Just In Time:
Enhanced Mobility and Equity through Real-Time Information
May 9, 2016 • George Mason University • School of Policy, Government & International Affairs
Disclaimer

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Acknowledgments

This document was prepared by the graduate students of George Mason University’s School of Policy, Government and International affairs during the spring 2016 Transportation Policy, Operations, and Logistics Master’s Degree Practicum.

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Foreword

Students in George Mason University’s Master of Arts in Transportation Policy, Operations, and Logistics (TPOL) program students gain advanced knowledge to become effective practitioners in progressive transportation related policy analysis, theory, research, practice and development. Critical analysis through research and communication skills prepares graduate students for real-world challenges in the transportation field.

Graduate students participate in a capstone practicum near graduation in which a transportation problem topic results in the delivery of a comprehensive project. Dr. Jonathan Gifford’s PUBP 722 class consulted with TransitScreen, Inc. The following document is a study of electronic transportation information displays in public spaces, including bus shelters and other types of street furniture, transit stops and stations.
## Contents

Foreword ................................................................................................................................. i

Contents ................................................................................................................................. ii

List of Acronyms and Abbreviations ......................................................................................... v

Executive Summary ...................................................................................................................... 1

Background ............................................................................................................................... 4

  Overview of Existing Technologies ......................................................................................... 4
    Automatic Vehicle Location .................................................................................................. 4
    Real-Time Information Software ......................................................................................... 5
    Integration of AVL and RTI Technology .............................................................................. 5
    Accessibility Limitations of Existing Technology ............................................................... 6

Case Studies ............................................................................................................................ 7

  Case Study Selection Methodology ....................................................................................... 7

Case Study Summaries ............................................................................................................. 8

  San Francisco ....................................................................................................................... 8
  Seattle ................................................................................................................................. 10
  Atlanta ............................................................................................................................... 10
  Jersey City .......................................................................................................................... 11
  Oakland .............................................................................................................................. 11
  Scottsdale ............................................................................................................................ 12
  State of Montana ................................................................................................................ 13

Additional Analyses ................................................................................................................ 13

  Chicago Transit Authority .................................................................................................... 13
  Hillsborough Area Regional Transit ...................................................................................... 14
  The Netherlands & Sweden ................................................................................................... 14

Additional Research Conclusions ........................................................................................... 15

Findings and Recommendations .............................................................................................. 15

Municipalities & Transit Agencies ............................................................................................ 16

  1. Cities Have a Variety of Transportation Options but Lack Integrated RTI. ................. 16
    Recommendation: Increase the availability of integrated RTI in public spaces to ensure equitable access to transportation services. ......................................................... 16
2. Transit Agencies and Alternative Transportation Providers Partner to Create Centralized RTI and Information Sharing ........................................... 16
3. RTI can Increase Transit Ridership and Customer Satisfaction ............. 17
4. Inconsistent Policies Governing the Use of Public Infrastructure or RTI Can Unintentionally Limit the Ability to Generate Revenue through Advertising .. 17
5. Public Agencies Often Utilize Funding from the Private Sector to Support RTI Enhancements ................................................................. 19

RTI Technology Providers ........................................................................ 19
1. Limited Access to Open Source Data Impedes RTI Provision .................. 19
2. Many Jurisdictions Use Public-Private Partnerships and Other Incentives for Infrastructure Improvements .................................................. 20
3. RTI Providers Find the Public Procurement Process to be a Barrier ........ 21

Conclusion .................................................................................................. 22

Appendix - Case Studies Detailed ................................................................ 23
San Francisco ............................................................................................ 23
Background ................................................................................................. 23
Transit Infrastructure .................................................................................. 24
Existing RTI Infrastructure ......................................................................... 25
Advertising Policies ................................................................................... 26
Innovative Initiatives .................................................................................. 28
Findings and Recommendations ................................................................ 29
Seattle .......................................................................................................... 30
Transit Infrastructure .................................................................................. 30
Existing RTI Infrastructure ......................................................................... 33
Atlanta ......................................................................................................... 34
Background ................................................................................................. 34
Transit Infrastructure .................................................................................. 34
Existing RTI Infrastructure ......................................................................... 35
Advertising Policies ................................................................................... 39
Innovative Initiatives .................................................................................. 41
Jersey City .................................................................................................. 44
Background ................................................................................................. 44
List of Acronyms and Abbreviations

AARP  American Association of Retired Persons
ABAG  Association of Bay Area Governments
ADA   Americans with Disabilities Act
API   Application Programming Interface
APTA  American Public Transportation Association
ARC   Atlanta Regional Commission, Atlanta Regional Council
AVL   Automatic Vehicle Location
BART  Bay Area Rapid Transit
BID   Business Improvement District
BUC   Buckhead Uptown Connection
CBD   Community Benefit District
CID   Community Improvement District
COG   Council of Governments
CRG   Civic Resource Group International
CTA   Chicago Transit Authority
DART  Dallas Area Rapid Transit
DOA   Department of Administration (State of Montana)
DOT   Department of Transportation
FTA   Federal Transit Administration
GDOT  Georgia Department of Transportation
GPS   Global Positioning System
GRTA  Georgia Regional Transportation Authority
GRYITS Greater Yellowstone Rural Intelligent Transportation Systems
GSA   General Services Administration
GTFS  General Transit Feed Specification
HART  Hillsborough Area Regional Transit
HBLRT Hudson-Bergen Light Rail
HSP   Hub Signage Program
ITS   Intelligent Transportation System
JPO   Joint Program Office
LCI   Livable Centers Initiative
LED   Light-Emitting Diode
LIZ   Living Innovative Zones
MAG   Maricopa Association of Governments
MAG   Minimum Annual Guarantee
MARTA Metropolitan Atlanta Rapid Transit Authority
MDT   Mobile Data Terminal
MDT   Montana Department of Transportation
MPO   Metropolitan Planning Organization

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TPOL, 2016
<table>
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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>MTC</td>
<td>Metropolitan Transportation Commission</td>
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<tr>
<td>MUNI</td>
<td>San Francisco Municipal Railway</td>
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<tr>
<td>ODT</td>
<td>Open Data Transit</td>
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<tr>
<td>ORCA</td>
<td>One Regional Card for All</td>
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<tr>
<td>PATH</td>
<td>Port Authority Trans-Hudson</td>
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<tr>
<td>RRFP</td>
<td>Regional Reduced Fare Program</td>
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<tr>
<td>RTI</td>
<td>Real-Time Information</td>
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<tr>
<td>SDOT</td>
<td>Seattle Department of Transportation</td>
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<td>SFMTA</td>
<td>San Francisco Municipal Transportation Agency</td>
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<td>STIR</td>
<td>Startup in Residence</td>
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<tr>
<td>TDM</td>
<td>Transportation Demand Management</td>
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<td>TM</td>
<td>Travel Montana</td>
</tr>
<tr>
<td>TNC</td>
<td>Transportation Network Company</td>
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<td>TOD</td>
<td>Transit Oriented Development</td>
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Executive Summary

As cities become increasingly connected and look to increase the use of transit, there is a need to assess the adequacy of real-time information (RTI). Research shows that the availability of RTI, which allows passengers to make timely and informed travel decisions, can increase transit usage by reducing wait time, improving the experience of captive riders, and attracting so-called ‘choice’ riders to alternate modes. Currently, RTI is largely reliant on: accurate GPS locations of transit assets, widespread smartphone usage, smartphone application logic and design, and ease of access to information.

Private sector ride-sharing and transportation network companies (TNCs) are often not integrated into current RTI displays. Smartphone usage is a general prerequisite for gathering useful and actionable RTI in many cities and for using ride-sharing and TNCs, but usage and access are not equal across all demographics. Low-income and elderly public transit users are more likely to travel without smartphones and therefore have limited or no access to RTI. This “digital divide” creates equity issues when those with smartphones and the wherewithal to utilize RTI experience increased access and mobility.

The U.S. Department of Transportation’s (U.S. DOT) multi-modal Ladders of Opportunity initiative is focused on aligning and redesigning the transportation system to expand economic opportunity and social mobility across the country. Historically, the way some transportation systems were designed divided communities by economic status and these communities continue to experience mobility challenges today. Aggregated transit information in an easily understandable format is one useful mechanism to help bridge the digital divide. Specifically, displaying RTI on digital screens in public spaces has the potential to increase access and mobility for all passengers, not just those with smartphones. Studies have also shown that RTI can increase transit revenue by attracting choice riders and allowing captive riders without smartphones to ride more frequently.

However, advancing the display of RTI in public spaces faces a number of challenges, including: adequate funding, regulatory ambiguity, complex procurement processes that can be difficult for small vendors to navigate and lack of open-source RTI data, as well as cooperation and coordination between public and private entities.

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To better understand the challenges that U.S. municipalities of varying sizes and demographic compositions are facing, six cities and one rural state were examined to identify innovative approaches and policy barriers that impede the expansion of RTI in public spaces. The following locations were assessed:

- San Francisco, CA
- Seattle, WA
- Jersey City, NJ
- Scottsdale, AZ
- Atlanta, GA
- Oakland, CA
- State of Montana

The case studies demonstrated varying degrees of existing or planned RTI infrastructure, but each displayed a general commitment to increasing the use and utility of transit. The studies also indicated that cities are searching for solutions to effectively disseminate RTI in public spaces and are continually searching for options to offset the capital costs of providing transit service through public-private partnerships and/or advertising contracts. The case studies and additional analyses resulted in:

Findings and Recommendations for Municipalities & Transit Agency Recommendations:

1. Cities Have a Variety of Transportation Options but Lack Integrated RTI
   
   **Recommendation:** Increase the availability of integrated RTI in public spaces to ensure equitable access to transportation services.

2. Transit Agencies and Alternative Transportation Providers Partner to Create Centralized RTI and Information Sharing
   
   **Recommendation:** Develop transit, technology, and financial policies that can adapt to emerging mobility options in connected urban environments.

3. RTI can Increase Transit Ridership and Customer Satisfaction
   
   **Recommendation:** Develop open data policies to provide sufficient data for use in third-party application and software development to increase the availability of RTI.

4. Inconsistent Policies Governing the Use of Public Infrastructure or RTI Can Unintentionally Limit the Ability to Generate Revenue through Advertising
   
   **Recommendation:** Review policies to ensure greater consistency of public policy governing public space and identify opportunities and challenges for integrating RTI technologies.
5. Public Agencies Often Utilize Funding from the Private Sector to Support RTI Enhancements  
*Recommendation:* Identify opportunities for flexible public-private partnerships that encourage development of RTI technologies.

Findings and Recommendations for RTI Technology Providers:

1. **Limited Access to Open Source Data Impedes RTI Provision**  
   *Recommendation:* Educate municipalities by presenting a clear business case that demonstrates the benefits of open source data provision for use with highly customizable RTI displays and potential ridership impacts for the jurisdiction.

2. **Many Jurisdictions Use Public-Private Partnerships and Other Incentives for Infrastructure Improvements**  
   *Recommendation:* Leverage available opportunities to enter into a public-private partnership and other creative financing mechanisms.

3. **RTI Providers Find the Public Procurement Process to be a Barrier**  
   *Recommendation:* Learn to work through public procurement processes, particularly those that benefit small businesses or are focused on best value.
Background

Emerging research indicates changes in U.S. travel patterns are the result of a long-term structural shift in demographics, culture, technology, and settlement patterns. As a result, U.S. transit ridership increased about a third in the period from 1995 to 2011, doubling the rate of population growth during the same timeframe (16.8%). Transportation planners should consider Americans’ increasing willingness to use alternative modes in the planning process.³

To respond to this growing demand for transit, transportation agencies are increasingly turning to technologies that improve service and customer satisfaction. This has led to a growing market for the display of RTI in public spaces. A recent survey of 37 transit agencies revealed nearly 87% plan to deploy more RTI signage in the future.⁴

Overview of Existing Technologies

The two most commonly utilized technologies to enable RTI are automatic vehicle location (AVL) systems and RTI software. These technologies are utilized by both public and private sector entities to provide vehicle arrival and departure predictions.

Automatic Vehicle Location

Bus AVL systems first appeared in the late 1970s and 1980s, prior to the development of Global Positioning Systems (GPS). AVL systems using GPS-based tracking became fully operational in 1995, eliminating the need to maintain legacy wayside signpost infrastructure. Much of the architecture of precursor AVL systems remains the same, but modern systems have benefited from increased functionality and reliability.⁵

AVL systems are primarily used for vehicle tracking and are increasingly employed for paratransit operations like trip booking, scheduling and dispatch. Increases in mobile data communication also spurred integration with web platforms and other agency systems, including video surveillance, farebox and smart card technology, and RTI software.⁶

Federal Transit Administration (FTA) research has emphasized a systems engineering approach to deploy AVL systems with agency-wide data management strategies. A cross-cutting study of AVL systems initiated by the U.S. DOT Intelligent Transportation Systems (ITS) Joint Program Office (JPO) reported an average cost

⁴ Schweiger, “Use of Electronic Passenger Information Signage in Transit.”
⁶ Parker.
per bus of $15,500. The JPO office reported that 54% of 78 major metropolitan areas in the United States had deployed AVL systems.\(^7\) A 2013 survey of large transit agencies revealed over 83% had already deployed AVL systems.\(^8\)

**Real-Time Information Software**

RTI signage is primarily used to display vehicle departure and arrival times for passengers and service providers. RTI systems utilize the vehicle location data from AVL hardware in conjunction with software that includes an arrival prediction algorithm. Public access to RTI data can be integrated into smartphone applications, websites, or variable message signs or directly through an Application Programming Interface (API) data feed. Traditionally, transit agencies have procured the AVL hardware and RTI software in a bundle that includes all on-board and central hardware, networked with software systems and licenses. This limits the amount of in-house expertise required, although staff positions for IT maintenance may be required.\(^9\)

Recent developments in RTI technologies have allowed for “off-the-shelf” GPS hardware that has reduced installation costs. Software advancements have included open source protocols from products like OneBusAway. The procurement of AVL systems and RTI software is also changing as more agencies realize the benefits of acquiring the technologies separately. This can often be challenging, as many AVL systems lack the open protocols necessary for interoperability with separate RTI software. Many hardware providers constrain the use of AVL data through proprietary systems that limit access to the processed data. This effectively restricts the use of other software providers and ultimately decreases the value of data owned by transit agencies.\(^10\)

**Integration of AVL and RTI Technology**

Recent innovations from third-party developers are helping to advance the provision of RTI in public spaces. TransitScreen offers a proprietary software that integrates RTI for multiple modes (including trains, streetcars, buses, bikeshares, and TNCs, as well as traffic reports, public safety alerts and other messages) on prominently located display screens. By including travel times for various modes, TransitScreen displays allow users to quickly compare and weigh these transportation options.\(^11\)

\(^7\) Parker.
\(^8\) Schweiger, “Use of Electronic Passenger Information Signage in Transit.”
\(^10\) Pulido and Canales.
\(^11\) Pulido and Canales.
The technology pulls primarily open-source transit data from multiple entities. The software is customizable and can add localized transportation options.\textsuperscript{12}

Redmon Group is an interactive multi-media and technology company that provides digital products and services, including websites, mobile applications, and digital signage.\textsuperscript{13} Redmon Group installs both hardware and software for its transit displays, which can also include assisted listening devices for the visually impaired.\textsuperscript{14} Redmon Group transit displays are customizable and can display open source multi-modal transit information. The company is an authorized U.S. government vendor.\textsuperscript{15}

There are also efforts by public agencies to advance the use of RTI. 511 services are often web-, phone-, or application-based RTI services provided at no cost to the user and supported by government entities. For example, the 511 Transit Tracker is a web-based service provided by a partnership of public agencies in the San Francisco Bay Area that allows users to access real-time bus and train departure times.\textsuperscript{16} The 511 Transit Tracker uses open source data to enable individuals and businesses to customize the displayed real-time transit data based on proximity to transit stops. The customized RTI information can be displayed in a storefront/business lobby on a display screen.

**Accessibility Limitations of Existing Technology**

Accuracy (or lack thereof) of publicly displayed information in train and bus terminals can profoundly impact user attitudes towards transit.\textsuperscript{17} Legacy methods of providing publicly-displayed transit information, such as static printed maps or schedules, are inadequate because they fail to accurately notify users about current routing, schedule adjustments, and service changes.

These legacy methods also tend to poorly inform disabled passengers and people without access to smartphones. The USDOT’s Bureau of Transportation Statistics found that 528,000 of the 1.9 million “home-bound” disabled Americans do not leave home due to perceived “transportation difficulties.”\textsuperscript{18} For example, the blind are hindered when using public transit because they cannot access printed/displayed

\textsuperscript{14} Commuter Page, para. 6.
information and hearing impaired individuals may not hear audio announcements due to background noise or faulty equipment.\textsuperscript{19}

Smartphone applications such as Transit App, Moovit, OneBusAway, and Stopinfo (for visually impaired) have been developed to improve the provision of RTI. However, these applications exclude a significant segment of the population that lack access to mobile technology and cannot take advantage of such tools. In 2015, 68\% of U.S. adults owned a smartphone, including 86\% of those ages 18-29, 83\% between ages 30-49, and 87\% of those with an annual household income of $75,000 and up.\textsuperscript{20} However, only 27\% of adults 65 and older own a smartphone and 44\% of smartphone owners with an annual household income below $30,000 have let their service lapse for financial reasons. Further, African Americans and Latinos are about twice as likely as whites to have canceled or cut off smartphone service.\textsuperscript{21}

Case Studies

To identify current, planned, and conceptualized applications of RTI throughout the country, the project team elected to use a case study approach: identifying seven case study areas in the U.S. for a targeted investigation of the transportation options available, existing/planned RTI applications, relevant transportation demand management (TDM) policies, existing signage/advertising policies, and innovative strategies to improve transportation accessibility through the use of RTI. This section describes the methodology used to select and analyze the case study areas.

Case Study Selection Methodology

The project team identified the U.S. DOT’s Smart City Challenge, a program designed to help cities address the challenges of "rapid population increases and rapidly growing demands on their transportation infrastructure," as a foundation for selecting case study cities/regions. U.S. DOT will award one mid-sized city up to $40 million in funding and private firm Vulcan Inc. will work with the city to provide an additional $10 million.\textsuperscript{22}

Over 70 cities applied to the U.S. DOT Smart City Challenge. Each city that applied to the program recognizes the imperative for increasing technological capacity to

\textsuperscript{22} “U.S DOT Announces Seven Finalist Cities for Smart City Challenge.” US Department of Transportation, March 12, 2016. https://www.transportation.gov/smartcity.
support residential and economic growth. As transportation options continue to grow, technology to support these options must also become smarter. Application to the Smart City Challenge demonstrates a commitment to investigating these technologies and integrating them appropriately into the content of each city’s unique environment. Therefore, the project team opted to select a diverse set of cities from the bank of program applicants to evaluate current approaches in using technology, like RTI, to support city and regional transportation options.

To determine criteria for selecting case study cities, the project team scored all of the U.S. DOT Smart City Challenge applicants and ranked them by population, transit score, and walkability score. The list of cities was split into three tiers by population (over 500,000; 250,000 to 500,000; less than 250,000). Six cities were selected for detailed analysis: two large (San Francisco, CA, Seattle, WA), three medium (Atlanta, GA, Jersey City, NJ, Oakland, CA), and one small (Scottsdale, AZ). To further diversify the case study analysis, the project team also examined the rural state of Montana and focused on its innovative government procurement methods for RTI.

For each city, the project team examined publicly available information on city and state transportation and related policies, and reviewed local transit agencies’ schedules, routes, and provision of any RTI. The project team researched city transportation demand management policies, city ordinances and zoning, and city and state advertising policies. The team conducted interviews with city staff to determine any unique aspects of the area’s available transportation information and compiled the results of this work in findings and recommendations of this study.

(Note: At the commencement of this analysis, the winners of the Smart City Challenge were not identified. On March 12, 2016, the Secretary of Transportation announced seven finalists: Austin, TX; Columbus, OH; Denver, CO; Kansas City, MO; Pittsburgh, PA; Portland, OR; and San Francisco, CA. The winner will be announced in June 2016.23)

Case Study Summaries
This subsection provides a consolidated summary of each of the seven case studies conducted by the project team. The Appendix to this report includes a more detailed account of each case study for reference.

San Francisco
San Francisco is experiencing rapid growth, changing demographics and declining funding at the State and Federal level. This has left the San Francisco Municipal Transportation Agency (SFMTA) with insufficient resources to operate and maintain

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23 US Department of Transportation 2016.
its existing transportation infrastructure. To overcome these mobility challenges, SFMTA will need to leverage innovative technologies to meet its strategic goals. The use of RTI shows promise in meeting many of these goals, including the integration of transportation modes, increased system safety, and an improved passenger experience.

SFMTA will also need to maximize local and regional funding to overcome budget shortfalls. Advertising is one way of supplementing other funding sources. A recent audit identified a lack of city-wide advertising policies, which has led to inconsistent advertising standards and conflicting agreements with advertisers. The audit also recommended monitoring existing agreements to maximize revenue. Implementing the recommendations in the audit will help maximize revenue from advertising contracts, but the agency will still need to look for cost-effective ways to provide more to residents with less.

One way San Francisco has welcomed cost-saving innovations is by creating a specific office dedicated to keeping government accountable, accessible, and responsive. The San Francisco Mayor’s Office of Civic Innovation champions new ideas, tools and approaches in city government. A major project to come out of this office was the introduction of Living Innovation Zones, which serve as a space for testing new ideas, projects and technologies. These zones have encouraged actions to emphasize non-motorized transportation, enhance pedestrian safety, foster neighborhood interaction, and support local businesses. Agencies seeking to maximize the use of RTI in public spaces have the opportunity to leverage the opportunities presented in these Living Innovation Zones.

San Francisco is at the forefront of utilizing RTI systems, including an open data initiative to maximize involvement from third-party developers. Utilizing RTI systems will help SFMTA to meet its strategic goals, but there is room for improved in the procurement of these systems. Identifying some of these lessons learned can bring value to cities that have yet to implement RTI systems. In utilizing NextBus Inc. to concurrently install both the AVL hardware and the RTI software, San Francisco inadvertently limited the use of its RTI data. In its initial contract with NextBus, ownership of the data was initially unclear. This led to conflicts with third-party developers who were looking to utilize the RTI data from the proprietary NextBus system. NextBus Information Systems initially sought revenue sharing agreements from third-party developers but SFMTA secured ownership of the data in an on-going maintenance agreement with NextBus Inc. in 2009. The development of SF OpenData, San Francisco’s open data initiative, followed soon thereafter.

Even though the San Francisco market encourages and promotes the implementation of advanced RTI systems, the combination of proprietary AVL systems the sophisticated GPS system used by SFMTA and ordinances that favor long-standing
customers makes it difficult for smaller companies to compete in the San Francisco market.

**Seattle**

Travel times using dynamic message signs and web postings cover 12 corridors in King County and in downtown Seattle. Infrastructure includes 34 dynamic message signs and portable digital signs. RTI is also available through an iPhone application and a Twitter feed. Puget Sound Transit, which operates in Seattle and the remainder of King County, operates the OneBusAway smartphone application, providing unified RTI from six different sources. In addition to King County Metro service, OneBusAway also covers all Community Transit (Snohomish County) routes, including those that extend into King County. Puget Sound Transit maintains an open data system, which also could facilitate RTI hosting through signage or other smartphone applications in their region.

In 2014, Seattle launched a pilot program partnering with 10 businesses to host TransitScreen, a real-time transit display screen for public spaces. TransitScreen donated the screens and Seattle paid for the software and one year of service.24

**Atlanta**

Atlanta, GA, has eight different transit service providers operating over 170 transit routes throughout the region. The Metropolitan Atlanta Rapid Transit Authority (MARTA) accounts for over 100 of these routes, offering both bus and rail services. The Atlanta Regional Commission (ARC) is the overarching transportation coordination agency for the region.

Each transit agency in the Atlanta region provides easily accessible schedule and route mapping information. MARTA and Cobb County Transit currently utilize AVL systems on their transit vehicles to enable RTI. The Georgia Regional Transportation Authority, Gwinnett County Transit, and the Atlanta Streetcar are undergoing AVL installations and upgrades. MARTA rail stations are the only transit facilities to currently post real time signage.

In 2010, ARC assumed the responsibility for manifesting a ubiquitous, standardized, and multidimensional signage program for all agencies in the region to create a “culture of transit literacy.” The new signage at each stop will refer transit users to various RTI sources available via phone (by calling or texting a bus stop’s unique ID number for real time info) or a mobile application. In addition to signage, information for each agency is available through cell phone applications for reference on-the-go. While each transit agency hosts its own unique mobile application, ARC has

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undertaken the development of the OneBusAway application for the region. ARC also provides overall marketing and transit advocacy directives for all agencies in the region.

Various initiatives at the city level also provide the opportunity to enhance both transit and active transportation options and information availability. The City of Atlanta has an Office of Innovation Delivery and Performance that focuses on various directives from the City’s Mayor. This office has shown potential interest in the integration of RTI signage in public spaces. ARC’s Livable Centers Initiative (LCI) program facilitates coordination between local governments and private developers in enhancing transportation options in mixed-use developments, as well.

In addition to the enhancement of transit information provided by the transit agencies, ARC, the municipalities, and members of the private sector (particularly developers) are beginning to advocate for transit usage – and other alternatives to the single-occupant vehicle. Technology like TransitScreen and the use of “mobility concierges” is helping to revolutionize how Atlantans get around. ARC identified that local municipalities, BIDs, and CIDCs could also sponsor these types of information displays in public spaces.

**Jersey City**

With its close proximity to Manhattan, Jersey City joins its neighboring cities in maximizing transit ridership. RTI for one of the two transit agencies serving Jersey City, New Jersey Transit, is provided through a phone application called “iTrans New Jersey Transit.” Third-party applications have also been developed that allow for travelers to receive notifications and updated live information on trains.

Outside of smartphone applications, however, there is a lack of RTI signage made available to the public. Further, current local sign and advertising policies would make it difficult to place real-time displays in public spaces, which limits the ability of marketers to expand in this area. Nevertheless, New Jersey’s Transit Village Initiative seeks to create more sustainable communities in which transit stations would be the central focus, surrounded by local businesses and residences. The use of real-time displays in such neighborhoods could potentially improve ridership and quality of life for residents.

**Oakland**

The City of Oakland, California, is committed to improving regional public transit. The city adopted a “Transit First” policy in 1996 to improve transit efficiency and has since implemented other sustainability goals such as a Complete Streets Policy. The Oakland City Council has worked in conjunction with the regional MPO, the Metropolitan Transportation Commission (MTC), to foster RTI improvements.
RTI is generally available in Oakland and the Bay Area. For example, the City of Oakland has had an advertising contract with Clear Channel Adshel to provide street furniture such as bus stops, kiosks, and trash cans in exchange for advertising space and the contract improved RTI by requiring the inclusion of digital NextBus arrival information screens in multiple bus stops.

The City of Oakland has implemented several innovative transportation system improvement initiatives. The Hub Signage Program (HSP) and Regional Measure 2 (RM2) are aimed at improving transit displays, RTI, and wayfinding. The city’s transportation demand management (TDM) program is directed at decreasing congestion with performance-based parking pricing and improved wayfinding signage.

**Scottsdale**

Scottsdale, AZ, is a small city that is part of the Phoenix metropolitan area. It is committed to providing mobility consistent with the surrounding cities, ensuring the transportation network maximizes route and mode choices while providing access for people of all ages and abilities.

Though not yet approved, the 2016 Transportation Master Plan incorporates two new trolley (diesel-powered buses painted to resemble old-fashioned streetcars) routes and one limited-stop bus route above the 2008 Transportation Plan requirements. Additionally, three route alternatives were identified for a potential future rail route to serve the city. This new route would require regional support from the Maricopa (County) Association of Governments (MAG), as well as Valley Metro, the regional transit service provider, and the FTA.

The frequency of transit service in Scottsdale varies from 10 to 30 minutes dependent on the provider and route. These services are currently used by 1.4% of the population. 31% of these users are identified as captive riders as they do not own or have access to a vehicle. Travel time, once aboard, averages in excess of 39 minutes, and over 32% of users have a commute greater than 60 minutes.\(^{25}\)

Valley Metro has equipped buses serving Scottsdale, as well as its light rail route (which connects Phoenix with Tempe and Mesa, but does not yet serve Scottsdale), with GPS technology managed by a system called NextRide. NextRide provides RTI available via smartphone applications and internet trip planners. RTI is unavailable, however, for the Scottsdale trolley service. Scottsdale is very restrictive and identifies specific standards for outdoor signage to include the design of the 18x24 bus stop sign

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used throughout the Valley. In May 2015, a variance to these requirements was approved and must be requested to the City of Scottsdale Transit Section. The variance allows for the inclusion of “LED real time bus information signs; bus route/traffic information kiosks,” which could eventually lead to RTI Displays.26

**State of Montana**

Montana’s Department of Administration (DOA) has been tasked with oversight of procurement for all agencies within the state. Recent revisions to Montana statutes have empowered the DOA to develop rules and policies allowing alternate methods of procurement in special cases when Montana’s competitive bid or RFP processes are unable to meet agency needs.

The Montana case study examines two traveler information kiosk implementations comparing the competitive bid process used for the Greater Yellowstone Rural Intelligent Transportation System (GYRITS) kiosk project to the sole-source method used for the Conrad Rest Area Traveler Information Kiosk. The comparison of these implementations demonstrates the flexibility and advantages in Montana’s special case procurement options, but it also demonstrates that the traditional competitive bidding method still has utility, given that time is not so limited and that there are multiple capable vendors.

**Additional Analyses**

Following the evaluation of each case study area, the project team further delved into research regarding the cost-benefit impacts of providing RTI. Two recent research studies focused on the effect of RTI integration on transit passenger behavior in U.S. cities. The first study focused on Chicago Transit Authority (CTA) in Chicago, Illinois, and the second evaluated RTI implications for Hillsborough Area Regional Transit (HART) service in Tampa, Florida. A third study reviewed the influence of RTI on transit passenger behavior in three Swedish cities.

The main impact areas investigated through these cost-benefit research studies include (1) the effect of mobile real-time information on the perceived and actual wait time of transit riders and (2) whether there was a corresponding ramifications on wait-time efficiency and customer appreciation.

**Chicago Transit Authority**

CTA, the transit system in the city of Chicago, utilizes the CTA Bus Tracker system. It is an RTI platform utilizing a GPS system to track the positions of CTA buses. CTA

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customers use the system to receive information on estimated bus arrival times. Customers are also able to obtain RTI from venues including the Bus Tracker website, customized scheduled emails, text messages for preferred bus stops, and third-party applications available via handheld devices and smartphones.27

A 2011 study of the impacts of RTI availability collected CTA passenger data from a range of time and geographical samples. The study determined the CTA Bus Tracker system had a positive effect on transit ridership. Estimates revealed that the weekday ridership for the CTA bus routes with Bus Tracker services increased substantially more than bus routes without CTA Bus Tracker systems.28 The analysis also considered user-level friendliness (i.e., the customer’s ability to interact with the CTA Bus Tracker technology) as a factor that could impact the effectiveness of the CTA Bus Tracker system. The data analysis also accounted for outside factors that could potentially influence ridership fluctuations including fuel costs, vehicle ownership, and ticket fare costs.29

**Hillsborough Area Regional Transit**

A similar study was conducted on bus riders in Tampa, Florida. The Tampa study analyzed the impact of RTI mobile-phone applications on wait times, satisfaction with transit service, and ridership.30 A controlled test was conducted using the HART bus system. The analysis concluded that RTI users experienced lower wait times by a margin of two minutes.31 Further analysis showed that RTI use reduced feelings of anxiety and/or frustration for system users, while productivity and safety observations increased for RTI users within the experimental group.32

**The Netherlands & Sweden**

To analyze the impacts of RTI on wait time, psychological impressions, customer satisfaction, and overall travel behavior, a study collected observational data at subway stations in The Hague, Netherlands, and Stockholm, Sweden. The data collected through these observational studies indicated that the calculated average of wait times decreased on subway lines utilizing real-time information displays by 1.4 minutes compared to the baseline, while the availability of these public information displays increased customer satisfaction by a substantial margin. Observations showed improved customer attitudes, and the analysis revealed a close relationship

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28 Tang and Thakuriah, 158.

29 Tang and Thakuriah, 154.

30 Brakewood et al., 410.

31 Brakewood et al., 421.

32 Brakewood et al., 421.
between respondents’ valuations of different factors and the magnitude at which these factors influenced mode choices given real-time information availability.  

**Additional Research Conclusions**

After analyzing research on the impact of RTI for public transport customers through these research efforts, it can be concluded a correlation exists between the introduction of RTI and customer wait time reduction and increased public satisfaction with transit services that utilize RTI. Further studies also demonstrate that transit agencies have increasingly utilized RTI as a means to rectify the perception of unreliability of public transport services. Mobile RTI and public displays provide transit agencies with a means of improving the rider experience.

**Findings and Recommendations**

Transit agencies operate and maintain systems through a combination of revenues and government funding. There is often limited funding available for improvements in addition to operation and maintenance costs. For example, San Francisco needs $17.5 billion for capital transit improvements. Seattle has a $75 million transit improvement shortfall, despite four fare increases to support transit in the last four years. Atlanta citizens elected to take out bonds for city improvements, which will include various transportation improvements.

As cities grow rapidly and demographics change, the need for sustainable approaches to meet public demand for transportation is clear. Creative revenue sources like advertising offer opportunities to increase funding available to support this demand. Further, advances in smartphones and technology provide a platform for innovative solutions to accommodate changing demographics and transportation demand through providing alternatives to more traditional travel methods.

This section investigates specific recommendations for (1) municipalities and transit agencies and (2) RTI technology providers to help guide these parties to improve existing funding strategies and infrastructure that support transportation information, services, and operations.

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33 Dziekan and Kottenhoff, 489-498.
35 “SFMTA 20-Year Capital Plan.”
Municipalities & Transit Agencies

The following six findings and recommendations summarize key policy considerations for municipal governments and transit agencies based on the case study analysis.

1. Cities Have a Variety of Transportation Options but Lack Integrated RTI

Communication of transit information varies significantly by city, and public policies can help ensure broader access. A number of the cities in this study provided RTI through some form of smartphone application. In other cases, open data policies allowed third-party developers to create integrated mobility and trip-planning applications. In both circumstances, however, this does not help the nearly one-third of U.S. households that do not have access to a smartphone. Policymakers must consider the alternatives to ensure greater access, particularly for lower-income households that rely on public transportation for mobility and may significantly benefit from public display of such information.

One approach adopted by a number of cities, including San Francisco and Seattle, is providing RTI through dynamic messaging signs at terminals and transit stops. This provides uniform access to information for those within proximity of the transit stop, and helps bridge the digital divide for those that may not have access to personal mobile technology.

Cities with a significant number of transit stops must think strategically about the most effective locations to install RTI systems due to the practical and fiscal challenges of implementing these throughout the transit network. In the case studies, digital displays were most common at major transit transfer points that serve multiple routes.

**Recommendation:** Increase the availability of integrated RTI in public spaces to ensure equitable access to transportation services.

2. Transit Agencies and Alternative Transportation Providers Partner to Create Centralized RTI and Information Sharing

As the concept of transportation on demand rapidly evolves, policymakers must evaluate the extent to which public services can both compete and complement the availability of alternative services. Cities must look for opportunities to leverage and utilize other transit alternatives to complement services already provided by the public sector.

In Atlanta, MARTA partnered with Uber to provide seamless transit-to-vehicle service. Riders can request an Uber ride while on a train or at a station and the
vehicle will be ready for pick-up when they arrive. This partnership demonstrates the ability for transit and TNC services to collaborate to create a mutually beneficial business for both services. Transit services provide mainstream access to popular origins/destinations, while the TNC can provide first- or last-mile service.\textsuperscript{38}

Other transit providers including Dallas Area Rapid Transit (DART) and Pinellas Suncoast Transit Authority (PSTA) are also creating partnerships with Uber to provide this connection to transit services. This amplifies transit ridership by attracting riders to transit who otherwise could not access the stations, opens up Uber's customer pool by providing cheaper rides, and increases the efficiency of seamless trips.\textsuperscript{39}

**Recommendation:** Develop transit, technology, and financial policies that can adapt to emerging mobility options in connected urban environments.

### 3. RTI can Increase Transit Ridership and Customer Satisfaction

There is an increasing awareness among U.S. policymakers that ITS can improve the efficiency and use of resources within the transportation system. A number of the cities evaluated in this report have already taken actions to leverage technology to monitor the performance of their public transit operations and provide RTI to consumers. Of the six cities evaluated, only one did not provide any RTI. While there is often a cost associated with capturing and communicating RTI, providing this service has been shown to increase ridership and customer satisfaction (as demonstrated in the Chicago, Tampa, and Swedish analyses) – two factors that can positively impact revenue. To ensure greater integration within a more broadly connected transportation network, cities should work to ensure that RTI is generated in an open data format so that it can be integrated with other systems to allow for more dynamic multi-modal route planning.

**Recommendation:** Develop open data policies to provide sufficient data for use in third-party application and software development to increase the availability of RTI.

### 4. Inconsistent Policies Governing the Use of Public Infrastructure or RTI Can Unintentionally Limit the Ability to Generate Revenue through Advertising

In case study cities where there was a need to manage potential budget shortfalls, transit operators adopted other revenue generating policies and contracts to offset the costs of RTI provision. These included agreements with private advertising firms


to allow advertising on public infrastructure space, provided that the advertising contractor build and maintain the infrastructure for the contract duration.

Advertising can act as an ancillary form of revenue for cities and transit programs. For example, San Francisco generated $20.9 million in revenue from advertising.\(^{40}\) Advertising campaigns may take various forms: from signage to infrastructure to vehicles. For example, Oakland entered into an agreement with advertising vendor Clear Channel Adshel, to advertise on bus shelters, kiosks, and litter bins that it provides to the city. Oakland retained one of three panels of each advertisement platform for city-related information.\(^{41}\) In another example, Valley Metro contracted advertising services at Phoenix bus stops. The agency in turn receives 63% of advertising net sales, or a minimum annual guarantee of $1 million for advertising rights.\(^{42}\)

However, development of such contracts can face challenges if inconsistent policies govern the display of advertising in public spaces. A complex regulatory environment presents challenges for stakeholders seeking to enter into agreements as both parties must ensure that the terms are compliant with all relevant laws. Because public infrastructure such as bus shelters and kiosks typically exists in the public right-of-way, these facilities may be subject to various state and local ordinances beyond those under the purview of the transit authority. Even within a particular city, there may be a patchwork of regulations that need to be addressed if a transit authority were to contract with advertising agencies to offset the costs of providing modern public amenities.

In San Francisco, for example, a recent audit identified a lack of city-wide advertising policies, which led to inconsistent advertising standards and conflicting agreements with advertisers. The case studies identified a broad range of limitations that are often put in place to reduce visual pollution and urban blight. While some cities recognized the need to identify opportunities for generating revenue through advertising, local government agencies typically seek to maintain discretion over the aesthetics of new facilities and the type of advertisements displayed.

**Recommendation:** Review policies to ensure greater consistency of public policy governing public space and identify opportunities and challenges for integrating RTI technologies.

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5. Public Agencies Often Utilize Funding from the Private Sector to Support RTI Enhancements

Depending on the scale of the transit network, a significant investment may be required to install an RTI system, including costs of equipment, power, network connectivity and ongoing maintenance. There is no one-size-fits-all approach and policymakers can adopt a scalable, flexible approach to meet the public need.

A number of cities, such as San Francisco and Phoenix, have entered into agreements with advertising agencies to address public infrastructure needs or provide a revenue source. These contracts often varied significantly in terms of the duration and requirements placed on the private-sector firm. Not all contracts required the advertising entity to provide RTI or other services at specific transit stops. However, longer term contracts, such as those spanning 20 years, may impede the ability of the transit authority to negotiate new requirements that may support greater accessibility within a more connected city environment. Shorter contract durations with RTI providers and advertisers can foster innovation and competition. With greater emphasis on balancing budgets, the public sector can identify opportunities to leverage public-private partnerships to ensure the financial feasibility of certain projects.

**Recommendation:** Identify opportunities for flexible public-private partnerships that encourage development of RTI technologies.

**RTI Technology Providers**

Three findings and recommendations were identified for RTI technology providers based on the case study analysis:

1. **Limited Access to Open Source Data Impedes RTI Provision**

Most case study cities have a complex network of transportation providers spanning the public and private sectors. For example, as was noted in the Seattle case study, six major transit entities provide service. In San Francisco, three different rail options exist, each owned and operated by a separate agency. Presenting aggregated data in an easily viewable format provides valuable information to travelers when selecting travel modes. Public display screens can be customized to provide local service options as well as beneficial information, such as public service announcements or emergency communications.

Open source data is more common; however, the availability of RTI data can still restrict the provision of RTI in some jurisdictions. In San Francisco, SFMTA contracted with private-sector firm NextBus to operate its AVL system. NextBus believed that it had ownership of the data and third-party developers received
demands that they split their revenues with NextBus. A new contract in 2009 clarified the ownership of the AVL data. In Seattle, open AVL data has allowed OneBusAway to provide RTI by multiple methods, including bus stop screens.

**Recommendation:** Educate municipalities by presenting a clear business case that demonstrates the benefits of open source data provision for use with highly customizable RTI displays and potential ridership impacts for the jurisdiction.

2. Many Jurisdictions Use Public-Private Partnerships and Other Incentives for Infrastructure Improvements

Public-private partnership opportunities can be helpful in offsetting the costs of procuring transit assets that display RTI, such as bus shelters, kiosks or screens. Providing designated advertising space generates revenue to help cover installation and/or ongoing maintenance costs. Opportunities exist to partner with other entities, such as business improvement districts (BIDs), particularly those interested in creating walkable, transit-oriented neighborhoods. For example, Atlanta’s BIDs support infrastructure investments to spur development and economic activity.

Despite the challenges of public procurement processes, the case studies demonstrated considerable cooperation between public and private actors. Seattle has worked with OneBusAway and also ran a pilot program with 10 local businesses and TransitScreen to install RTI displays at each location. TransitScreen donated the screens and Seattle paid for the software.\(^{43}\) Atlanta is working with BIDs, Community Improvement Districts and the private sector to update transit infrastructure, including new (but not RTI) signage. The Bay Area’s MTC has partnered with Civic Resource Group International and TransitScreen to modernize transit displays in many downtown locations. Valley Metro in Scottsdale approved the exploration of public-private partnerships for standard or electronic station kiosks.

There is a direct correlation between easily accessible RTI and increased transit ridership. According to a 2015 study on the New York City bus system, RTI increased bus ridership by 2% and increased yearly revenue by $5 million.\(^{44}\) For example, Oakland’s TDM program seeks to assess the most cost-effective methods to provide transportation services. Relatively small investments in accessible RTI displays could boost transit ridership without costly route or service expansions to help meet TDM goals.


Recommendation: Leverage available opportunities to enter into a public-private partnership and other creative financing mechanisms.

3. RTI Providers Find the Public Procurement Process to be a Barrier

Doing business with public entities generally requires adhering to a transparent public procurement process. Depending on the funding source, this process is unavoidable because it is governed by state or federal law. RTI technology providers should invest in learning to navigate public procurement processes, particularly those that support small businesses or are ranked for “best value” which accounts for technical expertise and experience, as well as price. The Montana case study demonstrated that there are opportunities to use unique procurement law provisions when specialized services are provided. However, even the ability to justify sole-source provision requires procurement acumen on the part of the RTI provider.

Another procurement strategy is to contract with a local jurisdiction, such as a small suburban municipality within a larger metro area, to gain a regional foothold. An easily customizable proposal could be developed to respond quickly to procurement opportunities. Finally, non-traditional procurement methods such as unsolicited public-private partnership proposals are another option (in which the private sector entity approaches a public agency with a plan to improve one of the agencies’ assets through a PPP).

The standard method of government procurement involves a competitive bidding process for up to a reasonable price. The City of San Francisco requires competitive bidding for projects in excess of $5,000, while the San Francisco BART District’s minimum is $10,000. Seattle has an e-bid site with open solicitations, results, and awards that provides easily available information on procurement and contracts.

Montana also has a traditional competitive bidding process, but the case study highlighted two examples of effective sole source procurements. The "term" contract is an open-ended contract wherein a contractor provides a specialized service under a particular dollar amount. The agency must justify the contract and advertise it in a public forum to allow competitors to challenge. This sole-source contracting method may help smaller companies contract with the government.

Recommendation: Learn to work through public procurement processes, particularly those that benefit small businesses or are focused on best value.
Conclusion

The case studies demonstrate that passengers are constantly seeking better ways to maximize their travel options and time, whether they are choice or captive riders. Providing easily accessible RTI can improve passenger perceptions and increase transit ridership.

Both municipalities and RTI providers would benefit from collaborative public-private partnerships. Technology companies can aggregate cities’ open source data in an easily viewable format. Public procurement regulations are often complex. The public sector could benefit by reviewing and streamlining its existing public space and advertising regulations to enhance provision of RTI for consumers.
Appendix - Case Studies Detailed

San Francisco

Background
The population of San Francisco has increased from 723,959 in 1990 to 805,235 in 2010, an 11.2% increase according to the U.S. Census Bureau. Since 1990, there have been dramatic shifts in the racial makeup of the city, including a modest 7.6% increase in the white population, a dramatic 35.7% decrease in the black/African American population and a significant 28.1% increase in the Asian population. San Francisco also saw an increase in the Hispanic population, although not at levels seen at the State or National level. Currently 15.3% of residents identify as Hispanic. The average age of San Francisco is increasing and currently stands at 38.2 years. San Francisco continues to rank amongst the top cities with the fewest children.

Planning Structure
The institutional arrangements within the Bay Area have evolved in complexity over time. Initially, the Association of Bay Area Governments (ABAG) was formed in 1961 to build partnerships between the 101 cities and nine counties within the Bay Area. ABAG acts as a Council of Governments (COG) to address sustainability, resilience and equity in the region. ABAG is currently working with the Metropolitan Transportation Commission (MTC) to develop Plan Bay Area 2040, a long-range planning document that represents the region’s integrated transportation and land use strategy.

MTC was established in 1970 by the California State Legislature and functions as the Bay Area’s Metropolitan Planning Organization (MPO). The MPO was initially focused on planning the region’s transportation network, with a focus on feeding bus and rail systems into the newly-constructed Bay Area Rapid Transit (BART) rail system. The role of MTC has grown to include the review of state and local applications for federal transportation grants, collecting tolls as the regional toll

45 Rahaim et al.
authority, and encouraging the construction of sustainable communities within the region.  

The San Francisco Municipal Railway (MUNI) was established as the operating transit agency of the City and County of San Francisco. MUNI worked in conjunction with other transit districts and agencies in the region. MUNI has evolved into the San Francisco Municipal Transportation Agency (SFMTA) in 1999.  

**Transit Infrastructure**

San Francisco has numerous transit options, including MUNI buses (both trolleybuses and diesel and natural gas-powered buses), light rail, cable cars and streetcars. There are also connections to other Bay Area communities via heavy rail systems, such as BART and Caltrain. The surface transportation network is managed by SFMTA, which seeks to place transit first, to build complete streets, and to provide social equity by prioritizing the most affordable and accessible modes. San Francisco is also home to several alternative transportation options, including Bay Area Bike Share, numerous car sharing options like City CarShare, Zipcar, RelayRides and Getaround, and ridesourcing services Uber, Lyft and Sidecar (all of which are headquartered in the city), as well as traditional taxis.

SFMTA maintains approximately 3,500 transit stops, according to its most recent short-range transit plan. It is the United States’ eighth largest system by boardings, carrying more than 225 million passengers annually.

In a recent 2015 Capital Plan, SFMTA identified $21.4 billion in capital needs, including all investments, procurements and programs. The capital needs were categorized as 48% restoration (defined as replacement or rehabilitation of an existing asset), 23% enhancement (defined as improvement of an existing asset above and beyond restoration) and 29% expansion (defined as new capital assets). Capital needs were also divided by mode: 82% transit, 9% vehicle, 5% walking and 4% biking.
Existing RTI Infrastructure

Automatic Vehicle Location

In August of 2002, SFMTA gave Notice to Proceed with the concurrent construction of an Automatic Vehicle Location (AVL) system and an RTI system, which is used to provide real-time arrival estimates of transit vehicles to patrons. The five-year contract was awarded to NextBus Inc., which provided the system design and implementation for the entire SFMTA fleet, totaling nearly 1,110 vehicles.\(^56\)

Within the contract between SFMTA and NextBus, ownership of the AVL data was initially unclear. This resulted in some third-party developers receiving demands for revenue splits to use AVL data collected by NextBus Information Systems. It was not until August 4, 2009, at the close-out of the original contract with NextBus, that SFMTA included specific language clarifying ownership of the data in an ongoing maintenance agreement.\(^57\)

Passenger Information Signs

The AVL contract with NextBus in August 2002 also included the installation of 450 roadside passenger information signs to convey real-time passenger information to the general public. The installation of these signs was completed by the end of the original contract in August 2009.\(^58\) NextBus installed 833 signs and 6 kiosks as part of the original SFMTA contract. The signs were described as two-line LED signs.\(^59\)

When a maintenance contract with NextBus was renewed in July 2013, SFMTA identified 900+ on-street passenger information signs.

Web Applications

The NextBus architecture includes integration with web applications, including NextMuni.com, an online portal for viewing real-time passenger information. AVL data is also integrated with MTC’s 511 system to provide real-time passenger information to the greater Bay Area. The AVL data can be archived for monitoring


schedule adherence, developing performance reports and replaying historic events, such as the timing and location of accidents.

**Mobile Applications**

AVL data for SFMTA is also available on mobile applications, including Muni Mobile, where patrons can view real-time transit information, purchase and store multiple tickets, and pay for fares.

**Advertising Policies**

**Local Regulations**

Advertising within San Francisco has been shaped by two voter-approved initiatives. The first was Proposition G, passed in March 2002, which prohibited new general advertising signs on public or private buildings, but did not prohibit advertising within the public right-of-way or on the exteriors of motor vehicles. The second initiative was Proposition E, which passed in November 2009 and prohibited any increase in the number of general advertising signs on city-owned street furniture.

At the local level, signs are also regulated by the San Francisco Planning Code, which divides the City into zoning districts to maintain the character and purpose of each district. Advertising within the public right-of-way is also subject to the San Francisco Public Works Code, which places limitations on posting public signs to reduce visual pollution and the resulting contributions to urban blight.60

**State Regulations**

At the state level, advertising contracts within the public right-of-way must be compliant with the California Public Contracting Code, which creates competitive bidding requirements for public works over a certain dollar threshold. Competitive bidding is required for contracts with local agencies in excess of $5,000.61 There are also separate code requirements for the San Francisco Bay Area Rapid Transit District, which requires competitive bidding for projects in excess of $10,000. 62

**Existing Contracts**

In 1997, San Francisco released a request for proposals for advertising in public restrooms and public service kiosks. JCDecaux was awarded the contract and was granted exclusive rights to erect and maintain public service kiosks on City property.

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The contract period was nearly 20 years and expires in October of 2016. One of the shortcomings of this long-term advertising contract is the inclusion of non-compete clauses. The contract with JCDecaux prohibited the City from displaying advertising panels from 18 to 55 square feet anywhere within the Downtown Area or within 300 feet of kiosks outside the Downtown Area.

One of the few exceptions to this non-compete clause was advertising on transit shelters owned by SFMTA, which executed an agreement with Clear Channel Inc. for advertising rights in 2007. Like the contract with JCDecaux, the contract period with Clear Channel was long-term: a 15-year period with an option for an additional five years. The Clear Channel contract also included non-compete clauses, prohibiting the installation of advertising larger than 18 square feet on any structure in the public right-of-way within 60 feet of any bus shelter or kiosk.

In 2010, the Board of Supervisors authorized a performance audit of the City’s current advertising policies and practices, which identified $20.9 million in advertising revenue from fiscal year 2009-10. The revenue originated from contracts with private companies and SFMTA, the Real Estate Division, the Department of Public Works, the Convention Facilities Department, the Recreation Department and the Parks Department. The audit identified a lack of city-wide advertising policies, which has led to inconsistent advertising standards and conflicting agreements with advertising companies. The audit also recommended monitoring existing agreements to maximize revenues. For example, the Department of Public Works only receives 7% of revenue from JCDecaux, substantially less than the 40-70% of revenue received from other agreements.

Outdoor Space Policies

Another major project to come out of the Office of Civic Innovation are the Living Innovative Zones (LIZ), which were launched on October 29, 2013 along Market Street, a major transit artery in San Francisco. These zones are an attempt to activate spaces through engagement with the public. The program is structured to encourage cross-disciplinary involvement to test new ideas, projects and technologies. These zones have the potential to enhance the public realm by connecting people with each other and their city. The installations can be changed over time as the space evolves and are designed to transform areas that are currently underutilized.63

The Living Innovation Zones have encouraged actions to maximize the use of public space. Currently, streets and public right-of-way make up 25% of all land area within San Francisco, more space than all the public parks combined. The Pavement to Parks program is an effort to reimagine how these underutilized spaces can be

transformed to encourage non-motorized transportation, enhance pedestrian safety, foster neighborhood interaction, and support local businesses.\textsuperscript{64} One way to transform underutilized street space is through parklets, which are temporary extensions of the adjacent sidewalk that can provide amenities like seating, planting and bicycle parking.\textsuperscript{65}

**Innovative Initiatives**

Cities are increasingly looking for cost-effective ways to address the challenges of shrinking budgets and rapidly changing demographics. Embracing innovative initiatives can allow cities like San Francisco to provide more to their residents with less. One way San Francisco has welcomed this type of innovation is by creating a specific office dedicated to keeping government accountable, accessible and responsive. The San Francisco Mayor’s Office of Civic Innovation is designed to champion new ideas, tools and approaches in city government. The Office of Civic Innovation has identified several key projects, including the Civic Innovation Spotlight Series, the Mayor’s Innovation Roundtable, SF Open Law and Startup in Residence.\textsuperscript{66}

The Civic Innovation Spotlight Series is a way of highlighting creative programs from Departments within the City and County of San Francisco. Every month, two programs are given an opportunity to share their ideas with a guest blog post. Examples include energy benchmarking for municipal buildings, an on-street car-share pilot program and recommendations for water conservation.\textsuperscript{67}

The Mayor’s Innovation Roundtable is a forum for thought leaders, startups and local governments to track emerging trends within the city. There are two parts to each roundtable: a discussion between the Mayor, local and national leaders, and City staff; and a forum where the wider public can engage with each thought leader.\textsuperscript{68}

SF Open Law is an initiative to reformat existing city laws in a way that’s more easily accessible to the public. The applications have yet to emerge but the hope is to break down traditional barriers to civic engagement. SF Open Law was made possible by the 2009 open data policy, which was later codified in the city’s administrative code

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\textsuperscript{64}“About Pavement to Parks | Pavement to Parks.” Accessed April 23, 2016. http://pavementtoparks.org/about/.


in 2010. This also led to the development of SF OpenData, a portal for datasets that can be used by developers, analysts and residents.\textsuperscript{69}

Startup in Residence (STIR) is a program that utilizes the technology-enabled products and services from San Francisco’s startup community to address the civic challenges of City Departments. The STIR model also helps to bridge the gap between entrepreneurship and innovation within the startup community and the sometimes unwieldy mechanics of government. The program has the potential to accelerate private-sector innovations and to solve the pain points that stifle public-sector productivity.\textsuperscript{70}

**Findings and Recommendations**

San Francisco is at the forefront of utilizing RTI systems, including an open data initiative to maximize involvement from third-party developers. Utilizing RTI systems will help SFMTA to meet its strategic goals, but the procurement of these systems was not without fault. Identifying lessons learned can bring value to cities that have yet to implement RTI systems.

In utilizing NextBus Inc. to concurrently install both the AVL hardware and the RTI software, San Francisco inadvertently limited the use of its RTI data and the use of emerging RTI technologies. In its initial contract with NextBus Inc., ownership of the data was initially unclear. This led to conflicts with third party developers who were looking to utilize the RTI data from the proprietary NextBus Inc. system. NextBus Information Systems initially sought revenue sharing agreements from third party developers but SFMTA later claimed ownership of the data in an on-going maintenance agreement with NextBus Inc. The development of SF OpenData, San Francisco’s open data initiative, followed soon thereafter in 2009.

Advocates of RTI systems have identified open architecture requirements as a key to building third-party RTI solutions. They argue that transit agencies cannot maximize the benefits from the latest technologies used to disseminate and manipulate RTI data without complete access to the databases. At a minimum, transit agencies should require an open architecture, meaning the software is independent of the hardware.\textsuperscript{71}


\textsuperscript{71} Pulido and Canales.
Seattle

Transit Infrastructure

The Seattle area has a variety of overlapping jurisdictional transit providers and stakeholders. Multiple counties and cities interact closely within commuting proximity. The primary entities include:

- Seattle Department of Transportation (SDOT) – City of Seattle
- King County Metro – King County Department of Transportation Metro Transit Division
- Community Transit – Snohomish County
- Pierce County Transit
- Sound Transit (regional agency funded by the three counties)
- Port of Seattle

City of Seattle

SDOT is organized into eight divisions.72 One of its core values is an “interconnected Seattle,” defined as providing an “easy-to-use, reliable transportation system.” The city also acknowledges a need to understand and plan for technological innovation.73 In 2007, a Complete Streets ordinance directed SDOT to design streets that safely accommodate walking, bicycling and transit.74

In an effort to make Seattle a highly walkable city, updates to the pedestrian master plan included “vibrancy,” described as a connected pedestrian environment. A technical update exercise recommended adding the following factors to support healthy communities: heavily weighted urban centers, job and housing growth, and mapping neighborhood retail destinations to include ten-minute walksheds to frequently used transit stops, parks, and schools.75 SDOT’s infrastructure inventory is estimated at $20 billion.76

Seattle offers a variety of mobility options including bus, train, streetcar, walking, bicycling, carpooling, vanpooling, carsharing, taxis, and TNCs. Other supporting

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transit programs include ORCA Cards, trip planning web tools and many smartphone apps. ORCA cards provide easy fare payment for transit, train, and ferry. The program also offers youth regional reduced fare (RRFP) and low-income ORCA subsidies.

**King County Metro**

King County Metro’s (Metro) main transit hub is in downtown Seattle with smaller surrounding regional hubs. Metro provides bus, streetcar, trolleybus, monorail, paratransit and vanpool services for 400,000 passengers daily. King County Metro serves up to half of Seattle’s downtown workforce, replacing 175,000 personal vehicles. The $635 million operating budget supports 1,400 buses, 1,300 vanpool vehicles, 340 Access vehicles, and 550 support vehicles. There are 130 park-and-ride lots and 8,500 bus stops with 1,900 shelters. The bus network includes the second most utilized trolleybus system in the U.S., with 74,000 average weekday riders.

Metro’s 2013-2014 budget assumed a $75 million dollar shortfall, resulting in a plan to reduce services even after four fare increases in four years. The plan to cut costs and implement efficiency measures did receive extra funding from a new City of Seattle contract and higher sale tax revenue and lower diesel prices have contributed to alleviating budgetary constraints. A final Long-Rang Public Transportation Plan is planned to be sent to the County Council in June 2016. Further, King County and Sound Transit signed an executive order in 2014 agreeing to joint bus and rail planning for the purposes of improving efficiencies and better integration of transit activities.

King County has an advertising policy that outlines the need to generate revenue through advertising. However, the county retains discretion regarding the nature of the content on transit vehicles and facilities. Advertising space is considered a limited public forum. The language prohibits subject matter that is controversial, interferes or diverts resources away from transit and/or poses significant risk to harm, inconvenience or annoy passengers or transit employees. Prohibited subjects include

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77 ORCA stands for “One Regional Card for All”

George Mason University TPOL, 2016 31
political messages and advertisements for tobacco, alcohol, firearms, and adult-themed television, games or entertainment.82

Puget Sound Transit

The Central Puget Sound Regional Transit Authority (Sound Transit) was created by the joint action of the County Councils of Pierce, King, and Snohomish Counties.83 The Link Light Rail system, consisting of the Tacoma Link and the Central Link, served 10.9 million riders in 2014. Long-range plans include expansion to connect Everett, Seattle, Tacoma, and Bellevue/Redmond. Sound Transit reported 17.7 million bus rapid transit passengers in 2014, while another 3.4 million passengers used the Sounder commuter train.84

Central Link Stops85

Sound Transit deployed OneBusAway in 2008 to provide unified real-time information from six sources. Sound Transit maintains an Open Data Transit (ODT) database, which contains publicly accessible data for the Puget Sound region. An application programming interface (API) key may be requested. The data may be used by anyone and development of new applications is encouraged. A webpage provides additional information, which may serve as a best practice for all transit agencies.86

Resolution 78-2 governs procurement and contracting rules. The resolution encourages innovative and alternative techniques. Procurement and contracting with Sound Transit is streamlined with an “eBid” website. Registrants have the opportunity to receive pushed notifications related to open solicitations, results, and award information. Procurement and contract information is easily accessible on the website, which may be another example of a best practice.87

Snohomish County

Community Transit is a municipal corporation providing public transportation services within Snohomish County, including northern portions of Seattle, with some routes extending south into King County. Services include bus, vanpool, and paratransit. Community Transit reports up to 40,000 passengers per weekday using

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82 King County Department Policies and Procedures, Transit Advertising Policy, CON 1-1-1 (D-P), January 12, 2012
83 The Central Puget Sound Regional transit Authority, Sound Transit was created under RCW Chapters 81.104 & 81.112 for the Pierce, King & Snohomish Counties region through action by the county councils pursuant to RCW 81.112.030 governed by a Board.
Just in Time: Enhanced Mobility and Equity through Real-Time Information

484 vehicles at 1,584 bus stops; 257 of these are equipped with a passenger shelter. Bus services consist of fixed routes, swift bus rapid transit with 12-minute intervals during peak periods, nine feeder routes to outlying communities, six rural routes, and 23 commuter routes, of which 13 go to downtown Seattle.

The vanpool program claims to be one of the largest in the nation, with a 408-vehicle fleet comprised of seven 12- and 15-passenger vans. Additionally, the program offers a ride-matching service for those seeking carpool or vanpooling through the Rideshareonline.com database. A DART Paratransit and Van GO program also serve the needs of those with disabilities, special needs, seniors and children.88

An ITS system was implemented for the entire fleet in 2013 with real-time location technology. NextBus arrival signs were installed at the Swift stations and major transit centers. In 2014, BusFinder by phone, web, and mobile device efforts were introduced, along with RTI signage. One of the signs was acquired by a contracted vendor who responded to a notice of request for bids for a contract estimated at $66,000.89

Puget Sound Regional Council’s 2010 employment figures estimated that 260,000 jobs were within a quarter-mile walk of Community Transit bus service.90

Existing RTI Infrastructure

Public transportation information is provided on 34 dynamic message signs and portable digital signs placed throughout downtown Seattle. Travel times using dynamic message signs, web postings, a smartphone app, and a Twitter feed cover 12 corridors and downtown. In 2014, Seattle launched a pilot program partnering with 10 businesses, in which each business hosted a dynamic transportation information display with software provided by TransitScreen, which donated the screens while the City paid for the company’s software and one year of service.91

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2021_TDP_Board_Intro_3-3-16.pdf, pp. 7-14
90 Image credit: “2016-2012 Transit Development Plan (Draft),” p. 12
91 “Transportation Options Program: Transit Screen Partnership Opportunity”
Atlanta

Background
Atlanta is the capital of Georgia and has a city population of 456,000 per the 2014 Census estimate. The Census estimates an 8.5% increase in population for the city from 2010 to 2015. Atlanta’s median income is $46,439 per year.92

Atlanta’s population is majority black or African American (52.9%) and 39.7% white. 94.4% of citizens have no Hispanic ethnicity. About 19% of the population is under 18 years of age, and almost 10% of the population is over 65 years in age. About 8% of the population are living with a disability and under age 65. These three populations tend to have the greatest need for transportation options and are least likely to be able to drive a personal automobile. 93

For commuting purposes, 68.5% of the City of Atlanta’s citizens drove to work alone and 7.3% work at home. Public transit is used by 10.0% of workers; 7.6% of workers carpooled; 4.6% walked; and 2.1% use another means of transportation (motorcycle, bicycle, taxi or other).94

Public transit users are generally low-income (75% of them make less than $35,000 annually) and mostly black (72.6%), with a median age of 36. 43.9% of public transit users do not have a vehicle while 34.8% have one vehicle, and 21.4% have two or more vehicles available. Travel time by public transit averages 49.8 minutes, with 22.3% having a commute of less than 30 minutes and 36.7% having a commute of more than 60 minutes.95

Transit Infrastructure
Atlanta is a relatively compact city with a density of about 3,145 persons per square mile.96 The city has an average walk score of 46 and transit score of 44, demonstrating

93 U. S. Census Bureau, “ACS Demographic and Housing Estimates: 2010-2014 American Community Survey 5-Year Estimates.”
96 “US Census Quick Facts: Atlanta City, Georgia.”
Just in Time: Enhanced Mobility and Equity through Real-Time Information

a moderate level of transit and active transportation accessibility throughout the city proper. The Atlanta region has a host of transit service providers, including:

- 99 Metropolitan Atlanta Rapid Transit Authority (MARTA) Bus Routes/Shuttles
- 4 MARTA Train Routes
- The Atlanta Streetcar Line (partnership with City of Atlanta, MARTA and the Atlanta Regional Council (ARC))
- 9 Emory University Shuttle Routes
- 33 Xpress GA Routes (operated by Georgia Regional Transportation Authority - GRTA)
- 2 Buckhead Uptown Connection (BUC) Routes
- 13 Cobb County Transit Routes
- 9 Gwinnett County Transit Routes

The City of Atlanta is also in the process of integrating a city-wide bikeshare system. The proposed system will bring over 500 shared bikes to the city that will be available at strategically-placed kiosks for convenient pick-up and drop-off.

Existing RTI Infrastructure

Transit Agencies/ARC

MARTA provides a host of resources for acquiring transit schedule information. The agency’s website provides an online trip planning tool, and simple LED real-time departure signs are available at almost every MARTA station on the platform. MARTA also has a project in the development stage to replace these real-time information boards at the stations with full-color displays.

A variety of smartphone applications also provide real time information for on-the-go reference. These applications include:


George Mason University

TPOL, 2016

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• **MARTA’s On the Go App**: Schedule, real-time, rider alert, and route connection information for MARTA’s bus and rail services.

• **Itsmarta.com On the Go**: A smartphone version of the Itsmarta.com website, providing access to schedule, real-time arrival, trip planning, route connection, fare, and outreach information.

• **OneBusAway**: Real-time arrival information for Atlanta area buses, including MARTA and the other local transit providers.

• **HopStop.com**: Directions, transit maps, station locator, and schedule finder for both transit and active modes of transportation.

• **TransitTime+ Trip Planner**: Schedule, service alerts, and real time bus information for MARTA and GRTA services.

About 60% of Atlanta residents have a smartphone, and about 30% of residents have a tablet, so the majority of residents are able to access the available real-time information via mobile device.

For the remainder of the population, little real-time transit information exists outside of MARTA rail station platforms.

The Atlanta Regional Council (ARC), the regional coordination agency for the ten-county metropolitan Atlanta region, is in the process of updating at-station/stop signage throughout all ten counties. The region-wide transit signage project began in the early 2010s as a result of a lack of consistent signage outside of the region’s core activity centers. ARC assumed the responsibility for manifesting a ubiquitous, standardized, and multidimensional signage program to improve upon the existing approach and create a “culture of transit literacy.”

Because the program supports all transit agencies in the region, there is one unified funding source for the project. This funding source is an aggregate of Federal Transit Administration (FTA) 5307 funds (the Urbanized Area Formula Program), local agency matches, and urban transit allocations from a transit package from the Georgia Department of Transportation (GDOT).

The new signage will be static, as providing real-time transit information for the over 12,000 stops throughout the counties would be fiscally infeasible. The new signage at each stop will include critical user information, information about connectivity between the regional transit systems, and refer transit users to various real-time information sources available via phone (by calling or texting a bus stop’s unique ID number for real time info) or a mobile application.

While each transit agency will continue to host its own unique mobile application, ARC has undertaken the development of the OneBusAway application for the region, as ARC aggregated the General Transit Feed Specification (GTFS) feeds for all

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agencies in the region. (The GTFS feed provides schedule information for all agencies in a standardized format.) Note that MARTA and Cobb County Transit currently utilize automatic vehicle location (AVL) systems on their transit vehicles to enable real-time locational information. GRTA, Gwinnett, and the Streetcar are undergoing AVL installs and upgrades. MARTA’s real-time GTFS is shown on OneBusAway, but Cobb County’s real-time information is only available with their Cobb County Transit-specific app. ARC anticipates that all regional agencies will be able to provide real-time GTFS in the near future.

ARC is in the process of securing the last portion of funding for the signage project and anticipates that implementation will occur over the course of the next two years. Given that this signage program is on the verge of a roll-out, as well as the potential update of the real-time transit feed signage at MARTA stations, ARC does not foresee the need or availability of funding for the implementation of real-time signage in public spaces throughout the region. ARC noted that interactive displays are difficult to run power to and the lack of public funding for such an operation renders it challenging to implement.108

Intermodal Facilities

Hartsfield–Jackson Atlanta International Airport is Atlanta’s primary commercial airport facility and major intermodal hub. Signage for the MARTA train station and bus linkages are placed throughout the airport.109

Over the past two decades, Atlanta has been in the planning stages of the potential Atlanta Multi-Modal Passenger Terminal. The effort involves partnerships across GDOT, Amtrak, ARC, MARTA, the City of Atlanta, and GRTA. No concrete plans to move the project forward exist at present, but it is possible that a public-private partnership may assist in pushing the proposed multi-modal facility into the region’s project pipeline.110

Municipalities

In 2008, Downtown and Midtown Atlanta completed the installation of a new “Wayfinding and Signage System.” The effort sought to provide signage for residents and tourists to various destinations throughout the Midtown, Olympic Park, Downtown, SoNo District, King Historic District, Government Walk, and Atlanta University Center. Signage targets motorists, pedestrians, cyclists, and transit users. The project reused map kiosks constructed for the 1996 Olympic Games to provide a

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108 Fowler, Aaron. Senior Transit Planner - Mobility Services Division at the Atlanta Regional Council. Telephone Interview, 2016.


local district map on one side of the kiosk and a city map or cultural component on
the other side of the kiosk. New kiosks were also built in high-traffic areas or MARTA
stations where a former Olympic kiosk was not present.\footnote{111}

Private Sector

North American Properties, a developer that worked on the Atlantic Station mixed-
use development project in Midtown near Georgia Tech’s campus, launched a
“Mobility Concierge” at the Colony Square mixed-use development to provide
individualized transportation consulting services to residents. North American
Properties also plans to install TransitScreen real-time transportation screens
throughout their sites to provide information about transportation options for
tenants, shoppers, and workers in the area.\footnote{112}

Relevant Transportation Demand Management (TDM) Policies

ARC leads various TDM activities throughout the region to encourage transportation
alternatives and steer commuters away from the traditional drive-alone option.
Georgia Commute Options (formerly run by Georgia Department of Transportation,
but soon to be under ARC’s authority) provides incentives for commuters using
transit or carpools. ARC also oversees the Guaranteed Ride Home Program,\footnote{113}
which provides a maximum of five free rides home (or to a car or alternative vehicle pick up)
from work each year if an unanticipated event occurs preventing a commuter to travel
home as intended.\footnote{114}

Further, ARC finalized the Atlanta Regional Transportation Demand Management
Plan in 2013, which is designed to align and coordinate existing TDM programs
across various stakeholders in the region. The plan resulted in the following priority
strategies, listing a lead organization and specific implementation steps to achieve
the action items in a clearly defined timeframe:\footnote{115}

\footnote{111} “City of Atlanta Downtown and Midtown Wayfinding Signage System.” Alanta Downtown, accessed April 27,
\url{http://gacommuteoptions.com/Save-Your-Commute/Make-It-Easier/Resources-Ridematching-Guaranteed-Ride-
Home-and-Transit-Route-Info/Guaranteed-Ride-Home}.
\url{http://gacommuteoptions.com/Save-Your-Commute/Make-It-Easier/Resources-Ridematching-Guaranteed-Ride-
Home-and-Transit-Route-Info/Guaranteed-Ride-Home}.
\footnote{115} Atlanta Regional Commission. “Regional Transportation Demand Management Plan.” Atlanta Regional
Commission, accessed April 27, 2016. \url{http://www.atlantaregional.com/transportation/commute-options/regional-
tdm-plan}. 

George Mason University TPOL, 2016
Table 1: TDM Plan Strategies

<table>
<thead>
<tr>
<th>Action</th>
<th>Lead</th>
<th>Partners</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Build on Georgia Commute Options rebranding to promote seamless customer experience</td>
<td>ARC</td>
<td>Marketing Manager, GDOT, transit agencies, CIDs, TMAs, and vanpool providers / operators</td>
<td>3 years</td>
</tr>
<tr>
<td>Improve connection of TDM to regional information systems</td>
<td>ARC</td>
<td>Marketing Manager, GDOT, transit agencies, universities, and the private sector</td>
<td>3 years</td>
</tr>
<tr>
<td>Improve regional coordination of transportation planning, land use, and travel choice</td>
<td>MPO</td>
<td>TDM Program Manager, GDOT, GRTA, transit agencies, local governments, and CIDs</td>
<td>2 years</td>
</tr>
<tr>
<td>Strategically link express bus service, local transit, vanpools, managed lanes and park and ride lots</td>
<td>Transit Agencies and ARC</td>
<td>Marketing Manager, GDOT, SRTA, the MPO, local governments, and vanpool operators.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Enhance integrated operations, branding and marketing of the regional vanpool program</td>
<td>GRTA</td>
<td>TDM Program Manager, Douglas and Cherokee Counties, GDOT, the Marketing Manager, TMAs, Community Improvement Districts (CIDs), vanpool operators / providers and transit agencies.</td>
<td>3 years</td>
</tr>
<tr>
<td>Leverage and diversify existing and potential funding sources to support creative, long-term and innovative strategies</td>
<td>ARC and GDOT</td>
<td>MPO, SRTA, local governments, boards of health, aging and human transportation services, universities, transit agencies, CIDs, and TMAs</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Develop metrics for all programs and services and use the data to make strategic improvements</td>
<td>ARC</td>
<td>GDOT, the TDM Advisory Committee, the TMAs, vanpool operators, the MPO, and the Marketing Manager.</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

ARC hosts a TDM Technical Advisory Committee (TAC) to review, assess, and guide the implementation of the TDM Plan and ongoing TDM activities throughout the region. The TAC meets quarterly to discuss TDM activities.116

Advertising Policies

Transit Agencies/ARC

ARC recently launched its first regional transit marketing campaign. While many of ARC’s campaigns in the past focused on TDM strategies like carpooling and vanpooling, this was the first to look exclusively at transit. ARC targeted the campaign at Millennials, with the intent of directing this population to the program’s main website, ATLTransit.org, which helps users to plan transit, active transportation, and multimodal trips.117

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116 “Regional Transportation Demand Management Plan.”
117 Fowler, 2016.
MARTA has transit marketing strategies in addition to those fostered by the ARC. In 2015, OUTFRONT Media signed a five-year (plus two option years) advertising services contract with MARTA. OUTFRONT is a national leader in advertising.\(^{118}\) The other transit agencies in the region are generally too small to take on their own transit marketing campaign, so they will benefit from both the ARC marketing campaign and the new signage program integrated throughout the region.

In recent years, the ARC region has refocused both funding and marketing for active transportation, which has resulted in safer and improved bicycle infrastructure. The construction of the Atlanta Beltline (a major bike/walk trail encircling the City, mostly on former railroad rights of way) helped to re-image transportation around the City. The development of the Beltline also led to an increased awareness of the bike/pedestrian infrastructure in neighborhoods adjacent to the Beltline, highlighting where additional improvements are necessary to increase accessibility for active transportation users.

Municipalities

In need of new infrastructure improvement funding sources, City of Atlanta voters elected to use bonds to finance various transportation enhancements throughout the City. The program, titled “Renew Atlanta,” is underway and uses bonds that the City sold in 2015. The program includes three tiers of phased projects intended to “upgrade public facilities, improve [the City’s] parks and recreation areas” and “install bike lanes and Complete Streets projects for more transportation options.”\(^{119}\) These types of improvement projects in public areas and streetscapes may provide a viable opportunity for the introduction of RTI displays.

Additionally, in 2015, the City of Atlanta began encouraging the integration of advertising and marketing signage and lighting to public facilities in “designated commercial districts and high-traffic corridors.” Public schools, police/fire vehicles, Centennial Olympic Park, the Beltline, and Hartsfield-Jackson International Airport were deemed inappropriate venues for private advertising.\(^{120}\) While restrictions exist, this opportunity to integrate advertising into public realms may also open the door for real-time transit information dissemination.

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Innovative Initiatives

Transit Agencies/ARC

MARTA recently evaluated the application of a transit-oriented development program. The program would review excess parking around MARTA stations to repurpose the space for mixed-use developments, which would aid in increasing population density – and thus markets – around transit stations.

ARC’s Livable Centers Initiative (LCI) program facilitates coordination between local governments and private developers in enhancing transportation options in mixed-use developments. The LCI program offers competitive grants to fund both studies and design/implementation of transportation improvements in selected activity centers throughout the region. In 2016, ARC awarded nine communities in the region LCI grants for studies, totaling $800,000. ARC awarded over $12 million for transportation project implementation in 11 communities. These communities previously completed LCI studies and went on to implement the findings. The 2016 recipients include:

Study Recipients:

- Buckhead Community Improvement District ($112,000)
- City of College Park ($80,000)
- City of Doraville & City of Chamblee ($96,000)
- City of Hapeville ($80,000)
- City of Jonesboro ($80,000)
- City of Smyrna ($100,000)
- Gwinnett Place Community Improvement District ($48,000)
- Gwinnett Village Community Improvement District ($100,000)
- Little Five Points Community Improvement District ($104,000)

Transportation Project Recipients:

- Avondale Station: Construction and maintenance of an intermodal bus facility, designated parking for MARTA patrons and a transit plaza within the parking structure for new development near the station. (MARTA - $4,000,000)
- Brookhaven Station: Construction of pedestrian improvements, including a new elevator and an improved network of wheelchair ramps at this rail station. (MARTA - $2,000,000)
- Engineering of Baker Street, two-way conversion (City of Atlanta - $226,560)


• Engineering of sidewalks and trails near West End, Oakland City and Lakewood MARTA stations (City of Atlanta - $264,000)
• Engineering of 15th Street extension in Midtown (City of Atlanta - $188,625)
• Engineering of Phase 1 of Rottenwood Creek Trail in Marietta (Cobb County - $400,000)
• Construction of sidewalks and trails connecting Medical Center and Dunwoody MARTA stations (DeKalb County - $264,000)
• Engineering of pedestrian improvements in Avondale Estates (DeKalb County - $128,000)
• Engineering of last-mile connectivity, sidewalks and trails for the Global Gateway Connector in College Park (Fulton County - $535,626)
• Right of way for multi-use trail from Norcross to Lilburn (Gwinnett County - $311,728)
• Bicycle and pedestrian improvements in Buford Town Center (Gwinnett County - $184,000)

Communities studying and implementing transportation options with LCI funds may be potential candidate areas for integration of RTI displays. These areas demonstrate a commitment to improving transportation infrastructure and choices and have the financial support necessary to realize these enhancements.

Municipalities

The City of Atlanta is currently in the process of reviewing existing zoning procedures. It is possible that the City will shift to a form-based code, which could include the incorporation of transit-oriented development types around rail lines and stations – in particular the new Atlanta Streetcar.

The City of Atlanta also has an Office of Innovation Delivery and Performance that focuses on various directives from the City’s Mayor. The Office of Innovation Delivery and Performance targets performance management and continuous improvements for Atlanta’s communities. An office that supports innovative endeavors is a potential candidate for integration of real-time information into areas in the City of Atlanta using partnerships and innovative financing approaches.

Private Sector/Partnerships

Throughout the region, Business Improvement Districts (BIDs) support investment for various projects that occur within specified areas with concentrations of businesses. Many BIDs have related organizations that focus on TDM strategies, which provide transportation options at the neighborhood level. While real-time transit information posting in public space could be beneficial for a variety of

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populations, ARC was concerned in the financing and maintenance responsibilities. ARC noted that local municipalities, BIDs, and CIDs could sponsor these types of information displays in public spaces. The Midtown Alliance is one possible candidate for this type of implementation.
Jersey City

Background

Across the Hudson River from Manhattan, Jersey City has more than 260,000 residents, contributing to the massive New York metropolitan population. Transit is central to the residents and economy of Jersey City. According to the American Community Survey, Jersey City ranks high nationally in automobile independence, with 47.5% of its residents utilizing some form of transit for commuting.\(^{124}\) The median citizen of Jersey City is 33.5 years old, making $58,907 per year.\(^{125}\) For commuting purposes, 32.6% of citizens drove to work alone, 3.1% work at home, 7.1% carpooled, 8.3% walked, and 1.3% used another means of transportation (motorcycle, bicycle, taxi or other).\(^{126}\) Fifty percent of public transit users are low income (< $35,000), however, 30.1% have annual incomes over $75,000. Nearly 45% of public transit users do not have a vehicle, while 42.0% have one vehicle and 13.6% have two or more vehicles. Travel time by public transit averages 44.0 minutes, with 17.4% having a commute of less than 30 minutes and 26.4% having a commute of more than 60 minutes.\(^{127}\)

Transit Infrastructure

Multiple rail options are available for Jersey City travelers. These include PATH (Port Authority Trans-Hudson) heavy rail (which is classified as a commuter rail system due to its connection with the national rail network, in spite of being a third-rail electrified subway-style operation), and the Hudson-Bergen Light Rail (HBLRT). PATH trains provide service east to west between Newark and New York City, while HBLRT trains offer service north to south between Secaucus and Bayonne. PATH is operated by the Port Authority of New York and New Jersey, an independent bi-state agency that also controls airports, seaports, bridges and tunnels, while HBLRT is operated by New Jersey Transit, a branch of the state government that runs trains, buses and paratransit statewide.

If travelers choose to move via bus, the major origin and destination points include the Journal Square Transportation Center, Exchange Place, and the Hoboken

Terminal. Bus transportation to several locations is available, including Newark and several destinations in Jersey City and Hudson County.

**Existing RTI Infrastructure**

Real-time transit information for travelers in Jersey City is limited. One option is the phone application called “iTrans New Jersey Transit”. It offers travelers trip timetables and live train information. Additionally, if subscribers use the “pro” service can see what platform their train is at and if it is delayed. There is also an option to have push alert notifications to update the user automatically, eliminating the need to watch the screen every day. There are also multiple other phone applications travelers can download and use similarly. They include “Embark NJ Rail” and “NJ Rails,” among others that also include New York City information.\(^{128}\)

Another tool that travelers can use is “My 511 Personalized Alerts.” This is a free service that offers either phone or web alerts to subscribers. The service consolidates traffic and transportation information into one source for commuters to easily access. Travelers can trust the information they are receiving from the 511 services because it is managed by public agencies such as the New Jersey Department of Transportation, the New Jersey Turnpike Authority, the New Jersey State Police, and the Port Authority of New York and New Jersey. Further information is gathered by traffic cameras, travel time sensors, and local police, fire, and medical emergency services.\(^{129}\)

511 services offer travelers information regarding weather, accidents, and incidents that would cause delays or otherwise affect how people get around. All major highways, interstates, turnpikes, bridges, and tunnels are monitored so commuters can access travel information seven days a week, 365 days a year.\(^{130}\) While the information available from 511 services tends to focus on highway and motor vehicle travel, this information can help motorists make more informed decisions about planning trips and alternate routes, including utilizing bus or rail if a delay makes motor vehicle use less beneficial.

Another tool travelers can use is the transit trip planner available on the New Jersey Transit website. This tool is available online, and while it is not real-time information, it can offer some assistance when planning a trip. The tool allows a user to input his or her origin, destination, date, and the time at which he or she wants to

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\(^{130}\) “Overview - 511NJ.org.”
depart or arrive. Additionally, it allows one to select which mode one would like to use, including rail only, bus only, light rail only, or all of the above.\textsuperscript{131}

\textbf{Advertising Policies}

The policies regarding advertising in public spaces in Jersey City may not be conducive to having real-time transit information available on streets, sidewalks, and parks.

Chapter 296 of the New Jersey Code of Ordinances gives details on all ordinances related to streets and sidewalks. Section 18 of this chapter states, “No person may place, leave or display any merchandise, advertising, signs or waste material on any public street or sidewalk, or in front of or adjacent to the exterior of any store or commercial premises between the building line and the public sidewalk.”\textsuperscript{132}

Chapter 239 discusses public park policies. Section 14 states, “No person in a park shall paste, glue, tack or otherwise post any sign, placard, advertisement or inscription whatever, nor shall any person erect or cause to be erected any sign whatever on any public lands or highways or roads adjacent to a park.”\textsuperscript{133}

Chapter 81 pertains to Advertising Materials. While it does not explicitly allow for public screens that offer real-time transit information, the ordinances could be interpreted differently. Section 5 states, “No person may paint, mark, write on, post or otherwise affix any handbill or sign to or upon any public property or structure without the authorization of the Traffic Engineer. Authorization shall be given only for the purpose of regulating, warning, identifying and guiding traffic.”\textsuperscript{134} Though the purpose of this ordinance is primarily to temporarily protect construction and utility workers, a loose interpretation could result in different outcomes.

When it comes to the interior of PATH’s 13 stations and 340 car fleet, JCDecaux operates all advertisements. Advertisements can be found inside train cars, on the exterior of cars using wraps, and throughout each station.\textsuperscript{135}

\textbf{Innovative Initiatives}

In an attempt to make more sustainable communities, the New Jersey Department of Transportation and New Jersey Transit have teamed together to lead a multiple

\begin{footnotesize}
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agency plan known as the Transit Village Initiative. This program offers incentives for cities to redevelop areas around transit stations using design models of transit-oriented developments (TODs). The goal of TODs is to establish appealing and lively neighborhoods that are friendly for pedestrians and where residents can live, shop, and recreate without depending on personal motor vehicles for transportation.\(^{136}\)

The Transit Village Initiative not only seeks to revive communities, it also looks to reduce vehicle congestion in addition to improving air quality by increasing transit use. According to studies utilized by New Jersey authorities, the more homes are located within half a mile of a transit facility, the more likely residents are to use transit. Another goal of the Initiative is to increase the number of homes and businesses in communities near transit stations.\(^{137}\)

Each community that wishes to be a part of the initiative has to meet certain criteria. They must identify existing transit and demonstrate a municipal willingness to grow. They must adopt a TOD redevelopment plan, identify specific locations and projects, identify bicycle and pedestrian enhancements, include affordable housing, and identify arts and cultural locations, among other requirements.\(^{138}\) TODs could benefit from installation of screens that offered real-time transit information since the majority of residents would be depending on bus or rail modes.


\(^{137}\) “NJDOT Transit Village Initiative Overview, Community Programs.”

\(^{138}\) “NJDOT Transit Village Initiative Overview, Community Programs.”
Oakland

Background

Oakland, CA is a diverse city with a population of 414,000 per the 2014 Census estimate that is 39.7% white, 36.1% black or African American, 16.5% Asian, 6.0% two or more races, and 11.7% of other backgrounds. Seventy-four percent of citizens have no Hispanic ethnicity. The median age of an Oakland citizen is 36.2 years and the median income is $52,962 per year. For commuting, 19.1% of workers used public transit, 11.2% car pooled, 4.3% walked, 4.8% used another means of transportation (motorcycle, bicycle, taxi or other), and 60.6% of citizens drove to work alone or work at home. Half of public transit users are low income (< $35,000), however, 21.9% make $75,000 or more, with a median age of 36.9. Public transit users mirror the demographics of the city for race and ethnicity. 21% of public transit users do not have a vehicle while 38.1% have one vehicle, and 40.9% have two or more vehicles available. Public transit travel time averages 43.8 minutes with 18.2% having a commute of less than 30 minutes and 26.7% having a commute of more than 60 minutes.

Planning Structure

Please refer to the San Francisco case study for an overview of the Bay area’s planning structure. The City of Oakland has a Planning Commission comprised of seven planning commissioners. The Oakland Chamber of Commerce supports Oakland’s ten business improvement districts (BIDs) and community benefit districts (CBDs).139

Transit Infrastructure

Oakland, CA is located in the San Francisco Bay Area and has numerous transportation options, including heavy rail, buses, ferries, and bikeshare. The city has an average walk score of 69 and transit score of 55, demonstrating a relatively high level of transit and active transportation accessibility throughout the city proper. Amtrak provides regional and long-distance heavy rail service in the region, including hourly corridor service connecting to Sacramento and San Jose, frequent daily service to the Central Valley, and once daily service to Los Angeles, Seattle, Chicago and intermediate points. The national passenger rail carrier operates two stations in Oakland: Jack London Square (annual ridership: 319,336) and Oakland Coliseum (annual ridership: 57,491). The Bay Area Rapid Transit District (BART) provides heavy rail transit service for the Bay Area and operates eight stops in Oakland. Alameda-Contra Costa Transit District (AC Transit) operates 33 bus lines

throughout the Bay Area, provides frequent peak period weekday service to/from San Francisco, and offers an “all-nighter” line during the late hours when BART is closed.

East Bay Paratransit provides on-demand service for disabled passengers who are unable to use regular buses or trains, like those operated by AC Transit and BART. The service operates wheelchair-capable vans and was established by AC Transit and BART to meet Americans with Disabilities Act (ADA) requirements. Greyhound provides primarily long distance bus service to the Bay Area and operates one station in Oakland. The Alameda/Oakland Ferry provides daily, year-round service to San Francisco’s Ferry Building, Pier 41, the Alameda ferry terminal, and AT&T Park (during baseball season). Oakland International Airport (a minor hub for Southwest Airlines) connects to BART, AC Transit, and Amtrak. Bay Area Bike Share, begun in San Francisco, is planning to expand to Oakland and other East Bay cities such as Berkeley – the plan is for 750 bikes to be spread across 60 stations between these two locations.

Existing RTI Infrastructure

RTI for public transit is available in the Oakland area across multiple media platforms. Digital displays are most common at major transit transfer areas, such as in BART stations or at AC Transit hubs. AC Transit bus stops have clearly posted phone numbers that riders can call for real-time updates. Third-party apps also provide RTI covering multiple Bay Area transit operators.

Specifically, BART offers RTI via its website, optional text/e-mail notifications, and third-party smartphone applications (utilizing BART’s open source data). In December 2014, BART converted existing poster ads in three downtown San Francisco stations to 17 digital screens to display a mix of advertising, news, weather and real time BART messages. AC Transit uses NextBus’ GPS technology to provide users with real-time bus information via the NextBus website, NextBus smartphone application, other third party smartphone applications, optional text/e-mail notifications, and electronic signs at bus stops. AC Transit provides real-time digital signs at bus shelters along the 1R and 72R routes, which service parts of Oakland. East Bay Paratransit installed Mobile Data Terminal (MDT)/Automatic Vehicle Locator (AVL) units on vehicles to reduce wait time for passengers and quicken the boarding process to increase available trips.

Transit.511.org is a free Bay Area transit trip planner that integrates multiple transportation modes across regional jurisdictions and offers real-time departure information by transit agency and route. 511 is managed by a partnership of public agencies led by the Metropolitan Transportation Commission (MTC), the California Highway Patrol, and the California Department of Transportation. 511 also offers a web-based application known as 511 Tracker that gives users and businesses the

2016

George Mason University TPOL, 49
ability to create a customized page of real-time transit information. The information can be displayed on a personal computer, smartphone, or television in the lobby of a building or storefront.

Oakland planning officials believe that as riders expect more real-time information from transit agencies, they will increasingly request a City role in implementing digital displays in public spaces.

The City of Oakland adopted a “Resolution Declaring the City of Oakland’s Support of Public Transit and Other Alternatives to Single Occupant Vehicles” (or “Transit First” policy) in 1996 and has since adopted other related sustainability goals such as a Complete Streets policy, a Pedestrian Master Plan, and a Bicycle Master Plan. Regionally, the provision of real-time transportation information is a priority driven by the Metropolitan Transportation Commission, the regional transportation planning and funding organization.

Advertising Policies

Local Regulations

Outdoor advertising signage is generally not permitted in Oakland unless authorized via franchise agreement by the Oakland City Council. Advertising signs are not allowed within 1,000 feet of rapid transit (a term not defined in the city code), in residential areas, or within 660 feet of the edge of a right-of-way of an Interstate or other highway. Existing signs are subject to design review by the City Planning office.

State Regulations

Please refer to the San Francisco case study.

Existing Contracts

Oakland contracted with Clear Channel Adshel in 2002 for its street furniture program. Adshel agreed to provide 256 advertising bus shelters, 256 non-advertising litter bins, and 22 advertising kiosks. Adshel agreed to provide one digital NextBus arrival prediction unit at each bus shelter. Each “Wayfarer” bus shelter is required to have six panels reserved for city, community and/or AC Transit information. Each “Pathfinder” kiosk is required to have one of three panels reserved for “city designated material.” The City of Oakland agreed to provide power and illumination for the shelters and kiosks if Adshel makes a flat power payment to Pacific Gas and

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Just in Time: Enhanced Mobility and Equity through Real-Time Information

Electric. Adshel will maintain all bus shelters and kiosks. However, as of 2011, only about 110 bus shelters were constructed due to issues with low ridership, power issues, and other obstacles.

Innovative Initiatives

The MTC initiated the Hub Signage Program (HSP) in partnership with Bay Area transit agencies in 2011. It included an initial $10 million capital investment in wayfinding signage, transit information displays, and real-time departure displays focused on transit hubs and three international airports. Sign installation is generally led by MTC or BART, depending on the location. Sign operation, maintenance and replacement responsibilities are split between MTC and the transit agencies, depending on sign type. In December 2015, as part of the MTC’s Hub Signage program, Civic Resource Group International (CRG) and TransitScreen, Inc. announced an agreement to modernize transit displays in the Bay Area and provide 511’s real-time and scheduled transit departure information on electronic information displays in more than 46 high-foot-traffic locations.

The Regional Measure 2 (RM2) Real-time Transit Information Grant Program established a $20 million competitive grant program to provide real-time transit information in 2005. As of July 2015, the program had allocated $19.3 million.

The Downtown Oakland Parking Management Plan is a transportation demand management (TDM) initiative that is being implemented to improve the efficiency of the city’s transportation system. The plan was funded on December 16, 2015, when the MTC allocated a $1.3 million grant to the City of Oakland “to implement performance based parking pricing and accompanying... [TDM] measures” One major goal of the plan is to “assess the most cost-effective mix of investments in pedestrian, bicycle, transit, ridesharing and parking infrastructure and services” Another goal of the program is to develop a real-time parking wayfinding system Oakland’s TDM plan is significant because it will likely foster improvements in RTI for users. For instance, a study for Oakland found that only 33% of surveyed people

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arrive downtown via automobile, so improving RTI may reduce congestion and promote increased transit use.\textsuperscript{148}

On June 30, 2015, the Oakland City Council voted to establish a DOT and fund it with $1.5 million for ample staffing.\textsuperscript{149} The establishment of Oakland’s DOT illustrates that the city is committed to improving its transportation system. The city’s new DOT will enhance street maintenance, implement new transportation projects, and secure more funds.\textsuperscript{150}

\textsuperscript{149} Campbell, Dave. “Oakland Getting a New Department of Transportation.” Bike East Bay, June 7, 2015. https://bikeeastbay.org/supportOAKDOT.
\textsuperscript{150} Campbell.
Scottsdale

Background
Scottsdale is an affluent suburb of Phoenix in Maricopa County, Arizona, and is the least populated and least diverse of the jurisdictions considered in the case studies. Scottsdale operates its own Trolley system and relies on regional transit agency Valley Metro to provide bus service to, through, and from Scottsdale, connecting it to Phoenix and surrounding communities. Valley Metro’s light rail line, which connects Phoenix with Tempe and Mesa, does not serve Scottsdale. Scottsdale is a member of the Maricopa Association of Governments, the designated Metropolitan Planning Organization for the Maricopa County region.

Public transit is used by only 1.4% of workers while the remaining workers either walk, carpool, or use other means of transportation (motorcycle, bicycle, taxi or other). Over 70% of public transit users make less than $35,000. Vehicle ownership does not seem to influence the mode decision as 30.8% of public transit users do not have a vehicle, 33.7% have one vehicle, and 35.5% have two or more vehicles available. Average travel time by public transit is 39.3 minutes, however, 32.4% of users have a commute greater than 60 minutes.¹⁵¹

Planning Structure
Initially established in 1967, the Maricopa Association of Governments (MAG) acts as a Council of Governments (COG) to address issues that cross jurisdictional boundaries, such as transportation, air quality, and human services. ¹⁵²

Transit Infrastructure
Scottsdale operates its own trolley system and relies on Valley Metro to provide bus service to, through, and from Scottsdale, connecting it to Phoenix and other Valley communities. The “trolley” system (utilizing rubber-tired buses made to look like vintage trolleys) is fare-free, while a one-way Valley Metro bus ticket costs $2.00 and an all-day pass may be purchased for $6.00.

The Scottsdale trolley system has four routes that operate year-round (with two additional seasonal routes). While there is no direct connection to the light rail system, one can navigate to Tempe via the neighborhood trolley route and transfer to the Tempe transit system, which is fare-free as well. Orbit, as the Tempe system is called, does make a light rail connection to Phoenix.

Valley Metro operates 11 bus routes that serve Scottsdale, including an express route to Downtown Phoenix. Valley Metro also provides specialized services for seniors or persons with disabilities, such as paratransit services, a reduced bus fare card, cab connection, and East Valley dial-a-ride. The East Valley dial-a-ride program requires an application process that upon approval provides specialized services for those qualified under the ADA as well as non-specialized car or van service to any person over the age of 65. These specialized services are generally obtained by contacting Valley Metro by phone or email, with advanced reservations required for ADA service and recommended for non-ADA service.\(^\text{153}\)

**Existing RTI Infrastructure**

Valley Metro has equipped its buses and trains with GPS technology and interfaced them with NextRide. This provides real-time scheduled arrivals, which are only accessible by telephone, smartphone app, or website. Scottsdale does not provide real-time transit information for its trolley system.

To get the arrival time at a stop with a phone, one may call or text and must provide the route number and stop number, which can be found on the bus stop. The call is not toll-free and standard text rates apply.\(^\text{154}\)

Internet users can use Valley Metro’s website to plan their trip.\(^\text{155}\) The site allows users to input an origin and destination and provides a recommended route. It provides access to the full system map as well as individual route schedules/timetables for each of the various modes. The site provides access to use NextRide to see the arrival of the next bus or train.

**Advertising Policies**

**Local Regulations**

At the local level, signs are regulated by the Scottsdale Municipal Code, Code of Ordinances, Appendix B, (Basic Zoning Ordinance), Article VIII.\(^\text{156}\) The articles of the Chapter set no distinction between types of signage or the content of advertising and apply to both commercial as well as personal advertising while ensuring that signage is compatible with the surrounding architecture.

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State Regulations

The state of Arizona’s Highway Beautification Program governs outdoor advertising signs (billboards) placed along state highways and some other roads. This program’s requirements are in addition to any programs and ordinances of local governments to control and oversee placement of signs within their jurisdictions. The Program ensures that Arizona meets the Federal Highway Administration regulations, a prerequisite for receiving Federal highway funds.157

Existing Contracts

The City of Phoenix and Valley Metro are contracted with OUTFRONT Media to sell advertising at bus and rail stations/stops.158 The current contract began in January 2012 and ends in September 2016.

OUTFRONT Media agreed to pay the City of Phoenix the greater of 63% of their net sales or the minimum annual guarantee (MAG). The MAG was initially established at $1 million with adjustments annually based on the prior year’s net sales.

OUTFRONT Media also sells train wraps – full and center-section wraps – and while contract specifics were not available the FY15 Valley Metro Rail Financial Report identified an increase of $1.2 million advertising income over the previous year.

Clear Channel Outdoor is contracted to sell interior and exterior advertising space on the City of Phoenix fleet of 512 buses.

Outdoor Space Policies

Scottsdale is very restrictive and identifies specific standards for outdoor signage in its Code of Ordinances, Appendix B, (Basic Zoning Ordinance), Article VIII, Sign Requirements. Further restrictions are identified for construction and placement of bus stops and other transit amenities. These standards are explained in detail in the Design Standards and Policies Manual, City of Scottsdale – January 2010.159 Bus stop signs are addressed in Section 5-6.301. In May 2015, a request for variance to these requirements was approved. These requests must be approved by the City of Scottsdale Transit Section and allow for variances that may include “LED real time bus information signs; bus route/traffic information kiosks.”

Innovative Initiatives

While no definitive timeline has been established, the Valley Metro Rail Board of Directors “has also approved the exploration of public-private partnership opportunities for the purchase, installation and management of advertising programs involving standard or electronic station kiosks, and video or LCD-TV technology in light rail vehicles.” When approved, a Request for Proposals will be posted on Valley Metro’s Contracts and Procurement page.\textsuperscript{160}
State of Montana

Greater Yellowstone Rural Intelligent Transportation Systems (GRYITS) Kiosks

In 1996 the State of Montana was awarded a grant of $123,000 for the purpose of operating informational kiosks at rest areas and select tourist locations along the Greater Yellowstone Corridor. Montana’s DOA negotiated an agreement between itself, the Montana Department of Transportation (MDT) and Montana’s Department of Commerce-Travel Montana (TM) officials. The agreement was unique in that MDT was to administer the grant while operating and maintaining the hardware for the kiosks. Additionally, the TM program had responsibilities to procure the hardware, develop the software, and assist with negotiating commercial advertisements when allowed by statute. By 2003, six (6) kiosk systems had been constructed and were operating with limited advertising. The systems have since been removed primarily due to obsolescence.

A number of outcomes resulted from the GRYITS kiosk program. First, the project established a lasting relationship between MDT and the TM providing a pathway for future partnerships. Second, both agencies independently had to use the competitive bid process in place at the time to outsource software development and maintenance for hardware and upgrades to the software. To meet the time constraints of the GYRITS grant, TM scrambled and procured the kiosk hardware equipment through donation effectively bypassing competitive bid process. Third, restricting the kiosks to donations limited the options for development resulting in a system that was obsolete shortly after implementation. Overall, the project demonstrated Montana’s need for statutory change in State procurement methods and for commercial advertisement.

Conrad Rest Area Informational Kiosk

In October of 2012, MDT and the TM agreed to jointly develop, operate, and maintain a “real time” traveler information center at the newly built public rest area in Conrad, MT. MDT agreed to provide the computer system hardware while TM developed the software, with both agencies sharing responsibility for content and maintenance.

163 “Memorandum of Understanding: Joint Agency Hardware and Software Agreement.” Montana Department of Transportation, October 12, 2012.
of the traveler information center kiosk.\textsuperscript{164} The TM chose to outsource software development and maintenance of the kiosk content using the “sole source” procurement method allowed by the new state statute and DOA policy. Axiom IT Solutions, on contract with the TM at the time of the proposal, was awarded the work order to develop the kiosk system at the rest area. They currently provide maintenance to keep the kiosk in operation.

Changes to Montana statute and DOA administrative rules allow for agencies like TM to procure IT services from vendors like Axiom on a “term” contract. This is an open-ended contract with qualified vendors like Axiom IT that provides specialized services on work orders for the state without having to resort to the full competitive bid procedure. The approval process requires the work order to be under a specified dollar amount and the agency seeking services must justify the use of term contractors. The agency must also advertise the award in an approved public forum for a given period. This allows other service providers to challenge the contract. All term contractors must be reported by the DOA.\textsuperscript{165}

Findings and Recommendations

In hindsight, it’s clear that Montana’s “sole source” process has some unique features not available to Montana’s agencies charged with bringing the GYRITS project to completion in 1996. Had Montana had their current procurement system in place at the time of the GYRITS, a more modern system may have been implemented. The service life of the kiosks could, theoretically, have been extended and perhaps remain in operation today. In choosing expediency of hardware donations the agencies constrained the GYRITS kiosk project to using obsolete equipment. In all fairness to the competitive bid process and the agencies involved in the GYRITS project, it can be argued that the traditional bid process would likely have resulted in a more modern kiosk system given time. Time was not a luxury afforded to decision makers and they acted accordingly. One thing is certain, the changes in Montana’s statute for procurement have given Montana agencies, like MDT and TM, new procurement process options and a level of flexibility to meet future needs in ever changing fast paced environments.

\textsuperscript{164} “Memorandum of Understanding...”

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Just in Time: Enhanced Mobility and Equity through Real-Time Information


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Just in Time: Enhanced Mobility and Equity through Real-Time Information


