Outline of Client Report and Presentation

1) Group A: Background & Overview of Recommendations
2) Group B: Data QC & Use of Google API
3) Group C: Model-Based Adjustment Step, Assign and Check Scenario-Specific Travel Times and Trip Assignments
4) Group D: Load Analysis
5) Group E: Analysis of Estimated Travel Times

DUE: *Monday* 10/2/23 Noon (Report and Slides)

Presentation Slides

Each group: add a few (<=5) slides to the Google slides document summarizing your section of the report (see below). Link to Google Doc: https://docs.google.com/presentation/d/1yZhci99kUhmjBbrTIK3N_VziEF0AQ9VllpOp4X3A_kA/edit?usp=sharing

Report Outline

1. *Background* (Paragraph 1, Group A). ONE PARAGRAPH! Highlight project motivation, goals, available data, question for SCC.

2 *Recommendations*

Overview. (Group A) One paragraph overview of the proposed analysis "pipeline" and a figure, as from class, depicting the stages of the analysis.

2.1 *Data QC and Estimating Travel Times Using the Google API* (Group B). A concise list (bullet points?) of recommended exploratory summaries and data checks to conduct prior to proceeding with the analysis. Out-of-county and other atypical trips, etc. A brief description of the Google Distance Matrix API (https://console.cloud.google.com/google/maps-apis/api-list?project=ems-travel-times), its *key* inputs and outputs. Provide links & references. A brief description of the R mapsapi package, its use and relevant functions. Be sure to note that bandwidth is limited when making calls to the API and that the full analysis will likely require many individual requests separated by brief time delays.

2.2 *Model-Based Adjustment Step, Assign and Check Scenario-Specific Travel Times and Trip Assignments* (Group C). (1) Describe as an optional step for our client the construction of a multiple regression model with the observed travel times from station to site as response and the various API estimated travel times on the same trips and factors such as time of day and distance as predictors to investigate whether it is useful to adjust the Google API estimates prior to analysis. Suggest comparing prediction RMSEs for simply using the Google `best guess' value against out-of sample (set aside) predictions from one or more such models. (2) Describe a process for assigning, checking and correcting conflicts in the scenario-specific travel times to each of the observed trips.

2.3 *Load Analysis* (Group D). Taking the proposed metrics discussed in class as a starting point, briefly describe a few options. Focus on your proposed approach (a binary indicator for whether the closest ambulance was available). Discuss how to model its dependence on scenario and other covariates (e.g. summer season, hour of the day), including event/call ID (as each scenario is assessed on each call) using a logistic link generalized linear mixed model (GLMM). As with the travel time analysis discussed in class (and to be described below), there will likely be numerous events where a load metric does not vary by scenario. Approach this as we discussed for travel times, modeling (1) the probability of there being variation/no variation across scenarios (logistic regression if there are covariates like season and time) and (2) the dependence of the load metric on scenario given that there is variation.

2.4 *Travel Time Analysis* (Group E). Outline a modeling approach for the estimated travel time data. Discuss how to model dependence of the estimated travel times on scenario and other covariates (e.g. summer season, hour of the day, system load), including event/call ID (as each scenario is assessed on each call) and describe how to use this model to compare the scenarios. As we have seen with the mock data, there will likely be numerous events where a load metric does not vary by scenario. Approach this by modeling (1) the probability of there being variation/no variation across scenarios (logistic regression if there are covariates like season and time) and (2) the dependence of the travel times on scenario given that there is variation (using a linear mixed model).