

# TASK 5: IMPLEMENTATION NEXT GENERATION ITS

Prepared for:



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# Section I:

## Introduction

# Introduction

Seattle's transportation system is evolving and growing. As part of that process, multiple major construction projects will be underway simultaneously in the Center City over the next several years. Seattle is also enjoying an upswing in private development projects as a result of a strong economy, increasing population density, and a more vibrant urban center.

These factors have the ability to create a more livable, sustainable and dynamic city in the long term. They can also place unprecedented pressure on the constrained transportation system, particularly while significant construction occurs in the Center City. The City identified the need to develop strategies to mitigate the cumulative impacts to the transportation system as a result of these factors. It is imperative that these strategies be implemented as soon as possible to avoid significant adverse impacts to the Center City from the major projects that will be in construction until 2020, which include the following:

- ▶ Alaskan Way Viaduct Replacement Program (including demolition of the existing viaduct)
- ▶ Elliott Bay Seawall Replacement
- ▶ Waterfront Seattle (reconstruction of Alaskan Way and waterfront improvements)
- ▶ Mercer West Corridor Project

## Access Seattle

Seattle established the Access Seattle initiative to maintain and improve accessibility into the Center City during construction and into the future. Access Seattle includes three main components:

- ▶ Capital improvement and major public and private development projects that will transform the Center City;
- ▶ Transportation system management, which includes enhanced construction coordination and deployment of the next generation of intelligent transportation systems (ITS) to optimize mobility; and
- ▶ Communications and marketing to inform the public about major projects in the Center City, and about changes to the Center City transportation system that will occur after construction is finished.

## Next Generation Center City ITS

Seattle Department of Transportation (SDOT) has been deploying intelligent devices for traffic management since 1998 and developed its first 5-year ITS strategic plan in 2003. This was followed by a 10-year ITS strategic plan published in March 2010. The ITS Strategic Plan 2010-2020 is a citywide plan focusing on maintaining and preserving existing ITS core infrastructure, utilizing it to its fullest capacity, and expanding it to provide additional geographic coverage.

"Next Generation Center City ITS" is a subset of projects and programs that are identified in the current ITS strategic plan that will increase SDOT's ability to manage mobility for all modes of transportation and freight in the Center City during a particularly heavy period of construction. The Seattle Department of Transportation

(SDOT) retained the Transpo Group to identify specific projects to be completed and develop an implementation plan for the improvements. Their scope included:

- ▶ Evaluation of major project construction schedules and impacts;
- ▶ Recommendations for transportation system improvements that will help mitigate construction impacts and improve Center City mobility;
- ▶ Evaluation of the functionality of the existing Traffic Management Center (TMC) and recommendations for expanding and enhancing the capabilities of the center;
- ▶ Recommendations for implementation of adaptive signal control systems in Seattle;
- ▶ An evaluation of parking management in the Center City and recommendations for improving curb space management; and
- ▶ Development of a plan to implement the recommended transportation system improvements so that they will provide benefit during the most demanding periods of construction.

## System Constraints

The existing Center City signal system is comprised of approximately 300 signals individually connected to the TMC with copper wire. The majority of the signals were installed in the mid-1980s. The current technology allows SDOT to change the signal timing based on the time of day.

Upgrading the downtown traffic management system with state of the art technology that adapts to traffic conditions would require upgrading the signals, controllers and the underlying communications network; installing a network of sensors to detect traffic; and upgrading the system software. It would be a long term capital intensive project that by itself would result in traffic impacts during implementation. This plan works within the constraints of the existing signal system to optimize mobility, rather than replacing and upgrading all signal-related infrastructure in downtown.

Another existing infrastructure constraint is the age and condition of the TMC video wall, where all camera images and maps are displayed. The operation of the TMC is dependent on a fully functioning video wall. The current wall and operating system are 10 years old and have reached obsolescence making it difficult or impossible to get replacement parts or service. Replacement of this wall is essential and is shown as the highest priority project in the implementation plan.

## Outcomes

When implemented, the Next Generation Center City ITS package as a whole will deliver the following:

- ▶ Sensing devices that will provide information to travelers on travel times;
- ▶ A responsive signal timing system that utilizes the data from real-time conditions and adjusts traffic signal cycle lengths accordingly;
- ▶ Dynamic signs that allow SDOT to modify lane assignments to improve traffic flow;
- ▶ Dynamic signs that will provide travelers with travel times on multiple routes at key locations to allow them to make informed decisions about how best to reach their destination;
- ▶ An expanded Traveler Information Map (TIM) that is also available in a smart phone “app” to provide a broad range of traveler information such as parking availability, construction impacts, transit information and travel times that can be customized for a traveler’s route;
- ▶ An expansion of e-Park into SODO and the Seattle Center Area and automated commercial vehicle load zone occupancy information to help travelers and freight vehicles find available parking and loading zones quickly; and
- ▶ Adaptive signal control on key corridors feeding into the Center City to better manage the flow on the corridor and onto the downtown street grid.

## Plan Contents and Organization

This plan lays out a package of ITS system improvements and new infrastructure and tools that can be implemented over the next three years to make the existing Center City transportation system as effective and efficient as possible through construction and beyond.

The following pages consist of:

- ▶ A visual glossary defining some of the Next Generation Center City ITS tools included in this plan;
- ▶ Project descriptions for each of the 26 projects on the deployment schedule. The descriptions include the purpose, the project components, and cost estimates for implementation as well as for ongoing maintenance and operations; and
- ▶ A deployment schedule designed to get critical projects implemented by the end of 2015, when construction impacts are expected to be the greatest.

# **Section 2:**

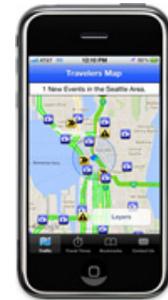
## **Visual Glossary**

# Visual Glossary



## Traffic Management Center (TMC)

The hub where the City's traffic control systems are monitored. The TMC allows the signal and ITS systems to be effectively managed by a team of traffic engineers.



## Travelers App

An application available for iPhone and iPads with similar content to the Travelers Information Map.



## Dynamic Message Signs

Signs give travelers information to make real-time travel decisions. Signs generally display incident information or projected travel times. They may also recommend alternative routes, limit travel speed, warn of duration and location of problems, or provide alerts or warnings.



## Traffic Cameras

Closed-circuit television cameras help detect congestion and accidents, and keep SDOT and the public constantly aware of traffic and road conditions. SDOT staff can use information from the cameras to make operational changes to signalized intersections.



### **Travelers Information Map**

Accessible to the public, this map shows up-to-date traffic information including levels of traffic congestion, travel times, large special events, and new incidents.



### **e-Park**

Dynamic signs guide motorists to participating Center City garages with available spaces. The signs tell how many spaces are available in each garage, and how to get there, which takes the guesswork out of parking and helps reduce congestion.



# **Section 3:**

## **Project Descriptions**

# 3. Project Descriptions

A total of 26 projects have been identified to implement the Next Generation ITS Plan. These projects will:

- ▶ Improve capacity and throughput
- ▶ Increase multi-modal safety and efficiency
- ▶ Improve traveler information and make it more accessible
- ▶ Adjust to dynamic environments

The projects fall into three general project types: projects that improve facilities, equipment and system capabilities within the Traffic Management Center (TMC); projects that improve the signal and ITS infrastructure on the Center City street grid; and projects that improve access to parking and parking management.

Project descriptions are included on the following pages for each individual project and the project names and numbers correspond to those on the deployment schedule. The projects are grouped into three categories:

- ▶ Deferred maintenance and operational deficiencies in the TMC
- ▶ Projects in the Center City that will improve SDOT's ability to maintain or improve capacity and throughput
- ▶ Projects that improve capacity and throughput on key corridors into the Center City

## TMC Deferred Maintenance and Operational Needs

### I. Video Wall Replacement

This project will purchase and install new video wall displays and a new video wall processor system to replace outdated equipment and provide compatibility with a wider range of ITS devices. It will also add flexibility in how content is displayed, and increase the number of sources that are supported. SDOT's existing video wall system is operating beyond its useful service life. Parts are obsolete and manufacturer's support for the current system is extremely limited. SDOT is at risk of losing the ability to view traffic video cameras for extended periods of time.

The project includes LED-based display cube technology with the capability of supporting 400 cameras with up to 40 simultaneous streams on the video wall at 50% system utilization.

#### Estimated Cost

Implementation Cost: \$350,000

Annual O&M Cost: \$60,000



## 2. Bluetooth Reader Pilot Project

This project will conduct a pilot program to test the accuracy and reliability of Bluetooth readers as a replacement for license plate readers (LPR) to obtain travel times. If the pilot is successful, SDOT will use lower-cost Bluetooth readers in place of LPR cameras.

### Estimated Cost

Implementation Cost: \$70,000

Annual O&M Cost: \$25,000

## 3. TMC Operational Enhancements

This project will increase operational efficiency by updating existing protocols and developing new protocols and agreements related to Traffic Management Center (TMC) operations, including:

- ▶ Develop an Incident Severity Index and response protocols that would trigger specific actions in the TMC, such as notifying partner agencies
- ▶ Integrate TMC operations with the Common Operating Picture being developed by the five major Seattle incident response agencies - SPU, SCL, SPD, SFD, and SDOT
- ▶ Develop a list of standardized pre-approved construction-related messages and a messaging priority index for dynamic message signs
- ▶ Develop five-year technical support requirements for Next Generation ITS projects
- ▶ Revise the agreement between SDOT and DoIT to include DoIT support after regular operating hours
- ▶ Develop a TMC operations log to facilitate field and back office equipment troubleshooting
- ▶ Develop an Inweb solution and protocol to include a construction event so that the TMC can provide the necessary support for messaging, mapping, etc.

### Estimated Cost

Implementation Cost: \$265,000

Annual O&M Cost: \$55,000

## 4. Add Traveler Information Data Sources

SDOT's Traveler Information Map (TIM) provides congestion information, travel times and incident and event information. This project will allow SDOT to incorporate travel information from outside agencies and data sources to provide parking, bicycle, transit and additional traffic data. This will allow TIM to evolve into a multi-modal travel information tool.

Enhancements may include:

- ▶ Providing real-time information related to transit alternatives
- ▶ Supplementing existing vehicle detector information with real-time data from outside sources to provide traffic flow information on additional corridors
- ▶ Providing bicycle count data on major bicycle facilities to highlight other travel options
- ▶ Integrating the e-Park data to TIM to provide information on parking availability

### Estimated Cost

Implementation Cost: \$50,000

Annual O&M Cost: \$17,000

## Center City Improvements

### 5. Center City Active Traffic Management

Sensors will be installed on major north-south corridors through the Central City to obtain travel times. The travel time information will be transmitted to new and existing dynamic message signs (DMS) to provide travelers with travel times on Alaskan Way, 1st, 2nd, 4th and 5th Avenues and key east/west feeders onto I-5. The information will also be available on the Traveler Information Map and the Access Seattle App. In addition to providing travel time, the traveler information will help distribute traffic volumes in the Center City.

Project components include 75 Bluetooth readers, eight DMS, and supporting communications system.

#### Estimated Cost

Implementation Cost: \$3,800,000

Annual O&M Cost: \$210,000

### 6. Center City Dynamic Signal Timing

Traffic flows are expected to change due to construction impacts from the major projects in the Center City. Dynamic signal timing responds to real-time traffic volume and travel time data to automatically change signal timing patterns. Travel times on primary corridors through the Center City will be improved, along with access to the freeway and transit speed and reliability. Additionally, dynamic lane management signs at selected locations will be installed to improve traffic by changing permitted lane usage at key locations depending on traffic volumes.

Project includes re-timing 300 signals, signal control software development, and upgrading signal equipment at 20 intersections.

#### Estimated Cost

Implementation Cost: \$1,350,000

Annual O&M Cost: \$44,000

### 7. Center City Traffic Camera Deployment

This project will install traffic cameras to increase coverage in the Center City to monitor congestion, detect and monitor incidents, and assess traffic management strategies. The traffic camera images will also be available for use by emergency responders. The primary corridors for additional video camera installation are Alaskan Way, 1st, 2nd, 4th, and 5th Avenues. Additional corridors may also be included.

The project includes 64 video cameras and supporting communications systems.

#### Estimated Project Cost

Implementation Cost: \$ 1,900,000

Annual O&M Cost: \$ 180,000

### 8. Railroad Crossing Information Signs

This project includes installation of blank-out signs at signalized intersections adjacent to major east-west railroad crossings at Broad St, S Atlantic St, S Holgate St, S Lander St, and S Spokane St. The signs will alert travelers to impending train crossings to reduce traffic queuing and provide notification to emergency responders about railroad crossing delays.

The project includes approximately 20 LED blank-out signs and the supporting communications system.

#### Estimated Cost

Implementation Cost: \$110,000

Annual O&M Cost: \$25,000

### 9. Colman Dock Ferry Arrival Information

This project will provide SDOT with the capability to obtain and use real-time capacity data from Washington State Ferries to automatically select and implement the most appropriate signal timing patterns on Marion Street upon ferry disembarkation to efficiently clear ferry traffic. Turn restrictions may also be triggered along the Marion Street corridor, and blank-out signs will inform drivers on Alaskan Way, Western Avenue and 1st and 2nd Avenues of ferry arrivals and the estimated duration of the delay.

#### Estimated Cost

Implementation Cost: \$ 80,000

Annual O&M Cost: \$ 17,000

## **10.Traveler Information Map (TIM) Enhancements**

The project will provide more robust real-time information to roadway users and improve the user interface by incorporating information from e-Park, dynamic message signs, enhanced travel time data, transit and possibly others through upgrades to TIM. Enhancing TIM will help users to avoid heavily congested areas and reduce time looking for parking in the downtown, the waterfront and Pioneer Square areas. The project would also transfer management and operations of the e-Park control system from an outside third party vendor to SDOT TMC operations. The integration would include the addition of an e-Park server and system management software to the TMC. The communication network of the on-street dynamic signs from Phase I & II will be converted from cell modems to SDOT's fiber network for communication.

### **Estimated Cost**

Implementation Cost: \$120,000

Annual O&M Cost: \$30,000

## **11. Integrating Portable Message Signs into the TMC**

This project integrates the portable dynamic message signs used for roadway construction projects with SDOT's communication and device management systems in the TMC. This will allow TMC staff to manage portable message signs with the same degree of flexibility as permanent signs. It will also result in a more efficient use of the portable message signs.

### **Estimated Cost**

Implementation Cost: \$25,000

Annual O&M Cost: \$12,000

## **12.Access Seattle Mobile Application**

This project will create a mobile phone application called Access Seattle that will consolidate comprehensive traveler information into one place for pedestrian, bike, transit and motor vehicle travelers and freight operators. It will include features such as the Travelers Information Map (TIM), construction impact information, real time transit information, what to expect in terms of detours (current and future) and road closures (current and future), and e-Park. This application will allow users to customize the information they receive. Additionally, the application could push information to users about routes they have selected so they will be automatically notified of construction impacts, incidents and impending roadway condition changes.

### **Estimated Cost**

Implementation Cost: \$350,000

Annual O&M Cost: \$35,000

## **13.TMC System Upgrades and Enhancements**

This project will expand and upgrade SDOT's current ITS management system to operate existing and new ITS devices installed as part of Next Generation ITS. Upgrades to the TMC operating systems will include automated system recovery features to reduce device or system downtime, and enhanced system performance reporting capabilities.

The project includes additional licenses, system configuration and device driver upgrades.

### **Estimated Cost**

Implementation Cost: \$57,000

Annual O&M Cost: \$27,000



## 14. Modernization of the Traffic Management Center (TMC)

This project consists of upgrades to the TMC space to improve operational functionality of the center. The project will optimize the current space allocated for the TMC and adhere to the following functional requirements:

- ▶ Maintain the core TMC components which include an equipment room, control room, and Emergency Operations Center;
- ▶ Allow for future growth;
- ▶ Maximize the available lines of sight to the video wall;
- ▶ Provide dedicated workstation consoles for TMC operators with individual access to the core ITS system platforms;
- ▶ Replace obsolete TMC components;
- ▶ Adhere to TMC design best practices;
- ▶ Maintain full TMC operations during construction; and
- ▶ Include a comprehensive cutover plan to include a phased migrate to the new facilities.

### Estimated Cost

Implementation Cost: \$1,175,000

Annual O&M Cost: \$90,000

## 15. Denny Way ITS

The Denny Way corridor between I-5 and Western Avenue carries a large percentage of general purpose traffic and freight from the north and distributes it onto major north-south corridors including I-5 and 1st, 2nd and 5th Avenues. Upgraded signals, vehicle detection, traffic cameras, dynamic message signs and fiber communication will be installed on Denny Way to improve traffic flow and provide enhanced traveler information. A system engineering evaluation will be completed to determine if adaptive signal control should be included as part of the project.

The project includes upgrading 14 signals, adding six traffic cameras, one dynamic message sign and expanding the communications system to accommodate the new equipment and signal systems.

### Estimated Cost

Implementation Cost: \$ 4,315,000

Annual O&M Cost: \$ 28,000

## 16. South Spokane Street ITS

Bluetooth readers and dynamic message signs will be installed on South Spokane Street from Airport Way to Terminals 5 and 18 to provide travel times. This is an important corridor for freight traffic. The project will provide travel options for trucks with destinations to points north of Seattle.

The project will include 20 Bluetooth readers and one dynamic message sign.

### Estimated Project Cost

Implementation Cost: \$ 665, 000

Annual O & M Cost: \$ 35,000

## 17. Spot ITS Improvements

This project will install dynamic message signs and Bluetooth or license plate readers and traffic cameras on major routes into the Center City to provide travel time and incident information at the following key locations:

- ▶ Elliott Avenue West at West Mercer Place in Interbay
- ▶ Delridge Way SW in West Seattle
- ▶ West Marginal Way S in South Park
- ▶ I-5 in Tukwila
- ▶ Airport Way South at South Lander Street in South Seattle

The project includes five dynamic message signs, 12 Bluetooth or license plate readers and 25 traffic cameras.

### Estimated Cost

Implementation Cost: \$ 2,800,000

Annual O & M Cost: \$ 80,000

## 18. e-Park Phase III Expansion and Integrate into TMC

This project expands Seattle's e-Park electronic parking guidance system to SODO and the Seattle Center, two of the Center City's most dynamic and event-dependent areas. The project includes getting agreements with garages in these areas to participate in e-Park, installing dynamic wayfinding signs and garage entrance signs that show real-time space availability, as well as installing static wayfinding signs. It also includes upgrades to the operating system to connect new projects in the program.

This project would also complete the scoping and design for a potential future effort to more fully integrate the various on-street city-owned and operated parking systems and related data such as: parking transaction and revenue data; parking occupancy data; parking pay station maintenance alerts, maintenance history and technician workload; on-street parking permitting; rate-setting and parking analytics; parking enforcement and license plate recognition; citation issuance and management; citation adjudication; and public information programs, smart phone applications and real-time on-street availability.

### Estimated Cost

Implementation Cost: \$4,625,000

Annual O&M Cost: \$256,000

## 19. Commercial Vehicle Load Zone Technology

SDOT has begun a two-year pilot project to use innovative technology and variable pricing strategies to maximize the efficient use of commercial vehicle loading zones (CVLZs) in downtown Seattle's public right-of-way. As part of the pilot, new detection technologies will be selected, installed and tested in a limited number of CVLZ locations. The Next Generation Center City ITS project will install the selected CVLZ detection technologies in additional locations beyond the pilot areas. It will also include development of a smart phone/internet application that will communicate availability of load zone space to delivery drivers and dispatchers where the detection technology is installed.

### Estimated Cost

Implementation Cost: \$750,000

Annual O&M Cost: \$75,000

## Connections to Center City

### 20. First Avenue South ITS

1st Ave S between S Spokane St and East Marginal Way is important for movement of freight and access to the stadium area. Traffic responsive operation will be extended on this segment of 1st Ave. This will involve upgrading signals and installing vehicle detection, fiber communication and traffic cameras.

The project includes upgrading five signals, adding three traffic cameras and supporting communication and vehicle detection systems.

### Estimated Cost

Implementation Cost: \$ 1,590,000

Annual O & M Cost: \$ 7,000

### 21. South Michigan Street ITS

Travel times will be measured and traffic cameras will be installed along S Michigan Street between East Marginal Way S and Carleton Avenue S to provide general purpose traffic and freight information about efficient options to travel between Georgetown, the stadiums, I-5, SR 509 and SR 99. Signals will be upgraded and vehicle detection and fiber communication will be installed to achieve these objectives.

The project includes two traffic cameras, eight Bluetooth and five signal upgrades.

### Estimated Cost

Implementation Cost: \$ 1,600,000

Annual O & M Cost: \$ 17,000

### 22. Nickerson/Westlake ITS

Install Bluetooth readers on the W Nickerson St/Westlake Ave N corridor that links Ballard's industrial area to South Lake Union and I-5. 10 Bluetooth readers will be installed on portions of 15th Ave W, W Nickerson St, Westlake Ave N, Mercer Street, and Fremont Avenue North to provide travel time information on the corridor.

### Estimated Cost

Implementation Cost: \$ 50,000

Annual O & M Cost: \$ 12,000



## 23. Data Warehousing

This project will implement data storage and warehousing capabilities that will operate in parallel with SDOT's data management system. The data warehousing system will enable SDOT to archive information for all modes of traffic, which will be useful for traffic evaluations, planning studies, parking studies, signal retiming initiatives, etc.

### Estimated Cost

Implementation Cost: \$80,000

Annual O&M Cost: \$17,000

## 24. Event “No Parking” Automation

This project will use dynamic “No Parking” signs to replace the use of temporary no-parking easels and guerilla post signs prior to major events in the stadium area. The signs would be blank until turned on, via the TMC, to convey an upcoming “No Parking” restriction prior to an event. The project includes scoping, technology identification and selection, system design, testing and implementation. The professional sports teams and event sponsors in the Pioneer Square neighborhood use temporary “No Parking” signs to communicate where parking in on-street spaces will be prohibited during an event. This is a labor intensive effort that is sometimes poorly coordinated and implemented resulting in inconsistencies and public confusion about parking availability.

### Estimated Cost

Implementation Cost: \$3,055,000

Annual O&M Cost: \$350,000

## 25. Network Bandwidth Evaluation

The Next Generation ITS substantially increases the number of devices that will be communicating with the TMC. Video cameras that support streaming video in particular require a lot of bandwidth. This project will review SDOT's network bandwidth capacities. This project will be conducted in collaboration with DoIT since the network bandwidth is shared between all departments at the City of Seattle.

### Estimated Cost

Implementation Cost: \$100,000

Annual O&M Cost: \$5,000

## 26. Parking Data Sharing Project

This project would promote the use of Seattle's on-street and off-street parking data to private vendors. Vendors could use the data to provide real-time and predictive information about parking availability and costs around their sites. Similar systems exist in cities including New York, Washington, DC, Austin, and Los Angeles. Vendors use the data to develop smartphone applications or to feed in-car navigation systems.

### Estimated Cost

Implementation Cost: \$ 45,000

Annual O&M Cost: \$5,000



# **Section 4:**

## **Deployment Schedule**

# Deployment Schedule

The individual project schedules and the overall plan implementation are designed to have many of the improvements in place and fully functioning by the end of 2015 when major downtown construction impacts will be the greatest. Many of the projects depend on completion of other projects or system upgrades in order to successfully be implemented, and the deployment schedule shown on the next page reflects these dependencies.

#	Project	Implementation Cost	O&M Cost per Year	2013		2014				2015				2016			
				Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<b>TMC Deferred Maintenance and Operational Needs</b>																	
1	Video Wall Upgrade	\$350,000	\$60,000														
2	Bluetooth Reader Pilot Project	\$70,000	\$25,000														
3	TMC Operational Enhancement	\$265,000	\$55,000														
4	Add Travelers Information Data Sources	\$50,000	\$17,000														
<b>Center City Improvements</b>																	
5	Center City Active Traffic Management	\$3,800,000	\$210,000														
6	Center City Dynamic Signal Timing	\$1,350,000	\$44,000														
7	Center City Traffic Camera Deployment	\$1,900,000	\$180,000														
8	Railroad Crossing Treatment	\$110,000	\$25,000														
9	Colman Dock Ferry Arrival Information	\$80,000	\$17,000														
10	Traveler Information Map Enhancements	\$120,000	\$30,000														
11	Integrating Portable Message Signs into the TMC	\$25,000	\$12,000														
12	Access Seattle Mobile Application	\$350,000	\$35,000														
13	TMC System Upgrades and Enhancements	\$57,000	\$27,000														
14	Modernization of Traffic Management Center (TMC)	\$1,175,000	\$90,000														
15	Denny Way ITS	\$4,315,000	\$28,000														
16	South Spokane Street ITS	\$665,000	\$35,000														
17	SPOT ITS Improvements	\$2,800,000	\$80,000														
18	e-Park III and Integration to TMC	\$4,625,000	\$256,000														
19	Commercial Vehicle Load Zone Technology	\$750,000	\$75,000														
<b>Connections to Center City</b>																	
20	1st Ave S ITS	\$1,590,000	\$7,000														
21	South Michigan Street ITS	\$1,600,000	\$17,000														
22	Nickerson/Westlake ITS	\$50,000	\$12,000														
23	Data Warehousing	\$80,000	\$17,000														
24	Event "No Parking" Automation	\$3,055,000	\$350,000														
25	Network Bandwidth Improvement Plan	\$100,000	\$5,000														
26	Parking Data Sharing Project	\$45,000	\$5,000														
<b>Grand Total</b>		<b>\$29,377,000</b>	<b>\$1,714,000</b>														