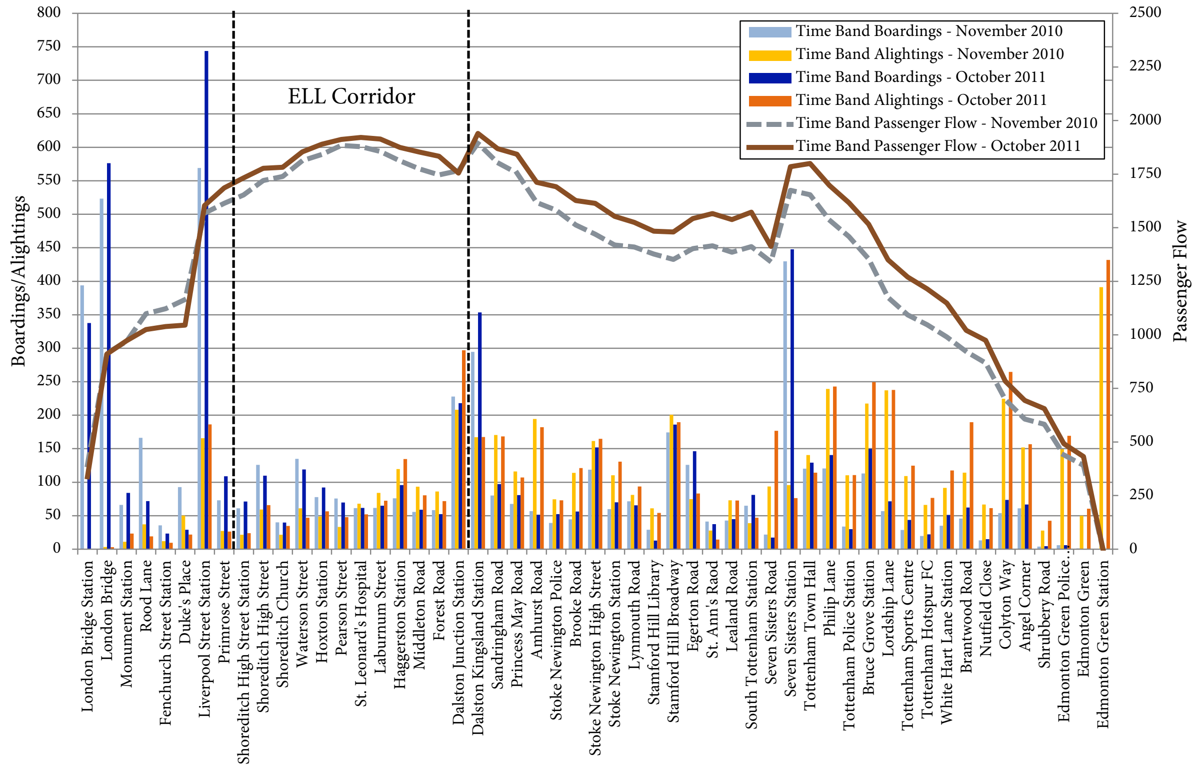
Route 149 - Northbound, AM Peak - April 2010 vs. October 2011



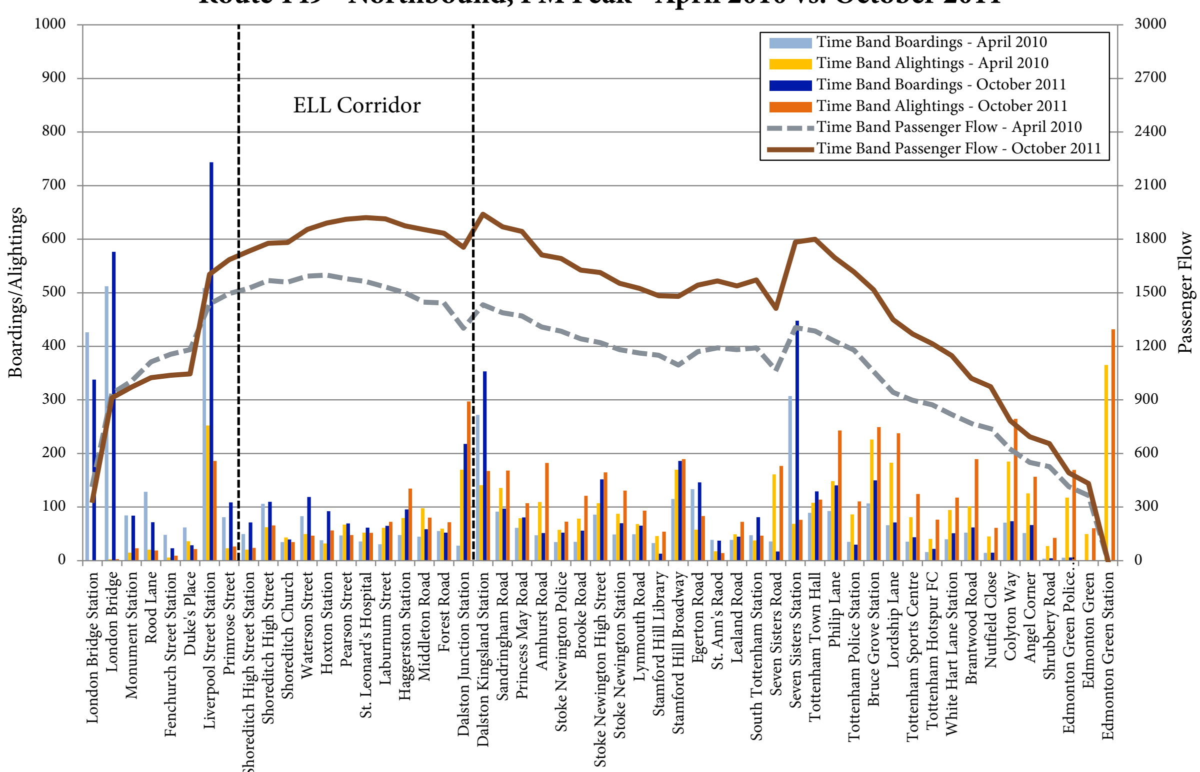
Route 149 - Northbound, PM Peak - April 2010 vs. September 2010



Route 149 - Northbound, PM Peak - November 2010 vs. October 2011



Route 149 - Northbound, PM Peak - April 2010 vs. October 2011



Passenger Counts for Route 149 - Southbound - All Day

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	10907	10897	2463	2039	3025	3019	16396	15954
		-10	0%	-425	-17%	-7	0%	-441	-3%
	Corridor			1014	854	1859	2092	2873	2946
				-161	-16%	233	13%	73	3%
	After					1665	2249	1665	2249
						584	35%	584	35%
	Total	10907	10897	3478	2892	6549	7360	20934	21149
		-10	0%	-585	-17%	810	12%	215	1%

Passenger Counts for Route 149 - Southbound - All Day

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	12011	12294	2705	1998	3097	2866	17813	17158
		283	2%	-707	-26%	-231	-7%	-655	-4%
	Corridor			1099	1344	1813	2199	2912	3543
				244	22%	386	21%	630	22%
	After					1824	1976	1824	1976
						153	8%	153	8%
	Total	12011	12294	3804	3341	6734	7041	22549	22677
		283	2%	-463	-12%	307	5%	128	1%

Passenger Counts for Route 149 - Southbound - All Day

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	10907	12294	2463	1998	3025	2866	16396	17158
		1388	13%	-466	-19%	-160	-5%	762	5%
	Corridor			1014	1344	1859	2199	2873	3543
				329	32%	340	18%	669	23%
	After					1665	1976	1665	1976
						311	19%	311	19%
	Total	10907	12294	3478	3341	6549	7041	20934	22677
		1388	13%	-137	-4%	492	8%	1743	8%

Passenger Counts for Route 149 - Southbound - AM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1658	1917	566	381	773	834	2997	3131
		259	16%	-186	-33%	61	8%	135	4%
	Corridor			168	113	400	463	569	576
				-55	-33%	62	16%	7	1%
	After					250	317	250	317
						68	27%	68	27%
	Total	1658	1917	734	494	1423	1614	3815	4025
		259	16%	-240	-33%	191	13%	210	5%

Passenger Counts for Route 149 - Southbound - AM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	2314	2565	722	568	962	912	3997	4044
		251	11%	-154	-21%	-50	-5%	47	1%
	Corridor			222	241	496	532	717	773
				19	9%	36	7%	55	8%
	After					360	362	360	362
						1	0%	1	0%
	Total	2314	2565	944	809	1818	1805	5075	5179
		251	11%	-135	-14%	-13	-1%	103	2%

Passenger Counts for Route 149 - Southbound - AM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1658	2565	566	568	773	912	2997	4044
		907	55%	2	0%	139	18%	1048	35%
	Corridor			168	241	400	532	569	773
				73	43%	131	33%	204	36%
	After					250	362	250	362
						112	45%	112	45%
	Total	1658	2565	734	809	1423	1805	3815	5179
		907	55%	75	10%	382	27%	1364	36%

Passenger Counts for Route 149 - Southbound - PM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	2318	2294	467	453	488	447	3273	3194
		-24	-1%	-15	-3%	-41	-8%	-79	-2%
	Corridor			249	204	403	381	652	585
				-45	-18%	-22	-6%	-67	-10%
	After					464	655	464	655
						191	41%	191	41%
	Total	2318	2294	716	657	1354	1483	4389	4434
		-24	-1%	-60	-8%	128	9%	45	1%

Passenger Counts for Route 149 - Southbound - PM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	2690	2959	551	434	498	485	3739	3878
		269	10%	-117	-21%	-13	-3%	139	4%
	Corridor			276	350	365	489	642	840
				74	27%	124	34%	198	31%
	After					537	629	537	629
						92	17%	92	17%
	Total	2690	2959	828	784	1400	1603	4917	5346
		269	10%	-43	-5%	203	15%	429	9%

Passenger Counts for Route 149 - Southbound - PM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	2318	2959	467	434	488	485	3273	3878
		641	28%	-33	-7%	-3	-1%	605	18%
	Corridor			249	350	403	489	652	840
				101	41%	86	21%	187	29%
	After					464	629	464	629
						165	36%	165	36%
	Total	2318	2959	716	784	1354	1603	4389	5346
		641	28%	68	9%	249	18%	957	22%

Passenger Counts for Route 149 - Northbound - All Day

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1536	2057	2303	2351	3413	2599	7252	7007
		521	34%	48	2%	-814	-24%	-245	-3%
	Corridor			1077	1076	2051	2317	3128	3393
				-1	0%	266	13%	264	8%
	After					9685	10035	9685	10035
						350	4%	350	4%
	Total	1536	2057	3380	3427	15149	14950	20066	20435
		521	34%	47	1%	-199	-1%	369	2%

Passenger Counts for Route 149 - Northbound - All Day

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1910	1839	2510	2611	2918	2828	7338	7278
		-71	-4%	102	4%	-90	-3%	-60	-1%
	Corridor			1162	1237	2417	2178	3580	3415
				75	6%	-239	-10%	-164	-5%
	After					11721	11925	11721	11925
						205	2%	205	2%
	Total	1910	1839	3672	3849	17056	16932	22638	22619
		-71	-4%	177	5%	-125	-1%	-19	0%

Passenger Counts for Route 149 - Northbound - All Day

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1536	1839	2303	2611	3413	2828	7252	7278
		302	20%	308	13%	-585	-17%	26	0%
	Corridor			1077	1237	2051	2178	3128	3415
				160	15%	127	6%	287	9%
	After					9685	11925	9685	11925
						2240	23%	2240	23%
	Total	1536	1839	3380	3849	15149	16932	20066	22619
		302	20%	469	14%	1783	12%	2553	13%

Passenger Counts for Route 149 - Northbound - AM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	501	646	310	322	285	280	1096	1248
		145	29%	11	4%	-5	-2%	152	14%
	Corridor			162	143	240	336	402	479
				-19	-11%	96	40%	77	19%
	After					1650	1519	1650	1519
						-131	-8%	-131	-8%
	Total	501	646	472	465	2174	2134	3148	3246
		145	29%	-7	-2%	-40	-2%	98	3%

Passenger Counts for Route 149 - Northbound - AM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	760	827	359	432	369	308	1488	1568
		67	9%	73	20%	-61	-16%	80	5%
	Corridor			207	216	379	367	586	583
				9	4%	-11	-3%	-2	0%
	After					2195	2227	2195	2227
						32	1%	32	1%
	Total	760	827	566	648	2943	2903	4269	4378
		67	9%	82	15%	-40	-1%	109	3%

Passenger Counts for Route 149 - Northbound - AM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	501	827	310	432	285	308	1096	1568
		326	65%	122	39%	24	8%	471	43%
	Corridor			162	216	240	367	402	583
				54	33%	128	53%	182	45%
	After					1650	2227	1650	2227
						577	35%	577	35%
	Total	501	827	472	648	2174	2903	3148	4378
		326	65%	176	37%	728	34%	1230	39%

Passenger Counts for Route 149 - Northbound - PM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	272	389	584	576	814	817	1671	1782
		117	43%	-9	-1%	3	0%	112	7%
	Corridor			168	198	467	515	635	712
				29	17%	47	10%	77	12%
	After					2303	2186	2303	2186
						-117	-5%	-117	-5%
	Total	272	389	753	773	3584	3518	4610	4681
		117	43%	20	3%	-66	-2%	71	2%

Passenger Counts for Route 149 - Northbound - PM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	328	313	664	703	928	959	1920	1975
		-15	-4%	39	6%	31	3%	54	3%
	Corridor			218	257	610	577	828	835
				39	18%	-33	-5%	6	1%
	After					2703	3036	2703	3036
						333	12%	333	12%
	Total	328	313	882	960	4241	4572	5452	5845
		-15	-4%	77	9%	331	8%	393	7%

Passenger Counts for Route 149 - Northbound - PM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	272	313	584	703	814	959	1671	1975
		41	15%	118	20%	145	18%	304	18%
	Corridor			168	257	467	577	635	835
				89	53%	110	24%	199	31%
	After					2303	3036	2303	3036
						732	32%	732	32%
	Total	272	313	753	960	3584	4572	4610	5845
		41	15%	207	27%	988	28%	1235	27%

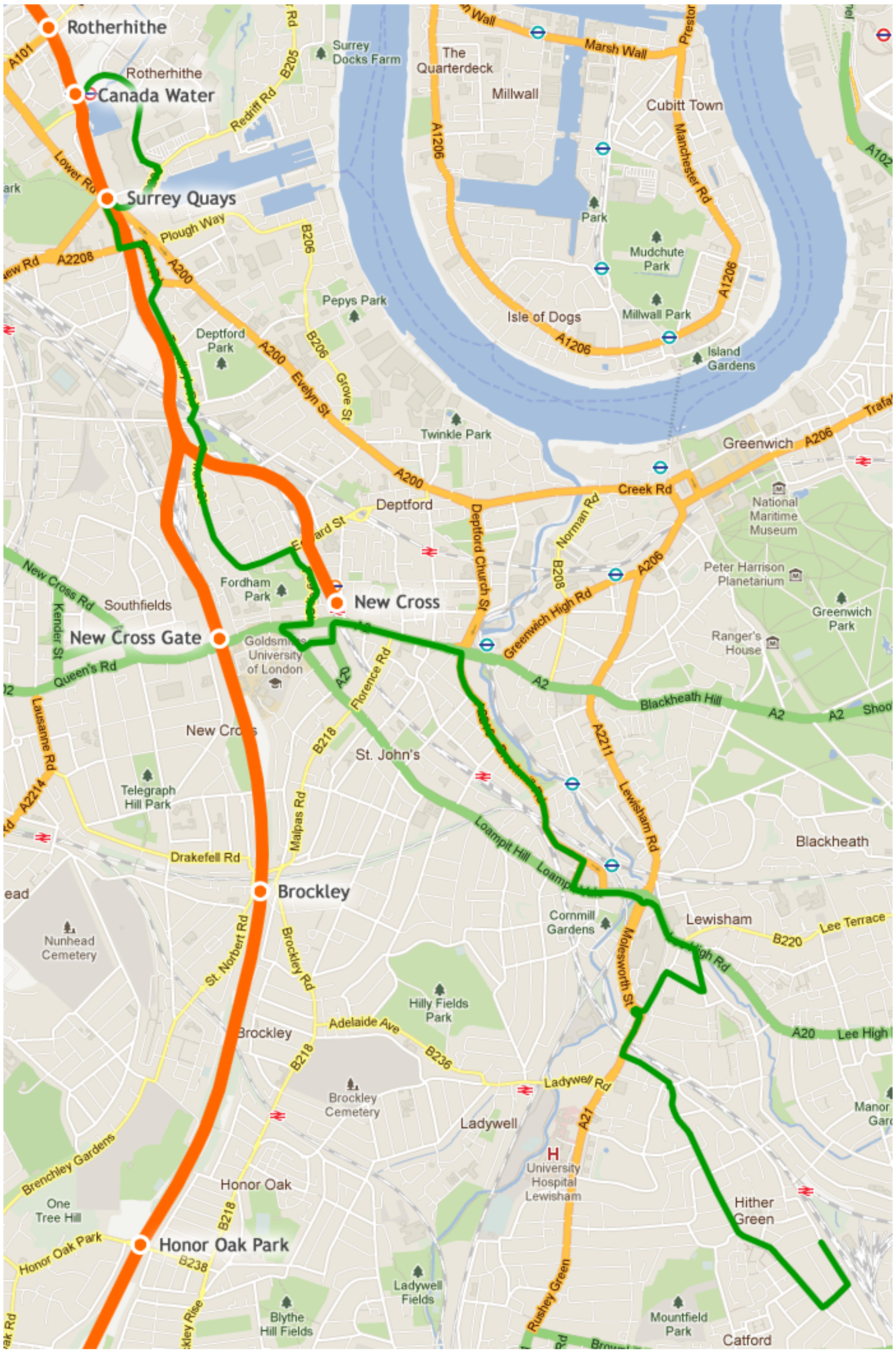
Route 149 - April 2010 vs. September 2010				
For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Sep-10	Percent Change
Southbound	All Day	6269	5842	-6.8%
	AM Peak	1516	1429	-5.7%
	PM Peak	1172	1008	-14.0%
Northbound	All Day	5699	5592	-1.9%
	AM Peak	684	651	-4.9%
	PM Peak	1518	1522	0.3%
Passenger Counts		Apr-10	Sep-10	Percent Change
Southbound	All Day	8362	8003	-4.3%
	AM Peak	1907	1790	-6.1%
	PM Peak	1607	1484	-7.6%
Northbound	All Day	8844	8342	-5.7%
	AM Peak	997	1081	8.4%
	PM Peak	2034	2105	3.5%
Entire Route				
Passenger Counts		Apr-10	Sep-10	Percent Change
Southbound	All Day	20934	21149	1.0%
	AM Peak	3815	4025	5.5%
	PM Peak	4389	4434	1.0%
Northbound	All Day	20066	20435	1.8%
	AM Peak	3148	3246	3.1%
	PM Peak	4610	4681	1.5%
Both	All Day	41000	41584	1.4%
System-Wide	All Day	6481026	6476783	-0.1%

Route 149 - November 2010 vs. October 2011				
For Route Segments in the ELL Service Area				
Average Passenger Flow		Nov-10	Oct-11	Percent Change
Southbound	All Day	6236	6077	-2.5%
	AM Peak	1809	1723	-4.8%
	PM Peak	1135	1191	4.9%
Northbound	All Day	6233	6142	-1.5%
	AM Peak	814	800	-1.7%
	PM Peak	1790	1841	2.9%
Passenger Counts		Nov-10	Oct-11	Percent Change
Southbound	All Day	8714	8406	-3.5%
	AM Peak	2401	2252	-6.2%
	PM Peak	1691	1759	4.0%
Northbound	All Day	9008	8855	-1.7%
	AM Peak	1314	1324	0.8%
	PM Peak	2421	2496	3.1%
Entire Route				
Passenger Counts		Nov-10	Oct-11	Percent Change
Southbound	All Day	22549	22677	0.6%
	AM Peak	5075	5179	2.0%
	PM Peak	4917	5346	8.7%
Northbound	All Day	22638	22619	-0.1%
	AM Peak	4269	4378	2.6%
	PM Peak	5452	5845	7.2%
Both	All Day	45187	45296	0.2%
System-Wide	All Day	6511109	6765182	3.9%

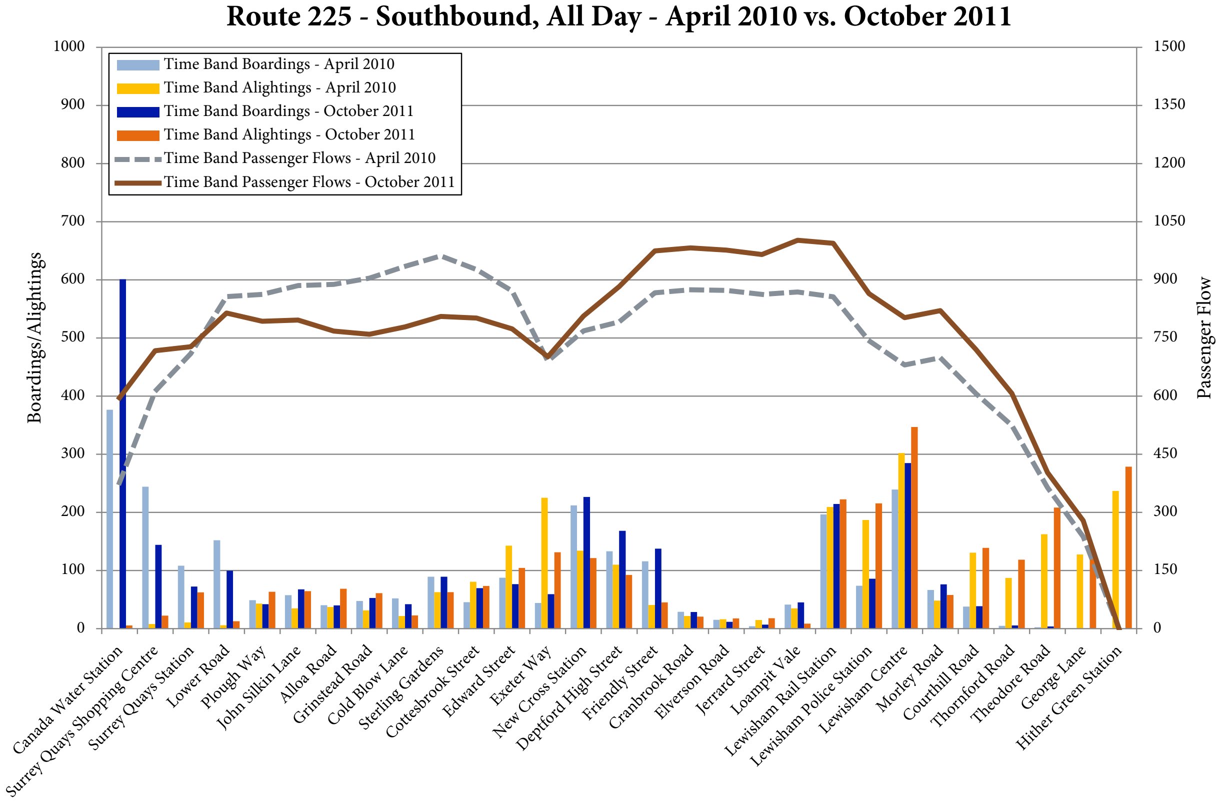
Route 149 - April 2010 vs. October 2011				
For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Oct-11	Percent Change
Southbound	All Day	6269	6077	-3.1%
	AM Peak	1516	1723	13.7%
	PM Peak	1172	1191	1.6%
Northbound	All Day	5699	6142	7.8%
	AM Peak	684	800	16.9%
	PM Peak	1518	1841	21.3%
Passenger Counts		Apr-10	Oct-11	Percent Change
Southbound	All Day	8362	8406	0.5%
	AM Peak	1907	2252	18.1%
	PM Peak	1607	1759	9.4%
Northbound	All Day	8844	8855	0.1%
	AM Peak	997	1324	32.9%
	PM Peak	2034	2496	22.7%
Entire Route				
Passenger Counts		Apr-10	Oct-11	Percent Change
Southbound	All Day	20934	22677	8.3%
	AM Peak	3815	5179	35.7%
	PM Peak	4389	5346	21.8%
Northbound	All Day	20066	22619	12.7%
	AM Peak	3148	4378	39.1%
	PM Peak	4610	5845	26.8%
Both	All Day	41000	45296	10.5%
System-Wide	All Day	6481026	6765182	4.4%

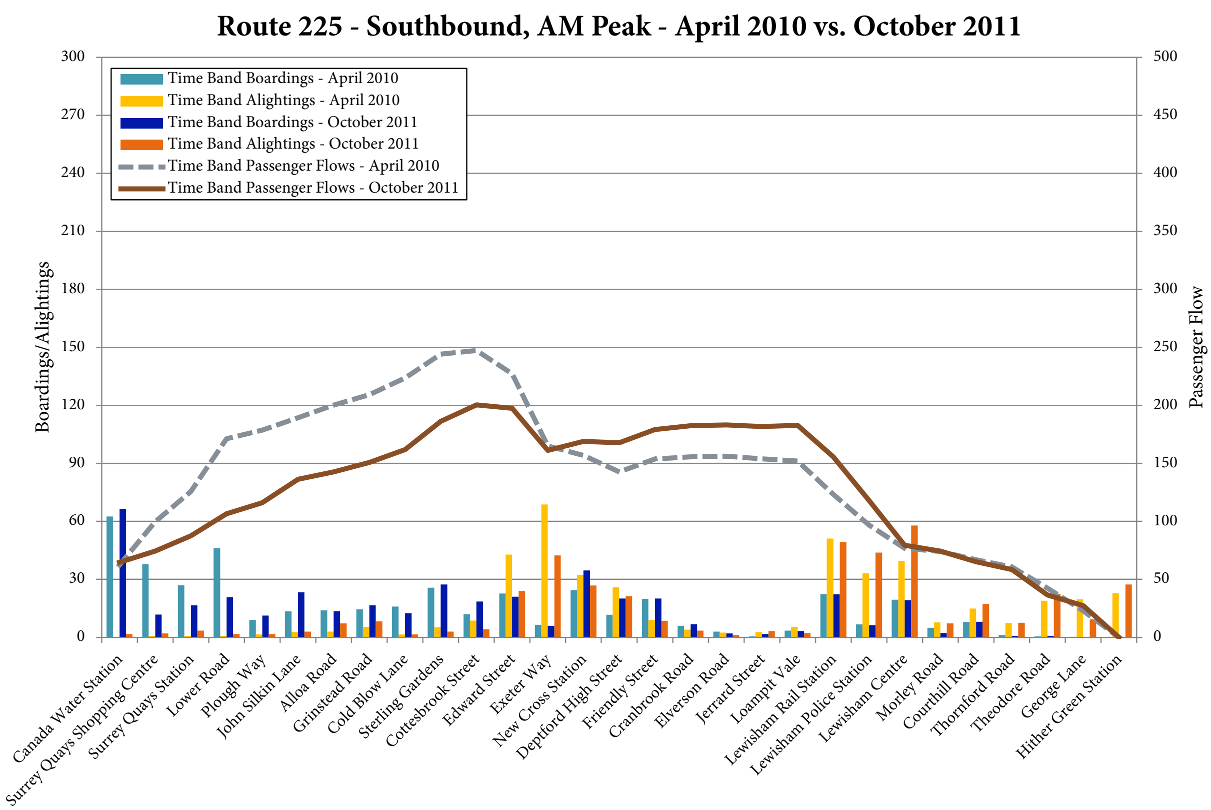
A.6 Route 225

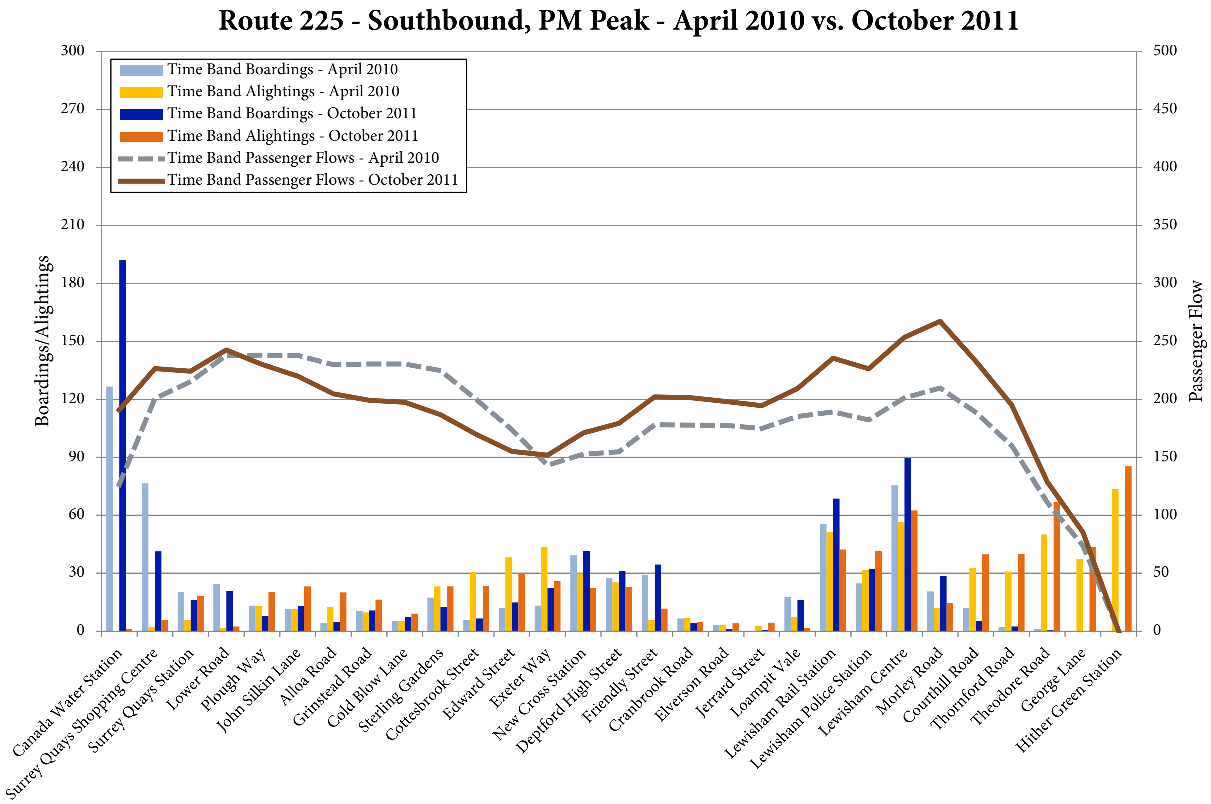
Traveling from Hither Green station in the south to Canada Water station in the north, route 225 provides four buses per hour service in the peak (and for much of the day). Along the way, it has stops near Lewisham station, New Cross station, and Surrey Quays station. About 5,300 passengers ride the 225 on the average weekday.



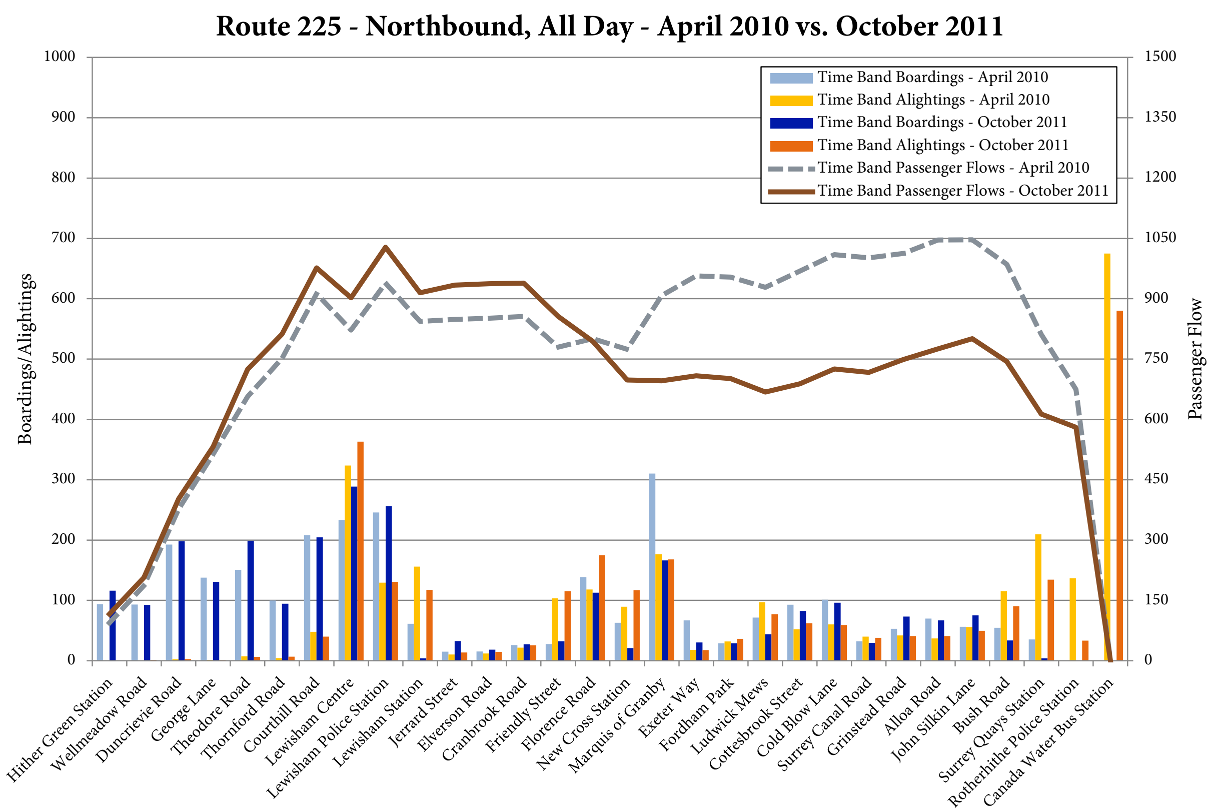
Map of Route 225


Route 225 - Southbound, All Day - April 2010 vs. October 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - October 2011
Boardings/Alightings
Passenger Flow
Canada Water Station
Surrey Quays Shopping Centre
Surrey Quays Station
Lower Road
Plough Way
John Silkin Lane
Alloa Road
Grinstead Road
Cold Blow Lane
Sterling Gardens
Cottesbrook Street
Edward Street
Exeter Way
New Cross Station
Deptford High Street
Friendly Street
Cranbrook Road
Elverson Road
Jerrard Street
Loampit Vale
Lewisham Rail Station
Lewisham Police Station
Lewisham Centre
Morley Road
Courthill Road
Thornford Road
Theodore Road
George Lane
Hither Green Station


Route 225 - Southbound, AM Peak - April 2010 vs. October 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - October 2011
Boardings/Alightings
Passenger Flow
Canada Water Station
Surrey Quays Shopping Centre
Surrey Quays Station
Lower Road
Plough Way
John Silkin Lane
Alloa Road
Grinstead Road
Cold Blow Lane
Sterling Gardens
Cottesbrook Street
Edward Street
Exeter Way
New Cross Station
Deptford High Street
Friendly Street
Cranbrook Road
Elverson Road
Jerrard Street
Loampit Vale
Lewisham Rail Station
Lewisham Police Station
Lewisham Centre
Morley Road
Courthill Road
Thornford Road
Theodore Road
George Lane
Hither Green Station

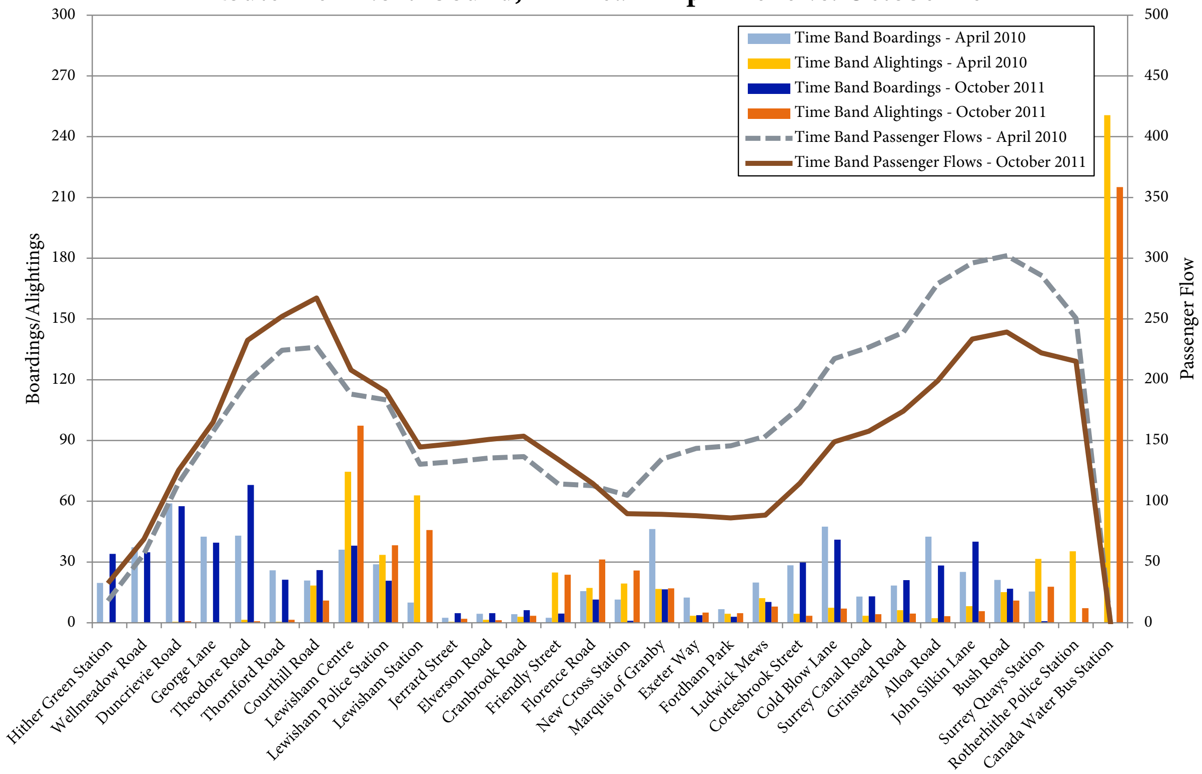


Route 225 - Southbound, PM Peak - April 2010 vs. October 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - October 2011
Boardings/Alightings
Passenger Flow
Canada Water Station
Surrey Quays Shopping Centre
Surrey Quays Station
Lower Road
Plough Way
John Silkin Lane
Alloa Road
Grinstead Road
Cold Blow Lane
Sterling Gardens
Cottesbrook Street
Edward Street
Exeter Way
New Cross Station
Deptford High Street
Friendly Street
Cranbrook Road
Elverson Road
Jerrard Street
Loampit Vale
Lewisham Rail Station
Lewisham Police Station
Lewisham Centre
Morley Road
Courthill Road
Thornford Road
Theodore Road
George Lane
Hither Green Station

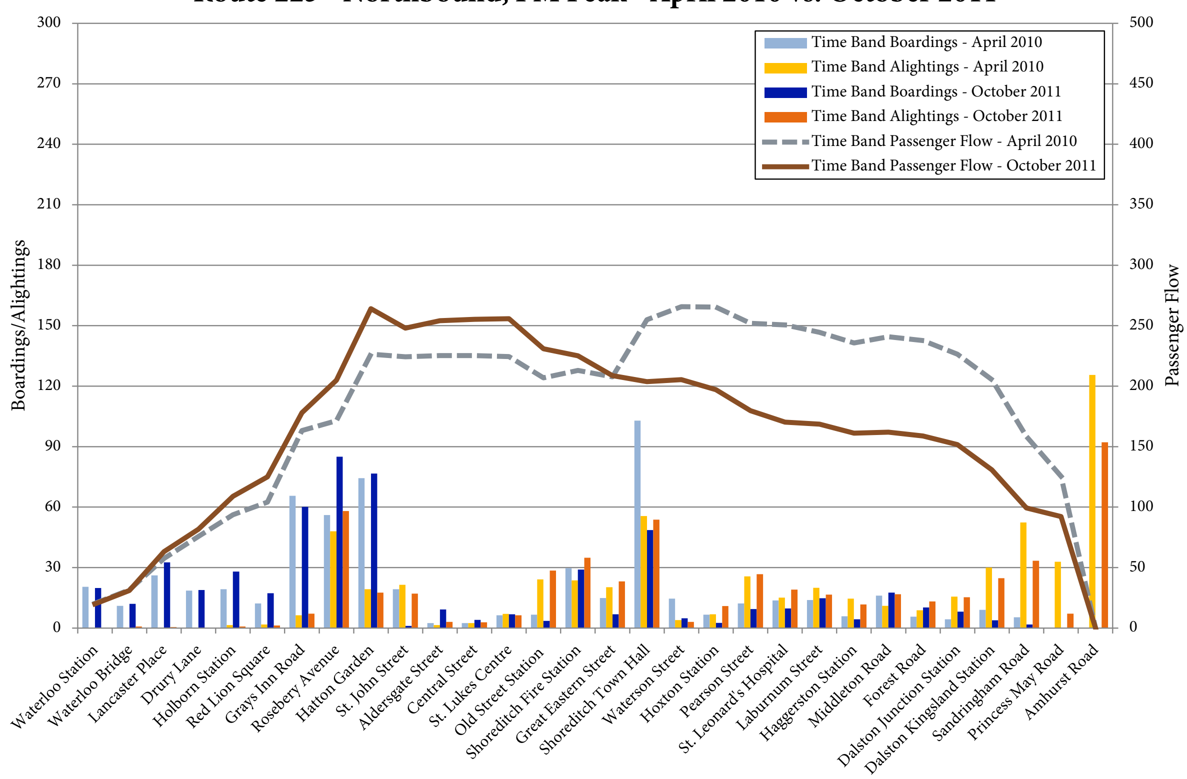


Route 225 - Northbound, All Day - April 2010 vs. October 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - October 2011
Boardings/Alightings
Passenger Flow
Hither Green Station
Wellmeadow Road
Duncrievie Road
George Lane
Theodore Road
Thornford Road
Courthill Road
Lewisham Centre
Lewisham Police Station
Lewisham Station
Jerrard Street
Elverson Road
Cranbrook Road
Friendly Street
Florence Road
New Cross Station
Marquis of Granby
Exeter Way
Fordham Park
Ludwick Mews
Cottesbrook Street
Cold Blow Lane
Surrey Canal Road
Grinstead Road
Alloa Road
John Silkin Lane
Bush Road
Surrey Quays Station
Rotherhithe Police Station
Canada Water Bus Station

Route 225 - Northbound, AM Peak - April 2010 vs. October 2011



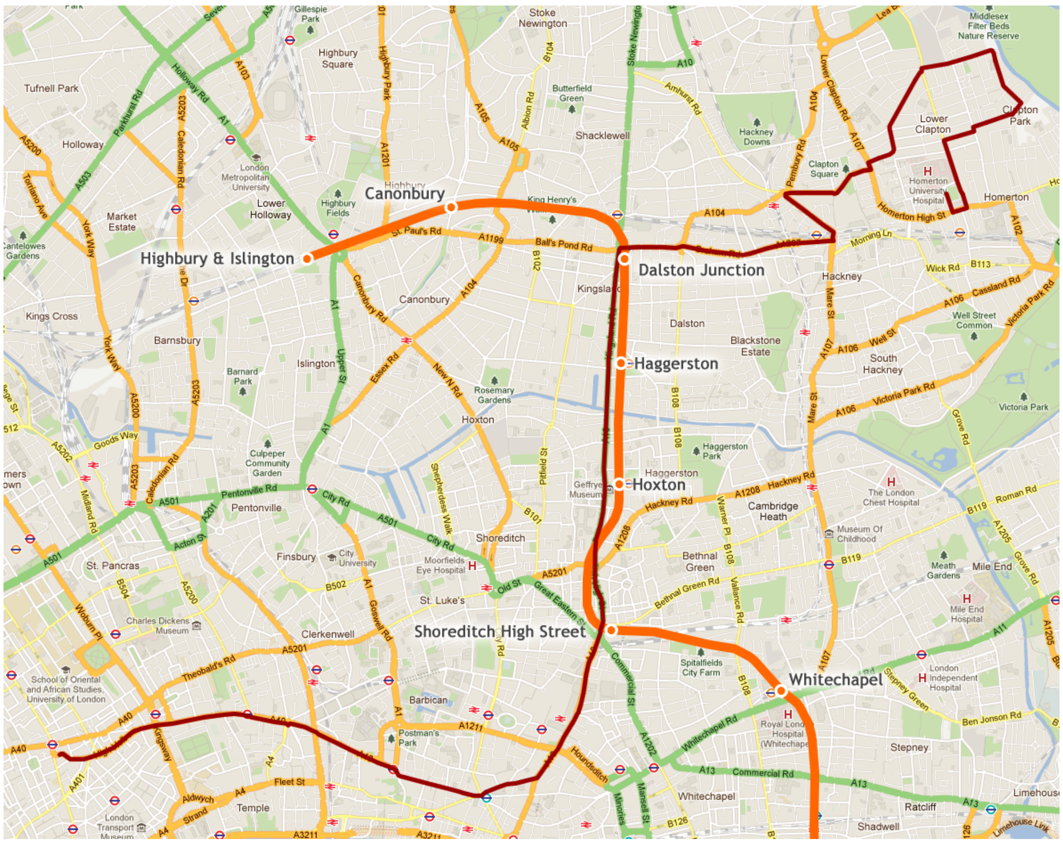
Route 225 - Northbound, PM Peak - April 2010 vs. October 2011



Route 225 - April 2010 vs. October 2011				
Passenger Counts		Apr-10	Oct-11	Percent Change
Southbound	All Day	2567	2791	8.7%
	AM Peak	439	414	-5.8%
	PM Peak	656	727	10.9%
Northbound	All Day	2776	2561	-7.7%
	AM Peak	660	597	-9.6%
	PM Peak	595	547	-8.2%
Both	All Day	5343	5352	0.2%
System-Wide	All Day	6481026	6765182	4.4%

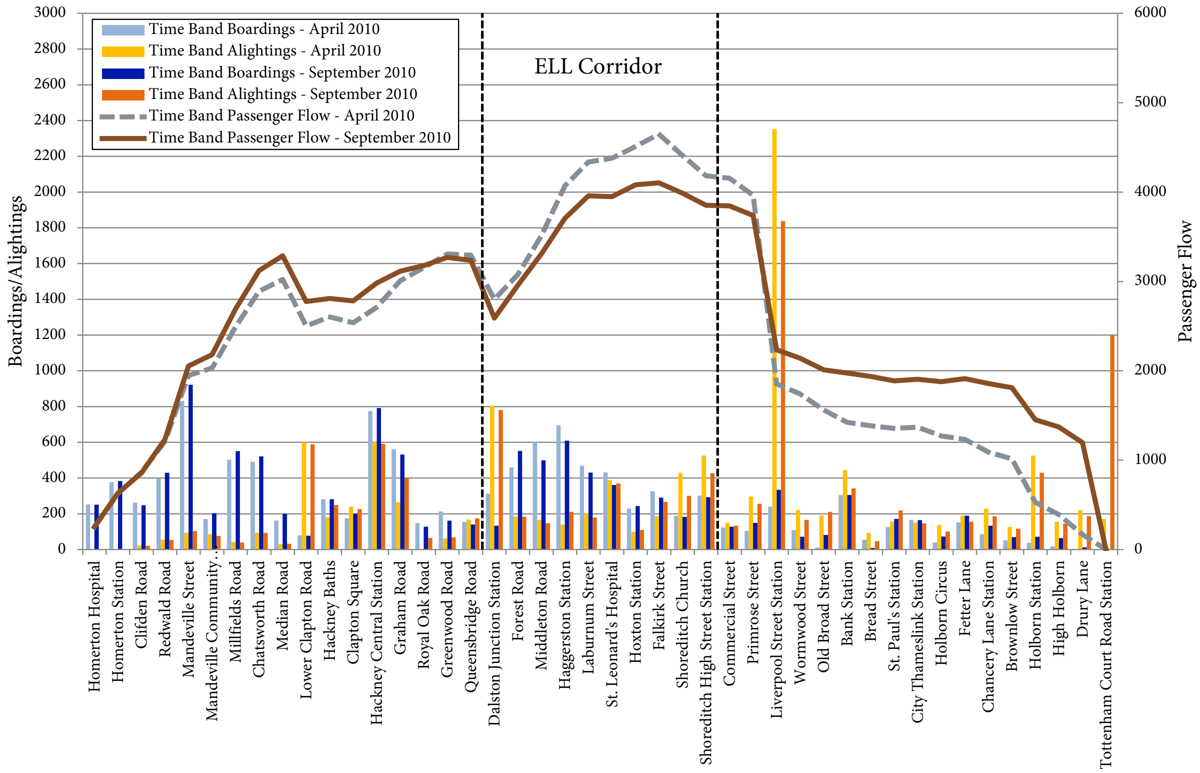
A.7 Route 242

Route 242 is unique among the corridor routes because it is mostly an east-west route that spends some time as a rather circuitous neighborhood-serving collector, before joining the Kingsland Road corridor. The route connects Homerton station in the northeast to Tottenham Court Road station in central London with peak frequencies of ten buses per hour.

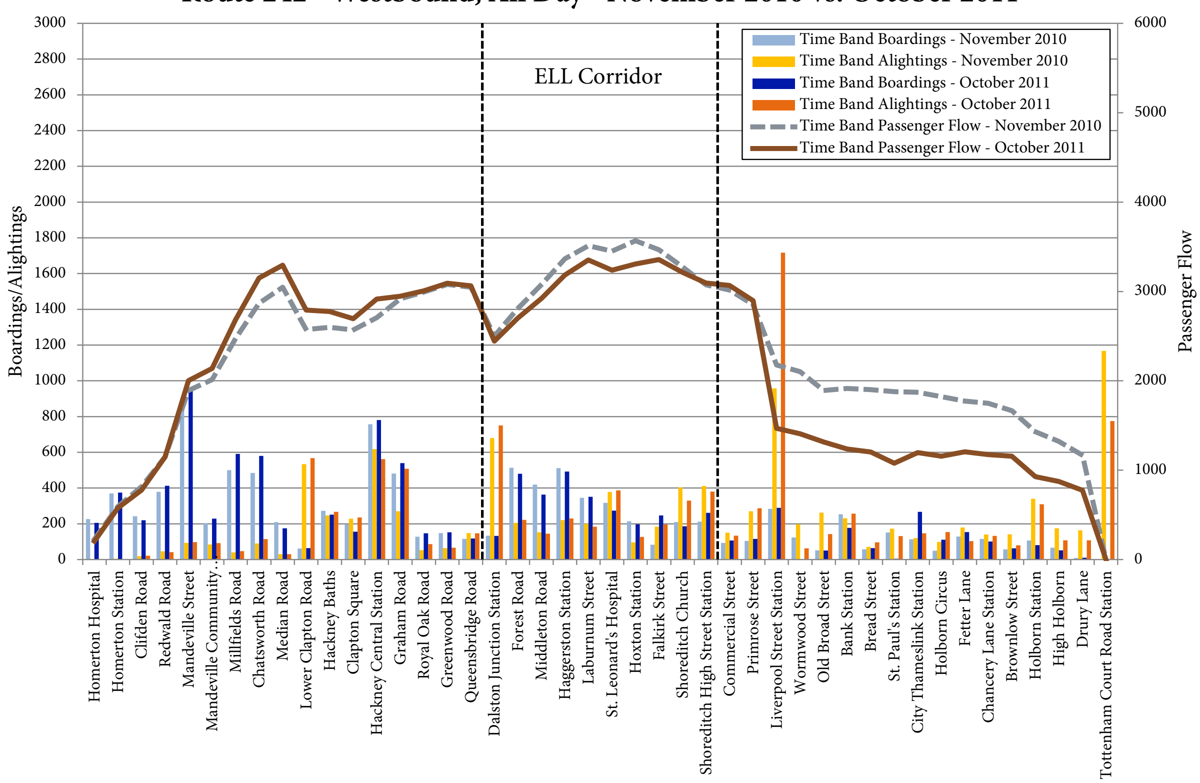


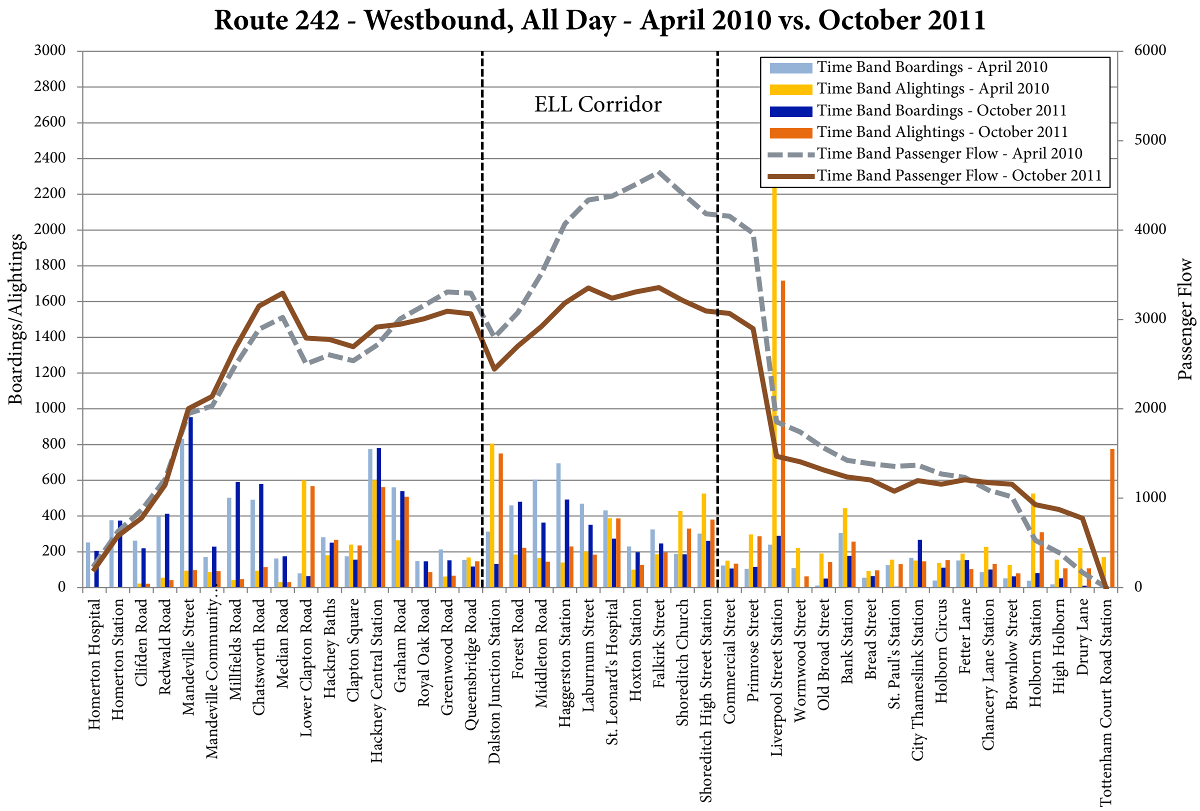
Map of Route 242

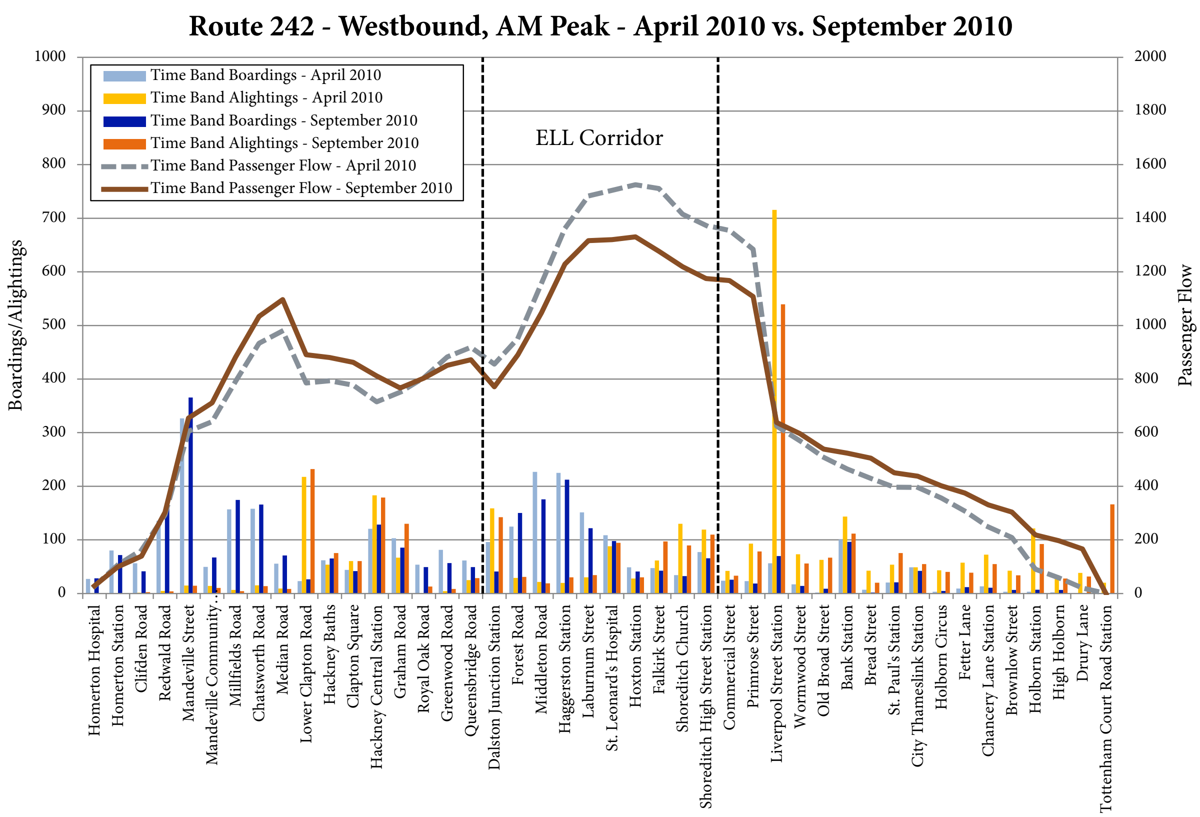
Route 242 - Westbound, All Day - April 2010 vs. September 2010



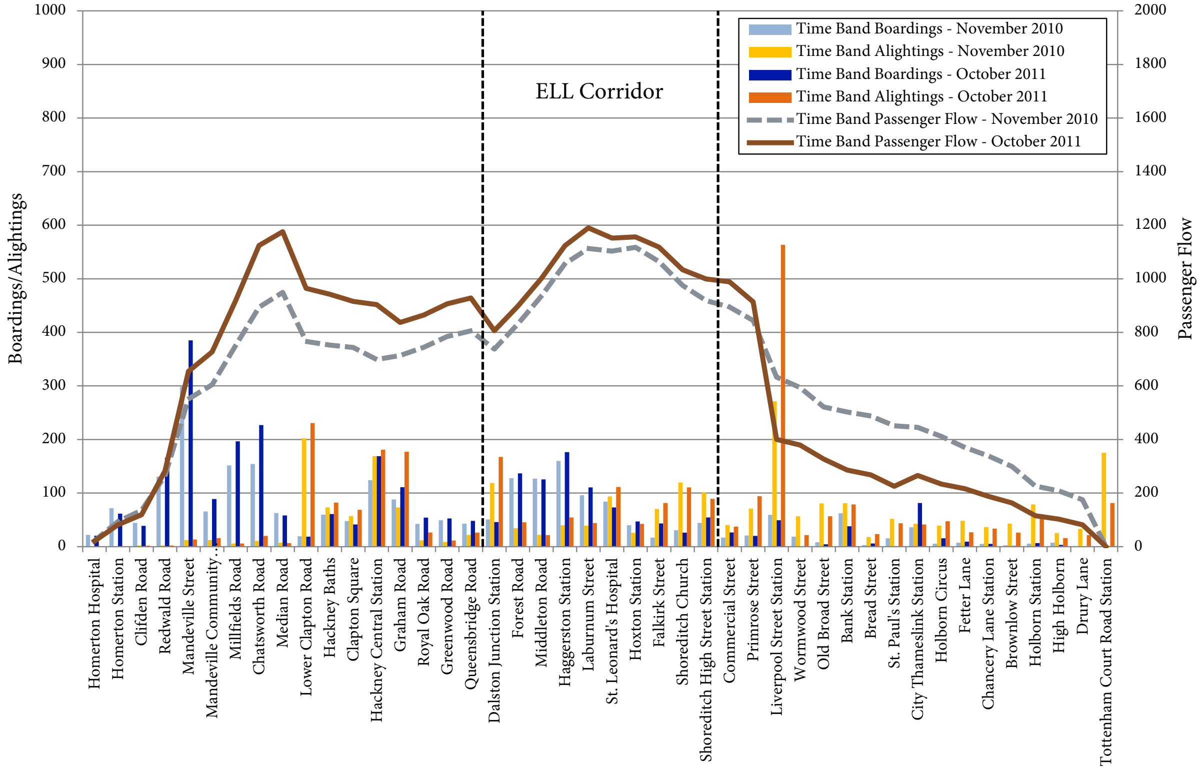
Route 242 - Westbound, All Day - November 2010 vs. October 2011



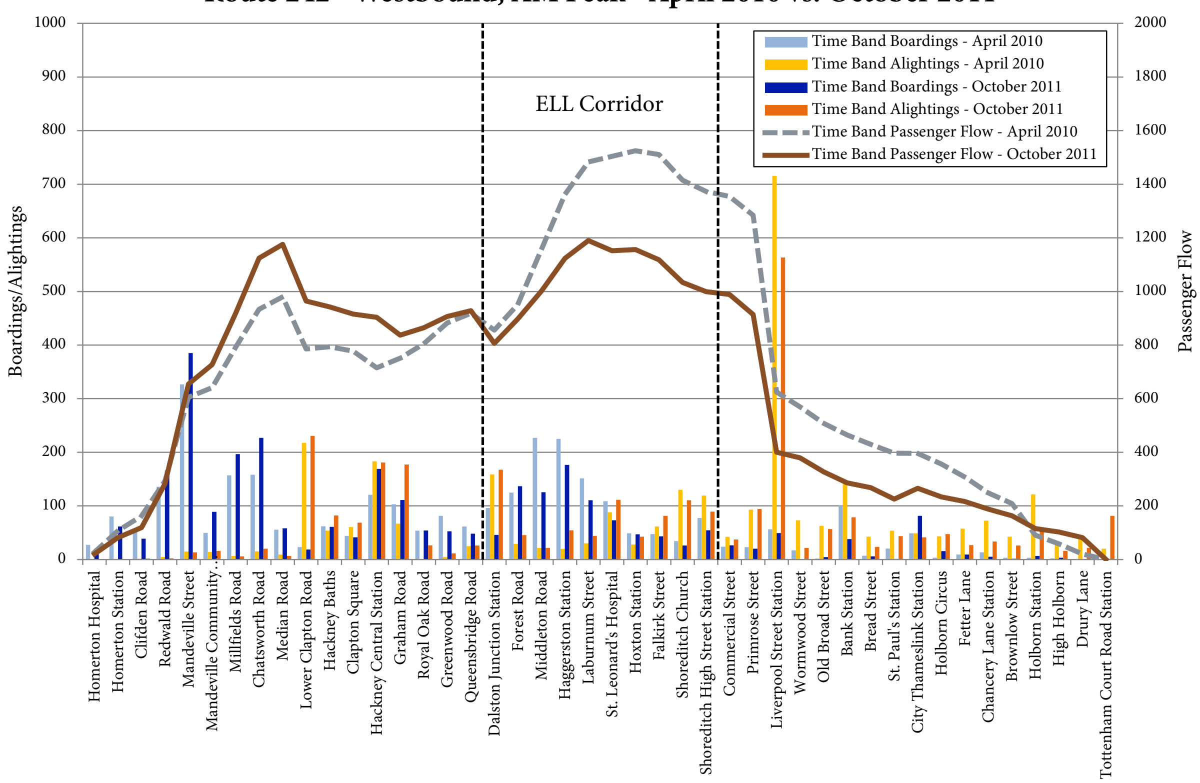

Route 242 - Westbound, All Day - April 2010 vs. October 2011
ELL Corridor
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - October 2011
Boardings/Alightings
Passenger Flow
Homerton Hospital
Homerton Station
Clifden Road
Redwald Road
Mandeville Street
Mandeville Community…
Millfields Road
Chatsworth Road
Median Road
Lower Clapton Road
Hackney Baths
Clapton Square
Hackney Central Station
Graham Road
Royal Oak Road
Greenwood Road
Queensbridge Road
Dalston Junction Station
Forest Road
Middleton Road
Haggerston Station
Laburnum Street
St. Leonard's Hospital
Hoxton Station
Falkirk Street
Shoreditch Church
Shoreditch High Street Station
Commercial Street
Primrose Street
Liverpool Street Station
Wormwood Street
Old Broad Street
Bank Station
Bread Street
St. Paul's Station
City Thameslink Station
Holborn Circus
Fetter Lane
Chancery Lane Station
Brownlow Street
Holborn Station
High Holborn
Drury Lane
Tottenham Court Road Station

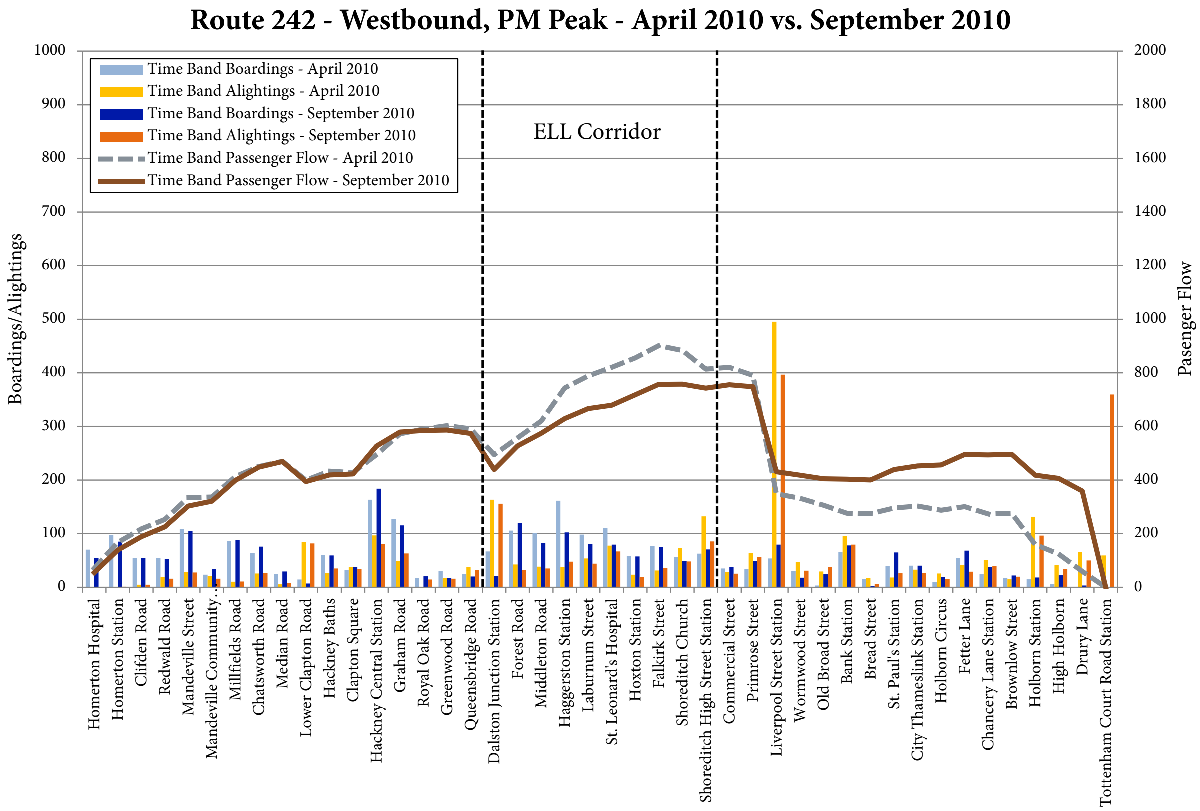

Route 242 - Westbound, AM Peak - April 2010 vs. September 2010
ELL Corridor
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - September 2010
Time Band Alightings - September 2010
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - September 2010
Boardings/Alightings
Passenger Flow

Route 242 - Westbound, AM Peak - November 2010 vs. October 2011



Route 242 - Westbound, AM Peak - April 2010 vs. October 2011




Route 242 - Westbound, PM Peak - April 2010 vs. September 2010
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - September 2010
Time Band Alightings - September 2010
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - September 2010
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Boardings/Alightings
Pasenger Flow
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Homerton Station
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Redwald Road
Mandeville Street
Mandeville Community...
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Chatsworth Road
Median Road
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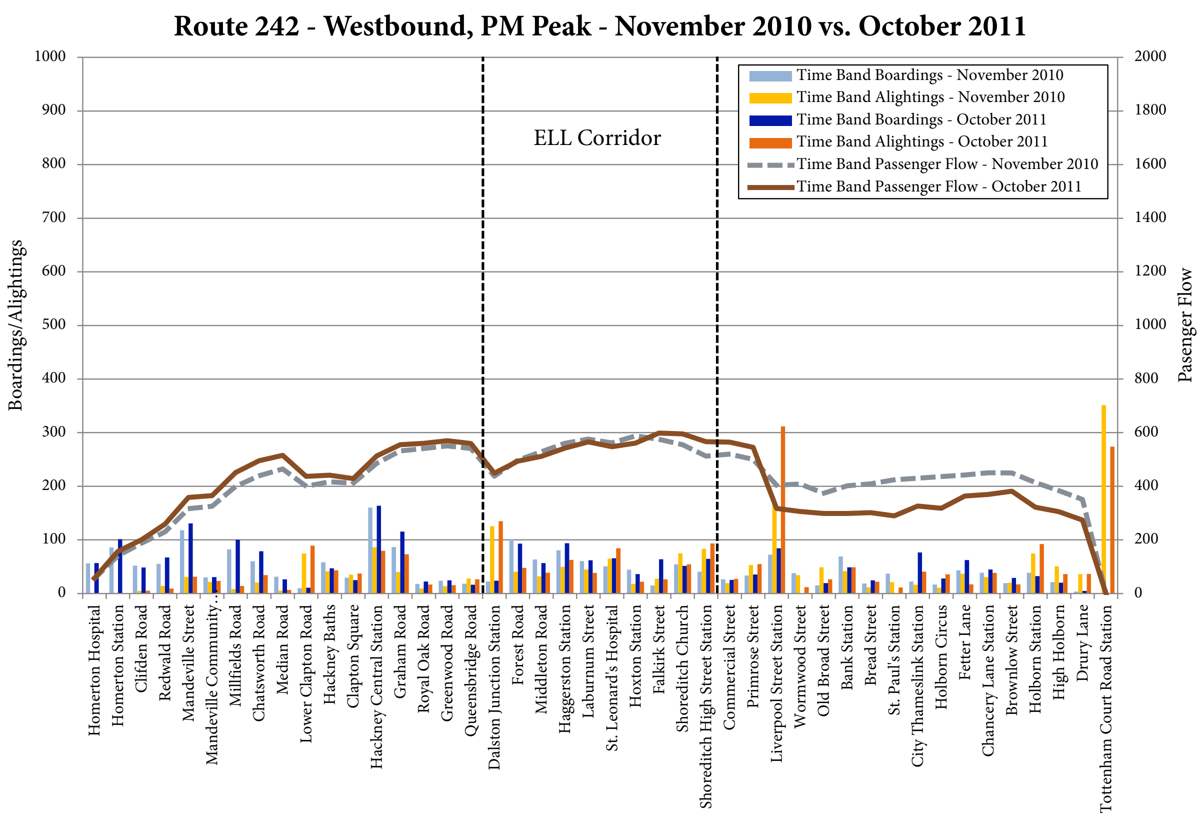
Clapton Square
Hackney Central Station
Graham Road
Royal Oak Road
Greenwood Road
Queensbridge Road
Dalston Junction Station
Forest Road
Middleton Road
Haggerston Station
Laburnum Street
St. Leonard's Hospital
Hoxton Station
Falkirk Street
Shoreditch Church
Shoreditch High Street Station
Commercial Street
Primrose Street
Liverpool Street Station
Wormwood Street
Old Broad Street
Bank Station
Bread Street
St. Paul's Station
City Thameslink Station
Holborn Circus
Fetter Lane
Chancery Lane Station
Brownlow Street
Holborn Station
High Holborn
Drury Lane
Tottenham Court Road Station


Route 242 - Westbound, PM Peak - November 2010 vs. October 2011
Time Band Boardings - November 2010
Time Band Alightings - November 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - November 2010
Time Band Passenger Flow - October 2011
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Liverpool Street Station
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Bank Station
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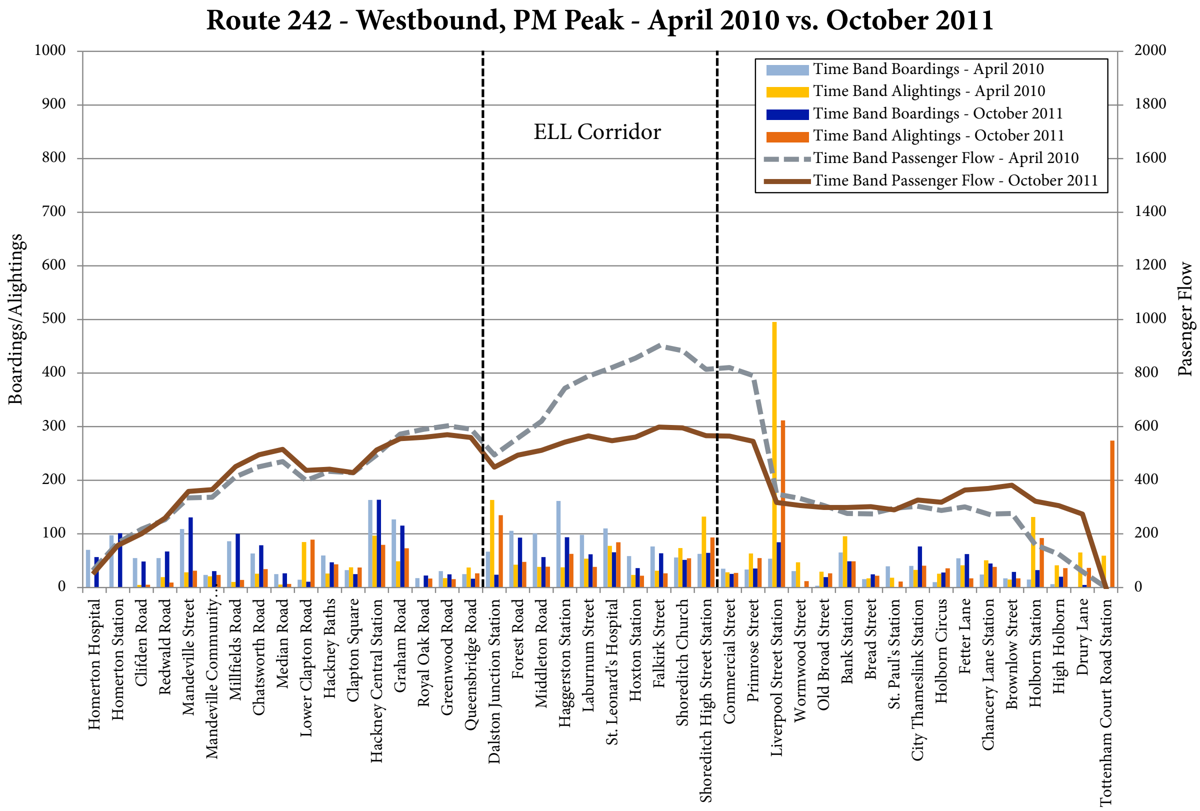
Drury Lane
Tottenham Court Road Station


Route 242 - Westbound, PM Peak - April 2010 vs. October 2011
ELL Corridor
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - October 2011
Boardings/Alightings
Pasenger Flow
Homerton Hospital
Homerton Station
Clifden Road
Redwald Road
Mandeville Street
Mandeville Community...
Millfields Road
Chatsworth Road
Median Road
Lower Clapton Road
Hackney Baths
Clapton Square
Hackney Central Station
Graham Road
Royal Oak Road
Greenwood Road
Queensbridge Road
Dalston Junction Station
Forest Road
Middleton Road
Haggerston Station
Laburnum Street
St. Leonard's Hospital
Hoxton Station
Falkirk Street
Shoreditch Church
Shoreditch High Street Station
Commercial Street
Primrose Street
Liverpool Street Station
Wormwood Street
Old Broad Street
Bank Station
Bread Street
St. Paul's Station
City Thameslink Station
Holborn Circus
Fetter Lane
Chancery Lane Station
Brownlow Street
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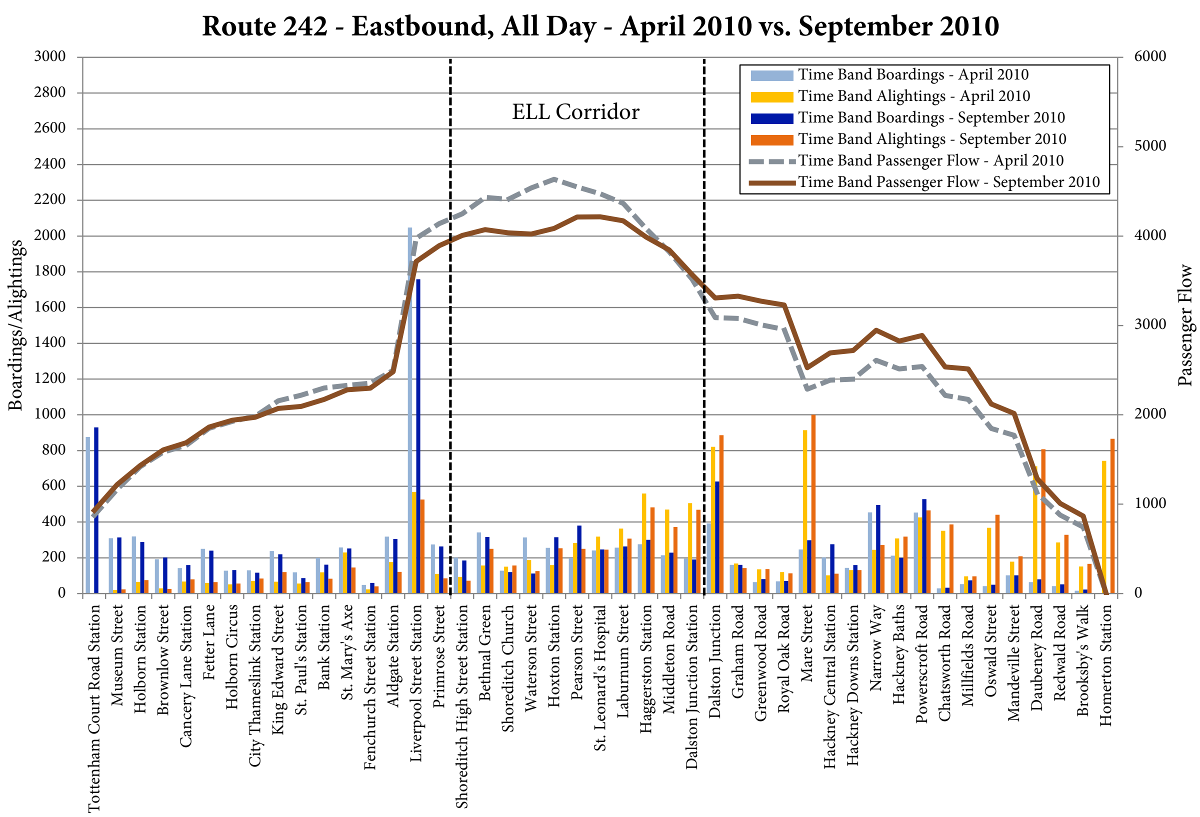
Route 242 - Eastbound, All Day - April 2010 vs. September 2010
ELL Corridor
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - September 2010
Time Band Alightings - September 2010
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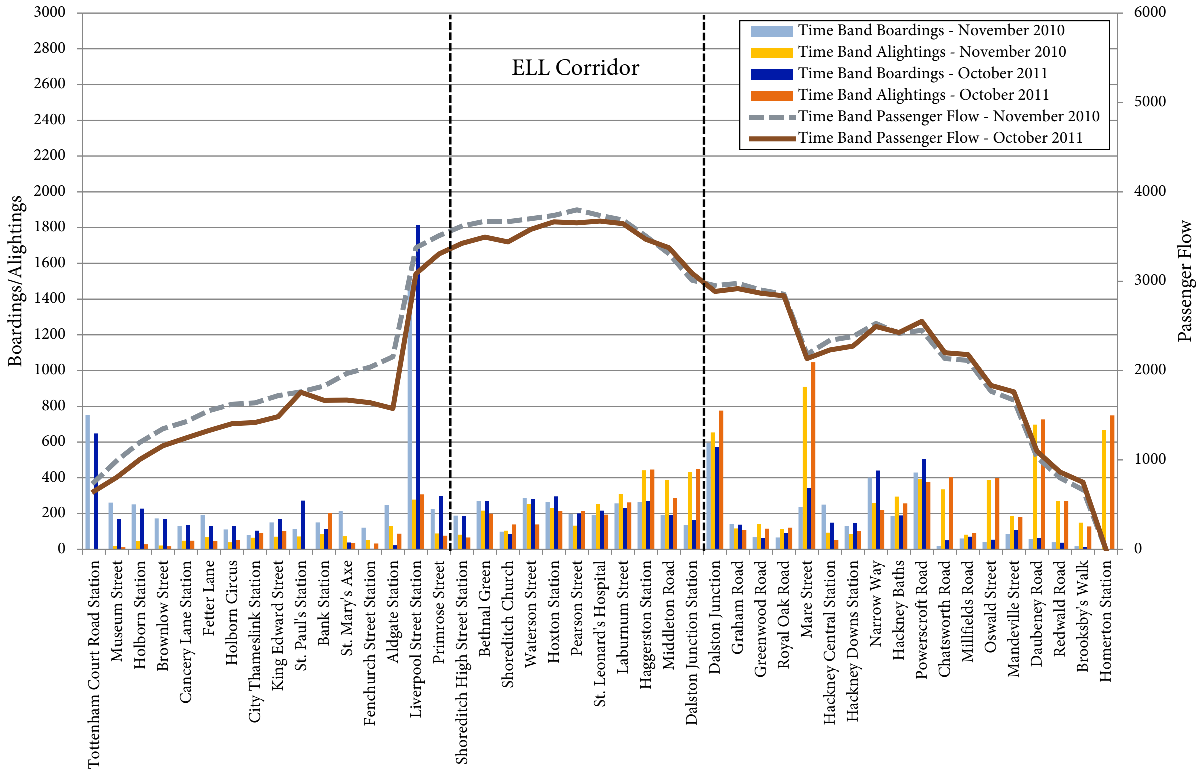
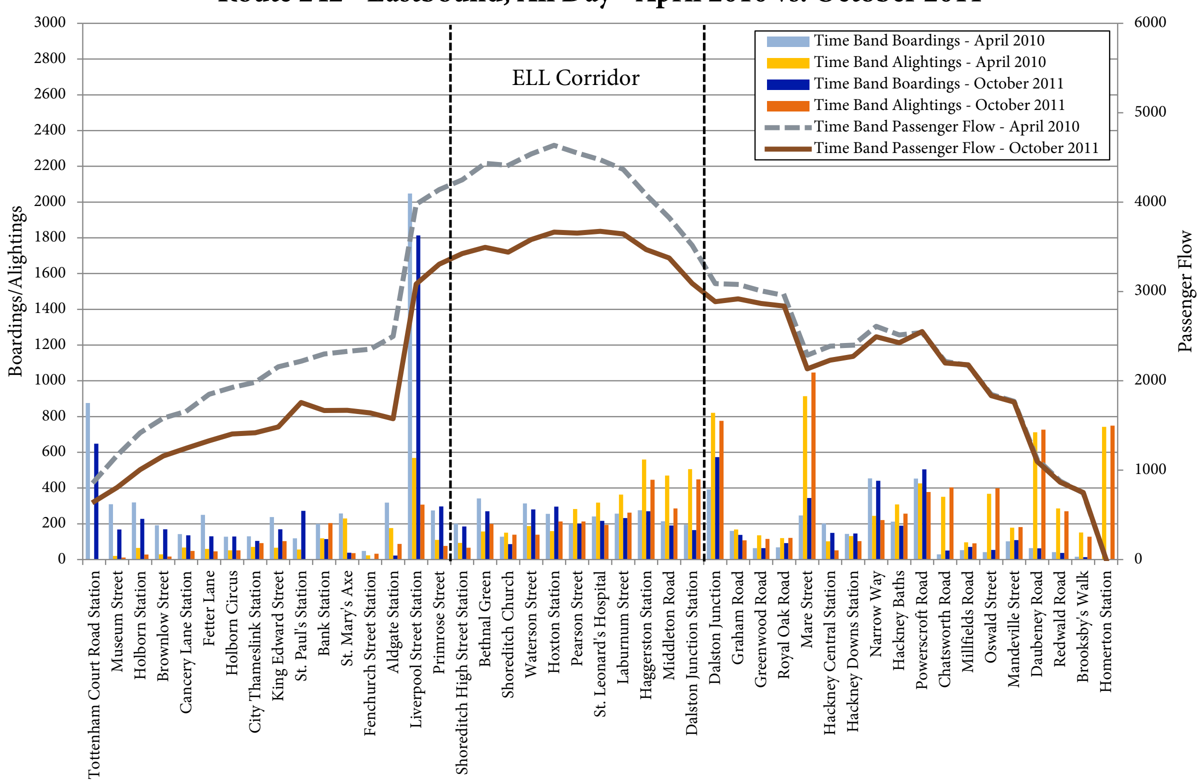
Time Band Passenger Flow - September 2010
Boardings/Alightings
Passenger Flow
Tottenham Court Road Station
Museum Street
Holborn Station
Brownlow Street
Cancery Lane Station
Fetter Lane
Holborn Circus
City Thameslink Station
King Edward Street
St. Paul's Station
Bank Station
St. Mary's Axe
Fenchurch Street Station
Aldgate Station
Liverpool Street Station
Primrose Street
Shoreditch High Street Station
Bethnal Green
Shoreditch Church
Waterson Street
Hoxton Station
Pearson Street
St. Leonard's Hospital
Laburnum Street
Haggerston Station
Middleton Road
Dalston Junction Station
Dalston Junction
Graham Road
Greenwood Road
Royal Oak Road
Mare Street
Hackney Central Station
Hackney Downs Station
Narrow Way
Hackney Baths
Powerscroft Road
Chatsworth Road
Millfields Road
Oswald Street
Mandeville Street
Daubeney Road
Redwald Road
Brooksby's Walk
Homerton Station

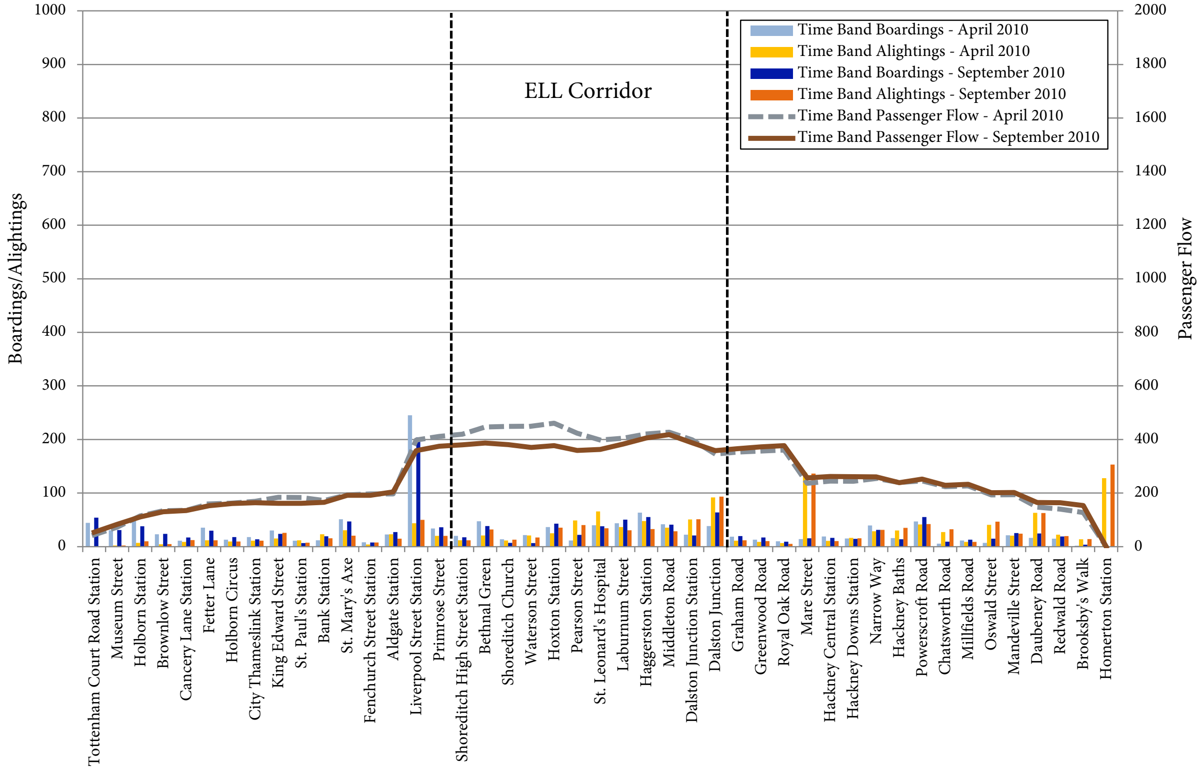
Route 242 - Eastbound, All Day - November 2010 vs. October 2011



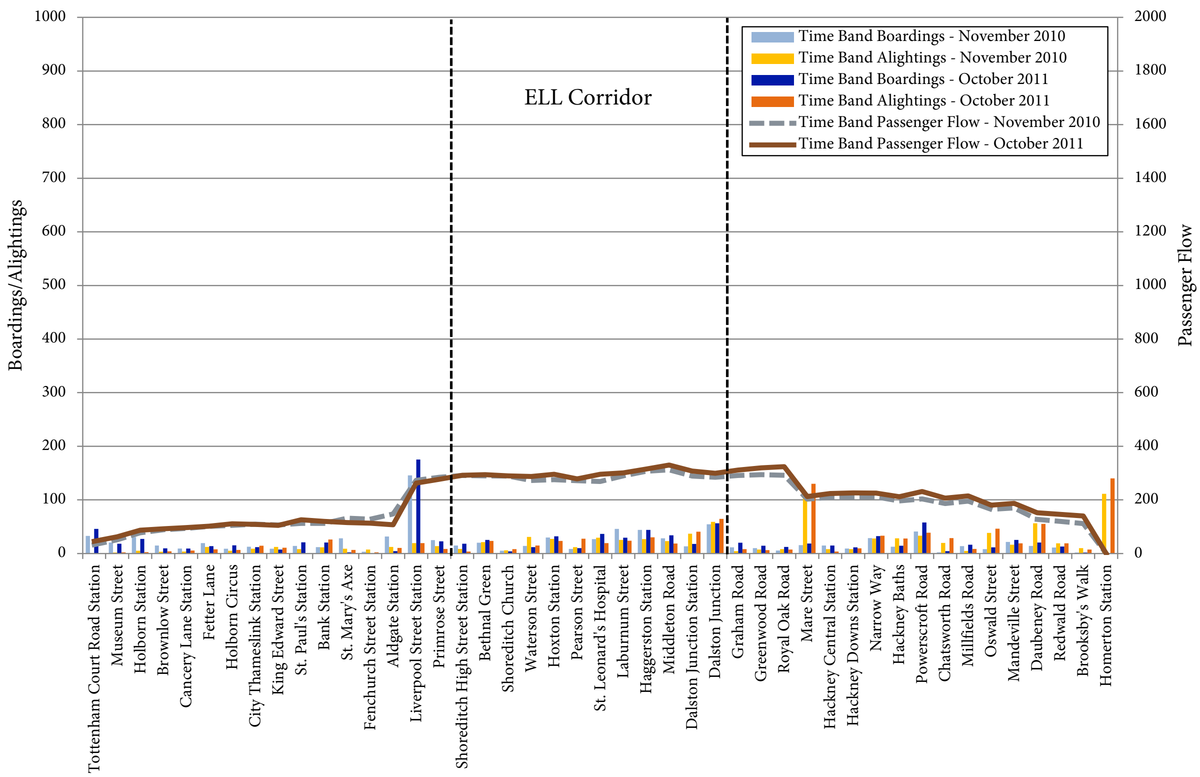
Route 242 - Eastbound, All Day - April 2010 vs. October 2011



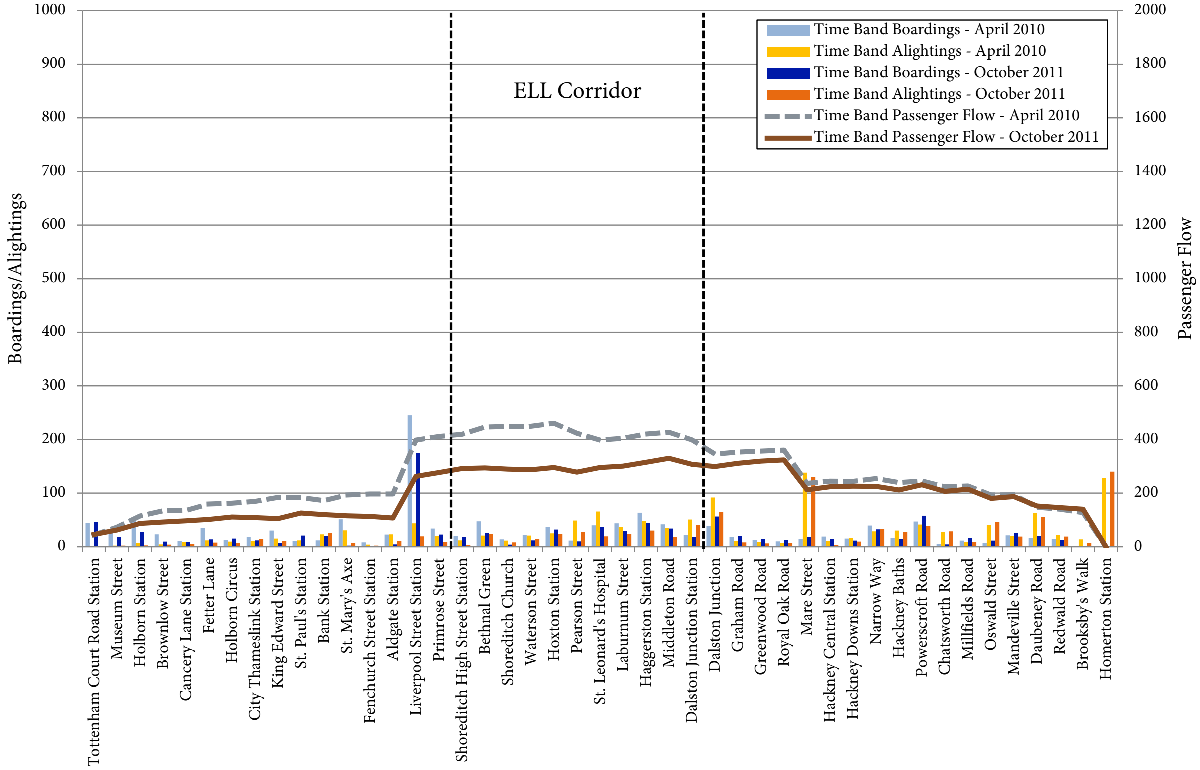
Route 242 - Eastbound, AM Peak - April 2010 vs. September 2010



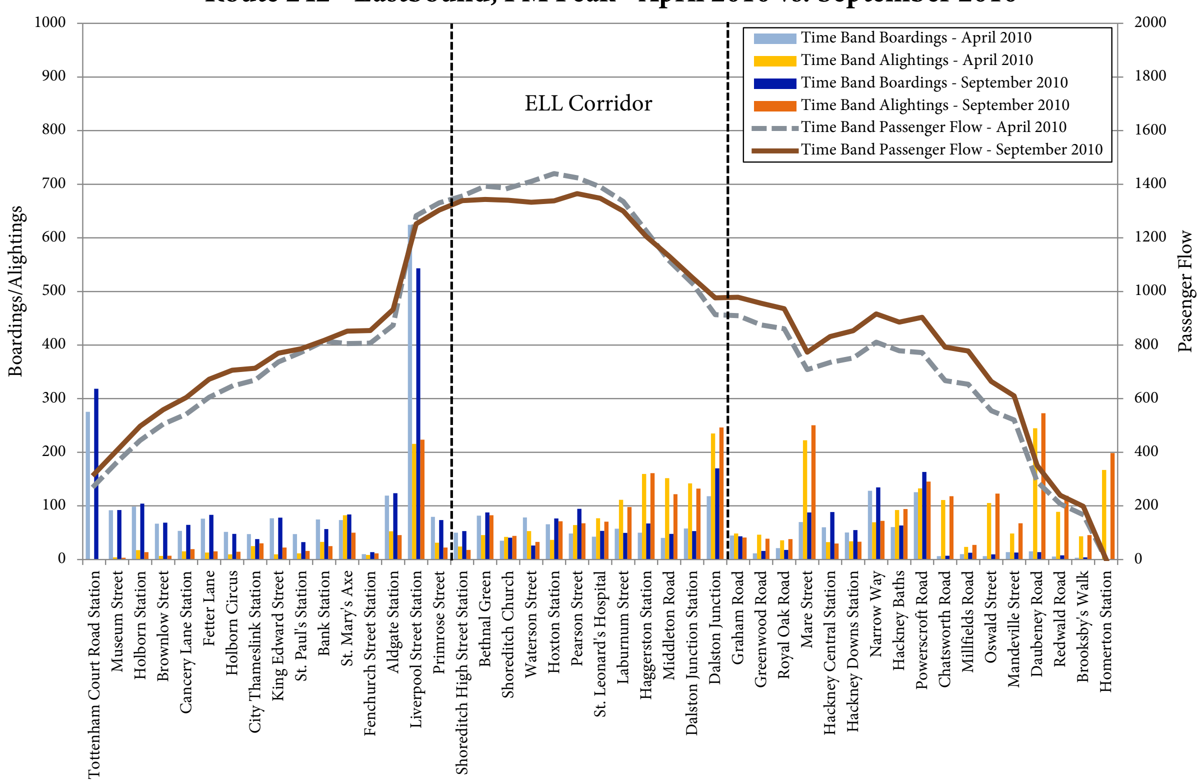
Route 242 - Eastbound, AM Peak - November 2010 vs. October 2011



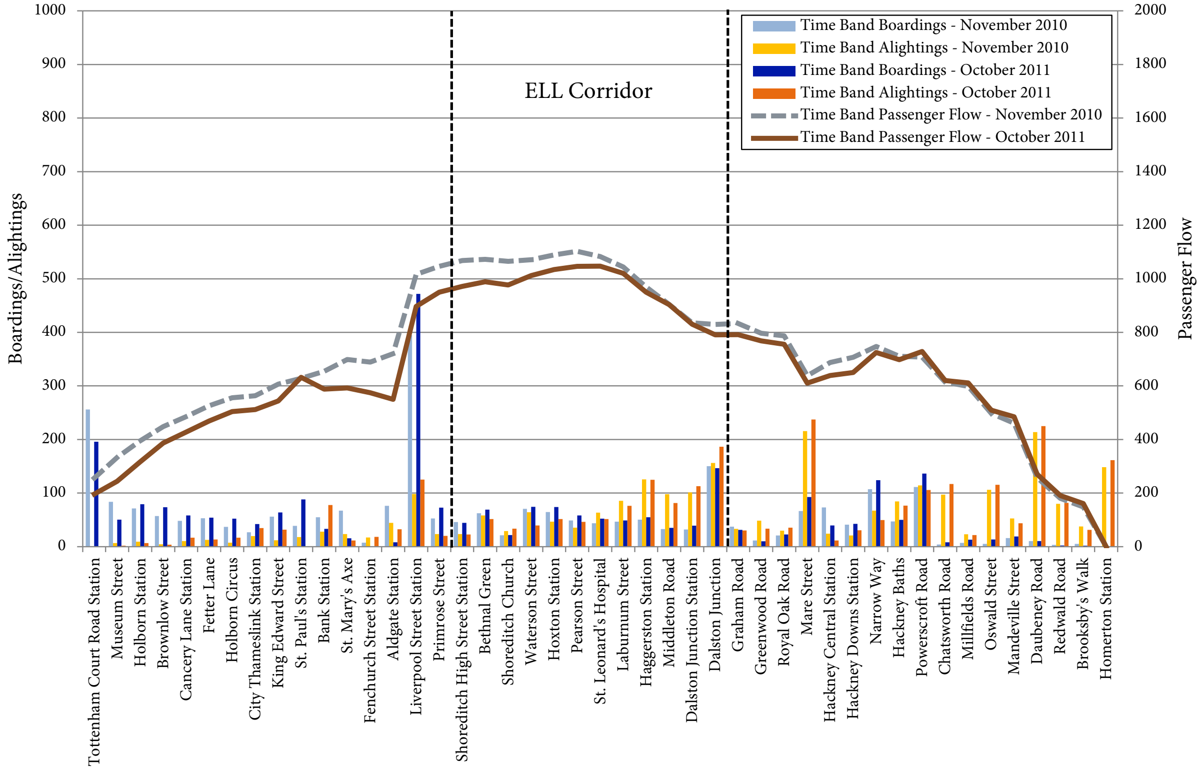
Route 242 - Eastbound, AM Peak - April 2010 vs. October 2011



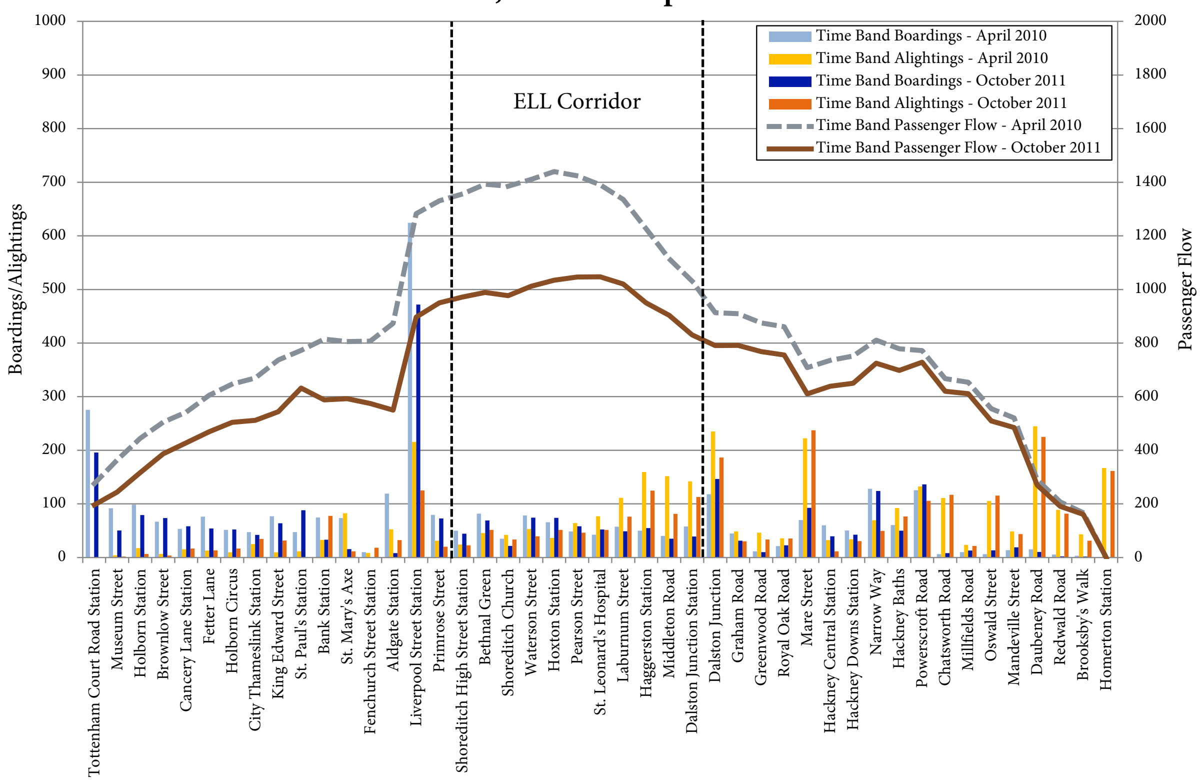
Route 242 - Eastbound, PM Peak - April 2010 vs. September 2010



Route 242 - Eastbound, PM Peak - November 2010 vs. October 2011



Route 242 - Eastbound, PM Peak - April 2010 vs. October 2011



Passenger Counts for Route 242 - Westbound - All Day

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	3235	3567	1334	1354	1184	1100	5753	6022
		332	10%	21	2%	-84	-7%	268	5%
	Corridor			1031	844	2348	2458	3379	3302
				-187	-18%	110	5%	-77	-2%
	After					2347	2321	2347	2321
						-26	-1%	-26	-1%
	Total	3235	3567	2365	2198	5879	5880	11479	11645
		332	10%	-167	-7%	0	0%	165	1%

Passenger Counts for Route 242 - Westbound - All Day

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	3248	3635	1386	1393	981	919	5615	5947
		388	12%	7	0%	-62	-6%	333	6%
	Corridor			867	807	1881	1914	2747	2721
				-60	-7%	34	2%	-26	-1%
	After					1975	1908	1975	1908
						-67	-3%	-67	-3%
	Total	3248	3635	2253	2200	4836	4741	10337	10576
		388	12%	-53	-2%	-95	-2%	239	2%

Passenger Counts for Route 242 - Westbound - All Day

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	3235	3635	1334	1393	1184	919	5753	5947
		400	12%	59	4%	-265	-22%	194	3%
	Corridor			1031	807	2348	1914	3379	2721
				-224	-22%	-434	-18%	-658	-19%
	After					2347	1908	2347	1908
						-439	-19%	-439	-19%
	Total	3235	3635	2365	2200	5879	4741	11479	10576
		400	12%	-165	-7%	-1138	-19%	-903	-8%

Passenger Counts for Route 242 - Westbound - AM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	804	929	351	354	471	376	1626	1658
		124	15%	2	1%	-95	-20%	32	2%
	Corridor			232	182	781	733	1013	916
				-50	-21%	-47	-6%	-97	-10%
	After					434	414	434	414
						-20	-5%	-20	-5%
	Total	804	929	583	536	1685	1523	3073	2988
		124	15%	-47	-8%	-162	-10%	-85	-3%

Passenger Counts for Route 242 - Westbound - AM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	790	1038	362	409	325	351	1477	1799
		249	31%	47	13%	27	8%	322	22%
	Corridor			184	192	549	593	733	786
				8	4%	44	8%	52	7%
	After					320	324	320	324
						4	1%	4	1%
	Total	790	1038	546	602	1194	1269	2530	2909
		249	31%	56	10%	74	6%	378	15%

Passenger Counts for Route 242 - Westbound - AM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	804	1038	351	409	471	351	1626	1799
		234	29%	58	17%	-119	-25%	173	11%
	Corridor			232	192	781	593	1013	786
				-40	-17%	-187	-24%	-227	-22%
	After					434	324	434	324
						-110	-25%	-110	-25%
	Total	804	1038	583	602	1685	1269	3073	2909
		234	29%	18	3%	-417	-25%	-164	-5%

Passenger Counts for Route 242 - Westbound - PM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	601	625	268	243	166	175	1035	1043
		23	4%	-24	-9%	9	5%	8	1%
	Corridor			255	171	434	498	689	669
				-84	-33%	63	15%	-20	-3%
	After					674	657	674	657
						-17	-2%	-17	-2%
	Total	601	625	523	415	1274	1330	2398	2369
		23	4%	-108	-21%	56	4%	-29	-1%

Passenger Counts for Route 242 - Westbound - PM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	562	642	260	284	156	141	978	1067
		80	14%	24	9%	-15	-10%	89	9%
	Corridor			177	185	316	361	493	547
				9	5%	45	14%	54	11%
	After					556	602	556	602
						46	8%	46	8%
	Total	562	642	437	470	1028	1104	2027	2215
		80	14%	33	8%	76	7%	189	9%

Passenger Counts for Route 242 - Westbound - PM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	601	642	268	284	166	141	1035	1067
		41	7%	16	6%	-25	-15%	32	3%
	Corridor			255	185	434	361	689	547
				-70	-27%	-73	-17%	-142	-21%
	After					674	602	674	602
						-72	-11%	-72	-11%
	Total	601	642	523	470	1274	1104	2398	2215
		41	7%	-53	-10%	-170	-13%	-183	-8%

Passenger Counts for Route 242 - Eastbound - All Day

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1560	1665	3143	2649	1279	1172	5982	5487
		106	7%	-495	-16%	-106	-8%	-495	-8%
	Corridor			1232	1151	1417	1508	2649	2659
				-81	-7%	91	6%	10	0%
	After					2584	3309	2584	3309
						725	28%	725	28%
	Total	1560	1665	4375	3799	5279	5989	11214	11454
		106	7%	-576	-13%	710	13%	240	2%

Passenger Counts for Route 242 - Eastbound - All Day

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1235	1206	2384	2289	1045	949	4664	4444
		-29	-2%	-95	-4%	-96	-9%	-220	-5%
	Corridor			1033	1029	1312	1365	2346	2394
				-4	0%	52	4%	48	2%
	After					2823	3037	2823	3037
						214	8%	214	8%
	Total	1235	1206	3417	3318	5180	5350	9833	9875
		-29	-2%	-99	-3%	170	3%	42	0%

Passenger Counts for Route 242 - Eastbound - All Day

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1560	1206	3143	2289	1279	949	5982	4444
		-354	-23%	-854	-27%	-329	-26%	-1537	-26%
	Corridor			1232	1029	1417	1365	2649	2394
				-202	-16%	-52	-4%	-255	-10%
	After					2584	3037	2584	3037
						453	18%	453	18%
	Total	1560	1206	4375	3318	5279	5350	11214	9875
		-354	-23%	-1057	-24%	71	1%	-1339	-12%

Passenger Counts for Route 242 - Eastbound - AM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	195	237	344	265	107	98	646	599
		41	21%	-79	-23%	-9	-9%	-47	-7%
	Corridor			152	144	219	197	370	341
				-8	-5%	-22	-10%	-29	-8%
	After					297	367	297	367
						70	24%	70	24%
	Total	195	237	495	409	623	662	1313	1307
		41	21%	-87	-17%	39	6%	-6	0%

Passenger Counts for Route 242 - Eastbound - AM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	143	131	199	190	77	84	419	405
		-11	-8%	-10	-5%	7	9%	-14	-3%
	Corridor			99	106	153	159	252	265
				6	6%	6	4%	12	5%
	After					277	347	277	347
						70	25%	70	25%
	Total	143	131	298	295	507	591	948	1017
		-11	-8%	-3	-1%	83	16%	69	7%

Passenger Counts for Route 242 - Eastbound - AM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	195	131	344	190	107	84	646	405
		-64	-33%	-154	-45%	-23	-21%	-241	-37%
	Corridor			152	106	219	159	370	265
				-46	-30%	-60	-27%	-106	-29%
	After					297	347	297	347
						50	17%	50	17%
	Total	195	131	495	295	623	591	1313	1017
		-64	-33%	-200	-40%	-32	-5%	-296	-23%

Passenger Counts for Route 242 - Eastbound - PM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	486	538	916	864	492	423	1894	1825
		53	11%	-52	-6%	-69	-14%	-69	-4%
	Corridor			257	266	357	383	614	649
				9	4%	26	7%	35	6%
	After					720	909	720	909
						189	26%	189	26%
	Total	486	538	1172	1129	1570	1715	3228	3383
		53	11%	-43	-4%	146	9%	155	5%

Passenger Counts for Route 242 - Eastbound - PM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	360	434	667	641	356	286	1382	1361
		74	21%	-26	-4%	-70	-20%	-21	-2%
	Corridor			197	215	323	358	520	573
				19	9%	35	11%	53	10%
	After					719	765	719	765
						46	6%	46	6%
	Total	360	434	863	856	1398	1409	2621	2699
		74	21%	-7	-1%	11	1%	78	3%

Passenger Counts for Route 242 - Eastbound - PM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	486	434	916	641	492	286	1894	1361
		-52	-11%	-275	-30%	-206	-42%	-533	-28%
	Corridor			257	215	357	358	614	573
				-41	-16%	0	0%	-41	-7%
	After					720	765	720	765
						45	6%	45	6%
	Total	486	434	1172	856	1570	1409	3228	2699
		-52	-11%	-316	-27%	-160	-10%	-528	-16%

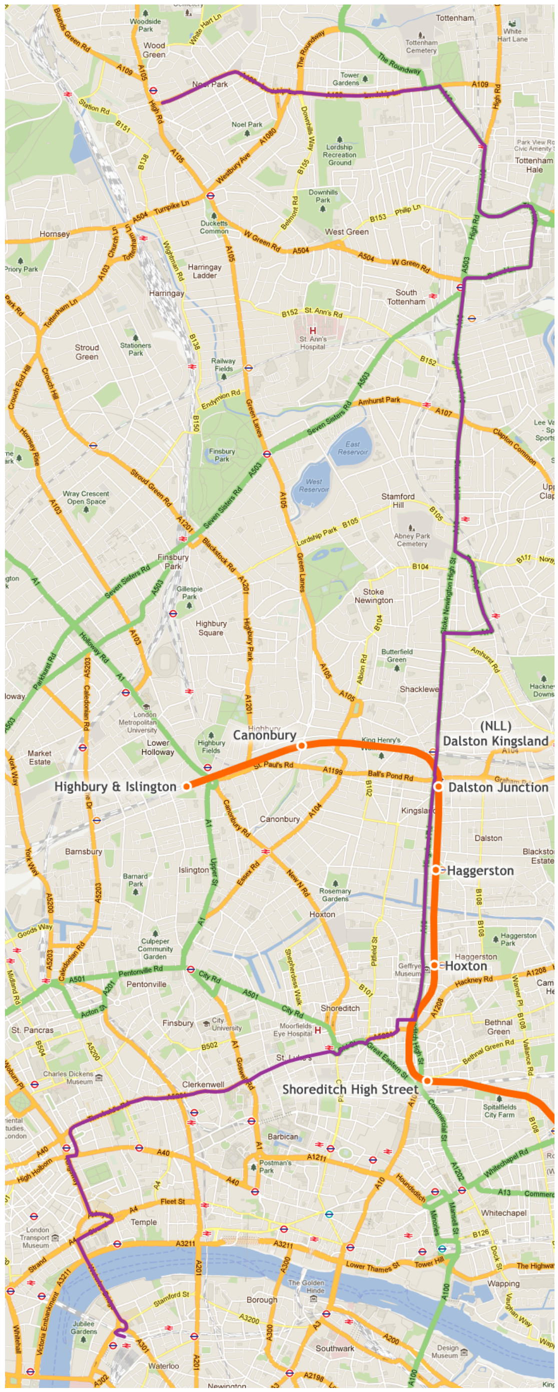
Route 242 - April 2010 vs. September 2010				
For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Sep-10	Percent Change
Westbound	All Day	3993	3649	-8.6%
	AM Peak	1314	1157	-11.9%
	PM Peak	748	649	-13.2%
Eastbound	All Day	4181	3961	-5.2%
	AM Peak	420	381	-9.4%
	PM Peak	1285	1256	-2.3%
Passenger Counts		Apr-10	Sep-10	Percent Change
Westbound	All Day	5897	5757	-2.4%
	AM Peak	1835	1645	-10.3%
	PM Peak	1123	1087	-3.2%
Eastbound	All Day	7071	6480	-8.4%
	AM Peak	821	703	-14.3%
	PM Peak	2022	1935	-4.3%
Entire Route				
Passenger Counts		Apr-10	Sep-10	Percent Change
Westbound	All Day	11479	11645	1.4%
	AM Peak	3073	2988	-2.8%
	PM Peak	2398	2369	-1.2%
Eastbound	All Day	11214	11454	2.1%
	AM Peak	1313	1307	-0.5%
	PM Peak	3228	3383	4.8%
Both	All Day	22693	23099	1.8%
System-Wide	All Day	6481026	6476783	-0.1%

Route 242 - November 2010 vs. October 2011				
For Route Segments in the ELL Service Area				
Average Passenger Flow		Nov-10	Oct-11	Percent Change
Westbound	All Day	3210	3081	-4.0%
	AM Peak	985	1048	6.4%
	PM Peak	539	543	0.7%
Eastbound	All Day	3532	3449	-2.3%
	AM Peak	287	299	4.2%
	PM Peak	1011	964	-4.6%
Passenger Counts		Nov-10	Oct-11	Percent Change
Westbound	All Day	5114	5033	-1.6%
	AM Peak	1420	1546	8.9%
	PM Peak	908	971	7.0%
Eastbound	All Day	5774	5632	-2.5%
	AM Peak	528	538	1.9%
	PM Peak	1542	1500	-2.7%
Entire Route				
Passenger Counts		Nov-10	Oct-11	Percent Change
Westbound	All Day	10337	10576	2.3%
	AM Peak	2530	2909	15.0%
	PM Peak	2027	2215	9.3%
Eastbound	All Day	9833	9875	0.4%
	AM Peak	948	1017	7.3%
	PM Peak	2621	2699	3.0%
Both	All Day	20169	20451	1.4%
System-Wide	All Day	6511109	6765182	3.9%

Route 242 - April 2010 vs. October 2011				
For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Oct-11	Percent Change
Westbound	All Day	3993	3081	-22.8%
	AM Peak	1314	1048	-20.2%
	PM Peak	748	543	-27.4%
Eastbound	All Day	4181	3449	-17.5%
	AM Peak	420	299	-28.9%
	PM Peak	1285	964	-25.0%
Passenger Counts		Apr-10	Oct-11	Percent Change
Westbound	All Day	5897	5033	-14.7%
	AM Peak	1835	1546	-15.7%
	PM Peak	1123	971	-13.5%
Eastbound	All Day	7071	5632	-20.3%
	AM Peak	821	538	-34.4%
	PM Peak	2022	1500	-25.8%
Entire Route				
Passenger Counts		Apr-10	Oct-11	Percent Change
Westbound	All Day	11479	10576	-7.9%
	AM Peak	3073	2909	-5.3%
	PM Peak	2398	2215	-7.6%
Eastbound	All Day	11214	9875	-11.9%
	AM Peak	1313	1017	-22.6%
	PM Peak	3228	2699	-16.4%
Both	All Day	22693	20451	-9.9%
System-Wide	All Day	6481026	6765182	4.4%

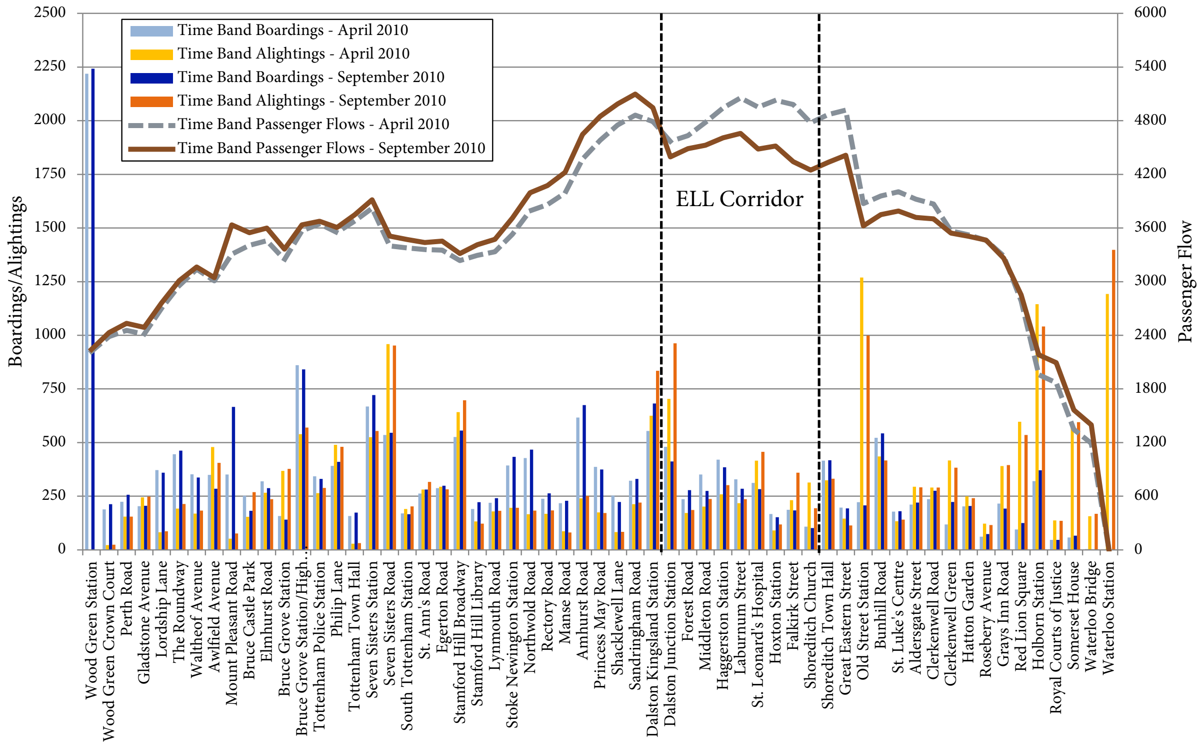
A.8 Route 243

Route 243 is the second route to begin its journey at Wood Green station (the other is route 67). From there it travels east to the A10, leaving the corridor in between Hoxton station and Shoreditch High Street station to head southwest to Waterloo station. This route has the highest frequencies of any in the corridor, with up to 15 buses per hour.

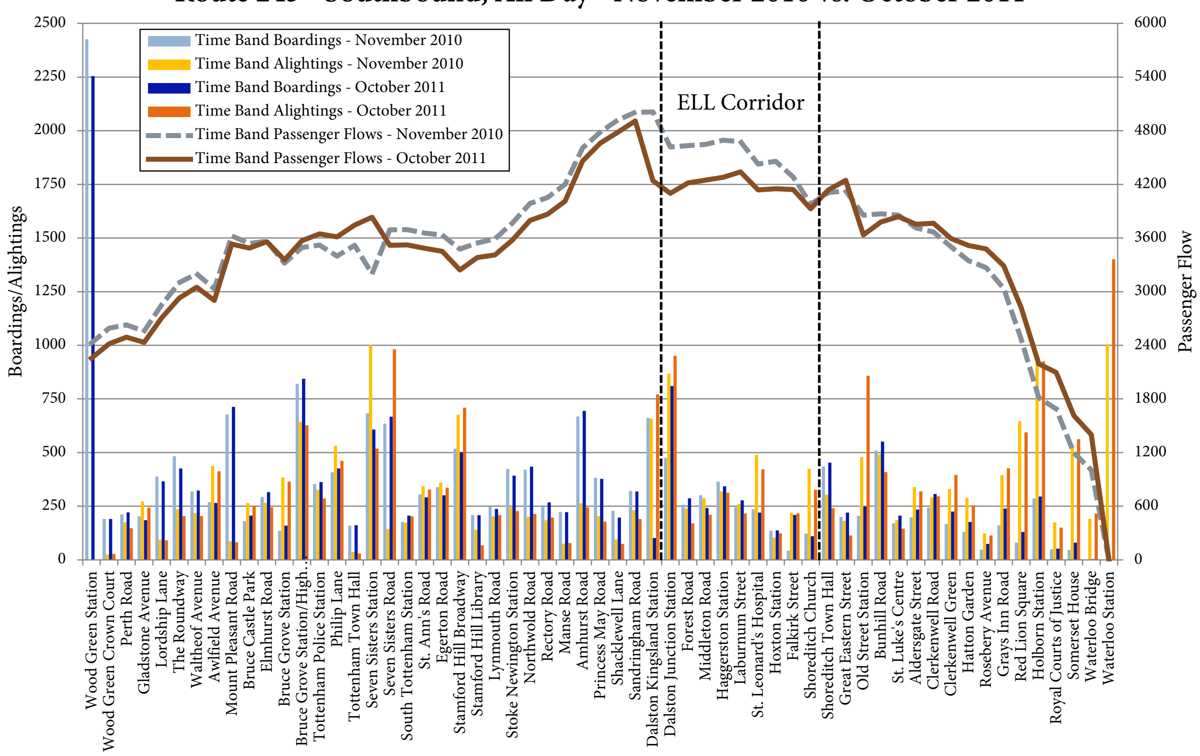


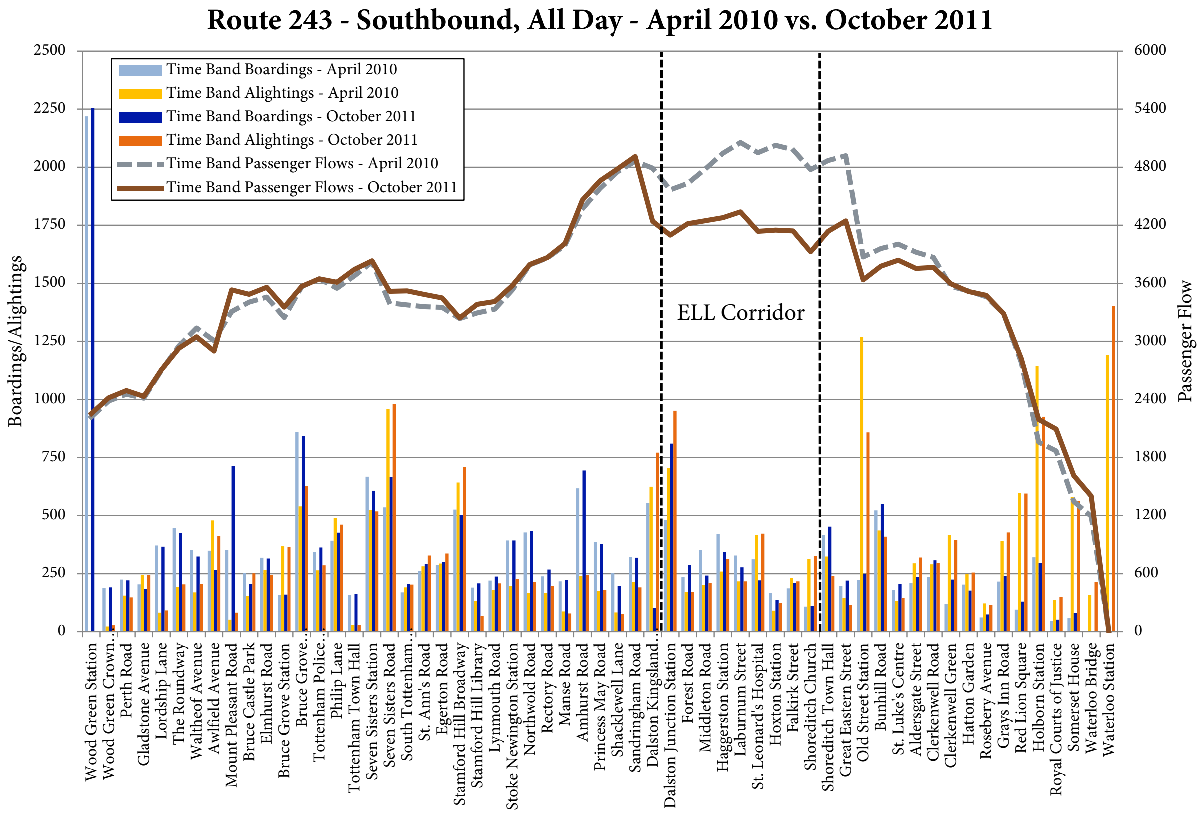
Map of Route 243

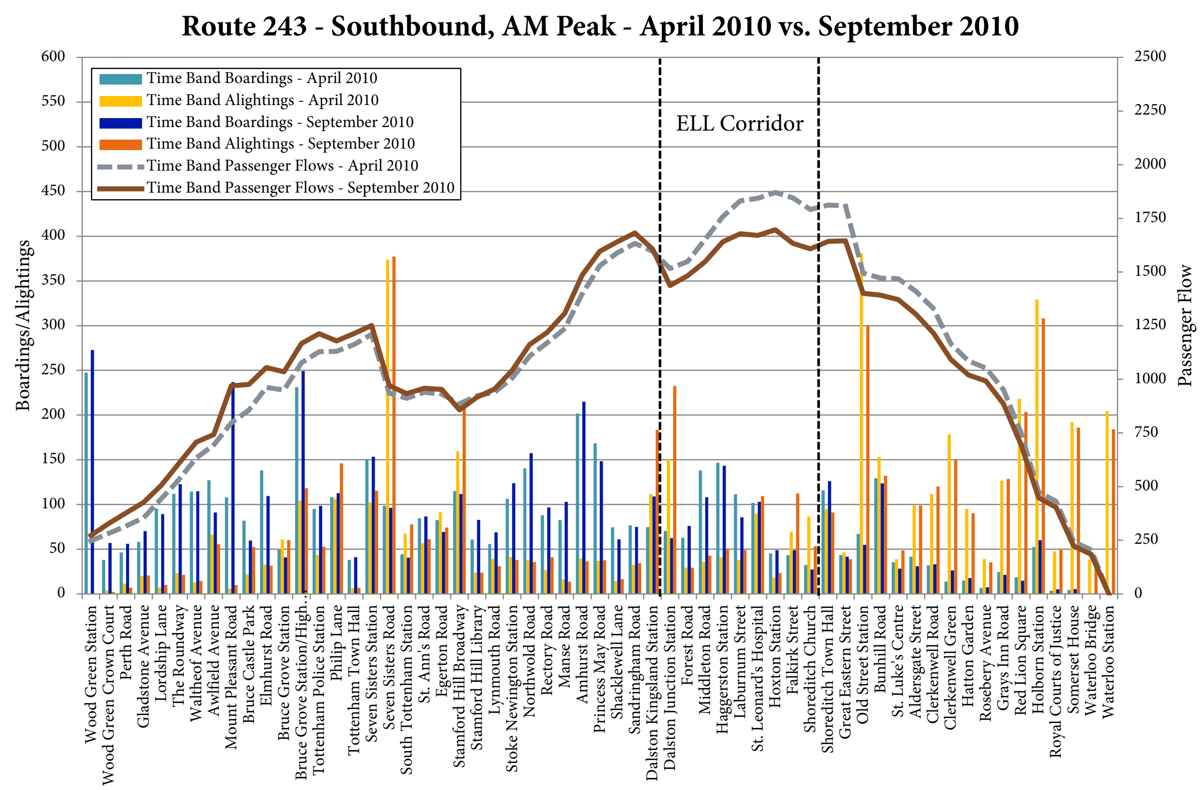
Route 243 - Southbound, All Day - April 2010 vs. September 2010



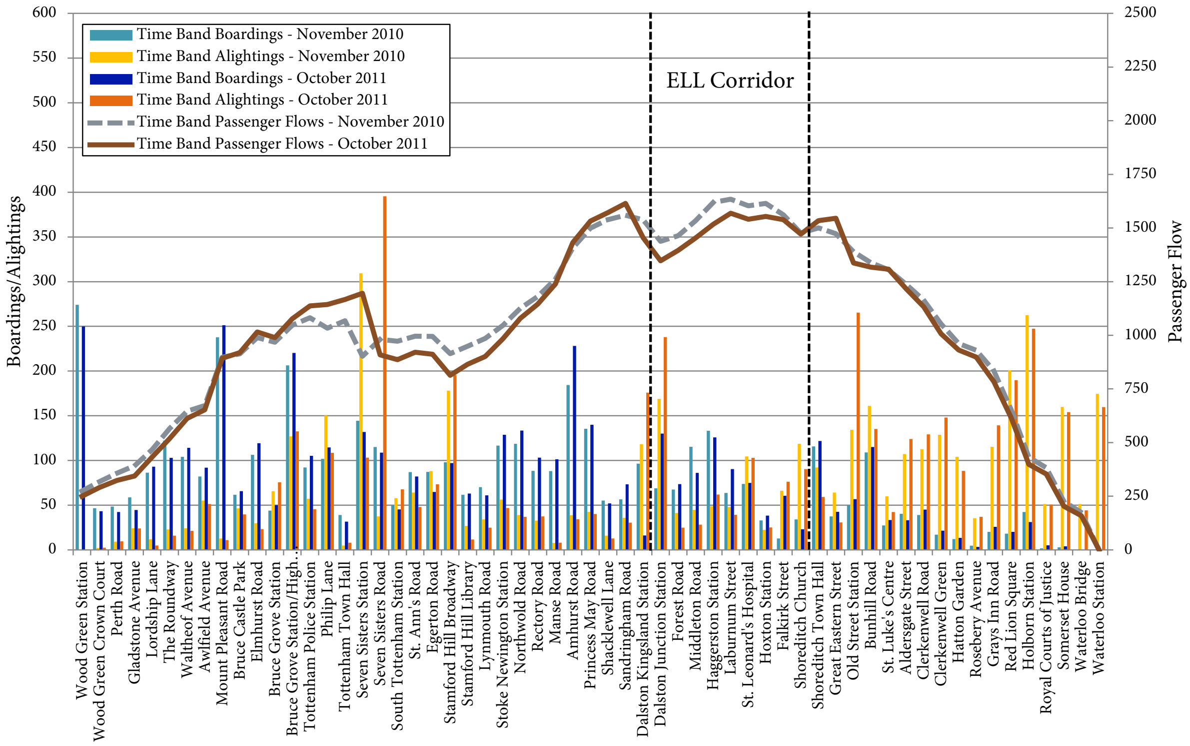
Route 243 - Southbound, All Day - November 2010 vs. October 2011



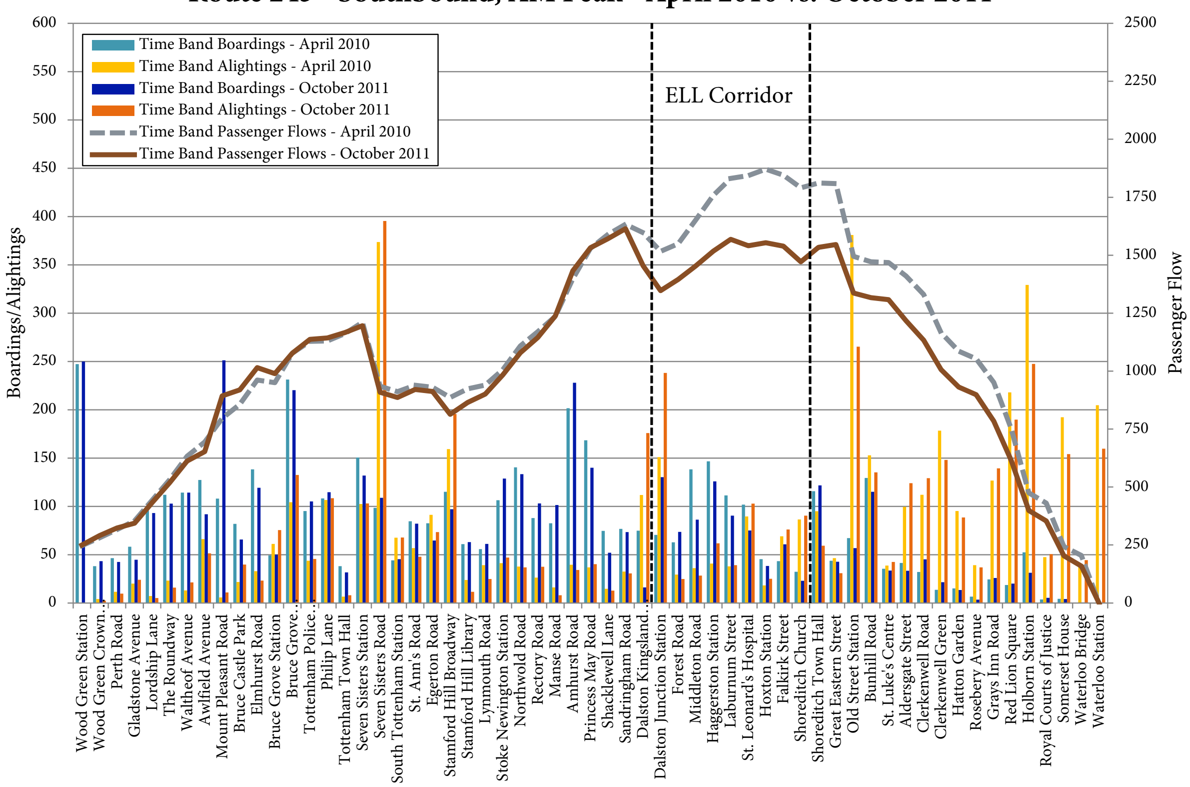

Route 243 - Southbound, All Day - April 2010 vs. October 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - October 2011
ELL Corridor
Boardings/Alightings
Passenger Flow
Wood Green Station
Wood Green Crown…
Perth Road
Gladstone Avenue
Lordship Lane
The Roundway
Waltheof Avenue
Awlfield Avenue
Mount Pleasant Road
Bruce Castle Park
Elmhurst Road
Bruce Grove Station
Bruce Grove…
Tottenham Police…
Philip Lane
Tottenham Town Hall
Seven Sisters Station
Seven Sisters Road
South Tottenham…
St. Ann's Road
Egerton Road
Stamford Hill Broadway
Stamford Hill Library
Lynmouth Road
Stoke Newington Station
Northwold Road
Rectory Road
Manse Road
Amhurst Road
Princess May Road
Shacklewell Lane
Sandringham Road
Dalston Kingsland…
Dalston Junction Station
Forest Road
Middleton Road
Haggerston Station
Laburnum Street
St. Leonard's Hospital
Hoxton Station
Falkirk Street
Shoreditch Church
Shoreditch Town Hall
Great Eastern Street
Old Street Station
Bunhill Road
St. Luke's Centre
Aldersgate Street
Clerkenwell Road
Clerkenwell Green
Hatton Garden
Rosebery Avenue
Grays Inn Road
Red Lion Square
Holborn Station
Royal Courts of Justice
Somerset House
Waterloo Bridge
Waterloo Station


Route 243 - Southbound, AM Peak - April 2010 vs. September 2010
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - September 2010
Time Band Alightings - September 2010
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - September 2010
ELL Corridor
Boardings/Alightings
Passenger Flow
Wood Green Station
Wood Green Crown Court
Perth Road
Gladstone Avenue
Lordship Lane
The Roundway
Waltheof Avenue
Awlfield Avenue
Mount Pleasant Road
Bruce Castle Park
Elmhurst Road
Bruce Grove Station
Bruce Grove Station/High…
Tottenham Police Station
Philip Lane
Tottenham Town Hall
Seven Sisters Station
Seven Sisters Road
South Tottenham Station
St. Ann's Road
Egerton Road
Stamford Hill Broadway
Stamford Hill Library
Lynmouth Road
Stoke Newington Station
Northwold Road
Rectory Road
Manse Road
Amhurst Road
Princess May Road
Shacklewell Lane
Sandringham Road
Dalston Kingsland Station
Dalston Junction Station
Forest Road
Middleton Road
Haggerston Station
Laburnum Street
St. Leonard's Hospital
Hoxton Station
Falkirk Street
Shoreditch Church
Shoreditch Town Hall
Great Eastern Street
Old Street Station
Bunhill Road
St. Luke's Centre
Aldersgate Street
Clerkenwell Road
Clerkenwell Green
Hatton Garden
Rosebery Avenue
Grays Inn Road
Red Lion Square
Holborn Station
Royal Courts of Justice
Somerset House
Waterloo Bridge
Waterloo Station

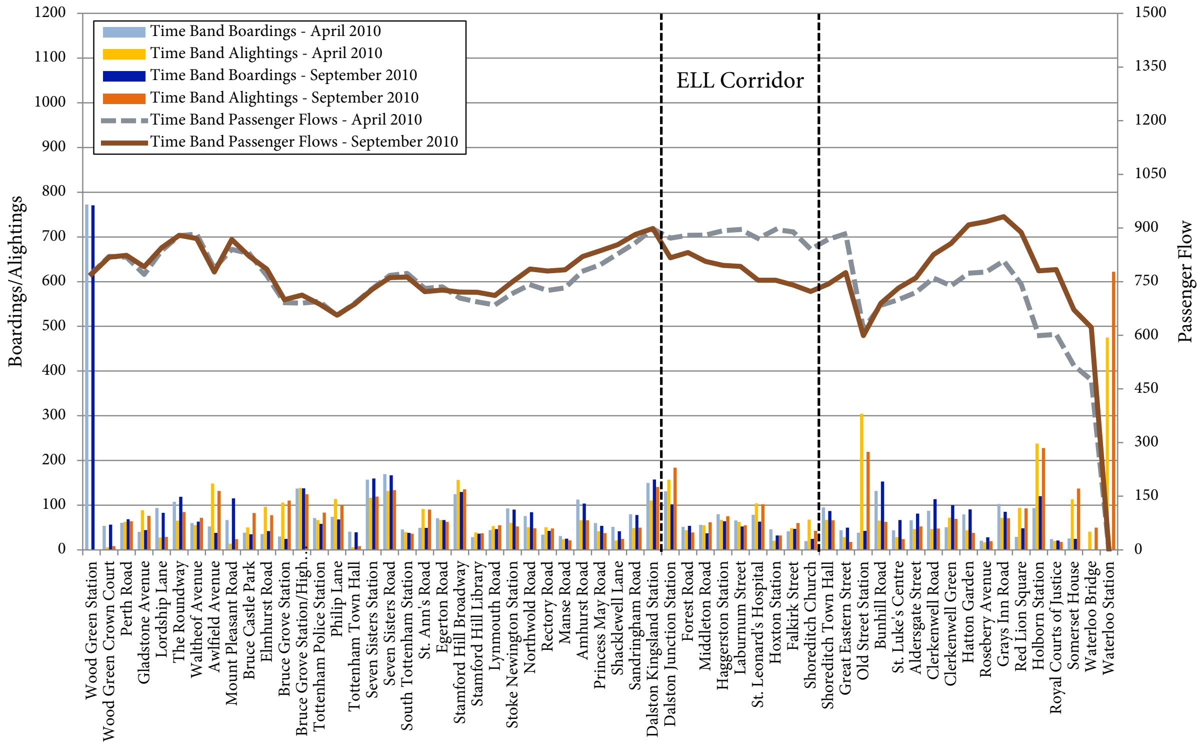
Route 243 - Southbound, AM Peak - November 2010 vs. October 2011



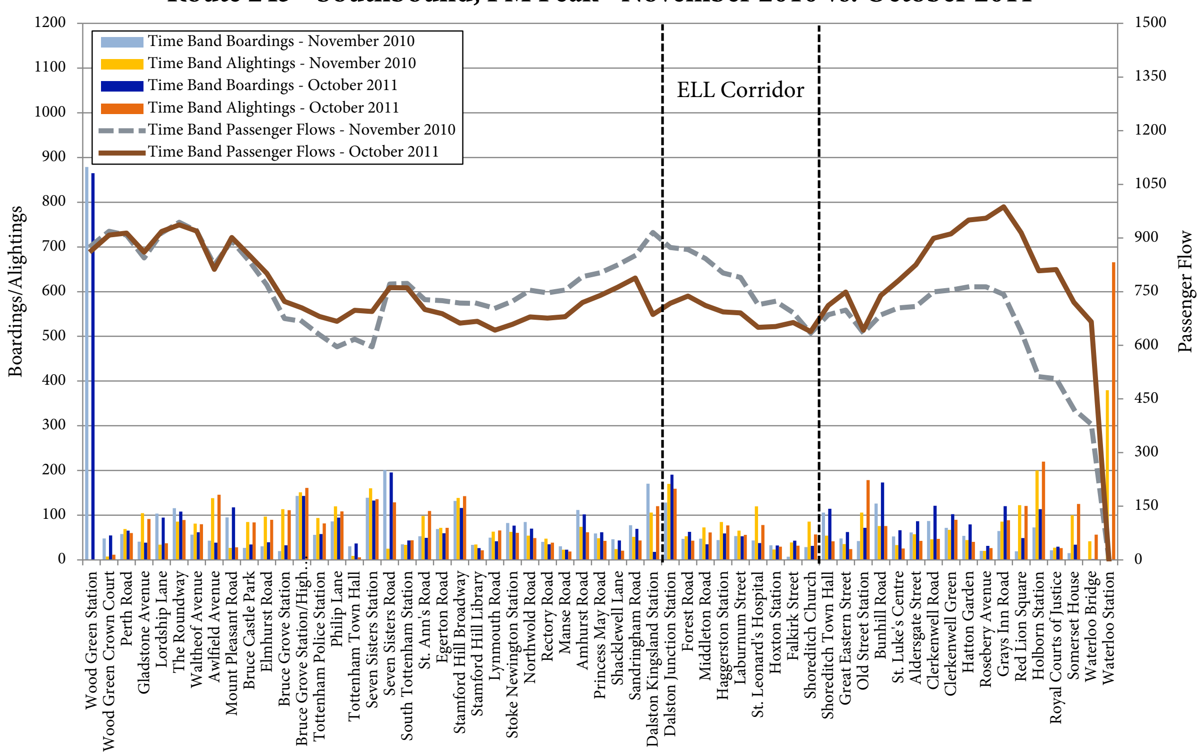
Route 243 - Southbound, AM Peak - April 2010 vs. October 2011



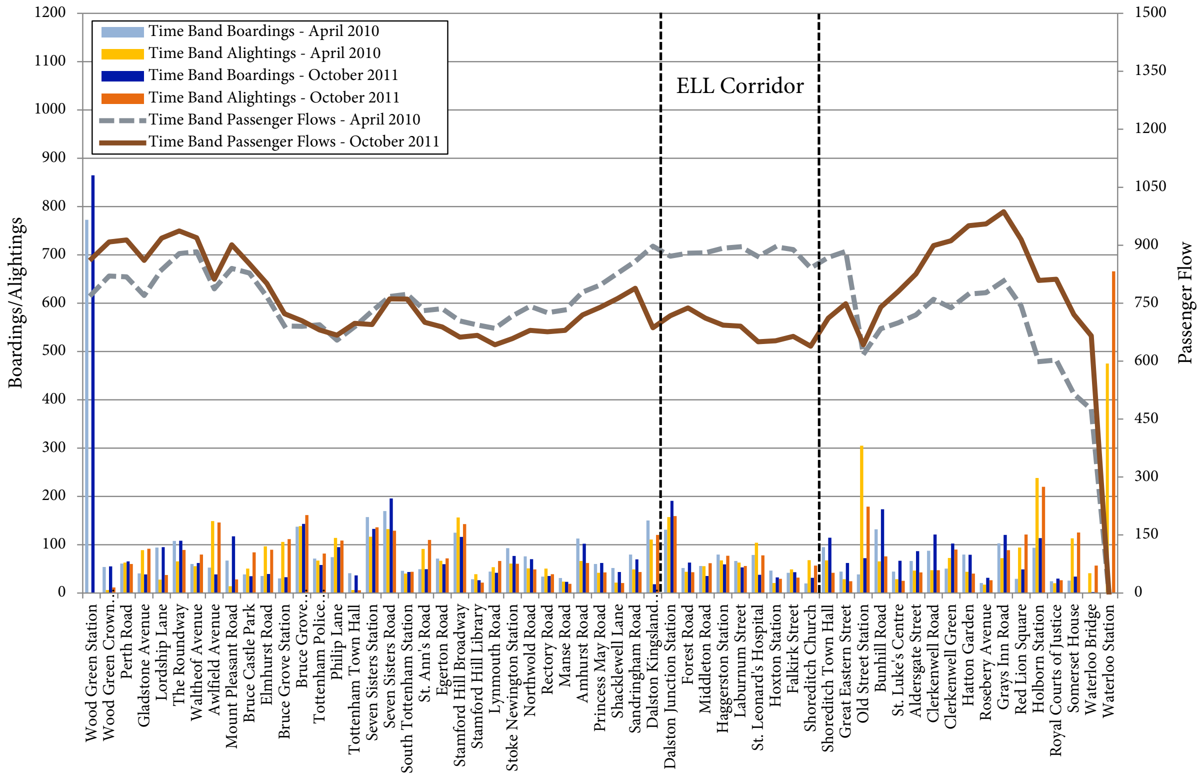
Route 243 - Southbound, PM Peak - April 2010 vs. September 2010



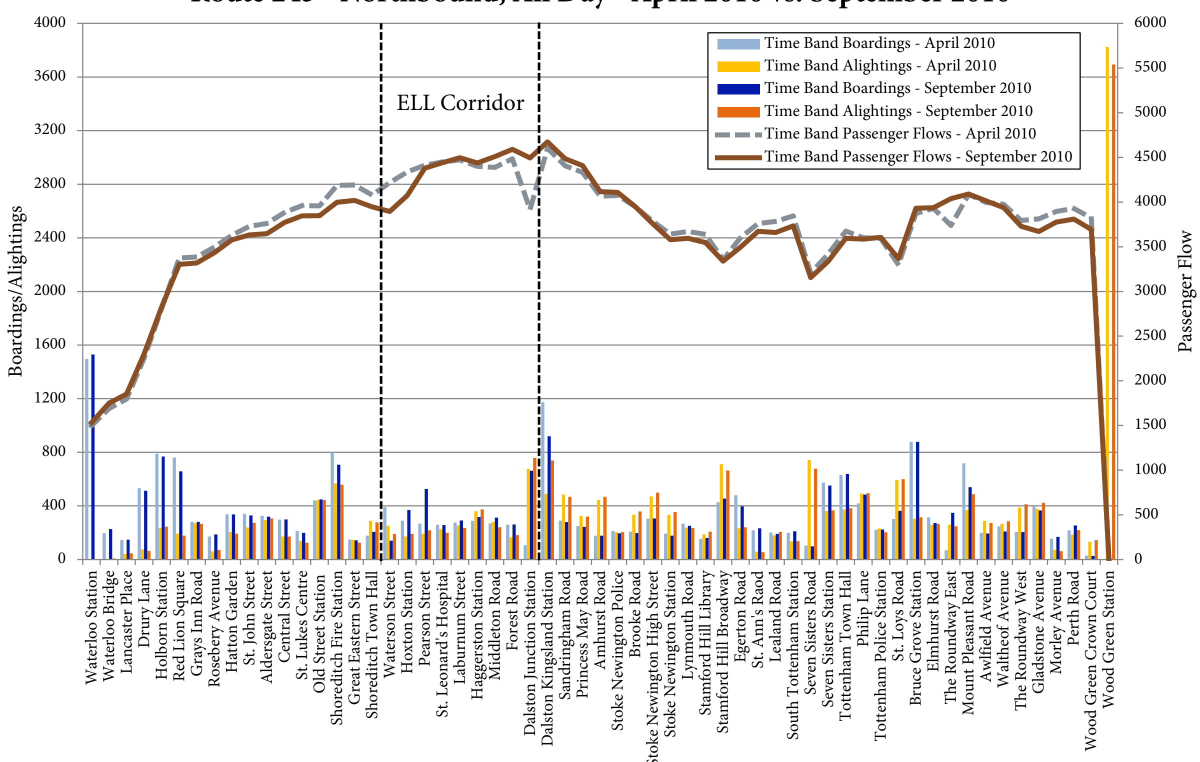
Route 243 - Southbound, PM Peak - November 2010 vs. October 2011



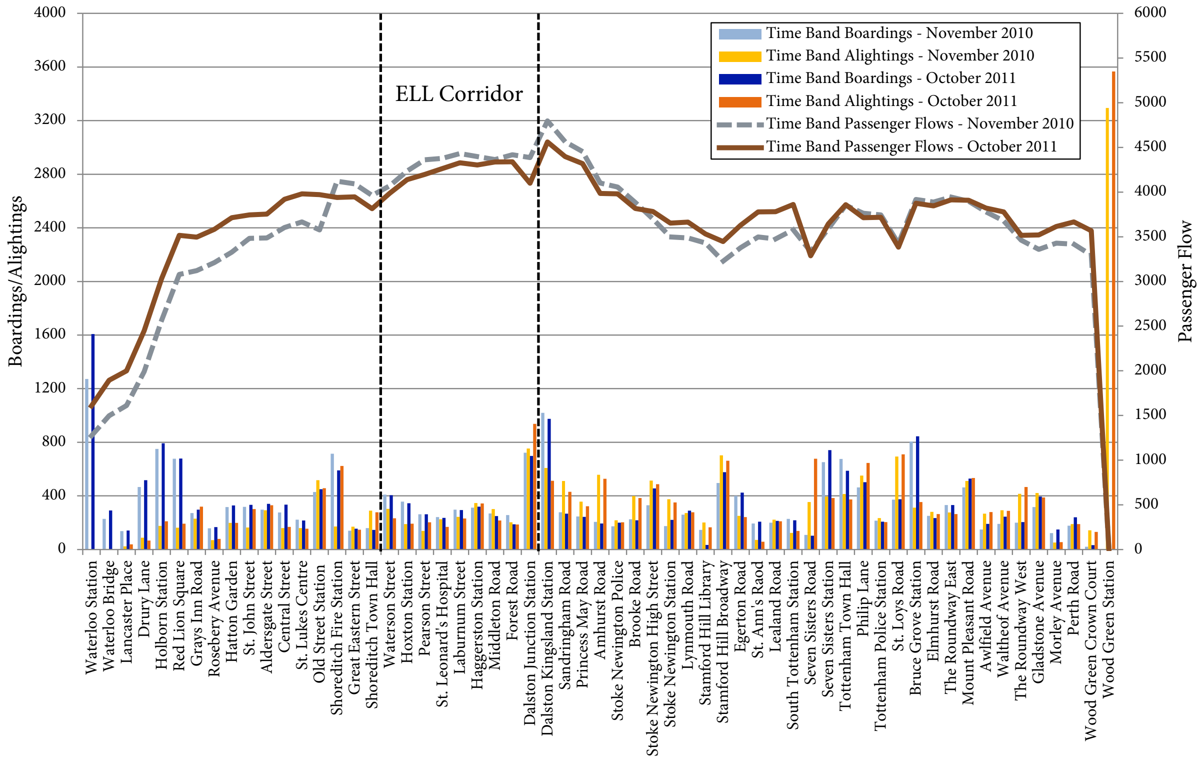
Route 243 - Southbound, PM Peak - April 2010 vs. October 2011



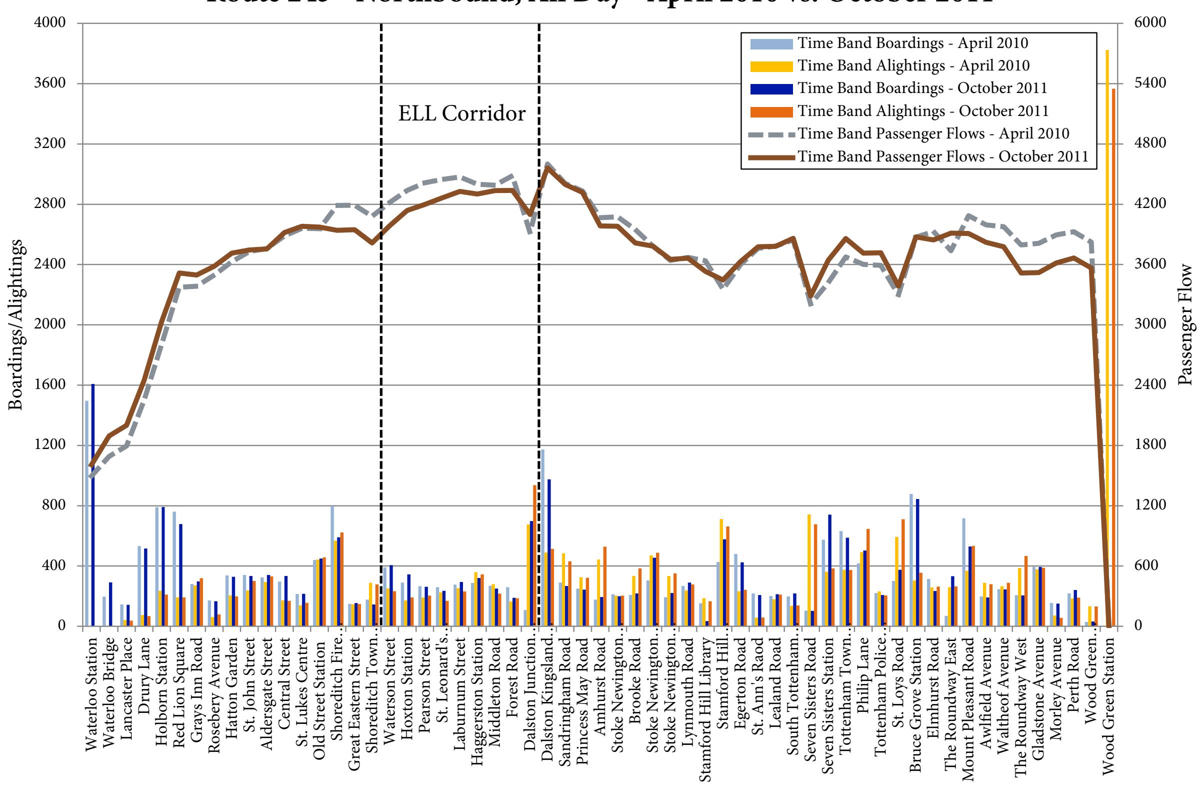
Route 243 - Northbound, All Day - April 2010 vs. September 2010

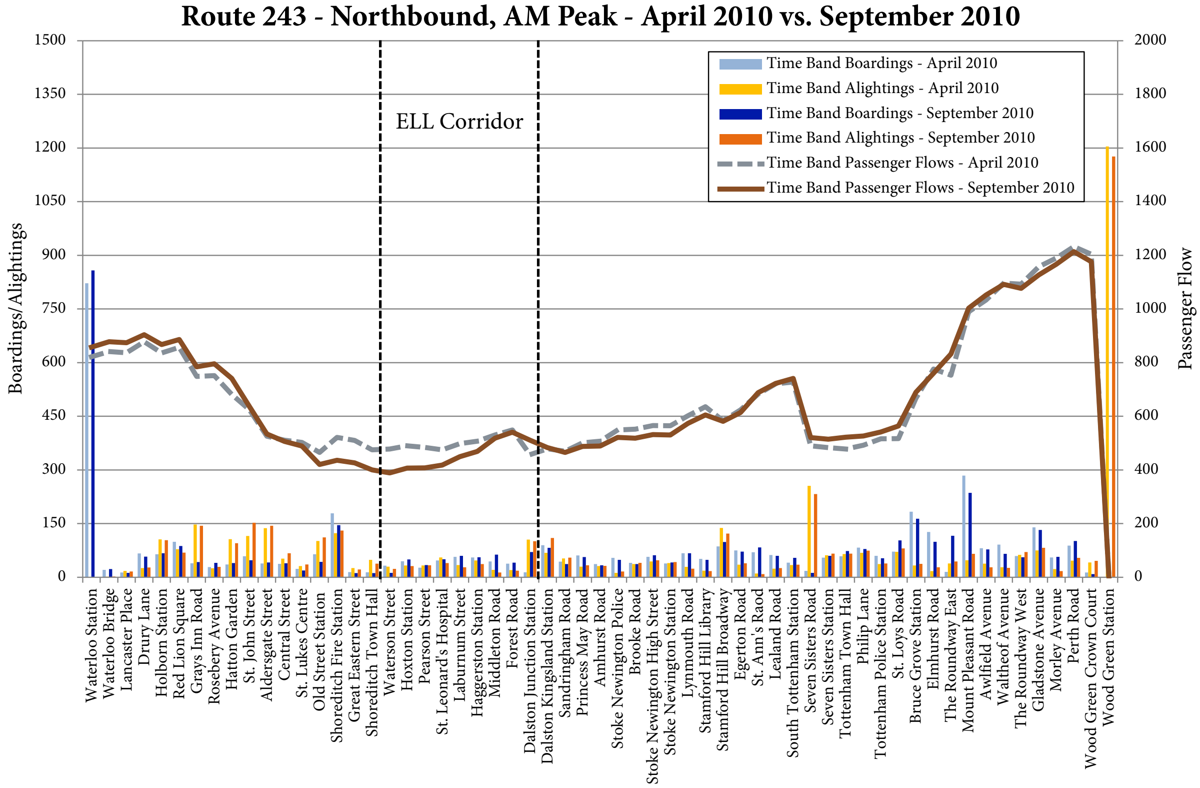


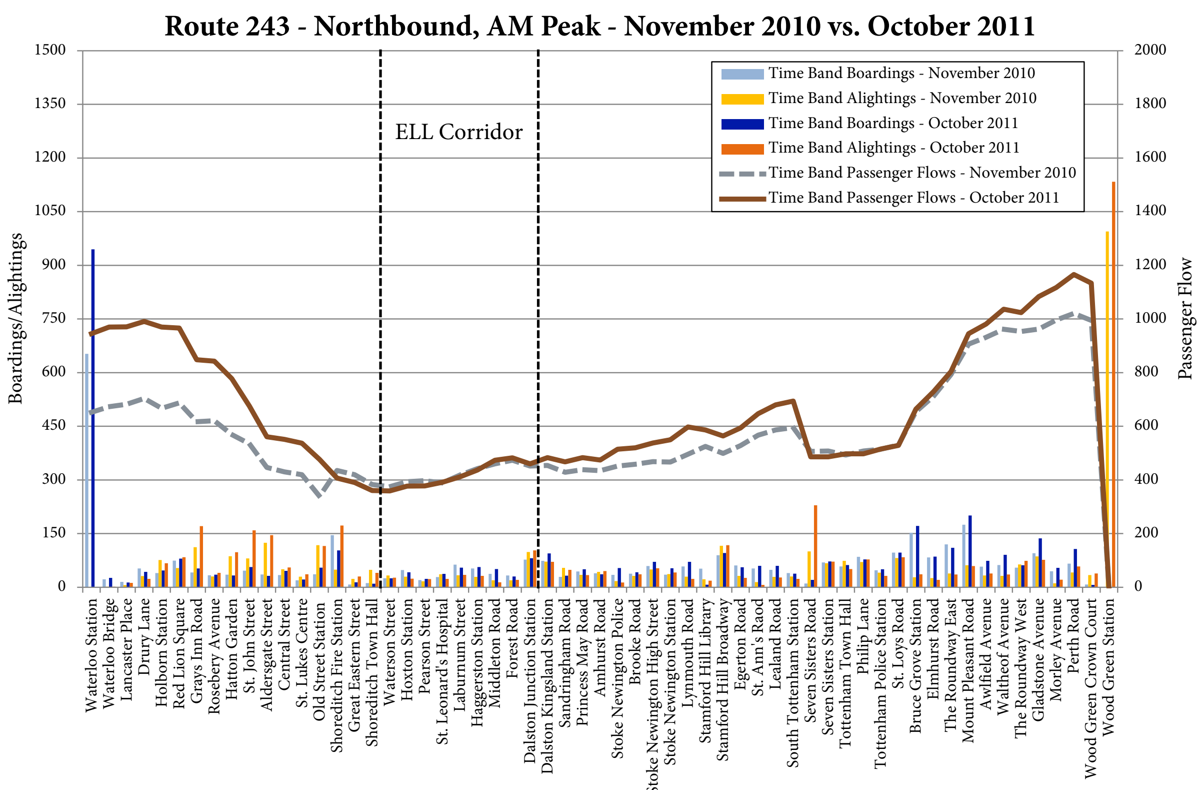
Route 243 - Northbound, All Day - November 2010 vs. October 2011

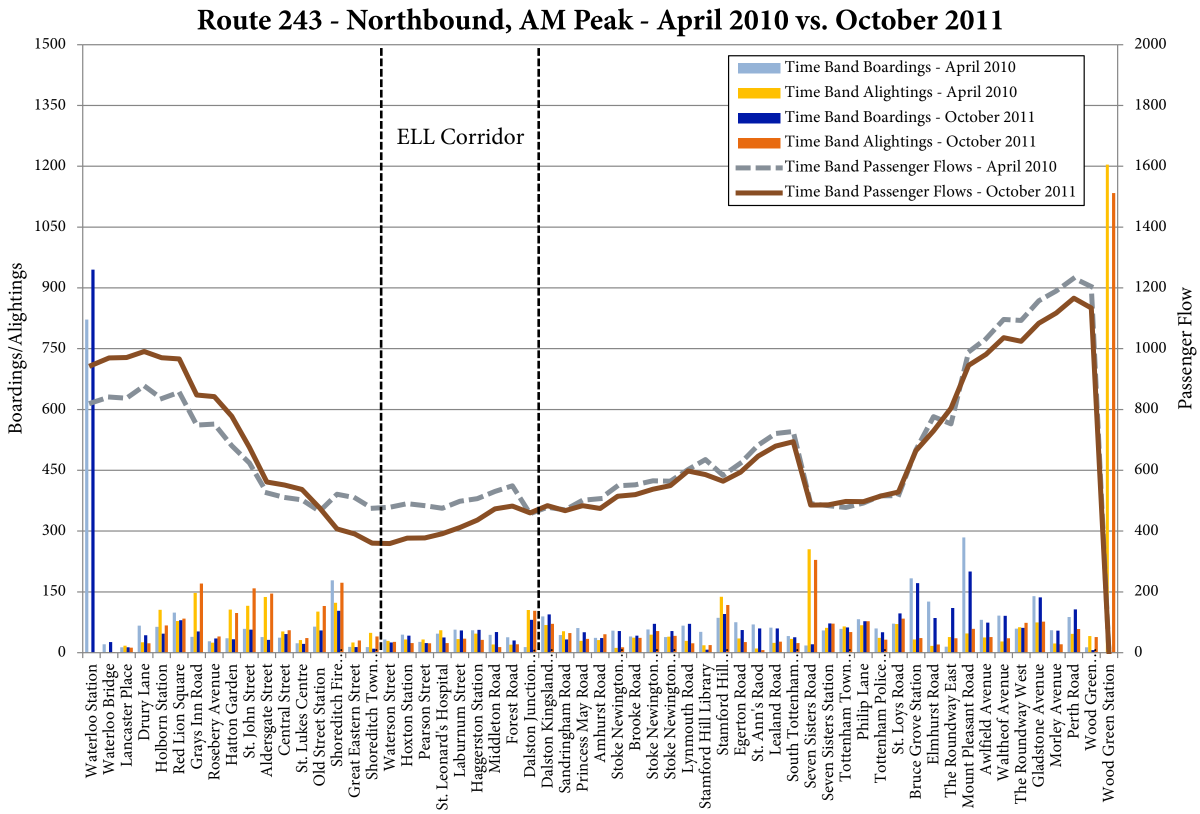


Route 243 - Northbound, All Day - April 2010 vs. October 2011

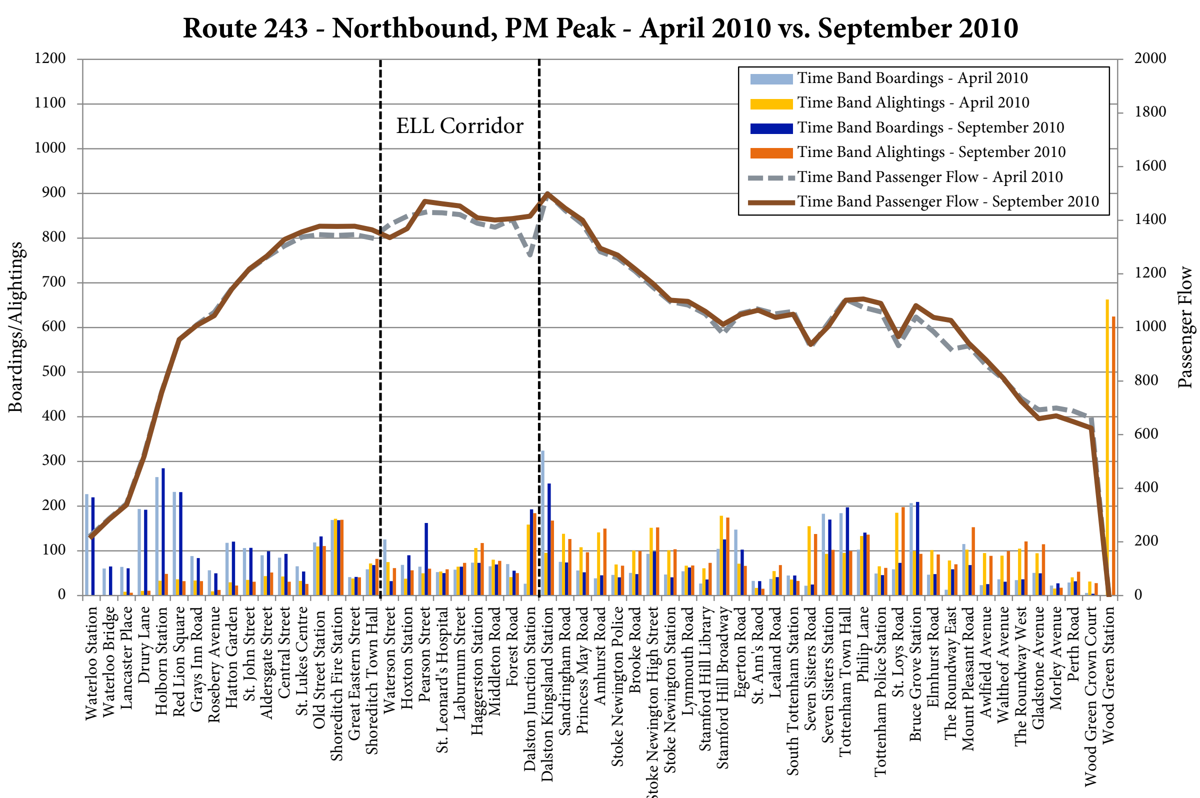



Route 243 - Northbound, AM Peak - April 2010 vs. September 2010
ELL Corridor
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - September 2010
Time Band Alightings - September 2010
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - September 2010
Boardings/Alightings
Passenger Flow
Waterloo Station
Waterloo Bridge
Lancaster Place
Drury Lane
Holborn Station
Red Lion Square
Grays Inn Road
Rosebery Avenue
Hatton Garden
St. John Street
Aldersgate Street
Central Street
St. Lukes Centre
Old Street Station
Shoreditch Fire Station
Great Eastern Street
Shoreditch Town Hall
Waterson Street
Hoxton Station
Pearson Street
St. Leonard's Hospital
Laburnum Street
Haggerston Station
Middleton Road
Forest Road
Dalston Junction Station
Dalston Kingsland Station
Sandringham Road
Princess May Road
Amhurst Road
Stoke Newington Police
Brooke Road
Stoke Newington High Street
Stoke Newington Station
Lynmouth Road
Stamford Hill Library
Stamford Hill Broadway
Egerton Road
St. Ann's Raod
Lealand Road
South Tottenham Station
Seven Sisters Road
Seven Sisters Station
Tottenham Town Hall
Philip Lane
Tottenham Police Station
St. Loys Road
Bruce Grove Station
Elmhurst Road
The Roundway East
Mount Pleasant Road
Awlfield Avenue
Waltheof Avenue
The Roundway West
Gladstone Avenue
Morley Avenue
Perth Road
Wood Green Crown Court
Wood Green Station

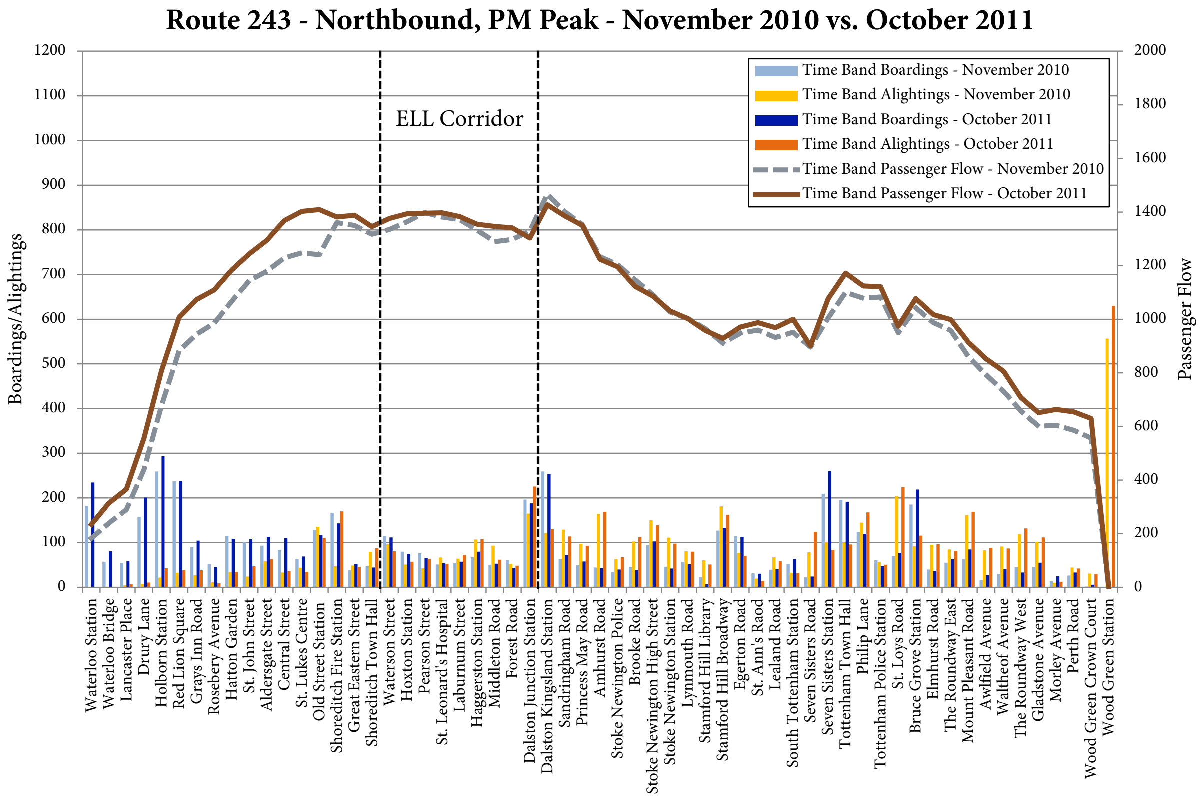

Route 243 - Northbound, AM Peak - November 2010 vs. October 2011
ELL Corridor
Time Band Boardings - November 2010
Time Band Alightings - November 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flows - November 2010
Time Band Passenger Flows - October 2011
Boardings/Alightings
Passenger Flow

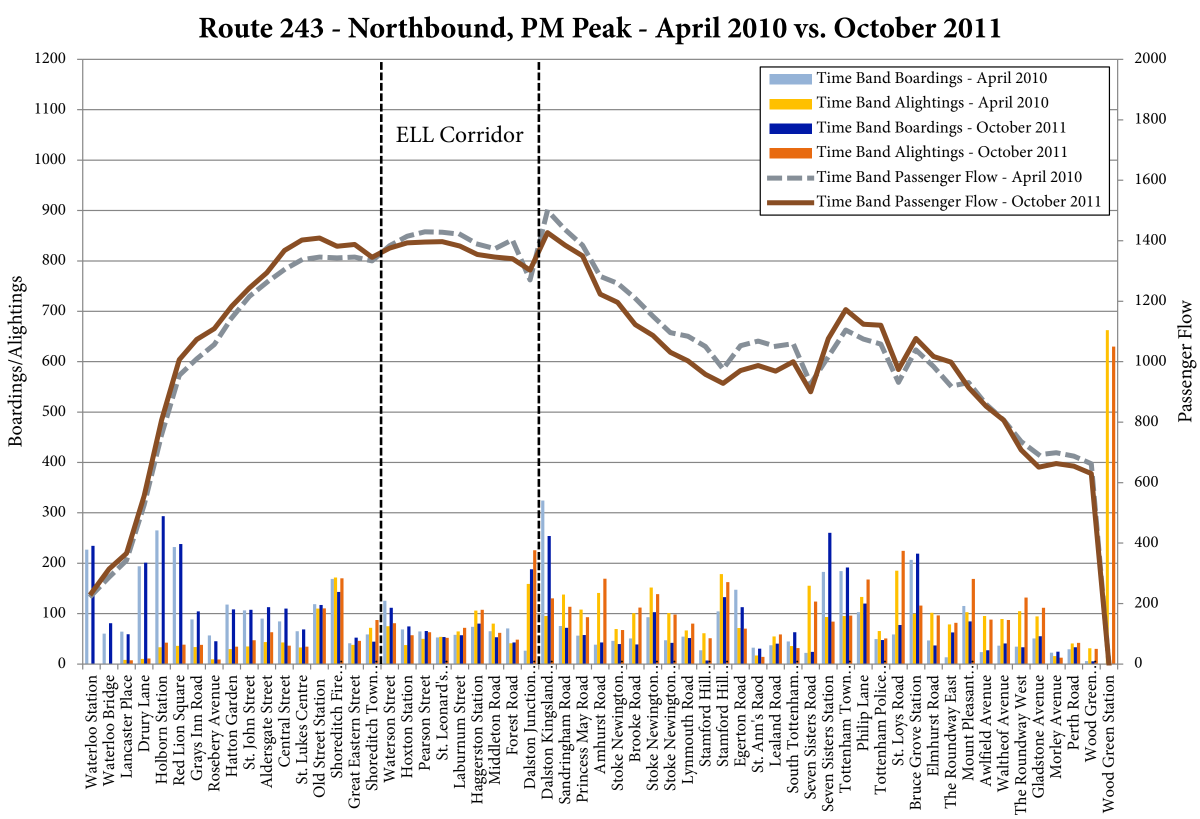


Route 243 - Northbound, AM Peak - April 2010 vs. October 2011
ELL Corridor
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - October 2011
Boardings/Alightings
Passenger Flow



Route 243 - Northbound, PM Peak - April 2010 vs. September 2010
ELL Corridor
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - September 2010
Time Band Alightings - September 2010
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - September 2010
Boardings/Alightings
Passenger Flow


Route 243 - Northbound, PM Peak - November 2010 vs. October 2011
ELL Corridor
Time Band Boardings - November 2010
Time Band Alightings - November 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - November 2010
Time Band Passenger Flow - October 2011
Boardings/Alightings
Passenger Flow


Route 243 - Northbound, PM Peak - April 2010 vs. October 2011
ELL Corridor
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - October 2011
Boardings/Alightings
Passenger Flow

Passenger Counts for Route 243 - Southbound - All Day

Apr-10	Sep-10		Alighting							
Change	Percent		Before		Corridor		After		Total	
Boarding	Before		9559	10126	1599	1559	2757	2424	13914	14109
			567	6%	-40	-2%	-333	-12%	195	1%
	Corridor				612	533	1734	1722	2346	2256
					-79	-13%	-11	-1%	-90	-4%
	After						2895	3447	2895	3447
							552	19%	552	19%
	Total		9559	10126	2211	2092	7386	7593	19155	19811
			567	6%	-118	-5%	208	3%	656	3%

Passenger Counts for Route 243 - Southbound - All Day

Nov-10	Oct-11		Alighting							
Change	Percent		Before		Corridor		After		Total	
Boarding	Before		10073	10164	1716	1182	2425	2107	14214	13453
			91	1%	-535	-31%	-317	-13%	-761	-5%
	Corridor				629	818	1430	1709	2059	2526
					189	30%	279	19%	467	23%
	After						3055	3609	3055	3609
							554	18%	554	18%
	Total		10073	10164	2345	2000	6910	7425	19328	19589
			91	1%	-346	-15%	515	7%	260	1%

Passenger Counts for Route 243 - Southbound - All Day

Apr-10	Oct-11		Alighting							
Change	Percent		Before		Corridor		After		Total	
Boarding	Before		9559	10164	1599	1182	2757	2107	13914	13453
			605	6%	-417	-26%	-649	-24%	-461	-3%
	Corridor				612	818	1734	1709	2346	2526
					206	34%	-25	-1%	181	8%
	After						2895	3609	2895	3609
							714	25%	714	25%
	Total		9559	10164	2211	2000	7386	7425	19155	19589
			605	6%	-211	-10%	39	1%	433	2%

Passenger Counts for Route 243 - Southbound - AM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1862	2246	383	390	1196	984	3440	3620
		385	21%	7	2%	-211	-18%	180	5%
	Corridor			90	80	581	596	671	676
				-10	-11%	15	3%	5	1%
	After					639	625	639	625
						-14	-2%	-14	-2%
	Total	1862	2246	473	470	2416	2205	4751	4922
		385	21%	-3	-1%	-211	-9%	171	4%

Passenger Counts for Route 243 - Southbound - AM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1996	2154	400	334	968	882	3365	3371
		158	8%	-66	-17%	-86	-9%	6	0%
	Corridor			94	114	474	566	568	680
				20	22%	92	19%	112	20%
	After					573	596	573	596
						24	4%	24	4%
	Total	1996	2154	494	449	2015	2045	4505	4647
		158	8%	-46	-9%	30	1%	142	3%

Passenger Counts for Route 243 - Southbound - AM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1862	2154	383	334	1196	882	3440	3371
		292	16%	-49	-13%	-313	-26%	-70	-2%
	Corridor			90	114	581	566	671	680
				24	27%	-15	-3%	9	1%
	After					639	596	639	596
						-43	-7%	-43	-7%
	Total	1862	2154	473	449	2416	2045	4751	4647
		292	16%	-25	-5%	-371	-15%	-104	-2%

Passenger Counts for Route 243 - Southbound - PM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	2556	2421	394	344	406	371	3357	3136
		-135	-5%	-51	-13%	-35	-9%	-221	-7%
	Corridor			171	125	353	327	524	452
				-45	-26%	-26	-7%	-72	-14%
	After					738	1138	738	1138
						401	54%	401	54%
	Total	2556	2421	565	469	1497	1836	4618	4727
		-135	-5%	-96	-17%	340	23%	109	2%

Passenger Counts for Route 243 - Southbound - PM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	2503	2520	390	241	352	287	3246	3047
		17	1%	-150	-38%	-66	-19%	-198	-6%
	Corridor			151	193	253	320	404	514
				42	28%	67	27%	110	27%
	After					894	1289	894	1289
						395	44%	395	44%
	Total	2503	2520	541	434	1499	1896	4543	4850
		17	1%	-107	-20%	397	26%	306	7%

Passenger Counts for Route 243 - Southbound - PM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	2556	2520	394	241	406	287	3357	3047
		-36	-1%	-154	-39%	-119	-29%	-309	-9%
	Corridor			171	193	353	320	524	514
				23	13%	-32	-9%	-10	-2%
	After					738	1289	738	1289
						551	75%	551	75%
	Total	2556	2520	565	434	1497	1896	4618	4850
		-36	-1%	-131	-23%	399	27%	232	5%

Passenger Counts for Route 243 - Northbound - All Day

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	3363	3546	1703	1713	2138	2043	7205	7302
		183	5%	10	1%	-96	-4%	97	1%
	Corridor			692	685	1611	1788	2303	2474
				-6	-1%	177	11%	171	7%
	After					10799	10882	10799	10882
						83	1%	83	1%
	Total	3363	3546	2395	2399	14548	14713	20307	20658
		183	5%	4	0%	165	1%	352	2%

Passenger Counts for Route 243 - Northbound - All Day

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	3183	3808	1675	1653	1985	1928	6842	7389
		625	20%	-21	-1%	-57	-3%	547	8%
	Corridor			729	828	1679	1473	2408	2302
				99	14%	-205	-12%	-106	-4%
	After					10827	11361	10827	11361
						534	5%	534	5%
	Total	3183	3808	2404	2482	14491	14762	20078	21052
		625	20%	78	3%	271	2%	974	5%

Passenger Counts for Route 243 - Northbound - All Day

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	3363	3808	1703	1653	2138	1928	7205	7389
		444	13%	-50	-3%	-210	-10%	184	3%
	Corridor			692	828	1611	1473	2303	2302
				137	20%	-138	-9%	-1	0%
	After					10799	11361	10799	11361
						562	5%	562	5%
	Total	3363	3808	2395	2482	14548	14762	20307	21052
		444	13%	87	4%	214	1%	745	4%

Passenger Counts for Route 243 - Northbound - AM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1082	1208	270	206	225	171	1577	1585
		127	12%	-64	-24%	-54	-24%	8	1%
	Corridor			116	96	222	269	338	365
				-20	-17%	47	21%	27	8%
	After					2415	2443	2415	2443
						28	1%	28	1%
	Total	1082	1208	386	302	2862	2883	4330	4393
		127	12%	-84	-22%	21	1%	63	1%

Passenger Counts for Route 243 - Northbound - AM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	952	1278	185	176	165	158	1302	1611
		326	34%	-9	-5%	-7	-4%	309	24%
	Corridor			97	98	210	221	307	320
				2	2%	11	5%	13	4%
	After					2116	2379	2116	2379
						262	12%	262	12%
	Total	952	1278	282	274	2491	2758	3725	4310
		326	34%	-8	-3%	267	11%	585	16%

Passenger Counts for Route 243 - Northbound - AM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1082	1278	270	176	225	158	1577	1611
		196	18%	-94	-35%	-67	-30%	34	2%
	Corridor			116	98	222	221	338	320
				-18	-15%	-1	0%	-19	-5%
	After					2415	2379	2415	2379
						-36	-1%	-36	-1%
	Total	1082	1278	386	274	2862	2758	4330	4310
		196	18%	-112	-29%	-104	-4%	-20	0%

Passenger Counts for Route 243 - Northbound - PM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	754	770	451	539	783	764	1988	2073
		16	2%	87	19%	-19	-2%	85	4%
	Corridor			133	140	429	458	563	598
				6	5%	29	7%	35	6%
	After					2460	2530	2460	2530
						71	3%	71	3%
	Total	754	770	585	679	3672	3752	5011	5201
		16	2%	94	16%	81	2%	190	4%

Passenger Counts for Route 243 - Northbound - PM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	707	858	508	526	713	738	1927	2122
		151	21%	18	4%	26	4%	195	10%
	Corridor			135	162	420	377	555	539
				26	20%	-43	-10%	-17	-3%
	After					2483	2620	2483	2620
						136	5%	136	5%
	Total	707	858	643	688	3616	3735	4966	5281
		151	21%	45	7%	119	3%	315	6%

Passenger Counts for Route 243 - Northbound - PM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	754	858	451	526	783	738	1988	2122
		104	14%	75	17%	-45	-6%	134	7%
	Corridor			133	162	429	377	563	539
				28	21%	-52	-12%	-24	-4%
	After					2460	2620	2460	2620
						160	6%	160	6%
	Total	754	858	585	688	3672	3735	5011	5281
		104	14%	103	18%	63	2%	270	5%

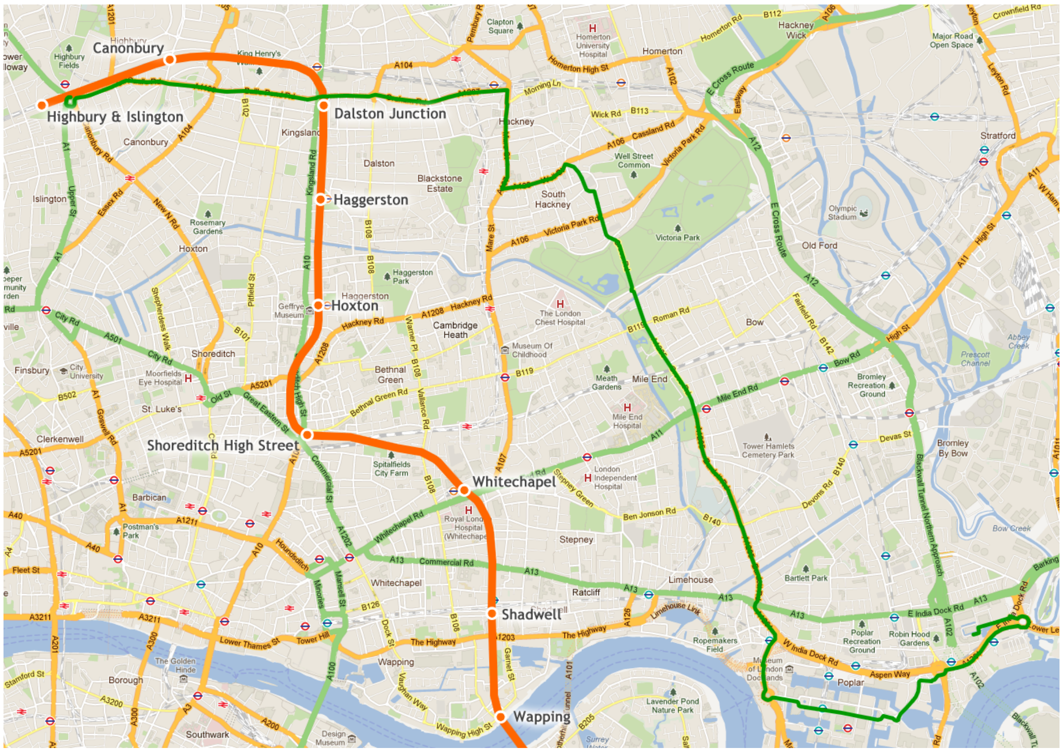
Route 243 - April 2010 vs. September 2010				
For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Sep-10	Percent Change
Southbound	All Day	4857	4474	-7.9%
	AM Peak	1740	1600	-8.1%
	PM Peak	880	779	-11.4%
Northbound	All Day	4342	4368	0.6%
	AM Peak	496	456	-8.1%
	PM Peak	1390	1413	1.6%
Passenger Counts		Apr-10	Sep-10	Percent Change
Southbound	All Day	6701	6239	-6.9%
	AM Peak	2250	2050	-8.9%
	PM Peak	1324	1167	-11.9%
Northbound	All Day	6144	6230	1.4%
	AM Peak	834	742	-11.0%
	PM Peak	1797	1901	5.8%
Entire Route				
Passenger Counts		Apr-10	Sep-10	Percent Change
Southbound	All Day	19155	19811	3.4%
	AM Peak	4751	4922	3.6%
	PM Peak	4618	4727	2.4%
Northbound	All Day	20307	20658	1.7%
	AM Peak	4330	4393	1.5%
	PM Peak	5011	5201	3.8%
Both	All Day	39462	40470	2.6%
System-Wide	All Day	6481026	6476783	-0.1%

Route 243 - November 2010 vs. October 2011				
For Route Segments in the ELL Service Area				
Average Passenger Flow		Nov-10	Oct-11	Percent Change
Southbound	All Day	4857	4171	-14.1%
	AM Peak	1549	1488	-4.0%
	PM Peak	771	684	-11.3%
Northbound	All Day	4338	4221	-2.7%
	AM Peak	422	419	-0.8%
	PM Peak	1344	1365	1.6%
Passenger Counts		Nov-10	Oct-11	Percent Change
Southbound	All Day	6200	5816	-6.2%
	AM Peak	1937	1897	-2.1%
	PM Peak	1147	1041	-9.2%
Northbound	All Day	6068	5883	-3.0%
	AM Peak	657	653	-0.5%
	PM Peak	1776	1803	1.5%
Entire Route				
Passenger Counts		Nov-10	Oct-11	Percent Change
Southbound	All Day	19328	19589	1.3%
	AM Peak	4505	4647	3.2%
	PM Peak	4543	4850	6.7%
Northbound	All Day	20078	21052	4.9%
	AM Peak	3725	4310	15.7%
	PM Peak	4966	5281	6.3%
Both	All Day	39406	40640	3.1%
System-Wide	All Day	6511109	6765182	3.9%

Route 243 - April 2010 vs. October 2011				
For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Oct-11	Percent Change
Southbound	All Day	4857	4171	-14.1%
	AM Peak	1740	1488	-14.5%
	PM Peak	880	684	-22.2%
Northbound	All Day	4342	4221	-2.8%
	AM Peak	496	419	-15.7%
	PM Peak	1390	1365	-1.8%
Passenger Counts		Apr-10	Oct-11	Percent Change
Southbound	All Day	6701	5816	-13.2%
	AM Peak	2250	1897	-15.7%
	PM Peak	1324	1041	-21.4%
Northbound	All Day	6144	5883	-4.2%
	AM Peak	834	653	-21.6%
	PM Peak	1797	1803	0.3%
Entire Route				
Passenger Counts		Apr-10	Oct-11	Percent Change
Southbound	All Day	19155	19589	2.3%
	AM Peak	4751	4647	-2.2%
	PM Peak	4618	4850	5.0%
Northbound	All Day	20307	21052	3.7%
	AM Peak	4330	4310	-0.5%
	PM Peak	5011	5281	5.4%
Both	All Day	39462	40640	3.0%
System-Wide	All Day	6481026	6765182	4.4%

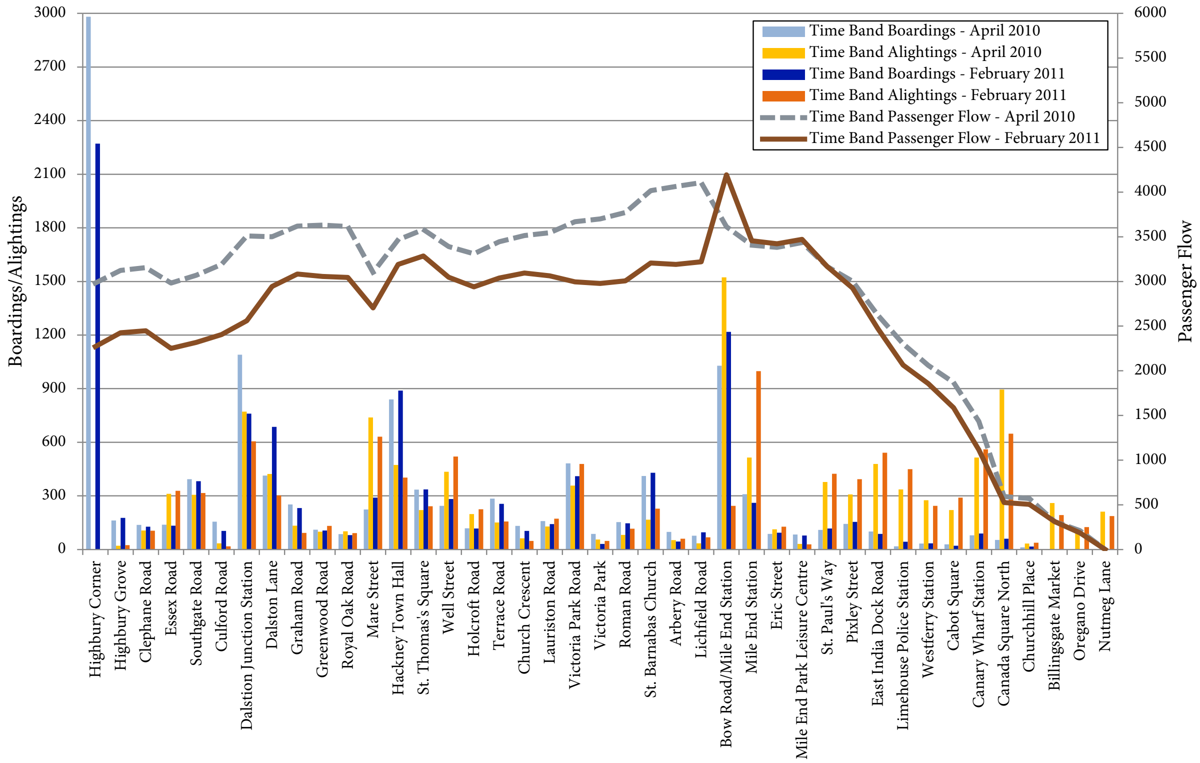
A.9 Route 277

Route 277 begins at Highbury & Islington and travels east, parallel to the North London Line, until Hackney Central, and then heads south to the Docklands, ending at Tower Hamlets' town hall, near East India DLR Station. Eight to ten buses per hour for much of the day provide service to over 20,000 passengers.

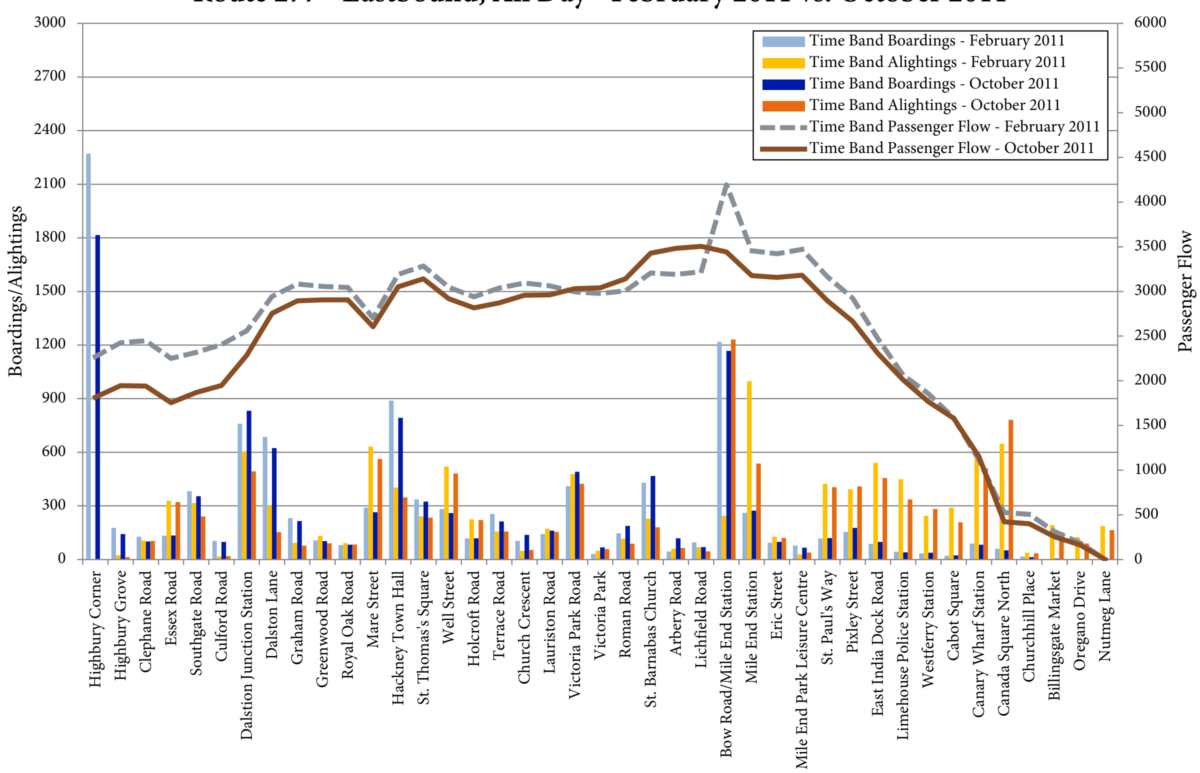


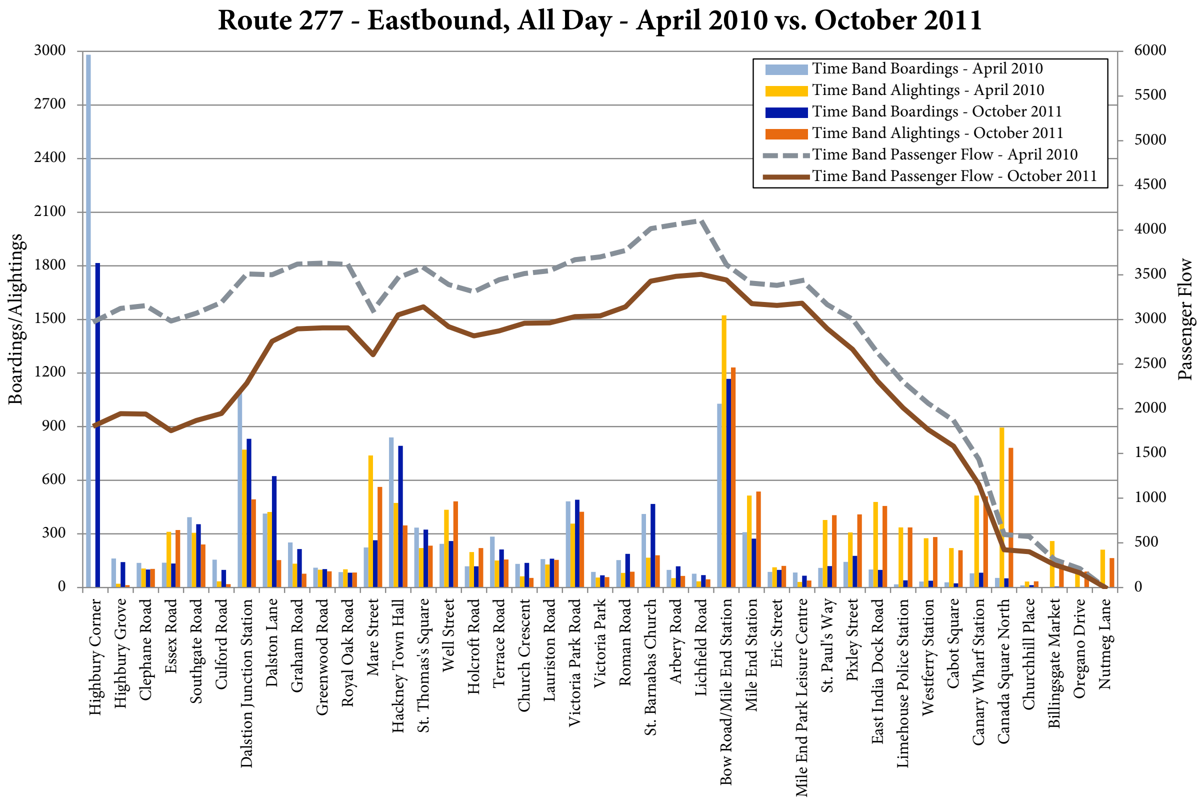
Map of Route 277

Route 277 - Eastbound, All Day - April 2010 vs. February 2011

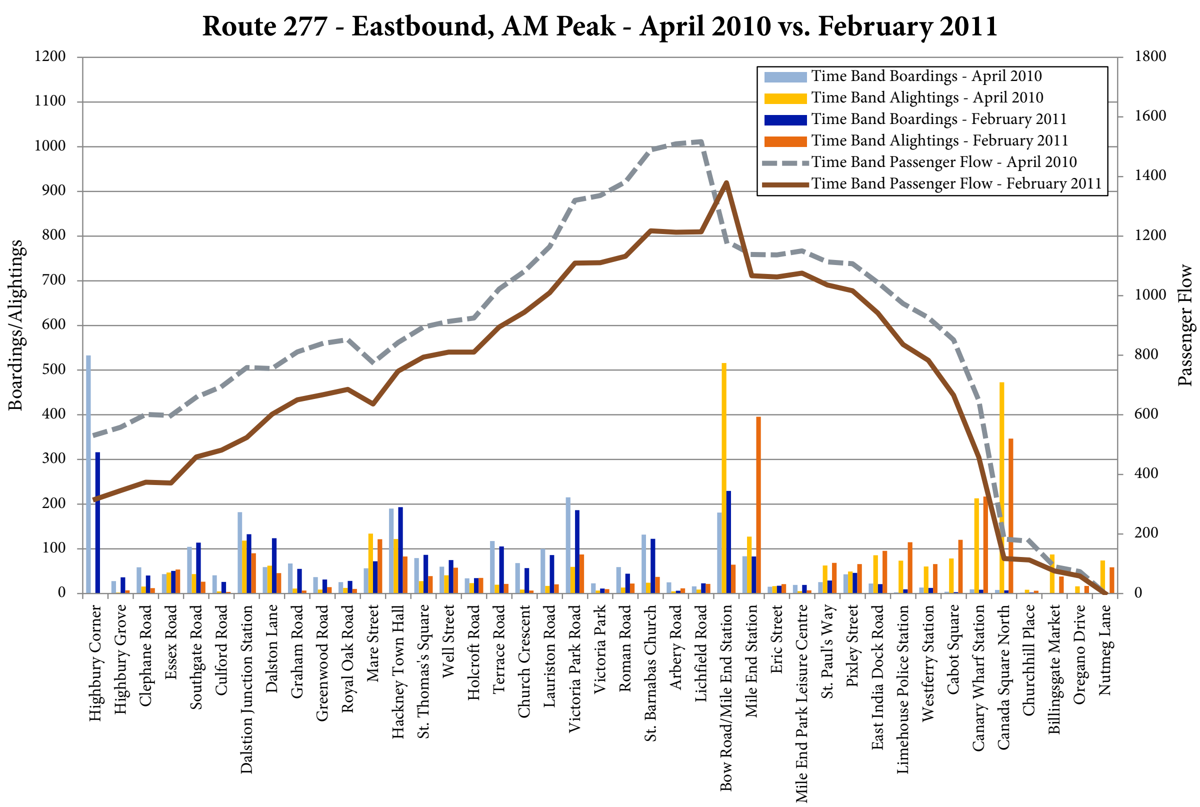


Route 277 - Eastbound, All Day - February 2011 vs. October 2011



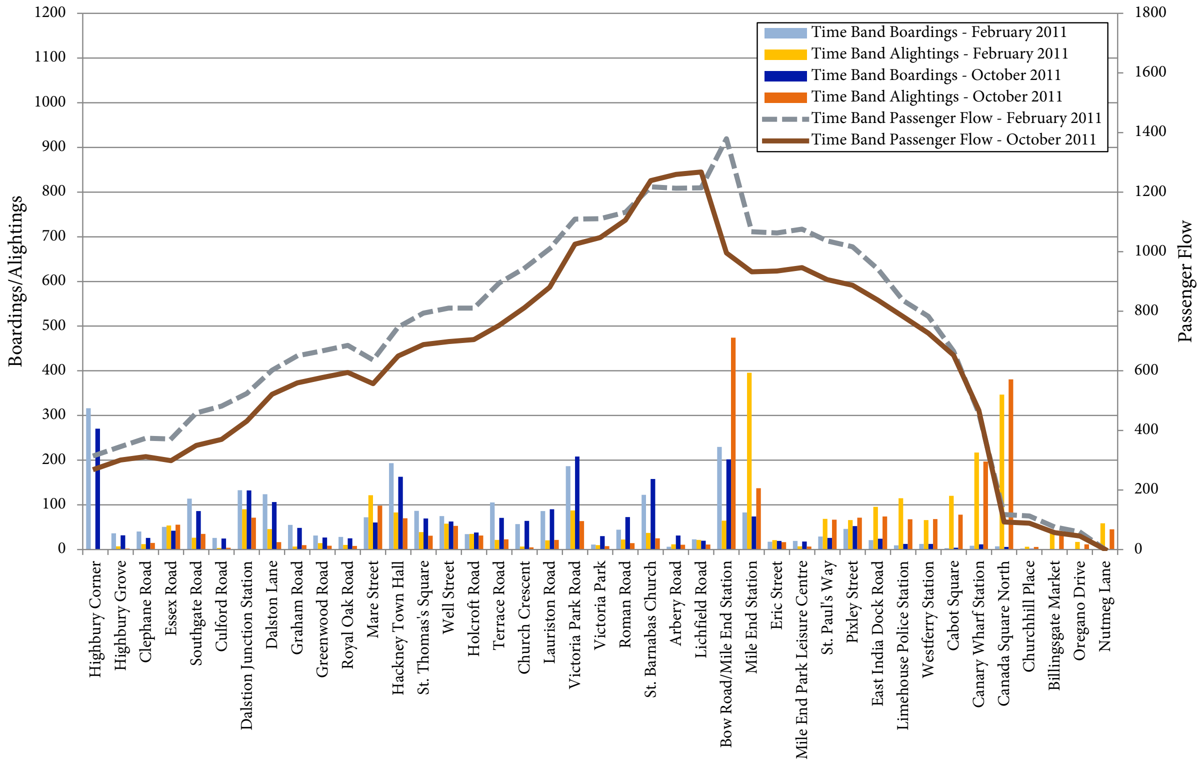


Route 277 - Eastbound, All Day - April 2010 vs. October 2011
Boardings/Alightings
Passenger Flow
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - October 2011
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
Highbury Corner
Highbury Grove
Clephane Road
Essex Road
Southgate Road
Culford Road
Dalstion Junction Station
Dalston Lane
Graham Road
Greenwood Road
Royal Oak Road
Mare Street
Hackney Town Hall
St. Thomas's Square
Well Street
Holcroft Road
Terrace Road
Church Crescent
Lauriston Road
Victoria Park Road
Victoria Park
Roman Road
St. Barnabas Church
Arbery Road
Lichfield Road
Bow Road/Mile End Station
Mile End Station
Eric Street
Mile End Park Leisure Centre
St. Paul's Way
Pixley Street
East India Dock Road
Limehouse Police Station
Westferry Station
Cabot Square
Canary Wharf Station
Canada Square North
Churchill Place
Billingsgate Market
Oregano Drive
Nutmeg Lane

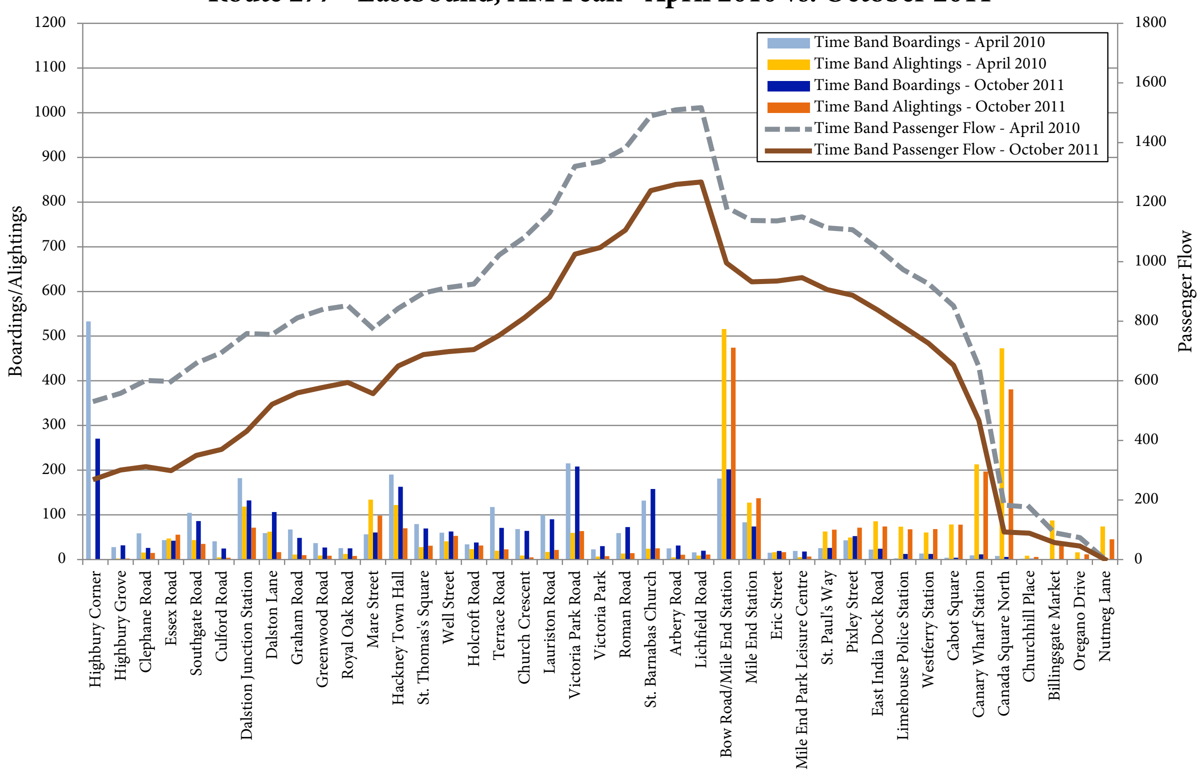


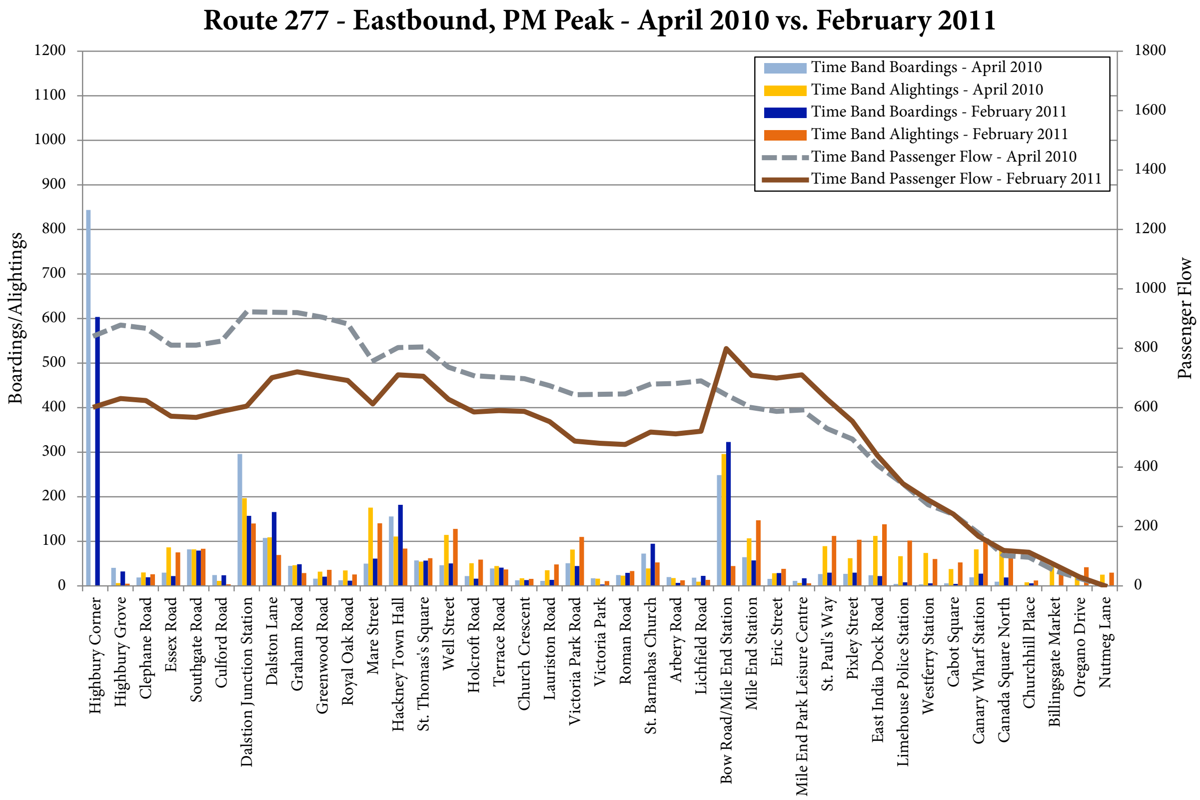
Route 277 - Eastbound, AM Peak - April 2010 vs. February 2011
Boardings/Alightings
Passenger Flow
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - February 2011
Time Band Alightings - February 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - February 2011
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
200
400
600
800
1000
1200
1400
1600
1800
Highbury Corner
Highbury Grove
Clephane Road
Essex Road
Southgate Road
Culford Road
Dalstion Junction Station
Dalston Lane
Graham Road
Greenwood Road
Royal Oak Road
Mare Street
Hackney Town Hall
St. Thomas's Square
Well Street
Holcroft Road
Terrace Road
Church Crescent
Lauriston Road
Victoria Park Road
Victoria Park
Roman Road
St. Barnabas Church
Arbery Road
Lichfield Road
Bow Road/Mile End Station
Mile End Station
Eric Street
Mile End Park Leisure Centre
St. Paul's Way
Pixley Street
East India Dock Road
Limehouse Police Station
Westferry Station
Cabot Square
Canary Wharf Station
Canada Square North
Churchill Place
Billingsgate Market
Oregano Drive
Nutmeg Lane

Route 277 - Eastbound, AM Peak - February 2011 vs. October 2011

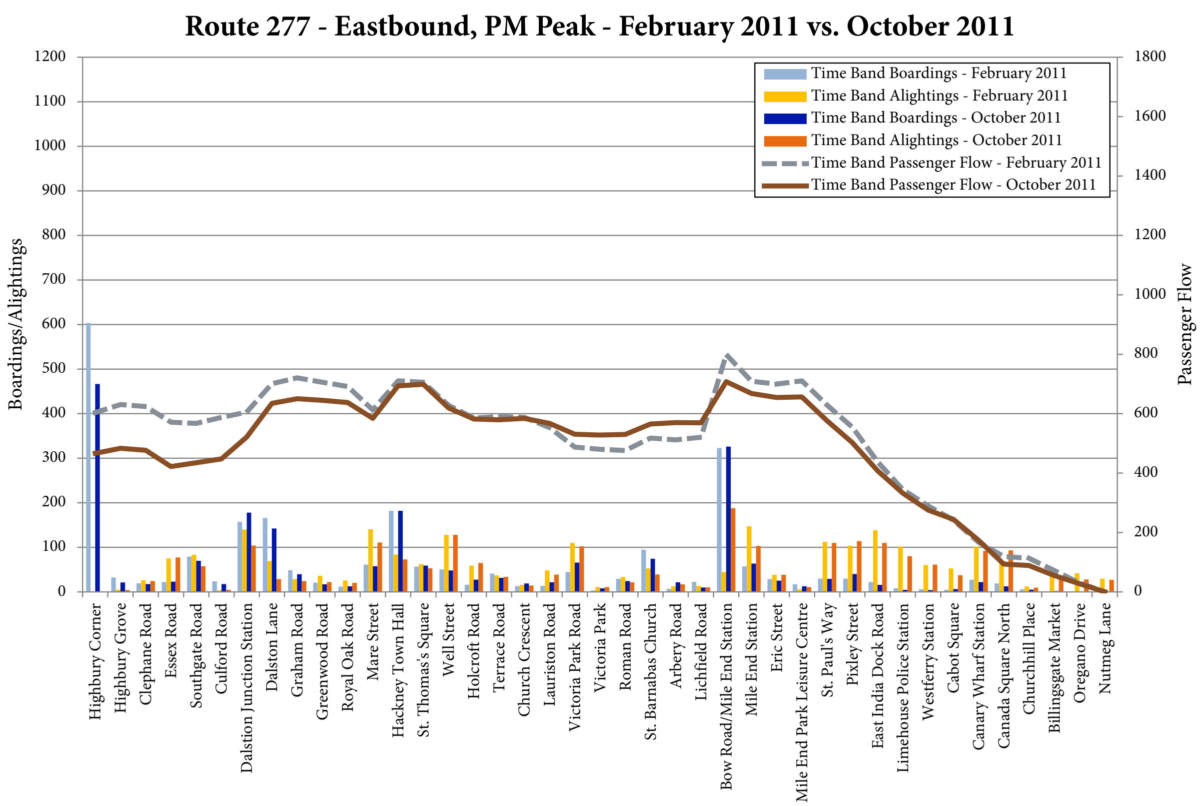


Route 277 - Eastbound, AM Peak - April 2010 vs. October 2011



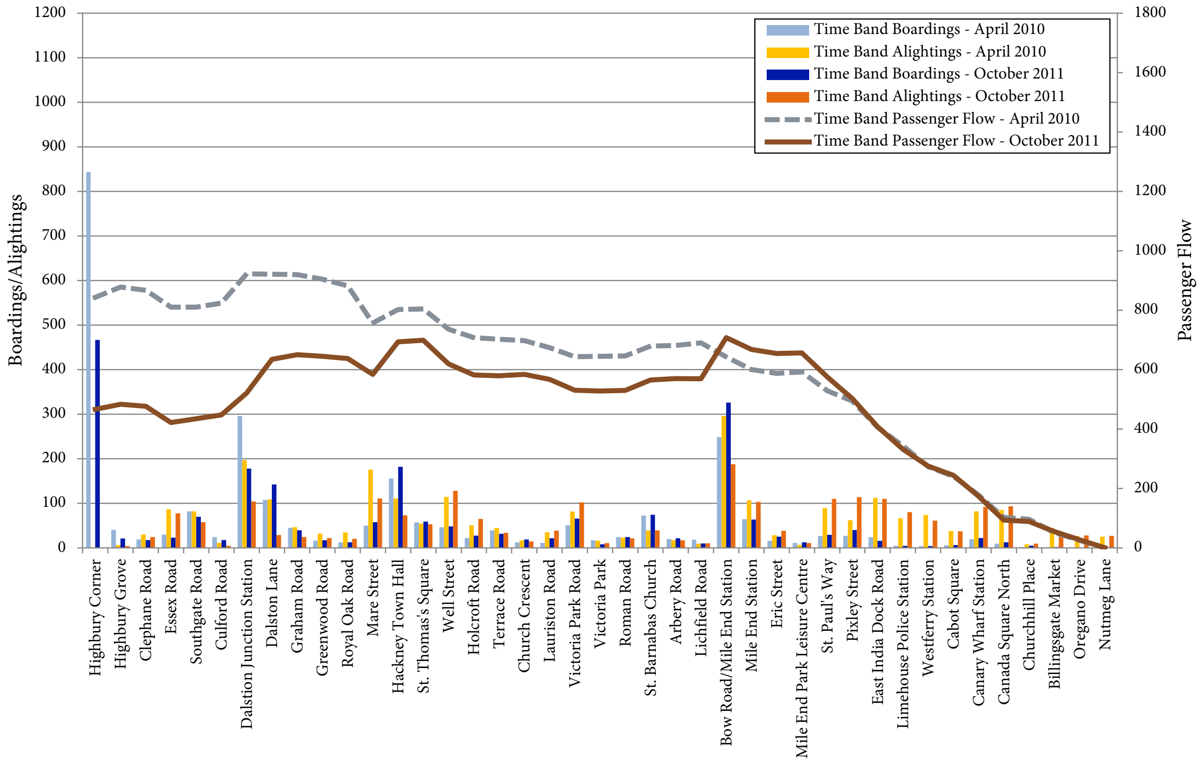


Route 277 - Eastbound, PM Peak - April 2010 vs. February 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - February 2011
Time Band Alightings - February 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - February 2011
Boardings/Alightings
Passenger Flow
Highbury Corner
Highbury Grove
Clephane Road
Essex Road
Southgate Road
Culford Road
Dalstion Junction Station
Dalston Lane
Graham Road
Greenwood Road
Royal Oak Road
Mare Street
Hackney Town Hall
St. Thomas's Square
Well Street
Holcroft Road
Terrace Road
Church Crescent
Lauriston Road
Victoria Park Road
Victoria Park
Roman Road
St. Barnabas Church
Arbery Road
Lichfield Road
Bow Road/Mile End Station
Mile End Station
Eric Street
Mile End Park Leisure Centre
St. Paul's Way
Pixley Street
East India Dock Road
Limehouse Police Station
Westferry Station
Cabot Square
Canary Wharf Station
Canada Square North
Churchill Place
Billingsgate Market
Oregano Drive
Nutmeg Lane

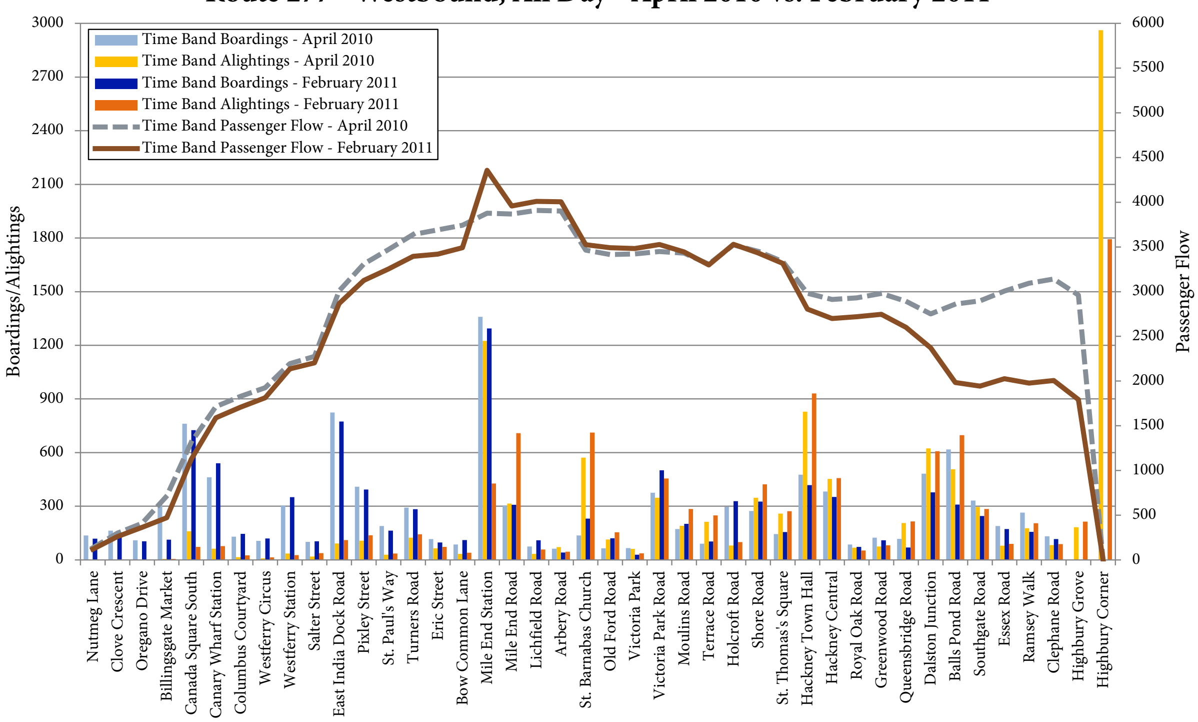


Route 277 - Eastbound, PM Peak - February 2011 vs. October 2011
Time Band Boardings - February 2011
Time Band Alightings - February 2011
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - February 2011
Time Band Passenger Flow - October 2011
Boardings/Alightings
Passenger Flow

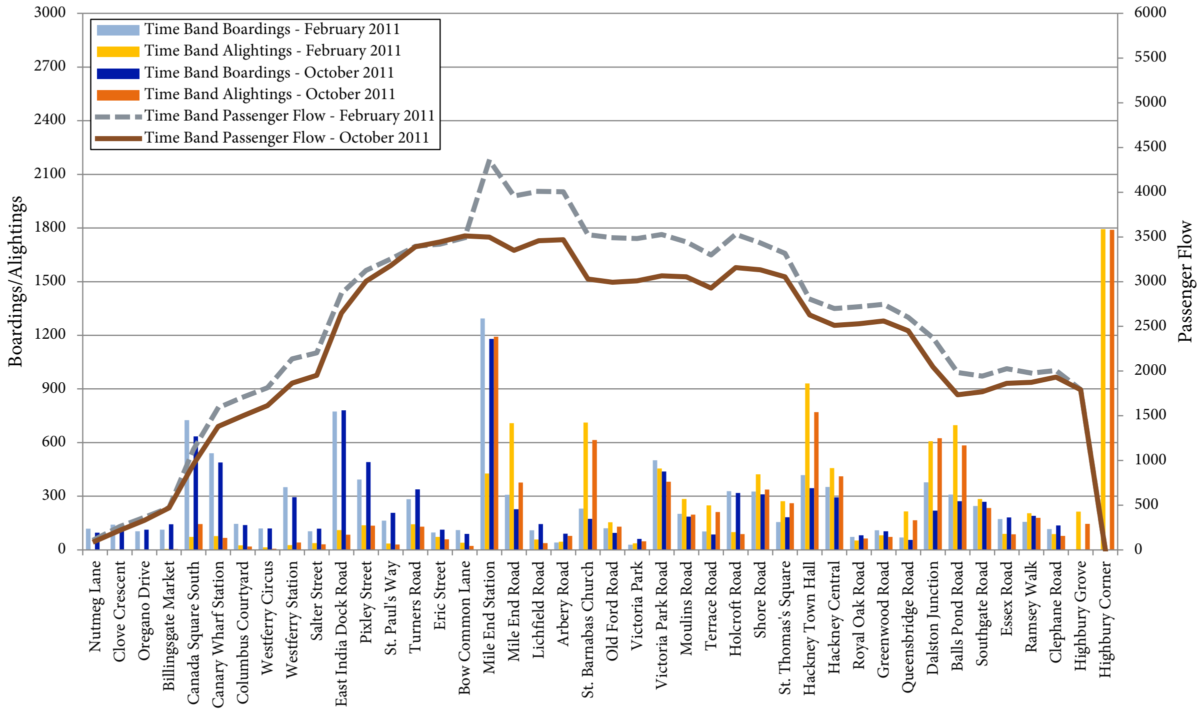
Route 277 - Eastbound, PM Peak - April 2010 vs. October 2011



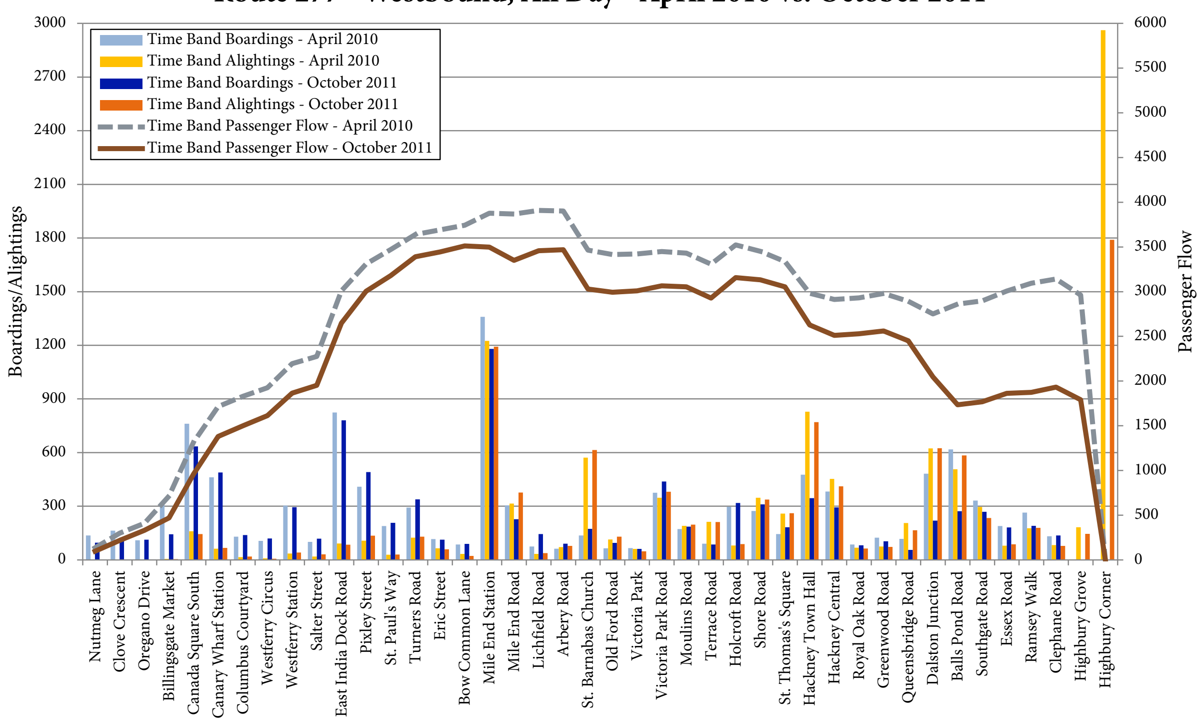
Route 277 - Westbound, All Day - April 2010 vs. February 2011

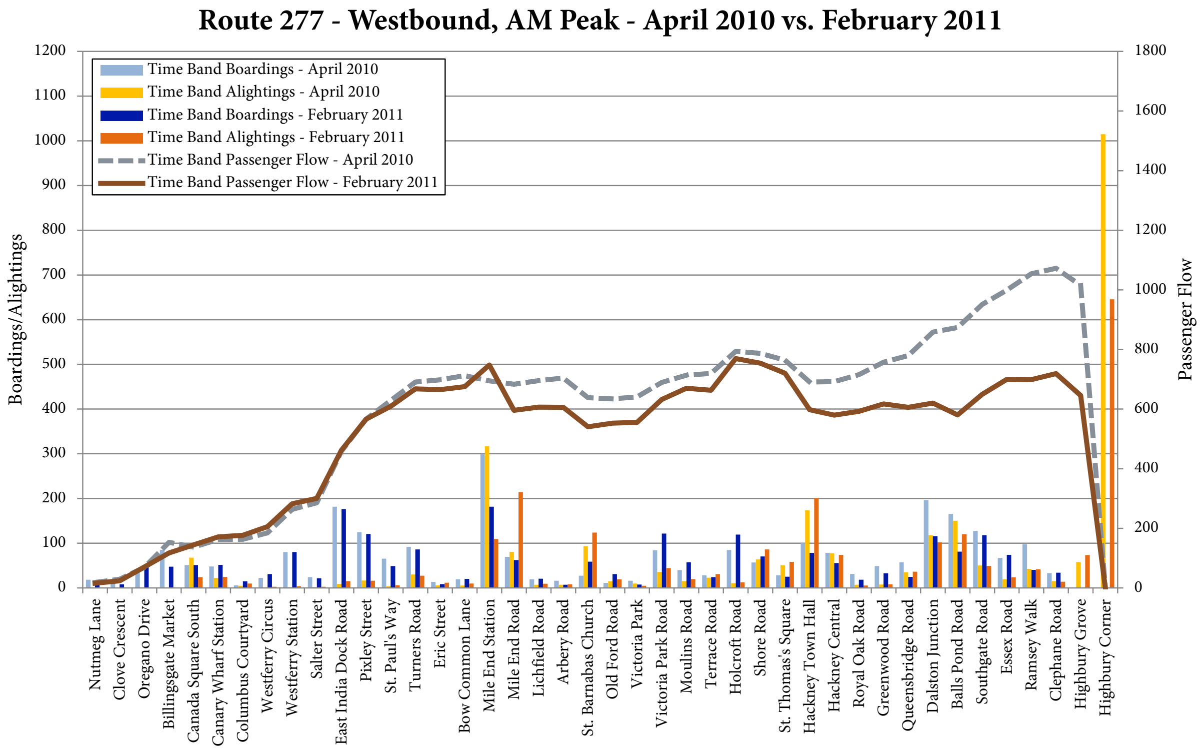


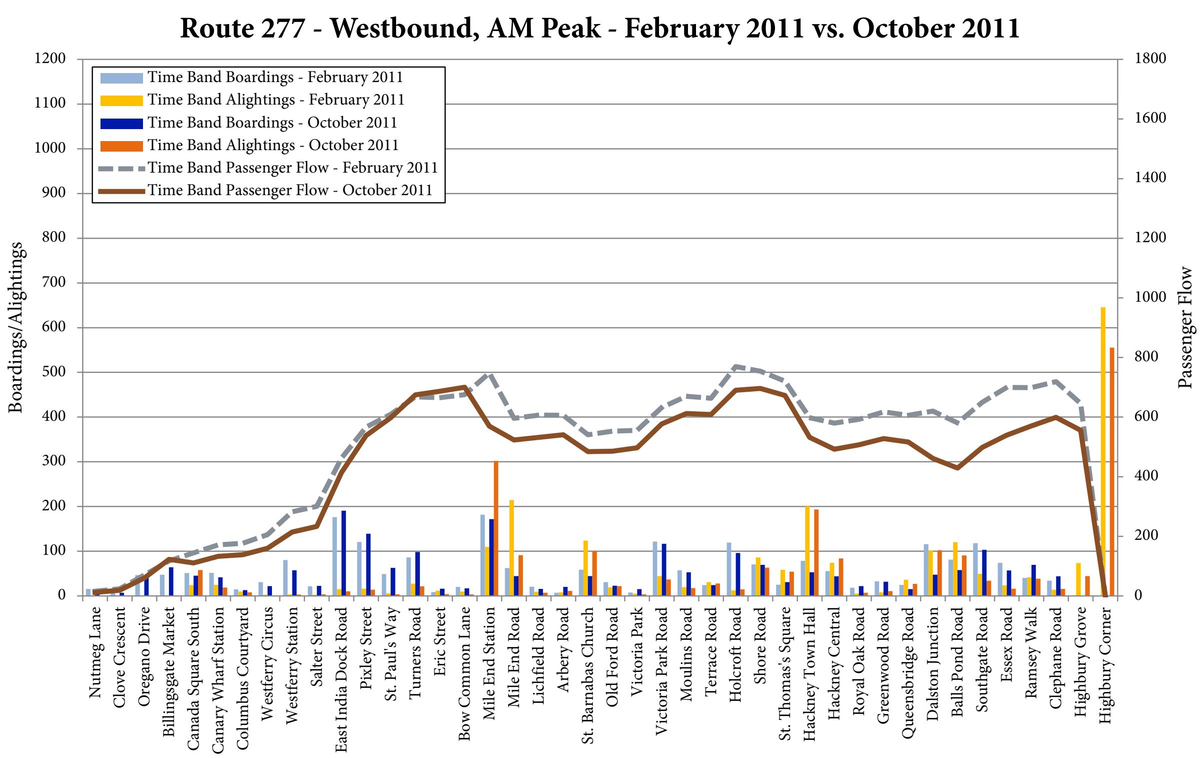
Route 277 - Westbound, All Day - February 2011 vs. October 2011



Route 277 - Westbound, All Day - April 2010 vs. October 2011




Route 277 - Westbound, AM Peak - April 2010 vs. February 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - February 2011
Time Band Alightings - February 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - February 2011
Boardings/Alightings
Passenger Flow
Nutmeg Lane
Clove Crescent
Oregano Drive
Billingsgate Market
Canada Square South
Canary Wharf Station
Columbus Courtyard
Westferry Circus
Westferry Station
Salter Street
East India Dock Road
Pixley Street
St. Paul's Way
Turners Road
Eric Street
Bow Common Lane
Mile End Station
Mile End Road
Lichfield Road
Arbery Road
St. Barnabas Church
Old Ford Road
Victoria Park
Victoria Park Road
Moulins Road
Terrace Road
Holcroft Road
Shore Road
St. Thomas's Square
Hackney Town Hall
Hackney Central
Royal Oak Road
Greenwood Road
Queensbridge Road
Dalston Junction
Balls Pond Road
Southgate Road
Essex Road
Ramsey Walk
Clephane Road
Highbury Grove
Highbury Corner


Route 277 - Westbound, AM Peak - February 2011 vs. October 2011
Time Band Boardings - February 2011
Time Band Alightings - February 2011
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - February 2011
Time Band Passenger Flow - October 2011
Boardings/Alightings
Passenger Flow
Nutmeg Lane
Clove Crescent
Oregano Drive
Billingsgate Market
Canada Square South
Canary Wharf Station
Columbus Courtyard
Westferry Circus
Westferry Station
Salter Street
East India Dock Road
Pixley Street
St. Paul's Way
Turners Road
Eric Street
Bow Common Lane
Mile End Station
Mile End Road
Lichfield Road
Arbery Road
St. Barnabas Church
Old Ford Road
Victoria Park
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St. Thomas's Square
Hackney Town Hall
Hackney Central
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Greenwood Road
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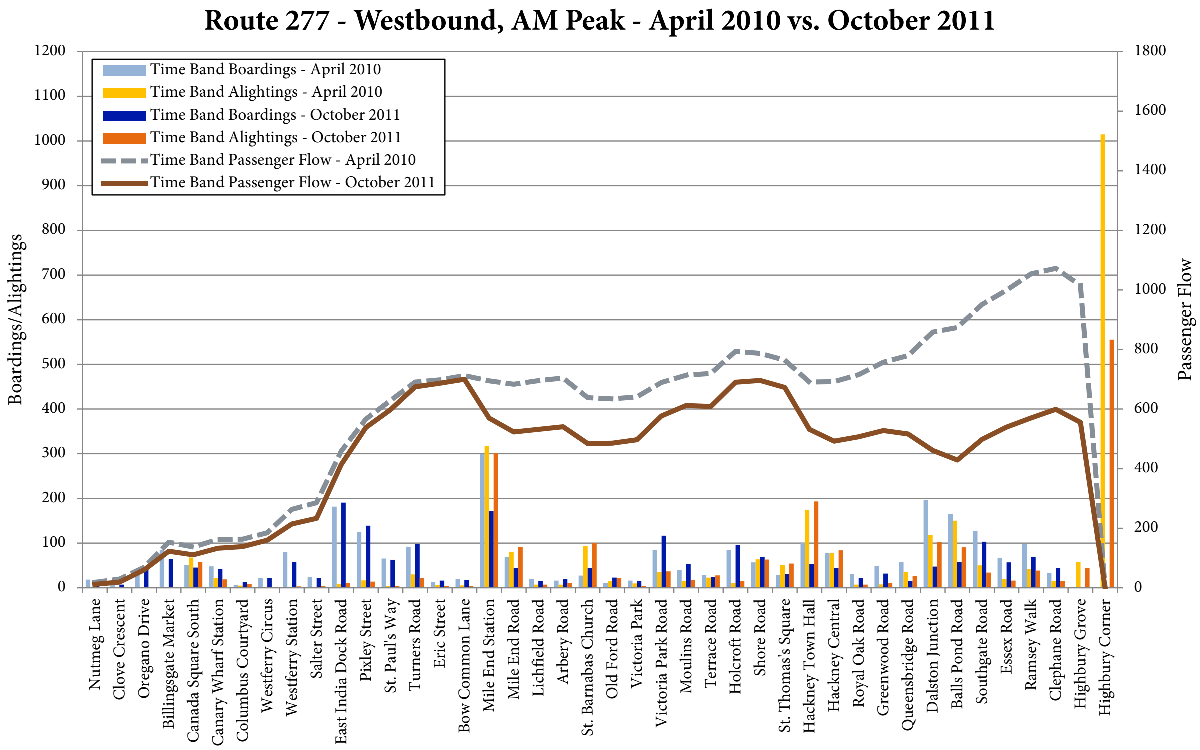
Balls Pond Road
Southgate Road
Essex Road
Ramsey Walk
Clephane Road
Highbury Grove
Highbury Corner



Route 277 - Westbound, AM Peak - April 2010 vs. October 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - October 2011
Boardings/Alightings
Passenger Flow
Nutmeg Lane
Clove Crescent
Oregano Drive
Billingsgate Market
Canada Square South
Canary Wharf Station
Columbus Courtyard
Westferry Circus
Westferry Station
Salter Street
East India Dock Road
Pixley Street
St. Paul's Way
Turners Road
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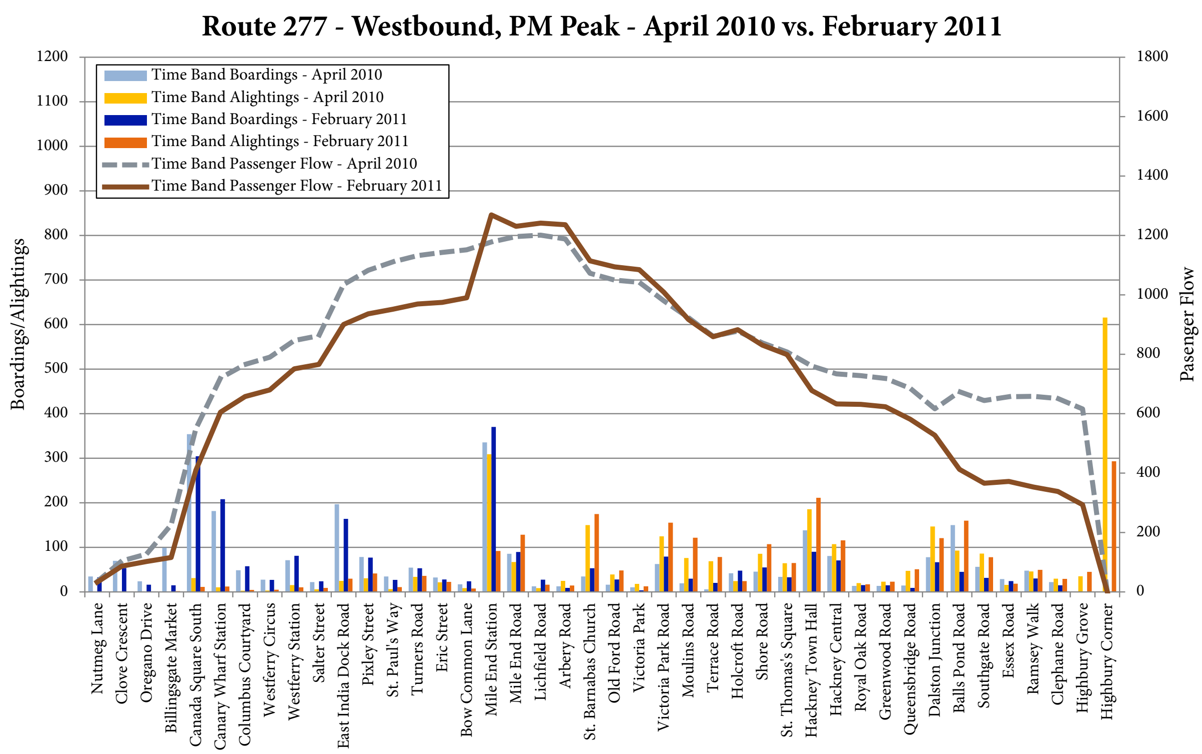
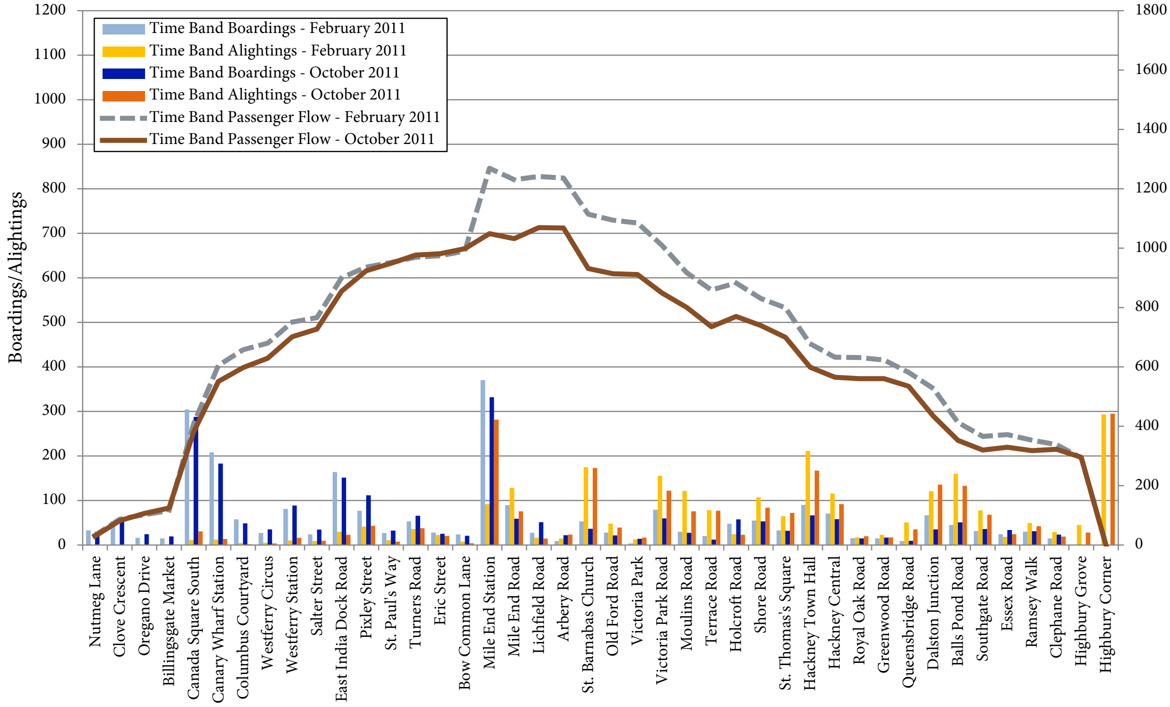
Southgate Road
Essex Road
Ramsey Walk
Clephane Road
Highbury Grove
Highbury Corner

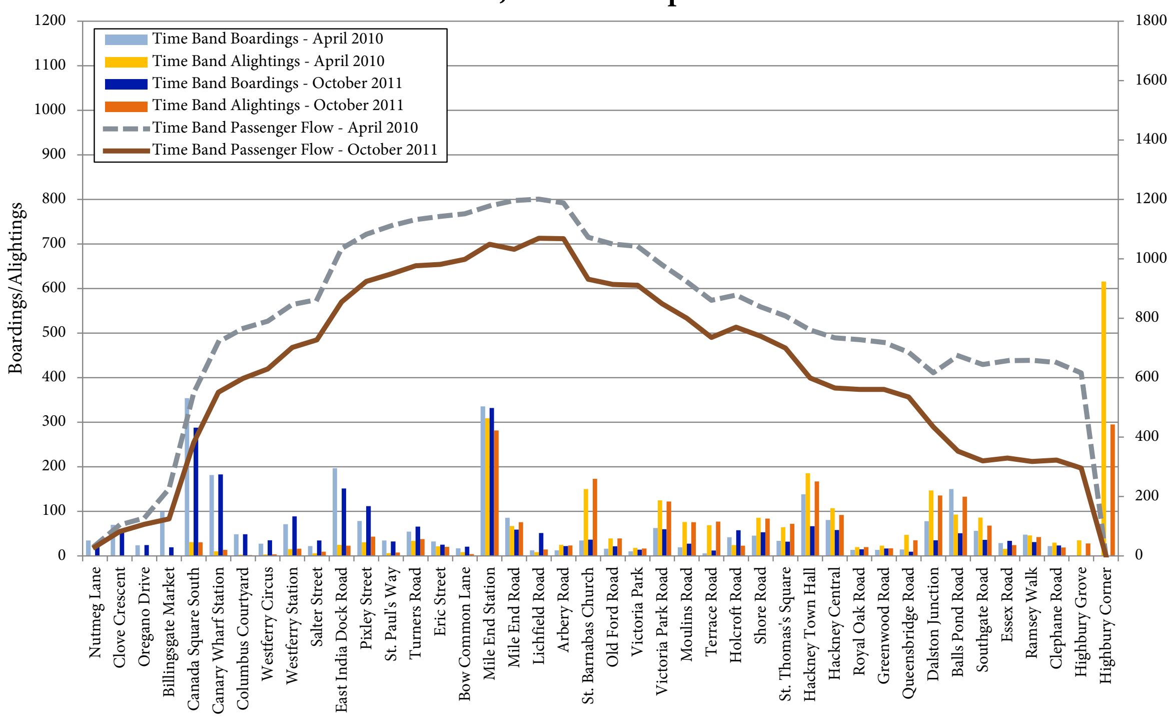


Route 277 - Westbound, PM Peak - April 2010 vs. February 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - February 2011
Time Band Alightings - February 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - February 2011
Boardings/Alightings
Pasenger Flow

Route 277 - Westbound, PM Peak - February 2011 vs. October 2011



Route 277 - Westbound, PM Peak - April 2010 vs. October 2011



Route 277 - April 2010 vs. February 2011				
Entire Route				
Passenger Counts		Apr-10	Feb-11	Percent Change
Westbound	All Day	11134	10447	-6.2%
	AM Peak	2669	2290	-14.2%
	PM Peak	2704	2449	-9.4%
Eastbound	All Day	11665	10916	-6.4%
	AM Peak	2786	2548	-8.5%
	PM Peak	2574	2396	-6.9%
Both	All Day	22799	21363	-6.3%
System-Wide	All Day	6481026	6627919	2.3%

Route 277 - February 2011 vs. October 2011				
Entire Route				
Passenger Counts		Feb-11	Oct-11	Percent Change
Westbound	All Day	10447	9945	-4.8%
	AM Peak	2290	2121	-7.4%
	PM Peak	2449	2363	-3.5%
Eastbound	All Day	10916	10435	-4.4%
	AM Peak	2548	2425	-4.8%
	PM Peak	2396	2220	-7.3%
Both	All Day	21363	20380	-4.6%
System-Wide	All Day	6627919	6765182	2.1%

Route 277 - April 2010 vs. October 2011				
Entire Route				
Passenger Counts		Apr-10	Oct-11	Percent Change
Westbound	All Day	11134	9945	-10.7%
	AM Peak	2669	2121	-20.5%
	PM Peak	2704	2363	-12.6%
Eastbound	All Day	11665	10435	-10.5%
	AM Peak	2786	2425	-12.9%
	PM Peak	2574	2220	-13.7%
Both	All Day	22799	20380	-10.6%
System-Wide	All Day	6481026	6765182	4.4%

A.10 Kingsland Road Corridor

For much of its journey through Hackney, the East London Line parallels a heavily served bus corridor along Kingsland Road. Route 67 runs from Wood Green station to Aldgate station, with minimum frequencies of five buses per hour in the peak. The 149 stays on the A10 nearly its entire route, running from Edmonton Green station to London Bridge station with 12 buses per hour in the peak. The only east-west route, the 242, runs west from Homerton station until meeting Kingsland Road, turns south along the corridor where it parallels the ELL, and then turns west again south of Shoreditch High Street station to head to Tottenham Court Road station. It has frequencies of about eight to ten buses per hour for much of the day. Route 243 also starts at Wood Green station, takes a slightly different route than the 67 to meet up with the A10, and then heads south, leaving the corridor between Hoxton station and Shoreditch High Street station to travel to Waterloo station. Peak frequencies are 15 buses per hour.

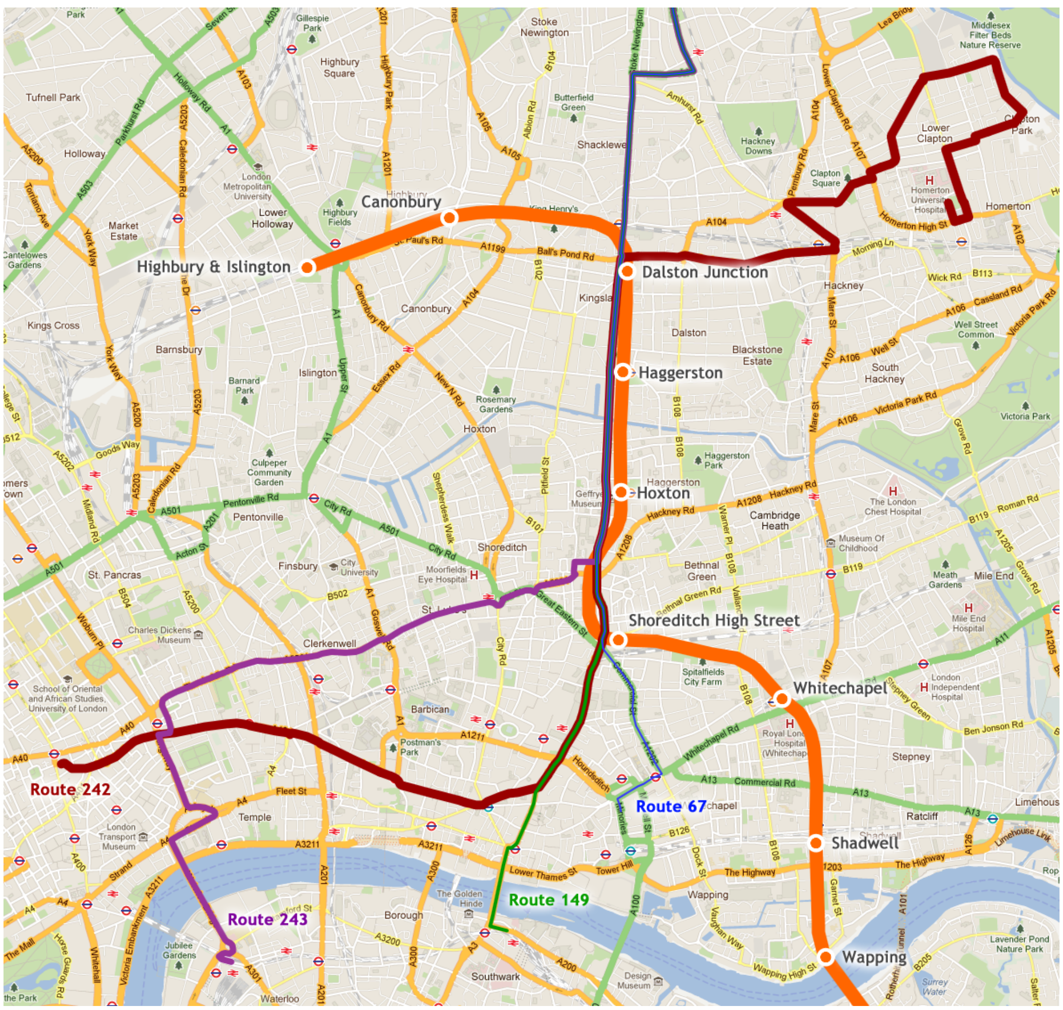
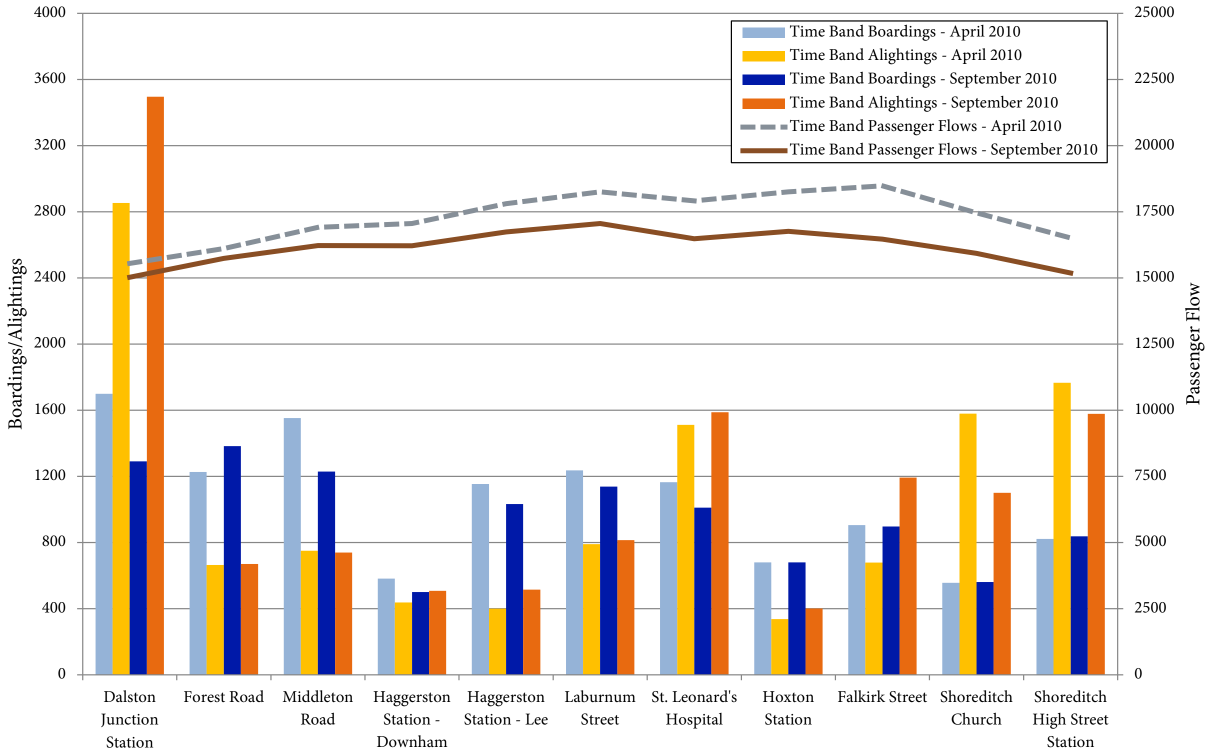
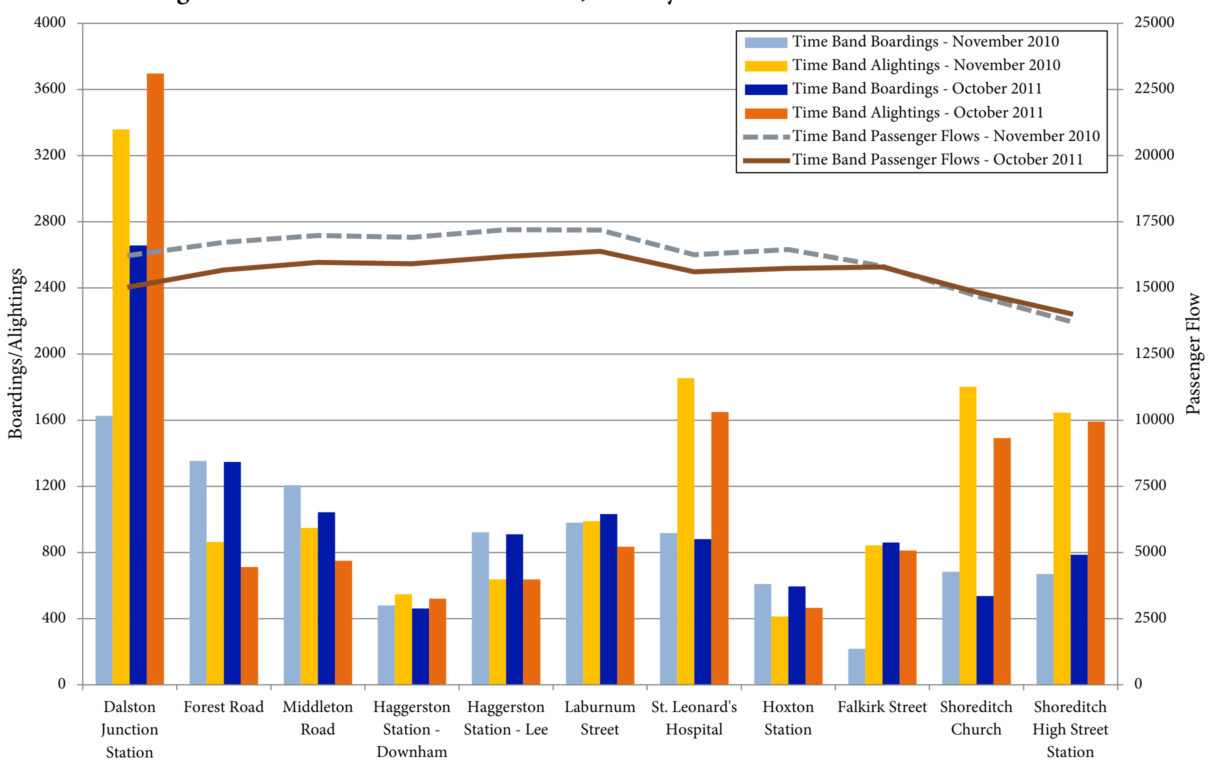


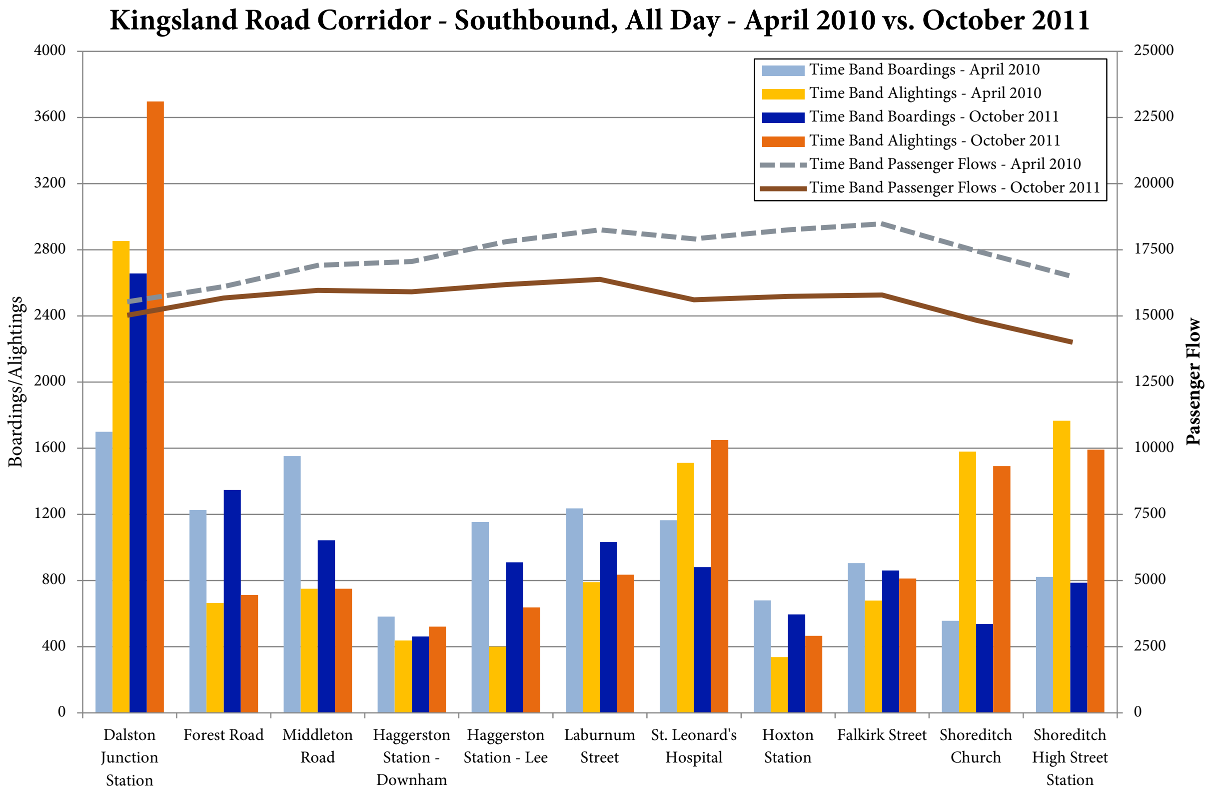
Figure 3-6: Map of the Bus Routes Serving the Kingsland Road Corridor

Kingsland Road Corridor - Southbound, All Day - April 2010 vs. September 2010



Kingsland Road Corridor - Southbound, All Day - November 2010 vs. October 2011




Kingsland Road Corridor - Southbound, All Day - April 2010 vs. October 2011
Boardings/Alightings
Passenger Flow
0
400
800
1200
1600
2000
2400
2800
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3600
4000
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5000
7500
10000
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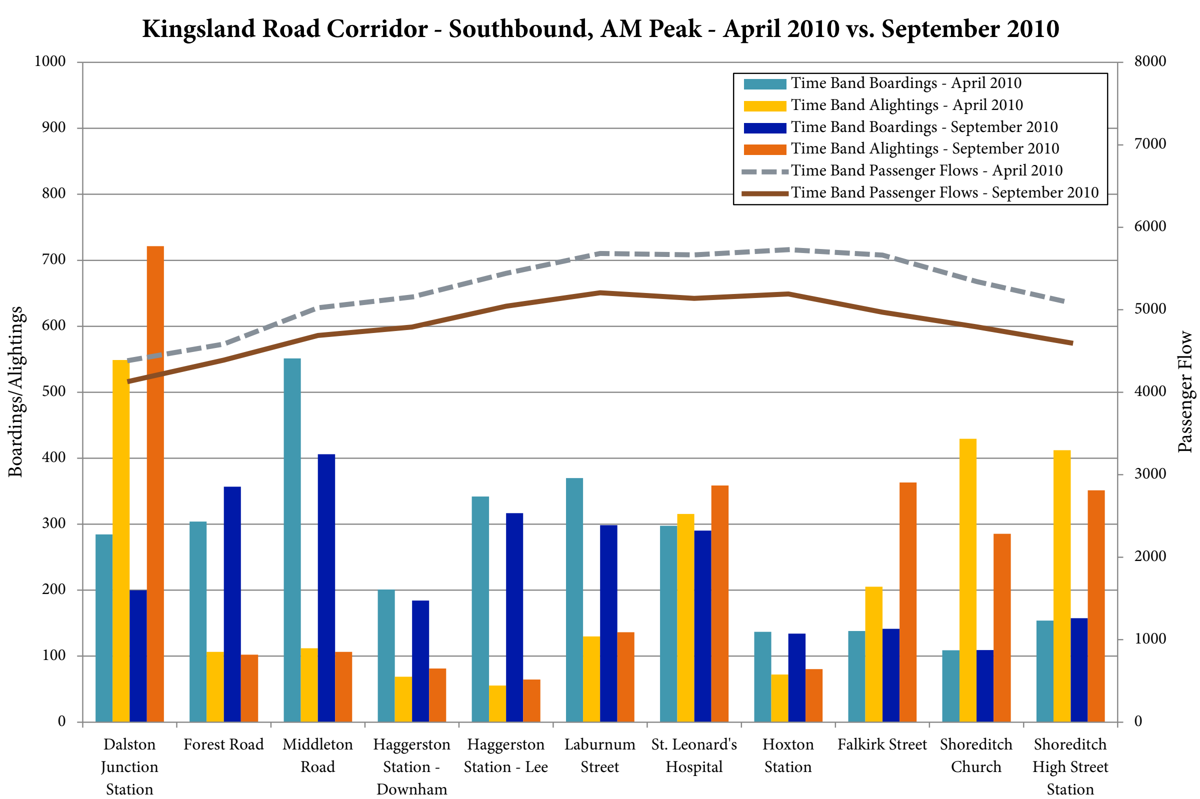
15000
17500
20000
22500
25000
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - October 2011
Dalston Junction Station
Forest Road
Middleton Road
Haggerston Station - Downham
Haggerston Station - Lee
Laburnum Street
St. Leonard's Hospital
Hoxton Station
Falkirk Street
Shoreditch Church
Shoreditch High Street Station


Kingsland Road Corridor - Southbound, AM Peak - April 2010 vs. September 2010
Boardings/Alightings
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Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - September 2010
Time Band Alightings - September 2010
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - September 2010
Dalston Junction Station
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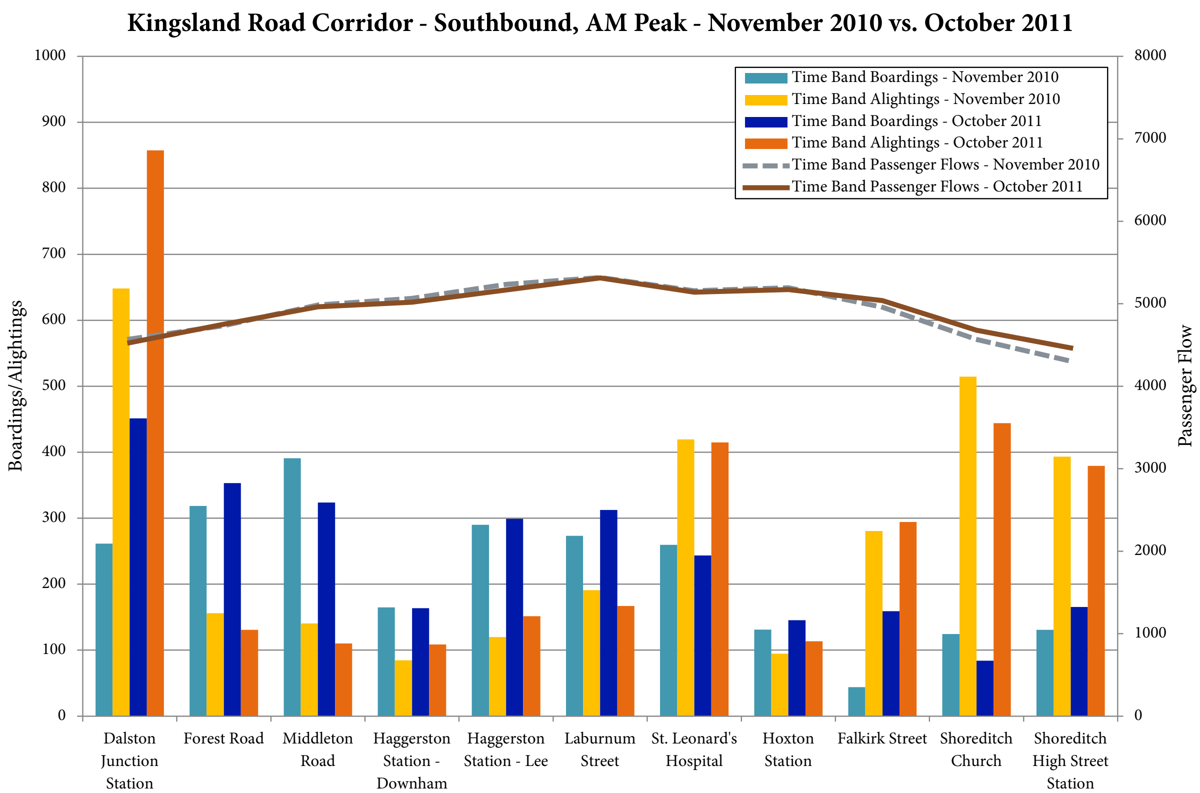

Kingsland Road Corridor - Southbound, AM Peak - November 2010 vs. October 2011
Time Band Boardings - November 2010
Time Band Alightings - November 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flows - November 2010
Time Band Passenger Flows - October 2011
Boardings/Alightings
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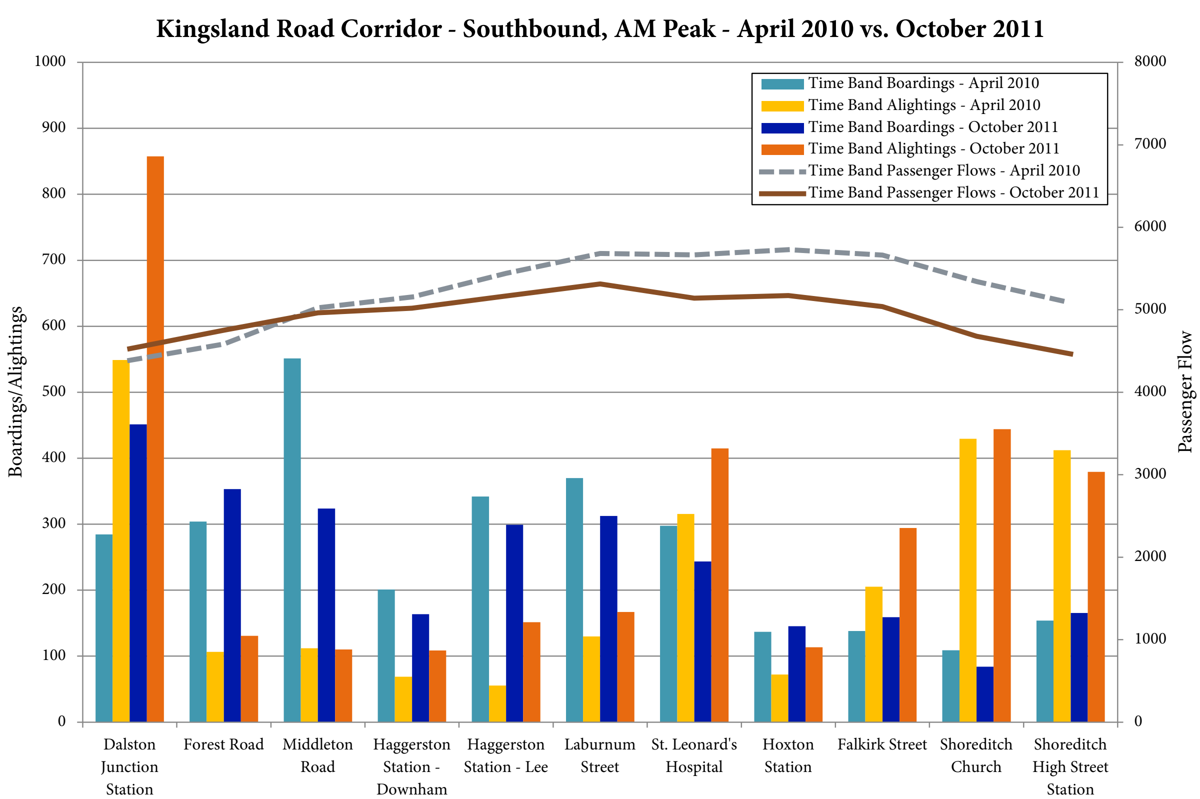

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Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
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Time Band Passenger Flows - October 2011
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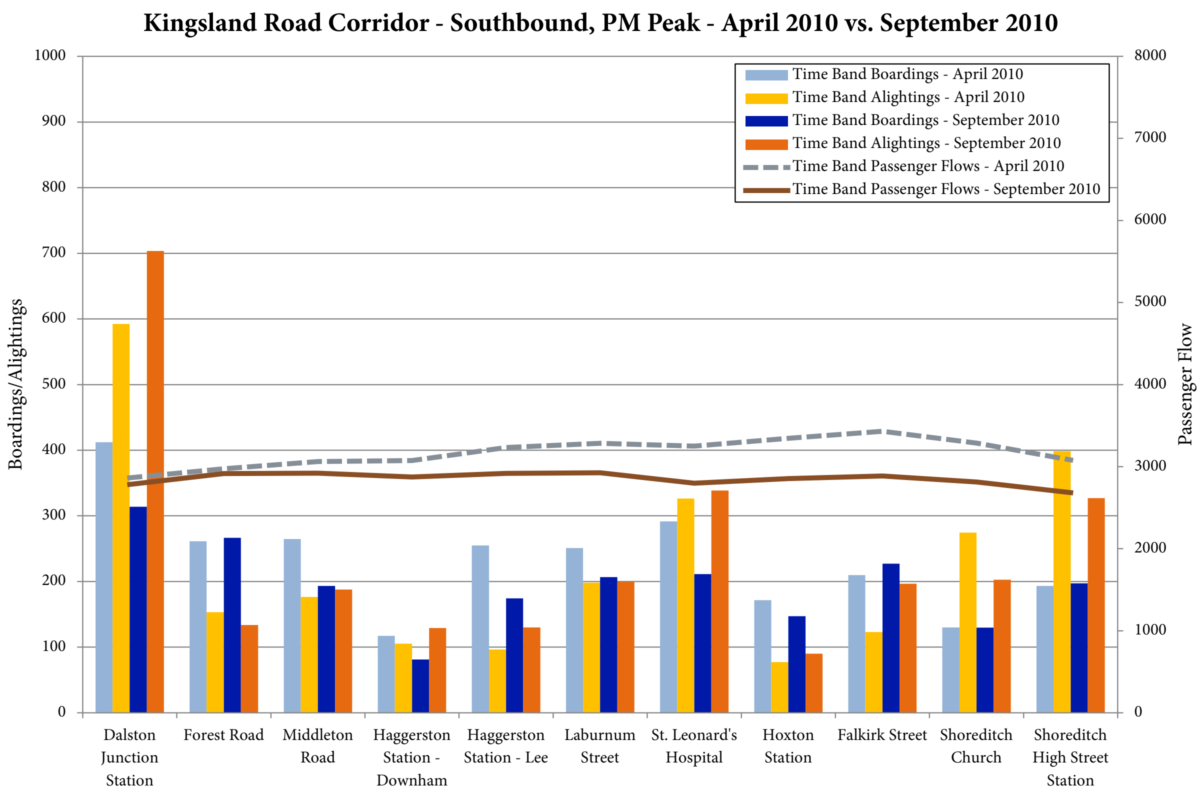
Kingsland Road Corridor - Southbound, PM Peak - April 2010 vs. September 2010
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Time Band Alightings - April 2010
Time Band Boardings - September 2010
Time Band Alightings - September 2010
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - September 2010
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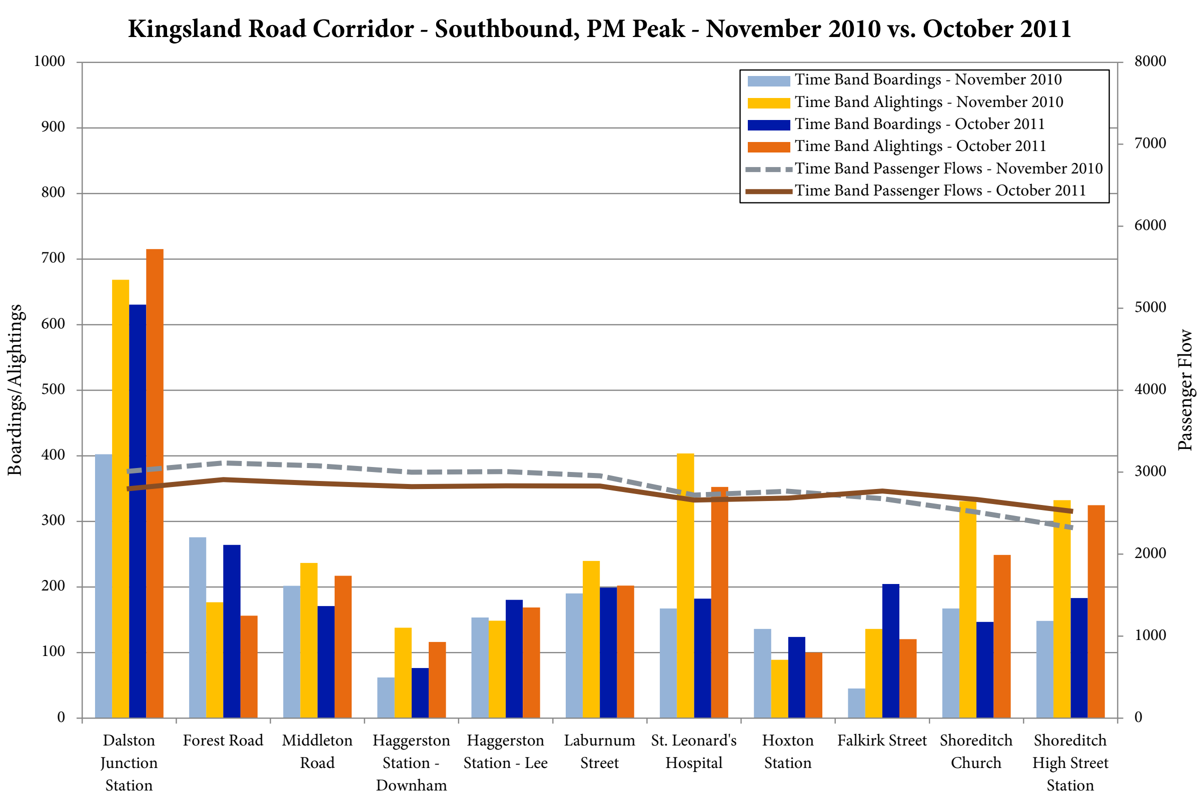
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Time Band Boardings - October 2011
Time Band Alightings - October 2011
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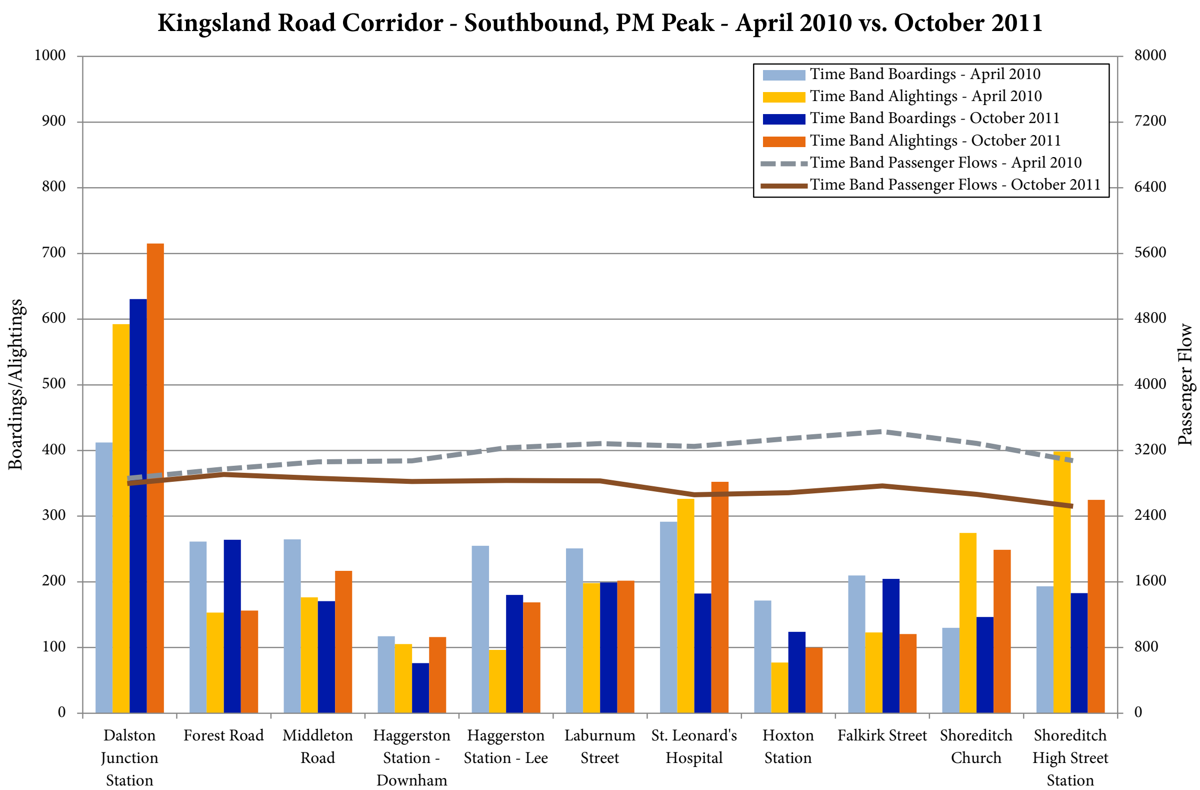
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Time Band Alightings - October 2011
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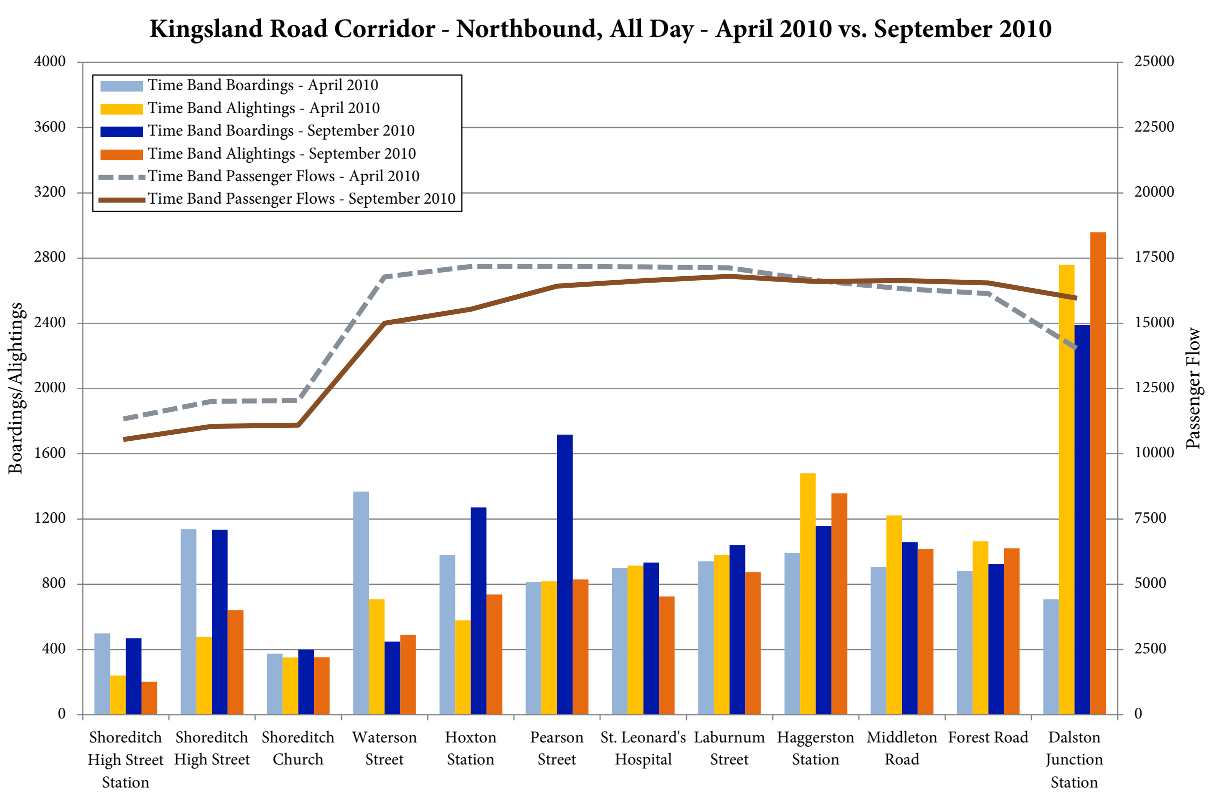
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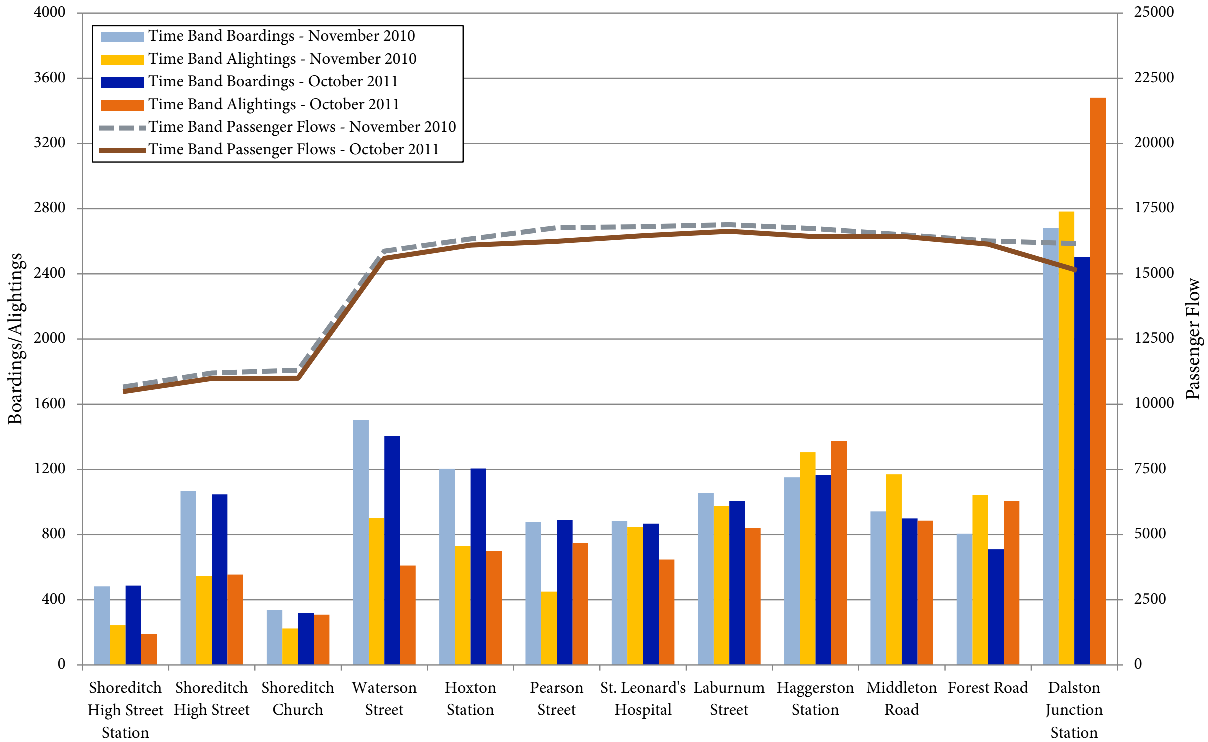
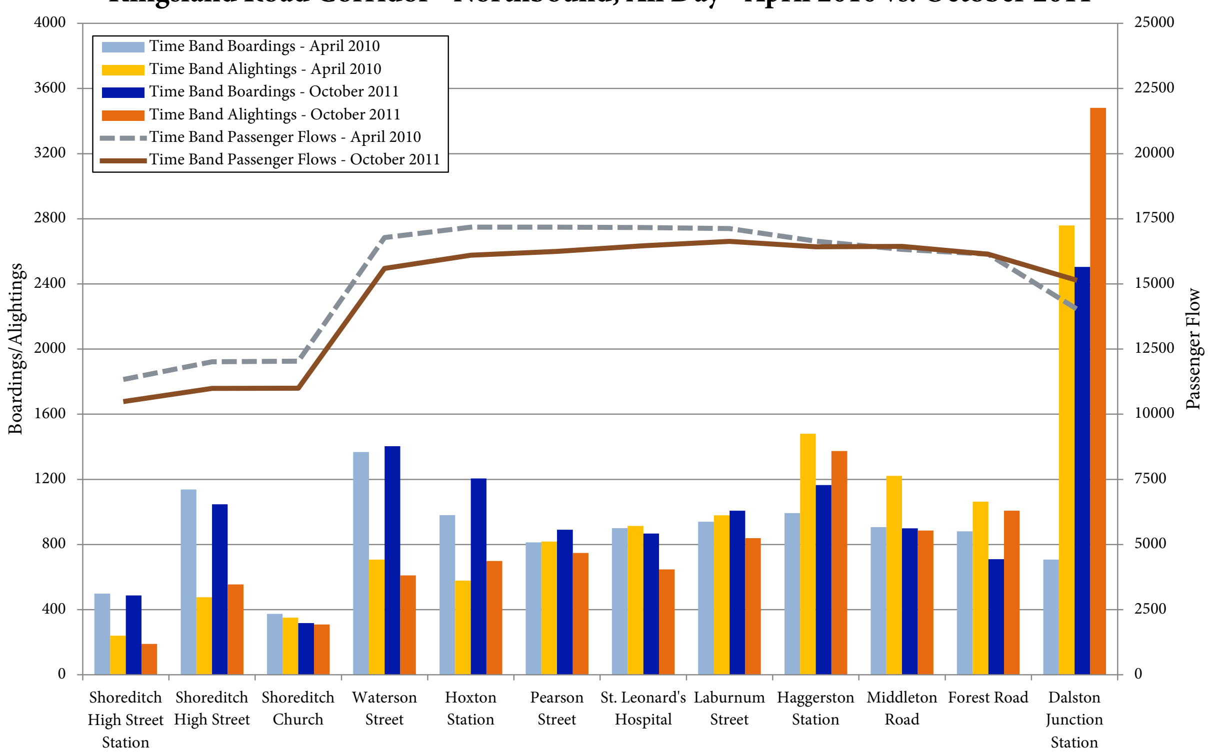
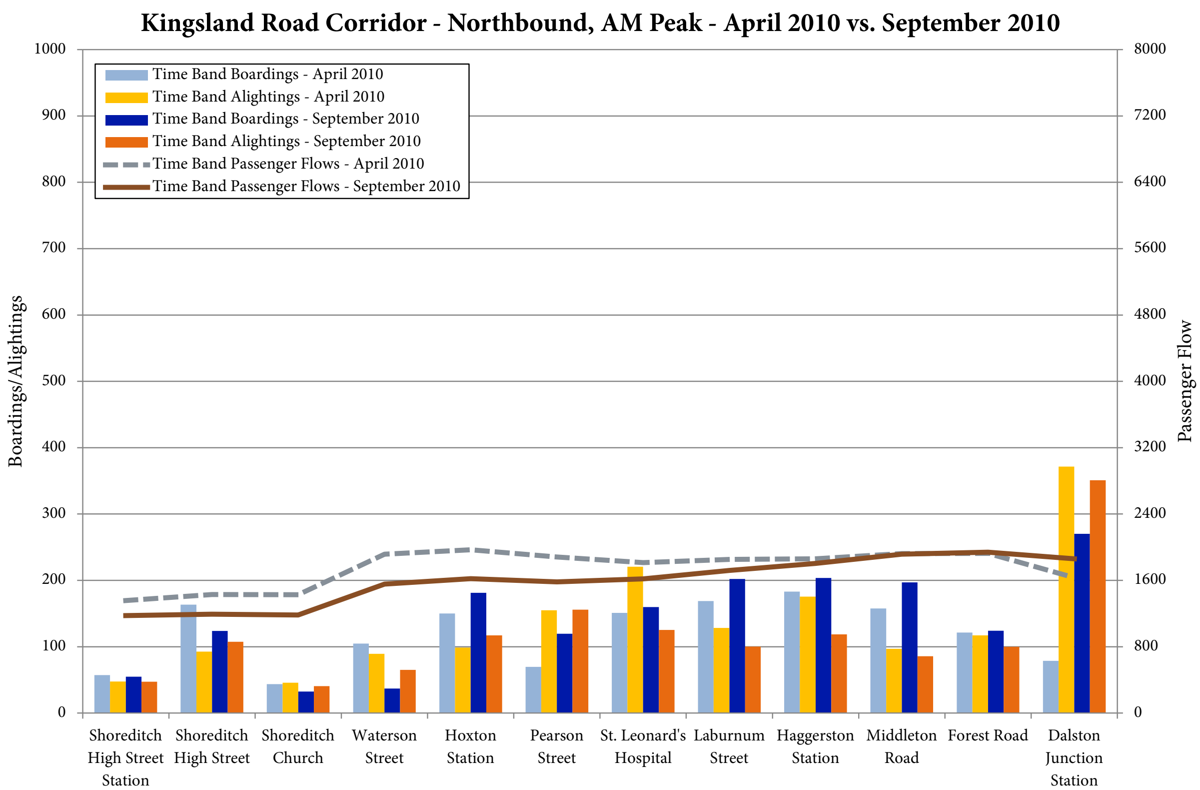
Kingsland Road Corridor - Northbound, All Day - November 2010 vs. October 2011



Kingsland Road Corridor - Northbound, All Day - April 2010 vs. October 2011





Kingsland Road Corridor - Northbound, AM Peak - April 2010 vs. September 2010
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Time Band Boardings - September 2010
Time Band Alightings - September 2010
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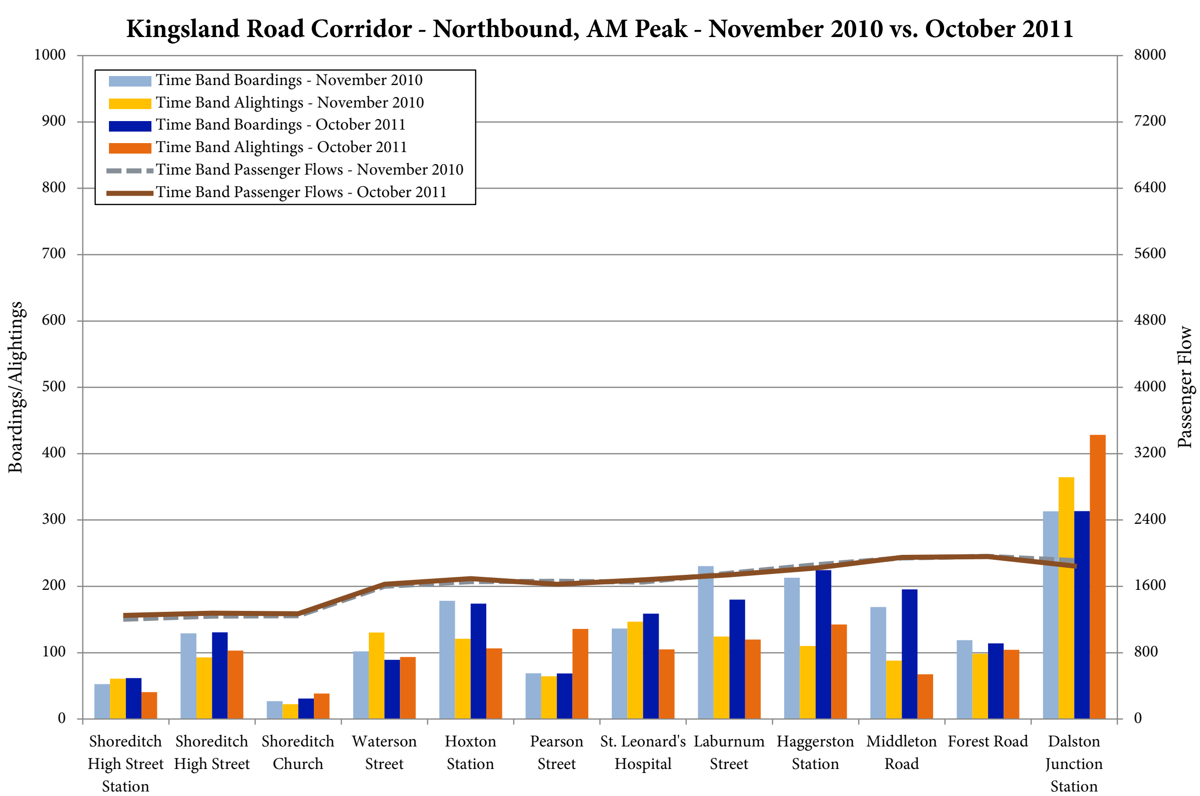

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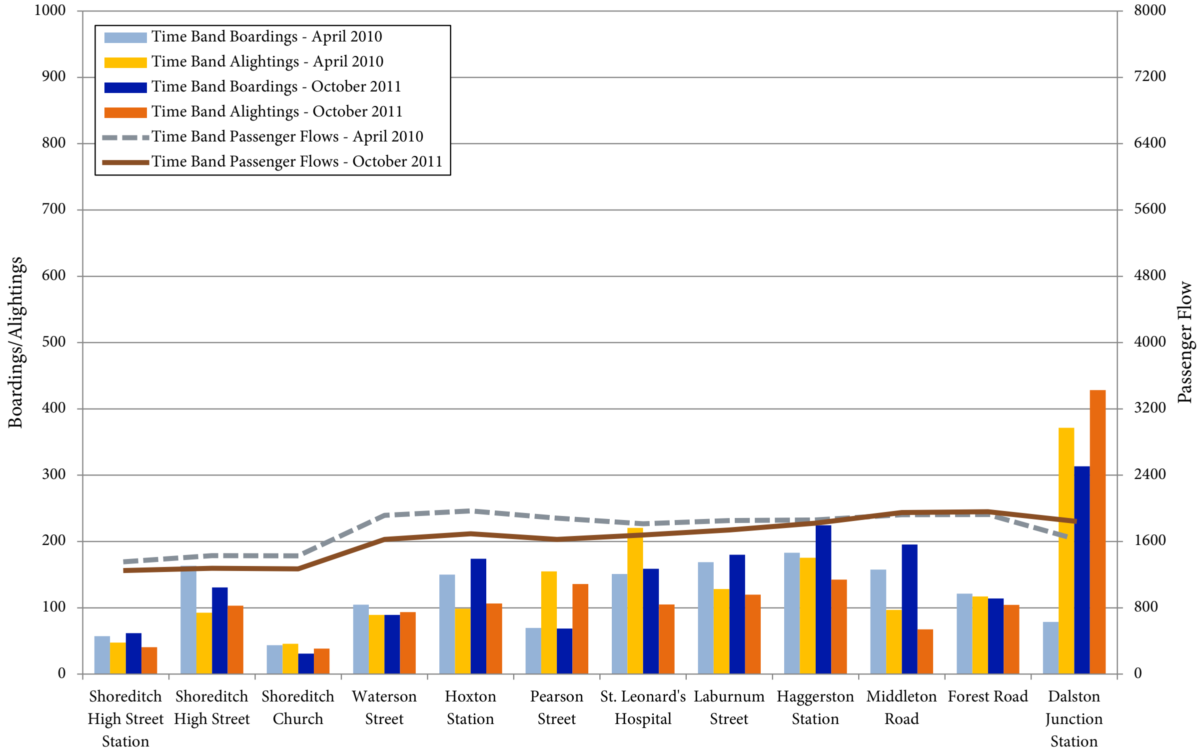
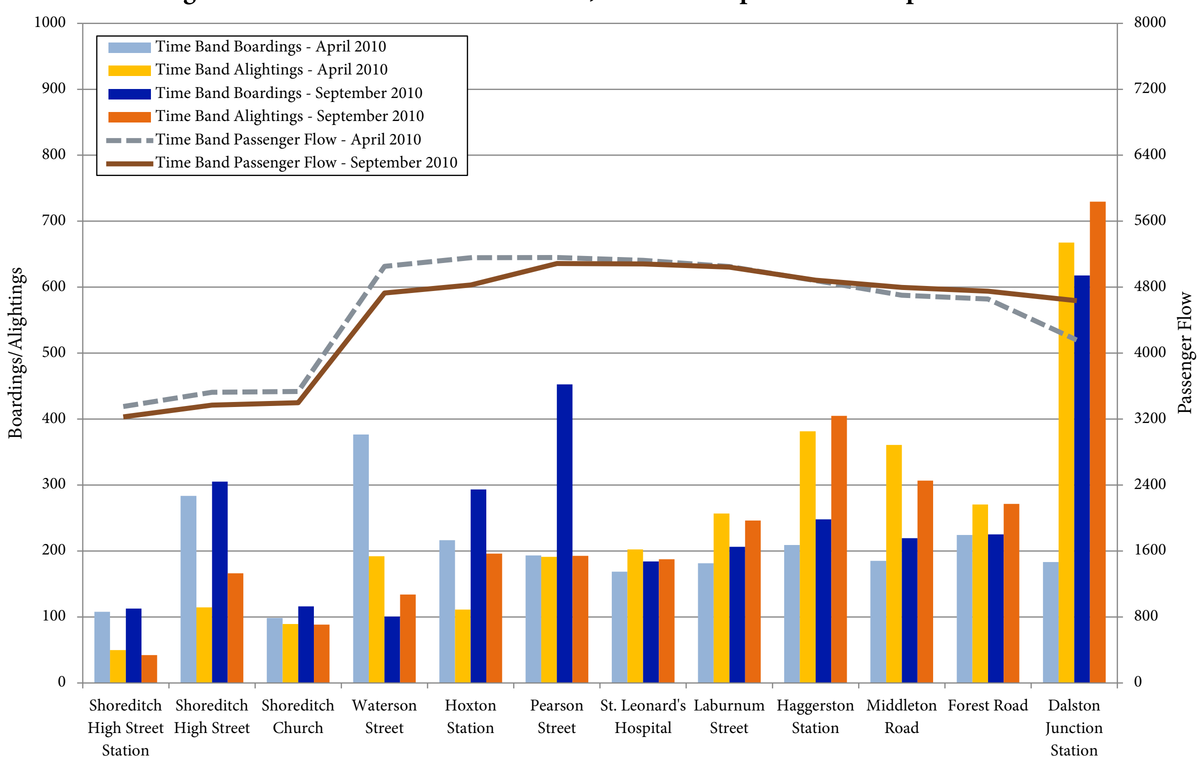
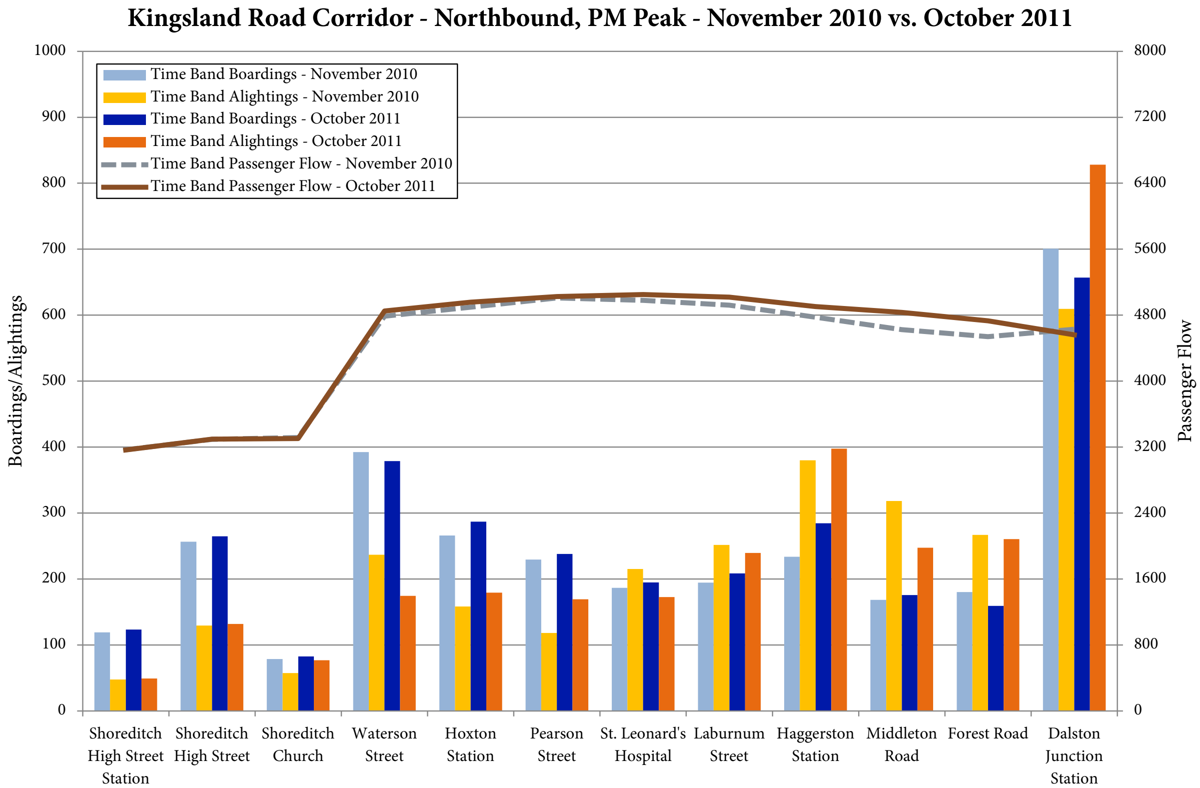
Kingsland Road Corridor - Northbound, AM Peak - April 2010 vs. October 2011



Kingsland Road Corridor - Northbound, PM Peak - April 2010 vs. September 2010

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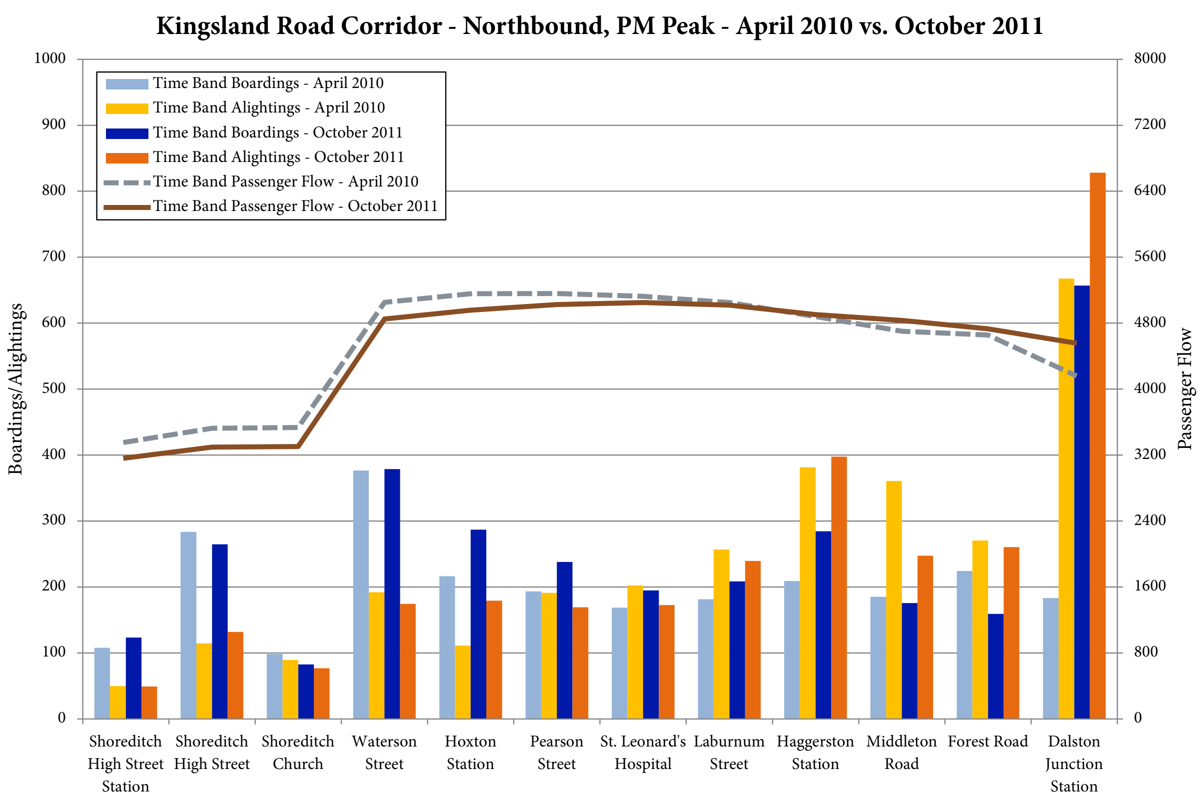
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Time Band Boardings - October 2011
Time Band Alightings - October 2011
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Time Band Passenger Flow - October 2011
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Pearson Street
St. Leonard's Hospital
Laburnum Street
Haggerston Station
Middleton Road
Forest Road
Dalston Junction Station

Kingsland Road Corridor - Southbound - All Day

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	29156	30414	6623	6301	7917	7433	43696	44148
		1259	4%	-322	-5%	-485	-6%	452	1%
	Corridor			3284	2806	6621	6805	9905	9611
				-478	-15%	184	3%	-294	-3%
	After					7086	8237	7086	8237
						1151	16%	1151	16%
	Total	29156	30414	9907	9107	21624	22474	60687	61996
		1259	4%	-800	-8%	850	4%	1309	2%

Kingsland Road Corridor - Southbound - All Day

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	31468	32051	7279	5709	7327	6738	46074	44498
		583	2%	-1570	-22%	-589	-8%	-1576	-3%
	Corridor			3268	3793	5610	6465	8879	10258
				525	16%	854	15%	1380	16%
	After					7044	7707	7044	7707
						663	9%	663	9%
	Total	31468	32051	10547	9502	19981	20910	61996	62463
		583	2%	-1045	-10%	929	5%	467	1%

Kingsland Road Corridor - Southbound - All Day

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	29156	32051	6623	5709	7917	6738	43696	44498
		2895	10%	-914	-14%	-1179	-15%	802	2%
	Corridor			3284	3793	6621	6465	9905	10258
				509	15%	-156	-2%	353	4%
	After					7086	7707	7086	7707
						620	9%	620	9%
	Total	29156	32051	9907	9502	21624	20910	60687	62463
		2895	10%	-405	-4%	-715	-3%	1776	3%

Kingsland Road Corridor - Southbound - AM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	5175	6057	1600	1433	2786	2501	9561	9991
		882	17%	-167	-10%	-284	-10%	430	5%
	Corridor			641	497	1947	1913	2588	2410
				-144	-23%	-34	-2%	-178	-7%
	After					1354	1388	1354	1388
						35	3%	35	3%
	Total	5175	6057	2242	1930	6087	5803	13504	13790
		882	17%	-312	-14%	-283	-5%	287	2%

Kingsland Road Corridor - Southbound - AM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	5973	6697	1793	1628	2519	2460	10285	10786
		724	12%	-164	-9%	-59	-2%	501	5%
	Corridor			602	690	1622	1828	2224	2518
				88	15%	206	13%	294	13%
	After					1281	1320	1281	1320
						39	3%	39	3%
	Total	5973	6697	2395	2318	5422	5609	13790	14624
		724	12%	-76	-3%	186	3%	834	6%

Kingsland Road Corridor - Southbound - AM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	5175	6697	1600	1628	2786	2460	9561	10786
		1522	29%	28	2%	-325	-12%	1225	13%
	Corridor			641	690	1947	1828	2588	2518
				49	8%	-119	-6%	-70	-3%
	After					1354	1320	1354	1320
						-34	-3%	-34	-3%
	Total	5175	6697	2242	2318	6087	5609	13504	14624
		1522	29%	77	3%	-478	-8%	1121	8%

Kingsland Road Corridor - Southbound - PM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	6796	6785	1343	1322	1219	1147	9358	9254
		-11	0%	-21	-2%	-72	-6%	-104	-1%
	Corridor			787	613	1328	1314	2115	1927
				-174	-22%	-14	-1%	-188	-9%
	After					1914	2507	1914	2507
						593	31%	593	31%
	Total	6796	6785	2130	1935	4461	4968	13387	13688
		-11	0%	-195	-9%	507	11%	301	2%

Kingsland Road Corridor - Southbound - PM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	7268	7558	1479	1151	1129	1035	9875	9744
		291	4%	-328	-22%	-94	-8%	-131	-1%
	Corridor			743	866	1029	1293	1772	2159
				123	16%	264	26%	387	22%
	After					2041	2563	2041	2563
						523	26%	523	26%
	Total	7268	7558	2223	2018	4198	4891	13688	14466
		291	4%	-205	-9%	693	16%	778	6%

Kingsland Road Corridor - Southbound - PM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	6796	7558	1343	1151	1219	1035	9358	9744
		762	11%	-192	-14%	-185	-15%	386	4%
	Corridor			787	866	1328	1293	2115	2159
				79	10%	-35	-3%	44	2%
	After					1914	2563	1914	2563
						649	34%	649	34%
	Total	6796	7558	2130	2018	4461	4891	13387	14466
		762	11%	-113	-5%	429	10%	1079	8%

Kingsland Road Corridor - Northbound - All Day

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	6732	7333	7550	7279	7626	6489	21907	21101
		601	9%	-271	-4%	-1136	-15%	-806	-4%
	Corridor			3598	3548	6277	7101	9875	10649
				-50	-1%	824	13%	774	8%
	After					28176	29727	28176	29727
						1551	6%	1551	6%
	Total	6732	7333	11148	10827	42078	43318	59958	61478
		601	9%	-321	-3%	1239	3%	1520	3%

Kingsland Road Corridor - Northbound - All Day

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	6372	6910	7079	7119	6674	6391	20124	20421
		538	8%	41	1%	-283	-4%	296	1%
	Corridor			3613	3840	6811	6314	10423	10154
				228	6%	-497	-7%	-269	-3%
	After					30930	31544	30930	31544
						614	2%	614	2%
	Total	6372	6910	10691	10960	44414	44249	61478	62119
		538	8%	268	3%	-166	0%	641	1%

Kingsland Road Corridor - Northbound - All Day

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	6732	6910	7550	7119	7626	6391	21907	20421
		179	3%	-430	-6%	-1234	-16%	-1486	-7%
	Corridor			3598	3840	6277	6314	9875	10154
				242	7%	37	1%	279	3%
	After					28176	31544	28176	31544
						3368	12%	3368	12%
	Total	6732	6910	11148	10960	42078	44249	59958	62119
		179	3%	-189	-2%	2171	5%	2161	4%

Kingsland Road Corridor - Northbound - AM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1831	2103	1013	890	702	606	3546	3598
		272	15%	-123	-12%	-96	-14%	53	1%
	Corridor			516	457	805	983	1321	1439
				-60	-12%	178	22%	118	9%
	After					5326	5324	5326	5324
						-1	0%	-1	0%
	Total	1831	2103	1529	1346	6832	6913	10192	10362
		272	15%	-183	-12%	81	1%	170	2%

Kingsland Road Corridor - Northbound - AM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1863	2246	835	910	667	613	3365	3770
		383	21%	75	9%	-54	-8%	404	12%
	Corridor			500	518	931	926	1431	1444
				17	3%	-5	0%	13	1%
	After					5565	5930	5565	5930
						364	7%	364	7%
	Total	1863	2246	1335	1428	7164	7469	10362	11144
		383	21%	93	7%	306	4%	782	8%

Kingsland Road Corridor - Northbound - AM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1831	2246	1013	910	702	613	3546	3770
		416	23%	-103	-10%	-89	-13%	224	6%
	Corridor			516	518	805	926	1321	1444
				2	0%	122	15%	123	9%
	After					5326	5930	5326	5930
						604	11%	604	11%
	Total	1831	2246	1529	1428	6832	7469	10192	11144
		416	23%	-101	-7%	637	9%	952	9%

Kingsland Road Corridor - Northbound - PM Peak

Apr-10	Sep-10	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1567	1710	2051	2124	2397	2269	6014	6104
		144	9%	73	4%	-128	-5%	89	1%
	Corridor			690	747	1604	1765	2294	2511
				57	8%	161	10%	217	9%
	After					6552	6835	6552	6835
						283	4%	283	4%
	Total	1567	1710	2741	2870	10553	10869	14860	15450
		144	9%	130	5%	316	3%	590	4%

Kingsland Road Corridor - Northbound - PM Peak

Nov-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1402	1612	1966	2014	2267	2256	5635	5882
		210	15%	48	2%	-11	-1%	247	4%
	Corridor			681	790	1662	1659	2343	2450
				109	16%	-3	0%	106	5%
	After					7055	7520	7055	7520
						464	7%	464	7%
	Total	1402	1612	2647	2805	10984	11434	15034	15852
		210	15%	157	6%	450	4%	817	5%

Kingsland Road Corridor - Northbound - PM Peak

Apr-10	Oct-11	Alighting							
Change	Percent	Before		Corridor		After		Total	
Boarding	Before	1567	1612	2051	2014	2397	2256	6014	5882
		46	3%	-36	-2%	-141	-6%	-132	-2%
	Corridor			690	790	1604	1659	2294	2450
				100	15%	55	3%	156	7%
	After					6552	7520	6552	7520
						967	15%	967	15%
	Total	1567	1612	2741	2805	10553	11434	14860	15852
		46	3%	64	2%	881	8%	991	7%

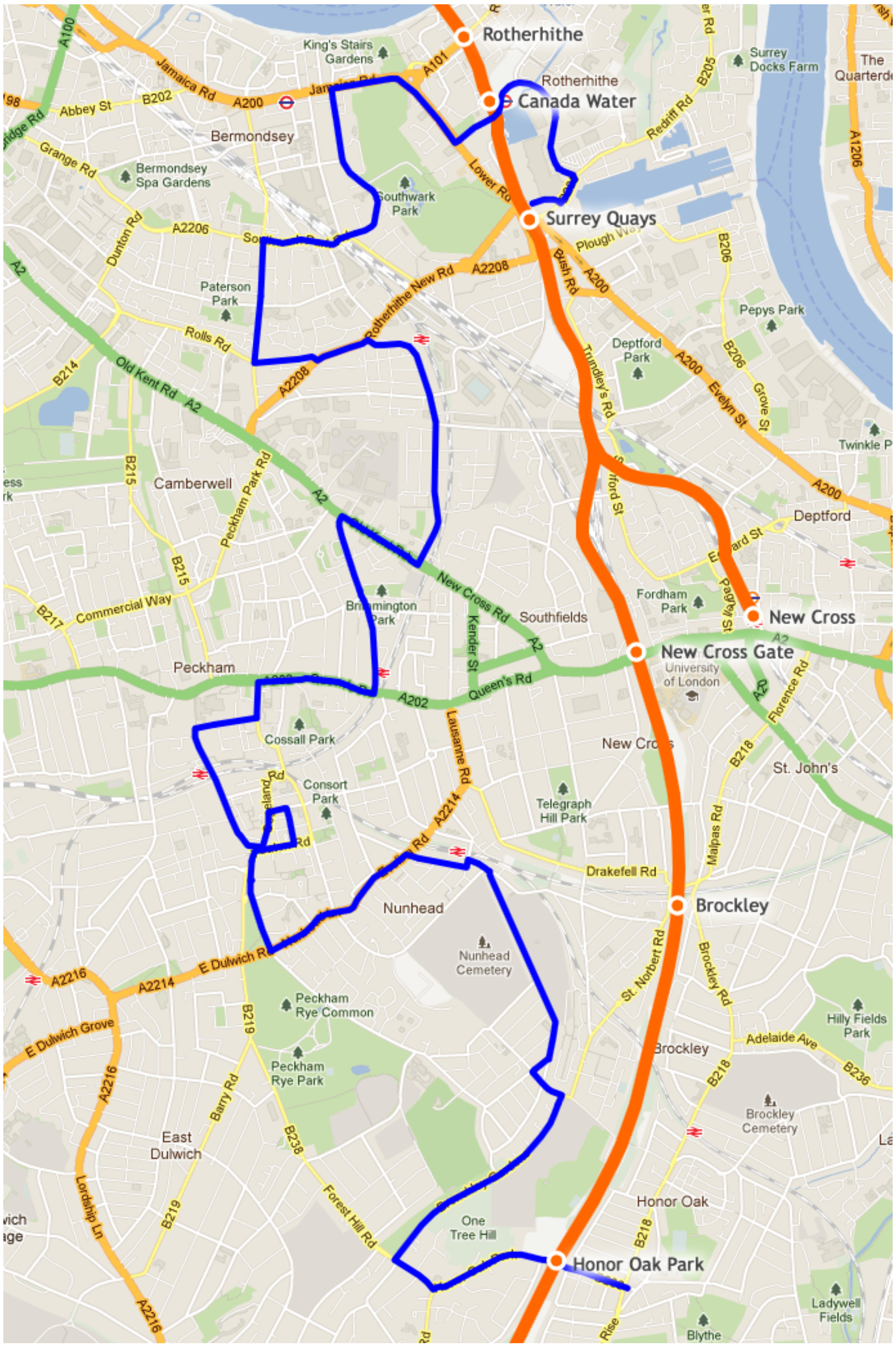
Kingsland Road Corridor - April 2010 vs. September 2010				
For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Sep-10	Percent Change
Southbound	All Day	17332	16184	-6.6%
	AM Peak	5255	4815	-8.4%
	PM Peak	3185	2855	-10.3%
Northbound	All Day	16365	15943	-2.6%
	AM Peak	1868	1706	-8.7%
	PM Peak	4863	4824	-0.8%
Passenger Counts		Apr-10	Sep-10	Percent Change
Southbound	All Day	24445	23345	-4.5%
	AM Peak	6974	6345	-9.0%
	PM Peak	4677	4396	-6.0%
Northbound	All Day	25050	24417	-2.5%
	AM Peak	3036	2935	-3.3%
	PM Peak	6742	6904	2.4%
System-Wide	All Day	6481026	6476783	-0.1%

Kingsland Road Corridor - November 2010 vs. October 2011				
For Route Segments in the ELL Service Area				
Average Passenger Flow		Nov-10	Oct-11	Percent Change
Southbound	All Day	16547	15624	-5.6%
	AM Peak	4911	4937	0.5%
	PM Peak	2830	2777	-1.9%
Northbound	All Day	16154	15857	-1.8%
	AM Peak	1742	1754	0.7%
	PM Peak	4735	4812	1.6%
Passenger Counts		Nov-10	Oct-11	Percent Change
Southbound	All Day	23484	22705	-3.3%
	AM Peak	6535	6607	1.1%
	PM Peak	4380	4345	-0.8%
Northbound	All Day	24176	23665	-2.1%
	AM Peak	2934	2967	1.2%
	PM Peak	6576	6720	2.2%
System-Wide	All Day	6511109	6765182	3.9%

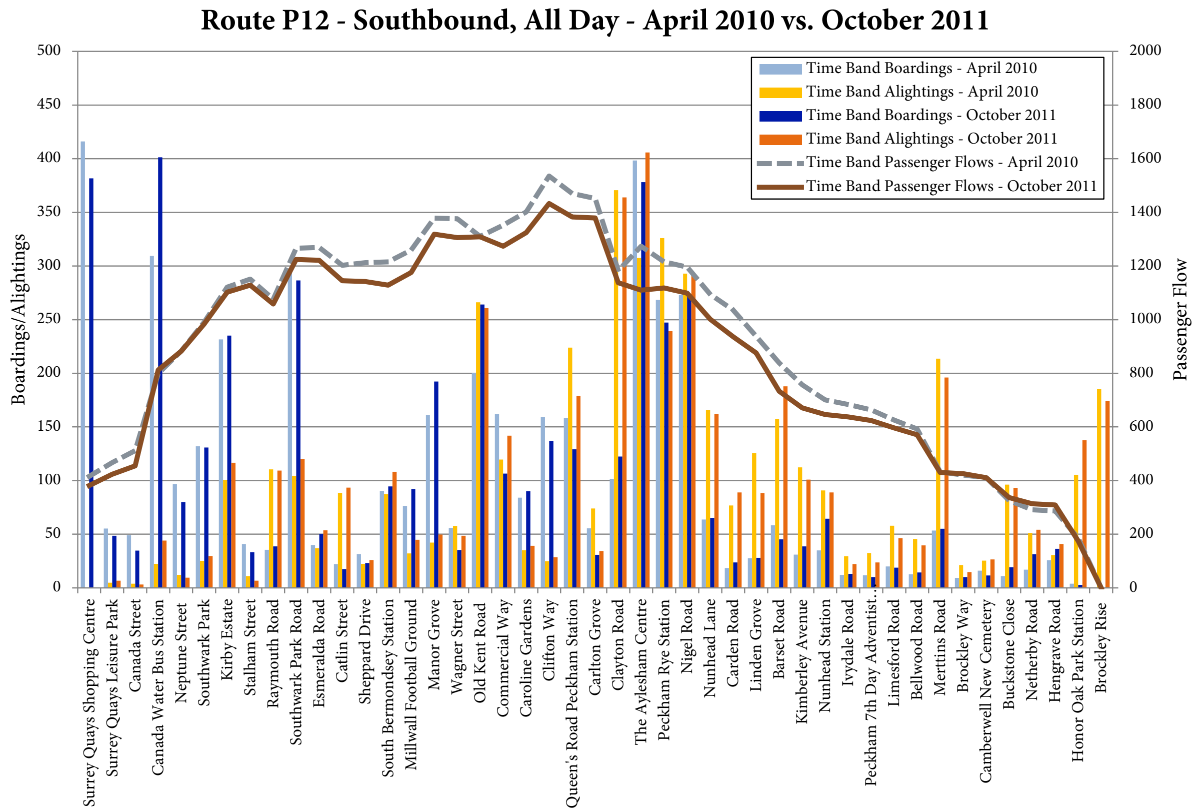
Kingsland Road Corridor - April 2010 vs. October 2011				
For Route Segments in the ELL Service Area				
Average Passenger Flow		Apr-10	Oct-11	Percent Change
Southbound	All Day	17332	15624	-9.9%
	AM Peak	5255	4937	-6.0%
	PM Peak	3185	2777	-12.8%
Northbound	All Day	16365	15857	-3.1%
	AM Peak	1868	1754	-6.1%
	PM Peak	4863	4812	-1.0%
Passenger Counts		Apr-10	Oct-11	Percent Change
Southbound	All Day	24445	22705	-7.1%
	AM Peak	6974	6607	-5.3%
	PM Peak	4677	4345	-7.1%
Northbound	All Day	25050	23665	-5.5%
	AM Peak	3036	2967	-2.3%
	PM Peak	6742	6720	-0.3%
System-Wide	All Day	6481026	6765182	4.4%

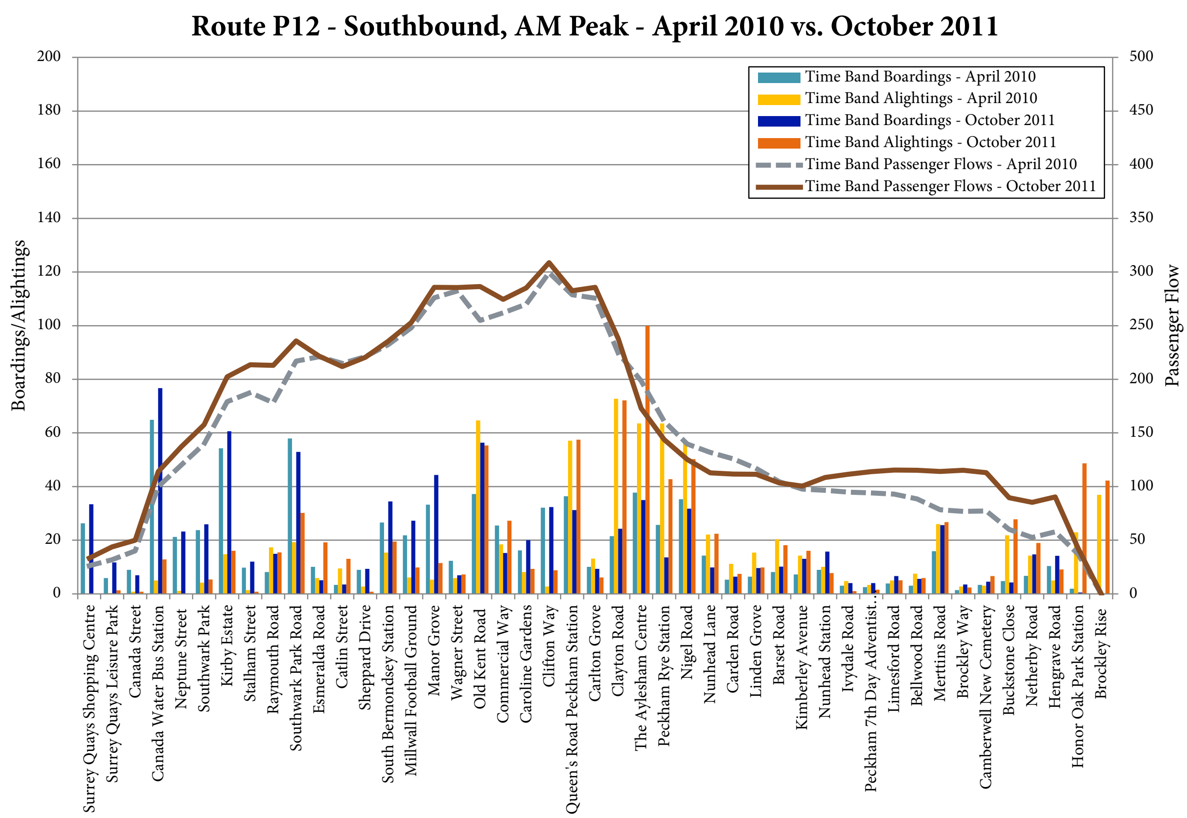
A.11 Route P12

The P12 starts near Honor Oak Park station in the south and takes a rather circuitous route to Surrey Quays station, passing a few National Rail stations and Canada Water station on the way. Service frequency in the peak is about five buses per hour, so ridership is less then 9,000 passengers a day.

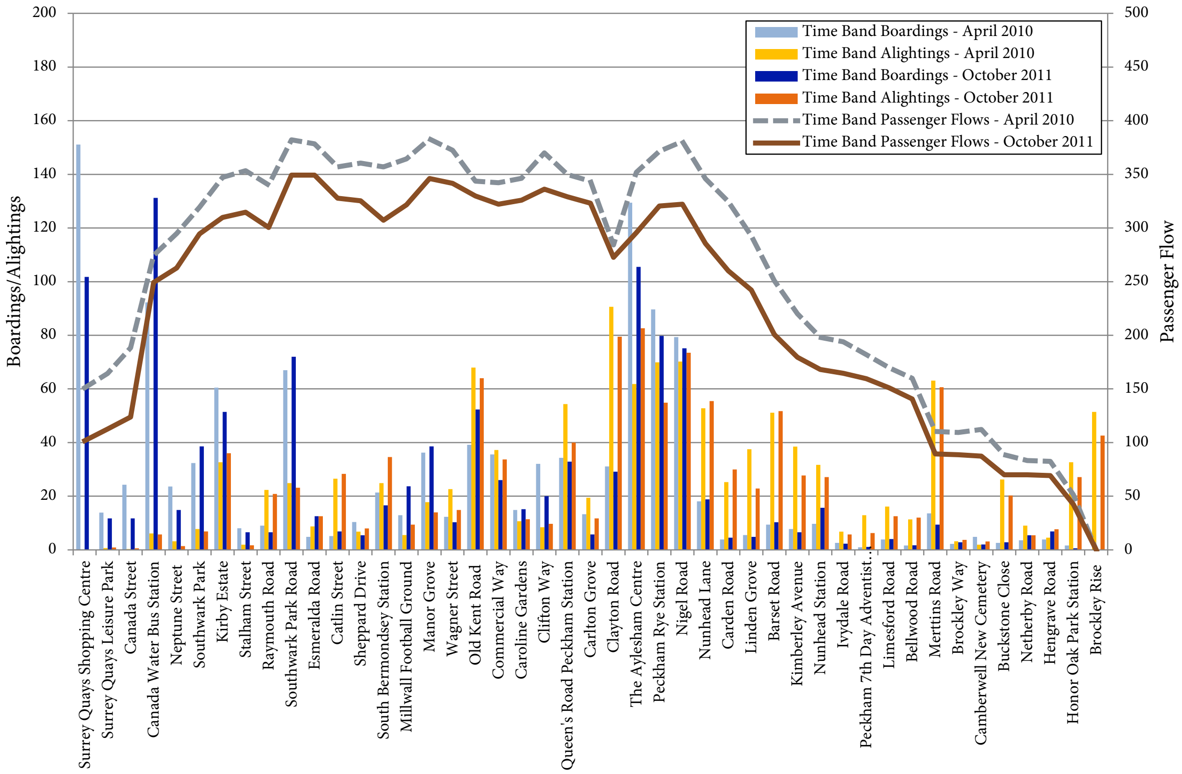


Map of Route P12

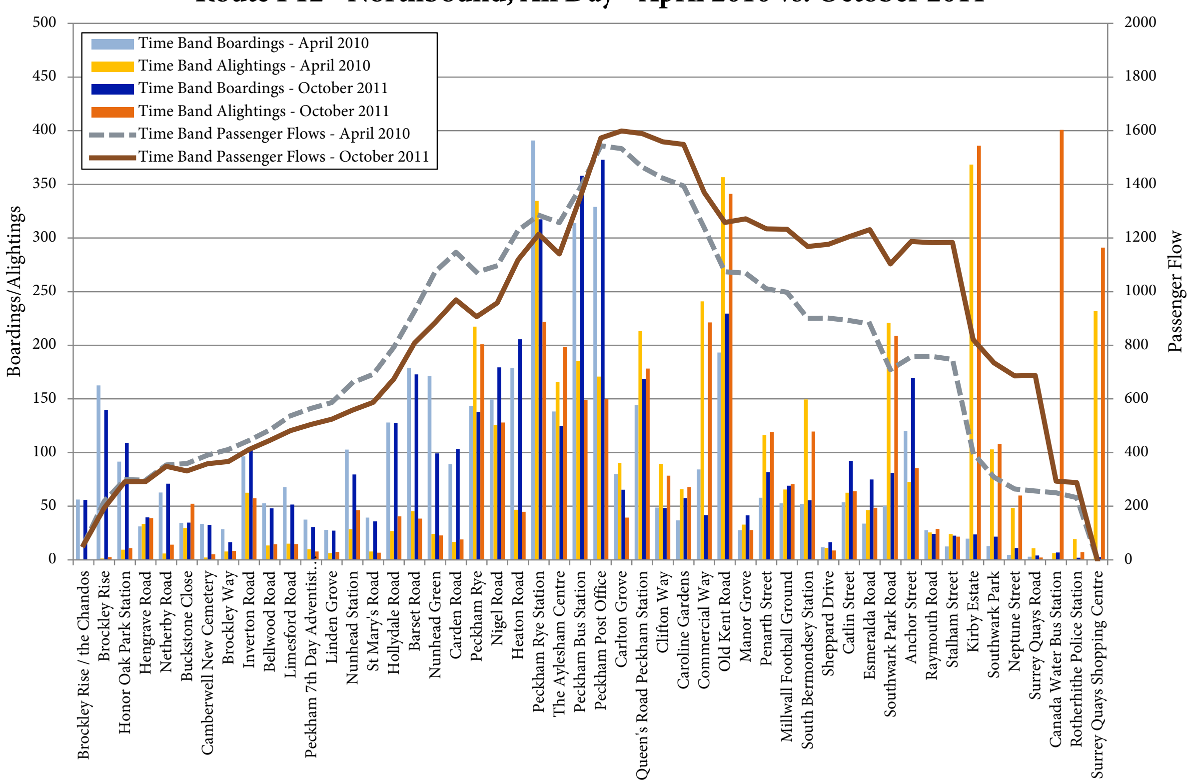

Route P12 - Southbound, All Day - April 2010 vs. October 2011
Boardings/Alightings
Passenger Flow
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - October 2011
Surrey Quays Shopping Centre
Surrey Quays Leisure Park
Canada Street
Canada Water Bus Station
Neptune Street
Southwark Park
Kirby Estate
Stalham Street
Raymouth Road
Southwark Park Road
Esmeralda Road
Catlin Street
Sheppard Drive
South Bermondsey Station
Millwall Football Ground
Manor Grove
Wagner Street
Old Kent Road
Commercial Way
Caroline Gardens
Clifton Way
Queen's Road Peckham Station
Carlton Grove
Clayton Road
The Aylesham Centre
Peckham Rye Station
Nigel Road
Nunhead Lane
Carden Road
Linden Grove
Barset Road
Kimberley Avenue
Nunhead Station
Ivydale Road
Peckham 7th Day Adventist..
Limesford Road
Bellwood Road
Merttins Road
Brockley Way
Camberwell New Cemetery
Buckstone Close
Netherby Road
Hengrave Road
Honor Oak Park Station
Brockley Rise

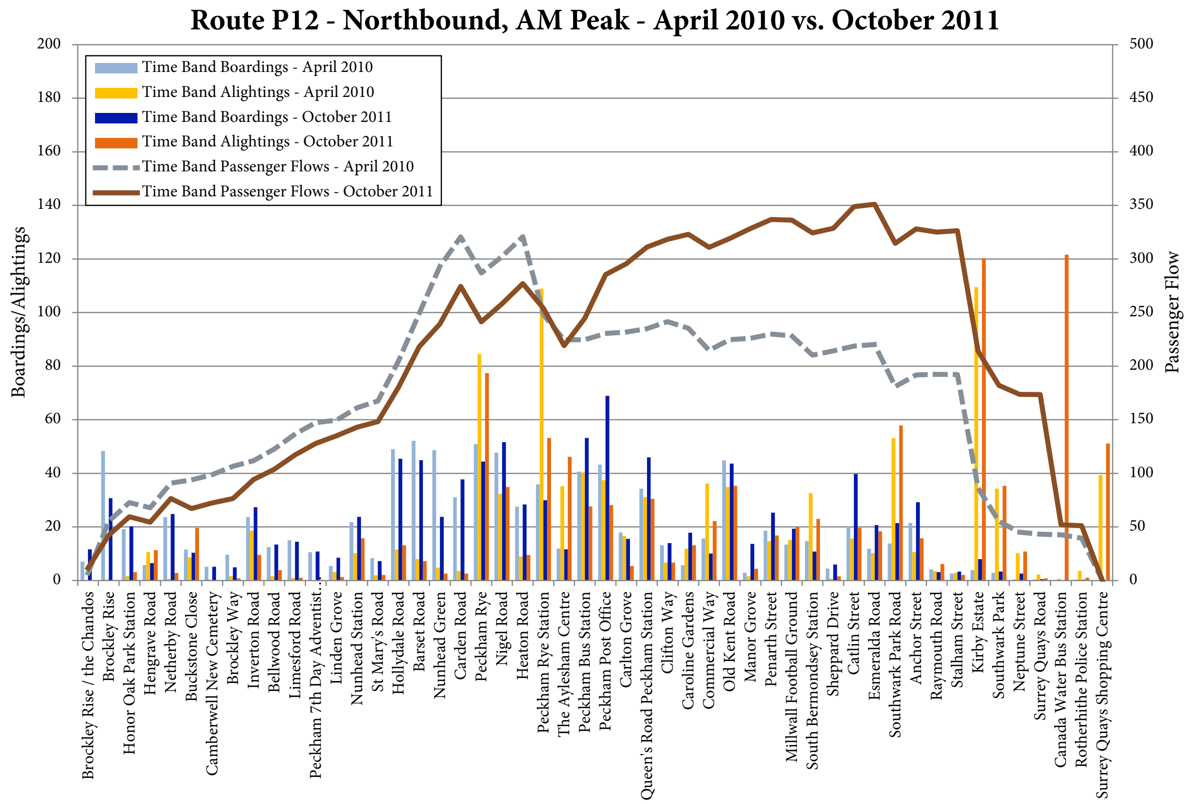

Route P12 - Southbound, AM Peak - April 2010 vs. October 2011
Boardings/Alightings
Passenger Flow
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - October 2011
Surrey Quays Shopping Centre
Surrey Quays Leisure Park
Canada Street
Canada Water Bus Station
Neptune Street
Southwark Park
Kirby Estate
Stalham Street
Raymouth Road
Southwark Park Road
Esmeralda Road
Catlin Street
Sheppard Drive
South Bermondsey Station
Millwall Football Ground
Manor Grove
Wagner Street
Old Kent Road
Commercial Way
Caroline Gardens
Clifton Way
Queen's Road Peckham Station
Carlton Grove
Clayton Road
The Aylesham Centre
Peckham Rye Station
Nigel Road
Nunhead Lane
Carden Road
Linden Grove
Barset Road
Kimberley Avenue
Nunhead Station
Ivydale Road
Peckham 7th Day Adventist..
Limesford Road
Bellwood Road
Merttins Road
Brockley Way
Camberwell New Cemetery
Buckstone Close
Netherby Road
Hengrave Road
Honor Oak Park Station
Brockley Rise

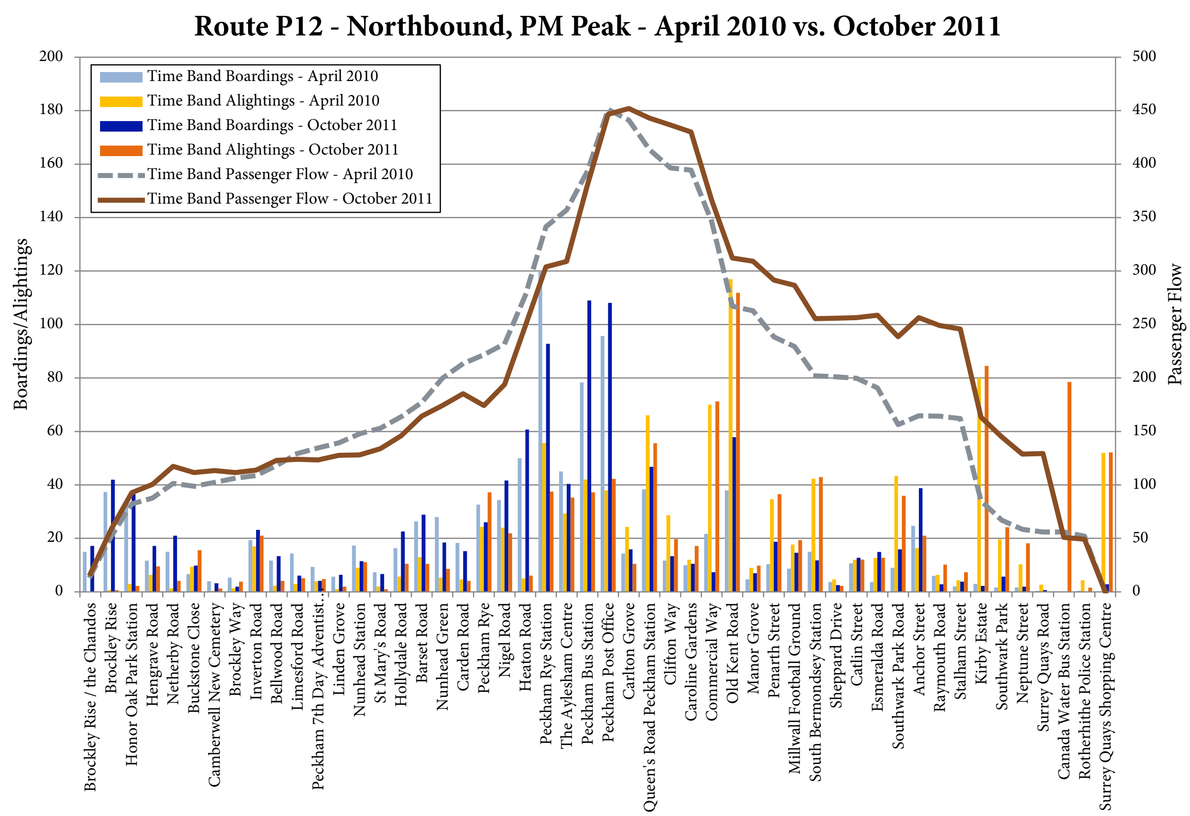
Route P12 - Southbound, PM Peak - April 2010 vs. October 2011



Route P12 - Northbound, All Day - April 2010 vs. October 2011




Route P12 - Northbound, AM Peak - April 2010 vs. October 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flows - April 2010
Time Band Passenger Flows - October 2011
Boardings/Alightings
Passenger Flow
Brockley Rise / the Chandos
Brockley Rise
Honor Oak Park Station
Hengrave Road
Netherby Road
Buckstone Close
Camberwell New Cemetery
Brockley Way
Inverton Road
Bellwood Road
Limesford Road
Peckham 7th Day Adventist...
Linden Grove
Nunhead Station
St Mary's Road
Hollydale Road
Barset Road
Nunhead Green
Carden Road
Peckham Rye
Nigel Road
Heaton Road
Peckham Rye Station
The Aylesham Centre
Peckham Bus Station
Peckham Post Office
Carlton Grove
Queen's Road Peckham Station
Clifton Way
Caroline Gardens
Commercial Way
Old Kent Road
Manor Grove
Penarth Street
Millwall Football Ground
South Bermondsey Station
Sheppard Drive
Catlin Street
Esmeralda Road
Southwark Park Road
Anchor Street
Raymouth Road
Stalham Street
Kirby Estate
Southwark Park
Neptune Street
Surrey Quays Road
Canada Water Bus Station
Rotherhithe Police Station
Surrey Quays Shopping Centre


Route P12 - Northbound, PM Peak - April 2010 vs. October 2011
Time Band Boardings - April 2010
Time Band Alightings - April 2010
Time Band Boardings - October 2011
Time Band Alightings - October 2011
Time Band Passenger Flow - April 2010
Time Band Passenger Flow - October 2011
Boardings/Alightings
Passenger Flow
Brockley Rise / the Chandos
Brockley Rise
Honor Oak Park Station
Hengrave Road
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Camberwell New Cemetery
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Inverton Road
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Southwark Park Road
Anchor Street
Raymouth Road
Stalham Street
Kirby Estate
Southwark Park
Neptune Street
Surrey Quays Road
Canada Water Bus Station
Rotherhithe Police Station
Surrey Quays Shopping Centre

Route P12 - April 2010 vs. October 2011

Passenger Counts		Apr-10	Oct-11	Percent Change
Southbound	All Day	4427	4444	0.4%
	AM Peak	783	872	11.3%
	PM Peak	1180	1102	-6.6%
Northbound	All Day	4267	4487	5.1%
	AM Peak	934	1014	8.6%
	PM Peak	998	1092	9.4%
Both	All Day	8694	8931	2.7%
System-Wide	All Day	6481026	6765182	4.4%

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