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# Improving Disabled Access to the Tram System in Melbourne, Victoria


An Interactive Qualifying Project submitted to the
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by

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## Abstract

This project assisted the Department of Infrastructure of the Victorian government in improving the accessibility of the tram system for disabled passengers in Melbourne, Australia. A systematic rating system for assessing future stops to upgrade to conform to accessibility standards was proposed and applied to three target routes. Criteria were defined by reviewing the current state of accessibility and interviewing stakeholders. The proposed approach will help to effectively focus project effort and funding to critical areas in the future.

## Acknowledgements

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## Authorship

Alexander Christakis, Katie Flynn, and Jennifer Himottu all contributed equally to the creation of this report

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## Nomenclature

AS – Australian Standards

ATSP – Accessible Tram Stop Program

ALGA – Australian Local Government Association

CBD – Central Business District

DDA – Disabilities and Discrimination Act of 1992

DHS – Department of Human Services

DOI – Department of Infrastructure

DSAPT – Disability Standards for Accessible Public Transport

GIS – Geographic Information System

HROEC – Human Rights and Equal Opportunities Commission

KAT Stop – Kerb Access Tram Stop

MAV – Municipal Association of Victoria

MCC – Melbourne City Council

MPTP – Multi Purpose Taxi Program

MOTC – Meeting our Transport Challenges

MPTP – Multi Purpose Taxi Program

MTF – Metropolitan Transport Forum

MTP – Metropolitan Transport Plan

PTAC – Public Transport Access Committee

PTD – Public Transport Division

TGSI – Tactile Ground Surface Indicator

## Executive Summary

The Department of Infrastructure (DOI) provides and controls the primary infrastructure in Victoria, Australia. The Public Transport Division (PTD) is a section within the DOI that controls the train, tram, and bus services throughout Victoria. Responsibilities of the PTD address issues such as accessibility, planning, safety, and contract management. The Accessible Tram Stop Program (ATSP) is an initiative from the Victorian government that works to improve the accessibility of the tram network in the city of Melbourne. This program has been given to the PTD to manage within the DOI in combination with partners Yarra Trams and VicRoads. At present, 150 accessible stops have been constructed; however, the ATSP has the goal of constructing 420 total platform stops by 2012. In the past, the DOI has focused on the least challenging stops to upgrade in order to demonstrate the platform stop concept and to provide as many stops as possible. However, in the future it is necessary to approach areas that are more challenging to construct as well as to incorporate additional criteria such as popular destinations, environment, and local government input.

The goal of this project was provide the DOI with an approach to assessing and selecting future stops to upgrade through the ATSP and to determine where the focus of the program should be in the future. The project team prioritized stops on three different tram routes to upgrade to accessible standards as well as recommend objective criteria by which to assess the stops. This study proposed a systematic rating system that incorporates these factors to prioritize a list of tram stops to be upgraded over the next few years of the ATSP. As a deliverable, the results, recommendations, and rating system were organized into a concise portfolio to be presented with the final report to the DOI.

The goal was attained by achieving the following objectives: examine the current deployment of accessible tram stops, obtain stakeholder input, define criteria for selecting sites, and prioritize tram stops to be updated. The current state of accessibility was studied to determine important areas in the network to consider for upgrading and to understand how past work was achieved. This work, together with stakeholder views and priorities from interviews, allowed the project team to develop a set of criteria. The criteria were organized into an observation spreadsheet which was used in the field to collect data in the form of physical dimensions, observations of the environment, road structure, and type of buildings in the area.

Three target routes were chosen and a total of 54 platform stop locations were identified and prioritized.

In order to determine the current state of accessibility in more detail, the project team examined what has previously been accomplished and how it was done. The current state of accessible was studied through field visits to both accessible and non-accessible routes and through analyzing map data. Initial field visits on a variety of tram routes were completed in order to determine what factors affected the ease of construction and feasibility of upgrading a typical safety zone stop to a platform stop. Factors observed included stop dimensions, road width, traffic flow, terrain, and type of nearby buildings. GIS mapping software was used to overlay the locations of tram stops, currently accessible stops, disability organizations, and demographic data on aerial maps of the city of Melbourne. The maps were used to track the location of target routes, locate stops within council boundaries, and analyze distances from disability centers and demographic data to the target stops. Three target routes were chosen as a result of this study and discussion with the DOI.

Interviews were completed throughout the course of the project to obtain the views of the DOI, VicRoads, Yarra Trams, local government councils, and disability advocate groups on the ATSP. Personal communication with the stakeholders involved was critical as they often each have very different priorities but must work together. Input from these stakeholders was used to identify important criteria for prioritizing stops as well as to provide supporting rational for them. VicRoads, whose focus is on the maintenance of road capacity and road safety, was interviewed in order to understand the affect of platform stops on the roadway and the feasibility of changing roadway structure in order to accommodate accessible stops. Yarra Trams, acting as the delivery agent in the ATSP, discussed furthering cooperation with DOI and its interactions with VicRoads and the councils. Interviews with the councils revealed their approach to accessibility, priority areas within each council, and how the council works with the DOI. A frequent issue raised through the course of the interviews was the issue of communication and how lack of common objectives prevented or hindered project delivery.

The developed rating system was applied to Route 96 along Nicholson Street, Route 112 through Saint George's Road, and Route 86 along High Street and Queens Parade. The results portfolio organized each stop in a table format with photographs, descriptions of general categories, a rating for each category, and an overall recommendation of what should be done for

the stop. The ratings were used to divide the stops on each target route into sections that could feasibility be constructed together. The target routes as well as the stop sections were prioritized by considering each of the three ratings and an order of approach was proposed.

The application of the rating system provided DOI with a systematic approach which is easy to apply from defined observations and helped to determine which stops are of higher priority for upgrading on Routes 96, 112, and 86. The rating system now allows the DOI to compare stops in terms of the complexity of their environment and the pressure to have the stop accessible due to stakeholder need as well as simply ease of construction. The ATSP has been focusing its efforts on stops that are least difficult to upgrade; however, more challenging stops will have to be upgraded in order to meet future DDA accessibility milestones. The proposed rating system provides a method to compare stops on a more complete basis that will assist in selecting more difficult future stops.

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# Chapter 1: Introduction

The past several decades have brought great strides in equal opportunities for the disabled population. Recent efforts in disability rights worldwide have lead to new legislative measurements requiring public areas to be accessible for people with disabilities. Disability is defined as a physical, sensory, psychological, or intellectual impairment and many of these disabilities prevent necessary mobility within the community. The efforts for social inclusion of those with disabilities therefore include, among others, enhancing the accessibility of public transportation systems, which is important in metropolitan areas as a reliable and economic form of transportation. In Melbourne, Australia, the tram system is a major component of public transit, as well as having an important place in Melbourne's history. Covering 245 kilometers of track with over 1,700 stops, Melbourne, Australia has the third largest tram system in the world (Yarra Trams, 2008). The expansive tram network benefits millions of passengers per year; however, the tram system has not yet reached an appropriate level of accessibility for disabled passengers.

The Department of Infrastructure (DOI) of the Victorian Government provides transport services to Victoria and is currently working towards upgrading the tram system for the disabled. The DOI has been addressing the problem by replacing older trams with high floors, with low floor trams and by constructing platform stops. The low floor trams are only accessible to the disabled population in conjunction with platform stops that have ramp access and a floor that is raised to the level of the low floor tram. It can also be difficult for people with disabilities to access trams because the tram stops are located within the road medians and it is unsafe to require disabled passengers to cross multiple lanes of traffic to reach the tram.

The Victorian government has published several initiatives that have been developed to plan and provide funds for increasing accessibility of public infrastructure. The *Linking Melbourne – Metropolitan Transport Plan* identifies strategies for overcoming major problems with the transportation system. A document called *Meeting Our Transport Challenges* presents specific project commitments and outlines $10.5 billion in infrastructure projects (DOI, 2006). *Think Tram* and the *Tram 109 Project* are two on-going projects within theses larger government initiatives to improve accessibility for the tram system. A main objective of *Think Tram* is aimed at improving safety and accessibility by upgrading to low floor trams and platform stops so that they comply with the Commonwealth Disability Discrimination Act. The *Tram 109*

*Project* followed initiatives of *Think Tram* and applied them in upgrading various stops along a complete route. Route 109 was chosen as it runs directly through Melbourne and encounters various operational conditions, taking into account travel demand, traffic congestions, delays, and pollution along Route 109 to minimize travel times (VicRoads - Think Tram Projects, 2008). The DOI's strategy in continuing and improving projects such as these in the future and currently is to form partnership programs with the tram companies, road agencies, and local governments. The Accessible Tram Stop Program (ATSP) is one such program in which the DOI, Yarra Trams, and VicRoads work together.

Although these government programs (*Think Tram*, *Tram 109 Project*, and ATSP) have been initiated, there remain a large number of inaccessible stops in the Melbourne tram network. Currently, only 150 out of an approximate 1,790 stops in the system have been made accessible to those with disabilities. The DOI has funding of $60 million over the next three years to upgrade 180 stops under the ATSP (DOI – *Action Plan*, 2007). The funds must be used efficiently as well as applied to areas critical for the disabled population. In this effort, the DOI needs to reevaluate the criteria that it uses in identifying stops to upgrade. The preliminary method in stop prioritization examined solely the construction ease of an upgrade. The construction ease was given a ranking T1 through T5, representing an easier or more difficult upgrade, respectively. The use of this system is limited due to unclear definitions of the rankings and because the rating only considers roadway restrictions. There are many other factors to be considered in the selection and prioritization of stops including how easy they would be to construct, how quickly they can be upgraded, their proximity to important destinations, and the affect on the communities and surrounding environment in which the stops are located. The issue of proper communication between the project partners and the local government councils is also a deciding factor in the success of the program and can either greatly advance the process or hinder work efforts. The current approach of the ATSP is to replace the current trams with low floor trams which are universally accessible when paired with accessible platform stops. The DOI constructs these accessible stops in groups which allows for quick and efficient delivery.

The goal of this project, therefore, is to determine a method for the selection of the next set of stops that will be upgraded by defining objective criteria and creating a rating system that takes into account a wider range of important factors. The project aims to provide insight to the DOI on where to focus the immediate future activities of the ATSP. This rating has been applied

to the stops along three target route areas to prioritize a group that can be made accessible in the future of the ATSP.

This study helped the DOI to increase ease of accessibility to the tram system for disabled passengers. A systematic rating system for assessing future stops to upgrade and comply with accessibility standards was proposed and applied to target route areas. Objective criteria that took into account roadway restrictions, environmental impact, and the need for increased accessibility was defined by reviewing the current state of accessibility and interviewing stakeholders such as the ATSP partners, disability advocate groups, and local government councils. This approach assisted the DOI to effectively focus project effort and funding to critical areas in the future.

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# Chapter 2: Background

Melbourne's tram system is important both historically and as a part of the public transportation system. Due to recent civil rights movements and new legislature in the last two decades, there have been large efforts to increase accessibility for people with disabilities. The Victorian Government has developed plans and set aside funds for projects relating to increased public accessibility, including the tram system. This section outlines necessary background for understanding the Melbourne tram system, reviews the context for the efforts conducted so far to increase accessibility, and describes the organizational approach involved in the management of running and upgrading the tram network.

## *2.1 The Melbourne Tram System*

Melbourne, Australia has created a globally recognized transit system including bus, train, and tram (The City of Melbourne, 2008). The city accommodates 716,000 daytime city users, an increase of 7% from the year 2004 to 2006 (The City of Melbourne, 2008). More job opportunities and a growing population has been the cause of this increase in demand. The large and increasing number of users has kept the city consistently working to ensure that people have necessary travel options. The Melbourne rail and tram system, shown in Figure 1, is extensive and organized by different colored lines; trams run radially to and from the city center and trains provide access to more distant locations in the metropolitan area.

The tram system, which is over 100 years old, is the third largest in the world, running on 240 double kilometers of track (Yarra Trams, 2008). In general, a tram system is surface based and runs above ground and on roads that are typically shared with other vehicles. The tram system allows city users to travel throughout the city in a safe and efficient manner. Specifically, the system causes fewer cars to be on the road which emphasizes efficient travel and sustainable development. Public transit also allows the public to travel without owning a car or finding a parking space in the city. At present, the tram network contains 27 major routes divided into two zones—Zone 1 and 2. A Zone 1 map is shown in Figure 2. Throughout the network there are about 1,790 stops including platforms and sidewalk curb stops (Yarra Trams, 2008).


**Figure 1: Melbourne Rail & Tram Map**

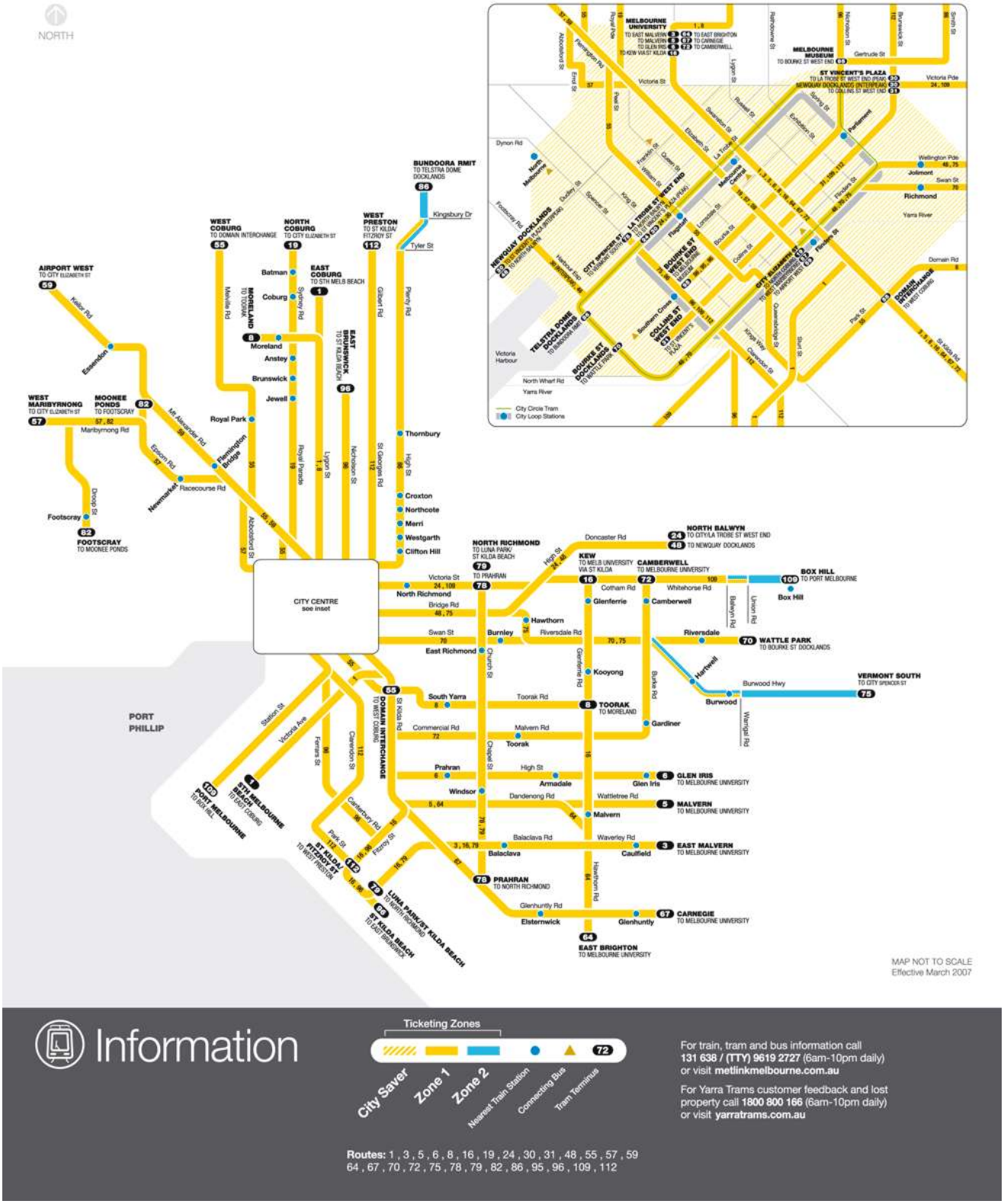


**Figure 2: Melbourne Zone 1 Tram Map**

Although trains are the most popular commuting transportation throughout the business week (at 51% of commuters), trams account for 21% of trips into the city (City of Melbourne) and 36% of trips around the city (Trembath, 2006). The most popular tram usage throughout the week occurs in the central business district (CBD) with approximately 30,000 people using the Federation Square/Flinders Street stop every day (Yarra Trams, 2008). In October 2006, Sweeny Research published a platform tram stop survey, which included a city user's survey. This research was funded by and presented to Yarra Trams and VicRoads—the organizations that manage the tram and road networks, respectively. Results showed that 67% of businesses said that trams have a positive impact on their companies while only 6% responded that the trams have a negative impact. Negative impacts were mainly due to the trams creating a lack of parking spaces—this occurs because roads need an extra lane for trams, which can be prioritized over parking (Trembath, 2006). Economically, trams allow people to arrive at places faster and easier which city businesses favor. Conveniently, trams allow people to travel throughout the city without the effort of walking or driving.

There has been consistent improvement in the network including more trams, a larger network (longer routes), and added patrons. Although several problems have been assessed and resolved, the one current issue with the Melbourne trams is accessibility. With the median age of a Melbourne city resident being 28, it is expected that 25% of Victorians will be over the age of 60 by the year 2021 (The City of Melbourne, 2008). However, the elderly do not account for all people with disabilities needing accessible options. The group of people benefiting from increasing accessibility includes visually impaired, amputees, hearing disabled, percentage of the elderly population, mobile disabled and passengers with strollers. The state of Victoria has recently put together several plans to make public transportation more accessible. The Premier, Steve Bracks, commented in a media release, "This [upgrade to fully accessible trams] will give more people the opportunity to access local services and to participate in their communities…These improvements are critical for ensuring people who have a disability can maintain their independence and quality of life" (DOI, 2006). The Department of Infrastructure, VicRoads and Yarra Trams have combined resources to continue to improve the quality and opportunities that the Melbourne tram network provides. They will complete this task by making the network more accessible to the disabled community through the Accessible Tram Stop Program (ATSP). Before the move to improve accessibility was initiated, there were 62

accessible stops out of the approximate 1,790 throughout the city. With the ATSP in place, 180 stops will be updated by the year 2010 to comply with the Disabilities Discrimination Act of 1992 (DDA). Updated stops (listed in Appendix D) will feature waiting areas, accessible boarding, hearing augmentation, and tactile ground surface indicators (TGSI) (DOI – *Melbourne Tram Network*, 2008).

## *2.2 Disabled Passengers*

People with disabilities face many issues as any kind of disability can be seen by others as a state in which they are less capable of working or living independently. People with disabilities, as well as older people, often find themselves less able to participate in society not necessarily because of their lack of physical ability, but because of pre-conceived ideas others have, including being thought of as less self-sufficient and unproductive. A person's success and life status can be assessed by other people in terms of their well-being, including their state of health, income, and participation in society, with a lack of these leading to decreased ability for the individual to achieve well-being in society as well as exclusion from the rest of society (Cantarero et al., 2007). The ability to move freely within one's environment greatly affects the quality of life for people with disabilities. Accessibility to public buildings, stores, information services, and transportation therefore often determines the actual impact of impairment (Social Development Canada, 2004).

More accessible public transportation is a major issue for passengers, especially for the elderly and disabled who represent a significant part of Australia's population. In 2003, the Australian Bureau of Statistics (ABS) found that 20% of people surveyed reported having a disability. In their survey, the ABS defined disability as "any limitation, restriction or impairment, which has lasted, or is likely to last, for at least six months and restricts everyday activities", and broke down the types of disabilities into physical, sensory, psychological, and intellectual impairments (Australian Bureau of Statistics, 1998). Figure 3 shows the relative numbers of each type of disability when considering the disabled population with respect to both genders. Although not all disabilities involve impairment of mobility, most do. The most common type is physical, followed by sensory. Both of these types of impairments contribute to challenges in a person's ability to travel freely. All together, impairments that involved limitation of mobility affected 73% of people with disabilities and were described by the ABS as

restrictions in physical activities, limited use of the feet and legs, hearing loss, and vision loss. (Australian Bureau of Statistics, 2003).

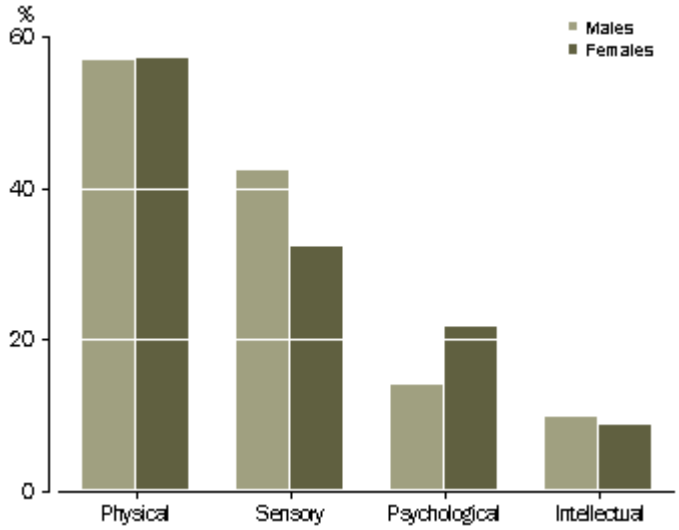


**Figure 3: Persons with a Disability: Impairment Types**

The large number of people with limitations of mobility among all types of people with disabilities makes it very important for the public transportation systems to be accessible by this group. Many people with limiting conditions are able to work and take care of themselves; however, accessible transportation is essential to their independence. Lack of transportation for people with disabilities makes it harder for them to participate in the workforce as well as in education. Problems with public transport occur particularly with more than one type of impairment. The ABS, for example, reported that one third of people with more than three of the identified disability types and a quarter of people with a physical impairment and one other type had difficulty with public transportation, such as difficulty getting into vehicles (Australian Bureau of Statistics, 1998).

Older people represent a significant portion of the population, with people over the age of 60 making up 17% of Australia's population and totaling about 3.35 million people. Naturally, disabilities are more common among seniors. The disability rate for this group is 51%, with 19% having a severe disability that limits necessary life activities. Figure 4 shows how disability rates increase with age, as well as differences in male and female demographics.

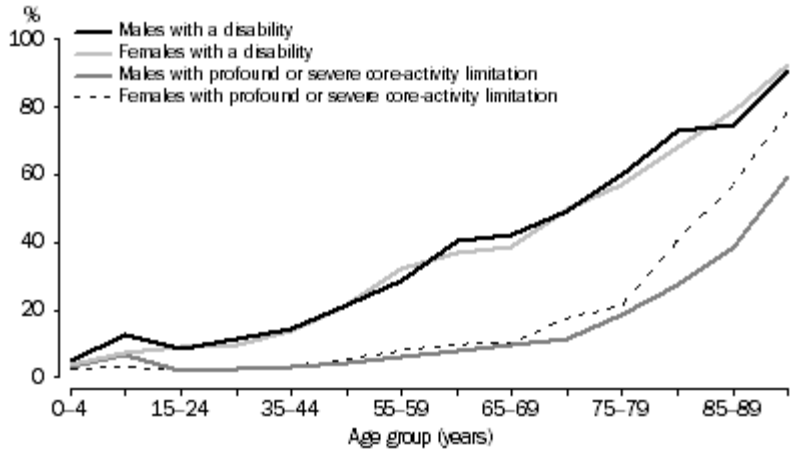


**Figure 4: All Persons, Disability Rates by Age and Gender**

Transportation is a major area that seniors require assistance with. Transport was found to be the third most needed form of assistance in Australia, following property maintenance and healthcare (Australian Bureau of Statistics, 2003).

The ability of those with disabilities to secure an adequate income is linked to their ability to travel. Barriers to employment include costs to participate in the workforce and an inflexible working environment. Transportation is a key issue in both of these issues as there can be additional costs for transportation and support as well as difficulty traveling to and from the workplace (HREOC, 2005). Many people with disabilities cannot drive themselves and for those who can, travel by car generally presents fewer difficulties; however, the cost of a car can be prohibitive, especially for people with disabilities who are more likely to have a lower income. Australia, in particular has the lowest average personal income for people with disabilities within the Organization for Economic Cooperation and Development which includes 30 developed countries including many European Countries, Japan, the United States, and New Zealand. According to the OECD, the average income for a disabled person in Australia is 44% of the income of a person without a disability (HREOC, 2005). In a Canadian survey, the two main barriers for using public transportation were that the ride further aggravated the health condition of the disabled person and the cost of the transportation. Important factors for use of public transportation by the disabled therefore involve accessibility and comfort. Public transportation should be convenient and comfortable as well as be widely available and relatively inexpensive (Social Development Canada, 2004).

## *2.3 Disability Standards*

Standards were written to prevent discrimination against people with disabilities. The standards outline the intent behind the creation of the standards as well as a framework for applying them. From a global perspective, the United States formed the Rehabilitation Act in 1973, and then formed the American Disabled for Accessible Public Transport in 1983 (information on the early American disability rights movement can be found in Appendix B). More specifically, Australia produced the Disability Discrimination Act 1992, which stated a detailed definition of "disability" and stated that it is unlawful to discriminate against people with disabilities. Following the Disability Discrimination Act, the Disability Standards for Accessible Public Transport, Victoria 2002 was created. These standards are directed particularly for public transport services.

### 2.3.1 Disability Discrimination Act 1992

The Disability Discrimination Act 1992 (DDA) prevents the unfair treatment and discrimination of Australian citizens that are disabled. In the DDA, the term "disabled" refers to people that:

> "have now, have had in the past, or may have in the future a total or partial loss of bodily or mental functions, total or partial loss of a body part, the presence in the body of organisms causing disease or illness, the presence of organisms in the body that are capable of causing disease or illness, the malfunction, malformation, or disfigurement of a part of the person's body, a disorder or malfunction that results in the person learning differently from a person that does not have the disorder or malfunction, and a disorder, illness, or disease that affects a person's thought processes, perception of reality, emotions, judgment, or results in disturbed behavior of the person" (Human Rights & Equal Opportunity Commission).

According the DDA definition, a person does not need to have permanent disabilities in order to be protected by the DDA. There is also no regulation in the DDA that states a person can only be covered if he/she is born with a disability; a person can also be covered if he/she became disabled anytime after birth. As a result, whether a person was born with his/her disability or not, is irrelevant as long as their disability falls into one of the categories stated in the DDA's definition of "disabled". Although there is no statement in the DDA that provides any special rights or benefits for people with disabilities, the Disability Discrimination Act protects people with disabilities and makes discrimination against them illegal.

Under the DDA, it is also unlawful to discriminate against disabled citizens who use equipment/aids, are accompanied by a service animal, or are accompanied by an assistant, interpreter, or reader. Therefore, people with disabilities are able to participate in everyday life situations, such as employment, education, activities of clubs and associations, etc., just as people without disabilities can. Along with preventing discrimination against citizens with disabilities, the DDA also makes it against the law to discriminate against people who are relatives, friends, caretakers, or co-workers of the disabled person. For example, it is against the law for a parent who has a child with a disability to be refused a job because the employer assumes the parent will need time off to look after their child.

As previously mentioned, the DDA allows people with disabilities to enjoy life without being discriminated against. Included in this are transportation services. The providers of these services cannot refuse to provide transportation for people with disabilities, provide services on less favorable terms and conditions, or provide the transportation in an unfair manner (Human Rights & Equal Opportunity Commission). However, the DDA also states that it is not required for the providers to supply disability access if the adjustments would cause major difficulties or excessive costs to the provider, also known as "unjustifiable hardship". In order to decide whether the situation is considered unjustifiable, the provider should consider how access would be provided, discuss the situation to the people involved, and consult relevant sources of advice.

Although the DDA does not include specific enforcements for the Act, it is still against the law for people to disregard what is stated in the DDA. If a person is discriminated against, a complaint can be made to the Human Rights & Equal Opportunity Commission (HREOC). If the HREOC cannot solve the issue, the complaint will then be given to the Federal Court or the Federal Magistrate's Service (ENAT, 2007).

### 2.3.2 Disability Standards for Accessible Public Transport

On October 23, 2002, the Disability Standards for Accessible Public Transport (DSAPT) implemented as a result of Section 31 of the Disability Discrimination Act (ENAT, 2007). While the Disability Discrimination Act provides broad terms to prevent disability discrimination, the DSAPT provides more specificity about the rights of passengers and the obligations of transport operators. Presentation of clearer details of the DDA for the DSAPT is the responsibility of the Attorney General. The objectives of the DSAPT are:

> "to ensure public transport operators and providers remove discrimination from public transport services; to remove discrimination on the basis of disability from public transport services over a thirty year period; to ensure that persons with disabilities, their families and caregivers can participate fully in, and enjoy, community life; and to promote recognition and acceptance within the community of the principle that persons with disabilities have the same fundamental rights as the rest of the community" (ENAT, 2007).

In 1999, it was estimated by the Commonwealth Government that the cost to implement the Disability Standards over the following 20 years would be 3.7 billion Australian dollars (ENAT, 2007).

To ensure that the transport operators will be able to successfully implement these Standards, a compliance timetable was set up. The compliance timetable consists of an "incremental compliance with the relevant requirements over 30 years with milestones at the fifth, tenth, fifteenth, twentieth, and thirtieth years" (Human Rights Branch, 2006) that will reduce the burden for operators and providers.

In addition to the compliance timetable, it is also stated in the Standards that every five years the Minister for Transport and Regional Services and the Attorney-General must review how efficient and effective the Standards are. From this review, it can be determined whether or not discrimination has been reduced and if any amendments need to be added to the Standards (ENAT, 2007).

However, a transport operator can obtain an exemption from the DSAPT by consulting with the Human Rights and Equal Opportunity Commission. In order for the Commission to consider an application for an exemption, the Accessible Public Transport Jurisdictional Committee, which consists of representatives of the Australian Government and State and Territory transport departments, has to provide advice. Although exemptions are allowed, they cannot last longer than five years and contain terms and conditions, depending on the situation. Lastly, the final decision for exemptions is reviewed by the Administrative Appeals Tribunal (ENAT, 2007).

Two years after they were established, corrections to the Standards were made. On April 2, 2004, the Disability Standards for Accessible Public Transport Amendment (No.1) (Technical Review Amendment) was published. This amendment added technical issues about transportation that were not recognized in the original Standards, such as access paths, hearing augmentation, and tactile ground surface indicators. Then on May 11, 2005, the Disability

Standards for Accessible Public Transport 2004 (No. 2) (Correction Amendment) was published. This amendment made minor changes to the technical requirements to make them clearer.

## *2.4 Tram Accessibility Efforts*

The Victorian Government has recognized the needs of people with disabilities and published several public transportation initiatives that include program to increase accessibility. The plans lay out objectives as well as allocate money for individual projects.

### 2.4.1 Current Government Initiatives

In 2004, the Victorian Government published the Linking Melbourne – Metropolitan Transport Plan (MTP). This policy statement identifies four areas in which the transport system needs improvement and includes safety, managing congestion, providing for metropolitan growth, and support for economic development. The document both describes what the Victorian Government has done and lays a foundation for future work for the next four to five years by suggesting strategies to address the four major problems.

An initiative called Meeting Our Transport Challenges (MOTC) follows the strategies and priorities of the MTP and presents specific project commitments. MOTC's overall goal is to maintain the state of Victoria as a desirable place to live, to keep up with population growth, and to sustain economic development. The Victorian Government is approaching these issues by working to make the transportation system more efficient with MOTC outlining $10.5 billion in infrastructure projects. The MOTC plan describes its objectives in ten basic "actions" (DOI, 2006).

The initiatives described in MOTC that pertain to tram accessibility fall under *Action 4: Improving metropolitan train and tram services* and include aims to ensure improved access to jobs, education, health, and other necessary services for people with disabilities. Public transportation is very important for people who have a disability, restricted mobility, or are elderly. MOTC addresses the need for increased accessibility to the current system through modification and replacement of trains, trams, and buses. The major solution provided by the plan is to introduce more low floor trams with platform stops. MOTC also plans for extending the network into growing areas such as suburbs and developing new cross-town connections in the city of Melbourne. *Action 9: Creating accessible, connected communities* of MOTC outlines additional plans of increasing transport accessibility with $710 million to be spent on better

urban planning and accessibility including access paths, ramps, handrails, tactile ground surface indicators (TGSIs), upgraded stops, and improved lighting. This program works to bring improvements up-to-date with the standards of the Commonwealth Disability Discrimination Act 1992 (DDA) (DOI, 2006).

### 2.4.2 Ongoing Work in the Tram System

VicRoads is running two recent programs in order to improve tram travel times, reliability, safety, and accessibility with goals for increasing total public transport use from 9% to 20% of motorized travel by 2020. One of these programs is *Think Tram* which is a State Government program managed by VicRoads together with the Department of Infrastructure and Yarra Trams. The project is consulted in part also with the local government and communities. *Think Tram* is funded as part of the State Government's "Meeting Our Transport Challenges Statement" and aims to increase public transport, a statewide goal called "Linking Victoria".

The objectives of the *Think Tram* project include improved tram travel times through increased frequency and reliability, improved safety and accessibility, improved urban design through better integration of the public transport facilities, and provision of an alternative, more environmentally responsible mode of transportation than car transportation. Table 1 shows a list of stops on routes currently considered in the *Think Tram* program. The accessibility is being improved by upgrading to low floor trams and upgrading the stops so that they are compliant with the Commonwealth Disability Discrimination Act (1992). The project also mentions the fact that there needs to be a balance between private and public transportation in order to help accommodate a range of transportation needs (VicRoads – Think Tram Projects, 2008).

Some specific features of the program include road-based improvements such as tram stop upgrades, raised dividing strips to better separate trams and motorists, right turn bans, and changes in traffic light sequences. Safety is also being reviewed by reconsidering the travel paths around and across trams and tram tracks (VicRoads - Think Tram Projects, 2008).

**Table 1: Current Projects in the Think Tram Program**

| Route | Stop |
|---|---|
| Route 6/8 | Toorak Road |
| Route 19 | Elizabeth Street, Royal Parade, Sydney Road |
| Route 48/75 | Flinders Street, Wellington Parade, Bridge Road, High Street, Doncaster Road |
| Route 55 | Queensbridge Street, William Street, Peel Street, Flemington Road |
| Route 57 | Elizabeth Street, Racecourse Road, Epsom Road |
| Route 59 | Elizabeth Street, Flemington Road, Mount Alexander Road |
| Route 64 | Dandenong Road |
| Route 67 | Brighton Road |
| Route 86 | Bourke Street, Gertrude Street, Smith Street, High Street, Plenty Road |
| Route 96 | Bourke Street, Nicholson Street |
| Route 109 | Spencer Street, Collins Street, Victoria Parade, Victoria Street<br>Route 112: Clarendon Street, Collins Street, Brunswick Street, St Georges Road |
| Route 112 | Clarendon Street, Collins Street, Brunswick Street, St Georges Road |
| All Routes | Traffic Signal Priority |

The *Think Tram* objectives specifically relating to the new platform stops were supported by a survey done by an independent company on over 500 tram users and 200 retailers to determine the public's opinion on the platform tram stops. Platform tram stops include ramps for wheelchair and pram access as well as shelter, lighting, and tram arrival information. Support was largely in favor of platform stops with 80% of respondents wanting to see more of them (Trembath, 2006).

The other major effort is the *Tram 109* project, aimed at improving tram travel times, accessibility, safety, reliability, and integration with the local streetscapes on route 109 which runs from Port Melbourne to Box Hill (see Figure 5). The project has the same objectives as *Think Tram* with the added necessity of taking travel demand, traffic congestion, delays, and pollution along route 109 into account.

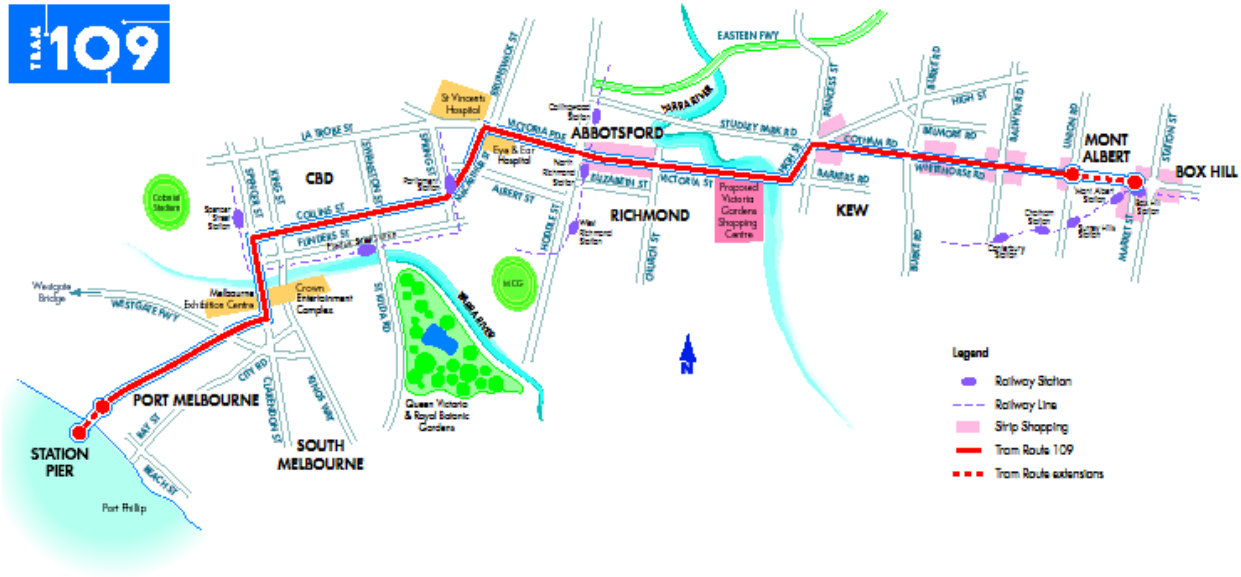


**Figure 5: Tram 109 Route**

The *Tram 109 Project* is also working to provide more accessible and safe transport for elderly people, passengers with prams, and those with impaired mobility. Improvements include low floor trams and accessible tram stops with features focusing on boarding, tactile ground surface indicators (TGSIs), waiting areas, ramps, and hearing augmentation (VicRoads – Tram 109 Project, 2008).

The *Tram 109 Project* is an important initiative to study as it was chosen to upgrade as a complete route. It is one of the longer tram routes in Melbourne with 19.5 km of track and is heavily used with about 8 million passengers a year. Route 109 was ideal for upgrading in this way because the route travels directly through Melbourne and encounters all of the possible tram operating conditions. Therefore, solutions that worked well could be expanded to other sections of the network (VicRoads - Tram 109 Commonly Asked Questions, 2006).

One way in which the State Government is approaching the need for increased accessibility is the replacement and refurbishing of trams. The replacement of trams is important not only as a means to provide more accessibility but is a major factor in identifying where accessible stops should be placed. The combination of the new low floor trams together with accessible stops provides complete disabled access. Efforts therefore in adding stops are focused to routes that already have low floor trams. As part of the "Meeting Our Transport Challenges" Statement, the Government committed $1.33 billion for extra new trains and trams. Ninety-five

low-floor trams have already been installed in Melbourne which greatly improves access for all passengers (New and Refurbished trams). Of the ninety-five, thirty-six are the "Citadis" tram type and fifty-seven are the "Combino" tram type. Examples of both types as well as the more common Z1 trams are shown in Figure 6. The low-floor trams only provide wheelchair access however, when combined with properly modified tram stops. This recent development is the first time full wheelchair access is possible for Melbourne's tram network. Some routes are completely updated to low-floor trams only such as Yarra Trams Route 109. Other trams have been refurbished including improvements for people with vision impairments such as high-contrast stanchions, grab handles, and step edging (DOI - New and refurbished trains and trams, 2008).

Citadis[1] Combino[2] Z1[3]

**Figure 6: Current Tram Models**

[1]Car, 2008, [2]Wikipedia public domain, 2008, [3]Wongm, 2008

### 2.4.3 Accessible Tram Stop Program

This project will work within the Accessible Tram Stop Program (ATSP). The program is part of the MOTC and defines programs for the implementation of DDA standards for the tram system in Victoria. The project is implemented by the Department of Infrastructure Yarra Trams and VicRoads (DOI - Tram Accessibility, 2008). Within this program the DOI is the client, Yarra Trams is the deliverer and VicRoads is the project partner. The ATSP has funding for 180 accessible updated stops in the regions of fourteen councils or local governments. Within the fourteen councils, there are a total of 420 tram stops that need to be evaluated. The goal of the program is to select and update the 180 stops within three years (DOI – Tram accessibility, 2008).

## *2.5 Management and Operation of the ATSP*

The Disability Discriminatory Act Tram Program is managed by the Department of Infrastructure, Yarra Trams and VicRoads. All three organizations are considered as the partners in this project with individual responsibilities. An organizational chart of the Partners is shown below in Figure 7. Together, the organizations collaborate in a Program Steering Committee that develops project initiatives and suggestions.

### 2.5.1 Department of Infrastructure

The Department of Infrastructure (DOI) is known as the client in the ASTP. As the client, the DOI is responsible for the program and the budget. They work closely with the state government that funds the project and request additional funding if needed. Yarra Trams and VicRoads each have individual contracts with the DOI and are compensated from the DOI for their services. The final design schemes for revised stops are all approved and receive input from the DOI. Additional responsibilities of DOI include communicating with the media about the ATSP and preparing the program management framework with other partners (North, 2008).

Within the DOI, the Public Transport Division (PTD) helps oversee the project. The Director of Public Transport has the "overall responsibility for project delivery through oversight of project direction" (North, 2006). The Director of Public Transport controls and is the leader of the Joint Steering Committee, which has representatives from the PTD, Yarra Trams, and VicRoads. The DOI provides a Client Manager that works closely with the PTD during the project. The responsibilities of the client manager are to manage the overall program, prioritize the project, manage High Level Stakeholder Consultations, manage the Yarra Trams and VicRoads relationship, provide overall project requirements, facilitate contractual agreements, give advice on project requirements, and provide a project delivery strategy.

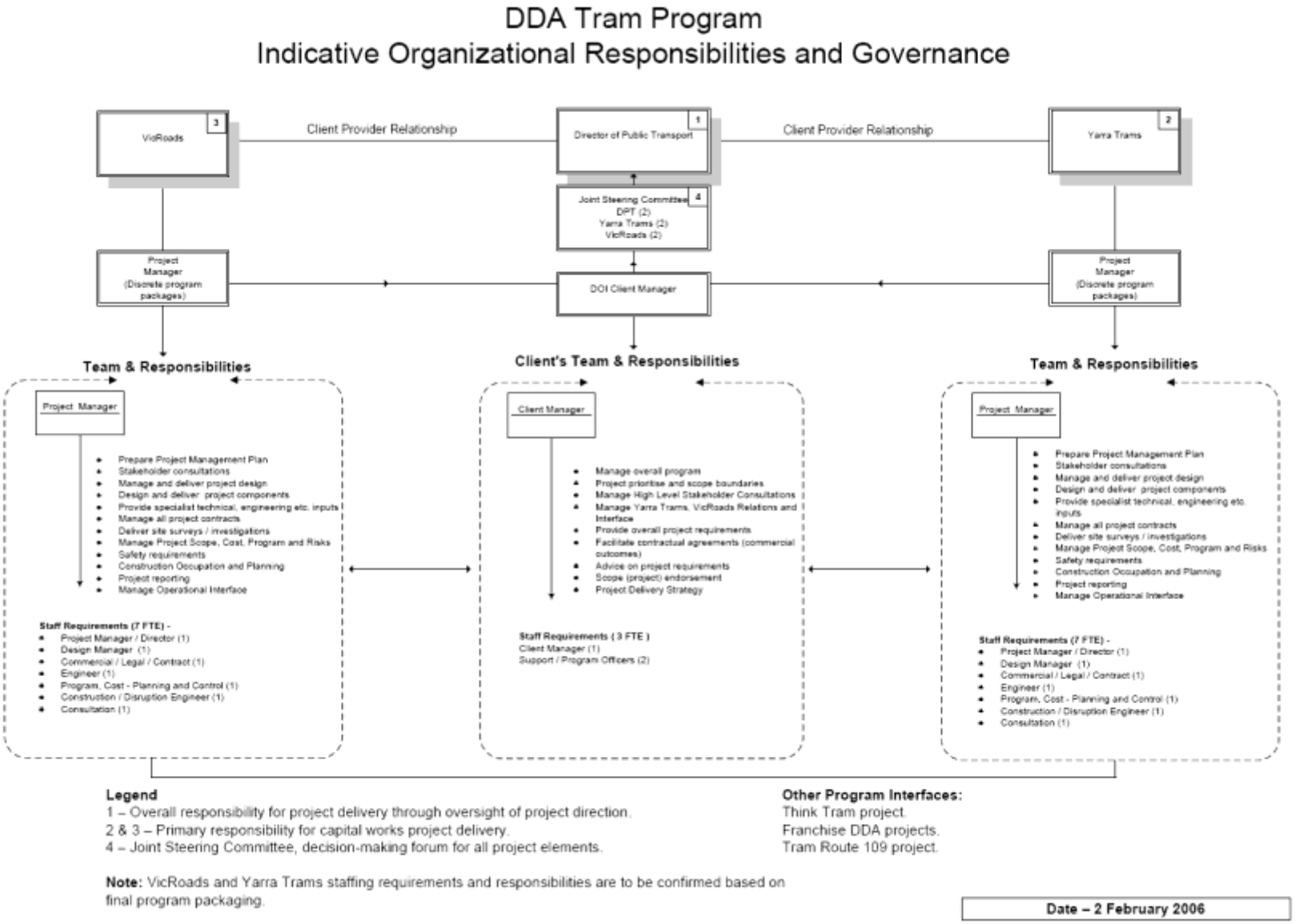


**Figure 7: DDA Tram Program**

### 2.5.2 Yarra Trams

Yarra Trams is a joint venture that was created in 1999 through companies Transdev (France) and Transfield (Australia). They operate under a franchise agreement with the Government of Victoria. The DOI manages and monitors the company. For the ATSP, Yarra Trams is known as the Deliverer for the contract and client's requirements. Yarra Trams has the responsibility of managing the implementation of the project. A Program Management Plan must be created by their organization that includes the following components:

- Scope management including packaging of works;
- Program management;
- Cost and budget management;
- Communications management;
- Quality management;
- Safety and environment management;
- Risk management;
- Procurement and contract management;
- Stakeholder management.

It is necessary that Yarra Trams work closely with the Client and ensure that the Client's requirements include safety and other required measures. As manager to the project implementation, the Deliverer specifically acts as a manager to design consultants, contractors and suppliers. Additionally, Yarra Trams must also ensure that safety and health issues are managed within the program (North, 2008).

The project manager of Yarra Trams is primarily responsible for capital works project delivery. The project manager also has the responsibilities of preparing a Project Management Plan, planning stakeholder consultations, managing and delivering a project design and its components, providing specialist technical and engineering inputs, managing all project contracts, delivering site surveys and investigations, managing the Project Scope, cost, risks, and safety requirements, constructing occupation and planning, providing project reporting, and managing the Operational Interface (North, 2006).

### 2.5.3 VicRoads

VicRoads is responsible for the roads of Victoria. Because the tram system runs on the roads, it is essential to include VicRoads in the planning process of the ATSP. Within the project, VicRoads is known as the Program Partner. The organization's main task is to provide information to the Client that will ensure the ATSP is following operation and functional needs

within the road system. They offer information on pedestrian and traffic management which will impact the development of new stops. Finally, VicRoads must endorse and approve tram stop selections, layout, specifications, and Yarra Tram's Program Management Plan (North, 2008).

The project manager within VicRoads has the primary responsibility of capital works project delivery, similar to Yarra Trams. The responsibilities of the project manager under VicRoads are also the same as Yarra Trams. The staff requirements for VicRoads are project manager/director, design manager, engineer, construction and disruption engineer, and a consultant (North, 2006).

### 2.5.4 Local Government Councils

Councils in Australia represent local governments. The tram network that we will be analyzing spreads across fourteen council territories in the Melbourne area. Table 2 shows the fourteen council names and number of tram stops that are within each boundary. The entire tram network spreads across other councils and boundaries. Those listed in Table 2 are within the boundaries that the ATSP is initially analyzing.

**Table 2: ATSP Councils**

| Council Name | Total ATSP Tram Stops |
|---|---|
| Melbourne | 185 |
| Port Phillip | 50 |
| Darebin | 31 |
| Yarra | 28 |
| Moonee Valley | 27 |
| Whitehorse | 22 |
| Stonnington | 19 |
| Maribyrnong | 15 |
| Docklands | 13 |
| Banyule | 9 |
| Glen Eira | 9 |
| Wittlesea | 7 |
| Moreland | 4 |
| Boroondara | 1 |
| **TOTAL** | 420 |

The boundary areas are shown on the following map in Figure 8.

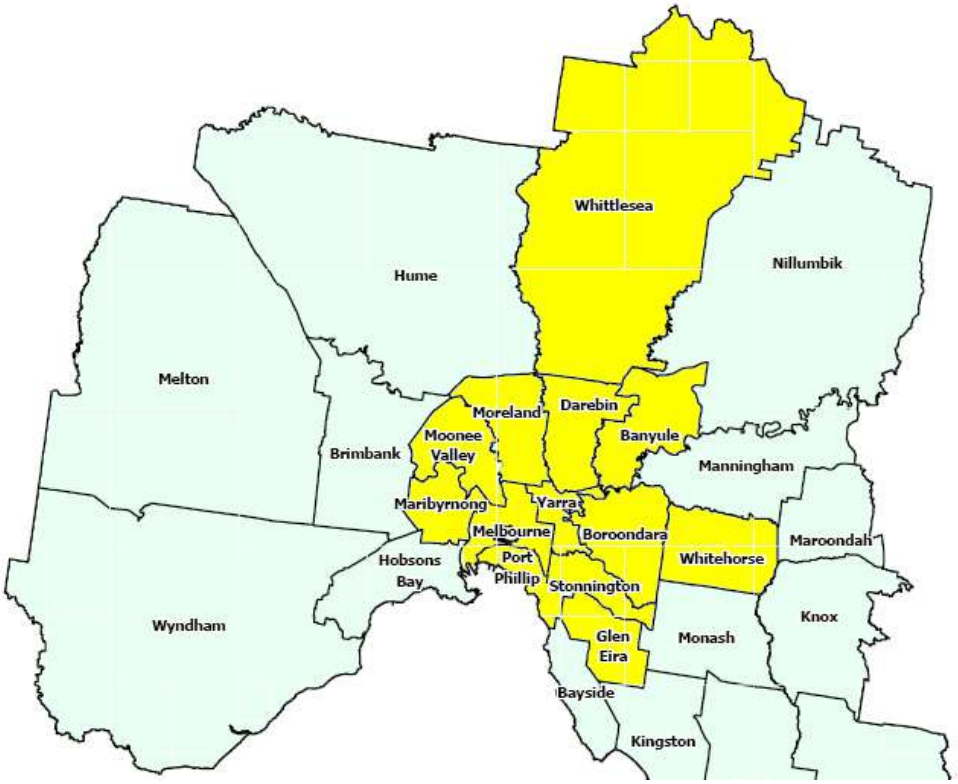


**Figure 8: ATSP Council Boundaries**

The partners typically notify the councils when a project plan is finalized by them, rather than at the beginning of a project. This action is done so that the partners can have full initial control in the project. When the proposed project is finalized, the partners submit it to the councils for approval. Along with the project submittal, planning applications and property inquiries must be completed by the partners. Each council's regulations must be familiar to the partners because the final decision for implementation is made by the councils. If a decision is rejected, the partners may go through an appeal process to the state government.

The Municipal Association of Victoria (MAV) represents and advocates for Victoria's 79 councils. There are several identified key contacts that are important in the process of keeping in contact with the councils. One is a position within the MAV called the "Disability Access and Inclusion Advisor" who is funded by the Victorian Government Department of Human Services (DHS). The position is part of the MAV's work to support local government's advocacy and delivery of improved transportation. This position was created in order to work with the councils to help plan, develop, and follow policies that create more accessible and inclusive communities. The policies follow a DHS State Disability Plan. The MAV also has a Transport and

Infrastructure Advisory Group. This is one of the MAV's major committees and provides advice to the MAV on infrastructure and transport strategy issues. This group is important as it identifies how these issues impact local government and assists in implementing policies and campaigns (MAV, 2008). The Metropolitan Transport Forum (MTF) is another means of involving local government. It contains members from the Melbourne metropolitan local government, representatives of transport companies, State Government officials, and other stakeholder groups. The purpose of the MTF is to promote effective, efficient, and equal transport through a forum environment where information can be publicized and debated and where research and policies can be collaboratively developed. The MTF meets in Melbourne every month (MTF, 2008).

## *2.6 Summary*

There is an established need for greater extent of accessibility in Melbourne's transportation system including the tram network. A significant amount of money has been allocated for the construction of new accessible tram stops, with recent projects making progress towards that effort with 80 stops completed since March 2007. More stops will be made accessible and the major problem is to determine where they should be placed. The current approach for the initiatives set forth by the Victorian Government is based on the cooperation of four organizations. The government's Department of Infrastructure, VicRoads, and Yarra Trams together with the local government councils each have their own role in the process and communication between them is vital for effective and efficient project development.

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# Chapter 3: Methodology

The goal of this project was to help the Department of Infrastructure determine which stops to upgrade for the Accessible Tram Stop Program. We presented the DOI with data and suggested methods and criteria that prioritized the tram stops to be upgraded. The project also studied communication and management between the project partners and the local government councils so that improvements could be made.

From March 11, 2008 until April 29, 2008, the project team worked with the Public Transport Division of the DOI in Melbourne, Australia. The project fulfilled its goals through the following objectives:

- Examine current deployment of accessible tram stops;
- Obtain stakeholder input;
- Define criteria and develop a rating system for selecting sites;
- Prioritize which tram stops should be updated.

Figure 9 relates the overall methodology for the project in flowchart form. The following section discusses the steps taken in the project. The team first studied the current deployment of accessible tram stops. Interviews were done with major stakeholders in order to learn their approach to disability access and factors important to them in selecting stops to upgrade. Criteria for prioritizing new accessible stop locations were defined by studying previous factors with the process guided by the stakeholder input. Finally, the criteria and input were used to develop a rating system that allowed the prioritization of a set of stops along specific sections of the tram network.

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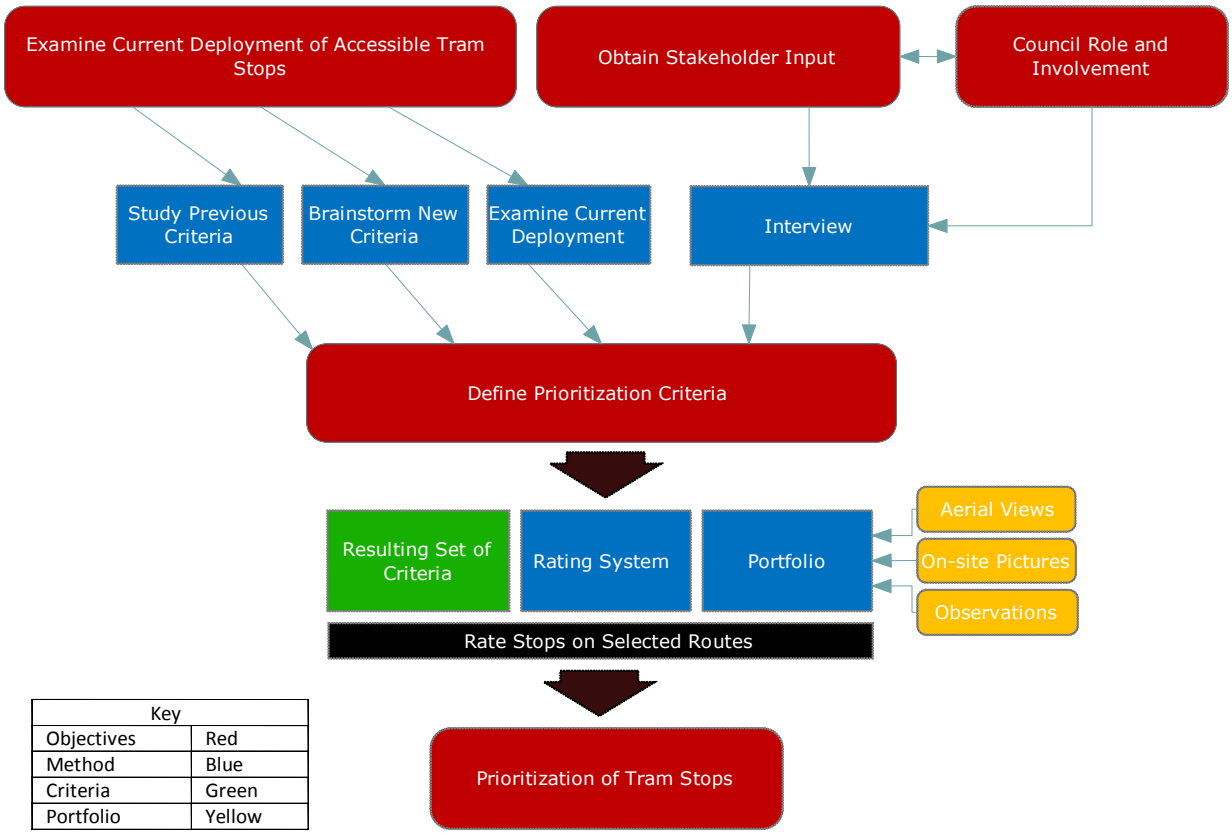


**Figure 9: Methodology Flowchart**

Another consideration for this project was the duration of each task. The project team completed the objectives previously outlined by the timeline shown in Appendix C. This was used to organize the team and keep the project on schedule throughout the seven weeks. When arriving in Melbourne, the team met with the project liaison, Jim North, to discuss the project, methodology and objectives, as well as learn about the DOI organization. Within the first three weeks, the project team traveled to different areas of the network to examine a wide variety of stops that were both accessible and inaccessible. While examining these areas, interviews were also being scheduled and completed to gain different stakeholders' views of the ATSP and suggestions for criteria when selecting sites to upgrade. During week 3, the team determined with the sponsor what areas of the tram network to focus the research. In the following two weeks, the stops in these areas were examined with respect to the revised criteria. Using the developed criteria and field data collection, a rating system was organized. While collecting this data, the rating system was applied and the information was continuously organized into the final deliverable until week 7. On April 28th, 2008, the final report was submitted, and the following

day, the final presentation was given. By following this timeline, the project team was able to achieve all objectives in a quick and efficient manner.

## *3.1 Examine Current Deployment of Accessible Tram Stops*

Currently, 150 of the approximate 1,790 tram stops in Melbourne, Australia have been updated to allow access for disabled passengers. Through government funding, 180 stops are being upgraded over the next three years. Although this is an improvement for alleviating discrimination against disabled passengers, there are still several more stops that need to be updated in order for the tram network to reach 100% compliance by the year 2032 (DOI – *Action Plan*, 2007).

To assist the DOI in assessing where additional tram stops should be located, the project team examined the current deployment of accessible and inaccessible tram stops across the tram network. This allowed for an understanding of the following:

- Why specific stops were chosen to upgrade;
- How current accessible tram stops were configured;
- What criteria was used to select the current stops;
- The process used to apply the criteria in selecting upgraded stops.

To gather this information the project team needed to:

- Study different areas of the network through site visits;
- Research the reasoning used to select the accessible stops as well as the reasoning for not upgrading other stops;
- Study and update existing maps to show where current accessible stops are located;
- Analyze the maps to identify gaps in accessibility.

To collect this information, the project team was guided by its sponsor, Jim North, through an assignment process. The assignments served both as educational and as problem solving sessions. Sequential assignments introduced the team to DOI and ATSP, gave the team the mindset required to approach the problem, and prepared the team for its activities in the field and in interviews. The results of these assignments can be found in Appendix G.

### 3.1.1 Field Case Studies

The team visited current accessible and non-accessible tram routes early in the process to gain insight for selecting stops in the future. The objective of the field visits early in the project process was to understand the engineering decisions behind the construction of the stops as well

as what was required to make certain stops accessible. The tram car configurations were observed as well as the characteristics of each stop. In particular, Routes 70, 86, and 64 were observed for stop placement, traffic conditions surrounding the stop, accessible features, safety features, and the terrain including slope of the land, vegetation, type of building, width of the road, and width of the road median. Data was taken through notes and photographs and then copied into a PowerPoint document for organization (shown in Appendix G). Photographs of key areas were taken and labels were added to detect areas/objects of note (Figure 10).


**Figure 10: Example of Area Labeling**

The routes were chosen to demonstrate how the tram system adapts to being able to service different environments and areas. The results of the field visits made the team aware of the issues involving in the ATSP and gave the team insight in selecting criteria to apply to prioritizing possible future locations.

### 3.1.2 Map Creation

The project team used aerial maps data when examining tram stops. Google Maps and MapInfo Professional 8.5 were used to obtain aerial views of stops and their surrounding environment. MapInfo is a geographic information system (GIS) software that allows analysis of terrain through the overlaying of layers including aerial data, roadway maps, and boundaries. Custom layers can also be created that use drawing tools. The GIS software fits all layers together on the same base map so that layers such as roads, tram lines, and identified locations are geographically and spatially accurate in relation to each other. Important features used included zooming, layer creation and labeling, and distance measurements. The maps were

created in order to access the layout of the environment surrounding the stop as well as to understand the stop locations in relation to their larger context. The maps revealed the cityscape, including features such as residential areas, parks, hospitals, intersections, and other road and tram track features. We obtained and used files from DOI databases and personal communications which contained the following:

- Aerial maps;
- Locations of disabled organizations;
- Areas where surveyed wheelchair users lived;
- The public transportation network;
- Local council boundaries.

Using MapInfo, different files (tables) can be layered together to obtain a visual with the data needed. Custom layers were also created that displayed:

- Accessible stop locations;
- Target routes;
- Council activity centers;
- Disability demographic data.

The maps were useful to the team in tracking stops through different council areas, identifying the function of the examined routes within the entire network, relating stops to nearby disability organizations or wheelchair users, and as a communication tool in discussions with stakeholders.

## *3.2 Obtaining Stakeholder Input*

Stakeholder input involved considering the opinions and needs of all associated groups, including the three project partners (DOI, Yarra Trams, and VicRoads), local government councils, legal and DDA specialists, and disability advocate groups. A representative of each of these stakeholder organizations was contacted to request a personal interview.

The project partners were approached differently from the other stakeholders, as the partners have the authority and responsibility for defining criteria, would like feedback on management, and need to solve logistical problems.

The following sections briefly discuss the stakeholders contacted and the information that was needed from each of them. Table 3 shows a list of stakeholders and the contacted representative with their title and contact information. The specific interview questions for these interviews can be found in Appendix I.

**Table 3: Stakeholder Interviewee Contacts**

| Stakeholder | Representative | Title | Contact Information |
|---|---|---|---|
| Department of Infrastructure | Emilio Savle | PTAC | emilio.savle@doi.vic.gov.au |
| | Nick Colwell | Legal | nicholas.colwell@doi.vic.gov.au |
| | Hector McKenzie | Deputy Director, PTD | |
| VicRoads | Mario Maldoni | Northwest Regional Manager | mario.maldoni@roads.vic.gov.au Tel: 9313 1209 |
| Yarra Trams | Massoud Majidi | Project Manager | Massoud.Majidi@yarratrams.com.au |
| Councils | Rob Moore | MCC - Manager of Urban Design | robmoo@melbourne.vic.gov.au |
| | Katie Dickson | Darebin Council | katie.dickson@darebin.vic.gov.au |
| | Shawn Neilsen | Moreland Council | sneilsen@moreland.vic.gov.au |
| | Website Resource | Online Directory | http://www.dvc.vic.gov.au/web20/dvclgv.nsf/headingpagesdisplay/find+your+local+council |

### 3.2.1 Department of Infrastructure Contacts

Within the DOI, the project manager for DOI's accessible bus stop program, Nicholas Colwell was interviewed due to his expertise with DDA law. Important information from the legal and DDA standards viewpoint were:

- Legal issues/concerns the DOI needs to be aware of;
- DDA standard compliance and enforcement;
- Where legal counseling and advice goes into the design and delivery process;
- Definition and use of "unjustifiable hardship;"
- Exemptions from DDA.

Hector McKenzie is the Deputy Director of Public Transport. He was interviewed on questions on the overall process of franchise within the ATSP. Mr. McKenzie was also interviewed for insight on the following:

- HREOC information;
- Information on the franchise change and how it will affect the program;
- How funding is arranged;
- Views on alternative accessible stops.

### 3.2.3 VicRoads Contact

Mario Maldoni, the Northwest Regional Manager of VicRoads, was interviewed for the VicRoads perspective of DDA standards, compliance, reduction of road width and traffic flow, and the working relationships with the councils and the DOI.

VicRoads provided valuable information on the effect that trams and accessible stops have on road space. VicRoads' major focus is the protection of the road for motor traffic and work to uphold traffic standards and regulations. Discussion focused on:

- General effect of trams on motor traffic;
- Interaction with the DOI and councils;
- Possibility of speed reduction;
- Ability and feasibility of reducing road lanes to create space for accessible tram stops;
- Opinion on alternative accessible tram stops.

### 3.2.4 Councils

Involvement of the local government councils is critical to large infrastructure projects including the ATSP. The ability to work with the councils is important; therefore, it is considered a factor that the project team took into account when deciding where to construct accessible stops. Constructive communication with them greatly enhances the effectiveness of the ATSP and relationships between them and the ATSP partners. To gain understanding about the local governments and their relationship with the DOI, representatives from the councils that contained the target routes were interviewed. The four councils were the Melbourne City Council (MCC), Darebin, Moreland, and Yarra. The interviews allowed the project team to obtain different views on the overall program from varying local governments, as well as to gain insight on specific local problems within each council.

The local government councils were approached for their desired input and for their individual regulations. There was also discussion on communication and the most effective way to ensure desired cooperation with the project partners. Previous problems in communication were identified. Issues discussed with each council included:

- Council view and approach to accessibility;
- Identified priority areas;
- Features of accessible stops that would be most beneficial to the council;
- Where council input is involved in the design and delivery process;
- Negotiation times with ATSP partners;
- Views on displacement of parking and reduction of traffic flow in their areas;
- Opinion of alternative stops as future options;
- Specific questions on major tram routes through the council.

### 3.2.5 Disability Advocate Groups

The Public Transport Access Committee (PTAC) works through the PTD to advise the Minister for Public Transport and the DOI on issues relating directly to public transport access for people with disabilities. It also provides advice on the aspects of the built environment. The committee is also a forum setting in which people with disabilities can meet with the Minister and Director of Public Transport to learn about progress in access issues and about new initiatives. Its role includes using its members and organizational networks to spread information back to the disability community, as well as monitoring compliance with the Disability Discrimination Act and the Disability Standards for Accessible Public Transport. The committee meets quarterly (DOI – Public Transport Access Committee, 2008).

Disability advocate groups were interested in issues such as how their concerns will be heard, how expansive the program is, and ensure DDA compliance. Their input was important for making sure the needs of disabled people were truly met. These organizations were contacted and personal correspondence through phone conversations or interviews were requested. Helpful information obtained by the Public Transport Access Committee (PTAC) included input for prioritizing where new accessible stops should go, criteria that matter most in deciding new locations, and options for improvement in communication.

The coordinator of the PTAC, Emilio Savle, was interviewed for his view of transport accessibility in Melbourne, DDA standards, and input from the perspective of the disability action groups. The questions for PTAC centered on issues including:

- What the groups do to advocate accessibility to the DOI;
- Why they are important stakeholders in the process;
- How the ATSP benefits from their involvement;
- How the groups influence the process of choosing and designing accessible stops;
- What input can PTAC give for site selection criteria.

## *3.3 Development of Criteria and Rating System*

Many factors need to be explored when considering the new locations of accessible tram stops. The project team identified and evaluated previous and additional criteria on which to base recommendations to the DOI for prioritizing the location of future accessible stops. The project team defined criteria by which to study and prioritize stops through:

- Previous rating methods;
- Field visits;
- Interviews with stakeholders;
- Brainstorming.

It is important for the DOI to act quickly and to deliver tram stops where they are most needed. Therefore, the success of the project was partially based on creating criteria that lead to effective and quick results. In this effort, it was important to keep in mind that collaboration is necessary between the project partners DOI, VicRoads, Yarra Trams, and the councils.

### 3.3.1 Criteria

Appropriate criteria were developed for comparing stop options. There are many factors in determining feasibility and degree of necessity for accessible stop locations. General types of factors are identified in Figure 11.


**Figure 11: Types of Prioritization Factors**

These factors are a combination of those that the DOI utilized in the past and those that the project team additionally took into consideration during the field observations. The DOI looked at criteria such as safety, time constraints, usage, and construction complexity. Because cost does not change stop priority for the DOI, this project did not consider cost in the developed criteria. The project team chose to also consider coverage (distance between stops), usage and important destinations. Important destinations included places that are popular for the community and locations important for the specific disabled community. More specific and observable definitions were defined through the methods described above for this broad spectrum of criteria, and an observation spreadsheet was created to use for the stops observed in stop site visits (Appendix H). Stops were surveyed and data was gathered in an organized manner using this method.

### 3.3.2 Rating System

A rating system was created to provide a numerical method of comparing stops between each other that took major observations and criteria into account. The rating system was created by collecting data from the observation spreadsheets and stop photographs, organizing the data into similar categories that affected the feasibility and need of upgrading a stop in similar ways, and applying values to the factors in each category. The general categories were divided into roadway, environment, and stakeholder need factors. The rating system was based on a scale from 1 to 5, with 1 representing a stop that was more feasible to accomplish.

The DOI does not currently have a rating system by which to assess future stops. So far, most stops upgraded have been stops that were least difficult to construct; however, the DOI will need to begin to focus on more difficult areas. The rating system created by the project team aims to assess stops on basis of difficulty of construction as well as the environment factors that affect its success and the need for accessibility in specific areas.

## *3.4 Prioritization of Tram Stops*

The project team used a funnel approach as shown in Figure 12 to narrow the scope of tram stops to prioritize. The following steps were used to create a list of target stops:

1. Determine target routes;
2. Field visits to target routes and collect data;
3. Create a rating system from defined criteria;
4. Apply the rating system to each stop in the target routes;

5. Analyze stop patterns to determine strategy to approach the upgrading of stops.

Three target routes were determined through discussion with the DOI that included which major routes provided important access ways to the city, the need for different strategies depending on the individual route's environment, and how immediately access on the route was needed. The three routes were chosen with a total of 54 stops to rate for prioritization including inbound and outbound locations.


**Figure 12: Funnel Chart for Prioritization**

There was a broad outlook on different tram network areas that included both accessible and non-accessible stops during the first and second week of the project. Using this background information along with information gained from a variety of stakeholders (as described in Section 3.3), the team obtained a better understanding of the criteria used to select areas for the deployment of accessible stops.

The inaccessible stops along the three route areas were analyzed with the created observation spreadsheet. The stop selection criteria included, but were not limited to, safety, complexity of construction, usage, coverage, time constraints and destinations as previously shown in Figure 11. Factors within each of these criteria were examined on each stop.

Once the target routes were chosen and data was collected, the rating system was applied, which gave each stop on the target routes a numerical rating for the three categories created in terms of roadway, environmental, and need for accessibility in the area. The ratings were then analyzed to identify groups of stops that could feasibly be approached together and which areas are more difficult. A strategy for upgrading the target routes was proposed in terms of groups of

stops to construct platform stops and important areas that are important to make accessible for those with disabilities.

The deliverable to the DOI was then comprised as a summary of the final project report. The portfolio included:

- Rating methodology;
- Stop photographs;
- Descriptions of the surrounding area;
- Observation spreadsheet for each stop;
- Project team's recommendations.

The project team's goal in creating this portfolio was to present the DOI with concise facts and ideas while being able to illustrate accessible stops in an organized fashion. The portfolio also assisted the project team, being an organized collection of stops along the prioritized route areas that we could continuously analyze. Through this organization the team recommended stops as a high priority upgrade or as a low priority upgrade to be considered within the larger goal of the ATSP. The portfolio was presented as a deliverable along with the project report to the PTD of the DOI. Results tables for the portfolio can be found in Appendix A.

## *3.5 Summary*

The main goal of this project was to help improve disability access to the tram system in Melbourne. It is important for the city to have a well-run tram system, and upgrading it to be accessible will allow everyone to use the city. By following the above methodology, we were able meet our project goals. We studied and identified areas to upgrade, interviewed key stakeholders in the ATSP, developed an effective rating system, and prioritized a number of stops along three target routes that should be upgraded in the near future through the program.

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# Chapter 4: Examine Current Deployment of Accessible Tram Stops

Examining the current state of accessibility across the tram network allowed the project team to learn about what has been accomplished so far, what challenges were faced in the ATSP, and what options were available. It also enabled the project team to access target routes in terms of their role in the system as a whole and where the ATSP needs to focus their attention in the future. This chapter discusses the results derived from this research activity which includes study of previous rating methods, field visits to accessible and inaccessible routes, study of accessible options that are not platform stops, and map creation to visually assess accessibility gaps and important areas. This section also describes how the target routes were chosen from the criteria found and gaps found in accessibility.

## *4.1 Previous Rating Method (T1-T5)*

The method previously used to prioritize stops was to rate them according to how difficult they were to construct. The individual tram stops were categorized according to a T1-T5 system, detailed in Table 4. This rating was applied to 416 stops with the goal of selecting 180 to complete by 2009/2010.

**Table 4: T1-T5 Rating System**

| Rating | Description | Number of stops |
|---|---|---|
| T1 | Adequate road space available, no changes to traffic lanes or services | 105 |
| T2 | Minor constraints (e.g. moving poles, fences, etc) but no road space needed | 75 |
| T3 | Some road space needed (unlikely to affect traffic capacity) | 45 |
| T4 | Likely to require traffic lane space | 115 |
| T5 | CBD locations where traffic lanes would be affected | 76 |

The T1-T5 approach was useful for the early stops and for obtaining funds for the project. However, this approach is not ideal for several reasons. In practice, a large number of stops that were considered to be T1 and T2 without needing road space actually needed to move into the road (T3). The T1-T5 rating was also exclusively done through aerial photography without taking a measurement on the stop site. Differentiating between T1, T2, and T3 stops was

difficult due to the lack of definition of adequate road space, effect of moving utilities in the area, and feasibility of reducing or eliminating traffic lanes. Therefore, there is a need to assess each stop in more detail. Detailed data cited as being useful to rating should be collected in the field and would specify the condition of stops in terms of physical condition, location, surrounding features, platform length, platform width, fencing, pathways, and adjacent trees. The major factor obtained from this rating method is the identification of road space as a key driving factor in the feasibility of building platform stops.

## *4.2 Preliminary Field Visits*

The project team completed a series of preliminary case studies to review the current state of the tram network and to present educated recommendations for future accessible upgrades. Route 70 travels to the east of the city and involves high traffic within a narrow road. Route 86 travels north of the city and includes several platform stops that were built in difficult locations—narrow roads, hills, numerous crosswalks, etc. Route 64 runs through an upper middle class neighborhood economy with several historical landmarks located nearby the tram tracks. By looking at these routes, the project team was able to research a wide variety of locations and understand the rationale behind the suitability of stop locations for disability access.

### 4.2.1 Route 70

Route 70 (Burwood Highway) was studied because of its lack of accessible tram stops. The area is difficult for constructing accessible stops because of the terrain and environment. The terrain is somewhat hilly and the area is densely populated with shops, parks, offices, and housing. The roadway is also crowded with two lanes of traffic traveling in each direction; however, the tram tracks share the road on the inner lanes and there is parking either next to or on the outer lanes. The vast majority of the stops were not considered suitable for disability access because they were sidewalk stops as shown in Figure 13. When the trams stop in the road, a stop sign is shown on the trams side so that the traffic behind them stops. This allows pedestrians to cross the street and enter the tram. Accessible stops are therefore difficult to construct because there is not enough space within the road, and the trams are separated from the sidewalk by a lane of traffic.

**Figure 13: Sidewalk Stop with Bench**

There were a small number of accessible stops on the route, including numbers 1-4, 7B, 7C, 7D, and 18. Stops 1-4 (see Figure 14) were located in a wide street, and stops 7B, 7C, and 7D were easier to upgrade because they were located in a flat area where there were no buildings and no shared road space. These stops were located at the beginning of the route before the tram entered the central business district of the city. Stop 18 was located in a residential area and was possible to upgrade because the road was wider with two lanes of traffic next to the tram tracks, and the surrounding area contained parking where there were no shops or housing.

**Figure 14: Stop 3 - Accessible Platform Stop in Median with Shelter and Seating**

There is still a need to introduce accessible stops along this route because of the surrounding important locations, such as an elderly serviced apartment complex, doctors' offices, and shopping areas throughout Burwood Highway

See Appendix G for the complete field trip report.

### 4.2.2 Route 86

Route 86 (Plenty Road) was studied because it provides a good model that can be applied to other routes in the ATSP. This field visit focused on difficult road situations, landscaping that was needed, how the DOI catered to the needs of the councils in order to deliver effective and needed stops, and the collaborative effort involving the DOI, VicRoads, and local councils. Two stops that were observed in detail were Stops 65 and 66. Both involved narrow traffic lanes on each side, high speed traffic, tram tracks running in the middle of the road, and complex crosswalks to reach the platform stops.

Stop 65 was important because it was in an area difficult to build in, but was constructed by the DOI in response to pressure from the local council because of nearby commercial development. It was a difficult stop to upgrade because a section of the road was curved and the road space was limited. The width of the three lanes on each side of the stop was narrowed to add more space to the median. The platform stop was therefore made to have the minimum amount of accessible width and then became narrower down the length of the stop (Figure 16). This allowed the stop to maintain the necessary length to accommodate the tram doors, as well as allow disabled access to the front of the tram. As a result of the high-velocity traffic on the road, proper crash protection was needed along the sides and at the ends of the stop (Figure 15). Compressive barriers were located at the ends of the stop and steel guardrails were placed along the sides of the stop. Tactile ground surface indicators (TGSI) were located along the edge of the platform and on the islands of the crosswalk.

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**Figure 15: Stop 65 - Compressive Barrier**


**Figure 16: Stop 65 - Narrowing Stop Width**

Stop 66 was also a difficult stop to upgrade because it was located on a hill and thus required the tram to stop on a slope, which then affected the accessible ramp (Figure 17). Due to road space limitations, the platform was very narrow and is the least wide in the network, which barely complies with the DDA standards. The stop was difficult to access due to the pedestrians having to cross multiple lanes of high-speed traffic. Consequently a complex, accessible crosswalk system was setup using traffic signals at several islands to connect the media to the roadside (Figure 18). The stop also used TGSIs.

**Figure 17: Stop 66 - Hill Terrain**

**Figure 18: Stop 66 - Complex Crosswalk System**

The case studies of Stops 65 and 66 revealed the collaborative effort between the project partners. The DOI provided funding and design for the stops. Permission was needed from VicRoads due to the fast-moving traffic and narrow lanes and required safety precautions, and the councils showed support for these stops.

See Appendix G for the complete field trip report.

### 4.2.3 Route 64

Route 64 (Dandenong Road) is located in an upper, middle class council. For this route, stops 47 and 48 were studied to observe how the engineering challenges, such as old buildings and a fast, moving highway, were overcome to upgrade the tram stop. Dandenong Road is a very large road and is a major highway that provides access to the city of Melbourne.

As a result of the stop being located around a large highway intersection, crash protection was built around the stop, which included steel guardrails on the sides (a VicRoads requirement),

a concrete barrier between the guardrails on the stop, and metal fences on the platform stop. TGSIs were used at the edge of the stop and on the accessible ramp. The ramp width was 2.4 m.

The importance of being able to work well with the councils was well demonstrated in studying Stop 48. The accessible stops were shared by the two councils Glen Eira and Stonnington, both located in upper middle class areas, by having one side of the tracks belonging to Glen Eira and the other side belonging to Stonnington. The councils, therefore, had many requests in regards to the look of the stop. The trees in the road median were not allowed to be touched, and old, decorative tram poles could not be moved or changed; therefore, they had to be worked around. A previously constructed path that crossed in front of the heritage building was narrow and sloped downward (Figure 19). This created a great hazard for wheelchair users since they would travel partly on the tram track and would have a higher risk of falling over sideways. As a result, a path behind the heritage building was constructed to allow access for those with disabilities. The councils also wanted proper landscaping incorporated to make the stop look as non-intrusive as possible.

**Figure 19: Stop 48 - Heritage Building and Intersection**

The next stop towards the city, Stop 47, is not accessible however (Figure 20). The problem with making Stop 47 accessible is that the stop is located in the median of a highway with no easy way of crossing the road to get to the stop. VicRoads would not allow the addition of a crosswalk to reach the stop because that would greatly slow down traffic on the highway.

**Figure 20: Stop 47**

Stops 47 and 48 show the possibilities and restrictions that apply to different conditions, even within close proximity. If the stop is needed, a solution can be devised; however, a location cannot be made less safe, even to make it more accessible, as in the case of Stop 47.

See Appendix G for the complete field trip report.

## *4.3 Options for Sidewalk Stops*

This project, under the ATSP, focuses on the prioritization of stops to make accessible by upgrading them to platform stops. Platform stops have been the typical accessible stop used by the DOI and are applicable to stops located in the road median. However, many tram routes travel on roads that are more narrow and do not have stops in the median, but rather on the sidewalk. In this situation, the tram stops and deploys a sign signaling traffic behind to stop to allow passengers to board. There have been two different pilot designs used by the DOI to make these types of routes accessible—Easy Access Stops and Kerb Access Tram Stops (KAT stop)

### 4.3.1 Easy Access Stops

Easy Access Stops are used in roads that have a lane of traffic adjacent to the tram tracks. At the stop, the entire road is raised to meet the level of the low floor tram (see Figure 21 below). When the tram stops, passengers walk from the sidewalk then across the raised road to board. Car traffic is directed over the raised section of the road and does not move into the road space shared with the tram tracks. Road markings include yellow lines directing traffic to the sides of the road, shallow road bumps running parallel to the tracks to keep cars off, and vertical markers

on the side of the stop to keep drivers away from the edge. Figure 25 shows the pilot Easy Access Stop with Stop 137 on Route 112, at the intersection of Harold Street and Danks Street.

**Figure 21: Easy Access Stop**

Advantages of the Easy Access Stop include having the traffic not interfering with the tram tracks, ease of construction, and not significantly affecting traffic flow or parking. The ramp length is about 30 meters which is the same as typical accessible stops. Disadvantages include some disruption with turning out of driveways in residential areas, reduction of traffic speed, and concerns with safety. So far this type of stop has only been used for one lane. No accidents with the stops have been reported.

### 4.3.2 Kerb Access Tram Stop

The Kerb Access Tram Stop (KAT stop) is used in roads that have two lanes in each direction, one of which is shared with the tram track. The concept of the KAT stop is to force the car traffic to share just one lane with the tram track. A raised platform jutting out from the sidewalk into the outside lane then meets the tram track at the level of the low floor tram. Figure 22 shows the KAT Stop 55 on Route 109 at the intersection of Hood Street and Whitestone Road. The right-hand image displays the KAT stop at the roadside and the left-hand image shows how two lanes are moved into one for the length of the KAT stop.

**Figure 22: Kerb Access Stop**

The advantage to the KAT stop is that it avoids changing the tram tracks, keeps the roadway level, and is directly connected to the sidewalk so that passengers do not have to cross any lanes of traffic. The KAT stop is more difficult to construct than the Easy Access Stop due to having to narrow the road, build into the road, alter the sidewalk and bike paths, and plan road management and markings. Because the KAT stop requires lane changes and markings that have to be placed both before and after the stop, it requires significantly more space than the standard stop. The length greatly affects parking displacement and residential driveways. The narrowing road also constricts traffic flow.

## *4.4 Construction Site Field Visit*

The project team was offered the opportunity to visit the construction sites of a line of stops that was upgraded on St Kilda Road (see Figure 23 for picture from the visit). The team was guided by Henri Ducasse and Alain Momedi of the DOI, and Michael Learmonth of the contractor Baulderstone Hornibrook. The team was able to observe the entire process of platform stop construction including:

- Stop demolition;
- Layout of foundation;
- Block placement;
- Layout of reinforced steel mesh;
- Concrete pouring;
- Electrical and communications wiring.

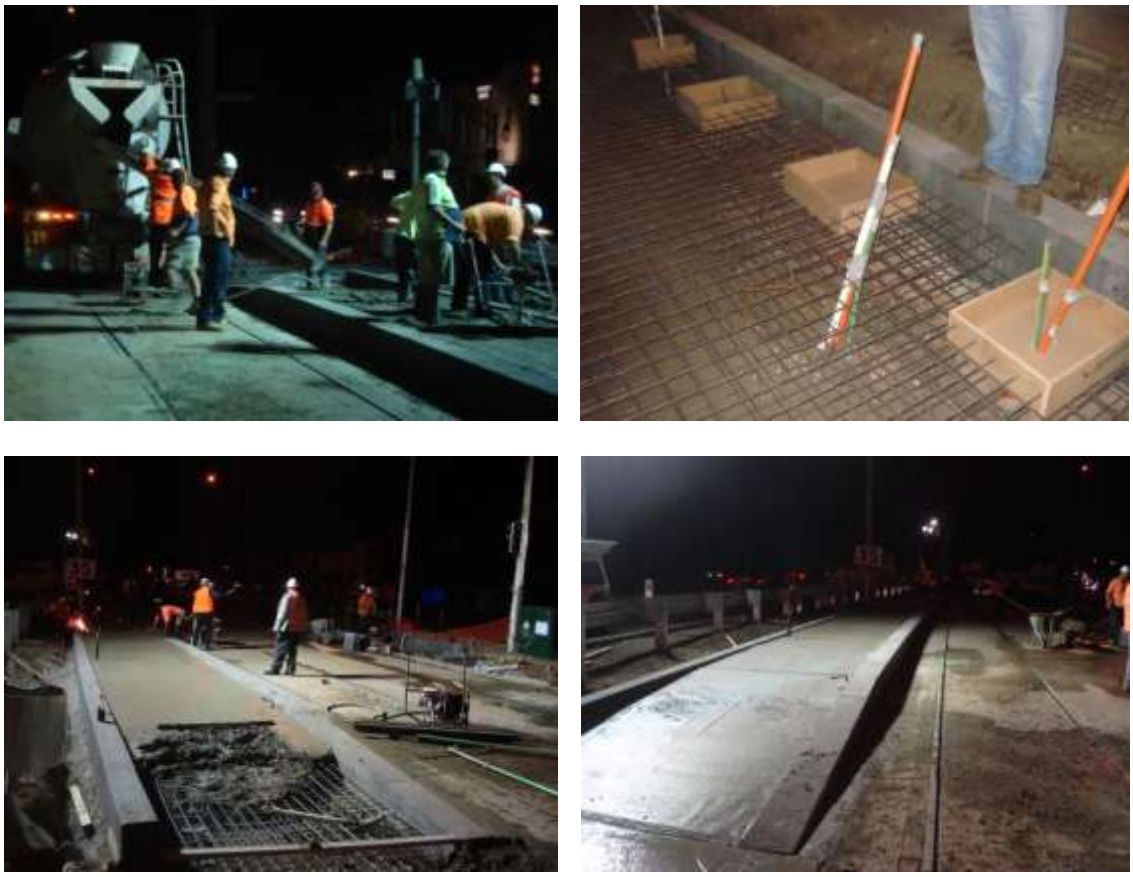

**Figure 23: Saint Kilda Road Construction**
**(From top left to bottom right: concrete pouring, partially poured stop with blocks and reinforcement steel mesh, completed pouring with ramp, foundation with boxes for platform installation)**

In general, construction occurs in a 58 hour block over weekends. Being able to observe platform stop construction was insightful to understanding how the stops fit into the roadway space, the impact stop building has in the neighborhood, and engineering challenges faced by the teams. It was also possible to observe the working relationship between the DOI project managers, site engineers from BH, Yarra Trams, and the construction teams.

## *4.5 Target Route Selection*

After completing initial field research on a variety of different areas within the tram network, the project team and sponsor chose three areas with twenty-seven stops to examine in further detail. The project team observed Route 96 along Nicholson Road, Route 112 along St. Georges Road, and Route 86 along Queens Parade and High Street. The routes are known well by the DOI; however, the individual stops were not previously examined for possible upgrades. In the field work on prioritized route areas, the project team examined twenty-seven stops.

Within the examined stops, there are two waiting areas—an outbound and inbound area. Some stops have both a median waiting area and a sidewalk waiting area. Sidewalk waiting areas were not analyzed for platform construction; therefore, there are fifty-two possible platform stop areas that the project team analyzed.

Route 96 runs north out of the city on Nicholson Road. It runs throughout the Yarra, Melbourne, and Moreland councils. Closer to the city, stops are located in the median; whereas, towards the route terminus all stops are located on the sidewalk. The team examined the route from Victoria Parade (Stop 11) until Brunswick Street (Stop 22). There is a mixture of old housing, restaurants, and shops along the route. There is heavy traffic typically using two lanes on each side of the track. Platform stops are feasible when there is enough space in the median. Most median stops along this route have the minimum width required to construct a narrow platform stop. Due to the length of the route, it was possible to examine the possibility of constructing up to twenty-three platforms within this area.

The area of the network along St. Georges Road belongs to Route 112. The route runs north when traveling outbound from the city center. The team examined stops from Clarke Street (Stop 26) until Miller Street (Stop 34). This section is within the boundaries of two councils—Darebin and Yarra—in a middle class economy. Restaurants, shops, heavy traffic, vegetation, and trees are all present on this road, which adds complexity to constructing platform stops. The tram route runs along a wide median with landscaping between the outbound and inbound tracks. Having a large median creates more space for constructing the platform stop. The road along St. Georges Road contains two lanes of traffic on either side of the median. Due to the length of the route, it was possible to examine the possibility of constructing up to eighteen platforms within this area.

Route 86 runs north from the city along Queens Parade and High Street. Similar to route 112, the area the team examined travels through the Yarra and Darebin councils. The team examined Smith Street (Stop 22) until Westgarth Street (Stop 27). This area of Route 86 contains a mixture of shops and restaurants with a few small apartment complexes and houses. Most of the area contains several traffic lanes with an extra traffic lane along the store fronts. This extra lane is divided from the main traffic road by a median of grass, and allows for more concealed parking. The route is used by the public the most in comparison with Route 96 and 112. The stops in this area are placed in a wide median width, while the stops before and after

Queens Parade and High Street are placed on the sidewalk. The median stops are typically large in width, making them ideal for platform stop construction. Due to the length of the route, it was possible to examine the possibility of constructing up to eleven platform stops within this area.

## *4.6 Map Creation and Analysis*

The creation of these maps allowed the project team to visually assess the function of the target routes within the entire network. The maps were used to identify specific stops, which stops lay in what council boundaries, where currently accessible tram stops were located, and to display disability demographic data in relation to the tram system, the target routes, and existing platform stops.

### 4.6.1 Map Layers

MapInfo aerial pictures of the greater Melbourne region were used as a base layer. Local government boundaries were then mapped. Lists of accessible stops were researched on Yarra Tram's website (http://www.yarratrams.com.au). A MapInfo layer that contained the location of each stop in the system was used to find which ones were accessible. A custom layer was then created that labeled those stops. The range of each target route that was to be studied was also plotted. In order to perform a basic needs assessment, the location of major disability organizations was plotted as well as a density map of where disabled users of the Multi-Purpose Taxi Program lived. A layer containing all roads and their names was also used. A feature used to identify stops, routes, and distances was that layers had multiple labels attached to them including stops by number route number, and location. Labels for the disability organizations included their name and distance to closest tram stop (these maps can be found in Figures 24, 25, 26, 27, 28, and 29). The source of each layer is shown in Appendix F, with specific directory pathways given for the DOI layers. The table sources of each layer are shown in Appendix J. Table 5 relates the information displayed in each map and how it was used.

**Table 5: Map Description and Function**

| Map Title | Description |
|---|---|
| Council boundaries, tram system, and currently accessible stops (Figure 24) | Displays Melbourne aerial data, local government boundaries, and location of all stops that are currently listed by Yarra Trams as accessible. |
| Target routes within tram system (Figure 25) | The three target routes chosen run in a north/south direction. Completing these areas would connect the accessible areas in the city with the accessible stops north on Plenty road. The three routes are major entrances to the city and so are important areas to make accessible. |
| MPTP user density (Figure 26) | The shaped green squares represent data from a survey done by the DOI for its Multi Purpose Taxi Program. The squares represent wheelchair user locations within 200m with the darker green representing more users. The scale ranges from 1-6 users. It can be seen from the map that disabled users of the program are especially located along the middle of St. George's Road and the upper section of Queen's Parade/High Street. |
| State of ATSP with disability organizations and MPTP density (Figure 27) | This map shows the density data as well as disability regions in the area |

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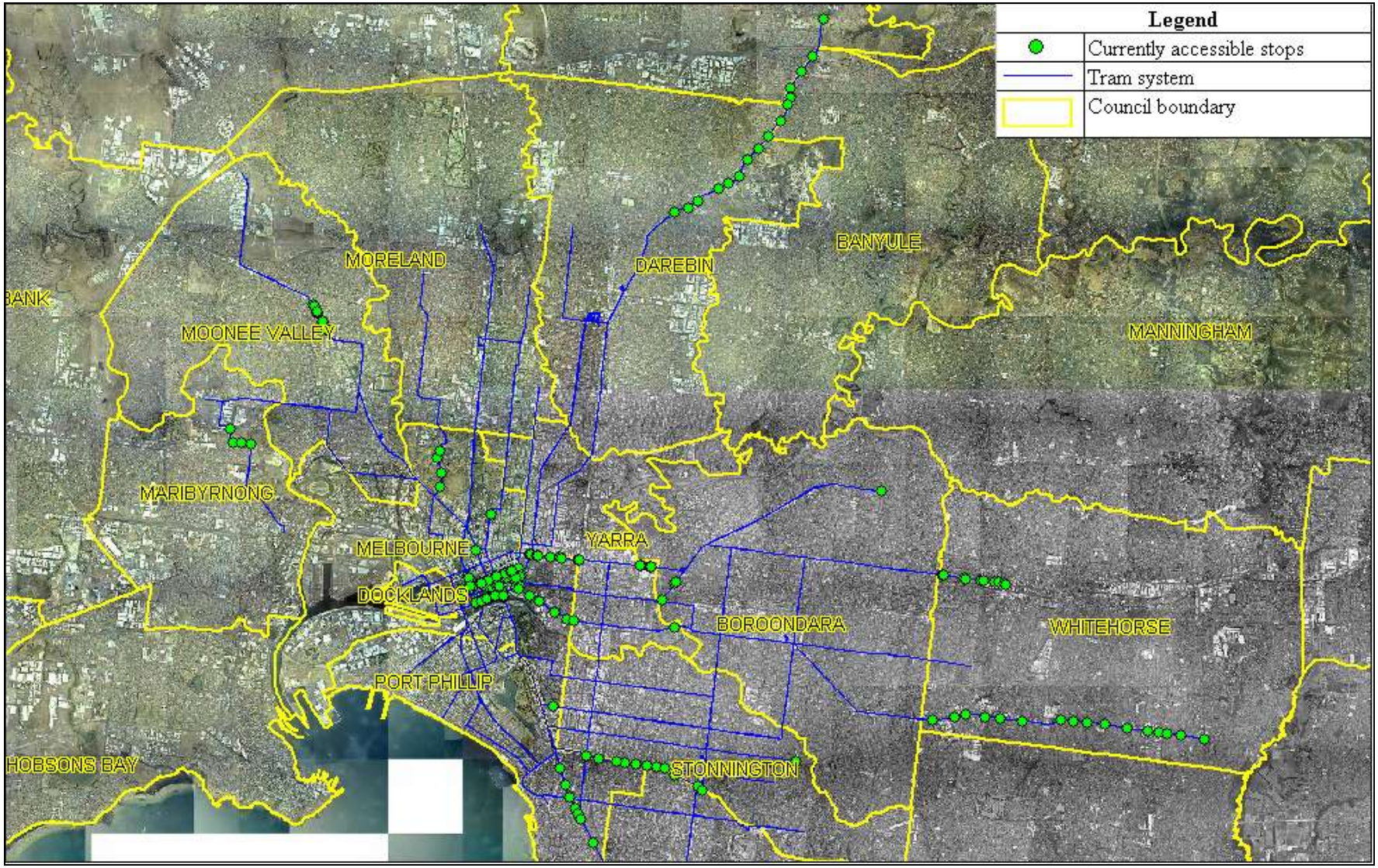


**Figure 24: Council boundaries, tram system, and currently accessible stops**

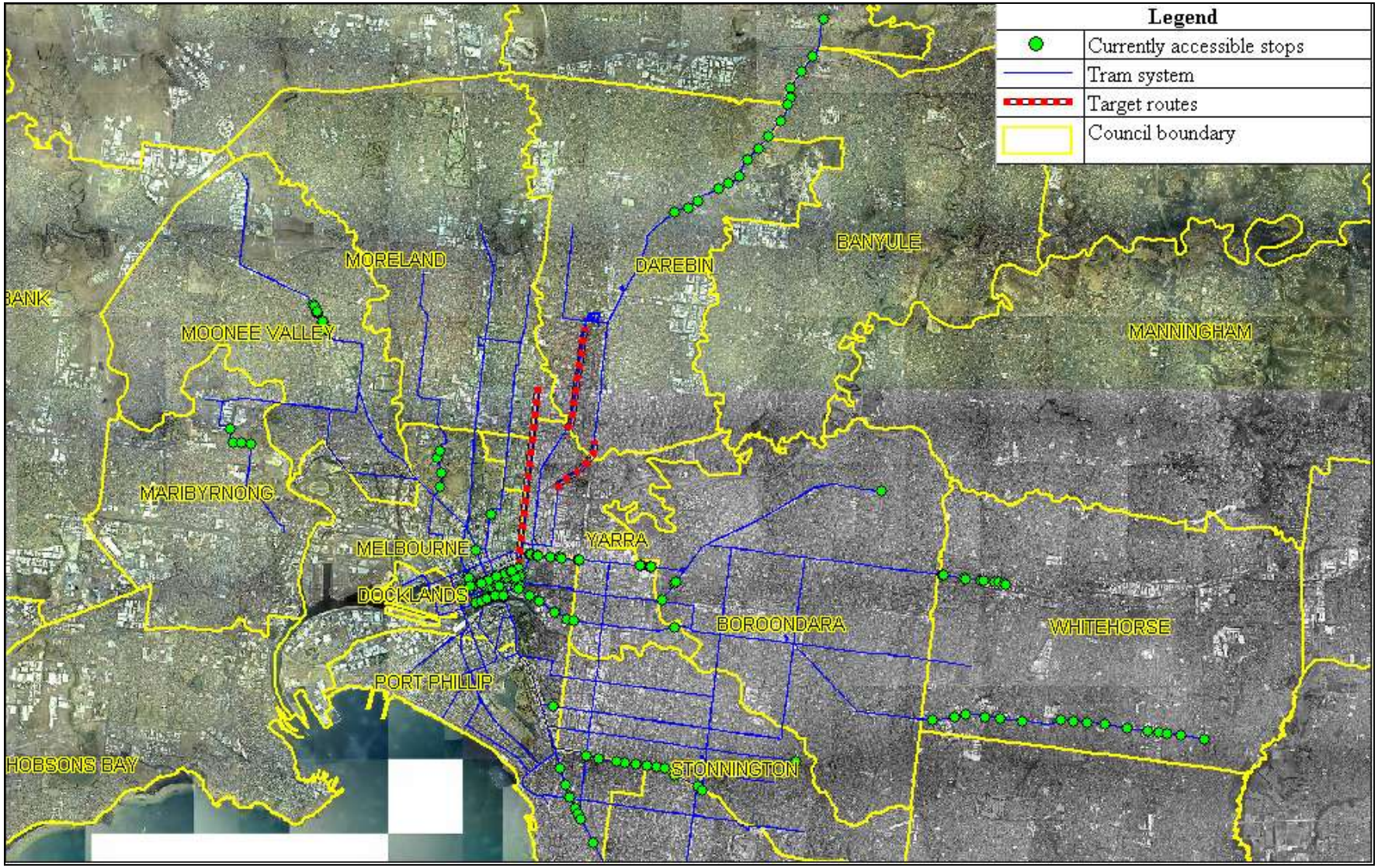


**Figure 25: Target routes within tram system**

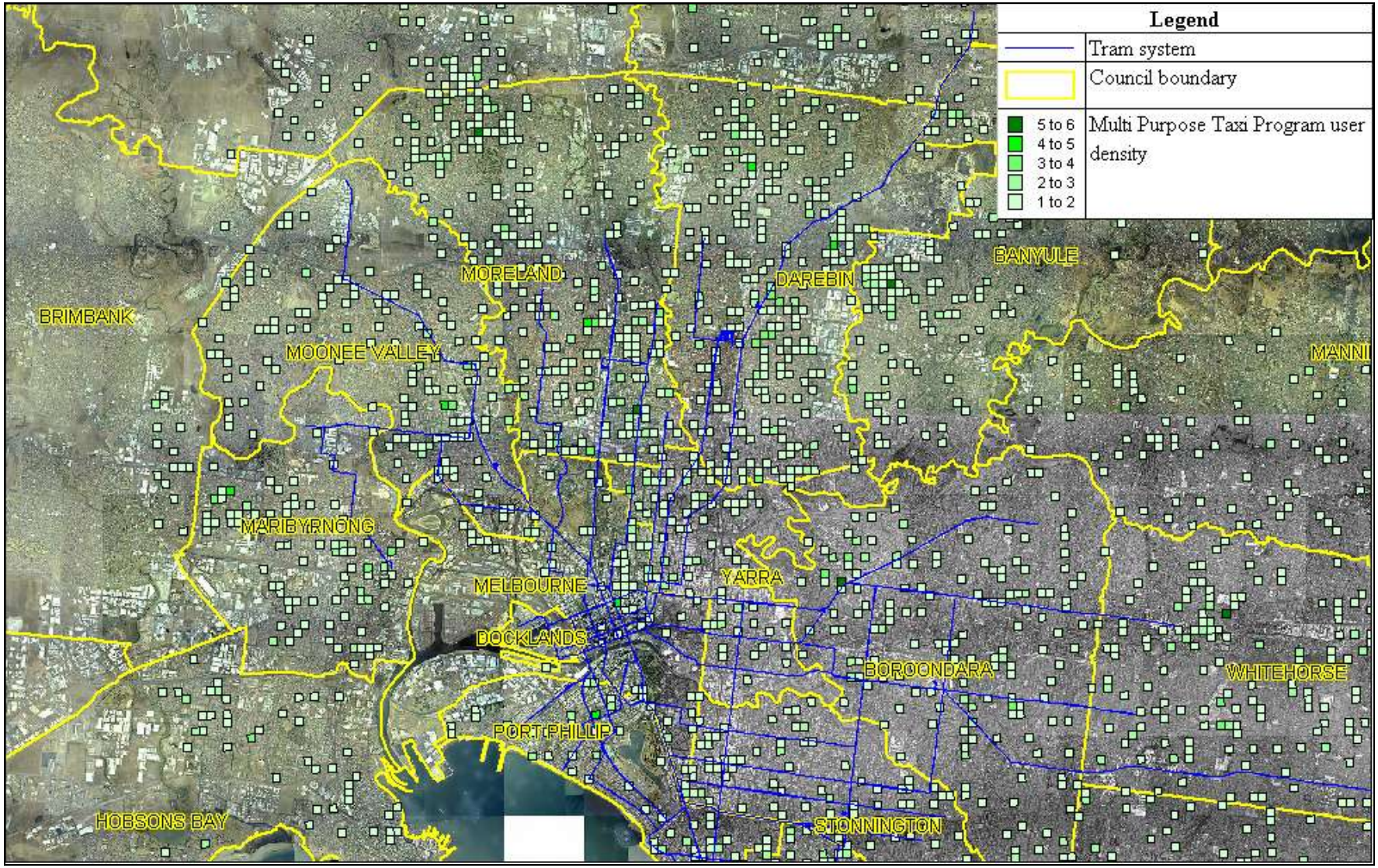


**Figure 26: MPTP user density**

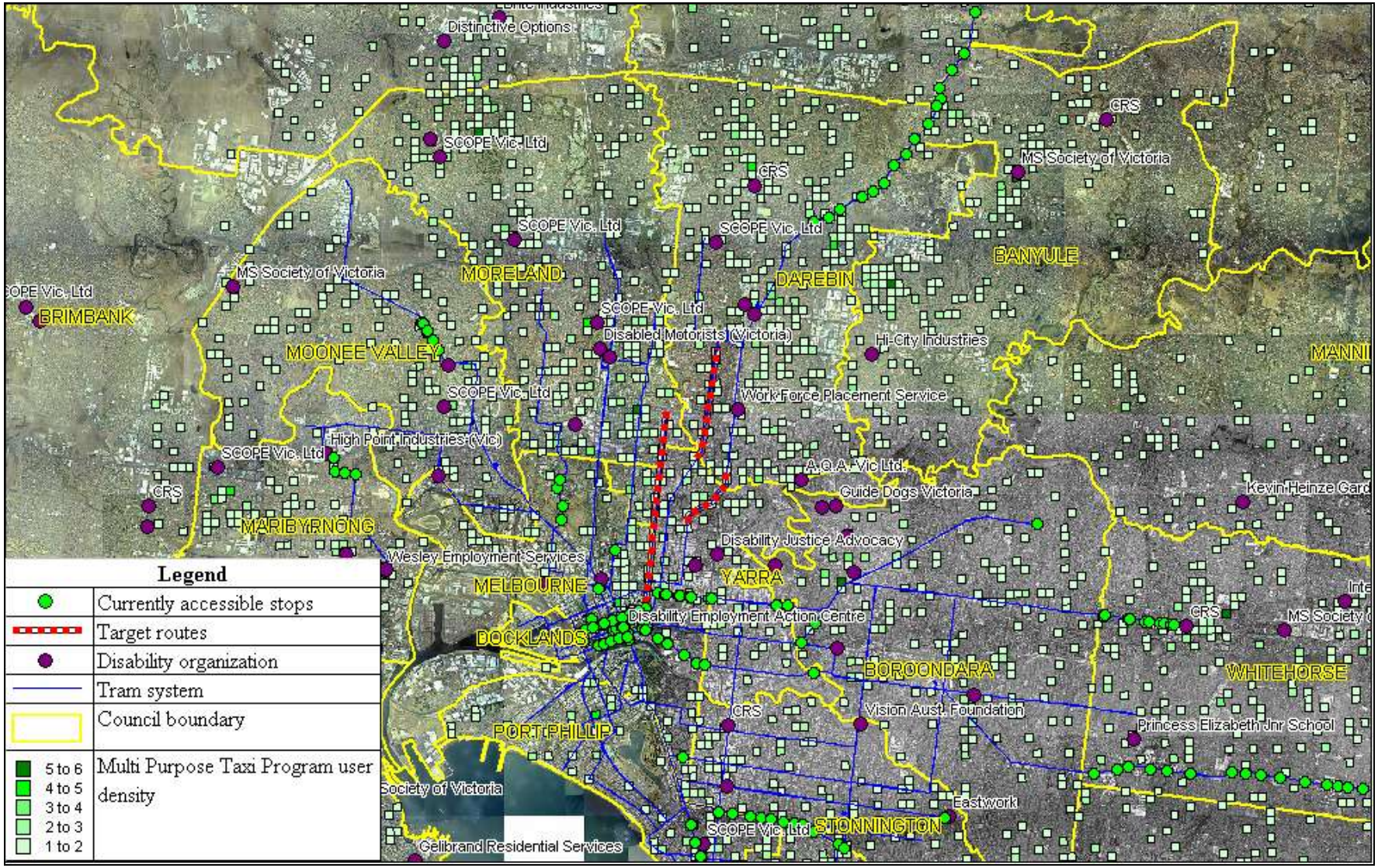


**Figure 27: State of ATSP with disability organizations and MPTP density**

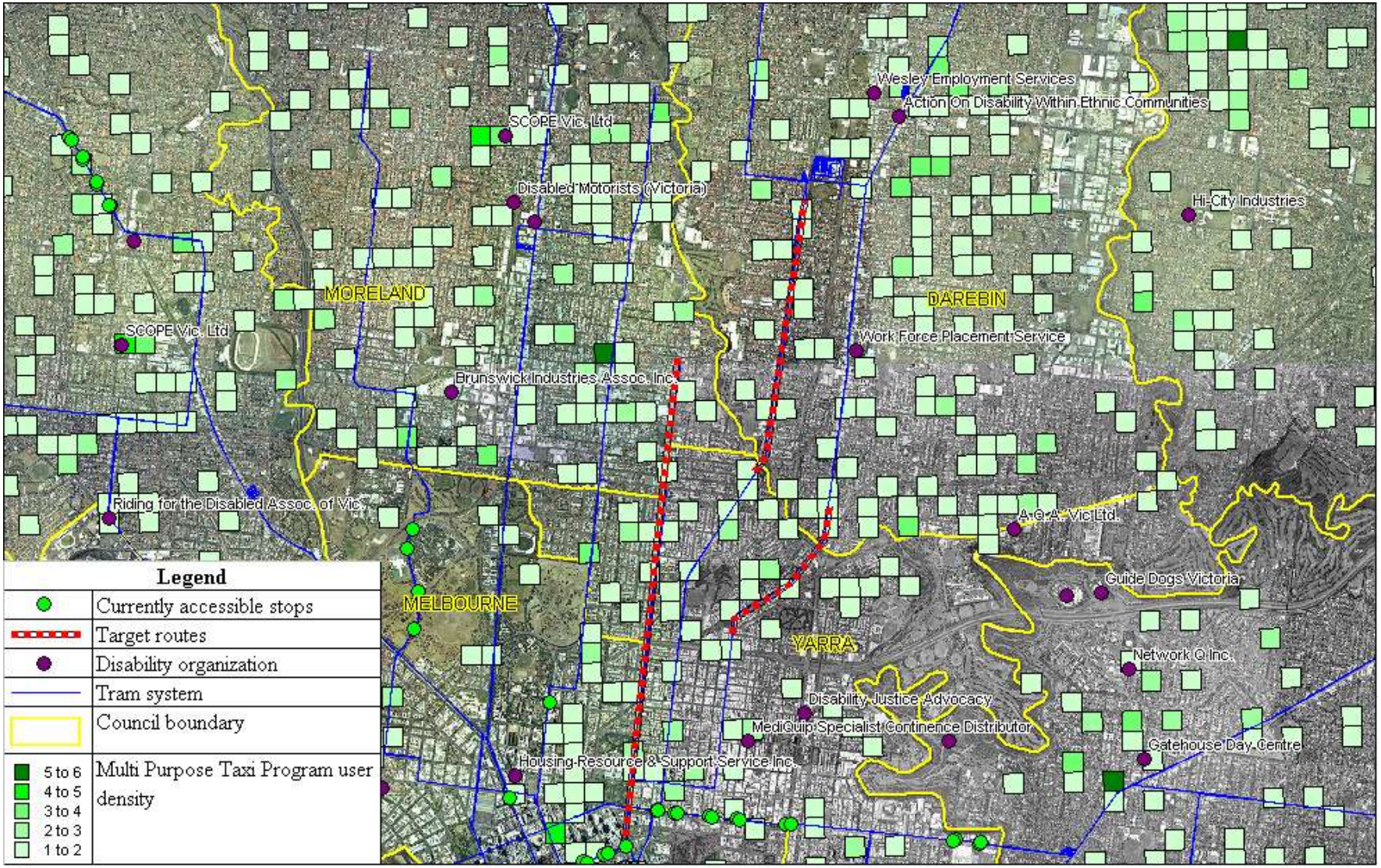


**Figure 28: Target route area with MPTP density and disability organizations**

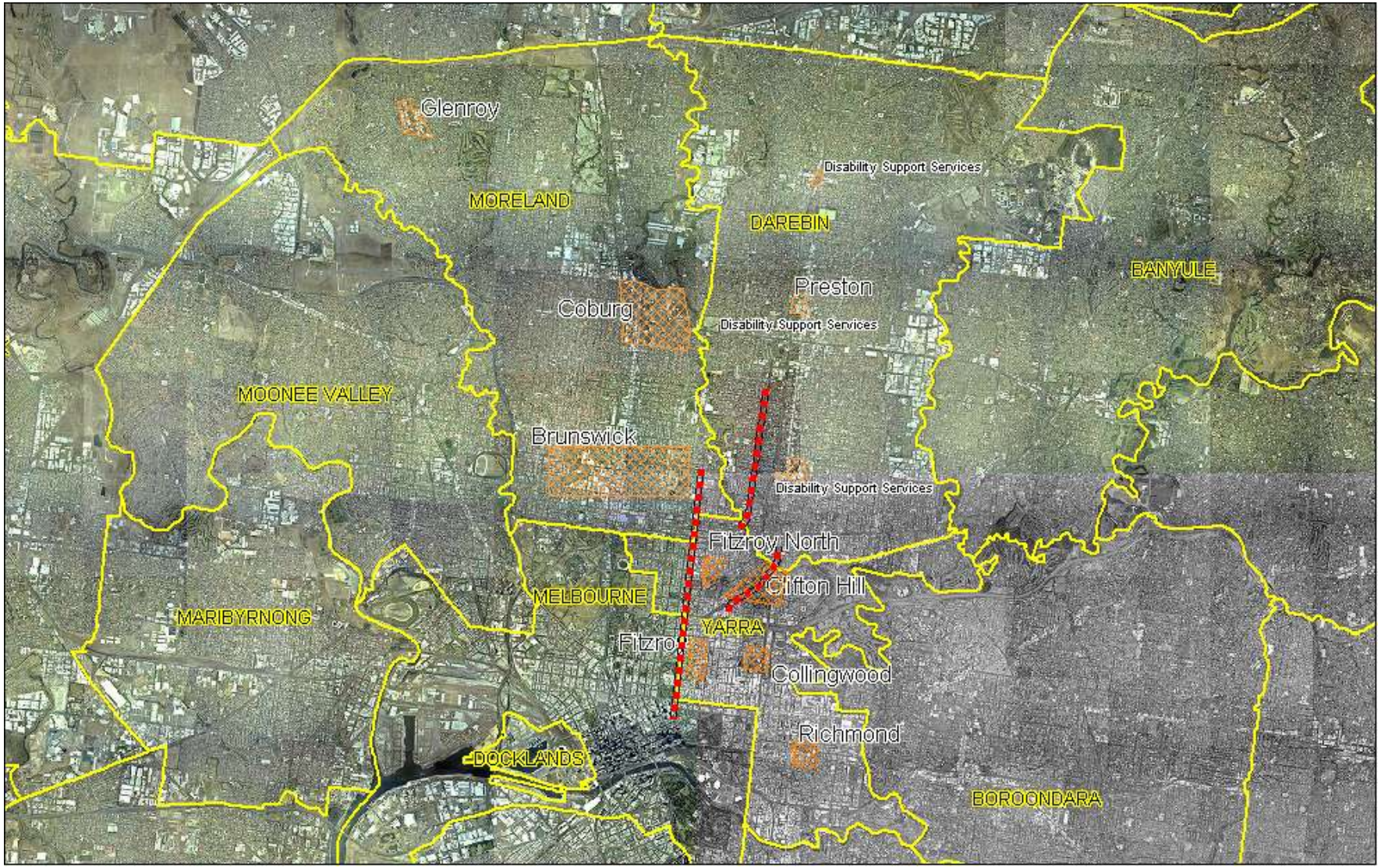


**Figure 29: Council Activity Centers**

### 4.6.2 Route Density Analysis

The density data from the MPTP was analyzed along each route by stop to estimate how many known disabled people lived in the area (Table 6). The ruler application in MapInfo was used to determine how many squares were within 200 or 400 m from the tram centerline. The number of people in each density square was given in the MapInfo layer. This information was used as a factor in the people rating.

**Table 6: Route Density Analysis**

Number of MPTP Users Color Key

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|

| Route 96 Stop Number | Number of MPTP Users within 200 meters | Number of MPTP Users within 400 meters |
|---|---|---|
| Stop 10 | 0 | 0 |
| Stop 11 | 0 | 2 |
| Stop 12 | 1 | 5 |
| Stop 13 | 3 | 4 |
| Stop 14 | 0 | 6 |
| Stop 15 | 1 | 3 |
| Stop 16 | 1 | 3 |
| Stop 17 | 0 | 3 |
| Stop 18 | 2 | 4 |
| Stop 19 | 2 | 4 |
| Stop 20 | 1 | 7 |
| Stop 21 | 2 | 6 |
| Stop 22 | 1 | 3 |

| Route 112 Stop Number | Number of MPTP Users within 200 meters | Number of MPTP Users within 400 meters |
|---|---|---|
| Stop 26 | 0 | 2 |
| Stop 27 | 2 | 2 |
| Stop 28 | 2 | 3 |
| Stop 29 | 0 | 2 |
| Stop 30 | 1 | 3 |
| Stop 31 | 3 | 4 |
| Stop 32 | 1 | 5 |
| Stop 33 | 2 | 3 |
| Stop 34 | 0 | 1 |

| Route 86 Stop Number | Number of MPTP Users within 200 meters | Number of MPTP Users within 400 meters |
|---|---|---|
| Stop 22 | 1 | 4 |
| Stop 23 | 1 | 7 |
| Stop 24 | 3 | 6 |
| Stop 25 | 0 | 6 |
| Stop 26 | 1 | 4 |
| Stop 27 | 3 | 5 |

### 4.6.3 Disability Organization Proximity

On Route 86 there are a number of nearby disability organizations beyond the area that the project team observed. The following table notes the closest disability organizations in the vicinity of Route 86 (Table 7). The target routes analyzed did not include any of these stops; however, the data will be important for future work along the route. Routes 96 and 112 were not near any identified disability organizations. The closest stop and distance to the stop were obtained from labels contained within the MapInfo layer.

**Table 7: Disability Organization Proximity on Route 86**

| Disability Organization | Closest Stop | Distance to Stop (meters) |
|---|---|---|
| MediQuip Specialist Continence Distributor | 18 | 271 |
| Disability Justice Advocacy | 19 | 800 |
| Work Force Placement Service | 34 | 91 |
| Action on Disability Within Ethnic Communities | 44 | 53 |
| Wesley Employment Services | 45 | 350 |

## *4.7 Summary*

The case studies in the field prepared the project team for studying stops that could possibly be upgraded by demonstrating what could be done, and identifying factors involved in selecting the site as well as potential complications. The field visits gave the team insight to issues such as road space and terrain to discuss in interviews with the councils, VicRoads, and Yarra Trams. Field visits were the most important way of defining important criteria because they allowed the project team to observe the effects of the cityscape and environment on the resulting stop that was upgraded. The three case studies completed were on three very different

routes that gave a wide range of possible criteria. The case studies have been discussed and the resulting criteria obtained from them are shown in Table 8.

**Table 8: Criteria identified from case studies**

| Route Studied | Characteristics | Important Factors Identified |
|---|---|---|
| Route 70 (Burwood Highway) | • High amount of traffic<br>• Narrow road<br>• Few accessible stops | • Number of lanes of traffic<br>• Width of lanes<br>• Median or sidewalk stop location<br>• Retail areas<br>• Parking availability |
| Route 86 (Plenty Road) | • Platform stops<br>• Retail development area<br>• Difficult locations - narrow roads, hills, numerous crosswalks | • Crash protection<br>• Crosswalks<br>• Topography<br>• Important Destinations |
| Route 64 (Dandenong Road) | • Upper middle class neighborhood<br>• Historical landmarks | • Type of housing<br>• Landmarks and heritage structures<br>• Importance of local council |

Reviewing the stops also demonstrated the need for stops to adapt to the environment in which they are needed. This is not a simple matter as it means that there is no standard solution that can be applied and that exact standards cannot always be followed. However, even though the standards allow for some flexibility, a stop can never be built to be less safe than it originally was, and safety is always the first priority. The case studies also demonstrated alternative types of stops that could be used instead of platform stops. The construction visits gave insight to the building process and the different groups involved in delivery. The maps that were created showed the tram network and current accessible stops, located disability organizations, and displayed MPTP user density. The target routes are oriented in a north-south direction and lay between the area of accessible stops in the CBD and accessible stops north of Plenty Road. The maps were also analyzed for stop distances from disability organizations and for MPTP user distance from the target routes. The target routes chosen for analysis were Route 96 along Nicholson Street, Route 112 along St Georges Road, and Route 86 along High Street and Queens Parade.

# Chapter 5: Obtaining Stakeholder Input

Stakeholders involved in the Accessible Tram Stop Program included the disability action groups who advocate for accessible public transport, the local government councils who provide input for the stops and approve them, and the project partners of the DOI, VicRoads, and Yarra Trams. Stakeholder input was important in order for the project team to understand what factors are important and how the relationships between the different groups work.

## *5.1 Disability Action Groups*

Emilio Savle is the coordinator for the Public Transport Advisory Committee. Mr. Savle gave his view of the DDA standards, a discussion on the role of PTAC, and an insight on criteria important to those with disabilities. Interview questions and the interview summary for the meeting on March 20, 2008 with Emilio Savle can be found in Appendix I.

The DDA provides an outline for applying the standards that includes a certain degree of flexibility, without ever compromising safety and taking into account that accessibility will be achieved over a period of time with a set budget for the ATSP. In the current approach any new system that is introduced must be compatible with existing systems that must be refurbished to be made accessible. The standards define minimum requirements for accessibility; however, it is not mandatory that structures be made in complete accordance with the standards when they are built. Enforcement is driven by complaints lodged by individuals or disability action groups such as the Human Rights and Equal Opportunities Commission (HREOC). If the complaint is considered valid and the structure is found to not conform to the standards, a court magistrate will issue a verdict requiring the structure to be changed. This system is meant to allow accessibility to be improved more quickly and easily without limiting the process of construction. The flexibility of the standards is helpful in situations that are difficult to make the stop accessible. Necessary alterations may be made to fit the situation as well as allowing the stops to be constructed more quickly as they do not have to be previously approved so that they conform to the standards (Salve, 2008).

The PTAC is comprised of representatives from fourteen different disability action groups. A complete list of members and the organization they represent, such as VicDeaf and Vision Australia, is given in Appendix E. The DOI looks for input from PTAC in the design stage so that the disability action groups can give their opinion on what they consider to be

accessible. Feedback from PTAC is given in the form of recommendations and opinions on both projects and on general initiatives. PTAC is able to anticipate problems with accessibility that design teams are likely to miss. At the quarterly PTAC meetings, transportation operators, including those from the bus, train, and tram systems, inform PTAC about the progress made. PTAC keeps track of initiatives promised in MOTC and the 2006 Action Plan and maintains a list of key accessibility issues that they expect will be one hundred percent complete by the year 2022. The latest version of this list that describes progress made from 2005 to 2006 can be found in Appendix J (Savle, 2008).

Criteria that are important from the viewpoint of PTAC are safety and ease of accessing the stop. Therefore, the distance from the sidewalk to the stop in the median is important, as well as the slope of the terrain around the stop, the speed that cars are traveling, and layout of crossing areas (i.e. crosswalks that involve passing and stopping through several islands rather than one straight walkway). Stops are also more important if other modes of transportation are nearby. For example, a stop is more desirable to those with disabilities if it is near a train, bus, or taxi stop. Shelters, seats, and lighting were expressed as not being necessary, but preferable to have.

Some recent data is available on the location of passengers with disabilities, specifically those who have used the state government's Multi Purpose Taxi Program. This service pays for taxi rides for those who cannot access other forms of public transport. Recently a survey was conducted on the Multi Purpose Taxi users that received 11,000 respondents. The survey results showed where these people lived, where they traveled to, and the locations of major disability organizations. The map shows the CBD of Melbourne with the tram network overlaid. The red areas represent the residences of the taxi users, with the darker areas representing more users living in that area. This data was mapped using layers within MapInfo.

## *5.2 Council Input*

Representatives were interviewed from the following councils: Melbourne City Council, Darebin Council and Moreland Council. Yarra council information was gained from literature review and input from the project sponsor. This section describes the four councils, organizes their views in chart form, and details further issues with each.

### 5.2.1 Melbourne City Council

Within the Melbourne City Council, it is estimated that of the 58,030 residents, approximately 14.9% have reported a disability. The 15-64 age range has the highest number of people with disabilities of about 6,100. There are 300 people between the ages of 0-14 that have a disability, and 2,300 people over the age of 65 have a disability. There are also approximately 500,000-600,000 visitors each day, and according to the Australian Bureau of Statistics, about 18-20% of these visitors have a disability (The City of Melbourne, 2008). Table 9 relates the MCC views on their role in accessibility, criteria important to them in selecting and constructing stops, their priority areas and strategy, and comments on communication with the DOI.

**Table 9: Interview Summary for MCC**

| **Interviewee** | **Rob Moore, Urban Design Manager** |
|---|---|
| Role discussion | Melbourne City Council<br>• Provide accessibility for the disabled without obstructing the city or pedestrian pathways |
| Criteria | Roadway<br>• Stop width within the Central Business District is not much of a concern because they want to slow down and reduce traffic<br>• MCC is more cautious about narrowing the road space because of its effect on constricting bicycle traffic<br>Parking<br>• Loss of parking is not an issue for the MCC<br>• The removed parking would be replaced by wider sidewalks<br>Shelters<br>• Shelter provisions are fully supported, but become problematic when advertisements are placed on them<br>Safety<br>• The waiting areas need to be wide and long enough for the pedestrians<br>• The tram and stop need to be accessible for a variety of people |
| Priorities | • Bourke Street |
| Strategy | • Construct easy access stops<br>• Incorporate island stops<br>• Assemble platform stops<br>• Blend in stops with the environment |
| Communication | • In the past, DOI has proposed ideas too quickly<br>• MCC would rather DOI take more time to contact an architect to obtain the best solution to constructing a stop |

The Melbourne City Council is pleased with the outcome of stops that have recently been upgraded. They support the platform stops, but believe that the shelters make the stops worse since they usually increase the width of the stop, disrupt the city appearance, and hinder the visibility of pedestrians and vehicle drivers. To minimize these hazards, MCC has a policy in which there cannot be more than two panels of advertisements on each side of the stop. The policy also allows ads to be oriented in any way; the ad companies would prefer the advertisements be perpendicular to the streets, but MCC would rather have the advertisements on panels parallel to the streets. The MCC strongly prefers the shelter to be 8 meters long since it makes the stops look more elegant and streamlined in the cityscape.

Melbourne City Council is also in favor of island stops; this is when the tracks split and travel around a waiting area. An advantage of using this type of stop is that there is only one waiting area that is shared by inbound and outbound passengers. This is considered to be very safe since the passengers don't have to cross any lanes of traffic to get from the inbound tram to the outbound tram, and vice versa. However, the driver of the tram would need to open the opposite doors than what they have to currently. If the driver were to open the wrong doors, the tram and passengers are open to traffic. Therefore, extensive fencing would be required. The MCC is also currently working on an electrical signal that could override the tram controls.

### 5.2.2 Darebin Council

The council of Darebin is located to the northeast of central Melbourne, above Yarra and to the east of Moreland (see Figure 14). Two target routes of the project run though Darebin: Route 112 on Saint Georges Road and Route 86 on High Street and Queens Parade. Darebin is favorable to disability access and supports accessible tram stops in their area. Its efforts for the inclusion of people with disabilities, particularly in public transportation, are shown in its participation in the MetroAccess initiative. MetroAccess is an important part of the Victorian State Disability Plan 2002-2012 and outlines a community based on approach to increasing disability inclusion through a partnership between state (Department of Human Services) and local government (Municipal Association of Victoria). Over 25,000 residents have a physical, intellectual, psychiatric, or sensory disability with people over 60 having more than half of them. Darebin estimates that there are more than 4,000 residents who act as carers for someone with a disability (Darebin City Council, 2007). Table 10 summarizes their views, strategy, and comments on communication.

**Table 10: Interview Summary for Darebin Council**

| **Interviewee (s)** | **Katie Dickson, Senior Transport Planner**<br>**Kate Myers, Sustainable Transport Coordinator** |
|---|---|
| Role discussion | Darebin Council:<br>• Makes sure program is tailored correctly to the environment<br>• Advocacy involving determining strategy for completing accessibility, finding activity centers, working with Yarra Trams and VicRoads<br>DOI:<br>• Involving council early in process<br>• Using council resources to help focus efforts<br>• Responsibility of ensuring proper placement of stops<br>• Responsibility of ensuring functionality of stops including proper crossings, smooth ramps, TGSIs<br>VicRoads:<br>• Discussions involving road space and congestion issues |
| Criteria | • Demographics and travel patterns<br>• Where tram provides access to buses<br>• Reducing road width and traffic flow is preferable<br>• Parking displacement is a secondary issue to accessibility |
| Priorities | • Northcote High School<br>• St. George intersection with Arthurton Street<br>• Normanby<br>• Activity Centers |
| Strategy | • Equal priority between trams, bus, and cycling<br>• Target defined activity centers given in Melbourne 2030<br>• Against easy access stop for safety concerns<br>• KAT stop possibility, currently advocating extending the walkway out<br>• Focus on tram usage more for High Street and car travel for St. Georges Road |
| Communication | • Darebin's comments have been ignored due to accessible program pushed quickly through<br>• Council resources not used<br>• Earlier communication desired<br>• Many complaints from people to council; there is no way to directly contact DOI<br>• Negotiations with DOI should commence with a planner before with engineers |

Discussion with Katie Dickson and Kate Myers focused on the roles of stakeholders, communication issues, and strategy for approaching accessible tram stops.

The council serves a key role in making sure that the programs proposed by the DOI are tailored correctly to the environment. The council has a great amount of information about the neighborhoods, travel patterns, and problems in the area; therefore, the solution proposed needs to properly work around these parameters. Darebin has found that certain stops have not been successful because the environment was not considered when stops were constructed to DDA standards. For example, some ramps have been too steep, TGSIs have not always been used, and crosswalks have not always been added. These factors are generally "finishing touches" compared to the actual construction, but are crucial to the stops success. Darebin and VicRoads have a working relationship; however, the parties often have conflicting views as the council wants traffic reduction and VicRoads protects road space.

Communication between the DOI and the councils should occur earlier. Rather than have the council approach predetermined plans, the council should be involved at least a year in advance. In this way, councils can give valuable, specific input that would not be known by the DOI. Often, councils have to work accessibility into larger infrastructure and renovation plans which does not allow a quick delivery of tram stops. However, the result in the long run would mean a more planned, integrated, and useful tram system. A recommendation made by Darebin was to initiate project discussion with an accessibility planner before discussing plans with an engineer.

### 5.2.3 Moreland Council

Moreland council is located in the inner north of Melbourne (see Figure 13). The Moreland community is very diverse with approximately one-third of the residents having been born overseas, mostly from non-English speaking countries. In the community, there are roughly 22,600 people (17.7% of the total population) that have a disability (Grammatikakis, 2008). Of the 17.7%:

- 76% have physical disabilities;
- 13% have sensory disabilities;
- 7% have psychological disabilities;
- 3% have acquired brain injuries;
- 2% have intellectual disabilities.

The major tram routes located in the Moreland council are routes 55 (Melville Road), 19 (Sydney Road), 1 (Lygon Street), and 96 (Nicholson Road). All of these routes travel from north to south and are parallel to each other. The minor tram routes, which travel from east to west,

are routes 22 and 25 (Moreland Road). As a result of there being no accessible tram stops within any of these routes, the Moreland council has a great interest in upgrading their stops.

**Table 11: Interview Summary for Moreland Council**

| **Interviewee** | **Shawn Neilsen, Moreland Council Advocate** |
|---|---|
| Role | Moreland Council<br>• Implement the Metro Access and Rural Access Programs to increase the community's ability to include people with disabilities<br>• Improve access to services for people with disabilities |
| Criteria | Determine the usage of tram stops<br>• The busiest areas need the most attention<br>Determine key destinations<br>• Disability services and centers<br>• Retail areas<br>• Connection to other forms of transportation<br>• City council buildings |
| Priorities | Route 19 Sydney Road<br>• Park Street<br>• Dawson Street/Glenline Road<br>• Bell Street<br>Key Activity Centers<br>• Coburg<br>• Brunswick<br>• Glenroy |
| Strategy | • Eliminate clearways<br>• Consultation<br>• Use of easy access stops<br>• Upgrade key stops first and then upgrade remaining stops |
| Communication | • The best way for DOI to approach the council is to integrate what is already occurring with the council<br>• Upgrading tram stops is more complicated with Moreland Council than with DOI<br>• The communication needs to include people with disabilities |

The main focus of the interview with Shawn Neilsen was to identify the approach Moreland council will use when upgrading their tram system and the role DOI will have during this process.

Moreland chose Route 19 along Sydney Road as their high priority route because they want to reduce the traffic and parking on this road since it is the main access to the city. The medians on this route are typically wide, and therefore the road will not be impacted when platform stops are added. However, issues arise from the Melbourne 2030, a document that

provides the overall vision of accessibility, which would need to be addressed before upgrading the stops. A major issue is integrating the platform stops into the tram network already established: if the stops are upgraded now, the council is afraid that the stops will have to be torn down in the future if other networks, such as buses, need to be repaired. This would then result in the council losing the money that they originally invested.

One strategy Moreland wants to take in upgrading the stops is to eliminate clearways that allow spaces on the road to be left open for parking. On the contrary, business owners want the clearways to remain since they believe having parking increases their customer rate. Another strategy the council would use is implanting Easy Access Stops. If these stops are used however, the pedestrian movement cannot be disadvantaged.

There is a lot of pressure in the council to have accessibility and is a high priority. In order for there to be a successful outcome for Moreland's plans, DOI needs to acknowledge the broader picture of work in the council and needs to cooperate with council efforts. Moreland must not only consult with DOI, but must also speak with people surrounding the tram stop area. Residents, business owners, and people with disabilities must also express their opinions and be warned in advance about the construction that is going to occur.

### 5.2.4 Yarra Council

The project team was unfortunately unable to interview a Yarra council representative; however, the team received input on the council from their website sources as well as from the project liaison—Jim North. The council borders MCC and has a population of 70,000 people. The community is diverse in first languages and growing in age with 56% of people between the age of 25 and 54. The council constructs a yearly report and has also developed a council plan document that discusses local government strategies from the year 2007 to 2011. A few of the key council priorities and strategies that relate to upgrading the tram system are the following:

- Develop a transport and parking strategy;
- Continue to work on the Inner Melbourne Action Plan;
- Progress draft structure plans for Victoria St and Smith St Activity Centers;
- Prioritisation of sustainable transport modes (walking, cycling, public transport) and reduced private vehicle travel;
- A built environment that is accessible for people of all ages and abilities;
- Enhance access and inclusion to all aspects of community life for people with disabilities and their careers;

- Increase the choice and quality of sustainable transport modes and infrastructure;
- Improve access for people with limited mobility to all aspects of community life.

In order to move towards improving access for people with limited mobility, the Yarra council plans to survey the community and modify existing services, develop new services (within the council and through non-council services) and implement sustainable transport actions for improved public transport (Yarra City Council, 2008).

## *5.3 ATSP Partners*

Gaining input from the ATSP partners is vital because they are the organizations that implement the upgrades to the tram network.

### 5.3.1 Department of Infrastructure

Hector McKenzie, the Deputy Director of Public Transport, is part of a group known as Franchise Relationships in which he manages different franchises. Within Franchise Relationships there is a subgroup for accessibility that has approximately 3-4 members.

In 1992 the Disability Discrimination Act (DDA) was established by the Victorian legislation, and was reevaluated in 1999 by the federal legislation. After these were published, no further action was taken to enforce the standards stated, which upset and frustrated many people. Then in 2002 the Disability Standards for Accessible Public Transport were established in which three conditions resulted:

- A set of standards were established;
- Milestones were introduced in which it was stated "compliance includes progress;"
- "Unjustifiable hardship" was incorporated.

These changed the dynamics of how disability discrimination was going to be controlled.

The Victorian government instituted their own plan in 2006: Meeting Our Transport Challenges. Around this time, four out of five franchises went bankrupt so the standards had to be reviewed again. Upon this review, the government was able to gain a better understanding of the DDA.

By the year 2007, not all of the milestones set in the DSAPT had been met. This did not cause much of an issue though since there had been much communication occurring with the

disabled population during the process of eliminating discrimination against those with disabilities.

When the franchise changes over in November two things will occur:

1. The ATSP will have to pay expenditures to the government
2. The ATSP will have to make sure the small steps that are taken will be able to meet the milestone.

The major expenditure will cost the ATSP approximately half a billion dollars, but it is unsure whether the ATSP will be able to pay this.

Nick Colwell, a former lawyer and present project manager in the PTD's Accessible Bus Stop Program, was interviewed for information on the DDA laws and compliance. The project team examined different situations in which upgrading to an accessible stop would be either impossible or require an excess of additional funding. Mr. Colwell provided the team with information on the unjustifiable hardship clause created by the DDA standards. Presently, there is no formal sign-off process for complaints on compliance. Compliance is not considered for upgrading until there is a complaint. Within the standards there are thirty different compliances that are reviewed by consultants during design. HREOC, although pressuring the ATSP to provide quick and efficient results, has brought forth few complaints due to the effort made for compliance by the DOI.

In the future, more milestones towards compliance will be made. Compliance will be at 25, 55, 90, and 100% by the years 2007, 2012, 2017 and 2032, respectively. Each of these milestones focuses on different parts of the disability standards and is presently not the responsibility of a single organization (i.e. DOI, Yarra Trams, etc). Nick Colwell gave the following future recommendations:

- It is necessary for the DOI to communicate well with the councils and assist them with understanding the DDA's compliances so mistakes in construction do not occur;
- The standards need to be challenged so that they can continuously be improved;
- With the population surrounding Melbourne increasing, future sites that may be in low populated areas need to be assessed for upgrades soon.

The DOI needs to continue to provide quick and efficient stop upgrades for HREOC.

### 5.3.2 Yarra Trams

Massoud Majidi is a Yarra Trams project manager. He was interviewed for his views on cooperation between the DOI and Yarra Trams, communication with VicRoads, and priorities for the Yarra Trams franchise.

When Yarra Trams is updating the tracks, the tram route has to be shut down. DOI then takes this opportunity to also upgrade the stops to add in platform stops. Not only does the merging of construction benefit the community because the tram route will be closed for less time, but DOI also benefits from this since they will not be penalized for stopping trams. Yarra also profits by DOI providing them with a budget for track renewal and accessible stop construction. During this Accessible Tram Stop Program process, Yarra Trams is the project manager, and they tend to use the DDA to support their decisions; however, the decision making process is not always easy because not all stakeholders may agree with the decision. This is the main weakness in the program: there is a lack of unified standards for all of the involved stakeholders.

In conjunction with complying with DOI in the ATSP, Yarra Trams also has to constantly communicate with VicRoads. All three organizations agree on most political issues, but this usually doesn't help much since there are many other challenges that are presented in which no consensus can be made. A major issue that occurs is that once a plan is presented by either Yarra Trams or DOI, VicRoads will go through every single detail again and hires a consultant to ensure that the plan is compliant with the standards. This causes much frustration since the second reevaluation takes up more time than what is preferred.

Yarra Trams only major consideration for the placement of accessible stops is to put them in areas where they will be most used

Yarra Trams is considering two different options for the design of future accessible stops when the new franchise occurs: tram lifts and Easy Access Stops; KAT stops will also be used, but will be very limited. Trams that have lifts will only be able to (un)load on roadways that are shared by both the trams and vehicle traffic. The key issue with these types of trams is liability. No specific solution has been achieved for this problem; however, Yarra Trams have been analyzing the pros and cons about the low floor tram lifts that rise 150mm above the ground used in Vienna, Europe. Yarra Trams have also been considering the Easy Access Stops; if these

stops can be made safe, then this design is a good approach to take since it takes up minimal road space and will allow the clearways to remain.

### 5.3.3 VicRoads

Mario Maldoni is a VicRoads manager in the Metropolitan Northwest Region of Melbourne. He has fifteen years of operation experience and previously worked for Yarra Trams for two years. As a team leader, he manages eleven engineers and works with the municipalities of Yarra, Port Phillip and the Melbourne City Council. VicRoads' primary job is to control and protect public transportation, cyclists, pedestrians, and other vehicles along Victoria's arterial roads (VicRoads – *Roads and Projects*, 2008). In recent years VicRoads has had a strong movement towards the idea of controlling the movement of people from the past idea of controlling the movement of cars. With this movement there has been more focus on pedestrians and bike traffic. A summary of VicRoads criteria for accessible stops, approach to accessibility, objectives in their organization, and communication with other organizations can be found in Table 12.

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**Table 12: Interview Summary for VicRoads**

| Interviewee (s) | Mario Maldoni, VicRoads Northwest Regional Manager |
|---|---|
| Criteria | Road Capacity<br>• Removing a traffic lane is accepted when intersections and ultimately, traffic are controlled by lights<br>• Pedestrian demand across and throughout street is observed<br>• Need to assess the impact of lane reduction in present and future<br>Crash Protection<br>• The responsibility is presently being discussed with more platforms being built in high speed areas<br>• Despite responsibility, uphold their own Road Management Acts as a code of practice<br>Parking<br>• Managed by councils<br>• VicRoads must address the impact of parking removal<br>Speed Limits<br>• Do not want to lower speeds for sole purpose of reducing crash protection<br>• Physical road environment must be addressed before changing the speed limit |
| Strategy | DDA<br>• Everything approved follows road guidelines, when compromising, safety needs to be ensured<br>• Urban design should be included in guidelines<br>• Road safety auditing is done to identify potential ways to maintain safety. A risk analysis spreadsheet is made to help best manage different risks<br>• Challenging the standards helps improve them for the future<br>Alternative Stops<br>• Easy access stops require several years for approval from VicRoads, even if they are located on a local road<br>• KAT stops are disliked because of the major alterations to the kerb line. There is a larger cost to shifting traffic. |
| Objectives | • Public transport, cyclists, pedestrians and vehicles along arterial roads<br>• Understanding the impact of change along roads<br>• Moving people, with a high focus on pedestrians and bike traffic |
| Communication | Councils<br>• Meetings held 1 to 2 times a year, with a chief executive meeting held every 3 years<br>• Trialing “cluster” meetings with councils that reside near each other that have similar problems/needs<br>Community<br>• Community engagement is difficult<br>• Public education is necessary so that the community understands why different decisions are made<br>ATSP Partners need to have early communication in the design process |

Ultimately, VicRoads must address the overall impact that changes in the road will create. Although tram stops are not the responsibility of VicRoads, they are responsible for the operation of arterial roads and must uphold their Road Management Act involving public transport and tram stops. In the ATSP, it is necessary for VicRoads to be involved early in the process. As the project team has examined, tram routes contain several stops that vary in different characteristics. These variances can require different platform designs and road impacts which VicRoads needs to individually assess. By having early communication, VicRoads can address impacts as well as review and challenge standards which will improve them for the future. Stakeholders have different needs and interests and when these are addressed at an early stage, VicRoads can locate common interests to satisfy everyone involved.

## *5.4 Summary*

The criteria individual stakeholders deemed to be important were summarized to obtain a more confined set of criteria (Table 13). This allowed the project team to compare the criteria gathered from each stakeholder and identify which criteria to mainly focus on. For example, an important criterion mentioned by three out of four stakeholders is roadway; therefore, it is imperative for roadway to be part of the rating system.

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**Table 13: Summary of Stakeholder Input**

| Stakeholder | Important Criteria |
|---|---|
| Melbourne City Council | Roadway<br>• Slowing down and reducing traffic is not an issue<br>• Reducing road space is a concern if it takes away bicycle space<br>Parking<br>• Displacing parking is not a problem since it will be replaced by wider sidewalks<br>Shelters<br>• Shelters can be constructed as long as the advertisements don't cause a safety hazard<br>Safety<br>• The trams and waiting areas need to be accessible for a variety of people |
| Darebin Council | Demographics<br>• Accessible stops need to be placed where there is a higher rate of disability population<br>Connection to other modes of transportation<br>• A key location is where trams provide access to buses<br>Roadway<br>• It is preferred that road width is reduced to minimize traffic flow<br>Parking<br>• Parking displacement is a secondary issue to accessibility |
| Moreland Council | Usage<br>• The tram stops that have the greatest usage have a higher priority of needing to be upgraded<br>Key destinations<br>• Stops that are surrounded by destinations that are used by a variety of people, such as disability centers, retail areas, and city council buildings, need to be upgraded |
| VicRoads | Roadway<br>• The effects of reducing lane width need to be examined for both the present and future<br>• Eliminating a road lane is accepted if the traffic can be controlled by traffic lights<br>Crash protection<br>• The responsibility is presently being discussed with more platforms being built in high speed areas<br>Parking<br>• The individual councils determine parking situations, but VicRoads must address the impact of parking removal<br>Speed limits<br>• Speed limits will not be reduced just because crash protection is wanted<br>• The physical road environment must be considered before changing the speed limit |

# Chapter 6: Development of Criteria and Rating System

The criteria used in the prioritization of the stops were derived from observations made during the site visits to important routes. Interviews with stakeholders supported the selection of criteria from the field visits and provided insight to the importance of each one. Interviews with the councils allowed the team to understand what factors were more important to each council, specific priority areas of the councils, and what the strategy of the council is for accessible public transport. The criteria needed to be observable in practice as well as useful in creating a numerical rating system. The objective of the preliminary rating system was to determine which stops would be the most feasible to construct when several factors were considered in the decision. The goal of the rating system—to facilitate the prioritization of stops—was to include an assessment not only of the spatial road constraints, but of the environmental factors and the particular people-driven need for stops in certain areas. This chapter explains in detail how the rating system was developed.

## *6.1 Observation Spreadsheet*

The resulting factors identified from the previously used rating system (T1-T5), case studies, and stakeholder input were organized into a chart that grouped them by themes. This allowed the project team to easily take notes during field visits to target sites. An example of the observation spreadsheet created is shown in Table 14.

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## Table 14: Example of Field Observation Spreadsheet

**Route: 112**

| **Road:St Georges Road** | **Stop 26 Clarke St** | | **Stop 27 Westbourne Gv** | |
|---|---|---|---|---|
| **Safety** | Outbound | Inbound | Outbound | Inbound |
| Lanes of Traffic | 2 | median | 2 | median |
| Width of Lanes | 3.2 | | inner lane is more narrow | |
| Location of Stop (median or sidewalk) | median (with landscaping to right) | | median (with landscaping to right) | |
| Width of Stop (2.1, 2.4, 3.3 m) | 1.7 | 3 | 1.7 | 3 |
| Length of Stop (+/- 33 m) | 31 | >33 | 78 | |
| Notes: | would need to move platform into road area. issue of crossing: shelter to track | | inb. side declines towards tracks speed - 60 km/h issue of crossing: shelter to track | |
| **Construction Ease** | | | | |
| Traffic Flow* | 2/3. | | 2/3. | |
| Environment (city, reservation, shops...) | Houses, school | | houses, school | |
| Intersection Locations | before stops | | none | |
| Landmarks | 2 traf. lights | 3 utility poles | 2 traf. lights | 1 utility pole |
| Notes: | 15 meters between utility poles modern shelter on inbound side w/ some vandalism. | | older shelter on inbound side | |
| **Terrain** | | | | |
| Topography | flat, with decline afterwards | | slight decline | |
| Parking Availability | none | | none | |
| Environment (Trees, landscaping… | landscaping to right of both stops | | landscaping to right of both stops | |
| **Usage** | | | | |
| Notes: | | | | |
| **Coverage** | | | | |
| Notes (consecutive vs alternating): | stops fairly close (~half block) | | stops fairly close (~half block) | |
| **Destinations** | | | | |
| Type of Housing | working class apartments | | | |
| Notes: | houses, Northcote H.S., not too many other destinations of note | | Northcote H.S., park and sports fields | |
| **Councils** | | | | |
| Council that stop is located in | Darebin | | Darebin | |

The observation spreadsheet was used as a practical application of the factors identified and provided preliminary groupings of the factors into safety, construction ease, terrain, usage, coverage, destinations, and council priorities.

## *6.2 Rating System*

The purpose of the rating system was to provide a consistent method of comparing stops between each other in terms of different criteria. However, the factors identified influenced prioritization in different ways. A critical example is a stop which is difficult to construct due to roadway and spatial restrictions, but is also located close to a hospital or elderly center where an accessible stop is highly useful. The DOI cannot only focus their priorities on stops that are simpler and faster to complete; they also must take into account the environment into which they are building as well as focus on areas that are desired and useful to the population.

### 6.2.1 Organization

The data obtained from field visits and stakeholder input was broken down into three major categories which affect the feasibility and achievability of the stops and routes in different ways:

- Roadway;
- Environment;
- People.

The roadway rating followed the intent of the T1 to T5 system in that it took into account road dimensions and spatial constraints. Included in the roadway category were factors such as the number of lanes of traffic, the width of the stop, the length of the stop, and parking availablility on the road space. The environment rating intended to compare the stops on the basis of the stops' placement in a given area and to assess issues created by the cityscape and terrain that might affect the success of the stop. The environment grouped factors including topography, landscaping and vegetation, intersection layouts, and landmarks such as heritage structures, crosswalk islands, and utility poles. The people rating aimed to gauge the preference and need for an accessible stop. This rating depended both on universally popular destinations, such as schools, hospitals, and public buildings, as well as destinations geared toward disability support. It also was affected by the council's opinions of the route and how accessibility fits into the councils' future project plans.

### 6.2.2 Point Value System

The rating system was based on a scale from 1 to 5 with a lower number representing a stop that was easier to accomplish. The approach for roadway and environment was taken to identify four major factors for each category and, starting with a base score of 1, add a point for each factor present at a particular stop. The rating then increases as more restrictive factors are identified. The people rating was calculated differently in that the base score was 5, with points subtracted as more supportive factors were found at each stop. In this way, future routes could be prioritized by performing site visits and using the same observations to arrive at a rating. The specific definition of each criterion for the categories is described in Table 15.

**Table 15: Point Value for Criteria**

| | | |
|---|---|---|
| **Roadway** | | |
| Lanes of traffic | 2 or less | +1 (0.5/0.5) |
| Width of stop | ≤ 1.8 m | +1 (0.5/0.5) |
| Length of stop | ≤ 28 m | +1 (0.5/0.5) |
| Parking availability | If available along length of stop | +1 |
| **Environment** | | |
| Landmarks | Crosswalk with islands, heritage landmarks, utility poles | +1 |
| Topography | Sloped, curve in track | +1 |
| Landscaping | Planted vegetation, landscaping | +1 |
| Intersection layout | If between inbound and outbound | +1 |
| **People** | | |
| Council approach | How conducive council plan is to quick delivery of program | – (0-2) |
| Destinations | Disability organization | – 1 |
| | Generally popular areas | – 1 |

The roadway criteria are mostly broken into half a point for the outbound stop and half for the inbound stop. The lanes of traffic were defined as 2 or less to add a point, representing increased difficulty, because it would significantly reduce traffic capacity if a road was reduced to one lane. The width of the stop must be greater than 1.8 m to avoid a point because 1.8 is the narrowest stop that can be built according to DDA standards (see Appendix K for platform stop design options). The length of the stop should be greater than 28 m. Stops are typically built to a 30 m length; however, stops can commonly be as long as 28 m without causing a problem. Parking is a larger problem, involving extensive discussion with councils to have it displaced, so any parking issue on the roadway merits a point. For example, Stop 29 on Route 112 was given a roadway rating of 1.5. The rating is always initially set at 1. The only factor that adds to the

rating of 1 on this stop is that the inbound stop has a width narrower than 1.8 m. This situation adds 0.5 to the original rating of 1 which results in a final roadway rating of 1.5.

For the environment rating, the presence of island crosswalks or heritage and utility structures would contribute a point to the rating. These factors make construction more difficult by having to move or work around existing infrastructure. Topography and a curve of the tracks affects the safety and ease of use of the stop. Having a slope usually requires longer or differently places ramps, and curves in the track can force ramps to narrow, depending on spatial constraints. Landscaping and vegetation are part of the environment that might not be affected by the stop and therefore has to be either maintained or worked around. The inbound and outbound stops can either be across an intersection or on the same side, with the intersection ahead. If the intersection is between the stops, the environment gets an addition point due to increased difficultly in traveling from an outbound stop to an inbound stop. For example, Stop 29 on Route 112 was given an environment rating of 4. The factors that add to the original rating of 1 on this stop are the uphill terrain (+1), landscaping/vegetation near the stop (+1), and the intersection between the inbound and outbound stops (+1). These situations add 3 points to the initial rating of 1 which results in a final environment rating of 4.

The people category is determined by both the local council position and destinations in the area. As a supportive category, criteria ratings for council and destinations are subtracted from the maximum rating of 5. The council is assigned either a 0, 1, or 2 depending on whether its overall approach is less or more conducive to the goals of the ATSP. The number is subtracted from 5 and since a lower score is more favorable, the higher number assignment corresponds to a council that is more conducive. The councils were rated relative to each other in terms of the extent of their disability services, whether they had a plan or existing project for disability access for public transport, whether they had identified of priority sites, and approach to accessibility in the future. A list of questions that could be used in meetings with councils is given in Appendix I. A major priority for DOI is being able to design and build stops quickly so the rating intends to reflect the council's desire or ability to approve designs in minimal time. However, whereas the nature of the ATSP is to deliver stops quickly, councils often have plans that conflict with the program or want to consult their community to ensure that the stop is successful. Table 16 below describes the rating given to each council with the sign next to the justification representing either a positive or negative factor in terms of time constraints.

**Table 16: Council Rating**

| Council | Rating | Justification |
|---|---|---|
| Darebin | **1** | • Have advocacy involving determining strategy for accessibility and locating priority areas that need accessible upgrades (+)<br>• Already have accessible stops (+)<br>• Need for tailoring programs correctly to their surroundings (-)<br>• Request at least one year for planning and design before construction of accessible tram stops begin (-) |
| Melbourne City | **2** | • Concern is to keep the overall city environment the same while creating accessible stops (-)<br>• Willing to provide council funds for additional construction material upgrades (+)<br>• Currently contain the most accessible tram stops and have approved to several quick and efficient future upgrades (+) |
| Moreland | **0** | • Large role in improving disabled access with Metro and Rural Access Programs (+)<br>• Have located key activity centers that would be priority areas for tram accessibility upgrades (+)<br>• Melbourne 2030 action plan needs to be incorporated into any accessibility upgrades (-)<br>• Presently, focused on eliminating clearways and gaining community input (-) |
| Yarra | **1** | • Initiatives for sustainable transport and community access (+)<br>• Currently has some accessible tram stops (+)<br>• However, no found program specific for accessibility for public transport (-) |

Important destinations are divided between destinations specifically for people with disabilities such as service providers and employment centers, and destinations that are generally popular such as schools, hospitals, other and public buildings. One point is subtracted for the presence of generally popular destinations and one if disability support destinations are present. The Multi Purpose Taxi Program survey data was used because it represents where a portion of the disabled population that require travel live. This type of data would be useful to consider in the future. In the rating system, having 5 or more MPTP users within 400 m subtracted a point (refer to Table 6).

### 6.2.3 Plotting the Rating

To visually display the rating results, the numerical value of the rating for each of the categories—roadway, environment, and people—were plotted against the stop number. This

allows easy recognition of low and high points, corresponding to more and less favorable areas. The identification of these trends allows stops to be grouped into sections that can be approached in order of difficulty (these graphs can be found in Figures 31, 32, and 33).

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# Chapter 7: Prioritization of Target Routes

This section describes the rating applied to the target routes, the identification of feasible and needed areas, the general requirements for each route, and the recommended order in which the routes should be approached. The grouping of stops into sections follows the DOI approach of constructing at least four platform stops simultaneously so that stops can be cost effective and built quickly.

To organize the collected data with included recommendations, tables were used for each stop analyzed. This method took the collected information from the field visit spreadsheet and organized it into information that the DOI could easily use and analyze. The tables include three pictures of the stop—one aerial photograph and two pictures of important stop features. The main subjects discussed were the roadway, environment, and people. Each topic is ranked on a scale from 1 to 5 within the table. The chart material describes the physical and spatial features of the stops that may or may not allow it to be updated, which provides the basis and rationale for the numerical rating applied. A representative example of this format is shown in Figure 30 for Stop 29 on Route 112. The charts for the stops in each route are located in Appendix A.

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## Route 112 – Stop 29 – Arthurton Road


| | | |
|---|---|---|
| **Roadway (Outbound):** There are four lanes of traffic that merge into a major intersection with heavy traffic. The width of stop is 2.2 meters, and the length is 50 meters. There is no parking availability along the length of the stop. | **Roadway (Inbound):** There are three lanes of traffic and the inner road lane is 2.6 meters wide. The width of the stop is 1.5 meters (+0.5), and the length is 32 meters. There is no parking availability along the length of the stop. | **1.5** |
| **Environment:** There were no landmarks or island crosswalks surrounding this stop. The topography is slightly uphill (+1.0). The median contains a walkway for pedestrians and bicyclists, and also contains vegetation (+1.0). There is an intersection between the inbound and outbound stops (+1.0). | | **4.0** |
| **People:** Destinations include a bus terminal, a train that is 300 meters away, a Merri Community Child Care, and a school (-1.0). There are 2 wheelchair users and no disability organizations within the 400m of the stop. This stop belongs to the Darebin council (-1.0). | | **3.0** |
| **Recommendations:** Even though the environment rating is high due to there being an intersection that could lead to difficulty during construction, this stop could be upgraded. The only measurement that would need to be accounted for is the width of the inbound stop; 300mm would need to be reduced from the road lanes. Since there are 3 lanes and no parking, the 300mm could easily be acquired. It would be beneficial if shelters were to be built parallel to the tracks because the only shelters available are for the bus stops, which are perpendicular to the trams tracks. Having these added shelters would increase the safety since there would be less people running from the bus shelters and across the tram tracks when the tram arrives. | | |

**Figure 30: Chart Format Example for Stop Description and Rating**

## *7.1 Route 96 (Nicholson Street)*

Thirteen stops—Stops 10 through 22—were analyzed on Route 96. This area was divided into two groups. The more feasible group is the first set of stops from Stop 10 to Stop 17. It can be seen from Figure 31 below that there is a trend of lower ratings for roadway and people for this group as compared to Stops 18 to 22.

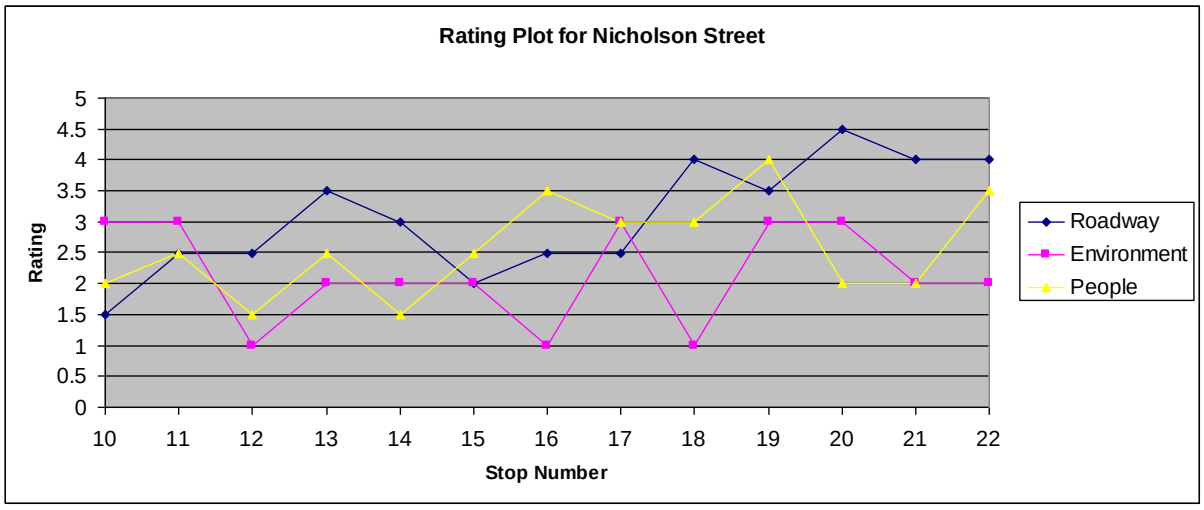


**Figure 31: Rating Plot for Nicholson Street**

All of the stops from 10 to 17 have at least one side (outbound or inbound) of the stop that requires roadspace due to narrow safety stop widths. The existing stop widths range from 1.3 to 1.5 m, therefore needing at least 300 to 500 mm of space to achieve the minimum 1.8 m width. The additional width would have to be obtained from the traffic lanes; however, there are only two lanes throughout most of Nicholson Street, making it more difficult to acquire this space. Lane width would have to be reduced in most cases. The stop lengths for this group of stops were at least 28 m in all but one case (Stop 16 was 26 m long).

The second group of stops includes Stops 18 through 21. These stops were considered more difficult than Stops 10 to 17 due to both inbound and outbound sites both being too narrow. Two lanes of traffic from which to obtain lane space and parking along Stops 18 and 20 limited the amount of road space that can be used. Stop 20 was an exception at 2.6 m width. For Stops 19 to 21, the length of the stops was significantly shorter than the typical 30 m accessible stop length with a range from 20 to 26 m. In this area, there were no noted priorities from a key destination viewpoint; however, two areas with a high number of MPTP users were located.

At Stop 22, the tram stop location changes from median to sidewalk, making the stop less feasible for constructing platform stops. If this stop was considered, the Easy Access Stop would be the most likely alternative because of the shared lane between cars and trams. A KAT stop would require too much space in the high-density and retail area. Figure 31 demonstrates the rise in people rating in the right half of the graph.

Prioritization of this route is to first consider Stops 10 to 17 and then Stops 18 to 21. The major differences between the groups were change to both sides becoming narrow and decreased stop length. Also, on the later section of the route, the number of important destinations decreases as it moves further away from the city. Compared to the examined areas of Route 86 and 112, Route 96 along Nicholson Street has the highest number of stops with difficult roadway restrictions. Therefore, Nicholson Street has the lowest priority for future platform among the three routes. The detailed results for Route 96 on Nicholson Street are found in Appendix A.

## *7.2 Route 112 (St George's Road)*

Nine stops (from Stop 26 to 34) on Route 112 along St. Georges Road were considered for future platform stop construction. The roadway rating separates the stops into a two groups, one of which is more feasible than the other. The first group consists of Stops 26 through Stop 29. This group has lower roadway ratings, shown in Figure 32, due to consistently wide inbound stops and sufficient stop length.

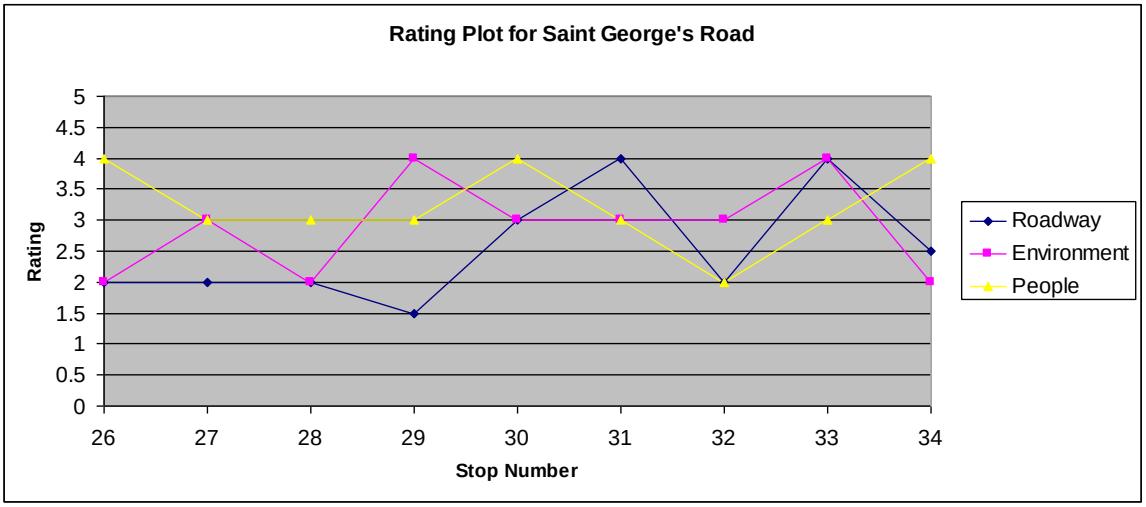


**Figure 32: Rating Plot for St. Georges Road**

Route 112 has outbound and inbound tracks laid on the same side of a wide landscaped median. The median contains a bike path and bus stops which causes the environment rating to be higher

compared to the other examined routes. Due to this setup, the inbound stops are located in the median and the outbound stops are between the track and road where there is less space available. The number of lanes adjacent to the outbound stops range from 2 to 4 lanes. A change in the track configuration occurs before Stop 29 where the tracks split to run on each side of the landscaped median instead of both lying next to each other on the same side. The location of the safety stops are between the track and the road. Space for constructed stops would be gained by moving into the road space or by moving the stop to between the median and the tracks. In this case, additional space would come from the landscaped median—an option supported by Darebin Council under the condition that the median is not used for increases in vehicle capacity. Stop 29 still has a lower roadway rating due to a wider outbound stop as well as being adjacent to three and four lanes of traffic. This group was determined to be more feasible and thus has a higher priority. Stop length is over 30 m for all the stops.

Stops 30, 32, and 34 are more difficult to upgrade due to the track split as well as a change back to two lanes of traffic on each side which causes the safety stop width to be too narrow on both the outbound and inbound sides. The available stop widths varied from 1 to 1.5 m, thus requiring up to 800 mm of additional space for platform stop construction. Stop 34 was the terminus for Route 112.

Stops 31 and 33 are the most difficult of the section. Although there is some increase in need for increased accessibility especially in these areas (retirement village, MPTP users, primary school, train station), due to narrow widths, two lanes of traffic, and some parking these stops are difficult to prioritize. Stop 33 also has a more complicated environmental situation due to the presence of the intersection between the outbound and inbound stops, a slope, and the landscaped median. These two stops were recommended for further consideration after the completion of the two sections previously described. The higher priority section is Stops 26 through 29, followed by Stops 30, 32, and 34. The difference between the two that would require a different strategy is the split in the tram tracks which causes both outbound and inbound stops to become narrower. The detailed results for Route 112 on St. Georges Road can be found in Appendix A.

## *7.3 Route 86 (Queens Parade and High Street)*

Six stops (Stop 22 to 27) were analyzed on Route 86 in the Queens Parade and High Street areas. The roadway restrictions and need for accessibility are most favorable in general among the three routes; therefore, this area is considered as the highest priority and should be focused on first. The first four stops (Stop 22 to 25) were grouped together as a feasible section to upgrade together. The street structure consists of the tram tracks in the road median, two lanes of traffic on either side, a small landscaped division on the outsides, and retail areas with their own parking and street beyond the divisions. The layout of these stops is a narrow outbound stop and a wider inbound stop. Obtaining road space for the outbound stops, which range in width from 1.2 to 1.7 m, would come from the lane space of Queens Parade's wide road structure. The people rating is lower in this section, shown in Figure 33, due to retail areas and several MPTP users in the area. A difficulty in prioritizing this area is that Stop 25 has a bus stop integrated with the tram stop, creating a more complicated construction environment.

Stop 26 is more difficult due to a very narrow outbound stop of 1 m, an incline in terrain, and having only one lane of traffic on the inbound side. As can be seen from Figure 33, there is an increase in both roadway and people rating, representing a more difficult and less important area to upgrade.


**Figure 33: Rating Plot for High Street/Queens Parade**

Stop 27 is more desirable than Stop 26 to have accessible due to important destinations nearby. Darebin has identified the area serviced by this stop as an activity center due to shops, restaurants, and bus and train services. There are also several MPTP users nearby the stop. The

major difficulty in upgrading Stop 27 is that it has a median (outbound) and a sidewalk (inbound) stop divided by the intersection of Westgarth Street. This creates a problem because only one platform stop can be constructed on the outbound side, whereas the inbound side will need to be analyzed further for an alternative accessible stop. The DOI also generally does not upgrade only one side of a stop. As a result of the difficulty involved with the switchover, it is recommended that Stop 26 is upgraded to service the area of Stop 27. The distance between the stops is approximately 250 m and there are sidewalks along the road with crosswalks across roads. An Easy Access Stop could theoretically be placed for the sidewalk stop on the inbound side of Stop 27; however, it would need further analysis. The detailed result for Route 86 on High Street and Queens Parade is found in Appendix A.

## *7.4 Summary*

The route and stop priority order is shown in Table 17 below. The project team recommends to the DOI that the route order of priority should be:

1. Route 86;
2. Route 112;
3. Route 96.

The order that the stop sections for each route should be approached is also recommended as summarized in Table 17.

**Table 17: Prioritization Summary**

| Route | Route Priority Order | Stop Group | Stop Priority Order |
|---|---|---|---|
| Route 86 | First | 22, 23, 24, 25 | First |
| | | 26 | Second |
| | | 27 | Further consideration |
| Route 112 | Second | 26, 27, 28, 29 | First |
| | | 30, 32, 34 | Second |
| | | 31, 33 | Further consideration |
| Route 96 | Third | 10, 11, 12, 13, 14, 15, 16, 17 | First |
| | | 18, 19, 20, 21 | Second |

Due to the nature of the ATSP in which multiple stops or sections of stops are constructed at the same time along a single route, it is recommended that each route is considered consecutively with the identified sections of it upgraded in the order proposed. A recommendation of "further consideration" implies that the stop should be done, but is more difficult to construct due to uncommon complications, such as a change to sidewalk stops or a

route terminus. From general observation there was a level of increased difficulty as each route moved further away from Melbourne's CBD. By following this prioritization, platform stops will be constructed in an effective and time-efficient manner.

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# Chapter 8: Conclusions

With the usage of the tram system continuing to grow, it is important that it becomes increasingly accessible for all passengers. There has been 150 accessible tram stops constructed throughout the Melbourne community in the past five years and the ATSP has the goal to construct a total of 420 stops by 2012. The project team worked together with the Department of Infrastructure to determine where the focus of the program should be in the future. To meet this goal, the project team performed an assessment of the current state of accessibility, defined prioritization criteria through field research and interviews, and developed a rating method. The rating method provided a systematic way of comparing stops in terms of roadway limitations, environmental factors, and need from both the general and disabled population. Finally, the rating method was applied to a total of 54 possible platform stop sites on three selected routes for the DOI to consider upgrading in the future.

The primary deliverable of this project consists of a portfolio for the DOI with a list and respective ranking of the proposed future accessible stops to be constructed. The criteria used to prioritize which stops of the tram network should be built was grouped into three categories—roadway, environment, and people. This portfolio, presented in Chapter 7, describes each stop examined, gives a rating for each of the three categories, justifies the rating, and presents a final recommendation for the stop.

The information acquired from literature reviews was expanded when performing interviews with a variety of stakeholders in the ATSP. The DOI was able to provide an overall summary of how stops are prioritized for accessible construction as well as the legal aspects involved with the disability standards. Yarra Trams and VicRoads expanded on this summary with information on their involvement and their own standards and criteria. Local laws and regulations were provided by the individual councils in which the prioritized stops were located. The outcome of these interviews was gaining information to help reformulate the criteria used to select stops to be prioritized for accessible upgrade.

Through working at the DOI, the project team was able to learn about the process of selecting stops and delivering the final construction. The previous method of prioritizing stops with a T1 to T5 ranking did not provide the DOI with a comprehensive evaluation of all the criteria involved. This rating system only examined the criteria of construction ease, not additionally considering popular community destinations, the disabled community and council

support. Learning about this method gave background for what was not useful in past prioritization and gave a basis for what can be improved. Visiting the stop construction site allowed the opportunity to see the timeline of building an accessible stop and how the community can be affected.

Using the literature background, interview data, and experience of working at the DOI for several weeks, the final deliverable of stop descriptions and recommendations was created and presented to the DOI. The DOI aims to select approximately 60 possible platform stops by July. By having the presented portfolio, there are 54 prioritized platform stop sites available for future construction. Using the rating system, accessible platforms can be constructed in order of priority, which includes factors of safety, construction ease, popularity, etc. By using the created portfolio of prioritized accessible stops, the DOI has a starting point for the stops to be delivered by July. They can begin analyzing these stops further with surveys and platform stop design and ultimately, these stops can be constructed. Using the rating system that was developed, more stops in other areas of the network can continue to be analyzed and prioritized for future construction. This will move the DOI closer to their goal of building 420 stops in the following years and will ultimately, help move the DOI towards the goal of ensuring that all community members can access public transport.

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# Chapter 9: Recommendations

Based on the findings of this study, the project team has compiled several recommendations to aid the Accessible Tram Stop Program. These recommendations were presented to the DOI in Melbourne, Victoria to assist them with achieving their overall objectives. The recommendations have been grouped into two sections that discuss assessing and prioritizing stops and communications, consultations, and cooperation between partners and councils.

The following list of recommendations, divided into two categories, was developed:

Assessing and Prioritizing Stops

- Utilize the developed rating system to compare future stop and route feasibility and need;
- Consider sections of Nicholson Street, St. Georges Road, and Queens Parade as three priority target routes;
- Consider developing a future rating system that applies to alternative stop construction

Communications, Consultations, and Cooperation between Stakeholders

- Consider cooperation with Yarra Trams in the future through merging of ATSP projects with Yarra Trams stop renewal work;
- Improve DOI communication between VicRoads and the councils by allowing some additional notification time of projects

## *9.1 Assessing and Prioritizing Stops*

The DOI has been focusing on stops that are easy to upgrade which is an approach that may not work well for the challenges faced by many future stops. The project recommends assessing stops in a more complete context on the basis of roadway restrictions, environment factors, and the need for accessibility in the area. The project team has created an observation spreadsheet that allows anyone performing field visits to observe critical features in the surrounding stop area. The rating system proposed in this study allows the DOI to assess the priority of stops with regard to each category through measurable and observable attributes.

The project team chose the three target route areas of Nicholson Road (Route 96), St. Georges Road (Route 112) and Queens Parade/High Street (Route 86). These routes are parallel to each other and represent major means of entering and exiting the city. These routes run through roads and cityscapes that represent a wide variety of conditions in terms of road

properties, environment, and overall purpose. Using the developed rating system, the team recommends that Route 86 along Queens Parade should be a first priority within the ATSP. Route 112 should then be upgraded, and lastly, Route 96. The project team has prioritized groups of stops within each of these routes that are the easiest to upgrade as well as the most desirable stops to become accessible for the community. A summary of the recommended prioritization within each route is shown in Table 18 in Section 7.4.

A final recommendation that must be made for assessing future stops is to develop a rating system for prioritizing alternative accessible stop areas. The rating system analyzes median safety zone stops for possible future platform stop upgrades. The rating system is not meant to analyze sidewalk stops for alternative KAT stops and Easy Access Stop construction. Alternative stops will need to be implemented in the near future because platform stop construction is not feasible throughout the entire network. Both types of stops designs are applicable in certain areas. Discussions and consultation with the DOI, VicRoads, and councils showed advantages and disadvantages of both. Generally, the Easy Access Stop was more supported; however, there was some council interest in the KAT stop for certain areas. The team recommends that the DOI continue to analyze these types of stops and consider a developing an additional rating system through consultation with VicRoads and the individual local councils.

## *9.2 Communications, Consultations, and Cooperation between Stakeholders*

The rating system was developed such that the DOI could continue to use it for the duration of the ATSP. The ATSP was developed through larger action plans such as *Melbourne 2030* and the *Accessible Public Transport in Victoria Action Plan 2006-12*. The initial goal of the ATSP was to construct 420 accessible stops within four years. Presently, they have funding to construct 180 accessible stops. In the overall action plans, there will be DDA compliance in the tram network of 25%, 55%, 90% and 100% in the years 2007, 2012, 2017 and 2032, respectively (DOI – *Action Plan*, 2007). The rating system will be best applied in the ATSP when comparing routes to identify for quick and feasible platform stop construction.

### 9.2.1 Merging with Yarra Trams and DOI Programs

To accomplish complete accessibility in the near future, the project team recommends that the DOI merges projects with Yarra Trams as a first step towards major infrastructure

changes that will be needed to reach the ultimate goal. This will be achieved by merging the ATSP with the Renewal and Maintenance Program when upgrading Route 96 as well as in future construction. Yarra Trams will soon have to renew the track in the area that the project team assessed. If construction occurs at the same time, Yarra Trams will benefit from gaining monetary resources from DOI and by having the position of project manager of all construction being held by a Yarra Trams employee. When service on a tram route is suspended due to track updates, there is no penalization; therefore, if both construction projects are combined, the DOI will benefit by not being fined for halting the tram service during construction. This arrangement works in each party's favor and is something that is recommended to trial on Nicholson Street and use in the future of the ATSP.

### 9.2.1 Future Rating by Communication with Councils

The developed rating system only includes the four councils that the prioritized route areas were located; therefore, in the future, a council rating will need to be developed for additional councils that contain areas of the tram network. The project team created this rating system using input from the councils to establish priorities. The council rating was developed on how conducive the council's overall goals and needs were to implementing the ATSP. A higher conducive rating typically means that the council already has several accessible stops and the ATSP can be applied with their current goals. A lower conducive rating typically means that the council has fewer or no accessible stops and the ATSP does not easily be incorporated into their current goals.

### 9.2.3 Additional Project Notification Time for Stakeholders

A common theme apparent from stakeholder interviews is that communication needs to be initiated earlier in the delivery process. The roles of each organization are clear; however, many complications can be avoided or reduced if each group is initially aware of major issues. The DOI has been following a fast-paced delivery process under pressure from disability action groups and because quicker and more efficient programs are provided with additional government funding. The quick delivery approach has also focused on stops that are easier to upgrade. However, this approach needs to balance quick delivery with the needs of major stakeholders including councils, Yarra Trams and VicRoads. Council and VicRoads representatives requested a one year advance notification for accessible upgrade projects. The

project team recommends that this time should not be used for discussion on specific platform stop design, but rather to determine what the major issues are for the area in question from council and VicRoads viewpoints. The councils identified the need to integrate their own on-going projects with the accessibility upgrades as a major factor that lengthens the time to make decisions. By allowing a year for preparation, councils will be able to properly integrate stop upgrades into overall plans such as *Melbourne 2030* and notify the community of the change in advance. Early notification would allow VicRoads to identify major road constraints before the stop design is completed. This would allow VicRoads to have a helpful role in the process instead of restricting or rejecting designs that do not meet their standards. Although a year is a longer period of time than what has been used recently by the DOI, several stops can be prioritized a year ahead of schedule so that all parties can be informed of future construction and work towards implementing them.

## *9.3 Summary*

Overall, the project team's recommendations will help the DOI move towards their goals in the ATSP. By applying the rating system, the project team has provided DOI with information on the prioritization order of 54 platform stops as well as a system to use in future prioritization. By merging the ATSP with Yarra Trams Renewal and Maintenance Program, both parties will benefit. Through effective communication between partners and stakeholders, the tram system can continue to move towards 100% accessibility compliance while considering the needs of all members of the community.

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# Appendix A Results Tables

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## Route 96 - Stop 10 – Albert St


| | | |
|---|---|---|
| **Roadway (Outbound):**<br>The outbound side is adjacent to 3 lanes of moderately heavy traffic at 50 km/h. The stop is in the road median and is 1.3 m wide (+0.5) and 45 m long. Parking is available on the outbound side past the ends of the stop. | **Roadway (Inbound):**<br>The inbound side has 3 lanes of traffic and is wider at 2.3 m. The stop is 38 m long. | **1.5** |
| **Environment:**<br>The environment includes trees along the sidewalk, parks along the road, and office buildings. Stop 10 was noted to be very close to Stop 11, within 100 m. The intersection with Albert St lies between the stops (+1.0). The road is on an incline (+1.0). | | **3.0** |
| **People:** Nearby locations include public buildings and other modes of transportation including Parliament, Parliament Station, and a bus terminal (–1.0). Stop 10 is located in Melbourne City Council (–2.0). | | **2.0** |

**Recommendations:**
This stop requires some road space for the outbound stop which should be possible due to the adjacent three lanes of traffic. The stop is long enough to accommodate a platform stop. The stop is very close to Stop 11 and rationalization of one of them should be considered.

# Route 96 - Stop 11 – Victoria Parade

| | | |
|---|---|---|
| **Roadway (Outbound):**<br>Stop 11 has 2 lanes of very heavy traffic (+0.5) and the lanes are narrower at 2.8 m. The stop is located in the median and is 2.1 m wide and 44 m long. Parking is available past the stops on both sides. | **Roadway (Inbound):**<br>The inbound side has 2 lanes of traffic (+0.5). The stop is 0.8 m with 1 m of shy space between the fencing and traffic (+0.5). | **2.5** |
| **Environment:**<br>This area is a Tram Accident Black Spot area (+1.0). The terrain is flat. It was noted that Stop 10 is very close to Stop 11. The intersection with Victoria Parade is located between the inbound and outbound stops (+1.0). The shelter is located on the sidewalk. | | **3.0** |
| **People:**<br>St. Vincent's Hospital is nearby (–1.0). The stop is located in on the border of the Melbourne and Yarra councils (–1.5). | | **2.5** |
| **Recommendations:**<br>The outboard stop has sufficient length and width. The inbound stop is narrow but has a full meter of shy space between the road and the fence. There is less road space as there are only two narrower lanes. | | |

# Route 96 - Stop 12 – Gertrude St

| | | |
|---|---|---|
| **Roadway (Outbound):**<br>The outbound side has 2 lanes of traffic (+0.5) and is located in the road median. It is 1.4 m (+0.5) wide and 36 m long. The speed decreases from 60 to 40 km/h in the area. | **Roadway (Inbound):**<br>The inbound side has 2 lanes of traffic (+0.5) and is 2 m wide and 36 m long. The inbound track curves to the right at the stop. | **2.5** |
| **Environment:**<br>The terrain is flat. The intersection with Gertrude St is in front the stop as both inbound and outbound stops are on the same side across from each other. Carlton Gardens is along the road. The stop is labeled as a Tram Accident Black Spot. There is a wide sidewalk. | | **1.0** |
| **People:**<br>There is a school nearby the stops and parks line the roadside. The stop also services the Melbourne Exhibition Center (–1.0). The stop is located in on the border of the Melbourne and Yarra councils (–1.5). 5 MPTP users were located within 400 meters (-1.0). | | **1.5** |
| **Recommendations:**<br>The inbound stop has sufficient length and width. The outbound stop is narrow and would require about 400mm of road space. There is less road space available as there are only two lanes. There is a speed reduction in the area which prevents needing crash protection. | | |

## Route 96 - Stop 13 – Hanover St


| | | |
|---|---|---|
| **Roadway (Outbound):**<br>The outbound side has 2 wider lanes of 3.2 m (+0.5). Traffic flow is moderate. The stop is located in the road median and is 1.5 m wide (+0.5) and 26 m long (+0.5). The speed limit is 40 km/h in the area. | **Roadway (Inbound):**<br>The inbound side has two lanes of wider traffic lanes (+0.5). The stop is 1.3 m wide (+0.5) and 28 m long. | **3.5** |
| **Environment:**<br>The stops lie on a slight decline heading away from the city (+1.0). The stop provides access to Hanover St; however, the intersection is not near the tram stops. There are some trees lining the sidewalks which are 3.6 m wide. There are parks in the general area. At this point, the route is moving away from the city and there are fewer buildings. | | **2.0** |
| **People:**<br>A Catholic convent and school was close to the stop (–1.0). The stop is located in on the border of the Melbourne and Yarra councils (–1.5). | | **2.5** |
| **Recommendations:**<br>This stop is more challenging due to both outbound and inbound stops being too narrow and too short. 300 mm is required for the outbound and 500 mm is required for the inbound. There are two lanes of traffic which limits space that can be taken; however, the speed limit in the area is decreased to 40 km/h for the school. Thus decreasing traffic flow may be acceptable. | | |

## Route 96 - Stop 14 – Murchison St

| | | |
|---|---|---|
| **Roadway (Outbound):**<br>The outbound side has two lanes of moderately heavy traffic (+0.5) at 60 km/h. The stop is located in the median and is 1.4 m wide (+0.5) and 31 m long. | **Roadway (Inbound):**<br>The inbound side also has 2 lanes of traffic (+0.5). The stop is located in the roadway median and is 1.4 m wide (+0.5) and 29 m long. | **3.0** |
| **Environment:**<br>The slop is on a declining slope heading away from the city (+1.0). Parking is available past the stops on both sides. A sidewalk was along the road on both sides with trees. | | **2.0** |
| **People:**<br>Stop 14 is mostly nearby housing. It is approximately 200m from Stop 13 and is therefore also close to the school and parks (–1.0). The stop is located in on the border of the Melbourne and Yarra councils (–1.5). 6 MPTP users were located in the area within 400 m (-1.0). | | **1.5** |
| **Recommendations:**<br>Both the outbound and inbound stops require 400 mm of additional space. Road space is limited due to two lanes of traffic. | | |

# Route 96 - Stop 15 – Elgin St


| | | |
|---|---|---|
| **Roadway (Outbound):**<br>The outbound side is bounded by 2 narrower lanes of traffic (+0.5). The stop is in the road median and is 2.8 m and 40 m long. The stop width varies from 1 to 2.8 m; however, the shy space keeps the stop side even at 2.8 m. The traffic speed is posted at 60 km/h. | **Roadway (Inbound):**<br>The inbound stop has 2 lanes of traffic (+0.5). It is 2.7 m wide and 53 m long. | **2.0** |
| **Environment:**<br>The topography of the land is flat. The sidewalk on both sides is lined with trees. The intersection lies between the stops (+1.0). Parking is available on both sides but past the stops. Both sides had shelters with the outbound side have an older one and the inbound side having a new glass one. | | **2.0** |
| **People:**<br>The type of buildings in the area was mostly high rise apartments. This tram stop is also 50 m from a bus stop (–1.0). The stop is located in on the border of the Melbourne and Yarra councils (–1.5). Stop 15 is close to Stop 14. | | **2.5** |

**Recommendations:**
This stop is easier to construct as both outbound and inbound stops are sufficiently wide and long enough to accommodate a 2150 mm platform stop. The stops are wide enough itself at one end, with road shy space maintaining the width. The only restriction noted is the two lanes of traffic which should only be an issue if additional road management is needed.

# Route 96 - Stop 16 – Kay St

| | | |
|---|---|---|
| **Roadway (Outbound):**<br>The outbound side has two lanes of moderate traffic (+0.5). The stop is located in the median and is 1.8 m wide and 31 m long. | **Roadway (Inbound):**<br>The inbound stop has two lanes of traffic (+0.5). The stop is 1.5 m wide (+0.5) and is 31 m long. | **2.5** |
| **Environment:**<br>The terrain is flat. The inbound and outbound stops are located across each other past the intersection with Kay St. There is a 3.7 m wide sidewalk with trees on both sides. | | **1.0** |
| **People:**<br>The type of building in the area is mostly apartments and office buildings. The stop is located in on the border of the Melbourne and Yarra councils (–1.5). | | **3.5** |
| **Recommendations:**<br>The outbound stop is just wide enough to accommodate an 1800 mm platform stop. The inbound stop requires 300 mm that would come from road space. Two lanes are available. Both stops are sufficiently long. | | |

# Route 96 - Stop 17 – Princes St



| | | |
|---|---|---|
| **Roadway (Outbound):**<br>Stop 17, Princes St, is surrounded by three lanes of traffic including two straight and one turning left lane. The stop is located in the median and is 1.5 m wide (+0.5) and 45 m long. There is significant traffic in the area. | **Roadway (Inbound):**<br>Stop 17 inbound is adjacent to 2 lanes (+0.5). It is located in the road median and is 1.3 m wide (+0.5) and 47 m long. Parking exists on the inbound side just after the stop ends. | **2.5** |
| **Environment:**<br>The sidewalk is 2.2 m wide on the outbound side and 3.8 m on the inbound side. The intersection is located between the stops (+1.0). Princes St is very wide with many lanes of traffic with islands necessary to cross the road (+1.0). The sidewalk contains some vegetation and trees. There is a shelter on the inbound side. | | **3.0** |
| **People:**<br>The buildings in the area include St. Bridget's school, a church, a petrol station, and a few apartment buildings (–1.0). Stop 17 is located in the council of Yarra (-1.0). | | **3.0** |
| **Recommendations:**<br>The outbound stop requires 300 mm of road space which is feasible as there are three lanes of traffic on that side. The inbound stop is more difficult as it requires an additional 500 mm and there are only two lanes of traffic. Both stops are over 45 m long. | | |

# Route 96 - Stop 18 – Curtain St

| | | |
|---|---|---|
| **Roadway (Outbound):**<br>Stop 18 has two lanes on its outbound side (+0.5). The stop is located in the median and is 1.3 m wide (+0.5) and 29 m long. The traffic is moderate. | **Roadway (Inbound):**<br>There are two lanes of traffic (+0.5). The inbound area is 1.6 m wide (+0.5) and 31 m long. Some parking (4 spots) was observed on the inbound side (+1.0). | **4.0** |
| **Environment:**<br>The terrain is flat. The sidewalks were wide with few trees on the sidewalk edge. The area was less busy with fewer shops. The sidewalk is 3.5 m wide. | | **1.0** |
| **People:**<br>The area contained some older housing, a hotel, bar, and Foodworks grocery (–1.0). The area was less dense as the route leads away from the city. The stop is located in the council of Yarra (-1.0). | | **3.0** |
| **Recommendations:**<br>This stop is more difficult due to the need to take road space, only two lanes of traffic, and parking in the area. The outbound stop requires 500 mm and the inbound stop requires 200 mm. Parking was observed to be on the road by the inbound stop which might have to be displaced considering that some road space is required. Both stops are sufficiently long. | | |

## Route 96 - Stop 19 – Tempany St

| | | |
|---|---|---|
| **Roadway (Outbound):**<br>Step 19 has two lanes on the outbound side which are narrower at 2.8 m (+0.5). The stop is located in the median and is 1.3 m (+0.5) and 26 m long (+0.5). The speed limit signs indicate 40km/h. Traffic flow was less than average. Parking was located past the stops. | **Roadway (Inbound):**<br>Step 19 has two lanes on the inbound side of 2.8 m width (+0.5). The stop is 1.5 m wide (+0.5) and 28 m long. | **3.5** |
| **Environment:**<br>The stop lay on a slight incline (+1.0) and parking was available on both sides past the stops. The road was bounded on both sides by a sidewalk lined with trees. No crosswalks were used to access the stop (+1.0). | | **3.0** |
| **People:**<br>The buildings in the area were older-looking apartments and houses. The stop was located in the council of Yarra (–1.0). | | **4.0** |
| **Recommendations:**<br>The outbound stop requires 500 mm of road space and is slightly under the typical length of a platform stop. The inbound stop requires 300 mm. Road space is limited with two lanes on each side. | | |

# Route 96 - Stop 20 – Richardson St



| | | |
|---|---|---|
| **Roadway (Outbound):**<br>Stop 20 on the outbound side has two lanes of traffic (+0.5). It is a median stop that is 1.5 m wide (+0.5) and 20 m long (+0.5). Traffic is moderate to heavy. Parking is available with 9 spots observed (+1). | **Roadway (Inbound):**<br>Stop 20 on the inbound side has two lanes of traffic (+0.5). It is 2.6 m wide and 25 m long (+0.5). | **4.5** |
| **Environment:**<br>The sidewalk width on the outbound side is 3.7 m and 4 m wide on the inbound side. The intersection with Richardson is a smaller intersection and lies between the stops (+1.0). The terrain is on a slight incline (+1.0). Some larger trees grow on the sidewalk. | | **3.0** |
| **People:**<br>Buildings in the area include older apartments, food stores, North Carlton Children's Center, Nicholson Village, and some small office buildings (–1.0). Stop 20 is located in the council of Yarra (-1.0). 7 MPTP users were located in the area (-1.0) | | **2.0** |
| **Recommendations:**<br>This stop is challenging due to parking nearby the outbound side, significantly decreased length, and road space needed on the outbound side. The inbound side is wide enough for a 2150 mm stop with the outbound side requiring 300 mm. Both sides have two lanes of traffic. | | |

## Route 96 - Stop 21 – Pigdon St

| | | |
|---|---|---|
| **Roadway (Outbound):**<br>The outbound side has 2 lanes of traffic (+0.5). The Stop is located in the road median and is 1.7 m wide (+0.5) and 21 m long (+0.5). Parking is available on both sides past the stop. | **Roadway (Inbound):**<br>The inbound side has 2 lanes of traffic (+0.5). The stop is 1.3 m wide (+0.5) and 21 m long (+0.5). | **4.0** |
| **Environment:**<br>The environment includes shrubs, with no trees and is flat. The intersection with Pigdon St is between the stops (+1.0). The sidewalk on both sides is 3.8 m wide. | | **2.0** |
| **People:**<br>Stop 21 is close to restaurants, coffee shops, a health trainer, and a language center (–1.0). Stop 21 is located in Yarra (-1.0). 6 MPTP users were located within 400 m (-1.0). | | **2.0** |
| **Recommendations:**<br>This stop is challenging due to significantly decreased length and road space needed for both stops. The outbound side requires little space (about 100 mm) with the inbound side requiring 500 mm. Both sides have two lanes of traffic. | | |

# Route 96 - Stop 22 – Brunswick St



| | | |
|---|---|---|
| **Roadway (Outbound):**<br>The outbound side has two lanes, with one shared with the tram track (+0.5). The stop is located in the road median and is 1.5 m wide (+0.5) and 20 m long (+0.5). Traffic flow is moderately high. Parking is on both sides, distanced from the stop. | **Roadway (Inbound):**<br>The inbound side has two lanes of traffic with one lane shared with the tram track (+0.5). The stop is located on the sidewalk, a change occurring on the same stop across the intersection (+1.0). | **4.0** |
| **Environment:**<br>The stops are located in a shop area with sidewalks that are 2.9 m on the outbound side and 2.5 on the inbound side. There is a critical change from median to sidewalk stop across the intersection as well as a change from two car lanes to two lanes with one shared with the tram system (+1.0). | | **2.0** |
| **People:**<br>There is little housing in the area. The environment includes parks and bike path nearby. Buildings include an osteopath doctor, church, and school (–1.0). Stop 22 is located on the border of Yarra and Moreland (-0.5). | | **3.5** |
| **Recommendations:**<br>This stop is difficult because there is a change in the road to two lanes with the center lanes sharing the road with the tram track. This is followed by a change from median to sidewalk stops. The median outbound stop requires 300 mm of road space and is only 20 m long. The inbound side is a sidewalk stop. An easy access stop could be constructed for this stop. | | |

## Route 96 - Stop 23 – Miller St

| | | |
|---|---|---|
| **Roadway (Outbound):**<br>Stop 23 is a sidewalk stop on the outbound side. There are two lanes of traffic with one shared with the tram system. | **Roadway (Inbound):**<br>Stop 23 is a sidewalk stop on the inbound side. There are two lanes of traffic with one shared with the tram system. | -- |
| **Environment:**<br>There is a shelter on the inbound side. The intersection with Miller St is located between the two stops and there is no crosswalk from the sidewalk to either of the stops. | | -- |
| **People:**<br>The stop is located on the border of Yarra and Moreland. | | -- |

**Recommendations:**
The route continues past this point as sidewalk stops. A possible option for this area would be easy access stops as there is only one lane of traffic besides the lanes that shares space with the tram tracks. A KAT stop could also be used to extend the existing sidewalk into the first lane to force sharing on one lane.

## Route 112 - Stop 26 – Clarke Street


| | | |
|---|---|---|
| **Roadway (Outbound):** There are two lanes of traffic adjacent to the tracks (+0.5). The width of the stop is narrow with a measurement of 1.7 meters (+0.5). The length of the stop, 31 meters, is long enough for the stop to be made accessible. There is no parking availability along the length of the stop. | **Roadway (Inbound):** A median is located alongside the inbound tracks, and since space can easily be taken away from the median, there will be no difficulties. The width of the stop is 3.0 meters, and the length of the stop is 33 meters. There is no parking availability along the length of the stop. | **2.0** |
| **Environment:** There were no landmarks or island crosswalks surrounding this stop. The topography is flat. The median contains a walkway for pedestrians and bicyclists, and also contains vegetation (+1.0). There are no intersections within the length of the stop. | | **2.0** |
| **People:** The type of housing in this area is working class apartments. There are 2 wheelchair users within the 400m of the stop, and there are no disability organizations. This stop belongs to the Darebin council (-1.0). | | **4.0** |
| **Recommendations:** This would be an ideal stop to be upgraded for accessibility because the width of the inbound waiting area is wide; and although the outbound waiting area has a slightly narrow width, the road lanes are wide enough (3.2 meters each) to be reduced without obstructing the traffic flow. The lengths of the inbound and outbound stops are long and are within the range that is accepted by councils (+/- 33m). Also, the path to the inbound stop is wide and is accessible for disabled users, specifically wheelchair users, because it gradually slopes downward. Tactile ground surface indicators would need to be added to this path in order for it to be accessible for the blind. | | |

# Route 112 - Stop 27 – Westbourn Gv.


| | | |
|---|---|---|
| **Roadway (Outbound):** There are two lanes of traffic; the inner lane closest to the tram stop is narrower than the outer lane (+0.5). The width of the stop is 1.7 meters (+0.5) and has a stop length of 46 meters. There is no parking availability along the length of the stop. | **Roadway (Inbound):** The inbound area is located next to a median that has landscaping. The waiting area has a width of 3 meters and contains one utility pole, and the stop length is 78 meters. There is no parking availability along the length of the stop. | **2.0** |
| **Environment:** There were no landmarks or island crosswalks surrounding this stop. The topography is slightly declined and the inbound area slopes towards the tracks (+1.0). The median contains a walkway for pedestrians and bicyclists, and also contains vegetation (+1.0). There are no intersections within the length of the stop. | | **3.0** |
| **People:** Destinations surrounding the stop are Northcote High School, a park, a sports field, and houses (-1.0). There are 2 wheelchair users and no disability organizations within the vicinity of the stop. This stop belongs to the Darebin council (-1.0). | | **3.0** |
| **Recommendations:** Stop 27 is a stop that should be upgraded because it fits the majority of the criteria needed to make a stop accessible. The waiting areas are more than long enough to add a platform stop; the inbound stop is wide; the outbound stop could be made wider by reducing the lane width of the road; and there are important destinations surrounding the stop. One problem that would have to be addressed is the shelter. The current shelter is constructed out of wood, but it should be made out of a glass/plastic material so that it is transparent and doesn't obstruct the view of the road for drivers. | | |

## Route 112 - Stop 28 – Sumner Ave.


| | | |
|---|---|---|
| **Roadway (Outbound):** There are two lanes of traffic (+0.5); the width of the stop is 1.2 meters (+0.5); and the stop is 50 meters long. There is no parking availability along the length of the stop. | **Roadway (Inbound):** Located next to a median, the width of the waiting area is 3 meters and the stop length is 50 meters. There is no parking availability along the length of the stop. | **2.0** |
| **Environment:** There were no landmarks or island crosswalks surrounding this stop. The topography is flat. The median contains a walkway for pedestrians and bicyclists, and also contains vegetation (+1.0). There are no intersections within the length of the stop. | | **2.0** |
| **People:** Destinations include residential houses and St. Joseph's home (-1.0). There are 3 wheelchair users and no disability organizations within the vicinity of the stop. This stop belongs to the Darebin council (-1.0). | | **3.0** |

**Recommendations:** Although this is an ideal stop to upgrade, the major issue of this stop would be reducing the traffic lanes by 600 millimeters to meet the minimum stop width of 1800 mm. This could be done since there is only a moderate amount of traffic and the speed limit is 60km/hr. The shelter will have to be reconstructed so that the material used is transparent. Once these issues are addressed, stop 28 could easily be constructed to have a platform stop.

# Route 112 - Stop 29 – Arthurton Road


| | | |
|---|---|---|
| **Roadway (Outbound):** There are four lanes of traffic that merge into a major intersection with heavy traffic. The width of stop is 2.2 meters, and the length is 50 meters. There is no parking availability along the length of the stop. | **Roadway (Inbound):** There are three lanes of traffic and the inner road lane is 2.6 meters wide. The width of the stop is 1.5 meters (+0.5), and the length is 32 meters. There is no parking availability along the length of the stop. | **1.5** |
| **Environment:** There were no landmarks or island crosswalks surrounding this stop. The topography is slightly uphill (+1.0). The median contains a walkway for pedestrians and bicyclists, and also contains vegetation (+1.0). There is an intersection between the inbound and outbound stops (+1.0). | | **4.0** |
| **People:** Destinations include a bus terminal, a train that is 300 meters away, a Merri Community Child Care, and a school (-1.0). There are 2 wheelchair users and no disability organizations within the 400m of the stop. This stop belongs to the Darebin council (-1.0). | | **3.0** |
| **Recommendations:** Even though the environment rating is high due to there being an intersection that could lead to difficulty during construction, this stop could be upgraded. The only measurement that would need to be accounted for is the width of the inbound stop; 300mm would need to be reduced from the road lanes. Since there are 3 lanes and no parking, the 300mm could easily be acquired. It would be beneficial if shelters were to be built parallel to the tracks because the only shelters available are for the bus stops, which are perpendicular to the trams tracks. Having these added shelters would increase the safety since there would be less people running from the bus shelters and across the tram tracks when the tram arrives. | | |

## Route 112 - Stop 30 – Gladstone Ave.


| | | |
|---|---|---|
| **Roadway (Outbound):** There are two lanes of traffic (+0.5), and each lane has a width of 3.6 meters. The width of the stop is 1.4 meters (+0.5) and the stop length is 32 meters. There is no parking availability along the length of the stop. | **Roadway (Inbound):** There are two lanes of traffic (+0.5). The width of the stop is 1.5 meters (+0.5) and the stop length is 43 meters. There is no parking availability along the length of the stop. | **3.0** |
| **Environment:** There were no landmarks or island crosswalks surrounding this stop. The stop is on a slight incline, and the inbound waiting area slopes upward toward the tracks (+1.0). The median contains a walkway for pedestrians and bicyclists, and also contains vegetation (+1.0). There are no intersections within the length of the stop. | | **3.0** |
| **People:** The destinations in this area include shops. There are 3 wheelchair users within the vicinity of the stop, and there are no disability organizations. This stop belongs to the Darebin council (-1.0). | | **4.0** |
| **Recommendations:** This stop is recommended to be upgraded because it is a simple stop; there are no intersections between the inbound and outbound stops, there is no parking availability, both stops lengths are long, and the outbound stop is wide. Only 300mm need to be added to the inbound width, which could easily be taken from the roadway since the traffic flow is moderate. There are also wheelchair users in the area that would find accessible stops to be greatly useful. | | |

# Route 112 - Stop 31 – Gadd Street


| | | |
|---|---|---|
| **Roadway (Outbound):** There are two lanes of traffic (+0.5). The stop length is 46 meters and the width is 1.3 meters (+0.5). There is no parking availability along the length of the stop. | **Roadway (Inbound):** There are two lanes of traffic (+0.5). The stop length is 28 meters and the width is 1.3 meters (+0.5). There are two traffic lights within the stop length. There are 2-3 parking spaces (+1.0) | **4.0** |
| **Environment:** There were no landmarks or island crosswalks surrounding this stop. The topography declines slightly going down the length of the stop, and the inbound waiting area slopes downward towards the tram tracks (+1.0). The median contains a walkway for pedestrians and bicyclists, and also contains vegetation (+1.0). There are no intersections within the length of the stop. | | **3.0** |
| **People:** The main destination in this area is a retirement village located on the outbound side (-1.0). There are 4 wheelchair users and no disability organizations within the 400m of the stop. This stop belongs to the Darebin council (-1.0). | | **3.0** |
| **Recommendations:** This stop would be difficult to upgrade and has a low priority due to complications that would occur during construction. There are narrow waiting areas, a short inbound stop length, and parking along the inbound road. Even though there is a retirement village near this stop and there would be many elderly passengers, they could access stop 30 (if it is upgraded) since it is relatively close. | | |

## Route 112 - Stop 32 – Normanby Ave.


| | | |
|---|---|---|
| **Roadway (Outbound):** There are three lanes of traffic. The width of the stop is 1.3 (+0.5) meters and has a length of 50 meters. There is no parking availability along the length of the stop. | **Roadway (Inbound):** There are four lanes of traffic. The width of the stop is 1.0 meters (+0.5) and has a length of 35 meters. There is no parking availability along the length of the stop. | **2.0** |
| **Environment:** There were no landmarks or island crosswalks surrounding this stop. The topography along the length of the stop is flat. The median contains a walkway for pedestrians and bicyclists, and also contains vegetation (+1.0). There is an intersection between the inbound and outbound stops (+1.0). | | **3.0** |
| **People:** Destinations include a motor inn, a uniting church, fast food restaurants, a bus stop area, Merri Community Childcare, and residential housing (-1.0). There are 5 wheelchair users (-1.0) and no disability organizations within the vicinity of the stop. This stop belongs to the Darebin council (-1.0). | | **2.0** |
| **Recommendations:** This stop could be made accessible. Even though the waiting areas are narrow, there are three or four lanes of traffic in which road space could be reduced. There are many popular destinations surrounding the stops that a variety of people would want to visit. | | |

# Route 112 - Stop 33 – Hutton Street


| | | |
|---|---|---|
| **Roadway (Outbound):** There are two lanes of traffic (+0.5). The width of the stop is 1.0 meter (+0.5) and has a length of 30 meters. There are approximately 1-2 parking spaces along the stop length (+1.0). | **Roadway (Inbound):** There are two lanes of traffic (+0.5). The width of the stop is 1.0 meter (+0.5) and has a length of 30 meters. There is no parking availability along the length of the stop. | **4.0** |
| **Environment:** There were no landmarks or island crosswalks surrounding this stop. The topography along the length of the stop slopes downward towards the tracks on the inbound side (+1.0). The median contains a walkway for pedestrians and bicyclists, and also contains vegetation (+1.0). There is an intersection between the inbound and outbound stops (+1.0). | | **4.0** |
| **People:** Destinations include a train that is 300 meters away, a chiropractor, Thornbury Primary School, and a café (-1.0). There are 3 wheelchair users and no disability organizations within the vicinity of the stop. This stop belongs to the Darebin council (-1.0). | | **3.0** |
| **Recommendations:** This stop would be quite difficult to upgrade, and therefore is not on of high priority. The waiting areas are very narrow and would need an additional 800mm in order for a platform to be constructed. It would hard to reduce the width of road lanes because there are only two for each direction and there is some parking adjacent to these lanes. Also, since the inbound waiting area slopes downward, a wheelchair ramp would then have to be built with a steep angle. | | |

## Route 112 - Stop 34 – Miller Street


| | | |
|---|---|---|
| **Roadway (Outbound):** There are two lanes of traffic (+0.5). The width of the waiting area is 1.3 meters (+0.5) and has a length of 48 meters. There is no parking availability along the length of the stop. | **Roadway (Inbound):** There are two lanes of traffic (+0.5). The width of the waiting area begins at 3.0 meters and widens as it approaches the shelter. The stop has a length of approximately 48 meters. There is no parking availability along the length of the stop. | **2.5** |
| **Environment:** There were no landmarks or island crosswalks surrounding this stop. The topography along the length of the stop is flat. The median contains a walkway for pedestrians and bicyclists, and also contains vegetation (+1.0). There are no intersections within the length of the stop. | | **2.0** |
| **People:** Destinations include a small plaza with a medical clinic, a pharmacy, Darebin Arts, and an entertainment center. There is 1 wheelchair user and no disability organizations within the vicinity of the stop. This stop belongs to the Darebin council (-1.0). | | **4.0** |
| **Recommendations:** This stop is recommended to be upgraded because the only issue there would be is the outbound stop width, which would need an additional 500mm. There is also a medical clinic that many people will use, including those with disabilities. | | |

# Route 86 - Stop 22 – Smith St


| | | |
|---|---|---|
| **Roadway (Outbound):**<br>The stop itself has a narrow 1.7 meter width (+0.5) and has a length over 45 meters. For both outbound and inbound stops, there are two lanes of traffic (+1.0). There is another extra traffic lane; however, it is divided from the main road by a landscaped median and meant for shop parking. | **Roadway (Inbound):**<br>The stop itself has a wide 3.3 meter width and has a length over 45 meters (right figure). | **2.5** |
| **Environment:**<br>There is an uphill incline moving outbound from the stop as well as a track curve (left figure) before the stop (+1.0). Parking is separated from the road, and crosswalks are easily marked. | | **2.0** |
| **People:**<br>The stop is located in Yarra council (-1.0). | | **4.0** |

**Recommendations:**
The inbound stop has sufficient measurements to place a platform stop. Outbound stop construction could require gaining at least 0.1 meters of shy space from the road shy space. The uphill terrain will create more difficulty when constructing accessible ramps; however there is no parking, landscaping or intersection to work around. There are not any specific key destinations in the area and few MPTP users within 400 meters.

# Route 86 - Stop 23 – Wellington St


| | | |
|---|---|---|
| **Roadway (Outbound):**<br>Stop has a narrow width of 1.5 meters (+0.5) and a length of 30 meters (right figure). There are 3 lanes of traffic directly besides both stops. There is another extra traffic lane; however, it is divided from the main road by a landscaped median and meant for shop parking. | **Roadway (Inbound):**<br>Stop has a moderate width of 2.4 meters and a long length of 50 meters (center figure). | **1.5** |
| **Environment:**<br>The stop is in a main street area with a flat topography; however, due to the intersection (left figure) in between the stops (+1.0) and the median separating the parking lane and traffic lanes, there are several crosswalks and islands (+1.0) used to travel from sidewalk to stop. | | **2.0** |
| **People:**<br>There are several retail and restaurant destinations in this area (-1.0) within Yarra council (-1.0). Within 400 meters there are at most, 7 MPTP users (-1). | | **2.0** |

**Recommendations:**
This stop has the most favorable ratings for each category out of all the stops examined on Route 86. Within the roadway there needs to be obtained at least 0.3 meters from one of three traffic lanes for a platform stop to fit. This stop and the following 2 stops (Stop 24 & 25) have the most favorable people ratings in the area of the route that was looked at. The environment could bring difficulties in the construction phase with a busy intersection and multiple roadway crossings.

## Route 86 - Stop 24 – Michael St

| | | |
|---|---|---|
| **Roadway (Outbound):**<br>The stop width varies between 1.2 and 2.6 meters (right figure) due to the lanes of traffic increasing from 2 to 3 along the stop. The length is 46 meters. There is another extra traffic lane; however, it is divided from the main road by a landscaped median and meant for shop parking. | **Roadway (Inbound):**<br>The stop has a large width of 3 meters and a length of 51 meters. There are 2 lanes of traffic on the side of this stop (+0.5). There is some available parking towards the end of the stop away from the intersection (+1.0). | **2.5** |
| **Environment:**<br>There is a flat topography and an intersection (left figure) between the stops (+1.0) and several crosswalks to walk to the stop (+1.0). | | **3.0** |
| **People:**<br>The stop is in a main street area with several retail areas and restaurants (-1.0) in the Yarra council (-1.0). There are also a maximum of 6 MPTP users within 400 meters of this stop (-1.0) | | **2.0** |
| **Recommendations:**<br>Both the outbound and inbound sides have enough space available for platform stop construction which does not occur on any other examined stops on Route 86. There is a strong need for this stop from the low rating in the people category; therefore, it should be considered to upgrade to accessible standards. | | |

# Route 86 - Stop 25 – Clifton Hill Interchange


| | | |
|---|---|---|
| **Roadway (Outbound):**<br>The stop width is a moderate to high 2.7 meters and 41 meters long with 3 lanes of traffic beside it (center figure). There is another extra traffic lane on each side; however, it is divided from the main road by a landscaped median and meant for shop parking. | **Roadway (Inbound):**<br>The stop width varies from 1.5 to 3 meters (center figure) with a length of 25 meters (+0.5). There are two lands of traffic beside the stop (+0.5). | **2.0** |
| **Environment:**<br>Although there is no intersection between the two stops (it is past the stops going outbound, shown in the left figure), there is a bus stop intersection (shown in right figure) between the stops which adds to the environment restrictions (+1.0). There are several crosswalks and islands especially because of the bus stops islands located within the median (+1.0). The terrain also declines in the outbound direction (+1.0). | | **4.0** |
| **People:**<br>There are less retail/shops than in the previous stops; however, there is a large bus interchange (-1.0) within the Yarra council (-1.0). There is also a maximum of 6 MPTP users within 400 meters (-1.0). | | **2.0** |
| **Recommendations:**<br>The measurements for platform stops are all adequate except for needing 3 additional meters in length for the inbound stop. The environment proves more difficult to work in due to the confusion created by the bus stop in the median besides the tram tracks. Although the environment is difficult to construct within, this is a needed stop for the community and has adequate measurements to build platform stops. | | |

## Route 86 - Stop 26 – Walker St


| | | |
|---|---|---|
| **Roadway (Outbound):**<br>The stop has a narrow width of 1 meter (+0.5) and a length of 28 meters. There are 2 lanes of traffic (+0.5) beside the stop. | **Roadway (Inbound):**<br>The stop has a large width of 3.1 meters and length of 38 meters (center figure). There is one lane of fast flowing traffic (+0.5). | **2.5** |
| **Environment:**<br>The track is at an incline moving outbound (+1.0). Other than the terrain, there are no other factors that restrict the environment rating. | | **2.0** |
| **People:**<br>In the stop vicinity there is an apartment complex, church, bus stop within 50 meters, and a train station within 410 meters (-1.0). The stop is located in Darebin council (-1.0). | | **3.0** |
| **Recommendations:**<br>The roadway makes this stop more difficult to construct with narrow lanes of traffic. The inbound side has adequate space for a platform stop; however, the outbound side does not and would need to take space from the 2 traffic lanes beside it. Although, the environment has a low rating, the terrain is at a moderate incline and will require adjustments to be made with the accessible ramp designs. | | |

# Route 86 - Stop 27 – Westgarth St


| | | |
|---|---|---|
| **Roadway (Outbound):**<br>The stop varies in width from 1.4 to 2.6 meters (right and center figure) and has the length of 40 meters. There are 2 lanes of traffic (+0.5) and another extra traffic lane; however, it is divided from the main road by a landscaped median and meant for shop parking. | **Roadway (Inbound):**<br>This stop is located on the sidewalk, therefore, it will not be considered for a platform stop. There is no adequate stop width (+0.5) or length (+0.5). There is one lane of traffic and an additional shared lane of traffic over the tram tracks (+0.5) | **3.0** |
| **Environment:**<br>There is an intersection between the two stops (+1.0) with several crosswalks and islands to travel to the outbound stop (+1.0). There is a flat terrain and no parking available in the stop area. | | **3.0** |
| **People:**<br>There are several shops and restaurants past the intersection on the inbound stop side as well as a bus stop within 25 meters. Darebin council (-1.0) has categorized this area as a key activity center (-1.0) in their council. There is also a maximum of 5 MPTP users within 400 meters of this stop (-1.0). | | **2.0** |
| **Recommendations:**<br>This stop has the highest roadway rating out of the examined stops on Route 86. Due to the sidewalk inbound stop, it will be less efficient to include this stop in a construction grouping of stops because only one side (the outbound side) could be upgraded. The environment is also moderately difficult to construct in compared with the other examined stops on the route. This stop should not be prioritized presently in the ATSP. | | |

# Appendix B Additional Background

**Early American Disability Rights Movement**

The efforts to make the transportation system more accessible are part of a larger effort for equality for people with disabilities. In the United States, a civil rights movement aimed at disability rights won its first victory with the Rehabilitation Act of 1973 which guaranteed rights to workers with disabilities. The movement gained strength in the 1980s with the National Council of the Handicapped calling for Congress to include people with disabilities in the Civil Rights Act of 1964. An organization was formed which specifically focused on transportation issues called the American Disabled for Accessible Public Transport (ADAPT) in 1983. The group's main activity involved protesting the lack of accessible public transportation by using civil disobedience against the American Public Transit Association as well as other local transit authorities. A federal appeals court ruling, ADAPT vs. Skinner, focused on the transportation needs of the disabled. The outcome of this court ruling determined it to be discriminatory for federal regulations to only allow transit authorities to spend three percent of their budgets on accessibility. A year later in 1990, the Americans with Disabilities Act (ADA) was signed and was declared to be a new "Declaration of Independence" for people with disabilities (Federal Transit Administration, 2006).

# Appendix C Project Timeline

| TASK | WEEK | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Meet with Jim North to discuss our methodology, and objectives | | | | | | | |
| Examine a wide variety of stops (accessible and inaccessible) | | | | | | | |
| Set up interviews and meet with stakeholders to discuss criteria | | | | | | | |
| Examine all stops within pilot areas with respect to criteria matrix | | | | | | | |
| Organize results into deliverable | | | | | | | |
| Present prioritization of accessible stops to Jim North and DOI | | | | | | | |

# Appendix D Accessible Stops by Route

| ACCESSIBLE STOPS BY ROUTE | | |
|---|---|---|
| **Route** | **Accessible Stops** | **Location** |
| 1 | 1 | Melbourne University |
| | 13 | Federation Square |
| | 29 | Victoria Ave. at Bridport St. |
| | 32 | South Melbourne Beach Terminus |
| 3 | 13 | Federation Square |
| | 1 | Melbourne University |
| 5 | 1 | Melbourne University |
| | 13 | Federation Square |
| | 32 | Chapel St. and Dandenong Rd. |
| | 34 | Westbury St./The Avenue |
| | 35 | Hotham St./William Rd. |
| | 36 | Alexandra St. Closeburn Ave. |
| | 37 | Lansdowne Rd./Irving Ave. |
| | 38 | Orrong Rd. |
| | 40 | Wattletree Rd. & Dandenong Rd. |
| 6 | 1 | Melbourne University |
| | 13 | Federation Square |
| | 53 | High St. at Malvern Rd. |
| 8 | 1 | Melbourne University |
| | 13 | Federation Square |
| 16 | 1 | Melbourne University |
| | 13 | Federation Square |
| | 48 | Hawthorn Rd./Dandenong Rd. |
| | 52 | Glenferrie Rd./Dandenong Rd. |
| | 134 | Fitzroy St. at Park St. |
| 19 | 7 | Elizabeth St. at Victoria St. |
| 24 | 12 | Victoria Pde., Brunswick & Gisborne Sts. |
| | 25 | Victoria St. at River Blvd. |
| | 24 | Victoria St. at Burnley St. |
| | 51 | Doncaster Rd., North Balwyn |
| 30 | D10 | Collins St. at Swanston St. |
| | D11 | Waterfront City |

| | | |
|---|---|---|
| 31 | D7 | Collins St. Extension Spencer St. |
| | D8 | Collins St. Extension Goods Shed 2 |
| | D9 | Collins St. Extention Terminus Temporary |
| | 1 | Collins St. b/n Spencer & King Sts. |
| | 5 | Collins St. at Elizabeth |
| | 6 | Collins St. at Swanston St. |
| | 8 | Collins St. b/n Russell St. & Exhibition St. |
| | 9 | Collins St. at Spring St. |
| | 12 | St. Vincent's Plaza |
| 48 | D2 | Docklands Dr. at Latrobe St. |
| | D10 | St. Mangos Lane |
| | D11 | Waterfront City |
| | 1 | Flinders St. at Spencer St. |
| | 2 | Flinders St. at King St. |
| | 3 | Flinders St. at Market St. |
| | 4 | Flinders St. at Elizabeth St. |
| | 23 | Burwood, Bridge & Church |
| | 25 | Victoria St. at River Blvd. |
| | 51 | Doncaster Rd., North Balwyn |
| 55 | 23 | Macarthur Rd. & Royal Park |
| | 24 | State Netball Hockey Center |
| | 25 | Melbourne Zoo |
| | 26 | Royal Park |
| 57 | 7 | Elizabeth St. at Victoria St. |
| 59 | 7 | Elizabeth St. at Victoria St. |
| | 42 | Mt. Alexander Rd. at Shamrock |
| | 43 | Mt. Alexander Rd. at Thistle |
| | 44 | Mt. Alexander Rd. at Thorn |
| | 45 | Mt. Alexander Rd. at Leake |
| 64 | 1 | Melbourne University |
| | 13 | Federation Square |
| | 32 | Chapel St. and Dandenong Rd. |
| | 34 | Westbury St./The Avenue |
| | 35 | Hotham St./William Rd. |
| | 36 | Alexandra St./Closeburn Ave. |
| | 37 | Lansdowne Rd./Irving Ave. |
| | 38 | Orrong Rd./Dandenong Rd. |
| | 40 | Wattletree Rd./Dandenong Rd. |
| | 42 | Kooyong Rd./Dandenong Rd. |
| | 48 | Hawthorn Rd./Dandenong Rd. |

| | | |
|---|---|---|
| 67 | 1 | Melbourne University |
| | 13 | Federation Square |
| 70 | 1 | Flinders St. at Spencer St. |
| | 2 | Flinders St. at King St. |
| | 3 | Flinders St. at Market St. |
| | 7A | Melbourne Park at Batman Ave. |
| | 7B | Melbourne Park at Rod Laver Arena |
| | 7C | Melbourne Park at Vodafone Arena |
| | 7D | Melbourne Park at Swan St. |
| | 4 | Flinders St. at Elizabeth St. |
| | 18 | Swan St. Burnley (GE) |
| 72 | 1 | Melbourne University |
| | 13 | Federation Square |
| | 26 | Commercial Rd. b/n St. Kilda Rd. & Punt Rd. |
| 75 | 1 | Flinders St. at Spencer St. |
| | 2 | Flinders St. at King St. |
| | 3 | Flinders St. at Market St. |
| | 4 | Flinders St. at Elizabeth St. |
| | 23 | Burwood, Bridge & Church |
| | 59 | Burwood Hwy. at Burwood Cemetery & Mausoleum |
| | 61 | Burwood Hwy. at Norman Oval |
| | 62 | Burwood Hwy. at Presbyterian Ladies College |
| | 63 | Burwood Hwy. at Deakin Uni./Mount Scopus College |
| | 64 | Burwood Hwy. at Station St. Opposite Greenwood Office Park |
| | 65 | Burwood Hwy. at St. Scholastica's Catholic School and Vision Australia |
| | 67 | Burwood Hwy. at Crow Street |
| | 68 | Burwood Hwy. at Near Benwerrin Kindergarten |
| | 69 | Burwood Hwy. at Highview Grove |
| | 70 | Burwood Hwy. at Blackburn Rd. |
| | 71 | Burwood Hwy. at Seven Oaks |
| | 72 | Burwood Hwy. at Lakeside Dr. |
| | 73 | Burwood Hwy. at Springvale Rd. |
| | 74 | Burwood Hwy. at Stanley St. |
| | 75 | Burwood Hwy. Terminus |
| | 122 | Spencer St. at Collins St. |
| 82 | 51 | Highpoint Shopping Center/ Rosamond Rd. |
| | 52 | Rosamond Rd. & River St. |
| | 53 | Maribyrnong College & River St. |

| | | |
|---|---|---|
| | 54 | Gordon St. and River St. |

| | | |
|---|---|---|
| 86 | 1 | Bourke St. at Spenser St. |
| | D2 | Docklands Dr. at Latrobe St. |
| | 3 | Bourke St. at William St. |
| | 4 | Bourke St. near Queen St. |
| | 5 | Bourke St. at Elizabeth St. |
| | 6 | Bourke St. at Swanston St. |
| | 7 | Bourke St. b/n Russell & Exhibition Sts. |
| | 9 | Bourke St. at Spring St. |
| | 55 | Albert St. |
| | 56 | Summerhill Village |
| | 57 | Reservoir Secondary College |
| | 58 | LaTrobe Golf Driving Range |
| | 59 | Preston General Cemetery |
| | 60 | Kingbury Drive (Latrobe University) |
| | 61 | Curtain Strett |
| | 62 | Bundoora Park and Bundoora Public Golf Course |
| | 63 | Greenwood Drive |
| | 64 | Havelock Avenue (Bundoora Extended Care) |
| | 65 | Grimshaw Street |
| | 66 | Settlement Road |
| | 67 | Bundoora Square Shopping Center |
| | 68 | Greenhills Road (North Park Private Hospital) |
| | 69 | Taunton Drive |
| | 71 | Plenty Rd. (Janefield) |
| 95 | 1 | Bourke St. at Spenser St. |
| | 3 | Bourke St. at William St. |
| | 4 | Bourke St. at Queen St. |
| | 5 | Bourke St. at Elizabeth St. |
| | 6 | Bourke St. at Swanston St. |
| | 7 | Bourke St. b/n Russell & Exhibition Sts. |
| | 8 | Bourke St. at Spring St. |

| | | |
|---|---|---|
| 96 | 1 | Bourke St. at Spenser St. |
| | 3 | Bourke St. at William St. |
| | 4 | Bourke St. at Queen St. |
| | 5 | Bourke St. at Elizabeth St. |
| | 6 | Bourke St. at Swanston St. |
| | 7 | Bourke St. b/n Russell & Exhibition Sts. |
| | 9 | Bourke St. at Spring St. |
| | 122 | Spencer St. at Collins St. |
| | 124A | Crown Entertainment Complex and Exhibition Center |
| | 126 | St. Kilda Light Rail City Rd. |
| | 127 | St. Kilda Light Rail South Melbourne |
| | 128 | St. Kilda Light Rail Albert Park |
| | 129 | St. Kilda Light Rail Wright St. |
| | 130 | St. Kilda Light Rail Middle Park |
| | 131 | St. Kilda Light Rail Fraser St. |
| | 132 | St. Kilda Light Rail St. Kilda Station |
| | 134 | Fitzroy St. at Park St. |
| 109 | 1 | Collins St. b/n Spencer & King Sts. |
| | 5 | Collins St. at Elizabeth |
| | 6 | Collins St. at Swanston St. |
| | 8 | Collins St. b/n Russell St. & Exhibition St. |
| | 9 | Collins St. at Spring St. |
| | 12 | Victoria Pde., Brunswick & Gisborne Sts. |
| | 13 | Victoria Pde. at Lansdowne St. |
| | 15 | Victoria Pde. at Smith |
| | 16 | Victoria Pde. At Wellington |
| | 18 | Victoria Pde. At Hoddle St. |
| | 24 | Victoria St. at Burnley St. |
| | 25 | Victoria St. at River Blvd. |
| | 54 | Whitehorse Rd. at Inglisby Rd. |
| | 55 | Whitehorse Rd. at Hood St. |
| | 56 | Whitehorse Rd. at Elgar Rd. |
| | 57 | Whitehorse Rd. at Nelson Rd. |
| | 58 | Box Hill Terminus, Whitehorse Rd. |
| | 124A | Crown Entertainment Complex and Exhibition Center |
| | 125A | Southbank |
| | 126 | Port Melbourne Light Rail Montague St. |
| | 127 | North Port |
| | 128 | Graham Street |
| | 129 | Beacon Cove |

| | | |
|---|---|---|
| 112 | 1 | Collins St. b/n Spencer & King Sts. |
| | 5 | Collins St. at Elizabeth |
| | 6 | Collins St. at Swanston St. |
| | 8 | Collins St. b/n Russell St. & Exhibition St. |
| | 9 | Collins St. at Spring St. |
| | 12 | Victoria Pde., Brunswick & Gisborne Sts. |
| | 124A | Crown Entertainment Complex and Exhibition Center |
| | 130 | Albert Rd. at Cecil St. |
| | 131 | Albert Rd. at Cecil St. |
| | 137 | Danks St. at Harold St. |

# Appendix E PTAC Members

| Representative | Organization |
|---|---|
| Mr. Peter Hudson | Paraquad Victoria |
| Ms Rina Sherry | Department of Human Services |
| Mr. Frank Hall-Bentick | Public transport user with links to local and international disability organizations |
| Ms Tricia Malowney | Victorian Disability Advisory Council |
| Ms Jessica Zammit | Blind Citizens Australia |
| Mr. Jeff Jackson | Returned and Services League of Australia |
| Ms Nicola Wood | Municipal Association of Victoria |
| Mr. Noel Smith | Arthritis Victoria |
| Mr. Patrick Moore | Council on the Ageing |
| Mr. Shane Kelly | SCOPE |
| Ms Jess Fritze | Victorian Council of Social Service |
| Mr. Maurice Gleeson | Vision Australia |
| Ms Jeanette Lee | YOORALLA |
| Mr. David Peters | Victorian Deaf Society (Vicdeaf) |

# Appendix F MapInfo Layer Sources

| Layer (file name) | Source | Directly File Path |
|---|---|---|
| Currently_accessible_stops | Custom | G:\Public Transport\ALL Public Transport\Business Development\000003 Projects\0071 Accessible Tram Stop Program\WPI Project 08\MapInfo Maps |
| target_routes | Custom | G:\Public Transport\ALL Public Transport\Business Development\000003 Projects\0071 Accessible Tram Stop Program\WPI Project 08\MapInfo Maps |
| critical_council_areas | Custom | G:\Public Transport\ALL Public Transport\Business Development\000003 Projects\0071 Accessible Tram Stop Program\WPI Project 08\MapInfo Maps |
| PedestrianCrossings_MI | Emilio Savle (Multi Purpose Taxi Program) | G:\Public Transport\ALL Public Transport\Business Development\000003 Projects\0071 Accessible Tram Stop Program\WPI Project 08\Multi Purpose Taxi Program MapInfo Data |
| disability_orgs_MI | Emilio Savle (Multi Purpose Taxi Program) | G:\Public Transport\ALL Public Transport\Business Development\000003 Projects\0071 Accessible Tram Stop Program\WPI Project 08\Multi Purpose Taxi Program MapInfo Data |
| density_200m | Emilio Savle (Multi Purpose Taxi Program) | G:\Public Transport\ALL Public Transport\Business Development\000003 Projects\0071 Accessible Tram Stop Program\WPI Project 08\Multi Purpose Taxi Program MapInfo Data |
| AD_LGA_AREA_POLYGON | DOI Database | W:\Administrative_Boundaries\Local_Government\VIC\2007 |
| All_Mosaics_blocks | DOI Database | N:\Imagery\Aerial Photography\Melbourne\2004\Mosaics |
| TR_ROAD | DOI Database | W:\Transport\Roads\Network\DSE_Vicmap_Transport\Current |
| Tram_Stop_2006_04 | DOI Database | W:\Transport\Tram\Network\2006 |
| Tram_Track_Centerline | DOI Database | W:\Transport\Tram\Network\2006 |

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# Appendix G Additional Assignments

## Assignment 1: Intellectual Capital

March 13, 2008

WPI Department of Infrastructure Team

**Assignment 1: Intellectual Capital**

Department of Infrastructure

2

### Objectives

- Define *intellectual capital*
- Explore how intellectual capital is useful in accessibility for the disabled

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3

### What is Intellectual Capital (IC)?

**Breakdown of Concept**

- *Intellectual*
  - Possessing/showing mental capacity to a high degree
- *Capital*
  - Source of profit/advantage/power

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1

### What is Intellectual Capital (IC)?

**Intellectual Capital**

- Intangible assets of an organization
- The sum of all ideas, information, and knowledge over which individuals or organizations may wish to exercise some form of control[1]
- Knowledge that can be converted into profit or results

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### What is Intellectual Capital (IC)?

**Components[2]**

- General knowledge
- Skill and experience of employees
- Organizational structure
- Learning ability
- Technological leadership

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### What is Intellectual Capital (IC)?

**Relationship of Information & Knowledge**

- Both are major forms of IC
- Information is valuable and does not change
- Knowledge is the ability to acquire and use information to achieve goals

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7

## What is Intellectual Capital (IC)?

### Knowledge

- It is dynamic as it involves a process of learning and using information[3]
- Connected with novelty, originality, innovation and progression[3]
- Related to qualifications of organization members and structure



8

## IC Applied to Disabled Access

### General knowledge

- Necessary for an organization to develop goods and services
- Includes:
  - Needs of disabled passengers
  - Criteria for selecting stops
  - Tram usage data
  - Rules and regulations
  - Previous projects



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## IC Applied to Disabled Access

### Skill and experience of employees

- Necessary to have employees with different backgrounds
- Includes:
  - Engineers
  - Lawyers
  - Management
- Employees with different backgrounds can acquire and use knowledge and information in different ways and allows the organization to do more.



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## IC Applied to Disabled Access

### Organizational structure

- Companies should re-organize to maximize performance of knowledge[4]
- For the team's project, the organizations are DOI, Yarra Trams, VicRoads, and the councils
- The roles of "client", "deliverer", "project partner" must be clearly defined with good information flow between the organizations
- Great organizational structure has more potential and value as it can lead to a better product in a more efficient process



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## IC Applied to Disabled Access

### Learning ability

- Need to be able to acquire information at a quick and efficient pace
- Many regions of the tram system are different and have their own problems
- The DOI needs to observe and recognize these various issues in order to deliver appropriate solutions



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## IC Applied to Disabled Access

### Leadership

- Project direction
- Division of labor
- Allocation of funds
- Able to identify organization's assets and improve efficiency

## Summary

- Intellectual capital combines the idea of knowledge and brain power with the concept of economic capital
- It includes the valuable, yet intangible, assets of an organization
- In considering disabled access, these intangible assets include:
  - General knowledge of the tram network and usage
  - Employee experience within previous projects and educational backgrounds
  - An organizational structure with defined "client", "deliverer" and "project partner" roles
  - The ability to learn information about the tram system as well as disabled standards at a quick and efficient pace
  - Leadership that can identify and use the organization's assets





## Works Cited

[1]http://books.google.com.au/books?id=eHZYi6bAZZ4C&pg=PA128&lpg=PA128&dq=ideas+behind+intellectual+capital&source=web&ots=pbbJphnWtN&sig=oQnQcTiPBfQk7PpLx6UjGvIGwy4&hl=en#PPA136,M1

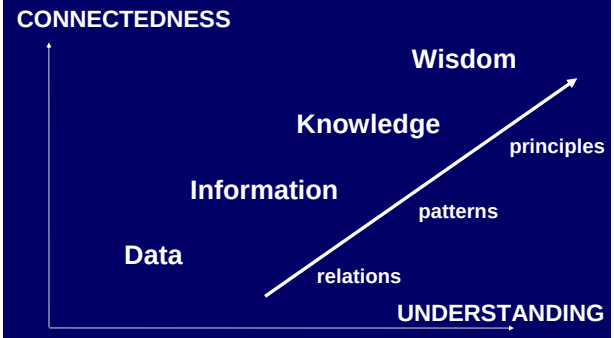
[2]http://melbourneinstitute.com/wp/wp2002n22.pdf

[3]http://epublications.bond.edu.au/cgi/viewcontent.cgi?article=1019&context=law_pubs

[4]http://www.providersedge.com/docs/book_reviews/Wealth_of_Knowledge.pdf



## Knowledge Management




## Knowledge...

**•..is present in facts, truths, ideas, judgements, talents, root causes, relationships, perspectives and concepts.**

**•..is essential for action, performance and adaptation.**

**•..is accumulated and integrated and held over time to handle novel situations and challenges.**

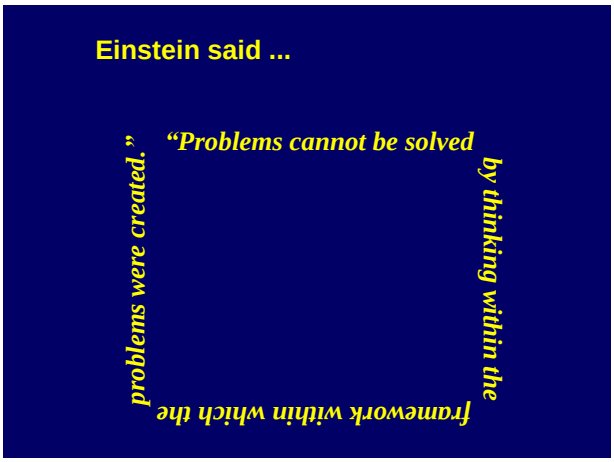
**•..is stored in the individual brain or encoded in organisational processes, documents, products, services, facilities and systems.**

## Technology Transfer Process… ...Critical Success Factors

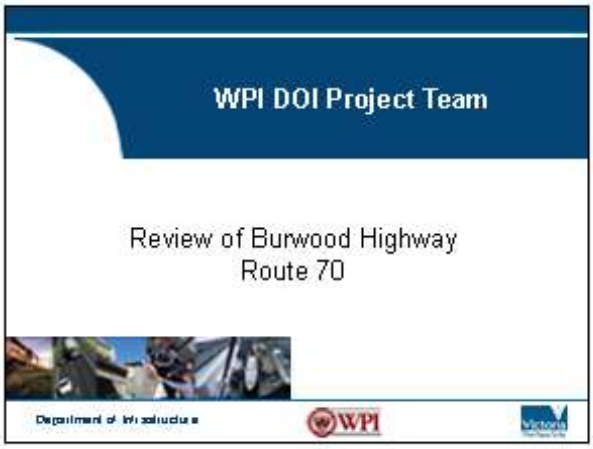
**Management System**
- **strategic formulation**
- **resource provision**
- **needs recognition**
- **culture building**
- **communication**

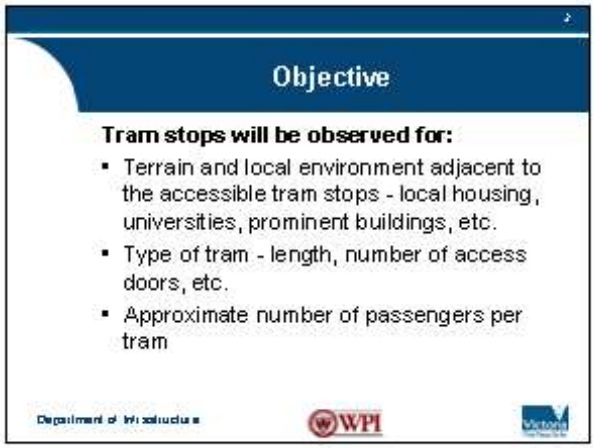
## Knowledge Architecture

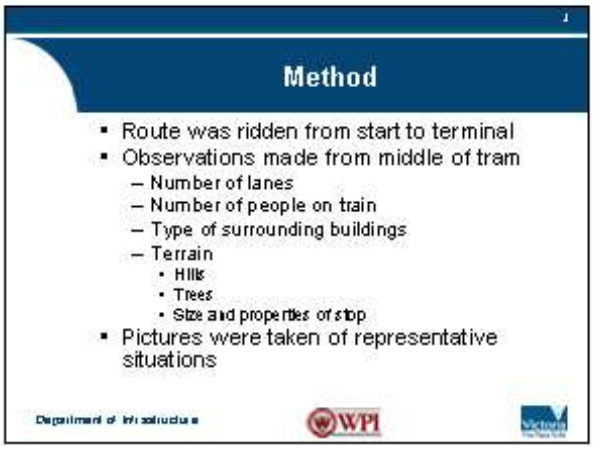
- **ATSP Program**
  - **agree process**
  - **agree model**
  - **set priorities**
  - **budgeting**
  - **table plan**




## Assignment 2: Route 70 – Review of Burwood Highway




## Tram Stop Map of Burwood Highway

Department of Infrastructure

## Route 70 – Burwood Highway

**Tram Specifications**

- Class A2 (Tram #271)
- Four doors
  - Two smaller up front
  - Four wider in middle
- Not accessible – two steps to tram floor

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## Route 70 – Burwood Highway

Stops 1-6

| | |
|---|---|
| Number of Lanes | 2 in each direction |
| Terrain | flat |
| Environment | Shopping, restaurants, museums |
| Stop Properties | Stops 1-4 have platform stops |
| Number of People | 20 |

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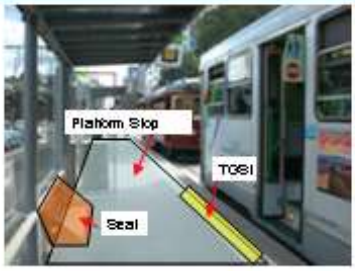
## Route 70 – Burwood Highway

Stop 3

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## Route 70 – Burwood Highway

Stops 3-5


Department of Infrastructure

## Route 70 – Burwood Highway

Stops 7A-7D

| | |
|---|---|
| Number of Lanes | 2 in each direction |
| Terrain | flat |
| Environment | Parks, leading CBD<br>7C is stop for MCG, 7B and 7D have no lanes for cars – tram space only |
| Stop Properties | Platform stops |
| Number of People | 20 |

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## Route 70 – Burwood Highway

Stop 8

| | |
|---|---|
| Number of Lanes | 1 lane in each direction |
| Terrain | flat |
| Environment | Parking in lane adjacent to tram |
| Stop Properties | Stop on sidewalk. Tram in median and passengers talk across lane to tram |
| Number of People | 18 |

## Route 70 – Burwood Highway

Stops 9-13

| | |
|---|---|
| Number of Lanes | 1 lane in each direction |
| Terrain | flat |
| Environment | Shopping areas – furniture, restaurants, cars |
| Stop Properties | Stop on sidewalk. No metal fencing. |
| Number of People | 20 |

## Route 70 – Burwood Highway

Stop 14

| | |
|---|---|
| Number of Lanes | 2 lanes in each direction |
| Terrain | flat |
| Environment | Shopping areas – furniture, restaurants, cars |
| Stop Properties | Stop on sidewalk. No metal fencing. |
| Number of People | 20 |

## Route 70 – Burwood Highway

Stops 15-17

| | |
|---|---|
| Number of Lanes | 2 lanes in each direction |
| Terrain | flat |
| Environment | Residential – parks, apartments, trees, tennis courts. Sudden increase in passengers at stop 16 at 3:30PM due to students. Large intersection at stop 17. |
| Stop Properties | Stop on sidewalk. No metal fencing. |
| Number of People | 20 |

## Route 70 – Burwood Highway

Stop 18

| | |
|---|---|
| Number of Lanes | 2 lanes in each direction |
| Terrain | flat |
| Environment | Parks |
| Stop Properties | Accessible with ramp and handrails |
| Number of People | 20 |

## Route 70 – Burwood Highway

Stops 19-29

| | |
|---|---|
| Number of Lanes | 2 lanes in each direction |
| Terrain | Uphill |
| Environment | Residential area |
| Stop Properties | Sidewalk stop, no handrails |
| Number of People | 20 |

## Route 70 – Burwood Highway

Stops 30-31

| | |
|---|---|
| Number of Lanes | 1 lane in each direction |
| Terrain | level |
| Environment | Residential area |
| Stop Properties | Sidewalk stop, no handrails, bench |
| Number of People | 20 |

## Route 70 – Burwood Highway

Stop 30


## Route 70 – Burwood Highway

Stop 32

| | |
|---|---|
| Number of Lanes | 1 lane in each direction |
| Terrain | Level |
| Environment | Residential area, cafes |
| Stop Properties | Sidewalk stop, handrails, bench |
| Number of People | 20 |

## Route 70 – Burwood Highway

Stop 32


## Route 70 – Burwood Highway

Stops 33, 34

| | |
|---|---|
| Number of Lanes | 1 lane in each direction |
| Terrain | Level |
| Environment | Residential area, cafes |
| Stop Properties | Sidewalk stop, handrails, bench |
| Number of People | 20 |

## Route 70 – Burwood Highway

Stop 32-36 Aerial View

## Route 70 – Burwood Highway

Stops 36-39

| | |
|---|---|
| Number of Lanes | Switch back to 2 lanes in each direction |
| Terrain | Level |
| Environment | Residential area, skin cancer clinic, doctors' offices |
| Stop Properties | Sidewalk stop |
| Number of People | 17 |

## Route 70 – Burwood Highway

Stops 40, 41

| | |
|---|---|
| Number of Lanes | 2 lanes in each direction |
| Terrain | Level |
| Environment | Shopping, cafes, large exchange of people with more people getting off |
| Stop Properties | Sidewalk stop |
| Number of People | 15 |

## Route 70 – Burwood Highway

Stops 42, 43

| | |
|---|---|
| Number of Lanes | 2 lanes in each direction |
| Terrain | Uphill and top of hill |
| Environment | Apartments, offices, aged service apartment (43) |
| Stop Properties | Sidewalk stop |
| Number of People | 15 |

## Route 70 – Burwood Highway

Stop 44-45

| | |
|---|---|
| Number of Lanes | One lane in each direction |
| Terrain | Downhill |
| Environment | Residential area, narrower streets |
| Stop Properties | Sidewalk stop |
| Number of People | 15 |

## Route 70 – Burwood Highway

Stops 46, 47

| | |
|---|---|
| Number of Lanes | One lane in each direction |
| Terrain | Downhill |
| Environment | Riversdale Park, increase in number of passengers |
| Stop Properties | Sidewalk stop, no bench or rail |
| Number of People | 20 |

## Route 70 – Burwood Highway

Stop 46

## Route 70 – Burwood Highway

Stop 48

| | |
|---|---|
| Number of Lanes | One lane in each direction |
| Terrain | Bottom of the hill |
| Environment | 7/11 convenience store, gas, shops |
| Stop Properties | Sidewalk stop, bench |
| Number of People | 20 |

## Route 70 – Burwood Highway

Stop 49

| | |
|---|---|
| Number of Lanes | One lane in each direction |
| Terrain | Uphill |
| Environment | Housing, trees on sides |
| Stop Properties | Sidewalk stop, bench |
| Number of People | 20 |

## Route 70 – Burwood Highway

Stop 50

| | |
|---|---|
| Number of Lanes | One lane in each direction |
| Terrain | Level |
| Environment | Residential area, trees, adjacent to intersection |
| Stop Properties | Sidewalk stop, no bench or rail |
| Number of People | 20 |

## Route 70 – Burwood Highway

Stop 50


## Route 70 – Burwood Highway

Stops 53-54

| | |
|---|---|
| Number of Lanes | 1 lane in each direction |
| Terrain | Uphill |
| Environment | Shops and offices |
| Stop Properties | Sidewalk stop |
| Number of People | 17 |

## Route 70 – Burwood Highway

Stops 55-61 (end of route)

| | |
|---|---|
| Number of Lanes | 1 lane in each direction |
| Terrain | Varies (Surrey Hills) |
| Environment | Residential and park area, Stop 60 is surrounded by few restaurants/shops |
| Stop Properties | Sidewalk stop |
| Number of People | 17 |

## Route 70 – Burwood Highway

Stop 56-61 Aerial View


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## Route 70 – Burwood Highway

Summary

- Terrain – level at start (1-19), hills in residential areas
- Lanes – changes. Starts with two lanes in each direction, then one lane in each direction, then back to two
- Environment
  - Housing (one Elderly/Serviced Apartments)
  - Shops
  - Cafés
  - Parks
  - Doctors' offices

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## Route 70 – Burwood Highway

**Summary**

- Very few accessible stops (only ones noted were 1-4, 7B, 7C, 7D, and 18)
  - 18 seemed possible as the road was wider with 2 lanes and the surrounding area was a park
- Trams were not accessible as stops were simply signs on the sidewalk with passengers walking to tram in its tram lane
- Passengers had to cross at least one lane of car traffic to reach tram

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## Assignment 3: Route 86 – Review of Plenty Road

### WPI DOI Project Team

Review of Plenty Road
Route 86

### Objective

**Tram stops will be observed for:**

- Terrain and local environment adjacent to the accessible tram stops - local housing, universities, prominent buildings, etc.
- Type of tram - length, number of access doors, etc.

### Method

- Route was observed from stop 60 to 66
- Observations made from middle of tram
  - Number of lanes
  - Type of surrounding buildings
  - Terrain
    - Hills
    - Trees
    - Size and properties of stop
- Pictures were taken of representative situations

### Tram Stop Map of Burwood Highway

### Route 86 – Plenty Road

**Tram Specifications**

- Class B2
- Four doors
  - Two smaller up front
  - Four wider in middle
- Not accessible – two steps to tram floor

### Route 86 – Plenty Road

**Stops 60-65**

- All accessible, platform stops
- Route runs from within a wide landscaped median to becoming part of highway traffic (no barrier between track and traffic lanes) nearing stop 65
- 3 lanes of traffic on each side
- Points of Interest: LaTrobe University, Bundoora Extended Care, Childcare Center, Restaurants, Shops, etc.

## Route 86 – Plenty Road

**Stop 65**




## Route 86 – Plenty Road

Stop 65 - engineering challenges

- Narrow traffic lanes on each side
- Fast area of highway
- Several road crossings necessary to get to platform



## Route 86 – Plenty Road

Stop 65 Platform

- Guardrail and barriers installed to protect platform passengers from traffic
- Traffic lane width reduced
- Platform created with narrow ramp to platform
- Platform width narrows from ramp to the end
  - Maintains necessary length to accommodate tram doors
  - Allows disabled passengers to board at front of tram
- TGSI installed on platform and crossing islands



## Route 86 – Plenty Road

Stop 65




## Route 86 – Plenty Road

Stop 65

Narrowing Platform Width

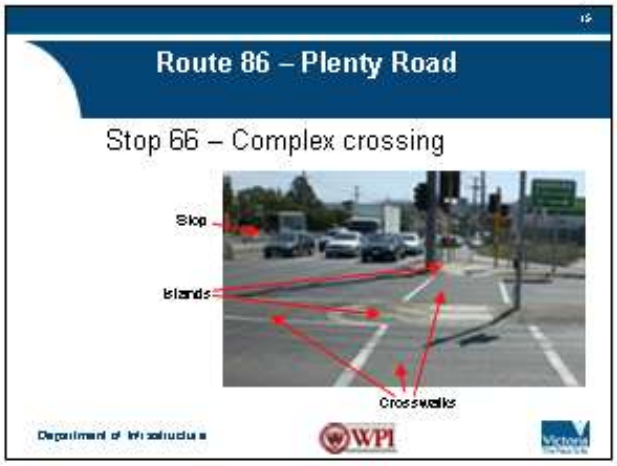


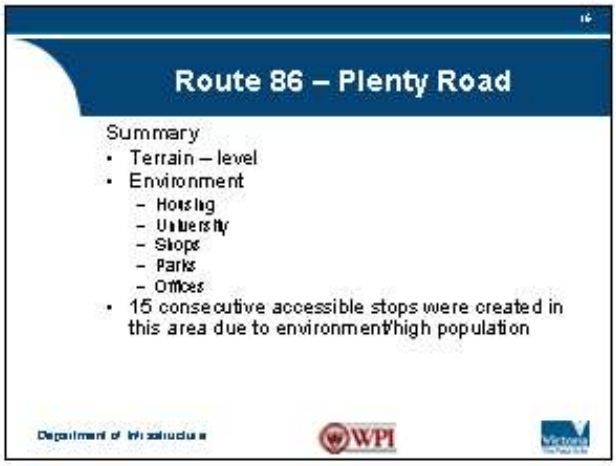
## Route 86 – Plenty Road

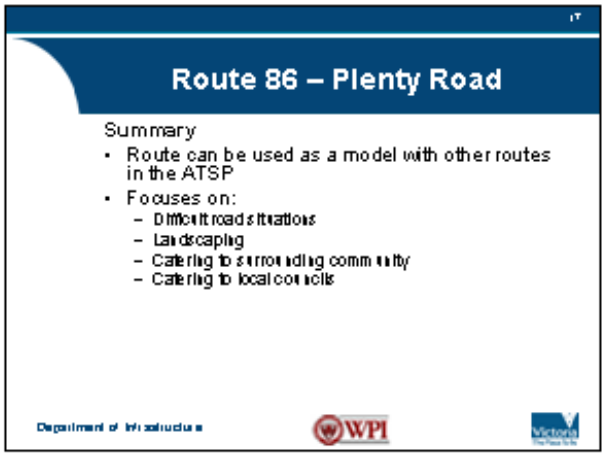
Stop 66

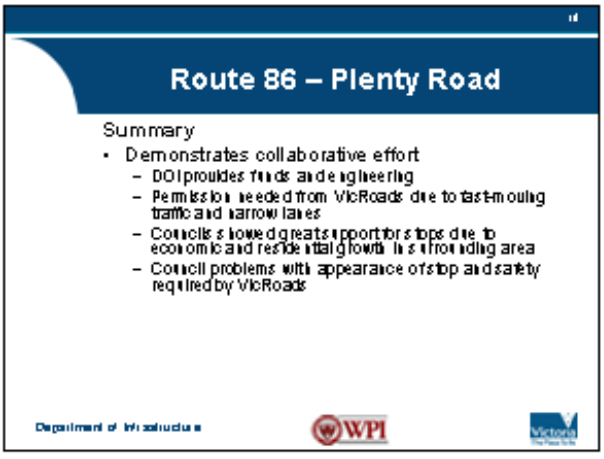
- Constructed on hill
- Narrow width (narrowest in network)
- TGSI installed on platform and crossing islands






**Assignment 4: Brainstorming**

March 11, 2003

WPI Department of Infrastructure Team

## Assignment 3: Brainstorming

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## Objectives

- Define *brainstorming*
- Explore why brainstorming is used
- Determine the advantages and disadvantages of brainstorming

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## What is Brainstorming?

**Brainstorming**

- A lateral thinking process
  - Initially, quantity is more important than quality
- A process used to develop as many creative solutions as possible to a problem

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## Individual vs. Group Brainstorming

**Individual**

- Wide range of ideas
- Develop ideas on their own time
- No fear of criticism

**Group**

- Ideas are developed more effectively
- Wider range of diversity

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## Advantages

**Idea Development**

- Variety of ideas are generated
- Ideas are not evaluated until all brainstorming is complete
- Even silly ideas can lead to creative ideas

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## Advantages

**Organization Development**

- Better employee relations
- New and improved products and services
- Better management of ideas
- Possible improvements in productivity and reliability

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## Necessary for Success

### Opening

- The chief executive needs to have an informative and compelling opening that tells the team members what the problem is and what its objectives are

## Necessary for Success

### Being Prepared

- The team members have to be prepared in order for brainstorming to be successful
- Each team member must have their own ideas before meeting as a group

## Disadvantages

### Individual Contribution is Limited

- One person speaks while others listen
- Listening to others restricts individuals from forming their own creative thoughts

## Disadvantages

### Unequal Participation

- The result of brainstorming is from a group
- Some people may participate less than others or simply follow the ideas of another

## Disadvantages

### Distractions

- Ideas are spoken aloud which inhibits individual thought
- Limited thinking time in group setting
- There will always be some fear of negative feedback

## Disadvantages

### Lack of direction and judgment

- Because no criteria is used to guide the process, the ideas may be very off-target

## Disadvantages

### Hierarchy

- In many countries, such as several in Asia, the boss is in control
- Once the boss has made a decision, the employees cannot persuade the boss to change his decision

## Disadvantages

### False Perceptions

- Although people enjoy working in a group more and are more satisfied with the result, usually less progress is actually achieved
- Because the group produced many ideas, the individual people feel like more ideas were created than would be if they worked by themselves

## Why is Brainstorming Useful?

### Want new "out of the box" ideas

- Use when you want a fresh outlook at a problem
- Use to get lots of new ideas at once
- Allows a more creative type of thinking
- Even if one idea is unreasonable, it may prompt or inspire another person to think of a better solution

## Why is Brainstorming Useful?

### Group Bonding

- Combine individual expertise
- People feel more effective and satisfied psychologically when working together

## Brainstorming

### Summary

- Brainstorming, despite its disadvantages, is a very useful process when generating various ideas to a solution
- Proper brainstorming produces the best and most successful results
- May not always be applicable to all problems

## Assignment 5: Leadership through Henry V

March 12, 2008

WPI Department of Infrastructure Team

### Assignment 5: Leadership and Team Values

Examining Henry V at the Battle of Agincourt

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### Objectives

**Explore**

- Successful thinking
- Successful strategy

**Examine**

- Henry Fifth at the Battle of Agincourt

**Relate**

- Henry V's approach with how DOI will approach the ATSP

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### Battle of Agincourt

**English**

- Commanded by English King Henry V
- Army consisted of 6,000-9,000 men

**French**

- Commanded by Constable Charles d'Albret
- Army consisted of 12,000-36,000 men

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### Battle of Agincourt

**Battle**

- October 25, 1415
- Fought between woods of Tramecourt and Agincourt
- The French still had some missing troops on the morning of the 25th, and therefore would not attack
- Henry then took a risk and pushed his troops forward, which was unexpected by the French

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### Battle of Agincourt

**Battle**

- The terrain was muddy, which caused the French to keep sinking into the mud and become physically weak
- This allowed the English bowmen to easily attack the French army
- Thousands of Frenchmen died, leading to their defeat
- On the morning of October 26th, Henry returned to the battlefield and order the coup de grâce of any wounded Frenchmen

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### Henry V

**Biography**

- Born on September 16, 1387 in Monmouth, Wales
- Became Prince of Wale in 1399
- Named Duke of Lancaster on November 10, 1399
- His other titles were Duke of Cornwall, Earl of Chester, and Duke of Aquitaine

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## Henry V

### Biography

- Reigned as King of England from 1413 to 1422
- Married to Catherine of Valois, daughter of the King of France
- Died August 31, 1422 in Bois de Vincennes, France

## Henry V: Speech at Agincourt

### Summary of Speech

- If one is not willing to fight, then he shall leave and only be rewarded with tangible goods
- If one is willing to risk his life to fight for his country, he will always be remembered and honored throughout the years
- Those who are at home and not fighting will regret not being part of the battle, for they will not be able to talk of such a great accomplishment

## Ideas Applied to DOI

### Henry V

- Concentration
- Coordination of Arms
- Planning and Decision Making
- Speed of Action
- Follow Through

### DOI

- Shared Values
- Clarity of Purpose
- Planning and Decision Making
- Action
- Follow Up

## Henry V: Thinking and Strategy

### Concentration

- Henry V and many Englishmen presumed they would lose the battle, considering the difference in army sizes
- As a result, Henry V declared to his men that they would have to fight for their lives because if they were captured, they would not be spared
- Although it seemed to be almost impossible for the English to win the battle, Henry V was confident and still fought strongly

## DOI: Thinking and Strategy

### Shared Values

- DOI has to work with many other organizations, such as Yarra Trams, VicRoads, and the councils, in order for the Accessible Tram Stop Program to become successful
- In order for any plans to become accomplished, every organization has to have an agreed upon consensus
- If one organization does not comply, then the program will fail

## Henry V: Thinking and Strategy

### Coordination of Arms

- Had approximately 900 men-at-arms, 200 archers and 5,000 long-bowmen
- Long-bowmen were positioned on the left and right sides
- Men-at-arms and knights were positioned in the center
- Archers were positioned in the very center

## Henry V: Thinking and Strategy

### Coordination of Arms

- The men-at-arms who wore armor were placed shoulder to shoulder in columns of four
- The archers placed pointed, wooden stakes, known as palings, into the ground at an angle to force the Frenchmen on horses to turn around
- Since the terrain was heavily muddy, the French and English army became heavily packed and could not fight
  - However, this allowed the long-bowmen to fight back the French



## DOI: Thinking and Strategy

### Clarity of Purpose

- Before DOI can tackle the problem, all project partners have to have a clear understanding of what the problem is stating/asking
- If DOI were to attempt to solve the problem without understanding the contents of the problem, nothing would get solved and everything would fall apart
- Once DOI starts breaking down individual issues to the initial problem, everything will come together in the end and result in success



## Henry V: Thinking and Strategy

### Planning and Decision Making

- After walking 250 miles (402 km) for 18 days, the English troops walked into the French forces
- The English, tired and weary, were unprepared and didn't have any plans on fighting the French
- Henry V decided to position his men across 750 yards of the territory



## DOI: Thinking and Strategy

### Planning and Decision Making

- DOI has to carefully plan what steps are going to be pursued to satisfy the problem
- However, if unexpected situations were to arise, DOI would have to be ready and willing to take on the challenge



## Henry V: Thinking and Strategy

### Speed of Action

- When first encountering the French troops, Henry had to act quickly to arrange his men on the battle field
- On the morning of October 25th, the French still had troops missing; therefore, the French had not attacked the English yet
- After waiting for three hours, Henry V commanded his troops to move forward
- The French were not ready for the English advancement



## DOI: Thinking and Strategy

### Action

- DOI always has to be ready to make quick decisions when problems occur
- DOI has to be confident in their actions
- Through their actions, DOI should present themselves as a positive organization that is always willing to improve the Victorian infrastructure

## Henry V: Thinking and Strategy

### Follow Through

- Fearing the French prisoners would rearm and attack the English troops from the back, Henry V had the prisoners killed
- After the battle, Henry V ordered a coup de gråce of any wounded French soldier
  - This was considered to be necessary protocol for the English

## DOI: Thinking and Strategy

### Follow Up

- To ensure that their methods have a successful outcome, DOI needs to follow up on their actions
- DOI has to make sure everything is safe and that the users are satisfied
- Follow up can be completed by:
  - On-site visits
  - Surveys
  - Interviews

## Conclusion

### Summary

- When DOI approaches the ATSP, they will have to be successful in their thinking and their strategy
- This can be done by relating their thinking and strategy to those of Henry V

## Assignment 6: Route 64 - Review of Dandenong Road

March 13, 2008

WPI Department of Infrastructure Team

**Assignment 6 – Dandenong Road**

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### Objectives

- Observe and note representative stops on Dandenong Road (Route 64)
- Understand challenges faced in designing the stop
- Applying observations to routes to be investigated later by the project team

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## Background

- Dandenong Road is a very large road; is a gateway into the city
- Stop 48 observed
  - Upper middle class neighborhood
  - Stops shared by two councils (Glen Eira and Stonnington)
  - Heritage feature complications
  - Located at a large intersection
- Stop 47 observed
  - Adjacent stop which is not accessible



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## Background

### Accessible stop list on route 64

- Stop 32, 34, 35, 36, 37, 38, 40, 42, 48
- Stop 48 is at the intersection of Hawthorne Rd and Dandenong Rd



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## Background

### Stop Map



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## Observations

### Stop 48

- Old stop building
  - Accessible path built around to avoid having the path on the rounded part of the turn
- Landscaping and working around old trees
- Handrail between stop and tram tracks



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## Observations

### Stop 48




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## Observations

### Stop 48 – Aerial View

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## Observations

### Stop 48

- Heritage poles
  - Council would not allow them to be moved or damaged
  - Tram lines were worked around them

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## Observations

### Stop 48

heritage poles

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## Observations

### Stop 48

- Crash protection
  - Guardrails on side to protect stop from car collisions (VicRoad requirement)
  - Concrete Barriers (tram requirement)
  - Not wanted by councils but required for stop safety
- Three lanes of traffic on each side
- Width of Stop 2.4 m
- TGSIs

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## Observations

### Stop 48

- Ramp is angle to allow tram to have enough clearance when turning

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## Observations

### Stop 47

- In median of road
- Not Accessible
  - Unlike at the intersection where crosswalks could be used, there is no way to cross highway safely
  - VicRoads did not feel it was able to slow traffic significantly at the stop by adding a crosswalk
  - There is also no accessible path for the disabled to cross tracks to go in the opposite direction

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## Observations

### Stop 47

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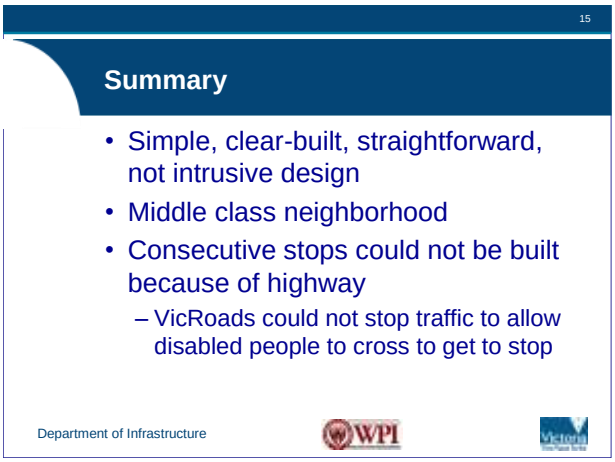


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# Appendix H Observation Spreadsheets for Field Work

**Route: 96** ***Stop 10 is attached at end of spreadsheet***

**Road: Nicholson** **Stop 11 Victoria Parade** **Stop 12 Gertrude St**

| **Safety** | Outbound | Inbound | Outbound | Inbound |
|---|---|---|---|---|
| Lanes of Traffic | 2 | 2 | 2 | 2 |
| Width of Lanes | narrow | | | |
| Location of Stop (median or sidewalk) | Median | | Median | |
| Width of Stop (2.1, 2.4, 3.3 m) | 2.15 | 0.9 with 1m shy space | 1.45 | 1.9 |
| Length of Stop (+/- 33 m) | 44.6 | 37.4 | 36.3 | |
| Notes: | Other route running perpendicular between intersection Tram Accident Black Spot?? | | inb. Track curves to right 60 km/h to 40 km/hr ahead Tram Accident Black Spot?? | |
| **Construction Ease** | | | | |
| Traffic Flow* | 5+ | | 4/5. | |
| Environment (city, reservation, shops...) | City, Carlton Gardens | | City, Carlton Gardens | |
| Intersection Locations | between stops | | in front of stops | |
| Landmarks | 2 traf light | 1 traf light | 2 traf. arrival poles | 1 traf. |
| Notes: | modern shelters on both sidewalks b/c of grass possible push back of sidewalk | | modern shelters on both sidewalks | |
| **Terrain** | | | | |
| Topography | flat | | flat | |
| Parking Availability | on opposite side of stops | | past stop? | |
| Environment (Trees, landscaping…) | | | | |
| **Usage** | | | | |
| Notes: | | | | |
| **Coverage** | | | | |
| Notes (consecutive vs alternating): | VERY close to stop 10 | | | |
| **Destinations** | | | | |
| Type of Housing | | | | |
| Notes: | St. Vincent's Hospital | | school ahead, Melbourne Exhibition Center, park | |
| **Councils** | | | | |
| Council that stop is located in | Yarra/Melbourne | | Yarra/Melbourne | |

**Route: 96** ***Stop 10 is attached at end of spreadsheet***

**Road: Nicholson** **Stop 13 Hanover St** **Stop 14 Murchison St**

| **Safety** | Outbound | Inbound | Outbound<br>Inbound | |
|---|---|---|---|---|
| Lanes of Traffic | 2 | 2 | 2 | 2 |
| Width of Lanes | Wider Lanes | | | |
| Location of Stop (median or sidewalk) | Median | | Median | |
| Width of Stop (2.1, 2.4, 3.3 m) | 1.5 | 1.3 | 1.4 | 1.4 |
| Length of Stop (+/- 33 m) | 25.8 | 28.5 | 31.4 | 29.3 |
| Notes: | 40 km/h, shelters on sidewalks | | 60 km/h<br>Long crosswalk wait, could cause<br>people to rush across traffic<br>to stop | |
| **Construction Ease** | | | | |
| Traffic Flow | 3 | | 3 | |
| Environment (city, reservation, shops...) | outer city, park | | outer city, housing | |
| Intersection Locations | none | | none | |
| Landmarks | 1 traf | 1 traf | 1 traf. | --- |
| Notes: | Outb sidewalk = 3.6 m, possible<br>to push sidewalk into park? | | lighting pole on outb safety zone<br>sign | |
| **Terrain** | | | | |
| Topography | slight decline | | decline | |
| Parking Availability | past stops | | past stops | |
| Environment (Trees, landscaping…) | trees on sidewalks | | trees/utilities on sidewalks | |
| **Usage** | | | | |
| Notes: | | | | |
| **Coverage** | | | | |
| Notes (consecutive vs alternating): | approximately 200 m to stop 14 | | | |
| **Destinations** | | | | |
| Type of Housing | | | nice apartments | |
| Notes: | school, convent | | school and gardens before | |
| **Councils** | | | | |
| Council that stop is located in | Yarra/Melbourne | | Yarra/Melbourne | |

**Route: 96** ***Stop 10 is attached at end of spreadsheet***

**Road: Nicholson** **Stop 15 Elgin St** **Stop 16 Kay St**

| **Safety** | | Outbound<br>Inbound |
|---|---|---|
| Lanes of Traffic | 2 2 | 2 |
| Width of Lanes | narrow | ~3.4 m |
| Location of Stop (median or sidewalk) | Median | Median |
| Width of Stop (2.1, 2.4, 3.3 m) | 2.8 2.7 at widest section | 1.8/1.5 |
| Length of Stop (+/- 33 m) | 39.5 52.7 | 31.4 |
| Notes: | Sidewalk shelters (outb-older)<br>(inb-modern), 60 km/h,<br>outb stop is past intersection rather then before as it is typically | sidewalks = 3.7 m<br>handrails by all median stops<br>Signs to divert traffic |
| **Construction Ease** | | |
| Traffic Flow | 4 | 3 |
| Environment (city, reservation, shops...) | outer city | shops (1 outside café) |
| Intersection Locations | between stops | none |
| Landmarks | 1 traf 1 traf past stop | 1 traf 1 traf |
| Notes: | | |
| **Terrain** | | |
| Topography | flat | flat |
| Parking Availability | past stops | past stop |
| Environment (Trees, landscaping…) | few trees/utilities on sidewalk | few trees on sidewalk edge |
| **Usage** | | |
| Notes: | | |
| **Coverage** | | |
| Notes (consecutive vs alternating): | close to stop 14 | 2 stops within half block |
| **Destinations** | | |
| Type of Housing | high rise apartments | apartments |
| Notes: | bus stop 50 m to right | |
| **Councils** | | |
| Council that stop is located in | Yarra/Melbourne | Yarra/Melbourne |

**Route: 96** ***Stop 10 is attached at end of spreadsheet***

**Road: Nicholson** **Stop 17 Princes St** **Stop 18 Curtain St**

| **Safety** | Outbound Inbound | Outbound Inbound |
|---|---|---|
| Lanes of Traffic | 3 (due to traffic light)/2 | 2/2. |
| Width of Lanes | | |
| Location of Stop (median or sidewalk) | Median | Median |
| Width of Stop (2.1, 2.4, 3.3 m) | 1.5/1.3 | 1.35/1.65 |
| Length of Stop (+/- 33 m) | 45.6/47.4 | 29.1/31.0 |
| Notes: | Sidewalk 2.2/3.8<br>handrails by all median stops<br>Signs to divert traffic | Sidewalk 3.55/<br>handrails by all median stops<br>Signs to divert traffic<br>Adequate Lighting |
| **Construction Ease** | | |
| Traffic Flow | 5 | 3 |
| Environment (city, reservation, shops...) | school, petrol, church | apartments, hotel, bar |
| Intersection Locations | between stops | none |
| Landmarks | 1 traf. ? | 1 traf. 1 traf |
| Notes: | Shelter inbound stop | Easier construction-<br>away from shops |
| **Terrain** | | |
| Topography | flat | flat |
| Parking Availability | left on inb. stop(looking outb) | none 4 spots |
| Environment (Trees, landscaping…) | few trees on sidewalk edge | few trees on sidewalk edge |
| **Usage** | | |
| Notes: | | |
| **Coverage** | | |
| Notes (consecutive vs alternating): | 2 stops within half block | 2 stops within half block |
| **Destinations** | | |
| Type of Housing | few apartments | older housing |
| Notes: | St. Bridgid's School | foodworks, hotel , bar |
| **Councils** | | |
| Council that stop is located in | Yarra | Yarra |

**Route: 96** ***Stop 10 is attached at end of spreadsheet***

**Road: Nicholson** **Stop 19 Tempany St** **Stop 20 Richardson St**

| **Safety** | Outbound | Inbound | Outbound | Inbound |
|---|---|---|---|---|
| Lanes of Traffic | 2 | 2 | 2 | |
| Width of Lanes | 2.8 - narrow | | | |
| Location of Stop (median or sidewalk) | Median | | Median | |
| Width of Stop (2.1, 2.4, 3.3 m) | 1.3 | 1.5 | 1.5/2.6 | |
| Length of Stop (+/- 33 m) | 26.3 | 28.2 | 20.7/25.1 | |
| Notes: | handrails by all median stops<br>Signs to divert traffic<br>40 km/h, shelters both sidewalks<br>NO CROSSWALKS | | Sidewalk 3.7/4.0<br>Shelter inbound<br>handrails by all median stops<br>Signs to divert traffic | |
| **Construction Ease** | | | | |
| Traffic Flow | 3 | | 4 | |
| Environment (city, reservation, shops...) | housing | | apartments, small office building | |
| Intersection Locations | none | | between stops (small) | |
| Landmarks | none | | 1 traf | ? |
| Notes: | less traffic than average | | | |
| **Terrain** | | | | |
| Topography | slight incline | | SLIGHT incline | |
| Parking Availability | past stops | | 9 on right | ~5 on left |
| Environment (Trees, landscaping…) | few trees on sidewalk edge | | larger trees on sidewalk | |
| **Usage** | | | | |
| Notes: | | | | |
| **Coverage** | | | | |
| Notes (consecutive vs alternating): | 2 stops within half block | | 2 stops within half block | |
| **Destinations** | | | | |
| Type of Housing | older apartments/houses | | old apartments | |
| Notes: | | | Conga foods, N Carlton Children's Center, Pizza, Nicholson Village | |
| **Councils** | | | | |
| Council that stop is located in | Yarra | | Yarra | |

**Route: 96** ***Stop 10 is attached at end of spreadsheet***

**Road: Nicholson** **Stop 21 Pigdon St** **Stop 22 Brunswick Street**

| **Safety** | Outbound | Inbound | Outbound | Inbound |
|---|---|---|---|---|
| Lanes of Traffic | 2 | | 2/1 | 1(+1 shared with track)/1 |
| Width of Lanes | | | | |
| Location of Stop (median or sidewalk) | Median | | Median | Sidewalk |
| Width of Stop (2.1, 2.4, 3.3 m) | 1.75/1.3 | | 1.5 | ------- |
| Length of Stop (+/- 33 m) | 21/21.1 | | 20 | ------- |
| Notes: | Sidewalk 3.8/3.85<br>handrails by all median stops<br>Signs to divert traffic | | Sidewalk 2.9/2.5<br>No handrails | |
| **Construction Ease** | | | | |
| Traffic Flow | 4 | | 4 | |
| Environment (city, reservation, shops...) | Several Shops | | Shops, apartments further out | |
| Intersection Locations | between stops (small) | | between stops | |
| Landmarks | none | | | |
| Notes: | Could get tight platform in | | Won't be easy to build platform especially on inbound side | |
| **Terrain** | | | | |
| Topography | flat | | curve before outbound stop | |
| Parking Availability | on right | on left | right / right 30 m from intersection | |
| Environment (Trees, landscaping…) | shrubs, no trees | | no trees | |
| **Usage** | | | | |
| Notes: | | | | |
| **Coverage** | | | | |
| Notes (consecutive vs alternating): | 2 stops within half block | | longer distance b/w stop 21 - 22 | |
| **Destinations** | | | | |
| Type of Housing | few, if any, housing | | few, if any, housing | |
| Notes: | Coffee, health trainers, restaurants, language center | | Park, bike path, osteopath doctor church, school and park further outbound | |
| **Councils** | | | | |
| Council that stop is located in | Yarra/Moreland | | Yarra/Moreland | |

**Route: 96**

**Road: Nicholson** **Stop 10 Albert Street**

| **Safety** | Outbound | Inbound |
|---|---|---|
| Lanes of Traffic | 3 | 3 |
| Width of Lanes | | |
| Location of Stop (median or sidewalk) | Median | |
| Width of Stop (2.1, 2.4, 3.3 m) | 1.3 | 2.3 |
| Length of Stop (+/- 33 m) | 45 | 38 |
| Notes: | outb shelter on sidewalk, 50 km/h | |
| **Construction Ease** | | |
| Traffic Flow | 4/5. | |
| Environment (city, reservation, shops...) | edge of city | |
| Intersection Locations | between stops | |
| Landmarks | both sides: 1 traf. 1 arrival post | |
| Notes: | | |
| **Terrain** | | |
| Topography | incline | |
| Parking Availability | past stop | none |
| Environment (Trees, landscaping…) | Few trees | |
| **Usage** | | |
| Notes: | | |
| **Coverage** | | |
| Notes (consecutive vs alternating): | VERY close to stop 11 | |
| **Destinations** | | |
| Type of Housing | | |
| Notes: | parliament station, bus terminal, offices, park, parliament | |
| **Councils** | | |
| Council that stop is located in | Moreland | |

**Route: 112** 27 is similar to 26

**Road:St Georges Road** **Stop 26 Clarke St** **Stop 27 Westbourn Gv**

| **Safety** | Outbound | Inbound | Outbound | Inbound |
|---|---|---|---|---|
| Lanes of Traffic | 2 | median | 2 | median |
| Width of Lanes | 3.2 | | inner lane is more narrow | |
| Location of Stop (median or sidewalk) | median (with landscaping to right) | | median (with landscaping to right) | |
| Width of Stop (2.1, 2.4, 3.3 m) | 1.7 | 3 | 1.7 | 3 |
| Length of Stop (+/- 33 m) | 31 | >33 | 78 | |
| Notes: | would need to move platform into road area. issue of crossing: shelter to track | | inb. side declines towards tracks speed - 60 km/h issue of crossing: shelter to track | |
| **Construction Ease** | | | | |
| Traffic Flow* | 2/3. | | 2/3. | |
| Environment (city, reservation, shops...) | houses, school | | houses, school | |
| Intersection Locations | before stops | | none | |
| Landmarks | 2 traf. lights | 3 utility poles | 2 traf. lights | 1 utility pole |
| Notes: | 15 meters between utility poles modern shelter on inbound side w/ some vandalism. | | older shelter on inbound side | |
| **Terrain** | | | | |
| Topography | flat, with decline afterwards | | slight decline | |
| Parking Availability | none | | none | |
| Environment (Trees, landscaping…) | landscaping to right of both stops | | landscaping to right of both stops | |
| **Usage** | | | | |
| | | | | |
| **Coverage** | | | | |
| Notes (consecutive vs alternating): | stops fairly close (~half block) | | stops fairly close (~half block) | |
| **Destinations** | | | | |
| Type of Housing | working class apartments | | | |
| Notes: | houses, Northcote H.S., not too many other destinations of note | | Northcote H.S., park and sports fields | |
| **Councils** | | | | |
| Council that stop is located in | Darebin | | Darebin | |

**Route: 112** 28 is similar to 26

**Road:St Georges Road** **Stop 28 Sumner Av** **Stop 29 Arthurton Rd**

| **Safety** | Outbound | Inbound | Outbound | Inbound |
|---|---|---|---|---|
| Lanes of Traffic | 2 | median | 4/2 | 2/3 |
| Width of Lanes | | | | 2.6 inner lane |
| Location of Stop (median or sidewalk) | median (with landscaping to right) | | median | |
| Width of Stop (2.1, 2.4, 3.3 m) | 1.2 | 3 | 2.2 | 1.5 |
| Length of Stop (+/- 33 m) | 50 | | 50 | 32 |
| Notes: | 60 km/h, inb waiting area declines towards track<br>issue of crossing: shelter to track | | shelter between tracks<br>pram crossing, grid fencing<br>no TGSIs<br>issue of crossing: shelter to track | |
| **Construction Ease** | | | | |
| Traffic Flow | 3 | | 4-5. | |
| Environment (city, reservation, shops...) | housing | | park/housing/shops | |
| Intersection Locations | none | | between intersection | |
| Landmarks | 2 traf. lights | 1 utility pole | 1 traf. light | 1 traf. light |
| Notes: | older shelter on inbound side | | need longer length for wheelchair ramp on inbound side<br>shy space for extra space in road | |
| **Terrain** | | | | |
| Topography | flat, incline after stop | | slight uphill | |
| Parking Availability | none | | none | |
| Environment (Trees, landscaping…) | landscaping to right of both stops | | $270,000 landscaping in median | |
| **Usage** | | | | |
| Notes: | | | | |
| **Coverage** | | | | |
| Notes (consecutive vs alternating): | stops fairly close (~half block) | | stops fairly close (~half block) | |
| **Destinations** | | | | |
| Type of Housing | working class apartments | | working class apartments | |
| Notes: | St. Joseph's home, houses | | bus terminal, train 300 m, merri community child care, school | |
| **Councils** | | | | |
| Council that stop is located in | Darebin | | Darebin | |

| **Route: 112** | | | 31 similar to 30 | |
|---|---|---|---|---|
| **Road:St Georges Road** | **Stop 30 Gladstone Ave** | | **Stop 31 Gadd St** | |
| **Safety** | Outbound | Inbound | Outbound | Inbound |
| Lanes of Traffic | 2 | 2 | 2 | 2 |
| Width of Lanes | 3.6 | | | |
| Location of Stop (median or sidewalk) | median | | median | |
| Width of Stop (2.1, 2.4, 3.3 m) | 1.4 | 1.5 | 1.3 | 1.3 |
| Length of Stop (+/- 33 m) | 32 | 43 | 46 | 28 |
| Notes: | issue of crossing: shelter to track<br>small waiting areas<br>inb. area inclines towards track<br>put stop on L rather than R?? | | issue of crossing: shelter to track<br>TGSI installed, inb. decline to tracks | |
| **Construction Ease** | | | | |
| Traffic Flow | 3 | | 4 | |
| Environment (city, reservation, shops...) | shops | | housing | |
| Intersection Locations | none | | past stops | |
| Landmarks | 2 traf lights | 2 traf lights | 2 lights before stop | 2 traf lights |
| Notes: | shy space for extra space in road<br>older shelter between stops<br>inb and outb incline towards tracks | | shy space for extra space in road<br>older shelter between stops<br>inb declines to tracks | |
| **Terrain** | | | | |
| Topography | slight incline | | slight decline | |
| Parking Availability | yes, past stop length | | none | 2-3 spots |
| Environment (Trees, landscaping…) | landscaped b/w stops | | landscaped b/w stops | |
| **Usage** | | | | |
| Notes: | | | | |
| **Coverage** | | | | |
| Notes (consecutive vs alternating): | stops fairly close (~half block) | | stops fairly close (~half block) | |
| **Destinations** | | | | |
| Type of Housing | | | working class apartments | |
| Notes: | | | retirement village (outb side) | |
| **Councils** | | | | |
| Council that stop is located in | Darebin | | Darebin | |

| **Route: 112** | 32 similar to 29 | | 33 similar to 29 | |
|---|---|---|---|---|
| **Road:St Georges Road** | **Stop 32 Normanby Ave** | | **Stop 33 Hutton St** | |
| **Safety** | Outbound | Inbound | Outbound | Inbound |
| Lanes of Traffic | 3 | 4 | 2 | 2 |
| Width of Lanes | | | | |
| Location of Stop (median or sidewalk) | median | | median | |
| Width of Stop (2.1, 2.4, 3.3 m) | 1.3 | 1 | 1 | 1 |
| Length of Stop (+/- 33 m) | 50 | 35 | 30 | 30 |
| Notes: | issue of crossing: shelter to track<br>TGSI installed, 70 km/h,<br>inb declines towards track<br>shelters in median | | issue of crossing: shelter to track<br>no TGSI, 70 km/h<br>inb declines towards track<br>shelters in median | |
| **Construction Ease** | | | | |
| Traffic Flow* | 4/5. | | 4 | |
| Environment (city, reservation, shops...) | housing then shops | | mix of shops & housing | |
| Intersection Locations | between stops | | between stops | |
| Landmarks | 1 traf light | 1 traf light | 1 traf light | 1 traf light |
| Notes: | shy space for extra space in road | | shy space for extra space in road | |
| **Terrain** | | | | |
| Topography | flat | | flat | |
| Parking Availability | inb, before stop | | ~1 space | before/mid stop |
| Environment (Trees, landscaping…) | landscaped b/w stops | | landscaped b/w stops | |
| **Usage** | | | | |
| Notes: | | | | |
| **Coverage** | | | | |
| Notes (consecutive vs alternating): | stops fairly close (~half block) | | stops fairly close (~half block) | |
| **Destinations** | | | | |
| Type of Housing | working class apartments | | | |
| Notes: | motor inn, uniting church,<br>fast food, some housing before,<br>bus stop area, merri<br>community childcare | | trains 300 m on R<br>chiropractor, Thornbury primary<br>school, café | |
| **Councils** | | | | |
| Council that stop is located in | Darebin | | Darebin | |

**Route: 112**

**Road:St Georges Road** **Stop 34 Miller St**

| **Safety** | Outbound | Inbound |
|---|---|---|
| Lanes of Traffic | 2 | median |
| Width of Lanes | narrow lanes | |
| Location of Stop (median or sidewalk) | median (with landscaping to right) | |
| Width of Stop (2.1, 2.4, 3.3 m) | 1.3 | 3 |
| Length of Stop (+/- 33 m) | 45-50 | |
| Notes: | issue of crossing: shelter to track<br>modern shelter on inb side | |
| **Construction Ease** | | |
| Traffic Flow | 5 | |
| Environment (city, reservation, shops...) | nothing, besides a small plaza | |
| Intersection Locations | past stop | |
| Landmarks | 1 traf light | none |
| Notes: | shy space for extra space in road<br>not a lot of space on outb side | |
| **Terrain** | | |
| Topography | flat | |
| Parking Availability | none | |
| Environment (Trees, landscaping…) | little landscaping to R of stops | |
| **Usage** | | |
| Notes: | | |
| **Coverage** | | |
| Notes (consecutive vs alternating): | stops fairly close (~half block) | |
| **Destinations** | | |
| Type of Housing | | |
| Notes: | small plaza with medical clinic<br>pharmacy, Darebin arts and<br>entertainment center is past stop | |
| **Councils** | | |
| Council that stop is located in | Darebin | |

**Route: 86**

| **Road: Queens Parade/High Street** | **Stop 22 Smith St** | | **Stop 23 Wellington** | |
|---|---|---|---|---|
| **Safety** | Outbound | Inbound | Outbound | Inbound |
| Lanes of Traffic | 2 | 2 | 3 | 3 |
| Width of Lanes | | | | |
| Location of Stop (median or sidewalk) | median | | median | |
| Width of Stop (2.1, 2.4, 3.3 m) | 1.7 | 3.3 | 1.5 | 2.4 |
| Length of Stop (+/- 33 m) | 45+ | 45+ | 30 | 50 |
| Notes: | 1 extra lane separated by median<br>60 km/h | | 1 extra lane separated by median<br>Several crosswalk islands | |
| **Construction Ease** | | | | |
| Traffic Flow* | 3+ | | 4+ | |
| Environment (city, reservation, shops...) | apartments, large store (hardware) | | main street area | |
| Intersection Locations | before stop | | in front of stop | |
| Landmarks | 1 traf/light pole | ------ | 1 traf | 1 traf |
| Notes: | stop constructed with brick<br>track bends into stop turning right before stop begins<br>inb shelter with perpend. Ad | | stop already raised on a curb on outb side<br>inb shelter with perpend. Ad | |
| **Terrain** | | | | |
| Topography | uphill | | flat | |
| Parking Availability | in extra lane | | past stop | |
| Environment (Trees, landscaping…) | median separating extra lane | | median separating extra lane | |
| **Usage** | | | | |
| Notes: | route seems to be more widely used than others examined | | | |
| **Coverage** | | | | |
| Notes (consecutive vs alternating): | Fairly close to Stop 23 | | close to stop 22 and 24 | |
| **Destinations** | | | | |
| Type of Housing | Apartments | | none | |
| Notes: | Hardware Store<br>Beginning of street… | | main street area | |
| **Councils** | | | | |
| Council that stop is located in | Yarra | | Yarra | |

**Route: 86**

**Road: Queens Parade/High Street** **Stop 24 Michael St** **Stop 25 Clifton Hill Interchange**

| **Safety** | Outbound | Inbound | Outbound | Inbound |
|---|---|---|---|---|
| Lanes of Traffic | 2 (opens to 3) | 2 | 3 | 2 |
| Width of Lanes | | | | |
| Location of Stop (median or sidewalk) | median | | median | |
| Width of Stop (2.1, 2.4, 3.3 m) | 1.2-2.6 | 3 | 2.7 | 1.5-3 |
| Length of Stop (+/- 33 m) | 46 | 51 | 41 | 25 |
| Notes: | 1 extra lane separated by median<br>60 km/h<br>TGSI, many island crossings | | 1 extra lane separated by median<br>TGSI<br>60 km/h | |
| **Construction Ease** | | | | |
| Traffic Flow | 4-5. | | 4? (half intersection ahead) | |
| Environment (city, reservation, shops...) | main street | | mix | |
| Intersection Locations | between | | main side street ahead on right | |
| Landmarks | 1 traf | 1 traf | 2 traf. | ----- |
| Notes: | shelters on both sides, inb has perpend Ad | | shelters: outb has paral. Ad, inb has perpend. Ad with vandalism, median bus stop before | |
| **Terrain** | | | | |
| Topography | flat | | decline | |
| Parking Availability | no | yes | before stop | in extra lane |
| Environment (Trees, landscaping…) | | | | |
| **Usage** | | | | |
| | | | | |
| **Coverage** | | | | |
| Notes (consecutive vs alternating): | close to 23 and 25 | | further distance away from 24 and 26 | |
| **Destinations** | | | | |
| Type of Housing | none | | nice houses/apartments | |
| Notes: | main street area | | bus stop has entire other stops with shelters included<br>not as many shops as previously in area | |
| **Councils** | | | | |
| Council that stop is located in | Yarra | | Yarra | |

**Route: 86**

**Road: Queens Parade/High Street** **Stop 26 Walker St** **Stop 27 Westgarth St**

| **Safety** | Outbound | Inbound | Outbound | Inbound |
|---|---|---|---|---|
| Lanes of Traffic | 2 | 1 | 2 | 1(+1 shared with track) |
| Width of Lanes | | | | |
| Location of Stop (median or sidewalk) | median | | median | sidewalk |
| Width of Stop (2.1, 2.4, 3.3 m) | 1 | 3.1 | 1.4 - 2.6 | ------ |
| Length of Stop (+/- 33 m) | 28 | 38 | 40 | ------- |
| Notes: | TGSI, crash protection at stop end<br>fast traffic flow | | no TGSI, 50 km/hr<br>several island crosswalks | |
| **Construction Ease** | | | | |
| Traffic Flow | 3+ | | 4 | |
| Environment (city, reservation, shops...) | mix | | shops | |
| Intersection Locations | none | | between stops | |
| Landmarks | 1 traf | 1 traf | 1 traf | 2 traf |
| Notes: | sidewalk at 2.2m on inb side | | old shelter in outb side, shelter with 2 paral. Ads on inb sidewalk<br>inb sidewalk= 3.3m | |
| **Terrain** | | | | |
| Topography | incline | | flat/slight decline | |
| Parking Availability | none | | no | yes (past stop/opposite side) |
| Environment (Trees, landscaping…) | trees past sidewalk | | none | |
| **Usage** | | | | |
| | | | | |
| **Coverage** | | | | |
| Notes (consecutive vs alternating): | on different road than stop 25<br>close to stop 27 | | close to stop 26 | |
| **Destinations** | | | | |
| Type of Housing | apartment complexes | | none | |
| Notes: | church, housing, shops ahead<br>buses 50 m, trains 410 m | | buses 25 m<br>shopping/main street area | |
| **Councils** | | | | |
| Council that stop is located in | Darebin | | Darebin | |

# Appendix I Interviews

**Emilio Savle (PTAC Representative) Interview**

*What do we need to know?*

- What do these groups do? How can/do/should they influence or inform the selection of sites for upgrade. Can they be useful in helping us determine where to upgrade stops within our 2 route areas?
- Why are they important stakeholders in the process?—question for us to observe
- How can ATSP benefit from their involvement?
- How the groups fit into the process (considering past/current/future process)?
- What input can PTAC give us for our site selection criteria (matrix spreadsheet)?

*Interview Questions*

- We understand you have several years experience working in the disability field. Can you provide us with some background on you recent work with accessibility audits and mapping for disable passengers?
- What are the major differences in strategy between Tram, Train, and bus accessibility?
- The PTAC is comprised of representatives from a variety of disability organizations, representatives from train/tram/bus/taxi companies, as well as staff from the PTD at DOI. What is the organizational structure of the PTAC?
- What type of input do the disability action groups give? (options, surveys, ideas, requests)
- How do the groups voice their concerns to the DOI?
- At what stage of the process can these groups provide input? (Are they being heard early in the process, or asked for approval after decisions have been made?)
- At what point in the program does the PTAC come in to selecting specific sites to upgrade?
- Do these organizations have any major issues with the ATSP that you know of? What is the positive and negative feedback on the current accessible stops?
- Is there a general consensus among the groups about what needs to be done to make the tram system more accessible?
- How much does the Tram system affect opportunities for those with disabilities in terms of jobs, education, and activities of daily life (shopping, entertainment, etc)?
- Part of our project aims to define criteria for prioritization of stops. What are important factors for the action groups? What are major destinations and locations that disabled passengers want to see made more accessible?
- So far, all upgrades have been built for consecutive stops. Would there be a benefit if it was possible to spread the accessible stops out to alternating ones?
- We will be meeting with representatives from individual organizations including VicDeaf and Vision Australia. Do you have any suggestions for how to approach them?
- To conclude, what is your overall opinion of the process or suggestions for improvement?

**Sean Neilsen (Moreland Council) Interview**

- What is your role as a DDA advocate in the council? How does Moreland advocacy work?
- We see that you provide these services--provide meal transportation and community transport. How popular are they? Where does public transport fit into these services? Do you feel there is a strong need for accessible trams?
- Do you feel that accessible stops would be beneficial in your community?
- From what we've researched, we haven't seen any accessible platform stops built thus far in Moreland council. Are there priority areas you know of that would benefit from having accessible tram stops?
- What does an accessible stop need to have to be most useful to your council? (Suggestions: as small as possible, take up least amount of road space, shelters, lighting, etc)
- For our project, we will be looking at three main routes: Nicholson Road, St. George's Road, and Plenty Road. These routes involve the Moreland council, Yarra, and MCC. The beginning stops for Nicholson Road are part of Yarra and are median stops – which can be upgraded to accessible platform stops. The last few stops of Nicholson Road (23-27) travel into the Moreland council and are sidewalk stops. Rather than constructing platform stops because of sidewalk restrictions, there are "easy access stops". Would the council accept these as alternative stops? If not, what other strategy will the council be using to handle the sidewalk stops?
- To make the sidewalk stops accessible, there will most likely need to be parking displacement. What is Moreland's view on displacing metered parking? Non-metered parking? Moving the parking to side streets? How much influence will storeowners have in parking displacement?
- There are 4 parallel routes (1, 19, 55, 96) that travel through the Moreland Council and most of them are consecutive. Does Moreland have any plans of providing more trams for a wider range of coverage?
- Route 96 on Nicholson Road (southeast corner) is on the Yarra/Moreland Council Boundary. Does one council take over responsibility for all stops, or is the region divided down the track?

**Katie Dickson (Darebin Council) Interview**

- What is your role in DDA access for Darebin?
- We see that you provide these services--provide meal transportation and community transport. How popular are they? Where does public transport fit into these services? Do you feel there is a strong need for accessible trams?
- Do you feel that accessible stops are beneficial in your community?
- Have there been any issues with the accessible tram stops you currently have?
- Are there priority areas in general you know of that would benefit from having accessible tram stops?
- How does the council determine priorities with respect to accessible transport needs?

*Stops*

- What features does an accessible stop need to have to be most useful to your council? (Suggestions: as small as possible, take up least amount of road space, shelters, lighting, etc)
- Rather than constructing platform stops, there are alternative accessible stops—KAT (Kerb Access Tram) stops or easy access stops. Would the council accept these as alternative stops, for example on Plenty Road?
- What do you see happening in the future for accessible stops in Darebin?

*Saint Georges Road*

- What is the councils view conflicts between bus stops in the median and needing more space for accessible tram stops?
- What is the council's view on reducing road width in order to accommodate platform stops for stops with narrow widths?
- Is there potential for using the landscaped median for space for accessible stops?
- On Saint Georges Road, there are shelters for the bus in the landscaped median and there is the issue of people using them and then trying to cross the tracks to get to the tram. What is the councils view on having a shelter at the tram stop also to avoid this?

*Route 86*

- What is Darebin's view on displacement of parking?
- Typically the stops have narrow outbound and wide inbound stops

**Rob Moore (MCC) Interview**

- What is your role in DDA access for the MCC?
- Do you feel that accessible stops are beneficial in your community?
- Have there been any issues with the accessible tram stops you currently have and what has their effect been in the community?
- Are there priority areas in general you know of that would benefit from having accessible tram stops?
- How does the council determine priorities with respect to accessible transport needs?
- What is the relationship with VicRoads in the city environment?
- What is the MCC view on displacement of parking?
- What is the MCC view on decreases road width and traffic flow?
- How was MCC approached for the accessible tram stop program? How and when was it consulted?

*Stops*

- What features does an accessible stop need to have to be most useful to your council? (Suggestions: as small as possible, take up least amount of road space, shelters, lighting, etc)
- Rather than constructing platform stops, there are alternative accessible stops—KAT (Kerb Access Tram) stops or easy access stops. Would the council accept these as alternative stops?
- What do you see happening in the future for accessible stops in MCC?
- Route 96 runs along the borders of Yarra and the MCC, how does control work out?

**Mario Maldoni (VicRoads) Interview**

- What is you background within VicRoads and working in the Metropolitan North West Region?
- How do trams affect the road system in general? Is there a view on how they positively/negatively impact the road capacity or the coexistence of trams and traffic?
- In the future, KAT (kerb access tram) stops and easy access stops may need to be constructed which will ultimately slow down traffic. What is the process that occurs with VicRoads when a speed limit changes or is it permitted?
- VicRoads did a study that concluded the end of last year on minimizing speeds to 40 km/h on specific roadways. Has consideration been given to applying this speed to more roads, or specifically, any of the roads we're examining (mention roads prioritizing)?
- We are looking at 86 (Queen's Parade), 96 (Nicholson St), and 112 (St Georges Road). VicRoads controls some road spaces, while councils control others. Where in the areas we are examining, does VicRoads control the road space? How does the relationship work between councils and VicRoads on different road spaces?
- Do you have any data on road characteristics within the routes we are looking at? (i.e. – traffic flow, do large trucks have access on these roads?)
- What is VicRoads view on the progress of the Accessible Tram Stop Program?
- Some routes, specifically on Nicholson Street have a narrow stop waiting width which will have to expand with an accessible platform stop. What would VicRoad's attitude be on loss of road space, either in narrowing the lanes, or removing a lane?
- If allowing a decrease in lane width, are there any conditions in minimum widths or specific locations where this would be available?
- In locations like Plenty Road on Route 86, a narrow platform stop was constructed in a fast traffic area; therefore, crash protection was needed. What are VicRoads guidelines on necessary crash protection?

**Hector McKenzie (DOI) Interview**

*What do we need to know?*

- HREOC information, how does it work?
- Overview Questions on ATSP
- Information on Franchise change, how that affects program
- Selection of stops
- How funding is arranged
- Views on alternative accessible stops

*Interview Questions*

- We understand that you control public transport franchises and arrange all funding for their accessibility programs. Can you tell us a little more on what is your background working within public transport?
- What is your background of working within the ATSP specifically? Where do you think stop selection needs to occur? Within the franchise or DOI, etc?
- What is the process in dealing and communicating with HREOC in the public transport accessibility upgrades?
- We've looked at the Meeting Our Transport Challenges documents, and as for accessibility programs, the bus and train accessibility programs have been very

successful; however, in comparison, the tram accessibility upgrades have had a slower progress rate. Why do you think this has occurred?

- What are your views so far on how the ATSP has progressed and been managed?
- What happens to the ATSP when the franchise changes over in November? Where does accessibility fit into the bidding of the franchise, or how much does is matter to a probable future owner?
- How are the new low floor trams going to be introduced throughout the network in the following years? How does DOI decide where they go?
- What is your opinion towards needing alternative stops—KAT stops and Easy Access Stops? (affecting the road space in different ways)

**Massoud Majidi (Yarra Trams) Interview**

*2 Major Discussions:*

1. Merger between Yarra Trams and DOI. By merging construction work, the road will be closed for less time helping the community. DOI will benefit by not being penalized for stopping trams and Yarra will benefit because DOI will provide them with a budget for track renewal and accessible stop construction. Yarra trams will take over as the project manager for this entire project. Both will benefit on being able to talk to the councils (Yarra Council, specifically) as a team.
    - When Yarra needs to do track work (specifically on Nicholson St) would it be possible for DOI to construct platform stops within the same time period? What has been the problem with this idea in the past?
    - Have you dealt with Yarra council in the past? What are there views and opinions on track updates/disturbing traffic/disturbing community, etc?
    - What does Yarra Trams think about the possibility of putting in underground wires in the future?
    - What does Yarra trams need from a business viewpoint?
2. Prioritization of stops specifically on Nicholson St and the ATSP program as a whole:
    - What is Yarra's process within stop selection at present?
    - How will the new franchise owner affect the ATSP program?
    - How is the present communication between the project partners? Do you have any recommendations for the future?
    - What would Yarra think about re-evaluating specific stops that are too close together, such as Stop 10 and 11 on Nicholson St?

# Appendix J Progress Towards Accessible Public Transport

| Standards area | Percentage compliant with DSAPT | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Melbourne Trains | | Melbourne Trams | | Melbourne Buses 2005 | | ViLine Trains | | ViLine Coaches | | Regional buses 2005 | | |
| | Infrastructure | Vehicles | Infrastructure | Vehicles | Infrastructure Est - Metlink* | Vehicles | Infrastructure | Vehicles | Infrastructure Est - Metlink* | Vehicles | Infrastructure Est - Metlink* | Vehicles | |
| 2 Access paths | 15a | | 87 | 21 | 54 | | 40 | 79 | 40 | | 19 | | |
| 3 Manoeuvring areas | 70 | 100 | 79 | 21 | 38 | 48 | 99 | 80 | 45 | 35 | 20 | 39 | |
| 4 Passing areas | 75 | | 79 | | 50 | | 89 | 56 | 40* | | 20* | | |
| 5 Resting points | 86 | | | | | | 69 | | | | | | |
| 6 Ramps | 23 | 100 | 100 | 21 | 53 | 48 | 37 | 100 | 100* | 35 | 50 | 39 | |
| 7 Waiting areas | 53 | | 100 | | 50 | | 84 | | 44* | | 27* | | 100% by 2007 except bus stops |
| 8 Boarding | 96 | 100 | 7 | 3 | 33 | | 94 | 100 | 44* | 35 | 25* | | |
| 9 Allocated space | | 100 | 89 | 21 | 52 | 48 | | 56 | 44 | 35 | 27 | 39 | |
| 10 Surfaces | 64 | 100 | 87 | 100 | 43 | 48 | 65 | 79 | 44 | 35 | 25 | 39 | 100% by 2012 except bus stops |
| 11 Handrails and grabrails | 76 | 100 | 100 | 100 | | 48 | 30 | 65 | | 35 | | 39 | 100% by 2012 except bus stops |
| 12 Doorways and doors | 88 | 100 | | 100 | | 48 | 81 | 56 | | 35 | | 39 | |
| 13 Lifts | 100 | | | | | | 100 | | | | | | |
| 14 Stairs | 35 | | | 21 | | | 64 | | | | | | |
| 15 Toilets | 82 | | | | | | 74 | 86 | | | | | |
| 16 Symbols - c | 98 | 50b | 100 | 21 | | 100 | 98 | 100 | | 100 | | 100 | 100% by 2007 except bus stops |
| 17 Signs - c | 98 | 50b | 100 | 100 | 100 | 100 | 100 | 100 | 100* | 100 | 50* | 100 | 100% by 2007 except bus stops |
| 18 Tactile ground surface indicators | 22 | | 7 | | 4 | | 13 | | 10 | | 5 | | |
| 19 Alarms | 100 | | | | | | 100 | 100 | | | | | 100% by 2007 |
| 20 Lighting | 95 | 100 | | 37 | | 48g | 6 | 100 | | 35g | | 39g | 100% by 2007 except bus stops |
| 21 Controls | 57 | 100 | | 100 | | | 38 | 86 | | | | | |
| 22 Furniture and fitments | 100d | | | | | | 8 | | | | | | |
| 23 Street furniture (seats) | 64 | | 100 | | 75 | | 93 | | 50 | | 50* | | |
| 24 Gateways | 100 | | | | | | 97 | | | | | | 100% by 2012 except bus stops |
| 25 Payment of fares - e | 100 | | 100 | 100 | | 100 | 100 | 100 | | 100 | | 100 | Full by 2012 (vending machines) except |
| 26 Hearing augmentation - i | 100 | 100 | 100 | 13 | | 100 | 14 | 100 | | 100 | | 100 | 100% by 2007 except bus stops |
| 27 Information - c | 96 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100% by 2007 except bus stops |
| 28 Booked services | | | | | | | | 100 | | 100 | | | 100% by 2007 |
| 29 Food and drink services | 28f | | | | | | 40P | 100h | | | | | 100% by 2007 except bus stops |
| 30 Belongings | | 100 | | | | | | 100 | | 100 | | | 100% by 2007 |
| 31 Priority seating | | 100 | | 100 | | 100 | | 100 | | 100 | | 100 | 100% by 2007 |

KEY

- Not applicable
- Fully accessible
- Not met 2007 Milestone
- Met 2007 but not 2012 Milestone
- Met 2012 Milestone

NOTES:
MOTC Funded Programs are planned to achieve the 2007 milestone (except late for tram stops) and make pro rata progress towards the 2012 milestone,
for infrastructure, with separate programs to progress compliance for vehicles.
* Estimate
a Access path compliance relies on pedestrian crossing upgrades.
b Connex is managing a program for compliance on trains.
c. Parts 16 Symbols, 17 Signs and 27 Information should meet 100% by 2007 through Metlink's contract for metropolitan train, tram and bus services and general public transport information.

d. Connex meets by direct assistance
e. Part 25 Payment of fares should be met by 2012 through the new TTA ticketing system to be introduced from 2007.
f. Part 29 compliance relies on sub lease compliance
g. Compliance may be higher if older buses comply.
h. VLine meets by direct assistance.
i. Hearing augmentation is deemed met either with visual information or direct assistance from a driver.
The information in the above table is from various sources including audits and best estimates (bus stops) and is regularly updated.
Minor non compliances are deemed compliance for this matrix, to be rectified operationally.
The milestones require at least 25 percent compliance in each item. It is not meaningful to 'average' performance across the Standards.
Modes can be grouped together further. e.g. V/Line and Connex trains, metro and regional buses

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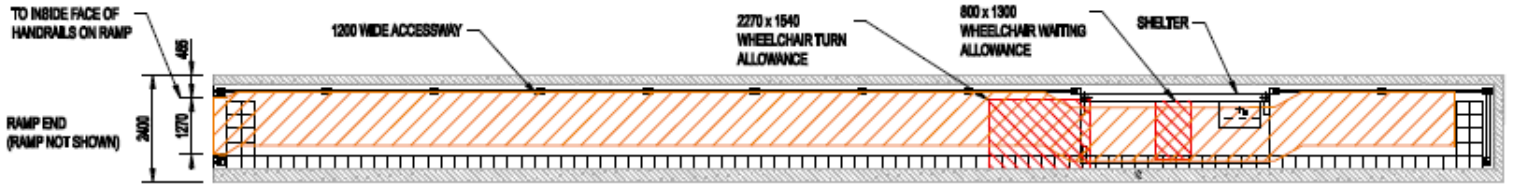
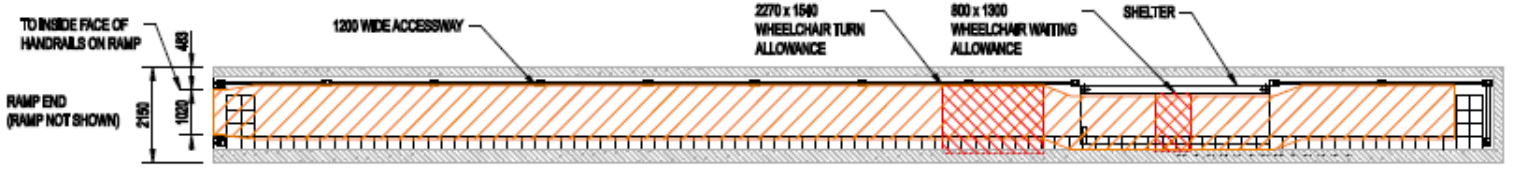
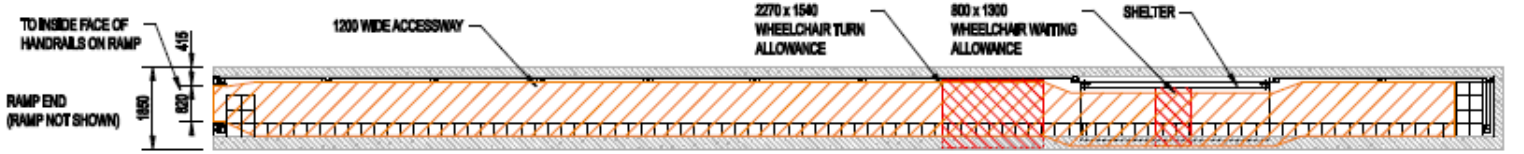
# Appendix K Platform Stop Designs



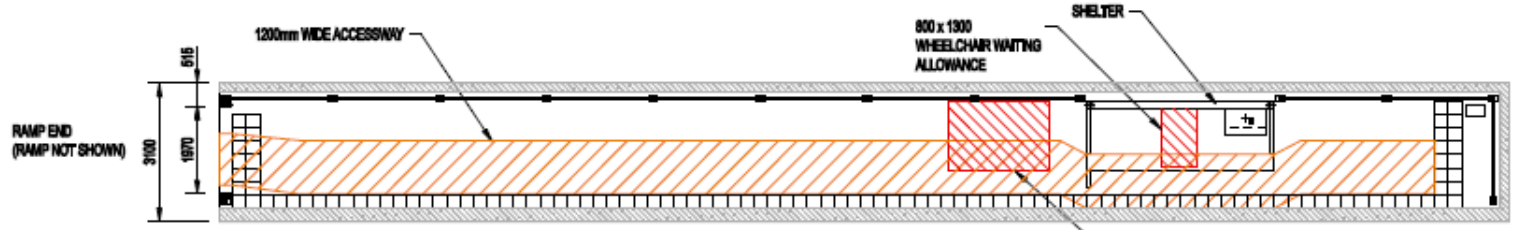

DOI STANDARD PLATFORM WIDTH 2400mm



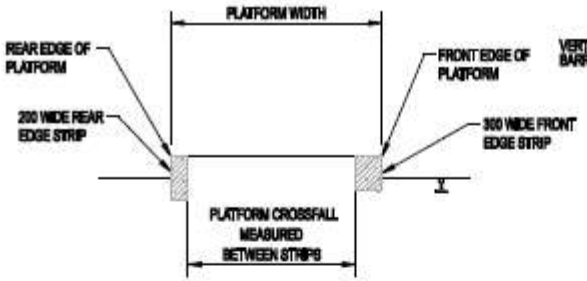

MINIMUM PLATFORM WIDTH 2150mm



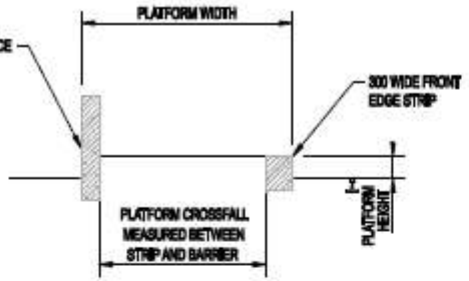

SAFETY ZONE TRAM STOP PLATFORM WIDTH 1850mm



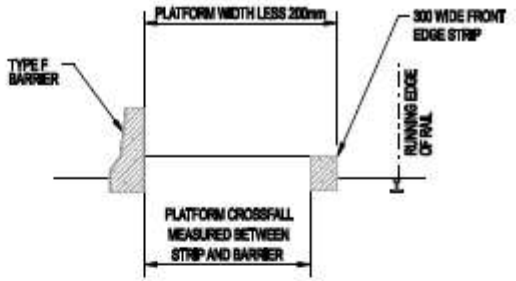

DESIGN WIDTH 3100mm



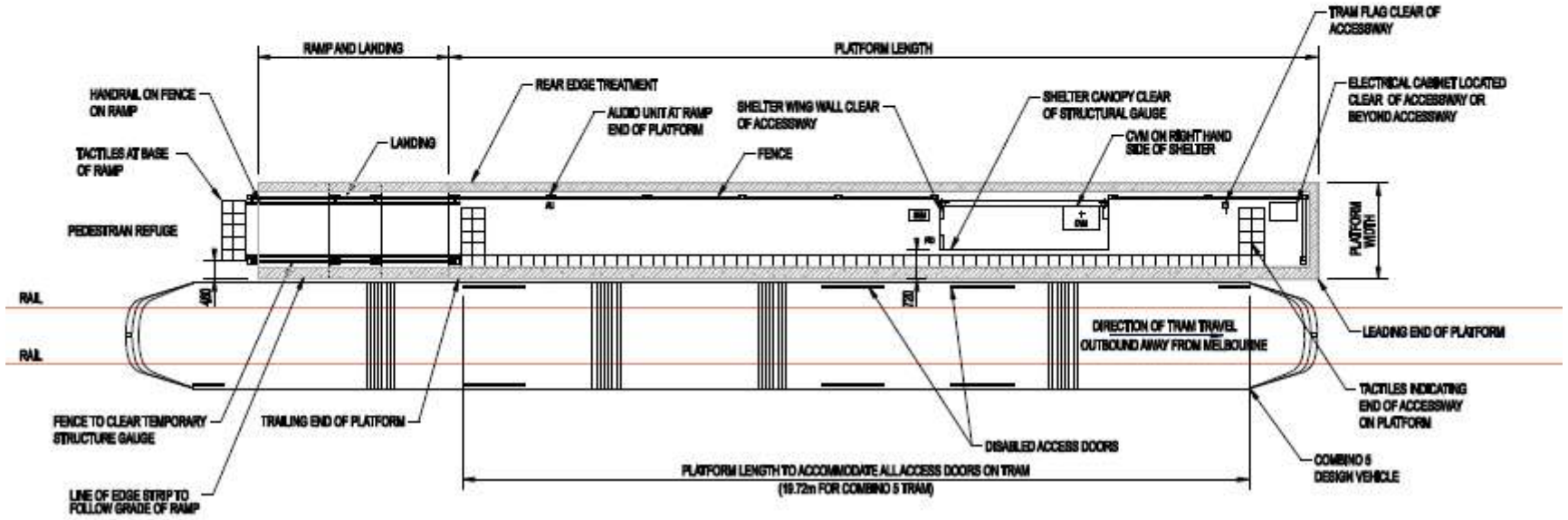

SECTION WITH REAR EDGE STRIP




SECTION WITH VERTICAL FACE BARRIER




SECTION WITH TYPE F BARRIER




FEATURES OF ACCESSIBLE TRAM STOP