City of Madison

Problem Identification: City Service Usage Levels

1.0: Contact Information	
City Data Team Lead	E. Anderson, Finance, eanderson3@cityofmadison.com
City Agency SME's	T. Gloyd, Streets (refuse and recycling data) R. Callaway, Traffic Engineering (pedestrian and bike trail data) K. Wick and R. Millerjohn, Library (circulation data) K. Schwenn, Water (water data) C. Carbon, Fire (EMS data)
UW Madison Lead	Tyler Caraza-Harter (tylerharter@gmail.com)
Project Team Members	

2.0 Problem Statement (max 200 words)
Prompt: What's the problem we are trying to solve? What is actually happening? Where does the problem exist? How do you know this is a problem?

Utilization levels of City of Madison services have changed during to the COVID-19 pandemic. However, it is difficult to pinpoint changes due to COVID-19-related factors, as opposed to other, co-occurring factors such as:

- Weather conditions
- Cyclical variations
- Special events
- Construction
- Schools and universities being in or out of session.

In particular, this is true for five City services which lend themselves to close, quantitative tracking, and for which utilization levels can change by the day or hour, and in some cases, geographic area or other areas of sub-unit analysis. These five City services are:

- Refuse and recycling collection
- Pedestrian areas and bike paths
- Library lending
- Water
- Emergency medical services (EMS).

3.0 Impact Statement (max 200 words)
Prompt: What change would you like to see happen? What should be happening?

As the pandemic continues, the City of Madison would like to be able to predict future levels of utilization of these five services. This will help inform City operations, like planning appropriate staffing and other resource levels. It can also help inform City policies around changes needed to make these services more or less available. (For example, a high level of bike path usage might indicate a need to open streets as additional path space.)

In order to do this, the City would like to see separate models for each service that can help predict service level utilization. Each model should:

- Separate the impacts of COVID-19 prevalence on service level usage from co-occurring factors such as the ones listed above.
- Predict future levels of service utilization based on COVID-19 prevalence and accompanying safety measures like public health restrictions, reopening phases, and telework.
- Develop predictions for total service usage as well as service usage at the sub-unit level where possible. For example:
  - A model for refuse and recycling collection could be developed for total tonnage, or separate models could be developed for each refuse and recycling collection.
  - A model for library lending might take into account effects that vary by geographic area at different library branches.
  - A model for water usage might be developed for each customer class, or for all water usage.

4.0 Service Change Statement
Prompt: What is the results you are trying to make with this project?

Current State	Future State
Data is collected on usage levels for these City services, but there are no models that show the effect of COVID-19 prevalence.	Models that can predict usage levels for these different services based on COVID-19 prevalence and accompanying safety measures will help inform City of Madison operations and policy as the pandemic continues.

5.0 Project Success Statement
Prompt: How will we know the project is successful?

In order for the City of Madison to better understand the effects of COVID-19 on service utilization levels, UW Madison students will develop separate models for the utilization levels of each of the five outlined City services.

6.0 Data Resources
The following data resources are available to support this project.

Service usage level data:

Service	Data Collected	Temporal Unit	Geographic Unit	Other Sub-Units	Link(s)
Refuse and recycling collection	Tonnage	Day	City of Madison	Separated by refuse and recycling	● https://data-cityofmadison.opendata.arcgis.com/datasets/streets-refuse-and-recycling-data
Pedestrian areas and bike paths	Users	Hour	Pedestrian counters in several		● https://data-cityofmadison.opendata.arcgis.com/datasets/upper-state-street-

			State St. locations; bike path counters in two locations		pedestrian-counts ● https://data-cityofmadison.opendata.arcgis.com/datasets/eco-totem-southwest-path-bike-counts ● https://data-cityofmadison.opendata.arcgis.com/datasets/eco-totem-capital-city-trail-bike-counts
Library lending	Circulation	Day	Branch		● https://www.scls.info/ils/reports/about/aboutoverview This dataset contains data for all branches in the South Central Library System. The Madison Public Library branches are: Alicia Ashman (ASH) Hawthorne (HAW) Lakeview (LAK) Central (MAD) Meadowridge (MEA) Monroe (MSB) Pinney (PIN) Sequoya (SEQ) Goodman South (SMB)
Water	Gallons consumed	Day	City of Madison	Customer class	● https://data-cityofmadison.opendata.arcgis.com/datasets/water-usage-data
EMS	Ambulance runs	Day	City of Madison		● https://data-cityofmadison.opendata.arcgis.com/datasets/ems-runs-data

Other data:
- COVID incidence: https://cityofmadison.maps.arcgis.com/apps/opsdashboard/index.html#/e22f5ba4f1f94e0bb0b9529dc82db6a3
- Other restrictions: https://publichealthmdc.com/coronavirus/data
- Weather: https://www.ncdc.noaa.gov/cdo-web/confirmation
  - Use station ID GHCND:USW00014837 (Dane County Regional Airport)
- UW Madison academic calendar: https://registrar.wisc.edu/schedule-of-classes-faculty/
- Madison Metropolitan School District academic calendars:
  - https://www.madison.k12.wi.us/files/www/uploads/2020-21schoolcalendar.pdf
  - https://www.madison.k12.wi.us/files/www/uploads/2019-20schoolcalendar.pdf
- UW Madison football game schedules:

- https://uwbadgers.com/documents/2020/7/9/2020_FB_Printable_Schedule_Color.pdf
- https://uwbadgers.com/documents/2019/2/8/2019_FB_Printable_Schedule_Color.pdf