Reversing the additional lane trend

Build new lanes or use existing lanes more effectively? In a recent US study* commissioned by Lindsay Transportation Solutions, the company argues the case for reversible lanes

The level of future uncertainty in transportation planning - specifically in addressing congestion on urban freeways - has increased significantly over the past few years. The impact of connected and autonomous vehicles on traffic flow, of Mobility as a Service (MaaS) initiatives, particularly the car-sharing elements, and exciting advances in traffic operations are some of the factors contributing to this uncertainty.

The US Federal Highway Administration acknowledged uncertainty in its recent publication ‘Advancing Transportation Systems Management and Operations through Scenario Planning’. Investment of billions of dollars in projects to widen congested urban freeways has become risky and might be a misappropriation of scarce transportation funds.

The study by Danial Rathbone** examines these two options, timelines and costs for reducing congestion. One option is widening a congested urban freeway by constructing one additional lane in each direction. The other option is providing a reversible lane using moveable barrier to create an additional lane during the traditional morning and late afternoon peak periods of travel.

Main findings of the report focussed on comparing costs, time from design to operation and environmental issues.

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Seen and safe with Visi-Barriers

US-based manufacturer Castek says that its Visi-Barrier is more than a safety barrier. Because it is highly visible, it solves poor delineation roadway problems prevalent under night driving and rainy conditions.

A continuous visible stripe is an integral part of each panel. The stripe consists of highly retroreflective glass beads placed in a wide vertical stripe that results in year-round, all-weather, high driver visibility, says Castek, a division of Transpo Industries, also based in the US.

The systems consists of precast polymer concrete barrier panels that act as a stay-in-place form. A thermosetting resin binder develops high strength and good resistance to the roadside elements and corrosive attack. The quantity of binder resin is between 8-12% of the total weight of the polymer matrix.

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Pre-dried blended aggregates - a combination of silica flours, granite and silica - comprise the balance of the polymer matrix.

Fibre glass mesh is placed in the panels during casting for additional reinforcement.

Threaded anchor inserts are cast into the back face of the panel to accept threaded hooked rods. Pull-out values for each cast-in insert meet or exceed 453kg. Alternately, recessed anchor pockets can be cast into the panels for easy retrofit applications from the traffic side. Special caps are available to cover the recessed anchor pockets after panel installation.

Minimum performance for the retroreflective surface is 1000mcd/ Lx/m² (milli-candela/lux/m²) at a geometric arrangement equivalent to an EcoLux Reflectometer that is at a 3.5° co-entrance angle and 1° observation angle.

The polymer concrete barrier panels are gel-coated on the traffic side to facilitate easy cleaning and to enhance panel aesthetics and colour.

Among the projects in which Visi-Barrier has been used are the George Washington Bridge in New York, the Kingston-Rhinecliff Bridge toll plaza, also in New York, and the Cumberland Gap Tunnel between Kentucky and Tennessee.

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Coronado Bridge in San Diego, California

Visi-Barrier from Castek/ Transpo: visibility as well as crash safety
A slim win for Rebloc in Estonia

Rebloc’s integrated noise barrier offers maximum noise protection while creating a highly effective noise barrier and vehicle restraint system. Rebloc says that its system meets the highest safety and quality standards and is tested according to European Standard EN 1317 (vehicle restraint system), EN 14388 and EN 1793 (noise barrier).

The main advantage of the noise barrier system is the combination of a vehicle restraint system as a concrete safety barrier with an integrated noise barrier. It features a space-saving slim design – the reason that it was chosen for installation in Estonia last autumn. There was not enough space for a conventional design including a regular guardrail and noise barrier.

Around 400m of single-sided noise barrier NB100/300_8_H2/W4 has been installed on motorway 4 – also known as the pan-European E67 – near Tallinn–Pärnu–Ikla. Project managers were particularly satisfied with the easy installation of the system and that construction was finished ahead of schedule, according to Rebloc.

The system features a modular construction consisting of a concrete base and a noise barrier panel that is inserted into the slotted recesses of two concrete elements. A full-length continuous steel tension bar is integrated into the barrier elements and connects them with the integrated coupling to form a strong and continuous chain. The coupling system has no loose parts, which facilitates the installation and prevents unauthorised removal of pieces.

Due to the modular construction, the system can act as a temporary noise barrier. Rebloc’s noise barrier is available as a one-sided system for use along the verge of the road as well as a double-sided system for the central reservation. The noise barrier can be customised to accommodate heights, containment levels and application-specific designs.

California

In September 2016, the US state of California passed a law requiring that, prior to the California Transportation Commission approving a capacity-increasing project or major street or highway lane realignment project, the California Department of Transportation (Caltrans) or a regional transportation planning agency must demonstrate that reversible lanes were considered for the project. This legislation recognises the cost-effectiveness of reversible lanes.

In fact, reversible lanes are not new to California. They have been used on the 2.7km Golden Gate Bridge since 1963 where they reduced severe traffic in the peak direction. However, they were labour-intensive to operate and posed serious safety problems because they led to the increase in head-on collisions.

Since early 2015, the Road Zipper, from Lindsay Transportation Solutions, has been reversing lanes on the Golden Gate Bridge. The Road Zipper system consists of T-shaped moveable reactive tension barriers that are linked like a zipper to form a continuous wall. Using a conveyor wheel system, the Road Zipper transfer machine travels at up to 16kph while raising the barriers slightly from the road surface and repositioning them to create a moveable “zipper lane.”

Rebloc’s integrated noise barrier: various materials and colours are available as sound absorption material.
Reversible lanes are also in use on the 3.4km San Diego-Coronado Bridge, along the Interstate 15 freeway in San Diego and, until recently, in the 1.1km Caldecott Tunnel in Oakland, California. More recently, Lindsay’s Road Zipper has been adopted in the San Francisco area of California and much further north, in the Pacific coast city of Vancouver, Canada.

In March, Lindsay signed a deal with the Bay Area Transportation Authority to deploy its Road Zipper System on the 8.8km Richmond-San Rafael Bridge in San Francisco. The moveable barrier technology will be used to create a bicycle and pedestrian walkway across the bridge. Lindsay’s revenue from this project is valued at around $9 million.

The project calls for moveable barrier to be installed on the north side of the upper deck of the bridge. This throughway will add another section to the planned 800km network of bicycle and hiking routes on the Bay Trail.

Moveable barriers have been used for bicycle lanes in other cities, but the Richmond-San Rafael Bridge installation is special, explains Chris Sanders, senior vice president of Lindsay Transportation Solutions.

Each reactive tension segment (RTS) of the chain will be an RTS Guard, a high-performance, high-containment barrier designed to separate bicycle and pedestrian paths from traffic on busy roads and bridges where vehicle encroachment into the path would have a high probability of causing injuries or fatalities. The flexible barrier can be static barrier or quickly changed and easily moved with a barrier transfer machine to expand the path or for maintenance and street cleaning.

RTS Guard increases the height of the barrier from 81cm to nearly 107cm. RTS Guard is tested to MASH TL-3 and the 107cm-high profile keeps cyclists from vaulting the barrier in case of impact. The barrier is pending FHWA approval for MASH TL-3.

BC bound

The San Francisco deal follows an agreement in December with the Canadian province of British Columbia’s Ministry of Transportation. The Road Zipper System will be installed on the Alex Fraser Bridge which connects the adjacent cities of Richmond and New Westminster with North Delta in Greater Vancouver.

The Zipper replaces a static concrete barrier in order to accommodate increased traffic flow during peak periods. Lindsay’s revenue from this project is valued at around $14 million, according to the company.

Opened in 1986, the 2.5km Alex Fraser Bridge was designed to allow for the number of lanes to be increased. When it first opened, only four of the six lanes were used for traffic. As traffic increased, pedestrian and cycling lanes were moved to the perimeter of the bridge so that all six lanes could be used for vehicles.

British Columbian officials will re-stripe the lanes, adding a seventh lane along with the new counterflow moveable barrier system to improve capacity and help reduce traffic congestion during peak periods. An average of 119,000 vehicles move across the bridge every day, and when this project is completed, officials say motorists can expect to save six minutes on their morning northbound commute and 12-16 minutes during the afternoon rush hour heading south.

Lindsay Transportation Solutions

www.Lindsay.com


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