Final Technical Appendix

Group G: Calgary Transit

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**Description of Data Product**

As seen in the presentation, our project includes a demand and supply index that are standardized and then used to calculate a demand and supply gap for approximately 200 communities within the city of Calgary. We have calculated the supply index with the method we outlined in the presentation, using the service coverage, frequency, and capacity. A few assumptions have been used here. First, with service coverage, any community that is included in a 400m radius of a bus stop or 800m radius of a train station is considered served by that stop. For service capacity, we assume that the trains and buses of the future will have the same capacity as in the present. We assumed 65 was the capacity for MAX buses and 600 was the capacity for trains, which included standing room. Finally, for service frequency, we used data to develop a relative frequency for each train and MAX bus route. We assumed future bus routes will carry the same frequency as the MAX teal route does today, and the green train line will carry the same frequency of service as the red line does today. In addition, we consider that rush hour frequencies (6-9am, 3-6pm) are higher than other hours of the day and adjust our overall frequencies accordingly. The formula to calculate the total supply index is given below.

The Z score for service coverage, frequency and capacity are added together and divided by 3, which is then standardized. The results have been displayed and generally downtown communities and communities surrounding the University of Calgary and SAIT seem to be the most covered by the current network. We have also calculated the supply index for the proposed future primary transit network that will be constructed over the next 20-25 years.

To calculate the demand index, we are using four transit disadvantaged groups which are seniors (over age 65), low income, those spending more than 30% of their income on rent, and those who are already employed and using transit to commute to work. We have calculated our demand index using two different methods. The first method calculates a Z-score (using mean and standard deviation) for each of the four-transit disadvantaged groups and finds the sum of the four Z-scores. Although very useful, this method’s versatility is limited and so the code for method 2 will be submitted for reasons explained later. These are then standardized with the highest demand community given a 1 and the lowest demand community given a 0. The formulas are given below for how the Z score sum is standardized and how the total demand index (TDI) is calculated:

TDI = SS(Zlowincome + Zseniors + Zgreaterthan30%rent + Ztransitusers),

The second method uses the totals in each community for the four transit disadvantaged groups and sets a weight to each of the four groups. This method is more versatile, and we have a goal to create a dashboard where the user can adjust the weights placed on each group accordingly, which would allow Calgary Transit to set the weights as they see fit. The python files for this will be submitted. The sum of the four groups multiplied by their respective weights is then standardized in the same way as seen below.

TDI = SS(lowincome\*wlowincome + seniors\*wseniors + greaterthan30%rent\*wgreaterthan30%rent + transitusers\*wtransitusers),

For our model, the weights are distributed equally among the four transit disadvantaged groups. Therefore, a weight of 0.25 has been assigned to each of the groups. These can be modified with the dashboard.

After calculating the supply index, we calculated the transit gap by finding the Demand Index – Supply Index for each community and giving the community a corresponding letter grade based on how well supply is meeting demand. We calculated the gap for both the current and proposed future primary transit network, with the assumption that standardized demand within Calgarian communities will stay the same over time. We used GIS to map the results of the transit supply and transit gap for the current and future network, and the demand index is displayed with GIS as well. Please see the python files for how we computed the demand index using method 2 and supply index for the current and future network. Finally, as mentioned earlier we used GUI to allow the user to adjust the weights using demand index method 2 accordingly and study how the results change. This allows greater flexibility for calculating demand and allows the user to prioritize specific transit disadvantaged groups where they feel it is necessary. The results for this are included in the submission in a separate file.