

# How Transit Agencies Handle Bicycles

An analysis of nine North American transit agencies

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# HOW TRANSIT AGENCIES HANDLE BICYCLES

## AN ANALYSIS OF NINE NORTH AMERICAN TRANSIT AGENCIES

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A key weakness with public transportation is the lack of accessibility to transit stops. Bicycles can increase user accessibility to transit stops and reduce door-to-door travel times. The goal of this thesis is to better understand how transit agencies currently integrate their transit service with bicycles. While there is a great deal of literature available on this topic, much of it is outdated and may be out of touch with current trends in bicycle and transit integration. With the recent increase in both bicycle and transit ridership, it is likely that many agencies have begun to alter their approach to bicycle and transit integration to accommodate for this rise. This thesis set out to produce a comprehensive analysis and concise report on how transit agencies currently handle bicycles. To do this, I conducted a survey to gather detailed information on bicycle programs, investments, planning, policies, procedures, funding sources, operations, infrastructure, marketing, and accessibility features from multiple transit agencies. I used two different methods when selecting transit agencies to take part in this study. One approach identified transit agencies that practice advanced bicycle and transit integration strategies through a literature review.

The other identified transit agencies located in cities with high bicycle ridership and transit use. Thirteen agencies were selected and nine of those agreed to complete the survey I created. I analyzed the survey responses and compared them to better understand the current methods and tools used by transit agencies to integrate bicycles and transit. I found that most agencies did not express interest in improving bicycle-on-transit facilities. Instead, most surveyed transit agencies had bicycle-planning documents that focused on the conception and implementation of improved bicycle access and secure bicycle parking.

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## **Dedication**

I would like to dedicate this thesis to my grandma, Tina Koster. Thanks for all your support and wisdom. I'll never forget the lessons you have shared.

## Preface

There is a continuing need to compile useful information for transit agencies. While the absence of information is not typically an issue, the availability of relevant and contemporary information is often lacking. There is a vast pool of information on how transit agencies handle bicycles, and while there were two Transit Cooperative Research Program (TCRP) reports written in 1994 and 2005, and a few other studies on bicycle and transit integration, up-to-date information is scattered between agencies and not easily found in the literature. The goal of this thesis is to provide both a comprehensive analysis of how transit agencies organizationally handle bicycles, and a concise report that will in-sum provide transit agencies with an understanding of the programs, investments, and interests of peer agencies.

There have been a variety of reports and articles written on the topic of bicycle and transit integration. Perhaps most notably, the *TCRP Synthesis 62: Integration of Bicycles and Transit*, completed in 2005, is one of the most up-to-date and comprehensive reports on bicycle and transit integration, having consolidated past studies on the topic and conducted its very own study with fifty-six participating transit agencies. Most large-scale studies on bicycle and transit integration were done prior to 2005 and even more recent articles on bicycle and transit integration tend to cite these pre-2005 studies. It has been close to 10 years since a comprehensive study has looked into how transit agencies integrate bicycles with their service. This gap in the literature raises the question

of what has been done by transit agencies in this 10-year period. For example, in the 11 years between the first 1994 *TCRP 4: Integration of Bicycles and Transit* report and the 2005 report, 80% of the 56 transit agencies who participated, reported having started at least one of their bicycle programs after 1994 (Schneider 2005). Some advancement in bicycle and transit integration since 2005 has likely been made, but how, where and to what degree are some of the questions that this study hopes to answer.

This thesis addresses how transit agencies plan for bicycles and implement bike related services. Information on the policies, procedures, funding sources, operations, infrastructure, marketing, accessibility, and more are documented and discussed. The goal of this study was not to survey as many transit agencies as possible on how they handle bicycle and transit integration, but rather to identify those that have used “best practices” in bike and transit integration to establish a holistic understanding of how these programs work. This study is more or less meant as a pilot study – surveying only a select group of transit agencies – and a potential building block for future, more comprehensive studies.

After reviewing the literature on bicycle and transit integration and meeting with King County Metro staff, thirteen transit agencies were selected to take part in the study. A comprehensive and concise survey was then constructed and sent to the thirteen transit agencies for them to complete. Nine of the thirteen

transit agencies completed the survey. The information each agency provided was then analyzed and compared in order to understand the methods and tools that these transit agencies currently use to integrate bicycles with their transit service.

This paper is targeted to transit agencies, bicycle and public transit advocates, transportation planners, transportation policy makers, elected officials and those who utilize bicycles and public transportation.

## Introduction

Bicycling is on the rise in America. The number of U.S. workers who ride a bicycle to work increased from approximately 488,000 in 2000 to 786,000 in 2008-2012. This 61% percent increase in bicycle commuting was greater than any other commuting mode increase in the US during this time (McKenzie 2014). While bicycle commuting only makes up a relatively small proportion of total commuting trips in America, it is becoming an integral part of localized transportation networks. The upward trend of bicycling is happening throughout the United States, and it is not the only transportation mode to see an increase in ridership.

10.7 billion trips were taken on U.S. Public Transportation in 2013, which was the highest annual reported public transit ridership in 57 years (Record 2014). This trend is expected to continue as more and more American's are choosing to commute by transit. From 1995 to 2008, public transportation trips increased in the United States by 38%. Like bicycling, public transit has a variety of environmental, congestion mitigation, cost, and health benefits associated with it when compared to single occupancy vehicle use. While riding bicycles and using public transit represent two unique forms of transportation, their modal advantages can substantially increase when properly integrated (Pucher and Buehler 2009).

## **Why transit agencies integrate their services with bicycles**

The adoption of bicycle related services by transit agencies benefits both cyclists and transit agencies (Pucher and Buehler 2009). Fast forms of public transportation, like trains, are often slower than a private automobile in terms of door-to-door travel time. Bikes assist in solving this key weakness in public transportation by improving accessibility to public transportation stops (Martens 2007). Bicycling can be substantially faster than walking, and is a more flexible mode of transportation than public transit. Through the introduction of bicycle related services, transit agencies extend the range that customers can travel to reach transit stops and stations, provide seamless transportation between bicycles and transit modes, and increase the attractiveness of transit by offering an additional amenity to customers (Coffel 2012, Schneider 2005, Pucher and Buehler 2009). This additional amenity can be very convenient for cyclists when bad weather, difficult topography, gaps in the bicycle network, or mechanical problems are encountered (Pucher and Buehler 2009).

Many transit agencies choose to integrate bicycles and transit as a way to increase transit ridership. While increasing ridership is often one of the primary goals of a transit agency, it is not the only factor transit agencies consider when making bike related decisions. Many agencies actively seek to increase multimodal trips made by a community, remove motor vehicles from roads and parking lots to free up space, reduce air pollution and automobile traffic

congestion, increase visibility of bicycling as a viable transportation option, improve the public images of transit to generate allies in the bicycling community, contribute to regional programs, provide infrastructure to support active/healthy living, and/or provide cyclists with the ability to bypass barriers to cycling (Schneider 2005, Pucher and Buehler 2009).

### **Why agencies approach bicycle integration in different ways**

Bicycling as a mode of transportation is increasing at a fast rate in the United States. Yet, this increase is not evenly distributed throughout the nation as many areas that have made previous investments in bicycling are seeing a greater increase in bike use (Coffel 2012, p. 66).

Different agencies often provide different levels and/or types of bike amenities, which is not to say that some agencies are simply better or more advanced than others. The equation for the types of service provided is much more complicated than that. For instance, some of the factors that influence the types of service a transit agency provides are transit ridership characteristics (headway, peak ridership, overcrowding), climate, influential advocacy groups, funding, political leadership, socioeconomic characteristics of the local population, bicycle access to transit, the quality of bike facilities connecting transit stops, local land use patterns, the design of the transit vehicles, etc. (Coffel 2012, Doolittle 1994).

## Overview of bicycle services provided by transit agencies

In short, there are benefits gained from merging bicycles and transit that either mode cannot provide alone. Transit allows bicyclists to take longer trips; bicycle access enlarges the catchment area of transit stops; transit enables bicyclists to travel across steep topography and bridge barriers; bicycle access can also increase the use and appeal of transit (Doolittle 1994).

In the past few decades there has been a large increase in the number of North American transit agencies that provide bicycle related services. The first programs were designed to transport bicycles across major highway bridges that did not warrant bicycles on their sidewalks or traffic lanes (Doolittle 1994). In 1991, the Intermodal Surface Transportation Efficiency Act (ISTEA) was enacted and emphasized a multimodal approach to improve transportation systems. The act essentially increased the available federal funding for bike and pedestrian facilities to be built. In 1997, the Transportation Equity Act for the 21<sup>st</sup> century, further encouraged the production of multimodal transportation systems. Transportation agencies in the United States spent approximately \$28 million in federal transportation funding for bicycle-related projects between 1999 and 2004 (Schneider 2005, Krizek 2011, Doolittle 1994).

Most transit agencies in North America offer an increasingly diverse set of bike related services. Mounting bike racks on buses and vanpool vehicles,

installing hooks and racks for storing bikes in rail cars, using hi-capacity bus bicycle racks, installing bicycle parking at stations, and providing secure bike parking at transit hubs are some of the primary infrastructural elements that transportation agencies have begun to invest in (Schneider 2005). Advances in equipment design, strategies, activism, political support, use, and awareness are all contributing factors to the growth of bicycle and transit integration programs (Krizek 2011).

Types of bicycle infrastructure that transit agencies in North America implement can fit into these following categories: Bicycle on Bus, Bicycle on Rail, Bicycle on Ferry, Bicycle and Vanpool, Bicycle Parking, and Bicycle Access to Transit (Schneider 2005, Krizek 2011, Doolittle 1994). To better understand these services, a detail description of each is described below.

### **Bicycle on Bus**

While buses can accommodate bicycles in several different ways, the majority of transit agencies do so using front-mounted racks. Front-mounted racks typically carry anywhere from 2 to 5 bicycles on the front of the bus. While there is no standard for design of these types of racks, there are performance characteristics that agencies consider when choosing a design (Doolittle 1994). With this system, customers load and secure their bikes on the racks, and then fold the rack up against the front of the bus when it's not in use. Some agencies allow passengers to bring their bikes on board the bus. However, this method is

often restricted during peak hours or altogether to prevent overcrowding (Schneider 2005, Pucher and Buehler 2009). Recently, some agencies have begun to accommodate bicycles on their Bus Rapid Transit (BRT) coaches. To accommodate bicycles on-board these BRT buses, agencies either provide vertical hanging hooks, space, or upright tension rollers near the back entrance of the bus (Coffel 2012). Some commuter buses are equipped with extra storage space underneath the floor of the bus (Schneider 2005).

Front-mounted bike racks with space for three bikes are becoming more common with their ability to provide additional capacity compared to the two-bike bus racks. While the added capacity is convenient for bikers in certain instances, it also means that when the rack is in use there is a larger overhang distance than there would be with a two-bike bus rack. Having an extra bike can also interfere with headlights, turn signal lights, and even windshield wipers on certain types of buses. When the rack is not in use and folded up against the bus it typically adds 6 to 9 inches to the front, often requiring additional storage space at the bus yard (Schneider 2005).

Most agencies that participated in a 2005 TCRP survey mentioned that maintenance on front-mounted bike racks was minimal, with one agency reporting that bike rack maintenance represented one-quarter of one percent of the entire maintenance budget. Most agencies included bike rack repairs as a part of routine maintenance procedures. Agencies also mentioned that the racks

added complexity to doing other routine maintenance work. Reports cited there being a difficulty in cleaning the front of the bus, bus washers being damaged by racks, bus windshield wipers being damaged by rack, the need to remove the rack when a bus is towed, and freezing parts during the winter (Schneider 2005).

Most transit agencies today prefer front-mounted racks on buses compared to rear-mounted racks. Rear-mounted racks have been known to cause a variety of problems including blocking access to the engine, covering bikes in exhaust, and being out of the driver's sight. Some agencies allow bicycles to be taken on board the bus, but many restrict this to prevent overcrowding. Agencies that do allow bikes on board the bus often leave the final decision up to the bus driver's discretion. From 2001 to 2011 there was a 42% increase (32% to 74%) of buses with exterior bike racks (Dickens et al. 2013).

## **Bicycle on Rail**

Light rail, heavy rail, and commuter rail system have accommodated bicycles by allowing them inside the train cars. Methods differ slightly, some requiring cyclists to board designated rail cars and remain with their bikes in designated areas while some have special hooks where bikes can be stored. Most North American agencies can accommodate between 2 and 16 bicycles per train depending on restrictions. Clara Valley Transportation Authority light rail in San Jose, CA can accommodate four bicycles with racks and another two in a standing area at the center of the car. It is also common for agencies to prohibit

bicycle access on trains during peak travel times to reduce congestion (Schneider 2005).

Cyclists can access light rail cars by a platform or street. Heavy rail can be a bit more difficult for cyclists to utilize because of fare gates or turnstile areas that lead to paid ticket areas. Commuter rail cars are most often accessible to bikes by an open platform (Schneider 2005).

Most light rail and heavy rail cars require no complicated design changes to accommodate bikes. Bikes are often stored in empty wheelchair accessible space or held in the doorway areas, although some transit agencies provide hooks and racks for cyclists to place their bikes. Seating can sometimes be removed to provide space for racks (Schneider 2005).

### **Bicycle on Ferry**

Providing the opportunity to bring bicycles on ferries allows ferry-goers the option to utilize a bicycle at both ends of their trip enabling them to reach destinations that may be too far from the terminal to walk. This type of service has long been essential to areas such as British Columbia and Washington State due to the geography of the region. Washington State Ferries register over 200,000 bicycle round trips per year (Schneider 2005).

## **Bicycle on Vanpool**

Integrating bicycles with vanpools is another way that transit agencies have provided bicycle access to their customers. This type of integration typically utilizes generic car bike racks that do not require customization. Having this feature available to customers allows some to participate in a program that may have otherwise been difficult or impossible. Commuters can ride a bicycle to reach a vanpool meeting place and then from the vanpool destination they can ride to their specific place of employment (Schneider 2005).

## **Bicycle parking and accessibility to transit**

Bicycle parking includes bike racks, bike lockers, bike cages, and staffed bike parking facilities (Schneider 2005). Providing bicycle parking empowers bicyclists to make convenient intermodal transfers that have no effect on the capacity limitations or stop time of transit vehicles (Krizek 2011).

Considering that not all transit users have a need or want to take their bike with them on a trip, proper parking facilities are necessary (Schneider 2005). Also, as the number of cyclists using transit grows, transporting bicycles may not be possible as bicycle capacity per vehicle can be an issue (Krizek 2011). Bicycle parking (whether it's a locker, cage, or rack) provides a connection for bicyclists at bus stops, stations, park and ride lots, etc. Inverted u-shaped racks are installed by agencies in areas that are visible from the street and convenient for cyclists to reach. Those who want easy access to their bike after a few hours

most commonly use inverted u-shaped racks. Bike lockers – on the other hand – are used by bicyclists who leave their bikes unattended throughout the day or overnight for added security from theft or damage. Also, transit agencies try to avoid installing bicycle parking in locations that will constrain the flow of transit passengers or inhibit maintenance activities such as snow removal (Schneider 2005).

The purchase price of bike parking facilities for transit agencies varies based on the type of facility. U-shaped racks cost between \$150 and \$200 per rack, and bike lockers cost between \$500 and \$2,500 apiece (depending on the model and quantity purchased). By comparison, the cost to build automobile parking and maintain it is astronomically higher (Schneider 2005). For the users of secure bicycle parking facilities, the costs are typically quite low. Most transit agencies charge fees for permits or rental leases – a set monthly fee, refundable deposit, or a one-time charge.

Access to transit stations, stops, and bicycle parking can be a barrier for those wishing to use a bicycle and transit. In the past some agencies have installed access design improvements including designated bicycle paths through park-and-ride lots, bike lanes on station roadways, bicycle route and parking signage, lighting features, locational attributes of the station and parking facility, and bicycle paths from neighboring communities to help improve access (Doolittle 1994, Schneider 2005, Coffel 20112)).

## **Organizational aspects of bicycle and transit integration**

When it comes to bicycle and transit integration, many transit agencies have several matters in common including gathering initial support, obtaining funding, marketing, establishing policies, monitoring, maintenance, improving accessibility, and planning (Schneider 2005). These are all issues that transit agencies dealt with when first integrating bicycles into their service and still deal with today.

### **Support and Involvement**

Initial support for transit agencies integrating bicycles with their service can come from multiple sources. While advocacy groups often played a large role in leading the charge to establish bicycle service, there are many other groups that have and still do provide assistance. Federal, state and local governments, elected officials, environmental groups, health promotion groups, students, businesses and advertising agencies, and staff within transit agencies have all been cited as having helped different transportation agencies get bicycle service (Schneider 2005).

Internally, transit agencies may designate someone or a group to manage its bicycle related service, but other groups and/or departments such as planning,

marketing, engineering, security, operations, and maintenance all have some level of involvement in transit and bicycle related services (Krizek 2011).

In the 1994 TCRP Bicycle and Transit Integration study most agencies that participated reported having an advisory or planning group that included external agencies and bicycle interest groups when planning programs, resolving operating issues, and promoting service to users. Of course the extent of involvement from each group varied from agency to agency. The figure to the right illustrates a generalized example of the membership and tasks for a bicycle-transit advisory committee used to develop bicycle and transit integration programs (Doolittle 1994, p. 10).

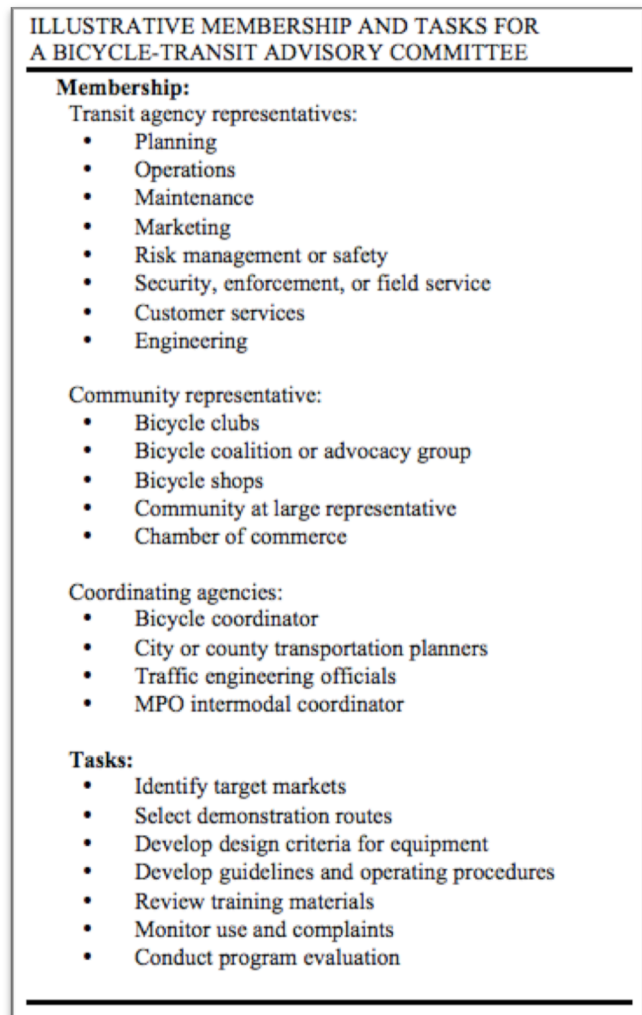


Figure 1

Support for these programs by operational staff often relies on strong leadership from top management. Successful programs typically have top-level policy makers, managers and project managers that are able to draw interested

parties together, persuade operating personal, make decisions, and create compromise and consensus (Doolittle 1994, p. 10).

## **Funding**

Funding for bicycle related service is a concern for most transit agencies. Major groups such as state departments of transportation, regional agencies, and local jurisdictions often help to fund bike related transportation improvements. While many North American transit agencies cover the initial expenses and current maintenance themselves, some agencies received support from state and federal funds. Federal sources include FTA section 5307 and section 5309 formula funds, the CMAQ program, and Surface Transportation Funds. Some bike and transit integration projects are sometimes 95% covered by the federal government (Pucher and Buehler 2009, Bicycles and Transit 2013). Bicycle improvements that qualify for FTA transit enhancement funds include: bicycle routes in and near a transit facility, bicycle parking and storage equipment at stations and equipment for transporting bicycles. Up-to-date and specific Federal Transit Administration (FTA) programs and bicycle related funding opportunities for Transit Agencies are located in the Appendix E table of this thesis.

Other ways in which transit agencies have funded their bicycle service includes: transit fares, agency operating budget, property taxes, sales taxes, hotel taxes, and business and individual donors (Schneider 2005).

## **Policies and Rules**

Many agencies have established policies or rules to restrict the types of bicycles that may be transported by bus, the time periods that bicycles can be taken on rail, a minimum age requirement for using the bicycle related services, and more. While some agencies adopt these policies at the highest levels within the agency, others have mid-level staff create the policies themselves. These policies are often available to the public in the format of web-based content, and brochures (Schneider 2005). There is not much further information available on how bike related policies and procedures are formed.

A common rule for bikes-on-buses is that all bicycles transported by bus bike racks must fit on the bike rack. Some agencies prohibit the use of certain types of bicycles on their bus bike racks including recumbent, tandems, tricycles, unicycles, electric bicycles, and/or bicycles with wheels less than 20 inches in diameter. Bikes with crates or boxes are also sometime prohibited if the object may block the drivers view. Some agencies prohibit children from using the bike-on-bus racks and others allow children to use them only if there is an adult present. For rail transportation, there are often regulations restricting bicyclists from using the rail cars during peak periods to reduce congestions in the cars. This regulation has been cited as being a frustration for many bicyclists who are also rail transit users (Schneider 2005).

## **Marketing**

The TCRP synthesis survey showed that a majority of transit agencies use some type of marketing program to market their bicycle related services.

Marketing techniques differ from agency to agency but all of the agencies used one or more of these techniques: brochures, agency based websites, state or regional websites, standard transit publications, posters, advertisements, demonstrations at public events, promotional videos, and kickoff events (Schneider 2005). While some agencies use only availed staff time to implement marketing efforts, others spend around \$50,000 (2005 estimate) to market the bicycle services they offer. Some agencies in this 2005 survey noted that they had partnered with other government agencies and the private sector to advertise their bicycle and transit program. Additional training for transit operators and bicyclists as well as the provision of education materials can help transit providers accommodate bikes more efficiently (Schneider 2005).

## **Monitoring**

There are a variety of techniques – both qualitative and quantitative – used by transit agencies to monitor the performance of their bicycle related services. Qualitative assessments of a bicycle service can be taken from transit agency staff (bus drivers, transit planners, etc.), transit customers, and community members. This type of feedback can be gathered through interviews, surveys or even informal discussions with transit advocates in the community (Schneider 2005).

Agencies have also been known to use quantitative measures to monitor performance. Types of measurements include counts of bicyclists on buses/trains/ferries, inventories of bike parking spaces, surveys of bicyclists riding the transit system. Surveys are used less frequently than counts because of the additional time required developing and administering them. Counts of riders or parked bicycles are often done manually by bus drivers or transit agency staff. There are a few examples in the literature of agencies that have established an automated system for counting the number of bicyclists using the agencies bike-on-bus service (Schneider 2005).

Central Ohio Transit Authority (COTA) in Columbus, Ohio added front-mounted bike racks to its fleet in 2004 and used existing advanced mobile data terminals (AMDTs) – that had been previously installed on the buses – to document each bicycle boarding. Once a passenger boarding the bus pulls down a front-mounted bike rack for use, the driver touches the AMDT on-screen prompts necessary to record a bike boarding. This feature allows transit agencies to monitor bike on bus use on each route and identify trends overtime. It is even integrated with COTA's wireless automated vehicle locater system so that the location of each loading point, specific bus, time of day, and date are known. Some bus operators at COTA expressed initial concerns about the added task of keying in each bicycle boarding. Although after operator training sessions on the task, operators have been reported to be using them consistently. It should also

be noted that an additional improvement to the bike-on-bus monitoring system could be to record each time a bicyclist takes his or her bike off the rack, but this would of course add another task for monitoring bicyclists (Schneider 2005). Implementing sensors in each bicycle slot on a front-mounted rack has been suggested as a way to solve the issue of additional tasks for drivers, but up until 2005 it had yet to gain much traction in terms of its implementation.

COTA has also conducted daily counts of bicyclists who use its bicycle parking racks to see how often they are being used. The RTD – Denver collected this type of data on a weekly basis. One of the most extensive bike parking studies was done by Miami-Dade County, Florida, where it found that close to half of the bicyclists were 40 to 59 years old and 85% were male. King County Metro Transit surveyed bicycle locker users about their trip characteristics and locker use patterns. The survey found that all types of people used the lockers and that in certain parts of the region those who worked in the technology sector used them more. King County also found that the percent of lockers being rented increased from around 25% in 2001 to 82% in 2004. In 2005 seven of King County Metro transit stations had waiting lists for bike lockers (Schneider 2005).

Most agencies that participated in the 2005 TCRP synthesis expressed interest in wanting to collect additional data about their bicycle and transit users. Agencies reported that if additional resources were available to them they would want the following data: Counts of bicyclists using transit services at different

times of day (peak vs. off peak), counts of bicyclists who are passed up by transit due to lack of capacity, bicycle transit user start and endpoint survey, socioeconomic characteristics of customers using bicycle services, the purpose of bike-on-transit trips, and how a bike-on-transit customer would reach his or her destination if the bicycle service was not provided (Schneider 2005).

In the 2005 TCRP Synthesis, Calgary Transit, San Diego Metropolitan Transit, British Columbia's TransLink, and Portland's TriMet reported having an increase in demand for bicycle services although no ridership data were available to quantify the trends they had expressed. Many transit agencies only provided anecdotal evidence for the levels and demographics of bike on transit usage. Only the RTD (Regional Transit District –Denver) reported user statistics that they received from a 2003 survey of bike-on-transit permit holders. The survey provided statistics on the demographics of the users and how often rail was used by cyclists. The amount of staff time dedicated to providing bicycle-on-rail service was provided by a few agencies and ranged from 1.5 full-time equivalents in Denver to 40 hours per year of staff time in San Diego (Schneider 2005).

## **Maintenance**

Bike on rail transit was mentioned as an issue for some agencies in that minor property damage sometimes occurred. Some agencies reported scratches to the interior of rail cars have been a result of bicycle accommodations. Some

bicyclists have also reported that their bicycles had sustained damage when using rail services (Schneider 2005).

Front-mounted bike racks on buses can easily be damaged when contact is made with other objects or vehicles. Most transit agencies include repairs as part of routine maintenance. Some challenges that transit agencies have come across in the maintenance of front-mounted bike racks are the replacement of broken racks, interference with bus wipers, the need to remove the rack when a bus is towed, and freezing parks during the winter. These challenges were cited as not typically being an obstacle to providing bike on bus service (Schneider 2005).

## **Access and Planning**

In many jurisdictions, transit agencies have limited control over conditions of streets and roadways surrounding transit stops and stations. Providing safe and comfortable bicycle routes to stations and stops usually falls on the local jurisdiction or state DOT as opposed to the transit agency (Coffel 2012). This can be a struggle in integrating these two modes if the safety and comfort of bicycle facilities and transit stops and stations are not desirable. Agencies often have to work with other governmental agencies to make improvements that they do not have the authority to do themselves. These partnerships have the potential to improve bicycle access to transit service. In fact, safety improvements such as lighting and general street improvements, comfort improvements such as way-

finding signage and bike parking have been made through such partnerships (Coffel 2012, Schneider 2005). There are some key design elements in newer stations that assist with bicycle accessibility. For example, a stairway channel on either side of a station stairway, allows bicyclists to easily roll their bicycles up and down the stairs when entering or exiting an underground station. Also, the Americans with Disabilities Act established rules for curb cuts, ramps, and station elevators among other things that bicyclists are typically allowed to use. These features can either directly or indirectly help improve the bicycle accessibility of stations.

Accessibility and parking for bicycles at transit facilities allows for opportune intermodal transfers. The enhancement and increase of suitable, easy to access bicycle parking provides the potential for greater intermodalism than bike-on-bus and bike-on-rail programs. Proper access and parking may also be the preferred choice of some cyclists who only use their bicycle on one leg of their transit trip. For example, the utility of a bicycle on the first part of a trip may be convenient for a transit rider, while the last part of a trip may be easily achieved without a bicycle, or vice versa. Parking may also be a convenient alternative in cases where there is no capacity for a bicycle on the transit vehicle (Doolittle 1994, Schneider 2005, Coffel 2012). Bicycle accessibility and parking are two intertwined aspects of bicycle and transit integration that have become popular points of interest for many transit agencies. For example, LA Metro, BART, and TriMet had all expressed a desire to develop bicycle storage solutions that

appeal to more bicyclists because of capacity limitations of bicycles being brought on-board transit vehicles (Coffel 2012).

To spread awareness and increase accessibility, King County Metro and California DOT place bike stations on their respective transit system maps (Schneider 2005). In addition to providing knowledge of these services, some transit agencies also work toward establishing safe and efficient routes for bicyclists to reach station entrances and/or parking areas with minimal pedestrian, bus or automobile conflicts. TriMet's 2008 redesign of its Rose Quarter Transit Center to improve bike related services and increase safety is a good example of how an agency can assist in efforts to better accommodate bicyclists (Coffel 2012).

Some transit agencies have created detailed plans on how they will improve bicycle and transit access and integration. LA Metro's 2006 Bicycle Strategic Plan focuses on integrating bicycles with both rail and bus transit. The plan identifies a total of one hundred and sixty seven bicycle-transit hubs in the region on which to focus resources. The plan even goes as far to include a description of audit procedures for evaluating obstacles to bicycle access, a toolbox of bike facility design measures that address each facility, and guidelines on developing and using it (Coffel 2012). LA Metro Bicycle Strategic Plan provides an outline for the agency to make strategic investments, while providing a framework for local jurisdictions and other organizations to use in their planning

efforts. LA Metro relies primarily on individual jurisdictions to ensure that bicycle access is a priority, but has conducted some of its own station-specific bicycle access plans. For example, the City of Long Beach completed a Pedestrian and Bicycle Access Study for its light rail stations to complement Metros' Bicycle Strategic Plan (Coffel 2012). How effective this document has been since it was adopted is not fully discussed in detail.

As discussed in the literature, transit agencies typically seek to achieve two goals related to bicycle access: (1) to increase bicycle access to support both the goals of the community and those of the agency for bike ridership, and (2) to institute a means of accommodating bikes within the transit system through storage facilities and/or on-board transit vehicles. These two goals are not always compatible as increasing access may in fact overwhelm the capacity of a transit system (Coffel 2012).

International literature shows that it is possible for bicycles to comprise up to 40 percent of transit access trips (Coffel 2012, p. 68). Yet, being able to realize such a high percentage is largely dependent on factors that are for the most part out of an agencies control, such as topography, weather, system wide quality of bicycle facilities, and bike culture all play large roles in peoples inclination to bike. A study of 280 people who ride bicycles and drive automobiles living within 2 miles of a train and light rail station at Centennial Plaza in Mountain View, CA, found that trip distance, trip purpose, car availability, race, gender, and proximity

to auto-friendly streets were all predictors of driving a car verse biking. Climate, weather and topography affect individual bicyclists differently in terms of their willingness to ride, but high-quality bike facilities at transit stations have been seen to have a positive impact on bicycle access (Coffel 2012).

Bicycle Sharing programs have been expanding rapidly around the United States and in some cases have been strategically linked to transit. Boston and Washington D.C. both have bike sharing programs where some of the bicycle docking stations are located near MBTA and WMATA transit stations, expanding transportation options for transit users and cyclists (Coffel 2012). Considering how recent the trend of bike sharing has been in America, exploring this further with agencies that participate in this survey could provide insightful knowledge that has yet to be addressed in the literature.

## **Literature gaps and research objectives**

The goal of this study is to better understand how North American transit agencies are currently handling bicycles. The last extensive synthesis and study on transit and bicycle integration was done 10 years ago in 2005, and much of the literature on bicycle and transit integration is at minimum a few years out of date. This study intends to build off of some of the past work done in this area and gather more up-to-date information on how transit agencies are handling bikes.

Most importantly this study sets out to consolidate and discuss the methods used by transit agencies to integrate transit and bicycles. The agencies studied will be those that have been cited as having used advanced methods in integrating their service with bicycles or those that serve cities with high bicycle use and transit ridership. The goal is to gather detailed insight on some of the most up-to-date practices being used by transit agencies in North America. For example, detailed information on how agencies currently evaluate and plan their bicycle related services are not specifically discussed within the literature. Also, bike share organizations have recently been growing across American cities and there is little information available on how transit agencies have been working to connect their services with this new technology.

Another objective of this study was to inform King County Metro of the recent advancements in bicycle and transit integration. Being that it was King County Metro that asked me to investigate how other transit agencies handle bicycles, I hope to provide the agency with information that may be of use in advancing their bicycle programs and services.

## **Methods: selecting transit agencies for the study**

This study did not intend to identify agencies that have yet to invest in bike and transit integration. Rather, the study set out to further examine – with a holistic lens – transit agencies that have been identified as having made advancements in one or more areas related to bicycle and transit integration.

Therefore, this study will set out to locate these agencies within the literature, gather in-depth information on how they currently plan for and implement bike related services, and compare strategies. This information will then be presented to King County Metro and all participating transit agencies to assist them in further developing their bicycle programs.

Only North American transit agencies were where asked to take part in the survey section of this study. While some international literature was explored and mentioned within this paper, the resources and time needed to expand the scope of the study outside of North America were not made available.

### **The Selection Process**

A critical question when creating a comparison group is, how the selection process should be done. Deciding which agencies to choose can sometimes present biases, leading to subjectivity and unwanted results. Having an approach to determine the transit agencies for this study is important to establish validity and usefulness of the results. This study will identify transit agencies that have already made investments in bike and transit integration. Even more so, the agencies selected will be those that have been recognized for using “best practices” in one or more areas of bike and transit integration by reports and/or peer reviewed literature. In the context of this thesis, a “best practice” is a transit agency program or service that was specifically called out in the literature as advancing bicycle and transit integration in some way. Using agencies that have

used “best practices” will insure that the agencies studied are those that have already invested time and energy into advancing their bicycle related services. The information they provide will ideally be of interest to other transit agencies including King County Metro.

Selecting agencies using a “best practice” filter is a great way to identify agencies that have made successful past investments in bicycle and transit integration, but many of the studies and reports that list these agencies may be out of touch with current trends in best practices. To address this potential issue, transit agencies that serve large cities with high bike and transit ridership will also be included. The reason for this is that when a high number of people are using bicycles and public transportation in a city, there is an elevated potential for bicycle and transit coordination (Pucher and Buehler 2009, Martens 2007, Hegger 2007). This prompted a secondary selection process that was used to minimize this study’s reliance on available literature.

### **Limitations of the Selection Process**

The method used to identify a group of transit agencies is only effective at finding agencies that have already been identified as having used best practices. Also, in order to be identified as an agency using best practices the agency would have had to participate in one of the past studies used to identify such agencies. While this method leaves room for the possibility of some deserving agencies to slip through the cracks, the secondary method tries to alleviate some

of the uncertainty. The second approach was used to find cities that have high transit and bicycle ridership, since much of the literature pointed to the fact that areas with high bicycle and transit ridership tend to have transit agencies that work to facilitate bicycle and transit integration (Pucher and Buehler 2009, Martens 2007, Hegger 2007).

Only transit agencies that served a major city with a population of 200,000 or more were selected for this study. Transit agencies that likely have a regional significance were of particular interest to King County Metro. Since King County Metro serves a large metropolitan area, there was interest in how agencies with a wide spread influence similar to that of King County Metro handle bicycles. Using city population size as an indicator of transit agencies size helped to narrow the number of potential candidates.

There are surely some agencies that were not included within this study either because they did not take part in previous bicycle and transit integration studies, and were therefore not mentioned for using best practices in the reviewed literature, or because they do not serve a major city with a population of 200,000 or greater. Even with these limitations, the results of this study should still be of use to participating agencies and those that did not participate. There is much to be learned from one another, especially as public transit and bicycle commuting grow in the United States (Hegger 2007).

The contents of this thesis are open to critique. The selection process, methodology, survey, and interpretation of the results are almost certainly not perfect, yet they are most definitely useful.

## Selected Agencies

Using the selection process described above, a total of thirteen agencies were selected. First the literature on bicycle and transit integration was reviewed and eight transit agencies that exhibited best practices were selected. All eight agencies and their identified best practice are listed below.

Transit Agencies mentioned in the literature for best practices		
City w/ population greater than 200,000	Agency	Agency Best Practice
Chicago, IL	Chicago Transit Authority (CTA)	The largest bike station in the U.S. in 2005
Columbus, Ohio	Central Ohio Transit Authority	Uses AMDT's to document the use of bicycles on transit
Denver, CO	RTD - Denver	Bike Counts of those who use bike parking facilities
Los Angeles, CA	LA Metro	Bicycle Strategic Plan and Bicycle Transportation Account Compliance Document (BTA)
Portland, OR	TriMet	Bike parking at Portland-Milwaukee light rail line. Accommodates bike access mode shares of 10-25 %, depending on the station
San Francisco, CA	Bay Area Rapid Transit - BART	Leader in bike and transit integration in North America.
Seattle, WA	King County Metro	Bike Locker Program coordination with local bike orgs to manage the program
Vancouver, British Columbia	TransLink	A fully integrated, multi-modal, regional transportation authority. Explicitly coordinates bike routes with public

		transportation.
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**Table 1**

Next, six transit agencies were identified as being located in cities with high bicycle and transit ridership. The higher number of people using both cycling and public transportation in a city, the greater the potential for bike and transit coordination (Pucher and Buehler 2009, Martens 2007, Hegger 2007). This was a strategy used to include transit agencies that may have been missed in the literature search, and those that may not have been mentioned within the literature because of the age of past reports and studies.

Large cities with high rates of bicycle and transit ridership			
City w/ population greater than 200,000	Transit Agency	* % transit Commuters by City (>5%)	* % Bike Commuters by city (>3%)
Washington DC	Washington Metropolitan Area Transit Authority	16.4%	3.1%
<b>San Francisco</b>	<b>BART, SFMTA</b>	<b>17.3%</b>	<b>3.4%</b>
<b>Seattle</b>	<b>Metro, Sound Transit</b>	<b>8.9%</b>	<b>3.4%</b>
Minneapolis	Minneapolis Metro Transit	5.5%	4.1%
<b>Portland</b>	<b>TriMet</b>	<b>7.1%</b>	<b>6.1%</b>
Madison, WI	Madison Metro Transit	5.8%	5.1%
* % transit commuters - 2013 American Community Survey 1-Year Estimates * % bike commuters - 2008–2012 American Community Survey Reports			

**Table 2**

Eleven cities were identified using this approach and of the eleven cities, three were identified in both the best practices, and high bike and transit ridership (represented in **bold** in Table 2). Two of the cities – San Francisco and Seattle – have multiple transportation agencies operating within and around their jurisdiction. Therefore, an additional transit agency for San Francisco and Seattle was selected – SFMTA and Sound Transit. After identifying the bicycle contact for each agency all thirteen were asked whether or not they would like to participate in the study.

An e-mail describing the study, and the comprehensive survey were sent to each contact. Of the thirteen contacts, ten said they would be willing to participate in the study. Ten of the transit agencies completed the survey and sent it back for analysis. One of these agencies – LA Metro – completed the survey a month late and their answers were not discussed within the discussion section of this thesis, but they were influential in parts of the conclusion. One of the agencies – BART – opted for a phone interview instead. Both methods were effective in retrieving valuable information for the study. The three agencies that did not participate in the study – TriMet, WAMATA, and Central Ohio Transit Authority responded to my initial e-mail saying that they did not have the time or resources to devote to a survey. Below is a table of all of the participating agencies and their respective major city.

Transit Agencies that took part in the Study	
Major City	Transit Agency
Denver, CO	RTD - Denver
San Francisco, CA	Bay Area Rapid Transit - BART

Seattle, WA	King County Metro
Vancouver, British Columbia	TransLink
Chicago, IL	Chicago Transit Authority (CTA)
San Francisco, CA	SFMTA
Minneapolis	Metro Transit (Minneapolis)
Seattle, WA	Sound Transit
Los Angeles	LA Metro
Madison, WI	Madison Metro Transit

**Table 3**

Below is a table of the name and title of the respondents who completed the survey.

The Name, Title and Agency of the Respondents		
Name	Title	Agency
Steve Beroldo	Manager Access Programs	BART
Helen Cook	Manager, Bicycle & Road Network Initiatives	TransLink
Rebecca Roush	Sound Transit Bicycle Program Coordinator	Sound Transit
Nick Carr	Senior Transportation Planner	SFMTA
Genevieve Hutchison	Senior Transportation Planner/Bike Program Coordinator	RTD
Tony Drollinger	Commuter Programs Specialist	Metro - Minneapolis
Drew Beck	Transit Planning and Scheduling Manager	Metro - Madison
Ref Lindmark	Transportation Planner / Bicycle Program Lead	King County Metro
Andrew Kao	Metro Trainee	LA Metro
Nicholas Smith	Strategic Planner	CTA

**Table 4**

## The Survey

The survey for this study was modeled using past transit and bicycle integration surveys from the TCRP Reports, and the help of staff at King County Metro Transit. The goal of this survey was to only ask questions that would provoke a useful response. Desirable information was seen as that which would

provide insight into current issues that transit agencies are dealing with in bicycle and transit integration.

After much deliberation and debate the survey was broken up into seven primary sections. Each section was indicative of a particular aspect of bicycle and transit integration. For a high-level overview of each section, below is a brief description of each section within the survey.

**1. Planning for Bicycles**

- Policies, plans, and programs that guide the bicycle decision-making process

**2. Providing Bicycle Infrastructure**

- Types and amounts of equipment that agencies use to transport and park bikes

**3. Monitoring and Evaluating Bicycle Use**

- How agencies gather and use data on their bike related services

**4. Bicycle Access to Transit**

- How agencies are involved in helping connect cyclists to transit

**5. Bicycle and Transit Safety**

- How agencies approach bicycle safety

**6. Public Information and Marketing for Bicycles**

- How agencies inform and promote their bicycle related services

**7. Further Information**

- What obstacles the agencies have had to overcome

The survey that was sent to each of the thirteen agencies can be found in Appendix A of this paper. Please review Appendix A if you are interested in seeing an exact replica of the survey that was sent out to these agencies.

Answers from nine of the thirteen agencies that completed the survey on time or at all, were consolidated and then discussed within the discussion section of this paper. General trends and unique answers were analyzed and elaborated on.

## Discussion

### Transit Agency Descriptions

There are differences between these nine agencies that influence the bicycle related services they provide. Below is a brief description of each agency to provide readers with an idea of the size and type of each agency that participated in this study.

**BART:** Bay Area Rapid Transit is a heavy-rail public transit and subway system that connects San Francisco and the surrounding bay area. BART currently operates out of 44 transit stations in 4 counties. 16 of the stations are surface, 13 elevated and 15 are subway stations (BART 2015). The agency is strictly rail oriented, as it does not operate or own buses.

**CTA:** The Chicago Transit Authority is the operator of mass transit in Chicago, Illinois and some of its surrounding suburbs. The agency uses both rail (the Chicago L) and CTA buses to operate its primary service. It operates the nation's second largest public transportation system and serves the City of Chicago and 35 surrounding suburbs. According to the CTA website, they have approximately 1.7 million rides taken on the average weekday (CTA 2015).

**King County Metro:** King County Metro Transit is the public transit authority of King County, Washington and a division of the King County Department of Transportation. It serves an area of more than 2,000 square miles and 2 million residents. The agency operates 214 bus, trolley, and dial-a-ride transit routes, serving destinations across the county (King 2015).

**Madison Metro:** Madison Metro Transit in Wisconsin operates bus service throughout the Madison, Middleton, Fitchburg, and Verona area. In 2013 it had 67 fixed-routes that served an area of 72 square miles and a population of 249,051 (Madison Metro 2013).

**Minneapolis Metro:** Minneapolis Metro Transit is the primary public transit operator in the Minneapolis-Saint Paul area of Minnesota, is an operating division of the Metropolitan Council (an MPO created by the state legislature), and is the largest public transit operator in the state. It offers an integrated network of buses, light rail and commuter trains. It serves 907 square miles, a total of 7+

counties and 90 cities. Minneapolis Metro has a total of 132 routes: 58 urban local routes, 64 express routes, 7 suburban local routes, 2 light rail routes, and 1 commuter rail (Minneapolis Metro 2014).

**RTD:** The Regional Transportation District is the mass transportation system for Denver and surrounding area. The RTD services 40 municipalities in 6 counties plus 2 city/county jurisdictions. The system has a service area population of 2.87 million. It operates bus and light rail systems on a total of 138 regular fixed routes in a service area of 2,340 square miles (RTD 2015).

**SFMTA:** The San Francisco Municipal Transportation Agency is an agency created by the consolidation of the San Francisco Municipal Railway (Muni), the Department of Parking and Traffic (DPT), and the Taxicab Commission. The Muni fleet is comprised of historic streetcars, biodiesel and electric hybrid buses, electric trolley coaches, light rail vehicles, para-transit cabs and vans, and cable cars (About the SFMTA 2015).

**Sound Transit:** Is Washington State's Central Puget Sound Regional Transit Authority. It operates express bus, commuter rail, and light rail service within the region including Snohomish, King and Pierce County. It oversees 26 express bus routes, 2 commuter rail lines, and 2 light rail lines (Sound Transit 2015).

**TransLink:** TransLink or legally the South Coast British Columbia Transportation Authority is the corporation responsible for the regional transportation network of Metro Vancouver in British Columbia, Canada. This includes regional transit, cycling, and commuting options as well as Intelligent Transportation System programs. All services are delivered through a variety of operating companies. They are the first North American transportation authority to be responsible for planning, financing and managing of all public transit in addition to major regional roads and bridges (TransLink 2015).

With this brief overview of the transit agencies surveyed, this paper will now begin to discuss the results of the survey. It is important to keep in mind that while these agencies all have used “best practices” in bicycle and transit integration and/or have high bicycle and transit ridership, they are different in many ways. Climate, geography, population, population density, history, funding, political leadership, government, local land use patterns, and much more can have an effect on functions of a transit agency. The results of this survey are not meant to point out the positives and negatives of how each agency handles bicycles, but rather to discuss what agencies are doing to accommodate bicycles as the transportation modes of our metropolitan areas evolve into the 21<sup>st</sup> century.

The results of this study are from the nine agencies that completed the survey by the subscribed deadline. No outside agencies are discussed within the discussion section of this thesis.

## **Planning for Bikes**

In this section transit agencies were asked about the elements that make up their bicycle programs and policies, how these programs and policies were created, how they are used, and the type of document in which they are kept. Most of the agencies that completed this section gave thorough responses to the questions asked and provided links to relevant documents and websites.

### *Organizational Structure*

All of the agencies surveyed have programs to facilitate bicycle and transit integration. The two most common programs used by all nine agencies are: Bikes on Transit and Bike Parking. Whether an agency is responsible for rail, bus or both, all agencies have programs dedicated to transporting and parking bicycles. Many of the agencies also have bicycle education and event elements to their bicycle program. For example, the SFMTA has bicycle and transit safety education, bicycle education, public bicycle safety outreach targeting most common crash types, employee work bike pool, bicycle theft prevention outreach, and bike share programs.

All nine agencies dedicate at least some staff time to bicycle and transit integration programs. The size and responsibilities of an agency seem to impact how much staff time is designated to bicycle and transit programs. For example, TransLink is responsible for planning, financing and managing all public transit in addition to major regional roads and bridges and has a full-time program manager and two bicycle planning staff who work a total of 1.6 Full Time Equivalent (FTE) on bike planning and .4 FTE on other modes. (TransLink 2015, Cook 2015). On the other hand, Madison Metro – a department of the City of Madison – does not have a program lead or manager in charge of its bicycle programs (Beck 2015).

Most agencies with the exception of TransLink and BART do not have an employee who manages the bicycle programs full-time. King County Metro, Sound Transit and RTD have a staff member who is designated as the lead coordinator for bicycle planning, but the extent of their work is not only focused on bicycles (Question 2 Appendix B).

At RTD the Bicycle Program Coordinator position is housed in the Planning Department within the Transit Oriented Communities Division. At Sound Transit the Bicycle program is in the Customer Facilities and Accessible Services division of the Operations Department, and at King County Metro the bicycle program is based in the Market Development group of the Service Development department. While the particular name of the department and/or group where the

bicycle program is housed may not be important, it is important to note that while these agencies “house” their bicycle programs in a particular group, the programs depend on the involvement and participation of other groups within the agency. In many cases, work groups that focus on Maintenance, Facilities, and/or Infrastructure and Operations have staff members who help run the agency’s bicycle programs (Question 2 Appendix B).

Minneapolis Metro, SFMTA, and CTA do not have a formal bicycle program manager or lead coordinator, but they do have multiple staff from multiple areas of the agency and in some cases outside the agency working on bicycle related programs and projects. The SFMTA bicycle program is part of its Livable Streets programming where more than 40 staff members are working on bike related issues. The CTA has integrated bicycle planning into many levels of its organization; the Planning Department coordinates with Operations and Infrastructure to handle day-to-day issues as well as with other local agencies to provide input on bicycle infrastructure improvements throughout the city. At Minneapolis Metro bicycle related planning is a part of many employees workload (Question 2 Appendix B).

Transit agency bicycle programs are not completely run by one person or group. They involve the coordination and work of multiple groups and/or staff within the agency and outside it. While having a lead coordinator or full time

position to manage the bicycle programs is somewhat common among these agencies, there are some that operate bicycle programs without one.

### *Policies and Planning*

All of the studied transit agencies have policies regarding the use of bicycles. These policies can be found on each agency’s respective bicycle webpage. Bicycle policies are most often used to describe how cyclists can park or transport their bicycle when using agency provided facilities. Bicycle policies differ from agency to agency, but generally follow a similar trend when addressing bicycle transportation.

Transit Agency Bicycle Webpage		
City	Transit Agency	Website
Chicago, IL	Chicago Transit Authority (CTA)	<a href="http://www.transitchicago.com/bikeandride/">http://www.transitchicago.com/bikeandride/</a>
Denver, CO	RTD - Denver	<a href="http://www.rtd-denver.com/Bike_n_Ride.shtml">http://www.rtd-denver.com/Bike_n_Ride.shtml</a>
Madison, WI	Metro Transit (Madison)	<a href="http://www.cityofmadison.com/Metro/playyourtrip/bikeRacks.cfm">http://www.cityofmadison.com/Metro/playyourtrip/bikeRacks.cfm</a>
Minneapolis	Metro Transit (Minneapolis)	<a href="https://www.metrotransit.org/bicycle">https://www.metrotransit.org/bicycle</a>
San Francisco, CA	SFMTA	<a href="http://www.sfmta.com/getting-around/bicycling">http://www.sfmta.com/getting-around/bicycling</a>
San Francisco, CA	Bay Area Rapid Transit - BART	<a href="http://www.bart.gov/guide/bikes">http://www.bart.gov/guide/bikes</a>
Seattle, WA	King County Metro	<a href="http://metro.kingcounty.gov/tops/bike/">http://metro.kingcounty.gov/tops/bike/</a>
Seattle, WA	Sound Transit	<a href="http://www.soundtransit.org/Rider-Guide/Bringing-your-bike">http://www.soundtransit.org/Rider-Guide/Bringing-your-bike</a>
Vancouver, British Columbia	TransLink	<a href="http://www.translink.ca/en/Rider-Guide/Bikes-on-Transit.aspx">http://www.translink.ca/en/Rider-Guide/Bikes-on-Transit.aspx</a>

**Table 5**

Most agencies that operate trains often have restrictions on when bicycles can be brought aboard the train. During peak periods and/or when the train is very crowded bicycles are not allowed onboard. Also, bikes with motors are rarely if ever permitted on trains by any of the agencies in this study. When transporting a bike by bus there are no restrictions on the time of day or crowding of the bus as long as there is room on the bike rack in front of the bus. If the bike rack is full, some agencies leave it up to the bus operator's discretion as to whether or not to let them bring the bicycle aboard. Motorized bikes are not allowed on the racks or within a coach by any of the agencies. Some agencies have an age requirement for taking bicycles on a train or bus and restrict those who are under 12 or 10 years of age from transporting their bike by bus or train without having an adult present. Folding bikes are permitted in both rail cars and buses at anytime (Question 3 Appendix B).

Bicycle policies can either be made informally on an ad hoc basis, or be formally adopted at a higher level. King County Metro and RTD generally make policies and procedures that address bicycles on an ad hoc basis. When there is an issue or concern regarding bicycle and transit integration, their lead bicycle coordinator works with others to resolve the issue and update policies. King County Metro had informal policies made formal regarding bicycle locker maintenance with their department's Power and Facilities group (King County – bike travel 2015, RTD – Bike-N-Ride 2015).

The CTA has formal policies related to when and how bicycles can be carried onto transit vehicles and has included bicycle parking in the planning process for future transit station improvement and expansion projects. The CTA's Planning department works directly with Operations staff to identify issues between transit operations and bicyclists in order to inform coordination with bicycle and roadway improvement projects that are being pursued by other city agencies. TransLink and Sound Transit also have policies that were formally adopted at a higher level. For example, Sound Transit has a board and CEO that administer bicycle policy that guides the bicycle programs at a high level. (Questions 3&4 Appendix B).

When developing these policies many of the transit agencies had involvement from internal and external groups. The CTA engages in planning efforts with local agencies in charge of designing and installing bicycle infrastructure in order to maintain a sustainable relationship between transit vehicles and bicycles. The City of Madison has a very active bicycle advocacy community that provides feedback on all aspects of bicycle transportation, including coordination with Madison Metro Transit. The SFMTA works with a vast amount of stakeholder groups when developing its policies and procedures. The SF Bicycle Coalition, SF Safety Awareness for Everyone (SAFE), SF Department of Public Health, SF Policy Department, SF Fire Department, SF Department of Public Works, SF Energy, YMCA of SF, SF Planning Department, SF Pedestrian Safety Advisory Committee, and the Muni Accessibility Advisory Committee, are

all groups or agencies that are involved in the process of creating bicycle policies for the SFMTA. Sound Transit has an internal stakeholder group and external stakeholder group made up of representatives from jurisdictions, advocacy groups and other transit agencies that are both engaged in the development of bicycle policies. TransLink has a Regional Cycling Strategy that held three large stakeholder meetings for input and involvement; these stakeholder groups were primarily made up of public agencies and advocacy groups (Questions 3&4 Appendix B). While the number of those involved in the policy making process varies between these agencies, the consistency of including both internal and external groups remains.

King County Metro creates most of its bicycle related policies internally, but does often reach out to bicycle advocacy groups, the city of Seattle, and Sound Transit (King County Metro operates Sound Transit buses) when changes to bicycle policies are made. So far RTD has created the majority of its policies with only internal input (Questions 3&4 Appendix B).

There are disparities in how some transit agencies described how they create bicycle policies. It is possible that there are differences between “bicycle use” policies and “bicycle planning” policies that were not identified in the survey questions. “Bicycle use” policies would be defined as procedures for how bicyclists can use bicycles with transit, while “bicycle planning” policies, are those which determine how future infrastructure, programs, and policies will be shaped.

It is likely that the latter would have a greater need for stakeholder input and is maybe why many agencies have listed a large variety of participating groups in the creation of their policies. I cannot make this statement with absolute certainty because of the way in which the survey questions were designed, but clarification in this area is needed. A distinction between the types of policies was not made in the survey that was distributed to these transit agencies. This could have possibly created some confusion when answering survey questions 3, 4 and 5, and is a limitation of the survey.

### *Planning Documents*

All of these agencies have many of their bicycle policies and procedures (“bicycle use” or “bicycle planning”) kept in publicly accessible documents or webpages. Some of the agencies like BART, RTD, King County Metro, TransLink, and SFMTA have agency planning documents with policies and practices for integrating bicycles. RTD and Sound Transit are currently working on bicycle accessibility plans. Sound Transit is in the beginning stages of integrating their bicycle policies with the agency’s System Access Policy update. The goal of the System Access Policy and Sound Transit’s access efforts are to increase ridership, and to encourage convenient and safe connections to Sound Transit services through all access modes including bicycles (Sound Transit System Access Policy 2015). RTD is currently wrapping up a Bicycle Parking and Accessibility Plan that will examine existing conditions of bike parking and access at RTD’s rail stations, Park-n-Rides, and transfer facilities. It also addresses

results from a customer survey on the behaviors and barriers to biking to transit or parking a bicycle at a transit facility. The Plan will outline current practices at RTD related to Bike Parking and Access and will make recommendations for the programs, including a recommendation to have a single document containing all policies and procedures related to bicycle parking and access.

Metro Minneapolis uses a document called *Thrive MSP 2040* created by the Metropolitan Council to address bicycle planning. The Metropolitan Council is the regional policy-making body, planning agency, and provider of essential services for both Minneapolis and St. Paul Metropolitan region (Drollinger 2015, Metropolitan Council – Who We Are 2015). Madison Metro will soon be using a “Transportation Master Plan” that the City of Madison is currently developing. The Madison Area Transportation Planning Board is also in the process of updating the Regional Bicycle Plan. While the planning documents used by Minneapolis and Madison Metro were not created by the Transit Agencies themselves, the agency as well as a variety of stakeholder groups did participate in their creation. These are the guiding documents used by these two agencies when implementing bicycle services and growing their bicycle programs. Yet, at Minneapolis Metro not all decisions are rooted strictly in policies or plans. Sometimes, a staff member suggests projects that he or she is then responsible for gaining internal and/or external support and funding (Question 6 Appendix B).

These next few paragraphs will look at the planning documents created by BART, RTD, King County Metro, TransLink, and SFMTA to see how each one addresses bicycle and transit integration. This will hopefully provide a snapshot of how these different agencies have made and use guiding documents to advance their bicycle programs, policies, and planning.

BART has two planning documents that are directly linked to bicycle planning – BART Bicycle Plan: Modeling Access to Transit and BART Bike Parking Capital Program: Increasing bike access while reducing bikes onboard (BART Bicycle Plan 2012, BART Bike Parking 2015). The BART Bicycle Plan is a guiding document with general policy while the BART Bike Parking Capital Program is more of a project specific document (Beroldo 2015).

The purpose of the BART Bicycle Plan is to outline specific strategies needed to encourage a greater number of passengers to bike to and park at BART stations. It's also meant to create a Bicycle Investment tool that BART and other transit agencies can use to select the improvements that will ideally result in the largest possible increase in bicycle access trips. The overall goal of this plan is to double BART bicycle access trips from 4% to 8% by 2022.

Recommended strategies for doubling the share of BART passengers accessing the station by bicycle include: improving station circulation for passengers with bicycles, creating bicycle parking facilities, helping to improve access beyond BART's boundaries, improving bicycle transport systems, and creating new

bicycle support programs. After much deliberation and research, each general strategy was broken into multiple sections that provide specific actions that can be taken by BART. These specific actions provide a fine-grained approach to reaching the ultimate goal – increase number of BART passengers to bike and park at the station (BART Bicycle Plan 2012).

The BART Bicycle Parking Capital Program focuses on improving secure bicycle parking at key stations. These key stations are those expected to be most effective at diverting auto access passengers to bike access and allow more BART riders who bring their bikes onboard to feel safe leaving them at their origin station. To do this a set of recommendations for the 31 stations were made including, bicycle racks inside station paid areas or drip lines, electronic lockers, and staffed and self-serve bike stations. While all of these types of bicycle parking already exist within BART's system, this plan provides a detailed analysis and implementation strategy for each of the key stations (BART Bike Parking 2015).

RTD is currently working on a Bicycle Parking and Accessibility Plan. They have a 2001 Bike-N-Ride Strategic Plan but because of its age it is rarely ever used or referenced (Hutchison 2015). The RTD has a *2009 Transit Access Guidelines* document and a *2006 Bus Transit Facility Design Guidelines and Criteria* document that both provide policies, criteria, and guidelines for accommodating bicycle and transit integration. The Transit Access document

supports the implementation of access hierarchy – encouraging an optimal balance of transportation modes to get to transit (RTD Transit Access Guidelines 2009). The Design guidelines and criteria document establishes minimum standards that should be used in the design of RTD bus transit facilities. The bicycle facilities section is intended to direct the Design Engineer in the design of bicycle parking, paths, lanes, stations, signage, etc. at all RTD bus transit facilities (RTD Bus Transit Facility 2006). Both of these documents are meant to insure that bicycles are not overlooked in the planning process when implementing new infrastructure. The Bicycle Parking and Accessibility Plan will address far more in terms of bicycle related services once it is produced.

Outside of the formal planning processes, most of the policies at RTD are made as needed with a group of relevant staff based on the topic and location. There is currently no specific group of people that make these decisions (Hutchison 2015).

Within King County Metro Transit's Strategic Plan there are some high level strategies focused on bicycle and transit integration. These strategies are focused on supporting bicycle access to jobs, services and the transit system to support mobility choices. The Strategic Plan calls for support for a number of programs that improve economic growth and the built environment. Most of the bicycle related text resides under: Economic Growth and Built Environment (King County Strategic Plan 2013). It is also important to note that Metro, unlike many

of the other agencies who have created their own agency planning documents, does not fully own any rail lines or rail stations. This may be a factor in why the agency has yet to create a detailed access plan like some of the agencies that operate rail and bus and have multiple high capacity transit stations. Yet, King County Metro is responsible for Park & Ride lots and transit centers that have no bicycle accessibility plan that I am aware of.

In cases where plans and policies are not available for a given situation, King County Metro has all relevant staff come together to create an action plan. Staff must commonly work across the aisle with other groups to deal with questions on data collection, bike locker issues, public requests, public messaging, and promotions (Question 4 Appendix B).

The SFMTA has a 2013-2018 Bicycle Strategy that was designed to align with the agency's vision for bicycling in the SFMTA 2013-2018 Strategic Plan goals and objectives. In the strategic plan, the SFMTA has a goal to have 50% of all trips made using sustainable modes (walking, bicycling, public transit, and vehicle sharing). This will require an 11% mode shift and the Bicycle Strategy estimates half of that can be accommodated by bicycles (SFMTA Bicycle Strategy 2013). The document has quite a thorough analysis of actions that will need to be taken to meet this goal. Ways to encourage mode shifts are outlined and a needs assessments for accommodating bicycle growth in the core, connecting neighborhoods, improving bicycle safety, providing safe and

convenient bicycle parking, accommodating transit and walk trips, growing bicycle culture, a comfort analysis, and a connectivity analysis were made. The strategy goes even further by presenting strategies to improve bicycle access, developing funding scenarios, creating a prioritization scheme, and relating it all back to the SFMTA 2013-2018 Strategic Plan (SFMTA Bicycle Strategy 2013). This is a well-integrated Strategy document with clear and precise goals. The fact that it is so well integrated with the SFMTA 2013-2018 Strategic Plan, show great hierarchical coordination between plans; the Strategic Plan is a high level framework, while the bicycle strategy is much finer grained – building off and expanding upon elements of the Strategic Plan.

TransLink – the corporation responsible for the regional transportation network of Metro Vancouver in British Columbia, Canada – is mandated to provide a regional transportation network that emphasizes walking, cycling, and transit as priorities. TransLink therefore has a 2011 Regional Cycling Strategy for Metro Vancouver and a 2013 Implementation Plan for the Regional Cycling Strategy to meet this mandate. The Regional Cycling Strategy describes the current state of cycling in Metro Vancouver, evaluates the potential for increased cycling, establishes a vision, sets goals, and outlines strategies to achieve those goals (TransLink – A Regional Cycling Strategy for Metro Vancouver 2011). The Regional Cycling Strategy is nested between TransLink’s 30-year Transportation Strategy (Transport 2040) and the 3-year Financial and Transportation Plan; it provides focused regional-level policy around bicycling. Transport 2040 has two

primary goals that set the stage for this documents, 1) have 15% of all trips less than 8km be made by bicycle by 2040, and 2) have 50% fewer people killed or seriously injured while cycling by 2040. Four comprehensive technical reports also provided guidance toward the development of this strategy including: Setting the Context (2009), Cycling and End-of-Trip Facilities (2009), Regional Cycling Network Background Study (2010), Bicycle Program Monitoring Study (2010). All of these studies contributed to the development of the Regional Cycling Strategy.

The 2013 Regional Cycling Strategy Implementation Plan tackles TransLink's challenges of covering operating costs and prioritizing strategies that will most effectively achieve the goals of the 2011 Regional Cycling Strategy. It identifies strategies and actions that TransLink can make to achieve the agencies mode share goals in the most effective way (TransLink – Regional Cycling Strategy Implementation Plan). Not only is this document well integrated with the 2011 Regional Cycling Strategy and Transport 2040 plan, but it is also comprehensive in its' prioritization strategy of bicycle investments. The relational hierarchy of TransLink documents is easy to follow and allows for a rational transition from high level policy and goals, to fine grained/detailed strategies and investments.

### **Providing Bicycle Infrastructure**

In this section, the equipment used to transport and park bicycles are discussed in detail. Each transit agency was asked to answer a variety of

questions pertaining to the types, locations, funding, metrics, restrictions, standards, and maintenance of bicycle infrastructure used to transport and park bicycles.

### *Funding and Specifications*

Funding for bicycle equipment by these nine agencies seems to primarily be part of the on-going budget, on a project-by-project basis, or grant funded. BART has an aggressive funding program where there is a complex mix of internal and external funding. The on going operating budget (or General Fund) covers a lot of the costs, while 10 to 15 different grants cover all or parts of capital projects at BART. The CTA has its on-bus equipment set as a standard for new vehicle purchases. Bicycle parking for the CTA is typically included in the funding for rail station expansion and rehabilitation projects. King County Metro uses Federal and State grants to fund new bicycle equipment including racks and lockers. Minneapolis Metro uses primarily its ongoing budget and state, federal, and local grants to fund its bicycle equipment. RTD has all of its bicycle equipment – front-mounted bus bike racks and bike racks and lockers – purchased using local funds. Modest expense accounts are set up for bike parking and the front-mounted bike bus racks with the cost of new buses. At Sound Transit Equipment for transporting and parking bicycles are paid for on a project-by-project basis. When Sound Transit procures buses and trains, the procurement includes on-board bike storage. When they contract out for the construction of a new station or facility, the funding for bicycle parking is part of that contract.

For agencies that have front-mounted bike racks on their bus fleet, most have them included in the standard specification when new coaches are ordered. CTA, Madison Metro, SFMTA, Sound Transit, and TransLink all have front-mounted bike racks incorporated within their standard specifications when new coaches are ordered. At King County Metro, the bracket that holds the rack is spec'd, but not the rack itself. Minneapolis Metro attaches most of the racks themselves while only a few come with pre-installed racks.

### *Transporting Bicycles*

All but one, of the nine surveyed transit agencies uses buses. Each of these eight transit agencies has a bus fleet that is capable of transporting bikes using front-mounted racks. Of these eight agencies, seven have 100% of their bus fleet equipped with front-mounted racks and one (RTD) has 97% covered. At the RTD, the only vehicles that do not transport bike are the RTD Free Mall Shuttle and Free MetroRide. These buses are downtown Denver circulator buses with short distance routes that are designed to have quick load/unload times. Allowing bicycles on these buses would likely slow down the travel time. Also, along these corridors there are many other transit options that do offer bicycle services (question 9 Appendix B, Appendix C).

Of the eight agencies that have buses, only King County Metro and Sound Transit have front-mounted racks that hold up to three bicycles as opposed to

two. In the future, SFMTA plans to have bus bike racks with space for three bikes installed on new coaches. While having an extra spot on a front-mounted rack increases the amount of bicyclists who can transport a bicycle using transit, it is not the only solution to transporting bikes on buses. Minneapolis Metro has 100% of its Bus Rapid Transit (BRT) fleet suited with racks inside the bus in an attempt to mimic the rail experience. This could be something that RTD looks into for their Downtown Circulator buses if they haven't already. It should also be look at by agencies that currently operate or will soon operate Bus Rapid Transit coaches. The only caveat to this solution is that some at Minneapolis Metro question the safety of having bikes onboard buses (question 8-12 Appendix B, Appendix C).

While Minneapolis Metro permits bikes onboard its BRT buses, no other agency permits having bikes onboard without permission from the operator. King County Metro, Madison Metro, Minneapolis Metro, and RTD will only allow bicycles onboard a bus at the operator's discretion. Most agencies allow folding bikes on buses at all times. TransLink is currently in the process of allowing folded bicycles on buses if space permits (question 8-12 Appendix B).

For agencies that have rail vehicles, interior space and/or interior bicycle hooks are the only ways in which bicycles are transported. None of the rail vehicles have front-mounted racks like their bus counterparts. At BART all rail cars except the first car have space for up to eight bicycles (the first train car

does not hold bicycles for safety reasons). On the rest of the BART train cars seats were removed to allow space for bicycles, luggage and strollers. The SFMTA light rail vehicles are of a hybrid design that must operate in a subway and in mixed traffic on the city streets, and the design necessary for this operation is a raised floor that does not allow for at-grade bicycle access in most situations. The interior of these rail vehicles also does not allow for a retrofit to remove seats and create bicycle space. Although these rail vehicles do allow for folding bikes (question 8-12 Appendix B, Appendix C).

For agencies that have rail vehicles, some have restrictions on when bicycles can and cannot be carried on the train. A few years earlier BART did not allow bicycles on the first three train cars during peak hours (7am – 9am and 4:30pm – 6:30pm), but this rule was not well enforced and eventually was changed to all bicycles on trains at all times. For the CTA, bicycles are permitted on trains every weekday except during peak hours and in cases of extreme crowding. TransLink has time of day/direction of travel restrictions where two of their SkyTrain lines are so busy at peak direction that bicycles are prohibited. TransLink also has one station where bikes have been prohibited from using trains because of capacity issues on the platform and vertical circulation. This issue is currently part of a large station renovation project (question 8-12 Appendix B).

Sound Transit, SFMTA, RTD, Minneapolis Metro, Madison Metro, and King County Metro have no time or directional restrictions for bikes on rail or bus. The only time when these transit agencies would not allow bicycles would be due to a capacity issue. If the front-mounted rack, bus, or train were full, a bicyclist would be passed up unless he or she could locate a parking facility to store the bicycle before entering the transit vehicle (question 8-12 Appendix B).

### *Parking Bicycles*

Finding space for cyclists to park their bicycle before using transit is a hot topic for many of the transit agencies that participated in this survey. Many of them are or have been working to increase the number of secure bicycle parking spaces available for bicyclists in particular areas – primarily busy transit stations, transit centers, transfer points, and park-n-rides. Most of the agencies mentioned that more accessible bicycle parking is critical to the success of their bicycle program. While each agency does accommodate users who want to transport their bike with them, most agencies stated that transporting bicycles is not a sustainable way to increase the use of bicycle and transit integration (Appendix B).

There are a wide variety of bicycle parking facilities that transit agencies use. Most commonly transit agencies use Leased Lockers - where users can pay a deposit and/or membership fee to reserve the use of a particular secure parking locker, On-demand Lockers – where users can reserve a secure locker

on a first come first serve basis for a nominal fee, Staffed bike parking – where there is a staffed secure facility where users can lock up their bicycle usually for a fee, Cages or self-serve parking – where users have access to a secure facility for a fee, or open bike racks – usually these are reverse U racks or Wave racks that are considered unsecure and are usually free to use. (Appendix D).

BART has a 2015 Bike Parking Capital Plan that details plans for the expansion of secure parking (2,500 parking spaces) at 31 select transit stations. While BART already offers a variety of parking options at many stations, it has recently in the past few years realized a need for more. The 2012 BART Bicycle Plan suggested improvements and an increase in bicycle parking based on findings that suggested ~25% of cyclists who currently bring their bikes onboard trains do so because they do not feel that there is adequate secure bicycle parking at their origin station (BART Bike Parking Capital Program 2015). The urgency for bicycle parking soon increased after the agency's board lifted the bicycle blackout period during peak hours in 2013. Freeing up more space on trains for passengers while still allowing passengers to access the station by bicycle and securely park their bicycle at the station is the primarily goal of the BART Bike Parking Capital Plan. BART plans to improve bicycle access by providing more attended and self-serve bike stations, leased lockers, and on-demand lockers – including a new design type of on-demand lockers called 'ArcLockers'.

ArcLockers are designed with maximum transparency so transit security can confirm if they are being used to store bicycles, also users will have an easier time finding their parked bicycle. ArcLockers also use remote reservation technology and can be rented on a first come first serve basis for a nominal hourly fee. Also, to improve access to bicycle parking, BART – at some of its stations – has installed sophisticated stairway channels that allow bicycles to be easily rolled up and down the stairs when entering or exiting an underground station (BART Bike Parking Capital Program 2015).

All surveyed agencies provide some level bicycle parking for transit users. Many locate bicycle parking at transfer points, bus stops, transit centers, Light Rail Stations, Bus Rapid Transit Stations, commuter rail stations, park and rides, and major retail or employment sites. The CTA installs and maintains bicycle-parking facilities at transit station both indoor and outdoor throughout its transit network. The Chicago DOT and other municipalities install bike parking in the public right of way near rail station and bus stops (question 14 Appendix B). King County Metro has bicycle parking options at all the Park and Rides and most of the Transit Centers it serves. King County Metro has also recently added on-street bike racks at key RapidRide (limited-stop/high frequency bus routes) stops (question 14 Appendix B).

For transit agencies to determine where bicycle parking should be located and how much of it should be provided, data collection, ridership projections, and

customer requests are often used. At BART a count of available bicycle parking is conducted at many of the transit facilities at a specific time between 10am to 4pm on a weekday. This count happens once every 3 years at BART and provides the agency with insight as what areas/stations are in need of more bicycle parking. The CTA conducts periodic capacity surveys to determine the utilization rates of parking facilities at CTA stations and in the nearby facility. King County Metro uses data collected from leased bicycle lockers to site locations for the implementation of on-demand lockers (question 15 Appendix B).

RTD determines bicycle parking on a case-by-case basis. The RTD Bike Parking and Accessibility Plan (that will be completed soon) will recommend a facility analysis that will consider the existing road network, major barriers, existing bicycle infrastructure in the surrounding area, and nearby land uses. TransLink also takes a similar approach that analyzes the need for bicycle parking by looking at the transportation system in holistic manner. TransLink identifies and uses ridership projections, projected cycling demand, supportive connective cycling infrastructure, customer requests, capacity constraints, and observations when determining where to locate bicycle-parking facilities (question 15 Appendix B).

Sound Transit used a formula to determine how much bicycle parking to have at each new station. When Sound Transit is planning a facility, they take the projected 2030 ridership on an average fall weekday afternoon at that facility and

assume that 4% of those riders will be arriving or departing from the facility by bicycle. Each facility is designed so that 2% of that ridership number has bicycle parking at the facility. Space is preserved for another 2% should the demand warrant adding it in the future. Minneapolis Metro has a similar formula for implementing bicycle parking to insure that space will be available for bicycle parking in the future if needed (question 15 Appendix B).

BART, SFMTA, RTD, Sound Transit, Madison Metro, and Minneapolis Metro both own and manage their bicycle parking internally. TransLink and King County Metro contract aspects of their bicycle parking to an outside party. TransLink contracts its' bicycle locker and parkade (a secure indoor facility for registered, daily use that is connected directly to Transit Service) registration, maintenance, and repair to a third party. King County Metro contracts with a statewide bicycle advocacy group known, as Washington Bikes to manage the keys for all King County Metro owned leased lockers (question 16 Appendix B).

The maintenance and replacement of transit agency owned bicycle facilities including lockers, racks, etc. are also for the most part done internally. Minneapolis Metro's lockers are administered by their Customer Service and Marketing staff, and maintained by their Engineering and Facilities staff. Staff from both of these department work close with one another regarding the state of parking facilities that are owned by Minneapolis Metro. At King County Metro the Power and Facilities staff maintain lockers while Marketing and Development

staff use grants to secure new locker facilities. King County Metro Design and Construction staff members purchase bike lockers and racks for park and rides as they are built. Most agencies only replace and maintain bicycle infrastructure as needed. There is no predetermined timeline for maintenance that these agencies use (question 17 Appendix B).

BART and TransLink contract their maintenance and replacement of bicycle parking facilities out to a third party. BART has a maintenance contract with E-lock technology that is on going where they provide services on an “as needed” basis for bicycle lockers. Any maintenance on BART’s bike stations (secure parking facilities with limited access and either self-serve or attended parking) is done by Bike Hub (question 17 Appendix B).

When bicycles are abandoned either on transit vehicles or at stations, transit agencies handle the situation in similar ways. Most of the agencies that participated in the study keep their abandoned bicycles for an extended period of time and then if they are not claimed, donate, surplus, recycle or auction them. For bicycles left at transit stations, BART and CTA tag bicycles parked at the station with red stickers every so often and if after a given amount of time bicycles with red stickers still on them are taken from the parking facility to lost and found where they stay for a given amount of time until they are either recycled or donated based on condition. At Minneapolis Metro, bicycles are delivered to the lost and found and kept for only 7 days, after which they are

scrapped or donated to bicycle nonprofits. King County Metro will store bikes for 10 days and Madison Metro for 2 weeks. At RTD and SFMTA, bicycles that are left on buses or abandoned are held for 90 days and then if not claimed sent to the police auction, or donated to other organizations including a local youth bike education program (question 18 Appendix B).

None of the agencies had statistics and/or numbers available on abandoned bicycles, except Minneapolis Metro. At Minneapolis Metro in 2014 there were a total of 1,087 bikes abandoned throughout the system. Of these bicycles, 43% were recovered by their owners, and this number has grown over the past few years. Minneapolis Staff have ideas about why so many bikes are abandoned each year, but they have not been able to validate any of them (question 18 Appendix B).

## **Monitoring and Evaluating Bicycle Use**

Monitoring and evaluating bicycles is typically done by transit agencies to better understand how, why, where, when, and by whom their bicycle related facilities are being used. Data can either be taken anecdotally, through surveys, using an automated system/counter, or having people count. Transit agencies typically use a mix of some of these techniques. BART conducted a huge survey in 2008 having over 50,000 BART customers who use weekday service returning questionnaires during the survey period. The questionnaire was geared toward collecting information about users trip purpose, how users get to and from BART

stations, and user demographics (Profile Survey 2008). This survey compiled a large amount of comprehensive data including how many passengers bicycle to BART stations. For example, 4% of those who accessed a BART station from home in 2008 did so by bicycle, compared to 3% in 1998 (Profile Survey 2008). While these studies can be informative they are also resource and time intensive as noted by BART staff (question 19 – 21 Appendix B). Other transit agencies such as CTA and RTD also conduct surveys to gather information on their bicycle facility use. CTA conducts periodic surveys of its bicycle parking facilities. RTD has a customer satisfaction on-board survey that is done every three years to collect data on the use of bicycle parking and bicycles on transit (question 19 Appendix B).

Most all of the agencies collect some level data from the use of leased and on-demand bicycle lockers. This data is typically compiled into monthly or bi-annual usage report. Only TransLink has an APC unit on each of its' buses that records when a bike rack is deployed, and while there is no reporting structure for this data, it is available via request. Many agencies including Sound Transit, King County Metro, Minneapolis Metro, and CTA collect bike on transit and bicycle rack (opposed to bike locker) parking data using volunteers to make periodic counts at strategic locations and times. Minneapolis Metro says it's looking for new ways to collect this type of data in a more regular and automated fashion. It may be in their best interest to look into some of the strategies employed by TransLink. Unlike many of the other agencies, Madison Metro relies

heavily on anecdotal data and customer feedback related to its' bicycle services. They do not use a formalized system to collect data about their system (question 19 Appendix B).

Almost all of the nine transit agencies in this study do not have adopted performance indicators to measure the success of their bicycle related services and programs. Bicycle performance indicators would be helpful in understanding how a transit agency is performing in certain areas relating to their bicycle related services. Without performance indicators it is difficult to directly compare multiple agencies on how successful their program and services are. BART, SFMTA, and TransLink are the only three that said they use performance indicators to measure the success of their bicycle related services. BART tracks the percentage of access trips and asks passengers how certain programs and/or services they provide are working for them. BART then uses this information when making decisions related to bicycles. SFMTA says it has adopted many performance indicators, but that they were too broad for them to list within this survey. A follow up with SFMTA might be worthwhile to understand what performance indicators they use. TransLink has targets for mode share, which are monitored through a trip diary. Trip Diaries are used to obtain information on 24-hour weekday travel from a random sample of local residents. This information can then be used to determine if TransLink has met its target mode share for bicycles to transit (Trip Diary Survey 2013).

Some agencies such as CTA and King County Metro use other indicators produced by outside organizations to influence their agencies decisions on bicycle related services. As bicycling has become a more important mode of travel in cities, some transit agencies coordinate with advocacy groups, DOTs, other jurisdictions, etc. to expand bicycle infrastructure where there has been indication of a need or desire. This provides an opportunity for transit agencies to consolidate some of their resources with outside organizations to enhance efficiencies, limit duplication of efforts, and expand the use of a performance indicator beyond how just an agency is performing, but how a city or region is performing (question 20 & 21 Appendix B).

### **Bicycle Access to Transit**

While we've discussed how all nine of these agencies are involved in the transporting and parking of bicycles, this section explores how agencies work to improve bicycle access to transit. An agency's involvement in improving bicycle access to transit seems to vary based on the control it has over streets and roadways connecting transit stops and stations to the surrounding area. Yet, all of the transit agencies within this study mentioned that they collaborate and work with local jurisdictions and/or organizations to better integrate access to transit for bicyclists (Appendix B).

SFMTA and TransLink have more control over access related infrastructure than any of the other transit agency that participated in this survey.

SFMTA is both the transit and transportation agency within San Francisco that implements and maintains the majority of bicycle facilities in San Francisco. It manages the city bike share program, and provides a signed and numbered bicycle route system with destination placards and more. Their way finding system is currently in the process of being upgraded to provide better, more easily accessible information. SFMTA provides parking guidelines for Muni (local transit), BART (regional transit), and Golden Gate Transit (regional transit) facilities within the city of San Francisco. SFMTA also plays a large role in the policy and code development relating to bicycle service in San Francisco. The partners involved with SFMTA to improve bike access to transit are the Department of Public works, Planning Department, Public Health Department, Board of Supervisors Bicycle Advisory Committee, the San Francisco Bicycle Coalition, and the Metropolitan Transportation Commission (question 22 Appendix B).

TransLink supports municipal efforts to improve cycling infrastructure through funding construction of new bicycle facilities. TransLink also owns the British Columbia Parkway multi-use pathway that runs underneath a section of the SkyTrain rapid transit system known as the Expo Line. This provides TransLink with the ability to monitor and establish better accessibility for bicyclists who use the rapid transit system. Just recently TransLink initiated a plan for integrating bike routes with the Millennium Line Sky Train extension project that is currently under construction (question 22 Appendix B).

Most of the other agencies surveyed do not directly work to improve bicycle access to their transit network, but many do work closely with outside agencies and/or organizations. The CTA is actively involved with local agencies in charge of installing and improving bicycle-related infrastructure. They collaborate with the City of Chicago and Divvy Bike Share when there are right of way improvements, bicycle signage installations, and the location of bike share docking stations. There are also note worthy efforts being made by jurisdictions to link bicycle related services to transit. The Chicago Department of Transportation (CDOT) made a commitment to improving and expanding the city's bicycle related infrastructure including key access routes to CTA transit facilities (question 22 – 24 Appendix B).

King County Metro is part of the jurisdictional conversations whenever there are street improvements (such as bike lanes) made that may impact transit service. For example, when the City of Seattle and Bellevue recently produced a new Bicycle master plan for their respective city, King County Metro had staff on a technical advisory group helping to develop the plan. When King County Metro is building new facilities (such as bus stops), the agency typically discusses bus and bike concerns with local planners. King County Metro also supports the local bike share program with staff, grant funds, and cross-promotion.

RTD, Minneapolis Metro, King County Metro, SFMTA and CTA mentioned that they work with local bike sharing organizations to improve bike share access to transit. RTD works with local Boulder and Denver bike sharing organizations and provides space free of charge for the placement of bicycle share station on their property (question 22 & 23 Appendix B). Five of the nine transit agencies that participated in this survey mentioned some level of involvement with a local bicycle share system. From the responses gathered in this survey, most transit agencies see the integration of bike share and transit as a positive modal pair.

## **Bicycle and Transit Safety**

This section is focused on understanding the programs and/or strategies used by transit agencies to improve the safety of bicyclists when sharing the roadway or transit facilities with buses or trains. While all agencies have a website with detailed information on how to properly use bicycles with transit, some do not have materials specific to educating the public about bicycle and transit safety. Although most of the agencies have produced safety training videos or other materials for operators to insure they are made aware of how to operate in the presence of bicyclists (question 25 & 26 Appendix B).

CTA, SFMTA, King County Metro, TransLink and Madison Metro have videos and/or materials that they've produced that are meant to educating the bicyclists and operators on how to safely share the road. King County Metro produced a series of short videos on bicycle and bus safety that are available on

the web and used at bus bases and in training by bicycle groups and employers who promote bicycle and bus safety. King County Metro also produces bookmarks and other materials about bicycle and bus safety that they distribute at events. The CTA also did something similar where they partnered with the Chicago Department of Transportation to create a 'Share the Road' training video for bus drivers and bicycles on how to safely share the road (question 25 Appendix B).

Madison Metro compiled surveillance video footage of "close call" bus and bicycle/pedestrian/skateboarder accidents. The release of this video was to raise awareness on the types of potential accidents in an effort to help prevent bad accidents from occurring. This is a unique tactic that has not been employed by any of the other agencies that participated in this study (question 25 Appendix B).

All of the transit agencies except for BART have training for their operators on how to handle bicyclists on the streets in a safe manner. BART is the only all rail agency that participated in this survey and noted that bicycle safety has not been a huge issue for the agency. This may be why BART has not formally addressed bicycle and transit safety like the other agencies that have transit service on mixed traffic streets (question 25 Appendix B).

At CTA operators are trained to follow all legal and safe roadway-operating procedures, including how to drive alongside bicyclists and navigate

through streets with different types of bicycle infrastructure. King County Metro's bicycle training segment for new operators is done by the Operating Training Department at Metro and includes videos and the review of policies associated with bikes and general safety tips about operating a bus in mixed traffic. King County Metro operates Sound Transit vehicles, so the operators for Sound Transit are given the same training. Madison Metro, Minneapolis Metro, RTD, SFMTA, and TransLink all have operator training materials – primarily training videos – that are used regularly to educate bus and train operators on how to drive safely among cyclists. With many North American cities still yet to have a completed bicycle network with established separate bicycle paths, safety for cyclists should be a concern and seems to be recognized by most of the agencies surveyed (question 25 Appendix B).

### **Public Information and Marketing for Bicycles**

All of the surveyed transit agencies market their bicycle related services. The agencies use websites, social media, outreach, regional cycling maps, pamphlets, brochures, posters, pocket guides, and/or events to inform the public about bicycle related services. Most agencies maintain and regularly update a bicycle webpage on their agencies website that publicizes rules, policies, events, marketing tactics, facts, etc. about bicycling. Some agencies actively use other means on top of having an up-to-date and comprehensive webpage (question 27 Appendix B).

The SFMTA has a guidebook entitled ‘The Official San Francisco Bike Guide’. This free booklet provides cyclists with a variety of information around bicycling in San Francisco. In it are San Francisco bike laws, safety tips, the facility types that bicyclist may encounter, detailed graphics on how to share the road, how the SF bike share program works, how to safely lock your bike, how to load it on a transit vehicle, and how to ride in weather. This guide is comprehensive, concise, to the point, specific to the local area, uses graphics wherever useful and could be useful for a variety of different knowledge-level and skill-level riders (San Francisco Bike Guide 2015). SFMTA also distributes a free citywide bicycle network map (question 27 – 29 Appendix B).

All of these transit agencies surveyed promote bicycles, but the ways in which bicycles are promoted vary from agency to agency. The CTA, King County, Madison Metro, Sound Transit, and TransLink promote the use of bicycles as part of a larger strategy focused on improving multimodal transportation throughout its service area. An emphasis on first-mile/last mile connections, multimodal options, a reduction of drive alone trips, or something similar is typically used to encourage the use and integration of bicycles and transit (question 27 – 29 Appendix B).

On top of many of the promotional tools and tactics mentioned above, Minneapolis Metro also promotes bicycling as a standalone mode. A portion of

their funding is dedicated to promoting all modes other than driving alone, so the agency often promotes bicycling (question 27 – 29 Appendix B).

RTD promotes bicycle and transit integration in a more specific way than the other agencies involved in the survey. The RTD is currently experiencing an increasing demand for bikes on buses and trains and the capacity of these vehicles cannot and will not be expanded for bicycles in the foreseeable future. Therefore, bike on bus, and bike on rail are not promoted very often. Instead the Bike Parking and Accessibility Plan is recommending a marketing campaign to promote bicycling to transit and parking the bicycle at the transit station. This marketing campaign will likely be taking place this year – 2015. RTD, TransLink, and BART expressed interest in promoting bicycle parking as opposed to the bike on transit, due to capacity issues. Developing and improving parking facilities for bicyclists should be on the radar of all transit agencies. Onboard capacity may soon be an issue for a number of transit agencies; so providing secure bicycle parking at strategic locations may be a promising way to remedy the capacity issue (Question 28 -30 Appendix B).

Many of these transit agencies use a variety of motivational messages to promote bicycles and transit integration. Healthy living, cost savings, and environmental health are a few of that were mentioned. SFMTA mentioned that they have not had a recent bicycle encouragement campaign, but that they recently secured funding to start planning for one. Some of the key elements of

this effort will be focused on demographic research and message testing (question 30 Appendix B).

### **Obstacles to providing bicycle service**

At the end of this survey, participating agencies were asked to list any obstacles that they had experienced with providing bicycle related services. Issues ranged from capacity limitations, funding shortfalls, limited staff, limited resources, competition for limited space, and regulatory action. Resource limitations as well as the fact that many of these transit agencies are a big public agency can sometimes mean that some project are not able to be pursued and that others take a long time to complete. Funding issues for bicycle related services were also a limitation that was mentioned. Some agencies even expressed that some staff and departments within the agency did not like bicycles and/or bicyclists, creating an “us vs. them” mentality that is not productive toward integration.

SFMTA mentioned that it had to deal with quite a large obstacle when the city and county of San Francisco was sued under the California Environmental Quality Act (CEQA) in 2006 and an injunction was issued to stop all bicycle facility construction until the environmental analysis was completed in 2009 (Question 31 Appendix B).

BART, RTD, and TransLink all mentioned that capacity on their transit vehicles has been an issue and has prompted some investment and studies into the expansion/improvement of bicycle parking (Question 31 Appendix B).

## **Conclusion**

This study set out to:

1. Understand the context in which transit agencies have operated bicycle related services
2. Establish a set of structured interview questions appropriate to answering the question of how transit agencies currently handle bicycles
3. Establish a study group – a group of transit agencies to survey
4. Compare methods used by the transit agencies within the study group and discuss trends and differences

The survey I developed with the help of King County Metro Staff was comprehensive and once completed by the nine participating agencies, brought forth a wealth of information to how transit agencies handle bicycles. There were a number items addressed by the nine transit agencies that merit further discussion, as they differed from or reinforced information from past studies.

## **Data Collection and Performance**

In the 2005 TCRP report, most agencies expressed interest in collecting more data about bicycle and transit users. In the survey I conducted, most of the

participating agencies described techniques they use on a periodic basis to collect a variety of user specific data. While many of the agencies would like to be collecting data on a more frequent basis, it appears that data collection on bicycle and transit users has grown since the 2005 TCRP report. Yet, if additional resources were available to these agencies, many said they would want the following to be done: Counts of bicyclists using transit services at different times of day (peak vs. off peak), counts of bicyclists who are passed up due to lack of capacity, bicycle and transit user start and endpoint surveys, socioeconomic characteristics of customers using bicycle services, the purpose of users taking bike-on-transit trips, and how bike-on-transit customers would reach their destination if the bicycle service was not provided. Some of these questions are crucial to understanding where, how and to what extent investments should be made. As mentioned by a few of the surveyed agencies, the answers to these questions are also a critical part of the planning process.

## **Planning**

Surveys, data collection, projections, observations, etc. can all be helpful in deciding how, where and when to make investments in bicycle related services. Prior to the 2012 BART Bicycle Plan, customers took a survey and its results suggested that approximately 25% of cyclists who bring their bicycle onboard trains do so because they do not feel that there is adequate secure bicycle parking at their origin station. This prompted action to be taken in the Bike Parking Capital Program where specific bicycle related improvements to stations

were planned using innovative solutions to accommodate for an underserved need, and to free up space for passengers on trains. This method suggest that there are merits in establishing methods to evaluate the need and/or want of a bicycle related service before developing plans to implement infrastructure projects.

From the available literature one might expect agencies to be interested in improving methods of bicycle transportation, i.e. front-mounted bus bicycle racks for 3 bikes, more space on trains for bikes, etc. This was not the case, as most agencies did not express interest in improving methods of bicycle transportation. Instead, most bicycle-planning documents focused on the conception and implementation of improved bicycle access and secure bicycle parking. This resonates with the idea that there are far more limitations to capacity when transporting bicycles as opposed to securely parking bicycles prior to entering a transit vehicle. Transit agencies that do not currently plan for bicycle parking and access, should most definitely address it when planning for future bicycle and transit related services. As stated in the introduction of this thesis, bicycle use and transit ridership are growing across America.

BART, SFMTA, and TransLink all have comprehensive bicycle-planning documents that other agencies may find useful. Many of these documents are specific to bicycles and show great hierarchical coordination between other plans; initial documents establish a high level framework and subsequent ones

create finer grained policies and plans – more specific to particular stations, parking facilities, implementation strategies, costs, etc.

King County Metro has a Strategic Plan with high-level bicycle policies to guide the agency moving forward. This is a good start, but more can be done as seen by BART, SFMTA, TransLink, and RTD. King County Metro should build off of the general strategies suggested in the Strategic Plan and develop a Strategic Bicycle Plan to advance its bicycle related service. As more people began to use bicycles to connect to transit, King County Metro may not be able to rely so heavily on its bicycle transportation services. Strategic placement of proper bicycle access and parking facilities will likely be an important task moving forward. This will be especially true if bicycle ridership to park & rides, transit centers, high capacity transit corridors, and other specific areas increase in the near future.

### **Bike Share Programs**

From the responses gathered in this survey, most transit agencies see the integration of bike share and transit as a positive modal pairing. Many of the agencies also work directly with bike share organizations to locate bike share docking stations near certain transit stops. This is key to promoting bicycle and transit integration into the future, as the networks of bike share stations continue to grow in cities. Research suggests that the distance someone is willing to walk to use a bike is around 1,000 feet or approximately a 5 minute walk (NACTO

2015). The distance someone is willing to walk to a bike when connecting his or her trip with transit is likely even shorter. For transit agencies, it'll be important to work closely with local bike share providers to insure that future docking stations are strategically placed near frequented transit stops. More data should be collected on this topic to better understand the demographic, number, and location of people willing to link their trip using bike share and transit.

### **Institutional Barriers**

Many of the agencies that participated in this survey mentioned at some point that they were either unable or slow to accomplish a project or task due to issues of ownership. Having to work across the table with multiple jurisdictions, advocacy groups, and agencies can make planning for and implementing projects quite difficult. I recommend that a future study looks at methods for removing institutional barriers that block multi-jurisdictional or multi-organizational planning and project implementation. This would be an interesting topic and may provide very relevant information for transit agencies regarding bicycle and transit integration.

## Bibliography

- “2008 BART Station Profile Study.” *BART Marketing and Research Department*. 2008. Pg. 8  
[http://www.bart.gov/sites/default/files/docs/2008StationProfileReport\\_web.pdf](http://www.bart.gov/sites/default/files/docs/2008StationProfileReport_web.pdf).
- “2011 Metro Vancouver Regional Trip Diary Survey.” Analysis Report. February 2013. [http://www.translink.ca/-/media/Documents/customer\\_info/translink\\_listens/customer\\_surveys/trip\\_diaries/2011%20Metro%20Vancouver%20Regional%20Trip%20Diary%20%20Analysis%20Report.pdf](http://www.translink.ca/-/media/Documents/customer_info/translink_listens/customer_surveys/trip_diaries/2011%20Metro%20Vancouver%20Regional%20Trip%20Diary%20%20Analysis%20Report.pdf).
- “BART – System Facts.” *BART*. Accessed April 16, 2015.  
<http://www.bart.gov/about/history/facts>.
- “BART Bicycle Plan.” *Modeling Access to Transit*. July 2012.  
[http://www.bart.gov/sites/default/files/docs/BART\\_Bike\\_Plan\\_Final\\_083012.pdf](http://www.bart.gov/sites/default/files/docs/BART_Bike_Plan_Final_083012.pdf)
- “BART Bike Parking Capital Program.” *Increasing bike access while reducing bikes onboard*. April 2015.  
[http://www.bart.gov/sites/default/files/docs/BART%20bike%20pkg%20update\\_2015-04-20\\_0.pdf](http://www.bart.gov/sites/default/files/docs/BART%20bike%20pkg%20update_2015-04-20_0.pdf).
- Beck, Drew. (Transit Planning and Scheduling Manager). Madison Metro. *Bicycle and Transit Integration Survey*. March 2015. Appendix A.
- Beroldo, Steve. (Manager Access Programs). BART. Interview by Brand N. Koster. March 2015. Discussion recorded in Appendix A.
- “Bicycles and Transit.” *U.S. Department of Transportation Federal Transit Administration*. Revised February 2013.  
[http://www.fta.dot.gov/documents/Flyer\\_BikesandTransit\\_MAP21\\_FINAL.pdf](http://www.fta.dot.gov/documents/Flyer_BikesandTransit_MAP21_FINAL.pdf).
- “Bikes on BART.” *Bay Area Rapid Transit*. Accessed April 24, 2015.  
<http://www.bart.gov/guide/bikes>.
- Carr, Nick. (Senior Transportation Planner). SFMTA. *Bicycle and Transit Integration Survey*. March 2015. Appendix A.
- Coffel, Kathryn. *Guidelines for Providing Access to Public Transportation Stations*. Transit Cooperative Research Program 153, 2012. Pg 45.
- Cook, Helen. (Manager, Bicycle & Road Network Initiatives). Translink. *Bicycle and Transit Integration Survey*. March 2015. Appendix A.
- “CTA - Overview (Structure, Mission, Values, Etc.)” *Transit Chicago*. Accessed April 16, 2015. <http://www.transitchicago.com/about/overview.aspx>.
- “CTA Bike & Ride.” *CTA*. Accessed April 24, 2015.  
<http://www.transitchicago.com/bikeandride/>.
- Dickens, Matthew, John Neff, and Darnell Grisby. "APTA 2013 Public Transportation Fact Book." (2013).
- Doolittle, John T, and Ellen Kret Porter. “Synthesis of Transit Practice 4: Integration of Bicycles and Transit.” National Academy Press, 1994.  
<http://onlinepubs.trb.org/onlinepubs/tcrp/tsyn04.pdf>.

- Drollinger, Tony. (Commuter Programs Specialist). Minneapolis Metro. *Bicycle and Transit Integration Survey*. March 2015. Appendix A.
- Hegger, Ruud. "Public transport and cycling: living apart or together?." *Public Transport International* 56, no. 2 (2007).
- Hutchison, Genevieve. (Senior Transportation Planner / Bicycle Program Lead). RTD. *Bicycle and Transit Integration Survey*. March 2015. Appendix A.
- "King County Metro – About Metro." *King County*. Accessed April 16, 2015. <http://metro.kingcounty.gov/am/>.
- "King County Metro – Bike Travel." *King County*. Accessed April 24, 2015. <http://metro.kingcounty.gov/tops/bike/>.
- "King County Metro Transit Strategic Plan for Public Transportation." *King County Metro*. 2013. [http://metro.kingcounty.gov/planning/pdf/KCMTStratPlan\\_2013\\_Update\\_LR.pdf](http://metro.kingcounty.gov/planning/pdf/KCMTStratPlan_2013_Update_LR.pdf).
- Krizek, Kevin, Eric Stonebraker, and Seth Tribbey. *Bicycling Access and Egress to Transit: Informing the Possibilities*. Final Report. Mineta Transportation Institute, 2011. [http://transweb.sjsu.edu/PDFs/research/2825\\_bicycling\\_access.pdf](http://transweb.sjsu.edu/PDFs/research/2825_bicycling_access.pdf).
- Lindmark, Ref. (Transportation Planner / Bicycle Program Lead). King County Metro. *Bicycle and Transit Integration Survey*. March 2015. Appendix A.
- Martens, Karel. "Promoting bike-and-ride: The Dutch experience." *Transportation Research Part A: Policy and Practice* 41, no. 4 (2007): 326-338.
- McKenzie, Brian. "Modes Less Traveled – Bicycling and Walking to Work in the United State: 2008-2012," *American Community Survey Reports: U.S. Census Bureau*, May 2014, <http://www.census.gov/prod/2014pubs/acs-25.pdf>.
- "Metro - Why Bike?." *Metro Transit Minneapolis / St. Paul Area*. Accessed April 24, 2015. <https://www.metrotransit.org/bicycle>.
- "Metro Bike Racks." *City of Madison – Metro Transit*. Accessed April 24, 2015. <http://www.cityofmadison.com/Metro/planyourtrip/bikeRacks.cfm>.
- "Metro Transit 2013 Annual Report." *Madison Metro Transit*. <http://www.cityofmadison.com/metro/annualreports/2013.pdf>.
- "Metro Transit 2014 Facts." *Metro Transit serving the Minneapolis / St. Paul Area*. 2014. <https://www.metrotransit.org/facts>.
- "Metropolitan Council – Who We Are." *Metropolitan Council*. Accessed April 24, 2015. <http://www.metrocouncil.org/About-Us/The-Council-Who-We-Are.aspx>.
- Pucher, John, and Ralph Buehler. "Integrating Bicycling and Public Transport in North America." *Journal of Public Transportation* 12, no. 3 (2009): 79–104.
- Pucher, John, Ralph Buehler, and Mark Seinen. "Bicycling Renaissance in North America? An Update and Re-Appraisal of Cycling Trends and Policies." *Transportation Research Part A: Policy and Practice* 45, no. 6 (July 2011): 451–75. doi:10.1016/j.tra.2011.03.001.
- Roush, Rebecca. (Sound Transit Bicycle Program Coordinator). Sound Transit. *Bicycle and Transit Integration Survey*. March 2015. Appendix A.

- “Record 10.7 Billion Trips Taken On U.S. Public Transportation In 2013.” American Public Transportation Association. March 10<sup>th</sup>, 2014. [http://www.apta.com/mediacenter/pressreleases/2014/Pages/140310\\_Ridership.aspx](http://www.apta.com/mediacenter/pressreleases/2014/Pages/140310_Ridership.aspx).
- “RTD – Bike-N-Ride.” RTD. Accessed April 24, 2015. [http://www.rtd-denver.com/Bike\\_n\\_Ride.shtml](http://www.rtd-denver.com/Bike_n_Ride.shtml).
- “RTD – Facts & Figures.” *Regional Transit District (RTD)*. Accessed April 16, 2015. <http://www.rtd-denver.com/factsAndFigures.shtml>.
- “RTD Bus Transit Facility Design Guidelines and Criteria.” *RTD – Regional Transportation District*. February 2006. [http://www3.rtd-denver.com/content/Eagle/VOLUME\\_3\\_-\\_REFERENCE\\_DATA/RTD%20Bus%20Transit%20Facility%20Guidelines,%20Feb%202006.pdf](http://www3.rtd-denver.com/content/Eagle/VOLUME_3_-_REFERENCE_DATA/RTD%20Bus%20Transit%20Facility%20Guidelines,%20Feb%202006.pdf).
- “RTD Transit Access Guidelines.” *Regional Transportation District*. January 2009. [http://www3.rtd-denver.com/content/Eagle/VOLUME\\_3\\_-\\_REFERENCE\\_DATA/Transit%20Access%20Guidelines%20Final,%20Jan%202009.pdf](http://www3.rtd-denver.com/content/Eagle/VOLUME_3_-_REFERENCE_DATA/Transit%20Access%20Guidelines%20Final,%20Jan%202009.pdf).
- Ryus, Paul. *A Methodology for Performance Measurement and Peer Comparison in the Public Transportation Industry*. Transit Cooperative Research Program 141, 2010. Pg 1-29.
- Schneider, Robert. *Integration of Bicycles and Transit, TCRP Synthesis of Transit Practice*. Transit Cooperative Research Program 62, 2005.
- “SFMTA – About.” *Who we are, what we do, our history, and our plans for the future*. Accessed April 16, 2015. <https://www.sfmta.com/about-sfmta>.
- “SFMTA – Bicycle Strategy.” *SFMTA*. April 2013. [http://sfmta.com/sites/default/files/BicycleStrategyFinal\\_0.pdf](http://sfmta.com/sites/default/files/BicycleStrategyFinal_0.pdf).
- “SFMTA – Bicycling.” *SFMTA*. Accessed April 24, 2015. <http://www.sfmta.com/getting-around/bicycling>.
- “SFMTA – The Official San Francisco Bike Guide 2<sup>nd</sup> Edition.” *SFMTA*. Accessed May 3, 2015. [http://sfmta.com/sites/default/files/pdfs/2014%20Bike%20Guide\\_EN\\_0.pdf](http://sfmta.com/sites/default/files/pdfs/2014%20Bike%20Guide_EN_0.pdf)
- Smith, Nicholas. (Strategic Planner). CTA. *Bicycle and Transit Integration Survey*. March 2015. Appendix A.
- “Sound Transit – About.” *Sound Transit Ride the Wave*. Accessed April 16, 2015. <http://www.soundtransit.org/About-Sound-Transit>.
- “Sound Transit – Bringing your bike.” *Sound Transit*. <http://www.soundtransit.org/Rider-Guide/Bringing-your-bike>.
- “Sound Transit System Access Policy.” *Sound Transit Resolution No. R2013-03 – Attachment A*. Accessed April 24, 2015. [http://www.soundtransit.org/documents/pdf/about/board/resolutions/2013/Resolution\\_R2013-03\\_-\\_Attachment\\_A\\_-\\_Final.pdf](http://www.soundtransit.org/documents/pdf/about/board/resolutions/2013/Resolution_R2013-03_-_Attachment_A_-_Final.pdf).
- “Transit Profiles: Top 50 Agencies.” *National Transit Database*. (2014).
- “TransLink – A Regional Cycling Strategy for Metro Vancouver.” TransLink. June 2011. [http://www.translink.ca/~media/documents/cycling/regional\\_cycling\\_strategy/cycling%20for%20everyone.ashx](http://www.translink.ca/~media/documents/cycling/regional_cycling_strategy/cycling%20for%20everyone.ashx).

- “TransLink – About Us.” *TransLink: Getting you everywhere you want to go in Metro Vancouver*. Accessed April 16, 2015. <http://www.translink.ca/en/About-Us.aspx>.
- “TransLink – Bikes on Transit.” TransLink. Accessed April 24, 2015. <http://www.translink.ca/en/Rider-Guide/Bikes-on-Transit.aspx>.
- “TransLink – Regional Cycling Strategy Implementation Plan.” June 2013. [http://www.translink.ca/~media/Documents/cycling/regional\\_cycling\\_strategy/rcs\\_implementation\\_plan\\_june\\_2013.ashx](http://www.translink.ca/~media/Documents/cycling/regional_cycling_strategy/rcs_implementation_plan_june_2013.ashx).
- “Walkable Station Spacing is Key to Successful, Equitable Bike Share.” NACTO. Accessed May 15, 2015. [http://nacto.org/wp-content/uploads/2015/04/NACTO\\_Walkable-Station-Spacing-Is-Key-For-Bike-Share.pdf](http://nacto.org/wp-content/uploads/2015/04/NACTO_Walkable-Station-Spacing-Is-Key-For-Bike-Share.pdf).

## Appendix A

### The Survey

Thank you for participating in this study by answering these questions on how your transit agency works to integrate its services with bicycles. If you have any questions about the survey feel free to contact me at [brandnk@uw.edu](mailto:brandnk@uw.edu)

Your Name & Title:

E-mail:

Phone:

#### Planning for Bicycles

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*This section asks about the policies, plans, and programs that guide the bicycle decision-making process at your agency.*

1. What elements are included in your agency's bicycle program, e.g., bikes on transit, bike/transit safety, bicycle parking at transit facilities, etc.?
2. Where does your agency's bicycle program fit within your agency's organizational structure? How many staff people work on bicycle planning for your agency? Is there a full-time bicycle program manager?
3. Does your agency have written policies or procedures that address bicycles, such as formal adopted policies, or standardized operating procedures? Or does your agency use informal or ad hoc practices created by staff? Please describe these policies or practices and provide links when available.
4. What organizations, agencies, jurisdictions, or advocacy groups were involved in the creation of these policies or practices? In what ways were they involved, and are they or other groups involved when updates/changes are made?
5. Are your bicycle policies and/or practices part of a larger planning document such as a strategic plan, demand-management plan, environmental plan, or other? Please provide a link to all relevant documents.
6. If your agency does not have bicycle policies or practices, please describe how your agency makes decisions for bicycle related services.

#### Providing Bicycle Infrastructure

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*This section asks about the types of equipment that your agency uses to transport and park bikes.*

7. How does your agency pay for bicycle equipment? If your agency uses sources outside the on-going budget, please describe the sources and how they're used.
8. Please fill in the table below to describe how your agency transports bikes

	# of bikes per bus or rail car	% of fleet covered	Comment
<b>Bus</b>			
Front-mounted rack			
Interior space or rack (describe)			
Other (describe)			
<b>Rail</b>			
Interior rack or hook (describe)			
Designated space (describe)			
Other (describe)			

9. If not all of your agency's vehicles transport bikes, how did you determine which would have the capabilities and which would not?
10. Are bikes ever permitted inside a bus? If yes, is that standard practice or only under some conditions? What are those conditions?
11. Are there restrictions about when or where bikes can be carried on your agency's fleet or system, such as time of day or location? What factors determined those restrictions?
12. Are bike racks on buses included in the standard specs when your agency orders new coaches?
13. Please fill in the table below to describe how your agency provides bike parking at stations, park and ride lots, transit centers or other transit facilities. Feel free to attach photos or product names.

	# of locations	# of units total	Capacity per unit	User cost	Comments
Leased lockers					
On-demand lockers					
Staffed bike parking					
Cages					
Open bike racks					
Other (describe)					

14. List the types of locations where your transit agency locates its bicycle parking (park and rides, transit stations, on-street bus stops, other).
15. What method(s) does your agency use for determining the amount of bicycle parking to provide? Does your agency use a specific rule-of-thumb, for example, based on transit ridership at a particular facility?
16. Does your agency own and manage its bicycle parking or use another party? How does it administer the use of its bicycle parking?
17. How are maintenance and replacement of bicycle infrastructure handled? Is this handled internally or contracted? What criteria determine when to replace equipment, including on-board racks and bicycle parking? Please describe.

18. How does your agency handle bikes abandoned on transit vehicles? How long are the bicycles kept for claiming by the owners? How many bicycles are left on transit vehicles annually?

### **Monitoring and Evaluating Bicycle Use**

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*This section asks about how your agency gathers and uses data on its bicycle services.*

19. What data does your agency collect on the use of its bicycle services (lockers, racks, etc.)? How is the data collected and how often?
20. Has your agency adopted performance indicators to measure the success of bicycle related services? How are these indicators used for decision-making?
21. Do you use other indicators, such as trends in local bike commuting, presence of a bike share program or other? If so, what are these indicators and how do they influence your agency's decisions on bike services?

### **Bicycle Access to Transit**

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*This section asks about how your agency is involved in helping cyclists get to transit.*

22. Is your agency involved in improving bicycle access to transit by helping to fund, build or support way-finding, on-street or off-street paths, lanes or facilities, station improvements, bike share programs, other? If yes, please describe.
23. Does your agency play a role in influencing local codes or policies related to bike access to transit? Please describe each and provide documentation if available.
24. What partners are involved with your agency to improve bike access to transit?

### **Bicycle and Transit Safety**

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*This section asks about how your agency approaches bicycle safety*

25. Has your agency created any programs to improve the safety of bicyclists when sharing the roadway or transit facilities with buses or trains? Please describe.
26. Does your agency have training for transit operators specific to operating in the presence of bicyclists? If yes, please describe and/or provide documentation.

### **Public Information and Marketing for Bicycles**

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*This section asks about how your agency informs and promotes services to cyclists.*

27. What communication methods does your agency use to inform the public about your agency's bicycle services (website, social media, events, brochures, other)?
28. Does your agency publicize rules for how cyclists are expected to use the bike related services? Please provide a link. How are these rules enforced?

29. Does your agency promote using bicycles with transit? If so what is your agency's objective for this promotion (first-mile/last mile connections, multimodal options, reducing drive-alone trips, increase catchment area, other)?
30. What motivational messages does your agency use (health, cost saving, environmental), and what types of channels does your agency use to communicate this message (social media, website, events, social marketing/behavior change strategies, other)?
31. Does your agency partner with local jurisdictions, organizations, or advocacy groups to market its bicycle related services?

### **Further Information**

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32. Please list any obstacles or issues that your agency has experienced or is experiencing with providing bicycle related services.
33. Is there anything about how your agency handles bicycles that this survey did not cover? If so, please describe.