Improving Trip Generation Estimates for Canadian Sites using aggregation and extraction techniques

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1 BACKGROUND

♦ Trip generation analysis plays a vital role in determining the impact of new land use developments. Trips are generally estimated using regionally established trip rates from trip generation data collected over the period of time at specific land uses. However, some regions which do not have their own data usually rely on trip generation data published by other similar regions or on data collected by the Institute of Transportation Engineers (ITE), USA.

♦ Over the last 50 years, ITE has already collected data at over 26,000 sites in various parts of the USA and Canada for 173 different types of land uses. As only a small subset of data (~0.5%) is from Canada, there is a question as to whether that data could better represent Canadian sites.

♦ As ITE's Trip Generation Manuals in the hardcopy format do not facilitate viewing or extracting data for specific regions (i.e. country or state) or the ability to aggregate data with local data, practitioners face a number of challenges in using ITE's data for Canadian sites.

♦ To evaluate if data extraction and aggregation have any impact on improving trip generation estimates, data from Canadian and American sites were studied separately in order to analyze the statistical parameters by using the OTISS Pro analysis tools.

♦ The analysis revealed that 38% of studies with good data showed significant improvements in terms of fine-tuning standard deviation and regression coefficient (R2) after extracting Canadian sites data. Similarly, about 15% of studies with good data showed improved statistics by aggregating with the American site data. This further helped us to improve trip generation estimates by establishing appropriate trip rates and equations for Canadian sites.

♦ Based on this finding, this poster illustrates that by having a way to extract ITE's data by regions or aggregate with the relevant local data could benefit Canadian practitioners performing qualitative trip generation analyses. It also emphasizes the importance of collecting more regional data.

2 OBJECTIVE

♦ To analyze the subset of ITE trip generation data collected in Canadian sites and examine if the techniques of data extraction or aggregation help in improving trip generation estimates.

♦ To compare and emphasize the quality of trip generation data collected in Canada.

♦ To establish better statistical parameters and help regional practitioners that perform qualitative trip generation analysis.

♦ To bring awareness of available tools for extracting and aggregating trip generation data.

3 METHODOLOGY

The study used the latest edition of ITE Trip Generation Data as it contained extensive data collected in Canadian sites in various land use and land use categories. Using tools provided in Online Traffic Impact Study Software (OTISS Pro), the rest of the analysis was performed. **Figure. 1** visually explains the use of the adopted methodology to achieve the goals listed in the objective section.
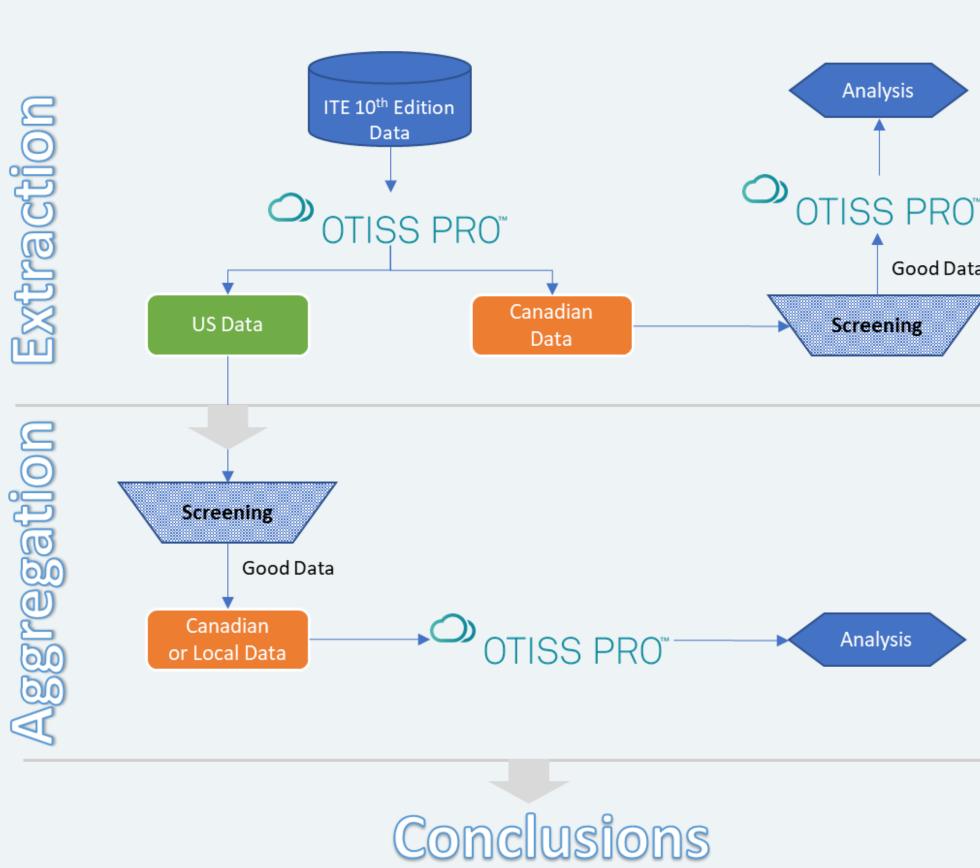

Figure 1. Visual representation of the methodology used for the analysis

4 DATA EXTRACTION

Using OTISS Pro, a number of data plots were analyzed filtering data by region and the profile is presented in **Figure 2.** Out of 254 data plots for Canada, 97 data plots showed improvements in Standard Deviation, R2, and Average Rates, and the findings are shown in **Figures 3 and 4**. Data statistics before the extraction are shown in **Figure 5**.
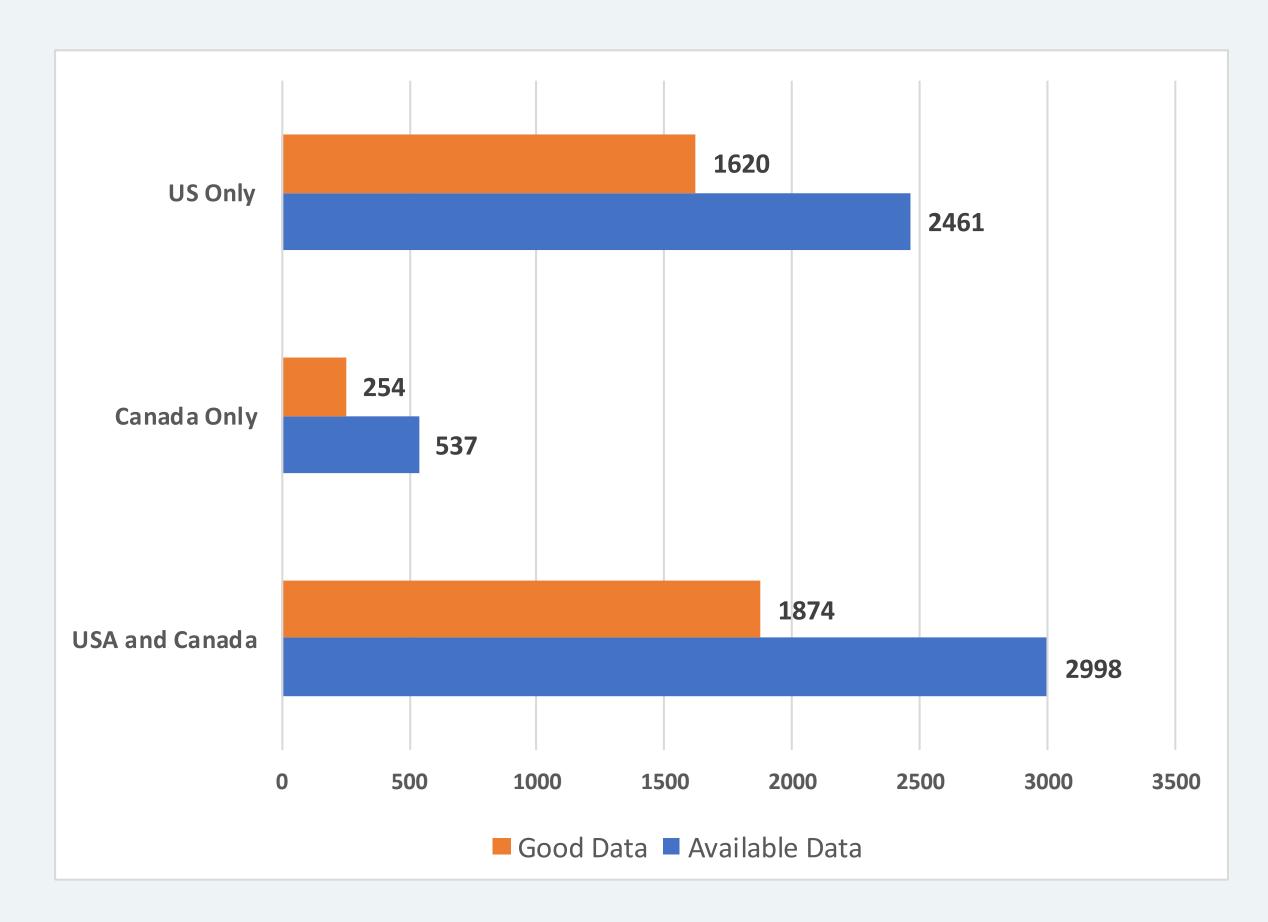

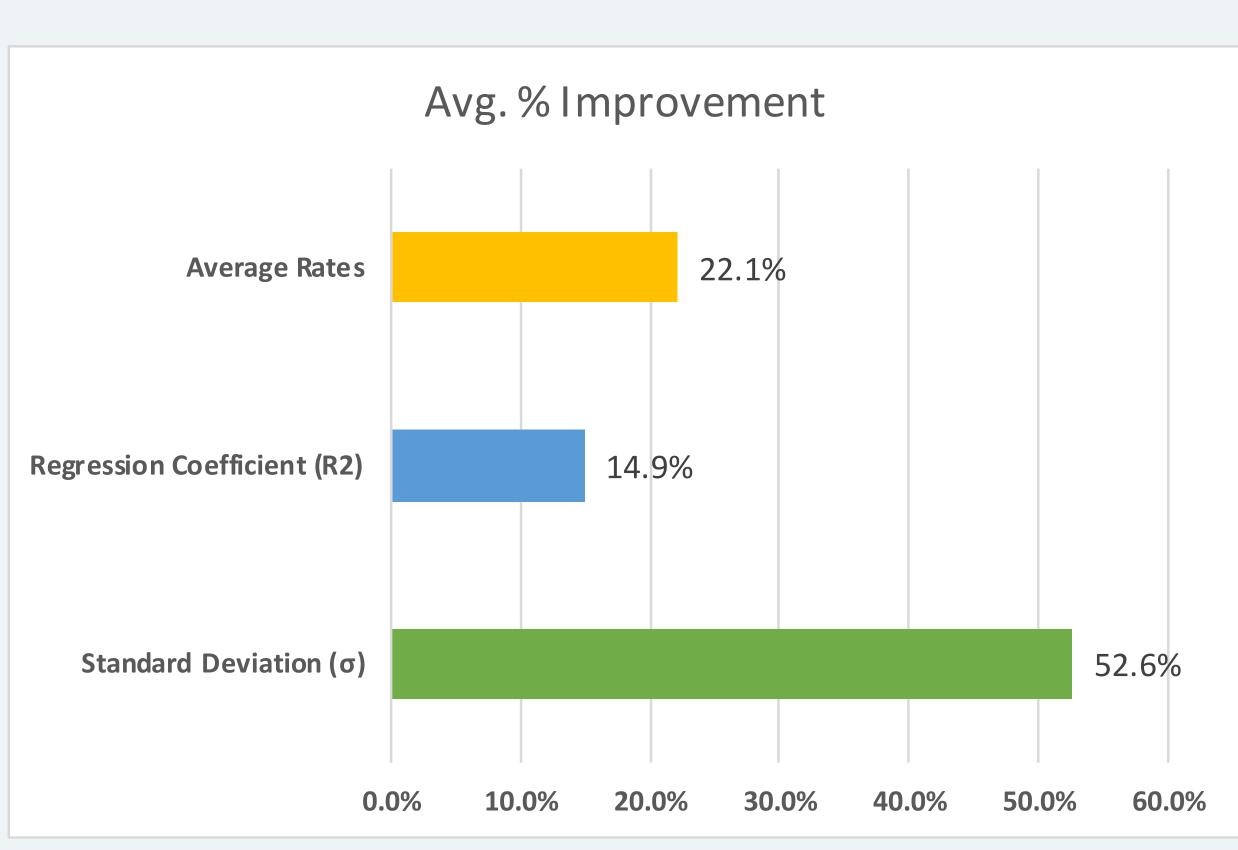Figure 2. Data profile observed in 10th Edition of ITE Trip Generation Data

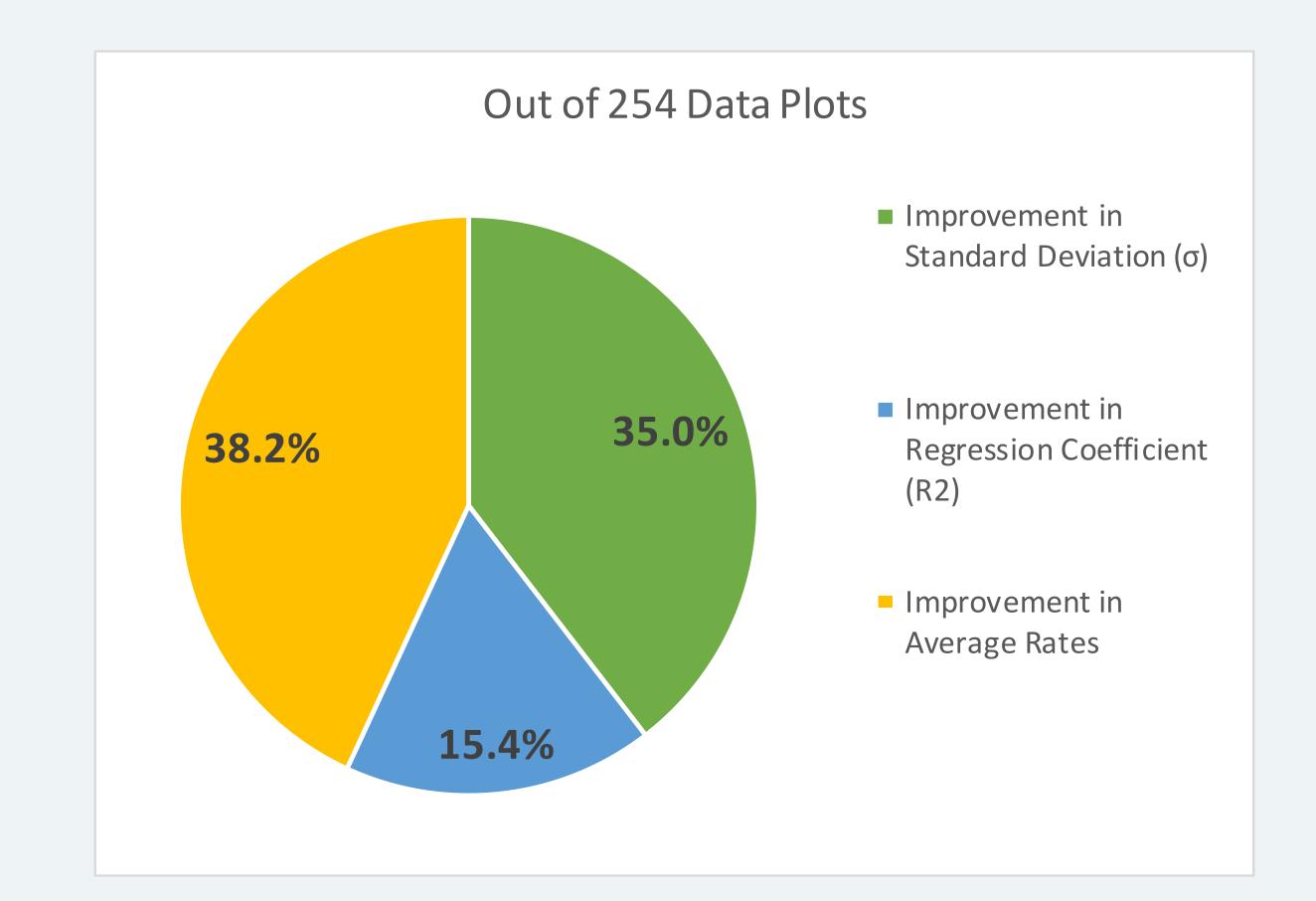Figure 3. Percentage improvements in statistical parameters among the data plots analyzed

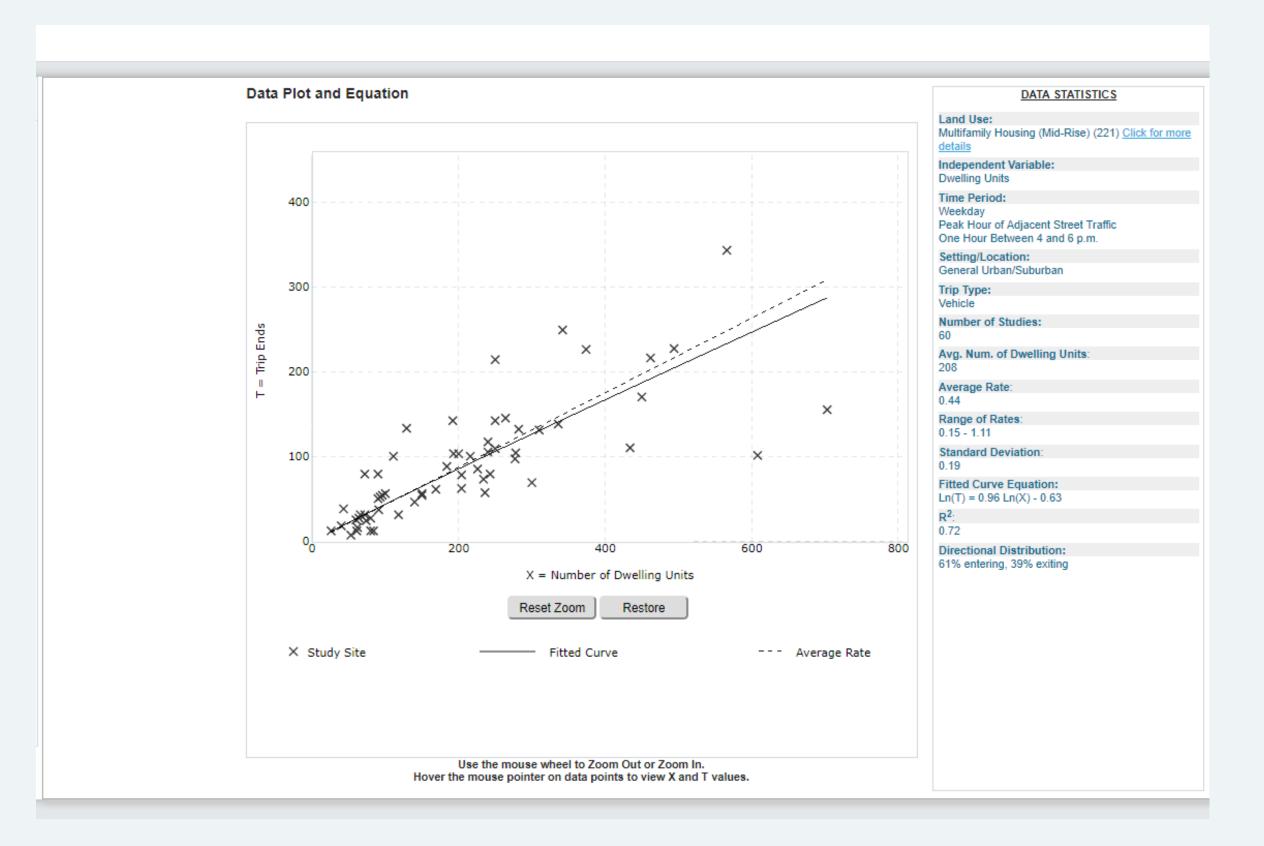Figure 4. Observed average improvements in statistical parameters

Figure 5. A sample data plot used containing data from US and Canada before extraction

5 TRIP ESTIMATES

After learning that the extraction technique would help improve ITE established statistics for trip generation, a sample data plot was considered for the comparison of trip estimates. As demonstrated in **Figures 6 and 7**, the extracted Canadian sites data showed significant improvements in trip estimates. Although the studies were limited, trips seemed to behave differently in Canadian sites for similar site conditions.

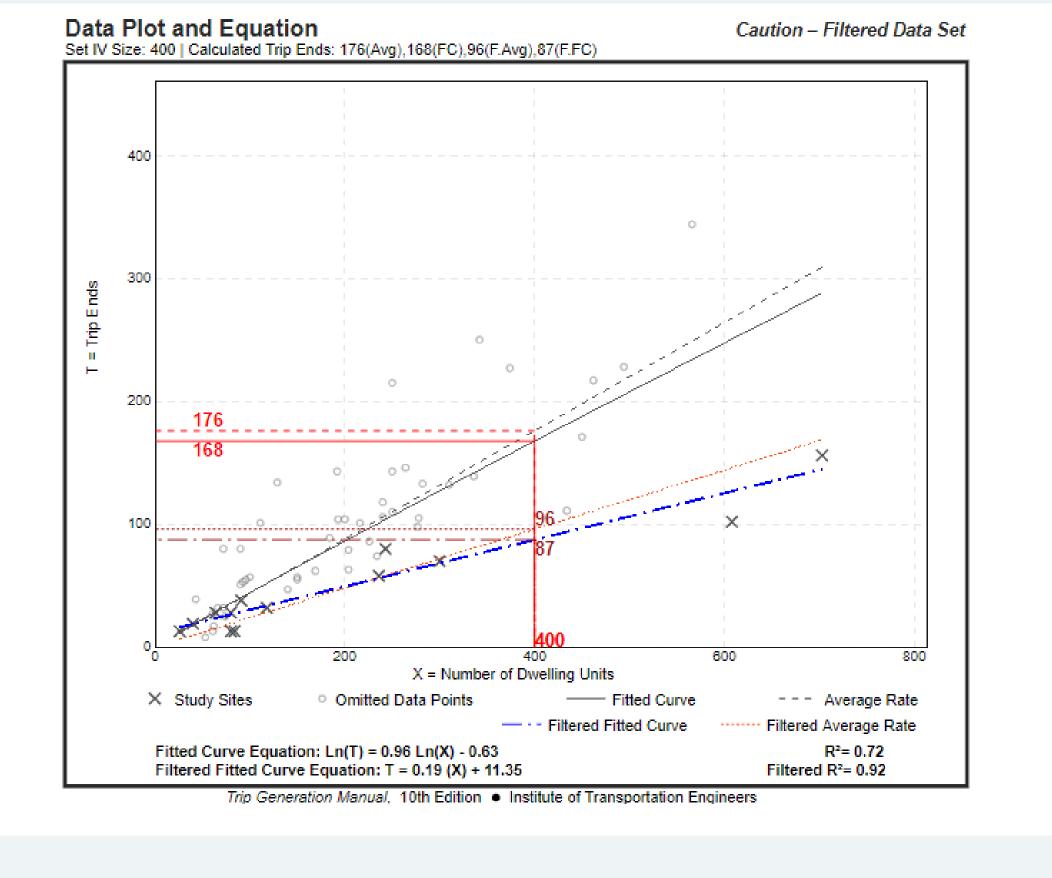Figure 6. Data extraction performed using OTISS Pro filter tool

Figure 7. Trip estimates using average rate and equation from extracted data

6 DATA AGGREGATION

ITE Trip Generation data contains several data plots solely based on Canadian sites. Using the Private Data Set tool in OTISS Pro and assuming that a Canadian practitioner has local data, data aggregation technique was executed to see if it helps improve trip estimates. The process of aggregation of data and improvements in statistics are shown in **Figures 8 and 9**.
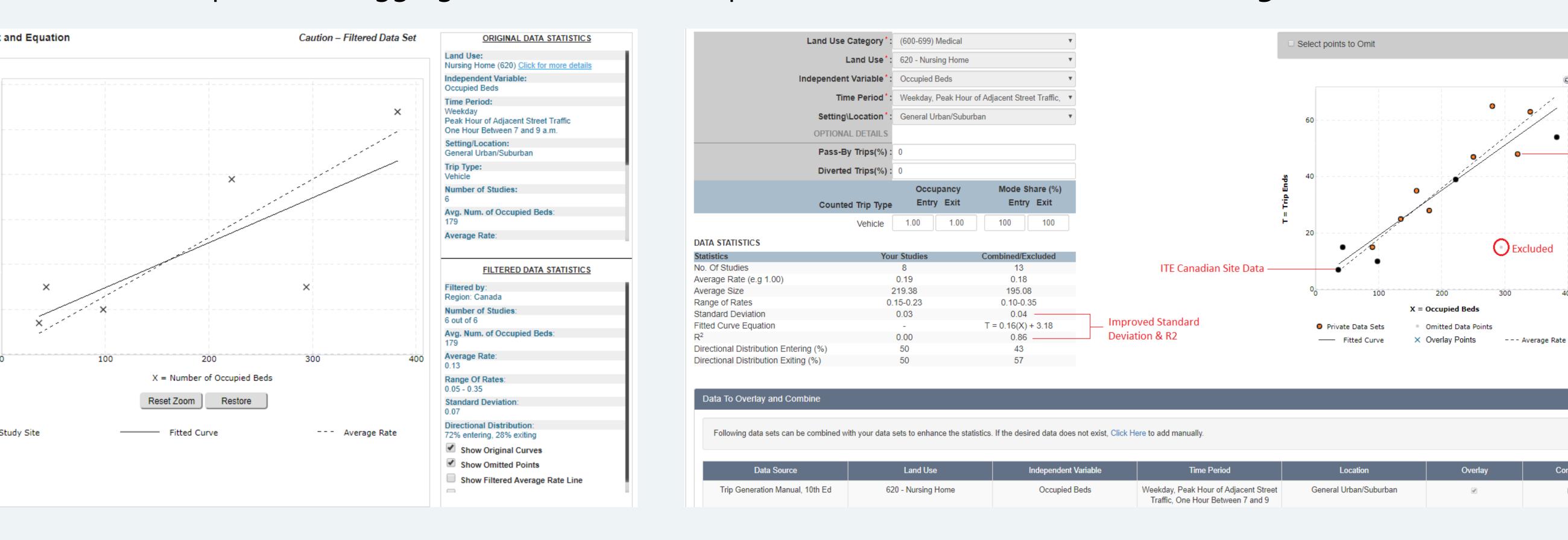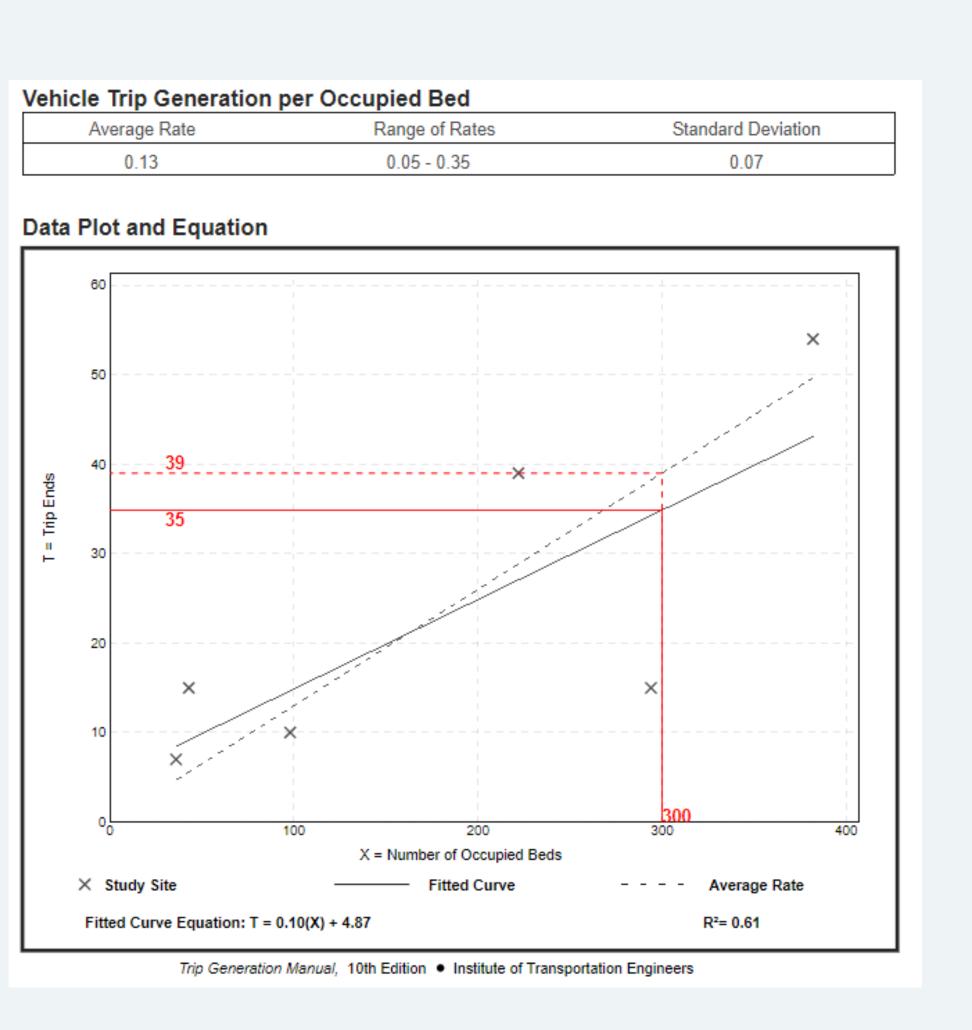

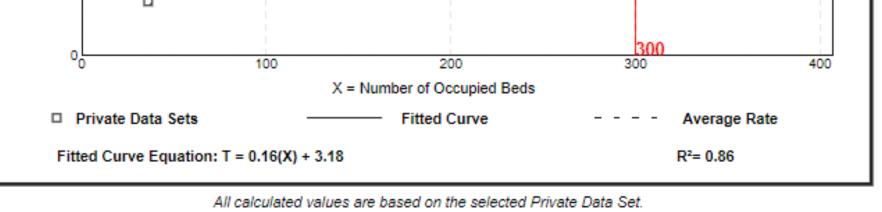Figure 8. ITE Data plot based on data collected in Canada

Figure 9. Process of data aggregation in OTISS Pro, Private Data Set functionality

7 TRIP ESTIMATES

As shown in **Figures 10 and 11**, aggregated data along with excluding the outlying studies demonstrated a significant change in the fitted-curve equation and average rate. The reduced standard deviation and increased regression coefficient clearly show that the aggregation technique helps in improving the trip estimates.

Figure 10. Trip estimates before the data aggregation

Figure 11. Trip Estimates after the data aggregation

8 FINDINGS

♦ Although the existing set of data plots in ITE Trip Generation Data representing Canadian data is relatively small, 38% of those data plots demonstrated significant improvements in average rate. Similarly, 35% of improvements in standard deviation and 15% of improvements in regression coefficient were observed after extracting and recalculating the data statistics.

♦ In terms of average improvements in statistics, the extraction of data helped achieve an average of 53% reduction in standard deviation, which in turn improved overall data dispersion. It also helped increase the regression coefficient by an average 15% and improve the average rates approximately by 22%.

♦ Using the available analytical tools like OTISS Pro and the local trip generation data, if it exists, the Canadian practitioners can exercise data aggregation to establish appropriate trip rates and equations to improve their trip generation estimates.

♦ After both data extraction and aggregation, trip estimates showed a significant difference in numbers indicating the atypical behaviour of trips when it comes to Canadian sites.

9 REFERENCES

♦ Institute of Transportation Engineers. 2017. Trip Generation 10th Edition: An Informational Report. Washington, DC: Institute of Transportation Engineers.

♦ OTISS Pro: Online Traffic Impact Study Software developed by Transoft Solutions in collaboration with ITE: [accessed 2019 April 01]. https://www.itetripgen.org

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