SLU EMS Response Times: Network Analysis of St. Lawrence University Campus

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Introduction

Collegiate emergency medical service (EMS) agencies provide valuable services to college and university campuses across the United States. The distinctive layout and road network of a college campus, however. can provide unique challenges to response times such as limited vehicle access to inner campus and indirect routes to high density call areas. To gain an understanding of the typical response routes available, and factors which may increase response time, SLU campus buildings were assessed for entrance and vehicle access. This study has indicated potential for limited access to inner campus to increase response times, prompting greater analysis.

Objectives

- Evaluate call history of St. Lawrence University Emergency Medical Services (SLU EMS), Fall 2014-Spring 2023 (Fig. 1A & B, Table 2)
- Establish dataset for entrances to buildings including vehicle accessibility (Fig. 3A & B)
- Establish start and end point datasets for the SLU EMS Emergency Response Vehicle (Fig. 3A & B)

Methods

SLU EMS call history was collected from past Patient Care Reports (PCRs) collected on every SLU EMS call. These reports are required by NYS DOH to be stored for several years, allowing for historical analysis. All PCRs from Fall 2014 to Spring 2023 were digitized using Excel (Table 2). As PCRs are considered Protected Health Information (PHI) under HIPAA, data used was stripped of individually identifiable information according to IIRB instructions.

GPS points were acquired at every entrance to buildings on the main campus within the SLU EMS response district using an Eos Arrow 100 GNSS receiver and the Esri Field Maps App, which was connected to a feature layer designed in ArcGIS Online. Other datasets, used to account for the designated parking locations of the SLU EMS response vehicle (Fig. 4), were created within ArcGIS Online. All datasets were moved into ArcGIS Pro for spatial analysis (Fig. 3A).

run_nmbr	weekday	location	time_of_day	en_rte_by	resp_dur	rideabout
18_01	Tuesday	Safety & Sec	0600-1200	2	6	N
18_02	Tuesday	Safety & Sec	0600-1200	2	6	N
18_03	Tuesday	Safety & Sec	0600-1200	2	6	N
18_04	Sunday	Dean-Eaton I	0000-0600	1	3	Y
18_05	Saturday	Dean-Eaton I	0000-0600	3	7	Y
18_06	Friday	Gaines Colle	1200-1800	3	7	N
18_07	Thursday	Lee Hall	1800-0000	1	5	Y
18_08	Thursday	Dean-Eaton I	1800-0000	3	7	Y
18_09	Thursday	Dean-Eaton I	0000-0600	4	9	N
18_10	Tuesday	Whitman Ha	0600-1200	3	5	N
18_11	Tuesday	Appleton Are	1800-0000	4	15	N
18_12	Tuesday	Rebert Hall	0600-1200	6	9	N
18_13	Sunday	Kirk Douglas	1200-1800	2	5	N
18_14	Monday	Newell Field	0600-1200	2	8	N
18_15	Saturday	Steiner Senic	0000-0600	4	10	N
18_16	Saturday	Priest Colleg	1800-0000	3	5	N
18_17	Saturday	Sykes Reside	0000-0600	6	10	N
18_18	Saturday	Dean-Eaton I	0000-0600	0	0	Y
18_19	Monday	Steiner Senic	1800-0000	2	7	N
18_20	Sunday	Rebert Hall	0000-0600	2	5	Y

Table 2. Sample Excel sheet of digitized PCRs

Figure 4. SLU EMS response vehicle, a 2014 Toyota Highlander

Results

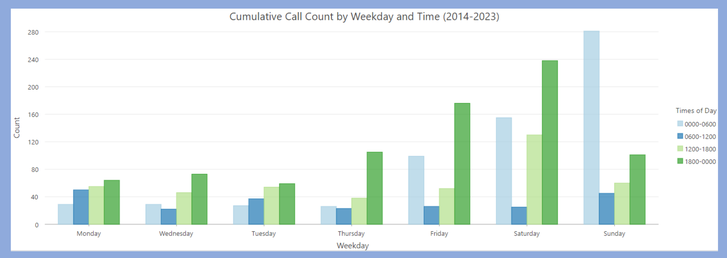

Figure 1A. Call count distributed by time of day and day of week, 2014-2023

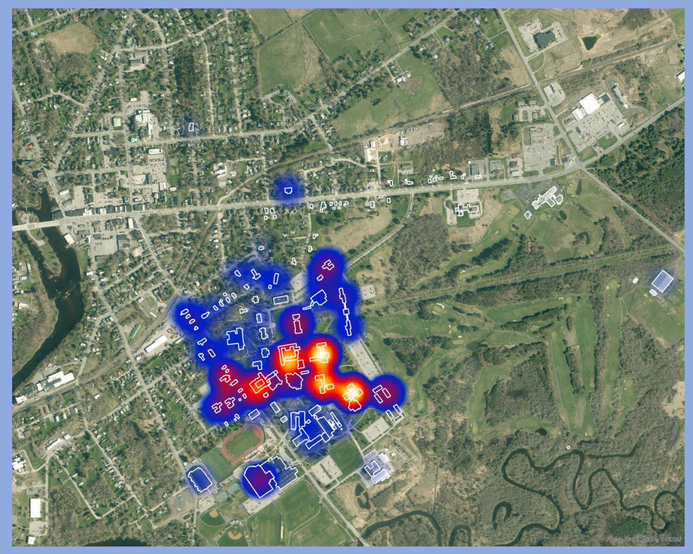

Figure 1B. Relative call density on campus by building, 2014-2023

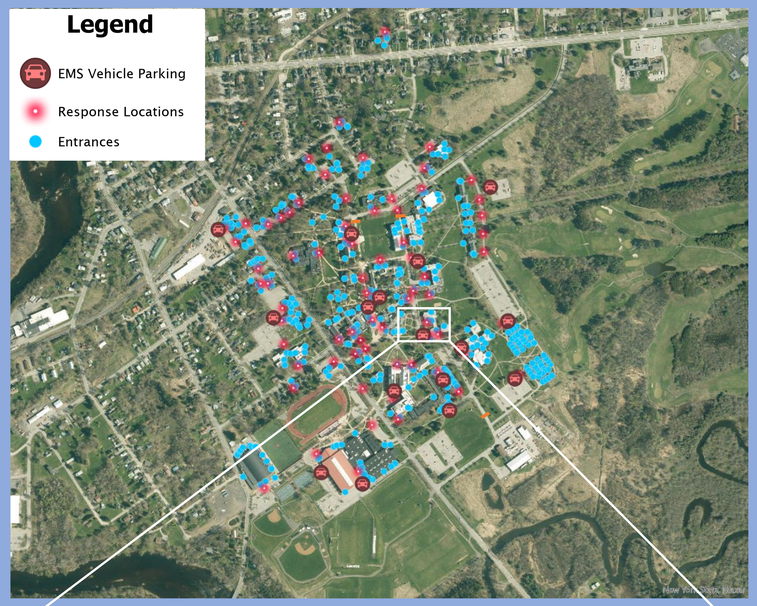

Figure 3A. Entrances, parking, and response location datasets symbolized over SLU campus
Figure 3B. Close-up of dorm entrances, parking, and response location datasets

Discussion/Conclusions

Inner campus areas had the highest density of calls (Fig. 1A), indicating the need for access and efficient routes from outer campus to inner campus. Entrance and vehicle datasets indicate some buildings are only accessible from inner campus or only accessible from outer campus. Further analysis is necessary to determine most efficient routes.

Future Work

Future work will include completion of Routes network analysis in ArcGIS Pro, now that baseline data has been established. Further research may consider:

- Gate access impact on response times
- Seasonal changes in road access
- Level of foot traffic on campus at certain times of day

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