EMERGING ROLE OF ACTIVITY CENTER TRANSPORTATION

ORGANIZATIONS IN TRAFFIC OPERATIONS SERVICES

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EMERGING ROLE OF ACTIVITY CENTER TRANSPORTATION

ORGANIZATIONS IN TRAFFIC OPERATIONS SERVICES

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To Mom, Dad, Aunt Eve, and Granddad

ACKNOWLEDGEMENTS

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LIST OF ABBREVIATIONS

ACT   Association for Commuter Transportation

ARC   Atlanta Regional Commission

ATIS   Advanced Traveler Information Services

BCID   Buckhead Community Improvement District

BID   Business Improvement District

CTS   Commuter Transportation Services, Inc.

CUTR   Center for Urban Transportation Research

ETF   ETF Associates

GIS   Geographic Information Systems

GPS   Global Positioning Systems

IBDM   Institute of Business District Management

IDA   International Downtown Association

ITRD   International Transport Research Documentation

ITS   Intelligent Transportation Systems

MAP-21   Moving Ahead for Progress in the 21st Century

MPO   Metropolitan Planning Organization

NCTR   National Center for Transit Research

RTI   Rahall Appalachian Transportation Institute

TDM   Transportation Demand Management

TMA   Transportation Management Association

TMACC   Transportation Management Association of Chester County

TMO	Transportation Management Association
TRIS	Transportation Research Information Services
TSM	Transportation Systems Management
TSP	Transit Signal Priority
ULI	Urban Land Institute
UTC	University Transportation Center

SUMMARY

Major activity center transportation management organizations (TMOs), an important part of the metropolitan form of today, are defined as concentrations of employment, residential and shopping activities that are well defined geographically. TMOs offer services to help reduce roadway congestion by promoting ride sharing and alternative means of transportation. In the past these organizations have not been actively involved in real-time operations and control of traffic services, but TMOs are now advancing their role in transportation operations.

The TMA Traffic Operations Survey was developed, which focused on traffic operations services and transportation system management practices of TMOs. The survey had the following structure: background, membership, services, and follow-up. The survey was emailed to 157 TMOs around the nation and 35 responses were received, a 22.2% response rate. Of the participating organizations only five (17%) organizations provided traffic services including traffic control improvements, signal timing, and collection of traffic data.

These findings determined that a minority of organizations are involved in traffic operations. The multiple organizations that are involved in traffic operations provided data on their websites including incident alerts, live traffic views, and real-time traffic or shuttle information. Very few of the organizations that used data to provide traffic operations services generated the data themselves. The research results determined that few organizations are actively attempting to assume a role in traffic operations.

CHAPTER 1

INTRODUCTION

The purpose of this project is to research the emerging roles that major activity center Transportation Management Organizations (TMOs) have in regional transportation, with a specific focus on traffic operations services. Major activity centers, an important part of the metropolitan form of today, are defined as concentrations of employment, residential, and shopping activities that are well defined geographically. TMOs offer services to help reduce roadway congestion by promoting ride sharing and alternative means of transportation, managing parking systems, and maintaining transit shelters. One of the areas that these organizations have had limited involvement is real-time operations and control of traffic services. However, with advancements in surveillance and control technologies these organizations now have the ability to become involved in traffic operation-oriented strategies. Such organizations are finding that with the installation of new technologies they can collect and share data with other groups and use the data to help reduce local traffic delay and congestion. Thereby reducing the economic impact associated with high levels of congestion. This thesis focuses on how TMOs have in the past and present advanced their role in transportation operations and as a provider of transportation services. In addition it investigates the feasibility, effectiveness, and transferability of these emerging services to other activity centers in the United States.

1.1 Background

1.1.1 Research Objectives

This study has three primary objectives. The first is to research the characteristics and practices of activity center transportation management organizations to determine current activity center efforts with respect to regional mobility strategies, with particular attention given to operations-oriented efforts. The second is to conduct a search of activity center organizations' websites and create a survey to send to activity center transportation organizations to identify the current state-of-practice with respect to regional mobility strategies, again with specific attention to operations-oriented actions. The third is to propose best services and methods that might be applied in activity centers and the feasibility, effectiveness and transferability of those services.

In addition this project is part of a larger University Transportation Center (UTC) project. The UTC project seeks to survey major activity centers in the United States with respect to their role and activities in actual operations of the transportation system serving their area, and support the implementation of road operations strategies being implemented by the Buckhead Community Improvement District. The project assess the success of similar activity center efforts elsewhere and the feasibility of implementing additional services in the BCID area and other organizations in the region and in the United States.

1.1.2 Research Methods

1.1.2.1 Literature Review

      A comprehensive literature review was conducted to define the characteristics of

activity center transportation organizations and how they operate, with a specific

concentration on their transportation systems and traffic operations services both in

operation today and proposed services for the future. Transportation services are aimed

at reducing local congestion; however, the number and types of services offered vary

from location to location based on multiple factors like coverage area, membership size,

and budget. Of specific interest are services involving traffic operations, collection and

use of real-time operational data, mobile applications, and ITS technologies. In addition

to providing an overview of the characteristics and services of activity center

transportation organizations, the literature review also focuses on the performance

measurement of their services. Performance measures can relate to efficiency, financial

accountability, and value of investment/return for services. The use of such performance

measures was part of the most recently passed federal transportation bill, Moving Ahead

for Progress in the 21st Century (MAP-21) .

1.1.2.2 Survey Development

      The literature review provided a foundation for the development of a traffic

operations services survey. The survey was crafted to collect general background

information followed by information more specific to transportation and traffic

operations services that in particular addressed the needs and desires of local Atlanta

activity center transportation organizations. The survey was organized around examples

of previous surveys conducted about TMOs as well as input from the BCID and the ARC.

The survey went through a process of multiple reviews and trials, with the content

reviewed by both BCID and ARC to ensure that the survey met their needs. The final

survey is located in Chapter 3 - Methodology.

1.1.3 Research Scope

The research utilized past surveys to review today's activity center transportation

services. Because traffic services have traditionally been an activity reserved for the

owners of the infrastructure and services, that is, service providers such as the state

department of transportation, this is an emerging role for activity center organizations.

Most activity center organizations focus their resources on traditional transportation

services and have yet to venture into these roles. The lack of traffic operations services

by these organizations may not be due to a lack of desire, but simply relate to other

contributing factors such as budget constraints, lack of staff capability, and opposition

from other transportation organizations. While more activity center organizations may

become involved in traffic operations in the future, this study was confined to only those

organizations that provided information found online about services they provide and to

survey participants—the survey did not attempt to determine the level of likely activity in

the future.

1.1.4 Thesis Organization

This thesis is organized in the following manner. Chapter 2, the literature review

of activity center transportation organizations, presents general background information

as well as services offered by such organizations. It also reviews past surveys that have

been conducted on the activities of these organizations. Chapter 3 describes the

methodology used to review organization websites, which focused on traffic operations

services and performance measurement, and describes the development of the survey.

Chapter 4 analyzes the information collected and evaluates existing practices. Chapter 5

discusses the results of the data collection and Chapter 6 concludes the thesis and

discusses the implications of the results, identifies limitations to the study, and presents

future research needs.

CHAPTER 2

LITERATURE REVIEW

This chapter provides background information about TMOs and discusses the roles that they have played in regional mobility efforts, with a specific interest in operations-oriented roles. Transportation Management Associations (TMAs) and Business Improvement Districts (BIDs) are two types of TMOs formed by activity centers, whose major purposes are to improve the local area and support the transportation needs of the employees working within their service boundary. Those TMAs and BIDs that address roadway congestion generally do so by promoting ride sharing and alternative means of transportation, managing parking systems, and maintaining transit shelters. Most of these services fall under a traditional Transportation Demand Management (TDM) system. However, with the advancements in technology and Intelligent Transportation Systems (ITS), these organizations are becoming involved in traffic operations-oriented strategies, commonly known as Transportation Systems Management (TSM).

The literature review starts with an overview of the different transportation strategies provided by TMOs, identifying the differences between TDM and TSM strategies. Following the transportation strategies will be background information and characteristic of two types of TMOs, TMAs and BIDs. Next, the previous surveys conducted on BIDs and TMAs will be reviewed, and their results discussed. The literature review finishes with an overview of performance measurements and examples of organizations involved in traffic operations, as identified in the literature.

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2.1 Activity Center Transportation Strategies

2.1.1 Transportation Demand Management (TDM)

Transportation Demand Management strategies, "manage the *demand* for motor vehicle travel, rather than the more expensive alternative of increasing the *supply* of transportation services (typically road building)." (National Center for Transit Research's (NCTR) National TDM and Telework Clearinghouse, 2001) The TDM strategies are meant to reduce the number of daily trips to and from employment centers that are made by the employees in peak hours by increasing the number of people per vehicle or influencing the times of day that travel is occurring. Commuter trips are the usual target for TDM practices because they comprise the largest portion of traffic on the road during peak hours (Institute of Transportation Engineers, 1993). Current TDM strategies include

- accommodating the same number of people in fewer motor vehicles (e.g. transit, carpooling/vanpooling, and cycling/walking),
- eliminating trips entirely (e.g. working at home), and
- shifting the timing of trips from the most congested periods to less busy times (NCTR National TDM and Telework Clearinghouse, 2001).

These strategies encourage use of alternative modes of travel other than single occupant vehicles by creating programs that reduce the number of commuting days, shifting commuter travel to non-peak hours, and providing improvements to transportation services. Additionally, marketing activities aim to encourage alternative modes through financial incentives and information dissemination (NCTR National TDM

and Telework Clearinghouse, 2001). These services range beyond just transportation but also include land use planning and employee incentives, as shown in   Table 1.

Table 1 TDM services. (Killen, Luten, and Owen 22, 2010)

Service
Promotional / marketing materials
Employer travel surveys
Promotional events
Trip reduction plan / travel plan development
Rideshare matching
Email newsletters
Guaranteed Ride Home
Advocacy
Employer travel coordinator training
Cycling program assistance
Transit pass sales
Employer networking events
Parking management planning
Web-based travel information
Land use / site design assistance
Relocation services
Tax benefit program assistance
Direct ridesharing incentives
Personalized journey planning, individual marketing
Telework program assistance
Subsidized transit passes
Vanpool services
Real-time travel alerts (email, SMS)
Shuttle / transit provision
Social media communications (Facebook, Twitter, etc.)
Vanpool subsidies
Web-based mapping or journey planner
Sample workplace policies
Carshare program (e.g., Zipcar)
Freight delivery plans

2.1.2 Transportation System Management (TSM)

Transportation System Management (TSM) strategies differ from TDM strategies in that their goal is the, "use of low cost improvements through construction, operational, and institutional actions, to improve operational efficiency and make the most productive and cost-effective use of existing transportation facilities, services and modes." (NCTR National TDM and Telework Clearinghouse, 2001) These strategies usually involve a low to moderate cost and can include traffic engineering improvements, traffic control improvements, freeway management strategies, priority treatment for high-occupancy vehicles, parking management, and transit service improvements (Ferguson, 1994). TSM services can involve the collection and use of real-time traffic operations data. TSM services have typically not been used by TMAs as much as traditional TDM strategies in the past, which is one of the reasons for this research. Transportation Systems Management strategies include

- one-way streets,
- reversible traffic lanes,
- intersection widening,
- bus turnout bays,
- improved signing and pavement marking,
- coordination of traffic signals,
- continuous optimization of timing plans,
- use of bus priority signal control systems,
- implementation of computer-based traffic control systems, and

- freeway traffic management (NCTR National TDM and Telework Clearinghouse, 2001).

Both TDM and TSM strategies play a role in the everyday operations of business improvement districts and transportation management associations.

2.2 Organization Characteristics

2.2.1 Business Improvement Districts (BIDs)

The most general definition of a business improvement district is an organization "in which a geographically defined majority of property owners and/or merchants agree to provide an extra level of public service in a specific area by imposing an added tax or fee on all of the properties and or businesses in the area." (Mitchell, 2001) A local government must legally establish the district, collect the tax assessment or fees, and then transfer the funds to the BID. Thus BIDs are considered private organizations that focus on, "enhancing the safety, cleanliness, image, and competitiveness of city centers." (Levy, 2001) Paul R. Levy was the executive director of the Center City District in Philadelphia when he wrote the article "*Paying for the Public Life*," in which he discusses BIDs' origins and evolution and discusses current trends and new initiatives. Levy states that the objective of BIDs is to strive to make cities livable and competitive with the suburbs. Mitchell states that there are five important things to understand about BIDs:

1. "BIDs are authorized by law through state legislation that permits local governments to create them.... The authorizing legislation from state to state is generally similar, yet there may be specific differences." (Mitchell 116, 2001)

2. "BIDs are usually established through a petition process in a business district comprising a specific number of blocks.... To approve a BID in most jurisdictions, the affected property owners or businesses must vote for it in a petition submitted to the local governing body." (Mitchell 117, 2001)

3. "BIDs receive most of their funding from an added assessment on the property owners and/or businesses within the boundary of the business district. These self-assessments are mandatory, except for residences, which are exempted." (Mitchell 117, 2001)

4. "BIDs may implement services through a nonprofit organization, government agency, or public-nonprofit partnership." (Mitchell 118, 2001)

5. "BIDs are expected to focus on what will be most effective for the business district. A governing board, composed mostly of property or business owners in the area, oversees the district to maintain accountability, establish a direction for its activities, and select a manager to run the BID." (Mitchell 118, 2001)

BIDs provide multiple benefits to the community. They fill gaps in municipal services, can focus exclusively on a specific downtown area, can adapt quickly to new opportunities, and can take calculated risks and attempt new approaches and strategies (Levy, 2001).

2.2.2 Transportation Management Associations (TMAs)

Transportation Management Associations (TMAs) are similar to BIDs but instead have a more direct focus on transportation in an area. They are generally created by local governments, chambers of commerce, or management of a major facility. These

organizations are member controlled and funded by local businesses who pay membership dues. The TMAs' aim is to increase transportation options, provide financial savings, reduce traffic congestion, and reduce pollution emissions (Victoria Transport Policy Institute, 2011). Figure 1 shows the number of identified TMAs per state and the number of those TMAs that responded to a 2003 survey conducted by the Center for Urban Transportation Research. The map identifies eight TMAs in the state of Georgia, six of which participated in the 2003 survey.
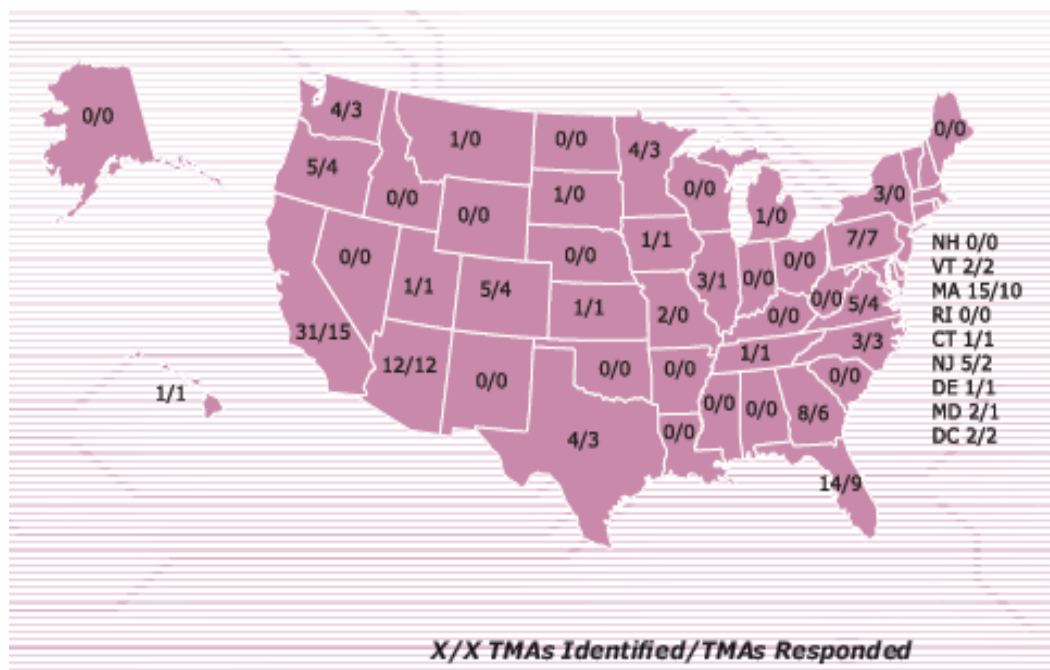
Figure 1 Map of TMAs per state in 2003. (Hendricks, 2004)

A strength of Transportation Management Associations is their ability to implement context sensitive conditions, which can vary from organization to organization, allowing TMAs to operate in a wide range of locations (NICHES, 2012). TMAs have expanded their responsibilities to both the business community and economic development agencies. Through efficient transportation they attempt to address economy and quality of life, as traffic congestion leads to higher economic loss

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in time, money, and secondary effects (Loveless and Welch, 1999). Benefits TMAs can provide include

- programs that are more cost effective than those typically managed by individual businesses,

- flexibility that government sometimes lack,

- greater understanding of local needs,

- high levels of public trust,

- reductions in overall economic losses, congestion, and pollution, and

- increased transportation options in an area (Victoria Transport Policy Institute, 2011).

Several TMAs have recently begun to make use of Intelligent Transportation Systems (ITS) as well as Geographic Information Systems (GIS) in their daily activities. These technologies can be used to help improve traffic, bus routing, and trip planning as well as other services. Loveless and Welch believe that TMAs, because of their scale, can "make promising venues for demonstration projects testing aspects of ITS." For example, they point to, ITS strategies that can complement car share programs and Global Positioning Systems (GPSs) that can allow fleet managers to know the location of every vehicle and aid in optimal scheduling. Surveys of these organizations give a better understanding of exactly what services they offer.

2.3 Previous BID and TMA Surveys

2.3.1 BID Surveys

Two surveys have been performed to obtain information about BIDs. The first survey of BIDs was performed in the summer of 1999 by Jerry Mitchell, who used the results in his "*Business Improvement Districts and the "New" Revitalization of Downtown*," article. The survey was mailed to managers of 404 BIDs with 264 responses in 43 states, a 65% response rate. The survey questioned BIDs about characteristics and services. Some of the information he collected from the survey includes

- the median number of full-time employees was two, and the average was eight;

- the median budget was $200,000, with a range from $8,000 to $15 million;

- the median city size for the population of BIDs was 104,445; city size population ranges between cities with as few as 1,000 persons to upwards of more than seven million; and

- one fourth of the BIDs in the response sample were located in urban areas with more than 700,000 residents.

Table 2, included in Mitchell's article, shows the services provided by BIDs and the extent of BID involvement.

Table 2 BID services offered (in percentages). (Mitchell, 2001)

	Very Involved	Somewhat Involved	Not at All Involved
Capital improvements: installing pedestrian-scale lighting and street furniture, planting trees and shrubbery	52	34	14
Consumer marketing: producing festivals and events, coordinating sales promotions, producing maps and newsletters	78	16	6
Economic development: offering incentives (such as tax abatements or loans) to new and expanding businesses	25	33	42
Maintenance: collecting rubbish, removing litter and graffiti, washing sidewalks, shoveling snow, trimming trees	58	27	15
Parking and transportation: managing a public parking system, maintaining transit shelters	18	27	55
Policy advocacy: promoting public policies to the community, lobbying government on behalf of business interests	50	38	12
Public space regulation: managing sidewalk vending, discouraging panhandling, controlling vehicle loading	38	41	21
Security: providing supplementary security guards, buying and installing electronic security systems, working with the city police force	36	32	32
Social services: aiding the homeless, providing job training, supplying youth services	6	28	66

NOTE: $N = 259$; it is less than 264 because of nonresponses to the service delivery question.

According to Table 2, BID services included capital improvements, consumer marketing, economic development, maintenance, parking and transportation, policy advocacy, public space regulation, security, and social services. The table shows that for "Parking and transportation," services, 45 organizations were either very or somewhat involved and 55 were not involved at all. Mitchell found that while BIDs do not directly operate their own transportation services they do promote the use of alternative modes of transportation.   It is not clear from this survey what, if any, involvement BIDs had in ITS. In conclusion Mitchell noted that it was unknown as to how well BIDs actually performed and how to accurately measure performance. This is an issue which could be solved with the implementation of performance measures which determine the effectiveness of services.

In 2010 the Institute of Business District Management (IBDM), Rutgers University's School of Public Affairs and Administration, and member organizations of the International Downtown Association (IDA) conducted a study of the present characteristics of BIDs and published their findings in 2011 as the, "*Business Improvements Districts: Census and National Survey.*" The study gathered information pertaining to: the geography of BIDs, revenue sources, budget size, governance, and tools for measuring performance.

The survey was emailed to 915 BIDs, that had been identified by the research group, and received responses from 275, a 30.1% response rate. Of those respondents, 73.5% claimed to work directly for a BID as opposed to working for a city or another entity. The survey showed that

- the median budget was $342,000, with a range from $11,000 to almost $18 million;

- the median city size for the population of BIDs was 102,804; and

- only ten percent of respondents said their BID used funding for long-term capital improvements (Becker, Grossman, and Dos Santos, 2011).

The survey questioned BIDs on their activities and the following results, seen in Table 3 shows the types of transportation services provided by BIDs. The table shows that only seven BIDs operated a downtown shuttle or ran a rideshare program with their own staff, and overall most BIDs did not provide any type of transportation services.

Table 3 Transportation service provided by BIDs. (Becker, Grossman, and Dos Santos, 2011)

Which of these Transportation services does your organization provide with funding from the BID?				
Answer Options	With our staff	Through contracts	Do not provide	Response Count
Parking system management	20	10	171	201
Transit shelter maintenance	5	22	174	201
Rideshare program	5	6	185	196
Operate downtown shuttle	2	18	182	202
			answered question	202
			skipped question	73

Unlike the 1999 survey, the 2010 survey did question BIDs about their

performance reporting and measurements, shown in Table 4. The majority of BIDs

obtained their data through various types of surveys, and some of the respondents

obtained data from different levels of government or private organizations.

Table 4 How BIDs obtained performance measurements. (Becker, Grossman, and Dos Santos, 2011)

How does your organization measure its performance?		
Answer Options	Response Percent	Response Count
Business Surveys	64.8%	127
Visitor Surveys	25.5%	50
Balanced Score Cards	6.1%	12
Focus Groups	20.9%	41
Data from the local government	38.3%	75
Data from the state government	7.1%	14
Data from the federal government	4.6%	9
Data from private organizations	23.5%	46
Other (please specify)	39.3%	77
	answered question	196
	skipped question	79

However while these BIDs were collecting information for performance

measurements it did not indicate what information was being measured. Table 5 shows

the types of performance information that was regularly reported.

Table 5 Performance information reported by BIDs. (Becker, Grossman, and Dos Santos, 2011)

What kind of information do you present in your performance reporting?		
Answer Options	**Response Percent**	**Response Count**
Square feet leased or vacancy	38.7%	75
New construction	38.1%	74
Retail Sales	20.1%	39
Number of visitors	23.7%	46
Change in employment	16.0%	31
Population	23.2%	45
Number of businesses	61.9%	120
Crime statistics	36.6%	71
Number of pedestrians	15.5%	30
Business perceptions	55.2%	107
Visitor perceptions	39.7%	77
Other (please specify)	32.5%	63
Answered question		194
Skipped question		81

None of the primary answers above are directly related to transportation, but some of the answers provided under "Other" included air quality, on-line GPS tracking of vehicle performance, ridership on transit, and vehicle miles reduced (Becker, Grossman, and Dos Santos, 2011). The survey provided recent organizational information and showed that transportation is still not a major service provided by BIDs.

2.3.2 TMA Surveys

Since 1989 nine national studies have been conducted to obtain information about TMAs, as follows:

1. "1989: The Association for Commuter Transportation (ACT) compiled its first comprehensive national TMA directory in 1989. Ferguson used these data to show that TMA characteristics varied significantly, depending on who initiated the TMA;

2. "1990: The Urban Land Institute (ULI) evaluated transportation management through partnerships, with a particular focus on TMAs, between 1986 and 1990. Their report focused especially on the evaluation of TMA results, measured in terms of observed changes in travel behavior;

3. "1991: The Georgia Institute of Technology conducted a national TMA survey under a grant from the Urban Mass Transportation Administration in 1991. Ferguson used these data to show how private sector participation affected and was affected by key TMA characteristics;

4. "1993: Commuter Transportation Services, Inc. (CTS) conducted a national TMA survey in 1993 under the auspices of ACT, focusing on policies and procedures, especially management and personnel issues. Ferguson and Davidson compared these national TMA survey results with those from several previous studies;

5. "1995: ACT compiled a new national TMA directory in 1995. This directory was a revised and improved version of ACT;

6. "1998: UrbanTrans Consultants, Inc. conducted a national TMA survey under the auspices of ACT in 1998. This survey was a revised version of the one CTS conducted in 1993;

7. "2002: ETF Associates conducted a national TMA internet search in 2002. The purpose of this study was to identify the survival characteristics of all previously identified TMAs;

8. "2003: The Center for Urban Transportation Research (CUTR) at the University of South Florida conducted a national TMA survey under the auspices of ACT in

2003. This survey was a revised and expanded version of the ones previously

conducted in 1993 and 1998" (Ferguson 2-3, 2007).

9. 2009: UrbanTrans Consultants, Inc. conducted a national TMA survey 2009. This

survey was a revised and expanded version of the ones previously conducted in

1993, 1998, and 2003.

Of these, the 2003 and 2009 TMA surveys were the most useful. The "2003

Transportation Management Association (TMA) Survey" received responses from 97 of

the 146 surveys sent to known American TMAs, a 66.4% response rate. The 70 question

survey contained questions about membership, services, personnel, policies, financial

characteristics and organizational characteristics of the TMAs to get a general model for

TMA development and operations. Results of the survey showed

- the median potential customer base was 100,000 people, with a range from 500 to

  8 million; and

- the geographical scope of TMAs was distributed as follows: 21% corridor, 19%

  regional, 15% central business district, 14% specialized activity center, 11%

  suburban, 6% citywide, and 14% other.

The responses for services provided by TMAs for this survey are provided in Table 6.

The survey concluded that TMAs,

"Provide services that link information to appropriate markets, such as Advanced

Traveler Information Services (ATIS). The 2003 TMA Survey yielded no

responses for Question 16 regarding services offered, which relate to linking

information. This does not necessarily mean that no TMAs do this. This role may

be accomplished as part of other services, such as "Promotional materials/newsletters" (offered by 88 percent of all TMAs); however, it might be useful to explicitly ask TMAs in the future if they conduct activities that aim to link information to appropriate markets, including ATIS." (Hendricks, 2004)

Based on the results of services offered by TMAs in the 2003 survey it was concluded that at the time none were providing ATIS, services that relate to linking information. It recommended that it would be useful to survey TMAs in the future about their activities to link information to the appropriate audiences, one of the main motivations for the survey in this research.

The 2009 survey was an updated version of the 2003 survey and went into depth about the organization's characteristics. It contained questions about background information, staffing, financial, memberships, services, and measurement & evaluation. The survey determined that

- the mean budget for TMAs was between $250,000 to $500,000,

- the median potential customer base was over 104,000 people,

- the top five services offered were: promotional materials, employer travel surveys, promotional event, trip reduction plan, and rideshare matching, and

- approximately 20% of TMA offered web on mobile services, online journey planning, and real-time phone alerts.

The survey results were compared to the previous three from 1993, 1998, and 2003. The service results showed a trend of what services were on the rise and which services were on the decline. The trends in services are in Table 6.

Table 6 Comparison of services provided to TMA members. (Killen, Luten, and Owen, 2010)

Service Provided to TMA Members	1993	1998	2003	2009
Promotional / marketing materials	84%	43%	47%	47%
Employer travel surveys	67%	--	--	45%
Promotional events	90%	55%	44%	44%
Trip reduction plan / travel plan development	69%	41%	38%	44%
Rideshare matching	73%	33%	37%	40%
Email newsletters	--	--	--	38%
Guaranteed Ride Home	67%	56%	51%	38%
Advocacy	96%	57%	41%	35%
Employer travel coordinator training	61%	49%	34%	35%
Cycling program assistance	--	--	32%	34%
Transit pass sales	39%	--	--	31%
Employer networking events	--	--	--	30%
Parking management planning	41%	22%	15%	29%
Web-based travel information	--	--	--	29%
Land use / site design assistance	--	37%	21%	28%
Relocation services	--	--	--	28%
Tax benefit program assistance	--	--	38%	28%
Direct ridesharing incentives	--	--	39%	26%
Personalized journey planning, individual marketing	--	--	--	25%
Telework program assistance	--	--	31%	25%
Subsidized transit passes	--	18%	35%	24%
Vanpool services	78%	33%	35%	24%
Real-time travel alerts (email, SMS)	--	--	--	21%
Shuttle / transit provision	31%	16%	27%	21%
Social media communications (Facebook, Twitter)	--	--	--	18%
Vanpool subsidies	24%	26%	36%	18%
Web-based mapping or journey planner	--	--	--	17%
Sample workplace policies	--	--	--	13%
Carshare program (e.g., Zipcar)	--	--	13%	11%
Freight delivery plans	--	--	--	4%

The survey results show which services have dropped, picked up, and leveled off across the years. The number of TMAs that provide services such as promotional events,

marketing materials, rideshare matching, and employer travel coordinator training which

have been offered since the 1993 survey have leveled off recently. While direct

incentives and subsidizing have decreased, this may be a result of the condition of the

economy. There have been increases in parking management and land use densities (in

some locations), allowing organizations to optimize space with increasing population.

There are still very few ITS and traffic operations services being offered; however, there

are now "Real-time travel alerts" and "Web-based mapping or journey planner" services

that TMAs are starting to provide. Trends in TMA characteristics obtained from the

previous surveys are shown in the figures below. The total number of TMAs in existence

during a particular year are shown in Figure 2 below, and separated by geographical

location.
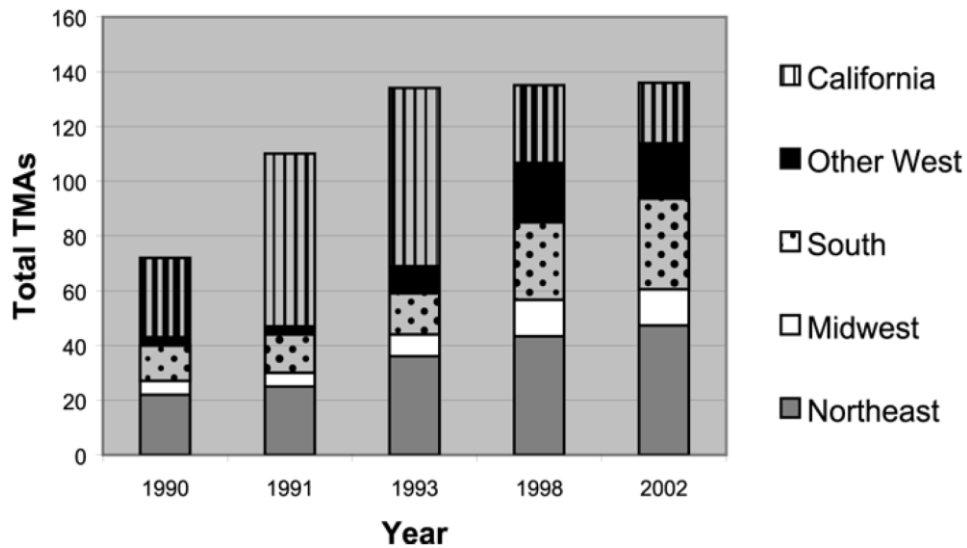
Figure 2 Total number of TMAs per region from 1990 to 2002 (Ferguson, 2007).

The change in median TMA budget is shown in Figure 3, with all values being

equivalent to 2003 dollars. The figure shows an increase in TMAs' budgets in 2003 as

compared to previous years. The breakdown of revenues versus expenses for TMA

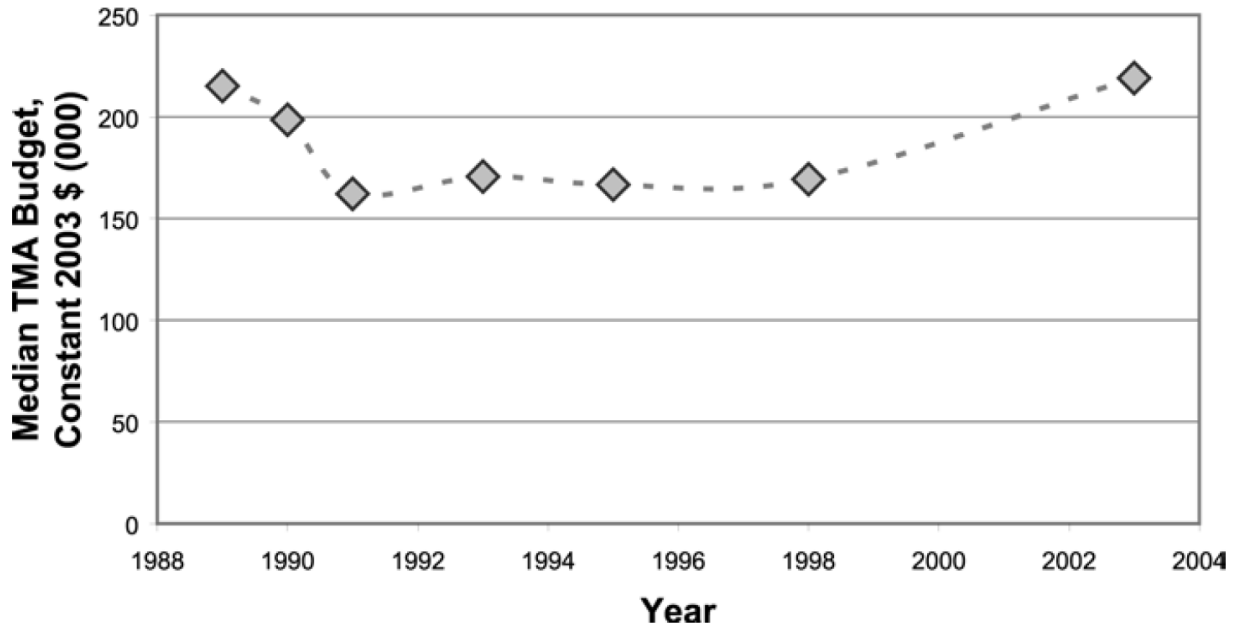budget categories is shown in Figure 4 where the revenues are generally greater than the expenses of TMAs.

Figure 3 Median TMA budget per year (Ferguson, 2007).

	Budget Category	Northwest	Midwest	South	Other West	California
Expenses	Office operations	$62,185	$81,250	$86,154	$51,073	$49,392
	Marketing amd promotion	$46,923	$25,625	$53,808	$14,854	$24,658
	Capital services	$29,107	$417	$1,442	$6,563	$12,100
	Other services	$32,417	$1,042	$17,404	$9,792	$32,333
	Other	$28,179	$0	$35,423	$26,052	$22,350
	Total	**$198,810**	**$108,333**	**$194,231**	**$108,333**	**$140,833**
Revenues	Member dues	$42,932	$42,583	$45,643	$23,973	$62,912
	Grants and subsidies	$143,568	$41,417	$110,071	$58,973	$45,890
	Service fees	$11,719	$0	$6,429	$14,732	$809
	Developer funding agreements	$4,427	$0	$23,750	$5,357	$11,015
	Other	$18,708	$24,333	$6,964	$18,393	$32,316
	Total	**$221,354**	**$108,333**	**$192,857**	**$121,429**	**$152,941**

Figure 4 TMA revenues versus expenses (Ferguson, 2007).

2.4 Performance Measurements

The latest transportation law, *Moving Ahead for Progress in the 21st Century* (MAP-21), emphasizes the use of performance measurements and performance based funding. This has been done to help guide decision making and improve the accountability of agencies. Similarly, transportation organizations are beginning to make use of performance measurements for their provided services. Limited funding has elevated the use of performance measurements, which can show efficiency, financial accountability, and value of investment/return for services (Mongioi, Thompson, and Suter, 2012). These program metrics could help increase the credibility of organizations and would provide documentation of service results. Shown in Table 7 are different categories of performance measurements, their purpose, and examples. These performance measurements could be used by TMAs or BIDs to evaluate their services for cost-effectiveness.

Table 7 Performance measures for TDM programs (Mongioi, Thompson, and Suter, 2012)

Performance Measure	Purpose	Example
Input Activity Measures	Shows quantitative data on the number activities or efforts initiated by the program. Refers to actions or activities on the part of the program.	• Number of employer outreach events held • Number of presentations given • Number of brochures distributed • Number of calls made by sales staff to businesses
Output Activity Measures	Shows quantitative data on the number of activities or results initiated by the customer or client, often in response to the program's input activities. Refers to actions or activities on part of the client or customer.	• Number of hotline calls received • Number of ride match applications received • Number of web hits online • Number of guaranteed ride home sign ups
Outcome/Direct Effect Measures	Quantifies the results of the input and output activities. Often a result of extrapolating the input or output data.	• Single occupant vehicle (SOV) trips reduced • Parking spots saved • Vehicle miles traveled (VMT) reduced • Greenhouse gases reduced
Cost Effectiveness Measures	Associates a dollar amount with each input or output activity and each outcome measure to show the level of effort associated with each action. Sometimes a result of extrapolating the input, output or outcome data.	• Cost per rideshare application • Cost per employer sign up • Cost per VMT reduced • Cost per carpool formed

2.5 TMOs Offering Traffic Operations Services

Some TMAs have started projects to influence traffic operations within their region. The Transportation Management Association of Chester County, PA (TMACC) has been studying Transit Signal Priority (TSP) as a way to enhance a bus route along a corridor in Chester County, PA. A TSP system can improve transit performance by reducing transit travel time and increasing bus on-time performance (Cassel, Cotter, and Herron, 2008). There is a project in the Morgantown, WV central business district that seeks to improve the overall flow of traffic in the downtown area to alleviate congestion

from inconsistent traffic patterns that occur from day-to-day and month-to-month. A major benefit of this system is the ability to remotely adjust signal operations and continuously monitor operations and signal status. To date the project is unfinished but expected results include reduced delay, shorter vehicle queues, and improved air quality (RTI, 2012).

2.6 Summary

The research objectives from the literature review were to examine current transportation practices within existing organizations. To date there are little to no literature sources that provide information on TMAs' or BIDs' role in traffic operations services strategies. Most of the data collected was from several past surveys, mostly the 2010 BID survey and the 2009 TMA survey, which summarize characteristics and services offered by organizations with no mention of traffic operational services. Most of the related information pertaining to traffic operations services will require a new transportation-focused survey. As a result of the literature review, the information gathered was used to construct a new survey, which gathered information on organizations' mobility strategies, TSM practices (i.e., traffic operations projects), and performance measurements from TMAs and BIDs nationally. The survey will also investigate the feasibility, effectiveness, and transferability of the services and measurements that are being implemented.

CHAPTER 3

METHODOLOGY

This chapter discusses the search of activity center organizations' websites and the formation and layout of the survey sent to organizations to identify the current state-of-practice with respect to regional mobility strategies.

3.1 Evaluation of Existing Organizations

The literature review laid the foundation for this project by concentrating on the characteristics of TMOs, the current services they offer, and on how they measured the effectiveness of their services. The majority of the information was obtained by using the TRID database. TRID, a database that combines the Transportation Research Information Services (TRIS) Database and the Organization for Economic Cooperation and Development's Joint Transport Research Centre's International Transport Research Documentation (ITRD) Database, provides access to worldwide transportation research.

The search of organizations' websites provided information on the most current TMO traffic operations projects and services. The TMO names and website address were obtained through national directories and information provided by other professionals. The National Directory of Transportation Management Associations, created by Association for Commuter Transportation (ACT) and updated in August 2012, was the largest source of TMO website addresses. Carol Becker, lead author of the Business Improvements Districts: Census and National Survey, helped identify additional organizations. Each websites' project list, services, and annual report were searched for any projects or services related to traffic operations or TSM practices. Additionally the

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research team joined the National Center for Transit Research's National TDM and Telework Clearinghouse's Transportation Demand Management (TDM) Listserv, which includes over 2,100 TDM professionals. The listserv archive was searched for previous postings containing information about any TMOs involved in traffic operations, and the team posted on the listserv seeking specific examples of current or previous projects or reports that had been done by organizations that involved traffic operations services.

3.2 Survey Development

3.2.1 Initial Framework

After the literature review and website search, a new survey was developed that focused on traffic operations services and TSM practices of TMOs. Previous surveys were used as a template for organizing and structuring the survey. Of the previous surveys, the "*2009 Transportation Management Association Survey*," the most recent TMA survey, was chosen as the primary template for the development of the new survey, as it was considered to be the most relevant to the objective of this research study. The survey helped formulate multiple questions as well as helped organize the structure of the survey.

The research team then developed a list of potential survey questions. The questions targeted general information and services offered. Most of the questions were set up in a single question format where the participant could select only one answer from a list of choices, generally yes or no questions. The questions were dynamic involving additional conditional questions that would obtain more detailed information based on the participant's previous answer.

In addition to obtaining information of traffic operations services the survey was intended to collect information on TMOs' performance measurements. Performance measurements are important because with today's limited funding, performance measurements which show efficiency, financial accountability, and value of investment/return for services become important input into developing the most cost effective programs. Successful performance measurements already in practice could be used as a template for other TMOs to evaluate their services and budget allocation.

Finally the duration of the survey was designed to be less than than ten to fifteen minutes to encourage a higher chance of participation. Efforts were also made to be sure the questions and their wording were clear so that there would be limited questions or confusion by participants.

3.2.2 Modification for ARC and BCID

The final survey had to meet the needs of BCID and ARC, as part of the larger UTC project. During the question development process the specific requests of ARC and BCID were taken into consideration and specific questions were developed to satisfy their needs. Some of their survey interests included

• facilitating live traffic view at intersections to TMO members,

• reducing a TMOs' dependence on intersection and driveway intersection officers,

• developing a transit connection app using route schedules and video,

• generating incident response alerts,

• allowing active traffic signal control, and

• predicting traffic congestion based on progression of traffic build up.

Over the course of the survey development the draft questions were sent to BCID and/or ARC for their review and additional input. Several draft surveys were sent for review.

3.3 Final Survey

The questions went through multiple drafts, editing the wording of the questions to make sure they would be clear to participants and that the research team received the appropriate answers. Additional questions were then added requesting permission to conduct a follow-up survey with the organization if desired by the research team.   The follow-up section allows participants to name specific studies or reports that they have previously completed involving traffic operations. The survey has 30 base questions, with a possibility of 24 conditional questions based on a participant's responses. The survey has the following order: background, membership, services, and follow-up.

The background section of the survey collects general information about organizations such as their name, classification, and website address. The membership section collects information on membership size, if the organization charges a membership fee, and how many individuals are served by the organization. The services section of the survey is the largest section and collects information about budgets, services provided by the organization, and performance measurements. The follow-up section allows for survey participants to consent to participate in a potential follow-up interview by providing additional contact information.

The web-based survey was initially created through the Georgia Tech Online Survey System. The questions and answer formats were programmed into the system and then the survey layout was created. The survey was completed and tested multiple times

to ensure that it followed the correct order for conditional questions and that there were

no additional issues with the survey. An identical survey was also created using

SurveyMonkey for potential participants more comfortable with that platform. The

survey was sent to multiple testers for time trials to check the duration of the survey. All

recorded time trials were less than ten minutes. The survey was sent out to the

organization contact emails obtained during the literature review and website search,

shown in Appendix A. Multiple follow-up emails were sent to encourage potential

participants to complete the survey. After all the follow-up emails were sent the phone

numbers obtained, also shown in Appendix A, were used to contact organizations to

encourage them to complete the survey. The final survey reflects all of the modifications

stated in the chapter and is shown on the following pages.

TMA Traffic Operations Services Survey

<u>Background</u>

1. Organization name:

2. Mailing Address:

3. Website address:

4. Organization Classification:

   - Transportation Management Association

   - Business Improvement District

   - Developer / property manager / business park manager

   - University

   - Other_____

5. What year was the TMA formed?

<u>Membership</u>

6. How many members are in your organization?

7. Is your organization fee based? Yes No

8. What is the geographic scope of your service area?

   - Regional

   - City

   - Corridor

   - Central business district / City center / Downtown

   - Suburban

   - Specialized Activity Center (university, hospital, airport, etc)

   - Other_____

9. What is the estimated number of individuals served by your TMA (please round to the nearest 1000)?

10. What is your average annual budget?

- Under 50,000
- 50,000 - 99,999
- 100,000 - 249,999
- 250,000 - 499,999
- 500,000 - 749,000

- 750,000 – 999,000
- 1,000,000 – 1,499,999
- 1,500,000 – 1,999,999
- 2,000,000 – 4,999,999
- 5,000,000 or more

11. What percentage of your budget was spent on transportation operations?

12. Which of the following services do you offer?

- ☐ Rideshare matching
- ☐ Telecommuting program
- ☐ Subsidized transit passes
- ☐ Direct rideshare incentives
- ☐ Shuttle/Local transit
- ☐ Guaranteed ride home
- ☐ Vanpool services
- ☐ Trip reduction plan preparation

- ☐ Parking services provision
- ☐ Parking pricing or management
- ☐ Transit pass sales
- ☐ Carshare program
- ☐ Coordinated travel plan
- ☐ Bicycle program
- ☐ N/A

13. Does your organization hire consultants or vendors? Yes No

If yes….

➢ Which of the following services do you contract out?

- ☐ Rideshare matching
- ☐ Telecommuting program
- ☐ Subsidized transit passes
- ☐ Direct rideshare incentives
- ☐ Shuttle/Local transit
- ☐ Guaranteed ride home
- ☐ Vanpool services
- ☐ Trip reduction plan preparation

- ☐ Parking services provision
- ☐ Parking pricing or management
- ☐ Transit pass sales
- ☐ Carshare program
- ☐ Coordinated travel plan
- ☐ Bicycle program
- ☐ N/A

14. Is your organization involved in traffic operations? Yes No

If yes….

➢ What tasks do you perform?

☐ Traffic control improvements

☐ Signal timing

☐ Signal coordination planning

☐ Optimization of timing plans

☐ HOV priority treatment

☐ Bus priority signal

☐ Traffic counts

☐ Traffic speeds

☐ Travel time

☐ Simulation

☐ Other_____

☐ N/A

15. Do you track performance measurements for transportation systems? Yes No

If yes….

➢ What services do you have measurements for?

☐ Rideshare matching

☐ Telecommuting program

☐ Subsidized transit passes

☐ Direct rideshare incentives

☐ Shuttle/Local transit

☐ Guaranteed ride home

☐ Vanpool services

☐ Trip reduction plan preparation

☐ Parking services provision

☐ Parking pricing or management

☐ Carshare program

☐ Bicycle program

☐ Traffic control improvements

☐ Signal timing

☐ Signal coordination planning

☐ Optimization of timing plans

☐ HOV priority treatment

☐ Bus priority signal

☐ Data collection

☐ Mobile application

☐ Traffic officers

   ☐ N/A   ☐ Other

- ➢ How do you measure these services?
- ➢ What do you do with these performance measures?

If no….

- ➢ Is your organization considering implementation of performance measurements?

16. Which service offered receives the most funding?

17. Does your organization have access to live traffic views / traffic cameras? Yes No

If yes….

- ➢ Who owns/maintains the cameras?
  - DOT
  - MPO
  - Local Agency
  - Your Organization
  - Other

➢ Is there a location for customers to view video/pictures? Yes No

18. Does your organization deliver real time incident reports? Yes No

If yes….

    ➢ How are reports distributed?

        ☐ Email

        ☐ Text

        ☐ Social Media

        ☐ Other

    ➢ Is there a website where one can subscribe for updates? Yes No

19. Do you have a mobile application sharing the area's transportation information?

Yes No

If yes….

    ➢ What is the application titled?

    ➢ What information is provided?

        ☐ Travel times

        ☐ Schedules

        ☐ Real time location

        ☐ Expected arrival time

20. Do you make use of traffic officers to conduct traffic during peak hours? Yes No

If yes….

    ➢ How many officers are staffed each day?

    ➢ What is the annual budget the officers, estimate to the nearest $1,000?

    ➢ Who pays for the officers?

        ☐ Police Department

        ☐ Individual businesses

        ☐ Local agency

        ☐ Your organization

        ☐ Other

21. Do you make use of ITS technologies to improve traffic? Yes No

If yes….

    ➢ Which ITS technologies are you using?

22. Does your organization use GIS to coordinate transportation? Yes No

23. Have you implemented projects pertaining to real-time traffic operations? Yes
   No

   If yes….

   ➢ What is the title(s) or location of the project?

   ➢ How difficult was the implementation process?

      • Easy

      • Medium

      • Hard

24. Have the implementation of ITS, GIS, Traffic operations shown an improvement
   in:

      ☐ Reduction of traffic officers

      ☐ Reduction in traffic congestion

      ☐ Reduction in travel time

      ☐ Increased travel speeds

      ☐ Increased carpooling/vanpooling

      ☐ Congestion

      ☐ Air Quality

      ☐ N/A

25. Have you or are you considering implementing projects involving real-time information? Yes No

   If yes….

   ➢ If you have considered and not followed through, why did you stop?

      ☐ Cost

      ☐ Time

      ☐ Effort

      ☐ No perceived benefits

      ☐ Public disapproval

      ☐ Other

      ☐ N/A

   ➢ What is the title(s) or location of the project?

26. Does your organization cooperate or share data/information with any local, state, or federal agencies? Yes No

   If yes….

   ➢ Names of cooperating parties:

27. Does your organization track service evaluation? Yes No

   If yes….

   ➢ How do you perform evaluation?

      ☐ Email

      ☐ Online survey

      ☐ Personal survey

      ☐ Mailer

      ☐ Other

   ➢ How often are these evaluations conducted?

Follow-up

28. If you have any studies (i.e. cost benefit, impact assessment, number results, etc.) please provide the name(s) so that they may be located and read for additional information:

29. Are you interested in receiving a copy of the final report? Yes No

30. Is it okay to contact your organization for a follow-up interview based on your survey results? Yes No

If yes….

   ➤ Organization contact name, phone number, and email:

CHAPTER 4

FINDINGS

This findings section discusses the findings of the research including the website reviews and listserv and survey responses.

4.1 Evaluation of Existing Organizations

4.1.1 Listserv Response

The research team posted to the National Center for Transit Research's National TDM and Telework Clearinghouse's Transportation Demand Management Listserv asking TDM professionals for specific examples of current or previous traffic operation projects conducted by TMOs. The posting read as follows:

"The University Transportation Center at Georgia Tech is researching the roles of activity center transportation organizations (TMAs, BIDs, etc) in regional mobility, with a specific focus on traffic operations services, such as signal control. We are looking for specific examples of current or previous projects or reports that have been done by organizations involving traffic operations services. If any of you or your agencies has been involved in such projects we would appreciate any information you might have involving these projects. Additionally we are searching for a national directory of BIDs and would appreciate any information on where one may be found."

The posting resulted in one relative response from Lou Fineburg, Program Director of Bike Pittsburgh. Fineburg mentioned that Carnegie Mellon's Traffic21

program had been working on signal timing among other projects in Southwestern

Pennsylvania, and he provided a link to the Traffic21 webpage. Upon further

investigation it was determined that Traffic21 was not a TMO but was a program created

by Carnegie Mellon to,

> "stimulate a broad community partnership to identify, refine, and deploy
>
> "intelligent transportation system" technology advancements to the Pittsburgh
>
> region's transportation system. [Their] goal is to leverage projects that will brand
>
> the region as an internationally-recognized place for "smart transportation" thus
>
> attracting further investment in both research and commercialization." (Traffic21,
>
> 2013)

The program helps the region receive state and federal funds that are used to

deploy smart transportation systems, and their projects are good examples of what TMOs

could do to solve similar problems in their areas. The Traffic21 projects are discussed in

detail in Chapter 5.

4.1.2 Website Reviews

Each websites' project list, services, and annual report were searched for anything

related to traffic operations services or TSM practices. Contact information for each

organization was collected while searching the website. Email addresses and phone

numbers were recorded so that organizations could be sent the new survey. The table in

Appendix A shows the organization names and websites that were reviewed, as well as

the contact information, and if they had any relative projects or services.   There were 165

organizations searched, with 13 of them either performing TSM services or having the

services provided by an outside source. These are discussed in Chapter 5.

4.2 Survey Responses

The "TMA Traffic Operations Survey" received 35 responses from 157

organizations around the nation, a 22.2% response rate. Of those 35 responses seven

were incomplete with participants only completing a portion of the survey.

4.2.1 Background and Membership

The participants included 25 TMAs, four BIDs, one university, and five

participants of other classifications. The median organization age is 19 years and 22

(71%) of the organization are fee based. Table 8 below shows the geographic area served

by organizations.

Table 8 Geographic scope of organization's service area.

What is the geographic scope of your service area?		
Answer Options	**Response Percent**	**Response Count**
Regional	19.2%	5
City	11.5%	3
Corridor	19.2%	5
Central business district / City center / Downtown	26.9%	7
Suburban	19.2%	5
Specialized Activity Center (university, hospital, airport, etc)	3.8%	1
Other (please specify)		10
answered question		**26**

4.2.2 Services

Table 9 shows the average annual budget for the organizations which range from

under $50,000 per year to over $5,000,000 per year. The median budget range is

$100,000 to $249,000 per year. Thirteen of the organizations allocated zero percent of

their budget for transportation while eleven organizations allocated anywhere from 5% to 100% of their budget for transportation.

Table 9 Average annual budget for organizations.

What is your average annual budget?		
Answer Options	**Response Percent**	**Response Count**
Under 50,000	3.6%	1
50,000 - 99,999	7.1%	2
100,000 - 249,999	39.3%	11
250,000 - 499,999	10.7%	3
500,000 - 749,000	10.7%	3
750,000 – 999,000	0.0%	0
1,000,000 – 1,499,999	10.7%	3
1,500,000 – 1,999,999	0.0%	0
2,000,000 – 4,999,999	14.3%	4
5,000,000 or more	3.6%	1
	answered question	**28**

The participating organizations offered multiple traditional TDM services. The services offered by a majority of organizations include rideshare matching, guaranteed ride home, and trip reduction plan preparation. Telecommuting programs, shuttle transit, vanpool services, carshare programs, and coordinated travel planning are other popular services offered. Table 10 shows additional services offered by organizations. Twenty-three (74%) organizations hired consultants or vendors to run some of the services. Consultants and vendors were primarily hired for rideshare matching, shuttle transit, guaranteed ride home, and vanpool services.

Table 10 TDM services offered by organizations.

Which of the following services do you offer?		
Answer Options	Response Percent	Response Count
Rideshare matching	70.0%	21
Telecommuting program,	40.0%	12
Subsidized transit passes,	26.7%	8
Direct rideshare incentives,	30.0%	9
Shuttle/Local transit,	36.7%	11
Guaranteed ride home,	63.3%	19
Vanpool services	43.3%	13
Trip reduction plan preparation	60.0%	18
Parking services provision	10.0%	3
Parking pricing or management	10.0%	3
Transit pass sales,	20.0%	6
Carshare program	16.7%	5
Coordinated travel plan	33.3%	10
Bicycle program	40.0%	12
N/A	20.0%	6
answered question		**30**

Five organizations are involved in traffic operations, and offer the traffic services shown in Table 11. Organizations were involved in signal operations and collection of data in their area. Other services were highway and pedestrian safety improvements.

Table 11 Traffic services offered by organizations.

What tasks do you perform?		
Answer Options	Response Percent	Response Count
Traffic control improvements	50.0%	2
Signal timing,	50.0%	2
Signal coordination planning,	75.0%	3
Optimization of timing plans,	50.0%	2
HOV priority treatment,	0.0%	0
Bus priority signal,	25.0%	1
Traffic counts,	75.0%	3
Traffic speeds,	0.0%	0
Travel time,	25.0%	1
Simulation,	25.0%	1
N/A	0.0%	0
Other (please specify)	50.0%	2
answered question		**4**

Sixteen (53%) organizations tracked performance measurements for transportation services, and an additional twelve organizations are considering implementing performance measurements. The services measured are shown in Table 12, and most organizations had measurements for rideshare matching, telecommuting programs, guaranteed ride home, shuttle transit and vanpool services.

Table 12 Services with performance measurements.

What services do you have measurements for?		
Answer Options	Response Percent	Response Count
Rideshare matching,	64.3%	9
Telecommuting program,	50.0%	7
Subsidized transit passes,	35.7%	5
Direct rideshare incentives,	21.4%	3
Shuttle/Local transit	42.9%	6
Guaranteed ride home	50.0%	7
Vanpool services	50.0%	7
Trip reduction plan preparation	35.7%	5
Parking services provision	0.0%	0
Parking pricing or management	0.0%	0
Carshare program	7.1%	1
Bicycle program	28.6%	4
Traffic control improvements	0.0%	0
Signal timing	7.1%	1
Signal coordination planning	0.0%	0
Optimization of timing plans	7.1%	1
HOV priority treatment	0.0%	0
Bus priority signal	0.0%	0
Data collection	14.3%	2
Mobile application	0.0%	0
Traffic officers	0.0%	0
N/A	0.0%	0
Other (please specify)		3
answered question		**14**

The performance measurements for services included

- on-time performance,

- ridership data,

- service users,

- number of registrants,

- vehicle Miles Traveled,

- car free days,

- cost per ride,

- cost per mile,

- surveys of companies to determine mode-splits, and

- number of signal timing plans developed.

These measurements were then used by organizations to evaluate and alter their services.

Organizations used measurements to

- evaluate and assess performance of vendor,

- create annual reports for members,

- determine the success of a program,

- determine vehicle miles reduced per program,

- complete annual applications for funding for services,

- report to funders,

- refine program services,

- provide data to local service providers,

- estimate fuel savings and environmental benefits,

- determine what new services might be attractive, and

- evaluate capacity issues.

Fourteen (50%) of the participating organizations have access to traffic cameras or live traffic views, ten of which had an online location where users could view the video or pictures from the cameras. Only two of those organizations owned and maintained their own cameras while others depended on the DOT or another local agency. Five (17%) of the organizations deliver real-time incident reports through email, text messaging, social media, and other means of delivery, and four of the organizations provide a website where users can subscribe to receive reports. Only one organization has a mobile application sharing traffic incidents, real-time transit options, and trip planning services for their area. Additionally only one organization makes use of traffic officers to conduct traffic. The officers are paid by the police department and used for traffic control during construction closures and not on a daily basis. Four (14%) organizations use ITS technologies to improve traffic, technologies including

- video vehicle detection,

- Variable Message Signs,

- EZpass readers,

- traffic signal control,

- cameras, and

- bus and fleet vehicle tracking.

Five (17%) organizations have implemented projects pertaining to real-time traffic operations, and thirteen either have in the past or are considering implementing similar projects. The implemented projects relate to real-time shuttle info, traffic incidents, and speed collection. Cost has been the biggest deterrent of the organizations

that have considered implementing similar projects. Table 13 shows the improvements seen by organizations as a result of implementing ITS, GIS, or traffic related services.

Table 13 Area improvements from organization's services.

Have the implementation of ITS, GIS, Traffic operations shown an improvement in:		
Answer Options	**Response Percent**	**Response Count**
Reduction of traffic officers	0.0%	0
Reduction in traffic congestion	14.3%	3
Reduction in travel time	9.5%	2
Increased travel speeds	4.8%	1
Increased carpooling/vanpooling	4.8%	1
Congestion	9.5%	2
Air Quality	9.5%	2
N/A	71.4%	15
	answered question	**21**

Twenty-four (85%) organizations cooperate or share data with local, state, or federal agencies. Eight organizations track service evaluations through email, online surveys, and personal surveys. These evaluations are primarily conducted yearly, but some organizations conducted them twice a year or every other year.

CHAPTER 5

ANALYSIS

This section of the thesis discusses in farther depth the importance of the material in the Findings chapter.

5.1 Organization Website Review and Survey Results

The search of organizations' websites found thirteen out of 165 identified TMOs providing traffic operations, TSM services, or having the services provided by an outside source. Nine of those thirteen organizations provided these services themselves while the remaining four linked users to an outside source for information. The organizations and the services offered are as follows:

128 Business Council, Waltham, MA: The organization has real-time GPS shuttle tracking on their website. The shuttle map can be selected by route choice. Upon selecting a route the shuttle stops are displayed on a map, which when individually selected displays the arrival time of the next shuttle. The organizations owns their own cameras and their webpage displays live views of local Route 128. The organization sends traffic alerts via email, and their Twitter webpage displays traffic alerts, shuttle delays, and other important transportation related alerts. The organization uses performance measurements for ridership on their shuttles and uses the measurements to evaluate capacity issues. The organization has considered the implementation of additional real-time information services but have not followed through due to cost and time limitations.

50 Corridor Transportation Management Association, Sacramento, CA: The association's homepage has a dropdown tool bar labeled "Real-Time Traffic," that when clicked provides a Google Map showing traffic in the area on and views from multiple DOT traffic cameras in a side-by-side view.

A Better City TMA, Boston, MA: The TMA has access to live video through DOT and local agency operated cameras and shares the video with their users. The TMA also collects performance measurements including vehicle miles traveled and number of registrants that are used as internal metrics.

Airport Corridor Transportation Association, Pittsburgh, PA: The TMA is involved in signal coordination planning along the corridor, collects real-time shuttle info, and tracks performance measurements for the local shuttle. The TMA has access to live video through DOT operated cameras and shares the video with their users.

Bucks County Transportation Management Association, Trevose, PA: The TMA is involved in traffic control improvements, traffic counts, and travel time collection. The TMA has access to live video through DOT operated cameras, shares the video with their users, and delivers real-time incident reports through email and text messaging, and social media. The TMA also uses Variable Message Signs and EZpass readers.

Charles River Transportation Management Association, Cambridge, MA: The TMA provides real-time incident reports using social media.

Commuter Services (formerly 494 Commuter Services), Edina, MN: The TMO collects performance measurements to determine the success, return-on-investment, vehicle miles reduced from their services. The measurements include how often users

carpool, number of transit passes sold, usage of each pass, number of riders at a specific bus stop, vanpools in operation, and how often a rider uses the vanpool service.

Delaware County Transportation Management Association, Media, PA: The TMA administered a TSP feasibility study for SEPTA riders along PA Route 3 in West Chester County. The segment of roadway was about four and a half miles long with 22 traffic signals. It cost the multiple townships involved a total of over $480,000 and about $2,000 per vehicle to equip the required emitter. The township costs included signal controller assembly, controller modifications, preemption system, preemption system modifications, system integration, and testing. The final report found that implementing the TSP improved travel time along the corridor as well as bus arrival and departure reliability (Jacobs, 2011).

Downtown Fort Lauderdale Transportation Management Association, Fort Lauderdale, FL: The TMA has a mobile application, Sun Trolley, which provides a list of all of the downtown trolley routes. When a route is selected a map shows the route, the current location, and direction that the trolley is travelling. However the viewing screen does not refresh automatically to show the trolleys' location, instead the user must hit a refresh button to find the updated location of the trolley.

Duwamish Transportation Management Association, Seattle, WA: The TMA has a "Traffic Alert" link on their home webpage. When clicking on the link users are taken to the Google Maps page of the downtown Seattle area, where Google Traffic shows the congestion and a specific "Seattle Traffic Alerts" setting shows the location and description of local road work construction.

Greater Mercer Transportation Management Association, Princeton, NJ: The

TMA provides traffic alerts and traffic congestion via Google Maps on their webpage.

The TMA also provides a list of daily traffic alerts that gives details on the alert's

location, time, and if it has been cleared or not. The map and alert list are shown in

Figure 5.
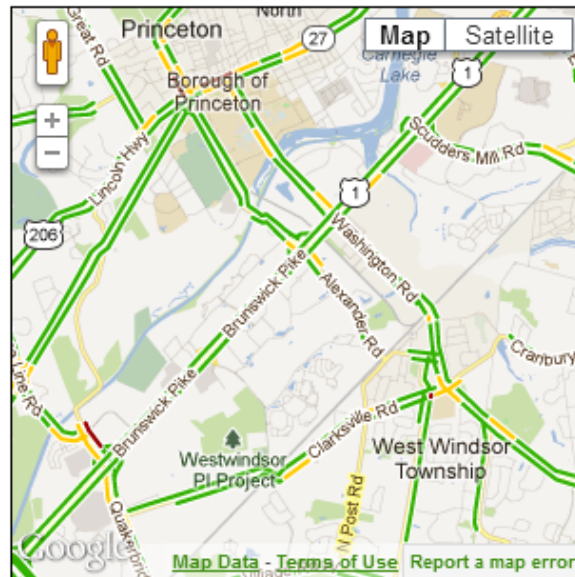
Figure 5 Greater Mercer TMA's traffic congestion map and traffic alerts (Greater Mercer TMA, 2013).

Greater Redmond Transportation Management Organization, Redmond, WA:

The TMA has access to live video through DOT operated cameras and shares the video

with their users.

HART Commuter Information Services, Flemington, NJ: The TMA provides traffic alerts via email. The alerts are sent during weekday peak commuting hours. The alerts include accidents, emergency personnel activity, disabled vehicles, congestion delays, and construction and weather delays.

Hudson Transportation Management Association, Jersey City, NJ: The TMA sends out real-time alerts via email that pertain to traffic, construction, and ozone alerts. The alerts may also be viewed on the webpage.

I-70 Coalition, Frisco, CO: The TMO has access to live video through DOT operated cameras and shares the video with their users. The organization at one time provided real-time road and traffic information but they no longer do. The organizations stated implementation of their services showed a reduction in traffic congestion.

Junction Transportation Management Association, Andover, MA: The TMO used performance measures to determine their carbon footprint by recoding the reductions in vehicle miles travelled, vehicle trips, and gases released into the environment. The reductions for the TMO during 2012 are shown in Table 14 below.

Table 14 Junction TMO reductions from 2012 (Junction TMO, 2013).

Reductions	Vehicle Miles Traveled	Vehicle Trips	HC (hydrocarbons)	CO (carbon monoxide)	VOC (volatile organic compounds)	CO2 (carbon dioxide)	GALS (gasoline)	Money saved (gasoline)
Carpools	732,825	33,264	5,008	37,155	1,590	666,205		$241,114
Vanpools	445,979	13,003	3,048	22,611	967	405,436	18,505	$69,765
Bicyclists	18,256	1,680	125	926	40	16,596	758	$2,856
TOTALS	1,197,060	47,947	8,180	60,692	2,597	1,088,237	83,219	$313,735

Keep Middlesex Moving Inc., New Brunswick, NJ: They provide real-time traffic alerts via email or text messaging to phones. They also provide an interactive Google Map of local area congestion.

Little Italy Association, San Diego, CA: The business district has a mobile application, San Diego's Little Italy, for parking in the district that includes parking lot locations, hours of operation, rates, directions using Google Maps and the mobile device's GPS system, the lot phone number, and total number of parking spaces at the facility. The application does not use real-time information but solely gives users information to help them decide where to park.
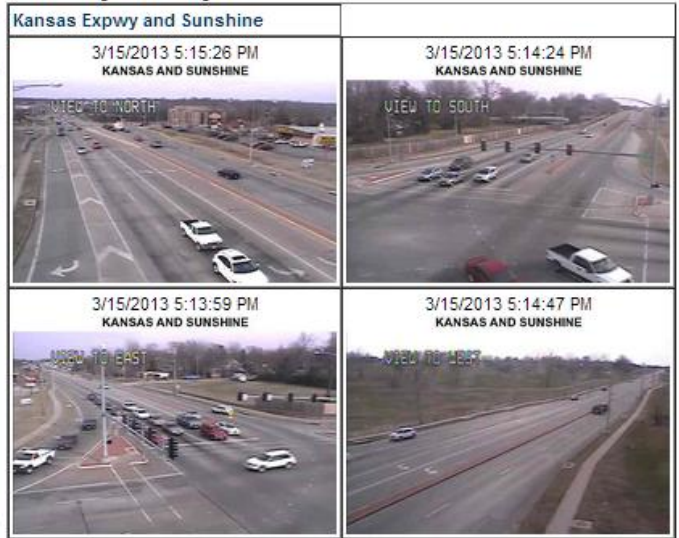
Midtown Transportation, part of Midtown Alliance, Atlanta, GA: The TMA is involved in multiple traffic operations including signal coordination planning, traffic counts, signal timing, optimizations of timing plans, and traffic control improvements.

Ozarks Transportation Organization, Springfield, MO: The website homepage provides a link to Ozarks' traffic info which redirects users to a webpage, Figure 6, that provides traffic camera views and lists current traffic incidents. The traffic incident information is updated every 30 seconds (City of Springfield).

Figure 6 Ozarks' traffic info (City of Springfield, 2013).

Pima Association of Governments, Tucson, AZ: The TMA is involved in multiple traffic operations including signal timing, signal coordination planning, optimization of timing plans, traffic counts, simulation, and bus priority signals. The TMA tracks performance measurements for signal timing plans to determine quantity of service. The TMA has access to live video through DOT operated cameras and shares the video with their users, deliver real-time incident reports to subscribers, and collects arterial speed data. Implementation of the services has resulted in increased travel speeds and reduction in traffic congestion and travel time.

The Presidio Trust, San Francisco, CA: Provides real-time shuttle tracking for its free shuttle service, PresidiGo Shuttle. The shuttle routes and stops are overlaid on

Google Maps, shown in Figure 7 below. The shuttles are marked as a circle containing a directional arrow with the shuttle number displayed next to it. The shuttle icon is green while it is in motion and red when stopped. Placing the cursor over the shuttle reveals additional information including the shuttle direction, percent full, the next stops, and arrival time until the next stops. Placing the cursor over a shuttle stop shows the time till next shuttle arrival.
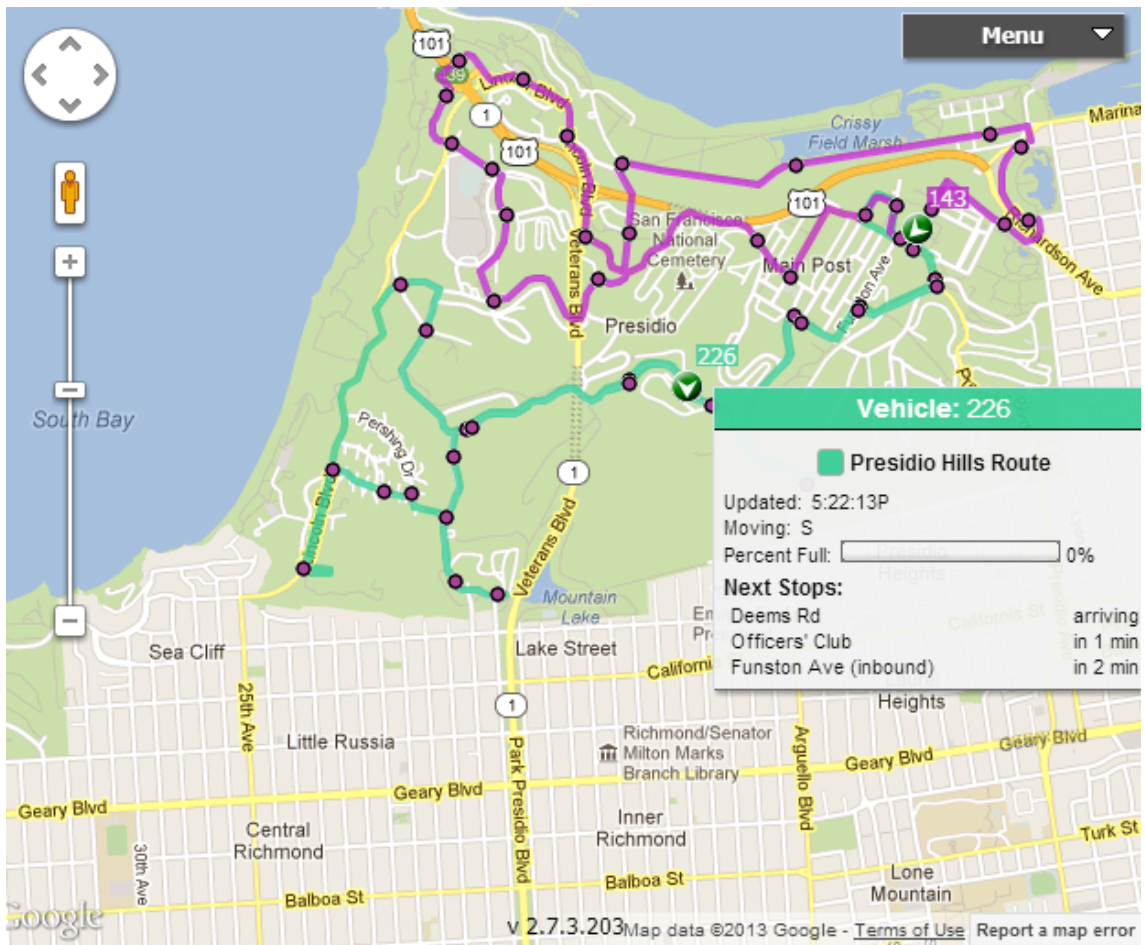
Figure 7 The Presidio Trust's real-time shuttle tracking service (The Presidio Trust, 2013).

Transportation Management Association of Chester County, Malvern, PA: The TMA uses performance measurements including on-time performance and ridership data to evaluate and assess the performance of vendors. The TMA has access to traffic

cameras owned by the DOT and shares the views with users, delivers real-time incident reports using email, text messaging, and social media, and uses video vehicle detection.

The TMA Group, Franklin, TN: The TMA has access to traffic cameras owned by another local agency. The TMA tracks performance measurements for their services to provide metrics to their funders.

The Transportation Management Association of San Francisco, San Francisco, CA: The TMA owns and has access to traffic cameras and has a location for users to view the video. The TMA delivers real-time incident reports by email, and has a mobile application, m.tmasfconnects.org, that provides traffic incidents, real-time transit options, and trip planning services.

Transmanage/Bellevue Downtown Association, Bellevue, WA: Has a link to a real-time traffic congestion map provided by the City of Bellevue. The data is collected by loop detectors between every 25 to 180 seconds. The map refreshes every minute, and the data is saved and sent to the GIS server (City of Bellevue).

Upper Valley TMA, White River Junction, VT: One of the TMA transit members has piloted a rural real-time system in Vermont and New Hampshire.

5.2 Listserv Response

The National Center for Transit Research's National TDM and Telework Clearinghouse's Transportation Demand Management Listserv posting resulted in one response about Carnegie Mellon's Traffic21 program. The program helps the Southwestern Pennsylvania region receive state and federal funds that are used to deploy smart transportation systems. The Traffic21 projects and solutions could be used as

guidance for TMOs to implement similar solutions in their area. Traffic21 is working on the following projects listed on their website:

Cranberry Township: The Township is currently experiencing shifts in traffic patterns due to its economic growth. Traffic21 proposed the solution of using real-time traffic camera data to create a model and to use the model to recommend signal timing plans and evaluate the impact the new plans on traffic and the environment. The solution also suggests modeling the use of adaptive traffic control signals and analyzing the impact of such a system. The results of the study will be used to determine other areas in the region that could benefit from a similar solution.

East Liberty: There is traffic congestion in the region that is tying up vehicles. Traffic21 has determined that adaptive signal control is effective even if only a few signals can be made to adjust their timing to meet changing conditions. The program is working on implementing a pilot program that involves nine intersections in East Liberty. If the pilot is determined to be successful, then the pilot area will be expanded to include more intersections.

Port Authority bus location: The Port Authority wanted a no cost way to provide bus riders with information about bus arrival times. Traffic21 suggested that crowd sourcing be used to collect the data. Traffic21 developed a mobile app, Tiramisu, which riders can download and run on their phone while riding the bus. The application shares rider GPS location and can provide an estimate of the vehicles occupancy. The application processes the GPS data and generates arrival times for the buses.

School bus location: Many students in the region are travelling to school using their personal vehicle instead of the school bus which is more energy efficient. The bus

arrival can fluctuate due to traffic which causes riders to have to wait for an unknown amount of time sometimes in poor weather conditions. Traffic21 is developing an internet and mobile application that will track school buses in the region and allow riders to know with more certainty when the bus will arrive, hopefully increasing bus ridership and decreasing single occupant vehicles on the road.

Predictive parking system: When visitors drive to Downtown Pittsburgh for special events they do not necessarily know where to park and can cause additional traffic congestion. Traffic21 helped supply funding to create an organization, ParkPGH, which provides real-time information for eighteen parking garages in the downtown area. The data is displayed on a Google map and can be downloaded as a mobile application. The application also predicts how many spaces will be available in the near future helping drivers make a decision on where to park.

These findings show that the minority of organizations are involved in traffic operations. Of the organizations that are involved in traffic operations multiple provided incident alerts, live traffic views, and real-time traffic or shuttle information. Very few of the organizations that are providing traffic operations services and using data on their websites aren't generating the data themselves.

CHAPTER 6

CONCLUSSIONS AND RECOMMENDATIONS

This thesis reviewed the roles that major activity center TMOs have in regional transportation, and developed a survey to determine how TMOs are becoming involved in real-time operations and control of traffic services. Organizations were examined for their current transportation practices, mobility strategies, and performance measurements. As part of a larger UTC project, the BCID has funded the development of a micro-simulation transportation land use model for the entire district area and wanted to research similar activity center efforts elsewhere to assist them during different implementation stages of this effort. The BCID had particular interests in the following areas:

• Facilitating live traffic view at intersections to TMO members

• Reducing a TMO's dependence on intersection and driveway intersection officers

• Developing a transit connection app using route schedules and video

• Generating incident response alerts

• Allowing active traffic signal control

• Predicting traffic congestion based on progression of traffic build up

These areas of interest were the key focus during the literature review, the review of organizations' websites, and the online survey. While the literature review found very little information on these interests the website review found thirteen organizations that are involved in similar activities. Seven of the organizations provided incident alerts to

subscribers primarily through emails or their webpage, while one organization also sent text message alerts. Three organizations provided real-time shuttle tracking primarily on their websites, but one organization had a mobile application for tracking their shuttles. These services generally provided shuttle routes, shuttle location, shuttle direction, stop locations, and estimated arrival times. Multiple organizations provided live views from traffic cameras; however almost all of the views came from other sources, usually the state or local DOT. Only one organization had their own webcams broadcasting live traffic, but the organization only had a total of two views. No organizations mentioned the use of intersection or driveway intersection officers, or predicting traffic congestion based on progression of traffic build up. While the organizations were not predicting traffic congestion themselves, they did provide a Google Maps display with Google Traffic enabled showing the local area congestion. No organization was involved with active traffic signal control, but one had implemented a TSP system for its local shuttle improving its travel time along the corridor and it's on time arrival reliability.

In addition to the website review the survey found other organizations involved in traffic and other real-time operations. Five organizations were involved in traffic operations including traffic control improvements, signal timing, signal coordination, optimization of timing, traffic counts, travel time collection, safety improvements, simulation, and bus priority signaling. Fourteen organizations had access to live traffic views from cameras that were primarily owned by the DOT, only two organizations owned their own cameras. Only one organization had a mobile application that provided traffic incidents and real-time transit options. Five organizations delivered incident reports using either email, text messaging, and/or social media. Sixteen Organizations

tracked performance measurements for their services used for reporting and adjusting

their services to be as efficient as possible. There were no organizations that mentioned

being involved in any projects similar to the one proposed by BCID.

While no TMOs were working on projects similar to BCID's the Traffic21

program at Carnegie Mellon is currently working on multiple projects of similar interests.

The program is using real-time camera data in a local township to create a model that will

be used to create new signal timing plans for the area and will later be used to model the

use of adaptive signal control. Traffic21 is also installing an adaptive signal system in

another local community that consists of nine intersections. The adaptive system is

currently in the pilot phase, but if it is successful more intersections will be added to the

system. Traffic21 is working on two different applications for transit, one for school

buses and one for a regional transit authority. The case of the regional transit authority is

interesting because they requested a no cost way to obtain the bus data to generate arrival

times for the buses. The result was the mobile app which is used by the riders to provide

the necessary information. These are all currently active projects that when completed

could provide results useful to TMOs wishing to implement similar services.

Performance measures were researched in addition to transportation practices

with very few results that related directly to transportation. In the 2003 TMA survey

there was no mention of TMAs collecting raw transportation data, such as traffic counts

or transit boarding, to measure the performance of their systems. However in the 2009

TMA survey less than half of the respondents were collecting raw data on their

transportation system. Most organizations were using satisfaction surveys to gauge the

success of their services. In the 2010 BID survey almost no organizations were using

performance measures for the transportation services. This is most likely due to the fact that very few BIDs provided any type of transportation services in their regions.

While real-time operations have gained momentum with advancements in surveillance and control technologies it is likely that almost no other TMOs are involved in real-time traffic operations due to the high capital and maintenance costs involved with the services. At least initially local TMOs, such as BCID, could utilize free services available, such as Google Traffic and DOT cameras, to provide their region with useful transportation information. For example create an app similar to the one used by Port Authority that uses crowd sourcing as a means of free data collection. TMOs could also considering using connected vehicles or other methods to collect travel data at low cost. Additional alternatives to reducing congestion, apart from traditional TDM strategies, can also be considered. For example, services such as parking lot information or real-time parking data could influence route choices and reduce cruising resulting in decreased congestion. As local TMAs, such as BCID, become increasingly involved in ITS they may become a template for other organizations wanting to implement similar systems.

6.1 Limitations of this Project

Obtaining a full, comprehensive set of previous data was difficult due to many factors. Most of the literature review came from previous surveys where the participants and results varied each time, making it hard to track exact change across TMOs over time. This also limited the comparison for results of the new survey because not all participants from the earlier surveys may have participated in the new survey and some of the organizations no longer exist. Additionally, it was difficult to compile a full list of TMOs and their contact information. There was no national directory found for BIDs, so

a list had to be compiled with the help of other professionals, resulting in a list that may not be all inclusive. It was also difficult to identify BIDs because they can go by a multitude of different names. Also in spite of multiple waves of follow-up communication the survey response rate was limited by those who wished to participate and those who had the time.

6.2 Future Work

Although major activity center TMOs now have the ability to become involved in traffic operations-oriented strategies this research indicated that in general, TMOs are not offering these services. With TMO's generally limited funding additional research should be conducted to identify minimal to no cost alternatives that TMOs could use to collect regional data. Additional recommendations can be made for the implementation of new real-time operations systems that focus on additional applications and organization benefits. If more TMOs show interest in implementing these services and emerging technologies, an organization could volunteer as a test-bed to measure the benefits of these services and technologies.

As part of the larger UTC project, additional recommendations can be made for the BCID, and since they are one of the first organizations to actively attempt to assume a role in traffic operations, the results of their project should be made available to other TMOs. The BCID may wish to consider creating a performance measurements system specifically for their region that could be used as a self-evaluation tool. The performance measurements could help the BCID learn where they could redirect funding to aid in the implementation of additional operations services.

Finally, the BCID system should be reviewed in the near future to determine how effective the project has been. The review should consider the benefits gained, performance measurements, identify where it has exceeded expectation, and to review the areas for improvement. If the project is considered to be a success, the organization can dedicate funding in the future for maintaining and potentially expanding the system. A successful traffic operations related project by BCID could help alleviate traffic congestion in the region, reduce the dependence of intersection officers, and lead to additional technological improvements that assist commuters and visitors. In addition developments in the area of new technology such as connected vehicles can open up potential for a more active role of TMAs in traffic operations.

APPENDIX A

ORGANIZATIONS AND CONTACT INFORMATION

Table 15 TMO websites searched, search result, and their contact information (all information procured available on organizations' websites). *Services provided by outside source.

Organization	Website Address	Email Address	Phone Number	Operations Services
128 Business Council	http://www.128bc.org	128bc@128bc.org	781-890-0093	Y
36 Commuting Solutions	http://36commutingsolutions.org	Audrey@36commutingsolutions.org	303-604-4383	N
494 Corridor Commission	http://494corridor.org	melissa@494corridor.org	612-749-4494	N
50 Corridor Transportation Management Association	http://50corridor.com/		866-698-7232	Y*
A Better City (ABC) Transportation Management Association	http://abctma.com		617-502-6240	N
Airport Corridor Transportation Association	http://acta-pgh.org	lynn.manion@acta-pgh.org	412-809-3505	N
Anaheim Resort Transportation	www.rideart.org	artinfo@atnetwork.org	714-563-5287	N
Annapolis Regional Transportation Management Association	http://www.artma.org	mbishop@arinc.com	410-897-9340	N
Anoka County TMO	http://anokacountytmo.com	tmo@co.anoka.mn.us	763-862-4260	N
Appleton Downtown Inc	www.appletondowntown.org	djuanna@appletondowntown.org	920-954-9112	N

Organization	Website Address	Email Address	Phone Number	Operations Services
Batavia Business Improvement District	www.downtownbataviany.com	dburkel@downtownbataviany.com	585-344-0900	N
Bay Area Houston Transportation Management Association	http://www.baytran.org	Kcoglianese@cityofwebster.com	832-771-0773	N
Bethesda Transportation Solutions	http://bethesdatransit.org	trobertson@bethesda.org	301-656-0868	N
Boulder Transportation Connections	http://www.bouldertc.org	amy@bouldertc.org	303-728-4568	N
Burbank Transportation Management Organization	www.btmo.org	BurbankTMO@polarisnet.net	818-953-7788	N
Business Improvement District of Coral Gables	www.shopcoralgables.com	info@shopcoralgables.com	305-569-0311	N
Campus Area Transportation Management Association	http://catmavt.org	catma@uvm.edu	802-656-7433	N
Capital Crossroads and Discovery Special Improvement Districts	www.downtowncolumbus.com	jcricksecker@sidservices.com	614-645-5063	N
Center City District	www.centercityphila.org	info@centercityphila.org	215-440-5512	N
Central District Management Association, Inc	http://www.centralbid.com	anthony@centralbid.com	518-462-4300	N
Central Philadelphia Transportation Management Association	http://centercityphila.org/about/CPTMA.php	info@centercityphila.org	215-440-5500	N
Centro San Antonio/Downtown Alliance	www.Downtownsa.org	jrichards@downtownsa.org	210-225-3862	N

Organization	Website Address	Email Address	Phone Number	Operations Services
Century City TMO	http://www.commute90067.com	Linda@cctmo.org	310-453-1714	N
Chapel West Special Services District	http://www.chapelwest.com	chapeldistrict@aol.com	203-787-3000	N
Charles River Transportation Management Association	http://www.charlesrivertma.org	info@charlesrivertma.org	617-324-6119	N
Charlotte Center City Partners	http://charlottecentercity.org	msmith@charlottecentercity.org	704-332-2227	N
City of Fort Smith	www.GoDowntownFS.com	jhughes@fortsmithar.gov	479-784-1001	N
City of Fremont	www.fremontne.gov	jan.rise@fremontne.gov	402-727-2630	N
City of Monterey Park	http://www.ci.monterey-park.ca.us/index.aspx?page=1811	dramirez@montereypark.ca.gov	626-307-1458	N
City of Santa Monica Virtual TMA	http://www.CommuteSM.com	support@commuteSM.com	310-458-8291	N
Commute Seattle	http://www.commuteseattle.com	jamiec@commuteseattle.com	206-613-3126	N
Commuter Challenge	http://commuterchallenge.org	sgerritson@enterpriseseattle.org	206-289-8656	N
Commuter Connections	http://www.mwcog.org/commuter2	ridematching@mwcog.org	800-745-7433	N
Contra Costa Centre Transit Village	http://www.contracostacentre.com/	ccca@contracostacentre.com	925-935-6337	N
Corpus Christi Downtown Management District	www.downtowncorpuschristi.com	jvidaurri@dtowncc.com	361-882-2363	N

Organization	Website Address	Email Address	Phone Number	Operations Services
Cross County Connection Transportation Management Association	http://www.driveless.com		856-596-8228	N
Delaware County Transportation Management Association	http://www.dctma.org	info@dctma.org	610-892-9440	Y
Downtown Akron Partnership	www.downtownakron.com	info@downtownakron.com	330-374-7676	N
Downtown and University Hill Management Division, Parking Services	http://www.bouldercolorado.gov/index.php?option=com_content&task=view&id=1238&Itemid=436	brautigamj@bouldercolorado.gov	303-441-3388	N
Downtown Beloit Association	www.downtownbeloit.com	shauna@downtownbeloit.com	608-365-0150	N
Downtown Cincinnati Inc.	www.downtowncincinnati.com	concierge@gototown.com	513-421-4440	N
Downtown Committee of Syracuse, Inc.	www.downtownsyracuse.com	mail@downtownsyracuse.com	315-4-22-8284	N
Downtown Dartmouth Business Commission	http://www.downtowndartmouth.ca/	info@downtowndartmouth.ca	902-466-2997	N
Downtown Denver Partnership	http://downtowndenver.com/AboutUs/ProgramsandInitiatives/DowntownDenverTMA/tabid/95/Default.aspx	apatel@downtowndenver.com	303-534-6161	N
Downtown Fort Lauderdale Transportation Management Association	http://www.suntrolley.com		954-761-3543	Y
Downtown in Motion/Central Houston, Inc.	http://centralhouston.com/Home/default.asp	rmeury@centralhouston.org	713-650-1470	N

Organization	Website Address	Email Address	Phone Number	Operations Services
Downtown Inc	www.downtown-santaana.com		714-547-6100	N
Downtown Ithaca Alliance	www.downtownithaca.com	gary@downtownithaca.com	607-277-8679	N
Downtown Manchester Special Service District	www.downtownmanchester.org	dmssd@ci.manchester.ct.us	860-645-2101	N
Downtown Minneapolis Transportation Management Organization	http://www.commuter-connection.org	dmaclaughlin@commuter-connection.org	612-370-3987	N
Downtown Phoenix Partnership	www.downtownphoenix.com	droderique@downtownphx.org	602-495-1500	N
Downtown Roanoke, Inc.	www.downtownroanoke.org	seanl@downtownroanoke.org	540-342-2028	N
Downtown Sanford, Inc.	www.downtownsanford.com	downtown@sanfordnc.net	919-775-8332	N
Downtown Stockton Alliance	www.downtownstockton.org	info@downtownstockton.org	209-464-5246	N
Downtown Tempe Community	www.downtowntempe.com	nancy@downtowntempe.com	480-355-6060	N
Downtown Ventura Partners	www.downtownventura.org	kevin@downtownventura.org	805-641-1090	N
Dulles Area Transportation Management Association	http://datatrans.org/about.html	jlarsen@datatrans.org	703-817-1307	N
Duwamish Transportation Management Association	http://www.duwamishtma.org	duwamishtma@seattleindustry.org	206-762-2492	Y*
East Aldine Management District	www.aldinedistrict.org	info@hhcllp.com	713-595-1220	N

Organization	Website Address	Email Address	Phone Number	Operations Services
Emeryville Transportation Management Association	http://emergoround.com/	info@emerygoround.com	510-451-3862	N
Energy Corridor District	www.energycorridor.org	cmartinson@energycorridor.org	281-759-3800	N
EZ Ride	http://www.ezride.org	info@ezride.org	201-939-4242	N
Fast Potomac Yard	http://fastpotomacyard.com	hperkins@legumnorman.com	240-450-5779	N
Florin Road Partnership	www.florinroad.com	florinroad@aol.com	916-424-4230	N
Glendale Transportation Management Association	http://www.glendaletma.net/	glendaletma@gmail.com	818-240-1361	N
goDCgo	http://www.godcgo.com	info@godcgo.com	202-299-2186	N
Greater Broadway Partnership	www.greaterbroadwaypartnership.com	greaterbroadwaypartnership@gmail.com	916-737-1427	N
Greater Des Moines Transportation Management Association	http://www.downtowndesmoines.com/pages/drivetime-des-moines	glyons@downtowndesmoines.com	515-286-4996	N
Greater Mercer Transportation Management Association	http://gmtma.org	tma@gmtma.org	609-452-1491	Y
Greater Redmond Transportation Management Association	http://grtma.org	LBallew@grtma.org	425-702-8001	N
Greater Valley Forge Transportation Management Association	http://www.gvftma.com	rhenry@gvftma.com	610-354-8899	N

Organization	Website Address	Email Address	Phone Number	Operations Services
Hacienda Business Park	http://www.hacienda.org/main/home.html	info@hacienda.org	925-734-6500	N
Hackettstown Business Improvement District	www.hackettstownbid.com	director@hackettstownbid.com	908-850-5004	N
HART Commuter Information Services	http://www.harttma.com	tara@harttma.com	908-788-5553	Y
Hollywood Media District BID	www.mediadistrict.org	jim@mediadistrict.org	323-860-0088	N
Hudson Transportation Management Association	http://hudsontma.org	info@hudsontma.org	201-792-2825	Y
I-70 Coalition	http://www.i70solutions.org	mbowes@i70solutions.org	970-389-4347	N
Ironbound Business Improvement District (IBID)	www.goironbound.com	nwkibid@aol.com	973-491-9191	N
Junction Transportation Management Association	http://www.junctiontmo.com/	info@junctiontmo.com.	978-247-3100	N
Kailua Village BID	www.kvbid.org	kailuavillagebid@gmail.com	808-326-7820	N
Keep Middlesex Moving Inc.	http://kmm.org		732-745-4465	Y
LA Fashion District	www.fashiondistrict.org	kent@fashiondistrict.org	213-488-1153	N
Leeward Oahu Transportation Management Association	http://lotma.org	lotma@lava.net	808-677-7433	N
Little Italy Association	www.littleitalysd.com	chris@littleitalysd.com	619-233-3898	Y

Organization	Website Address	Email Address	Phone Number	Operations Services
Lloyd District Transportation Management Association	http://lloydtma.org	mail@lloydtma.org	503-972-3289	N
Lower East Side BID	www.lowereastsideny.com	info@LowerEastSideNY.com	212-226-8161	N
Masco/Commute Works	http://www.masco.org/directions/commuteworks?ql=commuteworks	khewitt@masco.harvard.edu	617-632-2759	N
McClellan Park TMA	www.mcclellanparktma.org	brager@mcclellanparktma.org	916-570-5314	N
Merrimack Valley Transportation management Association	http://merrimackvalleytma.com	commute@merrimackvalleytma.com	781-639-6262	N
MetroWest/495 TMA	http://metrowest495tma1.org	stephanie@metrowest.org	508-879-5600	N
Midtown Business Association	www.mbasac.com	info@mbasac.com	916-442-1500	N
Milwaukee Downtown, BID #21	www.milwaukeedowntown.com	bweirick@milwaukeedowntown.com	414-220-4700	N
miracle mile improvement district	www.stocktonmiraclemile.com	denise@stocktonmiraclemile.com	209-948-6453	N
Missoula Ravalli Transportation Management Association	http://www.mrtma.org	mrtma2@montana.com	406-327-8707	N
Moffett Park & Business Transportation Association	http://www.mpbta.org	kerryh@mpbta.org	408-936-1889	N
Montclair Village Association	www.montclairvillage.com	info@montclairvillage.com	510-339-1000	N
Mooresville Downtown Commission	www.downtownmooresville.com	info@downtownmooresville.com	704-662-3336	N

Organization	Website Address	Email Address	Phone Number	Operations Services
Neponset Valley TMA	http://www.neponsetvalleyt ma.org	neponsetvalleytma @gmail.com	781-404-5023	N
New Britain Downtown District	www.newbritaindd.com	info@newbritaind d.com	860-229-0878	N
New North Transportation Alliance	http://newnorthalliance.org	bond@cutr.usf.edu		N
North Bethesda Transportation Center	http://www.nbtc.org/indexc ommunity.html	pschwartz@nbtmd .org	301-770-8108	N
North Natomas TMA	http://www.northnatomast ma.org		916-419-0055	N
North Shore TMA	http://northshoretma.org	andrealeary@veriz on.net	781-639-6262	N
Northern Neck Rideshare	http://www.neckride.org	info@neckride.org	804-333-6683	N
Northwest Side CDC	www.nwscdc.org	hsnyder@nwscdc. org	414-447-8230	N
Oakland Transportation Management Association	http://otma-pgh.org	mrainey@otma-pgh.org	412-687-4505	N
Old Town San Diego Chamber of Commerce	www.oldtownsandiego.org	otsd@aol.com	619-291-4903	N
Oldtown Salinas Association	www.oldtownsalinas.com		831-758-0725	N
Omaha Downtown Improvement District Association	www.omahadowntown.org	joe.omahadid@gm ail.com	402-916-1796	N
Orange Regional Transportation Management Association		dwhite@ctstransit. com	203-736-8810	N/A

Organization	Website Address	Email Address	Phone Number	Operations Services
Ozarks Transportation Organization	http://www.ozarkstransport ation.org	sfields@ozarkstran sportation.org	417-865-3042	Y*
Pasadena TMO	http://www.ci.pasadena.ca. us/Transportation/Transpor tation_Management_Assoc iation	tma@cityofpasade na.net	818-354-7433	N
Pensacola Downtown Improvement Board	www.downtownpensacola. com	dib@downtownpe nsacola.com	850-434-5371	N
Placer Country Transportation Management Association	http://pctpa.net/	pctpa@pctpa.net	530-823-4030	N
Point West Area TMA	http://www.80corridor.com			N
Portland Business Alliance	www.portlandalliance.com	lfrisch@portlandal liance.com	503-224-8684	N
Potomac and Rappahannock Transportation Commission	http://prtctransit.org	aharf@OmniRide. com	703-583-7782	N
Prairie Stone TMA	http://www.prairiestone.co m/transport.html	barbarahayskar@P rairieStone.com	847-732-1127	N
Ride-on TMA	http://www.ride-on.org/	contact@ride-on.org	805-541-8747	N
Ridewise	http://www.ridewise.org	staff@ridewise.org	908-704-1011	N
Sacramento TMA	http://sacramento-tma.org	sactma@surewest. net	916-737-1513	N
San Francisco International Airport Commission	http://www.flysfo.com/web /page/about/commission	Jean.Caramatti@fl ysfo.com	650-821-5042	N
Seaport TMA	http://seaporttma.org	info@SeaportTM A.org	617-385-5510	N

Organization	Website Address	Email Address	Phone Number	Operations Services
SmartCommute Transportation Management Association	http://www.smartcommute.org		919-549-8181	N
South 125 TMA	http://www.southeastconnections.com	sklausing@sebp.org	303-531-8378	N
South Bay Westside TMA		Cristina_corrales @equityoffice.com	310-642-0066	N/A
South Florida Education Center TMA	http://www.sfec.org		954-262-8832	N
South Natomas TMA	http://sntma.org	jason@sntma.org	916-335-2141	N
South Waterfront Transportation Management Association	http://www.southwaterfront.com/category/transportation	communityrelations@southwaterfront.com	503-236-6441	N
Spectrumotion TMA	http://www.spectrumotion.com/mission.asp		949-727-4273	N
St. Paul Smart Trips	http://smart-trips.org	jessica@smart-trips.org	651-224-8555	N
St. Petersburg Downtown Partnership	http://www.stpetepartnership.org	eric@stpetepartnership.org	727-821-5166	N
Stapleton TMA	http://stapletontma.com	kbowman@stapletonfoundation.org		N
Superior Business Improvment District	www.superiorbid.com	tenerellik@superiorbid.com	715-394-3557	N
Swan Island Transportation Management Association	http://swanislandtma.org	sitma@teleport.com	503-745-6563	N
Tampa Downtown Partnership	http://www.tampasdowntown.com	cburdick@tampasdowntown.com	813-221-3686	N
The BWI Business Partnership	http://bwipartner.org	connect@bwipartner.org	410-859-1000	N

Organization	Website Address	Email Address	Phone Number	Operations Services
The Partnership Transportation Management Association of Montgomery County	http://ptma-mc.org	execdir@ptma-mc.org	215-699-2733	N
The Presidio Trust	http://www.presidio.gov/visit/transportation/Pages/default.aspx	presidio@presidiotrust.gov	415-561-5418	Y
TMA Bucks	http://tmabucks.com	bill@bctma.com	215-244-9082	N
TMA of Lake Cook	http://tmalakecook.org	bill_baltutis@baxter.com	224-948-4023	N
TMA of San Francisco	http://tmasfconnects.org	kmartinson@TMASFCONNECTS.org	415-392-0210	N
Town Center Area CID	www.tcacid.com	lanie@tcacid.com	678-354-0701	N
Town Green District	www.infonewhaven.com	chris@downtownnewhaven.com	203-401-4245	N
Township of Haddon	www.haddontwp.com/	kburns@haddontwp.com	856-854-1176	N
Traffic Solutions	http://www.trafficsolutions.info/default.htm	info@trafficsolutions.info	805-963-7283	N
TranSComm at Boston University Medical Campus	http://www.bumc.bu.edu/transcomm	maureenl@bu.edu	617-638-7473	N
Transit Alliance	http://www.transitalliance.org	kosher@transitalliance.org	303-919-4334	N
Transmanage/Bellevue Downtown Association	http://www.bellevuedowntown.org/about/contact.html	caryn@bellevuedowntown.org	425-453-1223	Y*
TransOptions	http://www.transoptions.org		973-267-6209	N

Table 15 Continued TMO websites searched, search result, and their contact information.

Organization	Website Address	Email Address	Phone Number	Operations Services
Transportation Management Association Group	http://www.tmagroup.org	dhenry@tmagroup.org	615-790-4005	N
Transportation Management Association of Chester County	http://www.tmacc.org		610-993-0911	N
Transportation Management Association of Greater Springfield	http://tagsva.org	tags@tagsva.org	703-971-7727	N
Transportation Solutions	http://transolutions.org	info@transolutions.org	303-397-7086	N
Trek Transportation Management Organization	http://trekhouston.org		713-965-1711	N
Truckee North Lake Tahoe TMS	http://www.laketahoetransit.com/home	info@laketahoetransit.com	530-546-2912	N
Tysons Transportation Association	http://www.tytran.org		703-799-5394	N
Ukiah Main Street Program	www.downtownukiah.com	contact@ukiahmainstreetprogram.org	707-462-6789	N
Upper Valley Transportation Management	http://vitalcommunities.org/Transport/translinks.htm	aaron@vitalcommunities.org	802-291-9100	N
Urban Districts Alliance	www.itsalldowntown.com	donnie@itsalldowntown.com	417-831-6200	N
Warner Center TMA		tmo@warnercenter.org	818-716-5520	N/A
West Ridge Chamber of Commerce	www.westridgechamber.org	westridgechamber@sbcglobal.net	773-743-6022	N
West Shore Alliance TMA	http://www.choosewestshore.com	rotella@westshorealliance.org	813-289-5488	N

Table 15 Continued TMO websites searched, search result, and their contact information.

Organization	Website Address	Email Address	Phone Number	Operations Services
West Side Transportation Alliance	http://wta-tma.org	wta@wta-tma.org	503-906-7961	N
Wildwoods Boardwalk Special Improvement District, Management Corporation	www.dowildwood.com	wildwoodsb@dowildwood.com	609-523-1602	N

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