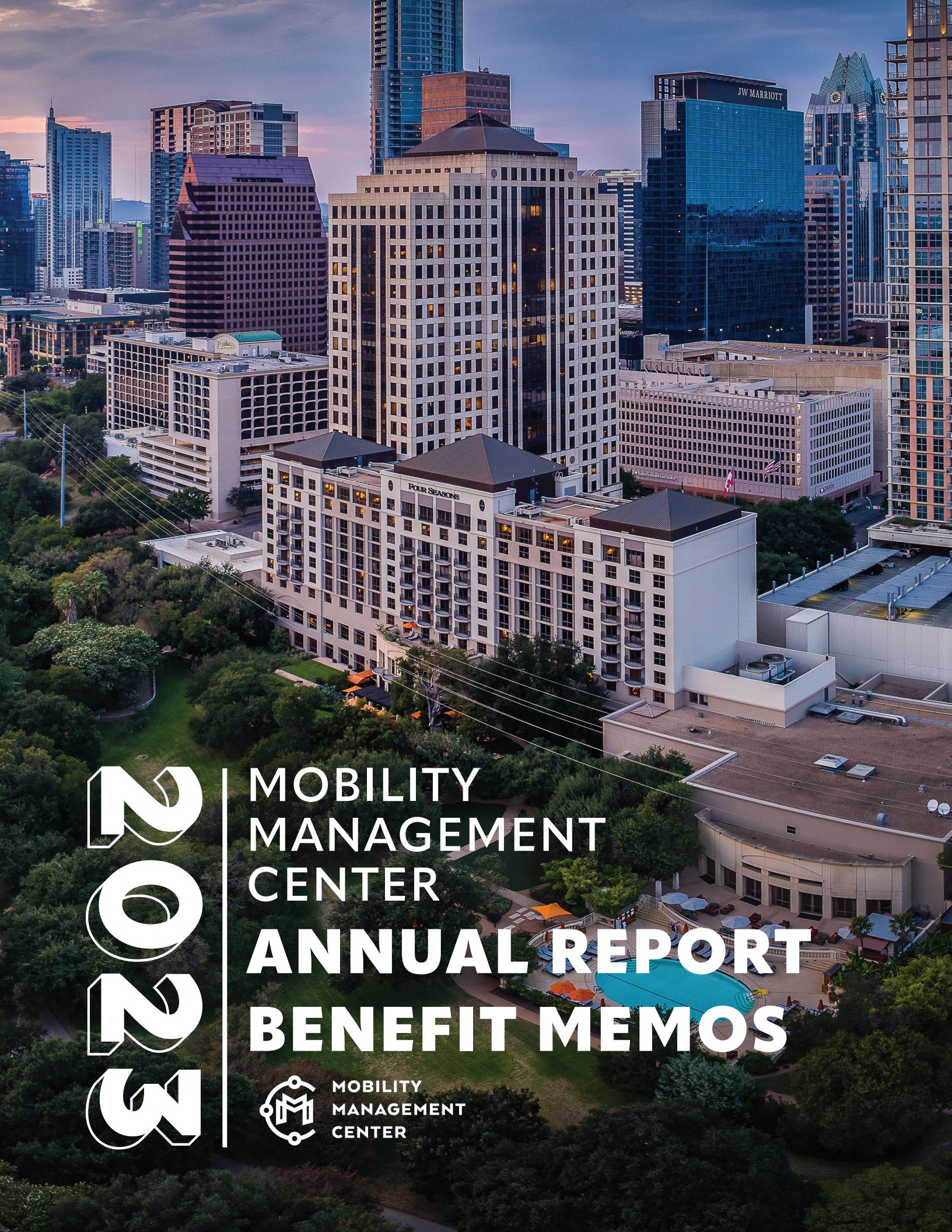

2023

MOBILITY MANAGEMENT CENTER ANNUAL REPORT BENEFIT MEMOS

MOBILITY
MANAGEMENT
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Introduction

Lane closures happen on Austin roadways each day. Some closures are due to planned events, but others are unexpected, for example when a traffic collision occurs or when a tree has fallen into the roadway. MMC staff identify incidents through a variety of different tools. These tools include social media, alerts by field staff, and observation via CCTV deployed across town, to name a few. MMC staff responds by alerting the public through Twitter or, if available, at permanent DMS. **Figure 1** shows a tweet from the MMC alerting drivers of a car fire and advising to use an alternative route due to subsequent delays, accompanied with a photo of the incident.

Figure 1: Crash alert via MMC Twitter

Not all benefits related to lane closure response are directly quantifiable; however, the time savings from MMC operators' signal adjustments that improve traffic flow are calculated in this report.

Lane Closure Management

MMC staff implements signal timing adjustments at adjacent signals to accommodate the changes in traffic flow due to lane closures. Incidents generally produce irregular traffic flow and require varied signal operations as compared to regular operations. This variance produces congestion and requires unique signal adjustments to reduce delay for impacted users. Additional benefits from implementing signal adjustments include saving the public time, reducing vehicle emissions, and lowering the chance of secondary collisions.

Lane Closure Management Benefit Methodology

In 2018 the University of Texas at Austin Center for Transportation Research (CTR) released a study that estimated vehicle delay hours saved based on amount and classification of impacted roadway. This methodology to calculate the benefit of MMC lane closure management. The annual delay savings from MMC of arterial lane closures at both major-major and major-minor intersections is quantified in **Table 1.**

Table 1: Lane Closure Benefit

Lane Closures							
	Major-Major Intersections			Major-Minor Intersections			Total Benefit
	Arterial Lane Closures	Veh Delay Saved (hrs)	Benefit	Arterial Lane Closures	Veh Delay Saved (hrs)	Benefit	
January	35	1866.7	$ 61,282.67	1	40.0	$ 1,313.20	$ 62,595.87
February	71	3786.7	$ 124,316.27	5	200.0	$ 6,566.00	$ 130,882.27
March	59	3146.7	$ 103,305.07	3	120.0	$ 3,939.60	$ 107,244.67
April	51	2720.0	$ 89,297.60	4	160.0	$ 5,252.80	$ 94,550.40
May	56	2986.7	$ 98,052.27	5	200.0	$ 6,566.00	$ 104,618.27
June	52	2773.3	$ 91,048.53	3	120.0	$ 3,939.60	$ 94,988.13
July	53	2826.7	$ 92,799.47	7	280.0	$ 9,192.40	$ 101,991.87
August	43	2293.3	$ 75,290.13	2	80.0	$ 2,626.40	$ 77,916.53
September	56	2986.7	$ 98,052.27	6	240.0	$ 7,879.20	$ 105,931.47
October	63	3360.0	$ 110,308.80	7	280.0	$ 9,192.40	$ 119,501.20
November	47	2506.7	$ 82,293.87	4	160.0	$ 5,252.80	$ 87,546.67
December	63	3360.0	$ 110,308.80	3	120.0	$ 3,939.60	$ 114,248.40
Total	649	34613.3	$ 1,136,355.73	50	2000.0	$ 65,660.00	$ 1,202,015.73

Vehicle Delay hours saved is estimated within traffic modeling software by modeling a typical intersection where 10 seconds of green traffic was added to the effected approach, which in turn alleviates delays. Using the delay per incident assumed in previous CTR reports, we took the difference in values of delay for the modeled intersection and generated a delay savings of 12 seconds per vehicle. Through discussion with INRIX staff, third party data gathered by INRIX detected lane closures and output an estimate for the number of closures for major-major and major-minor intersections. INRIX also provided an average of intersection volumes per hour for the two types of intersections totaling 3,000 veh/hr for Major-Minor intersections and 4,000 veh/hr for Major-Major intersections. The lane closure duration was also assumed to be the same as previous CTR reports at 4 hours per closure.

Annual lane closure management benefit was calculated using a formula that summed the monthly benefit generated from combining the data sourced from CTR reports, traffic modeling software, and INRIX analytics, which can be seen below:

$$\text{Annual Lane Closure Management Benefit} = \sum[\left(\frac{Delay\ Savings}{3600}\right) * (Intersection\ Volume) * (Assumed\ Lane\ Closure\ Duration) * (Road\ User\ Cost)]$$

Where:
Delay Savings = 12 seconds per vehicle (CTR/MMC)
Intersection Volume = 3,000 vehicles per hour at Major-Minor and 4,000 vehicles per hour at Major-Major (INRIX)
Assumed Lane Closure Duration = 4 hours per incident (CTR)
Road User Cost = $32.83 per Passenger Vehicle (TxDOT)

Delay savings from lane closure management generated approximately $1.14 million in savings for Major-Major intersections and $65,000 in savings for Major-Minor intersections.

Conclusion

The MMC identifies lane closures and congestion and responds with public alerts, signal adjustments, and monitoring of traffic operations city-wide. Lane closure management generates non-quantifiable and quantifiable benefits such as saving the public time, reducing vehicle emissions, and lowering the chance of secondary collisions. In 2022, the MMC generated a benefit of $1.2 million to road users in delay savings by managing a total of 699 arterial lane closures.

Introduction

Austin is home to hundreds of special events each year, ranging from small local events to international events attracting hundreds of thousands of attendees. The MMC has historically only managed major special events; however, in 2022, the MMC expanded to incorporate minor events (<20,000 attendance) in their management as well. With the addition of minor events management, the MMC totaled 466 unique special events in 2022. This document describes the methods used to estimate the benefits provided to the traveling public through the MMC management of major and minor special events. MMC management of special events also provide non-quantifiable benefits like improved pedestrian safety, improved public/traveler information through dynamic message signs and tweets, and improved coordination between transportation, public safety, and event management staff.

Major Events

Major events are defined as any special event with 20,000 or more attendees. Examples of major events that are currently managed by the MMC include (but are not limited to):

- South by Southwest
- Austin City Limits
- University of Texas Football

Refer to the Appendix for a complete list of major events.

Large events flood the transportation network with travelers during ingress and egress periods and often come with street closures, further disrupting typical traffic patterns. Intense periods of ingress and egress can result in abnormal travel patterns which provide opportunities for the MMC to signal timings to reduce delay. The MMC customizes signal plans and deploys them along relevant roadways to and from an event to then reduce queue length and increase throughput. Although the delay experienced from major events cannot be completely eliminated each time with extreme congestion, these actions performed by MMC staff can equate to thousands of hours saved in road user delay from major events.

Major Event Benefit Methodology

To estimate benefits from ingress and egress timing plans for planned events in Austin, the MMC collected travel data along critical arterials adjacent to event areas to generate average travel times.

The MMC then collected data for a 2019 event at the Frank Erwin Center where the MMC was not able to actively manage traffic. By comparing travel times within the event area for that event to other Erwin Center events that the MMC managed, the MMC found that active management of the event saved event goers 14% travel time. This methodology uses this 14% reduction in travel time for the average estimated travel time reduction to calculate time saved per event goer using Equation 1.

Equation 1

$$Time\ Saving\ per\ Vehicle = (Average\ Travel\ Time\ During\ Event) * (Travel\ Time\ Reduction)$$

Where:

Average Travel Time During Event = averaged collected travel data along critical arterials adjacent to event areas.

Travel Time Reduction = travel time reduction factor of 14%

Time Saving per Vehicle = amount of time saved per event goer. Applied to large scale events (see Appendix A) that always have custom timing plans implemented.

To find the monetary benefit of MMC management for major events, see Equation 2 below.

Equation 2

$$\text{Major Event Savings} = [(Time\ Savings\ per\ Vehicle) * (Attendance * Multimodal\ Reduction)] * (Road\ User\ Cost)$$

Where:

Time Savings per Vehicle = time savings per event goer calculated by Equation 1

*(Attendance * Multimodal Reduction)* = total number of attendees traveling to the event reduced by 20% to account for incoming attendees arriving via rideshare or other modes.

Road User Cost = a standardized value of user cost per vehicle that is released by the Texas Department of Transportation on an annual basis and incorporates value of time per hour delay from a variety of economic and environmental factors. In 2022, this factor was determined to be $32.83.

Major Event Savings = Monetary Benefit of MMC Management for Major Events

Using Equation 2 and associated values for each major event the MMC managed in 2022 (see Appendix A), the MMC saved the traveling public an estimated $655,000 through major event traffic management.

Minor Event User Benefit

In 2022, the MMC expanded special event operations to include minor events. Minor events range from 2,000 up to 20,000 expected attendees. Examples of minor events that are currently managed by the MMC include (but are not limited to;):

- UT Athletics
  - Baseball
  - Basketball
  - Volleyball
- Moody Event Center
- Large concert/performance venues
- High School Football Games

Refer to Appendix A for a complete list of minor events.

Ingress and egress times for a major special event might be in excess of two or three hours; by comparison, ingress and egress times for minor special events are usually only an hour. Due to the highly localized nature and relatively short duration of minor events, MMC adjustments to signal operations can provide large benefit to attendees.

Minor Event Benefit Methodology

Using signal performance data from minor events in 2021 where the MMC did not adjust timings, delay savings per attendee was estimated for each minor event using Equation 3. The MMC evaluated high

school football games throughout the city in 2021 and compared them to games in 2022 where the MMC adjusted timings, and found an average delay saving of 5 seconds per signal.

Equation 3

$$\text{Avg Delay Savings per Minor Event} = [(Control\ Delay\ with\ No\ Adjustment) - (Control\ Delay\ with\ Adjustment)] * (\#\ of\ Signals\ Encountered)$$

Where:

# of Signals Encountered = Estimated number of signals encountered for an attendee during ingress and egress. We estimate that each event goer passes through 6 signal per event on average.

Control Delay with No Adjustment = high school football game traffic delay with no MMC adjustment

Control Delay with No Adjustment = high school football game traffic delay with MMC adjustment

Average Delay Saving per Minor Event = delay saved during the entirety of the event

Using the average delay savings per minor event, we estimate the total minor event savings for 2022 using Equation 4.

Equation 4

$$\text{Minor Event Savings} = \sum[(Number\ of\ Events) * (Attendance) * (Average\ Delay\ Savings)] * (Road\ User\ Cost)$$

Where:

Number of Events = the total number of occurrences of each type of minor event

Attendance = total number of attendees travelling to a given minor event

Average Delay Savings = time savings per minor event calculated by Equation 3

Road User Cost = a standardized value of user cost per vehicle that is released by the Texas Department of Transportation on an annual basis and incorporates value of time per hour delay from a variety of economic and environmental factors. In 2022, this factor was determined to be $32.83.

Using Equation 4 and associated values for each minor event the MMC managed in 2022 (see Appendix B), the MMC saved the traveling public an estimated $725,900 through minor event traffic management.

Conclusion

The MMC provides benefit to the City of Austin and traveling public with management of special events of all sizes. With every special event, the MMC improves efficiency and safety for road users by adjusting traffic signal operations. Special event management generates non-quantifiable benefits such as improved pedestrian safety, improved public traveler information, and improved coordination between transportation, public safety, and event management. In 2022, the MMC generated a benefit of $1.4 million to road users in delay savings by managing 64 major and 402 minor events.

Major Event Cost Benefits

		Dates	Event Time	Analysis Start Time	Analysis End Time	Total Attendance	Critical Corridor Average Travel Time (min)	Travel Time Savings (min) per Vehicle	Travel Time Savings (hour) per Event	Event Benefit
Q2	Austin FC vs Atlas FC (Liga MX)	2/16	6:00 PM	4:00 PM	9:00 PM	20,738	3.49	0.488	134.924	$ 4,429.55
	Austin FC vs FC Cincinnati	2/26	5:00 PM	3:00 PM	8:00 PM	20,738	3.88	0.543	150.193	$ 4,930.84
	Austin FC vs Inter Miami CF	3/6	3:00 PM	1:00 PM	6:00 PM	20,738	3.71	0.520	143.782	$ 4,720.35
	Austin FC vs Seattle Sounders FC	3/20	3:30 PM	1:00 PM	6:00 PM	20,738	3.69	0.516	142.652	$ 4,683.28
	Club America vs Club de Futbol Monterrey	3/26	7:30 PM	5:00 PM	10:00 PM	10,000	3.51	0.491	65.495	$ 2,150.21
	Austin FC vs Minnesota United FC	4/10	6:30 PM	4:00 PM	9:00 PM	20,738	3.37	0.472	130.542	$ 4,285.69
	Austin FC vs Vancouver Whitecaps FC	4/23	7:30 PM	5:00 PM	10:00 PM	20,738	3.51	0.491	135.771	$ 4,457.35
	Austin FC vs LA Galaxy	5/8	6:00 PM	4:00 PM	9:00 PM	20,738	3.38	0.473	130.878	$ 4,296.72
	Austin FC vs Orlando City SC	5/22	7:00 PM	5:00 PM	10:00 PM	20,738	3.35	0.469	129.722	$ 4,258.77
	USMNT Soccer	6/10	7:00 PM	5:00 PM	10:00 PM	20,738	3.30	0.463	127.934	$ 4,200.08
	Austin FC vs FC Dallas	6/25	8:00 PM	6:00 PM	11:00 PM	20,738	3.46	0.484	133.754	$ 4,391.15
	4th of July Concerts	7/4		10:00 AM	11:00 PM	15,000	2.98	0.418	83.571	$ 2,743.63
	Austin FC vs Houston Dynamo	7/12	8:00 PM	6:00 PM	11:00 PM	20,738	3.40	0.476	131.711	$ 4,324.08
	Austin FC vs New York Red Bulls	7/24	7:00 PM	5:00 PM	10:00 PM	20,738	3.29	0.460	127.289	$ 4,178.90
	Rugby Sevens Championship	7/30	5:00 PM	3:00 PM	8:00 PM	7,000	3.00	0.420	39.241	$ 1,288.28
	Austin FC vs San Jose Earthquakes	8/6	8:00 PM	6:00 PM	11:00 PM	20,738	3.31	0.463	128.082	$ 4,204.94
	Austin FC vs Sporting KC	8/13	8:00 PM	6:00 PM	11:00 PM	20,738	3.33	0.466	128.915	$ 4,232.29
	Austin FC vs LAFC	8/26	7:00 PM	5:00 PM	10:00 PM	20,738	3.70	0.519	143.405	$ 4,707.99
	Austin FC vs Portland Timbers	8/31	8:00 PM	6:00 PM	11:00 PM	20,738	3.34	0.468	129.292	$ 4,244.65
	Austin FC vs Real Salt Lake	9/14	8:00 PM	6:00 PM	11:00 PM	20,738	3.37	0.472	130.448	$ 4,282.60
	Austin FC vs Nashville SC	9/17	8:00 PM	6:00 PM	11:00 PM	20,738	3.38	0.474	130.999	$ 4,300.69
	Austin FC vs Colorado Rapids	10/9	4:00 PM	2:00 PM	7:00 PM	20,738	3.50	0.490	135.381	$ 4,444.55
	Bundesliga Clubs	11/19	3:00 PM	1:00 PM	6:00 PM	7,000	3.34	0.467	43.587	$ 1,430.97
Q2 Subtotal		2/16 - 11/19				433,022	3.42	0.478	2777.568	$ 91,187.57
South By Southwest		3/11 - 3/21		10:00 AM	12:00 AM	134,537	10.11	1.416	2539.987	$ 83,387.77
UT Football	vs ULM	9/3	7:00 PM	4:00 PM	1:00 AM	94,873	3.39	0.474	599.692	$ 19,687.90
	vs Alabama	9/10	11:00 AM	8:00 AM	5:00 PM	105,213	3.70	0.517	725.702	$ 23,824.80
	vs UTSA	9/17	7:00 PM	4:00 PM	1:00 AM	102,520	3.59	0.503	687.387	$ 22,566.93
	vs West Virginia	10/1	6:30 PM	4:00 PM	12:00 AM	100,740	3.49	0.489	656.836	$ 21,563.93
	vs Iowa State	10/15	11:00 AM	8:00 AM	5:00 PM	100,072	3.44	0.482	642.708	$ 21,100.10
	vs TCU	11/12	6:30 PM	4:00 PM	12:00 AM	104,203	3.80	0.531	738.255	$ 24,236.91
	vs Baylor	11/25	11:00 AM	8:00 AM	5:00 PM	94,076	3.13	0.438	549.151	$ 18,028.64
UT Football Subtotal		9/3 - 11/25				701,697	3.50	0.491	4599.732	$ 151,009.20
ACL	Weekend 1	10/7 - 10/9		12:00 PM	11:00 PM	213,062	5.02	0.702	1994.625	$ 65,483.52
	Weekend 2	10/14 - 10/16		12:00 PM	11:00 PM	213,062	5.10	0.714	2028.569	$ 66,597.91
ACL Subtotal		10/7 - 10/16		12:00 PM	11:00 PM	426,123	5.06	0.708	4023.193	$ 132,081.44
COTA	Super Lap Battle	2/18 - 2/20		11:00 AM	12:00 AM	5,000	4.23	0.593	39.504	$ 1,296.91
	EchoPark Texas Grand Prix (NASCAR)	3/25 - 3/27		11:00 AM	12:00 AM	5,000	4.14	0.579	38.624	$ 1,268.04
	MotoGP	4/8 - 4/10		11:00 AM	12:00 AM	100,000	4.19	0.586	781.296	$ 25,649.94
	F1 US Grand Prix	10/21 - 10/23		11:00 AM	12:00 AM	440,000	6.10	0.853	5006.658	$ 164,368.60
COTA Subtotal		2/19 - 10/23				550,000	4.66	0.653	5866.083	$ 192,583.49
Trail of Lights		11/27 - 12/24		5:00 PM	11:00 PM	35,100	2.21	0.309	144.827	$ 4,754.65
									Total Benefit:	$ 655,004.12

Minor Event Cost Benefits

Month	Auditorium Shores	Bass Concert Hall	Conference	Erwin Center	Festival	High School Football	Moody Center	UIL	Zilker	Misc	Total
January	$0.00	$0.00	$1,094.33	$0.00	$0.00	$0.00	$0.00	$0.00	$2,735.83	$5,471.67	$9,301.83
February	$0.00	$9,520.70	$1,094.33	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13,679.17	$24,294.20
March	$0.00	$8,727.31	$0.00	$19,588.57	$0.00	$0.00	$0.00	$0.00	$0.00	$15,867.83	$44,183.71
April	$4,103.75	$12,694.27	$0.00	$9,794.28	$1,367.92	$0.00	$20,518.75	$0.00	$2,735.83	$12,037.67	$63,252.47
May	$0.00	$2,380.18	$3,283.00	$0.00	$1,367.92	$0.00	$28,726.25	$5,745.25	$0.00	$7,660.33	$49,162.93
June	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$24,622.50	$1,641.50	$5,471.67	$3,830.17	$35,565.83
July	$1,367.92	$793.39	$0.00	$0.00	$0.00	$0.00	$12,311.25	$0.00	$5,471.67	$0.00	$19,944.23
August	$0.00	$6,347.13	$0.00	$0.00	$2,735.83	$22,981.00	$45,141.25	$0.00	$0.00	$3,830.17	$81,035.38
September	$0.00	$8,727.31	$0.00	$0.00	$1,367.92	$51,707.25	$53,348.75	$0.00	$0.00	$6,566.00	$121,717.23
October	$0.00	$3,966.96	$0.00	$0.00	$0.00	$57,452.50	$53,348.75	$0.00	$0.00	$4,377.33	$119,145.54
November	$0.00	$8,727.31	$0.00	$0.00	$0.00	$14,363.13	$61,556.25	$0.00	$0.00	$2,735.83	$87,382.52
December	$0.00	$7,933.92	$0.00	$0.00	$0.00	$0.00	$57,452.50	$0.00	$5,471.67	$0.00	$70,858.08
Total	**$5,471.67**	**$69,818.47**	**$5,471.67**	**$29,382.85**	**$6,839.58**	**$146,503.88**	**$357,026.25**	**$7,386.75**	**$21,886.67**	**$76,056.17**	**$725,843.94**

Introduction

In January 2022, the Austin Mobility Management Center (MMC) began using data from KITS Advanced Traffic Management System (ATMS) that connects and manages each of the City's 1100 traffic signals, and INRIX Signal Analytics to proactively identify traffic signal performance issues. This methodology outlines how the MMC team used Smart City data to make proactive improvements to traffic operations, document subsequent actions, and estimated their benefit.

Process

Issue Identification

KITS ATMS has a native signal health dashboard that analyzes traffic signal controller logs to identify locations with potentially broken vehicle or pedestrian detection, among other performance metrics. This proactively alerts MMC staff to issues before the traveling public reports an operational issue or submits a complaint to the city-wide call center via 3-1-1.

INRIX Signal Analytics provide Signal Performance Measures (SPMs) using crowd-sourced, probe-based anonymized traffic data from road users. Data is gathered by INRIX through various applications and platforms. This proliferation rate ranges from 5% to 8% of the traveling public. This platform helps to identify traffic signal locations where delay or other performance metrics became worse compared to the previous four weeks. MMC staff can then use reporting tools within the platform to further refine the data for a deeper investigation. MMC staff uses these reports weekly to identify any new problem locations and address these impacts as able. How these findings are addressed, as well as how quickly they are resolved, varies based on the type of issue detected.

The MMC also uses situational awareness tools to identify incidents and traffic congestion irregularities along the City's roadway network. These include INIRX, Waze, Austin Fire Department information, social media, and other alerting systems. Upon identification of a traffic disruption, the MMC may implementing signal timing adjustments to improve congestion and reduce delay.

Solutions

The majority of issues the MMC proactively identified for this process fell into the following three categories:

- Pedestrian Detection Issues
- Signal Timing Issues
- Congestion Management Issues

For pedestrian detection issues identified using KITS Signal Health analytics, MMC would immediately dispatch signal technicians for same-day repairs.

For signal timing issues, MMC staff would investigate the issues using INRIX Signal Analytics and make timing adjustments to improve delay at the intersection for the target movement (the movement experiencing the worsening delay in our reports). This was frequently balancing green time from underutilized or less impacted movements to improve delay on the target movement.

For congestion management issues, the MMC team would implement alternative signal timing plans to get traffic around a blockage like a crash or construction closure. The MMC then would make signal timing adjustments to those special plans for the duration of the closure as needed.

Tracking

The MMC tracked each of these actions in 2022 as well as their before and after delay and estimated traffic volume using INRIX Signal Analytics data. The MMC also tracked the date the issue was found, the date it was resolved, and the duration of the impact.

Benefits

By tracking data for each action, the MMC could estimate the overall impacts of MMC actions on traveler delay and ultimately monetary delay saving benefits. By comparing the before and after delay from INRIX Signal Analytics, the MMC had an average delay improvement of 35% for the target movement of 23% for the total intersection in 2022. These actions impacted an estimated 14 million trips in 2022.

Using the TxDOT road user cost, an estimated effectiveness time of 30 days for proactive issues the MMC identified (or the duration of incident/event for Congestion Management Plans), the delay savings estimates from INRIX, and the estimated traffic volume from INRIX, the MMC estimated overall delay saving benefit using the following formula:

$$Benefit = (Delay\ savings) * (Estimated\ Traffic\ Volume) * (Duration\ of\ Improvement) * (Road\ User\ Cost)$$

Where:

Delay Savings = before delay minus after delay

Estimated Traffic Volume derived from INRIX per peak period

Duration of Improvement = assumed 30 days for issues found proactively or the duration of congestion management plans

Road User Cost = $32.83 from TxDOT Road User Cost

Conclusion

In all, the MMC proactively identified and mitigated over 120 issues in 2022 using this process and tracking procedure. Using this data and formula, the MMC estimated an overall benefit for MMC Actions to be $794 million in 2022.

MMC Actions Methodology

MMC Actions

AUSTIN TRANSPORTATION | MOBILITY MANAGEMENT CENTER | Kimley»Horn

3/3/2023 4:55:02 PM
Date Last Refreshed

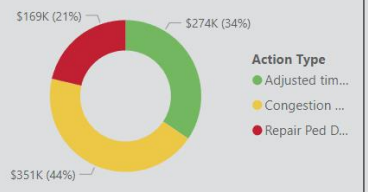
Issue Resolved Date
1/10/2022 12/31/2022

Action
All

Source
All

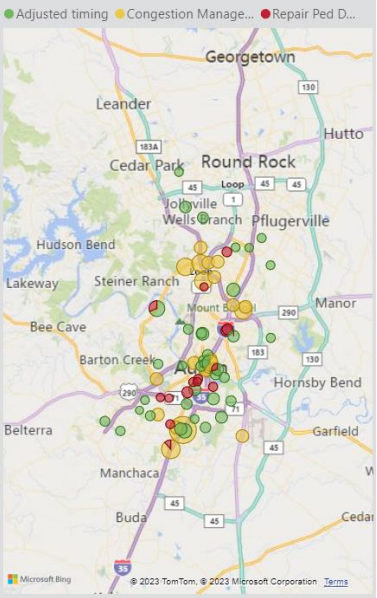
Status
All

Total Benefit by Action Type



Target Movement Avg % Delay Improvement	Total Intersection Avg % Delay Improvement
35%	23%
Target Movement Weighted Avg Delay Improvement	**Total Intersection Weighted Avg Delay Improvement**
31 sec	8 sec
Target Movement Impacted Trips	**Total Intersection Impacted Trips**
2M	14M
Target Movement Passenger Vehicle Benefit	**Total Intersection Passenger Vehicle Benefit**
$660K	$794K
Avg Target Movement Benefit per Action	**Avg Intersection Benefit per Action**
$6.6K	$7.94K

Action Locations by Category and Impact



MOBILITY MANAGEMENT CENTER

Kimley»Horn

Introduction

One of the major benefits provided by MMC staff is the ability to remotely investigate and respond to Citizen Service Requests (CSRs). CSRs can be submitted through the Austin 3-1-1 service and can be classified into the following categories:

- Traffic Signal - Maintenance
- Traffic signal - New/Change
- School zone flashing beacon

CSRs are assigned to appropriate personnel at the MMC. Addressing a CSR typically may include activities such as monitoring on CCTV, dispatching a technician, updating signal timing plans, and contacting the citizen to follow up.

Remote Investigation and Response

MMC staff can remotely investigate the cause of various issues and determine whether dispatching a technician is necessary. Many CSRs can be resolved by remote investigation, using tools such as KITS, CCTV, and School Zone Beacon Systems (**Figure 1**). If the issue can be resolved and closed remotely, a technician does not need to be dispatched to the field. Reducing total amount of needed dispatches helps save city resources.

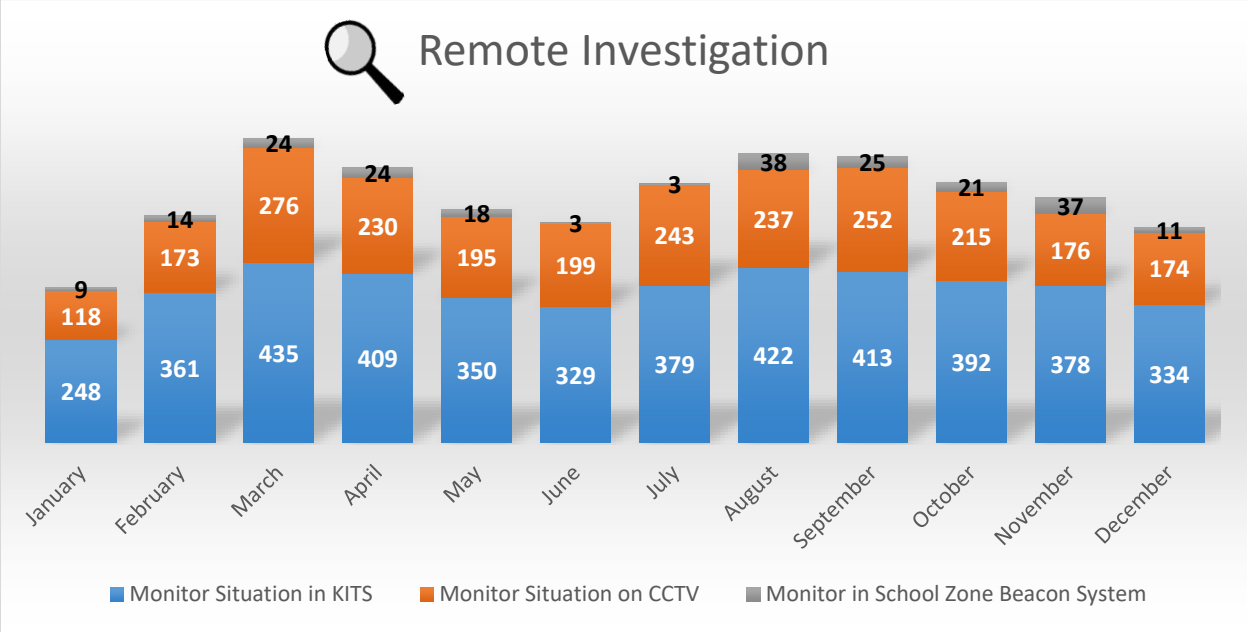


Figure 1: 2022 Monitored Situations by Month

One of the core functions of the MMC is to respond to CSRs. The MMC handling the majority of CSRs allows for signal engineers to focus on design and other more critical items unique to their skillset.

If after investigation a dispatch is deemed necessary, MMC operators can help troubleshoot remotely in order to offer support to the technician in the field. This saves time by reducing the amount of field troubleshooting needing to be done by the technician.

Cost-Benefit Analysis

To calculate cost savings from MMC staff remotely investigating and responding to citizen complaints, CSR records from 2022 were obtained from Data Tracker, the asset management system utilized by the City of Austin. CSRs that were closed without dispatching a technician represented remote response cost savings. The methodology assumed that 1.5 hours of technicians' time was spent per dispatch, including travel. Cost savings for signal engineers were also calculated and included in calculations for each of the two types of cost savings, assuming they previously spent 0.5 hours investigating each CSR.

The resulting calculations of benefits of remote investigation and response are shown in **Table 1**.

Table 1: Remote Response Cost Savings

	Cost Saved from Remote Resolution (No Dispatch)				
	Resolved CSRs	Technician Dispatched	Technician Cost Savings	Engineering Cost Savings	Total Savings
January	607	293	$ 47,100.00	$ 19,312.50	$ 66,412.50
February	635	238	$ 59,550.00	$ 20,062.50	$ 79,612.50
March	774	284	$ 73,500.00	$ 24,562.50	$ 98,062.50
April	737	236	$ 75,150.00	$ 23,437.50	$ 98,587.50
May	730	249	$ 72,150.00	$ 23,062.50	$ 95,212.50
June	711	262	$ 67,350.00	$ 22,500.00	$ 89,850.00
July	706	235	$ 70,650.00	$ 22,312.50	$ 92,962.50
August	975	401	$ 86,100.00	$ 30,937.50	$ 117,037.50
September	880	285	$ 89,250.00	$ 27,937.50	$ 117,187.50
October	798	267	$ 79,650.00	$ 25,312.50	$ 104,962.50
November	788	268	$ 78,000.00	$ 24,937.50	$ 102,937.50
December	660	221	$ 65,850.00	$ 21,000.00	$ 86,850.00
Total	9001	3239	$ 864,300.00	$ 285,375.00	$ 1,149,675.00

Overall, the remote investigation and response of citizen service requests by MMC staff provided approximately $1.15 million in cost savings.

Remote Resets

Malfunction Management Units (MMUs) monitor critical traffic signal cabinet components and signal indications to ensure proper operation. MMUs place signals in flash mode if any malfunctions occur. When this occurs, the issue that caused the fault must be resolved, and the MMU must be reset manually. Often due to storms or other power source issues, MMU faults can be triggered without any failures in signal cabinet components. In such cases, resetting the MMU is the only thing that is required to return the signal to normal operations.

The Austin Mobility Management Center (MMC) has the ability to reset MMUs remotely under certain conditions. Resetting MMUs remotely saves time and money by eliminating the need to dispatch technicians to reset the MMU and decreasing the delay incurred to road users. However, not every signal in flash has the equipment to do this, and many signals in flash are due to malfunctions that cannot be reset remotely for safety reasons.

MMUs are only reset remotely under the following conditions:

1. Communications must still be possible between the signal and the MMC
2. The signal must have a resettable MMU installed in the cabinet
3. The type of failure is Red Fail or Watchdog Timeout

Communication to a signal must be present for the signal to be remotely reset. If communications are down, there is no way for the MMC to tell the status of a signal remotely. Therefore, if a signal is confirmed to be in flash and communications are down, a technician must be dispatched.

Only certain types of MMUs have remote reset capabilities. The City continues to upgrade MMUs and more and more gain the ability to be reset remotely each month.

Lastly, the type of failure that the signal experienced to cause it to go into flash is critical. Some types of failures cannot be reset remotely, and a technician will need to be dispatched even though the previous two criteria where met. The two most common types of failure able to remotely reset are:

- Red Fail
  - There was an absence of all signal indications (red, yellow, or green) on a particular phase
- Watchdog
  - The MMU could not tell that the signal controller was still working or not

If all three conditions are met, MMC staff attempt to reset the MMU remotely. At the time of writing this methodology, the MMC successfully resets an average of 5-10 signals each week. Additionally, during inclement weather events signals able to be remotely reset can be upwards of 100+ instances due in the right conditions. The following cost-benefit analysis quantifies the benefit of remote resetting from the perspective of both cost savings to the traveling public and the city staff.

Cost-Benefit Analysis

Remote resets of MMUs provide benefits primarily into two categories, which can be represented below:

$$\text{MMU Remote Resetting Benefit} = (Road\ User\ Savings) + (Technician\ Savings)$$

Road User Savings

Road user savings represent monetary savings by road users in the form of time saved not having to wait at a signal in flash. This can be represented by the following equation:

$$\text{Road User Savings} = (Delay\ Savings) * (Vehicle\ Volume) * (Flash\ Time) * (Value\ of\ Time)$$

To estimate delay savings, the MMC measured the difference in delay at a traffic signal under normal conditions as compared to flashing conditions using INRIX Signal Analytics. During Winter Storm Mara, the intersection of Parmer Lane & Spectrum Drive remained on flash under battery backup power for multiple days while power was out due to the storm. We took control delay and volume data from INRIX Signal Analytics for the date of February 7, 2023 (flash operation) and compared it to January 23, 2022 (normal operation) during the PM peak period as shown in **Figure 2**. Using this comparison, we determined a difference in delay of 51 seconds per vehicle (0.014 hours per vehicle).

Table 1. Delay Savings

Delay Savings		
Variable	Unit	Per Intersection
Volume	vehicle	1950
AWSC Delay	seconds/vehicle	72
Signal Delay	seconds/vehicle	22
Δ Control Delay	seconds/vehicle	51
Δ Control Delay	**hours/vehicle**	**0.014**

Using this data, we also estimated vehicle volume to be 1,950 vehicles per hour using the INRIX Signal Analytics data.

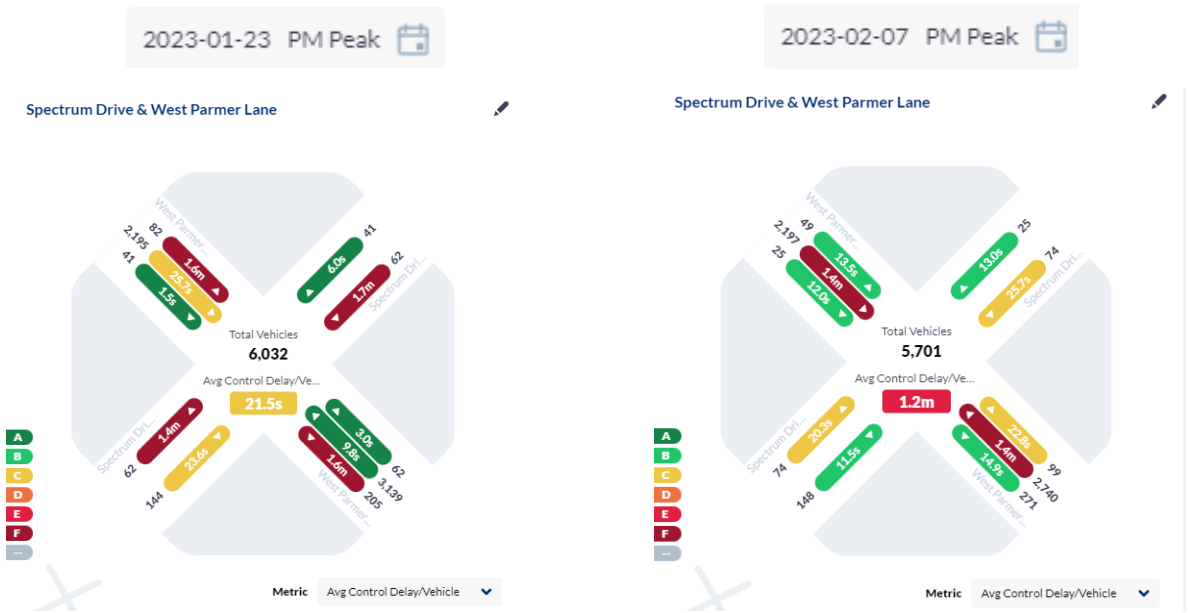


Figure 2: Scaled INRIX Volume Data

Flash time, the amount of time a signal is typically in flash whenever it must be dispatched, was estimated to be 1.5 hours based on event log data from KITS, the MMC's Advanced Traffic Management System (ATMS). Lastly, value of time is the dollar amount per hour delay costs the traveling public and is updated every year in the TxDOT Road User's Manual. This year, the value of time is estimated to be $32.83 per vehicle per hour. Using these values, the delay savings per each successful remote reset is $1,344.39.

Technician Savings

Technician Savings represents monetary savings by the City of Austin based on technician costs and incurred delay. This can be represented by the following equation:

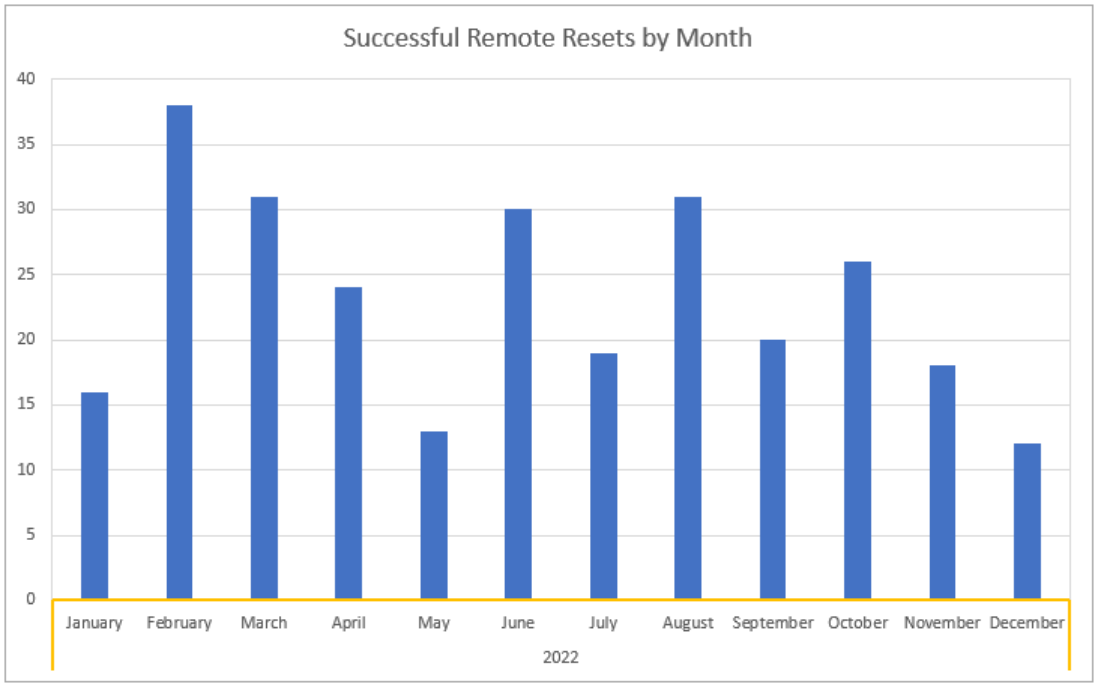
$$\text{Technician Savings} = (Saved\ Dispatch\ Time) * (Technician\ Rate)$$

Saved dispatch time refers to time saved by remotely investigating and resetting a signal. Generally speaking, it takes an average of 1.5 hours for a signal in flash to be brought back online, including travel time to the signal and on-site investigation. This translated to time saved directly as remote resetting negates the need for a technician to travel or investigate as they are not dispatched in the first place. Using an estimated cost of technician labor and equipment of $100/hr, we determined that each successful remote reset saves the City $150 in technician costs.

Total Benefit

Using records from our internal asset management and work tracking tools, **Figure 3** shows the number of successful remote resets each month for the year 2022.

Figure 3: Remote Resets by Month



By remotely resetting flashing signals, the MMC saves drivers and signal technicians time, generating approximately $1,500 in benefit with each reset. In 2022, the MMC reset 275 signals remotely, generating $415,440.00 in total benefit.

Conclusion

Remote investigation and response continues to be a core component of the MMC. Remote response and investigation is made possible by the extensive communication network managed by the city. Remote investigation saves time and resources for all levels of staff, resulting in a more efficient operation. Remote resetting allows for field staff to quickly respond to more involved issues, saving road users time and money. With the combined benefits of remote investigation, response, and resets, the MMC generated approximately $2.65 million cost savings in the year 2022.