BIXI 2 DELIVERABLE

BIXI VISUAL ANALYTICS

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INTRODUCTION

As requested by the Bixi organization, this report showcases visuals created to understand how the Bixi service is used. Included in this report are insights/patterns observed in the data through visualizations. In order to cater to different departments within the Bixi organization, each section outlines questions asked by the department, along with the data visualizations and patterns noticed.

UNDERSTANDING THE USAGE OF BIXI SERVICE

As requested by the Business Intelligence Manager, the following sections outline different visualizations on the usage of Bixi service with added factors like membership status, and top stations with a high percentage of round trips.

DIFFERENCE IN MONTHLY TRIPS FOR 2016 AND 2017

Figure 1 below shows that the total number of monthly trips for 2017 was higher than the monthly trips for 2016, except for the month of November where the total number of trips in 2016 was slightly higher than the total number of trips in 2017. This shows that the Bixi service was generally used a lot more in 2017 than in 2016.

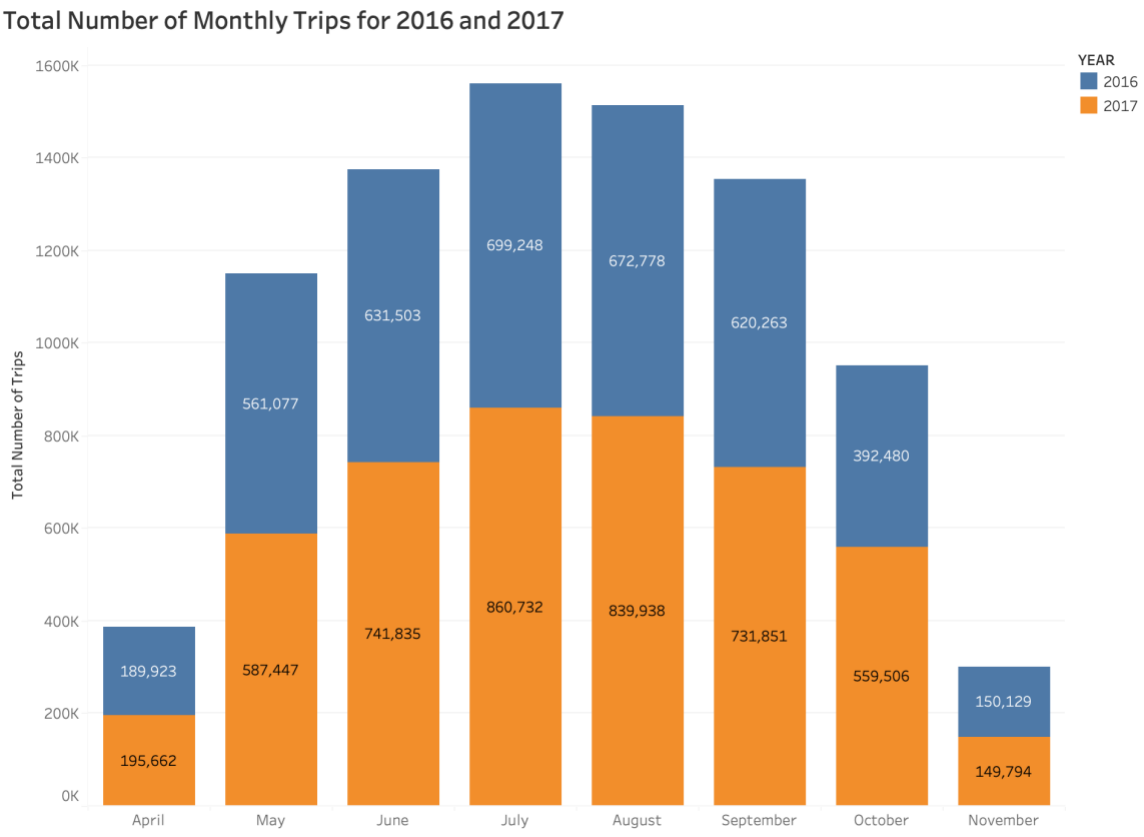

Figure 1 - Total Number of Monthly Trips for 2016 and 2017

PERCENTAGE OF TOTAL TRIPS BY MONTH FOR 2016 AND 2017

As stated in the previous section, the total number of monthly trips in 2017 is generally higher than the total number of monthly trips in 2016. For the percentage of total trips by month for 2016 and 2017, there is a similar trend in the fact that the summer months (specifically June, July, and August) have the highest percentage of total trips for both years.
However, Figure 2 shows that the percentage of total trips by month increased in July, August, and October for the year of 2017 and decreased for the rest of the months in comparison to the percentage of total trips in 2016.

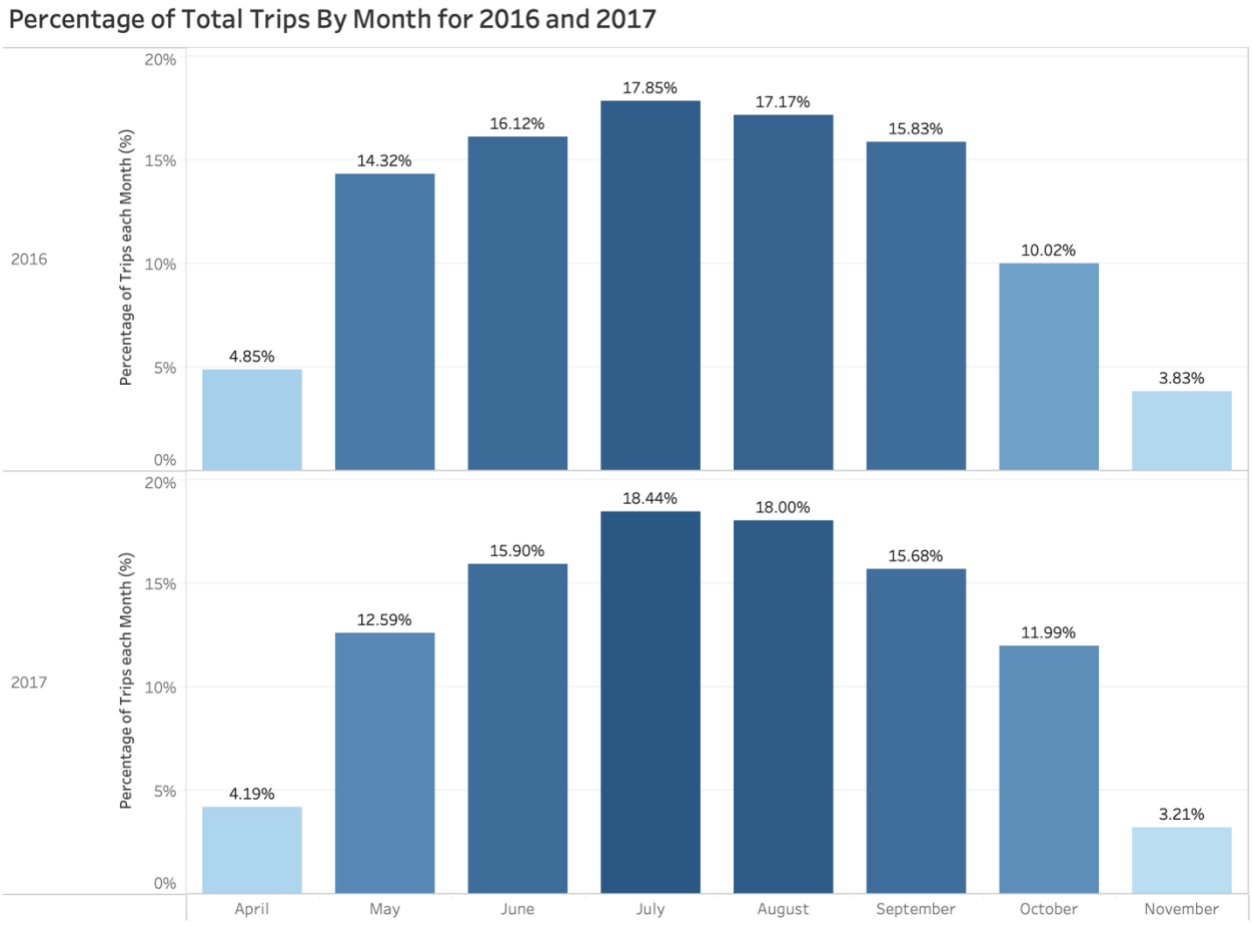

Figure 2 - Percentage of Total Trips By Month for 2016 and 2017

USAGE OF BIXI BIKES BY MEMBERS

To better understand how membership status affects the total number of trips in 2017, Figure 3 was created to show the percentage of trips by members for each month. This visual shows that majority of trips were taken by members in the month of November at 92.5%, and the percentage of trips by members was at its lowest in the month of July at 76.4%.

Meaning, that in general, majority of trips throughout the year is by members, but there is an increase in non-member trips in the month of July, where the percentage of trips by members is at its lowest. It seems that as the summer months approach, the percentage of trips by non-members increase.

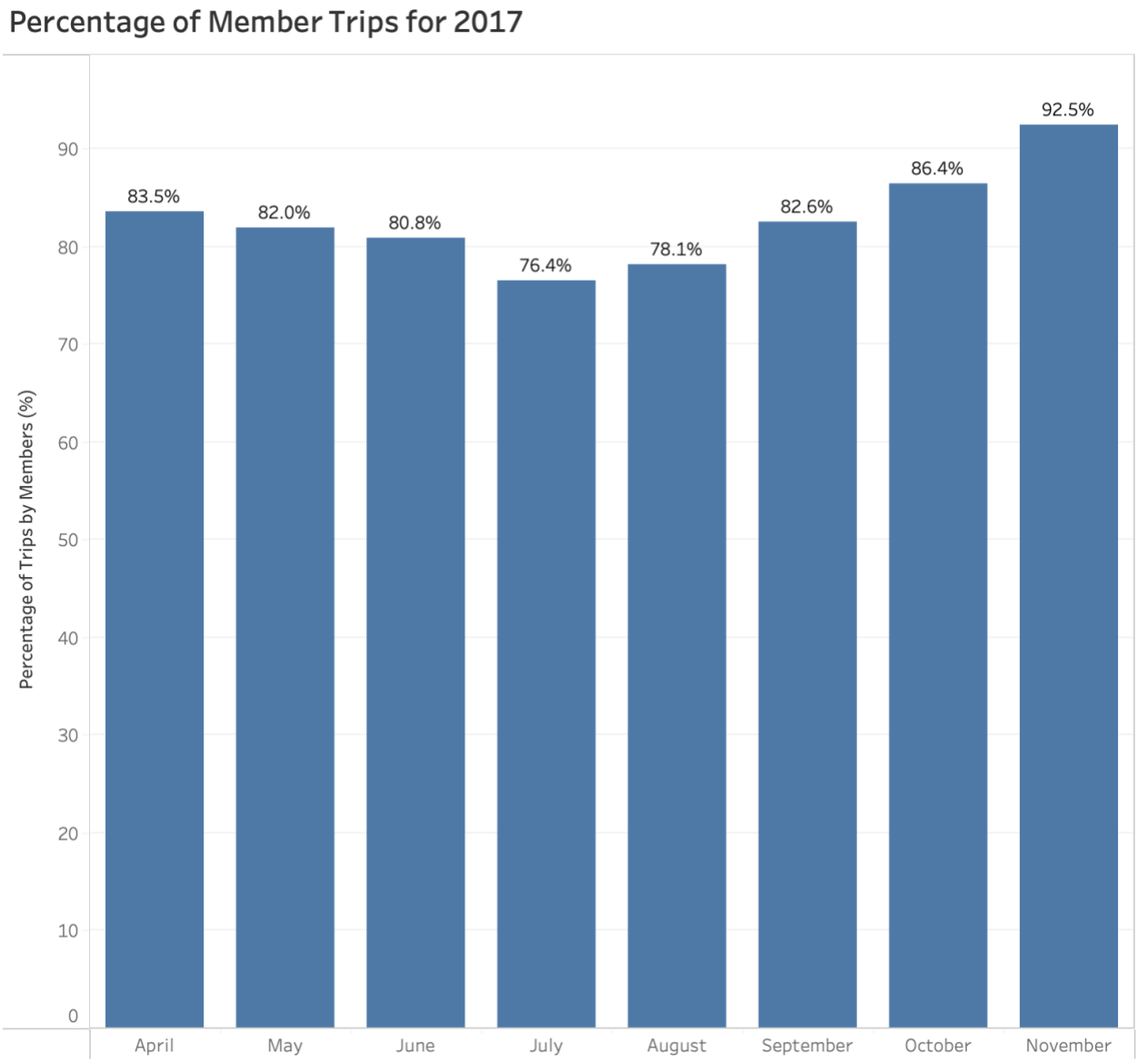

Figure 3 - Percentage of Member Trips for 2017

TOP STATIONS BY PERCENTAGE OF ROUND TRIPS

Figure 4 shows the top ten (10) stations by percentage of round trips. This figure shows us the top stations that had the highest percentage of round trips, where Bixi users start and end their trips at the same station the most.

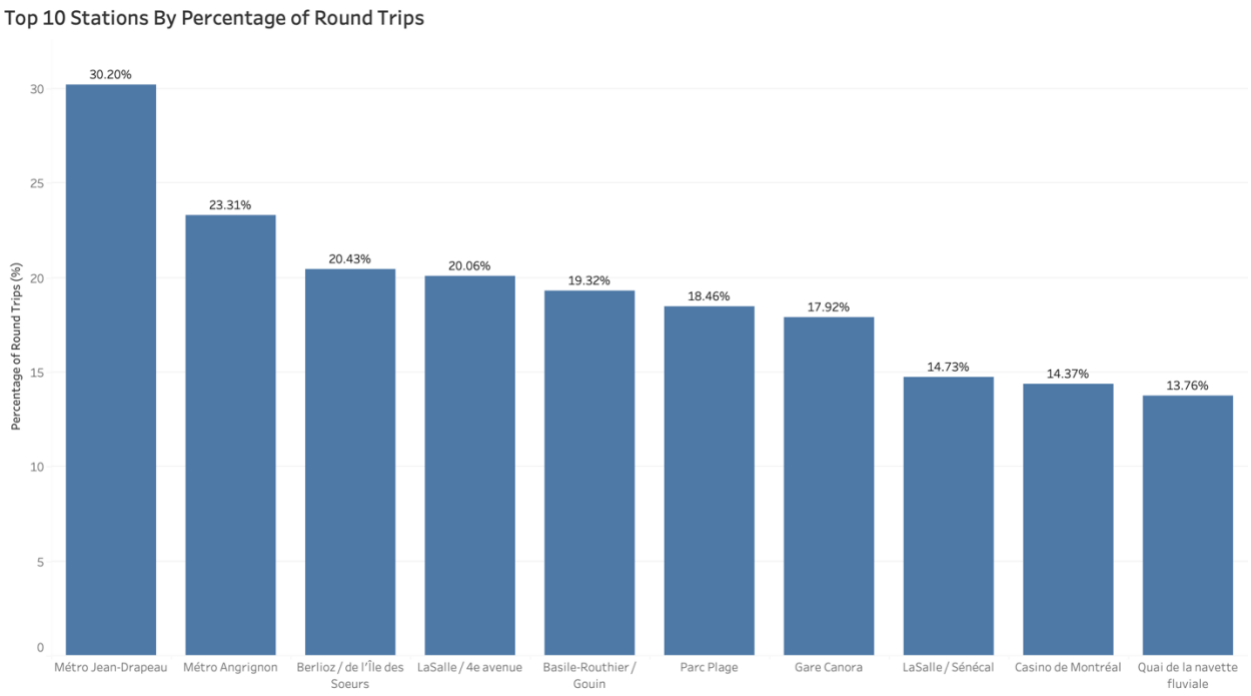

Figure 4 - Top 10 Stations by Percentage of Round Trips

FACTORS THAT INFLUENCE THE USAGE OF BIXI BIKES

As requested by the Marketing Team, the following sections outline different visualizations on how people use the Bixi service, in terms of duration of trips, and observed factors of influence, like membership status, and location of stations.

RELATIONSHIP BETWEEN ROUND TRIPS AND MEMBER TRIPS AT THE STATION LEVEL

To better understand the relationship between the percentage of round trips and percentage of member trips by station, Figure 5 was created to show the percentage of round trips and members based on each station. The scatter plot shows that majority of trips by members are not round trips, and there are more round trips when the percentage of non-member trips increase.

Simply put, when non-members use Bixi, there is a higher chance that they will start and end their trips at the same station (a round trip). When members use Bixi, there is a very low chance that they start and end their trips at the same station. It is likely that members mostly start their trips at one station and end trips at a different station.

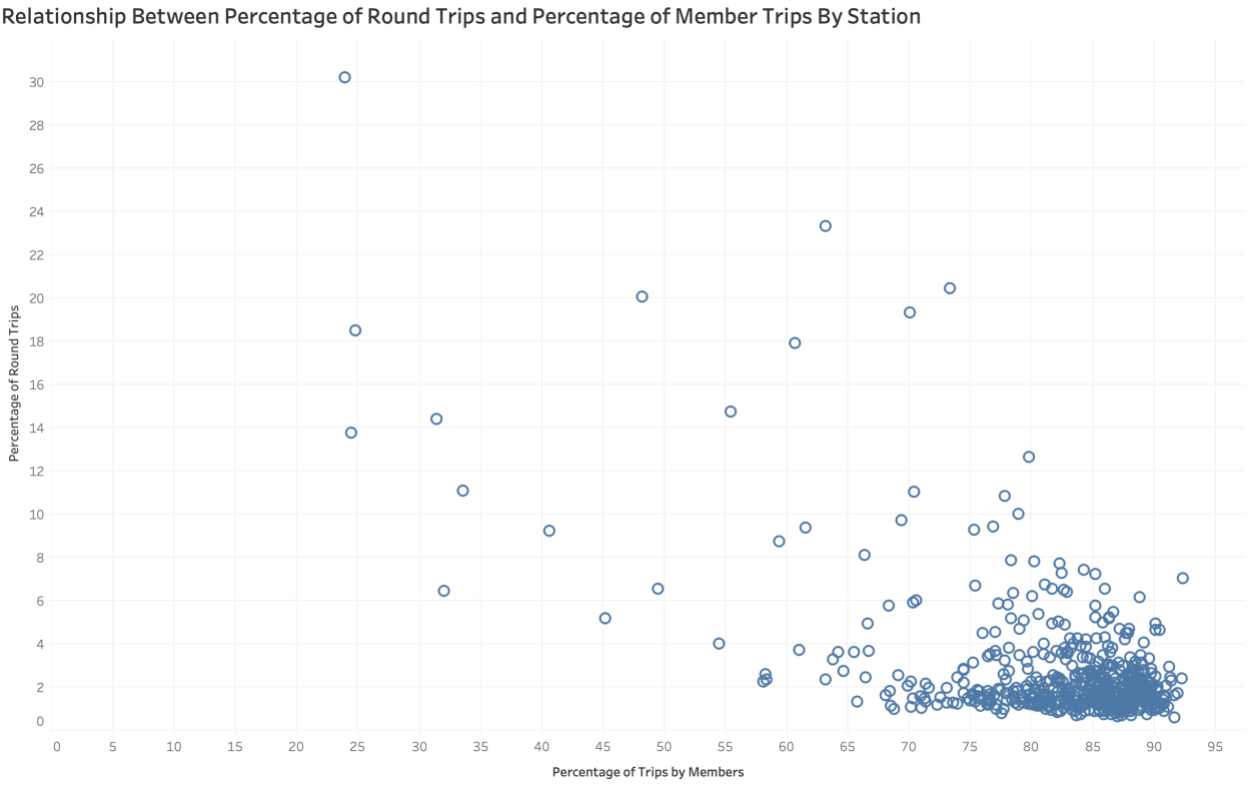

Figure 5 - Relationship Between Percentage of Round Trips and Percentage of Member Trips by Station

DIFFERENCE IN TRIP LENGTHS FOR MEMBERS AND NON-MEMBERS

The histogram in Figure 6 shows the total number of trips based on the duration in minutes for both members and non-members.

The trip length with the greatest number of trips by members is about five (5) minutes, while the trip length with the greatest number of trips by non-members is about twelve (12) minutes. There is a spike in terms of trip length for non-members in the five (5) minutes range, before it drops significantly past ten (10) minutes. This shows that most member trips are between two (2) and twelve (12) minutes in trip length, and most non-member trips are between five (5) minutes and 23 minutes in trip length.

Therefore, based on the data, members take shorter trips than non-members in terms of the length of trips.

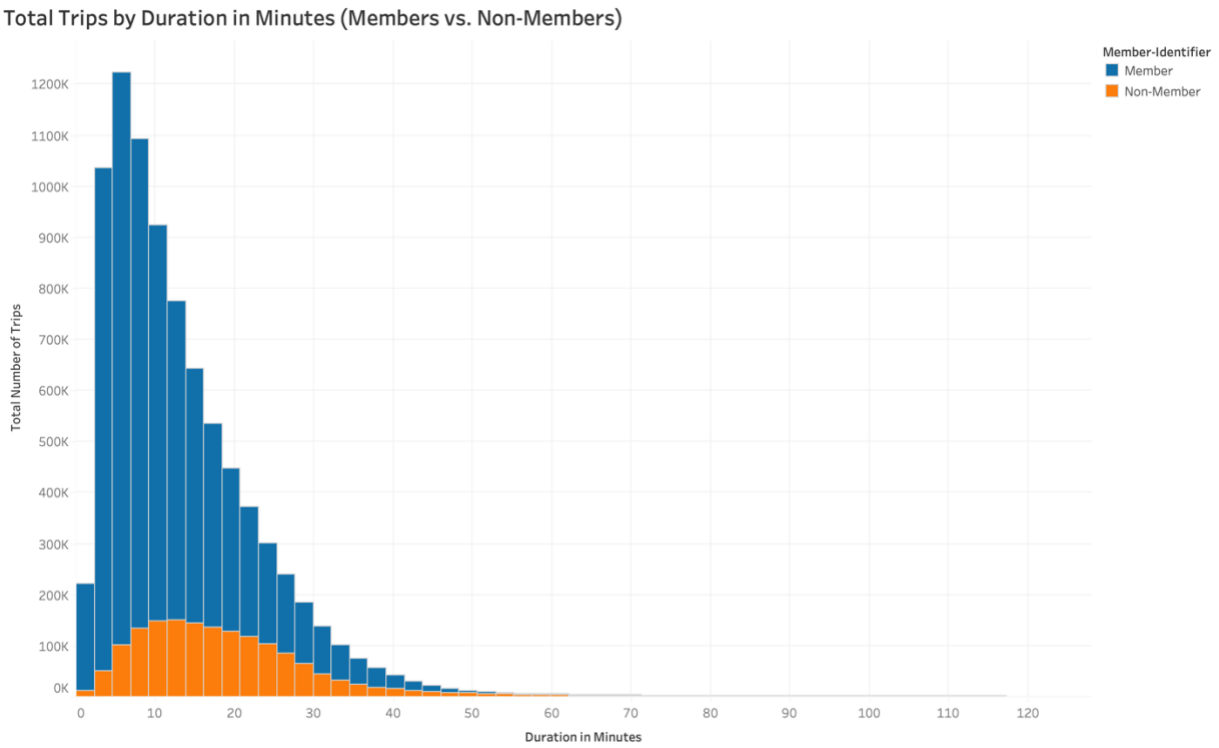

Figure 6 - Total Trips by Duration in Minutes (Members vs. Non-Members)

AVERAGE TRIP DURATION PER STATION ACROSS THE CITY

The map in Figure 7 shows the average trip duration per station across the city. Identified in red are stations with the shortest average trip (in seconds), and the blue dots identify stations with the longest average trips. The map shows that the stations outside of the central location in the city have the longer trips, and as the station gets more central (possibly in the downtown location), the trips get shorter. This might be due to the proximity of the stations in the central location.

The stations on the outskirts have more distance between them, rather than the stations in the central location. Bixi users can easily start a trip at a station and quickly end it at another station in close proximity to their starting station – when it is centrally located. The stations with the longest average trip duration are stations on the islands or stations close to water bodies, or stations that are far away from the centrally located stations. This might be because the end station is farther from the starting station, therefore increasing the duration of the trip.

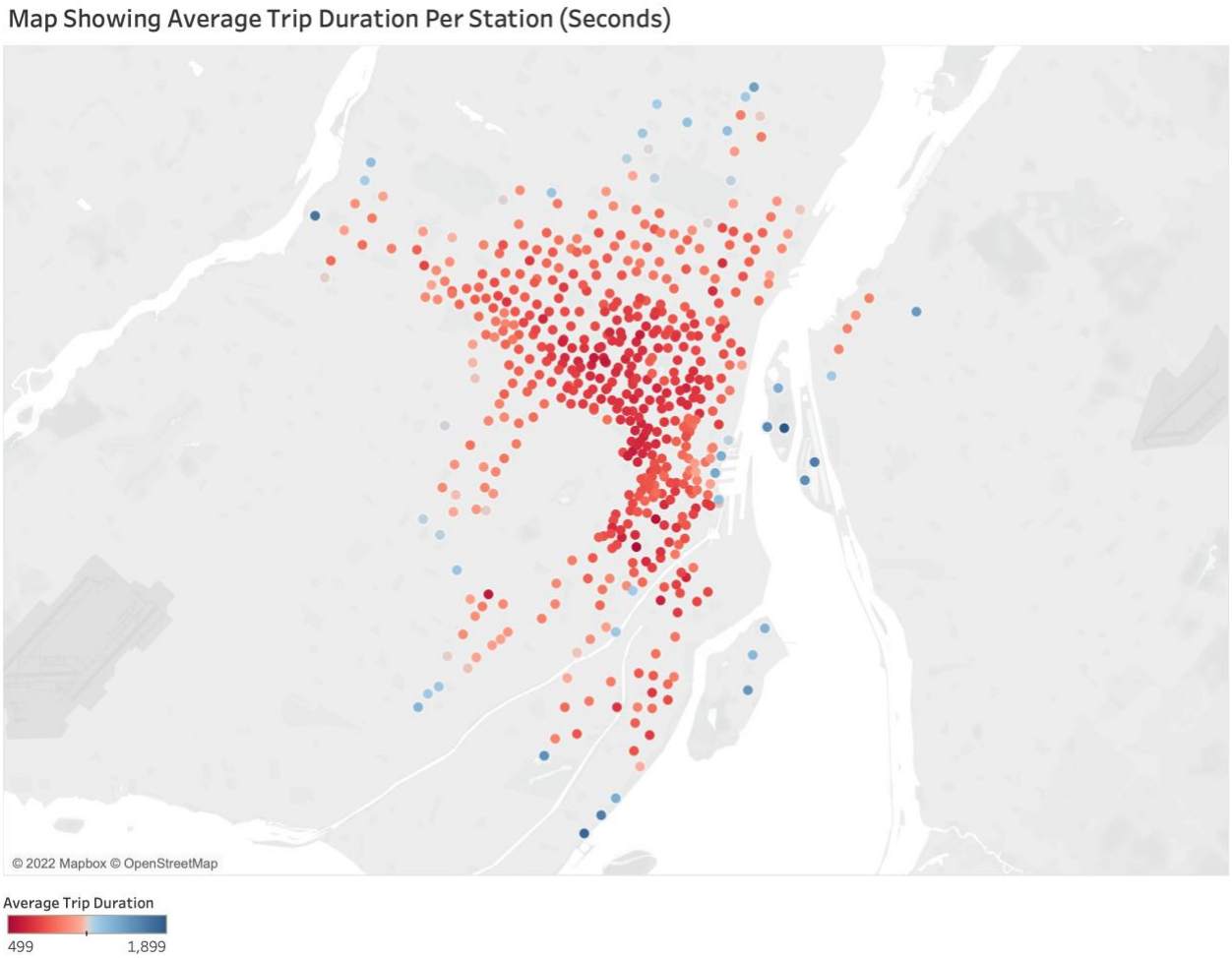

Figure 7 - Map Showing Average Trip Duration Per Station (in Seconds)

REVENUE GENERATED BY INFREQUENT USERS

As requested by the Finance Department, the following sections outline different visualizations on the revenue generated by infrequent users, who make single, shorter trips an hour or less. For the sake of this analysis, it was assumed that non-member trips are single trips.

The revenue from single trips, by infrequent users (non-members) was calculated based on the pricing model below:

- $2.99 flat rate for each trip that is 30 minutes or less
- $4.79 for trips greater than 30 minutes, up to 45 minutes in length
- $7.79 for trips greater than 45 minutes, up to 60 minutes

Based on this pricing model, the revenue for each rate was calculated. The results are found in Figure 8 below.

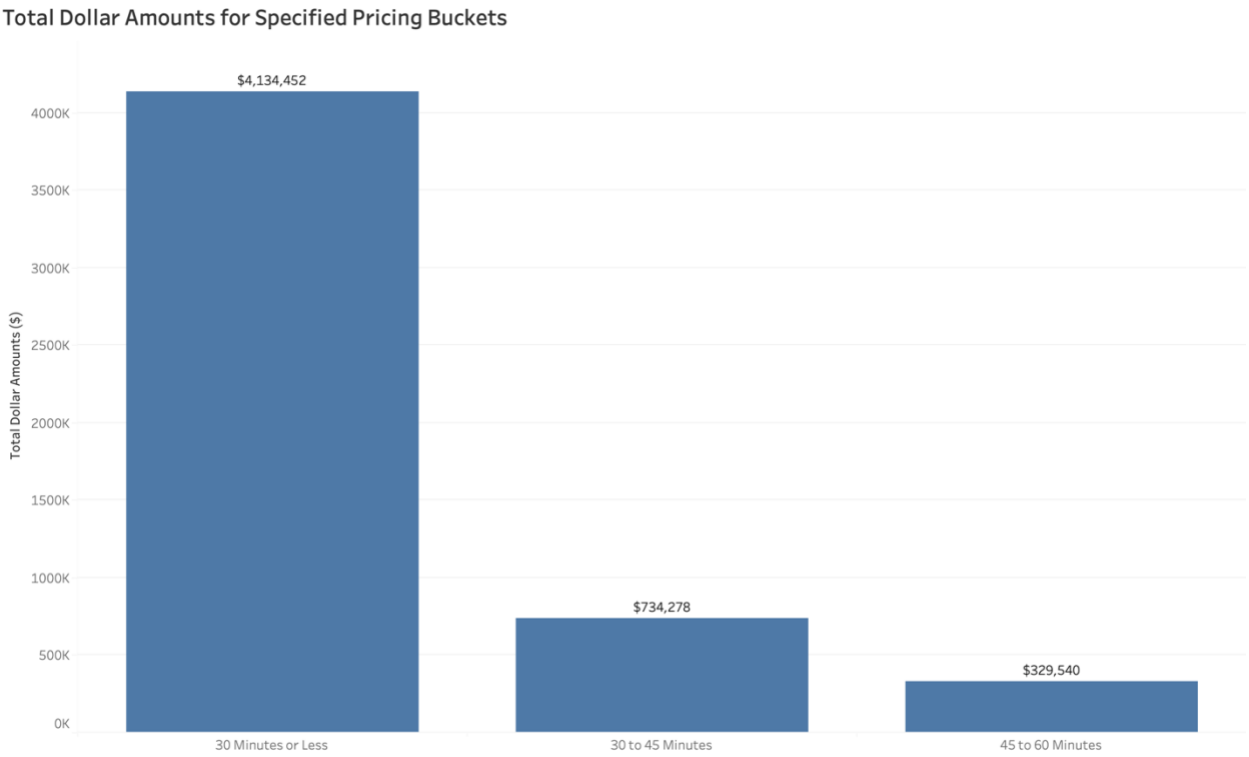

Figure 8 - Total Dollar Amounts for Specified Pricing Buckets

The total dollar amounts for flat rate trips of 30 minutes or less is $4,134,452.
The total dollar amounts for trips between 30 minutes and 45 minutes is $734,278.
The total dollar amounts for trips between 45 minutes and 60 minutes is $329,540.

This shows that majority of the revenue from single trips by infrequent users is from the flat rate with trips less than 30 minutes. The percentage of revenue for each of the three different pricing buckets is shown in Figure 9 with the flat rate producing 79.5% of the total revenue of all three pricing buckets. The rate for trips between 30 minutes and 45 minutes produced 14.1% and the rate for trips between 45 minutes and 60 minutes produced 6.3% of the total revenue for single trips by infrequent users.

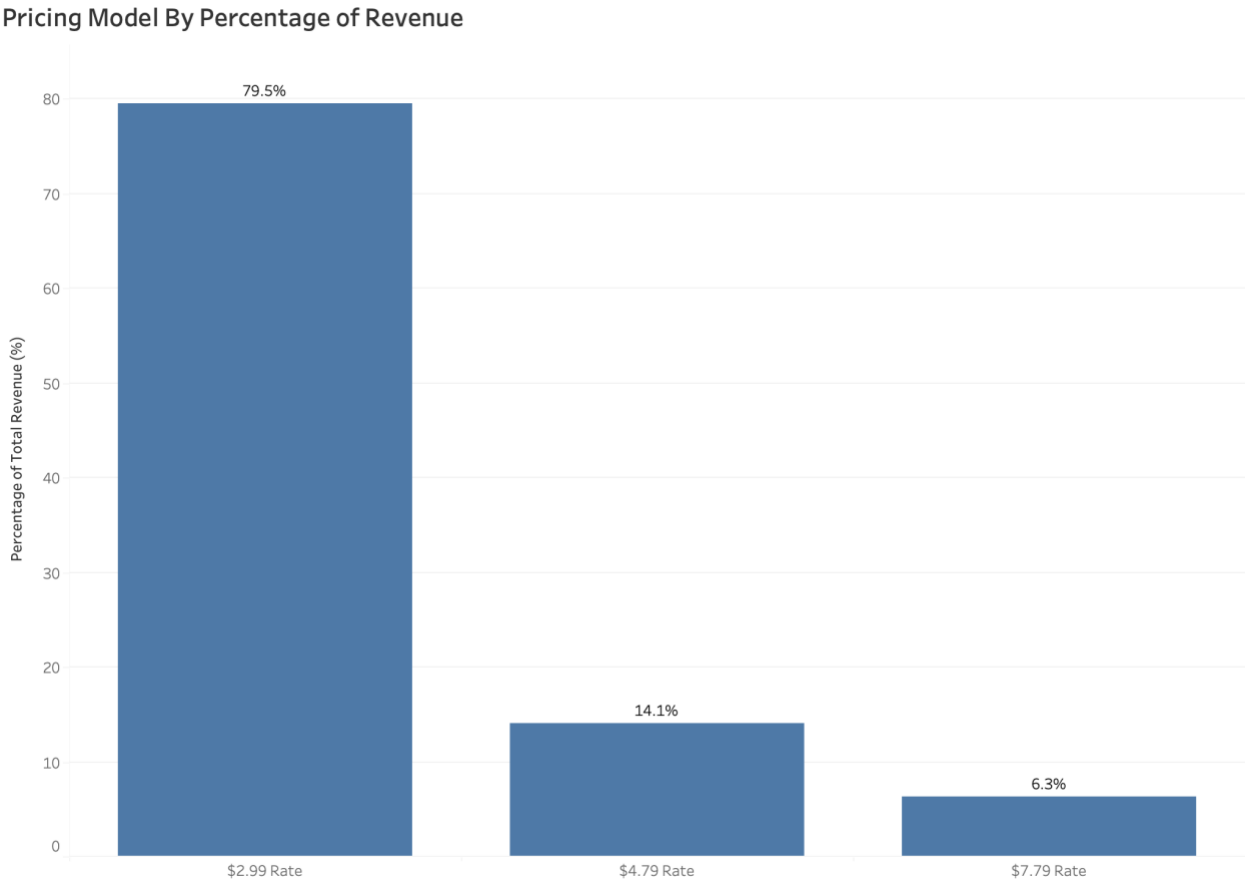

Figure 9 - Pricing Model by Percentage of Revenue

MOST REVENUE FROM FLAT RATE CHARGE

Specifically for the flat rate charge, the total amount of revenue was calculated for every hour and weekday to understand exactly when Bixi has the most revenue for all single trips 30 minutes or less by infrequent users. Figure 10 below shows the total amount of flat rate revenue for every hour and weekday. The red-highlighted cells show the higher total amount of revenue.

Based on the data, Bixi generates the most revenue on Sundays at 3PM, with generally high revenue on the weekends between 11AM and 8PM, and on weekdays at 5PM.

Total Amount of Flat Rate Revenue for Every Hour and Weekday

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
12 AM	$28,546	$10,558	$7,639	$9,496	$11,144	$14,496	$24,297
1 AM	$23,457	$6,521	$4,321	$6,058	$7,050	$10,321	$20,840
2 AM	$18,870	$4,069	$2,832	$3,746	$4,162	$6,671	$16,636
3 AM	$18,418	$3,489	$2,111	$2,592	$2,972	$5,469	$14,989
4 AM	$6,258	$1,363	$897	$1,044	$1,229	$2,078	$4,661
5 AM	$2,915	$1,145	$894	$942	$972	$1,292	$2,180
6 AM	$2,416	$1,896	$2,111	$2,159	$2,150	$2,030	$1,908
7 AM	$3,385	$5,484	$6,446	$6,730	$6,994	$5,974	$3,274
8 AM	$8,279	$12,684	$14,711	$16,732	$16,197	$13,464	$7,355
9 AM	$17,961	$14,454	$15,318	$15,769	$15,527	$14,454	$15,396
10 AM	$35,518	$19,076	$18,792	$18,574	$17,483	$18,559	$27,131
11 AM	$51,533	$25,131	$24,874	$25,011	$24,105	$26,943	$43,149
12 PM	$62,380	$28,486	$27,954	$28,082	$27,660	$32,256	$53,363
1 PM	$71,772	$30,184	$29,628	$30,067	$29,155	$34,508	$62,207
2 PM	$78,990	$32,609	$30,743	$30,872	$30,307	$36,024	$69,329
3 PM	$80,296	$35,423	$32,062	$33,889	$33,835	$39,567	$74,257
4 PM	$76,380	$36,044	$36,466	$38,595	$37,372	$42,901	$73,449
5 PM	$70,011	$38,152	$42,742	$42,763	$43,068	$45,774	$71,383
6 PM	$60,165	$35,291	$36,083	$38,296	$39,017	$42,024	$65,003
7 PM	$50,379	$27,977	$30,976	$32,184	$33,757	$36,971	$55,139
8 PM	$40,455	$23,403	$24,981	$26,210	$27,840	$31,900	$46,058
9 PM	$32,241	$18,915	$21,480	$23,014	$24,476	$28,662	$38,694
10 PM	$27,266	$15,542	$18,634	$21,307	$23,477	$27,200	$37,025
11 PM	$20,470	$11,398	$13,778	$16,977	$19,151	$26,581	$36,278

Total Amount of Flat Ra..
$894 $80,296

Figure 10 - Total Amount of Flat Rate Revenue for Every Hour and Weekday

INTERACTIVE REPORTING DASHBOARD

A dashboard was created to show visualizations of a map indicating the average trip duration for every station in the city, along with the total number of monthly trips for 2016 and 2017 – showcasing the months with the most and least number of trips, and a chart showing the time of day with the most trips by members and non-members to identify the times that Bixi bikes are used the most and the least by both members and non-members. The dashboard is shown in Figure 11 below.

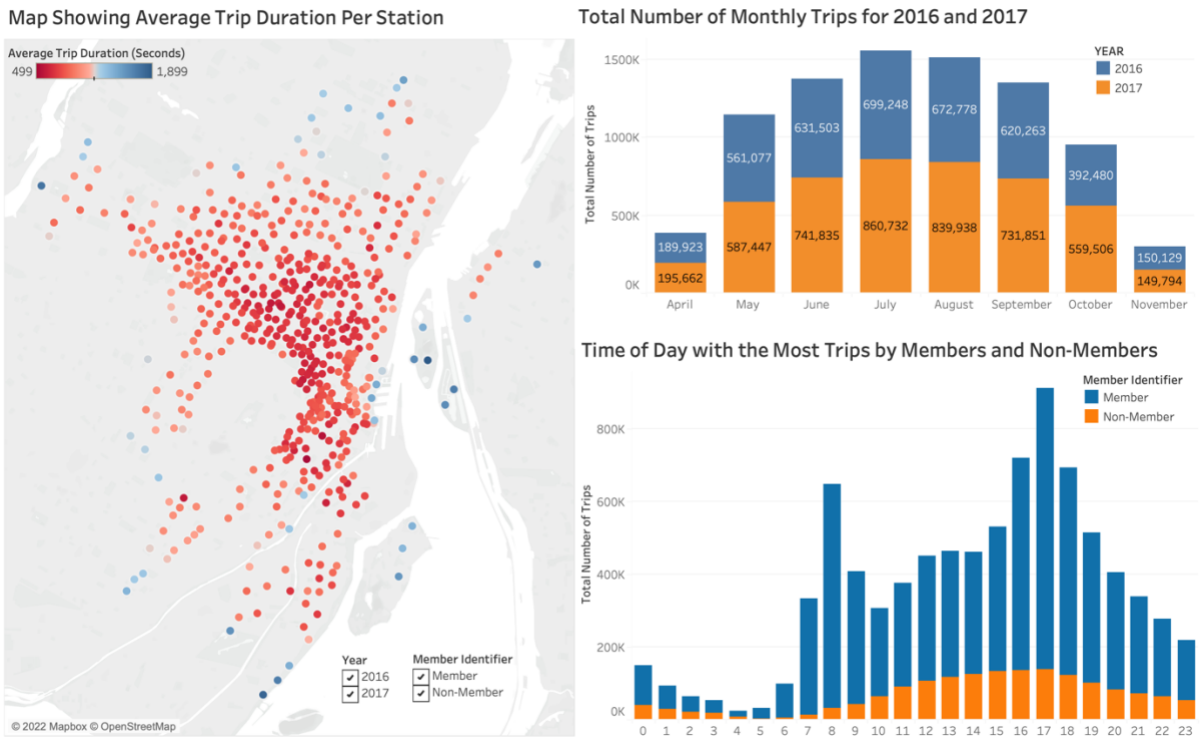

Figure 11 - Dashboard Showing Insightful Visualizations of Usage of Bixi Bikes

CONCLUSION

This report identified all the visualizations produced to understand the usage of Bixi bikes by members and non-members, including the top stations with the highest percentage of round trips. More in-depth visuals were created to understand the relationship between round trips and members, and if Bixi users are taking longer or shorter trips. The revenue generated by infrequent users (identified as non-members) and single trips were calculated to understand exactly when the most revenue is generated. Finally, an interactive dashboard was created to allow easy access to data and insights.