



DART Fiscal Year 2020 Quadrennial Performance Review

Covering FY2016 – FY2019

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Glossary of Abbreviations

Abbreviation	Definition
ADA	Americans with Disabilities Act
AEM	Administrative Employment Manual
APC	Automatic Passenger Counter
APTA	American Public Transportation Association
ARBOC	A specialty bus manufacturer of low-floor, body-on-chassis ("cutaway") buses
ATC	Automatic Train Control
ATP	Automatic Train Protection
AVP	Assistant Vice President
BOSS	Bus Operator to Supervisor Succession
CAFR	Comprehensive Annual Financial Report
CAPEX	Capital Expenditure
CFR	Code of Federal Regulations
CR	Commuter Rail
CDL	Commercial Driver's License
CEO	Chief Executive Officer
CNG	Compressed Natural Gas
COO	Chief Operating Officer
DAL	Dallas
DART	Dallas Area Rapid Transit
DEN	Denver
DR	Demand-Responsive
DT	Demand-Responsive Taxi
EAM	Enterprise Asset Management
EEO	Equal Employment Opportunity
EVIR	Electronic Verified Inspection Reporting
EVP	Executive Vice President
FRA	Federal Railway Administration
FTA	Federal Transit Administration
HEM	Hourly Employment Manual
HOU	Houston
HVAC	Heating, Ventilation, and Air Conditioning
IGBT	Insulated Gate Bipolar Transistor

K	Thousands
KPI	Key Performance Indicator
LED	Light-Emitting Diode
LR	Light Rail
LRV	Light Rail Vehicle
M	Millions
MDBF	Mean Distance (miles) Between Failures
MC	(MSP) Metro Council, Minneapolis/Saint Paul area
MOD	Mobility on Demand
MSP	Minneapolis-Saint Paul
MT	(MSP) Metro Transit, Minneapolis/Saint Paul area
MTA	Metropolitan Transit Authority of Harris County (Houston), aka Houston Metro
MTS	(San Diego) Metropolitan Transit System
NCTCOG	North Central Texas Council of Governments
NCTD	North (San Diego) County Transit District
NR	Non-Revenue (Vehicle)
NTD	National Transit Database
OEM	Original Equipment Manufacturer
OPEB	Other Post-Employment Benefits
PM	Passenger-Mile
PMI	Preventive Maintenance Inspections
PORT	Portland, Oregon
PTASP	Public Transportation Agency Safety Plan
PTC	Positive Train Control
ROW	Right of Way
RTD	(Denver) Regional Transportation District
SANDAG	San Diego County Association of Governments
SCADA	Supervisory Control and Data Acquisition
SF	San Francisco
SFO	San Francisco-Oakland
SJ	San Jose
SLC	Salt Lake City
SLRV	Super Light Rail Vehicle
SMS	Safety Management System

SOP	Standard Operating Procedure(s)
SSOP	State Safety Oversight Program
TM	(Fort Worth) Trinity Metro
TNC	Transportation Network Company
TRE	Trinity Railroad Express
Tri-Met	Tri-County Metropolitan Transportation District of (Portland) Oregon
TTI	Travel Time Index
TxDOT	State of Texas Department of Transportation
UberPool	Shared ride service offered by Uber, a transportation network company
USDOT	US Department of Transportation
UTA	Utah Transit Authority
UZA	Urbanized Area
VP	Vice President

1. Executive Summary

1.1 Requirements of the Audit

As per Texas Transportation Code Section 452.454., Dallas Area Rapid Transit (DART) must conduct a performance review audit (Performance Review) every four years by an outside firm with transit agency audit experience to:

- Evaluate information necessary for the performance of oversight functions by state and local officers; and
- Provide information to the authority to assist in making changes for the improvement of the efficiency and effectiveness of authority operations.

Each Performance Review examines one or more functional areas of DART, its compliance with applicable state law, and several key performance indicators.

For the 2020 Performance Review, the outside firm was to focus on transit operations. This included a review of the fixed route bus and light rail transit service directly operated by DART as well as DART's administration and management of the two contracted services for paratransit and commuter rail, or the Trinity Railway Express (TRE).

The period of the of the Performance Review (Review Period) is fiscal year 2016 to fiscal year 2019 (i.e., October 1st, 2016 through September 30th, 2019), and the fiscal years are referred to as "2016, 2017, 2018, and 2019" throughout this report.

As per Solicitation P-2055682, DART engaged IMG Rebel Advisory, Inc. (Rebel) in August 2020 to carry out the Performance Review. The consultants carrying out the Performance Review (the Performance Review Team or the Team) included Jeroen Kok, Kimmo Oostermeyer, Sasha Page, Arjun Pant, Christine Shepherd, and subconsultants Ray Friem of CodeRed Business Solutions Inc., Diane Gollhofer of DGR Consultants LLC, and Thomas A. Rubin.

1.2 Performance Review Summary

A summary of the key points of this Performance Review is provided below in the order of the primary Performance Review sections. The Performance Review includes an appendix with DART's response to the Team's "Observations" and "Findings", a discussion of peer comparison methodology, and additional points on certain Observations.

The Performance Review Team utilized the following format in collating its conclusions. Following some narratives or statistical analyses, the Team provides an "Observation" or a "Finding" highlighting important points. They are defined as follows:

- **Observations** consist of comments on certain aspects of DART's performance, including concerns or guidance on best practices that DART may want to consider.

They also may include commendations for good performance. The Team made 30 Observations; and

- **Findings** consist of significant conclusions made by the Team about DART's performance that include recommendations for specific actions. The Team made three Findings in the Performance Review.

A list of all Observations and Findings are found at the end of the Executive Summary. In addition, these are also found in the Performance Review sections to provide context.

1.2.1 Key Performance Measures

The Team evaluated DART both on the performance indicators mandated by the Texas Transportation Code as well as certain other metrics such as ridership and passenger fare revenue. The Team supplemented the internal key performance indicator (KPI) analysis with peer benchmarking to compare DART's performance with similar transit agencies on certain performance measures.

Internal KPI analysis

The results of the internal KPI analysis show that:

- Subsidy per passenger has increased from \$5.88 to \$6.37 from 2016 to 2019 for the total system, or roughly 8.3%, which is slightly more than the 7.7% increase in the Consumer Price Index for the Dallas-Fort Worth-Arlington area over the same period; however, subsidy on light rail and TRE has risen by 13% whereas it has risen by only 2.4% on bus and 5.0% on paratransit;
- The lower increase in subsidy per passenger for bus is driven by a switch to using automatic passenger counters (APCs) for logging bus ridership, which appears to have increased the number of riders counted on buses, though actual ridership is unlikely to have increased, given historic ridership trends on bus, as evidenced in Figure 13;
- Operating costs have grown from \$150.51 per revenue hour and \$9.96 per revenue mile in 2016 to \$160.61 per revenue hour and \$10.62 per revenue mile in 2019, or a roughly 7% increase, which is below Dallas-area inflation. However, operating cost has risen substantially for bus, by 14% per revenue mile during the Review Period, whereas cost per revenue hour has increased by only 3% for light rail and has decreased for both paratransit and TRE;
- Sales tax per passenger has increased by 8% over the Review Period, driven by a nearly 15% increase in sales tax revenue;
- The farebox recovery rate has generally declined across all modes to an average of 12.3%, in line with a decline in passenger fare revenue across the system;

- The decline in passenger fare revenue can be attributed to a decline in ridership, as evidenced by the data on passengers per hour in Figure 12; once again, the uptick in ridership from 2018 to 2019 is attributed to the introduction of APCs for passenger counting on buses beginning in 2019;
- On-time performance has held relatively steady, with a notable improvement in bus from 79.3% in 2016 to 82.4% by 2019, though with declines in paratransit and TRE. The Team's understanding is that the decline in paratransit on-time performance at the end of the Review Period was a temporary occurrence during a transition to a new operating model.
- The number of accidents per 100,000 miles has also been relatively steady, though the Team discovered an internal reporting issue on light rail accidents and that DART's internal definition of collision differs from the National Transit Database, which may merit further evaluation to better understand and determine whether to harmonize (*Finding 2*). However, the Team did not find any issues with reporting to NTD or other state or regulatory bodies.
- Mean distance between failures (MDBF) has universally declined across all modes except for paratransit, suggesting a need to further review preventive maintenance programs especially for light rail and TRE to ensure vehicle availability.

Overall, DART appears to have constrained growth in operating costs to below regional inflation while sales tax revenue has increased above inflation. Nevertheless, ridership has declined, reflecting broader trends in US public transit, and this has in turn has negatively affected passenger fare revenue and farebox recovery ratios. Finally, while accidents per 100,000 miles have generally stayed stable, they have increased significantly for light rail, and MDBF has universally declined except for in paratransit, indicating there is an opportunity to improve preventive maintenance to reduce the frequency of vehicle failures on bus, light rail, and TRE.

Peer benchmarking analysis

The Team also benchmarked DART's performance in comparison to similar transit agencies in the US, as further outlined in section 2.2. Peer agencies were chosen that operate in all four DART modes (bus, light rail, demand-responsive, and commuter rail), serve newer urbanized areas that are growing, have similar population density, and have newer light rail systems but that have been operating for long enough to integrate with other local transit elements.

The selected peers were Denver's Regional Transportation District, Houston's Metropolitan Transit Authority of Harris County, Minneapolis/St. Paul's Metro Council and Metro Transit agencies, Portland's Tri-County Metropolitan Transportation District of Oregon, Salt Lake City's Utah Transit Authority, and San Diego's Metropolitan Transit System and North County Transit District.

While no peer transit agency will be a perfect comparator, and there are a variety of differences between DART and the chosen set of peers, the Team believes the above peers represent the

most applicable comparators to DART based upon the criteria mentioned earlier. DART is roughly average in comparison to these peers in service area population, passenger miles per capita, and total vehicle revenue miles and hours.

The Team evaluated DART on:

- Productivity, as measured by passenger boardings per hour and average passenger load (passenger-miles divided by vehicle revenue miles);
- Cost-efficiency, as measured by operating cost per vehicle revenue hour and per vehicle revenue mile; and
- Cost-effectiveness, as measured by subsidy per passenger and per passenger mile.

At a total system level, DART is second-lowest on boardings per vehicle revenue hour and lower than average on average passenger load. It is highest in cost per vehicle revenue hour and second highest per revenue mile. Lastly, it is highest in subsidy per passenger and per passenger-mile. The results at a system level are driven by the low relative ridership of the system, as evidenced in Figure 25, though the Team notes that light rail performs relatively better than average on productivity; however, light rail is highest-cost of all peers per vehicle revenue hour. Bus is, in contrast, the lowest among peers for average passenger load but relatively average on cost per vehicle revenue mile and revenue hour.

Further analysis by mode is presented in section 2.2.

1.2.2 Compliance

In accordance with the Texas Transportation Code's stipulation that the Team's review evaluate DART's compliance with new state legislation, the Team identified 41 Acts passed by the Texas Legislature in the 2017 and 2019 sessions that appeared to potentially apply to DART, covering relevant statutory codes including the Government, Labor, Local Government, Occupations, Property, and Transportation Codes. The Team conferred with DART's General Counsel and eliminated 10 of the 41, producing 31 that were regarded as applicable, and reviewed appropriate documentation for the 31 to determine DART's compliance with the relevant legislation.

The Team found that DART is in compliance with almost all applicable State statutes, though there are two instances in which the Team believes DART may need to make certain changes to come into full compliance: 1) HB793 (2019), which exempts small businesses from the certification that they do not boycott Israel and 2) HB62 (2017), which prohibits vehicle operators from using portable electronic devices while a vehicle is in operation. The Team recommends that DART modify its procurement procedures to enable the small business exception for HB793 and that DART modify the Administrative Employment Manual and the Hourly Employment Manual to more explicitly prohibit the use of portable electronic devices by DART vehicle operators when operating DART vehicles, including non-revenue vehicles.

The Team has also made several recommendations for additional incorporation of requirements of the applicable Acts, though it notes that DART is substantially in compliance with all other applicable legislation found in the 2017 and 2019 legislative sessions.

1.2.3 Operations

Bus and Light Rail

Over the Review Period, **transit operations** undertook the following key initiatives:

- Enhanced security functions and bus operator safety;
- Executed accountability projects regarding customer complaint and attendance issues as well as reviewed extra board to right-size staff covering AM and PM shifts;
- Implemented modern fare instruments including tap cards and GoPass;
- Improved hiring processes to better screen operators, designed apprenticeship programs to improve retention, and reduced reliance on state administration of driver's license tests;
- Implemented a system to better identify vehicle defects with maintenance;
- Implemented fiber optic cable throughout the rail network, allowing for full implementation of automatic train protection (ATP), improving safety; and
- Supported capital light rail projects, which should reduce delays and accommodate capacity expansions: replacing downtown Dallas rail girders; installing downtown crossovers; and initiating the D2 project, adding additional downtown Dallas track.

DART also **reorganized by merging operation and maintenance departments by mode**, thereby fostering more oversight of operations and maintenance for each mode and encouraging the two disciplines to work more closely.

Bus operations experienced a/an:

- Decline in bus ridership from 1Q 2016 until 4Q 2018, a decline of 19%. However, ridership jumped by one third in 1Q 2019. This is because DART began using APCs in 2019 so this uptick is likely not reflective of an actual ridership increase.
- Drop in bus conduct and functional complaints slightly during the Review Period. Functional complaints dropped more significantly versus conduct during this period;
- Decline of unsafe operational complaints during the Review Period;
- Increase in bus operators' cell phone use complaints, also discussed in state statutory and safety regulations sections (*Observation 1*);

- Increase in missed trips, especially for mechanical reasons (*Observation 2*); and
- Decline in MDBF, in part due to 1) shorter life span of older cutaway vehicles and 2) bulk bus purchases, creating pressure on maintenance as large sections of the fleet enter mid-life/end-of-life stages simultaneously. This can be addressed by spreading out purchases at more even lifecycle intervals (*Finding 1*).

Bus performed in comparison to peers as follows:

- Buses have relatively low boardings per vehicle revenue hour and average passenger load. DART needs to continue to focus on ways to improve ridership, including eliminating low-demand routes, increasing frequency and service on high-demand routes, and fostering GoLink and other innovative transit solutions (*Observation 4*).
- Bus costs have been managed effectively as costs per vehicle revenue hour and per revenue mile are close to peer average, yet bus subsidy per passenger and per passenger mile are the highest among peers due to low boardings.

Light rail operations experienced a/an:

- Decline in ridership most pronounced in 2018 and 2019;
- Variability in on-time performance in the last four years, in part due to uncontrollable events, including poor weather;
- Decline in reported MDBF reliability, due in part to the doors and friction brake system, which should be addressed by a root cause analysis, reviewing the maintenance approach, and setting the appropriate threshold value for this KPI (*Observation 11*). The fleet reliability has been in steady decline since 2014.
- Decline in collisions per 100,000 miles;
- Increase in NTD reportable non-security events per 100,000 miles (*Finding 2*); and
- Decline in complaints per 100,000 persons.

Light rail performed in comparison to peers as follows:

- Suffers from high costs and high subsidies in comparison to the peer group, despite ridership productivity roughly in the middle of the peer group; and
- Nevertheless, serves as DART's backbone, with bus, paratransit, TRE, and increasingly microtransit service feeding into it and, in comparison with peers, is more heavily utilized.

Light rail addressed the following issues during the Review Period:

- Light rail continues to face a challenge in finding and maintaining qualified light rail operators and maintenance personnel, given DART's lengthy hiring process and a tight labor market overall and for certain trades. DART has begun to address this by seeking candidates outside the bus operator pool. These labor availability issues will become

more difficult as DART will require staff with increasingly higher skill levels with the increased use of sophisticated systems and electronic technology (*Observation 6*).

- Of DART's 163 LRT vehicles, 40 date back to the opening of the system in 1996, are therefore now nearly 25 years old and need to be retired soon—the FTA-stipulated minimum service life for federally-funded light rail vehicles is 30 years.
- DART has a spare ratio of 35%, which for a normal day is high. In case of special events, however, up to 157 vehicles are used, meaning DART may be maintaining a fleet for peak demand as opposed to typical weekly service requirements (*Observation 9*).
- DART carries out inspections on LRT vehicles using the pre-planned preventative maintenance inspections (PMI) at fixed intervals. Industry practice is that the original equipment manufacturer (OEM) recommendations are adhered to in the warranty phase and thereafter are optimized to local conditions of usage and network. The fact that the PMIs have not been updated may indicate a lack of adequate customization of PMIs to DART's specific needs and should be addressed (*Observation 10*).
- DART has established after-action review committees to address light rail electric catenary wire-downs and derailments to take track measurements and collect other data to find out what the cause was within 24 hours after an incident occurs. DART may also consider having a KPI to measure the performance of way and structures (*Observation 12*).

Paratransit and Commuter Rail

DART provides door-to-door **paratransit** across its 700-square mile service area on shared vans for disabled people who are unable to use DART buses or trains. This goes beyond the ADA-mandated requirement to serve riders within three-fourths of a mile from fixed transit routes.

Paratransit experienced a/an:

- Steady on-time performance until 2018, with a marked decline in Q4 2019 due to the transition to a new operating model;
- Decline in the number of accidents per 100K miles, the most dramatic decline among the four modes analyzed during the Review Period, a positive trend;
- 280% increase in MDBFs during the Review Period. Since DART transitioned to a new operating model with MV Transportation in 2019, it should continue to monitor service to ensure performance does not deteriorate; and
- Decrease in operating costs per revenue mile during the first three years by approximately 10%, yet then a rebound to nearly the same level in 2019.

Paratransit addressed the following issues during the Review Period:

- Took advantage of a decision in 2012 to compensate its paratransit operator, MV, on a per trip basis, instead of on a per hour basis previously, saving DART significant costs; and
- Changed MV's contract so that it serves mostly as a service broker, using the drivers and vehicles of other parties, including the services of Lyft, taxicabs, and other vehicles.

Paratransit performed in comparison to peers as follows:

- Boardings per hour was 1.15, which is among the lowest among its peer group;
- Despite the low boardings, DART's costs per revenue hour and revenue mile are close to the mean within the peer group; and
- Subsidy per passenger and per passenger-mile are above average, suggesting that DART is generous in covering ADA costs. DART also offers rider assistance programs for people over 65 years of age and those who are disabled in certain DART service area communities. Eligible riders receive a debit card which effectively allows them to pay \$25 and receive \$100 of value (*Observation 14*).

To address the needs of underserved areas and challenges of providing adequate transit service to primarily outlying, suburban areas, DART has developed "**GoLink**" service, which provides on-demand, personalized, curb-to-curb shuttle service for short-distance trips in less dense areas where traditional fixed route transit service may not perform well or does not exist:

- DART's goal is that GoLink's subsidy per passenger would be similar to or lower than the bus service it replaced, with response times of 10 minutes or less. DART's evaluation of three GoLink service areas showed that ridership increased compared to previous service, yet GoLink cost per passenger was mixed in comparison—one zone was lower and the other higher.
- GoLink response time was at or below the 10-minute goal for two of the three service areas, a positive, but this lags UberPool service with a response time of six minutes or less, though not a direct comparison. All told, study area riders rated GoLink's service higher than the previous service, making it a service and fiscal success (*Observation 15*).

GoLink's success is based in part on the **GoPass** mobile ticketing app, developed with several private vendors over the last seven years. As with GoLink, major improvements to GoPass were made during the Review Period and should impact DART's future business.

GoPass allows users to purchase passes, including through credit cards or retailers, helping to address Title VI issues:

- GoPass benefits include reducing DART's cash management costs; and
- DART has ambitions to license its **GoPass platform** to other agencies beyond the Dallas-Fort Worth region and expand services, in conjunction with its private partners.

Trinity Railway Express (TRE) is a 34-mile commuter rail line between Fort Worth and downtown Dallas, operated jointly by DART and Trinity Metro. The system operation, including maintenance of rolling stock and the right of way, is subcontracted to Herzog. TRE is funded by both DART (43%) and Trinity Metro (57%). TRE management is responsible for planning of renewals and equipment replacements. System operation and maintenance is provided under an operations and maintenance contract with Herzog.

TRE experienced a/an:

- On-time performance slippage during the Review Period, especially in 2019, for which TRE identified the cause as the availability of rolling stock and scheduling conflicts with freight rail operations;
- Low accident rates, consistently below one per 100,000 miles of operation; and
- Decrease in rolling MDBF rates, particularly significant in cab cars, for which TRE has initiated overhaul programs to improve operational outcomes.

TRE performed in comparison to peers as follows:

- TRE's boardings per vehicle revenue hour are among the lowest of the peers;
- TRE's costs in terms of cost per vehicle revenue hour and cost per vehicle revenue mile are very close to the average of the peers; and
- Like for other modes, TRE's subsidy per passenger and per passenger mile are somewhat higher than the average, with average costs somewhat offsetting the low ridership.

TRE addressed the following issues during the Review Period:

- Operated only enough equipment to maintain service, since equipment is overhauled in Canada and other shops around the US;
- Freight crossings leading to capacity issues, exacerbated on the western alignment (Fort Worth) with sidings, while the eastern alignment (Dallas) is double-tracked; and
- Redesigning dangerous grade crossings.

Other Operations Issues

During the Review Period, DART focused on improving **on-time performance** as bus metrics were previously in the mid-70s percentages. From 2016 to 2018, DART added time for short operator breaks and ensured restroom availability at the end of each line, leading to better performance.

With greater focus on performance and to obtain more accurate bus ridership data, DART has instituted **APCs**, which now count every bus passenger with far higher accuracy. The new data showed that ridership was substantially higher than expected, meaning that 2019 data should

not be compared with such data in previous years and for the purposes of the Performance Review reduces the effectiveness of evaluating bus ridership trends for all four years.

DART has carried out several other **bus and rail planning initiatives** during the Review Period that appear to have an important impact on the agency's operation.

- DART's key **bus planning** goals have been to ensure that bus integrates with light and commuter rail. Starting in 2019, DART has shifted from bus route integration to optimizing the bus network. This reflected a review since 2016 of routes that had significant subsidies per boarding and/or were inadequate given population growth. In October 2019, DART hired a consultant who provided DART with data to decide what percentage of resources are applied to routes with higher ridership potential compared to routes that provide broad service region coverage;
- DART has already implemented part of this strategy by creating seven **high-frequency "core" bus routes**, with the same hours and frequencies as light rail (*Observation 20*);
- DART's **major rail capital projects**, the D2 Subway, Red and Blue Line platform extensions, and a Dallas Streetcar central link in downtown Dallas, will likely materially impact operations going forward by adding additional capacity and addressing bottleneck issues (*Observation 21*); and
- DART has taken a total **transportation system approach** into the design and utilization of transit modal choices so that services are designed with connections to DART services and those operated by other agencies. DART exceeds the ADA minimum requirements of service, including providing paratransit service to the entire 700-square mile DART service area, which exceeds the statutorily required service area of within three-quarters of a mile of a fixed route bus line or a rail station, and goes beyond the statutory curb-to-curb to instead providing door-to-door service upon request.

Retirement benefits expense and other post-employment benefits (OPEB) have generally been stable through the Review Period:

- DART has managed to substantially reduce its net pension liability from roughly \$63.7M in 2016 to \$47.3M in 2019;
- However, from 2018 to 2019, benefits expenses increased by 20% due to a change in the defined benefit plan mortality tables used to calculate pension liability; and
- DART's net OPEB liability decreased substantially from 2018 to 2019, due to differences in expected versus actual experience in assumptions such as healthcare cost inflation.

Safety and Security

Safety refers to protection of people against operational injury and death, such as vehicle collisions; security refers to protection of people and assets against acts of malfeasance.

Safety is DART's top goal mandated by the board, included in performance management plans and individual performance mandates, from the top down. During the Review Period:

- Accidents appear to be stable with roughly two per 100,000 miles per quarter;
- DART's overall complaints trended down over the last year;
- The bus data closely mirrors the systemwide data but with a higher rate of accidents and complaints, consistent with a less controllable and maintainable environment versus other modes;
- TRE and paratransit had a leap in complaints Q4 2019; and
- The data provided to NTD appears to be in compliance with statutory requirements.

DART has been implementing the "**FTA Safety Management System (49 CFR 673)**" regulation effective July 2019, switching from a "system safety" to "safety management system (SMS)" approach. This effort started in 2016 with the passing of 49 CFR Part 674 rules for the "State Safety Oversight Program" (SSOP) and in 2017, Texas Senate Bill 1523 created the state safety oversight program for rail fixed guideway public transportation systems.

- SMS required that documentation is audited internally every October and evidence of compliance was provided via the last report on October 27-31, 2019, covering seven of the 21 SSOP elements reviewed on a three-year cycle. The report indicated that DART was substantially in compliance with its SSOP for the audited elements.
- TxDOT also performs an FTA triennial review every three years with the March 1, 2019 review reporting that "The audit team found DART to be generally compliant with its SSOP, TxDOT, and FTA requirements and to have generally sound safety practices."
- DART also provides data to TxDOT to include in their annual status report on the safety of rail fixed guideway for the State of Texas. According to the 2018 report, DART had 43 events and 21 "Corrective Action Plans" prepared.

DART has several **good practice safety programs** in place, including:

- Monthly minute clinics and quarterly training for all operators;
- Light rail worker protection program addressing right-of-way risks;
- Hazard ID program software giving employees an opportunity to identify any hazards;
- Safety committee made up of safety management, union, and executive management, and Public Transportation Administration Safety Plan (PTASP) that describes processes to implement Safety Management Systems (SMS) including safety performance targets;

- A rail side “after action” review team that reviews problems, checks for similar issues elsewhere, and confirms proper documentation is in place, and an industry safety tracker deals with safety issues on a case-by-case basis; and
- Early design involvement of safety personnel and a “Safe Driver Award.”

DART has addressed the following **safety issues and trends** during the Review Period:

- DART noted a spike in red signal violations in 2018 as operators having a hard time seeing signals due to the sun immediately behind signals. DART installed larger sun shields to block out the sun, and violations decreased in 2019 (*Observation 23*);
- The use of personal electronic devices in paratransit surveys and cell phone usage in bus complaints appears high and/or growing. With Texas House Bill 62 in 2017 prohibiting the use of wireless communication devices while operating a motor vehicle, this area of safety is of particular concern, although DART rule books clearly prohibit this. However, DART needs clear and consistent guidelines on this topic across all employee manuals (*Finding 3*).
- DART implemented the “Say Something Safety and Security App” allowing riders to report concerns directly to DART police via photos, videos, and text with locations.
- DART has been installing internal cameras on vehicles and at rail stations, increased the number of security guards, and has hired more fare enforcement officers on trains, taking a strong positive position on security (*Observation 24*).

DART has a comprehensive **training program**, including for mechanics, operators, paratransit employees, staff seeking to specialize, and entry-level employees seeking to take on managerial positions (*Observation 25*).

For DART’S **standard operating procedures (SOPs), rulebooks, and employment manuals**:

- In critical areas evaluated—including drug and alcohol testing, Equal Employment Opportunity (EEO), and the Americans with Disabilities Act (ADA)—DART had sufficient rules in place;
- While cell phone use is addressed in the bus and light rail SOPs and rulebooks, the Team’s understanding of the new Texas legislation and best practice is that these rules need to cover all employees who use DART vehicles or drive on DART business, not just transit vehicle operators (*Finding 3*);
- The documents did not refer to each other and are not reviewed and updated as a group. Furthermore, the documents need to be better organized and not all data is in the correct location (*Observation 27*).
- DART “Service Standards” show that DART is advanced in its use of cost factors in its selection of service options.

- DART could consider including specific rules from the hourly employment manual for the various other rulebooks to ensure completeness, such as rules covering cellphone usage during vehicle operation and on drug and alcohol use.
- DART or its vendors operating TRE and paratransit services should have similar SOPs and rulebooks that are maintained in similar fashion to DART's.

1.2.4 Observations and Findings

The Team makes several observations throughout the report and summarizes these observations in the table below for reference. The Team includes DART's formal response to these observations and findings in Appendix 2.

#	Topic	Observation
1	Bus Operations	Available data suggests that DART operators are not reducing cell phone usage per state requirements and best practice safety protocols. The Team makes six recommendations on how to ameliorate this situation, including a Finding.
2	Bus Operations	DART should carefully 1) monitor missed trip trends and 2) customer complaint data to determine if the 2019 measures to increase missed trip reporting accurately form the new baseline in the recording of actual causes.
3	Bus Maintenance	The maintenance department reports that it has sufficient resources on hand to meet the maintenance challenges of the fleet and the Performance Review Team would concur. Therefore, DART needs to evaluate other reasons for missed trips, as missed trips due to mechanical reasons have increased.
4	Bus Operations	DART must continue to focus on ways to improve bus ridership, including eliminating low-demand routes, increasing frequency and service on high-demand routes, and fostering GoLink and other innovative transit solutions.
5	Bus Maintenance	DART has identified various maintenance initiatives for bus maintenance to implement in the next two years. These initiatives, supported by an alternative bus procurement plan, could have dramatic impact on MDBF, which in turn could help improve on-time performance.
6	Light Rail Maintenance	DART will require staff who need increasingly higher skill levels with the increased use of sophisticated systems and electronic technology. These needs are going to be a further cost burden, and to adequately fill these positions DART may have to increase wages on top of increasing costs for health care and other benefits for some positions.

7	Light Rail Maintenance	As DART's light rail fleet and infrastructure age, it is important that DART pay more attention and devote more resources to maintenance, thereby improving operations performance. This may include creating five-to-seven-hour work packages that can be accomplished after PM peak using single tracking. This has successfully created better work packages at other agencies versus only performing maintenance when trains are not operating.
8	Light Rail Operations	DART should evaluate the root causes of its higher relative light rail costs versus peers. Bus restructuring and the expansion of GoLink may help to foster intermodal traffic with light rail, thereby increasing passenger utilization and improving cost and subsidy performance.
9	Light Rail Maintenance	As it replaces its existing fleet, DART should evaluate whether it needs to have such high spare ratios and the financial and strategic benefits of peak demand fleet availability.
10	Light Rail Maintenance	DART should update all maintenance and inspection plans—for fleet and way and structures—based on realized maintenance experience and current asset reliability. This requires DART to record and better analyze specific asset degradation behavior.
11	Light Rail Maintenance	While light rail has been meeting its revised mean distance between failures (MDBF) target, it is failing to meet its on-time performance target and could not meet its original MDBF target level, which was subsequently lowered in both 2018 and 2019. The Team recommends reviewing the maintenance approach to increase fleet reliability and performing a root-cause analysis for on-time performance to enable a targeted improvement program for both metrics.
12	Ways, Structures, and Amenities	DART does not have any specific KPIs to measure the performance of the DART ways, structures, and amenities. The Team recommends developing a key KPI on the availability of way, which might include a simple KPI that defines availability of way as a percentage of time. A more sophisticated KPI would define availability in terms of functionality that the infrastructure should enable, such as speed restrictions and headway.
13	Paratransit	As DART manages paratransit services going forward with a new platform that makes use of many different service providers, it should

		continue paying attention to service quality metrics such as on-time performance and customer service under this new format.
14	Paratransit	DART's paratransit costs are reasonable, in part due to the restructuring of the MV contract and its focus on managing this complex operation. This is in context of DART's generous service-area wide coverage and complementary rider assistance programs.
15	GoLink	DART's GoLink appears to be a service and fiscal success—better service at a lower cost to DART. The question for DART as it expands this service is whether it can continue offering a similar quality of service, replacing poorly used fixed route bus service or offering new service as DART shifts fixed-route service to high-frequency corridors.
16	GoPass	DART has made impressive strides with GoPass in the Review Period and is this field's transit industry leader. When the GoPass App, GoPass Tap Card, and EMV are used by the majority of riders, this should materially decrease ticketing costs, reduce cash handling, and improve customer service.
17	GoPass	DART's go-to-market strategy is impressive and ambitious. DART should expect to consider a number of approaches as it grows GoPass in its service region and nationally, consistent with rapid change in the technology industry.
18	TRE	DART—and Trinity—might review the opportunity to combine the management of all commuter rail operations under a single management team. At minimum, both should study a combined management model which could potentially identify economies of scale for the three commuter lines.
19	TRE	A high-level conclusion from KPI analysis of TRE is that DART, and partners, appear to have reasonable control of costs and that DART's focus needs to continue to be on making its modes more attractive to increase ridership.
20	Service Planning	DART's board will be faced with challenges as it approves the appropriate trade-off between ridership and coverage, as other U.S. transit agencies have. The Team is encouraged by the opportunities that GoLink offers, with prudent reduction of DART's FLEX Service. This

		may make the board's decision easier, as these modes offer alternatives to riders who may lose bus service coverage.
21	Service Planning	While DART's light rail system was essentially completed by 2016, DART continues to make prudent and timely capital investments to increase the performance of this critical asset. Since light rail is the backbone of DART's system, this increased performance should also improve performance of DART's other services that link to light rail.
22	Benefits, Pension, and OPEB Costs	DART appears to have managed both pension and OPEB liabilities well during the Review Period. While there has been fluctuation, particularly in OPEB, the adoption of new accounting standards and mortality tables appears to have led to a more realistic calculation of the long-term pension and OPEB liabilities on DART's balance sheet.
23	Light Rail Safety	Available data shows that DART had a spike in red signal violations in 2018, which were reduced in 2019 due to the installation of longer sun shields to block out low sunlight in winter months. The Team commends the simple but effective approach.
24	Security	DART has taken a strong positive position on security, particularly after surveys show passenger consider it a high priority in choosing public transit. DART has taken the initiative, obtained grants, and received state approvals to make several improvements, including a GPS-enabled security app, installing cameras, and increasing the visibility of enforcement officers and patrols.
25	Training	DART appears to have a solid training program but recognizes the need for continuous improvement with other educational partnerships, including the creation of a "Transit Operations Academy" and apprentice programs with local colleges and trade schools. They have also recognized the need for more hands-on practicums in the field. DART should also consider available digital technologies to provide some of these needs and creating and tracking quantitative measures of training success.
26	SOPs, Rulebooks, and Manuals	DART would benefit from reviewing unit rules and SOPs together at regular intervals. Even if individual SOPs do not require major updates, the regular review and dates associated give users confidence that the rules and procedures they are learning are current. DART might write

		this requirement as an SOP itself—i.e., to update SOPs at defined intervals or as a response to safety, maintenance, or other events.
27	SOPs, Rulebooks, and Manuals	The Team makes nine recommendations related to this topic, including updating of SOPs and rulebooks simultaneously, especially when they have not been updated in many years, including a table of contents in all rulebooks for easy user reference, ensuring information is located in the correct publication, removing SOPs for light rail vehicles that are included in bus maintenance lists, and ensuring that TRE and paratransit contractors have similar SOPs and rulebooks to DART's.
28	Bus Operations	DART may wish to consider advertising at bus stops and in bus shelters through contractors that currently provide such services, including providing, maintaining, and servicing the stops/shelters.
29	Funding	The Team recommends that DART actively search for and recruit Dallas-Fort Worth-Arlington urbanized area (UZA) transit and paratransit operators, public and private, to submit their reportable operations to the National Transit Database (NTD) to increase the Formula Federal Funding allocations to DART's UZA and, subsequently, to DART itself.
30	NTD Reporting	There appear to be trends in ridership and fare revenue data reported to NTD that cannot be easily explained. The Team recommends that DART attempt to determine what occurred. The main purpose of this inquiry should be forward-looking, to attempt to ensure that DART has good control of its fare revenues and the rapid reporting of data to be able to analyze trends and respond to changes in operating conditions.

The Team also had three findings:

Finding 1: The practice of bulk purchasing of bus rolling stock creates pressure on the maintenance department and causes uneven spending practices for rolling stock capital expenditures including federal grants and the required local match. The practice creates cycles of very high maintenance activity that could be avoided if bus procurements were more evenly distributed. DART should consider developing a transition plan for both the major sub fleets including 30- and 40-foot transit buses and the cutaway (ARBOC) fleet that spreads out the procurement of rolling stock at more even intervals over the expected life cycle of the equipment.

Finding 2: Since safety is a very high priority, DART should review whether the increase in light rail non-security NTD reportable events during the Review Period serves as a “canary in the coal

mine,” suggesting greater attention be paid to safety. Furthermore, both the difference in definition of “collision” between DART and NTD and the errors identified in calculating and reporting accidents for DART’s quarterly reports merit further review to ensure there is consistency in internal and external reporting as well as coordination between different reporting teams within DART.

Finding 3: The misuse of cell phones and electronic devices is a concern both in compliance with the new regulation and in customer complaints and surveys. This needs clear guidelines, with consistent rules of engagement, encouragement, enforcement, and reporting, as well as consistent measurement and evidence of compliance. DART should review its current SOPs on this topic and ensure that they are consistent with each other, with DART’s policies, and with the law. Furthermore, the Team would urge DART to make a concerted effort to make all employees aware of this issue, make the penalties for misuse clear, and extend this policy to all employees—i.e., if an employee is driving a DART vehicle or their own vehicle on DART business.

2. Key Performance Indicators

2.1 DART Performance over Performance Review Period (2016-2019)

The Team evaluated key performance indicators (KPIs), as statutorily required by the Texas Transportation Code Section 452.454(c), to determine DART's performance on the required indicators during the Review Period, 2016 through 2019. The following KPIs were examined:

- Subsidy per passenger;
- Operating cost per revenue mile;
- Operating cost per revenue hour;
- Sales and use tax receipts per passenger;
- Fare recovery rate;
- Number of passengers per hour;
- On-time performance;
- Number of accidents per 100,000 miles; and
- Number of miles between mechanical service calls.

The Team also analyzed passenger revenues over the Review Period, displayed under the farebox recovery rate analysis. As applicable, the Team displays each KPI at a total system level, followed by a breakdown by mode: bus, light rail, paratransit, and commuter rail (TRE).

The analysis uses quarterly data from DART's "Quarterly Operating, Financial, Performance, and Compliance Reports" as well as National Transit Database (NTD) data. Where DART's Quarterly Reports are used, the Team has used the average across the four quarters within a fiscal year to obtain the value for a given fiscal year. Paratransit combines reported values for two modes: "Demand-Responsive" (DR) and "Demand-Responsive Taxi" (DT).

It is important to note that in 2019 DART began using automatic passenger counters (APCs) on buses to count ridership. This has led to an increase in reported ridership in 2019 versus prior years. The Team understands that the uptick in reported ridership is not reflective of an actual increase in riders using the bus system but instead an increase in passengers counted.

Nevertheless, 2019 represents a new "baseline" for ridership statistics and any comparisons of DART's annual performance on KPIs involving ridership data must be viewed accordingly.

2.1.1 Subsidy per Passenger

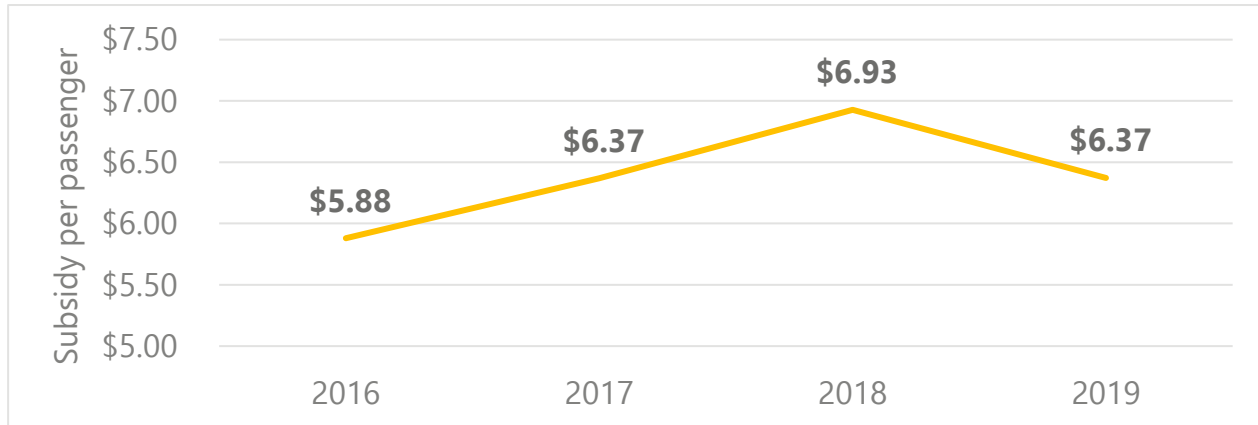
Subsidy per passenger is defined as operating expenses minus fare revenues (equating to net expense that is not covered by revenues), divided by the number of passengers in a given period. The change from 2018 to 2019 is complicated by two factors:

- A fare increase of 20% for daily, monthly, and annual passes, that occurred on August 18th, 2018, 44 days, or 12% from the end of DART's 2018. However, at the same time, there were many other changes that produced fare reductions for certain types of trips. There were also fare increases for paratransit van/sedan service in March 2019.
- DART implemented a new passenger counting system, as mentioned, which appears to have increased reported bus unlinked passenger trips over the previous methodology.

Because of these somewhat off-setting factors, the overall results, comparing 2018 to 2019, are difficult to reconcile. All mode ridership was up 6.9 million, 11.0%, due to the 7.2 million, 24%, increase in bus ridership.¹ This compares to a decline in ridership of nearly 5% in 2018 compared to 2017. Despite the fare increase in 2018, fare revenue only went up 1.4% in 2019, and the average fare per passenger actually declined 8.7%. The wide discrepancy between increase in ridership and decrease in fare revenue may warrant further analysis in subsequent reports, though this is likely driven by the increase in riders counted using the APCs while the actual number of riders using the system—and therefore, fare-paying customers—may have declined.

Figure 2 displays subsidy per passenger across all DART modes. Subsidy has generally increased over the Review Period, from an average of \$5.88 per passenger in 2016 to \$6.37 in 2019. The reduction in 2019 is driven largely by a switch to APCs on board vehicles, which increased the number of passengers recorded beginning in 2019. Subsidy per passenger at the total system level increased by 2.7% annually, on average; however, when comparing subsidy per passenger between 2018 and 2018 (before the switch to using APCs for bus passenger counting), the increase has been 8.6% per year. The change in passenger counting is discussed in subsequent sections of this Performance Review.

¹ The Team notes that DART's Quarterly Operating, Financial Performance, and Compliance Reports indicate a ridership increase of 9.1 million for bus between 2018 and 2019, meaning there may be a discrepancy in DART internal reporting versus NTD reporting.

Figure 1: Subsidy per Passenger (Total System)

As seen in Figure 2, there are similar trends across bus, light rail, and TRE, across which subsidy per passenger has also risen over the Review Period with a dip in 2019 due to the substantial increase in recorded passenger count.

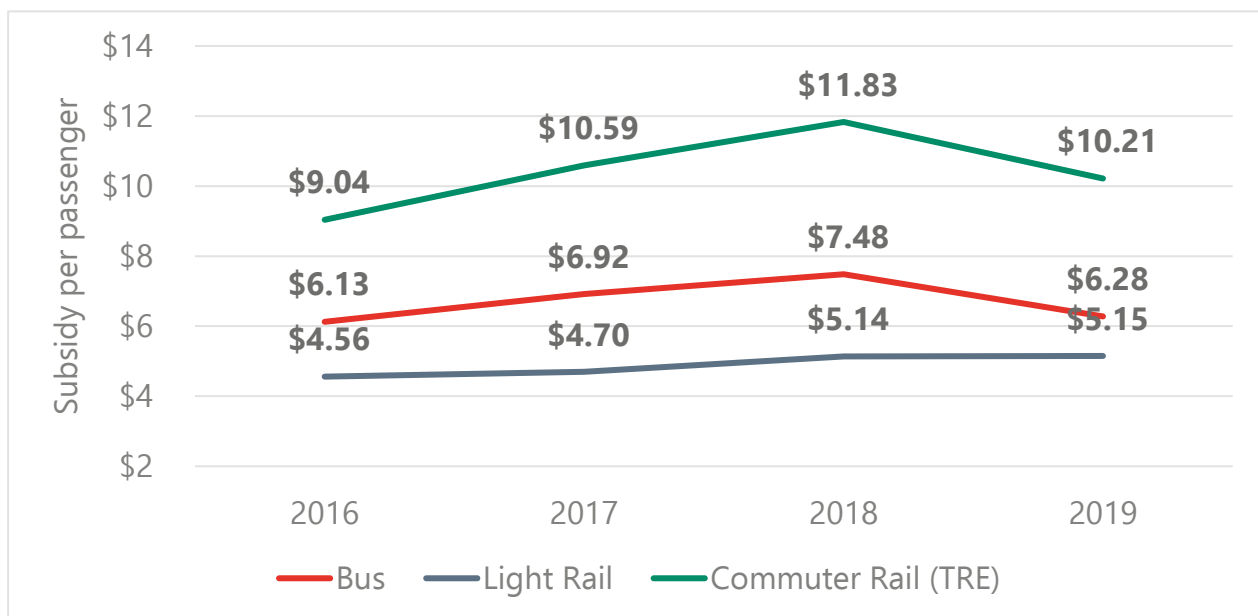
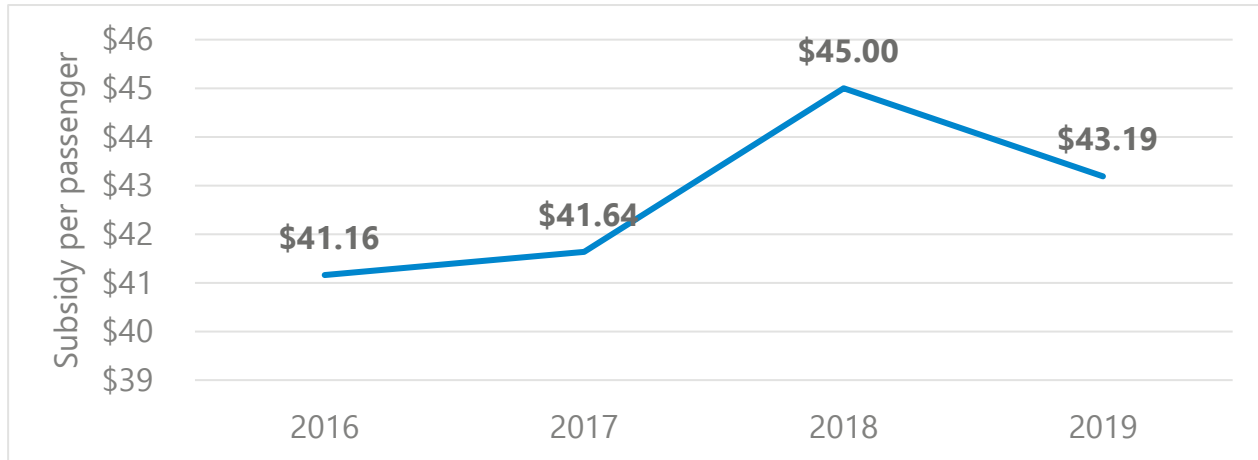
Figure 2: Subsidy per Passenger (Bus, Light Rail, TRE)

Figure 3 displays subsidy per passenger for paratransit, which has followed similar trends to DART overall and to the other modes. It is displayed separately due to the difference in scale, as paratransit requires a higher subsidy per passenger, on average, than other modes.

Figure 3: Subsidy per Passenger (Paratransit)

2.1.2 Operating Cost per Revenue Mile and per Revenue Hour

Figure 4 displays operating cost per revenue mile and revenue hour for DART as a whole. Operating cost per revenue mile and per revenue hour have both increased roughly 7% over the Review Period. This compares to a 7.7% increase in Consumer Price Index (CPI) for the Dallas-Fort Worth-Arlington, TX area over the same period, meaning operating cost per revenue mile and per revenue hour have grown slightly below inflation.

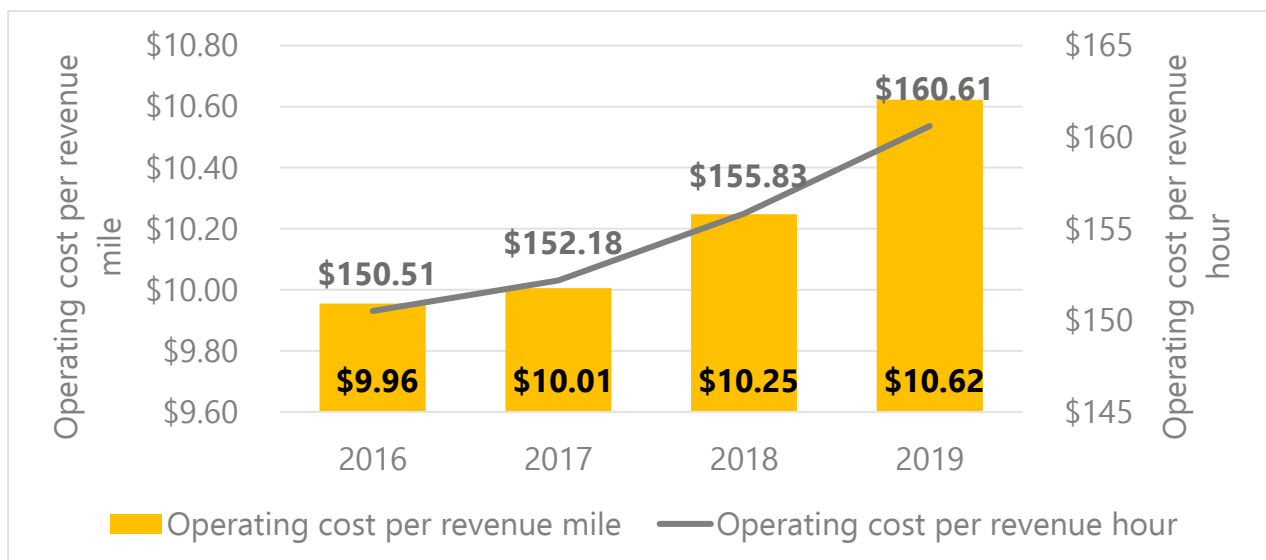
Figure 4: Operating Cost KPIs (Total System)

Figure 5 displays operating cost KPIs for bus. As the data demonstrates, both operating cost KPIs have increased over the Review Period by roughly 13-14% over four years, or roughly 3.5% per

year, which is substantially higher than inflation. The increase in 2019 is driven largely by a 9% increase in bus operating cost between 2018 and 2019.

Figure 5: Operating Cost KPIs (Bus)

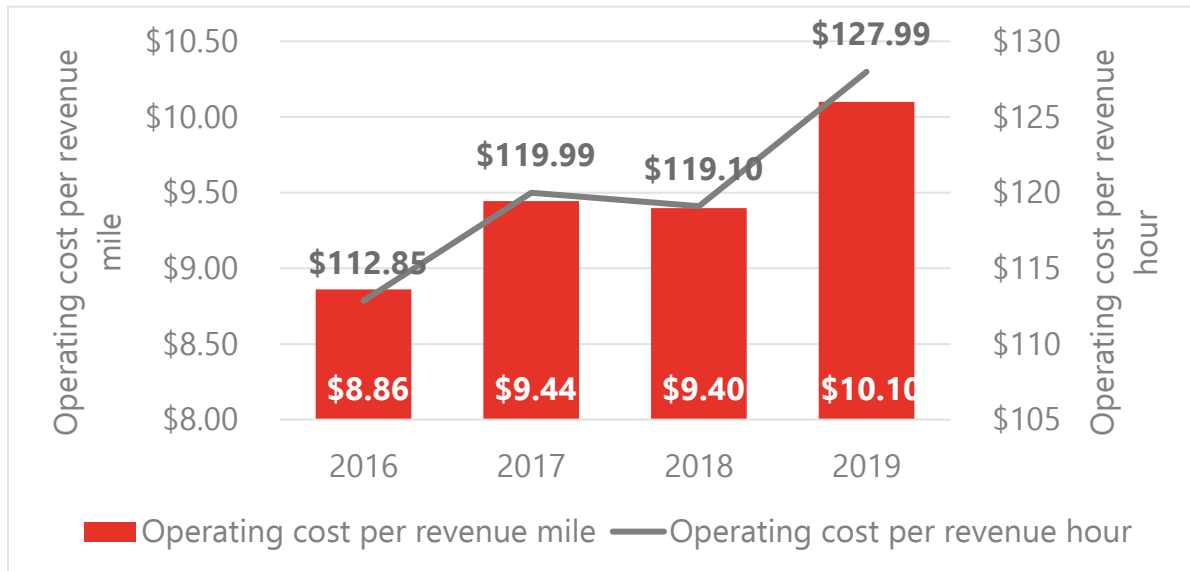


Figure 6 displays operating cost KPIs for light rail. There was an improvement in operating cost in 2017, declining from \$178.4 million to \$175.2 million, in addition to an increase in vehicle revenue miles from 9.8 million to 10.2 million. These factors combined to lead to a nearly 6% improvement in that year. More recently, operating cost benchmarks increased once again but are only 3-4% higher in 2019 versus 2016, substantially below inflation.

Figure 6: Operating Cost KPIs (Light rail)

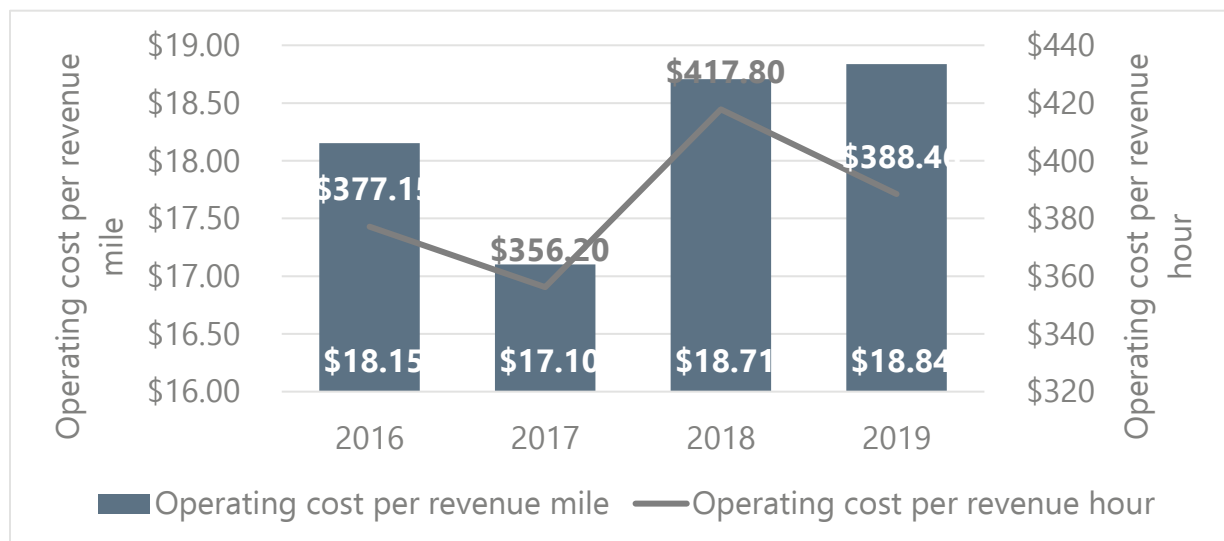


Figure 7 displays operating cost KPIs for paratransit. Operating cost per revenue mile and per revenue hour have both declined during the Review Period, with operating cost per revenue mile declining by about 4% between 2016 and 2019, which appears to be driven by an over 30% increase in revenue miles over the same period. Operating cost per revenue hour has stayed relatively flat, as revenue hours also increased by 28% over the same period.

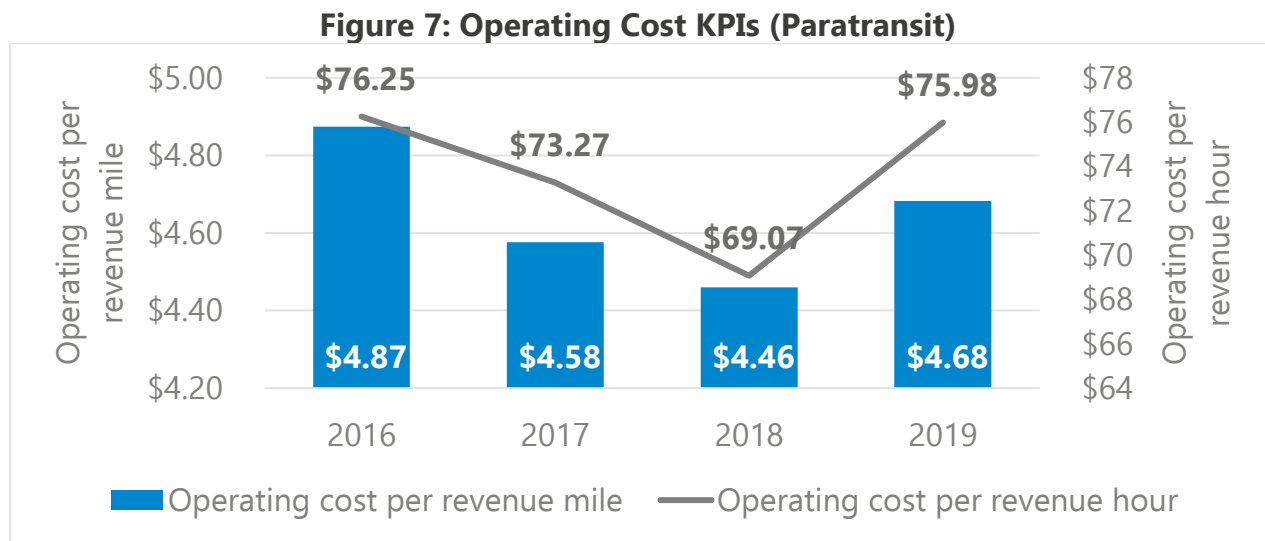
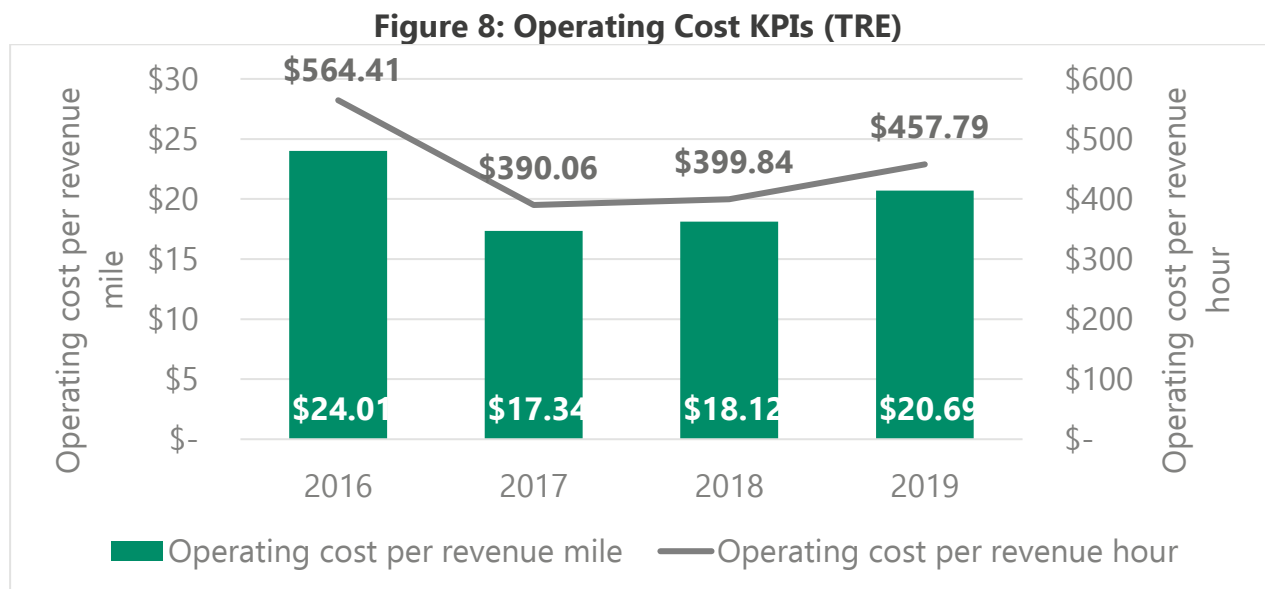


Figure 8 displays operating cost KPIs for commuter rail (TRE). Operating cost per revenue mile and per revenue hour have both declined significantly over the Review Period, driven by a substantial increase in revenue hours and revenue miles for TRE beginning in 2017.



2.1.3 Sales Tax per Passenger

Figure 9 displays sales tax per passenger for DART. Sales tax per passenger increased by 8.0% over the Review Period, and overall sales tax receipts increased roughly 14.6% over the Review Period, driving the increase in sales tax per passenger.

Figure 9: Sales Tax per Passenger (Total System)



2.1.4 Farebox Recovery Rate

Farebox recovery rate is defined as passenger fare revenue divided by modally allocated operating cost. Figure 10 displays the farebox recovery rate for all modes. Farebox recovery rate has generally declined across the system over the Review Period. As seen in Figure 11, this appears to be driven by a decrease in passenger fare revenue, despite fare increases in 2018, which in turn is driven by a decline in ridership from 2016 through 2018.

Figure 10: Farebox Recovery Rate (All Modes)

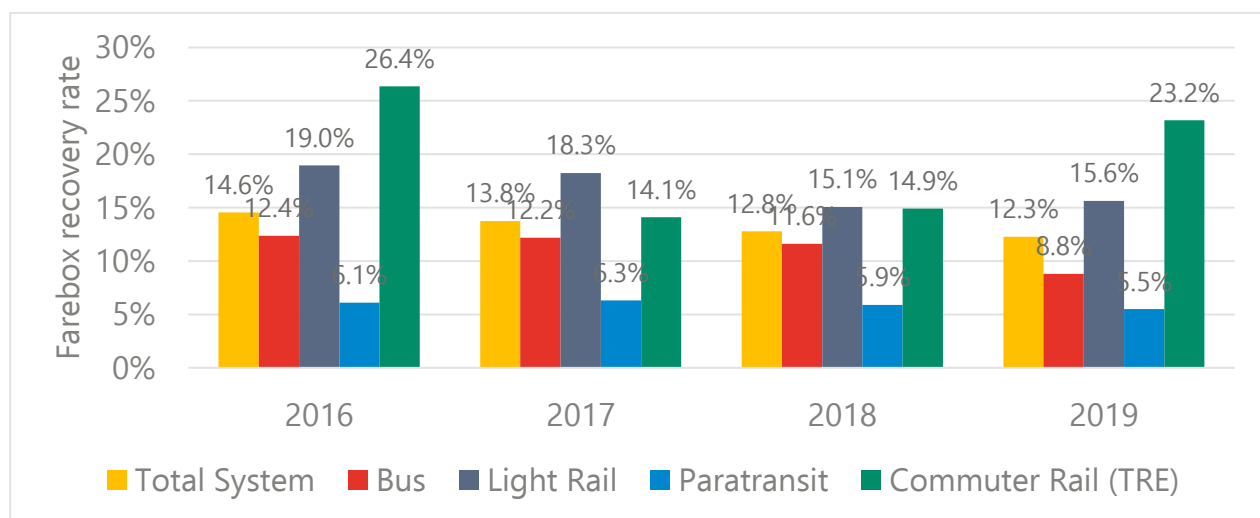
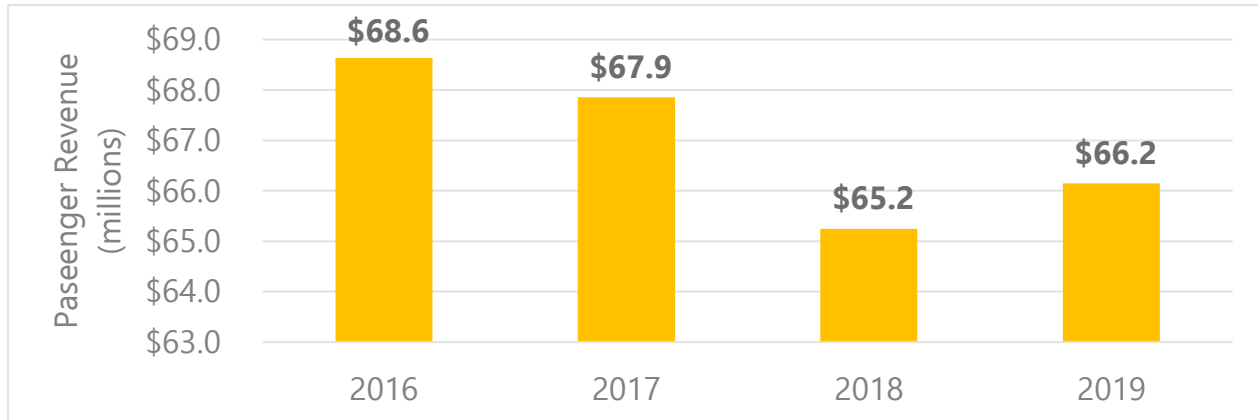


Figure 11: Passenger Revenue (Total System)

2.1.5 Number of Passengers per Hour

Passengers per hour is defined as ridership divided by total vehicle revenue hours, calculated for the total system and individually by mode. Figure 12 displays number of passengers per hour systemwide for DART. There has been a gradual decline in ridership, with a recent uptick in reported ridership in 2019 due to the introduction of APCs, as described earlier.

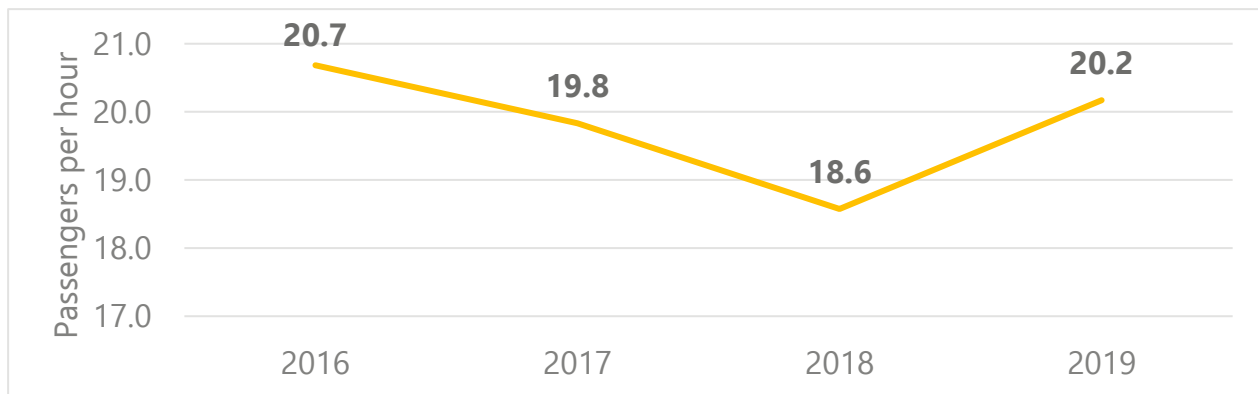
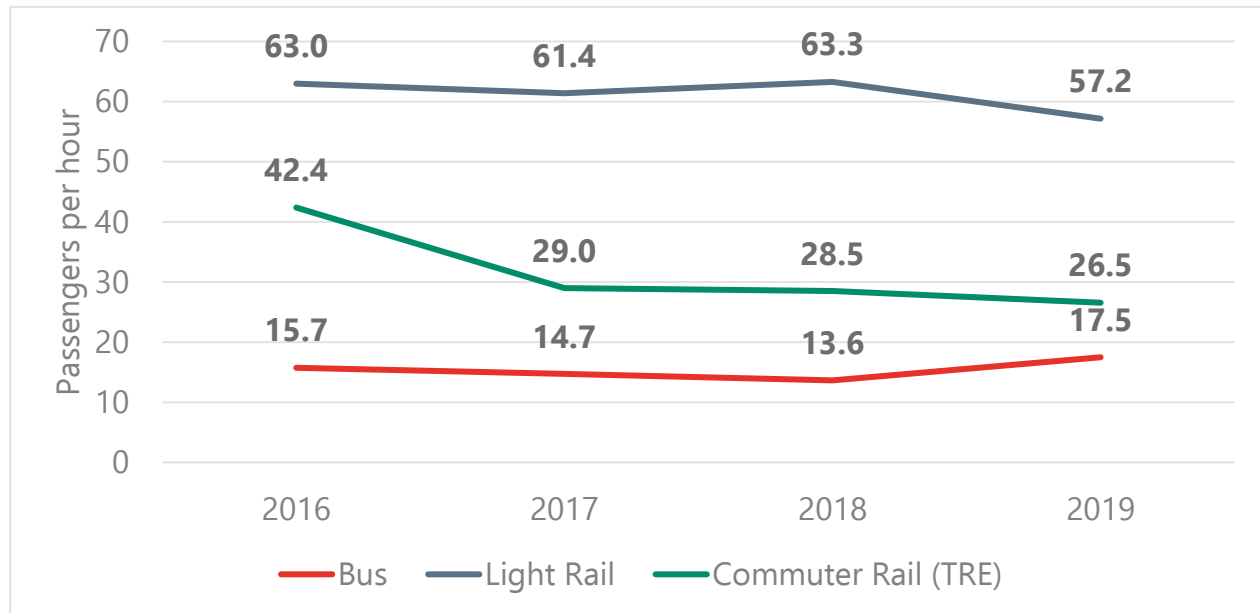
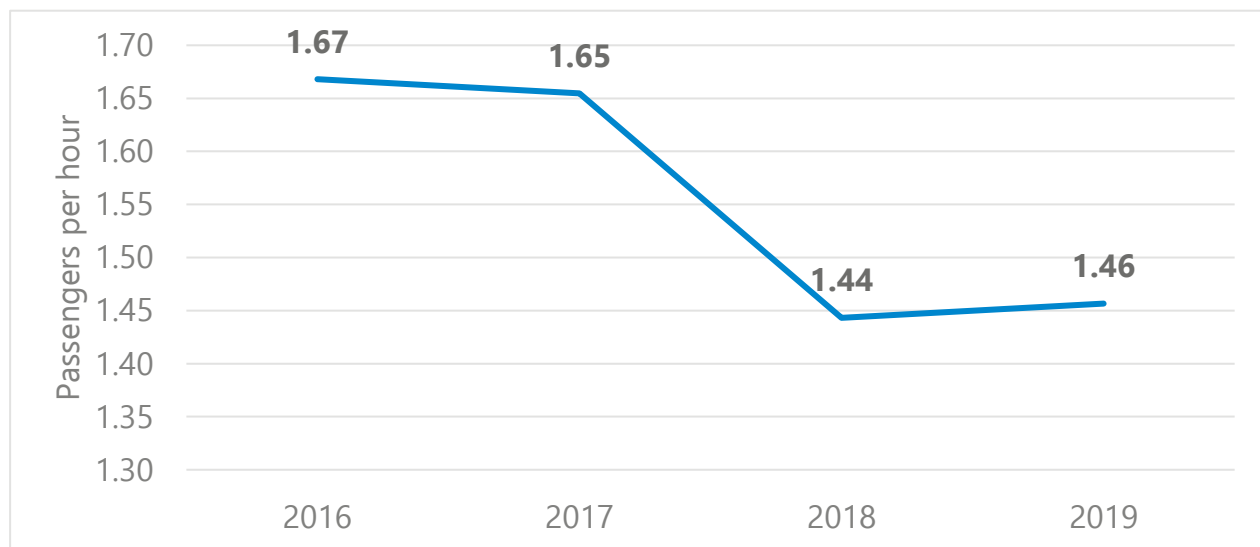
Figure 12: Passengers per Hour (Total System)

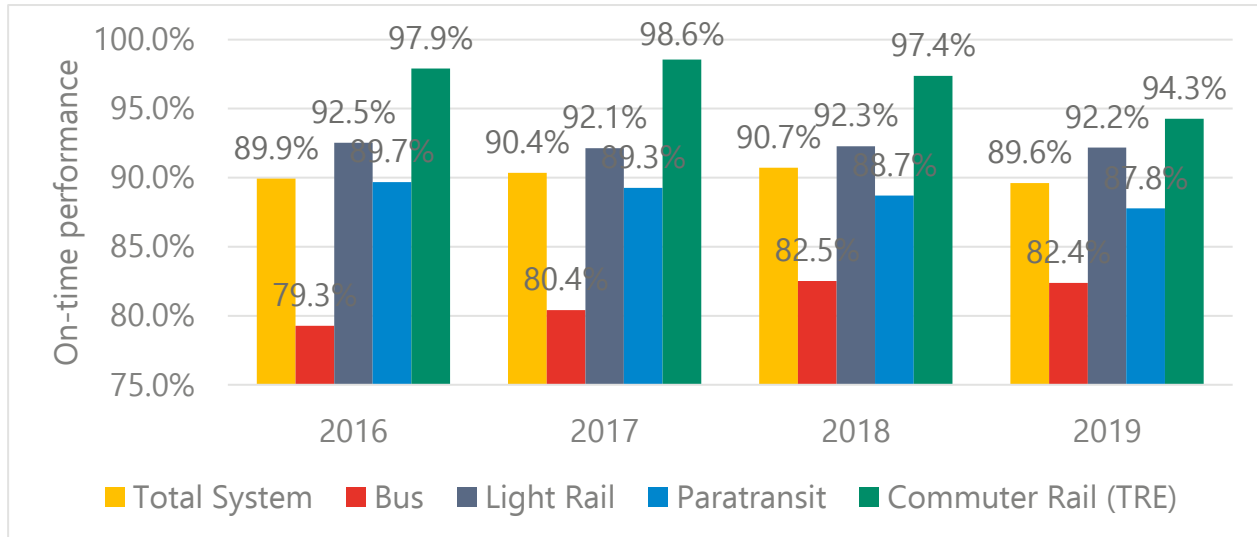
Figure 13 displays number of passengers per hour for bus, light rail, and commuter rail (TRE). Figure 14 displays passengers per hour for paratransit. There has been a general decline in passengers per hour across all modes, though there has been an increase reported ridership on bus largely because of the introduction of APCs to count passengers on buses, which has led to higher counts of passengers compared to previous methodology.

For paratransit, Appendix 1 discusses how DART may work with other transit providers in its service area to ensure that all FTA-eligible trips are counted, which will provide a better perspective on paratransit ridership and may help DART or other agencies maximize their FTA grant funding.

Figure 13: Passengers per Hour (Bus, Light Rail, TRE)**Figure 14: Passengers per Hour (Paratransit)**

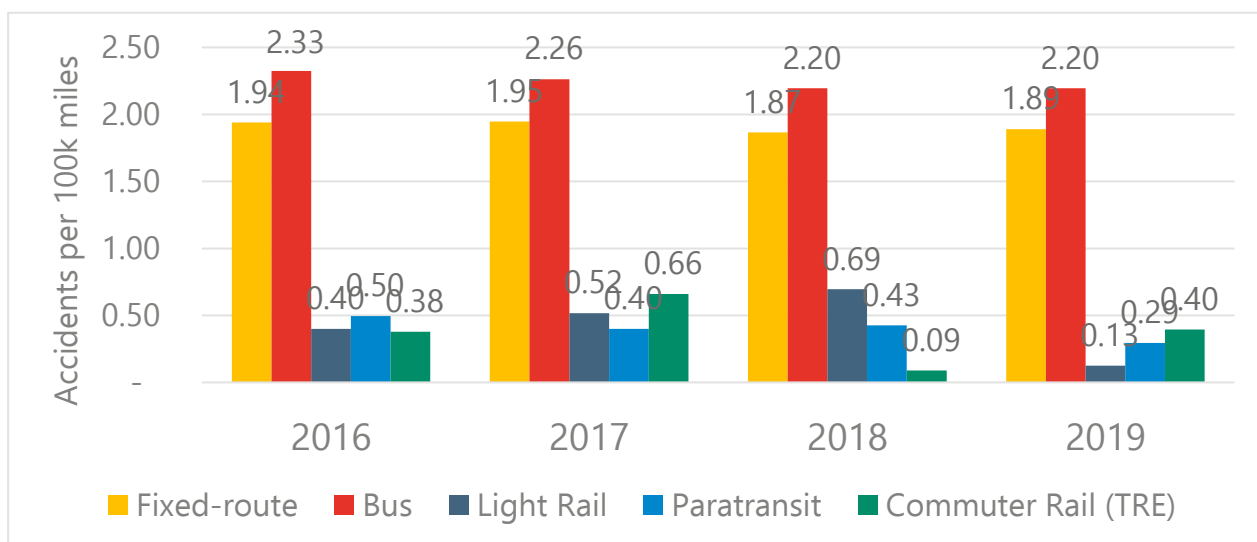
2.1.6 On-Time Performance

Figure 15 displays on-time performance systemwide for DART and across individual modes for the Review Period. On-time performance has stayed relatively stable for DART as a whole, with a notable improvement in bus on-time performance in 2018 and 2019. Commuter rail on-time performance declined over the Review Period from 97.9% in 2016 to 94.3% in 2019.

Figure 15: On-Time Performance (All Modes)

2.1.7 Number of Accidents per 100,000 Miles

Figure 16 displays accidents per 100,000 miles by mode. In general, DART has either held or improved its performance on accidents across modes; the Team notes that DART maintains a separate internal definition for light rail collisions versus the National Transit Database, discussed later in this report, though performance on both DART-defined and NTD-defined light rail collisions has improved during the Review Period. "Fixed-route" groups together bus, light rail, and commuter rail; it excludes paratransit.

Figure 16: Number of Accidents per 100K Miles (All Modes)

2.1.8 Number of Miles Between Mechanical Service Calls

Figure 17 displays mean distance in miles between mechanical service calls or mechanical “failures” that occur while a vehicle is in revenue service to the public. Figure 18 displays this for paratransit and Figure 19 for commuter rail (TRE). Paratransit only includes “Demand-Responsive” (DR) as reported to NTD, as mechanical failures on “Demand-Responsive Taxi” (DT) are not reported to NTD.

DART’s performance on mean distance between mechanical failures has generally declined over the Review Period. At a systemwide level, mean distance between failures was over 13,000 miles in 2016 but declined to roughly 9,000 miles in 2019. The decline has been most pronounced in TRE, where the number of overall failures went from six in 2016, as reported to NTD, to 35 in 2019. However, bus and light rail have also seen significant deterioration in performance on distance between failures over the Review Period. The Team discusses possible causes in subsequent sections of this report.

Figure 17: Mean Distance Between Failures (Total System, Bus, Light Rail)

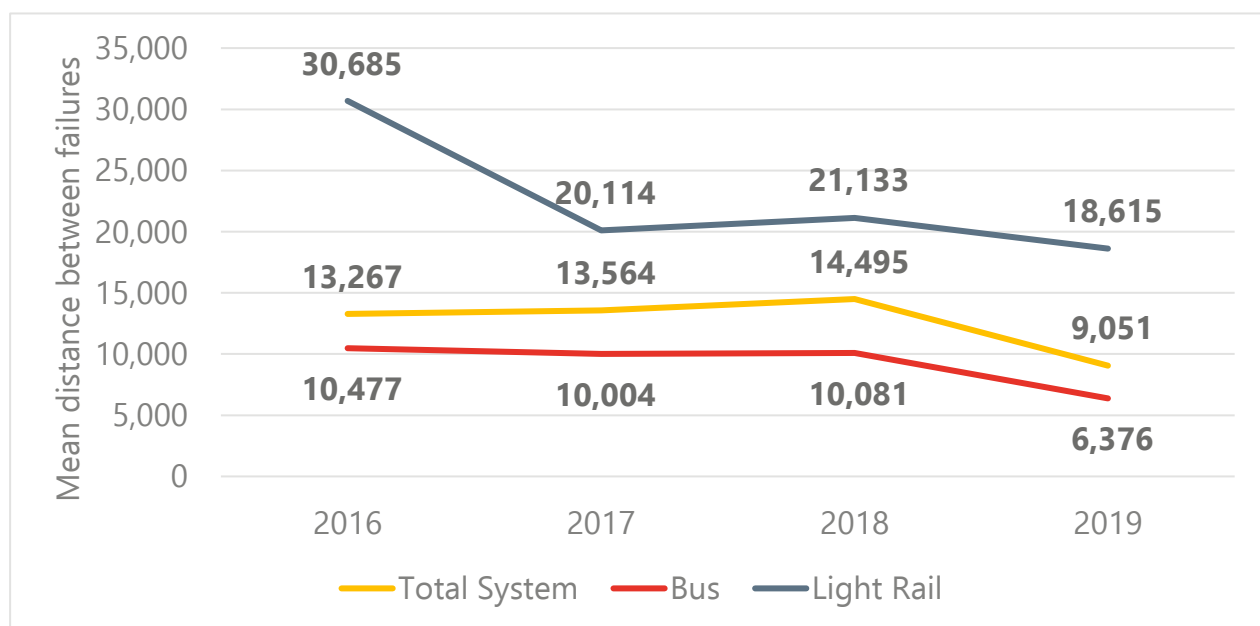
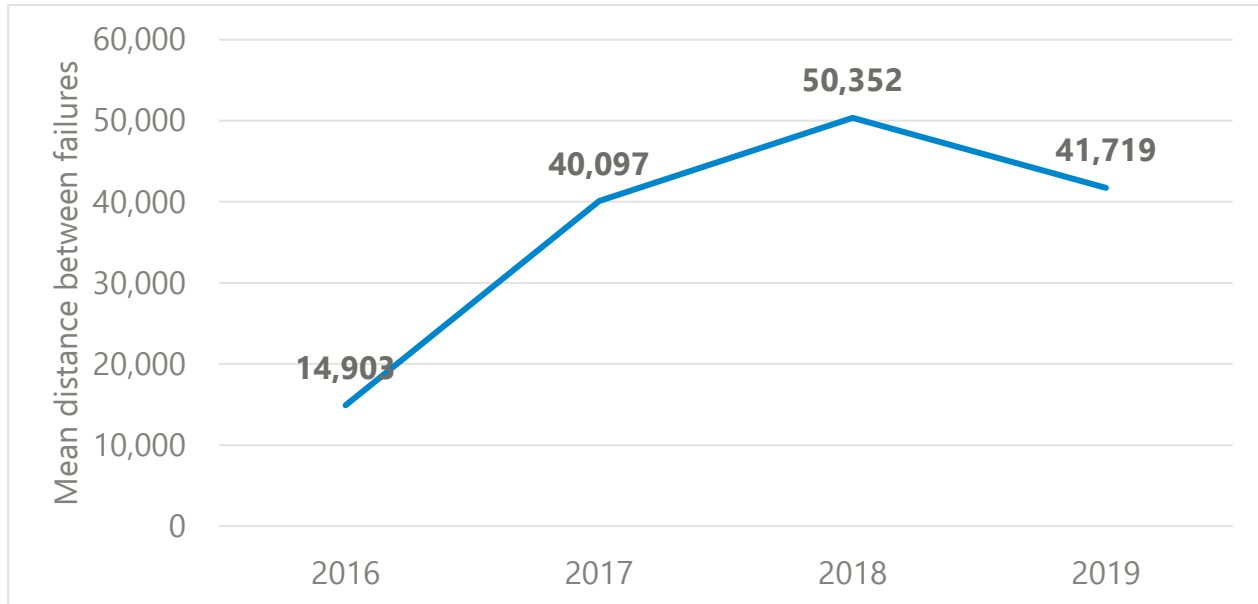
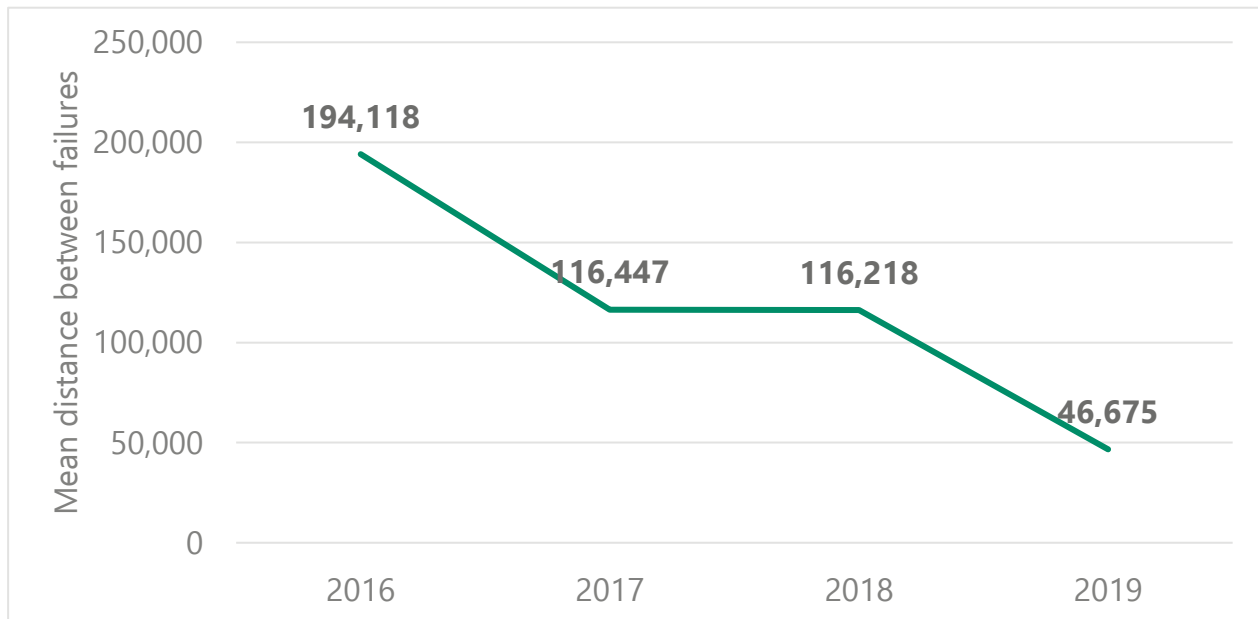


Figure 18: Mean Distance Between Failures (Paratransit)**Figure 19: Mean Distance Between Failures (TRE)**

2.1.9 General Observations on KPIs

Overall, DART has managed to keep operating cost per revenue mile and revenue hour as well as subsidy per passenger roughly in line with the inflation rate for the Dallas metropolitan area.

However, subsidy per passenger may have increased further given the change in ridership counting methodology beginning in 2019, which led to an increase in reported ridership. Bus operating cost per revenue hour and per revenue mile has been higher than inflation, while paratransit and TRE have both reduced their operating cost per revenue mile and revenue hour.

On the revenue side, performance has generally declined, in line with trends for transit agencies around the country. Farebox recovery rate has declined, likely due to decline in passenger fare revenue over the Review Period, likely due to less passengers using the system, as evidenced by the decline in passengers per hour for most modes apart from bus—due to the introduction of APCs for passenger counting.

On-time performance has stayed relatively stable, with a notable improvement in bus, though with a marked decline in on-time performance for TRE of 3.6% between 2016 and 2019.

In terms of safety, DART's performance on accidents per 100,000 miles has generally improved, with the exception of light rail, where accidents per 100,000 miles have doubled during the Review Period, which may merit further attention and root cause analysis.

Finally, DART's performance on maintenance appears to have declined during the Review Period. Mean distance between failures or service calls has nearly universally declined, meaning maintenance is not preventing failures during vehicle service, though one notable exception is for paratransit, which has significantly increased its performance on this metric.

2.2 Peer Analysis

2.2.1 Introduction

The Team recommends that DART institute a process of peer review on at least an annual basis. Section 2.2.4 discusses how it may be initiated and expanded and modified over time to meet DART's needs.

There are two general types of transit agency quantitative analysis, potentially using a large variety of metrics such as service area population density, operating cost per vehicle revenue mile, or boardings per vehicle revenue hour:

- Peer review, where a transit operator such as DART is compared to similar types of transit agencies operating in similar geographic, economic, and demographic areas in (approximately) the same time period; and
- Time series, where a transit operator's performance is tracked over multiple time periods, ranging from days to years – as utilized in the trend graphics in the previous section.

It is also possible to combine peer and time series analysis, as was done for several of the metrics in the *DART Peer Review*, prepared by AECOM (February 28, 2020). This can be useful, for

example, to determine if there is a difference in response between peers to common changes in conditions.

In this section, the Team presents an initial peer analysis report as a possible starting point for DART staff to utilize in future years with future modifications and additions as appropriate.

After discussion with relevant DART executives and review of prior DART peer reviews, including the AECOM *DART Peer Review*, the Team recommends six peers, listed by urbanized area and transit operator(s) with the acronym that will be utilized:

- Denver – Regional Transportation District (DEN);
- Houston – Metropolitan Transit Authority of Harris County (HOU);
- Minneapolis/Saint Paul (MSP) – Metro Council (MC) and Metro Transit (MT);
- Portland – Tri-County Metropolitan Transportation District of Oregon (PORT);
- Salt Lake City – Utah Transit (SLC); and
- San Diego (SD) – North County Transit District (NCTD) and San Diego Metropolitan Transit System (MTS).

2.2.2 Peer Selection Criteria

While peer comparison can be a valuable tool when properly utilized by experienced analysts, there is no such thing as a perfect peer or a peer group. The Team's objective was to find comparable transit operators serving comparable urbanized areas to the greatest extent possible. This means selecting a peer group that has members among which DART, in descriptive metrics such as service area population, numbers of passengers carried, etc. is more-or-less near the middle rather than the extremes, where possible.

For DART, the Team's specific criteria included looking for peers with the following characteristics:

- Serving relatively newer urbanized areas that are still growing, which generally means those in southern and western states, specifically those that have seen most of their growth since cars have become the dominant U.S. means of local transportation;
- Transit operator service areas roughly comparable to that of DART and with roughly comparable population density;
- Operating the four major modes of transit service that DART provides: bus, commuter rail, demand responsive, and light rail;
- Because DART's light rail operations are a major segment of the service it operates—almost half of total unlinked passenger trips and over half of total passenger-miles—the Team looked for peers with major, post-1980 light rail transit lines and services, yet operating long enough to become major elements of the local transit network;

- The Team did not utilize streetcar mode operations as a selection criterion, so streetcar, and other modes such as vanpool, were excluded from the peer selection analysis; and
- One transit operator or just one major transit operator in each peer area was preferred.

A more detailed explanation of the peer selection and omission process is provided in section 2.2.3.

2.2.3 Descriptive Metrics and Narrative

Below, the Team uses a selection of descriptive metrics, followed by narrative descriptions of each peer.

All data is from the National Transit Database for the 2019 reporting year, except for Figure 22 on Transit Modal Split and Traffic Congestion chart, with sources discussed below. All transit data is the total for the four principal modes: bus, commuter rail (except for Houston, which does not have commuter rail service), demand-responsive, and light rail.

Differences in the Peers

While the peers were specifically selected for the attributes that they share, there are some significant differences that impact their results, including:

- Most of the peers – DAL, DEN, HOU, MSP – are relatively flat and not extensively water- or mountain-bounded, allowing the service areas to expand in a near 360° pattern. The major exception is SD, which is largely located in a narrow strip between the Pacific Ocean to the West, San Diego Bay in the middle of the southern portion of the area, and hills and mountains to the east that direct much of the development into valleys. SLC is bordered by the Wasatch Front mountains immediately to the east, the Great Salt Lake to the Northwest, with the I-80 corridor almost the sole route to the mountain communities, including the extensive recreational facilities, and more mountains to the west. PORT operates south of the Columbia River, is bisected by the Willamette River, and has major lines of hills which lead to valleys of settlement. Generally speaking, it is easier to provide transit service to long, narrow, densely populated areas rather than flat and spread-out ones. This produces higher ridership per hour or mile of transit service and, therefore, lower subsidies because there is more revenue per hour and mile, which is one of the main reasons why SD rates well.
- DEN has a very large service area, approximately double that of the next-largest, Houston, but much of the DEN area is exurban and rural. While most of its service and ridership is concentrated in denser areas around and to and from Denver, it also provides commuter-express type services to and from several outlying smaller cities and Denver Airport.

- SLC has a fairly long and narrow service area from Ogden, approximately 40 miles to the North of SLC to Provo, approximately 45 miles to south, connected by the FrontRunner commuter rail and both long-haul and local bus service.
- Three cities of the peer group – DAL, HOU, and SLC – are located in “right-to-work” (RTW) states (Texas and Utah), which some believe produces lower labor costs and fewer restrictive work rules. SD is, of course, located in California, which is not a RTW state, but the transit agencies there have both low costs of employment for their employees and major use of purchased transportation service contractors that also tend to have lower employment costs than many of the other peers.
- Some of the peers have had various types of land use and transportation policies with major impact on transit for long periods of time. PORT, and the State of Oregon, has had very strong such policies for almost half a century. MSP has also been moving strongly in this direction for decades, while some of the others, notably DEN and SD, are also moving in this direction, particularly in comparison to the other peers.

These types of differences between the peers are not seen as a problem; they provide a number of peers that have both similarities and differences. Knowing what these differences are and how they impact performance can be of great assistance in interpreting the results – and in looking for things that work well in other areas that may be of interest and use to DART.

Dual Operator Peer Areas

For all but MSP and SD, these data are for the sole transit operator used in the analysis.

For MSP, where there are two transit operators, the data are from MT, which reports all the commuter rail and light rail, approximately 95% of the bus, and approximately 94% of the total service, measured by unlinked passenger trips (UPT). MC reports the remaining portion of the bus and all of the demand responsive service for MSP. The service area of MC includes all of that of MT, but extends further into lower density suburbs, exurbs, and rural areas where there is little fixed route transit service. The MC service area is 70% larger by square miles and 26% larger by population, so the population density of the MC exclusive service area is only 35% that of the MT service area. Therefore, using MT service area for MSP is only a minor distortion, at most.

For SD, the Team utilized the Urbanized Area (UZA) square miles and population data rather than that for the service areas of one or both of the transit operators. MTS’s service area includes 83% and NCTD’s includes 29% of the UZA population, so they have a significant joint service area, primarily along the commuter rail line from the Northern to the Southern portion of the County, and this exception to the general process does appears to be non-representative.

DART is somewhat unusual, because the DART service area is only 39% of the square miles and 47% of the population of the UZA. Unlike the MSP “Twin Cities,” where there are two transit agencies that both service the two principal cities and most of major surrounding suburbs, in the Metroplex “Twin Cities,” DART only serves the City of Dallas and many of the member jurisdiction

surrounding Dallas. However, since DART, including TRE, carries approximately 91% of the UPT for the entire 16-county greater Metroplex, the Team believes that the selected DART peer group, including the DART service area statistics, is valid for current peer comparison purposes.

Dividing square miles by population produces population per square mile or density. For the peers, the data are shown in Table 1.

Table 1: Peer Group Population Density

<u>Peer</u>	<u>Population/ Square Mile</u>
Dallas	3,450
Denver	1,247
Houston	2,871
Minneapolis/Saint Paul	2,814
Portland	4,086
Salt Lake City	2,556
San Diego	4,039
Average	2,528

From Figure 20 and Figure 21, DART is slightly smaller in both population and service area than the peer average as well as lower than average on passenger trips and passenger-miles per capita. However, from Table 1, it is above average in population density and overall is more-or-less in the middle on these metrics.

Figure 20: Service Area Square Miles and Population

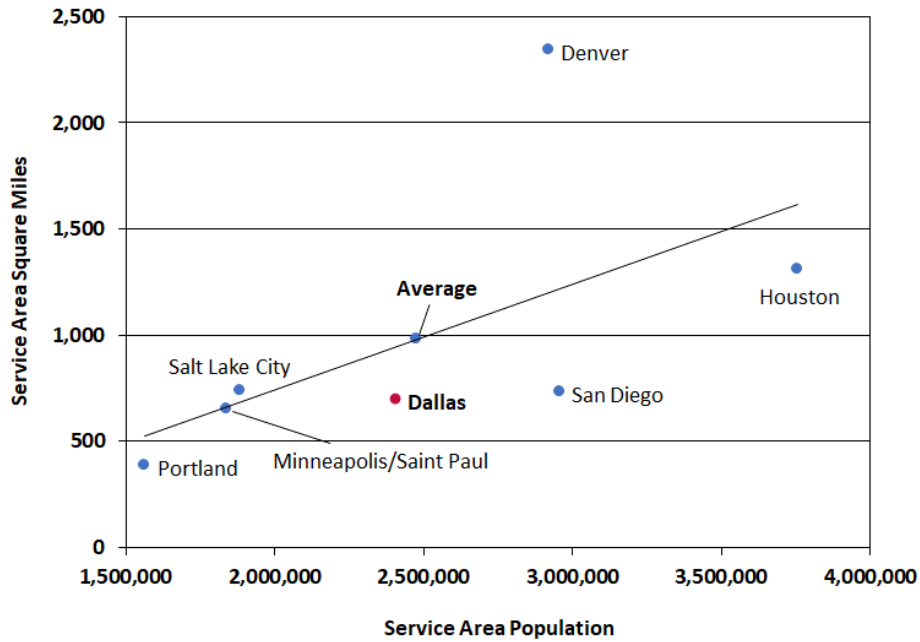


Figure 21: Unlinked Passenger Trips/Capita and Passenger-Miles/Capita

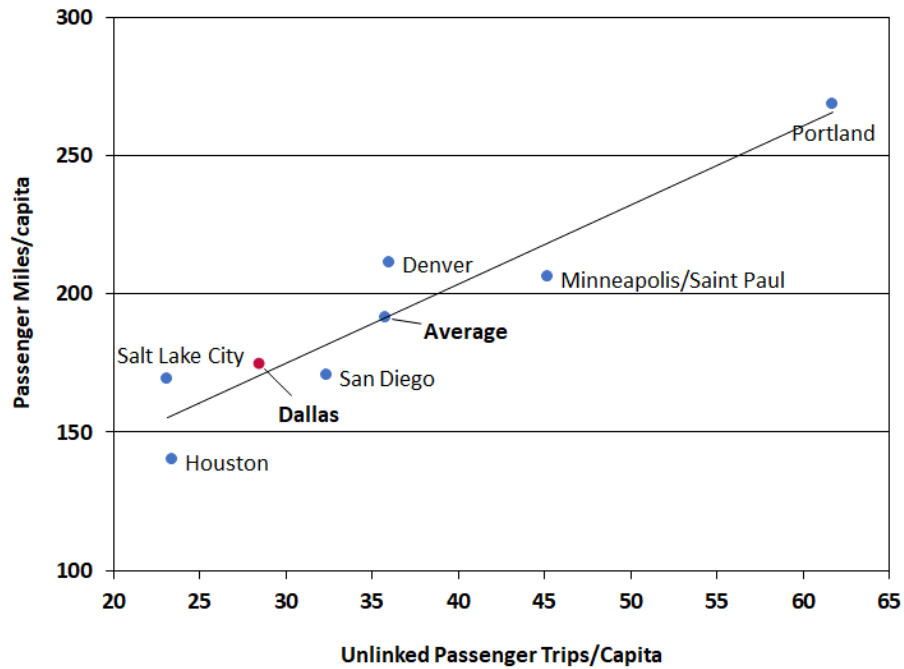
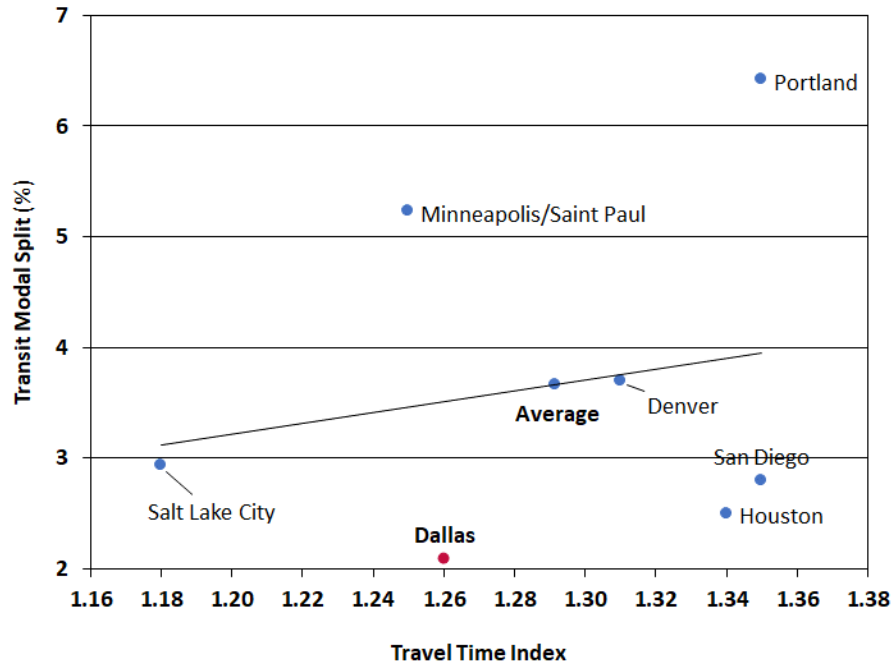
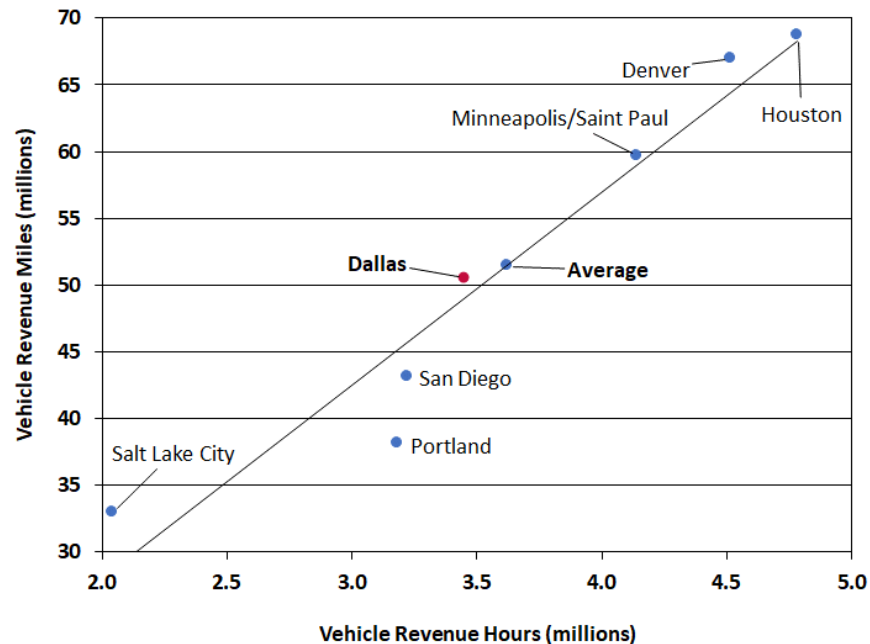


Figure 22: Transit Modal Split and Traffic Congestion

Dallas has the lowest transit modal split of the peers, 2.1%, compared to the average of 3.7%. DART was the third lowest on the TTI congestion metric.

Travel Time Index (TTI) is the long-standing, and perhaps best known, metric used to measure traffic congestion, first promulgated in 1982 by what is now the Texas A&M Transportation Institute. Simplifying somewhat, it is the ratio of the time required for a trip during peak periods to the time required for the same trip during free-flow conditions; *e.g.*, if a trip that takes 20 minutes off-peak takes 30 minutes during rush hour, the TTI is 1.50 (30 minutes/20 minutes).

Transit modal split is the percentage of working weekday home-work commuter trips by workers 16 years or older taken on transit, as reported in American Community Survey, Census Bureau.

Figure 23: Vehicle Revenue Hours and Vehicle Revenue Miles

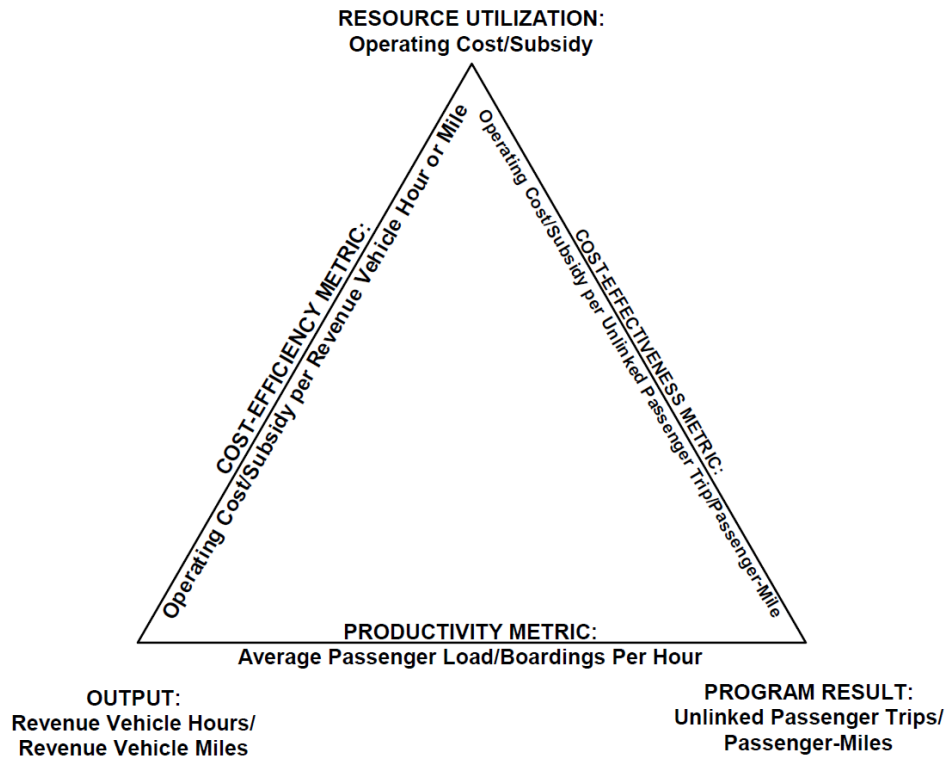
On service supplied, DART was in the middle – fourth – in both metrics and very close to the peer averages as shown in Figure 23.

2.2.4 DART Performance Versus Peers

Dallas and DART rank average to below average on these descriptive indicators – within an acceptable range of peers – and this therefore appears to be a good peer group for analysis of DART performance.

As a general rule, performance measures should not be done with only one metric; the use of multiple integrated measures can generally provide more insight, with reduced opportunity for misunderstandings than any single metric alone. Figure 24 – adapted from the publications of Prof. Pete Fielding of the University of California-Irvine, and father of the “Irvine School” for transit performance measures – shows the integration of metrics for:

- Cost-efficiency (the ratio of outputs, such as hours of revenue service, to inputs, such as costs and subsidies);
- Cost-effectiveness (the ratio of results, such as riders, to inputs, such as costs and subsidies); and
- Productivity (the ratio of results, such as riders, to outputs, such as hours of revenue service).

Figure 24: Overview of Transit Performance Measures**OTHER FAMILIES OF METRICS AND EXAMPLES**

SAFETY: Fatalities/Injuries per Passenger Mile
SERVICE QUALITY: Hours and Frequency of Services,
 On-Time Performance, Missed Trips

Other families of metrics, as shown, can include safety and service quality.

In the Team's experience, it is generally best to have performance metrics that can be disaggregated, or nested – and multiple different types of disaggregation can be useful. For example, cost-effectiveness metrics such as cost per vehicle hour for the entire organization can be:

- Disaggregated by mode, such as light rail and bus;
- Within mode:
 - Disaggregated by function, such as operations and maintenance;
 - Within maintenance, disaggregated by operating division; and
- Disaggregated by object class, such as employment, materials, utilities, services, etc., both for DART in total and within each mode.

The actual metrics analyzed need not be, and should not be, stable over time:

- As conditions and circumstances change, new metrics can be developed to indicate organization-wide and component performance; for example, there was no need for measuring DART's response to the COVID-19 public health emergency until the emergency occurred, but it now one of the most pressing challenges that DART has ever faced.
- Metrics can be added over time as the recipients and users become more comfortable with the process and the initial set of metrics.

It is generally best to review similar metrics and then make a selection of a small number that are most useful; for example, the following all basically address cost-effectiveness:

- Cost per passenger;
- Fare per passenger; and
- Subsidy per passenger.

While there will be differences between the trends for the above over time and these differences could be meaningful in some circumstances, it would be best to settle on one of these – and probably only one – to be presented to the public, Board, and senior management unless there are valid reasons for utilizing more than one.

For this initial presentation, the Team has devised three performance metric pairs for each mode, including the grand total of all modes:

- **Productivity: Boardings/Hour vs. Average Passenger Load** – Boardings per hour is calculated by dividing unlinked passenger trips (UPT) by vehicle revenue hours (VRH); average passenger load is calculated by dividing passenger-miles (PM) by vehicle revenue miles (VRM). In both cases, the results are the annual averages, including peak hour, mid-day, evening, and weekend service.

Higher performance means moving to the upper right on the graphs; the further to the upper right, the higher the loads, which is a positive aspect of transit operations until there is significant overcrowding. This does not appear to be a significant issue with this peer group compared to other transit operators, although there may be individual transit routes that can experience overcrowding, particularly during peak operating periods.

All else equal, these two often tend to move together; as one increases, so does the other. What causes variance between transit operators is average trip length. On the graphs, the agencies that are above the "average" line have longer average trip lengths.

- **Cost-Efficiency: Cost/VRH vs. Cost/VRM** – Cost/VRH is calculated as operating cost divided by VRH; Cost/VRM is calculated as operating cost divided by VRM. On this graph, the best place to be is in the lower left. Again, these two indicators tend to move together, with the primary differentiation being average operating speed. Those below the average line operate at higher average speed.

- Cost-Effectiveness: Subsidy/Passenger vs. Subsidy/Passenger-Mile** – Subsidy/passenger is calculated by dividing subsidy (defined as operating cost minus farebox revenues) by UPT; subsidy/passenger-mile is calculated by dividing subsidy by PM. Again, the desired position on this graph is in the lower left and the two indicators tend to move together, with those reporting below the average line having longer average trip lengths.

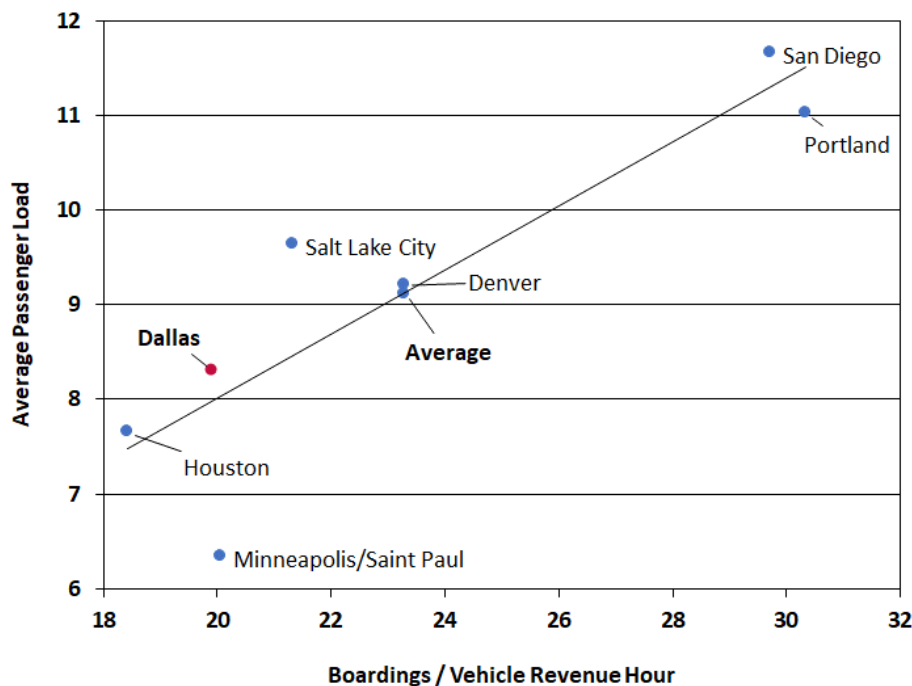
There are many transit performance and descriptive indicators that are in common use and almost all of them can be of significant utility. The Team has settled on the above because they are in common use and, in the Team's opinion, go directly to the most significant operating aspects of good transit, carrying the most passengers the furthest for the least amount of taxpayer funding.

Peer Group Performance Metrics

The Team reviews three performance metrics by mode, after the grand totals for each peer.

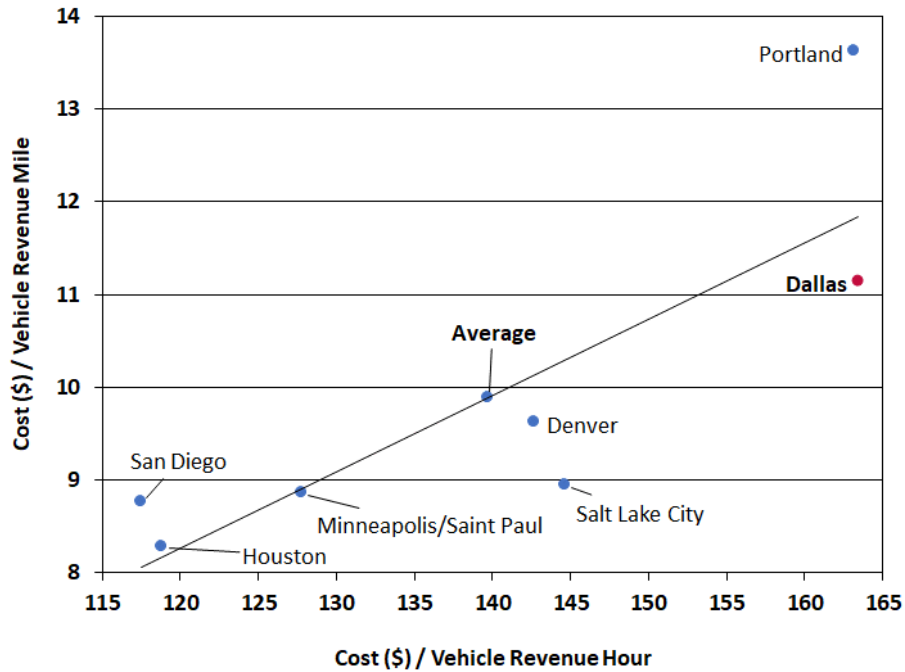
All Mode Metrics

Figure 25: Average Passenger Load Vs. Boardings/Hour (total system)



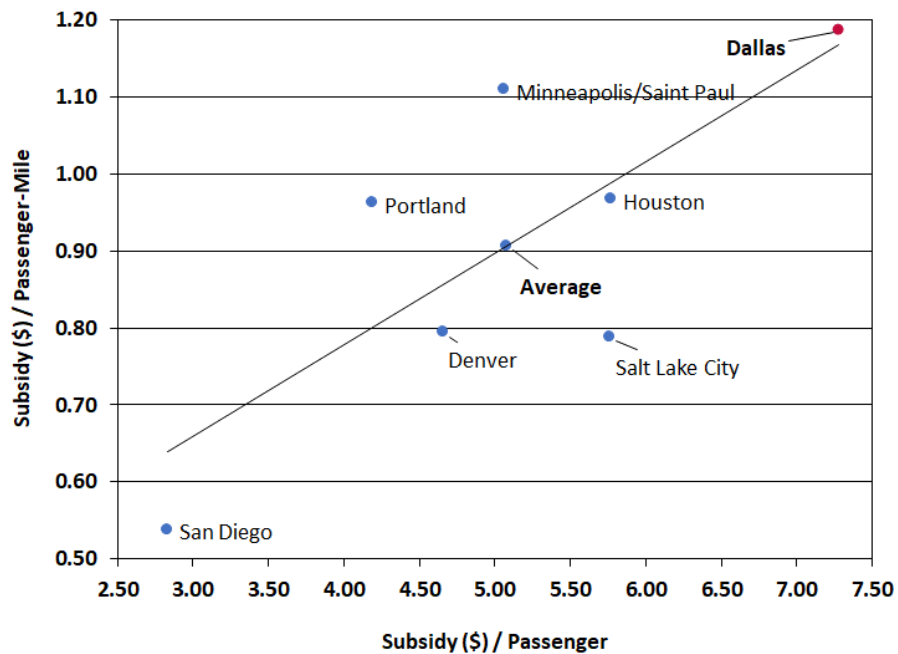
DART is second-lowest on boardings per vehicle revenue hour and substantially below average on both metrics.

Figure 26: Cost/VRM vs. Cost/VRH (total system)



DART's costs are the highest per revenue hour and second highest per revenue mile.

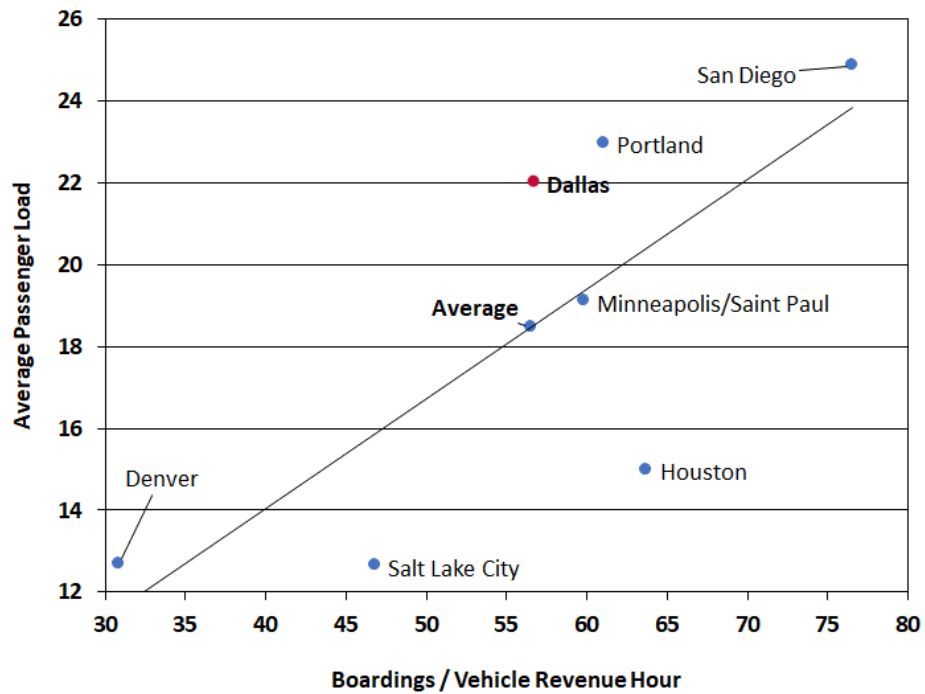
Figure 27: Subsidy/Passenger-Mile vs. Subsidy/Passenger (total system)



DART's subsidy/passenger and subsidy/passenger-mile are both the highest of the peer group.

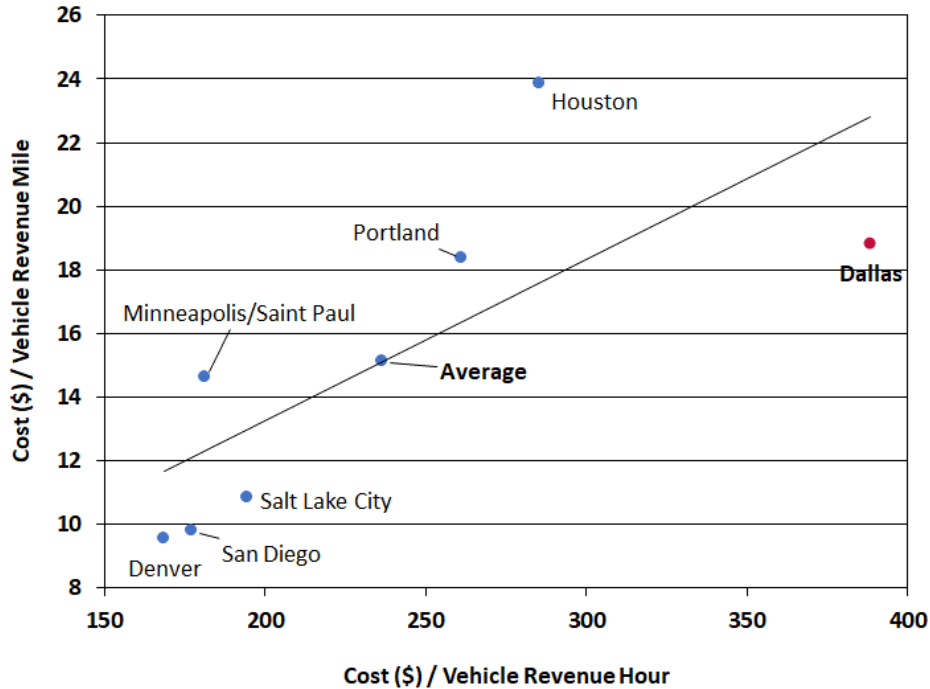
Light Rail Metrics

Figure 28: Average Passenger Load vs. Boardings/Hour (light rail)



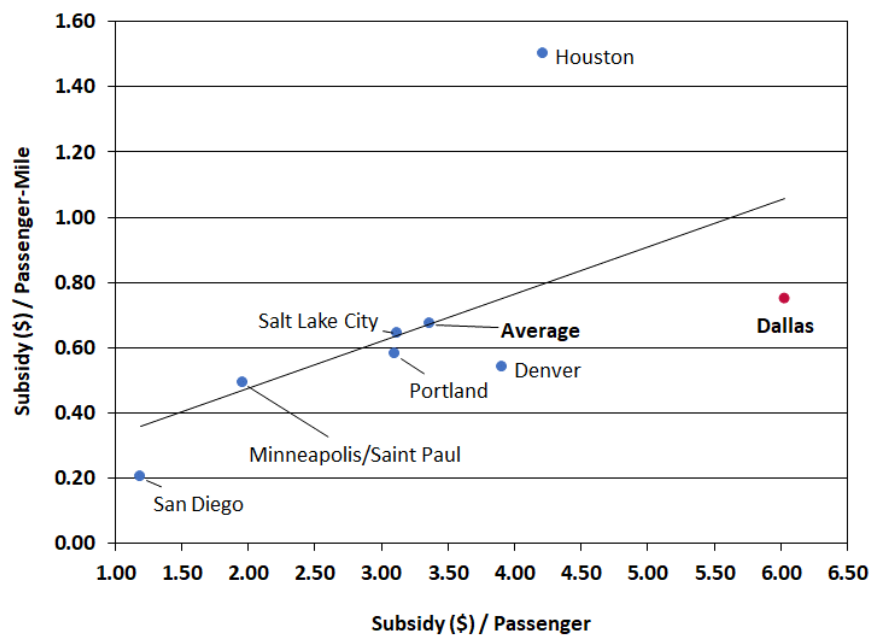
DART is third-lowest, but slightly above average, for boardings/hour and third-highest, well above average, for average passenger load.

Figure 29: Cost/VRM vs. Cost/VRH (light rail)



DART's cost/hour is the highest; cost/mile is the second-highest; both are well above average.

Figure 30: Subsidy/Passenger-Mile vs. Subsidy/Passenger (light rail)

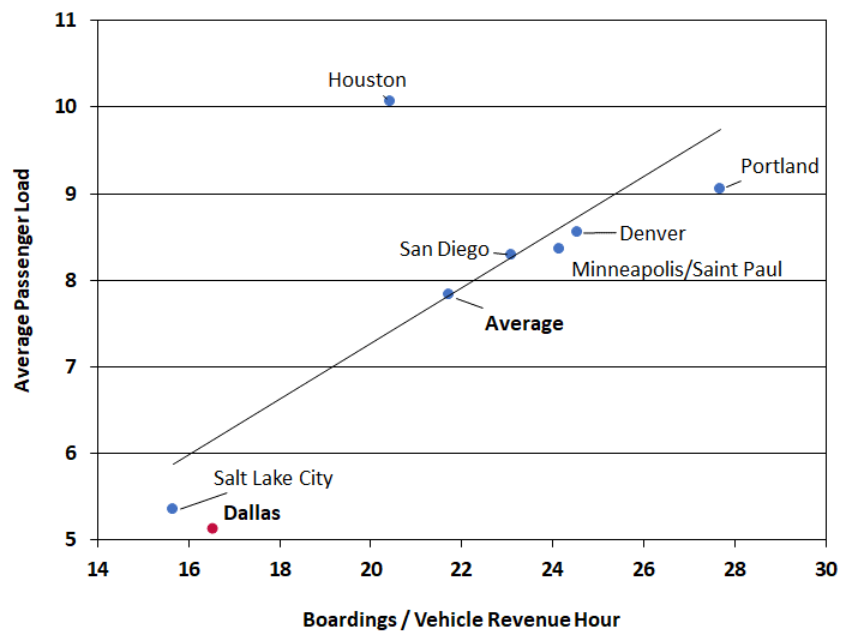


DART's subsidy/passenger is the highest; it is second-highest for subsidy/passenger-mile.

While DART's light rail ridership productivity is roughly in the middle of the peer group, giving it the best relative performance of the four DART modes, this relatively high performance was not sufficient to overcome the high operating costs, so the subsidy values are high.

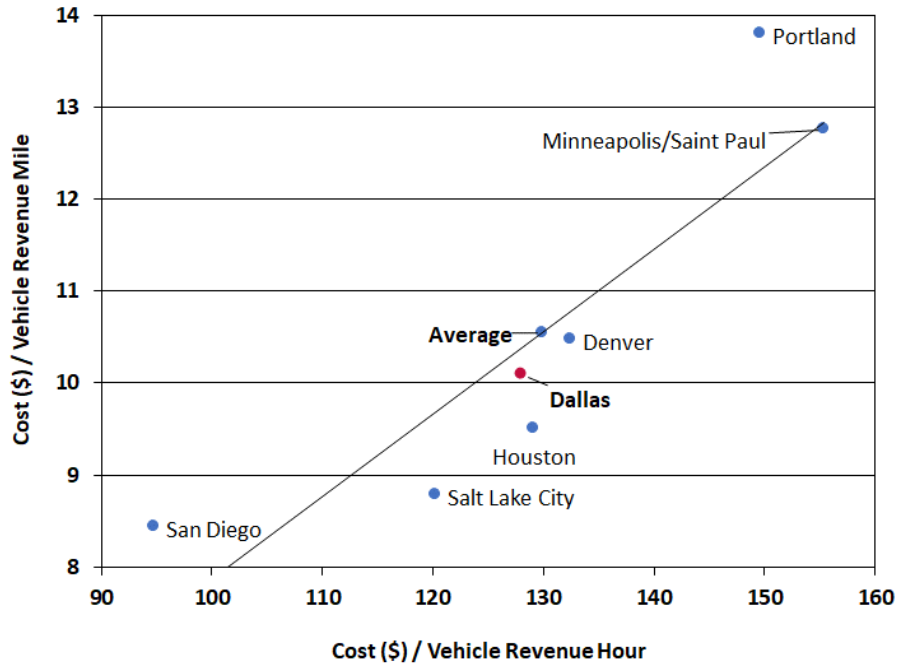
Bus Metrics

Figure 31: Average Passenger Load vs. Boardings/Hour (bus)



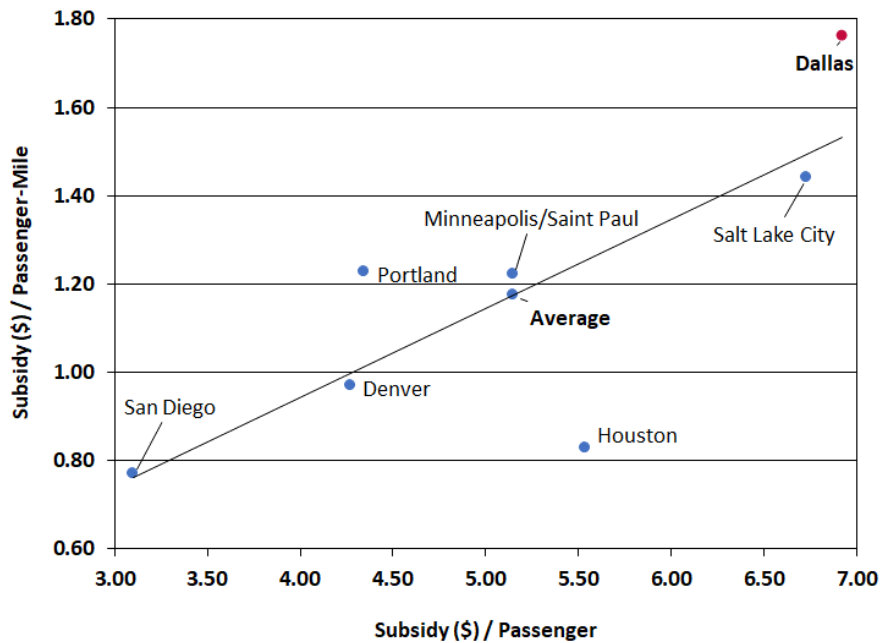
DART is the lowest for average passenger load and second-lowest for boarding/hour.

Figure 32: Cost/VRM vs. Cost/VRH (bus)



DART is fourth of seven and slightly below average for both cost indicators.

Figure 33: Subsidy/Passenger-Mile vs. Subsidy/Passenger (bus)



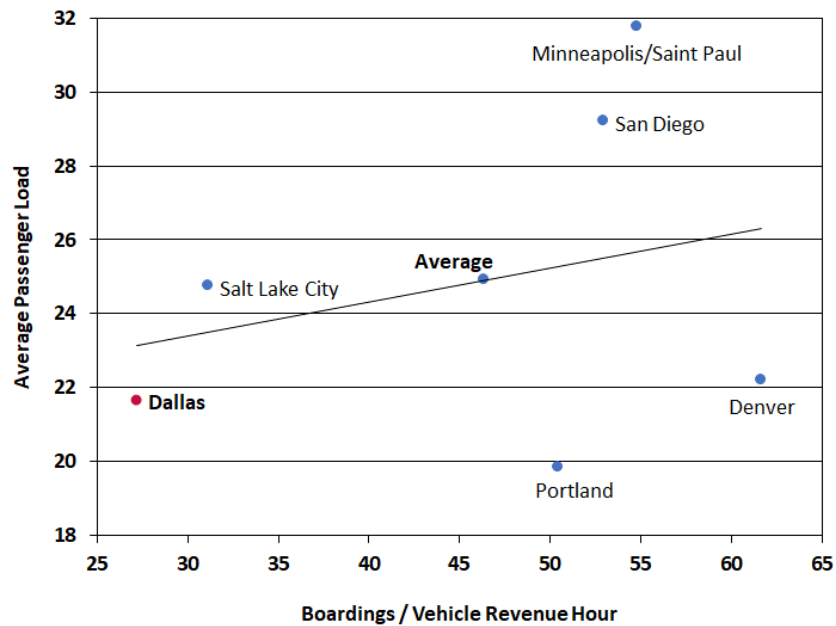
DART is the highest on both subsidy indicators.

DART's middle-of-the-pack performance on costs of operations is not sufficient to make up for low performance on bus transit productivity.

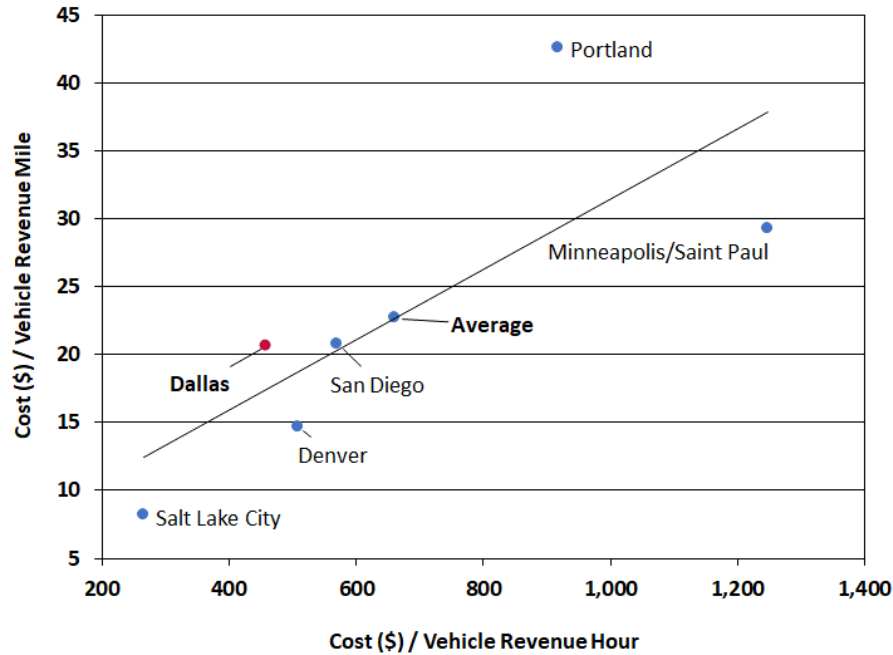
Commuter Rail (TRE) Metrics

For the charts in this section, please note that Houston does not operate commuter rail.

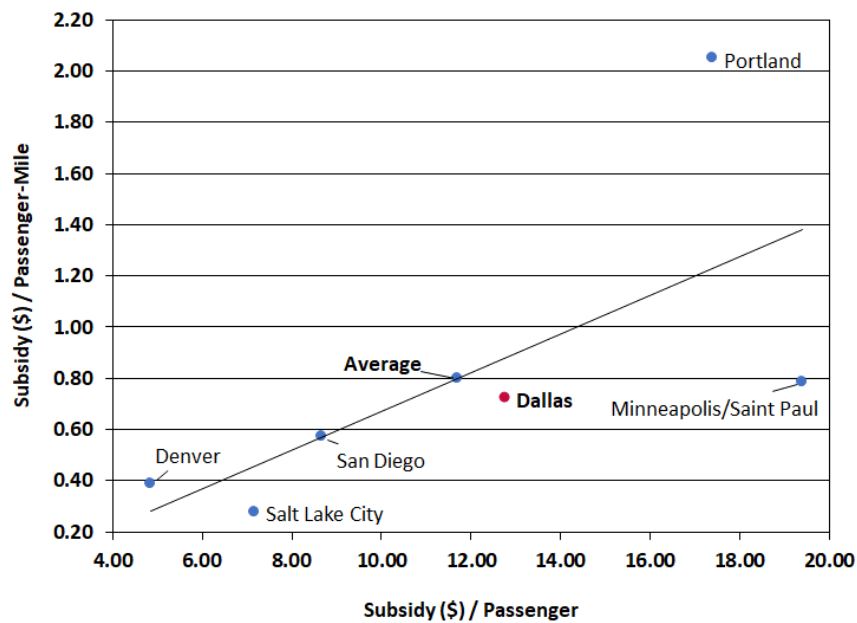
Figure 34: Average Passenger Load vs. Boardings/Hour (TRE)



DART (TRE) is the lowest for Boardings/Hour and second lowest for average passenger load.

Figure 35: Cost/VRM vs. Cost/VRH (TRE)

DART (TRE) is second-lowest for cost/hour and tied for third-lowest for cost/mile.

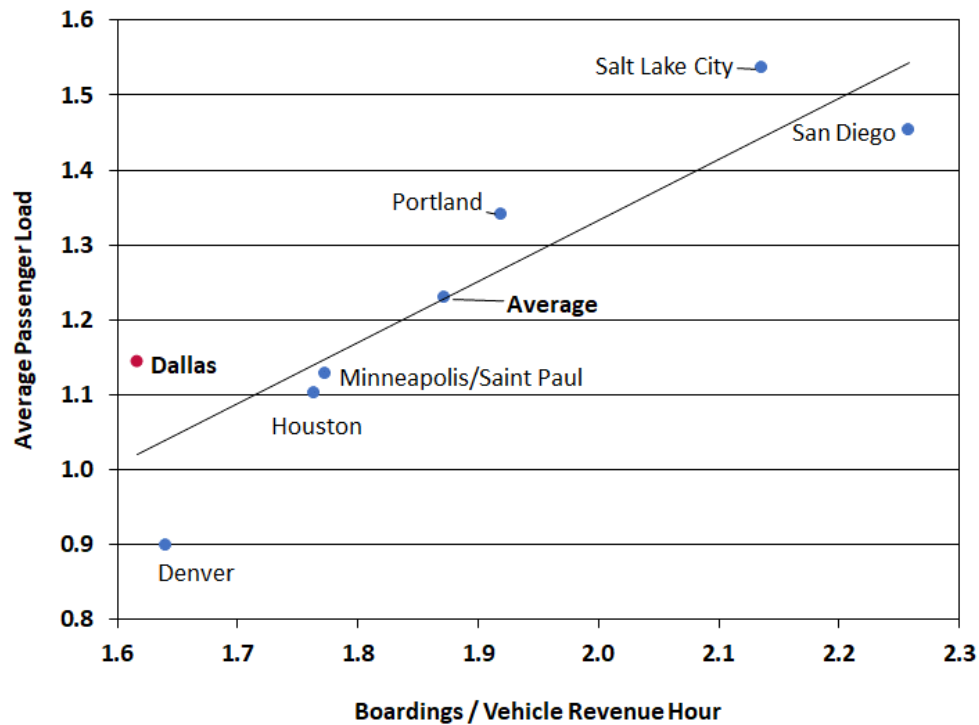
Figure 36: Subsidy/Passenger-Mile vs. Subsidy/Passenger (TRE)

DART (TRE) is slightly below average for subsidy/passenger-mile and slightly above average for subsidy/passenger, third highest (of six) for both.

This is DART's best performance of the four modes. Its relatively low costs offset low ridership productivity.

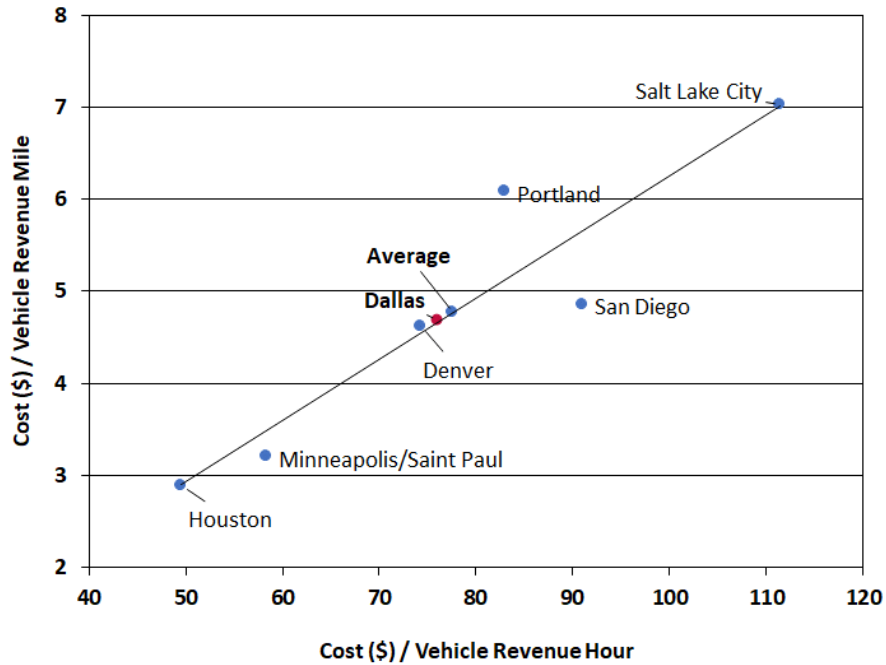
Demand-Responsive (Paratransit) Metrics

Figure 37: Average Passenger Load vs. Boardings/Hour (paratransit)



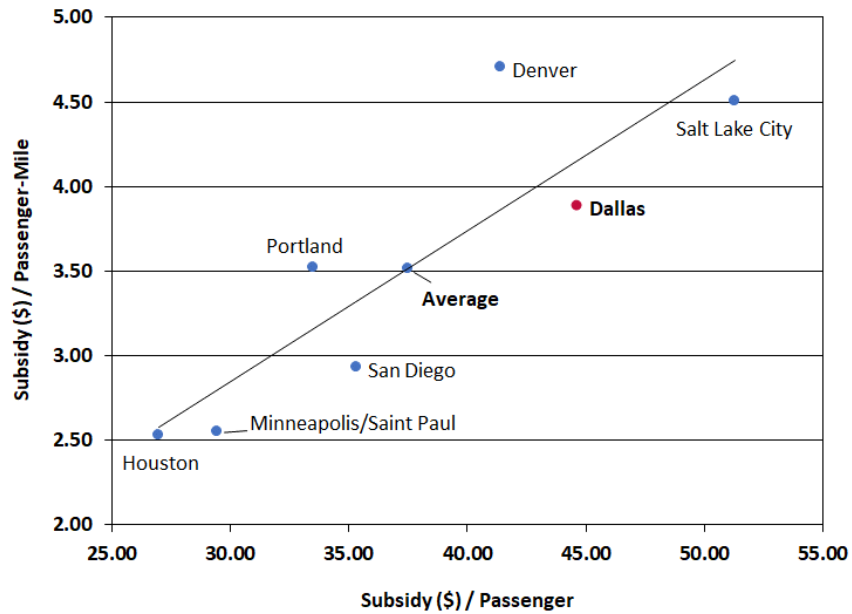
DART is the lowest for boardings/hour and slightly below average for average passenger load.

Figure 38: Cost/VRM vs. Cost/VRH (paratransit)



DART is slightly below average for both metrics, fourth of seven on both metrics.

Figure 39: Subsidy/Passenger-Mile vs. Subsidy/Passenger (paratransit)



DART is second-highest on subsidy/passenger, third highest on subsidy/passenger-mile; above average on both metrics. The average cost statistics are not enough to offset the low ridership productivity.

2.2.5 Summary

The characteristics of the DART service area make it difficult to serve through conventional transit modes. In the last three indicators, DART service, overall, shows low productivity as measured by transit service consumed per unit of service provided and high costs per unit of service provided. As a result, DART has the highest taxpayer subsidy per unit of service consumed of the peers.

A contributing factor to DART's high subsidies, not shown in a graphic, is DART's fare recovery ratio, which, at 11.6%, was second lowest (after Houston at 11.5%), compared to the peer average of 19.1%. Since passengers are paying less, other funding sources like sales taxes fund more of the agency's costs.

How to improve DART performance would require a more detailed analysis and report than is comprehended by the scope of this Performance Review. In high-level terms, the options include combinations of the following:

- Design more productive routes and improve matching of transit modes to the areas to be served and the type of transit service to satisfy the needs of the riders. DART currently has programs well underway for both;
- Reduce costs;
- Change the fare structure. However, the Team is not necessarily suggesting raising or lowering fares, as that would require more analysis, consistent with DART's overall strategy and objectives:
 - If the fares were increased, more fare revenue would likely—but not certainly—be generated, but ridership would decrease, which could lead to reductions in service operated. In some cases, for other transit operators, the cost savings from service reductions have exceeded the additional fare revenue. What often happens with fare increases is that the subsidy per passenger and per passenger-mile increase, but the total subsidies – to carry fewer passenger on lower levels of service – decrease;
 - If the fares were decreased, while the fare/passenger would decrease, the growth in the number of riders could more than offset the lower fare/passenger. In the few cases where major transit agencies have attempted major decreases, ridership has tended to increase so far as to require significant additional service, which increases operating costs. This generally has produced a decrease in subsidies per passenger and per passenger-mile due to the higher productivity of each hour

and mile of service, but higher total subsidy. However, because DART's ridership productivity is currently low, additional services would likely be required only on a small number of highly-utilized lines and in a few service areas.

Given the unprecedented difficulties of recovery from COVID-19 and the related economic downturn, while improving DART's performance is of obvious importance, actions to support this must be carefully incorporated into the higher-order priority of keeping DART financially viable and relevant to its passengers and taxpayers.

3. Statutory Compliance

3.1 Purpose

Texas Transportation Code §452.454 provides for a performance audit of entities such as DART every fourth state fiscal year, to include, under subsection (c)(2), “the authority’s compliance with applicable state law, including this chapter.”

3.2 Procedure

In order to determine the new acts (the Acts) of the Texas State Legislature, enacted during the two sessions, 2017 and 2019, that are applicable to DART during the Review Period, the Team reviewed Acts pertaining to all Texas statutory codes, including, but not limited to:

- Government Code;
- Labor Code;
- Local Government Code;
- Occupations Code;
- Property Code; and
- Transportation Code.

The Team’s search process included:

- Interviews with DART General Counsel and senior personnel in most DART departments;
- Reviews of summaries of legislative actions by the Texas Department of Transportation, the North Central Texas Council of Governments, transportation organizations (such as the Texas Transit Association), and law firms specializing in Texas transportation law; and
- Key word searches on all bills that were passed during the 2017 and 2019 sessions.

After the above process generated a list of 41 Acts that appeared to be applicable, the Team discussed the Acts on the list with DART General Counsel, producing a final list of 31 Acts, shown below. As noted in the details for each Act, General Counsel informed us that certain of the 31 are not applicable to DART for various reasons, but the Team notes that DART is in full or substantial compliance with the intention of the Act.

Also, several Acts enacted by the 2019 (86 R) session of the Texas Legislature were not enacted into law until well into calendar year 2019 and did not go into effect until September 1, 2019, only 30 days before the end of the period of this audit, which ended on September 30, 2019. In one case, action by the Administrative branch of the State of Texas to establish the specific requirements was not completed by September 30, 2019, so compliance with the new statute

was not possible – but the Team does not find non-compliance because there was nothing yet promulgated for DART to comply with.

3.3 Overall Conclusions

With two exceptions, the Team found no instances of non-compliance with any of the Acts enacted by the Texas State Legislature in its 2017 or 2019 sessions.

Texas statutes do not allow businesses contracting with DART to boycott Israel, with some exceptions. HB793 (2019) extended the exemption to companies with fewer than 10 full-time employees and contracts under \$100,000. The Team is not aware if any procurements between May 7, 2019, the effective date of this Act, and the end of the period of this audit on September 30, 2019, could have been impacted by this new requirement, but the Team recommends that DART change its procurement procedures to document that it is in compliance.

Another partial exception to DART's general compliance was with 2017's HB62, which prohibits vehicle operators from utilizing portable electronic devices such as smart phones and tablets while the vehicle is in operation. As a practical matter, it is impossible for any entity to ensure total and complete compliance with statutory mandates for impermissible human behavior. DART has adopted policies, and trained its employees, in the HB62 requirements and actively enforces non-compliance by transit vehicle operators, including disciplinary actions.

The Team has made several recommendations for additional incorporation of requirements of these Acts in various DART policies, procedures, web pages, training materials, and other documents.

3.4 Analysis

2017 Legislative Session (85 R – 2017)

Bill	Statute	Bill Caption and (partial) Applicable Text	Is DART Compliant?
HB8	Government Code §551.089.	Relating to cybersecurity for state agency information resources; "This chapter does not require a government body to conduct an open meeting to deliberate ... security assessments or deployments relating to information resources technology ..."	Yes
There are seven new Acts that relate to the DART board. Certain matters that apply to these seven are introduced and summarized here.			

Bill	Statute	Bill Caption and (partial) Applicable Text	Is DART Compliant?
<p>The two documents that contain the DART board processes are the <i>DART Board Bylaws</i>² (hereinafter "<i>Bylaws</i>") and the <i>DART Board Rules of Procedure</i>³ (hereinafter "<i>Rules</i>"), both last amended March 12, 2019.</p> <p><i>Bylaws</i> §13. provides that meetings shall be in compliance with the Texas Open Meetings Act and <i>Rules</i> §20 provides for "closed sessions," but there is no specific mention of the above.</p> <p>While DART shared an Executive Session Notice that explicitly states that deliberating security assessments or deployment relating to information resources is exempt from open meetings, in compliance with this new bill, the Team suggests that the DART board may wish to incorporate the specifics of the above into <i>Rules</i> so that all applicable citations will be contained in one consolidated set of documents for the benefit of DART board members, DART employees, and members of the public.</p>			
HB62	Transportation Code §§543.004.(a) and 545.4251.	<p>Relating to the use of a wireless communication device while operating a motor vehicle, creating a criminal offense, modifying existing criminal penalties; "An officer shall issue a written notice to appear if ... the offense charged is ... the use of a wireless communications device ...;" "A(n) (vehicle) operator commits an offense if the operator uses a portable wireless communications device to read, write, or send an electronic message an electronic message while operating a motor vehicle unless the vehicle is stopped."</p>	Substantially, with recommendations
<p>As is discussed below in Section 4.11.4, "Safety Trends," both the Bus and Rail Operator Handbooks have rules that comply with the requirements of this Act.</p> <p>However, the Team is concerned that there is not sufficient detail on this requirement for non-passenger-service vehicle operation, including operation of revenue vehicles for maintenance and other purposes and for DART employee operation of both DART non-revenue vehicles and personal vehicles by employees driving on DART business. While §7.2.A.2. of the <i>Administrative Employment Manual</i> (hereinafter, "<i>AEM</i>") states, "Actions taken by employees within the course and scope of their employment must comply with the law and be performed</p>			

² <https://www.dart.org/about/board/DARTBoardBylaws.pdf>

³ <https://www.dart.org/about/board/DARTBoardRulesOfProcedure.pdf>

Bill	Statute	Bill Caption and (partial) Applicable Text	Is DART Compliant?
<p>in an ethical manner," with similar language in the <i>Hourly Employment Manual</i> (hereinafter, "HEM") §8.3.H.5., the Team strongly suggests that the specific requirements of this Act be spelled out in detail.</p> <p>Further, given the documented rates of violations for revenue vehicle operations, the Team suggests that there be intensive training for new and existing employees and regular periodic retraining, such as annually, including requiring all employees to sign a certification that they have been informed of the requirements of this Act and the DART procedure and that they are potentially subject to disciplinary action for non-compliance.</p> <p>While it is impossible for any organization that employs thousands of vehicle operators to ensure absolute compliance with a requirement that mandates certain behaviors, DART has made reasonable efforts to mandate and enforce compliance. The Team recommends certain additional actions to clarify the requirements and provide training and retraining.</p>			
HB89	Government Code §808.053.	<p>Relating to state contracts with and investments in companies that boycott Israel;</p> <p>"If ... the company continues to boycott Israel, the state government entity shall sell, redeem, divest, or withdraw all publicly traded securities of the company ..."</p>	Yes
<p>The most recent (February 2019) version of Exhibit A, <i>Representations and Certifications (Locally Funded Supply/Service/Construction Contracts</i>,⁴ §15., "Contractor Certification Regarding Boycotting Israel (A-131, DEC 18), references the prohibition against boycotting Israel and Contract Administration Procedure 1-8, "Texas Senate Bill 252 and House Bill 89 Certification" addresses it. See discussion of 2019 HB793 below. There is no mention of this in <i>DART Procurement Regulations</i> (hereinafter, "Procurement").⁵ The Team suggests that this requirement be included in this DART master procurement regulation document to provide a central point for all procurement requirements for DART board members and employees, contractors and potential contractors, and members of the general public.</p>			

⁴ The version on the DART website is out of date (January 2005) and does not include the "Israel Boycott" provision:
<https://www.dart.org/webapps/procurement/solicitation/solfiles/1021305.pdf>

The Team suggests that the most recent version of Exhibit B be posted on the DART website.

⁵ <https://www.dart.org/procurement/DARTProcurementRegulations.pdf>

Bill	Statute	Bill Caption and (partial) Applicable Text	Is DART Compliant?
HB100	Occupations Code §2402.051.	Relating to the regulation of transportation network companies, requiring an occupational permit, authorizing a fee; "A person may not operate a transportation network company in this state without obtaining and maintaining a permit issued under this chapter."	Not Applicable (but Yes)
<p>As DART does not itself operate as a transportation network company (TNC), this statutory provision does not directly apply to it.</p> <p>The Team recommends that <i>Procurement</i>, procurement documents, and contracts with TNCs include the provision that the TNCs provide documentation of their permit to DART. The Team understands that DART does currently require such documentation, and the recommendation is that the process be formalized.</p>			
HB1861	Government Code §552.139.(b)	Relating to the confidentiality of certain information related to a computer security incident; "The following information is confidential: ... information directly arising from a governmental body's routine efforts to prevent, detect, investigation, or mitigate a computer security incident ..."	Yes
<p>This Act appears to apply to both Board process and the general conduct of DART business. <i>Rules</i> §20.4 lists the statutory topics that can be discussed and acted on in Closed Sessions, but the above is not included in that list.</p> <p>While the above statutory provision does not require any action of DART to be applicable to DART, the Team suggests that the DART board may wish to incorporate the specifics of the above into <i>Rules</i> so that all applicable citations will be contained in one consolidated set of documents for the benefit of DART board members, DART employees, and members of the public.</p> <p>The Team recommends that DART incorporate this – and other – statutory limitations on information available to the public on its web page, "Legal Notices – The Public Information Act."⁶</p>			

⁶ [DART.org - Legal Notices - Public Information Act](https://dart.org/legal-notices-public-information-act)

Bill	Statute	Bill Caption and (partial) Applicable Text	Is DART Compliant?
HB3047	Government Code §551.127.(a-3)	Relating to the meeting of a governmental body held by videoconference call; "A member of a governmental body who participates in a meeting by videoconference shall be considered absent for any portion of the meeting during which audio or video communication with the member is lost or disconnected. The governmental body may continue the meeting only if a quorum of the body present at the meeting ... continues to participate ..."	Yes
<p>While the above statutory provision does not require any action of DART to be utilized by DART, the Team suggests that the DART board may wish to incorporate the specifics of the above into <i>Rules</i> so that all applicable citations will be contained in one consolidated set of documents for the benefit of DART board members, DART employees, and members of the public. Neither <i>Bylaws</i> nor <i>Rules</i> currently has any reference to videoconference calls for Board meetings.</p>			
SB252	Government Code §2252.152.	Relating to prohibiting governmental contracts with a company doing business with Iran, Sudan, or a foreign terrorist organization; "A government entity may not enter into a governmental contract with a company that is identified on a list prepared and maintained under (references to code sections relating to Iran, Sudan, and foreign terrorist organizations)."	Yes
<p>Contract Administration Procedure 1-8, "Texas Senate Bill 252 and House Bill 89 Certification" addresses this requirement.</p> <p>However, there is no mention of this in <i>Procurement</i>.⁷ The Team suggests that this requirement be included in this DART master procurement regulation document to provide a central point for all procurement requirements for DART board members and employees, contractors and potential contractors, and members of the general public and that a section</p>			

⁷ <https://www.dart.org/procurement/DARTProcurementRegulations.pdf>

Bill	Statute	Bill Caption and (partial) Applicable Text	Is DART Compliant?
		on this be added to "Representations and Certifications," which details the legal requirements for DART contractors.	
SB253	Government Code §2270.0204.	Relating to investment prohibitions and divestment requirements for certain investments of public money; For each listed company ... the investing entity shall send a written notice ... offer(ing) the company the opportunity to clarify its Sudan-related, Iran-related, or designated foreign terrorist organization-related activities ..."	Yes
<p>SB253 added Chapter 2270 to Title 10 of the Texas Government Code; Chapter 2270 outlines prohibitions of investing public money in certain investments, including in any companies associated with the Sudanese government's genocide in Darfur or the Iranian government's sponsorship of terrorist activities. DART's "Board Policy II.04, Investment Policy" indicates that DART funds will be invested and managed in compliance with the Public Funds Investment Act (Chapter 2256, Government Code), among other policies and procedures. Compliance with Chapter 2256 of the Texas Government Code appears to bring DART into compliance with SB253, as the new Chapter 2270 applies to any entity subject to Chapter 2256.</p> <p>However, for the purposes of clarity, the Team recommends that DART add the following in Section 6 of the DART Investment Policy, II.04 as follows: "... (5) any investments that are prohibited by Chapter 2270, Subtitle F, Title 10, Government Code."</p>			
SB402	Transportation Code §461.009.	Relating to notice provided to persons with disabilities regarding the eligibility of persons with disabilities to use certain public transportation services; "PUBLIC TRANSPORTATION SERVICES FOR PEOPLE WITH DISABILITIES. ... To the extent practical within available resources, a provider shall notify individuals who are certified by the provider as eligible to use the provider's services that the individuals are entitled to use another provider's service for not more than 21 days without an additional application."	Yes

Bill	Statute	Bill Caption and (partial) Applicable Text	Is DART Compliant?
The required notice is on the DART "A Guide to Paratransit Services" ⁸ web page, under " IF I AM CERTIFIED FOR DART ADA PARATRANSIT SERVICE, WILL MY ELIGIBILITY TRANSFER OUT OF TOWN? ."			
SB564	Government Code §551.089.	Relating to the applicability of open meetings requirements to certain meeting of a governing body relating to information technology security practices; "This chapter does not require a governmental body to conduct an open meeting to deliberate ... security assessments of deployments relating to information resources technology ..."	Yes
<p><i>Rules</i> §20.4 lists the statutory topics that can be discussed and acted on in Closed Sessions, the above is not included in that list.</p> <p>While DART shared an Executive Session Notice that explicitly states that deliberating security assessments or deployment relating to information resources is exempt from open meetings, in compliance with this new bill, the Team suggests that the DART board may wish to incorporate the specifics of the above into <i>Rules</i> so that all applicable citations will be contained in one consolidated set of documents for the benefit of DART board members, DART employees, and members of the public.</p>			
SB1179	Transportation Code §460.406.(c)	Relating to purchasing and contracting practices of coordinated county transportation authorities; "The board of directors may authorize the negotiation of a contract without competitive sealed bids or proposals if: (certain goods and services for under \$50,000)"	Yes
<i>Procurement</i> , §§3-201 and 3-204 provide for negotiated procurements under \$50,000 for certain types of procurements, but not all those allowed by this Act. Because this Act expanded, not contracted, the types of contracts that could be awarded without negotiation, there is no question of DART non-compliance, but DART may wish to expand the uses of this			

⁸ [DART.org - A Guide to Paratransit Services](#)

Bill	Statute	Bill Caption and (partial) Applicable Text	Is DART Compliant?
type of procurement by changes to these elements of DART procurement practices, as documented in <i>Procurement</i> .			
SB1289	Government Code §2252.202.(a)	Relating to the purchase of iron and steel products made in the United States for certain governmental entity projects: "... the uniform general conditions for a project in which iron or steel products will be used must require that the bid documents provided to all bidders and the contract include a requirement that any iron or steel product produce through a manufacturing process and used in the project shall be produced in the United States."	Not Applicable (but Yes)
This applies to entities within the Executive Branch of the State of Texas, but the Team is informed by DART General Counsel, does <i>not</i> apply to a "political subdivision" such as DART. However, DART does comply with the Federal "Buy America" provisions for Federal transit grantees (49 CFR 661 <i>et seq.</i>), which are substantially identical.			

2019 Legislative Session (86 R – 2019)

HB339	Transportation Code §545.364.	Relating to the placement of speed limit signs at the end of construction or maintenance work zones: "An entity that sets a lower speed limit on a road or highway in the state highway system for a construction or maintenance work zone shall place or require to be placed a sign at the end of the zone that indicates the speed limit after the zone ends."	Yes
Although Procurement §6-403.16 "Accident Protection," subsection (a)(1), states, "... the Contractor shall -- ... comply with all safety standards required by federal, state, or local law and any additional standards customarily employed in connection with the type of work being performed or conditions ...," the Team recommends that DART incorporate a list of all such specific requirements, with a notice that other requirements not listed may be applicable.			

Bill	Statute	Bill Caption and (partial) Applicable Text	Is DART Compliant?
HB793	Government Code §2270.001. and .002.	Relating to certain government contracts with companies that boycott Israel; "Company" ... does not include a sole proprietorship ... applies only to a contract that is between a governmental entity and a company with 10 or more full-time employees ... and ... (the contract) has a value of \$100,000 or more ..."	No
<p><i>Representations and Certifications (Locally Funded Supply/Service/Construction Contracts, §15., "Contractor Certification Regarding Boycotting Israel (A-131, DEC 18) and Contract Administrative Procedure 1-8, "Texas Senate Bill and House Bill 89 Certification" references this general requirement but has not been updated for the changes in 2019 Session Act. The Team suggests that it be so updated.</i></p> <p>There is no mention of this in <i>Procurement</i>. The Team suggests that this requirement be included in this DART master procurement regulation document to provide a central point for all procurement requirements for DART board members and employees, contractors and potential contractors, and members of the general public.</p>			
HB1074	Labor Code §21.101.	Relating to the prohibition against age discrimination in certain employment training programs; "Except as provided by Section 21.054, the (§21.054 referred to programs under Federal provisions) provision of this chapter referring to discrimination because of age or on the basis of age apply only to discrimination against an individual 40 years of age or older."	Yes
<p>DART's "Statement of EEO (Equal Employment Opportunity) Policy"⁹ clearly states that "No person is unlawfully excluded from employment opportunities based on ... age ..." Similarly, §2.0, "Equal Opportunity," of the DART <i>Hourly Employment Manual</i> and <i>Administrative Employee Manual</i> (not available on the DART website) both discuss (§2.1.A.1. in each) that DART will not discriminate on the basis of age.</p>			

⁹ <https://www.dart.org/about/deo/eeo.asp>.

Bill	Statute	Bill Caption and (partial) Applicable Text	Is DART Compliant?
HB1665	Labor Code §406.145.(f)	Relating to certain workers' compensation reporting requirements; (minor modifications for notifications of coverage when a (construction) contractor and an independent sub-contractor agree to joint workers' compensation coverage.)	Not Applicable (but Yes)
<p>HB1665 amends the Texas Labor Code to eliminate a previous reporting requirement for hiring contractors with joint agreements to report subsequent hiring agreements to the Texas Division of Workers' Compensation. Contractors must now only report such subsequent agreements to their insurance carrier.</p> <p>Under its amended Exhibit D for construction and related contracts, DART requires prime contractors to confirm that subcontractors have adequate workers' compensation coverage or to name subcontractors as Additional Insured in the event that subcontractors and/or subconsultants cannot furnish this insurance on their own.</p>			
HB2503	Labor Code §408.183.(b-1)	Relating to workers' compensation death benefit eligibility for certain spouses of certain employees killed in the line of duty; "... an eligible spouse who remarried is eligible for death benefits for life ..." (for spouses of first responders who are killed in the line of duty).	Yes
<p>DART provides workers' compensation insurance for its employees through the Texas Department of Insurance; 28 Texas Administrative Code §132.7, Chapter 132: Death Benefits-Death and Burial Benefits,¹⁰ provides for benefits in compliance with the terms of the Act.</p>			
HB2706	Government Code §2256.011.	Relating to authorized investments for governmental entities and a study of the investment and management of funds by public schools; (technical definitions for allowed investments).	Yes
<p>The DART "Investment Policy and Investment Strategy, FY 2020" performed the necessary adjustments to DART's investment policy to come into compliance with HB2706.</p>			

¹⁰ [Proposed 28 TAC §132.7 \(texas.gov\)](#)

Bill	Statute	Bill Caption and (partial) Applicable Text	Is DART Compliant?
HB2775	Transportation Code §552.011.	Relating to movement of pedestrians in front of, under, between, or through rail cars at a railroad grade crossing; "A pedestrian may not move in front of, under, between, or through the cars of a moving or stationary train occupying any part of a railroad grade crossing."	Yes
While there is no requirement that DART have formal notices that every Texas traffic safety statute exists and applies, the Team suggests that it be added to the <i>DART Regulations for Management of the Authority</i> ¹¹ (rider "Code of Conduct") and relevant sections of <i>It's our DART. Let's keep it safe.</i> ¹² , including <i>Rail Safety Tips</i> .			
HB2840	Government Code §551.007.	Relating to the right of a member of the public to address the governing body of a political subdivision at an open meeting of the body; (Governing body shall allow members of the public to address the board at public meetings, may adopt time limits, requirements for translation of speaker's comments, and may not restrict criticism that is not otherwise prohibited by law.)	Yes
DART staff presented this new requirement to the DART board on November 12, 2019, with a PowerPoint presentation, "Board Briefing on House Bill 2840 – Public Comments." <i>Rules</i> §6 comprehends public comment; §6.6 provides that "Each speaker will have three minutes to address the Board." The Team suggests that this section be expanded to respond to the requirements for Government Code §551.007.(d) in regard to simultaneous translation or additional time for a speaker who requires a non-simultaneous translator.			
HB2899	Transportation Code §473.001.-.003.	Relating to civil liability and responsibility for defects in the plans, specifications, or other documents for the construction or repair of roads, highways, and related improvements; "A contractor who enters into a contract with a	Yes

¹¹ [DART.org - Code of Conduct](#)

¹² [DART.org - It's our DART. Let's keep it safe.](#)

Bill	Statute	Bill Caption and (partial) Applicable Text	Is DART Compliant?
		governmental entity is not civilly liable or otherwise responsible for the accuracy, adequacy, sufficiency, suitability, or feasibility of any project specifications and is not liable to the extent caused by a governmental entity.	
This Act limits the liability of contractors for defects in plans <i>et al</i> / caused by governmental entities for projects including roads and rail lines. DART is in compliance with this Act because it has no ability to not comply in the event of litigation with a contractor.			
HB4236	Occupations Code §1701.660.	Relating to permitting the viewing of certain body worn camera recordings; "A law enforcement agency may permit a person who is depicted in a recording of an incident (that involves incident of deadly force by a peace officer or is otherwise related to an administrative or criminal investigation of an officer) ... to view the recording (under specified conditions)."	Yes
DART Legal has informed us, "This law allows (but does not require) the unredacted viewing of a recording a person is depicted in (or an authorized representative if the person is deceased) if the law enforcement agency determines the viewing furthers a law enforcement purpose. DART will make these recordings available on a case-by-case basis after conferring with Legal." DART may wish to consider if adoption of a formal policy and procedure for processing such requests and making such decisions could be useful.			
SB322	Government Code §802.109.	Related to the evaluation and reporting of investment practices and performance of certain public retirement systems; "... a public retirement system shall select an independent firm ... to evaluate the appropriateness, adequacy, and effectiveness of the retirement system's investment practices and performance and to make recommendations for improving (the processes)."	Yes

Bill	Statute	Bill Caption and (partial) Applicable Text	Is DART Compliant?
DART has commissioned, and received, the report of DBIZ Investment Advisory Services, dated April 24, 2020, in compliance with this requirement of the Act.			
SB494	Government Code §551.045.	Relating to certain procedures applicable to meetings under the open meetings law and the disclosure of public information under the public information law in the event of an emergency, urgent public necessity, or catastrophic event; "In an emergency or where there is an urgent public necessity ... for a meeting for which notice has been posted in accordance with this subchapter is sufficient if the notice or supplemental notice is posted for at least one hour before the meeting is convened."	Yes
<p><i>Bylaws</i> §10. provides for emergency meetings of the Board and §13. provides for notice to Board members and <i>Rules</i> §3.3 provides that "Each Board member shall be given notice of a statutory emergency meeting of the Board at least two (2) hours before the time of the meeting."</p> <p>While the above statutory provision does not require any action of DART to be utilized by DART, the Team suggests that the DART board may wish to incorporate the specifics of the above into <i>Rules</i> so that all applicable citations will be contained in one consolidated set of documents for the benefit of DART board members, DART employees, and members of the public.</p>			
SB944	Government Code §181.006.	Relating to the public information law; "A current or former officer or employee of a governmental entity who maintains public information on a privately owned device shall: (1) forward to or transfer the public information to the governmental body or a governmental body server to be preserved ... or (2) preserve the public information in its original form in a backup or archive and on the privately owned device for the time described ..."	Yes

Bill	Statute	Bill Caption and (partial) Applicable Text	Is DART Compliant?
<p>DART staff presented this new requirement to the DART board on August 13, 2019, with the PowerPoint presentation, "Senate Bill 944 – Public Information Effective 9-1-19."</p> <p>However, neither <i>Bylaws</i> nor <i>Rules</i> addresses the requirements of the above Act. The Team suggests that the DART board incorporate the specifics of the above into <i>Rules</i> so that all applicable citations will be contained in one consolidated set of documents for the benefit of DART board members, DART employees, and members of the public.</p>			
SB1219	Government Code §402.0351.	Relating to human trafficking signs at certain transportation hubs; "The attorney general by rule shall prescribe the design and content of a sign regarding services and assistance available to victims of human trafficking to be displayed at transportation hubs ..."	Not Applicable
<p>This Act went into effect on September 1, 2019 and the Texas attorney general has not yet promulgated the design and content of the required sign. Therefore, while DART, technically, is not in compliance with the intention of this Act, at the end of the period of this performance audit, September 30, 2019, there was no regulation it could comply with, so there is nothing to be done but to await the publication of the requirements.</p> <p>DART has been a member of a coalition of transportation providers and other organizations that have joined forces to combat human, including posting bilingual signs on DART vehicles for many years.¹³</p>			
SB1640	Government Code §551.143.	Relating to the open meetings law; "A member of a governmental body commits an offense if the member ... knowingly engages in at least one communication among a series of communications that each occur outside of a meeting authorized by this chapter and that concern an issue within the jurisdiction of the governmental body in which the members engaging in the individual communications constitute fewer than a quorum of members but the members engaging in the series of	Yes

¹³ [DART.org - DART News Release](https://www.dart.org/news-releases)

Bill	Statute	Bill Caption and (partial) Applicable Text	Is DART Compliant?
		communications constitute a quorum of the members ..."	
<p>DART staff presented this new requirement to the DART board on July 9, 2019, with the PowerPoint presentation, "Senate Bill 1640 – 'Walking Quorum'."</p> <p>However, neither <i>Bylaws</i> nor <i>Rules</i> addresses the requirements of the above Act. The Team suggests that the DART board incorporate the specifics of the above into <i>Rules</i> so that all applicable citations will be contained in one consolidated set of documents for the benefit of DART board members, DART employees, and members of the public.</p>			
SB1827	Occupations Code §1701.701.	Relating to the possession and emergency administration of an epinephrine auto-injector by law enforcement agencies and peace officers; "A law enforcement agency may acquire and possess epinephrine auto-injectors and a peace officer may possess and administer an epinephrine auto-injector in accordance with this subchapter."	Yes
<p>Although DART is enabled by this Act to authorize its Police Force and individual law enforcement officers to acquire, possess, and administer epinephrine auto-injectors, it has not done so.</p>			
SB2224	Government Code §802.2011.	Relating to requiring a public retirement system to adopt a written funding policy; "The governing body of a public retirement system shall ... adopt a written funding policy that details the governing body's plan for achieving a funded ratio of the system that is equal to or greater than 100 percent ..." (and distribute it and make it available for public view).	Yes
<p>DART has commissioned, and received, the report of DBIZ Investment Advisory Services, dated April 24, 2020, in compliance with this requirement of the Act; on page 4, a schedule was constructed to have a reasonable probability of achieving a fully funded plan by the year 2036.</p>			

4. Administration & Management of Transit Operations

4.1 Modal Overview

The DART system includes most modes common to U.S. public transit agencies, including buses, light rail, commuter rail, paratransit services, support for vanpools, on demand services, and microtransit marketed as GoLink. DART's service area includes Dallas County, including the City of Dallas and twelve other cities in Dallas and the surrounding counties.

DART's light rail system opened in 1996 and consists of four lines—Red, Blue, Orange, and Green—which share common core infrastructure through the downtown area of Dallas. At over 93 miles, it is the longest light rail system in the United States.

Figure 40: Example of DART Light Rail Vehicle



Source: Dallas Arts District

DART operates the Trinity Railway Express (TRE), a commuter rail service between Dallas and Fort Worth, through an interlocal agreement with Trinity Metro.

Figure 41: Example of TRE Vehicles

Source: DART Daily

DART's Mobility Management oversees contracts in support of its paratransit and demand-responsive services (example vehicles shown in Figure 42). This is a multifaceted effort involving contractors, local taxis, and companies such as Uber, that provide door-to-door service for ambulatory passengers that meet ADA requirements.

Figure 42: Examples of Mobility Management Vehicles

Source: DART

DART's bus system provides many service types, some with specialized rolling stock for passenger comfort or load requirements and economic efficiency as shown in Table 2.

Table 2: DART Rolling Stock Type

Route Type	# of Routes	Rolling Stock
Local	28	31 or 40 ft. transit coach for service designed as "local"
Express	6	31 or 40 ft. transit coach for local service
Suburban	12	Suburban Coach
Cross Town	44	31 or 40 ft. transit coach for local service
Rail Connectors	52	Cutaway vehicles manufactured by ARBOC Specialty Vehicles
Destination Shuttles	16	Various

DART also operates the Dallas Streetcar, a collaborative endeavor among DART, the City of Dallas, and the North Central Texas Council of Governments (NCTCOG), the region's Metropolitan Planning Organization (example vehicle shown in Figure 43). The initial alignment operates from Union Station to the Bishop Arts District.

Figure 43: Example of Dallas Streetcar Vehicle



Source: DART

DART provides funding and administrative support for the non-profit McKinney Avenue Streetcar also known as the "M" Line as shown in Figure 44.

Figure 44: Example of McKinney Avenue Streetcar Vehicle



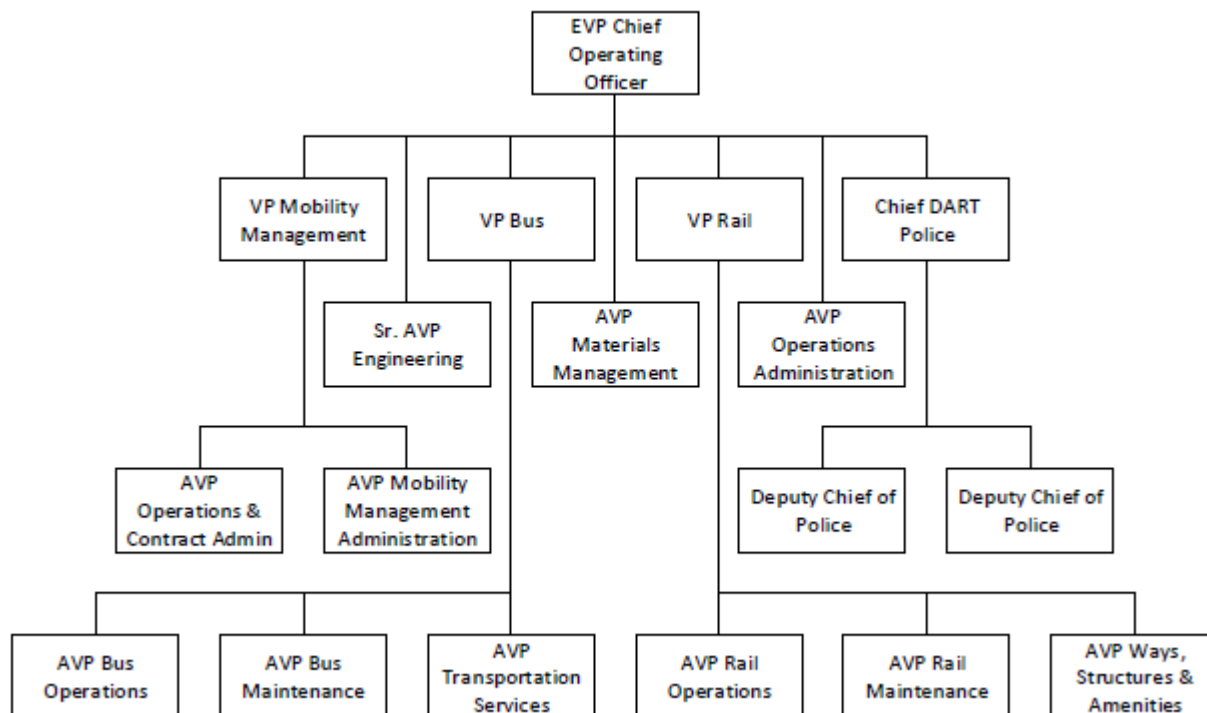
Source: McKinney Avenue Transit Authority (MATA)

The focus of this Performance Review is on light rail, TRE, bus, and mobility management; it does not include Dallas Streetcar or the M Line.

4.1.1 Organization and General Overview

DART's transit operations organization was reorganized during the Review Period. Previously, the unit was organized along technical function lines, i.e., operations, maintenance, engineering, etc. The new organization adopted in 2018 aligns the organization by operating mode, with each mode having under it respective operating and maintenance functions. At the vice president (VP) level, a single person has responsibility for all elements of service delivery including both operations and maintenance; this also includes Ways, Structures, and Amenities (WSA) in the case of rail, as shown in the organization chart in Figure 45 (rail WSA is also responsible for maintenance of most other infrastructure facilities). These departments are supported by an engineering department which reviews outcomes, develops specifications, and leads training programs. Mobility Management has its own VP ensuring the performance of the contractors that execute complimentary and reduced fare paratransit service and adherence to ADA requirements. In the new organization, several supporting functions also report to the Chief Operating Officer (COO), including the operations control center, materials management, and DART police functions. Organizational charts for the remainder of DART's organization are in Appendix 4.

Figure 45: DART Operations Organizational Chart



4.1.2 Initiatives During Review Period

Over the Review Period transit operations accomplished or supported several initiatives beyond the day-to-day execution of the transportation mission. These included:

- Enhancement of security functions on the transit system including additional officers;
- Enhancement of operator safety on transit buses, including operator barriers that limit access between operators and the public;
- Apprenticeship programs designed to improve retention and provide career paths;
- Light rail platform extension program which allows three-car train operation on the Red and Blue Lines. This also addresses some ADA issues with train boarding. This program has been initiated and is scheduled to be completed by 2022;
- Accountability projects in terms of retraining or discipline for customer complaint and attendance issues;
- Implementation of modern fare instruments including tap cards and GoPass;
- Department reorganization.

While not technically within the Review Period it should be noted that transit operations has performed a review of operating and cleaning policy changes as a result of the COVID-19 pandemic. Some of these activities are likely to be retained going forward as customer enhancements for the next quadrennial cycle.

4.1.3 Audits During Review Period

Transit operations was a part of state safety oversight and 2018 Federal Transit Administration (FTA) triennial audits. Relevant findings included:

1. Section 4: Technical Control – program management over contractors (City of Carrollton and TRE); subrecipient risk and a comprehensive program monitoring subrecipients and contractors for compliance with Federal requirements and performance goals, along with documentation of implementation;
2. Section 6: Satisfying Continuing Control – inadequate condition assessment performed on Rolling Stock (Asset Management Program Requirement);
3. Section 11: Americans with Disabilities Act – between car barriers not installed on railcar platforms; and
4. Section 11: Americans with Disabilities Act limits or capacity constraints on ADA paratransit service: missed trip and excessively long trip definitions and tracking.

DART submitted corrective action plans to the FTA, which accepted them and closed the audit.

4.1.4 Management Initiatives Going Forward

In the interview with the Operations executive management team, the following initiatives were identified as important to the continuous improvement of the transit system:

- Implement a new Enterprise Asset Management (EAM) system;
- Devise Bus and railcar replacement strategies / procurements;
- Monitor ongoing security effectiveness;
- Further develop of employee training programs to align with industry best practices; and
- Continue to innovate and implement practices aimed at improving the system's operational readiness during the COVID-19 pandemic.

4.2 DART Bus System Organization and Resources

4.2.1 Bus Operations and Maintenance Facilities

With over 680 buses, DART services close to 40 million riders per year at over 10,600 bus stops throughout its service region. Bus ridership declined from 8.9 million in 1Q 2016 to 8.0 million in 1Q 2018, or a decline of 10%, but it jumped up by 25% to 10 million riders in 1Q 2019, as shown in Figure 46. As discussed, this discontinuity between 2018 and 2019 is because of the introduction of automatic passenger counters (APCs) on buses to count ridership beginning in 2019. This led to an increase in reported ridership compared to prior years, which is not reflective of an actual increase in the number of riders using the bus system, and it is likely that the downward trend has continued, though it may be several years—after the effects of COVID have dissipated—that DART will be able to determine the long-term trend.

Figure 46: Bus Ridership in Millions

The bus organization operates from three separate locations with similar levels of capacity, as shown in Table 3. The East Dallas facility has additional heavy maintenance capabilities.

Table 3: Bus Maintenance Facilities

Facility Name	Address	Bus capacity	Note
East Dallas Operations Facilities Complex	4209 Main St., Dallas, TX 75266 & 4127 Elm St., Dallas, TX 75266	224	This facility also includes heavy repair facilities that support all DART bus garages including unit repair and rebuild for major bus components and a body shop for accident repair and general appearance of the bus fleet.
Northwest Bus Maintenance	2424 Webb Chapel Extension, Dallas, TX 75220-5702	222	
South Oak Cliff Bus Operations Facility	3422 E. Kiest Blvd., Dallas, TX 75203-4617	215	

Bus rolling stock and allocations are found in Table 4, showing that rolling stock is assigned to facilities by need and that sufficient stock is on hand at all locations to meet service and maintenance needs. The spare ratios are not excessive. The Proterra fleet is an all-electric fleet that can only be used on select routes due to limited operating range on a battery charge; DART's electric bus use is still in a demonstration/pilot status, generating important knowledge for potential later expanded electric (or other non-GHG emitting) vehicle service.

Table 4: Bus Rolling Stock and Allocation as of August 2019

Fleet Type	AM	PM	Assigned Buses	AM Spares	PM Spares	AM Spare Ratio	PM Spare Ratio
ARBOC	47	47	58	11	11	23.4%	23.4%
Local	127	127	154	27	27	21.3%	21.3%
Suburban	8	8	10	2	2	25.0%	25.0%
Total East Dallas	182	182	222	40	40	22.0%	22.0%
Proterra	2	2	7	5	5	250.0%	250.0%
Local	149	149	179	30	30	20.1%	20.1%
Suburban	12	12	15	3	3	25.0%	25.0%
Total South Oak Cliff	163	163	201	38	38	23.3%	23.3%
ARBOC	44	44	54	10	10	22.7%	22.7%
Local	150	151	183	33	32	22.0%	21.2%
Suburban	16	17	21	5	4	31.3%	23.5%
Total Northwest	210	212	258	48	46	22.9%	21.7%
Total ARBOC	91	91	112	21	21	23.1%	23.1%
Total Proterra	2	2	7	5	5	250.0%	250.0%
Total Local	426	427	516	90	89	21.1%	20.8%
Total Suburban	36	37	46	10	9	27.8%	24.3%
Total DART Bus Service	555	557	681	126	124	22.7%	22.3%

4.2.2 Employees by Facility

Bus operations has a total of 1,496 employees that support operation, supervision, and training needs. Table 5 outlines these employees' roles/assignments. In addition to operating DART's 681 buses over 158 routes, bus operations personnel support customer service at transfer centers and many of the rail stations where buses operate in coordination with light rail.

Table 5: DART Employee Role/Assignments by Function/Location

Function / Location	# of Employees
Administration	5
Transit Center Services	47
Transportation Support	38
Dispatchers	17
East Dallas Operators	371
East Dallas SMART (ARBOC)	114
South Oak Cliff Operators	407
Northwest Bus	396
Northwest SMART (ARBOC)	95
Career Link	4
Training	2
TOTAL	1,496

4.2.3 Bus Operations Initiatives During Review Period

DART undertook the following bus operations initiatives during the Review Period:

- Conducted an extra board review that resulted in the right-sizing of extra board employees to cover AM and PM shifts;¹⁴
- Improved hiring processes to screen operator candidates who have obtained a permit;
- Facilitated certain DART employees to become commercial driver's license (CDL)/third-party examiners, allowing DART to administer written and technical tests, reducing reliance on state agencies to administer driver's license tests;
- Implemented Zonar Electronic Verified Inspection Reporting (EVIR) system to catalog and better identify vehicle defects with the maintenance department; and
- Implemented automated on-time performance monitoring system with the planning department.

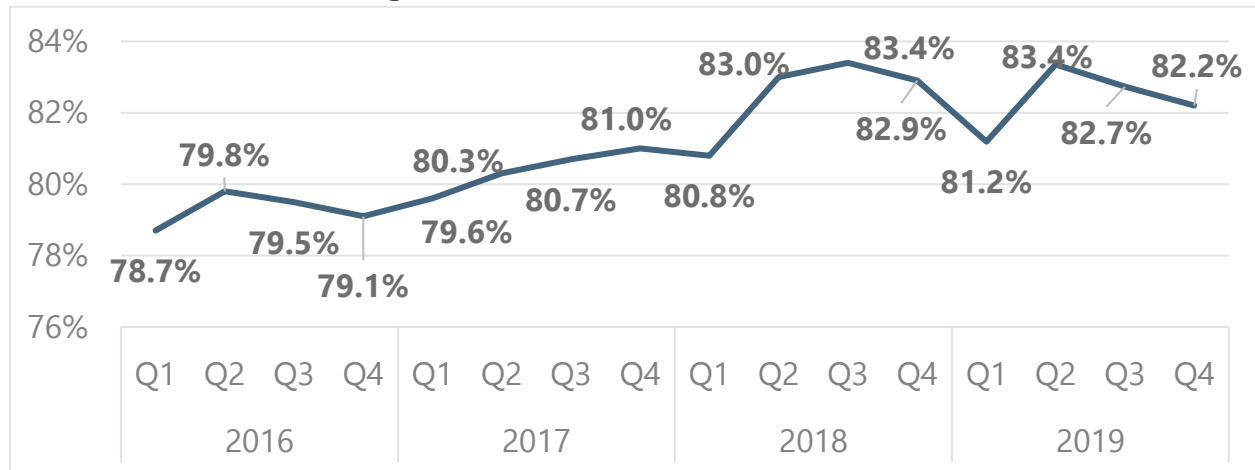
These are important initiatives that have the potential to improve DART's bus operations' efficiency and effectiveness.

¹⁴ In the transit industry, the "extra board" is the vehicle operators who are paid to report to the bus and rail operating yards to fill in for operators that are unable to operate their scheduled service due to vacation, illness, or other absence, and to respond to other unanticipated needs, such as pulling out a vehicle to replace one that broke down while in service on the street.

4.2.4 Bus Operations KPIs

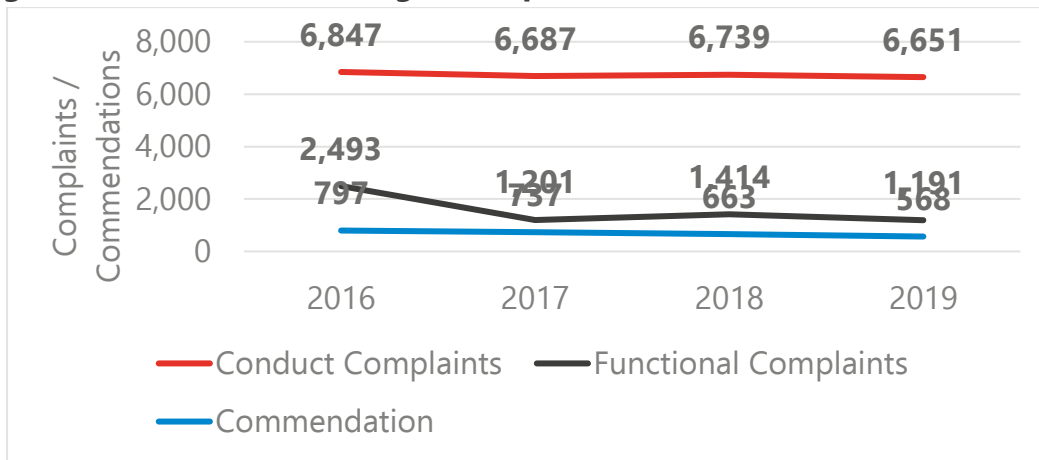
Bus on-time performance has steadily increased during the reporting period, as indicated in Figure 47, from below 80% in 2016 to above 82% in 2019.

Figure 47: Bus On-Time Performance

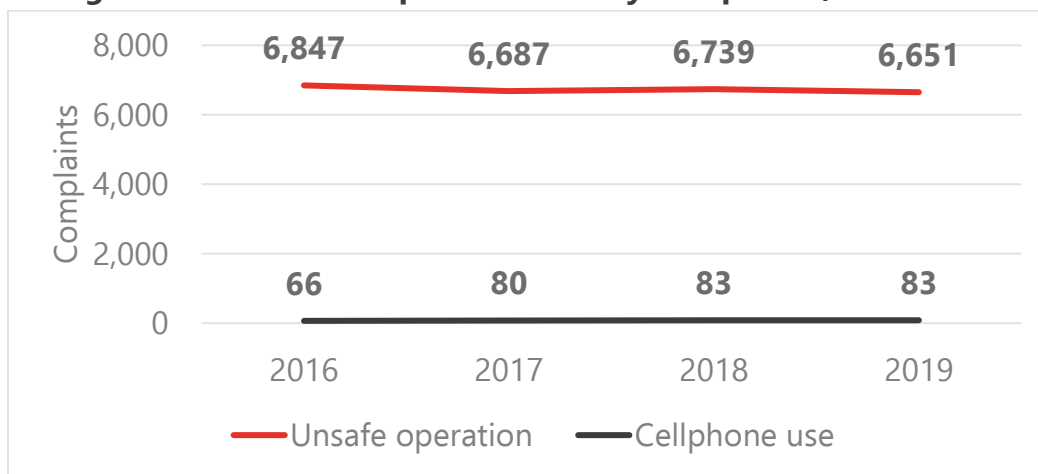


The reported number of conduct complaints dropped slightly during the Review Period, as shown in Figure 48. Functional complaints dropped more significantly during this period.

Commendations also dropped along with conduct complaints. This decline, especially in conduct complaints and commendations, is curious, as the Team would generally expect to see commendations increase along with a decrease in complaints. This could reflect a decline in capacity to engage with customer service calls/messages, or it could simply mirror the general decline in ridership during the Review Period.

Figure 48: DART Bus Passenger Complaints/Commendations, 2016-2019

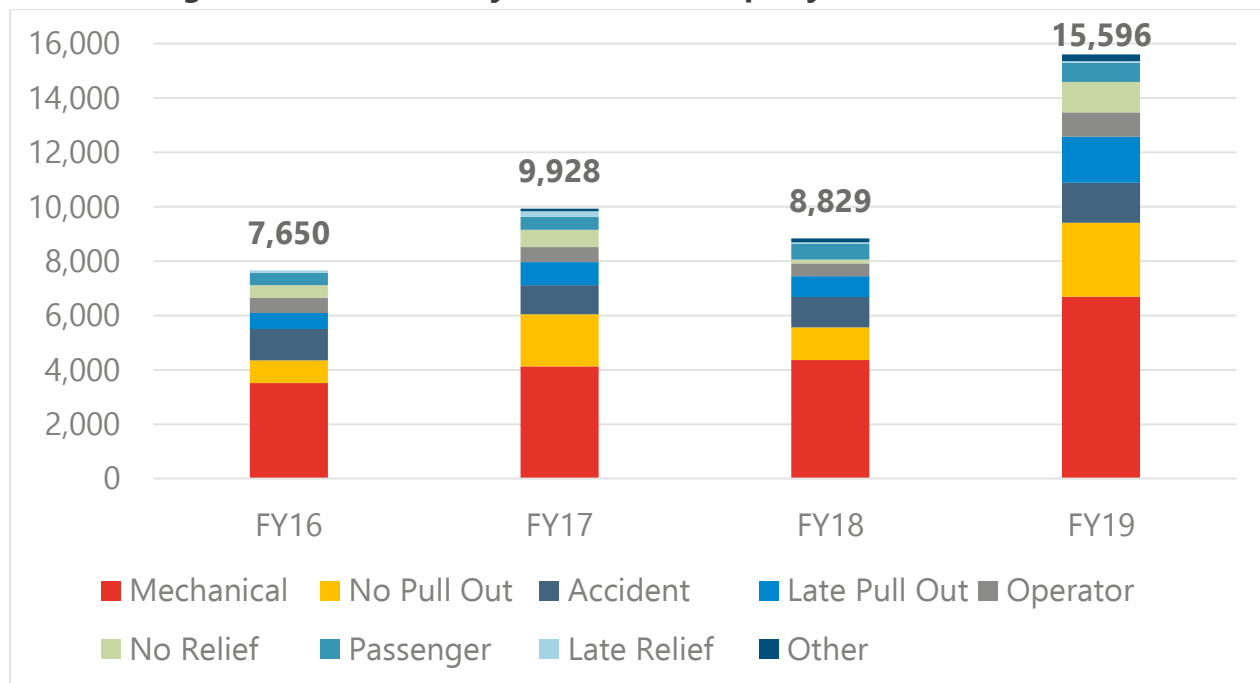
In terms of bus operations safety complaints, DART experienced a decline of unsafe operational complaints during the Review Period as well, as shown in Figure 49. However, the statistics show an increase in complaints for bus operators regarding cellphone use during the period. Passengers are often the most reliable eyes and ears for monitoring compliance of these issues, and the complaint data suggests that DART operators are not reducing cell phone usage per state requirements and national best practice. As discussed below, cell phone safety is a focus of the Performance Review Team, including in terms of state statutory and safety regulations compliance during the Review Period.

Figure 49: DART Bus Operations Safety Complaints, 2016-2019

Observation 1: Available data suggests that DART operators are not reducing cell phone usage per state requirements and best practice safety protocols. While this is not unique to DART, DART should do more to ensure that this requirement is being followed. See Finding 3. Also, the Team recommends that DART take the following actions:

1. *Provide new employees—not just operators—receive periodic retraining, including prominent mention in all training courses and documentation;*
2. *Require all employees to sign statements that they have been informed of the requirements, understand the requirements, and understand that violation can lead to disciplinary action, up to and including termination;*
3. *Post signs in ready rooms, lockers; and other public areas for employees;*
4. *Conduct more ride-checks and when doing ride-checks, ask if the operator has a cell/tablet/other device. If so, ask to inspect it and see if it is turned on;*
5. *Impose strong penalties for non-compliance; and*
6. *Apply this policy to all employees, including mechanics who take buses out for testing, service employees responding to road calls, etc., and non-operating employees driving DART cars and their personal cars on DART business.*

Figure 50: DART Bus System Missed Trips by Reason, 2016-2019



Missed trips on the bus system also increased significantly during the Review Period, especially for mechanical reasons, as seen in Figure 50. The sharp increase in 2019 may also be due to new data collection and reporting techniques that create more accuracy in terms of logging missed trip causes within the system. However, customer complaints about bus service did not increase significantly in 2019, which would have been expected if actual missed trips had doubled from

2018 to 2019; this raises concerns about the accuracy of missed trips data. Regardless, the increase in bus mechanical and operator issues during the Review Period is of concern.

Observation 2: *DART should carefully 1) monitor missed trip trends and 2) customer complaint data to determine if the 2019 measures to increase missed trip reporting accurately form the new baseline in the recording of actual events.*

4.2.5 DART Bus Operations Staff Initiatives and Issues Going Forward

Bus Operations managers will be focusing on the following initiatives and issues going forward:

- Mitigating absenteeism, a large proportion of variable cost reduction; and
- Continuing to monitor customer service metrics and the development of targeted programs and maintenance actions designed to be more proactive and improve customer-focused measures and metrics, for improved safety and customer satisfaction with DART's services.

4.2.6 Bus Maintenance Personnel Resources

The maintenance department provides preventive and corrective maintenance services for all buses operated by DART. The department also manages major vehicle repair projects and supports vehicle repairs for most of DART's non-revenue vehicle fleet. Table 6 shows that the mechanics assigned per location are in line with basic maintenance requirements.

Table 6: Bus Maintenance Employees by Function/Location

Function / Location	# of Buses	# of Employees
Administration		3
East Dallas Bus Services	222	89
Body Support	Total Fleet	27
South Oak Bus Services	201	73
Northwest Bus Services	258	94
Bus Central Support	Total Fleet	44
Non-Revenue Services	Non-Revenue Fleet	30
Total		360

Observation 3: *The maintenance department reports that it has sufficient resources on hand to meet the maintenance challenges of the fleet, and the Performance Review Team would concur. Therefore, DART needs to evaluate other reasons for missed trips, as missed trips due to mechanical reasons have increased.*

4.2.7 Bus Fleet Composition

The bus fleet spare ratio is between 20% and 22% and is consistent with industry standards, as shown in Table 4. The bus fleet is composed of three major fleet types as described below:

1. DART operates 112 buses manufactured by ARBOC, sometimes referred to as SMART buses due to their smaller size and ability to operate on smaller suburban roads. The fleet is compressed natural gas (CNG)-powered and is compliant with the requirements of the Americans with Disabilities Act (ADA). Most vehicles were purchased during the Review Period. This fleet has experienced significant mechanical difficulty, especially when considering the young age of the fleet.
2. Local buses are standard transit buses, either 30- or 40-feet in length and are assigned to routes based on passenger loads experienced on specific routes. This fleet is ADA-compliant and CNG-powered; the bulk of these vehicles were delivered by North American Bus Industries in 2013 and 2014. Given a minimum 12-year life cycle estimate, much of this fleet reached mid-life during the end of the Review Period. Maintenance requirements increase significantly at midlife, which can cause stress on the maintenance department from both a performance and cost perspective.
3. Suburban buses offer specific amenities, such as high-backed seats for bus routes, usually labelled “express,” which provide service from more remote communities to the urban core. The amenities are important due to the length of these trips, which can be considerably longer than standard bus commutes. DART operates 46 of this type of bus, all delivered in 2017. Table 7 shows the delivery year and quantities of each.

In 2013 and 2014, DART took possession of 66 30-foot transit coaches and 396 40-foot transit coaches, or 462 coaches out of the total “local fleet” of 516. This constitutes a “bulk buy”, which can have negative consequences for a maintenance department and can also create pressure on capital expense planning. Spreading rolling stock purchases over time reduces peak maintenance burden by ensuring high volume maintenance events, such as equipment mid-life overhauls, involve less equipment at any given time.

Table 7: DART Bus Subfleets, 2016-2019

Year	Manufacturer	Fuel	Under contract	2016	2017	2018	2019
2004	NABI Suburban 40'	Diesel		63	15		
2012	ARBOC (FLEX 26')	CNG		111	84	11	
2012	ARBOC (On-Call 26')	CNG		10	10	10	10
2013	NABI Transit 30'	CNG	N/A	30	30	30	30
2013	NABI Transit 40'	CNG	N/A	156	156	156	156
2014	NABI Transit 30'	CNG	N/A	33	33	33	33
2014	NABI Transit 40'	CNG	N/A	151	151	151	150
2014	ARBOC (On-Call 26')	CNG	N/A	1	1	1	1
2014	NABI Transit 40'	CNG	N/A	89	89	89	89
2015	NABI Transit 40'	CNG	N/A	17	17	17	17
2014	ARBOC (FLEX 26')	CNG	N/A	1	1	1	1
2016	Suburban 40'	CNG	N/A		46	46	46
2016	ARBOC (FLEX 26')	CNG	N/A		27	27	27
2017	ARBOC (FLEX 26')	CNG	N/A			73	73
2018	ARBOC (FLEX 26')	CNG	N/A				11

4.2.8 Bus Fleet Maintenance Initiatives During Review Period

DART undertook the following maintenance initiatives during the Review Period:

- Brought manufacturing after-market support for some bus systems in-house; and
- Re-initiated practice of doing campaign style maintenance of critical systems in advance of anticipated failure cycle.

These processes were implemented in an attempt to be proactive in improving “mean distance between failure” (MDBF) for the bus fleet to contribute to a better customer experience.

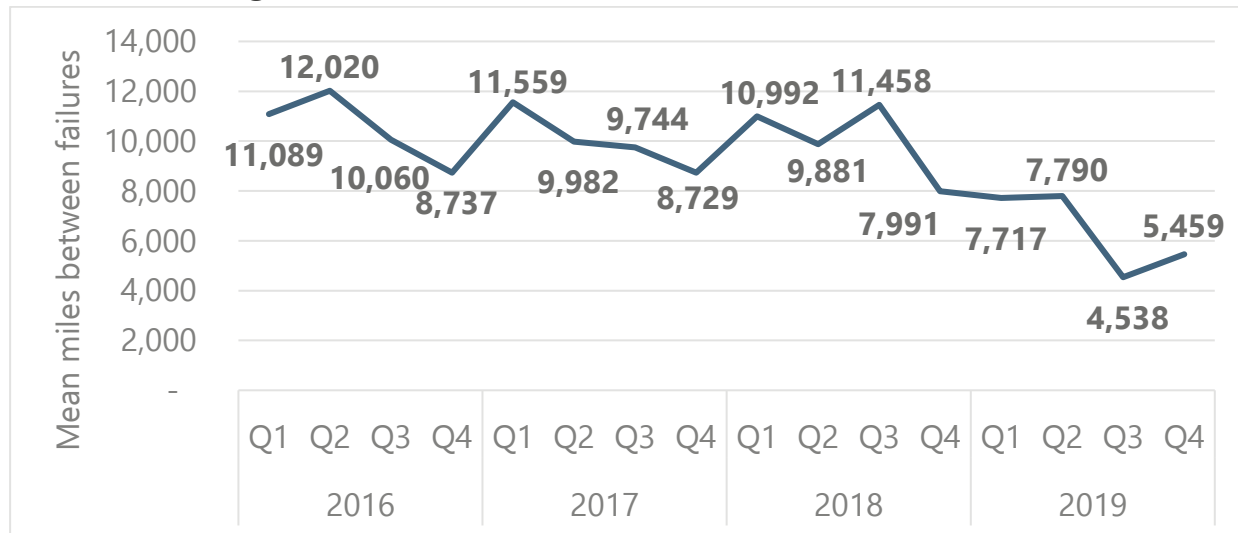
DART also indicated that DART Engineering established a “Fleet Reliability Panel” in May 2020, chaired by the Director of Standards, Performance, and Monitoring, with a mandate to increase MDBF for both rail and bus. DART believes the panel has been successful in addressing the top service issues, thereby increasing reliability. While the Team was not able to verify the increase in reliability outside of the Review Period—which ended in September 2019—the establishment of such a panel may assist DART in improving fleet reliability in subsequent years.

4.2.9 Key Bus Maintenance KPIs

The bus system has seen a significant decline in reported reliability, as Figure 51 shows. Changes to accounting methods played a role in this, as a change measuring only equipment failure impacts to service was replaced with one measuring all equipment failures. This is a significant

change that increases the failure count used in the measure but does not entirely explain the increasing failure rates.

Figure 51: Bus Mean Distance Between Failures (MDBF)



Looking deeper into these reports, it is clear that the smaller cutaway vehicles have a shorter life span, are approaching the end of lifecycle more rapidly than the larger bus fleet, and are generating a much higher failure rate than the larger-sized vehicle fleet.

Furthermore, DART has a practice of purchasing buses in large quantities at a time, as occurred in 2013 and 2014. This creates pressure on the bus maintenance department as large sections of the fleet enter mid-life and eventually end of life stages simultaneously.

This should be seen in the context that DART's bus maintenance team has an excellent record of performing maintenance inspections within the "on-time" mileage window for inspections recommended by the vehicle manufacturer. This involves tracking mileage on a daily basis and ensuring that buses receive scheduled inspections at proper intervals.

Finding 1: *The practice of bulk purchasing of rolling stock creates pressure on the maintenance department and causes uneven spending practices for rolling stock capital expenditures including federal grants and the required local match. The practice creates cycles of very high maintenance activity that could be avoided if bus procurements were more evenly distributed. The Team recommends that DART develop a transition plan for both the major sub fleets including 30- and 40-foot transit buses and the cutaway (ARBOC) fleet that spreads out the procurement of rolling stock at more even intervals over the expected life cycle of the equipment.*

One solution may be to do what many larger bus transit agencies have been doing—engaging in what amounts to five-year bus procurements, composed of a first-year procurement with, for example, four options at one-year intervals. This allows the agency to have an almost uniform

fleet for five years, which minimizes mechanics training and the number of parts that have to be stocked. This is relatively low risk, given if there is an event that means that the buses are not required, there is no penalty for not picking up an option; frequently, there are other transit agencies that are willing to take over the option.

4.2.10 Costs and Subsidies Issues

Compared to peers, DART's buses have relatively low boardings/vehicle revenue hour and average passenger load. Too few people are taking buses in comparison to peers, as shown in Figure 31, a demand issue that DART hopes to address with higher-frequency buses on heavily-utilized routes and GoLink microtransit, which are discussed in this Performance Review.

DART has been able to manage its costs relatively effectively, as shown in Figure 32. DART costs per vehicle revenue hour are very close to the peer average, as are costs per revenue mile. Because of such low ridership, DART's subsidy per passenger and subsidy per passenger mile are the highest in the peer group, as shown in Figure 33. DART's middle-of-the-pack performance on costs of operations is not sufficient to make up for the low performance on transit productivity.

The Team provides recommendations in Appendix 1 on further subsidizing bus cost through the use of advertising at bus shelters, which could generate additional revenue for DART.

Observation 4: *DART needs to continue to focus on ways to improve bus ridership, including eliminating low-demand routes, increasing frequency and service on high-demand routes, and fostering GoLink and other innovative transit solutions.*

4.2.11 Bus Maintenance Initiatives Going Forward

In the next year or two, DART management explained the following initiatives:

- Working to develop a more predictive approach to bus fleet maintenance;
- Reviewing opportunities to improve lubrication materials, which would drive a significant improvement in maintenance intervals and create additional mechanic time for a predictive maintenance program;
- Implementing a new EAM system with mechanic amenities that will improve data capture and reduce mechanic dwell time at computer stations by implementing mobile devices/tablets for mechanic documentation—removed from the 2020 budget but currently being reconsidered by the EAM project team; and
- Considering creating a transition plan from the current bulk bus fleet replacement program to a fleet purchasing plan more evenly spread over the anticipated bus life cycle. As discussed, this could reduce pressure on the bus maintenance department and spread purchases over a longer period in the capital cycle, including spreading out requirements for local money for capital match.

DART also relayed that bus maintenance has established a new Cummins Engineering Standard (CES), which extends oil drain intervals to 12,000 miles and that testing is currently underway in six buses across three shops to verify feasibility of this. While this falls outside of the Review Period, it may assist in improving fleet reliability in subsequent years.

Observation 5: *DART has identified various maintenance initiatives for bus maintenance to be implemented in the next two years. These initiatives, supported by an alternative bus procurement plan, could have dramatic impact on MDBF, which in turn could help improve on-time performance.*

4.3 Light Rail

DART is currently the largest light rail system in the U.S., with over 93 miles of light rail track, serving a large service area of around 700 square miles. It has a number of stations that are spaced at over a mile apart, giving it commuter rail-like qualities in many locations. While DART is making further improvements to its light rail network, including the D2 double-tracking, the build out of the DART light rail system was essentially completed by 2016.

The light rail system serves as DART's transit network's backbone, with major modes of bus, paratransit, TRE, and increasingly microtransit service feeding into it. Figure 28 underscores light rail's importance as it is a relatively heavily used system, in comparison to peers, with higher boardings per vehicle hour and significantly higher average passenger loads.

4.3.1 Organization and Resources

As per the reorganization that occurred in 2017, the Vice President of Rail manages operations; fleet maintenance; and ways, structures, and amenities. The purpose of the reorganization was to foster more oversight on operations and maintenance for each mode, reducing the tendency for one department to "point the finger" at another for poor performance.

4.3.2 Operations and Maintenance Staffing

DART continues to face a challenge finding and maintaining qualified operators. DART goes through an extensive process to interview, test, and conduct background checks on candidates. This process takes a considerable amount of time to ensure candidates selected meet all qualifications, including diversity criteria. Typically, DART hires from its bus operator pool. However, given the differences between bus and rail operations, DART has found that it is not able to recruit and maintain adequate staff from this source and has recently recruited externally.

This is also the case for identifying qualified maintenance personnel, such as signal maintainers. DART competes with freight rail, commuter rail, and other transit agencies for these skilled staff.

These hiring challenges are not unique to DART; many transit agencies face these challenges, especially for skilled labor, as these agencies may not pay market rates and public agency employment benefits may not be as valued by a younger workforce. DART has tried to address these issues by reaching out to community colleges, for instance, to help potential hires to learn signaling skills, so they can pass the necessary test. DART has also developed training curriculum for fleet mechanics and for traction electrification.

Observation 6: *DART is responding to critical labor availability issues that are not expected to get easier as DART will require staff who have higher skill levels with the increased use of sophisticated systems and digital technology. These needs are going to be a further cost burden and to adequately fill these positions, DART will have to increase wages on top of increasing costs for healthcare and other benefits.*

4.3.3 LRT Operations and Maintenance Initiatives

Light rail engaged in the following initiatives during the Review Period:

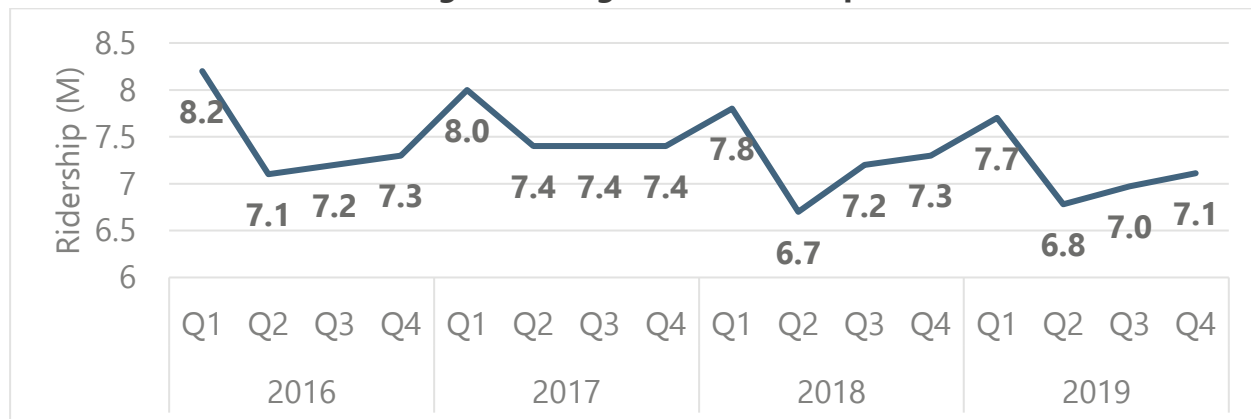
- Implemented fiber optic cable throughout the rail network, allowing for full implementation of automatic train protection (ATP), similar to positive train control (PTC) for commuter and intercity passenger rail systems. With its own fiber network, this will eliminate DART's dependence on a third-party fiber optic provider. This technology should improve safety and the day-to-day management of the light rail system.
- Supported major capital projects, including:
 - Replacing all rail girders in downtown Dallas;
 - Installing two crossovers downtown; and
 - Initiating the construction of the D2 project which will add another set of tracks through downtown Dallas.

These projects should reduce operational delays, including during bad weather and other emergencies. It will also help accommodate future capacity expansions.

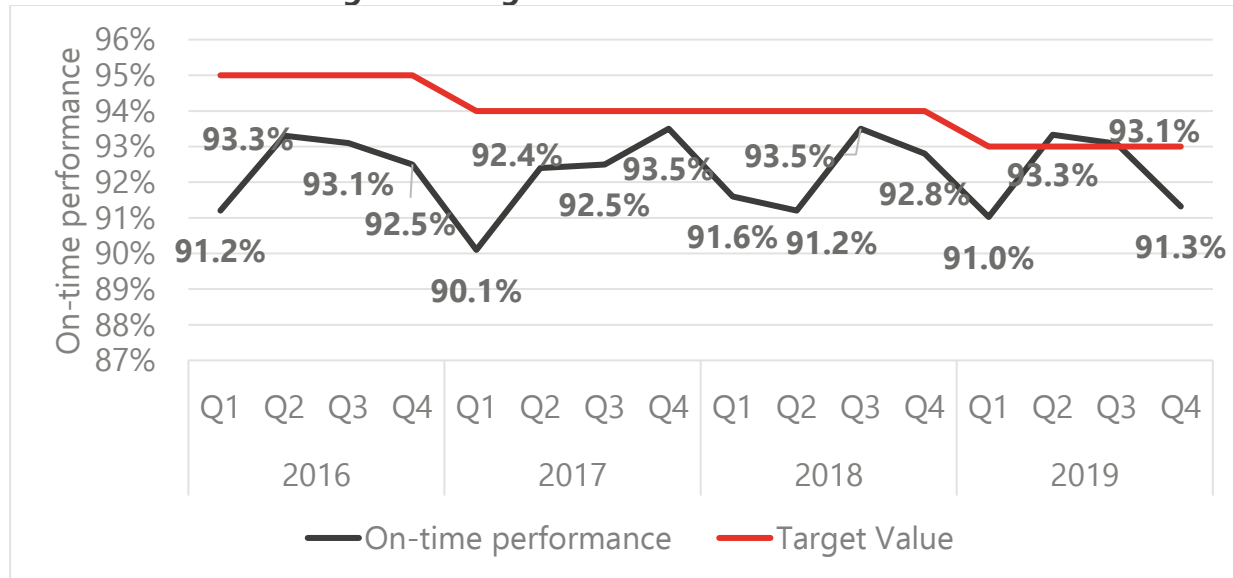
4.3.4 Ridership and KPIs

DART light rail is experiencing a decline in demand as shown in Figure 52, similar to DART's other major services, including buses and paratransit, similar to many other transit agencies nationally. The decline in demand is most pronounced in 2018 and 2019.

Figure 52: Light Rail Ridership



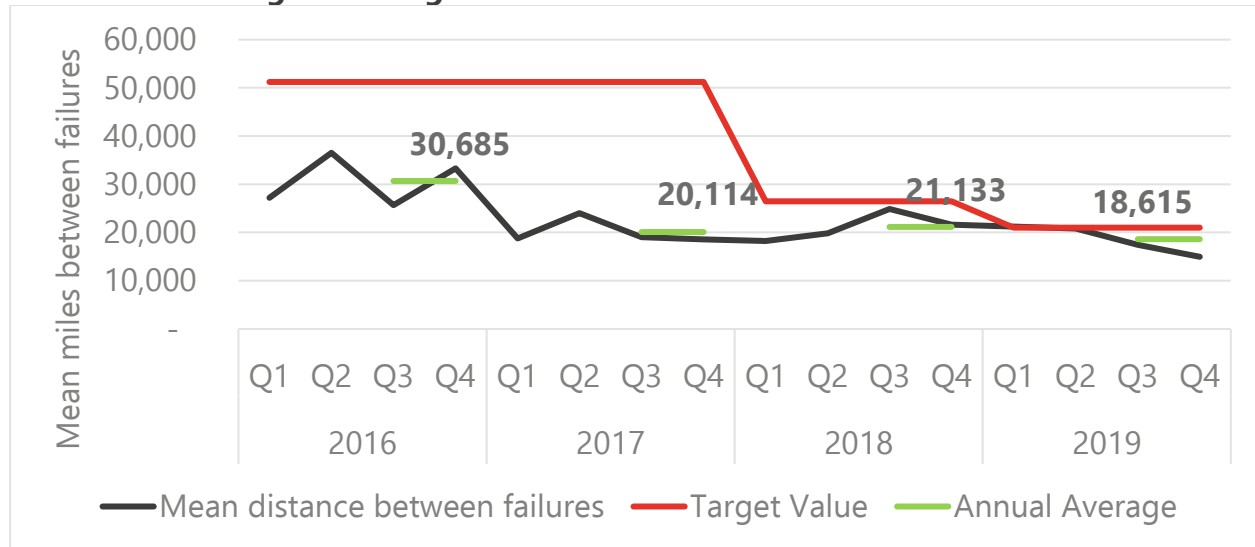
One of the possible explanations for reduced ridership is that on-time performance has varied in the last four years, from as high as 93.5% to as low as 90.1% as shown in Figure 53. Another is that nationally, many transit agencies have experienced declines in ridership. While being on-time ninety percent or higher is a reasonable target for many transit agencies, the fact that it slips, in the first half of each year, may appear to riders that the system is less reliable than it is.

Figure 53: Light Rail On-Time Performance

DART staff feel that one of the reasons why on-time performance is difficult to manage due to uncontrollable events, including poor weather.

For operations staff performance reviews, DART takes into account on-time performance and provides monetary incentives to reach targets, a measure that better aligns employee behavior with DART's goals, so that staff should be focused on this issue if the incentives are having the intended impact.

Another explanation is that mean distance between failures (MDBF) has declined from over 25,000 miles throughout 2016 to below 15,000 miles as of Q4 in 2019, as shown in Figure 54. These breakdowns may result in poor customer service perceptions as there are fewer trains to service riders, especially if these failures occur during commuting.

Figure 54: Light Rail Mean Distance Between Failures

DART staff are aware of MDBF decline and have initiated campaigns to increase the maintenance of key components that may have caused many of these breakdowns, including doors, compressors, and friction brakes. For instance, they put a larger fan in the compressors, which increased compressor reliability. They are also developing indicators to guide preventative maintenance, looking for issues that may cause failures before they actually happen.

Furthermore, DART looked at how operators are performing to see if there were patterns that could explain groups of failures. For instance, DART staff taught employees how to properly couple vehicles, as improper coupling has led to repeated pin damage; with that training, damage has stopped. DART is also now using technology that can identify potential failure in equipment through an amperage drop, providing an early warning. As discussed, DART rewards staff for on-time performance, which increases focus on the causes of delays.

Observation 7: *As DART's light rail fleet and infrastructure age, it is important that DART pay more attention and devote more resources to maintenance, thereby improving operations performance. This may include creating five-to-seven-hour work packages that can be accomplished after PM peak using single tracking. This has successfully created better work packages at other agencies versus only performing maintenance when trains are not operating.*

4.3.5 Accidents and Customer Service

DART has a strong safety record (see section 4.11). However, during the Review Period, NTD reportable events (excluding security-related events) per 100,000 miles have increased by 36%, as shown in Figure 55. The Team's understanding is that the trend is driven by an increase in "not otherwise classified" (NOC) events, which include slips, trips and falls, electric shocks, vehicles leaving roadway, yard derailments, and other events that are not reported as a collision, derailment, or fire. This NTD data for DART was obtained directly from the FTA's National Transit

Database. While vehicle collisions per 100,000 miles have decreased, there is a discrepancy between DART's internal reporting definition of "collision" and that of NTD, and this may merit harmonization moving forward.¹⁵ Figure 55 displays collision trends for both sets of data—DART internal and NTD-reported. Furthermore, it was discovered during the Team's review that the number of light rail accidents, as defined by DART, was incorrectly calculated and reported in DART's Quarterly Operating, Financial Performance, and Compliance Reports publication. While DART has indicated that this error has been corrected, the incident may call for further review of DART's KPI reporting practices and coordination between different reporting teams. However, the Team notes that it did not find any evidence of issues with NTD or other regulatory reporting.

Figure 55: Light Rail NTD and DART-Reported Collisions and Events per 100K Miles

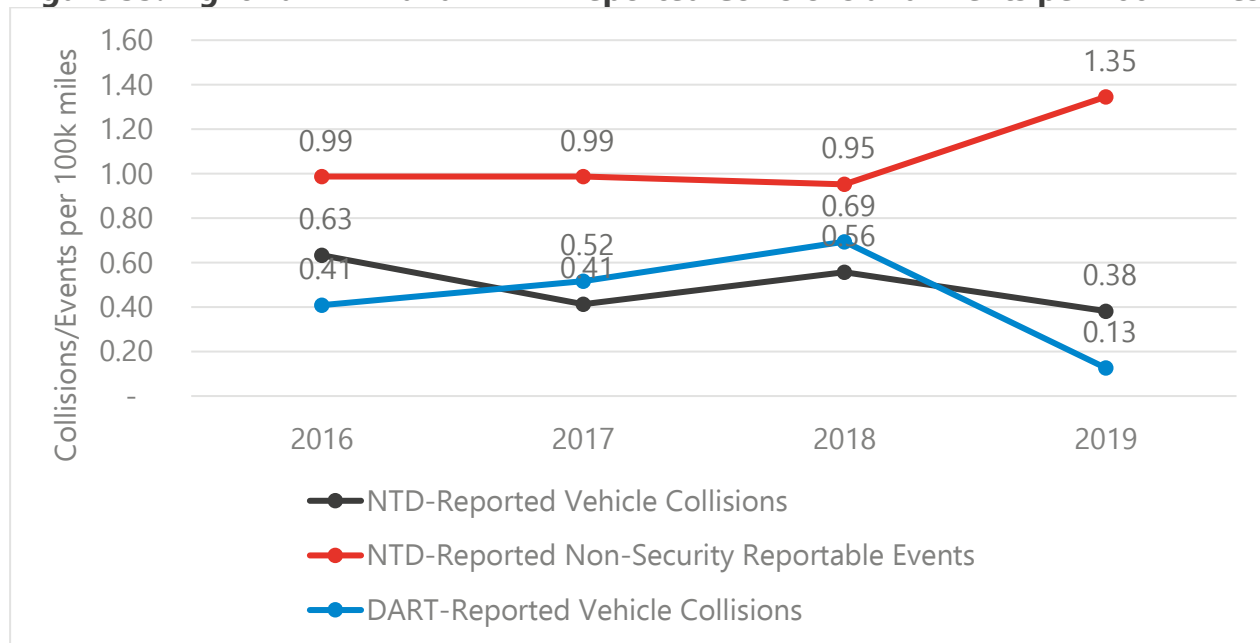


Figure 56 shows that complaints per 100,000 persons have declined during the Review Period, a positive trend.

¹⁵ DART indicated in e-mail communication that it only counts collisions with motor vehicles for internal reporting, whereas NTD defines a collision as an impact with another transit vehicle, a non-transit vehicle, a fixed object, a person(s), an animal, a rail vehicle, a vessel, or a dock.

Figure 56: Customer Complaints Per 100K Customers

Finding 2: Since safety is a very high priority, DART should review whether the increase in light rail non-security NTD reportable events during the Review Period serves as a “canary in the coal mine,” suggesting greater attention be paid to safety. Furthermore, both the difference in definition of “collision” between DART and NTD and the errors identified in calculating and reporting accidents for DART’s quarterly reports merit further review to ensure there is consistency in internal and external reporting as well as coordination between different reporting teams within DART.

4.3.6 Costs and Subsidies Issues

As shown in section 2.2, DART’s light rail operations suffer from high costs and high subsidies. As shown in Figure 29, DART’s costs per vehicle revenue hour are among the highest in the peer group while costs per revenue mile are also quite high, on par with Portland but lower than Houston. A similar pattern is apparent for subsidies as shown in Figure 30, with DART’s subsidy per passenger the highest and close to average for subsidy per passenger mile. While DART’s light rail ridership productivity is roughly in the middle of the peer group, giving it the best relative performance of the four DART modes, this relatively high performance was not sufficient to overcome the high operating costs, so the subsidy values are high.

Observation 8: Given DART’s current fiscal challenges, DART should evaluate the root causes of its higher relative light rail costs versus peers. DART’s other initiatives, including bus restructuring and the expansion of its GoLink microtransit service, may help to foster intermodal traffic with light rail, thereby increasing passenger utilization and improving cost and subsidy performance.

4.3.7 LRT Operating and Maintenance Initiatives and Issues Going Forward

Going forward, DART light rail has a number of initiatives and goals, which include the following:

- DART can improve customer service with an upgraded public information system. Also, it intends to update its supervisory control and data acquisition (SCADA) system to improve real time operations oversight and analyze the increasing amount of data being created.
- As discussed, DART is seeking to better predict maintenance requirements in an effort to reduce MDBF failure patterns.
- DART has initiated plans to replace initial “Fleet 51” and “Fleet 52” purchases that were made in 1997 and 1998, which have come to the end of their useful lives, with the intent to have the first new vehicles on property in 2025.

4.3.8 Fleet Characteristics

The DART LRT fleet consists of 163 Super Light Rail Vehicles (SLRV) built by Kinki Sharyo. The 40 oldest cars date back to the opening of the system in 1996 and are therefore now 24 years old. The last vehicles were delivered in 2011. Of these LRV sets, 115 were converted to three-car consists in the period between 2008 and 2014. The newest 48 vehicles were delivered as three-car consists. For the normal service, DART requires 106 vehicles (65%). This means that the spare ratio of 35% on a normal day is high. In case of events, however, up to 157 vehicles are used, meaning DART may be maintaining a fleet for peak demand as opposed to typical weekly service requirements.

***Observation 9:** As it replaces its existing fleet, DART should evaluate whether it needs to have such high spare ratios and the financial and strategic benefits of peak demand fleet availability.*

4.3.9 Maintenance Organization and Employees

DART carries out all maintenance in-house, except for some specialist works and rail car cleaning. Maintenance is carried out by a team of 178 staff in two locations. Inspections are carried out on the vehicles using the pre-planned preventative maintenance inspections (PMI) at fixed intervals. The PMIs were developed by the rail vehicle original equipment manufacturer (OEM) and are still in place. Industry practice is that the OEM maintenance recommendations are adhered to in the warranty phase and thereafter are optimized to the local conditions of usage and network. The fact that the PMIs have not been updated by the maintenance organization may indicate a lack of adequate customization of PMIs to DART’s specific needs, based on observed conditions and part failures on DART-specific vehicles over the life of the vehicle fleet.

For instance, DART used to inspect a pantograph every 10,000 miles. Instead, based on reliability data, DART has found that these fail every year, so it is now replacing those on that interval, effectively reducing inspections or other interventions to 15,000 miles.

Observation 10: *DART should update all maintenance and inspection plans—for fleet and way and structures—based on realized maintenance experience and current asset reliability. This requires DART to better record and analyze specific asset degradation behavior.*

4.3.10 Key Light Rail Maintenance KPIs

The key KPI for the fleet is the mean distance between failures (MDBF) of the vehicles, reported in miles. The light rail fleet has seen a significant decline in reported reliability in the period of 2016 – 2019. Despite lowering the target value for this KPI in two steps from the original 51,222 to 21,000 miles, the fleet is still underperforming in 2019 as shown in Figure 54.

To put the decline into perspective, the Team also looked at the MDBF values in the previous Performance Review period. In 2014, performance on MDBF was 45,662 miles, indicating that the previous target level of 51,000 miles may have been appropriate in previous years and that the decline in performance on this metric during this Performance Review period may be a symptom of structural deficiencies in fleet overhaul, renewal, and general vehicle maintenance.

The key issues with fleet reliability by the end of the Review Period are reported to be the doors and friction brake system. The Team has looked into the maintenance history of the fleet and found that the door systems on the 115 older vehicles were replaced in the period Q3 2016 – Q1 2018. The Team recognizes that door systems are a primary source for vehicles failures in older fleets, but replacing the door systems should have effectively mitigated this problem.

The KPI for DART light rail on-time performance shown in Figure 53 combines all elements of the rail system, including fleet, way and structures, and outside events. For this KPI, the target value has also been lowered during the Review Period from 95% to 93%. The annual average OTP KPI score remains at a steady level during the Review Period, though consistently below target.

Observation 11: *The fleet reliability has been in steady decline since 2014 and despite lowering the target value for the MDBF KPI during the Review Period, ultimately to 40% of its original value, light rail is still not consistently meeting its revised MDBF target. The Team recommends reviewing the maintenance approach to increase fleet reliability. The Team also recommends reviewing the appropriate threshold value for this KPI. Furthermore, on-time performance is stable over the years, but performance is still typically below target. The Team recommends performing a root-cause analysis for this underperformance to enable a targeted improvement program.*

4.3.11 Way, Structures, And Amenities

The maintenance organization is responsible for the maintenance of all elements of the rail infrastructure plus passenger amenities at stations and all bus stops. Outsourced activities are limited to bus stop cleaning and 90% of the landscaping work. All other activities are done in-house for which an organization of 320 staff is available. EAM tools are used to plan and keep

track of all required asset maintenance and inspection activities. All maintenance and inspection plans, including intervals for activities and life span, are based on OEM recommendations. DART owns almost all maintenance vehicles and is also responsible for maintaining ancillary equipment. In recent years, one dedicated maintenance staff is assigned for this maintenance.

Since the reorganization in 2017, DART has established an after-action review committee to address wire downs and derailments. The purpose is to take track measurements and collect other data to find out what the cause was, which was lacking before the reorganization. The action committee's goal is to meet within 24 hours after an incident occurs.

Observation 12: *DART does not have any KPIs to measure the performance of the light rail way and structures. Although it is an element of the on-time performance KPI, the lack of a KPI on the availability of infrastructure does not allow for analysis of the performance of the maintenance of way department. The Team recommends developing a key KPI on the availability of the way for operation. This might include a simple KPI that defines the availability of the way as a percentage of time. A more sophisticated KPI would be to define the availability in terms of the functionality that the infrastructure should enable, such as speed restrictions and headway.*

4.4 Mobility Management (Contracted Service)

4.4.1 Outsourced Paratransit Contract

DART provides door-to-door services on shared vans across its 700-square mile service area for disabled people who are unable to use DART buses or trains. This goes beyond the ADA-mandated requirement to serve riders within three-fourths of a mile from fixed transit routes.

DART transitioned to a new ridesharing services contract and operating model with MV Transportation, beginning with a soft start in Q4 2019. This likely caused a temporary decline in on-time performance as shown in Figure 58 and complaints at the end of the Review Period as DART and MV Transportation were temporarily working from two different software platforms. The Team understands from DART that on-time performance increased to 92.24% in FY2020.

1.4.1.1 Key Performance Indicators

Figure 57: Paratransit Ridership

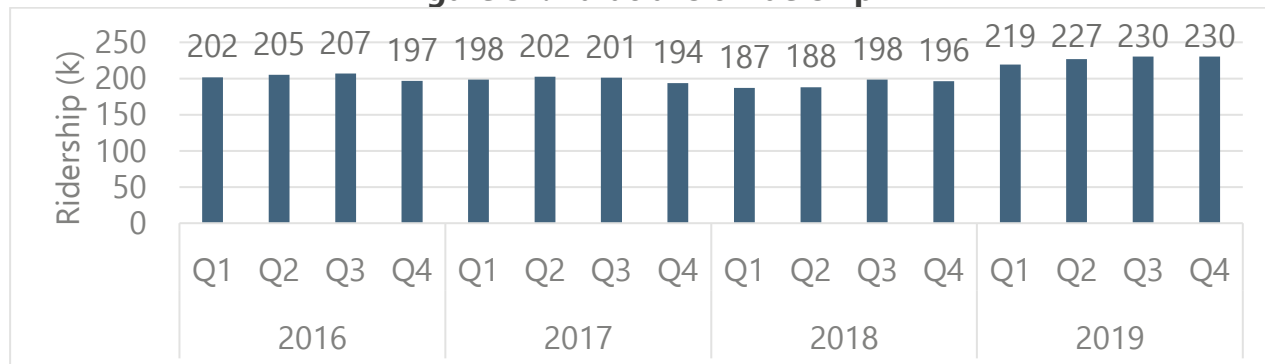
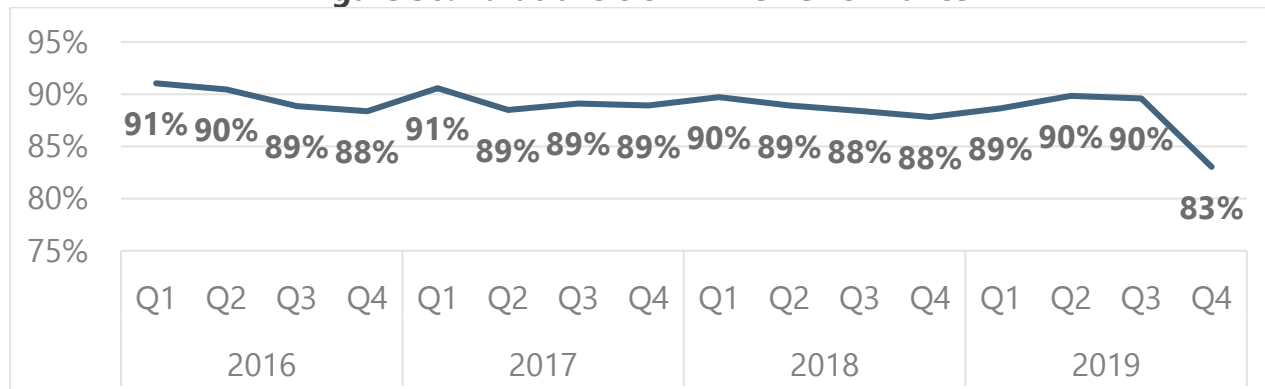


Figure 58: Paratransit On-Time Performance



DART's paratransit on-time performance has stayed relatively steady, though with a marked decline in Q4 2019 due to the soft start of a new operating model and contract with MV

Transportation. As shown in Figure 15, this was in line with a slipping of on-time performance for two of the three other transit modes, with bus on-time performance increasing slightly. DART is aware of this and staff are aggressively focusing on ways to increase on-time performance broadly.

Figure 59: Paratransit Accidents



Paratransit's number of accidents per 100K miles declined by almost one-third, as shown in Figure 59, the most dramatic decline among the four modes analyzed during the Review Period, which is a positive development.

Figure 60: Paratransit Complaints



Paratransit's MDBF increased by a dramatic 280% during the Review Period as shown in Figure 18. This may be a reason why on-time performance has remained fairly steady throughout the Review Period. Since DART is now relying upon a new operating model for Mobility Management, DART will need to monitor this to make sure that this performance does not deteriorate.

Observation 13: *As DART manages paratransit services going forward with a new platform that makes use of many different service providers, it should continue paying attention to service quality metrics such as on-time performance and to customer service under this new format.*

1.4.1.1 Contract Restructuring and Costs

During the Review Period, DART has taken advantage of a decision in 2012 to compensate its paratransit operator, MV, on a per trip basis, instead of on a per hour basis previously. Part of the reason for this is that DART wanted to pay for peaking demand and reduce the number of hours of MV employees who were not busy. This shift saved DART significant costs, as much as \$90M in 2012 in comparison to its previous contract for the year before. Furthermore, just after the Review Period, in October 2019, DART again changed MV's contract so that it served largely as a broker for services, using the drivers and vehicles of other parties, including services of Lyft, taxicabs, and other vehicles.

As Figure 7 shows, paratransit operating costs per revenue mile have decreased during the first three years of the Review Period by approximately 10%, from 2016 to 2018. However, they rebounded to nearly the same level in 2019, though still below the 2016 level overall.

Peer comparisons data shed another light on these issues. As Figure 37 shows, DART has boardings per hour of 1.62, which is among the lowest among its peer group. Despite the low boardings, DART's costs per revenue hour and revenue mile are close to the mean within the peer group as shown in Figure 38. In comparison to peers, DART's paratransit subsidy per passenger and subsidy per passenger-mile are above average, suggesting that DART is generous in how it shares ADA service costs as shown in Figure 39. Part of the reason for the higher subsidy per passenger may be that DART goes beyond the legally-mandated requirement – to serve only those riders near its fixed route services – to provide far more extensive service, both geographically and in terms of expanded eligibility, opening up its non-ADA demand-responsive service to all riders in the GoLink service areas (see next section).

DART also offers rider assistance programs for people over 65 years of age and those who are disabled or have a qualifying disability in certain DART service area communities. Eligible riders receive a debit card in which they pay 25% of the total value; in other words, a rider pays \$25 and receives \$100 of value. Riders in certain areas covered by "DART Rides" are limited to \$100 of value per month. Riders in the "Collin County Rides" areas may purchase up to \$100 per month for \$400 of value. Under both programs, riders are charged a set boarding fee plus a per mile fee. For ADA-eligible riders located in eligible jurisdictions, this service offers a choice of mode.

Observation 14: *DART's paratransit costs are reasonable, in part due to the restructuring of the MV contract and its focus on managing these complex operations. This is in the context of DART's generous service-area wide coverage and complementary rider assistance programs.*

4.4.2 GoLink and Microtransit

To address the needs of underserved areas in the DART service region and the on-going challenges of providing adequate transit service to primarily outlying suburban areas, DART has developed "GoLink" service, a form of microtransit.

GoLink provides on-demand, personalized, curb-to-curb shuttle service designed primarily for first- and last-mile transit service in less dense suburban and enclave areas where traditional fixed route transit service may not perform well, is not useful to many residents and travelers, or simply does not exist. GoLink is supplemented with UberPool service during peak periods, providing on-demand travel within certain zones to designated light rail stations and/or park-and-ride facilities. Those riders who go on to travel on other DART modes pay \$3.00 for an AM or PM pass; others pay \$2.50.

While GoLink is available to ADA riders, it is designed to be used by all riders. DART has set up separate GoLink service areas, generally of six or seven square miles each, that may include residential neighborhoods; retail, government, healthcare, religious, social, and entertainment destinations; and a rail station, bus transit center and/or park-and-ride. Unlike ADA demand-responsive service, which requires reservations made prior to the day of use—each GoLink trip must be scheduled the same day and walk-ons are not allowed.

As of the September 30, 2019, the end of the Review Period, DART had 13 GoLink areas, which were expanded to 16 on November 2nd, 2020. GoLink operates 5:00 a.m. to 9:00 p.m., Monday-Friday, with limited service in the Inland Port Zones on weekends and holidays. While GoLink was designed specifically for ease of use with a downloadable smart phone app from the Apple App Store, Google Play, or the GoPass[®] Tap card, users can also make call-in reservations and pay by contactless debit/credit cards.

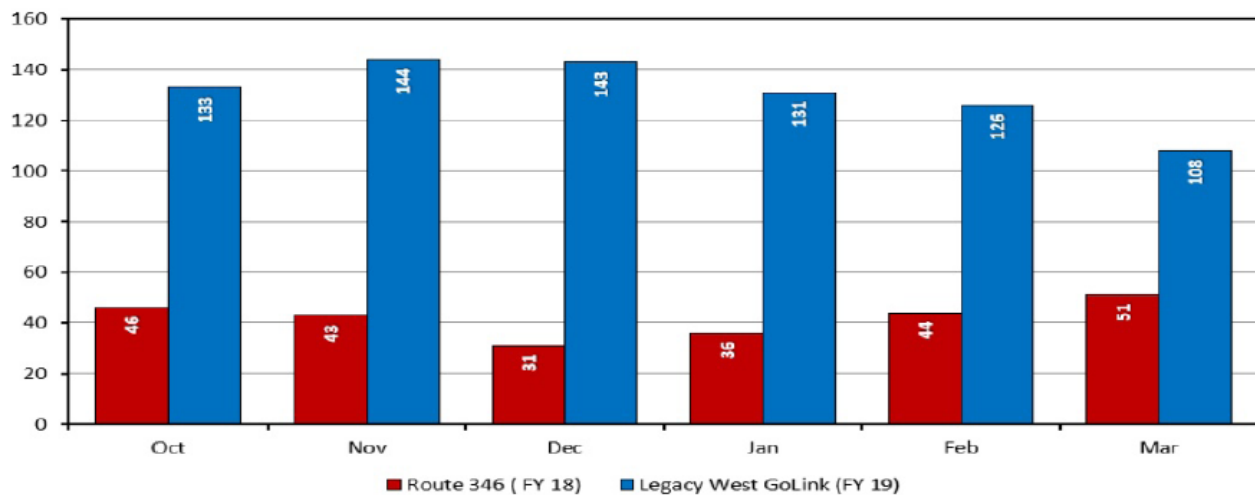
GoLink users have the option, bookable only through the app, of using UberPool for even more transit options. With the UberPool shared ride program, travel to or from any DART station or transit center within a zone costs \$1—waived during the current introductory period—and travel to or from any destination within a zone is \$3.

GoLink originated in 2016 when DART applied for a Federal Transit Administration (FTA) "Mobility on Demand Sandbox Demonstration" grant. DART was successful and it started to implement the program in 2017-2018, during the Review Period. By the end of 2018, DART had 13 microtransit zones in operation.

DART's goal is that the subsidy per passenger under GoLink would be similar or lower than the corresponding subsidy for bus service in the area that it was replacing, and that the response time of the service would be 10 minutes or less.

DART evaluated the initial GoLink service in an FTA report completed in 2020.¹⁶ The analysis focused on three northern Dallas service areas near Plano. As shown in Figure 61, in one of the service areas, Legacy West, average weekday ridership went up by two to three times over the study period compared to the previous fixed route bus service.

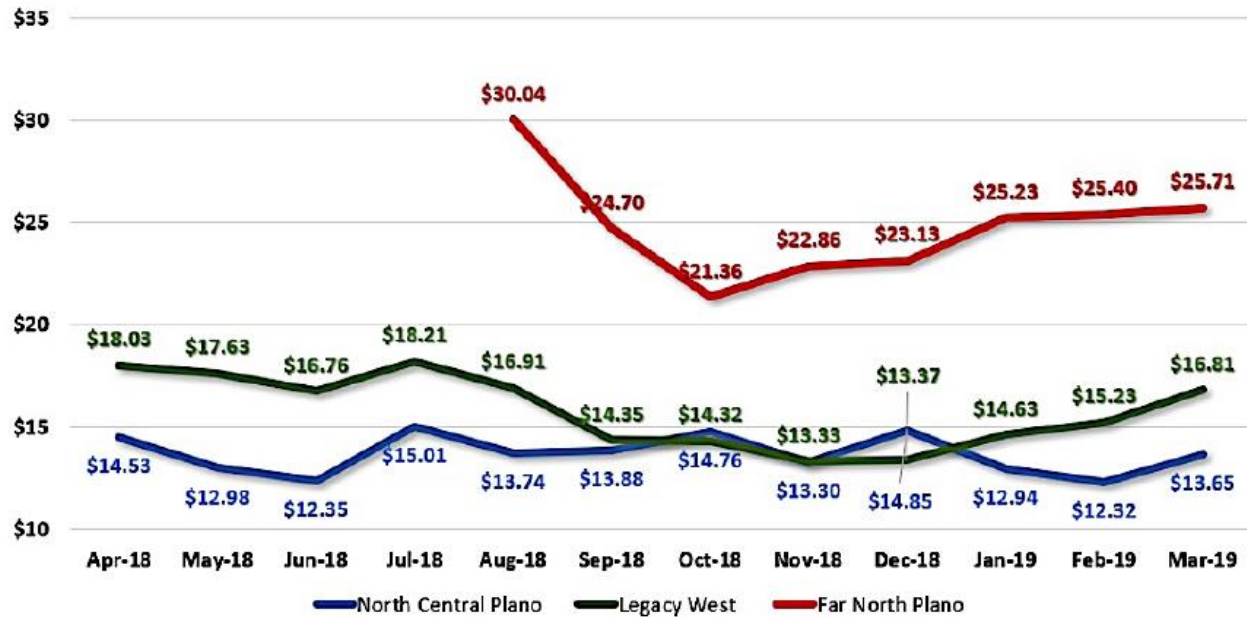
Figure 61: Avg. Weekday Ridership, Legacy West GoLink & Route 346, 10/2018 to 3/2019¹⁷



For Legacy West, passenger increases halved the previous bus subsidy per passenger of \$33.71 to \$18.03 and subsequently less, as shown in Figure 62. For the North Central Plano line, the resultant cost per passenger was even lower at \$15.01 or less. However, the previous bus line had higher boardings and so the previous subsidy was \$11.43 per passenger, lower than the new service's by approximately 20% to 25%. For the third service, Far North Plano, which is new, cost per passenger began at \$30.04 and has ended up less than \$26.00. Assuming that the bus boardings would have been similar to the Legacy West bus service at a cost per passenger of \$33.71, Far North Plano's costs are a net positive for DART—assuming that DART would have provided fixed route bus service eventually—and for passengers who benefit from new service.

¹⁶ Robert Parks and Somayeh Moazzeni, "Mobility on Demand (MOD) Sandbox Demonstration: DART First and Last Mile Solution," Federal Transit Administration, April 2020.

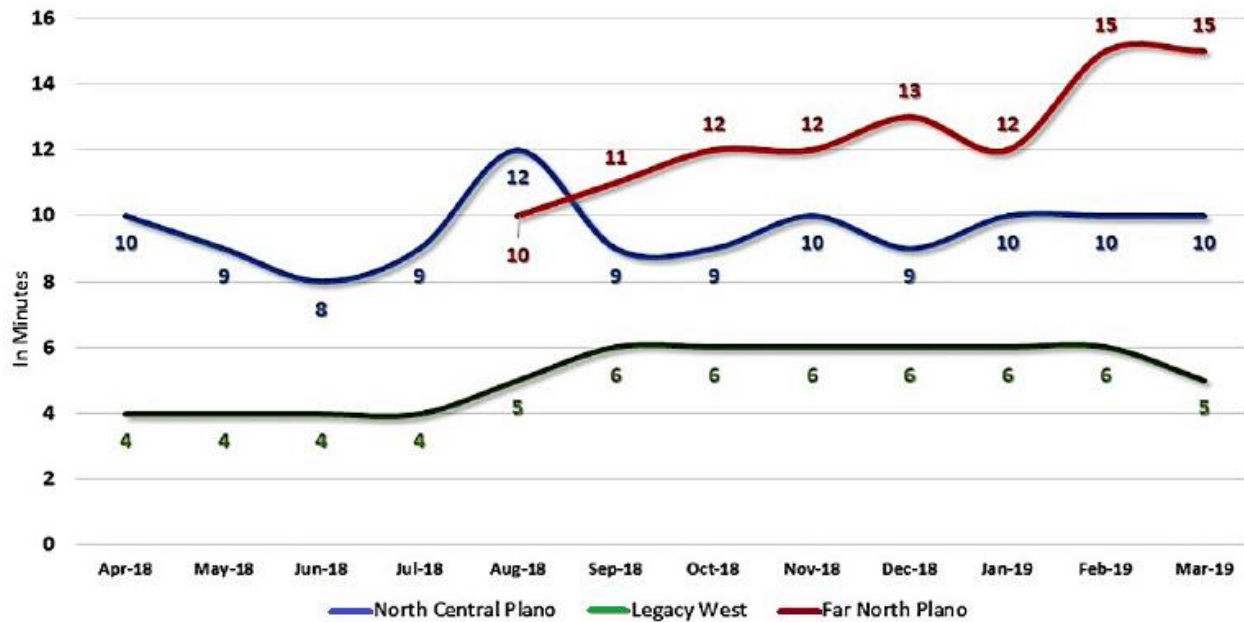
¹⁷ Ibid, p. 50.

Figure 62: GoLink Subsidy per Rider for Plano Zones¹⁸

For some of this new service, average response time is fifteen minutes or less, as shown in Figure 63. For the 10 other GoLink zones not analyzed, DART reports response times of 10 minutes on average. Not only does this meet DART's original goal, but these seem reasonable when making a comparison to light rail headways of every 10 minutes which are a goal of many light rail systems and DART's eventual goal for most of its light rail service. However, when compared to UberPool or other transportation network company (TNC) services, it lags. UberPool service provided in the Plano zones achieved a response time of six minutes or less.¹⁹ And in many downtown areas, Uber and Lyft single-occupancy service often has response times of less than five minutes. The latter are not fair comparisons, however, since such service is offered in denser areas and passenger fares are higher. Nevertheless, this is a performance standard to which some riders are accustomed and will no doubt compare this to GoLink, at least in the beginning.

¹⁸ Ibid, p. 48

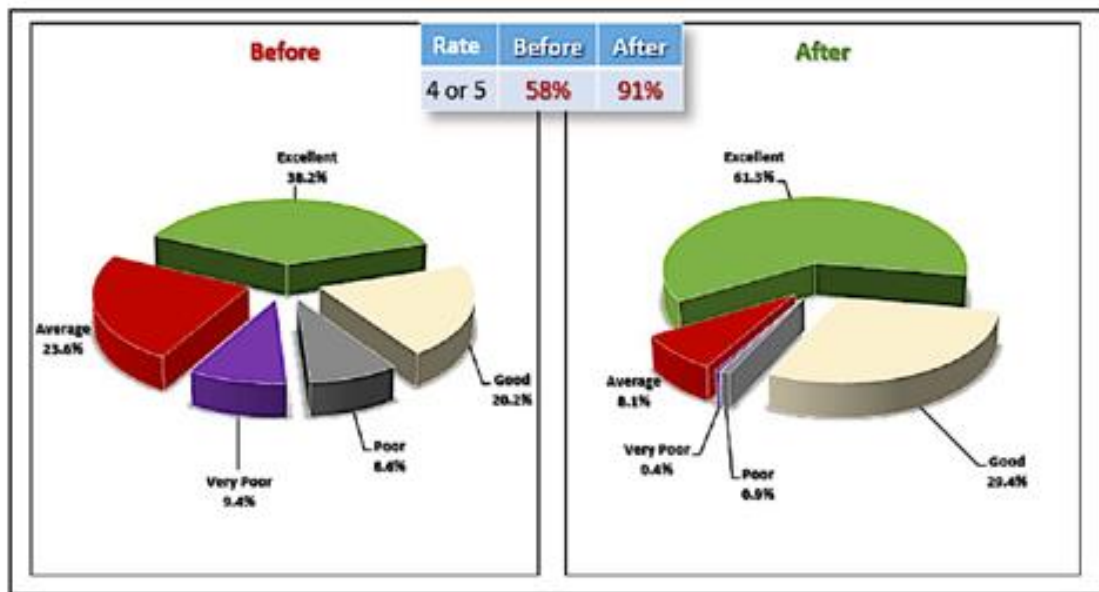
¹⁹ Ibid, p. 32

Figure 63: GoLink Average Response Time for Plano Zones, 4/2018 to 3/2019 ²⁰

The FTA study indicates that Plano zones riders are more satisfied with the GoLink service than the previous bus service, as access to stations rated as “excellent” or “good” increased from 58% before GoLink service to 91% after GoLink service as shown in Figure 64.

²⁰ Ibid, p. 32.

Figure 64: Ratings of Access to Bus Stops, Transit Centers, and LRT Stations Before/After GoLink²¹



Observation 15: DART's GoLink appears to be a service and fiscal success—better service at a lower cost to DART. DART should be commended for initiating this service, largely during the Review Period. The other 10 GoLink zones, as of September 30, 2019, apparently also have similarly positive metrics. This should be seen in the context that microtransit has had a rocky start in the last half decade, as both public agencies and private providers suffered from low demand in part because service was inferior to single-occupancy TNC service. While microtransit cannot carry the ridership of a full-sized fixed-route bus, this is not a negative but rather a difference that helps planners decide what type of service works best in specific service areas.

The go forward for DART is, through proper planning, community engagement, and continual application of lessons learned, identifying more areas where GoLink can outperform and be more productive and cost-effective than existing fixed route bus service. Part of the answer will lie in whether DART can make the economics work—particularly where the increased service and ridership will mean increased operating costs. In addition, it depends on whether the service to which GoLink connects—such as high frequency bus and/or rail—is reliable, frequent, reasonably-priced, and appears safe and secure.

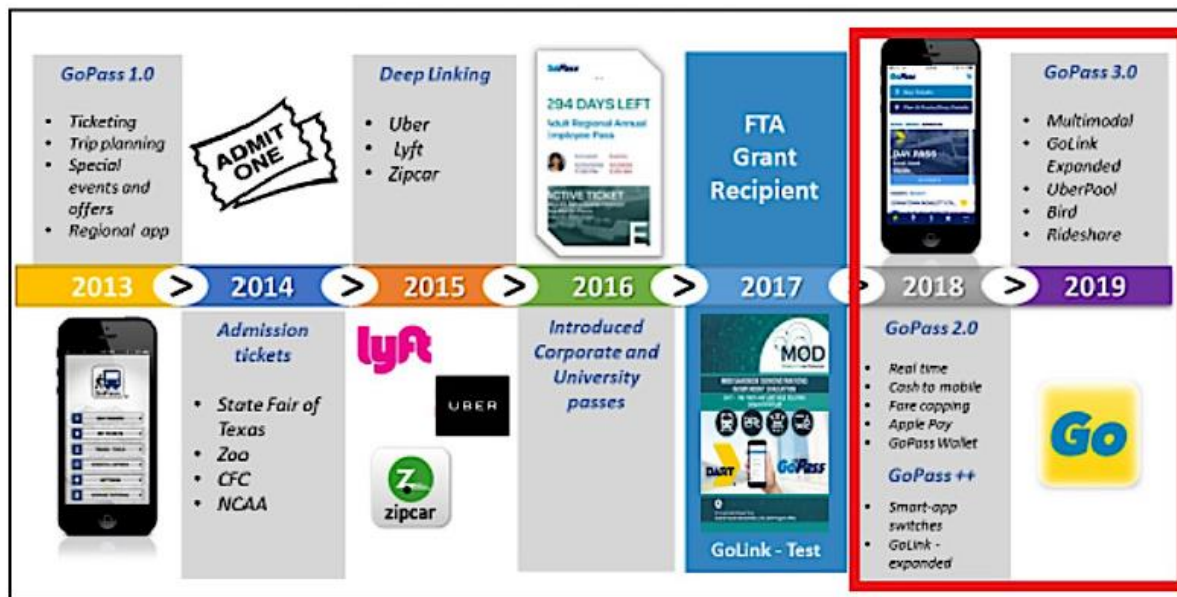
²¹ Ibid, p. 31

4.5 New Innovations

4.5.1 GoPass

One reason why GoLink has been successful is that DART and partners have taken advantage of on-demand mobile phone technology with wide availability among Dallas riders. Another reason is that GoLink relies on the GoPass mobile ticketing app, GoPass. DART has developed GoPass with private vendors over the last seven years, evolving from a simple instrument offering a few functions to a dynamic platform facilitating account-based ticketing and integration with other services, as shown in Figure 65. As with GoLink, major improvements to GoPass were made during the Review Period, which should impact DART future business.

Figure 65: Evolution of DART GoPass APP²²



Note: Accomplished actions highlighted in red.

The GoPass app has a number of payment capabilities, including allowing users to:

- Purchase passes with cash through local retailers, Apple Pay, or debit or credit cards;
- Take advantage of automatic fare-capping that charges the rider the lowest cost based on their ridership patterns, thereby removing some of the fare ticket guessing required of many current DART transit users, and of other systems, that may stifle transit use and is

²² Robert Parks and Somayeh Moazzeni, "Mobility on Demand (MOD) Sandbox Demonstration: DART First and Last Mile Solution," Federal Transit Administration, April 2020, p. 14.

poor customer service. Furthermore, this may allow some lower-income riders to take advantage of the lowest fares DART offers.

DART had previously relied on cash collection, magstripe card swipes at fareboxes, and ticket purchases via ticket vending machines. Furthermore, riders could only prepay a monthly pass for the next calendar month, meaning they needed to have funds available ahead of time. Like many transit agencies, DART has sought to reduce cash payments due to high transaction and management costs, which can amount to 10% or more of fare revenue, and the inability to offer differentiated ticketing options to all riders. Furthermore, DART wanted to move away from the magstripes, which caused technological problems.

GoPass may help DART reduce these costs. While DART does pay credit card transaction costs, which can be as much as 2.5% per transaction, these are much lower than the costs of managing cash. Furthermore, as discussed, GoPass facilitates GoLink's success, and it appears to have lowered the per passenger subsidy compared to the bus services it replaced so far.

GoPass is not the only way that DART will be lowering fare system costs and improving customer service. DART is also implementing "EMV" technology—the ability to "tap" a credit or debit card with an appropriate chip on a reader, the same way that a tap card is used. DART expects to start testing EMV technology in 2021-2022. This will include being able to "bundle" daily transactions, thereby reducing the number of bank transactions and reducing transaction fees.

DART does not only view GoPass as a way to reduce costs. DART can offer other services through GoPass, including events, security communication, rider alerts, and trip planning. These enhance customer service and attract riders to the GoPass app. They also make it easier for DART to offer additional mobility services, such as bike and scooter sharing and eventually connectivity to parking and traffic management services. Finally, DART can consider implementing frequent user rewards programs, in which some transit agencies are participating.²³

DART is sensitive to federal Title VI issues—that new technology unfairly discriminates against certain rider groups, such as those who do not have access to credit cards or bank accounts. DART has addressed this issue by allowing cash payments through a stored-valued card, the GoPass Tap Card, which, facilitates payment by simply touching the card to the electronic reader at each boarding. To pay using GoPass App, the rider "activates" the ticket in the app and then shows this to the bus operator or the fare inspector. The GoPass Tap Card can be reloaded at hundreds of DART region retail locations, including in low-income neighborhoods, as well as online via a debit or credit card. By using the GoPass Tap Card, lower income and cash customers can benefit from the same cost savings as those purchasing monthly travel cards up front.

Observation 16: *DART has made impressive strides with GoPass in the Review Period and is this field's transit industry leader. When the GoPass App, GoPass Tap Card, and EMV are used by the majority of riders, this should materially decrease ticketing costs, reduce cash handling, and*

²³ See <https://www.velocia.io>.

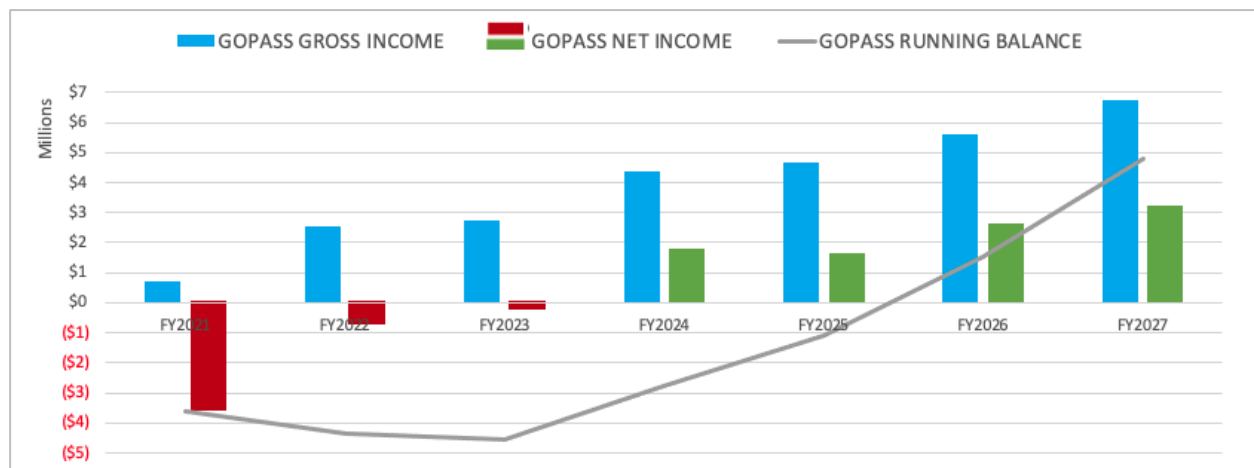
improve customer service. Furthermore, GoPass has facilitated GoLink and sets up DART to offer a suite of services provided inhouse or by partners, the foundation for "Mobility as a Service."

4.5.2 Mobility as a Service

DART has ambitions to license its GoPass platform to other transit agencies as well as expand the mobility services that it offers, in conjunction with its private partners. Currently, GoPass can be used at regional Dallas-Fort Worth metroplex agencies, including Denton County Transportation Authority (DCTA), Trinity Metro, and DART as well as at Tulsa Transit in Oklahoma.

DART is actively marketing GoPass or a "white label" GoPass to US transit agencies in its "Go-To-Market (GTM) Strategy." A marketing report presented to the DART board forecast that GoPass could be used by nine agencies in 2021 and by as many as 66 agencies in 2027, with revenues starting at \$0.7M and rising to \$6.8M. The GTM strategy will require investment, including up to 13 additional staff positions. DART projects that this will cost \$4.6M in additional expenses over the next three years, with a breakeven in five years as shown in Figure 66.

Figure 66: DART Staff Seven-Year Scalability Model for GoPass & MaaS Ecosystem²⁴



DART currently plans to make incremental investments, corresponding to license agreement transactions, making smaller investments than those suggested in the GTM strategy, i.e., it will hire additional staff as demand increases but limit exposure if demand is less. Furthermore, because of economies of scale benefits, operating costs may not increase as fast as demand. This strategy should reduce the risk that there are "surprises" requiring sudden retrenchment.

DART expects to reinvest surplus revenues from licensing agreements in enhancing its software, which will benefit DART riders as well as the "ecosystem" of GoPass users. This will help DART keep this technology up-to-date, which is essential in a technology sector that changes quickly.

²⁴ Elsborg, p. 16.

Observation 17: *DART's GTM Strategy is impressive and ambitious. DART should expect to consider a number of approaches as it grows GoPass in its service region and nationally, consistent with rapid change in the technology industry.*

4.6 On-Time Performance

During the Review Period, the DART board put a greater emphasis on improving on-time performance. DART bus on-time performance was previously in the mid-70s. In the period 2016-2018, DART increased focus on on-time performance, which included additional time for short breaks/restroom use and ensuring the availability of restrooms at the end of each bus line. For 2019, the Board had performance goals as shown in Table 8, none of which were met in 2019.

Table 8: DART Target and Actual On-Time Performance KPIs, 2019 4th Quarter

Mode	Goal	Actual 2019 Quarter 4
Bus	83%	82.20%
Light Rail	93%	91.32%
Commuter Rail (TRE)	97%	93.35%
Fixed Route (bus, light rail, commuter rail, and streetcar)	91%	88.96%

The Board's focus on on-time performance has been incorporated into the compensation of the CEO and some other staff. DART feels that this emphasis on this area has taken several years, but now they count it as a success.

Going forward, DART employees hope that future Boards do not change this orientation, or if they do, it is done slowly. In the past, staff felt they suffered from frequent Board priority changes—such as safety, farebox recovery—that affected momentum to realize objectives.

4.6.1 Ridership Statistics Changes

As discussed, with greater focus on performance and to obtain more accurate ridership data overall, DART has instituted automatic passenger counter (APC) systems, which now count every passenger. This contrasts with DART's previous process which was to estimate ridership based on sampling from farebox information.

The data showed that ridership was substantially higher than expected. This means that the ridership data for 2019 should not be compared with such data in the previous three years and for the purposes of this report reduces the effectiveness of evaluating trends for all four years.

4.7 Trinity Railway Express Operations

4.7.1 Historical Background

In the mid-1980s, the cities of Dallas and Fort Worth purchased the alignment from Rock Island Railroad to create a commuter rail line. An interlocal agreement between DART and Trinity Metro established a joint venture known as the Trinity Railway Express (TRE) commuter rail line that operates between Fort Worth and downtown Dallas. TRE initiated rail service in December 1996.

The operation of the system itself, including maintenance of both the rolling stock and the right of way, is subcontracted, most recently to Herzog Transit Services, Inc. The contract outlines general operations requirements, timetables, and KPIs that the contractor is responsible for achieving. Failure to achieve these goals can result in reduction in payment to the contractor.

Other than DART and Trinity employees working for TRE, there is no integration of any of the rail maintenance activities between the TRE system (TEXRAIL) and DART's soon to be operational Silver Line, formerly known as the "Cotton Belt line."

4.7.2 TRE Resources

The Trinity Railway Express (TRE) commuter train connects the downtown areas of Dallas and Fort Worth, with stops in the Mid-Cities and DFW Airport. DART and Trinity Metro formed a joint venture for the purchase and operation of the line. The TRE organization is staffed by individuals from the two organizations.

The TRE joint venture owners, DART and Trinity Metro, own the complete 34-mile alignment. TRE is responsible for the operations and maintenance of all elements of the system. The system includes nine train stations, which are all ADA-compliant. Many of these stations incorporate park-and-ride lots and tie-ins to bus or light rail services.

TRE operates a fleet of nine diesel locomotives and twenty-five bi-level coach cars, of which eight include an operating cab that can control the locomotive function from the far end of the train, eliminating the requirement to operate the train with a locomotive at either end. These were supplied between 1988 and 2001, which has triggered the initiation of renewal programs by TRE.

Some of the coach cars are somewhat older and do not include the operating cab systems necessary to control train operations of the locomotives. They are also involved in renewal and overhaul programs.

4.7.3 TRE Organization

The ultimate responsibility for the execution of TRE operation resides jointly with the presidents and boards of both DART and Trinity Metro. The presidents of both systems are responsible for overseeing the rail line. They both have accountability to their individual boards and receive information from the TRE Management Team. In addition, both DART and Trinity Metro

independently operate or plan to operate commuter rail lines within their own transportation systems:

- TEXRail was built and is operated by Trinity Metro, on right-of-way owned by DART, formerly part of the Cotton Belt shortline, from Fort Worth to DFW airport. Trinity Metro has a turnkey agreement with a purchased transportation operator that operates and maintains the diesel multiple unit (DME) equipment.
- The Silver Line is being built and operated by DART on the northwest segment of the former Cotton Belt shortline from DFW airport to Plano. DART has the option to have Herzog Transit Services, Inc. provide operations and maintenance services under its arrangement with Herzog.

While the two railroads will share a common terminus at DFW airport, the current plan is to operate them independently through a shared contractor, Herzog Transit Services, Inc.

Observation 18: *DART—and Trinity—might review the opportunity to combine the management of all commuter rail operations under a single management team. At a minimum, both should study a combined management model that could potentially identify economies of scale for the three commuter lines.*

4.7.4 TRE Management

The day-to-day operation of TRE is overseen by the Vice President Commuter Rail and Railroad Management, who is a DART employee. Other positions throughout the TRE organization may be filled by DART or Trinity Metro staff. TRE is funded by both DART (43%) and Trinity Metro (57%) based on the number of miles operated in each agency's service area. TRE management is responsible for planning of renewals and equipment replacements. Herzog provides input on asset condition and issues.

4.7.5 TRE Governance

In order to permit transparency for and input to TRE operations, the governance structure includes a number of committees as follows:

1. Coordinating Committee: Most management issues start at the coordinating committee with personnel from both DART and Trinity Metro. The committee reviews the needs of the system and prioritizes expenditures.
2. Management Committee: From the coordinating committee it goes to the management committee which includes the two presidents. This committee further refines and begins the processes within each transit system to determine and allocate resources.
3. Advisory Committee: Both the TM and DART president also serve on this committee along with six board members (three from each agency). This group works at the committee level of the board structure, recommending adoption of TRE projects and expenditures to the full board of each transit system.

4. Respective boards which approve funding for TRE projects as done for any function.

Although rarely required, the above process can be expedited in the event of an emergency situation. While this might appear to be cumbersome, the process above is a function of the interlocal agreement and establishes protections for both DART and Trinity.

4.7.6 TRE Regulatory Oversight

Technical oversight of heavy rail operations is provided by the Federal Railway Administration (FRA) which publishes guidelines and conducts reviews/audits of freight rail and heavy commuter rail operations. TRE is current with all FRA requirements including "Positive Train Control" (PTC) requirements. This allows TRE to operate mixed freight and commuter rail traffic. TRE is also subject to regulatory reviews by the Federal Transit Administration (FTA), which provides a portion of the funding for this operation. FTA also conducts audits on a three-year cycle. In the 2018 triennial audit, the TRE operation was cited for technical capacity issues including:

*Inadequate oversight of subrecipients (Carrollton) and contractor (TRE): DART must submit to the FTA regional office procedures for evaluating subrecipient risk and a comprehensive program monitoring subrecipients and contractors for compliance with Federal requirements and performance goals, along with documentation of implementation.*²⁵

The issues were quickly remediated, and FTA accepted an action plan to correct any deficiencies and closed the finding.

4.7.7 TRE Administration

By agreement, DART performs administrative functions such as National Transit Database submittals, FTA interfaces, and procurement of services and materials on behalf of Trinity Metro. Purchases related to operational expense are allocated as described above (Trinity Metro 56.78%--DART 42.66%). Capital expenditures are evenly funded between the two agencies as these are assumed to improve customer service evenly for customers regardless of their point of origination.

DART's planning department provides basic information to TRE regarding the service levels required and a basic schedule. The final schedule is created between TRE management and the operating contractor.

Complaints regarding TRE service will come into either DART's or Trinity Metro's complaint service center, which record and track and forward to TRE management for disposition.

4.7.8 TRE System Security

Security is provided separately by each jurisdiction (DART has transit police that patrol and respond, whereas Trinity Metro has contracts with local police departments for security). DART

²⁵ Fiscal Year 2018 Triennial Review of Dallas Area Rapid Transit System (DART), Page 8. August 3, 2018

and Trinity Metro are working to achieve a joint security agreement that could reduce any system security issues experienced on the operation.

4.7.9 TRE System Operation

System operation and maintenance is provided under an operations and maintenance contract with Herzog, which was last awarded in 2015 and is set to expire in 2025, although the contract provides for a series of one-year options that could be exercised. The contract renewal process bypasses the operating committee and starts with the management committee. This committee would approve an RFP that would be executed by DART's procurement department and require approval of both transit boards.

The operating contract covers FRA compliant maintenance of rolling stock and right-of-way equipment. The contract also includes dispatch functions for both commuter and freight rail service. All service employees are Herzog employees. The contract assumes a base level of compensation with various performance incentives and/or liquidated damages (LDs) for failure to achieve specific contractual requirements. Examples include late or cancelled trains if the reason for the delay or cancellation was within the contractor's direct control. The TRE operations team meets and reviews contract parameters and incidents with the contractor monthly. A partial list of service events that can prompt TRE to implement liquidated damages includes:

- A train fails (stops) between stations due to equipment failure; or
- System on-time performance issues resulting from a failure in the signal system; or
- Personnel or dispatching failures by the contractor that result in train delays of greater than 10 minutes.

Herzog is well versed in and maintains responsibility for heavy rail programs including the Roadway Worker Protection program and other safety and operational regulations promulgated by the Federal Railway Administration.

TRE requires Herzog, as system operator, to responsibly execute the proper procedures, both normal and emergency, required to safely operate the railroad. For example, if there is an accident, Herzog has to follow regular procedures, such as asking if a person wants medical attention, calling medical personnel, and sending out first responders. Herzog must also file appropriate reports for such incidents.

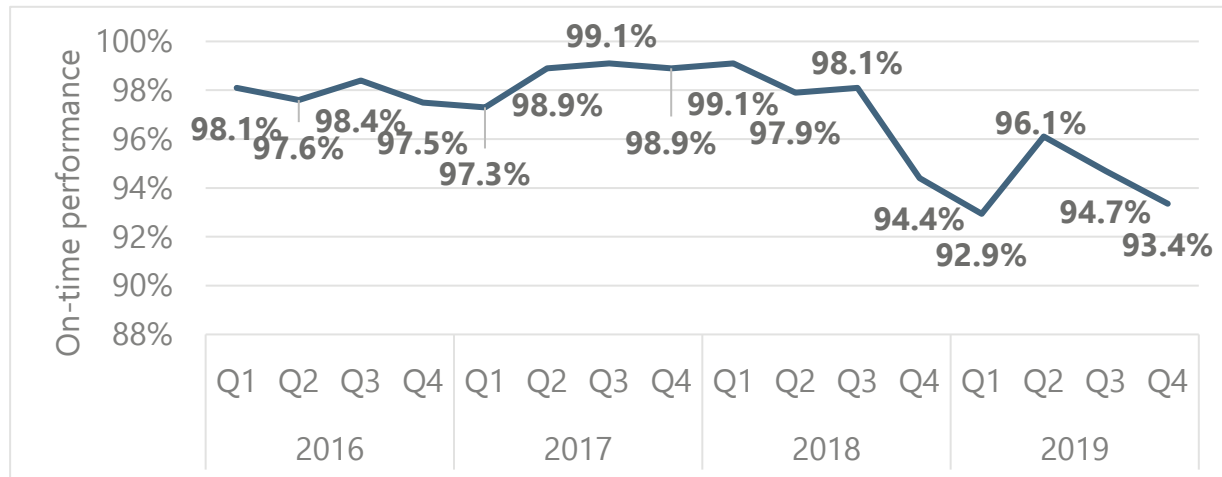
This arrangement allows Herzog to properly manage the immediate situation while also providing TRE with necessary information for administrative and regulatory purposes.

4.7.10 TRE System KPIs

During the Review Period, a notable slippage in TRE on-time performance was noted, as in Figure 67. This slippage was especially noticeable in 2019. TRE management reports that two issues are primarily responsible, including a short-term issue with availability of rolling stock due

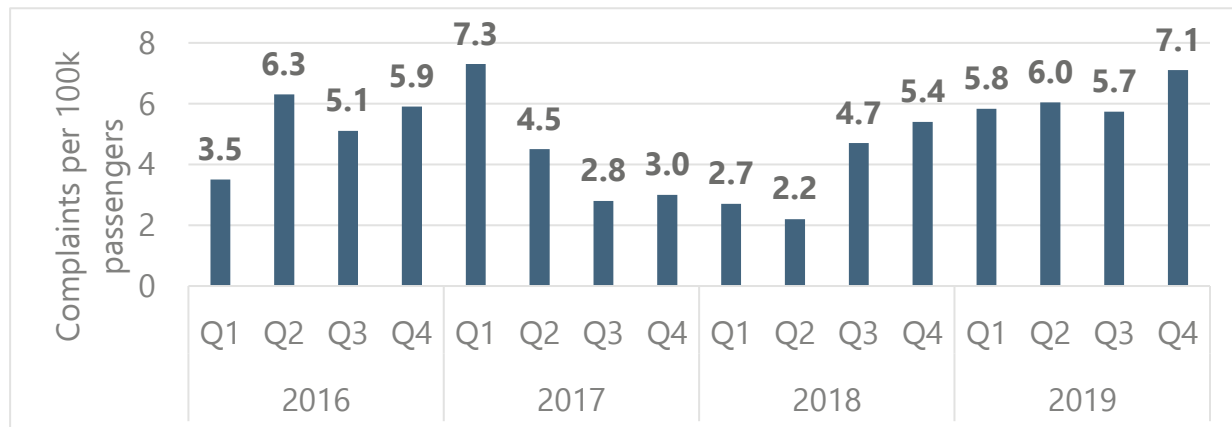
to ongoing overhaul projects, and issues with scheduling and interface with freight rail operations that can and are often scheduled to occur between commuter rail trains.

Figure 67: TRE: On-Time Performance



The Trinity Metro portion of the alignment operates sidings that TRE trains can access to permit freight trains to pass. This can result in delays if the freight trains are behind schedule. This is reflected in passenger complaints, as shown in Figure 68.

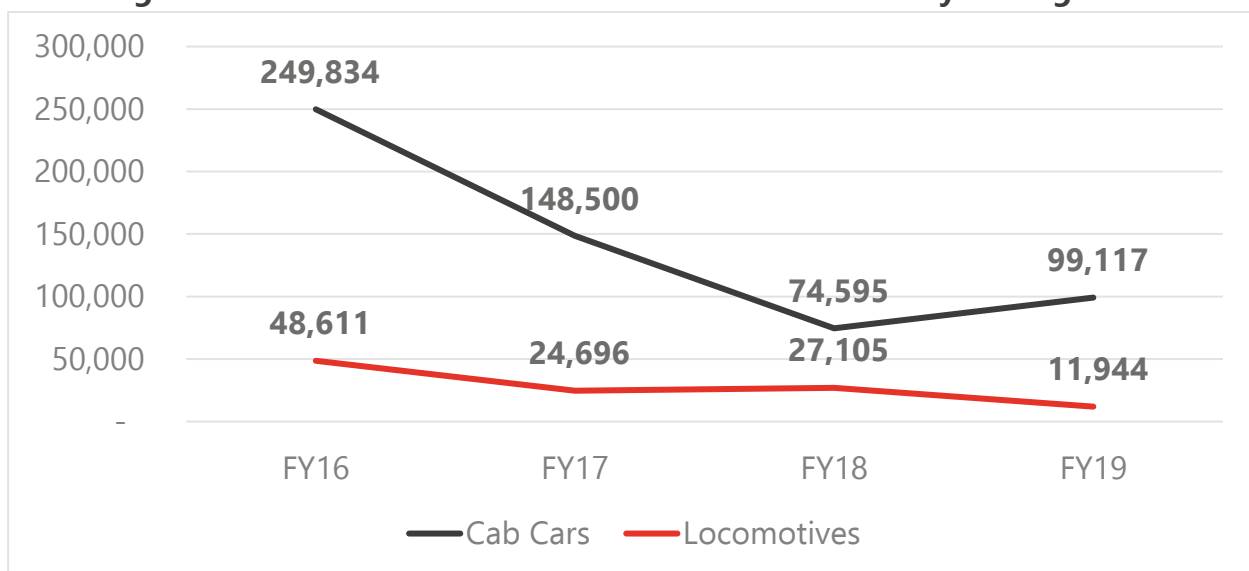
Figure 68: TRE Complaints per 100K Passengers



Accident rates are exceptional and are consistently below one per 100,000 miles of operation throughout the evaluation period, as shown in Figure 69.

Figure 69: TRE Accidents per 100K Miles

Critical rolling MDBF rates decreased during the oversight period, as shown in Figure 70. The failure rate is particularly significant in cab cars, the stock that is a combination of passenger compartment and operating cab at the far end of the train from the locomotive. TRE management has initiated overhaul programs that should improve operational outcomes, but improvement is likely to be slow due to the long cycle time of the restoration process and limited number of vehicles that can be in the program while meeting service requirements.

Figure 70: DART TRE Mean Distance Between Failures by Rolling Stock

4.7.11 Costs and Subsidy Issues

Similar to the other three modes, TRE's boardings per vehicle revenue hour are among the lowest in the peer group, as shown in Figure 34. Average passenger load is also in the lower half

of the peer group. Again, TRE's costs in terms of cost per vehicle revenue hour and cost per vehicle revenue mile are among the low side of the peers—making it a relative high performer, especially on the first metric, as shown in Figure 35. Unlike for the other modes, TRE's subsidy per passenger and per passenger mile are higher than the average but not extremely so, as shown in Figure 36. Its relatively low costs offset the low ridership productivity. As discussed, peer comparisons are challenging overall and by mode since the characteristics of commuter rail vary, including that not all peers have commuter rail, namely Houston. Furthermore, TRE is jointly governed with Trinity Metro, so it is not entirely under DART's responsibility.

Observation 19: *A high-level conclusion from KPI analysis of TRE is that DART, and partners, appear to have reasonable control of costs and that DART's focus needs to continue to be on making its modes more attractive to increase ridership.*

4.7.12 TRE Challenges

The TRE management team reports the following issues that they are closely monitoring or actively managing:

- **Equipment:** Only enough to maintain service. Equipment is overhauled in Canada and other shops around the US. Turnaround time has been an issue.
- **Freight crossing the corridor:** This leads to capacity issues as freight demand on the corridor is increasing. Freight operations generate revenue, which can be applied to infrastructure and maintenance costs. During peak time, they cannot take freight on. They have more capacity during mid-day. The west side of the alignment in Tarrant County, where TEXRail and Fort Worth are located, has many sidings spaced two miles apart. DART is reviewing opportunities to increase double tracking of the system to eliminate siding issues, maximize revenue opportunities, and enhance passenger rail service. This is not an issue on the east side of the alignment in Dallas County, since that alignment is double-tracked.
- **Grade crossings:** DART is making modifications for improved safety:
 - Calloway Cemetery crossing has been the site of vehicular traffic accidents. New design for reducing automobile track intrusion is being implemented; and
 - Market/Center Blvd intersection has problems with automobile drivers using GPS, which they interpret as instructing them to steer their vehicles onto the track. DART is considering a new design.

4.8 Engineering

The engineering organization provides electrical and mechanical engineering support to the bus and rail agencies, including for troubleshooting of vehicle systems and components to identify root cause of failures and develop and document equipment configuration changes when required.

Engineering produces specifications, procedures, and requirements for the purchase, maintenance, and improvement of vehicles and equipment and the development, review, and approval of all technical information related to vehicles and equipment functioning.

4.8.1 Training and Document Management

The training and document management section develops and implements training programs for mechanics, supervisors, and other maintenance personnel. It also has primary responsibility for assuring that training and maintenance documentation needs are met for all new systems and vehicles and for validating maintenance documentation in support of improving vehicle and systems reliability. This includes providing direction on the development of specification requirements for new systems and vehicles, evaluating submittals related to the manuals and documentation, and approving the format, scheduling, and delivery of the training. The section is also responsible for maintenance document management and control. Specifically, this group develops and maintains the online system and the maintenance document control workflow used to review, approve, and publish all maintenance manuals and related documents.

4.8.2 Warranty and Maintenance Services

The warranty and maintenance services section maintains service quality development, analysis, and distribution of maintenance reports and data. This group has primary responsibility for the measurement tool calibration program and technical responsibility for the DART tire lease contract. In addition, it administers all vehicle, equipment, and facility warranties and monitors fluids through wear metal and contaminant analysis to prevent system or subsystem failures.

4.9 Service Planning

DART has carried out a number of planning initiatives during the Review Period that appear to have an important impact on the agency's current management and could have significant impacts in the future. These include bus planning, focus on on-time performance, ridership statistics changes, light rail capital planning, GoLink and microtransit, and GoPass and ticketing.

4.9.1 Bus Planning

DART's overriding bus planning goals during the Review Period have been to ensure that the bus system integrates with light and commuter rail. Among other reasons, this was given priority since most of DART's major rail extensions and new stations were completed by 2016.

Starting in 2019, DART has begun to shift the focus from bus route integration to optimizing the bus network. This reflected a review since 2016 of routes that had significant subsidies per boarding and/or routes which were inadequate given population growth. Furthermore, Houston's successful bus network design in 2016-2018 raised the interest level of DART staff to consider a similar operational analysis.

In October 2019, DART hired consultant Jarrett Walker, who carried out the Houston work and similar work at other transit systems throughout the U.S. The study will provide DART with data to decide what percentage of its resources are applied to routes with higher ridership potential compared to routes that provide broad coverage of the DART service region. The results of the study, with board input, is expected to be made public in 2021 with respective changes to the 2022 budget, if any.

DART has already implemented a portion of this strategy by obtaining board approval for creating seven high-frequency "core" bus routes. These routes are supposed to run the same hours and frequencies as light rail, every twenty minutes. Combined with DART's light and commuter rail, these routes account for over fifty percent of DART riders.

With the introduction of GoLink and high frequency bus routes, DART has moved away from some of its bus "Flex Service," DART's route deviation variation on fixed route bus service. On Flex bus routes, there is a corridor along the bus route, generally varying in width from nothing at all in some sections to several tens of a mile from the route, where passengers can call in, same day, for pick-up and, once on the bus, can, at their option, ask for drop-off off-route. DART still operates some Flex Service bus lines, but others have been either dropped entirely or retracted to conventional straight-and-narrow bus service as former Flex Line route deviation areas have been converted into GoLink areas.

Observation 20: *The Team expects that DART's board will be faced with some challenges as it approves the appropriate trade-off between ridership and coverage, as other U.S. transit agencies have. The Team is encouraged by the opportunities that GoLink offers as discussed in*

4.4.2, and prudent reduction of DART's FLEX Service. This may help make the board's decision easier, as these modes offer alternatives to riders who may lose bus service coverage.

4.9.2 Light Rail Capital Planning and D2

The focus in this Performance Review is on operational issues. Nevertheless, it is appropriate for the Team to comment on other aspects of DART's performance that will have a material impact on its operational performance going forward.

DART's major light rail projects include the D2 Subway, platform modifications at 28 stations on the Red and Blue lines to accommodate three-car trains, and a Dallas Streetcar central link in downtown Dallas.

These three projects will add significant core capacity and enhanced access to the DART system. The D2 Subway will double light rail capacity downtown and address bottleneck issues created by four lines traveling through the same Pacific Avenue transit mall. This project will address bottlenecks, situations in which the alignment is shut down due to a breakdown or other stoppage, and eventually allow for greater capacity, reducing headways to as short as ten minutes.

The D2 project has been planned for many years, but the DART board made a critical decision to approve the D2 Subway Commerce/Victory/Swiss alignment as the locally preferred alternative in 2017 (during the Review Period). DART is currently in the project development phase and, during 2021, DART anticipates a request to enter the "Engineering" phase as part of the Federal Transit Administration Capital Investment Grant Program.²⁶

While the Silver Line is not the focus of the Performance Review, DART is also constructing the Silver Line project, which will add commuter rail service in DART's north and northeast service region, linking with Trinity Metro's TEXRail, DFW Airport, and three of DART's light rail lines.

Observation 21: *While DART's light rail system was essentially completed by 2016, DART continues to make prudent and timely capital investments to increase the performance of this critical asset. Since light rail is the backbone of DART's system, this increased performance should also improve performance of DART's other services that link to light rail.*

4.9.3 Total System Planning

It is important to recognize how DART has taken a total transportation system approach into the design and utilization of these transit modal choices for the greater benefit of all stakeholders:

- DART's services are designed with connections to the other DART services and transit services operated by other transit operators in the region, such as GoLink service areas including fixed route bus and rail stations and stops.

²⁶ DART "2021 Proposed Annual Budget and Financial Plan" p. 15.

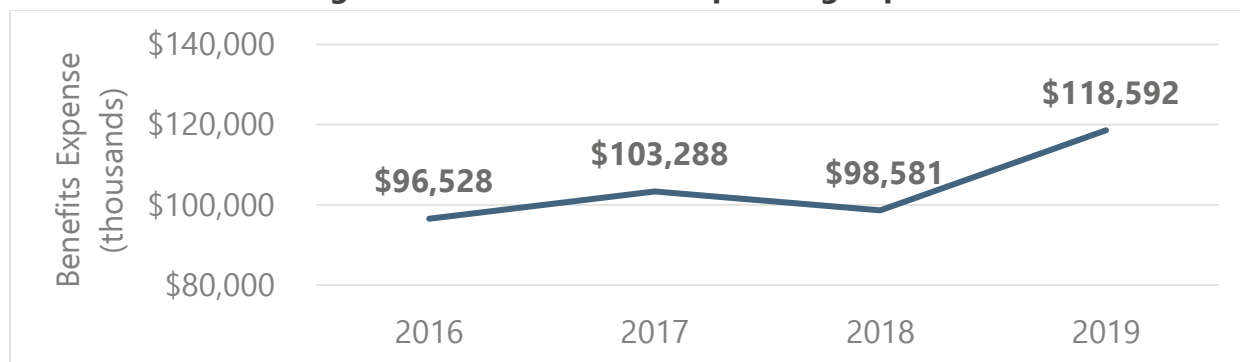
- These services are now reached and coordinated through the GoPass® App and the GoPass® Tap card.
- DART has gone to great lengths to exceed the ADA minimum requirements of service:
 - Instead of the statutorily required service area of within three-quarters of a mile of a fixed route bus line or a rail station, DART ADA service includes the entire 700-square mile DART service area.
 - DART ADA services will go beyond the mandated curb-to-curb service to door-to-door (within limits) when needed.
 - DART drivers will assist passengers with bags of groceries and other packages.
 - Besides the statutorily required no-additional-fare attendant, DART allows other, non-ADA passengers to accompany ADA passengers for a fare, space available.
 - While DART is allowed to charge double the standard adult cash fare (\$2.50) for paratransit services, the current ADA demand-responsive fare of \$3.50 is only a \$1.00 (40%) premium. However, if the ADA passenger is connecting to DART fixed route service, the fare is only \$1.00 for the ADA demand-responsive service, and there is no charge for the fixed route service for either the ADA passenger or the qualified attendant. This policy, combined with DART's Transit Orientation program providing one-on-one and group training for ADA transit users, assists the mobility-challenged in transitioning to the safe use of mobility expanding services to far more destinations, while also providing the financial benefit to DART of converting, or shortening, expensive ADA demand-responsive services to far less costly fixed route services, a clear win-win for DART and its ADA riders.



4.10 Benefits, Pension, and OPEB Costs

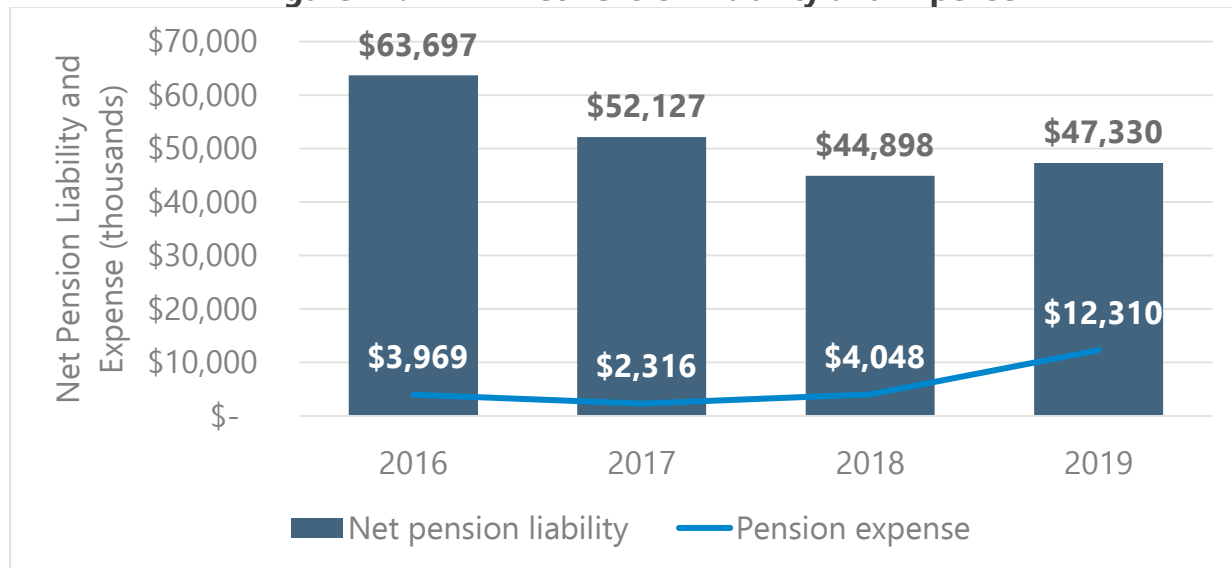
DART's annual benefit expense is displayed in Figure 71. During the Review Period, there was a substantial increase of 20% year-on-year in benefits expense from 2018 to 2019. This was primarily due to a change in the mortality tables that are used to calculate pension liability for DART's defined benefit plan, accounting for \$12.3M of the \$20.0M increase in annual benefits expense. DART's 2019 Comprehensive Annual Financial Report (CAFR) also notes increased healthcare usage by employees as a driver of higher benefits cost. Nevertheless, the Team notes that benefits expense has generally been stable through the Review Period.

Figure 71: DART Benefits Operating Expense



DART maintains three pension and retirement plans for its current and former employees. The first is a legacy defined benefit plan for all employees, retirees, and other beneficiaries that were eligible for DART's previous pension plan as of September 30th, 1995. Roughly 1,100 current employees and retirees continue to be covered by this plan. It is not open to new employees.

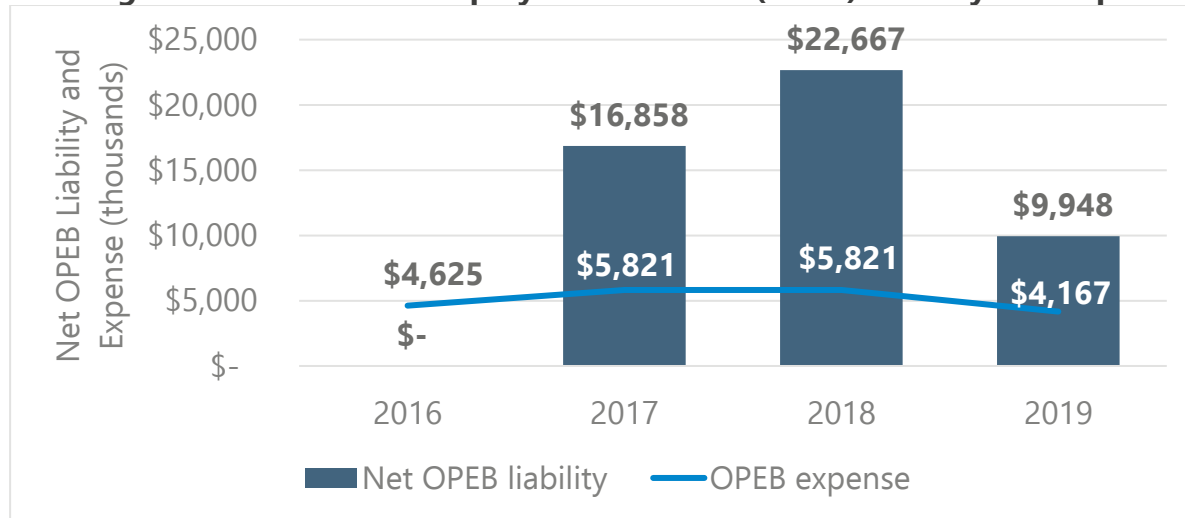
Figure 72 displays DART's net pension liability and annual expense related to this legacy defined benefit plan. As seen in the figure, DART has managed to substantially reduce its net pension liability during the Review Period, from roughly \$63.7M in 2016 to \$47.3M in 2019. There was a substantial pension expense of \$12.3M in 2019 due to a change in the mortality tables used for actuarial valuations; the new assumption, using the Society of Actuaries' Public Retirement Plans Mortality Tables, is that employees are living longer. The change in assumptions appears to be a sound decision for the purposes of assessing pension liability moving forward.

Figure 72: DART Net Pension Liability and Expense

DART's other two retirement plans are defined contribution plans, known as the DART Retirement Plan and the DART Capital Accumulation Plan, or DART's 401(k). DART contributes 7.7% of each participant's annual compensation to the Retirement Plan and will match 50% of employee contributions to the 401(k), up to a maximum of 3% of annual employee compensation. Both plans have a vesting schedule and participants become fully vested after five years of service. Due to the defined contribution nature of both plans, neither plan is included in DART's pension liability.

DART also provides other post-employment benefits (OPEB) to employees and their beneficiaries, consisting of health and life insurance benefits. There are roughly 4,000 active employees, retirees, and other beneficiaries as of September 30th, 2018 on DART's OPEB plan. Figure 73 displays net OPEB liabilities and annual expense during the Review Period. Net OPEB liability is not shown for 2016 due to the lack of available data in DART's 2016 CAFR, which the Team assumes to be due to the adoption of GASB 75 beginning in 2017.

As Figure 73 shows, DART's net OPEB liability decreased substantially from 2018 to 2019, due to differences in expected versus actual OPEB costs and changes in assumptions such as healthcare cost inflation. Annual OPEB expense has stayed relatively stable during the Review Period.

Figure 73: Other Post-Employment Benefits (OPEB) Liability and Expense

Observation 22: Overall, DART appears to have managed both pension and OPEB liabilities well during the Review Period. While there has been fluctuation, particularly in OPEB, the adoption of new accounting standards and mortality tables appears to have led to a more realistic calculation of the long-term pension and OPEB liabilities on DART's balance sheet.

4.11 Safety and Security

4.11.1 Overview

DART's board and CEO prioritize safety. It is a top agency goal mandated by the board and is included in performance management plans and individual performance mandates from the top down. The mandates have included:

- Develop and implement a compliant FTA Public Transportation Agency Safety Plan (PTASP) (by the deadline);
- Implement the FTA Safety Management System (SMS) (measurable steps taken);
- Receive favorable audits with minimal findings; and
- Reduce accidents and injuries per vehicle with a not-to-exceed ratio for bus, rail, train.

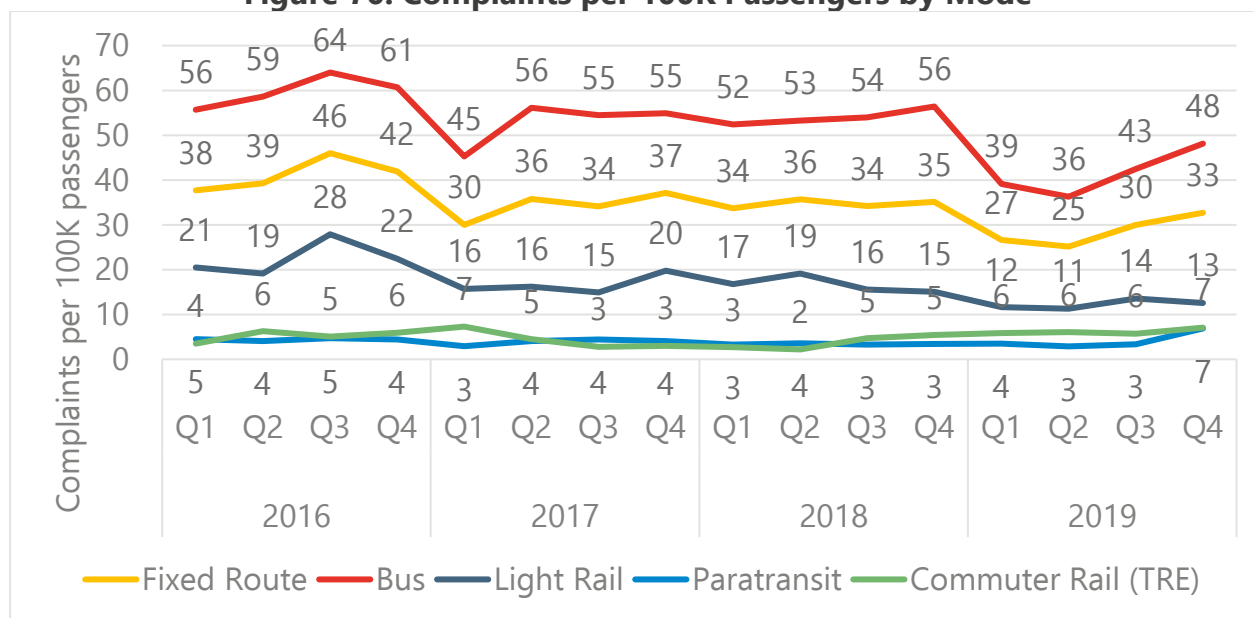
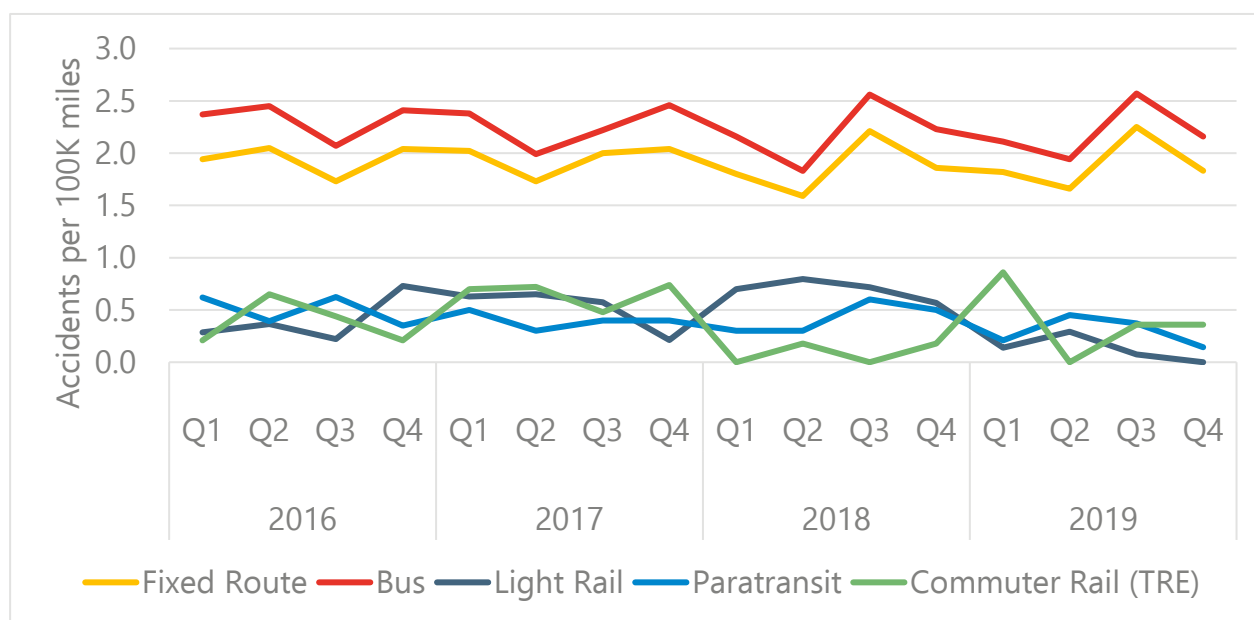
DART also received the American Public Transportation Association (APTA) Rail Safety and Security Excellence Award in 2019 in the Light Rail/Streetcar Category and Gold Award for Security.

4.11.2 Total System

One of the key performance indicators for safety is the number of accidents per 100,000 miles. DART's Quarterly Operating, Financial, Performance, and Compliance Reports report both complaints and accidents, as shown in Figure 74 and Figure 75. From this data, the number of complaints is trending down over the last year for the total system, and accidents appears to be stable with roughly two per 100,000 miles per quarter, though the Team notes that the reduction in complaints per 100,000 passengers could be driven by the increase in counted passengers thanks to the introduction of APCs in 2019.

Figure 74: DART-Wide Complaints per 100,000 Passengers**Figure 75: DART-Wide Accidents per 100,000 Miles**

When reviewing the individual modes in Figure 76 and Figure 77, the bus data closely mirrors the systemwide data but with a higher rate of accidents and complaints consistent with a less controllable and maintainable bus environment; this is lowered with the inclusion of the other modes. TRE and paratransit had a leap in complaints Q4 2019. The data provided to NTD appears to be in compliance with what is required.

Figure 76: Complaints per 100K Passengers by Mode**Figure 77: Accidents per 100K Miles by Mode**

According to DART's Chief Security Officer, DART has been preparing and implementing the new federal "FTA Safety Management System 49 CFR 673" regulation effective July 2019, which consists of switching from a "system safety" to "safety management system" approach. This effort started in 2016 with the passing of 49 CFR Part 674 rules for the "State Safety Oversight Program" (SSOP) replacing the previous version. Then in 2017, Texas Senate Bill 1523 relating to

the creation of the state safety oversight program for rail fixed guideway public transportation systems was passed.

DART's activities in implementing this new safety management system have included:

- Staff certification (deadline 7/2020 – which DART met);
- Changing over the required “Safety Management System” (SMS) with the new governance structure of management and new documentation requirements; and
- Educating the DART board and staff.

SMS required that documentation is audited internally every October and evidence of compliance was provided via the last report conducted October 27–31, 2019. This report covered seven—items one to seven—of the twenty-one elements in the SSOP that are reviewed on a three-year cycle. The report indicated that DART was substantially in compliance with its SSOP for the audited elements.

An FTA triennial review is performed by TxDOT every three years and the last report was prepared March 1, 2019. According to this review “The audit team found DART to be generally compliant with its SSOP, TxDOT, and FTA requirements and to have generally sound safety practices.” They also noted “For the first time in 20 years, all observations of operators sounding the audible for grade crossings was done correctly. ”

DART also provides data to TxDOT to include in their annual status report on the safety of their rail fixed guideway for the State of Texas. According to the 2018 report (2017 data) DART had 43 events and 21 “Corrective Action Plans” prepared. For 2019 (2018 data) all six transit systems were combined as shown in Table 9, which unfortunately does not provide for a comparable DART report.

Table 9: Corrective Action Plans for Six Texas Transit Systems - 2019

Safety Activities	Statewide Totals
Accidents	64
Reported Hazards	4
Corrective Action Plans (CAPs)	93

The TxDOT 2020 report was not posted online at the time of this writing.

4.11.3 Safety Programs

DART has several good practice safety programs in place, which include:

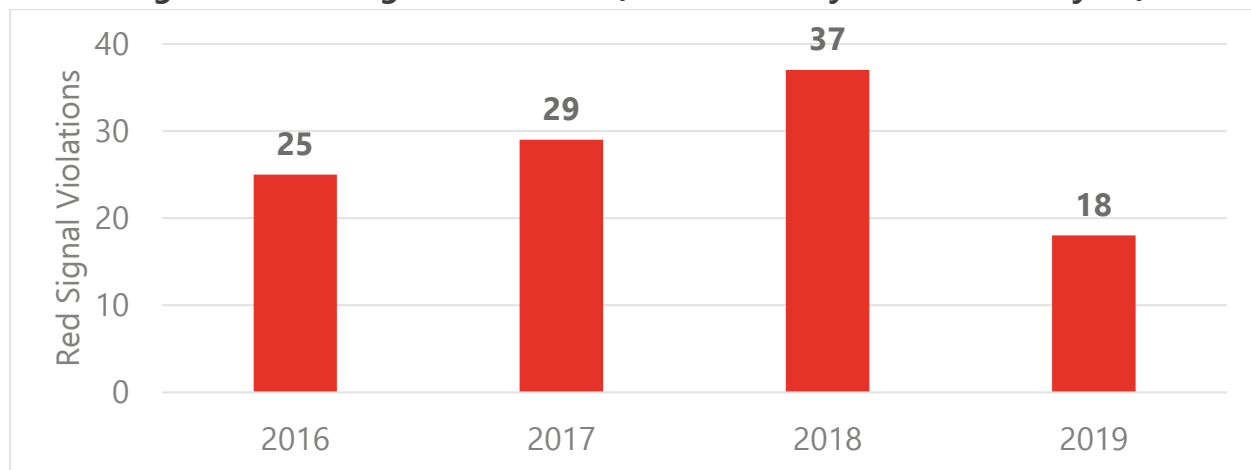
- **Monthly “Minute Clinics:”** These focus on the safety concern of the specific division, with operators determining what they want to learn based on their concerns, which encourages buy-in and ownership. This keeps the clinics relevant to recent events.
- **Quarterly training:** These are provided for all operators, which covers agency-wide concerns along with specifics customized to the department hot spots. The topics vary quarterly and have included the following in the last four years: Bloodborne Pathogens, fatigue awareness and seatbelt usage, heat stress, PPE and red-light awareness, winter driving safety tips, pre-trip inspection, slips, trips and falls, near misses and fire extinguisher use, distracted driver and operator safety, hazard ID process, safety violations, smart drive clips, fire assembly points, don’t be a target, and basic SMS.
- **Light rail worker protection program:** This is a training and implementation program that protects rail employees working in the right-of-way (ROW); it also covers contractors and anyone visiting the ROW.
- **Hazard ID program:** DART uses software that gives employees an opportunity to identify any hazards. These hazards are then elevated to managers and discussed at the bus and rail safety committees.
- **DART safety committee:** This committee consists of safety management, union, and the Executive Management Team. The Executive Management Team covers all departments at DART including Operations and Maintenance to Human Resources and Capital Programs. With SMS, the committee members are elevated to the executive level. The safety committee meets monthly.
- **A rail side “after action” review team:** This team reviews problems, checks for similar issues at other locations, and confirms proper documentation is in place along with corrective actions completed.
- **Industry safety tracker:** This tracker assists in tracking and deals with safety issues on a case-by-case basis.
- **Public Transportation Administration Safety Plan (PTASP):** This PTASP includes the processes and procedures to implement Safety Management Systems (SMS) including safety performance targets. This plan was to be in place by July 2020, but the deadline was extended to December 31, 2020 due to COVID-19 and is updated annually.
- **Early involvement of safety personnel in design:** Such involvement allows for the incorporation of safety initiatives that meet SMS program requirements.
- **“Safe Driver Award:”** Instituting such an award recognizes and rewards safe drivers.

4.11.4 Safety Trends

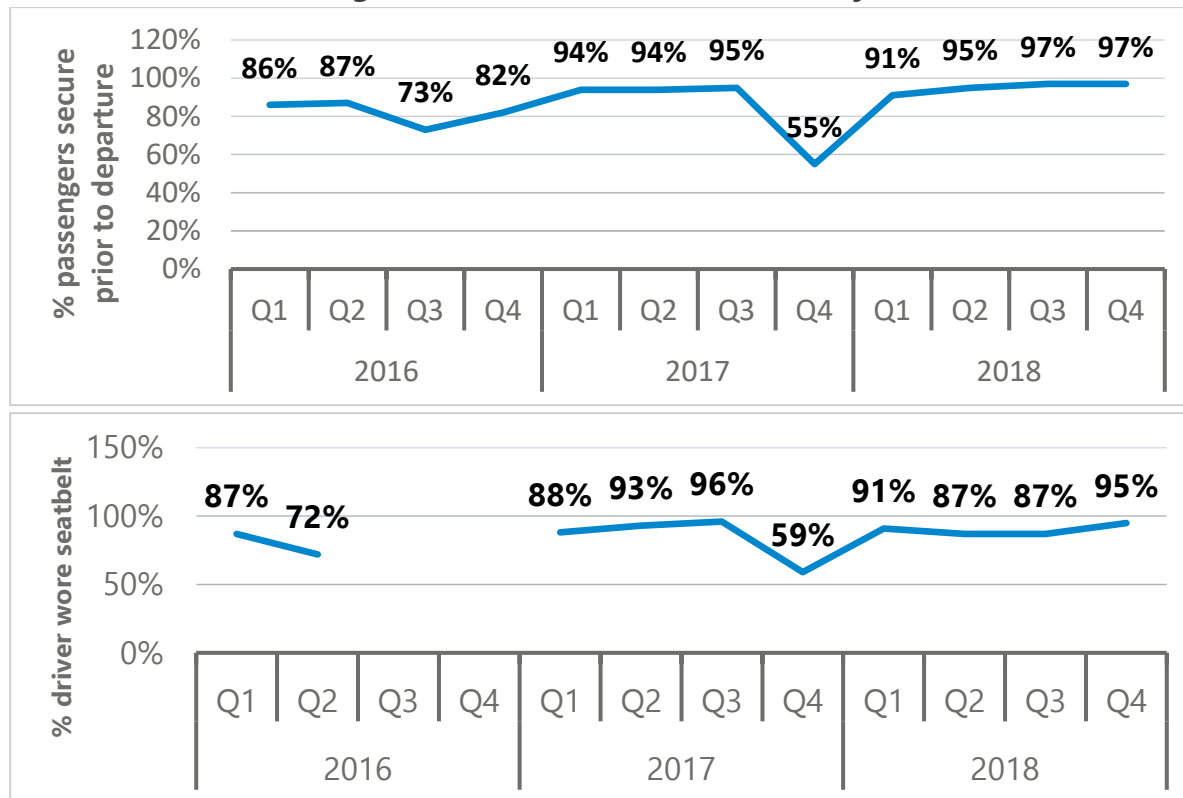
After DART noted a spike in **red signal violations** in 2018, as shown in Figure 78, it evaluated the situation and noted that operators were having a hard time seeing the signal due to bright sunlight. Longer sun shields were found that block out some of the sunlight, making signal lights easier to see; DART also switched to the use of LED bulbs. Violations decreased in 2019. The Team sees this as a pro-active and innovative move by the agency.

Observation 23: Available data shows that DART had a spike in red signal violations in 2018, which were reduced in 2019 due to the installation of longer sun shields to block out low sunlight in winter months. The Team commends the simple but effective approach.

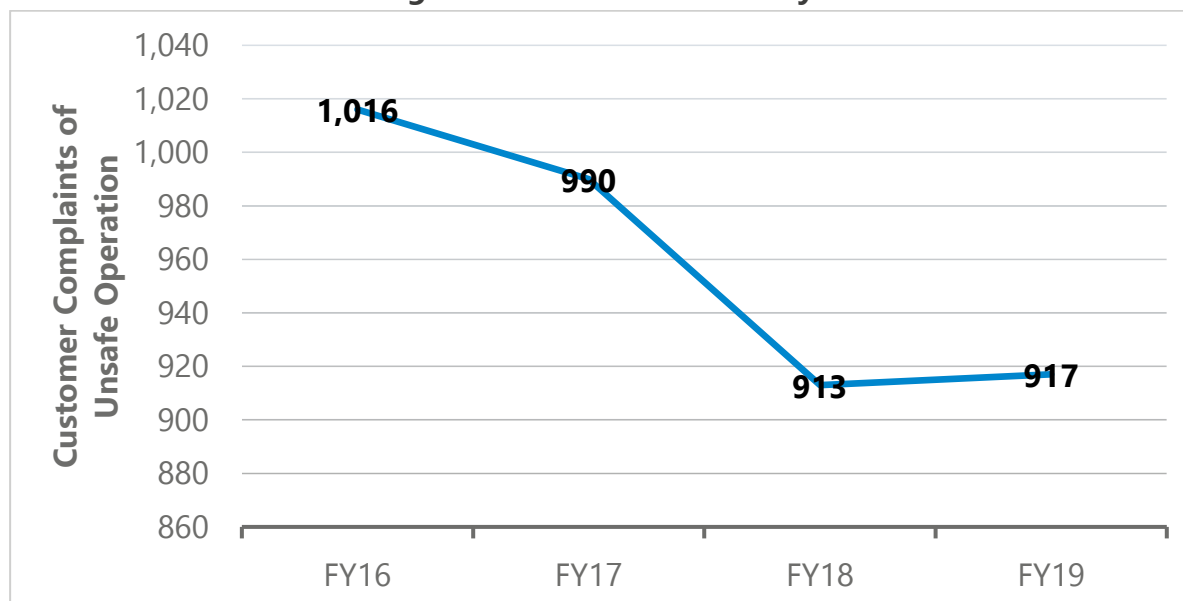
Figure 78: Red Signal Violations (October – May for each fiscal year)



DART reviewed paratransit trends using the data provided via customer surveys. Positive trends were seen except for what appears to be inaccurate data in Q4 2017, as in Figure 79.

Figure 79: Paratransit Trends Survey Data

Bus trends were reviewed using the data provided via customer complaints. Positive trends were noted based on the reduction in complaints for unsafe operations, as shown in Figure 80.

Figure 80: Bus Trends Survey Data

However, the use of personal wireless devices in paratransit surveys and cell phone usage in bus complaints appears high and/or growing compared to the beginning of the Review Period.

Figure 81 shows that the percentage of paratransit operators who used a personal electronic device in the Review Period varied from 12% to 36%, with consistent reporting of over 20% in the last three years. Figure 82 shows bus operator cellphone usage complaints increased by over 25% during the Review Period.

Figure 81: Paratransit Operator Use of Personal Electronic Device, Customer Survey Calls

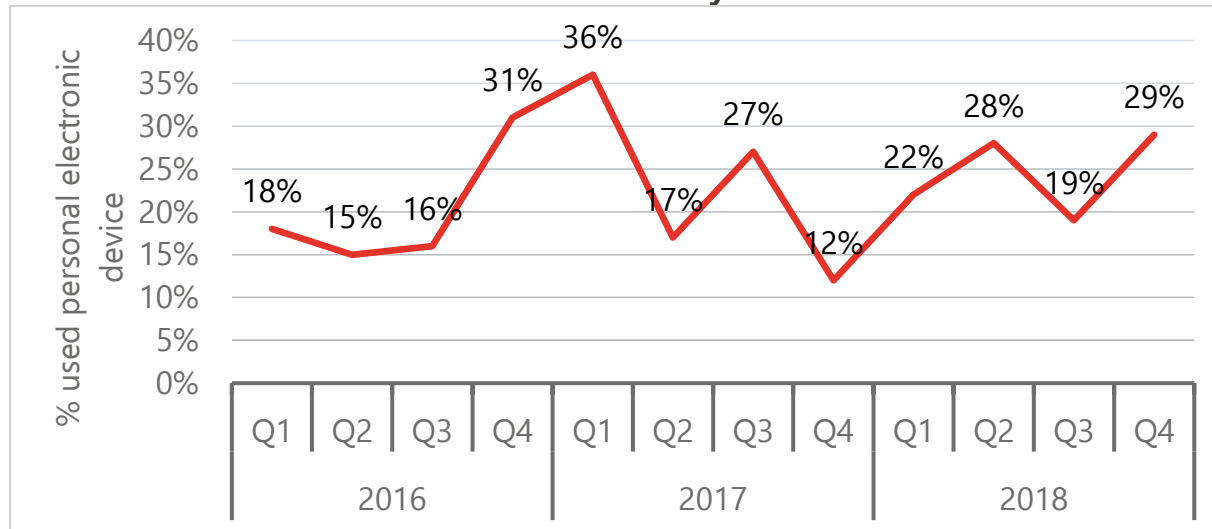
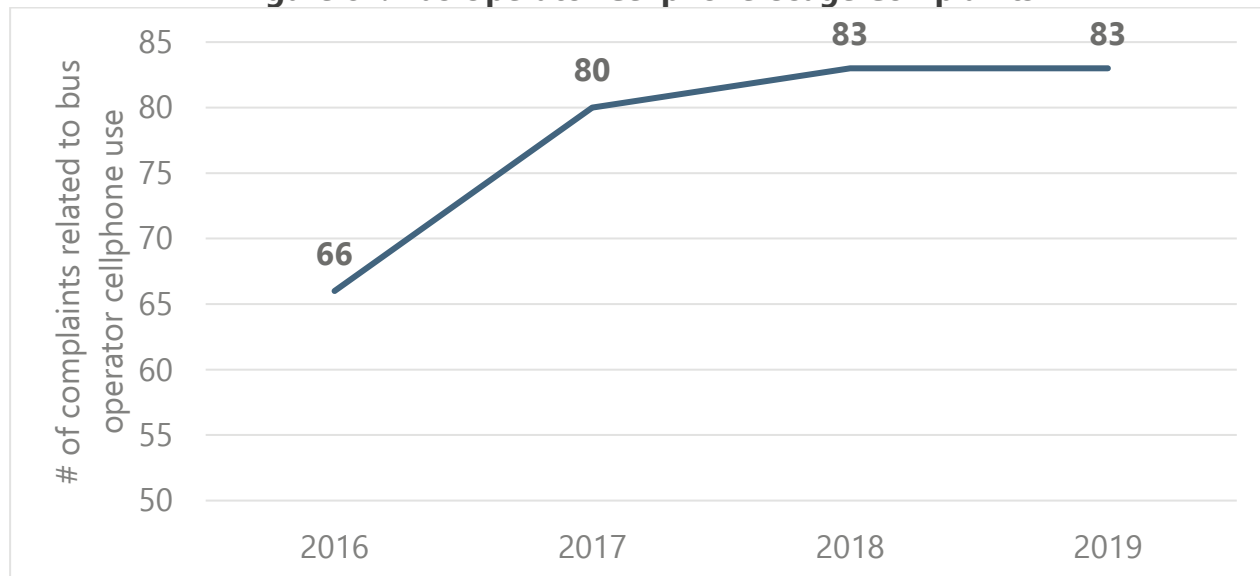


Figure 82: Bus Operator Cellphone Usage Complaints



With the passage of Texas House Bill 62 in 2017, which prohibits the use of a wireless

communication device while operating a motor vehicle, this area of safety is of particular concern.

DART indicated in an interview that it does not provide lockboxes for operators to store personal electronic devices on the vehicles but does at the operating yards. DART informed us that it allows operators to store devices in their bags, provided they were not accessible while vehicles are in service. On a separate occasion, the Team was informed that operators must put their cellphone in a lockbox and that DART verifies usage and that DART is thinking about putting jamming devices into the operator booth. While jamming devices may solve one problem, it may create others and the Team advises DART to review legal and federal rules and regulations in this regard.

DART's Administrative Employment Manual (AEM) and Hourly Employment Manual (HEM) contain a general comment that employees must not violate any laws or regulations, but the Team believes that falls short of what it should be.

The Team did find the prohibition clearly in both the Bus and Rail Operator rule books. The "Light Rail System Book of Operating Rules - Volume 5", which actually pre-dated the House bill, states the following:

2013 ELECTRONIC DEVICES

Use or possession (possession is defined as being located on or attached to the person) of the following is prohibited while operating a DART vehicle, performing other routine work duties, performing yard duties, or walking along the right-of-way ...²⁷

And the Bus Operator Rulebook v7-1 p 39-41 states the following:

11.50 Use of Cellular Telephones, Cellular Telephone Accessories, and non-DART Audio/Visual Equipment

... While operating a DART bus or shuttle van, cellular telephones, cellular accessories, and audio/visual equipment are to be powered off (not in silent or vibrate mode), not attached or affixed in any way to any part of the operator or operator's clothing, and stowed away out of reach and sight.

Instructors are also prohibited from using cellular telephones, cellular telephone accessories, and non-DART audio/visual equipment while training students/operators.²⁸

Cellular telephones, cellular accessories, and audio/visual equipment are to be powered off (not in silent or vibrate mode), not attached or affixed in any way to any part of the instructor or instructor's clothing, and stowed away out of reach and sight.

²⁷ DART Light Rail System Book of Operating Rules, Volume 5 **Invalid source specified.** p 38

²⁸ DART Bus Operator Rulebook, Volume 7 **Invalid source specified.** p 39-41

Exception for Use of Cellular Telephones and/or Cellular Telephone Accessories:

While operating a DART bus or shuttle van, if the radio becomes inoperable and the operator has attempted to make it operable, cellular telephones and/or cellular telephone accessories may be used to call Dispatch after satisfying the following conditions: safely move the bus to the nearest bus stop on the route, bring the bus to a complete stop, turn on the hazard lights, place the vehicle in neutral, activate the parking brake, inform passengers of the situation, and step off the bus. Then, the operator can use the cell phone to contact Dispatch while off the bus.

Finding 3: *The misuse of cell phones and electronic devices is a concern both in compliance with the new regulation and in customer complaints and surveys. This needs clear guidelines, with consistent rules of engagement, encouragement, enforcement, and reporting as well as consistent measurement and evidence of compliance. DART should review its current SOPs on this topic and ensure that they are consistent with each other, with DART's policies, and with the law. Furthermore, given the Team's experience as professionals and knowledge of the dangers of distracted driving, the Team would urge DART to make a concerted effort to make all employees aware of this issue, make the penalties for misuse clear, and extend this policy to all employees—i.e., if an employee is driving a DART vehicle or their own vehicle on DART business.*

4.11.5 Security

One of the most innovative security programs is DART's "Say Something Safety and Security App." This app allows riders to report concerns directly to DART police via photos, videos, and text with locations. They can also be set up for alerts to nearby security activities. It is easy to use and can be used discretely. DART was one of the first agencies to develop such an app.

DART has been installing internal cameras on their vehicles and at their rail stations, participating in a federal grant program since 2016. DART has recently increased security guards and has hired more fare enforcement officers on trains, increasing from 63 to 100 officers. These officers can write citations and are available to contact DART police through DART-issued radios, if needed. Depending on the city, DART then works with the respective police department for assistance.

DART is part of the "Safe Place" program, a national non-profit organization that builds community safety nets for young people in crisis. When young people in crisis need help, they simply approach any uniformed DART employee and let them know they need a "Safe Place." DART employees then work in coordination with QuikTrip and Jonathan's Place staff to transport the child to safety. They are also posting signs at transportation hubs as required by Texas Senate Bill 1219 relating to human trafficking.

DART's uniformed officers remain highly visible on DART buses and trains and at DART facilities. DART also continues the use of plainclothes officers in vehicles and buildings. DART has taken some specific additional security steps including:

- Increasing patrols at key locations such as the Cityplace tunnel;
- Participating in an FBI joint task force on terrorism;
- Placing DART officers on the “North Texas Joint Task Force on Terrorism,” an organization of local police departments that share intelligence information; and
- Participating in “Downtown Dallas Central Business District” emergency preparedness planning.

Observation 24: *DART has taken a strong positive position on security, particularly after passenger surveys consider it a high priority in choosing public transit, and DART has a large population of riders that have a choice when it comes to transportation. DART has taken the initiative, obtained grants, and received state approvals to make several improvements. This initiative and the innovative way DART has approached security, from creating a GPS-enabled security app to installing cameras and increasing the visibility of enforcement officers and patrols, as well as developing active partnerships with other enforcement agencies, is to be commended.*

4.12 Training Programs

DART has a comprehensive training program that appears to go into great depth. Some of the highlights found are noted below:

- **Formal Training Program for Mechanics:** DART’s mechanics entry level training program is extensive, comprised of a series of training and tests that start at novice mechanics at M1 and go all the way to M6. To support the technical advancement of equipment and vehicles, this training becomes quite specialized as it advances. The Team highlights a few key points for the first four-year training program:
 - Mechanics start at M1, and if they meet training requirements, advance every 6 months to M2 and M3 then 12 months to M4, then after four years to M6.
 - DART trains all employees on new technology for new vehicles and equipment received.
 - To advance, mechanics must do the following:
 - Complete coursework in time and pass a test to demonstrate functionality; and
 - During first six months, the training department schedules sessions (e.g., back injury training, forklift, CNG fueling, etc.), but after this initial period, it is the employee’s responsibility to sign up and attend classes.
 - Employees are incentivized to participate since advancement is rewarded through pay raises.

- After the first four years, training becomes specialized.
- **Ongoing Field Training for Operators:** DART has active field supervisors who work with operators. The supervisors do ride checks, some unannounced, and performance evaluations. Dashboards are updated in real-time with “Survey 123” submissions by supervisors. Although personal interaction is important, there are new smart vehicle technologies that may make monitoring easier and remove bias that DART may want to obtain to improve performance.
- **Paratransit Training Requirements:** These requirements are a part of the contractual scope of work. The resulting training list appears comprehensive.
- **Training – Long-Term Commitment:** As DART maintains employees for a long time, employees become specialized over time. DART wants to encourage cross-training and opportunities for growth and has therefore partnered with local colleges to build an educated staff with skills necessary for different jobs, particularly in challenging positions such as in the signal and traction electrification department.
- DART has a “**Bus Operator to Supervisor Succession (BOSS)**” program, which applies to operators, mechanics, and other entry-level and tech employees to gain the knowledge and skills to move up to first-line supervisor positions and for junior supervisors to move up into middle management.

Observation 25: *DART appears to have a solid training program but recognizes the need for continuous improvement with other educational partnerships, including the creation of a “Transit Operations Academy” and apprentice programs with local colleges and trade schools. They have also recognized the need for more hands-on practicums in the field. DART should also consider available digital technologies to provide some of these needs and creating and tracking quantitative measures of training success.*

4.13 SOPs, Rulebooks, and Manuals

As a part of the Performance Review, the Team reviewed standard operating procedures (SOPs), rulebooks, and employment manuals to ensure that DART has provided necessary guidance for performance or accomplishment of activities in accordance with regulatory requirements of directives. This review focused on critical areas where regulations exist for programs such as drug and alcohol testing, prohibition of cell phone use while operating a DART vehicle, Equal Employment Opportunity (EEO), and the Americans with Disabilities Act (ADA). In all cases DART had specific and sufficient rules or requirements in place. However, the documents do not refer to each other, are not reviewed, and updated as a group. The Team had to review a wide range of information to locate the required documentation.

Observation 26: *DART would benefit from reviewing unit rules and SOPs together at regular intervals. Even if individual SOPs do not require major updates, regular reviews give users*

confidence that the rules and procedures they are learning are current. DART might write this requirement as an SOP itself—i.e., to update SOPs at defined intervals or as a response to safety, maintenance, or other events.

The materials reviewed were checked for completeness, organization, and thoroughness through a process of both targeted and random reviews for other topics. The Review Team chose several topics to specifically review, including wire down procedures, train evacuation procedure, cell phone usage, and safety (police or medical procedures). Specific items reviewed are listed below:

Table 10: Inventory of SOPs, Rulebooks, and Manuals

Title	Last Revision	Description	Observations
Light Rail System Book of Operating Rules Volume 5	November 2017	Comprehensive list of light rail operating rules with color renderings of key information such as signal aspects. The book is well organized and current.	
Light Rail Standard Operating Procedures	April 2004	Contains instructions for DART personnel regarding incident responses. Generally, should be reviewed and updated at a minimum of every ten years.	SOPs and rulebooks are often complementary and work best when updated as a package. The relative age of the rail SOPs is a concern.
Engineering SOPs listed under Light Rail Maintenance Standard Operating Procedures	Various	Contains valuable information regarding warranty program administration. Also contains some seemingly operational SOPs such as power down after a derailment or removal of unrestrained animals from LRVs which are both recent, but unsigned SOPs.	DART should ensure that SOPs are located with the proper work groupings and that these specific SOPs are up-to-date in all areas.
Dallas Area Rapid Transit Bus Operator	Undated (but current)	Comprehensive listings of rules that must be adhered	The lack of a table of contents makes it such that users (operators) seeking

Title	Last Revision	Description	Observations
Rulebook Volume 7		to by DART personnel when operating buses.	specific information must scan through the book to look for information on any specific rule they want to clarify. The document should be dated.
SOPs Bus Operations	Individual SOPs updated on as need basis (Current)	List of specific bus incident responses for DART bus personnel. Also includes information regarding uniform requirements which might be more applicable to Bus Ops rulebook.	DART should ensure information is located in correct publication.
Engineering Bus Maintenance SOPs	Various (Current)	Contains information on warranty program administration and specific overhaul or component upgrade instructions.	Some SOPs in the bus maintenance list are clearly for LRV maintenance with the example of "Integrated Gate Bi-polar Transistor propulsion system retrofit". Care should be exercised to ensure correct procedures are filed with proper organization within DART.
Engineering SOPs Mobility Management	Various (Current)	Contains specific information regarding the administration of various rider programs or fare policies for vendors or DART service providers.	
DART Service Standards	2018	Contains specific information that guides DART's development of service based on desired geographic coverage and	DART is very advanced in their use of cost factors in their selection of service options.

Title	Last Revision	Description	Observations
		load capacity requirements. Also established use of and cost drivers for purchased alternative service options used by DART.	
Hourly Employment Manual (HEM)	01/25/18	Detailed guide for hourly employees. Includes important information for specific rules in areas such as substance abuse, safety requirements, as well as procedural guidelines for programs such as FMLA, workers' compensation, and various leave programs. Includes information for labor relations programs, including discipline and union representation of employees.	DART could consider including specific rules in this manual in the various other relevant rulebooks to make them more complete, such as rules on drug and alcohol use. The manual itself is very detailed and informative.
Administrative Employment Manual (AEM)	01/25/18	Detailed guide for administrative and salaried supervisors outlining work requirements and responsibilities as well as various programs available to DART employees within this classification.	

The Performance Review Team was not provided with specific SOPs governing contracted services for areas such as TRE or Mobility Management. Any requirements for these areas are likely to be included in the specific procurement and contract language between DART and the service providers. These areas are subject to review by FTA, FRA, and in some cases State Safety Oversight (SSO) and are regularly audited by these organizations.

Observation 27: The following is a summary of the observations in Table 10.

- The relative age of the Rail SOPs is a concern.

- *SOPs and rulebooks are often complementary and work best when updated as a package.*
- *DART should ensure that SOPs are located with the proper work groupings and that these specific SOPs are up-to-date in all areas.*
- *The lack of a table of contents for the bus operator rulebook makes it more difficult for users seeking specific information. The document should also be dated.*
- *DART should ensure information is located in the correct publication.*
- *Some SOPs in the bus maintenance list are clearly for LRV maintenance. Care should be exercised to ensure correct procedures are filed with proper organization within DART.*
- *DART Service Standards shows that DART is very advanced in its use of cost factors in their selection of service options.*
- *DART could consider including specific rules in the hourly employment manual in the various rulebooks to make them more complete, such as on cellphone use during vehicle operation and on drugs and alcohol.*
- *DART or its vendors operating TRE or paratransit services should have similar SOPs and rulebooks that are maintained in a similar fashion to DART's.*

Appendix 1 Other Recommendations

1.1 Bus Shelter Contracting

DART has aggressively pursued revenues from the placement of commercial advertising in most of its possible locations, including vehicle interiors and exteriors and in rail stations. In its *2021 Proposed Annual Budget and Financial Plan*, Figure 2.9, "Operating Revenues," page 68, DART shows advertising revenues increasing fairly steadily from \$4.1 million for fiscal 2020 to a projected \$9.0 million for fiscal 2040.

However, there is not currently any advertising on DART bus stop benches or in DART bus shelters. Also, DART is currently responsible for the expenditures to provide, maintain, and clean bus benches and shelters.

DART may wish to consider pursuing advertising on bus benches at bus stops and in bus shelters through contractors that currently provide such services, including providing, maintaining, and servicing the benches and/or shelters.

Before any decision is made to pursue such a possibility, DART should first:

- Make a preliminary projection of the potential revenues and cost savings from such advertising. The former can be done by contacting bus transit operators in comparable metro areas and transit advertising agencies and by review of current maintenance expenses and the opportunities for expense reduction;
- Decide if advertising on bus benches and at shelters, like advertising on vehicles and at other DART locations, is consistent with DART's overall policies and objectives;
- Work with the DART member cities to determine if such advertising would be consistent with their street landscaping and neighborhood appearance policies and practices. Note that, in many locations, the revenues from bus stop/shelter advertising accrue to the local general-purpose governmental unit(s), rather than the transit agency. However, even if DART does not receive the advertising revenues if such (an) arrangement(s) were to be entered into, DART could still receive the benefit of reduced capital and operating expenditures for providing and maintaining bus benches and shelters and, potentially, there could be more of these for its passengers;
- Recognize that there are fundamental differences in priorities between transit operators and bus bench/shelter advertising contractors:
 - Transit operators want to allocate bus bench and bus shelters by ridership and average wait time; the more riders at a location, and the longer the wait time, the more likely such resources are to be provided, and, all else equal, the greater the size and amenities provided;
 - Advertisers, on the other hand, are interested in the ability to place advertising where it can be seen by the most people;

- Have a workable plan for integrating—or separating—contracting for bus bench/shelter advertising from existing, similar advertising contracts;
- Be fully cognizant that, even if the bus bench and/or shelters advertising is contracted out, DART will still have significant responsibilities:
 - If DART, instead of the DART member cities, is the contracting government agency, DART would be responsible for overseeing the contractor, including ensuring that the required standards for such matters as bus shelter safety and appearance are met;
 - Even if DART is not the contracting agency, it will bear the responsibility for receiving the comments from riders, neighbors, and other interested parties in regard to the bus stops and shelters and the advertising therein, and then passing these on to the specific cities and/or the contractor(s) and otherwise coordinating with its member cities.

In regard to who should be doing the contracting, DART or the individual cities, it is more likely that potential contractors would rather deal with a single entity, versus potentially more than a dozen individual government agencies; the total revenues would likely also be greater, and the appearance of the bus shelters would be more consistent.

Observation 28: *DART may wish to consider pursuing advertising on bus benches at bus stops and in bus shelters through contractors that currently provide such services, including providing, maintaining, and servicing the benches and/or shelters.*

1.2 Maximize Reporting of Eligible Metroplex Transit Operations to NTD

The Team recommends that DART, working with other appropriate agencies, actively search for and recruit Dallas-Fort Worth-Arlington urbanized area (UZA) transit and paratransit operators, public and private, to submit their reportable operations to the National Transit Database (NTD) in order to increase the allocations to DART's UZA and, subsequently, to DART itself. The potential increases in federal formula transit funds could run into the millions of dollars per year.

Formula Federal Funding is one of DART's largest sources of revenue. In its *2021 Proposed Annual Budget and Financial Plan*, Figure 1.9, "Sources of Funds," page 36, for 2021, DART shows Formula Federal Funding originally budgeted of \$78.9 million, 9.4% of total non-debt revenue sources, second largest behind only Sales Tax revenues of \$583.8 million.

The Team notes that the allocations are made by urbanized area which, in this case, means the Dallas-Fort Worth-Arlington UZA, 1,780 square miles with a 2019 population of 5,910,669²⁹, which does not match up with city or county political boundaries or the coverage area of the North Central Texas Council of Governments (NCTCOG).

²⁹ Census Reporter, Dallas-Fort Worth-Arlington, Texas Urbanized area, <https://censusreporter.org/profiles/40000US22042-dallas-fort-worth-rlington-tx-urbanized-area/>

The Team recommends that DART, working in conjunction with NCTCOG and other transit operators, reach out to each potential NTD-reportable transit and paratransit operator in the area, including demand-responsive, medical demand-responsive, public and private-sector vanpool operators, and even the fixed guideway operator, Las Colinas Personal Rapid Transit.

In some cases, it may be advisable to be prepared to offer some types of technical assistance or even financial assistance to encourage potential reporters to make their NTD submissions.

Also, DART should be aware that there is generally a two-year delay between the data being reported to NTD and the funds being available to transit operators in the Dallas-Fort Worth-Arlington UZA.

DART, along with NCTCOG and the other transit operators in the UZA, would be best served by reaching advance consensus on the distribution of any additional funds between the operators.

Observation 29: *The Team recommends that DART actively search for and recruit Dallas-Fort Worth-Arlington urbanized area (UZA) transit and paratransit operators, public and private, to submit their reportable operations to the National Transit Database (NTD) to increase the Formula Federal Funding allocations to DART's UZA and, subsequently, to DART itself.*

1.3 Lost Trip Reporting

The Team recommends that DART formalize and improve its process for reporting of lost trips.

Definition of "Trip."

For purposes of the Performance Review, the definition of a "trip" is: a one-way trip by a transit vehicle in revenue service starting at one terminal point of a route and ending at another terminal point." A round trip is counted as two separate trips.³⁰

In the transit industry, the term "trip" is used in many different ways, such as "unlinked passenger trip," which refers to the movement of a transit passenger on a single transit vehicle operating in passenger service. "Trip" is also sometimes used to refer to a work assignment for a transit operator, which is generally for several one-way trips in a single shift and/or day of work—but the Team will refer to this as a "run".³¹ For this discussion, "trip" is a single one-way movement of a vehicle in scheduled transit service. A "lost trip," or "missed trip," is a scheduled trip that was either not initiated, was not completed due to various issues that occurred between the initiation of the trip and its scheduled terminus, or it was not initiated until well after the scheduled initiation time.

³⁰ U.S. Department of Transportation, Federal Transit Administration, *Glossary of Transit Terms For Section 15*, February 1992.

"Section 15" was the processor term for what is now known as the National Transit Database, coming from Section 15 of the Urban Mass Transportation Act of 1964, as Amended (now recodified as 49 USC 5335).

(There is no definition of "trip" in the current NTD Glossary.)

³¹ Dallas Area Rapid Transit Bus Operator Rule Book, Volume 7, §2.40, "Selecting Runs," page 11.

Statement of the Problem

The Team noted a trend of increasing numbers of lost trips, as shown by the following spreadsheet summary provided by DART. While the increase in lost trips is an important issue that will be addressed separately, this discussion concentrates on the methodology for reporting lost trips. Without accurate, consistent, and promptly available data regarding lost trips and their causes, it is more difficult to determine what problems exist and what actions should be taken.

Table 11: Summary of Lost Trips on Bus by Cause

By Cause	2016	2017	2018	2019
Accidents	1,157	1,065	1,112	1,469
Amenities	2	7	11	3
Bus Bridge		2		11
Criminal Act	68	52	28	65
Fare Box			5	3
Late Pull Out	585	850	771	1,694
Late Relief	82	197	60	56
Mechanical	3,511	4,130	4,361	6,689
No Pull Out	838	1,914	1,201	2,726
No Relief	472	630	139	1,117
Operator	547	556	474	888
Other		99	136	248
Passenger	458	487	575	709
Running Late	226	366	312	280
Silent Alarm	11	11	8	11
Supervisor	4	2	23	34
Fare Evasion	4	2	5	2
Grand Total*	7,965	10,370	9,221	16,005

* Grand Total for all four years combined is 43,561.

A problem on one run can lead to multiple lost trips; if a piece of work consisted of eight one-way trips and, on the sixth one-way trip, the vehicle became inoperative, the sixth run was not completed, and there was no substitution of a vehicle for the last two one-way trips and they were not operated, there would be one incident that caused a total of three lost trips.

The Team was provided with the master spreadsheet used to prepare the above schedule and did an analysis of incidents by number of lost trips, producing:

Table 12: Lost Trip Incidents by Number of Lost Trips per Incident

Number of Lost Trips/Incident	Number of Incidents	Number of Lost Trips	Percentage of Incidents	Percentage of Lost Trips
1	8,661	8,661	40.9%	19.9%
2	8,586	17,172	40.6%	39.5%
3	1,723	5,169	8.1%	11.9%
4	989	3,956	4.7%	9.1%
5	409	2,045	1.9%	4.7%
6	410	2,460	1.9%	5.7%
7	34	238	.2%	.5%
8	141	1,128	.7%	2.6%
9	58	522	.3%	1.2%
10 to 19	138	1,711	.7%	3.9%
20 to 40	16	427	.1%	1.0%
Totals	21,165	43,489	100.0%*	100.0%*

* Does not sum to 100.0% due to rounding.

Issues

1. There is no master procedure or instruction on how data are to be reported, nor definitions of terms, nor examples of how specific types of incidents should be reported; as a result, it appears that certain similar incidents are reported in different categories. For example, the same incident could be categorized as Fare Box, Mechanical, Other, or Supervisor.
2. There is no specified time period for defining when a late pull-out becomes a missed trip. Both should be reported, but a bus departing the operating garage or the layover point six minutes late, which means that some passengers will be inconvenienced in what is likely to be a minor way, is different from a bus pulling out for the first run over 60 minutes late, which can mean passengers experiencing serious missed work or medical appointment problems.
3. There is no grouping of incidents, for example no sum of all operator-associated incidents, sum of all mechanical-associated incidents, and sum of incidents which are generally not controllable by DART (i.e., criminal act, passenger-caused, fare evasion).
4. If a trip is lost because of the lack of *both* a vehicle *and* an operator, it should be reported in a category for both. For the grand total, it is reported once, but for operations and maintenance evaluated separately, it should be reported and responses prepared for each, for the *full* number of incidents for each. This requires honest reporting of such lost trips.
5. The sum of lost trips on the first schedule, 43,561, does not match that on the second, 43,489. The difference is not large – 72, or <.2%, but there should not be any difference.
6. There are many incidents with high numbers of lost trips, 103 (.5% of total incidents) with more than ten lost trips per incident, resulting in 1,628 lost trips (3.7% of total lost trips).

All but a few lost trips are caused by either the lack of an operator (no operator available for first trip and no replacement, sick on duty, etc.) and/or a vehicle (no vehicle available for first trip, breakdown in service, etc.). While many runs have the same operator and same vehicle, it is common to have some longer vehicle runs where the bus will be out longer than what is allowable or desirable for the operator, so there is a relief operator assigned to replace the original operator for the last part of the vehicle's run. However, the percentage of even such very long runs that exceed ten is generally very small—and runs with 20 or more trips, going as high as 40 in the detail spreadsheet, appear questionable.

7. Some of the titles in the first spreadsheet are not immediately clear. "Amenities," for example, appears to refer to a passenger getting sick or having other personal issues while on the bus, requiring that the bus be removed for service for cleaning.

Over 40% of the total lost trips were caused by incidents that resulted in three or more lost trips. Generally, in a situation that can cause the loss of the bus and/or operator for the rest of the run, the response is to send out a replacement bus and/or operator to complete the last portion of the run—and, generally, if one assumes that a one-way trip is at least 40 minutes, when the turnaround time between trips is considered, it would normally take at least one hour to pull out a replacement bus to pick up the run. Of course, every situation is unique, and the above assumptions are simplifications, but having this many incidents that appear to show either no replacement vehicle/operator assigned, or taking what appears to be a lengthy period for the replacement to go into service, is worth noting. In many cases, the last trips on a run are in the afternoon peak, when many riders would be traveling home from work or from other causes and could result in either a passenger being marooned or being seriously delayed.

Recommendations

1. DART should convene a committee to develop an integrated policy, process, methodology, procedure, and tools to improve data collection and reporting of lost trip incidents. The committee should include the first-line and mid-level managers who deal with the issues in their daily work with oversight and supervision from higher executives.
2. Although the above focuses on bus lost trips, the Team recommends that the committee have members from all DART modes (bus, light rail, demand-responsive, streetcar, and TRE) and all functions (operations, maintenance, planning [including run-cutting and scheduling], engineering, safety, and security). While there will be numerous types of incidents unique to each mode and function and there will need to be separate procedures for each mode, each individual modal process should be based on an overall common understanding of what is required, so that, among other things, all data users will have a common understanding of the terms and the data and that comparisons between modes and between operating yards and contractors will be meaningful.
3. The main product will be an operating procedure and manual:
 - a. All terms should be common and defined and, to the greatest extent possible, easily understandable by all, including those new to the process.

- b. As is done in the current system, there should be categories and subcategories. For example, within mechanical, there should be engine, transmission, HVAC, etc.
 - c. The categories and subcategories should be compatible with other systems, such as vehicle maintenance and safety, security, and risk management. Where possible, the same data should be entered once for all such systems and, as appropriate, later updates and/or corrections should also be entered once for all system, with a complete audit trail of such changes.
 - d. The number of major categories should be reduced by elimination/combination of most of the smaller ones; for example, some categories do not appear to be particularly useful ("Fare Box," at eight total lost trips over the four-year period; "Fare Evasion," with 13; "Amenities," with 23; and "Silent alarm," with 41)
 - e. The manual should include examples; such as, if this occurs, it is reported as "A;" if that occurs, it is reported as "B;" – and the list of examples is updated as new types of incidents occur and need proper reporting. The idea is, when someone has a question, there is an easily searchable document available.
4. There should be initial, on-going, and as-needed training of all users of the system.
5. Detail reports should be issued at least daily and reviewed by first-line managers for:
 - a. Data accuracy and completeness, which may indicate the need to educate the staff members entering the report; and
 - b. Events that may indicate the need for action, such as a recurring pattern of mechanical break-downs or continuing safety/security incidents at a specific bus stop or lay-over point.
6. Higher-level managers should review summary reports to, for example:
 - a. Realize there is a difference in operator availability between operating yards; and
 - b. Realize that one operating yard is experiencing far more of one type of mechanical issue than other yards with similar vehicle fleets.

1.4 Reconciliation of Ridership and Fare Revenue

While the Performance Review scope of work did not include a detailed analysis of DART's reported fare revenue and ridership, the Team noticed a number of inconsistencies that it could not reconcile, particularly between the fiscal year 2018 and 2019 reports to the National Transit Database:

- Total UPT, all modes (including TRE), increased 6.9 million, 11.0%.
- Bus ridership increased 7.2 million, 24%, more than the total increase for all modes.
- DART had a major fare increase in August 2018, about six weeks prior to the beginning of the 2019 NTD reporting year. Revenues for the most prominent fare media, such as monthly passes, increased 20%.

- In addition, there was an increase in demand-responsive fares in March of 2019; as DR was approximately 1.5% of total UPT in 2019, this fare increase could not be a major factor in the all-mode change.
- DART overall fare revenue increased 1%.
- Average fare/passenger decreased 9%.
- The first impression is that an 11% increase in UPT, coupled with a major increase in fare/trip, should have produced an increase in average fare per UPT and a larger increase in total fare revenue, but what was reported varies significantly from this.
- The consensus of DART personnel that the Team interviewed is that the major reason for the change in bus ridership was not that more riders were carried in 2019 than in 2018, but that the new APC installed for bus was far superior in collecting ridership data; in other words, the 2018, and prior period, bus UPT count was likely significantly understated. Given that the other major DART mode, light rail, showed a 2% decrease in UPT, this consensus appears reasonable to support a conclusion that the major factor in the year-to-year change in total UPT was the new bus APC system.
- Also, there were many changes in the overall fare structure over this period that produced fare reductions for some types of all-day transit travel, including transfers and round-trips. In addition, when there are shifts in total fare structure, many passengers will quickly realize how to reduce their new travel costs by changing the specific fare media that they utilize.
- There are undoubtedly many different factors that went into producing these results, but the Team has not attempted to review them in any detail to reach any conclusions.

The Team recommends:

- DART conduct an inquiry into the above to attempt to determine what occurred. However, as the time has passed to be able to generate new data on past events, let alone attempt to change or correct what went on in the past, the main purpose of this inquiry should be forward-looking, to attempt to ensure that DART has good control of its fare revenues and the rapid reporting of data to be able to analyze trends and respond to changes in operating conditions.
- DART should monitor which fare media are utilized for trips by mode and monitor changes in utilization of media, along with changes in UPT.
- DART could review how it allocates fare revenue by mode. It is impossible to precisely allocate fare revenue for many of DART's most utilized fare media; e.g., if a passenger uses a monthly pass for a one-way trip on one day that starts on a DART bus and continues to a light rail train, it is unclear how much fare revenue should be allocated to each of these two unlinked trips within the overall linked trip. There is no consensus in

the transit industry as to how this should be done and almost every transit agency has its own way of doing the allocation.

- DART could monitor fare violation rate by mode to see how these have changed over time and if it is possible to make this determination. It should be possible to track inspection rates and violations noted and citations issued on buses, for instance. DART could also reconcile data from fareboxes, ticket vending machines, and fare inspection with passenger counts to see if there are changes in ratios and trends over time.
- DART could review processes for internal fare revenue processing, fare media security, and counting, particularly for cash fares and ticket sales to determine whether they are reasonably and appropriately secure; security procedures and equipment should be developed and maintained with value and cost-effectiveness in mind.
- Central to all of the above is that DART could monitor whether fare compliance is a significant problem and what it is worth for DART to increase fare compliance. However, it can also easily cost more to increase compliance than the additional fares and fines collected, to say nothing of the potential passenger disputes and disruptions that strict enforcement can generate.

Observation 30: *There appear to be trends in ridership and fare revenue data reported to NTD that cannot be easily explained. The Team recommends that DART conduct an inquiry into the above to attempt to determine what occurred. However, as the time has passed to be able to generate new data on past events, let alone attempt to change or correct what went on in the past, the main purpose of this inquiry should be forward-looking, to attempt to ensure that DART has good control of its fare revenues and the rapid reporting of data to be able to analyze trends and respond to changes in operating conditions.*

Appendix 2 DART Response

The following table summarizes DART staff's response to the observations and findings of this report.

#	Topic	Observation	DART Response
1	Bus Operations	Available data suggests that DART operators are not reducing cell phone usage per state requirements and best practice safety protocols. The Team makes six recommendations on how to ameliorate this situation, including a Finding.	Comments included with Finding 3.
2	Bus Operations	DART should carefully 1) monitor missed trip trends and 2) customer complaint data to determine if the 2019 measures to increase missed trip reporting accurately form the new baseline in the recording of actual events.	Prior to January 8, 2021, missed trip reporting was created manually on a spreadsheet. Beginning January 9, 2021, the Technology team finalized and started automatic distribution of a daily missed block report that pulls directly out of our scheduling software, Trapeze. We are currently working on a weekly summary with percentages of missed trips. Once complete we will then add this item to our KPI reports and Tableau dashboard for trend analysis.
3	Bus Maintenance	The maintenance department reports that it has sufficient resources on hand to meet the maintenance challenges of the fleet and the Performance Review Team would concur. Therefore, DART needs to evaluate other reasons for missed trips because missed trips due to mechanical reasons have increased.	As mentioned in the review, the small bus fleet of ARBOC's is nearing end of life and is scheduled for replacement. The Engineering Department is leading the procurement of replacing 115 ARBOC buses in FY2022.

4	Bus Operations	DART must continue to focus on ways to improve bus ridership, including eliminating low-demand routes, increasing frequency and service on high-demand routes, and fostering GoLink and other innovative transit solutions.	Service evaluation and changes are the responsibility of the Planning Department, not the Bus Operations Department. Currently, this is a Board directed item.
5	Bus Maintenance	DART has identified various maintenance initiatives for bus maintenance to be implemented in the next two years. These initiatives, supported by an alternative bus procurement plan, could have dramatic impact on MDBF, which in turn could help improve on-time performance.	<p>In addition to a more proactive maintenance approach, we will also implement labor standards through our new EAM system. The implementation of labor standards will give us the ability to efficiently manage our inspections and repairs to allow for more wrench time for mechanics.</p> <p>Currently our engineering team is testing buses to verify the feasibility of 12,000-mile oil change intervals.</p>
6	Light Rail Maintenance	DART will require staff who have increasingly higher skill levels with the increased use of sophisticated systems and electronic technology. These needs are going to be a further cost burden and to adequately fill these positions, DART may have to increase wages on top of increasing costs for healthcare and other benefits for some positions.	We concur with this observation; there are jobs that require more sophistication. "More laptop, less wrench." As for addressing wages and benefits, we will undertake a review with DART Human Resources to reassess these positions.
7	Light Rail Maintenance	As DART's light rail fleet and infrastructure age, it is important that DART pay more attention and devote more resources to maintenance, thereby improving operations performance. This may include creating five-to-seven-hour work packages that can be accomplished after PM peak using single tracking. This has successfully created	A major challenge for Rail Operations, specifically WSA Maintenance Crews, is creating sufficient time to perform critical maintenance on equipment. DART will be reviewing strategies to increase available times for rail maintenance repair with the least amount of customer service

		better work packages at other agencies versus only performing maintenance when trains are not operating.	<p>impact as feasible. To shut the rail system down for maintenance, bus bridges are required.</p> <p>Strategy review encompasses the following avenues to increase available rail maintenance repair times:</p> <ul style="list-style-type: none"> 1) Single Tracking Operations during off-peak times 2) Combining maintenance operations with planned service disruptions (ex: Tunnel Connectivity Project) 3) Utilizing daily non-service window
8	Light Rail Operations	DART should evaluate the root causes of its higher relative light rail costs versus peers. Bus restructuring and the expansion of GoLink may help to foster intermodal traffic with light rail, thereby increasing passenger utilization and improving cost and subsidy performance.	The review of ridership, feeder services, operating cost, and fare structure to determine root cause/s of higher costs would best be served by a cross-functional team within the Agency. The Service Planning group would be best equipped to lead this effort.
9	Light Rail Maintenance	As it replaces its existing fleet, DART should evaluate whether it needs to have such high spare ratios and the financial and strategic benefits of peak demand fleet availability.	DART does "obsolete" parts when necessary. This observation is under review for further process improvements. There is a three-year pilot that removes 10 cars from service; it is successful to date. Therefore, DART is also examining the impact of purchasing fewer cars in our next fleet purchase. This action, if feasible, will help with the spare parts issue.

10	Light Rail Maintenance	DART should update all maintenance and inspection plans—for fleet and way and structures—based on realized maintenance experience and current asset reliability. This requires DART to record and better analyze specific asset degradation behavior.	<p>DART does update maintenance plans for both Fleet and WSA. As far as degradation of our assets, DART's new Maximo Program will be helpful, as the tool is implemented over the next 18-months.</p> <p>Engineering's Fleet Maintenance team is also conducting a feasibility study to move from a 10,000 PMI inspection cycle to a 15,000 PMI inspection cycle.</p>
11	Light Rail Maintenance	While light rail has been meeting its revised mean distance between failures (MDBF) target, it is failing to meet its on-time performance target and could not meet its original MDBF target level, which was subsequently lowered in both 2018 and 2019. The Team recommends reviewing the maintenance approach to increase fleet reliability and performing a root-cause analysis for on-time performance to enable a targeted improvement program for both metrics.	<p>LRT is meeting its target overall. There were reliability fluctuations from time to time due to the startup of the Dallas Streetcar in 2018. These issues are resolved at this point.</p> <p>Engineering is revamping the LRV & Bus reliability program and employing a more collaborative approach to recommend/improve maintenance methods. This team plans to implement root cause analysis training by fourth quarter of FY21 to enable improved identification of causal factors and correct solutions for our aging fleet.</p>
12	Ways, Structures, and Amenities	DART does not have any specific KPIs to measure the performance of the DART ways, structures, and amenities. The Team recommends developing a key KPI on the availability of way, which might include a simple KPI that defines availability of way as a percentage of time. A more sophisticated KPI would define availability in terms of	DART does not set monthly KPIs for WSA. However, the Maximo Enterprise Asset Management system will assist us in the performance process as it is implemented over the next 18-months.

		functionality that the infrastructure should enable, such as speed restrictions and headway.	Engineering - The Fleet Reliability Panel will add a Rail Maintenance team member to meetings going forward starting week of Feb. 1, 2021. DART will also work with the Imperial College GOALs team to study industry wide WSA-KPIs and customize them for DART.
13	Paratransit	As DART manages paratransit services going forward with a new platform that makes use of many different service providers, it should continue paying attention to service quality metrics such as on-time performance and to customer service under this new format.	DART's Paratransit operators and vehicles have been outsourced since before the Review Period. The drop in OTP and Customer Service KPIs in FY19 Q4 can be attributed to the Soft-Start of MMS' new contract and model with MV Transportation. Average OTP rose again in FY20 to 92.24%. There were 4.4 complaints per 1,000 actual trips for FY20.
14	Paratransit	DART's paratransit costs are reasonable, in part due to the restructuring of the MV contract and its focus on managing these complex operations. This is in context of DART's generous service-area wide coverage and complementary rider assistance programs.	
15	GoLink	DART's GoLink appears to be a service and fiscal success—better service at a lower cost to DART. The question for DART as it expands this service is whether it can continue offering a similar quality of service, replacing poorly used fixed route bus service or offering new service as DART shifts fixed-route service to high-frequency corridors.	DART has expanded and plans to expand the GoLink service in the coming years.
16	GoPass	DART has made impressive strides with GoPass in the Review Period and is this field's transit industry leader.	

		When the GoPass App, GoPass Tap Card, and EMV are used by the majority of riders, this should materially decrease ticketing costs, reduce cash handling, and improve customer service.	
17	GoPass	DART's GTM Strategy is impressive and ambitious. DART should expect to consider a number of approaches as it grows GoPass in its service region and nationally, consistent with rapid change in the technology industry.	
18	TRE	DART—and Trinity—might review the opportunity to combine the management of all commuter rail operations under a single management team. At a minimum, both should study a combined management model which could potentially identify economies of scale for the three commuter lines.	
19	TRE	A high-level conclusion from KPI analysis of TRE is that DART, and partners, appear to have reasonable control of costs and that DART's focus needs to continue to be on making its modes more attractive to increase ridership.	
20	Service Planning	DART's board will be faced with challenges as it approves the appropriate trade-off between ridership and coverage, as other U.S. transit agencies have. The Team is encouraged by the opportunities that GoLink offers and prudent reduction of DART's FLEX Service. This may help make the board's decision easier, as these modes offer alternatives to riders who may lose bus service coverage.	

21	Service Planning	While DART's light rail system was essentially completed by 2016, DART continues to make prudent and timely capital investments to increase the performance of this critical asset. Since light rail is the backbone of DART's system, this increased performance should also improve performance of DART's other services that link to light rail.	
22	Benefits, Pension, and OPEB Costs	DART appears to have managed both pension and OPEB liabilities well during the Review Period. While there has been fluctuation, particularly in OPEB, the adoption of new accounting standards and mortality tables appears to have led to a more realistic calculation of the long-term pension and OPEB liabilities on DART's balance sheet.	
23	Light Rail Safety	Available data shows that DART had a spike in red signal violations in 2018, which were reduced in 2019 due to the installation of longer sun shields to block out low sunlight in winter months. The Team commends the simple but effective approach.	Signal section will continue to work with Rail Training to help determine causation factors for high red signal incursion locations. Rail Training Program has evaluated and redesigned rail operator training that contributed to the decrease in red signal violations. Red Signal - Trend Analysis data is available for further analysis.
24	Security	DART has taken a strong positive position on security, particularly after surveys show passengers consider it a high priority in choosing public transit. DART has taken the initiative, obtained grants, and received state approvals to make several improvements, including a GPS-enabled security app, installing cameras, and	

		increasing the visibility of enforcement officers and patrols.	
25	Training	DART appears to have a solid training program but recognizes the need for continuous improvement with other educational partnerships, including the creation of a "Transit Operations Academy" and apprentice programs with local colleges and trade schools. They have also recognized the need for more hands-on practicums in the field. DART should also consider available digital technologies to provide some of these needs and creating and tracking quantitative measures of training success.	Maintenance Training began providing more in-shop presence to observe and identify training needs; trainers also provided guidance accordingly. However, COVID-19 protocols have hindered the Maintenance Training team in this effort. Recently, 3D video and picture animation (digital technology) were added as a training tool. Research continues for other digital technology that can help technicians perform tasks, receive real-time assistance from an industry expert, access service manuals or watch short micro learning videos.
26	SOPs, Rulebooks, and Manuals	DART would benefit from reviewing unit rules and SOPs together at regular intervals. Even if individual SOPs do not require major updates, regular reviews give users confidence that the rules and procedures they are learning are current. DART might write this requirement as an SOP itself—i.e., to update SOPs at defined intervals or as a response to safety, maintenance, or other events.	The Engineering standard is for all SOPs to be updated every 5 years. Currently, Operations Document Control is completing an audit to determine documents that are due for an update.
27	SOPs, Rulebooks, and Manuals	The Team makes nine recommendations related to this topic, including updating of SOPs and rulebooks simultaneously, especially when they have not been updated in many years, including a table of contents in all rulebooks for easy user reference, ensuring information is located in the correct publication, removing SOPs for light rail vehicles that are included in bus maintenance lists, and	

		ensuring that TRE and paratransit contractors have similar SOPs and rulebooks to DART's.	
28	Bus Operations	DART may wish to consider advertising at bus stops and in bus shelters through contractors that currently provide such services, including providing, maintaining, and servicing the stops/shelters.	Advertising at Shelters and Bus stops is currently prohibited. This activity must be permitted by the cities where these shelters and stops are located. However, we are working on gaining approval of such advertising, first with the City of Dallas. Additionally, many advertising contracts do include maintaining and servicing of the stops and shelters. Should we gain approval for advertising, we would then establish an RFP and include maintaining the stops and shelters in the contract.
29	Funding	The Team recommends that DART actively search for and recruit Dallas-Fort Worth-Arlington urbanized area (UZA) transit and paratransit operators, public and private, to submit their reportable operations to the National Transit Database (NTD) to increase the Formula Federal Funding allocations to DART's UZA and, subsequently, to DART itself.	
30	NTD Reporting	There appear to be trends in ridership and fare revenue data reported to NTD that cannot be easily explained. The Team recommends that DART attempt to determine what occurred. The main purpose of this inquiry should be forward-looking, to attempt to ensure that DART has good control of its fare revenues and the rapid reporting of data to be able to analyze trends and respond to changes in operating conditions.	

#	Topic	Finding	DART Response
1	Bus Fleet Purchase	The practice of bulk purchasing of bus rolling stock creates pressure on the maintenance department, causing uneven spending practices for rolling stock capital expenditures including for federal grants and the required local match. The practice creates cycles of very high maintenance activity that could be avoided if bus procurements were more evenly distributed. DART should consider developing a transition plan for both the major sub fleets including 30- and 40-foot transit buses and the cutaway (ARBOC) fleet that spreads out the procurement of rolling stock at more even intervals over the expected life cycle of the equipment.	<p>Bulk purchasing of bus rolling stock, as worded in the finding, does not take into consideration that there are not many American bus manufacturers left; purchasing in bulk may provide a lower rate per unit, and the maintenance schedule can be spread out to reduce high maintenance.</p> <p>Furthermore, DART plans its bus purchases under a Fleet Replacement Plan that accounts for groups or lots of sub-fleets based upon DART service needs. Bus manufacturers build production processes that provide better manufacturing control than during continuous production runs. Thus, this achieves better configuration management with bus builds of duplicate design and the avoidance of component obsolescence or parts supercessions. The first to last bus-to-bus configuration lowers the Agency's maintenance and inventory burden. Bulk purchases are limited to no more than 200 buses within any production order (again based upon service needs as forecasted).</p>
2	Rail Accidents	Since safety is a very high priority, DART should review whether the increase in light rail non-security NTD reportable events during the Review Period serves as a "canary in the coal mine," suggesting greater attention be	It was found that there was an error in the entry of the data reported in the "Quarterly Operating, Financial Performance and Compliance Report". The finance group has corrected the data on the

		paid to safety. Furthermore, both the difference in definition of “collision” between DART and NTD and the errors identified in calculating and reporting accidents for DART’s quarterly reports merit further review to ensure there is consistency in internal and external reporting as well as coordination between different reporting teams within DART.	attached spreadsheet. With this correction the data now is the same as the KPI reports submitted by Operations Safety and does not present a significant increase in accident frequency.
3	Misuse of cell phones	The misuse of cell phones and electronic devices is a concern both in compliance with the new regulation and in customer complaints and surveys. This needs clear guidelines, with consistent rules of engagement, encouragement, enforcement, and reporting as well as consistent measurement and evidence of compliance. DART should review its current SOPs on this topic and ensure that they are consistent with each other, with DART’s policies, and with the law. Furthermore, the Team would urge DART to make a concerted effort to make all employees aware of this issue, make the penalties for misuse clear, and extend this policy to all employees—i.e., if an employee is driving a DART vehicle or their own vehicle on DART business.	The effort to standardize manuals and policies requires the involvement of multiple departments. The AEM and HEM manuals are currently in the process of being revised. Until these policies are revised and implemented, we can implement some of the recommendations brought forward by the audit team. Examples include ensuring new employees, not just operators, receive periodic retraining; including prominent mention in all training courses and documentation; having all employees sign statements that they have been informed of the requirements, understand the requirements, and understand that violation can lead to disciplinary action, up to and including termination; and lastly, post signs in ready rooms, lockers, and other public areas for employees.

Appendix 3 Peer Analysis

DETAILED EXPLANATION OF PEER GROUP SELECTIONS AND OMISSIONS

Because of the requirement for light rail, the Team began with the 21 urbanized areas with light rail (excluding Dallas) in the United States and then applied the filtering criteria detailed below:

POTENTIAL DART PEER REJECTION CRITERIA					
Urbanized Area	Population Too Big or Small	Older and/or Denser UZA	Doesn't Have All Four Modes	Small and/or Very New Light Rail	Multiple Major Transit Operators
Baltimore		X		X	
Boston	X	X			
Buffalo	X	X	X	X	
Charlotte	X		X	X	
Cleveland		X	X	X	
Denver					
Houston			X		
Los Angeles	X	X			X
Minneapolis/Saint Paul					X
New Jersey	X	X			X
Phoenix			X	X	X
Pittsburgh		X	X		
Portland					
Sacramento	X		X		
Saint Louis		X	X		
Salt Lake City					
San Diego					X
San Francisco	X	X			X
San Jose					X
Seattle					X
Virginia Beach	X		X	X	

After application of the above criteria, there are three that do not have a single negative, Denver, Portland, and Salt Lake City.

Two, Minneapolis/Saint Paul and San Diego, fail only the "Multiple Major Transit Operator" criterion. For the former, the two operators are Metro Mobility (which operates demand-responsive service), and Metro Transit (which operates bus, commuter rail and light rail); they are

sister component units of the Metropolitan Council, the regional policy-making body, planning agency, and provider of essential services for the Minneapolis/Saint Paul Twin Cities metropolitan region, and they are governed by the same board.

In San Diego, the San Diego Metropolitan Transit System (MTS) operates commuter and regular bus, demand-responsive, commuter rail, and light rail in the City of San Diego and other incorporated cities and unincorporated areas in the Southern portion of the County of San Diego. (San Diego) North County Transit District (NCTD) operates commuter rail, the Coaster, from Northern San Diego County into the City of San Diego, demand-responsive, bus, and hybrid rail, the Sprinter, which the Team treated as light rail. While MTS and NCTD are separate agencies with separate boards of directors, they are both subject to the funding, project selection, construction, and other functions and activities of the San Diego Association of Governments, the metropolitan planning organization for San Diego County.

Therefore, for Minneapolis/Saint Paul, while, legally, there are two operators, the reality is virtually the same as a single operator. In San Diego, there are two separate operators, but the practicalities of their legal, operating, and financial environment lead to close coordination of their services.

The other single criterion-ranked UZAs are Houston, San Jose, and Seattle.

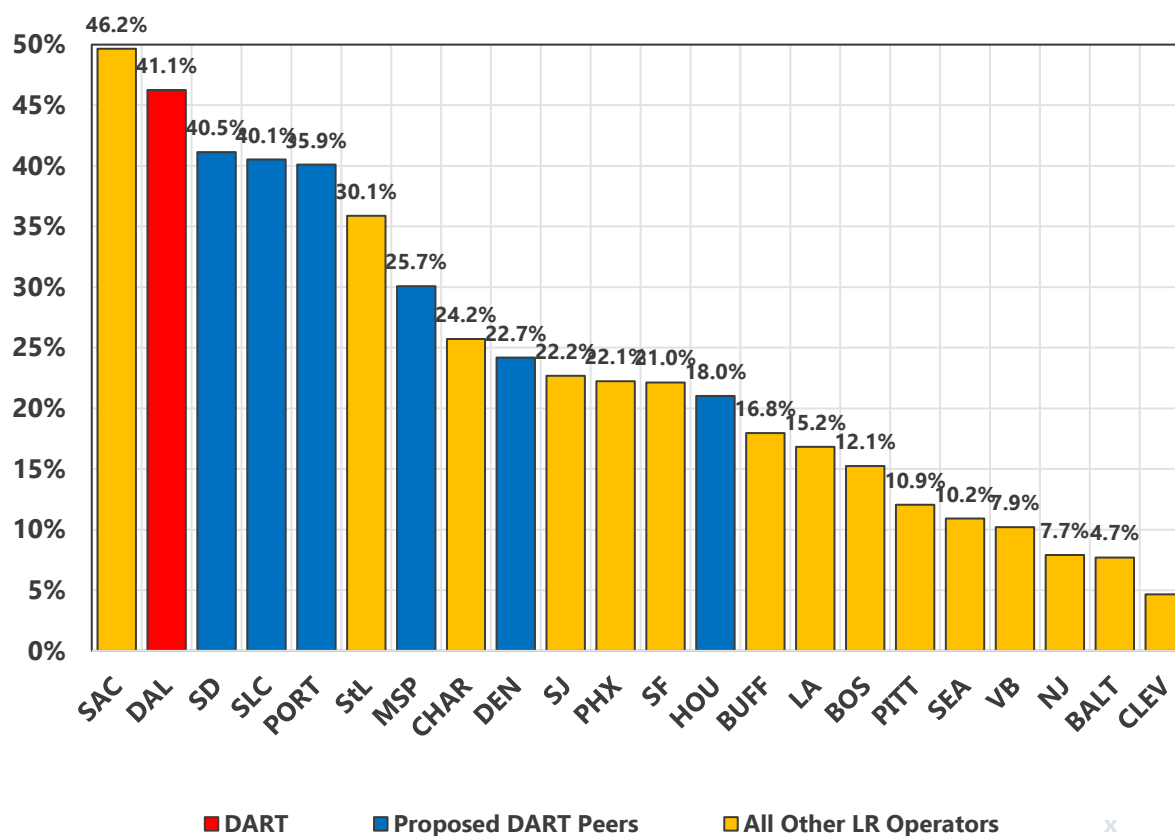
The Team decided to include Houston given its status as a major city in the State of Texas. While Houston does not operate commuter rail, the Team overlooked this attribute to include it.

The Team omitted San Jose because, while San Jose is a separate UZA, it shares a long border with the San Francisco-Oakland (SFO) UZA, which is much larger, and several transit operators cross the border, most specifically, the Caltrain commuter rail line that has been operating in one form or another between San Jose and San Francisco since the 1860s; therefore, while San Jose and its transit are significant in their own regard, there is a fair degree of interconnection and control over transportation and other decisions from the larger coterminous SFO UZA and it would be difficult to separate out the San Jose-only segments of transit operations.

Seattle is complex because of the large number of mostly medium to medium-large sized transit agencies – at least eight (Central Puget Sound Regional Transit Authority [dba Sound Transit], City of Everett, King County Department of Metro Transit [Seattle], King County Ferry District [Seattle], County of Pierce, Pierce County Transportation Benefit Area Authority [Tacoma], City of Seattle [dba Seattle Center Monorail], Snohomish County Public Transportation Benefit Area Corporation [Everett], and Washington State Ferries), with overlapping service areas, but mostly with two to four operators serving the same community.

Besides this complexity, the Team looked for major light rail systems. The Seattle area, which has a large light rail construction program, was relatively late in getting into light rail operations, and, therefore, light rail is a relatively small percentage of Seattle-area total transit trips:

Potential DART Peers - Light Rail Trips as % of Total Trips



As the graphic displays, the seven peer operators include six of the nine transit operators with the highest light rail trips as percentages of total trips. Sacramento was excluded because it has a smaller service area than most of the peers and it does not have commuter rail—it does have extensive intercity passenger rail service, including Amtrak, Amtrak California, and Capital Corridor, but this service, by definition, is not transit. Saint Louis and Charlotte are also smaller areas without commuter rail; Saint Louis is an older area and Charlotte’s light rail is relatively recent and its overall transit ridership is among the lowest of all the potential peers.

Finally, the Team believes that six good peers is enough.

How AECOM’s *DART Peer Review* Peers Were Evaluated for Inclusion – or Not

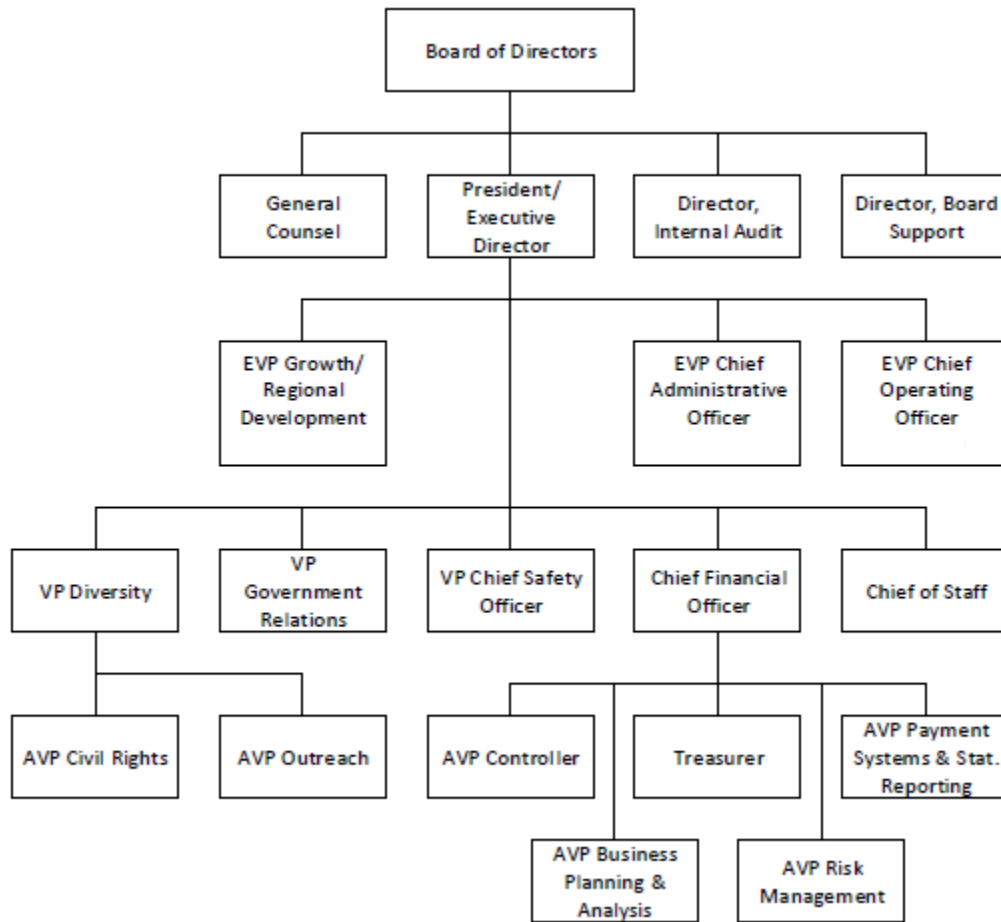
DART Peer Review included ten peers, which the Team considered for inclusion, and decided as follows:

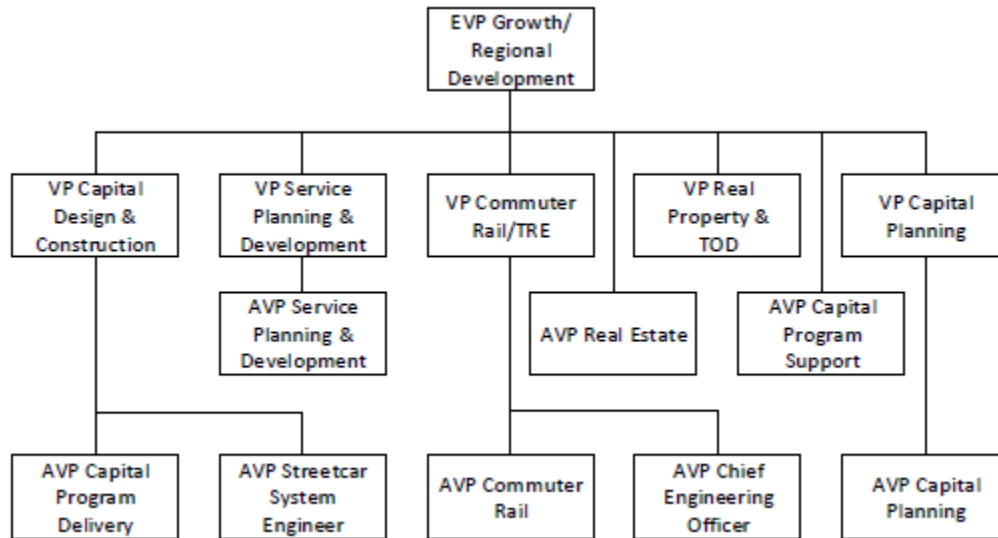
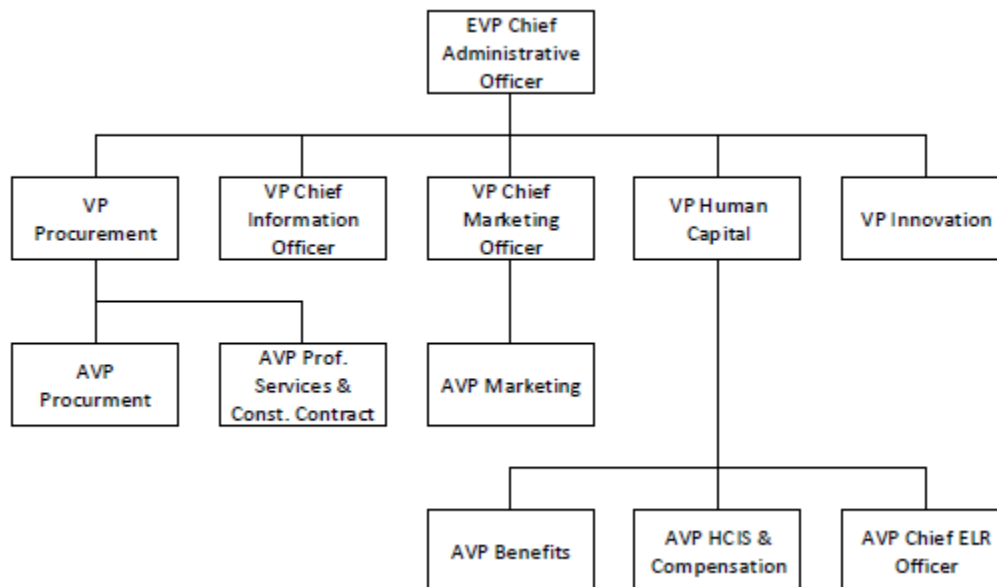
- Atlanta: Metropolitan Atlanta Regional Transit Authority (MARTA) excluded because MARTA operates heavy rail, which DART does not, and it does not operate light rail;

- Denver: Regional Transportation District (RTD) included;
- Houston: Metropolitan Transportation Authority of Harris County (Houston Metro) included;
- Minneapolis/Saint Paul: Metro Transit included, with Metro Mobility added;
- Phoenix: Valley Metro Regional Public Transportation Authority (Valley Metro) excluded because light rail is relatively recent and there are three separate operating agencies;
- Portland: Tri-County Metropolitan Transportation District of Oregon (Tri-Met) included;
- San Diego: Metropolitan Transit System (MTS) included, with North County Transit District added;
- Seattle which includes Central Puget Sound Regional Transit Authority (Sound Transit), King County Metro Transit Department (King County Metro), Sound Transit and King County Metro combined as Seattle Metro, was excluded for the reasons discussed in above.

Appendix 4 Org Charts

Executive-Level Org Chart



EVP Growth/Regional Development Org Chart**EVP Chief Administrative Officer Org Chart**

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