Programmatic Implementation and Value of ABC – VTrans Approach
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Presentation Outline:

- Accelerated Bridge Program Overview
- Programmatic Approach to ABC
- ABC Work Horse Bridges
- Delivering Legacy Bridges
- The Value of ABC for VTrans
Setting the Stage for the ABP and ABC

- Significant increase in funding for bridges
- Aging bridge population
- Tropical Storm Irene
- Legacy projects
  - Project on the books beyond 5 years
Accelerated Bridge Program Goals

- Improve the condition of Vermont’s bridges
- Be Transparent and Accountable to all stakeholders
- Be an early adopter of research
- Implement Accelerated Bridge Construction
- Build on successful and proven innovations

Project Delivery Performance Goal
- 24 months from project defined to advertising
- Deliver Legacy Projects
- Deliver 5 year plan for construction
The Accelerated Bridge Program

- ABP is embedded within the Structures Program
- The ABP draws projects from the same funding available for all of the Structures program
- Projects are selected for ABC or Expedited delivery
- Programmatic approach to delivering accelerated bridge construction projects
  - Consistent decision making for road closures and ABC
  - Consistent detailing (standardizing)
  - Consistent policies for Incentive/Disincentive
  - Consistent outreach throughout design and construction
ABP Implementation

- The Structures Section reorganized in 2012
- Created two new sections
  - Accelerated Bridge Program (ABP)
  - Project Initiation and Innovation Team (PIIT)
ABP Implementation

- Early and continued coordination
  - Public outreach
  - Contractor Input
  - Internal and External Stakeholders

- Streamline/expedite the project delivery process
  - Maximize flexibility in rules and process
  - Evaluate risk but run concurrent activities

- Be collaborative and flexible

- Develop and use standard details for ease of fabrication and construction

- Design projects to be successful for ABC
Project Initiation & Innovation Team

- Dedicated team of scoping Engineers and Technicians
- All bridge projects start here
- Approximately 20-30 projects initiated and scoped per year
- Heavy emphasis on collaboration
- Public Engagement in Process

**ABC option is always first consideration.**

- Goal of 25% assigned to the ABP
- Goal of 30% utilize PBES
Setting ABC Projects Up for Success

- Good scope and Structure type that supports ABC
- Credible CPM Schedules and Estimates
- Risk Register
- Traffic Management Plan
- Public Involvement Plan
More Program Reorganization!!

- **Team Co-location**
  - Utilities
  - Hydraulics

- **Team Co-organization**
  - Environmental
  - Right of Way
  - Construction

![Diagram showing the reorganization structure with nodes for Structures Program, Accelerated Bridge Program, Bridge Preservation, Alternative Contracting, Conventional Project Design/Delivery, Utility Coordinator, and Hydraulics.](image)
Cultivating teams through Co-organization

- **Project Initiation**
  - Collaboration Phase
    - Construction
    - Environmental
    - Right of Way

- **Project Definition**
  - Construction

- **Project Design**
  - Constructability Review Meeting
  - Specification Review Meeting
  - Construction
  - Environmental
  - Right of Way

- **Construction**
  - Pre-closure Contractor Coordination Meeting

- **Operations and Maintenance**
Streamlining the Project Development Process

- **Team Co-Location**
  - Hydraulics embedded in the Program
  - Utility Coordinator embedded

- **Team Co-Organization**
  - Focused collaboration with key internal project team members not in the Program
  - Construction, Environmental, Right of Way, Contracts and Maintenance

- Coordination and Constructability Meetings
- Assess risk and continually update Risk Register
- CPM schedules with concurrent activities
- *Communication, communication, communication*
The Programmatic Approach to Accelerated Bridge Construction
Why Do ABC in Vermont?

- Narrow roads and bridges
- Avoid use of Temporary Bridges
  - Less Environmental impact
  - Less Right of Way Acquisition
- Improved Safety in the work zone
- Reduce Community Disruption
- Typically not Driven by high road user costs
  - Vermont mostly low volume roads
- Reduce project costs in both Design and Construction
Standardizing for Success

- Compatible and interchangeable standard details
- NEXT Beams and PBU’s (steel with concrete deck)
- Precast approach slab and substructure details
- Common Closure Pour Details
- Lessons learned for detailing
- Work with Fabricators
- Reduced Design Costs
Short Term Road Closures

- ABC and Short term Road Closures
  - Vital to ABP Goal of Expediting Project Delivery
  - Eliminate need for Temp Bridge Construction
  - Avoid resources, ROW, utility impacts
  - Reduce Design and Construction Duration
  - Safer for workers and travelling public
  - Often Reduce Overall Mobility Impacts travelers

- Avoiding Temp. Bridges is Key to Success
  - No temp bridge saves $$$
  - No temp bridge = shorter project design/permitting time
  - No temp bridge = shorter construction time
VTrans ABC/Road Closure Policy

- Many factors are used to evaluate potential road closures
  - Traffic (vehicles per day and % trucks)
  - Detour Distance
  - Duration of Closure
  - Community effect (positive and negative)
  - Emergency Response
  - Mobility Concerns of the Traveling Public
  - Complexity and $ of Conventional Project

- We have not imposed road closures
- Rely on consensus building and public outreach
- Closure durations are based on mobility and need
Proposed and passed by Vermont’s Legislature in 2012

Applies to Town Highway Bridge Projects

Local share reduced by 50% when road is closed for bridge construction.

Highly successful at propelling widespread adoption of ABC

Very popular and many towns have elected to close roads since legislation

Since the enactment of ACT 153 46 towns have closed roads for bridge construction
Vermont’s Work Horse Bridge

60 – 120 feet long
76% of Vermont’s Structurally Deficient Bridges
ABC Closure Durations

- 90% of the ABC projects are the “work horse” bridge
- Road closure duration must fit the project need
- Most common closure duration is 21-28 days
  - Mobility maintained through local road systems
  - Emergency services able to maintain response time
  - Contractors able to maintain safe sustainable work pace
- Vermont ABC Closure Statistics:
  - 22% = 60 - 80 hour closure
  - 18% = 7 - 14 day closure
  - 45% = 21-28 day closure
  - 15% = Greater than 28 day closure
Woodstock
- 30’ Rigid Frame
- Precast Abutments on micropiles
- 21 Day Road Closure (Out of season)
- Worked with Regulators for special permit
- Bridge opened at 21 days

Barnard
- 85’ NEXT Beam
- Integral Abutments on Pre-drilled Piles
- Irene replacement bridge
- 28 Day Road Closure
- Bridge opened at 28 days
Weston

- 60' NEXT Beam
- Integral Abutments on Driven Piles
- Fairly long detour
- 21 Day Road Closure
- Bridge opened at 19 days

Castleton

- 70' NEXT Beam
- Integral Abutments on Driven Piles
- Early buy in from Rail Road
- Reduction in Rail Road Flaggers!!
- 28 Day Road Closure
- Bridge opened at 27 days
Burke
- 56’ NEXT Beam
- Integral Abutments on Driven Piles
- Town Requested an ABC project
- 21 Day Road Closure
- Bridge opened at 19 days

Clarendon
- 70’ NEXT Beam
- Integral Abutments on Driven Piles
- Historic requirement for concrete barrier
- 28 Day Road Closure
- Bridge opened at 26 days
Waitsfield

- 172’ Steel Girder
- One Abutment on Piles, One on Bedrock
- 35 Day Road Closure
- Bridge opened at 35 days
- First UHPC Pour

Cavendish

- 122’ Precast Bridge units (PBU’s)
- Integral Abutments on Driven Piles
- 35 Day Road Closure
- Bridge opened at 28 days
Fairfield
- 51’ Solid Slab
- Integral Abutments on Driven Piles
- 7 Day Road Closure
- Bridge opened at 7 days

Warren
- 101’ Precast Bridge Units
- Integral Abutments on Driven Piles
- 14 Day Road Closure
- Bridge opened at 12 days
Hartford
- 140’ Single span
- Slide in Bridge Construction
- 60 hour Road Closure
- Bridge opened in 54 hours

Rochester
- 68’ NEXT Beam
- Integral Abutments on Driven Piles
- 60 hour Road Closure
- Bridge opened at 54 hours
New Haven

- 164’ Curved Steel Girder with CIP deck
- Integral Pier cap cast off site with girders
- 75 Day Road Closure - Bridge opened at 70 days
Delivering the Legacy Projects

- Middlebury Sand Hill (Historic Arch Bridge)
  - Project was at a stalemate and on the books for over 20 years
  - Bridge too narrow and unstable for phased construction
  - Temporary Bridge located in an environmentally sensitive area creating permitting issues (NEPA)
  - ROW needed for temporary bridge could not be procured
  - ABC solution endorsed by community in 2012 to include 45 day bridge closure
    - Eliminated Temporary bridge
    - Greatly reduced Right of Way acquisition
  - Bridge was under construction in 2014
  - Bridge opened to traffic in 40 days
Project Challenges for ABC

- VT 125 Alignment & Profile
  - Sharp 60 degree radius (reverse Curve)
  - 7.5 % profile grade

- Utilities
  - Aerial lines
  - Water line on bridge

- Historic Structure
  - Arch Bridge

- Protected Resources
  - Archeology
  - Recreation Area
Challenges Cont.

- Site Constraints:
  - Narrow Corridor
  - Mountainous Topography

- Shallow Rock Formations:
  - 300 CY of Rock Removal on South Abutment
  - 50,000 psi Compressive Strength
  - Blasting Program Required
Prefabricated Bridge Elements

- Footings
- Abutments
- Wingwalls
- NEXT Beams
- Approach Slabs
- Arch
- Architectural Face Panels
Prefabrication Details

- Arch Details:
  - CIP Footings on Rock
  - Precast Arch Concept Detailed on Plans (Design by Fabricator)
  - 12 Pieces Total
  - Designed and Fabricated Locally
  - Lighting Inside Void for Inspection
Prefabrication Details

- NEXT Beams:
  - D Shape Utilized
  - Precast Curtain Wall
  - Beams Placed on 0% Cross Slope
  - Variable Thickness CIP Topping Slab
  - Precast Approach Slabs
ABC saves another Legacy Project!

- Stowe Bridge 2 on VT 108 – Busy Intersection VT 100/Mountain Rd)
  - Tourist Town – Relies on access to resort and businesses nearly year round
  - No room for Temporary bridge
  - Project on the books for 27 years
  - ABC solution endorsed by community in 2012 to include 54 day bridge closure
  - Project Advertised in August 2014
    - Waterline Temporary Relocation constructed November 2014 in preparation for Bridge Closure to begin April 6, 2015
  - Bridge opened to traffic in 46 days
    - Contractor not allowed to work from Friday evening to Sunday morning during closure period
The Value of ABC
ABC by the Numbers

54 ABC projects
Delivered from 2012 to date, which is
50% of all Projects
Representing

$84 Million
Construction costs

100%
New Bridges Opened on Time
ABP – Reduced Engineering Costs

40% savings in Engineering costs

- ABC Standardized approach
- Shorter duration design process = Preliminary Engineering (PE) Savings
- ABC = Shorter Construction Durations and Construction Engineering (CE) Savings

BRIDGE PROJECT AVERAGES

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<th>Accelerated</th>
<th>Conventional</th>
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<tbody>
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<td>PE</td>
<td>$236,182</td>
<td>$451,725</td>
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<tr>
<td>CE</td>
<td>$250,634</td>
<td>$398,305</td>
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</tbody>
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$236,182 $250,634
$451,725 $398,305
ABP – Positive Effect on Resource Demands

70-75% savings in resource demands

- ABC = Less impact to existing Utilities
- ABC = Less ROW impacts
- ABC = Less Environmental impacts
- Team Co-organization and Co-location efficiencies

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<tr>
<th>Category</th>
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<tbody>
<tr>
<td>ROW</td>
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ABC Construction Savings

18% Savings
ABC vs Conventional Projects based on 37 new projects
Customer Survey Results

- **How satisfied were you with ABC?**
  397 Responses from 9 projects
  - 85%
  - 9%
  - 5%
  - 0%
  - 1%

- **How satisfied are you with the information you received about the bridge project?**
  223 Responses from 9 projects
  - Very Satisfied
  - Somewhat Satisfied
  - Neither Satisfied nor Dissatisfied
  - Somewhat Dissatisfied
  - Very Dissatisfied

- **Overall, how satisfied were you with how VTrans delivered this project?**
  382 Responses from 9 projects
  - Very Satisfied
  - Somewhat Satisfied
  - Neither Satisfied nor Dissatisfied
  - Somewhat Dissatisfied
  - Very Dissatisfied
Important Links

Accelerated Bridge Program Web Page:
http://vtrans.vermont.gov/highway/structures-hydraulics/accelerated-bridge-program

Accelerated Bridge Construction Videos:
https://www.youtube.com/user/VTransTV

Planned Bridge Closures
http://vtrans.maps.arcgis.com/apps/webappviewer/index.html?appid=369106d8ddc34c1085760884c1fd7031

Public SharePoint Site (Project External Website)
https://outside.vermont.gov/agency/vtrans/external/Projects/Structures/12J160