Assessing Travel Behaviors Of the Employees, Residents, and Students of Merton

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Abstract

The purpose of this project was to assess the travel behaviors of the people of Merton in terms of time, cost , mode, as well as origin and destination. The survey data generated gave Merton Council a projected usage of the tram. This survey will also be part of a "before and after" study that will aid Merton Council in determining the success of the Croydon Tramlink and help advise whether the Merton Tramlink extension should be built.

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St. Thomas Middle School

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Executive Summary

The purpose of this project was to assess the travel behaviors of employees, residents, and students in a one-kilometer corridor along the Croydon Tramlink in Merton. The travel behaviors were to be assessed in terms of cost, time, mode, and origin and destination. The project was also meant to give the Merton Council a prediction of tram usage. The results of this project were obtained from three separate surveys carried out on employees, residents and students within the defined corridor.

Businesses having more than eight employees were mailed surveys to be completed and returned to Merton Council. The project team went to the businesses with less than eight employees and surveyed them face to face. University students were also surveyed face to face, but the high school and middle school students were mailed surveys to be completed during class time. Finally, a telephone survey was conducted for the residents.

The results from the surveys show that there is not widespread support among the three groups for the tram. Each group, employees, residents and students, was asked to rate the frequency they would use the tram on a one to five scale for different purposes such as shopping, work, school, errands, etc. The top three estimated purposed for tram usage were shopping, weekend transportation, and errands. A very small percentage of the population stated they would use the tram for their most frequent commute, which was going to work and school. By examining the entire populations predictions, 70 percent felt they might use the tram for shopping, but not frequently. Only 17 percent of the employees stated they would use the tram most often for shopping, and this was the largest percent out of all three respondent groups.

As well as giving Merton Council a predicted usage, the survey results show the origins and destinations of the three groups. Although fifty-five percent of the

entire population travel in and out of Merton to get to work, only eight percent travel to and from Croydon into Merton, which is the route the tram could benefit most. Looking at routes within the Borough: the largest individual percentages of the population traveling between areas was nine percent between Wimbledon and Morden, and seven percent traveling within Morden. Depending on how far this portion of the population must travel to get to the train, they possibly could greatly benefit from the tram's route.

The data analyzed from these surveys has shown that 55 percent of the entire population use the automobile for part of their commute. The bus was the second most commonly used mode of transportation with 48 percent of the entire population using it. The third highest form of transportation was walking with 40 percent of the entire population using this method.

The findings of this report will be compared to the results of a second survey that will be conducted in the future once the tram is operational. These two surveys will be compared to determine if the tram has affected the travel behaviors of the people within the tram corridor.

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1.0 Introduction

Many transportation problems currently found in cities are caused by the increasing number of cars. In response to these problems, many cities are turning to alternative means of transportation. The London Borough of Croydon has addressed the issue of traffic congestion by beginning to construct the Croydon Tramlink light-rail system. This light rail system is necessary due to the projected growth rate of car ownership in Croydon and Merton. Car ownership is expected to increase between 83 percent and 142 percent by the year 2010, as shown in the Alternate Movement Strategy. The Croydon Tramlink will relieve some of these traffic problems the city of Croydon and Merton is now facing.

The Croydon Tramlink is a light-rail system that is currently under development in south London. After completion, it will be the first modern tram in London and southern England. The Croydon project's cost is estimated at 200 million pounds, and is expected to be operational in late 1999. Once operational, this tram will provide service over a total of twenty-eight kilometers of track and will link Wimbledon in Merton with Croydon, Elmers End, New Addington, and Beckenham Junction in Bromley. The proposed Merton tramstops will be at Wimbledon, Dundonald Rd., Merton Park, Mordan Rd. Phipps Bridge, Mitcham, and Mitcham Junction.

The Merton Council has requested that a team of Worcester Polytechnic Institute students develop and conduct a public transportation survey. The survey is part of a "before and after study" in which the Merton Council will compare student, employee, and residents' travel methods prior to, and after, the completion of the Croydon Tramlink. The survey that the Croydon Tramlink project team is conducting will be used to assess the travel behaviors of students, employees, and residents prior

to the completion of the Croydon Tramlink. From the survey results, the team will be able to determine the origins, destinations, modes, costs, amount of time spent commuting daily. Once the Tramlink is operational, a second survey will be conducted to analyze how the travel methods of these commuters have changed. A comparison will then be made between the two surveys to determine the success of the Croydon Tramlink in the community. For example, Merton will be able to determine if the tram stops were placed in optimal locations for commuters. Also, from the results of these two surveys a conclusion can be made on whether the tram had an impact on road congestion, commute times, and transportation costs for the residents of Merton. Results such as these will be beneficial to other cities when planning public transportation systems. These systems need careful planning, due to the high costs of development.

Before traveling to London the team conducted background research on public transportation in the United States and the United Kingdom. The study revealed problems that can occur in cities when a public transportation system is proposed by the local government, such as lack of funding. Problems can also arise when the system is in place, such as a rise in crime and low passenger participation. The team studied these problems to gain a better understanding of public transportation. Some of these problems were examined in the case studies provided on the Dallas Area Rapid Transit (DART), Bay Area Rapid Transit (BART), and Docklands Light Railway (DLR). This research also provided information on the need for the light-rail systems, options for automation, funding, and the ability to expand an existing system.

The following literature review contains a brief description of light-rail transit

systems and their function in an urban setting. A summary of the history of public transportation and transit system research has been provided to aid in the understanding of the need for urban transit systems. Also, case studies are described, which portray how other cities developed light-rail systems. Finally, in order to produce an accurate and meaningful survey, a complete background of survey methodologies is included.

2.0 Literature Review

The following section includes information regarding traffic congestion in England and why plans are being made to increase public transportation options. This information is the foundation for building a project proposal that will answer the questions the London Borough of Merton has concerning a new public transit system being developed, called the Croydon Tramlink. The research consists of a description of England's traffic problems, a proposed solution to the traffic problems, and case studies of public transportation systems.

2.1 Public Transportation

2.1.1 Traffic Congestion

Today, many cities are turning to public transportation as a way to alleviate their traffic problems. In England, towns and cities are facing an increasing amount of traffic congestion not only during the morning and nightly commutes, but also throughout the day as well. Today it is estimated that 70 percent of the work force of Great Britain drives to work (Department of the Environment, Transport and the Regions, 1999). This high amount of traffic causes longer commutes, unpredictable commute times, and an increase in fuel consumption.

The total time spent in traffic in 1996, for drivers in Great Britain, has been estimated at 1.6 billion hours, and 80 percent of these hours were spent in urban areas. As stated above, a reason for this is that 70 percent of the workforce drives to work. It is interesting to note, however, that 75 percent of these drivers have parking provided to them by their employer, thus promoting the use of cars (DETR, 1999). The intention of the national government of Great Britain is to encourage the use of public transportation through the implementation of the New Deal for Transport (DETR, 1999).

2.1.2 Britain's Greatest Solution

The National Road Traffic Forecasts anticipate that traffic will increase between 24 percent and 51 percent from the year 1996 to the year 2016 (DETR, 1999), unless something is done to prevent this traffic growth. This is why the national government of Great Britain has created "A New Deal for Transport" within the Parliamentary Whitepapers. This Transport White Paper is an attempt to address the traffic problems by analyzing the cities and towns of England and offering measures such as public transportation, as a means to relieve traffic congestion (DETR, 1999).

One problem that has previously hindered change is that local traffic authorities did not have the right to charge motorists for workplace parking. Therefore, local authorities have been given the right to charge motorists for parking for the purpose of reducing traffic (DETR, 1999). Along with this fee, the Secretary of State will be charging travelers for the use of certain roads. The Department of Environment, Transport and the Regions mentions that it will be important for the government and local authorities to be in close cooperation in order to implement the ideas of the Transport White Paper. It is hoped that these new charges will help lessen traffic congestion by encouraging people to turn to public transportation as an alternative to driving their cars. In addition, the revenues earned by the tolls will aid in the funding of public transport systems throughout the United Kingdom.

2.1.3 Funding

Funding has historically been critical in any mass transit project. Many cities try to avoid proposed mass transit projects due to the immense amount of money needed to build and manage such projects. In the United States, the Urban Mass Transportation Administration (UMTA) was formed as a part of the Department of

Transportation to help develop public transport projects worthwhile for the public. In the early 1970s, the UMTA helped many cities begin work on light-rail transit (LRT) systems by authorizing a grant funded by the federal government. In 1970, the Urban Mass Transportation Assistance Act was passed, authorizing $3.1 billion to finance urban mass transportation. If the UMTA approved a city's application for grant money, 80 percent of the cost would be covered by UMTA while the rest was to be funded locally. This greatly reduced the cost for a city to build a LRT system, thus making it more plausible for many cities.

An example of government funding can be seen in the building of the Croydon Tramlink. This LRT system will cost around £200 million. However, the national government will be supplying £125 million of this cost. The remaining expenses will be paid for by private companies and by the revenues earned at tolls placed on company parking lots and heavily traveled roads.

2.1.4 Light-Rail Transit in Croydon

However, before funding for the Croydon Tramlink became an issue, the local government first had to determine whether or not a LRT system would be beneficial to the area. Light-rail transit systems are defined as electric streetcars with an overhead power supply. Light-rail trains operate both on streets and on exclusive off road right of ways. While some light-rails go underground when necessary, the majority stay above ground (Owen, 1976). To determine if a LRT system would benefit Croydon, the London Transport and British Rail conducted a study in 1991. The study included a survey of the public to determine their views on possible routes for a new tram. From those responding to the survey, 80 percent favored bringing a light-rail system to Croydon. Since 1991, the Croydon Council and London Transport

have worked together to promote the Croydon Tramlink (Top Hat Computing LTD, 1999).

The Croydon Tramlink will run through the London borough of Croydon. Most of the 28km (17.5m) Tramlink route will run along an old, abandoned British Rail track (17km). However, 3km of the new Tramlink will run along existing highways and the remaining 8km will be placed alongside existing roads. Croydon Tramlink has a one way route around central Croydon and three branches that spread out to Wimbledon, Beckenham Junction/Elmer's End and New Addington (Tramlink Croydon Limited, 1998).

Some of the advantages of having a LRT system are that they are highly economical as well as user and environmentally friendly. LRT systems can take advantage of already existing railroad tracks to decrease the costs of laying track, as shown in the Croydon Tramlink (Owen 1976). Another way LRT systems lower costs of operation is by using electrical power. These low costs result in savings that aid in keeping passenger ticket prices low (Rogers, 1977). CentreWest Buses Ltd. in connection with the London Transport, will set ticket prices while keeping in mind the prices must be competitive with other public transportation operations. Along with low-ticket prices, passengers appreciate tram accessibility. Accessibility is important to passengers who may have trouble walking to the terminal. Multiple tram stops reduce walking distances.

Accessibility is provided to passengers through the Croydon Tramlink's 38 tram stops. Each stop will have a platform that is two meters longer than the length of the tram (about 32.2. meters). Also, each platform will be placed a maximum of 350 millimeters above the track level for safety purposes, and the platforms will be built with the accessibility of wheelchairs and children's strollers in mind (Croydon Tramlink Limited, 1998).

However, even a low-cost and easily accessible train has potential disadvantages. Some of these disadvantages are increased crime rates, funding problems, and low passenger turnout. Ferguson observed in his article titled "Lock the House, Here Comes the Train" that the crime rate increased in the suburb of Linthicum, Maryland, after a LRT system was introduced. This LRT system connected Linthicum with a metropolitan area, thus providing a direct route for criminals from the city. Once the LRT system was in place, crimes such as violent assaults and burglary became more frequent. For example, one woman was stabbed in the back and robbed while purchasing a ticket for the train. In this instance, the people voted to get rid of the current LRT system because of the increased crime rate (Ferguson, 1994). Another problem of a LRT system can be low passenger turnout. Often, this is caused by expensive ticket prices, or by inaccessible tram stops. Obviously, if no one uses the tram, then a problem of funding arises. By weighing the advantages and disadvantages of LRT systems, cities can be more knowledgeable when considering if a LRT system will help solve their mass transit problems (Owens, 1976).

2.2 Case Studies

2.2.1 DART

One city that used the LRT system to reduce their mass transit problems was Dallas, Texas. Dallas became the first city in the southwestern United States to

acquire a modern light-rail system when the Dallas Area Rapid Transit (DART) was established in 1996. The first phase of the light-rail system is a 20-mile light-rail starter system. This is to be part of a 53-mile system that is expected to be completed by the year 2010 (Vantuono, 1996). At the opening of this starter system, DART offered free rides at all 14 stations for an entire day. This promotion attracted a large number of passengers who rode the light-rail that weekend. The ridership for that weekend was estimated at 48,600 passengers (Mass Transit, 1996). After the inauguration, the train carried approximately 18,000 people daily, which was higher than the expected 15,000 passengers per day. By June of 1997, ridership was up to 33,156 daily, which was 10 percent higher than the projected turnout (Miller, 1997).

The proposed 17.5-mile light-rail system in Croydon is also estimated to carry a large number of passengers. This system will have 24 light-rail vehicles (LRV), 21 of which will be in service at any time. Each of these vehicles will have the capacity to carry over 200 passengers (70 seats) (London Transport, 1998).

Although high ridership may be reasonably expected, the issue of funding always has to be addressed. For example, DART's light-rail system was supposed to be operational by 1988, but due to funding and administrative problems, the system was not completed until 1996 (Middleton, 1994). DART's cost was estimated at $860 million, with $160 million dollars coming from the federal government and the rest from a one percent sales tax levied in each of the 14 DART member communities (Mass Transit, 1996). This is an unusual balance of funding, since the federal government usually funds about 80 percent of a LRT project, while 20 percent comes from local funding (Miller, 1997). In the Croydon Tramlink case, the national government is paying £125 million of the £200 million, which is only 63 percent of

the cost (Tramlink Croydon Limited, 1998).

Even though funding problems can be resolved, there are other issues that need to be addressed. For instance, when DART's new light-rail system began serving downtown Dallas and other parts of the city, the bus schedules were altered. About two-thirds of the bus routes were altered to accommodate this new service, due to the fact that the train would be responsible for many areas the buses had previously covered (Mass Transit, 1996). However, the light-rail and bus systems were not completely separate. Both had ticket prices set at $1 dollar for 90 minutes of travel, and passengers could switch from train to bus and vice versa for no fee. Thus, fares were low with easy accessibility between buses and trains, plus there were several ticketing options. Passengers could purchase monthly passes, which offered discounts to children, senior citizens, students, and disabled people (Vantuono, 1996). Another option DART provided was offering half price fares during lunchtime. This promotion caused a 40 percent increase in business to restaurants during lunchtime hours (Miller, 1997).

The opportunity to attract passengers with discounts is not only available in the United States. The Croydon Tramlink will provide similar discounts once it is established. There will be discounted options such as weekly passes, multiple vehicle tickets, plus one day and multi-journey travel cards. The fares will also be similar to bus fares, in the sense that the tram will have costs based on other forms of public transportation costs. Also, London Transport will provide "feeder buses" for passengers so that they will be able to reach other destinations (Tramlink Croydon Limited, 1998).

In addition to pricing, trams and buses also share another common aspect, their

routes. As mentioned earlier, buses have to alter their routes based on new trams. One example of this can be seen in Dallas, where the bus route had to change to accommodate the light-rail traveling through the Transitway Mall. The Transitway Mall was composed of four train stations in the downtown area.

In this area, the tram was designed in a specific way to allow for an easier passing of pedestrians in the Central Business District, and to induce building openings for office leasing and retail opportunities (Mass Transit, 1996). This inducement helped many new businesses develop over the next year and a half. For example, the HBE Corporation invested $150 million dollars in developing a hotel to take advantage of DART's transit line to the popular Convention Center. Sears & Roebuck also redeveloped their complex as a result of the accessibility provided by the DART station (Miller, 1997). In addition to these two major companies, four banks, two supermarkets, numerous restaurants, and many shops were built (Mass Transit, 1996). The growth of business is also expected to occur upon the development of the Croydon Tramlink. Croydon has one of the largest shopping and business centers in the southeastern suburbs of central London. The tram is expected to provide additional support to around 1 million people who come from all over London (London Transport, 1998). The impacts that the Croydon Tramlink is expected to have on shopping and businesses should be a direct result of the improvements in urban transit.

In addition to helping shopping areas, tramlines also help to reduce traffic, which is shown by the DART system. In December of 1996, DART opened a six-mile light-rail line with a three-mile underground tunnel to aid in reducing highway traffic along the North Central Expressway (which is Dallas' busiest highway).

DART also opened a ten-mile light-rail line called the "Trinity Express" in one of the larger suburbs of Dallas that has helped with highway congestion (Mass Transit, 1996).

Similar traffic problems are also occurring in Croydon and are another reason for the Tramlink to be developed. There are congestion problems on many of the roads, which cause regular delays. If citizens of the area take advantage of the tram, there will be reduced travel time, ease on congestion, reduction in pollution, and a decrease in noise (London Transport, 1998).

2.2.2 BART

Another public transportation system that has effectively helped highway congestion problems is Bay Area Rapid Transit (BART) in San Francisco, California. Transportation problems developed in the Bay Area due to insufficient and inadequate ways to transport people. In September of 1972, BART was adopted as a partial solution. Although BART is not a light-rail system, its history covers many relevant topics that can be related to the Croydon Tramlink (Margro, 1995).

In 1972, BART opened a rail system that ran through Daly City, Concord, Fremont, and Richmond, and connected San Francisco with growing communities and businesses in the bay area (Margro, 1995). The original layout of the tracks was about 71 miles but today there are 150 miles of track, and the system carries approximately 300,000 passengers per day. The trains are kept under constant supervision in order to ensure safety, which is one of the chief concerns of BART. BART needs only one employee to run the train, due to the automated system that they have been using for the past 20 years (Smith, 1998).

The computer system has been useful to BART, however the original systems

are no longer being serviced or made. This has caused growth problems for BART. For example, if major computer problems ever occurred with the original equipment, there would be minimal support in solving the problem. An extension of the railway tracks was viewed as problematic, because it would create more data and result in a greater chance for serious computer problems. Fortunately in 1990, BART restored the rail system and upgraded the computer equipment under a $1 billion dollar plan. This restoration process encompassed all of the lines, stations, and maintenance facilities (Middleton, 1996). The new system helped provide safety for passengers and also gave BART the chance to grow. The new systems were originally expected to take four years to design and implement, but with the help of new technology the implementation was completed in two years (Smith, 1998).

The new system has an automatic fare collection device, which contains a debit/credit ticket-purchasing mechanism to allow for a more convenient way for passengers to purchase everyday tickets. This system handles the communication aspects as well, such as dispatch and radio communications (Smith, 1998). The automatic fare devices are more complicated than the simplified ticket machines that are being developed in Croydon. The developers of the Croydon Tramlink are trying to design a machine that will have simplified instructions and be accessible for handicapped people. These accessibility options will be Braille instructions for the sight impaired and reachable equipment, such as handrails, for passengers in wheelchairs (Tramlink Croydon Limited, 1998).

However, these restoration projects and ticket machines cost a great deal of money. As can be seen when looking at the amount of money BART spent on their upgrades. The cost for BART's upgrades were around $200 million-dollars, but

again, one of the chief concerns was to ensure passenger safety. BART has a main control room, which has the ability to monitor all 54 trains along with other information from 30,000 data points, which are posted every 23 milliseconds. In addition to the trains, the control center can also monitor which tracks are occupied, if doors are opened or closed, if the emergency telephones are operational, whether direction controls are locked and aligned, and if the ventilation and circuit breakers are operational. All these devices are needed in order to ensure safety. For example, if a fire breaks out in a tunnel, the problem can be detected from the control room (Smith, 1998).

Safety is also a major issue in the Croydon Tramlink project. This can be seen by the similar steps that the developers have taken. The Croydon Tramlink is expected to have a tram control center, which can observe and communicate with each of the stations. The view in the control center will be of the platform area for each station. This will be accomplished by using closed circuit TV cameras (CCTV). The communication with the central control center is available to the driver of the tram through a direct link. Passengers can also communicate with the central control center through a communication and assistance point at each station. Another safety feature will be alarms that will sound when the tram entrance is not securely closed. Furthermore, these entrances are to be level with the station platforms to provide easy accessibility for wheelchairs. In addition, wheelchairs do not have to be strapped down due to the gentle acceleration and braking qualities of the tram. Handrails will also be provided throughout the tram for all types of passengers. In addition, these stations will have shelters with several seats, along with an electronic display that shows information about the next tram (Tramlink Croydon Limited, 1998).

All of these computer and physical capabilities make a tram seem flawless, but there are problems that can hinder a railway. For example, BART's expansion had not only been prevented by their computer system problems, but also by the lack of regional consensus and competition with other Bay Area public transit projects. BART had always maintained service over its original network, but 1988 was the first chance BART had to expand with a $2.7 billion dollar BART Extensions Program. This gave BART the chance to extend to new parts of the Bay Area, allowing for additional transportation for the people. This expansion would also help in improving highway traffic problems. The first new line was a Pittsburgh/Antioch extension which was a 7.8-mile line costing $506 million dollars. The new train station built for this line had parking spaces available for 2,000 automobiles and transfer accommodations for six connecting bus routes (Middleton, 1996). The reason for the extension to Pittsburgh/Antioch was because the area was no longer an industrial area, but a suburban site where workers needed transportation into the city. There was also an expected 171 percent increase of commuters on the main highway in that area. Hence, building a line through the area would help in reducing the congestion on the highways. The line was expected to carry about 12,000 passengers daily (Margro, 1995).

Another extension in Dublin/Pleasanton cost approximately $514 million. This was a 14-mile extension that contained two parking lots, one for 1,200 automobiles and the other for 3,000 (Middleton, 1996). The reason for this new section was to respond to the growing number of people in the area and to counter the changes in land use. Land that had been mainly residential had new office parks, which needed BART's expansion to allow for employees to commute to work. This

new plan accommodated 22,480 passengers daily (Margro, 1995).

BART's highest priority is the extension that will service the San Francisco International Airport (SFO) by the year 2000. This eight-mile, 4-station extension will be constructed simultaneously with the extension to San Mateo County. This SFO project is estimated at $1.2 billion (Middleton, 1996). One important reason for this extension is to accommodate the expected increase in highway traffic. The SFO is planning on increasing the size of the airport, based on a $25 billion ten-year project that is expected to increase highway traffic by 70 percent (Margro, 1995). The rail extension will also improve air quality because of the reduction in car usage and increase in rail usage. Also, many public agencies indicated to the designators of federal funds that they want this BART project to be their highest priority. The total budget for this project is estimated at $1.2 billion dollars, with $750 million dollars coming from federal grants. SFO will provide additional funding, along with the State of California, and other California counties (Middleton, 1996). The extension is expected to be running by the year 2010 and to be carrying 68,500 passengers per day (San Francisco Bay Area Rapid Transit District, 1998). Again, these three extensions are examples where a railway has helped congestion on highways, improved air quality, and reduced the amount of noise in an area. These are some of the goals the Croydon Tramlink is hoping to accomplish (London Transport, 1998)

Many of these extensions and characteristics of BART have turned the railway system into a successful program. This can be seen through a strike that occurred at BART, in September of 1997. This strike involved 2,600 BART employees, who were dissatisfied with their salaries. The walk out caused a mass standstill on the Bay Area highways. People who usually had a 30-minute commute were traveling for an additional two hours due to the high amount of highway traffic. One woman said, "I realize how dependent I am on BART. Before, I took it for granted." (The Topeka-Capital Journal, 1997). However, many people felt that the workers who were on strike did not deserve more money since the trains were not safe, drunks were always on the trains, and the escalators never worked (DougWeb Online Bookstore, 1998).

In addition to these critics, there were also people who felt that BART would never perform as well as it did. One person said, "we believe that rail rapid transit may prove to be a poor investment for the Bay Area (1974, p. 137)." He felt that the BART plan was described as perfect transit solution and the Bay Area citizens were never shown what problems the BART system could have (Zwerling, 1974). For example, houses were torn down to make way for BART's tracks. These tracks also ran through a wetland area, which contained endangered species. BART's management tried to take care of this issue by moving the animals to a local conservation area (San Francisco Gate, 1996).

Croydon is also facing environmental problems due to the construction of the Tramlink. Some of these problems are the cutting down of valuable trees, disruption of archaeological digs, and infringement upon badger habitats. The developers are trying to keep the loss of trees to a minimum by making the Tramlink route avoid the most valuable trees. Also, to improve the appearance of the landscape they are

planting trees and shrubs along the Tramlink route. Also along this route, Wessex Archaeology is performing an archaeological impact study, to identify all possible archaeological remains. Lastly, in order to conform with the Protection of Badgers Act of 1992, badger tunnels are being developed under the tram where the badgers frequently travel (London Transport, 1998).

2.2.3 Docklands Light-Railway

Although the United States has only been developing light-rail systems since the 1970's, most of Europe is already familiar with these systems. Some European cities that currently have trams are Grenoble, Sheffield, Manchester, and Nantes, in addition to the tram presently being developed in Croydon. Another light railway system is the Docklands Light Railway (DLR) in London, which has had several problems and accomplishments over the past 20 years (The Economist, 1989).

The DLR is an example of one system that initially did not meet the standards for which the public and government had hoped. In 1991, the government decided to take ownership away from London Transport and give it to London Docklands Development Corporation (LDDC) due to the number of times the system had broken down since the opening in 1987. The government felt that many of the scheduled improvements would never occur. Some of the improvements were a main road into the center of London's docks, which would take about two years to complete, and an opening for a tube station, which would take about five years for completion (The Economist, 1991).

The London Transport had faced many problems with DLR, such as upgrading their capacity to handle 30,000 passengers an hour, instead of 2,000 per hour. The original owners who commissioned and operated the railway wished to upgrade the

capacity even though the London Transport opposed it. To increase the amount of passengers per hour, London Transport needed to widen the tracks, get larger trains, and have new signaling installed. These changes were estimated to cost £129m (Docklands Railway Management Ltd, 1998). London Transport felt they were solving many of these problems and it was unfair to take ownership away from them. Many people felt otherwise though, due to the fact that the London Transport had ignored suggestions by consultants to upgrade their computer system to accommodate expansions. So when the railway opened its expansion in June of that year, there was a computer overload and the system failed (The Economist, 1991).

However, this change in ownership to LDDC only lasted for a few years, because in March of 1997, Docklands Railway Management Ltd. became the new owner. Although ownership changed, both owners were able to make significant improvements to DLR. The trains now have the capacity to carry 115,000 people per day and as of January 1999, they were carrying 105,000 per day. The DLR is also concerned with safety and disabled passengers accessibility, making it the first UK rail system to provide facilities for the disabled. DLR now provides a hydraulic passenger lift for every station platform to incorporate wheelchair accessibility. This device is also useful to passengers with heavy shopping bags, or passengers with young children in strollers (Docklands Railway Management Ltd., 1998). As discussed earlier, Croydon Tramlink is also concerned with accessibility for passengers. Developers were able to avoid providing a hydraulic lift for passengers by designing platforms that will be built at the same height as every entrance of the tram (Tramlink Croydon Limited, 1998).

In addition to accessibility, DLR also provides safety through two systems

called Automatic Train Protection (ATP) and Automatic Train Control (ATC). These systems can monitor each station through a CCTV that is linked to the central control center, plus there are passenger alarms and emergency train stops at each station. Each train works on a timetable with the central computer so that the computer knows where each train should be and when. Also, since each train constantly communicates with the central computer through a signal, the train will stop if the signal is broken. This computer also allows for the passenger doors to be opened at the same time and adjustments to be made for the speed. The DLR trains run automatically, but there is a Passenger Service Agent on each train if the train needs to be run manually. This is different from other systems, since trams are usually driven manually with an employee on the tram to check for tickets. ATP makes sure the agent does not go over the maximum speed or leaves before a specified route has been programmed into the computer. However, the Passenger Service Agents are not there solely for driving purposes, they also check tickets, patrol for safety, and assist passengers. DLR also has automatic ticket vending machines at each station, which can provide daily tickets as well as discounted season tickets, one-day travel cards, and sail & rail tickets (Docklands Railway Management Ltd., 1998). Many of these ticketing, safety, and miscellaneous issues were discussed earlier with regards to Croydon Tramlink. However, the earlier comparisons were to American rail system, while this example of DLR shows that there are similarities in railway systems throughout the world.

2.2.4 Germany

A similar light-rail development has been established in Cologne, Germany. Bombardier, an LRV supplier, has received a $93 million dollar order from Cologne to supply 40 light-rail vehicles (Railway Age, 1994). Bombardier is also the supplier

for the trams that are being developed in Croydon. One reason that Bombardier is the supplier is because the developers want similar high quality vehicles, like the ones in Cologne (Tramlink Croydon Limited, 1998).

2.2.5 Los Angeles

One example of a railway system that has had problems and the track development discontinued is the Los Angeles rail system. Due to funding problems, the track extension will no longer be continued. There have been many poorly budgeted costs for this railway system, in addition to construction problems that have plagued the railway system. These are only a few issues that can damage a railway system and something that developers should take into consideration when planning a light-rail system (Baldwin, 1998).

2.3 Surveys

Surveys are a means to get accurate information from a target population. When examining a large population, it may be impossible to go to everyone to gather information. In such a case, only a survey could gather relevant and accurate information in a reasonable amount of time at a reasonable cost. The difficulty with conducting surveys is trying to make them as accurate as possible. In order to conduct an accurate survey, a proper sample list must be chosen as well as a suitable type of survey that will yield meaningful results. This section will look at different types of survey errors, strengths and weaknesses of multiple survey methods, as well as the problems of choosing a relevant sampling list and size. From this information we hope to select one or more survey types that will supply accurate data about the transportation habits of the people of Merton.

2.3.1 Survey Errors

Perfectly accurate surveys are extremely difficult, if not impossible, to conduct. In order to conduct an accurate survey, it must have four characteristics (Salant and Dillman, 1994). First, everyone in the target population must have the same chance of being chosen for the sampling list. Second, enough people must be chosen for the sampling list to achieve the desired level of accuracy. Third, straightforward and clear questions must be asked so that people are able to answer correctly. Lastly, everyone who was asked to participate in the survey must do what was asked of him or her. When surveys are not conducted in this manner, errors arise, causing inaccurate results (Salant and Dillman, 1994).

Salant and Dillman placed these survey errors into four basic categories: coverage error, sampling error, measurement error, and non-response error. Although all these errors cannot be completely eliminated, they must always be kept to a minimum. Any one of them could make the survey effort futile (Salant and Dillman, 1994).

A coverage error occurs when one's sampling frame is different from the favored target population. A sampling frame is the list of the people from which a sample list will be chosen (Salant and Dillman, 1994). A survey that has coverage error would obtain results from an irrelevant population. In our study, developing the correct sampling frame is a difficult task. We must survey the people of Merton within 1 km of the tramline to gain useful information about their travel habits. Surveying outside of this range would not only increase time and cost, but would also be more difficult to analyze. For example, it would not be useful to survey the entire state of Massachusetts about traffic problems in Worcester. Even when a sampling frame is well chosen, sampling errors can result from improperly choosing the sample.

Sampling error generally results from a survey conducted within the correct population, but with too small a sampling size. This produces imprecise results by not portraying the views of the entire target population. An example of sampling error would be surveying only ten people from Merton while its population is 170,000 people. On the contrary, by looking at the sampling size chart (Appendix B), it can be seen that the sampling sizes do not grow proportionately with the population sizes. By using this chart, sampling error can be overcome by selecting a more appropriate sampling size, which is discussed in the sampling section (Salant and Dillman, 1994).

Measurement and non-response errors have to do more with the form of the survey as well as the actual questions. Measurement error can occur if the questions are too complicated for the respondent to understand, or when the meaning of the question is misunderstood. For example, such an error can be seen in a survey dealing with a town's participation in religious activities (Salant and Dillman, 1994). Two separate people said that they attended church regularly, when in actuality one attended three times a month while the other attended three times a year. Both of the people did attend the church regularly according to their perception, but the survey results were useless. This type of error can be dealt with by creating clear, unambiguous questions that can not be misunderstood or have multiple meanings (Salant and Dillman, 1994).

Non-response error occurs when not enough people respond to the survey, decreasing the sampling size as well as altering the results. The problem is that those not responding may have different views than those who do respond. When surveying the people of Merton, we must make sure the survey is interesting and not too long. Otherwise, many people will not take the time to finish it, or give incorrect answers to

quickly finish the survey. If a portion of the population being sampled is insulted by some of the questions, then they may not finish the survey. In this case, the survey will only reflect the respondents' views that were not offended. This limitation could drastically alter the results, resulting in a meaningless survey. In order to decrease non-response errors, the form of the survey must be closely examined. All questions must be checked over to ensure they could not offend anyone. Also, drop-off surveys or mailings can easily be disregarded by being thrown out, which greatly increases non-response error. The goal of any survey is to obtain the highest response rate possible, which will yield the most accurate results. This is one reason why the form and wording of the survey is extremely important (Salant and Dillman, 1994).

2.3.2 Survey Types

Generally, there are four types of surveys: mail, telephone, face-to-face, and drop-off surveys. Each one is acceptable in certain situations, depending on budget, time, staff, and which type of error is predominant (Salant and Dillman, 1994). Mail surveys require fewer people because no direct exchange is necessary. In such a case, the sampling list is extremely important because if the mailing list does not accurately portray the targeted population, the survey is useless. As stated previously, there tends to be more non-response error because it is easy for people to throw away mail surveys. Therefore, according to Salant and Dillman mail surveys are extremely sensitive to coverage and non-response errors. Coverage error can be overcome by producing an appropriate sampling list that accurately spans the favored target population. Non-response errors can be overcome by producing an interesting, attractive survey that respondents will be less likely to throw away. Also, re-sending surveys or reminding non-respondents might yield a higher response rate. Both of

these aspects of mail surveys must closely be watched to assure that the results are as accurate as possible.

Telephone surveys are most useful when the majority of the target population own phones and when the questions are straightforward. Straightforward questions prevent any misunderstanding of the questions, thus eliminating measurement errors. However, telephone surveys do have some faults. Telephone surveys require more staff than mail or drop-off surveys because many people are needed to make phone calls to large populations. Telephone surveys also don't give an equal chance for people without phones, or people with unlisted numbers. On the contrary, homes with multiple phone lines have a higher chance of being selected (Salant and Dillman, 1994). Therefore, if the sampling list is taken from a phone directory, not everyone has an equal chance of being chosen. This yields a coverage error. This sort of coverage error is difficult to overcome because it is not easy to get a random sample list of phone numbers without using the phone directory.

Face-to-face survey interviews require more staff for large target populations, which means a high budget. With interviewers going door to door, these surveys are best used when there is no list of the target population to make a sampling list (Salant and Dillman, 1994). People are less likely to turn rudely away from an interviewer doing face-to-face surveys, which keeps non-response errors to a minimum. Measurement errors are also smaller because the interviewer can quickly answer any misunderstanding of the questions. On the other hand, face-to-face surveys can sometimes produce coverage bias. One example would be if interviewers only went to survey homes at one time of the day. This would not give the population not at home at that time the same chance as everyone else. This problem can easily be

overcome by varying the time at which interviews are conducted. For a small target population, face-to-face surveys work quite accurately. When the target population gets extremely large, the required high budget and staff deter many organizations from using face-to-face surveys (Salant and Dillman, 1994).

Drop-off surveys are a combination of mail and face-to-face surveys. By personally handing the surveys to people rather than just mailing them, non-response errors may be decreased slightly. Respondents are more likely to see the importance of the survey if someone personally gives it to them. Drop-off surveys are similar to the mail surveys in that they require straightforward questions and fewer people. However, they also allow for a small amount of instruction by the staff. Overall, drop-off surveys worked best when there is a limited staff and a large sampling size (Salant and Dillman, 1994). The largest problems with drop-off surveys are extremely low response rates. This is often the reason why this type of survey is not the most popular for conducting accurate surveys. When considering the possibilities of errors arising in all the types of surveys, proper sampling methods are vital in attempting to attain the most accurate survey possible.

2.3.3 Sampling

One of the most important parts of a survey is determining the sampling population as well as its size. As stated previously, the constructed sampling list must accurately portray the views of the target population. Salant and Dillman stated in their 1994 book entitled How to Conduct Your Own Survey that there are three steps to sampling. First, identify the target population. Then, put together a population list. This may consist of a telephone directory if a telephone survey is being conducted, or a list of registered voters if a mail or drop-off survey is being conducted. Finally,

select the sample. Sampling size depends on the target population size and how much error is acceptable (Salant and Dillman, 1994). When looking at relatively small populations, as the population increases, the greater the sampling list must be in order to achieve the necessary degree of accuracy. When the population increases from 10,000 to 100,000, the size of the sampling list does not increase by much. Another variable in determining sampling size is the required degree of accuracy. Normally, an accurate survey must be around three percent accurate, meaning that analysts are 95 percent confident that there is less than three percent error. Thanks to prior research, the correct sampling size for many percentages of errors can be quickly found from the sampling size table shown in Salant and Dillman's book How to Conduct Your Own Survey, shown in Appendix B.

Sampling can also be accomplished using a random number function and a population list. Any random person out of the population list is noted as number one. From that person on, everyone is given a number. The random number function randomly selects numbers within a desired range. Using these numbers, random people can be selected from the sample population to be part of the sample list. What is left to be resolved is the size of the sampling list, which is determined by how accurate the survey needs to be (Salant and Dillman, 1994).

2.4 Summary

Due to traffic problems caused by an excessive number of cars, many cities are developing public transportation systems to alleviate these problems. One such city implementing a public transit system is Croydon, a borough of London, England. The Croydon Tramlink is a light-rail transit composed of 38km of track. Britain's New Deal for Transport calls for funding for trams to partly come from revenues generated by tolls that will be imposed on parking lots and heavily traveled roads. Additional

funding will come from private businesses.

The Croydon Tramlink will provide inexpensive and accessible transportation for the students, employees, and residents of Merton and Croydon. Once the Tramlink is operational, comparisons will be made to determine if the passengers are saving time and money by using the tram. Other advantages of the Tramlink are wheelchair accessibility and convenient tram stops. Case studies of light-rail transit systems show these advantages. For example, the Dallas Area Rapid Transit of Dallas, Texas helped improve a shopping center's business. The Bay Area Rapid Transit of San Francisco, California helped relieve traffic congestion problems. However, these case studies also showed problems that can arise from LRT's.

One disadvantage of a LRT system is that the environment is affected by its construction. For example, the natural habitat of the badgers in Croydon is being disrupted by Croydon Tramlink's development. Other issues that must be considered when building a LRT system are passenger accessibility and safety. Frequent tram stops are important for make walking distances minimal to attract more passengers. Many devises such as passenger activated alarms aid in providing a safe environment for passengers. Another problem that must be faced when building a LRT system is funding. The cost of implementing such a system is high and requires an extensive amount of government and local aid. In order to ensure that the money will be well spent, cities should conduct extensive research on the travel methods of their residents.

One way to acquire information on the travel methods of residents is to conduct a survey. However, in order to ensure that the surveys are accurate and reveal valid results, proper surveying techniques must be observed. For example, a valid

survey depends on the correct sampling size, a proper method of choosing a sample, and an appropriate type of survey.

3.0 Methodology

The Croydon Tramlink is a 28 kilometer light rail system currently under development in South London. This tram links Wimbledon in Merton with Croydon, Elmers End, New Addington and Beckenham Junction in Bromely. There are to be seven tram stops in Merton at Wimbledon, Dundonald Rd., Merton Park, Morden Rd., Phipps Bridge, Mitcham, and Mitcham Junction. This project was concerned with separately surveying employees, residents and students living within one kilometer of the Tramlink route.

The survey provided information regarding the travel behavior of the employees, residents, and students in the proposed area in terms of origins, destinations, costs, time and mode of travel before the Croydon Tramlink was operational. This project is to be part of a "before and after" study in which a following survey will be conducted to determine the impact the tram has had on the travel behavior of employees, residents, and students in the defined area.

3.1 Choosing survey and sampling methods

When dealing with a random survey, it was imperative that everyone living or working within the defined area was given an equal chance to be chosen. It was also important to cover the entire defined area to ensure everyone's opinions were noted. As mentioned earlier, the project team surveyed employees, residents, and students, using three separate surveys. Separate surveys were given to each frame to ensure the questions were written to attain the most information from the appropriate group. Separate surveying methods were also used for each frame based on availability and convenience for the respondents.

When choosing the forms of these surveys, the time restraint on the project team was considered. The surveying staff consisted of three people, with a relatively short time to complete the project. Therefore, telephone and mail-in surveys were the first choice of survey methods. Telephone surveys worked well for surveying the residents of Merton. Aside from being the most proficient way to contact residents of Merton and be sure to get a response, the project team could also read the questions to the respondents and answer any questions they may have had if the survey question was unclear. This decreased any error that may have come due to interpreting the questions of the survey incorrectly. Telephone surveys were also chosen because they offered a higher response rate compared to that of a mail in survey. When using a mail in survey, it is highly likely that the response rate will be low due to respondents not returning the survey in the mail and either throwing the survey away or forgetting about it along with all the other "junk mail". Therefore, telephone surveys were chosen over a mail survey. Another survey method was considered for the residents, this method was door to door surveying. By going door to door the project team could have surveyed residents face to face at their homes. This type of surveying would have produced a high response rate and also decreased any error due to the respondents interpreting the questions incorrectly. This error would have been decreased because the project team would be allowed to read the survey questions to the residents and like the telephone survey, answer any questions the respondent may have had. Surveying door to door was not chosen for the survey method; however, due to the time restraints the team faced and also for safety issues. Residents needed to be surveyed after work hours, preferably between the hours of five and eight o'clock p.m., which would require the project team to be walking the streets of the

defined area at night. Also, it would have taken a lot of time to walk the entire area, making this survey method too time consuming for the team. Therefore, as stated above, the method chosen to survey the residents of the defined area was a telephone survey.

The project teams' objective when calling residents was to first, call residents only in the defined area and second, to reduce non-response errors as much as possible. To decrease non-response errors, informational mailings were sent to the respondents a week prior to the phone calls, as a means to provide awareness of the survey. The informational mailings included the importance of the survey, the questions that were going to be asked, general information on the Tramlink, as well as assurance that the respondents' participation in the survey is greatly appreciated and completely confidential. This mailing allowed the respondents to fully understand the importance of their participation in the survey, as well as letting them know when to expect the phone call. However, before these informational packets could be mailed out to residents, a list of the people in the defined area had to made. A list of phone numbers of the residents living in the defined area was not available, therefore, the project team used the electoral list of Merton in order to obtain an accurate list of the residents in the defined area.

3.1.1 Residents

As stated above, a list of the phone numbers of the people living in the defined area of Merton could not be obtained. Therefore, to obtain the phone numbers of the respondents in that area, an electoral list of registered voters in all of Merton was acquired from the Electoral Services Department of the London Borough of Merton. This list contained the names and addresses of citizens over the age of 18 that have

registered to vote. The registered voters were listed first by wards, then by street names within each ward. The list was not a complete representation of all the adults in Merton, however, since it did not include foreign nationalists and those people over 18 who have not registered. The accuracy of the list was checked though, by comparing the number of adults residing in Merton to the number of people on the electoral list. From a census done in 1991, the total number of people living in Merton was found to be around 170,000. However, this number included school children. Therefore, the number of children enrolled in all the schools in Merton (first, primary, middle and high schools) was subtracted from 170,000, yielding approximately 145, 000. Again, this number did not include young children that have yet to be enrolled in school or students that may have dropped out. The number of people on the electoral list was 132,595, resulting in about 90 percent of the total eligible adult population that had registered to vote. Another error in this percentage was that the census was completed in 1991 and the electoral list was from 1998. In those seven years, the population of Merton may have changed. Also, the 90 percent was assumed to be evenly distributed over all of Merton. It could be however, that the defined area along the Croydon Tramlink has a lower percentage of voter registration Overall, this method gave the Croydon project team the best list of residents within the defined area considering time and budget. The electoral list was further narrowed down to include only the five wards completely encompassed by the defined area. The problem with the four wards that lay only partially in the defined area was solved using the road map of the area. In this instance, only the streets contained in the defined area were included in the electoral list. This resulted in a sampling frame of approximately 50,000 residents.

From the sampling size chart (Appendix B), 96 surveys had to be completed in order to obtain 95 percent confidence that there would be no more than a 10 percent sampling error. A sampling size of 200 residents was chosen because if at least 50 percent of these surveys were completed and returned, the desired percentage of error would be met. If less then 50 percent of the surveys were completed, then the results would have been useless because the opinion of the majority could have been unrecognized. Any additional surveys returned above the 50 percent mark decreased the percentage of error.

Finally, from the electoral list containing all the streets in the defined area, 50 random pages were selected using a random number chart. From each page four random names were then selected, again using a random number chart. The phone numbers of these people were found by looking in the Merton phone book. The project team quickly found that many of the residents' phone numbers were unlisted. To compensate for this loss, the project team randomly selected more residents from the electoral list using the same method previously described. The names of the residents now chosen were immediately looked up in the phone book to see if their phone number was available. If it was, the number was recorded and the resident was added to the sampling list and an informational packet was mailed to them and they were contacted by phone. If the resident's number was not listed, their name was not added to the list. This method had to be implemented because without a phone number the project team had no way to contact the resident. Due to the lack of listed phone numbers (approximately 50 percent of the names on the electoral list originally chosen), an unforeseen sampling error occurred. Only those residents with listed telephone numbers had the chance of being surveyed, and those with unlisted numbers

no longer had a chance of being surveyed. Once a list of two-hundred residents and their respective phone numbers were made, the project team began calling the residents.

Since the majority of the residents were expected to be working during the day, the residents were called between the hours of five and eight in the evening, to ensure that they would be home from work. Often however, residents still had to be called numerous times before they were contacted. The form of the survey given to the residents over the phone is shown in Appendix F.

If the telephone surveys had not given the required number of responses, a back up method was developed. This second method of surveying residents was the door to door survey mentioned previously. The project team would have distributed surveys door to door to residents chosen at random. The respondent would have filled the survey out while the team member was still present, allowing the respondent to ask any questions they may have had. This would have decreased measurement error as well as non response error. If the respondent was not at home or did not have time to fill out the survey, they would have been given a stamped, return envelope addressed to the Merton Council to return the completed survey.

3.1.2 Employees

In order to survey the employees of the defined area, a database of approximately 2700 businesses was obtained. From this database, a random number chart was used to randomly select businesses to survey. If a business was selected and it was not in the defined area, the business' employees were not surveyed, and a new business was selected. Once a business was found to be in the defined area, random employees were then surveyed.

In order to determine the amount of surveys to be given to the employees, an estimation of the total number of employees was needed. The exact number was not needed however, because the number of surveys to be handed out only varied between 88 and 96 from a sample population range of 1,000 to 50,000. This small range was found from the survey sampling chart shown in Appendix B. Therefore, it was determined that 100 surveys needed to be obtained from the employees. Again, 200 surveys were distributed to ensure at least 100 surveys were collected, giving a 50 percent response rate.

Before distributing the surveys to the employees, the list of businesses was split into three groups based on the number of employees the business employed. This was done because if a random sample was just taken from the whole list, small businesses would have been chosen disproportionately. This was because over 65 percent of the total businesses in Merton were small businesses. Therefore, the businesses were split up in the following manner. One of the three groups contained the businesses with less than eight employees, another group were businesses with between eight and 100 employees, while the last group contained businesses with 100 employees or more. Businesses with less than eight employees made up 25 percent of the population of employees from the database. Therefore, 25 percent of the 200 surveys were distributed to these smaller businesses. The group of businesses that employed between 8 and 100 employees made up 35 percent of the population while the large business group made up 40 percent of the employee population. A few businesses from each subgroup were selected until the correct proportion of surveys were given to that population.

To randomly choose the employees that received the surveys, a list of the employees at each business was needed. A letter printed on Merton Council letterhead was sent to each selected business requesting an employee listing, by first explaining the Croydon Tramlink project and also assuring employee confidentiality. Upon contacting businesses, the project team found that many businesses were not willing to give out this information. However, each business contact person was willing to distribute surveys among the employees, as well as collect and mail the completed surveys back to the Merton Council. A copy of the survey given to each employee is shown in Appendix G. Although this method was not completely random, it was the only way to ensure at least 100 employee surveys were completed within the time allotted.

3.1.3 Students

A different form of surveying technique was used to acquire knowledge on the travel methods of students in the defined area of Merton. Rather than acquiring the addresses and phone numbers of the students of Merton, the students were surveyed in their classrooms and on school grounds. Face-to-face interviews gave the most accurate results with little error. It would have been impractical to conduct an interview with every student in every class, not only would this have been destructive to the inner workings of the school, but also the team could not have possibly accomplished the survey because of lack of time and staff. Therefore a written survey was handed out to students at school. The surveys were given to students age 12 to 18, since students younger than this may not be old enough to ride public transportation unsupervised. By dispersing the surveys to the students in class, a high response rate was obtained. In order to ensure that the students were not confused by

the surveys, it was important that the questions were written for the appropriate age group. Confusing students with elaborate questions would have altered the survey results. By distributing these surveys shown in Appendix E to the classrooms, useful and accurate information was quickly obtained for use in the project conclusions.

To determine which students were given a survey, a list of the schools contained within the one-kilometer corridor around the tram route was made. Then, schools were eliminated from the sample that only contained students under the age of 12. This narrowed the schools to just one middle school, 2 high schools and 2 schools for further education. The number of students that were surveyed was determined using the sample size chart (Appendix B). The combined attendance of the schools was known to be 2800, which meant 100 surveys needed to be obtained. Again, 200 surveys were distributed, but the number of surveys that each school received varied. The number of surveys given to each school was determined by the ratio of the number of students in the school to the total number of students of the schools in the tramway corridor. St. Thomas middle school received 16 percent of the surveys, Rutlish received 32 percent, Watermeads received 16 percent, Phoenix college received 11 percent, while Wimbledon School of Art received the remaining 25 percent of the surveys. This gave each student the same chance of being chosen for the survey. By using this sampling method, a precise survey was conducted producing accurate results.

The method used to select which high school classes were sampled was done by assigning each grade a number that was picked out of a hat. The school principal of both schools was contacted to arrange a time and date to survey the appropriate fraction of the sampling size of that grade. This letter is shown in Appendix H. Of

course, surveying the students was first approved by the proper school officials in order to adhere to the regulations regarding the distribution of surveys in a classroom. This approval was sought by contacting the appropriate school administrators. If any problems arose, revisions to the survey itself or the method would have been made according to the specifications of the school administrators.

In surveying higher education schools, the project team decided that professors would not be willing to give up class time in order for the students to fill out a survey. Therefore, face-to-face surveys were conducted. First, the project team sought the approval of the school administrator in order to come to the college campus and randomly survey students. The team conducted these face-to-face surveys with students who were willing to fill out the survey. Respondents were chosen by surveying every third person sitting at the cafeteria, and every third person who walked through the entrance hall. This ensured there was no bias on physical appearance or gender. Surveying was carried out in this fashion until the required percentage of the surveys were completed at both further education schools.

4.0 Data Collection

The following section contains the outcomes of the three surveys that were conducted of the students, residents, and employees of Merton. These surveys were conducted separately over a period of approximately three weeks. The method used for each survey was determined by a combination of knowledge gained about surveys from background research, as well as the availability and willingness of each group of respondents to complete the surveys. Students from St. Thomas, Rutlish, and Watermeads schools were willing to complete surveys that were handed-out during class time. Students from the further education schools, Phoenix College and Wimbledon School of Art, were surveyed face-to-face so as to not interrupt valuable class time. Randomly selected residents were surveyed over the phone due to the time constraints the Tramlink project team faced. Finally, based on employee size, small, medium, and large businesses were surveyed. Employees were surveyed from three separate sizes of businesses to ensure each employee had the same chance of being selected for the survey. If the businesses were not split up by size, only small businesses would have been chosen for surveying because there are so many more of them than larger businesses. The medium and large sized businesses were surveyed by mailing packets of written surveys to the businesses that were then distributed to random employees. The smaller businesses were surveyed face to face. The final method used for each survey is described more in depth in the following sections.

4.1 Employee Surveys

By examining the population of employees within each business size, the project team concluded the number of completed surveys needed from each business size. The small businesses made 12.5 percent of the work force, which meant they were distributed 25 out of the 200 surveys that were dispersed. To do this, the team

members went door to door to the small businesses and surveyed one employee from each business. The project team went into random shops and stores in the corridor along the tram route and introduced themselves to the employee present (often there was only one employee at the business). The team member explained the study that they were conducting and asked the employee if he/she would be willing to fill out the survey. The employee was given the option of having the survey read to them or filling it out themselves. Twenty-one surveys were completed in this manner for the small businesses. This gave an 84 percent response rate for the small businesses.

For the medium businesses, those containing between eight and one hundred employees, and the large businesses, those with over one hundred surveys, a different survey method was implemented. A database containing 2700 businesses in Merton was used in order to choose random businesses with more than eight employees that were in the tramlink corridor. A contact person was listed next to each business as well as a phone number. Once a business was chosen, the project team member called the contact person and asked if it would be possible to obtain a list of employees and their phone numbers in order to randomly call and survey employees from that businesses. However, every business contacted would not disclose this information. Another option that the team member suggested to the contact person was that the team would go to the business and survey the employees face to face. This method was also rejected by the businesses due to the time it would take away from the employees during their working hours.

The final method agreed upon by the contact person for each business was that he/she would be sent the surveys to distribute to the employees who could then fill out the surveys at their convenience. The contact person would then collect the completed

surveys and send them back to Merton Council. Five medium size businesses and four large businesses were then sent survey packets. The number of surveys ranged from 15 to 40, depending on the size of the business as well as how many surveys the contact person was willing to distribute. Attached to each survey sent was a map of the Croydon Tramlink route as well as a letter explaining the importance of the survey. Along with this packet of surveys, the contact person received a large, stamped envelope addressed to Merton Council to be used to return the completed surveys. The contact person was also given a deadline as to when to return the surveys. If the completed surveys had not been returned by the deadline, the project team telephoned that business and inquired about the status of the surveys. If the contact person indicated that they would have a low response rate, another business from the database was contacted and more surveys were sent. However, due to the limited time, surveys had to stop being sent two weeks before the final deadline of the project to ensure that the completed surveys would have the chance of being returned on time. After these surveys had been sent out, the project team continued calling the businesses to ensure the response rate was as high as possible. Using this method, 46 out of the 90 surveys were received from the medium sized businesses, which yielded a 51 percent response rate. The larger businesses did not fare so well.

Initially, the response rate of the large businesses was extremely low. Of the 106 surveys sent out, only 18 had been returned a week after the original deadline. In order to get a higher response rate, the project team surveyed employees of Merton Council, which is the largest employer in Merton. The team members surveyed the employees by going face to face to various floors of the building. The team member distributed forty-seven surveys by asking employees at their desks if they would be

willing to fill out a survey. The team member then dropped the survey off to be filled out at the convenience of the employee, and returned later to pick up the completed survey. All forty-seven surveys were completed and returned in this manner, increasing the large businesses' response rate to 42 percent. Overall, the response rate of all of the employees combined was 49 percent.

4.2 Resident Surveys

The response rate of the residents was the highest of all the three groups. As explained in the methodology, a list of residents and their phone numbers was made using both the 1998 electoral list of Merton and a local phone directory. Once this list was produced, the residents were sent an informational packet regarding the survey, as described earlier. The following week the project team began calling the residents between the hours of five and eight p.m., to ensure everyone was home from work. However, even though the calls were made after working hours, many of the residents were not at home. If a resident was not at home, a note was made as to what time they had been called and the team member moved on to the next name on the list. The majority of the time spent calling the residents was used up retrying numbers already called until a person could be reached.

Once a resident was contacted, the project team member introduced himself or herself, then asked the resident if they had received the informational packet regarding the survey. Approximately 90 percent of the residents contacted had received this packet and were already familiar with the survey. This saved time because the team member did not have to explain the project over the phone. Therefore, each phone call that resulted in a completed survey took an average of six minutes.

Occasionally, however, the person who was sent the informational packet was not home and the team member would be speaking to another member of the

household. If this was the case, and the resident was an adult, they were informed of the importance of the survey and asked if they would be willing to fill out the survey. In this manner, the project team made efficient use of the phone numbers listed.

4.3 Student Surveys

As explained previously in the methodology, the students of St.Thomas Middle School, Rutlish High School and Watermeads High School were surveyed by sending the appropriate number of surveys to the schools. Initially the project team had planned on traveling to the schools themselves and distributing the surveys in the classrooms. However, after contacting the head teachers of each of the schools, it was agreed that the teachers of the classrooms should distribute the surveys in order to disrupt the classes as little as possible. Therefore, the project team arranged to send the appropriate number of surveys to the head teacher who would then distribute the surveys to various classrooms where the students were at least 12 years old. General letters explaining the survey were sent, along with the surveys and maps of the route, to the teachers who would be distributing the surveys. The middle school students, age 12, were allowed to take the surveys home and discuss the questions with their parents. This was done to ensure that the students fully understood the questions. This also gave students the opportunity to discuss with their parents how the tram may affect their commute to school. By having the students take the surveys home, however, the response rate was reduced because some students forgot to return the surveys (see Table 4.3.1).

A separate method was used when surveying the students of Phoenix College and Wimbledon School of Art. Rather than try to distribute the surveys during class time, as was done with the younger grades, the university students were surveyed face to face. The project team went to the campuses of the two schools and surveyed the

students sitting in the cafeteria and also those coming through the entryways of the buildings. At the cafeteria, every third person was surveyed to ensure that there was no bias. When surveying students entering the buildings, any student willing to participate was surveyed. This was done because a limited number of students were in the entranceways. Table 4.3.1 shows the number of surveys sent, rejected, and completed for the students as well as for the residents and employees of Merton.

Table 4.3.1

Response Rate Summary

	Surveys			
	Completed	Rejected	Sent	% returned
Number of Employees				
Small - Less than 8	21	4	25	84%
Medium - Between 8 and 99	46	44	90	51%
Large - More than 99	65	88	153	42%
Sum	132	136	268	49%
Residents	102	11	113	90%
Schools				
Rutlish	75	25	100	75%
Watermeads	0	25	25	0%
St. Thomas	8	32	40	20%
Phoenix College	14	6	20	70%
Wimbledon School of Art	30	13	43	70%
Sum	127	101	228	56%
Total Summary	361	248	609	59%

Based on the sampling size table in Appendix B, the project team determined that at least 100 completed surveys needed to be collected from each group in order to be 95 percent confident that there was no more than a ten percent sampling error. The response rate for these surveys was also important when considering the accuracy of the results. As previously discussed in the methodology, the response rate for any survey must be at least 50 percent. Otherwise, the views of the majority of the population might not be reflected in the results. Therefore, the project team decided to conduct 200 surveys per group to keep the response rate high as well as ensure that

at least 100 surveys were collected. Table 4.3.1 shows that at least 100 completed surveys were collected from each group and that the response rate for each group was also at least 50 percent. With over 100 completed surveys from each group, the sampling error is slightly under 10 percent. In total, 361 surveys were completed out of the 609 that were conducted. This yielded a response rate of 59 percent, ensuring the views of the majority of the population were reflected in the results. By weighting the response rates of each group by their percentage of the population, the weighed response rate was calculated to be 81 percent.

In order to determine the correct proportions of surveys to give within each specified group, the populations of each group within the Tramlink corridor needed to be obtained. The population for the residents was found by using the most recent census data from 1991. This data showed the number of people living within the wards of Merton. The Tramlink corridor covered an area, which contained seven wards. Four of these wards were entirely in the corridor, while the other three were partially in the corridor. In order to give an accurate estimation of the partially contained wards, the project team looked at a map of the wards to see how residential the area contained within the corridor was. Once this estimation was found, the population of students within the Tramlink corridor, excluding schools for further education, was subtracted from this number. After completing this, the project team was able to estimate that there were 45,000 residents within the Tramlink corridor. Young children were included in this estimation of residents since they were not enrolled in school. Also, the project team was aware that the students enrolled in further education schools had the chance of being surveyed both as a resident and as a student.

To estimate the number of employees in the corridor, the database containing 2700 businesses was used. This database contained information about businesses throughout the entire Borough of Merton, therefore, a method needed to be developed to determine the number of employees within the corridor. A ratio method was used comparing the number of residents within the corridor, 45,000, and all of Merton, 170,000, to the sum of the employees calculated in the database, which was 41,000. This resulted in 11,000 employees within the Tramlink corridor.

In order to calculate the number of students within the corridor, a map was obtained that contained all of the schools within Merton. A corridor was drawn around the Tramlink and only schools with the ages of 12 and older were selected. Once the schools were located, a listing of the schools and their populations was obtained. This resulted in 3000 students within the Tramlink corridor.

Once the populations of the three groups were obtained, weights could be placed on each group. This was done simply by dividing each groups' population over the entire population within the corridor. This resulted in a .76 weight for residents, .19 weight for employees, and a .05 weight for students. These weights were useful in helping the project team determine average cost, time, and distance traveled for the entire population.

Although the project team wanted to give every person in each group a chance to be surveyed, as well as keep the survey random, there was some sampling error. In order to survey the residents, the most efficient method was determined to be a telephone survey. To obtain the names of which people would be called, the electoral list was used. Therefore, there was a 100 percent sampling error towards people who did not register to vote, foreigners who were unable to register, and people who did

not have registered phone numbers or phones. The 10 percent error rate for the residents therefore, only applied to those with telephones and listed numbers. Those people who were not eligible to be surveyed may have been different than those with listed numbers by characteristics such as age, sex, income, or occupation. However, the project team felt that even though these people were not eligible to be surveyed, the results were still valid. This was because the people who are not eligible to be surveyed would not differ vastly with respect to their travel patterns.

From the results of these surveys, data in the form of percentages for each population was obtained. This data was found for each group and put into tables and charts to accurately portray the information. This information was used to describe accurately to Merton Council the travel behaviors of the people of Merton concerning time, cost, mode and origins and destinations. The data gained from each question was vital in carrying out of this task.

4.4 Survey Question Data

The question Do *you have a regular commute?* was used simply as a gateway question to speed up the survey. If the respondent answered no, the interviewer skipped the questions pertaining to commutes. Therefore, there was no need for any analysis of this question. The subsequent questions yielded meaningful results for the project. The data used to generate all the tables in this section are shown in Appendix J. Except for Table 4.4.1, the following tables are arranged in two separate forms. The first form of table is arranged so that the survey information gained from each of the respondent groups is presented in three separate columns. The rows represent the response options from the surveys. The second form of tables depict the responses from the questions containing a one to five valued scale. Employees, residents, and students each have their own table of this form showing the results from their

individual survey. The columns in these tables represent the survey information gained from a specific respondent group within a rating scale of one through five as well as the option *never*. The rows represent specific modes or purposes of travel, which respondents were to rate on the one to five scale.

4.4.1 Respondents' Status

Table 4.4.1 is unique from the other tables in that it lists the response percentages of each respondent group along a row for that specific group. This information was useful to the project team in helping them determine the status of each group.

Table 4.4.1	**Percent of Respondents who are Employees, Residents or Students**			Completed Surveys
Employees	39% are Residents	2% are Students	0% are Retired	132
Residents	13% are Employees	4% are Students	26% are Retired	102
Students	100% are Students	100% are Residents	0% are Retired	127

Table 4.4.1 supplied the project team with useful information, specifically concerning the percentage of employees that reside in Merton, as well as the percentage of residents that are employed in Merton. From this data the project team was able to conclude that 39 percent of the employees in the defined area were also residents of Merton. This shows that the other 61 percent commute from outside of Merton. In turn, 13 percent of the residents are employed in Merton, while 26 percent are retired. As four percent of the residents were also students, 58 percent of the residents must travel outside of Merton to go to work. From these percentages of employees who live outside of Merton, and residents who work outside of Merton, the project team was able to get a better idea of how much commuting in and out of Merton takes place approximately every working day.

4.4.2 Origin and Destination

In addition to information on the percentages of people commuting in and out of Merton, information gained from the question pertaining to origin and destination gave the project team a better idea of the patterns of these commuters. Information from this question was compiled in Table 4.4.2.1-3. For employees, their destination was within the Tramlink corridor, so the main districts are listed as column headings. Since it varied greatly from where people were commuting from, the project team grouped the origins into the respective groups. This was done by looking at a map of the area and determining which origins should be grouped together, then placing the origins as rows on the left. The sum on the right is the percentage of employees who commute from each origin. The sum at the bottom is the percentage of employees who commute to the districts within the Tramlink corridor. The percentages within the table show the percent of people who come from each origin to each destination. The *No Answer* row represents returned employee surveys without an origin given, and the *No Answer* column also represents returned employee surveys with no destination given. The employee origin and destination figures are shown in Table 4.4.2.1.

Table 4.4.2.1	Origin and Destination for Employees					
	Destination					
Origin	Wimbledon	Morden	Mitcham	Colliers Wood	No Answer	**Sum**
Morden	8%	10%	0%	0%	0%	17%
Sutton	8%	7%	1%	0%	1%	16%
Mitcham	3%	2%	8%	0%	0%	12%
Wimbledon	5%	2%	0%	2%	0%	8%
Wandsworth	2%	2%	5%	0%	0%	8%
Croydon	0%	2%	2%	0%	1%	5%
Lambert	0%	2%	2%	0%	1%	5%
Epsom	1%	3%	0%	0%	0%	4%
Central London	2%	0%	1%	0%	0%	3%
Kingston	2%	2%	0%	0%	0%	3%
Colliers Wood	0%	0%	1%	1%	0%	2%
Greenwich	0%	1%	1%	0%	0%	2%
Essex	0%	1%	0%	0%	0%	1%
Hampton Court	1%	0%	0%	0%	0%	1%
Hounslow	1%	0%	0%	0%	0%	1%
Lewisham	1%	0%	0%	0%	0%	1%
Richmond	0%	0%	1%	0%	0%	1%
Southwark	1%	0%	0%	0%	0%	1%
Sussex	0%	0%	0%	0%	1%	1%
Tottenham	0%	1%	0%	0%	0%	1%
Addlestone	1%	0%	0%	0%	0%	1%
Bettersea	0%	0%	0%	0%	1%	1%
Guildyard	1%	0%	0%	0%	0%	1%
Leamingow	1%	0%	0%	0%	0%	1%
British	1%	0%	0%	0%	0%	1%
TW12 3E4	0%	1%	0%	0%	0%	1%
No Answer	1%	1%	0%	0%	4%	5%
Sum	36%	34%	20%	2%	8%	100%

The information regarding origins and destinations for residents was found in the same manner as the employees' figures. However, the table was designed slightly differently since different information was known about the residents. For the residents, the project team knew the origins were within the Tramlink corridor, so the corresponding districts were listed as column headings. However, it was the destinations that differed greatly, therefore, the project team grouped the destinations together the same way the employees origins were grouped together. Since the

employee and resident data differed, the same origins and destinations were not represented in each table. The resident information can be seen below in Table 4.4.2.2.

Table 4.4.2.2	**Origin and Destination for Residents**							
	Origin							
Destination	Colliers Wood	Mareland Cl.	Morden	Mitcham	Raines Park	Wimbledon	No Answer	**Sum**
Wimbledon	1%	0%	5%	1%	3%	6%	0%	16%
Central London	0%	0%	3%	1%	0%	7%	2%	13%
Croydon	0%	0%	3%	4%	0%	2%	1%	10%
Wandsworth	0%	0%	3%	2%	1%	2%	2%	10%
Morden	0%	0%	6%	0%	0%	3%	0%	9%
Sutton	0%	0%	3%	1%	0%	1%	1%	6%
Colliers Wood	1%	0%	1%	1%	0%	1%	0%	4%
Kingston	0%	0%	1%	0%	1%	1%	0%	3%
Mitcham	0%	1%	0%	2%	0%	0%	0%	3%
Hounslow	0%	0%	0%	0%	1%	0%	0%	1%
Gatwick Airport	0%	0%	0%	0%	0%	1%	0%	1%
Raines Park	0%	0%	1%	0%	0%	0%	0%	1%
Richmond	0%	0%	0%	0%	0%	0%	1%	1%
Lambert	0%	0%	0%	0%	0%	1%	0%	1%
Canary Wharf	0%	0%	0%	1%	0%	0%	0%	1%
Centenill	0%	0%	1%	0%	0%	0%	0%	1%
Chancery Ln.	0%	0%	0%	0%	0%	1%	0%	1%
No Answer	0%	0%	2%	1%	0%	0%	17%	20%
Sum	2%	1%	28%	14%	6%	25%	24%	100%

Information for the students origins and destinations was gathered the same way as the employee and resident data. However, the students' table was designed similar to the employee table, with respect to the positioning of the origins and destination, although only three districts were represented by the school population. The student table can be seen below in Table 4.4.2.3.

Table 4.4.2.3	**Origin and Destination for Students**			
	Destination			
Origin	Wimbledon	Morden	Mitcham	Sum
Wimbledon	3%	18%	2%	23%
Morden	3%	17%	2%	21%
Mitcham	4%	8%	2%	14%
Merton Park	1%	6%	0%	6%
Wandsworth	3%	3%	0%	6%
Sutton	3%	2%	0%	5%
Colliers Wood	2%	2%	0%	3%
Croydon	2%	1%	0%	3%
Raynes Park	0%	3%	0%	3%
Surrey	0%	2%	0%	2%
Ealing	1%	0%	0%	1%
Lambert	0%	1%	0%	1%
No Answer	2%	9%	1%	12%
Sum	24%	70%	6%	100%

According to the employee table, 61 percent of employees live in either Sutton, Mitcham, Morden, Wimbledon, or Wandsworth. These five main groups travel to Wimbledon, Morden, and Mitcham the most. Wimbledon is the destination for 36 percent of the employee travel, while Morden accounts for 34 percent. The districts with the largest amounts of travel both beginning and ending with a single district are Morden and Mitcham each with eight percent.

The most popular destinations for residents were Wimbledon, Central London, Croydon, Wandsworth, Morden, which together made up 58 percent of the destinations. . Wimbledon was the highest destination with 16 percent, followed by Central London with 13 percent. Croydon and Wandsworth both had 10 percent of the residents' destinations, while Morden had 9 percent. Morden and Wimbledon were the two most popular origins making up 53 percent of the origins. Morden was the highest origin with 28 percent and Wimbledon had the remaining 25 percent. The most popular single origin and destination pair for the residents was from Wimbledon

to Central London which was seven percent. Two other popular commutes, which both had six percent, were from Morden to Morden and from Wimbledon to Wimbledon.

The most popular origins for the students were Wimbledon, Mitcham, and Morden which made up 58 percent of the students' origins. Wimbledon was the most popular origin making up 23 percent of the students' origins, followed closely by Morden with 21 percent. Mitcham came in third for most popular origins for students with 14 percent. For the students' destinations, 70 percent of the students traveled to Morden, followed by Wimbledon with 24 percent. This high percentage for students commuting to Morden was caused by the 89 out of the 127 students surveyed in that area, between Phoenix College and Rutlish High School. The most common commutes for students were for students traveling from Wimbledon to Morden, which made up 18 percent. Morden to Morden was the second most popular commute with 17 percent.

The origin and destination percentages for the employees, residents, and students travel patterns were combined into the weighted origin and destination Table 4.4.2.4 shown below. Each individual percentage for given origins and destinations were multiplied by their respective portion of the population. Then, all the percentages were added up for each origin and destination, showing the origin and destination percentages for the entire population. However, these origins and destinations were not precisely what they were in the previous origin and destination tables. In Table 4.4.2.4, the percentages specifically mean the percentage of the population traveling between the noted areas. This was because employees'

destinations and residents' origins were combined. Therefore, the population travel patterns between areas are shown in Table 4.4.2.4.

Table 4.4.2.4	**Weighted Origin and Destination**						
	Destination						
Origin	Wimbledon	Morden	Mitcham	Colliers Wood	Raines Park	Other	**Sum**
Wimbledon	6%	9%	2%	2%	2%		20%
Morden		7%	1%	1%	1%		10%
Central London	6%	2%	1%	0%	0%		9%
Wandsworth	2%	3%	2%	0%	1%		8%
Croydon	2%	3%	3%	0%	0%		8%
Sutton	2%	4%	1%	0%	0%		7%
Mitcham			3%	1%	0%		4%
Colliers Wood				1%	0%		1%
Raines Park					0%		0%
Kingston	1%	1%	0%	0%	1%		3%
Lambert	1%	1%	0%	0%	0%		2%
Richmond	0%	0%	0%	0%	0%		0%
Other	3%	3%	2%	2%	1%	18%	28%
Sum	22%	32%	16%	6%	6%	18%	100%

Table 4.4.2.4 shows the travel patterns for the entire population traveling in and out of Merton. To determine the percentage of the population traveling within Wimbledon, Morden, and Mitcham, the two sums at the end of their two columns must be added together. This is because these sums represent percentage of the population traveling in and out, but there is no distinction between origin and destination in this table. Therefore, approximately 44 percent of the population travels in and out of Wimbledon, 42 percent travel in and out of Morden, and 20 percent travel in and out of Mitcham. The largest individual percentage of the population traveling between areas is 9 percent between Wimbledon and Morden. The second largest percentage is 7 percent that travel within Morden. Individual percentages of the population's travel patterns can also be seen in Table 4.4.2.4. It

should also be mentioned that 18 percent of the population did not supply data on their origin and destination.

4.4.3 Purpose of Journey

In Table 4.4.3, the percent columns list the percentages of each purpose of travel for the respective respondent groups. It was obvious that the employees' main commute was to work 100 percent of the time and that the students' main commute was to school 100 percent of the time. The table can be seen below in Table 4.4.3.

Table 4.4.3	**Purpose of Journey**		
	Employee	**Resident**	**Student**
	%	%	%
Work	100%	57%	0%
School	0%	10%	100%
Errands	0%	0%	0%
Shopping	0%	30%	0%
Wknd. Act.	0%	0%	0%
Other	0%	3%	0%
Sum	100%	100%	100%

What the project group found from this question was that for the residents' most frequent trip, 57 percent commute to work, 30 percent travel for shopping, 10 percent commute to school, and 3 percent travel for other reasons. This information could be important in determining the possible purposes people might use the tram for once it's in operation.

4.4.4 Frequency of Commute

Table 4.4.4 shows how frequently each group travels. These percentages gave the project team a better understanding of how frequent people's commutes, or journeys are.

Table 4.4.4	Frequency of Commute		
	Employee	**Resident**	**Student**
	%	%	%
Every Workday	80%	53%	0%
1-3 times per week	5%	32%	0%
3-5 times per week	14%	12%	100%
< once per week	2%	3%	0%
Sum	100%	100%	100%

The project team found that there was some ambiguity with this question, which may have affected the results. The options, 'Every Working Day,' and '3-5 times per week,' are both too broad for there to be any distinction between them. For example, someone working five days a week could have chosen either of the options. Therefore, the project team decided to group these two options together. By doing so, it can be concluded that 94 percent of the employees, 65 percent of the residents, and 100 percent of the students commute for the majority of the week. The remaining 35 percent of the residents commute from less than once a week to three times a week. This information was used to calculate the percent of the entire population who travel most days of the week.

4.4.5 Methods of Travel

Information from Tables 4.4.5.1-3 was used in the determination of the modes of travel for the employees, residents, and students of Merton. This question asked respondents their frequency of use of various forms of transportation. The results from this question were portrayed in three separate tables, one for each respondent group. As stated previously, the columns in these tables represent frequency on a one to five scale. The option *never* within the scale meant the respondent never used this

form of transportation. The rows represent specific modes of travel, which respondents were to rate in terms of frequency of use. Often, the middle rows received few responses. Therefore, sometimes rows 4 and 5 or *never use* and 1 were grouped together in discussion in order to better show overall patterns.

Table 4.4.5.1	**Methods of Travel for Employees on a 1 to 5 Scale**						
Response	**Never Use**	**1**	**2**	**3**	**4**	**5**	**Sum**
Walk	56%	11%	3%	7%	1%	23%	100%
Bicycle	80%	12%	5%	2%	0%	2%	100%
Taxi	85%	11%	2%	1%	0%	1%	100%
Bus	61%	15%	3%	7%	1%	13%	100%
Automobile	31%	9%	4%	2%	2%	52%	100%
Tube	80%	12%	1%	2%	1%	5%	100%
Other	87%	5%	1%	2%	0%	6%	100%

The project team found from Table 4.4.5.1 that 52 percent of the employees use an automobile, 23 percent walk, and 13 percent use buses as their most frequent mode of transportation. Much was also determined by examining the *never* and 1 column. By looking at the percentage of people who never use a specific mode of transportation, one can also tell how many use that specific mode at least part of the time. For example, 31 percent of the employees never use an automobile, which means 69 percent use an automobile at least part of the time. The second most common mode of transportation shared by 45 percent of the employees was walking, while 39 percent use the bus system at least part of the time. Also, by combining columns 1 and *never use*, the project team concluded that 96 percent of employees rarely use the taxi, while 92 percent rarely ever bike or use the tube.

Table 4.4.5.2	Methods of Travel for Residents on a 1 to 5 Scale						
Response	**Never Use**	**1**	**2**	**3**	**4**	**5**	**Sum**
Walk	63%	13%	2%	3%	4%	16%	100%
Bicycle	77%	22%	0%	0%	0%	1%	100%
Taxi	79%	20%	1%	0%	0%	0%	100%
Bus	51%	17%	3%	5%	6%	19%	100%
Automobile	48%	11%	3%	4%	2%	32%	100%
Tube	66%	16%	2%	2%	2%	13%	100%
Other	72%	16%	0%	3%	4%	6%	100%

By combining columns 4 and 5 in Table 4.4.5.2, the project team concluded that 34 percent of the residents use the automobile, 25 percent use busses, 20 percent walk, and 15 percent use the tube for their most frequent mode of transportation. Again, by looking at the *never* column, the project team found that 52 percent of the residents use an automobile at least part of the time, while 49 percent use the bus system. Also, 35 percent walk and 34 percent use the tube for transportation. Again, by examining columns 1 and *never use*, the taxi and bicycle were rarely used by 99 percent of residents. Also, 82 percent of the residents rarely take the tube for their travels.

Table 4.4.5.3	Methods of Travel for Students on a 1 to 5 Scale						
Response	**Never Use**	**1**	**2**	**3**	**4**	**5**	**Sum**
Walk	34%	7%	9%	11%	9%	30%	100%
Bicycle	69%	17%	5%	1%	3%	6%	100%
Taxi	83%	16%	0%	0%	0%	2%	100%
Bus	41%	15%	3%	6%	16%	19%	100%
Automobile	51%	19%	7%	3%	9%	11%	100%

By examining columns 4 and 5 in Table 4.4.5.3, the project team found that 39 percent of the students walk to school most often. Thirty-five percent of the students take the bus to school, while 20 percent ride in an automobile. By examining the *never* column, 66 percent of the students walk to school, 59 percent take a bus, 49 percent use an automobile, and 31 percent ride a bicycle at least part of the time.

4.4.6 Miles Commuted

The percentages in Table 4.4.6 portray how many miles each respondent group travels during their commute.

Table 4.4.6	Miles Commuted One-Way		
	Employee	**Resident**	**Student**
	%	%	%
0-5 mi.	54%	61%	91%
6-10 mi.	32%	23%	8%
11-15 mi.	5%	11%	1%
16-20 mi.	4%	2%	0%
20-25 mi.	3%	1%	0%
> 25 mi.	3%	2%	0%
Sum	100%	100%	100%

The results indicate that the majority of the entire population travels between zero and five miles one-way during their journey. However, 32 percent of the employees, and 23 percent of the residents travel between six and ten miles one-way. Overall, employees travel the farthest out of the population with 10 percent traveling over 15 miles, where as only 5 percent of the residents travel over 25 miles.

4.4.7 Commuting Time

Table 4.4.7 shows the traveling times for specific percentages of each of the respondent groups.

Table 4.4.7	Commuting Time for One-Way		
	Employee	**Resident**	**Student**
	%	%	%
5-20 min.	45%	48%	35%
20-40 min.	33%	25%	55%
40-60 min.	13%	23%	8%
1-1.5 hrs.	7%	4%	2%
1.5-2 hrs	1%	0%	0%
>2 hrs.	2%	0%	0%
Sum	100%	100%	100%

According to Table 4.4.7, 45 percent of the employees, 48 per ent of the residents, and 35 percent of the students spend 5-20 minutes traveling one way. The majority of the students, 55 percent, spend 20-40 minutes traveling to school, which seems high for the relatively short distance they travel. Although, when considering almost 60 percent use the bus system, which includes waiting for crowded busses, this amount of time may be reasonable. Again, employees also seem to be spending more time traveling, with 10 percent spending over an hour, while only 4 percent of the residents spend over an hour per commute.

4.4.8 Cost for Journey

The percentages from Table 4.4.8 show the amount of money people spend on their commute each week.

Table 4.4.8	**Cost for Journey Each Week**		
	Employee	**Resident**	**Student**
	%	%	%
£0-5	29%	61%	77%
£6-10	30%	15%	9%
£11-15	20%	8%	7%
£16-20	8%	8%	3%
£21-25	5%	4%	2%
£26-30	2%	3%	0%
>£30	6%	2%	2%
Sum	100%	100%	100%

These percentages show that students paid the least because 77 percent paid between zero and five pounds. Residents were paying slightly more, with 61 percent paying between zero and five pounds for their journeys, and 15 percent paying between six and ten pounds. Employees seem to be paying the most because only 29 percent pay zero to five pounds, while 30 percent pay between six and ten pounds, and 20 percent pay between eleven and fifteen pounds. This may be attributed to employees' slightly longer commute and more expensive mode of travel.

The data from Tables 4.4.5 - 4.4.8 allowed the project team to determine important statistics such as average commuting time and cost for each respondent group, as well as average time and cost per mile for separate modes of travel. This will be vital information for the after study that will be conducted following the implementation of the Tramlink. By comparing the before and after information, the Merton Council will be able to conclude exactly how beneficial the tram was for the people of Merton, with respect to both time and cost of travel. This information is presented below in sections 5.1 and 5.2.

4.4.9 Tramlink Beneficial to Journey

The percentages in Table 4.4.9 show the reaction of each respondent group on whether or not the tram will benefit their regular commute.

Table 4.4.9	**Tramlink Beneficial to Journey**		
	Employee	**Resident**	**Student**
	%	%	%
Yes	14%	27%	22%
No	86%	73%	78%
Sum	100%	100%	100%

This question gave a very general idea of the views of each respondent group towards the Tramlink. After being given an opportunity to examine the route and stops of the tram, respondents were asked if the tram could be beneficial to their commute. The employees benefited the least from the tram with 86 percent saying it was not useful in their commute. However, 27 percent of the residents felt the tram would benefit them. Students were slightly lower, with just 27 percent saying the tram was helpful in their commute to school. This information may allow Merton Council to gain a very general idea of how many people plan on using the Tram.

4.4.10 Tramlink's Affect on Businesses

Only the employee group was asked the following questions relating to businesses. The project team felt the employees would have the most accurate understanding of how the tram might affect their own business. The following tables show the employees' responses on how the tram might affect customer accessibility, employee accessibility, as well as employee commuting times.

Table 4.4.10.1	**Tram will increase customer accessibility**							
Response	Not at All	Don't Know	1	2	3	4	5	Total
Number	35	31	16	12	18	10	10	132
%	27%	23%	12%	9%	14%	8%	8%	100%

By combining the two columns *Not at All* and *Don't Know*, the project team could see that 50 percent of the employees felt the tram would help increase customer accessibility at least a little. By combining the one and two responses, as well as the four and five responses, the project team could make some assumptions. Out of these 50 percent that felt the tram would increase customer accessibility, 16 percent felt the tram would help increase customer accessibility greatly, while 21 percent felt the tram would only help a little. However, the largest percentage for people who felt the tram would help increase customer accessibility was for the response of 3 which was 14 percent. It was also noted that some of the businesses may not have been the type of business that had customers. Therefore, some of the 27 percent who chose not at all may have fell into this category.

Table 4.4.10.2	**Tram will increase employee accessibility**							
Response	Not at All	Don't know	1	2	3	4	5	Total
Number	29	33	11	12	21	14	12	132
%	22%	25%	8%	9%	16%	11%	9%	100%

Again, combining the *Not at All* and *Don't Know* columns helped the project team conclude that 53 percent of the employees felt that the tram would increase employee accessibility. Twenty percent of these employees felt that the tram would help greatly in improving employee accessibility, while 17 percent felt that it would not help that much. Again, the highest percentage for people who felt the tram would help increase employee accessibility was for the response of three which was 16 percent.

Table 4.4.10.3	**Tram will decrease commuting times**							
Response	Not at All	Don't Know	1	2	3	4	5	Total
Number	30	43	11	8	18	13	9	132
%	23%	33%	8%	6%	14%	10%	7%	100%

When the *Not at All* and *Don't Know* columns were combined, the project team determined that only 44 percent of the employees felt that the tram would decrease commuting times. This smaller percentage could be linked with the 33 percent of employees who chose the option *Don't Know*. The 33 percent of people who did not know whether or not the tram would help decrease commuting times may be due to the fact that some employees did not know enough about the travel behaviours of his/her fellow employees. Again, the highest response was for response three, with 14 percent. Seventeen percent of the employees felt that the tram would help decrease commuting times greatly, while 14 percent felt that the tram might not help that much.

4.4.11 Possible Uses for Tramlink

The following tables list the responses from questions pertaining to the predicted usage of the tram by each respondent group on a one to five scale. The results for employees, residents, and students were each presented in a separate table.

Information from Tables 4.4.11.1-3 gives Merton Council a clear idea of the possible reasons people might use the tram, as well as an idea of how frequently they may use it for each purpose.

Table 4.4.11.1	**Predicted Frequency of Tram Use for Employees on a 1 to 5 Scale**						
	Never Use	1	2	3	4	5	Sum
Work	64%	19%	3%	7%	2%	5%	100%
School	87%	8%	2%	0%	0%	2%	100%
Shopping	46%	16%	9%	12%	5%	11%	100%
Errands	74%	14%	5%	3%	2%	2%	100%
Wknd. Trans.	56%	16%	11%	7%	4%	7%	100%
Other	95%	2%	2%	1%	0%	0%	100%

As previously stated, much can be learned by examining the *never* column, which in this case means the respondents believe that they would never use the tram for that specific purpose. Table 4.4.11.1 shows that 46 percent of the employees felt they would never use the tram for shopping within Merton and 54 percent said they might use the tram for this purpose. However, 11 percent said they would use the tram most often for shopping purposes, while 16 percent felt the tram would be their least often choice of transportation. The second highest percent of employees, 46 percent, who felt they might use the tram for weekend transportation. However, only 7 percent felt they would chose the tram most often for transportation, while 16 percent felt they would use the tram least often. Examining employees' most frequent commute, which is to work, 36 percent felt they would think about using the tram. However, of these 36 percent, 19 percent felt they would use the tram least often, while only 5 percent said they would most likely use the tram. Based on these percentages, the majority of the employees felt they would not plan on using the tram very frequently for any purpose.

Table 4.4.11.2	**Predicted Frequency of Tram Use for Residents on a 1 to 5 Scale**						
	Never Use	1	2	3	4	5	Sum
Work	65%	26%	2%	0%	4%	3%	100%
School	67%	29%	1%	2%	0%	1%	100%
Shopping	25%	26%	19%	16%	7%	7%	100%
Errands	49%	30%	11%	3%	5%	2%	100%
Wknd. Trans.	44%	25%	11%	8%	9%	3%	100%
Other	75%	14%	6%	3%	1%	2%	100%

From Table 4.4.11.2, the reader can see that 75 percent of the residents felt they might use the tram for going shopping, 56 percent said they might use it for weekend transportation, and 51 percent felt they might use it for doing errands. However, much like the employees, a very low percent said they would use the tram most often for these purposes. In fact, only 7 percent stated they would use the tram most often for shopping, while, by combining the *never use* and 1 columns, 69 percent of the resident said they would rarely use the tram if at all for weekend transportation.

Table 4.4.11.3	**Predicted Frequency of Tram Use for Students on a 1 to 5 Scale**						
	Never Use	1	2	3	4	5	Sum
Work	60%	20%	6%	6%	2%	5%	100%
School	35%	22%	15%	14%	8%	6%	100%
Shopping	38%	26%	20%	9%	6%	2%	100%
Errands	75%	17%	4%	4%	1%	0%	100%
Wknd. Trans.	34%	21%	15%	17%	9%	5%	100%
Other	83%	5%	6%	1%	2%	4%	100%

By examining the *never* column of the next table, the highest response from students who felt they might use the tram for any purpose was 66 percent for weekend transportation. However, of these 66 percent, only 5 percent felt they would use the tram most often while 21 percent said they would rarely use it. When examining students' most frequent commute, going to school, 65 percent felt they might use the tram for this purpose. Again, the majority of these 65 percent felt they would use the tram least often, but this might change as they become more comfortable using it.

Overall, Tables 4.4.11.1-3 illustrates that the majority of the population does not plan on using the tram very often. However, the tables do show that some people understand that the tram may be helpful in their journeys. In time, more people may become more accustomed to the tram, and may in fact begin to use it most of the time for some purposes.

4.4.12 Ages of Respondents

This question was simply used to group the data for each respondent group by their age.

Table 4.4.12	Age of Respondents		
	Employee	**Resident**	**Student**
	%	%	%
13-18 yrs.	2%	3%	65%
19-29 yrs.	32%	6%	35%
30-49 yrs.	45%	37%	0%
50-65 yrs.	20%	25%	0%
Over 65 yrs.	1%	28%	0%
Sum	100%	100%	100%

Table 4.4.12 shows that a high percentage of the residents of Merton are near or above the age of retirement. The majority of the employees were within the age groups of 19-29, and 30-49 years of age. Many retired residents indicated that they were not planning on using the tram simply because the bus was free to them.

5.0 Analysis

The following analysis was done by the project team in order to generate information that would reveal travel patterns to Merton Council. The project team was concerned with answering Merton Council's questions concerning time, cost, mode, and origins and destinations of the people of Merton. The data used to construct the charts and tables in this section are shown in Appendix K.

5.1 Transportation Costs

Once the surveys were analyzed, the project team calculated an average travel cost for each respondent group using the spreadsheet shown in Appendix L. The average cost for each respondent group was calculated by summing the travel costs from each survey, and then dividing that sum by the total number of surveys for that respondent group. In order to calculate cost per mile, the average miles commuted by each responded group needed to be calculated per week, so it could then be compared to the average cost per week. The average miles per commute was converted to average miles per day by multiplying mile per commute by two because there are two commutes everyday. That figure was then multiplied by the number of days per week the respondent traveled . From table 4.4.4, the majority of the three respondent groups commute 3-5 days a week. Once these averages were found for each respondent group, the project team was able to compute the average cost per mile for each group. Once this average cost per mile was found, the project team weighted the averages for the three respondent groups in order to obtain an average cost per mile for the entire population. For example, since students make up 5 percent of the population and it costs the students on the average £.13 per mile, then 5 percent of the population spends about £.13 per mile. This same process of weighting the average cost per mile over the entire population was completed for each group. The results of these calculations, average distance per commute and average cost per mile for each group and the entire population, are shown in Tables 5.1.1-2.

Table 5.1.1	**Average Distance per Commute**		
	Employees	**Residents**	**Students**
Miles	7	5	3

Table 5.1.2	**Employees**	**Residents**	**Students**	**Average cost of entire population**
	£	£	£	£
Average Cost per Mile	0.16	0.14	0.13	
% of Population	0.19	0.76	0.05	
Weighted Cost	0.03	0.11	0.01	0.14

Table 5.1.1 shows that employees travel an average 7 miles per commute, while residents travel 5 miles and students travel on average 3 miles per commute. From the separate calculations of average cost per mile for each respondent group in Table 5.1.2, the project team was able to determine the average cost per mile of the entire population to be £.14. Employees pay the most being £.16 per mile, while residents pay £.14 per mile and students pay £.13 per mile. The higher cost per mile for employees could be attributed to loner average commutes by car.

Using the spreadsheets of each respondent group, the project team calculated average costs per mile for the two most frequent modes of travel for each respondent group, excluding walking. This was done by calculating average distance and then average cost per mile again for just the respondents who responded 4 or 5 on the specified mode of travel. The respondents were separated by different modes of travel by sorting each respondent group's spreadsheets for the specific mode of transportation. However, the project team determined that this calculation would not be completely valid because respondents may not have necessarily stated the cost of just the specified mode of transportation. For example, a respondent could have responded 4 or 5 for the use of both the car and bus, but only put down the cost of using the bus. This would alter the results for the average cost per mile of respondents who use an automobile. Knowing these results might be considerably off, the project team calculated them anyway thinking they still could be used to gain

general ideas of average costs for separate modes of transportation. The resulting average distance per commute for specific modes as well as average cost per mile of the most frequent modes of transportation for the respondent groups are shown in Tables 5.1.3-4.

Table 5.1.3	Average Distance (miles per commute) for a 4 or 5 Response		
	Employees	**Residents**	**Students**
Walking			0.91
Automobile	7.10	6.50	2.77
Bus	6.83	4.48	2.93

Table 5.1.4	Average Cost per Mile for a 4 or 5 Response		
	Employees	**Residents**	**Students**
	£	**£**	**£**
Automobile	0.16	0.13	0.21
Bus	0.18	0.12	0.16

Tale 5.1.3 shows that on average employees and residents travel for longer distances when traveling by car than when they travel by bus. Students travel about the same distance on average when traveling by car and bus. From Table 5.1.4 is can be seen that residents are paying the least per mile for both car and bus usage. Although the table shows that the bus is more expensive than the automobile for employees, this is probably due to the invalid nature previously discussed of these calculations. The cost for bus uses is probably also taking in account costs for using a car, many employees use a combination of the two. The average cost per mile for residents using the car or bus is higher than the average for the entire resident population. This shows that the majority of the residents use cheaper forms of transportation, such as walking.

5.2 Time for Transportation

The average commuting time per mile was also calculated for each respondent group similar to the way the average cost per mile was calculated. The results from this calculation are shown in Table 5.2.1. Secondly, with the spreadsheets sorted by mode of transportation for each respondent group, the average commuting time per mile for the specified modes of transportation was calculated. As with the average cost per mile for specific modes, these calculations are off because of multi-mode respondents trying to answer for both with one response. The results of these calculations are shown in Tables 5.2.1-2.

Table 5.2.1	**Average time for commute of entire population**			
	Employees	**Residents**	**Students**	**Total**
Average Time per mile(min)	4.49	4.72	8.65	
% of Population	0.19	0.76	0.05	
Weighted Commute Time (min)	0.85	3.59	0.43	4.87

Table 5.2.2	**Average Time per Mile (min) for a 4 or 5 response**		
	Employees	**Residents**	**Students**
Automobile	3.79	4.25	10.18
Bus	5.20	5.38	7.73

After weighting the average time spent commuting for the three respondent groups, the project team concluded that the population spend on average about 4.9 minutes per mile commuting. On average, employees and residents spend slightly less than average, spending about 4.5 and 4.7 minutes per mile commuting respectively. Students spend by far the most, taking almost 8.7 minutes per mile to get to school. This might be explained by the majority of students riding the bus to school, but Table 5.2.2 shows that students traveling in automobiles take longer per

mile than those on the bus. This data may be off because of students who travel both by bus and by car. However, the bus is shown to take longer per mile for both employees and residents. This information is also very important to the after survey in determining the affect of the tram to the travel behaviors of Merton. This information will allow Merton Council to determine if the tram saves time for commuters, both those on the tram and those still on the roads.

5.3 Modes of Transportation

Two forms of data could be analyzed from Tables 4.4.5.1-3, which show methods of travel. By using a one to five scale, bar charts were constructed in order to depict the most frequent methods of travel of the individual respondents of each group. Each respondent group was given their own bar chart showing which modes of transportation they use most frequently. The figures in the chart were calculated by summing the percentages in columns 4 and 5 of Tables 4.4.5.1-3 for each respective mode of travel. Columns 4 and 5 were chosen because the project group felt the total of the two columns would better portray the most often used modes of travel. If only column 5 was used, valuable information on uses of modes stored in column 4 would have been lost. Charts 5.3.1-3 depict the most often used modes of travel for each respondent group within their individual commutes.

Chart 5.3.1 Employee Modes of Travel for a 4 or 5 Response

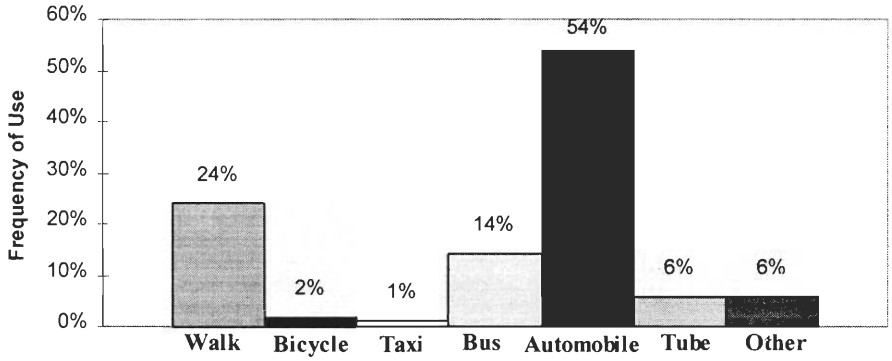


Chart 5.3.2 Resident Modes of Travel for a 4 or 5 Response

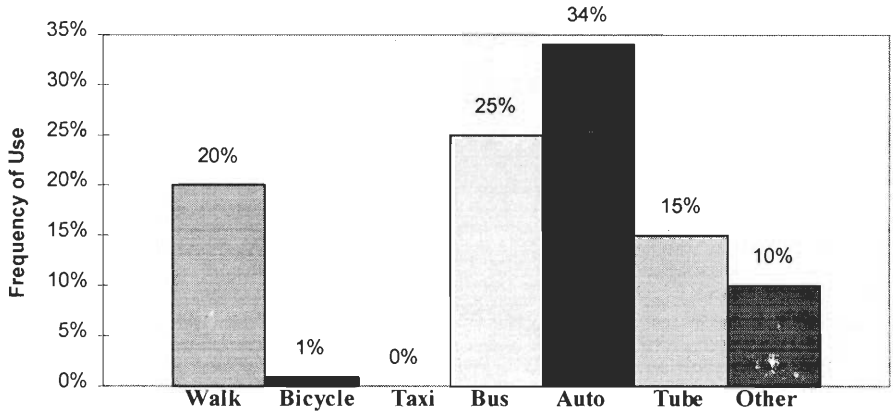
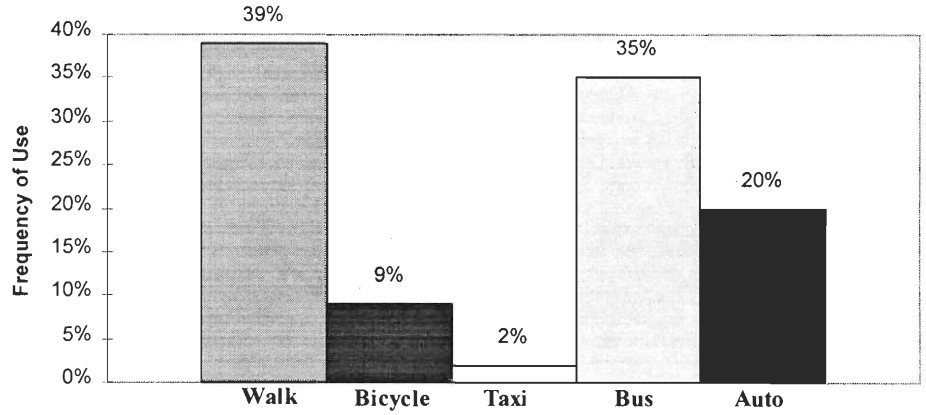


Chart 5.3.3 Student Modes of Travel for a 4 or 5 Response



Shown clearly on these charts, the automobile is used most often for the commutes of both employees and residents. Buses are used second most often by residents and students, and third most often for the commutes of employees. Walking is used most often by students, second most often by employees, and third most often by residents.

As previously stated, by looking at the *never* column, much can be learned about the entire population's travel method. Knowing the percent of a respondent group who never uses a mode of transportation also indicates the percent that do. By portraying in a bar chart a weighted percent of the respondent groups who at least use specific modes of transportation some of the time, information of modes of transportation of the entire population can be shown. Chart 5.3.4 show what modes of transportation the entire population uses more frequently. This was done by subtracting the percentages in the *never use* column for each mode by 100 percent. For example, the automobile was used by 55 percent of the entire population at least some of the time. Of course, the respondent groups' results needed to be weighted in order to truly represent the entire population's views. The difference between this chart and Charts 5.3.1-3, is that Chart 5.3.4 shows what percentages of the entire population use each mode of transportation at least some of the time. Charts 5.3.1-3 show the modes of transportation that are used most often *within* the commutes of the respondent groups. Overall, the following chart portrays a broader picture of what modes of travel are used more frequently by the entire population.

Chart 5.3.4 Weighted Frequency of Use for Entire Population

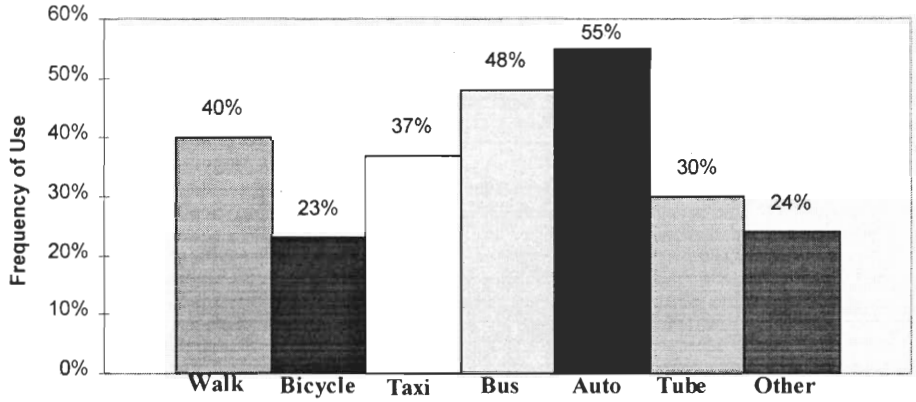


Chart 5.3.4 clearly shows that the most common mode of transportation for the entire population of Merton is the automobile. The bus is the second most common mode on travel, followed by walking, and then the taxi. Finally, the tube was surprisingly the fifth most common mode or transportation.

5.4 Projected Uses of the Tram

Two forms of data could also be obtained from Tables 4.4.11.1-3, which show the predicted frequency of tram use for each respondent group. By using a one to five scale, the predictions of frequency of tram use are shown by the bars in these charts. Each respondent group was given their own bar chart to show what purposes they predicted they would most often use the tram for. The figures in the chart were calculated by summing the percentages in columns 4 and 5 of Tables 4.4.11.1-3 for each respective purpose for tram use. Columns 4 and 5 were chosen because the project group felt the total of the two columns would better estimate the predicted most frequent purposes for tram use. If only column 5 was used, valuable information on frequent purposes of travel stored in column 4 would have been lost. Charts 5.4.1-3 portray the predicted most frequent purpose for tram use for each respondent group within their individual commutes.

Chart 5.4.1: Predicted Frequency of Tram Use for Employees with a 4 or 5 Response

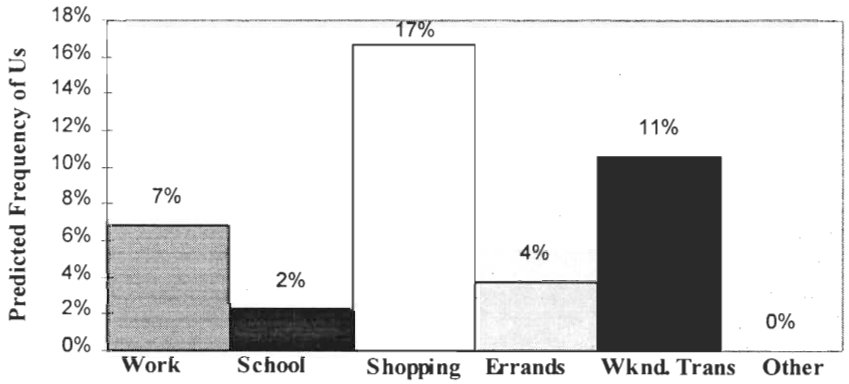


Chart 5.4.2: Predicted Frequency of Tram use for Residents with a 4 or 5 Response

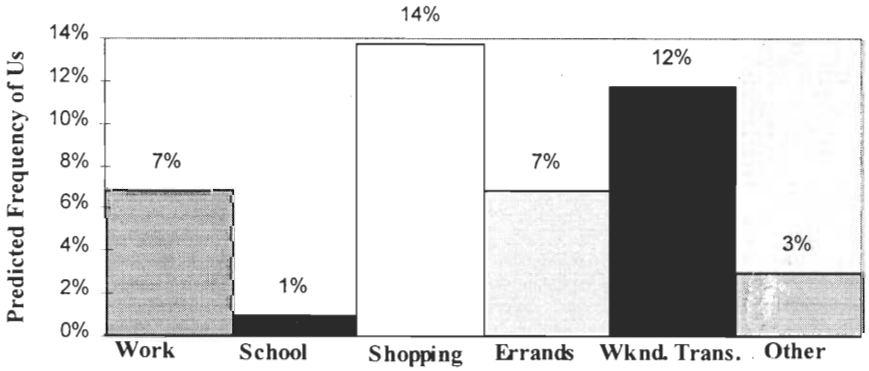
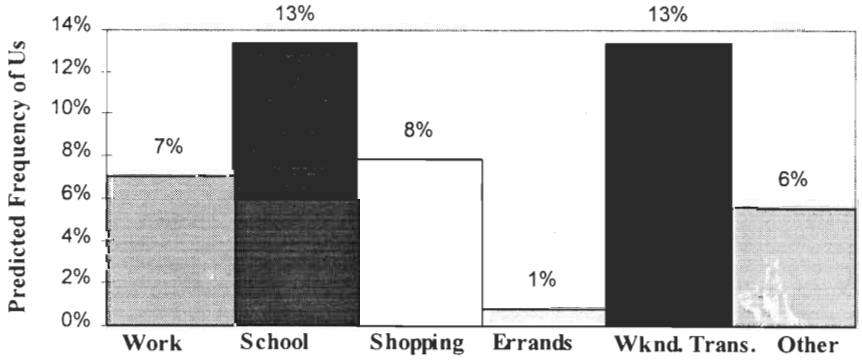


Chart 5.4.3: Predicted Frequency of Tram use for Students with a 4 or 5 Response

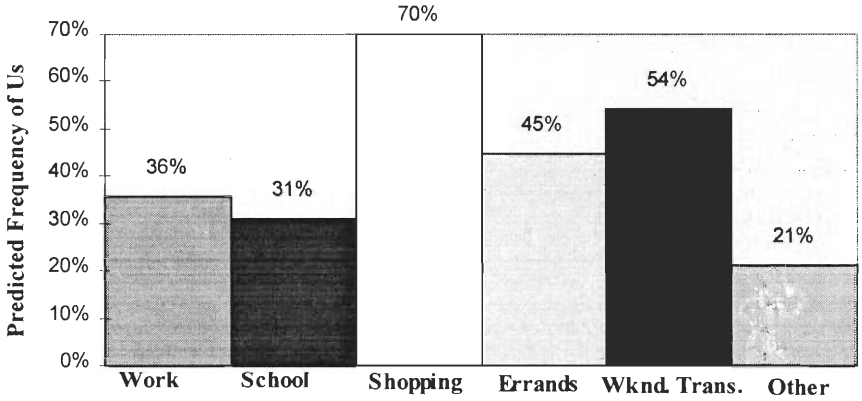


Charts 5.4.1-3 show that there is not much enthusiasm for tram use by any of the respondent groups. However, there does seem to be at least some interest in the possible benefits of the tram. Seventeen percent of employees felt they might use the tram most often for shopping purposes. Fourteen percent of the residents agreed with these employees, while only 8 percent of the students felt they would use the tram for shopping. The second most frequent predicted use of the tram was weekend transportation, where about 12 percent of each respondent group felt they would use the tram for this purpose. Finally, 13 percent of the students said they would use the tram most frequently for traveling to school. This could greatly decrease the amount of traffic on the road transporting children to school.

As previously stated, by looking at the *never* column, much can be learned about an entire population's travel method. Knowing the percent of a respondent group who predict they will never use the tram for any purpose also indicates the percent that predict they will. By portraying in a bar chart the percent of the respondent groups who predict they might use the tram at least some of the time for a specific purpose, broader information on possible purposes of tram usage of the entire population can be shown. Of course, the respondent groups' results needed to be weighted in order to truly represent the entire populations' predictions. Chart 5.4.4 shows what possible purpose for tram use are most frequent among the entire population. This chart was constructed by subtracting the percentage for each use from the *never use* column from 100 percent and multiplying this number by the weights for each group. The difference between this chart and Charts 5.4.1-3 is that Chart 5.4.4 shows a broader picture of what percentages of the population predict they will use the tram at least some of the time in the future. Charts 5.4.1-3 portray the

percent of the respondent groups who feel they will use the tram most often for the specified purpose. Overall, the following chart portrays a broader picture of the purposes for which the entire population predicts they might use the tram once it is operational.

Chart 5.4.4: Weighted Predicted Frequency of use of Tram for Entire Population



From Chart 5.4.4, the reader can see that 70 percent of the entire population feels they will possibly use the tram for shopping once it is operational. Fifty-four percent felt they may use the tram for weekend transportation, while 45 percent felt they might use it for errands. What must be kept in mind is that these figures include people who responded one to any of these purposes of tram use. In other words, these percentages include people who stated they would rarely use the tram for such purposes.

6.0 Survey Conclusions

The following conclusions were made by the project team in order to answer Merton Council's questions about the travel behaviors of the people of Merton, as well as form a base study for a follow up after study in order to assess the affect of the tram on Merton. The conclusions in this section are based on the analysis in sections 4.0 and 5.0 of the surveys conducted of the employees, residents, and

students of Merton. This data was collected in a professional manner, with great care taken to ensure that proper survey procedure was followed in order to produce accurate, non bias results.

6.1 Surveys

6.1.1 Employee Survey

Much knowledge was gained about the travel behaviors of the employees of Merton from the survey. The project team feels the results of the employee survey are relatively valid because the survey questions were based on a professional origin and destination study and the response ratio was 49 percent, which is very close to being the required 50 percent. If there was more time, more of the surveys could have been collected in order to increase the response ratio to over 50 percent. Overall, considering limited time and budget, there was little more the project team could do to obtain more accurate results.

The results from the survey show that 39 percent of the employees in Merton also live in Merton. Therefore, 61 percent of Merton's employees travel from outside of Merton on a daily bases. The general patterns of the employees' commutes can be seen in Table 4.4.2. This origin and destination table shows that 36 percent of the employees commute to Wimbledon, 34 percent to Morden, and 20 percent to Mitcham. Of these employees commuting to Wimbledon as well as Morden, 16 percent are coming from outside of Merton. By examining specific travel patterns, ten percent of the employee population travel within Morden every day to go to work. Also, 8 percent of the employee population travel from Sutton to Wimbledon, 8 percent from Morden to Wimbledon, 8 percent within Mitcham, and 7 percent from Sutton to Mitcham. The rest of the population of employees travel from other areas

outside of Merton, shown in Table 4.4.2. Out of these travel patterns, the tram route from Croydon to Wimbledon could benefit those employees traveling within Morden and Mitcham, from Sutton to Wimbledon, Sutton to Morden, Morden to Mitcham, and Morden to Wimbledon. Surprisingly, there were only 4 percent total out of all the employees that travel from Croydon into Merton, which is the route the tram could benefit most. Also, 61 percent of the employee population who commute from outside of Merton will most likely not benefit from the tram. This is because the tram was primarily built for inter-Borough travel within Merton. Therefore, only 14 percentage of employees stated that the tram would benefit their commute to work.

As expected, the primary mode of travel used by the employees is the automobile. Fifty-four percent of the employee population travel by car most often, while 69 percent travel by car at least some of the time, meaning they did not check *never use* on the survey question that pertained to automobiles. This is compared with 44 percent of employees who walk, and 39 percent who take the bus at least some of the time. What must be kept in mind is that taking the bus and walking are most likely modes that are used in combination with each other or other modes within people's travel. For example, half of someone's commute could be on foot, while the other half is on the bus. Employees who drive to work in their cars, on the other hand, would probably only walk from the parking lot. The portion of the population who walk, take the bus or tube are most likely to notice the tram once it is operational, and determine then if its route is beneficial to their travel. The 69 percent who use their car for transportation is the portion who need to be targeted in gaining users for the tram. Only by convincing drivers to use public transportation such as the tram will traffic congestion be improved throughout Merton.

The average commuting distance for employees was 7 miles, with just over 50 percent of the population traveling 0-5 miles to work, while 86 percent travel under 10 miles. This may also be a reason for very few employees stating they might use the tram. Employees who use a car for commuting would most likely not walk or drive to a tram stop when the average time taken by employees who drive to work is under 4 minutes per mile, with an average commuting distance of 7.1 miles. However, with an increase in car ownership projected to be between 86 and 142 percent by 2010, using the tram may take less time and be less aggravating than sitting in traffic. Employees who choose to ride the bus primarily for their commute spend slightly more time per mile, 5.2 minutes. Also, bus riders on average have a shorter commute of 6.8 miles. This may explain why fewer employees chose to use the bus. With over 60 percent of the employees commuting from outside of Merton, many would not want to spend so much time on a bus traveling over 10 miles. With an average time per mile on busses being just over 5 minutes from Table 5.2.2, such a commute would take about an hour.

The employee survey also gave the project group a lot of insight on how much the tram might benefit the businesses along the tram route. Overall, the employees felt the tram would be beneficial to businesses in the area. For example, 15 percent felt the tram would increase customer accessibility very much, while 47 percent said it would help at least a little. Also, 17 percent said the tram would increase employee accessibility very much, while 59 percent felt it would be at least a little improvement. Finally, 49 percent of the employees felt the tram would decrease commuter times at least a little. The high percentage of employees that felt the tram would be beneficial to customer accessibility relates to their feelings about the predicted uses for the tram.

Overall, a very high percentage of the employees felt they would not use the tram for most purposes. However, 54 percent felt they might use the tram shopping, even though only 16 percent said they would use the tram often for this purpose. Also, 44 percent felt the tram might benefit their weekend transportation. With only 7 percent of the employees feeling they might use the tram often to travel to work, it seems most employees felt that the tram might primarily be used for weekend traveling activities such as shopping.

6.1.2 Resident Survey

Many conclusions can be drawn from the results of the residents' surveys. First, however, it was imperative to take into consideration the possible bias that occurred in the survey. This bias occurred when the project team made a list of the residents in the defined area. The team constructed the list using an electoral list and a phone book. By using the electoral list, not all the residents living along the corridor had an equal chance of being surveyed. This was because the list did not include foreign nationalists, illegal aliens, or those residents who had simply not registered to vote. However, without any funds to purchase a list that included these groups of people, the electoral list was the most accurate source to form a sampling list from.

A second survey limitation occurred when the project team used the local phone book to acquire the phone numbers of the residents from the electoral list. Approximately 50 percent of the original list of residents did not have their telephone number listed. Therefore, only those residents with listed telephone numbers had a chance of being surveyed. If for some reason, the residents with unlisted numbers varied from those with listed numbers in terms of mode of transportation, income or travel behaviors, for example, these differences would not be reflected in the results of

this project. However, the project team did not feel there were any discrepancies concerning travel behaviours among residents with and without listed phone numbers.

Once the resident list was made, the project team conducted a telephone survey and obtained 102 completed resident surveys. The response rate of the residents was 90 percent, which makes the results extremely accurate. From these surveys, it was concluded that 13 percent of the residents were employed in Merton, 4 percent of the residents were students, and 26 percent of the residents were retired. When surveying the residents that were retired, 98 percent stated that they receive a free bus pass from Merton and they would not use the tram if they were charged to use it. This may explain why the project team found that 67 percent of the retired residents stated they would not use the tram. Also, the main commute for those residents that were retired was for shopping. Therefore, it was not surprising that 25 percent of the residents said they would never use the tram for shopping while only 7 percent said they might. Shopping received the highest predicted usage rate among the residents as shown in Table 4.4.11.2. Shopping was also the second most common purpose for travel among residents, 30 percent, while work received the highest with 57 percent.

Of those 57 percent of residents who commute to work, 32 percent use their car as their primary mode of transportation. However, 27 percent of all residents said the tram would be beneficial to their journey. Only 13 percent of the residents were employed in Merton, which is where the tram operates, therefore 14 percent of the residents that believe the tram will benefit their journey do not work in Merton. This means that these residents may use the tram for other reasons, as shown in Table 4.4.11.2.

The travel behaviors of those residents that do not work in Merton can be studied in the Origin and Destination chart in Table 4.4.2.2. Although 24 percent of the residents did not give information about their origin and destination, the project group concluded that the majority travel from Morden, Wimbledon, and Mitcham. Twenty-eight percent travel from Morden, 25 percent from Wimbledon, and 14 percent from Mitcham. The majority of the resident population travel to Wimbledon (16 percent), central London (13 percent), Croydon (10 percent), and Wandsworth (10 percent). The largest single group of residents traveling the same route is 7 percent, who travel from Wimbledon to central London. These residents probably could not benefit from the tram route because it would just be taking them the wrong way. The second largest groups are two groups, each 6 percent of the resident population, who travel within Wimbledon and Morden. These travel patterns could benefit from the tram route, depending on the distance from their specific origins and destinations from tram stops.

From Table 4.4.9, it was shown that a majority of the residents, 61 percent, commute five miles or less one way. Also, 20 percent of residents stated that walking was their primary mode of travel. For this reason, the tram may be used by these residents, since they are not traveling great distances, nor were they using their automobile to get to their destination. However, 25 percent of the residents listed the bus as their primary mode of travel, but as stated before, 26 percent of residents were retired and use the bus as their primary mode of transportation since they receive a free bus pass. Calculated from the survey data, 66.67 percent of the retired residents listed the bus as their primary mode of transportation. This group of people made it known throughout the telephone surveys that they would not use the tram if it cost

them money. This means that if the bus is the main competitor of the tram, the majority of the customers ride the bus freely and would not provide revenue for the tram if they were to use it.

The second highest percentage of residents that commute travel six to ten miles. Twenty-three percent of commuters travel between six to ten miles for their commute one way, followed by 11 percent who travel 11-15 miles one way. These two groups' commutes fall well beyond the range of the tram, meaning they would probably not be using the tram for their total commute, although they may use it for part of their trip.

Table 4.4.11.2 shows how many residents said they would never use the tram. Sixty-five percent of residents said they would not use the tram for work, which was evident from the conclusion in the above paragraph. Almost half, 49 percent, said they would not use the tram for errands, and 44 percent said they would not use the tram for weekend transportation. These results predict that there will be a low percentage of residents that will use the tram. This percentage could possibly be higher if pensioners were offered free passes.

6.1.3 Student Survey

The project team felt that the response rate of 56 percent from the students was adequate. Although one of the schools was unable to return any of the 25 surveys they were sent, the project team felt that the school population was accurately covered by obtaining information about the travel behaviours of 127 students from the other four schools. If not for the time constraints, the project team would have been able to collect more data from those schools which had poor response rates.

The results from the surveys showed that all of students who go to school in Merton, also reside in Merton. Also, 70 percent of these students travel to Morden. This percentage may have some bias, since 75 of the surveys came from Rutlish, which is in Morden and another 14 came from Phoenix College, which is also in Morden. Students with Mitcham as a destination only made up 6 percent of the possible travel destinations. This percentage could have been increased if the project team had more time to collect the surveys. Finally, 24 percent of the students traveled to Wimbledon. However, many students who lived in Morden were in the same districts as where the schools were. Seventeen percent of the students who lived in Morden went to school in Morden. This is understandable, in the sense that younger students usually live close to their schools. Also, 58 percent of the students lived in the three districts the schools are in, Wimbledon, Morden, and Mitcham.

When determining frequency of commute for the students, the project team realized a problem with the student survey. The students were never asked how frequently they commute to school. The younger students travel 3-5 times per week, but the older students may only have class a couple of time a week or more. Therefore, the project team concluded that 100 percent of the students commute 3-5 times per week.

As expected, walking is the students' primary method of travel to school. Sixty-six percent of the students walk to school, while bus is second with 59 percent. This was expected due to information discussed earlier, with 58 percent of the students living in one of the three districts. With such a large percentage being in a close proximity to the school, walking is an obvious choice. Thirty-nine percent of the students chose four and five, meaning most often, for walking as their primary

mode of travel. The grouping of four and five together was done in order to compare walking to bus usage. Thirty-five percent of the students chose four and five for the bus. The usage percentage for walking and taking the bus are very close when comparing the percentages for the four and five responses. This results in two modes of travel for students which are most commonly used, walking and riding the bus. The automobile was still used a large amount of the students, 49 percent. This percentage could be made of mostly older students who drive to Phoenix College or Wimbledon School of Art. With public transportation being largely used by students, the tram may be effective to the students' commute to school. Depending on how close the students are to the tram stop or how close the school is will ultimately determine if the students will use the tram.

With the majority of the students living close to their school and having walking as the primary mode of travel, it was expected for the commuting distance to be small. Ninety-one percent of the students travel between 0 and 5 miles one way to school. This percentage can be grouped with the 6 and 10 mile percentage, resulting in 99 percent of the students traveling less than 10 miles one-way to school.

Also with such a large percentage of students living close to their school, it was expected that the commuting time would be small as well. Thirty-five percent of the students take 5-20 minutes to get to school. This is consistent with a large number of students walking to school and living 0-5 miles away. A mile or two walk to school can easily take at least 20 minutes. The largest percentage of students takes 20-40 minutes to get to school, 55 percent. This again can be understood for students who walk to school, as well as students who take the bus to school. Buses can take awhile with frequent stops and heavy traffic in the early morning hours. Ninety

percent of the students take 5-40 minutes to get to school, so with the students willing to take this much time to get to school, the tram could be an option if it is more convenient than their current mode of travel.

With the majority of students walking to school, it was expected that a large percentage of the students would pay between £0 and 5 pounds. Seventy-seven percent of the students paid 5 pounds or less per week. Also, this percentage could include students who take the bus to school or are driven to school by car. With the younger students generally not driving themselves, they may have selected the option for spending £0 pounds because they do not pay for the gas or tickets. Their parents probably do. This percentage may be useful in determining how much to make the ticket prices for the Croydon Tramlink. Students, or their parents, would not want to pay more than the fares for the buses. Percentages for the other possible costs may be representative of the older students who drive themselves to school or take the bus and live farther away.

Most of the students know about the Croydon Tramlink, or at least the parents know about it if the students brought the survey home to be filled out. Therefore, the students would have a good idea about whether or not they will use the tram for school next year when the Tramlink is operational. Twenty-two percent of the students said they would use the Tramlink to get school, resulting in a large percentage (78 percent) who said they would not use the tram for school. This percentage could be changed once the tram is operational, due to the fact that some students may not realize how convenient the tram might be for them.

However, on the question concerning what the students might use the tram for, 65 percent of the students said they would use it to go to school. However, 37 percent

of these students chose one or two, meaning least often, for using the tram to go to school. Only 14 percent of the students chose 4 and 5 for using the tram to go to school. The highest percentage for using the tram for students was 66 percent for shopping. Again only 14 percent chose 4 and 5, but it shows that many of the students might use the tram at least some of the time. There was another high percentage of 62 percent of the students who would use the tram for shopping. Although 78 percent of the students said that the tram would not be beneficial for their commute to school, these other percentages show that the students are expecting to use the tram for other purposes.

Finally, with the project team surveying students 12 years and older, it was expected that the student population would be mainly in their teens. Sixty-five percent of the students surveyed were between 12 and 18 years old. The remaining 35 percent of the students were between 19 and 29 years old. This was expected given that the older students received fewer surveys.

6.2 Project Conclusions

6.2.1 Cost of Transportation

After examining average cost per mile for employees, residents, and students of Merton, the project group calculated the average transportation cost per mile for the entire population to be 14 pence. The employees spend the most with an average of 11 pounds per week. Residents pay on average 7 pounds per week, while students pay about 4 pounds per week. Transportation for the younger students is most likely paid for by their parents, but this cost is still important. When determining the price for tram use, this information about how much people are currently spending for travel must be kept in mind. Furthermore, it is imperative that the retired portion of the population of Merton is factored in to the determination of ticket prices. From the

telephone surveys of residents, retired people made it clear that they would not use the tram if they had to pay for it because the busses are free for them to use. Despite retired people making up at least 22 percent of the entire population, they are also the portion of the population who could benefit most from the tram. They are very likely to take advantage of inter-borough transport for such reasons as shopping, weekend transportation, or weekday errands.

In the after study, it might be helpful in determining the success of the tram to compare cost of travel for separate modes of travel. As explained earlier in section 5.1, the project group's calculations for average cost per mile by mode are not completely valid because this cost could also take in account other modes of transportation. Never the less, these calculations can give at least an estimate of what car drivers and bus riders are spending per mile of transport. Employees and students both pay 16 pence per mile for driving their automobiles, while residents pay about 13 pence. Students pay the most for riding the bus, approximately 21 pence per mile, while employees pay 18 pence and residents pay 12 pence per mile. If using the tram is cheaper than traveling by car or bus, people might be more inclined to use it.

6.2.2 Time for Transportation

Time will also be a major consideration in determining the success of the tram on the community's commutes. If the tram doesn't save people time, they are less likely to use it regularly. From the survey questions focused on traveling times, the project team calculated that the average journey time per mile for the entire population is approximately 4.9 minutes per mile. On average, employees have a 30-minute commute one-way to work, while residents are traveling 25 minutes and students are traveling 26 minutes one-way. With increasing traffic congestion expected in the near

future, the average journey time for the population, especially for employees who travel farther, might increase. As with the average cost per mile for separate modes of transportation, the calculations for average time per mile for specific modes may take in account other modes of transportation. However, even though they are not entirely valid, they may be able to be used in the future to broadly compare changes in commuting times for separate modes of travel. Overall, the bus takes longer per mile than the automobile, which was expected. Employees spend on average 3.8 minutes per mile in the car, and 5.2 minutes on the bus. Residents spend approximately 4.3 minutes driving, and 5.4 minutes riding the bus. Students spend the most time per mile for both methods of traveling, with the automobile taking 7.7 minutes per mile, and the bus taking 10.2 minutes per mile. The bus figure in particular could take in account walking, which is used by the majority of the students traveling to school. The longer times for students could be because of congestion on the roads due to similar travel patterns of parents dropping children off at school, or overcrowded busses taking longer at stops in order to fit as many students on as possible. Never the less, the tram would seem to be a good solution for transporting students to school. Fewer students being dropped off by parents or crowding the busses could lessen the load on the roads, allowing traffic to move more smooth.

6.2.3 Modes of Transportation

Data on the modes of transportation used by the people of Merton can be used by the after study in determining whether or not the tram had an affect on the uses of different modes of transportation. The results from the survey were not surprising in that they showed the majority of the adults driving their cars, while students mostly walked and drove in automobiles. From the weighted bar chart portraying

percentages of the population that use each mode of travel, 55 percent of the population use the automobile for their primary form of transportation. Approximately 69 percent of the employees drive to work at least some of the time, with 54 percent driving most often. Also, 52 percent of residents use a car at least some of the time for their journey, while 34 percent drive most of the time. The employees and residents, who drive for most of their journey, travel on average 7.1 and 6.5 miles respectively, one-way. Also, the percent driving are more than likely to grow with the number of car owners expected to double within the next ten years.

Bus usage was the second most widely used mode of transportation with 48 percent of the population riding the bus at least some of the time during their journey. Students primarily use buses, with 35 percent of the students take advantage of the bus routes in order to travel the average 2.9 miles to school everyday. This is a relatively cheap and dependable way for many parents to get their children to school and back without interrupting their workday. The large number of students using the bus at specific times of the day is known to discourage many other potential users from riding noisy, overcrowded buses. The majority of the 25 percent of the resident population who ride the bus most often is probably made up of the retired portion of the population who do not have to pay for this usage. These residents take the bus for an average 4.5 mile journey, while the 14 percent of the employee population who primarily travel by bus travel for an average 6.8 miles.

The third most common mode of transportation used by the population is walking, which is used most often by 39 percent of the students, 24 percent of the employees, and 20 percent of the residents. However, on rainy days, the students are most likely to ride the bus while the employees and residents take to their cars.

6.2.4 Projected Use of the Tram

When determining the projected frequency of use of the tram, the project team felt that each group should be analyzed in separate charts, shown in Table 5.4.1-3, then combined into a weighted chart in Table 5.4.4. The projected frequency of use for the tram for employees within the Tramlink corridor was highest for shopping at 17 percent. This was followed by weekend transportation at 11 percent. These two uses for the tram are beneficial for the employees who want to use tram to go shopping in Croydon or travel through a part of Merton to visit friends or see other parts of Merton over the weekend. Surprisingly, only a small seven percent of the employees said they would use the tram for work. This can be linked to the residence of the employees. The Tramlink would be most beneficial for employees who travel to work from Wimbledon, Morden, Mitcham, and Croydon. Although only 14 percent of the employees said the tram would be beneficial to their work, the percentage may increase if the tram is a more convenient route than their present one. The tram will not be beneficial to employees who do not work near a tram stop or do not live near a tram stop. This is because many employees would not want to take the unnecessary time to commute to the tram stops when a more direct route could be taken.

Again for residents, shopping was the highest projected use for the tram, this time at 14 percent. With 26 percent of the residents surveyed being retired, many of these people might use the tram to go shopping in Croydon. However, retired residents have free bus passes so many of them would not pay to ride the tram. Therefore, it may be wise for the Croydon Tramlink to offer free or reduced passes to retired residents as well. Residents who are not retired might use the tram for shopping, but also for weekend transportation, work, and errands. Work and errands

were both at seven percent, while weekend transportation was second at 12 percent as seen in Chart 5.4.2. With almost 40 percent of the residents traveling within Morden, Mitcham, Wimbledon, and Colliers Wood, it is easy to see how these people might use the tram for any of these uses. Obviously, residents would use the tram for work if they worked and lived in an area around the Tramlink. Although only 27 percent of the residents said that the Tramlink would be beneficial to their commute, 75 percent of the residents said they might use the tram for shopping. Also, over 50 percent of the residents said they might use the tram for both shopping and errands.

With respect to students, 13 percent of students said they would use the tram for both commuting to school and for weekend transportation. Sixty-six percent of the students said they would use the tram for weekend transportation, while 65 percent of the students might use the tram to commute to school. Another high percentage of students, 62 percent, said they might use the tram for shopping. Although the majority of them selected a one or two on the rating scale, meaning least often, there is still the chance for the students to use the tram. Again, students would primarily use the tram if their school and homes were near the tram stops. They would not want to go out of their way to commute to school when a more direct route could be taken. Weekend transportation may be for visiting friends or seeing other parts of Merton. The tram might also be used for shopping and work with projected percentages being eight and seven respectively. These percentages are probably geared more towards the older students who live near the schools. Therefore with easy accessibility to the tram, the students could travel to work if their work was near a tram stop or use it for shopping.

The project team developed a weighted predicted frequency of use chart, Chart

5.4.4, to see the percentages of what the entire might use the tram for. This resulted in the population saying that 70 percent of the people might use the tram for shopping. This would be mostly for people who lived near the Tramlink and wanted to go shopping in Croydon or Wimbledon. Some people said they shop the majority of time in Kingston, so the Tramlink would not be beneficial to them. The second highest projected use for the Tramlink was weekend transportation at 54 percent. Many of these people might use the tram to visit friends or see other parts of Merton. Some people stated they might just ride the tram to see how it is and decide whether they like it or not. Forty-five percent of the population said they would use the tram for errands, which could be such purposes as going to the doctor, getting a haircut, going to the dry cleaners, etc. Surprisingly, there was not a high percentage of projected usage for work and school, which was 36 and 31 percent respectively. This may be because it would take more time for the people to get to work or school if they used the tram.

6.2.5 Origin & Destination

By constructing a weighted origin and destination chart, the project team hoped to portray to Merton Council a general idea of the travel patterns of the entire population in the form of percentages. As described in section 4.4.2, in order to combine the travel patterns for residents and employees, their origins and destinations were disregarded. Therefore, Table 4.4.2.4 shows the areas where the percentage of the population is going to and coming from. From this chart, the majority of the population travels within Wimbledon, Morden, and Mitcham. As explained in section 4.4.2, forty-four percent of the population travel within Wimbledon, 42 percent within Morden, and 20 percent within Mitcham. This large percent of the population

traveling in and out of Wimbledon and Morden would suggest a possible high use of the tram which goes through Morden connecting Wimbledon to Croydon. However, as explained from Table 4.4.1, sixty-one percent of the employees must travel from outside of Merton, and 58 percent of the residents have destinations outside of Merton. This 56 percentage of the entire population probably would not benefit from the tram's inter-Borough focused route. On the other hand, the 8 percent traveling to and from Croydon shown in Table 4.4.2.4 might find the tram extremely beneficial to their journey. Looking at inter-Borough routes, The largest individual percentages of the population traveling between areas was 9 percent between Wimbledon and Morden, and 7 percent traveling within Morden. Depending on how far this portion of the population must travel to get to the train, they possibly could greatly benefit from the tram's route.

6.2.6 Summary

Overall, much was learned about the travel behaviors of the people of Merton, as well as the predicted use for the Croydon Tramlink. Raw data stating current average cost and time for travel was calculated for use in an after study to assess the effect of the tram on the people of Merton. Concerning travel behaviors, the majority of the population of Merton travels by car in and out of the Borough. Of the entire population, less than 25 percent stated they would benefit from the tram. Although the majority of the population did not feel they would use the tram for their most frequent commute, they did feel they might use it for other reasons. The most popular predicted uses for the tram were shopping and weekend transportation. However, only about 14 percent of the entire population felt they would use the tram frequently for these purposes. On a positive note, 30 percent of the students felt they would use

the tram most often for going to school, which would take much of the stress off overcrowded roads and busses during school commuting hours.

6.3 Recommendations

6.3.1 Further Research

In the future , the project team recommends for similar projects that more time be allowed to survey the population of the area. If the team had more time available to them, the response rates for each group may have been improved. Employee and student surveys may have been returned if more time was allotted, and there would have been more time to call additional residents. Also, to be more efficient, it would be better for the project team to pick up the surveys at the respected schools or businesses to ensure that the returned survey deadline is met.

In addition, the project team strongly suggests that if another survey is conducted, the results be placed in a database or some spreadsheets such as the ones in Appendix L. By placing all the respondents' answers to the survey questions in a spreadsheet, it was fairly simple to extract specific information from the results. The spreadsheet made it easier to analyze the data and calculate percentages. The spreadsheets may also be beneficial to other interested parties who might want to analyze the data in a different way.

6.3.2 Merton Tramlink

The results of the project team's surveys show that there was not an enthusiastic response from the employees, residents, or students in regards to the Croydon Tramlink. Most residents and employees felt the tram would not be beneficial for their main commute. The data shows that the projected usage of the tram is low, therefore it is not recommended that the Croydon Tramlink be extended

into the Merton Tramlink.

However, it is recommended that a second study be conducted in the future, once the tram has been in operation. When the people of the area become familiar with the tram, they may be more inclined to use it. Therefore, it is important to conduct an "after" survey to determine if the tram is being utilized. If it is determined by the second study that the tram is indeed being used and ridership is high, then Merton Council may want to consider extending the tram, with the Merton Tramlink.

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Appendices

Appendix A

Telephone Interview with Derek Egan

Contact with Derek Egan of W.S. Atkins

March 30, 1999

Telephone interview conducted by Celina Sienko

phone # 0137 272 6140

W.S. Atkins, a planning consultants company, conducted the Town Centre Capacity study for Merton Council in 1998. Derek Egan, an employee of W.S. Atkins, was contacted to gain information regarding how to conduct a valid, random survey of a defined area.

The project team asked Mr. Egan how his company determined what residents would be chosen to be surveyed for the Town Centre study. Mr. Egan explained that first, an area is defined and the post codes of that area are noted. The households of that area are then divided into primary sampling units using these post codes. Mosaic, a computer sampling tool, is then used to divide households into different categories based on specific characteristics. These characteristics have been determined from the census data, and include for example, the marital status of the adults of the household, whether or not they have children, and also the status of their employment. A sample of each of the different households are then selected. By splitting the households up in this manner, one can be sure to obtain an accurate representation of the entire area.

Businesses of the area were also divided up into sections based on their post codes. Then, as with the residents, Mosaic was used to randomly chose an accurate representative of businesses in the area. Mosaic, however, is extremely expensive and can cost up to two thousand pounds.

After discovering the cost of using Mosaic, the project team member explained the methods the team was using to generate a random sampling of residents, businesses and schools in the defined area (see Methodology). Mr. Egan agreed that based on the teams' budget and time limitations that these methods were the best way to generate a random sampling.

Appendix B

Sampling Size Chart

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IQP/MQP SCANNING PROJECT

George C. Gordon Library
WORCESTER POLYTECHNIC INSTITUTE

Appendix C

Gateway Transportation Initiative

Origin and Destination Study

Transportation Survey

Conducted by the

Gateway Transportation Initiative

1. Who is your employer?
2. What is your zip code where you live?
3. What city do you live in?
4. Please list the major intersection nearest your home:
5. What time do you generally arrive at work?
6. What time do you generally leave work?
7. How do you usually travel to work? Please write the number of days per week that you use each of the following ways of getting to work.

	Number of Days Per Week
Drive alone	_____
Carpool with 1 other person	_____
Carpool with 2 other persons	_____
Carpool with 3 other persons	_____
Carpool with 4 or more other persons	_____
Ride in a vanpool (7 to 13 Commuters in a van)	_____
Ride a bus	_____
Walk	_____
Motorcycle	_____
Bicycle	_____
Other (specify) _____	_____

8. If you currently do not use the bus to get to work, why? (Check all that apply)

A. _____No direct service/ Takes too long
B. _____No bus stop near home
C. _____Lack of route/scheduling information
D. _____Semice not frequent enough
E. _____No bus stop near work
F. _____Need car at work
G. _____Need car before or after work
H. _____No Park-N-Ride lots available
I. _____Dangerous street crossing
J. _____Other (specify) _____

9. If you were to drive directly from home to work by yourself, estimate how many miles It would be, one way. _____miles

10. On a typicai work day, estimate how many minutes It would take you to drive directly from your home to work. _____minutes

11 On a typical work day, estimate how many minutes it would take you to drive directlv from vour work to your work to your home. _____minutes

12. On a typical non-work day, estimate how many minutes it would take you to drive directly from your home to work. _____minutes

13. On a non-work day, estimate how many minutes it would take you to drive directly from your work to your home. _____minutes

14. A. Do you have any problems with parking at your work site?

Yes_____ No _____(Skip to Question 15)

B. What are the parking problems? (check all that apply)

_____Not enough parking spaces
_____Have to walk too far to get to the work site from available parking
_____No covered parking
_____Can't leave the parking lot during the day and find a parking space when I get back
_____Parking lot isn't safe after dark
_____Driving into lot/within lot is dangerous (accidents)
_____Other (please specify) _____

15. In a typical week how many days do you go directly to work without making any stops? _____days per week

16. If you make stops on the way to work, why do you stop? (Check all that apply)

A. _____to go to educational class
B. _____ drop children at childcare
C. _____drop children at school
D._____ pick up Carpooler
E. _____to eat
F._____pick up vanpooler
G. _____drop someone off at work
H._____conduct related business
I. _____ dry cleaners
J._____to go to bank
K. _____to exercise
L._____entertainment (rnovie,etc)
M. _____to go shopping
N._____to get gas
O. _____ none of the above
P. _____Other (specify) _____

17. In a typical week, how many days do you return directly home from work without making any stops? _____days per week

18. If you make stops on your way home from work, why do you stop? (Check all that apply)

A. _____to go to educational class
B. _____ drop children at childcare
C. _____drop children at school
D._____ pick up Carpooler
E. _____to eat
F._____pick up vanpooler
G. _____drop someone off at work
H._____conduct related business
I. _____ dry cleaners
J._____to go to bank
K. _____to exercise
L._____entertainment (rnovie,etc)
M. _____to go shopping
N._____to get gas
O. _____ none of the above
P. _____Other (specify) _____

19. How much money does it cost you to go back and forth to work each week? (gas, parking, tolls)

A. ___$0-5
B. ___$6-10
C. ___$11 -15
D. ___$16-25
E. ___$26-30
F. ___$31-35
G. ___$36-45
H. ___$46 or over

20. Compared to other activities you conduct during the day, how stressful do you find your commute to work? (Check one)

A. ___ Much more stressful than most activities
B. ___ More stressful than most activities
C. ___ About as stressful as most activities
D. ___ Less stressful than most activities
E. ___ Much less stressful than most activities

21. Which of the following means of commuting would you consider using at least two days per week? (check all that you would consider)

A. ___ Carpool
B. ___ Walk
C. ___ Vanpool
D. ___ Bus

E. ___ Bicycle F. ___ None

22. What would encourage you to use one or more of the commute alternatives listed in question # 21 above? (Check all that apply)

A. ___ Closer or better parking for carpools/vanpools
B. ___ More flexible work hours
C. ___ Bus pass subsidies
D. ___ Awards/company recognition
E. ___ Free guaranteed ride home for emergencies, unexpected overtime
F. ___ A program to coordinate and set up car/vanpools
G. ___ Additional vacation/ discretionary days off
H. ___ Showers and lockers at the work site
I. ___ Adequate bicycle parking facilities
J. ___ Exercise facilities on the work site
K. ___ Shuttle to lunch places/banks/ dry cleaners during the day
L. ___ Free tickets (to sports events, movie theater, etc.)
M. ___ Improved bus routes on a more frequent schedule
N. ___ Childcare facility on the work site
O. ___ None of the above
P. ___ Other (specify) _____

23. Please check any f the services which are within walking distance from, or located at, your work site.

A. ___ Medical services
B. ___ Dry Cleaners
C. ___ Snack bar
D. ___ Exercise facility
E. ___ Convenience store
F. ___ Post office
G. ___ Cafeteria
H. ___ Retail Shopping
I. ___ Child care
J. ___ other (specify) _____
K. ___ Banking

24. Which 3 of the following services not currently available would you like to have accessible to you within walking distance from your work site?

A. ___ Medical services
B. ___ Dry Cleaners
C. ___ Snack bar
D. ___ Exercise facility
E. ___ Convenience store
F. ___ Post office
G. ___ Cafeteria
H. ___ Retail Shopping
I. ___ Child care
J. ___ other (specify) _____
K. ___ Banking

25. B. I do not walk to any of the above facilities. _____

26. A. During a typical week, how many times do you walk to the following facilities during your lunch hour?

	Days Per Week		Days Per Week
A.	___ Medical services	B.	___ Dry Cleaners
C.	___ Snack bar	D.	___ Exercise facility
E.	___ Convenience store	F.	___ Post office
G.	___ Cafeteria	H.	___ Retail Shopping
I.	___ Child care	J.	___ other (specify) _____
K.	___ Banking		

26. B. I do not walk to any of the above facilities. _____

Commuter Characteristics (for statistical purposes only)

27. What is your job title? _____

28. What type of work would this be considered? Please check one.

A. ___ Clerical
B. ___Sales/Service
C. ___ Mgr./ Admin.
D. ___ Professional/Technical
E. ___ Production/Crafts
F. ___ Executive
G. ___ Other

.

29. Are you: _____ Male _____Female

30. What is your age:

A. ___ Less than 18
B. ___ 18-24
C. ___ 25 -34
D. ___ 35-44
E. ___ 45 -54
F. ___ 55 -64
G. ___ 65 and over

Appendix D

Contact with TAS Partnership Limited

Questionnaire for Croydon Tramlink

Contact with Chris Cheek of

TAS Partnership Limited/Specialists Consultants in Public Transport

March 26, 1999

Telephone interview conducted by Celina Sienko

phone # 0172 984 0756

Chris Cheek, an employee of TAS Partnership, was contacted in order to obtain information regarding surveys that had been conducted by TAS. Mr. Cheek informed Celina that TAS had conducted a survey in 1996 in Willow Lane Industrial Estate. He also explained that TAS had used the electoral list of the area in order to choose residents for the survey. The following pages include the cover letter for TAS' survey, as well as a copy of the survey itself.

TRANSPORT TO EMPLOYMENT QUESTIONNAIRE FOR CROYDON TRAMLINK

TAS

What the Survey is about

The Croydon Tramlink light rail system will open towards the end of 1999, and will be passing close to Willow Lane Industrial Estate. It has been suggested that a stop should be provided to serve the estate, at the end of Wandle Way. This survey is being undertaken on behalf of Tramtrack Croydon, the company which is building the system, to evaluate the use which might be made of such a stop.

More information about Tramlink

Tramlink will be a brand new transport system, linking central Croydon with Wimbledon, Elmers End, Beckenham Junction and New Addington. Services will be provided by modern, low-floor trams, each capable of carrying 220 passengers and fully accessible, with level boarding from the station platforms.

Services passing Willow Lane will operate every 10 minutes during the main part of the day, and every 20 minutes during the early morning, late evening and Sundays. They will be running between Wimbledon and Elmers End, providing connections with rail and bus services at Wimbledon, Mitcham Junction, West and East Croydon and Elmers End. In Croydon, convenient interchange will be available to other Tramlink services to Beckenham Junction and New Addington. The map overleaf shows the route of the system and the stations, together with links with the rail network in the area.

Though the precise fares have yet to be determined, they will be in line with current London Transport policies. Travelcards and concessionary passes will be valid on Tramlink.

Further information about the system is available on the Tramlink information line, 0181 760 5729, or from the Tramlink shop at Unit 5 Suffolk House, George Street, Croydon.

1. **What was the purpose of your journey to Willow Lane today?**
(Please tick [✓] box as appropriate)
Work ☐ Employer's Business ☐
Personal Business ☐ To/From School ☐
Other ☐

2. **How frequently do you travel to Willow Lane?**
(Please tick [✓] box as appropriate)
Every working day ☐ 3 - 5 times a week ☐
1 - 3 times a week ☐ Less than once a week ☐

3. **How did you get to Willow Lane today?**
(Please tick [✓] box as appropriate)
Own car ☐ Lift from family/friend ☐
One Bus ☐ Two or more buses Taxi ☐
Train ☐ Cycle ☐
Motorcycle ☐ Train/Bus Walk ☐

If you travel regularly to Willow Lane for work or school, please go to question 4, otherwise please go to question 15.

4. **What other means have you used in the last month?**
(Please tick [✓] all boxes that apply)
Own car ☐ Lift from family/friend ☐
Bus ☐ Taxi ☐
Train ☐ Cycle ☐
Motorcycle ☐ Walk ☐

5. **How long does it take you to get to Willow Lane?**
hours mins

6. **What time did you set off this morning?**
Time

7. **What time will you leave work this evening?**
Time

8. **How long does it take you to get home from Willow Lane?**
hours mins

9. **How many days a week do you work?**
(Please tick [✓] box as appropriate)
Less than 5 ☐ 5 days ☐ More than 5 ☐

10. **Do you work full time** (35 hours per week or more) **or part time?**
(Please tick [✓] box as appropriate)
Full time ☐ Part time ☐

11. **If you travel by car, do you share with anyone else?**
(Please tick [✓] box as appropriate)
No ☐ Yes, 1 person ☐ Yes more than 1 person ☐

12. **If you currently travel by car to work, do you require to use it during the day on your employer's business?**
(Please tick [✓] box as appropriate)

Yes ☐ No ☐

13. **If the answer to question 12 was YES, how frequently do you use your car for your employer's business?**
(Please tick [✓] box as appropriate)

Every working day ☐ 3 - 5 times a week ☐
1 - 3 times a week ☐ Occasionally ☐

14. **Do you ever come to work by car, even though your car is needed by another member of your family?**
(Please tick [✓] box as appropriate)

Frequently ☐ Sometimes ☐ Never ☐

15. **Is public transport available for your journey?** *(Please tick [✓] box as appropriate)*

Yes ☐ No ☐ Don't know ☐
Yes, but times are inconvenient ☐
Yes but with a walk ☐

16. **If you answered 'NO' to question number 15, would you consider using public transport if it were available?**
(Please tick [✓] box as appropriate)

Yes ☐
No ☐
Yes, if times were right ☐
Yes, if service was more frequent ☐
Yes if it was faster ☐
Yes, if it was higher quality ☐
Yes, if fares were lower ☐

17. **If you answered NO, to question 16, do you think that the opening of Tramlink would change your views—**
(Please tick [✓] box as appropriate)

With a stop at Wandle Way? ☐
With a stop at Mitcham Station? ☐
With a stop at Mitcham Junction Station? ☐

18. **What is your home postcode?**

☐☐☐☐ ☐☐☐

19. **Does your employer provide you with a car or car allowance?**
(Please tick [✓] box as appropriate)

Company vehicle ☐
Essential car users allowance ☐
Casual car users allowance ☐
Other support ☐

Thanks for your help.

Appendix E

Student Survey

The Merton Council is conducting a survey on students to determine their travel behaviours and their opinions on the new tram, the Croydon Tramlink. Your school was randomly selected to be surveyed in order to learn about its students' views regarding this matter. This survey should take only 8 minutes and is voluntary as well as completely confidential. Your response will greatly help in the attempt to reduce traffic problems in the future. Thank you for your cooperation.

1) Please write the name of the street you live on and the district it is in.

_____

_____

2) Please use a scale from 1 to 5, 1 being least often and 5 being most often, to rate your frequency of use for your commute to school.

Walking	1	2	3	4	5	N/A
Bicycle	1	2	3	4	5	N/A
Automobile	1	2	3	4	5	N/A
Bus	1	2	3	4	5	N/A
Taxi	1	2	3	4	5	N/A

3) About how many miles do you live from school?

0 - ½ mi. ___	2 - 5 mi. ___
½ - 1 mi. ___	5 - 10 mi. ___
1-2 mi. ___	> 10 mi. ___

4) On average, how long does it take you to get to school?

0-5 min. ___	30-45 min. ___
5-15 min. ___	45-60 min. ___
15-30 min.___	> 1hr. ___

5) About how much money does it cost you to get to school each week? (i.e. petrol, tickets, parking)

Nothing ___	£ 16-20 ___
£ 1-5 ___	£ 21-25 ___
£ 6-10 ___	£ 26-30 ___

£ 11-15 ___ Over £ 30 ___

6) Looking at the stops for the proposed Tramlink, do you think you might use the tram to get to school?

Yes _____ No _____

7) Please use a scale from 1 to 5, (1-least often…5-most often), to rate how frequently you might use the tram for each task.

Going to School	1	2	3	4	5	N/A
Shopping	1	2	3	4	5	N/A
Errands	1	2	3	4	5	N/A
Going to Work	1	2	3	4	5	N/A
Weekend Transportation	1	2	3	4	5	N/A
Other_____	1	2	3	4	5	

8) What is your age?

12-16 yrs.___

17-20 yrs.___

Over 20 ___

Appendix F

Resident Survey

Telephone Survey Introduction

1. Good evening, may I please speak with _____?

(Hello) My name is _____, and I'm calling on behalf of the Merton Council to talk with residents in Merton with regards to the current transportation study for the Croydon Tramlink Project. Merton Council has arranged an independent team to carry out a study in hopes of decreasing the traffic problem throughout Merton, you may be aware of this from the informational mailing we sent you. Did you receive this mailing?

Information from this survey is vital for the implementation of efficient public transportation in Merton in the form of trams such as the Croydon Tramlink or the proposed Merton Tramlink. You were randomly selected from the electoral list in order to express your views on this matter. This survey should take only about 8 minutes and is voluntary and completely confidential. If I come to any question that you prefer not to answer, just let me know and I will skip over it. OK?

NO →[READ AS APPROPRIATE]: When would be a better time to call?

Thank you for your time and have a nice evening.

INTERVIEWER RECORD NAME, TIME, DATE

2. Do you have your mailed copy of your survey and Tramlink route with you now?

NO →Would you like me to wait a minute so you can get it?

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Q8: On average, how much time does your commute take one way?

5-20 min.___	1-1.5 hrs.___
20-40 min.___	1.5-2 hrs.___
40-60 min.___	> 2 hrs. ___

Q9: About how much money does it cost for this commute each week? For example, paying for petrol, tickets, parking, etc.

£ 0-5 ___	£ 16-20 ___
£ 6-10 ___	£ 21-25 ___
£ 11-15 ___	£ 26-30 ___
	Over £30___

Q10: (Looking at the Croydon Tamlink route) Do you think the proposed route running from Mitcham Junction to Wimbleton Station will be beneficial to your commute?

Yes _____ No _____

Q11: Please use a scale from 1 to 5, 1 being least often and 5 being most often, to rate how frequently you might use the tram for each task.

Going to Work	1	2	3	4	5	N/A
Going to School	1	2	3	4	5	N/A
Shopping	1	2	3	4	5	N/A
Errands	1	2	3	4	5	N/A
Weekend Transportation	1	2	3	4	5	N/A
Other_____	1	2	3	4	5	N/A

Q12: What is your age?

13-18 yrs.___	50-65 yrs.___
19-29 yrs.___	Over 65 yrs.___
30-49 yrs.___	

Thank you for your time Mr./Mrs. _____, If you would like to hear the results of this study, they will be available through the Merton Council in approximately four weeks. Have a good evening.

Appendix G

Employee Survey

Questionnaire:

1) Please tick any that apply to you.

Resident in Merton _____

Student in Merton _____

Neither _____

2) How frequent do you commute to work?

Every working day ___ 3-5 times a week ___

1-3 times a week ___ Less than once a week ___

3) Please list by address your origin and destination for your commute to work.

Origin _____ Destination _____ _____

_____ _____

4) Please use a scale from 1 to 5, 1 being least often and 5 being most often, to rate your frequency of use of each method of travel for your journey to work.

Walk	1	2	3	4	5	N/A
Bicycle	1	2	3	4	5	N/A
Taxi	1	2	3	4	5	N/A
Bus	1	2	3	4	5	N/A
Automobile	1	2	3	4	5	N/A
Tube	1	2	3	4	5	N/A
Other_____	1	2	3	4	5	N/A

5) About how many miles is this commute one-way?

0-5 mi. ___ 15-20 mi.___

6-10 mi. ___ 20-25 mi.___

11-15 mi.___ > 25 mi. ___

6) On average, how long is your commute one way?

5-20 min.___ 1-1.5 hrs.___

20-40 min.___ 1.5-2 hrs.___

40-60 min.___ > 2 hrs. ___

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IQP/MQP SCANNING PROJECT

George C. Gordon Library
WORCESTER POLYTECHNIC INSTITUTE

Appendix H

Letters to Educators

London Borough of Merton
Merton Civic Centre
London Road
Morden, Surrey SM4 5DX
DX 41650 Morden

Switchboard: 0181-543 2222
Minicom: 0181-545 3245
Telex: 893062
Fax: 0181
Direct Line: 0181-545

13 April, 1999

Dear Ms. Bastick-Styles,

Merton Council has dedicated much of its time on the improvement of current public transportation. In hopes of developing an improvement plan, Merton Council has arranged an independent team to carry out a survey as part of a before and after study. This team is composed of university students from Worcester Polytechnic Institute located in the United States. The study will be used to advise Merton Council whether the Croydon Tramlink should be extended further into Merton. With the information from this study, Merton Council will be able to properly implement efficient public transportation in Merton. This information will not be used for any other purpose.

Your school was randomly selected from a list of schools in the borough of Merton in order to express the views of your students on this matter. This survey should take about eight minutes to complete and is voluntary as well as completely confidential. Only with you and your students' participation, will we be able to complete an accurate study to improve the current traffic situation in Merton. Along with the surveys, we have enclosed six informational letters to be given to the appropriate teachers to help explain the purpose of our survey.

We would like you to distribute the 100 surveys to students in your school. If the students have questions regarding the survey, please assure them they may take the surveys home to discuss the questions with their parents or guardians. However, it is imperative that the surveys are returned. Once the surveys have been completed it would be appreciated if you would gather them so we may come to your school to collect them. We will be contacting you on the 19th of April to determine if the surveys can be collected. If you would like to hear the results of this study, they will be available through Merton Council in approximately four weeks. Thank you very much for your help, we greatly appreciate your cooperation.

Yours Sincerely,

Max Gomez — Principle Planning Officer, Plans and Projects

Celina Sienko — Shelley Sougrin

Clark Steenstra

London Borough of Merton
Merton Civic Centre
London Road
Morden, Surrey SM4 5DX
DX 41650 Morden

Switchboard: 0181-543 2222
Minicom: 0181-545 3245
Telex: 893062
Fax: 0181
Direct Line: 0181-545

April 29, 1999

Mr Martin Moone
St. Thomas of Canterbury
Commonside East
Mitcham
Surrey CR4 1YG

Dear Mr Moone:

Merton Council is conducting a survey that is part of a before and after study that will help them decide if an extension of the Croydon Tramlink is necessary. This tram will provide an alternative to private transportation and will be in operation later this year. Merton Council would like to survey the students in year eight (age 12) of your school to obtain their opinions regarding this project. Also from this survey, we would like to learn how these students are currently traveling to and from school. This survey allows the students to voice their opinions and concerns regarding public transportation in Merton.

We have selected your school at random and would like to distribute our survey to approximately 15 students. This brief survey will take approximately 15 minutes to complete and we would like to administer it by Thursday, 8 April.

We would appreciate your cooperation in helping us conduct a valid survey. You can contact one of the people listed below at 545 3087 or Shelley Sougnin at 545 3063.

Thank you for your time and we look forward to hearing from you.

Sincerely,

Max Gomez

Celina Sienko

Clark Steenstra

ENVIRONMENTAL SERVICES
Director - Richard Rawes

London Borough of Merton
Merton Civic Centre
London Road
Morden, Surrey SM4 5DX
DX 41650 Morden

Switchboard: **0181-543 2222**
Minicom: **0181-545 3245**
Telex: **893062**
Fax: **0181**
Direct Line: **0181-545**

13 April 1999
Mr Roy Spooner
Watermeads High School
Lilleshall Road
Morden
Surrey SM4 6DU

Dear Mr Spooner,

Merton Council is conducting a survey that is part of a before and after study that will help them decide if an extension of the Croydon Tramlink is necessary. This tram will provide an alternative to private transportation and will be in operation later this year. Merton Council would like to survey the students of your school to obtain their opinions regarding this project. Also from this survey, we would like to learn how these students are currently traveling to and from school. This survey allows the students to voice their opinions and concerns regarding public transportation in Merton.

We have selected your school at random and would like to distribute our survey to approximately 30 students or one class around that size. This brief survey will take approximately 8 minutes to complete and we would like to administer it by Monday, 19 April.

We would appreciate your cooperation in helping us conduct a valid survey. You can contact one of the people listed below at 545 3087 or Shelley Sougrin at 545 3063.

Thank you for your time and we look forward to hearing from you.

Yours sincerely,

Max Gomez

Celina Sienko

Clark Steenstra

Appendix I

Employee Letter

ENVIRONMENTAL SERVICES
Director - Richard Rawes

merton
moving ahead

London Borough of Merton
Merton Civic Centre
London Road
Morden, Surrey SM4 5DX
DX 41650 Morden

Switchboard: **0181-543 2222**
Minicom: **0181-545 3245**
Telex: **893062**
Fax: **0181**
Direct Line: **0181-545**

9 April, 1999

Dear Employee, Contact No. -3087

Merton Council has dedicated much of its time on the improvement of current public transportation. In hopes of developing an improvement plan, Merton Council has arranged an independent team to carry out a survey as part of a before and after study. This team is composed of university students from Worcester Polytechnic Institute located in the United States. The study will be used to advise Merton Council whether the Croydon Tramlink should be extended. With the information from this study, the Merton Council will be able to properly implement efficient public transportation in Merton. This information will not be used for any other purpose.

Your business was randomly selected from a list of businesses in the borough of Merton in order to express your views on this matter. This survey should take only about eight minutes and is voluntary and completely confidential. Only with your participation will we be able to complete an accurate study to improve the current traffic situation in Merton.

When you complete your survey, please return it to Ms. Hawkins. We would appreciate if you could return the surveys by 19-4-99 so that they may be sent out that day. If you would like to hear the results of this study, they will be available through the Merton Council in approximately four weeks. We greatly appreciate your cooperation.

Yours Sincerely,

Max Gomez

Celina Sienko

Clark Steenstra

Principle Planning Officer
Plans and Projects

Shelley Sougrin

Appendix J

Data for Tables

Table 4.2.2.1	**Origin and Destination for Employees**					
	Destination					
Origin	Wimbledon	Morden	Mitcham	Colliers Wood	No Answer	**Sum**
Morden	10	13				23
Sutton	10	9	1		1	21
Mitcham	4	2	10			16
Wimbledon	7	2		2		11
Wandsworth	2	2	6			10
Croydon		3	3		1	7
Lambert		3	2		1	6
Epsom	1	4				5
Central London	3		1			4
Kingston	2	2				4
Colliers Wood			1	1		2
Greenwich		1	1			2
Essex		1				1
Hampton Court	1					1
Hounslow	1					1
Lewisham	1					1
Richmond			1			1
Southwark	1					1
Sussex					1	1
Tottenham		1				1
Addlestone	1					1
Bettersea					1	1
Guildyard	1					1
Leamingow	1					1
British	1					1
TW12 3E4		1				1
No Answer	1	1			5	7
Sum	48	45	26	3	10	132

Table 4.4.2.2	**Origin and Destination for Residents**							
	Origin							
Destination	Colliers Wood	Mareland Cl.	Morden	Mitcham	Raines Park	Wimbledon	No Answer	**Sum**
Sutton			3	1		1	1	6
Wandsworth			3	2	1	2	2	10
Central London			3	1		7	2	13
Colliers Wood	1		1	1		1		4
Croydon			3	4		2	1	10
Hounslow					1			1
Gatwick Airport						1		1
Kingston			1		1	1		3
Morden			6			3		9
Mitcham		1		2				3
Raines Park			1					1
Richmond							1	1
Lambert						1		1
Wimbledon	1		5	1	3	6		16
Canary Wharf				1				1
Centenill			1					1
Chancery Ln.						1		1
No Answer			2	1			17	20
Sum	2	1	29	14	6	26	24	102

Table 4.4.2.3	**Origin and Destination for Students**			
	Destination			
Origin	Wimbledon	Morden	Mitcham	**Sum**
Colliers Wood	2	2		4
Croydon	3	1		4
Ealing	1			1
Lambert	0	1		1
Merton Park	1	7		8
Mitcham	5	10	3	18
Morden	4	21	2	27
Raynes Park	0	4		4
Surrey	0	2		2
Sutton	4	2		6
Wandsworth	4	4		8
Wimbledon	4	23	2	29
No Answer	2	12	1	15
Sum	30	75	8	127

Table 4.4.3	**Purpose of Journey**					
	Employee		**Resident**		**Student**	
	Total	%	Total	%	Total	%
Work	132	100%	54	57%		0%
School		0%	9	10%	127	100%
Errands		0%	0	0%		0%
Shopping		0%	28	30%		0%
Wknd. Act.		0%	0	0%		0%
Other		0%	3	3%		0%
Sum	132	100%	94	100%	127	100%

Table 4.4.4	Frequency of Commute					
	Employee		**Resident**		**Student**	
	Total	%	Total	%	Total	%
Every Workday	106	80%	54	53%		0%
1-3 times per week	6	5%	33	32%		0%
3-5 times per week	18	14%	12	12%	100	100%
< once per week	2	2%	3	3%		0%
Sum	132	100%	102	100%	100	100%

Table 4.4.5.1	Methods of Travel for Employees on a 1 to 5 Scale						
Response	**Never Use**	**1**	**2**	**3**	**4**	**5**	**Sum**
Walk	75	15	4	9	1	31	135
Bicycle	105	16	6	2	0	3	132
Taxi	112	15	3	1	0	1	132
Bus	81	20	4	9	1	17	132
Automobile	41	12	5	3	3	68	132
Tube	105	16	1	2	1	7	132
Other	115	6	1	2	0	8	132

Table 4.4.5.2	Methods of Travel for Residents on a 1 to 5 Scale						
Response	**Never Use**	**1**	**2**	**3**	**4**	**5**	**Sum**
Walk	64	13	2	3	4	16	102
Bicycle	79	22	0	0	0	1	102
Taxi	81	20	1	0	0	0	102
Bus	52	17	3	5	6	19	102
Automobile	49	11	3	4	2	33	102
Tube	67	16	2	2	2	13	102
Other	73	16	0	3	4	6	102

Table 4.4.5.3	Methods of Travel for Students on a 1 to 5 Scale						
Response	**Never Use**	**1**	**2**	**3**	**4**	**5**	**Sum**
Walk	43	9	11	14	12	38	127
Bicycle	87	22	6	1	4	7	127
Taxi	105	20	0	0	0	2	127
Bus	52	19	4	8	20	24	127
Automobile	65	24	9	4	11	14	127

Table 4.4.6	Miles Commuted One-Way					
	Employee		**Resident**		**Student**	
	Total	%	Total	%	Total	%
0-5 mi.	71	54%	57	61%	116	91%
6-10 mi.	42	32%	21	23%	10	8%
11-15 mi.	6	5%	10	11%	1	1%
16-20 mi.	5	4%	2	2%	0	0%
20-25 mi.	4	3%	1	1%	0	0%
> 25 mi.	4	3%	2	2%	0	0%
Sum	132	100%	93	100%	127	100%

Table 4.4.7	Commuting Time for One-Way					
	Employee		**Resident**		**Student**	
	Total	%	Total	%	Total	%
5-20 min.	60	45%	44	48%	45	35%
20-40 min.	43	33%	23	25%	70	55%
40-60 min.	17	13%	21	23%	10	8%
1-1.5 hrs.	9	7%	4	4%	2	2%
1.5-2 hrs	1	1%	0	0%	0	0%
>2 hrs.	2	2%	0	0%	0	0%
Sum	132	100%	92	100%	127	100%

Table 4.4.8	Cost for Journey Each Week					
	Employee		**Resident**		**Student**	
	Total	%	Total	%	Total	%
£0-5	38	29%	62	61%	98	77%
£6-10	40	30%	15	15%	12	9%
£11-15	27	20%	8	8%	9	7%
£16-20	10	8%	8	8%	4	3%
£21-25	6	5%	4	4%	2	2%
£26-30	3	2%	3	3%	0	0%
>£30	8	6%	2	2%	2	2%
Sum	132	100%	102	100%	127	100%

Table 4.4.9	Tramlink Beneficial to Journey					
	Employee		**Resident**		**Student**	
	Total	%	Total	%	Total	%
Yes	19	14%	26	27%	28	22%
No	113	86%	69	73%	97	78%
Sum	132	100%	95	100%	125	100%

Table 4.4.11.1	Predicted Frequency of Tram Use for Employees on a 1 to 5 Scale						
	Never Use	1	2	3	4	5	Sum
Work	85	25	4	9	3	6	132
School	115	11	3	0	0	3	132
Shopping	61	21	12	16	7	15	132
Errands	98	19	6	4	3	2	132
Wknd. Trans.	74	21	14	9	5	9	132
Other	126	3	2	1	0	0	132

Table 4.4.11.2	Predicted Frequency of Tram Use for Residents on a 1 to 5 Scale						
	Never Use	1	2	3	4	5	Sum
Work	66	27	2	0	4	3	102
School	68	30	1	2	0	1	102
Shopping	26	27	19	16	7	7	102

Errands	50	31	11	3	5	2	102
Wknd. Trans.	45	26	11	8	9	3	102
Other	76	14	6	3	1	2	102

Table 4.4.11.3	**Predicted Frequency of Tram Use for Students on a 1 to 5 Scale**						
	Never Use	1	2	3	4	5	Sum
School	76	26	8	8	3	6	127
Shopping	45	28	19	18	10	7	127
Friends	48	33	25	11	8	2	127
Work	95	21	5	5	1	0	127
Wknd. Trans.	43	27	19	21	11	6	127
Other	106	6	7	1	2	5	127

Table 4.4.12	**Age of Respondents**					
	Employee		**Resident**		**Student**	
	Total	%	Total	%	Total	%
13-18 yrs.	2	2%	3	3%	82	65%
19-29 yrs.	42	32%	6	6%	45	35%
30-49 yrs.	60	45%	38	37%	0	0%
50-65 yrs.	27	20%	26	25%	0	0%
Over 65 yrs.	1	1%	29	28%	0	0%
Sum	132	100%	102	100%	127	100%

Appendix K

Data for Charts and Tables

Table 5.1.2	Data for Average Cost/Mile		
	Employees	**Residents**	**Students**
Completed Surveys	132	102	127
Average Cost per week £	11	7	4
Average miles for one-way	7	5	3
Average miles for week	66	54	30

Table 5.2.1	Data for Average Time/Mile		
	Employees	**Residents**	**Students**
Completed Surveys	**132**	**102**	**127**
Average miles for one-way	7	5	3
Average miles for week	66	54	30
Average time for one-way (min)	30	25	26
Average time for week (min)	296	254	261

Table 5.1.3 Walking = 50	
mile	
0-.5	22
.5-1	14
1-2	8
2-5	5
5-10	1
>10	0
Sum	50
Average	0.91

Table 5.1.3-4 and 5.2.2 For Employees with Automobiles from rated 4-5, =71					
Miles		Minutes		Cost	
0-5	32	5-20	28	0-5	13
6-10	27	20-40	32	6-10	26
11-15	5	40-60	9	11-15	18
16-20	4	1-1.5	2	16-20	5
21-25	2	1.5-2	0	21-25	4

>25	1	>2	0	26-30 >30	2 3
Sum	71	Sum	71	Sum	71

Avg. Miles/Commute	7	Avg. Time/Commute (min)	27		
Avg. Miles/Wk.	71	Avg. Time/Wk. (min)	269	Avg. Cost/Wk.	11

Table 5.1.3-4 and 5.2.2: Employees take Bus with 4-5 response					
Miles		Minutes		Cost	
0-5	10	5-20	5	0-5	0
6-10	6	20-40	5	6-10	11
11-15	0	40-60	4	11-15	4
16-20	0	1-1.5	3	16-20	1
21-25	0	1.5-2	0	21-25	0
>25	2	>2	1	26-30	0
				>30	2
Sum	18	Sum	18	Sum	18

Avg. Miles/Commute	7	Avg. Time/Commute (min)	36		
Avg. Miles/Wk.	68	Avg. Time/Wk. (min)	355	Avg. Cost/Wk.	12

Table 5.1.3-4 and 5.2.2: 35 Automobiles for residents with a 4 or 5 response					
Mile		Time		Cost	
0-5	19	5-20	15	0-5	16
6-10	10	20-40	11	6-10	11
11-15	4	40-60	9	11-15	1
16-20	0	1-1.5	0	16-20	3
21-25	1	1.5-2	0	21-25	1
>25	1	>2	0	26-30	1
				>30	2
Sum	35	Sum	35	Sum	35
Avg. Miles/Commute	7	Avg. Time/Commute (min)	28		
Avg. Miles/Wk.	65	Avg. Time/Wk. (min)	276	Avg. Cost/Wk.	9

Table 5.1.3-4 and 5.2.2: 25 Bus users for Residents with a 4 or 5 response					
Mile		Time		Cost	
0-5	20	5-20	17	0-5	19
6-10	3	20-40	3	6-10	3
11-15	1	40-60	3	11-15	1
16-20	0	1-1.5	2	16-20	1

21-25	0	1.5-2	0	21-25	0
>25	1	>2	0	26-30	1
				>30	0
Sum	25	Sum	25	Sum	25
Avg. Miles/Commute	4	Avg. Time/Commute (min)	24		
Avg. Miles/Wk.	45	Avg. Time/Wk. (min)	241	Avg. Cost/Wk.	5

Table 5.1.3-4 and 5.2.2: For 25 Students who have 4-5 response for Bus					
Mile		Time		Cost	
0-.5	0	0-5	0	0-5	9
.5-1	3	5-15	7	6-10	6
1-2	9	15-30	14	11-15	1
2-5	11	30-45	4	16-20	0
5-10	2	45-60	0	21-25	0
>10	0	>1 hr	0	26-30	0
				>30	1
Sum	25	Sum	25	Sum	25
Avg. Miles/Commute	3	Avg. Time/Commute (min)	21		
Avg. Miles/Wk.	28	Avg. Time/Wk. (min)	214	Avg. Cost/Wk.	5

Table 5.1.3-4 and 5.2.2: For 44 Students who have 4-5 response for automobile					
Mile		Time		Cost	
0-.5	0	0-5	0	0-5	22
.5-1	10	5-15	6	6-10	5
1-2	14	15-30	17	11-15	8
2-5	13	30-45	12	16-20	3
5-10	6	45-60	8	21-25	1
>10	1	>1 hr	1	26-30	0
				>30	0
Sum	44	Sum	44	Sum	44
Avg. Miles/Commute	3	Avg. Time/Commute (min)	30		

Avg. Miles/Wk.	29	Avg. Time/Wk. (min)	299	Avg. Cost/Wk.	6

Appendix L

Survey Data

132 Employee Surveys

Survey	Q1			Q2				Q3		Q4						Q5						Q6						Q7							Q8		Q9			Q10						Q11					
#	1	2	3	1	2	3	4	1	2	1	2	3	4	5	6	7	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	7	1	2	1	2	3	1	2	3	4	5	6	1	2	3	4	5	6
1		1		1				Cheam	Morden					5				1					1							1						1												1				
2		1		1				Crystal P	Merton					5				1						1						1						1												1				
3		1		1				Hackbridge	Morden					5			1						1							1						1							5		5			1				
4		1		1				Croydon	Morden					5				1				1						1							1	1	3	3	3							1				
5		1				1		Streatham Park	Morden	1	1	2	5	2	5		1					1							1						1	1	3	3							1						
6		1		1				SE 15	SM 4				1		1			1					1						1						1										1						
7		1		1				Croydon	Morden	1			5					1					1						1						1										1						
8	1			1				Morden	Morden	5							1						1						1						1										1						
9		1		1				TW12 3E4	SM4					5				1						1						1						1												1				
10	1						1	Merton	Morden	5			1		1		1						1						1						1	3	4	2			5	4	4		1						
11	1			1				Wimbledon	Morden					5				1					1							1						1	5	5	5	1		1	1						1			
12		1		1				Sutton	Morden	1			1	5			1						1						1						1	2	2	2							1						
13		1		1				Fulham	Morden	5	5	5	3	1	2			1						1							1				1		2	2	3	3		3				1					
14		1			1			Epsom	Morden					5				1					1						1						1	3	3	3							1						
15		1		1				Streatham Park	Morden	3				2	3	3		1						1						1						1	2	3	3				2			1						
16	1					1				1			1	5			1						1						1						1						1				1					
17	1			1				Morden	Morden	5	3	1	3	3			1						1						1						1						3				1						
18	1				1			Morden	Morden	5				1			1						1						1						1						1		2		1						
19		1		1				Kingston	Morden					5			1						1						1						1	4	4	5			3		4				1				
20		1		1				Surrey	Morden	5				5			1						1						1						1	5	5	4									1				
21		1		1				Epsom	Morden	5			5	5			1						1						1						1												1				
22	1						1	Mitcham	Morden	2	1	3	3	5	4		1						1						1						1	1	1	1	1	1	5	1	5		1						
23		1		1				Surrey	Morden					5				1					1						1						1												1				
24		1				1		Croydon	Merton					5			1						1						1						1			4					3				1				
25		1		1				Sussex	Merton					5					1				1											1	1		1										1				
26	1			1				Morden	Morden	1			5	2			1						1						1						1	1	2				1						1				
27		1		1				Tottingham	Morden					5			1						1						1						1												1				
28		1		1				Cheam	Morden				5				1						1						1						1	4	4	2	1		2		2			1				
29		1		1				Leatherhead	Morden					5				1					1											1	1		3	4									1				
30		1		1				Streatham Park	Mitcham					2			1						1						1						1								3				1				
31		1		1				Tooting	Mitcham	2			3				1						1						1						1	5	5	5	1		3				1						

132 Employee Surveys

Survey	Q1			Q2				Q3		Q4							Q5						Q6						Q7							Q8		Q9			Q10						Q11					
#	1	2	3	1	2	3	4	1	2	1	2	3	4	5	6	7	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	7	1	2	1	2	3	1	2	3	4	5	6	1	2	3	4	5	6
32	1			1				Tooting	Mitcham	1			4				1						1						1							1					2	4					1					
33	1			1				Tooting	Mitcham	1			5				1						1						1							1					1	5		5			1					
34		1		1				Tooting	Mitcham	2			5				1						1							1						1		5	4	5	1	1				1					
35	1			1				Croydon	Mitcham			2	5					1					1							1						1					4	5				1					
36		1		1				Sutton	Mitcham	5			3				1						1						1						1				1	1					1					
37		1		1				Croydon	Mitcham			1	5					1						1					1						1			5	4	5	3		4		1					
38		1		1				Carshalton	Wimbledon					5				1						1							1				1			4	3						1					
39	1			1				Morden	Wimbledon	3			1	1		1	1						1						1						1								1		1					
40		1		1				Worcester park	Wimbledon					2		5	1						1							1						1			3	3		3			1					
41		1		1				Surrey	Wimbledon		1	1		5			1						1							1						1									1					
42	1			1						5							1						1						1							1						1	1	1	1					
43		1			1			Esher	Wimbledon	1	2			5		3		1					1						1							1		1	3						1					
44		1		1				Epsom	Wimbledon	5	1	1	1	5	1			1					1							1						1		3	3		1	1	3			1					
45		1		1				Hampton Court	Wimbledon					5		5		1					1							1						1			4	4		3				1					
46		1		1				Carshalton	Wimbledon	5						5		1					1							1						1		1	2	1						1					
47		1		1				Carshalton	Wimbledon				1	3				1					1							1						1		4	3	3	4		4	2	3		1					
48	1				1			Wimbledon	Wimbledon	5							1						1							1						1		3	1	1	1		5	4	1				1			
49	1			1				Wimbledon	Wimbledon	5							1						1							1						1										3			1				
50		1		1				Sutton	Wimbledon					5			1						1							1						1		3				2				1					
51	1			1				Maltlake	Mitcham				5					1					1							1						1		2	2			5					1				
52	1			1				Mitcham	Mitcham					5				1					1							1						1							2			1					
53	1				1			Mitcham	Mitcham	5							1						1							1						1		4	2	4		5	5	4	5		1					
54	1			1				Colliers Wood	Mitcham				5				1						1							1						1		1	1				3	3	3		1					
55		1		1				Richmond	Mitcham					5					1				1							1						1							4					1				
56		1		1				Clapham	Mitcham						5		1						1							1						1		4	4	4			2				1				
57	1			1				Mitcham	Mitcham	5							1						1							1						1		2	1	3	3	1	3					1			
58	1			1				Mitcham	Mitcham	5	2	1	1	1	1	1	1						1							1						1		3	1	1	1	1	2	2	2			1				
59	1			1				Morden	Morden	5							1						1							1						1									1					
60	1			1				Morden	Morden	5							1						1							1						1									1					
61	1			1				Mitcham	Mitcham	5	1	1	1	1	1	1	1						1							1						1					3	1	2	1	2				1			
62	1					1		Colliers Wood	Colliers Wood	5							1						1							1						1		1	3	3			5		3		1					

132 Employee Surveys

Survey	Q1			Q2				Q3		Q4							Q5						Q6						Q7							Q8	Q9			Q10						Q11					
#	1	2	3	1	2	3	4	1	2	1	2	3	4	5	6	7	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	7	1	2	1	2	3	1	2	3	4	5	6	1	2	3	4	5	6
94		1		1				Victoria	Wimbledon	3			3		5			1							1					1						1	3	3	3				1					1					
95		1		1				Kingston	Wimbledon					5				1						1							1						1										1					
96	1			1				Rosehill	Wimbledon					5			1						1							1						1		3		1		3	1	3			1					
97	1					1		Wimbledon	Wimbledon					1			1						1						1							1														1		
98		1		1				Guildyard	Wimbledon	1	1	1	1	5	1	2						1		1									1		1												1					
99		1		1				Kilburn	Wimbledon					5	1			1						1						1						1													1				
100	1					1		Wimbledon	Wimbledon	3	1	1	1	5	1		1						1						1						1	3	3	3	1	1	1	1	2			1					
101		1		1				Leamingow	Wimbledon				5							1						1						1				1	3	4	3	1	1	1	1	1				1		
102	1			1				Wimbledon	Wimbledon		2				1		1							1							1						1	5				5						1			
103	1			1				Motspur Park	Wimbledon		5						1						1						1						1	5	5	5										1		
104	1			1				Morden	Wimbledon	5				1			1						1						1						1	2	2	2	1		1		1				1		
105		1				1		Carshalton	Wimbledon					5			1						1						1						1	3	2	2	1	1	1	1	1	1			1		
106		1		1				Addlestone	Wimbledon					5					1					1							1						1	3	3							1					1
107	1			1				Morden	Wimbledon	1	1	1	2	5			1						1							1						1		2		1		2		1		1				
108		1		1				Tooting	Wimbledon				3	5			1						1							1						1												1		
109	1			1				Morden	Wimbledon				1	5			1						1							1						1				1		1		2		1				
110	1			1				Mitcham	Wimbledon	1				5			1						1							1						1		1	2			1	1	1		1				
111		1		1				Guildford	Wimbledon	5	1	1	1	1	1	5				1				1							1						1	2	2	2	2	2	2	2	2	2	2	2				1	
112	1			1				Mitcham	Wimbledon				1	5			1						1							1						1		2	5		3		5		2			1			
113	1			1				Merton	Wimbledon	1				5			1						1							1						1		2	4	4	2		2	1	1		1				
114	1					1		Wimbledon	Wimbledon					5			1						1							1							1	3	3	3	1		1	1	1				1		
115		1		1				Cheam	Wimbledon					5				1						1							1						1	3											1		
116	1			1				Mitcham	Wimbledon					5			1						1						1						1					4	2	2	1	2			1				
117		1		1				Ewell West	Wimbledon	5						5	1						1							1						1	2				1						1				
118		1		1				Dartford Kent	Wimbledon				5			5				1				1							1						1												1				
119		1		1				Sutton	Wimbledon	5				5	1		1						1							1						1												1				
120		1		1				Feltham	Wimbledon	5				1		5			1				1							1						1		3	2									1				
121		1		1				Carshalton	Wimbledon	1	1	1	1	5	1	1	1						1							1						1				2		1	1	1	1		1					
122		1		1				Worcester park	Wimbledon					5			1						1							1						1	1	1	1								1				
123		1		1				Carshalton	Wimbledon	1	1	1	5	1	1	1	1						1							1						1										1	1	4	1	4	2			1		
124	1					1		British	Wimbledon	2	1	1	2	5	1		1						1						1						1	3	4	4				5		5		1						

132 Employee Surveys

Survey	Q1			Q2				Q3		Q4						
#	1	2	3	1	2	3	4	1	2	1	2	3	4	5	6	7
125			1	1				Carshalton	Wimbledon				5	4		
126			1	1				Croydon	Mitcham					5		
127			1	1				Norbury	Mitcham					5		
128	1			1				Mitcham	Mitcham				5	1		
129			1	1						3	2					
130			1	1				Worcester Park	Mitcham			1	1	5		
131			1	1				South Norwood	Mitcham	5			1			
132			1	1				Streatham Park	Mitcham					5		

Survey	Q5						Q6						Q7							Q8		Q9			Q10						Q11					
#	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	7	1	2	1	2	3	1	2	3	4	5	6	1	2	3	4	5	6
125		1							1					1							1						4		5					1		
126		1							1							1				1			5	5	5		3		3			1				
127	1						1							1							1								2				1			
128	1						1							1						1		5	5	5	5							1				
129		1					1							1						1		3	3	4	3		3		3			1				
130		1						1							1					1		3	5		3			2	1					1		
131		1										1					1				1	5	5	5	5		5	5	5				1			
132		1					1							1							1	1	4									1				
																																4	3	2	2	
																															2	2	2	8	7	1

102 Residents Surveys

Survey	Q1				Q2		Q3						Q4		Q5				Q6							Q7						Q8						Q9							Q10		Q11						Q12				
#	1	2	3	4	1	2	1	2	3	4	5	6	1	2	1	2	3	4	1	2	3	4	5	6	7	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	7	1	2	1	2	3	4	5	6	1	2	3	4	5
1	1						1						Merton Park	Croydon	1						1					1							1						1							1		5		3	1					1				
2	1				1		1						Wimbledon	Wimbledon	1					5						1						1						1							1				1			1						1				
3			1		1		1						Raines Park	Feltham	1				5					5		1							1						1							1														1				
4			1		1		1						Wimbledon	Tower Hill	1				4					4	4		1						1						1							1				2		2	2					1				
5			1			1																																							1	1	1	1	1					1				
6			1		1					1			Colliers Wood	Wimbledon		1					1					1						1						1							1																	1
7			1			1																																							1	1	3	2	4					1				
8			1		1		1						Merton	Euston	1									5			1					1									1				1	1	1	1	1					1				
9	1				1		1						Wimbledon	Wimbledon	1				5	1	1	1	1	1	1	1						1						1							1		1	1	1	1	1						1				
10			1		1							1	Wimbledon	Central Lon		1			1	1	1	1	1	4	5		1					1						1							1		1	1	1	1	2						1				
11			1		1		1						Merton	Central Lon					1	1	1	1	5	1	1		1					1						1							1		1	1	3	3	3					1				
12		1			1			1					Wimbledon	Wimbledon	1				5	1	1	1	2	1		1						1						1							1		1	1	5	2	3	1	1								
13				1	1					1						1						4																1																	1
14				1	1											1						5				1					1						1							1									1
15				1	1					1			Raines Park	Wimbledon		1						5				1					1						1							1						3									1
16				1		1																																									2	1		3					1
17				1		1																																									3	1	2					1
18				1		1																																								1	1	1	1	1	1				1
19				1	1					1			Raines Park	Wimbledon			1					5				1					1						1							1				3											1
20				1	1					1			Merton	Merton		1							5			1					1						1							1							2					1
21				1	1					1			Mitcham	Sutton			1					4	3			1						1						1							1				3									1
22		1			1			1					Merton Park	Rphampton			1		5			5		5			1					1						1							1				1							1				
23		1			1			1					Merton Park	Wimbledon	1				5				2			1						1						1							1			3	4	2	2		1								
24		1			1			1					Merton Park	Merton			1						5			1						1						1							1				1	1					1				
25				1	1							1	Mitcham	Allover	1							5		1	3				1				1						1							1				2			2								1
26			1		1					1			Mitcham	Colliers Wood	1								5				1					1						1							1																1
27				1	1					1			Mitcham	Croydon				1							5	1						1						1							1				5									1
28			1		1					1			Morden	Wimbledon	1							3	4			1						1						1							1				2	2				1				
29				1	1					1			Merton Park	Wimbledon	1				5		2	2				1						1						1							1						2									1
30				1	1					1			Mitcham	Croydon	1				3			5				1						1						1							1				5			5							1
31				1	1					1			Morden	Sutton	1							5				1						1						1							1															1

102 Residents Surveys

Survey	Q1				Q2		Q3						Q4		Q5				Q6							Q7						Q8						Q9							Q10		Q11						Q12				
#	1	2	3	4	1	2	1	2	3	4	5	6	1	2	1	2	3	4	1	2	3	4	5	6	7	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	7	1	2	1	2	3	4	5	6	1	2	3	4	5
32			1		1		1						Wimbledon	London bridge	1					1				5			1					1							1						1							1							1				
33			1		1		1						Merton	Tooting	1							1				1						1							1							1														1			
34			1		1		1						Merton	Richmond	1							3		5	5		1					1							1							1								2	2				1				
35	1				1		1						Mitcham	Merton	1									5		1						1							1							1								3	3	4				1			
36			1		1		1						E. London	London	1				5							1						1							1							1								2	2	1			1				
37			1		1		1						Mitcham	Croydon		1						5				1						1							1							1								3	2	2				1			
38			1		1		1						Merton	Battersea	1									5	2		1					1							1							1								3	2	4				1			
39			1		1		1						Merton Park	Tower London	1										5			1				1							1							1		4	2	4	4	4				1			
40	1				1		1						Merton Parl	Raines Park	1									5		1						1							1														4	4	4				1			
41	1				1		1						Mitcham	Mitcham	1									5		1						1							1							1								4							1		
42			1		1		1						Mitcham	Central Lon	1									5			1					1							1																							1		
43			1		1		1						Merton Park	Wandsworth	1									5		1						1							1																							1		
44			1		1		1						Merton Park	Central Lon		1									3	4			1			1							1																							1		
45			1		1		1						Merton	Sutton	1									5		1						1							1																							1		
46			1		1					1			Merton	Croydon		1						3				1													1							1	1	1	2	1	1									1		
47			1			1																																							1				1	1	1									1		
48			1		1			1					Mareland Cl	Mitcham	1				5	1	1	2	1	1	1	1						1							1								1	4	5	5	3				1			
49			1		1		1						Wimbledon	Victoria	1				1				5	2		1						1							1							2	1	2	2	4										1	
50	1				1		1						Morden	Centenill		1			1	1	1	5	1	1	1	1						1							1								1	1	2	1	1										1	
51			1		1			1					Wimbledon	Kingston		1			1	1	1	1	5	1	1	1						1							1								1	1	1	1	1				1							
52			1		1		1						Merton Park	Rohampton		1							5			1						1							1										2			2			1							
53			1		1		1						Merton Park	Waterloo	1								5			1						1							1										1	1	1				1							
54			1		1		1						Wimbledon	Waterloo	1				5						5		1					1							1										1		2				1							
55			1		1					1			Morden	Croydon				1	4			4	3			1						1							1							1			5		3						1				
56			1		1					1			mitcham	Croydon		1						4				1						1							1							5	5	5	5	5				1					
57				1	1					1			Merton Park	Wimbledon		1			4			5	2			1						1							1							1		3	3	3	2										1
58				1	1					1						1										1						1							1							1	1	1	1	1	1	1						1
59				1		1																				1						1														1	1	2	2	1						1
60				1	1			1								1							5			1						1							1							1	1	1	1	1	1	1						1
61				1	1					1					1								5			1						1							1							1	1	1	1	1	1	1						1
62				1	1					1						1							5			1													1							1	1	1	1	1	1	1						1

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Survey	Q1				Q2		Q3						Q4		Q5			
#	1	2	3	4	1	2	1	2	3	4	5	6	1	2	1	2	3	4
63			1		1		1						Merton Park	Surrey		1		
64			1		1		1						Merton Park	Croydon	1			
65			1		1		1						Mitcham	Canary Warf	1			
66			1		1		1						Wimbledon	Gatwick Airp	1			
67				1	1					1			Merton Park	Morden		1		
68			1		1			1					Morden	Morden	1			
69			1		1		1						Morden	Kingston			1	
70			1		1		1						Wimbledon	Streatham			1	
71	1				1		1						Mitcham	Wimbledon	1			
72			1		1					1			Surrey	Colliers Wood		1		
73			1		1		1						Wimbledon	Central Lon	1			
74			1		1		1						Wimbledon	Surrey	1			
75		1			1			1					Reins Park	Rohampton			1	
76			1		1		1						Merton Park		1			
77			1		1		1						Mitcham	Wandsworth			1	
78	1				1		1						Mitcham	Strattam	1			
79				1	1					1			Mitcham	mitcham		1		
80			1		1		1						Wimbledon	Chancery Ln	1			
81			1		1		1						Morden	Banstead	1			
82			1		1		1						morden	Morden			1	
83	1				1		1						Merton Park	morden	1			
84	1				1		1						Colliers Wood	Colliers Wood	1			
85			1		1		1						Merton Park	Sutton	1			
86			1		1		1						Wimbledon	Surrey	1			
87			1		1							1	Merton Park	Wimbledon	1			
88				1	1					1			Wimbledon	Croydon				1
89				1	1					1			Wimbledon	Wimbledon		1		
90	1				1		1						Wimbledon	Wimbledon	1			
91			1		1		1						Wimbledon	Suffolk	1			
92	1				1		1						Wimbledom	Merton Park	1			
93			1		1		1						Wimbledon	Beddington	1			

Survey	Q6							Q7						Q8					
#	1	2	3	4	5	6	7	1	2	3	4	5	6	1	2	3	4	5	6
63					5		1					1				1			
64						3	4			1						1			
65				5		5			1								1		
66							5				1						1		
67	3				3			1						1					
68	5	1	1	1	1	1		1						1					
69					5	5			1							1			
70	1	1	1	2	5	1	1	1							1				
71		1		3	5			1							1				
72				4	4			1						1					
73	5					5	5		1							1			
74					5					1					1				
75				5				1								1			
76					5								1			1			
77	1	1	1	1	5	1	1	1								1			
78	1	1	1	1	5	1	1	1						1					
79	1	1	1	5	1	1	1	1											
80	1	1	1	1	1	5	1		1						1				
81	1	1	1	1	5	1	1		1					1					
82	1	1	1	5	1	5	1			1						1			
83					5			1						1					
84	5							1						1					
85					5				1						1				
86					5					1						1			
87					5			1						1					
88					3				1						1				
89				5				1						1					
90	3			3				1						1					
91					5				1						1				
92					5			1						1					
93					5			1							1				

Survey	Q9							Q10		Q11						Q12				
#	1	2	3	4	5	6	7	1	2	1	2	3	4	5	6	1	2	3	4	5
63							1		1										1	
64					1			1		4				2				1		
65						1		1		5		5		3	5			1		
66						1			1	2									1	
67	1								1			1							1	
68	1								1	1	1	2	1	2				1		
69				1				1		4	1	2	1	5		1				
70	1							1		1	1	1	1	2				1		
71	1								1			1		1				1		
72	1							1				2							1	
73				1					1					2				1		
74		1							1						1			1		
75		1							1								1			
76							1		1			1						1		
77	1								1	1	1	3	1	3					1	
78				1				1		1	1	4	4	4	4			1		
79									1	1	1	1	1	1	1					1
80				1					1	1	1	1	1	1	1			1		
81		1							1	1	1	3	1	3				1		
82				1					1	1	1	1	1	1	1			1		
83		1							1									1		
84	1								1			5	4	4				1		
85				1					1			3							1	
86			1					1						3					1	
87		1							1										1	
88	1							1				2							1	
89	1								1			3								1
90	1								1			3		1					1	
91		1							1									1		
92	1								1										1	
93		1						1		4		2		3				1		

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Survey	Q1				Q2		Q3						Q4		Q5				Q6							Q7						Q8						Q9							Q10		Q11						Q12				
#	1	2	3	4	1	2	1	2	3	4	5	6	1	2	1	2	3	4	1	2	3	4	5	6	7	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	7	1	2	1	2	3	4	5	6	1	2	3	4	5
94		1			1		1						Wimbledon	Central Lon	1								5	3		1						1						1							1		1							1				
95		1			1		1						Wimbledon	Wimbledon	1				5	1	1	1	1	1	1	1						1						1							1		1	1	2	1	1	2		1						
96		1			1		1						Reins Park	Wimbledon	1				2				5			1						1						1							1				2	1	1			1						
97		1			1			1								1			4	1	1	4	1			1						1						1							1											1
98		1			1		1						Rains Park	kingston	1				5	1					4	1						1							1						1				4	4	4			1					
99				1	1			1					Wimbledon	Putnam		1			1		1	5			3	1						1						1						1			1	1	1	1	1								1
100				1	1			1					Wimbledon	Colliers Wood		1			2	1	1	1	5	1	1	1						1							1						1				3	1	1	1								1
101				1	1			1					Merton Park	Merton Park		1			5	1	1	1	1	1	1	1						1						1							1	1	1	1	1	1	1								1
102		1			1		1						Wimbledon	Fulham	1				5			1		5		1						1						1							1			1			1						1				
																										5	2	1				4	2	2				4	1						2	6							3	2	2
																										7	1	0	2	1	2	4	3	1	4	0	0	6	5	8	8	4	3	2	6	9						3	6	8	6	9

127 Students Surveys																																					
Survey	Q1	Q2					Q3						Q4						Q5								Q6		Q7						Q8		
#	1	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	7	8	1	2	1	2	3	4	5	6	1	2	3
1	Morden	5	1	1	1	1	1								1				1									1	1	4	2	1	4		1		
2	Morden			5			1							1					1									1		2			4	5	1		
3	Merton Park	3	1	5	4	1	1								1				1									1	3	5	4		3	5			1
4	Morden	3	4	1	2		1								1				1									1	1	1	2	1	1		1		
5	Mitcham	4	1	1	5	1	1								1					1							1		1	1	2	1	3		1		
6	Merton	5	2	1	1	1	1								1				1									1	1	3	3	1	1		1		
7	Colliers Wood	5	1	2	3	1	1								1					1								1		1	1				1		
8		2	1		4		1									1				1								1	2	5	2	3	5		1		
9	Wimbledon	5	1	2	1	1		1							1				1									1	1	3	1	1	1	1	1		
10	Wimbledon	2	1	1	5	1	1									1							1					1	1	2	1	1	1		1		
11	Merton	4	5	1			1						1						1									1		2	4		3		1		
12		5					1								1				1									1	2	1	2				1		
13	Wimbledon	2		4			1							1						1								1		2	2		2	2	1		
14	Wimbledon	1		5	1		1								1				1									1	1	3	2		1		1		
15	Morden		5		3		1							1					1									1		1	2				1		
16	Morden	1	5	1			1								1				1									1		2	2		1	1	1		
17	Mitcham				5			1								1			1								1		5		3			1	1		
18	Raynes Park				5		1								1					1								1		3	4			5	1		
19	Wimbledon	4			5		1								1					1								1			4		5		1		
20	Mitcham				5		1									1			1									1		2	2		1		1		
21	South Merton	5		1	1		1							1					1									1	1	3	1	1	4		1		
22	Wimbledon	5					1							1					1									1		5	2		4		1		
23	Wimbledon	5					1							1					1									1		5	3		5		1		
24	Morden	5		2			1							1					1									1		1			2		1		
25	Wimbledon	5					1									1			1									1		3			2		1		
26	Morden	2	1	4	1	1	1								1						1							1	1	2	3		3		1		
27	Wimbledon	1	1	1	5	1	1							1						1								1	1	1	1		3		1		
28	Morden	3		4	1		1								1				1									1		2	1				1		
29	Morden	2			4		1								1					1								1	1	4	2		3		1		
30	Earlsfeld	3			4		1										1			1							1		2		3		3		1		
31	Mitcham	5					1									1				1								1	1	3	2	1	4		1		
32	Morden	5		1	1			1								1			1									1			1		2		1		
33	Surrey	1	1	1	5	1	1										1			1								1	1	3	2	1	2		1		
34	Raynes Park	4		1	2		1								1					1								1					1		1		
35	Wimbledon	5	1		2		1									1			1								1		3	2	1		3		1		
36	Surrey	1	1	5	3	1	1								1					1								1	1	1	1	1	3	2	1		
37	Merton	2			5		1								1						1							1	1	4	1	1	5		1		
38	Raynes Park	3	1	1	4	1	1							1						1								1	1	4	4	2	3		1		
39	Merton	5					1						1						1									1		3			3		1		
40	Morden	5	1	1	1		1								1				1									1		2	2	2	1		1		
41	Wimbledon	1	5	1	1	1	1							1					1									1							1		
42	Merton Park	3	1		4		1									1				1							1		2	2			1		1		
43	Seasme Street					5	1											1								1		1						5	1		
44	Sutton	2		5	3				1						1				1								1		2	4	5	1	2		1		
45	Raynes Park	3	1	5	4	1		1						1					1									1							1		
46	Merton Park	5	1	1	1	1	1						1						1									1	1	5	1	1	5		1		
47	Wimbledon		5				1							1					1									1		3	1		3		1		
48	Wimbledon	2	2	1	4		1								1					1								1		4	1		4		1		
49	Mostyn Rd.	5	1	1	1	1	1						1						1									1	1	5	5	1	5	5	1		
50	Colliers Wood	5	1		3	1	1								1					1							1		2	3	1		2		1		

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Survey	Q1	Q2					Q3						Q4						Q5								Q6		Q7						Q8		
#	1	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	7	8	1	2	1	2	3	4	5	6	1	2	3
51	Morden	3	2	4	1		1								1				1									1		1			1		1		
52	Wimbledon	5		2			1						1						1									1		4	1	3	4		1		
53	Merton	1	5	1	1	1	1						1						1									1		1					1		
54	Merton	5					1							1					1									1		4	1		2	2	1		
55	Merton	5					1							1					1									1		2	3		3		1		
56	Morden	5					1							1					1								1		5						1		
57	Merton Park	5	1	1	1	1	1						1						1									1	1	3	3	3	4	4	1		
58	Wimbledon	3		1	1		1								1				1									1	1	5	4		2	1	1		
59	Mitcham	3		5	3		1							1						1							1		1	1	1		1		1		
60	Merton			5			1							1							1							1					2	2	1		
61	Mitcham	1			4		1								1					1							1		3	2			1		1		
62	Mitcham			2	4		1								1					1							1		5	1			4	2	1		
63	Morden	3		2			1								1					1								1		1			1		1		
64	Morden	5					1										1		1									1							1		
65	Mitcham				5		1								1					1								1							1		
66	North Cheam				5		1								1					1								1				2	3		1		
67					5			1							1					1							1		5		2		3	3	1		
68	Wimbledon	4	2	4	3		1								1											1		1							1		
69	Hexham	2		5			1								1				1									1		1			1		1		
70	Merton Park	5					1							1					1									1			2			1	1		
71	Merton Park	5					1						1						1									1		1			1		1		
72	Morden	5		3			1								1				1									1	2	3	2				1		
73	Wimbledon	5					1									1			1											3	1		3	4	1		
74	Streatham				5		1										1			1							1		3	4	1		2		1		
75	Wimbledon	4	4				1								1				1									1		1	2	1	3		1		
76	Mitcham				4		1									1					1							1		1			1			1	
77	Mitcham				5		1										1						1					1								1	
78	Wimbledon				4			1						1					1								1			2						1	
79	Morden			3			1									1					1						1		3	1	1	1	1	2		1	
80	Merton	3			3		1								1								1				1				3	1		2		1	
81	Mitcham				4		1										1					1															1
82	Wimbledon	4	1	1	1		1							1					1									1								1	
83	Morden			4	2		1									1				1								1		1		2					1
84	Wimbledon			4			1							1						1							1		3				1			1	
85	Mitcham			4			1								1						1						1		3							1	
86	Morden	5					1						1						1									1			2		2			1	
87	Morden	4	3				1							1					1									1		2	1		1			1	
88	Morden				4		1										1					1					1		4		4	3				1	
89	Merton Park	3	4				1							1					1									1								1	
90	Croydon			5			1									1					1							1			1		1				1
91	Wimbledon	4					1						1						1									1		1		3				1	
92	Morden				4		1								1							1						1		1			2			1	
93	Mitcham	5			5		1								1						1						1		4		4		4			1	
94	Wimbledon	3			4		1							1						1								1		1		4					1
95	Wimbledon			5			1									1					1						1		1	1	1		2				1
96	Wimbledon		5				1						1						1									1					2			1	
97	Colliers Wood						1										1							1				1								1	
98	Mitcham				4		1								1							1						1		1						1	
99	Morden	5					1						1						1									1			1					1	
100	Croydon				5		1											1						1				1								1	

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Survey	Q1	Q2					Q3						Q4						Q5								Q6		Q7						Q8		
#	1	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	7	8	1	2	1	2	3	4	5	6	1	2	3
101	Merton Park				5		1							1							1							1	1		2		2			1	
102	Sutton			5			1									1				1								1									1
103	Sutton				4		1								1							1						1			1					1	
104	Wimbledon			5			1								1					1								1									1
105	Mitcham	4			4		1									1						1						1		2			1			1	
106	Morden	5					1						1						1									1								1	
107	Morden	5	2				1							1					1									1			1					1	
108	Croydon			4			1								1						1						1				3					1	
109	Sutton				5		1									1						1						1		1			1				1
110	Wimbledon	2		3			1							1						1								1					1				1
111	Morden			5			1								1					1								1			2						1
112	Mitcham	4		2	5		1									1					1							1		1						1	
113	Sutton			3	4		1										1						1					1		2	3		3			1	
114	Croydon			4	1		1								1					1							1		2		1		1				1
115	Colliers Wood	5			5		1										1					1					1		4	1	1	2				1	
116	Ridgeway	4	2				1							1					1									1	1	2	2	1	2			1	
117	Wimbledon	2	4	2			1								1				1									1		3	1	1	1			1	
118						5	1						1						1									1			1		1			1	
119	Wimbledon	5		2			1							1					1									1	1	2	2	1	2			1	
120	Mitcham			4			1							1								1					1		3	4	2		4		1		
121	Tooting				5		1									1				1								1							1		
122	Mitcham	5					1						1						1								1		5	3	1		3		1		
123	Mitcham	5					1						1						1								1		5						1		
124	Merton	5	1	1	1	1	1								1				1									1	1	3	1	1	3	1	1		
125	Tooting				5		1									1				1							1				3		3		1		
126	St. John's Hill				5		1									1				1								1		1	1				1		
127	Wandsworth	1		1	5		1								1					1								1		3			2		1		