

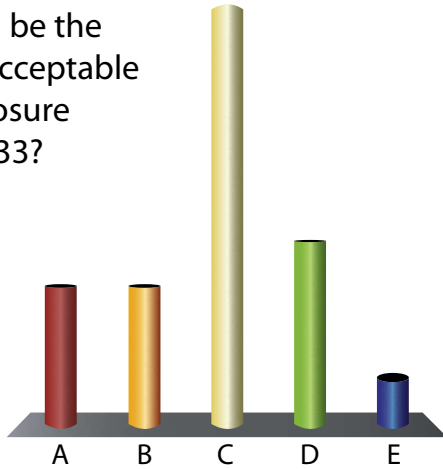
The Value of ABC

A department of transportation perspective from Vermont

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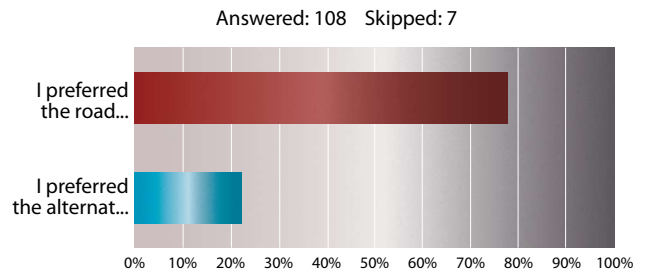
What would be the maximum acceptable length of closure for Bridge #33?

- A. 5 days
- B. 1 week
- C. 10 days
- D. 2 weeks
- E. 4 weeks



According to a Vermont Agency of Transportation survey, 45% of respondents found a 10-day closure acceptable. All Photos and Figures: Vermont Agency of Transportation.

How would you rate your level of satisfaction with the road closure compared to alternating one-way traffic following the bridge closure period?



Survey respondents overwhelmingly preferred short, total road closures to longer, alternating one-way closures.

The value and benefits of accelerated bridge construction (ABC) are often easier to distinguish and realize in urban environments characterized by high traffic volumes, congestion, and greater roadway densities. In these areas, ABC dramatically reduces work-zone, road-user costs. This coupled with other project costs including right-of-way acquisition (ROW), project administration, environmental permitting, and utility relocation, or lack thereof, often results in lower project costs making it an easy sell to lawmakers, the public, and other stakeholders.

Moreover, at a time when many of our urban highways are over capacity and customers have come to expect a reliable transportation network, building and maintaining support for efficiently preserving our highway assets can be easier with ABC, especially when detour routes are short. However, in rural states like Vermont, it can be harder to justify the value of ABC where daily traffic volumes and associated roadway user costs tend to be low. In addition, roadway networks are scarce, which results in lengthy detours, making it difficult to garner public support.

So what is the value of ABC and how should its value be measured? Like other states, many of the typical benefits hold true regardless of geography. For example, by closing a road rather than installing a temporary bridge, impacts to right-of-way, environmental resources, and utilities are reduced or eliminated altogether, facilitating expedited project delivery and rapid replacement of deteriorating infrastructure.

With Vermont's lengthy environmental permitting and ROW processes, the use of ABC substantially reduces the time it takes to deliver bridge rehabilitation and replacement projects, ultimately lowering design costs and reducing resource demands. Short-term road closures also improve safety for motorists and construction workers alike by routing traffic around rather than through the work zone.

Vermont Agency of Transportation's (VTrans') mission, like many other transportation agencies, includes providing for the safe movement of people and goods. VTrans' Structures Section recently adopted a general

rule of considering road closures as the preferred option for maintaining traffic unless deemed impractical during the project initiation phase. While not always obvious, short-term road closures also minimize impacts to the traveling public and commerce by significantly reducing on-site construction duration. Results from a public survey following three consecutive rapid bridge replacement projects on VT 73 in 2014 showed that 82% of respondents felt very satisfied with ABC even though the detour length was 51 miles over mountainous terrain.

In 2012, VTrans created the Accelerated Bridge Program (ABP). Since its inception, VTrans has reliably expedited project delivery and reaped many of the common benefits attributed to ABC. This success has added unanticipated value by becoming ingrained in our organizational culture promoting innovation throughout all phases of project delivery. In addition, the ABP has gained significant support from local politicians and, with this support, has been able to pass legislation that further enables and promotes the

program. Finally, VTrans has found that ABC adds substantial value to legacy projects that were once shelved due to public opposition to conventional construction.

Expediting Project Delivery

At a time of increased federal funding associated with American Recovery and Reinvestment Act (ARRA), along with an aging bridge population, VTrans examined various strategies to expedite the delivery of bridge projects. However, the narrow widths common to Vermont's workhorse bridges ruled out phased construction. This limitation, coupled with Vermont's lengthy ROW and environmental permitting processes required for temporary bridges, made it difficult to achieve the goal of expediting project delivery. In the past, ABC with short-term road closures was only used when all other alternatives were discounted. However, VTrans quickly came to realize that the project development process could be streamlined by using ABC.

In 2012, VTrans reorganized, creating the project initiation and innovation team (PIIT) and ABP. The PIIT was formed to ensure an efficient, consistent, and programmatic approach to identifying the best alternative for rehabilitating and replacing deteriorated bridges and culverts. This process considers the needs of the bridge; maintenance of traffic options, construction practices, and contracting methods; along with an emphasis on the context of the corridor and community involvement. Rather than looking at ABC and short-term closures as the last choice, these methods are examined alongside more conventional construction practices and only discarded if found impractical.

To ensure the successful implementation of ABC on a statewide basis, the ABP was established to specialize in expedited project delivery using prefabricated bridge elements and systems (PBES) and short-term road closures. By minimizing project impacts, VTrans has been able to reduce the project development phase from 60 months down to just 24 months, allowing VTrans to respond quickly to increases in funding, emergency bridge replacement projects, and bridge inventory performance measures. The ABP could not have come to fruition

at a better time. In August 2011, Tropical Storm Irene pummeled the slopes and valleys of Vermont, severely damaging more than 500 miles of state roads and 200 bridges, which isolated 13 communities.¹ Shortly after the initial response to repairing Vermont's transportation network, the ABP tapped into lessons learned by delivering all 15 emergency relief projects within 12 to 24 months. In addition, resource demands have been greatly reduced or eliminated allowing precious resources to be allocated to larger, more complex projects. This is something that is necessary at a time when state agencies are asked to do more with less.

Creating a Culture that Values Innovation

Like most large organizations, it is often difficult to innovate because standard operating procedures and associated habits are hard to change. The same holds true for roadway network users. At the onset of the ABP, team members met with stakeholders from around the state to demonstrate the value of ABC and PBES and garner support for the program. These forums provided an opportunity to vet best implementation practices and discuss comments or concerns from the public, emergency responders, and contractors. This early and continued collaboration created invaluable partnerships and a means for stakeholders to become invested in the program.

In addition, project managers (PMs) within the ABP were given a great deal of latitude and were encouraged to explore strategies for streamlining the project delivery process. This promoted creativity and calculated risk taking. Since the initial projects stemmed from Tropical Storm Irene, the ABP had support at the highest levels within VTrans to meet or exceed the time requirements associated with emergency-response funding along with a heightened urgency to restore the transportation network.

As these project progressed, members of the ABP team met regularly to share lessons learned and to recommend strategies to incorporate into standard operating procedures. This included determining concurrent development activities, how to effectively and efficiently coordinate with resource

Garnering Political Capitol

As word began to spread about the Accelerated Bridge Program (ABP), Vermont legislators became increasingly interested to learn more about rapid bridge replacement projects. Staff from the ABP were invited to provide an overview of the program to the House and Senate Transportation Committees. Committee members were impressed with the programmatic use of accelerated bridge construction (ABC) and reduced project impacts.

During these initial meetings, transportation committees brainstormed ideas to promote ABC on a statewide basis. These efforts ultimately led to the enactment of Act 153 in 2012, which reduces a town's share of local project costs by 50% if the town elects to close the road rather than install a temporary bridge. This provides a considerable financial incentive for towns to favor ABC. Ultimately, this legislation has propelled the use of ABC with 20 towns electing to take advantage of Act 153. Once towns become accustomed to short-term road closures to quickly deliver projects with minimal impacts, they are receptive to supporting ABC on state highway projects.

groups, best practices for public engagement, and standardizing plan sets and specifications. By creating a more inclusive and collaborative process, teams working on ABP projects became invigorated and excited to take a fresh look at modifying standard procedures which cultivated pride, ownership, and innovation.

As the first projects went out to construction, communities were hesitant to accept short-term road closures. Most residents, business owners, and emergency services were skeptical of ABC. To alleviate concerns, PMs worked closely with affected communities providing real time information and assurance that short-term road closures would actually reduce traffic impacts. In addition, most contracts were incentivized to open the road early, providing greater assurance of successful projects. As the first projects

were completed and roads reopened, communities began to embrace ABC with many towns holding celebrations. With these initial victories, the ABP gained significant momentum.

Partnering with Local Communities

Public involvement is often considered an impediment to project delivery. The public and other customers often have differing opinions and developing consensus can be difficult. However, investing in early and continued public involvement is essential to achieving buy-in and ongoing support. VTrans has found that public endorsement for the preferred alternative during the project initiation phase removes several barriers to delivering the project in construction and increases overall public satisfaction with the final product.

By its very nature, ABC with short-term road closures requires heightened public involvement throughout the project delivery process. For example, it's vital to ensure that affected communities agree in advance to a short-term road closure to curtail public opposition during design and construction. Communities must also be engaged to determine the optimum timing and duration of the closure to mitigate impacts to community events, local businesses, and emergency services. As construction begins, project outreach is essential to keep roadway users and other stakeholders informed prior to, during, and following the short-term closure to plan travel accordingly.

Public involvement and outreach has proven highly successful in the deployment of ABC and achieving public satisfaction.

Public involvement and outreach has proven highly successful in the deployment of ABC and achieving public satisfaction. On average, over 80% of all respondents have been very satisfied with ABC, even in communities that were initially opposed to this approach to project delivery.

Using ABC to Deliver Legacy Projects



Middlebury Sand Hill Bridge legacy project in 2014.

Several projects within the Vermont Agency of Transportation had been on the books since the early 1980s. Many of these projects were put on hold because of public opposition due to impacts from traditional construction methods. Often, other conventional solutions were proposed, only to be met with more disapproval due to community concerns over project impacts and traffic management strategies. This created significant inefficiencies including lengthy schedule delays and increased costs for these legacy projects.

With the establishment of the Accelerated Bridge Program in 2012, all legacy projects were reexamined to determine if accelerated bridge construction (ABC) was the right solution to revitalize these projects and in many cases, it was the only viable solution. After years of projects at a standstill, this innovative approach was embraced by the affected communities and other stakeholders.

The Middlebury Sand Hill Bridge is a prime example of a legacy project. The historic 49-ft-long arch structure built in 1924 was programmed for replacement in 1983. A community landmark in a recreational area, the site was surrounded by constraints including archeologically significant mill sites, a recreational swimming hole, and aerial utilities. Phased construction was not an option given the bridge type and inadequate bridge width. As a result, the original scope included a temporary bridge adjacent to the existing structure that posed significant impacts and public hardship. Even widening the bridge to meet state standards was contentious.

All of these factors caused the project to come to a halt. A solution that minimized project impacts and met historic requirements seemed impossible until a short-term road closure was considered. This strategy was much more palatable to the community and rejuvenated the project again after 28 years. To shorten construction, engineers designed an arch-like structure utilizing prefabricated bridge components. With this ABC solution, the project was delivered in just 3 years highlighting the successful use of innovation to remove impediments to delivering projects. The new arch was constructed in 42 days, 3 days short of the allowable 45-day closure period.

Three Years of Proven Performance

Since implementation in 2012, the ABP has delivered 28 projects totaling \$71.3 million with another 17 projects under development. The program has gained significant momentum and has proven successful at expediting project delivery by reducing the standard design duration from 60 months for conventional projects down to 24 months. Due to these achievements, the program has also received the support of Vermont's legislative branch which enacted Act 153 that reduces the town share of costs on local projects by 50% if the town chooses to close the road versus installing a temporary bridge. The ABP has also been used to replace several legacy bridge projects programmed since the 1980s. Much of this success is attributed to partnering with local communities.

Reference

1. Vermont Agency of Natural Resources. 2012. "Tropical Storm Irene," Vermont Agency of Natural Resources. October. <accessed January 30, 2016. <http://www.anr.state.vt.us/anr/climatechange/irenebythenumbers.html>>.

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EDITOR'S NOTE

This paper was originally submitted and presented at the 2015 National ABC Conference.