T&E COMMITTEE #3
December 7, 2009

MEMORANDUM

December 3, 2009

TO: Transportation, Infrastructure, Energy and Environment Committee

FROM: Glenn Orlin, Deputy Council Staff Director

SUBJECT: Briefing—November traffic signal incident

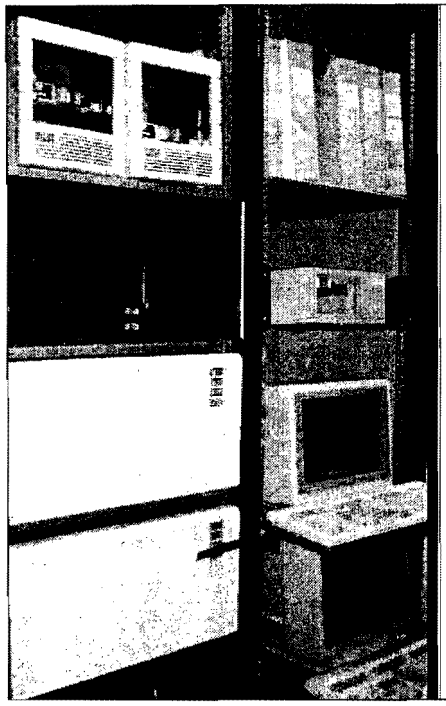
On November 4-5, 2009 the County's computerized traffic signal coordination system failed. While each signal continued to function, they operated as individual units on set patterns, unable to adjust to peak period cycles. Also, signals in high-volume corridors normally are synchronized to allow for the progression of platoons of vehicles, and the coordination system allows for real-time adjustments to the signal progressions in order to maximize flow. This, too, failed during this incident. About 36 hours after the system crashed for good the repair was completed and the system began to recover, and it fully recovered 8 hours after that.

Committee Chair Floreen has asked the Department of Transportation to provide a briefing on the incident; its presentation is on ©1-4. The Committee is interested in the timeline of events on November 4-5, DOT's diagnosis of the problem, what steps were taken during the incident that were successful and those that could be improved upon should a similar event recur, and how or whether the Traffic Signal System Modernization project should be adjusted.

The Council initially approved funding in the FY07-12 CIP to develop the scope the modernization effort, including a Request for Proposals, and the full $34 million Traffic Signal System Modernization project was programmed in the FY09-14 CIP in the spring of 2007. (The latest project description form is on ©5-6.) Recently the County Executive has written to the Governor suggesting that they work together to seek Federal funds to support this effort (©7-8).

DOT's Traffic Engineering and Operations staff will lead the briefing.

f:\orlin\fy10\fy10t&e\traffic signals\091207te.doc



Traffic Signal System

Tide Slide

Failure &

Modernization

Agenda

- Timeline of what happened
- Impacts to Traffic
- Contingency planning
- Make-up of existing system
- Modernization project & acceleration

Timeline

- Tues 11/3 Midnight – System crashed
  - Successfully restarted
- Wed 11/4 1 AM – Data General support called in
- Wed 3 AM – System crashed for good
- Wed 5 AM – Traffic reporters notified
- Wed 4 PM – Isolated the problem

Timeline

- Thurs 11/5 10 AM - Arrival of part
- Thurs 2 PM – CE's Press conference
- Thurs 3 PM – Repair completed & signals started coming back on-line
- Thurs 5 PM – Media notified of repair
- Thurs 11 PM – Last handful of signals back on line

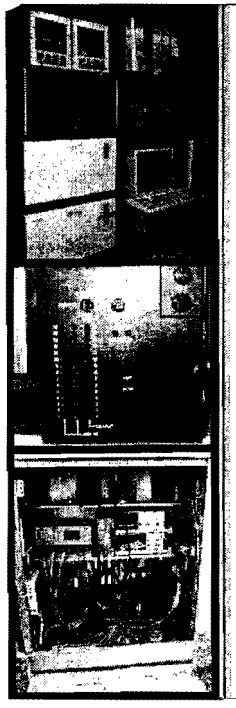
Impacts to Traffic

- All signals remained in operation, including pedestrian signals
- Timings were not being controlled by central computer
  - Could not activate peak period cycles
  - No synchronization between signals
- DOT staff was manually adjusting signal timings at local intersections
  - Over 200 signals were modified

Contingency Plans

- Installed local Time of Day signal timings at 200 critical intersections
  - Replicates central system timings at the intersection
  - Peak and off peak, and synchronization factors
- Planning to also install another 200 locations
- 35 County owned signals have UPS/BBU installed
- Failed part has been repaired/refurbished and have on hand – can facilitate immediate re-build in the event of a similar failure

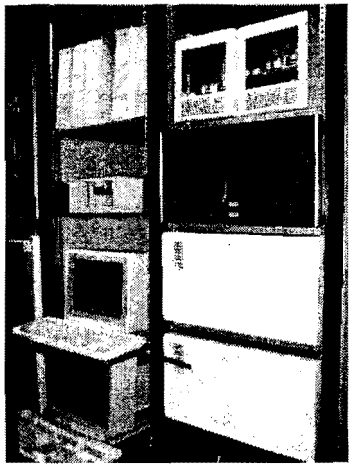
2

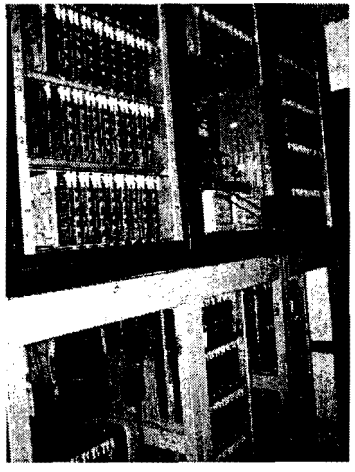


Existing System

- Essentially at/beyond end of useful life
- Many of the components are obsolete and no longer supported by vendors
  - Central computer – 25 years old
  - Operating System – AOS/V2
  - Central software - COMTRAC
  - Comm. hardware – archaic and proprietary
- Lacks state of the practice traffic management capabilities

Central Computers and Communication Racks



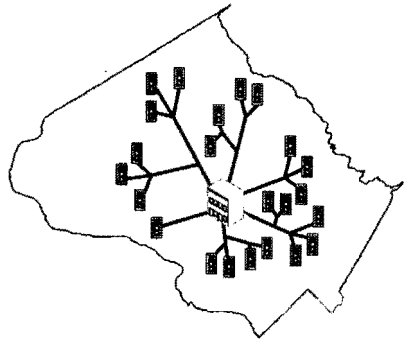


Modernization Project

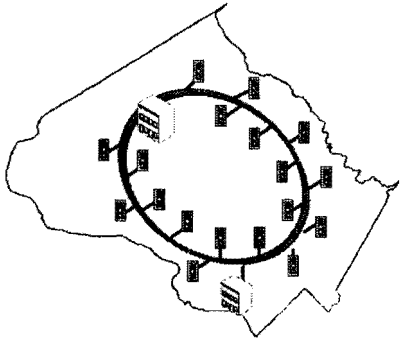
Component	Existing		Proposed
Central System	25 year old computers and software	→	Scalable network of modern computers, state of the practice software
Communications Plant	Copper cable and slow modems	→	FiberNet, supplemented with reconfigured copper cable plant
Intersection Hardware	Controller w/ limited intelligence & proprietary comm	→	Smart Controller w/ standardized comm
Architecture	Centralized	→	Distributed

Communications Network

Existing



Proposed



3

Future System

- Current $35 Million project underway
  - FY07-08: Planning & systems engineering
  - FY09-14: Implementation
- Phase 1 (Proof of Concept) – 90% complete
- Exploring project acceleration

Accelerated Plan

- Focus on deploying the necessary equipment that allows us to de-activate Comtrac as soon as possible
  - Interim solution
  - Partial integration
- Move all other non-critical project activity to occur after Comtrac is dead-lined.

Accelerated Plan

- By end of FY12 (June 2012):
  - 800 new controllers
  - 45 UPS/BBU at hub-ettes
  - Network and field communications to 800 locations
  - Associated integration
  - Deactivate Comtrac

Accelerated Plan

- After FY12:
  - Flashers & beacons
  - 220 UPS/BBU at County owned signals & ~ 200 critical state owned signals
  - Replace aged cabinets
  - Ultimate central system functionality & integration with ATMS

Deployment Plan - Original & Revised

	Original	Revised
FY10	120	120
FY11	140	340
FY12	185	340
FY13	165	
FY14	190	

Accelerated Plan - Constraints

- Communication plant upgrades are the driving factor in the schedule:
  - 300+ miles of cable to reconfigure
  - Live system – must maintain existing while setting up new; instantaneous cut-over
- Production of controllers

Traffic Signal System Modernization -- No. 500704

Category	Transportation	Date Last Modified	June 23, 2008
Subcategory	Traffic Improvements	Required Adequate Public Facility	No
Administering Agency	Transportation	Relocation Impact	None.
Planning Area	Countywide	Status	Preliminary Design Stage

EXPENDITURE SCHEDULE ($000)

Cost Element	Total	Thru FY07	Est. FY08	Total 6 Years	FY09	FY10	FY11	FY12	FY13	FY14	Beyond 6 Years
Planning, Design, and Supervision	5,763	298	2,177	3,288	548	548	548	548	548	548	0
Land	0	0	0	0	0	0	0	0	0	0	0
Site Improvements and Utilities	28,257	19	0	28,238	4,719	4,626	5,266	4,980	4,502	4,145	0
Construction	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0
Total	**34,020**	**317**	**2,177**	**31,526**	**5,267**	**5,174**	**5,814**	**5,528**	**5,050**	**4,693**	**0**

FUNDING SCHEDULE ($000)

Current Revenue: General	1,625	317	1,308	0	0	0	0	0	0	0	0
Federal Aid	269	0	269	0	0	0	0	0	0	0	0
G.O. Bonds	6,673	0	600	6,073	856	353	410	1,117	1,459	1,878	0
State Aid	12,128	0	0	12,128	2,067	1,974	2,323	2,130	1,931	1,703	0
Recordation Tax Premium	13,325	0	0	13,325	2,344	2,847	3,081	2,281	1,660	1,112	0
Total	**34,020**	**317**	**2,177**	**31,526**	**5,267**	**5,174**	**5,814**	**5,528**	**5,050**	**4,693**	**0**

DESCRIPTION

This project provided for Phase I which consisted of requirements development, systems engineering, and testing to modernize the County's traffic signal system. The addition of Phase II entails acquisition and implementation of a state-of-the-art replacement of the current central traffic signal control system. Key elements of the modernization include system central hardware and software and communications system cable plant re-configuration.

Anticipated phases of this project include: Phase I - FY07-08, Phase II - FY09-14 - implementation and quality assurance.

COST CHANGE

Based on Phase I findings, Phase II (full implementation of the system) is added to the project. The total project cost for the new system, which includes replacement of the existing functionality and addition of expanded capabilities is $44M. The expenditure display has been updated to reflect a six-year implementation scenario. The expenditures displayed in FY09-14 ($31.5M) do not include those costs of the total $44M system estimate that are associated with the project team's recommendations that will be implemented/expended directly by the Maryland State Highway Administration.

JUSTIFICATION

The existing traffic signal control system, though it has been highly reliable, is an aging system reliant on dated technology. Central and field communications devices are obsolete and problematic to maintain. As the technologies employed in the advanced transportation management system (ATMS) have advanced, it has become increasingly difficult to interface with the existing traffic signal control system (COMTRAC). Because of the limited functionality of the COMTRAC, the system is not able to take advantage of the capabilities of the current generation of local intersection controllers. These capabilities provide a greater level of flexibility to manage traffic demands.

The following reports focus on the condition of the current traffic signal control system and document the need to begin the process of system modernization: White Paper on the Status and Future of the Traffic Signal System in Montgomery County, Maryland, March, 2001; and Traffic Signal Replacement White Paper, January, 2002. The following new reports have been developed in Phase I: Concept of Operations, Revision 1.0 February, 2007; Traffic Signal System Modernization (TSSM) Requirements, Draft Revision F, May, 2007. These two reports further existing systems analysis and replacement systems functional requirements development. Working in conjunction with the Department of Technology Services (DTS), a comprehensive communications master plan is underway to review the existing communications subsystem and development of state-of-the-art communication systems architecture.

OTHER

Phase I Status (As of August 2007)
Concept of Operations - 100% complete/configuration control

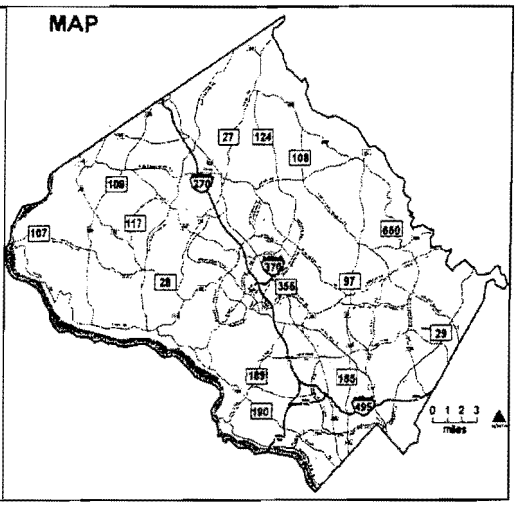
APPROPRIATION AND EXPENDITURE DATA

Date First Appropriation	FY07	($000)
First Cost Estimate Current Scope	FY09	34,020
Last FY's Cost Estimate		2,600
Appropriation Request	FY09	3,094
Appropriation Request Est.	FY10	3,200
Supplemental Appropriation Request		0
Transfer		0
Cumulative Appropriation		2,600
Expenditures / Encumbrances		1,355
Unencumbered Balance		1,245
Partial Closeout Thru	FY06	0
New Partial Closeout	FY07	0
Total Partial Closeout		0

COORDINATION

Traffic Signals Project
Advanced Transportation Management System
Maryland State Highway Administration
Department of Technology Services

MAP



System Requirements - 100% complete/configuration control
Communications Master Plan - 65% complete
Field Inventory - 90% complete
Risk Analyses and Contingency Planning - 5% complete
Cost Estimate and Implementation Plan - 25% complete

FISCAL NOTE

The County's traffic signal system supports over 800 traffic signal locations, of which more than 550 belong to the State but are maintained by the County on a reimbursement basis. The State Aid displayed in the funding schedule is subject to Maryland State Highway Administration budget approval.

Operating Budget Impacts are expected as a result of this project and will be identified as the project continues to develop.

OTHER DISCLOSURES

- The Executive asserts that this project conforms to the requirements of relevant local plans, as required by the Maryland Economic Growth, Resource Protection and Planning Act.

OFFICE OF THE COUNTY EXECUTIVE
ROCKVILLE, MARYLAND 20850

Isiah Leggett
County Executive

November 23, 2009

The Honorable Martin O'Malley
Governor of Maryland
100 State Circle
Annapolis, Maryland 21401-1925

Dear Governor O'Malley:

Earlier this month, Montgomery County experienced a catastrophic system-wide outage of its computerized traffic signal system. This resulted in extensive back-ups and delays along the major corridors in the County. The gridlock also impacted Fire and Police emergency response vehicles. As part of the National Capital Region (NCR), Montgomery County plays an integral role in meeting the region's disaster preparedness and response capacity. Transportation into, out of and around the metropolitan Washington, D.C. as well as the Baltimore-Washington Corridor is essential. In a recent meeting with Senator Barbara Mikulski, she recommended that I work with you on a request for Federal funds that could be used to implement critical enhancements to the County's aged and obsolete traffic signal system.

A new traffic signal system is necessary to ensure that we have a reliable traffic control system to manage increasing traffic demands and to manage unusual traffic flows associated with incidents and events affecting the transportation network in Montgomery County and the NCR. Montgomery County's traffic signal system plays a critical role in NCR safety, and has the potential to contribute to successful mitigation of all manner of hazards; likewise, its inefficiency could be detrimental to an effective evacuation, ingress to or egress from an incident area, or access to response and relief efforts. The NCR's evacuation plan requests that major roadways radiating out of the nation's capital operate with extended signal cycles that facilitate the major flow of traffic along evacuation routes. If Montgomery County is not able to implement such a timing strategy for all of its major roadways, the result will be tremendous gridlock, putting citizens, workers, and visitors to the region in danger.

For example, on September 11, 2001, because of the County's traffic signal system, we were able to quickly and remotely synchronize our traffic signals to allow the unusual and concentrated amount of traffic to flow into and through Montgomery County. Had we not had that capacity, an already difficult day would have been made significantly worse because of gridlock. Recent events have shown that we need a reliable traffic management system not just for the ordinary crush of traffic, but for those events that we hope happen never again. The unfortunate fact is we can no longer rely on our antiquated system.

Montgomery County has developed a plan to enhance and modernize the current system, and identified the hardware, software and equipment to address our specific needs. The modernized system will include implementation of a distributed architecture to eliminate single points of failure, and will incorporate robust redundancies to ensure continued operation. The total cost to upgrade the traffic signal system is approximately 35 million dollars. We are ready to work with your staff and other key individuals to determine an appropriate level of funding to request. This project is a sound federal investment that will provide the NCR with immediate and profound regional disaster preparedness. I look forward to working with you in preparing a formal request for funding, and as always, please feel free to contact me at 240-777-2500 with any questions or concerns.

Sincerely,

Isiah Leggett
County Executive

IL:ps

cc: Hon. Barbara A. Mikulski
Hon. Benjamin L. Cardin
Hon. Chris Van Hollen
Hon. Donna S. Edwards
Hon. Roscoe G. Bartlett
Beverley K. Swaim-Staley, Secretary, MDOT