

# Structures Accelerated Bridge Program Update 2012 - 2017

**Wayne Symonds, P. E.**  
**Structures Program Manager**

**Kristin Higgins, P.E.**  
**Accelerated Bridge Program**  
**Senior Project Manager**



# Presentation Outline

- Overview of Accelerated Bridge Construction
- Overview of the Accelerated Bridge Program
- Examples of high profile ABC projects
  - Middlebury Sand Hill Bridge
  - Stowe
- ABP 2016 constructed projects
- Expedited Project Delivery
- ABP 2017 construction projects
- Projects in Design
- Performance Measures
- Year to date Statistics
- Program Highlights
- Important Links

# Accelerated Bridge Construction (ABC)

ABC is bridge construction that uses design and construction methods to reduce the onsite construction time and mobility impacts that occur when building new bridges or replacing and rehabilitating existing bridges

Precast Bridge Elements and Systems are structural components of a bridge that are built offsite, or adjacent to the existing bridge and are set into place. Setting these elements into place as opposed to constructing them in place greatly reduces the onsite construction time and mobility impact time.

# Advantages of ABC

- Short term road closures to “install” Bridge components
  - Eliminates need for temporary bridge construction
    - Reducing impacts to:
      - ✓ Environmental Resources
      - ✓ Utilities
      - ✓ Right-of-Way
- Reduced design costs
- Reduced design and construction durations
- Reduced traffic impacts
- Safer for workers and traveling public

# Setting the Stage for the Accelerated Bridge Program(ABP)

- Significant increase in funding allocated to the Bridge Program
- Aging bridge population
- Tropical Storm Irene
- Legacy projects
- Accelerated Bridge Program created in 2012 and endorsed by Vermont's Secretary of Transportation



# The Accelerated Bridge Program

- The ABP is a program embedded within the Structures Design Section at VTrans
- Programmatic approach to delivering accelerated bridge construction projects
  - Consistent decision making (ABC or Road closures cannot be forced)
- Projects developed in the ABP for two reasons
  - Site constraints favor accelerated bridge construction (ABC)
    - Unsafe to construct project in phases or fit a temporary bridge
    - Environmentally sensitive areas
    - Complicated Utility Relocations
    - Right of Way complications
  - Project needs to be designed and developed quickly
    - Bridge in jeopardy of being closed
    - Bridge Unsafe
    - Bridge Failing



# 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
  - PE costs were at \$550,000.00 and we had no solution
  - 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

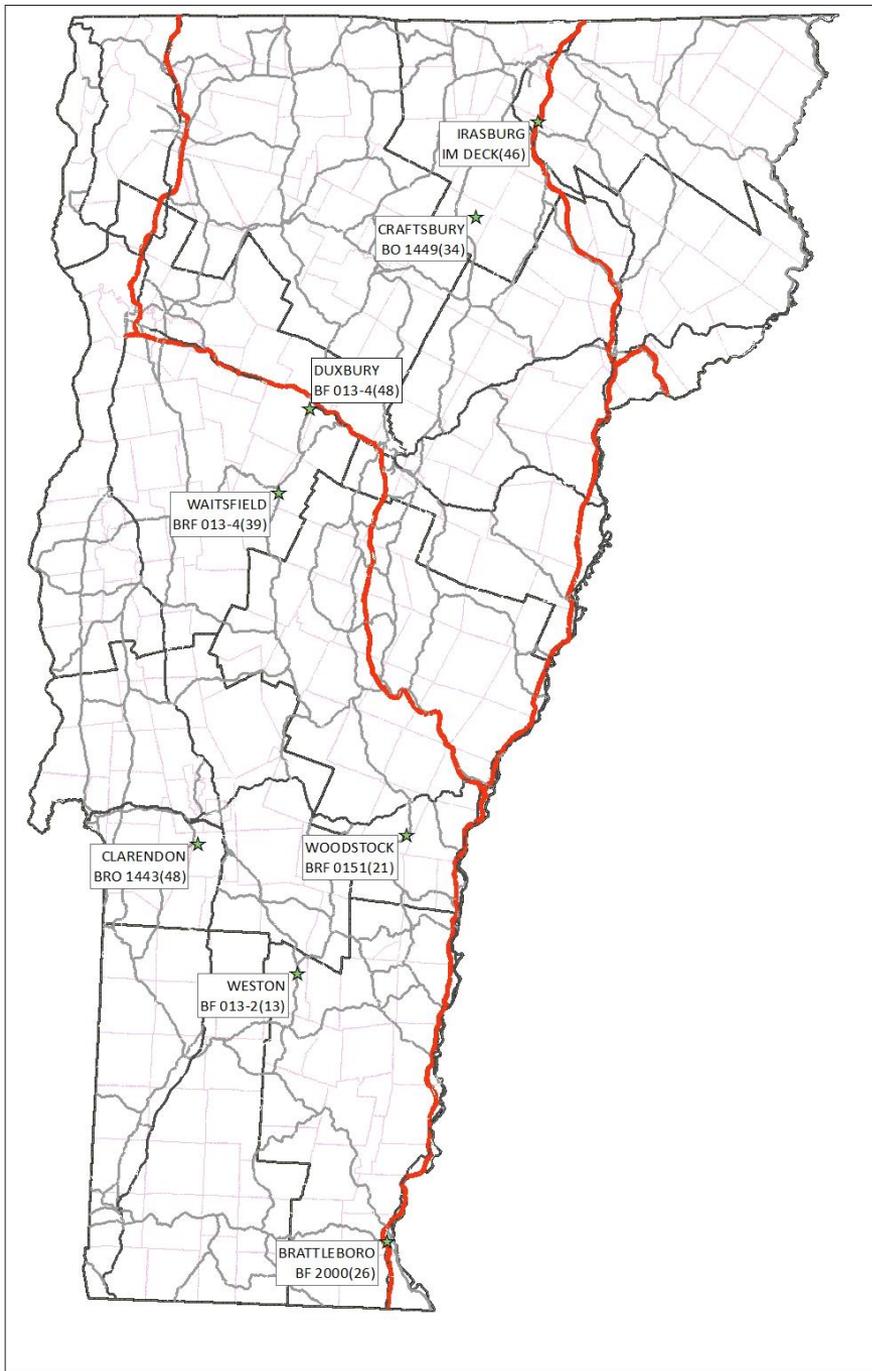


- Stowe Bridge 2 on VT 108 (Intersection VT 100/Mountain Rd)
  - Tourist Town – Relies on access to resort and businesses nearly year round
  - No room for Temporary bridge
  - Project on the books for 27 years
  - ABC solution endorsed by community in 2012 to include 54 day bridge closure
  - Project 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



# ABP Constructed projects - 2016

- 8 Projects were constructed totaling \$13.7 million
- 42% of projects developed in Structures were delivered through the ABP
- 44% of projects developed in Structures were constructed using ABC
- All ABC projects met specified closure durations
- 47 Planned road closures since 2012



## 2016 Bridge Replacements:

Waitsfield – Bridge 177 on VT 100

Woodstock – Bridge 24 on VT 106

Weston – Bridge 98 on VT 100

Clarendon - Bridge 11 on Walker Mt Rd

Craftsbury – Bridge 4 on Creek Rd

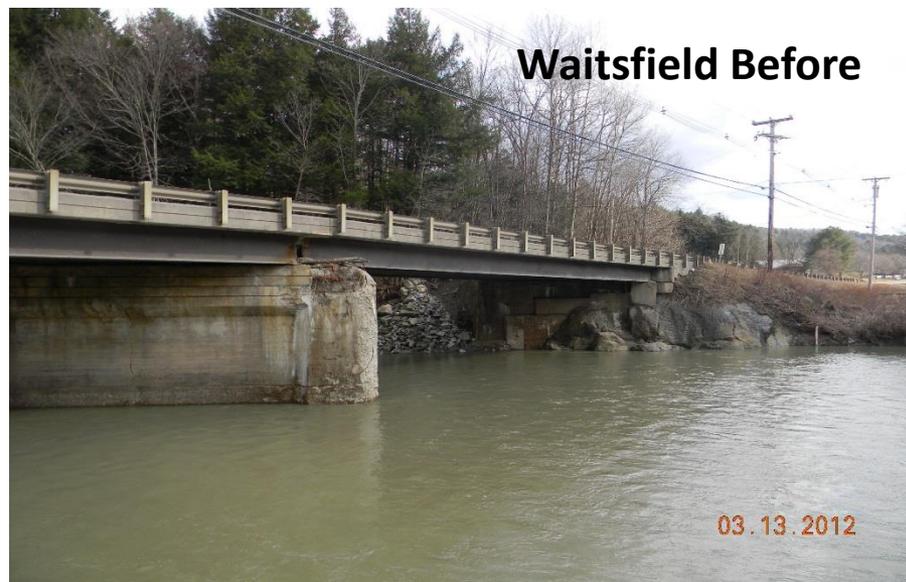
Duxbury – Bridge 193 on VT 100

## 2016 Bridge Decks:

Brattleboro – Bridge 31 on Elliott St

Irasburg – Bridge 107N on I-91

**Waitsfield Before**



**Waitsfield After**



**Woodstock Before**



**Woodstock After**



**Weston Before**



**Weston After**



**Clarendon Before**



**Clarendon After**





Craftsbury Before



Craftsbury After



New Haven Before

04/22/2016



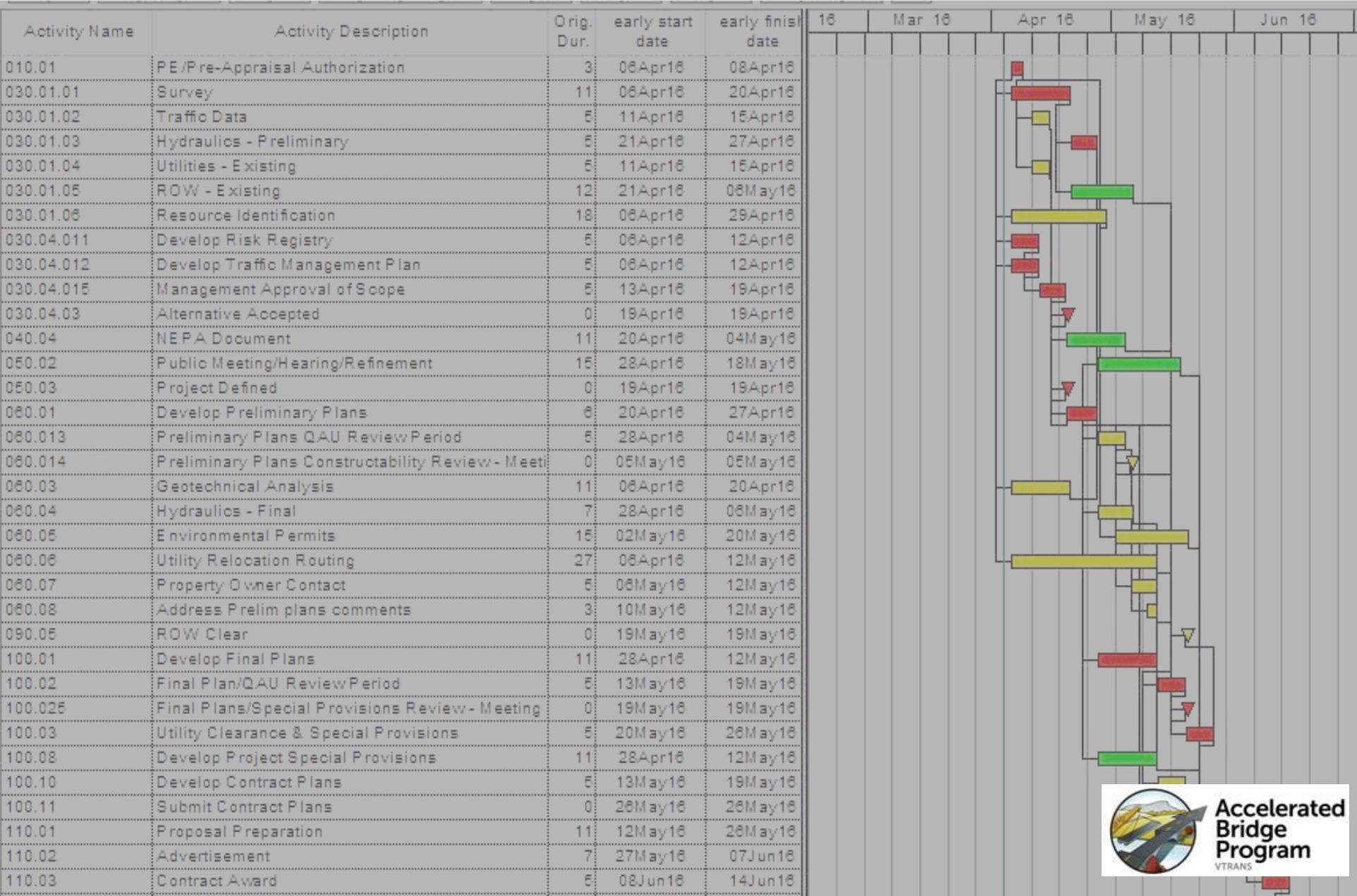
New Haven After

09/02/2016

# Delivering Bridge Deck Projects



# ABP - Expedites Project Delivery



# Duxbury Culvert Replacement





# Duxbury Culvert Replacement

- Expedited Project Delivery
  - Delivered project in 8 weeks (April 1<sup>st</sup> – May 25<sup>th</sup>)
- Colocation proved advantageous
  - Utility Coordinator within structures
  - Hydraulics Engineer embedded in Structures
  - Right of Way section prepared documents, negotiated and cleared right of way in just 4 weeks
- Innovative Contracting
  - Simplified bidding process
  - Shortlisted three contractors



# 2016 construction Innovation



- Long curve girder bridge with poor hydraulic capacity
- Steel bridge beams cast integral with pier cap
  - Allows for better hydraulic conveyance without drastic roadway grade change

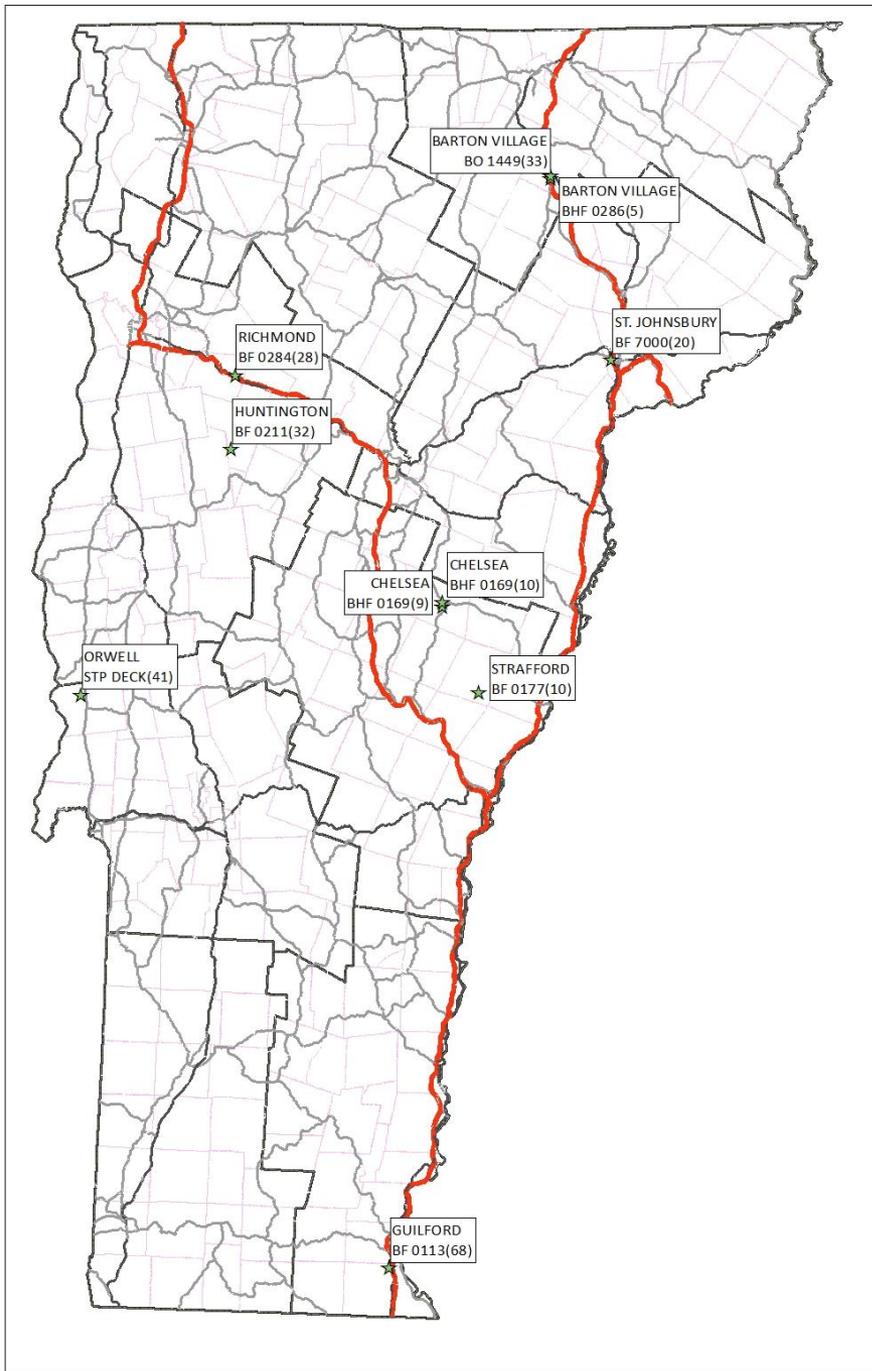
# 2016 Construction Innovation

- Ultra High Performance Concrete (UHPC)
- FHWA Every Day Counts (EDC) Initiative
- EDC 3 focused on UHPC as an option for connecting prefabricated bridge elements.
  - Waitsfield Bridge 177 on VT 100
    - Initially to connect precast deck slabs
    - Used to connect approach slab sections



# ABP Projects in Construction - 2017

- 10 Projects totaling \$14.5 million
- 50% of all projects developed in Structures were delivered through the ABP
- 59% of all projects developed in Structures will be constructed using ABC
- 15 road closures next summer
- 62 planned road closures for since 2012



## 2017 Bridge Replacements:

Barton Village – Bridge 20 on VT 100

Barton Village – Bridge 24 on VT 106

Chelsea – Bridge 9 on VT 110

Chelsea – Bridge 10 on VT 110

Guilford – Bridge 5 on US 5

St. Johnsbury – Bridge 6 on VT 2B

Richmond – Bridge 32 on US 2

Huntington – Bridge 8 on FAS 0211

Strafford – Bridge 9 on FAS 0177

## 2017 Bridge Decks:

Orwell – Bridge 4 on VT 73

# 2017 Innovation

- Ultra High Performance Concrete (UHPC)
- EDC - 4 focusses on implementation and is providing technical assistance and training for UHPC
  - Ludlow Bridge 25 on VT 103
    - Using to connect approach slabs
- Expedited Project delivery – Incorporating strategies from the C-19 study.

# Project Development

## Summer 2018

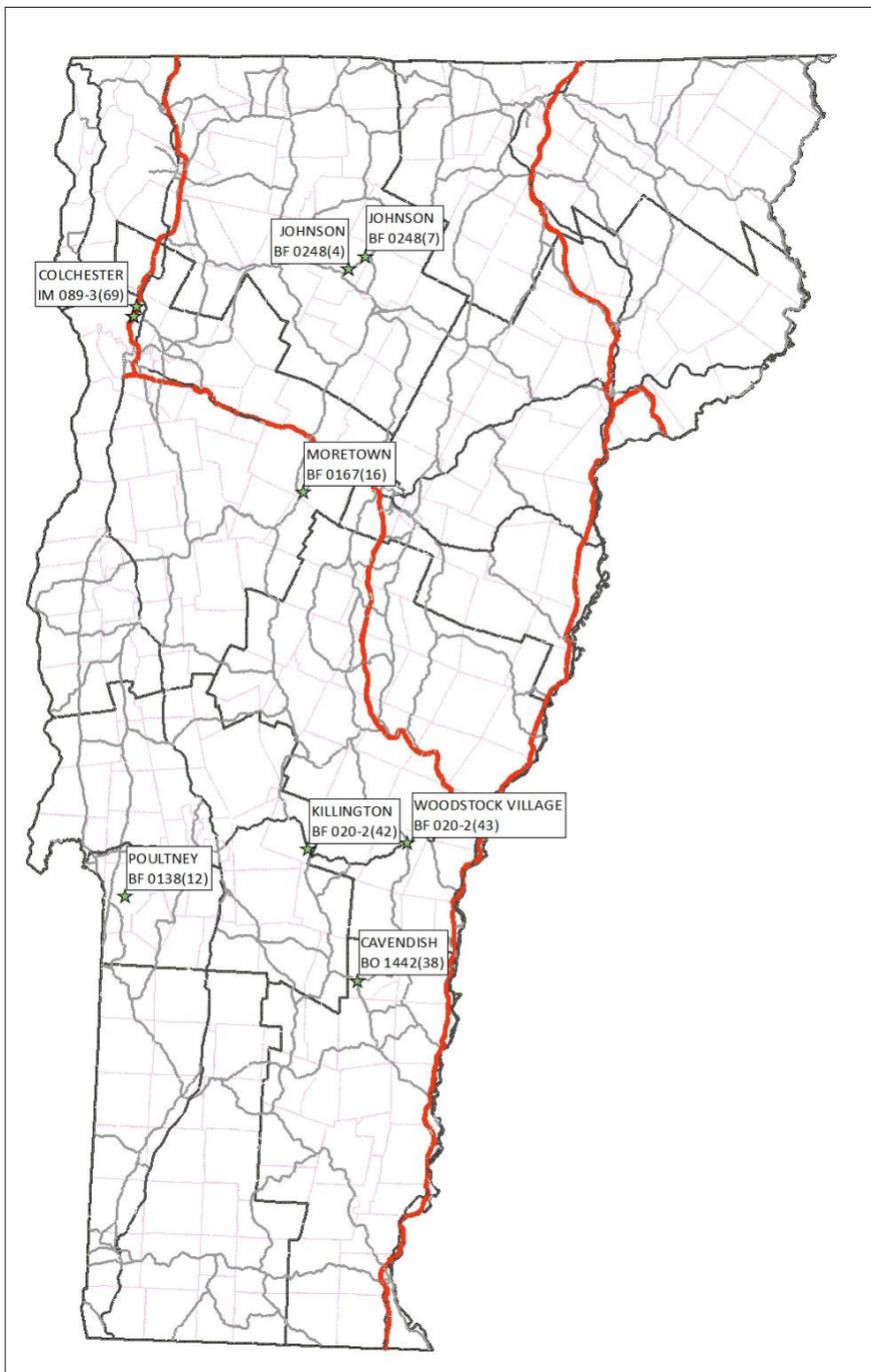
- Johnson BR 1 & 2 on VT 100C
- Johnson BR 4 on VT 100C
- Poultney BR 2 on FAS 0138
- Woodstock Village BR 51 on US4

## Summer 2019/2020

- Killington BR 33 on US4
- Cavendish BR 58 on TH 1
- Colchester BR's 76 & 77 on I-89N and I-89S

## Summer 2020

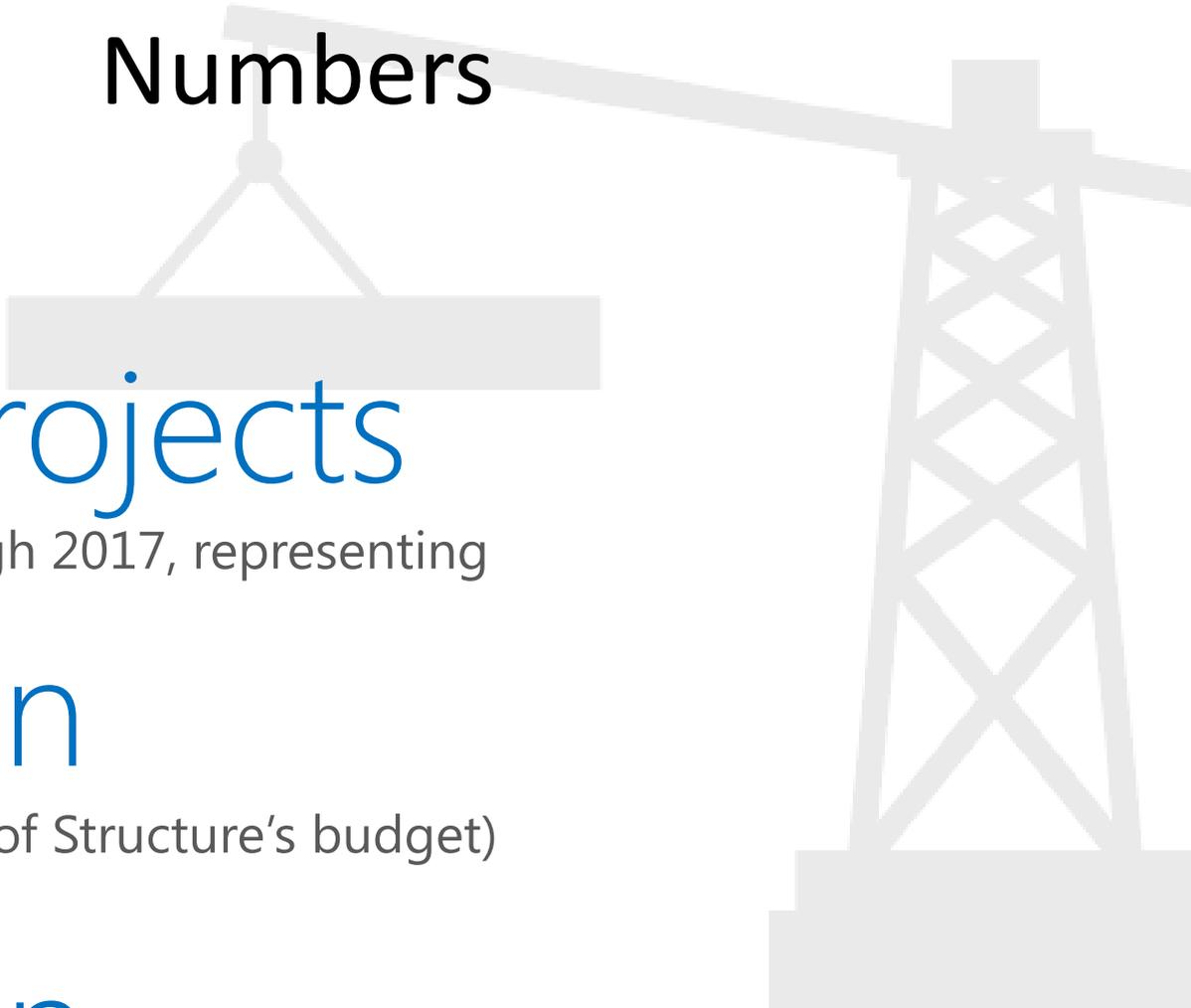
- Moretown BR 2 on VT 100B



# ABP Project Delivery Performance Measures

- 2012 Goal - 80% projects delivered in 24 months
  - Problem fitting all projects into this model and meeting optimal advertising period (September – December)
- 2017 Goal - 80% projects delivered according to the schedule developed at start of design phase
  - Focusses on credible scheduling while still being aggressive
  - Schedules are developed to fit the project
    - Some projects may have hyper accelerated schedules 6 – 18 months
    - Other projects will have reasonably accelerated schedules 18 - 30 months.
    - Project Managers measured according ability to meet to schedule milestone dates

# Accelerated Bridge Program by the Numbers



43 ABP projects

have been delivered through 2017, representing

\$77 million

in construction costs (34% of Structure's budget)

\$84 Million

Construction costs for ABC Projects (45% Structure's budget)

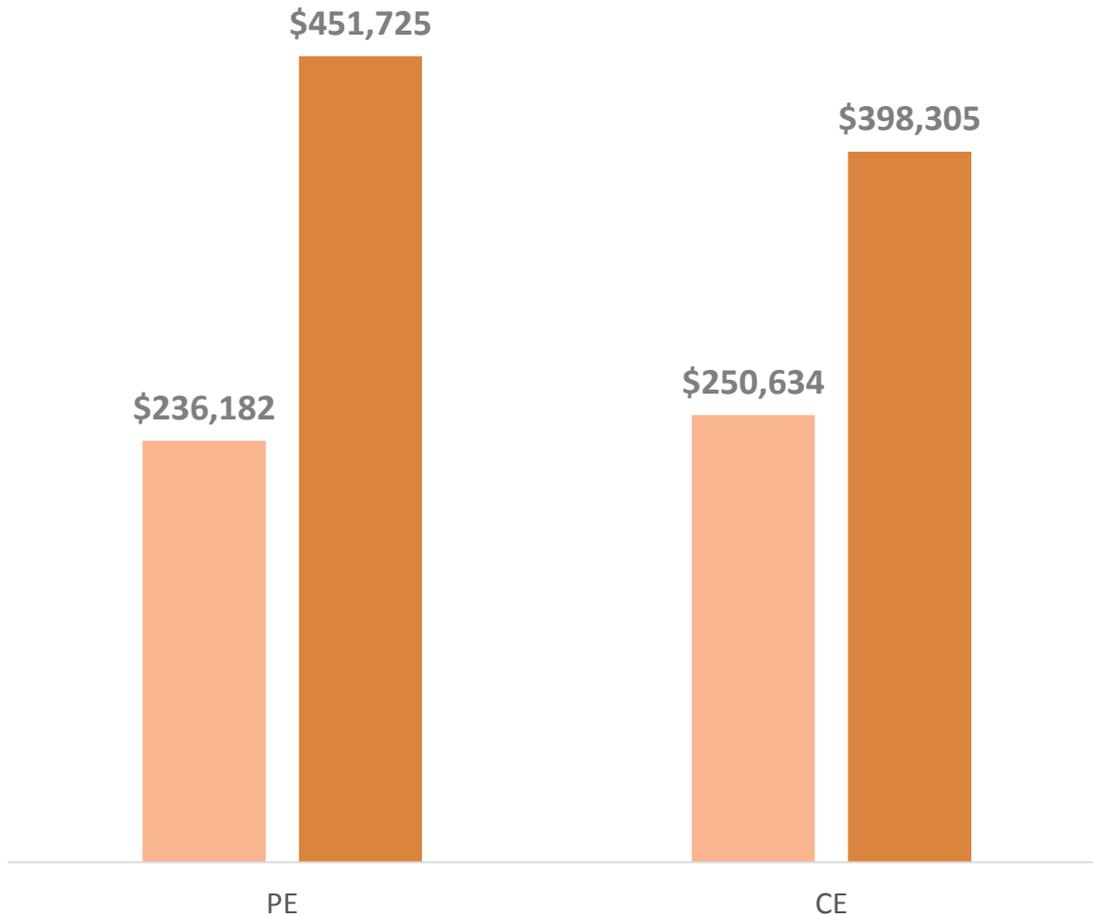


Accelerated  
Bridge  
Program  
VTRANS

# ABP = Reduced Engineering Costs

## BRIDGE PROJECT AVERAGES

Accelerated Conventional



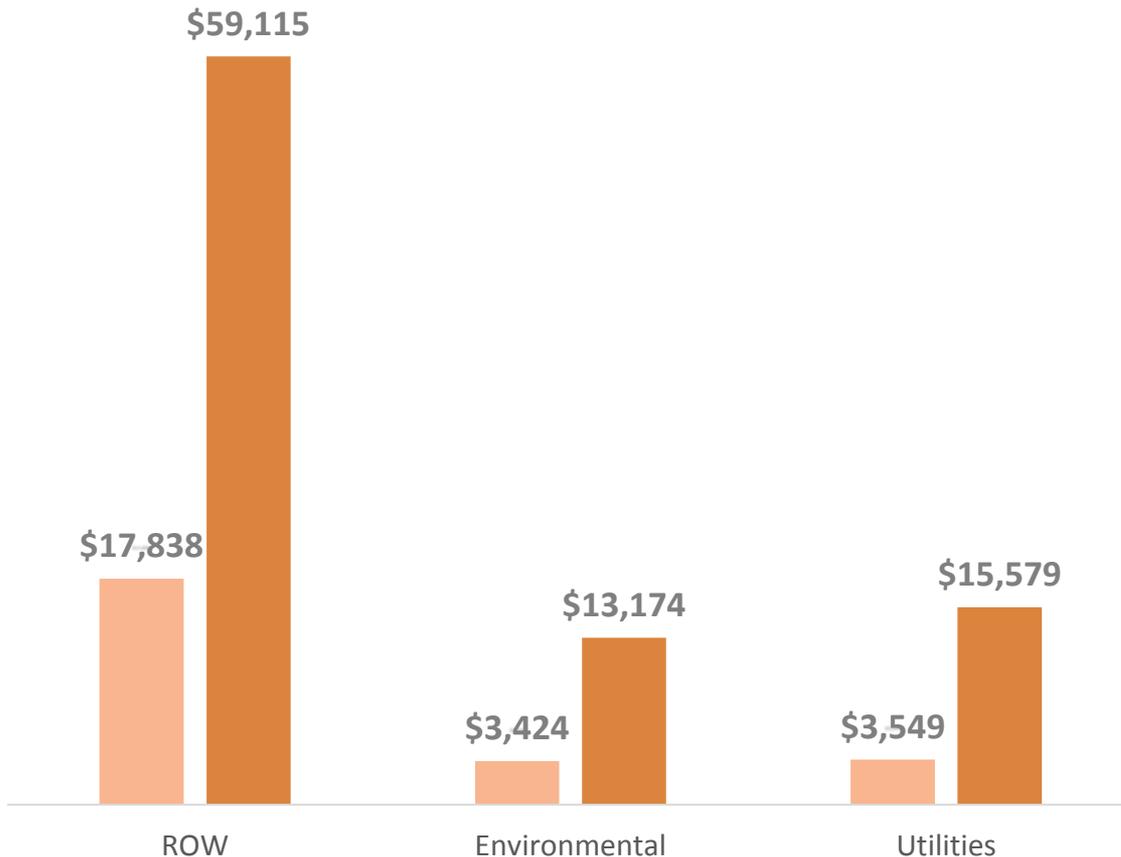
## 40% savings in Engineering costs

- Standardized drawings and specifications
- Standardized design details
- Builds on the success of past projects

# ABP = Positive Effect on Resource Demands

## BRIDGE PROJECT AVERAGES

Accelerated Conventional



## 70-75% savings in resource demands

- Less impact to resources
- Minor Alterations and “Block Out Approach” to minimize ROW impacts
- Environmentally responsible
- Team Co-organization



# Success made possible by Meaningful Public Engagement

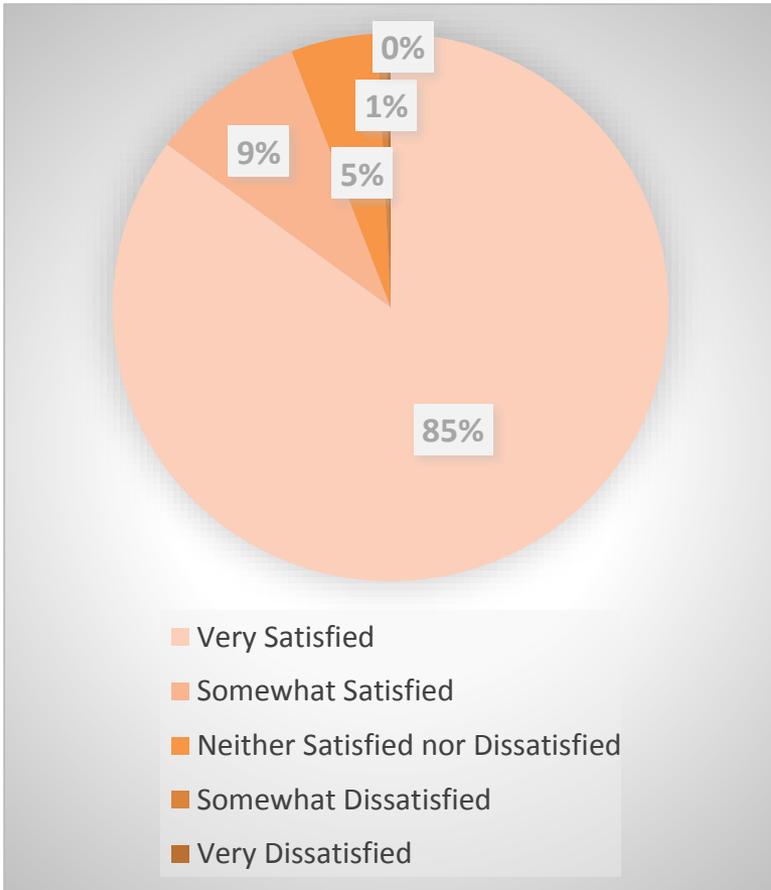
Forming community partnerships to garner support, expedite project delivery and increase public satisfaction



# Customer Survey Results

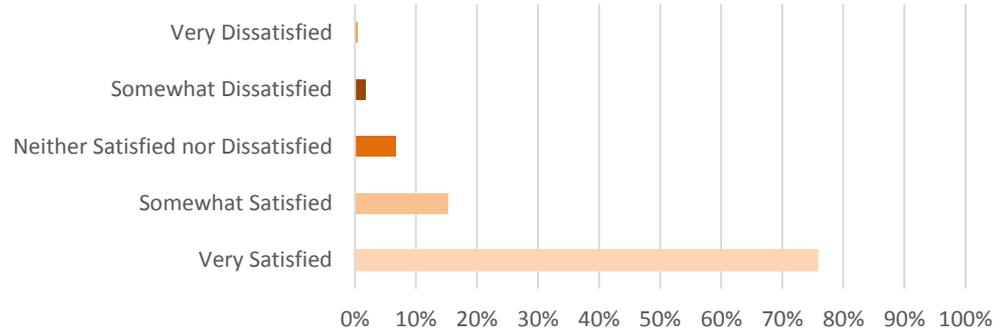
## How satisfied were you with ABC?

397 Responses from 9 projects



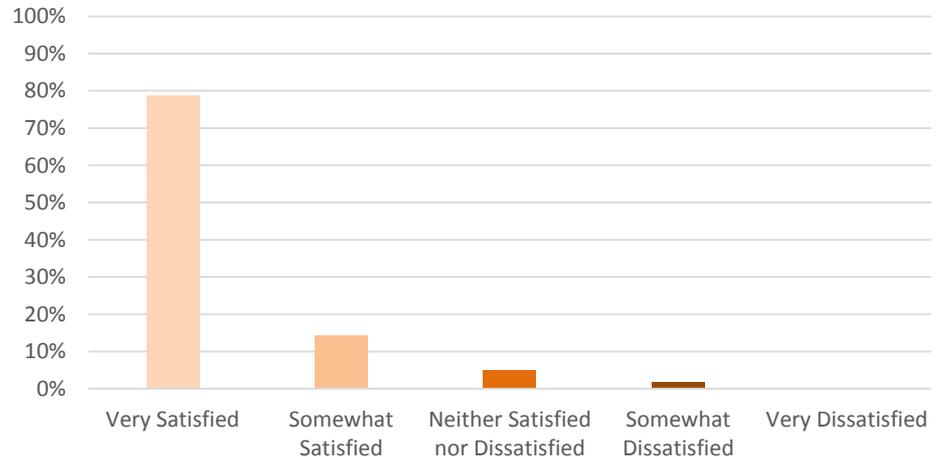
## How satisfied are you with the information you received about the bridge project?

223 Responses from 9 projects



## Overall, how satisfied were you with how VTrans delivered this project?

382 Responses from 9 projects



# Accelerated Bridge Program Highlights

- C19 Grant for Expedited Project Delivery
  - Awarded \$250,000.00 grant to develop and implement expedited project delivery strategies
  - ABP Project Manager Jennifer Fitch presented at the TRB 2016 mid-year meeting in Utah (All expenses Paid by FHWA)
- T2 Technology Grant
  - ABP website has been developed and is now available through VTrans website
- National Conferences
  - International Interactive Symposium on UHPC
  - Every Day Counts – 4 Summit (UHPC)
- Published Articles
  - ABP Project Managers have published 5 articles highlighting Vermont's experience with ABC in national engineering magazines
- Act 153
  - Local share reduced on town highway projects for bridge replacement projects that use road closures
  - Highly successful at propelling widespread adoption of ABC
  - 46 towns have elected to close roads to replace bridges



# 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/Struct>

