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**Advancing sustainable commuting: Demonstrating  
city leadership in response to the Climate  
Emergency**

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**Expansion of the City of Vancouver's Sustainable Commuting Program**

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## Executive Summary

This report was authorized by the City of Vancouver (COV) Sustainability Group to examine how the Sustainable Commuting Program (SCP) can encourage COV staff to commute more via active transit (walking/cycling) and public transit amidst recent SCP expansions, and to recommend ways of properly funding the SCP to avoid deficits while helping Vancouver achieve its Climate Emergency goals.

The research shows that although Vancouver has excellent infrastructure for active/public transit<sup>4</sup>, COV staff must increase these trip mode shares by almost 5% annually to meet the Big Move #2 (BM#2) target of 67% of trips in Vancouver by active/public transit.<sup>5</sup> BM#2 is quite a challenge, but research in Europe and North America shows commuters respond to both financial incentives and disincentives.<sup>1,2,3</sup> The recently expanded SCP can influence COV staff behavior with incentives/disincentives if COV can balance the SCP budget internally. COV can offset the \$0.4M-1.6M worth of incentives by either:

- (a) Charging \$10/month per pass for all COV staff that currently receive free parking.
- (b) Selling/leasing/repurposing 6-44 underused free parking stalls each year for \$36K-72K/stall.<sup>57-61</sup>
- (c) Implementing a combination of the two options above in a phased approach.

Due to status quo bias and 60% of COV staff living outside of active transit range (i.e. outside Vancouver), both options above will likely upset the thousands of COV employees that currently park free at COV sites (and have for decades).<sup>63</sup> However, research worldwide shows that incentive programs typically fail if commuters still have access to free parking.<sup>6</sup> So if COV wants to meet BM#2, it must follow Copenhagen's model: "Every year 2-3% of parking spaces [in Copenhagen] are removed to gradually wean residents from auto-dependency. In addition to being scarce, parking is expensive—about \$5/hour in the city center. And as the inconvenience and cost of parking increase, so, too, does the rate of bicycling."<sup>1,2</sup> For COV staff that simply won't consider active/public transit, COV can offer free parking for electric vehicles (EVs) and carpools. The province offers many EV rebates and COV staff can match with other carpoolers via the existing COV platform, GoOrca.com.

This report also recommends COV funding proposals for (a) a thorough inventory of COV's current end-of-trip (EOT) facilities and parking stalls and (b) ~\$7M worth of EOT facility infrastructure for the most populous COV sites.<sup>63</sup> Promoting city leadership examples, fitness with walk/bike-to-work campaigns, and Mobi bike share program among others will all supplement active transit rates with minimal funding. Vancity, Clif Bar, New Belgium Brewing, Patagonia, and Seattle Children's Hospital (SCH) have all implemented such measures in and around Vancouver with successful, quantitative results.<sup>7,8,75,76</sup>

Given COVID-19, COV has a unique opportunity to incrementally update transportation/transit policies while COV staff return to live, in-office work. The report research concludes that COV can meet BM#2 by offering incentives to non-drivers, levying disincentives to drivers, funding EOT facility infrastructure, and marketing fitness, safety, leadership, etc. These measures will properly allocate employee perks and distribute externalities equitably among staff using different mode shares to change travel behavior.

To summarize, this report recommends:

- Begin immediately charging ~\$10/month per pass for all COV staff that currently receive free parking. Increase parking pass prices annually as more commuters walk/bike/transit and less commuters drive.
- Begin the process of divesting COV staff parking real estate by selling/leasing underused parking stalls or repurposing underused parking areas for future COV facility expansions.
- Follow the paths of successful cities/organizations by mimicking transit policies and increasing EOT.

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## 1. Methodology

This report compiles thorough research including phone interviews, video interviews, email interviews, government policy documents, open-source media, transportation journals, urban planning books, case studies, city data, etc. From these sources, I quantified various data sets using Microsoft Excel, Tableau Desktop, Google Maps, and WalkScore.com. This report attempts to accurately illustrate the massive amounts of quantitative transit data to readers in a semi-technical, digestible format. All footnotes, quotes, calculations, and extrapolations correlate with references at the end of this report.

## 2. Glossary

<b><u>Acronym</u></b>	<b><u>Meaning</u></b>
2015 EETS	2015 EE Transportation Survey
BC	British Columbia
BM#1	Big Move #1
BM#2	Big Move #2
BM#3	Big Move #3
CHC	City Hall Campus
COV	The City of Vancouver
EOT	end-of-trip
EV	electric vehicle
GC	Greenest City
GHG	greenhouse gas
HBR	Harvard Business Review
LCA	life-cycle analysis
MEL	Master of Engineering Leadership
PEF	Property Endowment Fund
PPE	personal protective equipment
PTO	paid time off
REFM	Real Estate and Facilities Management
SCH	Seattle Children's Hospital
SCP	Sustainable Commuting Program
SCP2016B	Sustainable Commuting Program 2016 and Beyond
SF	square feet
TDM	Transportation Demand Management
UBC	The University of British Columbia
VCH	Vancouver Coastal Health
VGH	Vancouver General Hospital
VIHA	Vancouver Island Health Authority
VPD	Vancouver Police Department
VPL	Vancouver Public Library

### 3. Why are we here? Strategy/Policy setting

This report will describe the need for the City of Vancouver (COV) to not only continue its Sustainable Commuting Program (SCP), but expand its scope, coverage area, reward incentives, and parking policies to overcome two main challenges:

1. Help Vancouver (and COV) achieve its Climate Emergency goals.
2. Help COV display leadership by setting the sustainable example via the Corporate Green Operations Plan.

According to COV's Climate Emergency Response (RTS 12978), it states:

“To get on track for the City's 2030 target, Vancouver's emissions need to drop by 1.2 million tonnes. That's an average of 92,000 tonnes per year over the next decade—a five-fold increase from the past decade. For context, approximately 92,000 tonnes of reductions could be achieved individually by each of the examples below:

- Switching 15% of vehicle trips per year on Vancouver's roads to active transportation and transit.
- Replacing 35,000 gasoline cars owned by Vancouver residents with electric cars.”<sup>5</sup>

According to COV plan targets<sup>10</sup>, the report will examine the realistic effectiveness of the SCP on Big Moves #1, #2, and #3 (BM#1, BM#2, BM#3):

BM#1: By 2030, 90% of people live within an easy walk and roll of their daily needs.<sup>5</sup>

BM#2: By 2030, 67% of trips in Vancouver will be by active transportation and transit.<sup>5</sup>

BM#3: By 2030, 50% of the kilometres driven on Vancouver's roads will be by zero emissions vehicles.<sup>5</sup>

Both the Climate Emergency Response (RTS 12978) target of “switching 15% of vehicle trips per year...” and all three Big Moves will prove difficult for Vancouver residents, but Table 1 shows a more realistic level of difficulty for COV staff for each target:

assumes 2019 rate equal 2015 EETS

% of COV staff		9% walk 10% bike	9% walk 10% bike 23% transit		
Year	% drive alone	% walk/bike	% walk/bike/transit	% EV	
2020	46%	19%	42%	2%	
2021	39% (-)14%	22% (+)16.8%	44% (+)4.7%	3%	(+)35.5%
2022	34% (-)14%	26% (+)16.8%	46% (+)4.7%	4%	(+)35.5%
2023	29% (-)14%	30% (+)16.8%	49% (+)4.7%	6%	(+)35.5%
2024	25% (-)14%	35% (+)16.8%	51% (+)4.7%	8%	(+)35.5%
2025	21% (-)14%	41% (+)16.8%	53% (+)4.7%	11%	(+)35.5%
2026	18% (-)14%	48% (+)16.8%	56% (+)4.7%	15%	(+)35.5%
2027	16% (-)14%	57% (+)16.8%	58% (+)4.7%	20%	(+)35.5%
2028	14% (-)14%	66% (+)16.8%	61% (+)4.7%	27%	(+)35.5%
2029	12% (-)14%	77% (+)16.8%	64% (+)4.7%	37%	(+)35.5%
2030	10% (-)14%	90% (+)16.8%	67% (+)4.7%	50%	(+)35.5%

\*BM#1

\*BM#2

\*BM#3

\*Climate Emergency Response – RTS 12978

Table 1. Climate Emergency Target Goals.<sup>5,10</sup>

Assuming COV’s drive-alone, walk, bike, public transit, and electric vehicle (EV) rates in 2020 are similar to the rates stated in the COV 2015 EE Transportation Survey (2015 EETS) and subsequently published in the Sustainable Commuting Program 2016 and Beyond report (SCP2016B), Table 1 forecasts the percentage changes for every year between 2020 (current year) and 2030 (target year). As you notice, decreasing the percentage of COV commuters that drive alone from 46% to 10% (14% annual decrease) as per Climate Emergency Response (RTS 12978) or increasing the percentage of COV active transit commuters from 19% to 90% (16.8% annual increase) as per BM#1 between 2020 and 2030 are both very challenging targets. Increasing the percentage of COV EV rates from 2% to 50% (35.5% annual increase) as per BM#3 between 2020 and 2030 is an extremely challenging target. However, increasing the percentage of COV active/public transit commuters from 42% to 67% (4.7% annual increase) as per BM#2 between 2020 and 2030 is a realistic target. Thus, the remainder of this report will focus on evidence-based research to support recommendations on how COV staff can achieve BM#2 targets.

## 4. How can SCP help meet Climate Emergency goals?

### 4.1 Background of SCP and challenges

The SCP started in 2008 as the “Employee Mobility Program”. Currently, the Director of Facilities Design and Management implemented and began to manage pay parking for employees at the City Hall Precinct (the Precinct) and the General Manager of Business Planning and Services was originally tasked with setting and adjusting parking rates to reflect market conditions as required. An “Employee Mobility Program Stabilization Reserve” was created for the purpose of accumulating employee pay parking revenues generated within the Precinct and applying those revenues to support sustainable commuting initiatives for employees. The City Manager can adjust incentive levels to balance pay parking revenues with the cost of offering incentives to guide the allocation of funding between the various sustainable modes.<sup>64</sup>

COV published the SCP2016B based on survey data from 2015 EETS. As of 2015, 1692 out of a possible 7384 employees were eligible for the SCP, representing 23% of COV’s regular full time, temporary full time, and regular part time staff at specific COV sites in and around City Hall Campus (CHC). The SCP began small as a pilot program with seed funding from COV.

In preparation for the publication of SCP2016B, COV determined the accurate “benchmarking parking” market rate near CHC using Parkopedia.com and Google.com.<sup>67</sup> This data allowed the SCP to increase parking rates closer to market rates, which has helped balance the SCP budget. This paved the way for the SCP to use the revenue from COV staff at CHC parking areas to fund active/public transit incentives for COV staff working at CHC sites.

#### 4.2 Evaluation of current SCP

Through the SCP during years 2008-2019, COV staff who drove to work would sometimes pay for parking. Some of that parking was located on COV real estate. Thus, if COV staff drove to work and paid for parking under the jurisdiction of COV, that revenue represents the SCP’s sole source of annual revenue. By withdrawing from that revenue stream, the SCP distributes gift cards worth up to \$50 to COV staff that walked or biked to work and distributes transit rebates worth up to 20% of a monthly unlimited pass to COV staff that took public transit to work. The number of gift cards and transit rebate percentages can certainly be increased to produce rewards that are more readily attainable, and therefore incentivizing, for sustainable commuters.

The SCP reserve fund represents residual seed funding that was granted to the SCP when it started in 2008. The SCP reserve fund essentially functions as a stop gap to any potential deficit. If the SCP runs a deficit, COV balances the difference by moving funds out of the SCP reserve fund at the end of each year.

#### 4.3 Evaluation of expansion of SCP

In 2018, COV decided to expand the SCP to include all regular full time, temporary full time, and regular part time staff at all COV sites except Vancouver Police Department (VPD) and Vancouver Public Library (VPL). The SCP excluded VPD and VPL because those organizations fall under different leadership that would require many more layers of bureaucracy to navigate. According to the data in “per Worksites with Pay Parking - No VPD - Dec 2017.xls”, the expansion was a three-fold increase in SCP coverage area and now included 5348 out of a possible 8445 employees.<sup>63</sup> See Figure 2:

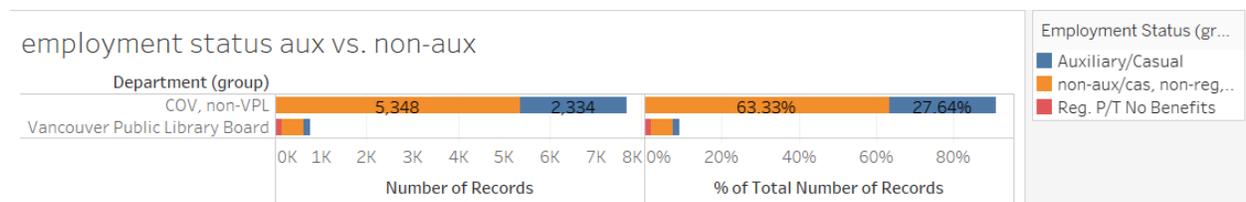


Figure 2. SCP expansion in coverage area (via Tableau Desktop software).

The expansion certainly liberated COV staff, however, the expansion was given approval with the understanding that the current revenue model would not support the anticipated increase in expenditure indefinitely. It was understood at the time that a new funding model would be necessary.

With the SCP expansion, we can assume that percentages of COV staff residences will roughly align with data collected in 2015 EETS regarding commuting behavior (see Table 3):

<u>Commute groupings</u>	<u>% of COV staff</u>	<u>Commute distance</u>	<u>Typically live in Van?</u>
Walk/bike/transit	20%	<5 km ...walk (<60 min) and bike (<30 min)	Y
Bike/transit	20%	5-10 km ...bike (30-60 min)	Y
Drive/transit	60%	10+ km ...drive or transit (double the drive time)	N

Table 3. General commuting behavior groupings.<sup>63</sup>

With the majority of COV staff falling in the last category of living quite far from Vancouver, research shows that these employees will not likely walk, bike, or transit regardless of usefulness, safety, comfort, or interest because of the sheer time and effort to cover the long (10+ km) distances.<sup>26</sup>

#### 4.4 Financial forecast

Using actual/estimated costs and revenue sources from 2019 and various scenario cost forecasts for 2020 and beyond, Scenario 1 shows a relatively conservative estimate for the forecasted annual deficit, Scenario 2 shows a moderate deficit, and Scenario 3 shows an aggressive/risky deficit:

Scenario 1: current (2019) administrative costs, gift card distributions, transit rebate percentage, etc.  
Scenario 1: -\$399,712

Scenario 2: 50% increase in administrative costs and gift card distributions, 50% transit rebate, etc.  
Scenario 2: -\$996,602

Scenario 3: 100% increase in administrative costs and gift card distributions, 75% transit rebate, etc.  
Scenario 3: -\$1,570,743

## 5. How to fund SCP deficit?

### 5.1 Continue funding SCP with supplemental revenue

Throughout 2008-2019, COV updated the parking rates at CHC to more accurately reflect the market rates in the surrounding area. However, after further analysis of easypark.ca, bestparking.com, parkopedia.ca, and craigslist.com, COV could certainly justify increasing daily COV parking rates near CHC depending on location. COV could gradually increase rates to reduce complaints, but it is more effective to charge daily rates or hourly rates to encourage on-demand usage instead of monthly rates since encourage staff to drive all month since they already paid for the whole month.

COV should determine what EasyPark would charge to increase/revise coverage area to the COV sites that already charge for parking and all other COV sites.

Current parking revenue funding:

- Cambie P1 and Cambie P2 charge \$8/day, but also has hourly rates. Cambie P2 charges \$160/month, but it would be a very easy switch to hourly/daily rates to maximize usage/revenue and minimize drive-all-month incentive.
- West Annex charges \$160/month (60% capacity, 102 stalls) and although it may prove difficult to convert from monthly parking rates to daily parking rates, it's certainly possible. If disability, visitor, EV, carpool, and fleet stall minimums met, then COV should convert to daily/hourly parking rates to maximize usage/revenue.
- 10<sup>th</sup> Ave surface lot charges \$160/month but will likely dissolve as a revenue source by mid-2020.
- Spyglass funds the SCP. It charges \$5/day or \$100/month (rare) but would be an easy switch to hourly rates as well.

EasyPark gives suggestions for hourly or daily parking rates, but not monthly because they don't monitor those areas. COV should solicit EasyPark parking rate suggestions according to market rate and simply use those competitive rates for COV staff.

The main challenge of the SCP is determining a fair way to supplement active/public transit commuters with incentives, while still running the SCP like a self-sufficient business. This report recommends a three revenue-generating options to offset three annual deficit scenarios. Option 2 shows number of parking stalls that need to be sold. Calculated by dividing scenario deficit by average selling price per parking stall in Vancouver (see Section 4.1.2):

Cost Element		Scenario...		
		1	2	3
Total Deficit		-\$399,712	-\$996,602	-\$1,570,743
Monthly COV parking pass	Option 1	\$8	\$40	\$94
Sale of COV parking stalls (units)	Option 2	6	18	44
Monthly COV parking pass (50%)	Option 3a	\$4	\$20	\$47
Sale of COV parking stalls (50%) (units)	Option 3b	3	9	22

Table 4. 2020 SCP deficit scenarios.

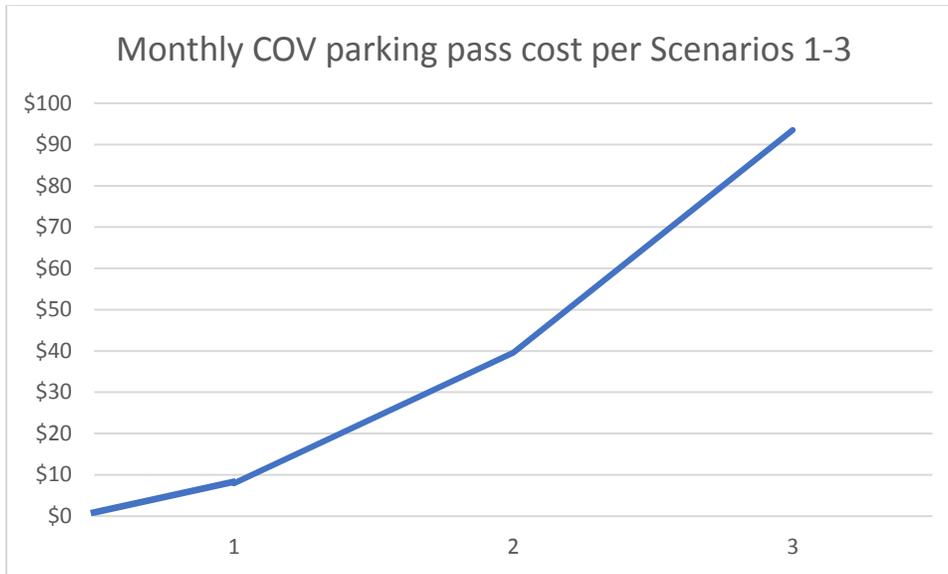


Figure 5. Option 1 – Average monthly COV parking pass cost for current (2020) free parking stalls.

#### 5.1.1 Option 1 – Monthly or daily COV parking pass

1. Depending on Scenarios 1-3, the SCP should charge \$10-100 per month, or preferably \$0.50-5 per day for each COV employee that currently parks for free AND increase existing parking rates to maximum allowable market rates at all other locations. Currently, COV does not maintain a database of COV parking stalls and if they are free or paid parking stalls. That said, the average parking pass fee is calculated by dividing the sum of workers at the top 17 COV sites with “NO PAY PARKING” listed and dividing again by 2 (Scenario 2) or dividing again by 3 (Scenario 3).<sup>63</sup> The reason the parking pass fee increases exponentially instead of linearly in Figure 5 is because as more employees forgo parking passes to take active/public transit instead, those employees switch from funding the SCP to withdrawing from the SCP. So, as the number of COV employees that drive and pay COV for parking decreases over time, those employees will pay ever-increasing fees to incentivize the ever-growing pool of active/public transit commuters to balance the SCP budget.

For a simple example that does not include driving costs (car payment, gasoline, tolls, time spent, etc.), Jane Doe works at a COV site like National Yard with free parking and wants to continue driving alone to work, she’ll need to pay approximately \$10 per month to park in monthly or daily fees at her formerly “free” parking lot. However, if she decides to take active/public transit instead, not only will she save \$10 per month on parking fees, but she’ll collect up to \$50 per month in gift cards or up to \$25 per month in transit rebates. Jane net gains \$35-60 per month from her switch from car commuting to active/public transit commuting.

Since \$10-100 per month is purely an average rate to charge COV staff in order to balance the SCP budget, more analysis must be done to determine the daily or monthly rate at each lot. If given COV approval to start charging all COV parking stalls, COV can begin build a COV site-specific pricing criteria with a baseline daily parking rate, then increasing as high as the market

will allow. For example, some sites don't have any parking, whereas some sites have loads of parking stalls. If a site has many free parking stalls and not many COV staff use them, Easy Park can charge as little as \$1-3/day since the lot has capacity that would otherwise go unused (at least in the short-term). If a site has very few free parking stalls and constantly at capacity, Easy Park can charge as high as the local market rate will allow, perhaps as high as \$50/day. Either way, there should be a minimum baseline daily parking charge at all sites that previously had free parking.

### 5.1.2 Option 2 – Sale, lease, or repurposing of COV parking stalls

2. Depending on Scenarios 1-3, COV could offset the cost of active/public transit incentives by “selling”, leasing, or repurposing 6-44 parking stalls annually in a phased approach in tandem with parking pass fees. As more COV staff commute actively, COV could lease parking real estate to car dealerships or film companies on a daily or monthly rate, sell parking estate back to the public (which is unlikely because COV wants to keep land usually), or letting COV REFM repurpose parking real estate for future facility expansion, fleet parking expansion, post-COVID workplace spacing expansion, etc. However, if this funding mechanism is implemented without parking pass fees, employees that park in free COV parking lots will see fewer stalls available each year. This could lead to employee complaints over the amount of available free parking. This may cause employees to (a) demand the parking stalls back or (b) simply arrive earlier in the workday to ensure their claim to a free parking stall or (c) park curbside in the local neighborhood. The number of parking stalls sold was determined by dividing the total annual deficit by the average real estate value of one parking stall in Vancouver which can range from \$36,000 to \$70,000 per stall. Calculated from:

Undeveloped parking real estate in Vancouver: \$108,000.<sup>57</sup>

...\$108,000 / 540 SF = \$200/SF

A typical parking stall is 9 feet by 20 feet (180 SF), however, according to Hunker.com, “Typical ranges for surface parking lots are 300 to 350 square feet per parking stall, which includes the area required for the parking stall and drive aisles.”<sup>58</sup>

Low estimate: 180 SF

Middle estimate: 300 SF

High estimate: 350 SF

Therefore, we calculate:

180 SF \* \$200/SF = \$36,000 (low estimate)

300 SF \* \$200/SF = \$60,000 (middle estimate)

350 SF \* \$200/SF = \$70,000 (high estimate)

Other market sources show developed parking stalls for sale for \$45,000, \$50,000, and \$60,000.<sup>59,60,61</sup> Thus, COV could realistically sell each staff parking stall in Vancouver for \$36,000-70,000. According to RateHub.ca, this translates to roughly \$150-300 per month based on average 30-year mortgage interest rates.<sup>62</sup> References and supporting documents for calculating parking stall price shown at end of report.

### 5.1.3 Option 3 – Combination approach

#### 3. Various combination of Options 1 and 2 (10/90%, 50/50%, 80/20%, etc.)

Theoretically, the SCP financial model is self-sufficient. For example, the very last drive-alone commuter will pay \$4.8M annually for his/her parking stall, thus financially supporting the incentives of every other active/public transit commuter at COV. Obviously, this scenario is extremely unlikely because drive-alone commuters will have voted with their feet way before the rate increased that high. Given the timescale of this financial model spectrum, it will likely take years or even decades before the SCP even reaches the point when the few remaining die-hard drive-alone commuters pay \$1,000-10,000 per year to park at their COV sites. So, COV must then reconsider the SCP financial model when drive-alone commuters begin paying \$1,000+ per year per parking pass. Between now and then, the financial model should operate efficiently.

This financial model will disproportionately affect auxiliary, casual, and no-benefit employees at COV because they will need to pay for parking, but they will not be eligible to receive any active transit incentives. Some auxiliary employees (600 employees) already pay to park and now remaining auxiliary employees must pay for a parking pass (1900 employees) but cannot receive incentive. These employees represent 30% of the entire COV workforce, so a future task for COV will be incorporating them in the SCP.

Unfortunately, COV does not have an exact way to determine which COV sites have full or partial lots that fall into four categories. Table 6 shows some examples:

	<b>COV on-site parking available</b>	<b>COV on-site parking unavailable</b>
<b>staff pay</b>	i.e. CHC	i.e. Woodward's, 814 Richards
<b>staff do not pay</b>	i.e. National, Evans, Manitoba Yards	i.e. various CCs

Table 6. COV lots that charge or do not charge for parking.<sup>63</sup>

If COV decides to charge for all COV parking stalls regardless of location, COV must conduct a more in-depth analysis to determine the number of parking stalls at each COV site, the number of parking stalls at each COV to be reserved for disabled, visitor, fleet, carpools, and EVs, then determine the appropriate daily market rate to charge for remaining COV staff parking stalls.

COV should also take advantage of this time to engage EasyPark in their scope and enforcement coverage area. Given the larger free parking lots, it may prove worthwhile to pay EasyPark to monitor previously free parking lots for COV staff that forgo the parking pass but attempt to park regardless.

According to COV's Corporate Plan 2020, we must "Complete a review of the City's master agreement with EasyPark for the provision of off-street parking operations on City-owned property, with the objective of optimizing related financial and non-financial benefits."<sup>40</sup>

Since monthly parking passes incentivize driving for the entire month instead of just a few days per month, COV should charge staff daily rates to park at previously-free lots. This would require the involvement of infrastructure (parking meters) and EasyPark enforcement, which, if given the approval to start charging all COV staff to park at all parking lots, EasyPark could accommodate.

## 5.2 Continue SCP without supplemental revenue

A last resort does remain. If COV does not charge COV staff for parking and does not divest/sell/lease free parking, the SCP can still function for many years with current CHC parking rates, but the SCP must limit active transit incentives and public transit rebates. This would certainly NOT help the Climate Emergency goals since it would continue encouraging staff to drive to their free parking stalls (status quo) and discouraging staff that take active/public transit.

## 5.3 Ideas that didn't pass initial filtering

The research for this report considered other ways to increase SCP revenue but did not pass the initial filtering:

Filter #1, COV could not justifiably use public taxes to fund COV staff incentives. For example, COV could not ask Translink or Transport Canada for funding because it'd require those organizations to open the incentives to all commuters in metropolitan Vancouver or nationwide. Metrolinx funded active transit incentives for all commuters in Toronto via the City of Toronto Smart Commute Plan but stopped the project shortly thereafter when the City of Toronto Smart Commute Plan lost funding too: "The termination of the Service Delivery Agreement for the delivery of the Smart Commute Program by Metrolinx has resulted in the loss of annual funding of \$531,793. Resources required to continue the delivery of the Smart Commute Program in Toronto has been included in the 2020 Environment and Energy Division Operating Budget submission for Council Consideration." "Metrolinx funding and the three-year agreement would be ending effective June 29, 2019. Metrolinx also terminated its agreements with the other GTHA Regional Municipal Partners".<sup>68</sup>

Filter #2, COV could not justifiably ask for continuous, non-capital (i.e. Climate Emergency) funding. This means COV can request funding for capital investment projects like active transit infrastructure and/or EOT facility infrastructure but not soft costs like promotions or annual incentives/rebates.

Filter #3, it would not make sense to create more administrative burden if accomplishing roughly the same goal. For example, if COV implemented a flat tax or percentage tax on all COV staff payroll but then reimbursed that exact amount if they commuted via active/public transit for at least 20 days per month, that would instigate COV staff. Much like the bottle bill. However, even if staff logged their active/public transit commutes in GoOrca.com, there would not be any easy way to ensure those employees truly took active/public transit without another layer of administrative oversight from individual COV sites. If someone claimed to bike to work to receive an incentive but physically drove to their free parking stall, a building manager or their supervisor would need to doublecheck the validity of this claim. In the end, it would solve similar objectives, but with more hassle.

## 6. Why should COV fund deficit?

### 6.1 Do incentives work?

All animals respond to small and large incentives in various ways, and humans are no different. More appropriately regarding the SCP, does the current 20% transit rebate and \$50 max gift card incentive encourage ENOUGH employees to take active/public transit to make it worth COV's time, money, and effort? According to internal COV data (SCP2016B and 2015 EETS) and many international studies, incentives do, in fact, encourage active/public transit.

### 6.1.1 Internal COV data says YES

#### IF YOU TAKE TRANSIT 1+ TRIPS A WEEK

Response	Chart	Percentage	Count
Convenient route/schedule		48.9%	352
Save money		41.1%	296

...2<sup>nd</sup> highest response: to save \$.

Figure 7. 2015 EETS.

#### IF YOU CARPOOL 1+ TRIPS A WEEK

Response	Chart	Percentage	Count
Convenient route/schedule		53.2%	189
Save money		56.1%	199

...highest response: to save \$.

Figure 8. 2015 EETS.

#### IF YOU BIKE/WALK/JOG/ ROLLERBLADE/SCOOT 1+ TRIPS A WEEK

Response	Chart	Percentage	Count
Close to home/short trip		51.6%	329
Save money		40.7%	259
No access to a vehicle		8.0%	51
Relaxing		43.2%	275
Fitness		71.7%	457
Reduce environmental impact		46.2%	294

...5<sup>th</sup> highest response: to save \$.

Figure 9. 2015 EETS.

#### Do you have any suggestions for ways to encourage sustainable commuting at your worksite?

The 602 response(s) to this question can be found in the appendix.

Response	Chart	Percentages	Count
Discounted		6%	26
Encourage		6%	26
Having to take Transit		7%	27
Subsidized		7%	29
Transit Passes		7%	28
Work Times		8%	32

...of top 6, 4 relate to rebates/savings

Figure 10. 2015 EETS.

### 6.1.2 Anecdotal evidence from staff says YES

According to some Parks Board Office staff, they also reinforce the sentiment that internal COV staff respond to incentives and disincentives accordingly. In the May and June 2020, they stated the need for drying facilities for wet winter, opt-in paid parking, carpooling, bike mentoring, or “bike pooling”.<sup>69,70</sup>

After a telephone conversation with a Yard Operations Coordinator, they shared some ideas on how employees currently respond to incentives/disincentives. We learned that of the roughly 1500 free parking stalls at National Yard and Manitoba yard, very few employees commute via active/public transit and most drive because of long distance commute, free parking incentive, and early morning start times. Most yard staff do not know about GoOrca.com and thus, staff don't know that GoOrca.com has a carpool buddy matching feature. When registering for a COV parking pass, employees must include their vehicle make/model, so very few employees could "sell" them to other COV employees or non-COV people for some financial benefit.

### 6.1.3 International research says YES

International research supports active transit incentives, but especially in tandem with EOT infrastructure and in tandem with paid parking. In fact, there's even research that shows tables of multiple other active transit publications describing the number of positive financial incentive studies versus negative financial incentives studies.<sup>65</sup> According to ByCycling, a startup that created a rewards platform, "70% of the people think that the best incentive for them to ride to work is cash."<sup>32</sup>

According to CityLab, Stockholm's "recommendation of cash or in-kind benefits for cyclists isn't the first of its kind. Several European countries have lined up various incentives and benefits to get people on to bikes—most notably an experiment in France [in 2015] where a control group of 10,000 employees were paid €0.25 a kilometer to cycle to work. This had only limited success, partly because commuters still had access to free parking."<sup>6</sup>

In Belgium, "companies and public organizations are likewise allowed to pay their employees when cycling to work with an amount of 0.20 € per kilometre per day (no more than 15 kilometres a day). The supplement is tax free for the employees and the employers get tax credit for the expense. **Research from Belgium has shown that in companies where the fare is being paid, cycling increases considerably (in the study in case, cycling increased from 6,3% to 9,5%).**"<sup>33</sup>

In the UK, a study stated "The most effective policy would combine improvements in en-route facilities, a daily payment to cycle to work and comprehensive trip end facilities and this would also have a significant impact on car commuting."<sup>12</sup> Table 11 shows a UK study of **forecasted** incentives (daily financial payments with EOT infrastructure) effectiveness:

Scenario	Car	Pass	Bus	Train	Walk	Cycle
Base	55.2	10.4	12.7	4.3	11.6	5.8
£0.50 per day payment	54.7	10.3	12.6	4.3	11.5	6.6
£1.00 per day payment	54.1	10.2	12.4	4.2	11.4	7.7
£1.50 per day payment	53.3	10.0	12.3	4.1	11.2	9.1
£2.00 per day payment	52.2	9.8	12.0	4.1	11.0	10.9
£3.00 per day payment	49.5	9.3	11.4	3.9	10.4	15.5
£4.00 per day payment	46.0	8.2	10.7	3.6	9.7	21.8
£5.00 per day payment	42.2	7.9	9.7	3.3	8.9	28.0

Note: These daily payments are halved at the forecasting stage since the model is estimated in one-way units.

Table 11. Effect of daily payments to cycle to work.<sup>12</sup>

Also, “The forecast effects of providing facilities at work are illustrated in Table 6. The survey indicated that 26% of employees had access to shower facilities, 35% had secure parking and 17% had both. The forecasts relate to the provision of these facilities for all employees. [Worthwhile] improvements in cycle market share result from the provision of facilities at work, particularly the provision of showers and indoor parking, but that the impact on other modes is limited.” Table 12 shows this effect:

Scenario	Car	Pass	Bus	Train	Walk	Cycle
Base	55.2	10.4	12.7	4.3	11.6	5.8
Outdoor parking provided	54.9	10.4	12.6	4.3	11.5	6.3
Indoor parking provided	54.7	10.3	12.6	4.3	11.5	6.6
Showers and indoor parking	54.5	10.3	12.5	4.2	11.4	7.1

Table 12. Effect of [EOT] facilities at work.<sup>12</sup>

Other studies in 2006 in the Netherlands ran experiments on how driver behavior changed when given direct financial incentives. “In Zoetermeer, The Netherlands, a study showed that 10-14% of car drivers switched to alternative travel modes [i.e. active/public transit] after daily financial incentives of €3-7 were given to regular commuters”.<sup>13</sup>

Location	Reward	Travel behaviour			No trip
		Departure time shifts	Route shifts	Mode shifts	
Zoetermeer	€3	35%	--	10%	1%
Zoetermeer	€7	44%	--	14%	3%
Hollandse Brug	€4 – €6	16%	9%	7%	6%
Moerdijk Brug	€4	15%	28%	5%	6%

Table 13. Effect of financial incentives on commuting behavior.<sup>13</sup>

According to research in the U.S. by Active Living Research, “Giving employees cash instead of employer-paid parking can reduce levels of single-occupant cars, and increase rates of carpools, transit use, walking and biking.”<sup>31</sup>

## 6.2 Free parking woes

A major paradigm shift that should occur in the long-term: COV should start divesting parking real estate ...and even longer-term, this requires updates to parking minimums, union agreements, antiquated zoning/codes, etc. An overwhelming amount of evidence shows the dark side of free parking and it’s obvious that COV succumbs to the same symptoms.<sup>24</sup> As prioritized in the Climate Emergency Action Plan, COV must continue fighting to replace parking minimums with parking maximums Vancouver-wide and divest all parking real estate except the minimum stalls required for people with disabilities, EVs, carpool vehicles, fleet vehicles, and visitor parking.

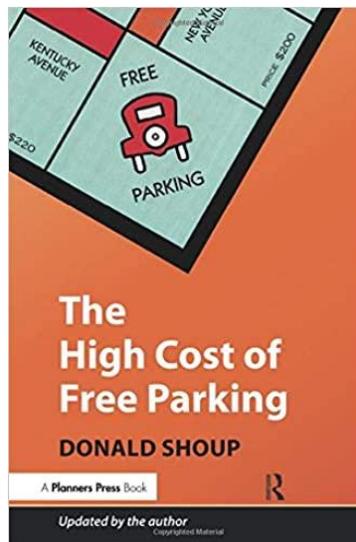


Figure 15. Free parking often hides the true costs of transportation real estate.<sup>24</sup>

According to *The Very Hungry City: Urban Energy Efficiency and the Economic Fate of Cities*, Austin Troy states, “No matter how safe, fast, convenient, and inexpensive bike commuting can be made, however, it won’t be adopted if it can’t at least partially out-compete cars. So, beyond the

“carrot” of incentivizing bicycle commuting, Copenhagen (and many other European cycling cities) also employs the “stick” of policies designed to discourage car use.”

In Copenhagen, “Every year 2 to 3 percent of parking spaces are removed to gradually wean residents from auto-dependency. In addition to being scarce, parking is expensive—about \$5 an hour in the city center. And as the inconvenience and cost of parking increase, so, too, does the rate of bicycling.”<sup>1,2</sup>

Active Living Research states, “The much higher cost of car ownership and use in northern Europe compared to the U.S. encourages bicycling, especially combined with limited car parking, car-free zones, comprehensive traffic calming, and lower overall speed limits, which reduces the overall convenience and attractiveness of car use.”<sup>31</sup>

According to Donald Shoup, America’s distinguished parking expert and author of the High Cost of Free Parking, he publishes case studies on how “cashing out” employees for their parking changes behavior and what free parking parameters affects, see Figure 16 below:

The case studies examined how cashing out affects the following:

- (1) Commuter mode shares
- (2) Vehicle trips to work
- (3) Vehicle-miles traveled to work
- (4) Vehicle emissions from work trips
- (5) Gasoline consumption for work trips
- (6) Employers’ spending for subsidizing commuting

Figure 16. The effects of cashing-out employer-paid parking.<sup>3</sup>

Table 17 shows the resulting changes to trip mode before and after parking price changes in the UK:

	Change in Trips by Each Mode			Change in Total Trips
	Car	Bus	Walk + Rail	
Reading	-23%	14%	14%	-7%
Bristol	-21%	13%	15%	-8%
Sheffield	-17%	8%	8%	-4%
Derby	-13%	9%	9%	-5%
Leeds	-10%	5%	3%	-3%
Average	-17%	10%	10%	-5%

Source: Tables 18 and 19 in Dasgupta *et al.* (1994).

Table 17. Mode shares and total trips for travel to the city center after parking prices are doubled.<sup>3</sup>

Donald Shoup summarizes his 2005 book, *The High Cost of Free Parking*, into three bullet points,

“I recommended three parking reforms that can improve cities, the economy, and the environment:

1. Remove off-street parking requirements. Developers and businesses can then decide how many parking spaces to provide for their customers.
2. Charge the right prices for on-street parking. The right prices are the lowest prices that will leave one or two open spaces on each block, so there will be no parking shortages. Prices will balance the demand and supply for on-street spaces.

3. Spend the parking revenue to improve public services on the metered streets. If everybody sees their meter money at work, the new public services can make demand-based prices for on-street parking politically popular.”<sup>36</sup>

According to CityLab, “France's experiment with paying people to ride to work was by no means a failure. Its impact was marginal, but it was marginal in the desired direction, even without much monetary force. But the real discussion officials need to have is about the best use of this limited money. Perhaps those same resources would have done more good expanding bike lanes, or focusing on workers who just changed jobs, or confronting the politically unpopular topic of free parking.”<sup>37</sup>

Vancouver’s own bicycling advocacy group, HUB Cycling states “any program that encourages cycling is worthwhile.” “Getting people to change that [driving] mindset is much more important than giving monetary incentives,” said HUB. “A bigger incentive would be to take away the free parking that some businesses offer.”<sup>38</sup> Additionally, “MEC does not provide free car parking for staff.”<sup>39</sup>

### 6.3 Outdated perk

Although we didn’t find any hard data on exactly how many free parking stalls exist in COV property, we can assume that roughly 4,000 (~50% of COV employees) have access to free parking. Each \$36-70K parking stall equates to a perk worth approximately \$150-300/month. This contentious equity debate gets complicated by many factors, but generally, COV has been “paying” roughly \$7M per year for half of all COV staff to:

- reside outside Vancouver
- contribute less to Vancouver’s economy and contribute more to suburban economies
- contribute less property taxes to Vancouver and contribute more property taxes to suburbs
- pollute the lower mainland (including Vancouver) with emissions, noise, etc.

The items listed above reinforce the fact that offering free staff parking is in direct contradiction to our Climate Emergency goals as a city and a region.

COV’s current Collective Agreement with CUPE 15 (the most subscribed union for COV staff), states:

#### 3.2 Parking (amended in the 2003-06 negotiations)

Notwithstanding the Employer's prior notice to cease providing free parking commencing 1995 January 01, the Employer agrees to delay the implementation of a paid parking system and will provide employees who currently have free parking available to them with sixty (60) days' notice prior to the date a paid parking system is implemented. Prior to such implementation, the Employer will meet with the Union to discuss impacts and issues and, effective 2004 June 17, the Employer further commits that any moneys collected as part of the Employer-paid parking program will be applied to an Employer transportation program.

These are important considerations to keep in mind when considering any changes to employee parking, benefits, transportation programs (i.e. the SCP).

## 6.4 “Status Quo Bias”

COV staff are just as partial to their current commuting behaviors as anyone else in Vancouver, also known as “status quo bias”, where people tend to maintain established behaviors unless incentives to change are substantial.”<sup>65</sup>

Since most Canadians have commuted via personal automobile for the past 75 years, it’s not surprising that much research about transportation over the past 75 years has “identified only a limited amount of evidence on financial incentives for active travel” according to a transportation journal entitled Financial Incentives to Promote Active Travel.<sup>65</sup>

According to the 2019 HBR article “Why It’s So Hard to Change People’s Commuting Behavior”, the authors recommend 3 strategies in addition to considering timing:<sup>71</sup>

- Make the full cost of driving salient for employees
- Make driving harder, and make other forms of commuting easier
- Change the default work arrangement

## 6.5 Seattle Children’s Hospital example

COV does not have many examples to follow in the Lower Mainland. In fact, the City of Surrey may still offer a small discount on transit pass purchases (~10%), but no other municipalities in metropolitan Vancouver have programs like COV’s SCP. However, Seattle Children’s Hospital (SCH) currently has a unique parking policy that currently functions in a very similar manner to how COV could function in the future.<sup>9</sup> After interviewing SCH, we compared SCH’s current policy with COV’s possible policy:

	Seattle Children's Hospital (SCH)	City of Vancouver (COV)
<b>Main challenge</b>	parking capacity, local traffic congestion	Climate Emergency goals, set the example
<b>Carrots</b>	\$3.50 daily commute bonus (taxable), pre-tax transit pass rebate	\$2.50 daily commute gift card (non-taxable), transit pass rebate (taxable)
<b>Sticks</b>	staff pay for parking, carpools pay half parking rate	67% of staff pay monthly parking fees, 33% of staff pay daily parking fees
<b>Primary funding source</b>	Parking fees	Parking fees
<b>Alternate funding source</b>	Hospital overhead	TBD
<b>Sites</b>	3+	70+
<b>Accountability</b>	staff parking charged and connected to active commute bonus	GoOrca.com doesn't backcheck paid parking and can't backcheck free parking
<b>SCP inception year</b>	1994	2008
<b>Drive-alone rate (inception year)</b>	78%	59%
<b>Drive-alone rate (2019)</b>	33%	46%
<b>Annual decrease in drive-alone rate</b>	2%	3%

Table 18. Compare and contrast between SCH and COV sustainable commuting programs.<sup>9</sup>

SCH charges fees for staff/regular parking, but visitor/patient parking is free. SCH provides daily commute bonus, \$3.5/day via a “commute calendar”. The transit bonuses are taxable transit bonuses,

but a transit pass rebate is pre-taxable. SCH offers the incentive for all non-drive-alone commutes (walk, bike, scooter, roller-skate, etc.) and drivers that carpool pay a half-rate. SCH never has enough parking on-site, so they are channeling parking off-site (with shuttles) sometimes. The program started in 1994 when the drive-alone rate was 78%. Now the goal is a 30% drive-alone rate by 2030. In 2019, the drive-alone rate was 33% following a 2016 drop (from light rail train opening). The main challenge was/is reducing traffic and congestion within residential neighborhood. Public transit has grown near the hospital, so public transit mode share has taken away from walking/biking mode share. Most all buildings have EOT infrastructure. Although SCH could not provide financial details, the program probably runs annual deficits, especially since shuttle costs are high, but hospital overhead absorbs that deficit. Transit pass rebate can be utilized on a per-trip basis or based on a percentage of the cost of an unlimited pass, roughly \$10/month for all trips. There is no incentive for EVs since parking capacity is SCH's biggest concern, not GHG emissions like Vancouver's concern. Additionally, SCH provides solid justification to push daily parking rates instead of monthly at SCH: "Jamie Cheney, the hospital's director of transportation, explained at the ACT conference how parking had been addressed two-fold: by allowing only daily rates that are adjusted annually (since monthly rates ultimately create a driving incentive), and by subsidizing non-driving commuters."<sup>41</sup>

## 6.6 Best practices from other organizations

Although very few organizations offer programs as similar as COV's SCP or SCH's transit/parking program, a few other organizations prioritize active/public transit because they already understand the massive non-quantitative benefits that active/public transit provide.

The financial institution, **Vancity**, locates offices close to transit stations, provides active/public transit rebates, provides a fuel-efficient Toyota Prius vehicle fleet, installed EOT facilities, provides a guaranteed ride home, offers commuter challenges, offers EV matching rebates, provides bike share, offers bike rebates, distributes theatre tickets, and provides credit for MODO carshare. Not only is this good for VanCity leadership and employees alike, VanCity can boast a much higher active/public transit rate than Vancouver residents by stating "55% of Vancity employees commute to work using alternative transportation, compared to 41% in Metro Vancouver at large."<sup>7</sup>

Organizations like **Clif Bar** in California, **Bonneville Power Administration** and **EasyStreet** (both in Portland, Oregon), **New Belgium Brewing**, **Honest Tea**, and **Patagonia** all offer \$27-50 per month in active transit incentives, rebates, and gift cards.<sup>75,76</sup>

**Whole Foods** in Vancouver regularly sponsors Bike To Work Days with free breakfast, offers tax-free bicycle for employees, provides transit pass incentives, holds raffles, and distributes many other active transit rebates.<sup>8</sup> At **MEC**, "employees can cruise straight into an underground bike locker complete with rows of bike parking, then head into the locker room to shower and change before going upstairs to the office."<sup>8</sup>

## 6.7 COV core competencies

If COV considers itself an efficient organization keeping pace with quickly evolving businesses, it must act like one. According to the Harvard Business Review (HBR), organizations must "rigorously define the boundaries of [its] core businesses and get agreement from [its] management team on the battleground."<sup>34</sup> Thus, if anything doesn't directly support a COV core competency, COV should divest or suspend pursuit. And although it may have been considered a core competency or standard perk at COV 75 years ago, staff parking should no longer be one of COV's core competencies or standard perks in 2020. COV perks should start the moment staff walk/roll within 5 meters of the facility footprint, but

not within 100-200 meters of the facility footprint like we allow now. Shall COV also give staff gas cards, coffee vouchers, or podcast subscriptions? These items are just as prevalent and helpful to commuters, but where and when will COV draw the line?

**A major paradigm shift that should occur in the short-term: COV should only offer staff benefits that are healthy.** If COV offers employee perks that only some staff take advantage of, they should at least be healthy perks. Healthy perks/benefits may include free salads, free sneakers, or free bicycles, because these all generally promote a healthy, active lifestyle. Unhealthy perks/benefits include free donuts, free gas, or free parking because these all generally promote an unhealthy, sedentary lifestyle. According to COV's 2012 - 2015 Collective Agreement with CUPE Local 15, single-occupant car commuting assistance like free parking/gas or free junk food (all very unhealthy) are not listed as perks at all.<sup>35</sup> In fact, since car commuting assistance is not listed, all COV employee benefits officially listed are healthy. COV must continue to provide tools/equipment/materials to **perform** your job productively and in the healthiest way (PPE, PTO, tuition assistance, etc.). COV must **NOT** provide the tools/equipment/materials to **arrive to** your job (free parking, gas cards, etc.), especially if arrivals to COV sites contradict Climate Emergency goals and individual/public health. COV should not be in the business of building, maintaining, and providing free unsustainable/unhealthy parking.

## 7. Besides funding SCP deficit, what else should we do?

### 7.1 EOT capital infrastructure

Since dual-purpose EOT facilities (showers, lockers, change rooms, washrooms, towels) support lunchtime/off-hours exercisers, the only tools/equipment/materials that assist active transit commuter arrivals are indoor/outdoor bike parking. EOT opponents could argue that free bike parking equates to free car parking, but this report counters with the fact that (a) bike parking takes 1/10<sup>th</sup> the space of car parking (see Figure 14) and (b) bike parking does not contradict COV's Climate Emergency goals since biking does not create GHG emissions.



*Park up to 10 instead of 1; a brilliant, yet difficult concept for our city leaders and merchants to grasp –*

Figure 14. Bicycle parking consumes 1/10<sup>th</sup> the parking footprint that car parking consumes.<sup>14</sup>

Currently, COV has EOT infrastructure in some of its owned and leased facilities. However, COV does not have an accurate inventory on quantity or the level of quality of that EOT infrastructure. A few

years ago, COV staff visited every COV site, changed all signage to meet all inclusivity accessibility requirements, and saw many EOT facilities, however, EOT inventory was not the primary purpose. This report estimated it would consume roughly 160 man-hours to complete a full EOT inventory analysis COV-wide. REFM doesn't have any inventory of EOT and has no current plans to collect one.

Recommended EOT inventory questionnaire for facility managers at each COV site:

- Number of employees at this site?
- How much bike storage? Indoor or outdoor on premises?
- How many showers?
- How many lockers?
- Other amenities like towel service, loaner bikes, etc.?
- How many parking spaces for COV staff?
- How many minimum parking spaces for EVs, people with disabilities, carpool vehicles, visitors?
- How much EV charging is nearby?

Of the COV sites with known EOT infrastructure, some sites have quite robust facilities that COV can certainly market. For example, National Yard allegedly provides an amazing EOT experience. Evans Yard has an outdoor bike rack, partially covered, behind a fence, so it's unlikely that the public would use it. Evans Yard is an example of one site COV should improve to set a minimum standard for. Other EOT facilities like Marine Gateway sit empty most often. Capital Projects handles EOT infrastructure construction/renovations, except as of now, there is no funding for EOT and the only project in the semi-design phase is the City Hall Subground EOT Renovation Project and the early phase of upgrading Evans Yard's EOT. For new EOT construction or renovation, COV's design/construction practices should follow the following minimum standards:

- COV Parking By-Law Section 6 Off-street Bicycle Space Regulations dated 2016.<sup>42</sup>
- COV Parking By-Law Section 6 Off-street Bicycle Space Regulations updated 2018.<sup>43</sup>
- LEED Bicycle Facilities credit.<sup>44</sup>
- HUB Cycling guidelines.<sup>45</sup>
- BC Active Transportation Design Guide.<sup>66</sup>

For example, below are a few key considerations/requirements for best practice EOT facilities:

	Column 1 Building Classification	Column 2 Required Bicycle Spaces	
		Class A	Class B
6.2.4	Office		
6.2.4.1	Office Uses	A minimum of one space for each 170 square metres of gross floor area.	A minimum of 6 spaces for any development containing a minimum of 2,000 square metres of gross floor area.

Figure 19a. Required bicycle spaces for offices per COV Parking By-Law Section 6.<sup>42,43</sup>

Use	Minimum Number Of:		
	Water Closets	Wash Basins	Showers
Office	1 shower for every 10 Class A bicycle spaces up to 50 spaces and one for every 20 spaces above 50	1 wash basin for any development requiring between 5 and 10 Class A bicycle parking spaces, plus one for every additional 20 spaces up to 50 spaces and one for every 40 spaces above 50	1 water closer for every 10 Class A bicycle spaces up to 50 spaces and one for every 20 spaces above 50

Figure 19b. Required toilets, sinks, and showers per COV Parking By-Law Section 6.<sup>42,43</sup>

### Bicycle storage and shower rooms

Provide short-term bicycle storage for at least 2.5% or more of all peak visitors, but no fewer than two storage spaces per project. Provide long-term bicycle storage for at least 5% of regular building occupants but no fewer than 2 spaces per project in addition to the short-term bicycle spaces. Provide at least one on-site shower with changing facility for the first 100 regular building occupants and one additional shower for every 150 regular building occupants thereafter. Short-term bicycle storage must be within 100 feet (30 meters) walking distance of any main entrance. Long-term bicycle storage must be within 100 feet (30 meters) walking distance of any functional entry. Bicycle storage capacity may not be double-counted: storage that is fully allocated to the occupants of nonproject facilities cannot also serve project occupants.

Figure 19c. Required bike storage, toilets, sinks, and showers per LEED Bicycle Facilities.<sup>44</sup>

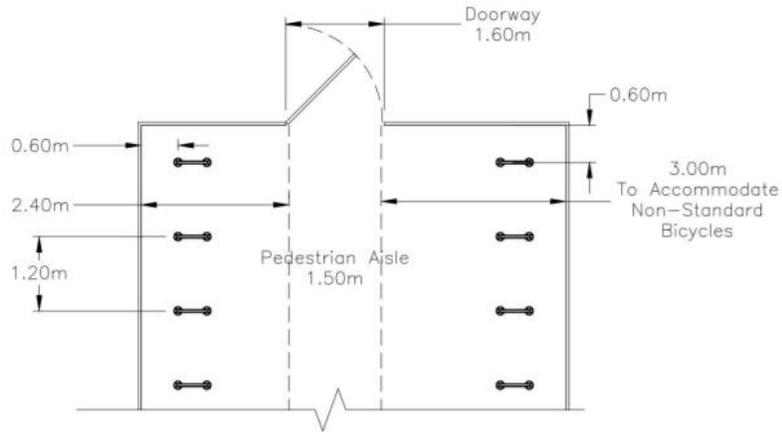


FIGURE H-146 // OFF-STREET BICYCLE PARKING LAYOUT

Figure 19d. EOT secure bicycle storage layout per BC Active Transportation Design Guide.<sup>66</sup>

HUB Cycling recommends COV visit the EOT facilities at Vancouver General Hospital (VGH) on 10th Avenue in Vancouver. It has integrated storage areas, secure parking, repair stations, a dryer and more. Vancouver Coastal Health (VCH) could give more details. Another site to visit, HUB Cycling gave Oxford Place (Oxford Property Group) in downtown Vancouver their Platinum standing and still has a Concierge contact there, who is responsible for the cycling facilities. Some photo examples of best practice EOT facilities in Vancouver are shown below:



Figure 20. EOT secure bicycle storage (Onni Group in downtown Vancouver).<sup>45</sup>



Figure 21. EOT washroom with washer/dryer (Oxford Properties Group in downtown Vancouver).<sup>45</sup>

When applying for capital funding, these guidelines suffice for new construction and spacious renovations, but COV is forced to improvise when renovating space-constrained buildings and add whatever infrastructure they can whether it meets the EOT guidelines.

COV should ensure all new/expanded COV facilities include standard end-of-trip infrastructure. New construction like Crossroads will follow LEED construction standards, while leased facilities will have followed the EOT standard of whatever previous agreement was in place. If City-owned, then REFM likely carved out some space for EOT probably by interior architects or designers, for example the male/female change room on 2nd floor of City Hall in 2008. Given a post-pandemic workplace, it may be possible to install additional lockers at each workstation with more space between.

Information from COV REFM:

- West Annex seismic upgrade needed to remove some parking stalls to widen structural columns and the West Annex bike cage expanded to cover 2+ parking stalls around 2015.
- COV doesn't have any plans to build/expand facilities over existing parking areas or convert parking areas to laydown yards, etc.
- PEF (within REFM) oversees parking, but Easy Park runs parking lots.
- Vancouver By-law mandates a certain amount of parking for any given building, so Council would need to amend the minimum parking by-law (in progress as of 2020).

With dual-purpose EOT facilities, COV can implement strategically placed showers, lockers, towels that assist not only active transit commuters, but lunchtime/off-hours exercisers as well. According to HUB Cycling's Recommendations: BC Active Transportation Strategy dated March 4, 2019, "Mandate active transportation end-of-trip facilities in all provincial government buildings, including secure bike parking, electric-assist cycle charging stations, showers, lockers, and related amenities like hair dryers, etc."<sup>46</sup> COV must request EOT infrastructure funding from the Climate Emergency Proposal via the Capital Improvements Department for high priority COV sites.

## 7.2 Priority EOT facilities and funding

According to a study among DC-area residents, “Compared to individuals without any bicycle facilities at work, commuters with cyclist showers, clothes lockers, and bike parking at work are associated with a 4.86 greater likelihood to commute by bicycle.” Also, “people whose employers offered free car parking had 70 percent smaller odds of commuting by bike, which comes as no surprise, and also that there was no significant relationship between transit benefits and cycling to work.”<sup>47</sup>

City Hall Subground EOT Renovation Project is a project to convert cafeteria to office space, and COV thinks existing washroom could be converted to EOT. With a rough construction estimate of \$500,000-1,000,000 for this project, there is currently no funding for full-scale design nor construction. COV does not have funding for any EOT upgrades. Neither project-specific, nor COV-wide.

According to the most senior Quantity Surveyor for EOT at COV’s REFM Facilities Planning, “There is no easy formula for renovating existing space for end-of-trip facility because there are many unknown variables, design and requirements. However, based on my estimating experience on pricing new construction for end-of-trip facility for industrial warehouse & office buildings, my data shows a new end-of-trip facility is around \$150,000 (hard cost only). If we factor in demo of existing space, hazardous material removal, higher standard code requirements, quality and onsite service connections, I would say a very high level for COV to turn some of our COV spaces to end-of-trip facility would be somewhere around \$200K-230K range (hard cost only). To add soft cost, please add another 30% on top so you are looking around \$260K to \$300K range for a total project cost for a new renovated end-of-trip facility. Please note the above costs exclude any offsite service upgrades, structural/seismic upgrades, fire suppression system upgrades and any possible/potential existing building issues.”

Armed with rough order of magnitude estimates from REFM, we calculated:

$\$300,000 \text{ per EOT renovation} * 20 \text{ COV sites} = \$6,000,000$

$\$6,000,000 + 1,000,000 \text{ for City Hall Subground EOT Renovation Project} = \$7,000,000$

This means COV needs roughly \$7M in funding to install EOT infrastructure for the top 20 most populous COV-owned sites, including the City Hall Subground EOT Renovation Project already conceived. Ironically, this is roughly the amount that COV “pays” annually for COV staff to park freely at various sites, and that only include direct costs.

If COV advocates for \$7M in EOT funding and only receives \$1M in EOT funding, that’s when “urban triage” comes into effect. Suburban Nation and Walkable City author, Jeff Speck, calls “urban triage” how to best use limited urban resources.<sup>26</sup> Applying this principle to COV sites means if we only receive enough funding to build 2-3 EOT facilities, let’s start with the most populous, COV-owned worksites that have the most potential to utilize EOT and prioritize sites accordingly each year. For example, Figure 22 shows the top 20 most populous, COV-owned worksites. This list excludes leased sites and auxiliary, casual, no-benefit, VPD, VPL employees. Therefore, the most populous sites have the highest priority and should receive EOT funding first:

physical location excl aux/cas, excl leased, excl VPL

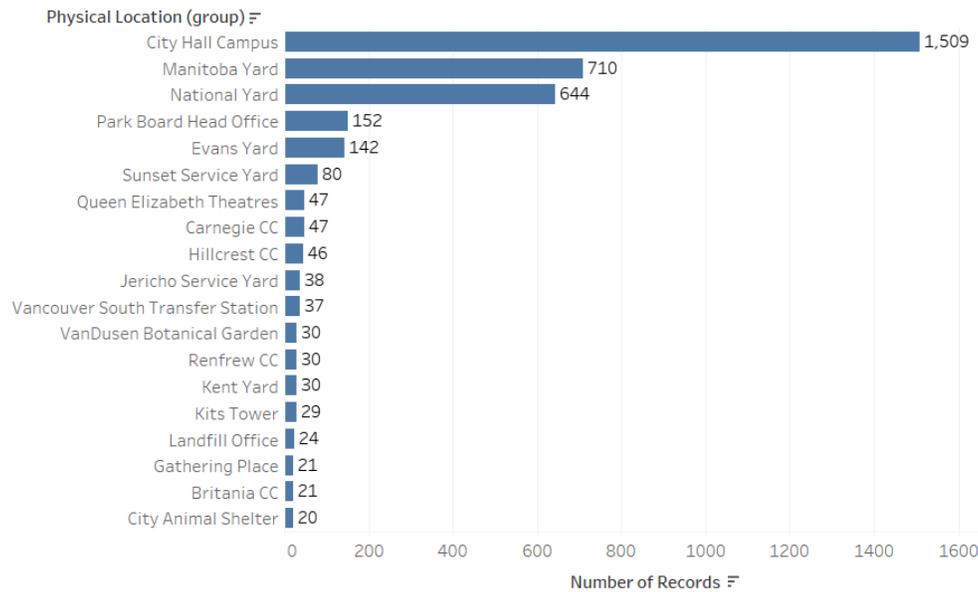


Figure 22. List of COV-owned sites by number of regular COV employees (excl. auxiliary, casual, etc.).<sup>63</sup>

### 7.3 Promotional incentive recommendations

Soft, non-SCP and non-capital-funding incentives include many items. For example, COV has not promoted any walkscore.com walk/bike/transit scores and has not tried soft nudges besides Bike to Work week. Additional ideas include:

- COV could furnish loaner bikes/e-bikes at each COV site so active transit commuters can use them for roundtrip work/personal errands. According to ACT-08 // SHARED CYCLING FLEET of COV's Transportation Demand Management (TDM) Measure – Schedule B, “One (1) cycle for each 3,000 m<sup>2</sup> gross floor area for Commercial – Office.”<sup>73</sup>
- COV could take Park Board Office's suggested idea and promote a bike pooling mentorship program to show new bikers bike safety, bike rules, etc.
- COV could market and promote GoOrca.com not only for commuters to log active/public transit trips in exchange of gift card points/rewards, but to find carpools/friends. Since the SCP was only recently expanded COV-wide, many people do not know about the benefits of GoOrca.com.
- COV should focus on providing only perks that are healthy, so COV could give free healthy food/swag in combination with HUB's Bike to Work week and a possible internal COV Walk/Bike to Work. This would gain visibility and incentivize staff to participate at least a few times per year, hoping these folks enjoy it and decide to bike more often.
- COV could promote GPS tracking apps and award gifts based on how many miles they actively transit from home to work, \$1/km or 1 bran muffin/km for fellow office staff and randomly spot-check to ensure it's (a) by active transit and (b) from their home-of-record. Bike challenges are friendly competition that gain visibility and build camaraderie.
- COV could promote the biking habits of city leadership that are keen and accessible. For example, Sadhu Johnston could ride with staff to work in a promotional “Bike with Sadhu” week.

Sadhu is a dedicated year-round cyclist and he also made a video for COV last year for Bike to Work week. Many CEOs nationwide are willing to set the example for the rest of the staff.<sup>50,51</sup>

- According to WalkScore.com, Vancouver ranks 4<sup>th</sup>, 4<sup>th</sup>, and 3<sup>rd</sup> in walking, biking, and transit accessibility in North America behind walk/bike/transit leaders like New York City, San Francisco, Boston, Minneapolis, Portland, and Toronto.<sup>15</sup> COV must leverage our excellent walk, bike, transit infrastructure AND the brand of biking like Copenhagen does.<sup>17</sup> Since Vancouver already has excellent walking, cycling, and public transit infrastructure, COV should promote walk/bike/transit scores to educate staff about how well-connected the most populous (highest priority) COV sites are:

COV site	# Records	Address	Walk Score	Bike Score	Transit Score	Incentivize...
City Hall	1509	453 W 12th Av	95	85	84	walk
Manitoba Yard	710	250 W 70th Av	54	89	77	bike
National Works Yard	644	701 National Av	71	100	91	bike
Park Board Office	152	2099 Beach Av	79	65	67	walk
Evans Yard	142	955 Evans Av	52	99	82	bike
West Annex	127	515 W 10th Av	98	63	86	walk
Sunset Nursery/ Service Yard	80	290 E 51st Av	87	98	57	walk, bike
Carnegie Community Centre	47	401 Main St	97	98	100	walk, transit, bike
Civic Theatres-Queen Elizabeth Theatre	47	695 Cambie St	98	86	100	walk, transit
Hillcrest Community Centre	46	4575 Clancy Loranger Way	79	100	72	bike
Jericho Service Yard	38	1451 Discovery St	21	80	50	bike
Vancouver South Transfer Station	37	377 W Kent Ave N	76	91	77	bike
VanDusen Botanical Garden	30	5251 Oak St	42	63	66	EV/carpool
Kent Yard	30	900 East Kent Ave S	49	69	59	EV/carpool
Renfrew CC	30	2929 East 22nd Av	70	91	84	bike
Kits Tower	29	2305 Cornwall Ave	91	94	67	walk, bike
Vancouver Landfill	24	5400 72nd St	0	50	0	EV/carpool
Britannia CC	21	1661 Napier St	95	89	76	walk
Gathering Place CC	21	609 Helmcken St	99	70	100	walk, transit
City Animal Shelter	20	1280 Raymur Av	57	88	81	bike

Table 23. List of highest priority COV-owned sites and corresponding walk/bike/transit scores.<sup>4</sup>

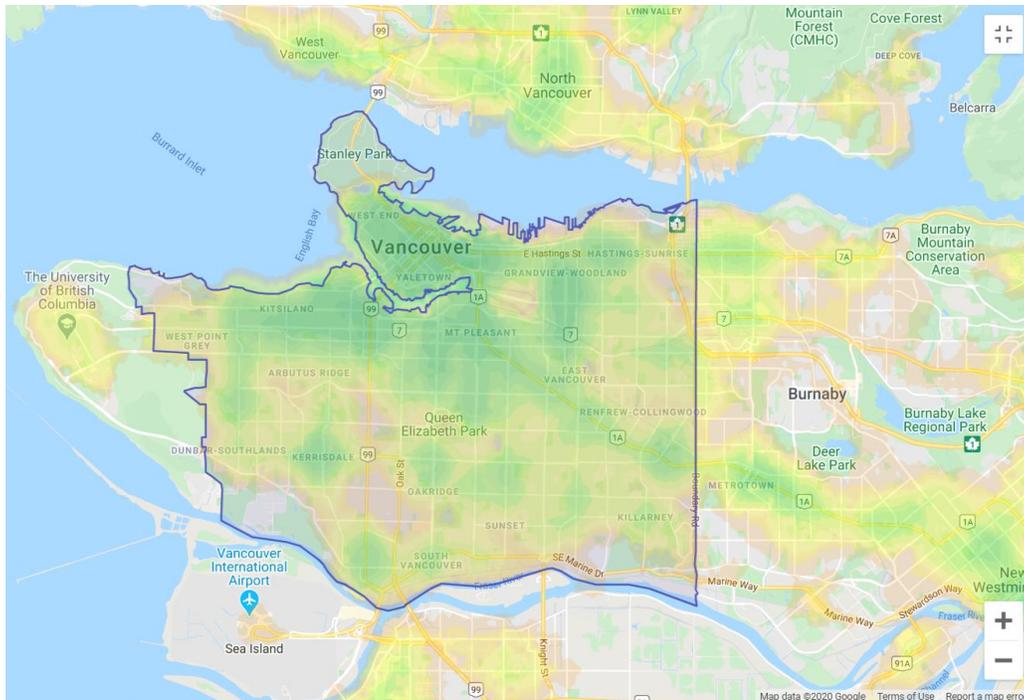


Figure 24. Heat Map of Walkability (Vancouver and adjacent municipalities).<sup>4</sup>

#### 7.4 Revise/expand GoOrca.com

GoOrca.com is COV's local online platform for sustainable commuting that distributed 722 individual gift cards in 2019. Some staff end up getting two or more gift cards per year if they commute by bike consistently. GoOrca.com was created by a third-party vendor called Rideshark who collects a one-time fee to create the platform, then charge COV a yearly maintenance fee based on the geographic size of the service area.

Cost totals for the whole platform are fixed and divided amongst the local member organizations (currently COV, VCH, and Vancouver Island Health Authority (VIHA)). In effect, that means COV pays \$8000 (\$6K + \$2K) for 2020 as our share of the yearly maintenance fee for the platform. This amount will remain constant year over year unless a) new organizations join the platform, b) we expand our service map, or c) we add new modules. Once Rideshark creates the platform, the expectation is that it will be managed locally. Right now, COV is in the position of overseeing the entire platform (for all organizations involved), though we are debating continuing in that role. One option is to transfer management of the platform to a local non-profit (like BEST), who can then act as a local manager of the platform and set maintenance fees.

COV should market, advertise, and promote GoOrca.com to other organizations to (a) reduce GHG in Van and (b) lower maintenance fees for all organizations involved. COV to lead research (possibly joint with HUB or BEST) to reallocate point rates.

And one thing COV must setup (which was dropped in the wake of the pandemic) is a partnership agreement between the three participating organizations. This would include processes for how to handle new organizations that want to join, questions about expanding the service map and adding new modules, and how it will be governed going forward.

COV doesn't yet have the capacity to check every active transit trip and it likely wouldn't be cost effective to do so via current mechanisms. When someone submits a gift card request through GoOrca.com, COV basically looks to ensure that they didn't claim a weekend or statutory holiday as a

commute to workday. If the SCP expansion caused parking passes and incentives/rebates to surge beyond the administrative capacity, COV would need to increase HR reimbursement managers or department representatives to help audit claims or simply forgo auditing to automate rewards disbursements.

Currently, VCH only promotes carpooling via GoOrca.com and doesn't pay any incentives. But VCH may later, and if they do, incentives will probably come from parking or overhead. Although direct financial incentives are unlikely, incentives will come in the form of free bike tune-up vouchers, rewards, subsidies, etc. VCH plans to obtain modal shares via survey. VCH does not experience any pinch points yet because they do not have targets to meet or complaints to assuage. Thus, VCH is open to updating GoOrca.com point distribution since they don't give gift cards. VCH launches carpooling.<sup>52</sup>

VIHA has not launched GoOrca.com yet since they just joined in February 2020. VIHA has a parking capacity motives much like SCH. VIHA has 11 sites including 3-4 sites with limited parking capacity. VIHA charges \$4 per day for all staff and most patients and has no plans to raise parking prices in 2020 or in the future. VIHA has considered an e-bike purchase program for up to \$2000-4000 installment to encourage cycling but has not considered direct financial incentives. VIHA is open to updating GoOrca.com point distribution since they also do not use it for point rates. Since VIHA wants to learn more about how COV distributes gift cards.

Since VCH and VIHA don't have any true pain points or pressure to change, COV has a wonderful opportunity to take a lead role in GoOrca.com and truly set the example for other organizations that can be convinced to join GoOrca.com. Also, VCH and VIHA want to collaborate as well. One of the first items to change about GoOrca.com is the point rates. For example:

commute type	points/roundtrip (current)	points/roundtrip (recommended)	*total points if 20 completed roundtrips/month	months to reach max (500 points)
walk	3	25	500	1.0
bike	5	20	400	1.3
transit	3	15	300	1.7
carpool	2	5	100	5.0
EV	1	1	20	25.0

\*average workdays/month = 20.8

Table 25. Highlighted points are not yet eligible for incentives as of Jul 2020.

Why do we recommend such high point rates for walkers and bikers and public transit? Because if someone walks, not only are they consuming the least amount of space while traveling, they consume the least amount of space while stationary. Figure 26 shows the real estate required for travel mode:

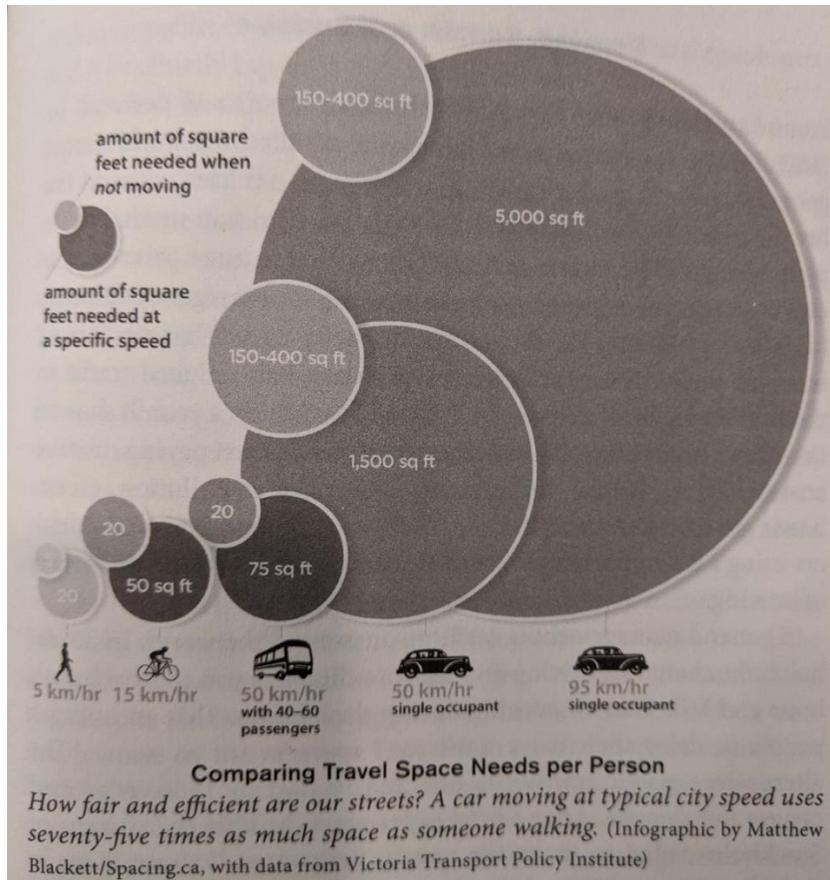


Figure 26. Comparing Travel Space Needs per Person.<sup>16</sup>



Figure 27. How each travel mode costs society when adding internal and external costs.<sup>17</sup>

Walkers consume the least amount of taxpayer funding. This metropolitan Vancouver research includes hard costs (infrastructure, policy, etc.) and external costs (air pollution, decreased real estate values, obesity's burden on universal healthcare, etc.). Not only do walkers and bikers consume less infrastructure, the amount of wear and tear on that infrastructure is 1/65,000 the amount of automobiles.<sup>53</sup>

Sidewalks do not consume nearly as much total transit real estate (per square foot, SF) that bike lanes do. Walkers consume only 20 SF moving and bikers consume 50 SF moving and public transit consume 75 SF.<sup>16</sup> Thus, walkers should receive 3-4x as many GoOrca.com points as public transit, and 2-3x as many GoOrca.com points as bikers.

The original point justification was based on two considerations. 1) Someone commuting by bike is far more likely to taking a car off the road than someone walking. The walker likely lives close to his/her worksite and would walk anyway (even if they weren't rewarded for it). 2) Commuting by bike comes with expenses, namely bike maintenance, so the reward is more proportional to the costs associated with that activity. COV can change the point values, but this needs to be agreed upon by all organizations participating in GoOrca.com (currently COV, VCH, and VIHA). Although these considerations are valid, they are anecdotal and not completely accurate. COV must use quantitative data to support their previous claim if they want to quantify point rates.

Currently for GoOrca.com, only walkers/bikers can trade their GoOrca.com commuting points for gift cards. So unsurprisingly, COV staff who carpool, take public transit, or drive EVs do not log their commutes on GoOrca.com because there's zero incentive to do so other than to find carpool buddies. Therefore, the point rates must include at least nominal points for transit/carpool/EV commuters so (a) those commuters feel good about gaining at least some commuting points and (b) those commuters are helping Climate Emergency goals at least minimally and (c) COV pays a lump sum for the GoOrca.com platform regardless of number of users, so COV should promote use as widely as possible to give rewards/rebates and advertise carpool buddy matching.

## 7.5 SCP revisions

There are certainly a few things COV can do now to revise the current SCP without additional funding:

- Consider more gift card options besides just MEC, Lululemon, and Lush Cosmetics. If gift card options align with SCP values, commuters may want Safeway, No Frills, Compass, Mobi, or Uber gift cards since commuters may need or want groceries and other transit flexibility instead of athletic/cosmetic stuff. Also, commuters may elect to forgo gift cards entirely in favor of non-taxable "transit reimbursement" or "cash bonus" line item on paychecks, maybe even accept a \$25 transit reimbursement instead of a \$50 gift card (since some COV staff do not want the hassle of gift cards).
- Advertise the user-friendly interactive map for parking for COV staff who insist on driving and want to know where to park on the market.<sup>72</sup>
- To incentivize staff that work at remote COV locations, the SCP must incentivize carpool (incentives and buddy-matching via GoOrca.com), EVs (free parking), and/or transit rebates for these employees. However, if transit still takes too long because of the remoteness, employees are left with just two incentive options (carpool, EV) to avoid daily/monthly parking rates.

## 8. Why should we fund SCP deficit AND fund other incentives?

Why charge all COV staff to park, thus properly funding SCP in hopes of encouraging active/public transit and thus decreasing GHG emissions? In a word: LEADERSHIP.

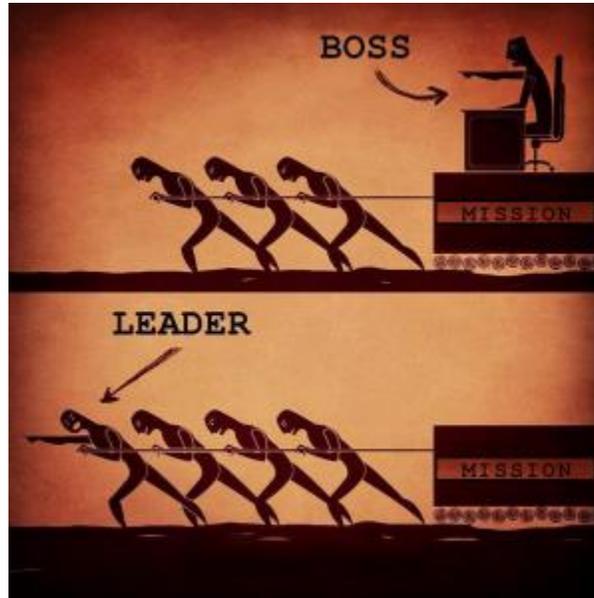


Figure 28. COV staff must show Climate Emergency leadership by setting the example.<sup>18</sup>

**If COV wants to lead by setting the example, it must at least meet the active/public transit rates of Vancouver residents.** According to pg. 4, 26, and 69 of the Summary Report of the 2018 Vancouver Panel Survey and averaging the percentages, COV staff are well below walking (COV 9% vs. pop. 17%), slightly below biking (COV 10% vs. pop. 14%), and slightly below transit (COV 23% vs. pop. 29%) rates compared to the general population of Vancouver.<sup>54</sup> Additionally, more recent survey results from the 2020 Greenest City Action Plan suggest even higher total active/public transit rates for Vancouver residents (64% in 2020 vs. 60% in 2018).<sup>56</sup>

	Commuting rate of...	
	Vancouver residents	COV staff
via walk	17%	9%
via bike	14%	10%
via transit	29%	23%

Table 29. Active/public commuting rates of Vancouver residents compared to COV staff.<sup>54</sup>

Comprehensive research shows that there's no silver bullet to increasing active/public transit at COV, city-wide, or metropolitan-wide. Thus, COV must implement change on many fronts: properly pricing staff parking at all COV sites, providing incentives to active/public transit commuters, promoting soft incentives, funding capital projects for EOT infrastructure at all COV sites, funding capital projects for public active/public transit infrastructure, create more density via zoning updates, switch parking minimums for parking maximums, etc. These combined efforts will create change, whereas funding just

one of the options above will not reach BM#2 targets. According to Active Living Research published in 2016, "There is currently insufficient evidence that by themselves, programs targeting the general population, such as carpooling, financial incentives, and mass media efforts and publicity campaigns result in population-level increases in active travel."<sup>31</sup>

Vancouver must compare its progress to Copenhagen for a multi-pronged approach because Copenhagen is the gold standard for active transit. Why? Simply because Copenhagen's active transit rates (55%) are triple COV's active transit rates (19%).<sup>11,54</sup>

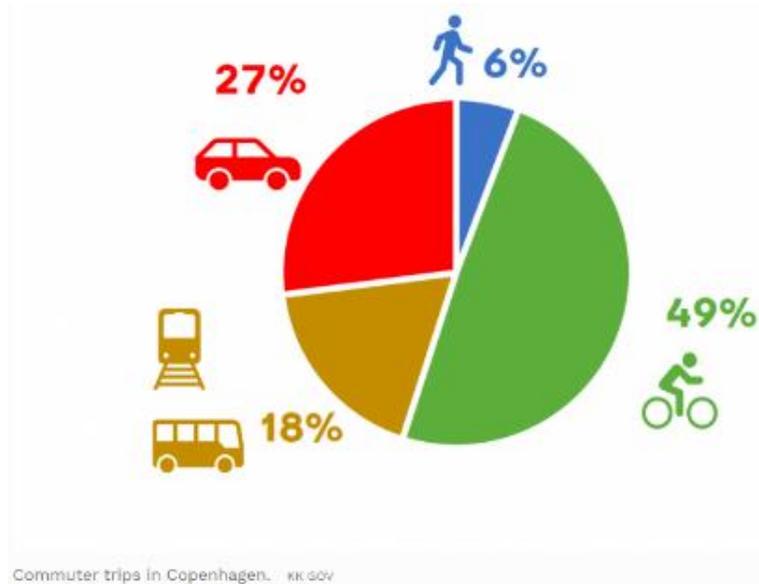


Figure 30. Commuter Trips in Copenhagen, 2018.<sup>11</sup>

So, if Vancouver wants to claim the Greenest City title, it must follow Copenhagen's approach. Aside from the ambitious claim of the world's Greenest City, Vancouver isn't even the most bicycle friendly city in Canada.<sup>19</sup> Montreal is slightly more bicycle friendly than Vancouver according to the Copenhagenize Index, a leading metric on cycling culture and infrastructure.<sup>19</sup>

In addition to active transit infrastructure, according to a 2019 study on correctly pricing car use and promoting dense urban development, it states, "a close look at the specific policies for taxing and pricing of cars and fuel, and promoting dense urban development are key to understanding why Copenhagen has been so successful."<sup>55</sup>

According to a 2017 article discussing if Danish infrastructure could be implemented in Canada, it states "Canadian cities present their own unique challenges. A bike lane design that works in Manhattan might not work in Montreal. But the bigger idea from the Copenhagen model could be applied here: a redefinition of what roads are for. They're not for moving cars, but people."<sup>25</sup>

"We don't really have that war on cars rhetoric [in Denmark]," Thoen says. It's about money. Cost-benefit: "Cycling infrastructure costs less to build and maintain. In Copenhagen, it's the little things that make cyclists feel safe enough to yawn: a five-centimetre curb separating cycle tracks from the road, or a "pregreen" traffic light that gives cyclists a five-second head start at traffic lights. One oft-quoted Danish study found that for every kilometre cycled, society profits 23 cents, and for every kilometre driven, it costs society 16 cents."<sup>25</sup>

## 8.1 Long-term scenario planning (realistic)

Regarding long-term scenario planning for the SCP, we can only realistically forecast budgets for the next 10-20 years. However, we can base our 2030 goals on organizations and cities that already achieved such results.

For example, Table 31 shows a 2030 target of 33% drive/carpool/EV rate and 67% active/public transit rate. This is a very realistic goal for 2030 because not only is that Vancouver’s BM#2 target, but SCH already had drive/carpool/EV mode share rates this low in 2019. So, although COV would be 11 years behind SCH, COV can certainly achieve similar results. If SCH can do it, COV can do it.

Table 31 also shows a 2040 target of 27% drive/carpool/EV rate and 73% active/public transit rate. This also is a very realistic goal for 2040 because Copenhagen already meets this trip mode share in 2018 (see Figure 30). So, although COV would be 22 years behind Copenhagen, COV can certainly achieve similar results with maximum effort. If Copenhagen can do it, COV and even metropolitan Vancouver can do it.

Finally, Table 31 shows a 2090 target of 10% drive/carpool/EV rate and 90% active/public transit rate. It’s too soon to tell if this is a realistic goal in 2090, but a 25% drive/carpool/EV rate is probably too easy of a target and a 1-5% drive/carpool/EV rate is probably unrealistically low given humans’ historic love affair with motor vehicles. However, a “90% by 2090!” marketing campaign could become quite catchy. If Vancouver and COV approaches these 2090 levels, COV will certainly need to convert underused parking real estate well before it reaches that point.

<b>Year</b>	<b>Drive/Carpool/EV</b>	<b>Walk/Bike/Transit</b>	<b>Notes</b>
<b>2030</b>	33%	67%	Meet BM#2 target, meet SCH mode share in 2019
<b>2040</b>	27%	73%	Meet drive modal share for Copenhagen in 2018
<b>2090</b>	10%	90%	"90% by 2090!" campaign

Table 31. Long-term scenario planning.

## 9. Final recommendations for COV leadership

This report makes many rational, logical arguments for the SCP revisions and other ways COV can meet BM#2 targets, help Climate Emergency goals, and showcase leadership by setting the example. Below is a prioritized list of recommendations for COV to implement immediately:

1. Ensure long-term SCP self-sufficiency by instituting employee-paid parking at all COV worksites.
2. Advocate for up to \$7M of EOT infrastructure funding over the next 10 years.
3. Inventory EOT infrastructure and parking stalls at all COV worksites.
4. Advertise SCP and promotional incentives at all COV worksites.
5. Offer only staff benefits that are healthy for both employees AND the region.
6. Divest parking real estate within COV and switch parking min. to max.

## 10. Tasks ahead upon approval

This report began by researching many areas of how to increase active transit among COV staff. The final recommendations are listed above, but once COV officially allows employee-paid parking at all COV sites, there is much work still to do. For example, the tasks below are listed in prioritized and time-sensitive order:

1. Contact EasyPark and solicit hourly/daily market rate suggestions for all COV sites.
2. Calculate and delineate the minimum parking stalls required for people with disabilities and visitors (and suggested parking stalls for carpools and EVs) at all COV sites.
3. Contact PEF to determine which existing parking areas PEF may want to repurpose for future facility expansion, laydown area, stalls for leasing, etc.
4. Contact VCH and VIHA to revise GoOrca.com commute point rates and solicit more organizations to participate (and cost-split) the GoOrca.com platform.
5. Update or eliminate written agreements and unwritten union agreements that state COV will provide parking and won't charge above market rate for parking.
6. Determine a way to allow auxiliary, casual, no-benefit, VPD, and VPL employees at COV to eventually gain access to SCP incentives.
7. COV has not conducted a quantitative analysis as to how popular EV incentives would be, nor how much EV infrastructure would cost. Where can we install EV charging, who would benefit the most, and what are the financial incentives model? These questions among many will require answers before moving forward with EV charging at COV.

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Van parking real estate (undeveloped)

[https://www.zillow.com/homedetails/LOT-William-St-C-Vancouver-BC-V5L-2R8/2083811869\\_zpid/](https://www.zillow.com/homedetails/LOT-William-St-C-Vancouver-BC-V5L-2R8/2083811869_zpid/)

Price           \$108,000  
Area            540 SF  
                  200 \$/SF

Parking space real estate required per stall: "Typical ranges for surface parking lots are 300 to 350 square feet per parking stall"

<https://www.hunker.com/13425060/how-to-calculate-the-square-feet-of-pavement-for-parking-spaces>

low est.           180 SF       (9' x 20')  
middle est.       300 SF  
high est.         350 SF

low est.         \$36,000 ... (180 SF \* \$200/SF)  
middle est.     \$60,000 ... (300 SF \* \$200/SF)  
high est.       \$70,000 ... (350 SF \* \$200/SF)

How to calculate monthly payment on 30-year mortgage of each parking stall

<https://www.ratehub.ca/mortgage-payment-calculator>

low est.         \$150 per month  
middle est.     \$250 per month  
high est.       \$300 per month

Value of all 4,000 free COV parking stalls

low est.        \$7,200,000 per year  
middle est.    \$12,000,000 per year  
high est.       \$14,400,000 per year

Other market options...

\$45,000 <https://www.cbc.ca/news/canada/british-columbia/downtown-vancouver-parking-stall-on-sale-for-45k-1.3171320>  
\$50,000 <https://bc.ctvnews.ca/vancouver-s-cheapest-real-estate-listing-right-now-is-a-50k-parking-spot-1.4469864>  
\$60,000 <https://www.vancourier.com/real-estate/how-much-should-a-parking-spot-cost-the-property-user-1.23861280>