

# Status of FY 2023 Transportation Initiatives

City Council Briefing  
April 4, 2023

The logo of the City of Dallas, featuring a stylized white 'D' on a dark blue background. Inside the 'D' is a white three-leaf plant. To the left of the 'D' are three horizontal white lines.

**City of Dallas**

Ghassan “Gus” Khankarli, Ph.D. P.E., PMP, CLTD  
Director  
Department of Transportation

# Presentation Overview



1. Purpose
2. Background
3. Traffic Signal Infrastructure
4. Data Management
5. ATMS Contract
6. Pavement Markings and Signs
7. Service Requests
8. Innovation
9. Next Steps
10. Discussion



# Purpose



- Provide an overview of current and ongoing transportation operations initiatives in the City of Dallas including:
  - Background and current status of traffic signal infrastructure
  - Status update on the Advanced Traffic Management System (ATMS) system operation and management
  - Pavement markings informational update
- Provide a general overview of other transportation department activities
- Next steps





# Traffic Signal Infrastructure



# Background



- On December 3, 2019, the Department of Transportation (TRN) presented the “Preliminary Look Into Traffic Signals Infrastructure” briefing to the Transportation and Infrastructure Committee.
  - Presentation laid out the average yearly cost to upgrade the signal infrastructure and the strategic approach to such upgrades.
- Following that briefing, TRN began the process of modernizing the upgrading of the traffic signal infrastructure based on the noted strategic approach.
- On April 19, 2021, TRN presented the “Infrastructure Update: Traffic Signals, School Flashers & Pavement Markings” to the Transportation and Infrastructure Committee.



# Background, continued



- On April 6, 2022, the Department of Transportation (TRN) presented the “Traffic Signal Infrastructure and Data Management Update” briefing to the City Council.
  - Included two key strategic items: (A) the ATMS contract and (B) data exchange governance, noting the collaboration with partnering agencies.
- On August 10, 2022, City Council resolution (CR 22-1571) authorized the extension of the expiring ATMS contract with Ericsson as the first step in the process of subsequent amendments to the contract.
- Recent council resolutions acted on agreements with partnering agencies for the funding or construction of traffic signals.



# Current Challenges and Opportunities



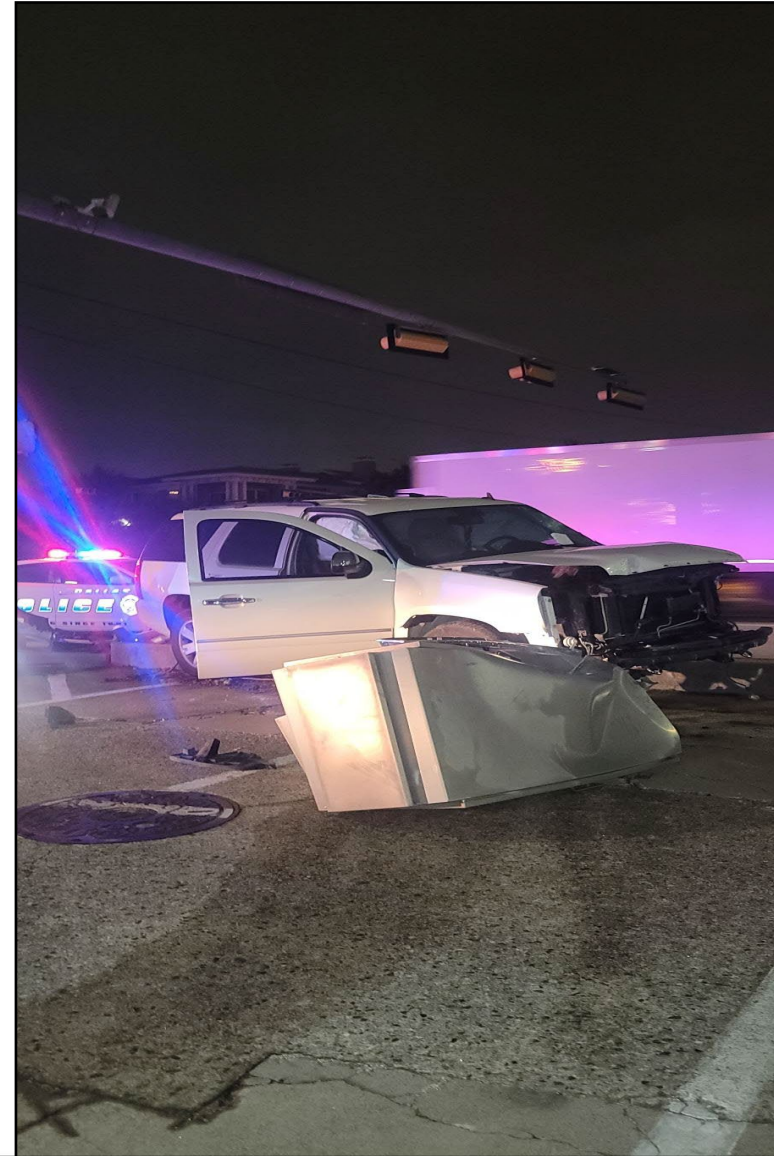
- Deteriorating physical infrastructure.
- Technological advances and system connectivity, including Advanced Traffic Controllers (ATCs) and radar.
- Natural disasters and man-made challenges.
- The following slides include pictures of scenarios found in the field.



# Example – Corrosion



# Example – Third Party Damage



# Example – New Signal



# Example – New (Central Business District)



# Annual Update – Signal Infrastructure



December 2019, 2020, 2021 and 2022 Comparison

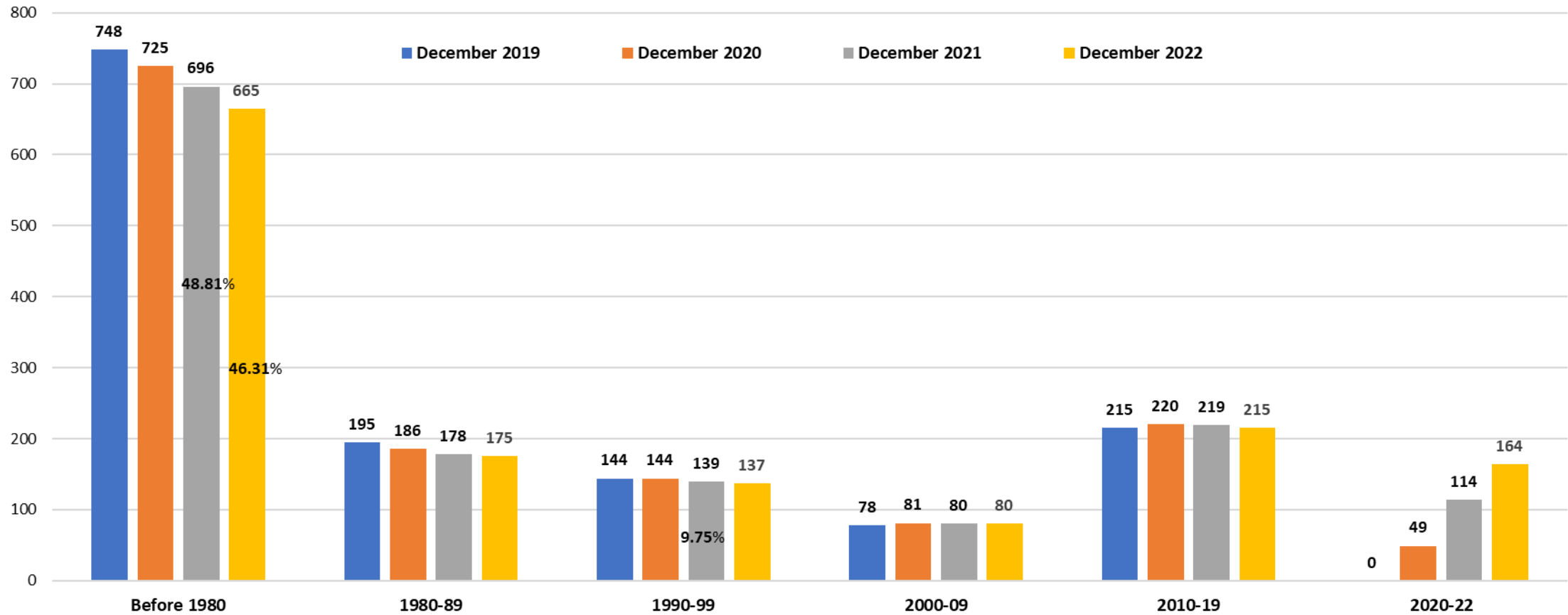
|                     | December 2019     |                    | December 2020     |                    | December 2021     |                    | December 2022     |                    |
|---------------------|-------------------|--------------------|-------------------|--------------------|-------------------|--------------------|-------------------|--------------------|
| Construction Decade | Number of Signals | Percent of Signals | Number of Signals | Percent of Signals | Number of Signals | Percent of Signals | Number of Signals | Percent of Signals |
| Before 1980         | 748               | 54.20%             | 725               | 51.60%             | 696               | 48.81%             | 665               | 46.31%             |
| 1980-89             | 195               | 14.13%             | 186               | 13.24%             | 178               | 12.48%             | 175               | 12.19%             |
| 1990-99             | 144               | 10.43%             | 144               | 10.25%             | 139               | 9.75%              | 137               | 9.54%              |
| 2000-09             | 78                | 5.65%              | 81                | 5.77%              | 80                | 5.61%              | 80                | 5.57%              |
| 2010-19             | 215               | 15.58%             | 220               | 15.66%             | 219               | 15.36%             | 215               | 14.97%             |
| 2020-22             | 0                 | 0.00%              | 49                | 3.49%              | 114               | 7.99%              | 164               | 11.42%             |
| Total               | 1,380             | 100.00%            | 1,405             | 100.00%            | 1,426             | 100.00%            | 1,436             | 100.00%            |



# Annual Update – Signal Infrastructure



Signals by Construction Decade



# Annual Update – Electronic Components

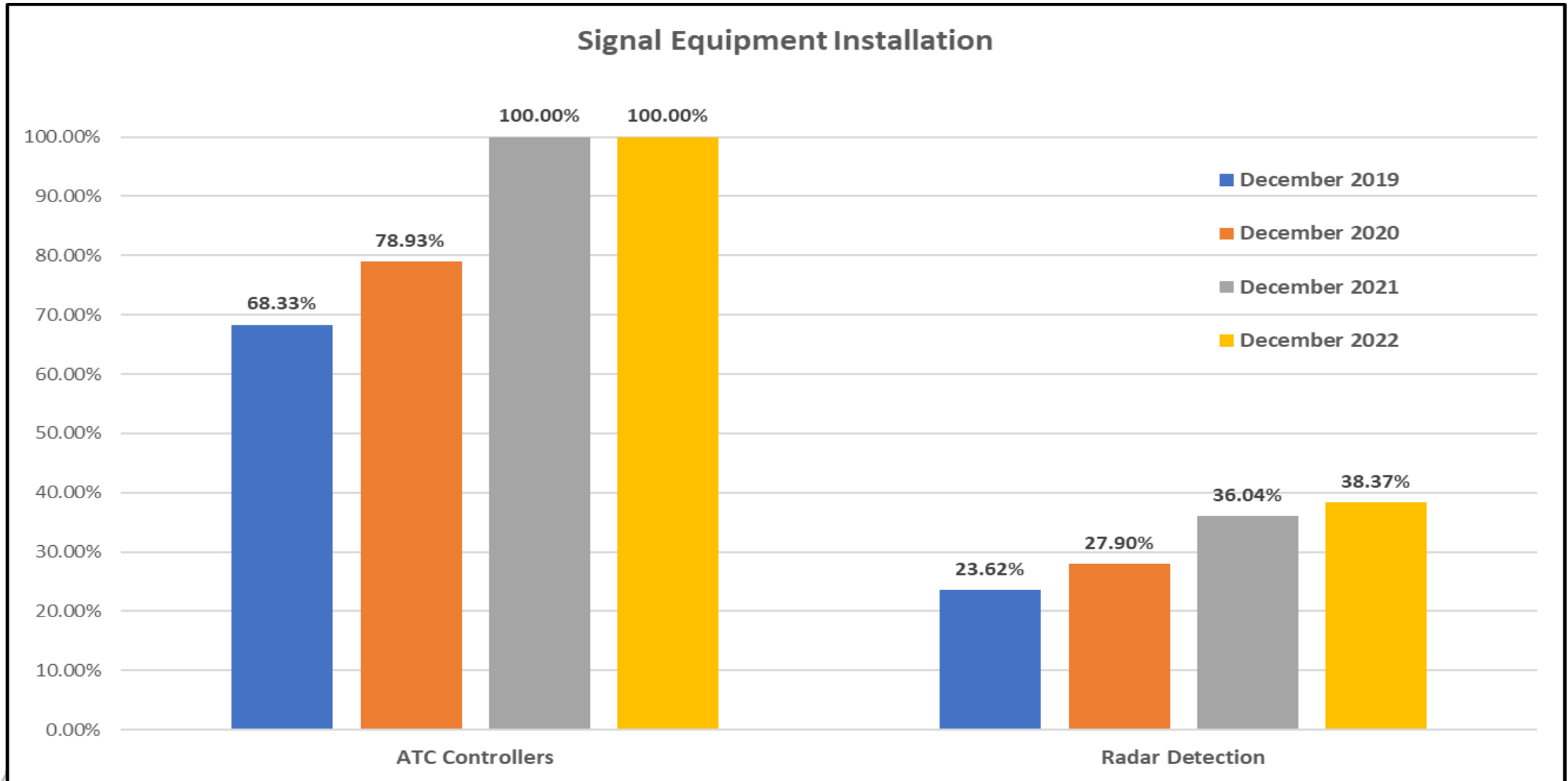


December 2019, 2020, 2021 and 2022 Comparison

|               | Number<br>of Signals | ATC<br>Controllers | ATC<br>% Completed | Radar<br>Detection | Radar Detection<br>% Completed |
|---------------|----------------------|--------------------|--------------------|--------------------|--------------------------------|
| December 2019 | 1,380                | 943                | 68.33%             | 326                | 23.62%                         |
| December 2020 | 1,405                | 1,109              | 78.93%             | 392                | 27.90%                         |
| December 2021 | 1,426                | 1,426              | 100.00%            | 514                | 36.04%                         |
| December 2022 | 1,436                | 1,436              | 100.00%            | 551                | 38.37%                         |



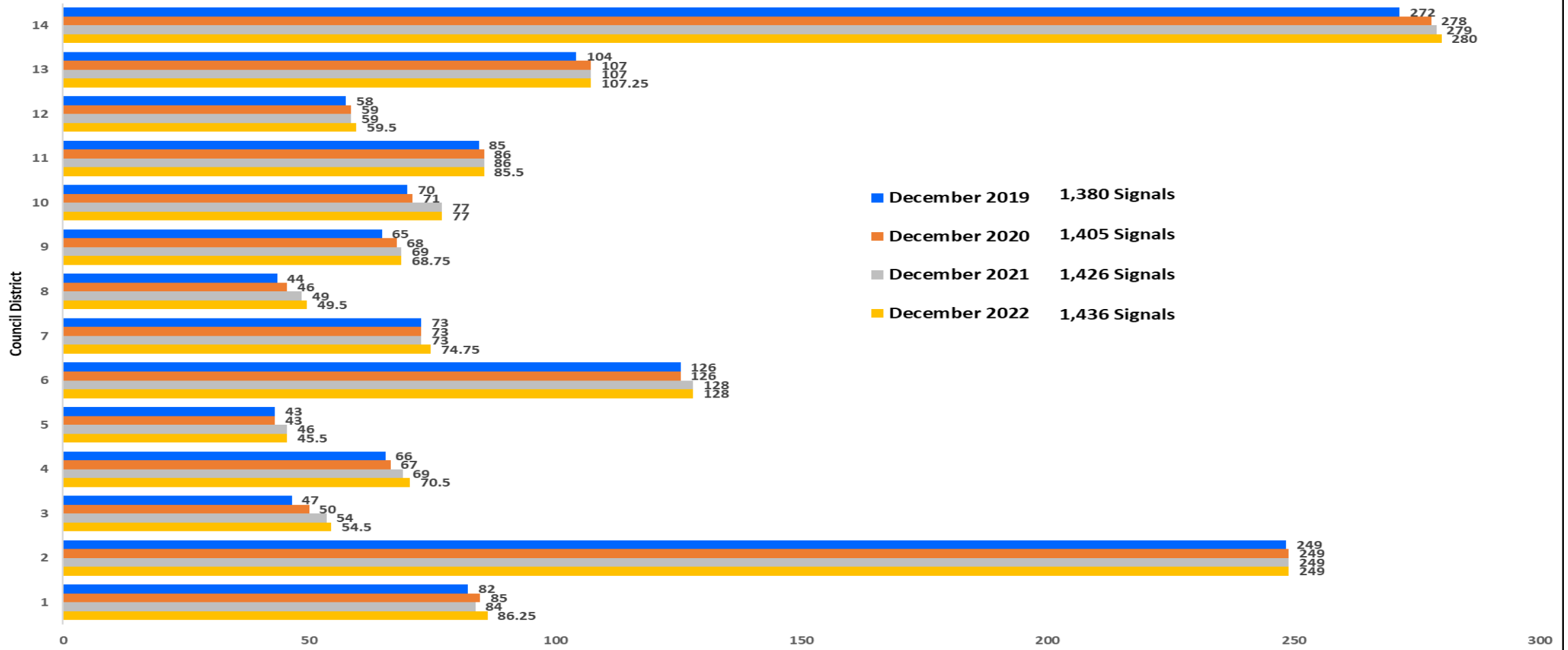
# Annual Update – Electronic Components



# Annual Update



Number of Traffic Signals by Council District



# Annual Update – Total Signals by CD



| Council District | December 2019 | %Total | December 2020 | %Total | December 2021 | %Total | December 2022 | %Total |
|------------------|---------------|--------|---------------|--------|---------------|--------|---------------|--------|
| 1                | 82.25         | 5.96%  | 84.75         | 6.03%  | 83.75         | 5.87%  | 86.25         | 6.01%  |
| 2                | 248.5         | 18.01% | 249           | 17.72% | 249           | 17.46% | 249           | 17.34% |
| 3                | 46.5          | 3.37%  | 50            | 3.56%  | 53.5          | 3.75%  | 54.5          | 3.80%  |
| 4                | 65.5          | 4.75%  | 66.5          | 4.73%  | 69            | 4.84%  | 70.5          | 4.91%  |
| 5                | 43            | 3.12%  | 43            | 3.06%  | 45.5          | 3.19%  | 45.5          | 3.17%  |
| 6                | 125.5         | 9.09%  | 125.5         | 8.93%  | 128           | 8.98%  | 128           | 8.91%  |
| 7                | 72.75         | 5.27%  | 72.75         | 5.18%  | 72.75         | 5.10%  | 74.75         | 5.21%  |
| 8                | 43.5          | 3.15%  | 45.5          | 3.24%  | 48.5          | 3.40%  | 49.5          | 3.45%  |
| 9                | 64.75         | 4.69%  | 67.75         | 4.82%  | 68.75         | 4.82%  | 68.75         | 4.79%  |
| 10               | 70            | 5.07%  | 71            | 5.05%  | 77            | 5.40%  | 77            | 5.36%  |
| 11               | 84.5          | 6.12%  | 85.5          | 6.09%  | 85.5          | 6.00%  | 85.5          | 5.95%  |
| 12               | 57.5          | 4.17%  | 58.5          | 4.16%  | 58.5          | 4.10%  | 59.5          | 4.14%  |
| 13               | 104.25        | 7.55%  | 107.25        | 7.63%  | 107.25        | 7.52%  | 107.25        | 7.47%  |
| 14               | 271.5         | 19.67% | 278           | 19.79% | 279           | 19.57% | 280           | 19.50% |
| <b>Total</b>     | <b>1380</b>   |        | <b>1405</b>   |        | <b>1426</b>   |        | <b>1436</b>   |        |



# Annual Update-Signals by Decade by CD-Numbers



| Council District | Before 1980 | 1980-89 | 1990-99 | 2000-09 | 2010-19 | 2020-22 | Total  | %Total  |
|------------------|-------------|---------|---------|---------|---------|---------|--------|---------|
| 1                | 43.5        | 2.25    | 1.25    | 1.5     | 17.5    | 20.25   | 86.25  | 6.01%   |
| 2                | 155.25      | 16.75   | 11.5    | 14      | 43.75   | 7.75    | 249    | 17.34%  |
| 3                | 17.25       | 4.25    | 7       | 7.25    | 7       | 11.75   | 54.5   | 3.80%   |
| 4                | 36.75       | 4       | 7.75    | 1       | 8       | 13      | 70.5   | 4.91%   |
| 5                | 23          | 1       | 2.25    | 3       | 9       | 7.25    | 45.5   | 3.17%   |
| 6                | 57.25       | 26.75   | 6       | 7       | 22      | 9       | 128    | 8.91%   |
| 7                | 35.25       | 8.5     | 8.5     | 3       | 6.75    | 12.75   | 74.75  | 5.21%   |
| 8                | 7.75        | 11      | 7.75    | 3.75    | 9.25    | 10      | 49.5   | 3.45%   |
| 9                | 32.5        | 7.75    | 2       | 2       | 6       | 18.5    | 68.75  | 4.79%   |
| 10               | 15.25       | 12      | 13      | 2       | 12      | 22.75   | 77     | 5.36%   |
| 11               | 27.5        | 27.5    | 11      | 7       | 10      | 2.5     | 85.5   | 5.95%   |
| 12               | 1.75        | 20.75   | 13.5    | 16      | 4       | 3.5     | 59.5   | 4.14%   |
| 13               | 51.5        | 16      | 12.5    | 1       | 21      | 5.25    | 107.25 | 7.47%   |
| 14               | 160.5       | 16.5    | 33      | 11.5    | 38.75   | 19.75   | 280    | 19.50%  |
| <b>Total</b>     | 665         | 175     | 137     | 80      | 215     | 164     | 1,436  | 100.00% |



# Annual Update-Signals by Decade by CD-Percentage



| Council District | Before 1980 | 1980-89 | 1990-99 | 2000-09 | 2010-19 | 2020-22 | Total  | %Total  |
|------------------|-------------|---------|---------|---------|---------|---------|--------|---------|
| 1                | 7%          | 1%      | 1%      | 2%      | 8%      | 12%     | 86.25  | 6.01%   |
| 2                | 23%         | 10%     | 8%      | 18%     | 20%     | 5%      | 249    | 17.34%  |
| 3                | 3%          | 2%      | 5%      | 9%      | 3%      | 7%      | 54.5   | 3.80%   |
| 4                | 6%          | 2%      | 6%      | 1%      | 4%      | 8%      | 70.5   | 4.91%   |
| 5                | 3%          | 1%      | 2%      | 4%      | 4%      | 4%      | 45.5   | 3.17%   |
| 6                | 9%          | 15%     | 4%      | 9%      | 10%     | 5%      | 128    | 8.91%   |
| 7                | 5%          | 5%      | 6%      | 4%      | 3%      | 8%      | 74.75  | 5.21%   |
| 8                | 1%          | 6%      | 6%      | 5%      | 4%      | 6%      | 49.5   | 3.45%   |
| 9                | 5%          | 4%      | 1%      | 3%      | 3%      | 11%     | 68.75  | 4.79%   |
| 10               | 2%          | 7%      | 9%      | 3%      | 6%      | 14%     | 77     | 5.36%   |
| 11               | 4%          | 16%     | 8%      | 9%      | 5%      | 2%      | 85.5   | 5.95%   |
| 12               | 0%          | 12%     | 10%     | 20%     | 2%      | 2%      | 59.5   | 4.14%   |
| 13               | 8%          | 9%      | 9%      | 1%      | 10%     | 3%      | 107.25 | 7.47%   |
| 14               | 24%         | 9%      | 24%     | 14%     | 18%     | 12%     | 280    | 19.50%  |
| <b>Total</b>     | 100%        | 100%    | 100%    | 100%    | 100%    | 100%    | 1,436  | 100.00% |
| <b>Total</b>     | 665         | 175     | 137     | 80      | 215     | 164     | 1,436  | 100.00% |



# Improvements Since December 2019



- Since December 2019, we:
  - Added 56 new signals to the system, bringing the total from 1380 to 1436.
  - Reconstructed 108 existing signals.
- Completed the upgrades to all the traffic signal controllers in December 2021.
- Increased the number of locations with radar detection to 38% of the system.
- These improvements allow the City to better manage the traffic signals through the ATMS.



# Advanced Traffic Management System (ATMS)

# What is ATMS?



- It is an integrated and centralized system that stores and displays traffic signal data and allows real-time evaluation of signal operations.
- Utilizes sensors, signage, information, processing, and other technology from across municipalities and agencies to provide overarching and shared capabilities.
- It provides real time information about traffic operations at signalized intersections.





# ATMS Components



- The ATMS contract with Ericsson was approved in August 2017 for a total of \$9.876 million covering development and maintenance for five years, with an option to renew for an additional five years.
- Components include:
  - **Advanced Traffic Controllers (ATCs)** – field computer at each traffic signal - replaces 1980's era controller technology.
  - **Traffic Management System (TMS)** – Centralized Computer Management System for the Traffic Signals - replaces 1992 Computer System.
  - **Video Management System (VMS)** – manages traffic monitoring cameras - replaces 1990's era analog technology.
  - **Asset Management System (AMS)** - Integration of City's Electronic Work Order and Asset Management System (EWAMS) and replaces a variety of spreadsheets, databases, and paper forms.



# ATMS Enhancements

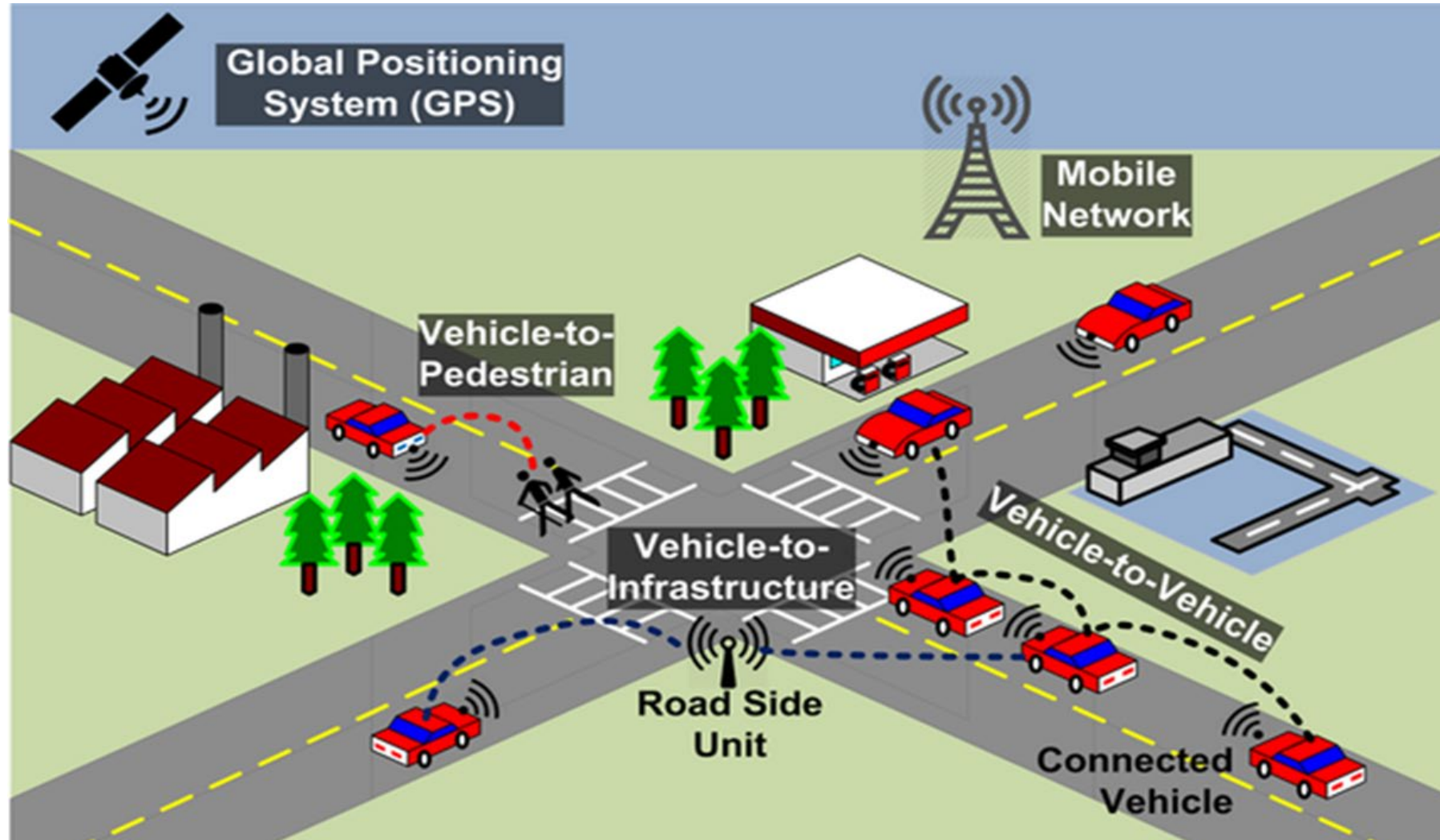


- The full operational value of ATMS relies on robust, reliable, and secure data exchange.
- The City's original contract with Ericsson did not include the Connected Vehicles/Autonomous Vehicles (CV/AV) module.
- Activation of this module is necessary for future data management.



# Data Management and the Future

# Data Management and the Future



# Data Management and the Future



- TRN has a forward-thinking approach to its signal and streetlight infrastructure covering the following three components:
  - Physical infrastructure component
  - Technological and system integration component inclusive of signal synchronization
  - Data exchange component
- TRN is coordinating these efforts with other city departments including Information and Technology Services, Data Analytics and Business Intelligence, and others



# Data Management and the Future



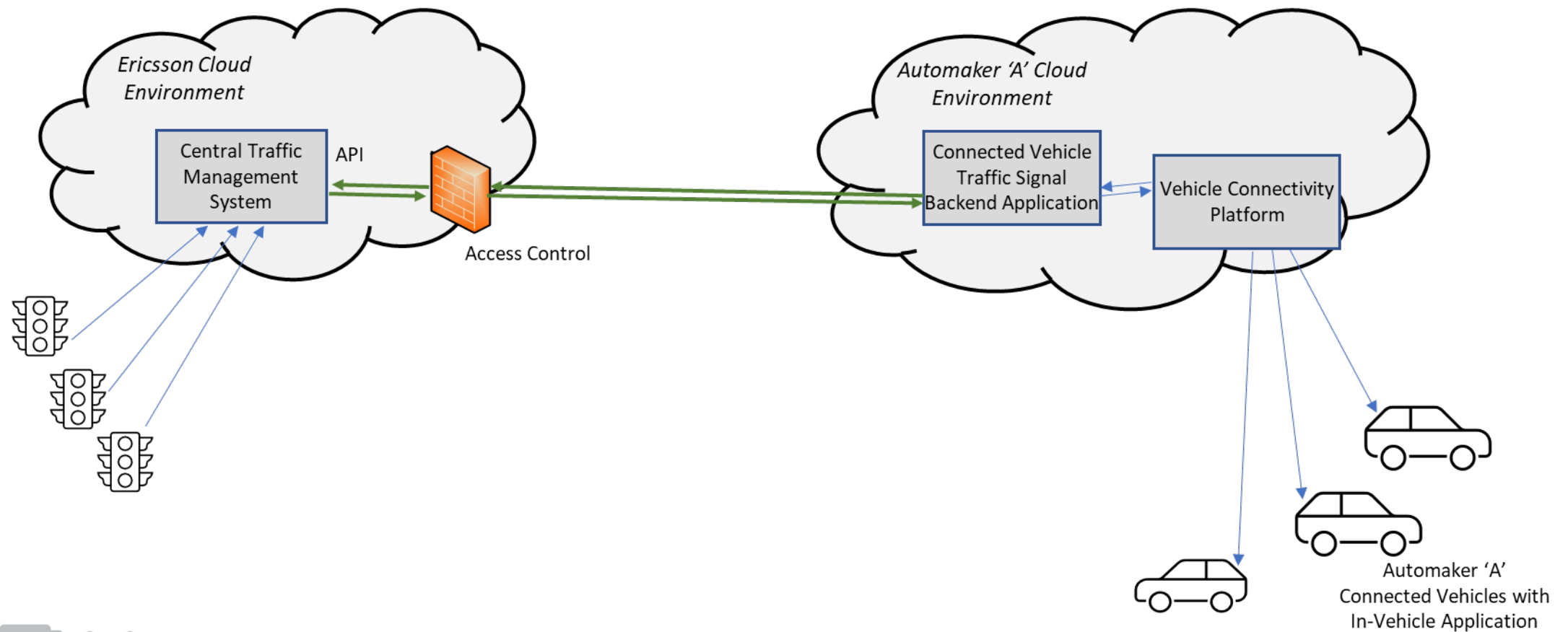
- Technological advances, public safety and regional integration requires having our systems updated and ready
- This necessitates the activation of the CV/AV component of the ATMS
- Activation of the CV/AV requires data exchange and a new set of rules that govern this process
- Additional enhancements to the existing system allows the city to incorporate the management of other systems such as school flashers, pre-emption capabilities, transit signal priority, etc.



# Data Management and the Future



## Dallas Traffic Signal Data Sharing



# Ericsson Contract Amendment Scope



| Scope                                         | Description                                                                                                                                                                                        |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| System Enhancements                           | Integrate school flasher and Battery Back Up Units (BBUs) into ATMS for real time status/data/control                                                                                              |
| CV/AV Solutions and ATCMTD Support            | Integrate Kinetic CV to enable real-time signal status sharing needed for the ATCMTD SM Wright project, signal pre-emption for emergency response, transit signal priority, and other applications |
| Extension of System Operation and Maintenance | Exercise five year renewal option of original contract from November 2022 to November 2027 for Ericsson to continue operation & maintenance of ATMS system                                         |



# Data Management and the Future



- Data exchange requires technological advances to address (a) Latency and (b) Security
- In 2013, the U.S. DOT published a data business plan. Key components include:
  - Data governance, quality, standards, privacy, and security
  - Oversight and coordination of data management practices
- COD's cost to activate the CV/AV module encompasses the following:
  - COD initial payment (activation cost)
  - COD yearly maintenance cost
  - Cost associated to manage 3<sup>rd</sup> party participation covering:
    - Program administration
    - Data exchange cost per data byte



# Current Opportunities - Estimated Cost



Estimated cost for budgeting purposes

| Description                                                                            | One Time Cost | Avg Yearly Cost | Total over 5 years | Comments                                                                                                                                                                                             |
|----------------------------------------------------------------------------------------|---------------|-----------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Existing systems Operations and Cloud Services                                         | \$ -          | \$ 900,000      | \$ 4,500,000       | Service is necessary to maintain operation of current system                                                                                                                                         |
| Kinetic Signals Upgrade                                                                | \$ 3,100,000  | \$ 310,000      | \$ 4,650,000       | Upgrade of current system needed for TSP, preemption, and improved CV/AV                                                                                                                             |
| School Flashers and BBU Integration                                                    | \$ 1,600,000  | \$ 575,000      | \$ 4,475,000       | Service is necessary to integrate the school flashers and BBU into current system which improves safety of school children                                                                           |
| TxDOT visualization and usability overhaul                                             | \$ 1,800,000  | \$ 200,000      | \$ 2,800,000       | Dynamic map updates for traffic incidents; tools for more efficient traffic management                                                                                                               |
| CV/AV License and deployment                                                           | \$ 1,900,000  |                 | \$ -               | Service is necessary to: (a) meet FHWA's ATCMTD grant requirements, (b) Activate the option for traffic signals preemption for emergency response, and (c) position the city for future technologies |
| CV/AV Corridor Testing - Frankford Rd and SM Wright; Includes support for TTI analysis | \$ 1,700,000  |                 | \$ -               | Service is necessary to test the CV/AV system and refine its operation and meet FWHA's ATCMTD requirements                                                                                           |
| CV/AV Data Share with 511 DFW                                                          | \$ 1,500,000  |                 | \$ -               | Part of ATCMTD scope to synchronize road closures, construction, events, incidents and make available for regional travelers and public users to view                                                |
| CA/AV Data Share with DART                                                             | \$ 1,900,000  |                 |                    | Transit priority for DART vehicles                                                                                                                                                                   |
| COD CV yearly cost after deployment                                                    |               | \$ 600,000      | \$ 3,000,000       | Yearly maintenance cost                                                                                                                                                                              |
| 3rd Party CV data access/user (DART, 511DFW, automakers, etc)                          | \$ 100,000    | \$ 300,000      | \$ 1,600,000       | Estimated yearly cost for a 3rd party to have access to traffic signals data. This cost can increase based on usage and excludes COD administration cost                                             |



# Data Management – Third Party



- COD will be the administrator of any 3<sup>rd</sup> party access to COD-owned data. 3<sup>rd</sup> party includes internal users such as DFR or DPD who use a different system/provider that needs to be integrated into TRN's Ericsson ATMS system.
- Any 3<sup>rd</sup> party access request will be required to be through COD as Ericsson's contract is with COD and will not have separate contract with any 3<sup>rd</sup> party for governance control.
- The City will incur costs to manage the program and the related usage expenses.
- A long-term funding strategy for 3<sup>rd</sup> party data & maintenance costs will be required. This funding strategy could include monetization of data management.



# Summary of Opportunities



- Inclusion of school flashers and BBU's into the ATMS will provide: (a) real time management and response to potential field issues and (b) enhanced safety around schools and for the traveling public.
- Activation of the CV/AV module will allow for:
  - The ability for our emergency responders to preempt our traffic signals through a GPS tracked movement
  - As per FHWA's Signal Timing Manual, benefits include:
    - Improved response time for emergency vehicles
    - Improved safety and reliability for vehicles receiving preemption right of way
    - Improved safety and clarity of right-of-way for other roadway users
  - Positioning the city to accommodate emerging/future technologies necessary to manage future mobility demands





# Pavement Markings and Signs



# Example – Pavement Markings



# Pavement Markings Overview



- Approximately 1,700 linear miles of roadways that account for nearly 8.5 million linear feet of stripes.
- 8,400 crosswalks, primarily at signalized intersections and includes nearly 3,400 school related locations.
- Approximately 7,000 stop bars and 2,700 pavement legends such as turning arrows.
- Nearly all street striping is installed by contractors.
- Majority of striping is completed between March and October, due to weather challenges in the colder months.
- City primarily uses Thermoplastic with a lifecycle of 2 to 5 years depending on roadway conditions and traffic volumes.
- Currently testing the use of preformed tape for some limited applications.



# Pavement Markings Overview



**\$1.8 Million** required to consistently restripe 400 +/- miles every year to maintain a high level of visible striping within the City to be on an average of 4 year cycle.



**\$1.8 Million** required to consistently restripe 1,200 crosswalks/stop bars for pedestrian safety and functional operations at school crossings, intersections and/or street every year to be on an average of 7 year cycle.

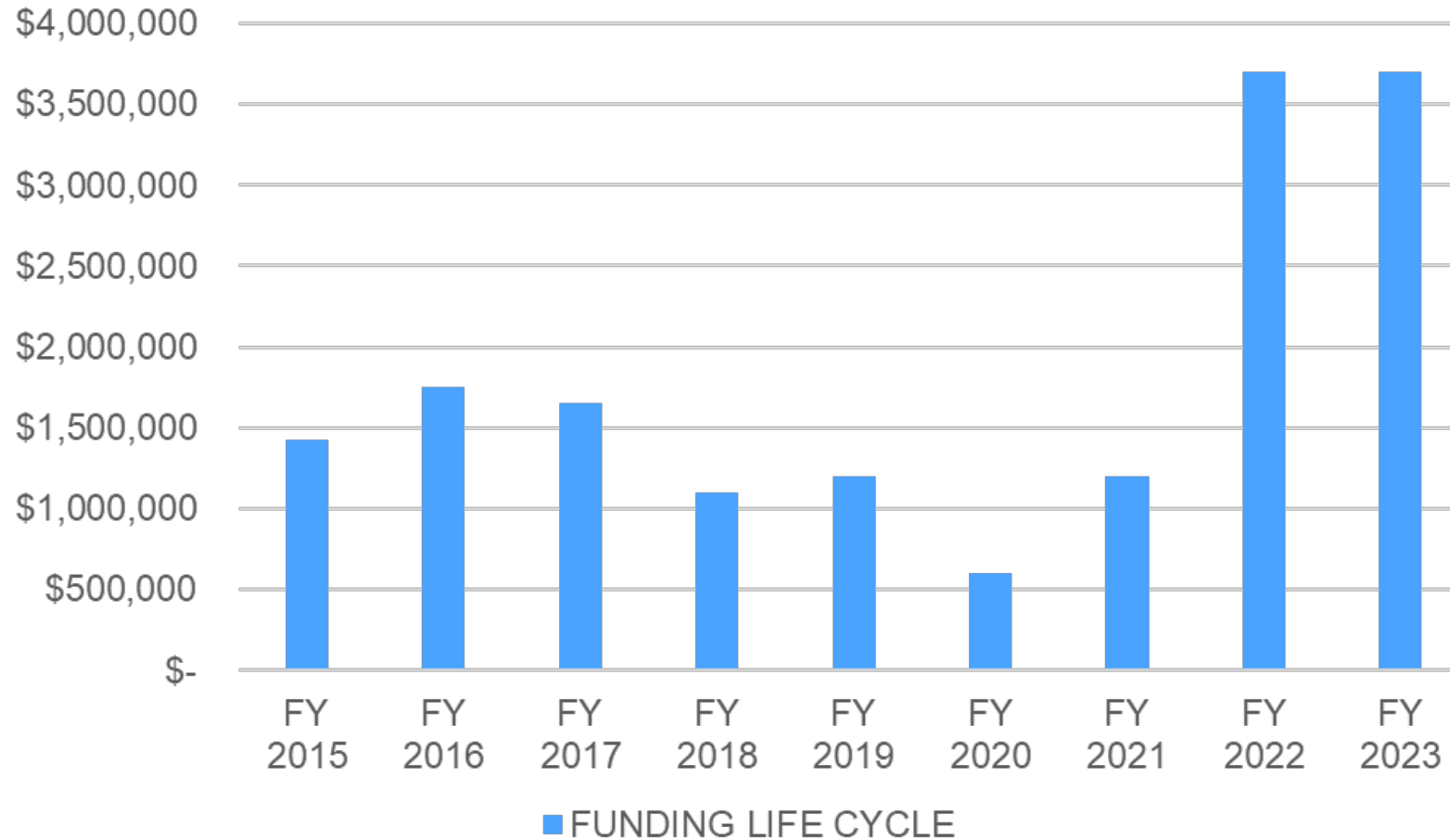


Ideal to consistently restripe 35 miles of bike facility to enhance reflectivity and exclusive protection of cyclists within the City (\$40,000 per mile) to be on an average of 4 year cycle.

# Pavement Markings – Budget



## OVERALL HISTORY



# Pavement Markings – Bike Lanes



- Painted bike symbols and signs are recommended every 250 feet



# Pavement Markings – Bike Lanes



- Green color enhancements are primarily used at specific designated areas
- Higher cost to implement colored pavement markings



# Example – Pavement Markings Challenges



# Traffic Signs



- Approximately 150,000 traffic signs throughout the city ranging from regulatory signs (stop signs, speed limits), warning signs (school zone, pedestrian crossings) and guide signs (street name plates).
- Replacement of 900 signs monthly (maintenance) for a total of 10,800 signs annually.
- Due to increases in aluminum industry wide, the cost for signs have increased by approximately 300%.





# Service Requests (SRs)



# SR Overview



- TRN processed approximately 95,755 SRs in 2021 and 2022
- Parking SRs increased by a total of 57% in 2022 since TRN began handling additional enforcement duties from DPD
- District Engineering handles the field requests including neighborhood traffic calming

| SR by Division                  | 2021         | 2022         |
|---------------------------------|--------------|--------------|
| Dispatched Transportation Calls | 16840        | 15734        |
| District Engineering            | 2903         | 3957         |
| Transportation Planning         | 982          | 137          |
| Parking Enforcement             | 15811        | 24994        |
| Signals and Maintenance         | 511          | 436          |
| Signs & Pavement Markings       | 5659         | 4891         |
| Street Lighting                 | 1310         | 1590         |
| <b>Grand Total</b>              | <b>44016</b> | <b>51739</b> |





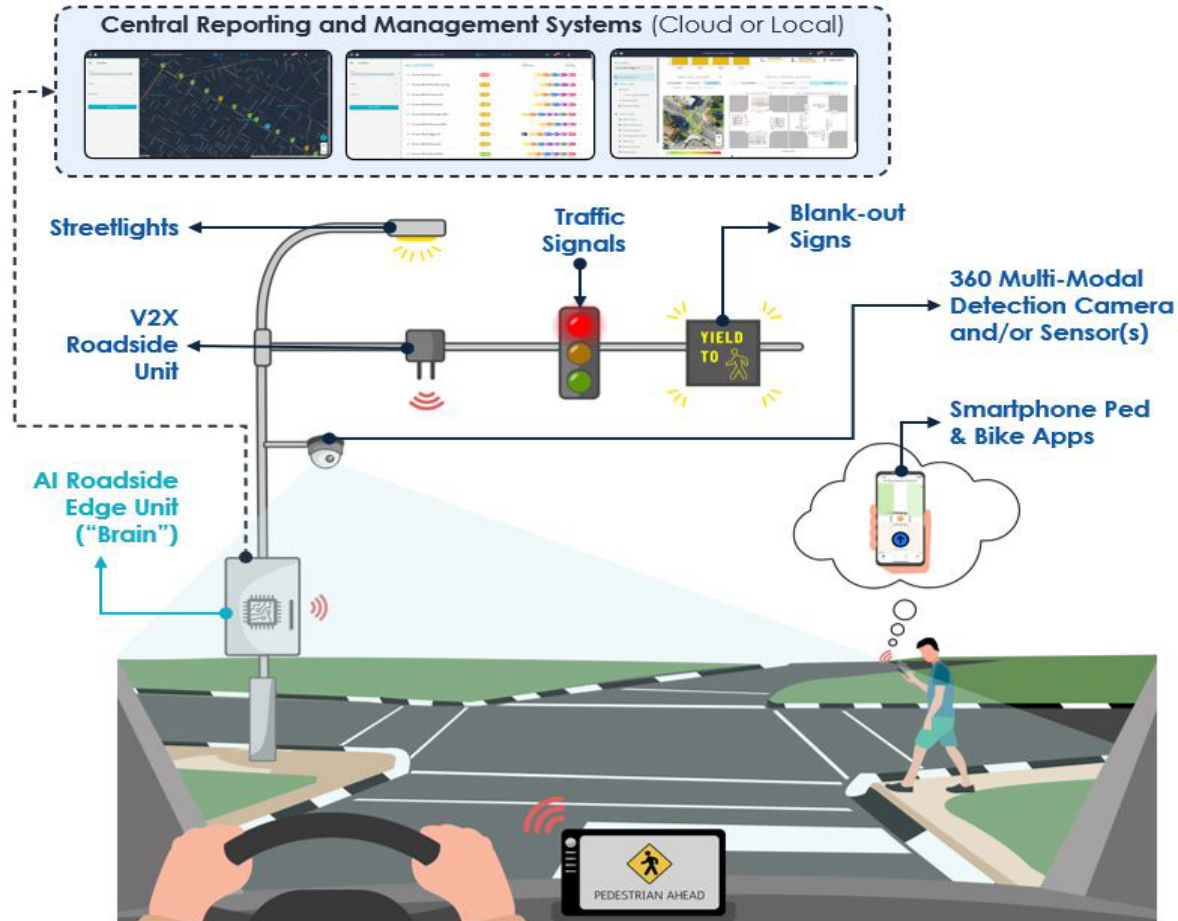
# Innovation



# Innovation – Real Time Analytics



## Intelligent and Safe Intersection Concept



### Select Use-Cases Enabled:

- **Multimodal** Detection and Traffic Signal **Adaptive** Control
- Blank-out Signs **Passive Actuation**
- Ped & Bike **Smartphone Safety Applications**
- **Connected Vehicles** Safety Alerts
- Streetlight **Brightness Control**
- **Near-Miss** and **Pedestrian Compliance** Issue Detection

### Key Features:

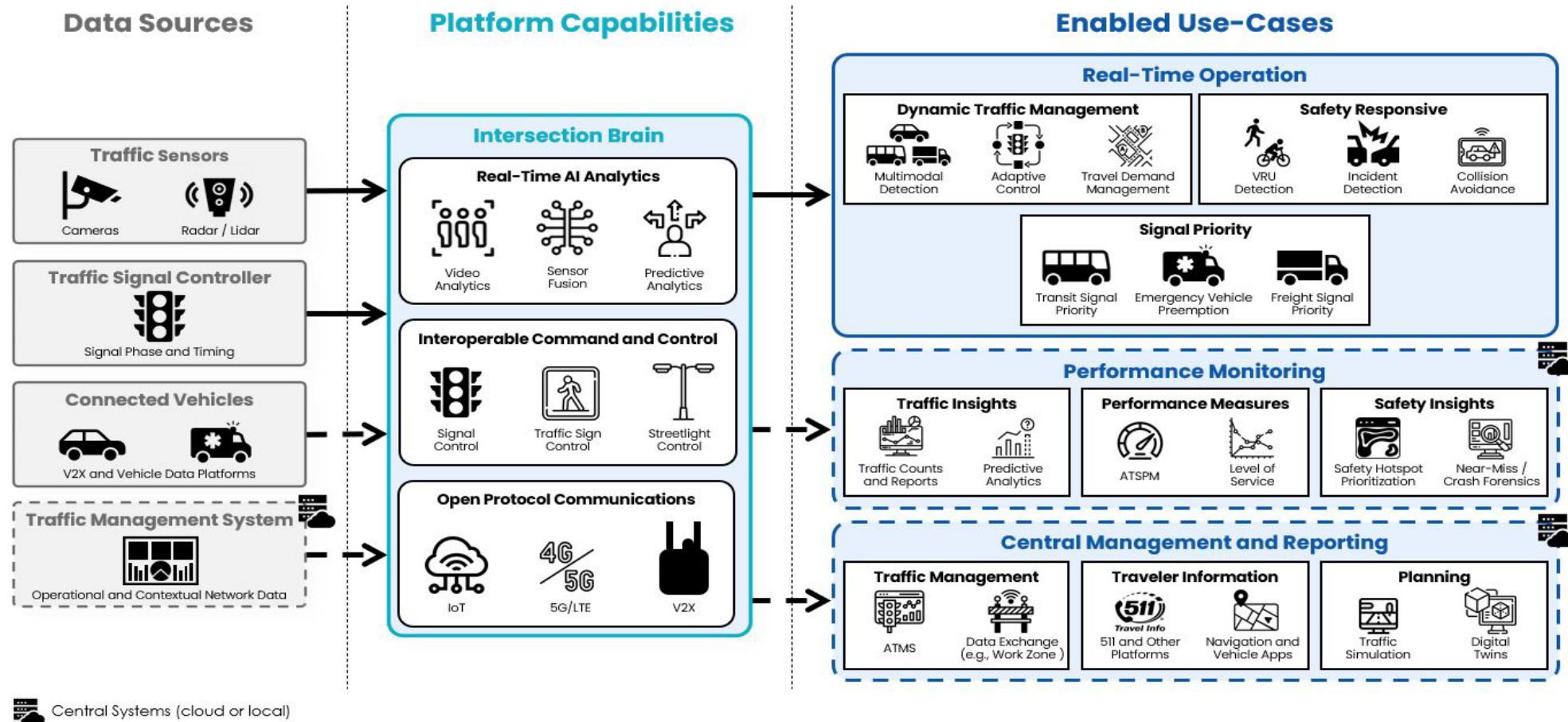
- Real-Time **AI-Powered** Analytics
- **Interoperable** and **Flexible** System
- **Open-Standard** Architecture and Communication Protocols
- **Modular** Application Platform



# Innovation – Real Time Analytics



## Intelligent and Safe Intersection Platform



# Innovation – Solar Powered Streetlights



# Innovation – Parking Meters and DMS



Dynamic Message Sign (DMS)



*Ref: Google Map, Accessed 3-31-2023*



# Key Challenges



- Supply chain, resources, and warehousing
- Unauthorized excavation/ borings that damage underground conduits and electrical systems
- Theft of wires that render streetlights inoperable
- Price volatility
- Other



# Next Steps



- **Traffic Signals:**

- Council action in early Fall to amend the City's existing contract with Ericsson to:
  - Migrate the current "Maxview" system to "Kinetic" system, add the CV/AV option and associated updates to the ATMS system
  - Add the needed services for FHWA's ATCMTD SM Wright Grant
  - Continue the internal and external coordination regarding preemption and transit signal priority

- **Traffic Signal Data Exchange Policy:**

- Continue to work with other departments to finalize the 3<sup>rd</sup> party data exchange policy framework for future council action

- **Future Updates and Progress Reports :**

- Status update on Vision Zero efforts, Bike Plan, Curb Lane Management, Traffic Calming Policy, and implementation of the Strategic Mobility plan



# Discussion



- General questions/comments/feedback



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