TRANS LINK

Bicycle Program Monitoring Study

Technical Memorandum 4: Proposed Bicycle Monitoring Program

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EXECUTIVE SUMMARY

TransLink is developing a Regional Cycling Strategy to guide cycling investment and programming across Metro Vancouver through to the year 2040. The "Bicycle Program Monitoring Study" is one of several studies being conducted as part of the Regional Cycling Strategy. The purpose of the "Bicycle Program Monitoring Study" is to develop a systematic, regional program to count bicycle trips and monitor bicycle use throughout the region.

This is the fourth and final Technical Memorandum that is being prepared as part of this study. The purpose of this technical memorandum is to outline the proposed Regional Bicycle Monitoring Program (BMP). The proposed Regional BMP is a structured, coordinated, strategic, and pro-active approach to collecting and utilizing bicycle data required to support the planning and assessment of cycling infrastructure and program investments throughout the region.

Strategy Development

A number of guiding principles for the development of the Regional BMP have been identified based on current practices locally and best practices elsewhere. These include maximizing the effectiveness of investments in cycling infrastructure by developing a strategic bicycle count program; focusing on the quality and value of data collected by building on historic bicycle counting efforts and coordinating with other data collection programs; and ensuring consistent data collection and analysis methodologies are used across the region.

Needs Definition

The design of a data collection and monitoring program requires an understanding of the potential applications of the data and needs of the end users. The need for a BMP varies widely among the municipalities and agencies throughout the region. For example, while some municipalities and agencies have formalized, on-going, comprehensive bicycle count programs, many municipalities have only collected and used bicycle data on a sporadic basis or have never collected bicycle related data in the past. With that in mind, many jurisdictions in the region would benefit from the following program elements in the BMP:

- Selection of count locations
- Selection of consistent count time period
- Data collection materials and equipment
- Data collection methodologies
- Support materials for volunteer counts
- Data archival formats
- Data analysis techniques
- Training
- Data reporting methodology

Assessment Indicators

Indicators have been developed in four broad topic areas to monitor and evaluate the use of cycling in the region:

- Bicycle Infrastructure
- Bicycle Use
- Cyclist Safety
- Cyclist Perceptions

These indicators form the basis for determining the overall scope and components of the monitoring program, as well as the specific data collection and assembly activities that will be required to operationalize these indicators.

Program Components and Elements

Each of the identified indicators requires a method to acquire such information. A number of data acquisition activities are necessary to collect and assemble the required information for the purposes of planning and monitoring a transportation system. These data acquisition activities can be accomplished through two general methods:

1. **Data collection** consists of the carrying out of data collection activities and are typically conducted to gather new or *primary* data for planning, operations or monitoring purposes, and can require a considerable amount of time, effort, and cost to design and implement.
2. **Data Assemblies** are the gathering of existing *secondary* data from various external sources that are used to describe the area or system of interest. For example, inventories of road attributes and operational characteristics can be considered as data assembly activities.

The overall proposed BMP consists of these two types of activities – data collection and data assembly activities. The recommended components are described below.

Data Collection Activities

1. Bicycle volume count survey

A bicycle volume count survey consists of the comprehensive collection of bicycle volume data along key corridors and locations. This is vital to the establishment of a long-term monitoring program and the evaluation of projects and policies. This component entails the design of a count program to capture bicycle volumes through the use of automatic and manual count methods at permanent or temporary count locations.

A total of 262 bicycle count locations have been recommended throughout the Metro Vancouver region, including existing bicycle count locations. It should be noted that municipalities should be consulted regarding these bicycle count locations, and that municipalities may choose to change or add to their local count locations based on their needs.

24 of the count locations are automatic permanent counters, or "control stations," which use inductive loop detectors. These automatic permanent count locations are recommended at major water crossings, other bridges, or along other significant corridors, and would form the backbone of the regional data collection program. Together, these 24 locations would provide a comprehensive assessment of cycling patterns (including daily, weekly, and monthly variations) in a variety of contexts throughout the region.

2. Bicycle intercept survey

The purpose of the bicycle intercept survey is to obtain information about cyclists travelling along a specific route or corridor. The information is

gathered in an interactive fashion such that information beyond observation-based surveys (i.e. counts), is obtained. This type of survey collects data similar to household surveys, however also includes non-residents such as visitors in the sampling, providing a more complete picture of a corridor's overall travellers and their behaviour. Depending on the needs and survey location and traffic characteristics, this survey could be designed as either a road-side interview survey or a postcard questionnaire survey.

To ensure an adequate number of samples are collected, heavily used cycling corridors should be surveyed. Furthermore, locations should coincide with bicycle count locations to ensure comprehensive volume counts are available. Finally, locations should be dispersed throughout the region to obtain a comprehensive regional coverage. Intercept surveys are recommended to be administered at 17 locations throughout the region.

3. Bicycle travel time survey

A bicycle travel time survey is used to collect trip travel time data between origin and destination points, and points along the travelled route. This information allows for the definition of a baseline indication of travel times, delay, and general congestion within and across the region. When assessing the travel time impacts of a new cycling route, travel time surveys can be employed to provide key information that may not otherwise be available from other methods.

It is recommended that bicycle travel time surveys be conducted ad-hoc, supporting the "before-and-after" analyses of new or modified transportation facilities that impact bicycle use. However, a good candidate of a formal bicycle travel time survey, for the purposes of monitoring, is the Central Valley Greenway (CVG). Bicycle travel times surveys have been conducted along the CVG corridor before and after construction. Continued monitoring of travel times along the CVG may prove useful in providing a regional indication of bicycle travel times. However, unlike the previous surveys, automobile travel times should also be conducted at the very least, if not transit travel times as well. This will provide a sound basis to determine relative regional travel time changes, and allowing for post-facility verification of travel time savings benefits.

4. Cycling network features inventory

The need for detailed bicycle route information is important to determine an assessment of features available and their conditions over time. The collection of route feature information allows for the quantification of the quality of bicycle routes and can be used to research and study the impacts of such features on bicycle safety, performance, and demand.

As there has been a previous Bicycle Route Features Inventory performed by TransLink (referred to as the "Network Validation Data"), it is advised that this existing dataset be updated over time.

<u>Data Assembly Activities</u>

5. Bicycle parking data

Similar to automobile mode choice, the provision of bicycle parking facilities at trip destination points can influence the use and convenience of cycling. Formal bicycle parking facilities (such as bicycle racks, bicycle lockers, showers, and clothing lockers)

support bicycle use and can be an indicator of the progress of cycling infrastructure policies.

6. Household origin-destination travel survey data

Regional household origin-destination travel surveys are conducted to measure travel patterns and behaviour data of residents in a region, typically over a 24-hour period. The travel information collected consists of data such as origin-destination, trip purpose, trip start and end points, day of travel, and travel mode. Specifically for the BMP, travel surveys provide total bicycle trips and bicycle mode share information that is used to determine the effectiveness of cycling-related investments and relative trends of bicycle use.

Statistics Canada Census Journey to Work data provide data similar to regional household travel surveys, however typically at a much larger sample size although with less detail and data collected per sample. This dataset considers travel only to work (approximately 1/6 of all trips in a day, or 1/3 assuming the same pattern on the return to home trip) and is defined as the average travel behaviour to work in the census year and not actual recorded-event data.

7. Bicycle safety data

Safety affects travel in many ways from congestion to perception and use of certain modes. For cycling, safety is a critical issue mainly due to the vulnerable nature of the bicycle mode relative to motorized vehicles. Therefore, the collection of bicycle safety data is important to measure the safety of cycling routes, as well as the potential perception of cycling safety and impact to cycling mode shares.

8. Bicycle route and network spatial data

Changes to the provision of bicycle routes can be monitored to determine trends of the growth of the supply of bicycle infrastructure. This information can be used in determining the performance of bicycle use in specific corridors or overall regional areas. Furthermore, in conjunction with total network data (i.e. total lane-km), a relative trend of bicycle to general purpose road supply (ratio) can be measured over time.

9. Multi-modal integration data

The supply of bicycle infrastructure also includes multi-modal integration. Measuring the integration of bicycles and transit services can provide an indication of the multi-modal synergy between the two or more modes. Measures can be made on transit vehicles (buses, Skytrain, Seabus), as well as bicycle trips using ferries or shuttle services to cross the George Massey Tunnel.

10. Contextual data

In order to calculate values for the indicators identified in **Section 4**, contextual data are required for some indicators. Specifically, the contextual data required include population (at the block face level), business points data, land use data, vehicle count data, and gas prices data.

Program Implementation

As the available resources may restrict the ability to implement the complete scope of the BMP at once, the components of the proposed program can be prioritized in terms of timing to reduce the overall cost per year.

The four data collection program components were assessed and prioritized based on five criteria:

- Significance
- Immediate need
- Independence
- Difficulty
- Budget required

Each of the data collection activities were scored on a scale of 1 to 5 and added together to determine an overall priority score. The activities were then assigned a priority ranking. The Bicycle Volume Count Survey was ranked as the highest priority, followed by the travel time survey, intercept survey, and route features inventory. **Table ES-1** provides a prioritized schedule of the start of each of these program components, frequencies, and annual budgets.

Table ES-1 – Summary of Proposed Bicycle Data Collection Activities

Data Collection Activity	Year 1 (2010)	Year 2 (2011)	Year 3 (2012)	Year 4 (2013)	Year 5 (2014)
Volume Count Survey & Network	$260,000	$70,000	$70,000	$70,000	$70,000
Intercept Survey		$70,000		$70,000	
Travel Time Survey		$5,000	$5,000	$5,000	$5,000
Route Features Inventory			$25,000		$15,000
Annual Total:	**$260,000**	**$145,000**	**$100,000**	**$145,000**	**$90,000**

Once the development of the BMP is initiated, an Implementation Plan will be required to provide a road map of the key steps required to ensure a smooth process for full implementation. The main implementation steps and components are as follows:

1. Develop and adopt Bicycle Monitoring Program Terms of Reference (TOR) which would form the basis from which the purpose, plans, components, and protocols of the BMP would be defined.
2. Establish a Bicycle Monitoring Program Committee comprised of TransLink and its municipal and provincial partners to assist and ensure the proper operation of the BMP.
3. Develop and Conduct Bicycle Volume Count Program
4. Develop and Conduct Bicycle Intercept Surveys
5. Develop and Conduct Bicycle Travel Time Surveys
6. Update Bicycle Route Features Inventory
7. Develop a Bicycle Account Report summarizing the status of cycling based on standardized indicators.

The management of the proposed BMP would be centred around the proposed Bicycle Monitoring Program Committee, which would provide direct interaction with the Bicycle Subcommittee and connections to local and provincial agencies. TransLink's role should consist of:

- **Coordination** – To act as a regional coordinator of cycling data to facilitate data sharing, consistency, best practices, and partnership opportunities.

- **Central Data Assembly** – To acquire and assemble cycling-related data from external sources.
- **Collect Own Data** – to ensure data is collected, archived, and evaluated on TransLink-owned facilities, and provided in an open standard.

Data Archive, Access and Dissemination

Data sharing is a key strategy to support the advancement of cycling information throughout the region. Sharing of cycling and related data will increase the information available for design, planning, and research in a cost-effective manner. Furthermore, sharing of data will facilitate closer coordination of data collection activities, further standardizing the available cycling data.

The benefit of a concerted effort to collect data is the opportunity to share the data and increase the value and utilization of the investment dollars made in the data collection. Hence, the issue of data sharing, dissemination and access is important and is a key part of the overall monitoring program. This component of the program consists of four basic steps:

1. **Data Acquisition**, which is the gathering of data from various sources and methods.
2. **Data Archive and Reduction**, which involves translating raw data into an electronic format, as well as storing, verifying, summarizing and managing the data.
3. **Access and Sharing of data** which allows for the distribution of the data and assists in decision-making processes.
4. **Dissemination of data** which involves providing access to the data in a centralized fashion.

Reporting

The BMP will result in a comprehensive amount of cycling-related data that will be collected and assembled across the region. In order for these data collection and assembly efforts to be translated into a useful monitoring program, a clear reporting structure is required to ensure that the data is analyzed, presented, and reported in a systematic and consistent fashion over time. This will allow for the clear monitoring of cycling-related trends as well as progress towards achieving the goals of the Regional Cycling Strategy.

It is recommended that the reporting structure consist of the publishing of a "Metro Vancouver Bicycle Account". This Bicycle Account is similar to Bicycle Accounts that have been developed in Copenhagen and Melbourne to monitor cycling related trends related to infrastructure, behaviour, and safety based on a combination of quantitative and qualitative indicators.

The Bicycle Account should be concise (5 pages) and clearly written using non-technical language that can be easily understood by a wide variety of audiences, including staff and politicians in each of the municipalities in the Metro Vancouver region, cycling advocates, the general public, and other stakeholders.

1.0 INTRODUCTION

TransLink is developing a Regional Cycling Strategy to guide cycling investment and programming across Metro Vancouver through to the year 2040. Providing increased choices and incentives for cycling is a priority in federal, provincial, regional, and municipal plans and policies. Therefore, there is a need and desire to invest in cycling infrastructure and related programs. However, this requires proper information in order to effectively utilize the limited resources available. To that end, the "Bicycle Program Monitoring Study" is one of several studies being conducted as part of the Regional Cycling Strategy. The purpose of the "Bicycle Program Monitoring Study" is to develop a systematic, regional program to count bicycle trips and monitor bicycle use throughout the region.

This is the fourth and final Technical Memorandum that is being prepared as part of this study. The first three technical memoranda summarized current data collection programs that are focused on cycling elsewhere in the world and throughout Metro Vancouver, as well as local contextual data programs throughout the Metro Vancouver region.

The purpose of this technical memorandum is to outline the proposed Regional Bicycle Monitoring Program (BMP) based on the findings from the previous three technical memoranda. The proposed Regional BMP is a structured, coordinated, strategic, and pro-active approach to collecting and utilizing bicycle data required to support the planning and assessment of cycling infrastructure and program investments.

A bicycle monitoring program should be designed to collect and acquire data on a frequent and timely basis, in order to detect changes and trends in bicycle demand and usage within the region over time. These changes can occur as a result of changes to demographics, economics, and other contextual variables. Changes in bicycle use can also occur due to new infrastructure, programs, and policies implemented within the regional transportation system.

Furthermore, in order to assess the success of the Regional Cycling Strategy as well as other plans and strategies, a proper monitoring program must be in place to be able to assess whether they have achieved their goals and targets.

This recommended Regional BMP in this Technical Memorandum includes the following nine sections:

- ***Section 1: Introduction*** provides an overview of the study, including the purpose and scope of the study and this Technical Memorandum.
- ***Section 2: Strategy Development and Guiding Principles*** outlines the overall strategy that has been applied in the development of the BMP, including a number of Guiding Principles.
- ***Section 3: Needs Definition*** identifies potential applications of the BMP, summarizes local bicycle data collection efforts and identifies gaps in data collection efforts, and outlines the general needs of an effective BMP.

- ***Section 4: Assessment Indicators and Evaluation Framework*** identifies variables that can be used as indicators in the BMP and includes an evaluation framework that can be used to assess the merits of project options.

- ***Section 5: Program Scope and Components*** outlines the overall scope of the BMP and describes each of the recommended data components.

- ***Section 6: Proposed Bicycle Monitoring Activities*** provides details regarding the specific activities that are required for each of the recommended data components, with specific emphasis on those components that require primary data collection.

- ***Section 7: Implementation and Management Plan*** identifies priorities for implementing the BMP based on resource constraints and includes an implementation plan, a management plan, and protocols for regional coordination.

- ***Section 8: Data Archive, Access and Dissemination*** provides recommendations regarding acquiring data, archiving data, accessing and sharing data, and disseminating data in a consistent fashion across the region.

- ***Section 9: Reporting*** outlines how the results of the BMP can be reported and distributed.

2.0 STRATEGY DEVELOPMENT AND GUIDING PRINCIPLES

The development of an effective monitoring program needs to consider issues such as future compatibility and comparability, sound statistically-based designs and analysis methods, and the incorporation of best practices from around the world in conjunction with the current practices undertaken in the local context. Overall, an effective monitoring program will provide the essential information needed for the assessment and development of sound policies, plans, and programs to support the growing impact of cycling as a mode of travel in Metro Vancouver.

The development of a monitoring program also requires both a strategic perspective and a detail-oriented approach. In addition, as the collection of data can be expensive, synergies with the collection of other data will allow opportunities to reduce costs and effort, while increasing the ability to integrate and use different datasets together to derive further value.

An overall strategy has been applied in the development of the Regional BMP. The strategy is based on the findings of the previous technical memoranda. In addition, the strategy is based on several key Guiding Principles that have been established, so that details such as survey and sampling designs meet a high standard of quality to ensure regional consistency and standard application of best practices. These principles arise from the findings of the previous technical memoranda. To that end, this section summarizes the findings of the previous technical memoranda and outlines the key Guiding Principles that have been used to develop the BMP.

2.1 Summary of Findings from Preceding Technical Memoranda

Technical Memorandum 1 presented research findings on bicycle count technologies and best practices. Examples from around the world were noted that collect and use cycling data in an effective manner, with emphasis on data presentation geared for decision-makers and the general public. The investigation identified that the most appropriate count technology depends on the specific location, purpose of the count data, accuracies required and characteristics of the cycling and pedestrian trips occurring at count locations. The characteristics and attributes of the count technologies were examined in light of their pros and cons, and the results presented in the report. The findings of Technical Memorandum 1 were used to provide the basis in determining the methods that were recommended for the BMP.

Technical Memorandum 2 summarized the data collection programs that are currently undertaken throughout Metro Vancouver. While there is a significant amount of cycling data collection activities that have been conducted, current collection methods are not coordinated across the region and as a result, the data collected can be inconsistent. The methodologies used to collect cycling data vary across the municipalities, as do the ways in which the data is processed and used. While it is encouraging that such data collection efforts are being undertaken, there are opportunities to strategically coordinate these efforts, to employ best practices and to implement a standardized method

of data collection and data reporting. Such a strategy will not only maximize the benefits of data collection investments, but also increase the prominence of cycling data collection as a whole.

Technical Memorandum 3 provided a comprehensive overview of the current transportation data collection programs throughout the region and outlined their relevance in relation to the development of a Regional BMP. It is important that such a program capitalize on the existing transportation data that is, and will continue to be, collected throughout the region. This will not only provide cost-savings, but also a more complete picture of travel patterns in the region, by ensuring a multi-modal approach is taken on all data collection activities where appropriate. Wherever possible, this supplementary data (e.g. collision data, APC data, travel survey data) should be integrated into the Bicycle Data Collection Program, and should be used to conduct a robust analysis of cycling, and the factors that influence cycling, throughout the region.

2.2 Guiding Principles

The following Guiding Principles summarize the findings of the best practices both locally and internationally and have been used to strategically develop the BMP. The Guiding Principles have been categorized in three broad areas – maximizing effectiveness of investments, prioritizing the quality and value of data collected, and ensuring consistent methodologies.

Maximizing Effectiveness of Investments

- **Focus on intra-municipal locations.** TransLink currently conducts inter-municipal bicycle counts through their screenline count program. The locations of these counts are generally concentrated along the municipal boundaries and not within the municipalities themselves, and they are also generally not located along bicycle routes and are not well suited to strategically capture bicycle volumes. The BMP will focus on intra-municipal locations, which will complement TransLink's existing and ongoing screenline count program.

- **Focus on utilitarian bicycle trips.** The monitoring program will be primarily directed towards commuter cyclists. It is recognized however that there may be opportunities to conduct studies where there are higher levels of both utilitarian and recreational cyclists (at locations such as the Central Valley Greenway and Canada Line Bridge). Where appropriate, the count program will monitor both types of cyclists.

- **Develop automatic count network supported by manual counts.** The core of the data collection program will be based on automated count technologies as opposed to manual counts. Although a comprehensive network of manual count locations will be proposed, a smaller network of automatic permanent bicycle count locations, or "control stations," will be established to provide the "backbone" of continuous counts that will provide the foundation for the regional BMP. TransLink could establish and administer such a network of control stations in conjunction with

municipalities and other agencies. Combined with local manual and automatic counts, a thorough coverage of bicycle movements across the region will be possible. It is anticipated that approximately 80% of the proposed count locations will be manual while 20% will be automatic.

- **Support and recognize volunteers.** The BMP will incorporate the cycling data that has been, and will continue to be, collected through volunteer efforts. TransLink could encourage volunteer programs to follow the standardized data collection methodology. However, it is recognized that it may not be reasonable to ask volunteers to take on the same role as paid employees.

- **Monitoring locations will be focused on bicycle routes.** Monitoring locations will correspond to existing bicycle routes or planned bicycle routes that are to be implemented in the short-term.

- **Monitoring locations will be focused in high priority areas.** Due to resource constraints and the nature of the data collection program, locations must be prioritized. The prioritization hierarchy of the locations will be based on existing and future cycling potential within each municipality. Data collection efforts will be focused on these locations, as identified through the regional Cycle Zone Analysis.

Prioritizing the Quality and Value of Data Collected

- **Focus on efficiency and quality of data.** Manual counts will be conducted at intersections wherever possible, instead of at mid-block locations. Intersection counts are more efficient where there are two or more bicycle routes that converge at the intersection. Automatic counters on the other hand, will be placed at mid-block locations as current count technology does not permit accurate intersection counts.

- **Capitalize on historic count locations.** In determining bicycle count locations, the locations of historical bicycle counts will be considered and prioritized where appropriate. This will allow the data that has been previously collected to be capitalized upon and it will help demonstrate changing trends over time.

- **Develop a plan to expand data collection locations.** TransLink has identified 7-8 sub-areas throughout the region. Criteria for expansion of the data collection program should be formalized and should account for variable geographies (rural, flat etc.) throughout the region.

- **Capitalize on opportunities to integrate the collection of cycling data with other data collection processes.** Wherever possible, the bicycle data collection process will be coordinated with other data collection efforts (e.g., vehicle count programs). Coordinating with other count programs will ensure that the data collection process is as streamlined and resource efficient as possible.

- **Capitalize on opportunities to integrate the collected cycling data with other transportation data.** A robust database of related data such as vehicle counts, origin-destination travel survey data, crash data, infrastructure data, route

characteristic data, and data from other agencies (e.g., APC data, BC Ferries, SeaBus) will be compiled wherever possible. This compilation of data will be used to analyze the transportation characteristics of the region as a whole and analyze multi-modal route characteristics. Furthermore, context data regarding variables that can significantly affect cycling demand (e.g. demographics, regional and urban form, fuel prices, road infrastructure and road network, traffic, climate, topology, land use, transit network and service) should be captured or referenced.

Ensuring Consistent Methodologies

- **Develop consistent data collection and analysis methodologies.** A consistent count process will be established, including consistent data collection and analysis methods, so that data can be accurately used to identify trends and changes in cycling volumes. Changes to methodologies may introduce design and data collection bias, resulting in potentially misleading trends.

- **Develop consistent set of resources.** In order to make the data collection process as easy and efficient for the municipalities, and to ensure program consistency, a set of standardized resources will be developed for their use. Such resources include standardized data collection instruments (i.e. forms), survey designs and methods, training materials, and equipment. However, as needs may vary by municipality, these standards would be considered as the basic level of information or practices such that the data collection will be compatible region-wide. Municipalities may wish to collect additional data beyond the recommendations outlined in this report to support their local bicycle planning efforts.

3.0 NEEDS DEFINITION

The design of a data collection and monitoring program requires an understanding of the potential application(s) and needs of the data. This requires consultation with the eventual users of this data to understand the applications and data needs and how the data will be used, as well as any data gaps that exist. Furthermore, future uses of the data may require different specifications.

The general issues and needs for bicycle data throughout Metro Vancouver were identified in Technical Memoranda 1 – 3. In addition, specific design needs into the development of the Regional BMP were identified in the Guiding Principles described previously in **Section 2**.

The following sub-sections provide a summary of the data needs and issues for the BMP throughout Metro Vancouver, through the identification of "end product" applications, the analysis of current gaps, or shortcoming of current practices and methods, in relation to a desired situation that addresses all needs and issues.

3.1 Applications

When designing a monitoring program, it is important to be cognisant of the intended end use of the resulting data collected. The BMP will serve a number of valuable functions that will help the region improve conditions for cyclists in an efficient and effective manner. The following applications provide a range of "ends" that identify the use of the data, as well as highlighting their importance:

- **Monitoring of Goals**: The BMP should be organized to systematically calculate performance measures that indicate how well the region is achieving its goals for cycling. Both quantitative and qualitative measures are appropriate. For example, metrics based on count data can be used to estimate changes in the number of bicycle trips across the region. Survey instruments that measure user perceptions of safety, maintenance, parking, etc. can provide feedback on the effectiveness of past bicycle investments and offer direction for future improvements.

- **Grant/Funding Programs**: Cycling data is often required when local governments apply for grants or funding from senior levels of government, and is required when submitting cost-sharing applications for bicycle infrastructure.

- **Greenhouse Gas (GHG) emissions:** Improved bicycle data will allow for improved estimates of the number of tonnes of greenhouse gas (GHG) emissions that a bicycle project will potentially remove from the environment. This is particularly important with the recent signing of Bill 27 which establishes targets for GHG emissions reductions. Promoting a shift from motorized transportation to cycling and walking can be a tool in helping to reduce overall GHG emissions. This is a metric that also increasingly required on grant applications.

- **Future Network/Facility Planning**: An ongoing and consistent data collection program will

provide a rich data source that can be used to identify cycling trends and justify the allocation of resources for bicycle infrastructure. Effective monitoring of past investments will provide important lessons learned that will inform the location future cycling routes and best practices in terms of facility design. Bicycle data can also serve as an input into project prioritization and programming process, and in the development of planning options and facility design.

- **Motivations and Perceptions**: A review of international best practices revealed that both quantitative and qualitative data are integral parts of a bicycle monitoring program. Surveys provide critical information about cycling that is not available from volume data alone. Understanding how residents perceive the safety, comfort and convenience of different bicycling facilities provides important feedback that will help the region evolve its bicycle investments to meet the needs of the local population. Local municipalities in the region confirmed the value of qualitative data in a review of existing practices and needs

- **Project Evaluation**: Bicycle count data is often used to evaluate newly implemented projects and trial projects. Staff use bicycle data to demonstrate the effectiveness of new or temporary programs and infrastructure implementation to decision-makers. Effective project validation can influence the permanence of a particular facility or program, as well as the possibility of expanding such investments further in the region.

3.2 Current Situation and Gap Analysis

Bicycle data collection efforts vary widely among the 23 government agencies in the Vancouver region. The various data collection efforts can be grouped as follows:

- **TransLink** counts bicycles as a part of its screenline vehicle count program, conducts regular Needs and Attitudes Surveys, and has purchased several automatic counters across the region.
- **The City of Vancouver** has the most extensive on-going bicycle data collection program of municipalities in the region, including manual counts, temporary automatic counts, permanent automatic counts, and has conducted cyclist surveys in the past.
- Four (4) other government agencies (Burnaby, Coquitlam, New Westminster, and UBC) have **formalized, ongoing count programs**, though like TransLink they tend to count bicycles as a part of vehicle counts, which means that the count locations may not necessarily be at strategic locations that are representative of overall bicycle use.
- Ten (10) jurisdictions have performed **one-time bicycle counts** in the past for specific purposes, such as a grant application.
- Seven (7) agencies have **never counted bicycles.**

Table 1 utilizes these categories to provide a concise summary of the various bicycle data collection efforts in the region. Gaps in the data collection efforts vary by group, but can be summarized as follows:

- **Manual bicycle counts** are only regularly performed by Vancouver.

- **Automatic counters** are utilized by TransLink and three other cities. TransLink paid for the installation of the automatic counters, while municipalities are responsible for collecting the data.
- Only TransLink regularly conducts **cyclist surveys**, although several other municipalities have conducted surveys, including the City of Vancouver.
- There is no standard **data collection format.**
- There is no standard **data reporting methodology.**
- Only Vancouver has **identified bicycle count locations** specifically to count bicycles.

Table 1 – Summary of Existing Bicycle Data and Practices and Related Gap Analysis

	Manual Bicycle Counts	Manual Counts as Part of Vehicle Counts	Automatic Counters	Cyclist Surveys	Count Time period	Data Collect-ion Format	Data Reporting Method-ology	Identified Bicycle Count Locations
TransLink	❍	●*	●**	●	As per existing surveys	As per existing surveys	❍	Locations generally selected to count vehicles
Vancouver	●	●	●	❍	Automatic counter = Continuous; Manual = 8am-9am 5pm-6pm	Varies	❍	●
Formalized / On-Going Bicycle Counts (4 jurisdictions)	Some jurisdictions perform manual counts	●	Some jurisdictions have them	❍	Varies	Varies	❍	Locations generally selected to count vehicles
Sporadic Collection (10 jurisdictions)	Some jurisdictions perform manual counts	Some jurisdictions perform manual counts	❍	❍	Varies	Varies	❍	❍
No counts (7 jurisdictions)	❍	❍	❍	❍	❍	❍	❍	❍

* In the most recent regional screenline count, TransLink selected locations specifically to count bicycle s(such as the Union / Adanac Bicycle route and Seaside Bicycle Route)

** TransLink paid installing for automatic counters, but municipalities are responsible for collecting data

● = Currently practiced

❍ = Currently not practiced

3.3 Needs Analysis

The following elements represent the general needs of an effective Regional BMP:

- **Adequate data quantity and quality** – Generally, the quantity and quality of data and associated information is inadequate. This is in part due to the lower priority given to cycling data due to the relatively low use of cycling as a mode of travel in many parts of the region. However, in order to plan for and monitor the use of bicycles in the region as required by adopted policies and plans, a higher level of effort and investment is required in order to collect cycling data adequate for requisite analyses.

- **Selection of count locations** – Development of criteria for selecting bicycle count locations is an important element of the BMP. With an understanding that there may be funding and/or other resource limitations, a prioritized set of count locations is desirable.

- **Survey instruments** – Surveys are essential for measuring qualitative data, including gauging user perceptions and needs in relation to different aspects of bicycle facilities across the region. Instruments may be manual count forms, survey questionnaires, or automatic count systems. Standard, accessible, and comprehensive, yet simple to use instruments should be developed.

- **Survey methodologies** – A key criteria for a monitoring program is the ability to detect trends, or changes between successive surveys. This requires consistency throughout the overall process, including the methodologies employed to collect the data. Consistent procedures and policies are at the heart of consistent methodologies and should be developed with both comprehensive breadth and practical application in mind.

- **Resources to purchase automatic counters** – Many jurisdictions have limited budgets to purchase automatic bicycle counters, which will provide continuous monitoring of different facility types across the region and offer important insight into temporal and seasonal trends in bicycle facility usage. There is an opportunity for TransLink to purchase automatic bicycle counters and distribute them to local jurisdictions on the condition that local jurisdictions periodically retrieve the data and share it with TransLink for analysis.

- **Data analysis techniques** – With most bicycle collection programs across the region being sporadic or non-existent, most jurisdictions lack specific techniques or tools for analyzing the bicycle data they will collect. There is an opportunity for TransLink to fulfil this need by conducting the data analysis and sharing the results with local jurisdictions, effectively standardizing the techniques.

- **Staff time to train counters, analyze data, administer surveys, etc.** – The staff time required to administer a bicycle monitoring program can be offset by concentrating certain functions, such as data analysis, with TransLink. A coordinated

and pooled-approach can provide synergies in cost-savings and effort.

- **Support materials for volunteer counters** – With most jurisdictions reporting limited staff time, training materials and other support materials and tools will be required to ensure volunteers across the region are conducting their counts in a consistent fashion.

- **Data reporting methodology** – A reporting methodology that clearly articulates trends in ridership, collisions, bicycle facility attributes, and resident perceptions are critical elements of a BMP. There is an opportunity for this to be provided in a single regional report produced by TransLink, or a combination of locally-produced reports based on a consistent format.

- **Consistent data collection materials and methods (count forms, survey forms, procedures etc.)** – Consistency is a critical principle underlying monitoring programs and cannot be overstated. Consistent practices are the best and cost-effective assurance that the sum of local monitoring efforts result in a usable and robust regional bicycle data set. Jurisdictions should utilize a standard regional count and survey form, and related materials and tools, to ensure consistency in the data and metadata collected. Furthermore, consistent methods in the form of standard procedures and data collection protocols should be developed.

- **Consistent count time period** – Manual counts should be undertaken at a consistent time period region-wide, including similar seasonal periods. Ideally, the time periods should be consistent to other data collection activities from which data may be used in conjunction with cycling data.

- **Consistent base data archive format** – A data entry format is necessary to ensure that local data collected according to regional standards can be easily combined into a regional bicycle monitoring database administered by TransLink. A basic data schema can provide a consistent minimum basis to ensure consistency.

Table 2 identifies the needs of the various jurisdictions as they relate to the elements of the Regional BMP highlighted above.

Table 2 – Needs Analysis (✓ indicates it is a need)

Need	TransLink	Vancouver	Formalized / On-Going Bicycle Counts (5 jurisdictions)	Sporadic Collection (8 jurisdictions)	No counts (8 jurisdictions)
Adequate data quantity and quality	✓	✓	✓	✓	✓
Selection of manual count locations	✓	×	✓	✓	✓
Survey instrument, equipment and methodologies	✓	✓	✓	✓	✓
Resources to purchase automatic counters	✓	×	✓	✓	✓
Data analysis techniques	✓	×	✓	✓	✓
Staff time to train counters, analyze data, administer surveys, etc.	×	×	✓	✓	✓
Support materials for volunteer counters	✓	×	✓	✓	✓
Data reporting methodology	✓	×	✓	✓	✓
Consistency across the region is key for the following:					
Consistent data collection materials and methods	✓	✓	✓	✓	✓
Consistent count time period	✓	✓	✓	✓	✓
Consistent base data archive format	✓	✓	✓	✓	✓

3.4 Summary of Needs

As **Table 2** indicates, jurisdictions in the region that have never performed bicycle counts will need to establish a basic data collection effort, which will include:

- Selection of count locations
- Selection of consistent count time period
- Data collection materials and equipment
- Data collection methodologies
- Support materials for volunteer counters
- Data archival format
- Data analysis techniques (this task can be assumed by TransLink)
- Training
- Data reporting methodology (this task can be assumed by TransLink)

Jurisdictions that have **sporadic collection programs** will have similar needs, as they typically have not selected a core set of locations to count continuously, nor have they generally utilized volunteer counters. While they may have established count time periods (which vary by agency), data collection materials and a data archival format, it will be critical to standardize these items throughout the region to facilitate comparative analysis across jurisdictions and create a regional data set with a much higher sample size than that of any single data monitoring program. Some of the key findings are:

- The **City of Vancouver** has the most advanced bicycle data collection program, providing a baseline to consider when establishing a regional BMP. However, similar to the jurisdictions with sporadic collection programs, it will be essential to standardize data collection methodologies region-wide.

- **All jurisdictions** share the need to identify best practices for how to utilize, share and disseminate bicycle data.

- **TransLink** could assist local communities with their existing needs highlighted above and establish consistent regional bicycle monitoring methodologies, data collection materials and reports.

4.0 ASSESSMENT INDICATORS & EVALUATION FRAMEWORK

As a key use of bicycle count data is the assessment of the impact of changes to the transportation system in terms of supply and demand, an understanding of the evaluation and assessment process is important to ensure the resulting data that is collected is applicable. Therefore a set of indicators and an evaluation framework is proposed that can be used in applications such as monitoring, project evaluation, and general planning. In addition, in order to ensure a holistic scope, considerations beyond just bicycle volumes are made.

4.1 Assessment Indicators

Variables that can be used as indicators are identified below. The temporal scope for indicators is typically annual[1], however demand/usage indicators can also be applied in monthly and daily timeframes. Indicators have been developed in four broad topic areas to monitor and evaluate the use of cycling in the region:

- Bicycle Infrastructure
- Bicycle Use
- Cyclist Safety
- Cyclist Perceptions

Recommended indicators are summarized in the following sections. Detailed descriptions are provided in **Appendix A**.

[1] The frequency of indicator reporting is generally a function of need/interest in the information, type of data collected (degree of difficulty), budget and resources required, and volatility of the indicator over time.

4.1.1 Bicycle Infrastructure

ID	Indicator	Measure
1.1	Length of total bicycle network	Total distance in lane kilometres of the regional bicycle network
1.2	Proportion of off-street pathways	Percentage of the total distance of the regional bicycle network made up of off-street pathways
1.3	Proportion of cycle tracks	Percentage of the total distance of the regional bicycle network made up of cycle tracks
1.4	Proportion of neighbourhood bikeways	Percentage of the total distance of the regional bicycle network made up of neighbourhood bikeways
1.5	Proportion of bicycle lanes	Percentage of the total distance of the regional bicycle network made up of bicycle lanes
1.6	Proportion of road network with bicycle facilities	Percentage of the total distance of the regional road network that includes a bicycle facility
1.7	Investment in cycling infrastructure	Total amount spent over previous year in constructing new cycling infrastructure across the region
1.8	Proportion of population within vicinity of a designated bicycle route	Percentage of the total regional population (residential and business) that is 500m or less from a designated bicycle route
1.9	Proportion of intersections bicycle controlled	Regional percent of bicycle-controlled intersections

4.1.2 Bicycle Use

ID	Indicator	Measure
2.1	Number of bicycle trips	Total number of bicycle trips per day originating in each area
2.2	Proportion of all trips made by bicycle	Percent of all trips made by bicycle originating in each area
2.3	Proportion of work trips made by bicycle	Percent of all work trips made by bicycle among employed labour force originating in each area
2.4	Proportion of school trips made by bicycle	Percent of all grade school trips made by bicycle originating in each area
2.5	Median distance of bicycle trips	Median distance of all bicycle trips
2.6	Proportion of all short distance trips made by bicycle	Percent of all trips under 5 km in length made by bicycle originating in each area
2.7	Median bicycle travel times	Median bicycle travel times between specific origins and destinations along specific corridors
2.8	Number of bicycle trips across screenlines	Average daily bicycle volumes across screenlines over 3-day period during Volume Count Survey period
2.9	Number of bicycle trips across screenlines by month	Average monthly bicycle volumes across screenlines
2.10	Bicycle trips across screenlines by time of day	Average hourly bicycle volumes across screenlines
2.11	Number of bicycle trips at all count locations	Average PM Peak bicycle volumes at all count locations over 3-day period during Volume Count survey period
2.12	Number of bicycles integrating with transit	Number of bicycles using buses, SkyTrain, SeaBus, or the George Massey Tunnel

4.1.3 Bicycle Safety

ID	Indicator	Measure
3.1	Number of bicycle collisions with motor vehicles	Total number of reported collisions of all types involving cyclists and motor vehicles
3.2	Number of bicycle collisions with motor vehicles per 10,000 bicycle trips	Proportion of reported collisions of all types involving cyclists and motor vehicles divided by total bicycle trips
3.3	Locations with highest number of collisions involving cyclists	Twenty locations across the region with the highest number of reported collisions of all types involving cyclists and motor vehicles
3.4	Number of bicycle collisions with motor vehicles resulting in fatalities	Total number of reported collisions involving cyclists and motor vehicles that resulted in fatalities
3.5	Percentage of cyclists wearing helmets	Proportion of counted cyclists wearing helmets
3.6	Proportion of women cyclists	Percentage of all surveyed cyclists who are women
3.7	Proportion of young cyclists	Percentage of all surveyed cyclists who are 20 years of age or younger

4.1.4 Cyclist Perceptions

ID	Indicator*
4.1	Bicycle-friendliness of the region
4.2	Cyclist sense of safety
4.3	Cyclists following road rules
4.4	Amount of bicycle routes
4.5	Design of bicycle routes
4.6	Maintenance of bicycle routes
4.7	Amount of bicycle parking
4.8	Feasibility of combining cycling with public transit

**measure is based on a survey response between 1-10*

The assessment indicators should be developed to ensure they are useful in tracking progress towards achieving the goals and policies of the Regional Cycling Strategy. To that end, they have been developed to support the tracking of progress regarding the two overarching goals of the draft Regional Cycling Strategy – more cycling, and safer cycling.

These indicators form the basis for determining the overall scope and components of the monitoring program (as discussed in **Section 5**), as well as the specific data collection and assembly activities that will be required to operationalize these indicators (as discussed in **Section 6**).

The development of a monitoring program would consider such assessment indicators to be tracked over time. The trend or temporal changes to these indicator values would be the basis for the monitoring program and provide an indication as to the effectiveness of policies, programs and infrastructure investments.

4.2 Project Evaluation Framework[2]

An evaluation framework is a standard measurement platform for assessing the merits of project options. An evaluation framework can be used to assess projects, evaluate the relative impact of a project (relative to a base "status-quo" case), and provide a comprehensive and holistic approach to infrastructure planning. A simplified example of an multiple account evaluation framework for assessing cycling planning-related options and scenarios is shown in **Table 3**, with descriptions of each account provided below.

4.2.1 Economic Account

- **Project Costs**: Defined as all the direct costs related to the planning, design, construction, operations, maintenance, and rehabilitation over the life of a project (which can vary by option).
- **Institutional Costs**: Defined as the costs related to the government agency resources used to support the project development and operation from the initial project conception to the end of project life. Resources would include staff time, materials, and any that contributes to the project beyond direct project costs.
- **Local Economic Impact**: The impact (benefit or cost) the project causes on the local businesses in the vicinity of the project. Such an assessment may be difficult and may require a standard "catchment buffer" of impact that consists of a discrete or continuous borders or buffers.

4.2.2 Social Account

- **Community Impact**: Defined as the impact to the community in terms of benefit (e.g. revitalization) or dis-benefit (e.g. segregation).
- **Travel Time Impact**: The time savings or costs due to changes in mode arising from the project. The full impact may only be analysed using a comprehensive method (e.g. demand model), and the value of time used may be subject to differences in mode and trip purpose.

[2] A project evaluation framework is beyond the scope of this monitoring program, however, it is useful to identify the data needs of such a framework so that the required data is collected within the opportunities provided by a monitoring program. Many of the data elements required in an evaluation framework will require additional studies, analyses and tools, such as a demand model. In the latter case, the collection of more cycling data will provide a means to better develop such demand models.

- **Operating Costs Impact**: The change of operating costs (e.g. fuel) as a result of the net changes to the use of motorized vehicles.
- **Safety Impact**: The change in costs due to changes in net collisions as a result of the project. Standard values of fatal, injury, and property damage-only collisions may be used as defined by local authorities.

4.2.3 Environmental Account

- **Air Emissions Impacts**: Savings related to the change of net air emissions from mobile sources (e.g. CACs, GHGs). Per unit values can be adopted from current market values, such as carbon offset costs in the case of CO_2 emissions, or health and ecological impacts related to criteria air contaminants.
- **Water Pollution Impacts**: Savings related to the change of net water pollution from mobile sources (e.g. brake dust, motor oil runoff).

It can be seen that a consistent unit of measurement is desired for each indicator so that an overall evaluation can be assessed as systematically as possible. In the example evaluation framework shown in **Table 3**, it can be seen that the unit of measurement desired is present value dollars. However, the present value of benefits and costs for various indicators may be difficult to estimate, with the precision of such estimates varying between indicators.

Furthermore, the identification of the specific indicators that comprise each evaluation account may require further research or studies, and additional data collection/assembly or modelling activities.

Table 3 – Example Project Evaluation Framework[3]

Evaluation Account	Account Indicators	Option 1	Option 2	Option n
Economic	Project Costs	$PV[4]	$PV	$PV
	Institutional Costs	$PV of resources expended	$PV of resources expended	$PV of resources expended
	Local Economic Impact	$PV of project impact to local economy	$PV of project impact to local economy	$PV of project impact to local economy
Social	Community Impact	$PV or impact ranking	$PV or impact ranking	$PV or impact ranking
	Travel Time Impact	$PV of value of time savings or cost	$PV of value of time savings or cost	$PV of value of time savings or cost
	Operating Costs Impact	$PV of operating costs	$PV of operating costs	$PV of operating costs
	Safety Impact	$PV of incident costs	$PV of incident costs	$PV of incident costs
Environmental	Air Emissions Impact	$PV of emissions impacts	$PV of emissions impacts	$PV of emissions impacts
	Water Pollution Impact	$PV of pollution impacts	$PV of pollution impacts	$PV of pollution impacts

[3] This is an example framework and all elements are not required, however encouraged in light of feasibility. The word "impact" is used when there is both a possibility that a benefit or dis-benefit may be the result of a particular project option. This example is a generic framework and is not necessarily an exhaustive or complete evaluation framework.
[4] $PV = Present value.

5.0 PROGRAM SCOPE AND COMPONENTS

The scope of the BMP is defined based on the data needs, local gap analysis, review of best practices elsewhere, recommended indicators, and potential resource availability identified from participating agency survey and interview results. The proposed BMP consists of components that support the data needs, with a focus on those components that the gap analysis identified to be currently lacking, such as a more comprehensive and coordinated bicycle count program.

This section includes an overview of the activities required to collect and assemble data, a description of the recommended scope of the BMP, and an overview of the each of the recommended BMP components and elements.

5.1 Data Collection Components

A number of data acquisition activities are necessary to collect and assemble the required information for the purposes of planning and monitoring a transportation system. The resulting datasets are also required for the development of analytical tools, such as travel demand models. These data collection activities can be accomplished through two general methods:

3. **Data Assemblies** are the gathering of existing *secondary* data from various external sources that are used to describe the area or system of interest. For example, inventories of road attributes and operational characteristics can be considered as data assembly activities.

4. **Data collection** through transportation studies and surveys consist of the carrying out of data collection activities and are typically conducted to gather new or *primary* data for planning, operations or monitoring purposes, and can require a considerable amount of time, effort, and cost to design and implement. Studies are typically smaller-scale activities focusing on a short time frame and on a small number of locations. Surveys are a much larger endeavour and are typically at a municipal or regional scale over a longer timeframe. Under the definition of a survey, a number of studies could be aggregated and conducted in the same relative time period, such as a screenline or cordon traffic volume survey.

The collection of data may seem like a trivial exercise, and in many cases the actual act of collecting data, such as manual traffic counts, is a fairly simple task. However, the design and conduct of a data collection activity can be a complex and specialized undertaking, requiring knowledge of statistics, logistics, operational safety, psychology, the purpose and application of the resulting data, and a good understanding of the data elements and data processing techniques.

A data collection activity encompasses a number of important steps that all influence the quality of the resulting information produced. These steps are identified as follows:

1. Data Purpose & Design;
2. Data Collection Activity Conduct;
3. Data Processing & Verification;

4. Data Analysis, Reduction & Summary; and
5. Data Interpretation & Application.

Throughout these steps, it is important to apply principles of "truth-in-data", which is the conscientious recording and documentation of every modification and step such that a data audit trail can be created to ensure the resulting data set is as robust as possible. Each of these steps is described in further detail below.

5.1.1 Data Purpose & Design

The need for specific data initiates the design of an appropriate data collection activity. The eventual application of the resulting data that will be collected is a significant input into the design of the data collection activity, as usefulness of the data will be affected by the quality and quantity of data collected. A high degree of confidence in the data collected is always the goal, however the quality and quantity of data will be influenced by available resources (such as labour, budget, time, etc.). Nevertheless, the design of a data collection activity should consider quality considerations, such as statistical significance, to ensure the highest degree of quality and appropriateness of the data collected.

5.1.2 Data Collection Activity Conduct

Carrying out a data collection activity is generally the most time-sensitive and labour-intensive part of a survey or study. For large surveys, this can also be the most costly part of the overall survey process.

During the conduct of data collection activities, the quality and quantity of the data collected can be influenced significantly by the surveyors. Experienced and skilled surveyors will generally collect much more reliable and less problematic data. However, these types of surveyors can be more expensive and their availability limited.

Background or contextual information should also be collected during the conduct of the data collection activity. This is commonly referred to as "metadata" which means "data about data". Examples of metadata include weather conditions, road closures or detours, accidents, holidays, and parades or sporting events. Metadata is important when applying the eventual data set as it can also be used to filter out data that may not be considered valid for a certain analysis. Metadata can also help explain outliers and other extreme measurements collected.

5.1.3 Data Processing & Verification

Data processing involves the entering (if data was manually collected on paper), checking, cleaning, and amendment of the collected data. The resulting processed data is used in the subsequent data analysis step. Depending on the type of data collection activity, the level of effort and time required for this step may be considerable. If performed incorrectly, logical errors may persist or be introduced into the data set. Therefore, a good strategy and methodology in the processing of data is critical.

5.1.4 Data Analysis, Reduction & Summary

Once the data has been processed as best as possible, it is ready to be analysed. Analysis can be done for the complete data set or the data set can be reduced, or aggregated, and this reduced data set

can then be analysed. A summary of the analysis should be generated providing not only the summary results of the data, but also standard data set descriptors (such as the average, minimum, maximum, standard deviations, confidence level, error, sample size, etc.) to fully describe the data.

5.1.5 Data Interpretation & Application

The final step is the interpretation and application of the resulting data set and summary statistics. This final step may seem minor, but it is important to ensure the resulting data is used properly. Proper use can be promoted through the disclosure of any limitations of the data that may not be obvious, how the data was collected, an indication of the quality of the data, and the provision of any metadata along with the data set. As such, the data should be interpreted and applied in an appropriate manner for which the data was collected.

Other data issues, such as storage, security/accessibility, and dissemination, should also be considered. These issues are discussed further in **Section 7**.

5.2 Scope of the Bicycle Monitoring Program

Bicycle monitoring programs can vary in their comprehensiveness and scope. As with any data collection effort, the benefits of additional and improved data must be weighed against the cost of collecting, organizing, analyzing, and maintaining the data. In the context of the Regional BMP, this can be thought of in terms of variations in:

1. The type and method of data collected; and
2. The quantity of each type of data.

Without an explicit understanding of the available budget or affordability of a specific monitoring program (which can vary annually), the proposed BMP has been designed in a holistic scope, and in a prioritized manner. This will allow for an eventual comprehensive program to be designed and scoped based on available resources.

From the input gathered for this study, the scope of the Regional BMP is recommended to consist of information collected and gathered based on the four sets of indicators identified in **Section 4**. The survey and study methods required to collect and calculate this set of data are described in the following section.

5.3 Program Components and Elements

Each of the identified data types requires a method to acquire such information. As noted previously in **Section 5.1**, data can be acquired through surveys, assembled from existing datasets, or synthesized (i.e. modelled). The following sub-sections describe the activities that can be considered to collect the data types identified in **Section 5.2** as components to a comprehensive Regional Bicycle Monitoring Program, including:

- Bicycle volume count survey
- Bicycle intercept survey
- Bicycle travel time survey
- Cycling network features inventory
- Bicycle parking data assembly
- Household origin-destination travel survey data assembly

- Bicycle safety data assembly
- Bicycle route and network spatial data assembly
- Multi-modal integration data assembly
- Contextual data assembly.

For each of these components, a brief description of the component and the purpose of collecting that component are provided. In addition, for each program component the required or optional data elements are outlined, notes regarding the data collection methodology are provided, potential data sources are described, and an assessment is provided as to whether the data component is already collected or if it is a new component for development and implementation.

Further details regarding the specific activities recommended for each component are provided in **Section 6**, with specific emphasis on those activities that require the collection of primary data.

5.3.1 Bicycle Volume Count Survey

Purpose and Description: A volume count survey consists of the comprehensive collection of bicycle volume data along key corridors and locations. This is vital to the establishment of a long-term monitoring program and the evaluation of projects and policies. This task entails the design of a count program, such as screenline/cordon counts, to capture total vehicular flows in, out, and through sub-areas within the region through the use of automatic and manual count methods at permanent or temporary count locations.

*Data Elements: (*optional)*

- Volume data by direction
- Time of crossing (individual records) or aggregations per time period
- Vehicle occupancy (in the case of bicycles, total riders per bicycle)*
- Helmet use*
- Lane usage (i.e. on general purpose lane, designated bicycle lane, path, or sidewalk)*
- Riding or walking their bicycle*
- Gender*
- Age (by general category)*

Methodology Notes: There are two methods to obtain volume data: automated and manual methods.

- Automated methods employ electronic counters installed at roadside locations typically at the mid-block. The benefit of automated methods is the ability to collect continuous data over days or longer, allowing for daily, weekly, monthly, and annual volume data to be collected.

  Permanent count locations ("control stations") provide continuous data collection and can provide true daily cycling volume estimates. However, it is not feasible to have permanent counters at all locations, and therefore temporary or coverage counts (i.e. short counts) are typically conducted at locations surrounding permanent count stations, with durations ranging from one or more days. Annual control station profiles can be used to develop adjustment or expansion factors to estimate daily cycling volumes at coverage count locations.

- Manual counts are conducted by human observers and generally performed only at intersections, where the collection of turning

movement is desired, and to identify any specific issues at a given location. Manual counts are typically conducted for peak periods, however can be conducted over a 24hr period in the case of screenline count programs. Typically, it is desired that a sample from 3 or more days is collected, subject to the variances of the volumes at a given location. **Appendix B** provides examples of manual bicycle volume count forms for both intersection and mid-block counts.

Potential Sources of Data: TransLink, Municipalities, Ministry of Transportation and Infrastructure, Vancouver Area Cycling Coalition

New Activity in Regional Bicycle Monitoring Program: Yes, as a new or expanded activity in addition to current bicycle count programs.

5.3.2 Bicycle Intercept Survey

Purpose: The purpose of the bicycle intercept survey is to obtain information about cyclists travelling along a specific route or corridor. The information is gathered in an interactive fashion such that information beyond observation-based surveys (i.e. counts), is obtained. This type of survey collects data similar to household surveys, however also includes non-residents such as visitors in the sampling, providing a more complete picture of a corridor's overall travellers and their behaviour. Depending on the needs and survey location and traffic characteristics, this survey could be designed as either a road-side interview survey or a postcard questionnaire survey.

*Data Elements: (*optional)*

- Trip origin & destination
- Intermediate stops
- Trip purpose
- Time or time period of interception
- Cyclist perceptions
- Time of departure*
- Time of arrival (if postcard or estimate if intercept*)
- Route taken/planned*
- Age (category)
- Gender

Methodology Notes: Surveys are conducted in the field at designated spots on a route or corridor. Surveyors waive down approaching cyclists and conduct interviews on the spot or hand out mail-back questionnaire forms. Interviews allow for more complex and probing questions, however on busy corridors, conditions may not allow the capture of all cyclists depending on the duration of each interview and the number of surveyors. In this case, a sample is obtained and a corresponding count is needed to allow for sample expansion post-survey. Alternatively in high-volume corridors, mail-back forms can be handed out at a much higher rate of dissemination. However, as less than a 100% response rate will typically result, a full count is also required to allow for sample expansion.

Example forms for both of these types of survey methods are provided in **Appendix C**.

Potential Sources of Data: TransLink, Municipalities, Ministry of Transportation and Infrastructure, Vancouver Area Cycling Coalition

New Activity in Regional Bicycle Monitoring Program: Yes, as a new or expanded activity in addition to current bicycle intercept surveys.

5.3.3 Bicycle Travel Time Survey

Purpose: A bicycle travel time survey is used to collect trip travel time data between origin and destination points, and points along the travelled route. This information allows for the definition of a baseline indication of travel times, delay, and general congestion within and across the region. When assessing the travel time impacts of a new cycling route, travel time surveys can be employed to provide key information that may not otherwise be available from other methods.

*Data Elements: (*optional)*

- Starting time (at origin)
- End time (at destination)
- Intermediate location times*
- Travel time
- Class of cyclist (skill/fitness level) or cyclist ID*

Methodology Notes: Manual or automated methods can be employed to collect travel time data. The simplest method consists of manual forms where surveyors on bicycles record trip starting and ending times at designated origin and destination points. Additional time records can be made at specific intermediate points along the route, such as intersections.

When including the latter data element, it can be more effective and safe to employ automated methods, such as electronic hand-held PDAs (personal digital assistants) or GPS receivers. These devices require less or no effort in manual recording on the part of the cyclist. Furthermore, stopped delays at intersections can be recorded with such equipment – data elements that can otherwise be too onerous for manual methods. **Appendix D** provides an example of a manual bicycle travel time survey form.

Potential Sources of Data: TransLink, Municipalities, Ministry of Transportation and Infrastructure, Vancouver Area Cycling Coalition

New Activity in Regional Bicycle Monitoring Program: Yes, as a new or expanded activity in addition to current bicycle travel time surveys.

5.3.4 Cycling Network Features Inventory

Purpose: Cycling route features such as pavement type, delineation and signage, shoulder type, and parking availability provide route attributes that can be used to plan and investigate route features influences on cycling demand.

*Data Elements: (*optional)*

- Route name*
- Street name
- Link start and end points
- Type of bicycle facility
- Width of bicycle facility (if marked)
- Roadway width*
- Shoulder type and width
- Pavement markings
- Signage
- On-street parking by restriction
- Traffic calming features
- Intersection controls
- Directional dividing line
- Surface type
- Lighting*
- Grade*

Methodology Notes: TransLink has conducted network features inventories in the past for the MRN as well as cycling routes ("Network Validation Data"). These inventories would form the basis of the survey method and data requirements. Manual field surveys would be required, possibly combined with in-house GIS network and orthographic data. With a baseline survey completed in recent years, an update of the dataset could be performed frequently in a formal monitoring program.

Potential Sources of Data: TransLink, Municipalities, Ministry of Transportation and Infrastructure, Vancouver Area Cycling Coalition

New Activity in Regional Bicycle Monitoring Program: Yes, as a new activity assuming Network Validation surveys are not formally scheduled.

5.3.5 Bicycle Parking Data Assembly

Purpose: Similar to automobile mode choice, the provision of bicycle parking facilities at trip destination points can influence the use and convenience of cycling. Formal bicycle parking facilities (such as bicycle racks, bicycle lockers, showers, and clothing lockers) support bicycle use and can be an indicator of the progress of cycling infrastructure policies.

*Data Elements: (*optional)*

- Bicycle parking facilities by type and location
- Bicycle rack utilization rate by type, location, time of day, day of week, and season*
- Bicycle locker utilization rate by location, time of day, day or week, and season

Methodology: Initially the methodology would be to inquire about, and assemble any available bicycle parking data from municipalities. If this information is not available field surveys may be required, which could include the use of GPS devices to record the presence of bicycle racks. Another possibility would be to create an on-line system such that volunteers and users can upload bicycle rack locations, and even suggest locations for improvements as well as rack usage.

Potential Sources of Data: TransLink, Municipalities, Ministry of Transportation and Infrastructure, Vancouver Area Cycling Coalition

New Activity in Regional Bicycle Monitoring Program: A field survey may be required to initially establish a baseline bicycle parking supply inventory, with updates provided by local authorities or volunteers through a more standard program.

5.3.6 Household Origin-Destination Travel Survey Data Assembly

Purpose: Regional household origin-destination travel surveys are conducted to measure travel patterns and behaviour data of residents in a region, typically over a 24-hour period. The travel information collected consists of data such as origin-destination, trip purpose, trip start and end points, day of travel, and travel mode. Specifically for the BMP, travel surveys provide total bicycle trips and bicycle mode share information that is used to determine the effectiveness of cycling-related investments and relative trends of bicycle use.

Census Journey to Work data (Statistics Canada) provide data similar to regional household travel

surveys, however typically at a much larger sample size although with less detail and data collected per sample. This dataset considers travel only to work (approximately 1/6 of all trips in a day, or 1/3 assuming the same pattern on the return to home trip) and is defined as the average travel behaviour to work in the census year and not actual recorded-event data. Furthermore, this dataset only comprises of the employed population, which is 52% of the total population (2006).

Data Elements: (^useful for bicycle monitoring program)

Household data

- Household size
- Household income
- Home location
- Building structure/type
- Vehicles^
- Bicycles^

Person data

- Employment status and location
- School status and location
- Age^
- Gender^
- Driver's license^

Trip data

- Trip origin & destination^
- Travel mode(s)^
- Trip purpose^
- Trip time^
- Trip length^
- Time of day
- Transit route
- Parking

Potential Sources of Data: TransLink, Ministry of Transportation and Infrastructure.

New Activity in Regional Bicycle Monitoring Program: No, obtain and assemble data from existing Regional Travel Survey program (e.g. Trip Diary Survey) conducted approximately every 5 years by TransLink.

5.3.7 Bicycle Safety Data Assembly

Purpose: Safety affects travel in many ways from congestion to perception and use of certain modes. For cycling, safety is a critical issue mainly due to the vulnerable nature of the bicycle mode relative to motorized vehicles. Therefore, the collection of bicycle safety data is important to measure the safety of a cycling routes, as well as the potential perception of cycling safety and impact to cycling mode shares. As the needs are for monitoring purposes, the data elements required are observational (for purposes of determining rates) and not necessarily causal-related.

Bicycle-vehicle crash data is available from police agencies and ICBC. Bicycle-related crashes involving non-motorized vehicles and pedestrians may be obtained from other sources, such as BC Vital Stats (mortality data), Ministry of Health Services (hospital separation data), and Canadian Hospitals Injury Reporting and Prevention Program (although for only ages 0-19 in BC). Collisions are typically classified in three categories: property damage only (PDO), injury (INJ), or fatality (FAT).

*Data Elements: (*optional)*

- Location

- Bicycle-vehicle crashes by type (PDO, INJ, FAT)
- Bicycle-bicycle crashes by type (PDO, INJ, FAT)*
- Bicycle-pedestrian crashes by type (PDO, INJ, FAT)*
- Single bicycle crashes by type (PDO, INJ, FAT)*
- Time of day
- Weather/surface conditions
- Road user volumes
- Helmet use*
- Geometric information*
- Bicycle-related conflicts by severity*

Potential Sources of Data: ICBC, BC Vital Stats, Ministry of Health Services, Canadian Hospitals Injury Reporting and Prevention Program, Vancouver Area Cycling Coalition

New Activity in Regional Bicycle Monitoring Program: No new survey or data collection required, only data assembly from identified sources. However, due to the nature of the data, it is recommended a formal agreement be made with data providers to ensure cycling related safety data is provided in a timely and adequate manner. The agreement can be written in the form of a data sharing agreement where safety data is received and volume and other data can be provided for mutual benefit.

Lack of data may result in statistically insignificant information. Conflict data can be collected automatically to determine a safety severity index through the use of video-based sensors.

5.3.8 Bicycle Route and Network Spatial Data Assembly

Purpose: Changes to the provision of bicycle routes can be monitored to determine trends of the growth of the supply of bicycle infrastructure. This information can be used in determining the performance of bicycle use in specific corridors or overall regional areas. Furthermore, in conjunction with total network data (i.e. total lane-km), a relative trend of bicycle to general purpose road supply (ratio) can be measured over time. The Digital Road Atlas, produced by GIS Innovations, consists of an updated road network and can be obtained from the Province of B.C.

*Data Elements: (*optional)*

Bicycle Route Network Spatial Data

- Bicycle route designation
- Intersection control
- Link length
- Grade
- On-street motorized vehicle parking*

Road Network Spatial Data

- Lanes
- Link length
- Intersection control
- Grade
- Classification
- On-street motorized vehicle parking*

Potential Sources of Data: TransLink, Municipalities, Ministry of Transportation and Infrastructure (supplied by GIS Innovations)

New Activity in Regional Bicycle Monitoring Program: No new survey or data collection required, only data assembly from identified sources and spatial data coding of bicycle-related road links.

5.3.9 Multi-Modal Integration Data Assembly

Purpose: The supply of bicycle infrastructure also includes multi-modal integration. Measuring the integration of bicycles and transit services can provide an indication of the multi-modal synergy between the two or more modes. Measures can be made on transit vehicles (buses, Skytrain, Seabus), as well as bicycle trips using ferries or shuttle services to cross the George Massey Tunnel.

*Data Elements: (*optional)*

- Inventory of transit vehicles that permit carriage of bicycles and the number accommodated on each
- Bicycle rack usage (via APC and ride check data)
- Bicycle counts on SkyTrain and Seabus
- Bicycle count on BC Ferries vessels
- Bicycle count on BC Ministry of Transportation and Infrastructure bicycle shuttles across George Massey Tunnel
- Bicycle-transit service hours*

Potential Sources of Data: TransLink, BC Ferries, Ministry of Transportation and Infrastructure

New Activity in Regional Bicycle Monitoring Program: No new data collection is required. TransLink and its operating subsidiaries already collect data regarding bicycles using transit, and the Ministry of Transportation and Infrastructure and BC Ferries also currently collect relevant data.

5.3.10 Contextual Data Assembly

Purpose: In order to calculate values for the indicators identified in **Section 4**, contextual data are required for some indicators. Specifically, the contextual data required include population (at the block face level), business points data, land use data, vehicle count data, and gas prices data.

Data Elements:

- Population and age distribution by blockface (census)
- Business points employee population (Pitney Bowes Business Insight / MapInfo)
- Land use data (Metro Vancouver)
- Vehicle counts (total and by class)
- Average gas prices

Methodology: The population contextual data provide a means to calculate normalized indicators. The issue in the use of two data sets as input into an indicator is the temporal scope of the datasets. If such indicators are calculated annually, both datasets should be updated likewise and represent similar time periods. Otherwise resulting trends may be misleading, such as the case of using annually increasing bicycle volumes with the same population data over a period of 5 years. In such a case, the resulting growth trend may be incorrect.

Potential Sources of Data: TransLink (business points supplied by Pitney Bowes), Metro Vancouver (supplied by Statistics Canada), Municipalities

New Activity in Regional Bicycle Monitoring Program: No new survey or data collection required, only data assembly from identified sources.

5.3.11 Metadata

Purpose: Metadata is secondary data that describes the primary data. Essentially, metadata is a logical,

standardized and organized form of documentation. Metadata provides descriptive contextual information and attributes regarding the primary data and can be used to process the data or inform use of the data.

Data Elements: (examples)

- Weather and road conditions
- Road closures, changes to road network (supply)
- Special events
- Holidays
- Special generators within vicinity
- Incidents within vicinity

Potential Sources of Data: Provided by data providers, in-field.

Methodology: Any data collection activity should capture appropriate metadata documenting the situation and conditions under which the data was captured. Data assemblies should ensure data acquired from sources also contain appropriate metadata.

5.3.12 Summary

Table 4 provides a summary of the recommended BMP activities, categorized as requiring both data collection and assembly, or data assembly only.

Table 4 – Summary of Bicycle Monitoring Program (BMP) Data Acquisition Activities

Activity	Data Collection and Assembly	Data Assembly Only
Volume Count Survey	●	
Intercept Survey	●	
Travel Time Survey	●	
Route Features Inventory	●	
Parking Inventory		●
Household O/D Travel Survey		●
Safety Data		●
Route/Network Spatial Data		●
Multi-Modal Integration Data		●
Contextual Data		●
Metadata	●	

6.0 Proposed Bicycle Monitoring Activities

A central component of the BMP is a bicycle count program. A systematic and statistically-significant method to count cyclists is central to the collection of quality cycling data. Key issues include locations, time periods, sample sizes, technologies, methods, data processing techniques and tools, and analysis methods.

The concept of counting cycling volumes is a type of point monitoring, in which volume data is collected at a particular location on a road infrastructure, corridor, or intersection. Cycling volume can be further broken into classes, and temporally, volumes can vary over the day, weekly, and seasonally. A key indicator is annual volumes (i.e. AADT) and expansion factors can be derived from extensive volume data (typically "permanent" count stations) to be used to expand data from "short count" or temporary stations. Combined with travel survey data, such as Census Journey-to-work or trip diary data, estimates of total cycling vkmt (vehicle-kilometres travelled) may be possible with an adequate network of cycling count locations.

The survey design must be robust enough for its intended purpose, and the reliability of the data will influence the ability to measure cycling behaviour or compute mode shares at a corridor level. The use of automated technologies influences the design of a count program and therefore the program will consider both manual and automated methods, as well as how to deal with variations in technology. Although cycling volume count data is the focus of this program development, eventually other information such as origin/destination, and user profiles, can be collected along with volume data. Combined, they can be a rich source of cycling information.

Based on the information and needs gathered for this study, a BMP has been defined with specific activities identified in **Section 5**. Of these activities, a number require primary data to be collected, as opposed to data that is collected by other agencies and only need to be obtained and assembled. The following provides a description of each of the proposed new or additional bicycle monitoring data collection activities, describing key elements of each survey design.

6.1 Data Collection Activities

6.1.1 Survey Design Components

In the design of a transportation survey, there are six general components that require specification:

1. **Data Description**
   - General data description
   - Main data types and elements

2. **Temporal Dimensions**
   - Periods of conduct per year
   - Time periods

3. **Spatial Dimensions**
   - Locations/routes

4. **Sample Size & Methodology**
   - Frequency

- Methods and processes

5. **Resources**
   - Personnel (field and office)
   - Materials & equipment

6. **Budget & Administration**
   - Full or partial/unit costs
   - Design, processing, analysis & administration

As the program should be realistic and flexible for varying levels of resource availability (such as funding, equipment, personnel, time, etc.), the count locations recommended will be prioritized accordingly with higher priority locations generally requiring automated equipment.

The following sub-sections provide details regarding each of these six survey design components for the recommended activities of the BMP which require data collection.

6.1.2 Bicycle Volume Count Survey

a) Data Description

Description: Manual and automated bicycle volume counts to determine the demand and utilization of cycling and related infrastructure.

Data Types and Elements: Manually bicycle volumes are recorded in 15 minute increments by direction. Automatically recorded bicycle volumes are saved in 15 minute "bins". Data can be aggregated to hourly and/or daily totals by direction. Additional metadata consists of weather information and atypical events such as holidays or Bike-to-Work Week campaigns.

b) Temporal Dimensions

Survey Conduct Periods: Manual volume counts are recommended to be conducted in-line with other volume count surveys, such as screenline surveys, which are typically conducted in the Fall season. Manual counts can also be conducted during the spring season, as well as the summer season. Generally, manual counts can be conducted anytime during the year, however, it is beneficial if a good network of bicycle and general traffic count control stations is established such that counts can be adjusted for seasonal variations for relative comparison to average annual daily count totals. Automatic volume counts are conducted continuously throughout the year.

[Primary Period: Fall; Secondary Period: Spring and Summer]

Time Periods: Control stations are automatic count locations that allow for data to be collected 24 hours a day continuously throughout the year. Manual counts are recommended to be conducted during peak periods, defined as 6AM – 9AM for the morning peak period, and 3PM -- 6PM for the afternoon peak period. It is also recommended to conduct counts during the mid-day off-peak period, defined as 11AM -- 1PM.

[Primary Time Period: AM & PM Peak Periods; Secondary Period: Mid-Day Peak Period]

c) Spatial Dimensions

Survey Locations: A total of 262 bicycle count locations have been recommended throughout the Metro Vancouver region, including existing bicycle

count locations. **Table 5** provides these locations broken out by types of count methods (manual count, automatic pneumatic tube counter, or automatic loop detector counter, or other count type). It should be noted that municipalities should be consulted regarding these bicycle count locations, and that municipalities may choose to change or add to their local count locations based on their needs.

Just under half of the recommended bicycle count locations currently exist (127). Of the planned locations, the majority (90) are planned to be implemented in the short-term, with 45 locations identified for the medium-term.

As shown in **Table 5**, 24 of the count locations are automatic permanent counters, or "control stations," which use inductive loop detectors. These automatic permanent count locations are recommended at major water crossings, other bridges, or along other significant corridors, and would form the backbone of the regional data collection program. Together, these 24 locations would provide a comprehensive assessment of cycling patterns (including daily, weekly, and monthly variations) in a variety of contexts throughout the region.

Of the 24 recommended automatic count locations, six already exist, and 18 are proposed. As these form the backbone of the data collection program, all of the proposed automatic permanent count locations are identified for short-term implementation, with the exception of two locations that will be implemented over the medium-term in conjunction with other projects (Murray-Clarke Connector and Port Mann Bridge).

Tables 6-8 provide summaries of the count locations, based on whether the recommended count locations are already existing (**Table 6**), whether they are recommended for implementation over the short-term (1-3 years) since they are located on an existing bicycle route (**Table 7**), or whether they are recommended for implementation over the medium-term (3-5 years) since they are located on a planned bicycle route to be implemented within the five years (**Table 8**).

Long-term count locations (5+ years) should be indentified in the future based on municipal plans for bicycle routes over the long-term.

There are six locations that are classified as "other", specifically SeaBus and George Massey Tunnel bicycle count locations (with two locations each), as well as Tsawwassen and Horseshoe Bay Ferry Terminals, all of which currently exist.

Appendix E provides further graphical and tabular count location details.

Table 5 – Recommended Bicycle Count Locations by Jurisdiction and Type – Existing & Proposed

Jurisdiction	Count Method				
	Manual	Automatic (Tube)	Automatic (Loop)	Other	Total
BC Ferries				2	**2**
BC MOTI			7	2	**9**
City of Burnaby	14	2	2		**18**
City of Coquitlam	15	2			**17**
City of Langley	5				**5**
City of New Westminster	12	1			**13**
City of North Vancouver	4				**4**
City of Port Coquitlam	3		1		**4**
City of Port Moody	2		1		**3**
City of Richmond	10		2		**12**
City of Surrey	20	1	2		**23**
City of Vancouver	74	31	5		**110**
City of White Rock	4				**4**
Corporation of Delta	6	1			**7**
District of North Vancouver	7				**7**
Langley Township	4				**4**
Maple Ridge	3				**3**
Pitt Meadows	2	1			**3**
TransLink			4	2	**6**
UEL	6				**6**
West Vancouver	2				**2**
Total	**193**	**39**	**24**	**6**	**262**

Table 6 –Bicycle Count Locations by Jurisdiction and Type - Existing

Jurisdiction	Count Method				
	Manual	Automatic (Tube)	Automatic (Loop)	Other	Total
BC Ferries				2	**2**
BC MOTI				2	**2**
City of Burnaby	4				**4**
City of Coquitlam	12				**12**
City of New Westminster	10				**10**
City of Vancouver	52	31	5		**88**
District of North Vancouver	3				**3**
TransLink			1	2	**3**
UEL	3				**3**
Total	**84**	**31**	**6**	**6**	**127**

Table 7 –Bicycle Count Locations by Jurisdiction and Type – Short-Term Proposed

Jurisdiction	Count Method				
	Manual	Automatic (Tube)	Automatic (Loop)	Other	Total
BC MOTI			6		**6**
City of Burnaby	7	2	2		**11**
City of Coquitlam	1				**1**
City of Langley	2				**2**
City of New Westminster	1				**1**
City of North Vancouver	4				**4**
City of Port Coquitlam	1		1		**2**
City of Port Moody	1				**1**
City of Richmond	9		2		**11**
City of Surrey	12	1	2		**15**
City of Vancouver	8				**8**
City of White Rock	2				**2**
Corporation of Delta	6	1			**7**
District of North Vancouver	4				**4**
Langley Township	2				**2**
Maple Ridge	2				**2**
Pitt Meadows	2	1			**3**
TransLink			3		**3**
UEL	3				**3**
West Vancouver	2				**2**
Total	**69**	**5**	**16**	**0**	**90**

Table 8 –Bicycle Count Locations by Jurisdiction and Type – Medium-Term Proposed

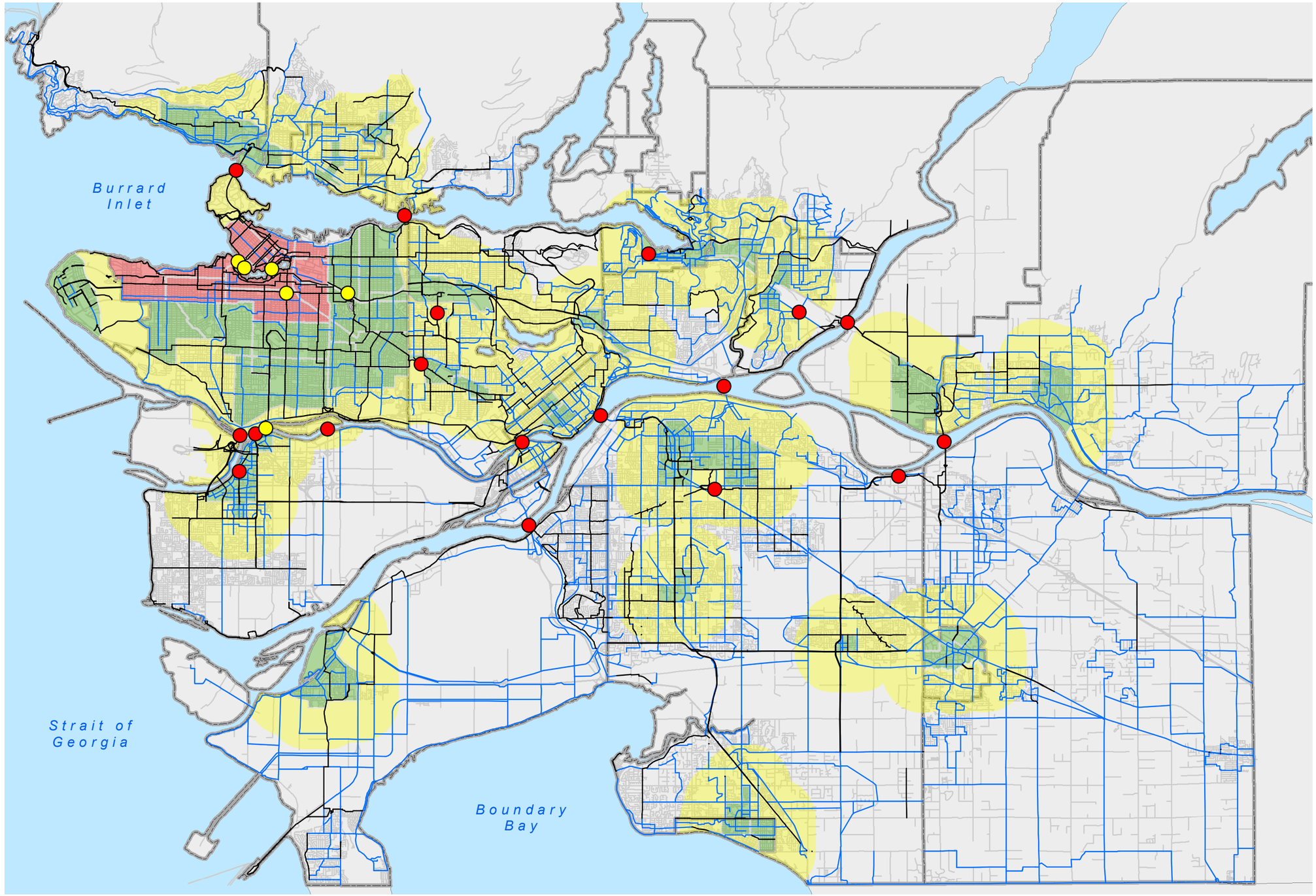
Jurisdiction	Count Method				
	Manual	Automatic (Tube)	Automatic (Loop)	Other	Total
BC MOTI			1		**1**
City of Burnaby	3				**3**
City of Coquitlam	2	1			**3**
City of Langley	3				**3**
City of New Westminster	1	1			**2**
City of Port Coquitlam	2	1			**3**
City of Port Moody	1		1		**2**
City of Richmond	1				**1**
City of Surrey	8				**8**
City of Vancouver	14				**14**
City of White Rock	2				**2**
Langley Township	2				**2**
Maple Ridge	1				**1**
Total	**40**	**3**	**2**	**0**	**45**

The network of 24 regional control locations provides a good network of automatic bicycle count locations to capture cycling movement across the region. This network can also be used as control stations used in conjunction with temporary manual or automatic counts. This network of permanent bicycle count stations is also conducive to establishing a formal network base of continuous region-wide bicycle count data. This network can be viewed as the "face" of the Regional Bicycle Monitoring Program, increasing the significance of cycling analytics. In addition, although the majority of the count locations are identified in this report as manual counts, this is considered the baseline technology. Municipalities may choose to use convert these manual locations to automated technologies instead or in the future as warranted.

Map 1 indicates the proposed bicycle automatic permanent count locations. **Map 2** indicates the proposed automatic temporary count locations, and **Map 3** indicates the proposed manual count locations.

Map 1

Proposed Automatic Permanent Bicycle Count Locations



- Existing Count Location
- Proposed Count Location
- Planned Bicycle Network
- Existing Bicycle Network
- Cycling Precinct
- Primary Cycling Area
- Secondary Cycling Area

TRANSLINK

URBANSYSTEMS

alta PLANNING + DESIGN

Acuere Consulting

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Kilometres

Bicycle Program Monitoring Study

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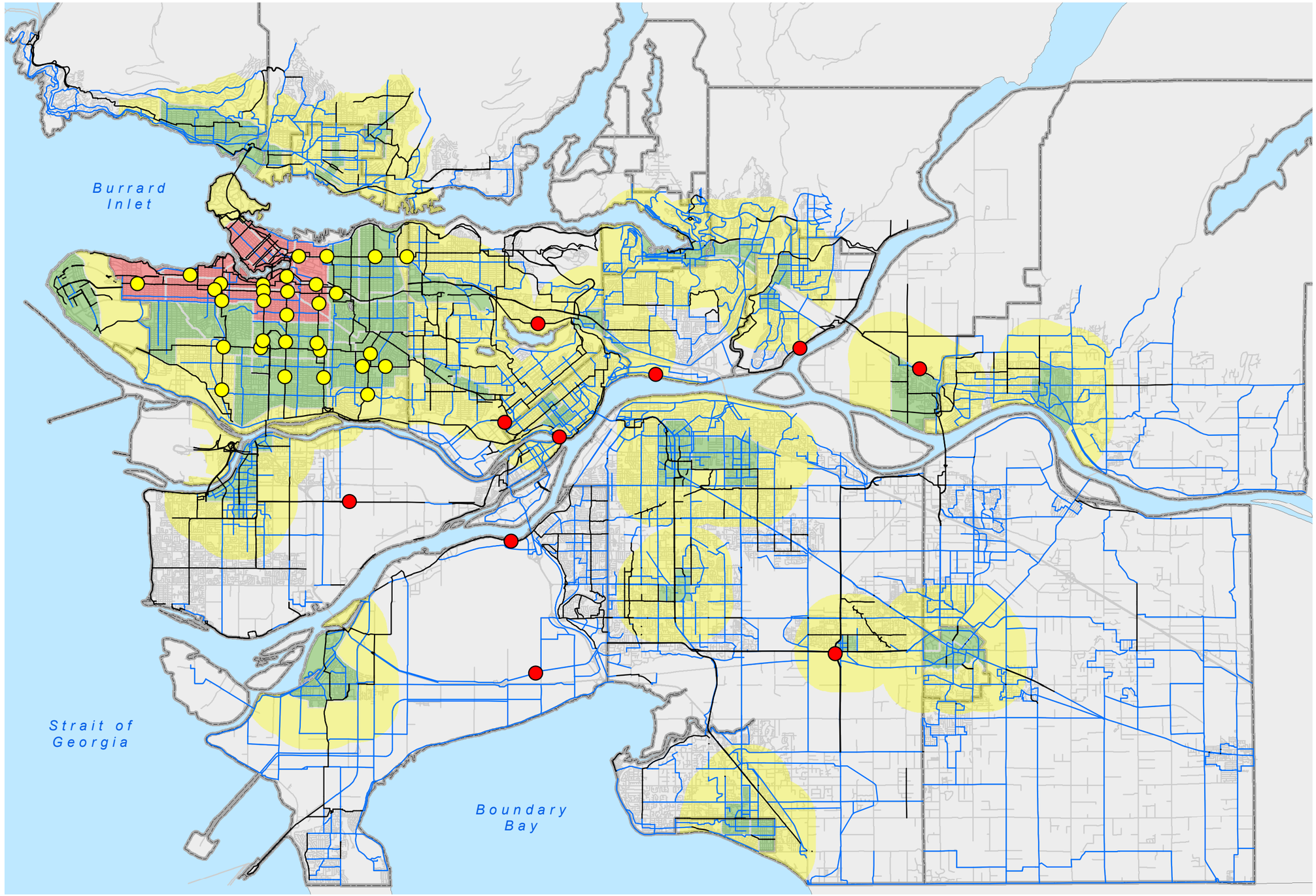
Map 2

Proposed Automatic Temporary Bicycle Count Locations



- Existing Count Location
- Proposed Count Location
- Planned Bicycle Network
- Existing Bicycle Network
- Cycling Precinct
- Primary Cycling Area
- Secondary Cycling Area

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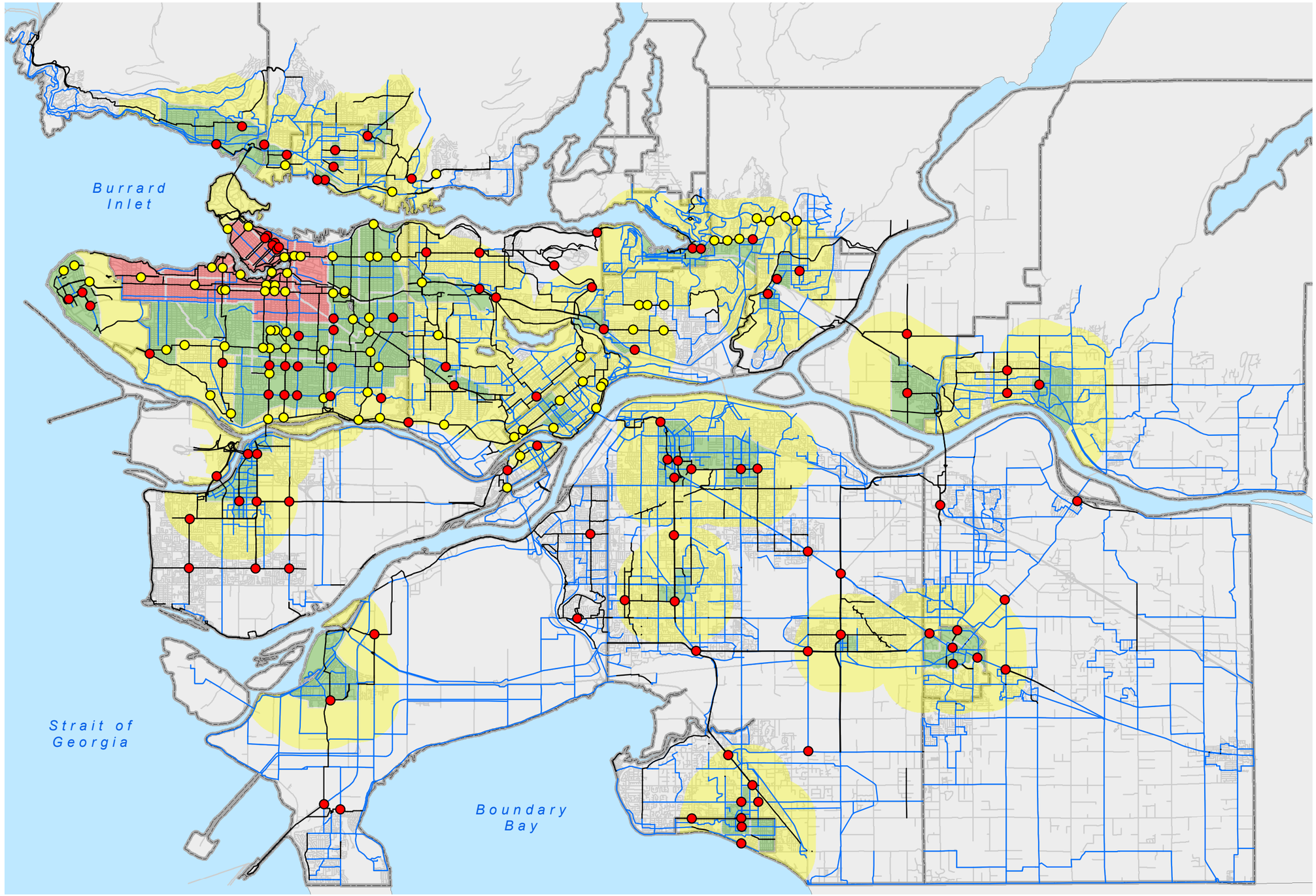
Map 3

Proposed Manual Bicycle Count Locations



- Existing Count Location
- Proposed Count Location
- Planned Bicycle Network
- Existing Bicycle Network
- Cycling Precinct
- Primary Cycling Area
- Secondary Cycling Area

TRANSLINK

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d) Sample Size & Methodology

Sampling Size: Embarking on a primary strategy to develop a network of bicycle control stations, continuous year-round data will be collected. Therefore, the sampling at these locations will be close to 100%. Focusing on the coordination of regional count data, a secondary strategy to assemble short count and manual data from municipalities would be the most cost-effective approach towards a comprehensive regional count program. Additional data could be collected by volunteers or government-led programs that can provide focused data collection with minimal cost and administrative effort.

Survey Methods and Processes: Automatically collected data may require manual acquisition of the data. Acquisition is fairly straight forward from control stations that are accessed via telemetry. Otherwise, if no communications link is provided, site-visits will be required frequently to obtain the data. Manually collected data require field studies by survey staff over the time periods required. Manual counts should require one to two surveyors in most locations and conditions. For extended periods of data collection, a shift schedule may be required to rotate staff through daily shifts.

e) Resources

Personnel: Regardless of the method of data collection, analysts and administrative staff are required to design, conduct, reduce, and summarize the data. If field-visits are required to setup, collect, and take-down automatic counters, technicians will be required. Manual data collection will require surveyors congruent to the extent of data collection effort.

Survey Materials & Equipment: For automatic count locations bicycle counters are required. These are a combination of sensor and storage units to record data in user-defined aggregations. A form of telemetry, be it wireless or wired, will provide more automated and efficient access to the data. For manual count locations, count boards will be required. Electronic count boards provide the convenience of simple data collection and no data entry post-survey. However, electronic count boards can be relatively expensive and require periodic maintenance. Manual count boards simply consist of clipboards, paper data entry forms, and pens. Manual count boards are inexpensive and do not require maintenance. Furthermore, the manual count method is more conducive to wider data collection using volunteers. The main material in such cases is the provision of electronic copies of count forms that can be easily printed. Finally, appropriate safety equipment and materials should be considered, such as reflective vests.

f) Budget & Administration

Full or Partial/Unit Survey Costs: A combined cost of automatic and manual count methods was assumed and adequate to cover operating and maintenance costs, including minor capital. **Table 9a** provides a breakdown of the initial capital and annual costs of a regional network of 16 new bicycle control stations for a 5 year period. This includes costs for all agencies, although, as has been done in the past, it is assumed that TransLink would be responsible for capital costs while other agencies would be

responsible for operating, maintenance, and administration costs.

Table 9b provides a breakdown of the initial capital and annual costs of automatic short counts (mid-block) at 9 locations and manual counts at 109 locations. Numerous locations have been identified and designated for potential candidates for manual counting, and upon continuous manual monitoring, conversion of a particular location to fully automatic continuous (perm-count) data collection may be warranted.

Table 9a – Bicycle Count Program Capital and Annual Costs –Permanent Count Control Stations (Short-Term)

	Location	Units	Annual Admin. $50/hr	Annual Tech. $40/hr	Capital Install $	Annual Operating $	Annual Maintenance $	Total $
1	Alex Fraser	2	$250	$1,200	$15,000	$1,200	$2,000	**$19,650**
2	Lions Gate	2	$250	$1,200	$15,000	$1,200	$2,000	**$19,650**
3	Second Narrows	2	$250	$1,200	$15,000	$1,200	$2,000	**$19,650**
4	Pattullo	1	$250	$1,200	$7,500	$600	$1,000	**$10,550**
5	Queensborough	2	$250	$1,200	$15,000	$1,200	$2,000	**$19,650**
6	Pitt River	1	$250	$1,200	$7,500	$600	$1,000	**$10,550**
7	Golden Ears	2	$250	$1,200	$15,000	$1,200	$2,000	**$19,650**
8	Oak St	2	$250	$1,200	$15,000	$1,200	$2,000	**$19,650**
9	Knight St	2	$250	$1,200	$15,000	$1,200	$2,000	**$19,650**
10	No. 3 Road	2	$250	$1,200	$15,000	$1,200	$2,000	**$19,650**
11	Sea Island Way	2	$250	$1,200	$15,000	$1,200	$2,000	**$19,650**
12	BC Parkway	1	$250	$1,200	$7,500	$600	$1,000	**$10,550**
13	Willingdon	1	$250	$1,200	$7,500	$600	$1,000	**$10,550**
14	Coast Meridian	1	$250	$1,200	$7,500	$600	$1,000	**$10,550**
15	Golden Ears Way	1	$250	$1,200	$7,500	$600	$1,000	**$10,550**
16	Green Timbers	1	$250	$1,200	$7,500	$600	$1,000	**$10,550**
	Total:	**25**	**$4,000**	**$19,200**	**$187,500**	**$15,000**	**$25,000**	**$250,700**

							Recommended Budget
Year:	2010	$4,000	$19,200	$187,500	$15,000	$25,000	$250,700	**$260,000**
	2011	$4,000	$19,200	$0	$15,000	$25,000	$63,200	**$70,000**
	2012	$4,000	$19,200	$0	$15,000	$25,000	$63,200	**$70,000**
	2013	$4,000	$19,200	$0	$15,000	$25,000	$63,200	**$70,000**
	2014	$4,000	$19,200	$0	$15,000	$25,000	$63,200	**$70,000**

Table 9b – Bicycle Count Program Capital and Annual Costs – Automatic Temporary Counts & Manual Intersection Counts

Volume Count Survey	Locations	Capital	Ann.O&M	Ann. Labour
Automatic Short Counts	9	$10,000.00	$1,800.00	$7,200.00
Manual Intersection Counts	109			$104,640.00

					Recommended Budget
Year:	2010	$10,000.00	$1,800.00	$111,840.00	**$125,000.00**
	2011		$1,800.00	$111,840.00	**$115,000.00**
	2012		$1,800.00	$111,840.00	**$115,000.00**
	2013		$1,800.00	$111,840.00	**$115,000.00**
	2014		$1,800.00	$111,840.00	**$115,000.00**

Notes

- Automatic tube counters assumed to cost $5000 each (x 2 units), $200/year O&M for each location, $40/hr labour x 10 hrs per location x 2 people - to be left over 3 days at each location to obtain 3 days of samples.
- Manual counts assumed for 8hrs for each location (3hr AM; 2hr Mid, 3hr PM) x 3 samples x $20/hr x 2 people per location average. Also a count of traffic volumes (just total not by class) would be made at each location.
- All costs assumed to be covered by municipalities (see Appendix E for a breakdown and details of locations per municipality)

Generally, five tiers of methods to capture bicycle count data range as shown in **Table 9c**. The tier of data capture required depends on a number of factors, such as:

- total volume (intensity)
- daily and seasonal variations
- significance of roadway to cycling
- designated cycling path
- costs

These factors should be considered in any warranting system, with possibly a score-threshold defined for each tier to direct the warranting process.

Table 9c – Tiers of Cycling Data Collection Techniques & Technologies

Tier	Commitment	Method	Duration	Technique/Technology	Locations Applicable
1	Ad-Hoc	Manual	1 hr to 24hrs	paper or electronic boards	intersection, mid-block
2	Ad-Hoc	Short-Counts	24hrs over 1 or more days	automatic counters (non-permanent)	mid-block
3	Regular/Planned	Manual	1 hr to 24hrs	paper or electronic boards	intersection, mid-block
4	Regular/Planned	Short-Counts	24hrs over 1 or more days	automatic counters (non-permanent)	mid-block
5	Continuous	Perm-Counts	continuous 24/365	automatic counters (permanent) + telemetry	intersection, mid-block

Design, Processing, Analysis & Administration: The proposed Bicycle Count Program focuses on the establishment and operation of a network of permanent count stations. However, it is expected that temporary manual and automated bicycle counts will be performed at the local level. The survey design of local counts should focus on locations, resources, and scheduling subject to available budget. Automatically collected data would require acquisition, verification, reduction and summary. Manually collected data requires the planning and design of studies that include procedures and resource logistics, forms and/or count equipment, post-survey entry if required, then followed by verification, data reduction, and finally data summary. Ultimately, the analysis should focus on the indicators to ensure any required policy or planning questions or needs are met.

As the infrastructure jurisdiction of some of the proposed permanent bicycle count stations are outside that of TransLink (i.e. BC MoTI), agreements concerning the establishment and operation of these count locations will be required. At the very least, a Memorandum of Understanding (MOU) should be developed between TransLink and BC MoTI, with additional agreements specifying details of design, installation, maintenance, and operation.

6.1.3 Intercept Survey

a) Data Description

Description: Intercept surveys are used to provide descriptive characteristics of travellers along a specific route or crossing. In addition to volume counts, intercept surveys provide additional information that supports a more complete and overall picture of travel behaviour and choices. As bicycle behaviour data is difficult to obtain through traditional household survey methods (resulting in small samples), directly targeting cyclists at specific points in the region provides a more effective means of obtaining such information.

Data Types and Elements: The use of an intercept sampling method is recommended, which does not require every cyclist to be considered. Data elements typically collected include:

- Trip origin and destination
- Intermediate stops
- Trip purpose
- Cyclist perceptions
- Route taken;
- Timing information such as departure time and estimated arrival time;
- Age
- Gender

Corresponding volume counts should be conducted so that intercept survey results can be expanded to these control totals.

b) Temporal Dimensions

Survey Conduct Periods: Intercept surveys are recommended to be conducted in-line with other surveys, which are typically conducted in the Fall season. Surveys can also be conducted during the spring and summer. Generally, surveys can be conducted anytime during the year, however, it is beneficial to perform these surveys consistently for monitoring purposes. As travel behaviour does not

change too frequently, it is recommended that intercept surveys be conducted every other year, and at the very least every 5 years.

[Primary Period: Fall; Secondary Period: Spring and Summer; Conducted every 2-5 years]

Time Periods: Intercept surveys should be conducted at least during the peak periods of bicycle travel. This would be during the AM, PM and Mid-Day periods of the day. However, as time periods are typically dominated by certain travel purposes (i.e. AM/PM periods are dominated by work trips), it is recommended that intercept surveys be conducted throughout the day, at least during day-light periods.

[Primary Time Period: AM/PM Peak & Mid-Day Periods; Secondary Period: Sunrise to sunset (i.e. 12-15 hours)]

c) Spatial Dimensions

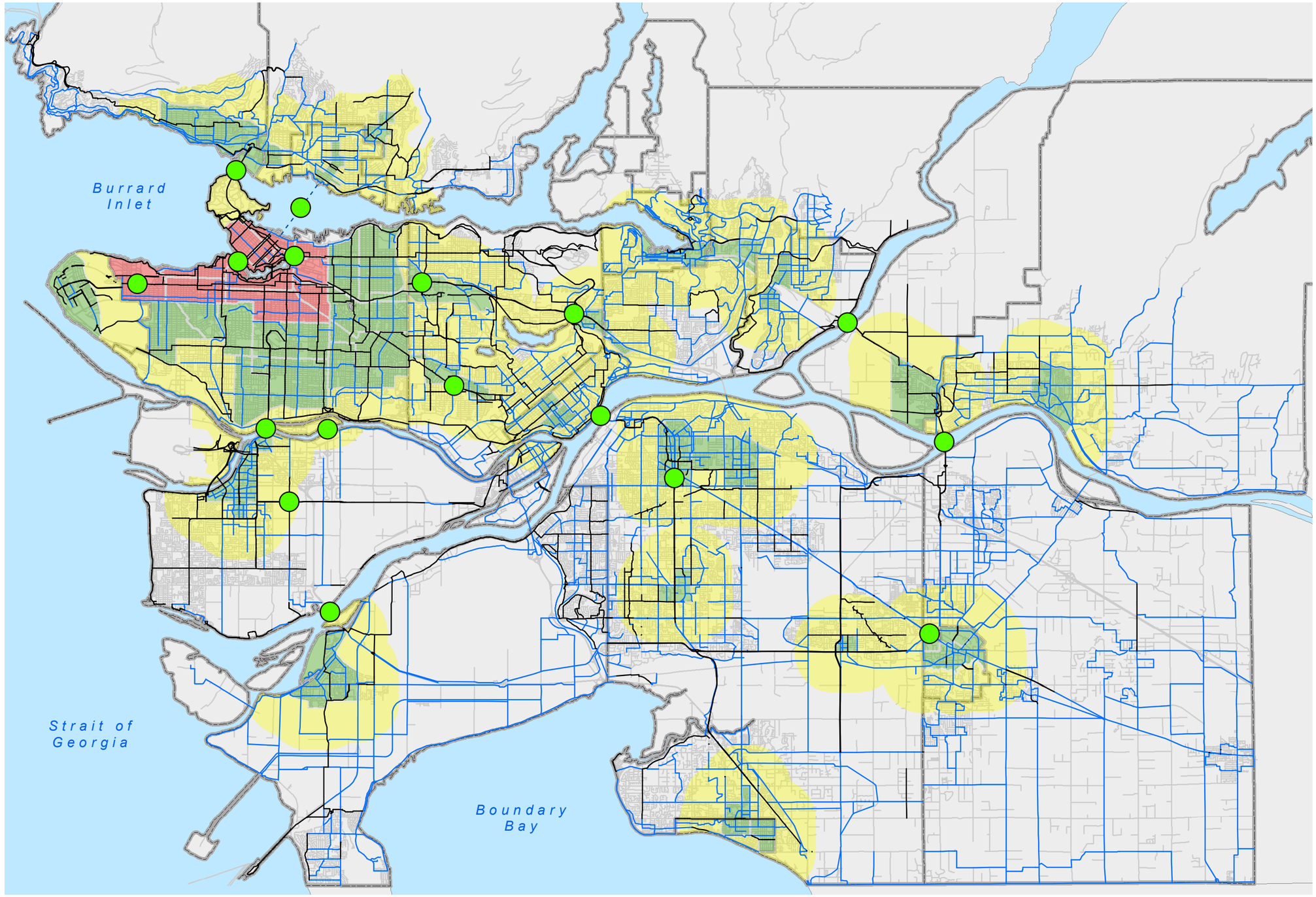
Survey Locations: To ensure an adequate number of samples are collected, heavily used cycling corridors should be surveyed. Furthermore, locations should coincide with bicycle count locations as identified in **Table 5** to ensure comprehensive volume counts are available. Finally, locations should be dispersed throughout the region to obtain a comprehensive regional coverage. Therefore, it is suggested intercept survey be conducted at the following 17 locations/routes:

1. Lion's Gate Bridge
2. Seabus (on-board surveys)
3. Burrard St. Bridge
4. Union St. @ Main St.
5. 7th Avenue
6. North Fraser Arm Bridge
7. Lougheed Hwy @ Gilmore Way
8. Lougheed Hwy @ Gaglardi Way
9. BC Parkway @ Dunblane Ave
10. Pattullo Bridge
11. Golden Ears Bridge
12. Pitt River Bridge
13. King George Hwy @ Fraser Hwy
14. Knight Street Bridge
15. Westminster Hwy @ No. 4 Road
16. George Massey Tunnel
17. 200th St. @ Fraser Hwy.

Map 4 graphically summarizes the proposed 17 intercept survey locations.

Map 4

Proposed Intercept Survey Locations



- Proposed Intercept Survey Location
- Planned Bicycle Network
- Existing Bicycle Network
- Cycling Precinct
- Primary Cycling Area
- Secondary Cycling Area

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d) Sample Size & Methodology

Sampling Size: It is ideal to obtain at least 3 days of samples per location. However, depending on the variance of intercept survey results for the first day and second day, additional surveys may not be required.

Survey Methods and Processes: The general survey method requires having cyclists stop for either on-the-spot interviews, or to be given mail-back surveys. Intercept interviews typically yield a higher sample rate and ensure questions are answered clearly and completely. Mail-back surveys are useful in high-volume locations or where more precise destination times and route selection information is required. Mail-back surveys also reduce the delay to cyclists as handing out mail-back surveys typically take 5-10 seconds, whereas interview surveys can take 1-2 minutes per interview.

e) Resources

Personnel: Regardless of the method of data collection, analysts and administrative staff are required to design, conduct, reduce, and summarize the data. Intercept interview surveys require surveyors who can interact effectively with passing cyclists. Mail-back surveys are much simpler and can be conducted by most people. Depending on the interview length and volume of cyclists, intercept interview methods may require more surveyors.

Survey Materials & Equipment: For intercept interview surveys, survey materials consist of interview forms, clipboards, and pens. For mail-back intercept surveys, mail-back postcards are the only items required, with possibly a record of number of distributions per hour. In addition, appropriate safety equipment and materials should be considered, such as safety vests.

As the intercept survey requires interaction with the public to obtain personal information, an officially signed letter from an authoritative and responsible person should be provided so that it can be displayed if required. **Appendix C** provides examples of intercept survey forms.

f) Budget & Administration

Full or Partial/Unit Survey Costs:

The most significant cost of intercept surveys is surveyor time. The cost of postage and printing for mail-back surveys can also be significant, however bulk rates usually apply as sample numbers increase. For purposes of estimating survey budget requirements, intercept interview surveys have been assumed. **Table 10** provides a breakdown of survey costs for the 17 locations identified previously.

Table 10 – Intercept Survey Costs

	Location	Daily Samples	Daily Hours	No. Surveyors Peak	No. Surveyors Off-Peak	Total Person Hours
1	Lion's Gate Bridge	3	15	2	2	90
2	Seabus (on-board surveys)	3	15	4	2	150
3	Burrard St. Bridge	3	15	4	2	150
4	Union St. @ Main St.	3	15	4	2	150
5	10th Ave/University Blvd.	3	15	4	2	150
6	North Fraser Arm Bridge	3	15	2	2	90
7	Lougheed Hwy @ Gilmore Way	3	15	4	2	150
8	Lougheed Hwy @ Gaglardi Way	3	15	4	2	150
9	BC Parkway @ Nelson Ave	3	15	4	2	150
10	Pattullo Bridge	3	15	2	2	90
11	Golden Ears Bridge	3	15	2	2	90
12	Pitt River Bridge	3	15	2	2	90
13	King George Hwy @ Fraser Hwy	3	15	2	2	90
14	Knight Street Bridge	3	15	2	2	90
15	Westminster Hwy @ No. 4 Rd.	3	15	2	2	90
16	George Massey Tunnel	3	15	2	2	90
17	200th St. @ Fraser Hwy	3	15	2	2	90
		51	**255**	**48**	**34**	**1950**
					Eff. Hourly Rate:	$ 20.00
					Surveyor Hour Total:	$ 39,000.00
					Data Entry:	$ 9,700.00
					Materials & Equipment:	$ 1,300.00
					Design & Admin:	$ 20,000.00
					Data Process. & Report:	$ 10,000.00
					Total:	**$ 70,000.00**

Design, Processing, Analysis & Administration: The survey design should focus on locations, resources, and scheduling subject to available budget. The final data that is collected will include data entry, verification, data reduction, and finally data summary. Ultimately, the analysis should focus on the indicators to ensure any required policy or planning questions or needs are met.

As some of the locations are outside of TransLink's jurisdiction, (i.e. BCMoTI, City of Vancouver), approvals/permits should be established prior to survey conduct. Furthermore, formal letters of support should be sought by these partnering jurisdictions to ensure minimal disruptions during survey conduct.

6.1.4 Travel Time Survey

a) Data Description

Description: One of the main elements in the justification of transport infrastructure is the savings of time made by users due to a proposed facility. To verify the resulting impact of facilities to the time savings on travel, a bicycle travel time survey can be conducted. Additionally, travel time surveys should also be conducted on other modes, such as automobile and transit, along the same corridor to allow for comparative analyses. As such, it is recommended that bicycle travel time surveys be conducted more in an ad-hoc fashion, and less for the purposes of monitoring, at least in the short-term.

Data Types and Elements: Bicycle travel time surveys require the collection of start and end travel times between an origin and destination. Additionally, during the survey, intermediate points can also be timed, to provide profiles of time-requirements over the travelled routes.

b) Temporal Dimensions

Survey Conduct Periods: Bicycle travel time surveys can be conducted during any period of the year. However, it is recommended that they be performed during the Fall season, to coincide with other major data collection efforts to allow for optimized cross-survey validation and analyses. Secondary time periods are the Spring and Summer periods. Any formal bicycle travel time survey that is performed periodically for the purposes of monitoring should be conducted every 2-5 years.

[Primary Period: Fall; Secondary Period: Spring and Summer; Conducted ad-hoc or formally every 2-5 years]

Time Periods: Bicycle travel time surveys should be conducted at least during the peak periods of bicycle travel. This would be during the AM, PM and Mid-Day periods of the day. Conducting bicycle travel time surveys during off-peak periods are mainly useful in establishing "free-flow" bicycle travel times.

[Primary Time Period: AM/PM Peak & Mid-Day Periods]

c) Spatial Dimensions

Survey Locations: It is recommended that bicycle travel time surveys be conducted ad-hoc, supporting the "before-and-after" analyses of new or modified transportation facilities that impact bicycle use. However, a good candidate of a formal bicycle travel time survey, for the purposes of monitoring, is the Central Valley Greenway (CVG). Bicycle travel times surveys have been conducted along the CVG corridor before and after construction. Continued monitoring of travel times along the CVG may prove useful in providing a regional indication of bicycle travel times. However, unlike the previous surveys, automobile travel times should also be conducted at the very least, if not transit travel times as well. This will provide a sound basis to determine relative regional travel time changes, and allowing for post-facility verification of travel time savings benefits.

d) Sample Size & Methodology

Sampling Size: Sample size requirements for travel time surveys vary with the variances observed along a particular route. This is not only subject to the natural fluctuations over a route, but the skill of the surveyors conducting bicycle travel time surveys. Overall, a minimum of three samples should be conducted to provide a basic sense of variances, with additional surveys being conducted when variances are high.

Sample size requirements also depend on the type of information being collected. The need for travel time data for intermediate points along a route may require a larger sample size, to account for larger number of data elements, and therefore variances observed. If the main objective is to determine overall travel times between an origin and destination, the sample size requirement may not be so large as there is only one data element that is being observed.

Survey Methods and Processes: Bicycle travel times can be conducted generally using three methods: Paper and pen, Personal Digital Assistants (PDAs), or GPS, as described below.

The simplest method is the use of paper and pen to record travel times at the starting point, intermediate points, and end point of a route. This method requires cycling surveyors to stop and is not as convenient as more automated methods. Furthermore, at the end of the survey the data must be manually entered. The benefit of this method is in its simplicity and ability for volunteers to be able to quickly conduct surveys with minimal administration.

Personal Digital Assistants (PDAs) can be used to provide a semi-automated method to collect travel time data. As used in past travel time surveys conducted along the CVG corridor, PDAs provide a "one-touch" recording of times at key destination points along the surveyed route. The surveyed route would be pre-programmed in the PDAs such that the data required to be collected would be prompted sequentially to the surveyor. Affixed to bicycle handle-bars, PDAs can be used to obtain travel time data in a more convenient manner. Furthermore, the data collected can be easily transferred to a database, reducing the need for manual data entry. And as only the travel times that are required are being recorded, the reduction of the data is also a simple exercise.

The most sophisticated method to collect bicycle travel time data is the use of a combination of GPS receivers and loggers. GPS-based travel time surveys have been conducted in the region, however, only for automobile related-surveys due to the power requirements that are only realistically available in the automobile environment. However, GPS technology has progressed such that the equipment are now in a much smaller form factor and consume less power. With the use of such equipment, bicycle GPS-based travel time surveys are a realistic and reliable method for data collection.

The only drawbacks in using GPS are that depending on the quality of the equipment and locations being surveyed, GPS signal may be intermittent. This is especially the case in areas with reduced sky visibility such as the downtown core. Also, the data provided by GPS can be overly-rich, in that more data is collected than required, and the data is

collected continuously without regard of any specific location. Therefore, the data is required to be reduced and spatial analyses required to capture travel time data to desired points along the route.

The benefit of GPS-based travel time surveys is the ability for surveys to be conducted completely "hands-free", providing more convenience and safety to the surveyors. Additionally, as data can be collected in 1-second intervals, post-analyses can be flexible in that almost any intermediate location along the route can be analysed, compared with the pre-determined locations that PDAs are limited to.

e) Resources

Personnel: A group of cyclists is required for bicycle travel time surveys. Depending on the scope and needs of the survey, cyclists should be more-or-less randomly picked to ensure a good representation of the full population of cyclists. This is critical as the skill of cyclists will be the most significant factor in the variances observed. Additionally, if automobile travel time surveys are being conducted, a group of drivers will also be required.

Survey Materials & Equipment: As defined previously, the three different methods of travel time data collection require different materials and equipment. Manual methods require simply a pen and paper form (**Appendix D** provides an example of a manual paper-based travel time survey record form). Methods using PDAs require a PDA for each cyclist, as well as a compatible holder to affix the PDA to each bicycle. The GPS-based method requires a GPS receiver/antenna, logger, and power source. Small-form all-in-one self-powered units are currently available and are recommended for GPS-based surveys.

f) Budget & Administration

Full or Partial/Unit Survey Costs: Assuming the need for only ad-hoc bicycle travel time surveys in the short-term, the bulk of the cost of a paper-based travel time survey is essentially the cost for labour. Assuming a rate of $20/hr (including data entry post-survey by the surveyor), with administration, data reduction and analysis costs absorbed internally, the cost of a survey is simply:

Ad-hoc Bicycle Travel Time Survey Cost:

RATE x SAMPLEHR x SAMPLES

Where:

- RATE is the hourly rate (i.e. $20) for the surveyors
- SAMPLEHR is the expected average or max. time, in hours, required to complete a single route sample
- SAMPLES is the number of total samples required (it is recommended at least 3 different types of cyclists be used to conduct a survey over a single route, with at least 3 samples of survey data collected for each)

Therefore, assuming 10 ad-hoc travel time surveys are to be conducted every year, the cost could be: $20/hr x 2hr/sample x 9 samples x 10 surveys = $3,600/year. A budget of $5,000 would be recommended in this case, to allow for contingencies such as re-samples or need for additional samples due to high variances.

Design, Processing, Analysis & Administration: Ad-hoc surveys, should be easily designed and administered by in-house staff. More formal and wider-scale surveys may require additional expertise and resources to design, manage, process, analyze, and report on the findings.

6.1.5 Bicycle Route Features Inventory

a) Data Description

Description: The need for detailed bicycle route information is important to determine an assessment of features available and their conditions over time. The collection of route feature information allows for the quantification of the quality and level of service along bicycle routes and can be used to research and study the impacts of such features on bicycle safety, performance, and demand.

Data Types and Elements: The data elements that can be captured through a Bicycle Route Features Inventory include spatial data such as:

- Type of bicycle facility
- Width of bicycle facility (if marked)
- Roadway width
- Shoulder type and width
- Pavement markings
- Signage
- On-street parking by restriction
- Traffic calming features
- Intersection controls
- Directional dividing line
- Surface type
- Lighting
- Signage

The data elements can vary based on needs, however, an inventory over time should have consistent elements collected continuously.

b) Temporal Dimensions

Survey Conduct Periods: Rote features inventories can be conducted any time of the year, however, it is recommended that they be conducted during summer periods due to resource availability (i.e. student surveyors) and generally reduced automobile volumes. Route features do not change significantly in a short period of time, therefore it is recommended that inventories be conducted every 3-5 years.

[Primary Period: Summer; Conducted every 3-5 years]

Time Periods: As features inventories are not time-of-day dependent, they can be conducted any time of the day, and in an ad-hoc fashion. As the data is only spatial and not temporal (other than the year and season collected), there are no time-requirements for data to be collected at a specific time period. The required time to collect inventory data depends on the size of the network as well as the data elements to be collected, however typically this can be done within 2-3 months.

c) Spatial Dimensions

Survey Locations: As there has been a previous Bicycle Route Features Inventory performed by TransLink ("Network Validation Data"), it is advised that this network surveyed be updated over time. Additional routes may be added, or conversely,

removed, however any changes should be reviewed thoroughly and based on need.

d) Sample Size & Methodology

Sampling Size: Only one sample or "pass" is required per inventory year.

Survey Methods and Processes: Bicycle route features inventories are generally conducted through a single "pass" along the defined network. The survey method is generally a site visit across the network, with route features recorded as per a standard recording template. A paper-based approach is the simplest method to employ, however it requires manual data entry, which can be extensive. More automated approaches such as the use of a mini-laptop may be possible and recommended for capturing and entry of data in the field. Other tools are also recommended, including a GPS to measure location and a camera to capture images.

e) Resources

Personnel: A single surveyor can collect the inventory data for a particular year. A team of 2 or more surveyors can be employed to reduce the time required. However, observation and data collection consistencies are an important factor when using more than one person in the field. Surveyors would be on bicycles for most of the network; however the use of automobiles can be useful for long on-road route inventories to enhance safety and/or weather related-issues.

Survey Materials & Equipment: For paper-based approaches, minimal equipment and materials are required, consisting of enough paper forms for a day's inventory, pens and clipboard. A computer-based survey would require a mini-laptop ("netbook"), a data entry application, and an additional source of power for extended survey periods (i.e. additional batteries), if required. Supplemental equipment, such as a USB or PCMCIA-based GPS receiver/antenna and a USB camera can be added to capture location and image data. However, the development of supporting applications will be required and may be the most complex part of such a setup.

f) Budget & Administration

Full or Partial/Unit Survey Costs: Bicycle route features inventories can be conducted through the use of summer co-op students, as typically done at TransLink. Assuming a salary of $25/hr over a 3 month period (7.5hrs/day) to collect, clean, analyse, and report on the inventory, the cost for labour would be $11,250. Assuming the use of a mini-laptop, extra battery, GPS, and web-cam affixed through a mount on a bicycle, the cost for equipment is estimated to be $1,200. The design and development of a data entry application that can capture GPS information and images is the most variable cost component, but based on previous examples can range from $5,000-$10,000. Overall, a high-end estimate is approximately $22,500. A budget of $25,000 is recommended for the first year, and $15,000 for subsequent iterations to account for labour and equipment maintenance/replacement and minor technical support.

Design, Processing, Analysis & Administration: The design of the bicycle route features inventory and supporting database and GIS is already established,

however some enhancements could be made. Overall, the process consists of project design; hiring and training of temporary staff; development of equipment and materials; in-field data collection; data cleaning, and reduction; analysis and reporting; and overall management and administration.

6.2 Data Assembly Activities

The assembly of secondary data from other sources should be performed periodically, relative to the update of such data. Referring to **Table 4**, the secondary data that should be assembled to support the BMP are:

- Household Origin-Destination Travel Survey;
- Safety Data;
- Route/Network Spatial Data;
- Multi-Modal Integration Data; and
- Contextual Data.

The timing of the secondary data will be based on the frequency and planned updates to these data sources, as shown in **Table 11.**

With most of the secondary data collected in consistent frequencies, formal requests for data can be made well in advance to ensure the data is available when needed.

Table 11 – Schedule of Secondary Data

	Frequency	Recent Update	Next Update
Bicycle Parking Inventory	Annually	none	2010/11
Household O/D Travel Survey	5 years	2008	2012/13/14
Safety Data	Annually	2009	2010
Route/Network Spatial Data	Annually	2009	2010
Multi-Modal Integration Data	Annually	2009	2010
Contextual Data	varies	varies	varies

6.3 Program Summary

The overall proposed Bicycle Monitoring Program consists of two general types of activities: Data Collection and Data Assembly. Data collection activities are the main components of the Program, requiring the most resources and budget. The proposed data collection activities and their recommended budgets are summarized in **Table 12. Map 5** illustrates all of the recommended volume count survey and intercept survey locations. Data assembly activities identified for in-house staff to conduct are summarized in **Table 13**.

The implementation of the proposed bicycle data collection activities will be further discussed in **Section 7**. The bicycle data assembly activities are recommended to be implemented immediately, initially starting with the drafting of MOUs to establish formal agreements in data sharing and access. Data sharing and access issues are further discussed in **Section 8**.

Table 12 – Summary of Proposed Bicycle Data Collection Activities

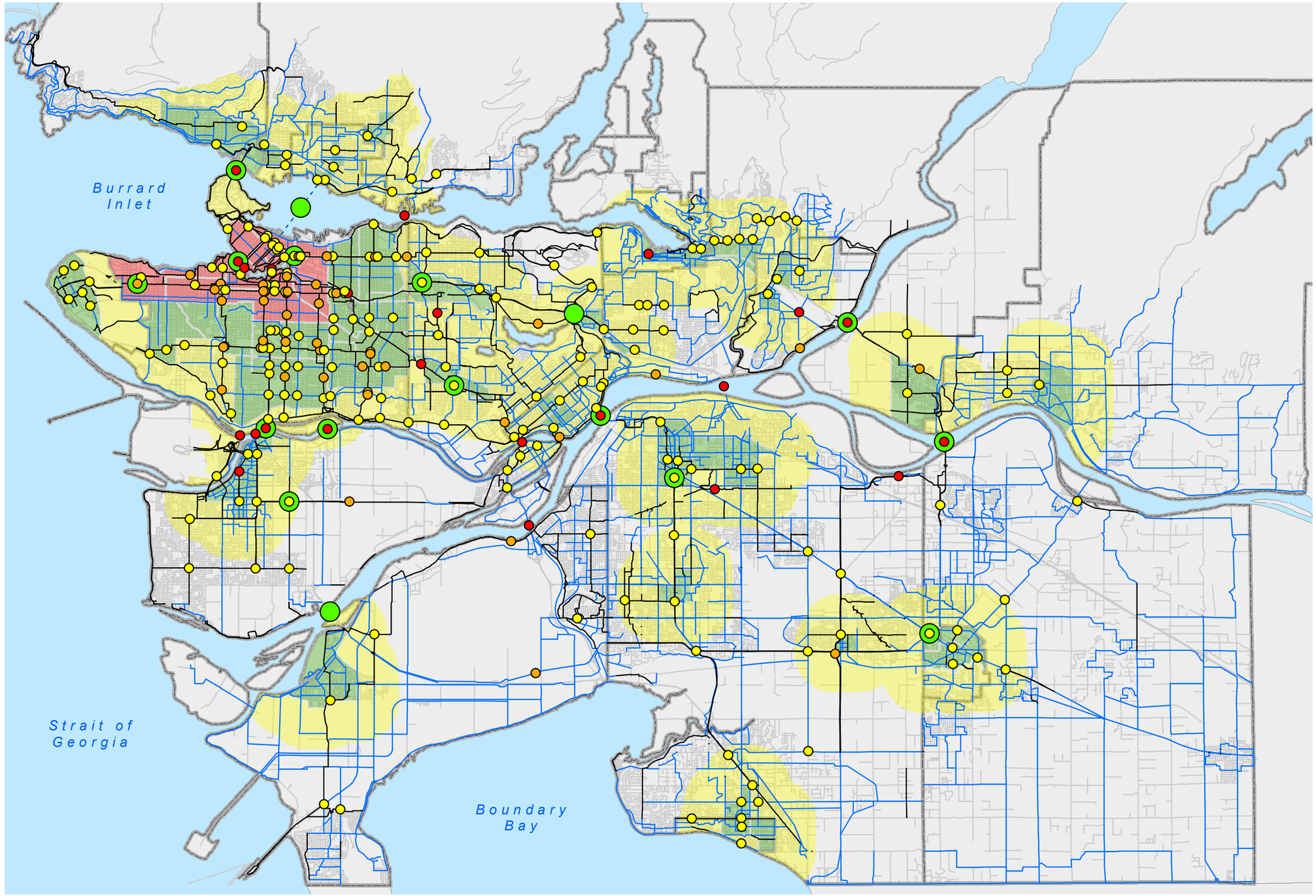
Data Collection Activity	Key Design Details	Recommended Budget	Recommended Frequency
Volume Count Survey	16 permanent count 'control' locations	$260,000 – initial year $70,000 – following years	Data collected continuously – complete samples
	Tube and manual count locations	$125,000 – initial year $115,000 – following years	Annually
Intercept Survey	16 locations	$70,000 per complete survey	2-5 years
Travel Time Survey	ad-hoc; CVG-monitoring	$5,000 per 10 single route surveys	ad-hoc or formally 2-5 years
Route Features Inventory	computer-based field data collection	$25,000 - initial year $15,000 – following years	3-5 years

Table 13 – Summary of Proposed Bicycle Data Assembly Activities

Data Assembly Activity	Potential Sources	Availability/Frequency
Bicycle Parking Inventory	TransLink, Municipalities, Ministry of Transportation and Infrastructure, Vancouver Area Cycling Coalition	Varies, ad-hoc
Household Origin-Destination Travel Survey	TransLink, Ministry of Transportation and Infrastructure	Typically every 4-5 years
Safety Data	ICBC, BC Vital Stats, Ministry of Health Services, Canadian Hospitals Injury Reporting and Prevention Program, Vancouver Area Cycling Coalition, UBC Civil Engineering	Varies, however data continuously collected and therefore availability as needed
Route/Network Spatial Data	TransLink, Municipalities, Ministry of Transportation and Infrastructure, Vancouver Area Cycling Coalition	Varies, dependent on dataset update frequency (i.e. DRA)
Multi-Modal Integration Data	TransLink, BC Ferries, Ministry of Transportation and Infrastructure	Varies, however continuously collected and therefore available as needed
Contextual Data	TransLink (business points supplied by Pitney Bowes), Metro Vancouver (supplied by Statistics Canada), Municipalities	Varies, dependent on dataset update frequency (i.e. Census updated every 5 years, data available approx. 2 years following Census year)

Map 5

Existing And Proposed Bicycle Monitoring Program



- Manual Count Location
- Automatic Loop Detector Count Location
- Automatic Pneumatic Tube Count Location
- Proposed Intercept Survey Location
- Planned Bicycle Network
- Existing Bicycle Network
- Cycling Precinct
- Primary Cycling Area
- Secondary Cycling Area

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7.0 PROGRAM IMPLEMENTATION

7.1 Program Prioritization

As the available resources may restrict the ability to fully implement the complete scope of the BMP at once, the components of the proposed program can be prioritized in terms of timing to reduce the overall budget-load per year. **Table 16** provides a prioritization matrix of the proposed data collection activities to provide the rationale for implementation timing, based on the following priority criteria:

- **Significance**: Defines the importance of the data collected in relation to the overall planning and policy need, as well as design and operations at both regional and local levels. Significance scores range from 1 (low) to 5 (high)
- **Immediate Need**: Defines the immediate need of the data, with scores ranging from 1 (low) to 5 (high) with activities that have been previously conducted and requiring low frequencies of repeated conduct designated with lower scores.
- **Independence**: Defines the need for other data sets, with less dependent data sets with higher independence scores. Dependence can defined as the need for other data for the design and conduct of a particular data collection activity. Independence scores range from 1 (low) to 5 (high).
- **Difficulty**: Defines the degree of difficulty in the design, implementation, and post-survey processing of the data collection activity. Difficulty scores range from 1 (high) to 5 (low).
- **Budget Required**: Defines the cost associated with conducting the data collection activity, including design and post-processing. Budget requirement scores range from 1 (high) to 5 (low).

The resulting scores for each criteria were added together for each data collection activity to provide a total priority score. The activities were then assigned a priority ranking.

Based on the priority ranking from **Table 14**, the timing of each of the data collection activities is scheduled for implementation. **Table 15** provides a prioritized schedule of the start of program components, conduct frequencies, and annual budgets.

Table 14 – Prioritization of Proposed Bicycle Data Collection Activities

Priority Criteria [1-5] / Data Collection Activity	Significance	Immediate Need	Independence	Difficulty	Budget Required	Priority Score	Priority Timing
Volume Count Survey & Network	5	5	5	2	1	**18**	**1**
Intercept Survey	4	4	4	2	2	**16**	**2**
Travel Time Survey	3	3	3	3	5	**17**	**2**
Route Features Inventory	5	2	3	2	3	**15**	**3**

Table 15 – Summary of Proposed Bicycle Data Collection Activities

Data Collection Activity	Year 1 (2010)	Year 2 (2011)	Year 3 (2012)	Year 4 (2013)	Year 5 (2014)
Volume Count Survey & Network	$260,000	$70,000	$70,000	$70,000	$70,000
Intercept Survey		$70,000		$70,000	
Travel Time Survey		$5,000	$5,000	$5,000	$5,000
Route Features Inventory			$25,000		$15,000
Annual Total:	**$260,000**	**$145,000**	**$100,000**	**$145,000**	**$90,000**

7.2 Implementation & Management Plan

In conjunction with TransLink and the Bicycle Subcommittee, a phased implementation and management plan for the BMP should be developed. The *Implementation Plan* should identify the key steps in fully implementing the BMP. The *Management Plan* should outline the elements, resources, protocols and stakeholders required to operate and manage BMP.

7.2.1 Implementation Plan

Once the development of the BMP is initiated, an Implementation Plan will be required to provide a road map of the key steps required to ensure a smooth process for full implementation. As such, although a plan is beyond the scope of this study, the main implementation steps and components are suggested as follows:

- **Develop and adopt Bicycle Monitoring Program Terms of Reference.** A Bicycle Monitoring Program Terms of Reference (TOR) would be the basis from which the purpose, plans, components, and protocols of the BMP would be defined. Based on the work of this study, the TOR would provide a concise definition of the key elements of the program.

- **Establish Bicycle Monitoring Program Committee.** This committee would comprise of partners and stakeholders that can assist and ensure the proper operation of the BMP. Partners would be defined as funding or in-kind donors to the program, and stakeholders as members who have a vested interest in the program. MOUs can be developed to formally associate partners with the BMP. The Committee is suggested to be a sub-committee under the Bicycle Subcommittee.

- **Activity 1: Bicycle Volume Count Program and Network.** The development of the bicycle volume count surveys and permanent count network would be the initial activity that would be undertaken. Steps in the setup of this activity would be taken in two streams: Bicycle permanent count network setup; and Bicycle Volume Counts program implementation.

  a. **Bicycle Permanent Count Network Setup.** The 16 permanent count locations, as identified in **Table 11**, would need to be established. This would require:
     - Design overall network
     - Design individual permanent counts by location
     - Procure, install & test
     - Access, reduce, and summarize data
     - Reporting

  b. **Bicycle Volume Counts Program.** The conduct of volume manual and temporary automatic counts would require the following steps:
     - Design overall program (priority, schedule, budget, logistics)
     - Hire field crew or contract procurement
     - Conduct field survey (manual counts; rotation of temporary automatic counters)
     - Entre/download, reduce, and summarize data
     - Reporting

- **Activity 2: Bicycle Intercept Surveys.** The development and conduct of bicycle intercept surveys would be the second activity under the BMP. The key steps are:
  - Contract procurement for design and management of survey
  - Design survey and conduct plan
  - Hire field crew (if not within contract)
  - Conduct survey
  - Enter, reduce, and summarize data
  - Reporting

- **Activity 3: Bicycle Travel Time Surveys.** The conduct of bicycle travel time surveys would be the third activity implemented under the BMP. The key steps are as follows:
  - Contract procurement for the design and management of surveys (optional)
  - Design survey and conduct plan
  - Hire field crew
  - Conduct survey

- Enter, reduce, and summarize data
- Reporting

- **Activity 4: Bicycle Route Features Inventory.** As the first inventory of bicycle route features has already been conducted by TransLink, the next inventory would not be required until 2012. However, it is recommended planning for the inventory be done in 2011 with consideration to the following steps:
  - Review data needs and routes
  - Contract procurement or in-house development of data collection equipment, design, and process
  - System testing (in-field)
  - Conduct full inventory (in-field)
  - Processing, reduce, and summarize data
  - Reporting

- **Bicycle Account Report.** A report on the status of cycling based on standardized indicators is recommended to be completed every 2 years, with a complete report produced every 5-6 years (further details provided in **Section 9**).

7.2.2 Management Plan

The management of the proposed BMP is centred around the proposed Bicycle Monitoring Program Committee (BMP Committee). **Figure 1** provides an example of the recommended structure to manage and oversee the proposed BMP.

The BMP Committee would provide direct interaction with the Bicycle Subcommittee and connections to local and provincial agencies. Partners and stakeholders involved in the program that are external to the Bicycle Subcommittee would also be connected through the BMP Committee. Reporting directly to the BMP Committee is the TransLink official responsible for the BMP. Working with internal staff resources, as well as contract resources, the Bicycle Monitoring Program Manager would be responsible for the entire program. At the very minimum, TransLink's role should be:

Coordination: To act as a regional coordinator of cycling data to facilitate data sharing, consistency, best practices, and partnership opportunities.

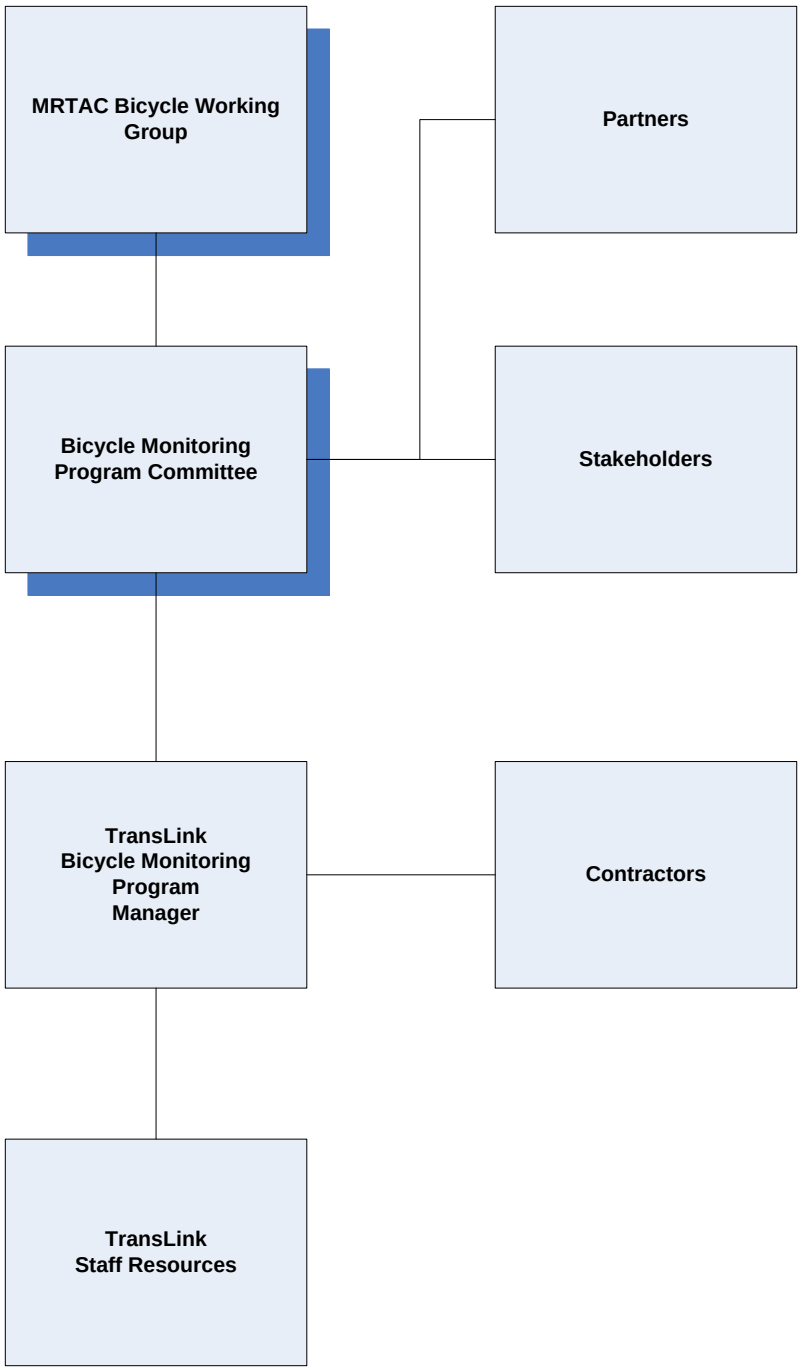
Central Data Assembly: To acquire and assemble cycling-related data from external sources both intra and inter-regional (i.e. StatsCan, Province of BC)

Collect Own Data: To ensure data is collected, archived, and evaluated on TransLink-owned facilities, and provided in an open standard.

Steps in developing the management plan and structure of the BMP are as follows:

- Adopt the Bicycle Monitoring Program from the Bicycle Subcommittee
- Establish the BMP Committee
- Identify and establish BMP partners and stakeholders
- Establish BMP management process and staff resources within TransLink

Figure 1. Proposed Bicycle Monitoring Program Management Structure



8.0 DATA ARCHIVE, ACCESS AND DISSEMINATION

Data sharing is a key strategy to support the progressive advancement of cycling infrastructure and services throughout the region. Sharing of cycling and related data will increase the information available for design, planning, and research in a cost-effective manner. Furthermore, sharing of data will facilitate closer coordination of data collection activities, further standardizing the available cycling data.

The benefit of a concerted effort to collect data is the opportunity to share the data and increase the value and utilization of the investment dollars made in the data collection. Hence, the issue of data sharing, dissemination and access is important and is a key part of the overall monitoring program. This component of the program consists of four basic steps:

5. Data Acquisition
6. Archive and Reduction
7. Access and Sharing
8. Dissemination

8.1 Data Acquisition

Data acquisition is the gathering of data from various sources and methods. The majority of the data will be acquired through formal data collection and assembly activities as discussed in previous sections. However, a minor, yet important method is to allow volunteers to collect data (primary data) through an organized yet ad-hoc program designed to allow volunteers to actively take part in the BMP. Supporting the informal collection of bicycle-related data, an online web tool can be developed to automate the gathering and centralization of such data.

8.1.1 Ad-Hoc Volunteer Data Collection Program

Based on discussions with stakeholders and the findings from Technical Memorandum 1, the use of volunteers was identified as a method for the ad-hoc collection of data. As such, an ad-hoc volunteer data collection program is recommended to be established that informally supports the objectives of the BMP. Volunteers can be used to obtain bicycle volume counts at pre-determined locations, or where they feel there is a lack of data. Volunteers can also be used to collect travel time data and simple intercept surveys. An informal, and loosely organized program allows for an efficient and community-based data collection initiative that can be supported by the BMP through incentives, standards, and tools.

8.1.2 Web Tool

To assist volunteer data collection, standard forms, as shown in **Appendices B-D**, can be used to ensure data is collected in a consistent manner. Once the data is collected manually on these paper forms, the data must be entered. A web-based tool can be developed to provide a convenient means of submitting the data collected from anywhere internet access is available. This tool would also be a centralized repository that will allow a simplified and efficient means to integrate the data to the overall BMP. A mock-up website has been developed to demonstrate this concept at: http://www.acuere.ca/bicycledata

8.2 Archive and Reduction

Central to a data collection and monitoring program is the archiving of historical data. While current data provides a status of existing conditions, the development of forecasts generally requires the knowledge of past conditions from which to determine trends to base future estimates. Furthermore, the archiving of data, from the raw, field-collected data, to modified and cleaned versions, is recommended to ensure a full "audit-trail" exists to ensure data quality and accountability.

8.2.1 Data Medium

Cycling data can be collected either in paper or electronic form. When collected in paper medium, the resulting completed form represents the raw data collected. This data should be entered into an electronic format and archived for reference, verification or audit purposes. When collected in an electronic medium, whether automatically (sensor-based counters) or manually (electronic count boards, laptops) collected, the resulting electronic files represent the raw data. A backup of the files, and/or a print-out of the data is recommended to ensure the raw data is not mistakenly lost or erased.

The goal of the exercise is to ensure the raw data is accurately translated into an electronic format in preparation for the reduction stage. The actual data structure or schema used should ensure the data is a fully verbatim copy of the original raw data, with additional metadata included, such as any data collection notes, field conditions, and other information relevant to the proper interpretation and use of the data.

It is recommended that properly indexed copies of the data be stored on secure and frequently backed-up file servers, as well as additional backups in CD/DVD or external hard-drive medium and stored in a separate location.

8.2.2 Data Preparation and Reduction

The data collected or assembled may not be useful in its raw form and will typically require summarization or reduction into a form that is useful for a given application. For example, volume data collected in 15 minute increments may be too detailed for use to describe daily volume totals. In this case, hourly or peak period totals may suffice to describe the daily variations of bicycle volumes at a particular location. However, before data is reduced, the raw data is typically "prepared" to ensure consistency and verification before being applied.

Data preparation consists of processes that verify the data identifying anomalies that may indicate errors, and data interpolation methods that fill in "data gaps" within the dataset. This process is essentially a modification of the raw data and therefore must be done with high scrutiny to ensure the data is not incorrectly modified. Essentially, the data preparation process adds value to the raw data collected by correcting for apparent errors and ensuring the data is complete and consistent for the reduction process.

The data reduction process should employ standard reduction methods to ensure consistent methodology, especially for monitoring purposes.

Data reduction is essentially a summarization or query of the prepared raw data. High-level queries can be performed from the prepared raw data, or the raw data can be prepared and reduced to a level that will be more easily used and managed than the raw data, yet retain enough detail to ensure proper queries can be made with adequate saliency.

8.2.3 Management

As a number of versions of a dataset may result from the collection of raw data, it is important to ensure a consistent and understandable version of the data be established and applied. This will ensure efficient and accurate use of the datasets for any required application. Likewise, queries and summaries should also be documented, or at least reduced and summarized data be associated with metadata describing the reduction/query applied for its creation.

Overall, principles of "truth-in-data" should be applied so that any resulting information produced form a dataset can be traced back to its origins. This will ensure accountability, accuracy, and repeatability – key principles in any monitoring program.

A key role in the proper management of data is the Data Administrator. The Data Administrator, whether a formal position, or a function of an existing position, is the steward of datasets. The Data Administrator keeps an updated status of all datasets and provides advice as to the use of the data. The distribution and sharing of datasets is also handled by the Data Administrator, a function which will be further discussed in the following sub-section.

8.3 Access, Sharing & Dissemination

The wide use of data collected increases the value of the data and stretches funding dollars that were used to collect the data. Therefore, access to, and sharing of, the data, and the dissemination of the results and findings of the data collected provide value and key information in the decision-making process. As such, the data is an important part of public policy and therefore should be distributed widely while ensuring its fidelity and proper use.

8.3.1 Principles

The provision of data and resulting information should be done in an open, yet controlled manner. The principle of "openness" ensures that the data is accessible for use, inspection, and accountability. However, to ensure proper application and interpretation, the release of the data must be done in a controlled manner to ensure the receiver is aware of the scope, quality, limitations, and modifications of the data. A possible negative consequence is the misuse of the data with published results that may damage the reputation of the dataset and data provider. Furthermore, newer versions of the data may arise as a result of such scrutiny, requiring release and updating of current users. In such a case, although a disclaimer can be added to require users to ensure they are using the latest datasets, it is recommended a proactive approach be taken to maintain a user list and ensure those on the list are notified immediately.

Overall, the right balance of openness and responsible management of the data is required to ensure the value of the data is maintained.

8.3.2 Centralized Access and Distribution

At the start of the BMP, access and provision of data will be more or less in a manual fashion. The access will be centralized due to the fact that the Data Administrator would be the single point-of-contact for the data. Eventually, a more formal and automated system should be established to allow for unlimited and efficient access. A web-based system can be developed that provides a centralized portal for the provision and distribution of the data and resulting information. Access-restrictions can be placed on low-level data, while information and high-level data can be published in open web-pages and documents. A centralized and single-point repository will allow for an efficient means of access and wide-distribution of bicycle-related data.

For the purposes of this report, access can be defined in 4 levels:

- **Level 1: Fully open to the public.** This consists of public web-pages and documents that do not have any access restrictions.
- **Level 2: Limited Access.** This consists of access restrictions (user-id and password) that allow limited access privileges to be provided to some or all of the datasets.
- **Level 3: Full Access.** This consists of access restrictions that allow full access privileges of all datasets to be provided.
- **Level 4: Administrator Access.** This is the highest level of access, allowing for full control and manipulation of the data and website. Only the Data Administrator or designate would be provided this access.

8.3.3 Access by Program Partners

Formal partners to the BMP should be provided unlimited access to datasets, with training and awareness of the data scope, limitations, modifications and quality. In most cases, partners will utilize the services of the Data Administrator to obtain information queried from the datasets, however Full Access (Level 3) should be provided as an indication of ownership.

8.3.4 Access by Practitioners

Transportation practitioners in the public, private, NGO/NFP, or academic sectors can be provided access to the BMP dataset. Limited or Full Access (Level 2 or 3) can be provided depending on the needs and authorization, and this access can be temporary or permanent in nature. A formal registration process would be established to ensure appropriate access is provided with proper credentialing.

8.3.5 General Public and Media

Relevant information and statistics from the BMP data would be published in public webpages and documents. Information and statistics such as current indicators and trends, would provide overview summaries of the status of cycling in the region. Documents such as Bicycle Accounts, survey results, and technical reports can be published to provide more detailed, yet organized, information and details of the underlying datasets and methods to ensure accountability.

Proactively, notifications and releases can be "pushed" to subscribers, decision makers,

corporations, agencies, and the media. General public or media releases can be provided for immediate notification of key statistics, findings or policy research. These information releases can provide a means of "informative advocacy" towards the promotion of cycling in the region.

9.0 REPORTING

The BMP will result in a comprehensive amount of cycling-related data that will be collected and assembled across the region. In order for these data collection and assembly efforts to be translated into a useful monitoring program, a clear reporting structure is required to ensure that the data is analyzed, presented, and reported in a systematic and consistent fashion over time. This will allow for the clear monitoring of cycling-related trends as well as progress towards achieving the goals of the Regional Cycling Strategy.

It is recommended that the reporting structure consist of the publishing of a "Metro Vancouver Bicycle Account". This Bicycle Account is similar to Bicycle Accounts that have been developed in Copenhagen and Melbourne to monitor cycling related trends related to infrastructure, behaviour, and safety based on a combination of quantitative and qualitative indicators, as summarized in Technical Memorandum 1.

The Bicycle Account should be concise (5 pages) and clearly written using non-technical language that can be easily understood by a wide variety of audiences, including staff and politicians in each of the municipalities in the Metro Vancouver region, cycling advocates, the general public, and other stakeholders. The Bicycle Account should include simple and consistent indicators that allow the audience to clearly understand cycling-related trends over time. In particular, each Bicycle Account should report on a variety of indicators in the four broad topic areas identified in **Section 4**:

- Bicycle Infrastructure
- Bicycle Use
- Cyclist Safety
- Cyclist Perceptions

Tables A1-A4 in **Appendix A** summarize the proposed indicators identified in **Section 4** that could be used to track progress in the areas of bicycle infrastructure, use, safety, and cyclist perceptions. The Tables include additional information, such as relevant measures, level of geography, collection and assembly activities required, potential data sources, and frequency of data collection and assembly for each indicator. It should be noted that many of the indicators that rely on data assembly activities using other data sources (such as the Trip Diary Survey and Census Data), cannot be updated in each Bicycle Account, as this data is typically collected in 4-5 year cycles. As such, it is recommended that an Interim Bicycle Account be prepared every 2 years based on new data that has been collected directly through the Bicycle Monitoring Program, and that a Complete Bicycle Account be prepared every 5-6 years to also include a comprehensive set of indicators.

In addition to the tracking of overall trends using these indicators, the Bicycle Account should also include descriptive text highlighting:

- Benefits of cycling
- Key accomplishments and achievements throughout the region since the previous Bicycle Account
- Description and explanation of key findings
- Opportunities for improvement

- Recommendations and strategies towards improving outcomes for the subsequent Bicycle Account

The Bicycle Account should also include extensive use of graphics to clearly convey the results and photos. There is also an opportunity to include cycling advocates and organizations in helping to provide some of the photos to be included in the Bicycle Account. For example, as part of Melbourne's 2008 Bicycle Account, the City ran a competition asking cycling and photography enthusiasts to send in images that represented the true character of cycling in Melbourne, and the winning entries were included in the Bicycle Account.

APPENDIX A

Proposed Bicycle Indicators

Table A1 – Potential Bicycle Account Indicators – Bicycle Infrastructure

ID	Indicator	Measure	Level of Geography	Data Collection / Assembly Activity	Potential Data Sources	Availability/ Frequency
1.1	Length of total bicycle network	Total distance in lane kilometres of the regional bicycle network	• Region • Municipalities	• Cycling Network Features Inventory	• **Network Validation Data**	2 years
1.2	Proportion of off-street pathways	Percentage of the total distance of the regional bicycle network made up of off-street pathways	• Region • Municipalities	• Cycling Network Features Inventory	• **Network Validation Data**	2 years
1.3	Proportion of cycle tracks	Percentage of the total distance of the regional bicycle network made up of cycle tracks	• Region • Municipalities	• Cycling Network Features Inventory	• **Network Validation Data**	2 years
1.4	Proportion of neighbourhood bikeways	Percentage of the total distance of the regional bicycle network made up of neighbourhood bikeways	• Region • Municipalities	• Cycling Network Features Inventory	• **Network Validation Data**	2 years
1.5	Proportion of bicycle lanes	Percentage of the total distance of the regional bicycle network made up of bicycle lanes	• Region • Municipalities	• Cycling Network Features Inventory	• **Network Validation Data**	2 years
1.6	Proportion of road network with bicycle facilities	Percentage of the total distance of the regional road network that includes a bicycle facility	• Region	• Cycling Network Features Inventory • Bicycle Route and Road Network Spatial Data Assembly	• **Network Validation Data** • **Digital Road Atlas**	2 years
1.7	Investment in cycling infrastructure	Total amount spent over previous year in constructing new cycling infrastructure across the region	• Region	• Municipal Interviews	• **Municipalities**	2 years
1.8	Proportion of population within vicinity of a designated bicycle route	Percentage of the total regional population (residential or business) that is 500m or less from a designated bicycle route	• Region	• Bicycle Route and Road Network Spatial Data Assembly • Census population data	• **Digital Road Atlas** • **StatsCan**	5 years
1.9	Proportion of intersections bicycle controlled	Regional percent of bicycle-controlled intersections	• Region	• Cycling Network Features Inventory • Bicycle Route and Road Network Spatial Data Assembly	• **Network Validation Data** • **Digital Road Atlas**	2 years

Table A2 – Potential Bicycle Account Indicators – Bicycle Use

ID	Indicator	Measure	Level of Geography	Data Collection / Assembly Activity	Potential Data Sources	Availability/ Frequency
2.1	Number of bicycle trips	Total number of bicycle trips per day originating in each area	• Region • Municipalities	• Household Origin-Destination Travel Survey Data Assembly	• Trip Diary Survey	4-5 years
2.2	Proportion of all trips made by bicycle	Percent of all trips made by bicycle originating in each area	• Region • Municipalities • Cycling Precincts • Primary Cycling Areas • Secondary Cycling Areas	• Household Origin-Destination Travel Survey Data Assembly	• Trip Diary Survey	4-5 years
2.3	Proportion of work trips made by bicycle	Percent of all work trips made by bicycle among employed labour force originating in each area	• Region • Municipalities • Cycling Precincts • Primary Cycling Areas • Secondary Cycling Areas	• Household Origin-Destination Travel Survey Data Assembly	• Census	5 years
2.4	Proportion of school trips made by bicycle	Percent of all grade school trips made by bicycle originating in each area	• Region • Municipalities • Cycling Precincts • Primary Cycling Areas • Secondary Cycling Areas	• Household Origin-Destination Travel Survey Data Assembly	• Census	5 years
2.5	Median distance of bicycle trips	Median distance of all bicycle trips	• Region • Municipalities • Cycling Precincts • Primary Cycling Areas • Secondary Cycling Areas	• Household Origin-Destination Travel Survey Data Assembly	• Trip Diary Survey	4-5 years
2.6	Proportion of all short distance trips made by bicycle	Percent of all trips under 5 km in length made by bicycle originating in each area	• Region • Municipalities	• Household Origin-Destination Travel Survey Data Assembly	• Trip Diary Survey	4-5 years
2.7	Median bicycle travel times	Median bicycle travel times between specific origins and destinations along specific corridors	• Region • Municipalities • Cycling Precincts • Primary Cycling Areas • Secondary Cycling Areas	• Household Origin-Destination Travel Survey Data Assembly	• Trip Diary Survey	4-5 years

ID	Indicator	Measure	Level of Geography	Data Collection / Assembly Activity	Potential Data Sources	Availability/ Frequency
2.8	Number of bicycle trips across screenlines	Average daily bicycle volumes across screenlines over 3-day period during Volume Count Survey period	• All automatic permanent counts • Automatic permanent counts entering Downtown Vancouver (Lions Gate Bridge, Burrard Bridge, Granville Bridge, Cambie Bridge)	• Volume Count Survey Data Collection	• Automatic Permanent Counts	2 years
2.9	Number of bicycle trips across screenlines by month	Average monthly bicycle volumes across screenlines	• All automatic permanent counts • Automatic permanent counts entering Downtown Vancouver (Lions Gate Bridge, Burrard Bridge, Granville Bridge, Cambie Bridge)	• Volume Count Survey Data Collection	• Automatic Permanent Counts	2 years
2.10	Bicycle trips across screenlines by time of day	Average hourly bicycle volumes across screenlines	• All automatic permanent counts • Automatic permanent counts entering Downtown Vancouver (Lions Gate Bridge, Burrard Bridge, Granville Bridge, Cambie Bridge)	• Volume Count Survey Data Collection	• Automatic Permanent Counts	2 years
2.11	Number of bicycle trips at all count locations	Average PM Peak bicycle volumes at all count locations over 3-day period during Volume Count survey period	• All count locations	• Volume Count Survey Data Collection	• Automatic Permanent Counts • Automatic Temporary Counts • Manual Counts	2 years
2.12	Number of bicycles integrating with transit	Number of bicycles using transit, SkyTrain, SeaBus, or the George Massey Tunnel	• Bicycle counts on SkyTrain, SeaBus, and George Massey Tunnel • Number of bicycle rack deployments on buses	• Multi-Modal Integration Data Assembly	• Multi-Modal Integration Data Assembly	2 years

Table A3 – Potential Bicycle Account Indicators – Cyclist Safety

ID	Indicator	Measure	Level of Geography	Data Collection / Assembly Activity	Potential Data Sources	Availability/ Frequency
3.1	Number of bicycle collisions with motor vehicles	Total number of reported collisions of all types involving cyclists and motor vehicles	• Region • Municipalities	• Bicycle Safety Data Assembly	• ICBC	2 years
3.2	Number of bicycle collisions with motor vehicles per 10,000 bicycle trips	Proportion of reported collisions of all types involving cyclists and motor vehicles divided by total bicycle trips	• Region • Municipalities	• Bicycle Safety Data Assembly • Household Origin-Destination Travel Survey Data Assembly	• ICBC • Trip Diary Survey	4-5 years
3.3	Locations with highest number of collisions involving cyclists	Twenty locations across the region with the highest number of reported collisions of all types involving cyclists and motor vehicles	• Region	• Bicycle Safety Data Assembly	• ICBC	2 years
3.4	Number of bicycle collisions with motor vehicles resulting in fatalities	Total number of reported collisions involving cyclists and motor vehicles that resulted in fatalities	• Region	• Bicycle Safety Data Assembly	• ICBC	2 years
3.5	Percentage of cyclists wearing helmets	Proportion of counted cyclists wearing helmets	• Region	• Volume Count Survey Data Collection	• Manual Bicycle Counts	2 years
3.6	Proportion of women cyclists	Percentage of all surveyed cyclists who are women	• Region	• Bicycle Intercept Survey Data Collection	• Bicycle Intercept Survey	2 years
3.7	Proportion of young cyclists	Percentage of all surveyed cyclists who are 20 years of age or younger	• Region	• Bicycle Intercept Survey Data Collection	• Bicycle Intercept Survey	2 years

Table A4 – Potential Bicycle Account Indicators – Cyclist Perceptions

ID	Indicator	Measure	Level of Geography	Data Collection / Assembly Activity	Potential Data Sources	Availability/ Frequency
4.1	Bicycle-friendliness of the region	Survey Response (scale of 1-10)	• Region	• Bicycle Intercept Survey Data Collection	• Bicycle Intercept Survey	2 years
4.2	Cyclist sense of safety	Survey Response (scale of 1-10)	• Region	• Bicycle Intercept Survey Data Collection	• Bicycle Intercept Survey	2 years
4.3	Cyclists following road rules	Survey Response (scale of 1-10)	• Region	• Bicycle Intercept Survey Data Collection	• Bicycle Intercept Survey	2 years
4.4	Amount of bicycle routes	Survey Response (scale of 1-10)	• Region	• Bicycle Intercept Survey Data Collection	• Bicycle Intercept Survey	2 years
4.5	Design of bicycle routes	Survey Response (scale of 1-10)	• Region	• Bicycle Intercept Survey Data Collection	• Bicycle Intercept Survey	2 years
4.6	Maintenance of bicycle routes	Survey Response (scale of 1-10)	• Region	• Bicycle Intercept Survey Data Collection	• Bicycle Intercept Survey	2 years
4.7	Amount of bicycle parking	Survey Response (scale of 1-10)	• Region	• Bicycle Intercept Survey Data Collection	• Bicycle Intercept Survey	2 years
4.8	Feasibility of combining cycling with public transit	Survey Response (scale of 1-10)	• Region	• Bicycle Intercept Survey Data Collection	• Bicycle Intercept Survey	2 years

APPENDIX B

Example Manual Bicycle Count Forms

- **Mid-Block Count Forms and**
- **Intersection Turning Movement**

Mid-Block Count Form - Bicycles & Pedestrians

FORM ID: BP-MID-2HR-V1

Count Location:	between and		**Site ID:**	**Page:**	of
Date:			**Time Period:**	to	
Surveyor Name:		**Surveyor ID:**		**Weather/ Road:**	

Start Time	**Cyclists**		**Pedestrians**	
	NB or WB	**SB or EB**	**NB or WB**	**SB or EB**

Notes:

Instructions for Form: [BP-MID-2HR-V1] - Mid-Block Bicycle & Pedestrian Count Form

Header Information:

Count Location: Write down the name of the road including adjacent cross-streets.

Site ID: Write down the Site Number if applicable (should be provided)

Page: If more than one page is used for a shift, note the page number and total pages
Total page number should be filled in at the end of the shift.

Date: Record the date of the count.

Time Period: Write the starting time and ending time of the total count session.

Surveyor Name: Print your name.

Surveyor ID: Print your ID number if provided.

Weather/Road: Note the weather and any abnormal road conditions.

Count Information:

Circle the Direction for which you are counting below the header

NB = North bound
WB = West bound
SB = South bound
EB = East bound

Pedestrians: Count individual people, including babies in strollers or carried
Hint: count "heads"; also count people in groups in bunches before recording.

Cyclists: Count individual people riding bikes (a tandum = two cyclists)

Recording: Use the "5 stick bundle" method (𝍸) to group counts into 5s.
Heavy flow observations can be represented by numbers.

Tally Sums: Tally up every 15 minute increment and write in the bottom-right box
This can be done after the shift.

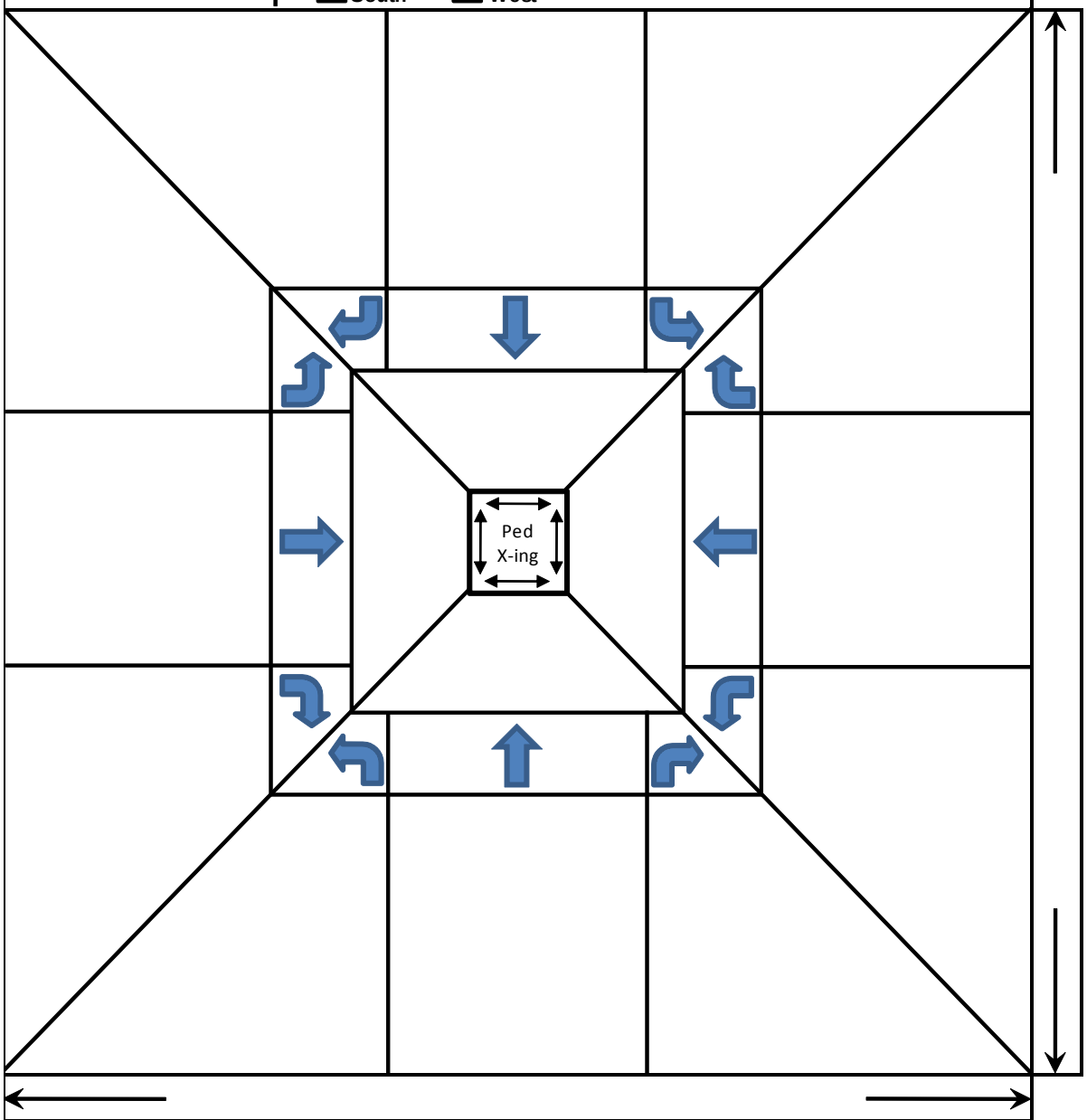
Note: [BP-MID-2HR-V1] is a 2-hour count form based on 15 minute count increments. Use additional forms for longer count durations or halve (and note) count areas to double the form capacity ONLY if count volume intensity is relatively low.

Intersection Count Form - Bicycles & Pedestrians

FORM ID: [BP-INT-1HR-V1]

Count Location:	at	Site ID:		Page:	of
Date:		Time Period:	to		
Surveyor Name:		Surveyor ID:		Weather/ Road:	

Direction: ☐ North ☐ East ☐ South ☐ West



15 Min. Colour Coding:		Notes:
0-15 min		
15-30 min		
30-45 min		
45-60 min		

Instructions for Form: [BP-INT-1HR-V1] - Intersection Bicycle & Pedestrian Count Form

Header Information:

Count Location: Write down the name of the roads crossing the intersection.

Site ID: Write down the Site Number if applicable (should be provided)

Page: If more than one page is used for a shift, note the page number and total pages
Total page number should be filled in at the end of the shift.

Date: Record the date of the count.

Time Period: Write the starting time and ending time of the total count session.

Surveyor Name: Print your name.

Surveyor ID: Print your ID number if provided.

Weather/Road: Note the weather and any abnormal road conditions.

Direction: Check off the direction(s) the top of the form is point towards (eg. "North" or "NorthWest").

Count Information:

Road Names: Between the arrows at the bottom and right of the form, write the corresponding road names.

Pedestrians: Count individual people, including babies in strollers or carried crossing the intersection and record in the corresponding approach area.
Hint: count "heads"; also count people in groups in bunches before recording.

Cyclists: Count individual people riding bikes (a tandum = two cyclists) and record in the corresponding turning movement area.

Recording: Use the "5 stick bundle" method (𝍸) to group counts into 5s.
Heavy flow observations can be represented by numbers.

15 Min. Increments: To record separate 15 minute increments, use 4 different coloured pens, each colour representing a 15 minute time period.

Note: [BP-INT-1HR-V1] is a 1-hour count form with the option of colour coded 15 minute count increments. Use additional forms for longer count durations.

APPENDIX C

Example Roadside Intercept Interview Survey and Mail-back Forms

Bicycle Intercept Survey Form

FORM ID: [B-INT-12-V1]

Site Location:		Site ID:		Page:	of
Date:		Time Period:	to		
Surveyor Name:		Surveyor ID:		Weather/ Road:	

1) X-Time:	AM/PM	AM/PM	AM/PM	AM/PM
2) Origin:				
3) Destination:				
4) Start Time:	AM/PM	AM/PM	AM/PM	AM/PM
5) Est. End Time:	AM/PM	AM/PM	AM/PM	AM/PM
6) Purpose:				
7) Route Taken:				
8) Route Plan:				
9) Age Cat:	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
10) Gender:	M F ?	M F ?	M F ?	M F ?
11) Party Size:				
12) Helmet:	Y N /	Y N /	Y N /	Y N /

1) X-Time:	AM/PM	AM/PM	AM/PM	AM/PM
2) Origin:				
3) Destination:				
4) Start Time:	AM/PM	AM/PM	AM/PM	AM/PM
5) Est. End Time:	AM/PM	AM/PM	AM/PM	AM/PM
6) Purpose:				
7) Route Taken:				
8) Route Plan:				
9) Age Cat:	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
10) Gender:	M F ?	M F ?	M F ?	M F ?
11) Party Size:				
12) Helmet:	Y N /	Y N /	Y N /	Y N /

1) X-Time:	AM/PM	AM/PM	AM/PM	AM/PM
2) Origin:				
3) Destination:				
4) Start Time:	AM/PM	AM/PM	AM/PM	AM/PM
5) Est. End Time:	AM/PM	AM/PM	AM/PM	AM/PM
6) Purpose:				
7) Route Taken:				
8) Route Plan:				
9) Age Cat:	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
10) Gender:	M F ?	M F ?	M F ?	M F ?
11) Party Size:				
12) Helmet:	Y N /	Y N /	Y N /	Y N /

Notes:

Instructions for Form: [B-INT-12-V1] - Bicycle Intercept Interview Survey Form

Header Information:

Site Location: Write down the name of the road including adjacent cross-streets.

Site ID: Write down the Site Number if applicable (should be provided)

Page: If more than one page is used for a shift, note the page number and total pages
Total page number should be filled in at the end of the shift.

Date: Record the date when the survey is conducted.

Time Period: Write the starting time and ending time of the survey period.

Surveyor Name: Print your name.

Surveyor ID: Print your ID number if provided.

Weather/Road: Note the weather and any abnormal road conditions.

Survey Samples:

Up to 12 interview samples can be recorded per page.

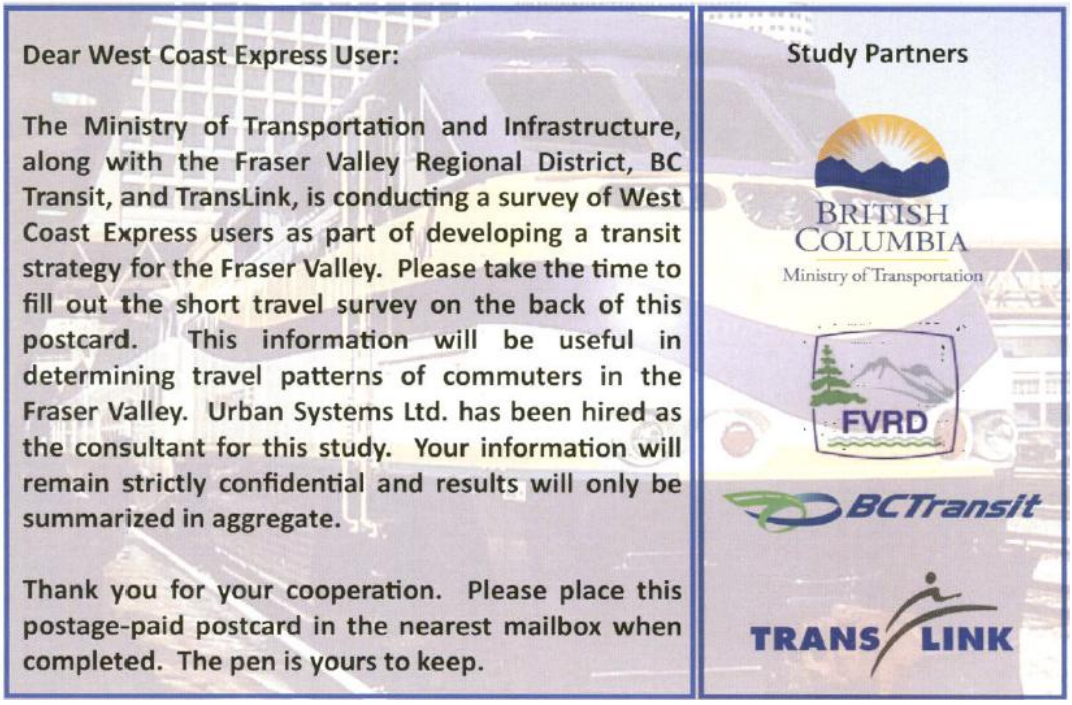
An introductory statement should be made such as:

"We are conducting a bicycle travel survey to help plan and improve cycling in the region.
Can I ask you a few questions, which will take about a minute."

For each sample as the following:

1) X-Time:	Time the cyclist(s) enter the site location (record the moment they agree to the survey)
2) Origin:	City or city area from where they started (also may be cross-streets or postal code)
3) Destination:	City or city area from where they are headed (also may be cross-streets or postal code)
4) Start Time:	Time they left their destination
5) Est. End Time:	Estimated time they expect to arrive at their destination
6) Purpose:	Purpose of Trip [e.g. Work, School, Leisure/Exercise, Friend/Family, Shopping, Personal]
7) Route Taken:	Short description of main route/roads taken to this point
8) Route Plan:	Short description of main route/roads planned to be taken to get to destination
9) Age Cat:	Ask their age by categories of 10's (i.e. 30's) otherwise guess
10) Gender:	Record their gender without asking
11) Party Size:	Record the number of total people the interviewee travelled with (including interviewee)
12) Helmet:	Record if helmet was worn. If more than one in the party, note [helmet users / party size]

Roadside Intercept Mail-Back Survey Example



Dear West Coast Express User:

The Ministry of Transportation and Infrastructure, along with the Fraser Valley Regional District, BC Transit, and TransLink, is conducting a survey of West Coast Express users as part of developing a transit strategy for the Fraser Valley. Please take the time to fill out the short travel survey on the back of this postcard. This information will be useful in determining travel patterns of commuters in the Fraser Valley. Urban Systems Ltd. has been hired as the consultant for this study. Your information will remain strictly confidential and results will only be summarized in aggregate.

Thank you for your cooperation. Please place this postage-paid postcard in the nearest mailbox when completed. The pen is yours to keep.

Study Partners

BRITISH COLUMBIA
Ministry of Transportation

FVRD

BCTransit

TRANSLINK

FRASER VALLEY TRANSIT STUDY – WEST COAST EXPRESS POSTCARD SURVEY

Stamp

Please take the time to complete the following questions:

1. Postal code of your trip origin: ___ ___ ___ ___ ___ ___
2. Which mode of travel did you use to get to this West Coast Express Station: ☐ Auto Driver ☐ Auto Passenger ☐ Bus ☐ Walk ☐ Bike ☐ Other: _____
3. Which scheduled train are you boarding: ☐ 5:27am ☐ 5:57am ☐ 6:27am ☐ 6:57am ☐ 7:27am ☐ 9:27am (TrainBus) ☐ 10:27am (TrainBus)
4. To which West Coast Express Station are you travelling to: ☐ Port Haney ☐ Maple Meadows ☐ Pitt Meadows ☐ Port Coquitlam ☐ Coquitlam Central ☐ Port Moody ☐ Waterfront
5. Are you: ☐ Male ☐ Female
6. Which age group do you represent: ☐ 15 and younger ☐ 16-18 ☐ 19-24 ☐ 25-34 ☐ 35-44 ☐ 45-54 ☐ 55-64 ☐ 65 and older
7. What is your present employment status: ☐ Working Full Time ☐ Working Part Time ☐ Student ☐ Retired ☐ Homemaker ☐ Unemployed

Mail to: **Urban Systems Ltd**
West Coast Express Survey
2353–13353 Commerce Pkwy
Richmond, BC V6V 3A1

APPENDIX D

Example Manual Bicycle Travel Time Survey Form

Bicycle Travel Time Survey Form

FORM ID: [B-TT-V1]

Origin Location:		**Destination Location:**			
Date:		**Time Period:**	to		
Surveyor Name:		**Surveyor ID:**		**Weather/ Road:**	

Origin Departure Time: _____ AM / PM

	Checkpoints & Description	Arrival / Through Time	Departure Time (if stopped)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

Destination Arrival Time: _____ AM / PM

Notes:

Instructions for Form: [B-TT-V1] - Bicycle Travel Time Survey Form

Header Information:

Origin Location: Write down the starting location description (intersection, landmark, etc.)

Destination Location: Write down the ending location description (intersection, landmark, etc.)

Date: Record the date of the survey.

Time Period: Record the time period of the survey.

Surveyor Name: Print your name.

Surveyor ID: Print your ID number if provided.

Weather/Road: Note the weather and any abnormal road conditions.

Survey Data:

1) Origin Departure Time: Record the time of departure from the origin.

2) Repeat for every Checkpoint identified:

Checkpoints: Pre-list the checkpoints (i.e. intersections or landmarks) that will be timed.

Arrival/Through Time: When arriving at a check point, if a stop is required (i.e. red traffic light), stop and record the time. Otherwise, if right-of-way is provided, continue through the intersection and stop when it is safe to do so and record the time of crossing.

Departure Time: If a stop was required (i.e. red traffic light), record the departure time so that the delay at this checkpoint can be measured.

3) Destination Arrival Time: Record the time of arrival to the final destination.

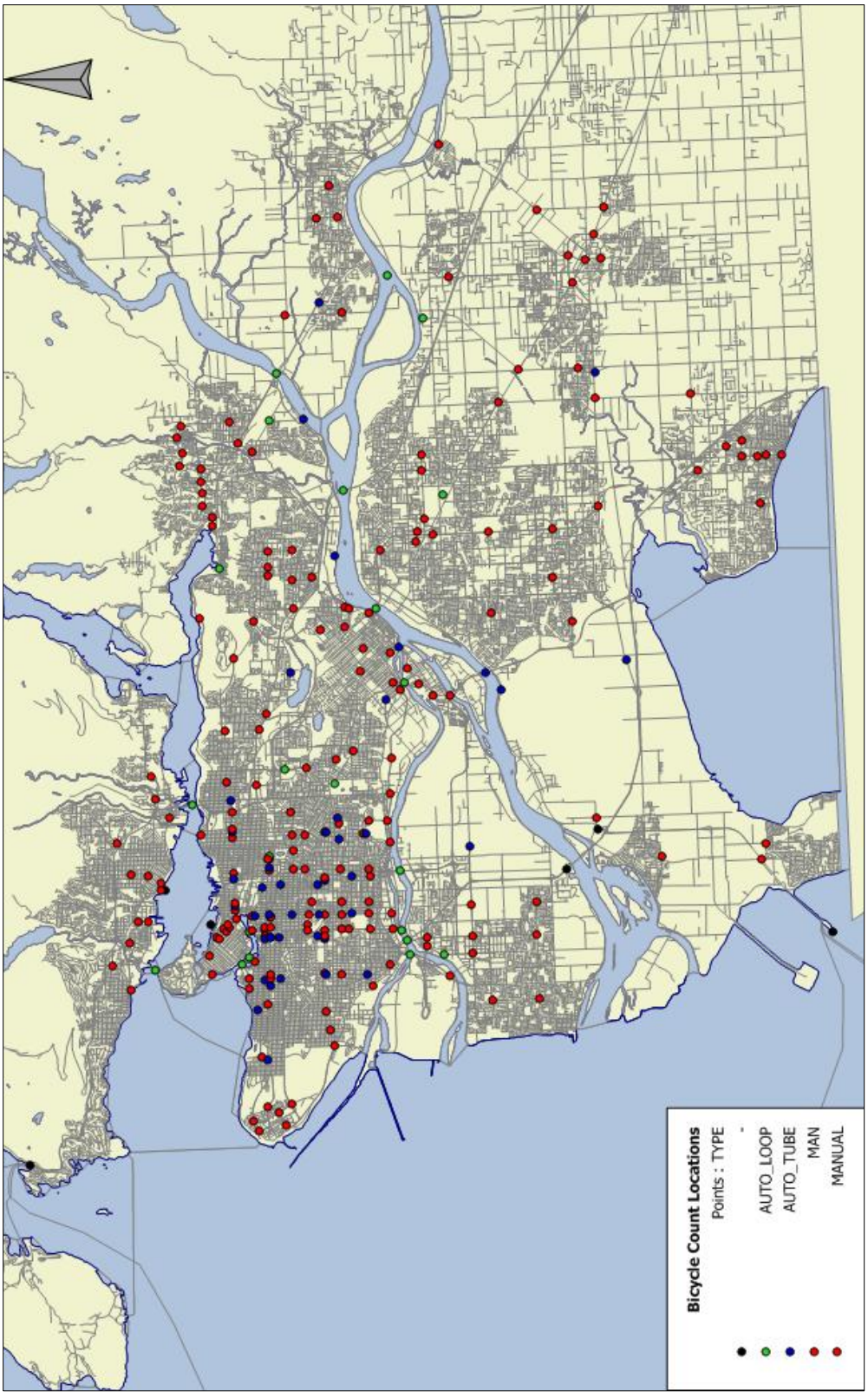
APPENDIX E

Bicycle Count Locations

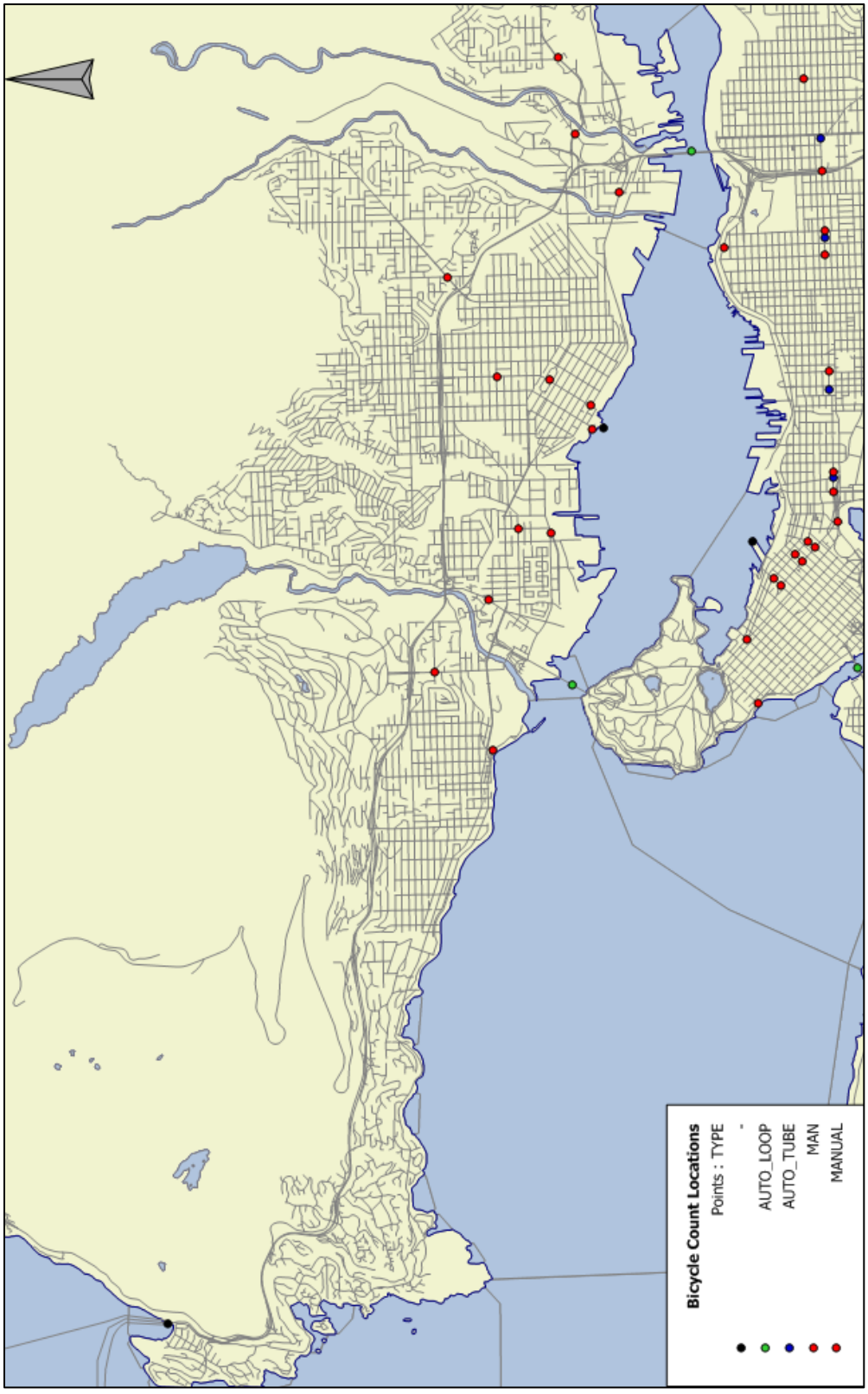
by

Jurisdiction, Type and Time Frame

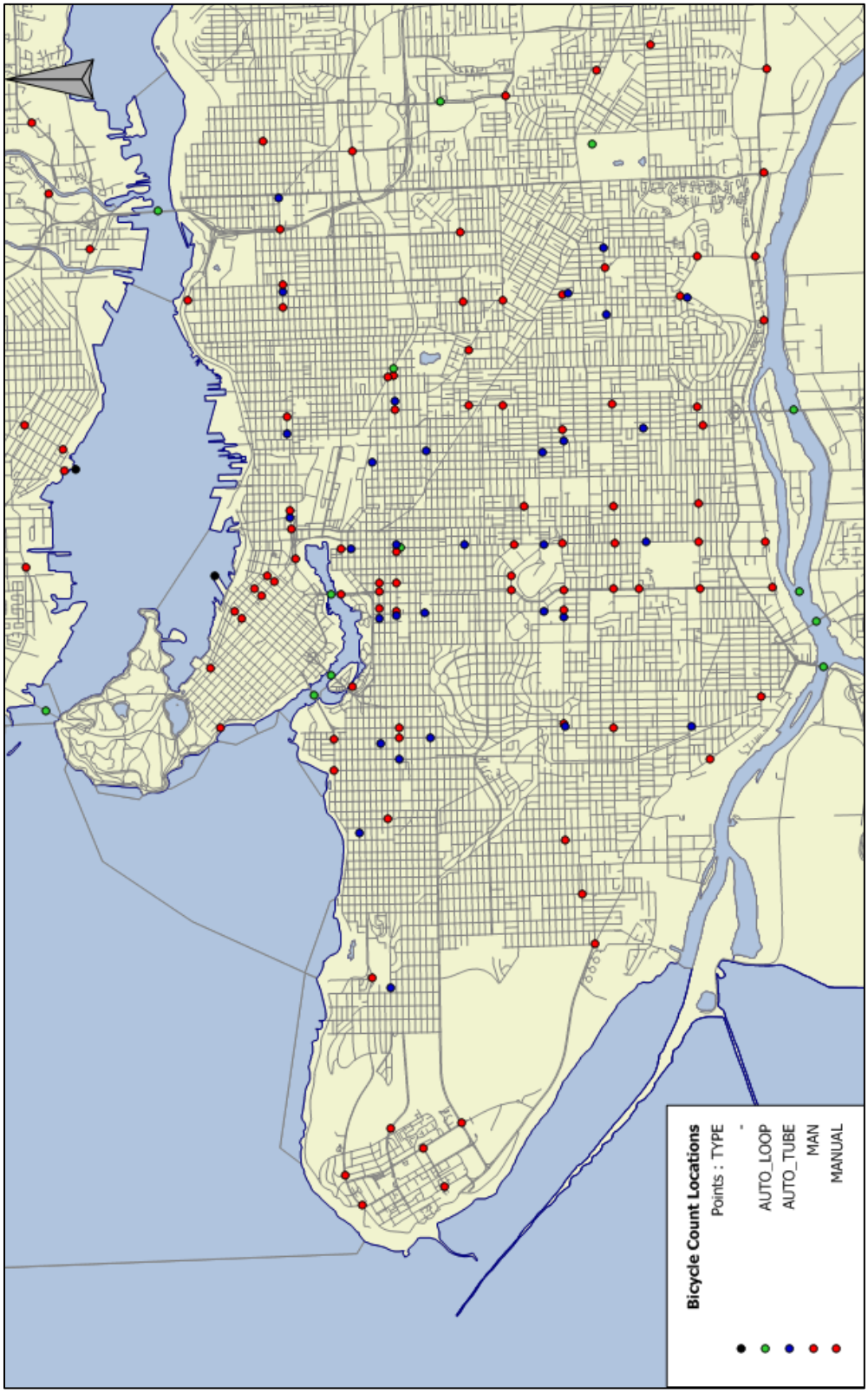
D1. Bicycle Count Locations by Type – Region Map



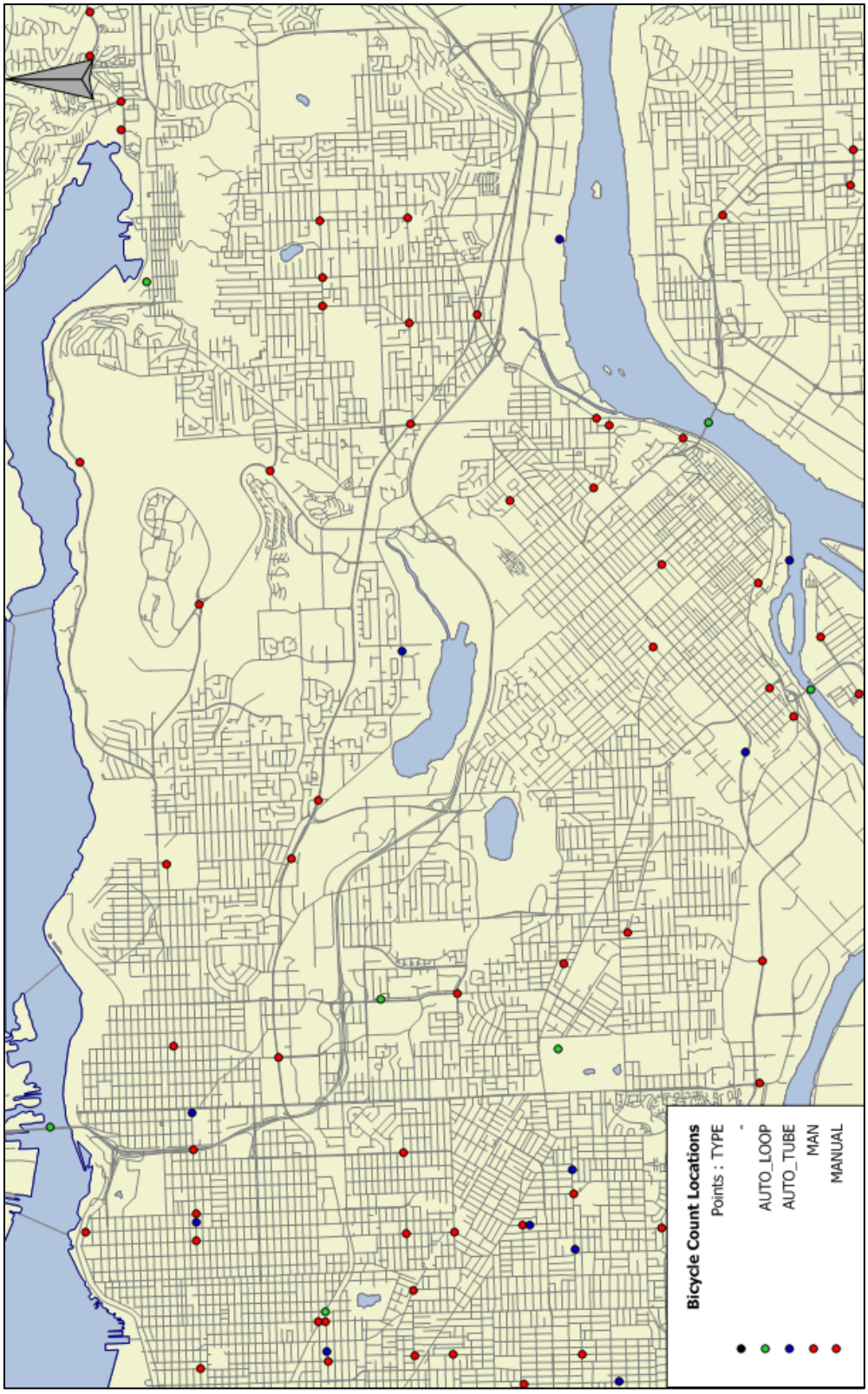
D2. Bicycle Count Locations by Type – North Shore Map



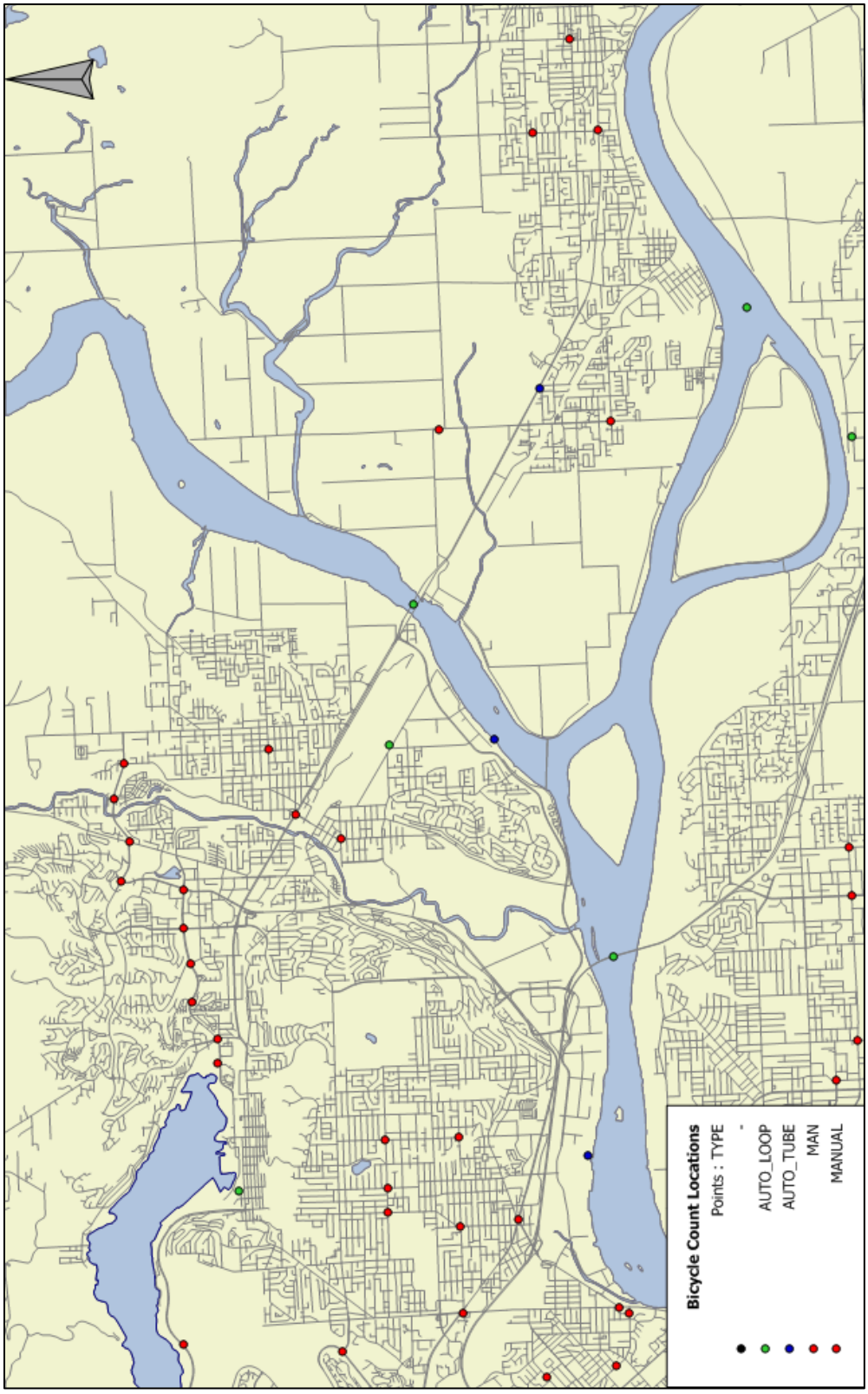
D3. Bicycle Count Locations by Type – Vancouver Map



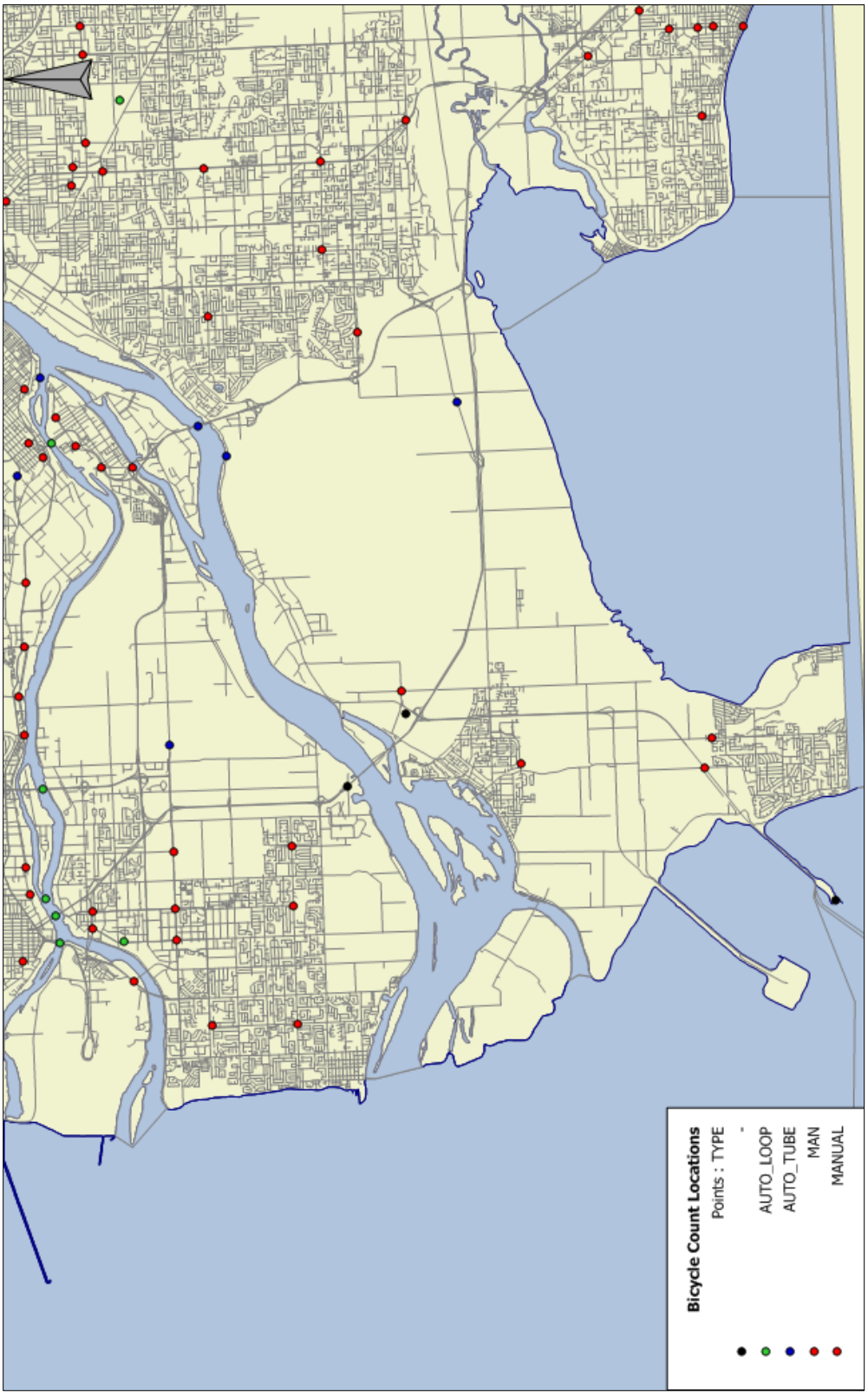
D4. Bicycle Count Locations by Type – Burnaby/New Westminster Map



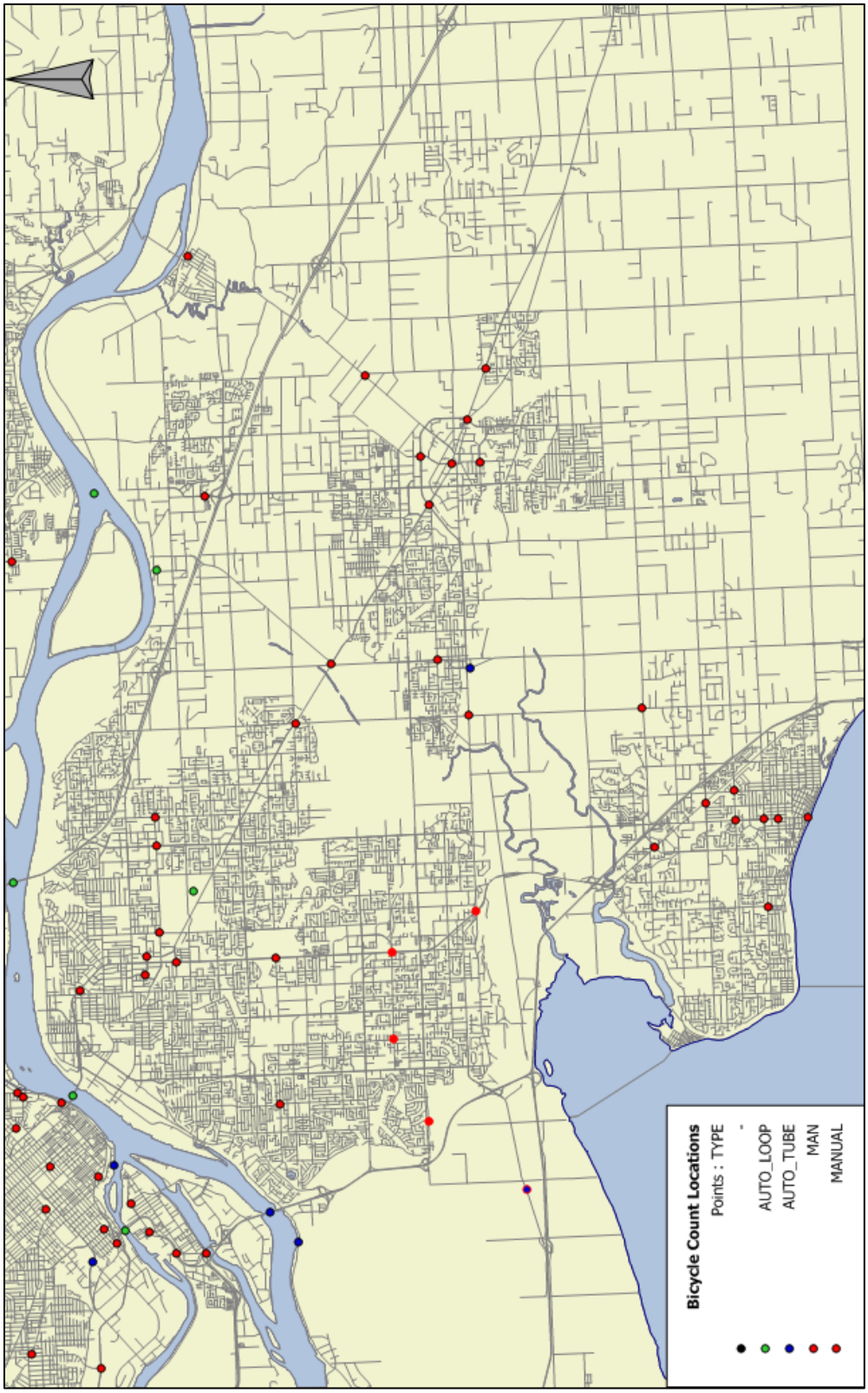
D5. Bicycle Count Locations by Type – North East Sector Map



D6. Bicycle Count Locations by Type – Richmond/North Delta Map



D7. Bicycle Count Locations by Type – Surrey/White Rock & Langleys Map



Bicycle Count Locations by Jurisdiction

No.	Time Frame	Type	Juris. Type	Juris. No.	Jurisdiction	Location	Location Proximity
1	EXIST	MANUAL	MUN	1	City of Burnaby	Marine Way	Nelson Ave
2	SHORT	MANUAL	MUN	2	City of Burnaby	Lougheed Hwy	Sperling Ave
3	MED	MANUAL	MUN	3	City of Burnaby	Lougheed Hwy	Kingsland Dr
4	EXIST	MANUAL	MUN	4	City of Burnaby	Lougheed Hwy	Gilmore Ave
5	EXIST	MANUAL	MUN	5	City of Burnaby	Deer Lake Pky	Willingdon Ave
6	EXIST	MANUAL	MUN	6	City of Burnaby	Armstrong Ave	Langley St
7	SHORT	MANUAL	MUN	7	City of Burnaby	Carleton Ave	Between Frances St and Pender St
8	MED	MANUAL	MUN	8	City of Burnaby	Frances St	Fell Ave
9	SHORT	MANUAL	MUN	9	City of Burnaby	Gaglardi Way	Burnaby Mountain Pky
10	SHORT	MANUAL	MUN	10	City of Burnaby	Gaglardi Way	Broadway
11	SHORT	MANUAL	MUN	11	City of Burnaby	Barnet Hwy	Between Cariboo Point Way and Reed Point Way
12	SHORT	AUTO_LOOP	MUN	12	City of Burnaby	White Ave N	Between Goard Way and Smith St
13	MED	MANUAL	MUN	13	City of Burnaby	Sussex Ave	Hazel St
14	SHORT	AUTO_LOOP	MUN	14	City of Burnaby	Central Park	Patterson Skytrain Station
15	SHORT	AUTO_TUBE	MUN	15	City of Burnaby	Southridge Dr	Between Byrnepark Dr and Griffiths Dr
16	SHORT	MANUAL	MUN	16	City of Burnaby	12th Ave	Mary Ave
17	SHORT	AUTO_TUBE	MUN	17	City of Burnaby	Winston St	Between McConnell Dr and Piper Ave
18	SHORT	MANUAL	MUN	18	City of Burnaby	Dunblane Ave	Beresford St
19	EXIST	MANUAL	MUN	1	City of Coquitlam	Foster Ave	Blue Mountain St
20	EXIST	MANUAL	MUN	2	City of Coquitlam	Foster Ave	Porter St
21	EXIST	MANUAL	MUN	3	City of Coquitlam	Foster Ave	Schoolhouse St
22	EXIST	MANUAL	MUN	4	City of Coquitlam	Rochester Ave	Blue Mountain St
23	EXIST	MANUAL	MUN	5	City of Coquitlam	Rochester Ave	Schoolhouse St
24	EXIST	MANUAL	MUN	6	City of Coquitlam	Guildford Way	Johnson St
25	EXIST	MANUAL	MUN	7	City of Coquitlam	Guildford Way	Lansdowne Dr
26	EXIST	MANUAL	MUN	8	City of Coquitlam	Guildford Way	Falcon Dr
27	EXIST	MANUAL	MUN	9	City of Coquitlam	David Ave	Pipeline Rd
28	EXIST	MANUAL	MUN	10	City of Coquitlam	David Ave	Pinetree Way
29	EXIST	MANUAL	MUN	11	City of Coquitlam	David Ave	Shaughnessy St
30	EXIST	MANUAL	MUN	12	City of Coquitlam	David Ave	Oxford St
31	MED	MANUAL	MUN	13	City of Coquitlam	Guildford Way	Pinetree Way
32	SHORT	MANUAL	MUN	14	City of Coquitlam	Lougheed Hwy	North Road
33	MED	MANUAL	MUN	15	City of Coquitlam	Brunette Ave	Lougheed Hwy
34	MED	AUTO_TUBE	MUN	16	City of Coquitlam	Proposed Multiuse Pathway	
35	MED	AUTO_TUBE	MUN	17	City of Coquitlam	Poco Trail	
36	MED	MANUAL	MUN	1	City of Langley	Fraser Hwy	Langley Bypass
37	MED	MANUAL	MUN	2	City of Langley	203 St	53 Ave
38	SHORT	MANUAL	MUN	3	City of Langley	204 St	Longley Bypass
39	SHORT	MANUAL	MUN	4	City of Langley	Fraser Hwy	Langley Bypass
40	MED	MANUAL	MUN	5	City of Langley	203 St	Fraser Hwy

41	EXIST	MANUAL	MUN	1	City of New Westminster	E Columbia St	Brunette Ave
42	EXIST	MANUAL	MUN	2	City of New Westminster	Cumberland St	Sapper St
43	EXIST	MANUAL	MUN	3	City of New Westminster	Cumberland St	E Seventh Ave
44	EXIST	MANUAL	MUN	4	City of New Westminster	E Columbia St	McBride Blvd
45	EXIST	MANUAL	MUN	5	City of New Westminster	Sixth St	Seventh Ave
46	EXIST	MANUAL	MUN	6	City of New Westminster	Seventh Ave	Twentieth St
47	EXIST	MANUAL	MUN	7	City of New Westminster	Seventh Ave	Twenty Third St
48	EXIST	MANUAL	MUN	8	City of New Westminster	Third Ave	Stewardson Way
49	EXIST	MANUAL	MUN	9	City of New Westminster	Boundary Rd	Dyke Rd
50	SHORT	MANUAL	MUN	10	City of New Westminster	Westminster Hwy	Boundary Rd
51	EXIST	MANUAL	MUN	11	City of New Westminster	Howes St	Boyd St
52	MED	MANUAL	MUN	12	City of New Westminster	Derwent Way	Duncan St
53	MED	AUTO_TUBE	MUN	13	City of New Westminster	New Westminster Quay	
54	SHORT	MANUAL	MUN	1	City of North Vancouver	Lonsdale Ave	Keith Rd
55	SHORT	MANUAL	MUN	2	City of North Vancouver	W 17th St	Lonsdale Ave
56	SHORT	MANUAL	MUN	3	City of North Vancouver	Lonsdale Ave	W Esplanade
57	SHORT	MANUAL	MUN	4	City of North Vancouver	Lonsdale Quay	
58	MED	MANUAL	MUN	1	City of Port Coquitlam	Wellington St	Prairie Ave
59	SHORT	MANUAL	MUN	2	City of Port Coquitlam	Shaughnessy St	Wilson Ave
60	MED	AUTO_LOOP	MUN	3	City of Port Coquitlam	Kingsway Ave	Broadway Ave
61	MED	MANUAL	MUN	4	City of Port Coquitlam	Shaughnessy St	Lougheed Hwy
62	SHORT	MANUAL	MUN	1	City of Port Moody	Murray St	Klahanie Dr
63	MED	MANUAL	MUN	2	City of Port Moody	Murray St	Ioco Rd
64	MED	AUTO_LOOP	MUN	3	City of Port Mdy	Vintner St	East of Douglas St
65	SHORT	MANUAL	MUN	1	City of Richmond	Williams Rd	Garden City Rd
66	SHORT	MANUAL	MUN	2	City of Richmond	Railway Ave	Williams Ave
67	SHORT	MANUAL	MUN	3	City of Richmond	Railway Ave	Granville Ave
68	SHORT	MANUAL	MUN	4	City of Richmond	Garden City Rd	Westminster Hwy
69	SHORT	MANUAL	MUN	5	City of Richmond	Westminster Hwy	Shell Rd
70	SHORT	MANUAL	MUN	6	City of Richmond	No. 3 Rd	Westminster Hwy
71	SHORT	MANUAL	MUN	7	City of Richmond	Russ Baker Way	Gilbert Rd
72	SHORT	MANUAL	MUN	8	City of Richmond	No. 3 Rd	Sea Island Way

73	SHORT	MANUAL	MUN	9	City of Richmond	Garden City Rd	Sea Island Way
74	MED	MANUAL	MUN	10	City of Richmond	Williams Rd	Shell Rd
75	SHORT	AUTO_LOOP	MUN	11	City of Richmond	No. 3 Rd	Between Mall Access and Cambie Rd
76	SHORT	AUTO_LOOP	MUN	1	City of Surrey	190 St	98 Ave
77	SHORT	MANUAL	MUN	2	City of Surrey	176 St	60 Ave
78	SHORT	AUTO_TUBE	MUN	3	City of Surrey	175 St	South of 56 Ave
79	MED	MANUAL	MUN	4	City of Surrey	Fraser Hwy	176 St
80	MED	MANUAL	MUN	5	City of Surrey	Fraser Hwy	168 St
81	MED	MANUAL	MUN	6	City of Surrey	168 St	56 Ave
82	SHORT	MANUAL	MUN	7	City of Surrey	56 Ave	King George Hwy
83	SHORT	MANUAL	MUN	8	City of Surrey	King George Hwy	68 Ave
84	MED	MANUAL	MUN	9	City of Surrey	King George Hwy	148 St
85	SHORT	MANUAL	MUN	10	City of Surrey	24 Ave	King George Hwy
86	MED	MANUAL	MUN	11	City of Surrey	20 Ave	156 St
87	MED	MANUAL	MUN	12	City of Surrey	20 Ave	152 St
88	SHORT	MANUAL	MUN	13	City of Surrey	102 Ave	134A St
89	SHORT	MANUAL	MUN	14	City of Surrey	102 Ave	East Whalley Ring Rd
90	SHORT	MANUAL	MUN	15	City of Surrey	King George Hwy	Fraser Hwy
91	SHORT	MANUAL	MUN	16	City of Surrey	100 Ave	104 St
92	SHORT	MANUAL	MUN	17	City of Surrey	100 Ave	156 St
93	SHORT	MANUAL	MUN	18	City of Surrey	King George Hwy	84 Ave
94	SHORT	AUTO_LOOP	MUN	19	City of Surrey	Green Timbers Urban Forest	
95	MED	MANUAL	MUN	20	City of Surrey	32 Ave	168 St
96	SHORT	MANUAL	MUN	21	City of Surrey	124 St	68 Ave
97	SHORT	MANUAL	MUN	22	City of Surrey	100 Ave	152 St
98	MED	MANUAL	MUN	23	City of Surrey	King George Hwy	132 St Diversion
99	EXIST	MANUAL	MUN	1	City of Vancouver	W 4th Ave	Between West Point Pl and NW Marine Dr
100	EXIST	AUTO_TUBE	MUN	2	City of Vancouver	W 8th Ave	Between Trimble St and Discovery St
101	EXIST	AUTO_TUBE	MUN	3	City of Vancouver	W 3rd Ave	Between Bayswater St and MacDonald St
102	EXIST	MANUAL	MUN	4	City of Vancouver	W 8th Ave	Stephens St
103	EXIST	AUTO_TUBE	MUN	5	City of Vancouver	W 7th Ave	Between Maple St and Cypress St
104	EXIST	MANUAL	MUN	6	City of Vancouver	Cornwall Ave	Cypress St
105	EXIST	MANUAL	MUN	7	City of Vancouver	Cornwall Ave	Yew St
106	EXIST	MANUAL	MUN	8	City of Vancouver	Island Park Walk	Old Bridge Walk
107	EXIST	MANUAL	MUN	9	City of Vancouver	Beach Ave	Chilco St
108	EXIST	MANUAL	MUN	10	City of Vancouver	W Georgia St	Cardero St
109	EXIST	AUTO_LOOP	MUN	11	City of Vancouver	Cambie St Bridge	North
110	EXIST	MANUAL	MUN	12	City of Vancouver	Cambie St Bridge	South
111	EXIST	MANUAL	MUN	13	City of Vancouver	Georgia Viaduct	Carrall St
112	EXIST	MANUAL	MUN	14	City of Vancouver	Ontario St	W 1st Ave
113	EXIST	AUTO_TUBE	MUN	15	City of Vancouver	Ontario St	Between W 3rd Ave and W 2nd Ave
114	EXIST	MANUAL	MUN	16	City of Vancouver	Union St	Main St
115	EXIST	MANUAL	MUN	17	City of Vancouver	W 7th Ave	Cambie St
116	EXIST	MANUAL	MUN	18	City of Vancouver	Yukon St	W 7th Ave
117	EXIST	MANUAL	MUN	19	City of Vancouver	W 7th Ave	Between Heather St and

							Ash St
118	EXIST	AUTO_TUBE	MUN	20	City of Vancouver	W 7th Ave	Between Willow St and Heather St
119	EXIST	MANUAL	MUN	21	City of Vancouver	W 10th Ave	Between Heather St and Ash St
120	EXIST	AUTO_TUBE	MUN	22	City of Vancouver	W 10th Ave	Between Willow St and Heather St
121	EXIST	MANUAL	MUN	23	City of Vancouver	Yukon St	W 10th Ave
122	EXIST	AUTO_TUBE	MUN	24	City of Vancouver	Heather St	Between W 15th Ave and W 14th Ave
123	EXIST	MANUAL	MUN	25	City of Vancouver	W 10th Ave	Cypress St
124	EXIST	MANUAL	MUN	26	City of Vancouver	W 10th Ave	Burrard St
125	EXIST	AUTO_TUBE	MUN	27	City of Vancouver	W 10th Ave	Arbutus St
126	EXIST	AUTO_TUBE	MUN	28	City of Vancouver	Cypress St	W 15th Ave
127	EXIST	MANUAL	MUN	29	City of Vancouver	Carnarvon St	W 37th Ave
128	EXIST	MANUAL	MUN	30	City of Vancouver	Dunbar St	W 29th Ave
129	EXIST	MANUAL	MUN	31	City of Vancouver	SW Marine Dr	Between 59th Ave and Arbutus St
130	EXIST	AUTO_TUBE	MUN	32	City of Vancouver	Angus Dr	Between W 58th Ave and W 59th Ave
131	EXIST	MANUAL	MUN	33	City of Vancouver	Cornish St	W 70th Ave
132	EXIST	MANUAL	MUN	34	City of Vancouver	Angus Dr	W 37th Ave
133	EXIST	AUTO_TUBE	MUN	35	City of Vancouver	Angus Dr	Pine Cres
134	EXIST	MANUAL	MUN	36	City of Vancouver	W 37th Ave	Cambie St
135	EXIST	AUTO_TUBE	MUN	37	City of Vancouver	W 37th Ave	Baillie St
136	EXIST	MANUAL	MUN	38	City of Vancouver	W 37th Ave	Heather St
137	EXIST	AUTO_TUBE	MUN	39	City of Vancouver	Heather St	Between McGuigan Ave and W 33rd Ave
138	EXIST	MANUAL	MUN	40	City of Vancouver	W 49th Ave	Cambie St
139	EXIST	AUTO_TUBE	MUN	41	City of Vancouver	Ontario St	E 50th Ave
140	EXIST	MANUAL	MUN	42	City of Vancouver	W Kent Ave N	Ontario St
141	EXIST	MANUAL	MUN	43	City of Vancouver	W Kent Ave N	Cambie St
142	EXIST	MANUAL	MUN	44	City of Vancouver	Ontario St	E 37th Ave
143	EXIST	AUTO_TUBE	MUN	45	City of Vancouver	Ontario St	Between Oriole Walk and E 33rd Ave
144	EXIST	MANUAL	MUN	46	City of Vancouver	Ontario St	E 29th Ave
145	EXIST	MANUAL	MUN	47	City of Vancouver	W 29th Ave	Yukon St
146	EXIST	MANUAL	MUN	48	City of Vancouver	W 29th Ave	Cambie St
147	EXIST	AUTO_TUBE	MUN	49	City of Vancouver	Ontario St	W 21st Ave
148	EXIST	AUTO_LOOP	MUN	50	City of Vancouver	Ontario St	Between W 11th Ave and W 10th Ave
149	EXIST	MANUAL	MUN	51	City of Vancouver	W 10th Ave	Between Manitoba St and Ontario St
150	EXIST	AUTO_TUBE	MUN	52	City of Vancouver	W 10th Ave	Between Ontario St and Quebec St
151	EXIST	AUTO_TUBE	MUN	53	City of Vancouver	Ross St	E 37th Ave
152	EXIST	MANUAL	MUN	54	City of Vancouver	E 37th Ave	Inverness St
153	EXIST	AUTO_TUBE	MUN	55	City of Vancouver	Windsor St	Between E 35th Ave and E 33rd Ave
154	EXIST	AUTO_TUBE	MUN	56	City of Vancouver	E 15th Ave	Windsor St
155	EXIST	AUTO_TUBE	MUN	57	City of Vancouver	Inverness St	Between E 51st Ave and E 49th Ave
156	EXIST	MANUAL	MUN	58	City of Vancouver	Inverness St	E 60th Ave
157	EXIST	MANUAL	MUN	59	City of Vancouver	E Kent Ave N	Elliot St
158	EXIST	MANUAL	MUN	60	City of Vancouver	E Kent Ave N	Kerr St
159	EXIST	MANUAL	MUN	61	City of Vancouver	E 45th Ave	Rupert St

160	EXIST	AUTO_TUBE	MUN	62	City of Vancouver	E 45th Ave	McKinnon St
161	EXIST	AUTO_TUBE	MUN	63	City of Vancouver	E 45th Ave	Between Elliot St and Wales St
162	EXIST	MANUAL	MUN	64	City of Vancouver	Earles St	E 38th Ave
163	EXIST	AUTO_TUBE	MUN	65	City of Vancouver	Earles St	Between E 40th Ave and E 38th Ave
164	EXIST	MANUAL	MUN	66	City of Vancouver	Slocan St	E 29th Ave
165	EXIST	MANUAL	MUN	67	City of Vancouver	Slocan St	E 22nd Ave
166	EXIST	MANUAL	MUN	68	City of Vancouver	Vaness Ave	Gladston St
167	EXIST	MANUAL	MUN	69	City of Vancouver	Adanac St	Slocan St
168	EXIST	AUTO_TUBE	MUN	70	City of Vancouver	Adanac St	Between Kaslo St and Renfrew St
169	EXIST	MANUAL	MUN	71	City of Vancouver	Adanac St	Renfrew St
170	EXIST	MANUAL	MUN	72	City of Vancouver	Wall St	N Kaslo St
171	EXIST	MANUAL	MUN	73	City of Vancouver	Adanac St	Between Rupert St and Cassiar St
172	EXIST	AUTO_TUBE	MUN	74	City of Vancouver	Adanac St	Between Kootenay St and Boundary Rd
173	EXIST	MANUAL	MUN	75	City of Vancouver	McLean Dr	Adanac St
174	EXIST	AUTO_TUBE	MUN	76	City of Vancouver	Adanac St	Between Vernon Dr and Clark Dr
175	EXIST	AUTO_TUBE	MUN	77	City of Vancouver	E 6th Ave	St. Catherines St
176	EXIST	MANUAL	MUN	78	City of Vancouver	E 10th Ave	Woodland Dr
177	EXIST	AUTO_TUBE	MUN	79	City of Vancouver	E 10th Ave	Between Woodland Dr and Commercial Dr
178	EXIST	MANUAL	MUN	80	City of Vancouver	Victoria Dr	E 10th Ave
179	EXIST	AUTO_LOOP	MUN	81	City of Vancouver	Grandview Hwy N	Semlin Dr
180	EXIST	MANUAL	MUN	82	City of Vancouver	Victoria Dr	E Broadway
181	EXIST	MANUAL	MUN	83	City of Vancouver	Vivian Dr	E 57th Ave
182	EXIST	AUTO_TUBE	MUN	84	City of Vancouver	Vivian Dr	Lynbrook Dr
183	EXIST	AUTO_TUBE	MUN	85	City of Vancouver	Union St	Gore Ave
184	EXIST	MANUAL	MUN	86	City of Vancouver	Union St	Dunlevy Ave
185	SHORT	MANUAL	MUN	87	City of Vancouver	Burrard St	W Pender St
186	SHORT	MANUAL	MUN	88	City of Vancouver	Burrard St	Dunsmuir St
187	SHORT	MANUAL	MUN	89	City of Vancouver	Richards St	W Pender St
188	SHORT	MANUAL	MUN	90	City of Vancouver	Richards St	Dunsmuir St
189	SHORT	MANUAL	MUN	91	City of Vancouver	Cambie St	Dunsmuir St
190	SHORT	MANUAL	MUN	92	City of Vancouver	Cambie St	W Pender St
191	MED	MANUAL	MUN	93	City of Vancouver	Angus Dr	W 45th Ave
192	MED	MANUAL	MUN	94	City of Vancouver	W 45th Ave	Cambie St
193	MED	MANUAL	MUN	95	City of Vancouver	Ontario St	E 45th Ave
194	MED	MANUAL	MUN	96	City of Vancouver	E 45th Ave	Prince Edward St
195	MED	MANUAL	MUN	97	City of Vancouver	W 59th Ave	Cambie St
196	MED	MANUAL	MUN	98	City of Vancouver	W 59th Ave	Ontario St
197	MED	MANUAL	MUN	99	City of Vancouver	E 59th Ave	Prince Edward St
198	MED	MANUAL	MUN	100	City of Vancouver	Prince Edward St	E 31st Ave
199	MED	MANUAL	MUN	101	City of Vancouver	E 59th Ave	Dumfries St
200	MED	MANUAL	MUN	102	City of Vancouver	E 45th Ave	Dumfries St
201	MED	MANUAL	MUN	103	City of Vancouver	Dumfries St	E 28th Ave
202	MED	MANUAL	MUN	104	City of Vancouver	Dumfries St	E 22nd Ave
203	MED	MANUAL	MUN	105	City of Vancouver	Kerr St	Rosemont Dr
204	MED	MANUAL	MUN	106	City of Vancouver	Rupert St	E 22nd Ave

205	SHORT	MANUAL	MUN	107	City of Vancouver	Boundary Rd	Between E Kent Ave N and Marine Way
206	EXIST	AUTO_LOOP	MUN	108	City of Vancouver	Burrard St Bridge	
207	EXIST	AUTO_LOOP	MUN	109	City of Vancouver	Granville St Bridge	
208	SHORT	MANUAL	MUN	110	City of Vancouver	SW Marine Dr	W 41st Ave
209	SHORT	MANUAL	MUN	1	City of White Rock	16 Ave	152 St
210	MED	MANUAL	MUN	2	City of White Rock	Johnston Rd	Thrift Ave
211	MED	MANUAL	MUN	3	City of White Rock	Marine Dr	Fir St
212	SHORT	MANUAL	MUN	4	City of White Rock	North Bluff Rd	Nichol Rd
213	SHORT	AUTO_TUBE	MUN	1	Corporation of Delta	River Rd	West of Nordel Way
214	SHORT	MANUAL	MUN	2	Corporation of Delta	Kitson Pky	McKenzie Dr
215	SHORT	AUTO_TUBE	MUN	3	Corporation of Delta	Ladner Trunk Rd	West of 104 St
216	SHORT	MANUAL	MUN	4	Corporation of Delta	116 St	84 Ave
217	SHORT	MANUAL	MUN	5	Corporation of Delta	60 Ave	64 St
218	SHORT	MANUAL	MUN	6	Corporation of Delta	44 Ave	Maple Lane
219	SHORT	MANUAL	MUN	7	Corporation of Delta	52 St	Hwy 17
220	SHORT	MANUAL	MUN	8	Corporation of Delta	56 St	18 Ave
221	EXIST	MANUAL	MUN	1	District of North Vancouver	W 1st St	Between Pemberton Ave and Lloyd Ave
222	EXIST	MANUAL	MUN	2	District of North Vancouver	Harbour Ave	Main St
223	EXIST	MANUAL	MUN	3	District of North Vancouver	Mt Seymour Pky	Berkley Rd
224	SHORT	MANUAL	MUN	4	District of North Vancouver	Capilano Rd	Fullerton Ave
225	SHORT	MANUAL	MUN	5	District of North Vancouver	Roosevelt Cres	Lloyd Ave
226	SHORT	MANUAL	MUN	6	District of North Vancouver	Lynn Valley Rd	William Ave
227	SHORT	MANUAL	MUN	7	District of North Vancouver	Mt Seymour Pky	Seymour Blvd
228	SHORT	MANUAL	MUN	1	Langley Township	200 St	Between 88 Ave and 91A Ave
229	SHORT	MANUAL	MUN	2	Langley Township	Fraser Hwy	216 St
230	MED	MANUAL	MUN	3	Langley Township	216 St	Glover Rd
231	MED	MANUAL	MUN	4	Langley Township	Mavis Ave	River Rd
232	SHORT	MANUAL	MUN	1	Maple Ridge	216 St	Between 123 Ave and 124 Ave
233	SHORT	MANUAL	MUN	2	Maple Ridge	224 St	Dewdney Trunk Rd
234	MED	MANUAL	MUN	3	Maple Ridge	Lougheed Hwy	216 St
235	SHORT	MANUAL	MUN	1	Pitt Meadows	Harris Rd	Between Old Dewdney Trunk Rd and Dewdney Trunk Rd

236	SHORT	MANUAL	MUN	2	Pitt Meadows	Harris Rd	Hammond Rd
237	SHORT	AUTO_TUBE	MUN	3	Pitt Meadows	Lougheed Hwy	Between Harris Rd and Park Rd
238	EXIST	MANUAL	MUN	1	UEL	University Blvd	Toronto Rd
239	EXIST	MANUAL	MUN	2	UEL	Chancellor Blvd	Western Pky
240	EXIST	MANUAL	MUN	3	UEL	Chancellor Blvd	East Mall
241	SHORT	MANUAL	MUN	4	UEL	Thunderbird Blvd	Wesbrook Mall
242	SHORT	MANUAL	MUN	5	UEL	W 16th Ave	Wesbrook Mall
243	SHORT	MANUAL	MUN	6	UEL	West Mall	Thunderbird Blvd
244	SHORT	MANUAL	MUN	1	West Vancouver	Argyle Ave	Keith Rd
245	SHORT	MANUAL	MUN	2	West Vancouver	Taylor Way	Inglewood Ave
246	-	-	OTH	1	BC Ferries	Trans-Canada Hwy	Horseshoe Bay-Departure Bay Ferry
247	-	-	OTH	2	BC Ferries	Tsawwassen Ferry Terminal	
248	-	-	OTH	1	TransLink	SeaBus	
249	SHORT	AUTO_LOOP	OTH	2	TransLink	Lions Gate Bridge	
250	-	-	OTH	3	TransLink	Lonsdale Quay	
251	SHORT	AUTO_LOOP	OTH	4	TransLink	Second Narrows Bridge	
252	SHORT	AUTO_LOOP	OTH	5	TransLink	Patullo Bridge	
253	SHORT	AUTO_LOOP	OTH	6	TransLink	Queensborough Bridge	
254	MED	AUTO_LOOP	OTH	7	TransLink	Port Mann Bridge	
255	SHORT	AUTO_LOOP	OTH	8	TransLink	Pitt River Bridge	
256	SHORT	AUTO_LOOP	OTH	9	TransLink	Golden Ears Bridge	
257	SHORT	AUTO_LOOP	OTH	10	TransLink	Alex Fraser Bridge	
258	-	-	OTH	11	TransLink	Hwy 99	Rice Mill Rd
259	-	-	OTH	12	TransLink	North of Hwy 17 overpass of Hwy 99	
260	SHORT	AUTO_LOOP	OTH	13	TransLink	Westminster Hwy	Between No. 6 Rd and No. 7 Rd
261	SHORT	AUTO_LOOP	OTH	14	TransLink	Arthur Laing Bridge	
262	SHORT	AUTO_LOOP	OTH	15	TransLink	Oak St Bridge	
263	EXIST	AUTO_LOOP	OTH	16	TransLink	North Arm Bridge	
264	SHORT	AUTO_LOOP	OTH	17	TransLink	Knight St Bridge	

Bicycle Count Locations by Method Type

No.	Time Frame	Type No.	Type	Juris. Type	Jurisdiction	Location	Location Proximity
1	EXIST	1	AUTO_LOOP	MUN	City of Vancouver	Cambie St Bridge	North
2	EXIST	2	AUTO_LOOP	MUN	City of Vancouver	Ontario St	Between W 11th Ave and W 10th Ave
3	EXIST	3	AUTO_LOOP	MUN	City of Vancouver	Grandview Hwy N	Semlin Dr
4	EXIST	4	AUTO_LOOP	MUN	City of Vancouver	Burrard St Bridge	
5	EXIST	5	AUTO_LOOP	MUN	City of Vancouver	Granville St Bridge	
6	SHORT	6	AUTO_LOOP	MUN	City of Burnaby	White Ave N	Between Goard Way and Smith St
7	SHORT	7	AUTO_LOOP	MUN	City of Burnaby	Central Park	Patterson Skytrain Station
8	SHORT	8	AUTO_LOOP	MUN	City of Richmond	No. 3 Rd	Between Mall Access and Cambie Rd
9	SHORT	9	AUTO_LOOP	MUN	City of Surrey	190 St	98 Ave
10	SHORT	10	AUTO_LOOP	MUN	City of Surrey	Green Timbers Urban Forest	
11	SHORT	11	AUTO_LOOP	OTH	TransLink	Lions Gate Bridge	
12	SHORT	12	AUTO_LOOP	OTH	TransLink	Second Narrows Bridge	
13	SHORT	13	AUTO_LOOP	OTH	TransLink	Patullo Bridge	
14	SHORT	14	AUTO_LOOP	OTH	TransLink	Queensborough Bridge	
15	SHORT	15	AUTO_LOOP	OTH	TransLink	Pitt River Bridge	
16	SHORT	16	AUTO_LOOP	OTH	TransLink	Golden Ears Bridge	
17	SHORT	17	AUTO_LOOP	OTH	TransLink	Arthur Laing Bridge	
18	SHORT	18	AUTO_LOOP	OTH	TransLink	Oak St Bridge	
19	EXIST	19	AUTO_LOOP	OTH	TransLink	North Arm Bridge	
20	SHORT	20	AUTO_LOOP	OTH	TransLink	Knight St Bridge	
21	SHORT	21	AUTO_LOOP	OTH	TransLink	Alex Fraser Bridge	
22	SHORT	22	AUTO_LOOP	OTH	TransLink	Westminster Hwy	Between No. 6 Rd and No. 7 Rd
23	MED	21	AUTO_LOOP	MUN	City of Port Coquitlam	Kingsway Ave	Broadway Ave
24	MED	22	AUTO_LOOP	MUN	City of Port Moody	Vintner St	East of Douglas St
25	MED	23	AUTO_LOOP	OTH	TransLink	Port Mann Bridge	
26	EXIST	1	AUTO_TUBE	MUN	City of Vancouver	W 8th Ave	Between Trimble St and Discovery St
27	EXIST	2	AUTO_TUBE	MUN	City of Vancouver	W 3rd Ave	Between Bayswater St and MacDonald St
28	EXIST	3	AUTO_TUBE	MUN	City of Vancouver	W 7th Ave	Between Maple St and Cypress St
29	EXIST	4	AUTO_TUBE	MUN	City of Vancouver	Ontario St	Between W 3rd Ave and W 2nd Ave
30	EXIST	5	AUTO_TUBE	MUN	City of Vancouver	W 7th Ave	Between Willow St and Heather St
31	EXIST	6	AUTO_TUBE	MUN	City of Vancouver	W 10th Ave	Between Willow St and Heather St
32	EXIST	7	AUTO_TUBE	MUN	City of Vancouver	Heather St	Between W 15th Ave and W 14th Ave
33	EXIST	8	AUTO_TUBE	MUN	City of Vancouver	W 10th Ave	Arbutus St
34	EXIST	9	AUTO_TUBE	MUN	City of Vancouver	Cypress St	W 15th Ave

35	EXIST	10	AUTO_TUBE	MUN	City of Vancouver	Angus Dr	Between W 58th Ave and W 59th Ave
36	EXIST	11	AUTO_TUBE	MUN	City of Vancouver	Angus Dr	Pine Cres
37	EXIST	12	AUTO_TUBE	MUN	City of Vancouver	W 37th Ave	Baillie St
38	EXIST	13	AUTO_TUBE	MUN	City of Vancouver	Heather St	Between McGuigan Ave and W 33rd Ave
39	EXIST	14	AUTO_TUBE	MUN	City of Vancouver	Ontario St	E 50th Ave
40	EXIST	15	AUTO_TUBE	MUN	City of Vancouver	Ontario St	Between Oriole Walk and E 33rd Ave
41	EXIST	16	AUTO_TUBE	MUN	City of Vancouver	Ontario St	W 21st Ave
42	EXIST	17	AUTO_TUBE	MUN	City of Vancouver	W 10th Ave	Between Ontario St and Quebec St
43	EXIST	18	AUTO_TUBE	MUN	City of Vancouver	Ross St	E 37th Ave
44	EXIST	19	AUTO_TUBE	MUN	City of Vancouver	Windsor St	Between E 35th Ave and E 33rd Ave
45	EXIST	20	AUTO_TUBE	MUN	City of Vancouver	E 15th Ave	Windsor St
46	EXIST	21	AUTO_TUBE	MUN	City of Vancouver	Inverness St	Between E 51st Ave and E 49th Ave
47	EXIST	22	AUTO_TUBE	MUN	City of Vancouver	E 45th Ave	McKinnon St
48	EXIST	23	AUTO_TUBE	MUN	City of Vancouver	E 45th Ave	Between Elliot St and Wales St
49	EXIST	24	AUTO_TUBE	MUN	City of Vancouver	Earles St	Between E 40th Ave and E 38th Ave
50	EXIST	25	AUTO_TUBE	MUN	City of Vancouver	Adanac St	Between Kaslo St and Renfrew St
51	EXIST	26	AUTO_TUBE	MUN	City of Vancouver	Adanac St	Between Kootenay St and Boundary Rd
52	EXIST	27	AUTO_TUBE	MUN	City of Vancouver	Adanac St	Between Vernon Dr and Clark Dr
53	EXIST	28	AUTO_TUBE	MUN	City of Vancouver	E 6th Ave	St. Catherines St
54	EXIST	29	AUTO_TUBE	MUN	City of Vancouver	E 10th Ave	Between Woodland Dr and Commercial Dr
55	EXIST	30	AUTO_TUBE	MUN	City of Vancouver	Vivian Dr	Lynbrook Dr
56	EXIST	31	AUTO_TUBE	MUN	City of Vancouver	Union St	Gore Ave
57	SHORT	32	AUTO_TUBE	MUN	City of Burnaby	Southridge Dr	Between Byrnepark Dr and Griffiths Dr
58	SHORT	33	AUTO_TUBE	MUN	City of Burnaby	Winston St	Between McConnell Dr and Piper Ave
59	SHORT	34	AUTO_TUBE	MUN	City of Surrey	175 St	South of 56 Ave
60	SHORT	35	AUTO_TUBE	MUN	Corporation of Delta	River Rd	West of Nordel Way
61	SHORT	36	AUTO_TUBE	MUN	Corporation of Delta	Ladner Trunk Rd	West of 104 St
62	SHORT	37	AUTO_TUBE	MUN	Pitt Meadows	Lougheed Hwy	Between Harris Rd and Park Rd
63	MED	38	AUTO_TUBE	MUN	City of New Westminster	New Westminster Quay	
64	MED	39	AUTO_TUBE	MUN	City of Coquitlam	Proposed Multiuse Pathway	
65	MED	40	AUTO_TUBE	MUN	City of Coquitlam	Poco Trail	
66	EXIST	1	MANUAL	MUN	City of Burnaby	Marine Way	Nelson Ave
67	EXIST	2	MANUAL	MUN	City of Burnaby	Lougheed Hwy	Gilmore Ave
68	EXIST	3	MANUAL	MUN	City of Burnaby	Deer Lake Pky	Willingdon Ave
69	EXIST	4	MANUAL	MUN	City of Burnaby	Armstrong Ave	Langley St

70	EXIST	5	MANUAL	MUN	City of Coquitlam	Foster Ave	Blue Mountain St
71	EXIST	6	MANUAL	MUN	City of Coquitlam	Foster Ave	Porter St
72	EXIST	7	MANUAL	MUN	City of Coquitlam	Foster Ave	Schoolhouse St
73	EXIST	8	MANUAL	MUN	City of Coquitlam	Rochester Ave	Blue Mountain St
74	EXIST	9	MANUAL	MUN	City of Coquitlam	Rochester Ave	Schoolhouse St
75	EXIST	10	MANUAL	MUN	City of Coquitlam	Guildford Way	Johnson St
76	EXIST	11	MANUAL	MUN	City of Coquitlam	Guildford Way	Lansdowne Dr
77	EXIST	12	MANUAL	MUN	City of Coquitlam	Guildford Way	Falcon Dr
78	EXIST	13	MANUAL	MUN	City of Coquitlam	David Ave	Pipeline Rd
79	EXIST	14	MANUAL	MUN	City of Coquitlam	David Ave	Pinetree Way
80	EXIST	15	MANUAL	MUN	City of Coquitlam	David Ave	Shaughnessy St
81	EXIST	16	MANUAL	MUN	City of Coquitlam	David Ave	Oxford St
82	EXIST	17	MANUAL	MUN	City of New Westminster	E Columbia St	Brunette Ave
83	EXIST	18	MANUAL	MUN	City of New Westminster	Cumberland St	Sapper St
84	EXIST	19	MANUAL	MUN	City of New Westminster	Cumberland St	E Seventh Ave
85	EXIST	20	MANUAL	MUN	City of New Westminster	E Columbia St	McBride Blvd
86	EXIST	21	MANUAL	MUN	City of New Westminster	Sixth St	Seventh Ave
87	EXIST	22	MANUAL	MUN	City of New Westminster	Seventh Ave	Twentieth St
88	EXIST	23	MANUAL	MUN	City of New Westminster	Seventh Ave	Twenty Third St
89	EXIST	24	MANUAL	MUN	City of New Westminster	Third Ave	Stewardson Way
90	EXIST	25	MANUAL	MUN	City of New Westminster	Boundary Rd	Dyke Rd
91	EXIST	26	MANUAL	MUN	City of New Westminster	Howes St	Boyd St
92	EXIST	27	MANUAL	MUN	City of Vancouver	W 4th Ave	Between West Point Pl and NW Marine Dr
93	EXIST	28	MANUAL	MUN	City of Vancouver	W 8th Ave	Stephens St
94	EXIST	29	MANUAL	MUN	City of Vancouver	Cornwall Ave	Cypress St
95	EXIST	30	MANUAL	MUN	City of Vancouver	Cornwall Ave	Yew St
96	EXIST	31	MANUAL	MUN	City of Vancouver	Island Park Walk	Old Bridge Walk
97	EXIST	32	MANUAL	MUN	City of Vancouver	Beach Ave	Chilco St
98	EXIST	33	MANUAL	MUN	City of Vancouver	W Georgia St	Cardero St
99	EXIST	34	MANUAL	MUN	City of Vancouver	Cambie St Bridge	South
100	EXIST	35	MANUAL	MUN	City of Vancouver	Georgia Viaduct	Carrall St
101	EXIST	36	MANUAL	MUN	City of Vancouver	Ontario St	W 1st Ave
102	EXIST	37	MANUAL	MUN	City of Vancouver	Union St	Main St
103	EXIST	38	MANUAL	MUN	City of Vancouver	W 7th Ave	Cambie St
104	EXIST	39	MANUAL	MUN	City of Vancouver	Yukon St	W 7th Ave
105	EXIST	40	MANUAL	MUN	City of Vancouver	W 7th Ave	Between Heather St and Ash St
106	EXIST	41	MANUAL	MUN	City of Vancouver	W 10th Ave	Between Heather St and Ash St
107	EXIST	42	MANUAL	MUN	City of Vancouver	Yukon St	W 10th Ave
108	EXIST	43	MANUAL	MUN	City of Vancouver	W 10th Ave	Cypress St

109	EXIST	44	MANUAL	MUN	City of Vancouver	W 10th Ave	Burrard St
110	EXIST	45	MANUAL	MUN	City of Vancouver	Carnarvon St	W 37th Ave
111	EXIST	46	MANUAL	MUN	City of Vancouver	Dunbar St	W 29th Ave
112	EXIST	47	MANUAL	MUN	City of Vancouver	SW Marine Dr	Between 59th Ave and Arbutus St
113	EXIST	48	MANUAL	MUN	City of Vancouver	Cornish St	W 70th Ave
114	EXIST	49	MANUAL	MUN	City of Vancouver	Angus Dr	W 37th Ave
115	EXIST	50	MANUAL	MUN	City of Vancouver	W 37th Ave	Cambie St
116	EXIST	51	MANUAL	MUN	City of Vancouver	W 37th Ave	Heather St
117	EXIST	52	MANUAL	MUN	City of Vancouver	W 49th Ave	Cambie St
118	EXIST	53	MANUAL	MUN	City of Vancouver	W Kent Ave N	Ontario St
119	EXIST	54	MANUAL	MUN	City of Vancouver	W Kent Ave N	Cambie St
120	EXIST	55	MANUAL	MUN	City of Vancouver	Ontario St	E 37th Ave
121	EXIST	56	MANUAL	MUN	City of Vancouver	Ontario St	E 29th Ave
122	EXIST	57	MANUAL	MUN	City of Vancouver	W 29th Ave	Yukon St
123	EXIST	58	MANUAL	MUN	City of Vancouver	W 29th Ave	Cambie St
124	EXIST	59	MANUAL	MUN	City of Vancouver	W 10th Ave	Between Manitoba St and Ontario St
125	EXIST	60	MANUAL	MUN	City of Vancouver	E 37th Ave	Inverness St
126	EXIST	61	MANUAL	MUN	City of Vancouver	Inverness St	E 60th Ave
127	EXIST	62	MANUAL	MUN	City of Vancouver	E Kent Ave N	Elliot St
128	EXIST	63	MANUAL	MUN	City of Vancouver	E Kent Ave N	Kerr St
129	EXIST	64	MANUAL	MUN	City of Vancouver	E 45th Ave	Rupert St
130	EXIST	65	MANUAL	MUN	City of Vancouver	Earles St	E 38th Ave
131	EXIST	66	MANUAL	MUN	City of Vancouver	Slocan St	E 29th Ave
132	EXIST	67	MANUAL	MUN	City of Vancouver	Slocan St	E 22nd Ave
133	EXIST	68	MANUAL	MUN	City of Vancouver	Vaness Ave	Gladston St
134	EXIST	69	MANUAL	MUN	City of Vancouver	Adanac St	Slocan St
135	EXIST	70	MANUAL	MUN	City of Vancouver	Adanac St	Renfrew St
136	EXIST	71	MANUAL	MUN	City of Vancouver	Wall St	N Kaslo St
137	EXIST	72	MANUAL	MUN	City of Vancouver	Adanac St	Between Rupert St and Cassiar St
138	EXIST	73	MANUAL	MUN	City of Vancouver	McLean Dr	Adanac St
139	EXIST	74	MANUAL	MUN	City of Vancouver	E 10th Ave	Woodland Dr
140	EXIST	75	MANUAL	MUN	City of Vancouver	Victoria Dr	E 10th Ave
141	EXIST	76	MANUAL	MUN	City of Vancouver	Victoria Dr	E Broadway
142	EXIST	77	MANUAL	MUN	City of Vancouver	Vivian Dr	E 57th Ave
143	EXIST	78	MANUAL	MUN	City of Vancouver	Union St	Dunlevy Ave
144	EXIST	79	MANUAL	MUN	District of North Vancouver	W 1st St	Between Pemberton Ave and Lloyd Ave
145	EXIST	80	MANUAL	MUN	District of North Vancouver	Harbour Ave	Main St
146	EXIST	81	MANUAL	MUN	District of North Vancouver	Mt Seymour Pky	Berkley Rd
147	EXIST	82	MANUAL	MUN	UEL	University Blvd	Toronto Rd
148	EXIST	83	MANUAL	MUN	UEL	Chancellor Blvd	Western Pky
149	EXIST	84	MANUAL	MUN	UEL	Chancellor Blvd	East Mall
150	SHORT	85	MANUAL	MUN	City of Burnaby	Lougheed Hwy	Sperling Ave
151	SHORT	86	MANUAL	MUN	City of Burnaby	Carleton Ave	Between Frances St and Pender St

152	SHORT	87	MANUAL	MUN	City of Burnaby	Gaglardi Way	Burnaby Mountain Pky
153	SHORT	88	MANUAL	MUN	City of Burnaby	Gaglardi Way	Broadway
154	SHORT	89	MANUAL	MUN	City of Burnaby	Barnet Hwy	Between Cariboo Point Way and Reed Point Way
155	SHORT	90	MANUAL	MUN	City of Burnaby	12th Ave	Mary Ave
156	SHORT	91	MANUAL	MUN	City of Burnaby	Dunblane Ave	Beresford St
157	SHORT	92	MANUAL	MUN	City of Coquitlam	Lougheed Hwy	North Road
158	SHORT	93	MANUAL	MUN	City of Langley	204 St	Langley Bypass
159	SHORT	94	MANUAL	MUN	City of Langley	Fraser Hwy	Langley Bypass
160	SHORT	95	MANUAL	MUN	City of New Westminster	Westminster Hwy	Boundary Rd
161	SHORT	96	MANUAL	MUN	City of North Vancouver	Lonsdale Ave	Keith Rd
162	SHORT	97	MANUAL	MUN	City of North Vancouver	W 17th St	Lonsdale Ave
163	SHORT	98	MANUAL	MUN	City of North Vancouver	Lonsdale Ave	W Esplanade
164	SHORT	99	MANUAL	MUN	City of North Vancouver	Lonsdale Quay	
165	SHORT	100	MANUAL	MUN	City of Port Coquitlam	Shaughnessy St	Wilson Ave
166	SHORT	101	MANUAL	MUN	City of Port Moody	Murray St	Klahanie Dr
167	SHORT	102	MANUAL	MUN	City of Richmond	Williams Rd	Garden City Rd
168	SHORT	103	MANUAL	MUN	City of Richmond	Railway Ave	Williams Ave
169	SHORT	104	MANUAL	MUN	City of Richmond	Railway Ave	Granville Ave
170	SHORT	105	MANUAL	MUN	City of Richmond	Garden City Rd	Westminster Hwy
171	SHORT	106	MANUAL	MUN	City of Richmond	Westminster Hwy	Shell Rd
172	SHORT	107	MANUAL	MUN	City of Richmond	No. 3 Rd	Westminster Hwy
173	SHORT	108	MANUAL	MUN	City of Richmond	Russ Baker Way	Gilbert Rd
174	SHORT	109	MANUAL	MUN	City of Richmond	No. 3 Rd	Sea Island Way
175	SHORT	110	MANUAL	MUN	City of Richmond	Garden City Rd	Sea Island Way
176	SHORT	111	MANUAL	MUN	City of Surrey	176 St	60 Ave
177	SHORT	112	MANUAL	MUN	City of Surrey	56 Ave	King George Hwy
178	SHORT	113	MANUAL	MUN	City of Surrey	King George Hwy	68 Ave
179	SHORT	114	MANUAL	MUN	City of Surrey	24 Ave	King George Hwy
180	SHORT	115	MANUAL	MUN	City of Surrey	102 Ave	134A St
181	SHORT	116	MANUAL	MUN	City of Surrey	102 Ave	East Whalley Ring Rd
182	SHORT	117	MANUAL	MUN	City of Surrey	King George Hwy	Fraser Hwy
183	SHORT	118	MANUAL	MUN	City of Surrey	100 Ave	104 St
184	SHORT	119	MANUAL	MUN	City of Surrey	100 Ave	156 St
185	SHORT	120	MANUAL	MUN	City of Surrey	King George Hwy	84 Ave
186	SHORT	121	MANUAL	MUN	City of Surrey	124 St	68 Ave
187	SHORT	122	MANUAL	MUN	City of Surrey	100 Ave	152 St
188	SHORT	123	MANUAL	MUN	City of Vancouver	Burrard St	W Pender St
189	SHORT	124	MANUAL	MUN	City of Vancouver	Burrard St	Dunsmuir St
190	SHORT	125	MANUAL	MUN	City of Vancouver	Richards St	W Pender St
191	SHORT	126	MANUAL	MUN	City of Vancouver	Richards St	Dunsmuir St
192	SHORT	127	MANUAL	MUN	City of Vancouver	Cambie St	Dunsmuir St
193	SHORT	128	MANUAL	MUN	City of Vancouver	Cambie St	W Pender St

194	SHORT	129	MANUAL	MUN	City of Vancouver	Boundary Rd	Between E Kent Ave N and Marine Way
195	SHORT	130	MANUAL	MUN	City of Vancouver	SW Marine Dr	W 41st Ave
196	SHORT	131	MANUAL	MUN	City of White Rock	16 Ave	152 St
197	SHORT	132	MANUAL	MUN	City of White Rock	North Bluff Rd	Nichol Rd
198	SHORT	133	MANUAL	MUN	Corporation of Delta	Kitson Pky	McKenzie Dr
199	SHORT	134	MANUAL	MUN	Corporation of Delta	116 St	84 Ave
200	SHORT	135	MANUAL	MUN	Corporation of Delta	60 Ave	64 St
201	SHORT	136	MANUAL	MUN	Corporation of Delta	44 Ave	Maple Lane
202	SHORT	137	MANUAL	MUN	Corporation of Delta	52 St	Hwy 17
203	SHORT	138	MANUAL	MUN	Corporation of Delta	56 St	18 Ave
204	SHORT	139	MANUAL	MUN	District of North Vancouver	Capilano Rd	Fullerton Ave
205	SHORT	140	MANUAL	MUN	District of North Vancouver	Roosevelt Cres	Lloyd Ave
206	SHORT	141	MANUAL	MUN	District of North Vancouver	Lynn Valley Rd	William Ave
207	SHORT	142	MANUAL	MUN	District of North Vancouver	Mt Seymour Pky	Seymour Blvd
208	SHORT	143	MANUAL	MUN	Langley Township	200 St	Between 88 Ave and 91A Ave
209	SHORT	144	MANUAL	MUN	Langley Township	Fraser Hwy	216 St
210	SHORT	145	MANUAL	MUN	Maple Ridge	216 St	Between 123 Ave and 124 Ave
211	SHORT	146	MANUAL	MUN	Maple Ridge	224 St	Dewdney Trunk Rd
212	SHORT	147	MANUAL	MUN	Pitt Meadows	Harris Rd	Between Old Dewdney Trunk Rd and Dewdney Trunk Rd
213	SHORT	148	MANUAL	MUN	Pitt Meadows	Harris Rd	Hammond Rd
214	SHORT	149	MANUAL	MUN	UEL	Thunderbird Blvd	Wesbrook Mall
215	SHORT	150	MANUAL	MUN	UEL	W 16th Ave	Wesbrook Mall
216	SHORT	151	MANUAL	MUN	UEL	West Mall	Thunderbird Blvd
217	SHORT	152	MANUAL	MUN	West Vancouver	Argyle Ave	Keith Rd
218	SHORT	153	MANUAL	MUN	West Vancouver	Taylor Way	Inglewood Ave
219	MED	154	MANUAL	MUN	City of Burnaby	Lougheed Hwy	Kingsland Dr
220	MED	155	MANUAL	MUN	City of Burnaby	Frances St	Fell Ave
221	MED	156	MANUAL	MUN	City of Burnaby	Sussex Ave	Hazel St
222	MED	157	MANUAL	MUN	City of Coquitlam	Guildford Way	Pinetree Way
223	MED	158	MANUAL	MUN	City of Coquitlam	Brunette Ave	Lougheed Hwy
224	MED	159	MANUAL	MUN	City of Langley	Fraser Hwy	Langley Bypass
225	MED	160	MANUAL	MUN	City of Langley	203 St	53 Ave
226	MED	161	MANUAL	MUN	City of Langley	203 St	Fraser Hwy
227	MED	162	MANUAL	MUN	City of Port Coquitlam	Wellington St	Prairie Ave
228	MED	163	MANUAL	MUN	City of Port Coquitlam	Shaughnessy St	Lougheed Hwy

229	MED	164	MANUAL	MUN	City of Port Moody	Murray St	Ioco Rd
230	MED	165	MANUAL	MUN	City of Richmond	Williams Rd	Shell Rd
231	MED	166	MANUAL	MUN	City of Surrey	Fraser Hwy	176 St
232	MED	167	MANUAL	MUN	City of Surrey	Fraser Hwy	168 St
233	MED	168	MANUAL	MUN	City of Surrey	168 St	56 Ave
234	MED	169	MANUAL	MUN	City of Surrey	King George Hwy	148 St
235	MED	170	MANUAL	MUN	City of Surrey	20 Ave	156 St
236	MED	171	MANUAL	MUN	City of Surrey	20 Ave	152 St
237	MED	172	MANUAL	MUN	City of Surrey	32 Ave	168 St
238	MED	173	MANUAL	MUN	City of Surrey	King George Hwy	132 St Diversion
239	MED	174	MANUAL	MUN	City of Vancouver	Angus Dr	W 45th Ave
240	MED	175	MANUAL	MUN	City of Vancouver	W 45th Ave	Cambie St
241	MED	176	MANUAL	MUN	City of Vancouver	Ontario St	E 45th Ave
242	MED	177	MANUAL	MUN	City of Vancouver	E 45th Ave	Prince Edward St
243	MED	178	MANUAL	MUN	City of Vancouver	W 59th Ave	Cambie St
244	MED	179	MANUAL	MUN	City of Vancouver	W 59th Ave	Ontario St
245	MED	180	MANUAL	MUN	City of Vancouver	E 59th Ave	Prince Edward St
246	MED	181	MANUAL	MUN	City of Vancouver	Prince Edward St	E 31st Ave
247	MED	182	MANUAL	MUN	City of Vancouver	E 59th Ave	Dumfries St
248	MED	183	MANUAL	MUN	City of Vancouver	E 45th Ave	Dumfries St
249	MED	184	MANUAL	MUN	City of Vancouver	Dumfries St	E 28th Ave
250	MED	185	MANUAL	MUN	City of Vancouver	Dumfries St	E 22nd Ave
251	MED	186	MANUAL	MUN	City of Vancouver	Kerr St	Rosemont Dr
252	MED	187	MANUAL	MUN	City of Vancouver	Rupert St	E 22nd Ave
253	MED	188	MANUAL	MUN	City of White Rock	Johnston Rd	Thrift Ave
254	MED	189	MANUAL	MUN	City of White Rock	Marine Dr	Fir St
255	MED	190	MANUAL	MUN	Langley Township	216 St	Glover Rd
256	MED	191	MANUAL	MUN	Maple Ridge	Lougheed Hwy	216 St
257	MED	192	MANUAL	MUN	City of New Westminster	Derwent Way	Duncan St
258	MED	193	MANUAL	MUN	Langley Township	Mavis Ave	River Rd
259	-	1	-	OTH	BC Ferries	Trans-Canada Hwy	Horseshoe Bay-Departure Bay Ferry
260	-	2	-	OTH	BC Ferries	Tsawwassen Ferry Terminal	
261	-	3	-	OTH	TransLink	SeaBus	
262	-	4	-	OTH	TransLink	Lonsdale Quay	
263	-	5	-	OTH	TransLink	Hwy 99	Rice Mill Rd
264	-	6	-	OTH	TransLink	North of Hwy 17 overpass of Hwy 99	

Bicycle Count Locations by Implementation Period

No.	Time No.	Time Frame	Type	Juris. Type	Jurisdiction	Location	Location Proximity
1	1	EXIST	MANUAL	MUN	City of Burnaby	Marine Way	Nelson Ave
2	2	EXIST	MANUAL	MUN	City of Burnaby	Lougheed Hwy	Gilmore Ave
3	3	EXIST	MANUAL	MUN	City of Burnaby	Deer Lake Pky	Willingdon Ave
4	4	EXIST	MANUAL	MUN	City of Burnaby	Armstrong Ave	Langley St
5	5	EXIST	MANUAL	MUN	City of Coquitlam	Foster Ave	Blue Mountain St
6	6	EXIST	MANUAL	MUN	City of Coquitlam	Foster Ave	Porter St
7	7	EXIST	MANUAL	MUN	City of Coquitlam	Foster Ave	Schoolhouse St
8	8	EXIST	MANUAL	MUN	City of Coquitlam	Rochester Ave	Blue Mountain St
9	9	EXIST	MANUAL	MUN	City of Coquitlam	Rochester Ave	Schoolhouse St
10	10	EXIST	MANUAL	MUN	City of Coquitlam	Guildford Way	Johnson St
11	11	EXIST	MANUAL	MUN	City of Coquitlam	Guildford Way	Lansdowne Dr
12	12	EXIST	MANUAL	MUN	City of Coquitlam	Guildford Way	Falcon Dr
13	13	EXIST	MANUAL	MUN	City of Coquitlam	David Ave	Pipeline Rd
14	14	EXIST	MANUAL	MUN	City of Coquitlam	David Ave	Pinetree Way
15	15	EXIST	MANUAL	MUN	City of Coquitlam	David Ave	Shaughnessy St
16	16	EXIST	MANUAL	MUN	City of Coquitlam	David Ave	Oxford St
17	17	EXIST	MANUAL	MUN	City of New Westminster	E Columbia St	Brunette Ave
18	18	EXIST	MANUAL	MUN	City of New Westminster	Cumberland St	Sapper St
19	19	EXIST	MANUAL	MUN	City of New Westminster	Cumberland St	E Seventh Ave
20	20	EXIST	MANUAL	MUN	City of New Westminster	E Columbia St	McBride Blvd
21	21	EXIST	MANUAL	MUN	City of New Westminster	Sixth St	Seventh Ave
22	22	EXIST	MANUAL	MUN	City of New Westminster	Seventh Ave	Twentieth St
23	23	EXIST	MANUAL	MUN	City of New Westminster	Seventh Ave	Twenty Third St
24	24	EXIST	MANUAL	MUN	City of New Westminster	Third Ave	Stewardson Way
25	25	EXIST	MANUAL	MUN	City of New Westminster	Boundary Rd	Dyke Rd
26	26	EXIST	MANUAL	MUN	City of New Westminster	Howes St	Boyd St
27	27	EXIST	AUTO_LOOP	MUN	City of Vancouver	Cambie St Bridge	North
28	28	EXIST	AUTO_LOOP	MUN	City of Vancouver	Ontario St	Between W 11th Ave and W 10th Ave
29	29	EXIST	AUTO_LOOP	MUN	City of Vancouver	Grandview Hwy N	Semlin Dr
30	30	EXIST	AUTO_LOOP	MUN	City of Vancouver	Burrard St Bridge	
31	31	EXIST	AUTO_LOOP	MUN	City of Vancouver	Granville St Bridge	
32	32	EXIST	AUTO_TUBE	MUN	City of Vancouver	W 8th Ave	Between Trimble St and Discovery St
33	33	EXIST	AUTO_TUBE	MUN	City of Vancouver	W 3rd Ave	Between Bayswater St and MacDonald St
34	34	EXIST	AUTO_TUBE	MUN	City of Vancouver	W 7th Ave	Between Maple St and Cypress St

35	35	EXIST	AUTO_TUBE	MUN	City of Vancouver	Ontario St	Between W 3rd Ave and W 2nd Ave
36	36	EXIST	AUTO_TUBE	MUN	City of Vancouver	W 7th Ave	Between Willow St and Heather St
37	37	EXIST	AUTO_TUBE	MUN	City of Vancouver	W 10th Ave	Between Willow St and Heather St
38	38	EXIST	AUTO_TUBE	MUN	City of Vancouver	Heather St	Between W 15th Ave and W 14th Ave
39	39	EXIST	AUTO_TUBE	MUN	City of Vancouver	W 10th Ave	Arbutus St
40	40	EXIST	AUTO_TUBE	MUN	City of Vancouver	Cypress St	W 15th Ave
41	41	EXIST	AUTO_TUBE	MUN	City of Vancouver	Angus Dr	Between W 58th Ave and W 59th Ave
42	42	EXIST	AUTO_TUBE	MUN	City of Vancouver	Angus Dr	Pine Cres
43	43	EXIST	AUTO_TUBE	MUN	City of Vancouver	W 37th Ave	Baillie St
44	44	EXIST	AUTO_TUBE	MUN	City of Vancouver	Heather St	Between McGuigan Ave and W 33rd Ave
45	45	EXIST	AUTO_TUBE	MUN	City of Vancouver	Ontario St	E 50th Ave
46	46	EXIST	AUTO_TUBE	MUN	City of Vancouver	Ontario St	Between Oriole Walk and E 33rd Ave
47	47	EXIST	AUTO_TUBE	MUN	City of Vancouver	Ontario St	W 21st Ave
48	48	EXIST	AUTO_TUBE	MUN	City of Vancouver	W 10th Ave	Between Ontario St and Quebec St
49	49	EXIST	AUTO_TUBE	MUN	City of Vancouver	Ross St	E 37th Ave
50	50	EXIST	AUTO_TUBE	MUN	City of Vancouver	Windsor St	Between E 35th Ave and E 33rd Ave
51	51	EXIST	AUTO_TUBE	MUN	City of Vancouver	E 15th Ave	Windsor St
52	52	EXIST	AUTO_TUBE	MUN	City of Vancouver	Inverness St	Between E 51st Ave and E 49th Ave
53	53	EXIST	AUTO_TUBE	MUN	City of Vancouver	E 45th Ave	McKinnon St
54	54	EXIST	AUTO_TUBE	MUN	City of Vancouver	E 45th Ave	Between Elliot St and Wales St
55	55	EXIST	AUTO_TUBE	MUN	City of Vancouver	Earles St	Between E 40th Ave and E 38th Ave
56	56	EXIST	AUTO_TUBE	MUN	City of Vancouver	Adanac St	Between Kaslo St and Renfrew St
57	57	EXIST	AUTO_TUBE	MUN	City of Vancouver	Adanac St	Between Kootenay St and Boundary Rd
58	58	EXIST	AUTO_TUBE	MUN	City of Vancouver	Adanac St	Between Vernon Dr and Clark Dr
59	59	EXIST	AUTO_TUBE	MUN	City of Vancouver	E 6th Ave	St. Catherines St
60	60	EXIST	AUTO_TUBE	MUN	City of Vancouver	E 10th Ave	Between Woodland Dr and Commercial Dr
61	61	EXIST	AUTO_TUBE	MUN	City of Vancouver	Vivian Dr	Lynbrook Dr
62	62	EXIST	AUTO_TUBE	MUN	City of Vancouver	Union St	Gore Ave
63	63	EXIST	MANUAL	MUN	City of Vancouver	W 4th Ave	Between West Point Pl and NW Marine Dr
64	64	EXIST	MANUAL	MUN	City of Vancouver	W 8th Ave	Stephens St
65	65	EXIST	MANUAL	MUN	City of Vancouver	Cornwall Ave	Cypress St
66	66	EXIST	MANUAL	MUN	City of Vancouver	Cornwall Ave	Yew St
67	67	EXIST	MANUAL	MUN	City of Vancouver	Island Park Walk	Old Bridge Walk
68	68	EXIST	MANUAL	MUN	City of Vancouver	Beach Ave	Chilco St
69	69	EXIST	MANUAL	MUN	City of Vancouver	W Georgia St	Cardero St
70	70	EXIST	MANUAL	MUN	City of Vancouver	Cambie St Bridge	South

71	71	EXIST	MANUAL	MUN	City of Vancouver	Georgia Viaduct	Carrall St
72	72	EXIST	MANUAL	MUN	City of Vancouver	Ontario St	W 1st Ave
73	73	EXIST	MANUAL	MUN	City of Vancouver	Union St	Main St
74	74	EXIST	MANUAL	MUN	City of Vancouver	W 7th Ave	Cambie St
75	75	EXIST	MANUAL	MUN	City of Vancouver	Yukon St	W 7th Ave
76	76	EXIST	MANUAL	MUN	City of Vancouver	W 7th Ave	Between Heather St and Ash St
77	77	EXIST	MANUAL	MUN	City of Vancouver	W 10th Ave	Between Heather St and Ash St
78	78	EXIST	MANUAL	MUN	City of Vancouver	Yukon St	W 10th Ave
79	79	EXIST	MANUAL	MUN	City of Vancouver	W 10th Ave	Cypress St
80	80	EXIST	MANUAL	MUN	City of Vancouver	W 10th Ave	Burrard St
81	81	EXIST	MANUAL	MUN	City of Vancouver	Carnarvon St	W 37th Ave
82	82	EXIST	MANUAL	MUN	City of Vancouver	Dunbar St	W 29th Ave
83	83	EXIST	MANUAL	MUN	City of Vancouver	SW Marine Dr	Between 59th Ave and Arbutus St
84	84	EXIST	MANUAL	MUN	City of Vancouver	Cornish St	W 70th Ave
85	85	EXIST	MANUAL	MUN	City of Vancouver	Angus Dr	W 37th Ave
86	86	EXIST	MANUAL	MUN	City of Vancouver	W 37th Ave	Cambie St
87	87	EXIST	MANUAL	MUN	City of Vancouver	W 37th Ave	Heather St
88	88	EXIST	MANUAL	MUN	City of Vancouver	W 49th Ave	Cambie St
89	89	EXIST	MANUAL	MUN	City of Vancouver	W Kent Ave N	Ontario St
90	90	EXIST	MANUAL	MUN	City of Vancouver	W Kent Ave N	Cambie St
91	91	EXIST	MANUAL	MUN	City of Vancouver	Ontario St	E 37th Ave
92	92	EXIST	MANUAL	MUN	City of Vancouver	Ontario St	E 29th Ave
93	93	EXIST	MANUAL	MUN	City of Vancouver	W 29th Ave	Yukon St
94	94	EXIST	MANUAL	MUN	City of Vancouver	W 29th Ave	Cambie St
95	95	EXIST	MANUAL	MUN	City of Vancouver	W 10th Ave	Between Manitoba St and Ontario St
96	96	EXIST	MANUAL	MUN	City of Vancouver	E 37th Ave	Inverness St
97	97	EXIST	MANUAL	MUN	City of Vancouver	Inverness St	E 60th Ave
98	98	EXIST	MANUAL	MUN	City of Vancouver	E Kent Ave N	Elliot St
99	99	EXIST	MANUAL	MUN	City of Vancouver	E Kent Ave N	Kerr St
100	100	EXIST	MANUAL	MUN	City of Vancouver	E 45th Ave	Rupert St
101	101	EXIST	MANUAL	MUN	City of Vancouver	Earles St	E 38th Ave
102	102	EXIST	MANUAL	MUN	City of Vancouver	Slocan St	E 29th Ave
103	103	EXIST	MANUAL	MUN	City of Vancouver	Slocan St	E 22nd Ave
104	104	EXIST	MANUAL	MUN	City of Vancouver	Vaness Ave	Gladston St
105	105	EXIST	MANUAL	MUN	City of Vancouver	Adanac St	Slocan St
106	106	EXIST	MANUAL	MUN	City of Vancouver	Adanac St	Renfrew St
107	107	EXIST	MANUAL	MUN	City of Vancouver	Wall St	N Kaslo St
108	108	EXIST	MANUAL	MUN	City of Vancouver	Adanac St	Between Rupert St and Cassiar St
109	109	EXIST	MANUAL	MUN	City of Vancouver	McLean Dr	Adanac St
110	110	EXIST	MANUAL	MUN	City of Vancouver	E 10th Ave	Woodland Dr
111	111	EXIST	MANUAL	MUN	City of Vancouver	Victoria Dr	E 10th Ave
112	112	EXIST	MANUAL	MUN	City of Vancouver	Victoria Dr	E Broadway
113	113	EXIST	MANUAL	MUN	City of Vancouver	Vivian Dr	E 57th Ave
114	114	EXIST	MANUAL	MUN	City of Vancouver	Union St	Dunlevy Ave

115	115	EXIST	MANUAL	MUN	District of North Vancouver	W 1st St	Between Pemberton Ave and Lloyd Ave
116	116	EXIST	MANUAL	MUN	District of North Vancouver	Harbour Ave	Main St
117	117	EXIST	MANUAL	MUN	District of North Vancouver	Mt Seymour Pky	Berkley Rd
118	118	EXIST	MANUAL	MUN	UEL	University Blvd	Toronto Rd
119	119	EXIST	MANUAL	MUN	UEL	Chancellor Blvd	Western Pky
120	120	EXIST	MANUAL	MUN	UEL	Chancellor Blvd	East Mall
121	1	SHORT	AUTO_LOOP	MUN	City of Burnaby	White Ave N	Between Goard Way and Smith St
122	2	SHORT	AUTO_LOOP	MUN	City of Burnaby	Central Park	Patterson Skytrain Station
123	3	SHORT	AUTO_TUBE	MUN	City of Burnaby	Southridge Dr	Between Byrnepark Dr and Griffiths Dr
124	4	SHORT	AUTO_TUBE	MUN	City of Burnaby	Winston St	Between McConnell Dr and Piper Ave
125	5	SHORT	MANUAL	MUN	City of Burnaby	Lougheed Hwy	Sperling Ave
126	6	SHORT	MANUAL	MUN	City of Burnaby	Carleton Ave	Between Frances St and Pender St
127	7	SHORT	MANUAL	MUN	City of Burnaby	Gaglardi Way	Burnaby Mountain Pky
128	8	SHORT	MANUAL	MUN	City of Burnaby	Gaglardi Way	Broadway
129	9	SHORT	MANUAL	MUN	City of Burnaby	Barnet Hwy	Between Cariboo Point Way and Reed Point Way
130	10	SHORT	MANUAL	MUN	City of Burnaby	12th Ave	Mary Ave
131	11	SHORT	MANUAL	MUN	City of Burnaby	Dunblane Ave	Beresford St
132	12	SHORT	MANUAL	MUN	City of Coquitlam	Lougheed Hwy	North Road
133	13	SHORT	MANUAL	MUN	City of Langley	204 St	Langley Bypass
134	14	SHORT	MANUAL	MUN	City of Langley	Fraser Hwy	Langley Bypass
135	15	SHORT	MANUAL	MUN	City of New Westminster	Westminster Hwy	Boundary Rd
136	16	SHORT	MANUAL	MUN	City of North Vancouver	Lonsdale Ave	Keith Rd
137	17	SHORT	MANUAL	MUN	City of North Vancouver	W 17th St	Lonsdale Ave
138	18	SHORT	MANUAL	MUN	City of North Vancouver	Lonsdale Ave	W Esplanade
139	19	SHORT	MANUAL	MUN	City of North Vancouver	Lonsdale Quay	
140	20	SHORT	MANUAL	MUN	City of Port Coquitlam	Shaughnessy St	Wilson Ave
141	21	SHORT	MANUAL	MUN	City of Port Moody	Murray St	Klahanie Dr
142	22	SHORT	AUTO_LOOP	MUN	City of Richmond	No. 3 Rd	Between Mall Access and Cambie Rd
143	23	SHORT	MANUAL	MUN	City of Richmond	Williams Rd	Garden City Rd

144	24	SHORT	MANUAL	MUN	City of Richmond	Railway Ave	Williams Ave
145	25	SHORT	MANUAL	MUN	City of Richmond	Railway Ave	Granville Ave
146	26	SHORT	MANUAL	MUN	City of Richmond	Garden City Rd	Westminster Hwy
147	27	SHORT	MANUAL	MUN	City of Richmond	Westminster Hwy	Shell Rd
148	28	SHORT	MANUAL	MUN	City of Richmond	No. 3 Rd	Westminster Hwy
149	29	SHORT	MANUAL	MUN	City of Richmond	Russ Baker Way	Gilbert Rd
150	30	SHORT	MANUAL	MUN	City of Richmond	No. 3 Rd	Sea Island Way
151	31	SHORT	MANUAL	MUN	City of Richmond	Garden City Rd	Sea Island Way
152	32	SHORT	AUTO_LOOP	MUN	City of Surrey	190 St	98 Ave
153	33	SHORT	AUTO_LOOP	MUN	City of Surrey	Green Timbers Urban Forest	
154	34	SHORT	AUTO_TUBE	MUN	City of Surrey	175 St	South of 56 Ave
155	35	SHORT	MANUAL	MUN	City of Surrey	176 St	60 Ave
156	36	SHORT	MANUAL	MUN	City of Surrey	56 Ave	King George Hwy
157	37	SHORT	MANUAL	MUN	City of Surrey	King George Hwy	68 Ave
158	38	SHORT	MANUAL	MUN	City of Surrey	24 Ave	King George Hwy
159	39	SHORT	MANUAL	MUN	City of Surrey	102 Ave	134A St
160	40	SHORT	MANUAL	MUN	City of Surrey	102 Ave	East Whalley Ring Rd
161	41	SHORT	MANUAL	MUN	City of Surrey	King George Hwy	Fraser Hwy
162	42	SHORT	MANUAL	MUN	City of Surrey	100 Ave	104 St
163	43	SHORT	MANUAL	MUN	City of Surrey	100 Ave	156 St
164	44	SHORT	MANUAL	MUN	City of Surrey	King George Hwy	84 Ave
165	45	SHORT	MANUAL	MUN	City of Surrey	124 St	68 Ave
166	46	SHORT	MANUAL	MUN	City of Surrey	100 Ave	152 St
167	47	SHORT	MANUAL	MUN	City of Vancouver	Burrard St	W Pender St
168	48	SHORT	MANUAL	MUN	City of Vancouver	Burrard St	Dunsmuir St
169	49	SHORT	MANUAL	MUN	City of Vancouver	Richards St	W Pender St
170	50	SHORT	MANUAL	MUN	City of Vancouver	Richards St	Dunsmuir St
171	51	SHORT	MANUAL	MUN	City of Vancouver	Cambie St	Dunsmuir St

172	52	SHORT	MANUAL	MUN	City of Vancouver	Cambie St	W Pender St
173	53	SHORT	MANUAL	MUN	City of Vancouver	Boundary Rd	Between E Kent Ave N and Marine Way
174	54	SHORT	MANUAL	MUN	City of Vancouver	SW Marine Dr	W 41st Ave
175	55	SHORT	MANUAL	MUN	City of White Rock	16 Ave	152 St
176	56	SHORT	MANUAL	MUN	City of White Rock	North Bluff Rd	Nichol Rd
177	57	SHORT	AUTO_TUBE	MUN	Corporation of Delta	River Rd	West of Nordel Way
178	58	SHORT	AUTO_TUBE	MUN	Corporation of Delta	Ladner Trunk Rd	West of 104 St
179	59	SHORT	MANUAL	MUN	Corporation of Delta	Kitson Pky	McKenzie Dr
180	60	SHORT	MANUAL	MUN	Corporation of Delta	116 St	84 Ave
181	61	SHORT	MANUAL	MUN	Corporation of Delta	60 Ave	64 St
182	62	SHORT	MANUAL	MUN	Corporation of Delta	44 Ave	Maple Lane
183	63	SHORT	MANUAL	MUN	Corporation of Delta	52 St	Hwy 17
184	64	SHORT	MANUAL	MUN	Corporation of Delta	56 St	18 Ave
185	65	SHORT	MANUAL	MUN	District of North Vancouver	Capilano Rd	Fullerton Ave
186	66	SHORT	MANUAL	MUN	District of North Vancouver	Roosevelt Cres	Lloyd Ave
187	67	SHORT	MANUAL	MUN	District of North Vancouver	Lynn Valley Rd	William Ave
188	68	SHORT	MANUAL	MUN	District of North Vancouver	Mt Seymour Pky	Seymour Blvd
189	69	SHORT	MANUAL	MUN	Langley Township	200 St	Between 88 Ave and 91A Ave
190	70	SHORT	MANUAL	MUN	Langley Township	Fraser Hwy	216 St
191	71	SHORT	MANUAL	MUN	Maple Ridge	216 St	Between 123 Ave and 124 Ave
192	72	SHORT	MANUAL	MUN	Maple Ridge	224 St	Dewdney Trunk Rd
193	73	SHORT	AUTO_TUBE	MUN	Pitt Meadows	Lougheed Hwy	Between Harris Rd and Park Rd
194	74	SHORT	MANUAL	MUN	Pitt Meadows	Harris Rd	Between Old Dewdney Trunk Rd and Dewdney Trunk Rd
195	75	SHORT	MANUAL	MUN	Pitt Meadows	Harris Rd	Hammond Rd
196	76	SHORT	AUTO_LOOP	OTH	TransLink	Lions Gate Bridge	
197	77	SHORT	AUTO_LOOP	OTH	TransLink	Second Narrows Bridge	
198	78	SHORT	AUTO_LOOP	OTH	TransLink	Patullo Bridge	

199	79	SHORT	AUTO_LOOP	OTH	TransLink	Queensborough Bridge	
200	80	SHORT	AUTO_LOOP	OTH	TransLink	Pitt River Bridge	
201	81	SHORT	AUTO_LOOP	OTH	TransLink	Golden Ears Bridge	
202	82	SHORT	AUTO_LOOP	OTH	TransLink	Arthur Laing Bridge	
203	83	SHORT	AUTO_LOOP	OTH	TransLink	Oak St Bridge	
204	84	EXIST	AUTO_LOOP	OTH	TransLink	North Arm Bridge	
205	85	SHORT	AUTO_LOOP	OTH	TransLink	Knight St Bridge	
206	86	SHORT	AUTO_LOOP	OTH	TransLink	Alex Fraser Bridge	
207	87	SHORT	AUTO_LOOP	OTH	TransLink	Westminster Hwy	Between No. 6 Rd and No. 7 Rd
208	88	SHORT	MANUAL	MUN	UEL	Thunderbird Blvd	Wesbrook Mall
209	89	SHORT	MANUAL	MUN	UEL	W 16th Ave	Wesbrook Mall
210	90	SHORT	MANUAL	MUN	UEL	West Mall	Thunderbird Blvd
211	91	SHORT	MANUAL	MUN	West Vancouver	Argyle Ave	Keith Rd
212	92	SHORT	MANUAL	MUN	West Vancouver	Taylor Way	Inglewood Ave
213	1	MED	MANUAL	MUN	City of Burnaby	Lougheed Hwy	Kingsland Dr
214	2	MED	MANUAL	MUN	City of Burnaby	Frances St	Fell Ave
215	3	MED	MANUAL	MUN	City of Burnaby	Sussex Ave	Hazel St
216	4	MED	MANUAL	MUN	City of Coquitlam	Guildford Way	Pinetree Way
217	5	MED	MANUAL	MUN	City of Coquitlam	Brunette Ave	Lougheed Hwy
218	6	MED	MANUAL	MUN	City of Langley	Fraser Hwy	Langley Bypass
219	7	MED	MANUAL	MUN	City of Langley	203 St	53 Ave
220	8	MED	MANUAL	MUN	City of Langley	203 St	Fraser Hwy
221	9	MED	AUTO_TUBE	MUN	City of New Westminster	New Westminster Quay	
222	10	MED	AUTO_LOOP	MUN	City of Port Coquitlam	Kingsway Ave	Broadway Ave
223	11	MED	MANUAL	MUN	City of Port Coquitlam	Wellington St	Prairie Ave
224	12	MED	MANUAL	MUN	City of Port Coquitlam	Shaughnessy St	Lougheed Hwy
225	13	MED	AUTO_LOOP	MUN	City of Port Moody	Vintner St	East of Douglas St
226	14	MED	MANUAL	MUN	City of Port Moody	Murray St	Ioco Rd
227	15	MED	MANUAL	MUN	City of Richmond	Williams Rd	Shell Rd
228	16	MED	MANUAL	MUN	City of Surrey	Fraser Hwy	176 St
229	17	MED	MANUAL	MUN	City of Surrey	Fraser Hwy	168 St
230	18	MED	MANUAL	MUN	City of Surrey	168 St	56 Ave
231	19	MED	MANUAL	MUN	City of Surrey	King George Hwy	148 St
232	20	MED	MANUAL	MUN	City of Surrey	20 Ave	156 St

233	21	MED	MANUAL	MUN	City of Surrey	20 Ave	152 St
234	22	MED	MANUAL	MUN	City of Surrey	32 Ave	168 St
235	23	MED	MANUAL	MUN	City of Surrey	King George Hwy	132 St Diversion
236	24	MED	MANUAL	MUN	City of Vancouver	Angus Dr	W 45th Ave
237	25	MED	MANUAL	MUN	City of Vancouver	W 45th Ave	Cambie St
238	26	MED	MANUAL	MUN	City of Vancouver	Ontario St	E 45th Ave
239	27	MED	MANUAL	MUN	City of Vancouver	E 45th Ave	Prince Edward St
240	28	MED	MANUAL	MUN	City of Vancouver	W 59th Ave	Cambie St
241	29	MED	MANUAL	MUN	City of Vancouver	W 59th Ave	Ontario St
242	30	MED	MANUAL	MUN	City of Vancouver	E 59th Ave	Prince Edward St
243	31	MED	MANUAL	MUN	City of Vancouver	Prince Edward St	E 31st Ave
244	32	MED	MANUAL	MUN	City of Vancouver	E 59th Ave	Dumfries St
245	33	MED	MANUAL	MUN	City of Vancouver	E 45th Ave	Dumfries St
246	34	MED	MANUAL	MUN	City of Vancouver	Dumfries St	E 28th Ave
247	35	MED	MANUAL	MUN	City of Vancouver	Dumfries St	E 22nd Ave
248	36	MED	MANUAL	MUN	City of Vancouver	Kerr St	Rosemont Dr
249	37	MED	MANUAL	MUN	City of Vancouver	Rupert St	E 22nd Ave
250	38	MED	MANUAL	MUN	City of White Rock	Johnston Rd	Thrift Ave
251	39	MED	MANUAL	MUN	City of White Rock	Marine Dr	Fir St
252	40	MED	MANUAL	MUN	Langley Township	216 St	Glover Rd
253	41	MED	MANUAL	MUN	Maple Ridge	Lougheed Hwy	216 St
254	42	MED	AUTO_LOOP	OTH	TransLink	Port Mann Bridge	
255	1	MED	AUTO_TUBE	MUN	City of Coquitlam	Proposed Multiuse Pathway	
256	2	MED	AUTO_TUBE	MUN	City of Coquitlam	Poco Trail	
257	3	MED	MANUAL	MUN	City of New Westminster	Derwent Way	Duncan St
258	4	MED	MANUAL	MUN	Langley Township	Mavis Ave	River Rd
259	1	-	-	OTH	BC Ferries	Trans-Canada Hwy	Horseshoe Bay-Departure Bay Ferry
260	2	-	-	OTH	BC Ferries	Tsawwassen Ferry Terminal	
261	3	-	-	OTH	TransLink	SeaBus	
262	4	-	-	OTH	TransLink	Lonsdale Quay	
263	5	-	-	OTH	TransLink	Hwy 99	Rice Mill Rd
264	6	-	-	OTH	TransLink	North of Hwy 17 overpass of Hwy 99	