IL ROUTE 13 ITS STUDY

Final Report

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SIMPO
SOUTHERN ILLINOIS
Metropolitan Planning Organization

HLR

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INTRODUCTION

The Southern Illinois Metropolitan Planning Organization (SIMPO), along with the Illinois Department of Transportation (IDOT), would like to investigate the options and feasibility of installing components of an intelligent transportation system (ITS) along the IL Route 13 corridor from Murphysboro to Marion in southern Illinois. SIMPO hired Hampton, Lenzini, and Renwick, Inc. (HLR) to inventory the existing traffic signals along this route, assess the system's readiness for ITS, describe the available options and costs, and recommend actions implement ITS along IL Route 13. In addition, HLR was asked to evaluate the existing railroad interconnect at the Canadian National Railway (CN) crossings of IL Route 13 in Carbondale and to make recommendations for the non-interconnected Union Pacific Railroad (UP) crossing at IL Route 13 in Marion.

This report summarizes and documents the existing traffic signal equipment, required upgrades, and various options to implement ITS along the IL Route 13 corridor. The report also describes the difference between an Automated Traffic Signal Performance Measures (ATSPM) system and a central traffic signal control system. Finally, the report provides recommendations of software and equipment and the associated estimated costs.

EXISTING SIGNAL INVENTORY

The project scope for this study covers 43 intersections along IL Route 13. HLR collected a detailed signal inventory of each intersection on September 27 and 28, 2017. HLR loaded the inventory data and photos into a GIS web application and submitted them to SIMPO on November 15, 2017. The detailed inventory can be seen at the link below or in table format in Appendix A of this report

http://lamac.maps.arcgis.com/apps/webappviewer/index.html?id=92c4512152c5417aba8e75327bd566f1

Summarizing the existing traffic signal inventory, all the traffic signal controllers are manufactured by Siemens (Eagle) and range from models M10 to M52. Most of the vehicle detectors along the corridor are inductive loops. One intersection uses microwave detection. The existing communications and interconnect vary between radio and serial connections. There are six master controllers located throughout the project limits with phone lines and modems for remote communication. Two standalone intersections also have phone lines and modems but without master controllers or any interconnect. Three of the study intersections are on a system with a master controller that is outside the study limits. There were at least 15 intersections with poor or no communication/interconnect.

AUTOMATED TRAFFIC SIGNAL PERFORMANCE MEASURES

Description

ATSPM is an innovative approach to managing traffic signal systems. It uses hi-resolution data recorded at one-tenth second intervals that is stored in the signal controller. This data is retrieved from the controller using software and converted to useful information. Information can include vehicle volumes and speeds, corridor travel times, detector actuations, signal phase terminations, and more. This lets the user know how the signal system is operating more quickly and more accurately than field observations. This information enables the user to make quick changes or repairs to ensure their system is performing at its optimal level.

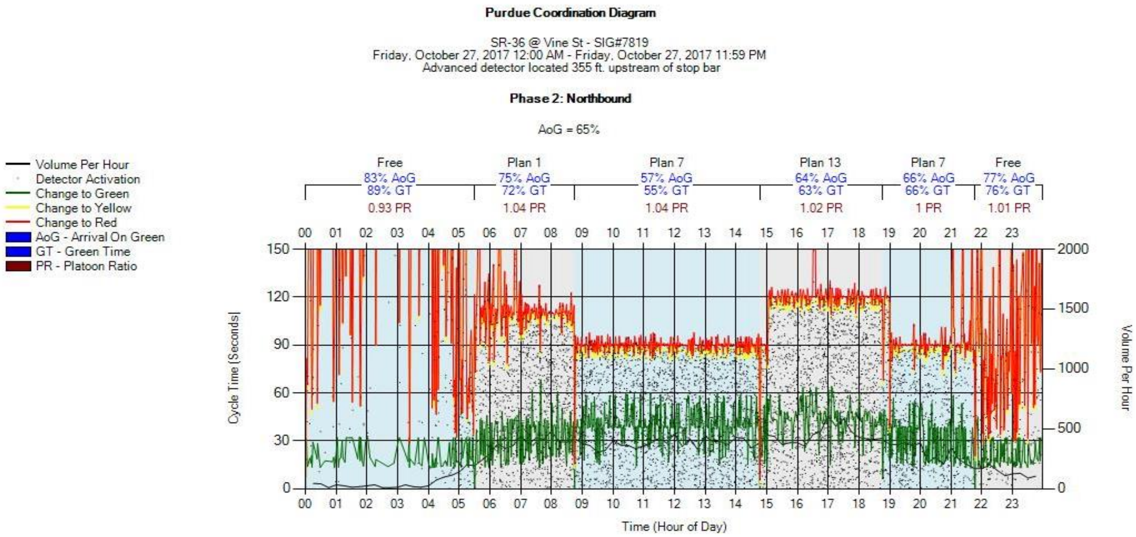
The main benefit to an ATSPM system is that the user knows exactly what is happening at exactly what times at all signals along a corridor. This allows agencies to proactively identify and correct issues. This can reduce or even eliminate citizen complaints because problems are found before the public even notices. The system can quickly provide data that shows malfunctioning detectors or pedestrian push buttons. Charts can easily show how a platoon is proceeding down a corridor and how to adjust the timings to optimize the flow. Data can show what phases may be getting too much green time that could be moved to other phases that may need more.

ATSPM systems do not show live intersection statuses nor can they be used to make changes to the signal controller database. They simply display historical data in a useful manner. Whatever changes come from examining the data would need to be entered via a separate remote system or by manually entering them at the controller in the field.

Performance Measures

The following section lists and describes the performance measures associated with ATSPM. All example images are from the Utah Department of Transportation (UDOT) ATSPM website.

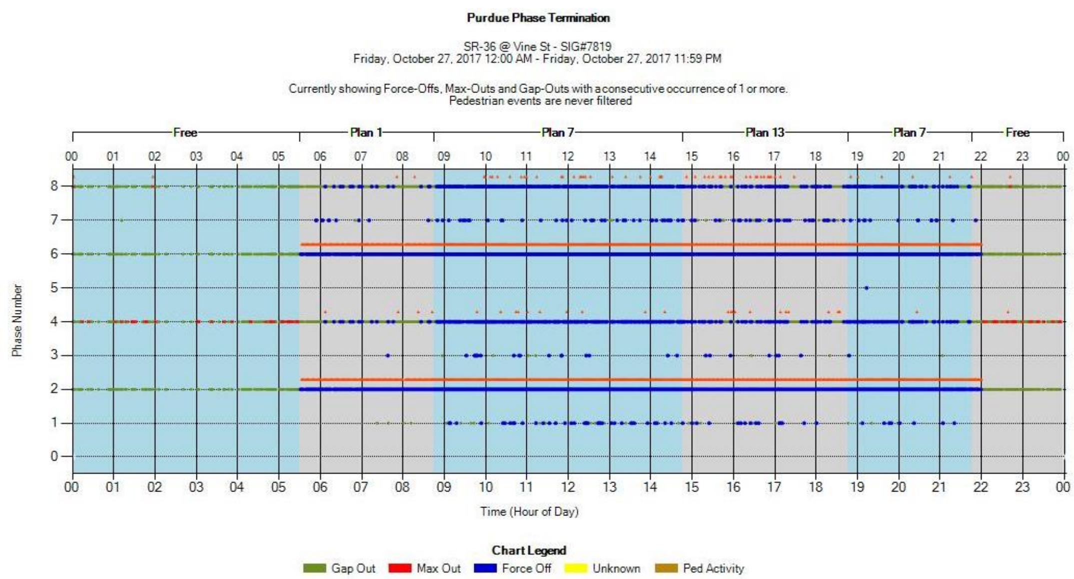
Purdue Coordination Diagram – A diagram that shows vehicle arrivals at an intersection relative to the stage of the cycle. The example on the next page shows when in the cycle the green, yellow, and red intervals display. Each dot is a vehicle arriving at the intersection. This is a quick way to evaluate the coordination along a corridor. The graphic also shows the percent arrival on green and platoon ratio to assist in adjusting timings.



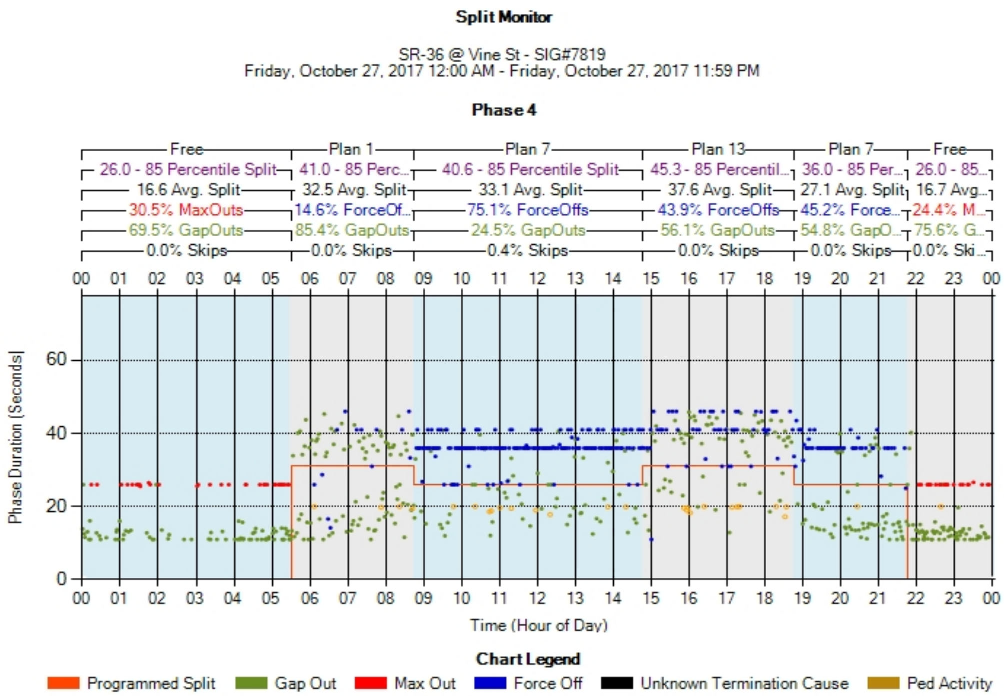
Approach Volume – The approach volume measure simply uses advanced detection to show the number of vehicles using an approach over time.

Approach Speed – If the intersection has radar advanced detection, this measure shows the approach speed of each vehicle.

Purdue Phase Termination – A diagram that illustrates the time and reason a phase terminates each cycle. This measure can be very useful in diagnosing a malfunctioning detector.



Split Monitor – Diagram (shown on the next page) that shows the actual phase length and reason for termination each cycle throughout a given time period. This is like the phase termination diagram, but with the time length of each phase included.

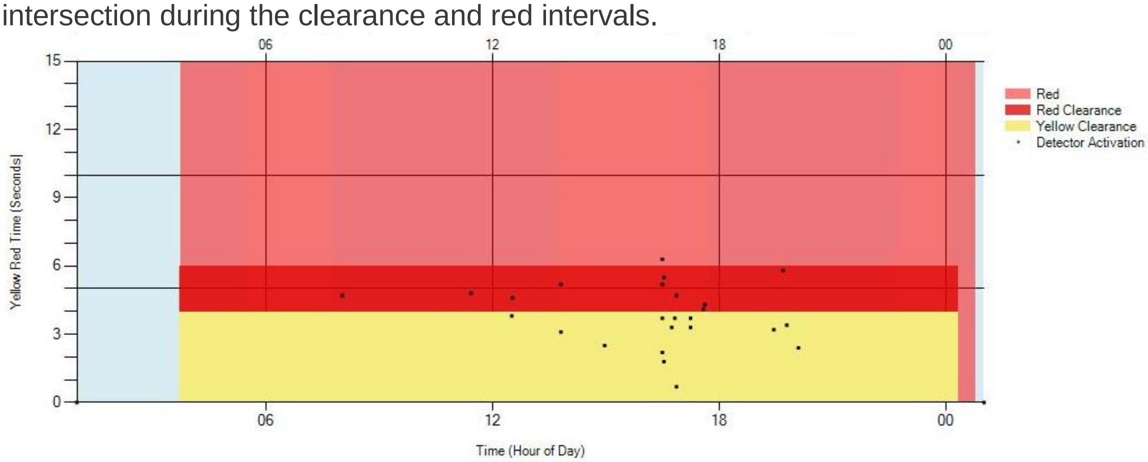


Turning Movement Counts – If each lane has separate stop bar detection this measure can give counts of vehicles using each movement.

Approach Delay – Uses advanced detection to mark the time a vehicle arrives during a red interval and when the phase turns green. This time length is the calculated delay per vehicle.

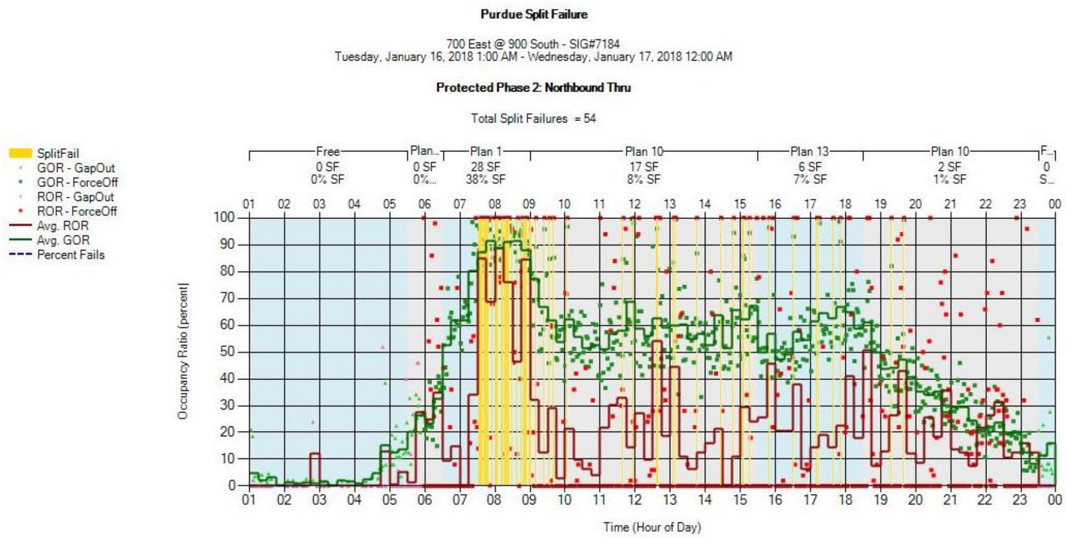
Arrivals on Red – Uses advanced detection to count the number of vehicles arriving at the intersection during a red interval.

Red Light Violations – Uses stop bar detection to display the number of vehicles that entered the intersection during the clearance and red intervals.



Preemption – Uses controller data to display time and duration of preemption calls.

Purdue Split Failure – Shows the number of times and percentage of time that a coordinated split fails. A split failure is defined as a split which terminates by force off while vehicle demand is still present. This data is useful in developing optimized timing plans.



Pedestrian Delay – Records the time between a pedestrian push button activation and the walk display.

Required Equipment

Three things are needed in the field for an effective ATSPM system: signal controllers, detection, and communication. The controller must have hi-resolution data logging capabilities. Currently, the following controllers are compatible with ATSPM systems:

- Econolite Cobalt – any version
- Econolite ASC3 – v2.50+ & OS 1.14.03+
- Econolite 2070 – v32.50+
- Intelight MaxTime – v1.7.0+
- Peek ATC – v03.05.0528+
- Trafficware 980 ATC – v76.10+
- Siemens M50 Linux – v3.52/4.53+
- Siemens M60 ATC – v3.52/4.53+

Currently none of the existing traffic signal controllers along IL Route 13 within the project limits are compatible with ATSPM. While there are 18 Siemens M50 or M52 controllers, they are not the Linux versions. All controllers will need to be replaced with compatible controllers.

The existing vehicle detection is adequate for an effective ATSPM system. All intersections have stop bar detection for left-turns and side streets and far back (advanced) detection for IL Route 13 approaches. Many of the intersections also have stop bar detection for IL Route 13, though they are generally tied together across all lanes. Table 1 on the following page shows which performance measures can be obtained given the detection present.

Table 1: Performance Measure by Detection Location

Performance Measure	No Detection	Advanced	Stop Bar (lane by lane)
Purdue Coordination Diagram		X	
Approach Volume		X	
Approach Speed		X[1]	
Purdue Phase Termination	X		
Split Monitor	X		
Turning Movement Counts			X[2]
Approach Delay		X	
Arrivals on Red		X	
Red Light Violations			X
Preemption	X		
Purdue Split Failure			X
Pedestrian Delay	X		

1. Only with advanced detection by radar
2. Detectors must be separated by lane. IL Route 13 detectors are not separated.

Good communication to the signal controller is recommended for an ATSPM system. All the high-resolution data is stored in the signal controller and needs to be pulled out and input into the software to be analyzed. The most convenient way to do this is through some form of remote access. However, the existing communication infrastructure will not work for ATSPM. The software needs to access the controller through an IP address via ethernet protocol. The current communication with the signals is a serial connection over phone line, radio, and copper. To utilize ATSPM an IP network would have to be established using network switches in each cabinet and either fiber or cell modem connection back to the central office.

Alternatively, ATSPM can be used without any remote communications. The hi-resolution data can be pulled directly from the controller front panel. An engineer or technician would have to visit each cabinet to retrieve the data. This can be performed on a scheduled interval that works for IDOT. The more often the data is retrieved, the more effective the system is.

Along with the three field components, a server will be needed at the District management center to host the software and store all the high-resolution data.

ATSPM Software

There are several software packages available to collect and display ATSPM. The most widely used is the software created by UDOT. UDOT was involved in the creation of ATSPM, and as part of that process they created their own software package to analyze and display data pulled from the signal controllers. UDOT provides the source code for their software for free which can be downloaded from a link on their ATSPM website. There are also detailed instructions for installing and programming the system. This software is housed on a server and utilizes a web browser interface to access the data. This web data is available to the public for anyone to see. The software also has the capability for email reports to be triggered and sent to staff and maintainers to alert of developing issues with their intersections.

There are other software options that can be used to collect and display ATSPM data. These options typically involve a setup and maintenance cost. There are also ways to collect and display ATSPM data using software packages involved in central system control. These software packages will be described in more detail later in this report.

Estimated Costs

After a review of the existing traffic signal inventory, HLR developed the following estimated costs for implementing an ATSPM system. The estimated costs for controllers and communications can be scaled down if it is desired to implement the whole corridor in phases, rather than all at once. The first cost estimate, shown in Table 2, assumes the installation of cell modems at each master location and ethernet radio interconnect between local controllers. This setup would provide adequate connectivity to provide efficient ATSPM operations. The second cost estimate, shown in Table 3, assumes fiber optic communications is desired. The third estimate in this section, shown in Table 4, applies if ATSPM data is to be pulled directly from the controller with no remote communication.

Table 2: ATSPM Cost Estimate (Cell Modem and Radio)

Pay Item	Quantity	Unit Cost	Total
Controller	43	$3,000	$129,000
Ethernet Radio	43	$3,500	$150,500
Ethernet Switch	43	$4,000	$172,000
Cell Modem	9	$1,500	$13,500
Server	1	$15,000	$15,000
Setup/Programming	43	$1,000	$43,000
Network Configuration	1	$10,000	$10,000
Software	1	$0	$0
		Sub-Total	$533,000
		Design & Construction Engineering	$45,000
		Total	$578,000

Table 3: ATSPM Cost Estimate (Fiber)

Pay Item	Quantity	Unit Cost	Total
Controller	43	$3,000	$129,000
Fiber-Optic Cable	145,000 LF	$3	$435,000
Conduit	125,000 LF	$10	$1,250,000
Handhole	200	$1,000	$200,000
Ethernet Switch	43	$4,000	$172,000
Server	1	$15,000	$15,000
Setup/Programming	43	$1,000	$43,000
Network Configuration	1	$10,000	$10,000
Software	1	$0	$0
		Sub-Total	$2,254,000
		Design & Construction Engineering	$100,000
		Total	$2,354,000

Table 4: ATSPM Cost Estimate (No Remote Communication)

Pay Item	Quantity	Unit Cost	Total
Controller	43	$3,000	$129,000
Server	1	$15,000	$15,000
Setup/Programming	43	$1,000	$43,000
Software	1	$0	$0
		Sub-Total	$187,000
		Design & Construction Engineering	$10,000
		Total	$197,000

CENTRAL CONTROL SYSTEM

Description

Central control, often referred to as Advanced Transportation Management Systems (ATMS), is a method of monitoring and controlling an agency's traffic signal controllers from a central location. Central control systems provide the agency with the ability to remotely monitor controller databases for unauthorized changes and investigate problems with the operation of detectors and controllers. Newer central control products have expanded the monitoring capabilities to include just about every component that might be in a signal cabinet, such as the Malfunction Monitoring

Unit (MMU) and Uninterruptible Power Supply (UPS). They also make it easier to set up video monitoring, either through video detection or through additional cameras.

In the past, central control was done using a phone line to communicate with a master controller in the field. The master controller then communicated with a set of local controllers on a closed-loop system. These systems are effective at monitoring a system and making changes but are slow and limited. The computer can only communicate with one controller at a time and at dial-up modem speeds, and the only components that can be checked are the controllers and detectors. The recent trend has been for agencies to move towards a modern central control system.

Modern central control systems typically use a software package hosted on a server that utilizes high speed communication to monitor and control multiple intersections on the system. This central software acts like a master controller, issuing timing plan commands and setting clocks and thus eliminating the need for physical master controllers in the field. The software's most basic functions are the same as the older dial-up systems but are much faster and more efficient. They are delivered in a more user-friendly environment that typically includes a map of the system with controllers immediately explorable from the map. These systems are also much more flexible, with many options to add features that make them more useful and powerful tools to completely control an agency's traffic signal network.

Unlike ATSPM, central control does not include high-resolution data analysis as part of its core features. These systems are more for live monitoring and remote changes to the controllers. However, some of the available central control products have optional modules that enable the high-resolution data to be analyzed and formatted for an additional cost.

Required Equipment

The key components for a central control system are the communication, controllers, and software/hardware. High-speed and robust communication is a must for effective central control. These are typically accomplished using fiberoptic cable or long-range high-speed radios. The current communication infrastructure along IL Route 13 is not suitable for implementation of central control. There is a mix of serial interconnect and short-range radios. These would all need to be replaced with either fiberoptic interconnect, long-range radios, or a mix of both. The fiber needs to run back to the central control location or long-range antennas need to be installed on a telecommunications tower at the central control location. In addition, each intersection will require a network switch.

The second component is compatible signal controllers. The signal controllers must be of compatible model and firmware version to successfully communicate with a central control system. Each software has its own requirements for controller compatibility, but in general the software can communicate with any controller make if it meets the National Transportation Communications for ITS Protocol (NTCIP) standards. NTCIP is a set of standards created to allow for interchangeability among traffic control equipment from different manufacturers. Some proprietary controller features may be lost when running NTCIP. Full controller functionality is available when the software and signal controller manufacturer are the same, but when running NTCIP on a different vendor's software, only basic controller features are typically available. The level of controller functionality varies depending on central software and signal controller brands.

Currently there are no controllers along IL Route 13 running NTCIP. The 18 Siemens M50/M52 controllers can be upgraded to NTCIP by installing a revised controller firmware. If the central software by Siemens is used, these controllers would not require an upgrade to NTCIP. The remaining 25 controllers would need to be replaced if a software brand other than Siemens is used. If Siemens TACTICS is used, no controller upgrades will be required at the time of implementation, but upgrades should be considered over time given the age of some of the inventory.

The last component of the central system is the software & hardware needed at the management center. A server that has the central software and license will need to be installed at the desired traffic management location. There are multiple software options that are discussed in the next section of this report.

Central Software Options

There are several vendors of central control software to choose from. Most of them are made by companies who also manufacture their own signal controllers, but there are also third-party options available. The following is a list of some of the central software systems currently used in Illinois. Brochures and data sheets for each software package are included in the appendix of this report.

- Econolite Centracs
- Siemens TACTICS
- Intelight MAXVIEW

Each of these systems' basic features include traffic signal database control and monitoring, status displays, reports, scheduling, and a graphical user interface. They are housed on a Microsoft Windows server and give owners control over access for viewing and editing data. All these systems can work with NTCIP compliant signal controllers with appropriate firmware versions. Centracs and TACTICS are Windows applications while MaxView is a web-based interface. A brief description of the unique features of each system follows.

Econolite Centracs

This is the most widely used central software in Illinois. Each user can create their own dashboard with their desired windows to make the program as powerful as possible for that operator. The interactive map is a convenient way to quickly manage and monitor many intersections. The map can either come from an agency's GIS database or a commercial source such as Bing Maps. Beyond the basic functions listed earlier, Centracs offers additional modules that can be added to the software for extra costs. These modules include:

- **Adaptive –** Uses algorithms to adjust splits and offsets of intersections based on existing traffic demand to optimize flow through a system.
- **ATSPM –** Uses high-resolution data stored in the controller to display unique metrics for understanding the existing operations of the traffic signal system.
- **Closed Circuit Television –** Provides management of digital video collected by various devices in the system.
- **Data Collection Management System –** Uses the existing detection systems to collect and store traffic data.
- **Dynamic Message Sign –** Allows for control of dynamic message signs.
- **Maintenance Management System –** GIS-based asset management and maintenance system.
- **Server-to-server** – Communicates with adjacent Centracs systems to allow for cooperative operations and management.
- **Travel Time –** Uses various devices to analyze and display corridor travel times.

Siemens TACTICS

TACTICS utilizes a navigation dashboard that shows the system status at a glance. It has an integrated intersection detailed status that allows the user to follow operations easily and know exactly what the controller is doing at all times. Beyond the basic functions listed earlier in the report, TACTICS offers additional options that can be added to the software for additional costs. These options include:

- **Dynamic Message Sign –** Allows for control of dynamic message signs.
- **Closed Circuit Television –** Provides management of digital video collected by various devices in the system.
- **Quick Response –** Allows the user to program "triggers" that will automatically detect events and enable automatic responses.
- **Center-to-center** – Communicates with adjacent TACTICS systems to allow for cooperative operations and management.

Intelight MAXVIEW

What makes MAXVIEW most unique is that it is a web-based application. Users can access their data anywhere with an internet connection. MAXVIEW uses a dashboard to display an interactive system map, device list, and other customizable layouts. Some unique features include expanded status displays and event monitoring, Outlook style time-of-day scheduler, drag & drop scheduling, and the ability to embed hotlinks and shortcuts into the intersection displays. There is also an additional module that integrates connected vehicles into the MAXVIEW software. Later this year, MAXVIEW will implement ATSPM in the software.

Estimated Costs

The costs of implementing a central control system can vary depending on the software package, added options, and type of communications installed. The estimates shown below are a rough estimate based on the existing signal inventory. The first cost estimate, Table 5, assumes a fiberoptic interconnect, which typically provides the best results in terms of speed and reliability. The second estimate, Table 6, assumes fiberoptic interconnect between controllers with long-range ethernet radios to span long distances between systems. The third estimate, Table 7, assumes a full radio interconnect with cell modems. This will provide adequate connectivity to perform central control functions, but it the least desirable. The nature of central control leads to large amounts of data being pulled from and pushed to controllers constantly. Live intersection statuses are usually being displayed at all times. Monthly data costs could be very high.

Table 5: Central Control Cost Estimate with Complete Fiber Interconnect

Pay Item	Quantity	Unit Cost	Total Cost Centracs	Total Cost TACTICS	Total Cost MaxView
Controller	43	$3,000	$129,000	$0	$129,000
Ethernet Switch	43	$4,000	$172,000	$172,000	$172,000
Fiber-Optic Cable	145,000 LF	$3	$435,000	$435,000	$435,000
Conduit	125,000 LF	$10	$1,250,000	$1,250,000	$1,250,000
Handhole	200	$1,000	$200,000	$200,000	$200,000
Server	1	$15,000	$15,000	$0	$15,000
Software & License[1]	1	Varies	$175,000	$80,000[2]	$105,000
Software Maintenance[3]	1	Varies	$13,000	$0	$11,000
		Sub-Total	$2,389,000	$2,137,000	$2,317,000
		Design and Construction Engineering	$100,000	$100,000	$100,000
		Total	$2,489,000	$2,237,000	$2,417,000

1. Software & License cost includes installation and training
2. Includes the cost of server and software maintenance
3. Software Maintenance costs are per year

Table 6: Central Control Cost Estimate with Hybrid Fiber/Radio Interconnect

Pay Item	Quantity	Unit Cost	Total Cost Centracs	Total Cost Tactics	Total Cost MaxView
Controller	43	$3,000	$129,000	$0	$129,000
Ethernet Switch	43	$4,000	$172,000	$172,000	$172,000
Ethernet Radio	8	$7,000	$56,000	$56,000	$56,000
Fiber-Optic Cable	95,000 LF	$3	$285,000	$285,000	$285,000
Conduit	75,000 LF	$11	$825,000	$825,000	$825,000
Handhole	125	$1,100	$137,500	$137,500	$137,500
Server	1	$15,000	$15,000	$0	$15,000
Software & License[1]	1	Varies	$175,000	$80,000[2]	$105,000
Software Maintenance[3]	1	Varies	$13,000	$0	$11,000
		Sub-Total	$1,807,500	$1,555,500	$1,735,500
		Design and Construction Engineering	$75,000	$75,000	$75,000
		Total	$1,882,500	$1,630,500	$1,810,500

1. Software & License cost includes installation and training
2. Includes the cost of server and software maintenance
3. Software Maintenance costs are per year

Table 7: Central Control Cost Estimate with Cell Modem and Radio Interconnect

Pay Item	Quantity	Unit Cost	Total Cost Centracs	Total Cost Tactics	Total Cost MaxView
Controller	43	$3,000	$129,000	$0	$129,000
Ethernet Switch	43	$4,000	$172,000	$172,000	$172,000
Ethernet Radio	43	$3,500	$150,500	$150,500	$150,500
Cell Modem	9	$1,500	$13,500	$13,500	$13,500
Server	1	$15,000	$15,000	$0	$15,000
Software & License[1]	1	Varies	$175,000	$80,000[2]	$105,000
Software Maintenance[3]	1	Varies	$13,000	$0	$11,000
		Sub-Total	$668,000	$416,000	$596,000
		Design and Construction Engineering	$50,000	$50,000	$50,000
		Total	$718,000	$466,000	$646,000

1. Software & License cost includes installation and training
2. Includes the cost of server and software maintenance
3. Software Maintenance costs are per year

RAILROAD INTERCONNECT

The project scope included evaluating three at-grade railroad crossings of IL Route 13. The first two crossings are the CN line that crosses EB and WB IL Route 13 in downtown Carbondale. These two crossings are currently interconnected to traffic signals at IL Route 13 (Main Street) & Illinois Avenue and IL Route 13 (Walnut Street) & Washington Street. After a review of the existing inventory and discussions with the Illinois Commerce Commission (ICC), it is recommended that these two signals and interconnect be upgraded. The ICC recommends the installation of overhead railroad cantilevers at the crossing and complete traffic signal cabinet upgrade, including the signal controller.

The third crossing evaluated was the UP crossing on IL Route 13 east of Court Street. This crossing is located approximately 550 feet east of the signal at IL Route 13 & Court Street and is not currently interconnected to the signal. Given the distance between the crossing and the traffic signal, an interconnect is not recommended. If there are known issues with traffic queuing over the railroad tracks there are other measures to try before an interconnect is recommended. Some of these measures include re-timing the traffic signal at IL Route 13 & Court Street, installation of queue detection along IL Route 13 west of the crossing, or the installation of “Do Not Stop On Tracks” signs with flashers activated by the traffic signal at Court Street. A full safety study should be performed at this location to determine what improvements should be made.

CONCLUSION & RECOMMENDATIONS

Both types of ITS technology, ATSPM and Central Control, presented in this report offer powerful tools to make traffic signal systems more efficient. ATSPM is a great way to continually evaluate a system’s operations and performance. It provides a great amount of data that can be used in a multitude of ways to maintain an optimal system. But the user must commit to routinely collecting and reviewing the data and acting on it to see the full benefit of ATSPM. In addition, the benefits of ATSPM are greater in more congested areas, as opposed to corridors with little or no congestion. Based on HLR’s initial field observations, there appears to be no congestion issues along IL Route 13.

While both are popular, central control is implemented far more often than ATSPM at this point. Central control has benefits no matter the size and congestion of the system. It allows users to continually monitor their system, see live statuses, and make changes remotely.

Based on the existing signal system and discussions with IDOT, HLR recommends implementing a central control system at this time. If desired later, ATSPM can be added using the central control software. While ATSPM is not available in all three software packages described earlier, they all have plans to add the feature soon. HLR recommends requesting proposals from multiple vendors to implement a central control system. This report briefly explains the features of three products currently used in Illinois, but full personalized proposals will help in making the best choice for IDOT.

After discussions with the ICC, it is recommended that the traffic signal cabinets and interconnect be upgraded at both CN crossings of IL Route 13 in Carbondale. New traffic signal cabinets should be installed that are up-to-date with the current ICC requirements. The UP crossing of IL Route 13 east of Court Street should not be interconnected to the signal at IL Route 13 & Court Street at this time. If a known issue exists, a safety study should be performed to determine what countermeasures can be implemented to reduce queueing over the railroad.

APPENDIX A
EXISTING TRAFFIC SIGNAL INVENTORY

ID	INTADDRESS	XCOORD	YCOORD	MAJORST	MINORST	CONTMANUF	CONTMODEL	CONTFIRMVR
1	3	-89.32594834	37.76473147	IL-13	2nd Street	Siemens	M52	3.34h
2	7	-89.31720837	37.76551626	IL-13	Williams St	Siemens	M40	3.33d
3	8	-89.29741644	37.76539322	IL-13	Watson Rd	Siemens	M50	3.34h
4	0	-89.28047844	37.76156803	IL-13	Country Club Rd	Siemens	M40	3.33b
5	1	-89.25348257	37.73812406	IL-13	Striegel Rd	Siemens	M50	3.34h
6	2	-89.24666736	37.73197867	IL-13	New Era Rd	Siemens	M52	3.34e
7	3	-89.24215776	37.72982415	IL-13	Sycamore St	Siemens	M42	3.34g
8	4	-89.23725405	37.7282629	IL-13	Glenview Dr	Siemens	M52	3.34g
9	6	-89.22789025	37.72434882	IL-13 EB	Oakland Ave	Siemens	M52	3.34e
10	5	-89.22786985	37.72630267	IL-13 WB	Oakland Ave	Siemens	M40	3.13h
11	8	-89.22186504	37.72483876	IL-13 EB	Poplar St	Siemens	M10	2.34s
12	7	-89.22211228	37.72677864	IL-13 WB	Poplar St	Siemens	M40	3.32L
13	11	-89.2183452	37.72513163	IL-13 EB	University Ave	Siemens	M40	3.33e
14	10	-89.21859554	37.72708605	IL-13 WB	University Ave	Siemens	M52	3.34g
15	18	-89.21672084	37.72523827	IL-13 EB	Illinois Ave	Siemens	M52	3.34g
16	19	-89.21693745	37.72719928	IL-13 WB	Illinois Ave	Siemens	M10	2.34q
17	22	-89.21512899	37.72537335	IL-13 EB	Washington St	Siemens	M40	3.34g
18	21	-89.21539114	37.7273288	IL-13 WB	Washington St	Siemens	M40	3.34e
19	24	-89.21376607	37.72744983	IL-13 WB	Marion St	Siemens	M10	2.34s
20	26	-89.20864855	37.72590559	IL-13 EB	Wall St	Siemens	M40	3.13h
21	25	-89.20860178	37.72786269	IL-13 WB	Wall St	Siemens	M30	3.13c
22	0	-89.19911216	37.72773832	IL-13 EB	Lewis Ln	Siemens	M40	3.32f
23	29	-89.19901001	37.72868661	IL-13 WB	Lewis Ln	Siemens	M52	3.34e
24	31	-89.19354459	37.73053639	IL-13	McKinney Ave	Siemens	M52	3.34g
25	32	-89.18641723	37.73525252	IL-13	Giant City Rd	Siemens	M40	3.32L
26	0	-89.16130749	37.74312249	IL-13	Reed Station Rd	Siemens	M40	3.34g
27	5	-89.14690287	37.74497812	IL-13	Spillway Rd	Siemens	M40	3.32L
28	3	-89.0957665	37.74503377	IL-13	Greenbriar Rd	Siemens	M42	3.34g
29	1	-89.07721763	37.74506107	IL-13	Division St	Siemens	M40	3.33e
30	5	-89.02161696	37.74505805	IL-13	IL-148	Siemens	M40	3.32d
31	1	-89.00984296	37.74506727	IL-13	Terminal Dr	Siemens	M40	3.34g
32	2	-89.00267818	37.7449778	IL-13	Pentecost Rd	Siemens	M40	3.32L
33	1	-88.99336298	37.74497671	IL-13	Redco Dr	Siemens	M40	3.32k
34	2	-88.98405327	37.74495578	IL-13	Skyline Dr	Siemens	M52	3.34h
35	6	-88.97476122	37.74448326	IL-13	Sinclair Dr	Siemens	M52	3.34h
36	8	-88.97020699	37.74314815	IL-13	Walton Way	Siemens	M52	3.34h
37	10	-88.96526789	37.74152693	IL-13	Halfway Rd	Siemens	M52	3.34h
38	13	-88.95812167	37.74058528	IL-13	I-57	Siemens	M52	3.34g
39	12	-88.94802136	37.74069694	IL-13	Carbon St	Siemens	M52	3.34e
40	14	-88.94190824	37.74073694	IL-13	Russell St	Siemens	M52	3.34h
41	16	-88.93262876	37.74092794	IL-13	Court St	Siemens	M50	3.34h
42	28	-88.92403839	37.74068472	IL-13	State St	Siemens	M40	3.13h
43	0	-88.91541805	37.74055925	IL-13	Fair St	Siemens	M40	3.13h

ID	CABTYPE	DETTYPE	LOOPAMP1_QTY	LOOPAMP1_MAKEMOD	LOOPAMP2_QTY	LOOPAMP2_MAKEMOD
1	TS-1	Loops	4	EDI LMD 632t	2	EDI LMD 602t
2	TS-1	Loops	7	EDI LM 301t	1	EDI LM 332t
3	TS-1	Loops	2	EDI LM 331t	4	EDI LM 301t
4	TS-1	Loops	5	EDI LM 302t	1	EDI LM 332t
5	TS-1	Loops	6	EDI LM 301t	2	EDI LM 331t
6	TS-1	Loops	6	MicroSense MNT	1	EDI LM 301t
7	TS-1	Loops	2	EDI LM 332t	4	EDI LM 302t
8	TS-1	Loops	2	EDI LM 332t	5	EDI LM 302t
9	TS-1	Loops	6	EDI LM 301t		
10	TS-1	Loops	2	EDI LM 302t		
11	TS-1	Loops	3	Sarasota 515T	1	Sarasota 535T
12	TS-1	Loops	2	EDI LMD 302t		
13	TS-1	Loops	2	Sarasota 515T		
14	TS-1	Loops	1	EDI LMD 302t	1	EDI LMD 301t
15	TS-1	Loops	2	EDI LM 331t		
16	TS-1	Loops	2	EDI LM 331t		
17	TS-1	Loops	2	EDI LM 301t		
18	TS-1	Loops/Microwave	1	EDI LM 331t	1	MS Sedco Intersector
19	TS-1	Loops	2	EDI LM 301t	1	EDI LM 331t
20	TS-1	Loops	4	EDI LM 301t	1	EDI LM 331t
21	TS-1	Loops	3	EDI LM 301t	1	EDI LM 331t
22	TS-1	Loops	2	EDI LM 331t	2	EDI LM 301t
23	TS-1	Loops	3	EDI LMD 302t	1	EDI LMD 301t
24	TS-1	Loops	6	EDI LMD 602t		
25	TS-1	Loops	5	EDI LM 302t	2	EDI LMD 302t
26	TS-1	Loops	10	EDI LM 301t	2	EDI LM 331t
27	TS-1	Loops	4	EDI LM 302t	2	EDI LM 332t
28	TS-1	Loops	7	EDI LMD 602t	6	EDI LMD 632t
29	TS-1	Loops	11	EDI LMD 602t	1	EDI LMD 632t
30	TS-1	Loops	11	EDI LMD 602t	3	EDI LMD 632t
31	TS-1	Loops	3	EDI LMD 602t	1	EDI LMD 632t
32	TS-1	Loops	3	EDI LMD 602t		
33	TS-1	Loops	9	EDI LM 301t	4	EDI LM 331t
34	TS-1	Loops	8	EDI LMD 602t		
35	TS-1	Loops	3	EDI LMD 602t	2	EDI LMD 632t
36	TS-1	Loops	5	EDI LMD 302t	2	EDI LM 302t
37	TS-1	Loops	13	EDI LMD 602t		
38	TS-1	Loops	6	EDI LMD 632t		
39	TS-1	Loops	15	EDI LMD 620t		
40	TS-1	Loops	3	EDI MD 602t	4	EDI LMD 602t
41	TS-1	Loops	4	EDI LM 332t	5	EDI LM 302t
42	TS-1	Loops	14	EDI LM 301t		
43	TS-1	Loops	15	EDI LM 301t		

ID	LOOPAMP3_QTY	LOOPAMP3_MAKEMOD	LOOPAMP4_QTY	LOOPAMP4_MAKEMOD	PHONELINE	INTTYPE	MODEM
1					FALSE	Radio	FALSE
2					FALSE	Radio	FALSE
3					FALSE	Radio	FALSE
4					TRUE		TRUE
5					FALSE	Serial	FALSE
6	5	EDI LM 331t			FALSE		FALSE
7	1	EDI LM 301t			FALSE	Radio	FALSE
8					FALSE	Radio	FALSE
9					FALSE	Radio	FALSE
10					FALSE		FALSE
11					TRUE	Radio	TRUE
12					FALSE	Radio	FALSE
13					FALSE	Serial	FALSE
14					FALSE	Serial	FALSE
15					FALSE	Serial	FALSE
16					FALSE	Serial	FALSE
17					FALSE	Serial	FALSE
18					FALSE	Serial	FALSE
19					TRUE	Radio	TRUE
20					FALSE	Serial	FALSE
21					FALSE	Serial	FALSE
22	1	EDI LM 302t	1	Detection Systems 913	FALSE		FALSE
23					FALSE	Serial	FALSE
24					FALSE	Radio	FALSE
25	3	EDI LM 332t	1	Sarasota 516T	FALSE	Radio	FALSE
26					TRUE		TRUE
27	1	EDI LM 301t			FALSE	Radio	FALSE
28					FALSE	Radio	FALSE
29					TRUE	Radio	TRUE
30					TRUE	Radio	TRUE
31					FALSE	Radio	FALSE
32					FALSE	Radio	FALSE
33	2	Sarasota 515T			FALSE	Radio	FALSE
34					FALSE	Radio	FALSE
35					FALSE	Radio	FALSE
36	2	EDI LM 301t	4	EDI ORACLE 52EC	FALSE	Radio	FALSE
37					TRUE	Radio	TRUE
38					FALSE	Radio	FALSE
39					FALSE	Radio	FALSE
40	2	EDI MD 632t			FALSE	Radio	FALSE
41					TRUE	Radio	TRUE
42					FALSE		FALSE
43					FALSE		FALSE

ID	MODEM_MAKEMOD	RADIO	RADIO_MAKEMODEL	COMMENTS
1		TRUE	Encom 5100	
2		TRUE	Encom 5100	
3		TRUE	Encom 5100	
4	US Robotics V.92	FALSE		
5		FALSE		No comm
6		FALSE		No comm
7		TRUE	Inuicom Communicator II	Bad comm
8		TRUE	Inuicom Communicator II	Bad comm
9		TRUE	Inuicom Communicator II	Bad comm
10		FALSE		No comm
11	US Robotics V.92	TRUE	Inuicom Communicator II	Master controller
12		TRUE	Inuicom Communicator II	
13		FALSE		
14		FALSE		
15		FALSE		
16		FALSE		Railroad interconnect, No comm
17		FALSE		Railroad interconnect
18		FALSE		No comm
19	US Robotics V.92	TRUE	Encom 5200	Master controller.
20		FALSE		
21		FALSE		
22		FALSE		No comm
23		FALSE		
24		TRUE	Encom 5100	
25		TRUE	Encom 5200	Bad comm
26	US Robotics V.92	FALSE		
27		TRUE	MDS 9810	
28		TRUE	MDS 9810	
29	US Robotics V.92	TRUE	MDS 9810	Master Controller
30	US Robotics V.92	TRUE	MDS 9810	Master Controller
31		TRUE	MDS 9810	Bad comm
32		TRUE	MDS 9810	
33		TRUE	MDS 9810	Bad comm
34		TRUE	MDS 9810	Bad comm
35		TRUE	MDS 9810	
36		TRUE	MDS 9810	
37	US Robotics V.92	TRUE	MDS 9810	Master controller
38		TRUE	MDS 9810	
39		TRUE	Encom 5100	
40		FALSE	Encom 5100	
41	US Robotics V.92	TRUE	Encom 5100	Master controller
42		FALSE		No comm
43		FALSE		No comm

APPENDIX B
CENTRAL CONTROL DATASHEETS

Centracs®

▹ ▹ The flexible and scalable Centracs 2.0 design also provides agencies with feature-rich options that best meet evolving transportation agency needs.

About Centracs

Transportation agencies, now more than ever, are looking for more efficient and cost effective solutions to manage traffic. Econolite offers Centracs 2.0 Advanced Transportation Management System (ATMS) as a valuable component of an effective ITS solution to easily address current and future traffic management challenges. Centracs 2.0 provides an integrated platform for traffic signal control, ITS field device monitoring and control, information management, graphical data display, advanced traffic algorithms, and much more. Centracs 2.0 is a flexible, user friendly and cost-effective system, enabling agencies to realize significant mobility benefits from its ATMS investment. The flexible and scalable Centracs 2.0 design also provides agencies with feature-rich options that best meet evolving transportation agency needs.

At A Glance

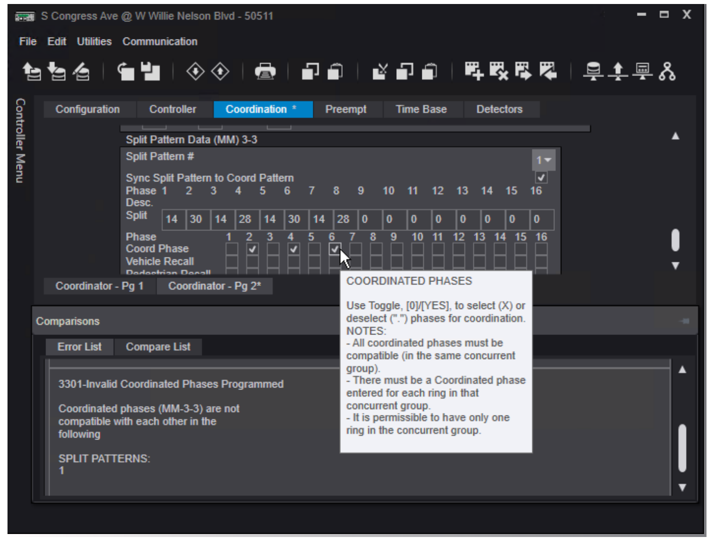
- NEW Database Editor
- Performance
  - Faster dialog loading times
  - Better processing and response times
  - Quicker report generation
- Support of newer technologies (Windows 10, touch features, and more)
- Improved User Interface

ECONOLITE®

Graphical User Interface and “Containers”

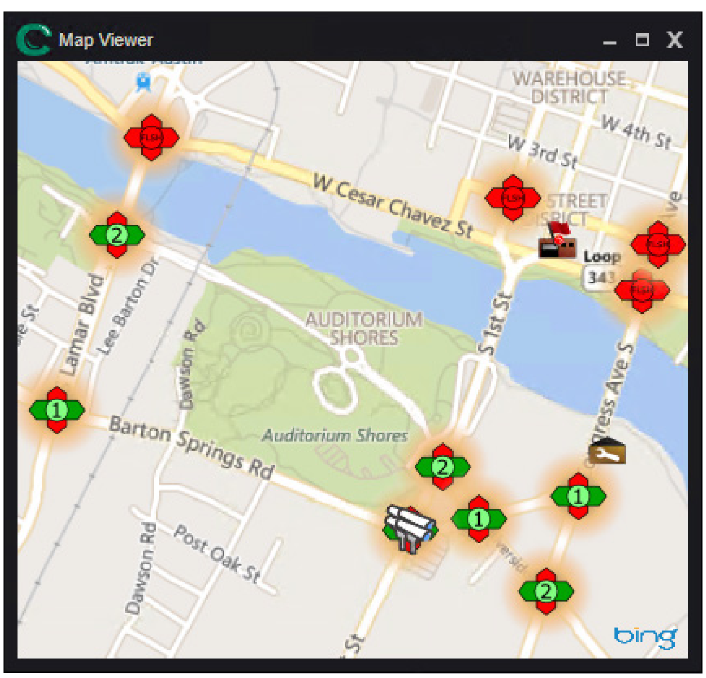
Modern Graphical User Interface (GUI) design is an integral part of Centracs 2.0. The intuitive GUI provides a short system learning curve, helping new users to immediately become productive while allowing experienced users to leverage the full power of Centracs 2.0’s advanced features. Centracs 2.0 offers an extensive and flexible suite of tools, encouraging users to establish individual workflows and environments for increased efficiency.

User versatility is made possible by the Centracs 2.0 user interface, which utilizes powerful “Container” technology. Containers assist the user in managing the various maps, status, and control screens by enabling the user to drag-and-drop open windows into containers.



Interactive GIS Based Maps

The modern GIS map technology and rendering tools behind Centracs 2.0 map interfaces make the map a truly convenient tool for managing and monitoring field devices. Simple mouse gestures are used to pan and zoom, while the Centracs 2.0 Container technology allows users to customize, display and store multiple maps. Agencies can select from a variety of commercial or government GIS data sources including their own GIS databases. The local intersection map editor in Centracs 2.0 is easy to use allowing users to add fully functioning intersection displays in a matter of minutes.



Centracs 2.0 takes care of the positioning and sizing of contained windows, leaving the user free to focus on more important tasks. When a user exits Centracs 2.0, the entire layout is remembered and then restored on the next login. Additionally, all system configuration actions are performed through the GUI - no need to edit configuration text files or registry entries.

Scalable Architecture

Centracs 2.0 implements a distributed layer architecture providing scalability and expandability. The “Core” or application server manages the system scheduler, traffic control algorithms, field device time management, alert generation, and more. Communication or “Comm Servers” perform the communications to field devices. The entire system can reside on a single computer or it can be spread across multiple computers. This allows Centracs 2.0 to efficiently manage a small agency’s needs on a single, inexpensive computer, or to scale up for a large agency needing to manage thousands of devices by distributing the processing across multiple computers.

Powerful Traffic Management Tools

The true value of a modern ATMS system depends on the tools provided to monitor and manage the system. Centracs 2.0 offers a wide range of reports and real-time monitors for nearly every aspect of the system. Real-time detector monitors, Time-Space and split monitors, coordination, Traffic Responsive, communication status, system performance monitors, alert monitors and detailed reports allow the various users of the system to track those aspects of the system that are most important. A real-time text-mode remote front panel for ASC/3 and Cobalt controllers allow Centracs 2.0 users to interface with controllers as if they were standing at the intersection. The signal database editor for Cobalt and ASC/3 controllers offers advanced features such as timing templates, spreadsheet style editing features and version management. Whether the user is a Traffic Engineer, a TMC manager, a System Administrator, or a signal shop manager, Centracs 2.0 provides the most effective tools for the job.

Communications and Device Support

Robust, dependable communication to field devices is key to a successful ATMS system and is a critical component of Centracs 2.0. Most communications media is supported, including fiber optics, twisted-pair, leased lines, and wireless. Protocol support includes: TCP/IP, UDP/IP, RS232 serial, ACT, PMPP, STMP, and SNMP. Traffic signal device support includes: Econolite's NTCIP-based Cobalt, ASC/2, ASC/2S, and ASC/3 (1000, 2100, or Rack Mount) NEMA TS1/TS2 controllers, 2070 (L or LN) controllers running ATC/2070, ASC/3 2070, or Oasis firmware, or controllers running EPAC version 4.01D,170-type controllers running certain versions of Wapiti W4IKS firmware, and NTCIP 1202 compliant controllers.

Centracs Maintenance Management System (MMS) (optional)

Centracs 2.0 MMS is a simple to use GIS-based asset management and maintenance system. It allows ITS and signal maintenance organizations to track assets in real-time through the products' entire life cycle. Offering both workstation and mobile device interfaces, it supports preventative maintenance planning and execution along with trouble ticket dispatch and work-order scheduling. Centracs 2.0 MMS is available as an optional module to Centracs 2.0, or as a stand-alone system.

Centracs DCMS (Data Collection Management System) (optional)

Centracs 2.0 DCMS turns new or existing detection systems into virtual count stations that gather and distribute traffic data without interruption, providing the accurate information needed for faster incident response, real-time changes to traffic signal timing,
or to anticipate special event traffic conditions.

Centracs Adaptive Module (optional)

Centracs 2.0 Adaptive is an arterial-based adaptive control module. Centracs 2.0 Adaptive uses the Centracs 2.0 native interface, simplifying the creation and management of adaptive intersection groups or sections. As a bonus, while the Centracs 2.0 Adaptive algorithms adjust splits and offsets, cycle length adjustments can be achieved by coupling our adaptive software with Centracs 2.0 Traffic Responsive techniques. Working directly with Econolite's ASC/3 controller software and avoiding adding undesirable hardware at the cabinet, Centracs 2.0 also allows the creation of multiple groups that can easily be managed using the Centracs 2.0 Time-of-Day scheduler. The power of Centracs 2.0 Adaptive provides a cost effective means of achieving real and measurable improvements in traffic flows without the cost of adding new servers, hardware, and by using existing controller coordination plans and existing communications channels.

Advanced Measures of Effectiveness (MOE) Module (optional)

The Centracs 2.0 MOE module was developed in conjunction with Purdue University. These reports use high density detector data collected 10 times per second from ASC/3 and Cobalt controllers to offer users a unique set of tools for understanding the factors influencing coordination and the effectiveness of timing at the intersection.

Dynamic Message Sign (DMS) Management (optional)

The Centracs 2.0 DMS module provides users the direct and instantaneous control to update and display valuable traveler information messages. By providing timely traffic condition or incident messages, Centracs 2.0 DMS can help provide congestion mitigation and increase roadway safety.

Server-to-Server Module (optional)

The Centracs 2.0 Server-to-Server module provides a unique interface allowing agencies to achieve unparalleled benefits through cooperative operations and system management. Adjoining Centracs 2.0 - managed cities can seamlessly share data and manage arterial traffic across agency boundaries providing true Center-to-Center communications. Centracs 2.0 Server-to-Server also allows agencies to participate in cross-jurisdictional management and monitoring of neighboring agency intersections.

CCTV (optional)

Close Circuit Television (CCTV) cameras have proven a valuable tool for many agencies. Econolite offers the Centracs Advanced CCTV module as an optional component of the Centracs ATMS. This module is an enterprise-class IP video surveillance solution that provides seamless management of digital video across IP networks.

Centracs Optional Modules

- Centracs MMS
- Centracs DCMS
- Centracs Travel Time
- Centracs Adaptive
- Centracs MOE
- Centracs DMS
- Centracs Server-to-Server
- Centracs CCTV

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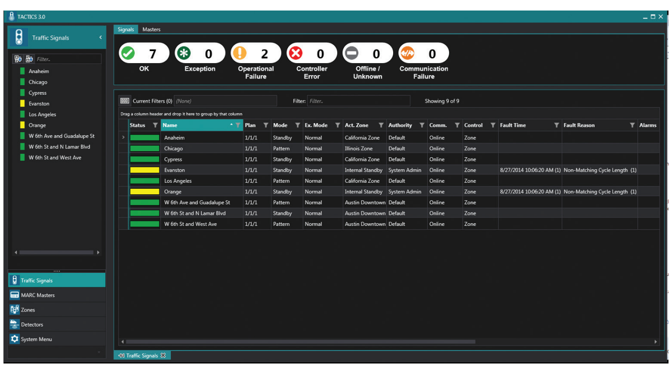
TACTICS™ 3

Central Advanced Transportation Management System

A better way to manage the job of managing traffic



Maybe we should call it easy street

With TACTICS 3, we've made a powerful, scalable traffic management system even easier to use. The first thing we did was improve the first thing you see – the user interface – so it's:

- Easier to monitor your system with an improved overview on the landing page
- Easier to see key information gathered in one place on the display
- Easier to get where you need to
- Easier to find what you have to
- Easier to filter information to work with

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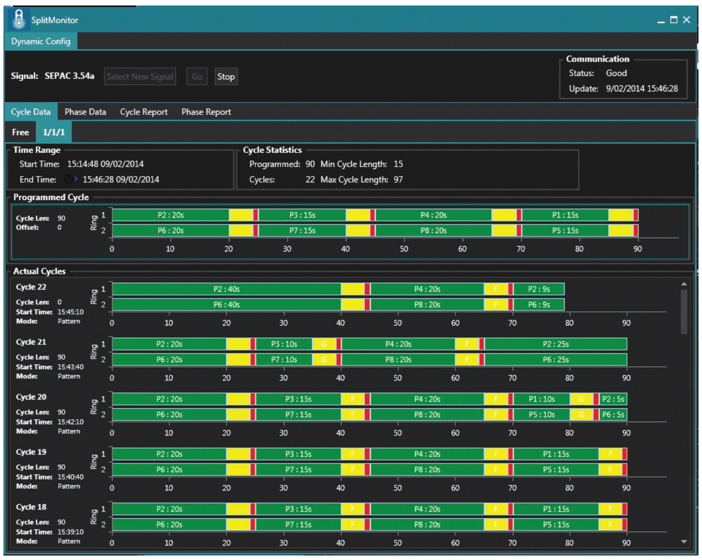
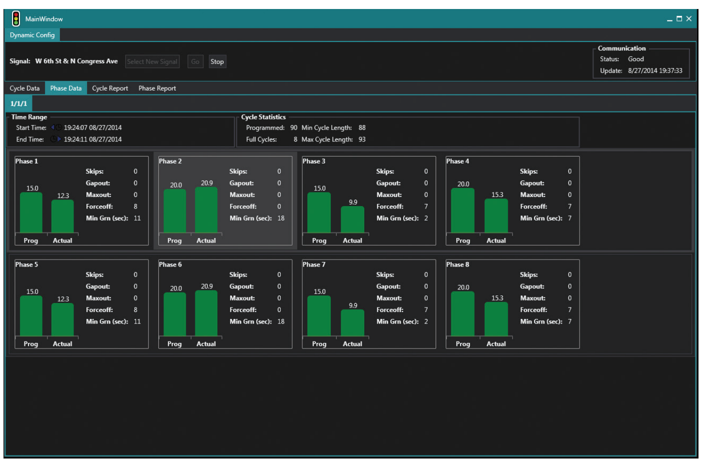
A new and better face for our user interface

The TACTICS 3 interface's enhanced status features quickly and easily provide a detailed overview of your traffic signal system, so you know exactly what the system is doing at any given point in time. Status features available include:

- Dashboard to show a summary of system status
- Hide/show/reorder each field in the status list
- Powerful search features to find devices easily
- Sort and filter lists
- Standard filters to locate problem intersections fast
- Quick navigation from list to map

While you work to improve traffic flow, TACTICS 3 improves the way you work with helpful features such as Quick Response, an integrated detailed Status Display, Split Monitor tools, full support for a range of controller software – including SEPAC, EPIC, SEMARC, Tempo Ramp Meter, and NTCIP controllers – dynamic message signs, closed-loop, and multilingual support.





4 scalable levels of solution

The TACTICS solution is a flexible, scalable solution with a series of four separate option packages that tailor to the needs of your traffic system as well as the needs of your region. As your system grows, your solution can grow – with each package scalable to the next level.

TACTICS View

Designed for use on notebooks, it's ideal for consultants and engineers. Using TACTICS View you can manage intersection timing data and controller database editing, with upload/download capabilities for a single controller at a time. Data is transferrable to or from a larger TACTICS system.

TACTICS Marc

A closed-loop for field masters using SEMARC controller software that connects masters on the street for uploads/downloads, simple analysis, and map displays.

TACTICS Central

This option offers the powerful features of a TACTICS Enterprise system in a down-sized package for smaller cities or areas with a limited number of intersections. You receive the advantages of more robust feature sets previously available only in larger central systems. As your needs grow, TACTICS Central can scale up in a seamless transition to the full Enterprise system.

TACTICS Enterprise

The Enterprise solution offers the full signal control and traffic management functionality of the other three TACTICS systems, plus advanced traffic management features – such as Quick Response – and expanded support, with standard and optional feature sets available.

TACTICS smartGuard

TACTICS smartGuard is a web-based traffic management solution that provides access to functionality from any internet-connected browser.

Expanded feature support provides more control

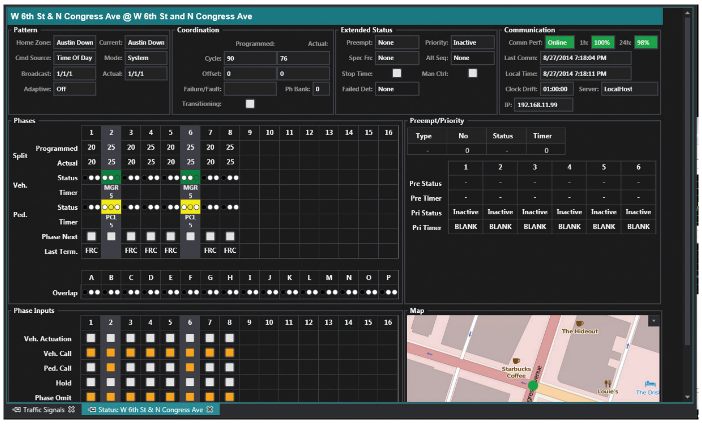
The guiding principle behind our improvements to TACTICS 3 is to give you more options to manage your traffic control system – more easily. By expanding the features in TACTICS, we're expanding the benefits you'll receive.

Powerful Home Page with Dashboard, Navigation Panel, List Displays, and Map

Begin navigation from a position of power. The new Dashboard shows system status at a glance. The customizable list displays allow you to filter or sort data in any way, hiding or reordering columns as you choose. The OSM-based map can be used anywhere.

Integrated Intersection Detailed Status Display

An overall summary bar makes intersection status immediately apparent. Detailed displays show phase status, splits, termination reasons, and programmed data. You can follow operations easily and know exactly what the controller is doing and why.



Status Polling

Additional status reports provide you a more detailed view of system-wide operation, enabling quick identification of issues for improved response.

- System Detector
- Active Alarms
- Quick Response
- Ramp Meters
- Port Server

Upload/Download

This feature allows you to compare differences between controllers, upload and download between them, and shorten controller configuration time.

History Parameter Reconstruction

If a change results in an undesirable effect, this feature permits easy rollback to the previous configuration. Annotation capability lets you document the reasons for changes.

User Defined Groups

You can logically group controllers independent of signal control grouping and manage more efficiently by arterial layout or communications channel, without affecting operational group settings.

Quick Response

More than 70 separate trigger types automatically detect events and enable automatic response to events and changing conditions.

Where we're going never loses sight of where you are

No matter where our technical improvements take the capabilities of the TACTICS Central Advanced Transportation Management System, we always respect the value of your investment in your current technology. Siemens TACTICS technology has earned the reputation for excellent compatibility with legacy systems and controllers. This same respect for your technology and investment is reflected in an attitude of partnership and the attention we pay to all details of project management, system implementation and integration, and ongoing maintenance and services.

The TACTICS Central Advanced Traffic Management System (ATMS) is part of a network of Siemens innovation for better traffic management that includes the m60 ATC advanced traffic controllers and the TACTICS smartGuard web-based mobile traffic control center. Working together, or independently, these capabilities put the most advanced technology into your traffic management mix.

Siemens TACTICS Packages Feature Support

	View	Marc	Central	Enterprise
Central/Workstation/ Communication Servers	–	X	X	X
Multiple-Language Support	O	O	O	O
Password Protected Access	X	X	X	X
Multi-User Controller Access	–	X	X	X
Permissions Control	–	X	X	X
Agency and Jurisdictional Permissions	–	X	X	X
Dashboard	–	X	X	X
Zone/Group Broadcasts	–	O	X	X
Intersection Status	–	X	X	X
System Detector Status	–	X	X	X
Active Alarm Status	–	X	X	X
Quick Response Status	–	O	O	X
Ramp Meter Status	–	–	X	X
Port Server Status	–	X	X	X
Port Server Client Status	–	X	X	X
Traffic Responsive Status	–	–	X	X
Controller Status	X	X	X	X
Second-per-Second Monitoring	–	–	X	X
Second-per-Second Signal	–	–	X	X
Controller Database Upload and Download	X	X	X	X
Upload and Download from One Controller to Another	–	–	X	X
Compare Controller Database to Central Database	–	X	X	X
Display List of All Differences Between Central and Field Devices	–	X	X	X
Parameter History and Rollback	–	X	X	X
MARC Master Support	–	X	X	X
SEPAC ECOM Support	X	X	X	X
SEPAC NTCIP Support	X	X	X	X
Virtual Ports for 3rd-Party Applications Support	–	O	O	O

	View	Marc	Central	Enterprise
Serial Connection Support	X	X	X	X
IP Connection Support	X	X	X	X
Dial-Up Support	X	X	X	X
Multiple Communications Servers	–	–	X	X
Light Rail Transit Support	–	X	X	X
Logical Grouping of Controllers Independent of Signal Control	–	–	X	X
Quick Command Access Buttons for Select Status Screens	–	X	X	X
Standard and Custom Reports	–	X	X	X
Synchro Support	–	X	X	X
Time Space Diagrams	–	O	X	X
Split Monitoring	–	O	X	X
DMS Sign Support	–	–	O	O
Ramp Meter Support	–	–	X	X
CCTV Support	–	–	O	O
Configurable Logging Levels	X	X	X	X
System Maps	–	X	X	X
Intersection Maps	–	X	X	X
MARC Maps	–	X	X	X
Multiple Intersection Maps	–	X	X	X
Sub-Maps	–	X	X	X
Symbol Display (hide/show) Levels	–	X	X	X
Custom Map Labels	–	X	X	X
Incidents	–	–	O	O
Quick Response	–	O	O	X
Traffic Responsive	–	X	X	X
Time of Day	–	X	X	X
Center-to-Center	–	–	O	O
OSM-Based Map	X	X	X	X
Selectable Themes	X	X	X	X

X standard feature   O optional feature   – not available

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NEVER STAND STILL

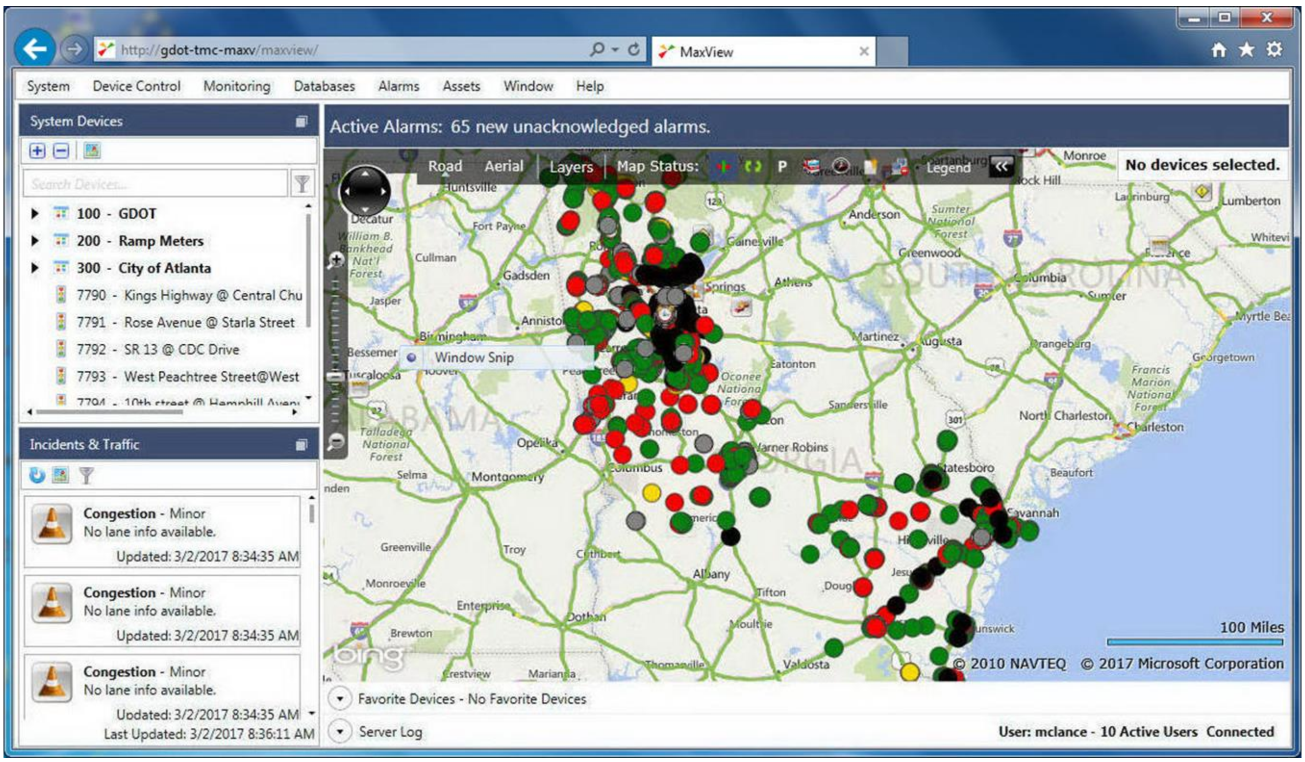
MaxView

Advance Transportation Management System

Overview

Intelight's MaxView® Advanced Traffic Management System (ATMS) software is a modern client/server application built using modern frameworks and technologies. MaxView is designed from the ground up, utilizing modern Graphical User Interface (GUI) design standards. Intelight delivers a true web-based, thin-client platform with MaxView, while also delivering a rich client experience, including an incredibly responsive main map, multiple client windows and other rich client interactions. MaxView is not adapted from an older legacy system and as such is not constrained by legacy interaction models or design standards, but instead is reimagined to embrace the modern web and modern web technologies.

MaxView's strict adherence to the NTCIP protocol enables an agency to place any NTCIP-compliant controllers on the system immediately, reducing the need to manage the legacy and new central systems together during the integration process.



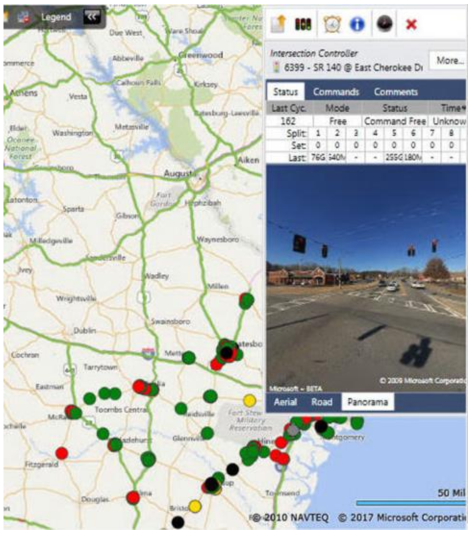
Highlights

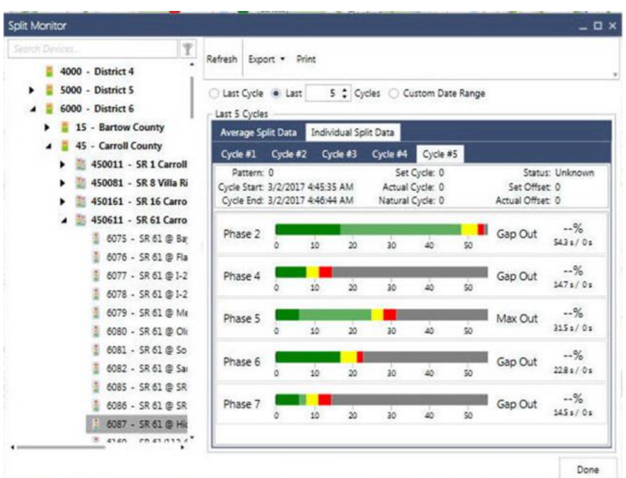
- Manage your entire traffic network from a real-time map
- All servers and controllers in one tree
- See which devices are online and graphically follow the network path from the devices back to servers
- User and group level access management
- Simultaneously connect two or more system servers
- Switch between your sessions using a mouse click or keystroke
- MaxView includes online real-time data graphs and usage charts, with the ability to do trend analysis
- MaxView retains and displays a history of system events that can be used to monitor operations and/or troubleshoot

Unique Functionality

- Easy to configure maps; no external programs necessary
- Expanded status displays and event monitoring
- Outlook style time of day scheduler
- Day, month and timeline views
- Drag and drop scheduling
- Modify multiple intersection timings from single screen
- Real-time split monitoring in Coordination and Free
- Real-Time analysis tools and event monitoring

Embedded panorama and camera views





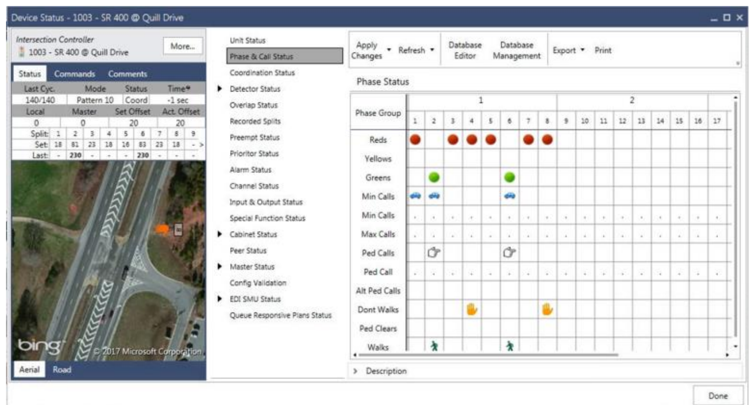
Split monitor

Support Advanced System Configurations

- Ability to embed hotlinks and shortcuts into the intersection displays and tabs
- Custom user configurations for maps based on user
- Dynamic status views by zoom level

Features and usability

- Time Space Diagram
- Split monitor
- VOS graphing
- Event monitoring
- Alarms and alerts



Detailed intersection status display

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