Project Goal:

Improve congestion and mobility by implementation of reporting and data collection software packages.

Project Outcome

Improve congestion and mobility by implementation of reporting and data collection software packages:

- **Installation of Adaptive Signal System Software**
- **Reporting for Transit Signal Priority**
- **Street Sync Backup**
- **VDG Sense Video Management System**

Working to Refine IntelliGent Highway Transportation (WRIGHT)

NE 20th Avenue- NW 2nd Avenue

Clark County

Project Information

Federal Funding Program:
Congestion Mitigation and Air Quality Improvement (CMAQ) Program

RTC Awarded Funding: **$480,000**

Total Project Cost: **$560,000**

Project Type: **TSMO**

Project Length: **1.0 miles**

Function Classification: **Minor Arterial**

Daily Traffic Volume: **20,000 ADT**

Project Description

Traffic signal system upgrades, adding: Adaptive Signal System, Reporting for Transit Signal Priority (TSP), Street Sync Backup and Video Sharing between three agencies (Clark County, City of Vancouver and Washington State Department of Transportation). This project upgraded computer software and hardware and will extend the functionality of county traffic signals by addressing more efficient movement of vehicle and bus traffic, allow for Clark County and C-Tran to optimize transit operations, quicker maintenance and backup protection for signal controllers, and simplifying multi-agency video sharing across incompatible platforms for better traffic management throughout the region.

Project Funding

Phase	Year	Federal Funds	County	WSDOT	City of Vancouver	Total
PE	2016	$480,000	$19,000	$9,000	$52,000	$560,000
ROW		$0	$0	$0	$0	$0
CN		$0	$0	$0	$0	$0
Total		$480,000	$19,000	$9,000	$52,000	$560,000

Traffic system improvements provided several congestion benefits for the region:

- **Task 1 - Installing the Adaptive Signal System software on NE 139th Street replaced clock-based time of day signal operation, and moves traffic more efficiently along the main arterial, and reducing the delay at side streets, which are often under-served by clock-based signals.**

- **Task 2 - Existing software in the county's traffic control center was upgraded to analyze C-Tran's implementation of Transit Signal Priority in the Highway 99 corridor, allowing the county to detect, track and report C-Tran buses, allowing the county and C-Tran to optimize the transit operations on NE Highway 99.**

- **Task 3 - Installation of Street Sync software reduces maintenance and repair time by automating backup of highly complex traffic signal controllers not yet added to the county's Ethernet communications network. This Street Sync Module and software allows signal technicians and engineers to make field changes in the controller, upload controller programming to a laptop, then sync those changes to a central traffic system.**

- **Task 4 - Video Sharing: Installation of servers and configuration of software, allowing at least one (of 3) agencies to view cameras of one other agency.**

Task 1 – Adaptive Signal System Software

Objective: Installation and configuration of Adaptive Traffic Control Technology

Overview:

Clark County uses Adaptive Traffic Control Technology to improve the performance of traffic corridors across the county. Adaptive traffic control improves movement of traffic by selecting a cycle length for the corridor and managing local timing values at each local intersection, which helps reduce wait times for lightly traveled movements and provides more efficient and safer movement between the intersections. Clark County's choice for adaptive signal programming provided by Cubic Corp. is called "SynchroGreen".

- Each year more signalized intersections are added to the SynchroGreen system, enabling traffic signal systems to make micro-adjustments to their local timings throughout the day. The net effects include better accommodation to changing traffic patterns with very little involvement by the Traffic Engineers.
- The WRIGHT project installed SynchroGreen at seven signalized intersections along the 139th Street Corridor from NW 2nd Avenue to NE 20th Avenue.

How it works:

Adaptive signals operate completely differently than the Time-Of-Day (TOD) operation. In adaptive operations, one signal is the master, and that signal determines what the current cycle length needs to be for the congestion at that corridor. Each other signal in the system of adaptive signals then varies the timing parameters (offset, splits, and cycle length) based on moving traffic needs for the overall corridor. It is quite possible that the signals will operate very similarly to TOD during the peak hours, but adaptive would be operated at the signals during the other 20+ hours of the day. During the Covid-19 Pandemic, the traffic signals that were running adaptive signal operations adjusted their signal operations automatically to reflect the almost 50% reduction in traffic volumes due to the stay-at-home orders.

Outcomes:

The adaptive control system is in active state, dated 1/19/2022, as shown in Figure 1 below. The county expects to see benefits from installation of the adaptive system in the future. Adaptive signals on the 139th Corridor are installed, configured and active on the SynchroGreen Controller list as shown in yellow highlight.

SynchroGreen Controller List View

ID	Name	Status
3011	CCPW - NW 2nd Av at NW 139th St	Active
3016	CCPW - NE 3rd Ct at NE 139th St	Active
3100	CCPW - NE Tenney Rd at NE 139th St	Active
3105	CCPW - NE 10th Ave at NE 139th St	Active
3110	WSDOT - NE 139th St at I-5 SB Onramp	Active
3115	WSDOT - NE 139th St at I-5 NB Offramp	Active
3120	CCPW - NE 20th Ave at NE 139th St	Active
3326	CCPW -NW 9th Av at NW 78th St	
3330	CCPW - NE Hazel Dell Ave at NE 78th St	Active
3335	CCPW - NE 5th Ave at NE 78th St	Active

Fig. 1 – Active SynchroGreen Controller List

Task 2 – Cubic Corp. TSP Reporting

Objective: Successfully report TSP activation by buses traveling the corridor

Overview:

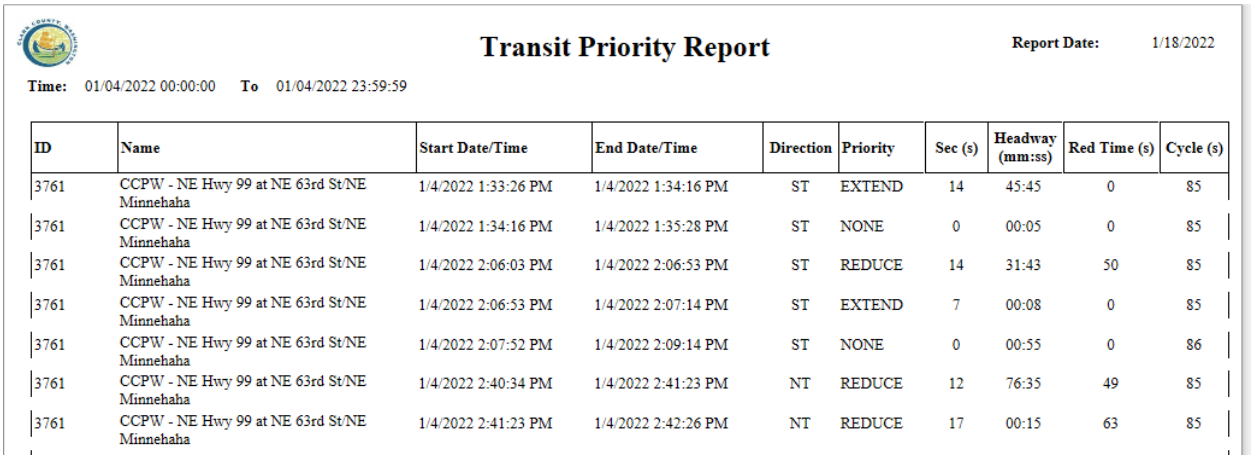
Clark County uses a central traffic system provided by Cubic Corp. called "ATMS.now". One of the capabilities provided by ATMS.now is high-resolution data collection from each traffic signal controller connected to it. The controller updates the high-resolution data ten times per second. For this task, we asked Cubic to provide a report showing activations from buses traveling a TSP enabled corridor. The report draws from any ATMS.now location using date / time stamps to frame the desired data.

How it works:

Each category of high-resolution data collected has a unique number called an enumeration that represents a specific event in the controller's operation. There are four unique TSP inputs for each controller. Buses traveling along the corridor are equipped with a radio transceiver that communicates with the base unit installed at each traffic signal. An interface card, model 764 made by GTT, decodes the radio signal to determine when a valid priority request signal is being received. When the vehicle transmitting the signal is within a preset range of the intersection or its speed calculates to a specific ETA, the GTT card sends a signal to the signal controller on one of the four TSP inputs. The signal controller uses two timing values to determine how long it has before the bus arrives and the phase to show green for the bus so it can continue through the intersection. The TSP input goes false again as the bus enters the intersection and the intersection resumes normal operation once more.

Outcomes:

The objective of this task is to generate reports that show when buses begin TSP calls and concisely describe how the controller adjusted its operation to accommodate the transit vehicle movement. Using ATMS.now, we can see which cycle the controller was running and the method it used to reach the TSP green. Based on conditions during the priority request the controller can reduce or extend the cycle length or do nothing if the vehicle will arrive during the TSP green without making any changes. This information is provided in a single line entry for each TSP activation.



Transit Priority Report

Report Date: 1/18/2022

Time: 01/04/2022 00:00:00 **To** 01/04/2022 23:59:59

ID	Name	Start Date/Time	End Date/Time	Direction	Priority	Sec (s)	Headway (mm:ss)	Red Time (s)	Cycle (s)
3761	CCPW - NE Hwy 99 at NE 63rd St/NE Minnehaha	1/4/2022 1:33:26 PM	1/4/2022 1:34:16 PM	ST	EXTEND	14	45:45	0	85
3761	CCPW - NE Hwy 99 at NE 63rd St/NE Minnehaha	1/4/2022 1:34:16 PM	1/4/2022 1:35:28 PM	ST	NONE	0	00:05	0	85
3761	CCPW - NE Hwy 99 at NE 63rd St/NE Minnehaha	1/4/2022 2:06:03 PM	1/4/2022 2:06:53 PM	ST	REDUCE	14	31:43	50	85
3761	CCPW - NE Hwy 99 at NE 63rd St/NE Minnehaha	1/4/2022 2:06:53 PM	1/4/2022 2:07:14 PM	ST	EXTEND	7	00:08	0	85
3761	CCPW - NE Hwy 99 at NE 63rd St/NE Minnehaha	1/4/2022 2:07:52 PM	1/4/2022 2:09:14 PM	ST	NONE	0	00:55	0	86
3761	CCPW - NE Hwy 99 at NE 63rd St/NE Minnehaha	1/4/2022 2:40:34 PM	1/4/2022 2:41:23 PM	NT	REDUCE	12	76:35	49	85
3761	CCPW - NE Hwy 99 at NE 63rd St/NE Minnehaha	1/4/2022 2:41:23 PM	1/4/2022 2:42:26 PM	NT	REDUCE	17	00:15	63	85

Fig. 2 – ATMS.now Transit Priority Report

Task 3 – Cubic Corp. Street Sync Backup

Objective: Demonstrate ability to perform data transfer between field laptops, field signal controllers and central traffic system.

Overview:

Clark County uses a central traffic system provided by Cubic Corp. called “ATMS.now”. This server-based software is used to maintain timing data for all signals connected to the physical network using fiber optics, radios, cellular radios, and cable modems. Unfortunately, there are still several traffic signals that are isolated from the network. Timing databases in these controllers must be manually entered and maintained. This introduces a huge opportunity for errors in the timing data to be introduced.

Cubic has produced a stand-alone software product called “Street Sync” that enables traffic signal timing to be synchronized with a laptop that can then be taken to the location of an isolated (off network) controller.

How it works:

Before Street Sync can be used it must be synchronized with ATMS.now. During this process copies of all ATMS.now timing databases are added to the laptop. The laptop is then taken to the field and the timing data can be sent to and received from the local controller through one of the serial ports, typically SP1 or SP4. If the controller already has timing entered, it can be uploaded to the laptop and then compared with ATMS.now version supplied during synchronization. Finally, if timing changes are made locally, they can be saved in the laptop and then transported back to ATMS.now during the next synchronization event.

Outcomes:

All these functions have been used, resulting in significantly greater labor efficiency, data integrity, and overall database reliability. ATMS.now coupled with Street Sync now can manage 100% of the controller databases running all versions of Cubic / Trafficware software.

Task 4 – VDG Sense Video Management System

Objective: Share video sources among software partners

Overview:

Clark County uses VDG Sense as its video management system (VMS) software. It provides management of video cameras used throughout the County traffic operations system. There are currently 135 cameras that can be selected and viewed. More cameras are added to the system each year. VDG provides a variety of ways to view single cameras as well as collections of cameras along the various corridors. Likewise, our partners in this project include Washington State DOT and the City of Vancouver that use VDG Sense to manage their cameras. This task intends to enable each agency to allow other partners to view and in some cases control cameras used by the partners.

How it works:

VDG Sense uses a user / device manager interface to provide secure access to various groups of cameras and determine how much control a user can exercise over them. If a user is permitted by user rights to access other agency's cameras, they will be able to call up and view those they have been granted permissions to see images and possibly control camera positioning. Interagency control is provided by a DMZ server that acts as a go-between for the various agencies requesting access to Clark County cameras. Users will see only the cameras they have been granted permissions to view.

Outcomes:

We will continue to work with VDG Sense manufacturer to bring the interagency sharing online. We have experienced several technological setbacks over the life of this project and the vendor is making good efforts to provide the working system as it was specified. We will have more to report by March 2022 after the vendor has completed programming and testing on version 2.6.11 (current installed version is 2.6.7).

By Mark Rodgers
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