City of Dallas

Status of FY 2023 Transportation Initiatives

City Council Briefing
May 17, 2023

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

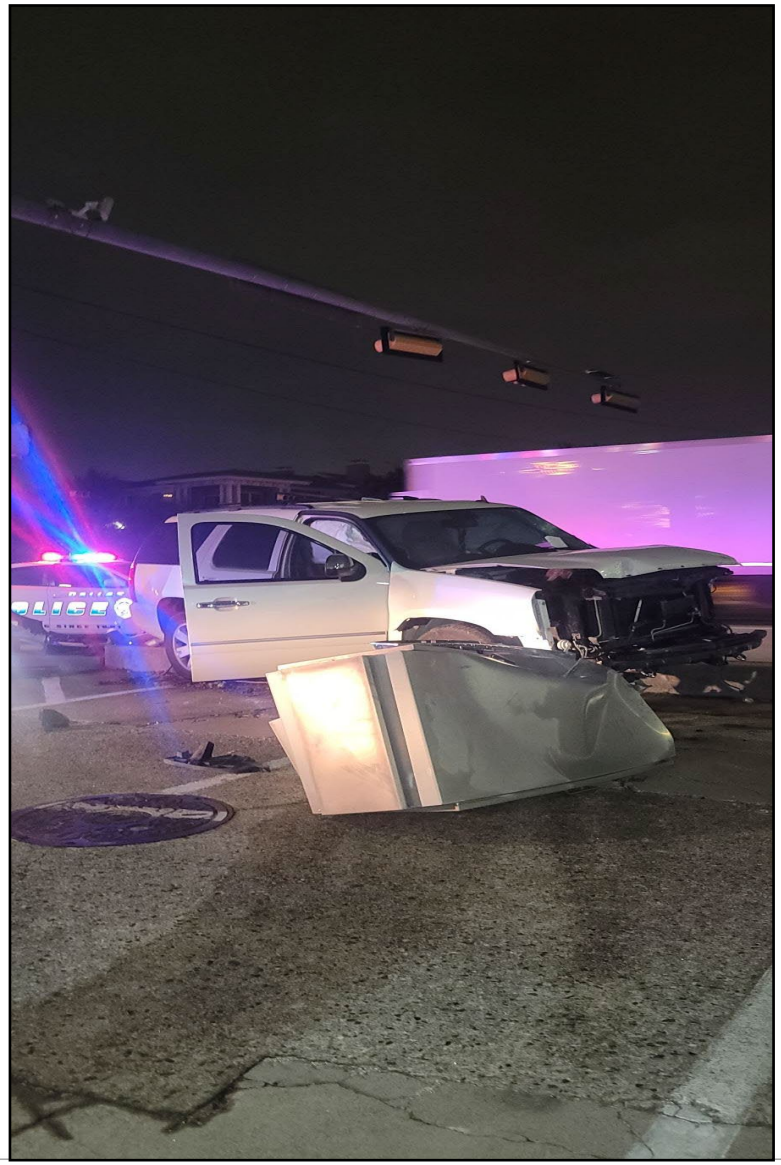
- On April 6, 2022, the Department of Transportation (TRN) presented the "Traffic Signal Infrastructure and Data Management Update" briefing to the City Council.
  - Included two key strategic items: (A) the ATMS contract and (B) data exchange governance, noting the collaboration with partnering agencies.
- 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

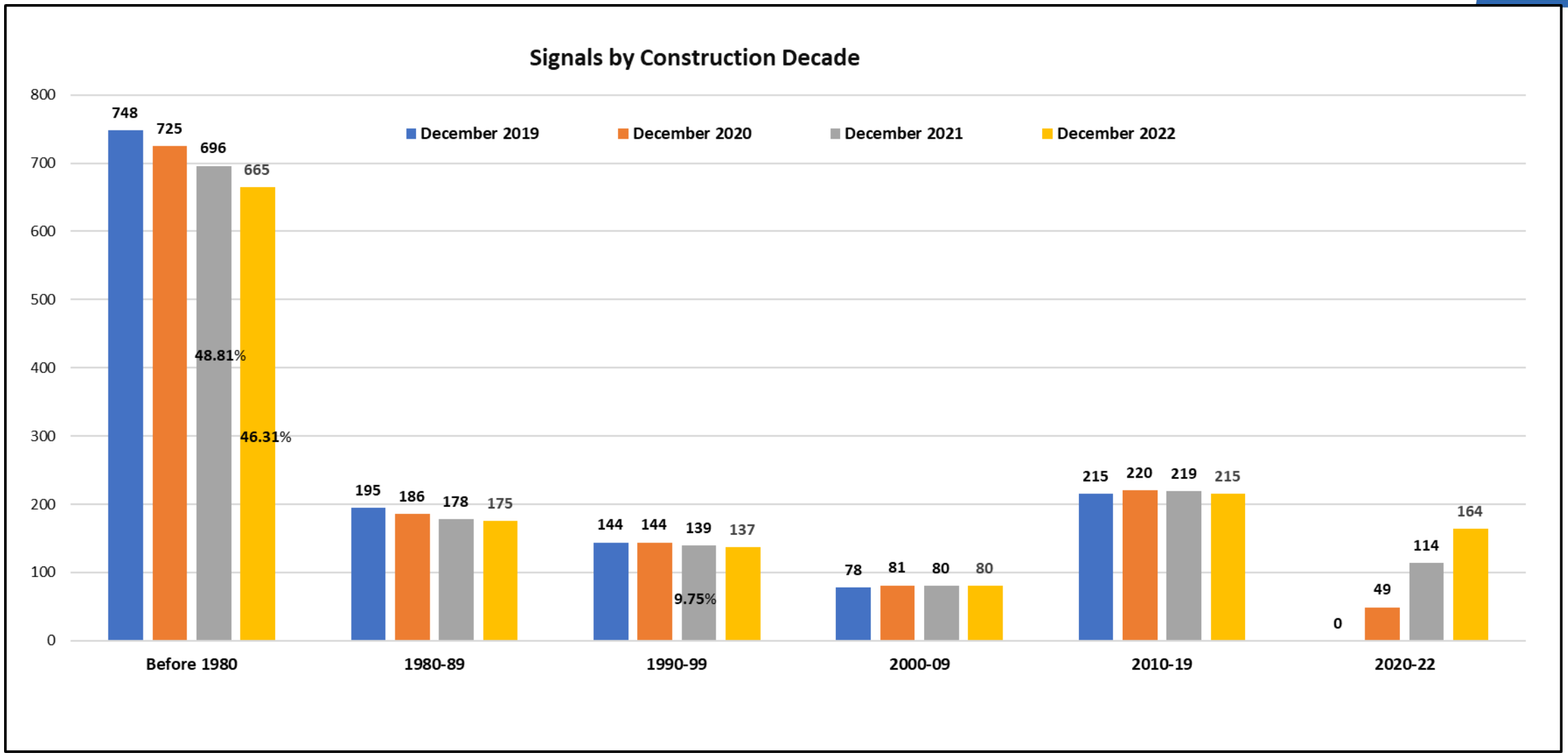
Example – New (Central Business District)

Annual Update – Signal Infrastructure

December 2019, 2020, 2021and 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

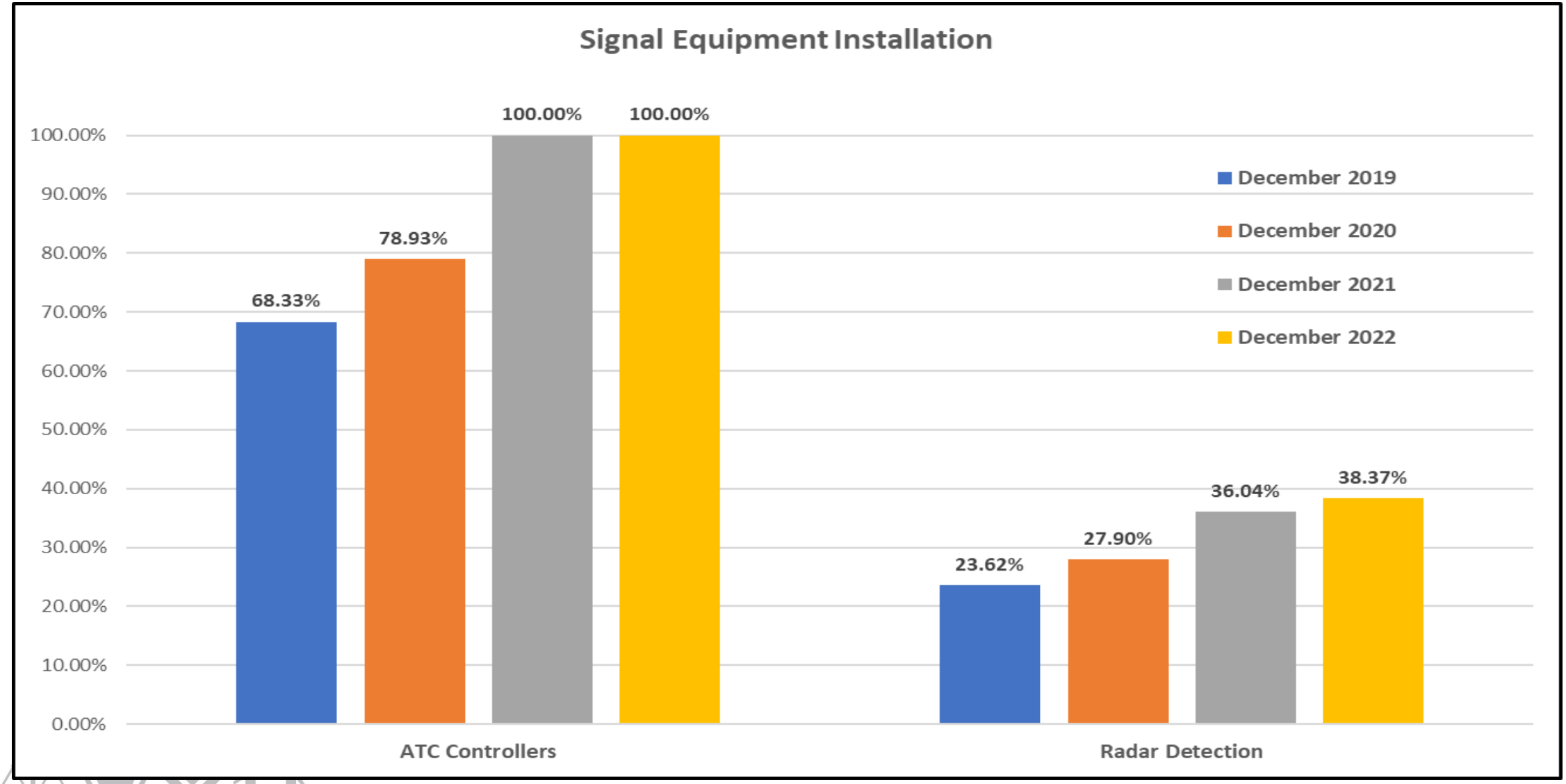


Annual Update – Electronic Components

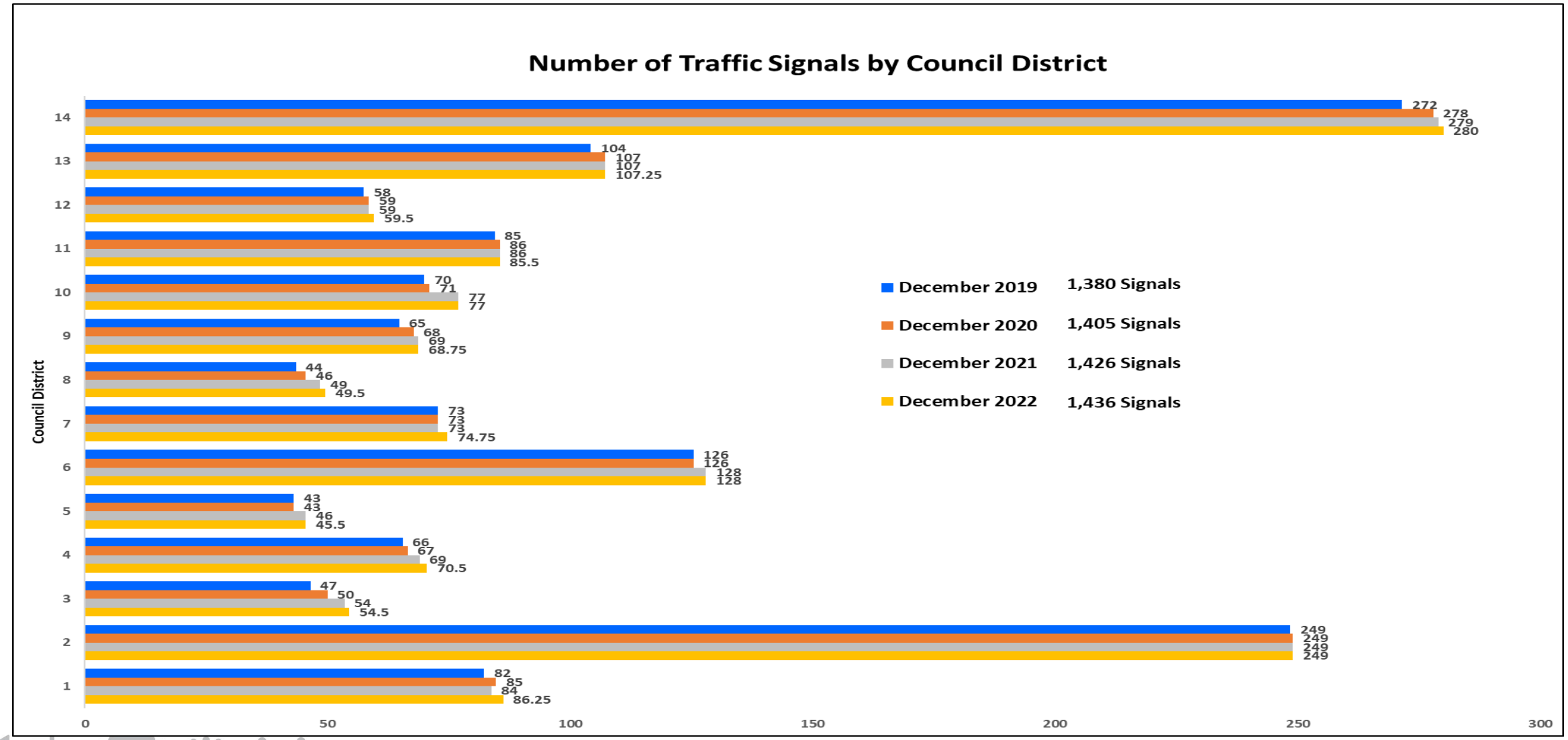
December 2019, 2020, 2021and 2022 Comparison

	Number of Signals	ATC Controllers	ATC % Completed	Radar Detection	Radar Detection % 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



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%
Total	**1380**		**1405**		**1426**		**1436**	

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%
Total	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%
Total	100%	100%	100%	100%	100%	100%	1,436	100.00%
Total	665	175	137	80	215	164	1,436	100.00%

Improvements Since December 2019

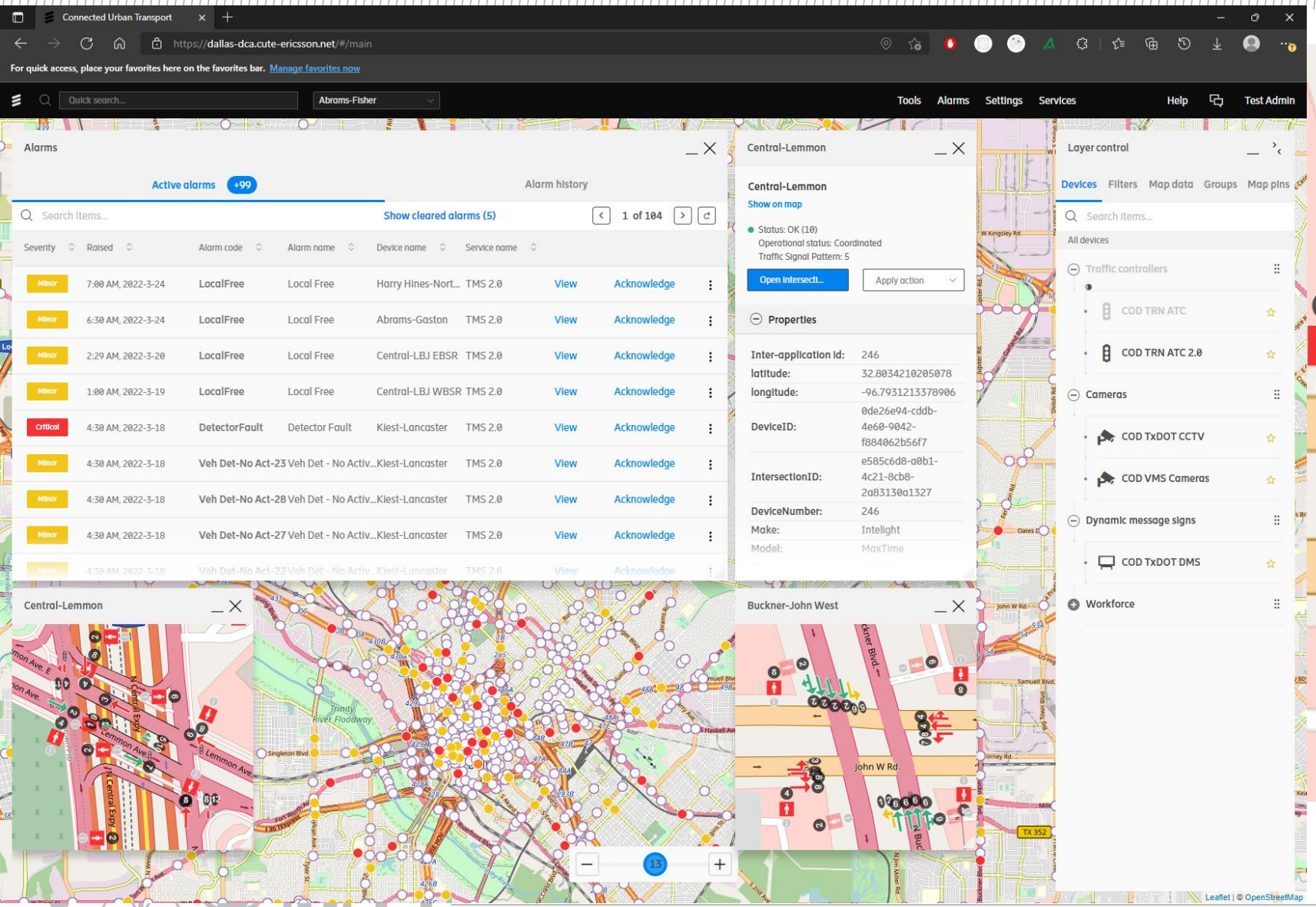
- Since December 2019, we:
  - Added 56 new signals to the system, bringing the total from 1380 to 1436.
  - Reconstructed 108 existing signals.
- Completed the upgrades to all the traffic signal controllers in December 2021.
- Increased the number of locations with radar detection to 38% of the system.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

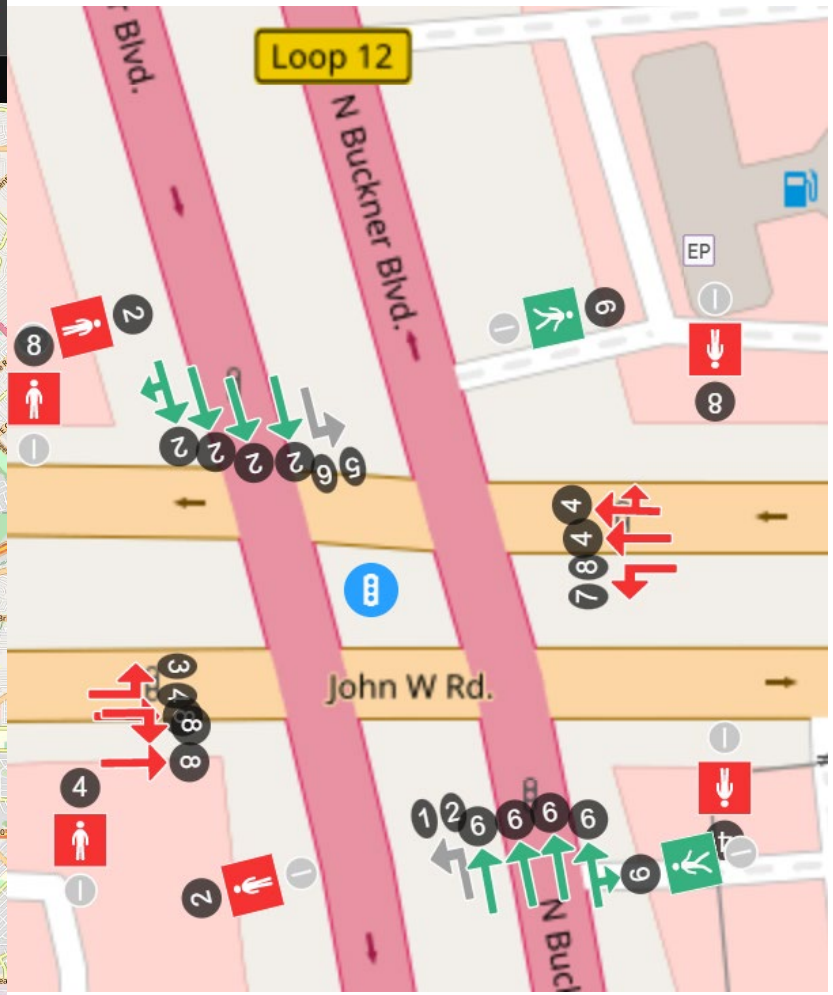
Advanced Traffic Management System (ATMS)

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.

What is ATMS?


Connected Urban Transport
https://dallas-dca.cute-ericsson.net/#/main
For quick access, place your favorites here on the favorites bar. Manage favorites now
Quick search...
Abrams-Fisher
Tools
Alarms
Settings
Services
Help
Test Admin
Alarms
Active alarms +99
Alarm history
Search items...
Show cleared alarms (5)
1 of 104
Severity
Raised
Alarm code
Alarm name
Device name
Service name
Minor 7:00 AM, 2022-3-24 LocalFree Local Free Harry Hines-Nort... TMS 2.0 View Acknowledge
Minor 6:30 AM, 2022-3-24 LocalFree Local Free Abrams-Gaston TMS 2.0 View Acknowledge
Minor 2:29 AM, 2022-3-20 LocalFree Local Free Central-LBJ EBSR TMS 2.0 View Acknowledge
Minor 1:00 AM, 2022-3-19 LocalFree Local Free Central-LBJ WBSR TMS 2.0 View Acknowledge
Critical 4:30 AM, 2022-3-18 DetectorFault Detector Fault Kiest-Lancaster TMS 2.0 View Acknowledge
Minor 4:30 AM, 2022-3-18 Veh Det-No Act-23 Veh Det - No Activ... Kiest-Lancaster TMS 2.0 View Acknowledge
Minor 4:30 AM, 2022-3-18 Veh Det-No Act-28 Veh Det - No Activ... Kiest-Lancaster TMS 2.0 View Acknowledge
Minor 4:30 AM, 2022-3-18 Veh Det-No Act-27 Veh Det - No Activ... Kiest-Lancaster TMS 2.0 View Acknowledge
Central-Lemmon
Central-Lemmon
Show on map
Status: OK (10)
Operational status: Coordinated
Traffic Signal Pattern: 5
Open intersecti...
Apply action
Properties
Inter-application Id: 246
latitude: 32.8034210205078
longitude: -96.7931213378906
DeviceID: 0de26e94-cddb-4e60-9042-f884062b56f7
IntersectionID: e585c6d8-a0b1-4c21-8cb8-2a83130a1327
DeviceNumber: 246
Make: Intelight
Model: MaxTime
Layer control
Devices
Filters
Map data
Groups
Map pins
Search items...
All devices
Traffic controllers
COD TRN ATC
COD TRN ATC 2.0
Cameras
COD TxDOT CCTV
COD VMS Cameras
Dynamic message signs
COD TxDOT DMS
Workforce
Central-Lemmon
Buckner-John West
John W Rd.
Leaflet | © OpenStreetMap


Loop 12
N Buckner Blvd.
John W Rd.
EP

ATMS Components

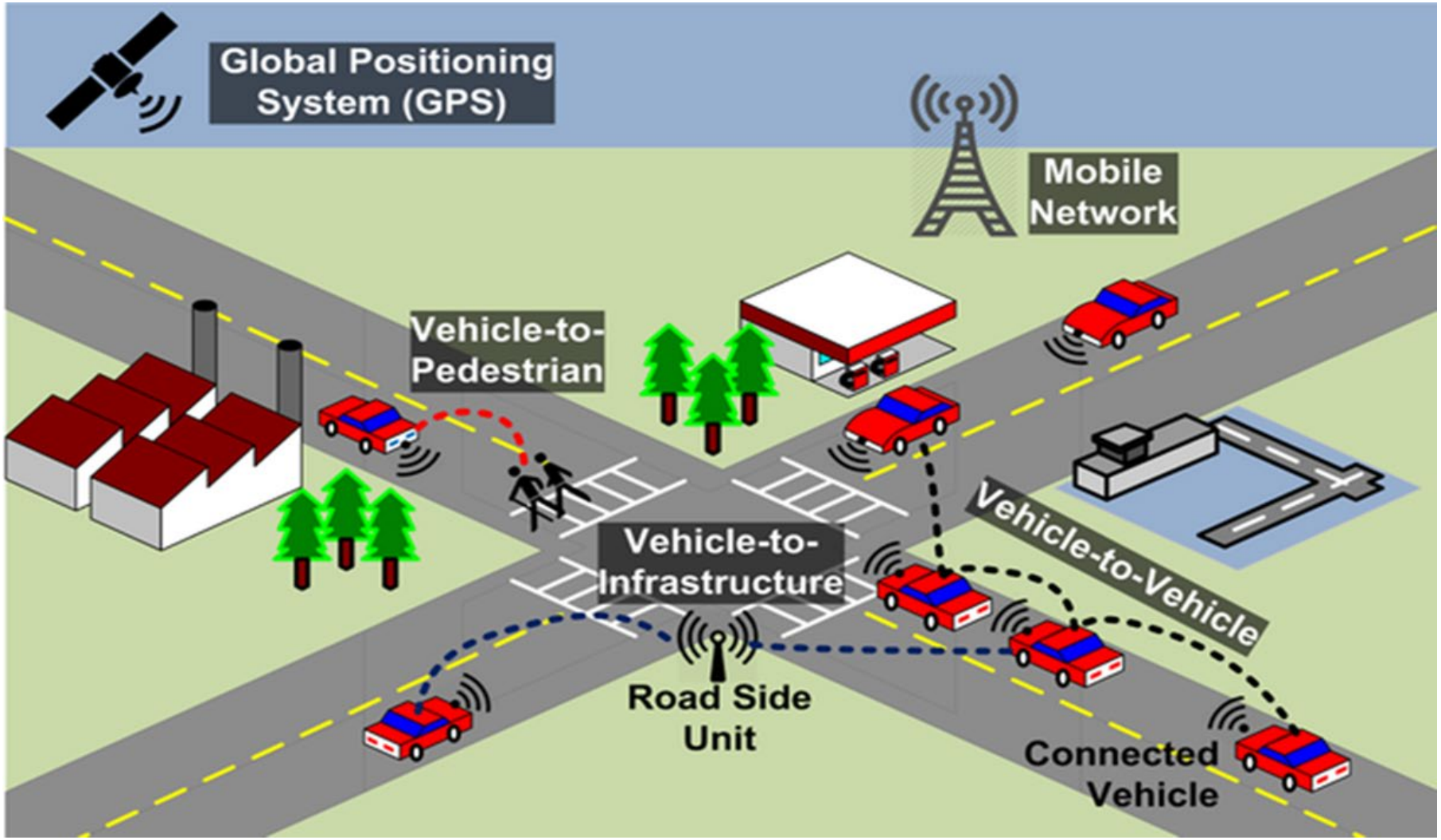
- The ATMS contract with Ericsson was approved in August 2017 for a total of $9.876 million covering development and maintenance for five years, with an option to renew for an additional five years.
- Components include:
  - **Advanced Traffic Controllers (ATCs)** – field computer at each traffic signal - 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

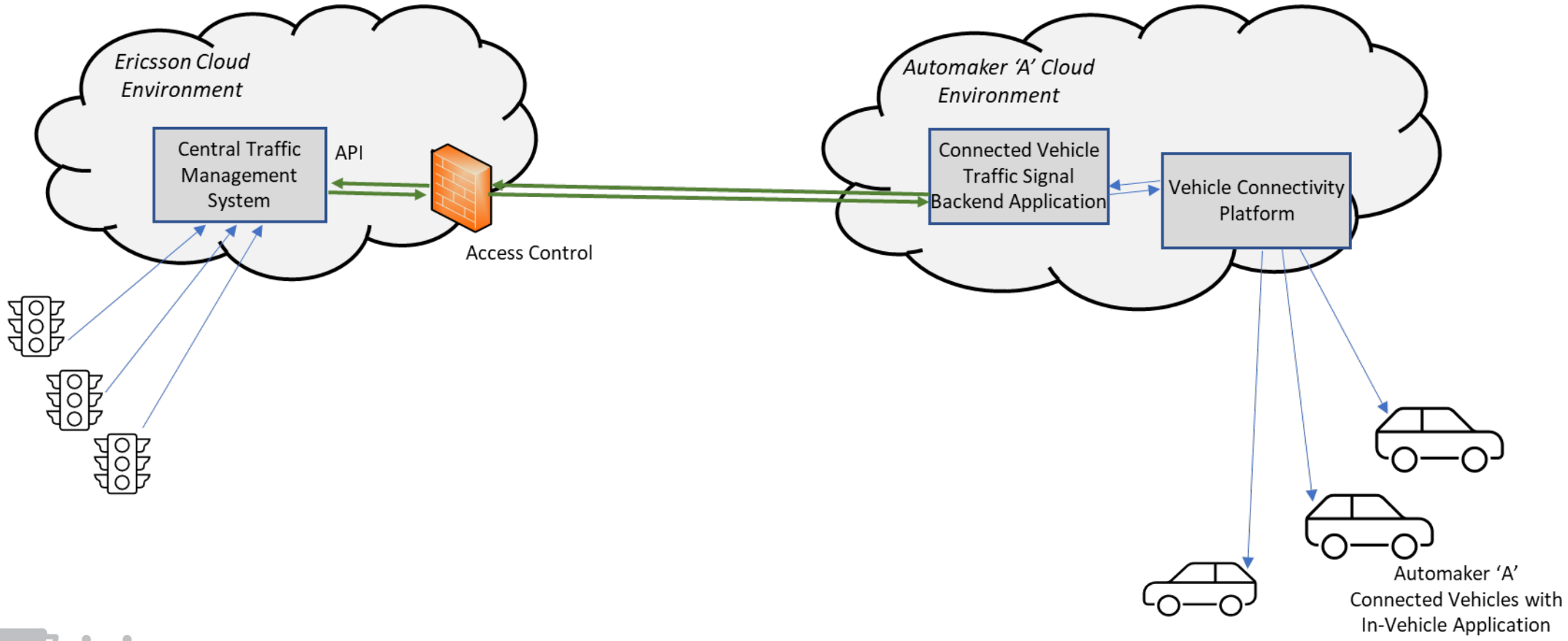
- TRN has a forward-thinking approach to its signal and streetlight infrastructure covering the following three components:
  - Physical infrastructure component
  - Technological and system integration component inclusive of signal synchronization
  - Data exchange component
- TRN is coordinating these 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 3rd 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 pre-emption 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 3rd party access to COD-owned data. 3rd 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 3rd 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 3rd party for governance control.
- The City will incur costs to manage the program and the related usage expenses.
- A long-term funding strategy for 3rd 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.

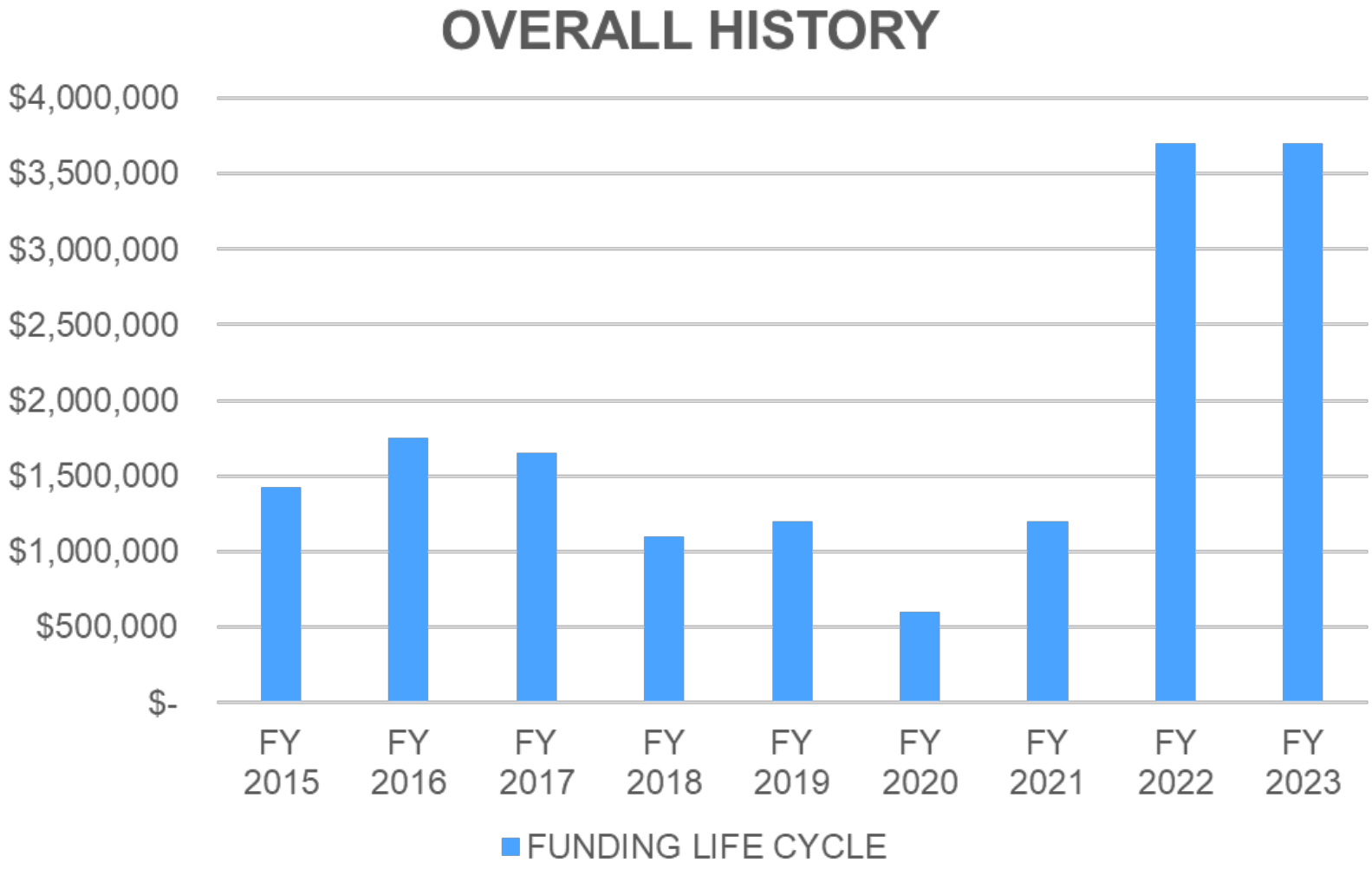
Pavement Markings Overview

$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



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

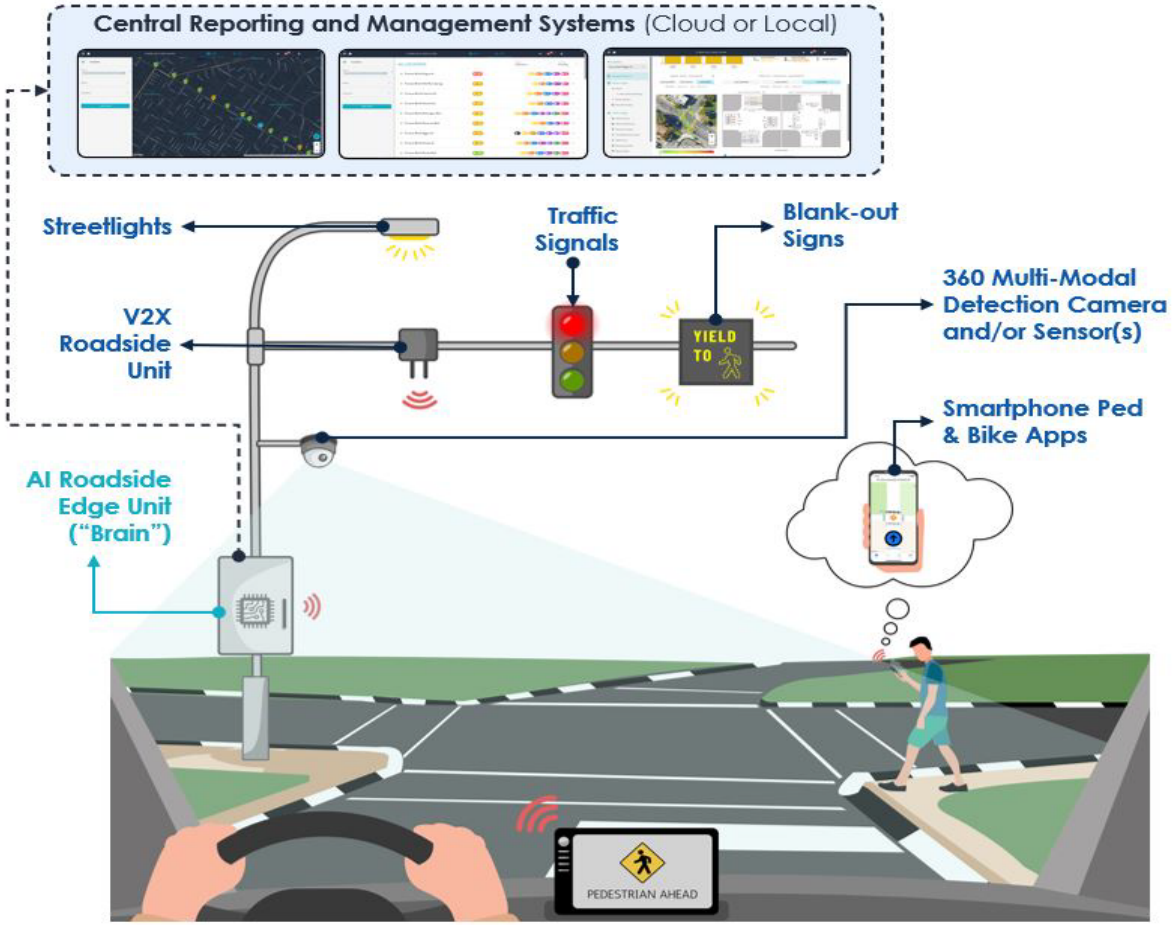
- TRN processed approximately 95,755 SRs in 2021 and 2022
- Parking SRs increased by a total of 57% in 2022 since TRN began handling additional enforcement duties from DPD
- District Engineering handles the field requests including neighborhood traffic calming

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
Grand Total	**44016**	**51739**

Innovation

Innovation – Real Time Analytics

Intelligent and Safe Intersection Concept



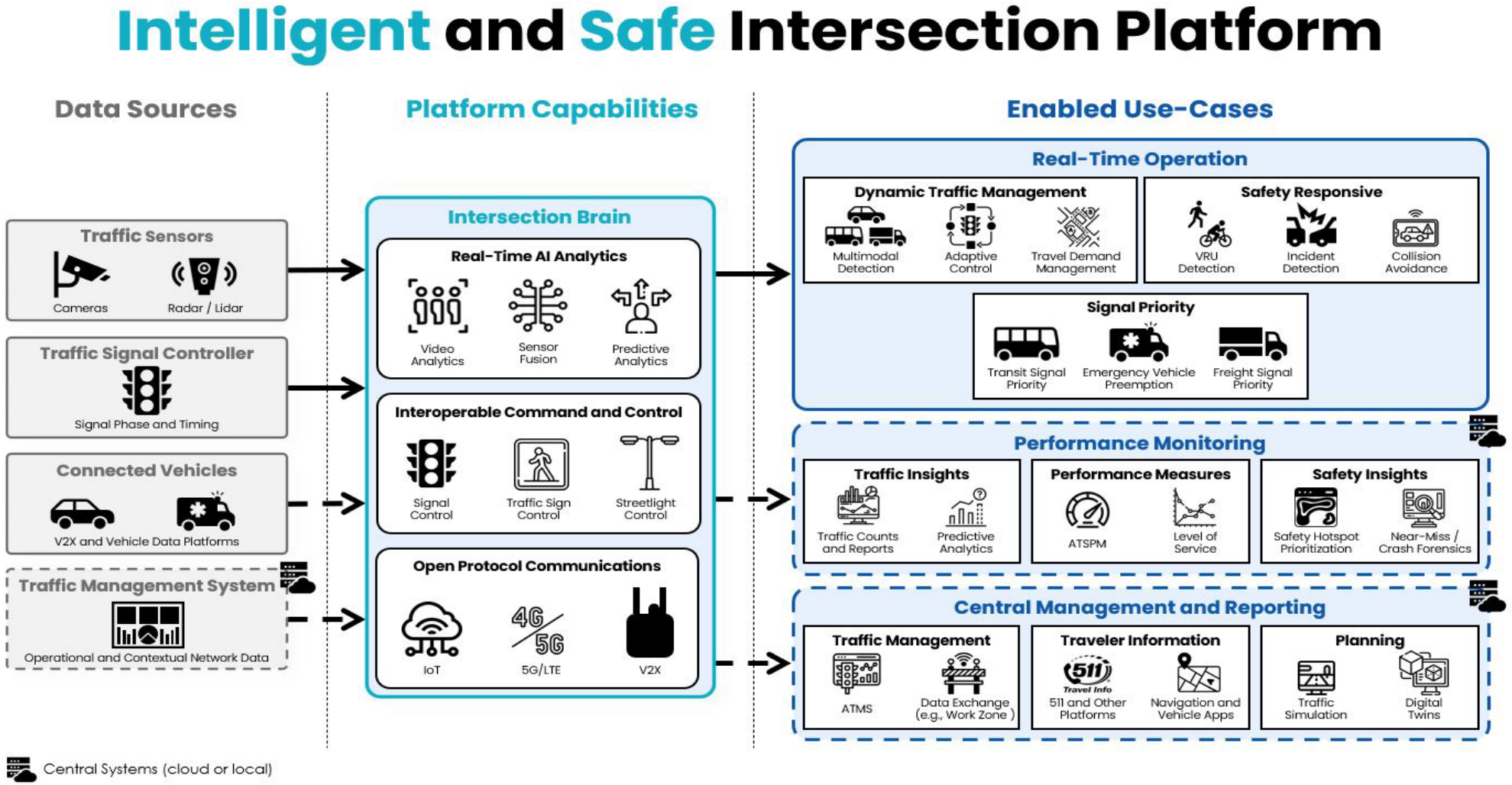
Select Use-Cases Enabled:

- **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



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 3rd 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

City of Dallas

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May 17, 2023

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