

# Memorandum


**TO:** SMART CITIES AND SERVICE  
IMPROVEMENTS COMMITTEE

**FROM:** John Ristow

**SUBJECT: SMART CITIES DATA PLATFORMS  
STATUS REPORT**

**DATE:** May 20, 2022

Approved



Date

May 24, 2022

## **RECOMMENDATION**

Accept a status report on Smart Cities Data Platforms, related to a City Roadmap item for Vision Zero, including insights for transportation planning and addressing crashes and fatalities.

## **BACKGROUND**

Vision Zero is the City's transportation<sup>1</sup> initiative to reduce traffic fatalities and severe injuries. It is a key project in the Fiscal Year 2021-2022 City Roadmap<sup>2</sup> that contributes to the Enterprise Priority: Safe, Vibrant and Inclusive Neighborhoods and Public Life. In February 2020, City Council approved a Vision Zero Action Plan<sup>3</sup> and a \$25 million investment strategy towards eliminating fatalities and reducing severe injuries while providing safe mobility on City roadways. A total of \$9.23 million has been programmed to date, providing for a robust data analytic platform, safety redesign projects on high injury corridors, and outreach and community engagement to move towards a culture around safety.

This memorandum provides an update on the development of the data analytics platform adopted by the Department of Transportation (DOT); its use cases for understanding traffic collision and injury trends, geographies, and equity implications; and how the platform supports the Vision Zero program's initiatives and goals.

<sup>1</sup> City of San José Vision Zero: <http://visionzerosj.org/>

<sup>2</sup> City Roadmap adopted by City Council on 3/16/2021:

<https://www.sanjoseca.gov/home/showpublisheddocument/71157/637685981634300000>

<sup>3</sup> Transportation Safety Vision Zero Action Plan adopted by City Council on 2/11/2020:

<https://sanjose.legistar.com/LegislationDetail.aspx?ID=4317064&GUID=E4268E1C-B289-4280-A28D-2D283519108D&Options=&Search=>

## **ANALYSIS**

DOT obtained vendor services through the Startup in Residence (“STiR”) program, similar to a request for proposals (RFP) process. Following an initial pilot project in 2018-2019, the STiR

RFP was posted in 2019, and the competitive process was completed in 2020. The initial year of the contract began in March 2021. DOT began creating internal user accounts for City staff in December 2021. The contract<sup>4</sup> was recently extended<sup>5</sup> in March 2022 for the first of two one-year optional extensions. The second extension will expire in March 2024.

UrbanLogiq built upon the City’s historical transportation database by deploying a comprehensive, easy-to-use data analytics platform that aggregates, automates, adds, and analyzes diverse datasets, providing a unified view of how San José data trends overlap. The platform ingested all relevant new and historical datasets originating from public and private sources and developed a centralized database enabling staff to meaningfully interact with the data over space and time analyses. As a result of aggregating diverse datasets into one unified platform, DOT has been able to automate processes and reports and apply predictive analytics and machine learning models to create a comprehensive view of traffic behavior and the contextual environment affecting it.

### **A. UrbanLogiq Platform – Status Update**

DOT has been building up its data analytics platforms since 2019. In 2019, DOT released a public-facing PowerBI tool that displays the last five years of crash and injury data mapped, located at <http://visionzerosj.org/>, under Maps & Data. In 2019 and 2020, DOT worked on procuring a cloud based internal platform for staff to use. Beginning in 2021 and over the past year, DOT has been developing the internal data analytics platform. Specifically, it includes an internal platform which staff manages directly and an external cloud-based service platform developed in partnership with the vendor. What is important to note in these efforts are the long-term investments into data sources, hygiene work, and analytics that allow the City to make data-driven decisions based on high-quality data and tools.

The *internal solution* integrates various DOT data sets. Staff developed an automated process to deliver visualizations, reports, and tables to perform analytics activities within the department. The internal platform enables staff to combine and analyze traffic safety, equity, sewer management, and planning activities on a smaller scale for an immediate, point-in-time view (see Figure 1). The City’s internal platform also serves as an incubation area to analyze different outputs and use-cases to determine the relevance of the data sets before including them in the external platform. Pilot work on developing this platform in 2018 showed correlation between

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<sup>4</sup> City of San Jose contract signed on 3/19/2021: <https://records.sanjoseca.gov/Contracts/OC-000127-000.pdf>

<sup>5</sup> City of San Jose contract extension began 3/19/2022: <https://records.sanjoseca.gov/Contracts/OC-000127-001.pdf>

adjacent land use and injury density, earning San José and UrbanLogiq an American Planning Association Technology Division Smart City Merit Award in 2019.<sup>6</sup>

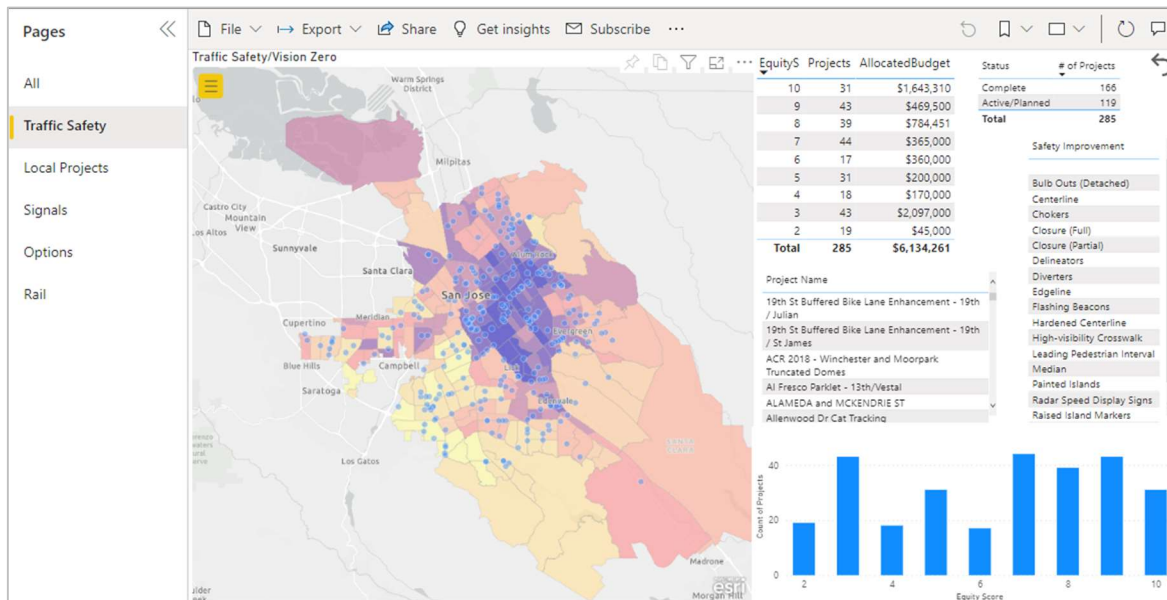


Figure 1 - Traffic Safety Projects per Equity Zone from 2019 – April 2022

DOT’s *external solution* is a cloud-based data service platform. The City partnered with UrbanLogiq to build out an end-to-end data analytics platform using a large set of data and intelligence services. Secure data transfer pipelines integrate City data, vendor data, and third-party data, which is normalized by UrbanLogiq and utilized throughout the data platform. This includes providing visualizations and analytics based on Key Performance Indicator’s (KPIs) and defined Use Cases. The external platform includes a wider set of data to perform more sophisticated analytics and modeling; and includes initial machine learning and artificial intelligence for predictive modeling.

Currently in progress, staff and vendor teams are working on basic machine learning process to provide analytics for establishing more precise risk scores around traffic on Priority Safety Corridors (PSC) and addressing Metropolitan Transportation Commission designated Equity Priority Areas in San José.

Over the next six months, DOT staff will be doing a very detailed analysis and investigation from the outputs that are produced via the UrbanLogiq partner and platform work. This will help establish a data dictionary, a historical data catalog, and core analytics derived from analysis of projects completed. In turn, this will assist with developing educated assumptions to look at predictive modeling around areas of project coordination, traffic safety, and planning decisions.

<sup>6</sup> <https://urbanlogiq.com/news/city-of-san-jose-department-of-transportation-receives-apa-smart-city-merit-award-for-data-driven-innovation/>

From these analyses, DOT and vendor staff will work to establish algorithms and intelligence to build a fully system-based prediction modeling tool. This will complete DOT's core 'full-stack' data platform. A centralized data repository, a data engineering product and layer to normalize data, machine learning data analytics algorithms, and artificial intelligence to produce outputs based on City 'Use Cases' and KPIs.

The partnership and data platform will scale vertically and horizontally. *Scaling vertically* allows us to continue to enhance, optimize, and scale DOT's existing analyses and predictions that will inform decisions in areas, such as equity, safety, cost reduction, operational efficiency, providing better services to the community, etc. *Scaling horizontally* will enable the City to leverage cross-divisional and cross-departmental data within the platform to expand use cases and KPIs to more areas.

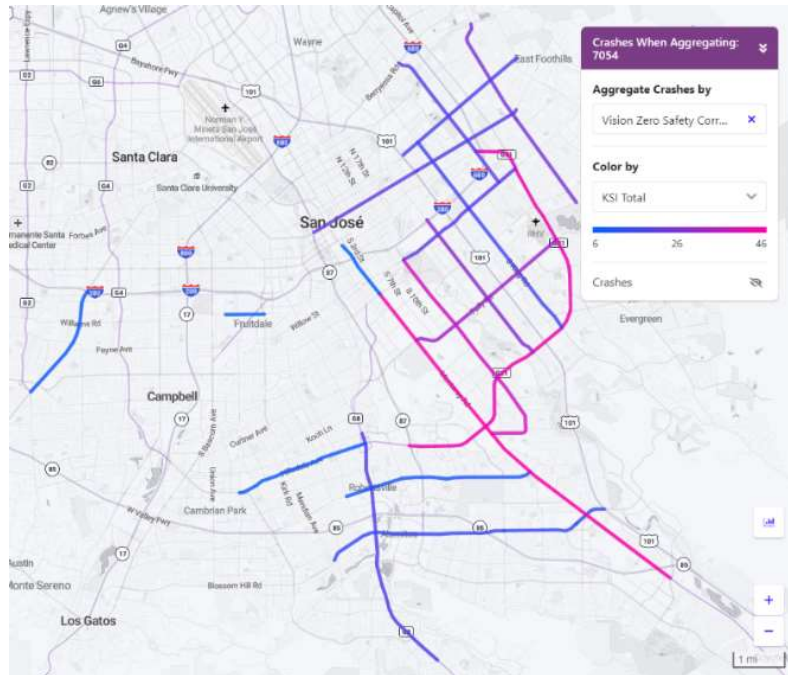
## B. Vision Zero Data Insights

One of the platform use cases involves creating data insights to inform transportation safety investment and work. The ability to quickly analyze crash data and gain insight on trends, patterns, and contributing factors is key to focusing limited staff and fiscal resources on the right things and in the right places to maximize the impact of corrective actions. Crash data is obtained from the Police Department's traffic collision reports. DOT staff enters the data into a database. Relevant data is then ingested into the external platform and the tools make it possible for DOT staff to visualize the data and understand trends through simple searches (easier for less experienced users) or customizable queries (for experienced and advanced users). Prior to this tool, many analyses were limited to staff with technical geospatial software experience and licenses. San José's newest platform is user-friendly and currently has developed a significant number of users (190), as of May 2022.

Important to DOT's Vision Zero goals are how staff can analyze: 1) Priority Safety Corridors (PSC); 2) crashes and injuries within a specific geography, such as a council district; and 3) how to focus on injuries for a specific road user type, such as pedestrians.

### Priority Safety Corridors

When San José adopted Vision Zero in 2015, DOT's geospatial information systems (GIS) team identified the PSCs by analyzing where fatal and severe injuries cluster. Today there are 17 corridors totaling 70 centerline miles of roadway (3% of San José streets) where 30-40% of fatal and severe injuries cluster. Figure 2 shows how the UrbanLogiq tool maps PSCs and highlights them via color by corridors that have more fatal and severe injuries.



The platform also includes customizable widgets which output high-ranking metrics. For example, Figure 3 shows Crash Count by Safety Corridor (Top 10) and Killed or Severely Injured (KSI) Count by Safety Corridor (Top 10) from the visualization in Figure 2. Not all crashes produce injuries. Crashes that do are called injury crashes. Among injury crashes, Vision Zero prioritizes reducing KSI crashes.

Crash Count by Safety Corridor (Top 10)



Tully Road between Monterey Road and Capitol Expwy	681
Capitol Expressway between Route 680 and Route 87	670
Monterey Road between Alma Ave and Bernal Road	564
Senter Road between Story Road and Monterey Road	499
King Road between McKee Road and Capitol Expwy	499
Santa Clara St between Rte 101 and Hwy 87	489
Blossom Hill Road between Route 101 and Manning Ave	483

KSI Count by Safety Corridor (Top 10)



Monterey Road between Alma Ave and Bernal Road	46
Capitol Expressway between Route 680 and Route 87	44
Senter Road between Story Road and Monterey Road	40
Tully Road between Monterey Road and Capitol Expwy	32
McLaughlin Ave between I-680 and Capitol Expwy	28
White Road between Penitencia Creek Road and Cunningham Ave	25
Santa Clara St between Rte 101 and Hwy 87	22

Figure 3 - UrbanLogiq: Crash Count and KSI Count by PSC segment (2016-2020)

DOT is increasingly able to analyze how to strategically – and more quickly– focus investments on areas that experience the most fatal and severe injuries. As the City looks to center equity in its service strategies and investments, Figure 4 shows the distribution of traffic fatalities by Council District (2017-2021). As highlighted in this figure, Districts 3 and 7 have the most traffic fatalities.

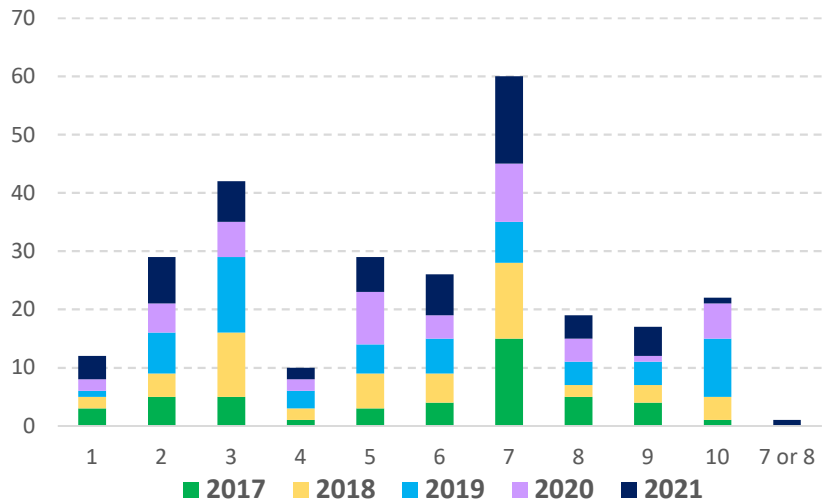


Figure 4: San José Traffic Fatalities by Council District (2017-2021)

As DOT builds the crash and injury analysis use case with the City’s partner vendor, the platform enables DOT project managers to visualize which specific corridors and intersections within a certain geography have the most crashes and injuries ranked by severity. This allows staff to choose data-informed project locations for grant applications, proposing projects to neighborhood organizations and elected officials, developing outreach materials, and engagement campaigns.

As an example of a finer analysis of a geographic area, Figure 5 shows that within District 7, larger numbers of crashes cluster at major intersections along Tully Road, Capitol Expressway, McLaughlin Avenue, and Story Road. While not all crashes produce injuries or severe injuries, the color gradient from blue (low severity injuries) to red (high severity injuries) shows that Capitol Expressway and Senter Road have the most fatal and severe injuries, followed by Capitol Expressway and Snell Avenue.



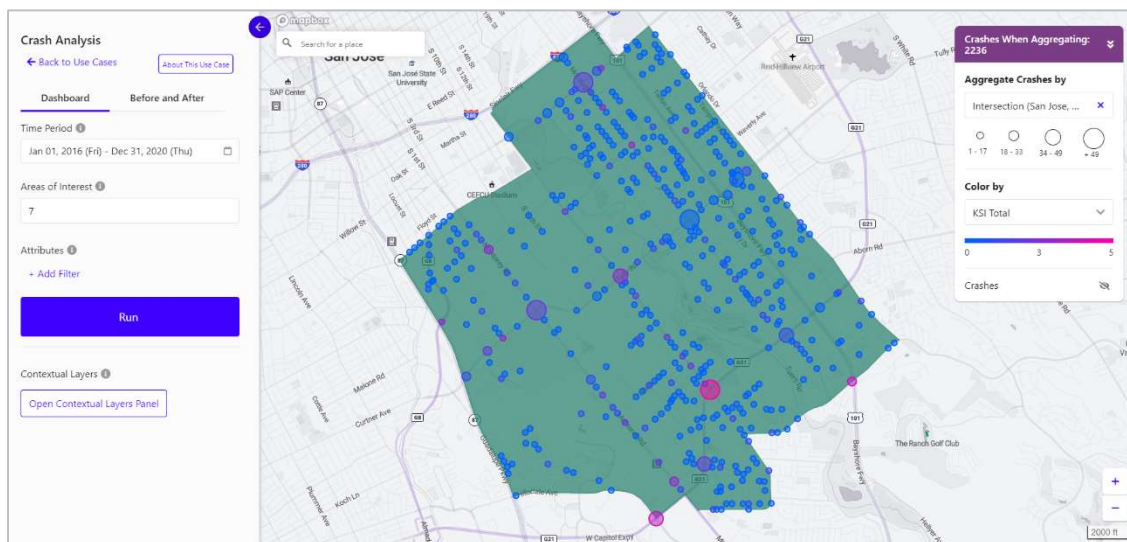


Figure 5: Crash Count and KSI total by intersection within District 7 (2016-2020)

Figure 6 shows that people killed while walking are the largest traffic fatality group by street user type. Between 2017 and 2021, 114 people in San José were killed while walking, representing 43% of the 267 people killed in traffic fatalities in that 5-year period. Looking at 2021 traffic fatality insights, 88% occurred on roadways with a posted speed limit of 35 mph or more.

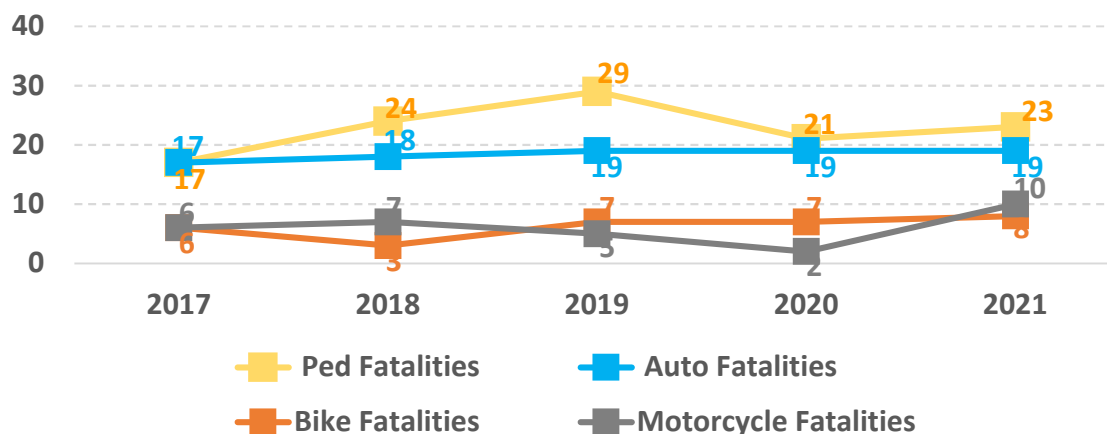


Figure 6: San José Traffic Fatalities by Street User Type (2017-2021)

Figure 7 shows an example of a complex search that the City's newer data platform allows DOT staff to easily perform: Pedestrians who were killed or severely injured on roadways with posted speed limits of 35 to 50 mph. This review highlights that investing in projects that slow speeds on Monterey Rd, Tully Rd, Story Rd, McKee Rd, and King Rd should be prioritized. All of these roads are also designated as a PSC.

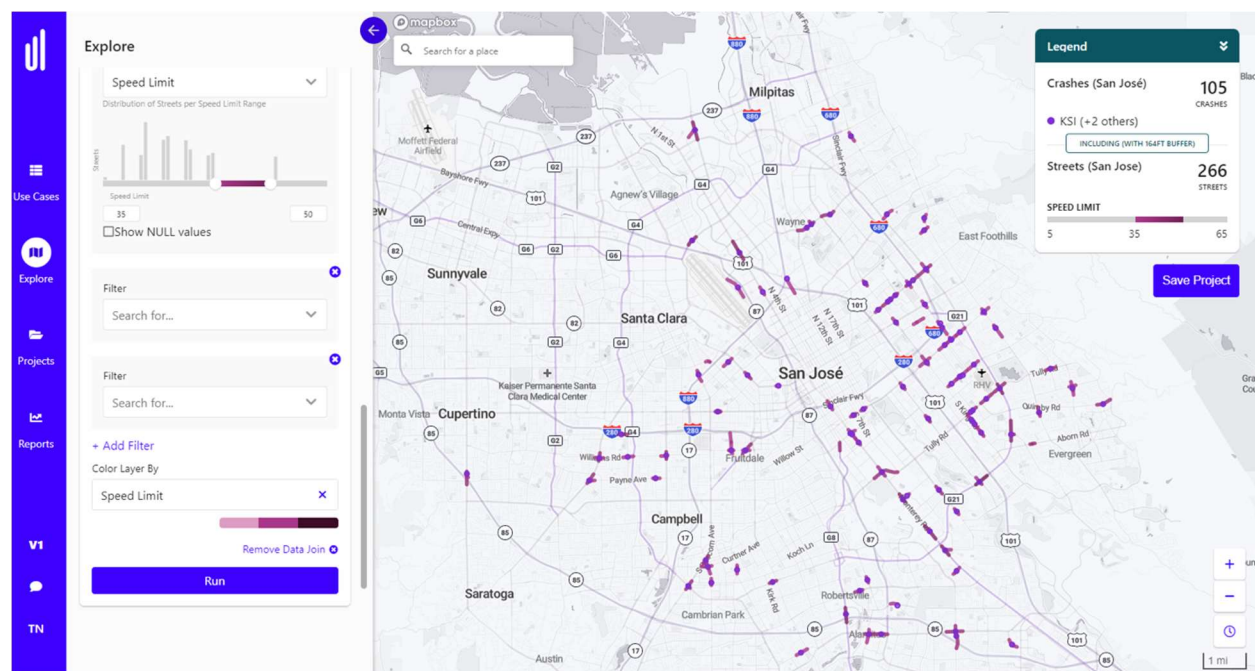


Figure 7: Map of pedestrian KSI on roads with a posted speed limit of 35 to 50 mph

## **CONCLUSION**

Data analytics tools have become incredibly useful for understanding where and why lives are lost to traffic collisions, and how the City can best focus safety investments to reduce injuries and prevent future traffic fatalities. This tool now allows internal staff outside the core data group to learn to run their own data searches and better understand how to use injury data in their project work. Through continued investment in data analytics platforms, staff is working to develop a more dynamic ability to update PSC maps and better understand and predict injury reduction effectiveness of recent and future roadway redesigns.

## **EVALUATION AND FOLLOW-UP**

Staff will present updates to the Transportation and Environment Committee and the Smart Cities and Service Improvements Committee on the status of the Vision Zero Action Plan and data-informed service improvements as part of the Fiscal Year 2022-2023 work plans for those committees.

## **COORDINATION**



HONORABLE MAYOR AND CITY COUNCIL  
May 20, 2022  
**Subject: Smart Cities Data Platforms Status Report**  
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This memorandum has been coordinated with the Information Technology Department and the City Attorney's Office.

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