ITS, Operations Management, Safety, and Security Planning 10

Construction Costs have been increasing faster than inflation rates due to global demand for construction inputs such as steel, concrete, and asphalt. Meanwhile, projected transportation revenues have either been holding steady or declining over time due to increasingly fuel efficient vehicles which affect revenues from the fixed cents/gallon federal and state gas taxes. This situation means that fewer construction transportation projects can be accommodated in the Financially Constrained List of Projects as compared with past long-range transportation plans.

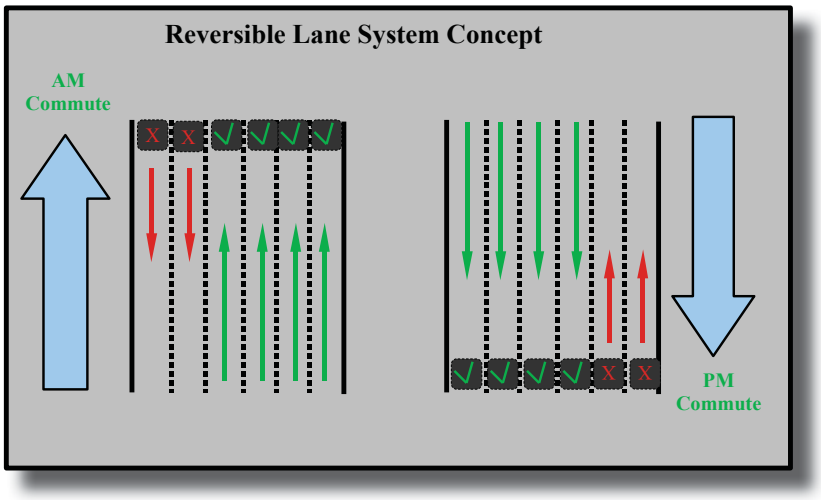
Photo simulation of possible Reversible Lane system for US 220 South

This creates both a challenge and an opportunity. It creates an opportunity for non-construction approaches (such as Intelligent Transportation Systems (ITS) and operations management) to play greater roles in long-range transportation planning. These approaches typically use existing infrastructure which is then "managed" using technology to observe, assess, and communicate messages to drivers.

Intelligent Transportation Systems

Reversible Lane Systems

While many technologies fall into the realm of ITS, a reversible lane system is one of the most elaborate. This system allows for reconfiguration of travel lanes on an existing roadway system in response to changing conditions, such as rush hour traffic or accidents.



In the diagram above 4 of 6 lanes are dedicated to the in going commute into the urban area in the morning, and 4 of 6 lanes are dedicated to outgoing commute in the evening. A reversible lane system is an excellent way to better manage the infrastructure already paid for by public funds, thereby reducing the need for costly facility expansion.

Photo-Simulation of Conceptual Reversible Lane system on US 460 (Orange Avenue) - Actual Conditions Depicted in Box Labeled "Current"

Interstate Reversible Lane Systems

Interstate reversible lane systems are similar to conventional reversible lane systems except that the center reversible lanes have limited access and are separated from the conventional interstate lanes. Vehicles enter and exit the reversible lanes through access gates at predetermined locations. A reversible lane could be used as an express lane from Roanoke to the New River Valley, as HOV lanes, as car only lanes, or as truck only. In fact, the reversible lanes could accommodate several functions -- HOV lanes for commute times, express lanes during the day, truck lanes at night. Fiber optics, sensors, and other technology can be installed to facilitate future technology advances.

Photo-Simulation of Conceptual Interstate Reversible Lane system on Interstate 581 - Actual Conditions Depicted in Box Labeled "Current"

Variable Speed Limit Zones

Variable speed limit zones allow speed limit adjustments in response to traffic flow conditions. The speed limit changes are communicated to drivers through a series of variable message signs (VMS) placed at regular intervals throughout the variable speed limit zone. The system can be used to reduce the speed limit for approaching traffic miles ahead of an incident, bottleneck, or severe congestion. It allows upstream traffic to clear before oncoming traffic amplifies the bottleneck by approaching too quickly. Likewise, safety is enhanced by reducing approach speeds and the likelihood of rear-end collisions.

Variable speed limit zones have been successfully deployed in larger urban areas such as Orlando, Florida. They are also used in Virginia at approaches to structural bottlenecks such as the bridge tunnels in the Hampton Roads area. Variable speed limit zones are not usually considered for smaller/medium urban areas such as Roanoke. However, increasing congestion on I-81 may warrant this approach as a mid-term measure while awaiting funds for a design or construction upgrade.

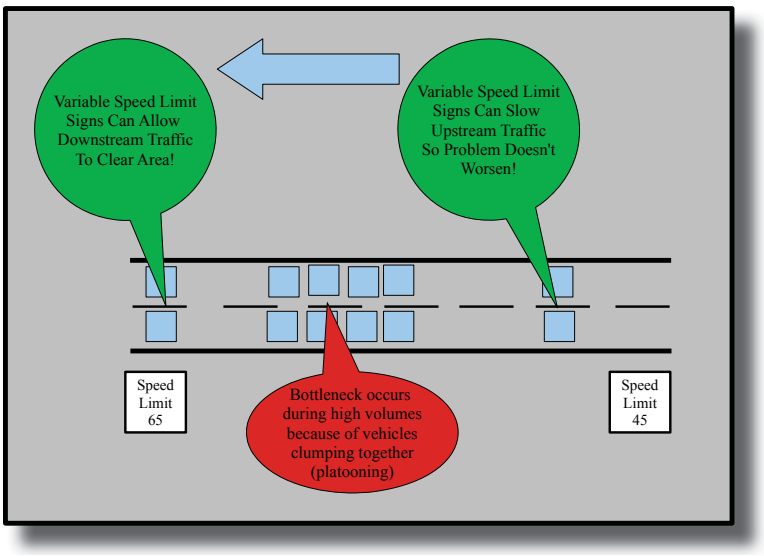


Photo-Simulation of Conceptual Interstate Variable Speed Limit Zone on Interstate 81 - Actual Conditions Depicted in Box Labeled "Current"

Parking Management Systems

Parking Management Systems incorporate a series of sensors and VMS that inform drivers which parking garages are full and direct drivers to parking garages with available space. This system could be combined with a common parking pass or common parking payment system to facilitate parking management. Parking Management Systems can not only reduce vehicle traffic, but can also potentially improve safety due to a reduction in cruising for parking spaces and fewer distracted drivers scanning side streets for open spaces.

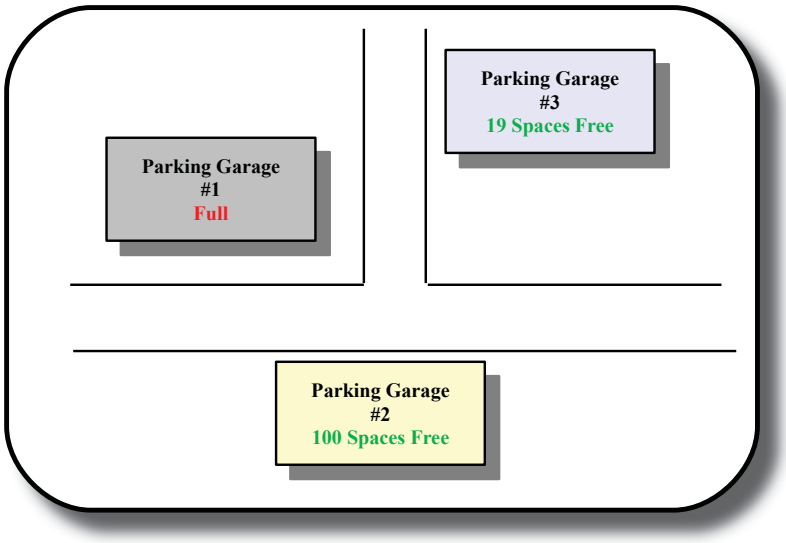


Photo-Simulation of Conceptual Parking Management Variable Message Signs in Downtown Roanoke - Actual Conditions Depicted in Box Labeled "Current"

Public Transportation Systems

The goal of this strategy is to get information into the hands of the transit user or potential user. In order to provide up-to-date information, transit vehicles, such as buses, would be outfitted with an Automatic Vehicle Location (AVL) system. This would allow operations managers to display up-to-date bus arrival times at bus stops and to display current vehicle locations on websites or through compatible mobile and hand held devices. This technology could open up additional ridership markets to transit systems. For example, a downtown employee could park a car once and take transit (using arrival time information) in order to avoid "in-and-out" parking charges. It would also benefit traditional transit customers.

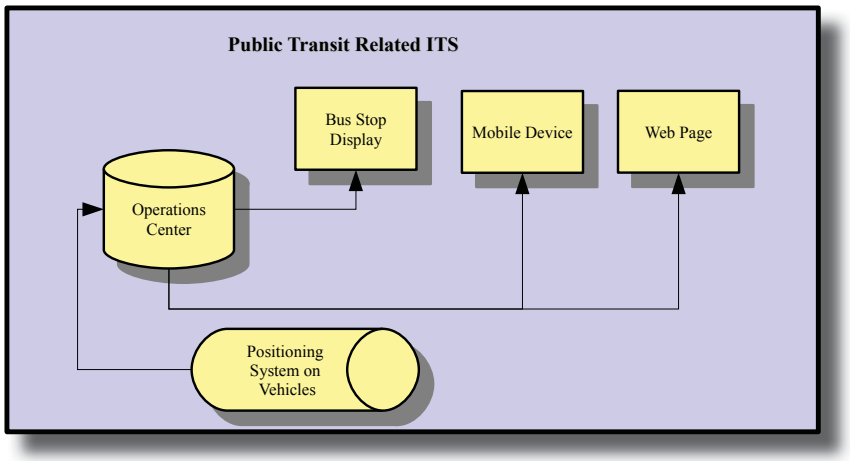
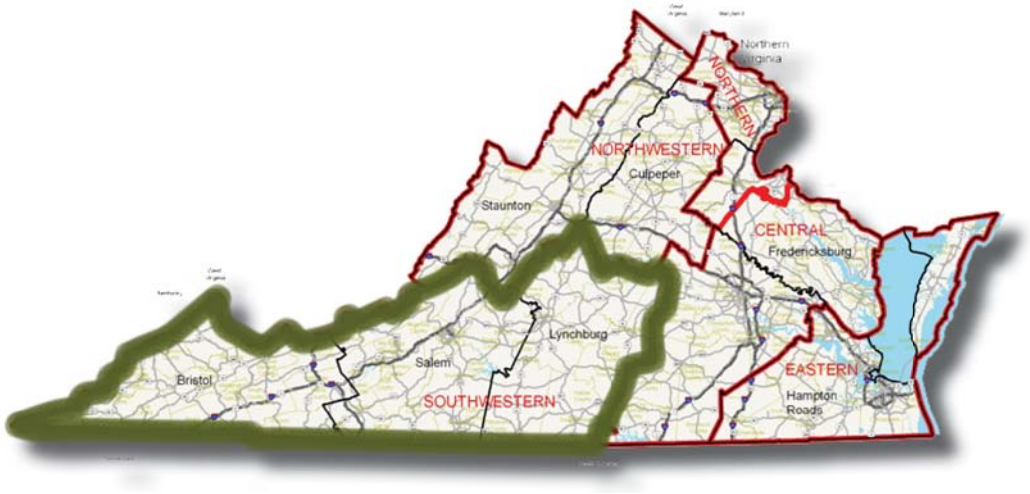


Photo-Simulation of Bus Arrival Time Message Sign - Actual Conditions Depicted in Box Labeled "Current"

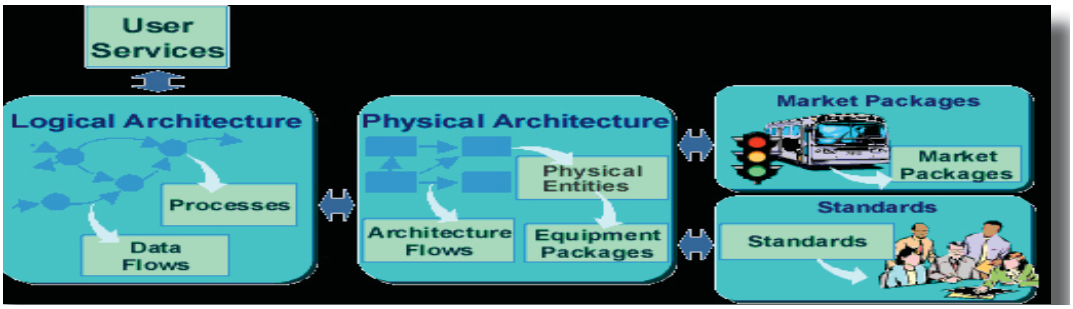


Proposed Virginia Southwest Region ITS Architecture geographic extent highlighted in green.

Regional ITS Architecture

Rapid advances in technology have created "new opportunities for transportation professionals to deliver safer and more efficient transportation services, and to respond proactively to increasing demand for transportation services." However, in order to effectively manage these opportunities, coordination between organizations is essential. To encourage and enable this coordination, the USDOT developed the National ITS Architecture as a cornerstone of planning for effective interagency coordination of technology-based projects. Further legislation encouraged "regional ITS architecture" that can be tailored to address local situations and ITS investment needs.

VDOT, along with a private consultant, ITERIS, is updating the Virginia Statewide ITS Architecture and the Regional ITS Architectures. The proposed updated ITS Architectures would apply to VDOT's Transportation Operations Center. RVAMPO recognizes the current VDOT ITS architecture, which conforms to the VDOT Salem Construction District geographic boundaries. The proposed updates would apply to VDOT's Transportation Operations Center (TOC) geography, which is larger than the previous "VDOT Construction District" geographical extent. The proposed geographical extent for the updated Regional ITS architecture is depicted in the map above. This geographical extent will include RVAMPO and MPOs in the Lynchburg Area, New River Valley, Danville, and portions of two multi-state MPOs near Bristol. It is anticipated that the RVAMPO will accept the final "Virginia Southwest Region ITS Architecture" as RVAMPO ITS Architecture.



Operations Management

Interstate 81 - Managed Travel Lanes System

The United States Department of Transportation's Federal Highway Administrations reports that traffic congestion has "reached unprecedented levels despite our heroic but, ultimately, failed efforts to build more highways in response to the nation's insatiable demand for travel."

Photo-Simulation of managed lanes in current I-81 median configured for Virginia Tech game days and other special events. Manage lanes could be coupled with a Variable Message Sign (right).

Managed travel lanes are one of the most effective tools for dealing with congestion. Managed travel lanes combine new construction of two or more lanes with ITS elements such as variable message signs (VMS), cameras and other sensors to actively manage the lanes to adapt to accidents, special events or peak travel times. (Note: These photo simulations are for illustration purposes only and are not drawn to scale.)

Managed travel lanes can be reversible and/or dedicated to trucks at specific times of the day. Non-recurring congestion, such as accidents, can play a major role in overall traffic delays. The figure to the right illustrates how repeatable temporary access points can allow traffic to shift around a major accident and allow emergency access to the scene.

Managed lanes are excellent for accommodating morning peak hour congestion. In this role the lanes could allow for peak hour directional traffic from Botetourt County to Roanoke, Salem, and the New River Valley. The managed lanes could consistently operate in the peak hour direction from 7:00 until 9:30 each morning.

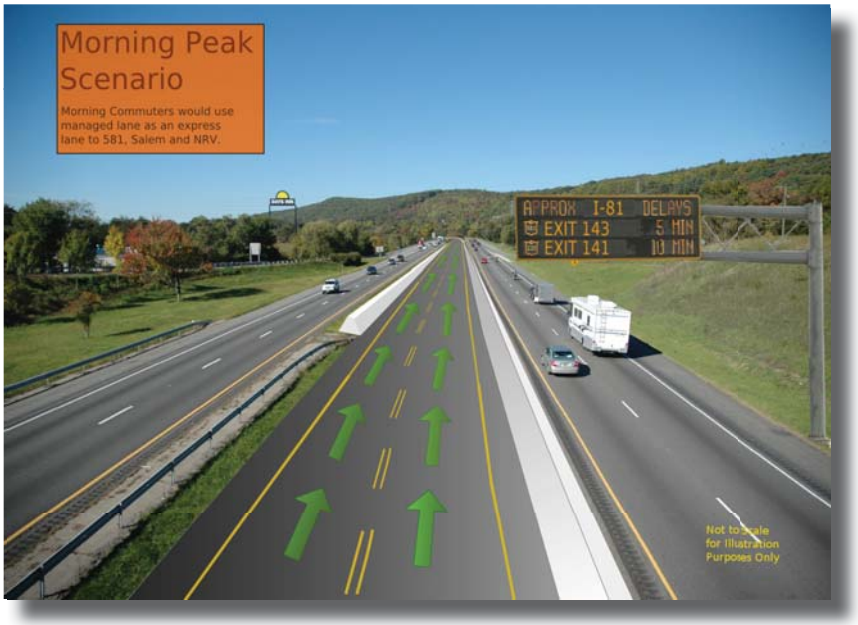


Photo-Simulation of managed lanes in current I-81 median configured for morning peak commute into Roanoke Metropolitan Area. Managed lanes could be coupled with a Variable Message Sign (right).

Likewise, managed lanes are excellent for accommodating afternoon peak hour congestion. In this role the lanes could allow for peak hour directional traffic from the Cities of Roanoke and Salem to Botetourt County. The managed lanes could consistently operate in the peak hour direction from 4:00 until 6:30 each afternoon.

Managed lanes can also be configured as truck only lanes, where the center lanes are restricted to through tractor trailers during the hours of highest tractor trailer demand.

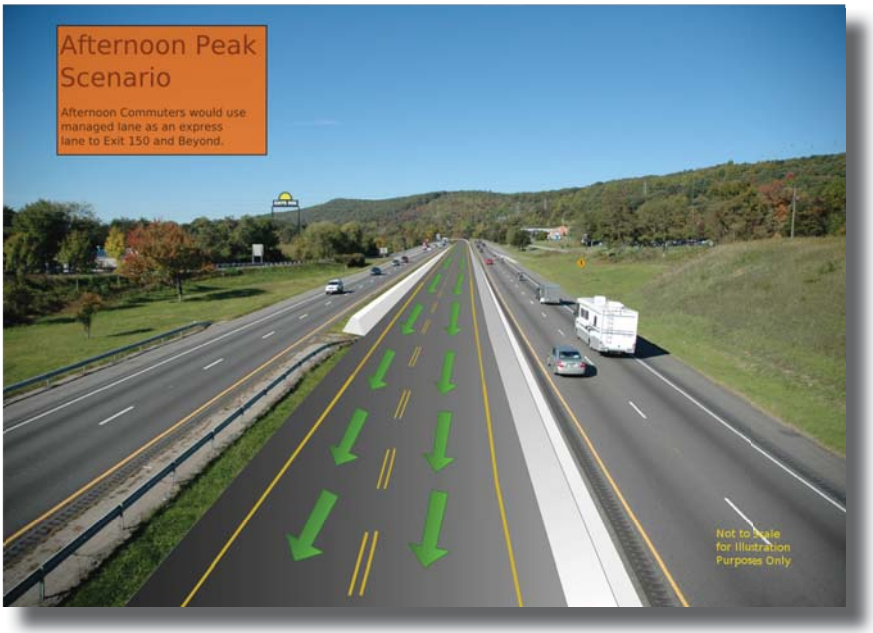


Photo-Simulation of managed lanes in current I-81 median configured for afternoon peak commute out of Roanoke Metropolitan Area.

The concept of truck only lanes was originally proposed by a consortium of companies referred to as "Star Solutions" under Virginia's Public Private Transportation Act (PPTA).

The figure below shows managed lanes that serve as truck lanes on a temporary or peak demand basis. The original PPTA concept would have permanently dedicated lanes to tractor trailer traffic twenty-four hours a day and seven days a week.

Another idea gaining acceptance is converting HOV (High Occupancy Vehicle) lanes to High Occupancy Toll (HOT) lanes. Free access to the HOV lanes is restricted to vehicles with two or more passengers, but by paying a toll Single Occupancy Vehicles (SOV) could gain access to the HOV lane.

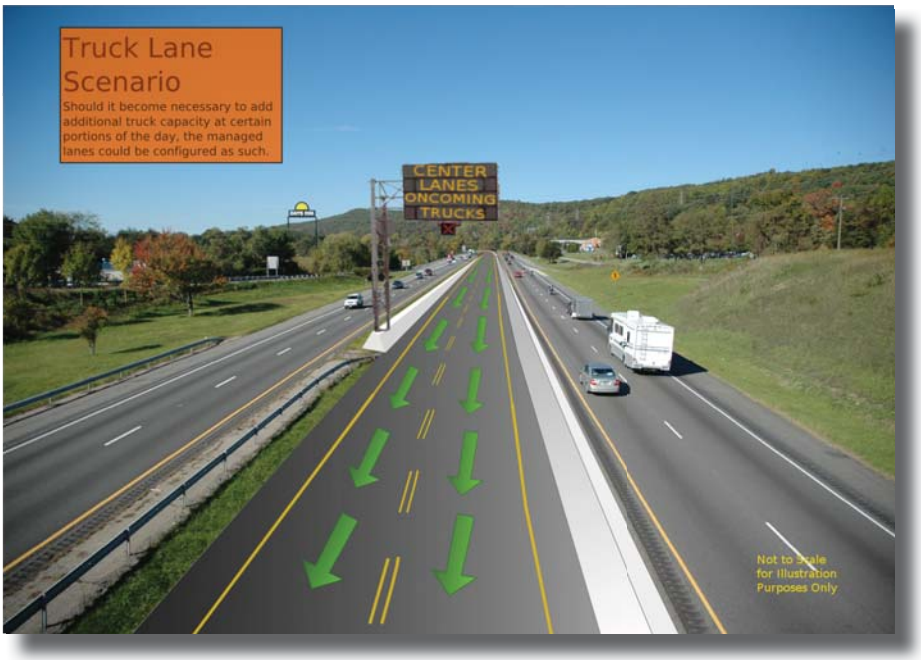


Photo-Simulation of managed lanes in current I-81 median configured for peak truck demand. Managed lanes could be coupled with a Variable Message Sign (center).

The fee could vary by the time of day and could be communicated using variable message signs. The fee would be collected using transponders and wireless technology.

Photo-Simulation of managed lanes in current I-81 median configured for morning High Occupancy Toll (HOT) peak commute. Managed lanes could be coupled with a Variable Message Sign (center), and additional High Occupancy Vehicle (HOV) outside lanes.

Safety Planning

Safe Routes To School Program

RVAMPO has been working with the Roanoke City, Roanoke County, and Salem City Schools systems since 2006 to develop Safe Routes to School (SRTS) programs in elementary and middle schools. With RVAMPO's assistance, these systems have successfully applied for SRTS grant funding through VDOT. The goal is to have SRTS programs at all appropriate schools in the region by 2015.

The SRTS programs enable and encourage students to walk and bicycle to school by assessing conditions around schools and conducting projects and activities that improve safety and reduce traffic and air pollution in the vicinity of schools. As a result, these programs make bicycling and walking to school safer and more appealing transportation choices while encouraging a healthy and active lifestyle from an early age.

The implications of SRTS can be far-reaching. Safe Routes programs can improve safety not just for children, but for all pedestrians and bicyclists. They provide opportunities for people to become more physically active and to rely less on their cars. SRTS programs benefit the environment and enhance the community's quality of life by reducing traffic congestion and motor vehicle emissions.

The SRTS initiative was given a tremendous uplift when funding for programs and infrastructure was included in the 2005 federal transportation legislation, SAFETEA-LU. Based on this legislation, the Virginia Department of Transportation developed a Safe Routes to School Program that provides grant funding to interested localities and schools to develop plans, activities, and infrastructure improvements for students in kindergarten through eighth grade.

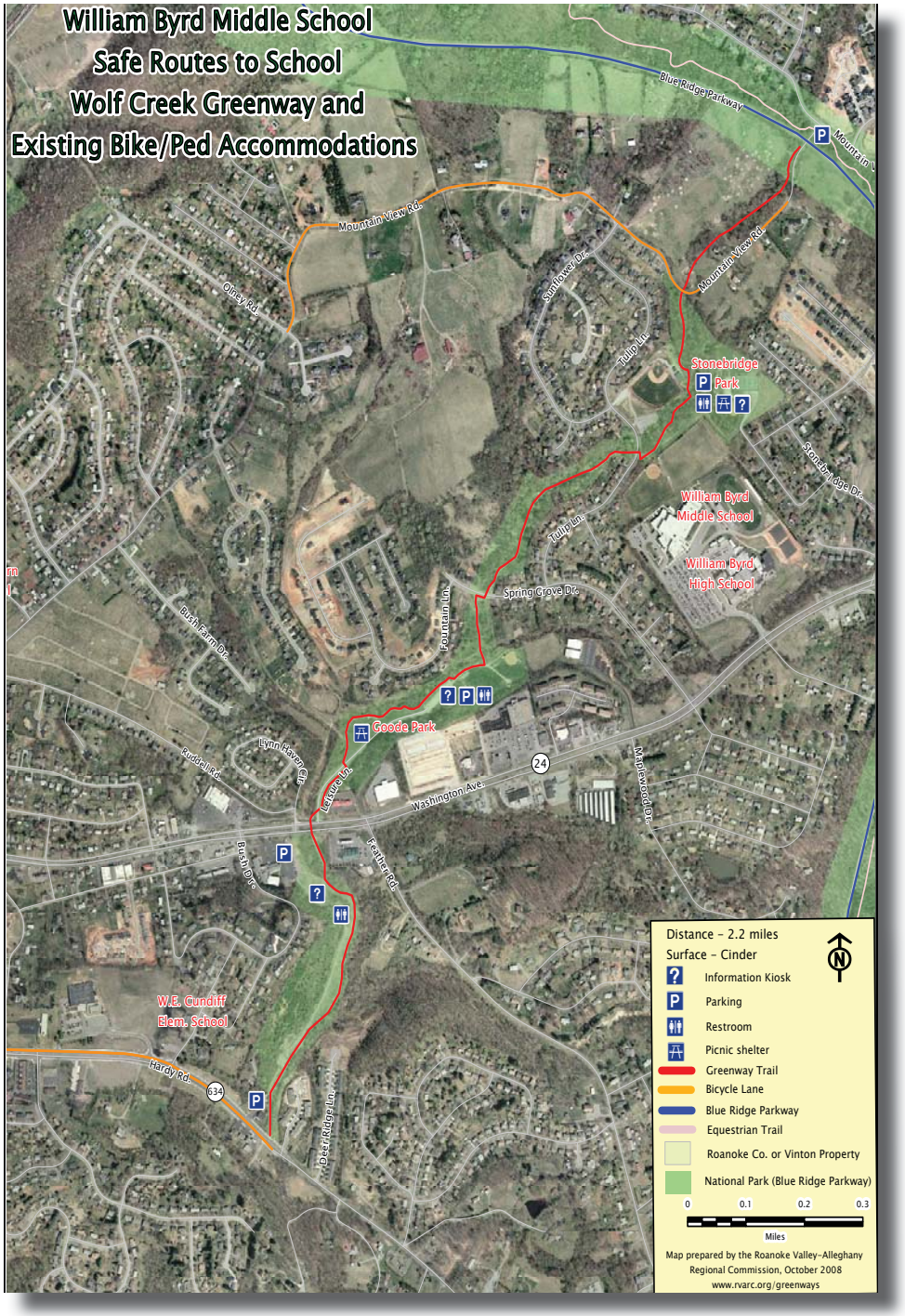
Safe Routes To School Travel Plans

When schools and communities are ready to move ahead, they develop Safe Routes to School Travel Plans. These are developed for an individual school, a group of schools, or an entire school system. Generally these plans include the following elements:

- Safe Routes to School Team
- Public Involvement
- Existing School Travel Environment
- Barriers to Active Transportation
- Recommendations

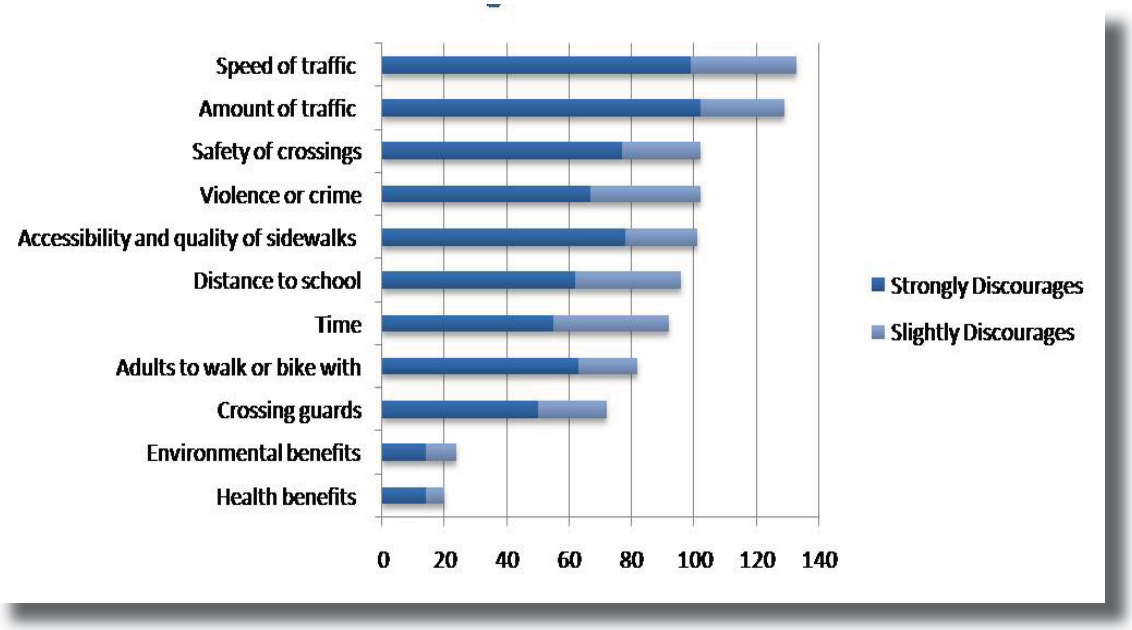
William Byrd Middle School students bicycling on the Wolf Creek Greenway.

A significant aspect of Safe Routes Travel Plans is identifying existing bicycle and pedestrian accommodations as well as potential connections. Below is a map from the William Byrd Middle School Plan that shows the existing accommodations near the school campus.



Map of existing bicycle and pedestrian facilities of the William Byrd Safe Routes to School Traval Plan.

SRTS Travel Plans also include extensive evaluation of existing modes of travel, barriers to active transportation, and potential solutions or recommendations. Below is a chart from the William Byrd school plan based on the results of a survey circulated to all William Byrd parents to assess their perceptions of accessibility and safety.



Roanoke County bicycle safety training program participants and mobile bike storage bus.

Strategic Highway Safety Plan

As required by SAFETEA-LU, the Commonwealth of Virginia has developed a Strategic Highway Safety Plan with the mission of saving lives and reducing injuries related to motor vehicle crashes. The plan calls for a multi-perspective approach to identifying problems in three emphasis areas: human factors, environmental, and fundamental. Elements of the plans include:

- Driver Behavior
- Special Users
- Roadway Departures
- Intersection Safety
- Pedestrian and Bicycle Safety
- Work Zone Safety
- Traffic Records
- Transportation Safety Planning

HIGHWAY SAFETY CHALLENGE

RVAMPO will coordinate with the Commonwealth to implement the recommendations of the plan, improve the level of transportation safety planning in the region, and fund projects through the Transportation Improvement Program (TIP).

Blue Ridge Transportation Safety Board

A staff representative of RVAMPO serves on the Blue Ridge Transportation Safety Board (BRTSB) and coordinates on projects of mutual interest. BRTSB's purpose is to coordinate and promote traffic safety programs, projects, and initiatives within the Roanoke DMV District and provide a professional network through which jurisdictions in the district can receive guidance and support for their individual traffic safety efforts. Several ongoing programs associated with the BRTSB include: the Roanoke Crash Investigation Team (RCIT), REACH (Responsible Educated Adolescents Can Help), and YOVASO (Youth of Virginia Speak Out About Traffic Safety).

BLUE RIDGE TRANSPORTATION SAFETY BOARD

Members of the Roanoke Crash Investigation Team (RCIT) at the scene of an accident.

Security Planning

Evacuation Planning

RVAMPO recently developed an evacuation guide to assist local governments with the plan for an evacuation. It was developed as a tool for emergency managers charged with assessing how best to protect citizens in the path of a threat. This guide is not an all-inclusive evacuation plan instruction manual as each community has unique features and many already have plans to deal with specific threats.

The guide suggests procedures that should be followed to order and implement an evacuation due to an emergency or event, so as to mitigate potential damage to the health, safety, and general welfare of impacted citizens.

Two types of evacuation types are defined in the guide, as follows:

- Emergency Evacuation – An incident or disaster that has no advanced notice and requires immediate evacuation, such as a fire or hazardous materials incident.

- Event Evacuation - A predicted hazard that has advanced notice and allows time for a planned response and evacuation authorization process, such as a flood or snow storm.

The guide contains both instructions and forms to respond to either evacuation type. For an emergency evacuation, it provides a very brief evacuation plan and evacuation order forms. For an event evacuation, it contains procedures and forms describing the complete evacuation planning and implementation process. The guide includes:

1. A fill-in-the-blank field checklist for managers charged with the evacuation effort;

2. A form for collecting data needed for planning and executing an evacuation; and,

3. A form to record the emergency evacuation response efforts.

RVAMPO recently helped the City of Roanoke integrate aspects of the guide into the City's Emergency Operations Procedure.